



WOOD BUFFALO
ENVIRONMENTAL
ASSOCIATION

NOVEMBER 2014
MONTHLY REPORT



CONTINUOUS MONITORING
INTEGRATED MONITORING
December 30, 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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December 30, 2014

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

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

Enclosed is the November 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 19 - Firebag
AMS 502 - ConocoPhillips Surmont

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

1.0 Concentrations in Excess of Alberta Ambient Air Quality Objectives

There were no ambient concentrations in excess of the air quality objectives as indicated in the Air Monitoring Directive Section III.A.3 (a & b) for SO₂, CO, H₂S, NO₂, NH₃, O₃ and PM_{2.5}.

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

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

2.0 Operational Status

2.1 Continuous Monitoring

In November 2014, there were two incidents resulting in compliance monitoring instruments operating less than 90 % of the time.

1. The air quality analyzers at the Patricia McInnes air monitoring station (AMS 6) operated less than 90% of the time. A damaged sample manifold at the station affected the normal operations of the SO₂, TRS, THC, O₃, NO₂ and NH₃ analyzers for 93 hours. Replacement of damaged parts of the sample manifold on November 10 resulted in an additional 2 to 3 hours of downtime. During data validation and processing, periods of data from the last completed station checklist on November 6 to replacement on November 10 were flagged as invalid. After flagging and processing for monthly reporting, data for the air quality analyzers were available from 81 to 87% of the time during this reporting period. This incident was reported to Alberta Environment and Sustainable Resource Department on November 23, 2014 (Reference number 292292).
2. The SO₂ analyzer at the Fort Chipewyan air monitoring station (AMS 8) operated less than 90% of the time. The SO₂ analyzer developed operational problems this reporting month resulting in 88 hours of invalid data. A backup analyzer was deployed to the

station on December 3, 2014. Following the installation calibration on December 3, the backup analyzer's response to environmental conditions was beyond the acceptable limits for a trace level SO₂ analyzer and WBEA data quality control standards. Several in-situ and remote maintenance attempts indicated a flow stabilization issue with the new trace level analyzer. A secondary backup trace level SO₂ analyzer was installed and calibrated on December 19, 2014. Normal operations for this parameter resumed on December 19 and operations of this new analyzer will continue to be monitored. After flagging and processing, data was available for 88% of the time for this reporting period. This incident was reported to Alberta Environment and Sustainable Resource Department on December 8, 2014 (Reference number 292793).

There was one incident of a monitoring instrument not required for air quality compliance operating less than 90 % of the time in November 2014.

Communication issues with the 20 m elevation temperature and relative humidity sensors at the Lower Camp Meteorological tower (AMS 3) resulted in 408 hours of invalid data this reporting period. After flagging and processing, data was available for 43% of the time for this reporting period.

2.2 Intermittent Monitoring

The November results for passive and integrated monitoring of PAH, VOC, RSC, PM_{2.5} and PM₁₀ are submitted with this report. Precipitation sample results were not available in time for submission with this report.

3.0 Monitoring Notes

General Network Notes

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

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

Station 1, Fort McKay- Bertha Ganter

Maintenance and replacement of the sample manifold parts on November 11 affected the normal operations of air quality analyzers for 3 hours.

The NH₃ 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 NH₃ analyzer operations resulting from the properties of the NH₃ gas. Data for one hour following the daily spans have been reported as invalid for a total of 31 hours this month.

There were three issues associated with operation of the PM_{2.5} analyzer resulting in 12 hours of invalid data. The analyzer experienced a single episode of unstable operations on November 7, resulting in 6 hours of invalid data. Cleaning of the sample inlet, detection chamber, flow audits and zero reference checks on November 11 and 12 interrupted the normal operations of the PM_{2.5} analyzer for an additional 6 hours.

Maintenance and audit of the tipping bucket precipitation collector on November 11 resulted in 1 hour of invalid data.

The relative humidity sensor recorded intermittent periods of values exceeding the normal sensor operating range this reporting period. This resulted in 17 hours of invalid data.

Flat-line in the output signals of the wind sensor resulted in 23 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

Flat-line in the output signals of the wind sensor resulted in 32 hours of invalid data this reporting period.

Station 3, Lower Camp B - Meteorology

Communication issues with the 20 m elevation temperature and relative humidity sensors resulted in 408 hours of invalid data this reporting period.

Flat-lines in the output signals of the 20 and 45 m elevation wind sensors resulted in 1 hour of invalid data this reporting period

Flat-lines in the output signals of the 167 m elevation wind sensors resulted in 21 hours of invalid data this reporting period.

Station 4, Buffalo Viewpoint

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

Station 5, Mannix

Maintenance and cleaning of the sample manifold on November 12 interrupted the normal operations of the H₂S analyzer for 1 hour.

Station operator activities on November 28 affected the normal operations of the THC analyzer for 1 hour.

Flat-lines in the output signals of all meteorological sensors resulted in 53 to 62 hours of invalid data this reporting period.

Station 6, Patricia McInnes

The NH₃ analyzer required additional time to stabilize to levels below ambient concentrations following the automated daily span and routine monthly calibration periods. Additional time for stabilization after exposure to high concentrations of the NH₃ gas is an inherent behavior in the NH₃ analyzer operations resulting from the properties of the NH₃ gas. Data for one hour following the daily spans and 14 hours following the two calibration periods have been reported as invalid for a total of 41 hours this month.

A new standardized data collection program upload to the station data logger on November 5 interrupted routine data collection of all parameters for 1 hour.

A damaged sample manifold at the station from November 6 to 10, affected the normal operations of the SO₂, TRS, THC, O₃, NO₂ and NH₃ analyzers for 93 hours. Replacement of the damaged parts of the sample manifold on November 10 resulted in an additional 2 to 3 hours of downtime. During data validation and processing, periods of data from November 6 to 10 were flagged as invalid.

Maintenance to the sample inlet, flow audits and zero reference checks on November 10 interrupted the normal operations of the PM_{2.5} analyzer for 1 hour.

Replacement of the sample pump and a follow-up calibration of the O₃ analyzer on November 24 interrupted the normal operations for 17 hours.

Maintenance on the daily zero and span systems and confirmation of O₃ analyzer responses on November 25 interrupted the normal operations of the NO₂ analyzer for 2 hours.

Depletion and replacement of the fuel cylinder at the station on November 28 affected the normal operations of the THC analyzer for 2 hours.

Flat-line in the output signals of the wind sensor resulted in 23 hours of invalid data this reporting period.

Station 7, Athabasca Valley

Maintenance and cleaning of instrument racks at the station on November 17 interrupted the normal operations of the PM_{2.5} analyzer for 2 hours.

Depletion and replacement of the carrier gas cylinder at the station on November 22 affected the normal operations of the THC analyzer for 1 hour.

Replacement of the sample pump and a follow-up calibration of the PM_{2.5} analyzer on November 25 interrupted the normal operations for 1 hour.

Station operator activities on November 28 affected the normal operations of all parameters for 8 hours.

Maintenance on the daily zero and span systems and confirmation of TRS analyzer responses on November 29 interrupted the normal operations of the analyzer for 1 hour.

A new data collection program and revision uploads to the data logger on November 28 interrupted the normal data collection of the Barometric Pressure sensor for 59 hours.

Station 8, Fort Chipewyan

Maintenance to the sample inlet and flow and zero reference checks on November 5 interrupted the normal operations of the PM_{2.5} analyzer for 3 hours.

The NO₂ analyzer experienced a single episode of excessive baseline drift on November 24 resulting in 1 hour of invalid data.

The SO₂ analyzer developed operational problems this month resulting in 88 hours of invalid data. A backup analyzer was deployed to the station on December 3, 2014. Following the installation calibration on December 3, the backup analyzer response to environmental conditions was beyond the acceptable limits for a trace level analyzer and WBEA data quality control standards. Several in-situ and remote maintenance attempts indicated a flow stabilization issue with the new trace level analyzer. A secondary backup trace level SO₂ analyzer was installed and calibrated on December 19, 2014. Normal operations for this parameter resumed on December 19 and operations of this analyzer will continue to be monitored.

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

Station 9, Barge Landing

The raw 5-minute average THC concentrations greater than the 25 ppm operating range of the analyzer occurred in two 1-hour periods (4 5-minute periods for the month). The range maximum value of 25 ppm was substituted during data validation for periods of concentrations greater than the range maximum before calculation of final 5-minute and 1-hour average values of THC. The highest 1-hour and 24-hour average values in the month for THC occurred in an hour of and on a day associated with range exceedance.

Station 11, Lower Camp

No operational issues to report this month.

Station 12, Millennium Mine

Multiple power spikes at the station on November 4 affected the normal operations of NO₂ analyzer for 2 hours.

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

Maintenance and cleaning of the sample manifold on November 18 affected the normal operations of the TRS analyzer for 1 hour.

Station 13, Fort McKay South

The SO₂ analyzer experienced multiple episodes of excessive baseline drift this reporting period. This resulted in 13 hours of invalid data for each analyzer.

Maintenance to the sample inlet, flow audits and zero reference checks on November 17 interrupted the normal operations of the PM_{2.5} analyzer for 1 hour.

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

Station 14, Anzac

Maintenance to the sample inlet, flow audits and zero reference checks on November 5 interrupted the normal operations of the PM_{2.5} analyzer for 3 hours.

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

Station 15, CNRL Horizon

The SO₂ analyzer experienced multiple episodes of intermittent unstable operations due to baseline drift this reporting period. This resulted in 20 hours of invalid data.

An electrical interference on the NO_x channel on the NO-NO₂-NO_x analyzer resulted in 18 hours of invalid data this reporting period.

The NO₂ analyzer response to the automated daily span check was greater than acceptable limits from November 19 to 24. Several in-situ and remote maintenance attempts of the analyzer and calibrator demonstrated routine operational specifications. The cause of the analyzer response is unknown and the analyzer response to daily span check normalized after November 24. A follow up calibration in December 2014 did not demonstrate any unusual response which required maintenance.

Maintenance to the sample inlet, flow audits and zero reference checks on November 19 interrupted the normal operations of the PM_{2.5} analyzer for 1 hour.

Maintenance on the daily zero and span systems and confirmation of NO₂ analyzer responses on November 24 interrupted the normal operations of the analyzer for 3 hours.

Station operator activities in relation to station setup upgrades for the new standardized data collection program on November 20 and 21 affected the normal operations of all parameters for 2 to 11 hours.

The implementation of the new data collection program at the station on November 20 interrupted the routine data collection of the solar radiation sensor for 25 hours.

Station 16, Shell Muskeg River

Maintenance on the daily zero and span systems and confirmation of NO₂ analyzer responses on November 17 interrupted the normal operations of the analyzer for 3 hours.

There were two issues associated with operation of the PM_{2.5} analyzer resulting in 11 hours of invalid data. Cleaning of the sample inlet, flow audits and zero reference checks on November 12 interrupted the normal operations of the PM_{2.5} analyzer for 2 hours. The analyzer failed to advance the filter tape on November 20, resulting in 9 hours of invalid data.

The relative humidity sensor recorded a single episode of values exceeding the normal sensor operating range on November 3, which resulted in 6 hours of invalid data.

Flat-lines in the output signals of the barometric pressure sensor resulted in 3 hours of invalid data this reporting period.

Station 17, Wapasu

Station operator activities during the installation of the new standardized data collection program at the site on November 25 affected the normal operation of all parameters for 3 hours.

There were two issues associated with operation of the PM_{2.5} analyzer resulting in 9 hours of invalid data. Cleaning of the sample inlet, flow audits and zero reference checks on November 24 interrupted the normal operations of the PM_{2.5} analyzer for 3 hours. The analyzer experienced two episodes of unstable operations this reporting period, resulting in 6 hours of invalid data.

Maintenance and cleaning of the sample manifold on November 19 affected the normal operations of the O₃ analyzer for 1 hour.

Maintenance on the daily zero and span systems and confirmation of O₃ analyzer responses on November 26 interrupted the normal operations of the analyzer for 4 hours.

Station 19, Firebag

The H₂S analyzer experienced a single episode of intermittent unstable operations due to excessive baseline drift resulting in 1 hour of invalid data.

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

Station 502, ConocoPhillips Surrmont

WBEA commissioned an ambient air quality survey at the ConocoPhillips facility to fulfill Alberta Environment's Environmental Protection and Enhancement Act (EPEA) facility approval number 48263-00-00. This station is equipped with ambient air quality analyzers for SO₂, H₂S, NO, NO₂, NO_x and meteorological sensors for ambient temperature, relative humidity, and wind speed and direction.

The SO₂ analyzer experienced extended stabilization periods after the daily span checks this reporting month, resulting in 27 hours of invalid data.

The H₂S analyzer experienced two episodes of unstable operations due to excessive baseline drifts resulting in 3 hours of invalid data.

Maintenance and replacement of the sample manifold on November 12 affected the normal operations of the SO₂, H₂S and NO₂ analyzers for 2 hours.

Flat-lines in the output signals of the wind sensor resulted in 18 hours of invalid data this reporting period.

Station 101 and 103, Portable Air Monitoring Stations

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

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

NOVEMBER 2014

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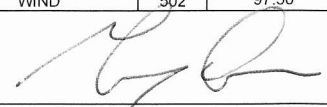
APPROVAL NUMBERS	REPORT DATE						
	MONTH	YEAR					
289664-00-00	11	2014					
254465-00-00							
149968-00-01							
48522-01-00							
240008-00-03	CONTINUOUS AMBIENT MONITORING						
48263-00-00			ONE-HOUR AVERAGE		24-HOUR AVERAGE		
224816-00-03	PARAMETER	STN. NO.	% TIME OPERATIONAL	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION
189942-00-02	SO2(ppm)	1	99.58	0.005	0	0.001	0
206355-00-00	SO2(ppm)	2	100.00	0.024	0	0.003	0
46586-00-00	SO2(ppm)	4	100.00	0.024	0	0.003	0
216466-00-04	SO2(ppm)	5	100.00	0.023	0	0.004	0
137467-00-00	SO2(ppm)	6	86.67	0.016	0	0.003	0
20809-01-00	SO2(ppm)	7	98.89	0.019	0	0.003	0
241311-00-00	SO2(ppm)	8	87.78	0.005	0	0.001	0
094-02-00	SO2(ppm)	11	100.00	0.023	0	0.005	0
305529-00-00	SO2(ppm)	12	100.00	0.023	0	0.003	0
026-02-00	SO2(ppm)	13	98.19	0.004	0	0.001	0
228044-00-00	SO2(ppm)	14	100.00	0.008	0	0.003	0
73203-01-00	SO2(ppm)	15	95.97	0.009	0	0.001	0
	SO2(ppm)	16	100.00	0.014	0	0.003	0
	SO2(ppm)	17	99.58	0.013	0	0.004	0
	SO2(ppm)	19	100.00	0.019	0	0.005	0
	SO2(ppm)	502	95.97	0.013	0	0.006	0
	H2S(ppm)	2	100.00	0.002	0	0.001	0
	H2S(ppm)	4	100.00	0.002	0	0.000	0
	H2S(ppm)	5	99.72	0.002	0	0.001	0
	H2S(ppm)	11	100.00	0.006	0	0.001	0
	H2S(ppm)	17	99.58	0.001	0	0.000	0
	H2S(ppm)	19	99.86	0.002	0	0.001	0
	H2S(ppm)	502	99.31	0.002	0	0.001	0
	TRS(ppm)	1	100.00	0.002	0	0.001	0
	TRS(ppm)	6	86.53	0.001	0	0.001	0
	TRS(ppm)	7	98.89	0.001	0	0.000	0
	TRS(ppm)	9	100.00	0.002	0	0.001	0
	TRS(ppm)	12	99.86	0.001	0	0.001	0
	TRS(ppm)	13	100.00	0.001	0	0.001	0
	TRS(ppm)	14	100.00	0.003	0	0.001	0
	TRS(ppm)	15	98.61	0.004	0	0.000	0
	THC(ppm)	1	99.17	2.8	-	2.1	-
	THC(ppm)	2	100.00	5.4	-	2.8	-
	THC(ppm)	4	100.00	3.9	-	2.5	-
	THC(ppm)	5	99.86	5.4	-	2.7	-
	THC(ppm)	6	86.39	2.4	-	2.1	-
	THC(ppm)	7	98.75	2.3	-	2.0	-
	THC(ppm)	9	100.00	14.7	-	3.6	-
	THC(ppm)	11	100.00	5.7	-	2.5	-
	THC(ppm)	12	100.00	4.5	-	2.7	-
	THC(ppm)	13	100.00	4.0	-	2.6	-
	THC(ppm)	14	100.00	3.9	-	2.2	-
	THC(ppm)	15	98.47	3.7	-	2.7	-
	THC(ppm)	16	100.00	4.4	-	2.8	-
	THC(ppm)	17	99.58	2.6	-	2.3	-
	THC(ppm)	19	100.00	2.6	-	2.3	-
	O3(ppm)	1	99.58	0.039	0	0.031	-
	O3(ppm)	6	84.17	0.038	0	0.032	-

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

NOVEMBER 2014

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APPROVAL NUMBERS	REPORT DATE						
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289664-00-00	11	2014					
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224816-00-03	PARAMETER	STN. NO.	% TIME OPERATIONAL	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION
189942-00-02	O3(ppm)	7	98.89	0.033	0	0.026	-
206355-00-00	O3(ppm)	8	100.00	0.037	0	0.035	-
46586-00-00	O3(ppm)	13	100.00	0.037	0	0.028	-
216466-00-04	O3(ppm)	14	100.00	0.038	0	0.033	-
137467-00-00	O3(ppm)	17	98.89	0.038	0	0.033	-
20809-01-00	NO2(ppm)	1	99.58	0.033	0	0.020	-
241311-00-02	NO2(ppm)	6	86.39	0.031	0	0.013	-
094-02-00	NO2(ppm)	7	98.89	0.034	0	0.016	-
305529-00-00	NO2(ppm)	8	99.86	0.021	0	0.008	-
026-02-00	NO2(ppm)	12	99.72	0.044	0	0.023	-
228044-00-00	NO2(ppm)	13	100.00	0.031	0	0.018	-
73203-01-00	NO2(ppm)	14	100.00	0.029	0	0.010	-
	NO2(ppm)	15	96.81	0.035	0	0.018	-
	NO2(ppm)	16	99.86	0.038	0	0.025	-
	NO2(ppm)	17	99.58	0.026	0	0.009	-
	NO2(ppm)	19	100.00	0.031	0	0.008	-
	NO2(ppm)	502	99.72	0.027	0	0.014	-
	CO(ppm)	7	98.75	0.4	0	0.2	-
	NH3(ppm)	1	95.56	0	0	0	-
	NH3(ppm)	6	80.97	0	0	0	-
	PM2.5(ug/m ³)	1	98.33	58.5	-	12.5	0
	PM2.5(ug/m ³)	6	99.86	47.4	-	13	0
	PM2.5(ug/m ³)	7	98.47	52	-	13.9	0
	PM2.5(ug/m ³)	8	99.58	18.3	-	8.5	0
	PM2.5(ug/m ³)	12	99.86	37.2	-	16.6	0
	PM2.5(ug/m ³)	13	99.86	18.6	-	11.8	0
	PM2.5(ug/m ³)	14	99.58	33.2	-	11.5	0
	PM2.5(ug/m ³)	15	99.31	37.3	-	13.5	0
	PM2.5(ug/m ³)	16	98.47	34	-	10.3	0
	PM2.5(ug/m ³)	17	98.33	22.3	-	14.2	0
	WIND	1	96.81	-	-	-	-
	WIND	2	95.56	-	-	-	-
	WIND	4	99.44	-	-	-	-
	WIND	5	95.56	-	-	-	-
	WIND	6	96.81	-	-	-	-
	WIND	7	98.89	-	-	-	-
	WIND	8	99.72	-	-	-	-
	WIND	9	100.00	-	-	-	-
	WIND	11	100.00	-	-	-	-
	WIND	12	100.00	-	-	-	-
	WIND	13	99.86	-	-	-	-
	WIND	14	98.75	-	-	-	-
	WIND	15	99.17	-	-	-	-
	WIND	16	100.00	-	-	-	-
	WIND	17	99.58	-	-	-	-
	WIND	19	97.92	-	-	-	-
	WIND	502	97.50	-	-	-	-
							
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
NOVEMBER 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

December 30, 2014

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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT McKAY - BERTHA GANTER (AMS 1)
 NOVEMBER 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	683	34	37	99.58	5	0	1	0
TRS(ppb) Average	683	37	37	100.00	2	0	1	0
THC(ppm) Average	680	34	40	99.17	2.8	-	2.1	-
NMHC(ppm) Average	680	34	40	99.17	0.736	-	0.078	-
CH4(ppm) Average	680	34	40	99.17	2.7	-	2.1	-
O3 (ppb) Average	682	35	38	99.58	39	0	31	-
NO2 (ppb) Average	682	35	38	99.58	33	0	20	-
NO (ppb) Average	682	35	38	99.58	56	-	15	-
NOX (ppb) Average	682	35	38	99.58	71	-	35	-
NH3 (ppb) Average	648	40	72	95.56	0	0	0	-
PM2.5 (ug/m3) Average	708	0	12	98.33	58.5	-	12.5	0
Wind Speed 10 m (km/h) Average	697	0	23	96.81	17	-	-	-
Wind Direction 10 m (deg) Average	697	0	23	96.81	-	-	-	-
Temperature 2 m (C) Average	720	0	0	100.00	11.4	-	3.6	-
Temperature 10 m (C) Average	720	0	0	100.00	10.6	-	4.6	-
Relative Humidity (%) Average	703	0	17	97.64	100	-	-	-
Precipitation (mm) Total	719	0	1	99.86	0.8	-	-	-
Surface Wetness (% of range) Average	720	0	0	100.00	82	-	-	-
Global Solar Radiation (W/m2) Average	720	0	0	100.00	150	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BERTHA GANTER FORT MCKAY (AMS 1)
NOVEMBER 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	683	0.7	1	-	0	0	0	1	1	1	5
TRS (ppb) Average	683	0.5	0	-	0	0	0	0	1	1	2
THC (ppm) Average	680	1.94	0.1	-	1.8	1.8	1.8	1.9	2	2.1	2.8
NMHC(ppm) Average	680	0.004	0.039	-	0	0	0	0	0	0	0.736
CH4(ppm) Average	680	1.94	0.1	-	1.8	1.8	1.8	1.9	2	2.1	2.7
O3 (ppb) Average	682	17.5	10	-	1	4	8	17	26	32	39
NO2 (ppb) Average	682	8.8	7	-	0	1	3	7	14	20	33
NO (ppb) Average	682	3.9	8	-	0	0	0	0	3	13	56
NOX (ppb) Average	682	12.7	13	-	0	1	3	8	18	31	71
NH3 (ppb) Average	648	0	0	-	0	0	0	0	0	0	0
PM2.5 (ug/m3) Average	708	5.38	4.8	-	0.2	1.4	2.3	3.9	7.1	11.3	58.5
Wind Speed 10 m (km/h) Average	697	5.7	3	-	0	2	3	5	7	10	17
Wind Direction 10 m (deg) Average	697	-	-	-	-	-	-	-	-	-	-
Temperature 2 m (C) Average	720	-7.63	7.4	-	-24.6	-17.6	-13.1	-7.8	-1.3	1.8	11.4
Temperature 10 m (C) Average	720	-7.17	7.1	-	-23	-16.6	-12.3	-7.5	-1.3	1.9	10.6
Relative Humidity (%) Average	703	82.6	9	-	51	70	78	84	88	93	100
Precipitation (mm) Total	719	-	-	3.81	0	0	0	0	0	0	0.8
Surface Wetness (% of range) Average	720	0.9	5	-	0	0	0	0	0	0	82
Global Solar Radiation (W/m2) Average	720	14.5	29	-	0	0	0	0	13	61	150

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

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	11 Nov 2014 14:00	11 Nov 2014 16:00	3	Maintenance - repair manifold
NMHC, CH4, THC	11 Nov 2014 14:00	11 Nov 2014 16:00	3	Maintenance - repair manifold
NMHC, CH4, THC	27 Nov 2014 15:00	27 Nov 2014 17:00	3	Maintenance - replaced fuel and carrier gas cylinders
O3	11 Nov 2014 14:00	11 Nov 2014 16:00	3	Maintenance - repair manifold
NO2, NO, NOX	11 Nov 2014 14:00	11 Nov 2014 16:00	3	Maintenance - repair manifold
NH3	01 Nov 2014 03:00	30 Nov 2014 03:00	31	Stabilization after daily span
NH3	11 Nov 2014 14:00	11 Nov 2014 16:00	3	Maintenance - repair manifold
PM2.5	07 Nov 2014 01:00	07 Nov 2014 06:00	6	Unstable operation - excessive baseline drift
PM2.5	11 Nov 2014 13:00	11 Nov 2014 15:00	3	Maintenance - Flow and zero check, sample head cleaning
PM2.5	12 Nov 2014 14:00	12 Nov 2014 16:00	3	Maintenance - clean detection chamber
Wind Speed, Wind Direction	03 Nov 2014 15:00	04 Nov 2014 12:00	22	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	23 Nov 2014 19:00	23 Nov 2014 19:00	1	Flat line in sensor output signal - Sensor frozen
Relative Humidity	03 Nov 2014 04:00	03 Nov 2014 13:00	10	Unstable operation - exceed upper range
Relative Humidity	04 Nov 2014 21:00	05 Nov 2014 03:00	7	Unstable operation - exceed upper range
Precipitation Collector	11 Nov 2014 13:00	11 Nov 2014 13:00	1	Maintenance - tipping bucket cleaned

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Summary of Hour Averages

Fort McKay - Bertha Ganter - November 2014

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 5 ppb on Nov 4 05:00	Maximum Daily Average: 1.4 ppb on Nov 2		Hours of Data:	683
Minimum Value: 0 ppb on Nov 5 22:00	Minimum Daily Average: 0.3 ppb on Nov 22		Hours of Missing Data:	37
Maximum Diurnal Average: 1.0 ppb at hour 14	Minimum Diurnal Average: 0.5 ppb at hour 22		Hours of Calibration:	34
Monthly Average: 0.7 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 1 P ₉₀ = 1 P ₉₉ = 2		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-Nov	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1
2-Nov	1	Z	1	1	1	1	1	1	1	1	1	2	2	5	4	4	2	1	1	1	1	1	1	1	1.4	5
3-Nov	2	Z	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.0	2
4-Nov	1	Z	1	2	5	3	2	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	0	1.1	5
5-Nov	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
6-Nov	0	Z	1	0	0	0	0	0	3	1	2	1	1	1	C	C	C	C	1	1	1	0	0	1	0.8	3
7-Nov	1	Z	1	0	0	0	1	1	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0.5	1
8-Nov	0	Z	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0.5	1
9-Nov	0	Z	0	0	0	0	0	0	0	1	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0.5	1
10-Nov	0	Z	1	1	1	0	1	0	0	1	0	0	1	0	0	0	0	1	0	0	0	0	1	1	0.5	1
11-Nov	0	Z	1	0	0	0	0	0	0	0	1	2	1	M	M	M	1	1	0	1	0	0	0	0	0.5	2
12-Nov	0	Z	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	1	0.4	1
13-Nov	0	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	0.7	1
14-Nov	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1
15-Nov	1	Z	1	1	1	1	1	0	1	0	1	1	1	1	1	1	1	0	0	1	1	1	1	1	0.6	1
16-Nov	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	0.7	1
17-Nov	1	Z	1	1	1	1	1	1	1	1	1	2	3	2	3	1	1	1	1	1	1	0	1	0	1.1	3
18-Nov	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1
19-Nov	1	Z	1	1	0	1	1	1	1	1	0	1	1	1	1	0	1	0	1	1	1	1	1	1	0.7	1
20-Nov	1	Z	1	1	2	2	1	1	1	2	2	2	1	1	1	1	1	1	1	1	1	1	1	0	1.2	2
21-Nov	1	Z	1	1	1	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
22-Nov	0	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-Nov	1	Z	0	0	0	0	0	0	0	0	1	1	2	2	2	1	1	0	0	1	0	1	0	0	0.6	2
24-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
25-Nov	1	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.4	1
26-Nov	0	Z	1	1	1	1	3	3	1	1	2	3	2	2	1	1	1	1	1	1	1	1	1	1	1.3	3
27-Nov	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	0	0	0	0	0.6	1
28-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	1	1	1	0	1	0.4	1
29-Nov	1	Z	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	1	1	0	1	0	1	1	0.6	1
30-Nov	0	Z	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	1	1	1	1	0	0	0	0.5	1

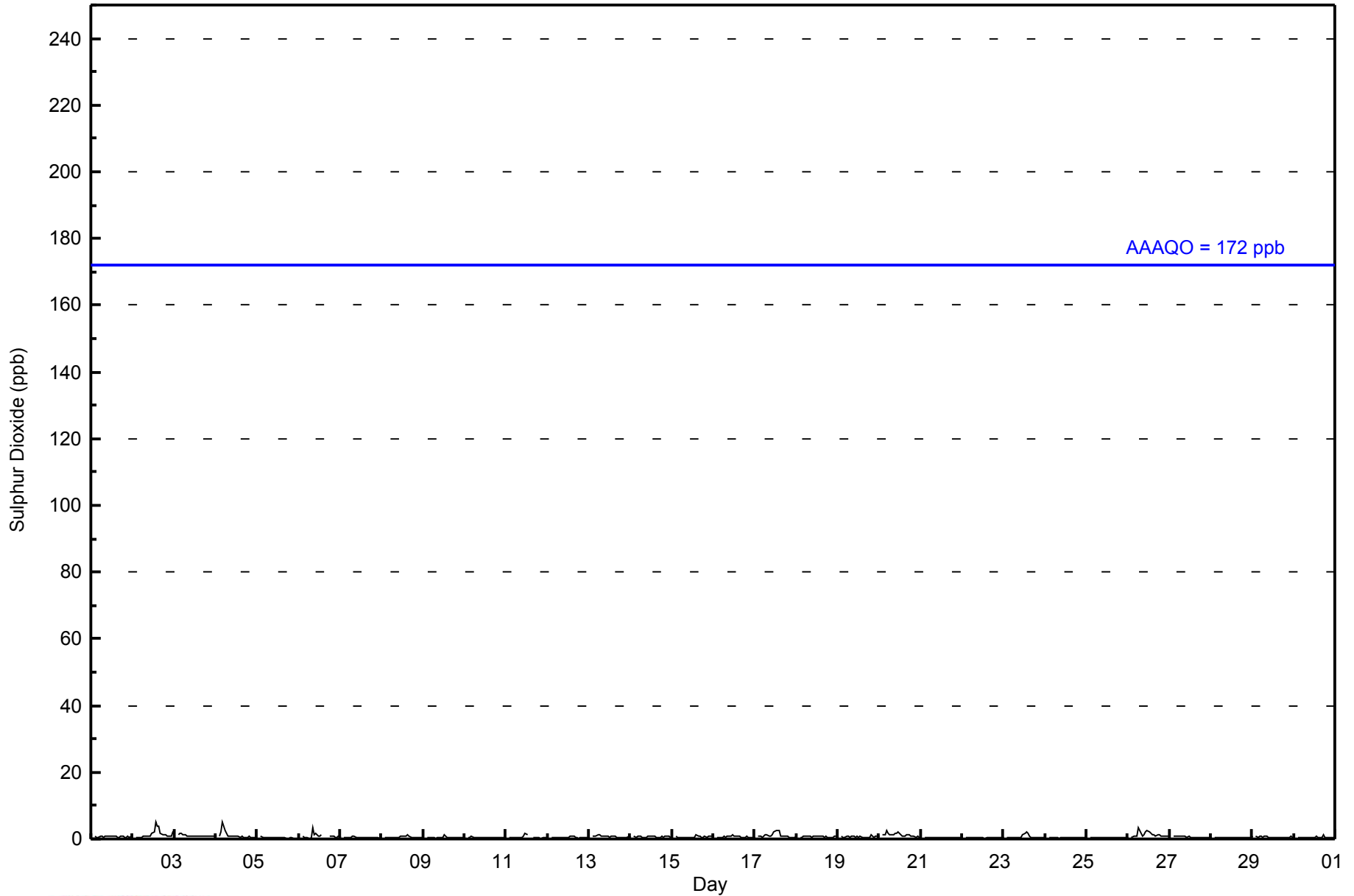
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2	--	1	2	5	3	3	3	3	3	2	2	3	3	5	4	4	2	1	1	1	1	1	1	2	Diurnal Maximum

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



WBEA
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Fort McKay - Bertha Ganter - November 2014





WBEA
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Fort McKay - Bertha Ganter - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	683	100.00	100.00
11 - 20	0	0.00	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 720



WBEA
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Fort McKay - Bertha Ganter - November 2014

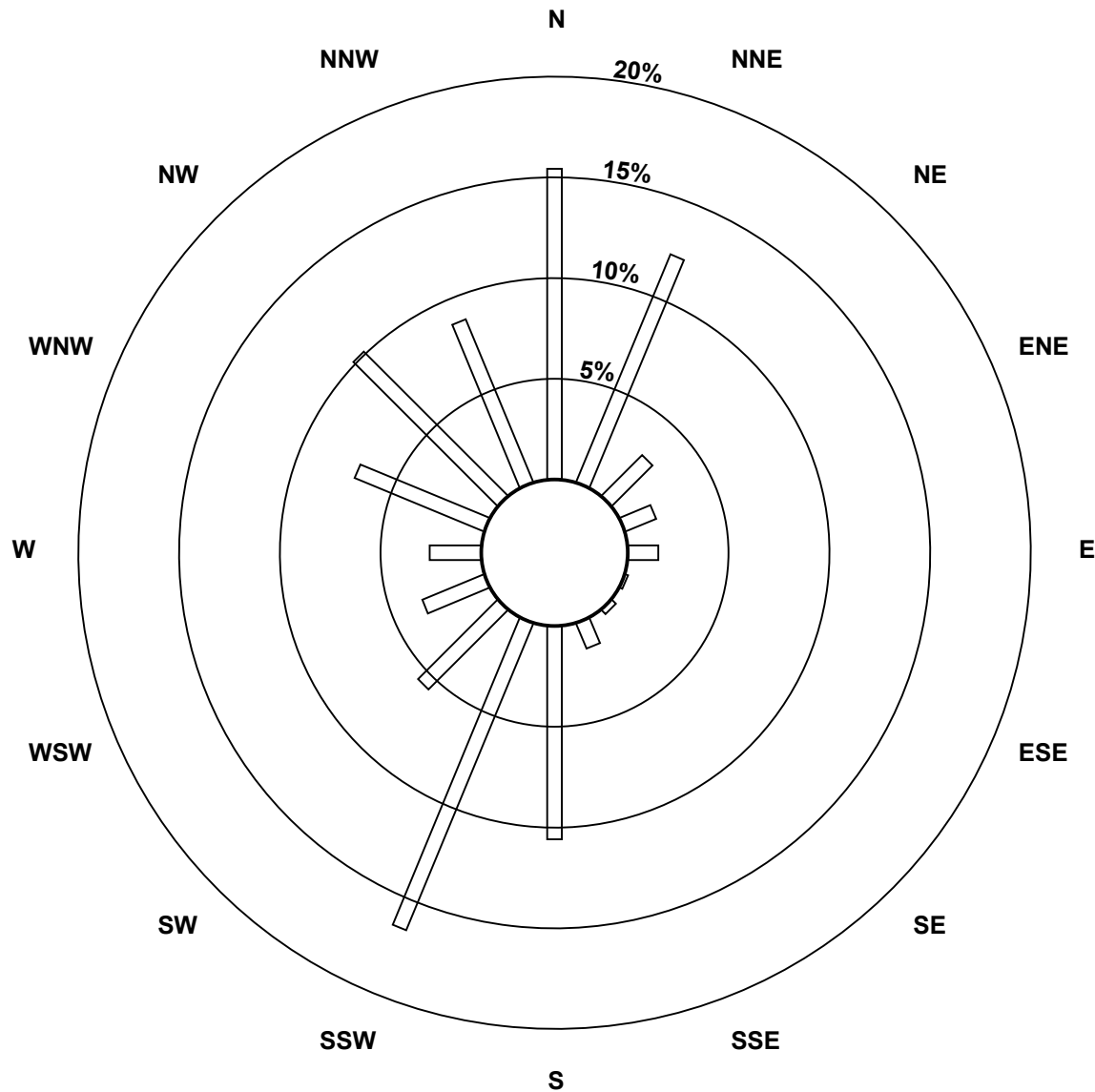
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	102	81	19	11	10	1	2	9	70	109	37	22	17	46	67	58	661
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	102	81	19	11	10	1	2	9	70	109	37	22	17	46	67	58	661

Total Number of Valid Hours: 661

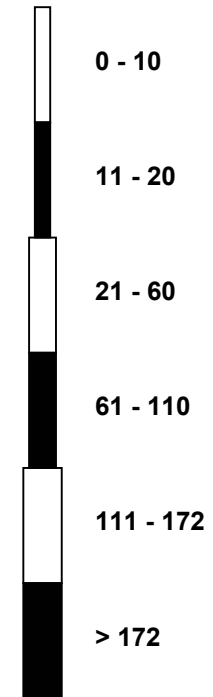
Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

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



Classes (ppb)

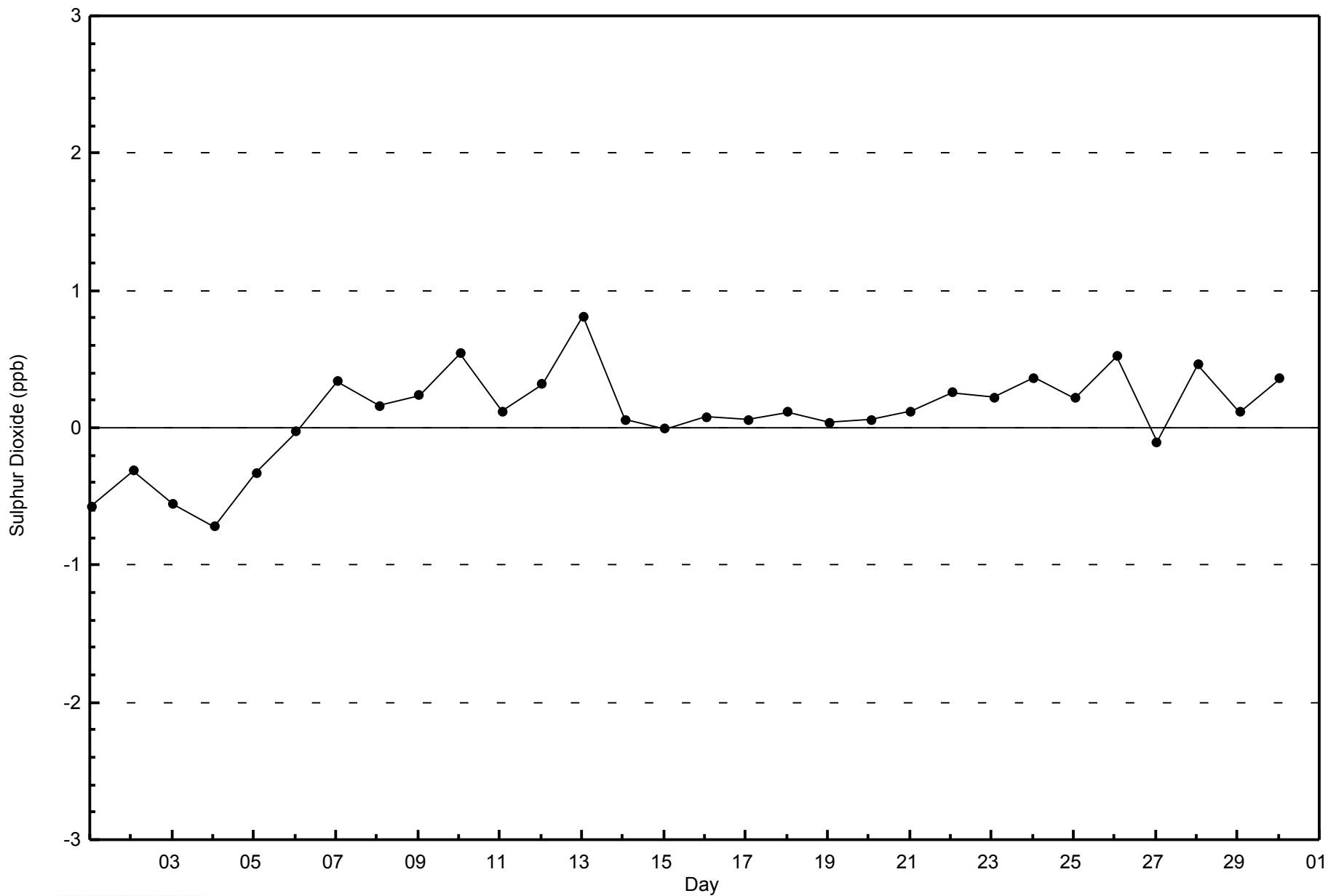


Total Number of Valid Hours: 661



WBEA
Zero Responses

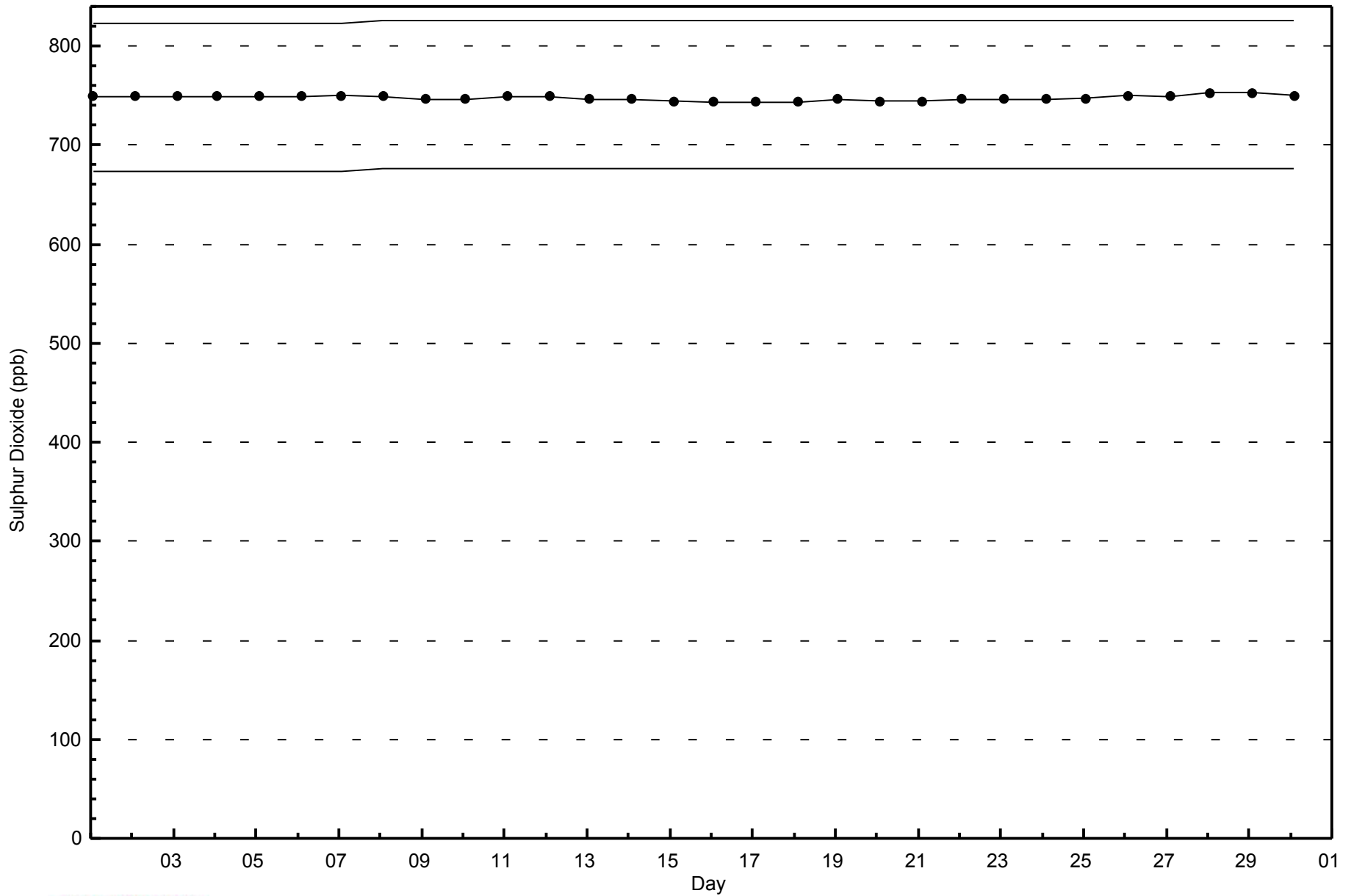
Sulphur Dioxide (SO₂) - ppb
Fort McKay - Bertha Ganter - November 2014





WBEA
Span Responses

Sulphur Dioxide (SO₂) - ppb
Fort McKay - Bertha Ganter - November 2014





Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 2 ppb on Nov 17 16:00	Maximum Daily Average: 0.9 ppb on Nov 2		Hours of Data:	683
Minimum Value: 0 ppb on Nov 1 05:00	Minimum Daily Average: 0.3 ppb on Nov 1		Hours of Missing Data:	37
Maximum Diurnal Average: 0.6 ppb at hour 17	Minimum Diurnal Average: 0.4 ppb at hour 2		Hours of Calibration:	37
Monthly Average: 0.5 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 1 P ₉₉ = 1		Percent Operational Time:	100.0

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

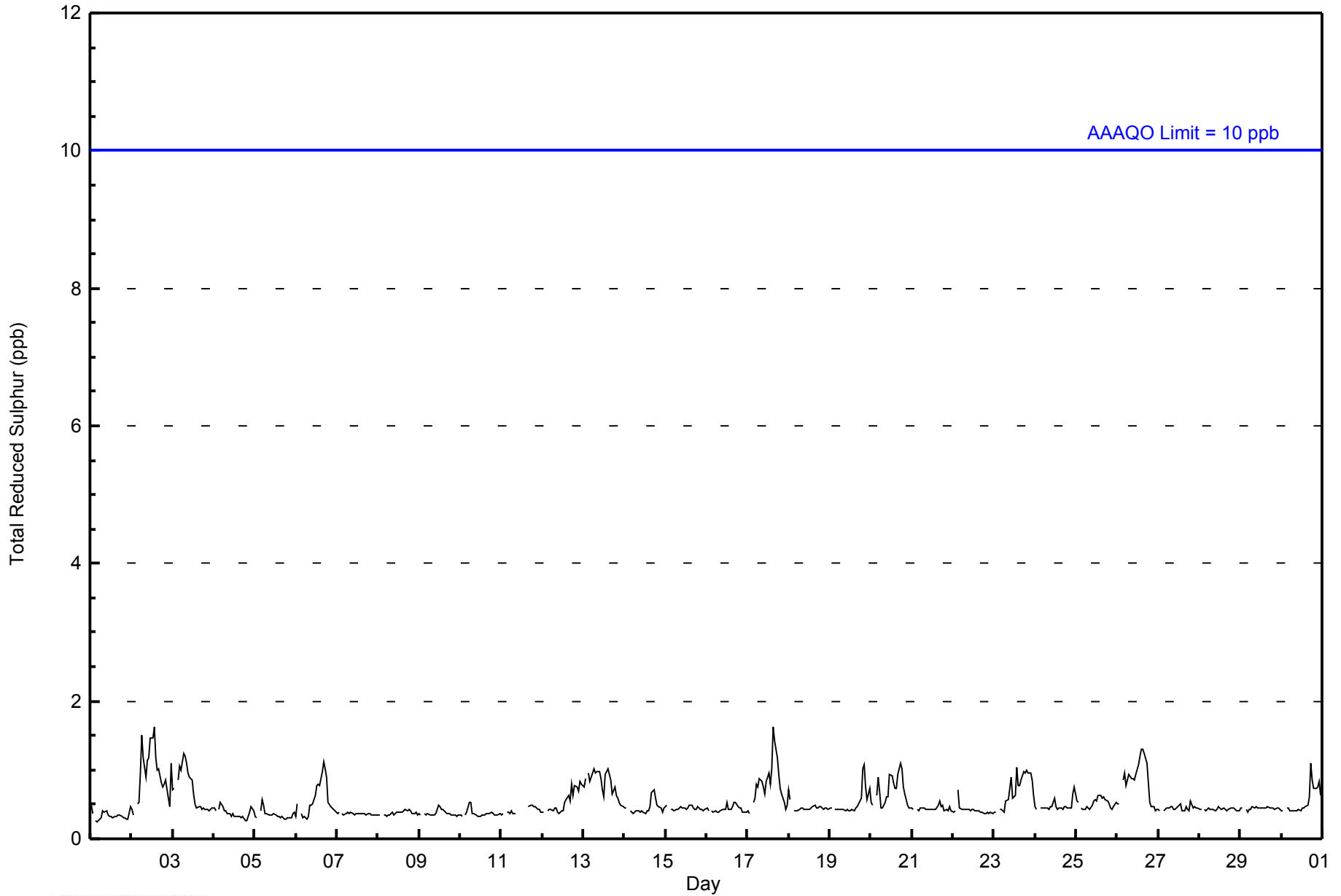
0.5	0.4	--	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	Diurnal Average		
1	1	--	1	1	1	2	1	1	1	1	1	1	1	2	1	2	1	1	1	1	1	1	1	1	1	Diurnal Maximum	

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



WBEA
Hourly Averages

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





WBEA
Cumulative Frequency Distribution

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

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

Total Number of Valid Hours: 683

Total Number of Hours: 720



WBEA
Frequency Distribution

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

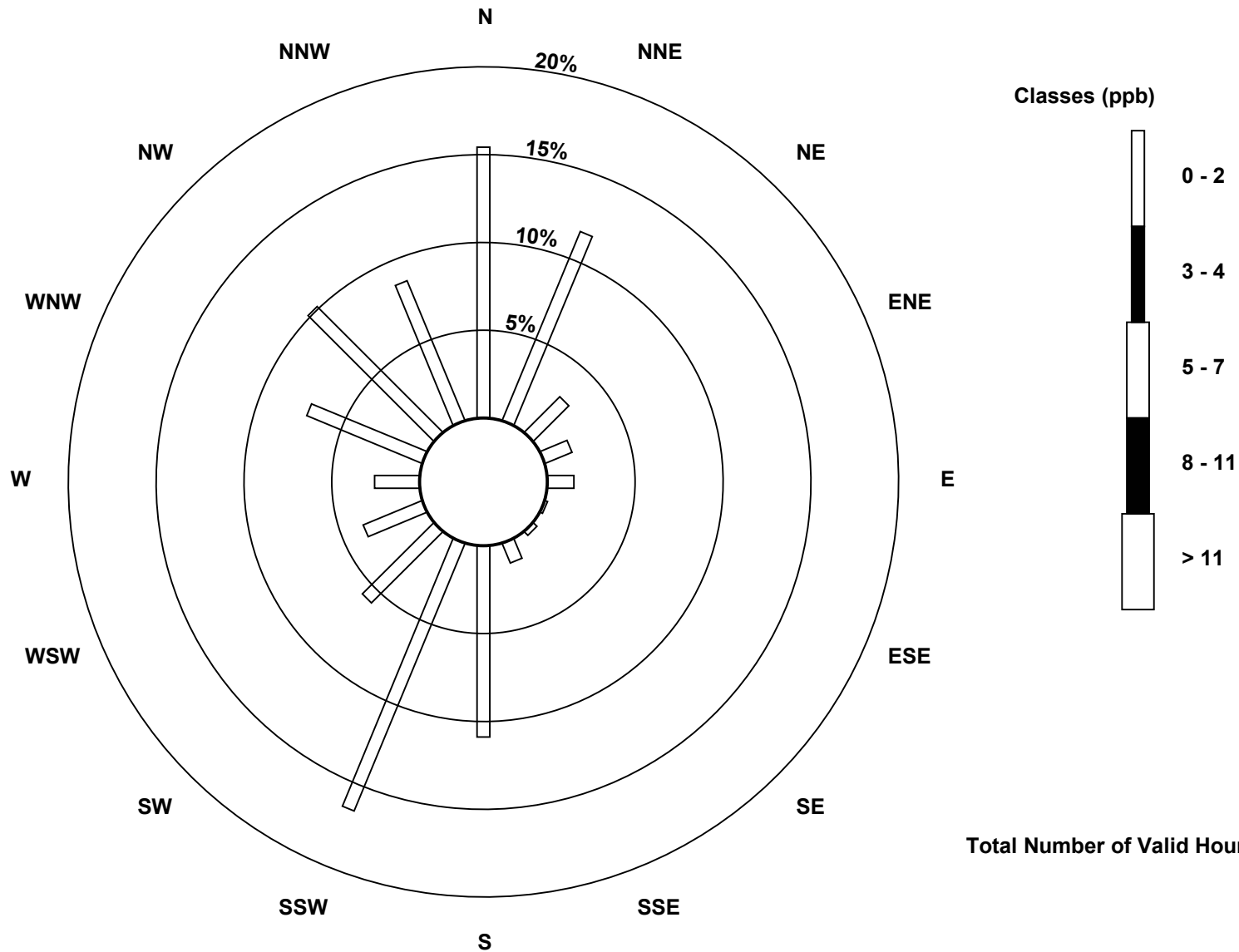
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	102	77	19	11	10	1	2	8	72	109	38	24	17	47	67	57	661
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	102	77	19	11	10	1	2	8	72	109	38	24	17	47	67	57	661

Total Number of Valid Hours: 661

Total Number of Hours: 720

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

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

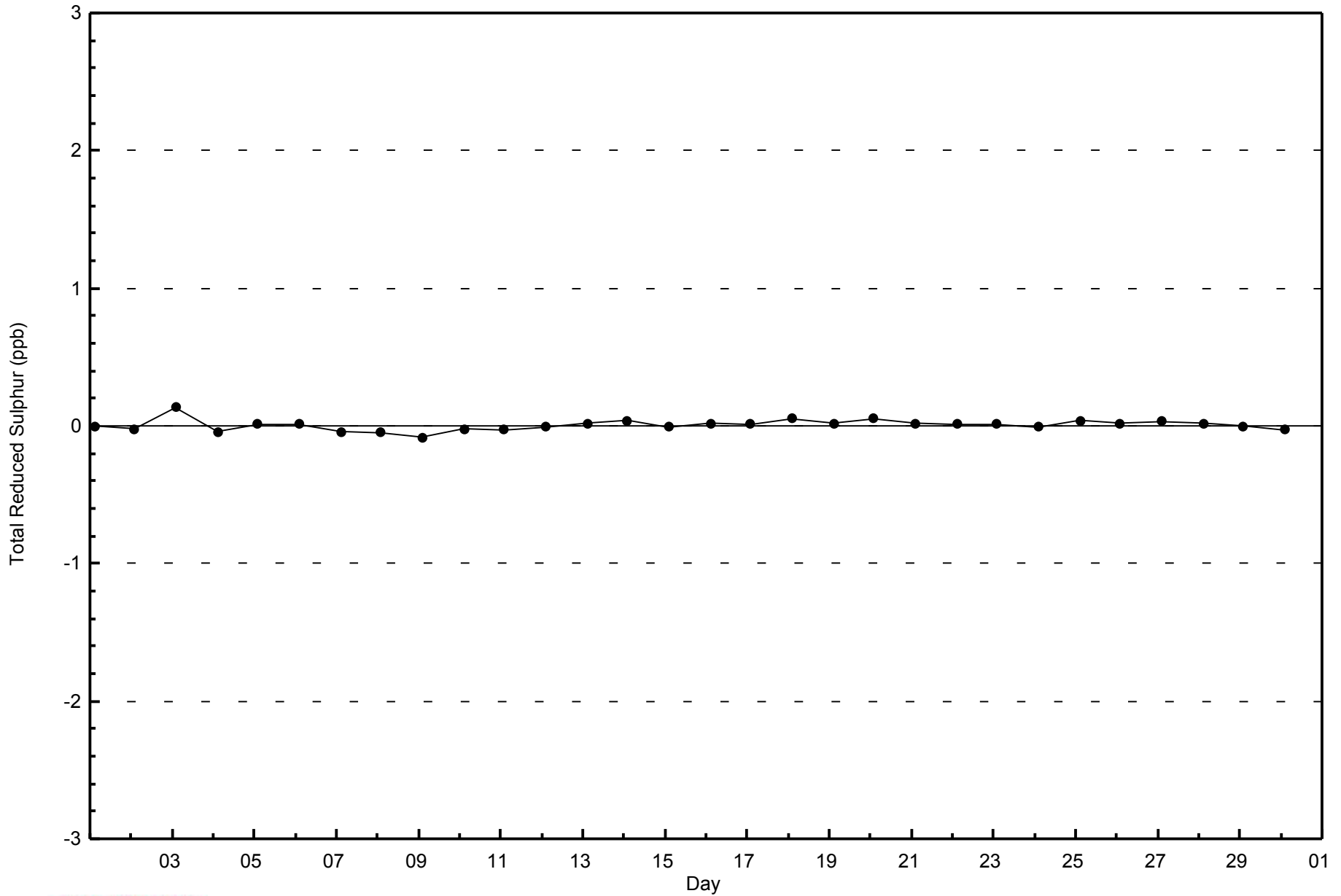


Total Number of Valid Hours: 661



WBEA
Zero Responses

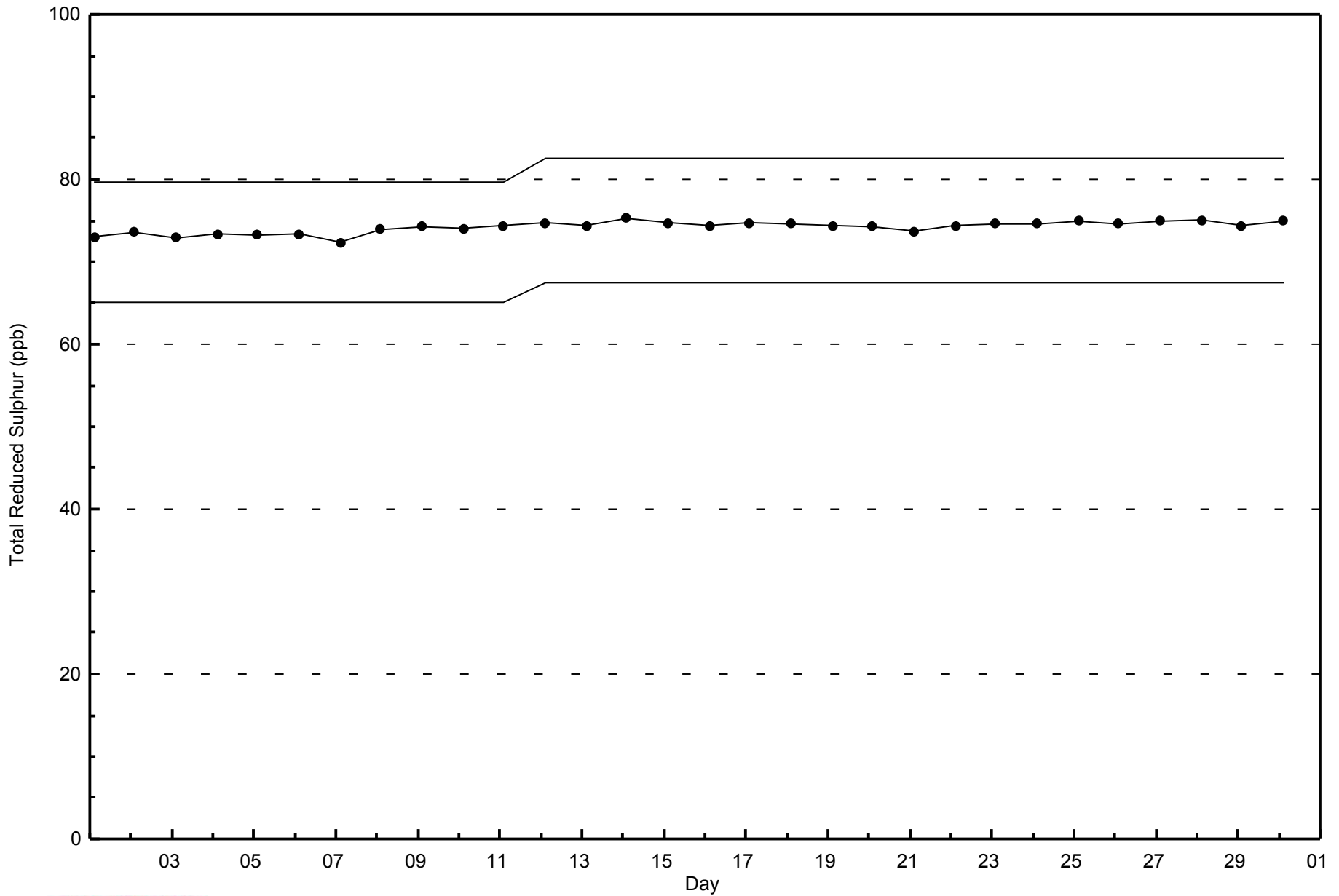
Total Reduced Sulphur (TRS) - ppb
Fort McKay - Bertha Ganter - November 2014





WBEA
Span Responses

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



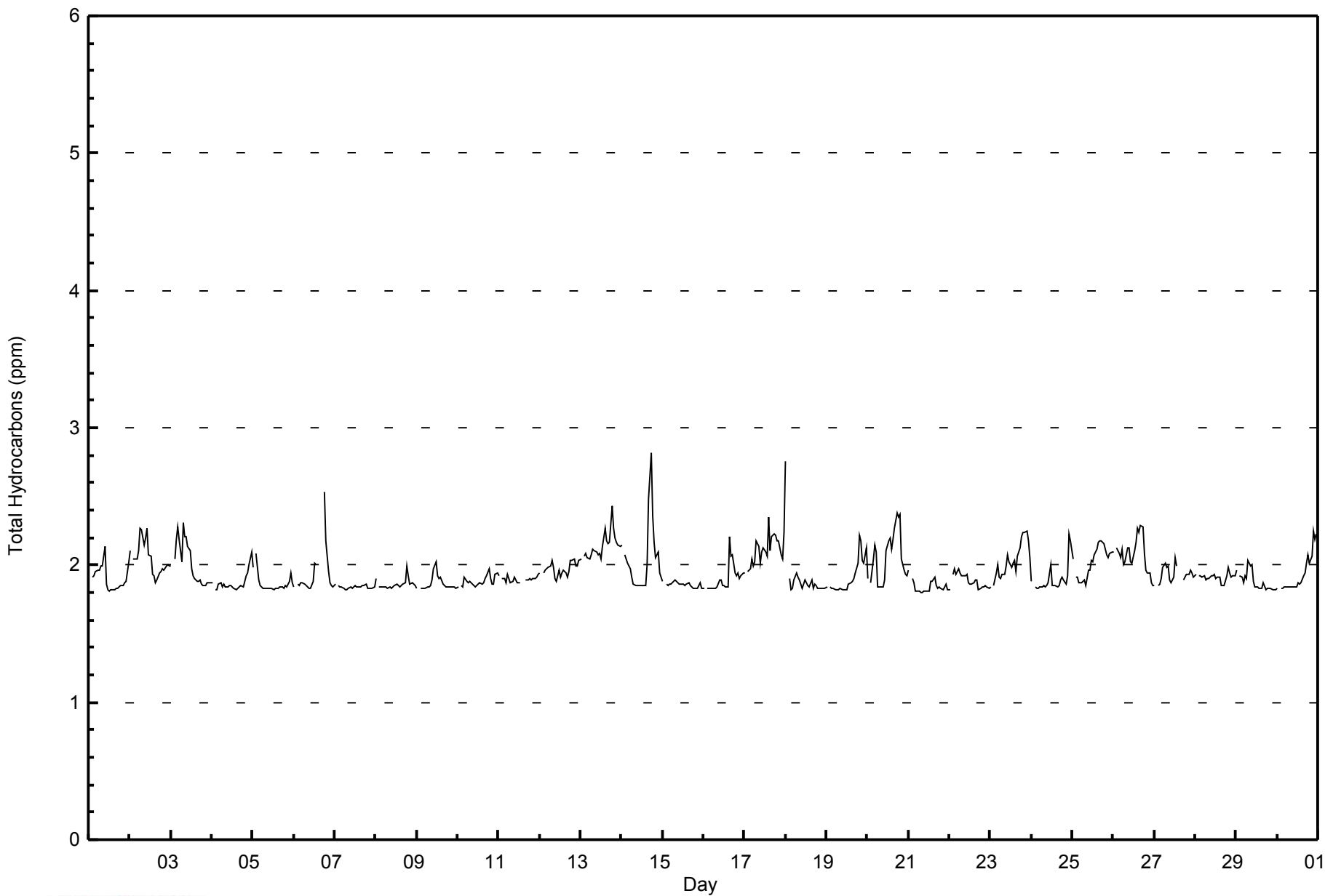


Maximum Value: 2.8 ppm on Nov 14 18:00																			Maximum Daily Average: 2.1 ppm on Nov 13						Hours in Service: 720																							
Minimum Value: 1.8 ppm on Nov 21 08:00																			Minimum Daily Average: 1.8 ppm on Nov 7						Hours of Data: 680																							
Maximum Diurnal Average: 2.0 ppm at hour 19																			Minimum Diurnal Average: 1.9 ppm at hour 7						Hours of Missing Data: 40																							
Monthly Average: 1.94 ppm																			Percentiles: P ₁ = 1.8 P ₁₀ = 1.8 Q ₁ = 1.8 Median = 1.9 Q ₃ = 2.0 P ₉₀ = 2.1 P ₉₉ = 2.4						Hours of Calibration: 34																							
																									Percent Operational Time: 99.2																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Nov	2.2	Z	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.1	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.2																						
2-Nov	2.1	Z	2.0	2.0	2.0	2.1	2.3	2.3	2.1	2.2	2.3	2.1	2.1	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.3																						
3-Nov	2.0	Z	2.0	2.2	2.3	2.2	2.0	2.3	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	2.3																						
4-Nov	1.9	Z	1.8	1.8	1.9	1.9	1.8	1.9	1.8	1.8	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.8	1.9	2.0	2.1	1.9	2.1																							
5-Nov	2.0	Z	2.1	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	2.1																							
6-Nov	1.8	Z	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.9	2.0	2.0	C	C	C	C	2.5	2.2	2.0	1.9	1.9	1.8	2.5																							
7-Nov	1.9	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.8	1.8	1.9	1.8	1.9	1.8	1.9	1.8	1.8	1.8	1.8	1.9																							
8-Nov	1.9	Z	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	2.0	1.9	1.9	1.9	1.9	1.8	2.0																							
9-Nov	1.8	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.0																							
10-Nov	1.8	Z	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	2.0																							
11-Nov	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	M	M	M	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9																							
12-Nov	1.9	Z	1.9	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	2.0	1.9	1.9	2.0	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0																							
13-Nov	2.0	Z	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.3	2.2	2.2	2.2	2.2	2.4	2.3	2.2	2.2	2.1	2.1	2.4																							
14-Nov	2.1	Z	2.1	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.9	2.0	2.5	2.8	2.4	2.2	2.1	1.9	1.9	1.9	1.9	2.8																							
15-Nov	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.8	1.9																							
16-Nov	1.8	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.8	1.8	1.8	1.8	2.2	2.1	2.1	1.9	1.9	1.9	1.9	1.9	1.9	2.2																							
17-Nov	1.9	Z	2.0	2.0	2.0	2.0	2.0	2.2	2.1	2.0	2.1	2.1	2.1	2.4	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.0	2.2	2.4																							
18-Nov	2.8	Z	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.9	1.8	1.8	1.9	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.8	2.8																							
19-Nov	1.8	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	2.0	2.2	2.2	2.0	2.0	2.1	2.2																							
20-Nov	1.9	Z	1.9	2.0	2.1	2.1	1.8	1.8	1.8	1.8	1.9	2.1	2.2	2.2	2.1	2.2	2.3	2.4	2.3	2.4	2.0	2.0	1.9	1.9	2.4																							
21-Nov	2.0	Z	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.8	2.0																							
22-Nov	1.8	Z	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	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.0																							
23-Nov	1.8	Z	1.8	1.9	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.2																							
24-Nov	1.9	Z	1.8	1.8	1.8	1.8	1.8	1.9	1.8	1.9	1.9	2.0	1.9	1.8	1.8	1.9	1.8	1.9	1.9	1.9	1.9	1.9	2.2	2.2	2.2																							
25-Nov	2.0	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2																							
26-Nov	2.1	Z	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.0	2.0	2.1	2.2	2.3	2.2	2.3	2.3	2.1	2.0	1.9	1.9	1.9	1.8	2.3																							
27-Nov	1.8	Z	1.9	1.9	1.9	2.0	2.0	2.0	2.0	1.9	1.9	1.9	2.1	2.0	M	M	M	1.9	1.9	1.9	1.9	2.0	1.9	1.9	2.1																							
28-Nov	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.9	2.0	1.9	1.9	1.9	1.9	2.0																							
29-Nov	2.0	Z	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	1.8	1.8	1.8	1.8	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.0																							
30-Nov	1.8	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	2.0	2.1	2.0	2.1	2.3	2.2	2.2	2.3																							
																								2.0	--	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	Diurnal Average	
																								2.8	--	2.1	2.2	2.3	2.2	2.3	2.3	2.2	2.2	2.3	2.1	2.2	2.2	2.4	2.2	2.5	2.8	2.5	2.4	2.2	2.3	2.2	2.2	Diurnal Maximum
Z - zerospan C - Calibration M - Maintenance																																																



WBEA
Hourly Averages

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





WBEA
Cumulative Frequency Distribution

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

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	554	81.47	81.47
2.1 - 3.0	126	18.53	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 680

Total Number of Hours: 720



WBEA
Frequency Distribution

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

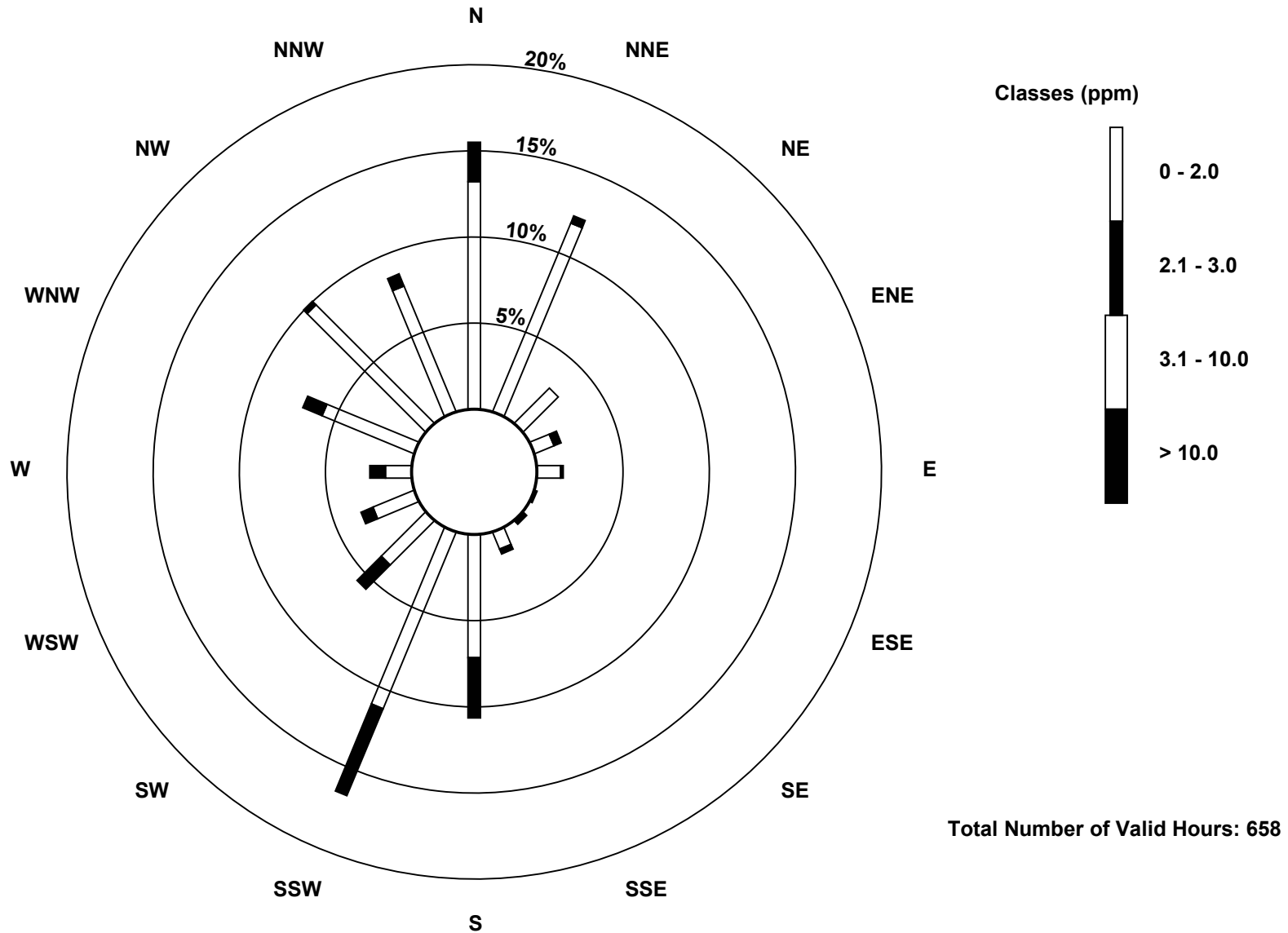
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	87	78	19	8	9	0	0	7	47	73	24	17	10	38	64	52	533
2.1 - 3.0	15	3	0	3	1	1	2	2	23	36	13	5	6	8	2	5	125
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	102	81	19	11	10	1	2	9	70	109	37	22	16	46	66	57	658

Total Number of Valid Hours: 658

Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

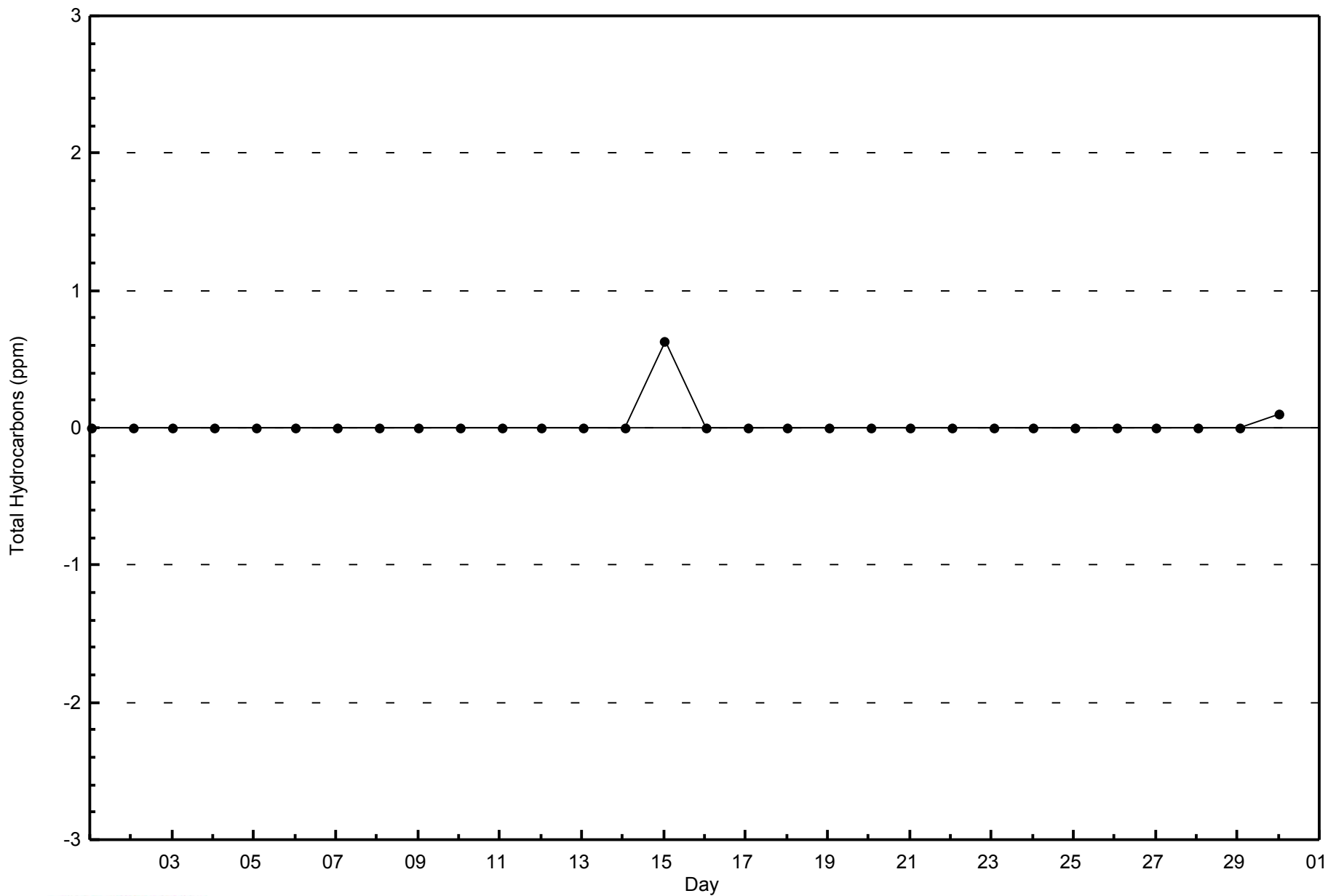
Total Hydrocarbons (THC) - ppm
Fort McKay - Bertha Ganter (AMS 1)





WBEA
Zero Responses

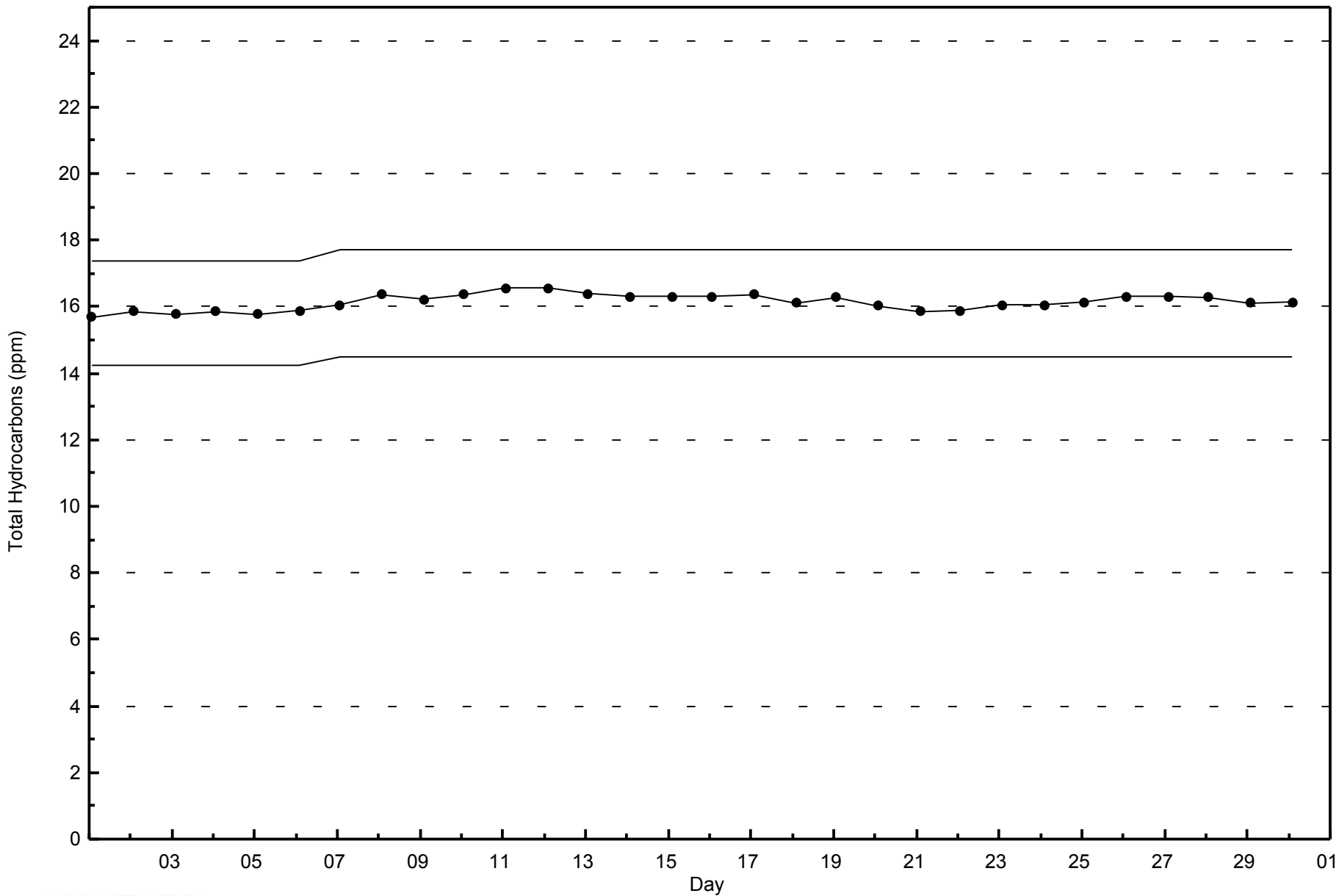
Total Hydrocarbons (THC) - ppm
Fort McKay - Bertha Ganter - November 2014





WBEA
Span Responses

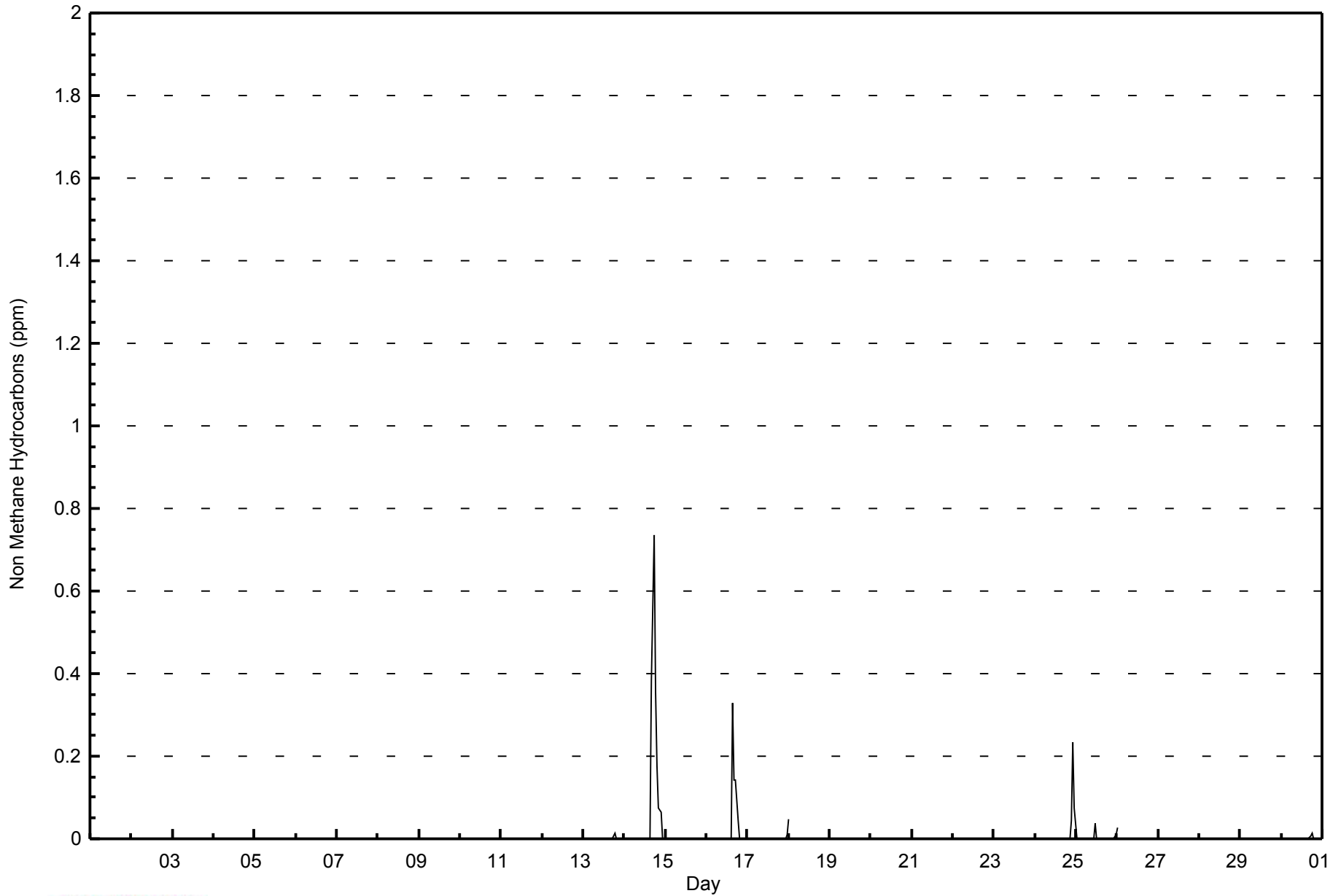
Total Hydrocarbons (THC) - ppm
Fort McKay - Bertha Ganter - November 2014





WBEA
Hourly Averages

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





WBEA
Cumulative Frequency Distribution

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

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	659	96.91	96.91
0.006 - 0.05	10	1.47	98.38
0.06 - 0.1	5	0.74	99.12
> 0.1	6	0.88	100.00

Total Number of Valid Hours: 680

Total Number of Hours: 720



WBEA
Frequency Distribution

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

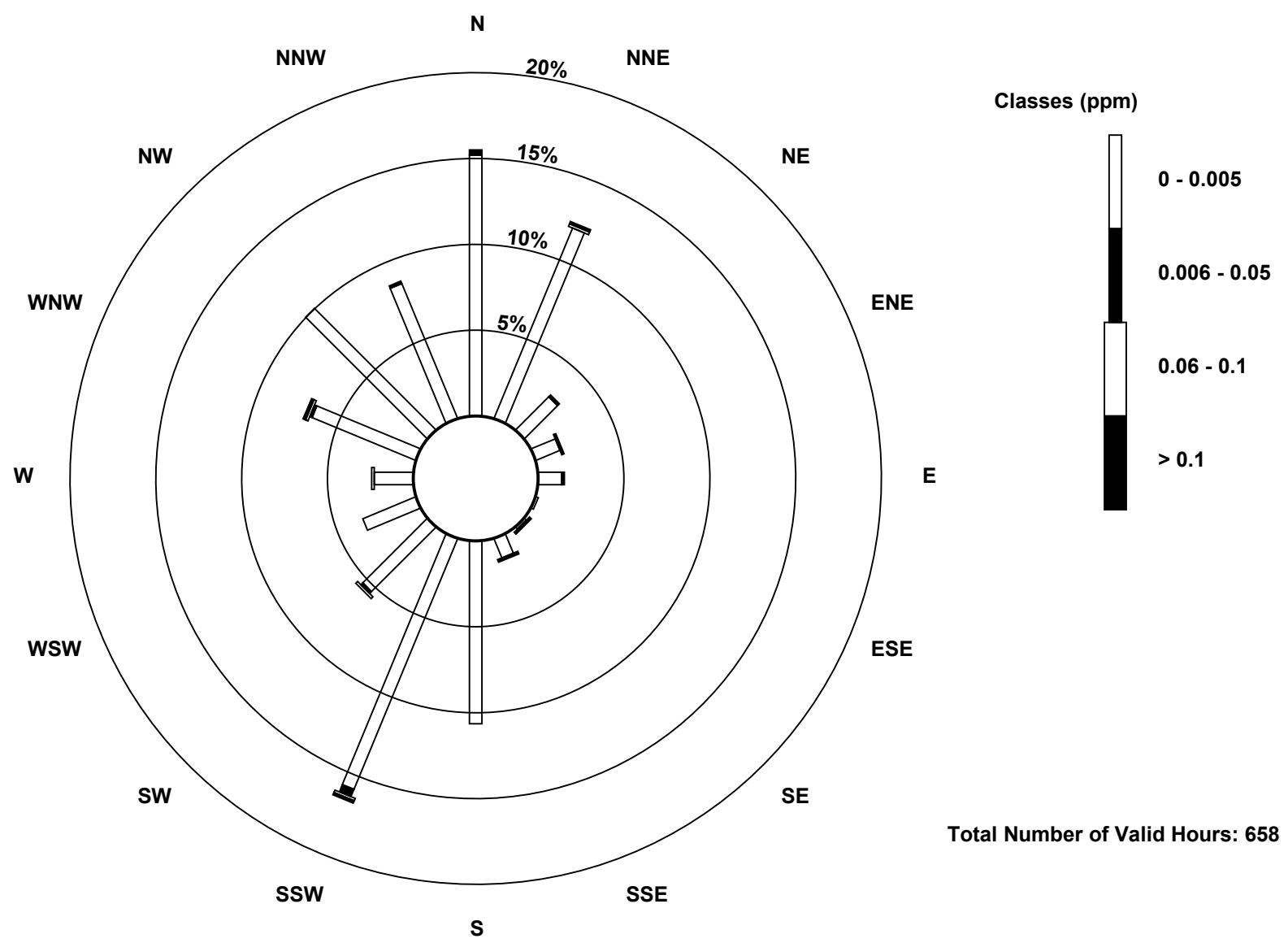
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	100	79	18	10	9	1	1	8	70	104	35	22	15	43	66	56	637
0.006 - 0.05	2	0	1	0	1	0	0	0	0	3	1	0	0	1	0	1	10
0.06 - 0.1	0	1	0	0	0	0	0	0	0	1	1	0	1	1	0	0	5
> 0.1	0	1	0	1	0	0	1	1	0	1	0	0	0	1	0	0	6
Totals	102	81	19	11	10	1	2	9	70	109	37	22	16	46	66	57	658

Total Number of Valid Hours: 658

Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

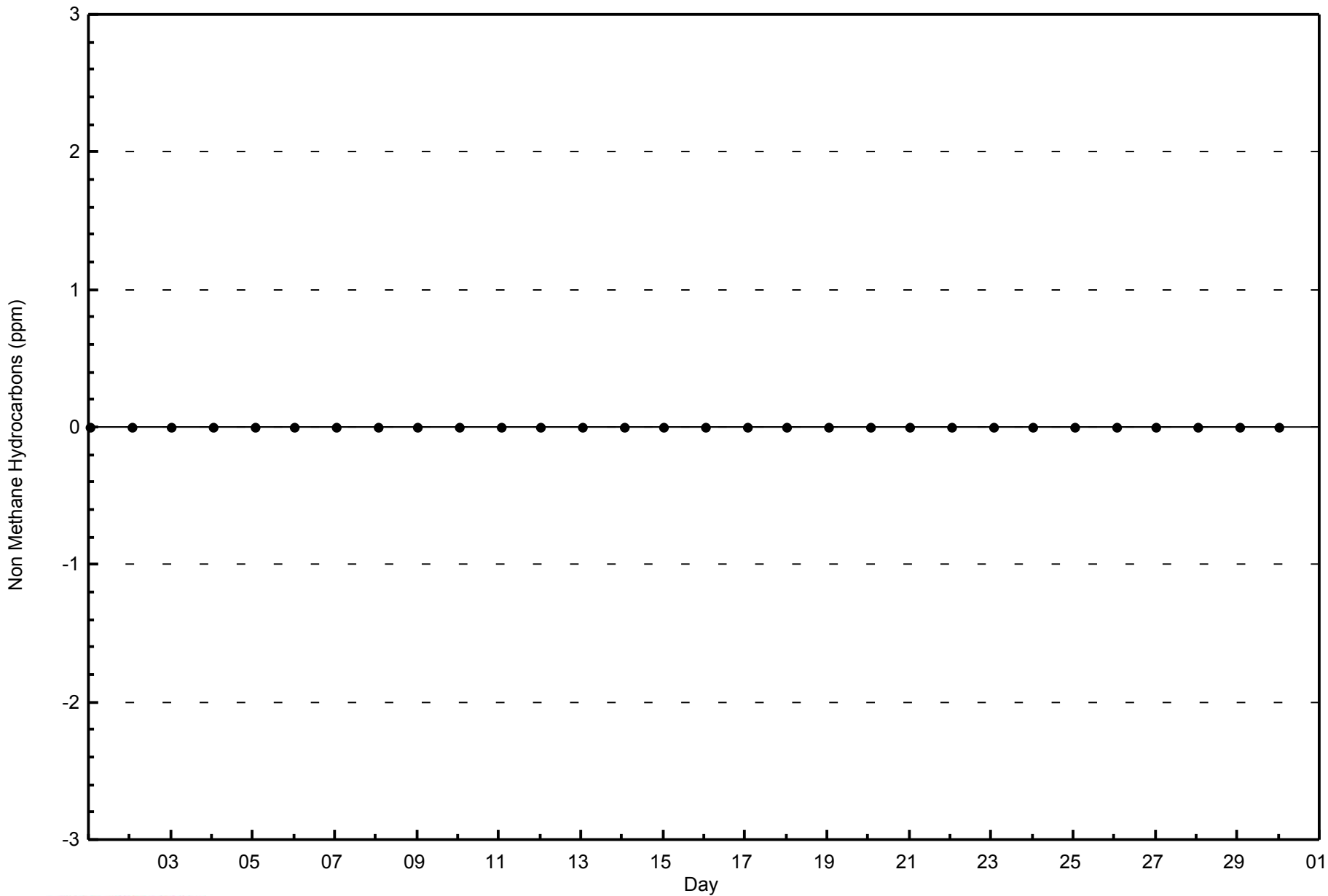
Non Methane Hydrocarbons (NMHC) - ppm
Fort McKay - Bertha Ganter (AMS 1)





WBEA
Zero Responses

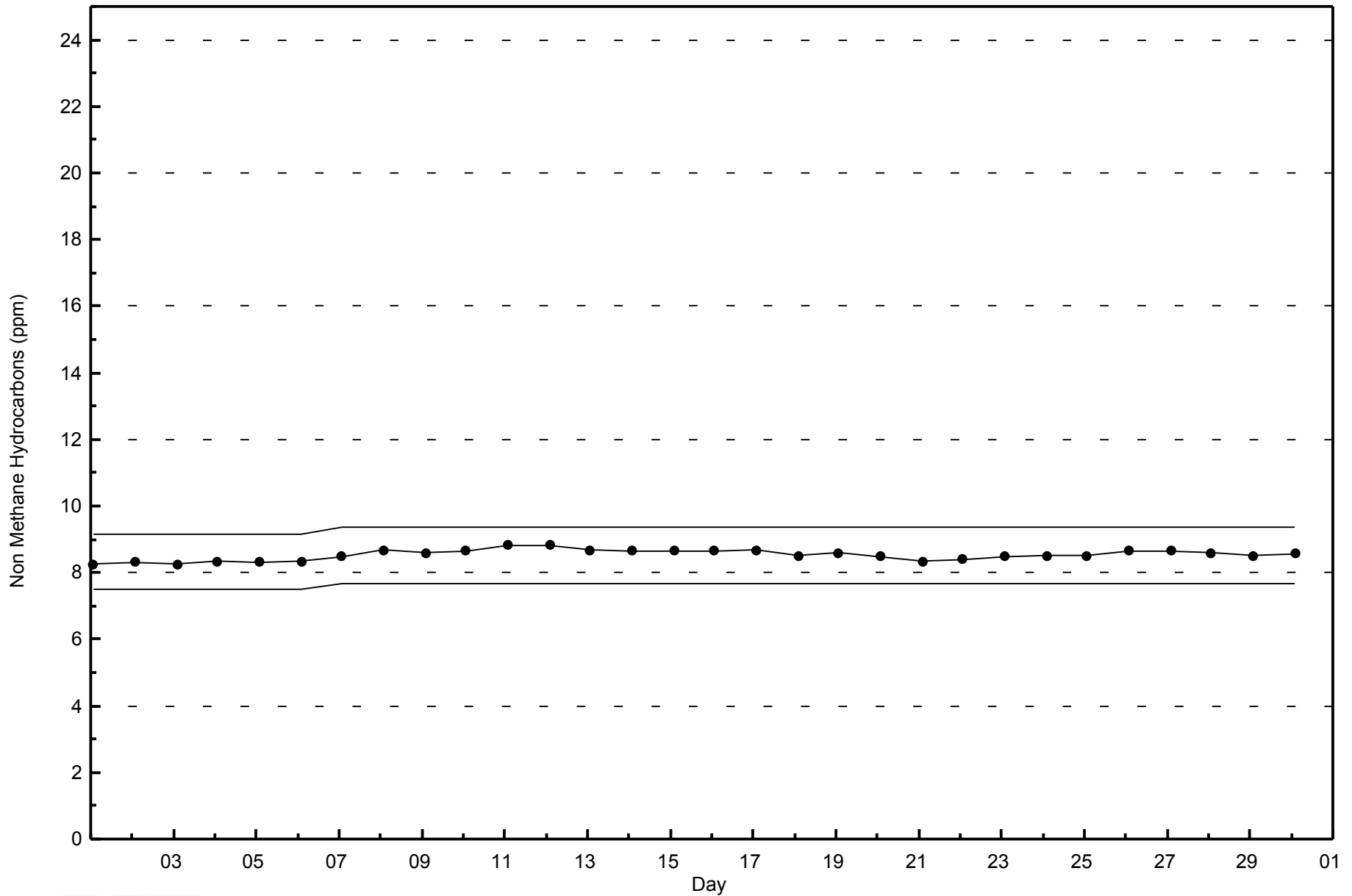
Non Methane Hydrocarbons (NMHC) - ppm
Fort McKay - Bertha Ganter - November 2014





WBEA
Span Responses

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





Summary of Hour Averages

Fort McKay - Bertha Ganter - November 2014

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 2.7 ppm on Nov 18 01:00	Maximum Daily Average: 2.1 ppm on Nov 13		Hours of Data:	680
Minimum Value: 1.8 ppm on Nov 21 08:00	Minimum Daily Average: 1.8 ppm on Nov 7		Hours of Missing Data:	40
Maximum Diurnal Average: 2.0 ppm at hour 19	Minimum Diurnal Average: 1.9 ppm at hour 7		Hours of Calibration:	34
Monthly Average: 1.94 ppm	Percentiles: P ₁ = 1.8 P ₁₀ = 1.8 Q ₁ = 1.8 Median = 1.9 Q ₃ = 2.0 P ₉₀ = 2.1 P ₉₉ = 2.3		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-Nov	2.2	Z	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.1	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.2
2-Nov	2.1	Z	2.0	2.0	2.0	2.1	2.3	2.3	2.1	2.2	2.3	2.1	2.1	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.3
3-Nov	2.0	Z	2.0	2.2	2.3	2.2	2.0	2.3	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	2.3
4-Nov	1.9	Z	1.8	1.8	1.9	1.9	1.8	1.9	1.8	1.8	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.8	1.9	2.0	2.1	1.9	2.1	
5-Nov	2.0	Z	2.1	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	2.1	
6-Nov	1.8	Z	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.9	2.0	2.0	C	C	C	C	2.5	2.2	2.0	1.9	1.9	1.8	2.5	
7-Nov	1.9	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.8	1.8	1.9	1.8	1.9	1.8	1.9	1.8	1.8	1.8	1.8	1.9	
8-Nov	1.9	Z	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	2.0	1.9	1.9	1.9	1.9	1.8	2.0	
9-Nov	1.8	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.0	
10-Nov	1.8	Z	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	2.0	
11-Nov	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	M	M	M	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	
12-Nov	1.9	Z	1.9	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	2.0	1.9	1.9	2.0	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
13-Nov	2.0	Z	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.3	2.2	2.2	2.2	2.2	2.4	2.3	2.2	2.2	2.1	2.1	2.4	
14-Nov	2.1	Z	2.1	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.9	2.0	2.1	2.1	2.0	2.0	2.0	2.0	1.9	1.9	1.9	2.1	
15-Nov	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.8	1.9	
16-Nov	1.8	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	
17-Nov	1.9	Z	2.0	2.0	2.0	2.0	2.0	2.2	2.1	2.0	2.1	2.1	2.1	2.4	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.0	2.2	2.4	
18-Nov	2.7	Z	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.9	1.8	1.8	1.9	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.8	2.7	
19-Nov	1.8	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	2.0	2.2	2.2	2.0	2.0	2.1	2.2	
20-Nov	1.9	Z	1.9	2.0	2.1	2.1	1.8	1.8	1.8	1.8	1.9	2.1	2.2	2.2	2.1	2.2	2.3	2.4	2.3	2.4	2.0	2.0	1.9	1.9	2.4	
21-Nov	2.0	Z	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.8	2.0	
22-Nov	1.8	Z	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	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.0	
23-Nov	1.8	Z	1.8	1.9	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.2	
24-Nov	1.9	Z	1.8	1.8	1.8	1.8	1.8	1.9	1.8	1.9	1.9	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1	1.9	2.1	
25-Nov	2.0	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.2	
26-Nov	2.1	Z	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.0	2.0	2.1	2.2	2.3	2.2	2.3	2.3	2.1	2.0	1.9	1.9	1.9	1.8	2.3	
27-Nov	1.8	Z	1.9	1.9	1.9	2.0	2.0	2.0	2.0	1.9	1.9	1.9	2.1	2.0	M	M	M	1.9	1.9	1.9	1.9	2.0	1.9	1.9	2.1	
28-Nov	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.9	2.0	1.9	1.9	1.9	1.9	2.0	
29-Nov	2.0	Z	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	1.8	1.8	1.8	1.8	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.0	
30-Nov	1.8	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	2.0	2.1	2.0	2.1	2.3	2.2	2.2	2.3	

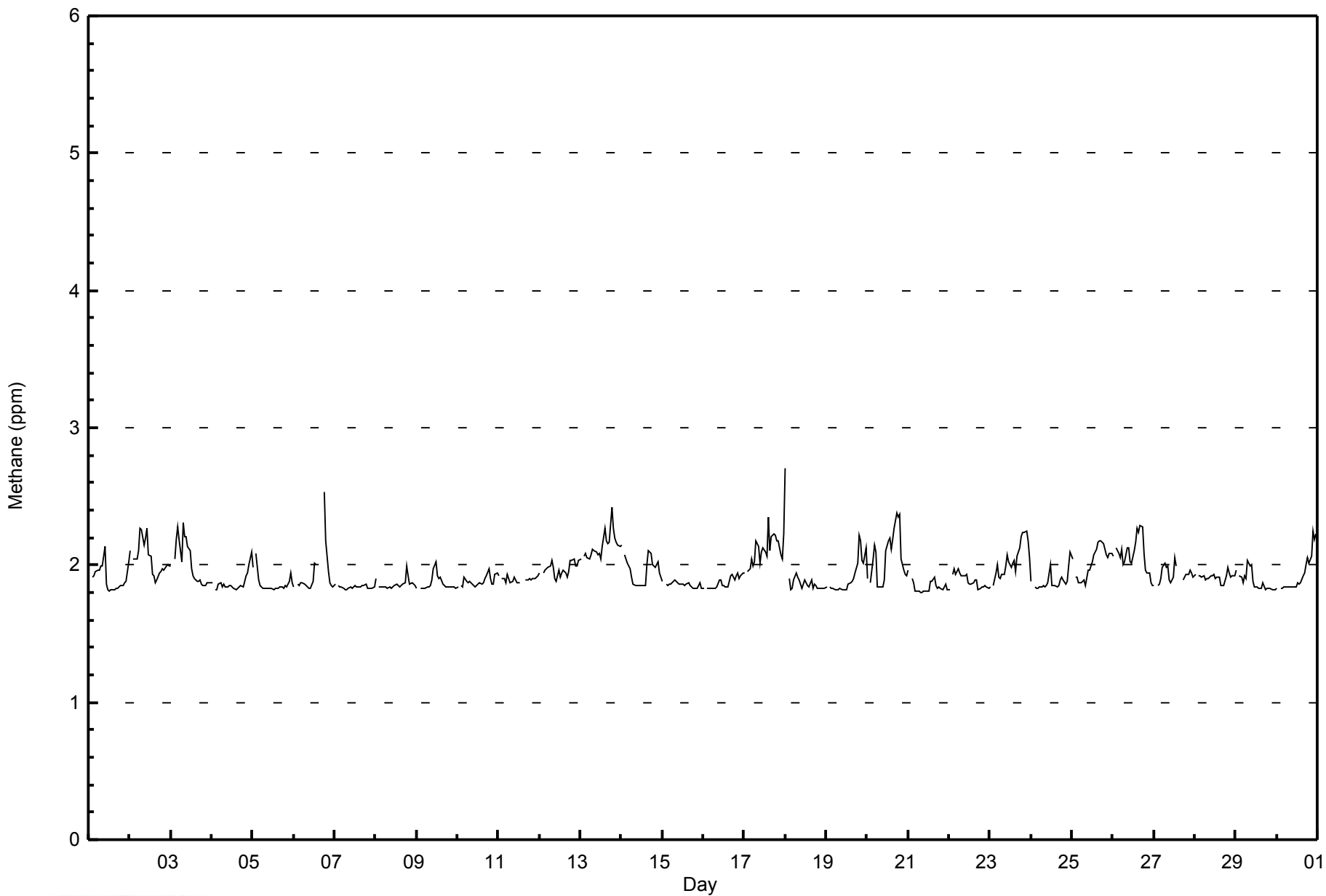
2.0	--	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	1.9	1.9	2.0	Diurnal Average
2.7	--	2.1	2.2	2.3	2.2	2.3	2.3	2.2	2.2	2.3	2.1	2.2	2.2	2.4	2.2	2.3	2.4	2.5	2.4	2.2	2.3	2.2	2.2	Diurnal Maximum

Z - zerospan C - Calibration M - Maintenance



WBEA
Hourly Averages

Methane (CH₄) - ppm
Fort McKay - Bertha Ganter - November 2014





WBEA
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Fort McKay - Bertha Ganter - November 2014

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	562	82.65	82.65
2.1 - 3.0	118	17.35	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 680

Total Number of Hours: 720



WBEA
Frequency Distribution

Methane (CH₄) - ppm
Fort McKay - Bertha Ganter - November 2014

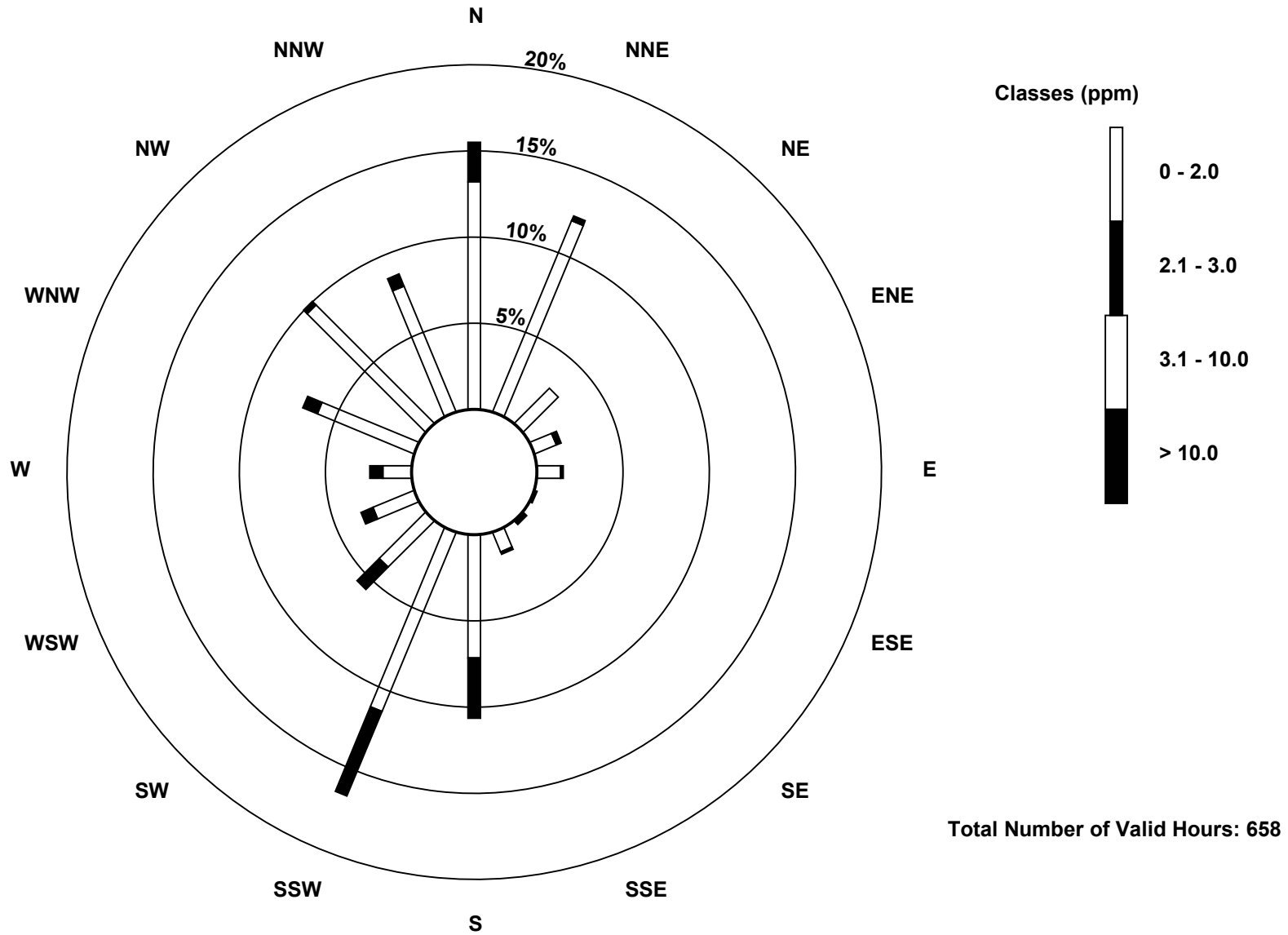
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	87	79	19	9	9	0	0	8	47	74	25	17	11	40	64	52	541
2.1 - 3.0	15	2	0	2	1	1	2	1	23	35	12	5	5	6	2	5	117
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	102	81	19	11	10	1	2	9	70	109	37	22	16	46	66	57	658

Total Number of Valid Hours: 658

Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

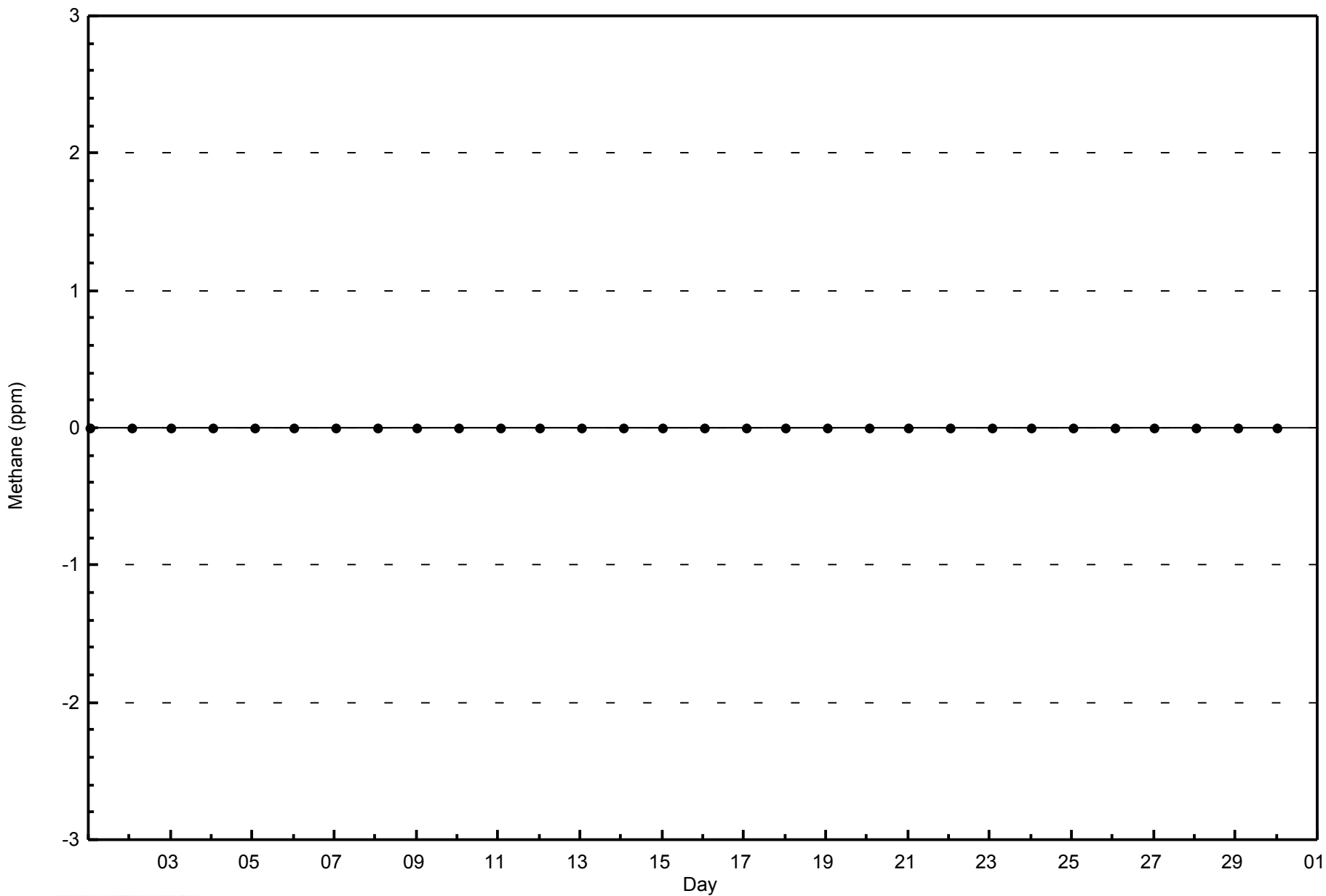
Methane (CH₄) - ppm
Fort McKay - Bertha Ganter (AMS 1)





WBEA
Zero Responses

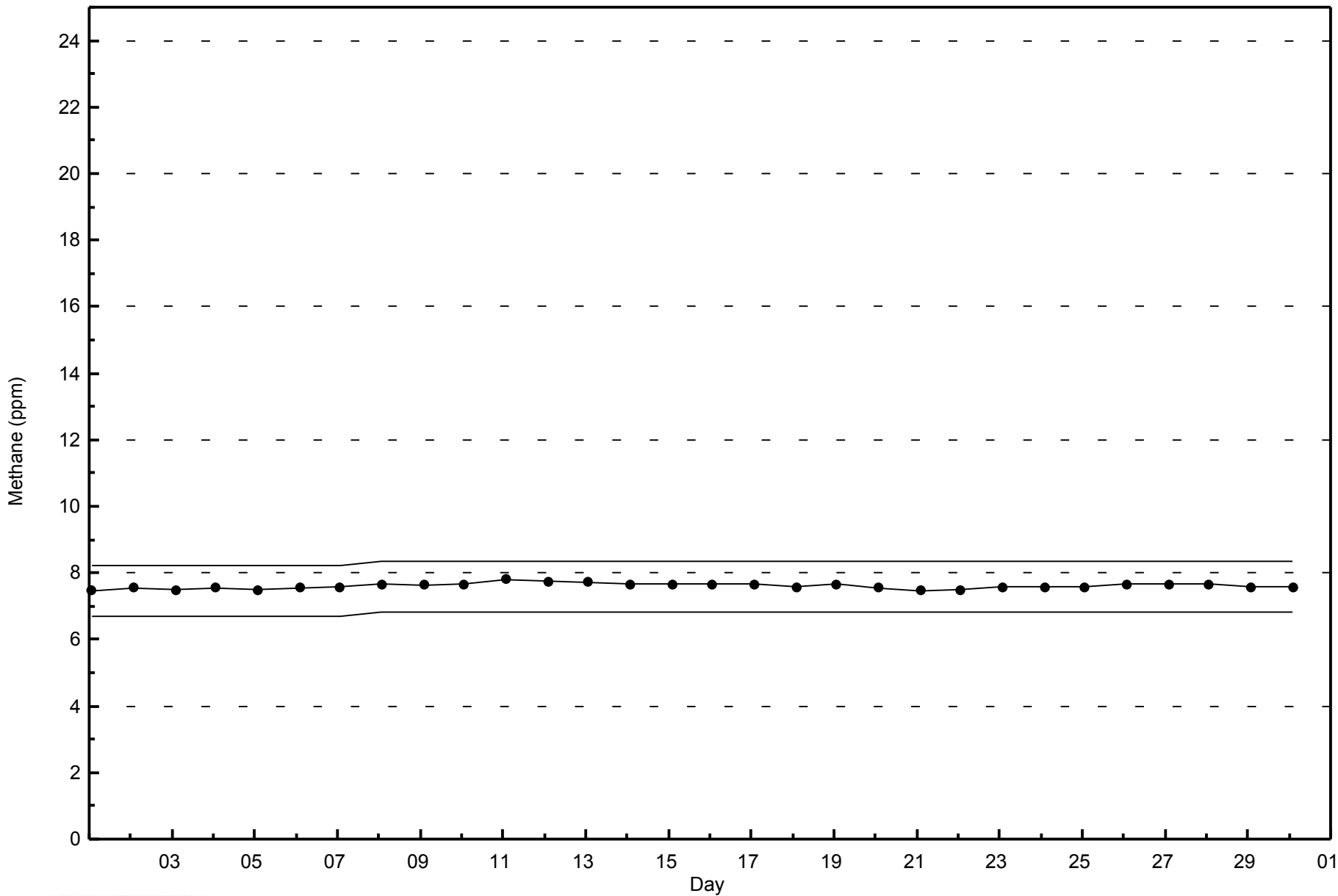
Methane (CH₄) - ppm
Fort McKay - Bertha Ganter - November 2014





WBEA
Span Responses

Methane (CH₄) - ppm
Fort McKay - Bertha Ganter - November 2014





Summary of Hour Averages

Fort McKay - Bertha Ganter - November 2014

Maximum Value: 56 ppb on Nov 2 11:00	Maximum Daily Average: 15.2 ppb on Nov 26	Hours in Service: 720
Minimum Value: 0 ppb on Nov 7 20:00	Minimum Daily Average: 0.1 ppb on Nov 7	Hours of Data: 682
Maximum Diurnal Average: 6.0 ppb at hour 11	Minimum Diurnal Average: 1.3 ppb at hour 5	Hours of Missing Data: 38
Monthly Average: 3.9 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 3 P ₉₀ = 13 P ₉₉ = 38	Hours of Calibration: 35
		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-Nov	22	Z	1	2	2	3	7	13	17	20	3	0	1	1	1	1	0	0	1	1	0	2	2	8	4.7	22
2-Nov	10	Z	5	4	3	12	35	38	28	34	56	15	9	6	5	5	3	9	8	11	10	9	10	14	14.7	56
3-Nov	2	Z	1	1	1	1	1	25	21	17	9	12	6	2	2	1	0	0	0	0	0	0	0	0	4.5	25
4-Nov	0	Z	0	0	0	0	0	0	0	1	0	2	1	0	0	1	0	0	0	0	0	0	4	11	1.0	11
5-Nov	7	Z	8	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	0	1	0	0	3	0	1.1	8
6-Nov	0	Z	0	0	0	0	0	0	1	1	2	1	2	3	3	2	4	29	40	11	0	0	0	0	4.4	40
7-Nov	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
8-Nov	0	Z	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.2	1
9-Nov	0	Z	0	0	0	0	0	0	0	1	4	7	3	2	2	0	0	0	0	0	0	0	0	0	0.9	7
10-Nov	0	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-Nov	0	Z	0	0	0	0	0	0	0	1	1	1	1	M	M	M	0	0	0	1	1	0	0	0	0.4	1
12-Nov	1	Z	2	11	12	11	12	22	20	4	5	10	3	2	1	1	1	1	1	2	3	0	1	2	5.5	22
13-Nov	2	Z	2	1	1	1	5	10	15	19	19	18	14	9	6	4	2	10	32	24	22	19	16	14	11.6	32
14-Nov	9	Z	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	3	5	3	7	14	8	2	2.4	14
15-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0.2	1
16-Nov	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0.2	1
17-Nov	1	Z	3	7	8	1	1	6	5	13	21	15	9	6	6	26	36	38	31	8	10	2	1	3	11.2	38
18-Nov	16	Z	0	0	0	0	0	1	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0.9	16
19-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	2	1	1	1	0	0	0	0	0	0	0	0.4	2
20-Nov	0	Z	0	0	0	0	0	1	1	2	4	6	10	42	25	20	2	0	4	30	5	0	0	0	6.6	42
21-Nov	0	Z	0	0	0	0	0	0	0	0	1	0	0	2	2	1	0	0	0	0	0	0	0	0	0.3	2
22-Nov	0	Z	0	0	0	0	0	0	0	1	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0.5	2
23-Nov	0	Z	0	0	0	0	0	0	1	4	12	16	14	6	5	3	2	15	31	40	38	48	34	7	12.0	48
24-Nov	0	Z	0	0	0	0	0	0	0	1	3	8	2	1	1	1	0	0	0	0	0	0	7	11	1.5	11
25-Nov	3	Z	1	0	0	0	0	0	0	3	7	9	13	14	16	20	24	23	12	8	7	7	20	33	9.6	33
26-Nov	25	Z	31	21	12	20	6	11	37	37	15	15	17	18	19	20	23	17	4	0	0	0	0	0	15.2	37
27-Nov	0	Z	0	0	0	0	0	1	0	1	2	6	13	9	2	2	3	0	0	2	1	1	0	0	1.8	13
28-Nov	0	Z	0	0	0	0	0	0	0	1	1	2	2	1	1	0	0	0	0	0	0	1	1	1	0.5	2
29-Nov	6	Z	1	0	0	1	1	9	5	6	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1.4	9
30-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	3	1	2	5	2	0	1	1	0	0	0	1	0.7	5

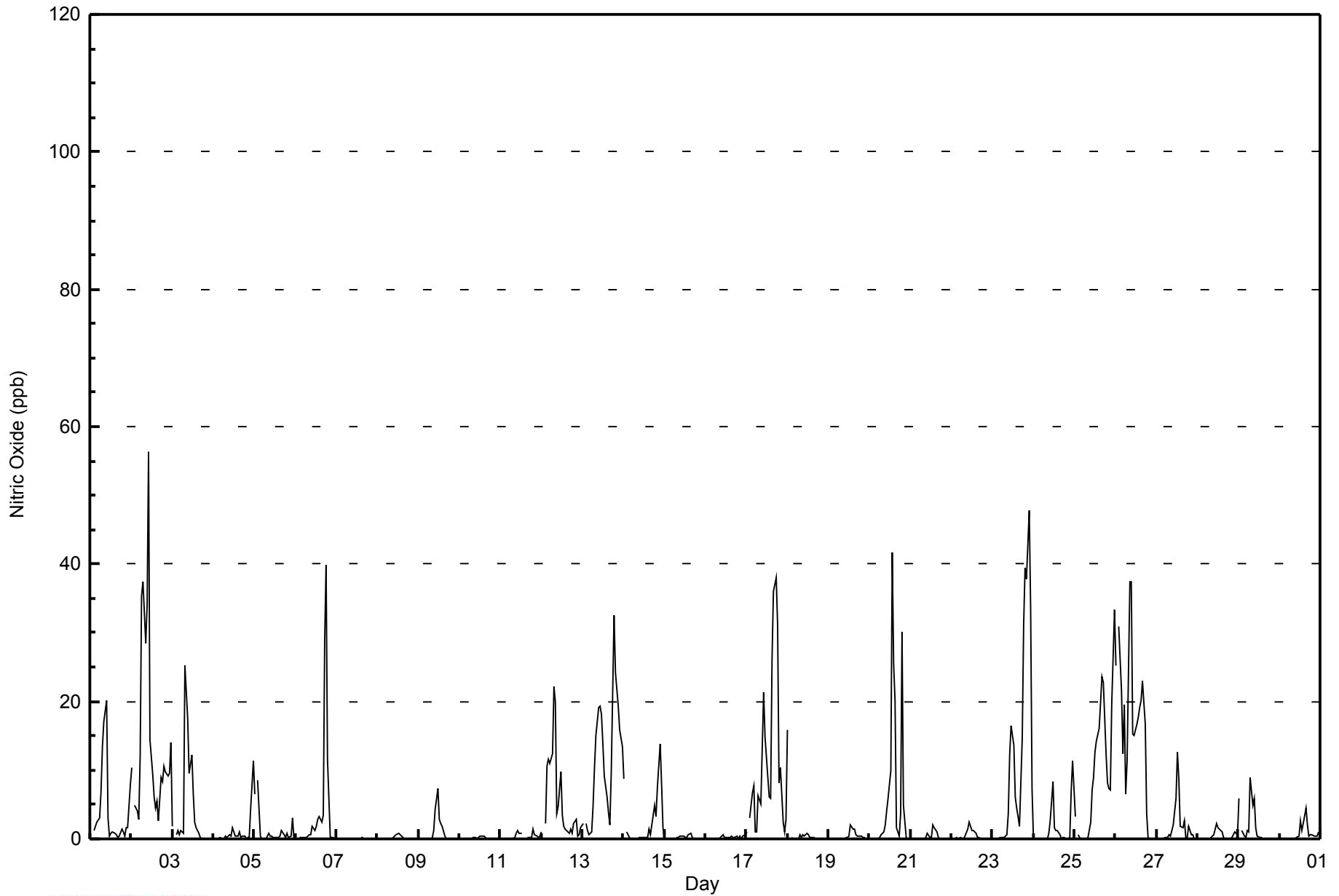
3.5	--	1.9	1.6	1.3	1.7	2.3	4.6	5.2	5.9	6.0	5.1	4.3	4.7	3.6	4.1	3.5	4.9	5.7	4.8	3.5	3.5	3.6	3.6	Diurnal Average	
25	--	31	21	12	20	35	38	37	37	56	18	17	42	25	26	36	38	40	40	38	48	34	33	Diurnal Maximum	

Z - zerspan C - Calibration M - Maintenance



WBEA
Hourly Averages

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





WBEA
Cumulative Frequency Distribution

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

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	646	94.72	94.72
21 - 40	33	4.84	99.56
41 - 80	3	0.44	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720



WBEA
Frequency Distribution

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

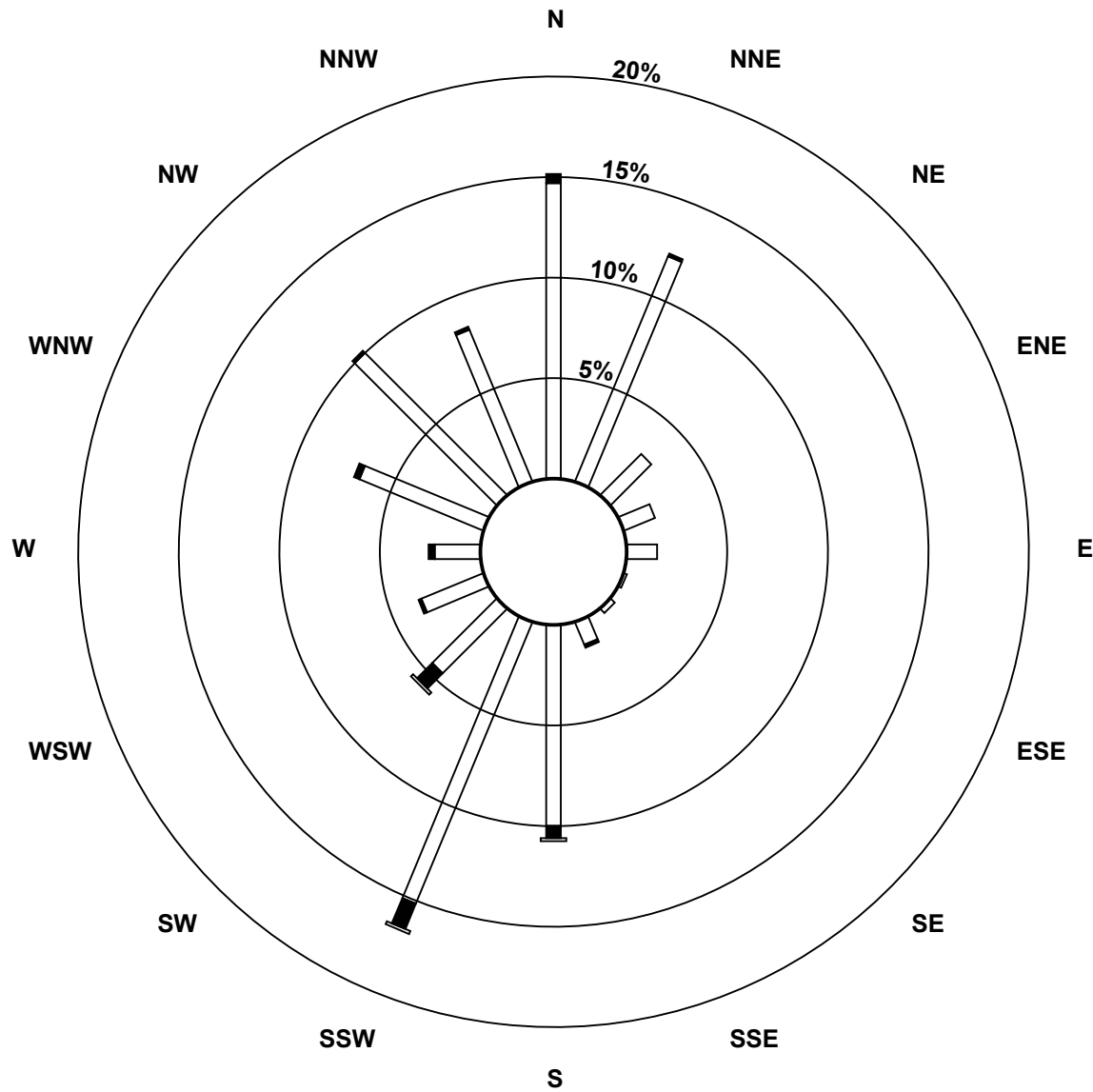
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	97	80	19	11	10	1	2	8	66	100	30	22	15	44	66	54	625
21 - 40	3	1	0	0	0	0	0	1	4	9	7	1	2	2	1	1	32
11 - 80	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	3
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	100	81	19	11	10	1	2	9	71	110	38	23	17	46	67	55	660

Total Number of Valid Hours: 660

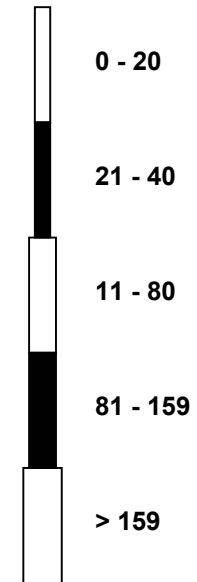
Total Number of Hours: 720

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

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



Classes (ppb)

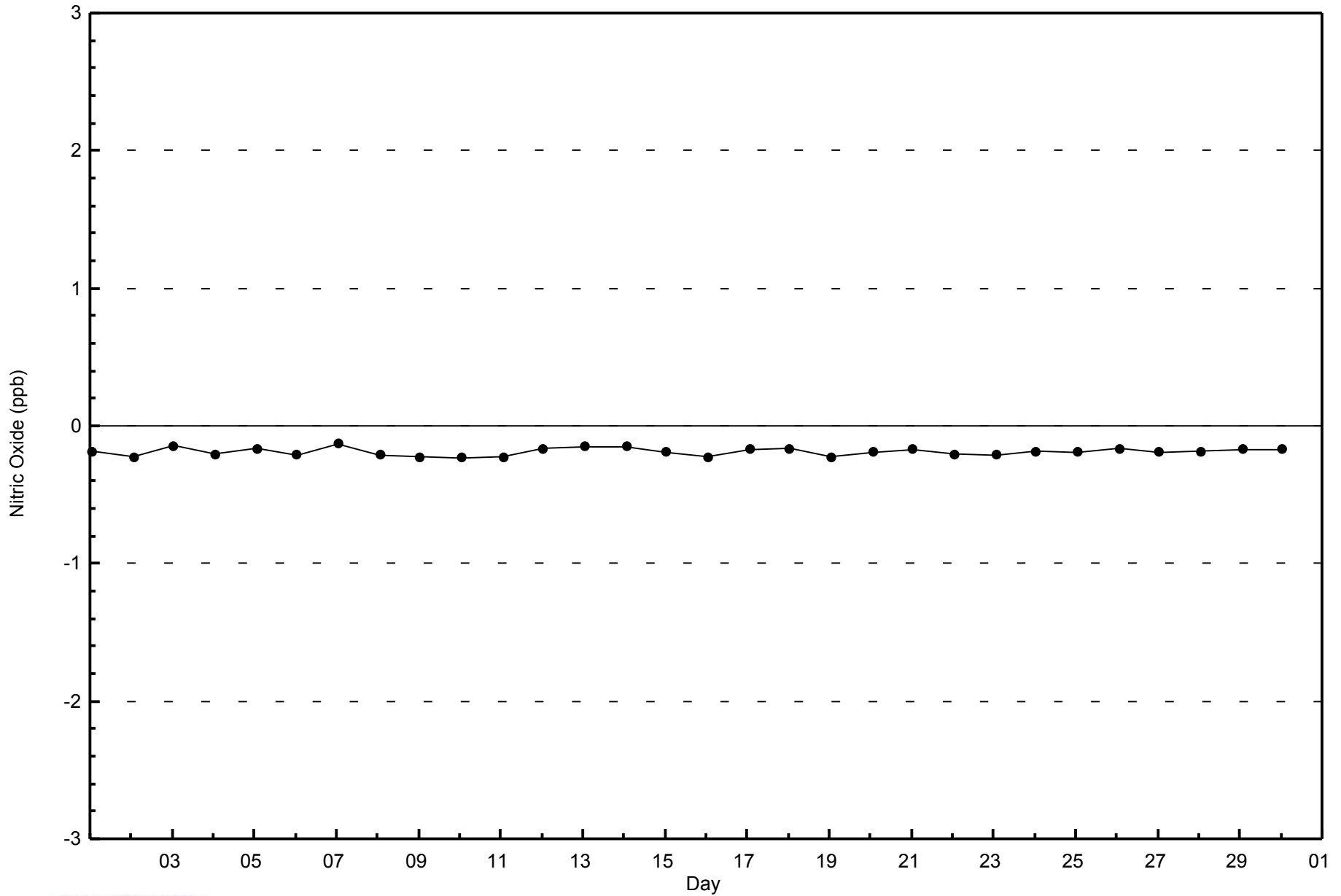


Total Number of Valid Hours: 660



WBEA
Zero Responses

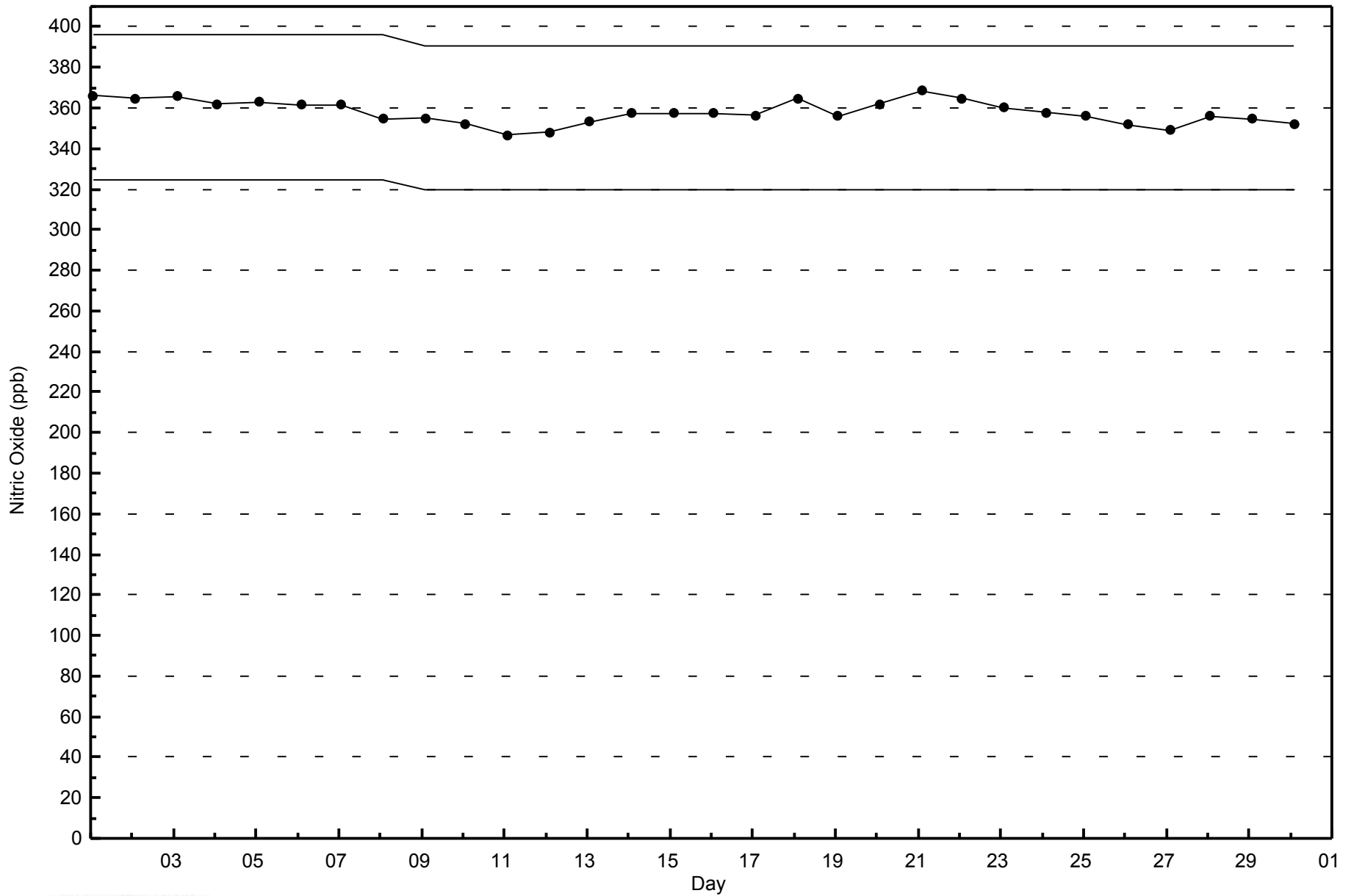
Nitric Oxide (NO) - ppb
Fort McKay - Bertha Ganter - November 2014





WBEA
Span Responses

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





Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 33 ppb on Nov 25 17:00	Maximum Daily Average: 19.8 ppb on Nov 26		Hours of Data:	682
Minimum Value: 0 ppb on Nov 30 00:00	Minimum Daily Average: 1.4 ppb on Nov 7		Hours of Missing Data:	38
Maximum Diurnal Average: 13.1 ppb at hour 19	Minimum Diurnal Average: 6.8 ppb at hour 13		Hours of Calibration:	35
Monthly Average: 8.8 ppb	Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 3 Median = 7 Q ₃ = 14 P ₉₀ = 20 P ₉₉ = 27		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-Nov	5	Z	2	2	2	3	4	7	10	9	3	1	1	2	2	3	3	10	12	7	4	6	6	10	4.9	12
2-Nov	8	Z	7	8	6	8	8	9	10	11	15	10	10	10	10	13	15	21	19	16	14	13	12	11	11.4	21
3-Nov	8	Z	6	9	9	9	7	9	9	7	6	8	10	8	8	7	8	8	7	6	5	7	11	11	7.9	11
4-Nov	8	Z	1	4	9	6	3	8	4	4	2	5	5	3	3	7	4	6	6	4	6	6	7	7	5.1	9
5-Nov	6	Z	8	4	3	2	2	1	2	1	1	1	1	1	1	1	3	4	3	9	1	6	12	3	3.3	12
6-Nov	2	Z	5	7	5	6	4	5	7	4	6	4	5	6	8	10	15	18	16	8	2	2	2	1	6.3	18
7-Nov	3	Z	1	0	1	1	1	1	1	C	C	C	C	C	1	2	2	4	4	1	0	0	1	2	1.4	4
8-Nov	6	Z	2	1	1	1	1	1	1	1	1	2	3	2	2	3	4	5	16	10	6	5	3	2	3.4	16
9-Nov	1	Z	0	0	1	0	1	1	1	3	7	10	6	7	9	4	3	3	3	1	2	3	2	1	2.9	10
10-Nov	0	Z	1	1	7	5	3	3	3	2	1	1	2	2	2	3	4	6	8	4	1	2	5	5	3.1	8
11-Nov	4	Z	5	3	2	6	4	2	3	6	4	3	3	M	M	M	7	13	11	15	12	12	9	8	6.6	15
12-Nov	10	Z	16	16	16	15	16	17	17	7	7	13	6	4	4	6	12	18	20	22	21	15	19	22	13.8	22
13-Nov	20	Z	20	18	17	18	20	22	20	17	16	14	13	12	14	17	20	22	24	20	19	17	16	14	17.7	24
14-Nov	18	Z	16	12	9	7	6	4	4	4	3	2	1	1	2	11	17	26	26	20	16	16	12	6	10.4	26
15-Nov	4	Z	1	1	1	1	1	3	2	2	1	1	1	1	4	8	4	5	1	1	0	3	4	1	2.2	8
16-Nov	1	Z	0	1	0	1	1	1	2	8	6	2	2	1	2	9	17	21	13	10	11	5	8	10	5.6	21
17-Nov	11	Z	12	15	20	17	18	23	21	18	18	16	13	11	16	26	27	26	23	20	17	15	12	14	17.8	27
18-Nov	22	Z	7	2	2	5	8	9	6	5	3	5	4	2	2	5	2	5	5	1	0	0	1	1	4.4	22
19-Nov	1	Z	2	2	1	0	0	1	2	1	1	1	1	9	8	13	17	20	19	18	19	17	11	10	7.5	20
20-Nov	10	Z	6	6	8	8	6	9	11	13	13	13	14	22	19	20	17	15	15	21	20	14	12	11	13.1	22
21-Nov	14	Z	10	8	4	4	5	3	2	2	6	2	1	9	11	15	10	7	6	3	2	4	7	1	5.9	15
22-Nov	3	Z	15	20	14	15	11	11	12	11	12	8	7	7	6	7	9	5	3	3	4	5	5	4	8.4	20
23-Nov	6	Z	6	15	18	12	10	16	14	16	19	15	12	9	10	13	17	21	21	21	20	21	18	17	15.0	21
24-Nov	7	Z	3	2	1	2	4	5	3	7	13	20	6	5	8	10	9	18	20	15	11	13	24	29	10.2	29
25-Nov	25	Z	21	15	11	11	9	7	6	14	17	14	17	20	25	31	33	29	27	25	23	21	21	24	19.3	33
26-Nov	22	Z	25	25	24	23	22	23	25	24	18	20	23	25	26	27	26	25	10	8	10	3	1	1	19.8	27
27-Nov	1	Z	3	3	8	17	16	16	15	10	8	12	20	16	8	11	18	9	8	16	16	19	11	8	11.6	20
28-Nov	10	Z	9	8	8	8	5	6	7	8	9	9	7	7	7	4	5	5	8	12	10	11	12	12	8.1	12
29-Nov	17	Z	9	10	6	20	17	28	17	17	6	1	1	1	1	2	5	0	2	1	2	0	0	0	7.0	28
30-Nov	0	Z	0	0	0	1	0	0	0	1	1	1	5	3	8	22	22	18	23	23	20	19	21	17	8.8	23

8.4	--	7.3	7.2	7.0	7.6	7.1	8.3	7.8	8.0	7.6	7.2	6.8	7.3	7.7	10.6	11.9	13.1	13.1	11.4	9.7	9.6	9.5	8.7	Diurnal Average	
25	--	25	25	24	23	22	28	25	24	19	20	20	23	25	31	33	29	27	25	23	21	24	29	Diurnal Maximum	

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



WBEA
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Fort McKay - Bertha Ganter - November 2014





WBEA
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Fort McKay - Bertha Ganter - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	624	91.50	91.50
21 - 40	58	8.50	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Fort McKay - Bertha Ganter - November 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	91	79	19	9	10	1	1	7	67	87	32	20	15	43	67	55	603
21 - 40	9	2	0	2	0	0	1	2	4	23	6	3	2	3	0	0	57
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	100	81	19	11	10	1	2	9	71	110	38	23	17	46	67	55	660

Total Number of Valid Hours: 660

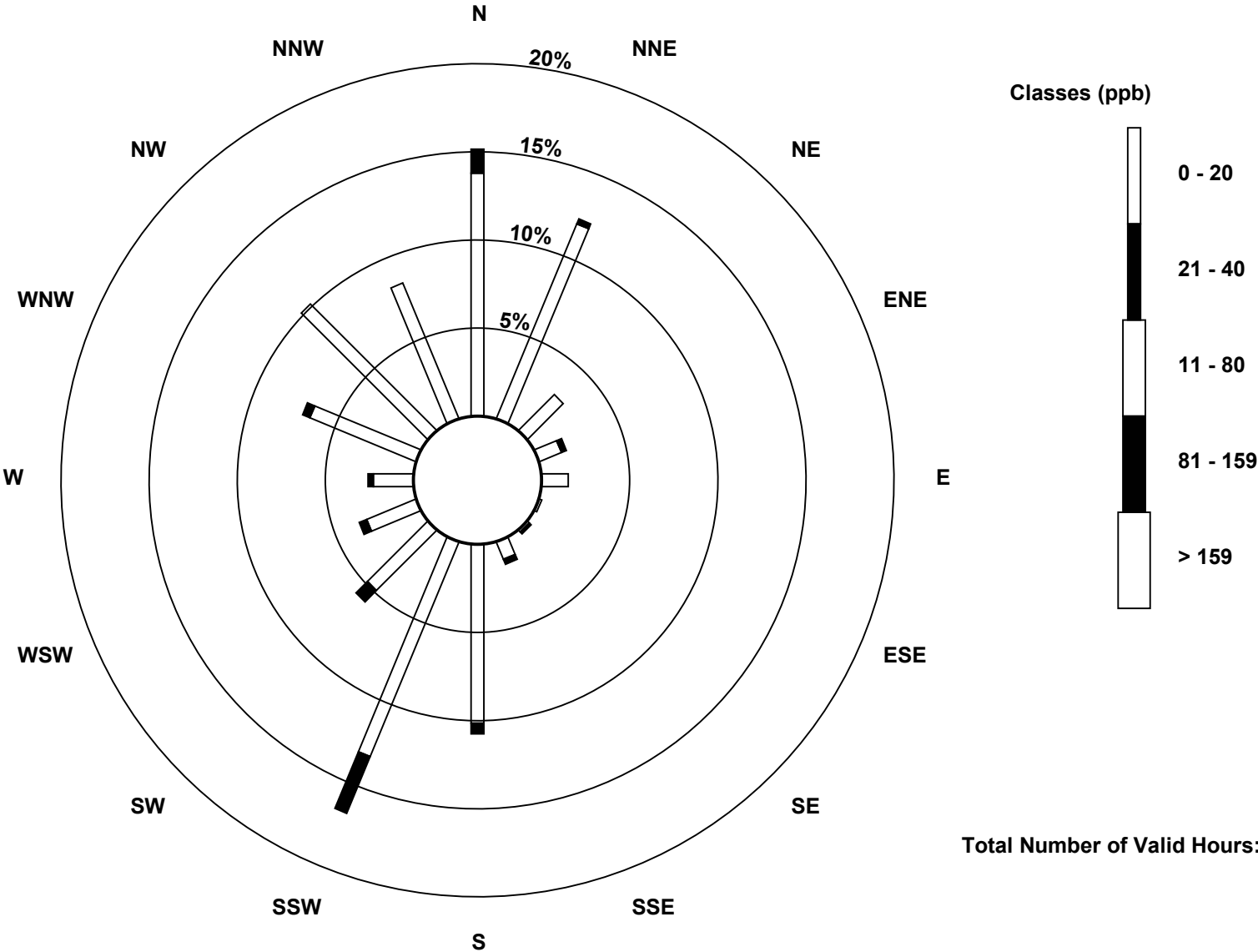
Total Number of Hours: 720

Wood Buffalo Environmental Association

Wind Rose Nov 2014

Nitrogen Dioxide (NO₂) - ppb

Fort McKay - Bertha Ganter (AMS 1)

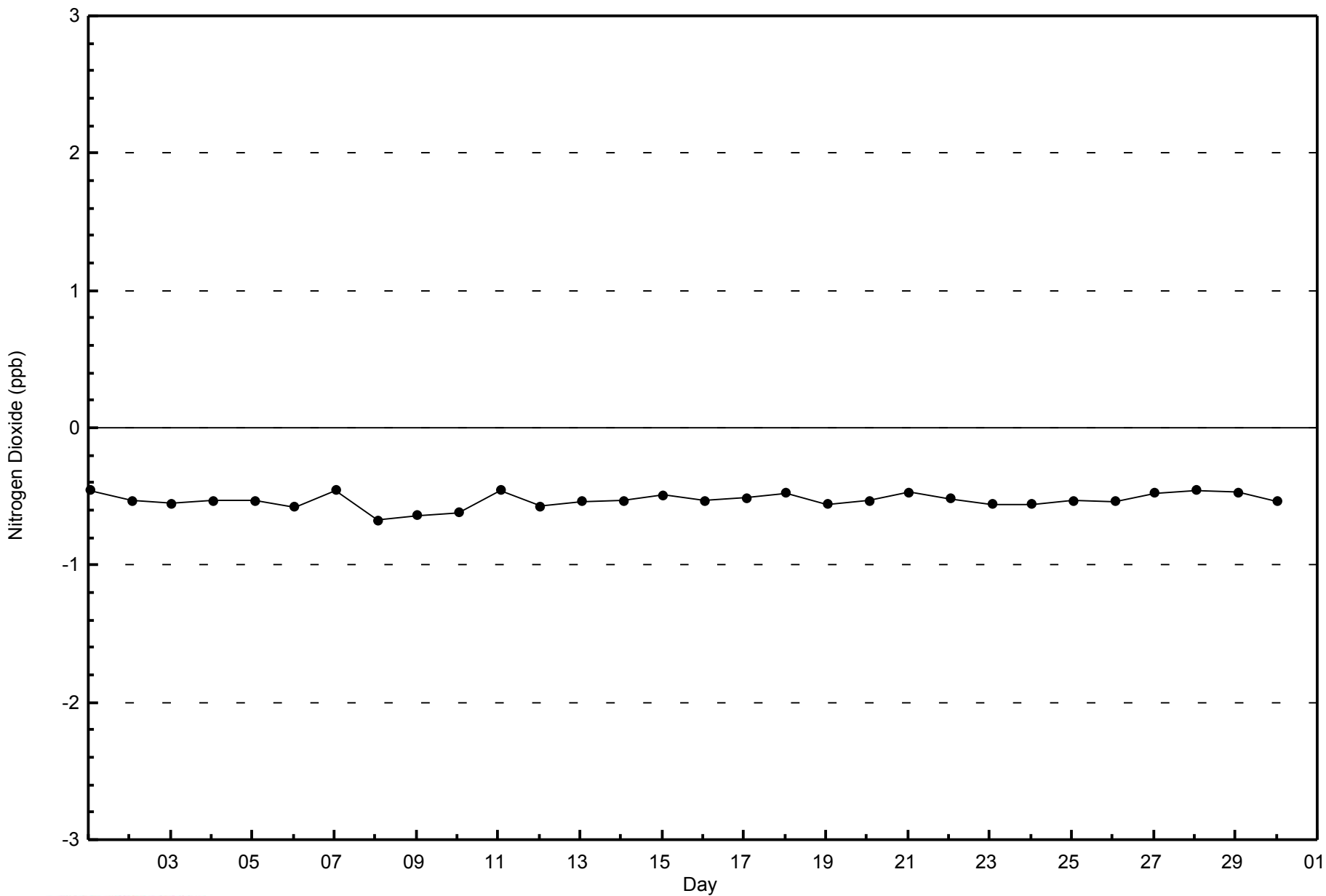


Total Number of Valid Hours: 660



WBEA
Zero Responses

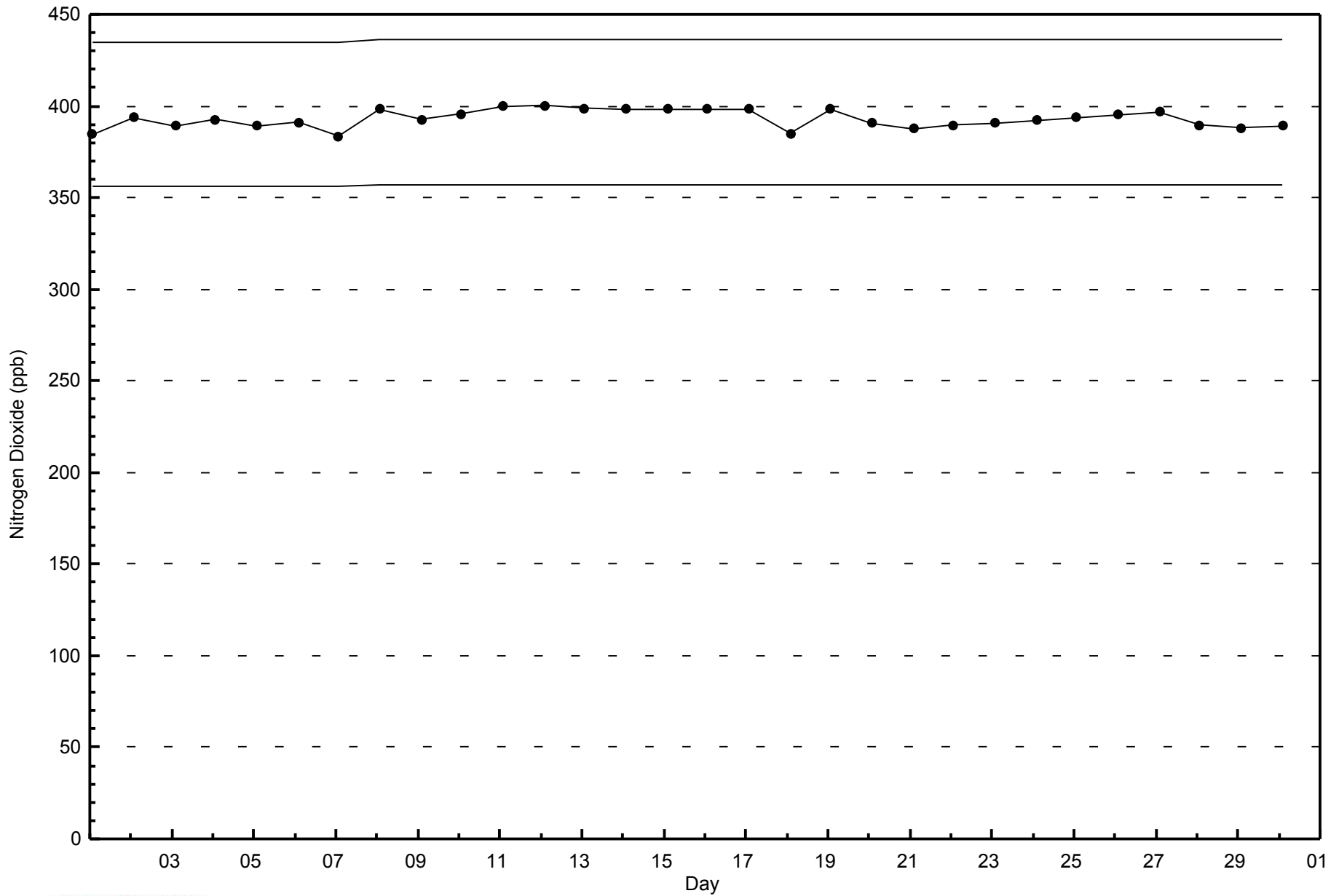
Nitrogen Dioxide (NO₂) - ppb
Fort McKay - Bertha Ganter - November 2014





WBEA
Span Responses

Nitrogen Dioxide (NO₂) - ppb
Fort McKay - Bertha Ganter - November 2014





Maximum Value: 71 ppb on Nov 2 11:00	Maximum Daily Average: 35.0 ppb on Nov 26	Hours in Service: 720
Minimum Value: 0 ppb on Nov 30 01:00	Minimum Daily Average: 1.4 ppb on Nov 7	Hours of Data: 682
Maximum Diurnal Average: 18.9 ppb at hour 19	Minimum Diurnal Average: 8.3 ppb at hour 5	Hours of Missing Data: 38
Monthly Average: 12.7 ppb	Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 3 Median = 8 Q ₃ = 18 P ₉₀ = 31 P ₉₉ = 61	Hours of Calibration: 35
		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-Nov	26	Z	3	4	5	6	11	20	27	29	6	1	2	3	3	3	3	10	13	8	5	7	8	18	9.6	29
2-Nov	18	Z	12	12	9	20	43	47	38	45	71	25	20	16	14	19	17	29	27	27	23	22	21	25	26.2	71
3-Nov	10	Z	7	10	10	10	8	34	30	24	16	20	16	10	9	8	8	8	7	6	5	7	11	11	12.4	34
4-Nov	8	Z	1	4	9	6	3	8	4	5	3	7	6	3	3	8	4	7	6	4	6	6	10	18	6.1	18
5-Nov	13	Z	17	4	3	2	1	1	2	1	1	1	1	1	1	2	5	5	4	10	1	7	15	3	4.4	17
6-Nov	2	Z	5	7	5	6	4	5	8	5	8	5	7	9	11	13	19	47	55	19	2	2	2	1	10.7	55
7-Nov	3	Z	1	1	1	1	1	1	1	C	C	C	C	C	2	2	2	4	4	1	0	0	0	1	1.4	4
8-Nov	6	Z	2	1	1	1	1	1	1	1	2	3	4	3	2	3	4	4	16	10	6	5	3	2	3.5	16
9-Nov	1	Z	0	0	0	0	1	1	1	5	11	18	9	9	11	4	3	3	3	1	2	3	2	1	3.8	18
10-Nov	0	Z	1	1	7	5	3	3	4	2	1	1	2	3	3	3	4	6	9	4	1	2	5	5	3.2	9
11-Nov	4	Z	5	3	2	6	4	2	4	7	5	3	4	M	M	M	7	13	12	17	13	12	10	9	7.0	17
12-Nov	11	Z	18	27	28	26	28	39	37	10	11	22	10	6	6	7	13	20	21	24	23	15	19	24	19.4	39
13-Nov	22	Z	22	19	17	19	25	33	35	36	35	32	26	22	20	21	22	32	56	44	41	36	32	28	29.3	56
14-Nov	27	Z	17	12	9	7	6	4	4	4	3	2	1	1	2	13	18	30	31	23	24	30	20	8	12.8	31
15-Nov	4	Z	1	1	1	1	2	3	3	3	2	2	1	1	5	9	5	5	1	1	0	3	4	1	2.4	9
16-Nov	1	Z	0	0	0	1	1	1	2	8	7	2	2	2	2	9	17	21	13	10	11	5	8	10	5.8	21
17-Nov	12	Z	15	22	28	18	19	30	26	31	40	31	22	17	22	52	63	64	54	28	27	18	13	17	29.0	64
18-Nov	38	Z	7	2	1	5	7	10	6	6	3	6	4	3	2	5	2	5	5	1	0	0	1	1	5.2	38
19-Nov	1	Z	2	2	1	0	0	1	2	2	1	1	2	10	9	14	18	20	20	18	19	17	11	10	7.9	20
20-Nov	10	Z	6	6	8	8	7	10	11	14	17	19	24	64	45	40	18	16	19	51	25	14	12	11	19.8	64
21-Nov	14	Z	10	8	4	4	5	3	2	3	7	2	1	11	12	16	10	7	6	3	2	4	7	1	6.1	16
22-Nov	3	Z	15	20	14	15	11	11	12	13	14	9	8	8	7	7	9	5	3	3	3	5	5	4	8.8	20
23-Nov	6	Z	6	15	18	12	11	16	15	20	31	32	26	15	14	16	19	36	52	60	58	69	52	24	27.0	69
24-Nov	7	Z	3	2	1	2	4	5	3	8	16	28	8	7	9	10	10	18	20	15	11	13	30	41	11.8	41
25-Nov	29	Z	22	15	11	11	10	7	6	16	24	23	30	34	41	51	56	52	39	33	30	28	41	57	28.8	57
26-Nov	47	Z	56	47	36	43	29	35	63	61	34	33	37	41	44	46	50	43	29	11	8	10	3	1	35.0	63
27-Nov	1	Z	3	3	7	17	16	16	16	11	10	18	32	24	10	12	21	9	8	18	16	20	11	8	13.4	32
28-Nov	10	Z	9	8	8	8	5	6	7	9	10	11	9	8	8	4	5	5	8	12	11	12	13	12	8.6	13
29-Nov	23	Z	10	10	6	21	17	37	22	23	7	1	1	1	1	2	5	0	2	1	2	0	0	0	8.4	37
30-Nov	0	Z	0	0	0	0	0	0	0	1	1	1	8	4	10	26	24	18	23	23	20	19	21	18	9.6	26

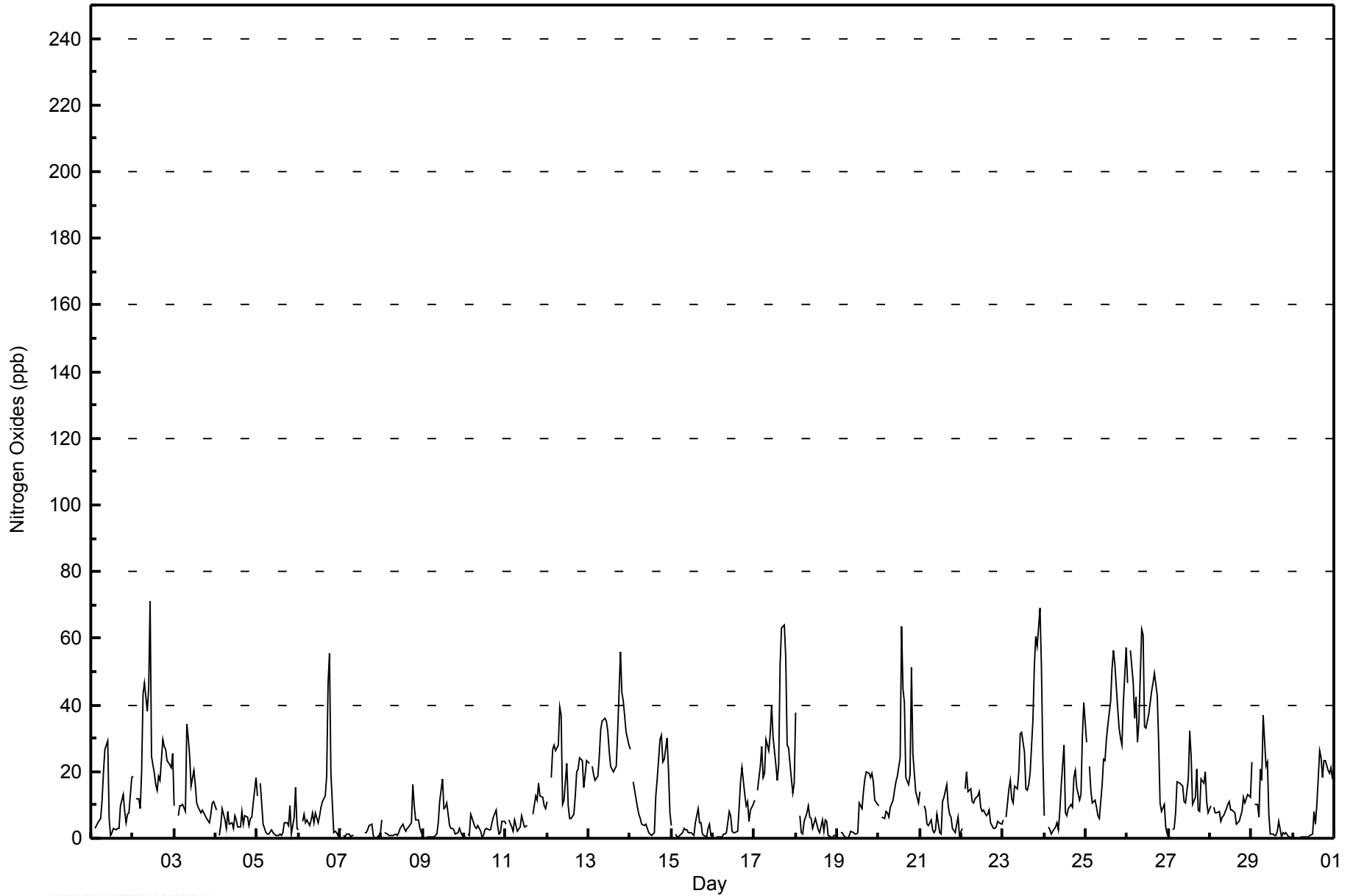
11.8	--	9.2	8.8	8.3	9.3	9.4	12.9	13.0	13.9	13.7	12.4	11.1	12.0	11.3	14.6	15.3	18.0	18.9	16.2	13.2	13.1	13.0	12.3	Diurnal Average	
47	--	56	47	36	43	43	47	63	61	71	33	37	64	45	52	63	64	56	60	58	69	52	57	Diurnal Maximum	

Z - zerspan C - Calibration M - Maintenance



WBEA
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Fort McKay - Bertha Ganter - November 2014





WBEA
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Fort McKay - Bertha Ganter - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	542	79.47	79.47
21 - 40	101	14.81	94.28
41 - 80	39	5.72	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Fort McKay - Bertha Ganter - November 2014

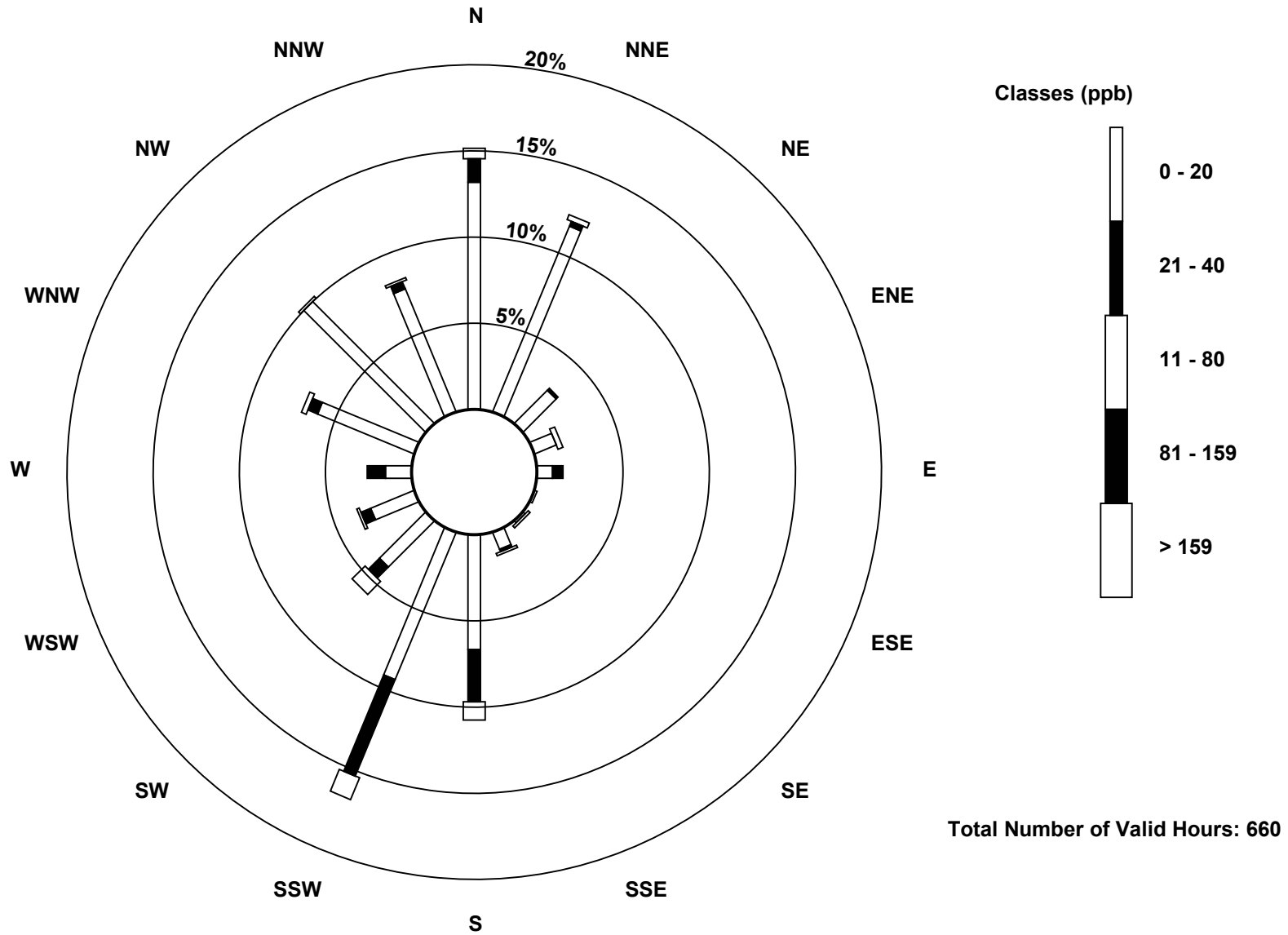
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	87	77	18	9	6	1	1	7	44	61	25	18	10	40	66	51	521
21 - 40	9	2	1	0	4	0	0	1	20	40	6	4	7	4	0	3	101
11 - 80	4	2	0	2	0	0	1	1	7	9	7	1	0	2	1	1	38
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	100	81	19	11	10	1	2	9	71	110	38	23	17	46	67	55	660

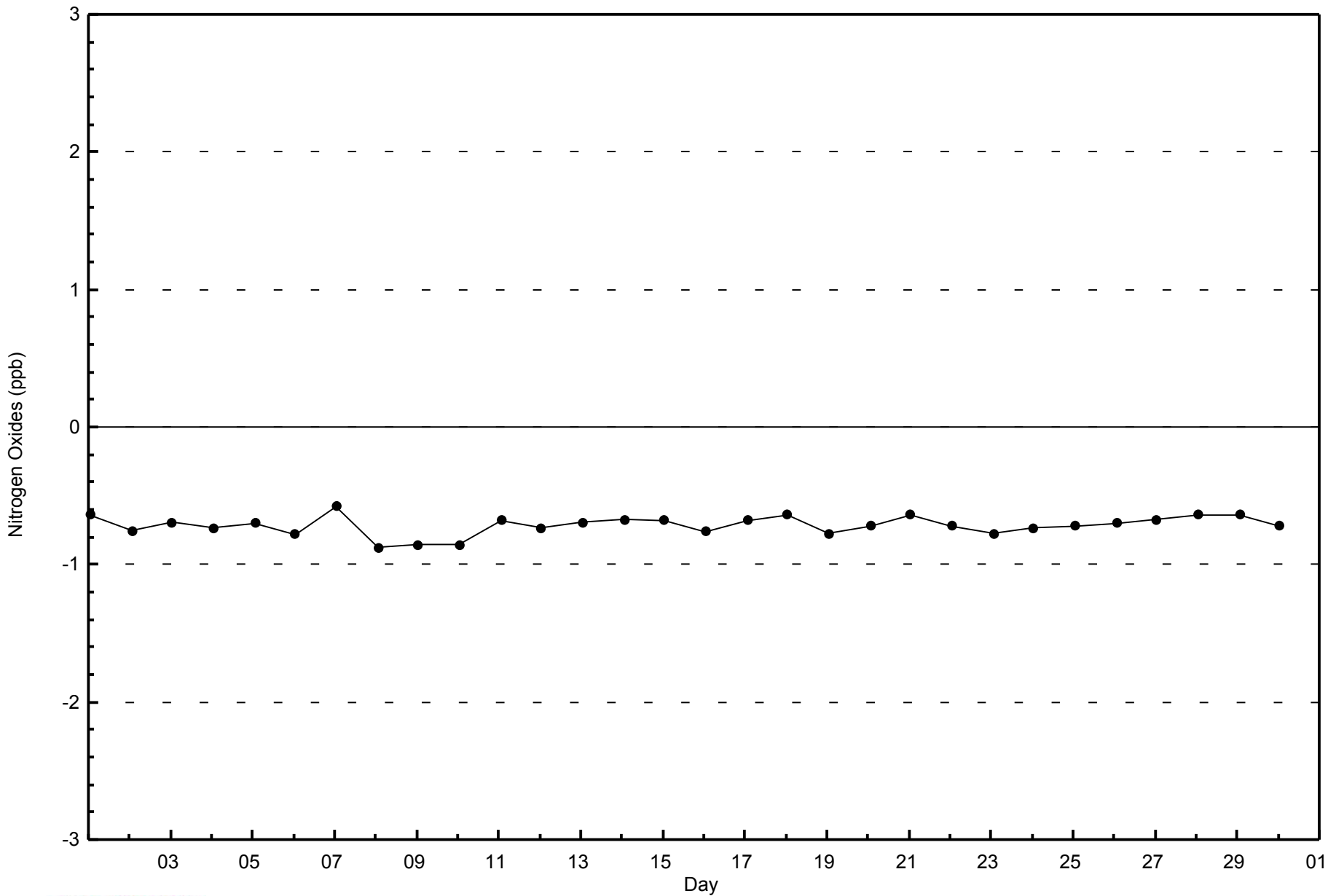
Total Number of Valid Hours: 660

Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

Nitrogen Oxides (NO_x) - ppb
Fort McKay - Bertha Ganter (AMS 1)

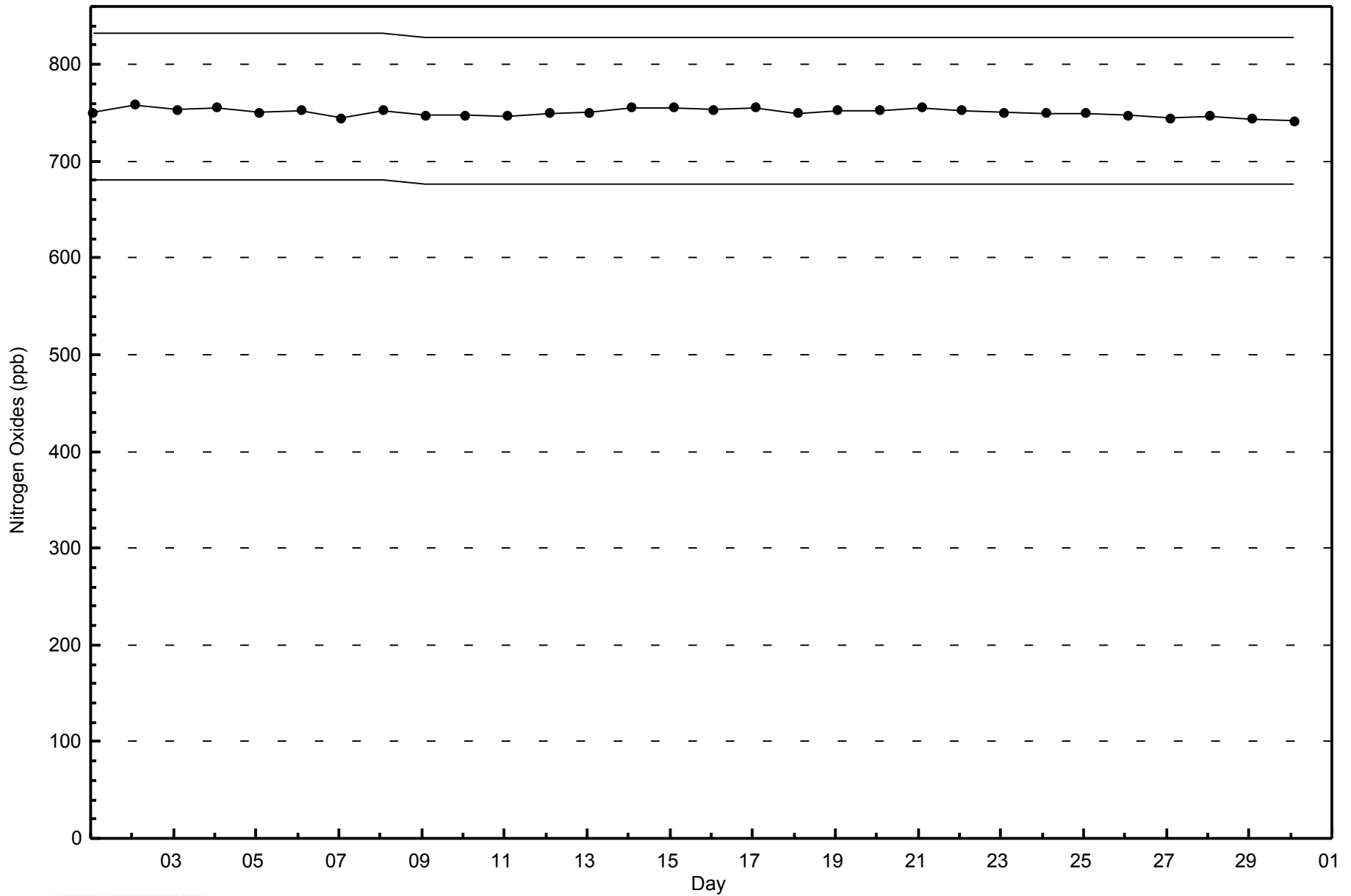






WBEA
Span Responses

Nitrogen Oxides (NO_x) - ppb
Fort McKay - Bertha Ganter - November 2014





Summary of Hour Averages

Fort McKay - Bertha Ganter - November 2014

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 39 ppb on Nov 16 05:00	Maximum Daily Average: 30.7 ppb on Nov 7		Hours of Data:	682
Minimum Value: 1 ppb on Nov 26 02:00	Minimum Daily Average: 5.9 ppb on Nov 13		Hours of Missing Data:	38
Maximum Diurnal Average: 23.1 ppb at hour 13	Minimum Diurnal Average: 13.3 ppb at hour 19		Hours of Calibration:	35
Monthly Average: 17.5 ppb	Percentiles: P ₁ = 2 P ₁₀ = 4 Q ₁ = 8 Median = 17 Q ₃ = 26 P ₉₀ = 32 P ₉₉ = 37		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-Nov	4	4	Z	4	4	4	4	4	4	6	15	20	24	24	25	26	24	15	9	8	9	5	5	4	10.9	26
2-Nov	4	5	Z	4	4	4	4	4	4	5	6	11	15	18	19	12	11	4	4	4	4	4	4	4	6.9	19
3-Nov	6	10	Z	6	6	5	5	4	4	4	6	6	9	13	13	13	13	14	15	16	14	12	11	9.5	16	
4-Nov	14	18	Z	17	12	14	17	10	13	13	14	11	12	15	14	10	10	7	6	8	6	5	4	4	11.0	18
5-Nov	4	4	Z	8	10	11	12	13	12	13	14	15	16	16	16	13	8	9	11	8	17	13	8	17	11.6	17
6-Nov	18	17	Z	12	15	15	17	17	15	18	17	20	20	19	17	14	7	4	4	9	14	22	23	23	15.4	23
7-Nov	20	18	Z	26	27	29	35	34	34	34	35	36	36	C	C	C	C	C	32	35	35	33	29	27	30.7	36
8-Nov	20	21	Z	22	21	24	24	25	29	31	33	33	32	33	34	33	31	26	17	19	19	17	22	21	25.6	34
9-Nov	24	25	Z	22	22	23	21	20	20	19	18	19	26	29	28	32	27	26	24	33	33	30	31	34	25.6	34
10-Nov	34	33	Z	31	25	25	24	22	25	31	33	34	32	30	30	30	28	26	23	27	29	27	23	23	28.0	34
11-Nov	24	22	Z	27	27	24	27	29	26	25	28	30	29	M	M	M	19	12	12	6	5	5	6	5	19.4	30
12-Nov	4	7	Z	2	2	2	2	3	7	21	22	17	23	25	25	22	15	8	7	5	6	10	7	3	10.6	25
13-Nov	4	3	Z	5	6	5	3	3	4	7	9	11	13	15	16	11	6	2	2	2	2	2	2	2	5.9	16
14-Nov	2	3	Z	8	10	10	18	24	26	25	27	30	32	32	32	21	12	3	2	4	5	2	7	17	15.2	32
15-Nov	22	23	Z	28	27	27	26	25	25	27	29	30	31	31	29	24	27	26	30	30	33	29	28	34	27.8	34
16-Nov	34	36	Z	38	39	37	37	36	35	28	31	36	36	36	35	27	16	9	16	19	12	16	11	7	27.3	39
17-Nov	5	4	Z	2	2	6	5	3	5	8	8	13	17	18	15	5	2	2	2	3	2	3	4	3	6.0	18
18-Nov	2	7	Z	28	26	20	16	17	22	23	29	29	31	33	34	31	33	30	31	34	34	33	33	33	26.5	34
19-Nov	32	32	Z	34	34	33	33	32	35	36	38	38	37	29	30	25	19	13	12	15	13	13	19	20	27.0	38
20-Nov	21	20	Z	23	21	22	23	19	17	14	14	14	12	4	5	3	6	6	4	2	3	10	12	14	12.7	23
21-Nov	12	20	Z	19	23	24	20	24	24	22	23	30	32	23	19	15	21	24	25	29	29	26	24	31	23.5	32
22-Nov	29	24	Z	11	16	16	19	19	18	18	18	22	22	21	23	22	21	24	24	25	24	23	23	23	21.1	29
23-Nov	22	23	Z	13	10	14	14	10	11	9	8	10	12	16	15	10	5	3	2	2	2	2	2	3	9.5	23
24-Nov	17	20	Z	25	26	25	26	24	25	22	18	13	26	27	26	23	22	13	12	16	19	17	7	2	19.6	27
25-Nov	4	7	Z	15	19	17	18	23	24	17	15	18	16	14	10	4	2	1	1	1	1	2	1	2	10.1	24
26-Nov	1	1	Z	2	2	2	2	2	2	4	8	9	8	6	4	3	2	2	3	16	19	17	27	30	7.5	30
27-Nov	31	30	Z	28	23	13	13	14	15	19	20	17	13	16	19	14	7	14	13	5	4	5	18	24	16.3	31
28-Nov	21	23	Z	23	22	22	25	24	23	21	21	21	23	23	23	26	25	23	17	13	12	10	8	9	19.9	26
29-Nov	5	4	Z	15	20	8	12	3	13	14	25	31	31	32	32	31	27	34	32	32	31	32	32	33	23.0	34
30-Nov	32	32	Z	32	32	30	30	31	31	31	31	31	27	31	26	12	11	14	10	10	13	13	12	14	23.4	32

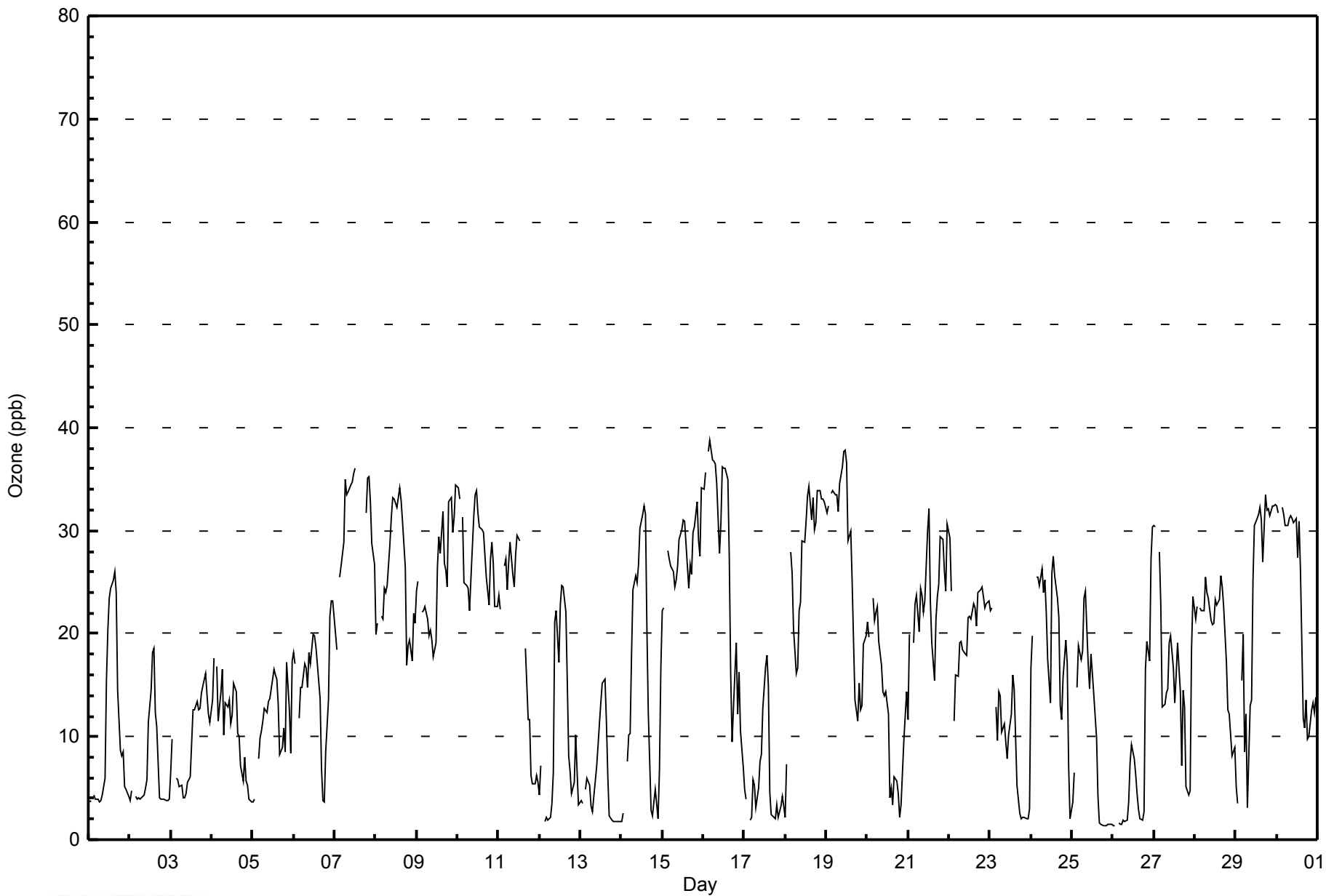
15.7	16.5	--	17.6	17.7	17.1	17.8	17.3	18.3	18.9	20.3	21.9	23.1	22.5	21.9	18.4	15.7	13.5	13.3	14.5	15.1	14.7	14.8	15.9	Diurnal Average	
34	36	--	38	39	37	37	36	35	36	38	38	37	36	35	33	33	34	32	35	35	33	33	34	Diurnal Maximum	

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



WBEA
Hourly Averages

Ozone (O₃) - ppb
Fort McKay - Bertha Ganter - November 2014





WBEA
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Fort McKay - Bertha Ganter - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	396	58.06	58.06
21 - 50	286	41.94	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720



WBEA
Frequency Distribution

Ozone (O₃) - ppb
Fort McKay - Bertha Ganter - November 2014

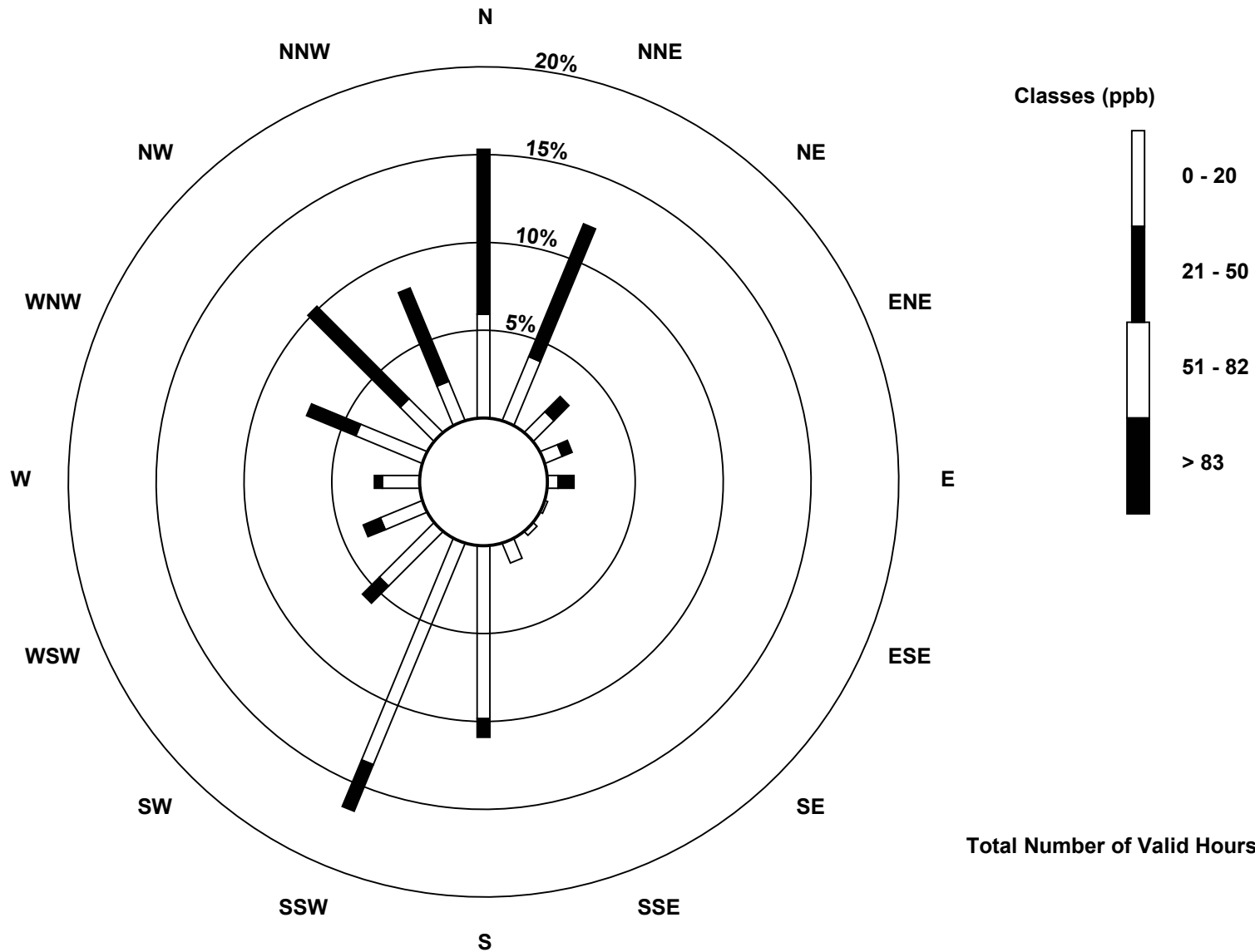
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	39	26	11	7	4	1	2	8	65	90	29	17	14	27	18	16	374
21 - 50	62	54	8	4	6	0	0	0	7	19	9	7	3	20	49	38	286
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	101	80	19	11	10	1	2	8	72	109	38	24	17	47	67	54	660

Total Number of Valid Hours: 660

Total Number of Hours: 720

Wood Buffalo Environmental Association
 Wind Rose Nov 2014

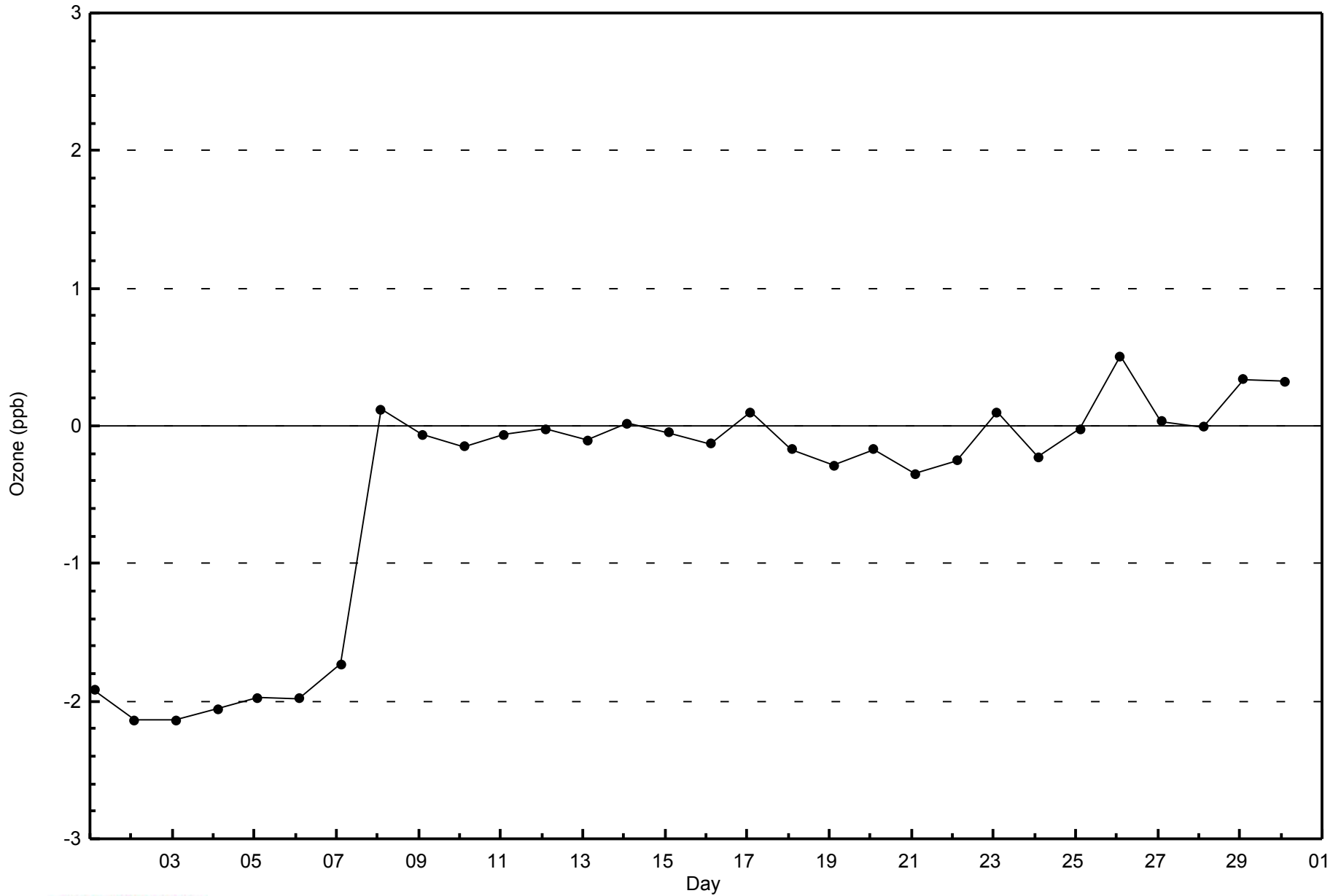
Ozone (O₃) - ppb
 Fort McKay - Bertha Ganter (AMS 1)





WBEA
Zero Responses

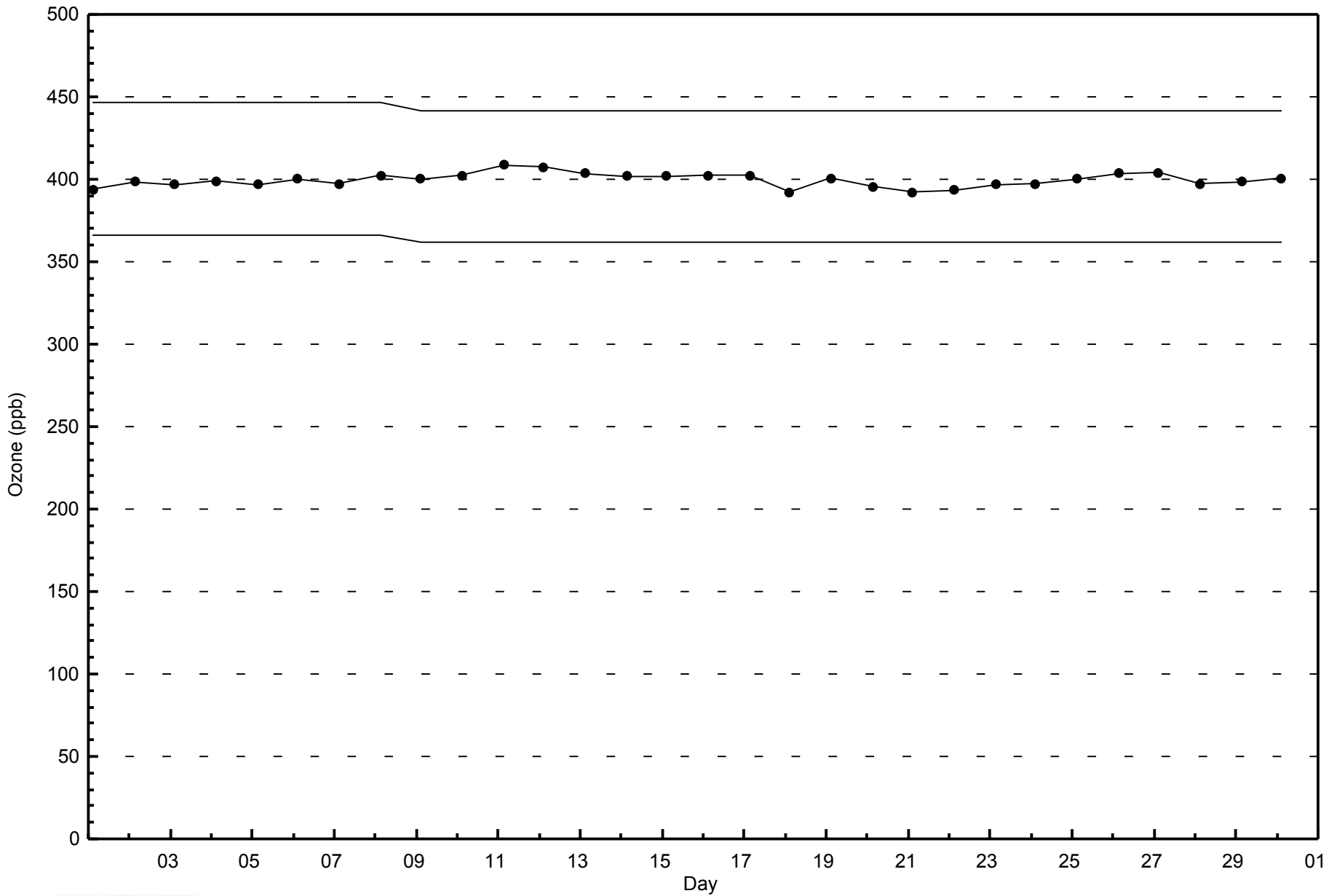
Ozone (O₃) - ppb
Fort McKay - Bertha Ganter - November 2014





WBEA
Span Responses

Ozone (O₃) - ppb
Fort McKay - Bertha Ganter - November 2014





Number of Exceedences (AAAQO):	24-hr: 0	Hours in Service:	720
Maximum Value: 58.5 µg/m ³ on Nov 30 14:00	Maximum Daily Average: 12.5 µg/m ³ on Nov 20	Hours of Data:	708
Minimum Value: 0.2 µg/m ³ on Nov 7 07:00	Minimum Daily Average: 1.6 µg/m ³ on Nov 7	Hours of Missing Data:	12
Maximum Diurnal Average: 7.1 µg/m ³ at hour 19	Minimum Diurnal Average: 4.3 µg/m ³ at hour 7	Hours of Calibration:	0
Monthly Average: 5.38 µg/m ³	Percentiles: P ₁ = 0.4 P ₁₀ = 1.4 Q ₁ = 2.3 Median = 3.9 Q ₃ = 7.1 P ₉₀ = 11.3 P ₉₉ = 21.4	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-Nov	7.9	7.1	4.8	4.9	5.6	5.9	5.4	5.7	4.9	4.9	3.2	1.7	1.3	1.8	1.8	2.1	13.3	8.5	10.5	7.6	2.9	11.9	4.8	5.5	5.6	13.3
2-Nov	4.4	5.5	9.2	5.0	2.5	5.6	6.0	6.7	7.0	5.7	7.0	6.3	8.2	16.9	7.2	4.4	5.1	5.8	6.0	6.6	5.5	4.6	4.1	4.4	6.2	16.9
3-Nov	7.3	10.3	11.3	13.2	15.8	17.3	10.5	9.9	8.2	12.0	10.1	10.2	7.2	6.9	9.0	8.8	7.5	6.7	5.9	5.0	4.4	3.8	2.8	2.6	8.6	17.3
4-Nov	2.3	3.1	3.6	7.2	8.6	8.7	7.4	8.7	6.4	4.9	3.5	3.0	2.9	3.1	3.3	3.5	2.2	1.9	1.8	1.3	1.6	1.7	1.8	2.2	3.9	8.7
5-Nov	2.3	3.1	5.6	12.5	15.3	8.1	7.3	9.2	10.4	8.9	6.4	4.7	3.5	3.1	3.7	3.9	4.3	4.6	2.6	3.9	5.0	6.3	8.4	9.9	6.4	15.3
6-Nov	8.9	7.4	7.0	7.0	5.9	5.8	5.3	5.9	5.6	5.5	5.2	4.8	5.0	4.9	5.0	6.8	9.8	9.5	7.7	3.5	2.3	5.6	8.5	2.1	6.0	9.8
7-Nov	UO	UO	UO	UO	UO	UO	0.2	0.2	0.3	0.8	1.2	1.0	0.9	1.0	1.2	1.3	1.7	2.9	3.4	2.7	2.4	2.4	2.6	2.9	1.6	3.4
8-Nov	3.7	4.4	4.7	4.1	3.9	3.7	3.4	3.6	3.6	2.4	1.8	1.5	1.8	1.6	1.5	1.6	2.6	3.9	5.6	4.8	5.3	5.4	4.2	3.4	3.4	5.6
9-Nov	2.6	2.5	2.3	2.2	2.3	2.2	2.3	2.3	2.5	2.8	3.1	3.6	2.8	3.1	2.3	2.7	3.3	4.0	3.8	3.7	2.7	2.7	2.8	2.6	2.8	4.0
10-Nov	3.1	3.6	3.5	3.1	3.4	3.4	3.1	3.2	4.1	3.4	2.2	2.6	3.0	3.3	3.6	3.2	2.7	2.6	2.6	2.5	2.4	2.2	2.2	2.4	3.0	4.1
11-Nov	3.3	3.9	3.8	3.1	3.0	2.8	2.6	2.0	2.5	2.8	3.1	2.4	M	M	M	7.6	9.3	18.3	19.4	10.9	9.5	8.1	6.7	6.4	6.3	19.4
12-Nov	17.3	24.5	5.7	4.0	10.7	6.4	6.7	24.7	9.7	5.8	2.3	2.5	2.7	M	M	M	4.1	6.9	5.3	7.4	12.6	4.7	7.9	16.3	9.0	24.7
13-Nov	18.9	11.4	6.2	7.1	6.0	7.5	12.0	10.7	15.5	9.6	10.5	11.4	11.2	12.7	17.4	15.6	14.6	16.4	17.5	14.7	13.5	12.1	10.7	9.3	12.2	18.9
14-Nov	8.0	8.0	7.2	6.5	6.4	6.1	5.3	6.3	5.7	5.9	6.0	5.1	3.3	3.2	3.4	3.7	5.3	9.1	11.4	6.2	7.5	10.0	4.5	4.8	6.2	11.4
15-Nov	8.6	4.8	5.0	5.5	7.0	7.9	9.2	11.1	10.5	9.1	7.1	5.9	5.1	3.8	3.8	5.1	6.5	4.9	1.9	3.2	1.1	1.3	0.9	0.3	5.4	11.1
16-Nov	0.3	0.3	0.4	0.7	0.4	0.4	0.5	0.7	0.5	0.9	1.0	0.4	0.4	0.6	0.6	2.5	4.0	4.4	2.2	1.4	4.6	0.7	7.1	28.8	2.7	28.8
17-Nov	23.0	9.5	10.3	2.2	2.8	1.2	1.4	1.7	1.7	2.9	4.6	4.4	5.7	4.9	6.6	13.4	16.1	13.6	10.7	8.3	8.7	7.9	6.6	6.7	7.3	23.0
18-Nov	8.1	5.0	3.0	1.0	1.3	3.2	3.9	2.0	1.0	1.0	0.6	0.8	0.9	1.0	0.8	4.5	1.5	2.0	1.8	1.2	1.0	0.9	0.9	1.0	2.0	8.1
19-Nov	2.2	1.2	0.8	0.7	0.6	0.6	0.7	0.7	0.7	1.1	1.1	0.8	0.9	1.6	1.3	1.8	5.6	14.1	8.4	6.3	6.6	5.1	3.7	5.7	3.0	14.1
20-Nov	8.3	7.3	5.4	4.8	5.9	6.5	7.5	9.8	13.9	16.7	15.7	14.7	16.0	17.6	16.7	18.7	19.5	19.9	17.8	13.0	12.5	11.7	10.6	9.6	12.5	19.9
21-Nov	8.8	7.3	5.6	3.8	2.7	1.8	1.7	1.5	1.4	1.4	1.3	1.1	0.8	1.2	1.5	2.0	1.8	1.7	1.7	2.5	2.3	1.7	1.8	1.3	2.4	8.8
22-Nov	1.4	1.5	1.7	1.9	1.5	1.6	1.6	1.6	1.6	1.7	1.8	2.1	2.0	1.9	1.7	1.5	1.5	1.6	1.6	1.7	1.8	2.1	1.9	2.0	1.7	2.1
23-Nov	1.4	1.3	1.3	1.5	1.6	1.6	1.6	1.6	1.8	4.2	12.1	6.1	3.0	5.4	4.6	4.0	7.3	7.0	7.8	11.8	8.7	6.1	5.7	3.6	4.6	12.1
24-Nov	2.9	2.9	3.2	3.2	2.3	2.6	2.6	2.9	2.1	3.8	4.0	2.6	1.8	1.8	4.6	2.0	2.1	2.6	2.8	2.3	2.3	2.5	3.2	2.9	2.7	4.6
25-Nov	1.8	1.4	1.6	1.5	2.1	1.8	1.4	1.3	2.1	1.8	2.3	2.2	3.8	4.6	4.0	5.3	8.0	6.5	25.4	22.0	21.5	15.3	13.1	12.1	6.8	25.4
26-Nov	9.1	8.6	11.0	9.1	6.7	8.1	6.8	9.4	11.8	11.8	11.1	10.5	10.9	12.8	14.6	11.6	12.1	11.3	7.8	3.2	2.5	2.5	2.1	2.3	8.7	14.6
27-Nov	3.3	1.7	1.8	1.5	1.7	3.2	3.0	2.7	2.9	2.7	2.7	3.5	5.7	8.0	3.2	3.7	8.9	3.5	2.6	7.4	3.9	2.8	2.8	2.7	3.6	8.9
28-Nov	4.7	2.4	2.3	2.2	2.1	2.3	2.6	3.2	4.5	6.1	5.2	3.5	2.8	3.4	3.0	2.5	2.3	2.3	2.4	6.3	11.7	6.0	4.9	5.0	3.9	11.7
29-Nov	5.0	5.4	4.2	2.6	2.5	3.6	3.6	4.3	4.4	4.1	3.3	2.5	3.1	1.9	1.4	1.8	2.4	3.3	3.8	3.9	4.7	4.3	4.8	4.7	3.6	5.4
30-Nov	3.9	3.5	4.0	4.2	4.1	3.9	4.1	3.9	3.7	3.7	3.7	12.7	11.2	58.5	11.5	5.7	11.6	9.8	11.4	8.7	7.4	8.8	6.9	7.9	9.0	58.5

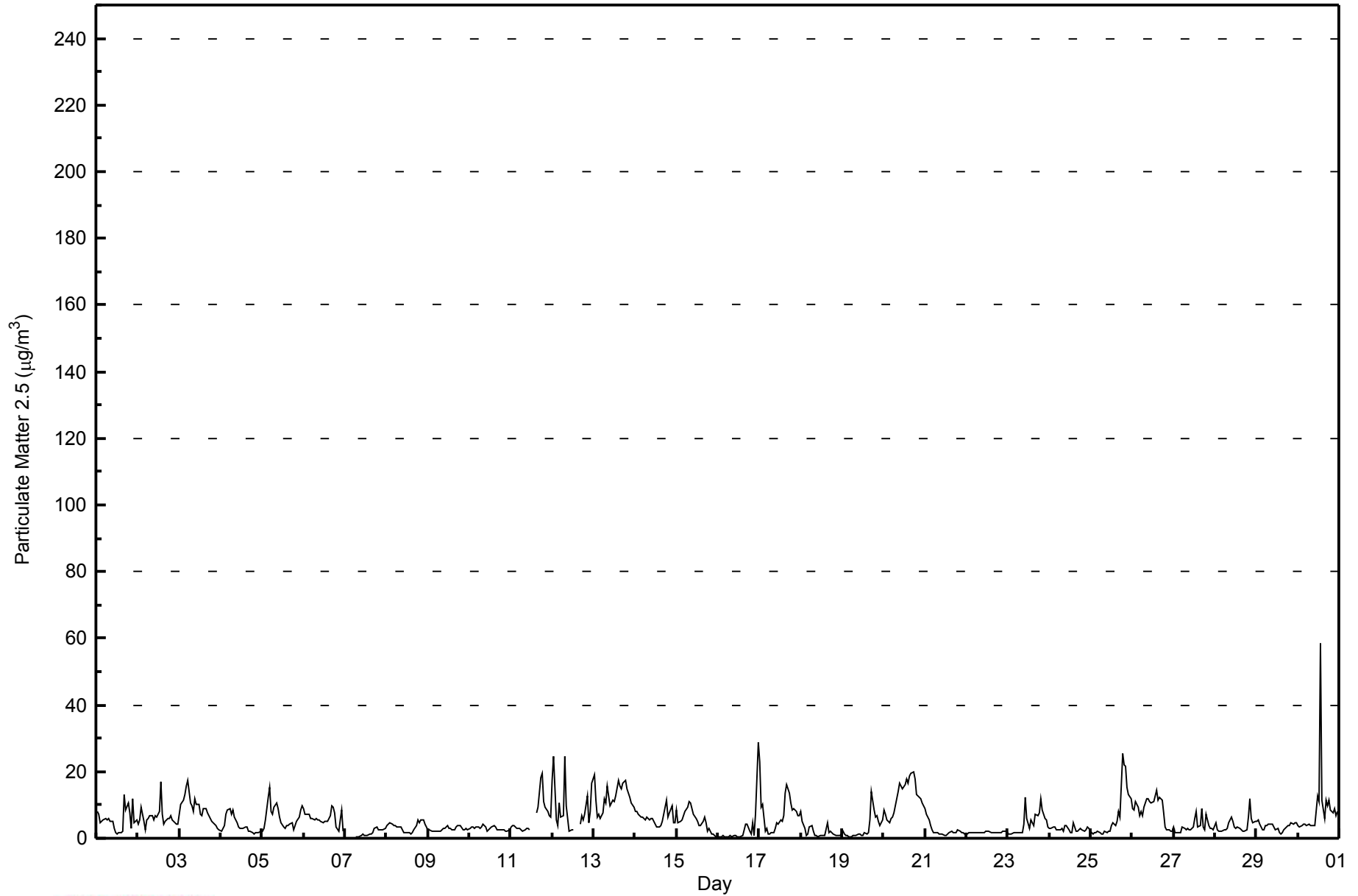
6.3	5.5	4.7	4.4	4.7	4.6	4.3	5.3	5.0	4.9	4.8	4.5	4.4	6.8	5.0	5.2	6.6	7.0	7.1	6.1	6.0	5.4	5.0	5.7	Diurnal Average	
23.0	24.5	11.3	13.2	15.8	17.3	12.0	24.7	15.5	16.7	15.7	14.7	16.0	58.5	17.4	18.7	19.5	19.9	25.4	22.0	21.5	15.3	13.1	28.8	Diurnal Maximum	

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



WBEA
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort McKay - Bertha Ganter - November 2014





WBEA
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort McKay - Bertha Ganter - November 2014

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	408	57.63	57.63
6 - 15	225	31.78	89.41
16 - 25	29	4.10	93.50
26 - 80	2	0.28	93.79
> 81.0	0	0.00	93.79

Total Number of Valid Hours: 708

Total Number of Hours: 720



WBEA
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Fort McKay - Bertha Ganter - November 2014

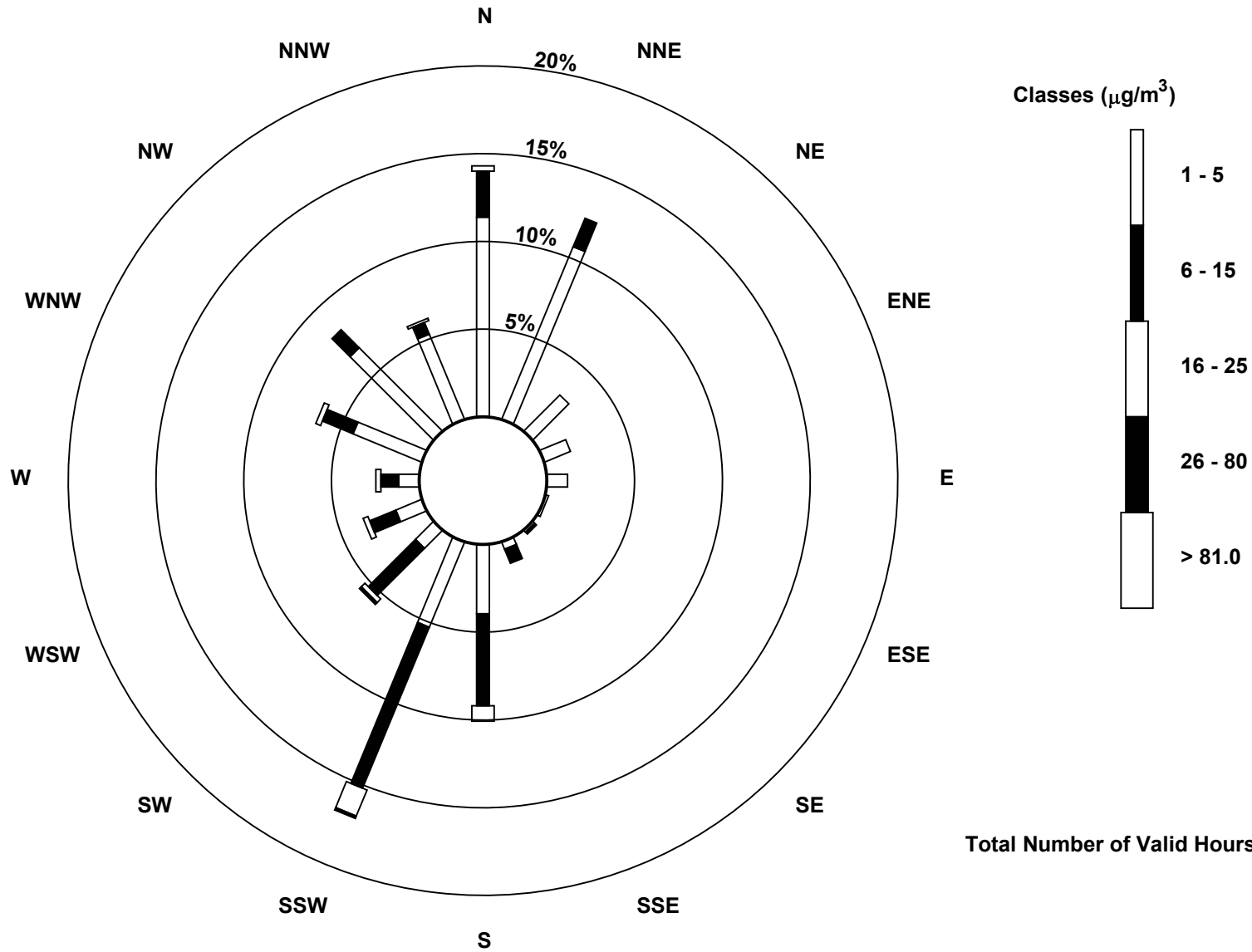
Concentration Ranges (μg/m ³)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	78	73	20	11	8	0	1	3	27	36	10	11	8	29	46	36	397
6 - 15	18	12	0	0	0	0	1	6	36	68	26	11	7	13	10	5	213
16 - 25	2	0	0	0	0	1	0	0	6	11	2	2	2	2	0	1	29
26 - 80	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	2
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	98	85	20	11	8	1	2	9	69	116	39	24	17	44	56	42	641

Total Number of Valid Hours: 685

Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Fort McKay - Bertha Ganter (AMS 1)



Total Number of Valid Hours: 685

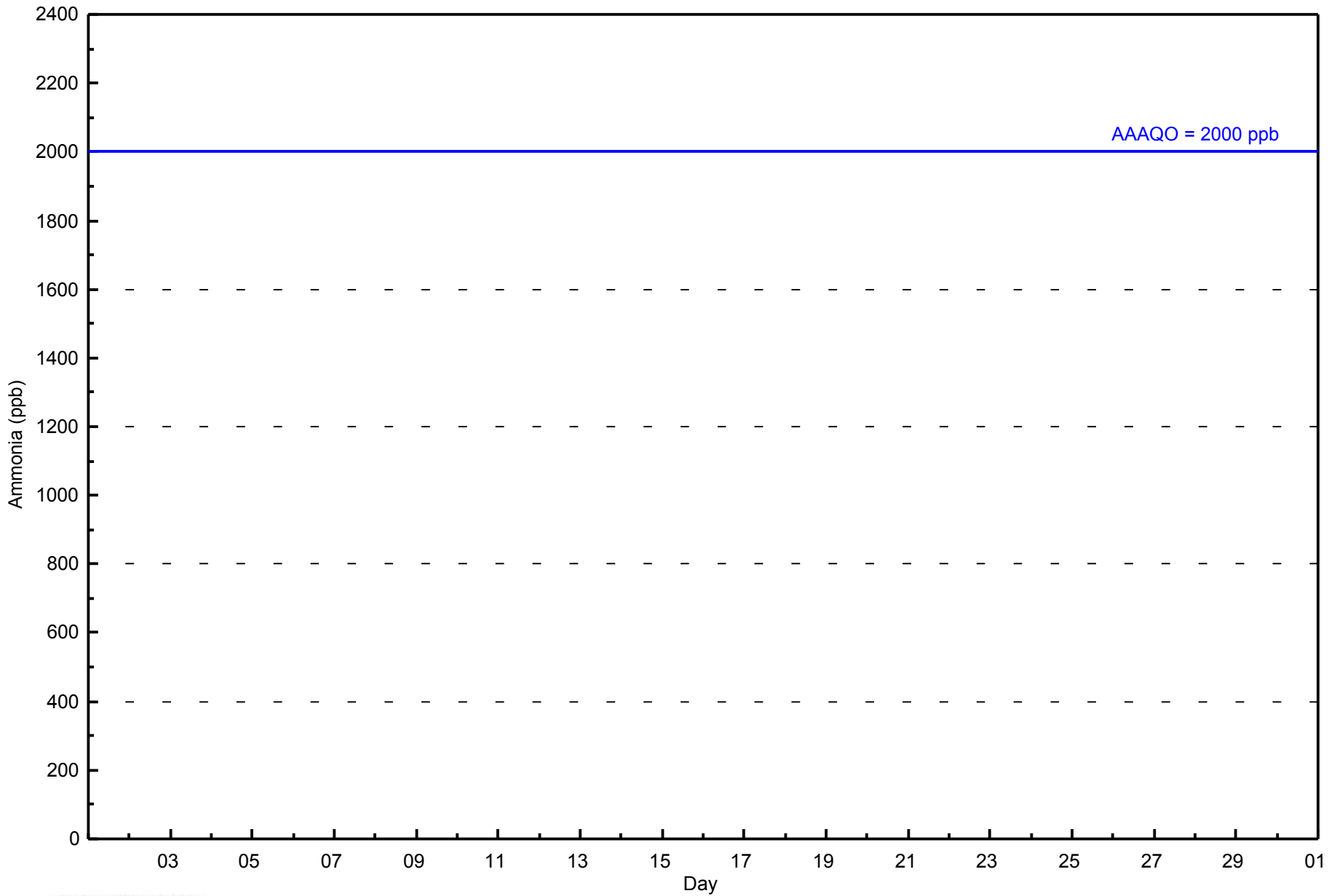


Number of Exceedences (AAAQO): 1-hr: 0 Maximum Value: 0 ppb on Nov 1 01:00 Maximum Daily Average: 0.0 ppb on Nov 1																	Hours in Service: 720 Hours of Data: 648 Hours of Missing Data: 72 Hours of Calibration: 40 Percent Operational Time: 95.6										
Minimum Value: 0 ppb on Nov 1 01:00 Minimum Daily Average: 0.0 ppb on Nov 1 Maximum Diurnal Average: 0.0 ppb at hour 1 Minimum Diurnal Average: 0.0 ppb at hour 1 Monthly Average: 0.0 ppb Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 0																											
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	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
2-Nov	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
3-Nov	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
4-Nov	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
5-Nov	0	Z	SP	0	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-Nov	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
7-Nov	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
8-Nov	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
9-Nov	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
10-Nov	0	Z	RE	0	0	0	0	0	0	0	C	C	C	C	C	C	C	C	C	C	0	0	0	0	0	--	0
11-Nov	0	Z	RE	0	0	0	0	0	0	0	0	0	M	M	M	0	0	0	0	0	0	0	0	0	0	0.0	0
12-Nov	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
13-Nov	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
14-Nov	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
15-Nov	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
16-Nov	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
17-Nov	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
18-Nov	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
19-Nov	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
20-Nov	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
21-Nov	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
22-Nov	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
23-Nov	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
24-Nov	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
25-Nov	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
26-Nov	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
27-Nov	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
28-Nov	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
29-Nov	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
30-Nov	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																								Diurnal Average			
0																								Diurnal Maximum			
Z - zerspan C - Calibration M - Maintenance SP - Span RE - Recovery																											
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 2000 ppb																											



WBEA
Hourly Averages

Ammonia (NH₃) - ppb
Fort McKay - Bertha Ganter - November 2014





WBEA

Cumulative Frequency Distribution

Ammonia (NH₃) - ppb

Fort McKay - Bertha Ganter - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 5	648	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: 648

Total Number of Hours: 720



WBEA
Frequency Distribution

Ammonia (NH₃) - ppb
Fort McKay - Bertha Ganter - November 2014

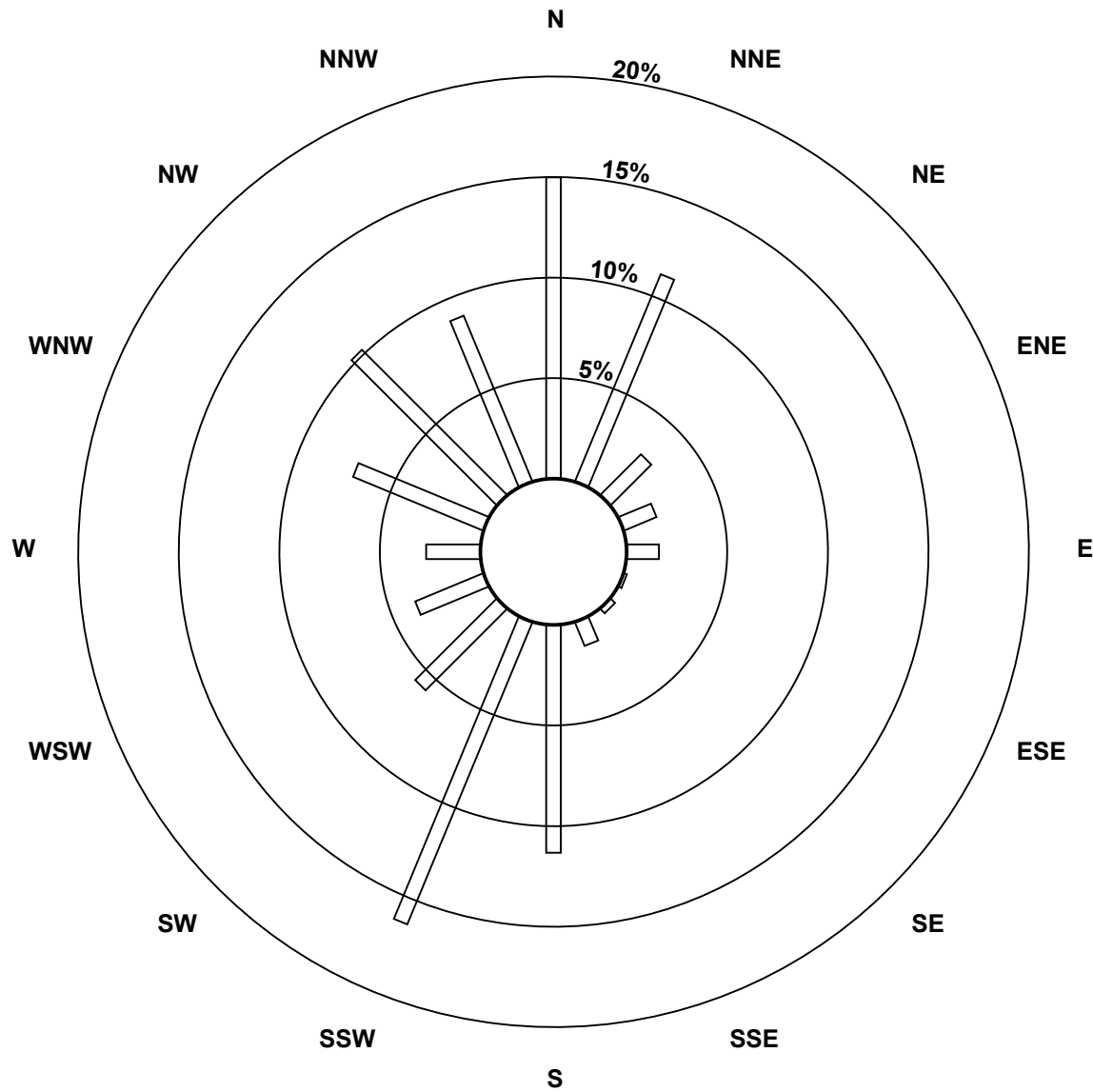
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	94	70	18	11	10	1	2	8	71	102	36	23	17	44	64	56	627
6 - 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	94	70	18	11	10	1	2	8	71	102	36	23	17	44	64	56	627

Total Number of Valid Hours: 627

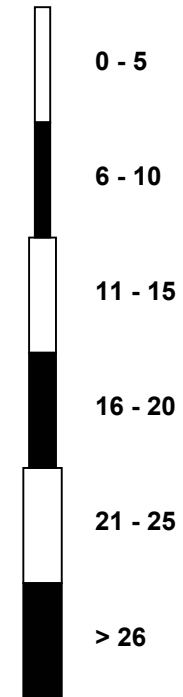
Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

Ammonia (NH₃) - ppb
Fort McKay - Bertha Ganter (AMS 1)



Classes (ppb)

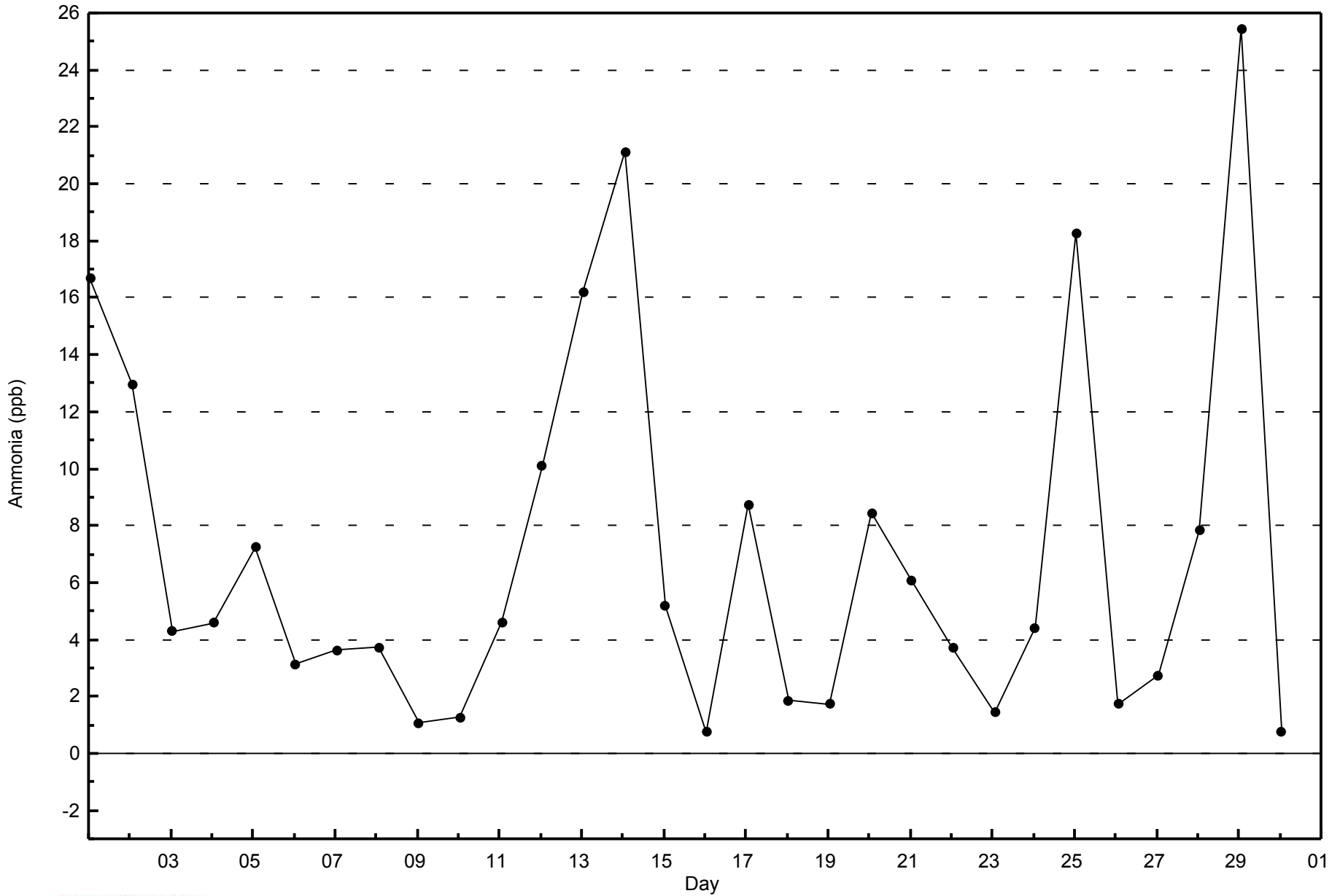


Total Number of Valid Hours: 627



WBEA
Zero Responses

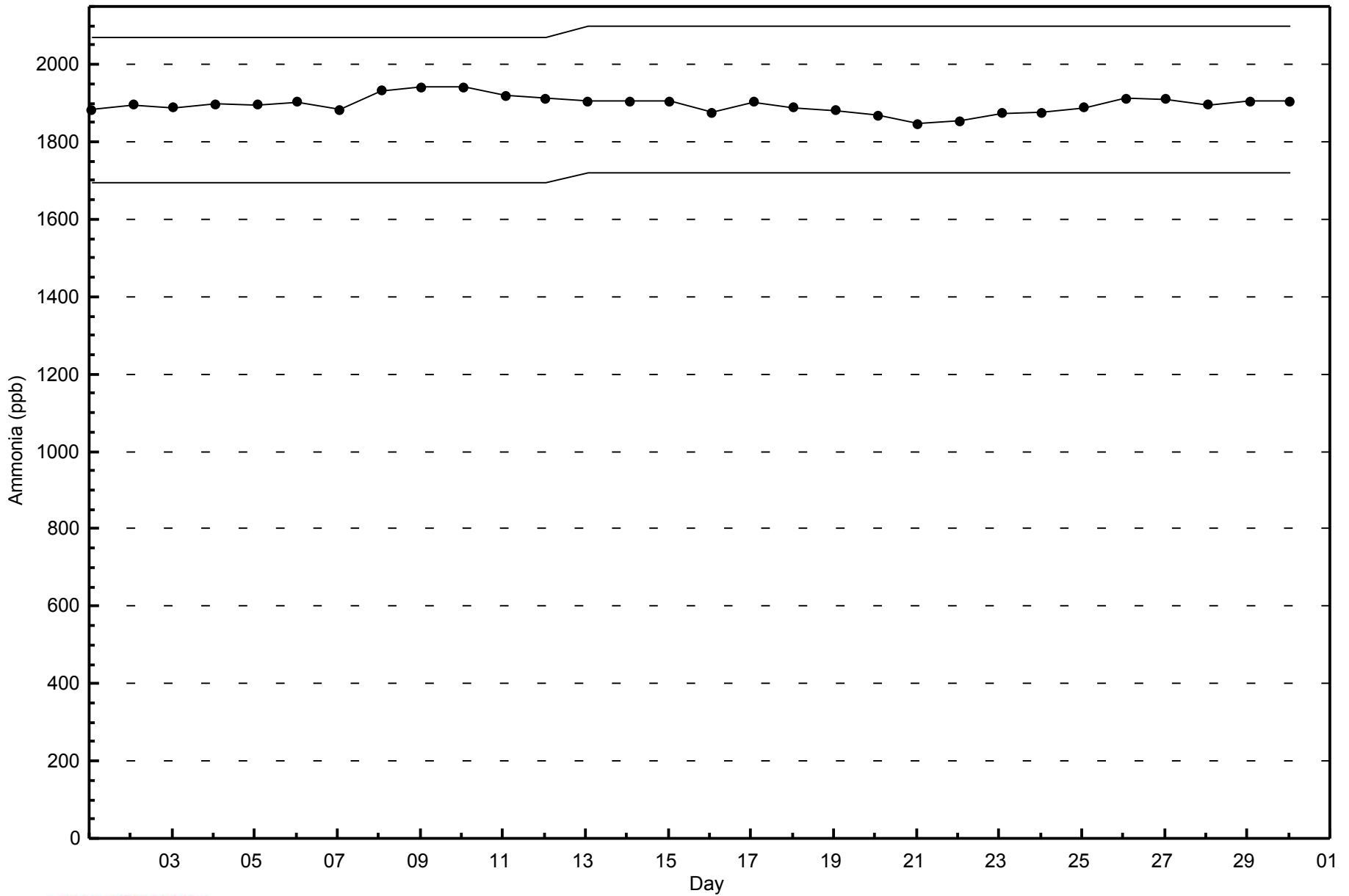
Ammonia (NH₃) - ppb
Fort McKay - Bertha Ganter - November 2014





WBEA
Span Responses

Ammonia (NH₃) - ppb
Fort McKay - Bertha Ganter - November 2014



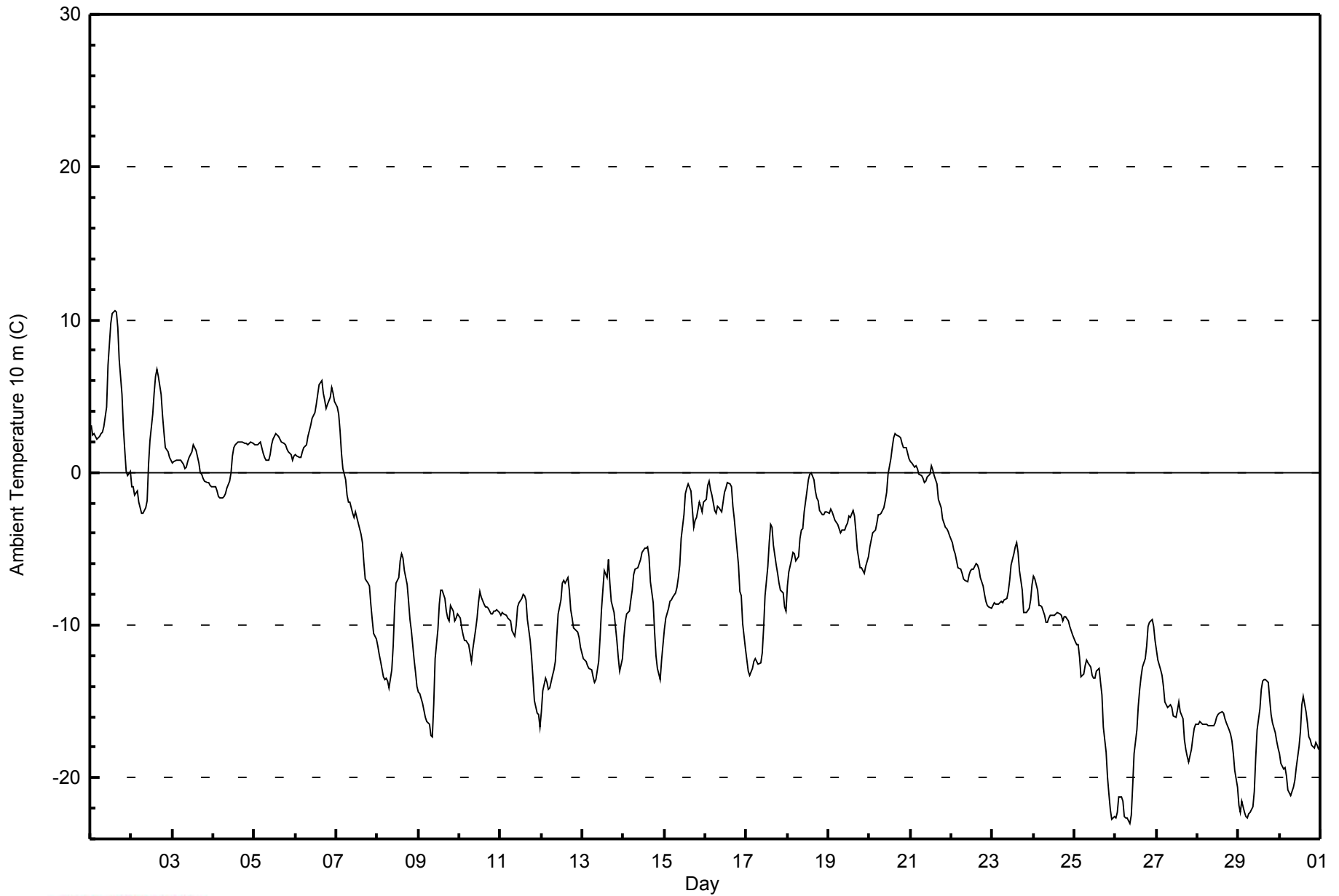


Maximum Value: 10.6 C on Nov 1 15:00		Maximum Daily Average: 4.6 C on Nov 1		Hours in Service: 720																						
Minimum Value: -23.0 C on Nov 26 09:00		Minimum Daily Average: -18.3 C on Nov 30		Hours of Data: 720																						
Maximum Diurnal Average: -4.5 C at hour 15		Minimum Diurnal Average: -8.5 C at hour 8		Hours of Missing Data: 0																						
Monthly Average: -7.17 C		Percentiles: P ₁ = -22.5 P ₁₀ = -16.6 Q ₁ = -12.3 Median = -7.5 Q ₃ = -1.3 P ₉₀ = 1.9 P ₉₉ = 6.8		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-Nov	3.1	2.5	2.6	2.4	2.2	2.4	2.6	2.6	3.0	4.3	7.0	8.4	9.8	10.4	10.6	10.5	9.5	7.4	5.1	2.9	1.5	0.1	-0.2	0.0	4.6	10.6
2-Nov	-0.9	-1.0	-1.5	-1.2	-1.9	-2.3	-2.6	-2.7	-2.3	-1.8	0.5	2.0	3.8	5.2	6.3	6.8	6.3	5.1	3.8	2.7	1.6	1.3	1.0	0.8	1.2	6.8
3-Nov	0.6	0.7	0.8	0.8	0.8	0.8	0.5	0.3	0.4	0.7	1.0	1.4	1.8	1.6	1.4	0.7	0.0	-0.2	-0.4	-0.5	-0.6	-0.7	-0.8	-0.9	0.4	1.8
4-Nov	-1.0	-0.9	-1.2	-1.6	-1.7	-1.6	-1.6	-1.4	-1.0	-0.6	0.0	1.1	1.6	1.8	2.0	2.0	2.0	2.0	1.9	1.9	1.8	1.9	2.0	1.9	0.5	2.0
5-Nov	1.8	1.8	1.8	2.0	1.6	1.3	1.0	0.8	0.8	1.2	1.8	2.2	2.5	2.5	2.4	2.2	2.0	1.9	1.8	1.6	1.3	1.2	0.8	1.0	1.6	2.5
6-Nov	1.2	1.1	1.0	0.9	1.3	1.6	1.8	2.4	2.7	3.1	3.5	3.9	4.5	5.1	5.8	6.0	5.2	4.7	4.2	4.5	5.0	5.5	5.2	4.7	3.5	6.0
7-Nov	4.3	3.8	2.7	1.3	0.3	-0.5	-1.5	-1.9	-2.0	-2.6	-2.9	-2.6	-2.9	-3.4	-4.1	-4.6	-5.9	-7.0	-7.2	-7.5	-8.6	-9.7	-10.6	-10.9	-3.5	4.3
8-Nov	-11.3	-11.9	-12.4	-13.4	-13.5	-13.5	-13.7	-14.1	-13.0	-11.4	-8.9	-7.3	-6.9	-5.8	-5.3	-5.6	-6.4	-7.4	-8.5	-9.7	-10.4	-12.3	-13.1	-14.0	-10.4	-5.3
9-Nov	-14.4	-14.5	-15.1	-15.6	-16.1	-16.3	-16.5	-17.3	-17.3	-15.2	-12.2	-10.2	-8.6	-7.7	-7.7	-8.2	-9.1	-9.6	-9.7	-8.7	-9.1	-9.7	-9.5	-9.3	-12.0	-7.7
10-Nov	-9.5	-10.1	-10.6	-11.0	-11.0	-11.3	-11.8	-12.4	-11.6	-10.2	-9.5	-8.6	-7.8	-8.2	-8.6	-8.8	-8.8	-8.9	-9.2	-9.2	-9.1	-9.1	-9.0	-9.1	-9.7	-7.8
11-Nov	-9.4	-9.2	-9.2	-9.4	-9.6	-9.6	-9.8	-10.3	-10.7	-10.0	-8.8	-8.5	-8.2	-8.0	-8.1	-8.4	-9.6	-11.0	-12.1	-13.5	-14.9	-15.7	-15.9	-16.7	-10.7	-8.0
12-Nov	-15.7	-14.3	-13.5	-13.7	-14.2	-14.1	-13.3	-12.9	-12.4	-10.7	-9.3	-8.3	-7.3	-7.0	-7.3	-6.9	-7.7	-9.0	-9.5	-10.2	-10.4	-10.5	-10.8	-11.5	-10.8	-6.9
13-Nov	-12.2	-12.3	-12.4	-12.6	-12.8	-12.9	-13.4	-13.8	-13.6	-12.3	-10.8	-9.0	-7.7	-6.4	-6.8	-5.7	-7.2	-8.5	-9.2	-10.1	-11.0	-12.1	-13.0	-12.2	-10.7	-5.7
14-Nov	-10.8	-9.8	-9.3	-9.1	-8.3	-7.7	-6.7	-6.3	-6.0	-5.7	-5.2	-4.9	-5.0	-4.8	-5.5	-7.2	-8.6	-10.5	-12.0	-12.8	-13.6	-12.2	-11.3	-8.3	-4.8	
15-Nov	-10.3	-9.5	-8.9	-8.4	-8.4	-8.2	-7.9	-7.5	-6.8	-6.0	-4.3	-2.8	-1.4	-1.0	-0.7	-1.2	-2.4	-3.6	-3.2	-2.9	-1.9	-2.2	-2.6	-1.9	-4.8	-0.7
16-Nov	-1.7	-0.8	-0.6	-1.1	-1.5	-2.5	-2.7	-2.3	-2.3	-2.6	-1.9	-1.3	-1.0	-0.7	-0.7	-1.0	-2.2	-3.1	-5.1	-6.0	-7.8	-8.1	-9.9	-11.5	-3.3	-0.6
17-Nov	-12.2	-13.0	-13.3	-12.9	-12.3	-12.2	-12.4	-12.6	-12.4	-11.8	-10.1	-8.0	-6.2	-4.6	-3.4	-3.6	-4.7	-6.0	-6.6	-7.3	-7.7	-7.9	-8.8	-9.0	-9.1	-3.4
18-Nov	-7.4	-6.5	-5.7	-5.2	-5.4	-5.8	-5.5	-4.3	-3.8	-3.7	-2.6	-1.2	-0.5	-0.1	0.0	-0.4	-1.2	-1.7	-1.8	-2.5	-2.8	-2.7	-2.6	-2.6	-3.2	0.0
19-Nov	-2.7	-2.4	-2.6	-2.8	-3.1	-3.4	-3.7	-3.9	-3.8	-3.7	-3.5	-3.3	-2.9	-2.9	-2.5	-2.9	-3.9	-5.0	-6.3	-6.2	-6.5	-6.6	-6.2	-5.5	-4.0	-2.4
20-Nov	-4.9	-4.4	-4.0	-3.7	-3.3	-2.8	-2.7	-2.7	-2.3	-1.8	-1.3	-0.1	0.9	1.7	2.3	2.5	2.4	2.4	2.3	1.9	1.7	1.6	1.3	0.9	-0.5	2.5
21-Nov	0.7	0.6	0.4	0.4	0.2	-0.1	-0.2	-0.4	-0.7	-0.5	-0.3	-0.1	0.4	0.2	-0.2	-0.8	-1.7	-2.0	-2.3	-3.1	-3.6	-3.7	-3.8	-4.1	-1.0	0.7
22-Nov	-4.6	-5.1	-5.4	-5.7	-6.2	-6.3	-6.6	-7.0	-7.1	-7.1	-6.7	-6.5	-6.4	-6.3	-6.0	-6.1	-6.4	-6.9	-7.4	-7.9	-8.5	-8.7	-8.8	-8.9	-6.8	-4.6
23-Nov	-8.7	-8.5	-8.6	-8.6	-8.6	-8.5	-8.5	-8.4	-8.2	-7.8	-7.1	-6.1	-5.4	-4.9	-4.6	-5.3	-6.4	-7.7	-9.1	-9.2	-9.1	-8.9	-8.4	-7.4	-7.7	-4.6
24-Nov	-6.8	-6.9	-7.7	-8.7	-8.7	-8.8	-9.3	-9.8	-9.8	-9.6	-9.4	-9.4	-9.3	-9.2	-9.3	-9.4	-9.7	-9.4	-9.7	-9.4	-9.7	-10.1	-10.3	-10.7	-9.2	-6.8
25-Nov	-11.1	-11.2	-11.3	-12.1	-13.3	-13.2	-12.6	-12.3	-12.5	-12.8	-13.3	-13.4	-13.5	-13.1	-12.9	-13.7	-14.6	-16.6	-18.3	-20.0	-21.1	-22.1	-22.8	-22.5	-15.0	-11.1
26-Nov	-22.7	-22.3	-21.3	-21.3	-21.6	-22.5	-22.6	-22.6	-23.0	-22.5	-20.5	-18.4	-16.9	-15.3	-14.2	-13.4	-12.7	-12.2	-11.4	-10.1	-9.8	-9.6	-10.1	-11.0	-17.0	-9.6
27-Nov	-11.6	-12.3	-12.9	-13.3	-14.0	-15.0	-15.4	-15.3	-15.2	-15.4	-15.9	-16.0	-15.6	-15.0	-15.7	-16.2	-17.5	-18.1	-18.6	-19.0	-18.2	-17.4	-16.8	-16.5	-15.7	-11.6
28-Nov	-16.5	-16.4	-16.4	-16.5	-16.5	-16.5	-16.6	-16.6	-16.6	-16.6	-16.4	-16.1	-15.9	-15.8	-15.7	-15.8	-16.1	-16.4	-16.8	-17.1	-17.6	-18.4	-19.5	-20.6	-16.8	-15.7
29-Nov	-21.8	-22.3	-21.5	-22.2	-22.5	-22.6	-22.4	-22.2	-21.9	-20.9	-18.7	-16.9	-15.5	-14.2	-13.7	-13.6	-13.6	-13.8	-14.9	-15.8	-16.4	-17.1	-17.6	-18.0	-18.3	-13.6
30-Nov	-18.4	-19.1	-19.4	-19.3	-19.9	-20.8	-21.1	-20.9	-20.6	-20.1	-19.4	-18.0	-16.9	-15.2	-14.7	-15.6	-16.4	-17.3	-17.5	-17.9	-18.0	-17.7	-17.9	-18.1	-18.3	-14.7
	-7.8	-7.8	-7.9	-8.1	-8.3	-8.4	-8.5	-8.5	-8.3	-7.8	-6.9	-5.9	-5.2	-4.7	-4.5	-4.7	-5.5	-6.2	-6.9	-7.3	-7.8	-8.1	-8.4	-8.5		Diurnal Average
	4.3	3.8	2.7	2.4	2.2	2.4	2.6	2.6	3.0	4.3	7.0	8.4	9.8	10.4	10.6	10.5	9.5	7.4	5.1	4.5	5.0	5.5	5.2	4.7		Diurnal Maximum



WBEA
Hourly Averages

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





WBEA
Cumulative Frequency Distribution

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

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	32	4.44	4.44
-20 - 0	550	76.39	80.83
0 - 10	135	18.75	99.58
10 - 20	3	0.42	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

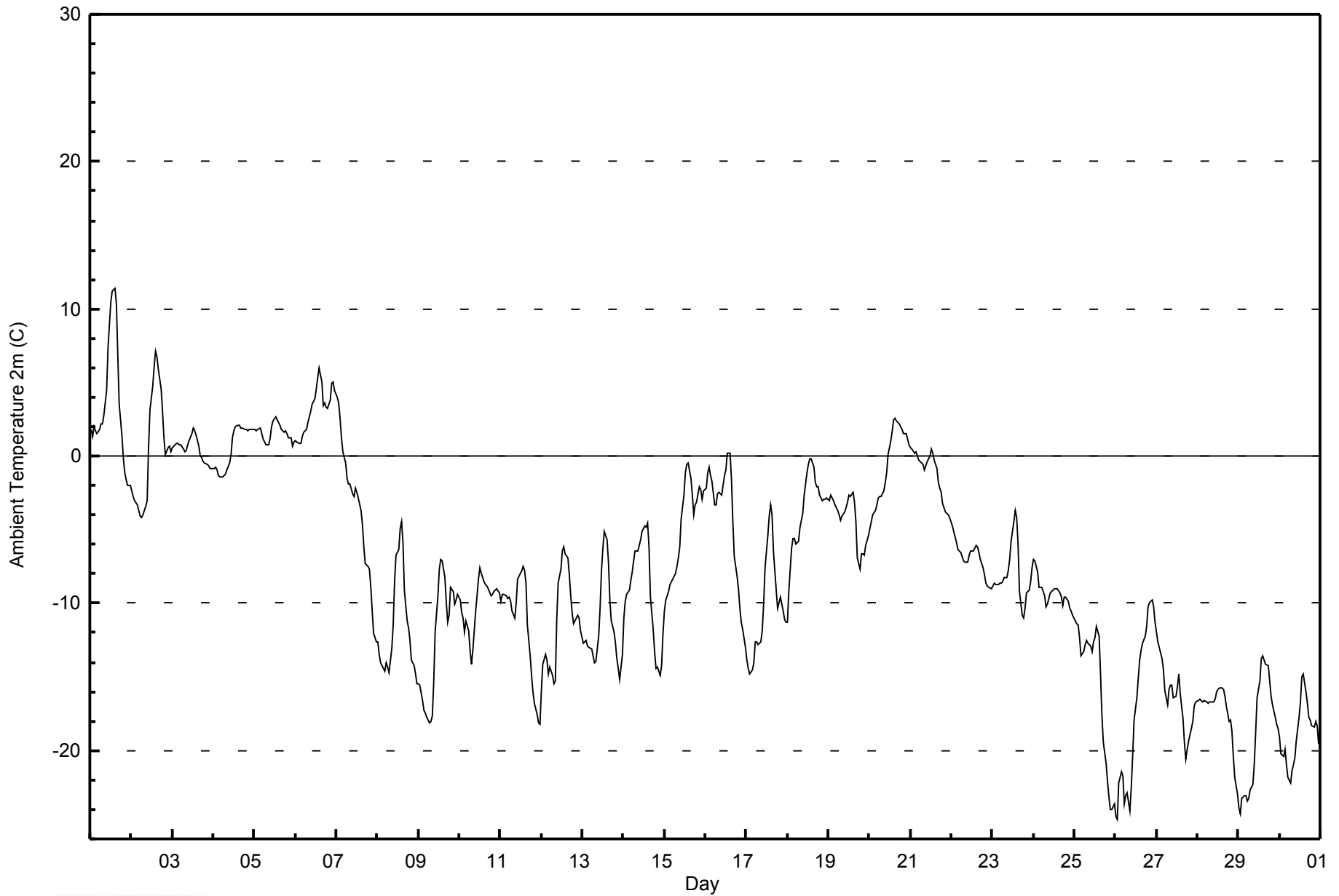


Maximum Value: 11.4 C on Nov 1 15:00		Maximum Daily Average: 3.6 C on Nov 1		Hours in Service: 720																						
Minimum Value: -24.6 C on Nov 26 02:00		Minimum Daily Average: -18.9 C on Nov 29		Hours of Data: 720																						
Maximum Diurnal Average: -4.3 C at hour 15		Minimum Diurnal Average: -9.2 C at hour 24		Hours of Missing Data: 0																						
Monthly Average: -7.63 C		Percentiles: P ₁ = -23.7 P ₁₀ = -17.6 Q ₁ = -13.1 Median = -7.8 Q ₃ = -1.3 P ₉₀ = 1.8 P ₉₉ = 7.0		Hours of Calibration: 0																						
				Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	1.8	1.3	2.0	1.7	1.5	1.8	2.2	2.2	2.7	4.5	7.3	8.9	10.4	11.2	11.4	10.4	6.9	3.5	1.4	-0.2	-1.1	-1.6	-2.0	-2.0	3.6	11.4
2-Nov	-2.4	-2.8	-3.0	-3.3	-3.7	-4.0	-4.2	-4.0	-3.4	-3.0	0.6	3.2	4.7	6.1	7.1	6.7	5.9	4.5	3.0	1.2	0.1	0.6	0.7	0.3	0.5	7.1
3-Nov	0.6	0.7	0.8	0.8	0.8	0.8	0.5	0.3	0.4	0.8	1.1	1.5	1.9	1.7	1.5	0.7	0.0	-0.1	-0.4	-0.5	-0.6	-0.7	-0.8	-0.9	0.5	1.9
4-Nov	-0.8	-0.7	-1.0	-1.3	-1.4	-1.4	-1.3	-1.3	-0.9	-0.4	0.1	1.2	1.7	2.0	2.0	2.1	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	0.5	2.1
5-Nov	1.8	1.8	1.8	1.9	1.5	1.2	1.0	0.7	0.8	1.3	2.0	2.3	2.6	2.5	2.3	2.1	1.8	1.7	1.7	1.5	1.3	1.2	0.7	1.0	1.6	2.6
6-Nov	1.1	0.9	0.9	0.9	1.3	1.6	1.8	2.3	2.6	3.1	3.5	3.9	4.5	5.3	6.0	5.1	3.4	3.6	3.3	3.2	3.8	4.9	5.0	4.5	3.2	6.0
7-Nov	4.0	3.7	2.6	1.2	0.2	-0.5	-1.5	-1.9	-1.9	-2.5	-2.8	-2.2	-2.5	-2.9	-3.7	-4.7	-6.1	-7.3	-7.5	-7.7	-8.9	-10.6	-12.0	-12.6	-3.7	4.0
8-Nov	-12.7	-13.5	-14.0	-14.5	-14.6	-14.0	-14.3	-14.7	-13.1	-11.5	-8.6	-6.7	-6.4	-4.9	-4.5	-5.9	-9.1	-11.2	-11.7	-12.5	-13.9	-14.2	-14.8	-15.4	-11.5	-4.5
9-Nov	-15.5	-15.5	-16.6	-17.3	-17.4	-17.8	-18.1	-18.1	-17.7	-15.3	-12.0	-9.5	-7.6	-7.0	-7.1	-8.3	-10.0	-11.3	-10.8	-8.9	-9.2	-10.0	-9.8	-9.4	-12.5	-7.0
10-Nov	-9.8	-10.6	-11.0	-11.9	-11.2	-11.9	-13.2	-14.2	-13.2	-10.5	-9.5	-8.4	-7.6	-8.0	-8.5	-8.7	-8.8	-9.0	-9.5	-9.4	-9.2	-9.1	-9.0	-9.3	-10.1	-7.6
11-Nov	-9.8	-9.4	-9.4	-9.4	-9.6	-9.6	-9.8	-10.6	-11.0	-10.0	-8.4	-8.2	-7.8	-7.5	-7.8	-8.6	-11.5	-13.6	-14.9	-16.0	-16.8	-17.5	-18.1	-18.2	-11.4	-7.5
12-Nov	-16.0	-14.1	-13.5	-13.9	-14.8	-14.4	-14.9	-15.4	-15.3	-11.1	-8.6	-7.7	-6.5	-6.1	-6.6	-7.0	-8.1	-9.5	-10.6	-11.4	-11.0	-10.8	-11.0	-11.8	-11.3	-6.1
13-Nov	-12.7	-12.6	-12.6	-12.9	-13.0	-13.1	-13.6	-14.0	-13.9	-12.2	-10.3	-7.8	-6.3	-5.1	-5.7	-7.2	-9.8	-11.2	-11.9	-12.7	-13.7	-14.5	-15.2	-13.5	-11.5	-5.1
14-Nov	-11.0	-9.9	-9.4	-9.1	-8.5	-7.9	-7.1	-6.5	-6.4	-6.1	-5.7	-5.1	-4.7	-4.8	-4.6	-6.1	-9.6	-11.8	-13.2	-14.4	-14.4	-14.9	-14.2	-12.1	-9.1	-4.6
15-Nov	-10.5	-9.8	-9.2	-8.7	-8.5	-8.3	-8.0	-7.5	-6.9	-6.1	-4.3	-2.7	-1.1	-0.5	-0.5	-1.5	-2.7	-4.0	-3.4	-3.1	-2.1	-2.3	-2.9	-2.4	-4.9	-0.5
16-Nov	-2.2	-1.1	-0.8	-1.3	-1.7	-3.4	-3.3	-2.6	-2.5	-2.7	-2.0	-1.3	-0.9	0.2	0.2	-1.6	-4.6	-6.8	-8.2	-9.0	-10.3	-11.3	-11.8	-13.0	-4.2	0.2
17-Nov	-13.8	-14.4	-14.8	-14.5	-14.1	-12.6	-12.7	-12.8	-12.6	-11.9	-10.1	-7.6	-5.4	-4.0	-3.3	-4.0	-6.4	-9.1	-10.3	-9.9	-9.6	-10.6	-11.1	-11.3	-10.3	-3.3
18-Nov	-11.3	-9.2	-6.3	-5.6	-5.6	-6.0	-5.8	-4.9	-4.3	-3.9	-2.7	-1.1	-0.5	-0.1	-0.1	-0.7	-1.8	-2.1	-2.1	-2.7	-3.0	-3.0	-2.9	-2.8	-3.7	-0.1
19-Nov	-3.1	-2.7	-2.9	-3.1	-3.4	-3.7	-4.0	-4.4	-4.1	-3.8	-3.5	-3.2	-2.6	-2.7	-2.5	-3.1	-4.4	-6.9	-7.7	-6.7	-6.6	-6.7	-6.1	-5.4	-4.3	-2.5
20-Nov	-4.9	-4.4	-4.0	-3.7	-3.3	-2.8	-2.8	-2.7	-2.4	-1.8	-1.1	0.1	1.0	1.7	2.5	2.6	2.4	2.2	2.0	1.8	1.5	1.5	1.1	0.8	-0.5	2.6
21-Nov	0.6	0.5	0.2	0.2	0.0	-0.3	-0.5	-0.6	-0.9	-0.7	-0.3	0.0	0.5	0.2	-0.2	-0.9	-1.8	-2.2	-2.4	-3.2	-3.8	-3.9	-4.0	-4.2	-1.2	0.6
22-Nov	-4.7	-5.2	-5.5	-5.9	-6.3	-6.5	-6.8	-7.1	-7.2	-7.2	-6.8	-6.4	-6.4	-6.4	-6.1	-6.2	-6.5	-7.0	-7.6	-8.1	-8.6	-8.8	-8.9	-9.0	-6.9	-4.7
23-Nov	-8.8	-8.7	-8.7	-8.7	-8.7	-8.6	-8.6	-8.2	-8.2	-7.8	-7.0	-5.7	-4.4	-3.7	-4.2	-6.0	-9.2	-10.8	-11.0	-10.3	-9.3	-9.1	-8.5	-7.6	-8.0	-3.7
24-Nov	-7.0	-7.1	-7.8	-8.9	-8.9	-8.9	-9.5	-10.3	-10.1	-9.6	-9.3	-9.1	-9.0	-9.0	-9.3	-9.6	-10.2	-9.5	-9.6	-9.9	-10.3	-10.6	-10.8	-10.8	-9.3	-7.0
25-Nov	-11.2	-11.4	-11.5	-12.3	-13.6	-13.3	-12.8	-12.5	-12.7	-12.9	-13.3	-12.6	-12.4	-11.6	-12.3	-14.8	-17.6	-19.4	-20.9	-22.1	-23.2	-24.0	-24.0	-23.6	-15.7	-11.2
26-Nov	-24.5	-24.6	-22.2	-21.4	-21.7	-23.7	-23.0	-22.9	-24.1	-22.5	-20.3	-18.0	-16.4	-15.1	-13.8	-13.2	-12.7	-12.2	-11.5	-10.3	-10.0	-9.8	-10.3	-11.3	-17.3	-9.8
27-Nov	-12.0	-12.6	-13.4	-13.8	-14.5	-16.0	-16.9	-15.8	-15.5	-15.6	-16.5	-16.3	-15.7	-14.8	-16.1	-17.9	-19.4	-20.6	-20.0	-19.3	-18.5	-18.0	-17.0	-16.7	-16.4	-12.0
28-Nov	-16.6	-16.5	-16.6	-16.7	-16.6	-16.7	-16.7	-16.7	-16.7	-16.7	-16.5	-16.1	-15.8	-15.8	-15.7	-15.9	-16.3	-17.0	-18.0	-18.0	-18.7	-20.4	-21.8	-23.0	-17.3	-15.7
29-Nov	-23.9	-24.3	-23.3	-23.1	-23.0	-23.5	-23.2	-22.7	-22.3	-20.9	-18.7	-16.5	-15.3	-13.7	-13.6	-13.8	-14.2	-14.2	-15.3	-16.3	-16.9	-17.7	-18.2	-18.5	-18.9	-13.6
30-Nov	-19.1	-20.2	-20.4	-19.9	-21.0	-21.8	-22.2	-21.3	-20.9	-20.5	-19.4	-17.7	-16.7	-14.9	-14.8	-16.0	-16.8	-17.8	-17.9	-18.3	-18.4	-18.1	-18.3	-19.5	-18.8	-14.8
	-8.5	-8.4	-8.3	-8.5	-8.7	-8.8	-9.0	-8.9	-8.7	-7.9	-6.8	-5.6	-4.8	-4.3	-4.3	-5.1	-6.5	-7.6	-8.1	-8.4	-8.6	-8.9	-9.1	-9.2		Diurnal Average
	4.0	3.7	2.6	1.9	1.5	1.8	2.2	2.3	2.7	4.5	7.3	8.9	10.4	11.2	11.4	10.4	6.9	4.5	3.3	3.2	3.8	4.9	5.0	4.5		Diurnal Maximum



WBEA
Hourly Averages

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





WBEA
Cumulative Frequency Distribution

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

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	39	5.42	5.42
-20 - 0	543	75.42	80.83
0 - 10	134	18.61	99.44
10 - 20	4	0.56	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

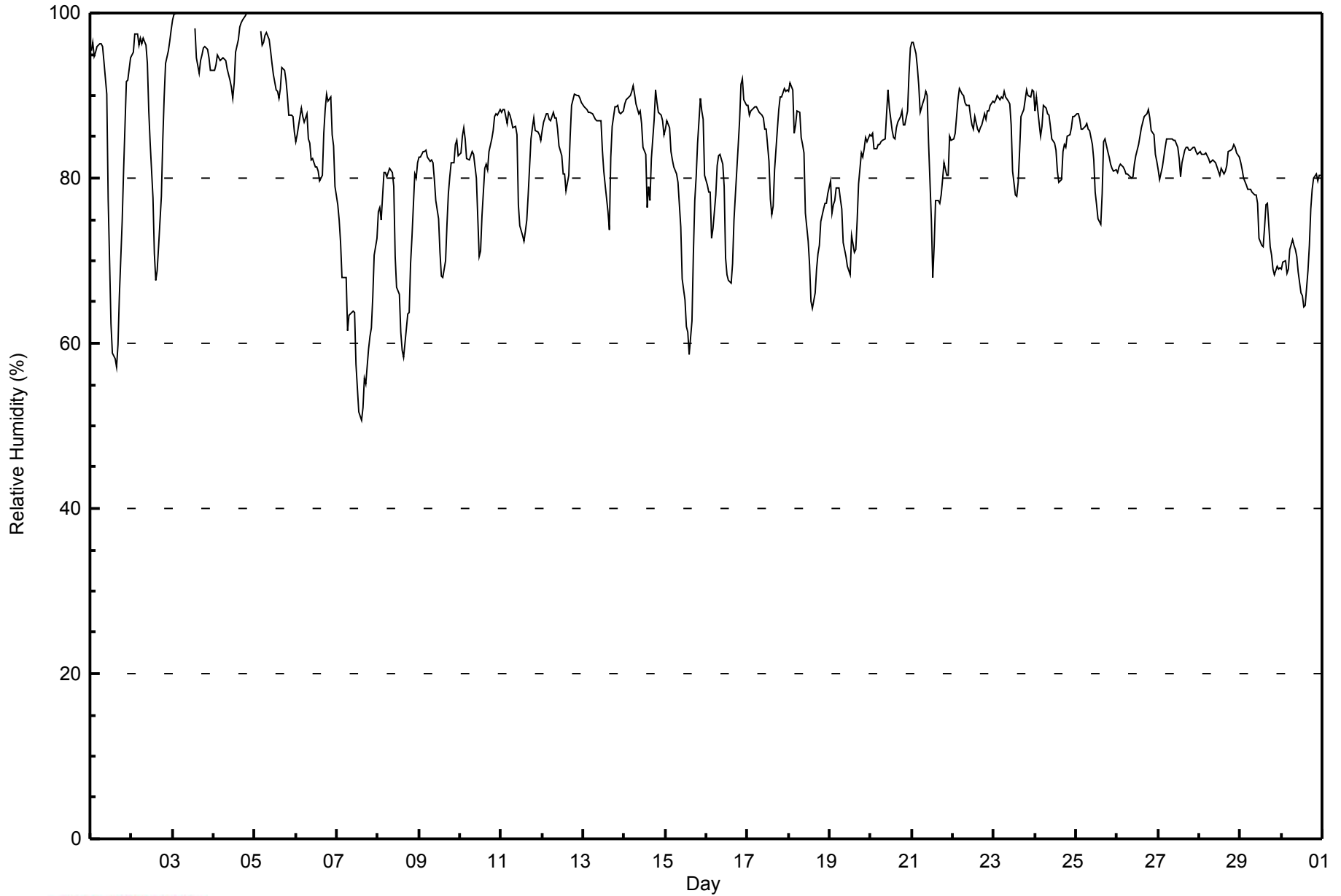


Maximum Value: 100 % on Nov 3 03:00																		Maximum Daily Average: 95.0 % on Nov 4																		Hours in Service: 720													
Minimum Value: 51 % on Nov 7 15:00																		Minimum Daily Average: 63.0 % on Nov 7																		Hours of Data: 703													
Maximum Diurnal Average: 85.9 % at hour 2																		Minimum Diurnal Average: 75.3 % at hour 15																		Hours of Missing Data: 17													
Monthly Average: 82.6 %																		Percentiles: P ₁ = 57 P ₁₀ = 70 Q ₁ = 78 Median = 84 Q ₃ = 88 P ₉₀ = 93 P ₉₉ = 99																		Hours of Calibration: 0													
																																				Percent Operational Time: 97.6													
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-Nov	96	96	95	95	96	96	96	96	94	90	77	70	62	59	58	57	60	66	75	81	86	92	92	95	82.5	96																							
2-Nov	95	95	97	97	96	97	96	97	96	94	88	84	78	71	68	69	72	78	85	90	94	95	97	98	88.6	98																							
3-Nov	99	100	100	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	98	95	93	94	95	96	96	96	95	93	93	--	100																							
4-Nov	93	94	95	95	94	95	94	94	93	92	91	90	92	95	97	98	99	99	100	100	UO	UO	UO	UO	95.0	100																							
5-Nov	UO	UO	UO	98	96	96	97	98	97	95	94	93	91	90	90	91	93	93	92	90	88	88	87	86	92.5	98																							
6-Nov	84	85	87	88	87	87	88	85	84	82	82	81	81	80	80	85	88	90	89	90	85	84	79	84.8	90																								
7-Nov	77	75	72	68	68	68	62	63	63	64	64	57	55	52	51	52	56	55	59	61	62	66	71	73	63.0	77																							
8-Nov	76	76	75	81	81	80	81	81	81	79	71	67	66	61	59	58	60	63	64	70	73	80	80	82	72.7	82																							
9-Nov	83	83	83	83	83	83	82	82	82	80	77	75	71	68	68	70	74	78	80	82	82	84	85	83	79.2	85																							
10-Nov	83	85	86	85	82	82	83	83	83	80	75	71	71	75	81	82	81	83	85	86	87	88	88	88	82.3	88																							
11-Nov	88	88	88	87	88	88	87	86	86	85	77	74	73	72	74	75	78	85	86	87	86	86	85	85	83.1	88																							
12-Nov	86	87	88	88	87	87	88	87	87	86	84	83	80	81	79	80	85	89	89	90	90	90	89	89	86.2	90																							
13-Nov	89	88	88	88	88	88	87	87	87	87	87	83	81	79	76	74	83	86	89	89	89	88	88	88	85.7	89																							
14-Nov	89	90	90	90	91	91	90	89	88	88	87	84	83	76	79	77	82	87	91	89	88	88	87	85	86.6	91																							
15-Nov	86	87	86	83	82	81	80	79	77	74	68	65	62	61	59	63	71	77	80	84	90	88	87	80	77.2	90																							
16-Nov	79	78	78	73	74	78	82	83	83	82	79	70	68	68	67	70	75	78	84	87	91	92	90	89	79.0	92																							
17-Nov	89	88	88	88	89	89	88	88	88	87	86	86	82	77	76	77	81	86	88	90	90	91	91	91	86.3	91																							
18-Nov	91	91	91	85	86	88	88	85	84	83	76	72	70	65	64	66	69	71	72	75	76	77	77	78	78.4	91																							
19-Nov	80	76	77	77	79	79	77	76	72	71	69	69	68	73	71	71	75	79	83	83	84	85	84	85	76.8	85																							
20-Nov	85	85	84	84	84	84	84	85	85	88	91	88	86	85	85	86	87	87	88	87	86	88	93	96	86.7	96																							
21-Nov	96	96	95	93	91	88	89	90	90	90	84	75	68	72	77	77	77	78	80	82	80	80	85	85	84.2	96																							
22-Nov	85	85	87	89	91	90	90	89	89	89	88	86	86	87	86	86	86	87	88	87	88	88	89	89	87.8	91																							
23-Nov	89	90	90	90	90	91	90	89	89	89	87	81	78	78	79	83	88	88	89	91	90	90	91	90	87.5	91																							
24-Nov	88	90	87	85	86	89	88	88	88	86	85	84	83	81	79	80	83	84	84	85	85	86	87	87	85.4	90																							
25-Nov	88	88	87	86	86	86	87	86	86	84	82	78	77	75	74	78	84	85	83	83	82	81	81	81	82.8	88																							
26-Nov	81	81	82	81	81	80	81	80	80	80	82	83	84	85	86	87	87	88	88	87	86	85	83	82	83.4	88																							
27-Nov	81	80	81	82	84	85	85	85	85	85	85	84	82	80	82	83	84	84	83	83	84	84	83	83	83.2	85																							
28-Nov	83	83	83	83	83	82	82	82	82	82	81	81	80	81	81	81	82	83	83	84	84	84	83	83	82.3	84																							
29-Nov	82	81	80	79	79	79	79	78	78	78	77	73	72	72	74	77	77	72	71	69	68	69	69	69	75.0	82																							
30-Nov	69	70	70	68	69	71	73	72	71	71	69	66	66	64	65	69	72	76	79	80	81	80	80	80	72.1	81																							
																								85.8	85.9	85.9	85.2	85.2	85.4	85.3	85.0	84.4	83.5	80.7	77.7	75.7	75.5	75.3	76.3	79.3	81.6	83.5	84.5	84.6	85.2	85.4	85.2	Diurnal Average	
																								99	100	100	98	96	97	97	98	97	95	94	93	92	98	97	98	99	99	100	100	96	95	97	98	Diurnal Maximum	
UO - Unstable Operation																																																	



WBEA
Hourly Averages

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





Maximum Value: 0.8 mm on Nov 6 13:00	Maximum Daily Total: 2.3 mm on Nov 6	Hours in Service: 720
Minimum Value: 0.0 mm on Nov 1 01:00	Minimum Daily Total: 0.0 mm on Nov 1	Hours of Data: 719
Maximum Diurnal Total: 1.0 mm at hour 15	Minimum Diurnal Total: 0.0 mm at hour 1	Hours of Missing Data: 1
Monthly Total: 3.81 mm	Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 0.3	Hours 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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.5	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.5
5-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	
6-Nov	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	0.3	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	2.3	0.8	
7-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
12-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
15-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

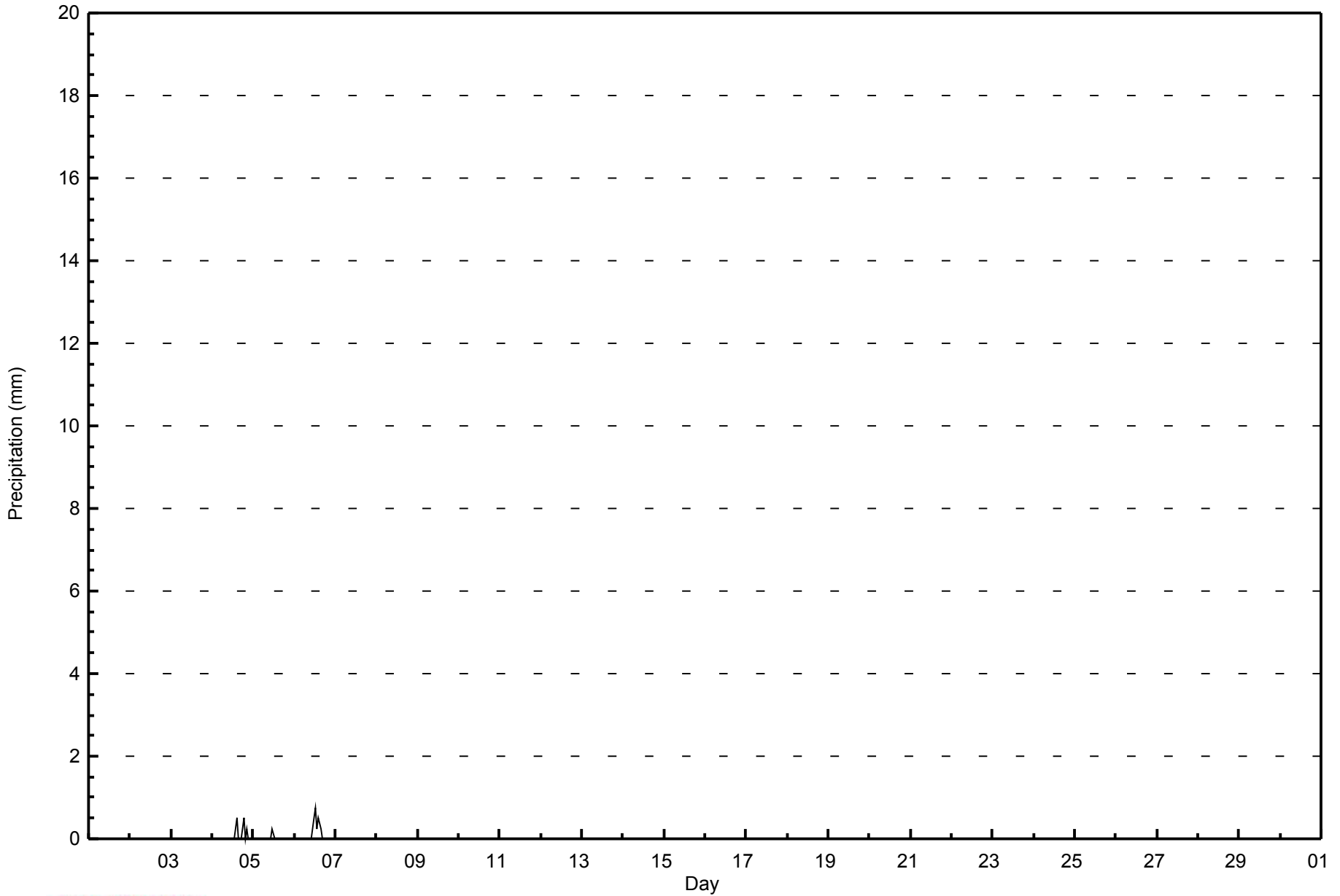
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.8	0.3	1.0	0.3	0.0	0.0	0.5	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Diurnal Average	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.8	0.3	0.5	0.3	0.0	0.0	0.5	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Diurnal Maximum

M - Maintenance



Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
Fort McKay - Bertha Ganter - November 2





WBEA
Cumulative Frequency Distribution

Precipitation (PC) - mm
Fort McKay - Bertha Ganter - November 2014

Concentration Ranges (mm)	Number of Hours	%	Cumulative %
0 - 0.3	714	99.30	99.30
0.4 - 0.5	4	0.56	99.86
0.6 - 0.7	0	0.00	99.86
0.8 - 1.4	1	0.14	100.00
1.5 - 10	0	0.00	100.00
> 10	0	0.00	100.00

Total Number of Valid Hours: 719

Total Number of Hours: 720

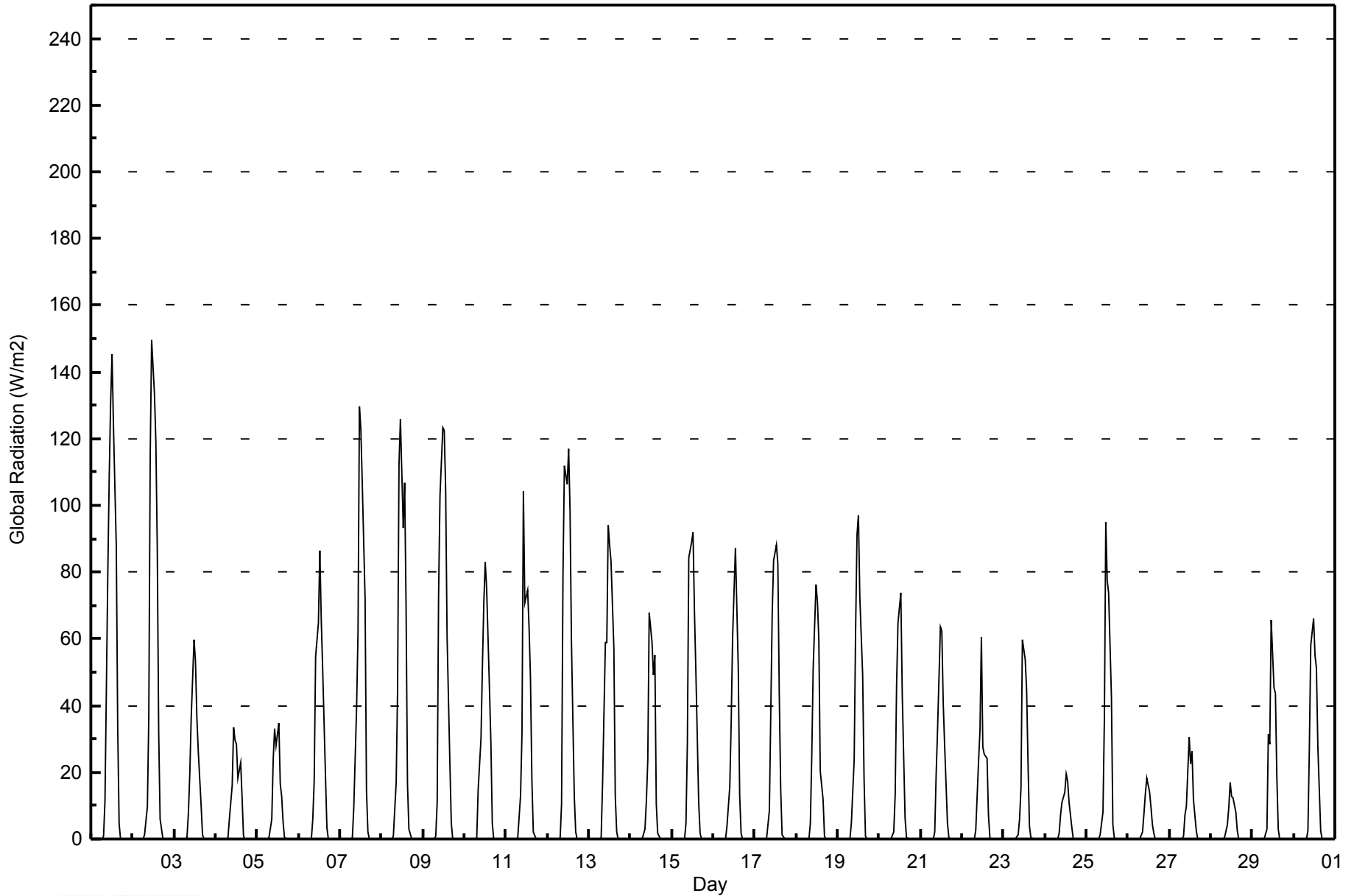


Maximum Value: 150 W/m2 on Nov 2 12:00																			Maximum Daily Average: 30.3 W/m2 on Nov 1						Hours in Service: 720		
Minimum Value: 0 W/m2 on Nov 4 20:00																			Minimum Daily Average: 2.8 W/m2 on Nov 28						Hours of Data: 720		
Maximum Diurnal Average: 73.6 W/m2 at hour 12																			Minimum Diurnal Average: 0.0 W/m2 at hour 19						Hours of Missing Data: 0		
Monthly Average: 14.5 W/m2																			Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 13 P ₉₀ = 61 P ₉₉ = 122						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-Nov	0	0	0	0	0	0	0	1	12	80	109	131	145	124	88	33	5	0	0	0	0	0	0	0	0	30.3	145
2-Nov	0	0	0	0	0	0	0	1	10	37	115	150	133	119	87	32	6	0	0	0	0	0	0	0	0	28.7	150
3-Nov	0	0	0	0	0	0	0	1	8	19	37	60	53	36	26	10	1	0	0	0	0	0	0	0	0	10.5	60
4-Nov	0	0	0	0	0	0	0	1	6	16	34	30	29	18	23	12	1	0	0	0	0	0	0	0	0	7.0	34
5-Nov	0	0	0	0	0	0	0	0	6	24	33	28	35	17	13	5	0	0	0	0	0	0	0	0	0	6.7	35
6-Nov	0	0	0	0	0	0	0	0	6	17	55	65	86	65	51	19	4	0	0	0	0	0	0	0	0	15.3	86
7-Nov	0	0	0	0	0	0	0	0	9	39	62	130	123	107	72	14	2	0	0	0	0	0	0	0	0	23.3	130
8-Nov	0	0	0	0	0	0	0	1	17	45	112	126	93	107	70	17	3	0	0	0	0	0	0	0	0	24.6	126
9-Nov	0	0	0	0	0	0	0	1	11	73	103	123	122	105	61	23	5	0	0	0	0	0	0	0	0	26.1	123
10-Nov	0	0	0	0	0	0	0	1	15	30	52	71	83	75	45	29	5	0	0	0	0	0	0	0	0	16.9	83
11-Nov	0	0	0	0	0	0	0	0	13	32	104	71	75	64	48	18	2	0	0	0	0	0	0	0	0	17.8	104
12-Nov	0	0	0	0	0	0	0	1	10	79	112	107	117	98	59	13	2	0	0	0	0	0	0	0	0	24.9	117
13-Nov	0	0	0	0	0	0	0	0	17	59	59	94	88	83	57	13	2	0	0	0	0	0	0	0	0	19.7	94
14-Nov	0	0	0	0	0	0	0	0	3	11	24	68	59	49	55	10	2	0	0	0	0	0	0	0	0	11.7	68
15-Nov	0	0	0	0	0	0	0	0	5	29	84	89	92	68	50	11	2	0	0	0	0	0	0	0	0	17.9	92
16-Nov	0	0	0	0	0	0	0	0	4	16	35	61	74	87	51	13	2	0	0	0	0	0	0	0	0	14.3	87
17-Nov	0	0	0	0	0	0	0	0	8	38	67	83	88	82	44	15	1	0	0	0	0	0	0	0	0	17.8	88
18-Nov	0	0	0	0	0	0	0	0	5	25	51	76	71	60	20	12	1	0	0	0	0	0	0	0	0	13.4	76
19-Nov	0	0	0	0	0	0	0	0	4	24	62	91	97	72	49	18	1	0	0	0	0	0	0	0	0	17.5	97
20-Nov	0	0	0	0	0	0	0	0	2	13	46	65	74	44	25	7	0	0	0	0	0	0	0	0	0	11.5	74
21-Nov	0	0	0	0	0	0	0	0	2	20	33	64	62	41	28	4	0	0	0	0	0	0	0	0	0	10.6	64
22-Nov	0	0	0	0	0	0	0	0	3	23	33	60	28	25	24	7	0	0	0	0	0	0	0	0	0	8.5	60
23-Nov	0	0	0	0	0	0	0	0	1	6	15	60	54	44	23	4	0	0	0	0	0	0	0	0	0	8.6	60
24-Nov	0	0	0	0	0	0	0	0	2	7	11	14	20	18	11	4	0	0	0	0	0	0	0	0	0	3.6	20
25-Nov	0	0	0	0	0	0	0	0	1	8	36	95	78	74	42	4	0	0	0	0	0	0	0	0	0	14.1	95
26-Nov	0	0	0	0	0	0	0	0	2	8	14	18	14	9	4	2	0	0	0	0	0	0	0	0	0	3.0	18
27-Nov	0	0	0	0	0	0	0	0	1	7	10	30	22	26	12	3	0	0	0	0	0	0	0	0	0	4.7	30
28-Nov	0	0	0	0	0	0	0	0	0	4	9	17	13	12	8	3	0	0	0	0	0	0	0	0	0	2.8	17
29-Nov	0	0	0	0	0	0	0	0	3	31	29	66	45	43	19	3	0	0	0	0	0	0	0	0	0	10.0	66
30-Nov	0	0	0	0	0	0	0	0	2	27	58	66	55	51	28	3	0	0	0	0	0	0	0	0	0	12.2	66
																			0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.3 6.3 28.2 53.4 73.6 70.9 60.9 39.8 11.9 1.6 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0						Diurnal Average		
																			0 0 0 0 0 0 0 1 17 80 115 150 145 124 88 33 6 0 0 0 0 0 0 0 0						Diurnal Maximum		



WBEA
Hourly Averages

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





WBEA
Cumulative Frequency Distribution

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

Concentration Ranges (W/m2)	Number of Hours	%	Cumulative %
0 - 20	572	79.44	79.44
21 - 100	126	17.50	96.94
101 - 300	22	3.06	100.00
301 - 600	0	0.00	100.00
601 - 900	0	0.00	100.00
> 900	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Speed: 17 km/h on Nov 7 04:00	Maximum Daily Speed Average: 10.4 km/h on Nov 7	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 17 18:00	Minimum Daily Speed Average: 0.6 km/h on Nov 26	Hours of Data: 697
Maximum Diurnal Speed Average: 2.2 km/h at hour 20	Minimum Diurnal Speed Average: 0.4 km/h at hour 15	Hours of Missing Data: 23
Monthly Average Velocity: 1.4 km/h 307.3 deg	Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 3 Median = 5 Q ₃ = 7 P ₉₀ = 10 P ₉₉ = 15	Percent Operational Time: 96.8

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-Nov	W3	WSW3	WNW1	SSW2	S2	SSW3	S3	S5	SSW6	SSW6	SW6	WSW6	SW6	SW6	WSW6	SW5	SW4	SW4	SW3	SW2	SW2	SW3	WSW2	SW5	SW3.6	SW6	
2-Nov	SW2	SW3	SW3	SW4	WSW2	SSW3	SW2	S4	SSW3	WSW2	S2	S7	S7	S8	S10	S11	S9	S7	S6	S5	S5	SSW6	S6	S6	S4.9	S11	
3-Nov	SSW10	SSW8	SSW6	SSW7	S7	SSW5	SSW6	SW2	W1	N3	N4	N4	N6	NNE6	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	----	SSW10	
4-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	----	ENE3	
5-Nov	NNW3	WNW2	SW2	WNW6	NW7	NW5	WNW4	WNW6	WNW6	NNW7	WNW6	WNW6	WNW8	WNW7	NW8	NNW2	S1	SSW3	SSE4	SW6	SSW6	S6	SSW6	SSW9	W3.4	SSW9	
6-Nov	S7	S9	SSE8	SSE12	SSE13	SSE15	SSE14	S15	S12	S15	S11	S16	SSW9	S8	S9	SW4	WSW3	SSW3	S4	WNW5	NW7	NW11	NNW11	N11	S6.1	S16	
7-Nov	NNW9	NNW14	NNW16	NNW17	NNW15	NNW14	NNW14	NNW10	N10	NNW12	N12	N14	NNW14	NNW13	N12	N8	NNW8	NNW8	NNW6	N7	NNW7	NNW5	N4	N4	NNW10.4	NNW17	
8-Nov	NW4	NW4	WNW5	WNW4	WNW3	NW6	NW5	NW5	NW9	NW7	NW9	NW7	WNW6	NW5	NNW3	NNW4	N3	NNE4	N5	NW4	NW5	W5	NW5	NW3	NW4.6	NW9	
9-Nov	W2	WNW2	NNW2	NNW3	NW2	WNW2	WNW3	WNW4	WNW4	NW3	W2	W2	NE3	NE6	NNE5	N5	NNW4	NW4	NNW4	NNE6	NNE8	N4	N5	N6	NNW3.1	NNE8	
10-Nov	N6	N7	N6	NW7	NW6	NW5	WNW4	NW3	N5	N6	N8	N10	NNE10	NNE10	NNE10	NNE9	NNE7	NNE6	N6	N6	NNW5	NW5	NW5	NNW5	N5.8	N10	
11-Nov	N4	NNW3	N4	NNE7	N6	NNE6	NNE5	NNE5	N4	NNE5	NNE5	NNW4	NNE2	NW4	N4	NNE2	W2	WSW2	WNW2	NW1	W3	WNW2	NW3	WSW2	N2.8	NNE7	
12-Nov	SSW1	SSW3	SSW3	S3	SSW3	SSW2	SSW3	SW3	SW4	SW5	S6	SSW8	S9	S10	S10	S8	S6	S6	SSW5	SSW5	SSW6	SSW8	SSW7	SSW5	SSW5.3	S10	
13-Nov	SSW6	SSW7	SSW8	SSW8	SSW7	SSW7	SSW7	SSW6	SSW5	SSW6	S6	S7	S7	S7	S4	NNW1	N5	N4	WNW2	NW3	NNW1	WNW2	NNW1	W1	SSW3.4	SSW8	
14-Nov	WNW3	WNW3	NW4	NW3	NNW4	NW3	N5	N6	N6	N6	N7	N8	N6	NNW3	E3	SE1	SSW2	SSE1	WNW3	SW1	SSW3	SW4	SSW6	NNW2.2	N8		
15-Nov	SSW6	SSW7	SSW7	SW7	SSW9	SSW10	SSW10	SSW8	SSW9	SW9	SW10	WSW10	WNW6	NNW5	NNE7	NNE9	NNE8	NNE8	NNW9	NNW11	N13	NNW11	NNW10	NNW9	WNW3.1	N13	
16-Nov	NNW11	N14	N15	N12	N10	N5	N9	N8	NW7	NW6	NNW7	NNW9	N6	E5	E3	ENE4	W2	WNW4	NNW3	N2	W1	WNW1	SW1	SW2	N5.0	N15	
17-Nov	SSW3	SW2	SSW4	SSW4	SSW5	SSW7	S8	SSW6	SSW6	WSW4	SSW7	S7	S10	S9	SW5	SW5	SSW3	SSW0	N4	NNW3	N1	WNW1	NW2	N4	SSW3.4	S10	
18-Nov	N4	N4	NNE6	N6	WNW6	WNW8	NW2	WNW6	WNW6	WNW5	NW10	NW8	NW14	NNW13	NNW10	NW10	NW8	NNW8	NW8	NW7	NW6	NW4	NW5	WNW5	NW6.6	NW14	
19-Nov	WNW5	NW6	NW7	NW8	NW4	NW3	NW3	NW2	WNW4	WSW4	SW6	SW8	SSW7	SSW9	SSW10	SSW7	SSW6	S4	S5	S6	S6	S5	S8	S7	SW3.6	SSW10	
20-Nov	SSW6	SSW6	S8	S7	SSW8	SSW9	S10	SSW10	SSW11	SSW8	S7	S8	SSW7	SW6	S5	S5	SSW4	ESE1	N5	N6	NNE4	NNE4	NNE5	NNE5	SSW3.9	SSW11	
21-Nov	NNE5	NNE5	NNE4	N5	N5	N5	N4	N5	NNW4	NNE3	NNE5	NNW7	NW8	N5	NE5	NE5	NE6	NE6	NE6	NNE7	N4	NNE4	NE4	ENE8	NNE4.7	NW8	
22-Nov	ENE6	NE7	NE5	NNE6	NNE7	NNE7	NNE7	NNE7	NNE8	NNE8	NNE8	NNE9	NNE9	NNE9	NNE10	NNE9	NNE8	N9	N9	NNE8	N8	N8	N6	N5	NNE7.5	NNE10	
23-Nov	N5	N4	N4	N3	NW3	WNW2	SSE3	S5	SSW4	SSW5	SSW6	SSW7	S7	S8	S8	SSW5	SSW3	WSW3	AF	SW1	SSW2	SSW1	NNE2	N5	SSW1.8	S8	
24-Nov	N6	N5	NNE7	N5	N5	N5	N5	N3	NNE3	NNE2	NE2	E4	E4	E3	E2	ENE2	NE2	ENE2	ENE2	NE3	NE5	NE4	NNE4	NNE6	NNE3.2	NNE7	
25-Nov	N5	NNE5	N6	N7	N6	N5	N5	N6	N5	N5	NE5	NE5	E5	E6	E5	ENE4	ENE1	N3	WNW1	W2	WSW1	W2	WSW1	SW2	SSW3	NNE2.6	N7
26-Nov	SW2	SSW4	SSW5	SSW6	SSW5	SSW4	SSW6	SSW3	SW3	S3	SSW7	S5	S5	S4	S3	SE1	SSE0	N5	N6	NNE8	NNE7	NNE5	NNE11	NNE9	S0.6	NNE11	
27-Nov	N10	NNE8	NNE7	NNE6	NNE5	N4	N4	N4	NNW4	N2	NNE3	N2	SW3	W1	NNW2	NW3	W1	NNW3	NNW1	S1	NW1	N3	NNE5	NNE6	N3.2	N10	
28-Nov	NE5	NNE5	NNE6	NNE6	NNE5	NNE6	NNE7	NNE6	NNE6	NNE6	NNE6	NNE6	NNE7	N7	NNE7	N6	N5	N3	NNW3	WSW2	WSW1	WSW4	WSW3	SSW3	NNE4.1	NNE7	
29-Nov	S3	SSW4	SSW5	SSW6	SSW7	SSW6	SSW7	SSW7	SSW8	S6	SSW5	WSW6	WSW6	W5	WNW6	NW8	NW5	NW10	NNW11	NW12	NW11	NW9	NW10	NW10	W3.9	NW12	
30-Nov	NW9	NW8	NW9	NW10	WNW7	WNW4	WNW8	WNW9	WNW9	W7	WSW8	SW9	SSW13	SSW11	SSW12	SSW11	SSW8	SSW8	SSW8	SSW8	SSW9	SSW8	SSW8	SSW8	SSW4	WSW5.7	SSW13

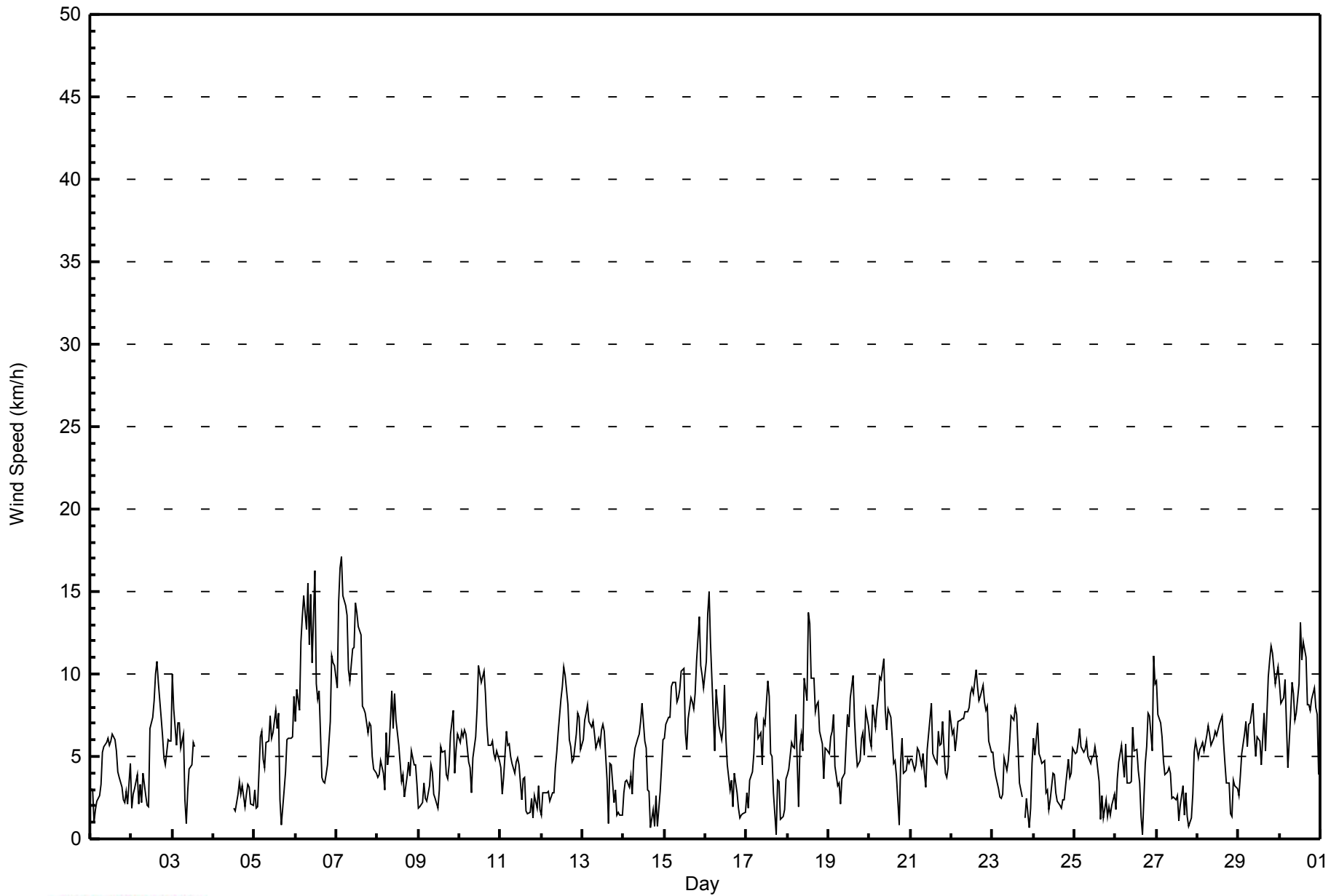
NNW1.8	NW1.9	NNW1.9	NW1.9	NNW1.7	NNW1.8	NNW1.1	W1.4	W2.0	W1.7	NNW1.7	W1.7	W1.1	W0.7	NW0.4	NW0.7	NW0.9	NNW1.5	NNW1.8	NNW2.2	NNW2.0	NW1.7	NW2.0	NW1.9	Diurnal Average	
NNW11	NNW14	NNW16	NNW17	NNW15	SSE15	NNW14	S15	S12	S15	N12	S16	NW14	NNW13	N12	SSW11	S9	NW10	NNW11	NW12	N13	NW11	NNE11	N11	Diurnal Maximum	

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



WBEA
Hourly Averages

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





WBEA
Cumulative Frequency Distribution

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

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	358	51.36	51.36
6 - 11	310	44.48	95.84
12 - 19	29	4.16	100.00
20 - 28	0	0.00	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 697

Total Number of Hours: 720



WBEA
Frequency Distribution

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

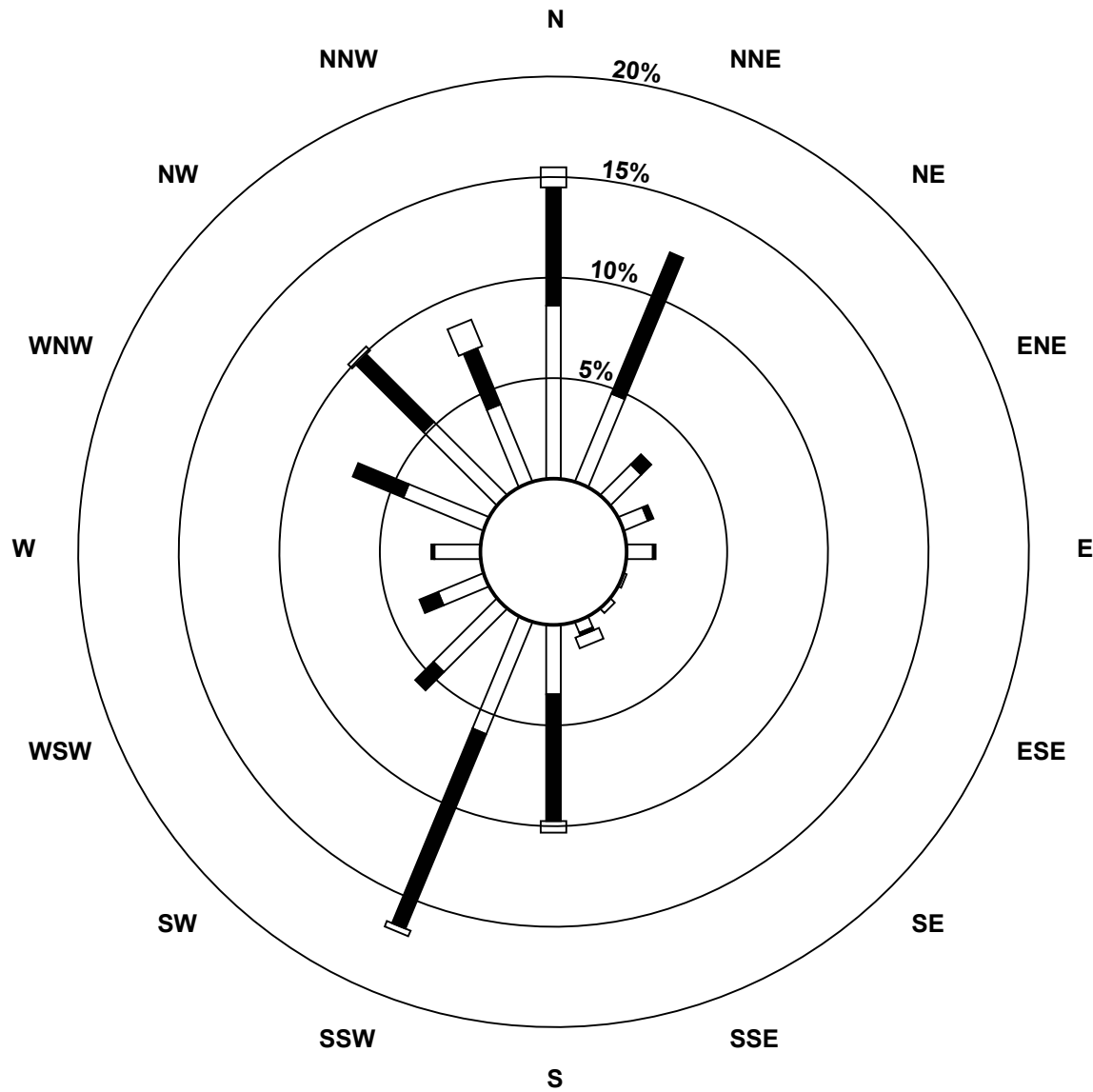
Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	60	33	15	9	9	1	2	4	24	42	31	17	16	30	36	29	358
6 - 11	41	53	5	2	1	0	0	1	44	73	9	7	1	19	33	21	310
12 - 19	7	0	0	0	0	0	0	4	4	2	0	0	0	0	2	10	29
20 - 28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	108	86	20	11	10	1	2	9	72	117	40	24	17	49	71	60	697

Total Number of Valid Hours: 697

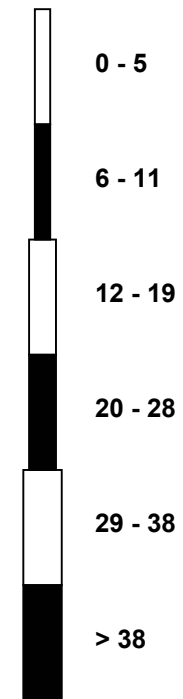
Total Number of Hours: 720

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

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



Classes (km/h)



Total Number of Valid Hours: 697



Summary of Hour Standard Deviations

Fort McKay - Bertha Ganter - November 2014

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 5 km/h on Nov 7 04:00			Hours of Data:	697
Minimum Value: 0 km/h on Nov 28 22:00			Hours of Missing Data:	23
			Hours of Calibration:	0
			Percent Operational Time:	96.8
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 2 P ₉₀ = 3 P ₉₉ = 5				

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

Diurnal Maximum

AF - Analyzer Failure



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Fort McKay - Bertha Ganter - November 2014

Direction of Maximum Speed: 337 deg on Nov 7 04:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 342.0 deg on Nov 7	Hours of Data: 697
Direction of Minimum Speed: 201 deg on Nov 17 18:00	Direction of Minimum Daily Speed Average: 0.6 deg on Nov 26
Direction of Minimum Speed: 201 deg on Nov 17 18:00	Hours of Missing Data: 23
Monthly Average Direction: 282.8 deg	Percent Operational Time: 96.8

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-Nov	262	247	299	193	172	195	171	190	197	192	230	248	236	233	247	230	221	236	223	228	216	230	252	226	223.3
2-Nov	224	231	218	223	250	208	223	189	208	245	175	175	178	186	182	183	189	181	184	173	181	193	189	191	191.0
3-Nov	196	199	201	196	190	207	201	223	276	5	354	357	10	19	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--
4-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	35	47	60	60	48	72	54	21	10	359	11	332	--
5-Nov	328	292	234	298	304	309	301	302	300	304	303	300	301	295	305	340	187	196	158	220	213	172	200	199	274.9
6-Nov	187	186	166	158	165	162	160	171	174	186	188	186	194	188	189	229	256	211	173	285	309	324	334	353	187.5
7-Nov	327	336	334	337	330	328	345	343	351	346	354	349	345	346	350	349	344	334	338	354	341	346	356	354	342.0
8-Nov	316	324	303	292	296	305	319	315	310	314	314	324	299	313	341	328	8	12	5	315	313	277	320	312	316.6
9-Nov	275	290	330	340	305	303	299	296	300	319	264	276	49	51	33	2	338	324	335	14	16	2	360	353	345.1
10-Nov	351	357	356	320	316	320	298	320	4	358	352	1	27	23	27	18	23	13	10	351	328	316	316	330	355.0
11-Nov	354	336	1	17	9	26	31	19	4	15	24	345	20	314	358	12	261	256	285	304	271	294	310	247	354.6
12-Nov	193	197	194	189	203	194	201	224	230	226	184	193	181	177	179	185	188	187	195	199	203	196	199	201	193.4
13-Nov	204	202	198	203	195	195	197	201	202	198	189	172	170	176	178	344	357	359	302	308	332	285	330	280	201.2
14-Nov	287	285	306	325	335	325	356	2	2	2	5	6	5	3	344	92	134	200	161	290	218	193	221	205	340.1
15-Nov	198	195	201	214	210	208	201	202	210	220	229	251	301	330	12	12	16	13	344	340	357	342	332	335	282.0
16-Nov	344	356	5	360	354	354	359	354	322	316	335	348	359	83	97	74	268	286	329	354	277	285	219	229	350.6
17-Nov	212	220	208	205	202	196	188	192	198	250	208	187	177	190	217	221	202	201	4	337	2	282	318	6	205.4
18-Nov	8	353	17	2	299	302	319	303	303	299	319	325	320	330	336	326	318	327	318	305	309	317	305	300	321.8
19-Nov	301	308	309	310	309	324	320	319	285	239	231	228	208	198	200	203	198	188	181	191	183	172	182	180	225.0
20-Nov	193	197	191	185	193	193	191	193	196	196	181	191	203	215	175	183	194	119	7	11	28	15	19	19	191.3
21-Nov	25	28	13	9	10	7	357	2	343	23	13	333	323	11	41	52	40	36	48	19	10	16	49	72	18.1
22-Nov	62	52	35	26	18	20	15	16	22	23	22	22	15	16	18	16	13	6	9	13	7	9	5	3	18.5
23-Nov	357	359	359	355	321	292	157	174	198	200	203	206	183	175	182	193	206	252	AF	222	200	204	15	1	205.6
24-Nov	9	7	15	11	3	7	6	356	15	12	50	88	89	95	91	69	46	70	72	47	54	44	15	13	31.2
25-Nov	11	13	5	6	4	5	7	10	11	34	43	79	92	96	74	78	8	295	271	237	280	246	226	211	21.5
26-Nov	232	212	193	195	199	196	202	206	217	182	193	178	175	183	172	133	164	8	8	22	24	25	17	13	175.6
27-Nov	11	13	15	16	19	3	2	6	342	352	14	355	231	263	337	306	261	348	327	170	325	0	26	25	2.4
28-Nov	34	30	27	23	28	18	19	26	28	23	25	27	28	11	14	9	5	349	333	254	255	252	238	212	14.8
29-Nov	191	199	209	196	200	206	200	200	202	172	198	243	251	263	295	307	312	326	330	325	323	320	322	315	272.2
30-Nov	313	311	314	316	303	284	298	290	285	259	254	223	201	205	202	199	194	194	195	194	193	194	200	241	238.0
	322.3	319.2	326.4	317.3	294.9	283.8	283.1	278.0	279.4	279.7	286.1	276.7	271.0	269.6	311.1	323.3	320.9	330.9	338.4	329.5	326.6	312.4	320.8	325.0	

Diurnal Average

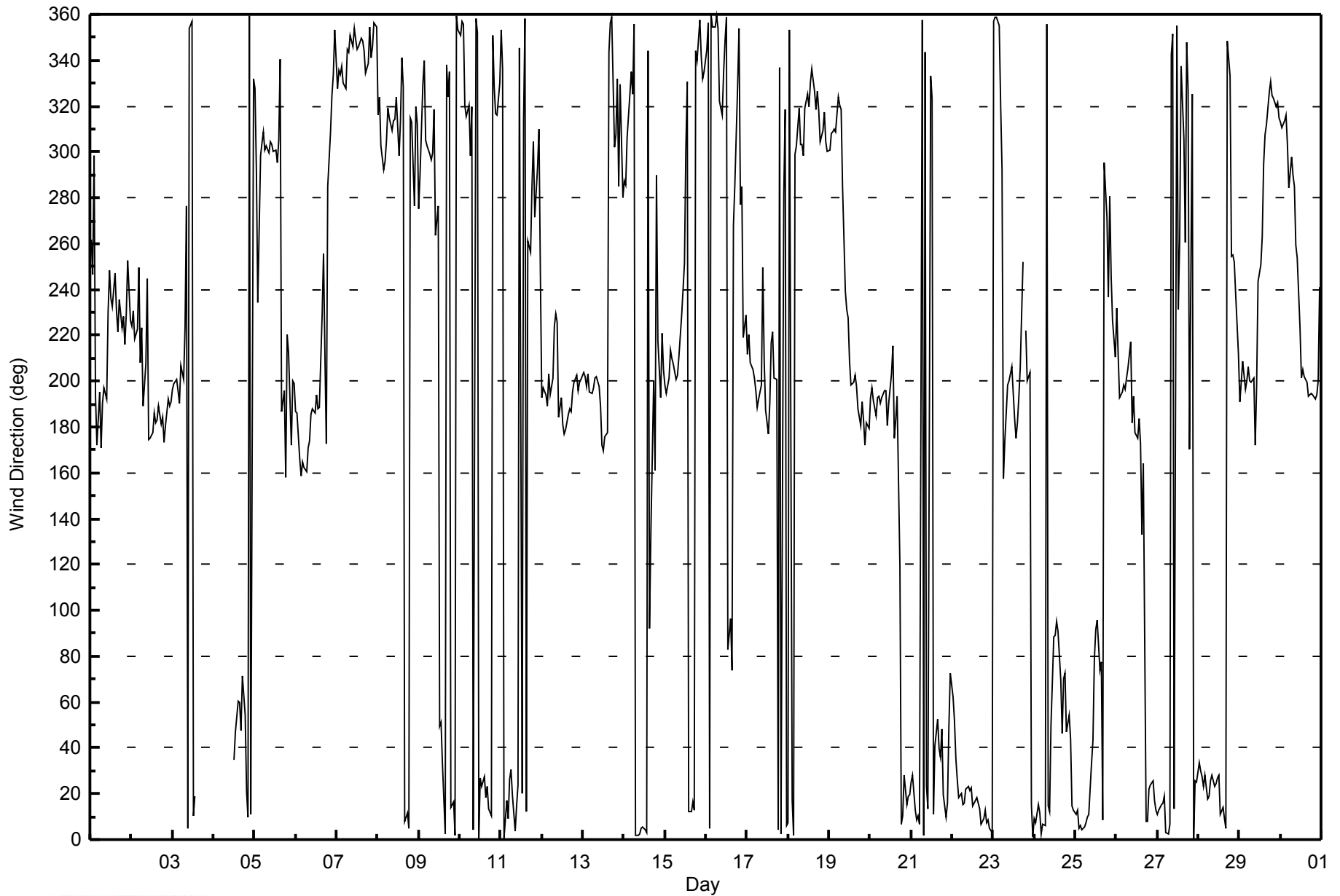
AF - Analyzer Failure

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



WBEA
Hourly Averages

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





Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

Fort McKay - Bertha Ganter - November 2014

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 102 deg on Nov 1 03:00			Hours of Data:	697
Minimum Value: 11 deg on Nov 12 21:00			Hours of Missing Data:	23
Percentiles: P ₁ = 12 P ₁₀ = 15 Q ₁ = 18 Median = 25 Q ₃ = 34 P ₉₀ = 47 P ₉₉ = 82			Hours of Calibration:	0
			Percent Operational Time:	96.8

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-Nov	24	27	102	54	34	41	69	18	15	18	31	40	42	40	37	29	13	14	16	27	35	28	48	20	102
2-Nov	50	34	20	14	37	26	22	13	32	26	60	20	21	19	14	14	14	16	15	16	17	19	20	19	60
3-Nov	16	15	20	20	18	21	16	55	71	40	24	28	34	39	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	71
4-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	48	38	34	24	34	27	23	17	17	21	19	36	48
5-Nov	22	27	33	28	22	22	22	20	21	17	21	25	23	31	17	59	82	26	17	28	27	19	16	17	82
6-Nov	17	17	19	18	14	15	23	17	16	17	18	16	33	18	17	32	27	34	24	46	15	18	22	24	46
7-Nov	22	22	21	23	22	21	24	21	27	27	27	27	29	27	27	26	20	17	17	22	19	18	16	22	29
8-Nov	17	24	18	20	39	16	32	21	14	22	22	32	38	63	65	23	23	22	15	33	17	24	22	29	65
9-Nov	62	51	41	20	33	21	15	14	25	31	58	82	67	62	51	32	17	13	21	37	36	28	27	25	82
10-Nov	22	21	21	19	17	16	17	53	25	23	25	28	34	38	38	35	35	30	27	21	20	18	17	19	53
11-Nov	17	26	23	32	28	35	44	34	24	33	49	54	77	49	33	34	85	41	27	27	15	26	30	42	85
12-Nov	58	22	21	22	18	25	33	22	25	27	27	20	23	14	13	14	13	14	13	14	11	15	14	16	58
13-Nov	14	13	15	15	14	15	14	13	14	14	18	17	16	17	21	80	12	19	32	21	26	42	54	43	80
14-Nov	24	20	22	24	28	19	20	23	25	25	29	29	32	33	75	40	79	17	55	39	66	19	22	18	79
15-Nov	15	12	13	21	16	19	14	17	18	22	28	38	43	30	34	28	31	29	29	24	27	25	19	18	43
16-Nov	20	25	27	31	25	25	24	25	20	17	25	25	41	43	65	41	33	14	32	75	68	47	32	27	75
17-Nov	25	22	25	24	12	14	14	15	16	41	29	17	14	17	20	17	28	90	24	38	70	80	65	38	90
18-Nov	24	16	27	30	20	18	60	15	15	18	19	23	19	23	23	17	17	18	16	17	25	34	22	18	60
19-Nov	16	16	16	15	21	19	30	63	37	46	34	33	45	21	17	15	13	16	19	14	17	27	15	17	63
20-Nov	14	15	16	16	17	18	17	16	16	16	16	18	22	22	31	18	19	72	17	26	46	33	30	30	72
21-Nov	37	40	31	30	26	26	23	26	23	38	38	30	20	54	41	39	38	44	45	35	24	35	44	35	54
22-Nov	40	39	42	35	30	33	31	32	31	35	36	33	34	34	32	34	32	27	30	32	28	26	25	26	42
23-Nov	22	28	25	25	24	22	64	20	22	20	16	21	21	15	15	13	13	15	AF	68	55	93	71	23	93
24-Nov	27	28	33	27	27	29	25	27	40	67	55	30	38	47	48	40	49	60	46	46	34	35	23	24	67
25-Nov	24	27	26	23	31	24	24	25	29	40	39	45	28	27	47	83	12	63	43	34	18	59	41	28	83
26-Nov	45	16	20	16	20	17	19	23	20	25	22	22	16	22	18	51	93	29	27	34	42	38	31	30	93
27-Nov	27	30	29	34	36	31	20	20	25	29	40	58	26	64	61	22	47	31	55	81	63	24	36	37	81
28-Nov	38	48	35	34	40	33	29	37	36	41	37	44	40	30	29	32	25	17	17	21	47	13	16	26	48
29-Nov	24	25	27	12	15	16	12	15	17	19	33	42	46	44	30	19	17	20	20	19	18	17	16	14	46
30-Nov	16	13	15	15	14	28	21	29	37	34	42	27	16	17	14	12	12	11	13	12	13	14	14	29	42
	62	51	102	54	40	41	69	63	71	67	60	82	77	64	75	83	93	90	55	81	70	93	71	43	

Diurnal Maximum

AF - Analyzer Failure



Wood Buffalo Environmental Association

SO₂ Calibration Report

Station Information

Calibration Date	November 6, 2014	Previous Calibration	October 8, 2014
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Routine		
Start Time (MST)	14:20	End Time (MST)	17:27
Barometric Pressure	n/a mmHg	Station temp.	21 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	1730512
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	730	730
Calculated slope	0.993844	1.000096	Chamber temp.	42.0	42.0
Calculated intercept	1.099212	0.395922	Pressure (mmHg)	716.0	716.0
Analyzer Background	38.8	38.8	Flow (lpm)	0.496	0.496
Analyzer Coefficient	0.759	0.749	Intensity	359xx	359xx

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	-0.4	NA
as found span	5500	81.5	755.7	760.8	0.993
calibrator zero	5500	0.0	0.0	0.2	NA
high point	5500	81.5	755.7	756.0	1.000
second point	5500	45.7	423.8	422.0	1.004
third point	5500	22.8	211.4	211.0	1.002
as left zero	5500	0.0	0.0	0.3	NA
as left span	5500	81.5	755.7	756.0	1.000
Average Correction Factor					1.002

Corrected As found	761.2	Previous response	759.3	% change	-0.2%
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Notes:

Calibration Performed By: Zack Eastman



Wood Buffalo Environmental Association

SO₂ Calibration Summary

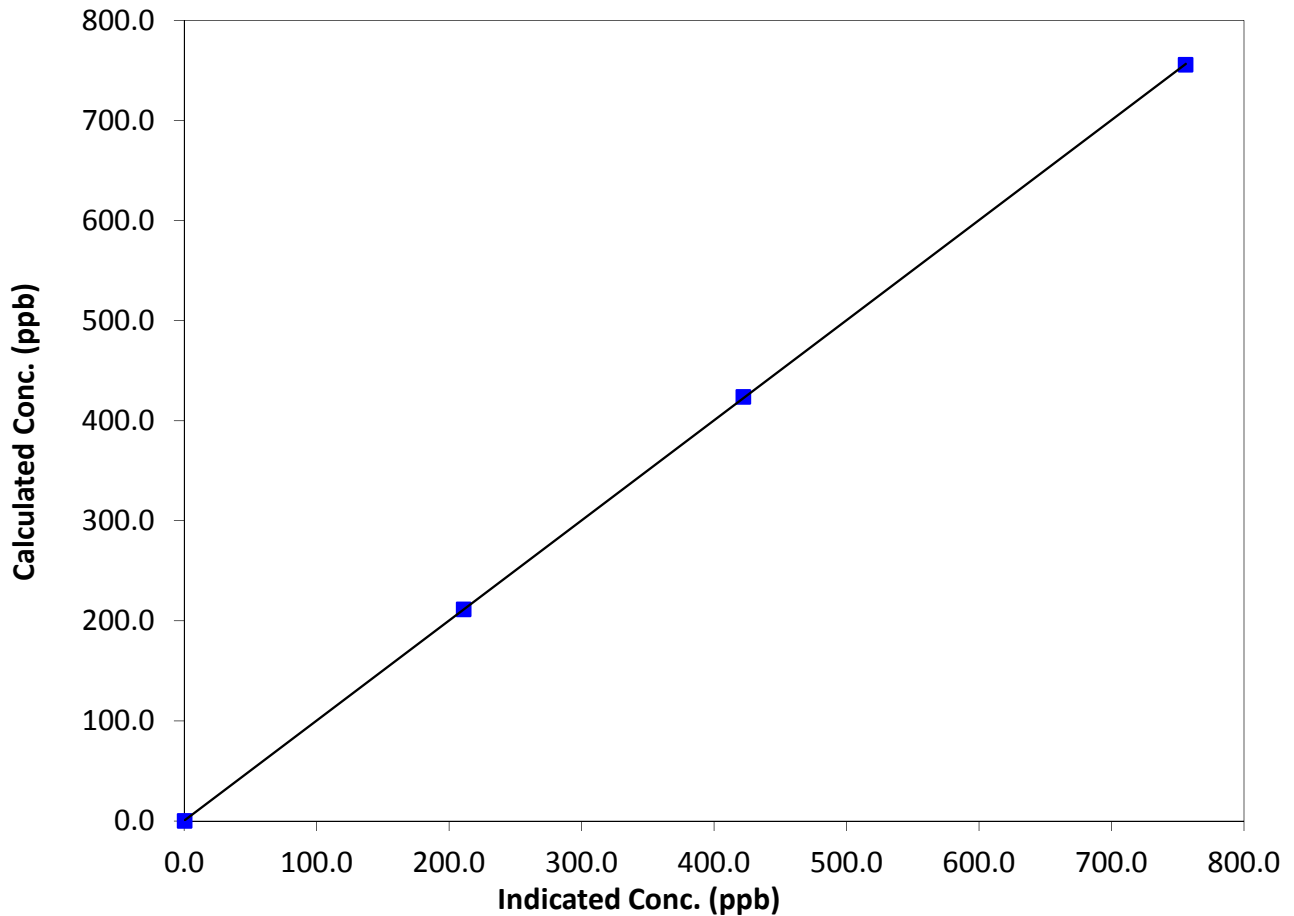
Station Information

Calibration Date	November 6, 2014	Previous Calibration	October 8, 2014
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	14:20	End Time (MST)	17:27
Analyzer make	Thermo 43C	Analyzer serial #	50911

Calibration Data

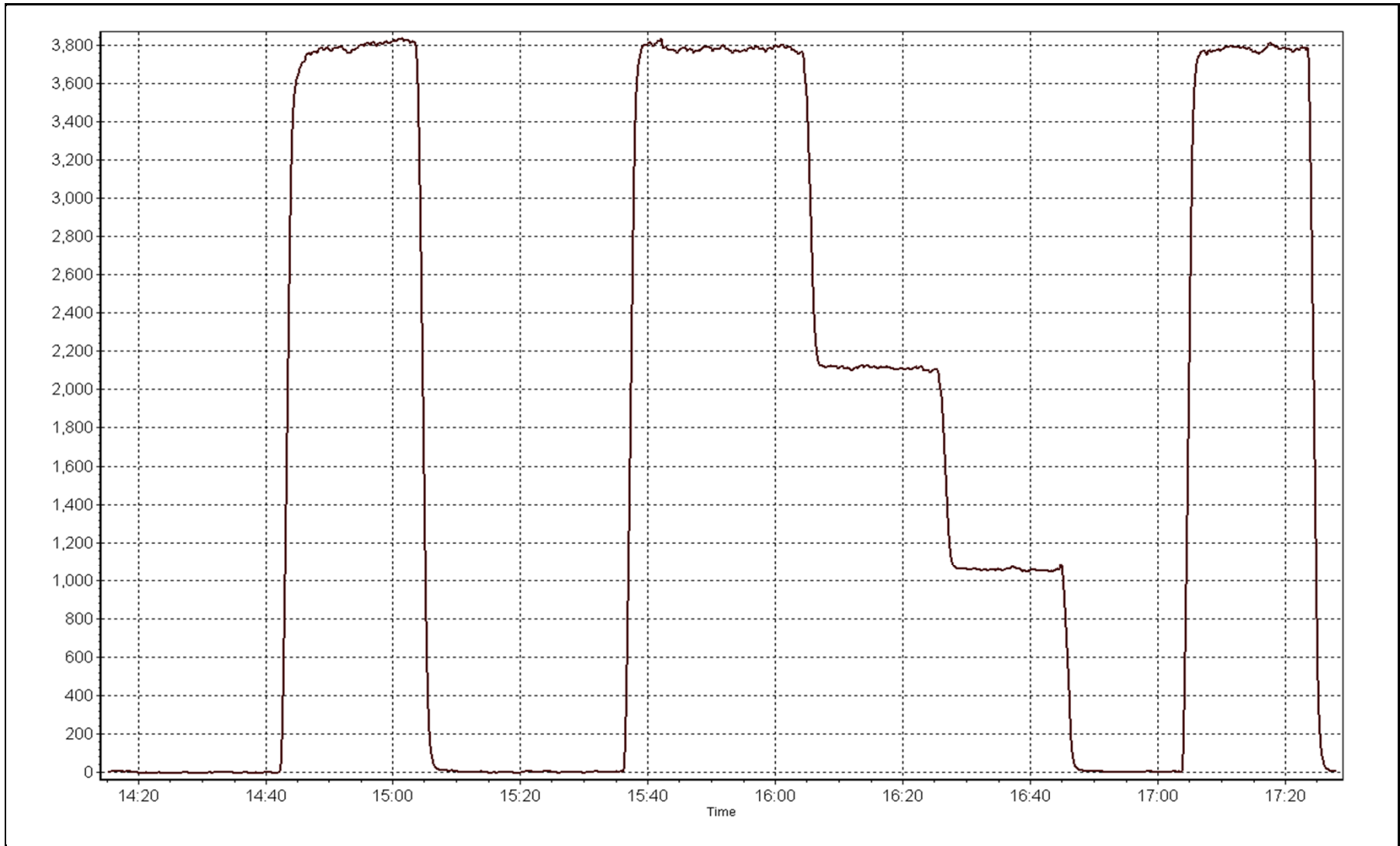
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	N/A	Correlation Coefficient	0.999991
755.7	756.0	0.9996		
423.8	422.0	1.0042	Slope	1.000096
211.4	211.0	1.0020		
			Intercept	0.395922

SO₂ Calibration Curve



SO2 Calibration Plot

Date: November 6, 2014



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Wood Buffalo Environmental Association

TRS Calibration Report

Station Information

Calibration Date	November 11, 2014	Previous Calibration	October 9, 2014
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Routine		
Start Time (MST)	9:50	End Time (MST)	13:45
Barometric Pressure	n/a mmHg	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial number	1730512
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	1148	1148
Calculated slope	1.000716	1.004177	Chamber temp.	45	45
Calculated intercept	0.055056	0.042789	Pressure	693.0	693.0
Analyzer Background	1.63	1.59	Flow	0.432	0.432
Analyzer Coefficient	0.976	0.976	Intensity	80	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	0.00	-0.07	NA
as found span	6500	46.0	75.0	74.5	1.007
SO2 scrubber check	5500	22.8	211.4	0.46	NA
calibrator zero	6500	0.0	0.00	0.02	NA
high point	6500	46.0	75.0	74.7	1.004
second point	6500	24.6	40.1	39.9	1.006
third point	6500	12.3	20.1	19.9	1.009
as left zero	6500	0.0	0.0	0.09	NA
as left span	6500	46.0	75.0	74.7	1.004
Average Correction Factor					1.007

Corrected As found	74.6	Previous response	74.9	% change	0.5%
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Notes:

zero adjusted slightly after inlet filter change. No other adjustments.

Calibration Performed By:

Zack Eastman



Wood Buffalo Environmental Association

TRS Calibration Summary

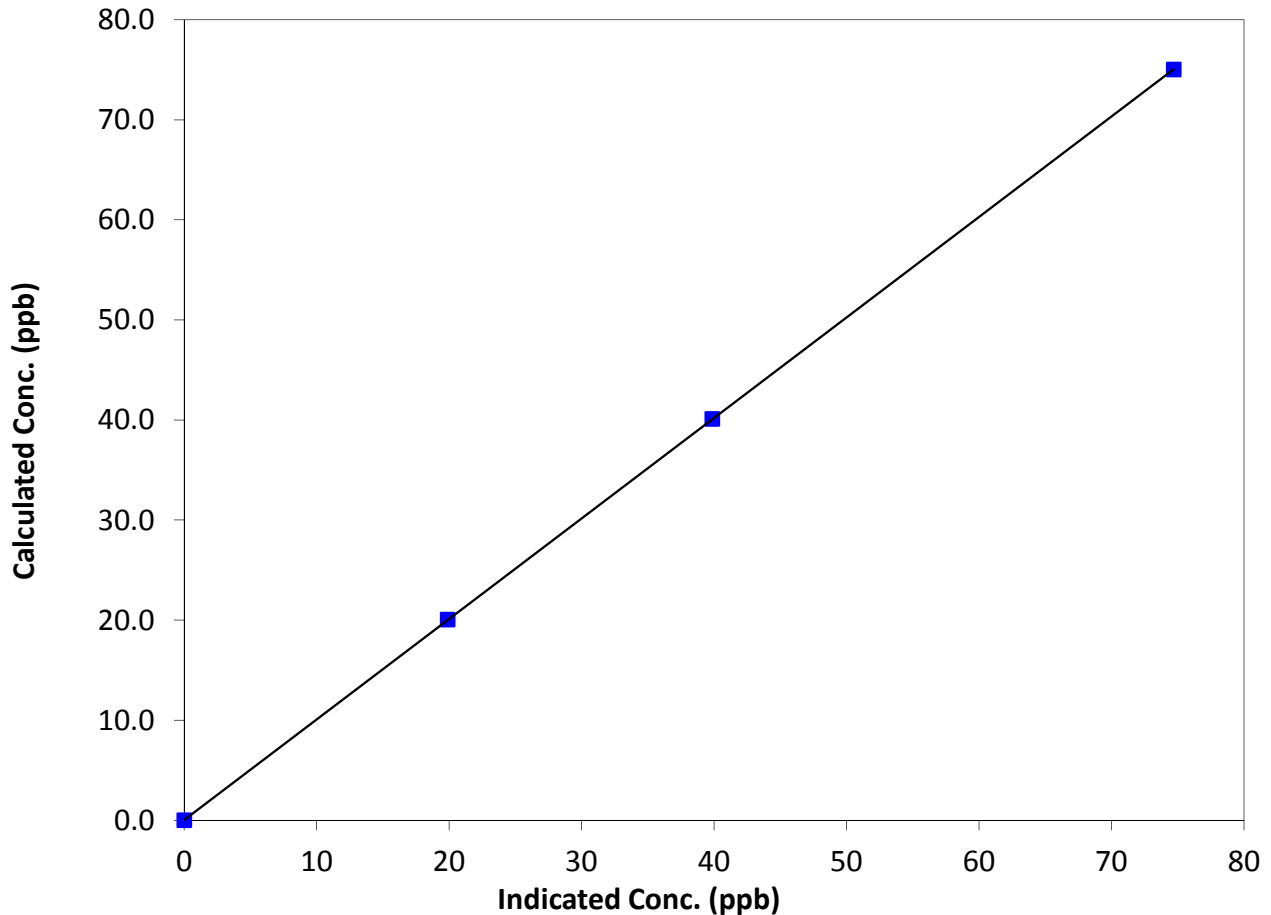
Station Information

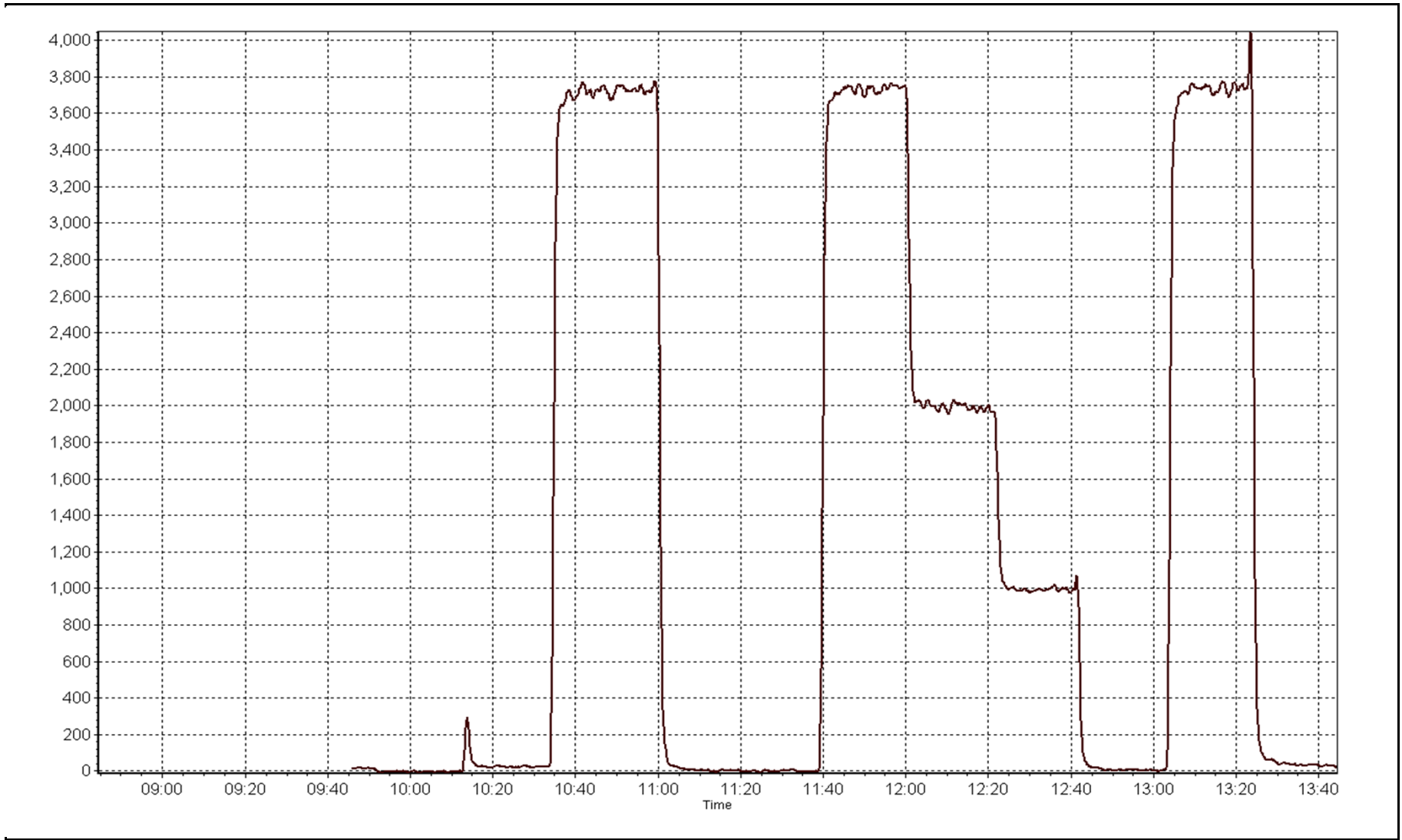
Calibration Date	November 11, 2014	Previous Calibration	October 9, 2014
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:50	End Time (MST)	13:45
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1218153461

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999997
75.0	74.7	1.0042		
40.1	39.9	1.0064	Slope	1.004177
20.1	19.9	1.0090		
			Intercept	0.042789

TRS Calibration Curve







Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Station Information

Calibration Date	Thursday, November 06, 2014	Prev Calibration	Wednesday, October 08, 2014
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Routine		
Start Time (MST)	14:20	End Time (MST)	17:27
Barometric Pressure	n/a mmHg	Station temp.	21 Deg C
Calibrator Model	Sabio 4010	Serial Number	1730512
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	35.0	35.0
THC Range (input)	50	50	Flame Temp	401.0	401.0
NMHC Range (ppm)	50	50	Carrier Pressure	40.0	40.0
NMHC Range (input)	50	50	Fuel Pressure	42.0	42.0
THC Calc slope	0.997246	0.998377	Air Pressure	32.0	32.0
THC Calc intercept	0.032452	0.026665	Det Temp	175.0	175.0
NMHC Calc slope	0.997998	0.999957	Filter Temp	175.0	175.0
NMHC Calc intercept	0.007734	0.007666	Column Temp	74.0	74.0

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	15.64	1.020
calibrator zero	5500	0.0	0.00	0.00	N/A
high point	5500	81.5	15.95	15.97	0.999
second point	5500	45.7	8.94	8.91	1.004
third point	5500	22.8	4.46	4.42	1.010
as left zero	5500	0.0	0.00	0.00	N/A
as left span	5500	81.5	15.95	15.98	0.998
Average Correction Factor					1.004

Corrected As found 15.64 Previous response 15.96 % change 2.1%

Notes:

zero and span adjusted after inlet filter changed.

Calibration Performed By: Zack Eastman



Wood Buffalo Environmental Association

THC / NMHC Calibration Report

NMHC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5500	0	0.00	0.00	N/A
as found span	5500	81.5	8.39	8.18	1.026
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	4.70	1.002
third point	5500	22.8	2.35	2.33	1.008
calibrator zero					
as left zero	5500	0.0	0.00	0.00	N/A
as left span	5500	81.5	8.39	8.39	1.001
Average Correction Factor					1.003

Corrected As found 8.18 Previous response 8.40 % change 2.7%

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	5500	0	0.00	0.00	N/A
as found span	5500	81.5	7.56	7.46	1.013
calibrator zero	5500	0.0	0.00	0.00	N/A
high point	5500	81.5	7.56	7.57	0.998
second point	5500	45.7	4.24	4.21	1.007
third point	5500	22.8	2.11	2.09	1.012
calibrator zero					
as left zero	5500	0.0	0.00	0.00	N/A
as left span	5500	81.5	7.56	7.59	0.996
Average Correction Factor					

Corrected As found 7.46 Previous response 7.56 % change 1.3%



Wood Buffalo Environmental Association

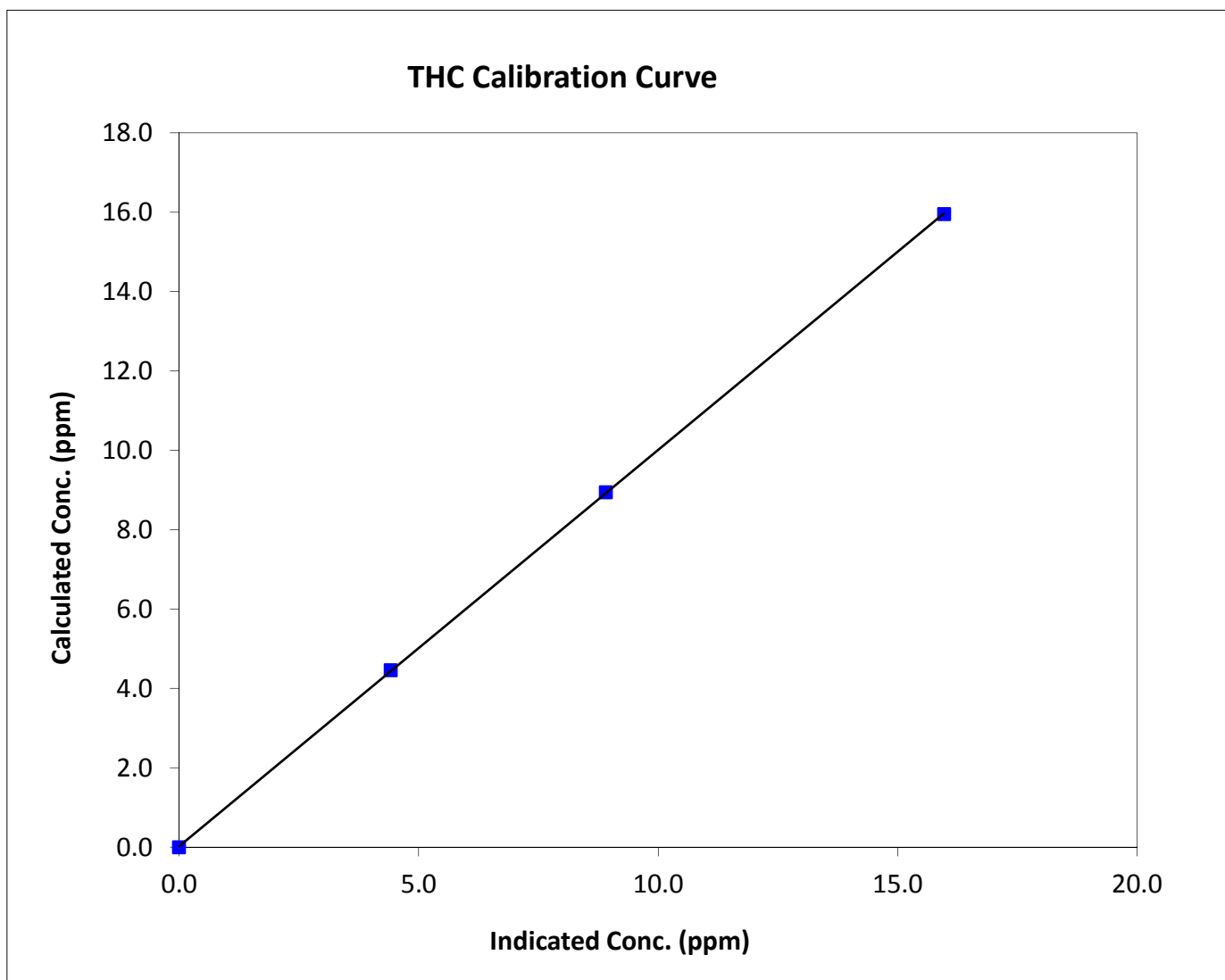
THC Calibration Summary

Station Information

Calibration Date	November 6, 2014	Previous Calibration	October 8, 2014
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	14:20	End Time (MST)	17:27
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	0.999985
15.95	15.97	0.9989		
8.94	8.91	1.0039	Slope	0.998377
4.46	4.42	1.0096		
			Intercept	0.026665





Wood Buffalo Environmental Association

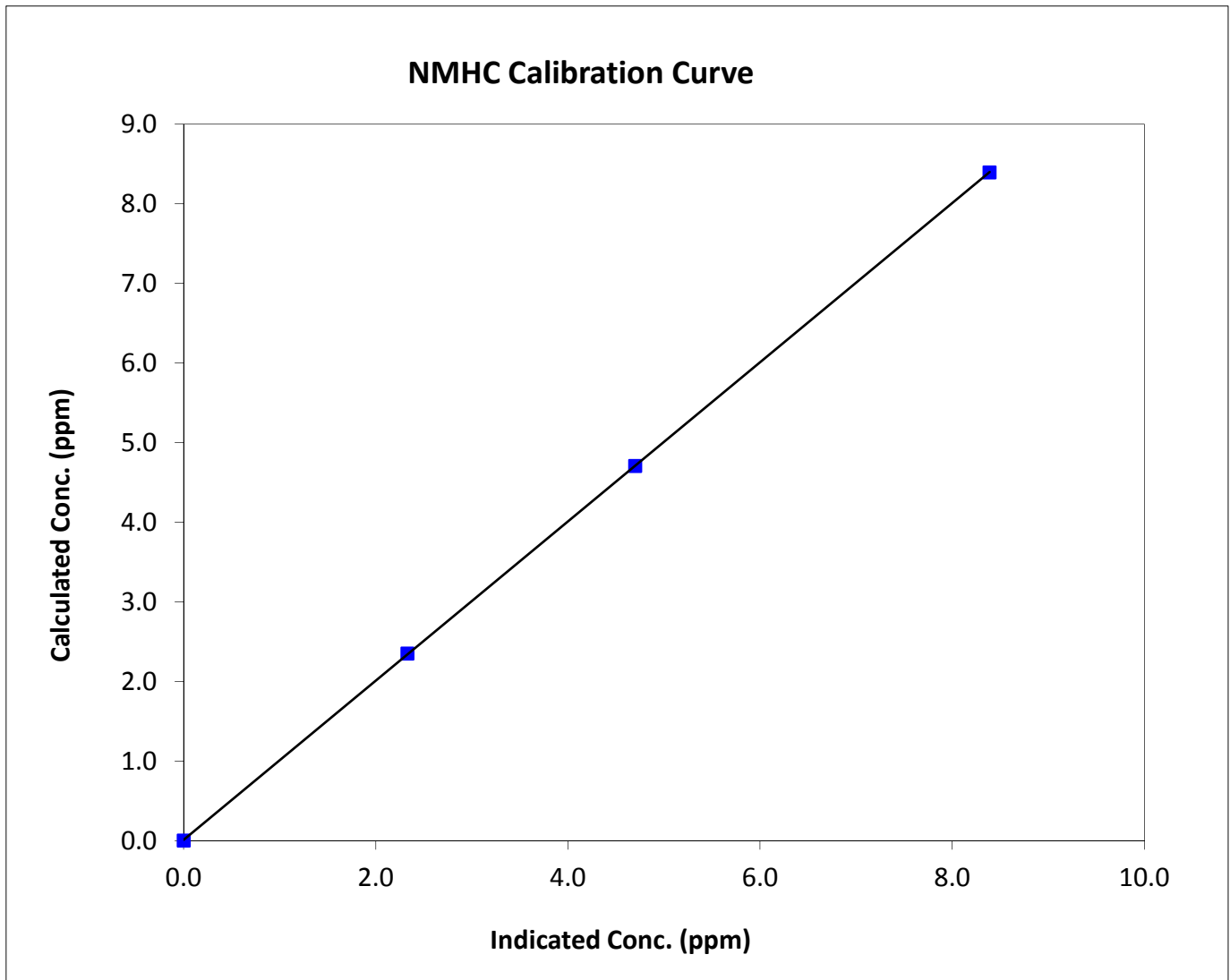
NMHC Calibration Summary

Station Information

Calibration Date	November 6, 2014	Previous Calibration	October 8, 2014
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	14:20	End Time (MST)	17:27
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	0.999995
8.39	8.39	1.0005		
4.71	4.70	1.0015	Slope	0.999957
2.35	2.33	1.0079		
			Intercept	0.007666







Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

Calibration Date	November 7, 2014	Previous Calibration	October 21, 2014
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Routine		
Start Time (MST)	13:30	End Time (MST)	17:07
Barometric Pressure	N/A mmHg	Station temp.	23 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	1730512
NO2 calibration used	Friday, November 07, 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.	24.0	24.0
Analyzer Range (input)	5000	5000	Lamp temp.	53.0	53.0
Calculated slope	0.996165	0.997759	Pressure	670.0	670.0
Calculated intercept	-0.544643	-0.235055	Flow cell A	0.725	0.725
Analyzer Background	-1.4	-1.4	Flow cell B	0.724	0.724
Analyzer Coefficient	1.024	1.012	Cell A Intensity	87xxx	87xxx
			Cell B Intensity	80xxx	80xxx

Analyzer make Thermo 49i Analyzer serial # 1300156233

Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Lamp Intensity (mA)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5500	0.00	0.0	-0.2	N/A
as found span	5000	1.10	398.4	405.8	0.982
calibrator zero	5500	0.00	0.0	0.5	N/A
high point	5000	1.10	398.4	399.3	0.998
second point	5000	0.60	207.9	209.5	0.992
third point	5000	0.35	109.4	109.0	1.004
calibrator zero	5500	0.00	0.0		NA
as left zero	N/A	0.00	0.0	0.8	NA
as left span	N/A	1.10	398.4	402.7	0.989
Average Correction Factor					0.998

Corrected As found 406.0 Previous response 400.5 % change -1.3%
Average Correction

Notes:

optics cleaned after as founds and inlet filter change as part of routine maintenance. Span adjusted after filter change and optics cleaned.

Calibration Performed By: Zack Eastman



Wood Buffalo Environmental Association

O₃ Calibration Summary

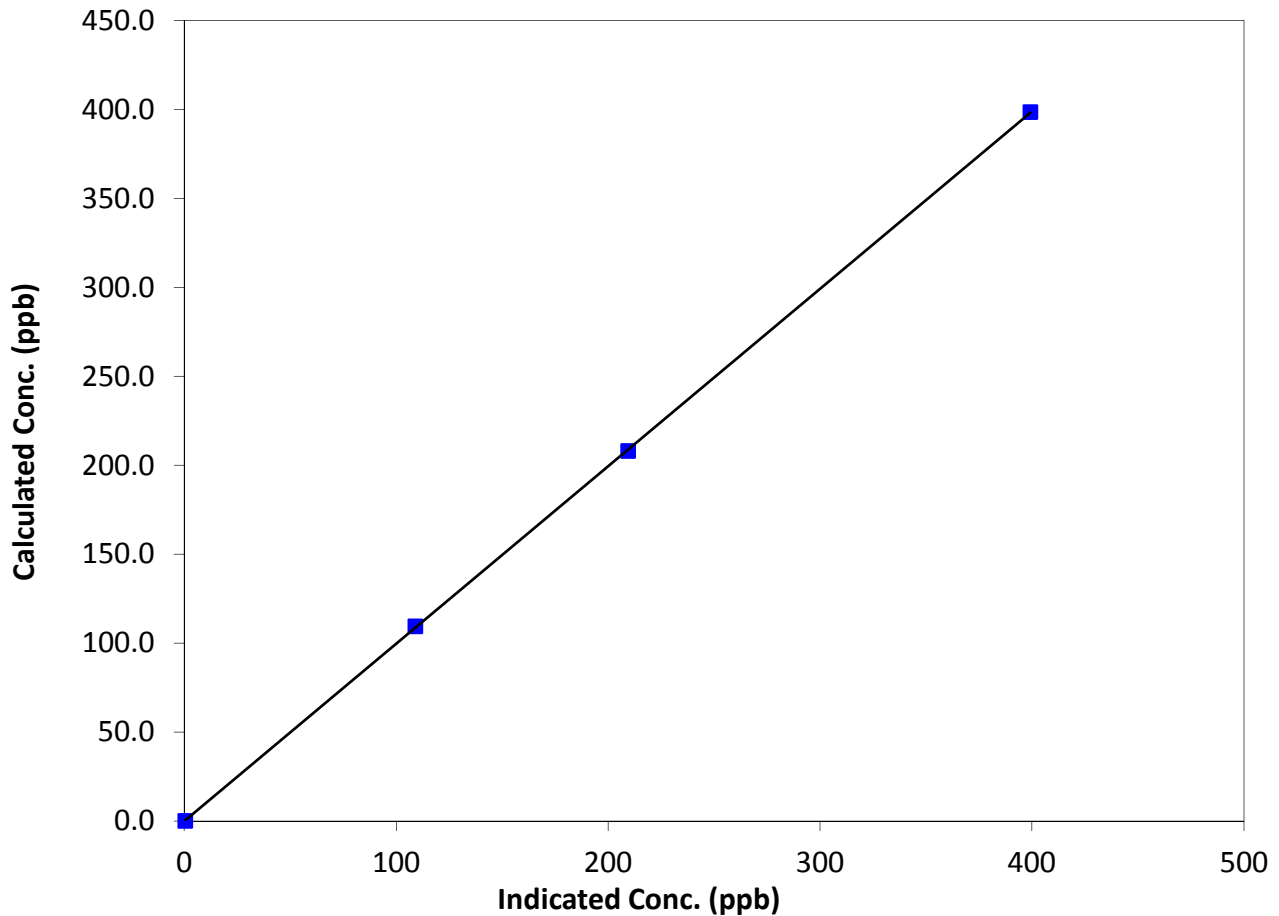
Station Information

Calibration Date	Friday, November 07, 2014	Previous Calibration	October 21, 2014
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	13:30	End Time (MST)	17:07
Analyzer make	Thermo 49i	Analyzer serial #	1300156233

Calibration Data

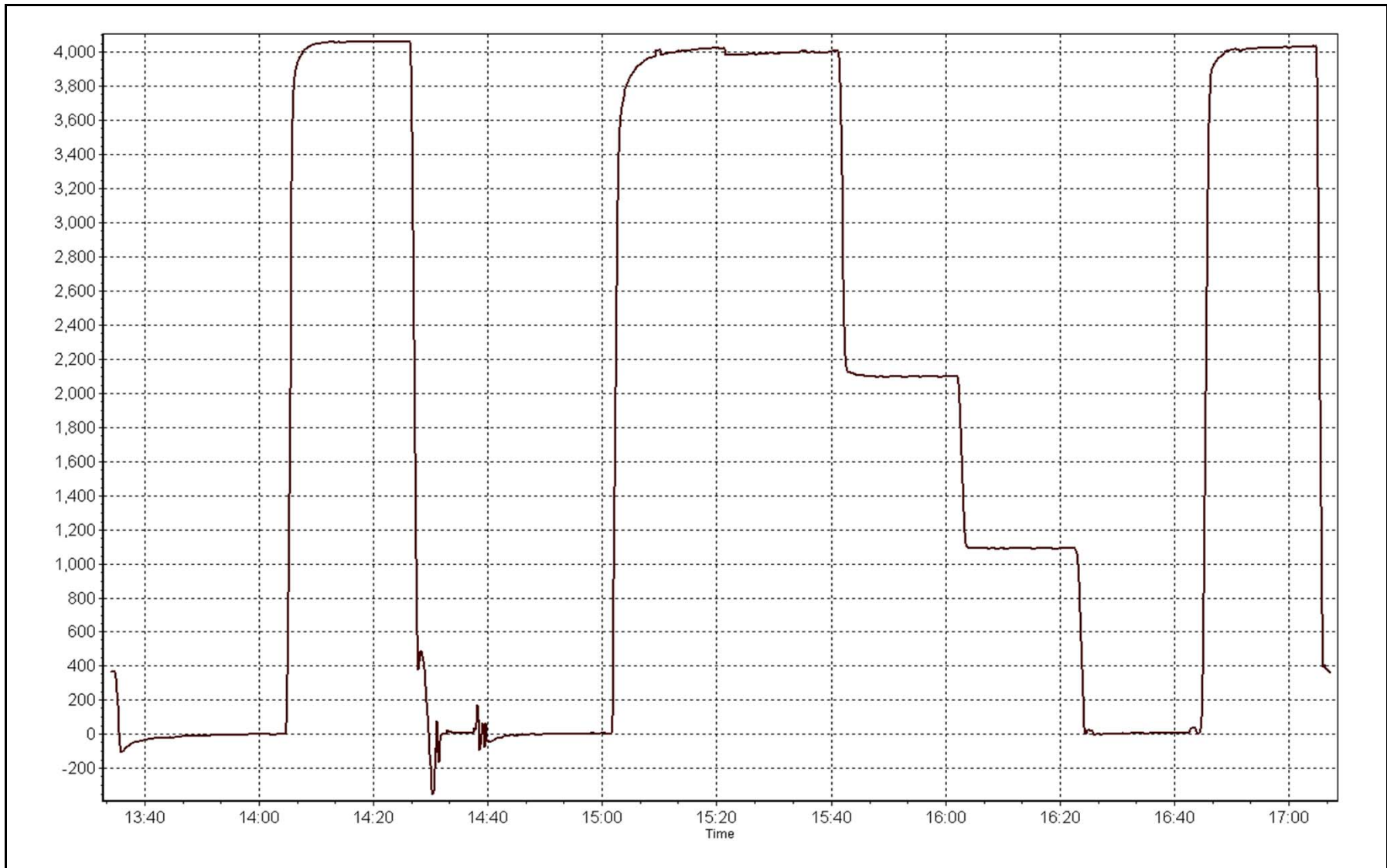
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.5	N/A	Correlation Coefficient	0.999981
398.4	399.3	0.9977		
207.9	209.5	0.9924	Slope	0.997759
109.4	109.0	1.0037		
			Intercept	-0.235055

O₃ Calibration Curve



O3 Calibration Plot

Date: November 7, 2014





Wood Buffalo Environmental Association

NO_x-NO-NO₂ Calibration Report

Station Information

Calibration Date	November 7, 2014	Previous Calibration	October 19, 2014
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	<input type="text" value="Routine"/>		
Start Time (MST)	9:00	End Time (MST)	13:36
Barometric Pressure	n/a mmHg	Station Temperature	21.0 Deg C
Calibrator	SABIO 4010	Serial Number	1730512
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
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Parameter		NOx	NO	NO2
MV conversion	Analyzer Range (ppb)	5000	5000	5000
	Analyzer Range (mv)	5000	5000	5000
Before	Data Slope	1.001519	1.000736	1.003191
	Data Offset	1.053233	0.571677	1.074197
After	Data Slope	0.998942	0.998493	1.001706
	Data Offset	1.014389	0.944263	0.746540
Channel #				
Voltage Range		0-5000mv	0-5000mv	0-5000mv

Analyzer Information

Analyzer make/model	Thermo 42i NO/NO2/NOx Analyzer	Analyzer serial #	1218153357
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Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	0.872	ppb	0.866	ppb
NOx coefficient	0.997	ppb	0.999	ppb
NO2 coefficient	1.000	ppb	1.000	ppb
NO bkgrnd	6.2		6.2	
NOx bkgrnd	6.9		6.9	
Chamber Temp	50.0	Deg C	50.0	Deg C
Moly Temp	326.0	Deg C	326.0	Deg C
PMT Temp	-2.7	Deg C	-2.7	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell Press	206.0	mmHg	206.0	mmHg
Sample Flow	503.0	ccm	503.0	ccm

Notes:

Inlet filter changed after as founds, span adjusted slightly after filter change.



Wood Buffalo Environmental Association

NO_x-NO-NO₂ Calibration Report

Station Information

Calibration Date: November 7, 2014 Station Number: AMS 1

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NO _x conc (ppb)	Calculated NO conc (ppb)	Calculated NO ₂ conc (ppb)	Indicated NO _x conc (ppb)	Indicated NO conc (ppb)	Indicated NO ₂ conc (ppb)	NO _x Correction factor	NO Correction factor
as found zero	5500	0.0	0.0	0.0	0.0	-0.96	-0.25	-0.70	N/A	N/A
as found span	5500	81.5	749.8	749.8	0.0	754.0	755.0	-1.0	0.994	0.993
calibrator zero	5500	0.0	0.0	0.0	0.0	-0.6	-0.1	-0.5	N/A	N/A
high point	5500	81.5	749.8	749.8	0.0	750.0	750.4	-0.4	1.000	0.999
second point	5500	45.7	420.4	420.4	0.0	419.2	419.9	419.7	1.003	1.001
third point	5500	22.8	209.8	209.8	0.0	208.8	208.1	-0.4	1.005	1.008
calibrator zero										
as left zero	5500	0.0	0.0	0.0	0.0	-0.5	-0.1	-0.4	N/A	N/A
as left span	5500	81.5	749.8	351.0	398.8	750.0	352.0	398.0	1.000	0.997
Average Correction Factor									1.002	1.003

Corrected As found NO_x= 755.0 NO= 755.3 Percent Change NO_x= -1.0% NO= -0.9%
 Previous Response NO_x= 747.6 NO= 748.7

GPT Calibration Data

Dilution Flow 5500 ccm Source Gas Flow 81.50 ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO ₂ conc (ppb)	Indicated NO _x conc (ppb)	Indicated NO conc (ppb)	Indicated NO ₂ conc (ppb)	NO _x Correction factor	NO Correction factor	NO ₂ Correction factor	Converter Efficiency
Cal zero			0.0			-0.5			N/A	
1st NO ₂ (300)	N/A	351.0	398.4	748.0	351.0	397.0	0.988	1.000	1.004	99.6%
2nd NO ₂ (200)	N/A	541.5	207.9	748.5	541.5	207.0	0.987	1.000	1.004	99.6%
3rd NO ₂ (100)	N/A	640.0	109.4	748.0	640.0	108.0	0.988	1.000	1.013	98.7%
4th NO ₂ (0)	749.4	N/A	-0.4	749.0	749.4	-0.4	0.986	1.000	N/A	N/A
Average Correction Factor							0.987	1.000	1.007	99.3%

Calibration Performed By: Zack Eastman



Wood Buffalo Environmental Association

NO_x Calibration Summary

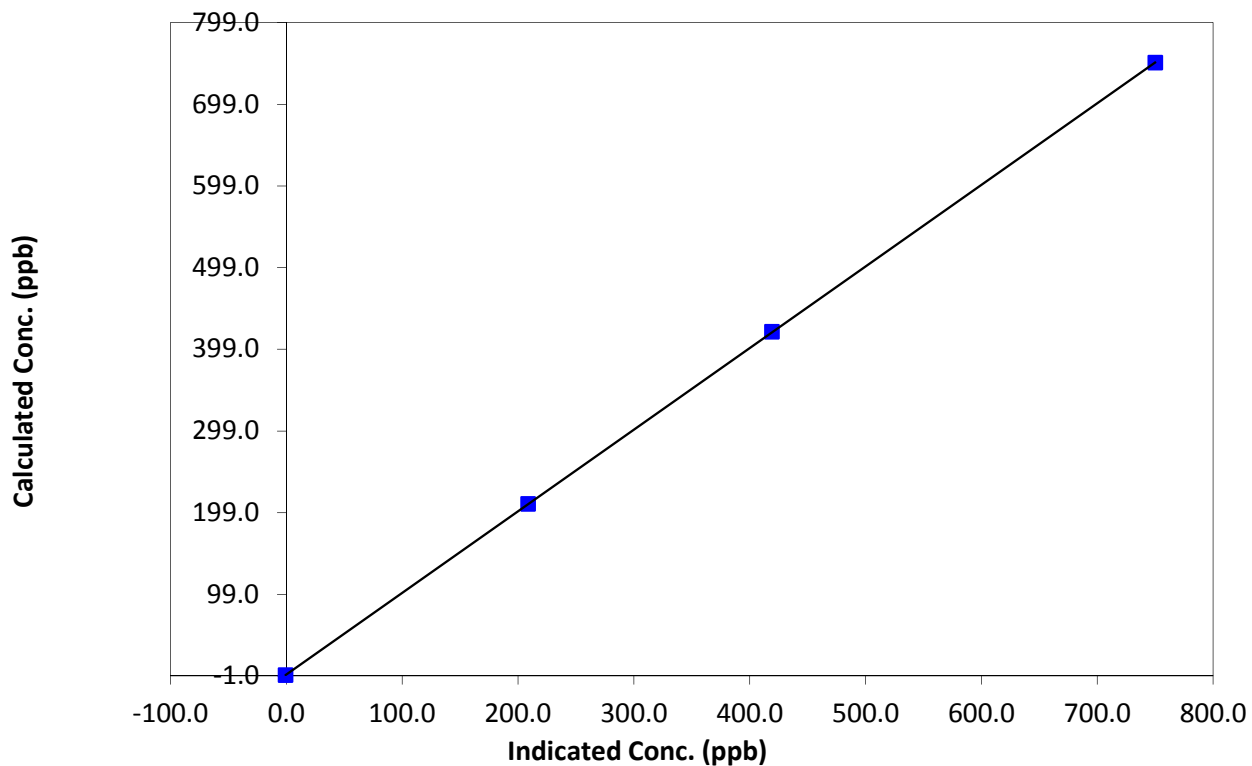
Station Information

Calibration Date	November 7, 2014	Previous Calibration	October 19, 2014
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:00	End Time (MST)	13:36
Analyzer make	Thermo 42i NO/NO ₂ /NO _x Analyzer	Analyzer serial #	1218153357

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.6	N/A	Correlation Coefficient	0.999997
749.8	750.0	0.9997		
420.4	419.2	1.0030	Slope	0.998942
209.8	208.8	1.0046		
			Intercept	1.014389

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

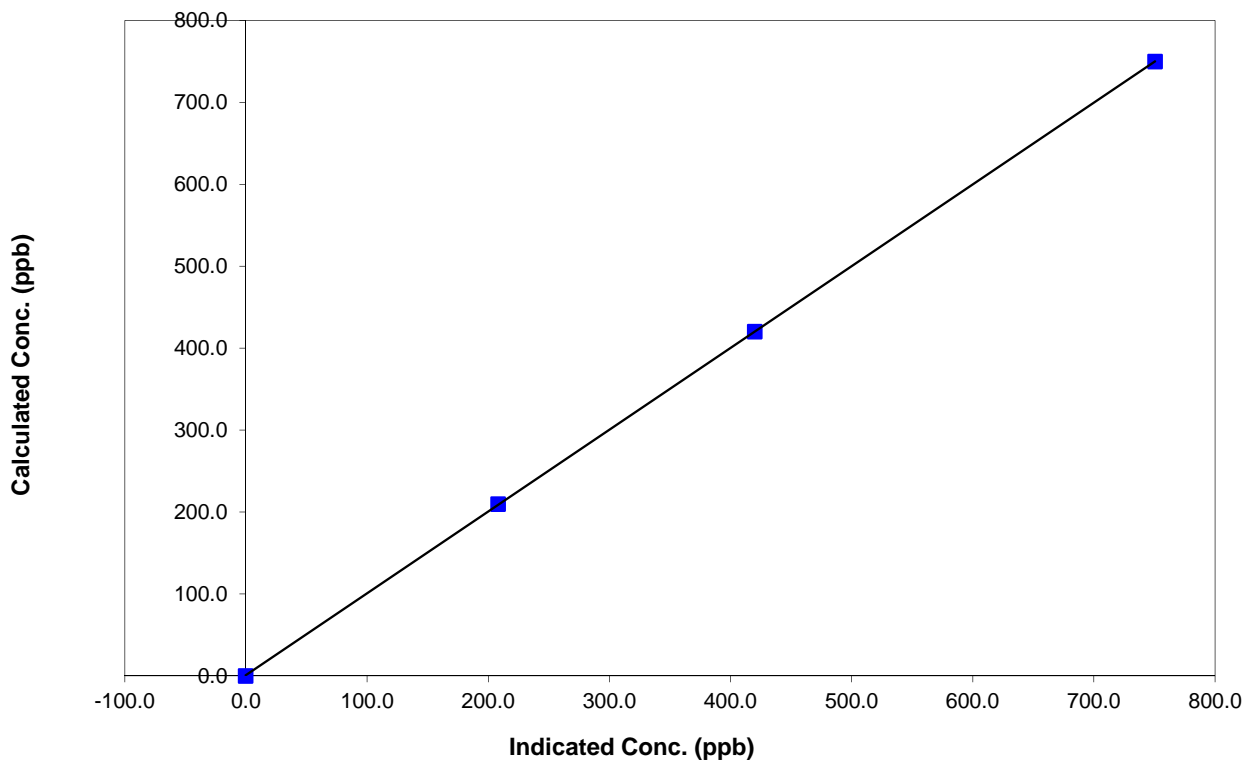
Station Information

Calibration Date	November 7, 2014	Previous Calibration	October 19, 2014
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:00	End Time (MST)	13:36
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	0.999993
749.8	750.4	0.9992		
420.4	419.9	1.0013	Slope	0.998493
209.8	208.1	1.0080		
			Intercept	0.944263

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

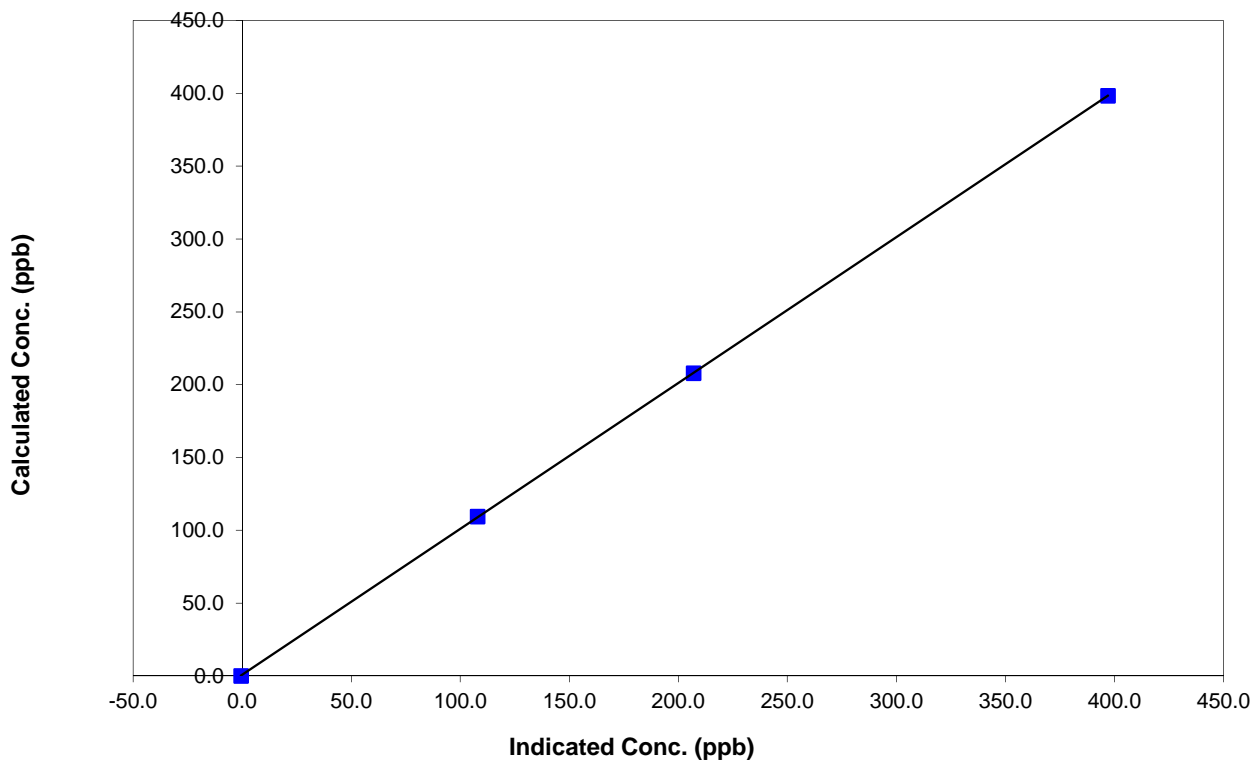
Station Information

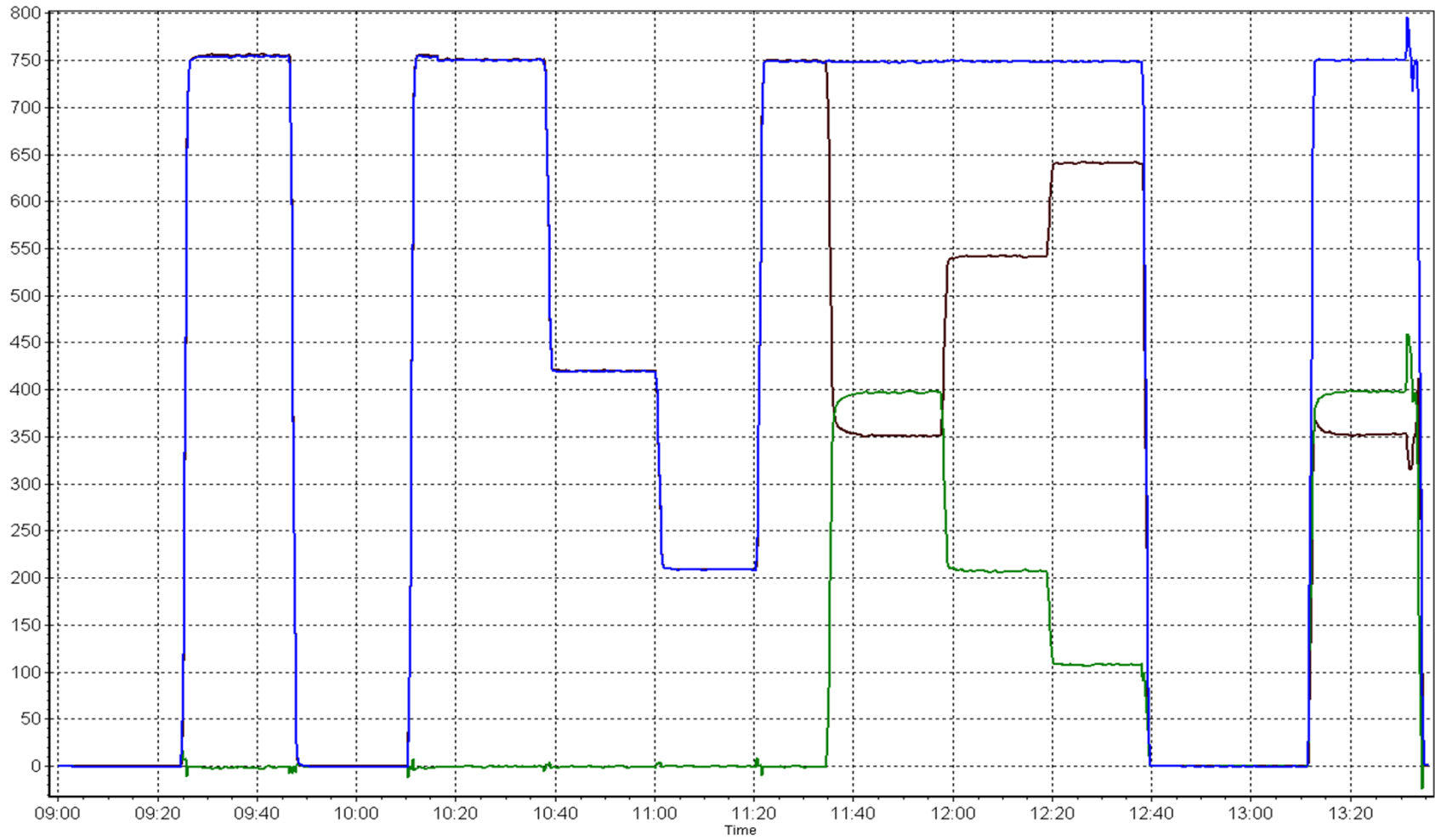
Calibration Date	November 7, 2014	Previous Calibration	October 19, 2014
Station Number	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:00	End Time (MST)	13:36
Analyzer make	Thermo 42i NO/NO ₂ /NO _x Analyzer	Analyzer serial #	1218153357

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.5	N/A	Correlation Coefficient	0.999996
398.4	397.0	1.0035		
207.9	207.0	1.0043	Slope	1.001706
109.4	108.0	1.0130		
			Intercept	0.746540

NO₂ Calibration Curve







Wood Buffalo Environmental Association

Nt-NO_x-NH₃ Calibration Report

Station Information

Calibration Date	November 10, 2014	Previous Calibration	October 21, 2014
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Routine		
Start Time (MST)	11:00	End Time (MST)	16:00
Barometric Pressure	N/A mmHg	Station Temperature	21.0 Deg C
Calibrator	Sabio 4010	Serial Number	1730512
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	0.983892	1.001732	0.998004
	Data Offset	-8.236354	0.202515	-6.908791
After	Data Slope	0.983721	0.998136	0.998334
	Data Offset	-5.840320	0.399255	-4.879739
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 Slope	1.179		1.127	
NOX Slope	1.151		1.112	
NH3 Conv coeff	0.974		0.963	
NO slope	1.101		1.057	
No bkgnd	0.0	mV	0.0	mV
Nt bkgnd	0.1	mV	0.1	mV
NOX bkgnd	0.0	mV	0.0	
NhH3 conv temp	825	DegC	825	Deg C
Chamber Temp	50.0	Deg C	50.0	Deg C
Moly Temp	314.0	Deg C	314.0	Deg C
PMT Temp	7.0	Deg C	7.0	Deg C
O3 flow	85.0	ccm	85.0	ccm
R Cell Press	5.6	mmHg	5.6	mmHg
PMT Voltage	614.0	v	614.0	v
Sample Flow 1 NO	513.0	ccm	513.0	ccm
Sample Flow 2 Nox	514.0	ccm	514.0	ccm

Notes:

NT channel adjusted on NO high point after as founds, NH3 adjusted after as found NH3.



Wood Buffalo Environmental Association

Nt-NO_x-NH₃ Calibration Report

Station Information

Calibration Date:

November 10, 2014

Station Number:

AMS 1

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated Nt conc (ppb)	Calculated NO _x conc (ppb)	Calculated NH ₃ conc (ppb)	Indicated Nt conc (ppb)	Indicated NO _x conc (ppb)	Indicated NH ₃ conc (ppb)	Nt Correction factor	NH ₃ Correction factor
as found zero	5500	0.0	0.0	0.0	0.0	-0.3	-0.2	-0.3	NA	NA
as found NO	5500	81.5	749.8	749.8	NA	784.1	778.0	15.3	0.956	NA
calibrator zero	5500	0.0	0.0	0.0	0.0	-0.5	-0.4	-0.3	NA	NA
high NO point	5500	81.5	749.8	749.8	NA	750.5	750.8	-0.9	0.999	NA
NO/O ₃ point	5500	81.5	749.8	749.8	NA	750.3	750.8	-1.2	0.999	NA
as found NH ₃	6500	67.7	1999.8	NA	1999.8	1987.0	12.0	1957.0	1.006	1.022
first NH ₃	6500	67.7	1999.8	NA	1999.8	2037.0	12.2	2006.5	0.982	0.997
second NH ₃	6500	33.9	1001.4	NA	1001.4	1022.5	6.2	1007.0	0.979	0.994
third NH ₃	6500	16.9	499.2	NA	499.2	523.0	4.2	512.5	0.954	0.974
as left zero						0.0				
as left span						0.0				
Average Correction Factor									0.9992	0.9884

Corrected As found

Nt = 784.4 ppb

NH₃ = 1957.3 ppb

Previous response

Nt = 770.3 ppb

NH₃ = 2010.7 ppb

Nt percent change -1.8%

NH₃ percent change 2.7%

Converter efficiency 96.3%

Calibration Performed By:

Zach Eastman



Wood Buffalo Environmental Association

NH3 Calibration Summary

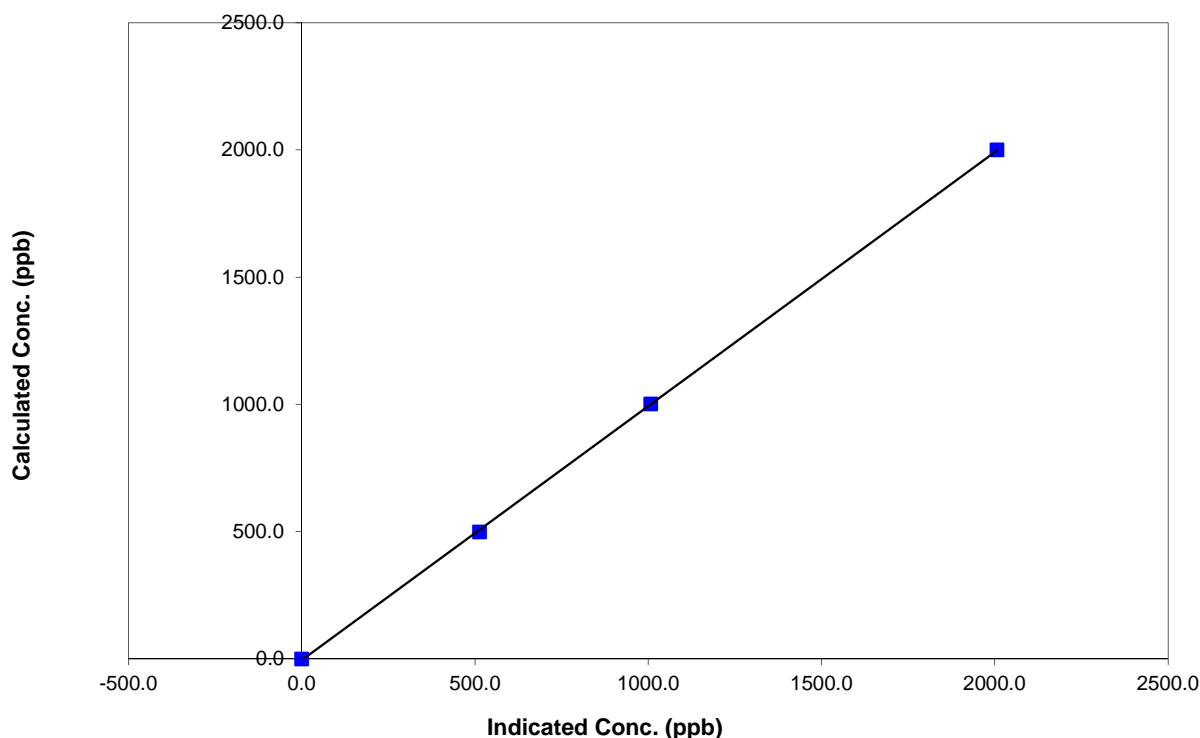
Station Information

Calibration Date	November 10, 2014	Previous Calibration	October 21, 2014
Station Number	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	11:00	End Time (MST)	16:00
Analyzer make	API T201	Analyzer serial #	152

NH3 Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		
0.0	-0.3	N/A	Correlation Coefficient	0.999960	
1999.8	2006.5	0.9966		Slope	0.998334
1001.4	1007.0	0.9944	Intercept		-4.879739
499.2	512.5	0.9740			

NH3 Calibration Curve





Wood Buffalo Environmental Association

Nt Calibration Summary

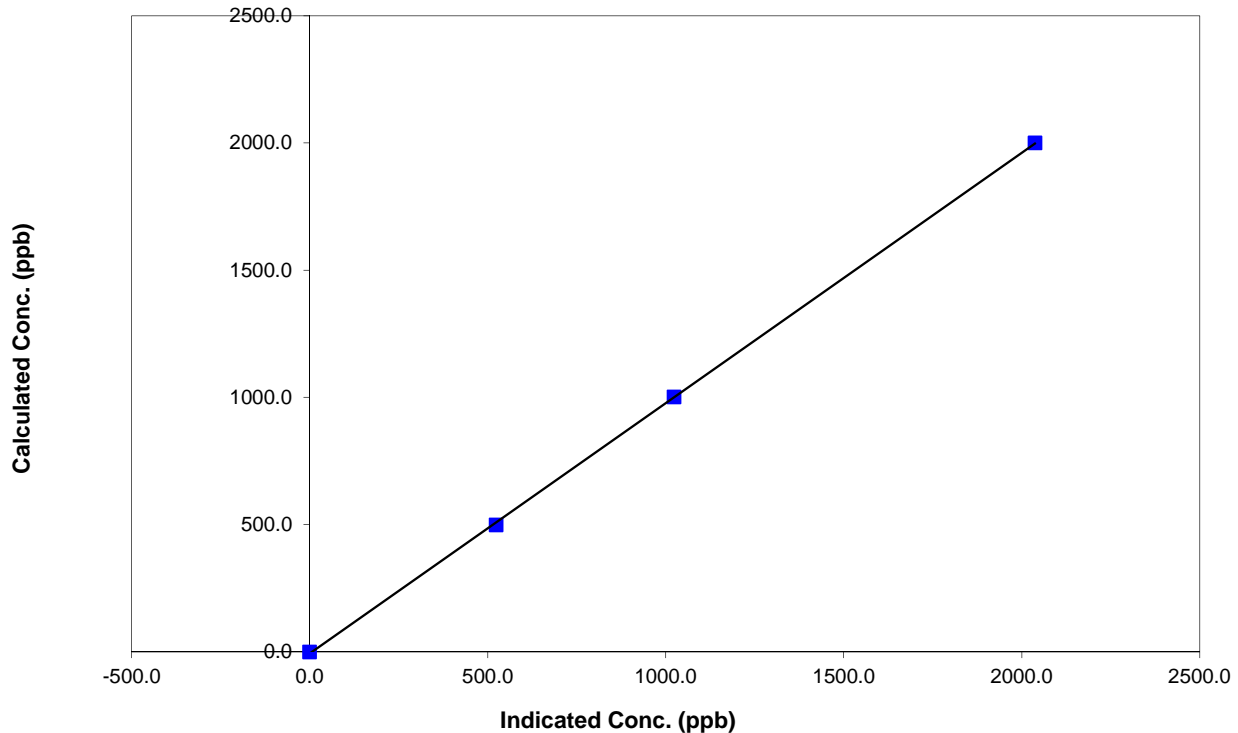
Station Information

Calibration Date	November 10, 2014	Previous Calibration	October 21, 2014
Station Number	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	11:00	End Time (MST)	16:00
Analyzer make	API T201	Analyzer serial #	152

Nt (NH₃) Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.5	N/A	Correlation Coefficient	0.999939
1999.8	2037.0	0.9817		
1001.4	1022.5	0.9793	Slope	0.983721
499.2	523.0	0.9545		
	0.0		Intercept	-5.840320

Nt Calibration Curve





Wood Buffalo Environmental Association

NOx Calibration Summary

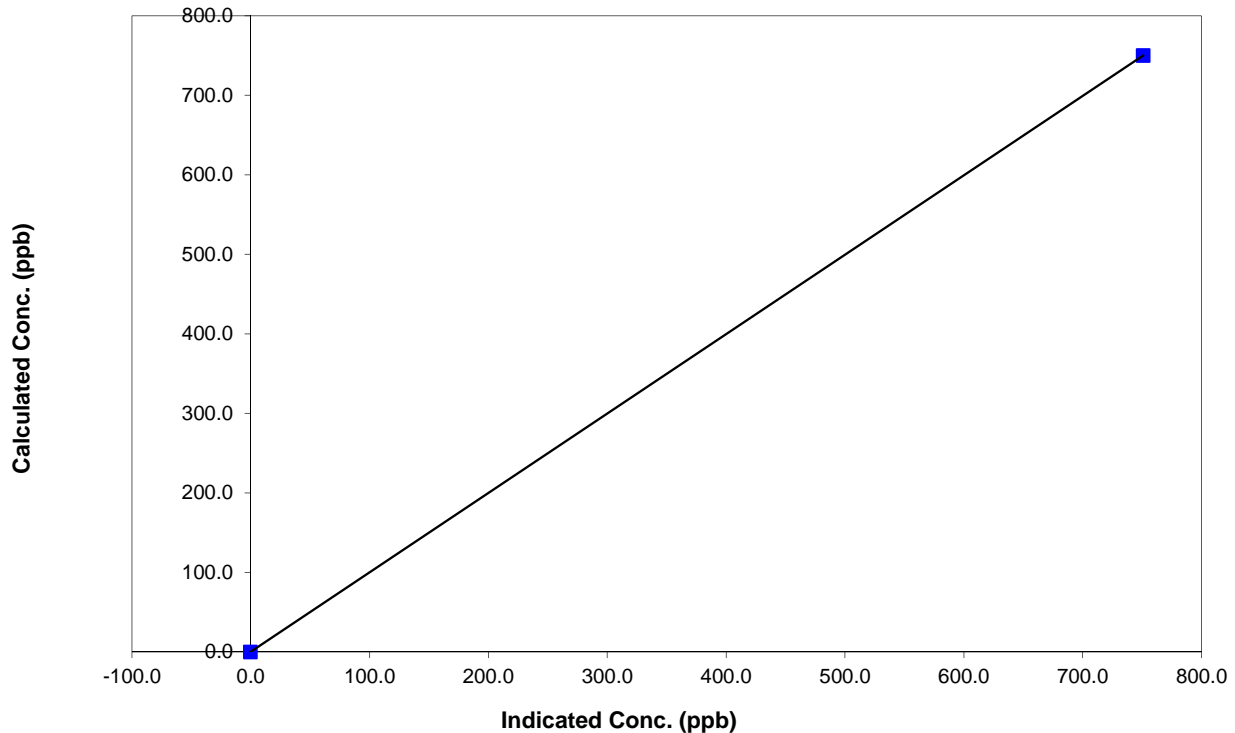
Station Information

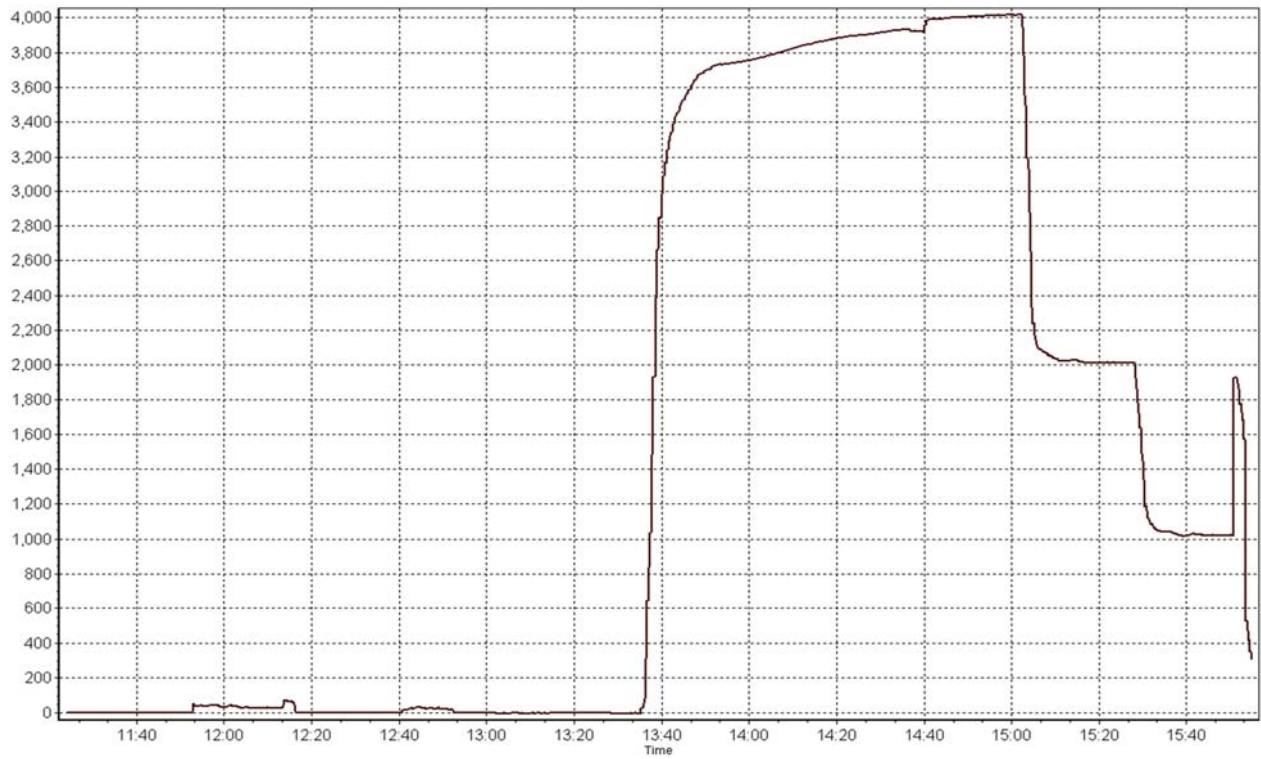
Calibration Date	November 10, 2014	Previous Calibration	October 21, 2014
Station Number	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	11:00	End Time (MST)	16:00
Analyzer make	API T201	Analyzer serial #	152

NO_x Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.4	N/A	Correlation Coefficient	1.000000
749.8	750.8	0.9987		
749.8	750.8	0.9987	Slope	0.998136
			Intercept	0.399255

NO_x Calibration Curve





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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 2
MILDRED LAKE
NOVEMBER 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

December 30, 2014

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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MILDRED LAKE (AMS 2)
 NOVEMBER 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	686	34	34	100.00	24	0	3	0
H2S (ppb) Average	686	34	34	100.00	2	0	1	0
THC (ppm) Average	686	34	34	100.00	5.4	-	2.8	-
Temperature (C) Average	720	0	0	100.00	9.5	-	3.9	-
Wind Speed 10 m (km/h) Average	688	0	32	95.56	27	-	-	-
Wind Direction 10 m (deg) Average	688	0	32	95.56	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MILDRED LAKE (AMS 2)
 NOVEMBER 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	686	0.9	1	-	0	0	0	1	1	2	24
H2S (ppb) Average	686	0.2	0	-	0	0	0	0	0	1	2
THC (ppm) Average	686	2.33	0.3	-	2	2.1	2.1	2.2	2.4	2.8	5.4
Temperature 2 m (C) Average	720	-11.11	7.9	-	-26.7	-22.3	-16	-12.1	-5.6	0.2	9.5
Wind Speed 10 m (km/h) Average	688	8.9	4	-	1	4	6	8	11	14	27
Wind Direction 10 m (deg) Average	688	-	-	-	-	-	-	-	-	-	-

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

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
Wind Speed, Wind Direction	03 Nov 2014 15:00	04 Nov 2014 14:00	24	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	04 Nov 2014 17:00	04 Nov 2014 17:00	1	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	05 Nov 2014 04:00	05 Nov 2014 10:00	7	Flat line in sensor output signal - Sensor frozen

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Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 24 ppb on Nov 12 04:00	Maximum Daily Average: 2.7 ppb on Nov 12		Hours of Data:	686
Minimum Value: 0 ppb on Nov 21 23:00	Minimum Daily Average: 0.3 ppb on Nov 22		Hours of Missing Data:	34
Maximum Diurnal Average: 1.5 ppb at hour 4	Minimum Diurnal Average: 0.6 ppb at hour 1		Hours of Calibration:	34
Monthly Average: 0.9 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 1 P ₉₀ = 2 P ₉₉ = 5		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	1	Z	1	1	1	1	1	1	0	1	1	2	1	1	1	5	1	1	1	1	0	1	1	3	1.0	5
2-Nov	1	Z	1	1	1	1	1	1	1	2	2	3	1	3	4	3	3	2	2	1	3	4	2	1	1.9	4
3-Nov	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	0	1	0	1	0.6	1	
4-Nov	0	Z	1	1	1	1	1	1	1	1	1	1	0	2	2	1	1	4	2	1	1	2	1	1	1.0	4
5-Nov	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1
6-Nov	1	Z	1	2	2	3	5	3	1	1	2	1	1	2	4	3	1	1	1	4	1	1	1	1	1.9	5
7-Nov	1	Z	0	0	1	0	1	0	1	1	0	0	0	0	1	0	1	1	1	1	1	1	1	0	0.5	1
8-Nov	0	Z	0	0	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0.5	1
9-Nov	0	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
10-Nov	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.4	1
11-Nov	1	Z	0	0	0	0	0	0	0	0	0	1	1	1	1	7	3	1	1	1	1	1	1	1	1.0	7
12-Nov	1	Z	8	24	9	3	2	1	1	1	1	1	1	3	4	1	0	0	1	0	0	0	0	0	2.7	24
13-Nov	2	Z	0	1	1	1	1	1	1	1	1	1	1	3	7	2	1	2	1	1	1	1	1	1	1.3	7
14-Nov	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	5	3	1.1	5
15-Nov	1	Z	1	1	1	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0.6	1
16-Nov	1	Z	0	0	0	0	0	0	0	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	0.6	1
17-Nov	0	Z	1	1	1	2	4	3	1	2	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1.2	4
18-Nov	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.9	1
19-Nov	1	Z	1	1	1	1	1	1	1	1	0	1	1	0	0	1	1	1	1	1	0	1	1	0	0.6	1
20-Nov	1	Z	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.0	2
21-Nov	1	Z	1	1	1	1	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.5	1
22-Nov	0	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-Nov	0	Z	0	0	0	0	0	1	1	1	1	1	3	2	1	1	0	0	0	0	0	0	0	0	0.7	3
24-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
25-Nov	0	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	3	0.6	3
26-Nov	1	Z	2	1	2	5	5	3	2	1	C	C	C	C	2	1	1	2	1	1	1	1	1	1	1.8	5
27-Nov	1	Z	1	1	0	1	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0.5	1
28-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	1	1	1	1	1	1	1	0.5	1
29-Nov	1	Z	1	1	1	1	1	1	1	1	1	1	4	3	3	1	1	1	1	0	0	0	0	0	1.0	4
30-Nov	0	Z	0	0	0	0	2	3	8	2	1	1	1	1	1	0	1	0	0	0	1	1	1	2	1.2	8

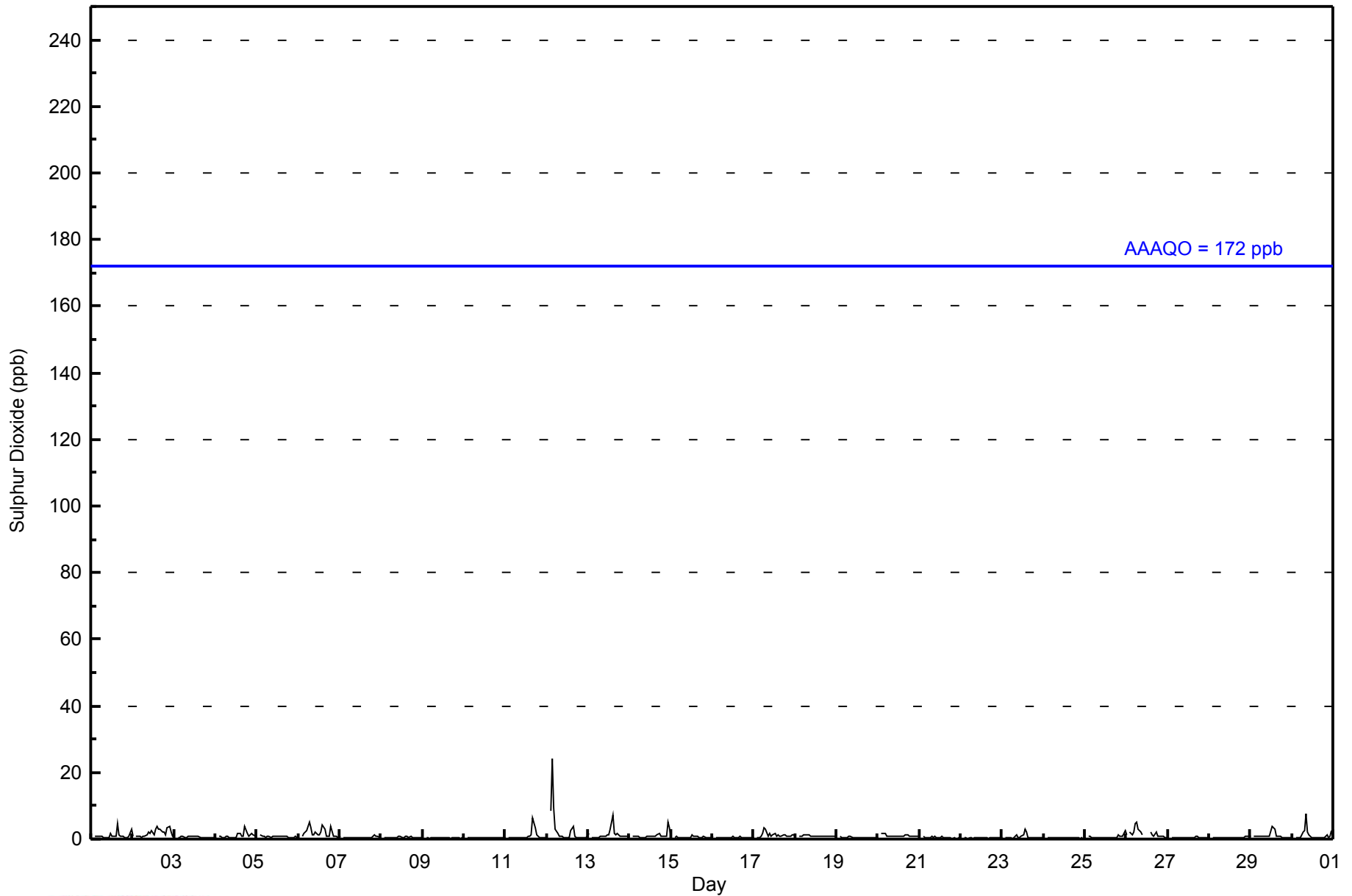
0.6	--	1.0	1.5	1.0	0.9	1.0	0.9	0.9	0.8	0.7	0.8	0.9	1.0	1.3	1.1	1.0	1.0	0.7	0.8	0.7	0.7	0.8	0.8	Diurnal Average	
2	--	8	24	9	5	5	3	8	2	2	3	4	3	7	5	7	4	2	4	3	4	5	3	Diurnal Maximum	

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



WBEA
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Mildred Lake - November 2014





WBEA
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Mildred Lake - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	685	99.85	99.85
11 - 20	0	0.00	99.85
21 - 60	1	0.15	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



WBEA
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Mildred Lake - November 2014

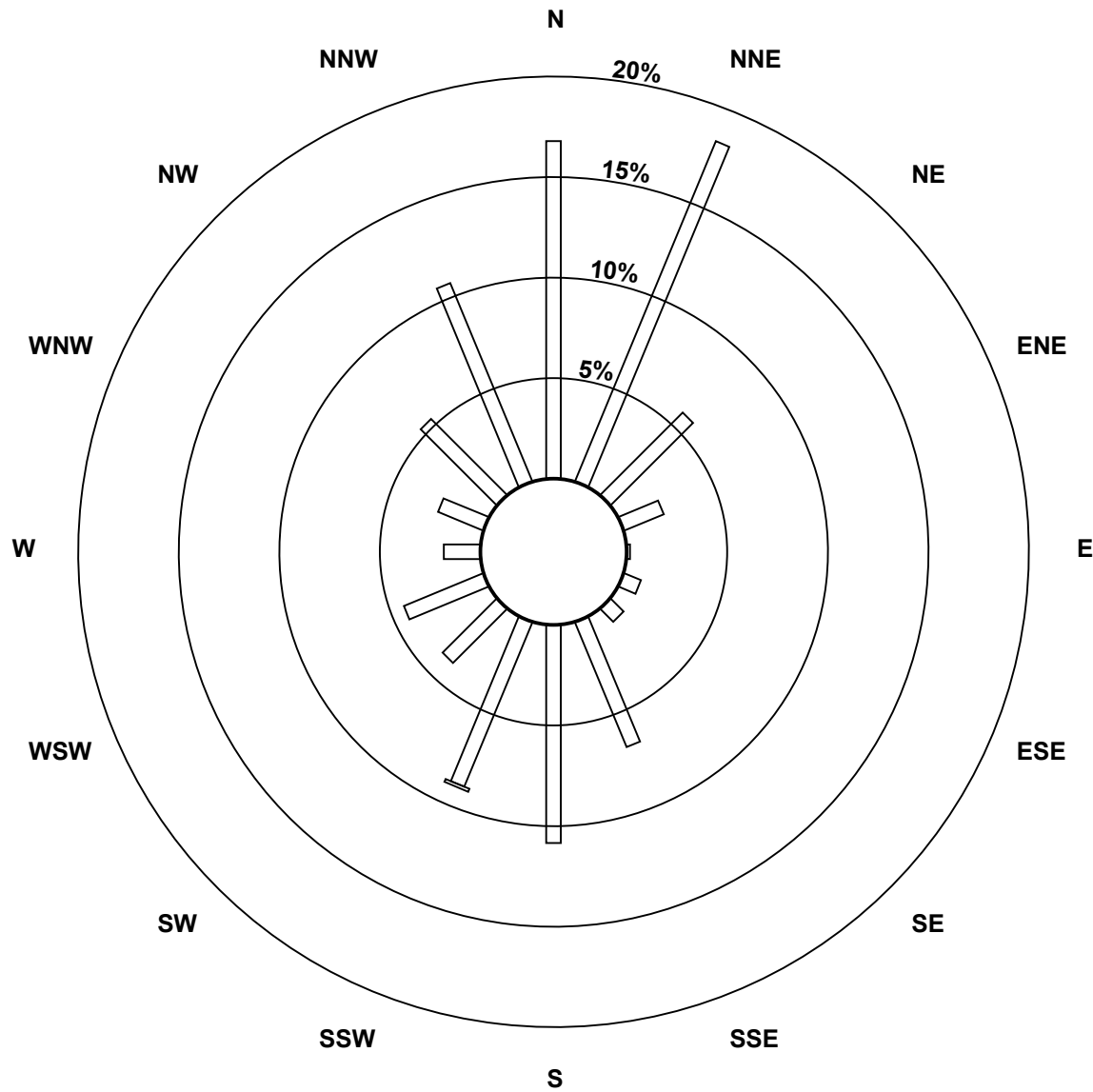
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	110	120	38	14	1	6	6	44	71	58	25	28	12	16	35	70	654
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	110	120	38	14	1	6	6	44	71	59	25	28	12	16	35	70	655

Total Number of Valid Hours: 655

Total Number of Hours: 720

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

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



Classes (ppb)

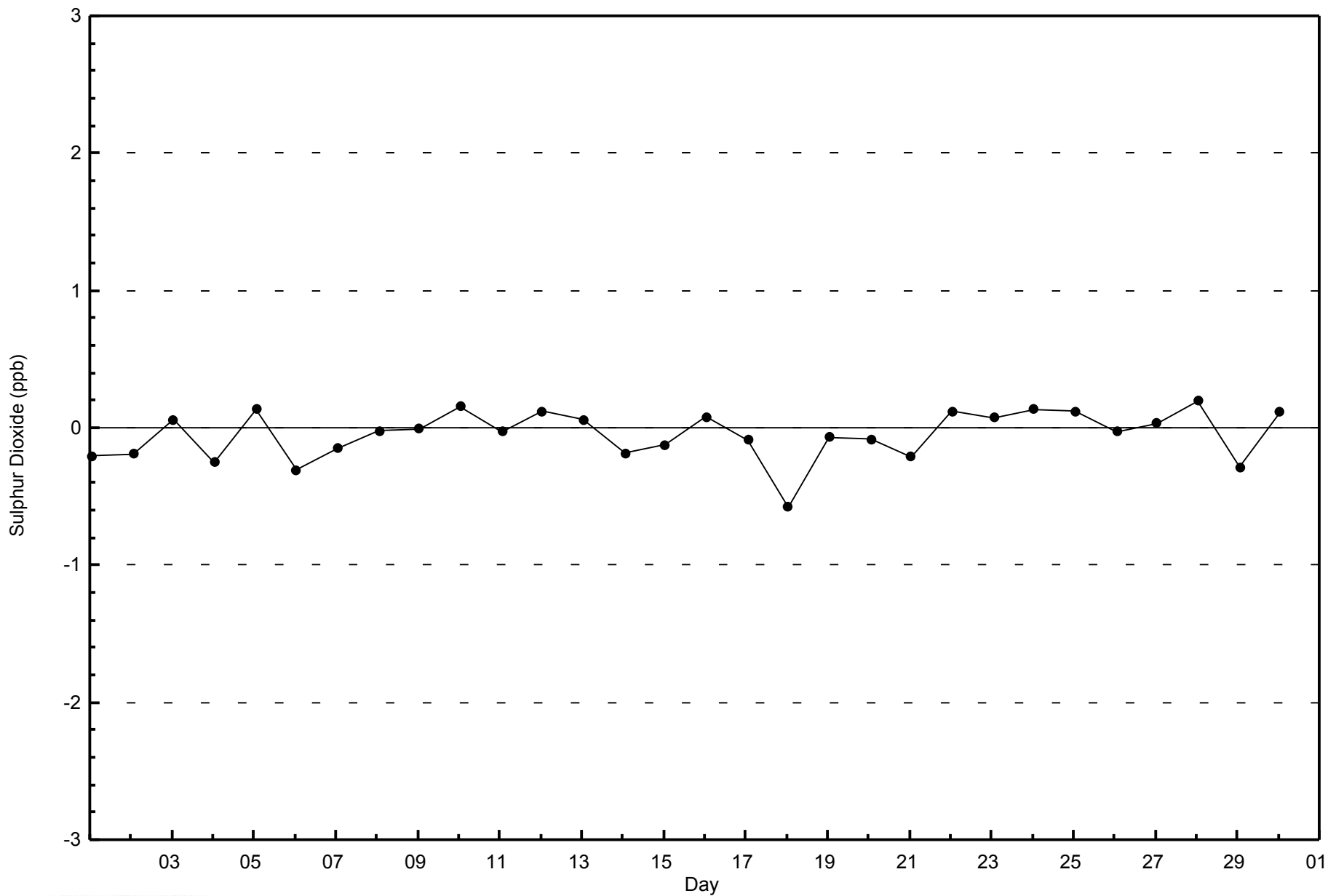


Total Number of Valid Hours: 655



WBEA
Zero Responses

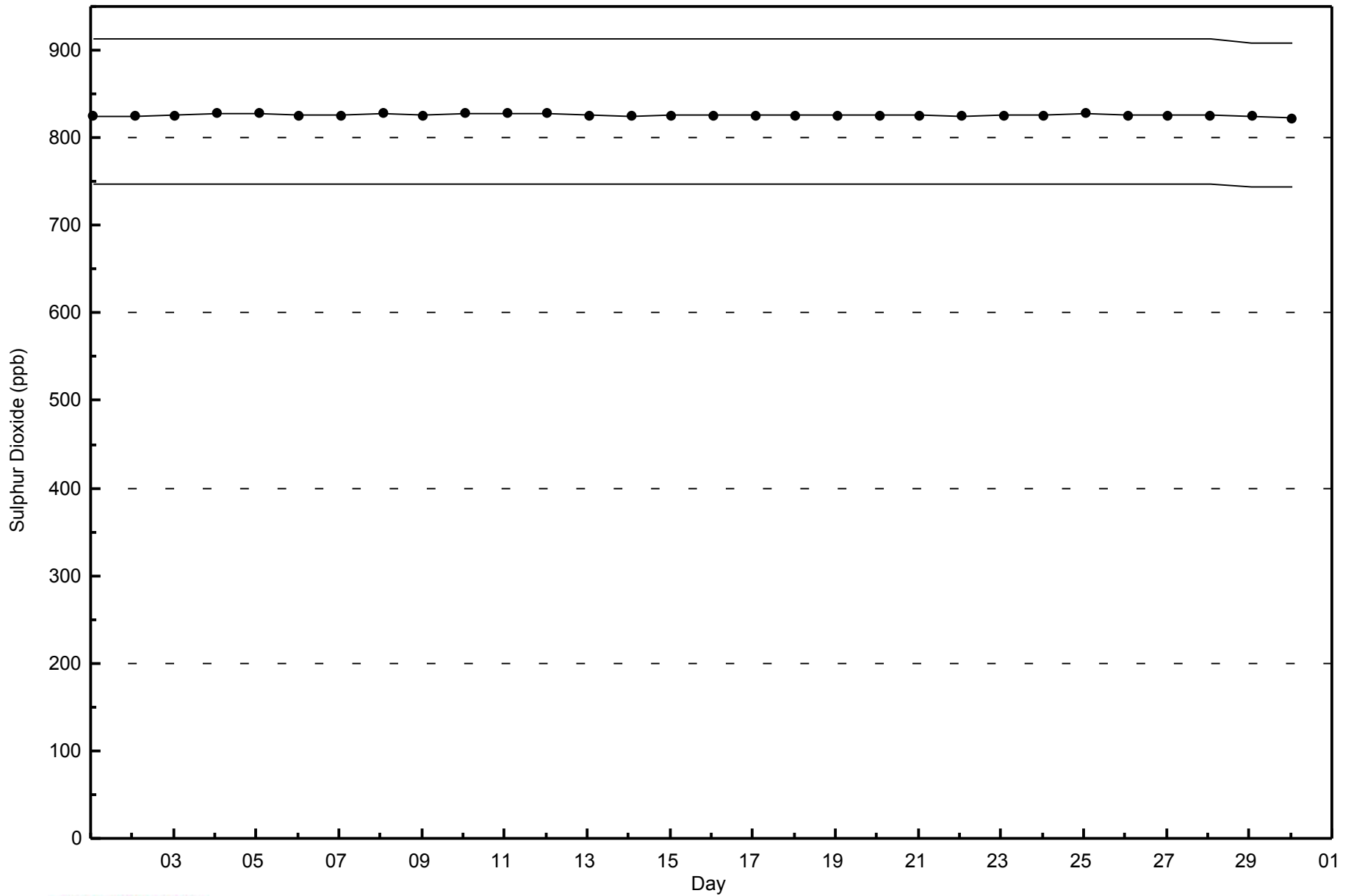
Sulphur Dioxide (SO₂) - ppb
Mildred Lake - November 2014





WBEA
Span Responses

Sulphur Dioxide (SO₂) - ppb
Mildred Lake - November 2014





Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 2 ppb on Nov 2 00:00	Maximum Daily Average: 0.7 ppb on Nov 2		Hours of Data:	686
Minimum Value: 0 ppb on Nov 1 11:00	Minimum Daily Average: 0.0 ppb on Nov 10		Hours of Missing Data:	34
Maximum Diurnal Average: 0.4 ppb at hour 18	Minimum Diurnal Average: 0.2 ppb at hour 11		Hours of Calibration:	34
Monthly Average: 0.2 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 1		Percent Operational Time:	100.0

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

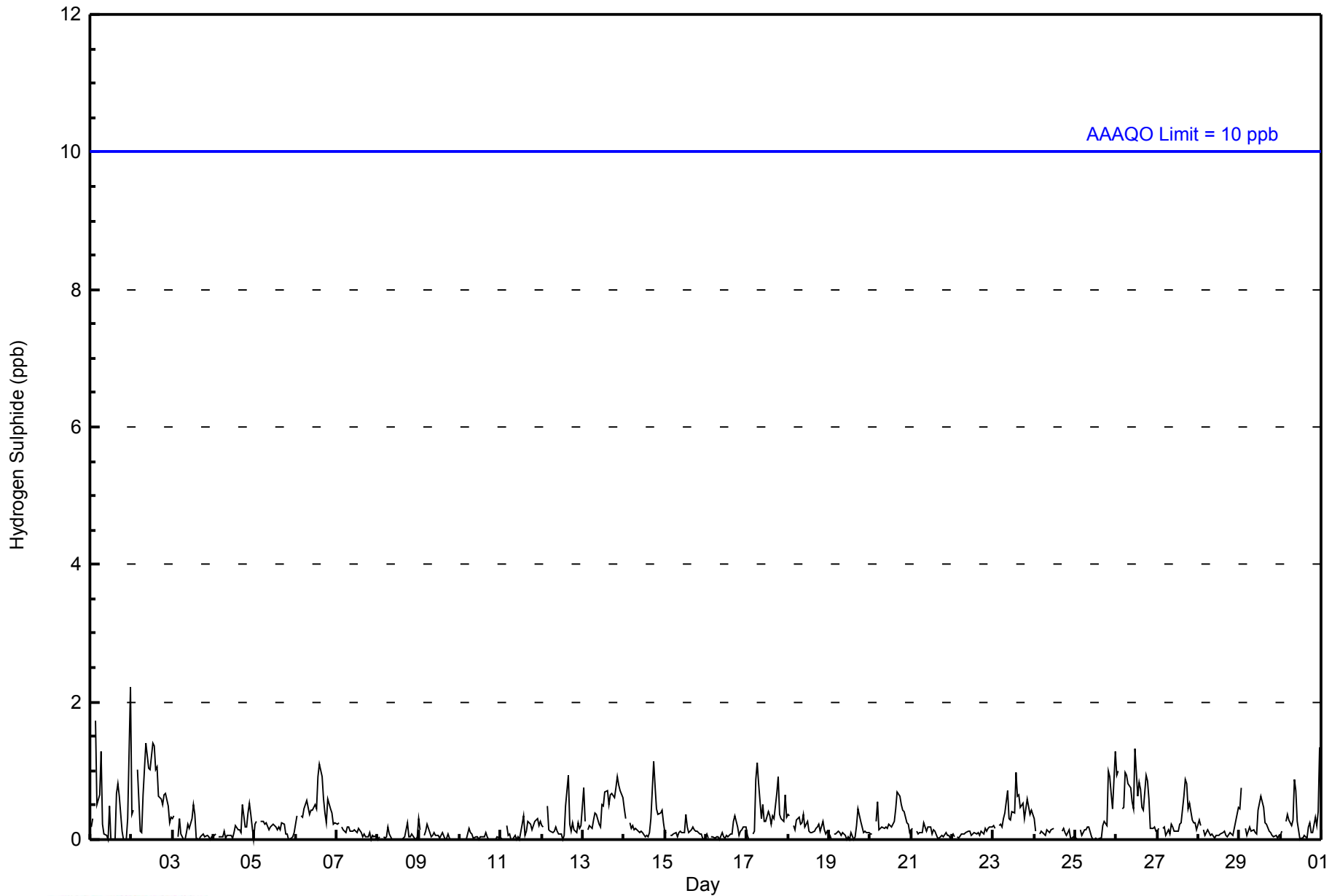
0.2	0.2	--	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.3	0.3	0.4	0.3	0.3	0.2	0.2	0.2	0.3	Diurnal Average	
1	1	--	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	Diurnal Maximum	

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



WBEA
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Mildred Lake - November 2014





WBEA
Cumulative Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
Mildred Lake - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	686	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



WBEA
Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
Mildred Lake - November 2014

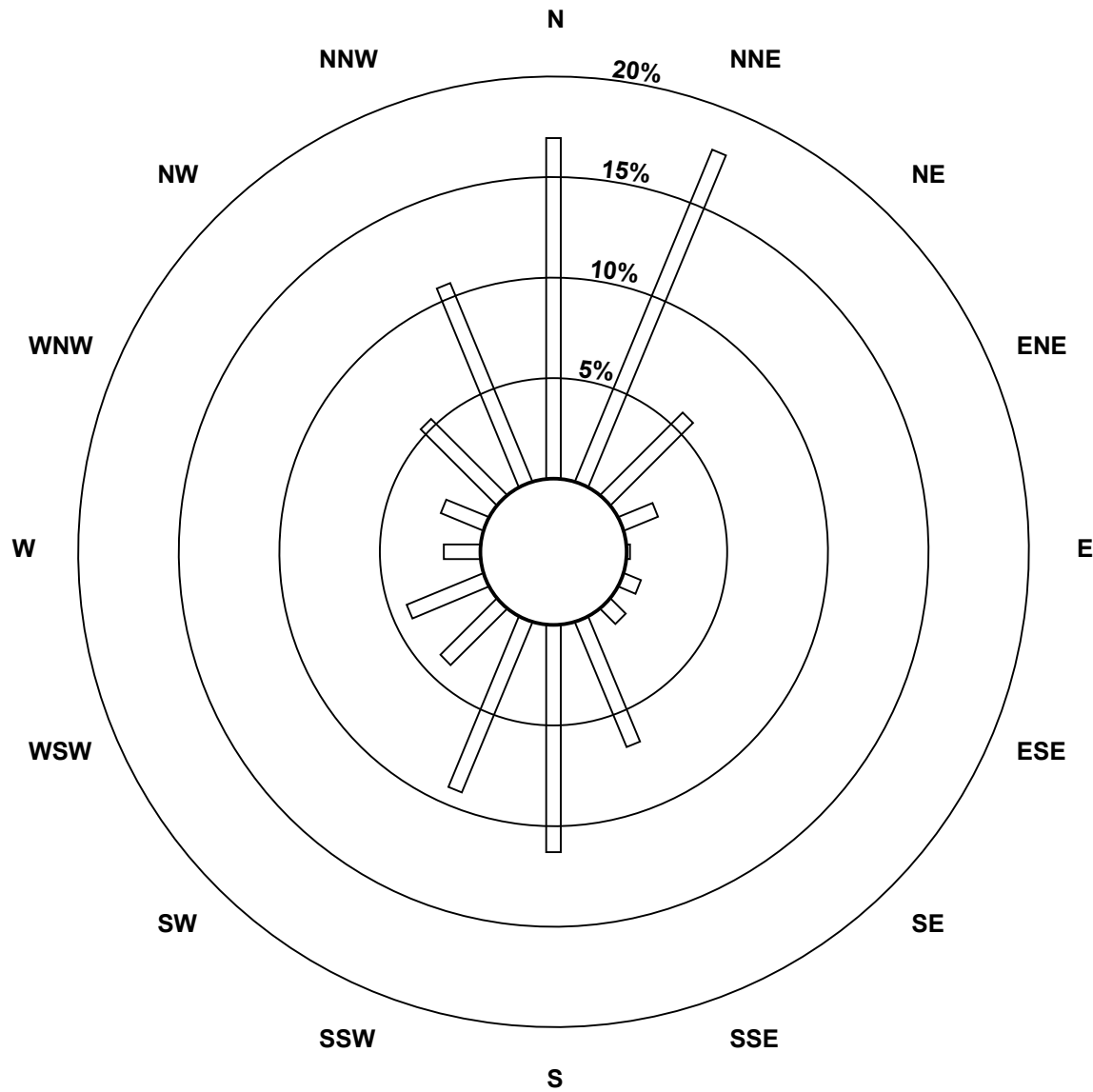
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	111	117	38	12	1	6	7	44	74	60	26	27	12	15	35	70	655
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	111	117	38	12	1	6	7	44	74	60	26	27	12	15	35	70	655

Total Number of Valid Hours: 655

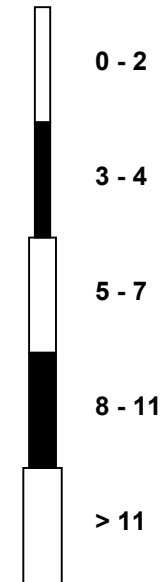
Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

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



Classes (ppb)

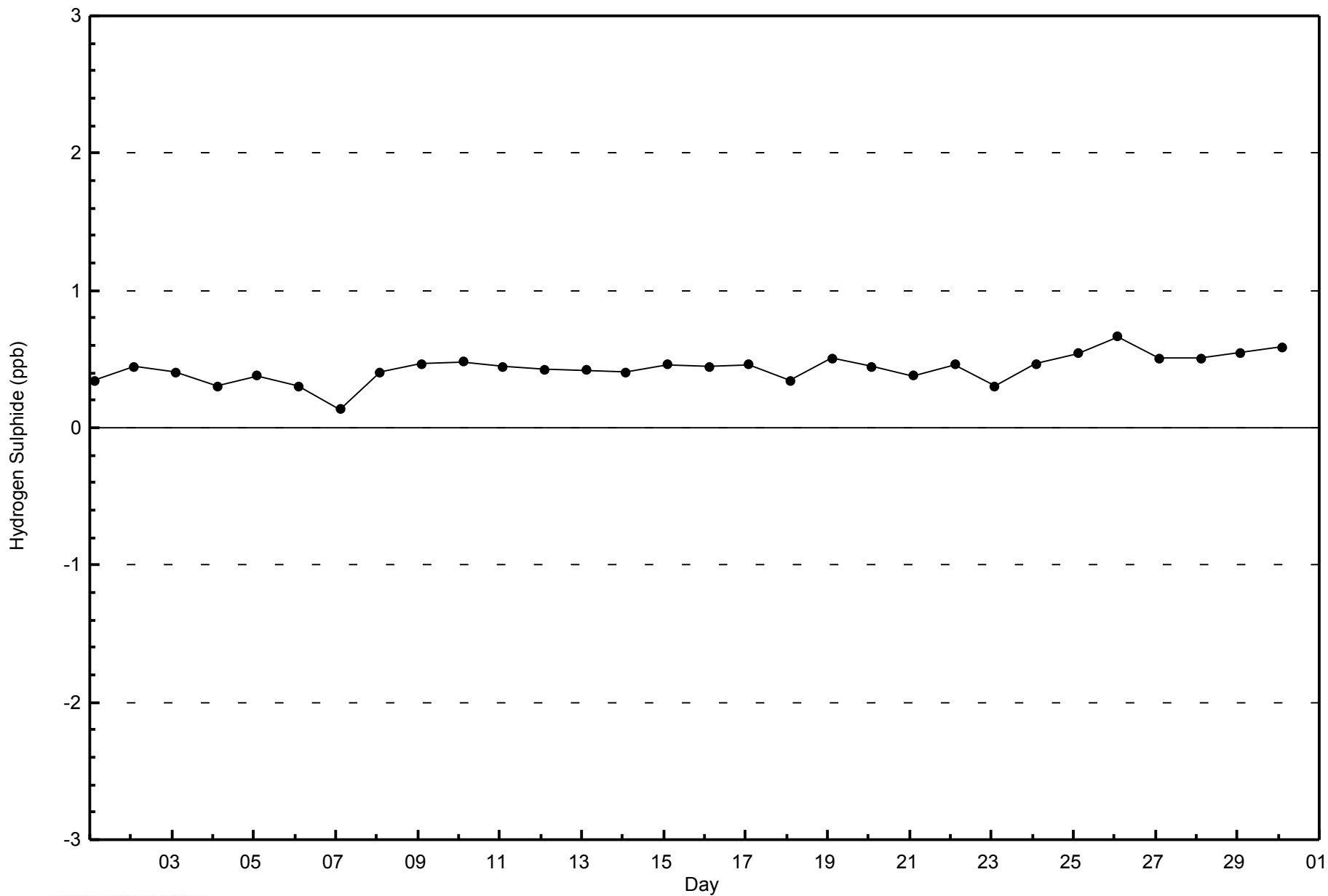


Total Number of Valid Hours: 655



WBEA
Zero Responses

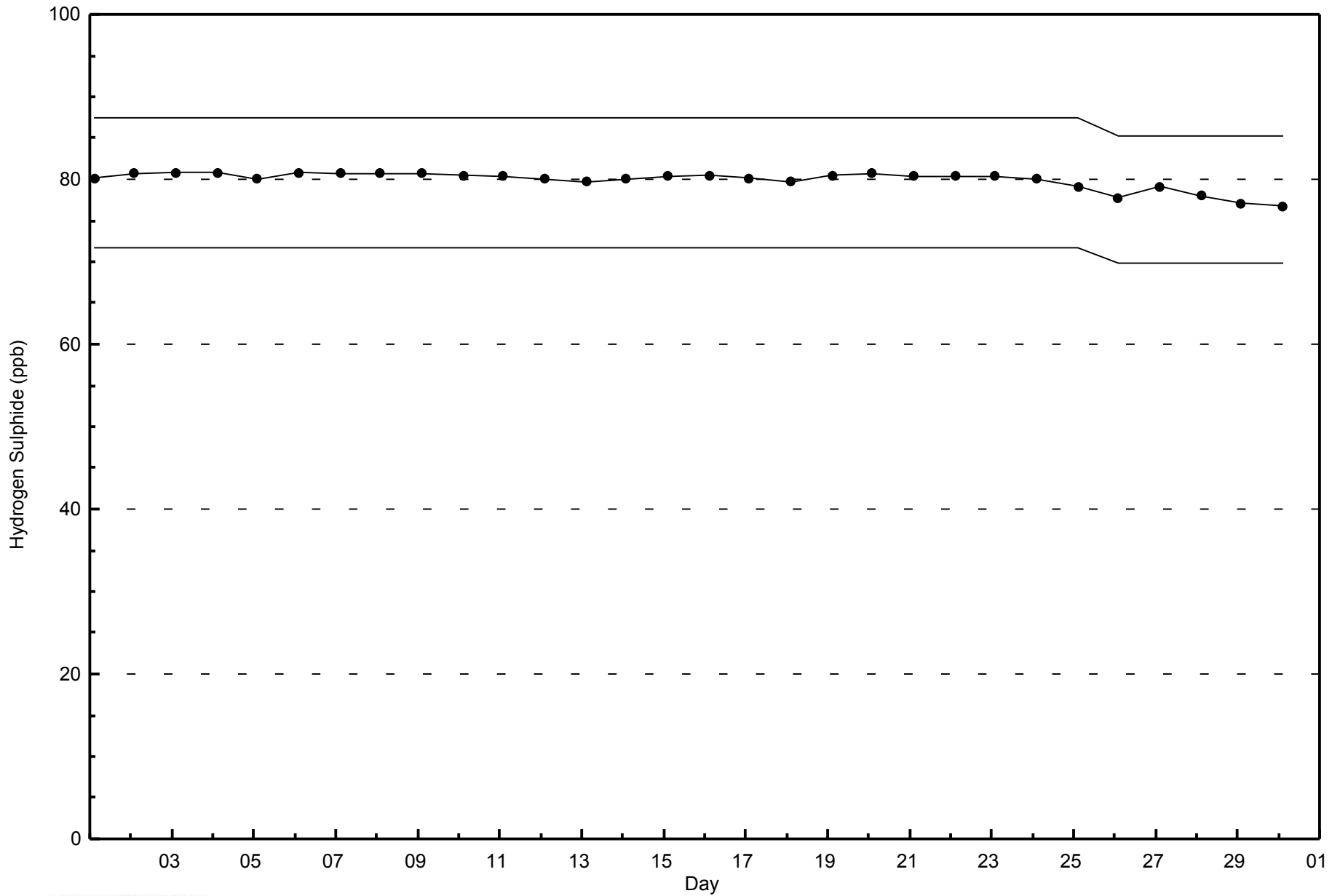
Hydrogen Sulphide (H₂S) - ppb
Mildred Lake - November 2014





WBEA
Span Responses

Hydrogen Sulphide (H₂S) - ppb
Mildred Lake - November 2014



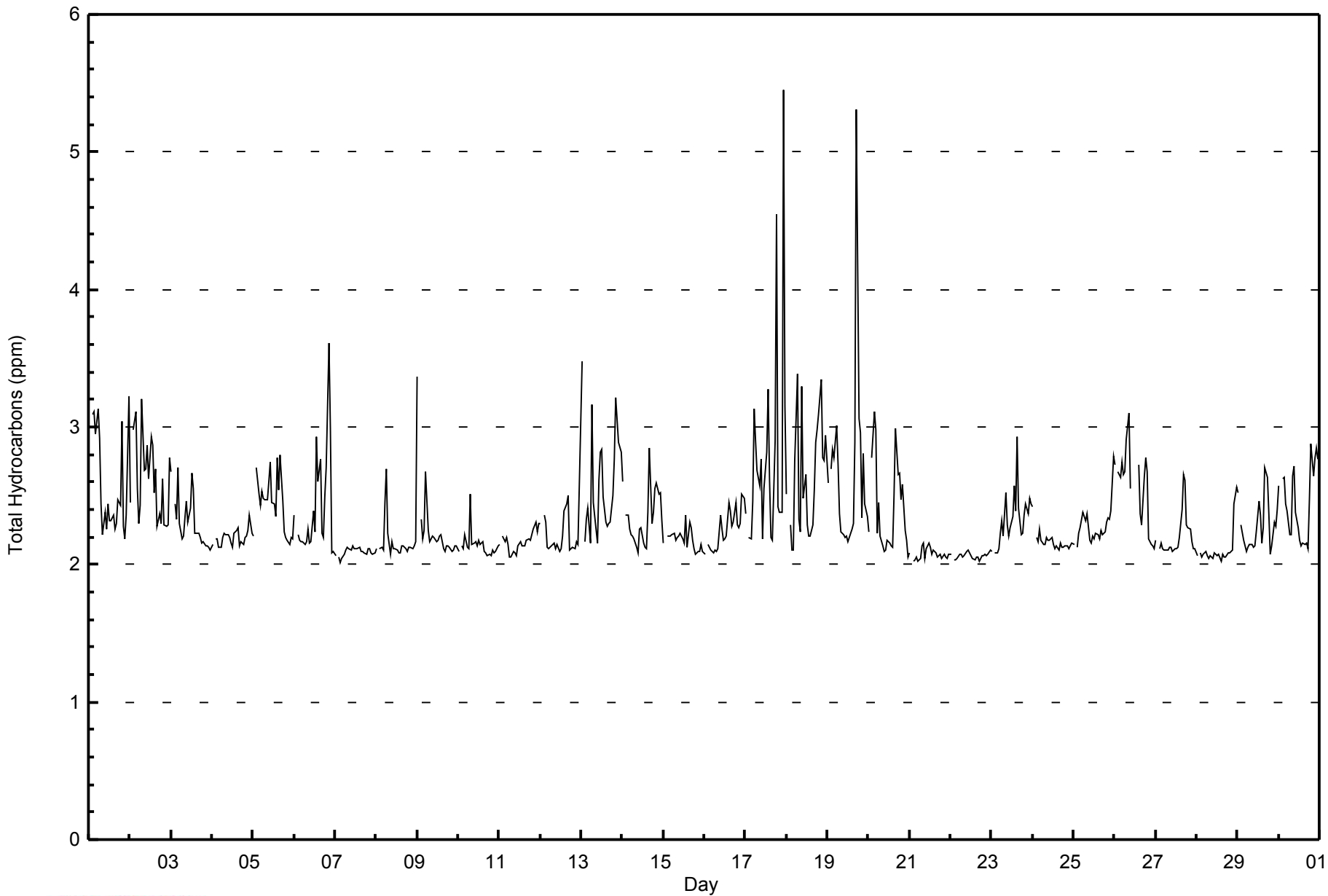


Maximum Value: 5.4 ppm on Nov 17 23:00														Maximum Daily Average: 2.8 ppm on Nov 17														Hours in Service: 720	
Minimum Value: 2.0 ppm on Nov 7 04:00														Minimum Daily Average: 2.1 ppm on Nov 22														Hours of Data: 686	
Maximum Diurnal Average: 2.4 ppm at hour 18														Minimum Diurnal Average: 2.2 ppm at hour 11														Hours of Missing Data: 34	
Monthly Average: 2.33 ppm														Percentiles: P ₁ = 2.0 P ₁₀ = 2.1 Q ₁ = 2.1 Median = 2.2 Q ₃ = 2.4 P ₉₀ = 2.8 P ₉₉ = 3.4														Hours of Calibration: 34	
																												Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Nov	2.3	Z	3.1	3.1	3.0	3.1	2.9	2.4	2.2	2.4	2.3	2.4	2.3	2.3	2.4	2.3	2.3	2.5	2.4	3.0	2.3	2.2	2.4	3.2	2.6	3.2			
2-Nov	2.5	Z	3.0	3.1	2.6	2.3	2.4	3.2	2.7	2.7	2.9	2.6	2.9	2.9	2.5	2.7	2.3	2.4	2.3	2.6	2.3	2.3	2.3	2.8	2.6	3.2			
3-Nov	2.7	Z	2.4	2.3	2.7	2.3	2.2	2.2	2.3	2.5	2.3	2.4	2.7	2.5	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.3	2.7			
4-Nov	2.1	Z	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.3	2.1	2.2	2.1	2.2	2.2	2.2	2.4	2.2	2.2	2.4			
5-Nov	2.2	Z	2.7	2.5	2.4	2.5	2.5	2.5	2.5	2.6	2.7	2.4	2.4	2.4	2.8	2.5	2.8	2.5	2.2	2.2	2.2	2.1	2.2	2.2	2.4	2.8			
6-Nov	2.4	Z	2.2	2.2	2.2	2.2	2.1	2.2	2.3	2.2	2.2	2.4	2.2	2.9	2.6	2.8	2.2	2.2	2.5	2.7	3.6	3.0	2.1	2.1	2.4	3.6			
7-Nov	2.1	Z	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1			
8-Nov	2.1	Z	2.1	2.1	2.1	2.5	2.7	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.7			
9-Nov	3.4	Z	2.3	2.2	2.3	2.7	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	3.4			
10-Nov	2.1	Z	2.1	2.1	2.2	2.1	2.1	2.5	2.1	2.2	2.2	2.1	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.5			
11-Nov	2.1	Z	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.3	2.2	2.3			
12-Nov	2.3	Z	2.4	2.3	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.2	2.4	2.4	2.5	2.1	2.1	2.1	2.1	2.2	2.1	2.6	2.2	2.6			
13-Nov	3.5	Z	2.2	2.3	2.4	2.2	3.2	2.5	2.3	2.2	2.6	2.8	2.8	2.5	2.3	2.3	2.3	2.3	2.5	2.8	3.2	3.0	2.9	2.8	2.6	3.5			
14-Nov	2.6	Z	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.1	2.3	2.3	2.2	2.1	2.1	2.4	2.8	2.3	2.4	2.6	2.6	2.5	2.5	2.3	2.3	2.8			
15-Nov	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	2.4	2.1	2.3	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.4			
16-Nov	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.4	2.3	2.2	2.2	2.2	2.4	2.4	2.3	2.3	2.5	2.3	2.3	2.3	2.5	2.5	2.2	2.5			
17-Nov	2.4	Z	2.2	2.2	2.5	3.1	2.9	2.7	2.6	2.8	2.2	2.5	2.8	3.3	2.6	2.2	2.2	2.9	4.5	2.4	2.4	2.4	5.4	3.2	2.8	5.4			
18-Nov	2.5	Z	2.3	2.1	2.1	2.8	3.4	2.3	2.2	3.3	2.5	2.7	2.3	2.2	2.2	2.3	2.5	2.9	3.0	3.1	3.4	2.8	2.8	2.9	2.6	3.4			
19-Nov	2.6	Z	2.7	2.8	2.8	3.0	2.7	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.9	5.3	3.1	3.0	2.3	2.8	2.4	2.4	2.6	5.3			
20-Nov	2.2	Z	2.8	3.1	3.0	2.2	2.5	2.2	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.5	3.0	2.7	2.7	2.5	2.6	2.2	2.2	2.1	2.4	3.1			
21-Nov	2.1	Z	2.0	2.0	2.1	2.0	2.0	2.1	2.2	2.0	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.0	2.1	2.1	2.2			
22-Nov	2.1	Z	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1			
23-Nov	2.1	Z	2.1	2.1	2.1	2.2	2.3	2.2	2.5	2.3	2.2	2.3	2.4	2.6	2.4	2.9	2.4	2.2	2.2	2.4	2.4	2.4	2.5	2.4	2.3	2.9			
24-Nov	2.4	Z	2.2	2.2	2.3	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.4			
25-Nov	2.1	Z	2.1	2.2	2.3	2.4	2.3	2.3	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.3	2.3	2.3	2.4	2.8	2.3	2.8			
26-Nov	2.7	Z	2.7	2.6	2.7	2.7	2.7	2.9	3.1	2.6	C	C	C	C	2.7	2.4	2.3	2.6	2.8	2.7	2.2	2.1	2.1	2.1	2.6	3.1			
27-Nov	2.2	Z	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.4	2.7	2.6	2.3	2.3	2.3	2.2	2.1	2.1	2.2	2.7			
28-Nov	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.0	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.4	2.6	2.1	2.6			
29-Nov	2.5	Z	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.5	2.4	2.2	2.3	2.7	2.6	2.4	2.1	2.1	2.3	2.3	2.4	2.3	2.7			
30-Nov	2.6	Z	2.6	2.6	2.4	2.4	2.2	2.2	2.6	2.7	2.4	2.3	2.2	2.1	2.2	2.1	2.2	2.1	2.5	2.9	2.6	2.8	2.8	2.8	2.5	2.9			
																								Diurnal Average					
																								Diurnal Maximum					
																								Z - zerospan C - Calibration					



WBEA
Hourly Averages

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





WBEA
Cumulative Frequency Distribution

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

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	20	2.92	2.92
2.1 - 3.0	642	93.59	96.50
3.1 - 10.0	24	3.50	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



WBEA
Frequency Distribution

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

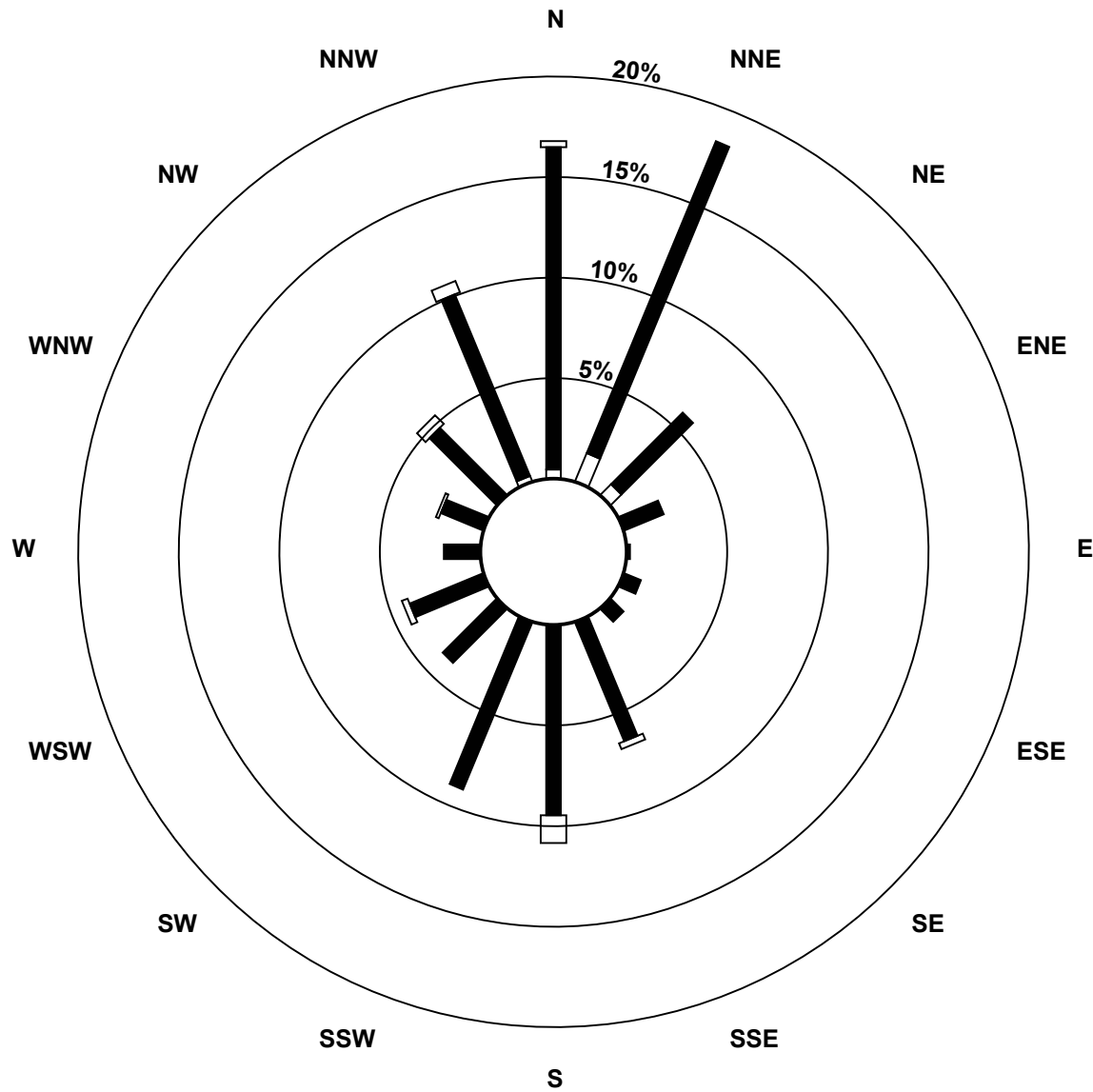
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	3	10	5	0	0	0	0	0	0	0	0	0	0	0	0	2	20
2.1 - 3.0	105	110	33	14	1	6	6	42	62	59	25	26	12	15	31	64	611
3.1 - 10.0	2	0	0	0	0	0	0	2	9	0	0	2	0	1	4	4	24
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	110	120	38	14	1	6	6	44	71	59	25	28	12	16	35	70	655

Total Number of Valid Hours: 655

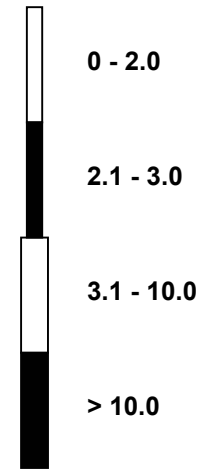
Total Number of Hours: 720

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

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



Classes (ppm)

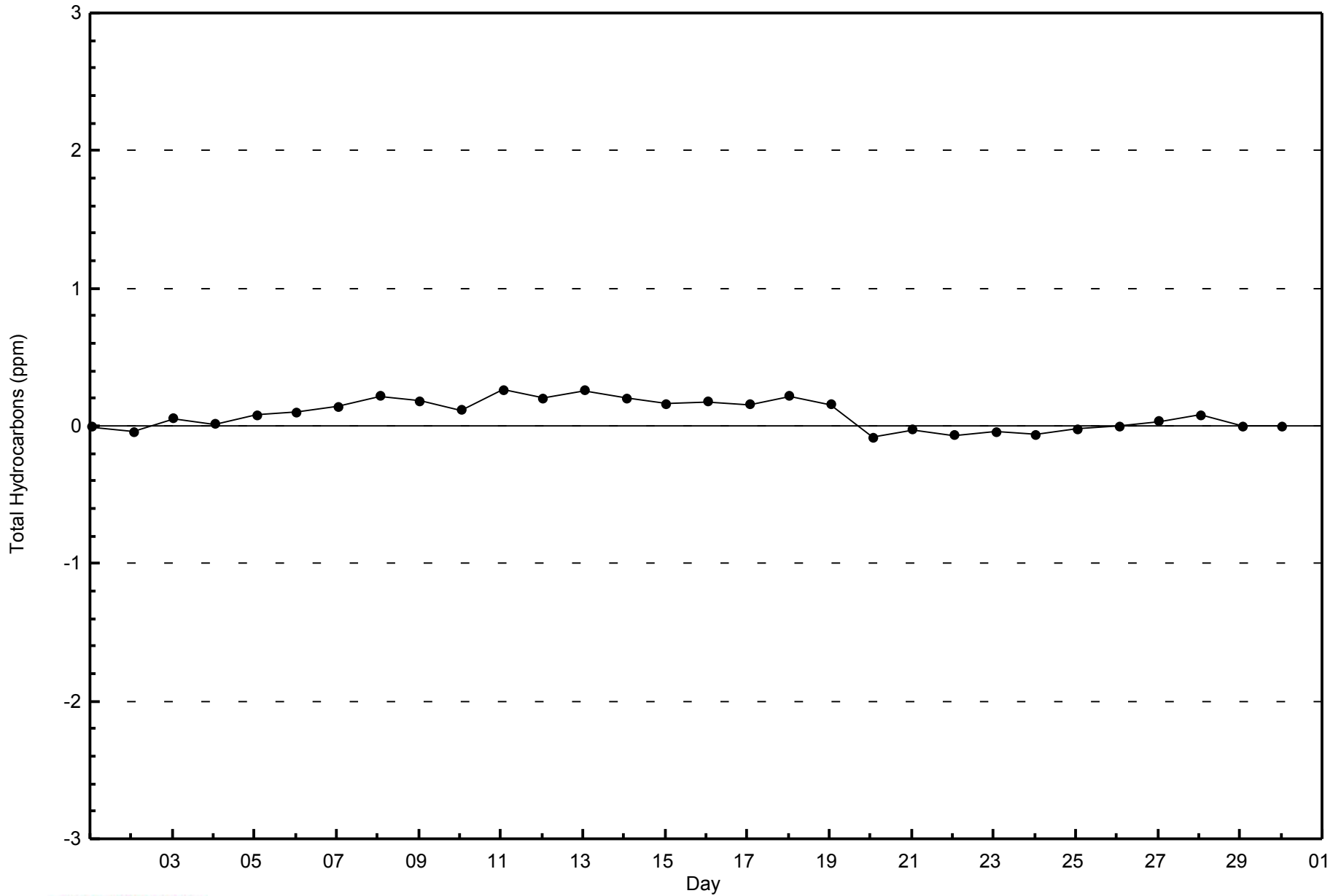


Total Number of Valid Hours: 655



WBEA
Zero Responses

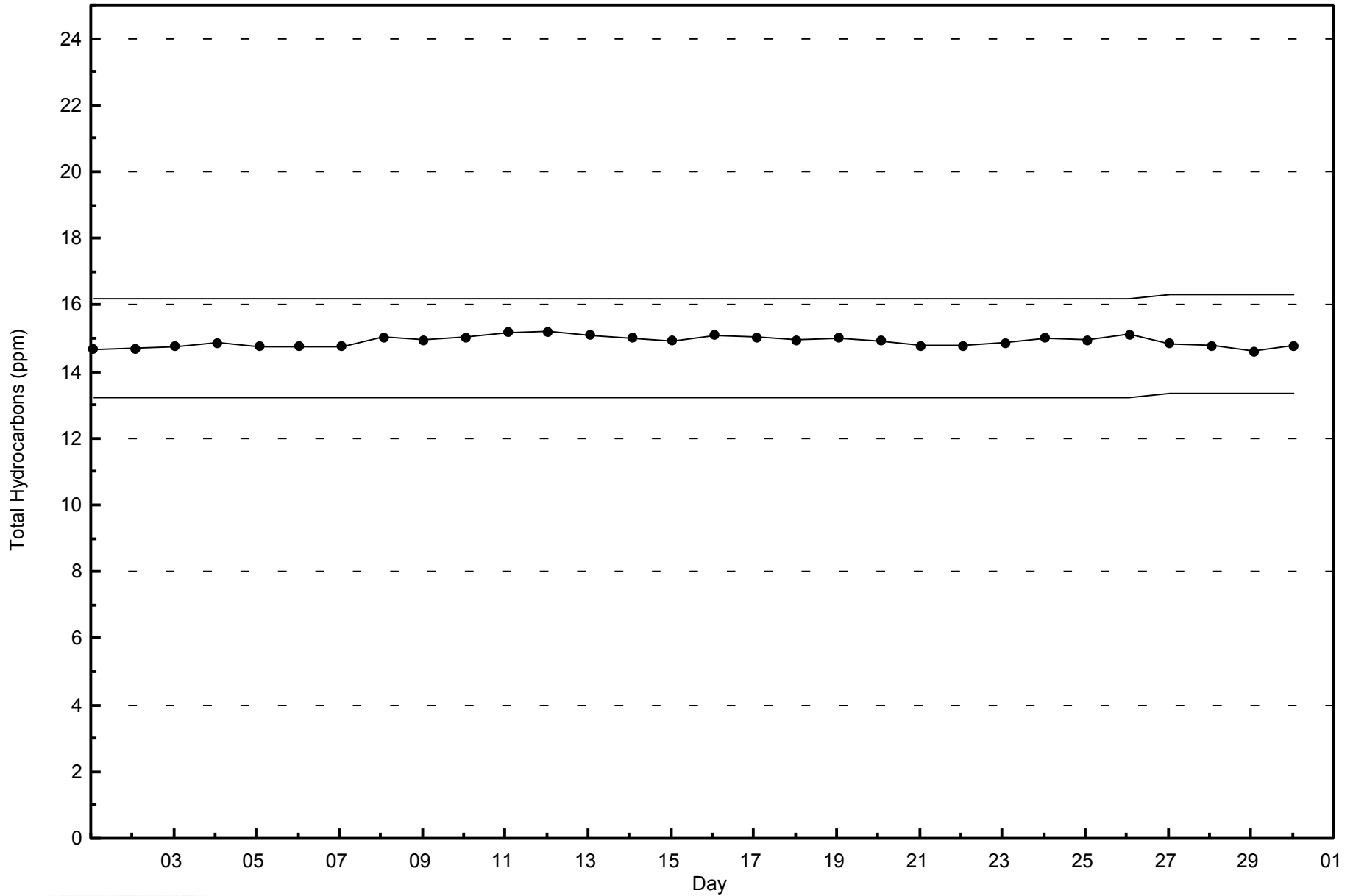
Total Hydrocarbons (THC) - ppm
Mildred Lake - November 2014





WBEA
Span Responses

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



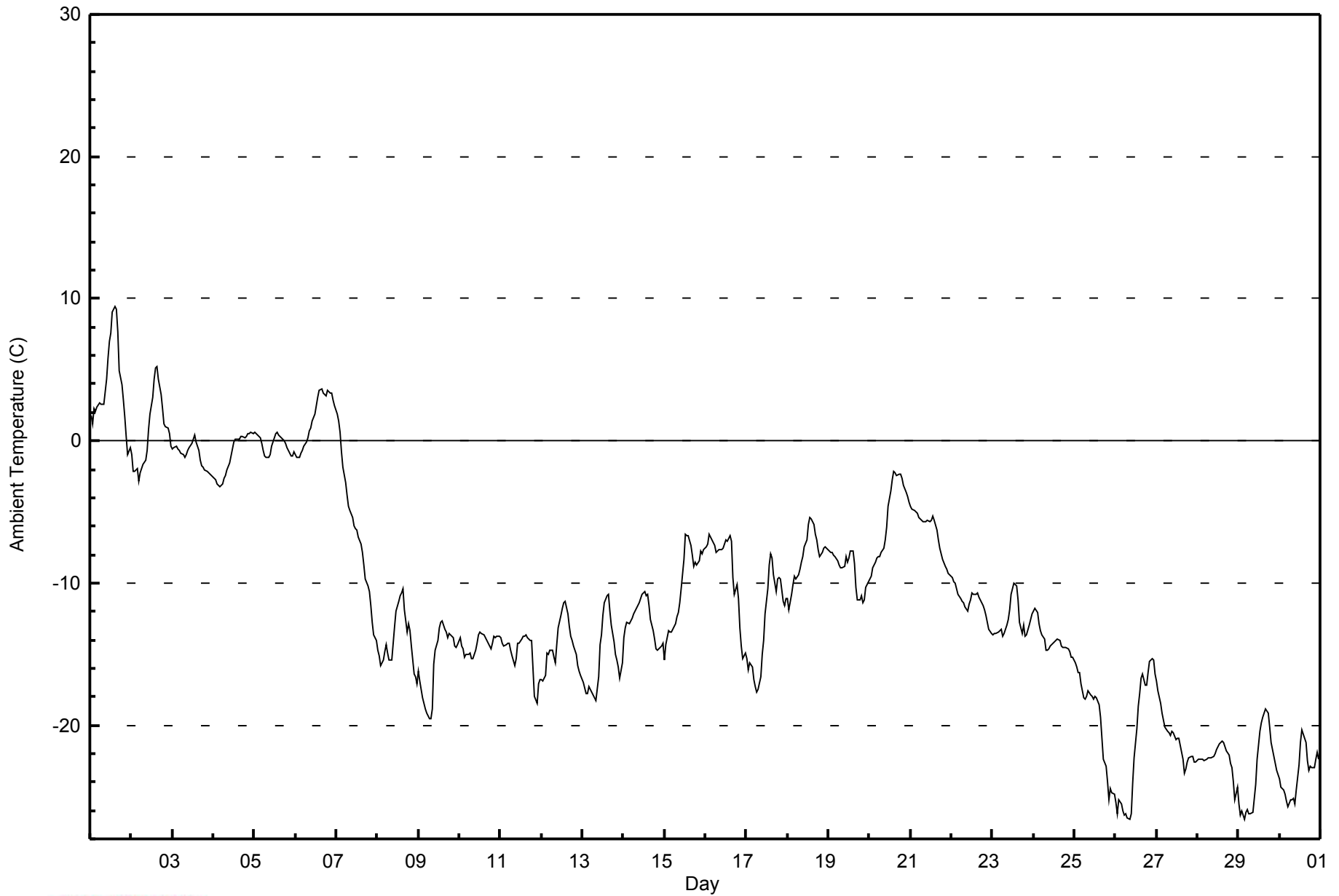


Maximum Value: 9.5 C on Nov 1 15:00		Maximum Daily Average: 3.9 C on Nov 1		Hours in Service: 720																																												
Minimum Value: -26.7 C on Nov 29 04:00		Minimum Daily Average: -23.4 C on Nov 30		Hours of Data: 720																																												
Maximum Diurnal Average: -9.0 C at hour 15		Minimum Diurnal Average: -12.2 C at hour 8		Hours of Missing Data: 0																																												
Monthly Average: -11.11 C		Percentiles: P ₁ = -26.3 P ₁₀ = -22.3 Q ₁ = -16.0 Median = -12.1 Q ₃ = -5.6 P ₉₀ = 0.2 P ₉₉ = 4.9		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-Nov	1.8	1.2	2.3	2.1	2.4	2.7	2.6	2.6	2.6	4.3	5.8	7.0	7.6	9.1	9.5	9.2	7.7	4.9	3.9	2.9	1.7	0.3	-1.0	-0.5	3.9	9.5																						
2-Nov	-1.0	-2.1	-2.2	-2.0	-2.8	-2.2	-2.0	-1.6	-1.4	-0.7	0.8	1.9	3.0	4.3	5.1	5.3	4.4	3.3	2.3	1.2	1.0	0.9	0.5	-0.3	0.7	5.3																						
3-Nov	-0.5	-0.5	-0.4	-0.6	-0.7	-0.9	-1.0	-1.2	-1.0	-0.6	-0.4	-0.2	0.1	0.4	-0.1	-0.7	-1.4	-1.7	-1.8	-2.0	-2.2	-2.3	-2.4	-2.5	-1.0	0.4																						
4-Nov	-2.6	-2.8	-3.0	-3.2	-3.2	-3.1	-2.7	-2.4	-2.0	-1.6	-1.1	-0.6	-0.1	0.1	0.1	0.1	0.3	0.3	0.2	0.3	0.5	0.5	0.6	0.5	-1.0	0.6																						
5-Nov	0.6	0.5	0.4	0.3	-0.2	-0.7	-1.0	-1.2	-1.2	-0.9	-0.3	-0.1	0.5	0.6	0.4	0.3	0.2	0.0	-0.2	-0.5	-0.7	-1.1	-1.1	-0.8	-0.3	0.6																						
6-Nov	-0.9	-1.1	-1.2	-0.9	-0.7	-0.4	-0.1	0.2	0.7	0.9	1.4	1.9	2.5	3.1	3.6	3.6	3.3	3.2	3.1	3.5	3.3	3.4	2.8	2.5	1.6	3.6																						
7-Nov	1.9	1.4	0.6	-0.8	-1.9	-2.9	-3.8	-4.6	-4.9	-5.4	-6.0	-6.2	-6.3	-6.7	-7.3	-7.9	-8.7	-9.7	-10.2	-10.6	-11.5	-12.7	-13.7	-14.1	-6.3	1.9																						
8-Nov	-14.7	-15.2	-15.8	-15.4	-14.8	-14.3	-14.9	-15.4	-15.4	-14.2	-13.0	-12.0	-11.3	-10.9	-10.7	-10.4	-11.8	-13.5	-12.8	-13.3	-14.4	-16.4	-16.6	-17.1	-13.9	-10.4																						
9-Nov	-16.2	-16.9	-18.1	-18.5	-18.9	-19.1	-19.5	-19.6	-18.8	-15.8	-14.8	-14.1	-13.2	-12.7	-12.6	-13.2	-13.5	-13.8	-13.6	-13.6	-13.8	-14.4	-14.5	-14.3	-15.6	-12.6																						
10-Nov	-13.8	-14.4	-14.6	-15.2	-15.1	-15.0	-14.9	-15.3	-15.4	-14.8	-14.2	-13.6	-13.4	-13.5	-13.6	-13.9	-14.1	-14.3	-14.6	-14.3	-13.8	-13.9	-13.8	-13.7	-14.3	-13.4																						
11-Nov	-13.8	-14.2	-14.5	-14.4	-14.3	-14.3	-14.7	-15.1	-15.8	-15.3	-14.2	-14.2	-13.9	-13.8	-13.7	-13.6	-13.8	-14.1	-14.1	-16.0	-18.0	-18.5	-17.1	-16.8	-14.9	-13.6																						
12-Nov	-16.8	-16.9	-16.5	-14.9	-15.0	-14.8	-14.8	-15.2	-15.6	-14.3	-13.1	-12.2	-11.8	-11.4	-11.3	-12.2	-13.1	-13.7	-14.0	-14.4	-15.0	-15.8	-16.2	-16.5	-14.4	-11.3																						
13-Nov	-17.0	-17.4	-17.8	-17.8	-17.3	-17.7	-17.8	-18.1	-18.2	-16.6	-14.3	-13.6	-12.3	-11.4	-10.9	-10.8	-12.0	-12.9	-14.1	-15.1	-15.5	-16.0	-16.7	-15.6	-15.3	-10.8																						
14-Nov	-13.9	-13.1	-12.8	-12.8	-12.7	-12.5	-12.2	-12.0	-11.6	-11.4	-11.1	-10.8	-10.6	-10.9	-10.8	-11.6	-12.6	-13.3	-13.9	-14.6	-14.8	-14.5	-14.4	-14.3	-12.6	-10.6																						
15-Nov	-15.4	-14.3	-13.4	-13.5	-13.5	-13.2	-12.9	-12.4	-12.1	-11.4	-10.4	-8.4	-6.5	-6.7	-6.6	-7.4	-8.1	-8.8	-8.6	-8.7	-8.4	-7.7	-8.0	-7.6	-10.2	-6.5																						
16-Nov	-7.4	-7.2	-6.5	-6.7	-6.9	-7.3	-7.9	-7.8	-7.6	-7.7	-7.6	-7.3	-7.0	-7.1	-6.7	-7.0	-9.6	-10.8	-10.1	-11.1	-13.1	-14.5	-15.3	-14.9	-9.0	-6.5																						
17-Nov	-15.3	-16.1	-15.6	-15.9	-16.8	-17.3	-17.7	-17.5	-16.6	-15.0	-14.0	-12.1	-10.4	-8.7	-8.0	-8.2	-9.4	-10.6	-9.7	-9.6	-9.7	-11.3	-11.6	-11.1	-12.8	-8.0																						
18-Nov	-11.1	-11.9	-10.8	-10.1	-9.5	-9.7	-9.4	-9.0	-8.5	-8.1	-7.5	-7.0	-5.9	-5.4	-5.5	-5.9	-6.5	-7.0	-7.7	-8.1	-7.9	-7.5	-7.5	-7.6	-8.1	-5.4																						
19-Nov	-7.8	-7.9	-7.9	-8.0	-8.2	-8.4	-8.8	-8.9	-8.9	-8.8	-8.1	-8.6	-8.3	-7.8	-7.7	-8.7	-10.3	-11.2	-11.2	-10.9	-11.4	-11.2	-10.3	-9.9	-9.1	-7.7																						
20-Nov	-9.7	-9.5	-8.9	-8.5	-8.2	-8.1	-8.1	-7.9	-7.6	-7.0	-6.1	-4.6	-3.5	-2.8	-2.2	-2.2	-2.4	-2.3	-2.3	-2.6	-3.1	-3.6	-4.0	-4.3	-5.4	-2.2																						
21-Nov	-4.6	-4.8	-4.9	-5.0	-5.1	-5.4	-5.6	-5.7	-5.7	-5.6	-5.6	-5.7	-5.6	-5.3	-5.6	-6.2	-7.0	-7.6	-8.0	-8.4	-8.8	-9.1	-9.3	-9.4	-6.4	-4.6																						
22-Nov	-9.6	-9.9	-10.0	-10.4	-10.8	-11.1	-11.3	-11.4	-11.7	-12.0	-11.5	-11.2	-10.7	-10.8	-10.8	-10.7	-11.0	-11.2	-11.6	-11.9	-12.3	-12.8	-13.2	-13.5	-11.3	-9.6																						
23-Nov	-13.6	-13.6	-13.5	-13.4	-13.3	-13.3	-13.8	-13.5	-12.9	-12.6	-11.9	-10.8	-10.0	-10.2	-10.2	-11.2	-12.7	-13.5	-12.9	-13.7	-13.6	-12.9	-12.6	-12.2	-12.6	-10.0																						
24-Nov	-12.0	-11.8	-12.0	-12.8	-13.4	-13.7	-13.9	-14.7	-14.8	-14.6	-14.4	-14.3	-14.2	-14.1	-14.0	-14.1	-14.4	-14.6	-14.5	-14.6	-14.6	-14.9	-15.2	-15.2	-14.0	-11.8																						
25-Nov	-15.6	-15.9	-16.3	-16.3	-17.1	-18.1	-18.2	-18.0	-17.6	-17.9	-18.0	-18.2	-18.0	-18.0	-18.5	-19.4	-21.0	-22.4	-22.9	-23.9	-25.2	-24.5	-24.7	-24.8	-19.6	-15.6																						
26-Nov	-25.5	-26.3	-25.2	-25.6	-26.0	-26.3	-26.2	-26.5	-26.6	-26.2	-24.0	-22.3	-20.2	-18.7	-17.8	-16.7	-16.4	-17.2	-17.1	-16.3	-15.5	-15.4	-15.4	-16.4	-21.2	-15.4																						
27-Nov	-16.9	-17.6	-18.4	-19.1	-19.7	-20.1	-20.5	-20.5	-20.7	-20.5	-20.5	-21.0	-20.9	-20.9	-21.4	-22.4	-23.3	-23.1	-22.6	-22.3	-22.2	-22.2	-22.5	-22.6	-20.9	-16.9																						
28-Nov	-22.4	-22.4	-22.4	-22.4	-22.5	-22.4	-22.3	-22.3	-22.3	-22.2	-22.0	-21.7	-21.5	-21.3	-21.2	-21.3	-21.5	-21.8	-22.1	-22.6	-23.0	-24.0	-25.3	-24.3	-22.4	-21.2																						
29-Nov	-25.5	-26.4	-26.1	-26.7	-26.1	-25.9	-26.3	-26.2	-26.2	-25.1	-24.2	-22.4	-20.5	-19.8	-19.4	-19.2	-18.9	-19.2	-20.2	-21.2	-21.7	-22.7	-23.2	-23.5	-23.2	-18.9																						
30-Nov	-23.8	-24.3	-24.6	-24.9	-25.4	-25.8	-25.3	-25.3	-25.1	-25.5	-24.6	-22.8	-21.2	-20.3	-20.6	-21.2	-22.5	-23.2	-22.9	-22.9	-23.0	-22.4	-21.9	-22.4	-23.4	-20.3																						
																								-11.4	-11.7	-11.7	-11.8	-11.9	-12.0	-12.2	-12.2	-12.1	-11.6	-10.8	-10.2	-9.4	-9.1	-9.0	-9.3	-10.0	-10.7	-10.8	-11.2	-11.6	-11.9	-12.1	-12.1	Diurnal Average
																								1.9	1.4	2.3	2.1	2.4	2.7	2.6	2.6	2.6	4.3	5.8	7.0	7.6	9.1	9.5	9.2	7.7	4.9	3.9	3.5	3.3	3.4	2.8	2.5	Diurnal Maximum



WBEA
Hourly Averages

Ambient Temperature (AT) - C
Mildred Lake - November 2014





WBEA
Cumulative Frequency Distribution

Ambient Temperature (AT) - C
Mildred Lake - November 2014

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	107	14.86	14.86
-20 - 0	535	74.31	89.17
0 - 10	78	10.83	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Speed: 27 km/h on Nov 7 03:00	Maximum Daily Speed Average: 16.5 km/h on Nov 7	Hours in Service: 720
Minimum Speed Value: 1 km/h on Nov 1 01:00	Minimum Daily Speed Average: 1.1 km/h on Nov 26	Hours of Data: 688
Maximum Diurnal Speed Average: 3.5 km/h at hour 20	Minimum Diurnal Speed Average: 1.4 km/h at hour 9	Hours of Missing Data: 32
Monthly Average Velocity: 2.2 km/h 342.8 deg	Percentiles: P ₁ = 2 P ₁₀ = 4 Q ₁ = 6 Median = 8 Q ₃ = 11 P ₉₀ = 14 P ₉₉ = 22	Percent Operational Time: 95.6

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
1-Nov	WSW1	SSW2	W5	WSW2	WSW3	WSW4	WSW4	SW6	SSW8	SW7	SSW8	SW5	WSW7	SW7	SW6	W6	WNW6	SW1	SSW4	SSW6	SW5	SW6	SSE5	SSE5	SW4.4	SSW8		
2-Nov	SSW6	S5	S5	SSE5	S3	SSW8	SSW8	S7	SSE9	S9	SSE9	SSE10	S11	SSE11	SSE12	SSE13	SSE13	SSE10	SSE12	S10	SSE11	SSE13	S14	S11	S9.1	S14		
3-Nov	S13	S13	SSW9	S9	S9	SSW9	SSW8	SSW6	S4	ENE3	N4	NNW6	N7	NNE8	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	----	S13		
4-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	SE10	ESE10	AF	SE10	SE9	SSE11	SSE13	SSE10	S6	S6	----	SSE13	
5-Nov	W4	NW10	NW12	AF	AF	AF	AF	AF	AF	AF	AF	AF	NW12	WNW10	WNW11	NW13	NW12	NW11	NW7	WSW5	SSW3	SSW10	SW10	SSW10	S11	S12	----	NW13
6-Nov	S14	SSE15	SSE18	SSE18	SSE17	SSE20	SSE22	SSE21	SSE24	SSE24	SSE21	S15	SSE14	SSE9	SSE11	S10	SSW9	SSW7	SW8	WNW10	NW12	NW16	NNW17	NNW15	S9.4	SSE24		
7-Nov	NNW12	NNW23	NNW27	NNW26	NNW22	NNW23	NNW21	NNW16	NNW18	N20	N20	N19	N19	N19	N20	N15	N13	N12	N12	NNW13	N10	N7	NNE7	NNE6	N16.5	NNW27		
8-Nov	NE6	NE4	NNE3	N5	N2	NNW5	N7	NNW8	NNW10	NNW13	NNW14	N13	N13	NNW12	NNW9	NNW8	N4	NE5	NE7	NE8	NNE5	NNE3	N4	NNW4	N6.7	NNW14		
9-Nov	NNW5	N5	NNE4	N3	NW2	NE4	NNE5	NNE5	NNE2	NNE3	N5	N8	NNE9	NNE10	NNE9	NNE7	NNE5	NNE3	N6	N6	NNE7	NNE7	NNE5	NNE3	NNE5.0	NNE10		
10-Nov	N10	N10	N10	N9	NNW12	NNW12	NNW11	NNW7	N10	NNE14	N16	N15	NNE16	NNE14	N14	NNE12	NNE9	NNE10	N10	N8	N8	NNW8	NNW8	NNW7	N10.5	NNE16		
11-Nov	NNW8	N8	N7	N6	N7	NNE6	NE6	NE5	NNE4	ENE5	NE2	NNW6	N6	N8	N6	N6	N4	NNE4	N3	NE4	ENE3	ENE3	NE2	NNE3	NNE4.6	NNW8		
12-Nov	ENE2	SE2	S4	SSW10	SSW11	SSW10	SSW10	SSW11	SSW10	SSW12	SSW13	SSW13	S12	S11	SSE9	SSE10	SSE11	S9	SSW9	SSW8	SSW9	S6	SSW7	S7	S8.4	SSW13		
13-Nov	S8	S8	SSW7	SSW8	SSW9	S8	S9	SSW8	SSW9	SSW10	S9	S11	SSE10	SE8	SE7	ESE4	NNE5	NNE8	N8	N6	N7	N6	N6	N6	S3.0	S11		
14-Nov	N5	N6	N5	N6	N8	N8	N7	N7	N8	N8	N8	N8	NNE9	N9	N10	N8	NNW7	NW6	WSW3	WSW3	NW4	WNW5	W7	W8	WSW9	NNW5.2	N10	
15-Nov	SSW9	NW10	WSW14	WSW13	WSW13	WSW14	WSW13	WSW13	WSW14	WSW13	WSW13	WSW15	W12	NNW9	N12	N11	N13	NNE15	N22	NNW16	NNW15	N15	NNW16	NNW16	WNW7.4	N22		
16-Nov	NNW15	N15	N19	N18	N17	N15	N14	N16	N13	NNW12	NNW12	NNW11	NNW13	NNW8	NNW8	N5	NE3	NNW5	NNW9	N8	N5	NW2	SSW3	SW5	N9.6	N19		
17-Nov	SW5	SSW6	S7	SSW8	S7	S6	SSE8	SSE7	S10	S12	SSW11	S11	S12	S13	S8	SSW5	S5	NNW3	NNW8	N10	N7	NNW4	NNW6	N8	S3.9	S13		
18-Nov	NNE8	N7	N11	N13	N12	NNW9	NNW9	NNW12	NNW11	NW10	NW13	NW13	NW14	NW15	NNW16	NW15	NW14	NW15	NW13	NW13	NW10	NW10	NW11	NW11	NNW11.3	NNW16		
19-Nov	NW10	NNW10	NNW10	NNW9	NNW9	NNW10	NNW6	NW7	WNW6	W7	WSW7	SW7	SSW8	SW9	SW8	SSW8	S7	S8	S8	S7	SSW11	SSE9	S10	S8	WSW3.5	SSW11		
20-Nov	SSW7	S7	S9	S11	S11	S11	S10	SSW9	SSW10	SSW9	S11	S10	SSW10	S8	SSW4	ESE4	ESE3	E4	ENE4	N8	NNE10	NNE9	NNE10	NNE8	SSE4.0	S11		
21-Nov	NNE9	NNE8	NNE7	NNE7	NNE7	NNE8	N7	N8	N8	N7	NNE9	N10	NNW11	N11	NNE8	NE7	NE9	NE9	ENE8	NE8	ENE7	ENE4	NE6	NE9	NNE7.1	NNW11		
22-Nov	ENE9	NE10	NE7	NE8	NE9	NNE10	NE10	NE11	NNE8	NNE10	NNE11	NNE12	NNE14	NNE14	NNE14	NNE14	NNE14	NNE11	NNE14	NNE13	NNE13	NNE10	NNE13	NNE10	NNE11.1	NNE14		
23-Nov	NNE9	NNE8	NNE6	NNE5	N2	NNW4	ESE3	SSE5	S7	SSW8	SSW9	SSW9	S8	SSE9	SSE8	S6	SSW5	SSW5	WNW3	SW1	SSW2	WSW2	NE2	N7	S1.7	SSW9		
24-Nov	NNE8	NNE8	NNE9	NNE10	N9	N8	NNE7	NNE5	NNE3	NNE4	NE4	NE5	ENE5	NNE4	ENE3	NE4	NNE4	NE5	NE4	NE5	NE6	NE4	NNE5	NNE6	NNE5.4	NNE10		
25-Nov	NNE7	NNE8	NNE9	N9	N11	NNE11	N10	N8	N8	NNE8	NNE8	NNE9	NNE7	NNE7	NNE5	NE5	NE4	NNE3	WNW2	NNE4	S3	ESE2	S2	SE5	NNE5.4	N11		
26-Nov	SSE5	S4	S7	S6	S7	S8	SSE10	S7	S8	SSW5	S4	S4	SSW4	S5	S5	SSW4	NNE1	N7	N10	N11	NNE13	NNE11	NNE13	NNE17	ESE1.1	NNE17		
27-Nov	NNE16	NNE14	NNE9	NNE7	NNE8	NNE7	NNE8	NNE7	NNE5	NNE7	NNE9	NE6	ENE2	NNW3	NNW4	NNW4	NNW5	N5	N4	N4	NNE5	NE5	NE6	NNE8	NNE6.3	NNE16		
28-Nov	NNE7	NNE8	NNE10	NE10	NE9	NNE8	NNE8	NNE9	NNE10	NNE9	NE11	NNE11	NNE12	NNE12	N10	N12	NNE11	N9	NNE7	N4	N4	NNW3	W2	SW5	NNE7.7	NNE12		
29-Nov	SW3	WSW5	WSW9	SW9	SW9	WSW10	SW9	SW10	SW11	WSW13	W16	W12	W13	W12	WNW14	WNW13	NW12	NW15	NW16	NNW19	NNW18	NW17	NNW18	NW15	WNW9.8	NNW19		
30-Nov	NW18	NW16	NW14	NW13	WNW14	WNW14	WNW15	WNW16	W12	W12	WSW13	WSW10	SW10	SW9	SSW10	SSW10	S10	S8	S9	S9	SSE12	S12	SSE11	SSE5	WSW6.6	NW18		

N2.7	NNW3.2	NNW3.0	NNW2.5	NNW2.5	NNW2.5	NNW1.5	NW1.7	W1.4	NNW1.6	NW1.9	NW2.2	NNW2.3	NNW2.6	N2.1	N2.1	N2.3	N2.4	N3.1	N3.5	N2.6	N2.1	NNW2.4	N2.6	Diurnal Average
NNW18	NNW23	NNW27	NNW26	NNW22	NNW23	SSE22	SSE21	SSE24	SSE24	SSE21	N19	N19	N19	N20	NW15	NW14	NW15	N22	NNW19	NNW18	NW17	NNW18	NNE17	Diurnal Maximum

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



Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed (WS) - km/h

Mildred Lake - November 2014

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 6 km/h on Nov 15 22:00			Hours of Data:	688
Minimum Value: 0 km/h on Nov 11 22:00			Hours of Missing Data:	32
			Hours of Calibration:	0
			Percent Operational Time:	95.6
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 5				

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

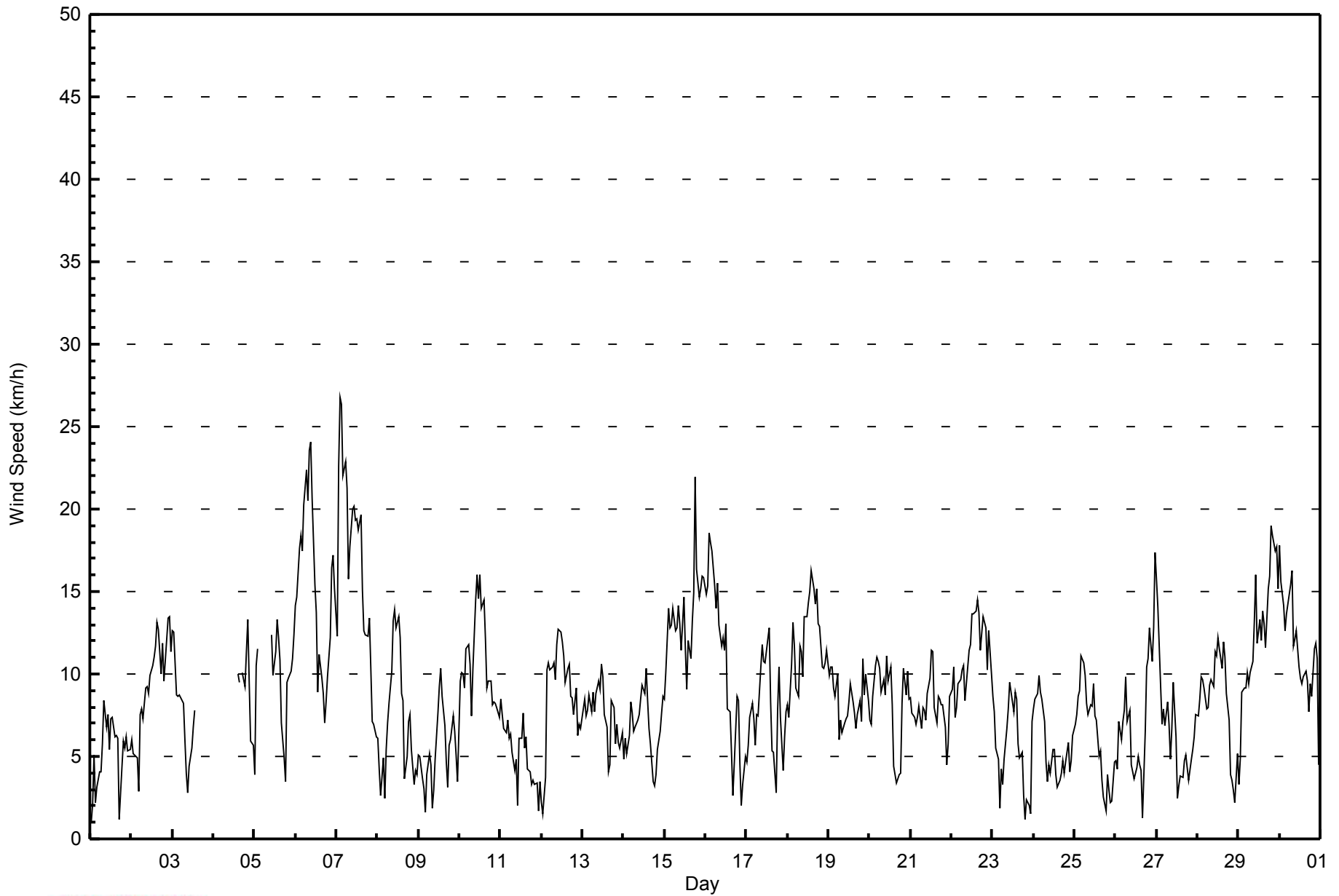
4	6	5	5	5	4	5	5	4	4	5	5	6	5	4	4	4	5	6	5	4	6	6	5	
Diurnal Maximum																								

AF - Analyzer Failure



WBEA
Hourly Averages

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





WBEA
Cumulative Frequency Distribution

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

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	156	22.67	22.67
6 - 11	370	53.78	76.45
12 - 19	146	21.22	97.67
20 - 28	16	2.33	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 688

Total Number of Hours: 720



WBEA
Frequency Distribution

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

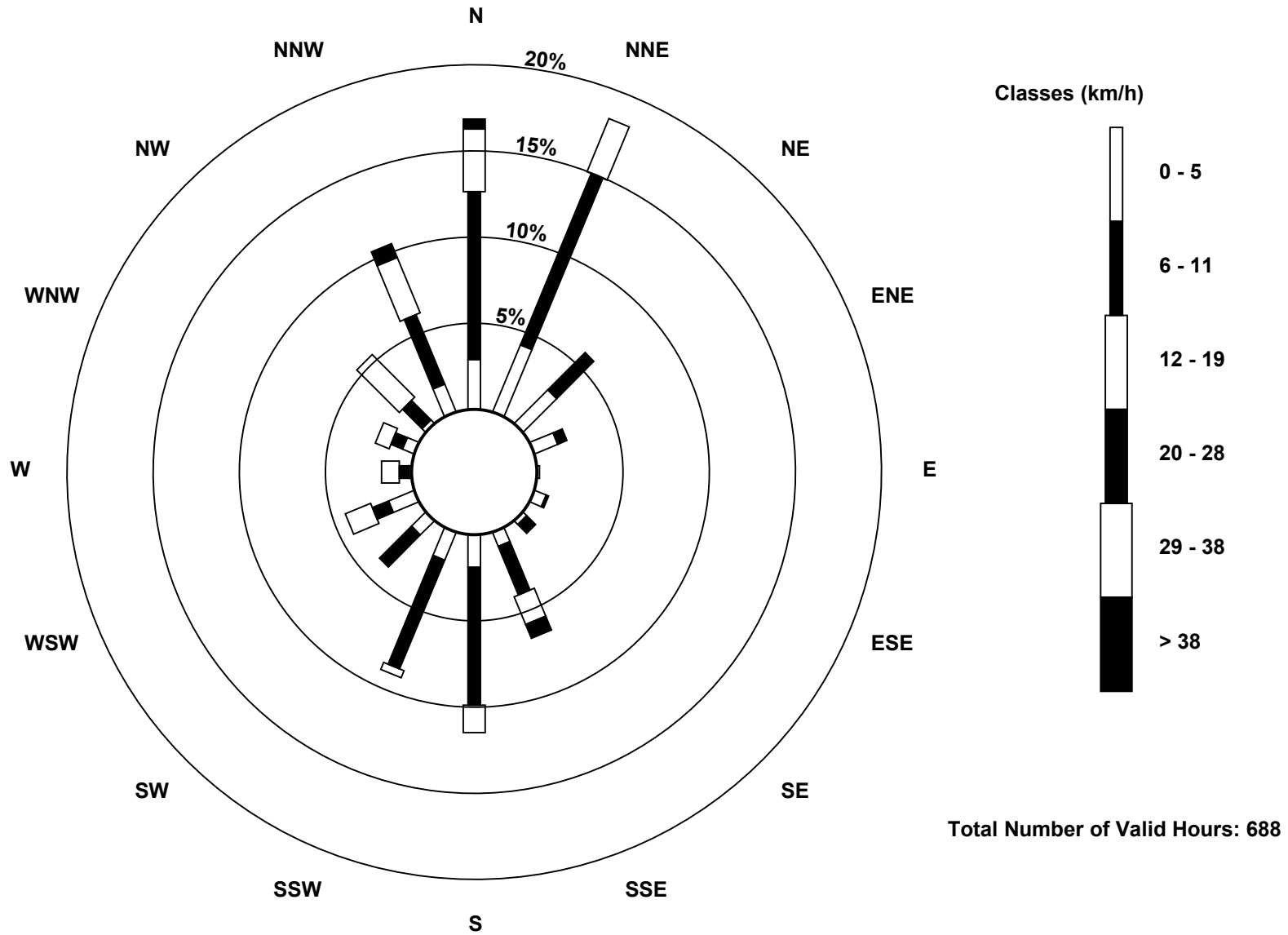
Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	20	29	19	10	1	5	2	6	13	12	8	11	1	5	2	12	156
6 - 11	67	74	21	4	0	1	5	21	55	47	18	7	4	5	11	30	370
12 - 19	25	23	0	0	0	0	0	12	11	3	0	11	7	6	24	24	146
20 - 28	4	0	0	0	0	0	0	6	0	0	0	0	0	0	0	6	16
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	116	126	40	14	1	6	7	45	79	62	26	29	12	16	37	72	688

Total Number of Valid Hours: 688

Total Number of Hours: 720

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

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





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Mildred Lake - November 2014

Direction of Maximum Speed: 346 deg on Nov 7 03:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 350.3 deg on Nov 7	Hours of Data: 688
Direction of Minimum Speed: 243 deg on Nov 1 01:00	Direction of Minimum Daily Speed Average: 1.1 deg on Nov 26
Direction of Minimum Speed: 243 deg on Nov 1 01:00	Hours of Missing Data: 32
Monthly Average Direction: 296.5 deg	Percent Operational Time: 95.6

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-Nov	243	210	281	242	251	258	237	221	206	214	194	223	237	231	225	265	295	228	209	213	220	215	160	168	224.6	
2-Nov	200	183	176	162	178	201	198	182	161	170	168	163	169	160	153	159	156	161	166	169	156	162	176	189	169.4	
3-Nov	169	174	194	185	182	198	193	207	170	58	11	345	356	18	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	
4-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	136	122	AF	142	143	156	165	157	174	171	--	
5-Nov	277	313	314	AF	AF	AF	AF	AF	AF	AF	AF	308	300	303	305	320	310	308	250	208	213	224	206	188	182	--
6-Nov	170	168	163	152	148	156	153	162	167	166	167	169	168	166	162	171	197	202	231	293	318	318	327	341	173.1	
7-Nov	335	335	346	344	347	342	348	347	341	355	360	356	351	357	358	354	351	350	359	347	357	355	18	31	350.3	
8-Nov	44	42	27	355	0	341	353	346	344	345	343	352	353	342	333	343	8	36	40	35	21	24	2	340	357.8	
9-Nov	327	351	13	8	315	56	26	12	31	22	5	11	26	26	27	18	24	18	2	5	28	31	29	12	17.0	
10-Nov	356	5	1	353	342	340	340	331	4	15	10	2	16	20	8	18	23	14	11	9	355	348	346	346	2.3	
11-Nov	344	354	350	6	6	27	38	40	32	76	48	328	355	360	3	3	5	14	6	39	62	63	42	27	12.9	
12-Nov	62	125	172	201	200	202	206	194	193	198	200	198	174	170	156	160	168	176	195	196	192	188	192	182	186.8	
13-Nov	180	190	200	194	196	190	181	193	194	195	172	172	163	144	130	119	31	12	10	3	359	358	5	9	172.3	
14-Nov	349	352	357	1	2	358	5	360	359	359	5	20	7	353	11	342	318	249	252	304	293	279	269	237	342.2	
15-Nov	208	225	242	247	243	244	244	245	238	244	241	244	267	343	349	6	11	12	6	344	342	349	334	348	296.7	
16-Nov	340	350	5	2	351	2	3	358	354	333	344	346	347	334	328	353	46	332	347	353	360	326	210	223	349.8	
17-Nov	223	205	188	193	174	173	156	167	171	182	192	187	170	173	179	192	187	329	346	1	351	334	332	9	186.3	
18-Nov	25	5	9	8	351	335	332	341	346	313	322	315	322	324	331	325	315	317	321	318	311	322	314	313	330.0	
19-Nov	324	330	327	333	339	346	337	317	296	259	239	217	204	219	214	208	169	178	172	183	194	164	181	190	241.1	
20-Nov	192	189	169	171	176	184	186	192	198	192	175	178	194	179	192	120	108	98	71	10	26	32	13	17	167.8	
21-Nov	24	29	31	25	16	20	9	10	357	1	18	358	332	351	31	56	54	47	67	56	68	68	53	56	26.4	
22-Nov	59	56	54	40	37	29	35	39	30	23	27	30	28	29	32	31	29	20	20	24	25	18	15	23	30.2	
23-Nov	19	14	30	15	352	344	117	153	188	202	199	195	177	156	163	183	193	203	294	217	208	238	47	7	177.0	
24-Nov	15	18	18	12	8	357	16	16	24	30	53	49	58	30	63	38	29	46	35	46	52	44	15	30	26.9	
25-Nov	19	27	27	8	7	12	11	9	10	24	23	15	13	20	31	49	38	25	289	15	188	120	189	137	20.4	
26-Nov	161	181	178	174	183	177	167	179	188	204	186	190	200	174	182	195	23	8	6	10	29	31	15	18	118.1	
27-Nov	13	14	26	21	15	28	17	32	15	30	33	36	59	332	339	343	343	356	355	360	13	39	35	30	17.7	
28-Nov	27	26	33	41	36	23	19	20	19	27	36	30	23	23	11	11	13	10	16	5	354	340	259	215	21.0	
29-Nov	230	249	245	234	227	238	226	236	230	251	263	264	274	274	292	301	312	320	324	332	330	326	328	319	286.7	
30-Nov	318	314	313	308	299	299	297	291	275	267	258	239	228	220	210	196	187	178	176	172	167	169	163	160	253.8	

351.7 347.7 345.7 348.0 335.7 326.9 333.7 314.1 280.9 291.7 313.1 314.2 326.4 344.7 357.9 2.6 2.8 3.3 0.3 352.4 354.6 352.7 342.7 355.1
 Diurnal Average

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



Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Mildred Lake - November 2014

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 97 deg on Nov 26 17:00	Hours of Data: 688
Minimum Value: 6 deg on Nov 13 21:00	Hours of Missing Data: 32
	Hours of Calibration: 0
	Percent Operational Time: 95.6
Percentiles: P ₁ = 8 P ₁₀ = 11 Q ₁ = 13 Median = 15 Q ₃ = 20 P ₉₀ = 27 P ₉₉ = 75	

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-Nov	84	50	32	51	34	43	39	28	20	25	21	34	27	26	24	25	15	91	37	9	10	12	18	28	91
2-Nov	18	31	13	22	67	15	9	19	14	13	21	19	17	16	16	12	13	13	15	15	16	16	14	16	67
3-Nov	13	16	15	18	21	14	15	25	23	77	21	13	14	22	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	77
4-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	16	15	AF	17	17	16	12	15	27	19	27
5-Nov	43	16	19	AF	AF	AF	AF	AF	AF	AF	17	16	19	16	16	17	21	29	51	19	16	16	16	16	51
6-Nov	13	12	13	16	17	15	17	14	11	11	12	11	23	27	15	14	12	14	25	23	16	15	13	20	27
7-Nov	19	13	11	10	11	11	14	12	12	12	12	13	15	13	12	11	11	10	11	10	13	13	15	22	22
8-Nov	15	15	43	16	30	31	15	14	14	12	14	19	20	16	16	12	16	7	11	12	16	25	10	14	43
9-Nov	21	8	20	37	53	15	20	17	63	34	26	18	22	21	25	15	14	17	9	11	17	16	17	19	63
10-Nov	16	11	11	15	10	9	14	15	16	13	13	16	16	17	15	17	17	14	13	15	15	11	10	9	17
11-Nov	9	10	12	11	14	21	19	17	15	23	69	28	28	13	15	17	13	16	18	22	11	13	24	22	69
12-Nov	33	33	26	12	13	13	13	11	11	12	12	14	15	15	16	14	10	13	11	12	8	13	12	10	33
13-Nov	9	10	11	13	12	11	11	12	13	15	15	13	15	20	16	25	12	8	7	8	6	6	7	9	25
14-Nov	13	9	12	9	11	10	13	9	10	11	12	18	19	12	14	18	34	32	43	33	25	25	26	23	43
15-Nov	12	20	21	21	22	22	23	22	22	22	22	22	34	18	14	11	12	13	12	16	11	21	14	11	34
16-Nov	10	16	13	14	11	12	14	12	11	13	11	12	14	13	15	34	32	21	7	8	60	27	20	11	60
17-Nov	14	13	12	13	14	15	12	15	12	22	14	17	15	12	15	20	32	61	17	9	7	28	14	24	61
18-Nov	15	11	11	13	12	21	19	12	14	16	16	15	16	15	12	14	14	14	15	15	16	15	16	14	21
19-Nov	14	11	14	16	15	11	18	19	25	26	26	18	22	21	17	16	12	14	11	15	15	16	16	15	26
20-Nov	18	22	14	12	13	16	15	18	14	15	15	15	13	23	33	34	20	21	17	18	17	18	11	12	34
21-Nov	15	17	17	16	15	15	12	13	17	14	19	24	12	16	27	16	18	19	19	21	15	15	16	16	27
22-Nov	16	16	18	15	15	14	16	15	16	14	14	17	16	15	16	15	15	14	15	15	15	13	11	14	18
23-Nov	14	14	17	17	44	18	27	19	16	16	14	15	20	15	13	12	13	12	36	75	21	84	86	16	86
24-Nov	13	15	14	12	12	10	20	16	22	25	27	27	23	30	39	24	26	23	25	25	15	20	14	14	39
25-Nov	13	14	14	11	9	10	10	11	14	18	21	15	16	19	17	18	35	33	26	13	27	57	41	13	57
26-Nov	16	26	16	16	17	14	11	16	18	25	40	32	28	20	22	27	97	14	9	17	19	18	16	15	97
27-Nov	12	14	16	15	15	16	15	17	18	17	19	27	83	55	27	19	14	8	9	10	11	18	18	17	83
28-Nov	16	17	17	17	17	15	15	14	15	16	18	18	15	16	12	12	12	10	12	15	11	20	56	18	56
29-Nov	33	32	23	22	26	24	21	20	18	21	21	24	22	22	18	16	16	13	14	11	12	13	11	15	33
30-Nov	13	14	15	15	15	15	15	17	21	17	19	24	21	19	20	12	15	13	11	10	8	9	11	66	66
	84	50	43	51	67	43	39	28	63	77	69	34	83	55	39	34	97	91	51	75	60	84	86	66	

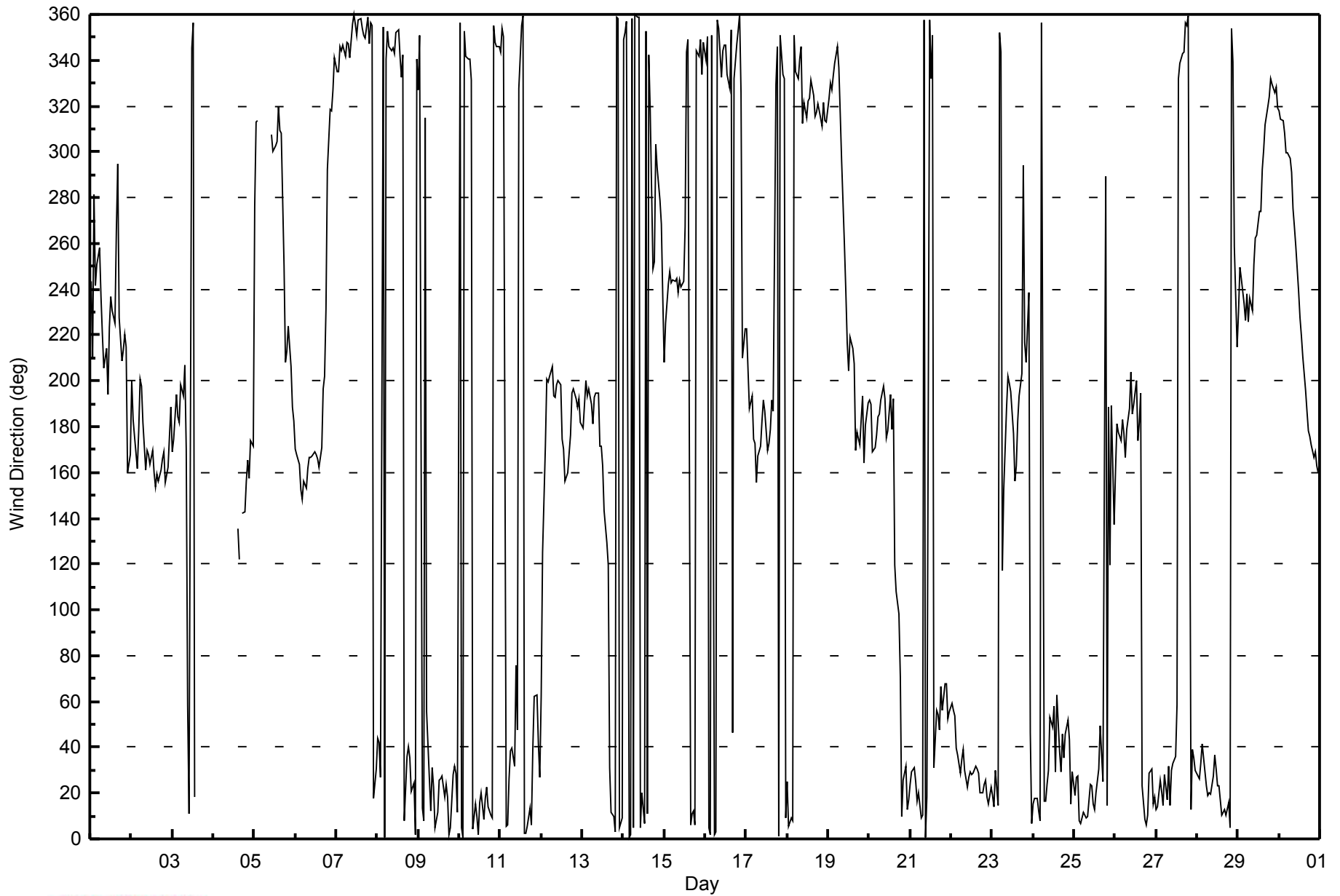
Diurnal Maximum

AF - Analyzer Failure



WBEA
Hourly Averages

Wind Direction (WD) - deg
Mildred Lake - November 2014



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Wood Buffalo Environmental Association

SO₂ Calibration Report

Station Information

Calibration Date	November 26, 2014	Previous Calibration	October 8, 2014
Station Name	Mildred Lake	Station Number	AMS 2
Reason:	Routine		
Start Time (MST)	10:05	End Time (MST)	13:10
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	907
Calculated slope	0.993684	0.997818	Chamber temp.	44.6	44.4
Calculated intercept	1.446227	1.393294	Pressure (mmHg)	707.0	714.3
Analyzer Background	27.6	27.4	Flow (lpm)	0.520	0.521
Analyzer Coefficient	0.899	0.897	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	0.2	NA
as found span	5000	69.9	830.4	830.4	1.000
calibrator zero	5000	0.0	0.0	0.2	NA
high point	5000	69.9	830.4	831.9	0.998
second point	5000	35.4	420.6	418.5	1.005
third point	5000	17.7	210.3	208.3	1.010
calibrator zero	5000	0.0	0.0	0.2	NA
as left zero	5000	0.0	0.0	1.2	NA
as left span	5000	69.9	830.4	831.8	0.998
Average Correction Factor					1.004

Corrected As found 830.2 Previous response 834.2 % change 0.5%

Notes:

Changed filter after as founds. Slight adjustment was made to the span.

Calibration Performed By:

Devin Russell



Wood Buffalo Environmental Association

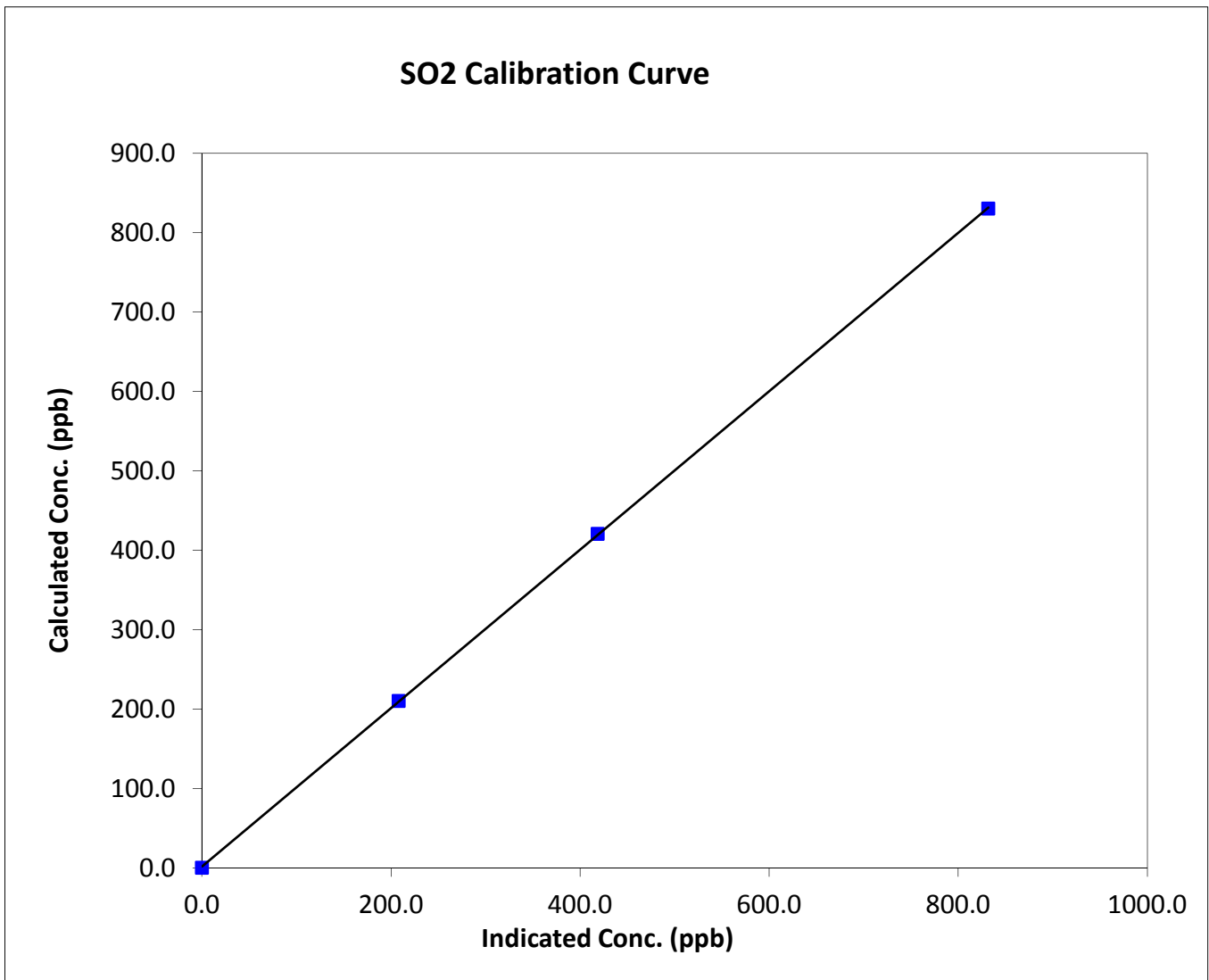
SO₂ Calibration Summary

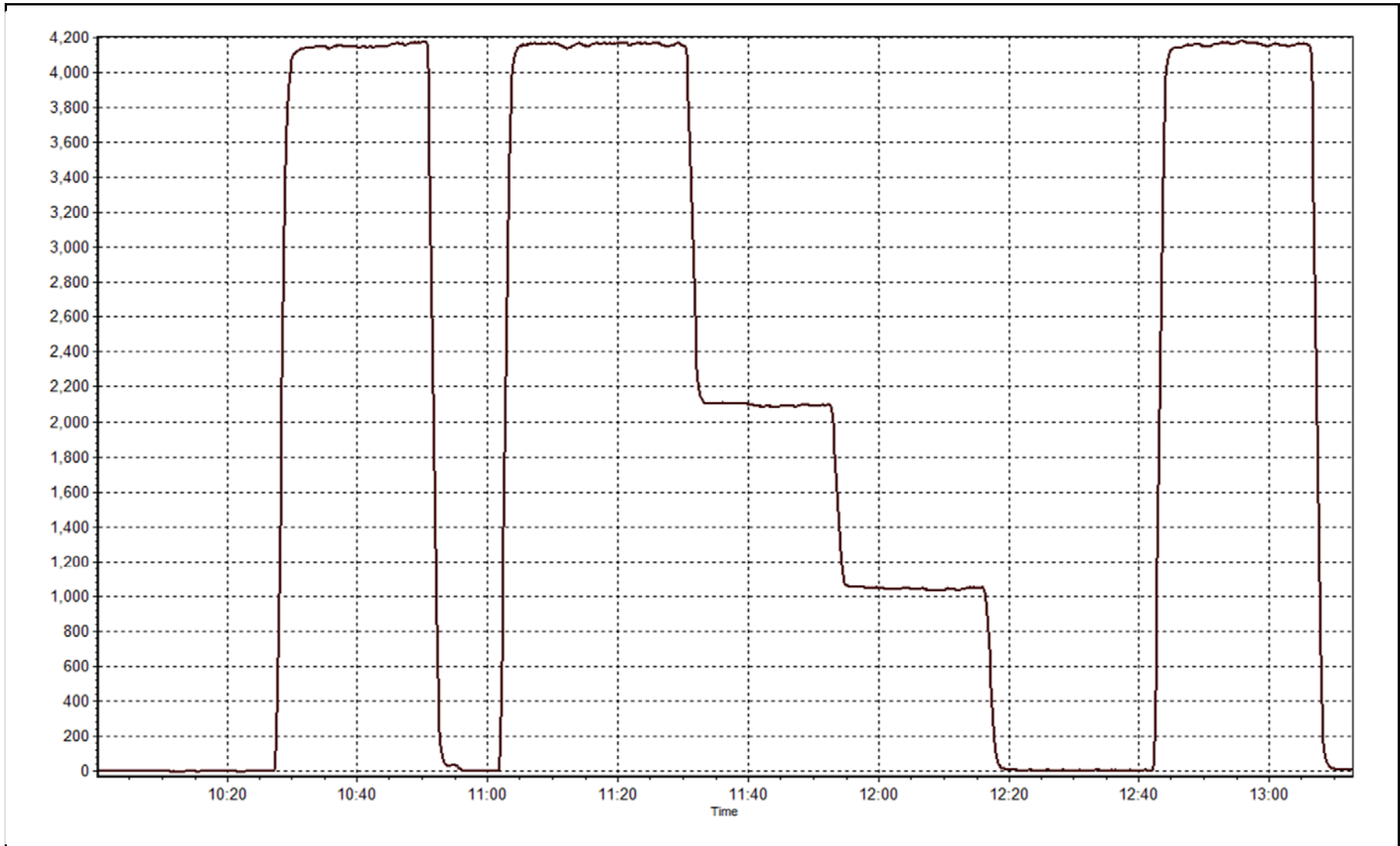
Station Information

Calibration Date	November 26, 2014	Previous Calibration	October 8, 2014
Station Name	Mildred Lake	Station Number	AMS 2
Start Time (MST)	10:05	End Time (MST)	13:10
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	0.2	N/A	Correlation Coefficient	0.999981
830.4	831.9	0.9982		
420.6	418.5	1.0049	Slope	0.997818
210.3	208.3	1.0095		
			Intercept	1.393294







Wood Buffalo Environmental Association

H2S Calibration Report

Station Information

Calibration Date	November 24, 2014	Previous Calibration	October 10, 2014
Station Name	Mildred Lake	Station Number	AMS 2
Reason:	Routine		
Start Time (MST)	11:50	End Time (MST)	15:10
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	-600
Analyzer Range (mv)	5000	5000	Lamp voltage	774	775
Calculated slope	0.993549	1.004851	Chamber temp.	45	45
Calculated intercept	-0.229840	-0.505948	Pressure	542.3	547.5
Analyzer Background	12.9	12.7	Flow	1.004	1.015
Analyzer Coefficient	0.886	0.873	Intensity	87	87
			Converter temp.	323	324

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	5000	0.0	0.0	0.4	NA
as found span	4000	57.3	80.1	81.2	0.986
SO2 scrubber check	5000	17.7	210.3	0.5	NA
calibrator zero	4000	0.0	0.0	0.4	NA
high point	4000	57.3	80.1	80.1	0.999
second point	4000	28.7	40.1	40.5	0.991
third point	4000	14.3	20.0	20.5	0.975
calibrator zero				0.4	
as left zero	5000	0.0	0.0	0.5	NA
as left span	4000	57.3	80.1	80.1	1.000
Average Correction Factor					0.988

Corrected As found	80.8	Previous response	80.8	% change	0.1%
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Notes:

Scrubber check completed after third point. Adjusted span.

Calibration Performed By:

Devin Russell



Wood Buffalo Environmental Association

H2S Calibration Summary

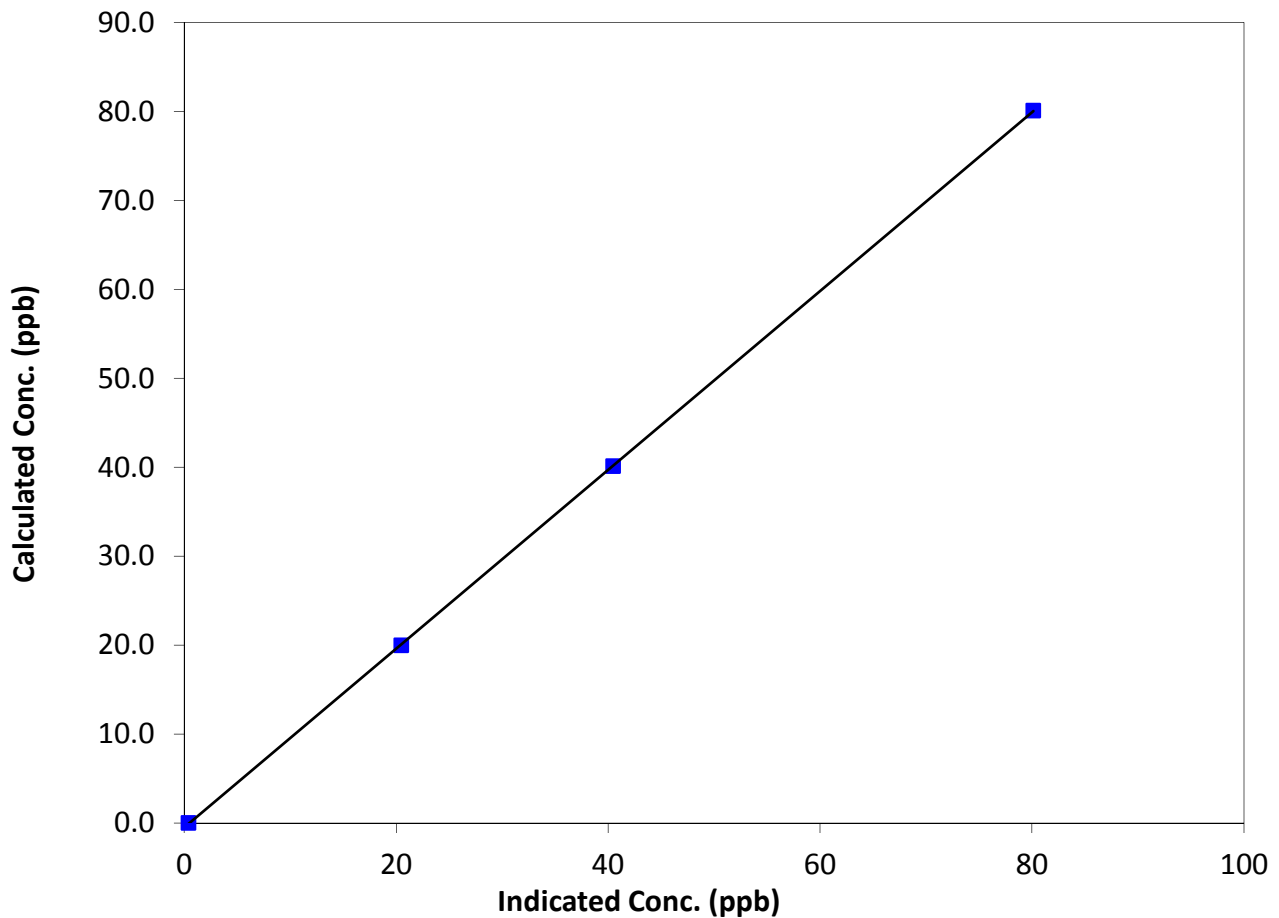
Station Information

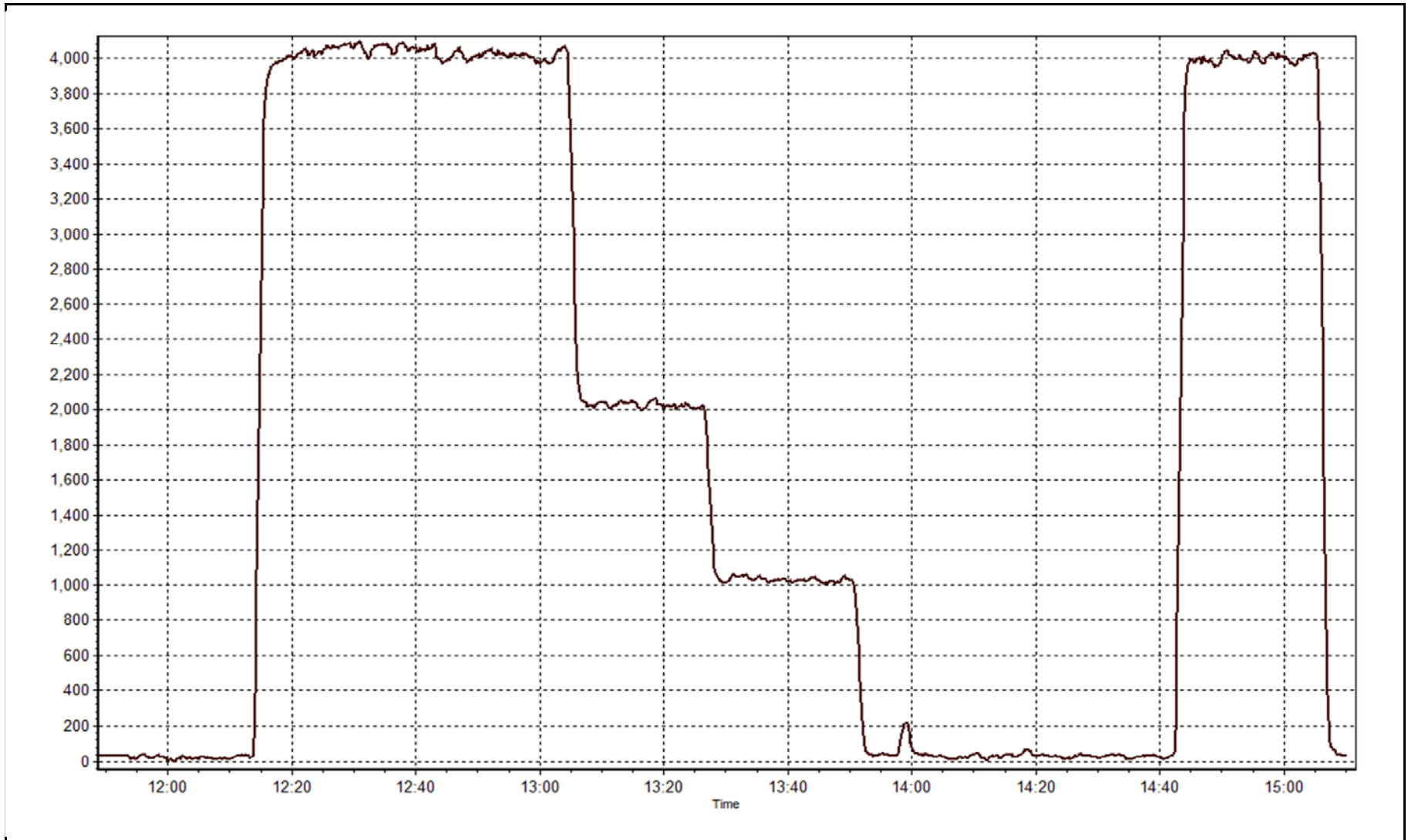
Calibration Date	November 24, 2014	Previous Calibration	October 10, 2014
Station Name	Mildred Lake	Station Number	AMS 2
Start Time (MST)	11:50	End Time (MST)	15:10
Analyzer make	TEI 450i	Analyzer serial #	815129107

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.4	N/A	Correlation Coefficient	0.999992
80.1	80.1	0.9992		
40.1	40.5	0.9908	Slope	1.004851
20.0	20.5	0.9752		
			Intercept	-0.505948

H2S Calibration Curve







Wood Buffalo Environmental Association

THC Calibration Report

Station Information

Calibration Date	November 26, 2014	Previous Calibration	October 8, 2014
Station Name	Mildred Lake	Station Number	AMS 2
Reason:	Routine		
Start Time (MST)	10:05	End Time (MST)	13:10
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	0.999101	0.997576	Fuel Pressure	25.7	25.7
Calculated intercept	-0.009885	0.013437			
BKG	2.45	2.41			
COEF	4.965	4.877			

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	-0.01	N/A
as found span	5000	69.9	14.83	14.95	0.992
calibrator zero	5000	0.0	0.00	-0.01	N/A
high point	5000	69.9	14.83	14.86	0.998
second point	5000	35.4	7.51	7.49	1.002
third point	5000	17.7	3.75	3.76	0.998
calibrator zero	5000	0.0	0.00	-0.01	N/A
as left zero	5000	0.0	0.00	0.03	N/A
as left span	5000	69.9	14.83	14.75	1.005
Average Correction Factor					0.999

Corrected As found 14.96 Previous response 14.85 % change -0.8%

Notes:

Changed filter after as founds. Adjusted span.

Calibration Performed By:

Devin Russell



Wood Buffalo Environmental Association

THC Calibration Summary

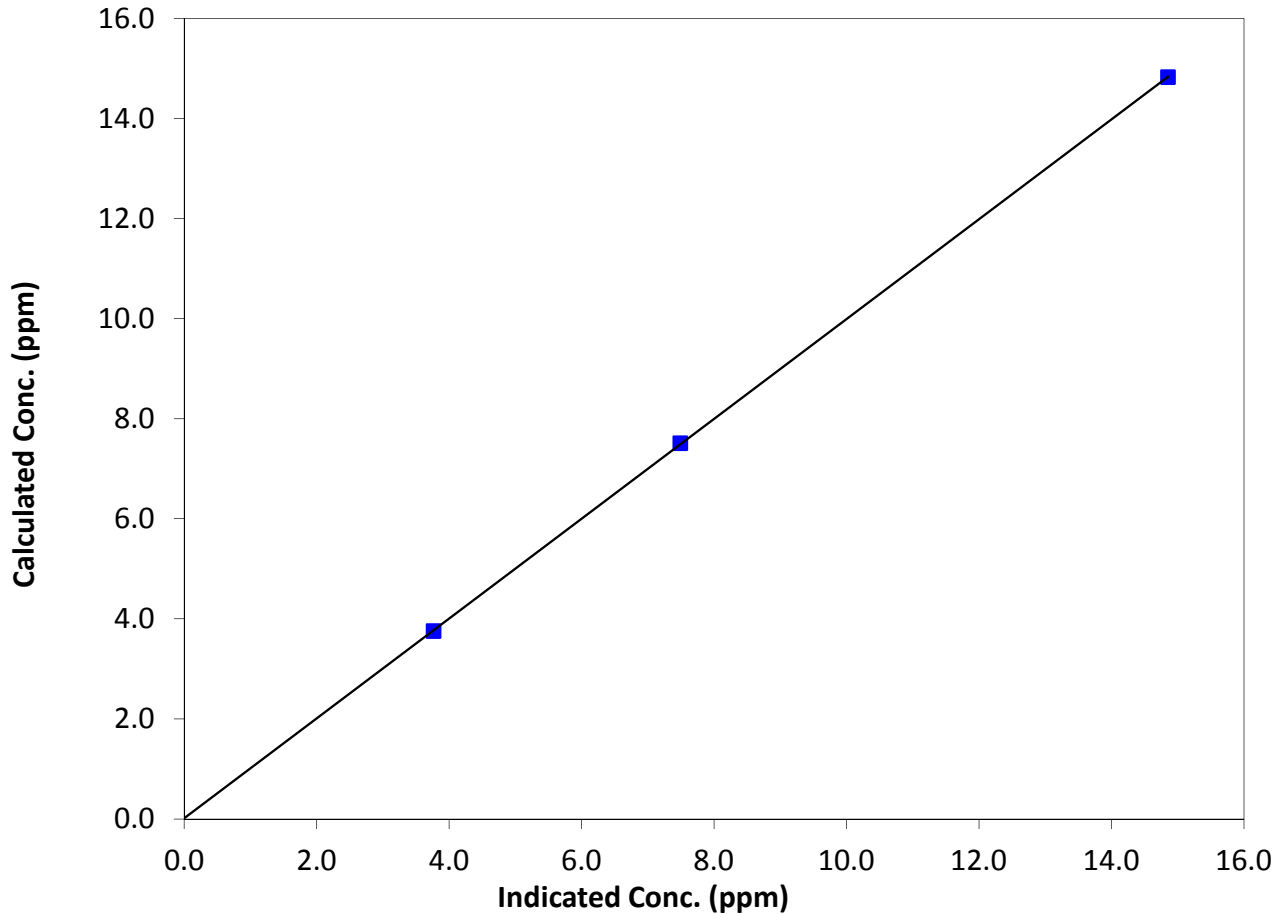
Station Information

Calibration Date	November 26, 2014	Previous Calibration	October 8, 2014
Station Name	Mildred Lake	Station Number	AMS 2
Start Time (MST)	10:05	End Time (MST)	13:10
Analyzer make	51i-LT	Analyzer serial #	1300156231

Calibration Data

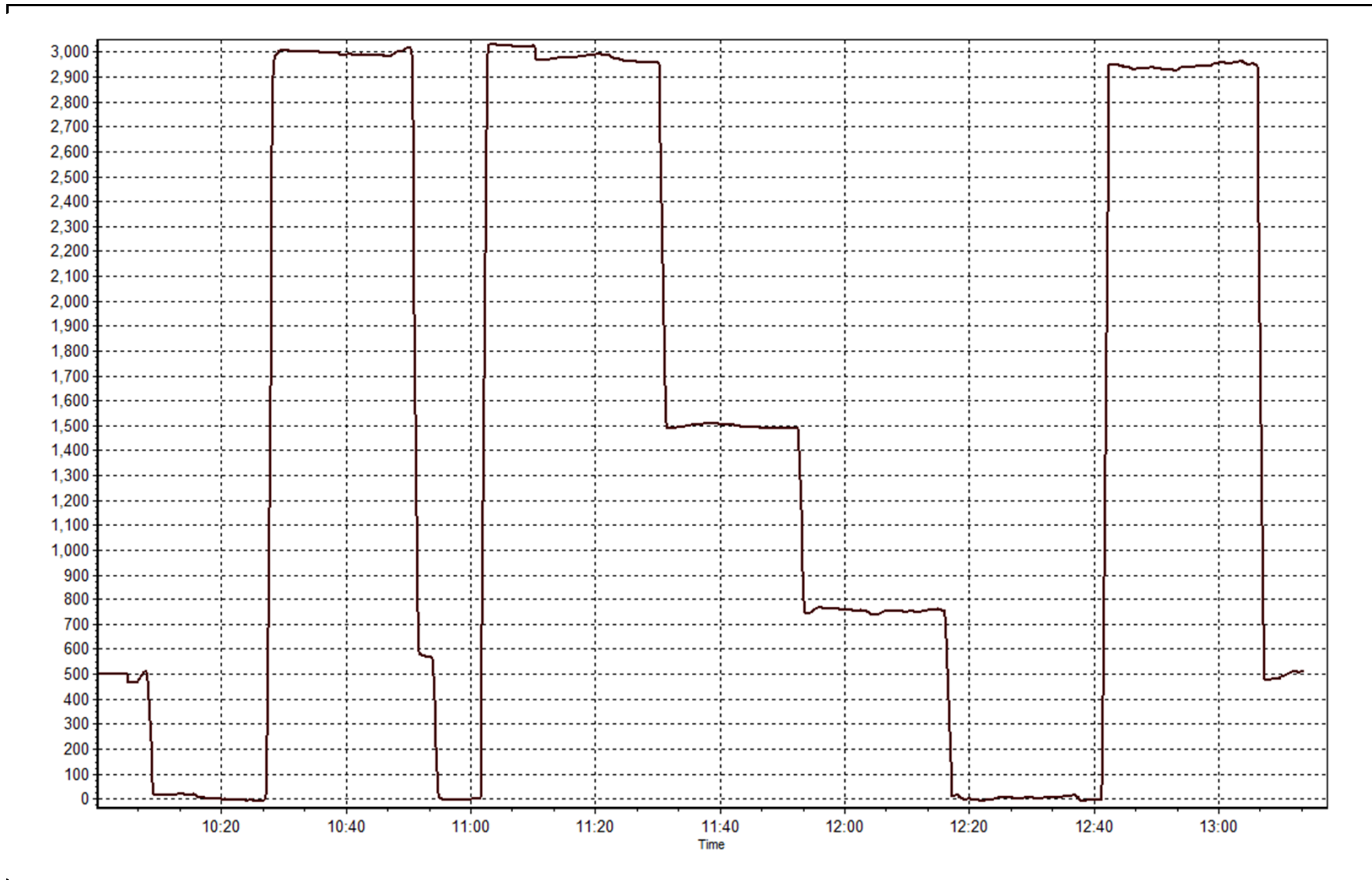
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	-0.01	N/A	Correlation Coefficient	0.999994
14.83	14.86	0.9980		
7.51	7.49	1.0023	Slope	0.997576
3.75	3.76	0.9976		
			Intercept	0.013437

THC Calibration Curve



THC Calibration Plot

Date: November 26, 2014



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 3
LOWER CAMP METEOROLOGY
NOVEMBER 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

December 30, 2014

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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP MET TOWER (AMS 3)
NOVEMBER 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	312	0	408	43.33	9.4	-	4.1	-
Temperature 45 m (C) Average	720	0	0	100.00	9.3	-	4.4	-
Temperature 100 m (C) Average	720	0	0	100.00	8.8	-	4.7	-
Temperature 167 m (C) Average	720	0	0	100.00	8.3	-	4.7	-
Relative Humidity 20 m (%) Average	312	0	408	43.33	99	-	-	-
Relative Humidity 45 m (%) Average	720	0	0	100.00	98	-	-	-
Relative Humidity 100 m (%) Average	720	0	0	100.00	99	-	-	-
Relative Humidity 167 m (%) Average	720	0	0	100.00	98	-	-	-
Wind Speed 20 m (km/h) Average	719	0	1	99.86	26	-	-	-
Wind Speed 45 m (km/h) Average	719	0	1	99.86	35	-	-	-
Wind Speed 100 m (km/h) Average	720	0	0	100.00	49	-	-	-
Wind Speed 167 m (km/h) Average	699	0	21	97.08	53	-	-	-
Wind Direction 20 m (deg) Average	719	0	1	99.86	-	-	-	-
Wind Direction 45 m (deg) Average	719	0	1	99.86	-	-	-	-
Wind Direction 100 m (deg) Average	720	0	0	100.00	-	-	-	-
Wind Direction 167 m (deg) Average	699	0	21	97.08	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	719	0	1	99.86	0.7	-	-	-
Vertical Wind Speed 45 m (km/h) Average	719	0	1	99.86	1.7	-	-	-
Vertical Wind Speed 100 m (km/h) Average	720	0	0	100.00	4.4	-	-	-
Vertical Wind Speed 167 m (km/h) Average	699	0	21	97.08	4.5	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP MET TOWER (AMS 3)
 NOVEMBER 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	312	-4.04	5.5	-	-15.7	-10.9	-8.9	-2.8	0.3	2.9	9.4
Temperature 45 m (C) Average	720	-11	8	-	-28	-22.2	-16.1	-12.2	-5.4	0.5	9.3
Temperature 100 m (C) Average	720	-11.02	7.9	-	-26.6	-21.9	-15.6	-12.1	-5.9	0.1	8.8
Temperature 167 m (C) Average	720	-11.15	7.8	-	-25.7	-22	-15.6	-12.2	-6.4	-0.1	8.3
Relative Humidity 20 m (%) Average	312	79.2	11	-	47	63	73	80	88	93	99
Relative Humidity 45 m (%) Average	720	77.1	9	-	47	64	73	78	83	88	98
Relative Humidity 100 m (%) Average	720	77.7	9	-	48	65	73	79	84	88	99
Relative Humidity 167 m (%) Average	720	78.1	10	-	48	64	73	79	84	88	98
Wind Speed 20 m (km/h) Average	719	7.2	4	-	0	2	4	7	10	13	26
Wind Speed 45 m (km/h) Average	719	9.6	6	-	0	3	6	9	13	17	35
Wind Speed 100 m (km/h) Average	720	13.9	8	-	1	6	9	12	17	25	49
Wind Speed 167 m (km/h) Average	699	16.8	9	-	1	7	11	15	21	29	53
Wind Direction 20 m (deg) Average	719	-	-	-	-	-	-	-	-	-	-
Wind Direction 45 m (deg) Average	719	-	-	-	-	-	-	-	-	-	-
Wind Direction 100 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-
Wind Direction 167 m (deg) Average	699	-	-	-	-	-	-	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	719	-0.06	0.2	-	-0.7	-0.3	-0.2	0	0	0.1	0.7
Vertical Wind Speed 45 m (km/h) Average	719	0	0.5	-	-1.4	-0.5	-0.2	-0.1	0.2	0.6	1.7
Vertical Wind Speed 100 m (km/h) Average	720	0.14	0.6	-	-1.6	-0.5	-0.1	0.1	0.4	0.8	4.4
Vertical Wind Speed 167 m (km/h) Average	699	0.39	0.8	-	-1.7	-0.4	0	0.2	0.7	1.4	4.5

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

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
Temperature, Relative Humidity 20 m	08 Nov 2014 22:00	18 Nov 2014 04:00	223	Flat line in sensor output signal - Sensor frozen
Temperature, Relative Humidity 20 m	23 Nov 2014 00:00	23 Nov 2014 11:00	12	Flat line in sensor output signal - Sensor frozen
Temperature, Relative Humidity 20 m	23 Nov 2014 20:00	01 Dec 2014 00:00	173	Flat line in sensor output signal - Sensor frozen
Wind Speed. Wind Direction, Vertical Wind Speed 20 m	04 Nov 2014 20:00	04 Nov 2014 20:00	1	Flat line in sensor output signal - Sensor frozen
Wind Speed. Wind Direction, Vertical Wind Speed 45 m	04 Nov 2014 20:00	04 Nov 2014 20:00	1	Flat line in sensor output signal - Sensor frozen
Wind Speed. Wind Direction, Vertical Wind Speed 167 m	03 Nov 2014 20:00	04 Nov 2014 12:00	17	Flat line in sensor output signal - Sensor frozen
Wind Speed. Wind Direction, Vertical Wind Speed 167 m	26 Nov 2014 10:00	26 Nov 2014 13:00	4	Flat line in sensor output signal - Sensor frozen

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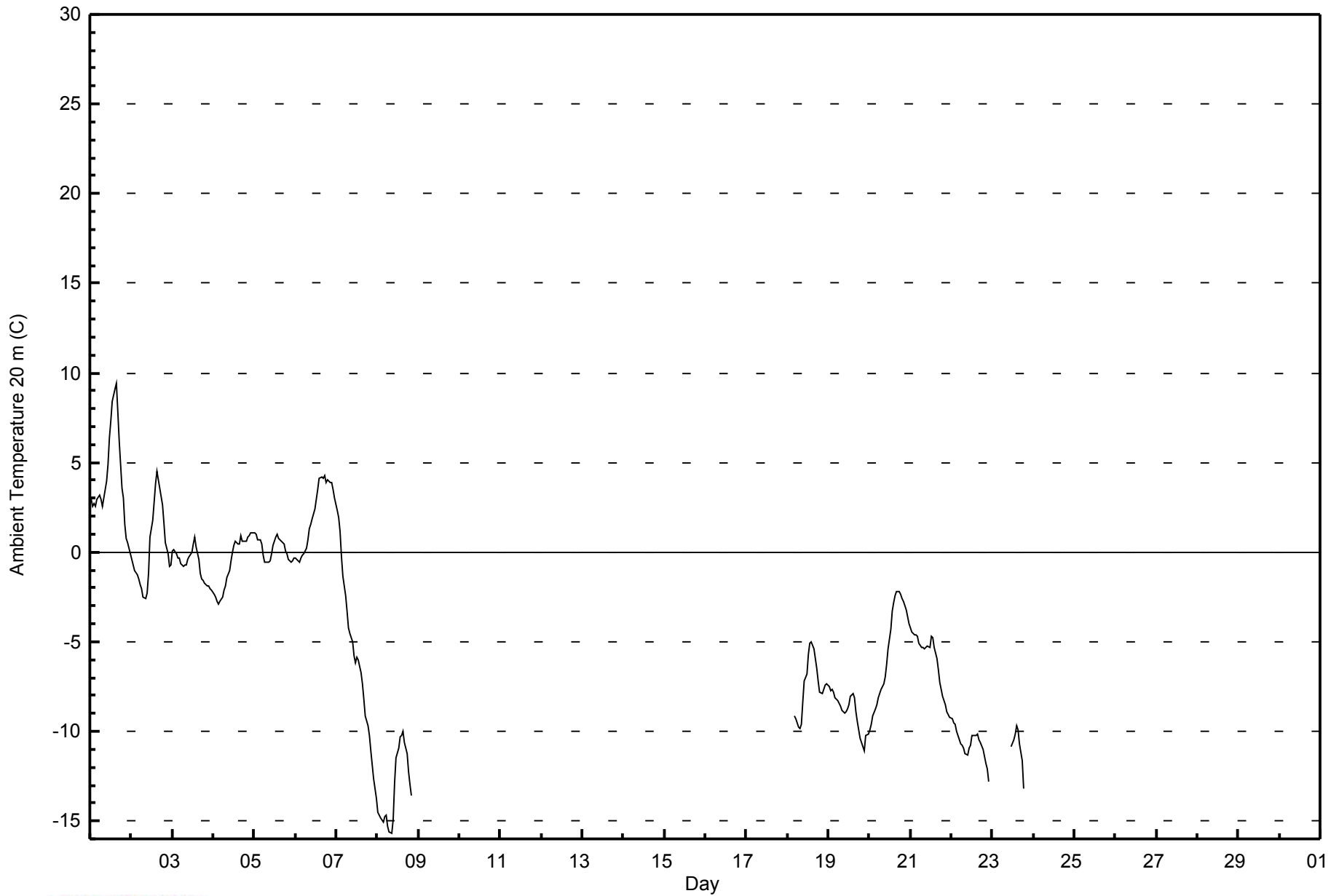


Maximum Value: 9.4 C on Nov 1 16:00		Maximum Daily Average: 4.1 C on Nov 1		Hours in Service: 720																						
Minimum Value: -15.7 C on Nov 8 09:00		Minimum Daily Average: -13.2 C on Nov 8		Hours of Data: 312																						
Maximum Diurnal Average: -2.8 C at hour 15		Minimum Diurnal Average: -5.0 C at hour 8		Hours of Missing Data: 408																						
Monthly Average: -4.04 C		Percentiles: P ₁ = -15.1 P ₁₀ = -10.9 Q ₁ = -8.9 Median = -2.8 Q ₃ = 0.3 P ₉₀ = 2.9 P ₉₉ = 8.0		Hours of Calibration: 0																						
				Percent Operational Time: 43.3																						
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-Nov	2.9	2.5	2.7	2.6	3.0	3.2	2.9	2.5	3.1	4.0	4.9	6.3	7.3	8.4	9.1	9.4	7.8	6.2	3.5	3.0	1.6	0.8	0.5	-0.1	4.1	9.4
2-Nov	-0.4	-0.7	-1.0	-1.3	-1.5	-1.8	-2.1	-2.5	-2.6	-2.3	-1.2	0.8	1.7	2.8	3.8	4.5	4.0	3.1	2.6	1.6	0.5	-0.1	-0.8	-0.7	0.3	4.5
3-Nov	0.0	0.1	-0.1	-0.3	-0.4	-0.6	-0.8	-0.7	-0.7	-0.4	-0.2	-0.1	0.4	0.8	0.3	-0.4	-1.2	-1.5	-1.6	-1.8	-1.9	-1.9	-2.0	-2.1	-0.7	0.8
4-Nov	-2.3	-2.5	-2.8	-2.9	-2.8	-2.5	-2.2	-1.9	-1.4	-1.0	-0.5	0.0	0.3	0.6	0.4	0.5	0.9	0.6	0.6	0.6	0.8	0.9	1.1	1.1	-0.6	1.1
5-Nov	1.0	1.0	0.7	0.6	0.4	-0.2	-0.6	-0.6	-0.6	-0.5	-0.1	0.3	0.8	1.0	0.8	0.7	0.6	0.5	0.1	-0.1	-0.4	-0.6	-0.5	-0.3	0.2	1.0
6-Nov	-0.3	-0.4	-0.5	-0.3	-0.2	-0.1	0.2	0.7	1.3	1.5	1.9	2.4	3.0	3.5	4.1	4.2	4.1	4.3	3.9	4.0	3.9	3.8	3.5	3.0	2.1	4.3
7-Nov	2.3	2.0	1.1	-0.3	-1.4	-2.5	-3.3	-4.3	-4.6	-5.0	-5.8	-6.2	-5.9	-6.0	-6.7	-7.3	-8.2	-9.1	-9.7	-10.2	-11.1	-11.9	-12.7	-13.8	-5.9	2.3
8-Nov	-14.5	-14.7	-14.8	-15.0	-14.7	-14.7	-15.3	-15.6	-15.7	-14.9	-12.9	-11.5	-10.9	-10.3	-10.3	-10.0	-10.6	-11.3	-12.3	-13.0	-13.6	AF	AF	AF	-13.2	-10.0
9-Nov	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-Nov	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-Nov	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-Nov	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-Nov	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-Nov	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-Nov	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-Nov	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-Nov	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-Nov	AF	AF	AF	AF	-9.1	-9.3	-9.7	-9.9	-9.6	-8.3	-7.2	-6.8	-5.7	-5.1	-5.0	-5.4	-6.0	-6.5	-7.2	-7.8	-7.9	-7.6	-7.5	-7.3	-7.4	-5.0
19-Nov	-7.5	-7.7	-7.7	-7.8	-8.1	-8.3	-8.5	-8.6	-8.8	-9.0	-8.9	-8.7	-8.5	-8.0	-7.9	-8.2	-8.9	-9.5	-10.4	-10.6	-10.8	-11.1	-10.3	-10.2	-8.9	-7.5
20-Nov	-9.9	-9.6	-9.2	-8.7	-8.5	-8.1	-7.9	-7.7	-7.3	-6.9	-6.2	-5.4	-4.3	-3.3	-2.8	-2.4	-2.2	-2.2	-2.4	-2.6	-2.8	-3.2	-3.6	-4.0	-5.5	-2.2
21-Nov	-4.2	-4.5	-4.6	-4.6	-4.7	-5.1	-5.3	-5.3	-5.4	-5.3	-5.3	-5.3	-4.7	-4.8	-5.3	-5.9	-6.6	-7.2	-7.7	-8.1	-8.5	-8.9	-9.1	-9.2	-6.1	-4.2
22-Nov	-9.3	-9.5	-9.6	-10.0	-10.2	-10.7	-10.8	-11.0	-11.2	-11.4	-10.9	-10.8	-10.3	-10.3	-10.3	-10.1	-10.5	-10.6	-11.0	-11.4	-11.8	-12.1	-12.8	AF	-10.7	-9.3
23-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	-10.8	-10.4	-10.2	-9.7	-9.9	-10.7	-11.6	-13.2	AF	AF	AF	AF	AF	--	-9.7
24-Nov	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-Nov	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-Nov	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-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
28-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
29-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
30-Nov	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		
-3.5 -3.7 -3.8 -4.0 -4.5 -4.7 -4.9 -5.0 -4.9 -4.6 -4.0 -4.0 -3.4 -2.9 -2.8 -2.9 -3.4 -3.9 -4.6 -4.3 -4.8 -4.3 -4.5 -4.0																										
2.9 2.5 2.7 2.6 3.0 3.2 2.9 2.5 3.1 4.0 4.9 6.3 7.3 8.4 9.1 9.4 7.8 6.2 3.9 4.0 3.9 3.8 3.5 3.0																										
AF - Analyzer Failure																										



WBEA
Hourly Averages

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





WBEA
Cumulative Frequency Distribution

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

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	228	73.08	73.08
0 - 10	84	26.92	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 312

Total Number of Hours: 720

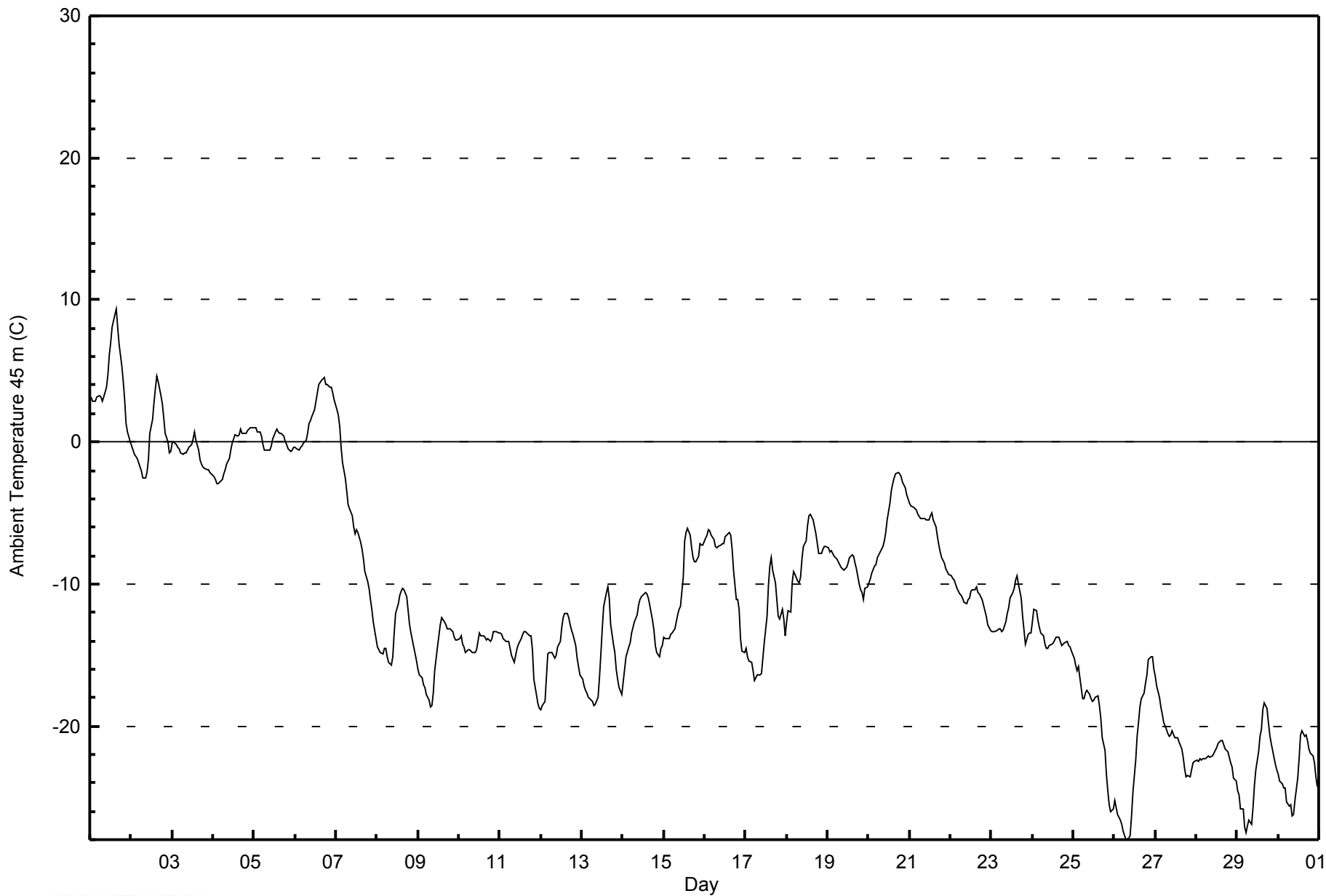


Maximum Value: 9.3 C on Nov 1 16:00		Maximum Daily Average: 4.4 C on Nov 1		Hours in Service: 720																																													
Minimum Value: -28.0 C on Nov 26 08:00		Minimum Daily Average: -23.3 C on Nov 30		Hours of Data: 720																																													
Maximum Diurnal Average: -8.9 C at hour 16		Minimum Diurnal Average: -12.2 C at hour 24		Hours of Missing Data: 0																																													
Monthly Average: -11.00 C		Percentiles: P ₁ = -27.0 P ₁₀ = -22.2 Q ₁ = -16.1 Median = -12.2 Q ₃ = -5.4 P ₉₀ = 0.5 P ₉₉ = 5.7		Hours of Calibration: 0																																													
				Percent Operational Time: 100.0																																													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Nov	3.2	2.9	2.9	2.9	3.2	3.2	3.2	2.8	3.2	3.8	4.7	6.1	7.0	8.1	8.9	9.3	8.1	6.9	5.4	4.2	3.0	1.3	0.7	0.0	4.4	9.3																							
2-Nov	-0.3	-0.6	-0.9	-1.2	-1.5	-1.8	-2.1	-2.5	-2.6	-2.2	-1.2	0.6	1.6	2.7	3.8	4.7	4.2	3.2	2.7	1.7	0.6	0.0	-0.8	-0.6	0.3	4.7																							
3-Nov	-0.1	0.0	-0.2	-0.4	-0.5	-0.7	-0.9	-0.8	-0.8	-0.6	-0.4	-0.2	0.2	0.7	0.1	-0.5	-1.3	-1.6	-1.7	-1.9	-2.0	-2.0	-2.1	-2.2	-0.8	0.7																							
4-Nov	-2.4	-2.6	-2.9	-3.0	-2.9	-2.6	-2.2	-2.0	-1.5	-1.1	-0.6	-0.1	0.2	0.5	0.4	0.5	0.9	0.6	0.6	0.6	0.8	0.9	1.0	1.0	-0.7	1.0																							
5-Nov	1.0	1.0	0.7	0.7	0.4	-0.2	-0.6	-0.6	-0.6	-0.5	-0.3	0.3	0.7	0.9	0.7	0.6	0.6	0.4	0.0	-0.2	-0.5	-0.7	-0.5	-0.4	0.1	1.0																							
6-Nov	-0.4	-0.5	-0.6	-0.4	-0.3	-0.1	0.2	0.6	1.3	1.5	1.8	2.3	2.8	3.4	4.1	4.3	4.4	4.5	4.0	4.1	3.9	3.8	3.4	2.9	2.1	4.5																							
7-Nov	2.3	1.9	1.1	-0.4	-1.5	-2.6	-3.4	-4.4	-4.7	-5.2	-6.0	-6.4	-6.2	-6.4	-7.1	-7.6	-8.2	-9.1	-9.8	-10.3	-11.1	-11.8	-12.6	-13.8	-6.0	2.3																							
8-Nov	-14.5	-14.6	-14.8	-14.9	-14.6	-14.5	-15.1	-15.5	-15.7	-15.1	-13.4	-12.1	-11.4	-10.8	-10.5	-10.3	-10.4	-10.9	-11.9	-12.8	-13.4	-14.4	-14.9	-15.4	-13.4	-10.3																							
9-Nov	-16.0	-16.4	-16.6	-17.1	-17.3	-17.7	-18.1	-18.7	-18.6	-17.7	-16.1	-14.5	-13.6	-12.9	-12.4	-12.7	-12.8	-13.1	-13.2	-13.2	-13.4	-13.8	-13.9	-14.0	-15.2	-12.4																							
10-Nov	-13.8	-13.7	-14.2	-14.5	-14.8	-14.6	-14.7	-14.7	-14.9	-14.8	-14.6	-14.0	-13.4	-13.7	-13.7	-13.7	-13.9	-13.9	-14.0	-13.8	-13.4	-13.3	-13.4	-13.4	-14.0	-13.3																							
11-Nov	-13.5	-13.6	-13.8	-14.1	-14.0	-14.1	-14.6	-15.0	-15.5	-15.1	-14.5	-14.2	-13.8	-13.6	-13.4	-13.4	-13.4	-13.6	-13.7	-14.6	-16.7	-17.9	-18.5	-18.7	-14.7	-13.4																							
12-Nov	-18.9	-18.5	-18.2	-16.6	-15.0	-14.8	-14.8	-15.0	-15.2	-15.0	-14.4	-14.1	-13.1	-12.3	-12.1	-12.1	-12.3	-12.9	-13.2	-13.6	-14.4	-15.2	-15.8	-16.4	-14.7	-12.1																							
13-Nov	-16.7	-17.2	-17.5	-17.7	-17.9	-18.1	-18.2	-18.5	-18.5	-18.0	-16.5	-14.9	-13.2	-11.6	-10.6	-10.2	-11.0	-12.9	-14.2	-14.9	-16.1	-16.7	-17.2	-17.8	-15.7	-10.2																							
14-Nov	-16.9	-16.0	-15.1	-14.4	-14.1	-13.4	-13.1	-12.7	-12.2	-11.5	-11.1	-10.9	-10.7	-10.6	-10.7	-11.0	-11.5	-12.5	-13.3	-14.3	-14.8	-15.1	-14.5	-14.4	-13.1	-10.6																							
15-Nov	-13.7	-13.8	-13.8	-13.9	-13.5	-13.4	-13.1	-12.7	-12.2	-11.8	-11.6	-11.6	-9.5	-7.0	-6.4	-6.1	-6.6	-7.5	-8.1	-8.5	-8.5	-8.0	-7.1	-7.2	-7.3	-10.1	-6.1																						
16-Nov	-6.8	-6.6	-6.2	-6.3	-6.5	-6.9	-7.4	-7.5	-7.4	-7.3	-7.2	-7.1	-6.7	-6.6	-6.4	-6.5	-7.6	-9.0	-11.1	-11.1	-11.8	-13.8	-14.8	-14.9	-8.5	-6.2																							
17-Nov	-14.5	-15.2	-15.4	-15.5	-16.1	-16.8	-16.6	-16.4	-16.4	-16.3	-15.3	-14.1	-12.3	-10.1	-8.8	-8.1	-9.1	-9.9	-11.1	-12.3	-12.5	-11.8	-12.5	-13.6	-13.4	-8.1																							
18-Nov	-12.7	-11.8	-12.0	-9.9	-9.1	-9.3	-9.8	-9.9	-9.6	-8.2	-7.4	-7.0	-5.8	-5.2	-5.1	-5.5	-6.0	-6.5	-7.2	-7.9	-7.9	-7.5	-7.4	-7.3	-8.2	-5.1																							
19-Nov	-7.5	-7.7	-7.7	-7.9	-8.1	-8.3	-8.4	-8.6	-8.8	-9.0	-9.0	-8.8	-8.6	-8.1	-7.9	-8.1	-8.6	-9.0	-10.0	-10.4	-10.6	-11.1	-10.3	-10.2	-8.9	-7.5																							
20-Nov	-9.9	-9.6	-9.2	-8.8	-8.6	-8.2	-7.9	-7.7	-7.3	-7.0	-6.3	-5.5	-4.4	-3.4	-2.9	-2.5	-2.2	-2.2	-2.2	-2.5	-2.8	-3.3	-3.7	-4.0	-5.5	-2.2																							
21-Nov	-4.3	-4.5	-4.6	-4.7	-4.8	-5.1	-5.4	-5.4	-5.4	-5.4	-5.4	-5.5	-5.1	-5.0	-5.5	-6.0	-6.7	-7.3	-7.7	-8.1	-8.6	-8.9	-9.1	-9.3	-6.2	-4.3																							
22-Nov	-9.4	-9.6	-9.7	-10.1	-10.3	-10.7	-10.8	-11.0	-11.3	-11.4	-11.1	-11.0	-10.5	-10.4	-10.4	-10.2	-10.6	-10.7	-11.1	-11.5	-11.8	-12.2	-12.9	-13.3	-10.9	-9.4																							
23-Nov	-13.4	-13.4	-13.3	-13.2	-13.2	-13.1	-13.3	-13.2	-12.6	-12.1	-11.7	-11.0	-10.6	-10.3	-9.7	-9.4	-10.0	-11.0	-12.2	-13.2	-14.3	-13.5	-13.5	-13.5	-12.3	-9.4																							
24-Nov	-12.7	-11.8	-11.9	-12.6	-13.1	-13.4	-13.6	-14.2	-14.5	-14.5	-14.3	-14.2	-14.1	-13.9	-13.8	-13.8	-14.1	-14.3	-14.2	-14.1	-14.1	-14.3	-14.4	-14.7	-13.8	-11.8																							
25-Nov	-15.2	-15.8	-16.1	-15.8	-16.6	-18.0	-18.1	-17.7	-17.5	-17.8	-18.1	-18.3	-18.1	-17.9	-17.9	-18.5	-19.4	-20.9	-21.8	-23.4	-24.6	-25.5	-26.0	-25.8	-19.4	-15.2																							
26-Nov	-25.3	-25.8	-26.2	-26.6	-27.0	-27.4	-27.7	-28.0	-27.9	-27.7	-26.4	-24.7	-22.4	-20.7	-19.8	-18.7	-18.0	-17.7	-17.0	-16.4	-15.3	-15.1	-15.1	-16.0	-22.2	-15.1																							
27-Nov	-16.5	-17.1	-18.0	-18.6	-19.1	-19.7	-20.2	-20.5	-20.8	-20.6	-20.3	-20.8	-20.8	-20.8	-21.1	-21.6	-22.2	-23.0	-23.6	-23.5	-23.6	-23.1	-22.6	-22.5	-20.9	-16.5																							
28-Nov	-22.4	-22.5	-22.3	-22.4	-22.3	-22.3	-22.2	-22.1	-22.2	-22.1	-21.9	-21.7	-21.5	-21.2	-21.0	-21.0	-21.3	-21.6	-21.8	-22.2	-22.6	-22.9	-23.6	-23.9	-22.1	-21.0																							
29-Nov	-24.5	-24.9	-25.8	-25.8	-27.1	-27.5	-27.0	-26.6	-26.9	-25.8	-24.1	-23.1	-21.8	-20.7	-20.2	-18.9	-18.4	-18.8	-19.7	-20.6	-21.2	-22.2	-22.7	-23.1	-23.2	-18.4																							
30-Nov	-23.3	-23.8	-24.1	-24.4	-24.4	-25.3	-25.6	-25.5	-26.3	-26.2	-25.2	-23.7	-22.3	-20.6	-20.3	-20.7	-20.6	-21.0	-21.6	-21.9	-22.1	-22.6	-23.5	-24.3	-23.3	-20.3																							
																								-11.3	-11.4	-11.6	-11.6	-11.7	-11.9	-12.1	-12.1	-12.1	-11.8	-11.3	-10.6	-9.8	-9.2	-9.0	-8.9	-9.3	-9.9	-10.4	-10.9	-11.3	-11.7	-12.0	-12.2	Diurnal Average	
																								3.2	2.9	2.9	2.9	3.2	3.2	3.2	2.8	3.2	3.8	4.7	6.1	7.0	8.1	8.9	9.3	8.1	6.9	5.4	4.2	3.9	3.8	3.4	2.9	Diurnal Maximum	



WBEA
Hourly Averages

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





WBEA
Cumulative Frequency Distribution

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

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	107	14.86	14.86
-20 - 0	529	73.47	88.33
0 - 10	84	11.67	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

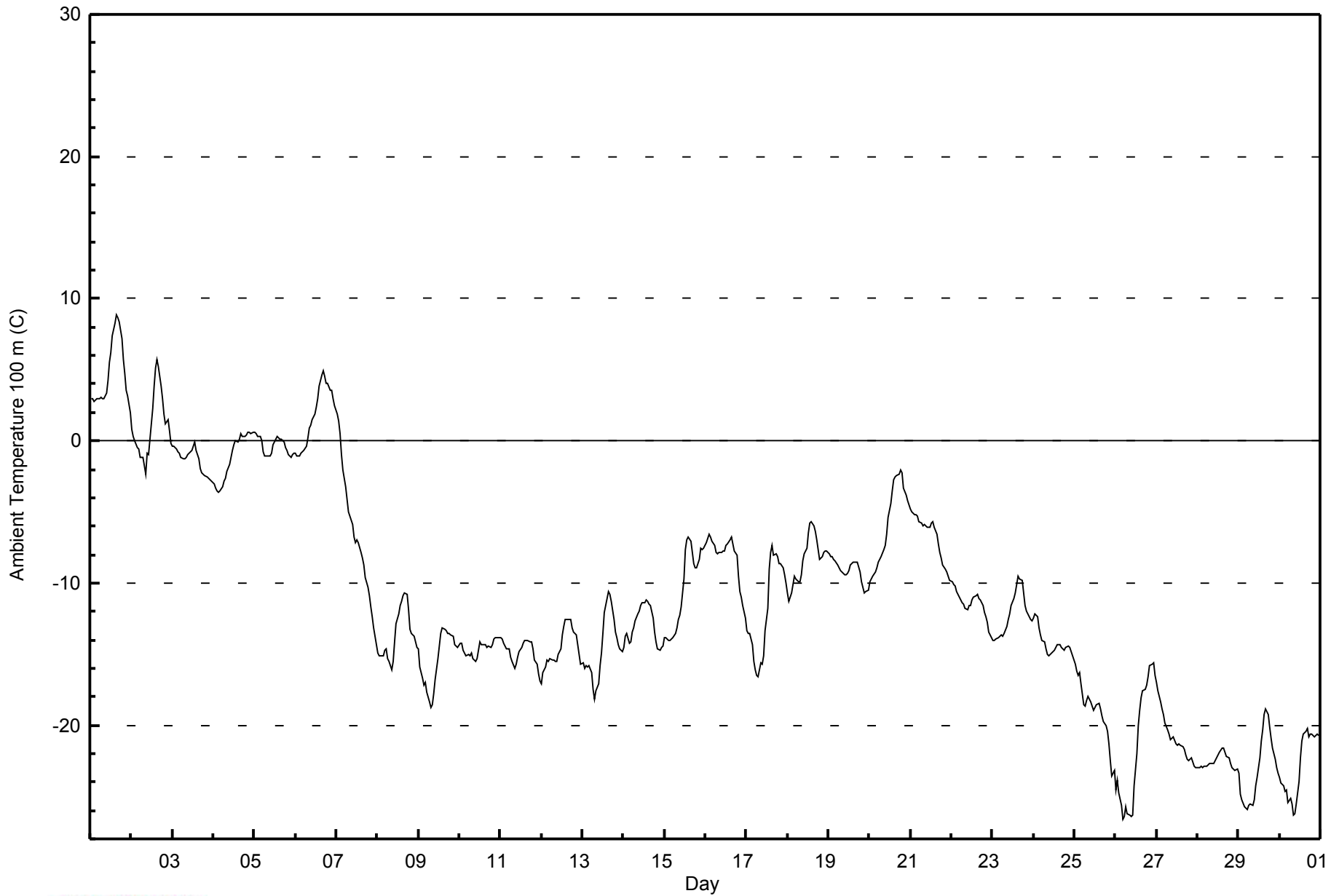


Maximum Value: 8.8 C on Nov 1 16:00		Maximum Daily Average: 4.7 C on Nov 1		Hours in Service: 720																																												
Minimum Value: -26.6 C on Nov 26 05:00		Minimum Daily Average: -23.1 C on Nov 29		Hours of Data: 720																																												
Maximum Diurnal Average: -9.2 C at hour 16		Minimum Diurnal Average: -12.3 C at hour 8		Hours of Missing Data: 0																																												
Monthly Average: -11.02 C		Percentiles: P ₁ = -26.3 P ₁₀ = -21.9 Q ₁ = -15.6 Median = -12.1 Q ₃ = -5.9 P ₉₀ = 0.1 P ₉₉ = 5.6		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-Nov	3.0	3.0	2.8	2.8	3.0	3.0	3.1	3.0	2.9	3.3	4.2	5.5	6.2	7.4	8.3	8.8	8.7	8.4	7.2	5.7	4.7	3.6	3.2	2.0	4.7	8.8																						
2-Nov	0.8	0.3	0.0	-0.5	-0.5	-1.2	-1.2	-1.1	-2.3	-0.8	-1.0	0.1	2.2	3.8	5.1	5.7	5.2	3.8	3.0	1.9	1.2	1.5	0.7	-0.2	1.1	5.7																						
3-Nov	-0.4	-0.4	-0.5	-0.7	-0.8	-1.1	-1.2	-1.2	-1.2	-1.0	-0.8	-0.6	-0.3	-0.1	-0.7	-1.3	-2.0	-2.2	-2.3	-2.5	-2.6	-2.6	-2.8	-2.8	-1.3	-0.1																						
4-Nov	-3.1	-3.3	-3.6	-3.6	-3.5	-3.3	-2.9	-2.6	-2.1	-1.7	-1.2	-0.7	-0.3	0.0	-0.1	0.1	0.5	0.3	0.3	0.4	0.6	0.6	0.5	0.6	-1.2	0.6																						
5-Nov	0.6	0.5	0.3	0.3	0.0	-0.7	-1.0	-1.1	-1.1	-1.0	-0.8	-0.3	0.1	0.3	0.2	0.1	0.1	-0.1	-0.5	0.7	-1.0	-1.2	-1.0	-0.9	-0.4	0.6																						
6-Nov	-0.9	-1.0	-1.1	-0.9	-0.8	-0.6	-0.4	0.2	0.9	1.1	1.5	1.9	2.4	3.0	3.8	4.6	4.9	4.6	4.1	4.1	3.5	3.5	3.0	2.5	1.8	4.9																						
7-Nov	1.8	1.4	0.5	-1.0	-2.1	-3.2	-4.1	-5.0	-5.3	-5.9	-6.7	-7.2	-7.0	-7.2	-7.8	-8.3	-8.8	-9.6	-10.3	-10.9	-11.7	-12.4	-13.2	-14.3	-6.6	1.8																						
8-Nov	-14.9	-15.1	-15.2	-15.1	-14.8	-14.6	-15.4	-15.5	-16.1	-15.5	-14.2	-12.9	-12.2	-11.6	-11.2	-10.9	-10.7	-10.8	-11.9	-13.2	-13.6	-13.8	-14.2	-14.5	-13.7	-10.7																						
9-Nov	-14.7	-15.9	-16.7	-17.2	-17.0	-17.7	-18.4	-18.7	-18.5	-17.7	-16.8	-15.3	-14.4	-13.6	-13.1	-13.3	-13.4	-13.5	-13.5	-13.7	-13.8	-14.3	-14.5	-14.5	-15.4	-13.1																						
10-Nov	-14.3	-14.3	-14.7	-14.9	-15.1	-15.0	-15.1	-14.9	-15.4	-15.5	-15.3	-14.8	-14.2	-14.4	-14.4	-14.4	-14.5	-14.5	-14.6	-14.4	-14.0	-13.9	-13.9	-13.9	-14.6	-13.9																						
11-Nov	-13.8	-14.0	-14.2	-14.6	-14.6	-14.7	-15.2	-15.5	-16.0	-15.8	-15.2	-14.8	-14.5	-14.2	-14.0	-14.0	-14.0	-14.2	-14.2	-14.6	-15.4	-15.8	-16.4	-16.9	-14.9	-13.8																						
12-Nov	-17.1	-16.3	-15.9	-15.4	-15.5	-15.4	-15.4	-15.4	-15.5	-15.5	-15.1	-14.6	-13.6	-13.0	-12.6	-12.6	-12.6	-12.6	-13.2	-13.4	-13.7	-14.4	-15.1	-15.7	-14.6	-12.6																						
13-Nov	-15.6	-16.0	-15.8	-15.9	-15.8	-16.3	-17.4	-18.2	-17.6	-17.1	-15.8	-14.9	-13.6	-12.1	-11.1	-10.6	-10.8	-11.3	-12.6	-13.4	-13.8	-14.3	-14.7	-14.8	-14.6	-10.6																						
14-Nov	-14.5	-13.7	-13.5	-14.2	-14.1	-13.5	-13.1	-12.6	-12.2	-11.9	-11.6	-11.4	-11.4	-11.2	-11.3	-11.4	-11.6	-12.5	-13.4	-14.1	-14.7	-14.7	-14.5	-14.4	-13.0	-11.2																						
15-Nov	-13.9	-13.9	-14.1	-14.0	-14.0	-13.9	-13.5	-13.1	-12.5	-12.2	-11.7	-9.8	-7.6	-6.9	-6.7	-7.1	-7.9	-8.6	-9.0	-8.9	-8.3	-7.6	-7.7	-7.5	-10.4	-6.7																						
16-Nov	-7.1	-6.9	-6.6	-6.8	-7.0	-7.4	-7.8	-8.0	-7.9	-7.8	-7.8	-7.4	-7.2	-7.0	-6.8	-7.3	-7.8	-8.1	-9.6	-10.6	-11.0	-11.6	-12.4	-8.1	-6.6																							
17-Nov	-13.3	-13.5	-13.6	-14.3	-15.5	-16.1	-16.5	-16.6	-15.6	-15.7	-15.1	-13.3	-11.8	-9.0	-7.8	-7.4	-8.0	-8.0	-8.2	-8.6	-8.6	-8.9	-9.4	-10.0	-11.9	-7.4																						
18-Nov	-10.7	-11.3	-10.7	-10.1	-9.5	-9.7	-9.9	-9.9	-9.4	-8.5	-7.9	-7.6	-6.5	-5.8	-5.7	-6.0	-6.4	-6.9	-7.7	-8.3	-8.2	-7.9	-7.7	-7.7	-8.3	-5.7																						
19-Nov	-7.9	-8.1	-8.1	-8.3	-8.5	-8.7	-8.9	-9.1	-9.2	-9.4	-9.5	-9.4	-9.1	-8.7	-8.5	-8.5	-8.5	-8.6	-9.2	-9.9	-10.3	-10.7	-10.6	-10.6	-9.1	-7.9																						
20-Nov	-10.0	-9.8	-9.5	-9.2	-9.0	-8.5	-8.3	-8.1	-7.6	-7.4	-6.5	-5.4	-4.4	-3.5	-2.8	-2.6	-2.5	-2.3	-2.0	-2.3	-3.3	-3.8	-4.2	-4.5	-5.7	-2.0																						
21-Nov	-4.8	-5.0	-5.2	-5.2	-5.3	-5.7	-5.8	-5.9	-5.9	-5.9	-6.1	-6.1	-5.8	-5.7	-6.1	-6.6	-7.2	-7.9	-8.3	-8.7	-9.1	-9.3	-9.5	-9.8	-6.7	-4.8																						
22-Nov	-9.9	-10.1	-10.2	-10.6	-10.8	-11.2	-11.4	-11.5	-11.7	-11.9	-11.6	-11.6	-11.2	-11.0	-10.9	-10.8	-11.1	-11.2	-11.6	-12.0	-12.4	-12.8	-13.5	-13.9	-11.5	-9.9																						
23-Nov	-14.0	-14.0	-13.9	-13.8	-13.8	-13.6	-13.8	-13.6	-13.1	-12.6	-12.2	-11.6	-11.1	-10.7	-10.1	-9.5	-9.7	-9.9	-10.7	-11.6	-12.0	-12.4	-12.6	-12.6	-12.2	-9.5																						
24-Nov	-12.5	-12.1	-12.4	-13.2	-13.7	-14.0	-14.2	-14.7	-15.0	-15.1	-15.0	-14.9	-14.8	-14.6	-14.3	-14.3	-14.5	-14.6	-14.8	-14.6	-14.4	-14.5	-14.8	-15.2	-14.3	-12.1																						
25-Nov	-15.7	-16.2	-16.5	-16.3	-17.1	-18.6	-18.6	-18.2	-18.0	-18.4	-18.7	-18.9	-18.8	-18.6	-18.5	-18.8	-19.3	-19.7	-20.0	-20.5	-21.3	-22.5	-23.5	-23.2	-19.0	-15.7																						
26-Nov	-24.5	-23.9	-24.7	-25.6	-26.6	-26.4	-25.7	-26.2	-26.3	-26.5	-26.3	-24.3	-22.0	-20.0	-18.9	-18.1	-17.5	-17.5	-17.2	-16.6	-15.8	-15.7	-15.6	-16.5	-21.6	-15.6																						
27-Nov	-17.0	-17.6	-18.4	-18.9	-19.3	-19.8	-20.4	-20.6	-21.1	-20.9	-20.8	-21.4	-21.5	-21.4	-21.4	-21.5	-21.7	-22.1	-22.4	-22.5	-22.3	-22.6	-22.9	-23.0	-20.9	-17.0																						
28-Nov	-23.0	-23.0	-22.9	-23.0	-22.9	-22.9	-22.8	-22.7	-22.7	-22.7	-22.5	-22.3	-22.1	-21.9	-21.6	-21.6	-21.9	-22.2	-22.3	-22.7	-23.0	-23.1	-23.1	-23.1	-22.6	-21.6																						
29-Nov	-23.3	-24.8	-25.3	-25.7	-25.8	-26.0	-25.6	-25.5	-25.6	-25.2	-24.3	-23.6	-22.3	-21.2	-20.4	-19.3	-18.8	-19.2	-20.1	-21.0	-21.6	-22.4	-23.0	-23.3	-23.1	-18.8																						
30-Nov	-23.7	-24.1	-24.3	-24.7	-24.6	-25.4	-25.1	-25.6	-26.3	-26.3	-25.5	-23.9	-22.3	-21.1	-20.6	-20.5	-20.3	-20.8	-20.6	-20.6	-20.8	-20.7	-20.6	-20.7	-22.9	-20.3																						
																								-11.1	-11.3	-11.5	-11.7	-11.8	-12.1	-12.2	-12.3	-12.2	-12.1	-11.7	-11.1	-10.3	-9.7	-9.3	-9.2	-9.4	-9.7	-10.1	-10.6	-10.9	-11.1	-11.4	-11.7	Diurnal Average
																								3.0	3.0	2.8	2.8	3.0	3.0	3.1	3.0	2.9	3.3	4.2	5.5	6.2	7.4	8.3	8.8	8.7	8.4	7.2	5.7	4.7	3.6	3.2	2.5	Diurnal Maximum



WBEA
Hourly Averages

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





WBEA
Cumulative Frequency Distribution

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

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	107	14.86	14.86
-20 - 0	536	74.44	89.31
0 - 10	77	10.69	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

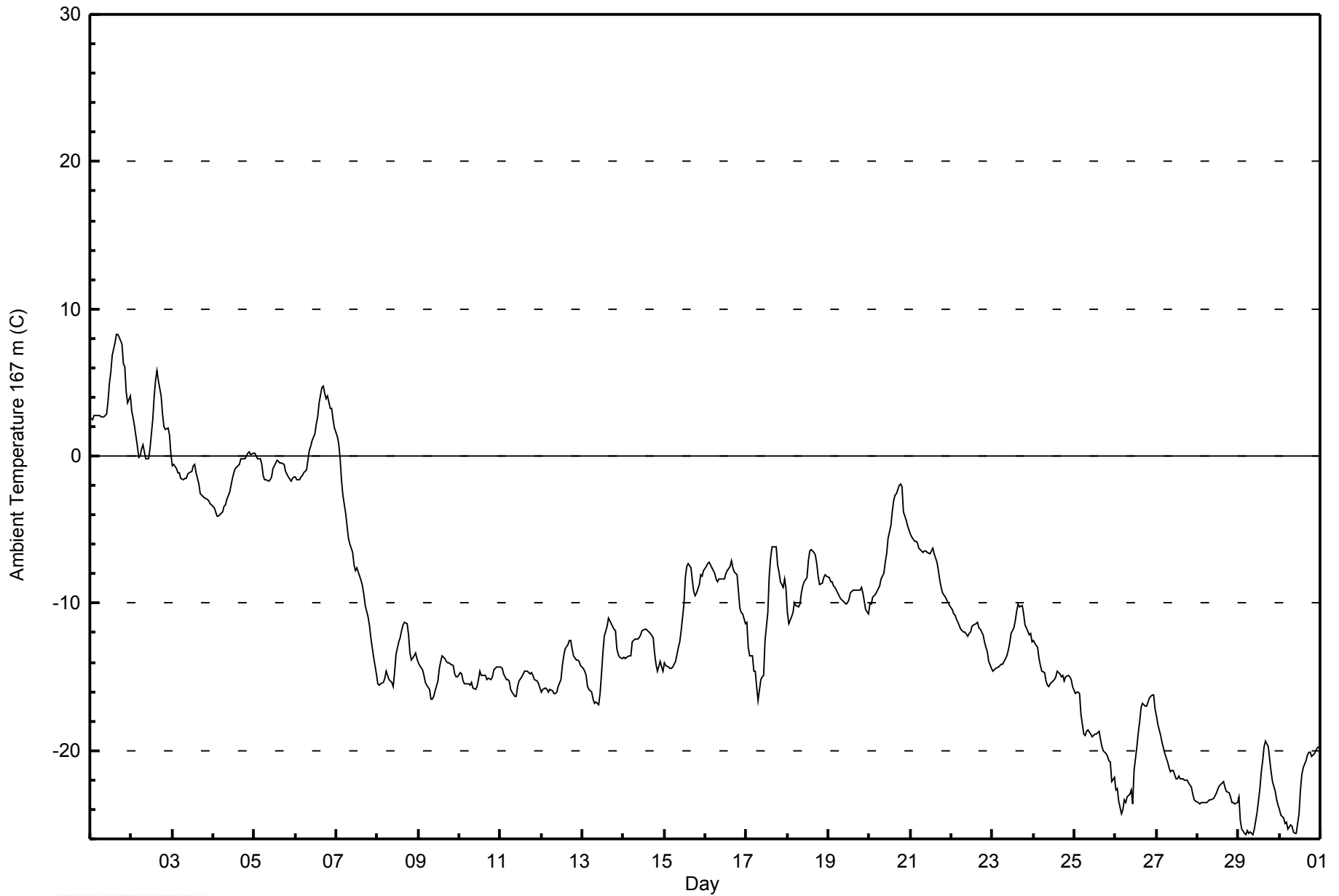


Maximum Value: 8.3 C on Nov 1 17:00		Maximum Daily Average: 4.7 C on Nov 1		Hours in Service: 720																																												
Minimum Value: -25.7 C on Nov 29 09:00		Minimum Daily Average: -23.3 C on Nov 29		Hours of Data: 720																																												
Maximum Diurnal Average: -9.6 C at hour 16		Minimum Diurnal Average: -12.3 C at hour 8		Hours of Missing Data: 0																																												
Monthly Average: -11.15 C		Percentiles: P ₁ = -25.6 P ₁₀ = -22.0 Q ₁ = -15.6 Median = -12.2 Q ₃ = -6.4 P ₉₀ = -0.1 P ₉₉ = 5.9		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-Nov	2.5	2.5	2.7	2.7	2.8	2.7	2.7	2.7	2.6	2.8	3.7	5.0	5.7	6.8	7.7	8.3	8.3	8.1	7.6	6.3	6.1	4.4	3.7	4.1	4.7	8.3																						
2-Nov	3.0	2.6	2.0	0.7	0.0	0.0	0.5	0.8	-0.2	-0.2	-0.2	0.4	2.5	3.9	5.1	5.8	5.2	4.1	2.8	2.0	1.8	1.9	1.4	0.1	1.9	5.8																						
3-Nov	-0.6	-0.6	-0.8	-1.1	-1.2	-1.5	-1.6	-1.6	-1.5	-1.2	-1.1	-1.0	-0.7	-0.6	-1.2	-1.9	-2.5	-2.6	-2.7	-2.9	-3.0	-3.0	-3.2	-3.3	-1.7	-0.6																						
4-Nov	-3.5	-3.8	-4.1	-4.1	-4.0	-3.7	-3.4	-3.3	-2.9	-2.4	-2.0	-1.5	-1.1	-0.8	-0.7	-0.5	-0.2	-0.2	-0.1	0.0	0.2	0.3	0.1	0.2	-1.7	0.3																						
5-Nov	0.2	0.0	-0.2	-0.2	-0.5	-1.3	-1.6	-1.6	-1.7	-1.6	-1.4	-0.9	-0.5	-0.3	-0.4	-0.4	-0.5	-0.6	-1.1	-1.2	-1.4	-1.7	-1.5	-1.4	-0.9	0.2																						
6-Nov	-1.4	-1.6	-1.6	-1.5	-1.3	-1.1	-0.9	-0.3	0.4	0.6	1.0	1.6	2.2	2.7	3.6	4.7	4.7	4.3	3.9	4.1	3.2	3.2	2.4	1.9	1.5	4.7																						
7-Nov	1.3	0.9	-0.1	-1.6	-2.7	-3.8	-4.7	-5.6	-5.9	-6.6	-7.4	-7.7	-7.6	-7.8	-8.4	-8.8	-9.4	-10.1	-10.9	-11.5	-12.3	-13.0	-13.7	-14.8	-7.2	1.3																						
8-Nov	-15.5	-15.5	-15.5	-15.4	-15.0	-14.6	-14.9	-15.2	-15.4	-15.7	-14.7	-13.4	-12.7	-12.3	-11.9	-11.5	-11.3	-11.4	-12.1	-13.3	-13.9	-13.5	-13.4	-13.8	-13.8	-11.3																						
9-Nov	-14.0	-14.2	-14.5	-14.9	-15.4	-15.6	-15.9	-16.5	-16.5	-16.4	-15.9	-15.3	-14.4	-14.0	-13.5	-13.7	-13.9	-14.1	-14.1	-14.2	-14.3	-14.8	-15.0	-15.0	-14.8	-13.5																						
10-Nov	-14.7	-14.8	-15.3	-15.4	-15.5	-15.5	-15.6	-15.4	-15.8	-15.9	-15.7	-15.2	-14.6	-14.9	-14.9	-14.9	-15.1	-15.1	-15.2	-14.9	-14.6	-14.4	-14.4	-14.4	-15.1	-14.4																						
11-Nov	-14.3	-14.5	-14.8	-15.2	-15.2	-15.3	-15.8	-16.0	-16.3	-16.3	-15.6	-15.2	-15.0	-14.8	-14.6	-14.6	-14.7	-14.8	-14.7	-14.9	-15.1	-15.3	-15.4	-15.7	-15.2	-14.3																						
12-Nov	-16.0	-15.8	-15.8	-15.8	-16.0	-15.9	-16.0	-16.1	-16.1	-16.0	-15.7	-15.2	-14.2	-13.6	-13.1	-12.8	-12.5	-12.6	-13.1	-13.6	-13.8	-13.9	-14.0	-14.3	-14.7	-12.5																						
13-Nov	-14.4	-14.6	-14.9	-15.6	-15.8	-16.1	-16.5	-16.8	-16.7	-16.9	-16.2	-14.8	-13.4	-12.2	-11.5	-11.0	-11.2	-11.4	-11.7	-11.9	-13.1	-13.5	-13.7	-13.8	-14.1	-11.0																						
14-Nov	-13.6	-13.8	-13.6	-13.6	-13.6	-12.6	-12.6	-12.5	-12.4	-12.4	-12.1	-11.9	-11.8	-11.7	-11.9	-12.0	-12.1	-12.4	-13.3	-14.1	-14.6	-13.9	-14.3	-14.6	-13.0	-11.7																						
15-Nov	-14.1	-14.2	-14.4	-14.4	-14.4	-14.3	-14.0	-13.5	-13.0	-12.6	-11.8	-10.1	-8.3	-7.5	-7.3	-7.6	-8.5	-9.2	-9.5	-9.3	-8.7	-8.1	-8.2	-7.8	-10.9	-7.3																						
16-Nov	-7.5	-7.3	-7.2	-7.4	-7.6	-8.0	-8.4	-8.5	-8.4	-8.4	-8.4	-8.4	-8.0	-7.8	-7.5	-7.1	-7.6	-7.9	-8.1	-9.2	-10.3	-10.6	-10.8	-11.4	-8.4	-7.1																						
17-Nov	-11.3	-13.0	-13.6	-13.6	-14.6	-14.6	-15.7	-16.6	-15.1	-14.9	-14.9	-12.5	-10.6	-8.1	-6.9	-6.2	-6.1	-6.2	-7.4	-7.9	-8.5	-8.9	-8.4	-9.0	-11.0	-6.1																						
18-Nov	-10.6	-11.4	-10.9	-10.6	-10.0	-10.1	-10.3	-10.1	-9.3	-8.8	-8.5	-8.2	-7.1	-6.4	-6.3	-6.6	-6.8	-7.3	-8.1	-8.8	-8.6	-8.3	-8.1	-8.2	-8.7	-6.3																						
19-Nov	-8.3	-8.6	-8.5	-8.8	-8.9	-9.3	-9.5	-9.6	-9.8	-9.9	-10.0	-10.0	-9.8	-9.3	-9.1	-9.1	-9.1	-9.1	-9.1	-8.9	-9.3	-9.8	-10.4	-10.7	-9.4	-8.3																						
20-Nov	-10.0	-10.1	-9.6	-9.4	-9.2	-9.0	-8.8	-8.4	-7.9	-7.2	-6.6	-5.6	-4.8	-3.8	-3.0	-2.7	-2.6	-2.0	-1.9	-2.1	-3.8	-4.4	-4.7	-5.0	-5.9	-1.9																						
21-Nov	-5.3	-5.5	-5.7	-5.8	-5.9	-6.3	-6.4	-6.5	-6.5	-6.4	-6.6	-6.6	-6.4	-6.3	-6.7	-7.2	-7.8	-8.5	-8.9	-9.3	-9.6	-9.8	-10.0	-10.2	-7.3	-5.3																						
22-Nov	-10.5	-10.7	-10.8	-11.1	-11.3	-11.8	-11.9	-12.0	-12.0	-12.2	-12.1	-12.0	-11.6	-11.5	-11.4	-11.3	-11.6	-11.7	-12.2	-12.6	-13.0	-13.3	-14.0	-14.4	-12.0	-10.5																						
23-Nov	-14.6	-14.5	-14.4	-14.3	-14.2	-14.1	-14.2	-13.9	-13.5	-13.1	-12.7	-12.1	-11.7	-11.2	-10.5	-10.0	-10.2	-10.2	-10.7	-11.4	-11.7	-12.1	-12.0	-12.6	-12.5	-10.0																						
24-Nov	-12.6	-12.7	-13.0	-13.7	-14.3	-14.6	-14.7	-15.3	-15.6	-15.6	-15.4	-15.3	-15.2	-15.0	-14.7	-14.8	-15.0	-14.9	-15.3	-15.0	-14.9	-15.0	-15.2	-15.6	-14.7	-12.6																						
25-Nov	-16.1	-16.0	-16.1	-16.1	-17.5	-18.9	-19.0	-18.7	-18.6	-18.9	-19.1	-19.0	-18.9	-18.9	-18.7	-19.3	-19.7	-20.0	-20.2	-20.4	-20.7	-20.8	-22.1	-21.8	-19.0	-16.0																						
26-Nov	-22.7	-22.6	-23.4	-24.3	-24.0	-23.3	-23.6	-23.1	-23.0	-22.7	-23.6	-21.4	-19.7	-18.8	-18.0	-17.1	-16.8	-16.9	-17.0	-16.7	-16.4	-16.3	-16.2	-17.2	-20.2	-16.2																						
27-Nov	-17.6	-18.2	-19.0	-19.4	-19.8	-20.2	-20.8	-21.2	-21.4	-21.3	-21.4	-21.9	-21.9	-21.8	-21.9	-21.9	-22.0	-22.0	-22.1	-22.2	-22.5	-23.0	-23.3	-23.4	-21.3	-17.6																						
28-Nov	-23.5	-23.6	-23.5	-23.6	-23.5	-23.5	-23.4	-23.3	-23.3	-23.3	-23.1	-22.8	-22.6	-22.4	-22.2	-22.2	-22.2	-22.5	-22.8	-22.9	-23.2	-23.5	-23.6	-23.6	-23.5	-23.1	-22.2																					
29-Nov	-23.2	-24.8	-25.4	-25.6	-25.7	-25.4	-25.6	-25.5	-25.7	-25.3	-24.8	-24.2	-22.6	-21.5	-20.7	-19.7	-19.3	-19.7	-20.6	-21.4	-22.1	-22.8	-23.3	-23.7	-23.3	-19.3																						
30-Nov	-24.0	-24.4	-24.6	-25.0	-24.9	-25.4	-25.1	-25.1	-25.5	-25.6	-25.6	-24.3	-22.7	-21.6	-21.1	-20.7	-20.3	-20.1	-20.1	-20.4	-20.2	-20.0	-19.9	-19.8	-22.8	-19.8																						
																								-11.1	-11.4	-11.5	-11.8	-12.0	-12.1	-12.2	-12.3	-12.2	-12.1	-11.9	-11.3	-10.6	-10.0	-9.7	-9.6	-9.7	-9.9	-10.3	-10.6	-11.0	-11.1	-11.4	-11.6	Diurnal Average
																								3.0	2.6	2.7	2.7	2.8	2.7	2.7	2.7	2.6	2.8	3.7	5.0	5.7	6.8	7.7	8.3	8.3	8.1	7.6	6.3	6.1	4.4	3.7	4.1	Diurnal Maximum



WBEA
Hourly Averages

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





WBEA
Cumulative Frequency Distribution

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

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	104	14.44	14.44
-20 - 0	550	76.39	90.83
0 - 10	66	9.17	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Value: 99 % on Nov 3 04:00	Maximum Daily Average: 95.3 % on Nov 3	Hours in Service: 720
Minimum Value: 47 % on Nov 7 15:00	Minimum Daily Average: 58.6 % on Nov 7	Hours of Data: 312
Maximum Diurnal Average: 84.5 % at hour 1	Minimum Diurnal Average: 71.9 % at hour 15	Hours of Missing Data: 408
Monthly Average: 79.2 %	Percentiles: P ₁ = 50 P ₁₀ = 63 Q ₁ = 73 Median = 80 Q ₃ = 88 P ₉₀ = 93 P ₉₉ = 98	Hours of Calibration: 0
		Percent Operational Time: 43.3

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-Nov	94	93	90	91	89	88	90	93	89	84	80	73	67	62	60	58	61	66	79	79	87	92	92	94	81.3	94
2-Nov	93	92	92	91	91	91	91	93	93	91	88	82	81	78	75	74	77	81	83	87	92	94	97	97	87.6	97
3-Nov	98	98	98	99	98	98	98	97	98	97	97	98	96	93	91	90	91	94	94	94	94	94	93	91	95.3	99
4-Nov	92	90	90	91	91	91	90	89	87	87	86	85	86	86	91	91	86	92	93	94	93	93	93	94	90.1	94
5-Nov	94	94	93	90	82	85	89	87	86	85	84	81	79	78	78	77	76	78	78	79	80	81	79	76	82.9	94
6-Nov	76	80	81	81	82	81	82	80	78	78	78	78	77	76	75	77	77	74	76	75	79	78	77	75	78.0	82
7-Nov	72	69	67	64	63	63	61	59	60	59	60	60	53	51	47	48	52	52	50	53	52	59	64	67	58.6	72
8-Nov	69	67	69	75	64	75	82	75	72	72	65	62	61	59	57	55	59	74	72	62	67	AF	AF	AF	67.4	82
9-Nov	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-Nov	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-Nov	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-Nov	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-Nov	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-Nov	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-Nov	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-Nov	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-Nov	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-Nov	AF	AF	AF	AF	76	74	80	83	84	80	70	69	68	63	61	63	64	67	69	72	74	73	73	73	71.8	84
19-Nov	75	76	74	75	76	75	73	71	72	70	67	66	65	65	64	65	68	70	74	76	76	79	79	81	72.2	81
20-Nov	81	81	79	78	79	80	81	81	82	84	86	84	81	80	81	81	82	82	84	86	83	83	88	91	82.4	91
21-Nov	90	90	89	88	85	81	82	83	85	84	76	68	65	60	68	71	73	72	73	72	72	73	76	80	77.3	90
22-Nov	81	79	79	85	86	85	85	84	84	82	80	80	78	82	83	81	81	82	82	83	82	83	83	AF	82.1	86
23-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	76	75	75	75	76	79	81	86	AF	AF	AF	AF	AF	--	86
24-Nov	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-Nov	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-Nov	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-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
28-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
29-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
30-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--

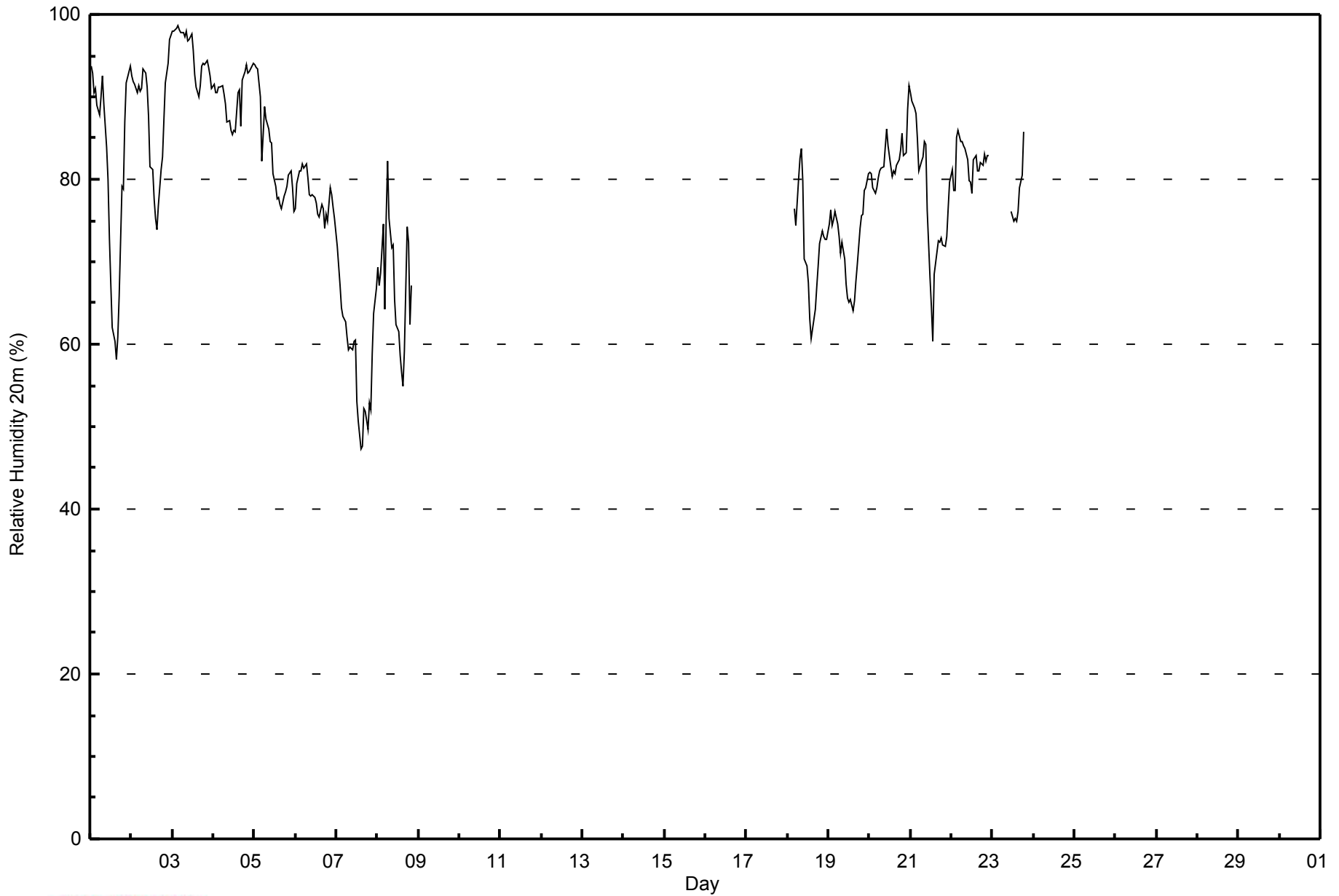
84.5	84.0	83.5	84.0	81.8	82.1	83.4	82.8	82.2	81.1	78.4	75.8	73.7	72.0	71.9	71.9	73.3	76.1	78.1	77.8	79.3	81.8	82.8	83.5	Diurnal Average		
98	98	98	99	98	98	98	97	98	97	97	98	96	93	91	91	91	94	94	94	94	94	94	97	97	Diurnal Maximum	

AF - Analyzer Failure



WBEA
Hourly Averages

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





WBEA
Cumulative Frequency Distribution

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

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	18	5.77	5.77
60 - 80	137	43.91	49.68
80 - 100	157	50.32	100.00

Total Number of Valid Hours: 312

Total Number of Hours: 720

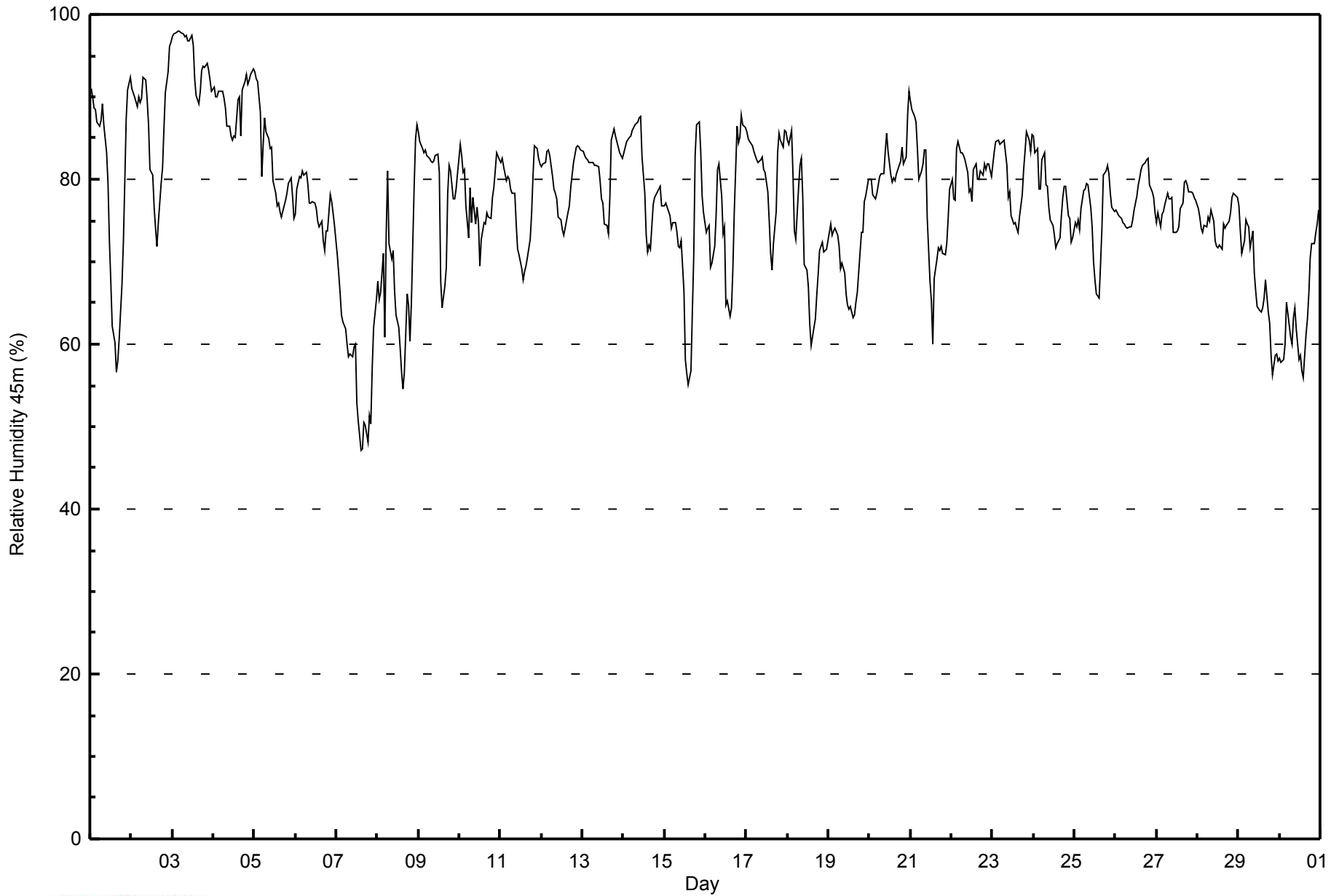


Maximum Value: 98 % on Nov 3 04:00																	Maximum Daily Average: 94.9 % on Nov 3																	Hours in Service: 720															
Minimum Value: 47 % on Nov 7 15:00																	Minimum Daily Average: 57.6 % on Nov 7																	Hours of Data: 720															
Maximum Diurnal Average: 80.9 % at hour 1																	Minimum Diurnal Average: 70.0 % at hour 15																	Hours of Missing Data: 0															
Monthly Average: 77.1 %																	Percentiles: P ₁ = 51 P ₁₀ = 64 Q ₁ = 73 Median = 78 Q ₃ = 83 P ₉₀ = 88 P ₉₉ = 98																	Hours of Calibration: 0															
																																		Percent Operational Time: 100.0															
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Nov	91	90	89	89	87	86	87	89	87	83	79	73	68	62	60	57	58	61	67	72	80	87	91	92	78.6	92																							
2-Nov	91	91	90	89	90	89	90	92	92	90	87	81	80	77	74	72	75	80	81	86	91	93	96	97	86.4	97																							
3-Nov	97	98	98	98	98	98	98	97	98	97	97	97	96	92	90	89	91	93	94	94	94	93	92	91	94.9	98																							
4-Nov	91	90	90	91	91	91	90	89	86	87	85	85	85	85	90	90	85	91	92	93	91	92	93	93	89.4	93																							
5-Nov	93	92	92	88	80	84	87	86	85	84	84	80	78	77	77	76	75	77	77	78	80	80	78	75	81.8	93																							
6-Nov	76	79	80	80	81	81	81	79	77	77	77	77	76	75	74	75	73	71	74	74	78	77	76	74	76.8	81																							
7-Nov	71	69	66	64	63	62	60	58	59	59	60	60	53	51	47	47	51	50	48	51	50	57	62	65	57.6	71																							
8-Nov	68	65	66	71	61	73	81	72	70	71	66	64	62	59	57	55	57	66	65	60	65	79	85	87	67.7	87																							
9-Nov	86	85	84	83	83	83	82	82	82	82	83	83	81	68	64	67	69	78	82	81	78	78	79	81	79.3	86																							
10-Nov	84	83	81	81	77	73	79	75	78	74	77	75	70	73	75	74	76	75	75	78	79	81	83	82	77.4	84																							
11-Nov	82	83	81	80	80	80	79	78	78	75	71	71	69	68	69	69	71	73	76	80	84	84	83	82	76.9	84																							
12-Nov	82	82	82	83	84	83	80	79	78	78	75	75	74	73	74	76	77	79	80	82	84	84	84	83	79.6	84																							
13-Nov	83	83	83	82	82	82	82	82	82	82	80	78	77	75	74	73	78	85	86	85	85	84	83	83	81.1	86																							
14-Nov	83	84	85	85	85	86	86	87	87	88	88	83	78	73	71	72	72	77	78	78	78	79	77	77	80.7	88																							
15-Nov	77	77	76	76	74	75	75	74	72	72	73	66	58	56	55	57	64	71	83	87	87	83	78	76	72.5	87																							
16-Nov	74	74	74	69	70	72	76	81	82	78	73	74	65	65	63	64	69	76	86	84	85	88	87	86	75.7	88																							
17-Nov	86	85	85	84	83	83	82	82	82	83	81	81	78	75	71	69	72	76	83	86	85	84	86	86	81.2	86																							
18-Nov	85	84	86	80	74	73	79	82	83	78	70	69	67	62	60	62	63	66	68	71	72	71	71	71	72.8	86																							
19-Nov	74	75	73	74	74	73	72	69	70	69	66	65	64	65	63	64	65	66	71	74	73	77	78	80	70.5	80																							
20-Nov	80	80	78	78	78	79	80	81	81	83	86	83	81	80	80	80	81	82	82	84	82	83	88	91	81.6	91																							
21-Nov	90	89	88	87	84	80	81	82	84	84	75	68	65	60	68	70	72	71	72	71	71	72	75	79	76.5	90																							
22-Nov	80	78	77	84	85	83	83	83	82	81	79	79	77	81	82	80	80	81	81	82	81	82	82	80	80.9	85																							
23-Nov	82	83	85	85	84	84	85	85	82	78	78	76	75	74	74	75	78	81	83	86	85	83	85	85	80.8	86																							
24-Nov	85	83	84	79	79	82	83	79	79	77	75	74	73	72	72	73	76	78	79	79	76	75	72	73	77.4	85																							
25-Nov	75	74	75	74	76	79	79	79	79	77	74	70	68	66	66	70	74	81	81	82	81	78	77	76	75.4	82																							
26-Nov	76	76	76	75	75	75	74	74	74	74	75	76	78	79	80	81	82	82	82	83	79	78	78	76	77.5	83																							
27-Nov	75	76	74	76	76	77	78	78	78	78	74	74	74	74	76	77	80	80	79	78	78	78	78	78	76.8	80																							
28-Nov	76	75	74	74	74	74	75	75	76	75	72	72	72	72	72	75	74	74	75	76	78	78	78	78	74.8	78																							
29-Nov	77	74	71	72	75	75	74	72	74	69	66	65	64	64	64	66	68	64	63	59	56	59	59	58	66.9	77																							
30-Nov	58	58	58	60	65	64	61	60	63	64	62	58	59	57	56	61	63	66	70	72	72	74	75	76	63.8	76																							
																								80.9	80.4	80.0	79.7	79.0	79.3	80.0	79.3	79.3	78.1	76.3	74.3	72.2	70.3	70.0	70.5	72.1	74.9	77.1	78.1	78.6	79.8	80.2	80.4	Diurnal Average	
																								97	98	98	98	98	98	98	97	98	97	97	97	96	92	90	90	91	93	94	94	94	93	96	97	Diurnal Maximum	



WBEA
Hourly Averages

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





WBEA
Cumulative Frequency Distribution

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

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	40	5.56	5.56
60 - 80	396	55.00	60.56
80 - 100	284	39.44	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

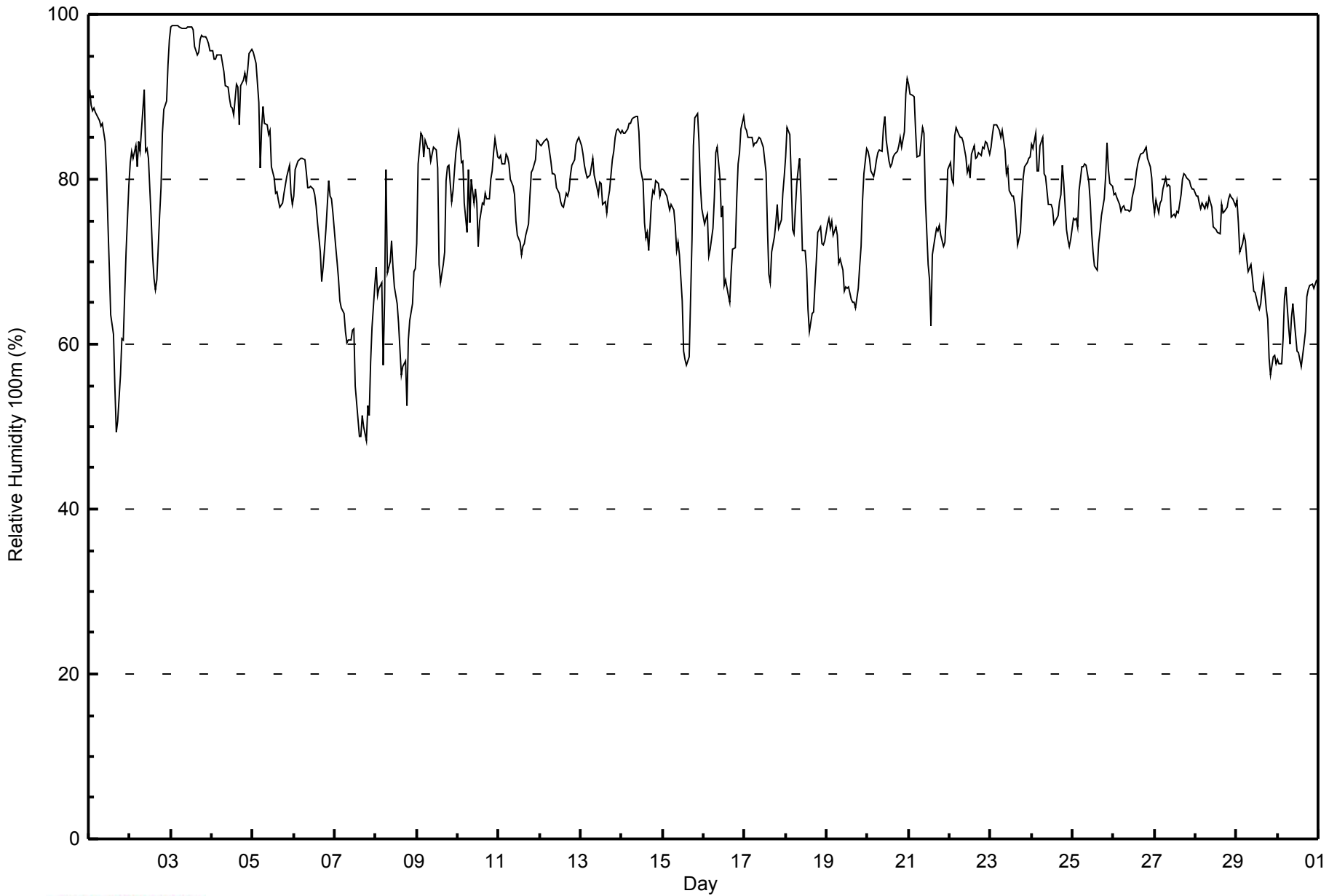


Maximum Value: 99 % on Nov 3 03:00																		Maximum Daily Average: 97.6 % on Nov 3																		Hours in Service: 720													
Minimum Value: 48 % on Nov 7 19:00																		Minimum Daily Average: 59.0 % on Nov 7																		Hours of Data: 720													
Maximum Diurnal Average: 81.5 % at hour 2																		Minimum Diurnal Average: 71.7 % at hour 15																		Hours of Missing Data: 0													
Monthly Average: 77.7 %																		Percentiles: P ₁ = 51 P ₁₀ = 65 Q ₁ = 73 Median = 79 Q ₃ = 84 P ₉₀ = 88 P ₉₉ = 98																		Hours of Calibration: 0													
																																				Percent Operational Time: 100.0													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Nov	91	89	88	89	88	87	87	86	87	85	81	75	69	64	61	55	49	51	56	61	60	66	71	79	74.0	91																							
2-Nov	82	83	82	84	82	85	83	86	91	83	84	83	75	71	68	67	68	76	79	86	89	89	94	97	81.9	97																							
3-Nov	98	99	99	99	99	99	98	98	98	98	98	98	99	98	96	95	95	97	97	97	97	97	96	96	97.6	99																							
4-Nov	96	95	95	95	95	95	94	93	91	91	90	89	89	88	91	91	87	91	92	93	92	93	95	96	92.3	96																							
5-Nov	95	95	94	89	81	86	89	87	87	85	86	81	80	78	78	77	77	77	78	79	80	82	78	77	83.3	95																							
6-Nov	78	81	82	82	83	83	82	81	79	79	79	79	78	77	75	71	68	69	72	74	80	78	78	76	77.6	83																							
7-Nov	72	70	68	65	64	64	62	60	60	60	62	62	55	53	49	49	51	50	48	53	51	58	62	67	59.0	72																							
8-Nov	69	66	67	67	58	65	81	69	70	73	69	67	65	63	59	56	57	58	53	61	63	65	69	69	64.9	81																							
9-Nov	72	82	86	85	83	85	84	84	82	83	84	84	81	70	68	70	71	80	81	82	77	79	81	83	79.8	86																							
10-Nov	86	85	82	82	77	74	81	75	80	77	79	77	72	75	77	77	78	78	78	80	81	83	85	83	79.2	86																							
11-Nov	83	83	82	82	83	83	82	80	79	78	75	73	72	71	72	72	73	75	78	81	81	82	85	85	78.7	85																							
12-Nov	84	84	85	85	85	85	82	81	81	80	79	78	77	77	77	78	78	79	80	82	82	84	85	85	81.4	85																							
13-Nov	84	83	82	81	80	81	81	82	81	79	78	80	80	77	77	76	78	79	82	83	85	86	86	86	81.1	86																							
14-Nov	86	86	86	86	87	87	87	87	88	88	86	81	80	75	73	74	71	77	79	78	80	79	78	79	81.5	88																							
15-Nov	79	79	78	77	76	77	76	74	71	72	71	65	59	58	57	58	66	73	84	87	88	85	79	76	73.7	88																							
16-Nov	75	75	76	71	72	74	78	83	84	80	76	77	67	68	66	65	69	72	72	78	82	83	86	88	75.6	88																							
17-Nov	86	86	85	85	85	84	84	84	85	85	84	84	81	74	68	68	71	73	75	77	74	75	78	80	79.7	86																							
18-Nov	83	86	85	80	74	73	79	81	83	78	71	71	69	64	62	64	64	67	70	74	74	72	72	73	73.8	86																							
19-Nov	75	75	74	75	73	74	73	70	70	69	66	67	67	67	65	65	65	64	67	69	72	77	81	84	71.1	84																							
20-Nov	83	83	81	80	81	82	83	84	83	86	88	85	82	81	82	83	83	83	84	85	84	86	90	92	84.0	92																							
21-Nov	92	90	90	90	86	83	83	85	86	86	78	70	68	62	71	73	74	74	74	73	72	72	76	81	78.7	92																							
22-Nov	82	80	79	85	86	85	85	85	85	83	81	82	80	83	84	83	83	83	83	84	84	85	84	83	83.2	86																							
23-Nov	84	85	87	87	86	86	85	86	84	81	81	79	78	78	77	75	72	74	77	80	81	82	83	83	81.2	87																							
24-Nov	84	84	86	81	81	84	85	81	80	79	77	77	76	75	75	76	77	78	82	80	74	73	72	73	78.7	86																							
25-Nov	75	75	75	74	79	82	82	82	82	80	77	74	71	69	69	72	74	76	78	80	84	81	79	79	77.0	84																							
26-Nov	78	78	78	77	76	77	77	76	76	76	76	78	79	81	82	83	83	83	83	84	83	82	80	77	79.3	84																							
27-Nov	76	77	76	77	77	79	80	79	79	79	75	76	75	76	76	78	80	81	81	80	80	79	79	79	78.1	81																							
28-Nov	78	78	77	76	77	76	77	77	78	77	74	74	74	74	73	77	76	76	77	78	78	78	78	77	76.4	78																							
29-Nov	77	75	71	72	73	72	70	69	70	68	67	66	65	64	65	67	68	64	63	58	56	58	59	58	66.5	77																							
30-Nov	58	58	58	61	66	67	62	60	63	65	63	59	59	58	57	60	61	66	67	67	67	67	67	68	62.6	68																							
																								81.4	81.5	81.1	80.7	79.8	80.4	81.2	80.2	80.4	79.4	77.8	76.3	74.1	72.3	71.7	71.8	72.2	74.1	75.6	77.4	77.7	78.5	79.6	80.2	Diurnal Average	
																								98	99	99	99	99	99	98	98	98	98	98	98	98	99	98	95	95	97	97	97	97	97	96	97	Diurnal Maximum	



WBEA
Hourly Averages

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





WBEA
Cumulative Frequency Distribution

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

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	36	5.00	5.00
60 - 80	368	51.11	56.11
80 - 100	316	43.89	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

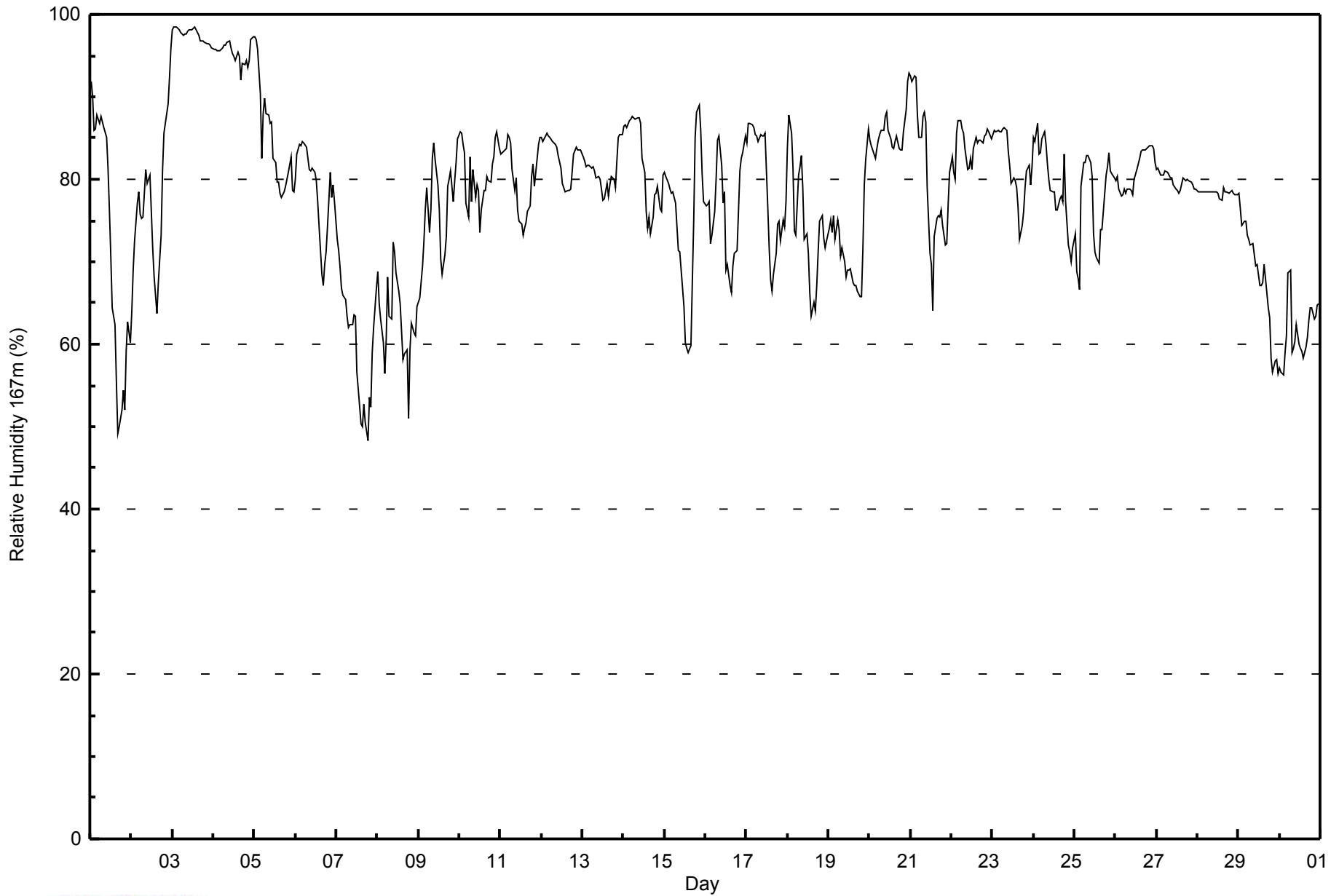


Maximum Value: 98 % on Nov 3 14:00																	Maximum Daily Average: 97.5 % on Nov 3																	Hours in Service: 720									
Minimum Value: 48 % on Nov 7 19:00																	Minimum Daily Average: 60.2 % on Nov 7																	Hours of Data: 720									
Maximum Diurnal Average: 81.4 % at hour 7																	Minimum Diurnal Average: 73.1 % at hour 16																	Hours of Missing Data: 0									
Monthly Average: 78.1 %																	Percentiles: P ₁ = 52 P ₁₀ = 64 Q ₁ = 73 Median = 79 Q ₃ = 84 P ₉₀ = 88 P ₉₉ = 98																	Hours of Calibration: 0									
																																		Percent Operational Time: 100.0									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																			
1-Nov	92	90	86	86	88	87	88	87	86	85	81	76	71	64	62	55	49	50	52	54	52	59	63	60	71.9	92																	
2-Nov	64	69	73	77	79	76	75	75	81	79	80	80	72	68	66	64	68	73	81	86	87	89	92	96	77.1	96																	
3-Nov	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	97	97	97	97	97	96	96	96	96	97.5	98																	
4-Nov	96	96	96	96	96	96	96	96	97	97	96	95	95	94	95	95	92	94	94	94	94	94	97	97	95.3	97																	
5-Nov	97	97	96	90	82	88	90	88	88	87	87	83	82	80	80	78	78	78	79	80	81	83	79	78	84.5	97																	
6-Nov	80	83	84	84	85	84	84	83	81	81	81	81	80	77	74	68	67	70	71	74	81	78	79	77	78.7	85																	
7-Nov	73	71	69	67	66	65	63	62	62	62	64	63	57	55	50	50	53	50	48	54	52	59	62	67	60.2	73																	
8-Nov	69	65	63	60	56	60	68	63	63	72	71	69	66	65	61	58	59	59	51	59	63	61	61	65	62.9	72																	
9-Nov	65	66	70	72	76	79	74	76	83	84	82	79	76	70	68	71	73	79	80	81	77	80	82	85	76.2	85																	
10-Nov	86	86	84	83	77	75	83	77	81	78	79	79	73	76	79	79	80	80	80	82	83	85	86	84	80.6	86																	
11-Nov	83	83	83	84	85	85	84	81	79	80	76	75	75	73	74	75	76	77	80	82	79	83	84	85	80.1	85																	
12-Nov	85	85	85	86	85	85	85	84	84	84	83	81	79	79	79	79	79	79	81	83	84	83	84	84	82.6	86																	
13-Nov	83	82	82	82	82	81	81	81	80	80	80	79	77	78	80	78	79	80	80	79	82	85	85	85	80.9	85																	
14-Nov	86	87	86	87	87	88	88	87	87	87	87	83	81	76	74	75	73	75	78	78	79	77	76	80	81.9	88																	
15-Nov	81	80	79	79	78	78	77	74	71	71	69	65	60	60	59	60	68	75	85	88	89	86	81	77	74.6	89																	
16-Nov	77	77	77	72	73	76	80	85	85	82	77	78	69	70	67	66	70	71	71	76	81	83	83	85	76.3	85																	
17-Nov	84	87	87	87	86	85	85	85	85	85	85	86	77	72	68	66	68	71	75	75	72	75	74	77	79.1	87																	
18-Nov	84	88	86	81	74	73	80	82	83	79	73	73	71	66	63	65	64	67	71	75	76	73	72	72	74.6	88																	
19-Nov	74	75	74	76	73	75	74	71	72	70	68	69	69	69	67	67	67	66	66	66	72	79	82	86	71.9	86																	
20-Nov	85	84	84	83	84	85	85	86	86	88	88	86	85	84	84	85	85	84	83	84	86	89	92	93	85.6	93																	
21-Nov	93	92	92	92	88	85	85	88	88	87	79	71	70	64	73	75	76	75	76	74	72	72	77	81	80.2	93																	
22-Nov	83	81	80	86	87	87	86	86	84	81	81	83	81	84	85	84	85	85	84	85	85	86	86	85	84.2	87																	
23-Nov	85	86	86	86	86	86	86	86	86	83	82	79	80	80	79	77	73	74	76	79	81	82	79	82	81.6	86																	
24-Nov	85	85	87	83	83	85	86	84	82	80	79	78	78	76	78	78	77	83	77	72	71	70	72	72	79.4	87																	
25-Nov	73	69	68	67	79	82	82	83	83	82	80	73	71	71	70	74	74	76	81	81	83	81	81	80	76.8	83																	
26-Nov	80	80	79	78	78	79	78	79	79	79	78	80	81	82	83	83	84	84	84	84	84	84	84	82	81.0	84																	
27-Nov	81	81	80	80	81	81	81	80	80	80	79	79	79	78	79	80	80	80	80	80	80	79	79	79	79.9	81																	
28-Nov	79	79	78	78	78	78	78	78	79	79	78	79	78	78	77	79	78	78	78	79	79	78	78	78	78.4	79																	
29-Nov	78	76	74	75	75	73	73	72	72	71	69	70	67	67	67	70	68	64	63	58	57	58	58	56	68.1	78																	
30-Nov	57	57	56	59	61	69	69	59	59	60	62	60	59	59	58	60	61	63	64	64	63	63	65	65	61.4	69																	
																	81.2	81.1	80.8	80.5	80.2	80.9	81.4	80.6	80.8	80.4	79.2	77.7	75.3	73.8	73.2	73.1	73.3	74.5	75.8	77.0	77.4	78.4	78.9	79.7	Diurnal Average		
																	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	97	97	97	97	97	96	96	97	97	Diurnal Maximum	



WBEA
Hourly Averages

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





WBEA
Cumulative Frequency Distribution

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

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	41	5.69	5.69
60 - 80	348	48.33	54.03
80 - 100	331	45.97	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Speed: 26 km/h on Nov 6 07:00	Maximum Daily Speed Average: 12.0 km/h on Nov 7	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 14 19:00	Minimum Daily Speed Average: 1.1 km/h on Nov 3	Hours of Data: 719
Maximum Diurnal Speed Average: 2.2 km/h at hour 20	Minimum Diurnal Speed Average: 0.1 km/h at hour 11	Hours of Missing Data: 1
Monthly Average Velocity: 0.8 km/h 338.2 deg	Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 4 Median = 7 Q ₃ = 10 P ₉₀ = 13 P ₉₉ = 22	Percent Operational Time: 99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	SW1	WSW2	SW1	SE2	S3	SW2	SSE7	SSE8	SSE8	SSE6	SSE7	SW7	WSW9	WSW9	WSW6	WSW6	W4	S0	SW1	SSE4	SSE5	SE9	SE9	SE6	S3.4	SE9
2-Nov	SE7	SSE8	SSE7	SE6	SSE7	SE6	SSE9	SSE9	ESE3	SSE7	SSE7	SE5	SSE7	SSE11	SSE14	SSE14	SSE10	SSE6	SSE8	S5	SE6	SE11	SSE6	SSE6	SSE7.6	SSE14
3-Nov	S8	S12	S8	S6	S9	S7	S6	S5	SE5	E2	NW4	NW3	NW6	N7	NNE8	NNE7	NNE8	NNE7	NNE7	N6	NNE4	NNE4	ENE5	NE2	E1.1	S12
4-Nov	ENE5	E5	ESE5	SSE6	S7	SSW6	ESE7	ESE8	SE6	ESE7	SE10	SE9	SE9	SE10	SE8	ESE7	SE11	SE13	AF	SE14	SE10	SSE5	S4	SE7.3	SE14	
5-Nov	WSW2	NW7	WNW5	WNW13	WNW18	WNW14	WNW15	WNW15	WNW17	WNW16	NW12	WNW14	WNW12	NW13	NW10	NW6	W6	WSW9	SW5	SW10	SE12	SSW7	SSW9	S13	WNW8.6	WNW18
6-Nov	S16	S15	SSE14	SE19	SSE24	SE25	SSE26	SSE24	SSE22	SSE23	SSE22	SSE17	SSE16	SSE11	SSE14	SSE14	SSE9	S4	SSW3	WNW9	NNW6	NW12	NW18	NNW13	SSE10.8	SSE26
7-Nov	NW10	NW16	NNW18	NNW19	NNW15	NNW15	NNW14	NNW13	NNW12	N13	N14	N12	NNW15	NNW15	NNW14	NNW12	NNW9	NNW10	NNW10	NNW10	NNW11	NNW7	N6	NNE4	NNW12.0	NNW19
8-Nov	NNE3	NNE4	NNE3	NW3	NW4	NNE2	N4	N7	NNW7	N6	NNW8	NNW8	N10	NNW8	NW9	NW6	NNW4	NNE3	NNE3	NNE4	NE3	NNE1	N2	N2	NNW4.3	N10
9-Nov	N1	NNW2	NNW2	NW2	N2	N1	NNW3	NW2	NW3	NNW3	N3	N4	N6	NNE8	NNE6	NNE5	NNE5	NNW4	NNW4	N7	NNE6	NNE8	NNE4	NNW4	N3.7	NNE8
10-Nov	NNW5	NNW7	NNW9	NNW8	NW8	NNW7	NW8	NNW7	N8	N10	NNE9	N10	N12	N14	N12	N11	N8	N7	N7	N7	N9	NNW6	NNW6	NW8	N8.0	N14
11-Nov	NW8	NW8	NNW7	NNW6	N6	NNE5	NE4	NE4	N3	ENE3	E0	WNW3	NNW5	NNW6	NNW4	NNW5	N4	NE4	NNW2	N4	NNW4	NNW3	NNW3	NW3	NNW3.7	NW8
12-Nov	NW3	NW2	NNW2	S1	SW9	SW9	SW10	SSW6	SSW8	S10	S10	S10	S8	SSE8	SSE11	SSE13	SSE12	SSE12	SE7	SSE6	SSE10	SSE12	SSE12	SSE9	S7.0	SSE13
13-Nov	SSE10	SSE12	SSE14	SE12	SSE14	SE12	SSE8	SSE6	SSE7	SSE8	SE11	SSE11	SSE8	SSE7	SSE5	SSE3	N5	N5	N3	NNW3	NNW4	NNW3	NNW3	NW3	SE5.0	SSE14
14-Nov	NW3	NW3	NW3	NW4	NNW4	NW4	NW3	NW3	NNW3	NNW4	NNW6	N7	N7	N8	N7	N5	WNW3	SE1	NNW0	NNW3	NW4	W2	WSW5	S4	NNW3.1	N8
15-Nov	S7	S10	S9	S8	SSW7	S8	S8	S8	S9	S8	SSE11	SSW7	WSW11	NNW5	NNW8	NNW8	N10	N13	N15	NNW12	NNW12	NNW13	NW14	NNW12	WNW1.9	N15
16-Nov	NW12	NNW11	N15	NNW14	NNW12	NNW11	NNW11	NNW11	NNW9	NNW9	NNW8	NNW9	NNW10	NNW5	NNE3	SW1	WSW2	WNW1	NW2	NW2	NW2	NNW1	SSE0	S1	NNW6.5	N15
17-Nov	SE3	SSE6	SSE10	SSE11	SSE11	SSE10	SSE12	SSE11	SSE11	SE7	SSE6	SSE11	SSE9	SSE11	SSE8	SSE7	SE4	NNW1	NNW3	NNW3	NW3	NNW3	NW3	NNW3	SSE5.5	SSE12
18-Nov	NW3	NW4	NW5	N9	NNW10	NNW7	N4	N3	WNW1	NW4	NW9	NW11	NW13	NW14	NNW12	NW12	NW13	NW12	NNW8	N7	N4	NNW4	NNW5	NNW5	NW7.2	NW14
19-Nov	NNW6	N4	NNW5	NNW5	N5	NW3	NW1	WNW3	NW3	WSW5	WSW8	SW8	SSW7	SW7	SW7	SSW6	SSE7	S8	SSE13	SSE12	SSE12	SSE7	SSE6	ENE2	SSW2.8	SSE13
20-Nov	ESE4	E2	SSE6	SSE4	SSE4	SSE10	SSE7	S3	SSE3	SSE3	SSE5	SSE10	SSE10	SSE8	SE7	SE5	SE1	N1	NNW3	N5	N6	N5	NNW5	NNW5	SE2.6	SSE10
21-Nov	N7	N6	N5	N5	N6	NNW4	NW5	NNW6	NNW5	NNW5	N7	NNW9	NNW7	NNW8	NNE5	NNE4	NE7	NE8	ENE7	ENE8	ENE5	ENE3	NE4	NE7	NNE5.1	NNW9
22-Nov	NE6	NE7	NE4	NNE4	N5	N6	NNE6	NE5	NNE6	NNE6	NNE7	NNE8	NNE9	NNE8	N9	N9	N9	N8	N9	N9	N8	N7	N9	N8	NNE6.9	N9
23-Nov	N7	NNW4	NNW2	NNW3	NW3	NW2	E2	SSE3	S5	S6	S7	S7	SSE6	SSE9	SSE9	S6	SSW4	WSW3	NNW2	WNW2	N1	NNW1	NW2	NNW2	S1.5	SSE9
24-Nov	NNW3	N6	N5	N6	NNW6	NNW5	NNW5	NNW4	NNW3	N4	N4	N5	NNE3	N3	N2	N2	N2	NNE2	NW2	NNE2	ENE3	NNE2	NNE3	N5	N3.3	N6
25-Nov	N4	NNE4	NNE4	N4	N7	N8	NNW5	NNW5	N5	N7	N6	N6	N8	N8	N5	N4	NNW3	WNW1	NNW2	NW3	SE1	NNW1	NNW1	S1	N4.0	N8
26-Nov	SSE6	SSE10	SSE7	SSE8	SE7	SE8	SSE10	SSE7	SSE9	SE5	SSE5	SSE8	SSE4	SSE6	SSE6	SE3	NNW2	NNW5	NNW6	NNW6	N9	N7	N9	N13	SE2.6	N13
27-Nov	N11	N10	N8	N6	N6	N7	NNW4	N5	NW3	N4	NNE8	N3	N3	N2	WNW3	NW2	WNW1	NW3	NNW2	NNW2	NW3	NNW2	N3	N4	N4.2	N11
28-Nov	N7	N7	NNE6	NNE7	N6	N7	N6	N7	N6	N7	NNE8	N10	N10	N9	N8	N6	NNW7	NNW6	N5	NW3	NW2	NW2	WSW1	SSE3	N5.6	N10
29-Nov	SSW1	SW4	SSW3	SSE7	SSE12	SE10	SE11	SSE12	SE11	S8	WSW8	W9	W15	W12	W12	WNW11	NW12	NW13	NW14	NW15	NW16	NW13	NW15	NW16	W4.6	NW16
30-Nov	NW17	NW15	NW15	NW12	WNW13	WNW11	W17	W18	W19	W15	W11	SSW7	SSE10	S9	S10	SSE16	SSE17	SSE19	SSE20	SSE18	SSE18	SSE20	SSE21	SSE17	SSW6.3	SSE21

NNW1.6	NNW1.2	N1.1	N1.2	NNW0.8	W0.5	S0.5	SW0.3	SW0.8	SW0.1	NNW0.1	W0.7	NW1.5	NNW1.4	N0.9	N0.5	NNW0.8	NNW1.3	N1.6	NNW2.2	N1.5	N0.9	NNW1.4	N1.5	Diurnal Average	
NNW17	NNW16	NNW18	NNW19	SSE24	SE25	SSE26	SSE24	SSE22	SSE23	SSE22	SSE17	SSE16	NNW15	NNW14	SSE16	SSE17	SSE19	SSE20	SSE18	SSE18	SSE20	SSE21	SSE17	Diurnal Maximum	

AF - Analyzer Failure

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



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 8 km/h on Nov 6 07:00	Hours of Data: 719
Minimum Value: 1 km/h on Nov 12 03:00	Hours of Missing Data: 1
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 2 Q ₃ = 3 P ₉₀ = 5 P ₉₉ = 7	Hours of Calibration: 0
	Percent Operational Time: 99.9

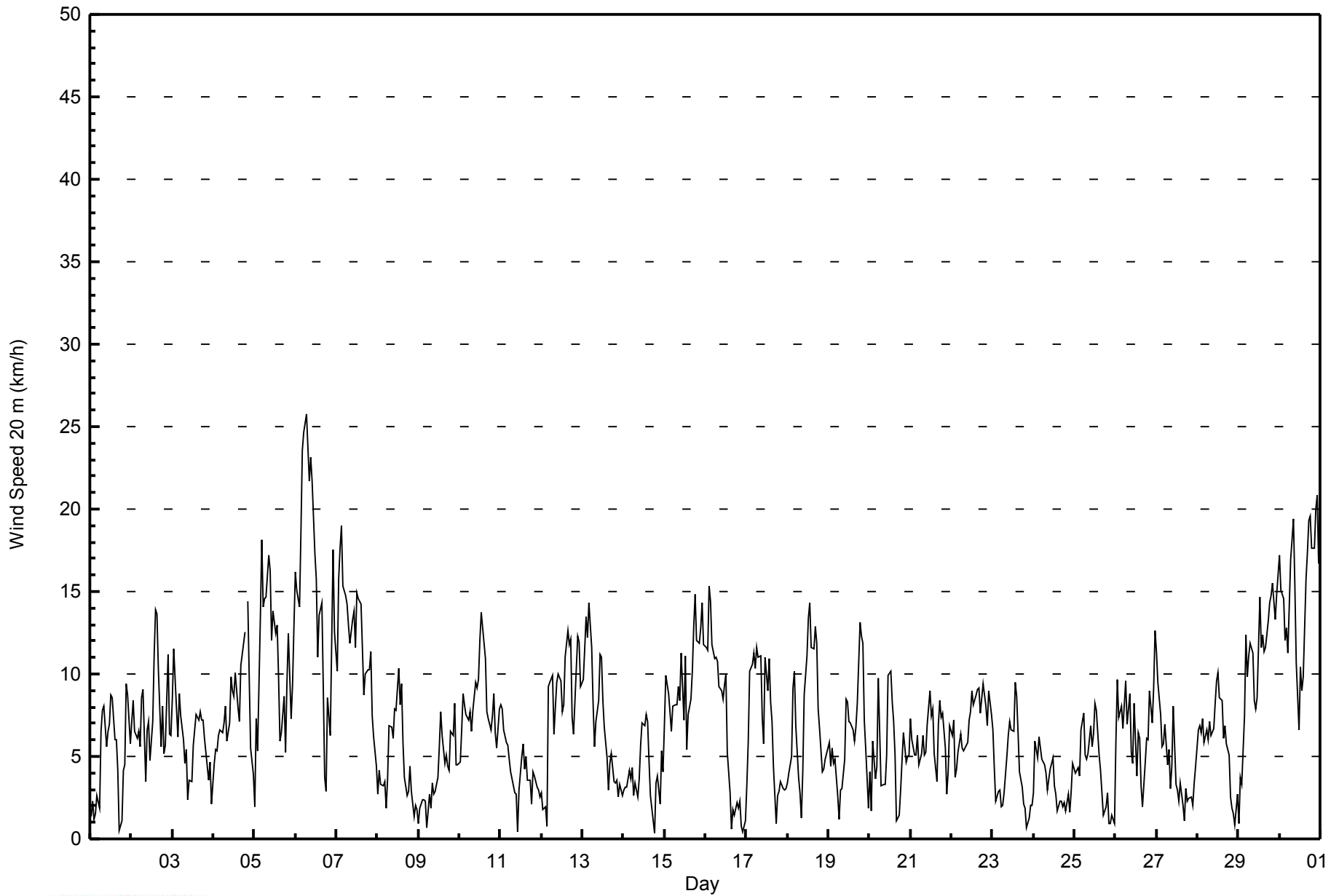
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	1	1	1	1	2	2	2	4	3	2	2	3	3	3	2	2	2	1	1	2	2	2	2	3	4	
2-Nov	3	2	2	2	3	3	2	3	2	2	2	3	3	3	4	4	3	3	4	4	4	4	3	3	4	
3-Nov	3	4	4	2	3	3	2	3	2	1	1	1	2	3	3	3	3	3	3	3	2	2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

AF - Analyzer Failure



WBEA
Hourly Averages

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





WBEA
Cumulative Frequency Distribution

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

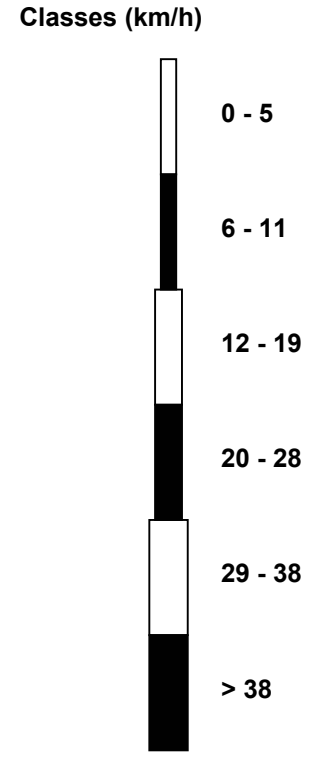
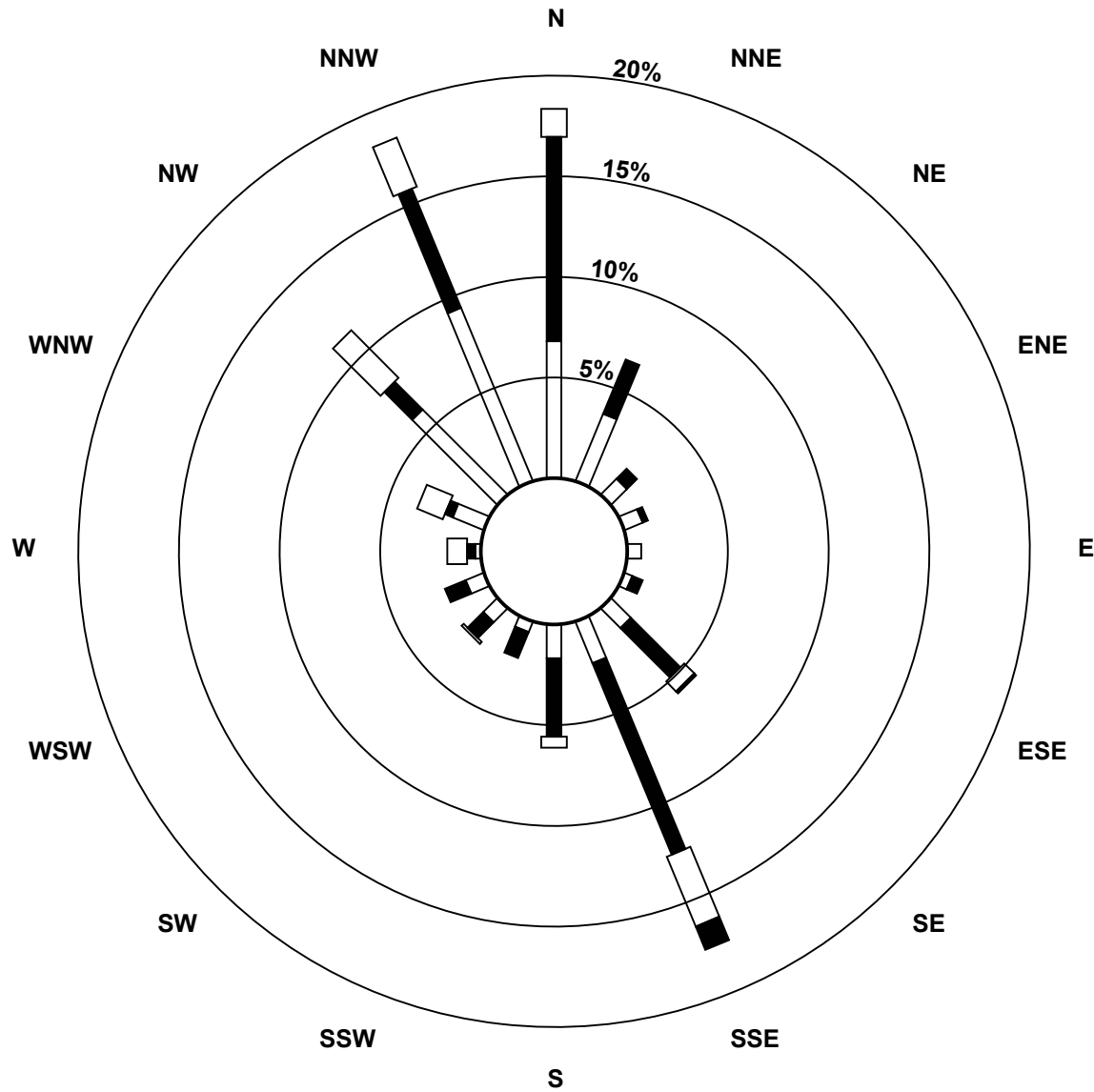
Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	278	38.66	38.66
6 - 11	324	45.06	83.73
12 - 19	107	14.88	98.61
20 - 28	10	1.39	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 719

Total Number of Hours: 720

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

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



Total Number of Valid Hours: 719



Maximum Speed: 35 km/h on Nov 6 07:00	Maximum Daily Speed Average: 16.0 km/h on Nov 7	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 25 21:00	Minimum Daily Speed Average: 1.7 km/h on Nov 23	Hours of Data: 719
Maximum Diurnal Speed Average: 3.3 km/h at hour 20	Minimum Diurnal Speed Average: 0.2 km/h at hour 7	Hours of Missing Data: 1
Monthly Average Velocity: 1.5 km/h 343.5 deg	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 6 Median = 9 Q ₃ = 13 P ₉₀ = 17 P ₉₉ = 28	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-Nov	SW2	WSW5	SW3	SE2	S3	SW3	SSE6	SSE9	SSE9	SSE6	SSE7	SW9	WSW11	WSW11	WSW7	WSW9	W7	S1	SW2	SSE4	SSE7	SE13	SE12	SE8	SSW4.3	SE13
2-Nov	SE9	SSE11	SSE9	SE8	SSE8	SE8	SSE11	SSE11	ESE5	SSE8	SSE9	SE6	SSE9	SSE14	SSE19	SSE18	SSE13	SSE9	SSE13	S8	SE10	SE16	SSE9	SSE8	SSE10.1	SSE19
3-Nov	S10	S13	S9	S7	S10	S8	S6	S5	SE7	E3	NW4	NW4	NW7	N9	NNE11	NNE11	NNE12	NNE10	NNE11	N9	NNE7	NNE5	ENE7	NE3	ENE1.8	S13
4-Nov	ENE6	E7	ESE7	SSE7	S8	SSW8	ESE10	ESE11	SE8	ESE10	SE13	SE12	SE11	SE13	SE11	ESE10	SE14	SE15	SE17	AF	SE19	SE14	SSE7	S4	SE9.6	SE19
5-Nov	WSW3	NW9	WNW7	WNW18	WNW23	WNW18	WNW19	WNW19	WNW22	WNW21	NW15	WNW18	WNW17	NW17	NW13	NW8	W8	WSW11	SW6	SW12	SW16	SSW9	SSW12	S15	WNW11.1	WNW23
6-Nov	S18	S17	SSE18	SE25	SSE34	SE33	SSE35	SSE32	SSE28	SSE32	SSE29	SSE23	SSE22	SSE14	SSE18	SSE17	SSE11	S5	SSW4	WNW13	NNW9	NW16	NW21	NNW16	SSE14.2	SSE35
7-Nov	NW13	NW19	NNW23	NNW24	NNW20	NNW19	NNW19	NNW17	NNW15	N18	N19	N16	NNW20	NNW19	NNW19	NNW16	NNW12	NNW13	NNW14	NNW14	NNW16	NNW10	N9	NNE6	NNW16.0	NNW24
8-Nov	NNE4	NNE6	NNE5	NW4	NW5	NNE3	N5	N9	NNW9	N8	NNW10	NNW10	N14	NNW10	NW11	NW7	NNW6	NNE4	NNE5	NNE7	NE4	NNE2	N3	N3	N5.9	N14
9-Nov	N2	NNW3	NNW3	NW3	N3	N2	NNW4	NW3	NW4	NNW3	N3	N5	N7	NNE11	NNE9	NNE7	NNE8	NNW6	NNW6	N9	NNE10	NNE13	NNE7	NNW6	N5.2	NNE13
10-Nov	NNW6	NNW10	NNW12	NNW11	NW10	NNW9	NW10	NNW9	N10	N14	NNE14	N14	N18	N20	N17	N15	N10	N10	N9	N10	N12	NNW8	NNW7	NW9	N11.0	N20
11-Nov	NW10	NW10	NNW9	NNW8	N8	NNE7	NE6	NE6	N5	ENE3	E1	WNW4	NNW6	NNW7	NNW5	NNW6	N5	NE6	NNW3	N5	NNW5	NNW4	NNW4	NW3	NNW4.9	NW10
12-Nov	NW3	NW2	NNW2	S3	SW11	SW11	SW12	SSW8	SSW10	S11	S11	S10	S8	SSE9	SSE13	SSE15	SSE13	SSE15	SE9	SSE9	SSE13	SSE15	SSE15	SSE12	S8.4	SSE15
13-Nov	SSE13	SSE15	SSE18	SE17	SSE20	SE17	SSE13	SSE9	SSE11	SSE12	SE14	SSE15	SSE11	SSE8	SSE6	SSE4	N6	N8	N4	NNW4	NNW5	NNW4	NNW5	NW4	SE6.8	SSE20
14-Nov	NW4	NW4	NW4	NW5	NNW5	NW6	NW3	NW5	NNW5	NNW6	NNW8	N11	N10	N11	N10	N7	WNW5	SE1	NNW1	NNW4	NW5	W6	WSW10	S5	NNW4.6	N11
15-Nov	S8	S10	S9	S8	SSW8	S9	S9	S9	S9	S9	SSE13	SSW8	WSW15	NNW7	NNW10	NNW12	N14	N19	N21	NNW16	NNW16	NNW17	NW18	NNW15	NW3.1	N21
16-Nov	NW14	NNW16	N21	NNW20	NNW16	NNW15	NNW16	NNW15	NNW13	NNW12	NNW11	NNW12	NNW13	NNW7	NNE3	SW1	WSW2	WNW2	NW2	NW2	NW2	NNW2	SSE1	S3	NNW8.5	N21
17-Nov	SE8	SSE10	SSE13	SSE13	SSE15	SSE14	SSE15	SSE13	SSE14	SE9	SSE7	SSE14	SSE11	SSE16	SSE13	SSE9	SE7	NNW1	NNW5	NNW6	NW5	WNW4	NW3	NNW4	SSE7.2	SSE16
18-Nov	NW7	NW8	NW9	N14	NNW14	NNW9	N6	N4	WNW2	NW6	NW11	NW13	NW16	NW17	NNW15	NW14	NW16	NW16	NNW10	N9	N6	NNW7	NNW7	NNW8	NW9.9	NW17
19-Nov	NNW8	N6	NNW8	NNW7	N7	NW4	NW2	WNW4	NW5	WSW7	WSW11	SW10	SSW8	SW8	SW8	SSW7	SSE8	S10	SSE16	SSE15	SSE13	SSE11	SSE7	ENE3	SSW3.1	SSE16
20-Nov	ESE6	E3	SSE7	SSE5	SSE6	SSE11	SSE9	S4	SSE4	SSE4	SSE6	SSE12	SSE13	SSE10	SE9	SE7	SE2	N1	NNW4	N7	N10	N7	NNW8	NNW8	SE3.2	SSE13
21-Nov	N10	N8	N8	N7	N9	NNW6	NW7	NNW9	NNW7	NNW7	N10	NNW12	NNW10	NNW11	NNE8	NNE5	NE10	NE13	ENE11	ENE12	ENE8	ENE4	NE7	NE10	NNE7.3	NE13
22-Nov	NE9	NE10	NE6	NNE6	N8	N10	NNE9	NE8	NNE9	NNE10	NNE11	NNE13	NNE14	NNE13	N13	N13	N13	N11	N13	N12	N11	N9	N13	N11	NNE10.2	NNE14
23-Nov	N9	NNW6	NNW3	NNW4	NW3	NW3	E3	SSE4	S6	S7	S8	S7	SSE8	SSE12	SSE11	S9	SSW6	WSW3	NNW3	WNW3	N1	NNW1	NW2	NNW3	S1.7	SSE12
24-Nov	NNW5	N9	N7	N9	NNW8	NNW7	NNW7	NNW6	NNW5	N5	N6	N6	NNE4	N3	N2	N3	N4	NNE4	NW3	NNE3	ENE5	NNE3	NNE4	N6	N4.7	N9
25-Nov	N6	NNE7	NNE7	N6	N10	N10	NNW7	NNW7	N7	N10	N8	N9	N10	N10	N8	N7	NNW4	WNW2	NNW4	NW4	SE0	NNW1	NNW1	S5	N5.6	N10
26-Nov	SSE8	SSE11	SSE9	SSE10	SE8	SE10	SSE12	SSE9	SSE10	SE6	SSE5	SSE9	SSE4	SSE8	SSE7	SE4	NNW3	NNW7	NNW9	NNW9	N13	N10	N13	N19	ESE2.7	N19
27-Nov	N16	N14	N11	N9	N9	N11	NNW7	N9	NW5	N7	NNE13	N5	N4	N4	WNW5	NW4	WNW2	NW4	NNW3	NNW4	NW4	NNW4	N5	N6	N6.4	N16
28-Nov	N9	N10	NNE9	NNE11	N9	N9	N8	N10	N9	N10	NNE12	N13	N14	N13	N12	N9	NNW10	NNW9	N8	NW4	NW3	NW2	WSW2	SSE3	N8.1	N14
29-Nov	SSW2	SW5	SSW5	SSE9	SSE13	SE11	SE12	SSE11	SE11	S8	WSW12	W12	W21	W17	W18	WNW16	NW15	NW16	NW18	NW18	NW19	NW17	NW18	NW20	W6.6	W21
30-Nov	NW22	NW20	NW19	NW16	WNW17	WNW15	W23	W25	W26	W22	W16	SSW8	SSE10	S10	S11	SSE18	SSE20	SSE22	SSE23	SSE21	SSE22	SSE24	SSE27	SSE22	SW7.8	SSE27

NNW2.1	NNW2.1	N2.0	N1.9	NW1.4	NNW0.7	SW0.2	NNW0.4	WSW0.9	NNW0.5	N0.7	NW1.0	NW2.3	NNW2.1	N1.5	N1.1	NNW1.6	N2.1	N2.5	NNW3.3	N2.4	N1.4	NNW1.9	N2.1	Diurnal Average	
NNW22	NW20	NNW23	SE25	SSE34	SE33	SSE35	SSE32	SSE28	SSE32	SSE29	SSE23	SSE22	N20	NNW19	SSE18	SSE20	SSE22	SSE23	SSE21	SSE22	SSE24	SSE27	SSE22	Diurnal Maximum	

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



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 8 km/h on Nov 6 07:00	Hours of Data: 719
Minimum Value: 1 km/h on Nov 27 18:00	Hours of Missing Data: 1
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 3 P ₉₀ = 5 P ₉₉ = 7	Hours of Calibration: 0
	Percent Operational Time: 99.9

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

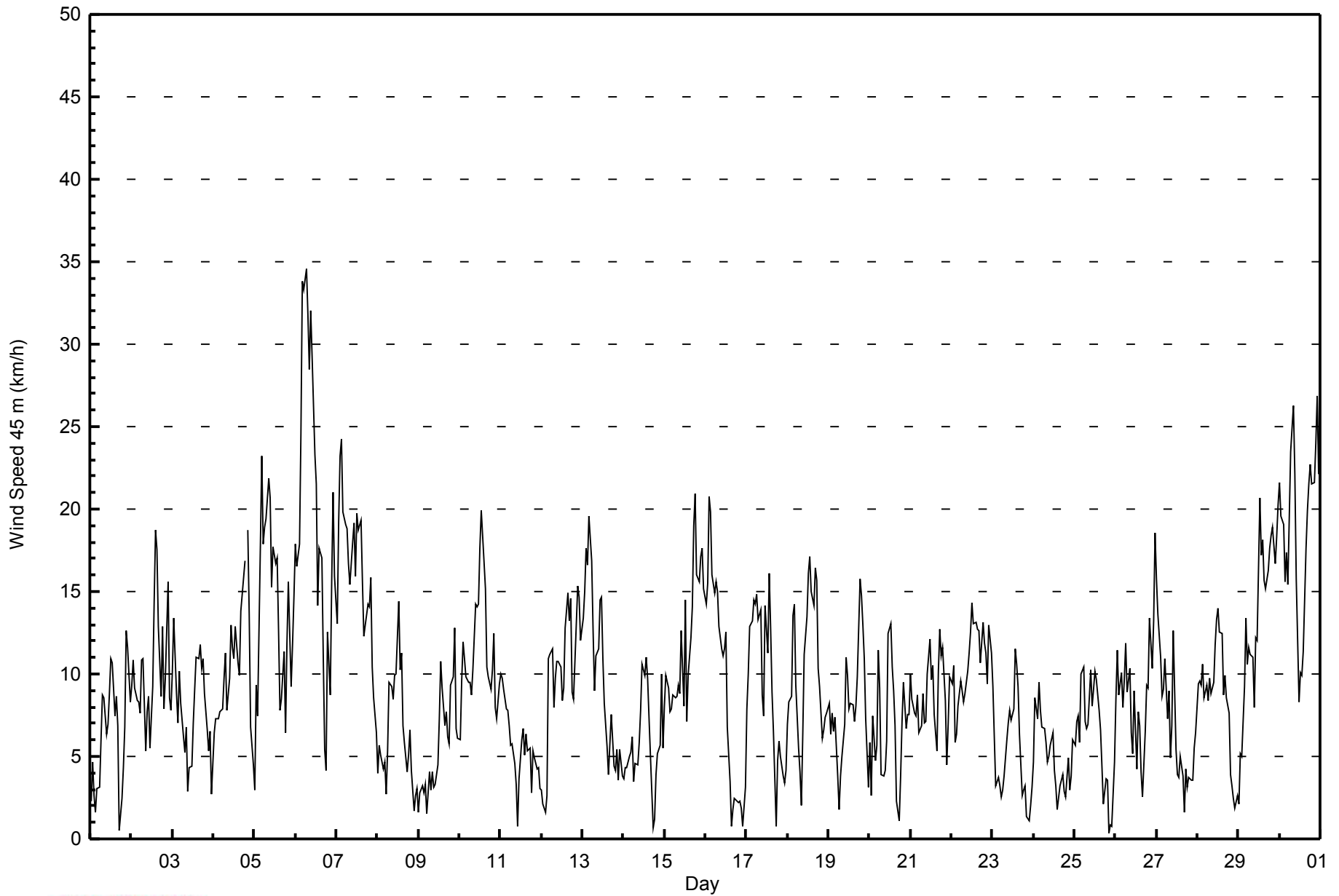
Diurnal Maximum

AF - Analyzer Failure



WBEA
Hourly Averages

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





WBEA
Cumulative Frequency Distribution

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

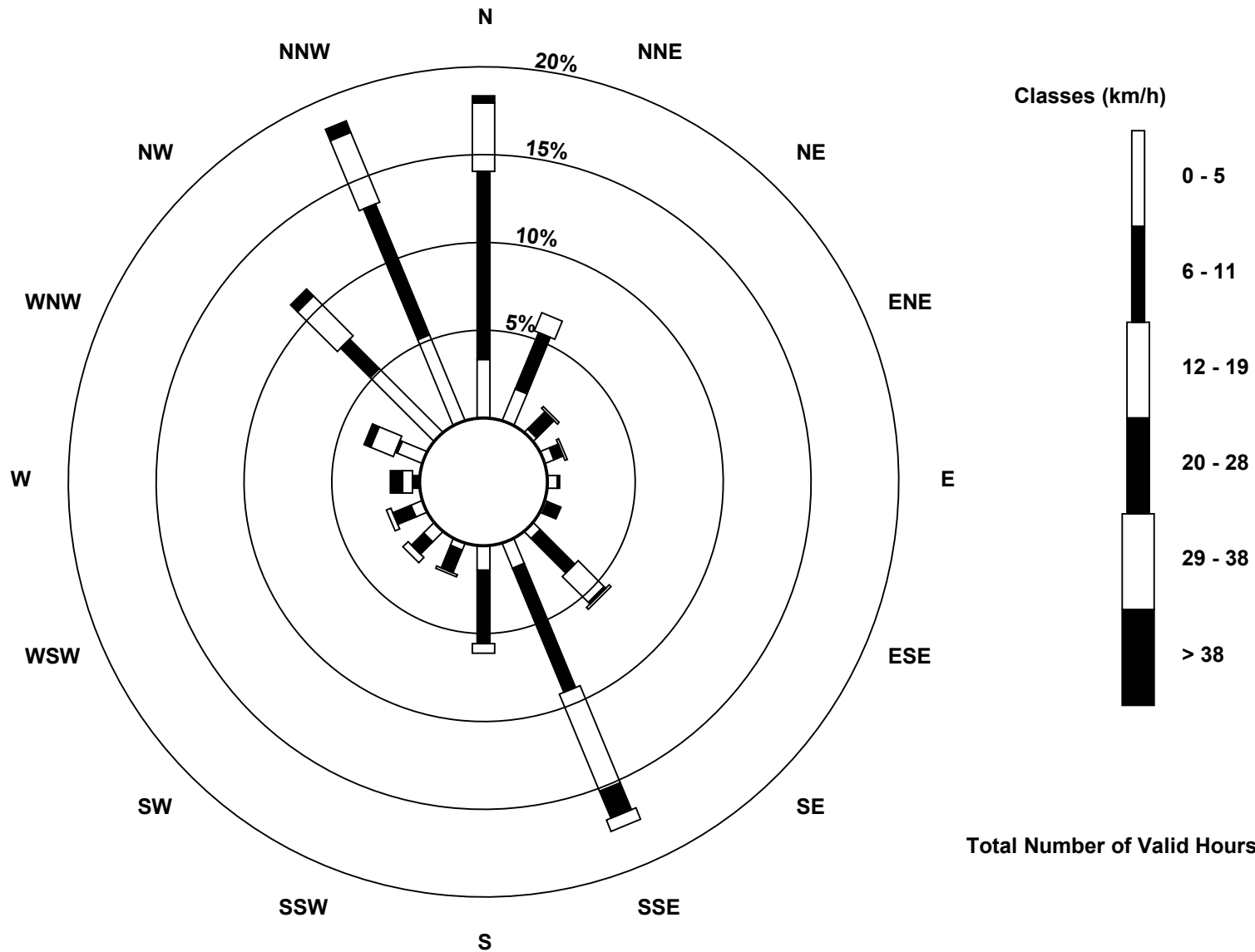
Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	174	24.20	24.20
6 - 11	332	46.18	70.38
12 - 19	174	24.20	94.58
20 - 28	33	4.59	99.17
29 - 38	6	0.83	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 719

Total Number of Hours: 720

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

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



Total Number of Valid Hours: 719



Maximum Speed: 49 km/h on Nov 6 07:00	Maximum Daily Speed Average: 23.1 km/h on Nov 7	Hours in Service: 720
Minimum Speed Value: 1 km/h on Nov 24 15:00	Minimum Daily Speed Average: 2.8 km/h on Nov 23	Hours of Data: 720
Maximum Diurnal Speed Average: 4.7 km/h at hour 20	Minimum Diurnal Speed Average: 1.3 km/h at hour 11	Hours of Missing Data: 0
Monthly Average Velocity: 2.9 km/h 333.7 deg	Percentiles: P ₁ = 2 P ₁₀ = 6 Q ₁ = 9 Median = 12 Q ₃ = 17 P ₉₀ = 25 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-Nov	SW4	WSW6	WSW9	WSW9	WSW9	WSW10	SW6	SSW7	SSW9	S6	S6	SW10	WSW12	SW12	WSW9	WSW12	W13	SW7	SSW2	SSW3	SW5	S4	SSE9	SSE12	SW6.8	W13
2-Nov	SSE8	SSE12	SSE12	SSE13	SSE8	SSE13	SSE14	SSE12	SE15	SSE16	SE18	SE11	SE15	SE16	SSE19	SSE21	SE28	SE23	SE32	SE21	SE23	SE25	SE21	SSE14	SSE17.0	SE32
3-Nov	SSE16	SSE19	SSE12	SSE8	SSE14	SSE9	SSE6	S6	SE8	ENE2	NNW5	NW8	NW10	N12	N15	NNE14	NNE15	N13	NNE14	N12	NNE8	NNE7	ENE8	NE4	NE3.4	SSE19
4-Nov	ENE8	E10	ESE11	SE10	SSE9	S9	ESE16	ESE18	ESE12	ESE15	SE19	SE16	SE16	SE18	SE17	SE18	SE22	SE25	SE28	SE28	SE29	SE25	SSE11	SSE7	SE15.8	SE29
5-Nov	SW6	WNNW14	W12	WNNW26	WNNW32	WNNW25	WNNW26	WNNW27	WNNW29	WNNW28	WNNW22	WNNW25	WNNW24	WNNW24	W12	WNNW14	SW8	SW17	SW21	SSW12	S16	S19	S16	S19	W16.0	WNNW32
6-Nov	SSE22	SSE23	SE28	SE35	SE48	SE45	SE49	SE45	SE40	SE43	SE39	SE34	SE30	SSE17	SE20	SSE19	S14	S9	SW10	W23	NW17	NW27	NW31	NNW23	SSE18.7	SE49
7-Nov	NW20	NW29	NNW35	NW35	NNW29	NW29	NNW27	NNW23	NNW22	NNW26	N26	N22	NNW27	NNW26	NNW27	NNW22	NNW19	NNW21	NNW22	NNW20	NNW22	NNW16	N15	NNE11	NNW23.1	NW35
8-Nov	NNE7	NNE9	N7	NNW7	NW8	NNW5	NNW9	NW15	NNW16	NNW14	NW12	NNW13	N19	NW13	NW13	NW10	NNW8	N9	NNE12	NNE10	N6	NNW5	NNW7	NW8	NNW9.3	N19
9-Nov	NW7	NNW7	NNW6	NNW4	NW4	N3	N7	N5	NNW6	NNW5	NNW4	N6	N10	N13	NNE12	NNE10	NNE12	N10	N10	N14	NNE18	NNE19	NNE11	N9	N8.4	NNE19
10-Nov	NNW9	N15	NNW18	NNW19	NW17	NNW16	NNW14	NW16	N16	N20	N19	N19	N24	N27	N22	N20	N14	N15	N14	N15	N17	NNW12	NNW11	NNW13	N16.3	N27
11-Nov	NNW14	NNW14	NNW15	N13	N12	NNE10	NNE8	NE10	NNE9	ENE5	NNE2	NW5	NNW7	NNW7	N6	NNW8	N7	NNE7	NNW3	ENE5	ENE5	ESE4	ESE2	SE2	N6.2	NNW15
12-Nov	SSE2	SSW3	SSE3	SW11	SW12	SW13	SW13	SSW9	S12	S14	S11	S11	S9	SSE10	SSE13	SSE16	SSE18	S14	S8	S6	SSE10	SSE14	SSE10	SSE12	S9.7	SSE18
13-Nov	SSE12	SSE11	S11	S11	S13	SSE14	SSE12	SSE13	SSE12	SSE9	SSE9	SSE12	SE13	SE11	SE7	SE6	NNE5	N9	NNE9	N8	NNW10	NNW11	NNW9	N12	SE4.6	SSE14
14-Nov	NNW9	NW11	NNW10	NNW9	NNW10	NNW14	NNW10	NNW10	NNW13	NNW12	N12	N15	N13	NNW14	NNW13	N10	W10	WSW4	WSW6	WSW14	WSW14	WSW17	WSW18	SW12	NW8.4	WSW18
15-Nov	SW17	SSW15	SSW13	SW12	SW15	SSW13	SSW11	SSW10	SSW12	SSW10	S9	SW14	WSW18	NW10	NNW14	NNW19	N21	N28	N32	NNW26	NNW24	NNW26	NNW27	NNW26	WNNW8.0	N32
16-Nov	NW23	NNW26	N31	NNW29	NNW25	NNW23	NNW25	NNW24	NNW21	NW18	NNW17	NW16	NNW17	NNW9	NNW6	NNE5	NE5	NW3	NW13	NNW10	NNW7	NW5	WSW3	SW4	NNW14.5	NNW31
17-Nov	SW5	SSW4	S7	SSE8	SSE13	SSE13	SE20	SSE18	SSE18	SSE11	SSE12	SSE16	SE17	SSE23	SSE19	S12	SSW5	W5	NNW7	NNW19	NW13	NW8	NW6	N12	SSE6.4	SSE23
18-Nov	NNE16	N13	N19	N22	NNW24	NW15	NW8	NW9	NNW11	NW14	NW16	NNW19	NW22	NW24	NW22	NW20	NNW26	WNNW25	NW18	NW12	NW10	NW12	NW15	NW15	NW15.8	WNNW26
19-Nov	NW17	NW12	NW15	NW12	NNW12	NNW7	NNW4	WNNW7	W9	WSW10	SW14	SW12	S8	SSW9	SW10	SSW8	S11	S14	SSE16	SSE16	S16	SSE16	SSE13	SE6	SW5.1	NW17
20-Nov	SE7	SE8	SSE12	SE11	SE12	SSE13	SE15	SSE9	SSE8	SSE8	SSE10	SSE13	SSE11	SSE10	SSE8	SSE6	SE6	SE6	E4	N9	N14	NNE10	N12	N12	SE5.4	SE15
21-Nov	N14	N13	NNE12	N11	N13	N9	NNW10	N13	NNW11	NNW12	N14	NNW16	NW13	NNW14	NNE10	NE7	NE15	NE19	NE15	NE16	ENE13	ENE9	NE12	NE16	NNE11.0	NE19
22-Nov	NE15	NE16	ENE9	NNE9	NNE11	NNE12	NNE13	NE12	NE13	NNE15	NNE15	NNE16	NNE20	NNE18	NNE18	N17	N17	N15	N18	N17	N16	N13	N18	N16	NNE14.3	NNE20
23-Nov	N12	NNW9	N5	NNW5	NW3	WNNW4	NE2	SE7	SSE9	S10	S8	S9	SSE8	SE12	SSE13	S11	SSW11	SSW14	SW10	WSW4	SW3	WSW3	NNW1	NNW7	S2.8	SSW14
24-Nov	N12	N14	N12	N14	N11	NNW11	N11	N9	N8	N7	N8	NNE5	N3	N1	N3	NNE5	ENE10	N3	E7	E11	E9	E7	NE7	NE7	NNE6.7	N14
25-Nov	NNE9	NE13	NE14	NNE11	N13	N13	N12	N11	N11	N14	N10	N10	N12	N11	NNE9	NNE8	NNE8	NNE7	N3	N5	ENE2	SE7	S3	SE10	NNE7.6	NE14
26-Nov	SE16	SSE15	SSE13	SSE7	SSE12	SSE12	SSE15	SSE8	S9	SSE8	SE7	SE10	SE6	SE8	SSE4	SSE4	ENE3	N9	N16	N16	N20	NNE16	NNE21	N28	E3.4	N28
27-Nov	N24	N19	N17	N15	N17	N20	N14	N14	N10	NNE12	NNE18	NNE8	N5	N5	NNW7	NW8	NNW7	NNW9	NNW9	NNW7	N9	NNE10	NNE10	N11	N11.5	N24
28-Nov	N12	N13	NNE13	NNE14	NNE11	N13	N11	N13	N13	N13	NNE16	N17	N18	N18	N17	N12	N15	N14	N12	N7	NNW6	NNW5	WNNW4	SW5	N11.6	N18
29-Nov	SW10	SW15	SW15	SSW8	SSW7	SSW7	SW11	SW15	SW11	SW17	WSW22	WSW20	WSW29	WSW27	WSW26	W23	WNNW24	NW25	NW27	NW28	NW29	NW29	NW31	NW32	W16.4	NW32
30-Nov	WNNW34	WNNW31	WNNW31	WNNW27	WNNW29	W24	W38	W39	WSW38	WSW32	WSW23	SW13	SSW12	SSW11	SSW13	S15	S18	S20	SSE20	S17	SSE20	SSE24	SSE21	SSE21	WSW14.5	W39

NNW4.0	NNW4.0	NNW4.2	NNW4.4	NW3.8	NW2.9	NW1.8	NNW2.1	NNW1.9	NNW1.8	NNW1.3	NW1.8	NW3.1	NNW3.1	NNW2.6	NNW2.3	NNW2.6	N2.8	N3.8	NNW4.7	N4.1	N2.7	NNW3.5	NNW3.8	Diurnal Average	
WNNW34	WNNW31	NNW35	SE35	SE48	SE45	SE49	SE45	SE40	SE43	SE39	SE34	SE30	N27	NNW27	W23	SE28	N28	SE32	NW28	NW29	NW29	NW31	NW32	Diurnal Maximum	

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

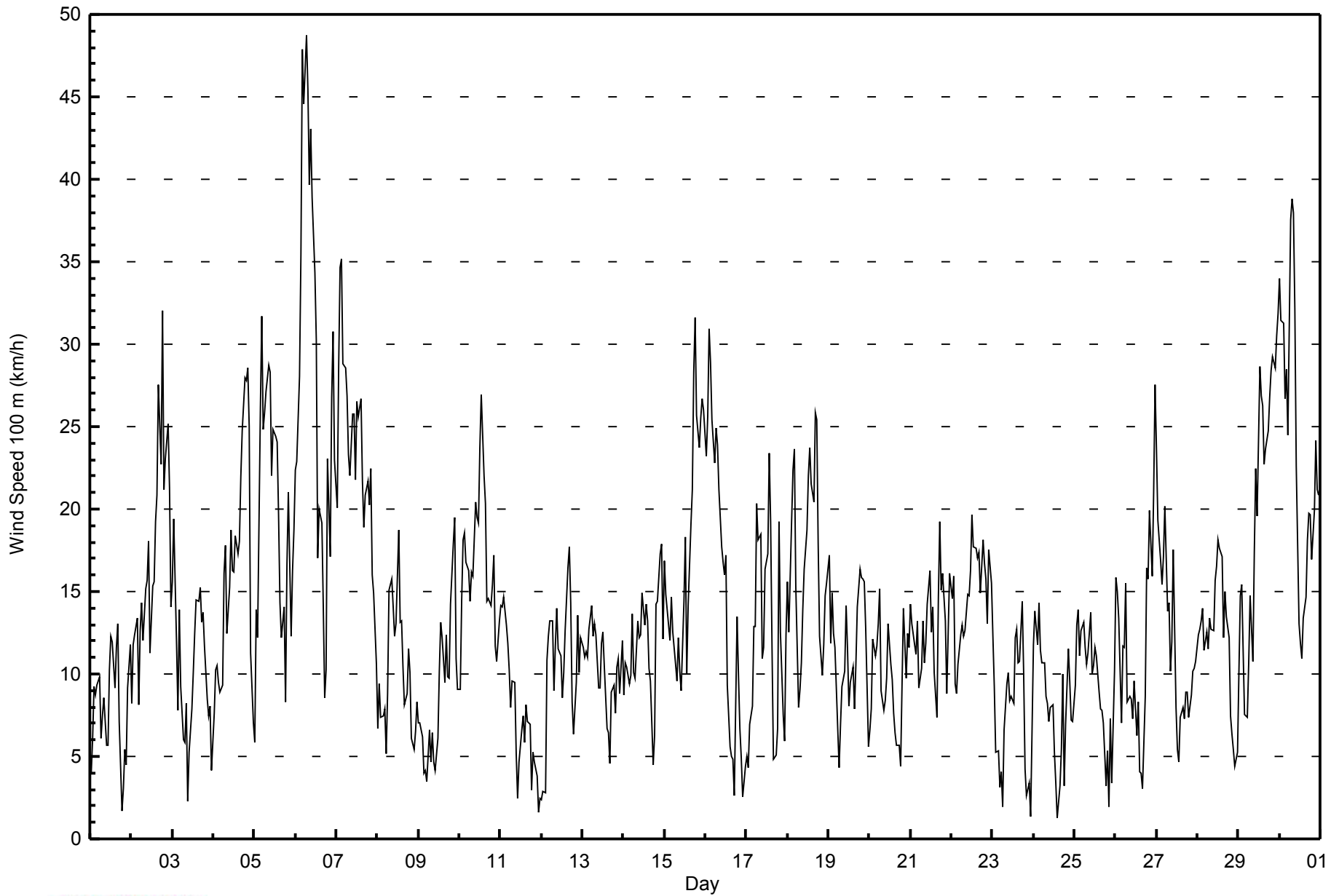


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 7 km/h on Nov 26 23:00														Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0											
Minimum Value: 0 km/h on Nov 25 20:00																									
Percentiles: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



WBEA
Hourly Averages

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





WBEA
Cumulative Frequency Distribution

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

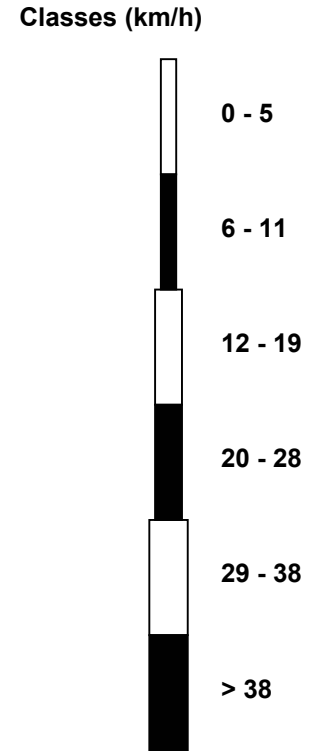
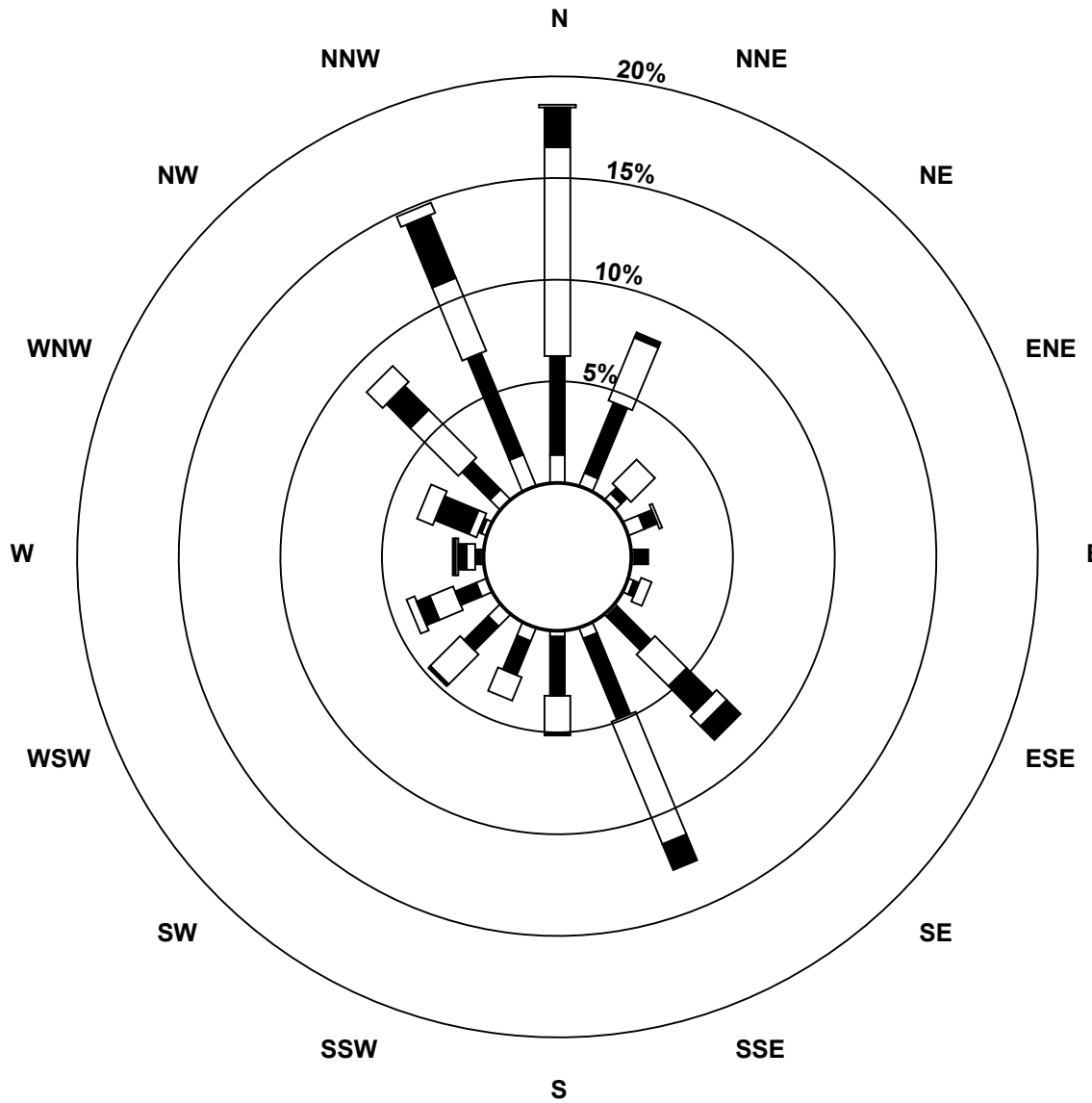
Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	69	9.58	9.58
6 - 11	235	32.64	42.22
12 - 19	282	39.17	81.39
20 - 28	98	13.61	95.00
29 - 38	28	3.89	98.89
> 38	8	1.11	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

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



Total Number of Valid Hours: 720



Maximum Speed: 53 km/h on Nov 6 07:00	Maximum Daily Speed Average: 26.3 km/h on Nov 7	Hours in Service: 720
Minimum Speed Value: 1 km/h on Nov 23 07:00	Minimum Daily Speed Average: 2.6 km/h on Nov 3	Hours of Data: 699
Maximum Diurnal Speed Average: 6.2 km/h at hour 20	Minimum Diurnal Speed Average: 3.2 km/h at hour 16	Hours of Missing Data: 21
Monthly Average Velocity: 4.5 km/h 324.0 deg	Percentiles: P ₁ = 3 P ₁₀ = 7 Q ₁ = 11 Median = 15 Q ₃ = 21 P ₉₀ = 29 P ₉₉ = 43	Percent Operational Time: 97.1

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-Nov	W6	WNW5	W14	W14WSW18	WSW16	WSW13	SW11	SW16	SW10	SW7	WSW12	WSW14	WSW14	WSW12	WSW14	W15	WSW9	SW9	WSW12	W15	WSW13	SSW6	S9	WSW11.1	WSW18			
2-Nov	S10	S11	S14	SSE13	SSE12	S17	S17	SSE20	SSE21	SSE16	SSE16	SSE17	SSE17	SSE16	SSE20	SSE21	SE29	SE28	SE31	SE27	SE28	SSE28	SSE25	SSE17	SSE19.2	SSE31		
3-Nov	SSE16	SSE18	SSE11	SSE8	SSE14	SSE9	S6	S6	SSE7	NE1	N6	NNW7	NNW11	N13	N15	NNE15	NNE16	N14	NNE14	AF	AF	AF	AF	AF	ENE2.6	SSE18		
4-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	SE19	SE21	SE22	SE22	SE26	SE28	SE33	SE32	SE29	SE13	S9	---	SE33
5-Nov	WSW10	WNW17	W17	WNW30	WNW36	WNW28	WNW30	WNW31	WNW33	WNW31	WNW26	WNW27	WNW26	WNW26	WNW26	WNW23	WNW18	W14	WSW16	SW10	SW18	SW25	SSW17	S21	S25	W18.6	WNW36	
6-Nov	SSE26	SSE25	SE32	SE40	SE50	SE46	SE53	SSE48	SSE39	SSE42	SSE37	SSE32	SSE29	SSE16	SSE18	S19	SSW17	SSW11	WSW15	WNW29	NW24	NW34	NW36	NNW27	SSE17.9	SE53		
7-Nov	NW25	NW34	NNW40	NNW40	NNW34	NNW33	NNW29	NNW25	NNW25	NNW28	N28	N23	NNW29	NNW28	NNW29	NNW24	NNW22	NNW25	NNW26	N23	NNW25	N18	N19	NNE18	NNW26.3	NNW40		
8-Nov	NNE13	NNE14	N11	NNW12	NNW10	NW10	NW13	NW20	NNW23	NNW21	NW16	NNW14	N19	NNW14	NW14	NW12	NNW9	N10	NE17	NNE16	NNE10	N10	N13	NNW12	NNW12.6	NNW23		
9-Nov	NW10	NNW10	NNW10	N7	WNW7	NNW3	NE7	NNE6	N4	NW4	NNW6	N7	N11	N14	NNE12	NNE10	N14	N12	N13	N20	NNE23	NNE24	NNE16	N12	N10.1	NNE24		
10-Nov	NNW13	N16	N19	NNW23	NNW22	NNW21	NNW18	NW19	N20	N23	N20	N20	N25	N28	N23	N22	N16	N17	N18	N18	N20	N14	N12	N15	N18.8	N28		
11-Nov	N17	N16	N16	N16	N14	NNE12	NE10	NNE12	NE15	ENE9	NNE3	NNW6	NNW7	NNW8	N6	NNW9	N7	NNE6	N3	ENE3	E7	ESE7	SSE6	S5	NNE7.1	N17		
12-Nov	SW6	SW9	SSW9	SW12	SW12	SW14	SW14	SSW10	SSW12	SSW13	SSW12	SSW11	S9	SSE9	SSE11	SSE13	S14	SSW14	SW16	SW13	SSW11	SSW12	SSW13	SSW11	SSW11.1	SW16		
13-Nov	SSW10	SSW11	SW14	SSW15	SSW15	SSW15	SSW12	SSW12	SSW12	SW11	SSW8	S7	S6	SSE8	SE9	SE7	ENE2	NNE6	NNE13	NE15	NE13	NNE14	NNE16	NNE20	S2.8	NNE20		
14-Nov	NNE16	N12	N10	N13	NNW17	N17	N15	N16	N14	N14	N15	N16	N13	N15	NNW15	NNW11	W11	W13	WSW16	W19	W19	W21	W28	WSW18	NW10.9	W28		
15-Nov	SW22	SW22	SW21	SW18	SW21	SW20	SW18	SW17	SW18	SW17	SW13	WSW22	WSW22	NW12	NNW16	N22	N25	N33	N37	NNW30	NNW29	NNW31	NNW33	NNW33	WNW11.6	N37		
16-Nov	NNW29	NNW32	N36	N34	NNW30	NNW27	N30	NNW30	NNW26	NNW22	NNW21	NW18	NNW20	NNW10	NW10	N6	NNE5	NNW5	NW21	NNW19	NNW12	NNW9	NW5	W8	NNW18.9	N36		
17-Nov	WSW9	WSW10	SW10	SSW11	S10	SSW10	SSE14	SSE17	SSE23	SSE19	SSE16	SSE20	SSE23	S27	S22	SSW16	SW15	W20	NW18	NNW24	N13	NNW10	NW13	NNW16	SSW7.6	S27		
18-Nov	NNE26	NNE21	N26	N28	NNW29	NNW20	NW14	NW16	NNW21	NW18	NW20	NW22	NW25	NW26	NNW25	NW24	NW31	NW31	NW23	NW18	NW15	NW17	NW19	NW20	NNW20.5	NW31		
19-Nov	NW22	NW17	NW20	NW17	NW16	NW9	NW7	WNW9	W11	WSW13	SW15	SW13	SSW9	SSW11	SW11	SSW10	S11	S15	S20	S18	SSW21	S13	S15	SSE11	WSW7.2	NW22		
20-Nov	SSE12	SSE12	SSE18	SE19	SSE19	SSE11	SSE13	SSE12	SSE11	SSE12	SSE15	S14	S10	SSW9	SSW8	SSW4	S3	SW2	ENE5	NNE11	NNE15	NNE11	N14	NNE13	SSE5.9	SSE19		
21-Nov	NNE16	NNE15	NNE14	NNE13	N15	N11	N11	N16	N13	N15	N15	NNW18	NW14	NNW15	NNE11	NE9	NE18	NE22	NE18	NE19	NE16	ENE11	NE14	ENE21	NNE13.2	NE22		
22-Nov	ENE19	ENE21	ENE14	NE12	NE13	NE15	NE17	NE16	ENE15	NE19	NNE17	NNE17	NNE20	NNE20	NNE20	NNE18	NNE19	NNE16	NNE20	NNE18	NNE17	NNE14	N17	NNE16	NNE16.4	ENE21		
23-Nov	N12	N10	NNE7	N5	NNW2	W6	ESE1	SSE8	SSE9	S13	SSW13	SSW10	S8	SSE11	SSE13	SSW9	SW14	SW17	WSW14	W8	NNW4	NW2	NNW8	N13	SSW2.9	SW17		
24-Nov	NNE16	N16	N13	N17	N12	N12	N11	N9	NNE12	NNE9	NNE9	NNE8	NE5	N3	N1	NE3	NE6	E11	NE4	E12	ESE14	ESE13	E12	ENE11	NE7.7	N17		
25-Nov	NE14	ENE17	ENE16	NE18	N12	N14	N14	N14	N14	N14	N14	NNE10	N11	N12	N11	NNE9	NNE8	NE11	NE8	NNE6	NNE7	NE3	E6	S6	S12	NNE8.7	NE18	
26-Nov	SSE12	SSE15	SSE14	SSE13	SSE16	SSE19	SSE19	SSE16	SSE18	AF	AF	AF	AF	SSE10	S8	S8	SSW3	NNW6	N21	N21	NNE23	NNE19	NNE25	N31	ESE3.2	N31		
27-Nov	N26	N21	NNE21	NNE21	NNE23	NNE26	N17	NNE17	NNE16	NNE16	NNE20	NNE9	N5	N6	NNW7	NNW7	NNW7	N9	N9	N8	NE14	NE16	NNE14	NNE13	NNE14.1	N26		
28-Nov	NNE13	NNE13	NNE14	NNE15	NNE12	N13	N12	N14	N14	NNE13	NNE16	NNE16	N18	NNE19	N18	N13	N16	N16	N16	NNE12	NNE8	NNE7	N4	SW5	N12.7	NNE19		
29-Nov	WSW14	WSW23	WSW21	SW15	SW16	WSW22	WSW22	SW25	SW21	WSW30	WSW32	WSW29	WSW37	W33	W31	WNW27	WNW29	NW31	NW33	NW35	NW35	NW37	NW39	NW40	W23.8	NW40		
30-Nov	NW43	NW40	WNW40	WNW35	WNW37	WNW29	WNW36	W47	W43	W39	WSW31	SW19	SSW18	SSW16	SSW17	SSW16	SSW23	SSW20	SSW20	SSW22	S16	SSW19	SSW20	SSW18	WSW20.6	W47		

NNW6.1	NNW5.9	NNW5.8	NNW6.1	NW5.8	NW5.3	NW3.5	NNW4.1	NNW3.8	NNW4.3	NNW3.9	NNW4.1	NNW4.4	NW4.0	NW3.3	NW3.2	NW3.4	NNW4.0	NNW5.4	NNW6.2	N5.5	NNW4.7	NNW5.6	NNW5.5	Diurnal Average
NW43	NW40	WNW40	SE40	SE50	SE46	SE53	SSE48	W43	SSE42	SSE37	SSE32	WSW37	W33	W31	WNW27	NW31	N33	N37	NW35	NW35	NW37	NW39	NW40	Diurnal Maximum

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



Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 8 km/h on Nov 5 20:00	Hours of Data: 699
Minimum Value: 1 km/h on Nov 9 10:00	Hours of Missing Data: 21
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 7	Hours of Calibration: 0
	Percent Operational Time: 97.1

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

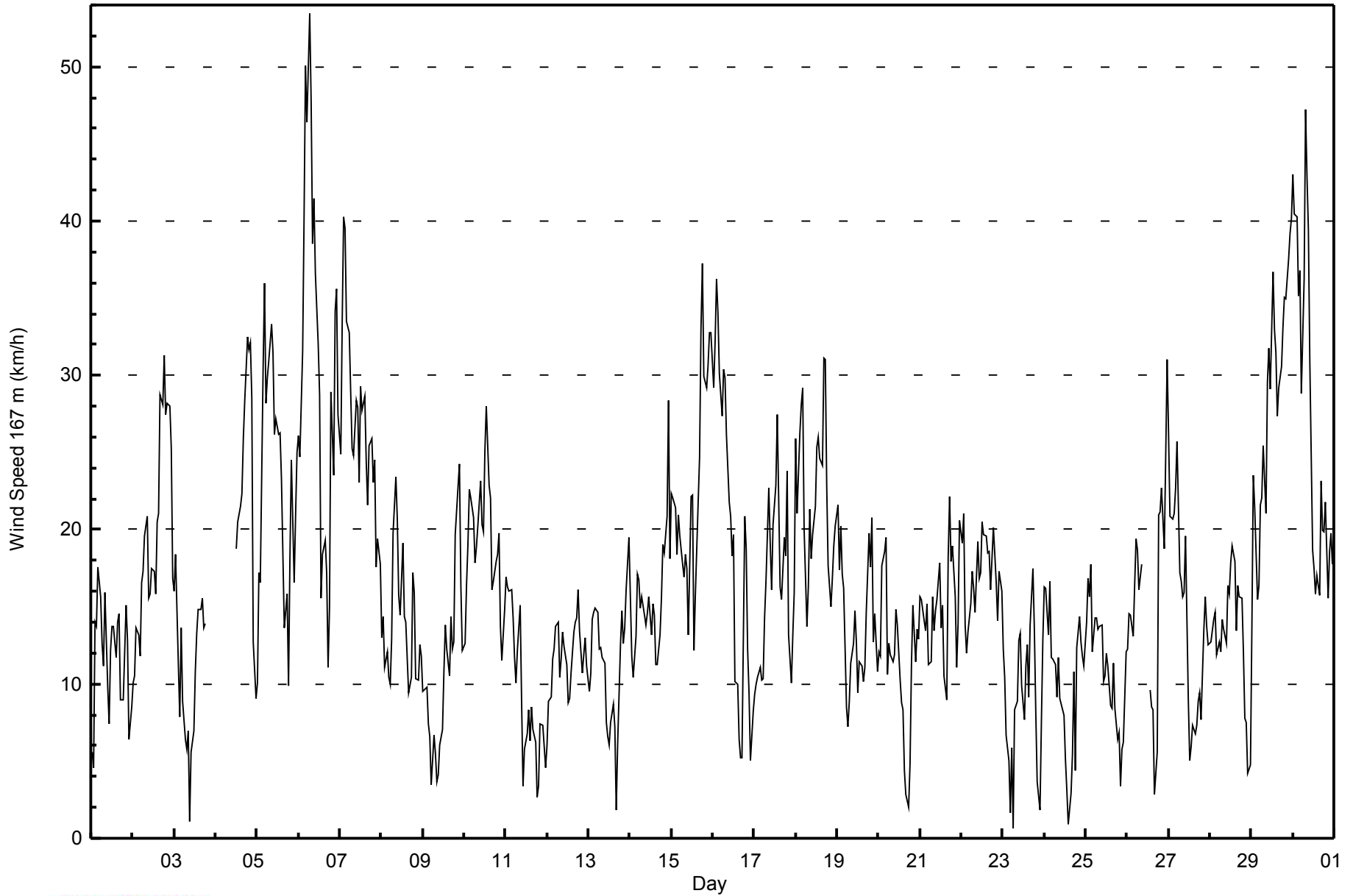
5	5	6	6	5	5	5	6	7	6	6	5	5	6	5	4	4	7	5	8	5	7	7	5	
Diurnal Maximum																								

AF - Analyzer Failure



WBEA
Hourly Averages

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





WBEA
Cumulative Frequency Distribution

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

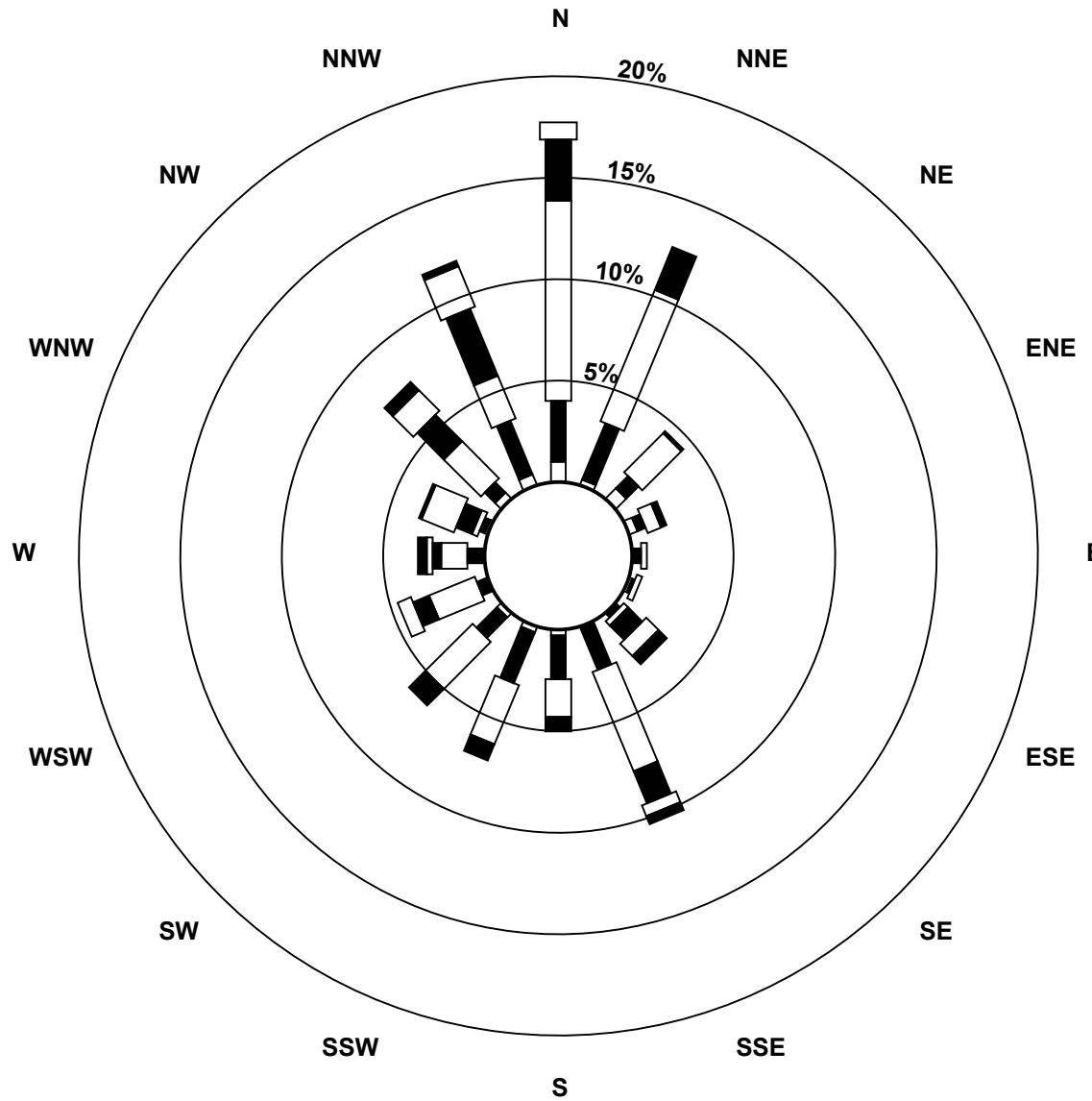
Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	32	4.58	4.58
6 - 11	154	22.03	26.61
12 - 19	305	43.63	70.24
20 - 28	131	18.74	88.98
29 - 38	60	8.58	97.57
> 38	17	2.43	100.00

Total Number of Valid Hours: 699

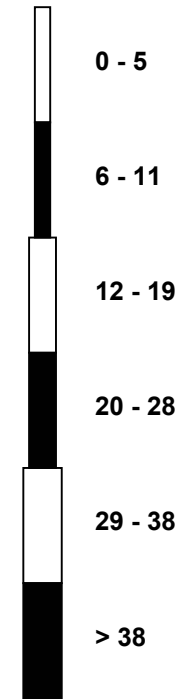
Total Number of Hours: 720

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

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



Classes (km/h)



Total Number of Valid Hours: 699



Direction of Maximum Speed: 149 deg on Nov 6 07:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 340.7 deg on Nov 7	Hours of Data: 719
Direction of Minimum Speed: 332 deg on Nov 14 19:00	Direction of Minimum Daily Speed Average: 1.1 deg on Nov 3
Direction of Minimum Speed: 332 deg on Nov 14 19:00	Hours of Missing Data: 1
Monthly Average Direction: 324.3 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-Nov	218	243	222	135	178	214	154	151	161	156	157	231	258	250	257	250	263	176	232	160	158	145	141	143	187.2
2-Nov	145	149	147	145	150	146	149	151	113	147	156	141	151	156	155	155	161	166	164	178	134	142	154	159	151.8
3-Nov	171	169	176	178	170	174	170	176	143	96	320	312	321	352	15	20	24	16	20	10	30	17	68	46	84.7
4-Nov	61	94	111	160	182	198	109	113	129	117	125	128	126	139	132	119	137	140	130	AF	136	146	161	174	133.5
5-Nov	249	304	300	299	299	299	297	297	295	297	305	298	302	304	320	319	279	251	220	219	223	205	194	186	282.6
6-Nov	180	171	149	141	148	146	149	148	154	151	152	152	149	157	154	154	158	191	200	284	334	316	319	331	156.7
7-Nov	324	323	333	332	334	332	343	336	332	350	356	0	340	343	345	345	345	332	341	345	348	343	359	25	340.7
8-Nov	17	12	32	314	322	13	357	350	343	353	341	343	3	328	310	315	339	23	12	16	46	19	3	353	348.4
9-Nov	353	335	346	312	351	358	330	323	320	341	352	1	355	12	27	27	20	335	331	0	29	31	15	348	1.3
10-Nov	339	348	334	333	322	329	322	332	355	10	13	11	7	360	4	359	2	355	351	358	2	334	329	320	350.4
11-Nov	320	324	331	335	350	17	41	50	5	70	91	284	329	331	339	334	357	39	335	354	348	332	338	325	345.1
12-Nov	315	316	334	188	225	227	228	211	193	184	185	187	186	160	156	157	162	157	142	148	152	154	153	148	174.7
13-Nov	151	150	149	143	147	145	150	155	158	148	146	152	149	153	153	156	2	360	355	339	337	342	331	322	145.5
14-Nov	323	326	319	316	332	326	315	321	340	339	348	10	8	356	353	360	288	142	332	343	324	281	256	186	334.6
15-Nov	186	170	173	172	201	185	178	177	177	180	157	202	257	328	345	343	356	7	358	332	334	343	325	329	285.8
16-Nov	323	331	349	348	338	342	344	341	338	327	334	327	332	345	20	236	258	300	313	322	304	335	163	171	336.0
17-Nov	144	158	148	148	153	152	159	160	156	143	149	157	149	153	152	148	145	338	341	342	309	292	325	340	153.4
18-Nov	323	310	309	351	339	330	355	350	283	314	320	314	315	321	331	315	308	307	328	352	349	342	330	333	324.8
19-Nov	330	349	337	348	0	323	309	294	305	254	239	231	194	215	229	199	167	169	152	155	161	152	150	77	197.0
20-Nov	120	84	159	156	157	161	151	175	155	165	159	159	155	151	141	133	141	353	344	353	1	4	343	346	142.4
21-Nov	353	1	8	4	354	347	326	346	333	336	8	347	329	341	29	28	53	53	60	59	63	67	45	52	13.0
22-Nov	50	53	52	18	11	9	25	46	27	20	12	15	17	12	7	359	358	1	2	0	358	357	359	6	12.8
23-Nov	356	342	335	329	310	323	87	162	171	178	186	176	160	157	160	186	203	248	332	282	359	328	320	331	189.4
24-Nov	332	351	4	11	346	340	345	336	343	355	0	5	30	358	354	6	358	31	311	16	71	30	31	9	359.8
25-Nov	355	32	23	7	354	359	343	339	349	8	8	4	1	358	10	353	336	302	336	312	146	336	343	180	357.6
26-Nov	158	154	150	154	140	144	148	149	155	145	159	164	156	155	157	146	346	339	338	341	2	9	11	359	130.8
27-Nov	359	1	1	353	359	360	344	359	326	0	22	3	350	0	298	304	301	318	331	335	313	332	352	353	351.6
28-Nov	1	1	12	19	8	359	359	0	355	4	13	2	1	10	8	351	346	345	352	318	316	324	258	155	0.4
29-Nov	204	222	210	157	148	146	145	147	143	170	240	262	268	271	265	295	307	318	318	319	324	317	320	317	277.2
30-Nov	313	309	310	313	298	285	278	281	269	271	260	201	160	188	183	155	160	157	153	153	152	153	153	152	209.8
333.1 338.4 356.6 352.9 300.7 265.5 188.0 216.5 219.1 218.9 335.7 278.4 317.4 327.0 352.4 1.6 346.9 348.4 3.7 342.1 9.6 10.4 343.4 349.3																									
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 - November 2014

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 105 deg on Nov 14 19:00	Hours of Data: 719
Minimum Value: 5 deg on Nov 30 18:00	Hours of Missing Data: 1
Percentiles: P ₁ = 6 P ₁₀ = 13 Q ₁ = 16 Median = 20 Q ₃ = 27 P ₉₀ = 44 P ₉₉ = 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-Nov	79	35	76	68	52	59	17	18	16	19	13	29	19	16	18	13	48	90	68	32	18	7	10	19	90
2-Nov	17	14	15	15	32	22	11	15	47	18	16	37	20	13	11	11	11	24	32	85	52	16	40	20	85
3-Nov	17	14	16	21	15	19	16	41	20	36	24	17	15	25	26	28	23	25	29	26	32	36	34	58	58
4-Nov	29	27	24	28	21	27	26	23	22	23	18	16	20	15	18	22	19	14	15	AF	12	22	22	21	29
5-Nov	49	21	25	18	16	17	16	16	15	15	17	16	17	17	20	23	21	16	41	16	7	18	14	13	49
6-Nov	13	14	17	17	16	14	14	15	15	15	14	14	15	17	12	8	11	31	24	37	27	22	13	20	37
7-Nov	17	17	16	15	16	17	21	19	17	18	23	22	18	19	18	17	16	15	17	17	17	19	25	37	37
8-Nov	43	32	40	31	29	52	38	18	21	22	23	29	27	27	20	15	16	11	27	24	27	57	23	40	57
9-Nov	75	35	27	33	28	72	27	59	27	35	38	35	31	27	32	38	23	19	15	19	20	21	29	23	75
10-Nov	25	22	14	16	15	15	15	17	17	22	23	23	22	21	22	20	20	19	21	21	17	23	22	13	25
11-Nov	13	13	15	18	21	39	37	25	36	49	91	60	32	28	32	20	34	27	69	20	14	14	17	21	91
12-Nov	12	24	30	91	15	15	14	17	11	11	11	12	16	17	10	9	8	8	12	12	10	12	10	13	91
13-Nov	16	11	11	12	11	16	22	27	23	17	13	13	16	15	13	52	10	12	16	15	16	17	14	17	52
14-Nov	16	15	15	13	20	16	21	15	23	18	21	24	23	22	19	17	65	72	105	31	32	81	27	26	105
15-Nov	21	14	14	16	16	15	13	15	15	14	11	28	19	42	17	17	18	20	19	18	20	19	14	14	42
16-Nov	12	18	19	18	17	17	18	18	17	16	19	18	17	25	31	72	74	55	45	35	66	79	94	47	94
17-Nov	16	13	7	8	12	11	13	10	12	31	25	14	17	19	28	32	24	94	48	43	21	44	34	24	94
18-Nov	36	19	20	18	15	14	18	27	50	29	20	17	17	17	17	17	16	17	20	17	22	25	28	26	50
19-Nov	23	21	22	19	17	44	47	26	44	18	14	15	18	17	17	12	13	13	7	6	12	19	41	57	57
20-Nov	40	50	29	51	30	13	25	55	34	33	25	11	11	11	15	16	79	48	22	12	20	27	16	15	79
21-Nov	15	20	21	20	19	21	17	18	23	24	23	25	23	20	37	33	22	21	20	20	21	18	20	17	37
22-Nov	21	22	28	23	21	17	21	23	19	19	20	25	21	21	19	18	15	16	16	17	17	17	18	21	28
23-Nov	17	20	26	28	32	40	44	23	14	19	17	15	17	11	12	14	13	37	46	43	89	69	59	44	89
24-Nov	26	19	26	23	18	18	18	22	29	35	23	26	43	34	45	42	29	57	67	51	26	55	27	25	67
25-Nov	29	42	27	23	18	16	20	20	25	22	23	20	16	16	22	21	28	52	45	34	71	63	54	51	71
26-Nov	15	10	12	12	15	15	11	50	13	42	38	11	20	16	14	70	47	25	19	20	22	27	28	20	70
27-Nov	18	17	17	21	19	14	17	12	20	15	23	37	30	39	32	37	62	23	32	16	27	30	18	20	62
28-Nov	17	17	20	23	21	20	19	18	19	20	24	19	18	23	20	20	19	18	19	22	20	33	84	36	84
29-Nov	91	38	30	14	10	9	11	12	10	18	51	31	19	25	17	22	17	14	14	14	13	14	14	14	91
30-Nov	15	14	15	16	17	19	17	17	14	19	18	41	13	13	28	6	6	5	5	5	5	5	8	12	41

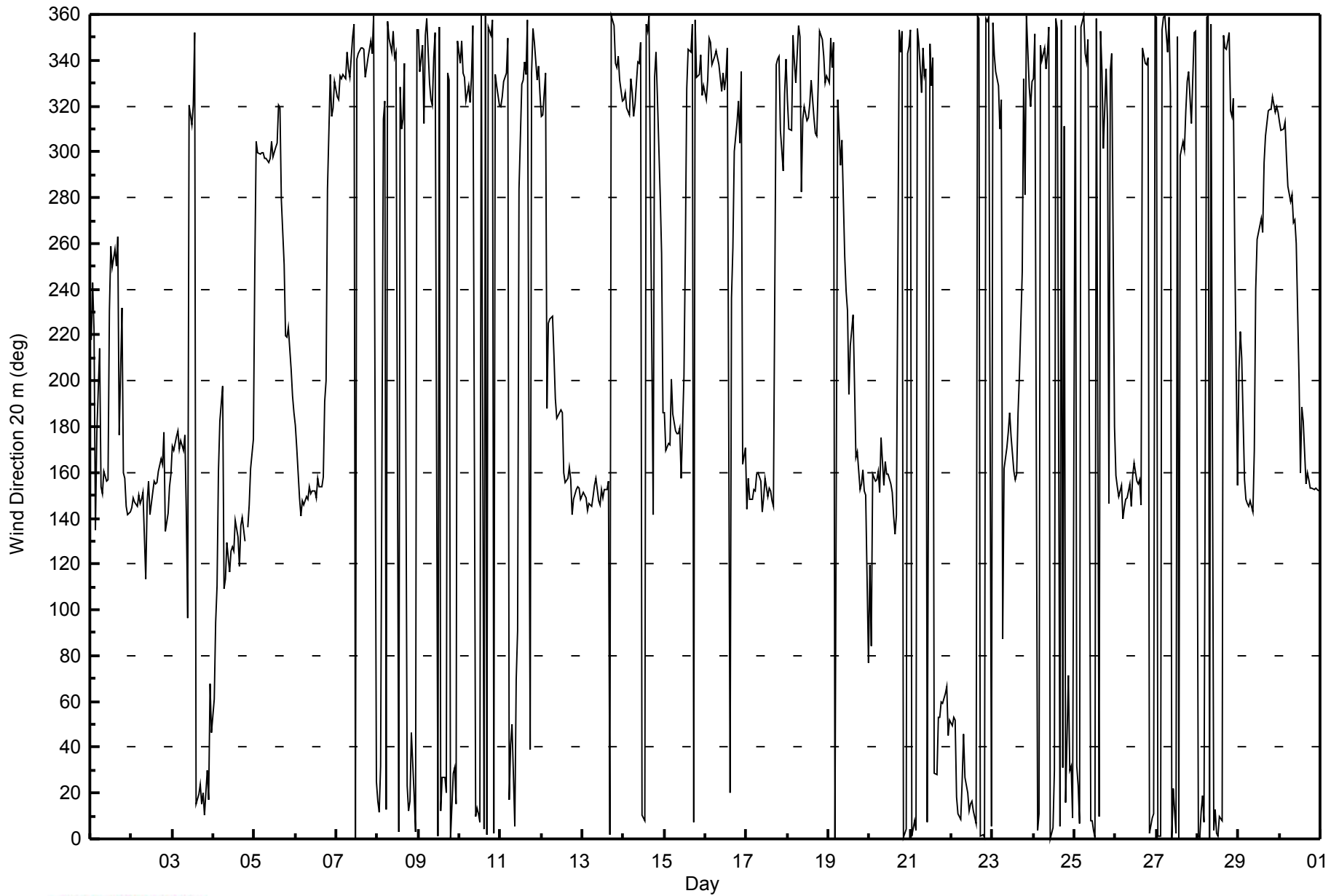
91	50	76	91	52	72	47	59	50	49	91	60	43	42	45	72	79	94	105	85	89	81	94	58	
Diurnal Maximum																								

AF - Analyzer Failure



WBEA
Hourly Averages

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





Direction of Maximum Speed: 139 deg on Nov 6 07:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 335.0 deg on Nov 7	Hours of Data: 719
Direction of Minimum Speed: 162 deg on Nov 25 21:00	Direction of Minimum Daily Speed Average: 1.9 deg on Nov 23
Direction of Minimum Speed: 162 deg on Nov 25 21:00	Hours of Missing Data: 1
Monthly Average Direction: 325.1 deg	Percent Operational Time: 99.9

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	203	239	248	199	204	231	159	148	159	149	147	225	251	241	249	240	250	223	271	164	152	135	136	139	189.7
2-Nov	139	142	140	139	144	139	139	140	116	141	144	131	145	145	144	143	144	150	145	156	123	133	140	151	141.1
3-Nov	158	156	164	167	157	163	162	167	133	89	318	312	316	347	9	15	17	12	14	4	24	5	59	42	54.6
4-Nov	55	87	104	150	171	184	107	107	120	111	118	121	119	131	124	115	130	133	125	AF	131	133	151	166	125.4
5-Nov	236	294	289	288	290	290	288	288	287	288	293	290	293	293	310	307	272	244	214	211	131	133	151	166	274.2
6-Nov	169	159	137	132	138	137	139	139	142	140	141	140	137	146	143	145	155	171	183	274	321	306	310	325	145.7
7-Nov	317	315	326	325	327	325	339	330	326	344	352	356	335	336	339	339	338	327	335	338	341	340	358	21	335.0
8-Nov	6	7	22	316	319	360	349	341	336	343	333	335	357	324	303	310	334	12	15	14	23	331	335	337	342.1
9-Nov	346	351	348	323	349	359	337	324	319	341	344	358	346	6	24	18	18	337	334	354	20	22	11	346	359.0
10-Nov	337	344	331	330	317	325	316	321	349	6	10	4	3	357	358	354	358	350	346	352	356	330	326	315	346.6
11-Nov	316	320	328	334	344	12	32	42	4	55	62	286	326	324	335	327	356	31	334	358	348	342	344	337	344.5
12-Nov	330	335	339	208	216	219	220	201	180	173	175	178	175	147	146	146	154	150	143	146	142	143	143	141	164.7
13-Nov	142	142	141	138	140	138	140	138	144	139	137	142	138	140	140	142	349	350	341	329	342	335	327	319	135.6
14-Nov	323	331	326	316	333	330	320	322	330	332	342	7	2	350	346	353	278	223	275	309	296	254	248	201	325.0
15-Nov	186	170	173	175	195	180	174	171	173	173	150	202	251	322	338	339	350	4	353	326	328	336	318	324	300.1
16-Nov	317	326	344	342	332	336	339	336	333	321	327	320	326	343	8	5	295	290	320	261	323	325	230	159	331.0
17-Nov	145	147	136	139	142	143	146	147	146	136	141	145	136	141	141	142	136	350	330	337	327	305	316	325	141.5
18-Nov	335	308	319	349	335	326	347	344	310	304	310	304	305	313	324	307	299	296	318	341	338	329	315	321	318.1
19-Nov	316	336	325	336	349	324	322	291	289	245	230	223	186	206	220	188	165	168	144	144	157	140	143	85	194.1
20-Nov	113	103	147	143	143	148	140	157	150	152	148	146	144	142	134	128	123	24	351	341	358	358	339	341	126.6
21-Nov	348	359	6	359	349	343	325	339	330	332	3	341	321	334	22	25	48	46	52	51	56	61	39	43	9.3
22-Nov	41	46	45	12	5	4	16	37	22	15	8	10	11	6	3	354	353	357	357	356	354	351	354	2	8.0
23-Nov	353	336	336	326	303	314	67	147	158	169	177	164	146	145	148	173	189	201	273	267	257	304	273	331	175.9
24-Nov	333	346	0	5	342	334	340	335	344	351	357	0	24	356	346	355	357	36	317	31	71	58	38	4	358.0
25-Nov	354	31	21	4	348	352	340	335	347	4	4	360	356	357	7	353	333	293	309	318	162	239	278	140	355.0
26-Nov	143	140	139	143	135	137	140	140	143	139	145	150	142	142	143	134	345	333	336	337	0	7	12	358	105.8
27-Nov	354	358	358	352	358	359	342	355	334	357	20	1	344	354	306	305	338	312	323	341	314	330	351	348	349.9
28-Nov	357	358	7	16	4	354	355	357	351	0	8	359	359	8	5	345	342	340	346	327	323	306	271	161	356.3
29-Nov	189	206	203	155	138	131	139	148	141	179	240	250	256	259	254	283	296	308	308	309	316	307	311	306	268.5
30-Nov	303	299	299	301	290	274	268	271	259	260	250	203	161	179	177	149	154	151	145	143	142	143	142	142	209.3
338.6 343.5 356.9 350.5 320.1 316.4 121.9 319.7 237.5 341.9 7.2 319.6 323.0 336.0 359.9 2.0 346.5 350.0 357.6 337.9 6.3 10.0 343.7 351.3																									
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 45 m (WD45m) - deg
Lower Camp Met Tower - November 2014

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 92 deg on Nov 25 21:00	Hours of Data: 719
Minimum Value: 2 deg on Nov 30 23:00	Hours of Missing Data: 1
Percentiles: P ₁ = 4 P ₁₀ = 9 Q ₁ = 12 Median = 15 Q ₃ = 21 P ₉₀ = 34 P ₉₉ = 83	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-Nov	51	15	47	47	39	54	22	14	16	18	12	24	12	11	12	9	45	83	53	48	11	3	6	10	83
2-Nov	10	10	9	10	12	14	8	11	31	15	13	29	15	8	6	6	12	16	22	56	21	10	24	14	56
3-Nov	14	12	14	17	12	17	15	40	17	37	22	13	12	21	20	21	17	18	19	20	24	29	31	57	57
4-Nov	22	19	19	25	18	24	16	15	14	14	12	12	14	12	13	15	14	11	10	AF	8	15	21	16	25
5-Nov	34	19	22	13	11	12	10	11	10	11	13	11	12	13	17	20	17	14	39	16	6	18	10	8	39
6-Nov	10	13	13	12	10	9	10	10	11	10	9	11	10	17	8	7	10	21	18	27	21	17	11	19	27
7-Nov	16	15	13	13	13	15	21	16	14	16	18	18	14	16	15	14	12	13	13	13	13	16	20	30	30
8-Nov	33	28	24	22	24	36	26	13	16	16	17	24	20	23	18	13	13	9	17	18	25	39	17	18	39
9-Nov	50	20	15	26	14	33	19	37	23	34	29	28	22	19	26	26	17	16	13	14	14	14	23	19	50
10-Nov	22	17	12	13	13	12	13	16	15	17	15	18	16	16	16	15	17	16	17	16	13	22	18	12	22
11-Nov	12	10	13	15	17	36	28	17	23	42	90	54	27	22	27	16	28	17	65	19	11	10	9	18	90
12-Nov	13	24	37	84	13	14	13	17	9	7	8	10	15	15	6	6	8	7	10	9	6	8	7	9	84
13-Nov	9	8	6	7	5	9	12	16	15	11	8	8	12	11	11	28	9	10	15	25	11	15	7	13	28
14-Nov	14	11	11	11	16	13	17	11	13	14	16	16	18	15	15	14	31	69	73	34	28	48	13	23	73
15-Nov	19	13	13	17	16	14	11	13	13	11	11	28	14	39	14	14	16	15	15	15	17	17	12	11	39
16-Nov	11	17	16	15	14	14	14	14	13	15	16	15	14	23	25	65	48	40	36	30	37	18	55	46	65
17-Nov	5	7	4	5	7	8	8	9	8	34	25	9	13	12	18	16	7	89	11	13	20	34	30	34	89
18-Nov	17	6	12	14	12	11	14	18	34	20	16	14	15	14	14	15	12	13	17	12	16	18	20	22	34
19-Nov	20	17	17	16	13	35	65	22	30	13	9	13	18	19	17	13	10	8	8	4	12	13	34	39	65
20-Nov	29	38	23	40	27	10	18	57	30	24	21	7	7	8	10	10	48	64	17	9	15	21	13	12	64
21-Nov	12	17	16	17	15	17	14	14	19	20	18	22	20	16	34	26	16	15	15	15	15	12	13	12	34
22-Nov	15	16	24	16	16	12	15	16	12	12	13	16	14	15	13	15	11	12	12	13	13	12	13	15	24
23-Nov	12	14	20	21	24	33	39	17	12	18	15	14	12	8	10	7	13	21	29	33	66	86	49	35	86
24-Nov	22	14	22	19	13	14	14	18	19	21	19	21	34	29	40	26	18	42	37	46	19	27	28	23	46
25-Nov	26	25	19	20	14	11	15	15	24	15	17	13	11	11	16	16	14	26	17	31	92	77	91	10	92
26-Nov	10	7	10	8	11	10	8	31	7	42	35	8	17	13	11	64	42	22	14	16	16	19	21	16	64
27-Nov	13	13	13	16	13	11	13	10	16	12	16	27	25	26	29	22	35	15	16	11	17	24	16	17	35
28-Nov	13	14	15	16	15	14	15	14	14	14	17	13	13	16	15	16	14	14	13	16	13	15	50	36	50
29-Nov	61	25	28	12	9	6	11	16	17	22	39	21	12	14	10	16	14	11	11	12	12	12	12	12	61
30-Nov	11	10	11	13	13	13	11	11	8	10	9	37	17	10	28	5	5	5	4	3	3	3	2	6	37

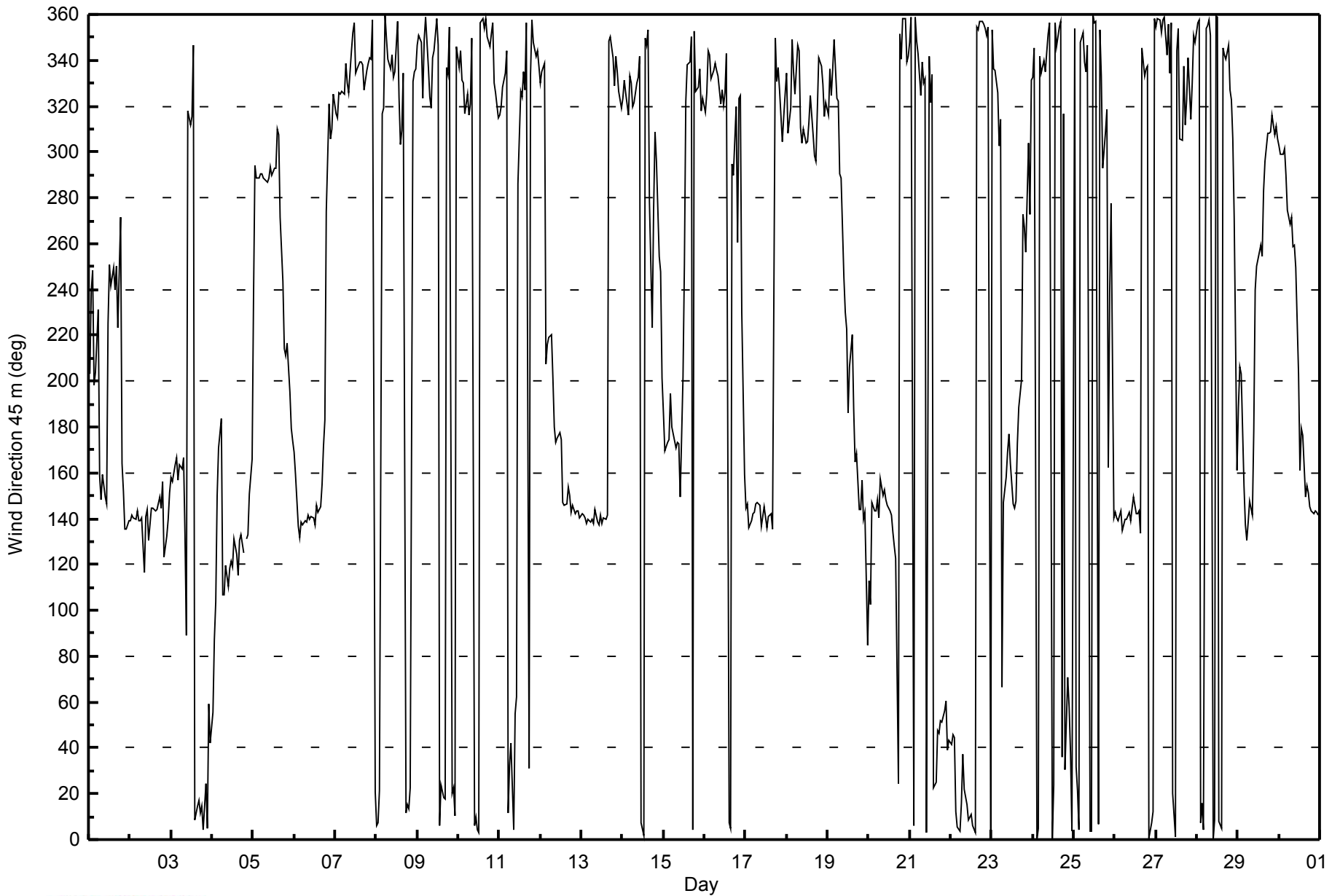
61	38	47	84	39	54	65	57	34	42	90	54	34	39	40	65	48	89	73	56	92	86	91	57	
Diurnal Maximum																								

AF - Analyzer Failure



WBEA
Hourly Averages

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





Direction of Maximum Speed: 141 deg on Nov 6 07:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 336.9 deg on Nov 7	Hours of Data: 720
Direction of Minimum Speed: 1 deg on Nov 24 15:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 2.8 deg on Nov 23	Percent Operational Time: 100.0
Monthly Average Direction: 312.8 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	236	258	256	249	247	249	216	206	200	184	171	230	244	236	237	241	260	229	203	198	226	186	158	155	225.3
2-Nov	161	152	153	148	158	155	159	163	139	153	146	137	144	146	148	147	139	140	141	144	142	144	141	156	146.4
3-Nov	151	149	155	161	150	161	167	170	138	77	344	324	322	357	9	15	18	11	15	8	22	13	59	49	53.8
4-Nov	66	97	110	146	168	176	116	112	121	122	125	126	125	135	131	125	135	139	135	137	138	139	148	162	131.1
5-Nov	233	286	276	287	289	290	288	288	287	289	294	290	291	293	304	300	271	245	219	214	221	201	177	171	274.1
6-Nov	164	153	140	137	141	140	141	143	145	145	145	144	141	147	146	160	181	188	220	276	310	305	312	327	152.0
7-Nov	322	316	328	325	330	326	338	331	327	346	351	354	336	337	340	341	340	330	339	345	345	348	3	24	336.9
8-Nov	16	14	4	335	321	338	344	325	327	331	325	339	355	324	305	312	344	9	31	19	7	347	338	314	341.3
9-Nov	311	333	347	342	320	4	3	349	334	341	333	351	352	7	23	17	13	357	355	0	16	22	18	357	0.8
10-Nov	343	352	342	340	325	329	328	316	354	4	6	5	1	358	0	358	3	359	358	1	3	345	345	333	350.9
11-Nov	336	340	347	351	356	13	32	34	26	67	29	320	329	333	350	332	359	26	344	59	76	107	122	126	3.3
12-Nov	149	196	165	216	217	219	222	206	184	179	183	182	173	149	148	149	161	174	187	184	167	159	164	156	178.3
13-Nov	160	162	169	169	171	164	159	154	163	167	157	153	145	133	127	131	26	9	24	11	346	343	347	350	142.9
14-Nov	330	326	329	333	337	343	338	341	337	340	351	7	1	348	348	350	276	246	248	255	253	249	253	229	315.7
15-Nov	219	210	209	216	218	206	201	200	201	196	179	228	250	317	334	348	358	7	354	330	337	342	323	330	300.5
16-Nov	326	335	349	347	335	342	346	342	339	325	331	322	329	338	331	28	35	317	326	330	328	313	247	222	336.2
17-Nov	216	195	173	167	154	155	146	147	157	161	162	153	146	149	161	170	196	268	340	343	326	315	322	7	159.3
18-Nov	17	355	358	359	339	326	314	323	332	305	308	303	306	314	326	309	302	298	308	318	313	312	304	306	320.4
19-Nov	308	319	312	320	329	330	331	294	277	243	228	220	189	208	218	197	173	173	165	166	174	154	153	124	220.6
20-Nov	146	144	148	143	145	150	144	150	161	149	153	153	160	161	166	151	135	125	95	4	9	12	349	357	134.4
21-Nov	1	10	15	7	0	356	342	349	343	342	6	343	318	335	23	36	51	49	54	52	57	67	46	51	16.8
22-Nov	50	54	58	31	26	19	29	43	38	27	21	18	15	15	14	7	5	8	6	6	4	3	360	7	19.0
23-Nov	359	347	358	342	317	293	50	142	153	174	187	169	149	141	149	179	209	212	230	240	234	249	342	343	189.9
24-Nov	349	360	5	6	351	341	350	358	6	5	7	10	30	2	1	6	31	64	358	81	94	97	84	40	18.3
25-Nov	24	46	34	26	352	354	353	349	356	8	11	0	356	358	16	18	12	29	7	355	66	126	175	144	14.1
26-Nov	145	151	153	164	149	160	155	163	172	166	136	138	140	136	155	157	66	353	355	352	8	13	12	1	96.9
27-Nov	359	4	7	6	8	7	360	8	6	13	23	15	359	352	327	326	337	338	339	334	6	25	19	4	2.4
28-Nov	5	5	12	18	13	2	2	4	358	8	14	5	4	9	6	351	349	349	359	359	338	342	293	217	1.4
29-Nov	223	225	233	198	201	213	227	230	218	236	245	245	250	253	256	281	296	305	308	312	315	309	311	305	272.5
30-Nov	302	299	298	297	291	277	273	271	258	255	244	223	204	192	200	170	181	170	167	171	161	162	165	165	241.7

334.0 338.4 341.9 334.7 315.6 310.2 311.1 302.5 289.1 295.8 329.2 312.5 317.4 332.2 340.2 341.8 343.1 349.1 355.1 341.8 352.6 353.1 339.4 345.9

Diurnal Average

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

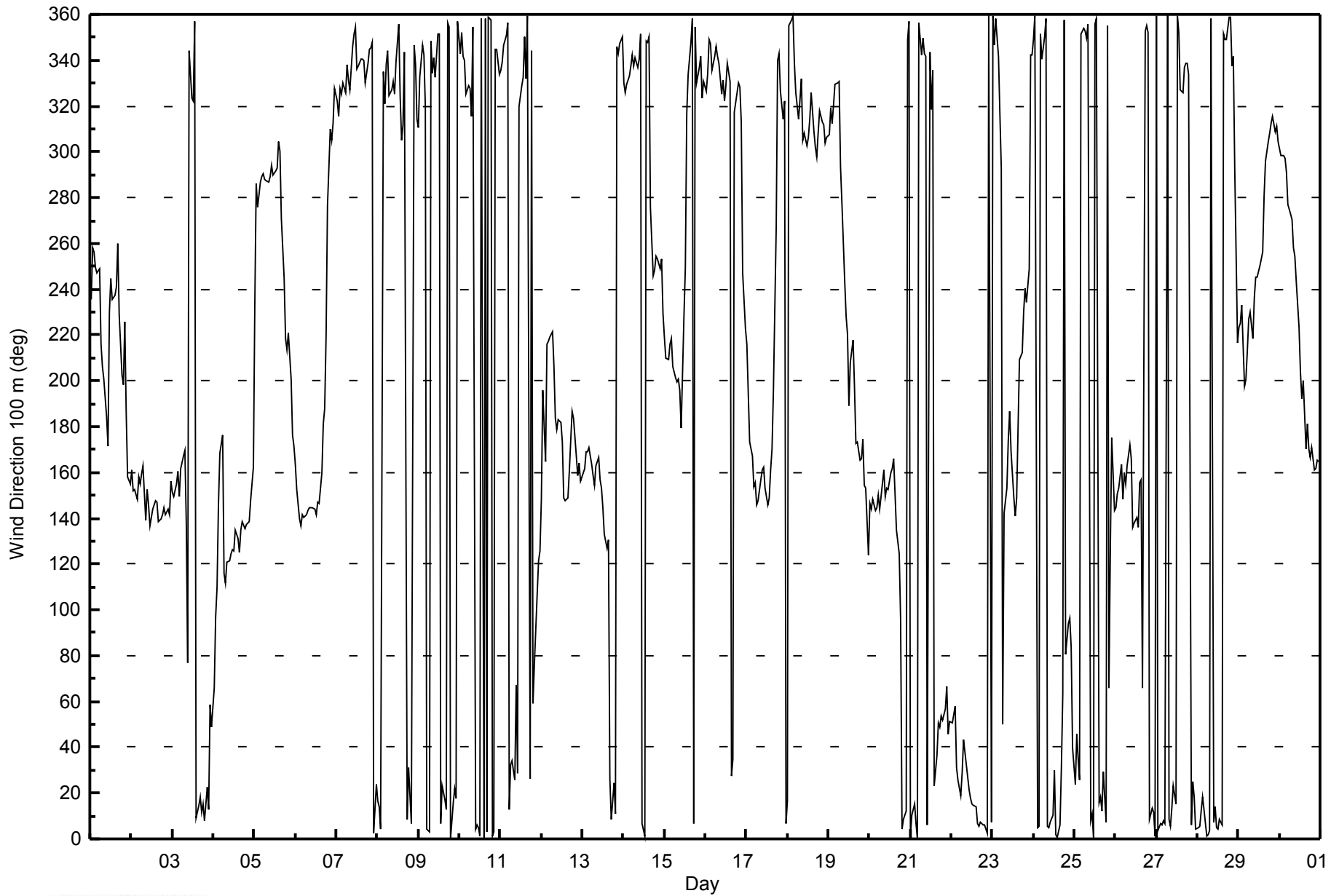


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0																	Hours in Service: 720																								
Maximum Value: 84 deg on Nov 1 19:00																	Hours of Data: 720																								
Minimum Value: 2 deg on Nov 4 21:00																	Hours of Missing Data: 0																								
Percentiles: P ₁ = 3 P ₁₀ = 6 Q ₁ = 8 Median = 10 Q ₃ = 14 P ₉₀ = 20 P ₉₉ = 47																	Hours of Calibration: 0																								
Percentiles: P ₁ = 3 P ₁₀ = 6 Q ₁ = 8 Median = 10 Q ₃ = 14 P ₉₀ = 20 P ₉₉ = 47																	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-Nov	17	9	10	9	14	13	20	22	16	22	23	14	7	8	7	6	11	6	84	37	23	20	10	7	84																
2-Nov	14	18	6	5	12	7	6	9	13	7	6	14	9	7	5	5	4	6	3	9	5	3	5	9	18																
3-Nov	8	5	11	13	7	13	14	30	11	43	15	7	7	14	15	14	9	14	14	13	17	20	28	43	43																
4-Nov	17	11	11	18	19	21	8	7	9	7	7	8	6	6	6	7	9	3	3	2	2	5	16	17	21																
5-Nov	25	14	14	10	7	7	6	7	6	5	8	6	5	7	9	13	13	9	37	15	3	16	9	7	37																
6-Nov	11	10	6	6	3	4	4	4	6	4	4	4	5	14	10	15	7	15	18	15	11	7	6	16	18																
7-Nov	13	10	8	8	9	10	18	13	11	11	12	11	10	11	11	9	7	8	8	8	7	11	11	23	23																
8-Nov	23	15	13	12	8	17	8	11	8	9	13	21	12	18	12	8	14	4	13	12	17	14	9	8	23																
9-Nov	11	10	10	19	25	16	11	13	10	22	20	17	13	11	20	15	8	9	9	9	7	7	14	11	25																
10-Nov	16	11	7	8	6	8	9	11	13	8	7	9	9	10	9	10	11	10	11	10	7	17	11	11	17																
11-Nov	10	7	8	11	10	24	16	10	13	29	69	39	22	18	22	11	19	10	34	40	17	10	47	46	69																
12-Nov	18	18	29	8	11	8	10	13	8	5	10	10	17	13	8	5	4	13	16	19	8	7	8	8	29																
13-Nov	8	9	9	10	10	9	11	9	9	14	14	9	6	7	6	10	23	16	6	14	8	6	11	8	23																
14-Nov	12	5	3	5	10	3	6	4	3	6	9	9	12	12	9	16	23	40	27	7	7	6	6	13	40																
15-Nov	8	7	10	13	11	12	13	16	15	15	16	13	11	30	12	10	9	9	9	11	13	12	9	6	30																
16-Nov	7	11	11	11	9	9	9	9	7	11	13	11	10	15	21	9	12	22	4	11	24	19	34	18	34																
17-Nov	14	19	11	10	8	9	4	6	8	20	11	6	7	6	7	12	26	30	17	4	4	22	21	10	30																
18-Nov	16	9	8	9	7	7	15	13	9	14	11	9	11	10	10	12	7	7	8	10	12	11	10	9	16																
19-Nov	7	11	9	9	10	20	21	13	17	10	6	11	17	16	12	12	7	5	7	7	10	9	16	25	25																
20-Nov	21	18	10	14	12	7	6	13	18	9	13	8	10	10	19	15	14	13	13	25	10	16	6	5	25																
21-Nov	8	11	10	11	9	14	9	9	14	15	10	18	13	10	28	16	10	8	9	10	8	6	5	7	28																
22-Nov	9	11	16	12	11	9	10	10	8	6	8	8	7	9	8	10	7	8	7	8	8	8	7	7	16																
23-Nov	6	8	9	8	25	22	47	11	12	13	17	17	10	6	11	11	8	6	6	10	28	42	73	20	73																
24-Nov	12	9	14	12	7	10	7	11	14	15	14	16	19	18	51	20	15	13	39	26	6	6	12	25	51																
25-Nov	20	11	11	11	7	7	8	8	12	9	10	8	6	7	9	10	10	11	30	8	47	12	30	8	47																
26-Nov	6	6	11	13	9	14	11	11	8	15	13	9	11	11	15	24	37	16	7	12	9	11	14	9	37																
27-Nov	9	8	8	8	7	5	8	9	12	8	10	19	19	18	19	9	7	5	6	5	10	9	11	9	19																
28-Nov	7	8	9	9	9	9	8	8	8	8	11	8	8	9	8	8	7	8	9	10	9	13	22	10	22																
29-Nov	9	12	14	15	19	27	18	11	15	13	9	9	5	4	6	13	9	8	9	7	6	7	6	7	27																
30-Nov	7	6	6	7	6	8	3	5	4	3	5	19	16	11	18	8	8	6	6	7	6	4	6	6	19																
																	25	19	29	19	25	27	47	30	18	43	69	39	22	30	51	24	37	40	84	40	47	42	73	46	
																	Diurnal Maximum																								



WBEA
Hourly Averages

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





Maximum Value: 0.7 km/h on Nov 29 10:00		Maximum Daily Average: 0.1 km/h on Nov 19		Hours in Service: 720																						
Minimum Value: -0.7 km/h on Nov 29 13:00		Minimum Daily Average: -0.2 km/h on Nov 5		Hours of Data: 719																						
Maximum Diurnal Average: 0.0 km/h at hour 3		Minimum Diurnal Average: -0.1 km/h at hour 13		Hours of Missing Data: 1																						
Monthly Average: -0.06 km/h		Percentiles: P ₁ = -0.6 P ₁₀ = -0.3 Q ₁ = -0.2 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.1 P ₉₉ = 0.4		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-Nov	0.0	0.0	0.1	0.1	0.1	0.0	0.2	0.1	0.3	0.0	0.1	0.0	-0.4	-0.2	-0.3	0.0	0.0	0.1	0.0	0.1	0.2	0.3	0.1	0.1	0.0	0.3
2-Nov	0.1	0.0	0.0	-0.2	0.1	0.1	0.0	-0.2	-0.2	-0.2	-0.2	-0.1	-0.2	-0.5	-0.2	-0.3	-0.1	0.1	0.2	0.0	-0.3	-0.5	0.0	-0.1	-0.1	0.2
3-Nov	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	-0.1	0.0	0.0	-0.1	-0.1	-0.1	-0.2	-0.1	-0.1	-0.1	0.0	0.0	0.1	-0.2	-0.1	0.0	0.1
4-Nov	-0.2	0.0	0.0	0.1	0.0	-0.1	-0.1	-0.2	-0.1	-0.3	-0.2	-0.2	-0.2	-0.3	-0.2	-0.2	-0.2	-0.3	-0.5	AF	-0.4	-0.1	-0.1	0.1	0.1	0.1
5-Nov	0.0	-0.2	-0.1	-0.3	-0.4	-0.3	-0.4	-0.3	-0.6	-0.5	-0.2	-0.4	0.0	-0.1	-0.1	-0.1	-0.2	-0.1	0.0	-0.1	-0.2	0.0	-0.1	-0.1	-0.2	0.0
6-Nov	0.1	0.1	0.0	-0.3	-0.1	-0.4	-0.5	-0.3	0.0	0.3	-0.1	0.1	-0.1	-0.1	-0.2	0.0	0.4	0.1	0.1	-0.1	-0.1	-0.2	-0.5	-0.3	-0.1	0.4
7-Nov	-0.1	-0.4	-0.1	-0.5	0.0	-0.1	-0.3	-0.2	-0.2	-0.1	-0.3	-0.3	-0.1	-0.1	0.0	-0.2	0.1	-0.1	0.1	-0.1	0.0	0.1	-0.1	-0.1	-0.1	0.1
8-Nov	-0.1	-0.3	-0.2	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1	0.1	-0.3	-0.3	-0.1	-0.1	-0.1	-0.2	-0.2	0.0	0.0	-0.1	-0.1	0.1
9-Nov	0.0	0.0	-0.1	-0.1	0.0	0.0	-0.1	-0.1	-0.1	0.0	-0.1	0.2	0.0	-0.3	0.1	-0.1	-0.1	0.0	0.0	-0.1	-0.1	-0.1	0.0	-0.1	0.0	0.2
10-Nov	-0.1	0.1	0.0	0.0	-0.1	0.1	-0.2	0.0	-0.1	0.0	0.1	-0.2	-0.1	-0.1	-0.4	-0.3	-0.2	-0.2	-0.2	-0.1	-0.4	-0.1	0.1	-0.2	-0.1	0.1
11-Nov	-0.2	-0.1	0.1	0.2	-0.1	0.0	-0.1	-0.1	-0.1	0.0	0.3	-0.1	-0.1	-0.1	0.0	0.0	0.1	0.0	0.1	-0.1	0.0	0.0	-0.1	0.0	0.0	0.3
12-Nov	-0.1	0.0	0.0	0.1	-0.1	-0.1	-0.1	-0.1	-0.1	0.2	0.2	-0.1	0.0	0.0	-0.2	-0.2	0.2	0.0	0.1	0.2	0.1	-0.1	0.0	-0.1	0.0	0.2
13-Nov	0.0	0.0	-0.1	0.1	0.0	0.0	0.0	-0.3	-0.3	0.1	-0.1	-0.1	0.0	0.1	-0.2	0.1	-0.2	-0.2	-0.2	-0.2	-0.2	0.0	-0.1	0.0	0.0	0.1
14-Nov	-0.1	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.1	0.1	-0.1	-0.2	-0.2	-0.1	-0.1	0.0	0.0	0.1	0.0	-0.1	-0.1	0.0	0.0	0.2	0.0	0.2
15-Nov	0.2	0.4	0.4	0.3	0.1	0.2	0.3	0.2	0.2	0.2	0.0	0.2	-0.3	-0.2	0.1	0.1	-0.1	-0.3	-0.3	-0.1	-0.2	-0.2	-0.3	-0.2	0.0	0.4
16-Nov	-0.3	-0.1	-0.5	-0.3	0.0	0.0	0.1	0.0	0.0	-0.1	0.0	-0.2	-0.1	0.0	0.0	0.2	0.1	0.1	0.0	0.1	0.0	0.1	0.1	0.1	0.0	0.2
17-Nov	0.1	0.1	0.3	0.0	-0.2	0.0	-0.3	-0.3	-0.2	-0.4	0.0	-0.2	-0.3	-0.3	-0.3	-0.1	0.2	0.0	0.0	-0.1	-0.1	0.0	0.0	0.0	-0.1	0.3
18-Nov	-0.1	-0.2	-0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.1	-0.3	-0.4	-0.5	-0.3	-0.1	-0.3	-0.2	-0.2	-0.1	-0.1	0.0	0.1	0.0	0.1	-0.1	0.1
19-Nov	0.2	0.0	0.1	0.1	0.0	0.0	0.0	-0.1	0.1	-0.1	0.0	-0.1	0.1	0.0	-0.1	-0.1	0.4	0.5	0.1	-0.1	0.4	0.0	-0.1	0.0	0.1	0.5
20-Nov	-0.1	0.0	0.0	-0.1	-0.1	-0.2	0.0	-0.1	0.0	0.0	0.0	-0.5	-0.4	-0.1	0.0	-0.1	0.1	0.0	0.0	0.0	-0.1	-0.1	0.2	0.1	-0.1	0.2
21-Nov	-0.1	-0.1	0.0	-0.1	0.0	0.0	0.1	0.0	-0.1	0.1	-0.1	-0.3	-0.1	0.0	0.0	0.1	-0.1	0.0	-0.2	-0.1	0.0	0.0	0.0	-0.2	-0.1	0.1
22-Nov	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.1	0.0	0.1	0.2	0.2	0.1	-0.1	-0.2	-0.2	-0.1	-0.3	-0.2	-0.2	-0.1	-0.2	-0.1	-0.1	0.2
23-Nov	-0.2	0.1	0.1	0.1	-0.1	0.0	0.0	0.1	0.0	0.1	0.4	0.1	0.0	0.0	0.1	0.2	-0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.4
24-Nov	0.0	-0.1	0.0	-0.1	0.0	0.1	0.1	0.0	0.1	-0.2	0.0	-0.1	0.0	-0.2	-0.1	0.0	-0.1	0.0	0.1	-0.1	0.0	0.0	0.0	-0.2	0.0	0.1
25-Nov	0.1	0.1	0.0	-0.1	0.1	-0.3	0.0	0.0	-0.2	-0.1	-0.2	-0.2	-0.7	-0.6	-0.1	-0.2	-0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.1	-0.1	0.1
26-Nov	0.1	0.2	0.0	0.2	-0.1	-0.1	0.0	0.3	0.4	0.0	0.1	0.1	0.1	0.2	0.1	0.0	0.0	-0.2	0.0	0.0	-0.3	-0.2	-0.3	-0.2	0.0	0.4
27-Nov	-0.3	-0.2	-0.1	0.0	-0.2	-0.1	0.0	-0.1	-0.1	-0.1	-0.2	0.0	0.0	0.0	-0.1	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0
28-Nov	-0.3	-0.2	-0.2	-0.3	-0.2	-0.2	-0.2	-0.4	-0.2	-0.2	-0.3	-0.4	-0.4	-0.1	-0.4	-0.2	-0.1	0.0	-0.1	-0.1	0.0	0.0	0.1	0.1	-0.2	0.1
29-Nov	0.1	0.1	0.1	0.3	0.4	0.3	0.3	0.5	0.4	0.7	0.0	-0.2	-0.7	-0.3	-0.3	-0.3	-0.4	-0.3	-0.5	-0.4	-0.4	-0.2	-0.2	-0.3	-0.1	0.7
30-Nov	-0.4	-0.4	-0.3	-0.3	-0.3	-0.3	-0.4	-0.6	-0.6	-0.5	-0.3	0.1	0.4	0.1	0.0	0.3	0.4	0.1	0.0	0.1	0.0	0.0	-0.2	-0.2	-0.1	0.4
																								Diurnal Average		
																								Diurnal Maximum		
AF - Analyzer Failure																										



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 4.7 km/h on Nov 6 05:00	Hours of Data: 719
Minimum Value: 0.1 km/h on Nov 25 18:00	Hours of Missing Data: 1
Percentiles: P ₁ = 0.1 P ₁₀ = 0.4 Q ₁ = 0.8 Median = 1.2 Q ₃ = 1.7 P ₉₀ = 2.4 P ₉₉ = 3.8	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-Nov	0.3	0.3	0.5	0.3	0.6	0.7	0.7	0.9	0.9	1.0	1.2	1.3	1.6	1.5	1.1	0.9	0.5	0.2	0.2	0.4	0.3	0.7	1.0	0.9	1.6
2-Nov	1.0	1.2	1.0	0.9	0.9	1.0	1.2	1.3	1.1	0.9	1.4	1.4	1.6	1.7	2.1	1.7	1.4	1.4	2.4	1.4	1.5	1.9	1.2	1.0	2.4
3-Nov	1.4	1.6	1.2	1.0	1.2	1.1	0.8	0.9	1.0	0.6	0.7	0.6	1.0	1.5	1.8	1.8	1.9	1.7	1.7	1.5	1.2	1.0	1.2	0.8	1.9
4-Nov	1.1	1.4	1.4	1.3	1.3	1.3	1.7	1.9	1.3	1.6	2.0	1.7	1.7	1.8	1.6	1.7	2.0	1.9	2.3	AF	2.1	2.2	1.1	0.6	2.3
5-Nov	0.5	1.4	1.1	2.5	3.2	2.5	2.5	2.6	2.8	2.8	2.4	2.4	2.5	2.5	2.0	1.4	1.1	1.1	0.9	1.2	1.3	1.2	1.4	1.7	3.2
6-Nov	2.2	2.1	2.9	3.5	4.7	4.3	4.5	4.4	3.8	4.4	3.8	3.3	3.0	1.7	1.8	1.5	0.9	0.6	0.5	1.9	1.5	2.3	2.9	2.2	4.7
7-Nov	1.8	3.0	3.5	3.6	3.1	2.9	3.0	2.5	2.4	2.8	3.0	2.6	3.1	3.0	2.9	2.4	1.9	1.9	2.1	2.1	2.3	1.6	1.5	1.3	3.6
8-Nov	0.8	1.0	0.9	0.4	0.4	0.4	0.7	1.2	1.5	1.4	1.8	1.9	2.6	1.9	1.6	1.0	0.5	0.2	0.6	1.0	0.5	0.2	0.2	0.2	2.6
9-Nov	0.2	0.3	0.4	0.3	0.3	0.2	0.5	0.4	0.6	0.7	1.1	1.3	1.6	1.9	1.9	1.2	1.2	0.8	0.6	1.4	1.5	2.0	1.2	1.1	2.0
10-Nov	0.9	1.5	1.7	1.6	1.1	1.3	1.2	1.2	1.6	2.5	2.6	2.4	3.0	3.1	2.6	2.4	1.7	1.5	1.5	1.7	1.9	1.3	1.1	1.1	3.1
11-Nov	1.2	1.2	1.2	1.2	1.3	1.4	1.2	1.0	0.7	1.2	1.2	1.2	1.3	1.3	1.1	1.1	0.9	0.9	0.5	0.7	0.5	0.3	0.3	0.4	1.4
12-Nov	0.3	0.2	0.2	0.5	1.2	1.1	1.1	0.8	0.9	1.0	1.2	1.1	1.2	1.6	1.5	1.5	1.2	1.4	0.8	0.8	1.2	1.6	1.5	1.5	1.6
13-Nov	1.7	1.6	1.9	2.0	2.1	2.2	1.9	1.4	1.8	1.5	1.8	1.9	1.7	1.4	0.8	0.3	0.5	0.8	0.5	0.4	0.4	0.2	0.2	0.3	2.2
14-Nov	0.4	0.5	0.5	0.6	0.7	0.7	0.4	0.5	0.5	0.9	1.3	1.9	1.7	1.7	1.5	0.9	0.5	0.3	0.4	0.7	0.8	0.9	1.1	0.6	1.9
15-Nov	1.0	1.1	1.0	1.0	1.1	1.1	1.1	1.0	1.1	1.1	1.3	1.3	2.0	1.3	1.6	1.7	2.0	3.0	3.2	2.3	2.4	2.5	2.5	2.1	3.2
16-Nov	1.8	2.2	3.2	2.9	2.4	2.3	2.4	2.3	2.0	1.7	1.8	1.8	2.0	1.3	0.7	0.3	0.2	0.2	0.2	0.3	0.3	0.1	0.1	0.2	3.2
17-Nov	0.2	0.4	0.8	0.9	1.4	1.5	1.7	1.5	1.5	1.3	1.2	1.7	1.6	2.4	1.9	1.1	0.5	0.2	0.2	0.4	0.2	0.2	0.2	0.3	2.4
18-Nov	0.6	0.3	0.8	2.0	2.1	1.2	0.8	0.5	0.4	1.1	1.9	2.0	2.4	2.5	2.3	2.1	2.4	2.3	1.7	1.3	0.8	0.9	1.1	1.3	2.5
19-Nov	1.4	0.8	1.3	0.9	0.9	0.6	0.4	0.5	0.8	0.7	1.1	1.0	1.0	1.1	0.8	0.6	0.6	0.8	1.0	1.0	1.2	1.5	1.4	0.8	1.5
20-Nov	0.9	0.6	1.0	1.2	1.3	1.4	1.7	0.8	0.9	0.8	1.0	1.5	1.4	1.3	1.1	0.8	0.4	0.2	0.3	0.7	1.4	1.1	1.0	0.9	1.7
21-Nov	1.3	1.3	1.2	1.1	1.4	1.0	0.9	1.3	1.0	1.1	1.8	1.9	1.5	1.8	1.5	1.0	1.7	2.0	1.7	1.7	1.3	0.5	0.9	1.4	2.0
22-Nov	1.4	1.7	1.0	1.1	1.2	1.3	1.4	1.2	1.2	1.5	1.8	2.1	2.4	2.1	2.0	2.0	1.8	1.5	1.9	1.7	1.7	1.3	1.8	1.8	2.4
23-Nov	1.3	0.9	0.6	0.6	0.5	0.4	0.3	0.3	0.8	1.1	1.1	1.2	1.1	1.2	1.1	0.7	0.5	0.4	0.3	0.2	0.1	0.2	0.3	0.5	1.3
24-Nov	0.5	1.2	1.1	1.5	1.2	1.1	0.9	0.7	0.7	1.0	1.1	1.2	1.1	0.9	0.8	0.6	0.4	0.7	0.5	0.6	0.6	0.5	0.5	0.9	1.5
25-Nov	1.0	1.3	1.2	1.0	1.2	1.5	1.1	1.0	1.2	1.6	1.3	1.4	1.5	1.5	1.2	0.7	0.3	0.1	0.2	0.2	0.1	0.1	0.1	0.2	1.6
26-Nov	0.9	1.1	1.0	1.1	1.0	1.1	1.4	1.1	0.9	0.9	0.9	1.1	0.8	1.1	0.9	0.7	0.5	1.0	1.3	1.3	2.1	1.8	2.3	2.9	2.9
27-Nov	2.3	1.9	1.6	1.0	1.1	1.2	0.7	0.7	0.4	0.8	2.1	1.1	0.9	0.7	0.5	0.2	0.1	0.2	0.2	0.2	0.4	0.4	0.7	1.0	2.3
28-Nov	1.4	1.4	1.5	1.8	1.3	1.4	1.3	1.4	1.4	1.5	2.0	2.1	2.1	2.2	2.0	1.3	1.5	1.2	1.1	0.5	0.2	0.1	0.2	0.2	2.2
29-Nov	0.4	0.7	0.7	0.8	1.2	0.9	1.3	1.5	1.1	1.4	2.2	2.0	2.7	2.6	2.2	2.4	2.2	2.2	2.5	2.5	2.6	2.3	2.7	2.8	2.8
30-Nov	3.0	2.5	2.6	2.2	2.4	2.2	3.1	3.3	2.8	2.8	1.9	1.2	1.3	1.1	1.3	1.2	1.5	1.3	1.4	1.3	1.3	1.6	2.3	2.4	3.3
	3.0	3.0	3.5	3.6	4.7	4.3	4.5	4.4	3.8	4.4	3.8	3.3	3.1	3.1	2.9	2.4	2.4	3.0	3.2	2.5	2.6	2.5	2.9	2.9	

Diurnal Maximum

AF - Analyzer Failure



Maximum Value: 1.7 km/h on Nov 6 07:00		Maximum Daily Average: 0.7 km/h on Nov 6		Hours in Service: 720																							
Minimum Value: -1.4 km/h on Nov 7 04:00		Minimum Daily Average: -0.5 km/h on Nov 5		Hours of Data: 719																							
Maximum Diurnal Average: 0.1 km/h at hour 22		Minimum Diurnal Average: -0.1 km/h at hour 13		Hours of Missing Data: 1																							
Monthly Average: 0.00 km/h		Percentiles: P ₁ = -1.2 P ₁₀ = -0.5 Q ₁ = -0.2 Median = -0.1 Q ₃ = 0.2 P ₉₀ = 0.6 P ₉₉ = 1.5		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-Nov	0.0	0.0	-0.1	0.0	0.1	-0.1	0.4	0.7	0.7	0.3	0.4	0.1	-0.3	-0.3	-0.4	-0.1	-0.1	0.1	0.0	0.4	0.5	1.4	0.9	0.6	0.2	1.4	
2-Nov	0.6	0.4	0.6	0.3	0.6	0.5	0.5	0.2	0.0	0.1	-0.1	0.3	0.2	0.3	0.9	0.7	0.3	0.6	1.0	0.4	0.1	0.3	0.4	0.2	0.4	1.0	
3-Nov	0.5	0.6	0.6	0.2	0.5	0.3	0.2	0.2	0.4	0.0	-0.1	-0.1	-0.4	-0.2	-0.1	0.0	-0.1	-0.2	-0.2	-0.1	0.1	0.2	0.1	0.0	0.1	0.6	
4-Nov	0.1	0.4	0.4	0.6	0.1	0.1	0.5	0.5	0.4	0.4	0.6	0.4	0.4	0.5	0.5	0.4	0.5	0.6	AF	0.7	0.6	0.1	0.1	0.1	0.4	0.7	
5-Nov	-0.1	-0.5	-0.3	-0.9	-1.1	-0.8	-1.1	-1.1	-1.4	-1.2	-0.7	-0.9	-0.6	-0.7	-0.4	-0.1	-0.3	0.0	0.1	-0.2	-0.2	0.1	-0.1	-0.3	-0.5	0.1	
6-Nov	0.3	0.9	1.0	0.9	1.7	1.5	1.7	1.5	1.6	1.7	1.2	1.3	1.0	0.8	0.8	1.0	1.0	0.2	0.0	-0.3	-0.3	-0.6	-1.2	-0.8	0.7	1.7	
7-Nov	-0.5	-1.1	-0.9	-1.4	-0.7	-0.8	-0.6	-0.7	-0.7	-0.3	-0.5	-0.2	-0.8	-0.4	-0.5	-0.5	-0.3	-0.4	-0.3	-0.4	-0.4	0.0	0.2	0.0	-0.5	0.2	
8-Nov	0.0	-0.2	-0.2	-0.1	-0.1	-0.1	-0.1	-0.3	-0.3	-0.2	-0.3	-0.1	-0.4	-0.1	-0.7	-0.5	-0.3	-0.1	-0.1	-0.2	-0.1	0.0	-0.2	-0.2	-0.2	0.0	
9-Nov	0.0	0.0	-0.1	-0.1	0.0	0.1	0.1	0.0	-0.2	0.0	-0.1	0.2	-0.1	-0.3	0.2	0.2	0.1	-0.1	0.0	-0.2	0.1	-0.1	0.2	-0.1	0.0	0.2	
10-Nov	-0.1	0.0	-0.3	-0.2	-0.5	-0.3	-0.6	-0.4	-0.2	0.0	0.0	-0.3	-0.3	-0.4	-0.4	-0.3	-0.2	0.0	-0.2	-0.1	-0.4	-0.2	-0.1	-0.5	-0.3	0.0	
11-Nov	-0.6	-0.5	-0.2	-0.1	-0.1	0.1	0.0	0.1	-0.1	0.1	0.4	0.1	-0.1	-0.3	-0.1	-0.2	0.0	0.0	0.0	-0.2	-0.3	-0.1	-0.1	0.0	-0.1	0.4	
12-Nov	0.0	0.0	0.0	0.0	-0.2	-0.1	-0.1	-0.1	-0.3	0.0	-0.1	-0.4	-0.1	0.3	0.5	0.5	0.9	0.8	0.6	0.6	0.9	0.7	0.7	0.5	0.2	0.9	
13-Nov	0.7	0.9	1.1	1.0	1.4	1.1	0.4	0.0	0.0	0.5	0.8	0.6	0.6	0.5	0.1	0.2	-0.3	-0.3	-0.3	-0.4	-0.4	-0.2	-0.4	-0.2	0.3	1.4	
14-Nov	-0.3	-0.2	-0.1	-0.3	-0.1	-0.1	-0.1	-0.2	-0.1	0.0	-0.1	-0.1	-0.2	-0.3	-0.3	-0.1	-0.1	0.1	0.0	-0.3	-0.3	0.0	0.2	0.0	-0.1	0.2	
15-Nov	0.2	0.4	0.2	0.3	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.7	0.2	-0.3	-0.3	-0.2	-0.2	-0.4	-0.1	-0.6	-0.8	-0.7	-0.7	-1.0	-0.9	-0.2	0.7
16-Nov	-0.8	-0.8	-0.8	-0.6	-0.4	-0.4	-0.3	-0.2	-0.3	-0.3	-0.3	-0.6	-0.4	-0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	-0.3	0.2	
17-Nov	0.7	0.8	1.3	1.0	0.6	0.9	0.3	0.2	0.4	-0.1	0.1	0.5	0.2	0.6	0.4	0.2	0.6	0.1	-0.1	-0.2	-0.2	-0.1	-0.1	-0.1	0.3	1.3	
18-Nov	-0.3	-0.6	-0.4	-0.3	-0.2	-0.4	-0.1	-0.1	0.0	-0.2	-0.7	-0.6	-1.1	-0.9	-0.7	-0.7	-0.8	-0.7	-0.5	-0.5	-0.2	-0.2	-0.3	-0.1	-0.4	0.0	
19-Nov	0.0	-0.2	-0.2	0.0	-0.1	-0.3	0.0	-0.2	0.0	-0.1	0.1	0.0	0.0	0.2	-0.1	-0.2	0.4	0.8	1.0	0.8	1.0	0.6	0.2	0.0	0.2	1.0	
20-Nov	0.0	0.1	0.1	0.1	0.1	0.2	0.3	0.0	0.0	0.0	0.2	0.0	0.2	0.5	0.6	0.3	0.2	0.0	-0.1	-0.2	-0.1	-0.1	0.0	-0.1	0.1	0.6	
21-Nov	-0.2	-0.1	0.0	-0.1	-0.1	-0.1	-0.1	-0.2	-0.3	-0.2	-0.2	-0.6	-0.4	-0.4	0.3	0.2	0.2	0.3	0.0	0.3	0.2	0.1	0.1	0.2	0.0	0.3	
22-Nov	0.3	0.2	0.1	0.0	-0.1	-0.2	0.2	0.1	0.1	0.1	-0.1	-0.1	0.0	0.0	-0.3	-0.2	-0.2	-0.2	-0.2	-0.3	-0.3	-0.3	-0.3	-0.2	-0.1	0.3	
23-Nov	-0.2	-0.1	0.1	0.1	-0.1	0.0	0.1	0.2	0.2	0.2	0.3	0.1	0.4	0.7	0.7	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.7	
24-Nov	-0.1	-0.2	0.1	0.0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.3	-0.1	0.0	0.1	-0.2	-0.1	0.0	-0.2	0.1	0.1	0.2	0.1	0.0	-0.3	0.0	0.2	
25-Nov	0.0	0.1	0.3	0.0	-0.2	-0.3	-0.1	-0.1	-0.2	-0.2	-0.1	-0.3	-0.6	-0.4	-0.1	-0.3	-0.2	0.0	-0.1	0.0	0.1	0.1	0.1	0.3	-0.1	0.3	
26-Nov	0.5	0.7	0.3	0.8	0.1	0.3	0.4	0.8	1.1	0.4	0.3	0.5	0.3	0.6	0.4	0.1	-0.1	-0.5	-0.2	-0.2	-0.4	-0.1	-0.2	-0.7	0.2	1.1	
27-Nov	-0.6	-0.4	-0.3	-0.1	-0.3	-0.3	-0.3	-0.2	-0.2	-0.2	-0.1	0.0	-0.1	-0.1	-0.2	-0.2	0.0	-0.2	-0.2	-0.2	-0.1	-0.1	-0.1	-0.1	-0.2	0.0	
28-Nov	-0.3	-0.4	-0.2	-0.2	-0.2	-0.3	-0.2	-0.3	-0.2	-0.2	-0.3	-0.4	-0.4	-0.3	-0.3	-0.3	-0.2	-0.2	-0.1	-0.1	-0.2	-0.1	0.0	0.2	-0.2	0.2	
29-Nov	0.2	-0.1	0.0	0.8	1.4	0.9	1.2	1.3	1.0	0.6	0.1	-0.2	-0.7	-0.2	-0.4	-0.7	-0.6	-0.9	-1.1	-1.1	-1.0	-0.6	-0.9	-1.2	-0.1	1.4	
30-Nov	-1.2	-1.0	-1.0	-0.8	-0.8	-0.6	-0.9	-1.4	-0.9	-0.7	-0.2	0.3	0.7	-0.1	0.3	1.3	1.3	1.3	1.3	1.4	1.3	1.6	1.6	1.1	0.2	1.6	
																								Diurnal Average			
																								Diurnal Maximum			
																								AF - Analyzer Failure			



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Vertical Wind Speed 45 m (VW45m) - km/h
Lower Camp Met Tower - November 2014

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 4.1 km/h on Nov 6 05:00	Hours of Data: 719
Minimum Value: 0.1 km/h on Nov 27 17:00	Hours of Missing Data: 1
Percentiles: P ₁ = 0.2 P ₁₀ = 0.4 Q ₁ = 0.9 Median = 1.3 Q ₃ = 1.8 P ₉₀ = 2.6 P ₉₉ = 3.9	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-Nov	0.4	0.3	0.7	0.5	0.8	1.0	0.8	0.9	1.1	1.0	1.1	1.3	1.6	1.4	1.1	0.7	0.5	0.2	0.3	0.6	0.6	0.5	0.9	0.9	1.6
2-Nov	1.0	1.2	1.1	1.0	0.9	1.1	1.1	1.3	1.2	1.0	1.5	1.5	1.4	1.5	1.6	1.3	1.8	1.7	2.8	1.6	1.7	1.8	1.2	1.2	2.8
3-Nov	1.6	1.7	1.3	1.1	1.3	1.3	0.8	0.9	1.0	0.6	0.7	0.7	1.0	1.5	1.7	1.7	1.8	1.6	1.6	1.5	1.2	1.2	1.2	0.9	1.8
4-Nov	1.1	1.3	1.4	1.4	1.5	1.4	1.6	1.9	1.4	1.5	1.9	1.5	1.6	1.6	1.5	1.6	2.0	1.9	2.2	AF	1.8	2.2	1.3	0.7	2.2
5-Nov	0.6	1.5	1.3	2.6	3.4	2.7	2.5	2.8	2.9	2.8	2.5	2.6	2.7	2.6	2.3	1.8	1.3	1.0	0.9	1.4	1.4	1.4	1.6	2.0	3.4
6-Nov	2.5	2.5	2.9	3.2	4.1	3.7	4.0	4.0	3.9	3.9	3.4	2.9	2.8	1.3	1.5	1.2	0.9	0.8	0.7	2.2	1.9	2.7	3.1	2.6	4.1
7-Nov	2.1	3.2	3.9	4.1	3.5	3.5	3.3	2.9	2.6	3.1	3.2	2.8	3.4	3.4	3.2	2.6	2.1	2.2	2.5	2.3	2.6	1.9	1.9	1.5	4.1
8-Nov	1.0	1.2	1.1	0.5	0.4	0.5	0.9	1.3	1.7	1.6	2.0	2.3	2.6	2.2	1.8	1.2	0.5	0.2	0.8	1.2	0.6	0.2	0.3	0.3	2.6
9-Nov	0.3	0.4	0.4	0.4	0.4	0.4	0.6	0.5	0.7	0.8	1.1	1.5	1.8	1.9	2.1	1.4	1.4	1.0	0.9	1.4	1.6	2.0	1.4	1.2	2.1
10-Nov	1.1	1.7	2.0	1.9	1.2	1.4	1.4	1.3	1.7	2.6	2.6	2.4	2.9	3.3	2.7	2.6	1.8	1.7	1.7	1.9	1.8	1.5	1.3	1.2	3.3
11-Nov	1.4	1.3	1.5	1.5	1.5	1.5	1.3	1.0	0.9	1.3	1.4	1.4	1.5	1.6	1.2	1.3	1.0	0.8	0.6	0.8	0.5	0.3	0.4	0.4	1.6
12-Nov	0.3	0.2	0.3	0.6	1.3	1.2	1.3	1.0	1.0	1.1	1.4	1.4	1.4	1.5	1.2	1.3	1.2	1.2	0.9	0.8	1.0	1.4	1.3	1.4	1.5
13-Nov	1.7	1.4	1.6	1.6	1.5	2.0	1.9	1.6	1.9	1.4	1.5	1.5	1.6	1.2	0.8	0.4	0.3	0.6	0.5	0.5	0.4	0.3	0.3	0.4	2.0
14-Nov	0.5	0.5	0.5	0.6	0.8	0.9	0.5	0.6	0.6	1.1	1.5	1.9	1.6	1.6	1.6	0.9	0.7	0.5	0.7	0.9	1.0	1.2	1.2	0.8	1.9
15-Nov	1.3	1.4	1.3	1.2	1.4	1.4	1.2	1.2	1.3	1.3	1.2	1.6	2.0	1.4	1.8	2.0	2.2	3.3	3.4	2.8	2.8	3.0	2.9	2.3	3.4
16-Nov	2.1	2.7	3.5	3.2	2.8	2.6	2.7	2.8	2.4	2.0	2.1	2.0	2.4	1.3	0.7	0.3	0.3	0.2	0.3	0.4	0.3	0.1	0.1	0.4	3.5
17-Nov	0.4	0.6	0.6	0.8	1.2	1.4	1.7	1.5	1.6	1.3	1.2	1.5	1.6	2.0	1.9	1.2	0.6	0.3	0.2	0.4	0.3	0.3	0.2	0.4	2.0
18-Nov	0.8	0.4	1.1	2.2	2.5	1.3	0.7	0.5	0.5	1.3	2.1	2.3	2.6	2.9	2.6	2.4	2.4	2.6	2.0	1.3	1.0	1.0	1.4	1.5	2.9
19-Nov	1.8	1.0	1.5	1.2	1.0	0.8	0.4	0.6	1.0	0.7	1.0	1.2	1.2	1.4	0.9	0.9	0.7	0.9	0.9	0.9	1.3	1.6	1.5	0.9	1.8
20-Nov	0.9	0.7	1.0	1.4	1.4	1.5	1.9	1.1	1.0	0.9	1.0	1.2	1.2	1.0	0.9	0.6	0.4	0.2	0.2	0.8	1.5	1.1	1.3	1.1	1.9
21-Nov	1.4	1.4	1.3	1.2	1.5	1.1	1.0	1.5	1.1	1.3	1.8	1.9	1.8	1.9	1.6	1.1	1.8	2.0	1.6	1.7	1.4	0.4	0.8	1.4	2.0
22-Nov	1.5	1.8	1.1	1.1	1.3	1.2	1.4	1.2	1.2	1.4	1.7	2.2	2.4	2.2	2.0	2.0	1.8	1.5	2.0	1.8	1.8	1.4	1.9	1.9	2.4
23-Nov	1.4	1.0	0.7	0.7	0.5	0.6	0.3	0.5	0.9	1.5	1.3	1.2	1.1	1.1	1.0	0.8	0.9	0.5	0.4	0.2	0.2	0.3	0.3	0.5	1.5
24-Nov	0.7	1.3	1.3	1.6	1.2	1.2	1.1	0.8	0.8	1.1	1.2	1.2	1.1	0.9	0.8	0.6	0.4	0.8	0.6	0.7	0.8	0.6	0.6	0.9	1.6
25-Nov	1.1	1.3	1.2	1.1	1.2	1.4	1.3	1.2	1.2	1.6	1.4	1.3	1.3	1.3	1.2	0.8	0.3	0.2	0.2	0.1	0.1	0.2	0.2	0.4	1.6
26-Nov	0.8	0.9	1.2	0.9	1.0	1.0	1.2	1.0	0.9	0.9	0.9	1.0	0.8	1.0	0.8	0.6	0.5	1.0	1.5	1.5	2.2	2.0	2.6	3.0	3.0
27-Nov	2.4	1.9	1.7	1.0	1.2	1.3	0.9	0.7	0.6	0.8	2.1	1.2	0.9	0.7	0.5	0.3	0.1	0.2	0.3	0.3	0.5	0.5	0.8	1.1	2.4
28-Nov	1.3	1.4	1.5	1.7	1.4	1.4	1.3	1.5	1.4	1.5	2.1	2.0	2.1	2.2	2.0	1.4	1.7	1.4	1.2	0.5	0.3	0.2	0.2	0.3	2.2
29-Nov	0.6	1.0	0.9	1.0	1.1	0.8	1.4	1.7	1.3	1.8	2.4	2.2	2.7	2.7	2.1	2.6	2.5	2.4	2.7	2.8	3.1	2.6	3.0	3.0	3.1
30-Nov	3.3	2.7	2.8	2.5	2.7	2.5	3.4	3.4	2.6	2.8	1.8	1.1	1.4	1.4	1.6	1.1	1.3	1.1	1.0	0.9	0.9	1.1	1.2	1.9	3.4
	3.3	3.2	3.9	4.1	4.1	3.7	4.0	4.0	3.9	3.9	3.4	2.9	3.4	3.4	3.2	2.6	2.5	3.3	3.4	2.8	3.1	3.0	3.1	3.0	

Diurnal Maximum

AF - Analyzer Failure



Maximum Value: 4.4 km/h on Nov 2 19:00		Maximum Daily Average: 1.4 km/h on Nov 6		Hours in Service: 720																																														
Minimum Value: -1.6 km/h on Nov 7 04:00		Minimum Daily Average: -0.4 km/h on Nov 18		Hours of Data: 720																																														
Maximum Diurnal Average: 0.3 km/h at hour 14		Minimum Diurnal Average: 0.0 km/h at hour 24		Hours of Missing Data: 0																																														
Monthly Average: 0.14 km/h		Percentiles: P ₁ = -1.0 P ₁₀ = -0.5 Q ₁ = -0.1 Median = 0.1 Q ₃ = 0.4 P ₉₀ = 0.8 P ₉₉ = 2.5		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-Nov	0.1	0.1	-0.3	0.1	-0.2	-0.1	-0.1	0.1	0.0	0.1	0.0	0.9	0.1	0.4	0.1	0.3	0.1	0.2	0.1	0.0	0.1	0.0	0.5	0.7	0.1	0.9																								
2-Nov	0.2	0.2	0.7	0.1	0.2	0.5	0.4	0.3	0.5	-0.2	-0.5	0.2	1.2	1.3	1.8	1.0	1.4	2.4	4.4	1.8	1.3	1.0	0.9	0.1	0.9	4.4																								
3-Nov	1.2	1.9	1.0	0.4	1.2	0.4	0.2	0.5	0.6	0.0	0.0	-0.2	-0.6	0.3	0.5	0.2	0.1	0.0	-0.1	0.2	0.5	0.1	0.7	0.4	1.9	0.4																								
4-Nov	0.1	0.6	0.5	1.2	0.5	0.3	0.8	0.9	0.6	0.8	0.7	0.3	0.7	0.7	0.8	0.7	0.8	0.8	0.4	0.5	0.8	2.5	0.4	-0.1	0.7	2.5																								
5-Nov	0.0	-0.3	-0.4	-0.9	-0.5	-0.9	-1.0	-1.0	-0.9	-1.0	-0.6	-0.9	-0.7	-0.5	-0.5	0.1	0.0	0.2	0.4	0.6	0.9	0.5	-0.2	-0.7	-0.3	0.9																								
6-Nov	1.0	2.9	2.6	2.0	2.8	2.4	2.3	2.6	3.7	2.9	2.5	2.3	2.1	1.0	1.0	0.4	0.0	-0.1	0.0	0.3	-0.1	-0.4	-0.9	-0.2	1.4	3.7																								
7-Nov	-0.6	-0.9	-0.9	-1.6	-0.7	-0.7	0.0	-0.3	-0.1	0.6	0.1	0.3	-0.7	-0.4	-0.4	-0.3	-0.5	-0.5	-0.7	-0.4	-0.6	0.4	1.0	0.4	-0.3	1.0																								
8-Nov	0.7	0.0	-0.1	-0.1	-0.2	-0.1	-0.1	-0.5	-0.6	-0.6	-0.2	0.3	-0.5	-0.3	-0.6	-0.5	-0.1	-0.3	0.0	0.0	-0.3	-0.1	-0.4	-0.5	-0.2	0.7																								
9-Nov	-0.2	-0.3	-0.2	-0.1	-0.1	0.0	0.0	0.0	-0.3	-0.1	-0.1	-0.1	-0.4	-0.3	0.7	0.5	0.5	0.1	0.0	0.1	0.2	0.0	0.5	0.0	0.0	0.7																								
10-Nov	0.2	0.6	-0.6	-0.3	-0.4	-0.4	-0.5	-0.5	0.1	0.5	-0.2	0.1	0.3	-0.2	-0.3	0.1	0.3	0.5	0.1	0.4	0.1	0.2	0.0	-0.6	0.0	0.6																								
11-Nov	-0.5	-0.2	0.0	0.0	0.0	0.2	0.4	0.3	0.4	0.2	0.4	0.1	0.4	-0.1	0.2	-0.4	0.0	0.1	0.0	-0.1	0.1	0.1	0.0	0.1	0.1	0.4																								
12-Nov	0.1	0.0	0.0	0.2	0.1	0.3	0.5	0.2	-0.1	-0.5	-0.1	-0.7	0.2	0.5	0.4	1.0	0.9	0.5	-0.1	-0.1	0.2	0.5	0.2	0.3	0.2	1.0																								
13-Nov	0.6	0.5	0.1	0.3	0.0	0.7	0.3	0.8	0.8	0.3	0.2	0.6	1.0	0.4	0.2	0.3	-0.1	-0.1	0.0	-0.2	-0.4	-0.3	-0.2	-0.2	0.2	1.0																								
14-Nov	-0.4	-0.4	-0.3	-0.2	-0.2	-0.1	-0.3	-0.2	-0.1	-0.2	0.0	0.1	-0.1	-0.3	-0.3	-0.2	0.2	0.2	0.3	-0.6	0.0	1.1	0.9	0.3	0.0	1.1																								
15-Nov	0.6	0.0	0.2	0.3	0.4	-0.1	0.1	0.0	0.0	0.1	0.3	1.0	0.4	0.0	-0.3	-0.3	0.3	0.6	0.1	-1.0	-0.2	-0.8	-0.8	-0.8	0.0	1.0																								
16-Nov	-0.9	-0.8	-0.4	-0.2	-0.9	-0.4	-0.5	-0.4	-0.6	-0.3	-0.5	-0.7	-0.3	0.4	-0.2	0.1	0.0	0.0	-0.3	-0.1	-0.1	-0.1	0.0	0.0	-0.3	0.4																								
17-Nov	0.1	0.0	0.1	0.0	0.5	0.9	0.4	0.4	0.5	-0.7	-0.3	1.0	0.6	2.0	1.5	-0.2	0.0	-0.1	-0.1	-0.2	-0.3	-0.1	-0.1	0.1	0.3	2.0																								
18-Nov	-0.2	-0.2	-0.1	0.4	-0.6	-0.6	-0.2	-0.3	-0.3	-0.1	0.0	-0.4	-0.9	-0.8	-0.5	-0.5	-0.8	-0.3	-0.3	-1.2	-0.7	-0.5	-0.3	0.1	-0.4	0.4																								
19-Nov	0.1	-0.4	0.1	-0.1	-0.1	-0.2	0.0	-0.3	0.1	0.6	0.8	0.4	-0.1	0.3	0.4	0.0	0.2	0.6	0.7	1.3	1.1	1.6	1.2	-0.1	0.4	1.6																								
20-Nov	0.0	0.4	0.1	0.3	0.3	0.2	0.8	0.0	-0.4	0.1	0.3	0.4	0.1	0.3	0.4	0.2	0.4	0.3	0.1	0.0	0.1	0.1	0.1	0.0	0.2	0.8																								
21-Nov	0.0	0.0	0.1	0.1	0.1	0.0	-0.2	0.0	-0.2	0.0	0.5	-0.4	-0.4	-0.5	0.8	-0.1	0.4	0.1	-0.1	0.1	0.0	0.1	0.0	-0.1	0.0	0.8																								
22-Nov	0.1	0.2	0.2	0.2	0.0	-0.1	0.4	0.0	-0.1	0.2	0.1	0.3	-0.2	0.5	0.1	0.2	0.3	0.2	0.2	0.3	0.3	0.1	0.2	0.2	0.2	0.5																								
23-Nov	0.0	0.1	0.2	0.1	-0.1	-0.1	0.0	0.3	0.7	-0.1	0.7	0.4	0.5	0.9	0.9	0.0	0.1	0.1	0.1	0.0	0.0	0.0	-0.1	-0.1	0.2	0.9																								
24-Nov	-0.1	0.0	0.4	0.2	0.0	-0.1	0.0	0.1	0.0	0.1	0.0	-0.2	0.0	0.6	-0.1	-0.3	0.1	0.1	0.7	0.3	0.4	0.7	0.4	-0.4	-0.6	0.7																								
25-Nov	0.3	0.7	0.7	0.6	0.1	0.1	0.2	0.1	0.0	0.0	0.2	-0.3	-0.4	-0.3	0.0	0.2	-0.1	0.1	0.1	0.1	0.1	0.4	0.1	0.7	0.2	0.7																								
26-Nov	1.0	0.6	-0.1	0.1	-0.4	-0.3	0.1	0.7	0.0	0.1	0.4	0.5	0.3	0.7	0.1	0.1	0.1	-0.1	0.0	0.0	0.0	0.4	0.2	0.1	0.2	1.0																								
27-Nov	-0.1	0.2	0.0	0.0	0.1	0.1	-0.1	0.0	0.0	0.1	-0.1	0.5	0.1	0.0	-0.1	-0.2	-0.1	-0.2	-0.2	-0.1	-0.1	0.0	-0.1	0.2	0.0	0.5																								
28-Nov	0.1	0.0	0.2	-0.1	0.1	0.0	0.0	0.0	0.1	0.1	-0.1	0.1	0.0	-0.1	0.2	0.1	0.0	-0.2	0.1	0.0	-0.2	-0.1	0.0	0.1	0.0	0.2																								
29-Nov	0.3	0.2	0.9	-0.1	0.1	-0.1	0.2	0.7	-0.1	1.5	1.6	0.6	1.0	1.7	0.9	0.3	-0.5	-0.9	-1.1	-0.9	-0.7	-0.7	-0.7	-1.0	0.1	1.7																								
30-Nov	-1.2	-1.1	-1.1	-0.5	-0.3	0.2	-0.2	-0.4	0.3	1.6	1.2	0.5	0.3	0.2	0.0	0.3	-0.3	0.3	0.3	0.1	0.5	0.4	0.5	0.1	0.1	1.6																								
																								0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.1	0.1	0.2	0.2	0.0	0.1	0.2	0.1	0.0	Diurnal Average
																								1.2	2.9	2.6	2.0	2.8	2.4	2.3	2.6	3.7	2.9	2.5	2.3	2.1	2.0	1.8	1.0	1.4	2.4	4.4	1.8	1.3	2.5	1.2	0.7	Diurnal Maximum		



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 3.9 km/h on Nov 7 03:00 Minimum Value: 0.1 km/h on Nov 25 20:00 Percentiles: P ₁ = 0.2 P ₁₀ = 0.5 Q ₁ = 0.9 Median = 1.3 Q ₃ = 1.8 P ₉₀ = 2.3 P ₉₉ = 3.5																								Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	0.4	0.3	1.0	0.9	1.5	1.4	1.2	1.0	1.4	1.1	1.1	1.5	1.2	1.4	0.9	0.6	0.6	0.4	0.5	0.8	0.8	0.6	0.8	0.8	1.5
2-Nov	0.7	0.9	0.9	1.0	0.8	1.0	1.1	1.2	1.9	1.3	1.7	2.1	1.5	1.3	1.3	1.6	2.1	2.1	1.5	2.2	1.8	1.0	1.3	1.2	2.2
3-Nov	1.8	1.6	1.4	1.3	1.3	1.4	0.9	1.1	0.7	0.5	0.4	0.3	0.9	1.4	1.6	1.8	1.6	1.5	1.7	1.7	1.3	1.5	1.4	1.4	1.8
4-Nov	1.2	1.5	1.5	1.9	1.8	1.4	1.4	1.8	1.5	1.3	1.8	1.6	1.7	1.4	1.4	1.5	1.7	1.2	1.3	1.0	1.0	1.8	1.5	1.0	1.9
5-Nov	1.0	1.5	1.5	2.2	2.9	2.2	2.1	2.1	2.3	1.9	2.1	1.7	1.7	2.0	2.0	1.7	1.1	1.0	1.1	1.2	1.0	1.3	1.5	1.8	2.9
6-Nov	3.2	3.1	2.6	2.8	2.3	2.6	2.9	3.3	3.9	3.7	3.1	2.6	2.0	1.4	1.4	1.4	1.0	0.8	1.0	1.9	1.9	2.4	2.7	2.8	3.9
7-Nov	2.0	3.2	3.9	3.8	3.6	3.7	3.2	2.9	2.6	3.3	3.1	2.5	3.5	3.6	3.0	2.7	1.8	2.3	2.0	2.4	1.9	1.9	1.9	1.8	3.9
8-Nov	1.8	1.6	1.3	0.7	0.5	0.7	0.6	1.0	1.4	1.5	2.5	2.9	2.9	2.7	1.8	0.7	0.5	0.3	1.1	1.4	0.7	0.3	0.3	0.4	2.9
9-Nov	0.4	0.4	0.3	0.4	0.4	0.4	0.5	0.5	0.6	0.7	1.1	1.5	1.9	2.0	2.4	1.9	1.2	0.9	1.0	1.4	1.3	1.9	1.6	1.3	2.4
10-Nov	1.3	1.9	1.6	1.8	1.3	1.4	1.5	1.1	1.9	2.6	2.0	2.5	2.7	2.9	2.4	2.3	1.9	2.0	1.9	2.0	1.9	1.6	1.3	1.1	2.9
11-Nov	1.3	1.1	1.2	1.6	1.5	1.7	1.7	1.1	1.2	1.5	1.7	1.6	1.8	1.9	1.4	1.4	1.0	0.7	0.7	0.6	0.4	0.2	0.3	0.4	1.9
12-Nov	0.3	0.4	0.4	0.7	1.1	1.6	1.5	1.0	1.0	1.0	1.3	1.3	1.6	1.7	1.2	1.4	1.4	1.1	1.1	1.1	1.1	0.9	0.9	0.9	1.7
13-Nov	0.9	0.9	1.1	1.3	1.5	1.4	1.5	1.5	1.5	1.3	1.3	1.2	1.0	0.6	0.6	0.4	0.3	0.2	0.4	0.4	0.5	0.5	0.5	0.6	1.5
14-Nov	0.6	0.4	0.3	0.2	0.6	0.6	0.8	0.4	0.5	1.0	1.4	1.8	1.4	1.6	1.5	0.9	1.0	0.6	1.0	1.2	1.5	1.9	1.3	1.0	1.9
15-Nov	1.4	1.5	1.5	1.6	1.9	1.7	1.3	1.4	1.4	1.3	1.2	2.1	2.1	1.4	1.7	1.9	2.2	3.5	3.3	2.2	3.0	3.0	3.0	1.9	3.5
16-Nov	2.0	2.9	3.6	3.5	3.0	2.5	2.7	2.9	2.2	1.8	2.5	1.9	2.3	1.8	0.7	0.4	0.3	0.3	0.6	0.8	0.5	0.3	0.2	0.6	3.6
17-Nov	0.6	0.7	0.7	0.9	1.0	1.0	1.5	1.8	1.9	1.4	1.3	1.2	1.8	1.7	1.7	1.4	0.7	0.8	0.5	0.4	0.4	0.4	0.4	0.6	1.9
18-Nov	1.4	0.9	1.5	2.5	2.0	1.2	0.9	0.7	1.0	1.4	2.1	2.1	2.5	2.7	2.5	2.1	1.8	1.9	1.8	1.5	1.3	1.4	1.5	1.6	2.7
19-Nov	1.5	1.3	1.5	1.5	1.1	1.0	0.9	0.9	1.3	0.9	0.8	1.3	1.4	1.6	1.1	1.0	0.8	0.8	1.2	1.4	1.3	1.4	1.4	1.3	1.6
20-Nov	1.0	1.3	1.2	1.8	1.9	1.4	1.8	1.6	1.3	1.0	1.3	1.0	1.2	0.9	1.1	0.7	0.4	0.3	0.2	0.5	1.4	1.4	0.9	0.7	1.9
21-Nov	1.0	1.4	1.6	1.4	1.5	1.4	0.9	1.4	1.0	1.1	1.9	1.9	2.0	1.9	1.8	1.4	1.9	2.0	1.9	1.9	1.1	0.2	0.5	1.5	2.0
22-Nov	1.8	2.1	1.5	1.2	1.3	1.2	1.5	1.5	1.1	1.3	1.6	1.8	2.0	1.9	2.0	2.1	1.5	1.4	1.7	1.7	1.6	1.2	1.1	1.5	2.1
23-Nov	0.8	0.8	0.6	0.5	0.5	0.5	0.2	0.6	1.2	1.7	1.4	1.4	1.1	1.2	1.3	0.8	0.8	0.7	0.6	0.3	0.2	0.4	0.3	0.4	1.7
24-Nov	0.6	1.3	1.3	1.5	0.9	0.9	0.9	0.8	0.9	1.1	0.9	1.0	1.2	1.0	0.7	0.5	0.3	0.6	0.8	0.9	0.8	0.8	0.8	1.3	1.5
25-Nov	1.5	1.3	1.1	1.1	1.0	0.9	1.0	1.0	1.0	1.3	1.3	1.1	1.0	0.8	0.9	0.8	0.5	0.3	0.1	0.1	0.2	0.3	0.3	0.7	1.5
26-Nov	1.0	1.2	1.3	0.9	1.3	1.0	1.2	1.2	1.0	1.1	0.9	0.7	0.5	0.6	0.5	0.5	0.3	0.4	0.7	1.3	2.3	2.3	2.4	2.6	2.6
27-Nov	2.4	2.0	1.8	1.3	1.4	1.2	0.8	0.7	0.9	1.2	2.0	1.5	0.9	0.5	0.2	0.3	0.1	0.2	0.2	0.2	0.4	0.9	1.2	1.0	2.4
28-Nov	1.1	1.2	1.5	1.7	1.4	1.1	1.0	1.3	1.1	1.2	2.1	1.6	1.7	1.9	1.8	1.3	1.3	1.0	0.9	0.7	0.5	0.3	0.3	0.4	2.1
29-Nov	1.1	1.6	1.0	1.1	1.0	1.7	1.8	2.0	1.9	2.9	3.0	2.4	2.1	2.0	1.2	2.6	2.0	2.3	2.3	2.8	2.7	2.4	2.5	2.3	3.0
30-Nov	2.8	2.4	2.2	2.2	2.2	1.9	1.4	2.3	1.2	1.3	1.3	1.1	1.5	1.2	1.5	1.2	1.3	1.3	1.3	1.5	1.4	1.2	1.3	1.2	2.8
Diurnal Maximum																									



Maximum Value: 4.5 km/h on Nov 2 19:00	Maximum Daily Average: 1.7 km/h on Nov 6	Hours in Service: 720
Minimum Value: -1.7 km/h on Nov 18 20:00	Minimum Daily Average: -0.3 km/h on Nov 18	Hours of Data: 699
Maximum Diurnal Average: 0.5 km/h at hour 11	Minimum Diurnal Average: 0.2 km/h at hour 24	Hours of Missing Data: 21
Monthly Average: 0.39 km/h	Percentiles: P ₁ = -0.9 P ₁₀ = -0.4 Q ₁ = 0.0 Median = 0.2 Q ₃ = 0.7 P ₉₀ = 1.4 P ₉₉ = 3.3	Hours of Calibration: 0
		Percent Operational Time: 97.1

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-Nov	0.1	0.0	-0.1	0.4	0.1	0.4	0.5	0.9	1.3	0.8	0.6	1.5	0.9	0.9	0.5	0.7	0.6	0.6	0.8	0.7	0.4	0.7	0.4	0.3	0.6	1.5																						
2-Nov	0.6	0.3	0.5	0.3	0.4	0.4	0.5	0.6	0.9	-0.4	-0.1	0.7	1.8	1.4	1.6	1.2	2.0	3.6	4.5	3.0	1.6	0.9	1.4	0.4	1.2	4.5																						
3-Nov	0.7	1.2	1.0	0.7	1.2	0.4	0.3	0.5	0.4	0.1	0.1	0.0	0.2	0.3	0.7	0.9	0.1	0.2	0.0	AF	AF	AF	AF	AF	0.5	1.2																						
4-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	1.3	0.8	1.3	1.4	1.3	0.9	0.7	0.5	1.0	3.5	0.7	0.2	--	3.5																						
5-Nov	0.5	0.3	0.1	-0.6	-0.5	-0.4	-0.7	-0.8	-0.6	-0.5	-0.3	-0.6	-0.4	0.1	-0.1	0.9	0.3	0.6	0.9	1.8	2.0	1.9	0.1	-0.6	0.1	2.0																						
6-Nov	1.5	3.7	3.6	2.7	3.0	2.4	2.5	2.9	3.7	2.6	2.1	2.4	2.0	0.8	0.7	1.0	2.0	1.0	1.0	1.3	0.2	-0.3	-0.9	-0.3	1.7	3.7																						
7-Nov	-0.5	-0.7	-0.9	-1.4	-0.4	-0.7	0.4	-0.2	0.0	1.0	0.3	0.1	-0.7	-0.5	0.1	-0.3	-0.3	-0.5	-0.6	-0.7	-0.6	0.6	1.5	1.2	-0.2	1.5																						
8-Nov	0.7	0.2	0.0	-0.2	-0.3	-0.1	-0.2	-0.5	-0.6	-0.8	-0.4	0.3	-0.6	-0.6	-0.7	-0.5	-0.2	-0.2	0.5	0.6	0.0	0.0	-0.2	-0.3	-0.2	0.7																						
9-Nov	-0.2	-0.2	-0.2	0.1	-0.1	0.3	0.0	0.1	0.0	-0.1	0.0	-0.3	-0.5	-0.4	1.1	0.4	0.6	0.2	0.3	0.2	0.3	0.0	0.8	0.2	0.1	1.1																						
10-Nov	0.1	0.9	-0.4	-0.2	-0.4	-0.3	-0.1	-0.3	0.1	0.1	-0.2	0.4	0.3	-0.4	-0.4	-0.1	0.4	0.4	0.1	0.6	0.1	0.4	0.2	-0.5	0.0	0.9																						
11-Nov	-0.3	-0.1	0.1	0.2	-0.1	0.2	0.6	0.4	0.9	0.1	0.5	0.5	0.2	-0.1	0.2	-0.5	0.1	0.0	0.0	0.2	0.5	0.5	0.3	0.3	0.2	0.9																						
12-Nov	0.5	0.8	0.8	0.8	0.9	0.8	1.1	0.7	1.2	0.9	1.0	0.3	0.9	0.2	0.2	0.7	0.7	2.0	0.9	0.9	0.9	0.9	1.0	0.6	0.8	2.0																						
13-Nov	0.8	1.0	1.0	1.3	0.9	0.8	0.3	0.7	1.0	0.8	0.3	0.3	0.5	0.4	0.5	0.6	0.1	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.5	1.3																						
14-Nov	0.0	-0.1	-0.1	0.0	-0.1	0.3	-0.1	-0.1	0.1	0.1	0.0	0.4	0.2	-0.4	-0.4	-0.4	0.7	1.0	1.4	-0.1	0.9	1.3	1.7	1.0	0.3	1.7																						
15-Nov	1.7	1.6	1.5	1.3	1.6	1.6	1.7	1.4	1.5	1.7	1.3	1.9	1.2	0.0	-0.2	0.0	0.3	0.5	0.3	-0.9	0.2	-0.6	-0.7	-0.5	0.8	1.9																						
16-Nov	-0.7	-0.5	-0.3	-0.1	-0.8	-0.5	-0.4	-0.1	-0.3	-0.4	-0.4	-0.5	-0.4	0.4	-0.1	0.0	0.1	0.1	-0.4	0.0	0.1	-0.1	0.0	0.3	-0.2	0.4																						
17-Nov	0.5	0.4	1.0	0.8	0.2	1.4	-0.1	0.1	0.3	-1.3	0.1	1.0	0.5	1.5	1.2	0.8	0.7	-0.1	-0.4	-0.5	0.0	0.0	-0.1	-0.1	0.3	1.5																						
18-Nov	0.1	0.2	0.0	0.3	-0.4	-0.6	-0.4	-0.4	-0.2	0.0	0.3	-0.3	-0.6	-0.6	-0.3	-0.4	-0.6	0.1	0.0	-1.7	-0.9	-0.6	0.0	0.5	-0.3	0.5																						
19-Nov	0.3	-0.3	0.6	0.2	0.0	0.0	0.2	-0.1	0.6	1.3	1.4	0.8	0.4	0.8	1.1	0.9	0.3	0.4	0.4	0.6	3.0	1.5	1.3	0.4	0.7	3.0																						
20-Nov	-0.1	0.5	0.4	0.8	0.7	0.2	0.4	-0.1	-0.2	0.1	0.2	0.4	0.1	0.5	0.8	0.3	0.3	0.2	0.1	0.1	0.2	0.0	0.2	-0.1	0.2	0.8																						
21-Nov	-0.1	-0.1	0.2	0.0	0.3	-0.1	-0.1	0.0	0.0	0.2	0.6	-0.4	-0.1	-0.6	0.9	-0.1	0.7	0.6	0.1	0.2	0.3	0.1	0.2	0.3	0.1	0.9																						
22-Nov	0.4	0.4	0.5	0.2	0.0	-0.2	0.5	0.2	0.3	0.2	0.1	0.5	-0.1	0.5	0.3	0.3	0.3	0.2	0.2	0.5	0.4	0.2	0.2	0.2	0.3	0.5																						
23-Nov	0.0	0.1	0.1	0.1	0.0	0.0	0.2	0.5	0.8	0.2	1.9	1.1	0.3	0.7	0.8	0.5	1.2	1.2	0.6	-0.1	0.0	0.2	-0.1	0.1	0.4	1.9																						
24-Nov	0.2	0.0	0.5	0.5	0.0	0.0	0.1	0.0	0.1	-0.1	-0.2	0.0	0.7	-0.2	-0.3	-0.3	0.1	0.4	1.3	0.7	1.3	1.4	0.9	0.0	-0.6	1.4																						
25-Nov	0.7	1.7	1.3	1.3	0.1	0.2	0.3	0.1	0.1	0.2	0.4	-0.4	-0.3	-0.3	0.0	0.3	-0.1	0.1	0.1	0.2	0.1	0.3	0.4	0.1	0.3	1.7																						
26-Nov	0.5	0.2	0.1	0.2	-0.2	0.0	0.0	1.1	1.0	AF	AF	AF	AF	0.5	0.1	0.2	0.3	0.1	0.0	-0.1	-0.1	0.3	0.2	0.4	0.2	1.1																						
27-Nov	0.2	0.4	-0.1	-0.1	0.2	0.1	0.0	0.0	0.3	0.1	0.0	0.7	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.0	0.2	0.1	0.7																						
28-Nov	0.0	-0.1	0.1	-0.1	0.1	0.1	0.1	-0.1	0.2	0.2	-0.1	0.5	0.0	-0.1	0.3	0.3	0.1	0.2	0.1	0.2	0.0	0.0	0.1	0.3	0.1	0.5																						
29-Nov	0.8	1.2	1.6	1.1	1.0	0.8	0.8	2.0	0.8	3.4	3.4	1.8	1.9	2.7	1.4	1.1	-0.3	-0.7	-0.9	-0.9	-0.8	-0.6	-0.5	-0.8	0.8	3.4																						
30-Nov	-1.0	-0.8	-0.8	-0.1	0.2	0.9	0.1	0.8	0.5	2.8	2.4	1.5	1.8	1.5	1.3	1.3	1.8	1.9	1.8	2.0	0.7	1.5	1.6	1.0	1.0	2.8																						
																								0.3	0.4	0.4	0.4	0.3	0.3	0.3	0.4	0.5	0.5	0.5	0.5	0.4	0.3	0.4	0.4	0.5	0.5	0.5	0.3	0.4	0.5	0.3	0.2	Diurnal Average
																								1.7	3.7	3.6	2.7	3.0	2.4	2.5	2.9	3.7	3.4	3.4	2.4	2.0	2.7	1.6	1.4	2.0	3.6	4.5	3.0	3.0	3.5	1.7	1.2	Diurnal Maximum

AF - Analyzer Failure



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Vertical Wind Speed 167 m (VW167m) - km/h
Lower Camp Met Tower - November 2014

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 4.6 km/h on Nov 6 09:00	Hours of Data: 699
Minimum Value: 0.1 km/h on Nov 27 17:00	Hours of Missing Data: 21
Percentiles: P ₁ = 0.2 P ₁₀ = 0.4 Q ₁ = 0.8 Median = 1.2 Q ₃ = 1.7 P ₉₀ = 2.3 P ₉₉ = 3.5	Hours of Calibration: 0
	Percent Operational Time: 97.1

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	0.4	0.3	0.8	0.4	0.7	1.2	1.3	0.9	1.1	1.2	1.1	1.3	1.0	1.1	1.0	0.7	0.8	0.4	0.7	1.2	0.8	0.5	0.5	0.5	1.3
2-Nov	0.8	0.7	0.8	0.8	0.9	0.8	0.8	1.1	1.5	1.2	1.2	1.9	1.7	1.6	1.6	1.6	1.9	1.7	2.3	2.5	1.7	1.2	1.2	1.2	2.5
3-Nov	1.5	1.8	1.1	1.1	1.2	0.9	0.6	0.9	0.7	0.5	0.2	0.2	0.7	1.0	1.6	2.1	1.2	1.5	1.8	AF	AF	AF	AF	AF	2.1
4-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	1.7	1.3	1.4	1.4	1.6	1.0	1.0	1.4	2.1	1.7	1.1	1.1	2.1
5-Nov	1.1	1.4	1.7	1.9	2.5	2.1	1.8	2.1	2.0	1.6	2.2	1.4	1.5	1.9	1.7	1.7	1.1	0.8	1.2	0.9	0.8	1.0	1.3	1.3	2.5
6-Nov	2.8	3.4	2.7	2.4	2.3	2.5	2.5	3.7	4.6	4.5	3.8	3.1	2.3	1.3	1.3	1.2	0.8	0.7	1.1	1.8	2.1	2.4	2.7	2.8	4.6
7-Nov	2.0	3.1	3.2	3.5	3.3	3.2	3.2	2.8	2.6	3.5	3.0	2.7	3.1	3.5	3.2	2.4	1.5	1.7	1.5	1.9	1.5	2.1	1.8	1.5	3.5
8-Nov	2.1	1.6	1.3	0.8	0.7	0.6	0.5	0.8	0.9	1.1	2.1	3.0	3.0	2.7	1.9	0.6	0.6	0.3	0.7	1.1	0.9	0.4	0.6	0.5	3.0
9-Nov	0.6	0.4	0.4	0.4	0.2	0.3	0.3	0.3	0.7	0.4	0.6	1.4	1.9	2.2	2.7	1.9	0.8	0.8	0.9	1.4	0.8	1.3	1.3	1.5	2.7
10-Nov	1.5	2.1	2.0	1.7	1.2	1.3	1.4	1.2	2.0	2.8	2.2	2.5	3.1	3.1	2.5	2.5	2.1	2.2	2.2	2.4	2.0	1.6	1.5	1.3	3.1
11-Nov	1.5	1.2	1.5	1.5	1.4	1.5	1.8	0.9	0.9	1.5	1.7	1.9	2.0	1.9	1.6	1.1	1.0	0.4	0.7	0.4	0.3	0.4	0.4	0.4	2.0
12-Nov	0.3	0.5	0.7	0.8	1.1	1.6	1.4	1.0	0.6	0.7	0.8	0.9	1.4	1.2	1.1	0.9	0.7	0.8	1.3	1.2	0.9	0.9	0.7	0.8	1.6
13-Nov	0.8	0.9	1.0	1.2	1.4	1.4	1.4	1.2	1.3	1.1	0.9	0.8	0.7	0.7	0.5	0.3	0.3	0.2	0.3	0.2	0.7	1.0	0.7	0.8	1.4
14-Nov	0.6	0.4	0.3	0.2	0.7	0.6	0.5	0.4	0.5	0.8	1.5	1.9	1.6	1.7	1.3	1.0	1.2	0.5	0.8	0.9	1.0	1.3	0.8	0.7	1.9
15-Nov	0.8	1.3	1.5	1.7	2.0	1.8	1.7	1.9	1.8	1.5	1.5	1.8	1.6	1.4	1.4	1.8	2.6	3.6	3.3	1.9	3.2	3.0	2.9	1.6	3.6
16-Nov	2.0	2.9	3.8	3.8	2.6	2.3	2.5	2.5	1.8	1.5	2.2	1.8	2.1	1.8	0.8	0.5	0.2	0.4	0.6	0.4	0.4	0.3	0.2	0.5	3.8
17-Nov	0.4	0.5	0.8	1.0	0.9	1.4	1.1	1.5	1.7	1.3	0.9	1.0	1.7	1.2	1.2	1.7	1.1	1.2	0.8	0.6	0.5	0.5	0.4	1.0	1.7
18-Nov	1.6	1.3	2.0	2.7	1.8	1.0	1.2	1.1	0.8	1.6	2.1	2.2	2.6	2.7	2.4	2.0	1.3	1.7	1.9	1.8	1.6	1.5	1.7	1.5	2.7
19-Nov	1.2	1.1	1.2	1.3	0.9	1.2	0.9	1.1	1.2	1.0	0.9	1.3	1.1	1.6	1.2	0.7	0.5	0.6	0.5	0.8	1.6	1.1	1.4	1.7	1.7
20-Nov	1.3	1.5	1.3	2.1	2.0	1.1	1.5	1.4	1.0	1.1	1.4	0.9	0.8	0.8	0.9	0.6	0.3	0.4	0.4	0.5	1.4	1.5	0.6	0.6	2.1
21-Nov	1.2	1.5	1.7	1.6	1.9	1.6	1.2	1.3	0.9	1.1	2.2	1.8	2.0	1.7	1.8	1.4	1.3	1.6	1.7	1.6	0.9	0.3	0.3	0.8	2.2
22-Nov	1.5	1.6	1.4	1.2	1.4	1.2	1.4	1.3	0.9	1.0	1.6	1.9	2.0	2.3	2.2	2.3	1.9	1.7	1.9	2.1	1.7	1.3	1.2	1.5	2.3
23-Nov	0.9	0.6	0.4	0.3	0.2	0.4	0.3	0.7	1.2	1.1	1.3	1.1	0.9	1.3	1.3	0.6	0.5	0.4	0.5	0.3	0.2	0.4	0.4	0.6	1.3
24-Nov	0.8	1.4	1.2	1.3	0.7	0.6	0.9	1.1	0.9	1.1	1.0	0.9	1.4	0.9	0.6	0.5	0.3	0.4	1.0	0.8	0.6	0.7	0.8	1.3	1.4
25-Nov	1.8	0.8	0.6	0.9	0.9	0.7	0.6	0.6	1.1	1.5	1.3	1.0	1.1	1.0	1.0	1.0	0.6	0.2	0.2	0.2	0.1	0.3	0.5	0.4	1.8
26-Nov	0.7	0.7	0.8	0.7	1.3	1.5	1.1	1.1	1.1	AF	AF	AF	AF	1.7	0.7	0.5	0.4	0.3	0.5	1.5	2.5	2.3	2.4	2.6	2.6
27-Nov	2.6	2.3	2.1	1.4	1.4	0.9	0.7	0.7	0.8	1.2	1.7	1.6	0.8	0.4	0.3	0.4	0.1	0.2	0.2	0.3	0.5	1.1	1.6	1.2	2.6
28-Nov	1.1	1.2	1.6	1.8	1.4	1.1	1.1	1.4	1.2	1.4	2.2	1.9	1.9	2.0	1.9	1.1	1.2	1.1	1.1	0.8	0.5	0.3	0.4	0.4	2.2
29-Nov	0.5	0.9	0.9	0.9	1.6	1.8	1.8	1.7	2.6	2.5	1.8	1.6	1.2	1.0	1.1	2.3	1.7	2.1	2.3	2.6	2.7	2.1	2.2	1.7	2.7
30-Nov	2.1	1.7	1.6	1.7	1.9	2.0	1.1	1.2	1.0	1.0	0.9	0.9	1.5	1.0	1.3	0.8	1.0	0.8	1.0	0.9	0.8	0.8	0.9	1.2	2.1
Diurnal Maximum																								2.8	

AF - Analyzer Failure

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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 4
BUFFALO VIEWPOINT
NOVEMBER 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

December 30, 2014

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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BUFFALO VIEWPOINT (AMS 4)
 NOVEMBER 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	685	35	35	100.00	24	0	3	0
H2S (ppb) Average	686	34	34	100.00	2	0	0	0
THC (ppm) Average	685	35	35	100.00	3.9	-	2.5	-
Temperature (C) Average	720	0	0	100.00	9.4	-	3.3	-
Wind Speed 10 m (km/h) Average	716	0	4	99.44	32	-	-	-
Wind Direction 10 m (deg) Average	716	0	4	99.44	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BUFFALO VIEWPOINT (AMS 4)
 NOVEMBER 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	685	0.5	1	-	0	0	0	0	0	1	24
H2S (ppb) Average	686	0.1	0	-	0	0	0	0	0	0	2
THC (ppm) Average	685	2.26	0.2	-	2.1	2.2	2.2	2.2	2.3	2.4	3.9
Temperature 2 m (C) Average	720	-11.3	8	-	-28.8	-22.2	-15.8	-12	-5.6	-0.2	9.4
Wind Speed 10 m (km/h) Average	716	11.4	6	-	1	5	7	10	14	20	32
Wind Direction 10 m (deg) Average	716	-	-	-	-	-	-	-	-	-	-

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

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
Wind Speed, Wind Direction	03 Nov 2014 10:00	03 Nov 2014 13:00	4	Flat line in sensor output signal - Sensor frozen

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Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 24 ppb on Nov 12 03:00	Maximum Daily Average: 2.5 ppb on Nov 12		Hours of Data:	685
Minimum Value: 0 ppb on Nov 19 00:00	Minimum Daily Average: 0.1 ppb on Nov 28		Hours of Missing Data:	35
Maximum Diurnal Average: 1.1 ppb at hour 3	Minimum Diurnal Average: 0.3 ppb at hour 17		Hours of Calibration:	35
Monthly Average: 0.5 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 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-Nov	0	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-Nov	0	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-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0.2	1
4-Nov	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
5-Nov	0	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-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
7-Nov	0	Z	0	0	0	0	1	1	5	7	8	8	3	2	3	4	1	1	2	3	1	1	1	0	2.4	8
8-Nov	0	Z	0	0	1	0	2	0	0	1	1	7	3	12	2	0	0	0	0	0	0	0	0	1	1.4	12
9-Nov	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
10-Nov	0	Z	0	1	1	2	4	1	1	0	0	4	2	0	0	0	0	0	0	0	0	0	0	0	0.7	4
11-Nov	0	Z	0	0	0	0	0	0	0	0	1	0	1	1	1	1	2	4	5	5	5	3	3	3	1.6	5
12-Nov	2	Z	24	16	7	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.5	24
13-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0.3	1
14-Nov	0	Z	2	1	1	0	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0.4	2
15-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	1	0	0.3	1
16-Nov	0	Z	1	0	4	2	0	0	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	4
17-Nov	0	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-Nov	0	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
19-Nov	0	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-Nov	0	Z	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	2	4	1	1	0	0	0.7	4
21-Nov	0	Z	0	0	0	0	0	0	0	1	0	0	0	3	2	0	0	0	0	0	0	0	0	0	0.5	3
22-Nov	0	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-Nov	0	Z	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.4	1
24-Nov	0	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-Nov	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
26-Nov	0	Z	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	1	1	1	0	0	0	0	0.4	1
27-Nov	0	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-Nov	0	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-Nov	0	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-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0

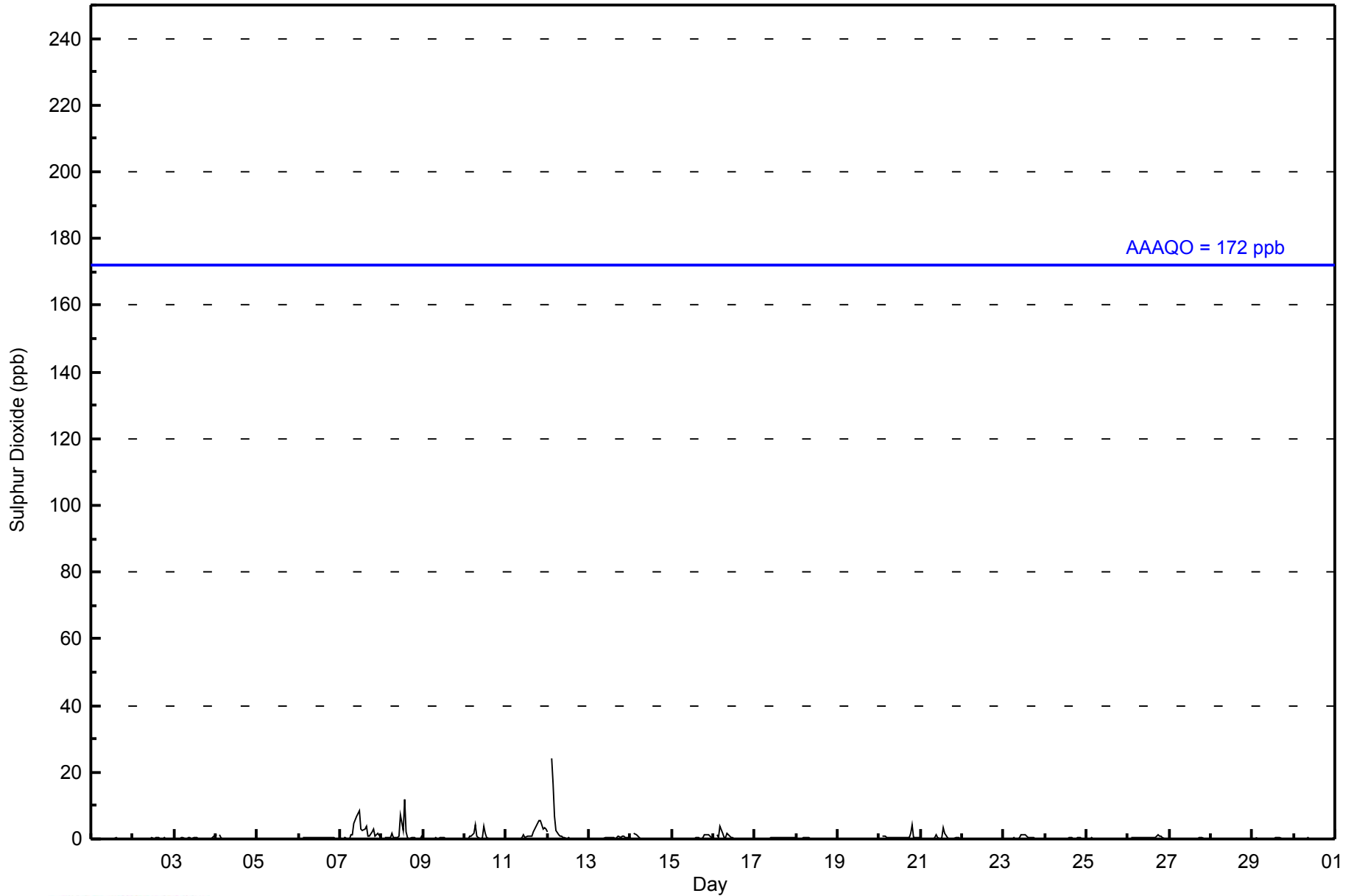
0.3	--	1.1	0.8	0.6	0.4	0.4	0.3	0.4	0.5	0.6	0.9	0.5	0.8	0.5	0.3	0.3	0.4	0.5	0.7	0.4	0.3	0.4	0.3	Diurnal Average	
2	--	24	16	7	2	4	1	5	7	8	8	3	12	3	4	2	4	5	5	5	3	3	3	Diurnal Maximum	

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



WBEA
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Buffalo Viewpoint - November 2014





WBEA
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Buffalo Viewpoint - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	682	99.56	99.56
11 - 20	2	0.29	99.85
21 - 60	1	0.15	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



WBEA
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Buffalo Viewpoint - November 2014

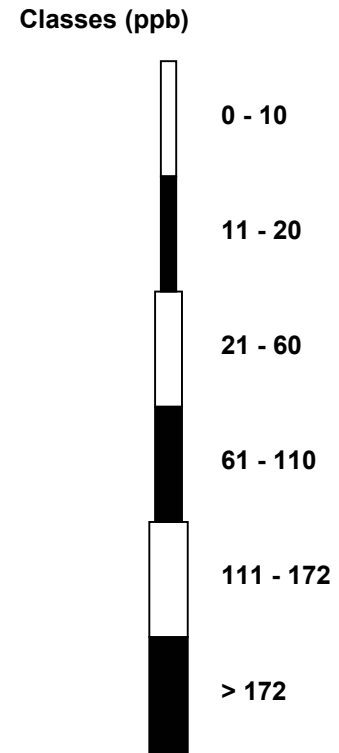
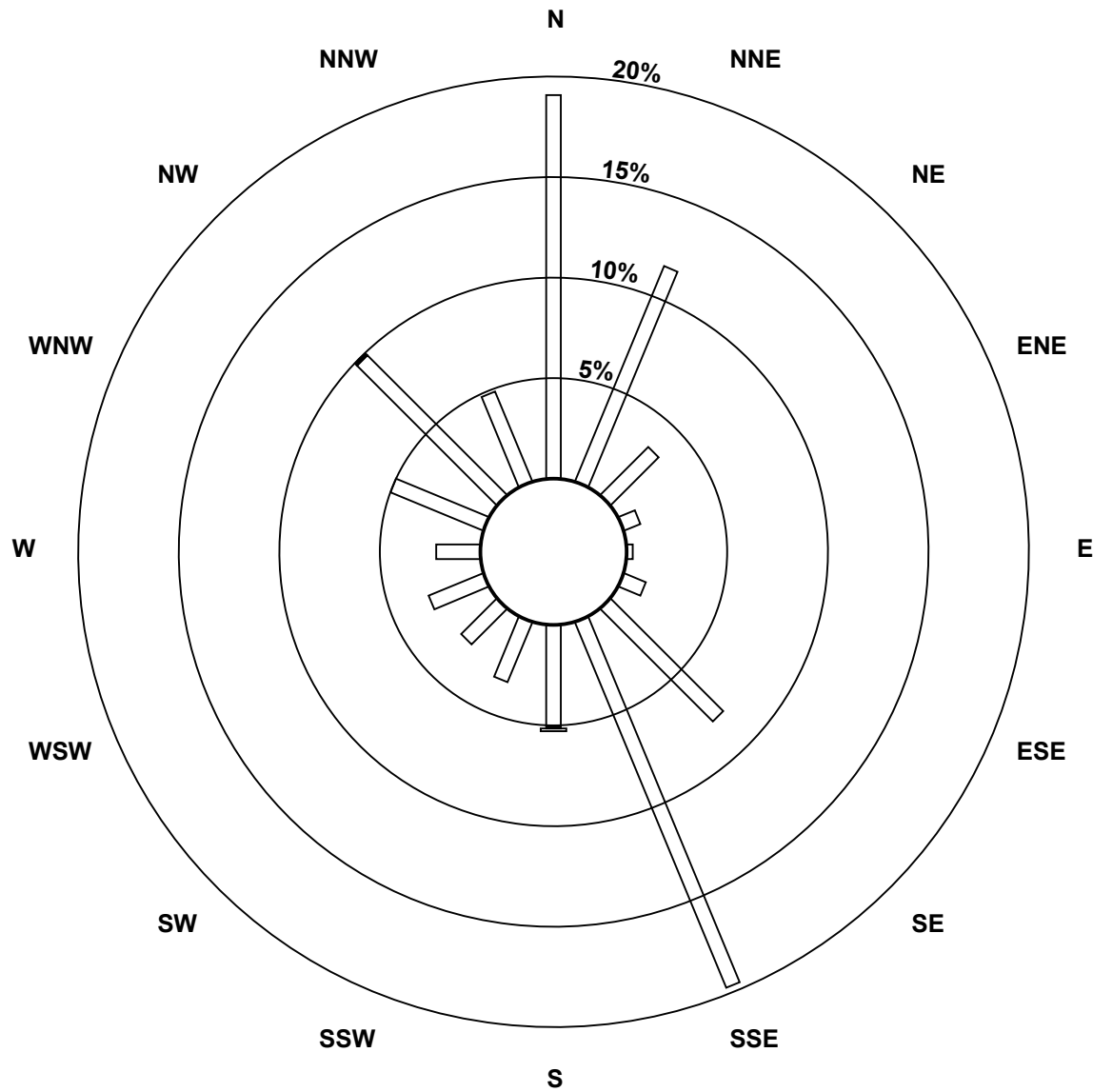
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	130	79	23	6	2	8	54	134	34	22	17	20	15	34	67	33	678
11 - 20	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	2
21 - 60	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	130	79	23	6	2	8	54	134	36	22	17	20	15	34	68	33	681

Total Number of Valid Hours: 681

Total Number of Hours: 720

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

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

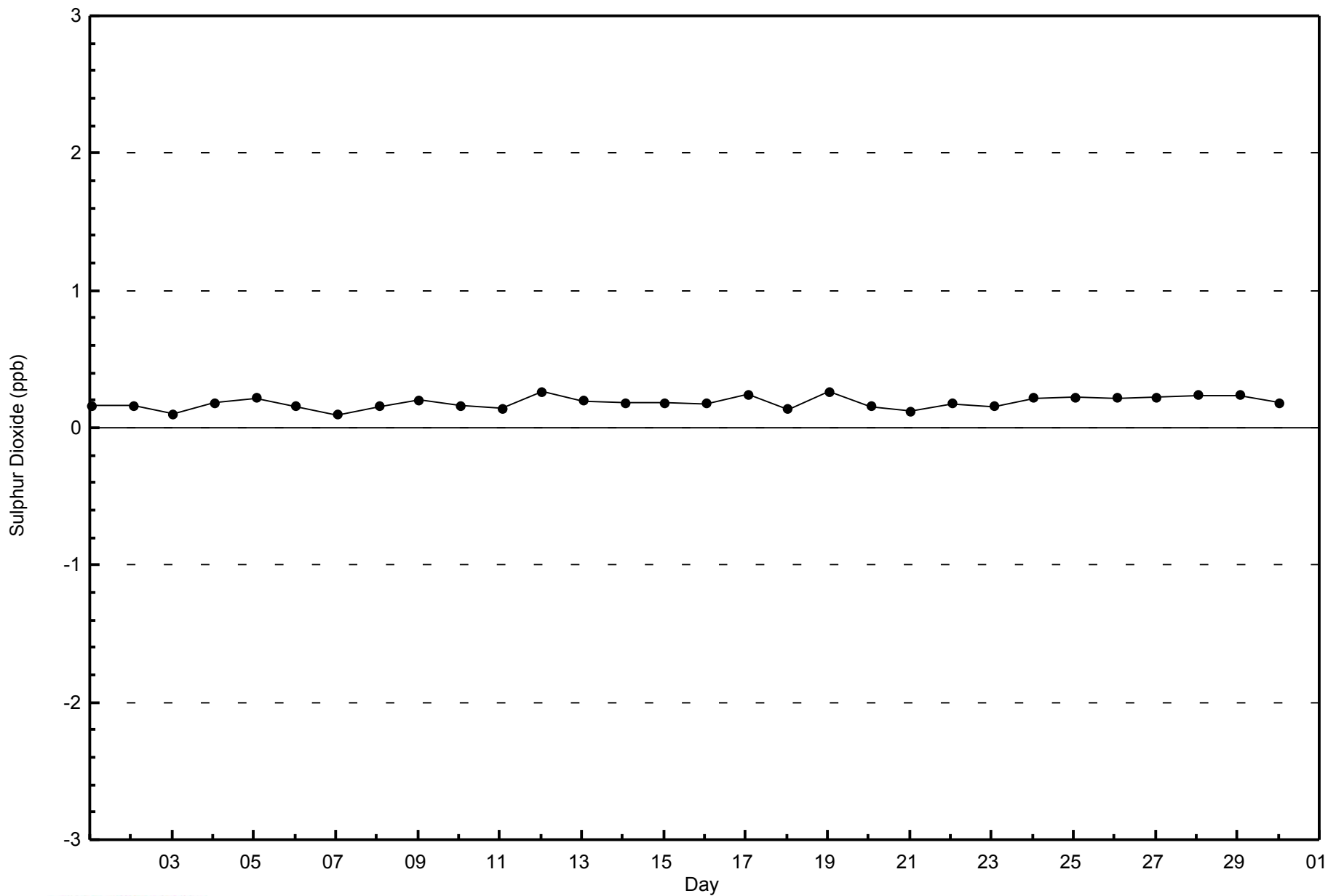


Total Number of Valid Hours: 681



WBEA
Zero Responses

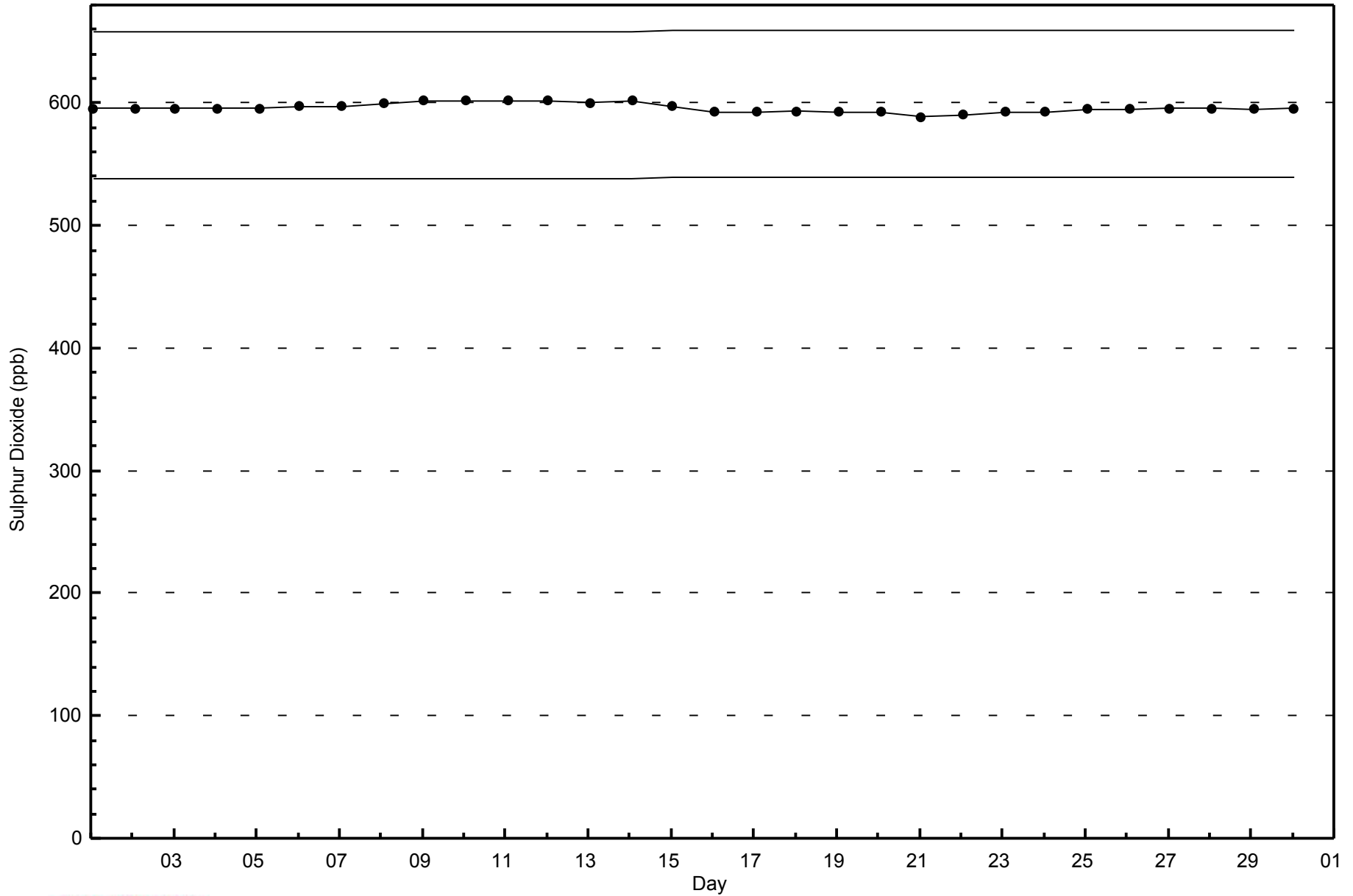
Sulphur Dioxide (SO₂) - ppb
Buffalo Viewpoint - November 2014





WBEA
Span Responses

Sulphur Dioxide (SO₂) - ppb
Buffalo Viewpoint - November 2014



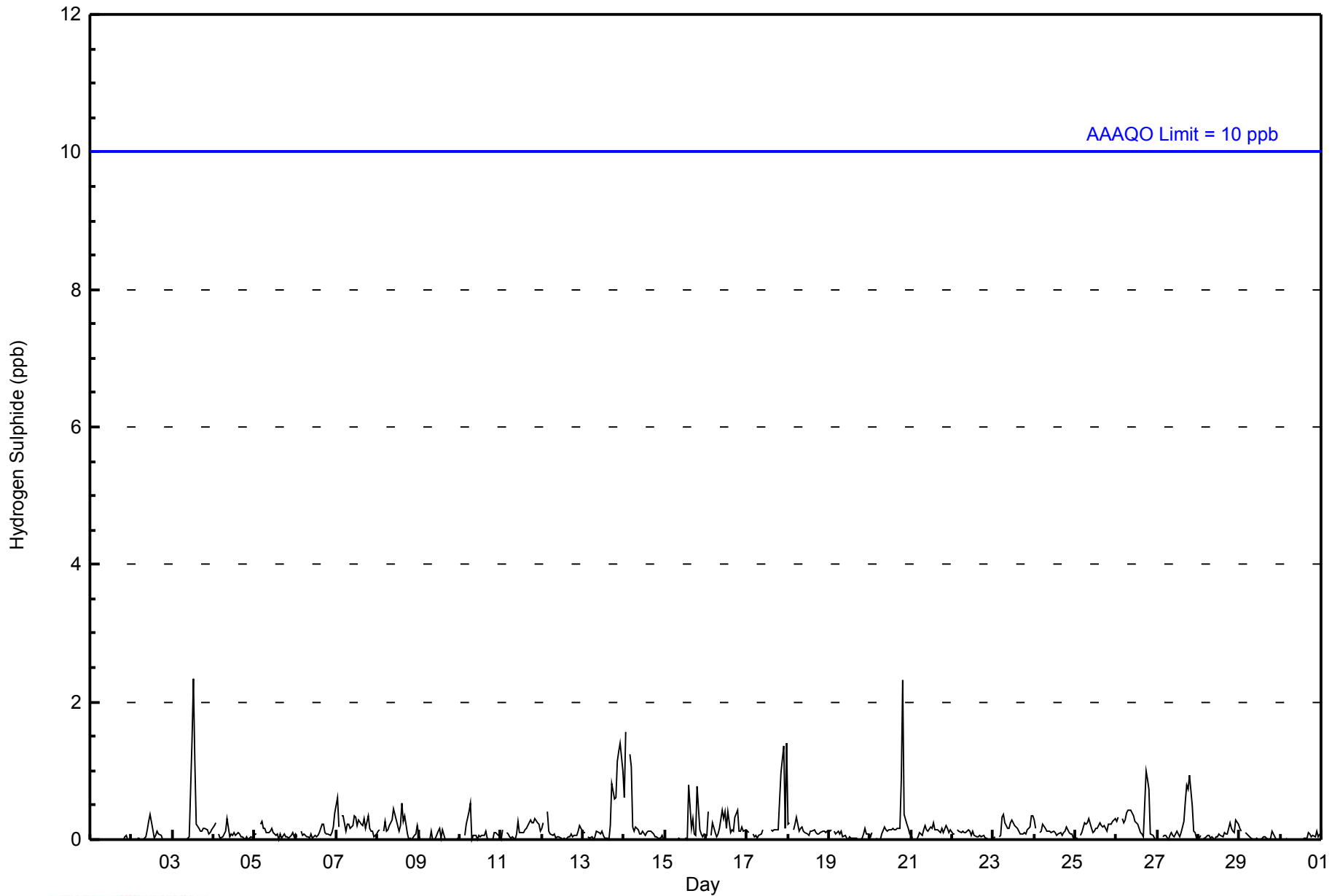


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0														Hours in Service: 720																									
Maximum Value: 2 ppb on Nov 3 13:00														Maximum Daily Average: 0.3 ppb on Nov 13										Hours of Data: 686															
Minimum Value: 0 ppb on Nov 1 01:00														Minimum Daily Average: 0.0 ppb on Nov 1										Hours of Missing Data: 34															
Maximum Diurnal Average: 0.3 ppb at hour 20														Minimum Diurnal Average: 0.1 ppb at hour 8										Hours of Calibration: 34															
Monthly Average: 0.1 ppb														Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1										Percent Operational Time: 100.0															
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24															
1-Nov	0	0	Z	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-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0													
3-Nov	0	0	Z	0	0	0	0	0	0	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0.3	2													
4-Nov	0	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-Nov	0	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-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0													
7-Nov	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													
8-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.2	1													
9-Nov	0	0	Z	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-Nov	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1													
11-Nov	0	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-Nov	0	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-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0.3	1													
14-Nov	1	2	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2													
15-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0.1	1													
16-Nov	0	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-Nov	0	0	Z	0	0	0	0	0	0	0	C	C	C	C	0	0	0	0	0	1	1	1	0	1	0.3	1													
18-Nov	0	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-Nov	0	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-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0.3	2													
21-Nov	0	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-Nov	0	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-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0													
24-Nov	0	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-Nov	0	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-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0.3	1													
27-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0.2	1													
28-Nov	0	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-Nov	0	0	Z	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-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0													
														0.1	0.2	--	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.2	0.2	0.1	0.2	Diurnal Average	
														1	2	--	1	1	0	1	0	0	0	0	1	2	1	1	0	1	1	1	2	1	1	1	1	Diurnal Maximum	
Z - zerospan C - Calibration																																							
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb																																							



WBEA
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Buffalo Viewpoint - November 2014





WBEA
Cumulative Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
Buffalo Viewpoint - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	686	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



WBEA
Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
Buffalo Viewpoint - November 2014

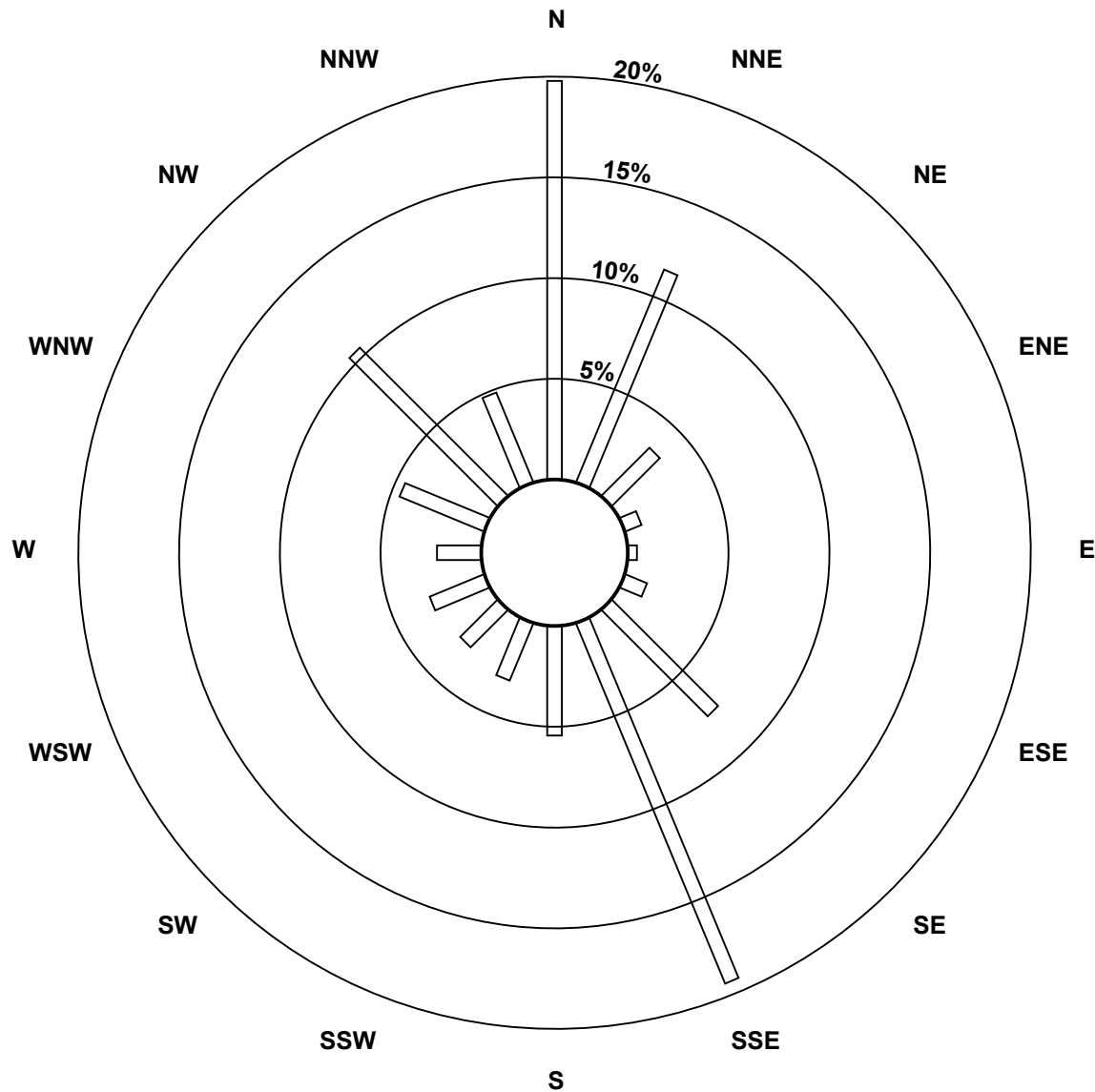
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	135	78	23	6	3	8	51	132	37	21	18	20	15	31	71	33	682
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	135	78	23	6	3	8	51	132	37	21	18	20	15	31	71	33	682

Total Number of Valid Hours: 682

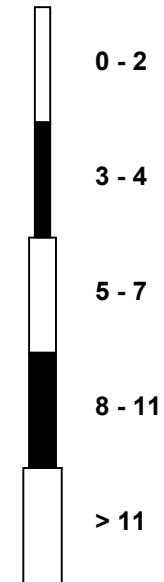
Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

Hydrogen Sulphide (H₂S) - ppb
Buffalo Viewpoint (AMS 4)



Classes (ppb)

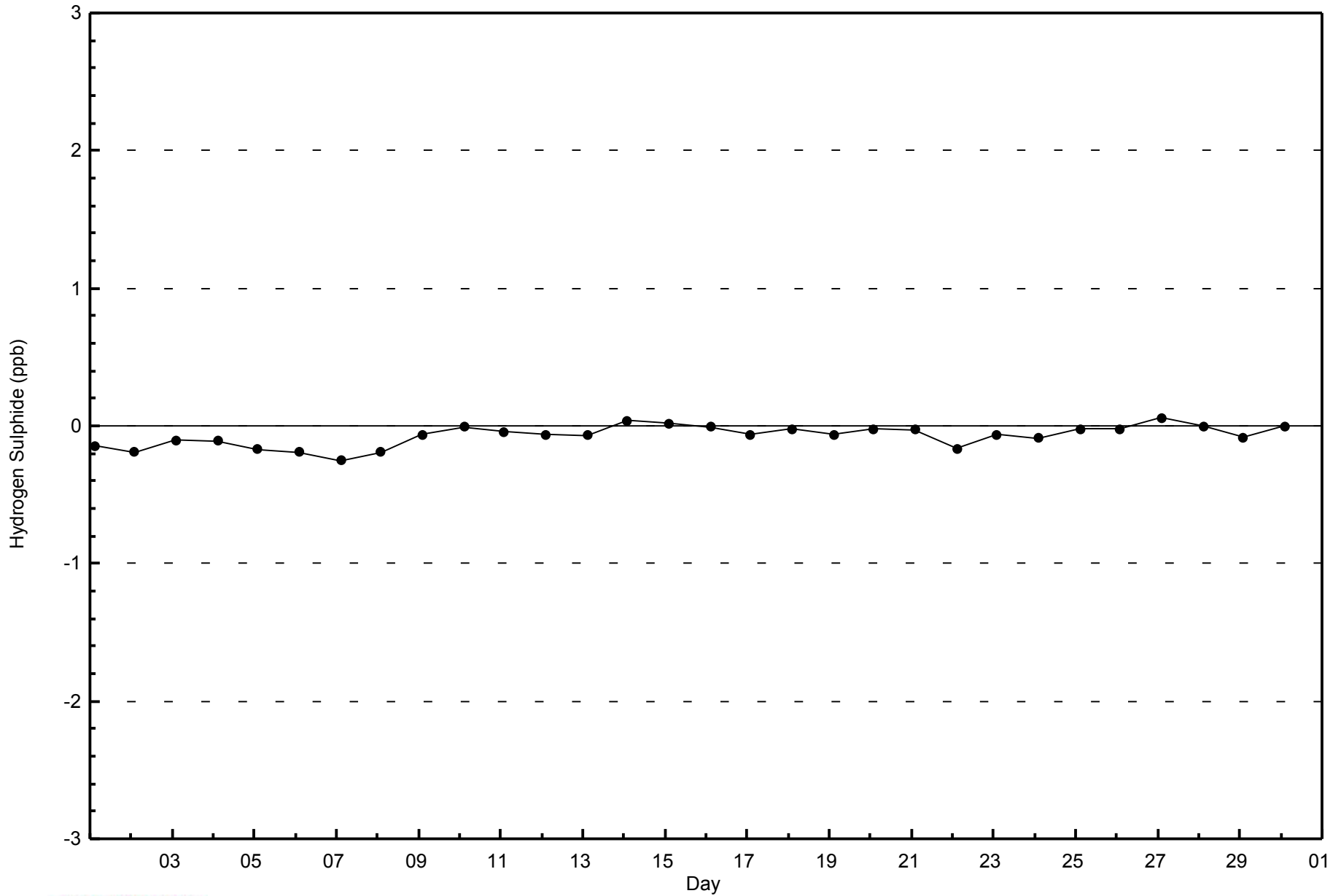


Total Number of Valid Hours: 682



WBEA
Zero Responses

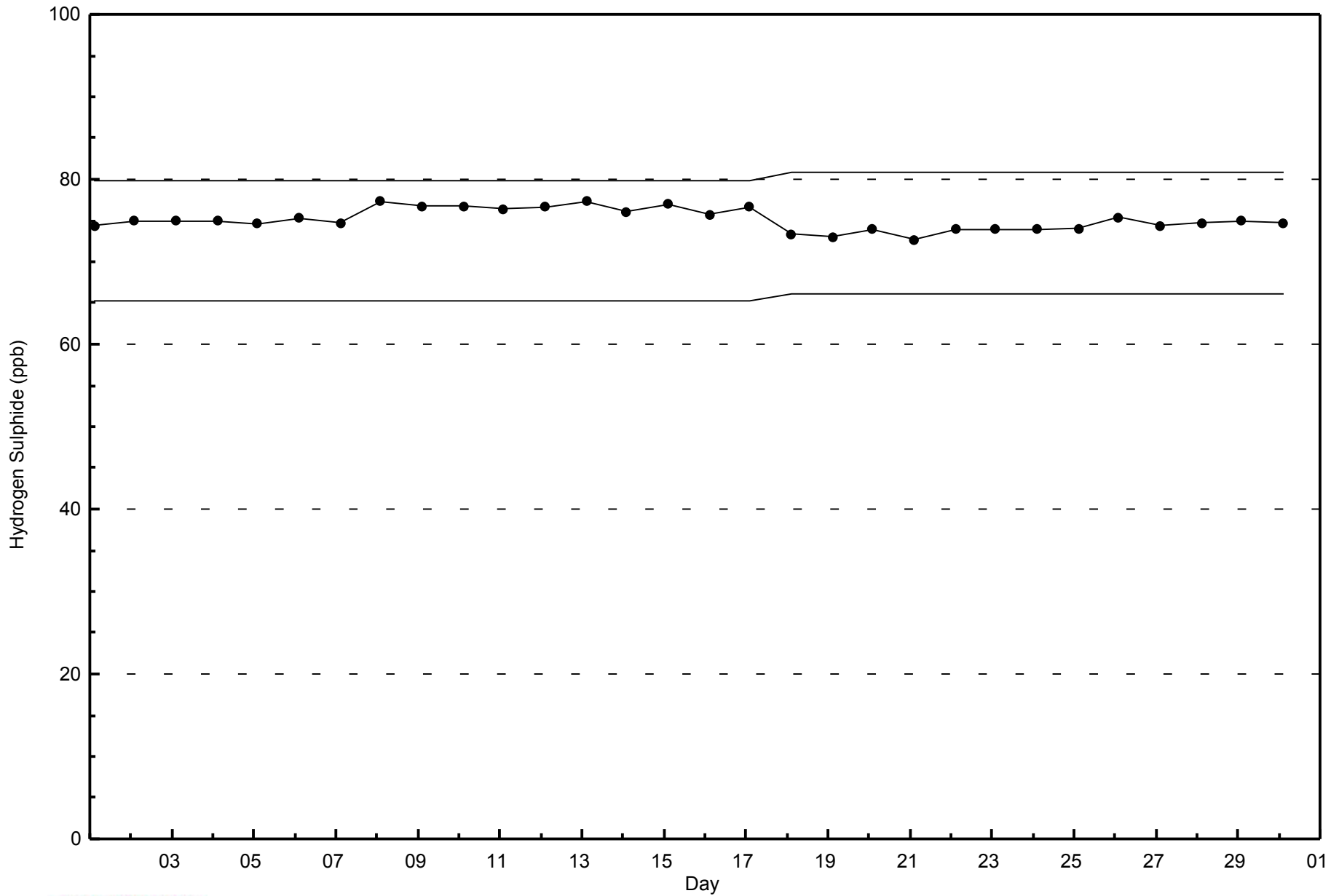
Hydrogen Sulphide (H₂S) - ppb
Buffalo Viewpoint - November 2014





WBEA
Span Responses

Hydrogen Sulphide (H₂S) - ppb
Buffalo Viewpoint - November 2014



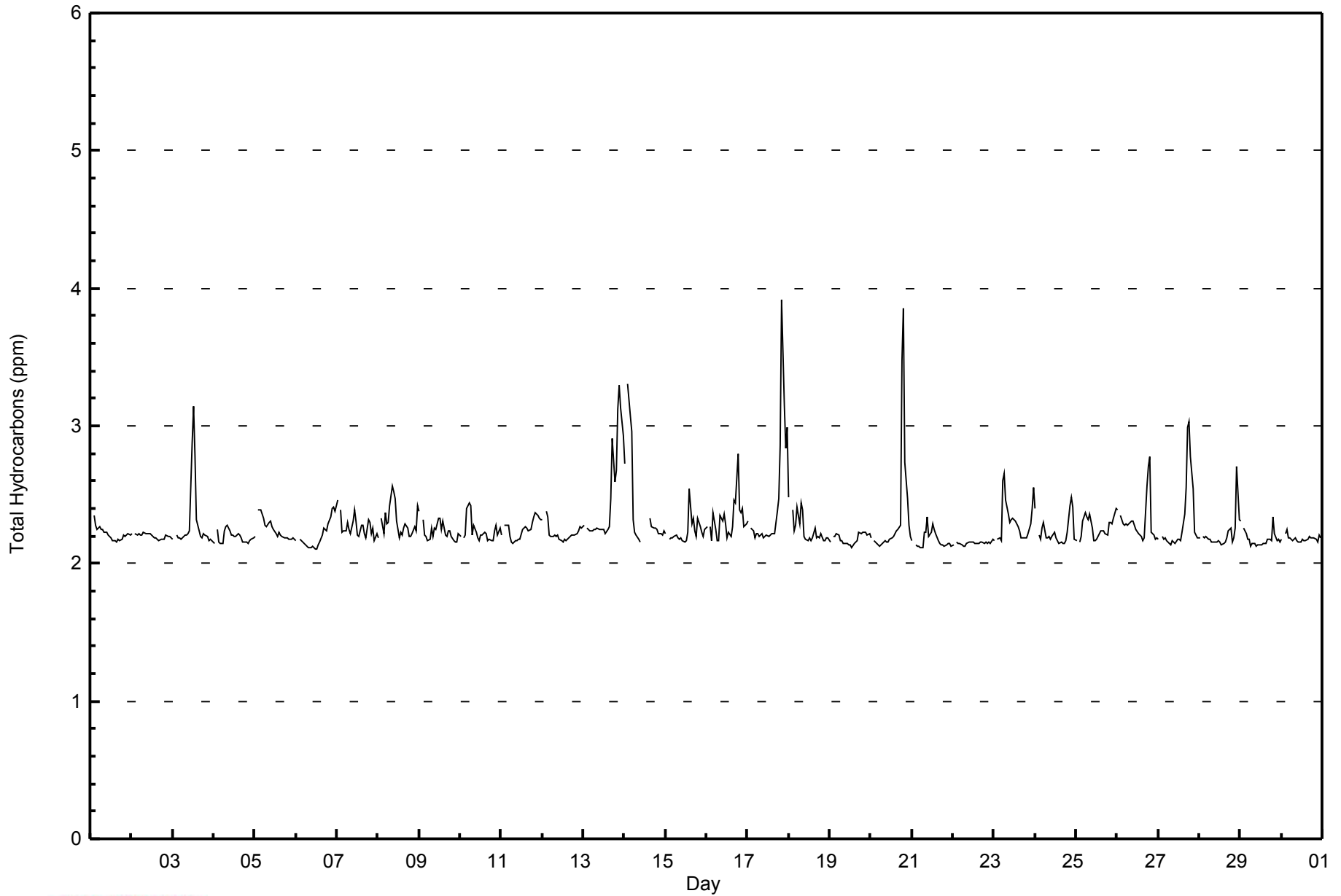


Maximum Value: 3.9 ppm on Nov 17 21:00																	Maximum Daily Average: 2.5 ppm on Nov 13										Hours in Service: 720	
Minimum Value: 2.1 ppm on Nov 6 13:00																	Minimum Daily Average: 2.1 ppm on Nov 22										Hours of Data: 685	
Maximum Diurnal Average: 2.4 ppm at hour 20																	Minimum Diurnal Average: 2.2 ppm at hour 14										Hours of Missing Data: 35	
Monthly Average: 2.26 ppm																	Percentiles: $P_1 = 2.1$ $P_{10} = 2.2$ $Q_1 = 2.2$ Median = 2.2 $Q_3 = 2.3$ $P_{90} = 2.4$ $P_{99} = 3.1$										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-Nov	2.3	Z	2.3	2.3	2.2	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	
2-Nov	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	
3-Nov	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.9	3.1	2.8	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	
4-Nov	2.1	Z	2.2	2.2	2.1	2.1	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	2.1	2.2	2.2	2.2	2.2	2.2	2.2	
5-Nov	2.2	Z	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	
6-Nov	2.2	Z	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.3	2.3	2.2	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.4	
7-Nov	2.5	Z	2.4	2.2	2.2	2.2	2.3	2.2	2.2	2.3	2.4	2.3	2.2	2.2	2.3	2.3	2.2	2.2	2.3	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.2	
8-Nov	2.2	Z	2.3	2.2	2.4	2.3	2.3	2.4	2.6	2.5	2.5	2.3	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.2	2.2	2.3	2.2	2.4	2.4	2.4	2.4	
9-Nov	2.4	Z	2.3	2.2	2.2	2.2	2.2	2.3	2.2	2.3	2.2	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	
10-Nov	2.2	Z	2.2	2.2	2.4	2.4	2.4	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.3	2.2	2.3	2.2	
11-Nov	2.2	Z	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	2.2	2.2	2.3	2.3	2.4	2.3	2.3	2.3	2.3	2.3	2.3	
12-Nov	2.3	Z	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	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.2	
13-Nov	2.3	Z	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	2.5	2.9	2.6	2.7	3.1	3.3	3.1	2.9	2.9	2.5	3.3	
14-Nov	2.7	Z	3.3	3.1	3.0	2.3	2.2	2.2	2.2	2.2	2.2	C	C	C	C	C	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.4	3.3	
15-Nov	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	2.5	2.3	2.3	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	
16-Nov	2.3	Z	2.3	2.2	2.4	2.3	2.2	2.2	2.3	2.3	2.4	2.3	2.2	2.2	2.2	2.3	2.5	2.4	2.8	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.3	
17-Nov	2.3	Z	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4	2.5	2.9	3.9	3.1	2.8	3.0	2.4	3.9		
18-Nov	2.5	Z	2.4	2.2	2.3	2.4	2.3	2.4	2.4	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	2.5	
19-Nov	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	
20-Nov	2.2	Z	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	3.5	3.9	2.7	2.5	2.3	2.2	2.4	3.9		
21-Nov	2.2	Z	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.3	2.2	2.2	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	
22-Nov	2.1	Z	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.1	2.2	2.1	2.2	2.1	2.2	2.1	2.2	2.2	
23-Nov	2.2	Z	2.2	2.2	2.2	2.6	2.7	2.5	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	2.3	2.4	2.6	2.3	2.7	2.7	
24-Nov	2.4	Z	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.1	2.2	2.2	2.4	2.5	2.4	2.2	2.2	2.5	2.5	
25-Nov	2.2	Z	2.2	2.2	2.3	2.4	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	2.3	2.3	2.3	2.3	2.4	2.3	2.4	2.4	
26-Nov	2.4	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	2.6	2.7	2.8	2.2	2.2	2.2	2.2	2.2	2.3	2.8	
27-Nov	2.2	Z	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.4	2.5	3.0	3.0	2.8	2.5	2.2	2.2	2.2	2.2	2.3	3.0	
28-Nov	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.3	2.7	2.3	2.2	2.7	
29-Nov	2.3	Z	2.3	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.3	
30-Nov	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	
		2.3	--	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.4	2.3	2.3	2.3	2.3	2.3	2.3	Diurnal Average	
		2.7	--	3.3	3.1	3.0	2.6	2.7	2.5	2.6	2.5	2.5	2.9	3.1	2.8	2.5	2.4	2.5	3.0	3.5	3.9	3.9	3.3	3.1	3.0	3.0	Diurnal Maximum	
Z - zerospan		C - Calibration																										



WBEA
Hourly Averages

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





WBEA
Cumulative Frequency Distribution

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

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	0	0.00	0.00
2.1 - 3.0	675	98.54	98.54
3.1 - 10.0	10	1.46	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



WBEA
Frequency Distribution

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

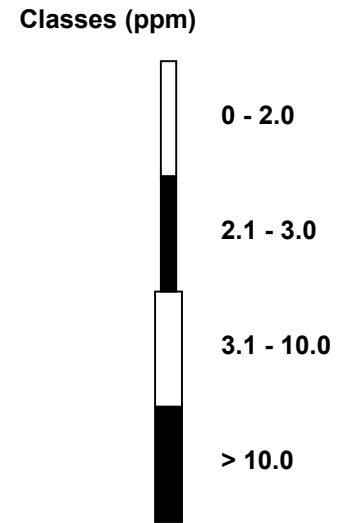
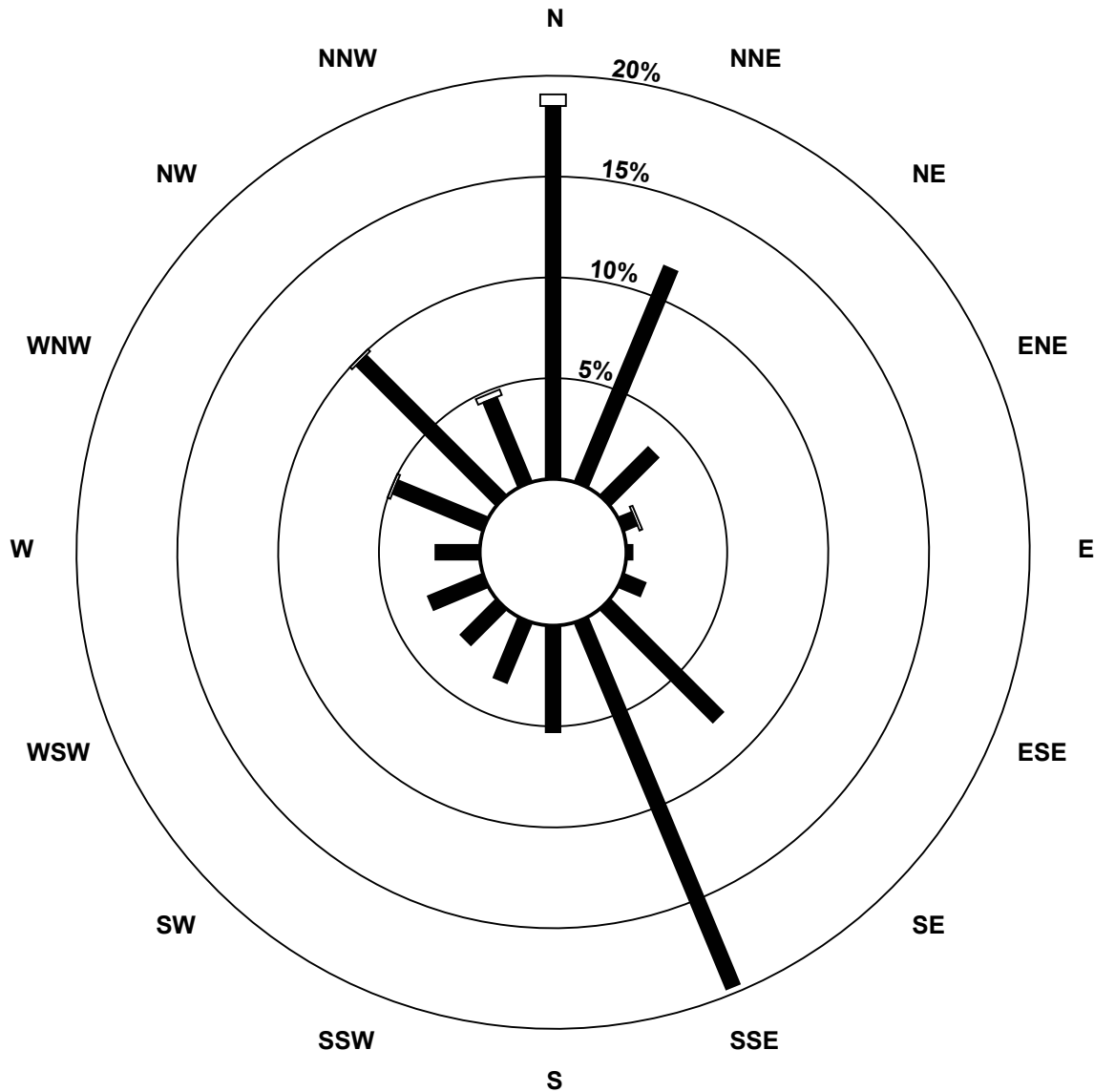
Concentration Ranges (ppm)	Wind Direction																Totals	
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW		
0 - 2.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.1 - 3.0	126	79	23	5	2	8	54	134	36	22	17	20	15	33	67	31	672	
3.1 - 10.0	4	0	0	1	0	0	0	0	0	0	0	0	0	1	1	2	9	
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Totals	130	79	23	6	2	8	54	134	36	22	17	20	15	34	68	33	681	

Total Number of Valid Hours: 681

Total Number of Hours: 720

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

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

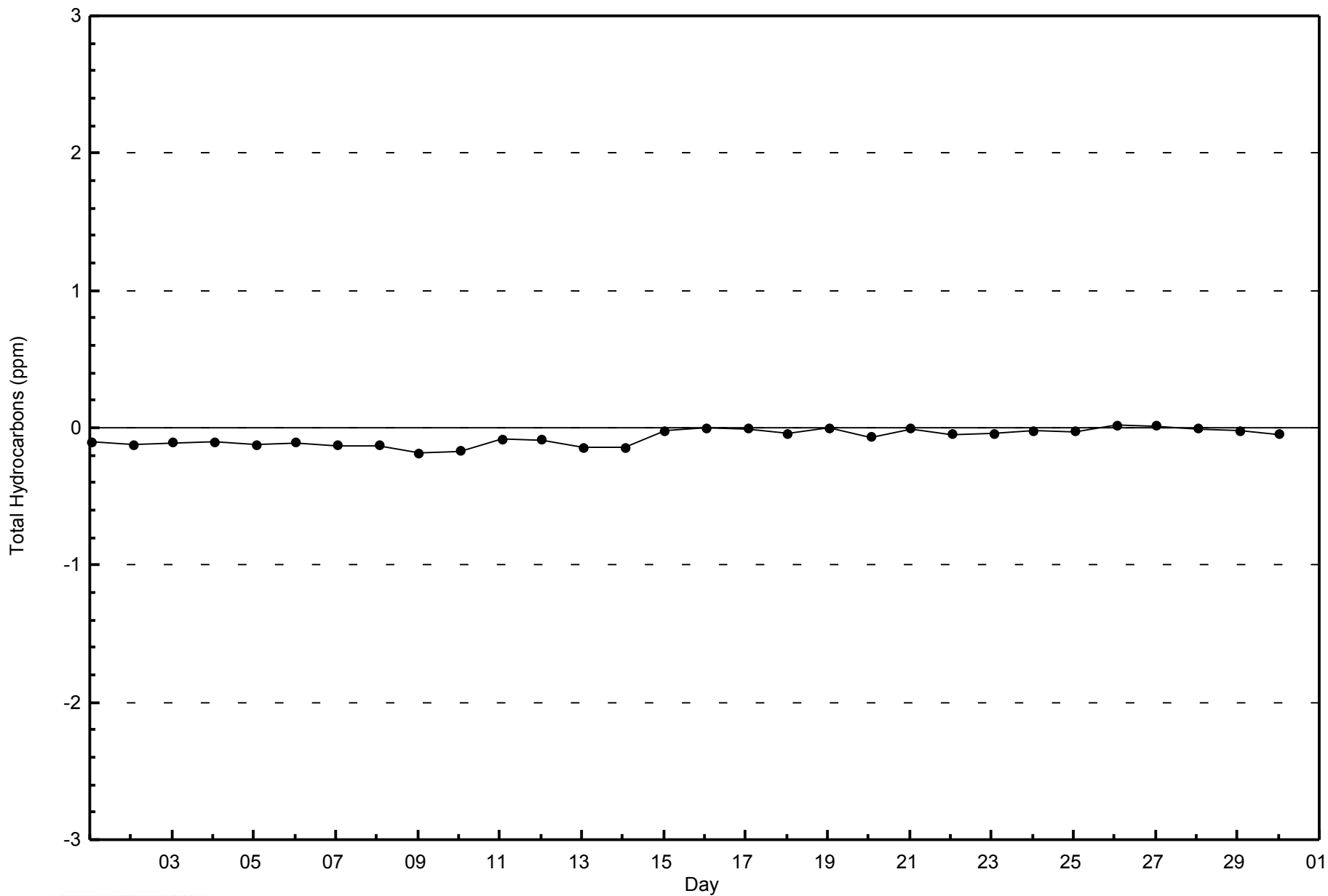


Total Number of Valid Hours: 681



WBEA
Zero Responses

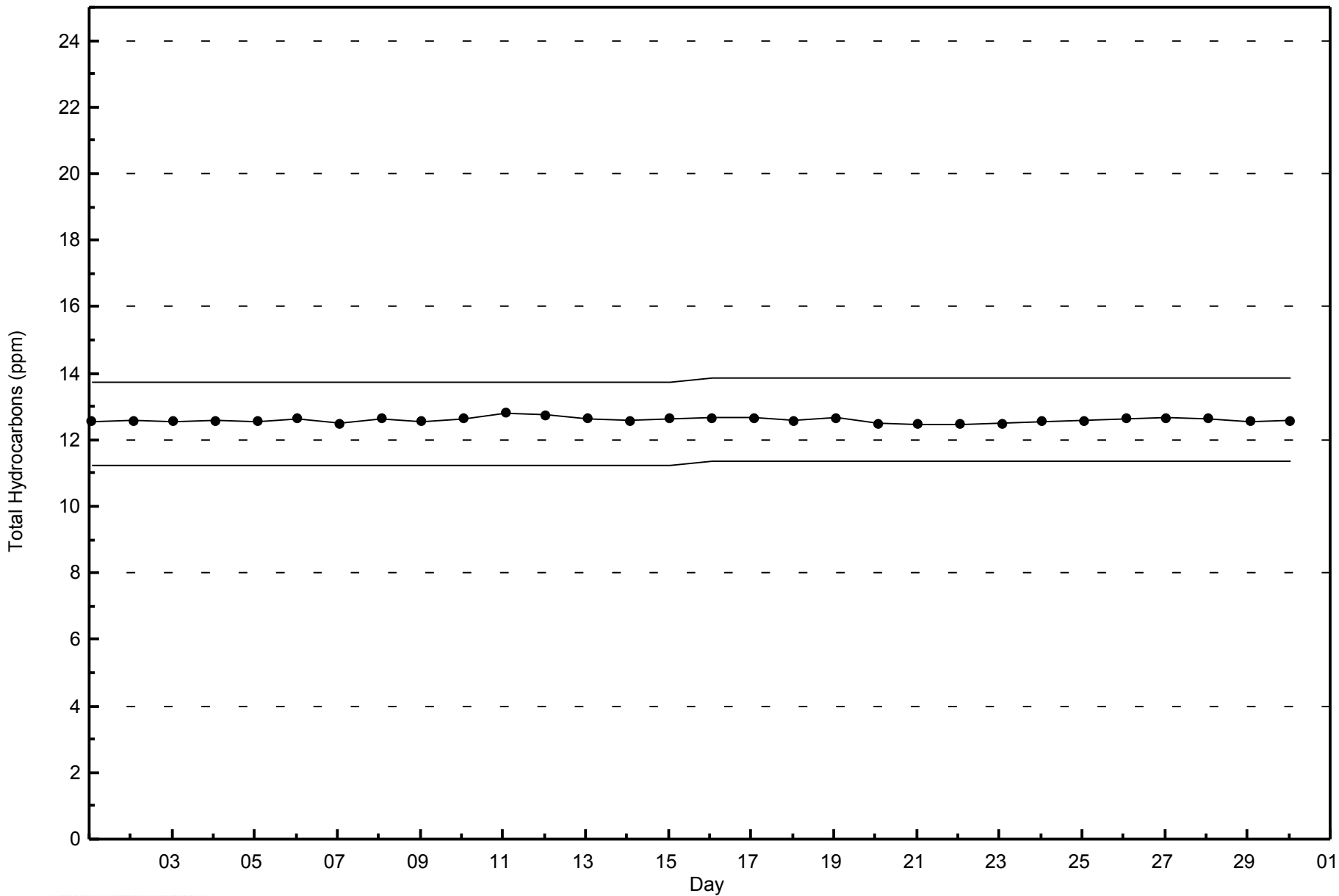
Total Hydrocarbons (THC) - ppm
Buffalo Viewpoint - November 2014





WBEA
Span Responses

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



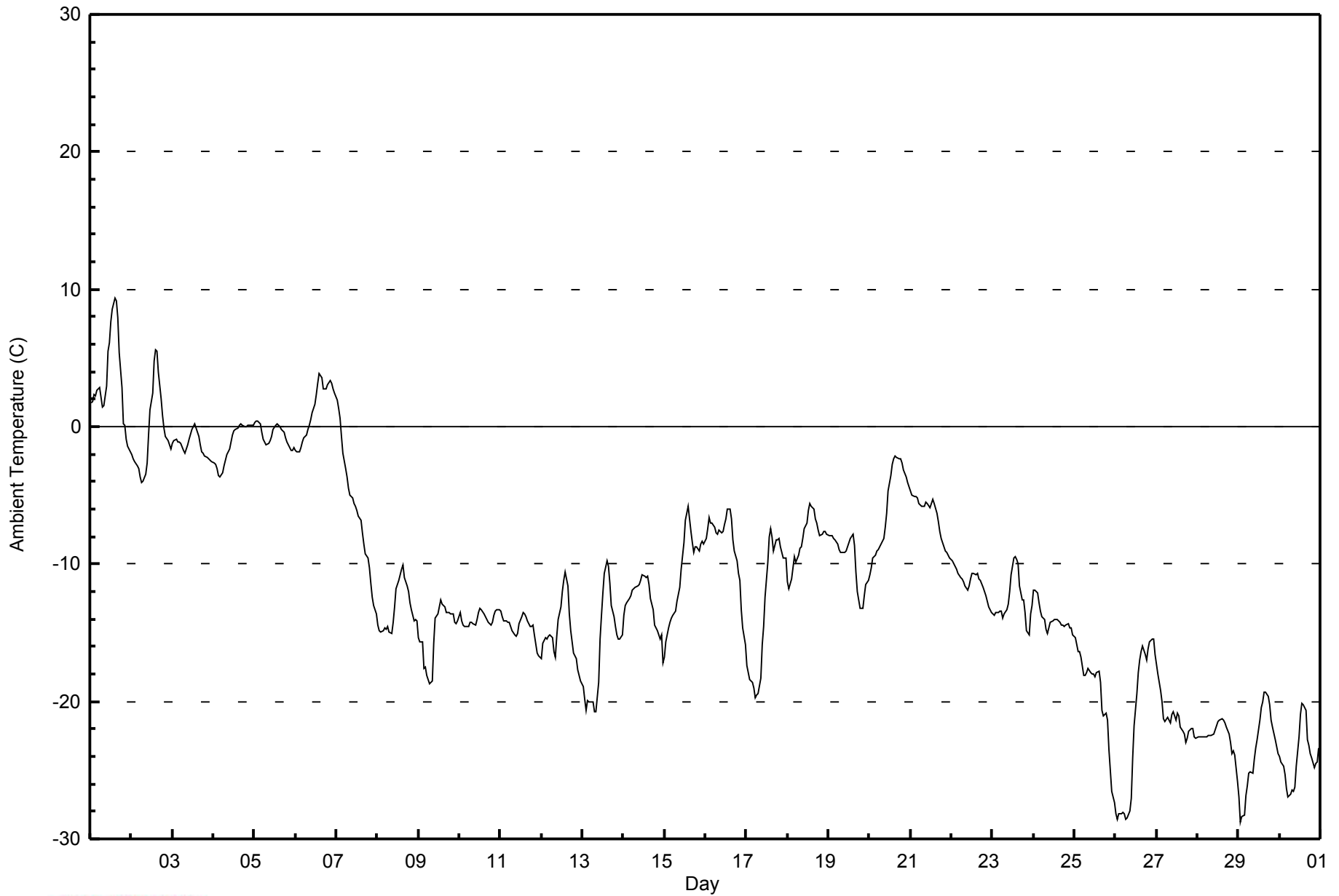


Maximum Value: 9.4 C on Nov 1 15:00		Maximum Daily Average: 3.3 C on Nov 1		Hours in Service: 720																																												
Minimum Value: -28.8 C on Nov 29 02:00		Minimum Daily Average: -24.1 C on Nov 30		Hours of Data: 720																																												
Maximum Diurnal Average: -8.8 C at hour 15		Minimum Diurnal Average: -12.6 C at hour 8		Hours of Missing Data: 0																																												
Monthly Average: -11.30 C		Percentiles: P ₁ = -28.2 P ₁₀ = -22.2 Q ₁ = -15.8 Median = -12.0 Q ₃ = -5.6 P ₉₀ = -0.2 P ₉₉ = 5.2		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-Nov	1.7	1.9	2.3	2.2	2.6	2.9	2.2	1.4	1.5	2.9	5.5	6.1	7.6	8.6	9.4	9.1	8.0	5.4	2.8	0.2	0.1	-1.0	-1.5	-1.8	3.3	9.4																						
2-Nov	-2.0	-2.3	-2.5	-2.8	-3.0	-3.7	-4.0	-3.9	-3.4	-2.6	-0.6	1.2	2.5	4.8	5.6	5.5	3.9	2.0	0.8	-0.1	-0.7	-1.0	-1.4	-1.6	-0.4	5.6																						
3-Nov	-1.3	-1.0	-1.0	-1.1	-1.2	-1.3	-1.7	-2.0	-1.6	-1.3	-0.9	-0.2	0.0	0.2	-0.1	-0.7	-1.3	-1.8	-1.9	-2.1	-2.2	-2.4	-2.4	-2.5	-1.3	0.2																						
4-Nov	-2.7	-2.7	-3.1	-3.5	-3.6	-3.4	-2.8	-2.5	-2.1	-1.6	-1.1	-0.7	-0.3	-0.2	-0.1	0.1	0.2	0.1	0.0	0.0	0.1	0.1	0.1	0.1	-1.2	0.2																						
5-Nov	0.3	0.4	0.4	0.2	-0.4	-0.9	-1.1	-1.3	-1.2	-1.0	-0.7	-0.2	0.1	0.2	0.1	0.0	-0.2	-0.4	-0.8	-1.1	-1.3	-1.8	-1.7	-1.6	-0.6	0.4																						
6-Nov	-1.8	-1.9	-1.8	-1.5	-1.1	-0.8	-0.6	-0.3	0.1	0.5	1.0	1.6	2.4	3.1	3.8	3.6	2.8	2.8	2.7	3.1	3.3	3.1	2.7	2.4	1.2	3.8																						
7-Nov	1.9	1.3	0.6	-0.7	-1.9	-3.1	-3.7	-4.5	-4.9	-5.2	-5.6	-5.8	-6.1	-6.5	-6.8	-7.7	-8.5	-9.3	-9.6	-10.3	-11.4	-12.4	-13.1	-13.7	-6.1	1.9																						
8-Nov	-14.5	-14.8	-15.0	-14.9	-14.6	-14.8	-14.6	-14.9	-15.0	-14.2	-13.1	-11.8	-11.2	-10.8	-10.4	-10.1	-11.0	-11.6	-12.0	-12.8	-13.3	-14.2	-14.1	-14.2	-13.2	-10.1																						
9-Nov	-15.4	-15.6	-15.7	-17.6	-17.5	-18.1	-18.7	-18.6	-18.5	-15.8	-13.9	-13.6	-13.1	-12.6	-12.9	-13.2	-13.5	-13.6	-13.5	-13.6	-13.6	-14.3	-14.3	-14.1	-15.1	-12.6																						
10-Nov	-13.6	-14.1	-14.4	-14.5	-14.5	-14.5	-14.2	-14.3	-14.4	-14.5	-14.0	-13.5	-13.2	-13.3	-13.6	-13.9	-14.0	-14.2	-14.4	-14.3	-13.7	-13.4	-13.4	-13.3	-14.0	-13.2																						
11-Nov	-13.4	-13.8	-14.1	-14.1	-14.2	-14.2	-14.6	-14.8	-15.1	-15.2	-15.1	-14.3	-13.9	-13.5	-13.6	-13.8	-14.1	-14.5	-14.5	-14.4	-15.2	-16.4	-16.7	-16.8	-14.6	-13.4																						
12-Nov	-16.9	-15.8	-15.4	-15.4	-15.3	-15.2	-15.4	-16.4	-16.8	-15.2	-14.1	-13.2	-12.0	-11.2	-10.6	-11.6	-13.6	-14.9	-15.7	-16.4	-16.9	-17.7	-18.2	-18.5	-15.1	-10.6																						
13-Nov	-18.9	-19.9	-20.6	-19.9	-20.1	-20.0	-20.0	-20.8	-20.8	-18.6	-15.5	-13.7	-12.1	-10.7	-9.8	-10.1	-11.3	-13.0	-13.8	-14.5	-15.1	-15.5	-15.5	-15.2	-16.1	-9.8																						
14-Nov	-13.7	-13.0	-12.8	-12.5	-12.3	-11.9	-11.8	-11.7	-11.6	-11.5	-11.2	-10.8	-10.9	-11.0	-10.9	-11.5	-12.5	-13.4	-14.5	-14.7	-14.9	-15.5	-15.2	-17.2	-12.8	-10.8																						
15-Nov	-16.8	-15.7	-14.7	-14.2	-14.0	-13.7	-13.4	-12.7	-12.2	-11.7	-10.4	-8.4	-6.9	-6.3	-5.8	-7.6	-8.5	-9.2	-8.8	-8.7	-9.1	-8.5	-8.3	-8.6	-10.6	-5.8																						
16-Nov	-8.1	-7.4	-6.6	-7.0	-7.0	-7.3	-7.8	-7.9	-7.5	-7.7	-7.7	-7.2	-6.7	-6.0	-6.0	-6.7	-8.2	-9.0	-9.7	-10.7	-11.2	-13.3	-14.6	-15.8	-8.6	-6.0																						
17-Nov	-17.4	-17.9	-18.5	-18.7	-19.0	-19.7	-19.6	-19.4	-18.3	-15.9	-14.5	-12.4	-9.8	-8.1	-7.4	-8.1	-9.1	-8.2	-8.3	-8.2	-8.7	-9.6	-9.5	-9.5	-13.1	-7.4																						
18-Nov	-11.3	-11.8	-11.1	-10.3	-9.4	-9.9	-9.4	-8.9	-8.8	-8.1	-7.4	-7.0	-6.1	-5.6	-5.8	-6.0	-6.7	-7.1	-7.5	-7.9	-7.9	-7.6	-7.7	-7.9	-8.2	-5.6																						
19-Nov	-8.0	-8.0	-8.0	-8.1	-8.3	-8.5	-9.0	-9.1	-9.1	-9.2	-9.1	-8.8	-8.4	-8.1	-7.8	-8.7	-10.6	-12.0	-13.2	-13.2	-13.2	-12.3	-11.5	-11.2	-9.7	-7.8																						
20-Nov	-10.7	-10.3	-9.6	-9.3	-9.0	-9.0	-8.8	-8.5	-8.2	-7.4	-6.3	-4.6	-3.6	-2.7	-2.4	-2.1	-2.3	-2.3	-2.3	-2.6	-3.2	-3.7	-4.1	-4.4	-5.7	-2.1																						
21-Nov	-4.7	-4.9	-5.1	-5.1	-5.2	-5.6	-5.8	-5.8	-5.8	-5.5	-5.6	-5.9	-5.6	-5.3	-5.6	-6.4	-6.9	-7.6	-8.1	-8.5	-9.0	-9.2	-9.3	-9.6	-6.5	-4.7																						
22-Nov	-9.7	-10.0	-10.1	-10.4	-10.7	-11.0	-11.1	-11.3	-11.5	-11.9	-11.6	-11.1	-10.6	-10.7	-10.8	-10.7	-11.1	-11.2	-11.6	-12.0	-12.3	-12.7	-13.1	-13.5	-11.3	-9.7																						
23-Nov	-13.6	-13.7	-13.5	-13.5	-13.5	-13.4	-13.9	-13.6	-13.3	-12.9	-12.0	-10.8	-9.6	-9.4	-9.7	-10.0	-11.6	-12.6	-12.7	-13.5	-14.8	-15.2	-13.7	-13.0	-12.6	-9.4																						
24-Nov	-11.9	-11.9	-12.1	-12.8	-13.4	-13.8	-14.0	-14.8	-15.1	-14.6	-14.3	-14.1	-14.0	-14.1	-14.0	-14.2	-14.4	-14.5	-14.5	-14.4	-14.4	-14.6	-14.7	-15.1	-14.0	-11.9																						
25-Nov	-15.4	-15.8	-16.3	-16.4	-16.8	-18.1	-18.1	-17.9	-17.6	-17.9	-18.0	-18.0	-18.2	-17.9	-17.8	-18.6	-20.7	-21.0	-20.9	-21.3	-23.5	-25.0	-26.5	-27.4	-19.4	-15.4																						
26-Nov	-28.1	-28.6	-28.2	-28.2	-28.1	-28.2	-28.6	-28.5	-28.0	-27.0	-24.1	-21.8	-19.4	-17.9	-17.0	-16.4	-16.0	-16.5	-16.9	-16.2	-15.6	-15.5	-15.5	-16.6	-22.0	-15.5																						
27-Nov	-17.3	-18.0	-19.2	-20.1	-21.2	-21.5	-21.2	-21.3	-21.5	-21.0	-20.8	-21.4	-20.9	-21.1	-21.9	-22.2	-22.4	-23.0	-22.7	-22.2	-21.9	-22.0	-22.5	-22.6	-21.2	-17.3																						
28-Nov	-22.6	-22.6	-22.6	-22.6	-22.6	-22.6	-22.5	-22.4	-22.5	-22.3	-22.0	-21.8	-21.5	-21.3	-21.2	-21.3	-21.6	-21.9	-22.3	-23.0	-23.8	-23.6	-23.9	-25.8	-22.5	-21.2																						
29-Nov	-27.0	-28.8	-28.4	-28.3	-26.9	-26.1	-25.2	-25.1	-25.2	-24.2	-23.4	-22.8	-21.3	-20.4	-20.0	-19.3	-19.3	-19.6	-20.3	-21.3	-21.9	-22.8	-23.3	-23.8	-23.5	-19.3																						
30-Nov	-24.0	-24.4	-24.7	-25.3	-26.3	-27.0	-26.8	-26.4	-26.6	-26.2	-24.7	-22.6	-20.9	-20.1	-20.3	-20.7	-22.8	-23.2	-23.8	-24.1	-24.8	-24.5	-24.5	-23.4	-24.1	-20.1																						
																								-11.9	-12.0	-12.1	-12.2	-12.3	-12.5	-12.5	-12.6	-12.5	-11.9	-11.0	-10.3	-9.5	-8.9	-8.8	-9.1	-9.9	-10.5	-10.9	-11.3	-11.7	-12.1	-12.2	-12.5	Diurnal Average
																								1.9	1.9	2.3	2.2	2.6	2.9	2.2	1.4	1.5	2.9	5.5	6.1	7.6	8.6	9.4	9.1	8.0	5.4	2.8	3.1	3.3	3.1	2.7	2.4	Diurnal Maximum



WBEA
Hourly Averages

Ambient Temperature (AT) - C
Buffalo Viewpoint - November 2014





WBEA
Cumulative Frequency Distribution

Ambient Temperature (AT) - C
Buffalo Viewpoint - November 2014

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	115	15.97	15.97
-20 - 0	540	75.00	90.97
0 - 10	65	9.03	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Speed: 32 km/h on Nov 16 04:00	Maximum Daily Speed Average: 21.7 km/h on Nov 7	Hours in Service: 720
Minimum Speed Value: 1 km/h on Nov 23 23:00	Minimum Daily Speed Average: 1.7 km/h on Nov 23	Hours of Data: 716
Maximum Diurnal Speed Average: 4.9 km/h at hour 20	Minimum Diurnal Speed Average: 2.4 km/h at hour 10	Hours of Missing Data: 4
Monthly Average Velocity: 3.5 km/h 344.1 deg	Percentiles: P ₁ = 2 P ₁₀ = 5 Q ₁ = 7 Median = 10 Q ₃ = 14 P ₉₀ = 20 P ₉₉ = 27	Percent Operational Time: 99.4

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	S5	SW5	WSW6	SW5	WSW5	WSW6	SSE4	SE7	SSE7	SE6	SW5	SW9	WSW9	SW9	WSW9	WSW9	WSW5	SSE6	S7	SSE8	SSE7	SSE9	SE10	SSE9	SSW4.9	SE10
2-Nov	SSE10	SSE10	SSE9	SSE10	SSE9	S9	SSE9	SSE9	SSE9	SSE9	SSE10	SE10	SE10	SE9	SE10	SE11	SSE12	SSE11	SSE12	SSE11	SSE9	SSE10	SSE12	SSE13	SSE10.0	SSE13
3-Nov	SSE12	SSE10	SSE7	SSE7	SSE7	SSE8	S6	S7	SSE6	AF	AF	AF	AF	N11	NNE13	NNE12	NNE12	NNE12	NNE13	NNE10	NNE9	NE7	NE7	ENE6	ENE3.5	NNE13
4-Nov	ENE6	E4	SE8	SE7	SSE9	SE5	ESE8	ESE10	ESE7	SE8	ESE10	SE11	SE10	SE11	ESE10	ESE9	SE8	SE10	SE10	SE10	SSE9	SSE5	SSE6	SE7.9	SE11	
5-Nov	WSW6	W12	W11	WNW19	WNW20	WNW19	WNW15	WNW15	WNW17	WNW18	WNW18	WNW16	WNW16	WNW15	WNW14	W12	WSW10	SW6	SSE5	S7	S5	SSE7	SSE9	SSE9	W9.8	WNW20
6-Nov	SSE9	SSE11	SSE14	SE18	SE19	SE17	SE22	SSE22	SSE19	SSE17	SSE16	SSE12	SSE11	SE6	SE9	SSE9	S7	S5	SSW6	WNW10	NW17	NW20	NW24	NW22	SSE6.8	NW24
7-Nov	NW21	NW26	NW27	NW28	NW29	NW28	NW24	NNW23	NNW22	NNW23	NNW24	NNW24	NNW25	NNW25	NNW24	NNW21	NNW22	NNW24	NNW22	NNW20	NW16	NNW13	NNE13	NNE13	NNW21.7	NW29
8-Nov	NNE11	NNE11	NNE8	N7	SW6	SSW5	NW9	NW12	NW15	NW16	NW15	NNW14	N17	NW12	NW13	NW11	NW8	N7	NNE11	NE11	NNE11	NNE8	N9	NNW7	NNW8.5	N17
9-Nov	W3	WSW5	WNW4	SSE6	S5	SE6	SE3	SSE3	S3	S2	NNE4	NNE6	N9	NNE13	NNE11	NNE12	NNE11	NNE9	NNE11	N14	N16	NNE15	NNE12	NNE12	NNE5.4	NNE16
10-Nov	N19	N23	N23	N21	NW18	NNW18	NNW16	NW15	N22	N21	N23	N27	N22	N24	N24	N22	N17	NNE15	N18	N17	N15	N17	N17	N14	N19.0	N27
11-Nov	N14	N15	N16	N15	N17	NNE13	NNE13	NNE11	NNE10	NE9	ENE5	NNE5	N7	N7	N7	N6	NNE5	NNE4	S2	SSW4	ESE1	SE5	SSE4	SSE5	NNE6.5	N17
12-Nov	SSE6	S6	S5	S5	S6	S6	SSW5	SSE7	S6	S8	S10	SSE11	SSE9	SSE7	SSE7	SE9	SSE8	SSE8	SSE9	SSE9	SSE9	SSE9	SSE9	SSE8	SSE7.4	SSE11
13-Nov	SSE9	SSE8	SSE9	SSE10	SSE8	SSE8	SSE7	S8	S8	SSE6	SE6	SE7	SE8	SE8	SE7	SE6	ENE4	NNE7	N8	NNE6	N7	N8	N7	N7	SE3.4	SSE10
14-Nov	N4	NW4	NW7	NNW7	NNW8	N14	N15	N14	N16	N17	N17	N14	N13	N14	N10	NW9	WSW8	SSW6	WSW3	W10	W12	SW9	WSW8	S8	NNW6.8	N17
15-Nov	S9	S8	SSW9	SW9	SW11	SSW11	SSW10	SSW9	SSW10	SSW8	SSW7	WSW12	W17	WNW9	NNW12	N19	N21	N22	N27	NW19	NW20	NW19	NW17	NW16	WNW6.6	N27
16-Nov	NW15	NW19	N31	N32	NNW22	N27	N23	N27	N22	NW14	NNW15	NW18	NW16	NW12	NW12	WNW11	WNW10	NW10	WNW9	W6	WNW6	SSW4	S4	SSW6	NNW13.3	N32
17-Nov	SSE6	SSE8	SE10	SSE9	SSE9	SSE9	SSE9	SSE7	SSE11	SSE12	SSE9	SSE11	SSE13	SSE12	SSE10	SSE9	SSE9	W5	NW10	NNW12	NNW8	WNW8	WNW8	NNW11	SSE4.6	SSE13
18-Nov	NNE13	N15	N14	N22	N20	NW14	NW14	NW16	NW14	NW15	NW19	NW18	NNW16	NW22	NW23	NW20	NW17	NW19	NW19	NW18	NW17	NW15	NW15	NW15	NW15.9	NW23
19-Nov	NW14	NW14	WNW15	WNW13	WNW13	WNW11	WNW10	W10	W7	SW7	SW6	SSW7	S8	SSW10	SSW8	S7	SE7	SSE6	SE7	SSE7	SSE7	SE7	SSE9	SSE9	WSW4.5	WNW15
20-Nov	SSE10	SSE11	SSE12	SSE12	SSE12	SSE12	SSE13	SSE12	SSE10	SSE11	SSE12	SSE10	SSE9	SSE7	SE8	SSE7	SE7	SE5	NE3	N8	N14	N10	N12	N12	SSE5.4	N14
21-Nov	N13	N11	N10	N10	N12	N13	N12	N12	N18	NNW16	NNE13	N14	NW13	NNW13	N11	NE8	NE11	NNE14	NE11	NE12	NE13	NE8	NE9	NE13	NNE11.1	N18
22-Nov	NE14	NE15	NE10	NE11	NNE13	NNE12	NNE13	NE12	NE10	NNE12	NNE15	NNE16	NNE18	NNE20	NNE20	NNE19	N19	N17	N19	N20	N18	N14	N16	N16	NNE15.1	NNE20
23-Nov	N13	N11	N7	N5	WNW2	WNW5	SE3	SE5	SSE7	S7	SSE8	SSE7	SSE6	SE7	SE8	S5	S6	S7	SSW5	SSE2	S5	S3	NNW1	NNW6	SSE1.7	N13
24-Nov	N11	N10	N13	N15	N12	N11	N12	NNE9	N5	NNE4	NNE5	NE5	NE6	NNE5	NNE4	NE5	NE5	NE7	NE7	E7	E6	ENE5	NNE7	NNE6.7	N15	
25-Nov	NNE10	NNE9	NNE10	NNE7	N13	NNE12	N11	N14	N14	N13	N10	N11	N8	N8	N6	NNE3	N4	N5	NNE2	NNE2	SE5	S4	SSE6	SSE7	NNE6.3	N14
26-Nov	SSE9	SSE12	SE12	SE12	SE12	SE10	SE11	SE12	SE12	SSE9	SSE9	SSE8	SSE6	SSE9	S6	SSE6	SSE3	NNE6	N13	N18	N20	NNE18	N18	N28	E4.0	N28
27-Nov	N26	N22	N13	N10	N9	N11	N13	NNE12	N10	NNE11	NNE15	NNE8	NNE2	N5	NNW2	NW3	NW3	N4	NW3	NNW4	NNE8	NNE10	NNE11	N10	N9.1	N26
28-Nov	N12	N13	NNE16	NNE15	NNE14	N14	N13	N14	N16	N14	N15	N17	N18	N17	N16	N18	N17	N14	N10	N8	NNW5	NW5	SW4	S6	N12.0	N18
29-Nov	SSE8	SSE8	SSE8	SE9	SSW6	SSW6	SW10	SW12	SW10	WSW13	W17	WSW23	WSW19	WSW17	WSW16	W17	W14	NW20	NW23	NW23	NW24	NW22	NW24	NW24	W10.9	NW24
30-Nov	WNW24	NW20	WNW21	WNW19	WNW15	WNW12	W17	W20	WSW22	WSW13	SW11	SW9	SSW11	SSW12	S11	S9	SSE12	SSE10	SSE8	SSE8	SSE7	SSE9	SE10	SSE9	WSW7.4	WNW24
N3.8NNW4.0 N4.0 N3.8 NW3.4NNW3.2NNW2.8NNW2.6NNW2.4NNW2.8NNW3.1 NW3.3NNW3.8NNW3.7NNW3.4NNW2.9 N3.9 N4.6 N4.9NNW4.7 N3.6 N3.7 N3.7																								Diurnal Average		
N26 NW26 N31 N32 NW29 NW28 NW24 N27 N22 NNW23 NNW24 N27 NNW25 NNW25 N24 N22 NNW22 NNW24 N27 NW23 NW24 NW22 NW24 N28																								Diurnal Maximum		

AF - Analyzer Failure

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



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 6 km/h on Nov 26 20:00	Hours of Data: 716
Minimum Value: 0 km/h on Nov 23 18:00	Hours of Missing Data: 4
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 5	Hours of Calibration: 0
	Percent Operational Time: 99.4

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

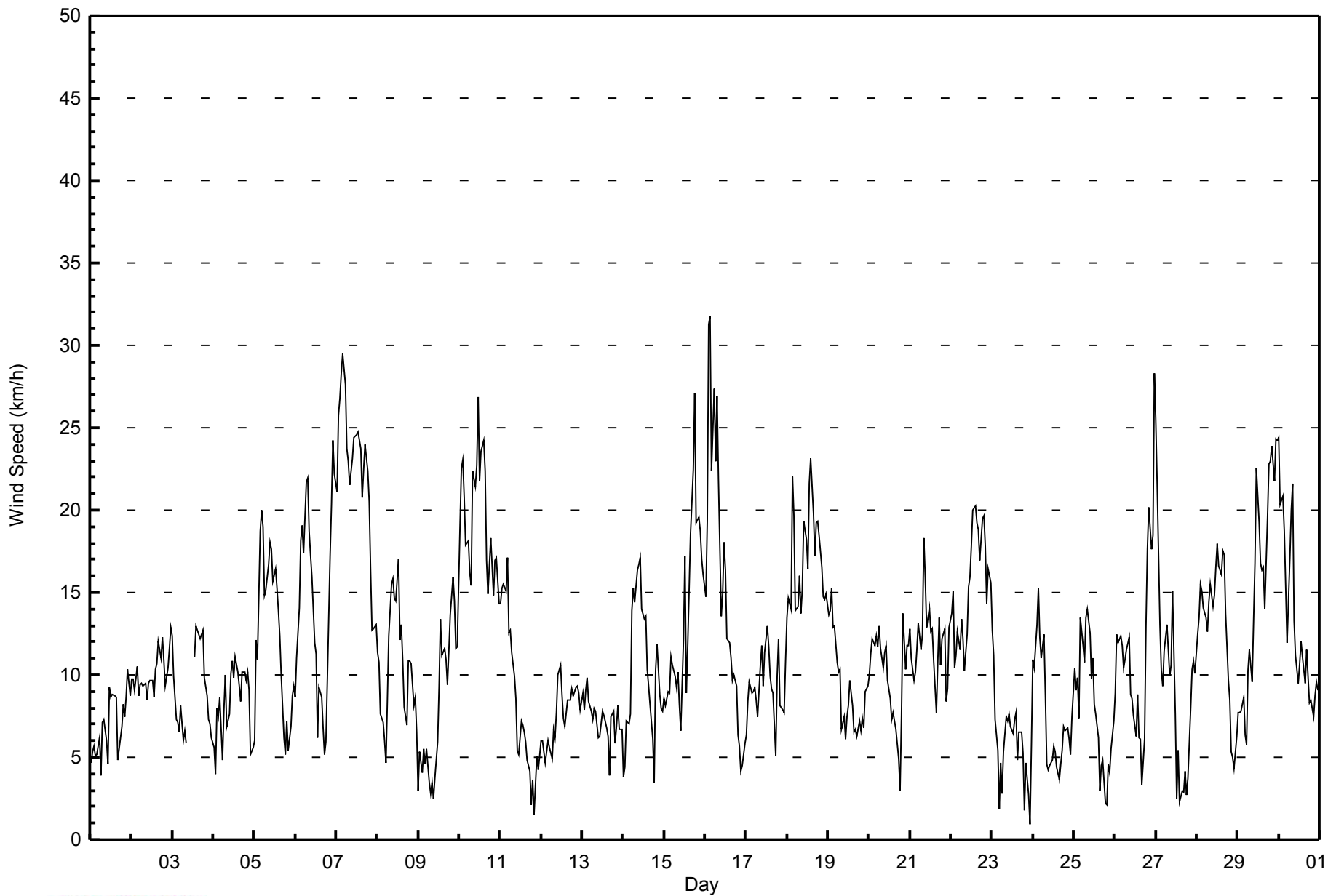
Diurnal Maximum

AF - Analyzer Failure



WBEA
Hourly Averages

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





WBEA
Cumulative Frequency Distribution

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

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	85	11.87	11.87
6 - 11	334	46.65	58.52
12 - 19	224	31.28	89.80
20 - 28	70	9.78	99.58
29 - 38	3	0.42	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 716

Total Number of Hours: 720



WBEA
Frequency Distribution

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

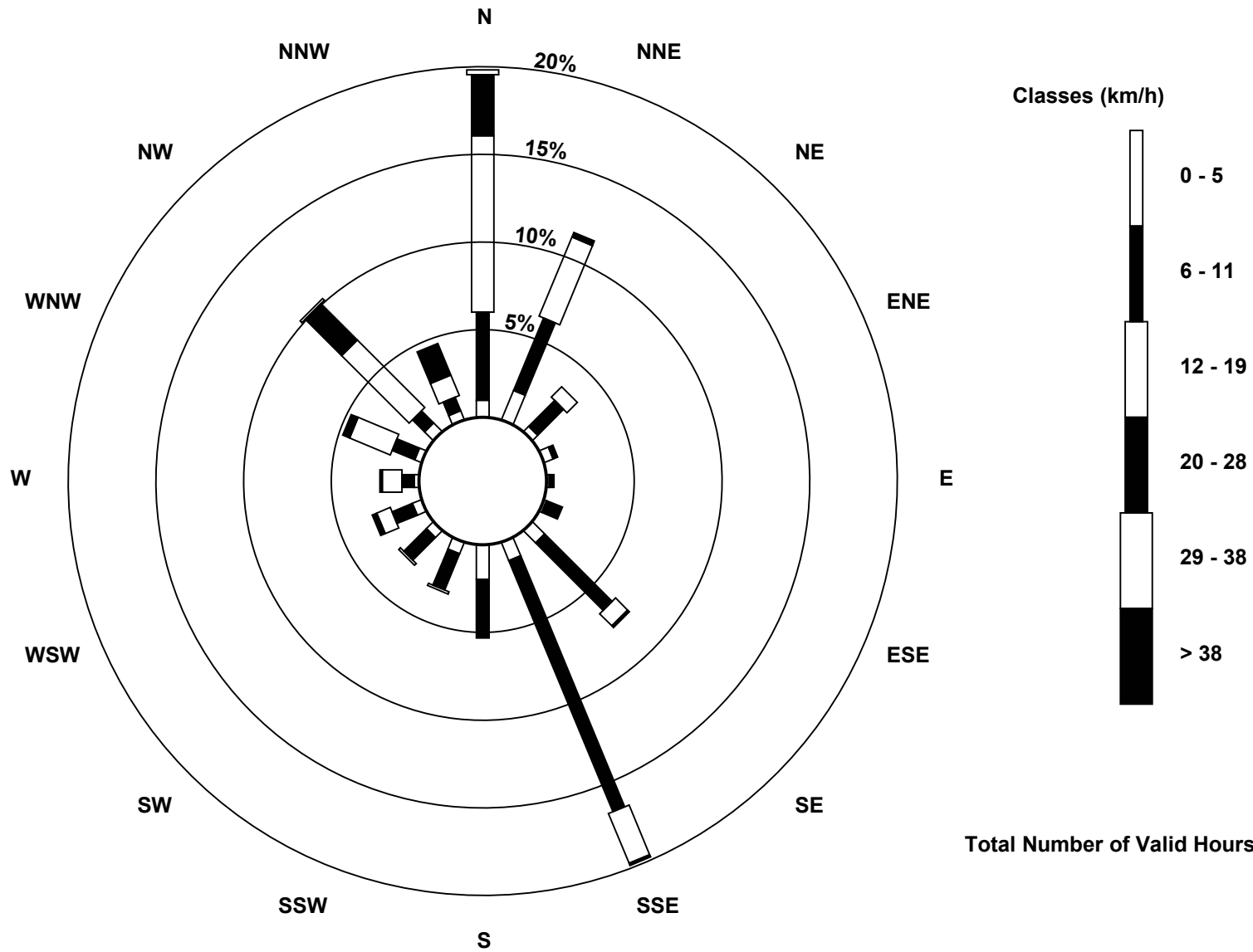
Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	7	13	3	4	1	1	7	8	14	5	4	4	2	3	5	4	85
6 - 11	36	32	15	2	2	7	39	111	24	16	13	9	5	10	7	6	334
12 - 19	72	35	6	0	0	0	7	22	0	1	1	6	8	18	39	9	224
20 - 28	25	2	0	0	0	0	1	1	0	0	0	2	1	3	21	14	70
29 - 38	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	142	82	24	6	3	8	54	142	38	22	18	21	16	34	73	33	716

Total Number of Valid Hours: 716

Total Number of Hours: 720

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

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



Total Number of Valid Hours: 716



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Buffalo Viewpoint - November 2014

Direction of Maximum Speed: 356 deg on Nov 16 04:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 331.3 deg on Nov 7	Hours of Data: 716
Direction of Minimum Speed: 327 deg on Nov 23 23:00	Direction of Minimum Daily Speed Average: 1.7 deg on Nov 23
Direction of Minimum Speed: 327 deg on Nov 23 23:00	Hours of Missing Data: 4
Monthly Average Direction: 289.7 deg	Percent Operational Time: 99.4

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-Nov	170	235	252	233	246	240	155	138	160	140	221	236	242	233	240	258	258	167	171	152	150	147	144	152	195.8
2-Nov	156	160	160	154	166	173	167	156	148	154	153	140	144	141	140	144	152	155	163	156	153	153	157	160	154.4
3-Nov	159	158	157	156	162	162	191	179	151	AF	AF	AF	AF	6	16	15	18	21	13	15	22	38	41	68	58.5
4-Nov	73	97	135	144	155	135	106	110	120	126	123	124	127	127	122	123	136	141	144	146	151	157	158	167	132.1
5-Nov	247	279	273	289	294	290	284	284	290	293	295	285	284	286	289	275	247	221	167	185	180	156	156	156	274.3
6-Nov	151	150	148	144	144	144	142	149	153	150	152	155	152	138	143	155	170	179	196	283	305	312	319	314	161.3
7-Nov	316	313	316	326	320	310	319	334	328	335	344	342	331	330	346	343	329	330	339	339	324	345	13	17	331.3
8-Nov	21	17	24	6	227	199	319	315	317	318	312	340	356	322	322	316	315	11	23	35	27	16	360	333	342.9
9-Nov	269	248	298	164	184	141	143	154	171	173	19	25	4	13	18	18	13	18	18	11	11	17	20	15	17.1
10-Nov	358	356	356	351	323	330	334	312	349	3	358	350	1	4	6	1	6	13	6	359	360	359	358	2	354.5
11-Nov	4	358	3	7	2	16	27	29	30	54	74	25	6	6	6	5	14	19	177	197	108	138	153	167	18.9
12-Nov	153	180	185	177	186	187	201	163	173	174	178	164	166	161	152	143	147	152	152	153	159	160	160	154	163.9
13-Nov	160	164	162	154	167	160	152	172	169	164	144	134	131	130	130	130	61	21	11	15	356	357	354	359	131.2
14-Nov	351	316	322	328	329	359	3	4	360	360	360	2	5	358	360	315	252	204	254	269	259	235	239	180	335.0
15-Nov	175	183	206	219	220	213	203	208	202	201	195	240	260	302	335	359	360	3	357	324	318	317	308	307	295.8
16-Nov	308	322	353	356	342	353	358	356	349	314	328	319	324	316	305	294	296	309	289	275	294	210	187	210	330.7
17-Nov	160	149	146	157	150	148	152	168	156	162	163	162	154	156	163	155	162	265	305	336	331	301	299	331	167.7
18-Nov	17	2	355	4	353	311	306	315	311	304	307	306	296	306	312	313	306	309	310	310	306	311	310	306	318.2
19-Nov	307	304	299	296	295	288	289	279	273	228	217	195	188	199	194	179	142	160	146	166	162	145	161	162	236.5
20-Nov	164	159	156	160	161	163	158	163	167	163	157	161	167	157	143	157	140	130	56	360	8	9	357	359	147.2
21-Nov	2	11	11	8	3	8	3	358	1	346	17	5	320	335	354	34	39	28	42	43	44	42	39	40	12.4
22-Nov	40	39	46	39	30	28	33	37	36	19	17	15	14	13	15	16	10	8	7	10	11	4	2	9	18.7
23-Nov	2	357	10	352	295	292	135	138	163	173	167	165	152	131	129	178	181	176	205	168	177	181	327	346	153.8
24-Nov	1	5	5	7	8	357	3	12	4	22	18	43	37	27	25	20	39	43	37	55	100	100	66	30	22.2
25-Nov	23	33	21	20	9	12	10	357	354	4	10	1	1	359	358	29	9	7	19	23	142	185	153	156	12.8
26-Nov	160	149	143	143	144	143	139	142	146	151	152	150	163	159	174	163	149	20	4	360	7	13	10	5	98.8
27-Nov	358	356	6	6	355	5	5	15	11	21	16	13	15	4	330	310	321	359	319	348	16	22	19	11	5.2
28-Nov	11	9	13	16	13	6	4	1	1	8	9	9	3	4	355	358	356	356	6	5	342	325	234	176	3.5
29-Nov	167	159	153	142	199	203	227	227	225	244	259	250	251	253	255	272	279	308	309	322	313	310	311	311	273.5
30-Nov	303	306	300	293	288	288	271	266	255	239	230	215	206	194	188	169	155	158	155	154	152	159	144	151	241.9
	355.9	346.3	351.3	354.5	325.5	327.9	340.2	333.3	329.8	327.4	339.0	328.6	321.8	336.4	345.0	344.7	348.7	357.9	355.1	350.0	348.5	350.8	351.2	354.1	

Diurnal Average

AF - Analyzer Failure

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



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 83 deg on Nov 11 21:00	Hours of Data: 716
Minimum Value: 5 deg on Nov 12 19:00	Hours of Missing Data: 4
	Hours of Calibration: 0
	Percent Operational Time: 99.4
Percentiles: P ₁ = 6 P ₁₀ = 10 Q ₁ = 11 Median = 14 Q ₃ = 18 P ₉₀ = 25 P ₉₉ = 60	

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-Nov	36	17	27	24	23	37	51	19	14	17	56	24	25	22	22	14	31	11	14	19	23	10	8	10	56
2-Nov	16	10	9	8	17	9	7	10	14	16	15	16	18	19	18	16	14	16	15	15	13	16	17	16	19
3-Nov	15	16	18	21	21	21	18	17	15	AF	AF	AF	AF	17	13	12	13	13	12	13	15	18	19	20	21
4-Nov	19	43	23	24	21	33	17	17	18	19	17	17	18	17	16	16	18	18	16	17	16	16	22	18	43
5-Nov	39	15	14	15	14	14	15	15	14	14	15	16	15	16	17	15	15	16	21	17	20	15	17	16	39
6-Nov	15	17	17	16	16	17	18	18	18	18	18	19	29	60	16	16	16	19	29	29	12	12	12	13	60
7-Nov	12	12	12	13	13	12	16	13	12	14	13	13	14	13	14	16	12	12	14	17	12	12	11	13	17
8-Nov	13	11	12	35	12	36	31	11	11	10	13	27	16	20	15	14	12	32	11	15	13	12	12	39	39
9-Nov	50	28	79	16	25	10	13	43	35	46	26	24	17	15	15	14	11	13	10	11	12	12	12	11	79
10-Nov	10	11	10	18	13	13	15	12	18	11	11	12	13	12	10	11	11	11	11	10	11	11	10	11	18
11-Nov	10	10	9	10	10	15	15	14	14	21	30	30	19	18	25	14	12	12	63	14	83	10	17	20	83
12-Nov	9	18	18	21	22	22	23	10	11	17	18	18	23	24	20	16	9	7	5	6	9	9	10	9	24
13-Nov	15	11	9	17	10	9	13	12	10	14	20	17	17	18	16	11	41	14	8	8	11	7	9	7	41
14-Nov	34	24	8	19	15	12	10	10	10	9	9	11	10	10	12	23	15	25	49	12	12	18	14	14	49
15-Nov	8	14	14	19	14	15	16	20	18	22	35	16	18	27	17	10	9	10	12	14	11	12	12	11	35
16-Nov	11	13	12	12	14	14	11	10	12	17	15	13	13	15	13	11	11	5	17	25	13	28	31	22	31
17-Nov	25	12	9	15	5	8	11	13	13	18	18	18	17	18	18	12	20	36	9	23	14	13	7	21	36
18-Nov	10	9	13	10	18	12	11	11	11	13	13	13	14	13	12	12	11	11	11	11	11	11	11	11	18
19-Nov	11	12	12	13	13	14	14	16	23	17	20	31	25	19	18	17	11	16	15	13	16	15	16	17	31
20-Nov	14	17	15	16	16	17	17	16	16	15	15	19	17	18	13	16	10	16	25	18	10	12	10	11	25
21-Nov	11	13	14	10	10	11	11	12	12	16	13	11	24	17	23	14	17	14	16	17	14	14	14	14	24
22-Nov	14	14	15	13	13	14	13	14	14	12	11	12	12	11	11	12	11	10	10	10	10	10	10	10	15
23-Nov	11	11	12	13	44	16	52	16	16	18	18	21	24	23	14	26	17	11	20	61	27	59	82	55	82
24-Nov	9	12	10	10	12	11	10	18	35	45	21	24	22	20	21	21	17	19	16	23	18	15	24	13	45
25-Nov	11	13	12	13	10	10	11	8	9	12	9	8	10	9	12	28	15	22	71	68	29	42	25	11	71
26-Nov	11	5	6	6	9	10	9	9	12	14	15	17	19	17	21	19	42	14	9	10	10	11	11	10	42
27-Nov	10	9	9	9	13	7	7	9	8	10	11	18	51	14	45	19	42	12	39	28	12	13	12	11	51
28-Nov	11	11	11	11	11	11	10	10	9	10	11	10	10	10	10	10	10	8	7	7	13	19	36	18	36
29-Nov	16	16	18	10	29	32	16	15	18	17	14	12	15	14	12	16	16	11	11	10	11	11	11	10	32
30-Nov	11	11	12	13	13	16	14	14	9	19	15	17	18	19	18	15	10	14	15	12	15	10	11	13	19

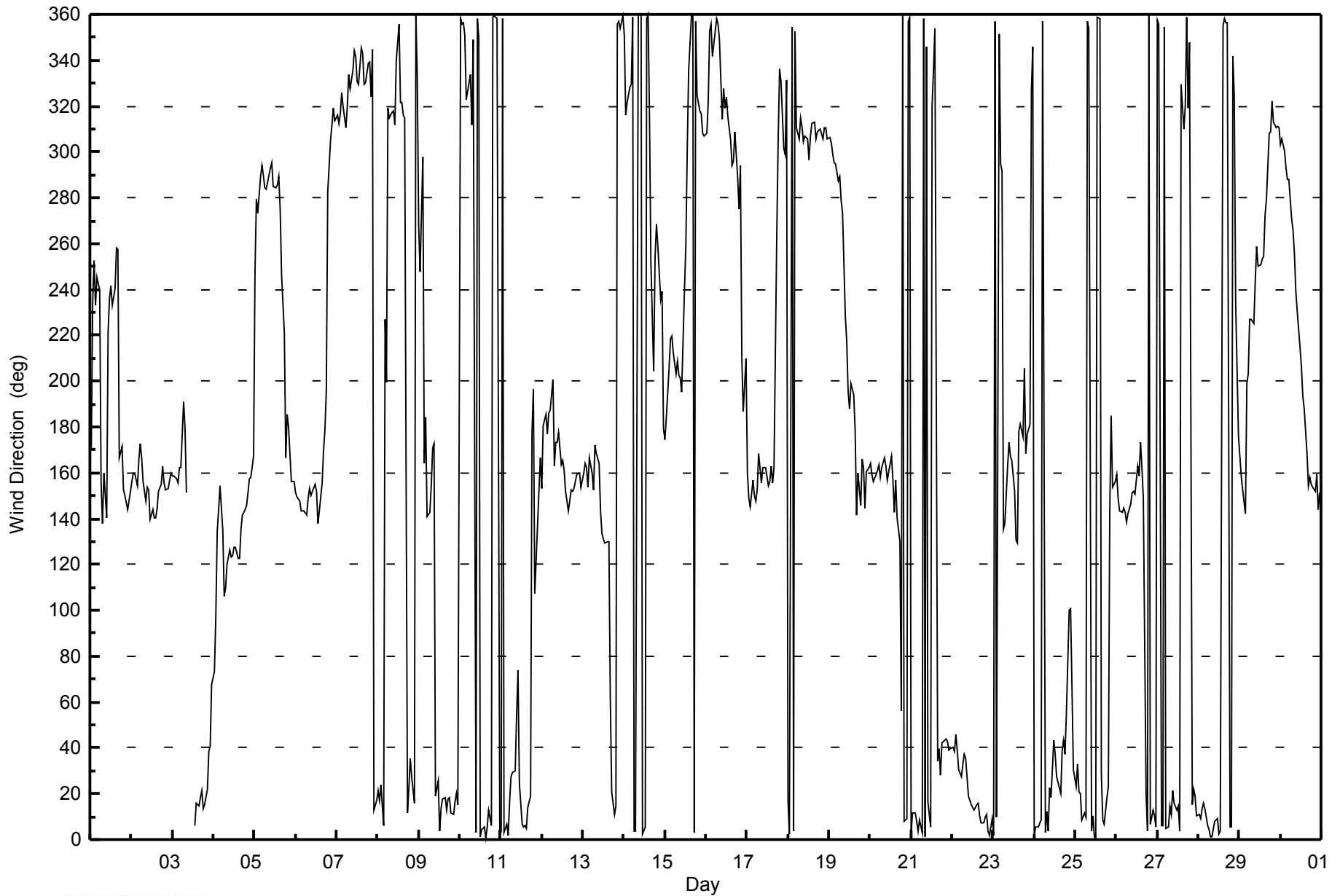
50	43	79	35	44	37	52	43	35	46	56	31	51	60	45	28	42	36	71	68	83	59	82	55	
Diurnal Maximum																								

AF - Analyzer Failure



WBEA
Hourly Averages

Wind Direction (WD) - deg
Buffalo Viewpoint - November 2014



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Wood Buffalo Environmental Association

SO₂ Calibration Report

Station Information

Calibration Date	November 14, 2014	Previous Calibration	October 2, 2014
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Reason:	Routine		
Start Time (MST)	10:25	End Time (MST)	14:05
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	827	838
Calculated slope	0.994665	0.999870	Chamber temp.	45.1	45.1
Calculated intercept	-0.518743	-0.150305	Pressure (mmHg)	694.0	707.5
Analyzer Background	9.5	9.3	Flow (lpm)	0.498	0.506
Analyzer Coefficient	0.896	0.885	Intensity	84	85

Analyzer make TEI 43i Analyzer serial # JC1327300932

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.1	NA
as found span	5000	58.8	599.8	605.8	0.990
calibrator zero	5000	0.0	0.0	0.1	NA
high point	5000	58.8	599.8	599.6	1.000
second point	5000	29.4	299.9	301.3	0.995
third point	5000	14.7	149.9	149.4	1.004
calibrator zero	5000	0.0	0.0	0.1	NA
as left zero	5000	0.0	0.0	0.2	NA
as left span	5000	58.8	599.8	597.1	1.005
Average Correction Factor					1.000

Corrected As found 605.6 Previous response 603.5 % change -0.4%

Notes:

Filter changed after as founds. Adjusted span.

Calibration Performed By:

Devin Russell



Wood Buffalo Environmental Association

SO₂ Calibration Summary

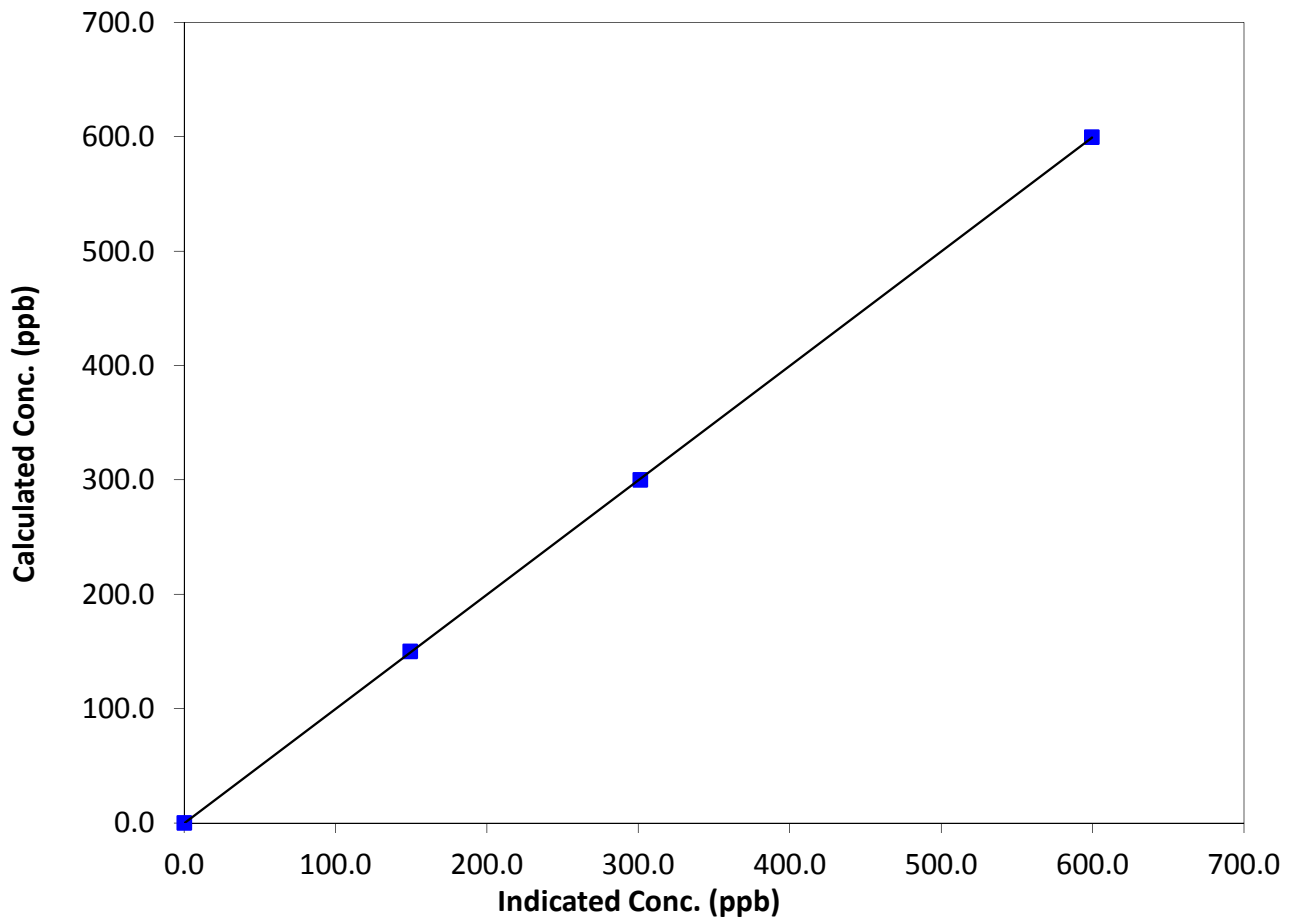
Station Information

Calibration Date	November 14, 2014	Previous Calibration	October 2, 2014
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Start Time (MST)	10:25	End Time (MST)	14:05
Analyzer make	TEI 43i	Analyzer serial #	JC1327300932

Calibration Data

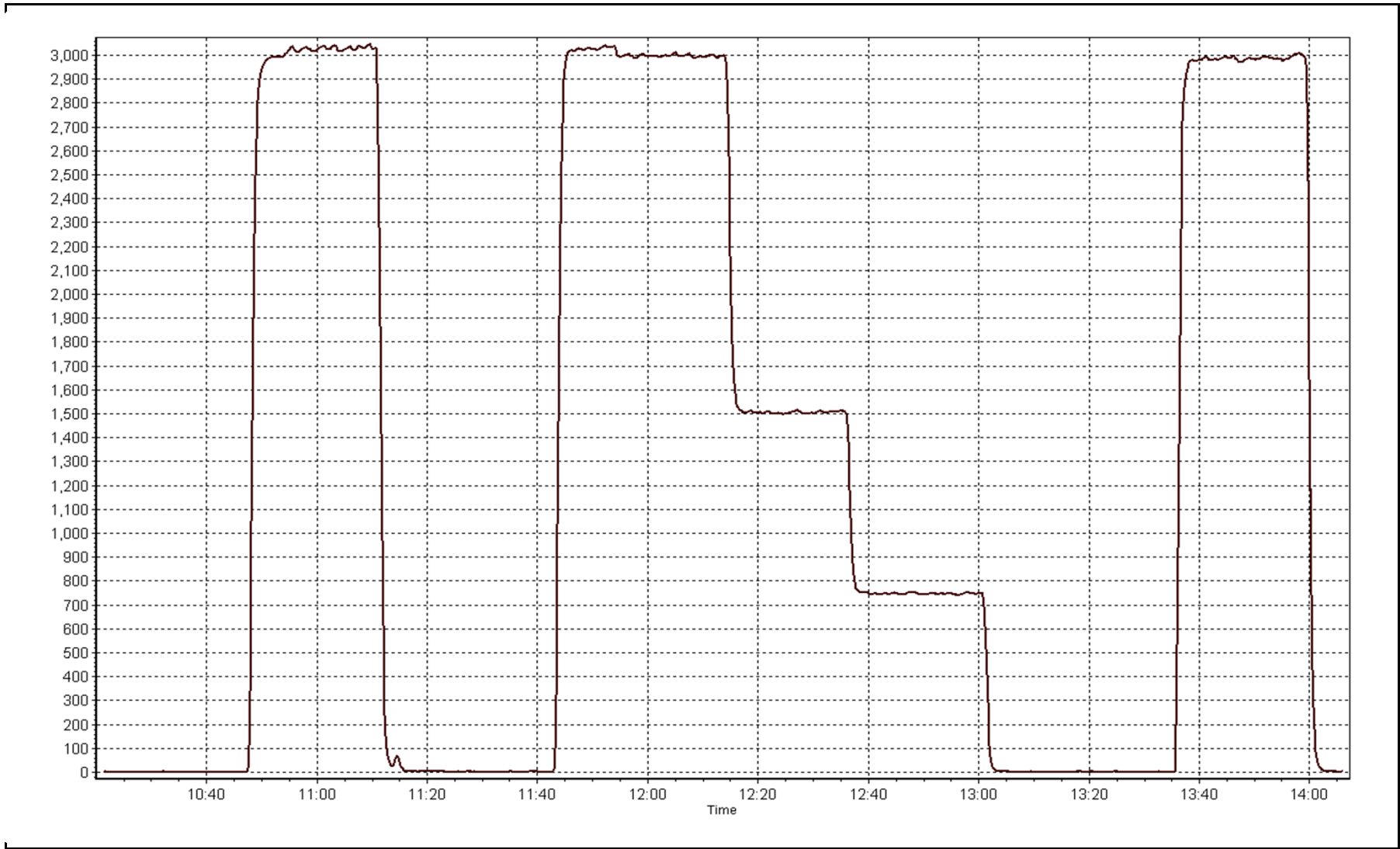
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	N/A	Correlation Coefficient	0.999989
599.8	599.6	1.0003		
299.9	301.3	0.9954	Slope	0.999870
149.9	149.4	1.0039		
			Intercept	-0.150305

SO₂ Calibration Curve



SO2 Calibration Plot

Date: November 14, 2014





Wood Buffalo Environmental Association

H2S Calibration Report

Station Information

Calibration Date	November 17, 2014	Previous Calibration	October 3, 2014
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Reason:	Routine		
Start Time (MST)	10:15	End Time (MST)	13:55
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 #	dig

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	100	100	PMT voltage	-616	-616
Analyzer Range (mv)	5000	5000	Lamp voltage	868	869
Calculated slope	0.992220	0.998259	Chamber temp.	45	45
Calculated intercept	0.115595	-0.052416	Pressure	538.2	548.4
Analyzer Background	14.6	14.2	Flow	1.032	1.048
Analyzer Coefficient	0.896	0.864	Intensity	94	94
			Converter temp.	329	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	77.6	0.968
SO2 scrubber check	5000	14.7	149.9	1.4	NA
calibrator zero	6000	0.0	0.0	-0.1	NA
high point	6000	46.1	74.9	74.9	1.000
second point	6000	25.8	41.9	42.3	0.990
third point	6000	15.3	24.9	25.0	0.994
calibrator zero	6000	0.0	0.0	-0.1	NA
as left zero	5000	0.0	0.0	-0.1	NA
as left span	6000	46.2	75.1	75.4	0.996
Average Correction Factor					0.995

Corrected As found 77.7 Previous response 75.5 % change -2.8%

Notes:

Changed filter after as founds. Scrubber check after as founds. Adjusted span.

Calibration Performed By:

Devin Russell



Wood Buffalo Environmental Association

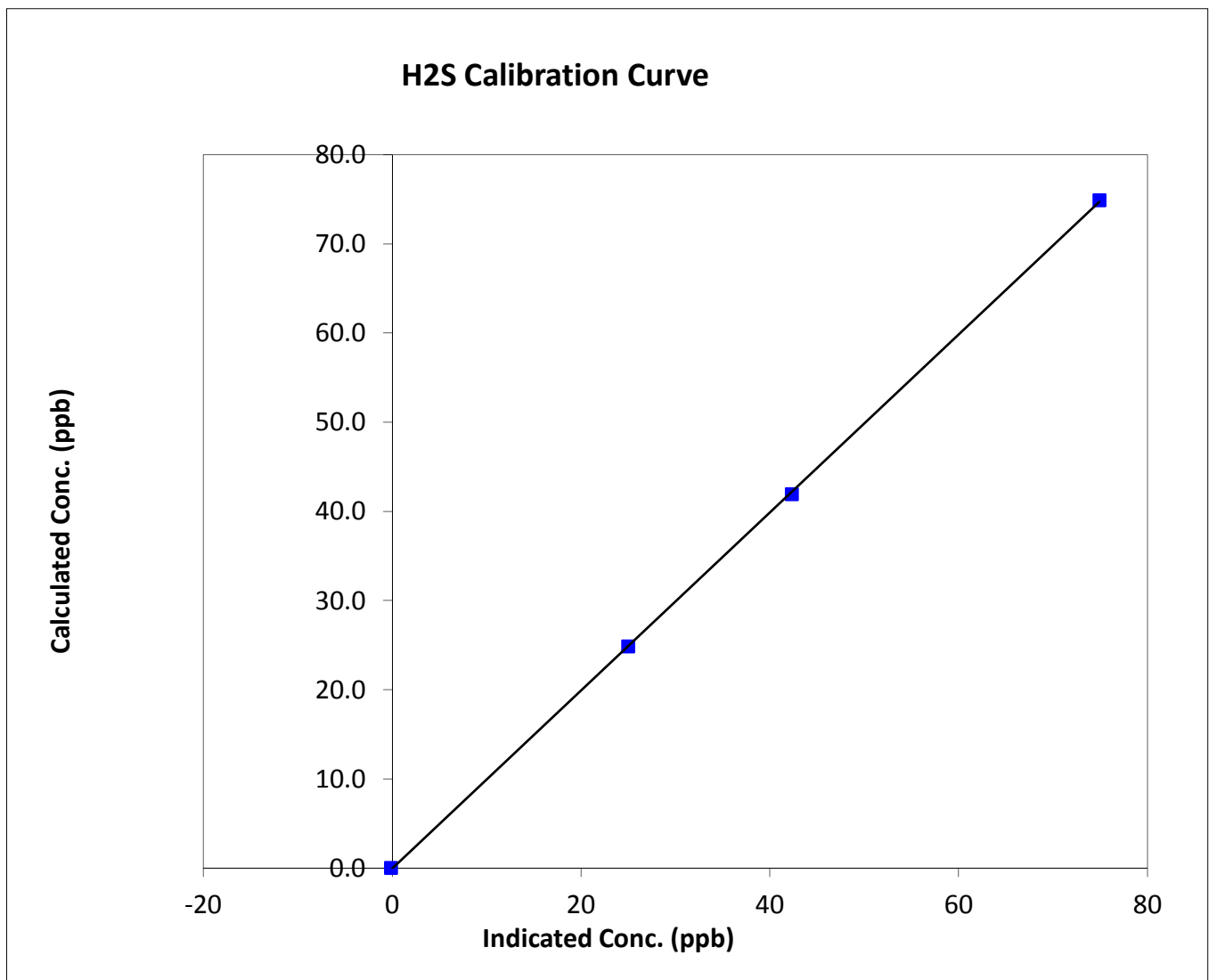
H2S Calibration Summary

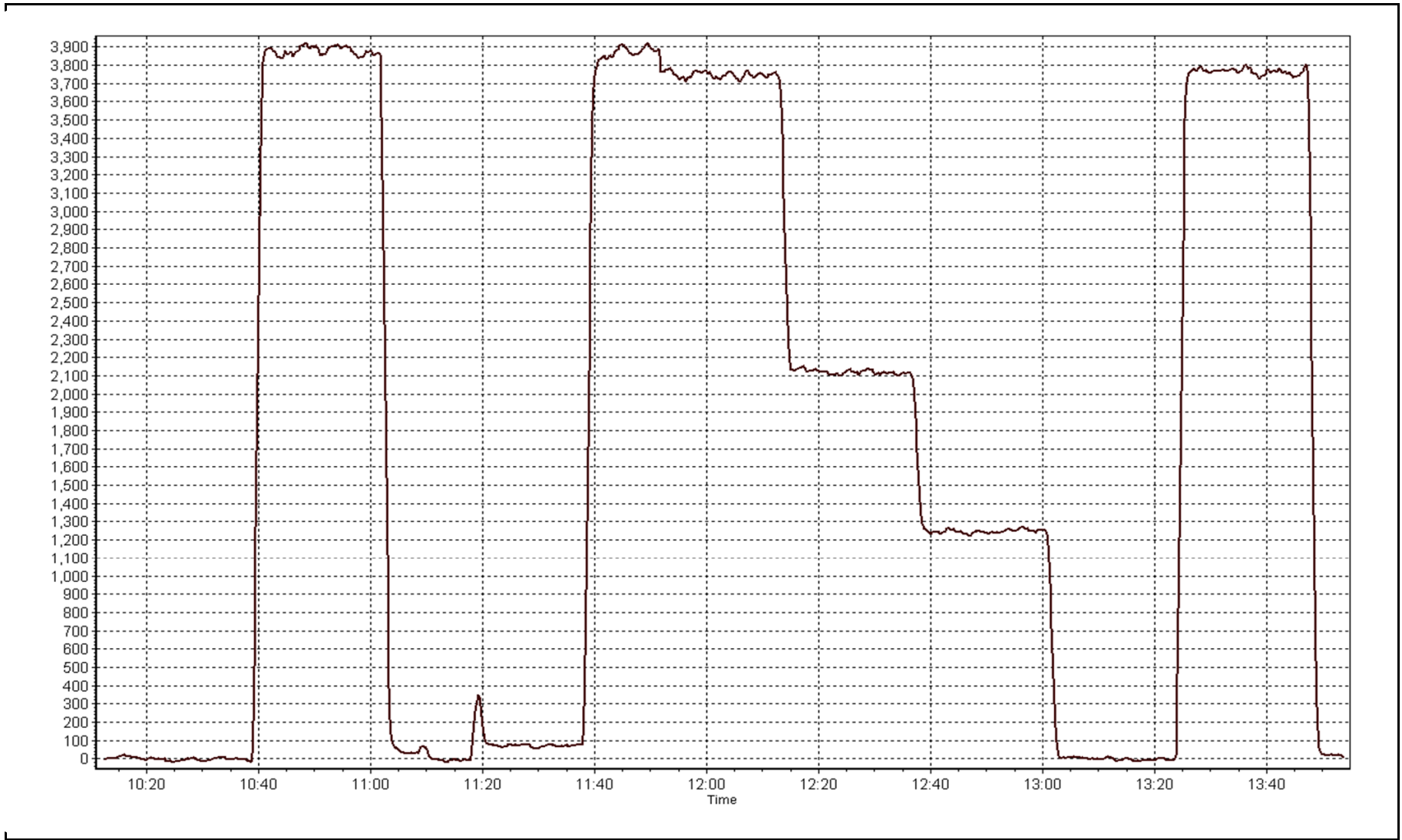
Station Information

Calibration Date	November 17, 2014	Previous Calibration	October 3, 2014
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Start Time (MST)	10:15	End Time (MST)	13:55
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	0.999950
74.9	74.9	1.0000		
41.9	42.3	0.9902	Slope	0.998259
24.9	25.0	0.9939		
			Intercept	-0.052416







Wood Buffalo Environmental Association

THC Calibration Report

Station Information

Calibration Date	Friday, November 14, 2014	Previous Calibration	Thursday, October 02, 2014
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Reason:	Routine		
Start Time (MST)	10:25	End Time (MST)	14:05
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	0.998761	0.997954	Fuel Pressure	18.2	18.4
Calculated intercept	-0.045865	-0.032882			
BKG	1.4	1.2			
COEF	4.109	4.114			

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	-0.13	N/A
as found span	5000	58.8	12.56	12.40	1.013
calibrator zero	5000	0.0	0.00	0.02	N/A
high point	5000	58.8	12.56	12.59	0.997
second point	5000	29.4	6.28	6.38	0.984
third point	5005	14.7	3.14	3.16	0.992
calibrator zero	5000	0.0	0.00	0.02	N/A
as left zero	5000	0.0	0.00	0.03	N/A
as left span	5000	58.8	12.56	12.68	0.991
Average Correction Factor					0.991

Corrected As found 12.53 Previous response 12.62 % change 0.7%

Notes:

Filter changed after as founds. Adjusted zero and span.

Calibration Performed By:

Devin Russell



Wood Buffalo Environmental Association

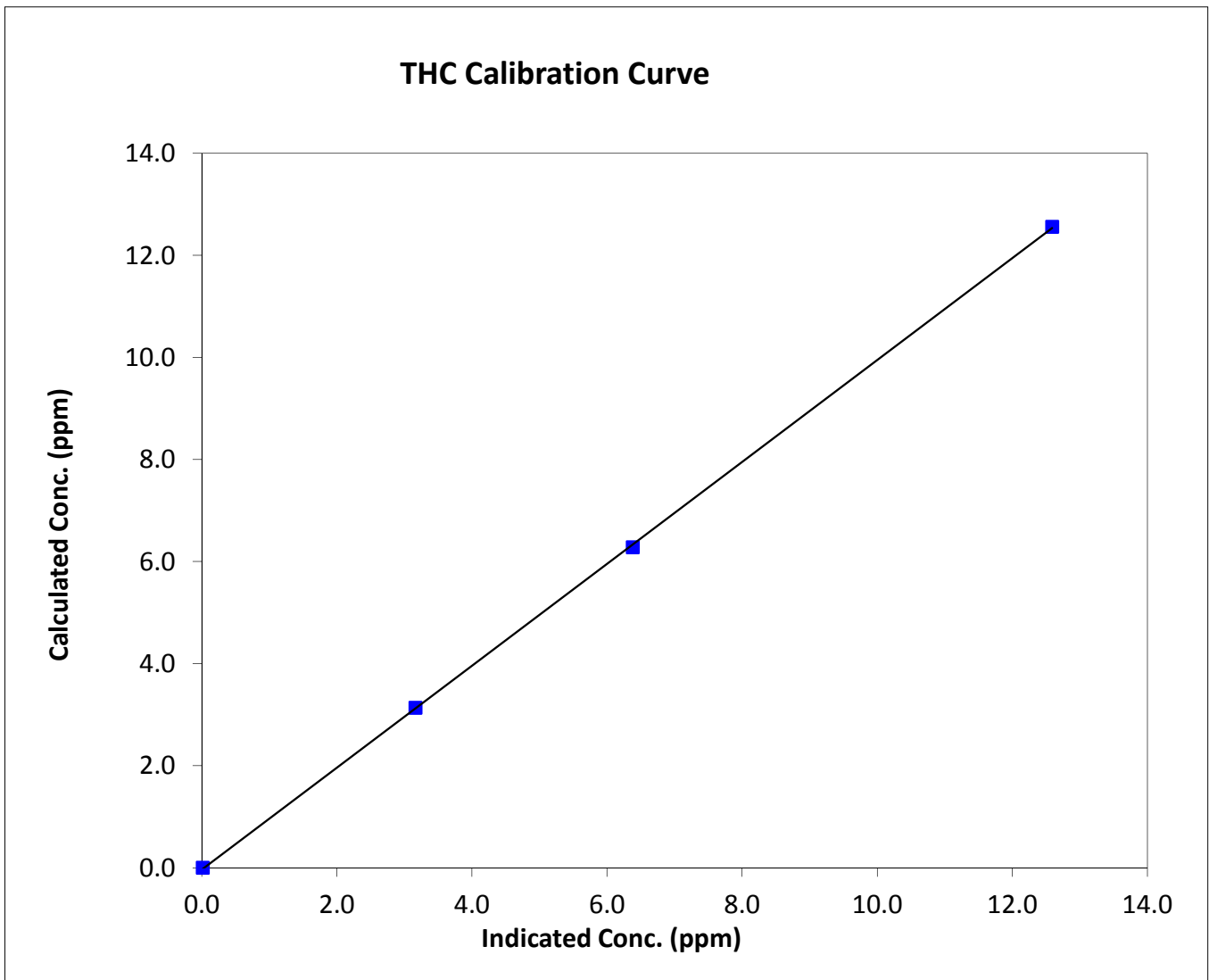
THC Calibration Summary

Station Information

Calibration Date	November 14, 2014	Previous Calibration	October 2, 2014
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Start Time (MST)	10:25	End Time (MST)	14:05
Analyzer make	TEI 51i-LT	Analyzer serial #	1201650671

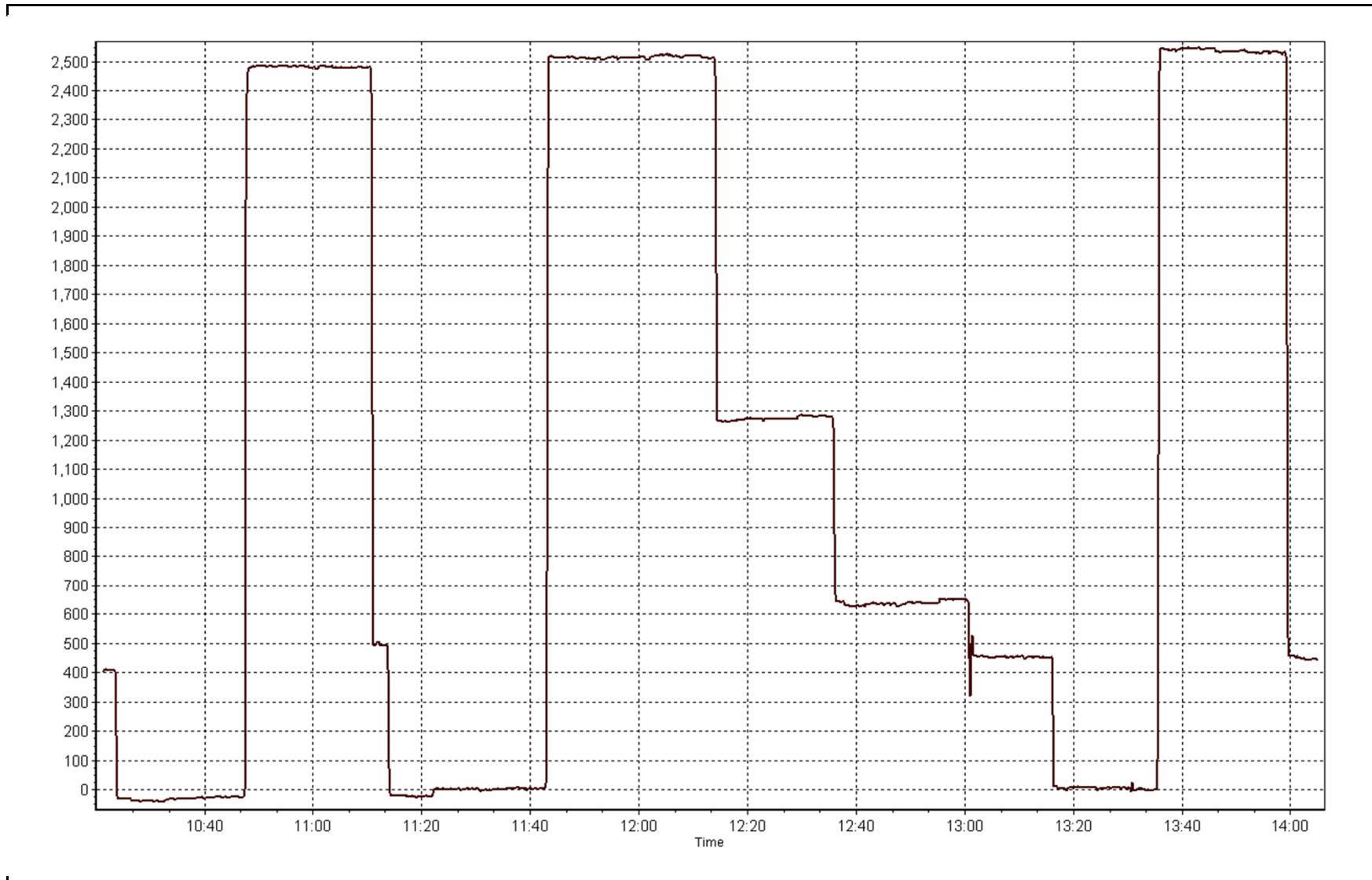
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.02	N/A	Correlation Coefficient	0.999952
12.56	12.59	0.9973		
6.28	6.38	0.9841	Slope	0.997954
3.14	3.16	0.9919		
			Intercept	-0.032882



THC Calibration Plot

Date: November 14, 2014



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

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

**AMS 5
MANNIX
NOVEMBER 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

December 30, 2014

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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MANNIX (AMS 5)
NOVEMBER 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	686	34	34	100.00	23	0	4	0
H2S (ppb) Average	684	34	36	99.72	2	0	1	0
THC (ppm) Average	685	34	35	99.86	5.4	-	2.7	-
Temperature 2 m (C) Average	720	0	0	100.00	8.7	-	3.3	-
Temperature 20 m (C) Average	665	0	55	92.36	9	-	4.2	-
Temperature 45 m (C) Average	661	0	59	91.81	8.7	-	4.5	-
Temperature 75 m (C) Average	662	0	58	91.94	8.5	-	4.7	-
Temperature 90 m (C) Average	658	0	62	91.39	8.3	-	4.7	-
Relative Humidity 2 m (%) Average	720	0	0	100.00	98	-	-	-
Relative Humidity 20 m (%) Average	665	0	55	92.36	97	-	-	-
Relative Humidity 45 m (%) Average	661	0	59	91.81	93	-	-	-
Relative Humidity 75 m (%) Average	659	0	61	91.53	93	-	-	-
Relative Humidity 90 m (%) Average	657	0	63	91.25	94	-	-	-
Wind Speed 20 m (km/h) Average	688	0	32	95.56	28	-	-	-
Wind Speed 45 m (km/h) Average	667	0	53	92.64	36	-	-	-
Wind Speed 75 m (km/h) Average	662	0	58	91.94	41	-	-	-
Wind Speed 90 m (km/h) Average	661	0	59	91.81	42	-	-	-
Wind Direction 20 m (deg) Average	688	0	32	95.56	-	-	-	-
Wind Direction 45 m (deg) Average	667	0	53	92.64	-	-	-	-
Wind Direction 75 m (deg) Average	662	0	58	91.94	-	-	-	-
Wind Direction 90 m (deg) Average	661	0	59	91.81	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	688	0	32	95.56	0.9	-	-	-
Vertical Wind Speed 45 m (km/h) Average	667	0	53	92.64	1.2	-	-	-
Vertical Wind Speed 75 m (km/h) Average	662	0	58	91.94	1.7	-	-	-
Vertical Wind Speed 90 m (km/h) Average	661	0	59	91.81	4.3	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MANNIX (AMS 5)
NOVEMBER 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	686	1.1	3	-	0	0	0	0	1	3	23
H2S (ppb) Average	684	0.5	0	-	0	0	0	0	1	1	2
THC (ppm) Average	685	2.34	0.3	-	2.1	2.2	2.2	2.3	2.4	2.5	5.4
Temperature 2 m (C) Average	720	-11.28	7.9	-	-29.1	-22.2	-15.9	-12.2	-5.7	-0.2	8.7
Temperature 20 m (C) Average	665	-11.99	7.6	-	-28.2	-22	-16.1	-13	-7.9	-0.6	9
Temperature 45 m (C) Average	661	-12.11	7.5	-	-27.3	-22.1	-16.2	-13.1	-8.1	-1	8.7
Temperature 75 m (C) Average	662	-12.07	7.5	-	-26.6	-22.1	-16.1	-13.2	-8.2	-0.7	8.5
Temperature 90 m (C) Average	658	-12.15	7.4	-	-26.6	-22.2	-16.1	-13.3	-8.3	-0.9	8.3
Relative Humidity 2 m (%) Average	720	80.1	9	-	53	68	76	81	85	90	98
Relative Humidity 20 m (%) Average	665	77.8	8	-	50	66	74	80	83	86	97
Relative Humidity 45 m (%) Average	661	77.4	8	-	50	66	73	79	84	86	93
Relative Humidity 75 m (%) Average	659	77.5	8	-	49	65	73	79	84	86	93
Relative Humidity 90 m (%) Average	657	78.1	8	-	49	66	73	80	85	87	94
Wind Speed 20 m (km/h) Average	688	11.0	5	-	1	5	8	10	13	18	28
Wind Speed 45 m (km/h) Average	667	14.9	6	-	2	7	11	15	18	23	36
Wind Speed 75 m (km/h) Average	662	17.2	7	-	2	7	12	17	22	27	41
Wind Speed 90 m (km/h) Average	661	18.1	8	-	1	8	12	18	23	29	42
Wind Direction 20 m (deg) Average	688	-	-	-	-	-	-	-	-	-	-
Wind Direction 45 m (deg) Average	667	-	-	-	-	-	-	-	-	-	-
Wind Direction 75 m (deg) Average	662	-	-	-	-	-	-	-	-	-	-
Wind Direction 90 m (deg) Average	661	-	-	-	-	-	-	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	688	-0.1	0.3	-	-1.1	-0.5	-0.3	-0.1	0.2	0.3	0.9
Vertical Wind Speed 45 m (km/h) Average	667	0	0.5	-	-1.4	-0.6	-0.3	0	0.3	0.6	1.2
Vertical Wind Speed 75 m (km/h) Average	662	0.06	0.4	-	-0.8	-0.4	-0.1	0.1	0.3	0.5	1.7
Vertical Wind Speed 90 m (km/h) Average	661	0.79	0.9	-	-1	-0.1	0.1	0.6	1.2	1.9	4.3

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

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
H2S	12 Nov 2014 15:00	12 Nov 2014 16:00	2	Maintenance - manifold cleaning
THC	28 Nov 2014 11:00	28 Nov 2014 11:00	1	Maintenance - stn operator on site cleaning
Temperature, Relative Humidity 20 m	02 Nov 2014 22:00	04 Nov 2014 15:00	42	Flat line in sensor output signal - Sensor frozen
Temperature, Relative Humidity 20 m	04 Nov 2014 22:00	05 Nov 2014 10:00	13	Flat line in sensor output signal - Sensor frozen
Temperature, Relative Humidity 45 m	02 Nov 2014 22:00	05 Nov 2014 08:00	59	Flat line in sensor output signal - Sensor frozen
Temperature, Relative Humidity 75 m	03 Nov 2014 01:00	05 Nov 2014 10:00	58	Flat line in sensor output signal - Sensor frozen
Temperature, Relative Humidity 90 m	02 Nov 2014 13:00	02 Nov 2014 14:00	2	Flat line in sensor output signal - Sensor frozen
Temperature, Relative Humidity 90 m	03 Nov 2014 01:00	05 Nov 2014 12:00	60	Flat line in sensor output signal - Sensor frozen
Wind Speed. Wind Direction, Vertical Wind Speed 20 m	03 Nov 2014 08:00	04 Nov 2014 15:00	32	Flat line in sensor output signal - Sensor frozen
Wind Speed. Wind Direction, Vertical Wind Speed 45 m	03 Nov 2014 02:00	03 Nov 2014 02:00	1	Flat line in sensor output signal - Sensor frozen
Wind Speed. Wind Direction, Vertical Wind Speed 45 m	03 Nov 2014 05:00	05 Nov 2014 08:00	52	Flat line in sensor output signal - Sensor frozen
Wind Speed. Wind Direction, Vertical Wind Speed 75 m	03 Nov 2014 01:00	05 Nov 2014 10:00	58	Flat line in sensor output signal - Sensor frozen
Wind Speed. Wind Direction, Vertical Wind Speed 90 m	03 Nov 2014 01:00	05 Nov 2014 11:00	59	Flat line in sensor output signal - Sensor frozen

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Summary of Hour Averages

Mannix - November 2014

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 23 ppb on Nov 15 18:00	Maximum Daily Average: 4.2 ppb on Nov 28		Hours of Data:	686
Minimum Value: 0 ppb on Nov 1 03:00	Minimum Daily Average: 0.0 ppb on Nov 5		Hours of Missing Data:	34
Maximum Diurnal Average: 1.8 ppb at hour 21	Minimum Diurnal Average: 0.6 ppb at hour 10		Hours of Calibration:	34
Monthly Average: 1.1 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 3 P ₉₉ = 14		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0	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-Nov	0	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-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0.3	1
4-Nov	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
5-Nov	0	Z	0	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-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	8	5	0.9	8
7-Nov	1	Z	0	0	0	0	0	0	1	1	0	1	1	1	1	2	1	2	2	2	2	2	0	0	0.8	2
8-Nov	0	Z	4	1	0	0	1	1	1	1	1	0	0	2	13	3	2	1	0	0	4	12	9	0	2.5	13
9-Nov	1	Z	0	0	0	0	0	0	1	1	1	2	1	0	0	1	0	1	2	0	0	0	1	0.6	2	
10-Nov	0	Z	1	1	1	0	0	1	1	1	0	0	0	0	0	6	3	12	17	15	7	3	1	3.1	17	
11-Nov	1	Z	0	1	0	1	0	0	0	0	1	1	2	1	2	1	2	7	12	4	2	3	6	2.0	12	
12-Nov	7	Z	9	14	13	5	2	1	1	1	0	0	C	C	C	C	0	0	0	0	0	0	0	2.8	14	
13-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	4	3	6	4	1.0	6	
14-Nov	14	Z	4	4	1	6	11	3	4	3	5	2	3	1	1	1	1	0	0	0	0	0	0	2.8	14	
15-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	4	23	3	1	1	3	1	1	1.7	23	
16-Nov	0	Z	1	1	0	1	1	1	0	0	1	0	0	1	1	0	1	1	0	0	0	0	0	0.5	1	
17-Nov	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	0	1	0.3	1	
18-Nov	5	Z	15	3	1	1	1	1	0	1	1	6	2	1	3	2	1	0	1	1	1	1	3	2.3	15	
19-Nov	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0.2	1	
20-Nov	0	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	3	10	0.9	10	
21-Nov	7	Z	0	0	4	7	9	3	1	0	4	1	1	0	0	0	0	0	0	0	0	0	0	1.7	9	
22-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	1	5	1	2	2	0.7	5	
23-Nov	1	Z	2	1	1	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	1	0.6	2	
24-Nov	3	Z	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.6	3	
25-Nov	0	Z	0	0	0	2	2	3	2	1	1	1	1	1	0	0	0	1	1	1	1	0	0	0.9	3	
26-Nov	0	Z	0	0	0	0	0	1	1	1	1	0	1	0	0	0	1	3	4	13	2	1	2	1.4	13	
27-Nov	1	Z	6	1	0	0	1	0	0	0	0	0	1	1	0	0	1	1	1	0	0	0	0	0.7	6	
28-Nov	1	Z	1	0	1	2	1	2	16	4	1	3	14	14	12	9	3	3	6	1	0	1	0	4.2	16	
29-Nov	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4	1	0	0	0.5	4	
30-Nov	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	

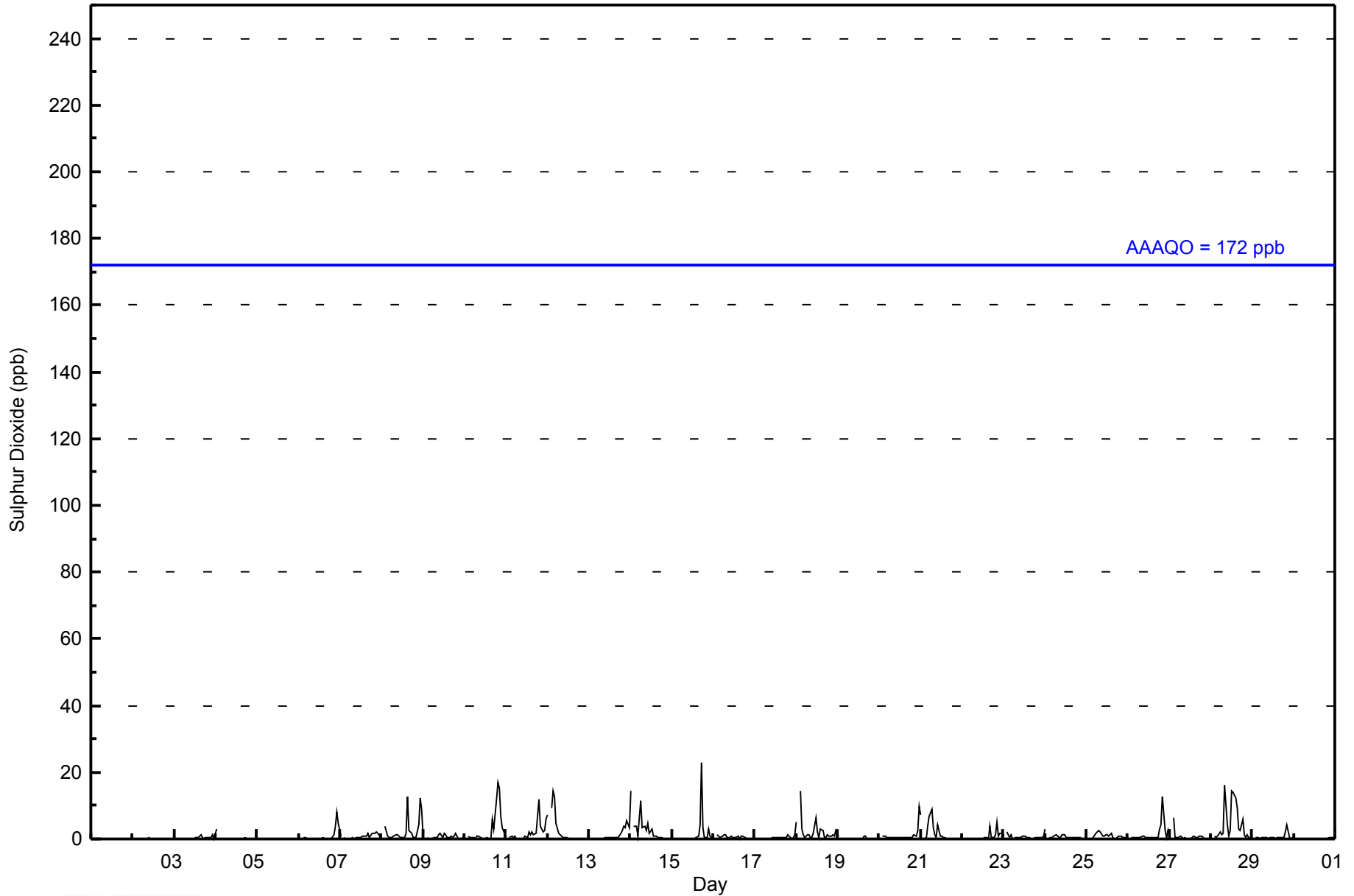
1.6	--	1.6	0.9	0.8	1.0	1.1	0.7	1.0	0.6	0.7	0.7	1.0	0.9	1.0	1.2	1.0	1.3	1.4	1.7	1.8	1.1	1.5	1.5	Diurnal Average	
14	--	15	14	13	7	11	3	16	4	5	6	14	14	12	13	6	23	12	17	15	7	12	10	Diurnal Maximum	

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



WBEA
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Mannix - November 2014





WBEA
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Mannix - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	669	97.52	97.52
11 - 20	16	2.33	99.85
21 - 60	1	0.15	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



WBEA
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Mannix - November 2014

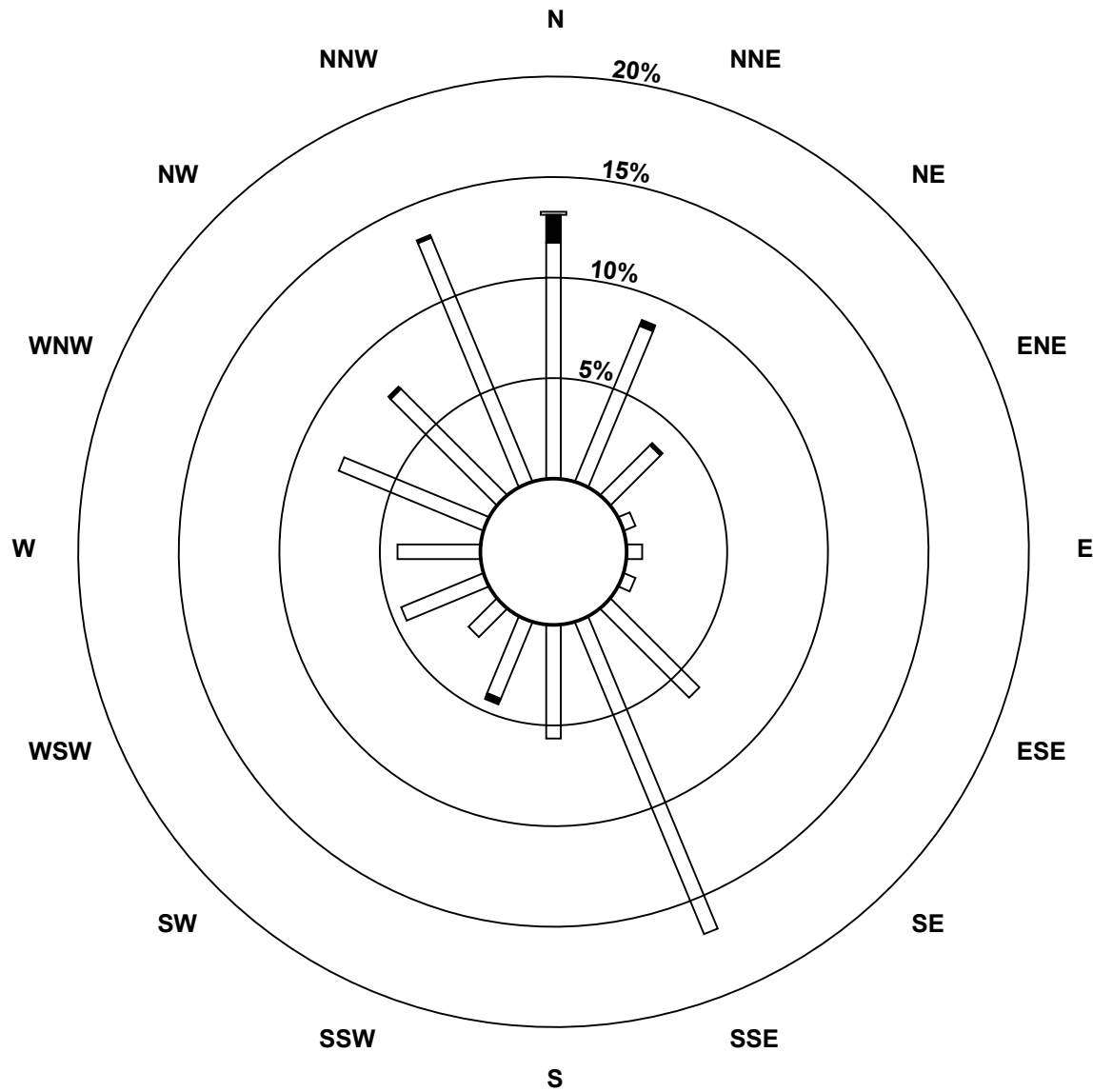
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	77	55	23	4	5	4	41	110	37	27	13	29	27	51	49	86	638
11 - 20	9	2	1	0	0	0	0	0	0	2	0	0	0	0	1	1	16
21 - 60	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	87	57	24	4	5	4	41	110	37	29	13	29	27	51	50	87	655

Total Number of Valid Hours: 655

Total Number of Hours: 720

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

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



Classes (ppb)

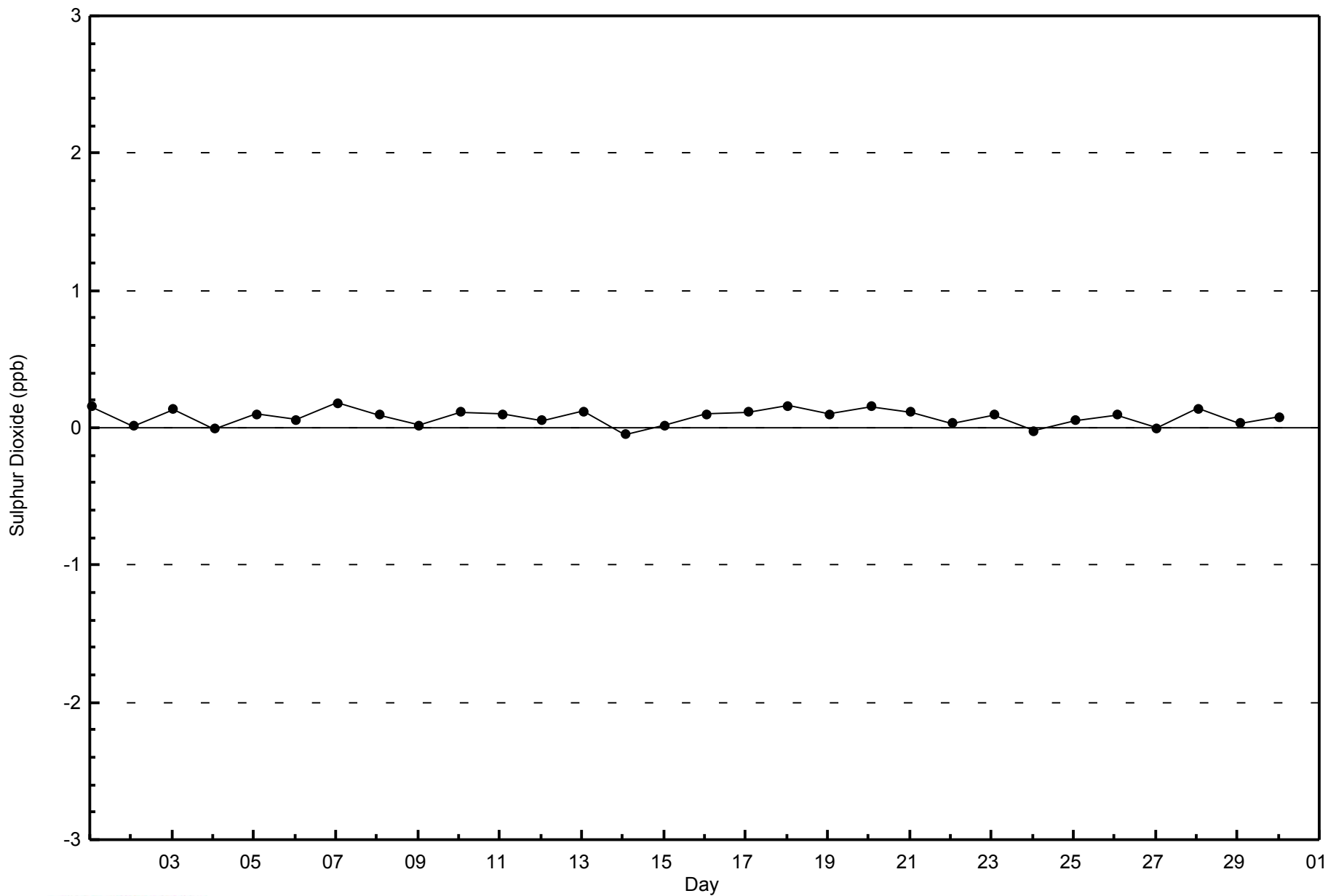


Total Number of Valid Hours: 655



WBEA
Zero Responses

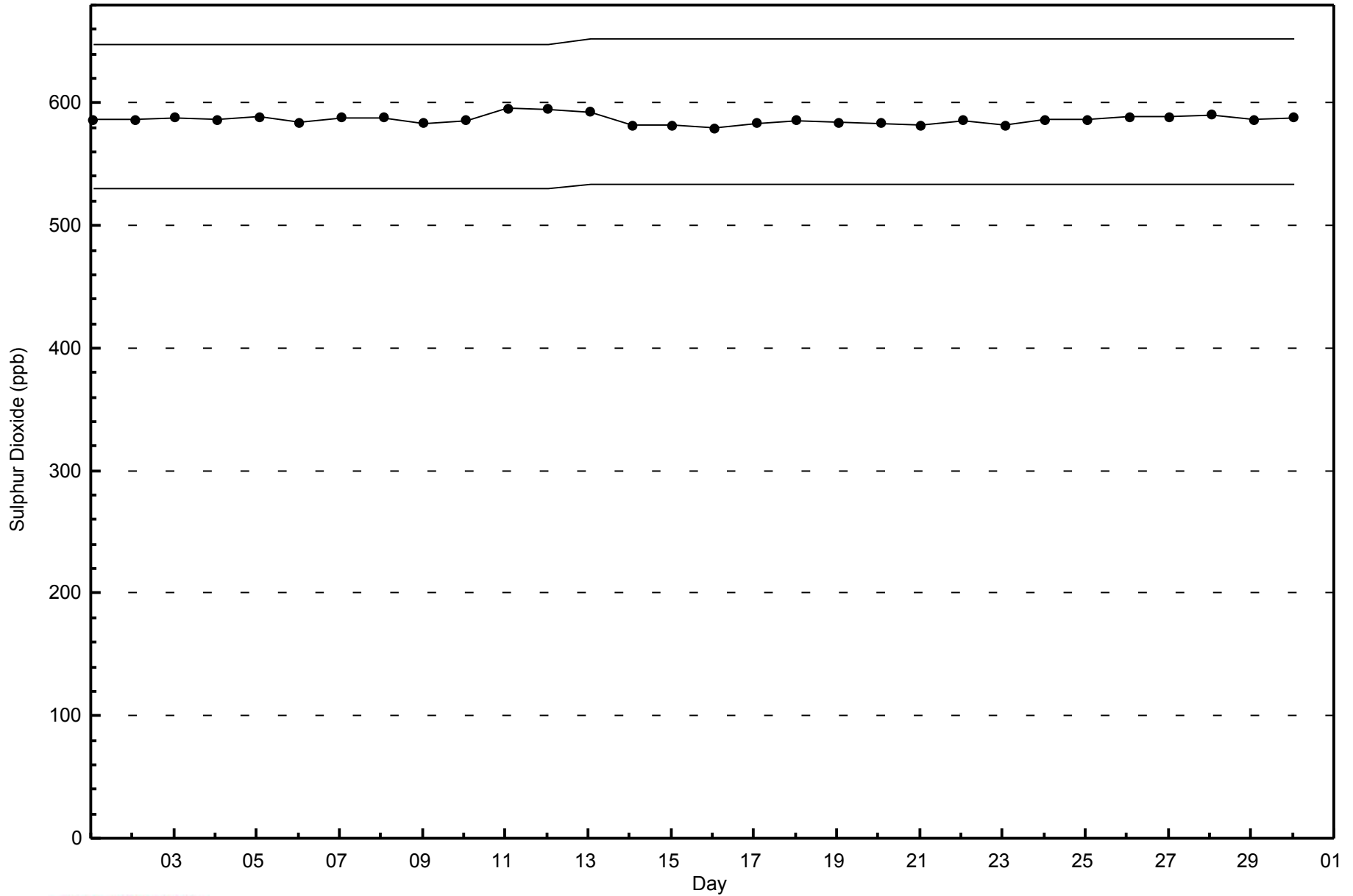
Sulphur Dioxide (SO₂) - ppb
Mannix - November 2014





WBEA
Span Responses

Sulphur Dioxide (SO₂) - ppb
Mannix - November 2014





Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 2 ppb on Nov 13 23:00	Maximum Daily Average: 0.8 ppb on Nov 25		Hours of Data:	684
Minimum Value: 0 ppb on Nov 1 12:00	Minimum Daily Average: 0.1 ppb on Nov 1		Hours of Missing Data:	36
Maximum Diurnal Average: 0.6 ppb at hour 18	Minimum Diurnal Average: 0.4 ppb at hour 12		Hours of Calibration:	34
Monthly Average: 0.5 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 1 P ₉₉ = 2		Percent Operational Time:	99.7

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

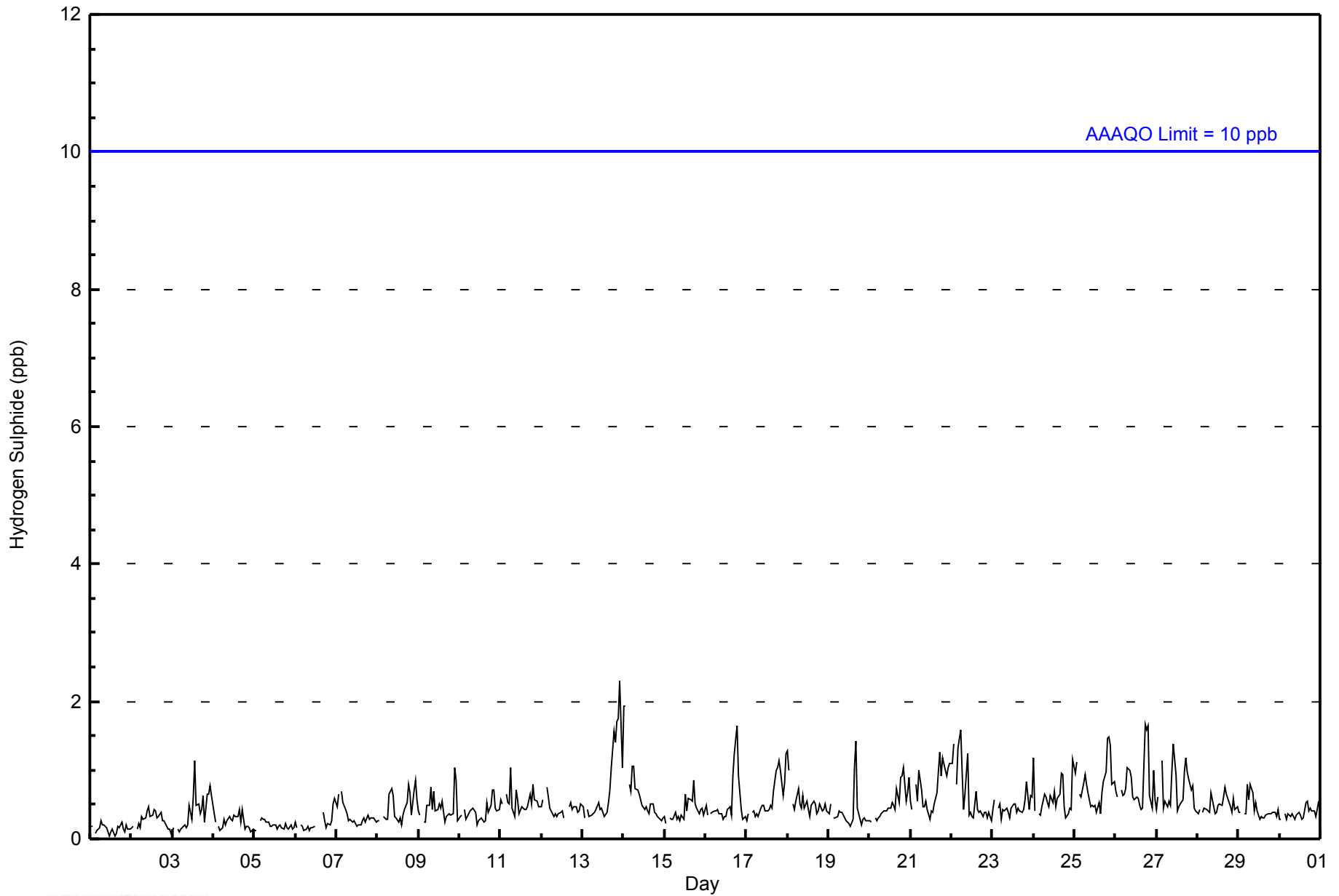
0.5	0.5	--	0.5	0.4	0.5	0.5	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.6	0.6	0.6	0.6	0.6	0.5	0.6	0.5	Diurnal Average		
2	2	--	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	1	Diurnal Maximum	

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



WBEA
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Mannix - November 2014





WBEA
Cumulative Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
Mannix - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	684	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



WBEA
Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
Mannix - November 2014

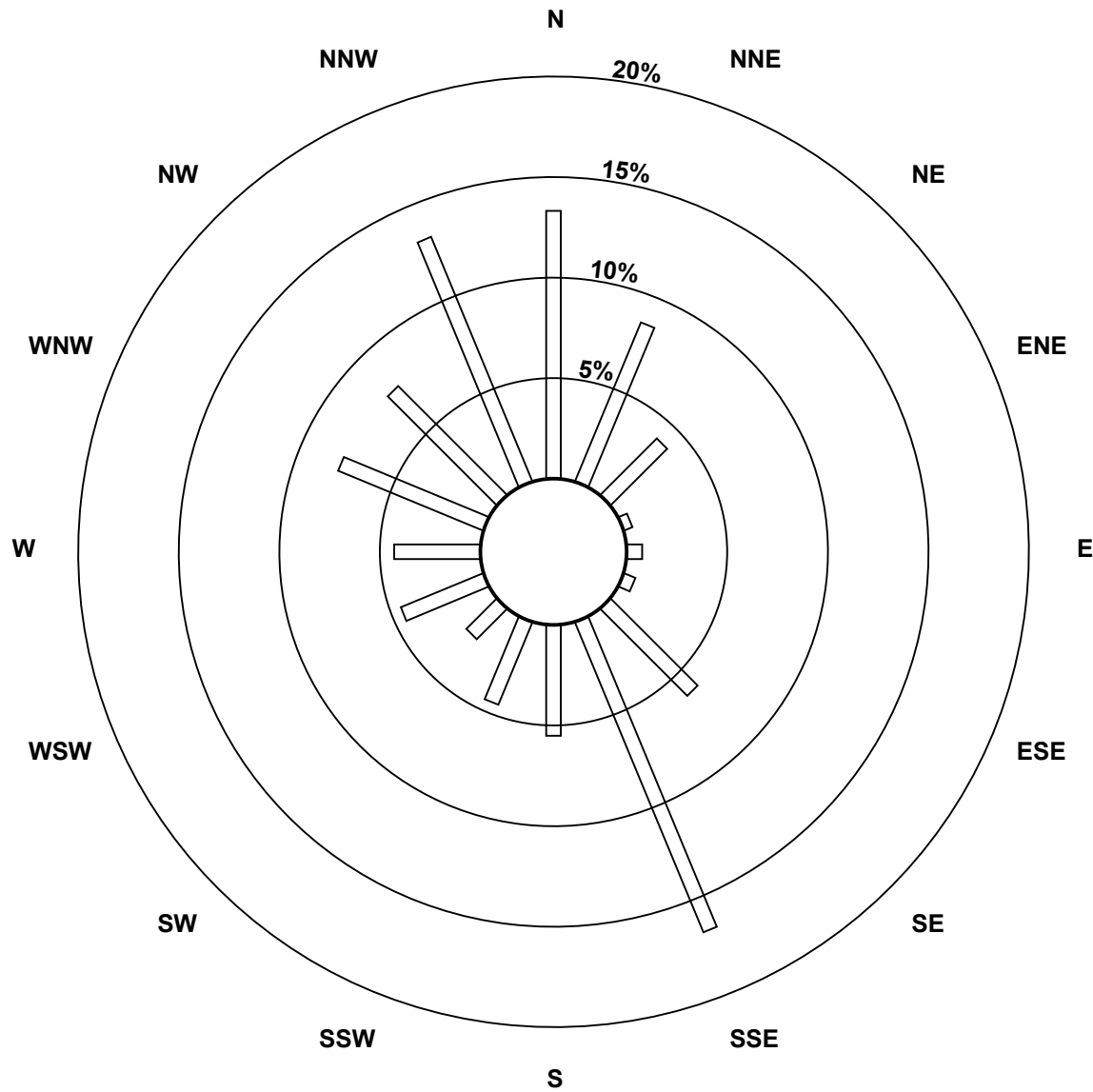
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	87	56	26	3	5	4	40	109	36	29	14	29	28	51	50	86	653
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	87	56	26	3	5	4	40	109	36	29	14	29	28	51	50	86	653

Total Number of Valid Hours: 653

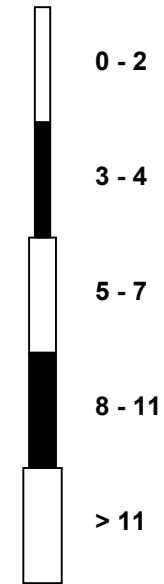
Total Number of Hours: 720

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

**Hydrogen Sulphide (H₂S) - ppb
Mannix (AMS 5)**



Classes (ppb)

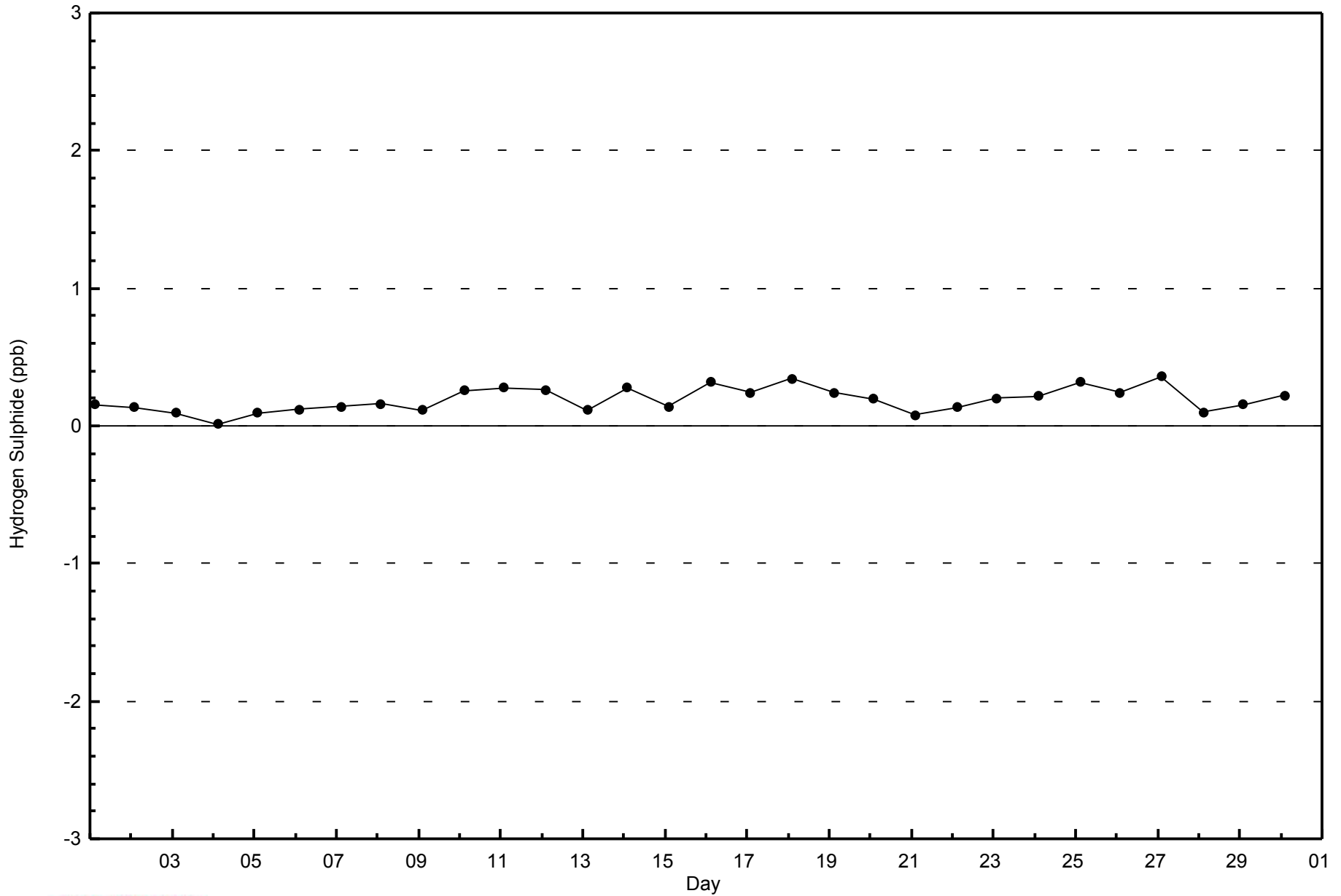


Total Number of Valid Hours: 653



WBEA
Zero Responses

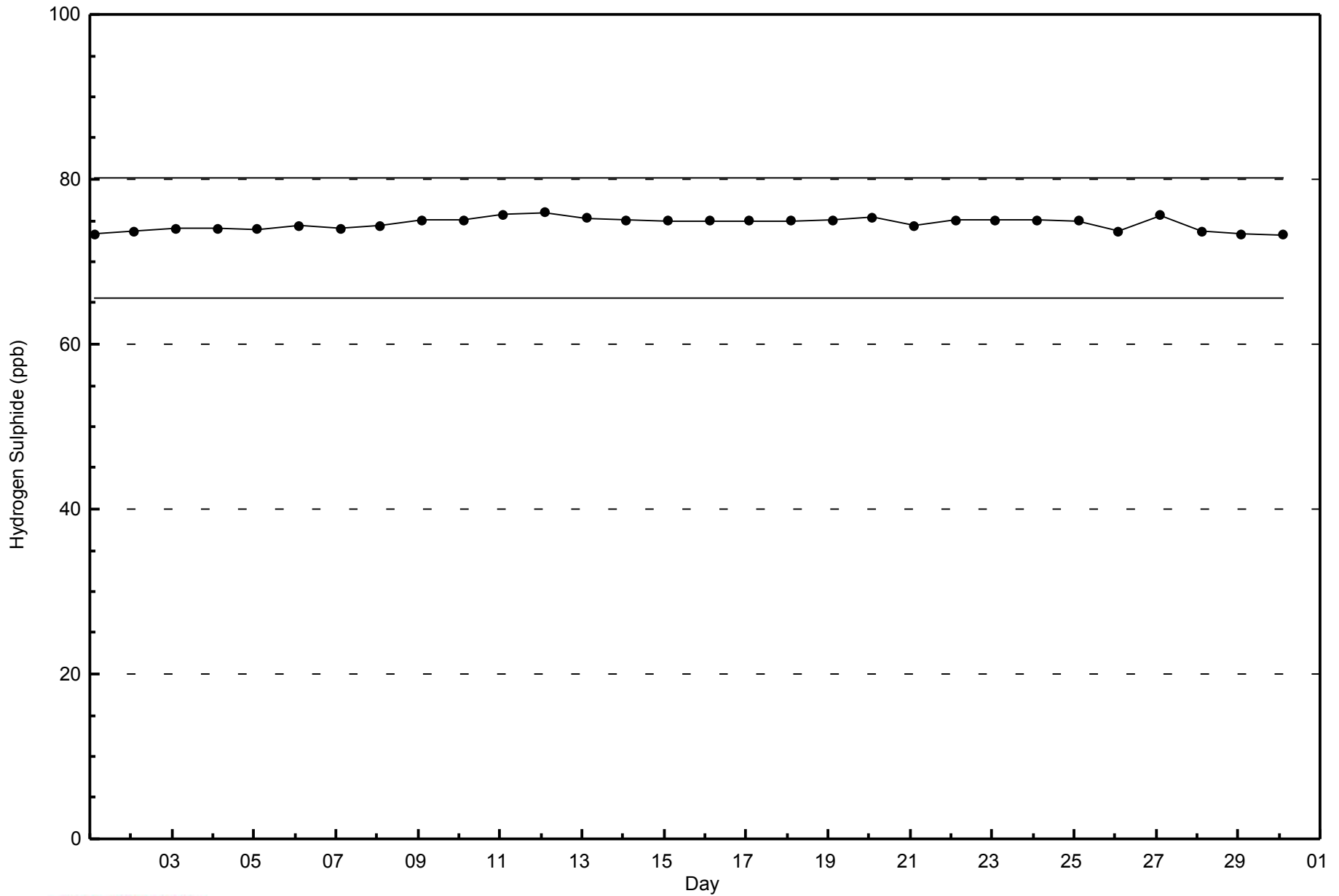
Hydrogen Sulphide (H₂S) - ppb
Mannix - November 2014





WBEA
Span Responses

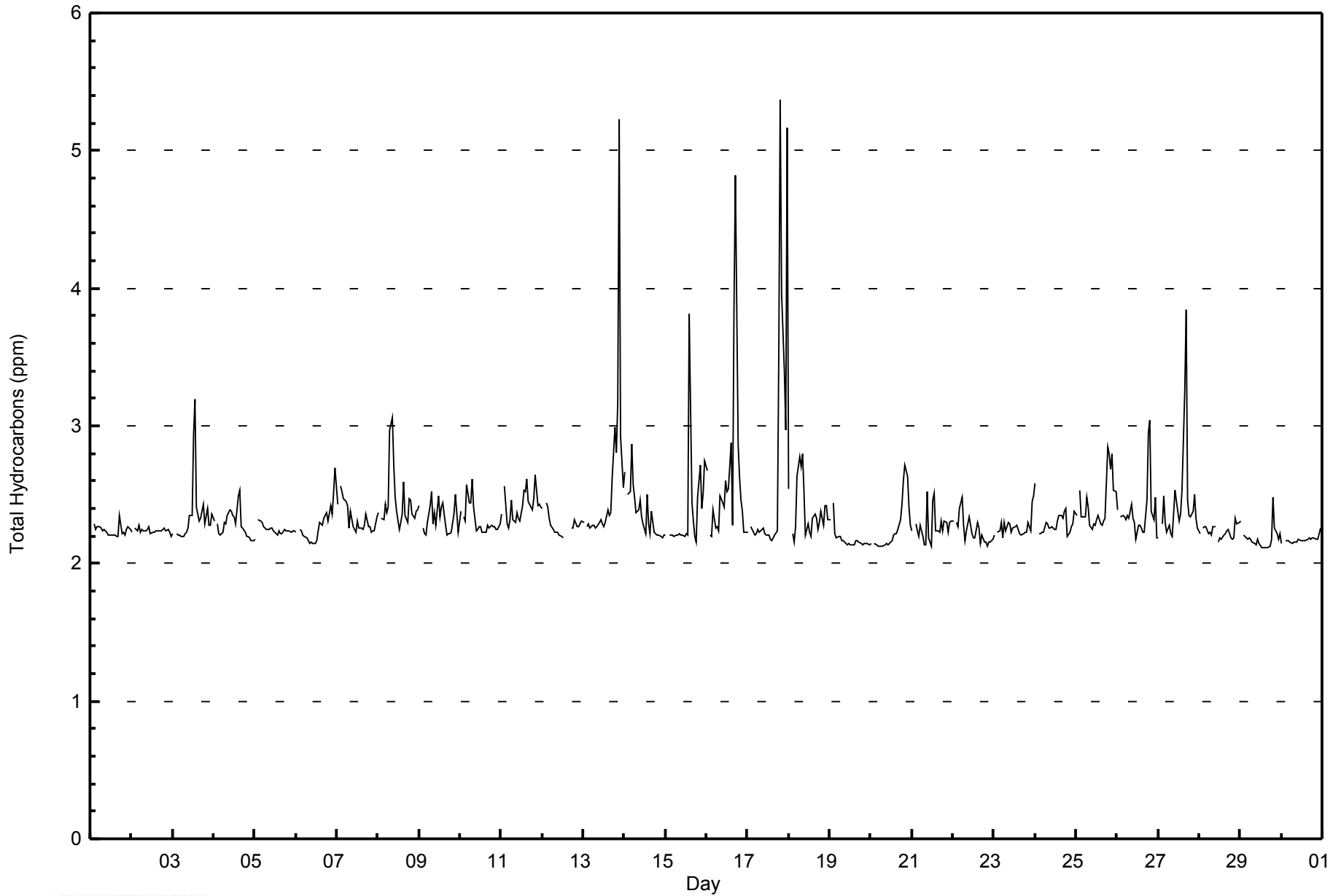
Hydrogen Sulphide (H₂S) - ppb
Mannix - November 2014





WBEA
Hourly Averages

Total Hydrocarbons (THC) - ppm
Mannix - November 2014





WBEA
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Mannix - November 2014

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	0	0.00	0.00
2.1 - 3.0	671	97.96	97.96
3.1 - 10.0	14	2.04	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



WBEA
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Mannix - November 2014

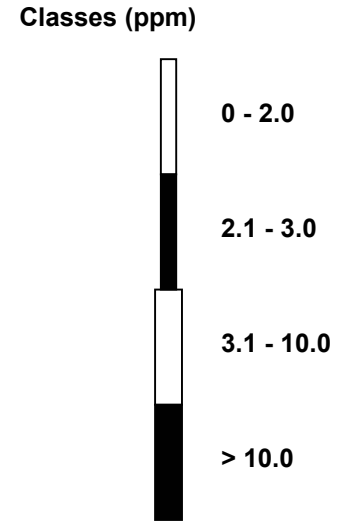
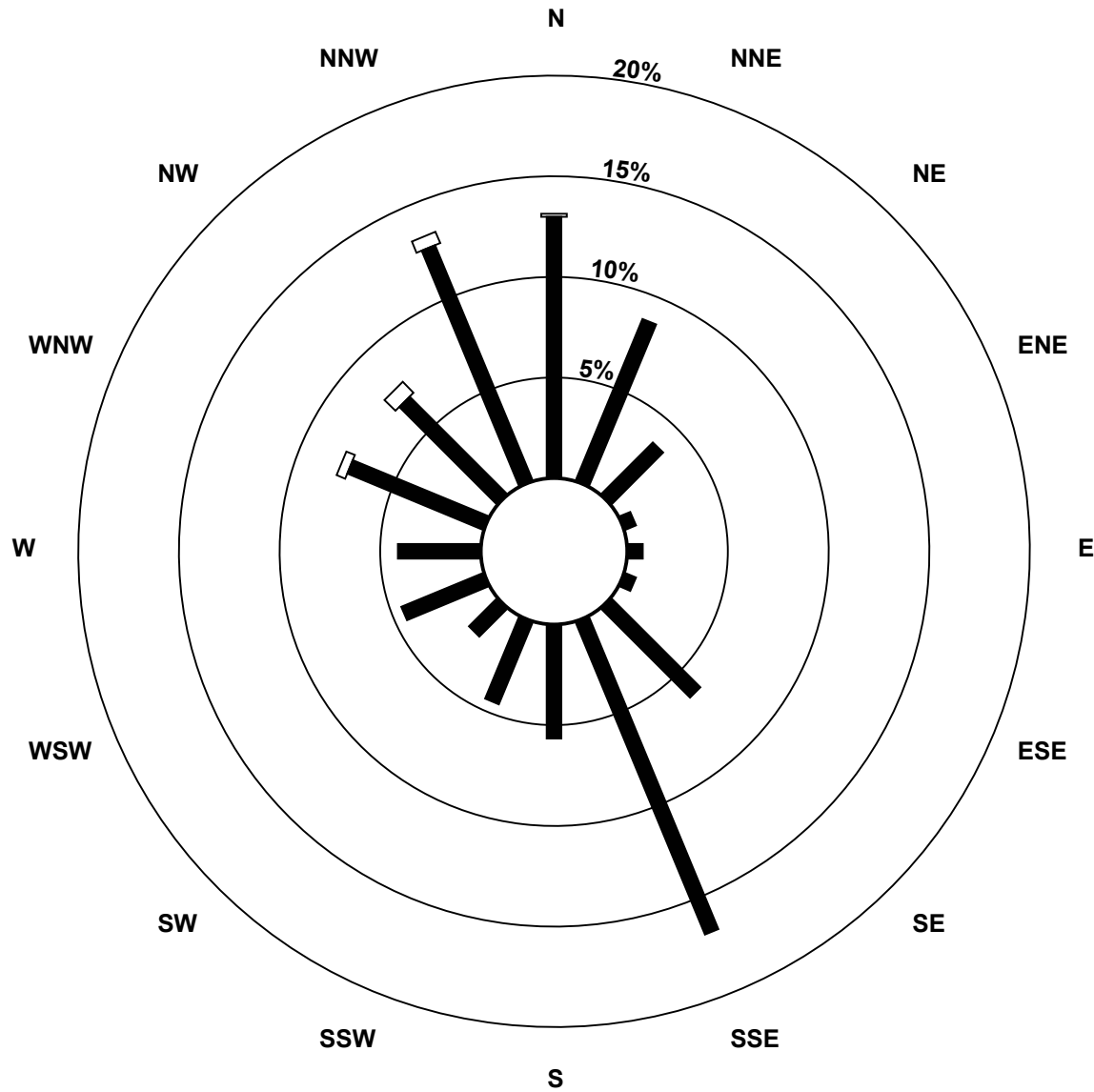
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.1 - 3.0	85	57	24	4	5	4	41	110	37	29	13	29	27	48	45	83	641
3.1 - 10.0	1	0	0	0	0	0	0	0	0	0	0	0	0	3	5	4	13
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	86	57	24	4	5	4	41	110	37	29	13	29	27	51	50	87	654

Total Number of Valid Hours: 654

Total Number of Hours: 720

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

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

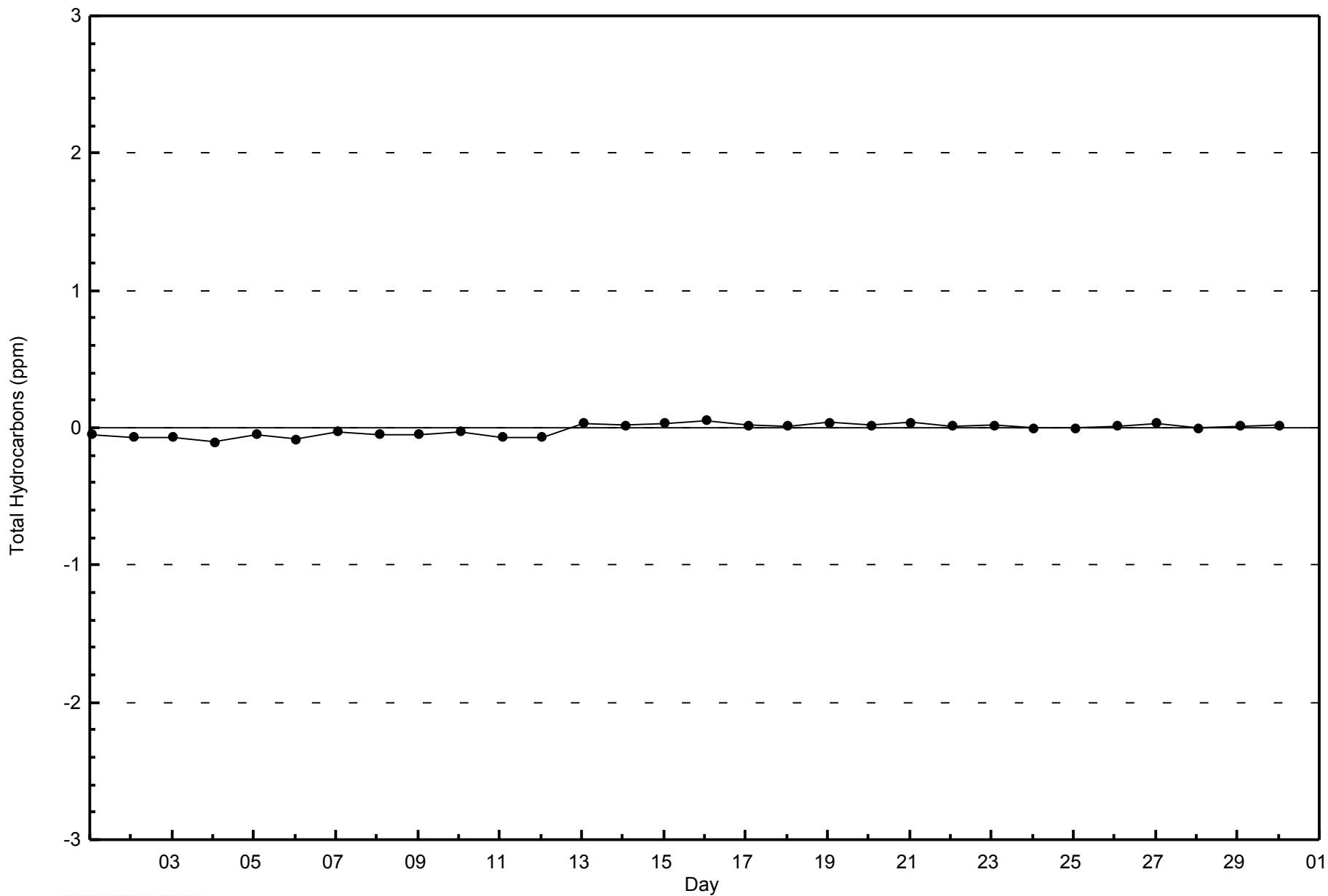


Total Number of Valid Hours: 654



WBEA
Zero Responses

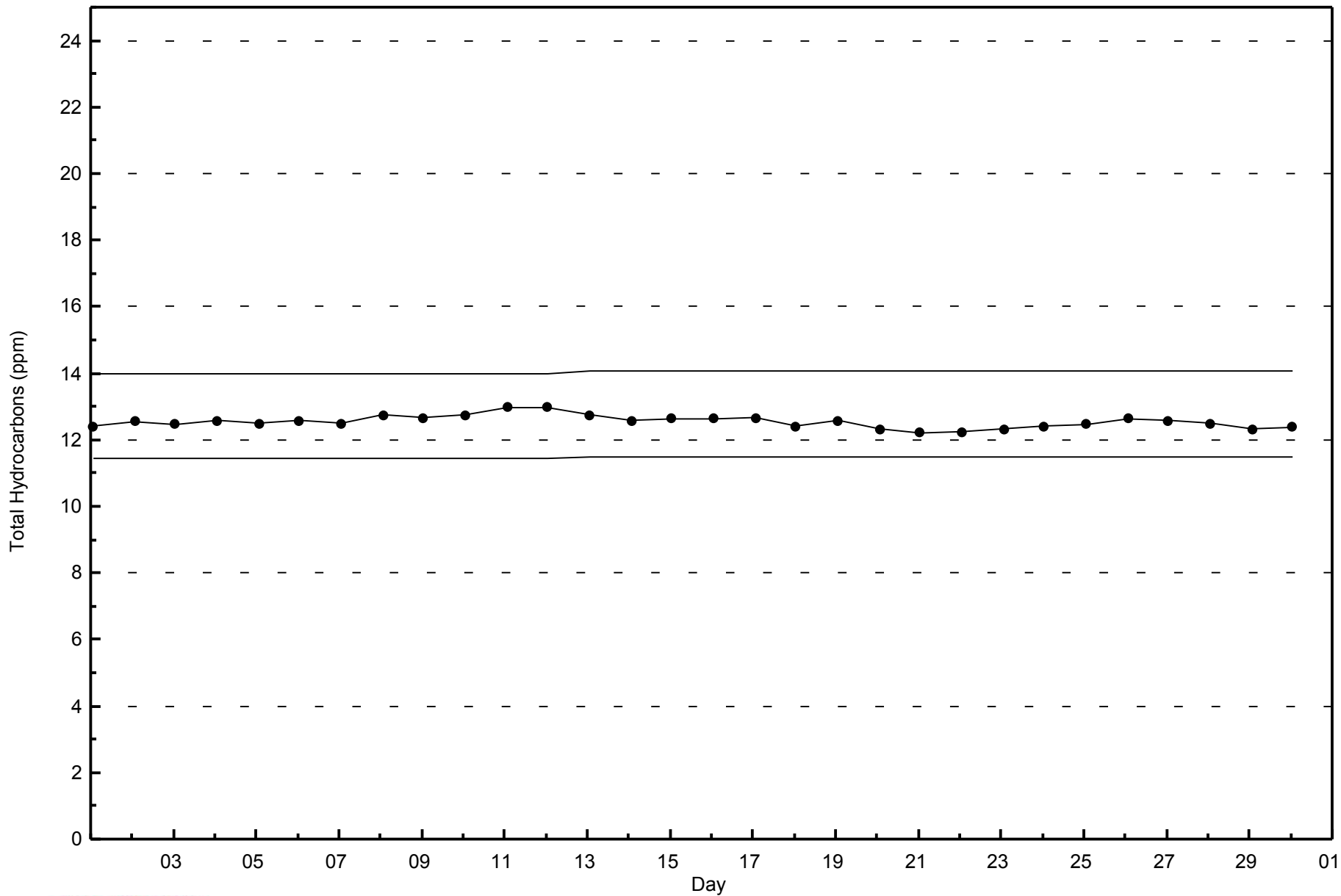
Total Hydrocarbons (THC) - ppm
Mannix - November 2014





WBEA
Span Responses

Total Hydrocarbons (THC) - ppm
Mannix - November 2014



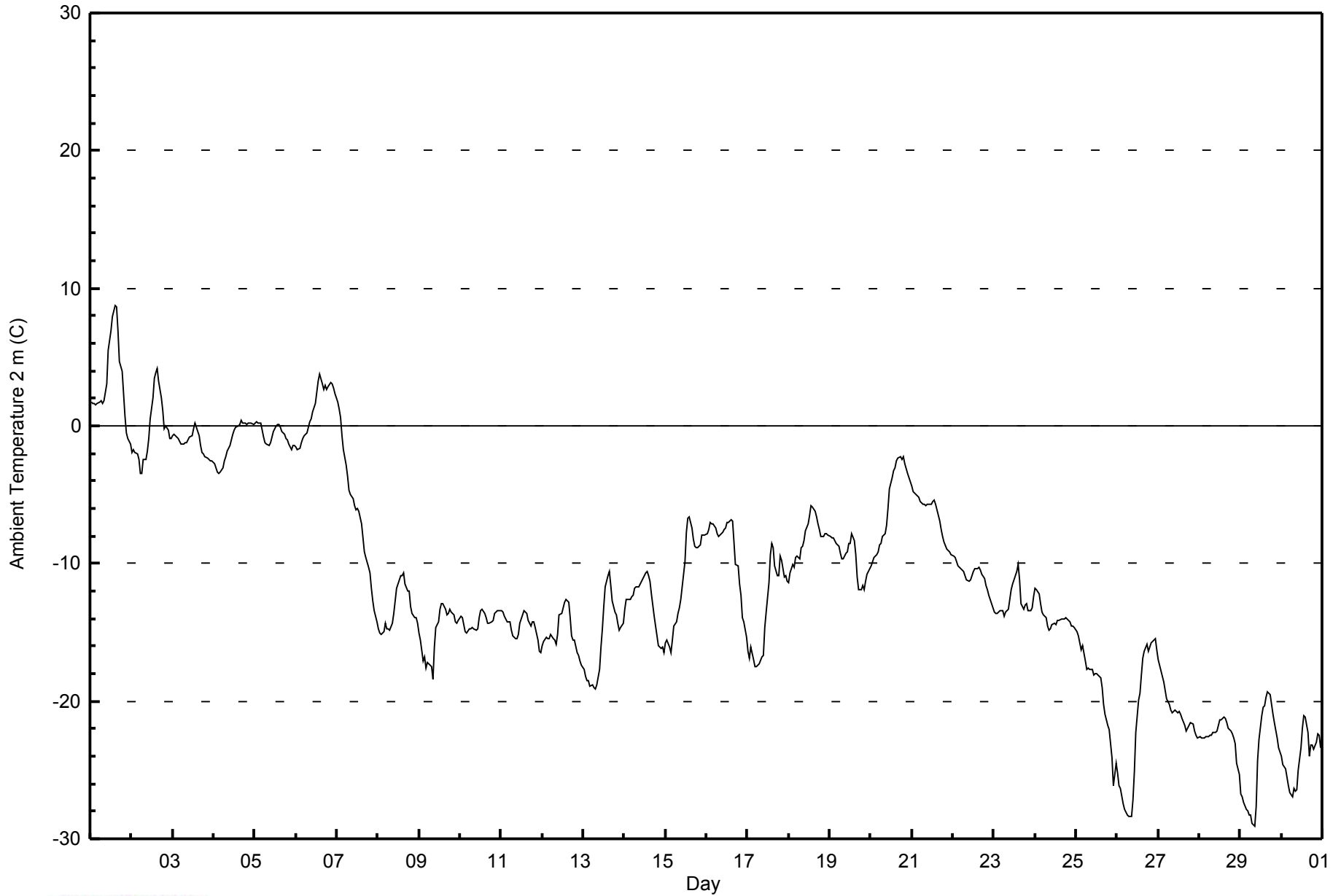


Maximum Value: 8.7 C on Nov 1 15:00		Maximum Daily Average: 3.3 C on Nov 1		Hours in Service: 720																																												
Minimum Value: -29.1 C on Nov 29 09:00		Minimum Daily Average: -24.1 C on Nov 29		Hours of Data: 720																																												
Maximum Diurnal Average: -9.2 C at hour 15		Minimum Diurnal Average: -12.5 C at hour 7		Hours of Missing Data: 0																																												
Monthly Average: -11.28 C		Percentiles: P ₁ = -28.1 P ₁₀ = -22.2 Q ₁ = -15.9 Median = -12.2 Q ₃ = -5.7 P ₉₀ = -0.2 P ₉₉ = 5.0		Hours of Calibration: 0																																												
				Percent Operational Time: 100.0																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Nov	1.7	1.6	1.6	1.6	1.7	1.8	1.8	1.6	1.8	3.0	5.5	6.2	7.0	7.9	8.7	8.7	6.9	4.6	4.0	2.3	0.7	-0.6	-0.9	-1.3	3.3	8.7																						
2-Nov	-1.9	-1.7	-1.9	-2.0	-2.4	-3.5	-3.5	-2.4	-2.5	-1.8	-0.9	0.5	2.0	3.4	3.9	4.2	3.3	2.0	1.2	-0.2	0.0	-0.3	-0.9	-0.9	-0.3	4.2																						
3-Nov	-0.7	-0.6	-0.8	-1.0	-1.1	-1.3	-1.3	-1.2	-1.2	-1.1	-0.8	-0.7	-0.2	0.2	-0.2	-0.7	-1.4	-1.9	-2.1	-2.2	-2.4	-2.4	-2.5	-2.6	-1.3	0.2																						
4-Nov	-2.7	-3.0	-3.4	-3.5	-3.4	-3.1	-2.5	-2.2	-1.8	-1.4	-1.0	-0.6	-0.3	-0.1	0.0	0.1	0.4	0.2	0.2	0.1	0.2	0.2	0.2	0.1	-1.1	0.4																						
5-Nov	0.2	0.3	0.2	0.2	-0.3	-0.8	-1.3	-1.4	-1.4	-1.2	-0.8	-0.4	0.0	0.1	0.1	-0.1	-0.4	-0.6	-0.9	-1.1	-1.3	-1.7	-1.5	-1.4	-0.6	0.3																						
6-Nov	-1.5	-1.7	-1.6	-1.2	-0.9	-0.7	-0.5	-0.1	0.3	0.5	1.0	1.7	2.5	3.2	3.7	3.1	2.6	2.9	2.7	2.8	3.2	3.0	2.7	2.3	1.3	3.7																						
7-Nov	1.7	1.3	0.6	-0.7	-1.7	-2.8	-3.7	-4.7	-5.0	-5.3	-5.8	-6.1	-6.0	-6.2	-7.1	-8.2	-9.2	-9.6	-10.2	-10.7	-11.8	-12.8	-13.4	-14.2	-6.3	1.7																						
8-Nov	-14.7	-15.0	-15.1	-15.0	-14.3	-14.8	-14.8	-14.8	-14.4	-13.6	-12.7	-11.8	-11.2	-10.9	-10.9	-10.7	-11.5	-12.0	-11.9	-13.1	-13.7	-13.9	-14.0	-14.3	-13.3	-10.7																						
9-Nov	-15.1	-15.6	-17.1	-16.7	-17.6	-17.2	-17.4	-17.5	-18.4	-16.1	-14.6	-14.2	-13.3	-12.9	-12.9	-13.3	-13.7	-13.6	-13.3	-13.5	-13.8	-14.3	-14.4	-14.1	-15.0	-12.9																						
10-Nov	-13.9	-14.0	-14.5	-15.0	-15.1	-14.8	-14.8	-14.7	-14.8	-14.8	-14.7	-13.9	-13.4	-13.3	-13.6	-13.9	-14.3	-14.3	-14.3	-14.1	-13.7	-13.5	-13.4	-13.5	-14.2	-13.3																						
11-Nov	-13.4	-13.5	-13.8	-14.2	-14.3	-14.2	-14.8	-15.2	-15.5	-15.5	-15.1	-14.4	-13.8	-13.4	-13.5	-13.6	-14.1	-14.6	-14.2	-14.2	-14.6	-15.6	-16.4	-16.5	-14.5	-13.4																						
12-Nov	-16.0	-15.7	-15.4	-15.4	-15.4	-15.2	-15.4	-15.6	-15.8	-15.1	-13.7	-13.7	-13.2	-12.8	-12.6	-12.8	-14.0	-15.2	-15.5	-15.5	-16.5	-16.7	-17.1	-17.4	-15.1	-12.6																						
13-Nov	-17.7	-18.2	-18.6	-18.6	-18.9	-18.8	-19.0	-19.1	-18.8	-17.6	-16.1	-14.7	-13.1	-11.7	-10.9	-10.6	-11.6	-12.7	-13.5	-13.8	-14.4	-14.9	-14.7	-14.3	-15.5	-10.6																						
14-Nov	-13.4	-12.6	-12.7	-12.6	-12.4	-12.3	-11.8	-11.7	-11.5	-11.3	-11.1	-10.7	-10.6	-10.8	-11.3	-12.2	-13.8	-14.5	-15.3	-16.0	-16.2	-16.0	-16.5	-16.5	-12.9	-10.6																						
15-Nov	-15.7	-15.5	-16.0	-16.5	-15.6	-14.5	-14.2	-13.6	-13.2	-12.6	-11.7	-9.9	-7.8	-6.7	-6.6	-7.5	-8.3	-8.7	-8.9	-8.9	-8.7	-7.9	-7.9	-7.9	-11.0	-6.6																						
16-Nov	-7.9	-7.5	-7.0	-7.1	-7.2	-7.5	-7.8	-8.0	-7.9	-7.7	-7.5	-7.4	-7.1	-7.0	-6.8	-7.0	-8.4	-10.0	-10.1	-11.5	-12.3	-14.0	-14.2	-15.4	-8.9	-6.8																						
17-Nov	-16.4	-16.9	-16.0	-17.0	-17.5	-17.5	-17.3	-17.3	-16.8	-16.6	-14.7	-13.5	-11.3	-9.4	-8.5	-8.9	-10.2	-10.9	-10.9	-9.4	-9.7	-10.9	-10.9	-11.3	-13.3	-8.5																						
18-Nov	-11.4	-10.7	-10.1	-10.2	-9.6	-9.5	-9.6	-8.9	-8.7	-8.3	-7.6	-7.1	-6.5	-5.8	-5.9	-6.2	-6.6	-7.1	-7.6	-8.0	-8.1	-7.8	-7.8	-7.9	-8.2	-5.8																						
19-Nov	-8.1	-8.1	-8.2	-8.3	-8.5	-8.7	-9.2	-9.6	-9.6	-9.2	-9.1	-8.5	-8.5	-7.9	-8.3	-9.3	-11.0	-11.9	-11.9	-11.5	-11.9	-11.3	-10.8	-10.4	-9.6	-7.9																						
20-Nov	-10.2	-9.9	-9.6	-9.3	-9.2	-8.7	-8.6	-8.1	-7.8	-7.2	-6.0	-4.6	-3.7	-3.2	-3.1	-2.6	-2.4	-2.3	-2.4	-2.2	-2.7	-3.5	-3.8	-4.1	-5.6	-2.2																						
21-Nov	-4.4	-4.8	-5.0	-5.1	-5.2	-5.5	-5.7	-5.7	-5.8	-5.7	-5.7	-5.7	-5.5	-5.4	-5.7	-6.5	-6.9	-7.6	-8.1	-8.5	-9.0	-9.1	-9.1	-9.4	-6.4	-4.4																						
22-Nov	-9.4	-9.6	-9.9	-10.2	-10.3	-10.5	-10.6	-10.9	-11.2	-11.3	-11.2	-10.9	-10.5	-10.4	-10.3	-10.3	-10.5	-10.7	-11.1	-11.6	-11.9	-12.3	-12.6	-13.2	-10.9	-9.4																						
23-Nov	-13.5	-13.6	-13.6	-13.5	-13.4	-13.4	-13.8	-13.5	-13.3	-12.6	-11.9	-11.5	-10.9	-10.6	-10.1	-11.2	-12.9	-13.3	-13.0	-12.9	-13.4	-13.4	-13.3	-12.4	-12.7	-10.1																						
24-Nov	-11.8	-11.9	-12.2	-13.0	-13.5	-13.8	-13.9	-14.6	-14.8	-14.7	-14.4	-14.4	-14.4	-14.2	-14.1	-14.1	-14.0	-14.1	-13.9	-14.0	-14.3	-14.5	-14.5	-14.6	-13.9	-11.8																						
25-Nov	-15.0	-15.2	-15.8	-16.3	-16.0	-17.1	-17.7	-17.6	-17.7	-17.7	-18.1	-18.0	-18.0	-18.1	-18.3	-19.0	-20.3	-21.0	-21.7	-22.1	-23.0	-24.1	-26.1	-24.5	-19.1	-15.0																						
26-Nov	-25.3	-26.1	-26.4	-27.4	-27.8	-28.1	-28.2	-28.4	-28.4	-27.1	-25.1	-22.3	-19.9	-19.4	-18.1	-16.9	-16.3	-15.9	-16.4	-16.1	-15.7	-15.6	-15.5	-16.2	-21.8	-15.5																						
27-Nov	-16.9	-17.4	-18.2	-18.6	-19.2	-19.9	-20.3	-20.7	-20.8	-20.8	-20.6	-20.9	-20.8	-20.9	-21.3	-21.8	-22.2	-21.9	-21.8	-21.5	-21.7	-22.2	-22.4	-22.7	-20.6	-16.9																						
28-Nov	-22.6	-22.7	-22.7	-22.6	-22.6	-22.5	-22.5	-22.4	-22.3	-22.3	-22.2	-21.8	-21.4	-21.4	-21.2	-21.2	-21.5	-21.9	-22.2	-22.4	-22.7	-23.0	-24.5	-25.3	-22.4	-21.2																						
29-Nov	-26.7	-27.0	-27.3	-27.9	-27.9	-28.3	-28.3	-28.9	-29.1	-27.7	-24.3	-22.8	-21.1	-20.4	-20.3	-19.7	-19.3	-19.6	-20.2	-21.0	-21.6	-22.7	-23.3	-23.7	-24.1	-19.3																						
30-Nov	-24.0	-24.6	-24.9	-25.5	-26.1	-26.7	-27.0	-26.3	-26.6	-26.5	-25.0	-23.4	-22.0	-21.0	-21.2	-22.3	-24.0	-23.2	-23.2	-23.5	-23.0	-22.4	-22.5	-23.4	-24.1	-21.0																						
																								-11.6	-11.7	-11.8	-12.1	-12.2	-12.3	-12.5	-12.5	-12.4	-12.0	-11.2	-10.5	-9.8	-9.3	-9.2	-9.4	-10.1	-10.6	-10.9	-11.1	-11.4	-11.8	-12.1	-12.2	Diurnal Average
																								1.7	1.6	1.6	1.6	1.7	1.8	1.8	1.6	1.8	3.0	5.5	6.2	7.0	7.9	8.7	8.7	6.9	4.6	4.0	2.8	3.2	3.0	2.7	2.3	Diurnal Maximum



WBEA
Hourly Averages

Ambient Temperature 2 m (AT2m) - C
Mannix - November 2014





WBEA
Cumulative Frequency Distribution

Ambient Temperature 2 m (AT2m) - C
Mannix - November 2014

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	107	14.86	14.86
-20 - 0	548	76.11	90.97
0 - 10	65	9.03	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Summary of Hour Averages

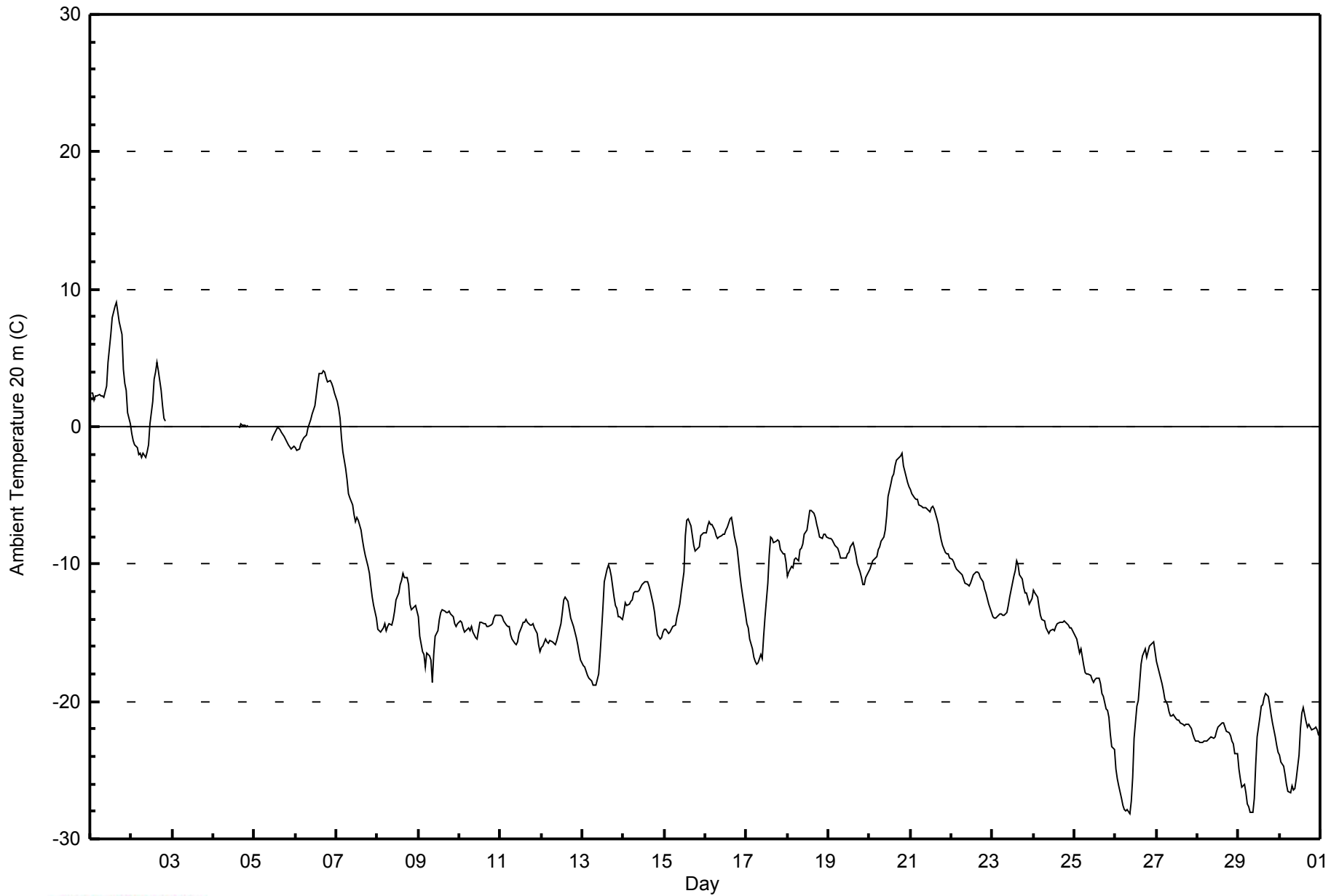
Mannix - November 2014

Maximum Value: 9.0 C on Nov 1 16:00		Maximum Daily Average: 4.2 C on Nov 1		Hours in Service: 720																																												
Minimum Value: -28.2 C on Nov 26 09:00		Minimum Daily Average: -23.6 C on Nov 29		Hours of Data: 665																																												
Maximum Diurnal Average: -9.6 C at hour 16		Minimum Diurnal Average: -13.7 C at hour 9		Hours of Missing Data: 55																																												
Monthly Average: -11.99 C		Percentiles: P ₁ = -27.6 P ₁₀ = -22.0 Q ₁ = -16.1 Median = -13.0 Q ₃ = -7.9 P ₉₀ = -0.6 P ₉₉ = 6.7		Hours of Calibration: 0																																												
				Percent Operational Time: 92.4																																												
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-Nov	2.4	2.4	1.9	2.2	2.3	2.3	2.3	2.3	2.1	2.9	4.7	5.7	6.7	7.9	8.8	9.0	8.4	7.6	6.7	4.2	3.1	2.6	1.0	0.2	4.2	9.0																						
2-Nov	-0.5	-1.0	-1.3	-1.5	-2.0	-1.9	-2.3	-1.9	-2.2	-1.8	-1.3	0.3	1.8	3.5	4.0	4.7	4.0	2.7	1.5	0.6	0.4	AF	AF	AF	0.3	4.7																						
3-Nov	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-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	0.2																						
5-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	-1.0	-0.7	-0.3	-0.1	-0.1	-0.2	-0.4	-0.7	-0.9	-1.1	-1.4	-1.6	-1.5	-1.4	--	-0.1																					
6-Nov	-1.5	-1.7	-1.7	-1.2	-1.0	-0.8	-0.6	-0.1	0.2	0.5	1.0	1.6	2.3	3.1	3.9	3.9	4.1	3.9	3.5	3.3	3.4	3.2	2.9	2.4	1.4	4.1																						
7-Nov	1.8	1.3	0.6	-0.8	-1.9	-3.0	-3.9	-4.9	-5.2	-5.7	-6.4	-6.9	-6.7	-6.8	-7.5	-8.2	-8.8	-9.3	-10.2	-10.7	-11.6	-12.4	-13.0	-14.0	-6.4	1.8																						
8-Nov	-14.7	-14.9	-14.9	-14.7	-14.4	-14.8	-14.5	-14.3	-14.4	-14.1	-13.4	-12.6	-12.1	-11.5	-11.2	-10.7	-11.0	-11.0	-11.5	-12.9	-13.3	-13.1	-13.0	-13.4	-13.2	-10.7																						
9-Nov	-13.8	-15.2	-16.3	-16.6	-17.5	-16.4	-16.7	-17.0	-18.6	-16.5	-15.3	-14.8	-14.0	-13.5	-13.3	-13.4	-13.5	-13.6	-13.5	-13.6	-13.9	-14.4	-14.6	-14.4	-15.0	-13.3																						
10-Nov	-14.1	-14.2	-14.7	-15.0	-14.9	-14.7	-14.9	-14.6	-14.9	-15.4	-15.4	-14.8	-14.2	-14.2	-14.3	-14.4	-14.6	-14.5	-14.5	-14.4	-13.9	-13.8	-13.7	-13.7	-14.5	-13.7																						
11-Nov	-13.7	-13.8	-14.1	-14.5	-14.6	-14.5	-15.2	-15.5	-15.8	-15.9	-15.6	-15.0	-14.6	-14.2	-14.2	-14.1	-14.3	-14.4	-14.4	-14.3	-14.7	-15.0	-15.8	-16.3	-14.8	-13.7																						
12-Nov	-16.1	-15.9	-15.5	-15.6	-15.7	-15.5	-15.7	-15.8	-15.8	-15.6	-15.1	-14.4	-13.5	-12.6	-12.4	-12.7	-13.3	-13.9	-14.2	-14.6	-15.3	-15.9	-16.4	-17.0	-14.9	-12.4																						
13-Nov	-17.4	-17.5	-17.8	-18.1	-18.3	-18.5	-18.8	-18.8	-18.8	-18.0	-16.6	-15.0	-13.2	-11.3	-10.4	-10.1	-10.4	-10.9	-12.4	-13.0	-13.3	-13.9	-13.9	-14.1	-15.0	-10.1																						
14-Nov	-13.5	-12.8	-13.0	-12.9	-12.7	-12.6	-12.1	-12.0	-11.9	-11.7	-11.5	-11.3	-11.3	-11.3	-11.6	-12.0	-12.9	-13.6	-14.5	-15.2	-15.5	-15.4	-14.9	-12.8	-12.8	-11.3																						
15-Nov	-14.7	-14.8	-15.0	-15.0	-14.8	-14.5	-14.4	-13.8	-13.4	-13.0	-12.1	-10.6	-8.0	-6.8	-6.7	-7.2	-8.0	-8.6	-9.0	-9.0	-8.8	-7.9	-7.8	-7.7	-10.9	-6.7																						
16-Nov	-7.7	-7.3	-6.9	-7.1	-7.2	-7.5	-7.9	-8.1	-8.1	-7.9	-7.8	-7.9	-7.5	-7.3	-6.8	-6.6	-7.3	-8.0	-8.9	-9.8	-10.8	-11.6	-12.3	-13.6	-8.4	-6.6																						
17-Nov	-14.3	-14.6	-15.5	-16.2	-16.8	-17.1	-17.3	-17.2	-16.6	-16.8	-15.2	-13.8	-11.4	-9.3	-8.1	-8.1	-8.5	-8.3	-8.2	-8.3	-9.0	-9.3	-9.2	-9.9	-12.5	-8.1																						
18-Nov	-10.9	-10.6	-10.2	-10.3	-9.6	-9.6	-9.8	-9.0	-8.8	-8.5	-7.9	-7.5	-6.8	-6.1	-6.1	-6.3	-6.6	-7.1	-7.5	-8.1	-8.1	-7.8	-7.8	-8.0	-8.3	-6.1																						
19-Nov	-8.1	-8.2	-8.2	-8.4	-8.6	-8.8	-9.2	-9.5	-9.6	-9.6	-9.6	-9.3	-9.1	-8.7	-8.4	-8.9	-9.4	-9.9	-10.6	-10.9	-11.5	-11.5	-11.0	-10.6	-9.5	-8.1																						
20-Nov	-10.4	-10.1	-9.8	-9.6	-9.5	-9.0	-8.8	-8.3	-8.0	-7.6	-6.5	-5.1	-4.2	-3.7	-3.5	-2.8	-2.5	-2.3	-2.1	-1.9	-2.8	-3.7	-4.0	-4.3	-5.8	-1.9																						
21-Nov	-4.5	-4.9	-5.1	-5.3	-5.3	-5.7	-5.8	-5.9	-5.9	-5.9	-6.0	-6.2	-5.9	-5.8	-6.0	-6.7	-7.1	-7.8	-8.3	-8.7	-9.2	-9.3	-9.3	-9.6	-6.7	-4.5																						
22-Nov	-9.7	-9.8	-10.1	-10.4	-10.5	-10.7	-10.8	-11.1	-11.4	-11.5	-11.6	-11.4	-11.0	-10.8	-10.6	-10.5	-10.7	-10.9	-11.3	-11.8	-12.1	-12.5	-12.9	-13.6	-11.2	-9.7																						
23-Nov	-13.8	-14.0	-13.9	-13.7	-13.7	-13.6	-13.7	-13.7	-13.5	-13.0	-12.5	-11.9	-10.8	-10.5	-9.8	-10.1	-10.8	-11.1	-11.7	-12.1	-12.1	-12.9	-12.7	-12.5	-12.4	-9.8																						
24-Nov	-11.9	-12.1	-12.4	-13.1	-13.7	-14.0	-14.1	-14.7	-14.9	-15.0	-14.8	-14.7	-14.8	-14.5	-14.4	-14.3	-14.2	-14.3	-14.1	-14.2	-14.4	-14.6	-14.7	-14.8	-14.1	-11.9																						
25-Nov	-15.2	-15.4	-16.0	-16.5	-16.1	-17.4	-17.9	-18.0	-18.0	-18.1	-18.4	-18.6	-18.4	-18.3	-18.3	-18.8	-19.5	-19.6	-20.6	-20.6	-21.1	-22.4	-23.3	-23.5	-18.8	-15.2																						
26-Nov	-24.9	-25.7	-26.1	-27.0	-27.5	-27.9	-28.0	-27.9	-28.2	-27.3	-25.5	-22.7	-20.4	-19.9	-18.6	-17.2	-16.6	-16.2	-16.7	-16.4	-15.9	-15.8	-15.6	-16.3	-21.8	-15.6																						
27-Nov	-17.1	-17.5	-18.3	-18.7	-19.2	-19.8	-20.2	-20.7	-21.0	-21.1	-20.9	-21.3	-21.3	-21.4	-21.5	-21.6	-21.7	-21.7	-21.7	-21.7	-21.9	-22.4	-22.7	-22.9	-20.8	-17.1																						
28-Nov	-22.9	-23.0	-23.0	-22.9	-22.9	-22.9	-22.8	-22.7	-22.5	-22.7	-22.6	-22.2	-21.8	-21.8	-21.6	-21.6	-21.8	-22.2	-22.3	-22.5	-22.8	-23.1	-23.8	-23.8	-22.6	-21.6																						
29-Nov	-25.0	-25.7	-26.2	-26.0	-26.7	-27.4	-27.7	-28.1	-28.0	-27.1	-24.6	-22.6	-21.1	-20.4	-20.3	-19.7	-19.4	-19.6	-20.2	-20.9	-21.6	-22.5	-23.2	-23.7	-23.6	-19.4																						
30-Nov	-23.9	-24.4	-24.7	-25.3	-26.0	-26.5	-26.7	-26.1	-26.4	-26.3	-25.6	-23.9	-22.0	-20.8	-20.4	-21.5	-21.9	-21.7	-21.9	-22.0	-22.0	-21.9	-22.0	-22.5	-23.6	-20.4																						
																								-12.5	-12.6	-12.9	-13.1	-13.3	-13.4	-13.6	-13.6	-13.7	-13.4	-12.4	-11.7	-10.8	-10.3	-10.0	-9.6	-9.9	-10.2	-10.6	-11.0	-11.4	-12.6	-12.8	-13.1	Diurnal Average
																								2.4	2.4	1.9	2.2	2.3	2.3	2.3	2.3	2.1	2.9	4.7	5.7	6.7	7.9	8.8	9.0	8.4	7.6	6.7	4.2	3.4	3.2	2.9	2.4	Diurnal Maximum
AF - Analyzer Failure																																																



WBEA
Hourly Averages

Ambient Temperature 20 m (AT20m) - C
Mannix - November 2014





WBEA
Cumulative Frequency Distribution

Ambient Temperature 20 m (AT20m) - C
Mannix - November 2014

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	106	15.94	15.94
-20 - 0	501	75.34	91.28
0 - 10	58	8.72	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 665

Total Number of Hours: 720



Summary of Hour Averages

Mannix - November 2014

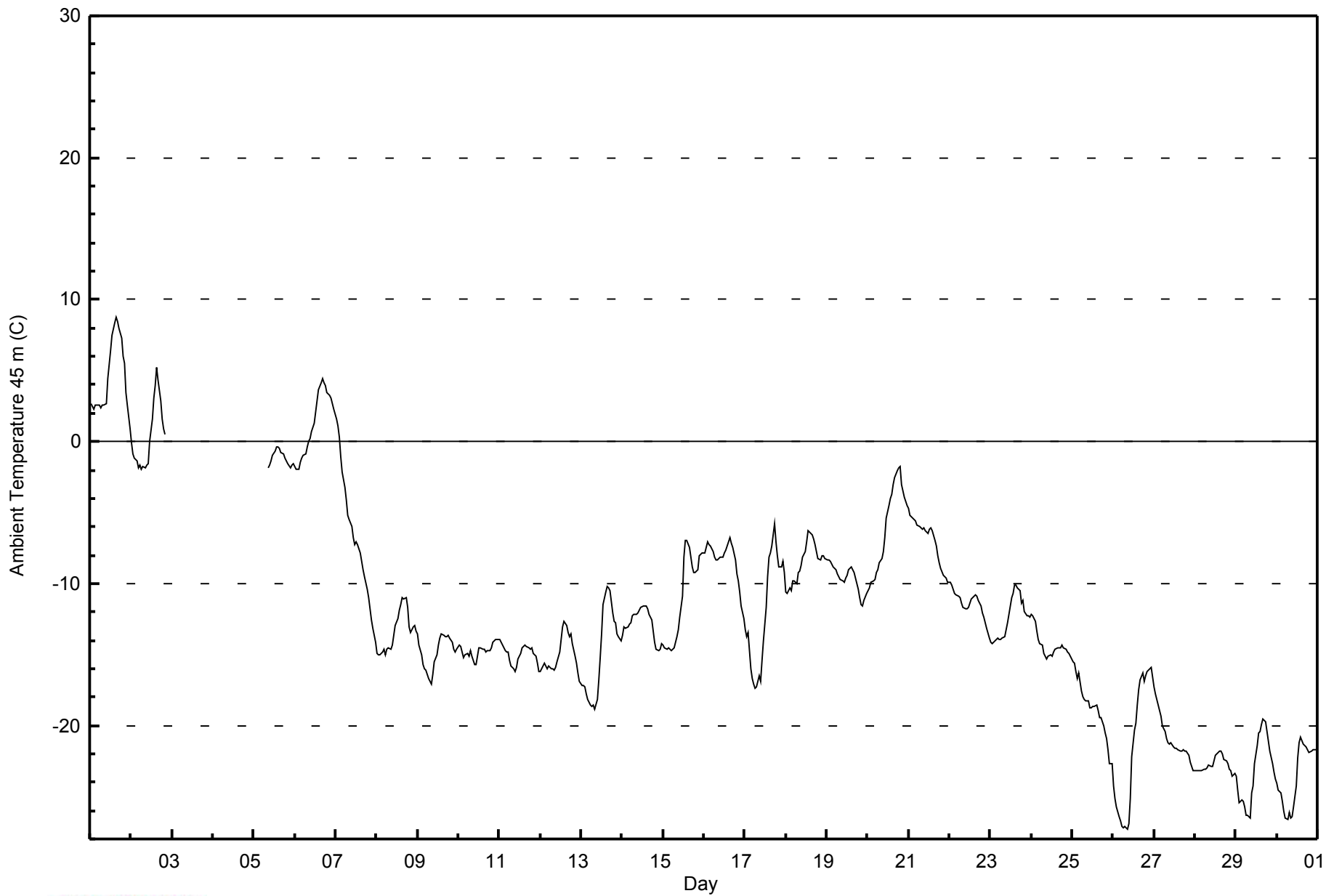
Maximum Value: 8.7 C on Nov 1 16:00		Maximum Daily Average: 4.5 C on Nov 1		Hours in Service: 720																																												
Minimum Value: -27.3 C on Nov 26 09:00		Minimum Daily Average: -23.6 C on Nov 30		Hours of Data: 661																																												
Maximum Diurnal Average: -10.1 C at hour 16		Minimum Diurnal Average: -13.7 C at hour 7		Hours of Missing Data: 59																																												
Monthly Average: -12.11 C		Percentiles: P ₁ = -26.5 P ₁₀ = -22.1 Q ₁ = -16.2 Median = -13.1 Q ₃ = -8.1 P ₉₀ = -1.0 P ₉₉ = 6.3		Hours of Calibration: 0																																												
				Percent Operational Time: 91.8																																												
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-Nov	2.6	2.4	2.2	2.6	2.5	2.5	2.4	2.6	2.6	2.7	4.4	5.5	6.4	7.5	8.4	8.7	8.4	8.0	7.3	6.0	5.5	3.4	2.5	0.9	4.5	8.7																						
2-Nov	0.0	-0.9	-1.2	-1.4	-1.9	-1.7	-1.9	-1.7	-1.9	-1.7	-1.6	0.1	1.6	3.1	4.0	5.3	4.4	2.9	1.6	0.9	0.5	AF	AF	AF	0.4	5.3																						
3-Nov	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-Nov	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-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	-1.8	-1.6	-1.3	-1.0	-0.6	-0.4	-0.4	-0.5	-0.7	-0.9	-1.2	-1.4	-1.6	-1.7	--	-0.4																						
6-Nov	-1.8	-2.0	-1.9	-1.5	-1.2	-1.0	-0.8	-0.3	0.0	0.2	0.7	1.3	2.1	2.9	3.7	4.1	4.4	4.2	3.9	3.5	3.3	3.1	2.7	2.2	1.3	4.4																						
7-Nov	1.6	1.1	0.4	-1.0	-2.1	-3.3	-4.1	-5.2	-5.5	-6.0	-6.7	-7.3	-7.0	-7.2	-7.9	-8.5	-9.0	-9.5	-10.4	-11.0	-11.8	-12.6	-13.2	-14.1	-6.7	1.6																						
8-Nov	-15.0	-15.1	-15.1	-14.8	-14.6	-15.1	-14.7	-14.5	-14.7	-14.4	-13.7	-13.0	-12.5	-11.9	-11.5	-11.0	-11.1	-11.0	-11.7	-13.1	-13.5	-13.1	-13.0	-13.3	-13.4	-11.0																						
9-Nov	-13.6	-14.3	-15.0	-15.7	-16.0	-16.1	-16.7	-16.9	-17.1	-16.4	-15.5	-15.0	-14.4	-13.8	-13.6	-13.6	-13.7	-13.8	-13.7	-13.8	-14.1	-14.6	-14.9	-14.6	-14.9	-13.6																						
10-Nov	-14.3	-14.4	-14.9	-15.2	-15.1	-14.9	-15.1	-14.8	-15.2	-15.7	-15.7	-15.2	-14.5	-14.5	-14.6	-14.6	-14.8	-14.7	-14.7	-14.6	-14.2	-14.0	-13.9	-13.9	-14.7	-13.9																						
11-Nov	-14.0	-14.1	-14.4	-14.7	-14.8	-14.8	-15.5	-15.8	-16.0	-16.2	-15.9	-15.3	-14.9	-14.6	-14.5	-14.3	-14.5	-14.6	-14.6	-14.5	-14.9	-15.1	-15.6	-16.2	-15.0	-14.0																						
12-Nov	-16.2	-16.0	-15.6	-15.8	-16.0	-15.8	-16.0	-16.0	-16.1	-16.0	-15.5	-14.8	-13.9	-13.0	-12.7	-13.0	-13.5	-13.8	-13.6	-14.2	-15.1	-15.6	-16.3	-16.9	-15.1	-12.7																						
13-Nov	-17.2	-17.1	-17.3	-17.8	-18.2	-18.5	-18.7	-18.6	-18.9	-18.2	-16.8	-15.2	-13.5	-11.4	-10.6	-10.2	-10.3	-10.5	-12.0	-12.7	-12.8	-13.5	-13.7	-14.0	-14.9	-10.2																						
14-Nov	-13.7	-13.0	-13.2	-13.1	-12.9	-12.7	-12.3	-12.2	-12.2	-12.1	-11.9	-11.7	-11.6	-11.6	-11.6	-11.8	-12.1	-12.5	-13.4	-14.1	-14.6	-14.7	-14.6	-14.2	-12.8	-11.6																						
15-Nov	-14.3	-14.5	-14.6	-14.6	-14.6	-14.7	-14.6	-14.1	-13.7	-13.2	-12.4	-10.9	-8.1	-7.0	-7.0	-7.4	-8.1	-8.8	-9.3	-9.2	-9.0	-8.1	-8.0	-7.8	-11.0	-7.0																						
16-Nov	-7.8	-7.4	-7.1	-7.3	-7.4	-7.7	-8.2	-8.4	-8.3	-8.1	-8.1	-8.2	-7.8	-7.6	-7.0	-6.8	-7.1	-7.5	-8.4	-9.3	-9.8	-10.6	-11.6	-12.5	-8.3	-6.8																						
17-Nov	-13.3	-13.8	-13.5	-16.0	-16.7	-17.1	-17.4	-17.3	-16.5	-16.9	-15.4	-14.0	-11.6	-9.5	-8.1	-7.8	-7.3	-5.8	-7.1	-8.1	-8.8	-8.8	-8.4	-9.2	-12.0	-5.8																						
18-Nov	-10.6	-10.7	-10.3	-10.5	-9.8	-9.8	-10.0	-9.2	-9.1	-8.7	-8.1	-7.8	-7.1	-6.3	-6.3	-6.5	-6.8	-7.3	-7.7	-8.3	-8.4	-8.0	-8.0	-8.2	-8.5	-6.3																						
19-Nov	-8.3	-8.3	-8.4	-8.6	-8.8	-9.0	-9.3	-9.5	-9.7	-9.8	-9.9	-9.6	-9.5	-9.1	-8.8	-9.0	-9.3	-9.7	-10.4	-11.0	-11.5	-11.6	-11.2	-10.7	-9.6	-8.3																						
20-Nov	-10.5	-10.3	-10.0	-9.8	-9.7	-9.2	-9.0	-8.6	-8.3	-7.8	-6.8	-5.4	-4.5	-4.0	-3.7	-3.1	-2.6	-2.1	-1.8	-1.7	-3.0	-3.9	-4.2	-4.5	-6.0	-1.7																						
21-Nov	-4.7	-5.2	-5.4	-5.5	-5.6	-5.9	-6.0	-6.1	-6.1	-6.1	-6.3	-6.4	-6.2	-6.1	-6.3	-7.0	-7.3	-8.1	-8.6	-9.0	-9.4	-9.5	-9.6	-9.9	-6.9	-4.7																						
22-Nov	-10.0	-10.1	-10.4	-10.7	-10.8	-10.9	-11.0	-11.4	-11.6	-11.8	-11.8	-11.7	-11.4	-11.1	-10.9	-10.8	-10.9	-11.2	-11.6	-12.1	-12.3	-12.8	-13.1	-13.8	-11.4	-10.0																						
23-Nov	-14.1	-14.2	-14.1	-14.0	-13.9	-13.9	-13.9	-13.8	-13.7	-13.3	-12.8	-12.2	-11.0	-10.7	-10.1	-10.1	-10.3	-10.5	-11.4	-11.1	-12.0	-12.2	-12.3	-12.4	-12.4	-10.1																						
24-Nov	-12.1	-12.3	-12.6	-13.4	-14.0	-14.2	-14.3	-14.9	-15.1	-15.3	-15.1	-15.0	-15.1	-14.8	-14.7	-14.5	-14.5	-14.5	-14.4	-14.5	-14.7	-14.9	-14.9	-15.1	-14.4	-12.1																						
25-Nov	-15.5	-15.7	-16.2	-16.6	-16.3	-17.6	-18.0	-18.2	-18.2	-18.3	-18.7	-18.8	-18.7	-18.6	-18.6	-18.9	-19.5	-19.5	-20.0	-20.5	-20.9	-21.7	-22.7	-22.7	-18.8	-15.5																						
26-Nov	-24.2	-25.1	-25.8	-26.4	-26.8	-27.2	-27.2	-27.1	-27.3	-26.9	-25.2	-22.2	-20.4	-19.8	-18.5	-17.4	-16.8	-16.3	-16.9	-16.5	-16.2	-16.1	-15.9	-16.6	-21.6	-15.9																						
27-Nov	-17.3	-17.7	-18.6	-19.0	-19.4	-20.0	-20.4	-21.0	-21.2	-21.3	-21.2	-21.5	-21.6	-21.6	-21.7	-21.8	-21.8	-21.7	-21.8	-21.9	-22.1	-22.6	-22.9	-23.2	-21.0	-17.3																						
28-Nov	-23.2	-23.2	-23.2	-23.2	-23.2	-23.1	-23.1	-23.0	-22.8	-22.9	-22.9	-22.5	-22.1	-22.0	-21.8	-21.8	-22.1	-22.4	-22.5	-22.7	-23.0	-23.2	-23.6	-23.4	-22.8	-21.8																						
29-Nov	-23.6	-24.6	-25.5	-25.3	-25.4	-25.7	-26.4	-26.4	-26.5	-24.8	-24.3	-22.7	-21.4	-20.6	-20.4	-19.9	-19.6	-19.8	-20.4	-21.1	-21.8	-22.7	-23.3	-23.8	-23.2	-19.6																						
30-Nov	-24.1	-24.5	-24.8	-25.3	-26.0	-26.5	-26.6	-26.1	-26.5	-26.4	-25.7	-24.3	-22.3	-21.2	-20.9	-21.3	-21.5	-21.5	-21.7	-21.9	-21.8	-21.7	-21.7	-21.8	-23.6	-20.9																						
																								-12.4	-12.6	-12.8	-13.1	-13.3	-13.5	-13.7	-13.6	-13.3	-13.1	-12.7	-12.0	-11.1	-10.5	-10.2	-10.1	-10.3	-10.5	-10.9	-11.4	-11.7	-12.5	-12.7	-13.0	Diurnal Average
																								2.6	2.4	2.2	2.6	2.5	2.5	2.4	2.6	2.6	2.7	4.4	5.5	6.4	7.5	8.4	8.7	8.4	8.0	7.3	6.0	5.5	3.4	2.7	2.2	Diurnal Maximum
AF - Analyzer Failure																																																



WBEA
Hourly Averages

Ambient Temperature 45 m (AT45m) - C

Mannix - November 2014





WBEA
Cumulative Frequency Distribution

Ambient Temperature 45 m (AT45m) - C
Mannix - November 2014

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	107	16.19	16.19
-20 - 0	502	75.95	92.13
0 - 10	52	7.87	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 661

Total Number of Hours: 720



Summary of Hour Averages

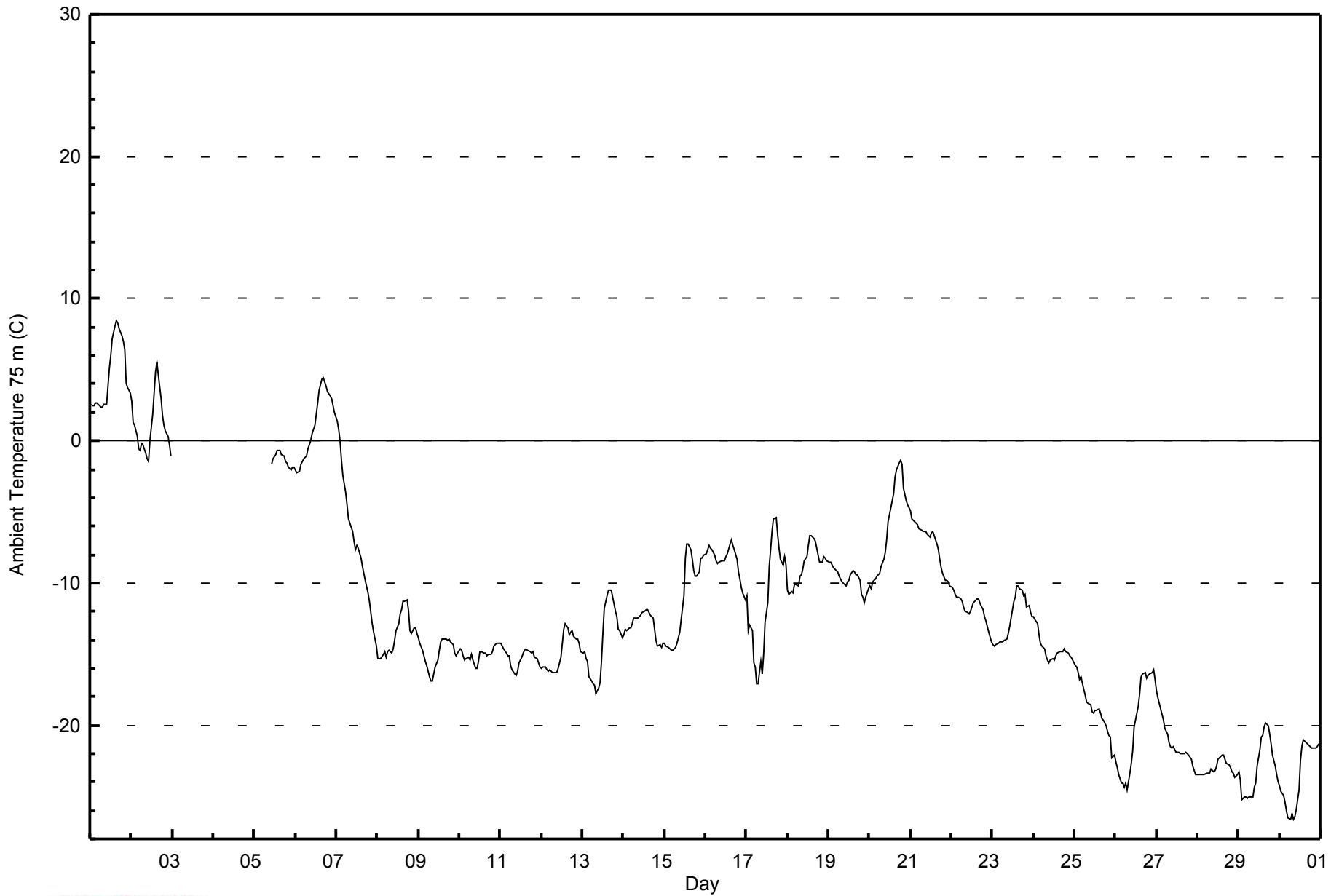
Mannix - November 2014

Maximum Value: 8.5 C on Nov 1 16:00		Maximum Daily Average: 4.7 C on Nov 1		Hours in Service: 720																																													
Minimum Value: -26.6 C on Nov 30 07:00		Minimum Daily Average: -23.6 C on Nov 30		Hours of Data: 662																																													
Maximum Diurnal Average: -10.2 C at hour 16		Minimum Diurnal Average: -13.6 C at hour 8		Hours of Missing Data: 58																																													
Monthly Average: -12.07 C		Percentiles: P ₁ = -25.6 P ₁₀ = -22.1 Q ₁ = -16.1 Median = -13.2 Q ₃ = -8.2 P ₉₀ = -0.7 P ₉₉ = 7.0		Hours of Calibration: 0																																													
				Percent Operational Time: 91.9																																													
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-Nov	2.6	2.4	2.4	2.7	2.6	2.5	2.4	2.4	2.6	2.6	3.9	5.1	6.0	7.2	8.0	8.5	8.2	7.9	7.4	7.0	6.5	4.1	3.8	3.4	4.7	8.5																							
2-Nov	2.8	1.3	1.1	0.3	-0.6	-0.7	-0.1	-0.3	-0.9	-1.3	-1.5	0.0	1.9	3.3	4.9	5.5	4.6	3.0	1.8	1.1	0.7	0.3	-0.3	-1.1	1.1	5.5																							
3-Nov	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-Nov	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-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	-1.7	-1.3	-0.9	-0.7	-0.6	-0.7	-1.0	-1.1	-1.4	-1.6	-1.8	-2.0	-1.9	-1.8	--	-0.6																						
6-Nov	-2.0	-2.2	-2.1	-1.7	-1.5	-1.3	-1.1	-0.6	-0.3	0.0	0.5	1.1	1.8	2.6	3.5	4.3	4.5	4.2	3.8	3.5	3.2	2.9	2.4	2.0	1.2	4.5																							
7-Nov	1.4	0.8	0.1	-1.4	-2.4	-3.6	-4.5	-5.5	-5.8	-6.4	-7.1	-7.7	-7.4	-7.6	-8.2	-8.8	-9.3	-9.8	-10.7	-11.3	-12.1	-12.9	-13.4	-14.4	-7.0	1.4																							
8-Nov	-15.3	-15.3	-15.3	-15.0	-14.8	-15.3	-14.8	-14.7	-14.9	-14.6	-14.0	-13.4	-12.9	-12.2	-11.8	-11.3	-11.3	-11.2	-12.0	-13.3	-13.5	-13.2	-13.2	-13.5	-13.6	-11.2																							
9-Nov	-13.8	-14.3	-14.8	-15.1	-15.5	-15.8	-16.6	-16.9	-16.9	-16.4	-15.9	-15.4	-14.7	-14.1	-13.9	-13.9	-14.0	-14.1	-14.0	-14.1	-14.4	-15.0	-15.2	-14.9	-15.0	-13.8																							
10-Nov	-14.6	-14.7	-15.2	-15.4	-15.3	-15.2	-15.4	-15.0	-15.4	-16.0	-16.0	-15.5	-14.9	-14.9	-14.9	-14.9	-15.1	-15.0	-15.0	-14.9	-14.5	-14.3	-14.2	-14.2	-15.0	-14.2																							
11-Nov	-14.2	-14.4	-14.7	-15.0	-15.1	-15.1	-15.8	-16.1	-16.4	-16.5	-16.2	-15.7	-15.2	-14.9	-14.8	-14.7	-14.7	-14.8	-14.9	-14.8	-15.2	-15.3	-15.6	-15.9	-15.2	-14.2																							
12-Nov	-16.0	-16.0	-15.9	-16.1	-16.2	-16.1	-16.3	-16.3	-16.3	-16.3	-16.0	-15.3	-14.3	-13.3	-12.9	-13.1	-13.6	-13.5	-13.4	-13.7	-13.9	-13.9	-14.2	-14.8	-14.9	-12.9																							
13-Nov	-15.0	-14.8	-15.3	-15.5	-16.6	-16.8	-17.1	-17.2	-17.8	-17.4	-17.0	-15.5	-13.6	-11.8	-10.9	-10.5	-10.5	-10.5	-11.4	-12.0	-12.3	-13.3	-13.4	-13.8	-14.2	-10.5																							
14-Nov	-13.7	-13.2	-13.4	-13.2	-13.1	-12.8	-12.5	-12.5	-12.4	-12.2	-12.0	-11.9	-11.9	-11.9	-12.1	-12.3	-12.5	-13.3	-14.0	-14.4	-14.3	-14.6	-14.2	-14.2	-13.0	-11.9																							
15-Nov	-14.3	-14.4	-14.6	-14.6	-14.7	-14.8	-14.5	-14.3	-13.9	-13.4	-12.6	-10.9	-8.2	-7.3	-7.2	-7.6	-8.4	-9.1	-9.5	-9.5	-9.2	-8.3	-8.2	-8.0	-11.1	-7.2																							
16-Nov	-7.9	-7.6	-7.3	-7.5	-7.6	-8.0	-8.4	-8.6	-8.6	-8.4	-8.4	-8.5	-8.1	-7.9	-7.3	-7.0	-7.3	-7.6	-8.4	-9.3	-9.7	-10.3	-10.7	-11.2	-8.4	-7.0																							
17-Nov	-10.9	-13.4	-13.0	-13.4	-15.6	-15.9	-17.1	-17.1	-15.5	-16.4	-15.1	-12.8	-11.4	-8.9	-7.7	-6.4	-5.5	-5.4	-6.6	-7.6	-8.3	-8.7	-8.1	-8.7	-11.2	-5.4																							
18-Nov	-10.5	-10.8	-10.6	-10.7	-10.1	-10.1	-10.2	-9.5	-9.4	-9.0	-8.4	-8.1	-7.4	-6.6	-6.6	-6.8	-7.1	-7.5	-8.0	-8.5	-8.6	-8.2	-8.2	-8.4	-8.7	-6.6																							
19-Nov	-8.5	-8.6	-8.7	-8.9	-9.1	-9.3	-9.5	-9.7	-9.9	-10.1	-10.2	-10.0	-9.8	-9.4	-9.1	-9.2	-9.4	-9.4	-9.8	-10.8	-11.0	-11.3	-11.0	-10.4	-9.7	-8.5																							
20-Nov	-10.2	-10.4	-9.9	-9.7	-9.5	-9.5	-9.3	-8.8	-8.3	-7.9	-7.0	-5.7	-4.7	-4.2	-3.7	-2.6	-2.0	-1.5	-1.4	-1.7	-3.3	-4.2	-4.5	-4.7	-6.0	-1.4																							
21-Nov	-4.9	-5.4	-5.7	-5.8	-5.8	-6.2	-6.3	-6.3	-6.3	-6.4	-6.6	-6.7	-6.5	-6.4	-6.6	-7.3	-7.6	-8.4	-8.9	-9.3	-9.8	-9.8	-9.9	-10.2	-7.2	-4.9																							
22-Nov	-10.3	-10.5	-10.8	-11.0	-11.0	-11.1	-11.3	-11.7	-12.0	-12.1	-12.1	-12.0	-11.7	-11.4	-11.2	-11.1	-11.2	-11.5	-11.9	-12.4	-12.6	-13.1	-13.4	-14.1	-11.7	-10.3																							
23-Nov	-14.3	-14.5	-14.4	-14.2	-14.1	-14.1	-14.1	-14.0	-13.9	-13.5	-13.1	-12.5	-11.3	-11.0	-10.2	-10.2	-10.4	-10.5	-10.9	-10.8	-11.7	-11.6	-12.0	-12.3	-12.5	-10.2																							
24-Nov	-12.3	-12.6	-12.9	-13.6	-14.2	-14.4	-14.6	-15.2	-15.4	-15.6	-15.4	-15.3	-15.4	-15.1	-15.0	-14.8	-14.8	-14.8	-14.8	-14.6	-14.8	-15.0	-15.1	-15.2	-15.4	-14.6	-12.3																						
25-Nov	-15.8	-16.0	-16.3	-16.8	-16.5	-17.5	-17.9	-18.4	-18.5	-18.6	-19.0	-19.2	-19.0	-18.9	-18.9	-19.2	-19.5	-19.6	-20.0	-20.4	-20.7	-20.9	-22.3	-22.1	-18.8	-15.8																							
26-Nov	-22.6	-23.0	-23.5	-24.1	-24.1	-24.4	-24.1	-24.6	-23.4	-22.7	-21.8	-20.1	-19.1	-18.7	-17.8	-16.6	-16.4	-16.3	-16.7	-16.5	-16.4	-16.3	-16.2	-16.8	-20.1	-16.2																							
27-Nov	-17.6	-18.0	-18.9	-19.3	-19.6	-20.2	-20.6	-21.2	-21.5	-21.6	-21.5	-21.9	-21.9	-21.9	-22.0	-22.0	-22.0	-21.9	-22.0	-22.1	-22.4	-22.9	-23.2	-23.5	-21.2	-17.6																							
28-Nov	-23.4	-23.5	-23.5	-23.5	-23.4	-23.4	-23.4	-23.3	-23.1	-23.3	-23.2	-22.9	-22.4	-22.3	-22.1	-22.1	-22.4	-22.7	-22.8	-23.0	-23.3	-23.4	-23.7	-23.5	-23.1	-22.1																							
29-Nov	-23.2	-23.9	-25.2	-25.0	-25.1	-25.1	-25.1	-25.0	-25.1	-24.3	-24.1	-22.9	-21.7	-20.9	-20.7	-20.1	-19.8	-20.0	-20.7	-21.3	-22.1	-22.8	-23.5	-24.0	-23.0	-19.8																							
30-Nov	-24.3	-24.7	-25.0	-25.4	-26.1	-26.5	-26.6	-26.3	-26.6	-26.5	-25.9	-24.5	-22.5	-21.5	-21.0	-21.2	-21.3	-21.4	-21.5	-21.6	-21.6	-21.7	-21.5	-21.4	-23.6	-21.0																							
																								-12.2	-12.5	-12.7	-12.9	-13.2	-13.4	-13.5	-13.6	-13.6	-13.5	-12.8	-12.1	-11.3	-10.7	-10.4	-10.2	-10.3	-10.5	-11.0	-11.3	-11.7	-12.0	-12.2	-12.4	Diurnal Average	
																								2.8	2.4	2.4	2.7	2.6	2.5	2.4	2.4	2.4	2.6	2.6	3.9	5.1	6.0	7.2	8.0	8.5	8.2	7.9	7.4	7.0	6.5	4.1	3.8	3.4	Diurnal Maximum
AF - Analyzer Failure																																																	



WBEA
Hourly Averages

Ambient Temperature 75 m (AT75m) - C
Mannix - November 2014





WBEA
Cumulative Frequency Distribution

Ambient Temperature 75 m (AT75m) - C
Mannix - November 2014

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	108	16.31	16.31
-20 - 0	499	75.38	91.69
0 - 10	55	8.31	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 662

Total Number of Hours: 720



Summary of Hour Averages

Mannix - November 2014

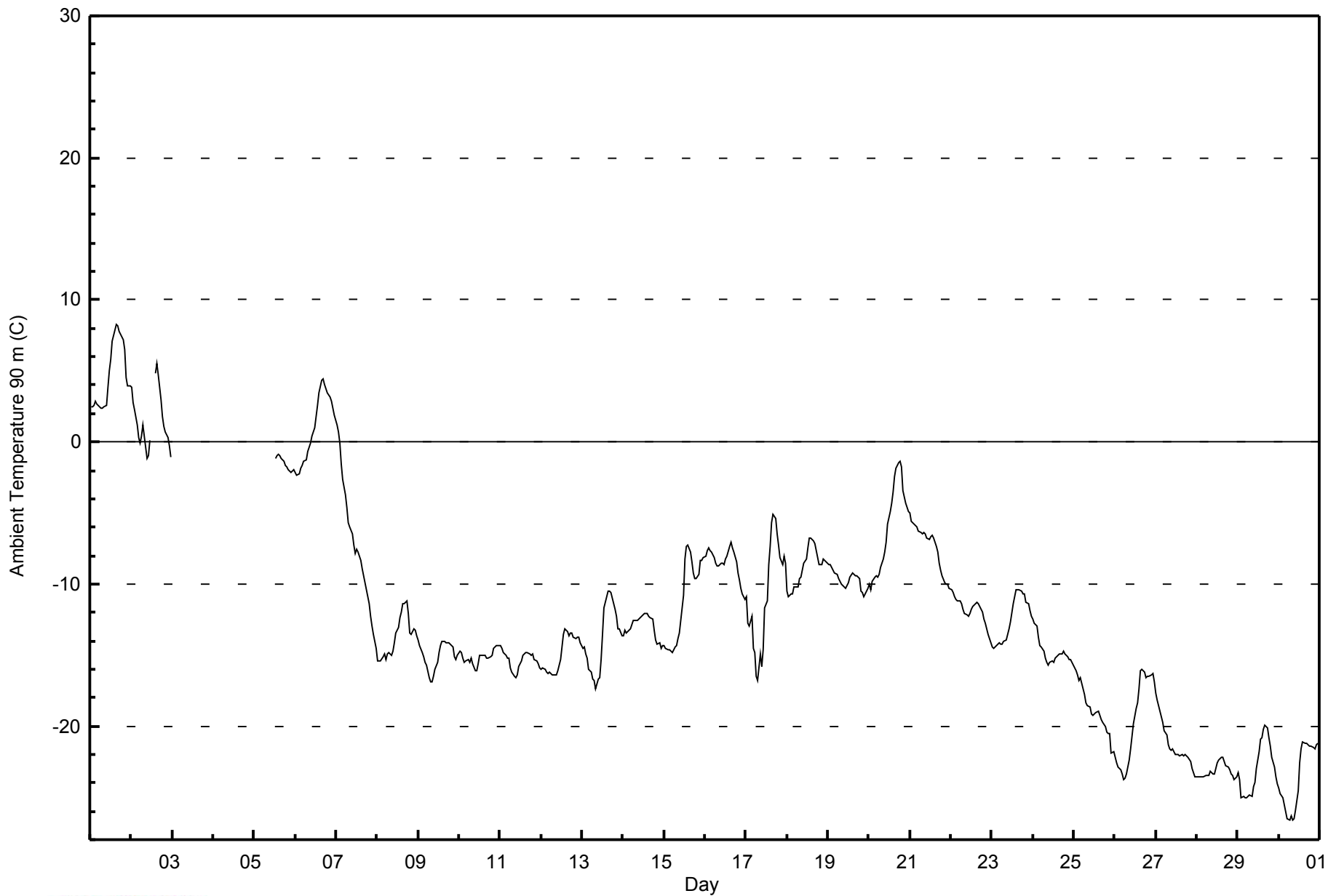
Maximum Value: 8.3 C on Nov 1 16:00		Maximum Daily Average: 4.7 C on Nov 1		Hours in Service: 720																							
Minimum Value: -26.6 C on Nov 30 07:00		Minimum Daily Average: -23.6 C on Nov 30		Hours of Data: 658																							
Maximum Diurnal Average: -10.3 C at hour 16		Minimum Diurnal Average: -13.5 C at hour 8		Hours of Missing Data: 62																							
Monthly Average: -12.15 C		Percentiles: P ₁ = -25.9 P ₁₀ = -22.2 Q ₁ = -16.1 Median = -13.3 Q ₃ = -8.3 P ₉₀ = -0.9 P ₉₉ = 7.0		Hours of Calibration: 0																							
				Percent Operational Time: 91.4																							
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-Nov	2.5	2.4	2.6	2.9	2.7	2.5	2.4	2.3	2.5	2.6	3.8	5.0	5.9	7.0	7.9	8.3	8.1	7.8	7.4	7.2	6.5	4.5	4.0	4.0	4.7	8.3	
2-Nov	3.9	2.7	2.3	1.2	0.3	-0.1	0.4	1.2	-0.4	-1.2	-0.9	0.1	AF	AF	4.8	5.5	4.7	3.0	1.8	1.1	0.7	0.3	-0.2	-1.0	1.4	5.5	
3-Nov	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-Nov	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-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	-1.2	-1.0	-0.9	-1.2	-1.3	-1.6	-1.8	-2.0	-2.2	-2.0	-2.0	--	-0.9
6-Nov	-2.2	-2.4	-2.3	-1.8	-1.6	-1.4	-1.2	-0.7	-0.4	-0.1	0.4	1.0	1.7	2.6	3.5	4.4	4.4	4.1	3.7	3.5	3.2	2.9	2.3	1.9	1.1	4.4	
7-Nov	1.2	0.7	-0.1	-1.5	-2.6	-3.8	-4.6	-5.6	-6.0	-6.5	-7.3	-7.8	-7.5	-7.7	-8.4	-8.9	-9.4	-9.9	-10.9	-11.4	-12.2	-13.0	-13.5	-14.5	-7.1	1.2	
8-Nov	-15.4	-15.4	-15.4	-15.1	-14.9	-15.3	-14.9	-14.9	-15.0	-14.7	-14.2	-13.5	-13.0	-12.4	-12.0	-11.4	-11.4	-11.2	-12.1	-13.4	-13.5	-13.2	-13.3	-13.7	-13.7	-11.2	
9-Nov	-13.9	-14.3	-14.8	-15.2	-15.5	-15.7	-16.6	-16.9	-16.9	-16.5	-16.0	-15.5	-14.8	-14.3	-14.1	-14.1	-14.1	-14.2	-14.1	-14.2	-14.4	-15.1	-15.3	-15.0	-15.1	-13.9	
10-Nov	-14.7	-14.9	-15.3	-15.6	-15.4	-15.3	-15.5	-15.2	-15.6	-16.1	-16.1	-15.6	-15.0	-15.0	-15.1	-15.1	-15.3	-15.2	-15.1	-15.0	-14.6	-14.4	-14.4	-14.3	-15.1	-14.3	
11-Nov	-14.4	-14.5	-14.8	-15.1	-15.2	-15.3	-15.9	-16.2	-16.5	-16.6	-16.4	-15.8	-15.4	-15.0	-14.9	-14.8	-14.9	-14.9	-15.0	-14.9	-15.3	-15.5	-15.6	-15.9	-15.4	-14.4	
12-Nov	-16.1	-15.9	-16.0	-16.2	-16.3	-16.2	-16.4	-16.4	-16.4	-16.4	-16.1	-15.4	-14.5	-13.6	-13.2	-13.3	-13.6	-13.4	-13.4	-13.7	-13.8	-13.7	-13.8	-14.1	-14.9	-13.2	
13-Nov	-14.5	-14.5	-14.9	-15.2	-16.0	-16.2	-16.7	-16.8	-17.4	-16.7	-16.6	-15.3	-13.5	-11.7	-10.9	-10.5	-10.5	-10.6	-11.4	-11.8	-12.3	-13.2	-13.2	-13.7	-13.9	-10.5	
14-Nov	-13.7	-13.3	-13.4	-13.2	-13.2	-12.8	-12.6	-12.6	-12.5	-12.4	-12.3	-12.1	-12.0	-12.1	-12.2	-12.4	-12.5	-13.3	-13.9	-14.3	-14.1	-14.5	-14.3	-14.3	-13.0	-12.0	
15-Nov	-14.3	-14.5	-14.6	-14.7	-14.8	-14.8	-14.5	-14.3	-13.8	-13.4	-12.5	-10.8	-8.2	-7.4	-7.3	-7.7	-8.5	-9.2	-9.6	-9.6	-9.3	-8.4	-8.3	-8.1	-11.2	-7.3	
16-Nov	-8.0	-7.7	-7.4	-7.6	-7.8	-8.1	-8.6	-8.8	-8.7	-8.5	-8.5	-8.6	-8.3	-8.0	-7.4	-7.1	-7.4	-7.7	-8.4	-9.3	-9.7	-10.3	-10.7	-11.0	-8.5	-7.1	
17-Nov	-10.9	-12.8	-13.0	-12.3	-14.6	-14.9	-16.5	-16.8	-14.9	-15.8	-14.6	-11.7	-11.2	-8.6	-7.3	-5.7	-5.1	-5.4	-6.5	-7.3	-8.1	-8.7	-8.0	-8.5	-10.8	-5.1	
18-Nov	-10.5	-10.9	-10.7	-10.7	-10.2	-10.2	-10.2	-9.6	-9.5	-9.1	-8.6	-8.2	-7.5	-6.8	-6.8	-6.9	-7.2	-7.6	-8.1	-8.6	-8.6	-8.3	-8.3	-8.5	-8.8	-6.8	
19-Nov	-8.6	-8.6	-8.8	-9.0	-9.2	-9.4	-9.6	-9.8	-10.0	-10.2	-10.3	-10.1	-9.9	-9.5	-9.2	-9.3	-9.5	-9.4	-9.6	-10.5	-10.6	-10.9	-10.7	-10.3	-9.7	-8.6	
20-Nov	-10.0	-10.4	-9.8	-9.6	-9.4	-9.5	-9.4	-8.9	-8.3	-7.8	-7.1	-5.8	-4.9	-4.3	-3.6	-2.4	-1.9	-1.5	-1.4	-1.7	-3.4	-4.3	-4.6	-4.9	-6.0	-1.4	
21-Nov	-5.0	-5.6	-5.8	-5.9	-6.0	-6.3	-6.4	-6.5	-6.4	-6.5	-6.7	-6.8	-6.6	-6.6	-6.8	-7.4	-7.8	-8.5	-9.0	-9.4	-9.9	-10.0	-10.0	-10.3	-7.3	-5.0	
22-Nov	-10.4	-10.6	-10.9	-11.1	-11.1	-11.2	-11.4	-11.8	-12.1	-12.2	-12.3	-12.1	-11.8	-11.5	-11.3	-11.2	-11.3	-11.6	-12.0	-12.5	-12.7	-13.2	-13.5	-14.2	-11.8	-10.4	
23-Nov	-14.4	-14.6	-14.4	-14.3	-14.2	-14.2	-14.2	-14.1	-13.9	-13.6	-13.2	-12.6	-11.4	-10.9	-10.4	-10.4	-10.4	-10.5	-10.7	-10.7	-11.3	-11.3	-11.9	-12.3	-12.5	-10.4	
24-Nov	-12.4	-12.7	-13.0	-13.8	-14.3	-14.5	-14.7	-15.3	-15.5	-15.7	-15.5	-15.4	-15.5	-15.2	-15.1	-14.9	-14.9	-14.9	-14.8	-14.9	-15.1	-15.3	-15.3	-15.6	-14.8	-12.4	
25-Nov	-15.9	-16.1	-16.4	-16.8	-16.6	-17.4	-17.8	-18.4	-18.6	-18.7	-19.1	-19.2	-19.1	-19.0	-19.0	-19.3	-19.5	-19.7	-20.0	-20.5	-20.5	-20.5	-21.9	-21.8	-18.8	-15.9	
26-Nov	-22.2	-22.6	-22.9	-23.1	-23.4	-23.7	-23.7	-23.4	-22.4	-21.6	-20.7	-19.8	-18.8	-18.4	-17.4	-16.1	-16.0	-16.2	-16.6	-16.5	-16.5	-16.4	-16.3	-16.9	-19.7	-16.0	
27-Nov	-17.7	-18.2	-19.0	-19.4	-19.7	-20.3	-20.7	-21.3	-21.6	-21.7	-21.7	-22.0	-22.0	-22.1	-22.0	-22.1	-22.0	-22.1	-22.2	-22.2	-22.5	-23.0	-23.3	-23.6	-21.3	-17.7	
28-Nov	-23.6	-23.6	-23.6	-23.6	-23.6	-23.5	-23.5	-23.5	-23.2	-23.4	-23.3	-23.0	-22.6	-22.4	-22.2	-22.2	-22.2	-22.5	-22.8	-22.9	-23.1	-23.4	-23.5	-23.7	-23.6	-23.2	-22.2
29-Nov	-23.3	-23.8	-25.1	-25.0	-25.0	-25.1	-25.0	-24.9	-24.9	-24.3	-24.0	-23.0	-21.8	-21.0	-20.8	-20.2	-19.9	-20.1	-20.8	-21.5	-22.2	-22.9	-23.6	-24.1	-23.0	-19.9	
30-Nov	-24.4	-24.8	-25.0	-25.5	-26.1	-26.5	-26.6	-26.3	-26.6	-26.5	-25.9	-24.5	-22.6	-21.6	-21.1	-21.2	-21.2	-21.4	-21.4	-21.4	-21.5	-21.6	-21.3	-21.2	-23.6	-21.1	
																								Diurnal Average			
																								Diurnal Maximum			
-12.2 -12.5 -12.7 -12.9 -13.1 -13.3 -13.5 -13.5 -13.5 -13.5 -13.2 -12.5 -11.9 -11.4 -10.5 -10.3 -10.4 -10.6 -11.0 -11.4 -11.7 -12.0 -12.2 -12.4																											
3.9 2.7 2.6 2.9 2.7 2.5 2.4 2.3 2.5 2.6 3.8 5.0 5.9 7.0 7.9 8.3 8.1 7.8 7.4 7.2 6.5 4.5 4.0 4.0																											
AF - Analyzer Failure																											



WBEA
Hourly Averages

Ambient Temperature 90 m (AT90m) - C

Mannix - November 2014





WBEA
Cumulative Frequency Distribution

Ambient Temperature 90 m (AT90m) - C
Mannix - November 2014

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	107	16.26	16.26
-20 - 0	495	75.23	91.49
0 - 10	56	8.51	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 658

Total Number of Hours: 720

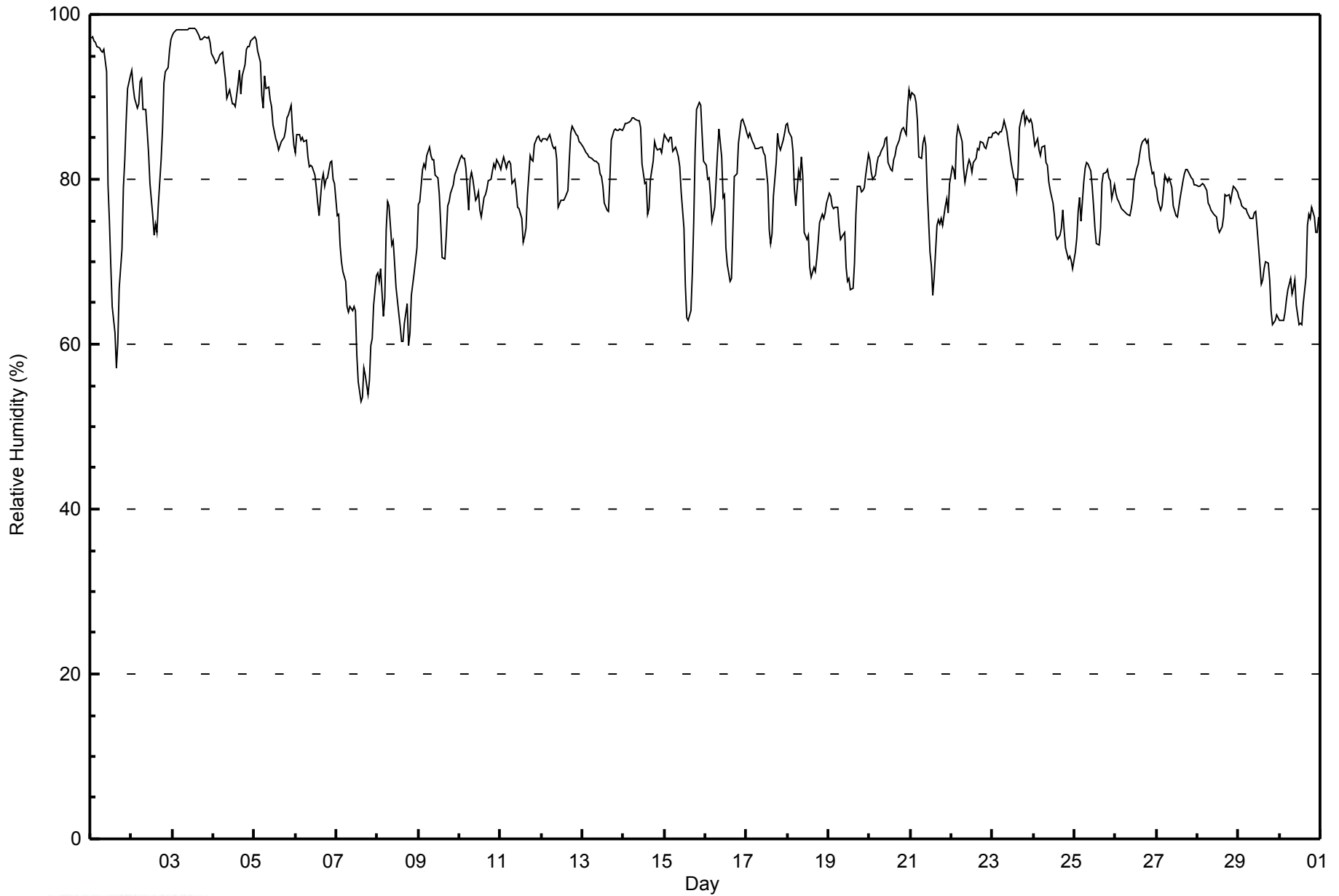


Maximum Value: 98 % on Nov 3 13:00 Maximum Daily Average: 97.7 % on Nov 3																		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Minimum Value: 53 % on Nov 7 15:00 Minimum Daily Average: 63.0 % on Nov 7 Maximum Diurnal Average: 83.1 % at hour 1 Minimum Diurnal Average: 73.7 % at hour 15 Monthly Average: 80.1 % Percentiles: P ₁ = 57 P ₁₀ = 68 Q ₁ = 76 Median = 81 Q ₃ = 85 P ₉₀ = 90 P ₉₉ = 98																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	97	97	97	97	96	96	96	95	96	93	79	75	69	65	61	57	60	67	72	79	82	87	91	93	83.2	97
2-Nov	93	91	90	89	89	92	92	89	88	86	83	80	76	73	75	74	77	82	86	92	93	94	96	97	86.5	97
3-Nov	97	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	97	97	97	97	97	97	97	95	97.7	98
4-Nov	95	94	94	95	95	96	94	92	90	91	90	89	89	89	91	93	90	92	94	96	96	96	97	97	93.1	97
5-Nov	97	97	96	94	90	89	92	91	91	90	89	87	85	84	84	84	85	85	86	87	88	89	86	84	88.7	97
6-Nov	83	85	85	85	85	85	85	83	82	82	82	81	79	77	76	80	81	79	80	80	82	82	80	79	81.5	85
7-Nov	76	76	72	70	69	68	65	64	65	64	65	64	59	55	53	54	57	56	54	56	60	61	65	68	63.0	76
8-Nov	69	68	69	63	66	74	77	77	72	73	70	67	64	62	60	60	63	65	60	61	66	69	70	72	67.3	77
9-Nov	77	77	81	82	81	83	84	83	82	82	80	80	78	75	71	70	73	77	77	78	79	81	81	82	79.0	84
10-Nov	82	83	83	82	81	76	80	81	80	77	78	78	76	75	78	78	79	80	80	81	82	81	82	82	79.9	83
11-Nov	81	82	83	81	82	82	82	80	80	79	77	76	75	72	73	74	78	83	82	82	84	85	85	85	80.2	85
12-Nov	85	85	85	85	85	85	84	84	84	82	77	78	78	77	78	79	82	86	86	86	85	85	85	84	82.9	86
13-Nov	84	83	83	83	83	83	82	82	82	82	81	80	79	77	76	76	80	85	86	86	86	86	86	86	82.4	86
14-Nov	86	87	87	87	87	87	88	87	87	87	86	82	79	80	76	76	80	82	85	84	84	84	83	84	84.0	88
15-Nov	85	85	85	85	85	83	84	83	83	82	78	74	67	63	63	64	69	75	83	88	89	89	85	82	79.6	89
16-Nov	82	80	80	78	75	77	80	83	86	83	78	78	72	70	68	68	74	80	81	84	86	87	87	86	79.2	87
17-Nov	86	85	86	85	84	84	84	84	84	84	83	83	79	74	72	73	78	82	86	84	84	85	86	87	82.5	87
18-Nov	87	86	85	83	79	77	81	80	83	80	74	73	73	69	68	69	69	70	72	75	76	75	76	77	76.6	87
19-Nov	78	78	77	76	77	77	74	73	73	74	69	68	68	67	67	70	76	79	79	78	79	79	81	83	74.9	83
20-Nov	82	81	80	81	82	83	83	83	84	85	85	82	81	81	82	83	84	85	86	86	86	85	89	91	83.7	91
21-Nov	90	90	90	89	87	83	83	84	85	84	79	71	70	66	68	74	75	75	75	74	77	78	76	79	79.3	90
22-Nov	82	81	80	85	86	85	85	81	80	82	82	82	81	82	83	84	84	85	84	84	84	84	85	85	83.1	86
23-Nov	86	86	86	85	86	86	86	87	86	84	83	82	80	79	81	86	88	88	87	88	87	87	87	87	85.0	88
24-Nov	85	84	85	84	83	84	84	82	82	80	79	77	76	73	73	74	76	74	72	70	71	70	69	69	77.4	85
25-Nov	71	73	76	78	75	80	81	82	82	81	79	77	74	72	72	74	79	81	81	81	80	80	78	79	77.8	82
26-Nov	78	78	77	76	76	76	76	76	76	76	78	80	81	82	83	84	85	85	84	85	83	81	81	79	79.8	85
27-Nov	79	77	76	77	79	80	80	80	80	79	77	76	75	77	78	80	81	81	81	81	80	80	79	79	78.8	81
28-Nov	79	79	79	79	79	79	77	77	76	76	76	75	74	74	74	75	78	78	78	77	78	79	79	78	77.3	79
29-Nov	78	77	77	76	76	76	76	75	75	76	76	74	70	67	68	69	70	70	68	64	62	63	64	63	71.3	78
30-Nov	63	63	63	64	65	67	68	66	67	68	65	62	63	62	65	68	74	76	75	77	75	74	75	75	68.3	77
83.1 82.9 82.8 82.4 82.1 82.3 82.6 82.1 81.9 81.3 79.2 77.6 75.6 74.0 73.7 74.8 77.2 79.4 80.0 80.8 81.4 81.8 82.0 82.3																								Diurnal Average		
97 98 98 98 98 98 98 98 98 98 98 98 98 98 98 98 98 97 97 97 97 97 97 97 97																								Diurnal Maximum		



WBEA
Hourly Averages

Relative Humidity (RH) - %
Mannix - November 2014





WBEA
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Mannix - November 2014

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	11	1.53	1.53
60 - 80	317	44.03	45.56
80 - 100	392	54.44	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Summary of Hour Averages

Mannix - November 2014

Maximum Value: 97 % on Nov 4 21:00	Maximum Daily Average: 84.0 % on Nov 20	Hours in Service: 720
Minimum Value: 50 % on Nov 7 19:00	Minimum Daily Average: 60.8 % on Nov 7	Hours of Data: 665
Maximum Diurnal Average: 80.7 % at hour 7	Minimum Diurnal Average: 71.1 % at hour 15	Hours of Missing Data: 55
Monthly Average: 77.8 %	Percentiles: P ₁ = 54 P ₁₀ = 66 Q ₁ = 74 Median = 80 Q ₃ = 83 P ₉₀ = 86 P ₉₉ = 93	Hours of Calibration: 0
		Percent Operational Time: 92.4

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-Nov	96	94	94	91	91	91	92	92	93	90	81	75	69	63	60	55	53	54	60	67	68	71	84	86	77.9	96
2-Nov	87	88	87	86	88	87	88	86	87	85	83	79	74	72	73	70	73	79	85	90	92	AF	AF	AF	82.9	92
3-Nov	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-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	97
5-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	89	86	84	83	82	83	83	83	84	86	85	87	84	82	--	89
6-Nov	82	85	85	85	85	84	85	82	81	81	81	80	79	77	74	75	72	73	75	77	81	81	78	78	79.8	85
7-Nov	73	74	70	68	67	66	63	62	63	63	64	64	58	54	52	51	53	53	50	52	56	56	61	65	60.8	74
8-Nov	67	66	66	58	62	73	75	72	70	72	70	68	65	62	60	59	59	59	56	59	64	65	65	68	64.9	75
9-Nov	71	75	79	80	80	83	85	83	83	83	81	80	78	74	69	69	71	75	76	78	79	81	81	81	78.2	85
10-Nov	82	82	82	82	80	74	80	80	79	77	78	78	76	75	78	78	79	79	80	81	82	81	82	81	79.4	82
11-Nov	81	82	83	81	82	83	83	80	81	79	77	77	76	73	74	74	78	81	81	81	84	84	85	84	80.3	85
12-Nov	85	85	84	84	86	86	84	83	84	83	81	80	78	76	76	78	81	84	85	86	86	86	86	85	83.0	86
13-Nov	85	84	84	84	84	83	83	83	83	83	82	80	78	74	73	74	76	79	84	85	85	86	86	86	81.8	86
14-Nov	87	87	87	87	88	88	88	88	88	88	87	80	77	79	73	75	78	80	81	81	82	82	82	82	83.0	88
15-Nov	82	83	82	81	80	81	82	81	81	79	77	74	65	60	60	61	66	74	83	88	88	87	82	78	77.3	88
16-Nov	78	77	78	75	73	75	79	83	86	82	77	79	71	70	67	66	69	73	77	80	83	86	88	88	77.5	88
17-Nov	87	87	86	86	85	84	85	84	85	85	84	83	78	72	69	69	71	74	78	79	80	80	81	83	80.6	87
18-Nov	86	86	84	82	76	75	81	80	83	80	73	72	73	68	66	67	67	69	71	74	75	74	75	76	75.4	86
19-Nov	77	77	75	75	75	75	72	70	71	73	69	68	68	68	66	67	69	71	73	74	77	78	80	83	73.1	83
20-Nov	82	80	80	81	82	83	83	84	84	86	86	83	83	82	83	83	84	85	84	85	86	86	90	92	84.0	92
21-Nov	90	91	91	90	87	83	83	85	85	84	79	71	69	65	68	74	75	75	75	74	77	78	76	80	79.5	91
22-Nov	82	82	80	86	87	86	85	82	80	83	83	83	82	83	83	85	84	85	85	84	84	85	86	86	83.7	87
23-Nov	86	86	86	86	86	86	87	88	86	85	85	84	80	79	77	78	80	81	84	83	83	85	86	86	83.8	88
24-Nov	84	83	84	83	83	83	84	81	81	80	79	78	76	74	73	74	76	73	71	70	70	70	69	69	77.2	84
25-Nov	71	73	76	78	75	81	82	82	82	82	80	77	74	71	71	73	78	76	79	81	81	81	80	80	77.7	82
26-Nov	79	78	78	77	77	76	76	76	76	76	77	79	81	82	83	84	84	85	84	85	83	81	81	78	79.8	85
27-Nov	77	77	76	77	79	81	80	81	80	79	77	76	76	77	78	80	80	81	81	81	81	80	80	80	78.9	81
28-Nov	80	80	80	80	80	79	77	76	76	75	75	75	74	73	74	75	78	77	78	77	78	79	79	79	77.2	80
29-Nov	78	77	77	75	76	76	75	75	75	74	73	70	66	65	66	68	69	68	66	62	60	61	62	61	69.8	78
30-Nov	61	61	61	62	64	65	66	65	66	67	66	63	61	59	61	65	69	70	71	72	72	71	72	73	65.9	73

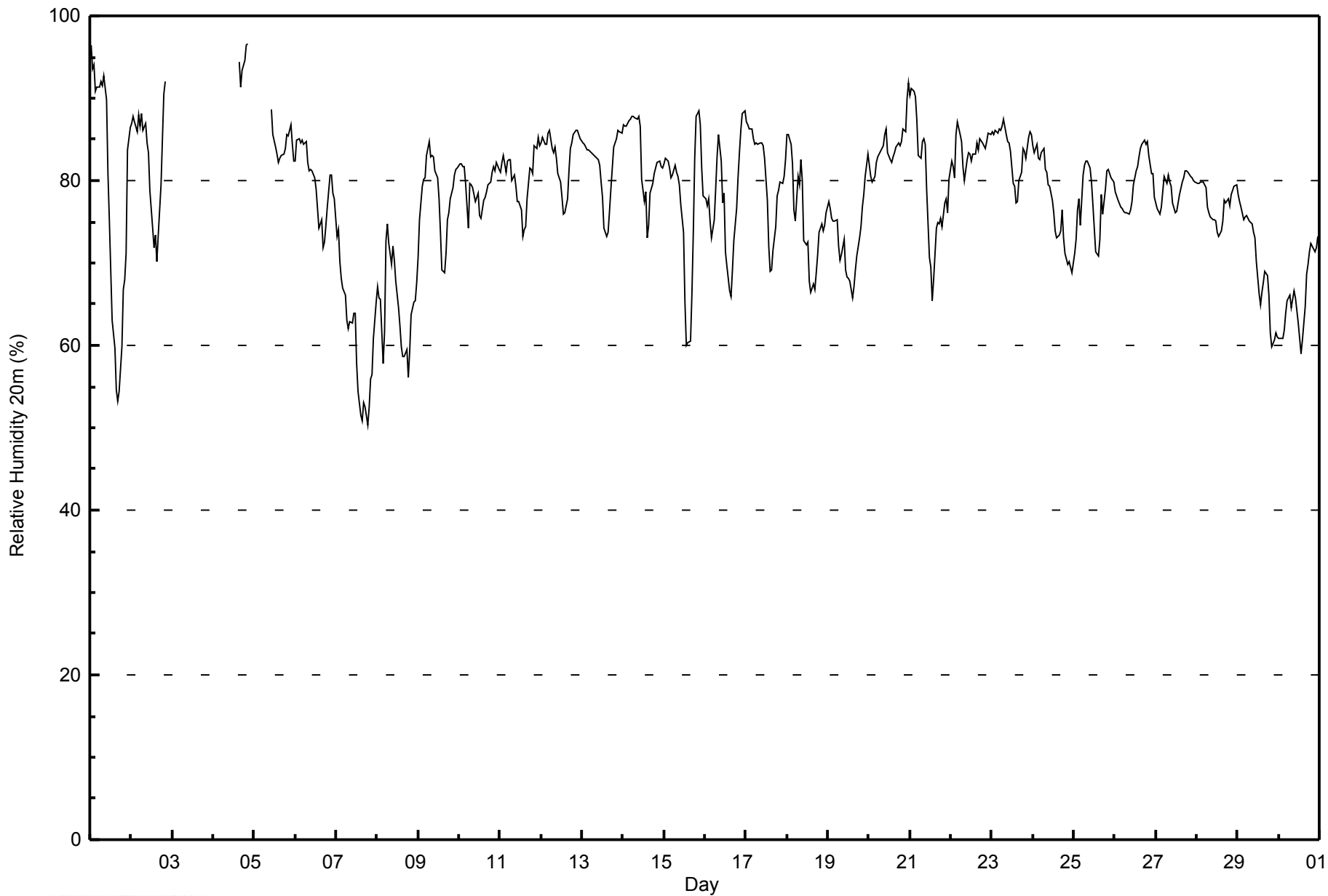
80.6	80.7	80.6	79.9	79.9	80.3	80.7	80.1	80.2	79.7	78.4	76.5	73.9	71.8	71.1	72.5	74.0	75.6	77.0	78.3	79.3	78.6	79.3	79.7	Diurnal Average	
96	94	94	91	91	91	92	92	93	90	89	86	84	83	83	94	91	93	95	96	97	87	90	92	Diurnal Maximum	

AF - Analyzer Failure



WBEA
Hourly Averages

Relative Humidity 20m (RH20m) - %
Mannix - November 2014





WBEA
Cumulative Frequency Distribution

Relative Humidity 20m (RH20m) - %
Mannix - November 2014

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	25	3.76	3.76
60 - 80	330	49.62	53.38
80 - 100	310	46.62	100.00

Total Number of Valid Hours: 665

Total Number of Hours: 720



Summary of Hour Averages

Mannix - November 2014

Maximum Value: 93 % on Nov 1 01:00	Maximum Daily Average: 84.5 % on Nov 20	Hours in Service: 720
Minimum Value: 50 % on Nov 7 19:00	Minimum Daily Average: 60.8 % on Nov 7	Hours of Data: 661
Maximum Diurnal Average: 80.6 % at hour 7	Minimum Diurnal Average: 71.3 % at hour 15	Hours of Missing Data: 59
Monthly Average: 77.4 %	Percentiles: P ₁ = 52 P ₁₀ = 66 Q ₁ = 73 Median = 79 Q ₃ = 84 P ₉₀ = 86 P ₉₉ = 91	Hours of Calibration: 0
		Percent Operational Time: 91.8

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-Nov	93	92	91	88	88	89	90	89	88	89	81	75	69	63	60	54	51	52	55	54	55	65	72	80	74.2	93
2-Nov	83	86	86	84	86	84	85	84	84	82	83	78	73	72	72	65	71	78	85	89	92	AF	AF	AF	81.0	92
3-Nov	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-Nov	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-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	92	90	89	86	85	84	83	83	84	86	85	87	84	82	--	92
6-Nov	83	85	86	85	85	85	85	83	82	82	82	81	79	77	74	72	69	70	71	75	80	80	78	78	79.4	86
7-Nov	73	74	70	68	67	66	63	62	63	63	64	64	58	55	52	51	53	52	50	52	56	56	61	66	60.8	74
8-Nov	67	66	65	57	61	73	74	72	70	72	71	68	65	63	60	59	58	58	55	59	63	64	65	67	64.7	74
9-Nov	70	73	78	81	82	83	85	83	84	82	81	80	78	74	69	69	71	76	76	78	79	81	82	82	78.2	85
10-Nov	82	82	82	82	80	75	80	80	80	78	78	79	76	76	78	78	79	80	80	81	82	82	83	82	79.8	83
11-Nov	82	83	84	82	83	83	84	81	81	80	78	78	77	74	75	75	78	81	81	81	85	84	85	84	80.7	85
12-Nov	85	86	84	85	86	86	85	85	85	84	82	81	79	77	77	79	82	84	83	84	86	86	86	85	83.4	86
13-Nov	85	84	84	84	84	83	83	83	83	83	83	84	82	75	74	74	76	78	82	83	84	86	85	86	81.9	86
14-Nov	87	87	87	87	88	88	87	87	87	87	86	79	77	79	73	75	78	77	78	80	80	80	80	80	82.2	88
15-Nov	81	82	81	80	79	80	81	81	80	79	77	73	64	59	60	60	66	74	83	88	89	87	82	78	76.8	89
16-Nov	77	77	78	75	73	76	79	83	86	83	77	79	71	70	67	66	68	70	74	78	81	84	85	86	76.8	86
17-Nov	85	86	87	87	86	85	85	85	85	84	84	83	77	72	68	68	69	70	75	77	78	77	76	80	79.5	87
18-Nov	84	86	85	82	76	75	81	80	83	80	73	72	73	68	66	67	66	68	71	74	75	74	74	76	75.4	86
19-Nov	77	76	75	75	74	75	71	69	70	73	69	69	69	68	66	67	68	69	72	74	76	78	81	84	72.7	84
20-Nov	82	81	80	81	83	84	84	84	85	86	87	84	84	83	84	84	84	83	83	85	87	87	91	92	84.5	92
21-Nov	90	92	92	91	88	83	83	85	85	85	79	71	69	65	68	75	75	75	76	75	78	78	77	81	79.9	92
22-Nov	83	82	81	86	88	86	85	82	80	83	84	84	83	84	84	85	84	86	85	85	84	85	86	86	84.2	88
23-Nov	86	86	86	86	87	86	87	87	85	85	85	84	80	79	78	77	77	77	81	78	81	82	84	85	83.0	87
24-Nov	84	83	84	83	83	84	82	81	80	80	78	77	75	74	74	74	77	73	71	70	70	70	69	69	77.5	84
25-Nov	72	73	76	78	74	81	81	83	83	82	80	77	74	72	71	73	78	73	77	81	82	82	81	81	77.8	83
26-Nov	79	78	78	77	77	77	76	77	76	76	78	80	81	81	83	84	84	84	84	84	84	83	83	80	80.2	84
27-Nov	78	77	76	77	79	81	80	81	80	80	78	77	77	77	79	80	81	81	81	81	81	80	80	80	79.2	81
28-Nov	80	79	79	79	79	79	79	79	77	76	76	76	74	73	74	76	78	78	78	77	79	79	79	79	77.6	80
29-Nov	78	76	74	73	73	72	72	73	72	70	70	69	66	65	66	67	69	68	66	61	59	60	61	60	68.3	78
30-Nov	61	60	60	61	64	65	66	64	65	66	65	63	61	59	61	64	67	69	70	72	71	70	71	72	65.3	72

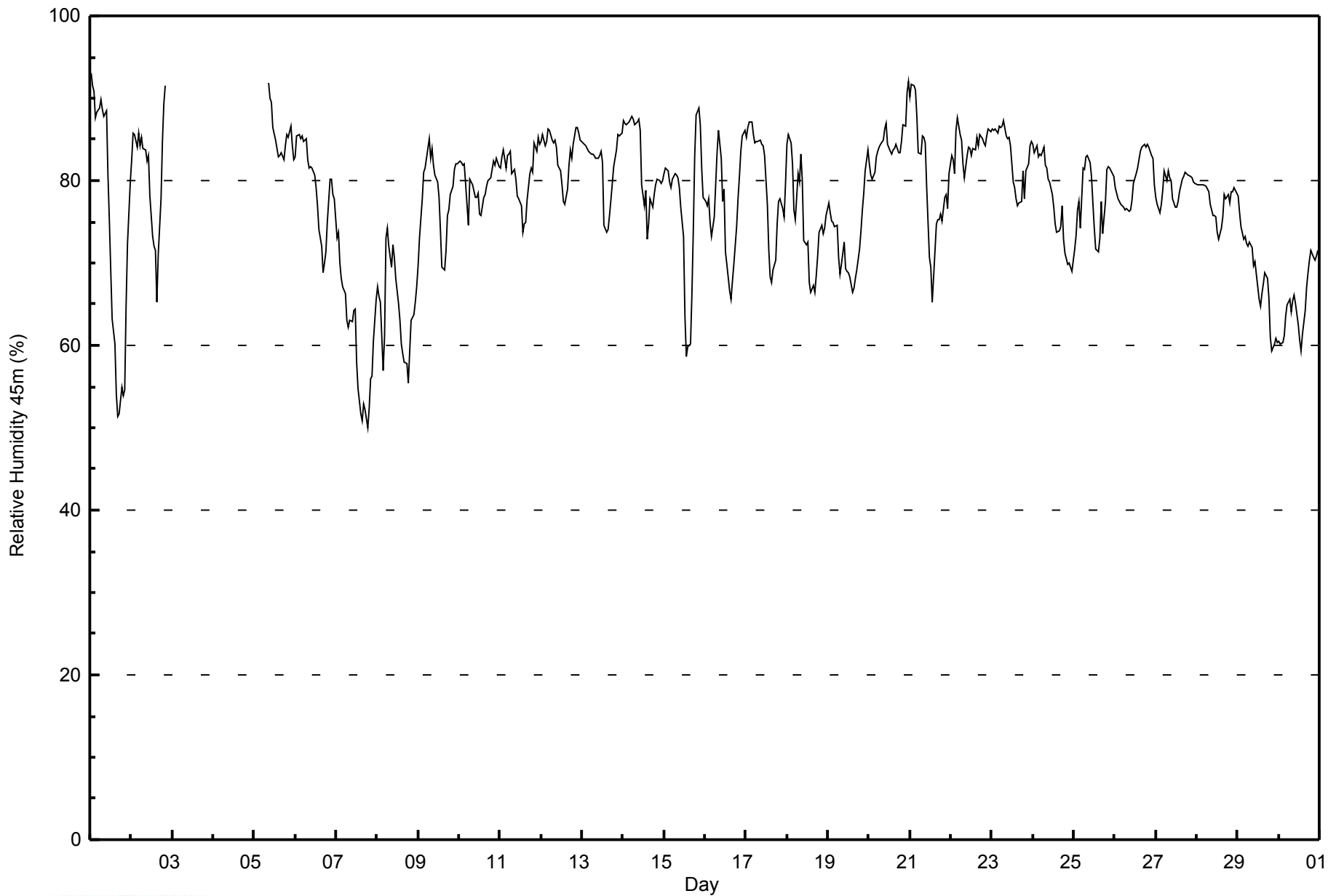
80.3	80.5	80.4	79.7	79.7	80.1	80.6	80.0	80.5	80.0	78.6	76.9	74.2	72.1	71.3	71.5	72.8	74.0	75.4	76.5	77.9	78.0	78.6	79.2	Diurnal Average	
93	92	92	91	88	89	90	89	92	90	89	86	85	84	84	85	84	86	85	89	92	87	91	92	Diurnal Maximum	

AF - Analyzer Failure



WBEA
Hourly Averages

Relative Humidity 45m (RH45m) - %
Mannix - November 2014





WBEA
Cumulative Frequency Distribution

Relative Humidity 45m (RH45m) - %
Mannix - November 2014

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	26	3.93	3.93
60 - 80	333	50.38	54.31
80 - 100	302	45.69	100.00

Total Number of Valid Hours: 661

Total Number of Hours: 720

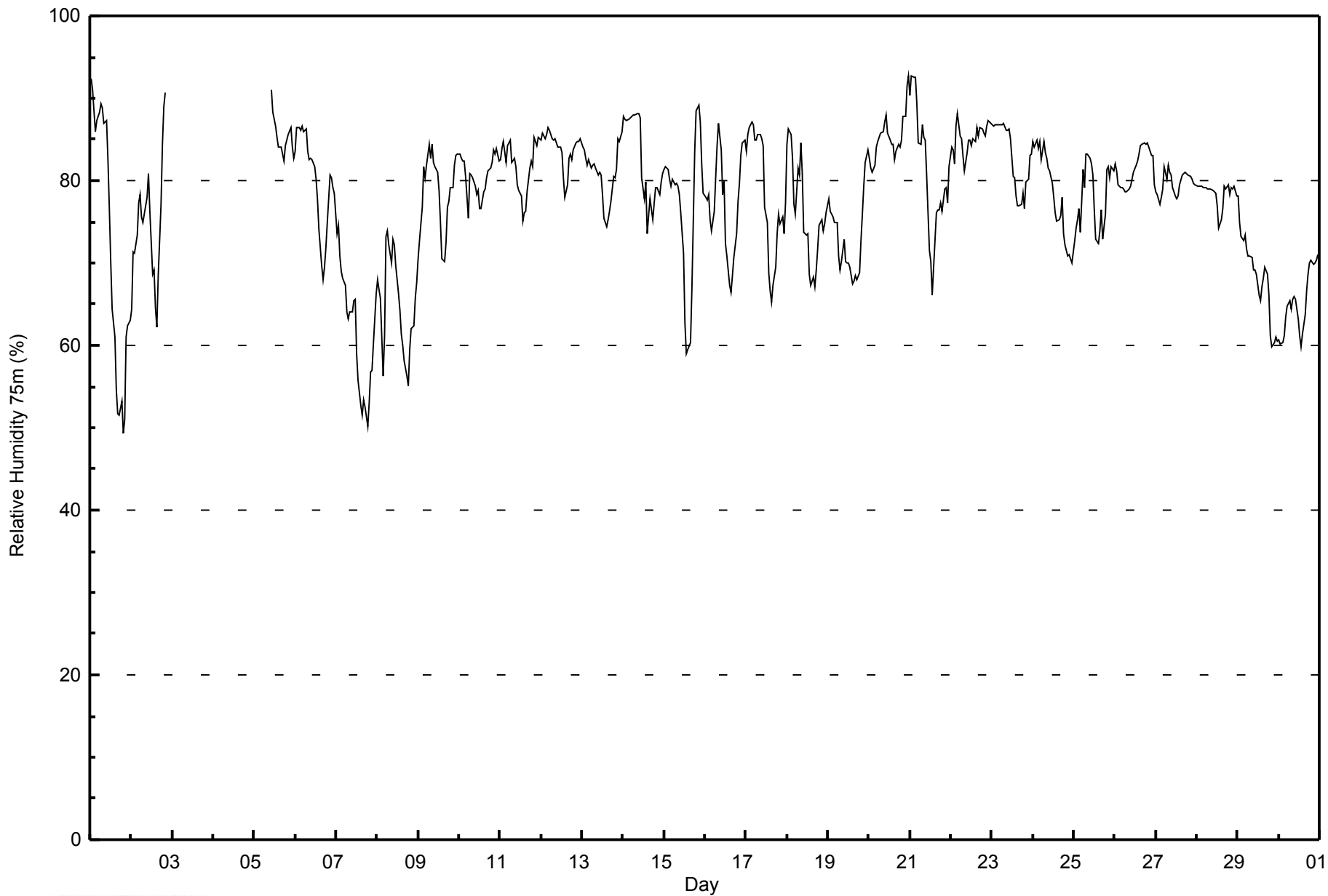


Maximum Value: 93 % on Nov 21 00:00																			Maximum Daily Average: 85.3 % on Nov 20						Hours in Service: 720	
Minimum Value: 49 % on Nov 1 20:00																			Minimum Daily Average: 61.6 % on Nov 7						Hours of Data: 659	
Maximum Diurnal Average: 80.4 % at hour 7																			Minimum Diurnal Average: 71.7 % at hour 15						Hours of Missing Data: 61	
Monthly Average: 77.5 %																			Percentiles: P ₁ = 52 P ₁₀ = 65 Q ₁ = 73 Median = 79 Q ₃ = 84 P ₉₀ = 86 P ₉₉ = 91						Hours of Calibration: 0	
																									Percent Operational Time: 91.5	
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-Nov	92	91	89	86	87	88	89	89	87	87	82	77	70	64	61	55	52	52	53	49	51	61	62	63	72.4	92
2-Nov	64	71	71	73	77	78	76	75	77	78	81	76	69	69	65	62	68	77	84	89	91	AF	AF	AF	74.9	91
3-Nov	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-Nov	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-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	91	88	87	85	84	84	84	82	84	85	86	86	84	83	--	91
6-Nov	84	86	87	86	87	86	86	84	83	83	83	82	80	78	74	70	68	70	72	75	81	80	79	78	80.0	87
7-Nov	74	75	71	69	68	67	64	63	64	64	65	66	59	56	53	52	53	53	50	53	57	57	60	66	61.6	75
8-Nov	68	67	66	56	61	73	74	72	70	73	72	70	66	64	61	60	58	56	55	59	62	62	66	68	65.0	74
9-Nov	70	73	77	82	80	82	84	83	84	82	82	81	79	75	71	70	73	77	77	79	79	82	83	83	78.7	84
10-Nov	83	83	82	82	80	76	81	81	80	79	78	79	77	77	79	79	80	81	82	82	84	83	84	82	80.6	84
11-Nov	83	84	85	82	84	85	85	82	83	82	80	79	78	75	76	76	79	81	82	82	85	84	85	85	81.7	85
12-Nov	85	86	85	86	86	86	85	85	85	85	84	84	83	80	78	79	83	83	82	84	85	85	85	85	83.9	86
13-Nov	84	84	83	82	83	82	82	82	82	81	81	81	78	75	74	75	76	78	80	80	81	85	85	86	80.8	86
14-Nov	88	87	87	87	88	88	88	88	88	88	88	80	78	80	74	76	78	75	77	79	79	78	80	81	82.5	88
15-Nov	81	82	81	80	79	80	80	80	79	78	76	71	63	59	59	60	67	75	84	88	89	87	82	79	76.7	89
16-Nov	78	78	78	75	74	76	80	84	87	84	78	80	72	71	67	66	68	71	74	77	80	83	85	85	77.2	87
17-Nov	84	86	86	87	87	85	85	86	86	85	84	77	75	69	67	65	67	69	74	76	75	76	74	77	78.3	87
18-Nov	84	86	86	83	77	76	81	81	85	81	74	73	73	69	67	68	67	69	72	75	75	74	75	76	76.1	86
19-Nov	78	76	76	76	75	75	71	69	70	73	70	70	70	69	67	68	69	68	69	73	76	79	82	84	73.0	84
20-Nov	83	81	81	82	84	85	85	86	86	87	88	86	85	84	84	83	84	84	84	85	88	88	92	93	85.3	93
21-Nov	90	93	93	93	89	85	84	87	85	85	81	72	70	66	70	76	76	76	77	76	79	79	77	82	80.9	93
22-Nov	84	84	82	87	88	85	85	83	81	83	85	85	84	85	85	87	85	86	86	86	85	87	87	87	85.1	88
23-Nov	87	87	87	87	87	87	87	87	86	86	86	85	81	80	78	77	77	77	79	77	80	80	83	83	82.9	87
24-Nov	85	84	85	84	85	83	85	83	83	82	81	80	78	76	75	75	76	78	74	72	71	71	70	70	78.5	85
25-Nov	73	74	75	77	74	81	79	83	83	83	82	81	76	73	72	74	76	73	76	81	82	80	82	81	78.0	83
26-Nov	82	81	79	79	79	79	79	79	79	79	80	81	82	82	83	84	84	85	84	85	84	83	83	79	81.5	85
27-Nov	79	78	77	78	79	82	80	82	81	81	79	78	78	78	80	81	81	81	81	81	81	80	80	79	79.7	82
28-Nov	79	79	79	79	79	79	79	79	79	79	79	79	77	74	75	77	79	79	79	78	79	79	79	78	78.5	79
29-Nov	78	75	73	73	73	72	71	71	71	69	69	69	66	65	67	68	69	69	66	61	60	60	61	61	68.2	78
30-Nov	61	60	60	61	63	65	65	64	66	66	66	63	61	60	61	64	67	69	70	70	70	70	71	71	65.1	71
																								Diurnal Average		
																								Diurnal Maximum		
80.0 80.4 80.0 79.7 79.8 80.2 80.4 80.2 80.3 80.1 79.5 77.5 74.8 72.9 71.7 71.8 73.1 74.1 75.3 76.4 77.6 77.8 78.3 78.7																										
92 93 93 93 89 88 89 89 88 88 91 88 87 85 85 87 85 86 86 89 91 88 92 93																										
AF - Analyzer Failure																										



WBEA
Hourly Averages

Relative Humidity 75m (RH75m) - %
Mannix - November 2014





WBEA
Cumulative Frequency Distribution

Relative Humidity 75m (RH75m) - %
Mannix - November 2014

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	26	3.95	3.95
60 - 80	326	49.47	53.41
80 - 100	307	46.59	100.00

Total Number of Valid Hours: 659

Total Number of Hours: 720

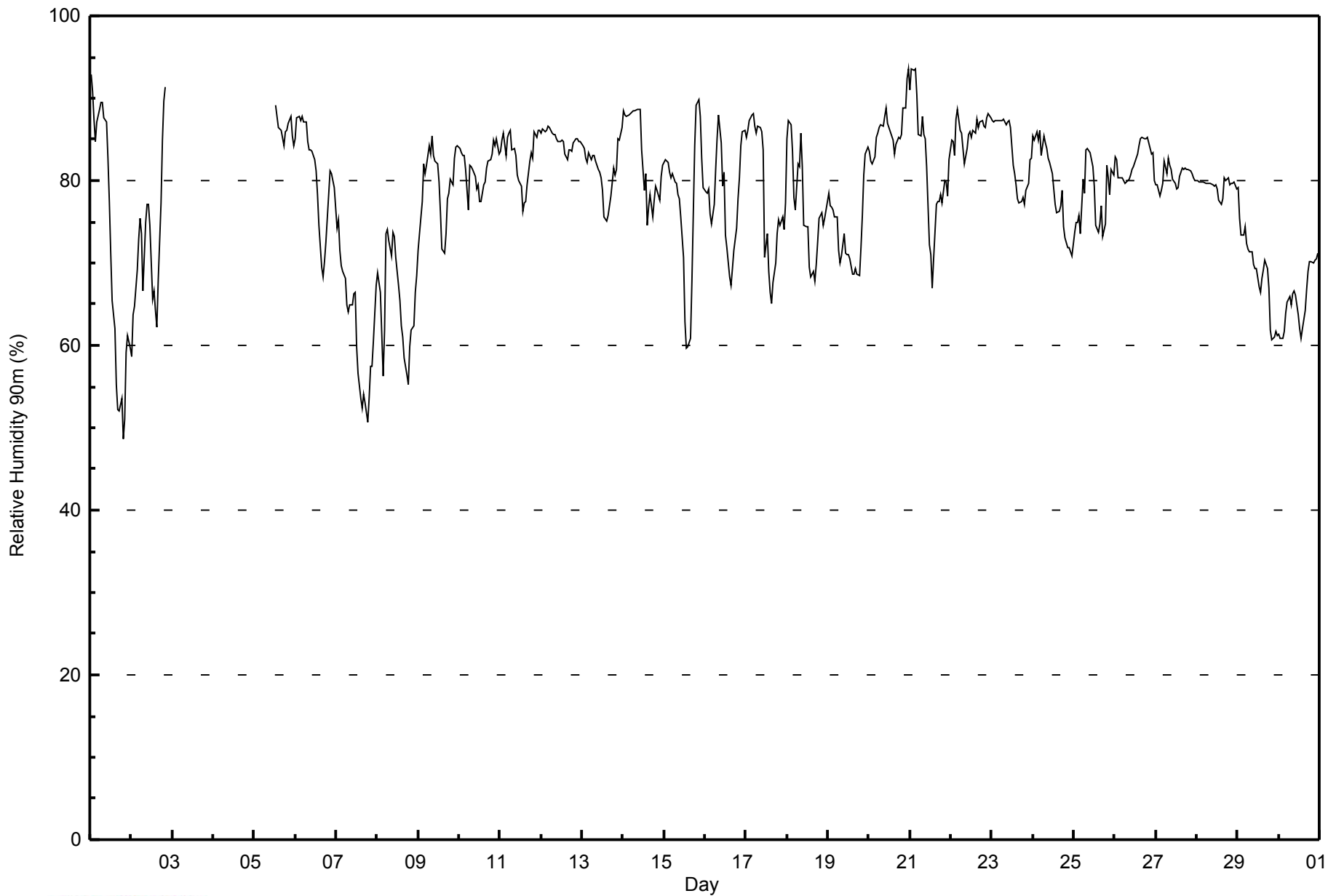


Maximum Value: 94 % on Nov 21 04:00																			Maximum Daily Average: 86.2 % on Nov 20						Hours in Service: 720		
Minimum Value: 49 % on Nov 1 20:00																			Minimum Daily Average: 62.3 % on Nov 7						Hours of Data: 657		
Maximum Diurnal Average: 81.0 % at hour 9																			Minimum Diurnal Average: 72.7 % at hour 16						Hours of Missing Data: 63		
Monthly Average: 78.1 %																			Percentiles: P ₁ = 53 P ₁₀ = 66 Q ₁ = 73 Median = 80 Q ₃ = 85 P ₉₀ = 87 P ₉₉ = 91						Hours of Calibration: 0		
																									Percent Operational Time: 91.3		
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-Nov	93	91	87	85	87	89	89	90	88	87	83	77	71	65	62	55	52	52	54	49	51	59	61	60	72.4	93	
2-Nov	59	64	65	69	73	75	74	67	75	77	77	75	66	67	64	62	68	77	85	90	91	AF	AF	AF	72.3	91	
3-Nov	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-Nov	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-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	89	88	87	86	86	84	86	86	87	88	85	84	--	89
6-Nov	85	88	88	87	88	87	87	85	84	84	84	83	81	78	75	70	68	70	72	75	81	81	80	79	80.8	88	
7-Nov	74	75	72	70	69	68	65	64	65	65	66	67	60	57	54	52	54	53	51	54	58	58	60	67	62.3	75	
8-Nov	69	68	66	56	62	74	74	73	71	74	73	71	67	65	62	61	59	56	55	60	62	62	67	69	65.6	74	
9-Nov	71	74	77	82	81	82	84	83	85	83	82	82	80	76	72	71	74	78	78	80	79	83	84	84	79.5	85	
10-Nov	84	83	83	83	81	77	82	82	81	80	79	79	77	78	79	80	81	82	83	83	85	84	85	83	81.5	85	
11-Nov	83	85	86	83	85	86	86	84	84	83	81	80	79	76	77	77	80	82	83	83	86	85	86	86	82.8	86	
12-Nov	86	86	86	86	87	86	86	86	86	85	85	85	85	85	83	83	84	84	84	85	85	85	85	85	85.0	87	
13-Nov	84	84	83	82	83	83	83	83	82	81	81	80	79	76	75	76	77	78	82	81	81	85	85	86	81.3	86	
14-Nov	88	88	88	88	88	88	89	89	89	89	89	84	79	81	75	77	78	76	78	79	79	78	80	82	83.2	89	
15-Nov	82	83	82	81	80	81	80	80	78	78	76	71	63	60	60	61	68	76	84	89	90	88	83	79	77.1	90	
16-Nov	79	79	79	76	75	77	81	85	88	85	79	81	73	72	68	67	69	72	74	78	80	84	86	86	78.1	88	
17-Nov	85	86	87	88	88	87	86	87	86	86	84	71	73	69	66	65	68	70	74	75	75	76	74	77	78.4	88	
18-Nov	85	87	87	83	78	76	82	82	86	82	75	74	74	70	68	69	68	70	72	75	76	75	75	77	76.9	87	
19-Nov	78	77	77	76	76	76	72	70	71	74	71	71	71	70	69	69	69	69	68	72	76	81	83	84	73.7	84	
20-Nov	84	82	82	83	85	86	86	87	87	88	89	87	86	85	85	83	84	85	85	86	89	89	92	93	86.2	93	
21-Nov	91	94	93	94	90	86	85	88	86	85	82	72	71	67	70	77	77	77	78	77	80	80	78	83	81.7	94	
22-Nov	85	85	83	87	89	86	86	84	82	84	86	86	85	86	86	87	86	87	87	87	86	88	88	88	86.0	89	
23-Nov	87	87	87	87	87	87	87	87	87	87	87	86	82	81	79	78	77	77	78	77	79	80	83	83	83.3	87	
24-Nov	85	85	86	85	86	83	85	85	84	83	82	81	79	77	76	76	77	79	74	73	72	72	71	71	79.5	86	
25-Nov	74	75	75	76	74	80	79	84	84	83	83	82	79	75	74	75	77	73	75	82	80	78	81	81	78.2	84	
26-Nov	83	83	80	80	80	80	80	80	80	81	81	82	83	83	84	85	85	85	85	85	85	83	83	80	82.4	85	
27-Nov	79	80	78	79	80	82	81	83	82	81	80	80	79	79	81	81	81	82	81	81	81	81	80	80	80.5	83	
28-Nov	80	80	80	80	80	80	80	80	80	79	79	79	79	78	77	78	80	80	80	79	80	80	80	79	79.4	80	
29-Nov	79	75	73	73	74	72	72	71	71	70	69	69	67	66	68	69	70	69	67	62	61	61	62	61	69.0	79	
30-Nov	61	61	61	62	64	65	66	65	66	67	66	64	62	61	62	64	67	69	70	70	70	70	70	71	65.6	71	
																			80.6 80.8 80.4 80.1 80.4 80.7 81.0 80.7 81.0 80.7 79.6 77.7 75.8 73.9 72.8 72.7 73.8 74.8 75.9 76.9 78.0 78.2 78.9 79.2						Diurnal Average		
																			93 94 93 94 90 89 89 90 89 89 89 87 89 88 87 87 86 87 87 90 91 89 92 93						Diurnal Maximum		
AF - Analyzer Failure																											



WBEA
Hourly Averages

Relative Humidity 90m (RH90m) - %
Mannix - November 2014





WBEA
Cumulative Frequency Distribution

Relative Humidity 90m (RH90m) - %
Mannix - November 2014

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	26	3.96	3.96
60 - 80	305	46.42	50.38
80 - 100	326	49.62	100.00

Total Number of Valid Hours: 657

Total Number of Hours: 720



Maximum Speed: 28 km/h on Nov 7 04:00	Maximum Daily Speed Average: 18.0 km/h on Nov 7	Hours in Service: 720
Minimum Speed Value: 1 km/h on Nov 9 06:00	Minimum Daily Speed Average: 2.5 km/h on Nov 23	Hours of Data: 688
Maximum Diurnal Speed Average: 4.1 km/h at hour 20	Minimum Diurnal Speed Average: 1.4 km/h at hour 8	Hours of Missing Data: 32
Monthly Average Velocity: 2.6 km/h 325.7 deg	Percentiles: P ₁ = 2 P ₁₀ = 5 Q ₁ = 8 Median = 10 Q ₃ = 13 P ₉₀ = 18 P ₉₉ = 25	Percent Operational Time: 95.6

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	SSW4	WSW8	WSW8	WSW8	SW7	SSW5	S6	S7	S8	SSE7	S5	SW8WSW10	WSW9	SW9	WSW8	WSW4	SSW5	SW7	WSW9	SW8	SSE5	SSE8	SSE8	SW5.9	WSW10		
2-Nov	SSE9	SE8	SSE10	SSE10	SE8	SSE9	SSE11	SSE11	SE11	SE10	SE11	SE12	SSE14	SSE10	SSE12	SSE13	SSE13	SE13	SE13	SSE10	SE11	SE12	SE11	SSE11	SSE10.8	SSE14	
3-Nov	SSE13	SSE11	SSE9	SSE10	SE8	SSE9	SSE8	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	----	SSE13	
4-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	ESE12	SE12	SE11	SE10	SE10	SE8	SSE8	S5	----	SE12
5-Nov	SW6	W15	W13	W19	W25WNW21	W22	W22	W20	W19WNW19	W20	W20	W19	W16	W13WSW10WSW10	SSW4	SSW9	SSW8	SSE9	SSE11	SSE13	W12.3	WNW25					
6-Nov	SE15	SE14	SE17	SE17	SE20	SE21	SE22	SE26	SE24	SE23	SE20	SE16	SE15	SE5	SE7	SSE7	S9	S7	SSW8	W13WNW16WNW20WNW25	NW23	SSE8.4	SE26				
7-Nov	NW19WNW24	NW27	NW28	NW26	NW25	NW25	NNW17	NNW18	NNW19	NNW18	N16	NNW19	NNW20	NNW19	NNW16	NNW15	NNW16	NNW16	NNW13	NNW13	NNW12	NNW10	N11	NNW18.0	NW28		
8-Nov	NNE13	N12	N8	NNW8	WNW7	WSW8	W5	NW8WNW13	NW14	NW15	NNW14	NNW16	NW13	NW14	NW9	NNW8	NNW8	NNE12	NNE12	NNE11	N8	N7	NNW5	NNW8.7	NNW16		
9-Nov	NNW5	W5	WNW4	WSW6	WSW5	NE1	NNE2	NW2	WSW5	NNW3	NNW4	NNW6	N8	NNE10	NNE10	N10	N8	N7	N8	N10	NNE15	NNE12	NNE9	N8	N5.3	NNE15	
10-Nov	NNW11	NNW13	NNW15	NNW15	NW14	NNW16	NW15	NW13	NNW16	NNW19	NNW16	NNW15	NNW17	NNW20	NNW18	NNW16	N11	N10	N10	N15	N13	N10	N10	NNW14	NNW14.0	NNW20	
11-Nov	NNW13	NNW10	NNW9	NNW15	NNW13	N10	NNE11	NNE9	NNE8	NE9	NNE6	NNW5	NW7	NW7	NW6	NW5	NNW4	N5	N5	NE3	S5	SSE4	WSW3	SSW3	NNW5.4	NNW15	
12-Nov	SSW3	SW4	SSW5	SSW6	SSW7	SSW7	SW8	SSW7	S7	S7	S10	S10	SSE9	SSE7	SE8	SSE12	SSE11	S10	S8	SSE7	SSE9	SSE12	SSE11	SSE9	S7.6	SSE12	
13-Nov	SSE8	SSE11	SSE9	SSE9	SSE10	SSE12	SSE11	SSE12	SSE11	SSE9	SE8	SE8	SSE8	SE5	ESE5	SE4	NE1	N5	N10	N7	NNW5	NNW5	N8	NNE9	SE4.1	SSE12	
14-Nov	N8	NNW9	NNW6	NNW6	NNW9	NNW10	NNW9	NNW9	N8	N10	N12	N8	NNW8	NNW12	NNW8	WNW6	WSW6	WSW9	WSW11	WSW12	WSW13	WSW12	SSW10	NW5.9	WSW13		
15-Nov	SSW9	SSW9	S9	SSW8	SSW10	S10	S11	S9	S10	S10	SSE10	S7	SW3WNW13	NW13	NNW16	N17	N20	NNW23	NW18	NW19	NNW19	NW23	NW19	WNW4.8	NNW23		
16-Nov	NW15	NW18	NNW23	NNW23	NW20	NNW18	NNW18	NNW18	NW15	NW15	NW13	NW14	NW15	NNW10	NW8	WNW9	NW5	WNW6	WNW9	WNW10	WNW7	WSW4	WSW7	WSW7	NW11.9	NNW23	
17-Nov	SSW5	S8	SSE9	SSE9	SSE11	SSE10	SSE12	SSE14	SSE13	SSE11	SSE11	SSE16	SE12	SSE15	SSE12	SSE10	S8	WSW6	NW6	NNW8	NW7	WNW5	WNW9	N7	SSE6.1	SSE16	
18-Nov	N16	NNE23	N17	NNW20	NNW19	NW14	NNW14	NNW12	NNW12	NNW15	NNW17	NNW18	NNW20	NNW20	NNW18	NNW17	NNW17	NNW16	NNW15	NNW15	NNW12	NNW12	NNW12	NW14.4	NNE23		
19-Nov	WNW12	WNW10	WNW10	WNW11	WNW9	W8	W8	W9	SW9	SW9	S7	S8	SSW10	S8	S6	SSE9	SSE9	SSE11	SSE11	SSE12	SSE12	SSE10	SSE8	SW5.1	SSE12		
20-Nov	SSE9	SSE11	SSE10	SSE9	SSE10	SSE12	SSE13	SSE11	SSE10	SSE10	SSE11	SSE10	SSE9	SSE7	SSE7	SSE5	SSE3	SE1	ESE3	N4	N11	NNE9	NNW7	N8	SSE5.2	SSE13	
21-Nov	N12	NNE12	NNE11	NNE12	NNE12	NNE13	NNE13	N13	NNW13	NW12	N12	NNW15	NW11	NW13	N9	NNE8	NE11	NE15	NE14	NE13	NE12	NE8	NE9	NE11	NNE10.4	NE15	
22-Nov	NE12	NE14	ENE11	NE11	NE12	NNE10	NE13	ENE15	ENE13	NE11	NNE13	NNE15	NNE16	NNE18	NNE18	NNE14	N15	NNE13	N16	N18	N15	N13	N11	N12	NNE12.8	N18	
23-Nov	N8	NNW7	NNW4	NNW3	W4	W7	SSW2	SSE7	SSE7	S8	S8	SSE8	SSE6	SE8	SSE10	SSE9	S7	SSW7	WSW4	WNW4	WNW2	W6	NW3	NW3	SSW2.5	SSE10	
24-Nov	N13	N12	N13	N12	N11	NNW10	N8	NNE9	NNE9	NNE7	NNE4	NNE5	NE6	N2	NE3	NE2	NE4	NE5	E7	E10	E11	E8	E8	NE11	NNE6.4	N13	
25-Nov	NE9	NE9	NNE9	NNE8	NNE8	N9	N8	NNW6	NNW7	N8	NNE9	N8	NNW6	NNW8	N8	N7	N6	N10	WNW4	N5	ENE2	ESE4	SSW5	SE6	N5.4	N10	
26-Nov	SE8	SE10	SSE10	SSE9	SSE10	SE9	SSE10	SSE10	SSE9	SSE8	SSE7	SSE7	SSE8	S5	S5	SSW3	NNW3	NNW11	NNW13	NNE21	NNE18	NNE15	NNW20	ESE2.6	NNE21		
27-Nov	NNW18	N17	NNE23	NNE17	N10	N11	NNE14	N10	N10	NNE11	NNE13	NNE8	NW4	N7	NNW4	NW5	NNW5	N6	N5	N6	NNE9	NNE10	NNE12	NNE12	N9.9	NNE23	
28-Nov	N11	N13	N14	NNE14	NNE15	N13	NNE13	N14	N13	NNE12	N13	N13	N17	NNE19	N15	N12	NNW9	NNW11	N9	N9	N6	NW3	WNW5	SW6	N10.7	NNE19	
29-Nov	SW8	SW9	SW7	S9	S11	SSE10	SSE10	SSE9	S10	SSW10	SSW4	WSW11	WSW16	W17	WSW15	W19	W19	WNW18	WNW20	NW28	NW24	WNW21	WNW21	WNW21	W9.7	NW28	
30-Nov	WNW23	WNW21	WNW21	W19	WNW19	W19	W17	W19	W18	WSW13	SW7	S7	SSW10	SSW11	S8	SSE12	S13	S15	SSE13	SSE11	SSE13	SSE15	SSE14	SSE12	SW8.4	WNW23	

NNW3.5NNW3.6NNW3.6NNW3.6 NW3.3 NW2.5 NW1.4 NW1.4NNW1.7 NW1.5NNW1.5 NW2.0NNW2.7 NW4.0 NW3.2 NW2.2 NW1.8NNW2.5NNW3.1NNW4.1NNW3.7NNW2.4 NW2.9NNW3.0
 WNW23WNW24 NW27 NW28 NW26 NW25 NW25 SE26 SE24 SE23 SE20 W20 W20WNW20WNW20 W19 W19 N20 NNW23 NW28 NW24WNW21WNW25 NW23

Diurnal Average
 Diurnal Maximum

AF - Analyzer Failure

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



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 8 km/h on Nov 15 19:00	Hours of Data: 688
Minimum Value: 1 km/h on Nov 1 20:00	Hours of Missing Data: 32
Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 7	Hours of Calibration: 0
	Percent Operational Time: 95.6

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

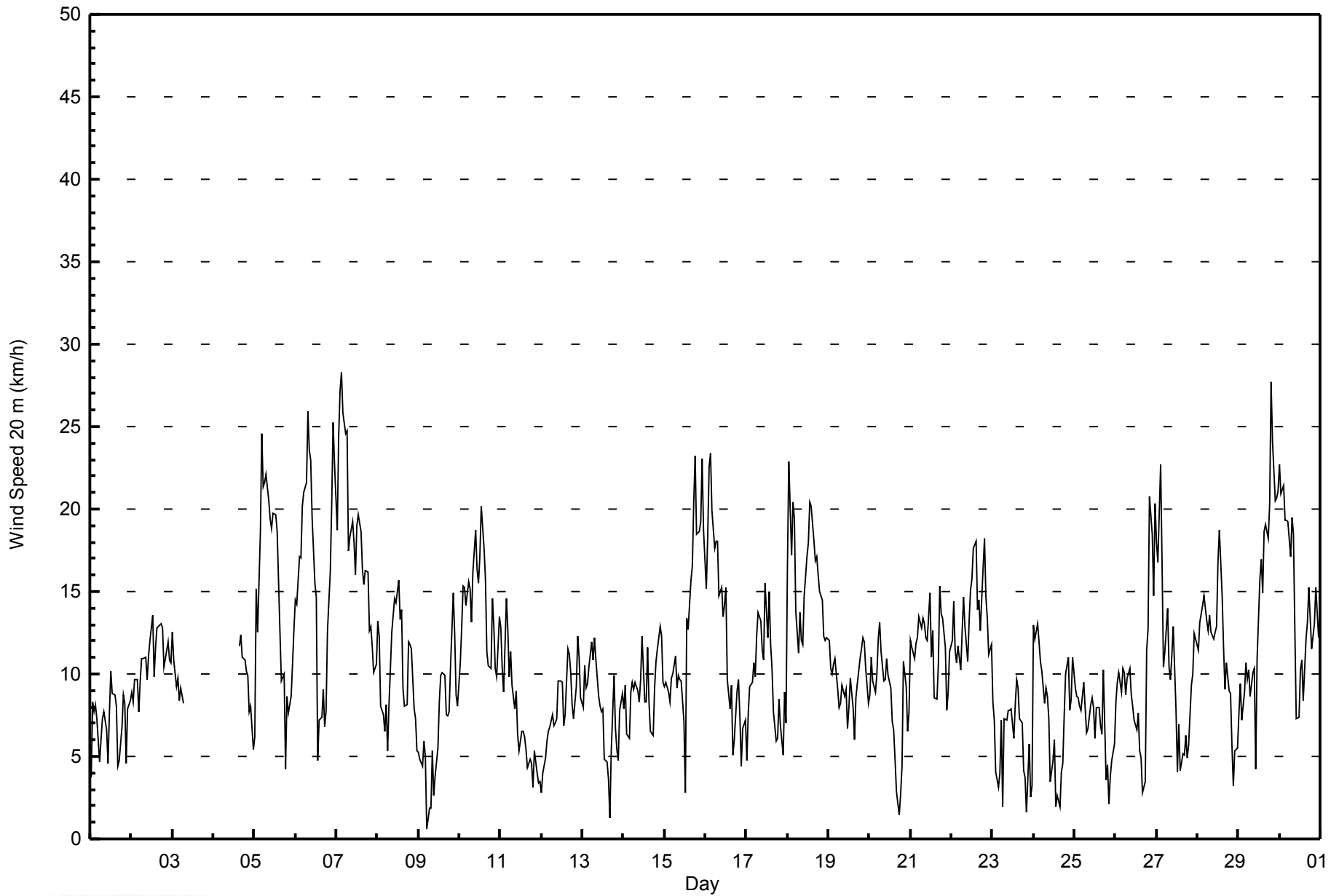
Diurnal Maximum

AF - Analyzer Failure



WBEA
Hourly Averages

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





WBEA
Cumulative Frequency Distribution

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

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	84	12.21	12.21
6 - 11	338	49.13	61.34
12 - 19	219	31.83	93.17
20 - 28	47	6.83	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 688

Total Number of Hours: 720



WBEA
Frequency Distribution

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

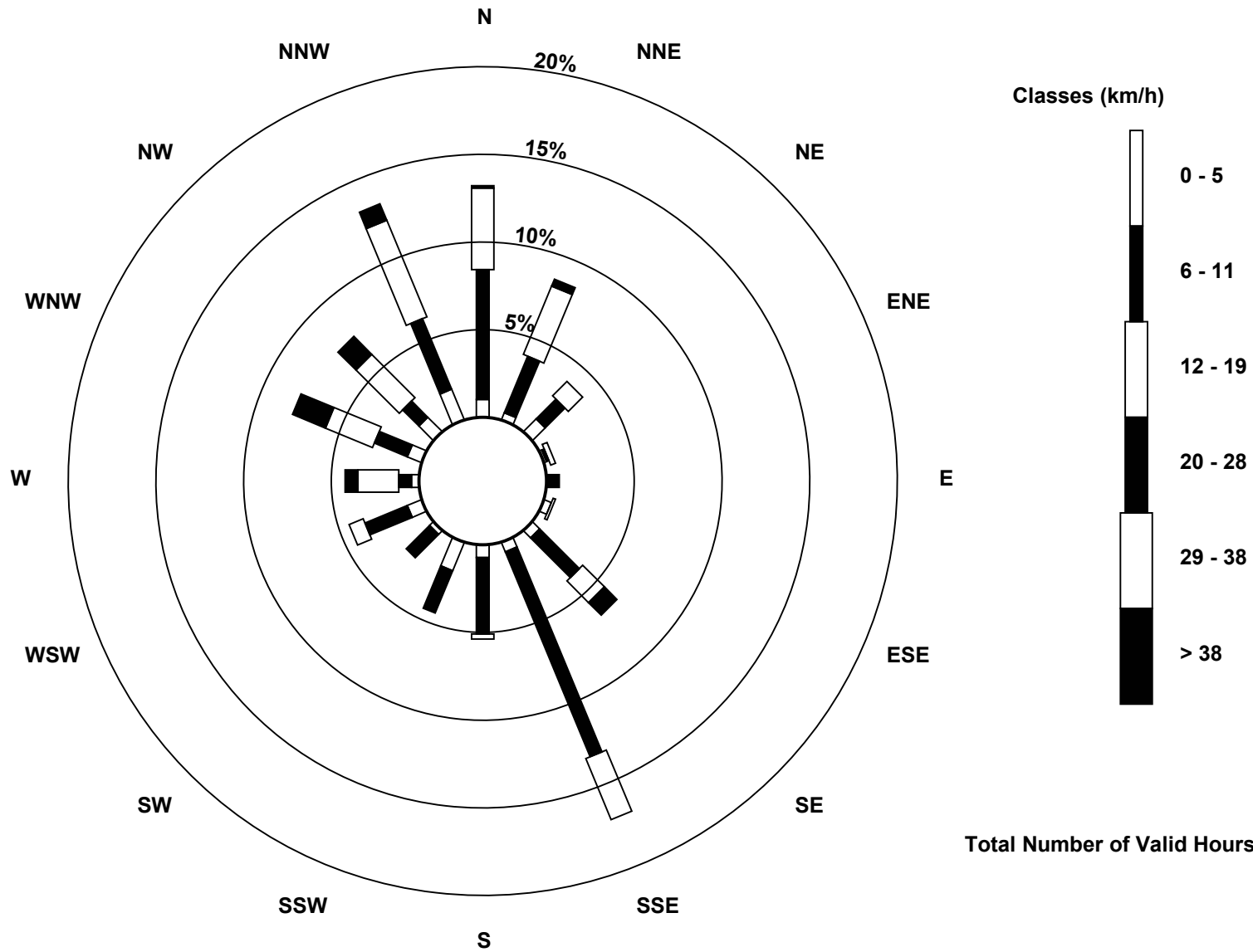
Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	7	3	7	1	0	3	4	4	5	12	2	6	3	6	8	13	84
6 - 11	51	24	11	1	5	0	22	87	30	18	13	18	5	14	9	30	338
12 - 19	32	29	8	2	0	1	12	26	2	0	0	6	16	20	24	41	219
20 - 28	1	3	0	0	0	0	7	0	0	0	0	0	5	14	10	7	47
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	91	59	26	4	5	4	45	117	37	30	15	30	29	54	51	91	688

Total Number of Valid Hours: 688

Total Number of Hours: 720

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

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





Maximum Speed: 36 km/h on Nov 7 04:00	Maximum Daily Speed Average: 23.3 km/h on Nov 7	Hours in Service: 720
Minimum Speed Value: 2 km/h on Nov 13 17:00	Minimum Daily Speed Average: 3.5 km/h on Nov 23	Hours of Data: 667
Maximum Diurnal Speed Average: 6.1 km/h at hour 20	Minimum Diurnal Speed Average: 0.8 km/h at hour 8	Hours of Missing Data: 53
Monthly Average Velocity: 3.4 km/h 328.3 deg	Percentiles: P ₁ = 3 P ₁₀ = 7 Q ₁ = 11 Median = 15 Q ₃ = 18 P ₉₀ = 23 P ₉₉ = 32	Percent Operational Time: 92.6

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-Nov	SW5	W11	W13	WSW12	WSW10	WSW8	SSW8	S12	SSW15	S9	SSW6	SW9	WSW11	WSW10	SW11	WSW11	WSW7	SW6	SW10	WSW14	WSW14	SSW8	SSE14	SSE16	SW8.6	SSE16	
2-Nov	SSE16	SSE15	SSE16	SSE16	SSE15	SSE16	SSE18	SSE18	SE19	SSE15	SSE16	SE16	SSE19	SSE14	SSE18	SE20	SE19	SE20	SE19	SE17	SE17	SE18	SE16	SSE15	SSE16.8	SE20	
3-Nov	SE16	AF	SSE11	SSE11	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	----	SE16	
4-Nov	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-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	W23	WNW22	WNW23	W22	W22	W21	W18	W15	WSW12	WSW13	SSW6	SSW14	SSW12	S13	SSE15	SSE17	----	W23
6-Nov	SE19	SE19	SE22	SE23	SE28	SE28	SE29	SE34	SE30	SE29	SE26	SE21	SE20	SE7	SE11	SSE14	S18	S14	SSW14	W18	WNW22	WNW27	NW33	NW29	SSE11.6	SE34	
7-Nov	NW25	NW32	NW35	NW36	NW32	NW31	NW31	NNW23	NNW24	NNW25	NNW24	N21	NNW24	NNW24	NNW24	NNW22	NNW20	NNW22	NNW22	NNW17	NNW17	NNW16	NNW13	N13	NNW23.3	NW36	
8-Nov	NNE17	N16	N11	NNW11	WNW9	WSW9	WNW7	NW11	NW16	NW17	NW17	NNW17	NNW19	NW16	NW17	NW11	NNW12	N12	NNE15	NNE16	NNE16	N12	N11	N7	NNW11.5	NNW19	
9-Nov	N8	NNW5	NNW7	WNW4	W8	NE3	NNE3	NNE3	WNW4	NNW4	NNW5	NNW7	N10	NNE11	NNE12	NNE12	N10	N10	N10	N14	NNE20	NNE16	NNE11	N11	N7.7	NNE20	
10-Nov	NNW14	NNW17	NNW20	NNW20	NW19	NNW20	NW19	NW17	NNW21	NNW25	NNW22	NNW20	NNW22	NNW26	NNW23	NNW21	N15	N14	N14	N20	N18	N14	N13	NNW17	NNW18.4	NNW26	
11-Nov	NNW16	NNW14	NNW12	NNW19	NNW17	NNE12	NNE14	NNE11	NNE9	NE10	NNE7	NNW7	NW8	NW8	NW7	NW6	NNW6	N6	N5	NE4	SSE6	SSE5	SW4	SW5	N6.8	NNW19	
12-Nov	SW3	SSW6	SSW7	SSW9	SSW10	SSW9	SW10	SSW10	S11	S12	S14	S13	SSE11	SSE8	SE9	SSE14	SSE16	S16	S15	S11	SSE15	SSE19	SSE17	SSE14	S10.9	SSE19	
13-Nov	SSE13	SSE17	SSE16	SSE16	SSE16	SSE17	SSE16	SSE18	SSE16	SSE11	SE9	SE9	SE8	SE5	ESE5	SE4	E2	N6	NNE15	NNE11	N9	N10	N13	NNE14	SE6.0	SSE18	
14-Nov	N12	N14	NNW9	NNW8	NNW12	N14	N13	N14	N12	N11	N12	NNE15	N11	NNW10	NNW15	NNW11	WNW9	WSW11	WSW14	W16	WSW19	WSW21	WSW19	SW14	NW8.7	WSW21	
15-Nov	SSW17	SSW17	SSW16	SSW15	SSW17	SSW16	S16	S13	S15	S14	SSE13	SSW10	WSW5	WNW16	NW16	NNW22	N23	N27	N31	NW24	NW24	NNW26	NW29	NW25	WNW6.7	NNW31	
16-Nov	NW21	NNW25	NNW30	NNW31	NNW25	NNW24	NNW24	NNW24	NNW19	NW19	NW18	NW17	NW19	NNW12	NW11	WNW13	NW8	NW9	NW13	WNW14	NW12	WNW6	W7	WSW11	NW16.4	NNW31	
17-Nov	WSW8	SSW8	S13	SSE16	SSE16	SSE16	SSE18	SSE20	SSE21	SSE18	SSE17	SSE21	SSE18	SSE21	SSE19	S18	S15	W16	WNW15	NNW14	NNW11	NW10	WNW15	NNW12	S8.6	SSE21	
18-Nov	N24	N31	N24	NNW28	NNW25	NW18	NW15	NW18	NW15	WNW16	WNW19	WNW22	WNW22	WNW25	NW24	NW23	WNW23	WNW23	WNW22	WNW20	WNW19	WNW16	WNW16	WNW17	NW18.9	N31	
19-Nov	WNW16	WNW14	WNW13	WNW13	WNW14	WNW12	WNW11	W11	W12	WSW10	SW11	SSW10	S10	SSW13	S12	S11	SSE13	SSE15	SSE17	SSE16	SSE18	SSE16	SSE14	SSE13	SSW6.9	SSE18	
20-Nov	SSE13	SSE15	SSE13	SSE12	SSE13	SSE16	SSE17	SSE15	SSE13	SSE13	SSE14	SSE12	S12	SSE9	SSE8	SSE6	S5	SSE3	ESE3	NNE6	N14	NNE12	N10	N11	SSE6.8	SSE17	
21-Nov	N17	NNE15	NNE14	NNE16	NNE16	NNE18	NNE17	N18	N18	NNW15	N16	NNW20	NW14	NW15	N10	NNE10	NE14	NE20	NE16	NE17	NE14	NE9	NE11	NE15	NNE13.7	NNW20	
22-Nov	NE15	NE18	ENE13	NE13	NE15	NE13	NE15	ENE17	ENE15	NE14	NNE16	NNE18	NNE20	NNE22	NNE23	NNE18	NNE19	NNE16	N21	N24	N20	NNE18	N15	N16	NNE16.3	N24	
23-Nov	N12	NNW9	N5	NNW4	W4	W8	SW2	SSE8	SSE10	S11	S11	SSE9	SSE7	SE10	SSE12	S14	S15	SSW13	SW8	W7	W4	W8	N5	NNW5	SSW3.5	S15	
24-Nov	N18	N17	N17	N16	N14	NNW14	N11	NNE12	NNE11	NNE9	NNE4	NNE5	NE7	NE3	NE2	NE4	NE5	E9	E12	E13	E10	E10	ENE12	ENE12	NNE8.0	N18	
25-Nov	NE10	NE10	NE11	NNE11	NNE10	N13	N11	NNW8	NNW8	N11	NNE10	N9	NNW7	NNW10	N10	N10	NNE9	NNE13	N5	NNE7	ENE3	ESE6	SSE7	SSE11	NNE7.0	NNE13	
26-Nov	SE14	SSE16	SSE17	SSE17	SSE19	SSE18	SSE17	SSE16	SSE19	SSE15	SSE12	SSE12	SSE11	SSE12	S11	S9	S4	NNW4	N16	N18	NNE28	NNE25	NNE20	N27	SE5.1	NNE28	
27-Nov	NNW24	N23	NNE29	NNE22	N15	N16	NNE19	N14	N13	NNE15	NNE17	NNE10	NNW5	N8	NNW5	NNW7	NNW7	N9	N8	NNE12	NNE13	NNE16	NNE15	N13.2	NNE29		
28-Nov	N14	N17	N17	NNE18	NNE19	N17	NNE16	N18	N16	NNE16	N16	N17	N22	NNE24	N19	N15	NNW12	NNW14	N13	N11	N8	NNW3	WNW7	WSW6	N14.0	NNE24	
29-Nov	SW11	SW16	SW15	SSW17	SSW17	SSW13	S15	S15	S18	SW18	SW9	WSW15	WSW19	W19	W18	W21	W23	WNW24	WNW27	NW35	NW30	WNW27	WNW28	WNW29	W14.8	NW35	
30-Nov	WNW29	WNW28	WNW28	WNW23	WNW25	W25	W21	W23	W23	WSW18	SW10	S11	SSW16	SSW16	S12	S18	S22	S24	SSE21	SSE18	SSE20	SSE23	S22	SSE21	SW12.3	WNW29	

NNW5.1	NNW5.3	NNW4.5	NNW4.0	NW3.8	NW2.9	N1.5	NNW0.8	W1.7	WNW1.7	NNW1.7	NW2.2	WNW3.2	NW4.5	NW3.5	NW2.7	NW2.4	NW3.6	NNW4.7	NNW6.1	NNW5.8	NNW4.0	NNW4.1	NNW4.2	Diurnal Average
WNW29	NW32	NW35	NW36	NW32	NW31	NW31	SE34	SE30	SE29	SE26	W22	NNW24	NNW26	WNW24	NW23	WNW23	N27	NNW31	NW35	NW30	WNW27	NW33	WNW29	Diurnal Maximum

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



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 8 km/h on Nov 15 19:00	Hours of Data: 667
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Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 2 Median = 3 Q ₃ = 3 P ₉₀ = 5 P ₉₉ = 7	Hours of Calibration: 0
	Percent Operational Time: 92.6

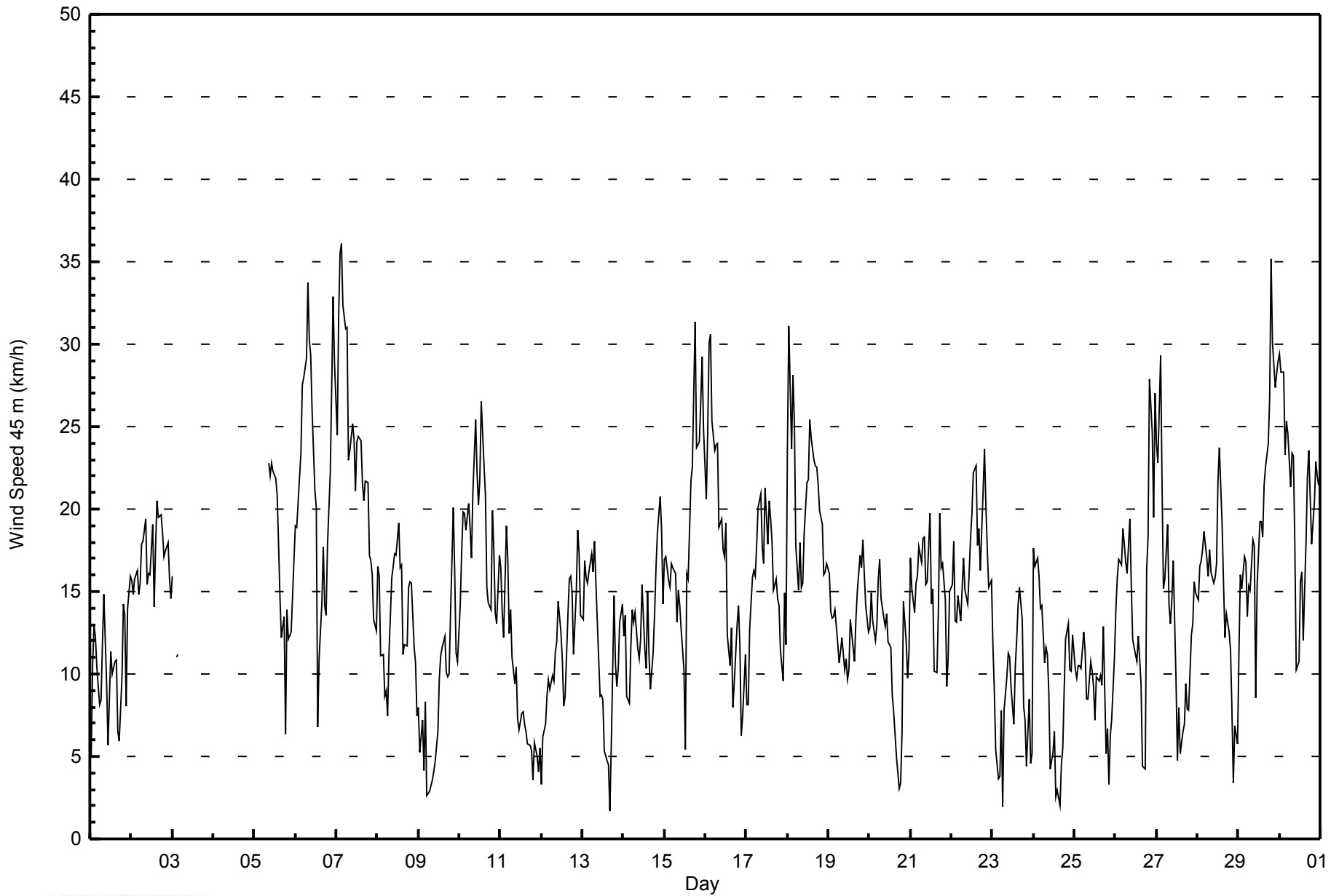
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	3	2	2	1	1	2	3	2	2	2	2	3	2	3	3	2	3	1	4	2	2	2	3	2	4
2-Nov	2	2	3	3	3	2	2	2	3	4	3	3	3	3	3	2	2	3	3	2	3	3	2	2	4
3-Nov	3	AF	3	2	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF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

AF - Analyzer Failure



WBEA
Hourly Averages

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





WBEA
Cumulative Frequency Distribution

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

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	44	6.60	6.60
6 - 11	165	24.74	31.33
12 - 19	324	48.58	79.91
20 - 28	112	16.79	96.70
29 - 38	22	3.30	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 667

Total Number of Hours: 720



WBEA
Frequency Distribution

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

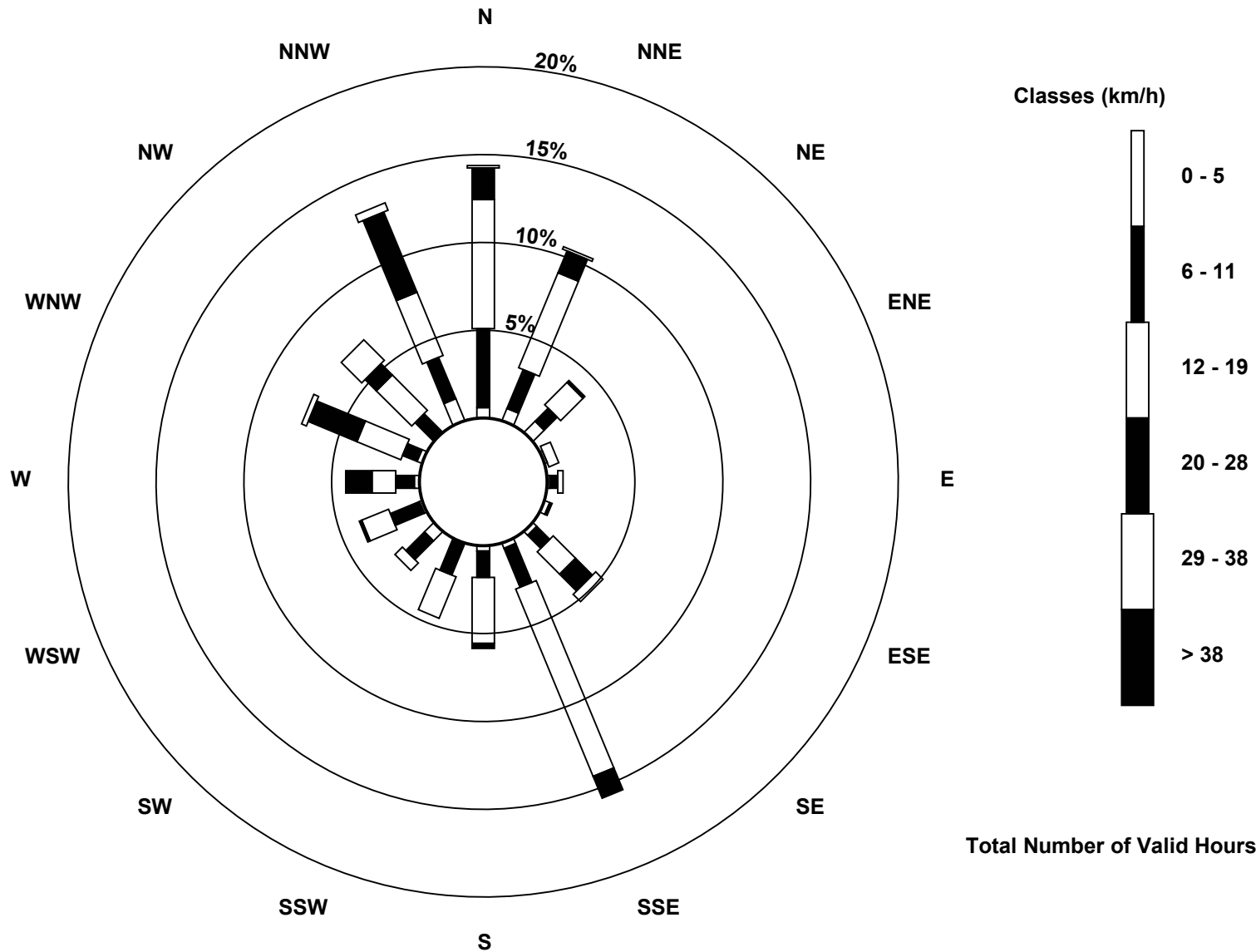
Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	4	5	6	1	1	2	2	2	2	0	5	1	2	2	0	9	44
6 - 11	30	16	7	0	3	1	7	16	10	13	10	12	7	6	10	17	165
12 - 19	49	39	12	4	2	0	12	77	25	17	4	11	9	18	19	26	324
20 - 28	12	9	1	0	0	0	9	9	2	0	0	1	10	20	6	33	112
29 - 38	1	1	0	0	0	0	4	0	0	0	0	0	0	2	11	3	22
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	96	70	26	5	6	3	34	104	39	30	19	25	28	48	46	88	667

Total Number of Valid Hours: 667

Total Number of Hours: 720

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

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





Maximum Speed: 41 km/h on Nov 7 04:00	Maximum Daily Speed Average: 26.0 km/h on Nov 7	Hours in Service: 720
Minimum Speed Value: 2 km/h on Nov 23 07:00	Minimum Daily Speed Average: 3.8 km/h on Nov 23	Hours of Data: 662
Maximum Diurnal Speed Average: 7.2 km/h at hour 21	Minimum Diurnal Speed Average: 0.6 km/h at hour 10	Hours of Missing Data: 58
Monthly Average Velocity: 3.8 km/h 330.2 deg	Percentiles: P ₁ = 3 P ₁₀ = 7 Q ₁ = 12 Median = 17 Q ₃ = 22 P ₉₀ = 27 P ₉₉ = 36	Percent Operational Time: 91.9

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-Nov	WSW6	W11	W17	W15WSW14	WSW12	SW10	SSW11	SSW15	SSW11	SSW7	SW9WSW12	WSW10	SW12WSW12	WSW8	SW6	SW10	W16	W15	SW11	S9	SSE13	SW9.9	W17			
2-Nov	S15	SSE19	SSE19	SSE23	SSE23	SSE24	SSE27	SSE27	SSE26	SSE22	SSE22	SSE22	SSE25	SSE20	SSE25	SE23	SE23	SE24	SE24	SE20	SE19	SE15	SE18	SSE18	SSE21.4	SSE27
3-Nov	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-Nov	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-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	---	WNW28
6-Nov	SE22	SE23	SE25	SE24	SE28	SE29	SE29	SE37	SE33	SE33	SE29	SE24	SE22	SE8	SSE15	SSE21	S22	S17	SW14	W22WNW26	WNW32	NW36	NW32	SSE12.8	SE37	
7-Nov	NW28	NW35	NW40	NW41	NW36	NW34	NNW34	NNW26	NNW26	NNW28	NNW27	N23	NNW27	NNW27	NNW26	NNW24	NNW23	NNW25	NNW25	NNW19	NNW19	NNW18	NNW15	NNE13	NNW26.0	NW41
8-Nov	NNE18	N18	N12	NNW14	NNW10	WSW10	NW9	NW13	NW17	NW18	NW18	NNW18	NNW20	NW17	NW17	NW12	NNW14	N14	NNE18	NNE19	NNE19	N15	N13	N9	NNW13.0	NNW20
9-Nov	N9	N7	N7	N7	W6	NNE5	NE4	NE5	N4	NNW5	N5	NNW7	N10	NNE11	NNE12	NNE13	N11	N11	N11	N15	NNE24	NNE21	NNE14	N13	N9.3	NNE24
10-Nov	NNW16	NNW20	NNW23	NNW23	NNW22	NNW23	NNW21	NW19	NNW24	N28	NNW25	NNW23	NNW24	NNW30	NNW25	N24	N17	N16	N17	N23	N20	N16	N15	NNW20	NNW21.0	NNW30
11-Nov	NNW19	NNW16	NNW14	NNW23	NNW19	NNE14	NNE16	NNE12	NNE10	NE11	NE7	NNW6	NW8	NW8	NW7	NW6	NNW5	N6	N5	NE3	SSE6	SSE5	SSW4	SW6	N7.3	NNW23
12-Nov	WSW4	SSW9	SSW7	SSW9	SSW10	SSW9	SW10	SSW10	S13	S14	S15	S13	SSE11	SSE8	SE9	SSE15	SSE20	S19	SSW16	S13	S15	S17	S17	S15	S12.0	SSE20
13-Nov	S12	S13	S12	S14	S18	S19	S15	S15	SSE19	S14	SSE10	SE9	SE8	SE6	SE4	SE5	SE3	NNE3	NNE15	NE16	NNE13	N15	NNE19	NNE20	SE5.1	NNE20
14-Nov	N17	N17	N10	N11	NNW13	N17	N16	N16	N13	NNW13	N13	NNE17	N13	NNW11	NNW17	NNW12	WNW11	WSW15	WSW18	W21	W23	W25	WSW22	SW17	NW10.6	W25
15-Nov	SW21	SSW21	SSW20	SW18	SW20	SSW20	SSW20	S16	S18	S17	S15	SSW12	WSW9	WNW17	NW18	NNW26	N26	N30	N36	NNW27	NNW28	NNW31	NW33	NW30	WNW8.8	N36
16-Nov	NW24	NNW30	NNW35	NNW35	NNW29	NNW28	NNW28	NNW28	NNW22	NNW22	NNW20	NW18	NW21	NNW13	NW12	WNW14	NW9	NW10	NW16	NW15	NW15	NNW7	NW5	W9	NNW18.9	NNW35
17-Nov	W8	SW8	SSW10	SSE17	S16	S17	SSE23	SSE27	SSE31	SSE24	SSE24	SSE29	SSE25	SSE29	SSE27	S24	SW20	W21	WNW21	NW20	NNW16	NW12	WNW16	NNW17	S10.9	SSE31
18-Nov	NNE29	N36	N27	N33	NNW30	NW20	NW18	NW21	NW17	NW17	WNW20	WNW23	WNW23	WNW27	NW26	NW25	WNW25	WNW25	WNW24	WNW23	WNW21	NW19	WNW18	WNW19	NW21.2	NNE36
19-Nov	NW18	NW16	WNW15	WNW15	WNW15	WNW13	WNW13	W14	WSW11	SW12	SSW11	S11	SSW14	S13	S12	SSE15	SSE20	SSE23	SSE22	S23	SSE21	SSE20	SE18	SSW8.2	S23	
20-Nov	SSE18	SSE19	SSE18	SSE17	SE17	SSE18	SSE20	SSE17	SSE18	SSE17	SSE16	SSE14	S14	S10	S8	S8	S6	SSW2	ENE3	NNE7	NNE16	NNE14	N12	N14	SSE8.4	SSE20
21-Nov	N20	NNE18	NNE16	NNE19	NNE18	NNE21	NNE19	N21	N22	NNW18	N17	N23	NNW16	NW16	N11	NE11	NE16	NE23	NE18	NE19	NE17	ENE11	NE13	NE18	NNE15.8	N23
22-Nov	NE18	NE21	ENE15	NE15	NE17	NE15	ENE17	ENE19	ENE17	NE16	NNE18	NNE20	NNE22	NNE25	NNE26	NNE20	NNE21	NNE18	NNE23	NNE26	N22	NNE19	N17	N17	NNE18.2	NNE26
23-Nov	N13	NNW10	N6	NNW4	WSW3	W9	SW2	SE6	SSE13	S14	S12	SSE10	SSE7	SE11	SSE14	S16	S18	SSW16	SW12	WSW10	W8	NW6	N7	NNW9	SSW3.8	S18
24-Nov	NNE21	NNE20	N18	N18	N14	NNW17	N12	NNE13	NNE13	NNE10	NNE4	NNE5	NE7	NNE3	NE4	ENE2	NE5	ENE6	E8	E10	E13	E9	E10	ENE13	NNE8.8	NNE21
25-Nov	NE11	ENE11	NE12	NNE13	NNE13	N13	N14	N10	NNW9	N12	NNE11	N9	NNW7	NNW10	N10	NNE12	NNE10	NNE13	NNE7	NNE8	NNE4	E5	SSE9	SSE13	NNE7.9	NNE14
26-Nov	SSE17	SSE24	SSE22	SSE24	SSE26	SSE26	SSE26	SE19	SSE24	SSE26	SSE21	SSE20	SSE16	SSE18	SSE16	SSE15	SSE8	NNW2	N19	N23	NNE31	NNE28	NNE24	N31	SE9.7	NNE31
27-Nov	N27	N26	NNE33	NNE26	NNE19	N19	NNE23	N16	N15	NNE18	NNE21	NNE11	NNW4	NNE8	NNW5	NNW7	N7	N11	N9	N9	NNE16	NNE17	NNE18	NNE17	NNE15.6	NNE33
28-Nov	NNE16	NNE18	NNE18	NNE19	NNE21	NNE19	NNE17	NNE19	N18	NNE17	NNE18	NNE19	N24	NNE26	N21	N17	NNW14	NNW15	N15	N13	NNE9	N4	NW5	WSW4	N15.7	NNE26
29-Nov	SW10	WSW21	SW20	SW21	SW18	SW17	SSW14	SW17	SW19	WSW21	WSW14	WSW19	WSW22	W21	W21	W24	W25	WNW27	WNW30	NW39	NW32	WNW31	WNW32	WNW33	W18.8	NW39
30-Nov	WNW34	WNW33	WNW33	WNW26	WNW30	W29	W25	W27	WSW27	WSW22	WSW14	SSW14	SSW18	SSW18	S14	S22	S27	S29	S24	S23	S26	S27	S29	S27	SW15.8	WNW34

NNW7.1 NNW6.2 NNW6.0 NNW5.6 NW4.2 NW3.5 NNW1.8 NNW1.1 WSW0.9 NNW0.6 NW1.4 NW1.7 NNW3.0 NW4.1 NW3.1 NW2.5 NNW2.6 NW3.9 NNW5.6 NNW7.1 NNW7.2 NNW5.6 NNW4.9 NNW5.2
 WNW34 NNE36 NW40 NW41 NW36 NW34 NNW34 SE37 SE33 SE33 SE29 SSE29 NNW27 NNW30 SSE27 NNW26 S27 N30 N36 NW39 NW32 WNW32 NW36 WNW33

Diurnal Average
 Diurnal Maximum

AF - Analyzer Failure

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



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 9 km/h on Nov 6 07:00			Hours of Data:	662
Minimum Value: 1 km/h on Nov 1 18:00			Hours of Missing Data:	58
			Hours of Calibration:	0
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 8			Percent Operational Time:	91.9

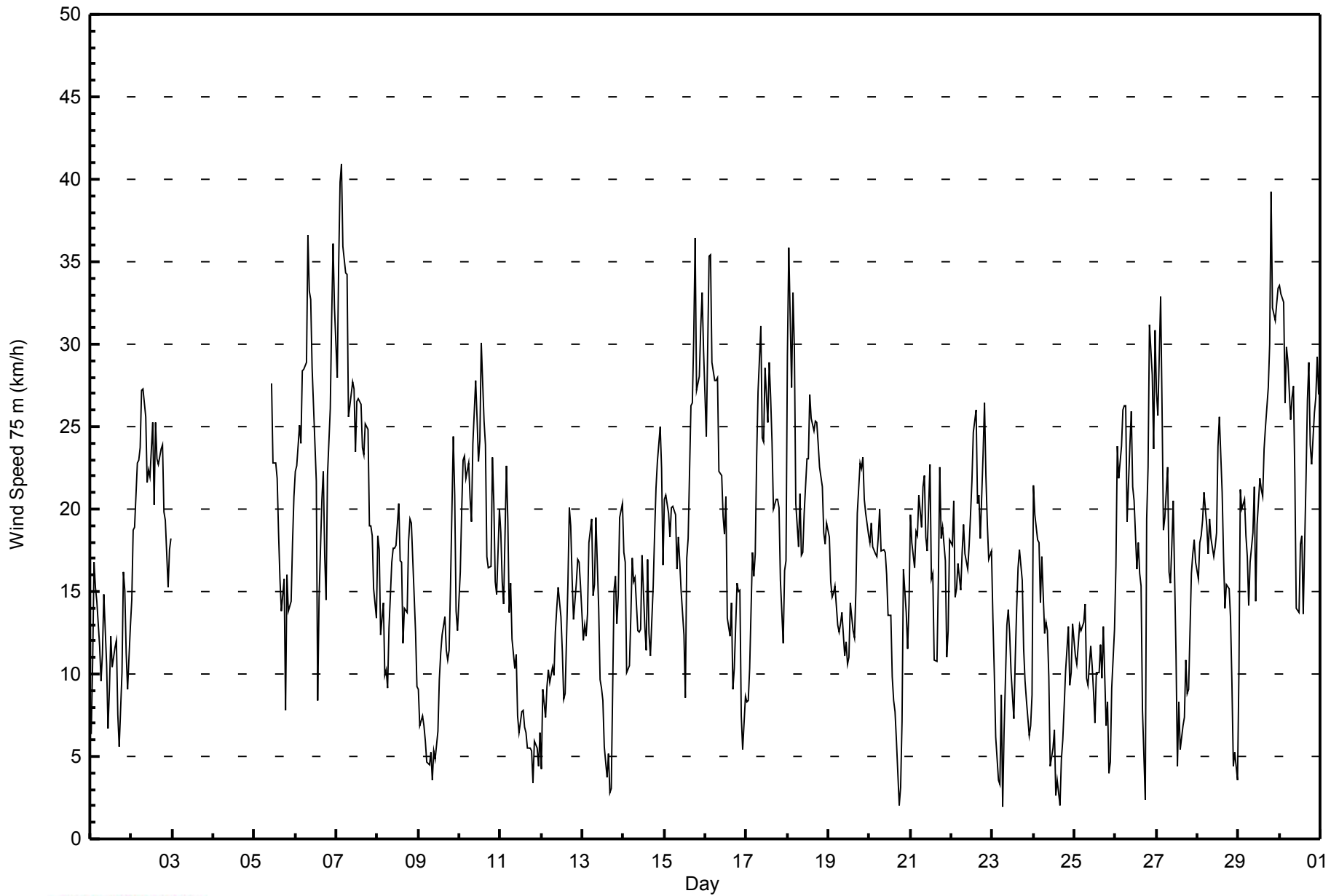
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	3	2	2	2	1	2	2	2	2	2	2	3	2	3	2	2	3	1	4	2	1	3	2	3	4
2-Nov	6	3	1	2	2	1	2	2	2	3	3	3	4	3	2	1	2	3	2	3	4	4	3	2	6
3-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF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

AF - Analyzer Failure



WBEA
Hourly Averages

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





WBEA
Cumulative Frequency Distribution

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

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	36	5.44	5.44
6 - 11	120	18.13	23.57
12 - 19	274	41.39	64.95
20 - 28	184	27.79	92.75
29 - 38	45	6.80	99.55
> 38	3	0.45	100.00

Total Number of Valid Hours: 662

Total Number of Hours: 720



WBEA
Frequency Distribution

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

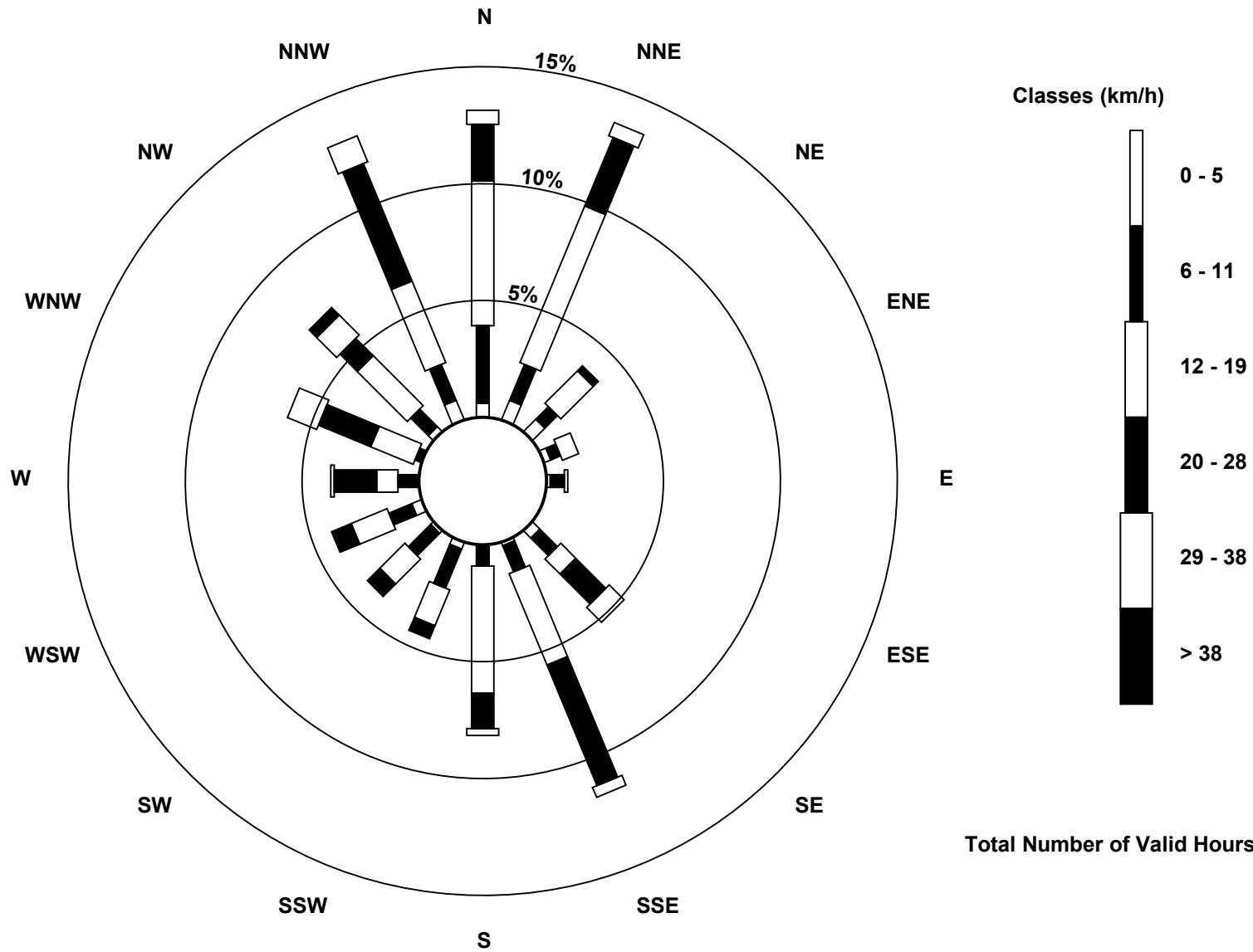
Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	4	6	5	2	1	0	3	1	0	2	1	3	0	0	2	6	36
6 - 11	22	11	5	3	4	0	7	8	6	12	9	7	6	2	7	11	120
12 - 19	41	48	13	5	1	0	6	28	36	11	10	11	6	13	20	25	274
20 - 28	16	21	2	0	0	0	12	37	10	4	5	6	12	16	7	36	184
29 - 38	4	4	0	0	0	0	6	3	2	0	0	0	1	9	8	8	45
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3
Totals	87	90	25	10	6	0	34	77	54	29	25	27	25	40	47	86	662

Total Number of Valid Hours: 662

Total Number of Hours: 720

Wood Buffalo Environmental Association
 Wind Rose Nov 2014

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



Total Number of Valid Hours: 662



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Speed 90 m (WS90m) - km/h

Mannix - November 2014

Maximum Speed: 42 km/h on Nov 7 04:00	Maximum Daily Speed Average: 27.0 km/h on Nov 7	Hours in Service: 720
Minimum Speed Value: 1 km/h on Nov 26 18:00	Minimum Daily Speed Average: 3.5 km/h on Nov 13	Hours of Data: 661
Maximum Diurnal Speed Average: 8.0 km/h at hour 21	Minimum Diurnal Speed Average: 0.6 km/h at hour 11	Hours of Missing Data: 59
Monthly Average Velocity: 4.2 km/h 322.9 deg	Percentiles: P ₁ = 3 P ₁₀ = 8 Q ₁ = 12 Median = 18 Q ₃ = 23 P ₉₀ = 29 P ₉₉ = 38	Percent Operational Time: 91.8

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-Nov	WSW7	W11	W18	W17	WSW17	WSW13	SW11	SSW11	SSW15	SSW11	SSW7	SW9	WSW12	SW11	SW12	WSW13	WSW8	SW6	SW10	W15	W16	SW13	S8	SSE9	WSW10.6	W18
2-Nov	S10	SSE15	SSE14	SSE19	SSE22	SSE23	SSE26	SSE30	SSE27	SSE24	SSE27	SE26	SSE28	SSE23	SSE27	SE25	SE25	SE26	SE27	SE23	SE20	ESE18	SE18	SE21	SE22.0	SSE30
3-Nov	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-Nov	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-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	W23	W24	W24	W19	W16	WSW15	WSW17	SSW8	S16	SSW14	SSE15	SSE20	SSE23	----	W24
6-Nov	SE25	SE25	SE28	SE28	SE32	SE31	SE34	SE40	SE37	SE36	SE32	SE27	SE24	SE10	SE17	SSE23	S24	S17	SW15	W24	WNW27	WNW32	WNW37	NW33	SSE14.3	SE40
7-Nov	NW29	WNW35	NW42	NW42	NW37	NW35	NW35	NNW26	NW27	NNW29	NNW29	NNW24	NNW28	NNW28	NNW27	NNW25	NNW25	NNW26	NNW26	NNW20	NNW19	NNW19	NNW16	N14	NNW27.0	NW42
8-Nov	N19	N18	N13	NNW16	NNW11	WSW11	WNW10	NW13	NW17	NW18	NW18	NW18	NNW21	NW17	NW17	NW12	NNW15	NNW14	NNE19	NNE21	N21	N16	N13	N10	NNW13.8	NNE21
9-Nov	N10	N8	N8	N8	W5	N5	NNE6	NE6	N4	NNW6	NNW5	NNW7	NNW10	N12	NNE13	N14	N12	N11	N12	N16	N26	NNE23	NNE15	N14	N10.2	N26
10-Nov	NNW17	NNW21	NNW24	NNW25	NW23	NNW24	NW21	NW20	NNW25	NNW29	NNW27	NNW24	NNW25	NNW32	NNW27	NNW25	N18	N17	N17	N25	N21	NNW16	NNW16	NNW22	NNW22.2	NNW32
11-Nov	NNW20	NNW17	NNW15	NNW24	NNW21	N14	NNE16	NNE13	NNE11	NNE12	NNE8	NNW6	NW8	NW8	NW7	NW7	NNW5	N6	N5	NE3	SE6	SE6	S5	SW6	N7.7	NNW24
12-Nov	SW4	SSW10	SSW7	S9	S10	SSW10	SSW11	SSW10	S13	S15	S16	S14	SSE11	SSE9	SE9	SSE17	SSE22	S19	SSW17	SSW14	S14	S15	S14	SSW14	S12.1	SSE22
13-Nov	SSW11	SSW12	SSW12	SSW14	S15	S16	S12	S12	SSE17	S11	SSE10	SE10	SE9	SE7	ESE5	SE6	SSE4	NNE2	NNE13	NE16	NNE14	N17	NNE22	NNE24	SE3.5	NNE24
14-Nov	N20	N19	N11	N12	NNW14	N18	N17	N17	NNW13	NNW13	N13	N18	N13	NNW12	NNW17	NNW13	W12	WSW16	WSW21	W23	W23	W25	WSW24	SW18	NW11.6	W25
15-Nov	SW22	SSW22	SSW21	SW20	SW21	SSW22	SSW21	S18	S20	S18	S15	SW14	WSW10	W17	NW19	NNW28	N28	N32	NNW38	NW29	NW30	NNW33	NW35	NW32	WNW10.3	NNW38
16-Nov	NW26	NNW32	NNW38	NNW38	NW30	NNW29	NNW29	NNW30	NNW24	NW23	NW21	NW19	NW21	NW14	WNW13	WNW15	NW9	WNW11	NW16	NW16	NW15	NNW8	NNW5	W6	NW19.8	NNW38
17-Nov	WSW6	WSW10	SSW10	SSE15	S14	S12	SSE24	SSE31	SSE34	SE27	SSE27	SSE33	SSE30	SSE32	SSE31	S25	SW22	W22	W22	NW22	NNW17	NW12	NNW16	NW19	S11.4	SSE34
18-Nov	N32	N38	N29	NNW35	NNW32	NW22	WNW19	NW22	NW18	WNW18	WNW20	WNW23	WNW23	WNW27	WNW26	WNW25	WNW26	WNW26	WNW25	WNW23	WNW22	NW19	WNW18	WNW20	NW22.0	N38
19-Nov	WNW19	WNW16	WNW15	WNW15	WNW16	WNW13	W13	W14	W14	SW11	SW12	S11	S12	SSW15	S13	S13	SSE15	SSE20	SSE25	SSE26	S25	SSE22	SSE23	SE21	SSW9.0	SSE26
20-Nov	SE21	SSE21	SE20	SE20	SE20	SSE20	SSE22	SSE19	SSE20	SSE20	SSE18	SSE14	S15	S11	S9	S6	SSW5	WSW3	NNE3	N8	N17	NNE15	N13	N15	SE9.0	SSE22
21-Nov	N21	NNE19	NNE18	NNE20	N20	N22	N20	N22	NNW23	NNW20	N18	NNW24	NW16	NW17	NNW11	NNE11	NE17	NE23	NE19	NNE20	NE18	NE12	NE13	NE19	N16.7	NNW24
22-Nov	NE19	NE22	NE16	NE16	NE18	NE16	NE19	ENE20	ENE19	NE17	NNE19	NNE20	N22	N26	NNE28	NNE21	N22	NNE19	N24	N27	N22	N20	N18	N18	NNE19.0	NNE28
23-Nov	N14	NNW11	N7	NNW4	WSW3	W9	WSW2	SE6	SSE15	SSE16	S13	SSE11	SSE8	SE12	SSE15	S18	S18	SSW17	SW14	WSW11	W10	NW7	NNW8	NNW11	SSW4.0	S18
24-Nov	N23	N21	N19	N19	N14	NNW18	N13	N13	N13	N10	N5	NNE6	NE7	NNE3	NE3	NE2	NE5	ENE7	E11	E15	E16	E13	E12	ENE13	NNE9.2	N23
25-Nov	NE11	ENE11	NE12	NNE14	NNE14	N13	N15	N11	NNW10	N12	N11	N9	NNW7	NNW10	N10	N13	NNE9	NNE13	N7	N8	NNE4	E5	SSE12	SSE15	NNE8.0	SSE15
26-Nov	SSE16	SSE24	SE24	SE27	SE29	SSE30	SSE27	SE24	SE27	SSE29	SSE24	SSE20	SSE18	SE19	SE17	SSE15	SE10	NNE1	N20	N24	N33	N30	N26	NNW33	SE10.6	N33
27-Nov	NNW29	N27	N34	NNE28	N20	N21	N24	N17	N17	NNE19	NNE22	NNE12	NW4	N9	NNW6	NNW7	N8	N12	N9	N10	NNE18	NNE20	NNE19	N18	N16.8	N34
28-Nov	N16	N19	N19	N20	N22	N20	N18	N20	N19	N18	N18	N19	N25	N26	N22	N18	NNW15	NNW16	N16	N14	N11	N5	NW5	WSW3	N16.4	N26
29-Nov	SW10	WSW23	SW23	SW22	SW19	SW19	SW14	SW18	SW20	WSW23	WSW17	WSW20	WSW22	WSW21	WSW21	W24	W26	WNW28	WNW31	NW40	WNW33	WNW32	WNW33	WNW34	W20.5	NW40
30-Nov	WNW35	WNW34	WNW34	W27	W31	W30	W27	W28	WSW29	WSW24	WSW16	SSW15	SSW19	SSW19	S14	S23	S28	S31	S25	S23	SSE27	S29	S32	S29	SW17.4	WNW35

NNW8.0 NNW7.0 NNW6.7 NNW6.5 NW4.9 NW4.4 NW2.5 NW1.2 WSW1.2 NNW0.9 NW0.6 NNW1.8 NNW3.1 NNW4.1 NW3.2 NNW2.7 NNW3.0 NW4.3 NW6.0 NNW7.7 NNW8.0 NNW6.3 NNW5.3 NNW5.7
 WNW35 N38 NW42 NW42 NW37 NW35 NW35 SE40 SE37 SE36 SE32 SSE33 SSE30 SSE32 SSE31 NNW28 S28 N32 NNW38 NW40 N33 NNW33 WNW37 WNW34

Diurnal Average
 Diurnal Maximum

AF - Analyzer Failure

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



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 8 km/h on Nov 29 20:00			Hours of Data:	661
Minimum Value: 1 km/h on Nov 1 18:00			Hours of Missing Data:	59
			Hours of Calibration:	0
			Percent Operational Time:	91.8
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 7				

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

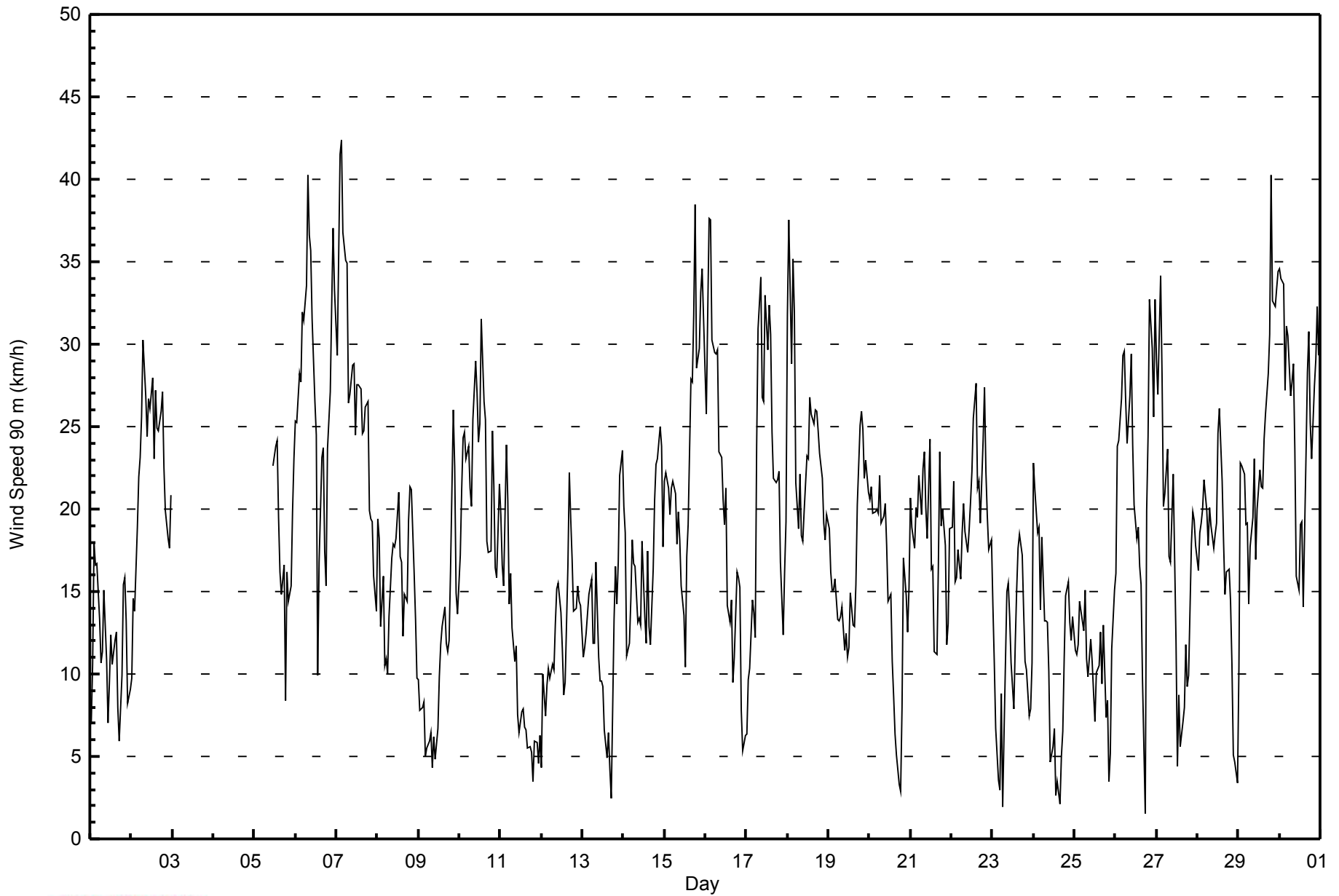
7 6 7 8 7 6 7 8 7 5 7 5 6 6 4 6 6 7 8 8 6 7 6 7

AF - Analyzer Failure



WBEA
Hourly Averages

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





WBEA
Cumulative Frequency Distribution

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

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	31	4.69	4.69
6 - 11	112	16.94	21.63
12 - 19	247	37.37	59.00
20 - 28	200	30.26	89.26
29 - 38	67	10.14	99.39
> 38	4	0.61	100.00

Total Number of Valid Hours: 661

Total Number of Hours: 720



WBEA
Frequency Distribution

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

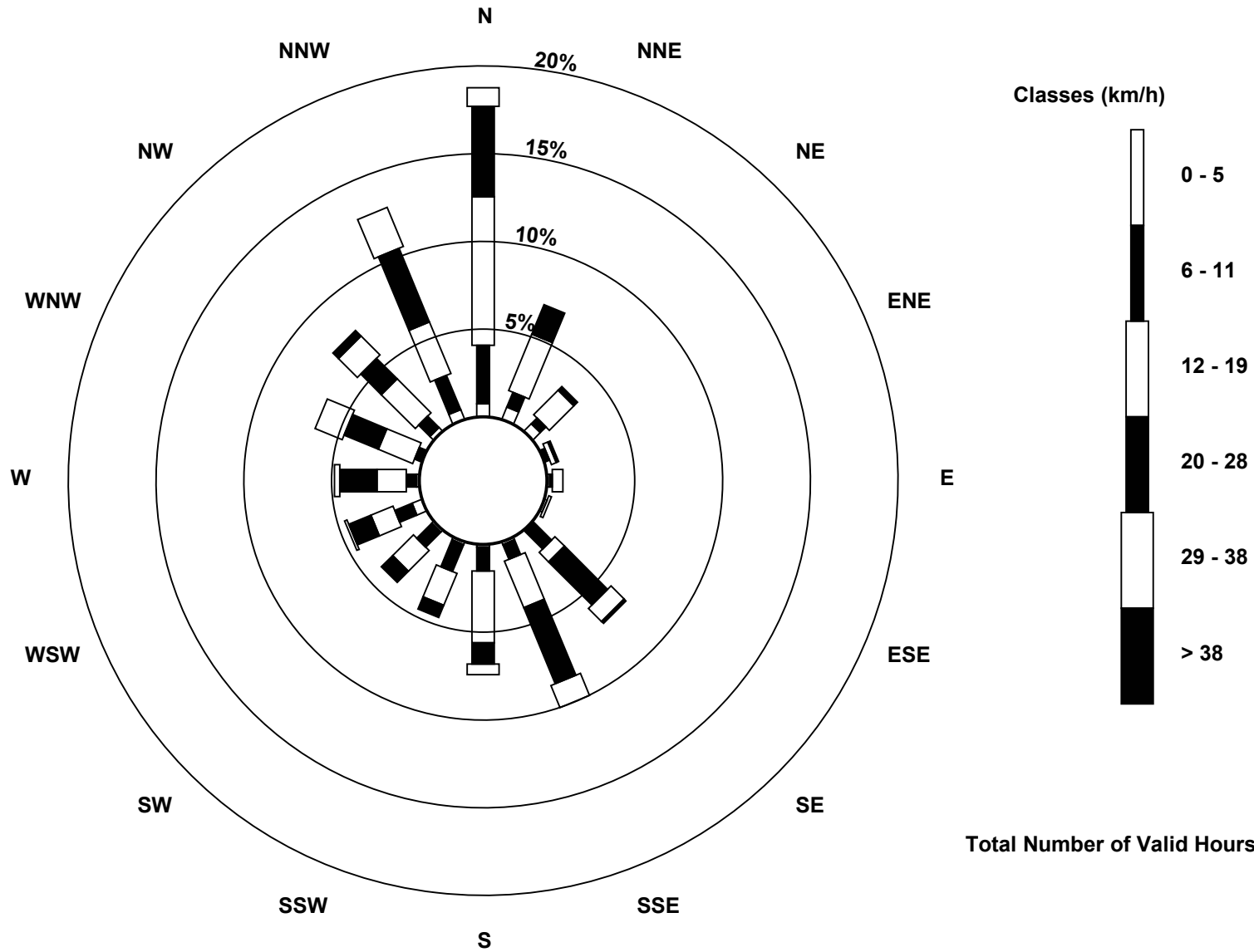
Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	5	5	4	0	1	1	0	1	1	1	1	4	1	0	2	4	31
6 - 11	22	6	3	2	1	0	10	6	9	11	8	7	4	3	6	14	112
12 - 19	56	23	13	2	4	1	5	19	27	13	11	9	11	14	18	21	247
20 - 28	34	12	2	1	0	0	23	31	8	5	6	9	14	14	11	30	200
29 - 38	7	0	0	0	0	0	7	9	4	0	0	1	2	11	10	16	67
> 38	0	0	0	0	0	0	1	0	0	0	0	0	0	0	3	0	4
Totals	124	46	22	5	6	2	46	66	49	30	26	30	32	42	50	85	661

Total Number of Valid Hours: 661

Total Number of Hours: 720

Wood Buffalo Environmental Association
 Wind Rose Nov 2014

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



Total Number of Valid Hours: 661



Summary of Hour Averages

Mannix - November 2014

Direction of Maximum Speed: 323 deg on Nov 7 04:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 333.0 deg on Nov 7	Hours of Data: 688
Direction of Minimum Speed: 52 deg on Nov 9 06:00	Hours of Missing Data: 32
Direction of Minimum Daily Speed Average: 2.5 deg on Nov 23	Percent Operational Time: 95.6
Monthly Average Direction: 295.4 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-Nov	193	247	245	243	225	210	177	173	184	167	187	234	247	243	233	239	243	213	223	237	232	154	148	150	214.9
2-Nov	157	146	148	147	145	158	153	148	141	145	143	142	157	150	148	151	147	146	144	148	136	137	144	160	147.4
3-Nov	147	152	148	157	141	156	165	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--
4-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	115	134	129	129	134	136	144	158	171	--
5-Nov	226	269	268	279	281	284	278	279	277	277	284	277	273	269	276	266	254	239	193	193	202	167	154	153	264.4
6-Nov	145	145	143	134	135	136	135	140	141	139	140	142	137	137	139	157	176	184	201	273	291	293	303	312	154.8
7-Nov	323	303	322	323	321	321	323	336	327	340	342	352	334	340	347	345	342	335	344	344	348	341	341	6	333.0
8-Nov	16	11	360	339	286	243	280	310	298	313	318	330	338	319	306	322	332	347	22	22	19	1	352	340	335.6
9-Nov	339	262	286	243	257	52	16	324	253	337	342	340	350	13	19	11	358	358	3	5	19	29	27	355	355.6
10-Nov	330	339	329	330	324	333	324	319	340	343	342	342	340	338	339	343	358	351	3	4	358	351	350	333	340.2
11-Nov	332	331	334	334	337	11	26	15	14	35	28	344	319	314	313	313	341	352	0	38	174	168	239	208	347.1
12-Nov	200	214	200	199	195	202	214	194	185	182	182	174	166	153	145	151	163	169	176	153	159	160	157	150	172.5
13-Nov	148	156	155	154	155	156	154	158	156	152	145	140	149	125	110	137	38	359	2	10	345	335	4	12	135.1
14-Nov	3	347	336	334	334	347	345	345	347	349	2	11	354	334	336	341	290	241	237	250	251	247	238	212	316.6
15-Nov	199	192	187	196	198	185	170	174	173	172	161	188	229	285	319	338	350	2	346	321	318	336	316	317	296.6
16-Nov	310	324	339	340	326	330	334	335	324	319	322	319	327	310	296	307	297	290	289	286	257	251	238		317.9
17-Nov	205	169	163	160	158	153	147	151	154	156	160	159	144	152	166	168	174	245	313	333	320	299	302	355	165.6
18-Nov	9	12	355	343	333	317	302	309	309	295	293	297	286	296	303	303	295	292	300	300	293	299	290	289	311.1
19-Nov	295	298	295	287	289	288	276	273	264	236	225	191	178	208	188	184	152	158	151	158	162	154	158	160	215.4
20-Nov	165	158	159	155	159	161	156	159	164	157	164	161	164	159	159	163	166	129	123	6	8	13	344	354	152.4
21-Nov	6	18	24	23	12	21	12	355	346	323	1	342	323	316	350	31	38	40	52	42	46	49	46	44	13.9
22-Nov	44	48	59	46	45	33	55	69	62	36	20	16	14	15	25	16	11	12	9	9	7	10	358	1	26.1
23-Nov	350	334	344	345	261	266	194	156	165	172	178	160	147	135	150	168	179	195	242	283	286	260	323	314	193.1
24-Nov	9	5	9	9	11	336	5	18	13	16	17	24	50	8	40	52	46	52	91	97	93	98	89	56	33.3
25-Nov	49	50	28	18	14	4	2	333	335	359	16	356	336	339	357	2	7	9	297	9	60	113	211	145	8.6
26-Nov	144	145	148	149	152	150	145	158	160	155	157	157	156	158	177	186	201	330	348	347	12	15	14	348	112.2
27-Nov	343	2	14	24	6	4	12	0	3	21	29	24	319	5	332	318	331	359	358	0	16	20	15	12	6.7
28-Nov	6	9	8	12	13	9	12	8	10	13	10	8	11	14	9	1	339	337	355	6	1	306	284	227	4.0
29-Nov	221	215	214	183	175	160	157	166	170	195	204	246	251	261	258	271	278	291	300	311	305	296	296	295	263.5
30-Nov	292	294	293	278	283	277	263	264	260	248	226	179	192	201	176	161	170	171	158	153	156	157	159	152	229.7
	340.2	333.2	338.8	330.2	312.1	309.8	323.1	309.7	288.5	309.5	333.3	320.6	303.1	309.6	319.4	316.0	315.8	329.5	343.9	339.4	343.0	340.6	320.2	332.4	
	Diurnal Average																								

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



Summary of Hour Standard Deviations

Mannix - November 2014

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 90 deg on Nov 15 13:00	Hours of Data: 688
Minimum Value: 5 deg on Nov 16 20:00	Hours of Missing Data: 32
Percentiles: P ₁ = 6 P ₁₀ = 9 Q ₁ = 10 Median = 13 Q ₃ = 16 P ₉₀ = 23 P ₉₉ = 54	Hours of Calibration: 0
	Percent Operational Time: 95.6

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-Nov	36	15	11	10	11	20	21	12	12	14	30	19	21	20	18	14	28	14	10	9	21	18	10	8	36
2-Nov	10	13	10	10	14	9	10	9	10	12	12	10	11	12	9	8	7	8	9	10	10	10	8	13	14
3-Nov	11	11	11	9	13	14	11	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	14
4-Nov	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
5-Nov	28	8	6	10	8	9	7	6	7	7	9	7	8	7	9	9	11	8	31	21	13	11	12	11	31
6-Nov	12	11	11	11	11	11	12	10	11	9	11	10	11	75	13	21	11	13	12	17	10	10	10	14	75
7-Nov	17	10	11	11	13	11	15	16	13	14	15	15	15	15	13	13	12	13	13	15	12	13	16	15	17
8-Nov	13	12	17	17	39	10	37	21	11	18	14	17	15	20	13	17	13	14	11	10	9	15	12	38	39
9-Nov	33	42	52	14	23	80	72	53	14	50	54	37	23	16	14	16	15	14	14	14	12	11	19	17	80
10-Nov	15	15	12	12	11	12	10	12	13	13	13	13	14	13	13	14	17	15	18	17	18	17	16	14	18
11-Nov	12	15	15	12	13	17	13	14	16	15	21	34	23	23	18	18	17	8	14	48	20	15	27	17	48
12-Nov	20	22	15	16	17	19	18	17	16	15	16	17	16	25	14	10	8	7	10	11	7	7	8	12	25
13-Nov	10	8	8	10	9	9	10	8	9	10	13	13	15	20	22	15	54	17	6	10	15	25	10	14	54
14-Nov	19	14	15	13	12	14	14	13	13	14	14	15	18	21	13	14	23	14	11	6	6	8	9	12	23
15-Nov	11	11	11	13	10	14	9	12	13	14	13	20	90	13	11	13	17	15	13	12	10	18	12	10	90
16-Nov	12	14	12	14	12	12	13	13	11	13	19	12	12	17	20	19	13	8	10	5	7	16	7	11	20
17-Nov	29	13	8	12	9	10	10	10	10	16	13	9	12	11	14	9	18	22	17	23	22	24	16	28	29
18-Nov	9	10	13	13	14	16	15	15	12	11	10	10	10	9	10	9	9	9	9	9	8	13	9	9	16
19-Nov	9	10	10	9	10	10	9	11	10	9	14	23	21	20	20	14	8	8	8	8	11	10	10	11	23
20-Nov	11	12	10	12	9	9	10	12	14	11	10	10	11	12	13	17	37	48	34	31	12	11	18	16	48
21-Nov	13	12	12	13	14	12	10	13	18	12	17	14	18	14	31	15	18	11	11	12	11	11	10	10	31
22-Nov	10	11	13	10	10	10	17	10	10	13	9	9	10	10	10	11	10	10	9	10	10	9	12	12	17
23-Nov	17	13	23	20	47	8	53	7	16	15	15	11	19	10	11	12	8	10	23	47	43	28	68	45	68
24-Nov	15	13	10	15	12	12	15	14	15	25	29	30	24	57	44	47	17	28	12	12	11	13	13	10	57
25-Nov	11	10	12	12	20	13	20	14	16	19	13	21	21	14	18	11	12	9	42	14	41	41	27	12	42
26-Nov	13	10	10	9	8	9	11	8	9	15	18	16	14	11	26	21	36	32	13	13	13	12	21	13	36
27-Nov	14	16	11	12	17	13	11	13	13	18	12	17	55	25	32	14	15	11	14	14	12	12	10	11	55
28-Nov	12	11	11	10	11	13	11	11	16	12	11	12	11	9	13	18	14	12	16	12	18	43	18	16	43
29-Nov	9	9	22	9	8	10	8	13	9	16	53	43	11	9	9	7	6	11	11	10	8	9	9	9	53
30-Nov	9	8	8	6	7	8	6	6	7	8	17	17	22	17	18	7	8	8	7	7	9	8	9	10	22
	36	42	52	20	47	80	72	53	18	50	54	43	90	75	44	47	54	48	42	48	43	43	68	45	

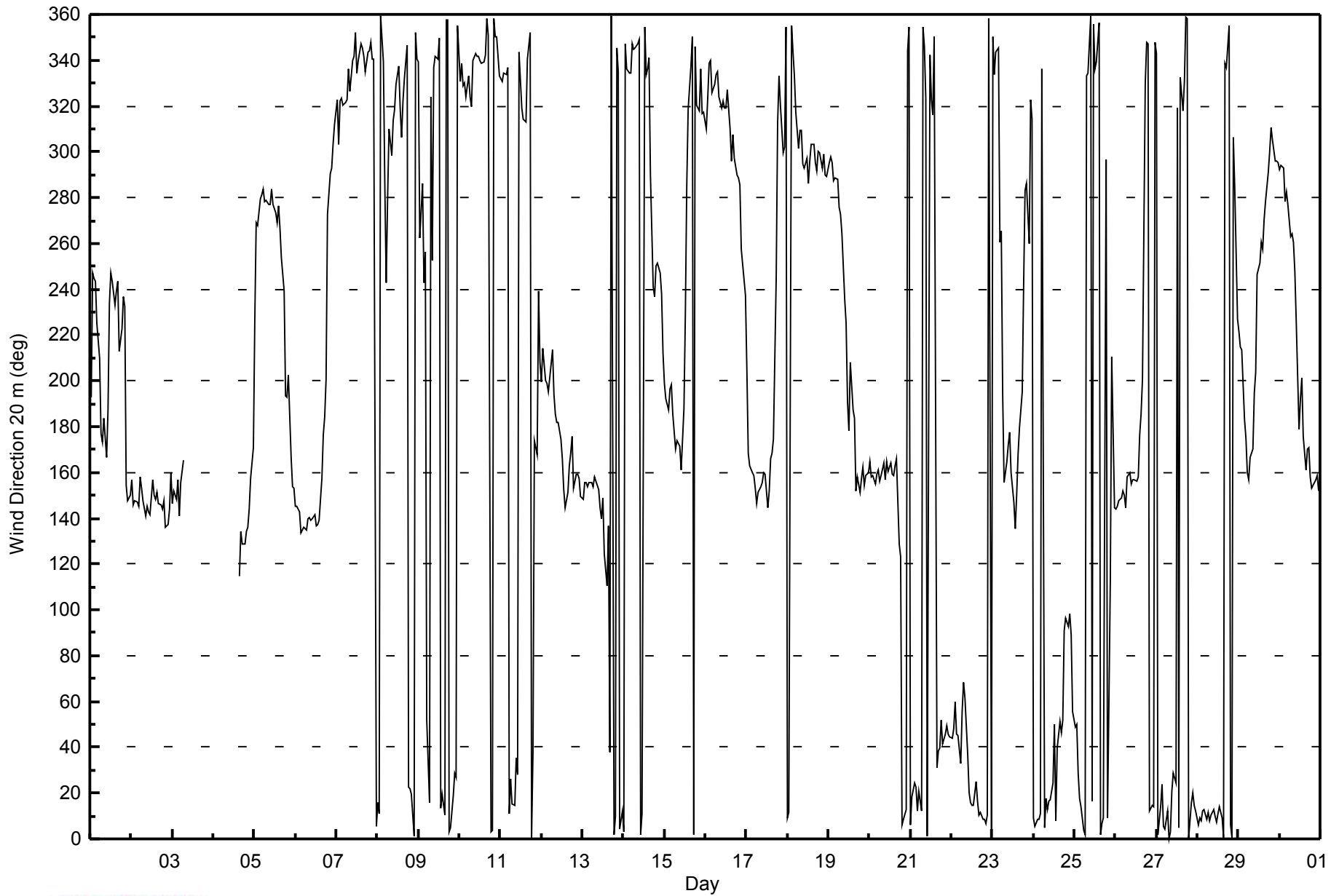
Diurnal Maximum

AF - Analyzer Failure



WBEA
Hourly Averages

Wind Direction 20 m (WD20m) - deg
Mannix - November 2014





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction 45 m (WD45m) - deg

Mannix - November 2014

Direction of Maximum Speed: 325 deg on Nov 7 04:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 334.7 deg on Nov 7	Hours of Data: 667
Direction of Minimum Speed: 97 deg on Nov 13 17:00	Hours of Missing Data: 53
Direction of Minimum Daily Speed Average: 3.5 deg on Nov 23	Percent Operational Time: 92.6
Monthly Average Direction: 299.6 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-Nov	229	261	261	258	251	248	198	188	194	177	194	234	245	243	232	240	248	224	229	253	247	193	158	155	223.7
2-Nov	159	150	152	152	151	157	155	150	139	147	148	145	157	154	149	140	140	143	143	143	132	133	139	157	146.9
3-Nov	146	AF	149	155	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--
4-Nov	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-Nov	AF	AF	AF	AF	AF	AF	AF	AF	280	282	287	280	275	272	279	269	254	240	202	193	202	170	153	154	--
6-Nov	144	144	141	133	134	136	134	139	140	139	138	141	136	142	143	162	177	184	211	274	295	296	306	315	155.1
7-Nov	324	305	324	325	323	324	326	339	328	341	345	354	335	341	347	346	342	335	344	343	348	344	344	8	334.7
8-Nov	16	11	3	342	295	251	294	312	304	316	319	333	341	323	309	323	336	349	25	24	17	6	359	357	339.8
9-Nov	360	330	327	292	270	45	29	26	297	340	348	340	353	17	21	14	0	359	5	5	19	28	29	355	2.4
10-Nov	333	342	333	334	326	335	325	321	343	348	346	344	344	342	342	346	1	353	6	6	1	354	352	338	343.5
11-Nov	336	333	337	338	342	12	26	22	16	37	31	344	325	318	317	314	342	358	6	46	167	157	218	234	350.1
12-Nov	216	210	203	199	195	203	217	196	187	181	182	177	167	153	142	151	163	174	189	169	162	162	159	155	175.6
13-Nov	153	160	160	158	156	157	157	160	157	153	144	139	145	129	117	134	97	11	13	28	7	359	11	17	132.7
14-Nov	5	355	342	343	338	353	352	352	350	349	2	13	358	337	339	344	288	248	248	260	258	256	249	227	317.1
15-Nov	210	202	202	210	208	192	179	180	177	177	164	196	245	287	323	342	353	4	349	324	322	340	319	322	288.5
16-Nov	316	327	342	342	328	334	338	338	328	324	326	323	323	330	310	299	319	309	307	296	314	303	274	256	323.3
17-Nov	255	196	176	160	160	157	148	153	160	158	164	161	151	155	168	172	191	260	299	331	333	315	303	339	177.5
18-Nov	10	10	357	348	337	321	305	314	314	300	295	299	290	297	304	305	298	295	301	301	296	303	295	293	314.4
19-Nov	300	302	298	290	292	291	284	281	266	237	226	192	183	206	187	185	156	158	152	158	165	155	157	155	211.9
20-Nov	160	160	157	154	156	162	157	158	164	158	166	163	170	166	163	161	172	161	111	21	10	18	353	0	151.6
21-Nov	9	20	25	22	12	20	13	356	350	328	2	347	326	320	350	32	38	39	51	39	44	52	45	42	14.3
22-Nov	43	49	59	46	47	37	55	67	61	37	22	17	15	15	25	18	12	15	10	10	8	12	2	4	26.5
23-Nov	356	339	358	343	259	270	217	147	162	173	176	161	150	136	150	174	183	195	234	265	279	272	4	347	193.3
24-Nov	10	9	10	10	11	341	4	17	13	14	17	24	47	20	40	55	49	56	94	98	93	99	89	58	32.7
25-Nov	49	54	34	24	21	5	3	345	341	2	17	358	340	343	359	7	15	15	358	16	59	106	167	154	16.4
26-Nov	138	147	153	165	162	159	153	157	166	162	151	151	165	163	175	184	188	330	352	350	12	15	14	351	134.1
27-Nov	346	3	14	22	10	8	13	4	6	22	27	25	329	8	336	328	337	4	359	3	20	26	18	14	8.8
28-Nov	8	10	11	12	14	10	14	9	9	15	11	9	10	13	10	3	341	342	358	7	7	340	298	246	5.6
29-Nov	234	231	225	202	201	198	176	191	187	223	229	249	253	260	259	271	280	294	302	313	306	300	299	298	262.6
30-Nov	294	296	295	282	284	279	267	266	260	248	234	188	198	200	180	170	177	175	164	160	162	164	169	165	226.2
	343.9	339.6	342.5	337.9	317.1	319.8	350.6	344.1	267.8	300.3	332.0	321.3	303.4	310.2	318.4	310.2	305.6	318.5	336.8	336.7	342.5	342.9	328.0	334.0	

Diurnal Average

AF - Analyzer Failure

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



Summary of Hour Standard Deviations

Mannix - November 2014

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 71 deg on Nov 15 13:00			Hours of Data:	667
Minimum Value: 3 deg on Nov 2 00:00			Hours of Missing Data:	53
			Hours of Calibration:	0
			Percent Operational Time:	92.6
Percentiles: P ₁ = 4 P ₁₀ = 6 Q ₁ = 7 Median = 9 Q ₃ = 13 P ₉₀ = 18 P ₉₉ = 43				

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-Nov	23	10	5	7	8	14	21	11	7	14	25	19	19	17	16	11	21	19	14	5	15	18	10	3	25
2-Nov	7	7	6	6	9	6	6	6	5	9	9	9	8	8	6	4	3	5	6	6	5	4	6	10	10
3-Nov	8	AF	9	9	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	9
4-Nov	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-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	6	6	7	6	7	6	7	8	10	5	27	18	9	9	9	27
6-Nov	9	8	8	8	7	8	9	8	8	7	8	8	7	51	13	17	4	7	13	14	8	7	8	13	51
7-Nov	15	9	8	8	10	9	12	14	10	11	11	10	12	11	9	9	9	10	9	11	8	9	12	13	15
8-Nov	9	8	12	14	35	9	31	16	8	16	11	15	12	18	10	13	8	11	10	8	7	10	7	19	35
9-Nov	13	33	37	33	17	37	16	40	23	39	43	30	20	13	10	11	11	10	10	9	8	9	14	13	43
10-Nov	13	11	9	9	9	9	8	10	10	9	8	9	10	10	10	10	14	12	13	12	13	13	13	12	14
11-Nov	11	12	12	9	10	13	9	12	13	12	18	30	20	19	16	14	14	6	8	44	17	12	27	7	44
12-Nov	18	15	11	10	10	14	13	11	10	7	9	10	12	22	12	8	6	6	5	9	4	3	4	7	22
13-Nov	7	4	4	6	6	5	6	4	6	9	9	11	13	18	12	36	29	6	7	12	10	6	8	36	
14-Nov	11	11	11	11	10	10	9	8	10	11	12	14	19	9	10	20	7	8	4	3	5	5	11	20	
15-Nov	7	7	7	8	7	8	6	8	8	9	11	17	71	12	9	9	14	12	10	10	9	15	11	8	71
16-Nov	10	11	9	11	10	9	10	10	9	11	17	10	10	14	19	17	10	7	9	6	6	12	4	8	19
17-Nov	17	15	11	8	6	6	8	7	6	11	9	5	9	8	8	5	16	16	6	15	11	15	9	27	27
18-Nov	6	6	10	9	11	14	13	13	10	11	7	7	8	7	8	7	7	6	6	6	6	11	7	6	14
19-Nov	6	8	7	7	7	7	5	8	9	8	12	16	18	16	14	8	6	5	5	5	9	7	9	9	18
20-Nov	9	8	7	9	7	6	7	9	12	8	7	9	10	9	11	10	19	28	20	27	9	9	12	12	28
21-Nov	8	8	9	9	11	9	8	10	13	11	15	10	16	12	31	11	14	8	8	10	8	9	9	7	31
22-Nov	8	9	10	7	9	8	14	8	8	12	6	6	7	7	8	8	6	7	6	6	5	5	8	7	14
23-Nov	12	9	15	21	35	7	54	7	13	9	8	8	18	7	9	12	4	9	17	29	16	23	43	47	54
24-Nov	10	9	6	12	8	8	14	10	11	19	22	25	18	46	40	41	16	22	9	9	10	10	13	8	46
25-Nov	9	10	9	9	17	7	12	11	13	13	10	16	18	11	14	7	9	9	35	13	29	20	13	7	35
26-Nov	5	6	6	4	4	6	7	6	3	11	10	11	8	8	10	10	36	32	8	8	8	8	17	10	36
27-Nov	11	13	7	9	12	9	7	10	9	14	9	13	31	22	26	13	17	7	8	9	10	9	8	9	31
28-Nov	8	8	9	7	7	9	9	8	12	9	8	8	7	6	9	14	10	9	10	9	13	40	15	18	40
29-Nov	8	4	15	6	4	11	5	11	12	11	33	14	9	8	8	6	6	8	8	8	7	7	6	6	33
30-Nov	7	6	6	6	5	6	5	5	6	5	16	13	13	12	12	6	4	4	4	5	6	4	5	5	16
	23	33	37	33	35	37	54	40	23	39	43	30	71	51	40	41	36	32	35	44	29	40	43	47	

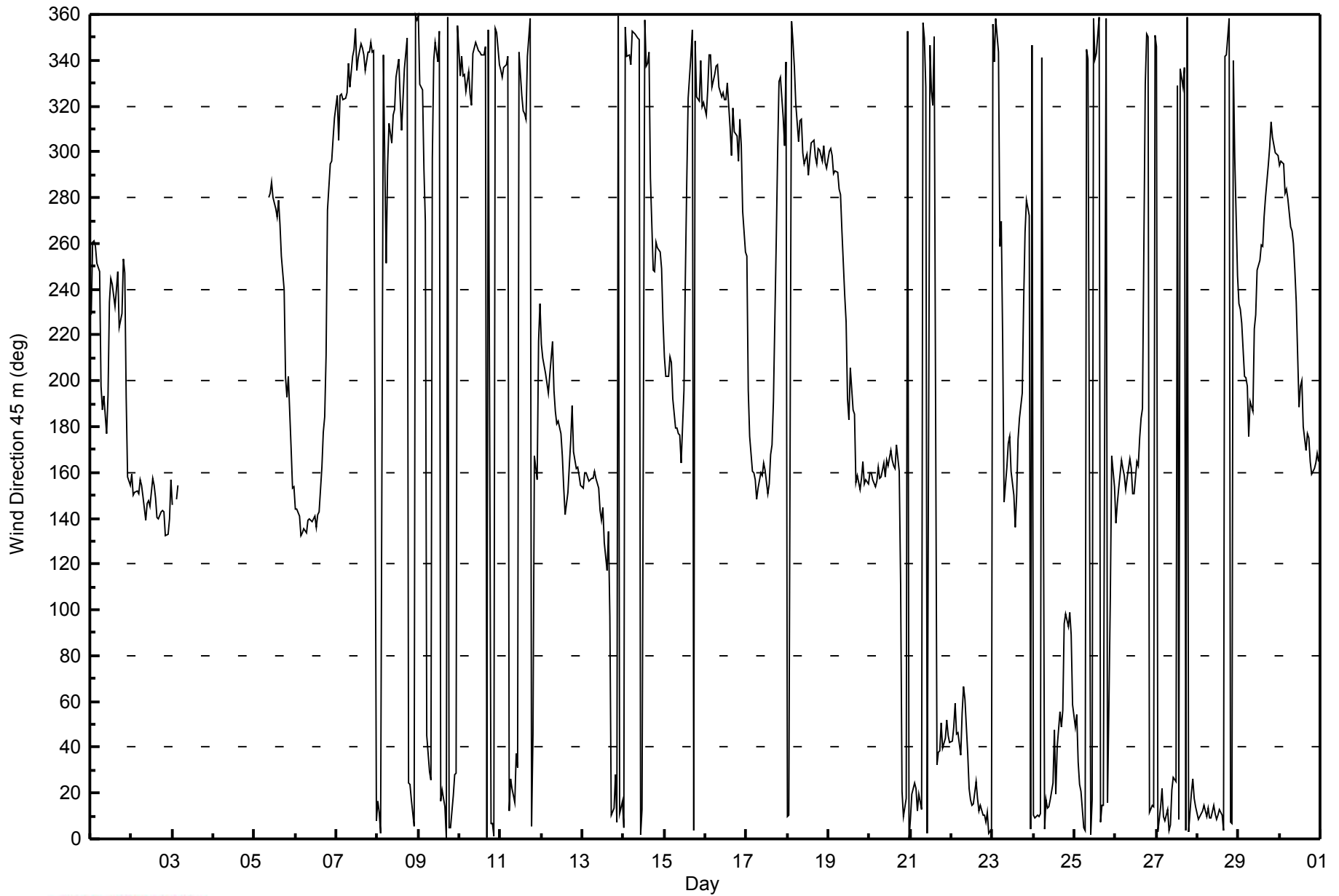
Diurnal Maximum

AF - Analyzer Failure



WBEA
Hourly Averages

Wind Direction 45 m (WD45m) - deg
Mannix - November 2014





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction 75 m (WD75m) - deg

Mannix - November 2014

Direction of Maximum Speed: 326 deg on Nov 7 04:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 335.4 deg on Nov 7	Hours of Data: 662
Direction of Minimum Speed: 232 deg on Nov 23 07:00	Hours of Missing Data: 58
Direction of Minimum Daily Speed Average: 3.8 deg on Nov 23	Percent Operational Time: 91.9
Monthly Average Direction: 298.8 deg	

Day	Hourly Period Ending At (MST)																								Daily Average	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	253	271	268	262	258	257	222	203	207	198	207	234	244	240	232	241	250	230	232	264	261	216	175	164	236.2	
2-Nov	173	161	163	162	159	164	163	154	148	150	152	148	159	158	153	141	140	140	140	137	134	133	135	151	150.9	
3-Nov	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-Nov	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-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	297	286	276	273	282	271	256	241	206	191	202	172	153	153	--
6-Nov	145	144	142	135	136	137	136	140	141	141	140	142	138	146	149	167	180	189	223	275	298	299	308	319	158.5	
7-Nov	326	306	326	326	324	324	327	339	329	342	344	353	336	341	347	346	343	336	344	343	348	345	347	13	335.4	
8-Nov	17	11	4	344	300	257	304	313	308	319	319	333	343	326	310	323	338	353	27	26	16	7	3	1	342.9	
9-Nov	3	358	360	358	276	31	40	43	359	345	352	338	354	19	24	18	2	1	7	5	19	28	29	359	9.6	
10-Nov	336	345	338	338	328	336	328	323	346	352	348	347	346	346	345	349	2	356	8	8	3	355	354	344	346.4	
11-Nov	339	337	340	343	346	14	28	27	20	41	36	343	326	318	317	316	342	3	11	53	153	149	194	229	354.8	
12-Nov	240	201	205	196	195	203	216	195	184	182	181	175	168	156	144	152	164	185	208	189	178	181	180	181	183.1	
13-Nov	180	183	190	190	171	178	173	171	168	169	148	141	144	135	125	137	137	24	24	42	25	10	21	22	139.6	
14-Nov	7	2	352	354	344	359	358	357	352	348	3	15	2	340	341	346	284	255	256	264	266	265	254	233	319.7	
15-Nov	219	211	211	218	215	202	193	189	184	185	173	213	251	287	325	347	356	5	350	328	327	344	323	326	288.5	
16-Nov	323	332	345	344	331	337	341	340	332	328	328	325	325	330	309	300	319	310	313	306	326	329	323	276	328.6	
17-Nov	263	227	192	167	171	174	155	158	162	154	163	156	155	157	166	182	217	264	290	326	345	320	302	327	184.2	
18-Nov	12	11	360	352	340	326	306	317	319	304	296	301	292	298	305	306	299	297	303	303	299	308	300	297	317.9	
19-Nov	304	306	299	291	293	291	287	284	265	238	225	192	184	204	188	186	160	162	157	158	171	160	156	144	207.5	
20-Nov	147	158	149	148	146	161	157	156	159	157	165	166	175	174	176	176	185	207	68	22	12	21	0	5	149.3	
21-Nov	11	21	26	23	14	18	13	359	353	335	5	349	329	324	353	35	41	41	51	41	45	57	48	47	16.6	
22-Nov	46	52	62	51	53	49	60	68	64	42	26	19	17	17	26	20	16	18	13	13	11	15	6	7	30.2	
23-Nov	359	344	8	343	258	270	232	137	158	172	175	164	156	140	152	178	188	198	232	258	280	306	5	346	196.1	
24-Nov	14	12	10	10	9	346	4	16	14	15	14	26	48	31	49	58	56	65	96	99	92	99	88	64	31.5	
25-Nov	53	62	46	32	29	10	11	356	346	5	18	360	348	348	3	12	26	20	15	16	29	91	155	161	22.6	
26-Nov	152	156	149	153	152	151	153	142	148	150	150	155	156	148	157	165	168	348	356	354	13	16	15	354	131.0	
27-Nov	349	4	16	21	13	11	14	8	10	24	26	27	330	12	344	347	352	8	6	9	25	27	22	17	12.4	
28-Nov	12	12	14	15	17	13	16	12	10	16	13	12	11	12	11	6	346	347	3	10	12	2	311	246	8.9	
29-Nov	229	239	234	217	219	225	211	217	216	238	245	248	252	259	259	271	281	296	303	314	308	302	301	301	267.3	
30-Nov	296	297	295	286	283	279	270	266	258	249	240	198	202	200	187	176	183	180	175	171	169	172	176	173	228.2	

344.2 339.2 341.7 340.7 318.7 313.7 334.2 345.7 240.3 294.0 323.0 316.2 297.4 308.9 317.2 304.4 295.9 313.3 334.8 337.1 344.3 344.4 336.4 339.7

Diurnal Average

AF - Analyzer Failure

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



Summary of Hour Standard Deviations

Mannix - November 2014

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 61 deg on Nov 26 18:00			Hours of Data:	662
Minimum Value: 2 deg on Nov 30 17:00			Hours of Missing Data:	58
			Hours of Calibration:	0
			Percent Operational Time:	91.9
Percentiles: P ₁ = 3 P ₁₀ = 5 Q ₁ = 6 Median = 8 Q ₃ = 11 P ₉₀ = 17 P ₉₉ = 43				

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-Nov	11	8	4	6	5	11	16	14	5	12	24	19	18	16	15	11	15	21	12	8	11	16	14	4	24
2-Nov	12	4	4	3	4	3	3	3	3	7	5	6	6	5	3	5	4	3	3	3	4	5	4	6	12
3-Nov	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-Nov	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-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	5	7	7	6	7	8	10	5	23	16	9	9	8	7	23
6-Nov	7	7	6	7	6	6	7	6	7	5	6	6	6	34	10	12	3	6	14	13	8	6	7	13	34
7-Nov	14	8	7	7	8	7	11	12	9	9	10	9	11	11	8	8	8	8	8	10	6	7	10	14	14
8-Nov	8	6	10	13	29	10	28	13	7	13	10	13	10	17	10	12	6	9	8	6	6	8	7	10	29
9-Nov	12	15	20	20	24	23	14	13	28	31	38	26	20	13	10	10	10	9	9	8	5	6	13	12	38
10-Nov	11	9	9	7	7	8	7	9	9	9	6	7	8	8	8	9	13	11	11	10	12	12	12	11	13
11-Nov	10	10	11	7	8	11	7	11	13	12	18	34	18	16	15	13	15	9	9	43	15	14	19	9	43
12-Nov	20	12	12	9	9	14	12	11	9	5	6	8	10	17	9	6	5	9	4	9	4	4	5	11	20
13-Nov	10	6	8	7	6	5	5	4	3	6	7	9	10	12	14	10	25	38	9	8	12	6	4	6	38
14-Nov	7	8	11	11	10	8	7	6	10	10	10	11	14	19	8	8	18	5	5	3	3	6	3	8	19
15-Nov	7	5	5	7	6	5	6	7	7	8	8	18	56	12	8	7	12	10	9	9	8	13	9	7	56
16-Nov	9	10	8	10	9	7	9	8	8	10	17	10	9	12	17	15	10	6	8	9	4	10	13	20	20
17-Nov	6	17	13	4	12	5	7	4	5	8	5	4	5	4	4	12	12	11	5	12	10	10	8	25	25
18-Nov	5	4	8	8	9	13	11	11	9	11	6	7	7	6	8	6	6	6	5	5	5	10	8	5	13
19-Nov	6	8	7	6	5	6	5	8	10	9	11	15	15	15	12	6	6	4	5	3	10	5	8	7	15
20-Nov	6	6	5	6	7	6	5	7	7	5	6	8	8	8	13	8	9	48	24	24	7	7	9	7	48
21-Nov	6	5	7	8	10	7	7	8	11	8	14	8	15	10	31	9	10	6	7	9	6	7	7	4	31
22-Nov	6	8	8	5	7	8	11	7	6	12	6	5	5	6	6	6	6	6	4	4	4	4	6	6	12
23-Nov	9	8	10	25	29	6	56	8	13	9	7	8	17	6	8	11	3	12	7	16	7	23	21	11	56
24-Nov	7	7	5	11	8	6	12	8	10	16	17	23	19	45	35	37	18	21	10	11	11	12	12	8	45
25-Nov	9	9	7	7	16	5	9	10	12	11	9	15	18	10	11	5	9	6	11	9	24	28	11	6	28
26-Nov	4	3	4	4	2	4	7	5	4	3	7	4	6	4	9	8	25	61	6	7	7	7	15	8	61
27-Nov	9	12	6	7	10	8	5	9	7	11	6	11	45	20	21	17	17	9	9	8	7	7	6	7	45
28-Nov	7	6	8	6	6	7	8	7	10	7	6	6	5	5	8	12	10	8	8	7	10	19	15	31	31
29-Nov	12	3	11	5	5	8	7	8	10	7	13	10	7	7	7	6	5	7	7	7	6	6	5	6	13
30-Nov	6	5	4	5	4	4	5	5	5	4	12	12	9	10	11	6	2	3	4	3	3	3	4	3	12
	20	17	20	25	29	23	56	14	28	31	38	34	56	45	35	37	25	61	24	43	24	28	21	31	

Diurnal Maximum

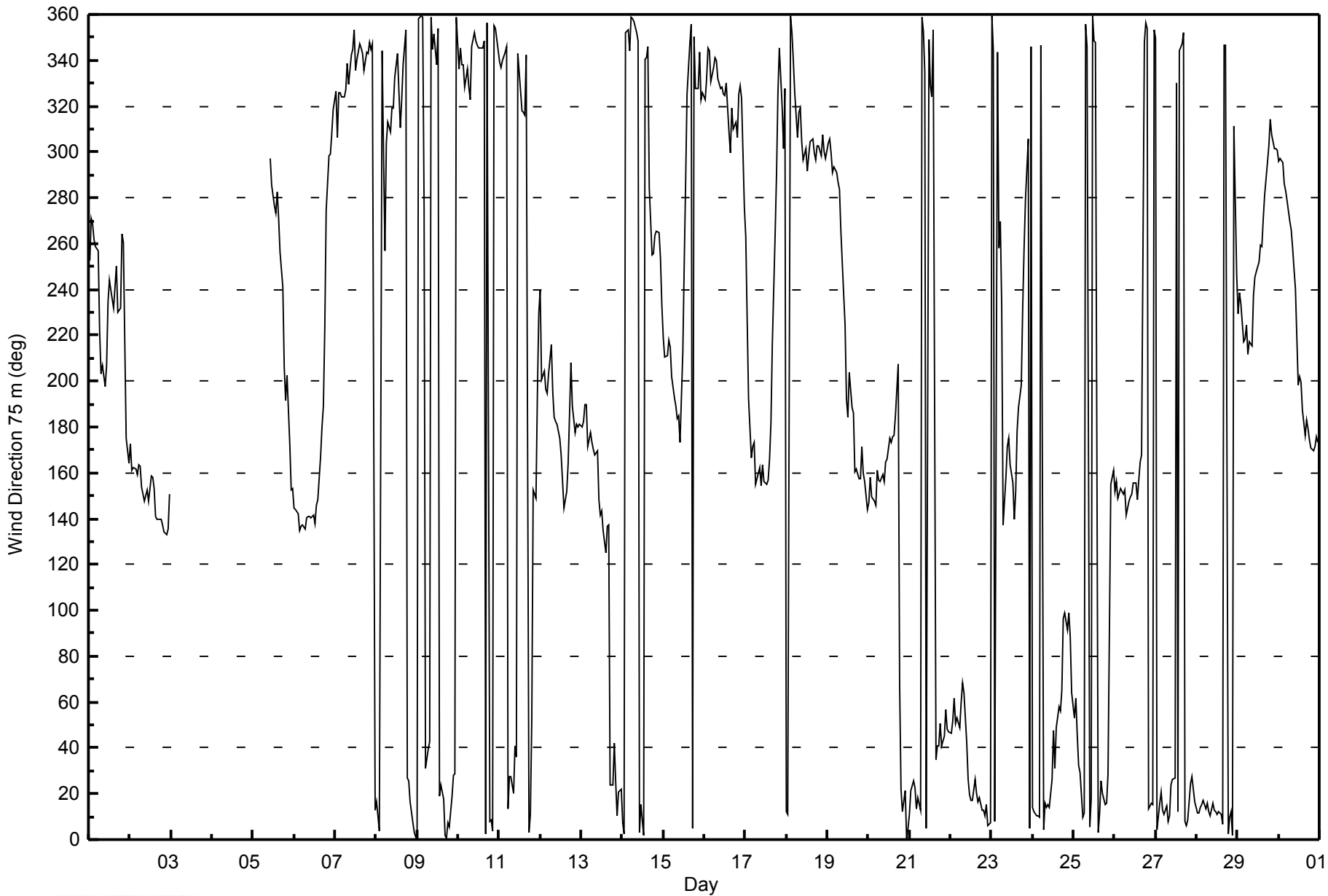
AF - Analyzer Failure



WBEA
Hourly Averages

Wind Direction 75 m (WD75m) - deg

Mannix - November 2014





Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 73 deg on Nov 26 18:00			Hours of Data:	661
Minimum Value: 1 deg on Nov 26 05:00			Hours of Missing Data:	59
			Hours of Calibration:	0
			Percent Operational Time:	91.8
Percentiles: P ₁ = 3 P ₁₀ = 4 Q ₁ = 6 Median = 8 Q ₃ = 11 P ₉₀ = 16 P ₉₉ = 40				

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-Nov	10	8	4	6	4	9	13	15	5	10	25	18	17	16	14	10	12	21	11	7	7	15	17	9	25
2-Nov	20	8	6	3	4	3	3	3	3	6	5	5	5	3	2	7	5	3	2	2	3	3	3	6	20
3-Nov	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-Nov	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-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	7	7	4	6	7	8	5	22	17	10	9	7	6	22
6-Nov	7	6	6	6	5	6	7	7	7	6	7	6	5	30	9	12	3	7	13	12	7	5	7	13	30
7-Nov	14	8	6	6	8	7	11	12	8	9	9	8	10	10	7	8	7	8	7	10	5	7	9	14	14
8-Nov	7	6	9	12	25	9	26	11	6	11	9	13	10	16	9	11	5	9	7	5	5	7	7	10	26
9-Nov	11	12	13	12	28	20	13	12	20	23	37	24	21	11	9	9	10	8	9	8	4	5	12	11	37
10-Nov	11	8	9	6	7	7	7	9	9	8	6	7	8	8	7	8	13	11	11	9	12	12	12	10	13
11-Nov	10	10	11	6	8	11	7	10	12	11	18	32	17	16	14	12	14	12	8	43	14	14	14	11	43
12-Nov	18	10	13	9	9	14	12	11	9	4	7	8	10	18	9	6	5	9	5	11	5	5	7	13	18
13-Nov	11	6	8	8	8	6	6	7	4	9	9	9	10	13	16	9	14	47	9	7	8	5	4	5	47
14-Nov	5	8	10	10	10	7	6	5	10	9	10	12	14	19	7	9	16	3	4	3	3	6	4	7	19
15-Nov	7	5	4	6	6	5	6	6	8	7	7	18	40	12	8	7	12	10	8	8	7	12	9	7	40
16-Nov	8	9	8	9	8	7	8	8	7	9	16	9	8	11	16	14	10	6	7	9	6	11	15	30	30
17-Nov	10	11	17	4	22	6	8	3	7	8	6	4	4	3	4	14	10	9	5	13	8	10	9	24	24
18-Nov	5	3	8	7	9	11	10	10	8	10	6	7	7	6	7	5	5	5	5	4	5	9	9	5	11
19-Nov	6	8	6	6	5	6	4	8	9	9	10	15	15	15	12	6	6	4	5	4	11	6	9	6	15
20-Nov	5	5	5	5	6	5	5	6	5	4	6	7	7	7	16	14	13	21	35	16	6	7	8	6	35
21-Nov	6	5	6	7	9	7	7	7	10	8	13	8	15	11	31	9	9	5	6	8	5	8	6	4	31
22-Nov	6	8	7	5	7	8	10	6	6	11	6	5	5	6	6	6	5	6	4	4	4	4	5	4	11
23-Nov	7	7	8	27	29	7	60	7	13	8	7	8	17	6	8	11	2	11	6	14	10	17	16	9	60
24-Nov	6	7	5	10	8	5	11	7	9	14	17	21	20	46	41	40	18	20	7	7	9	9	11	10	46
25-Nov	9	9	7	6	16	6	9	9	12	9	8	13	17	10	10	4	10	4	9	6	14	30	13	5	30
26-Nov	3	3	3	2	1	5	8	6	5	5	3	3	9	4	8	7	17	73	6	6	7	6	14	8	73
27-Nov	9	12	5	6	9	7	5	8	6	11	5	11	51	22	20	16	14	9	10	8	6	6	6	7	51
28-Nov	7	5	7	5	5	6	7	6	10	7	5	6	5	5	7	11	10	8	7	7	10	15	16	32	32
29-Nov	11	4	10	5	6	7	7	9	10	6	9	8	6	7	7	6	5	6	7	6	6	6	5	5	11
30-Nov	5	4	4	4	3	4	4	4	4	3	10	12	9	9	12	6	2	3	4	4	3	3	3	3	12

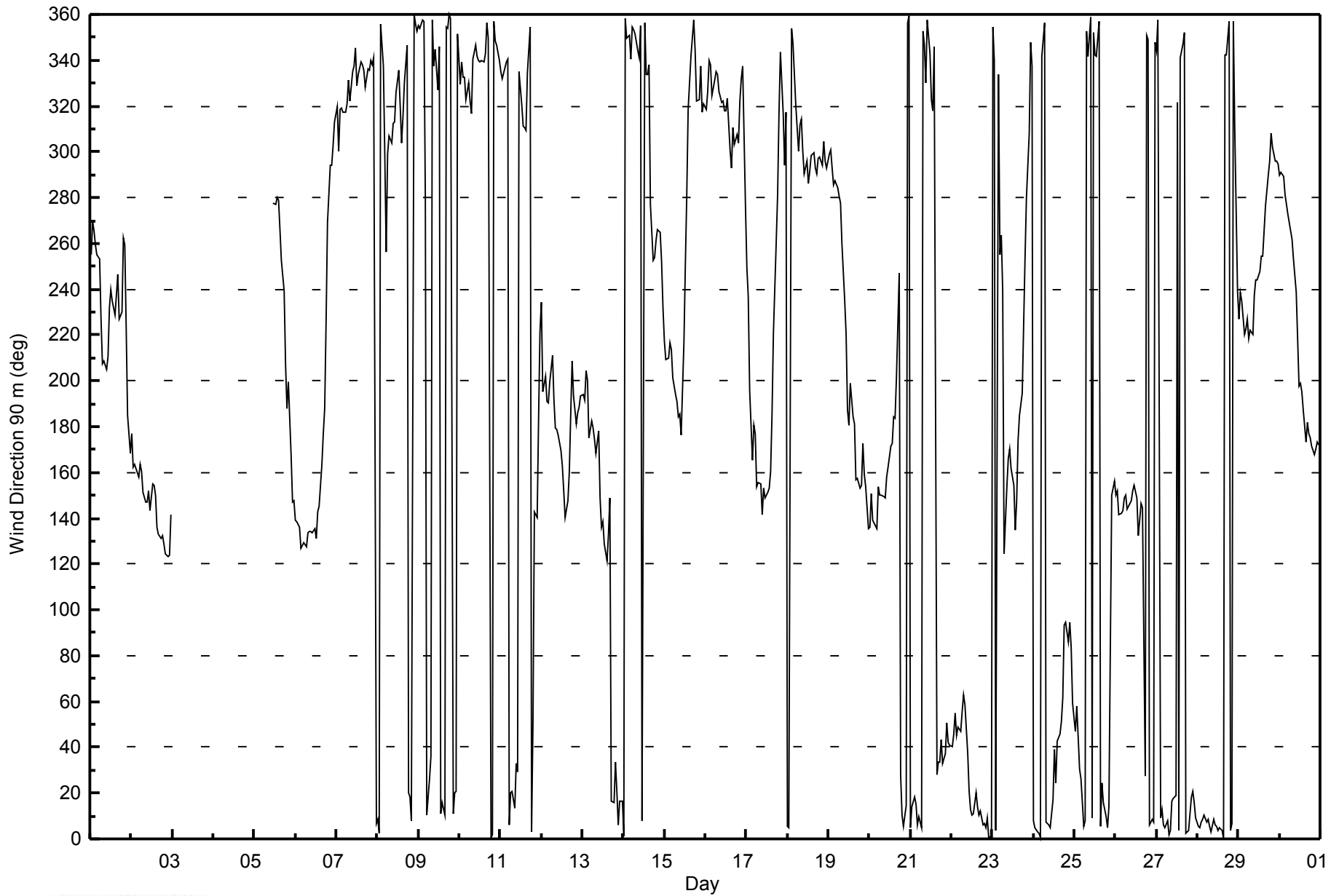
20	12	17	27	29	20	60	15	20	23	37	32	51	46	41	40	18	73	35	43	14	30	17	32	
Diurnal Maximum																								

AF - Analyzer Failure



WBEA
Hourly Averages

Wind Direction 90 m (WD90m) - deg
Mannix - November 2014





Summary of Hour Averages

Mannix - November 2014

Maximum Value: 0.9 km/h on Nov 4 18:00		Maximum Daily Average: 0.3 km/h on Nov 2		Hours in Service: 720																						
Minimum Value: -1.1 km/h on Nov 7 04:00		Minimum Daily Average: -0.6 km/h on Nov 7		Hours of Data: 688																						
Maximum Diurnal Average: 0.0 km/h at hour 12		Minimum Diurnal Average: -0.2 km/h at hour 3		Hours of Missing Data: 32																						
Monthly Average: -0.10 km/h		Percentiles: P ₁ = -0.8 P ₁₀ = -0.5 Q ₁ = -0.3 Median = -0.1 Q ₃ = 0.2 P ₉₀ = 0.3 P ₉₉ = 0.6		Hours of Calibration: 0																						
				Percent Operational Time: 95.6																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0.0	-0.1	-0.3	-0.3	-0.3	-0.2	-0.1	0.1	-0.1	0.3	0.1	-0.3	-0.2	-0.2	-0.2	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	0.0	0.2	0.2	-0.1	0.3
2-Nov	0.2	0.3	0.4	0.3	0.2	0.4	0.4	0.4	0.3	0.3	0.5	0.3	0.5	0.5	0.4	0.4	0.3	0.2	0.3	0.4	0.3	0.3	0.4	0.3	0.3	0.5
3-Nov	0.2	0.5	0.2	0.2	0.1	0.4	0.2	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	0.5
4-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	0.9
5-Nov	-0.1	-0.1	-0.1	-0.2	-0.4	-0.3	-0.4	-0.6	-0.5	-0.3	-0.2	-0.4	-0.2	-0.1	-0.1	-0.1	-0.1	-0.3	0.1	0.0	0.0	0.2	0.3	0.3	-0.2	0.3
6-Nov	0.4	0.3	0.1	0.4	0.5	0.5	0.7	0.7	0.7	0.6	0.7	0.4	0.4	0.0	0.3	0.2	0.1	0.0	-0.2	-0.3	-0.2	-0.5	-0.6	-0.8	0.2	0.7
7-Nov	-0.5	-0.7	-0.8	-1.1	-0.9	-0.9	-1.0	-0.6	-0.6	-0.6	-0.3	-0.3	-0.6	-0.7	-0.6	-0.5	-0.5	-0.4	-0.6	-0.2	-0.5	-0.3	-0.4	-0.3	-0.6	-0.2
8-Nov	-0.3	-0.4	-0.3	-0.3	0.0	-0.3	-0.1	-0.2	-0.2	-0.4	-0.5	-0.2	-0.8	-0.2	-0.3	-0.1	-0.5	-0.3	-0.1	-0.2	-0.1	-0.3	-0.4	-0.3	-0.3	0.0
9-Nov	-0.1	-0.1	0.0	-0.2	-0.1	0.0	-0.1	-0.1	-0.2	0.1	0.0	0.2	-0.1	-0.3	-0.3	-0.3	-0.3	-0.4	-0.2	-0.3	-0.3	0.2	0.1	-0.1	-0.1	0.2
10-Nov	-0.2	-0.3	-0.5	-0.6	-0.5	-0.6	-0.8	-0.5	-0.5	-0.4	-0.7	-0.6	-0.6	-0.8	-0.6	-0.4	-0.3	-0.3	-0.3	-0.3	0.0	-0.2	-0.2	-0.5	-0.4	0.0
11-Nov	-0.5	-0.1	-0.2	-0.5	-0.3	-0.1	0.1	-0.2	-0.2	0.0	-0.1	0.0	0.0	-0.2	-0.2	-0.1	-0.1	-0.2	-0.2	0.1	-0.1	0.1	0.0	-0.1	-0.1	0.1
12-Nov	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.3	-0.2	0.0	0.2	0.3	0.3	0.1	0.2	0.5	0.2	0.4	0.3	-0.1	0.2	0.4	0.4	0.3	0.3	0.1	0.5
13-Nov	0.1	0.2	0.1	0.2	0.3	0.4	0.2	0.4	0.3	0.1	0.4	0.4	0.2	0.3	0.5	0.3	0.0	-0.1	-0.3	-0.3	-0.2	-0.1	-0.4	-0.3	0.1	0.5
14-Nov	-0.2	-0.3	-0.1	-0.3	-0.5	-0.4	-0.3	-0.4	-0.6	-0.5	-0.4	-0.2	0.0	0.0	-0.5	-0.3	-0.1	-0.2	-0.3	-0.4	-0.4	-0.5	-0.5	-0.3	-0.3	0.0
15-Nov	-0.2	-0.1	-0.2	-0.2	-0.2	-0.1	0.3	0.1	0.2	0.3	0.3	0.0	0.0	-0.2	-0.5	-0.6	-0.6	-0.4	-0.8	-0.7	-0.7	-0.6	-0.7	-0.5	-0.3	0.3
16-Nov	-0.4	-0.6	-0.9	-0.7	-0.8	-0.7	-0.8	-0.6	-0.6	-0.4	-0.3	-0.4	-0.4	-0.2	-0.1	-0.2	-0.1	-0.1	-0.2	-0.3	-0.1	-0.1	-0.2	-0.1	-0.4	-0.1
17-Nov	-0.1	0.0	0.1	0.2	0.3	0.3	0.4	0.3	0.3	0.2	0.2	0.5	0.5	0.3	0.2	0.2	0.1	-0.1	-0.2	-0.3	-0.2	-0.1	-0.2	-0.2	0.1	0.5
18-Nov	-0.6	-0.7	-0.5	-0.6	-0.7	-0.6	-0.3	-0.3	-0.3	-0.2	-0.3	-0.3	-0.3	-0.3	-0.6	-0.4	-0.3	-0.4	-0.3	-0.3	-0.3	-0.3	-0.2	-0.2	-0.4	-0.2
19-Nov	-0.3	-0.2	-0.1	-0.2	-0.2	-0.1	-0.2	-0.2	-0.2	-0.3	-0.3	0.1	0.1	-0.1	0.1	0.0	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.2	0.0	0.4
20-Nov	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.3	0.2	0.3	0.3	0.3	0.2	0.3	0.1	0.2	0.1	0.0	0.1	-0.1	-0.3	-0.2	-0.1	-0.3	0.2	0.4
21-Nov	-0.4	-0.3	-0.2	0.1	-0.3	0.1	-0.2	-0.4	-0.3	-0.5	-0.3	-0.5	-0.3	-0.4	-0.1	0.1	0.3	0.2	0.2	0.1	0.2	0.4	0.1	0.4	-0.1	0.4
22-Nov	0.1	0.2	0.6	0.2	0.1	0.0	0.2	0.6	0.6	0.2	-0.2	-0.5	-0.4	-0.4	-0.1	-0.4	-0.5	-0.2	-0.6	-0.6	-0.4	-0.3	-0.3	-0.5	-0.1	0.6
23-Nov	-0.3	-0.2	-0.2	-0.1	0.1	-0.1	0.0	0.2	0.1	0.3	0.0	0.3	0.3	0.2	0.2	0.3	-0.1	-0.1	-0.1	0.0	0.0	-0.1	-0.1	0.0	0.0	0.3
24-Nov	-0.5	-0.3	-0.4	-0.2	-0.2	-0.2	-0.2	-0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.3	0.3	0.1	0.3	0.2	0.3	0.3	0.3	0.3	0.0	0.3
25-Nov	0.0	0.1	0.1	-0.1	0.0	-0.3	-0.2	-0.3	-0.3	-0.2	-0.2	-0.3	0.1	-0.1	-0.3	-0.3	-0.2	-0.3	-0.2	-0.1	0.0	0.1	-0.1	0.3	-0.1	0.3
26-Nov	0.3	0.3	0.4	0.4	0.4	0.3	0.3	0.3	0.4	0.2	0.2	0.4	0.2	0.2	0.1	0.1	-0.1	0.0	-0.4	-0.4	-0.7	-0.6	-0.1	-0.6	0.1	0.4
27-Nov	-0.4	-0.2	-0.8	-0.2	-0.1	-0.3	-0.4	-0.4	-0.4	-0.1	0.2	0.2	0.0	-0.1	-0.1	-0.1	-0.1	-0.3	-0.1	-0.2	-0.1	0.1	-0.4	-0.4	-0.2	0.2
28-Nov	-0.3	-0.4	-0.5	-0.5	-0.3	-0.4	-0.4	-0.4	-0.2	-0.2	-0.3	-0.2	-0.5	-0.6	-0.4	-0.2	-0.3	-0.4	-0.2	-0.3	-0.1	0.0	0.0	-0.1	-0.3	0.0
29-Nov	0.0	-0.3	-0.2	-0.2	-0.2	0.0	0.0	0.1	0.0	-0.3	0.1	0.1	-0.5	-0.2	-0.3	-0.1	-0.3	-0.4	-0.4	-0.9	-0.7	-0.5	-0.4	-0.4	-0.2	0.1
30-Nov	-0.5	-0.4	-0.7	-0.3	-0.5	-0.3	-0.4	-0.2	-0.2	-0.4	-0.3	0.3	0.1	0.0	0.2	0.5	0.3	0.2	0.6	0.5	0.5	0.6	0.6	0.6	0.0	0.6
																								Diurnal Average		
																								Diurnal Maximum		
-0.1 -0.1 -0.2 -0.2 -0.1 -0.1 -0.1 -0.1 -0.1 -0.1 -0.1 0.0 0.0 -0.1 -0.1 -0.1 -0.1 -0.1 -0.1 -0.1 -0.1 -0.1 0.0 -0.1 -0.1																								0.4 0.5 0.6 0.4 0.5 0.5 0.7 0.7 0.7 0.6 0.7 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.9 0.6 0.5 0.5 0.6 0.6 0.6		
AF - Analyzer Failure																										



Summary of Hour Standard Deviations

Mannix - November 2014

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 3.5 km/h on Nov 16 04:00			Hours of Data:	688
Minimum Value: 0.2 km/h on Nov 16 22:00			Hours of Missing Data:	32
			Hours of Calibration:	0
			Percent Operational Time:	95.6
Percentiles: P ₁ = 0.2 P ₁₀ = 0.5 Q ₁ = 0.9 Median = 1.2 Q ₃ = 1.7 P ₉₀ = 2.2 P ₉₉ = 3.2				

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

AF - Analyzer Failure



Summary of Hour Averages

Mannix - November 2014

Maximum Value: 1.2 km/h on Nov 6 10:00 Maximum Daily Average: 0.7 km/h on Nov 2																								Hours in Service: 720 Hours of Data: 667		
Minimum Value: -1.4 km/h on Nov 7 04:00 Minimum Daily Average: -0.7 km/h on Nov 7 Maximum Diurnal Average: 0.1 km/h at hour 12 Minimum Diurnal Average: -0.1 km/h at hour 3 Monthly Average: 0.00 km/h Percentiles: P ₁ = -1.1 P ₁₀ = -0.6 Q ₁ = -0.3 Median = 0.0 Q ₃ = 0.3 P ₉₀ = 0.6 P ₉₉ = 0.9																								Hours of Missing Data: 53 Hours of Calibration: 0 Percent Operational Time: 92.6		
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-Nov	0.1	0.1	-0.3	-0.2	-0.2	-0.1	0.0	0.1	-0.1	0.3	0.3	-0.1	-0.1	0.0	-0.2	-0.1	0.0	0.0	-0.1	-0.2	-0.1	0.0	0.5	0.4	0.0	0.5
2-Nov	0.4	0.6	0.9	0.8	0.6	0.8	0.8	1.0	0.9	0.8	0.8	0.8	0.9	0.7	0.7	0.9	0.8	0.6	0.6	0.7	0.8	0.7	0.7	0.6	0.7	1.0
3-Nov	0.4	AF	0.6	0.6	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	0.6
4-Nov	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-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	0.0	0.1	0.1	-0.1	-0.1	-0.1	-0.1	-0.2	-0.4	0.1	0.0	0.0	0.4	0.4	0.6	0.6	-
6-Nov	0.7	0.8	0.6	0.8	0.9	0.8	0.8	0.9	1.1	1.2	1.1	0.7	0.7	0.4	0.4	0.5	0.4	0.2	-0.2	-0.4	-0.4	-0.6	-0.8	-0.8	0.4	1.2
7-Nov	-0.7	-0.7	-1.3	-1.4	-1.1	-0.9	-1.3	-0.5	-0.6	-0.7	-0.1	-0.5	-0.6	-0.7	-0.5	-0.6	-0.4	-0.6	-0.5	-0.3	-0.7	-0.6	-0.5	-0.2	-0.7	-0.1
8-Nov	-0.3	-0.3	-0.2	-0.2	0.2	-0.2	0.1	-0.1	-0.2	-0.4	-0.5	0.0	-0.8	-0.1	-0.4	0.0	-0.6	-0.3	0.2	0.0	-0.2	-0.3	-0.3	-0.2	-0.2	0.2
9-Nov	0.1	0.2	0.2	0.1	0.0	0.3	0.1	0.1	0.0	0.1	0.3	0.7	0.0	-0.2	-0.2	-0.3	-0.2	-0.3	-0.1	-0.2	-0.1	0.4	0.3	0.0	0.1	0.7
10-Nov	-0.2	-0.4	-0.7	-0.9	-0.6	-0.9	-0.9	-0.5	-0.6	-0.8	-0.9	-0.7	-0.7	-1.0	-0.9	-0.3	-0.1	0.0	0.3	0.2	0.7	0.0	-0.1	-0.2	-0.4	0.7
11-Nov	-0.3	0.0	0.0	-0.5	-0.2	0.0	0.2	0.2	-0.1	0.2	0.0	0.3	0.4	-0.2	-0.2	0.0	0.0	-0.1	0.1	0.3	0.0	0.3	0.2	-0.1	0.0	0.4
12-Nov	0.1	0.1	0.1	0.1	0.1	-0.1	-0.3	0.0	0.2	0.3	0.4	0.5	0.3	0.4	0.7	0.5	0.6	0.4	0.0	0.2	0.5	0.5	0.6	0.4	0.3	0.7
13-Nov	0.3	0.4	0.1	0.3	0.6	0.6	0.7	0.8	0.6	0.3	0.7	0.6	0.5	0.6	1.1	0.4	0.3	0.1	-0.1	0.0	-0.1	0.0	-0.3	0.0	0.3	1.1
14-Nov	-0.3	-0.2	-0.1	-0.2	-0.2	-0.4	-0.1	-0.2	-0.7	-0.4	-0.3	0.1	0.3	0.3	-0.6	-0.4	-0.1	-0.2	-0.5	-0.5	-0.6	-0.6	-0.5	-0.3	-0.3	0.3
15-Nov	-0.4	-0.3	-0.2	-0.3	-0.3	-0.1	0.4	0.4	0.5	0.3	0.4	0.0	0.2	-0.2	-0.5	-0.7	-0.5	-0.2	-1.1	-0.8	-0.9	-0.9	-1.1	-0.8	-0.3	0.5
16-Nov	-0.5	-0.8	-1.2	-1.1	-0.8	-0.9	-1.1	-0.9	-0.7	-0.7	-0.2	-0.5	-0.6	-0.3	0.2	0.0	-0.1	-0.1	-0.3	-0.3	-0.2	-0.1	-0.1	0.0	-0.5	0.2
17-Nov	-0.1	0.0	0.1	0.6	0.4	0.7	0.7	0.8	0.3	0.4	0.4	0.6	0.9	0.7	0.6	0.2	0.1	-0.2	-0.3	-0.4	-0.2	-0.2	-0.2	-0.2	0.2	0.9
18-Nov	-0.5	-0.7	-0.5	-1.1	-0.8	-0.5	-0.4	-0.3	-0.3	-0.2	-0.2	-0.4	-0.4	-0.3	-0.6	-0.5	-0.4	-0.4	-0.3	-0.2	-0.4	-0.1	-0.3	-0.3	-0.4	-0.1
19-Nov	-0.3	-0.3	-0.2	-0.2	-0.3	-0.3	-0.3	-0.3	-0.2	-0.3	-0.3	0.3	0.4	-0.1	0.3	0.3	0.6	0.5	0.7	0.5	0.5	0.6	0.6	0.4	0.1	0.7
20-Nov	0.3	0.5	0.5	0.4	0.4	0.5	0.5	0.5	0.3	0.4	0.5	0.7	0.6	0.4	0.2	0.4	0.3	0.2	0.2	0.0	-0.2	0.2	0.2	0.0	0.3	0.7
21-Nov	-0.2	-0.1	-0.1	0.2	0.0	0.3	0.0	-0.4	-0.5	-0.6	-0.2	-0.7	-0.4	-0.5	0.1	0.4	0.3	0.3	0.3	0.1	0.3	0.4	0.1	0.3	0.0	0.4
22-Nov	0.1	0.4	0.8	0.1	0.3	0.2	0.5	0.6	0.6	0.2	-0.1	-0.2	-0.2	-0.2	0.0	-0.1	-0.3	0.0	-0.4	-0.5	-0.4	-0.2	-0.2	-0.4	0.0	0.8
23-Nov	-0.1	-0.2	-0.2	0.0	0.3	0.0	0.1	0.2	0.3	0.5	0.2	0.3	0.5	0.4	0.5	0.4	0.1	0.0	-0.1	0.0	0.0	-0.1	0.1	0.1	0.1	0.5
24-Nov	-0.4	0.1	-0.4	0.1	-0.1	-0.2	-0.2	0.1	0.0	0.3	0.3	0.3	-0.1	0.4	0.2	0.7	0.4	0.5	0.1	0.4	0.6	0.4	0.3	0.8	0.2	0.8
25-Nov	0.1	0.3	0.2	0.1	0.3	-0.2	-0.2	-0.3	-0.3	0.1	0.0	0.0	0.4	-0.1	-0.2	-0.1	0.0	-0.1	0.1	0.0	0.1	0.3	0.2	0.8	0.1	0.8
26-Nov	0.9	0.8	0.8	0.5	0.5	0.5	0.7	0.6	0.3	0.5	0.7	0.7	0.4	0.5	0.4	0.1	0.1	0.1	-0.4	-0.5	-0.7	-0.6	0.1	-0.5	0.3	0.9
27-Nov	-0.4	0.1	-0.9	-0.1	0.2	0.1	-0.1	-0.3	-0.4	0.0	0.3	0.4	0.2	-0.2	-0.1	0.0	0.0	-0.2	-0.2	-0.2	0.1	0.5	-0.2	-0.2	-0.1	0.5
28-Nov	-0.2	-0.3	-0.5	-0.3	-0.2	-0.3	-0.2	-0.3	-0.1	-0.1	-0.2	-0.2	-0.4	-0.6	-0.1	-0.1	-0.3	-0.5	-0.2	-0.2	0.1	0.1	0.1	0.0	-0.2	0.1
29-Nov	0.1	-0.4	-0.5	-0.4	-0.4	-0.2	-0.2	0.0	-0.1	-0.5	0.3	0.2	-0.5	-0.2	-0.4	-0.4	-0.4	-0.4	-0.6	-1.1	-0.8	-0.6	-0.6	-0.6	-0.4	0.3
30-Nov	-0.7	-0.8	-0.8	-0.5	-0.6	-0.5	-0.6	-0.5	-0.6	-0.6	-0.4	0.3	0.2	0.1	0.4	0.6	0.4	0.4	0.7	0.8	0.8	0.8	0.7	0.7	0.0	0.8
																								Diurnal Average		
																								Diurnal Maximum		
AF - Analyzer Failure																										



Summary of Hour Standard Deviations

Mannix - November 2014

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 4.0 km/h on Nov 16 04:00			Hours of Data:	667
Minimum Value: 0.1 km/h on Nov 1 18:00			Hours of Missing Data:	53
			Hours of Calibration:	0
			Percent Operational Time:	92.6
Percentiles: P ₁ = 0.2 P ₁₀ = 0.5 Q ₁ = 0.8 Median = 1.3 Q ₃ = 1.8 P ₉₀ = 2.5 P ₉₉ = 3.6				

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

Diurnal Maximum

AF - Analyzer Failure



Summary of Hour Averages

Mannix - November 2014

Maximum Value: 1.7 km/h on Nov 5 11:00	Maximum Daily Average: 0.5 km/h on Nov 26	Hours in Service: 720
Minimum Value: -0.8 km/h on Nov 10 11:00	Minimum Daily Average: -0.2 km/h on Nov 7	Hours of Data: 662
Maximum Diurnal Average: 0.2 km/h at hour 11	Minimum Diurnal Average: -0.1 km/h at hour 3	Hours of Missing Data: 58
Monthly Average: 0.06 km/h	Percentiles: P ₁ = -0.7 P ₁₀ = -0.4 Q ₁ = -0.1 Median = 0.1 Q ₃ = 0.3 P ₉₀ = 0.5 P ₉₉ = 0.9	Hours of Calibration: 0
		Percent Operational Time: 91.9

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-Nov	0.1	0.2	-0.1	-0.1	-0.2	-0.1	-0.2	-0.2	-0.4	0.0	0.0	0.0	-0.2	0.2	-0.4	-0.1	-0.1	0.0	-0.1	-0.1	0.0	-0.2	0.2	0.2	-0.1	0.2																							
2-Nov	0.2	0.6	0.9	0.8	0.8	0.7	0.8	0.7	0.3	0.3	0.8	0.6	0.7	0.6	0.5	-0.1	0.0	-0.2	-0.1	0.0	-0.2	-0.2	0.0	0.2	0.4	0.9																							
3-Nov	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-Nov	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-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	1.7	0.1	0.0	-0.1	0.1	0.1	-0.2	-0.5	0.0	0.0	-0.2	0.2	0.1	0.3	1.7																							
6-Nov	-0.1	0.1	-0.3	-0.4	-0.5	-0.5	-0.5	-0.6	-0.4	-0.1	-0.2	-0.2	-0.1	0.0	0.1	0.4	0.3	0.0	-0.3	-0.2	0.1	0.1	0.3	-0.2	-0.1	0.4																							
7-Nov	-0.2	0.2	-0.5	-0.4	-0.3	-0.2	-0.5	0.0	-0.2	-0.3	0.3	-0.2	-0.2	-0.1	-0.1	-0.4	-0.1	-0.2	-0.4	-0.1	-0.5	-0.5	-0.4	0.1	-0.2	0.3																							
8-Nov	0.0	-0.1	0.0	0.1	0.5	-0.1	0.2	0.3	0.1	-0.1	-0.1	0.0	-0.6	0.0	-0.1	0.2	-0.3	0.0	0.4	0.2	0.0	-0.3	-0.3	-0.6	0.0	0.5																							
9-Nov	0.0	0.3	0.3	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.4	0.9	0.0	-0.2	0.1	-0.1	0.1	-0.2	0.0	0.1	0.3	0.2	0.4	0.2	0.1	0.9																							
10-Nov	0.0	0.0	-0.3	-0.6	-0.3	-0.5	-0.6	-0.1	-0.2	-0.2	-0.8	-0.7	-0.6	-0.7	-0.7	-0.1	0.4	0.5	0.9	0.9	1.6	0.6	0.3	0.1	-0.1	1.6																							
11-Nov	0.2	0.5	0.4	-0.3	0.1	0.1	0.2	0.2	-0.1	0.1	-0.1	0.3	0.6	0.0	-0.1	0.0	0.1	-0.1	0.0	0.3	-0.2	0.1	0.1	-0.1	0.1	0.6																							
12-Nov	0.1	0.1	0.0	0.0	-0.1	-0.2	-0.5	-0.1	0.0	0.0	0.1	0.2	0.0	0.0	0.5	0.2	0.4	0.1	-0.3	-0.1	0.2	0.2	0.2	0.1	0.0	0.5																							
13-Nov	0.1	0.1	-0.2	-0.1	0.3	0.4	0.4	0.4	0.4	0.2	0.4	0.2	0.1	0.3	0.8	0.0	0.1	0.1	0.2	0.0	0.2	0.3	0.1	0.3	0.2	0.8																							
14-Nov	-0.1	0.1	0.3	0.0	0.1	-0.2	0.0	-0.1	-0.7	-0.2	0.0	0.6	0.9	0.5	-0.4	-0.3	0.1	-0.2	-0.5	-0.5	-0.5	-0.4	-0.5	-0.4	-0.1	0.9																							
15-Nov	-0.5	-0.5	-0.4	-0.4	-0.5	-0.4	-0.2	0.2	0.2	0.0	0.2	-0.2	0.4	0.1	-0.2	-0.2	0.0	0.8	-0.8	-0.4	-0.4	-0.6	-0.6	-0.3	-0.2	0.8																							
16-Nov	-0.2	-0.5	-0.8	-0.7	-0.3	-0.7	-0.8	-0.6	-0.5	-0.4	0.1	-0.2	-0.2	-0.1	0.3	0.4	0.1	0.1	-0.1	-0.1	0.0	0.0	0.0	0.2	-0.2	0.4																							
17-Nov	0.1	-0.1	0.0	0.4	0.3	0.6	0.4	0.8	0.3	0.3	0.5	0.5	0.6	0.6	0.6	-0.1	-0.3	0.0	0.0	-0.1	0.1	0.0	0.2	0.1	0.2	0.8																							
18-Nov	0.0	-0.3	0.2	-0.5	-0.4	-0.2	-0.1	0.0	0.0	0.2	0.3	0.2	0.1	0.4	0.1	0.0	0.1	0.0	0.1	0.3	0.1	0.2	0.1	0.1	0.0	0.4																							
19-Nov	0.1	0.1	0.1	0.0	-0.2	-0.2	-0.2	-0.2	-0.2	-0.4	-0.6	0.0	0.3	-0.3	0.2	0.1	0.4	0.4	0.5	0.3	0.4	0.6	0.3	0.1	0.1	0.6																							
20-Nov	0.1	0.4	0.1	0.0	-0.1	0.4	0.4	0.3	0.2	0.4	0.4	0.6	0.3	0.2	-0.1	0.3	0.2	0.0	0.1	0.1	0.1	0.4	0.4	0.3	0.2	0.6																							
21-Nov	0.1	0.1	0.1	0.5	0.3	0.4	0.1	0.2	-0.2	-0.4	0.3	-0.5	-0.1	-0.2	0.3	0.2	0.4	0.5	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.5																							
22-Nov	0.2	0.6	0.7	0.2	0.5	0.3	0.7	0.7	0.7	0.3	0.3	0.1	0.1	0.1	0.2	0.1	0.1	0.3	-0.1	-0.2	-0.1	0.1	0.1	-0.1	0.3	0.7																							
23-Nov	0.0	-0.1	-0.1	0.1	0.1	0.0	0.0	0.0	0.2	0.5	0.2	0.2	0.3	0.0	0.3	0.2	-0.1	-0.2	-0.2	0.0	0.0	0.0	0.1	0.2	0.1	0.5																							
24-Nov	0.0	0.6	-0.2	0.5	0.0	0.1	-0.1	0.2	0.1	0.5	0.2	0.4	-0.1	0.4	0.2	0.8	0.4	0.6	-0.2	0.1	0.3	0.1	0.0	0.7	0.2	0.8																							
25-Nov	0.1	0.4	0.2	0.3	0.4	0.0	0.1	-0.3	-0.3	0.5	0.4	0.1	0.3	0.0	0.0	0.0	0.1	-0.1	0.4	0.1	0.1	0.1	0.2	0.5	0.2	0.5																							
26-Nov	0.7	1.0	0.5	0.9	0.9	0.9	1.2	0.2	0.7	1.0	0.7	0.7	0.9	0.9	0.7	0.6	0.3	0.1	0.0	-0.1	-0.7	-0.6	0.0	-0.1	0.5	1.2																							
27-Nov	0.1	0.8	-0.8	-0.1	0.6	0.7	0.3	0.0	-0.3	0.2	0.3	0.5	0.3	-0.3	-0.1	0.2	0.2	-0.1	0.0	-0.1	0.2	0.4	0.0	-0.1	0.1	0.8																							
28-Nov	0.0	-0.3	-0.4	0.0	0.0	-0.3	-0.1	-0.2	0.3	0.0	-0.1	-0.1	-0.3	-0.5	0.3	0.1	0.0	-0.2	0.1	-0.1	0.2	0.1	0.2	0.0	0.0	0.3																							
29-Nov	0.0	-0.5	-0.6	-0.6	-0.4	-0.4	-0.3	-0.2	-0.4	-0.6	0.6	0.3	-0.3	-0.2	-0.4	-0.3	-0.1	0.3	0.2	0.1	0.3	0.1	-0.1	-0.1	-0.2	0.6																							
30-Nov	0.0	-0.1	-0.3	-0.4	-0.2	-0.1	-0.6	-0.4	-0.7	-0.8	-0.5	0.0	0.0	-0.1	0.3	0.3	0.0	0.2	0.4	0.5	0.5	0.5	0.5	0.5	0.0	0.5																							
																								0.0	0.1	-0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	Diurnal Average
																								0.7	1.0	0.9	0.9	0.9	0.9	1.2	0.8	0.7	1.0	1.7	0.9	0.9	0.9	0.8	0.8	0.4	0.8	0.9	0.9	1.6	0.6	0.5	0.7	0.0	Diurnal Maximum

AF - Analyzer Failure



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 4.0 km/h on Nov 16 04:00	Hours of Data: 662
Minimum Value: 0.1 km/h on Nov 25 21:00	Hours of Missing Data: 58
Percentiles: P ₁ = 0.2 P ₁₀ = 0.4 Q ₁ = 0.7 Median = 1.2 Q ₃ = 1.7 P ₉₀ = 2.4 P ₉₉ = 3.4	Hours of Calibration: 0
	Percent Operational Time: 91.9

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-Nov	0.4	0.3	0.3	0.3	0.4	0.4	0.4	0.6	0.5	0.6	1.4	1.6	1.4	1.8	1.7	1.0	0.4	0.2	0.2	0.3	0.1	0.6	0.4	0.4	1.8
2-Nov	0.4	0.6	0.7	0.9	0.8	0.7	0.7	0.7	0.4	1.1	1.5	1.6	1.1	1.1	0.8	0.6	0.7	1.0	1.0	0.8	1.2	1.1	1.0	1.1	1.6
3-Nov	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-Nov	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-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	2.2	1.8	1.5	1.5	1.4	1.0	0.9	0.7	0.6	0.6	0.9	0.8	1.2	1.6	2.2
6-Nov	2.2	2.1	2.2	2.5	2.6	2.7	3.0	3.6	3.4	3.0	2.6	1.8	1.8	0.9	1.0	0.7	0.5	0.5	0.6	1.0	1.7	2.1	2.7	2.5	3.6
7-Nov	2.4	2.7	3.3	3.4	3.2	3.0	3.0	3.0	2.6	2.8	3.3	2.7	3.2	3.3	2.9	2.5	2.2	2.5	2.5	2.2	1.5	1.3	1.2	1.6	3.4
8-Nov	1.9	1.3	0.9	1.4	1.5	0.9	1.0	1.1	1.2	1.7	2.0	3.1	2.6	2.7	1.9	1.6	0.8	0.9	1.4	1.3	1.1	1.2	1.2	1.4	3.1
9-Nov	1.2	1.0	0.8	0.7	0.5	0.6	0.7	0.7	0.4	0.6	1.6	1.8	2.0	2.0	1.9	1.4	1.3	1.2	1.5	1.7	1.6	1.7	1.7	1.8	2.0
10-Nov	1.6	2.1	2.2	2.1	1.9	2.2	1.9	1.9	2.5	2.9	2.2	2.1	2.7	2.9	2.4	2.5	2.2	2.3	2.4	2.6	3.1	2.3	2.3	2.4	3.1
11-Nov	2.2	2.1	1.9	1.8	2.0	1.6	1.6	1.7	1.8	1.9	1.6	1.8	1.8	1.8	1.5	1.3	0.8	0.3	0.7	0.9	0.6	0.6	0.2	0.4	2.2
12-Nov	0.5	0.5	0.8	0.9	1.4	1.6	1.4	1.1	0.9	0.9	1.7	1.9	1.8	1.7	1.6	1.1	0.9	0.3	0.4	0.6	0.5	0.5	0.7	0.7	1.9
13-Nov	0.5	0.3	0.4	0.5	0.7	0.7	0.5	0.6	0.7	0.8	1.0	1.3	1.4	1.3	1.3	0.9	0.4	0.2	0.3	0.5	0.4	0.7	0.7	1.0	1.4
14-Nov	1.5	1.9	1.3	1.1	1.2	1.2	1.5	1.2	1.4	1.5	1.7	1.8	2.1	1.8	1.5	1.0	0.6	0.3	0.4	0.5	0.3	0.2	0.3	0.4	2.1
15-Nov	0.5	0.7	0.7	0.8	0.8	0.9	0.8	1.1	0.9	0.9	0.8	0.8	1.8	1.3	1.5	2.3	2.6	3.8	3.6	2.2	2.2	3.1	2.9	2.2	3.8
16-Nov	2.0	2.6	3.4	4.0	2.9	2.6	2.7	2.8	2.1	2.0	2.4	1.9	2.0	1.5	1.4	1.3	0.7	0.5	0.4	0.3	0.5	0.2	0.2	0.3	4.0
17-Nov	0.2	0.3	0.4	0.5	0.6	0.5	1.2	1.4	0.8	1.2	1.0	0.9	1.5	1.1	0.8	0.6	0.5	0.6	0.5	1.0	0.6	0.5	0.4	0.9	1.5
18-Nov	1.9	2.0	2.9	3.2	3.0	1.9	1.2	1.7	1.6	1.6	1.7	1.9	1.7	2.2	2.2	1.9	1.7	1.7	1.6	1.4	1.1	1.4	1.1	1.0	3.2
19-Nov	1.0	0.8	1.2	1.0	1.1	0.8	0.5	0.4	0.8	0.8	1.3	1.7	1.6	1.7	1.4	0.5	0.3	0.3	0.4	0.8	0.7	0.8	0.7	0.7	1.7
20-Nov	0.6	0.9	0.8	0.9	0.8	1.1	1.2	1.2	0.9	1.0	1.2	1.3	1.2	0.8	0.5	0.4	0.4	0.3	0.2	0.4	1.1	1.2	0.9	1.0	1.3
21-Nov	1.1	1.3	1.4	1.7	2.0	2.0	1.8	2.2	1.9	1.5	2.2	2.2	1.7	1.8	1.6	1.3	1.4	1.3	1.5	1.4	1.2	1.0	0.7	0.9	2.2
22-Nov	1.2	1.6	1.6	0.9	1.0	1.2	1.5	1.6	1.4	1.1	1.3	1.3	1.5	1.5	2.0	1.4	1.5	1.2	1.3	1.6	1.2	1.0	1.1	1.0	2.0
23-Nov	0.8	0.9	0.6	0.4	0.3	0.3	0.3	0.7	0.6	1.2	1.2	1.0	1.1	1.0	1.0	0.7	0.2	0.2	0.3	0.2	0.2	0.2	0.4	0.8	1.2
24-Nov	1.5	2.0	1.2	1.5	0.9	1.1	1.2	1.1	1.2	1.2	1.2	1.3	1.1	1.2	1.2	0.7	1.0	1.1	1.4	1.9	2.1	1.8	1.7	1.4	2.1
25-Nov	1.1	1.1	0.6	1.0	0.9	0.6	0.9	1.0	1.4	1.4	1.3	1.2	1.5	1.5	1.1	0.7	0.3	0.3	0.7	0.3	0.1	0.6	0.3	0.4	1.5
26-Nov	0.4	0.4	0.5	0.4	0.4	0.5	0.6	0.8	0.7	0.7	1.5	1.5	0.5	0.7	0.6	0.6	0.6	0.4	1.2	2.0	2.3	2.2	2.7	3.1	3.1
27-Nov	3.1	2.9	2.5	2.4	1.5	1.5	1.2	1.4	1.4	1.5	1.7	1.6	1.2	1.3	0.9	0.9	0.7	0.9	0.6	1.0	1.2	1.9	1.5	1.6	3.1
28-Nov	1.6	1.6	1.7	1.4	1.6	1.6	1.7	1.8	2.2	1.5	1.5	1.5	1.6	1.6	1.8	1.7	1.6	1.5	1.4	1.2	0.8	0.6	0.5	0.1	2.2
29-Nov	0.2	0.3	0.5	0.8	0.6	0.9	0.7	0.6	0.7	0.6	1.3	2.5	2.0	1.9	1.6	1.4	1.3	1.9	2.3	3.0	2.7	2.3	2.2	2.2	3.0
30-Nov	2.4	1.8	1.8	1.2	1.2	1.1	1.4	1.6	1.4	1.1	0.8	0.9	1.7	1.3	0.9	0.6	0.6	0.9	0.6	0.6	0.8	0.9	1.1	0.8	2.4

Diurnal Maximum

AF - Analyzer Failure



Summary of Hour Averages

Mannix - November 2014

Maximum Value: 4.3 km/h on Nov 6 23:00																								Maximum Daily Average: 2.0 km/h on Nov 18																								Hours in Service: 720	
Minimum Value: -1.0 km/h on Nov 2 22:00																								Minimum Daily Average: 0.0 km/h on Nov 22																								Hours of Data: 661	
Maximum Diurnal Average: 0.9 km/h at hour 2																								Minimum Diurnal Average: 0.7 km/h at hour 7																								Hours of Missing Data: 59	
Monthly Average: 0.79 km/h																								Percentiles: P ₁ = -0.7 P ₁₀ = -0.1 Q ₁ = 0.1 Median = 0.6 Q ₃ = 1.2 P ₉₀ = 1.9 P ₉₉ = 3.6																								Hours of Calibration: 0	
																								Percent Operational Time: 91.8																									
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-Nov	0.8	1.4	1.8	1.5	1.3	1.2	0.4	0.3	0.1	0.3	0.2	0.5	0.7	0.9	0.3	0.8	0.5	0.3	0.5	1.6	1.7	0.5	0.3	0.3	0.8	1.8																							
2-Nov	0.4	0.8	1.0	1.2	1.5	1.5	1.7	1.7	1.2	1.0	1.9	1.4	1.7	1.3	1.3	0.3	0.1	-0.2	0.2	-0.2	-1.0	-1.0	-0.8	0.4	0.7	1.9																							
3-Nov	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-Nov	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-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	2.3																							
6-Nov	0.2	0.4	0.0	-0.8	-0.7	-0.6	-1.0	-0.3	0.0	0.2	0.0	0.1	-0.1	0.1	0.5	1.2	1.2	0.8	0.6	2.2	3.1	3.7	4.3	3.0	0.8	4.3																							
7-Nov	2.4	4.0	3.1	3.2	3.0	3.0	2.4	1.8	2.0	1.4	1.7	0.9	1.6	1.6	1.4	0.9	1.2	1.7	1.1	1.0	0.4	0.5	0.3	0.3	1.7	4.0																							
8-Nov	0.0	0.1	0.3	1.0	1.6	0.8	1.3	1.6	1.9	1.6	1.4	1.1	0.6	1.3	1.4	1.1	0.5	0.5	0.1	-0.1	-0.1	-0.1	0.0	-0.6	0.7	1.9																							
9-Nov	0.1	0.3	0.3	0.0	0.5	0.0	-0.2	-0.1	0.1	0.2	0.5	1.4	0.3	-0.3	0.0	0.0	0.3	0.0	0.0	0.4	0.4	0.0	0.1	0.7	0.2	1.4																							
10-Nov	1.2	1.2	1.1	0.8	1.4	1.0	0.9	1.6	1.0	1.0	0.4	0.4	0.7	0.9	0.5	1.0	1.0	1.4	1.3	1.6	2.6	1.4	1.1	1.3	1.1	2.6																							
11-Nov	1.5	1.6	1.3	1.1	1.2	0.1	0.0	-0.1	-0.3	-0.5	-0.3	0.8	1.2	0.5	0.3	0.6	0.4	-0.1	0.0	0.1	-0.3	0.0	0.2	0.2	0.4	1.6																							
12-Nov	0.4	0.5	0.2	0.3	0.3	0.2	-0.1	0.3	0.4	0.7	0.6	0.6	0.2	0.0	0.5	0.5	1.2	0.9	0.3	0.4	0.6	0.6	0.5	0.4	0.4	1.2																							
13-Nov	0.3	0.3	0.0	0.2	0.5	0.8	0.5	0.5	0.6	0.4	0.4	0.1	0.0	0.0	0.2	-0.2	0.1	0.1	0.0	-0.3	0.0	0.5	0.0	0.2	0.2	0.8																							
14-Nov	0.2	0.5	0.8	0.5	0.9	0.4	0.6	0.4	-0.2	0.4	0.3	0.7	1.4	1.3	0.4	0.4	1.4	1.4	1.4	1.9	2.0	2.3	1.7	0.7	0.9	2.3																							
15-Nov	0.6	0.4	0.4	0.5	0.5	0.5	0.7	0.9	1.1	0.6	0.7	0.5	1.3	2.0	1.4	1.2	1.2	1.9	1.0	1.6	1.8	1.1	2.5	2.3	1.1	2.5																							
16-Nov	2.1	1.9	1.1	1.4	1.9	1.3	0.9	1.1	1.1	1.4	1.8	1.4	1.6	1.0	1.7	1.9	0.9	1.2	1.6	1.5	1.2	0.4	0.3	0.9	1.3	2.1																							
17-Nov	0.6	0.5	0.3	0.7	0.6	0.8	1.1	1.6	1.2	0.5	1.3	1.2	1.6	1.6	1.9	0.9	0.9	2.3	2.7	1.9	0.9	1.1	2.0	2.0	1.3	2.7																							
18-Nov	0.3	-0.3	1.0	1.0	1.5	1.6	1.7	2.0	1.5	2.0	2.4	2.7	2.5	3.2	2.9	2.7	3.0	2.7	2.8	2.9	2.5	2.1	2.0	2.2	2.0	3.2																							
19-Nov	2.1	1.8	1.7	1.7	1.4	1.1	1.2	1.4	1.2	0.3	-0.1	0.5	0.6	0.3	0.7	0.6	0.7	1.0	1.2	1.0	1.3	1.2	1.1	0.2	1.0	2.1																							
20-Nov	0.3	0.9	0.5	0.2	0.0	0.9	0.9	0.8	0.6	0.8	0.9	1.1	0.7	0.4	0.1	0.4	0.2	0.2	0.0	0.0	0.2	0.2	0.8	0.5	0.5	1.1																							
21-Nov	0.2	-0.1	-0.2	0.3	0.6	0.3	0.3	1.1	0.8	0.7	0.9	0.6	1.2	1.1	0.7	-0.2	0.0	-0.2	-0.2	-0.3	-0.2	-0.1	-0.2	-0.2	0.3	1.2																							
22-Nov	-0.3	-0.2	0.0	-0.3	-0.1	-0.3	0.1	-0.2	-0.1	-0.2	0.0	0.0	0.1	0.0	-0.2	0.0	0.1	0.1	-0.1	-0.1	0.0	0.2	0.3	0.1	0.0	0.3																							
23-Nov	0.5	0.5	0.0	0.1	0.3	0.8	0.2	-0.3	0.6	0.9	0.5	0.4	0.4	0.0	0.5	0.8	0.8	0.5	0.5	1.0	1.2	0.6	0.3	0.7	0.5	1.2																							
24-Nov	0.0	0.8	-0.1	0.9	0.1	0.9	0.3	0.1	0.0	0.5	0.1	0.4	-0.4	0.2	0.0	0.7	0.1	0.2	-0.7	-0.6	-0.4	-0.5	-0.5	0.1	0.1	0.9																							
25-Nov	-0.4	0.0	-0.1	-0.1	0.1	0.0	0.2	-0.1	0.2	0.8	0.4	0.4	0.6	0.4	0.1	0.0	0.0	-0.2	0.3	0.1	0.0	-0.1	0.4	0.8	0.2	0.8																							
26-Nov	0.9	1.2	0.6	0.7	0.5	0.9	1.1	0.5	0.6	1.1	1.5	1.3	0.9	0.5	0.7	0.8	0.4	0.1	0.7	1.0	-0.6	-0.6	0.2	1.5	0.7	1.5																							
27-Nov	1.6	1.9	-1.0	-0.1	0.9	1.1	0.4	0.2	-0.2	0.1	0.1	0.3	0.4	-0.3	0.1	0.5	0.5	0.1	0.1	0.0	0.1	0.3	-0.1	-0.1	0.3	1.9																							
28-Nov	0.1	-0.2	-0.3	0.0	0.0	-0.3	-0.2	-0.1	0.4	0.0	-0.1	0.0	-0.2	-0.4	0.6	0.5	0.8	0.6	0.6	-0.1	0.2	0.1	0.6	0.2	0.1	0.8																							
29-Nov	0.5	1.3	1.0	0.5	0.6	0.8	0.4	0.8	0.7	1.2	2.4	2.2	1.9	1.9	1.7	2.2	2.6	3.3	3.5	4.3	3.6	3.6	3.6	3.8	2.0	4.3																							
30-Nov	3.7	3.6	3.4	2.6	3.2	3.1	2.2	2.4	2.2	1.2	0.6	0.5	0.8	0.7	0.9	1.2	1.5	1.4	1.3	1.2	1.4	1.4	1.7	1.4	1.8	3.7																							
																								Diurnal Average																									
																								Diurnal Maximum																									
0.8 0.9 0.7 0.7 0.9 0.8 0.7 0.7 0.7 0.7 0.8 0.9 0.8 0.8 0.8 0.8 0.8 0.8 0.8 0.8 0.9 0.8 0.7 0.8 0.9																								3.7 4.0 3.4 3.2 3.2 3.1 2.4 2.4 2.2 2.0 2.4 2.7 2.5 3.2 2.9 2.7 3.0 3.3 3.5 4.3 3.6 3.7 4.3 3.8																									
AF - Analyzer Failure																																																	



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 4.0 km/h on Nov 15 18:00	Hours of Data: 661
Minimum Value: 0.1 km/h on Nov 19 18:00	Hours of Missing Data: 59
Percentiles: P ₁ = 0.3 P ₁₀ = 0.5 Q ₁ = 0.7 Median = 1.2 Q ₃ = 1.7 P ₉₀ = 2.4 P ₉₉ = 3.3	Hours of Calibration: 0
	Percent Operational Time: 91.8

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

3.1	3.2	3.2	3.9	3.0	3.0	3.1	3.5	3.4	3.1	3.1	3.2	3.1	3.2	2.9	2.4	2.5	4.0	3.6	2.9	3.3	3.1	3.0	3.2	
Diurnal Maximum																								

AF - Analyzer Failure



Wood Buffalo Environmental Association

SO₂ Calibration Report

Station Information

Calibration Date	November 12, 2014	Previous Calibration	October 9, 2014
Station Name	Mannix	Station Number	AMS 5
Reason:	Routine		
Start Time (MST)	13:00	End Time (MST)	16:13
Barometric Pressure	730 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	-635	-634
Analyzer Range (mv)	5000	5000	Lamp voltage	872	875
Calculated slope	0.998184	0.992309	Chamber temp.	44.9	45.1
Calculated intercept	0.264929	0.025560	Pressure (mmHg)	713.2	713.2
Analyzer Background	7.0	6.9	Flow (lpm)	0.487	0.487
Analyzer Coefficient	0.992	0.985	Intensity	89	90

Analyzer make TEI 43i Analyzer serial # 1008841399

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.1	NA
as found span	5000	58.8	599.8	606.4	0.989
calibrator zero	5000	0.0	0.0	0.3	0.000
high point	5000	58.8	599.8	604.0	0.993
second point	5000	29.4	299.9	303.6	0.988
third point	5000	14.7	149.9	149.7	1.001
calibrator zero					
as left zero	5000	0.0	0.0	0.2	0.000
as left span	5000	58.8	599.8	603.4	0.994
Average Correction Factor					0.994

Corrected As found 606.3 Previous response 600.6 % change -0.9%

Notes:

Small adjustment to span. Filter changed after As Finds.

Calibration Performed By:

Ryan Power



Wood Buffalo Environmental Association

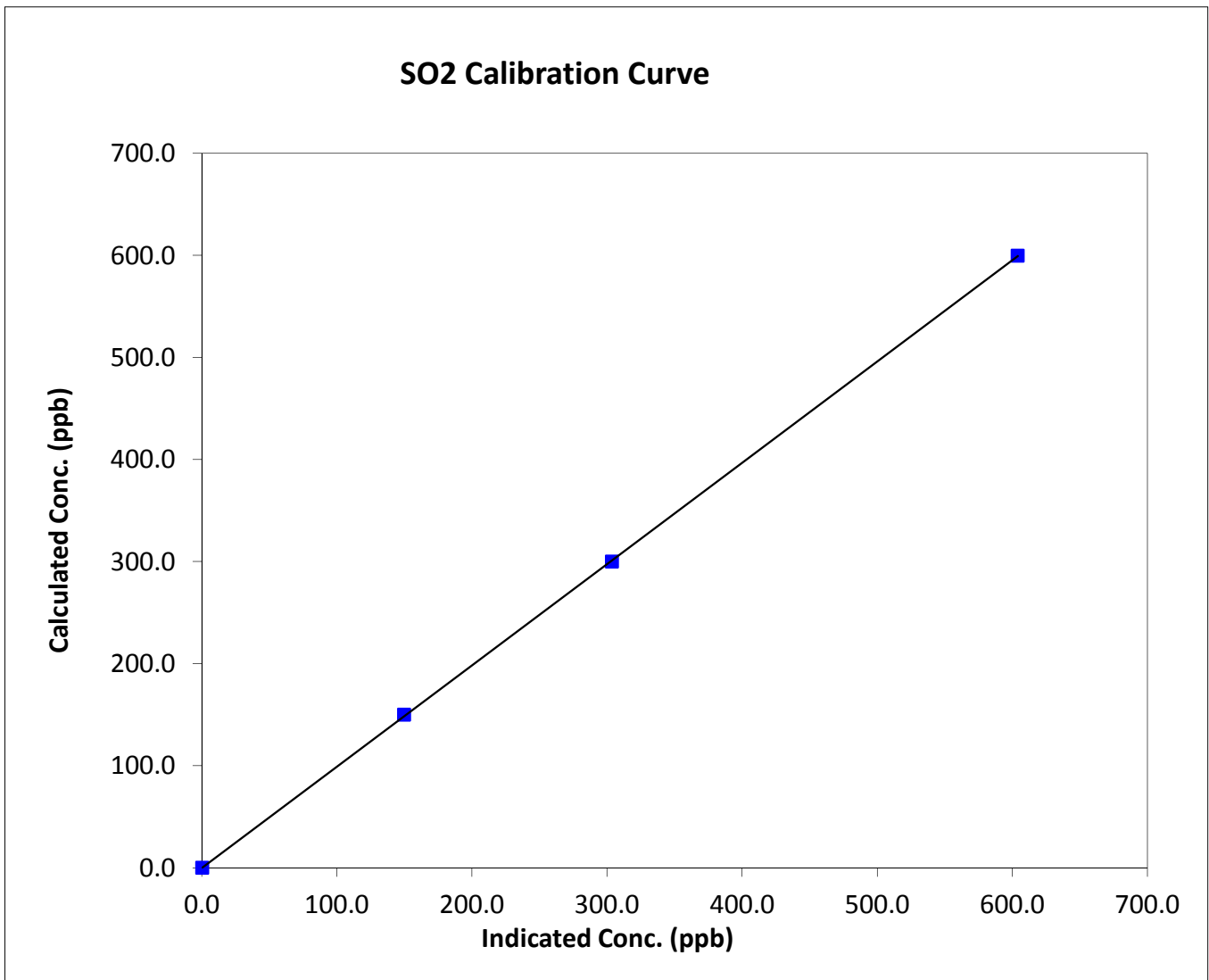
SO₂ Calibration Summary

Station Information

Calibration Date	November 12, 2014	Previous Calibration	October 9, 2014
Station Name	Mannix	Station Number	AMS 5
Start Time (MST)	13:00	End Time (MST)	16:13
Analyzer make	TEI 43i	Analyzer serial #	1008841399

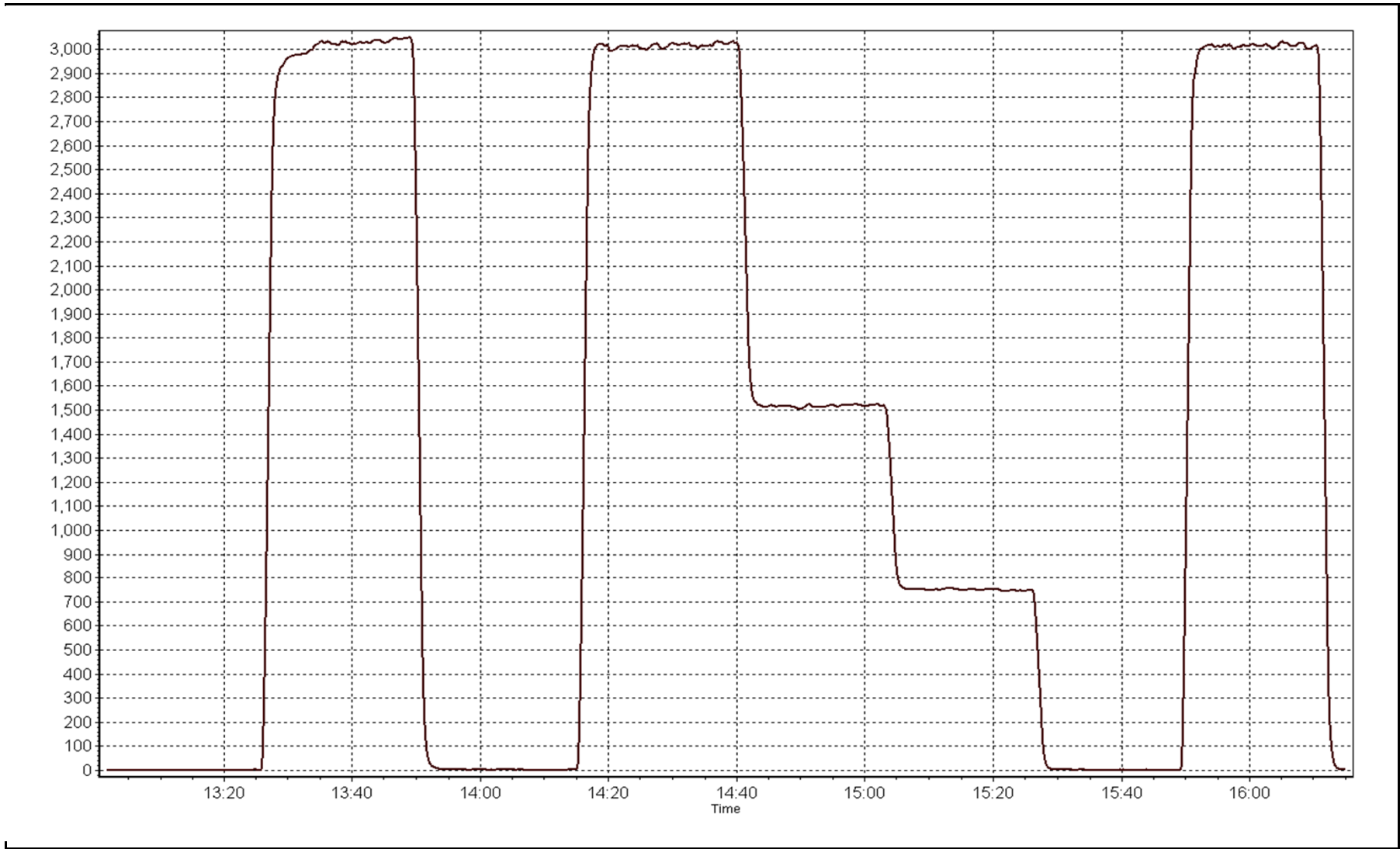
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.3	N/A	Correlation Coefficient	0.999980
599.8	604.0	0.9930		
299.9	303.6	0.9877	Slope	0.992309
149.9	149.7	1.0013		
			Intercept	0.025560



SO2 Calibration Plot

Date: November 12, 2014





Wood Buffalo Environmental Association

H2S Calibration Report

Station Information

Calibration Date	November 6, 2014	Previous Calibration	October 8, 2014
Station Name	Mannix	Station Number	AMS 5
Reason:	Routine		
Start Time (MST)	12:25	End Time (MST)	14:52
Barometric Pressure	725 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	878	875
Calculated slope	1.004700	0.995638	Chamber temp.	45	45
Calculated intercept	-0.031345	0.088451	Pressure	504.7	504.7
Analyzer Background	14.7	14.6	Flow	1.045	1.046
Analyzer Coefficient	1.120	1.12	Intensity (%)	115	115
			Converter temp.	326	324

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	0.04	NA
as found span	5000	36.8	75.1	75.4	0.996
SO2 scrubber check	5000	29.4	299.9	1.7	NA
calibrator zero	5000	0.0	0.0	0.0	NA
high point	5000	36.8	75.1	75.4	0.996
second point	5000	20.6	42.0	42.2	0.997
third point	5000	12.3	25.1	24.9	1.009
calibrator zero					
as left zero	5000	0.0	0.0	0.1	NA
as left span	5000	36.8	75.1	74.8	1.004
Average Correction Factor					1.000

Corrected As found	75.3	Previous response	74.8	% change	-0.7%
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Notes:

No adjustments. As Found used as Calibrator Zero and High Point. Scrubber check after third point, filter changed after scrubber check.

Calibration Performed By:

Ryan Power



Wood Buffalo Environmental Association

H2S Calibration Summary

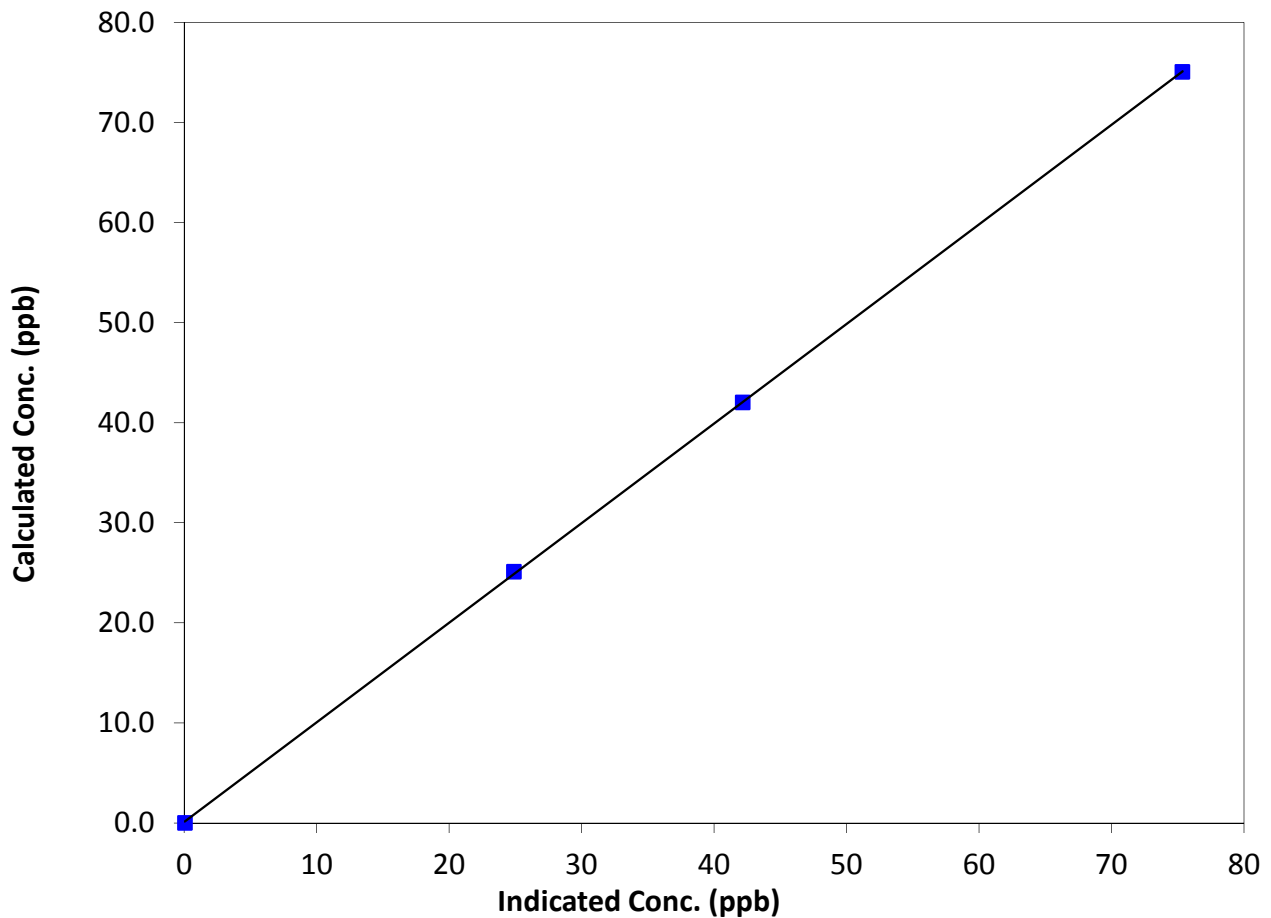
Station Information

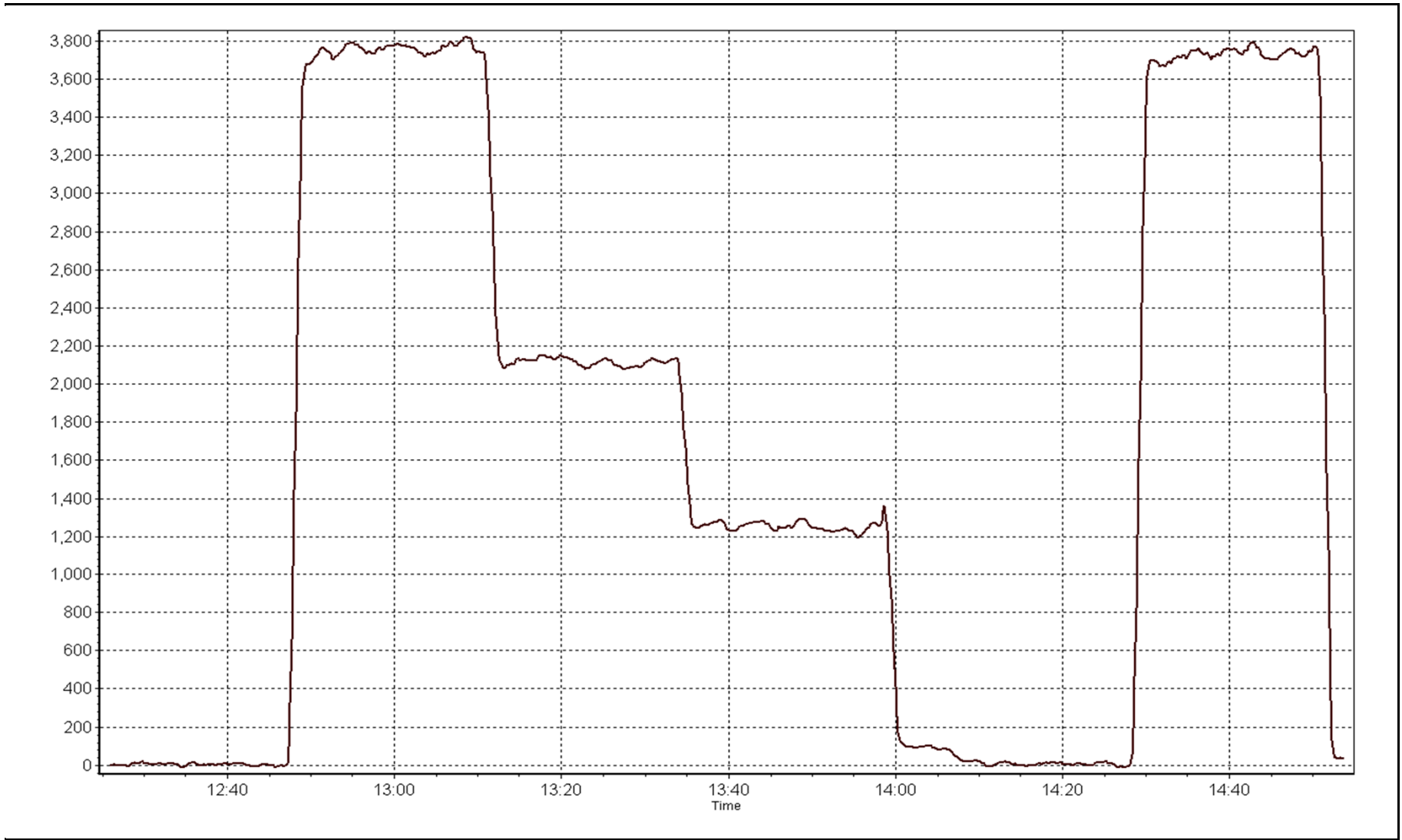
Calibration Date	November 6, 2014	Previous Calibration	October 8, 2014
Station Name	Mannix	Station Number	AMS 5
Start Time (MST)	12:25	End Time (MST)	14:52
Analyzer make	TEI 450i	Analyzer serial #	815129108

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999974
75.1	75.4	0.9962		
42.0	42.2	0.9965	Slope	0.995638
25.1	24.9	1.0085		
			Intercept	0.088451

H2S Calibration Curve







Wood Buffalo Environmental Association

THC Calibration Report

Station Information

Calibration Date	Wednesday, November 12, 2014	Previous Calibration	Thursday, October 09, 2014
Station Name	Mannix	Station Number	AMS 5
Reason:	Routine		
Start Time (MST)	13:00	End Time (MST)	16:10
Barometric Pressure	740 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	11.6	11.6
Analyzer Range (mv)	5000	5000	Air	42.3	42.3
Calculated slope	1.000778	1.001370	Fuel Pressure	20.2	20.2
Calculated intercept	-0.014870	0.000606	Detector Temp	125.0	125.1
Bkg	2.04	1.94	Flame Temp	165.2	166.0
Slope	1.792	1.768			

Analyzer make TEI 51i-LT Analyzer serial # 1317958295

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	-0.06	N/A
as found span	5000	58.8	12.72	12.87	0.988
calibrator zero	5000	0.0	0.00	0.03	N/A
high point	5000	58.8	12.72	12.72	1.000
2nd point	5000	29.4	6.36	6.34	1.004
3rd point	5000	14.7	3.18	3.15	1.011
calibrator zero					
as left zero	5000	0.0	0.00	0.03	N/A
as left span	5000	58.8	12.72	12.79	0.994
Average Correction Factor					1.005

Corrected As found 12.94 Previous response 12.72 % change -1.7%

Notes:

Small adjustments to zero and span. Filter changed after As Finds.

Calibration Performed By:

Ryan Power



Wood Buffalo Environmental Association

THC Calibration Summary

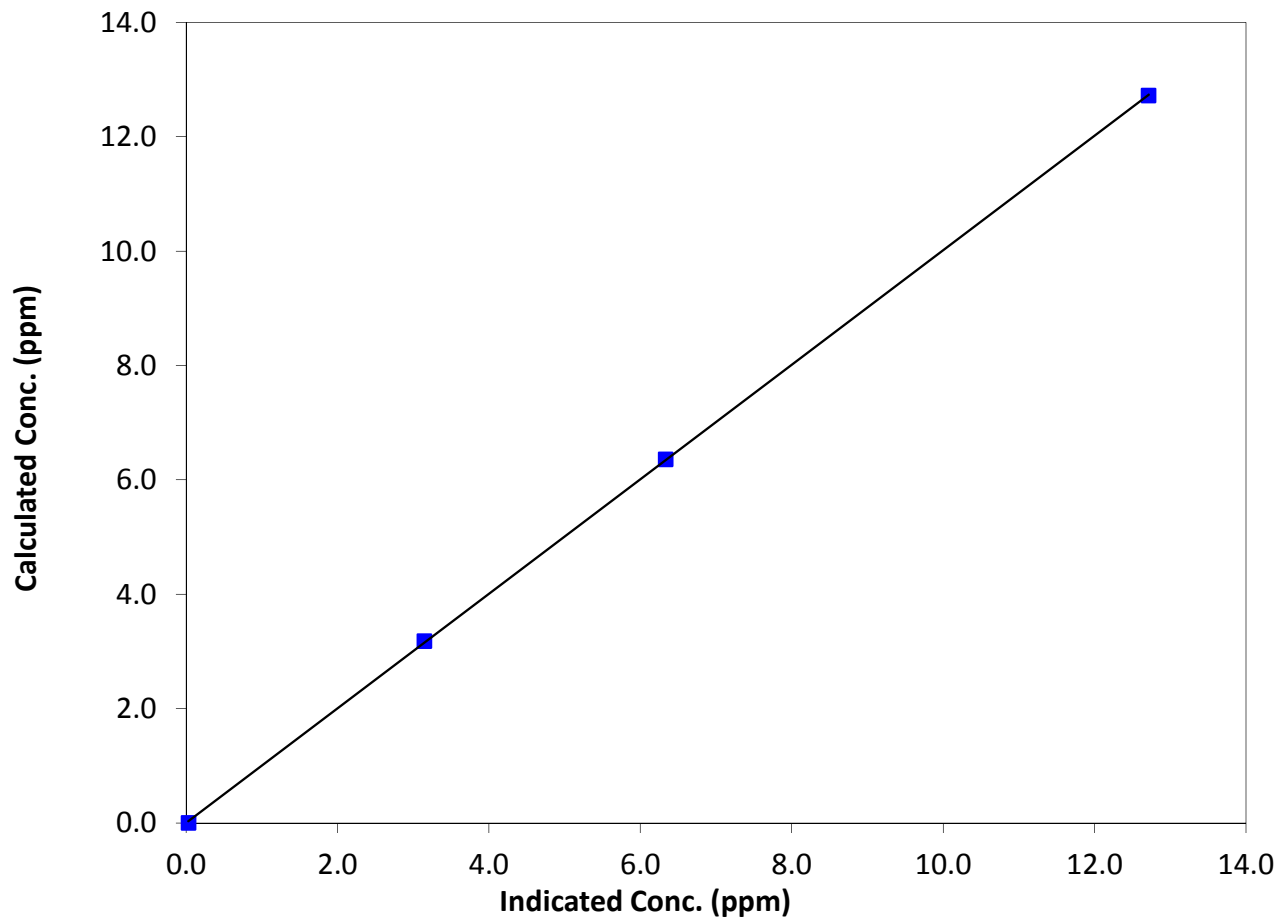
Station Information

Calibration Date	November 12, 2014	Previous Calibration	October 9, 2014
Station Name	Mannix	Station Number	AMS 5
Start Time (MST)	13:00	End Time (MST)	16:10
Analyzer make	TEI 51i-LT	Analyzer serial #	1317958295

Calibration Data

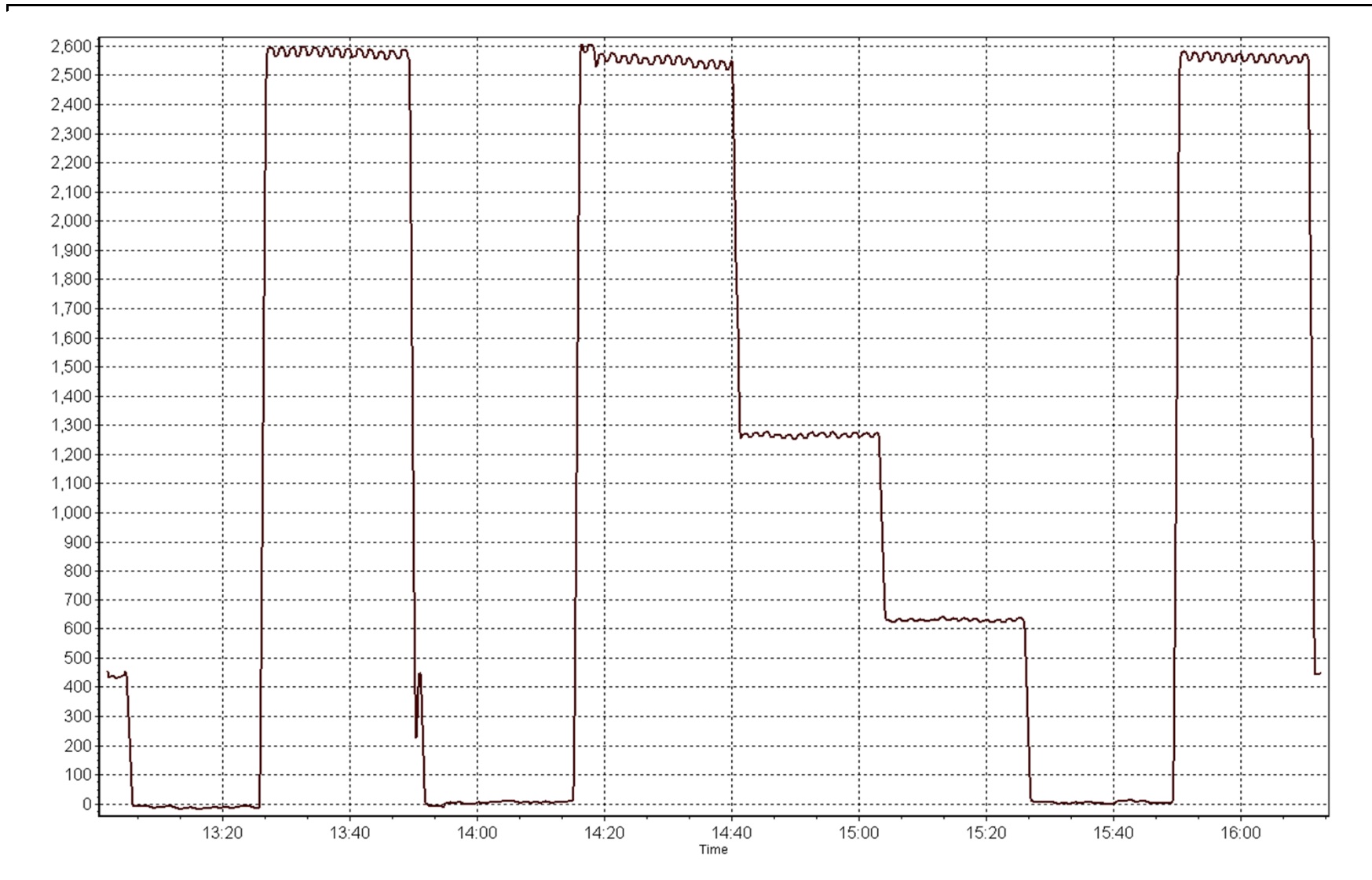
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.03	N/A	Correlation Coefficient	0.999976
12.72	12.72	1.0003		
6.36	6.34	1.0038	Slope	1.001370
3.18	3.15	1.0108		
			Intercept	0.000606

THC Calibration Curve



THC Calibration Plot

Date: November 12, 2014



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

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

**AMS 6
PATRICIA MCINNES
NOVEMBER 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

December 30, 2014

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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - PATRICIA McINNES (AMS 6)
NOVEMBER 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	592	32	128	86.67	16	0	3	0
TRS (ppb) Average	597	26	123	86.53	1	0	1	0
THC (ppm) Average	590	32	130	86.39	2.4	-	2.1	-
NMHC(ppm) Average	590	32	130	86.39	0.094	-	0.005	-
CH4(ppm) Average	590	32	130	86.39	2.4	-	2.1	-
O3 (ppb) Average	576	30	144	84.17	38	0	32	-
NO2 (ppb) Average	590	32	130	86.39	31	0	13	-
NO (ppb) Average	590	32	130	86.39	25	-	7	-
NOX (ppb) Average	590	32	130	86.39	49	-	20	-
NH3 (ppb) Average	544	39	176	80.97	0	0	0	-
PM2.5 (ug/m3) Average	719	0	1	99.86	47.4	-	13	-
Temperature 2 m (C) Average	720	0	0	100.00	9.1	-	2.9	-
Relative Humidity (%) Average	720	0	0	100.00	98	-	-	-
Wind Speed 10 m (km/h) Average	697	0	23	96.81	27	-	-	-
Wind Direction 10 m (deg) Average	697	0	23	96.81	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - PATRICIA McINNES (AMS 6)
NOVEMBER 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	592	0.8	2	-	0	0	0	0	1	2	16
TRS (ppb) Average	597	0.5	0	-	0	0	0	1	1	1	1
THC (ppm) Average	590	2	0.1	-	1.9	1.9	2	2	2	2.1	2.4
NMHC(ppm) Average	590	0.001	0.005	-	0	0	0	0	0	0	0.094
CH4(ppm) Average	590	1.99	0.1	-	1.9	1.9	2	2	2	2.1	2.4
O3 (ppb) Average	576	18.7	10	-	1	6	10	19	26	31	38
NO2 (ppb) Average	590	6.7	6	-	0	1	2	5	9	14	31
NO (ppb) Average	590	2.4	4	-	0	0	0	1	3	7	25
NOX (ppb) Average	590	9.1	9	-	0	1	3	7	12	21	49
NH3 (ppb) Average	544	0	0	-	0	0	0	0	0	0	0
PM2.5 (ug/m3) Average	719	5.15	5.2	-	0	1	2.1	3.7	6.2	11.1	47.4
Temperature 2 m (C) Average	720	-11.48	8.1	-	-30.6	-22	-16.7	-12.3	-5.8	-0.3	9.1
Relative Humidity (%) Average	720	79.2	9	-	48	67	74	80	84	92	98
Wind Speed 10 m (km/h) Average	697	10.1	5	-	1	4	6	10	13	17	27
Wind Direction 10 m (deg) Average	697	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - PATRICIA McINNES (AMS 6)
NOVEMBER 2014

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
ALL PARAMETERS	05 Nov 2014 12:00	05 Nov 2014 12:00	1	DAS program upgrade - data not collected
SO2	06 Nov 2014 16:00	10 Nov 2014 14:00	95	Analyzer failure - sample manifold cracked
TRS	06 Nov 2014 15:00	10 Nov 2014 14:00	96	Analyzer failure - sample manifold cracked
NMHC, CH4, THC	06 Nov 2014 16:00	10 Nov 2014 14:00	95	Analyzer failure - sample manifold cracked
NMHC, CH4, THC	28 Nov 2014 11:00	28 Nov 2014 12:00	2	Maintenance - replaced fuel and carrier gas cylinders
O3	06 Nov 2014 15:00	10 Nov 2014 14:00	96	Analyzer failure - sample manifold cracked
O3	24 Nov 2014 18:00	25 Nov 2014 10:00	17	Maintenance - new sample pump installed
NO2, NO, NOX	06 Nov 2014 16:00	10 Nov 2014 14:00	95	Analyzer failure - sample manifold cracked
NO2, NO, NOX	25 Nov 2014 11:00	25 Nov 2014 12:00	2	Maintenance - confirmed calibration points for Ozone
NH3	01 Nov 2014 05:00	30 Nov 2014 10:00	27	Stabilization after daily span
NH3	04 Nov 2014 16:00	04 Nov 2014 19:00	4	Stabilization period after routine calibration
NH3	05 Nov 2014 20:00	06 Nov 2014 05:00	10	Stabilization period after routine calibration
NH3	06 Nov 2014 15:00	10 Nov 2014 14:00	96	Analyzer failure - sample manifold cracked
PM2.5	10 Nov 2014 14:00	10 Nov 2014 14:00	1	Maintenance - Flow and zero check, sample head cleaning
Wind Speed, Wind Direction	03 Nov 2014 10:00	03 Nov 2014 14:00	5	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	03 Nov 2014 17:00	04 Nov 2014 10:00	18	Flat line in sensor output signal - Sensor frozen

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Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 16 ppb on Nov 11 14:00	Maximum Daily Average: 3.5 ppb on Nov 11
Minimum Value: 0 ppb on Nov 28 12:00	Hours of Data: 592
Maximum Diurnal Average: 1.9 ppb at hour 16	Hours of Missing Data: 128
Monthly Average: 0.8 ppb	Hours of Calibration: 32
Minimum Daily Average: 0.1 ppb on Nov 30	Percent Operational Time: 86.7
Minimum Diurnal Average: 0.5 ppb at hour 9	
Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 2 P ₉₉ = 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-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
2-Nov	0	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-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	2	1	1	3	4	8	7	7	1	1.6	8
4-Nov	0	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
5-Nov	0	0	0	0	Z	0	0	0	0	0	0	MS	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
6-Nov	0	0	0	0	0	Z	0	0	0	C	C	C	C	C	C	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	0
7-Nov	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-Nov	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-Nov	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-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	1	1	2	2	3	1	2	1	1	1	--	3
11-Nov	1	0	0	0	Z	1	1	0	0	0	1	9	10	16	12	8	6	2	1	2	2	2	2	2	3.5	16
12-Nov	3	1	3	6	5	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.0	6	
13-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	3	2	0.6	3	
14-Nov	2	Z	2	2	2	1	2	1	1	1	1	2	4	2	6	15	3	1	0	0	0	0	0	2.1	15	
15-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	2	1	1	3	2	3	2	2	0.9	3	
16-Nov	2	2	3	Z	1	3	1	0	1	5	1	0	0	0	0	0	0	0	0	0	0	0	0	1.0	5	
17-Nov	0	0	0	0	Z	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0.4	1	
18-Nov	1	1	2	1	1	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	2	
19-Nov	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-Nov	0	Z	1	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	1	2	0.6	2	
21-Nov	1	1	Z	0	0	0	1	3	2	0	1	2	4	1	8	6	2	0	0	0	0	0	0	1.5	8	
22-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.3	1	
23-Nov	2	2	1	3	Z	2	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.9	3	
24-Nov	0	1	0	0	1	Z	0	0	0	0	0	1	4	1	0	0	0	0	0	0	0	0	0	0.6	4	
25-Nov	Z	0	0	0	0	0	0	1	2	2	3	3	2	2	1	4	2	0	0	0	0	0	0	1.1	4	
26-Nov	0	Z	0	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0	2	4	1	0	1	0.7	4	
27-Nov	4	2	Z	0	0	0	0	0	0	0	0	1	0	2	1	1	0	0	0	0	0	0	0	0.6	4	
28-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	2	3	4	2	1	2	1	1	1	0	0.8	4	
29-Nov	0	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
30-Nov	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	

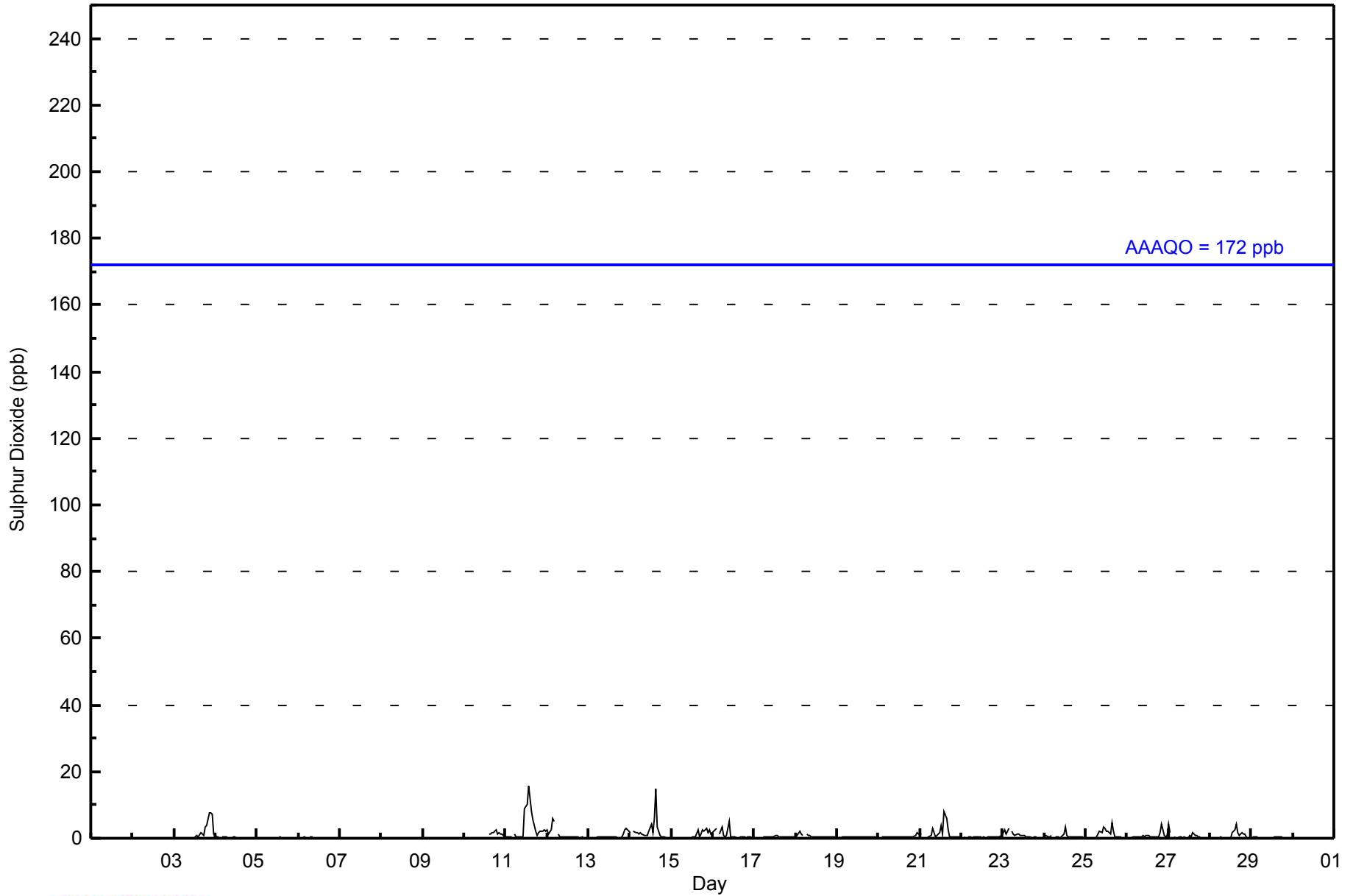
0.8	0.6	0.7	0.7	0.6	0.6	0.5	0.5	0.5	0.6	0.5	1.0	1.2	1.2	1.5	1.9	0.9	0.5	0.6	0.7	1.0	0.8	0.8	0.5	Diurnal Average	
4	2	3	6	5	3	2	3	2	5	3	9	10	16	12	15	6	2	3	4	8	7	7	2	Diurnal Maximum	

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



WBEA
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Patricia McInnes - November 2014





WBEA
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Patricia McInnes - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	589	99.49	99.49
11 - 20	3	0.51	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: 592

Total Number of Hours: 720



WBEA
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Patricia McInnes - November 2014

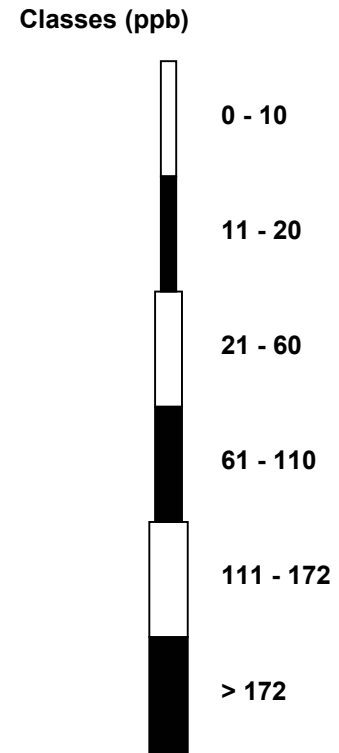
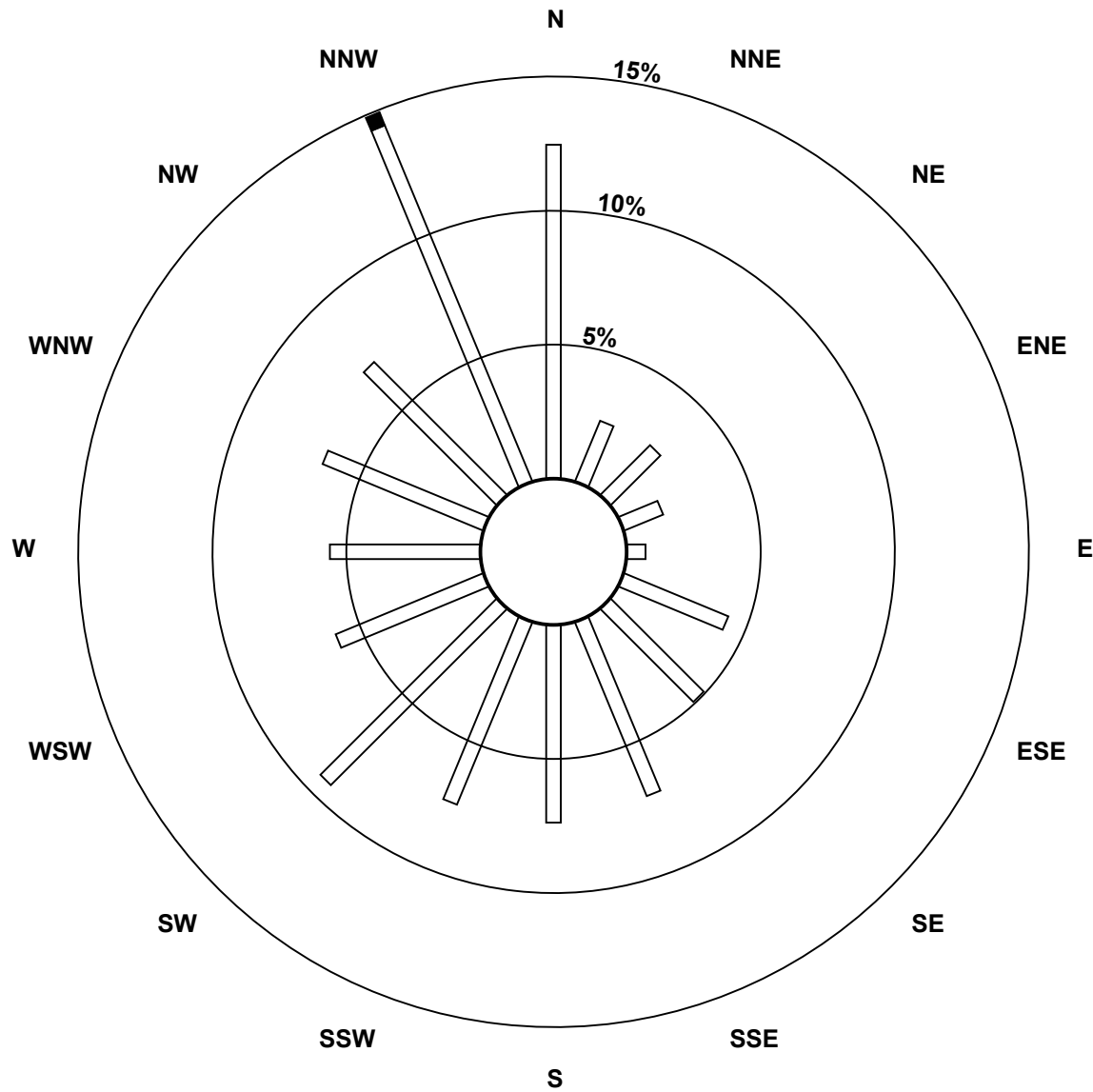
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	71	14	15	9	4	24	28	40	42	42	53	34	32	37	40	82	567
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	71	14	15	9	4	24	28	40	42	42	53	34	32	37	40	85	570

Total Number of Valid Hours: 570

Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

Sulphur Dioxide (SO₂) - ppb
Patricia McInnes (AMS 6)

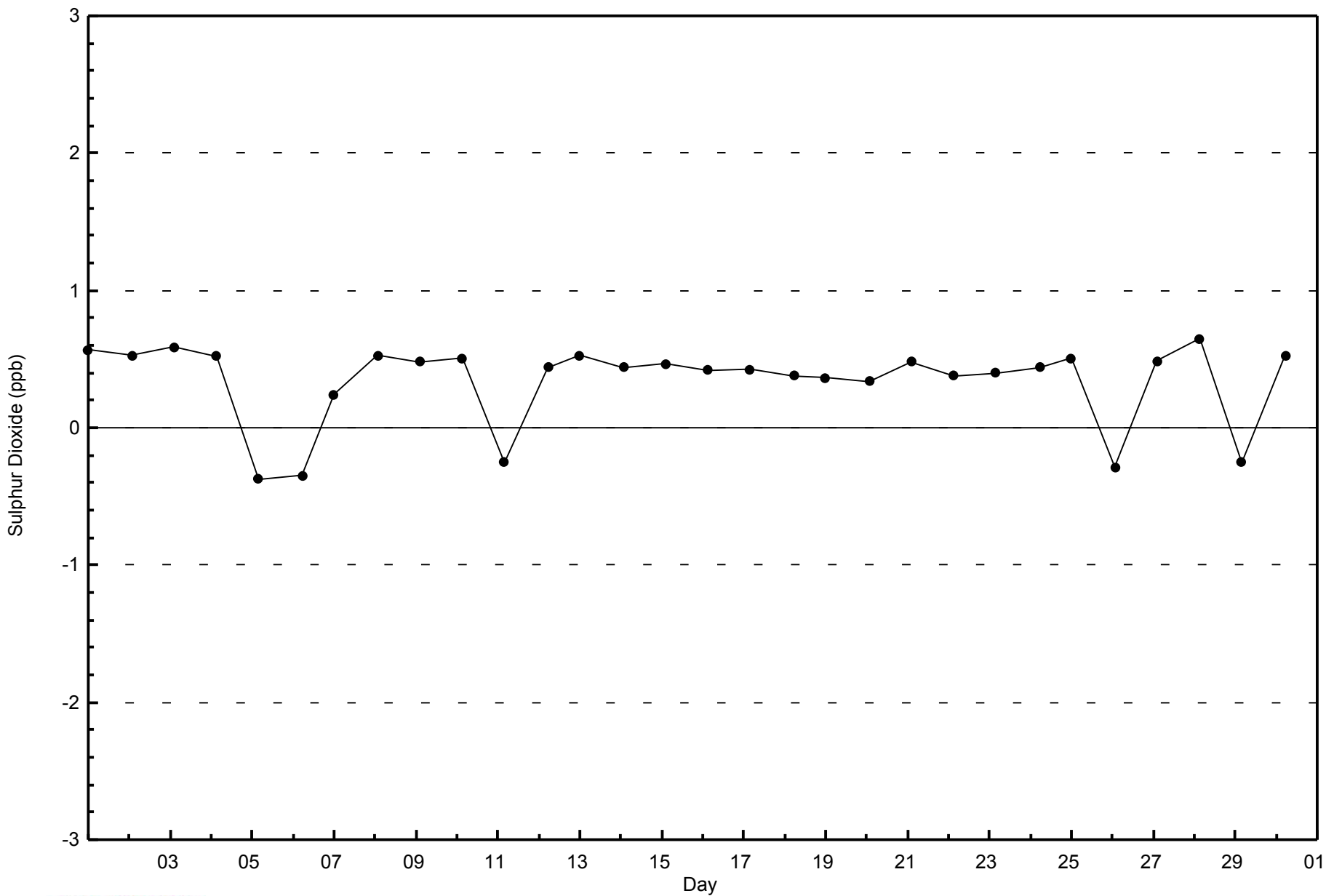


Total Number of Valid Hours: 570



WBEA
Zero Responses

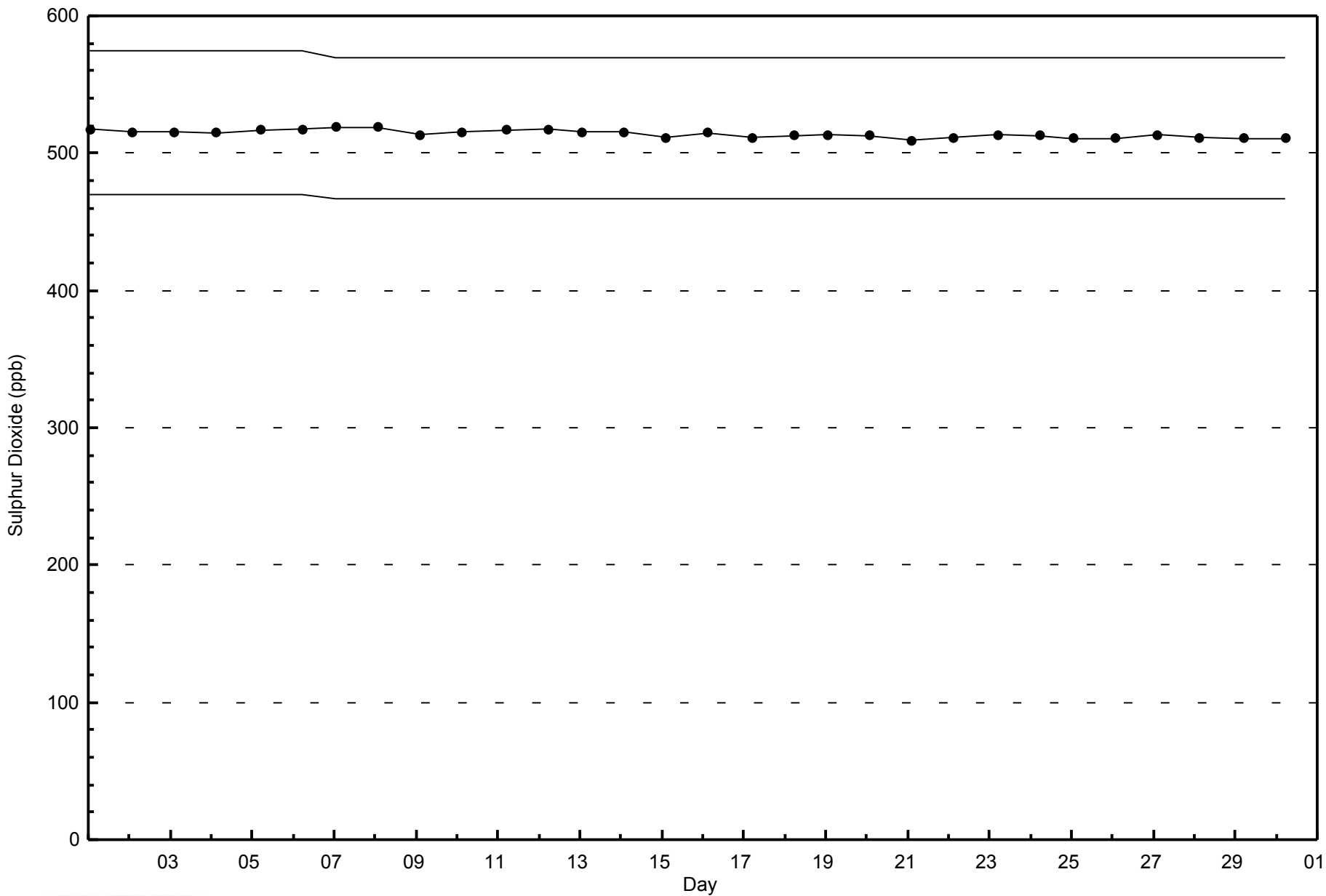
Sulphur Dioxide (SO₂) - ppb
Patricia McInnes - November 2014





WBEA
Span Responses

Sulphur Dioxide (SO₂) - ppb
Patricia McInnes - November 2014





Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

Patricia McInnes - November 2014

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 1 ppb on Nov 13 23:00	Maximum Daily Average: 0.7 ppb on Nov 26		Hours of Data:	597
Minimum Value: 0 ppb on Nov 1 20:00	Minimum Daily Average: 0.4 ppb on Nov 1		Hours of Missing Data:	123
Maximum Diurnal Average: 0.6 ppb at hour 23	Minimum Diurnal Average: 0.5 ppb at hour 3		Hours of Calibration:	26
Monthly Average: 0.5 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 1 P ₉₀ = 1 P ₉₉ = 1		Percent Operational Time:	86.5

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-Nov	0	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
2-Nov	0	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
3-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0.6	1
4-Nov	1	1	1	1	Z	1	1	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0.5	1
5-Nov	0	0	0	0	0	Z	1	0	0	0	0	MS	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
6-Nov	0	0	0	0	0	0	Z	1	0	0	0	0	0	0	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	1
7-Nov	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-Nov	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-Nov	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-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	1	1	1	1	1	0	1	1	1	--	1
11-Nov	0	0	0	0	0	Z	1	0	0	0	0	1	1	1	1	1	1	1	0	1	0	1	0	0	0.5	1
12-Nov	0	0	1	1	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
13-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	1	1	0.6	1
14-Nov	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1
15-Nov	1	1	1	Z	1	1	1	0	1	1	1	1	0	1	0	1	1	1	1	1	1	1	0	0	0.5	1
16-Nov	0	0	0	0	Z	0	0	0	0	1	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0.5	1
17-Nov	0	0	0	0	0	Z	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	0	0	0.5	1
18-Nov	1	1	1	1	1	1	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1
19-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0.5	1
20-Nov	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	0.7	1
21-Nov	1	1	1	Z	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	0.6	1
22-Nov	1	0	1	1	Z	0	0	0	1	1	0	1	0	1	0	0	0	1	1	0	0	0	0	1	0.5	1
23-Nov	1	1	1	1	1	Z	1	1	1	1	1	1	1	1	0	1	1	0	0	0	0	0	0	0	0.6	1
24-Nov	1	1	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.6	1
25-Nov	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1
26-Nov	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1
27-Nov	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.6	1
28-Nov	1	1	1	1	Z	1	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	0.6	1
29-Nov	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0.5	1
30-Nov	0	0	0	0	0	0	Z	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0.5	1

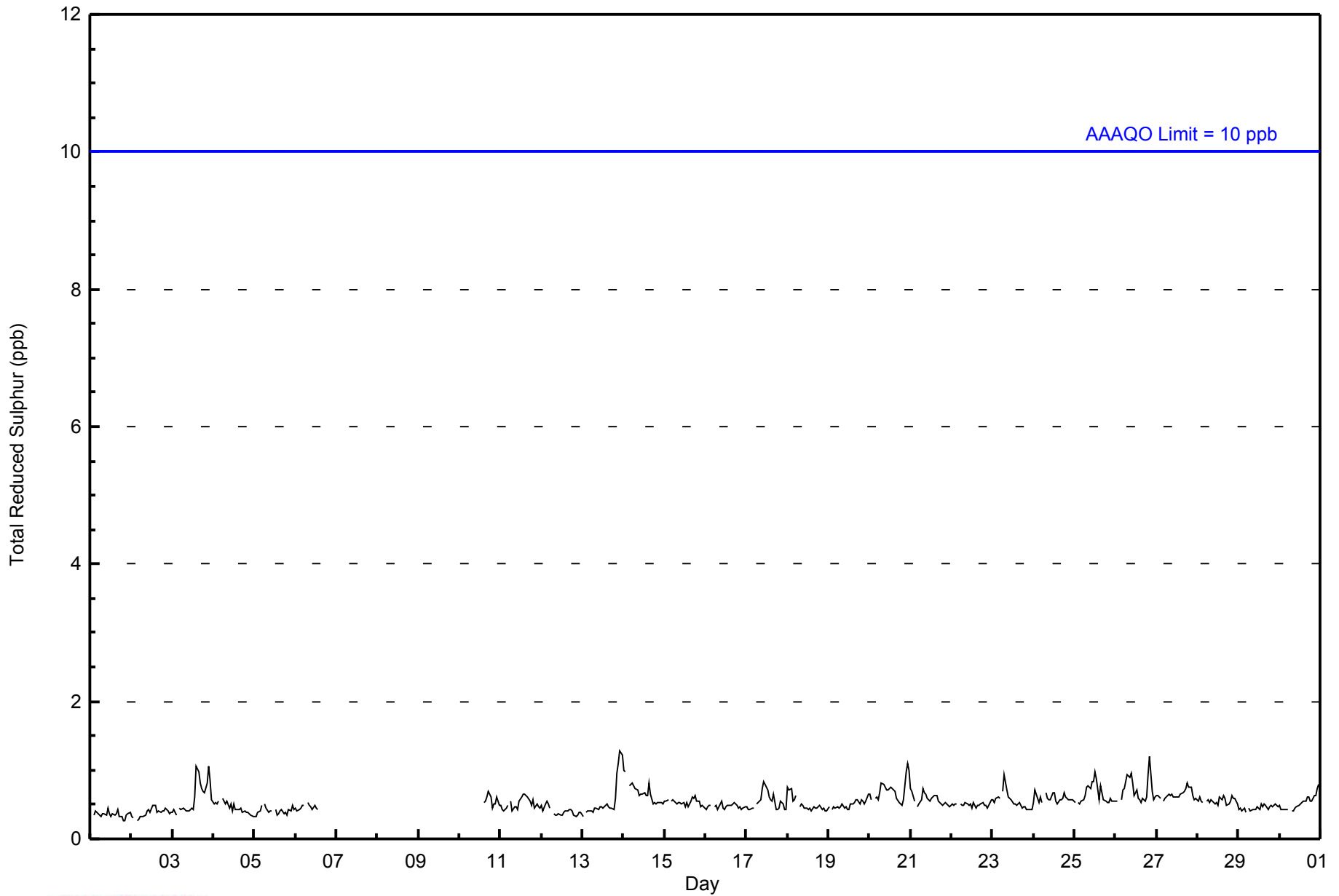
0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.5	0.5	0.5	0.6	0.6	0.6	0.5	Diurnal Average
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Diurnal Maximum

Z - zerspan M - Maintenance AF - Analyzer Failure MS - Missing
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb



WBEA
Hourly Averages

Total Reduced Sulphur (TRS) - ppb
Patricia McInnes - November 2014





WBEA
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Patricia McInnes - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	597	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: 597

Total Number of Hours: 720



WBEA
Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Patricia McInnes - November 2014

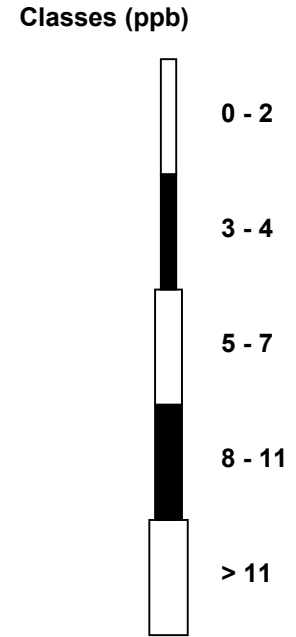
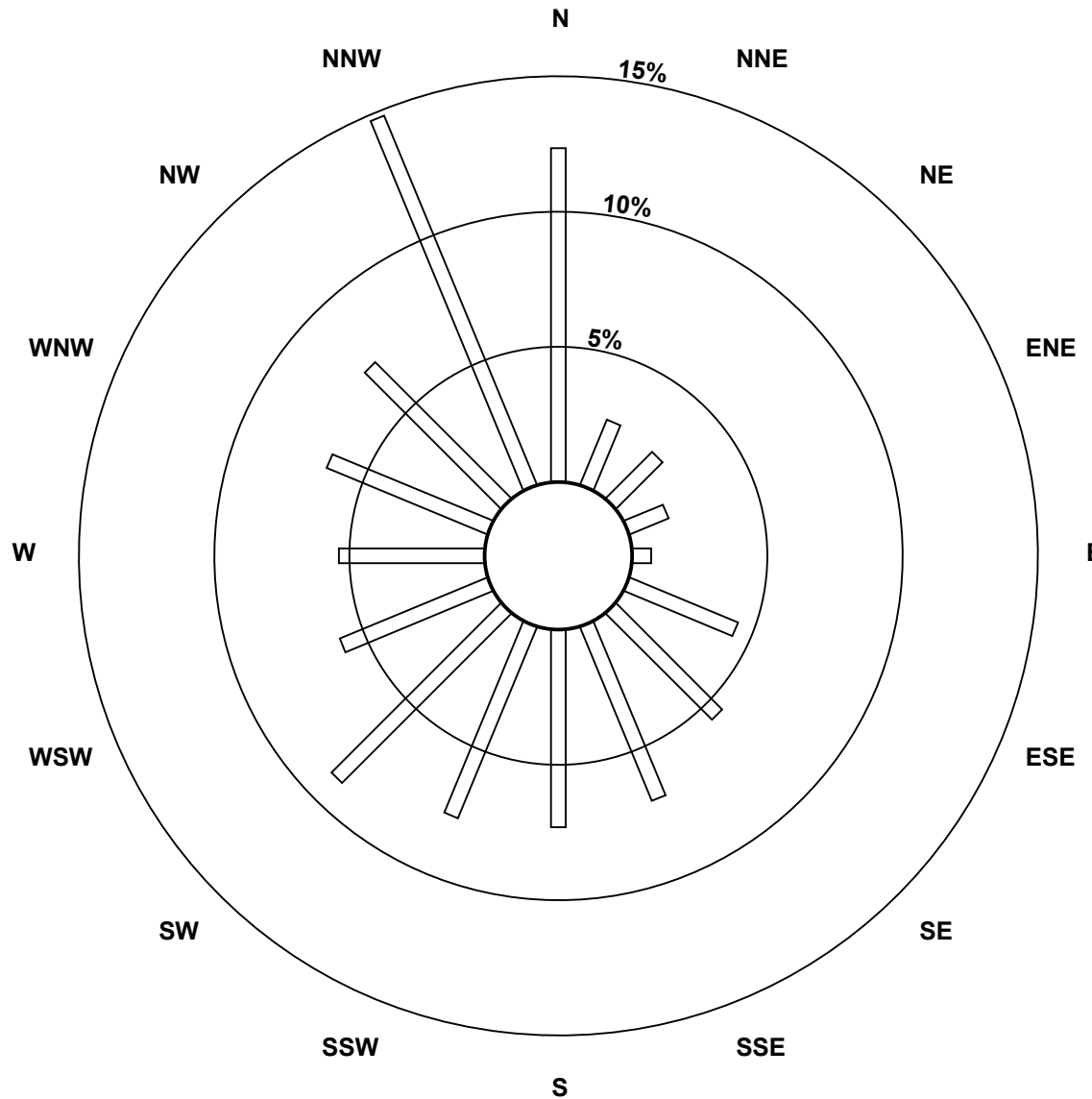
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	71	15	14	9	4	25	32	40	42	44	51	34	31	37	41	85	575
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	71	15	14	9	4	25	32	40	42	44	51	34	31	37	41	85	575

Total Number of Valid Hours: 575

Total Number of Hours: 720

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

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

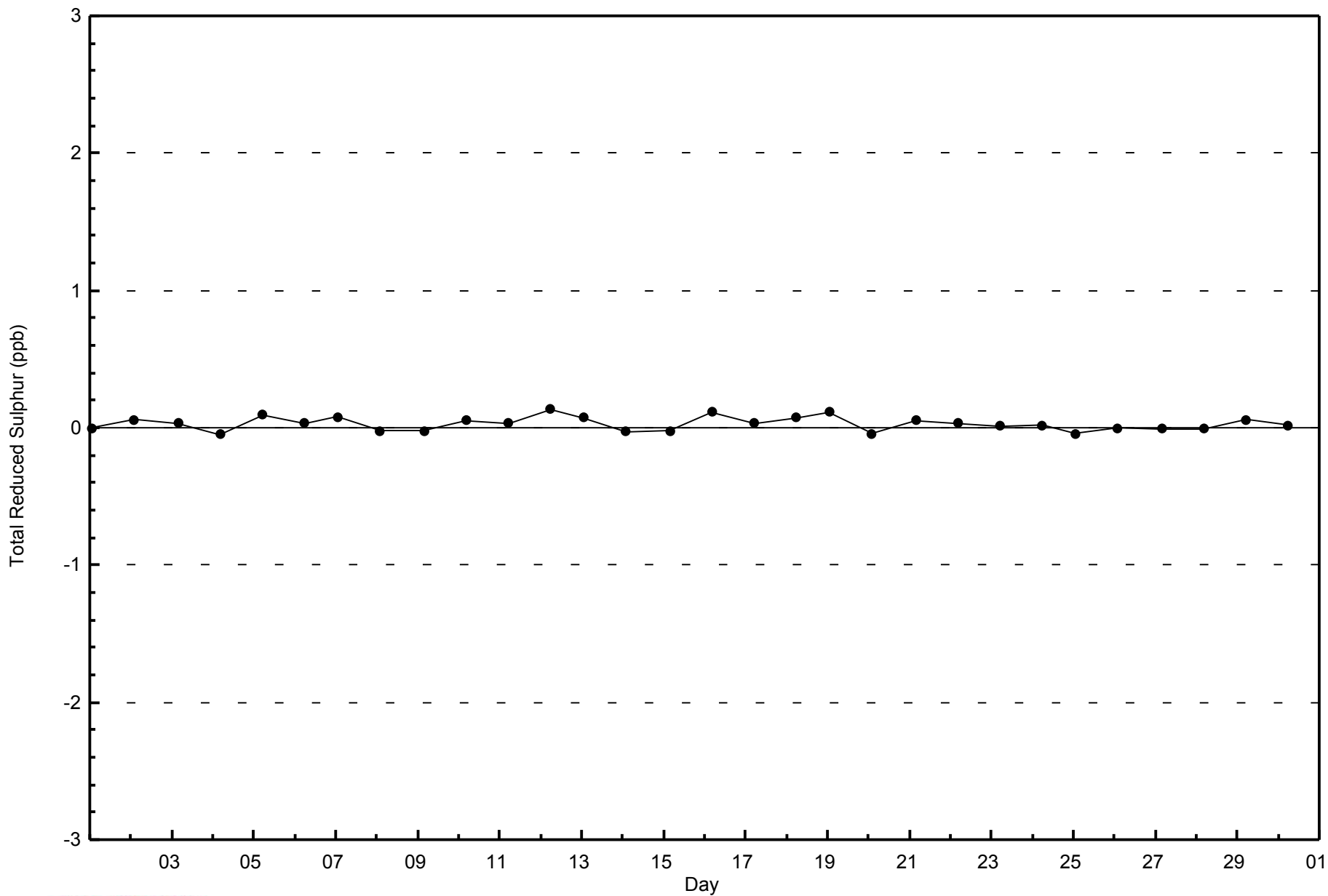


Total Number of Valid Hours: 575



WBEA
Zero Responses

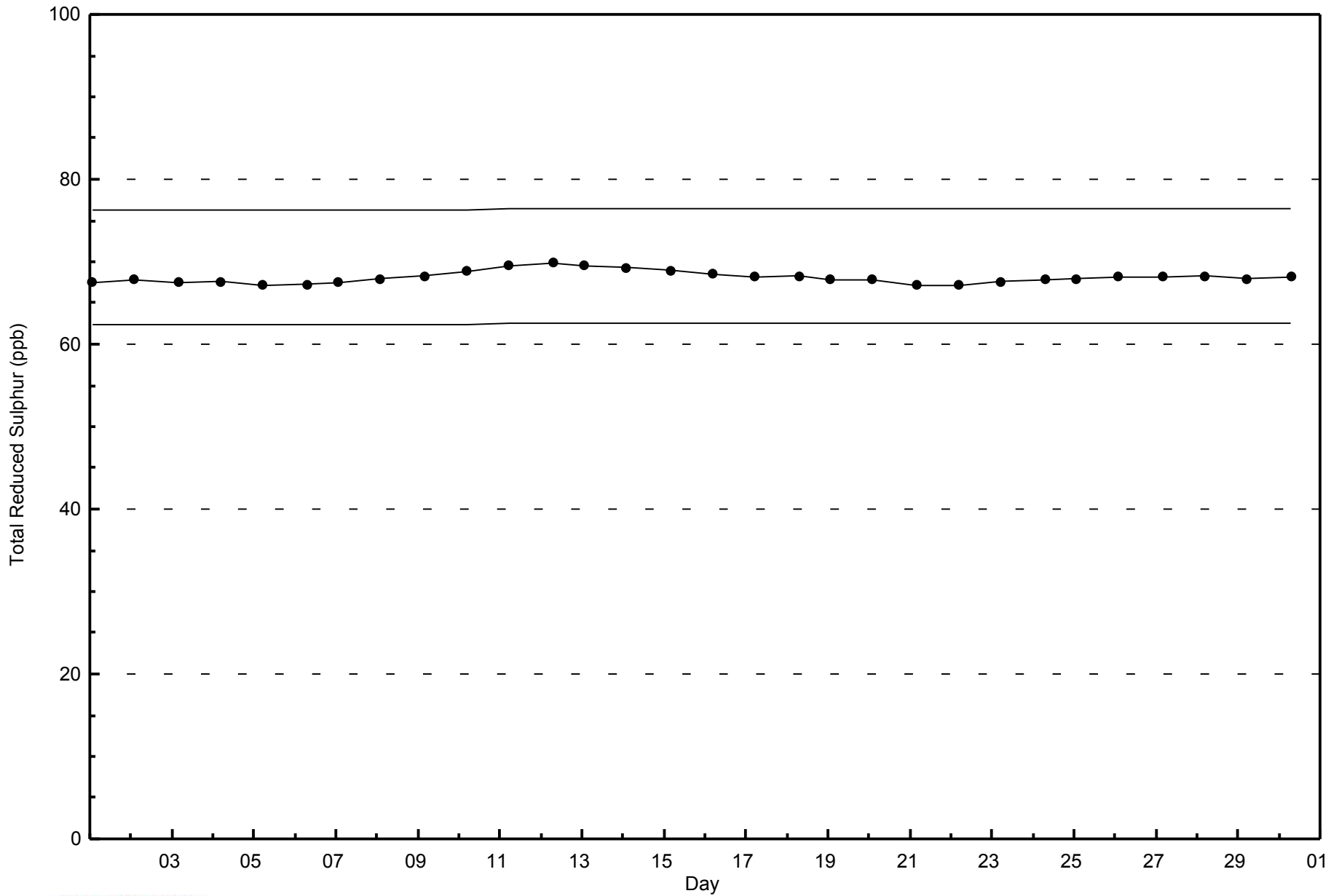
Total Reduced Sulphur (TRS) - ppb
Patricia McInnes - November 2014





WBEA
Span Responses

Total Reduced Sulphur (TRS) - ppb
Patricia McInnes - November 2014



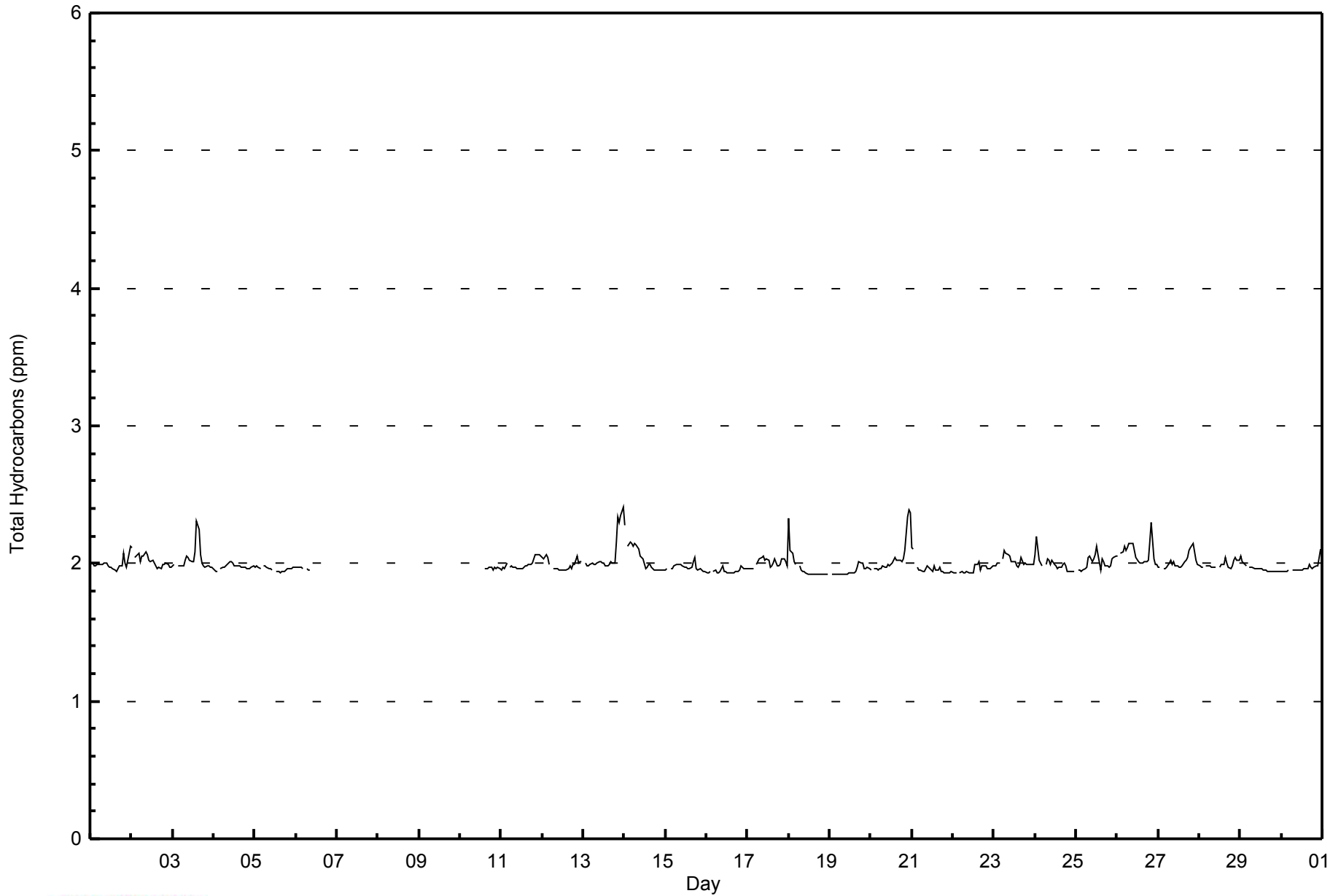


Maximum Value: 2.4 ppm on Nov 14 00:00																	Maximum Daily Average: 2.1 ppm on Nov 26										Hours in Service: 720	
Minimum Value: 1.9 ppm on Nov 18 14:00																	Minimum Daily Average: 1.9 ppm on Nov 16										Hours of Data: 590	
Maximum Diurnal Average: 2.0 ppm at hour 1																	Minimum Diurnal Average: 2.0 ppm at hour 14										Hours of Missing Data: 130	
Monthly Average: 2.00 ppm																	Percentiles: P ₁ = 1.9 P ₁₀ = 1.9 Q ₁ = 2.0 Median = 2.0 Q ₃ = 2.0 P ₉₀ = 2.1 P ₉₉ = 2.3										Hours of Calibration: 32	
																											Percent Operational Time: 86.4	
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-Nov	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.1	2.0	2.1		
2-Nov	2.1	Z	2.0	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1		
3-Nov	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.3	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.3		
4-Nov	1.9	1.9	1.9	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
5-Nov	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	M	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
6-Nov	2.0	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	C	C	C	C	C	C	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	2.0		
7-Nov	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-Nov	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-Nov	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-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
11-Nov	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.0	2.1		
12-Nov	2.0	2.0	2.1	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.1		
13-Nov	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.3	2.3	2.4	2.4	2.1	2.4		
14-Nov	2.3	Z	2.1	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.3		
15-Nov	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	2.0		
16-Nov	1.9	1.9	1.9	Z	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	1.9	2.0		
17-Nov	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1		
18-Nov	2.3	2.1	2.1	2.0	2.0	Z	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0		
19-Nov	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0		
20-Nov	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.3	2.4	2.4	2.0	2.4		
21-Nov	2.1	2.1	Z	2.0	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0		
22-Nov	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
23-Nov	2.0	2.0	2.0	2.0	Z	2.0	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1		
24-Nov	2.1	2.2	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.2		
25-Nov	Z	2.0	1.9	1.9	1.9	2.0	2.0	2.0	2.1	2.0	2.0	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1		
26-Nov	2.0	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.3	2.0	2.0	2.0	2.1	2.3		
27-Nov	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.1		
28-Nov	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	M	M	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
29-Nov	2.1	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0		
30-Nov	1.9	1.9	1.9	1.9	1.9	Z	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1		
																	Diurnal Average											
																	Diurnal Maximum											
																	2.0											
																	2.3											
Z - zerspan																												
C - Calibration																												
M - Maintenance																												
AF - Analyzer Failure																												



WBEA
Hourly Averages

Total Hydrocarbons (THC) - ppm
Patricia McInnes - November 2014





WBEA
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Patricia McInnes - November 2014

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	519	87.97	87.97
2.1 - 3.0	71	12.03	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 590

Total Number of Hours: 720



WBEA
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Patricia McInnes - November 2014

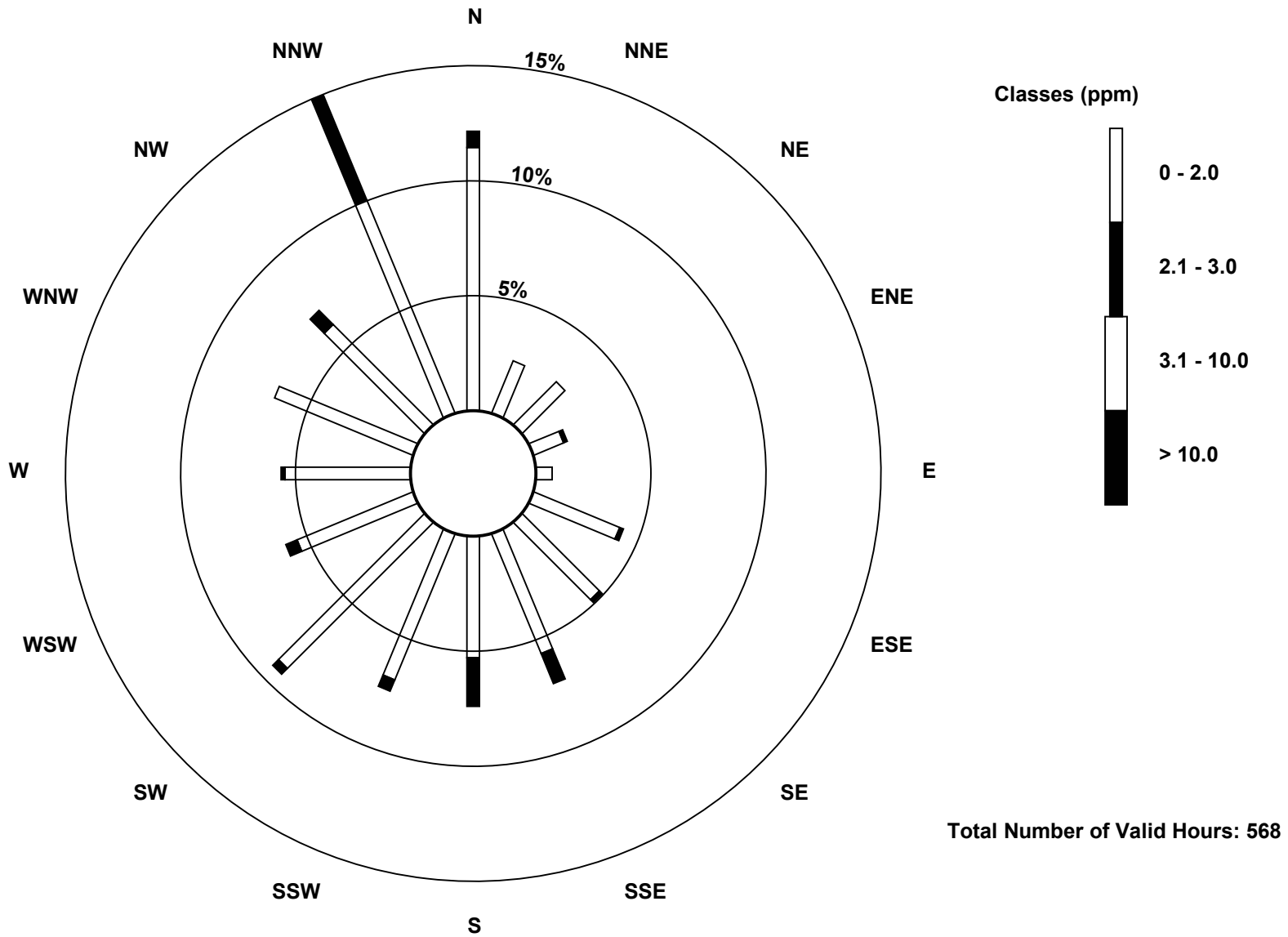
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	65	14	15	8	4	23	27	32	30	39	51	31	31	37	35	57	499
2.1 - 3.0	4	0	0	1	0	1	1	8	12	3	2	3	1	0	5	28	69
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	69	14	15	9	4	24	28	40	42	42	53	34	32	37	40	85	568

Total Number of Valid Hours: 568

Total Number of Hours: 720

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

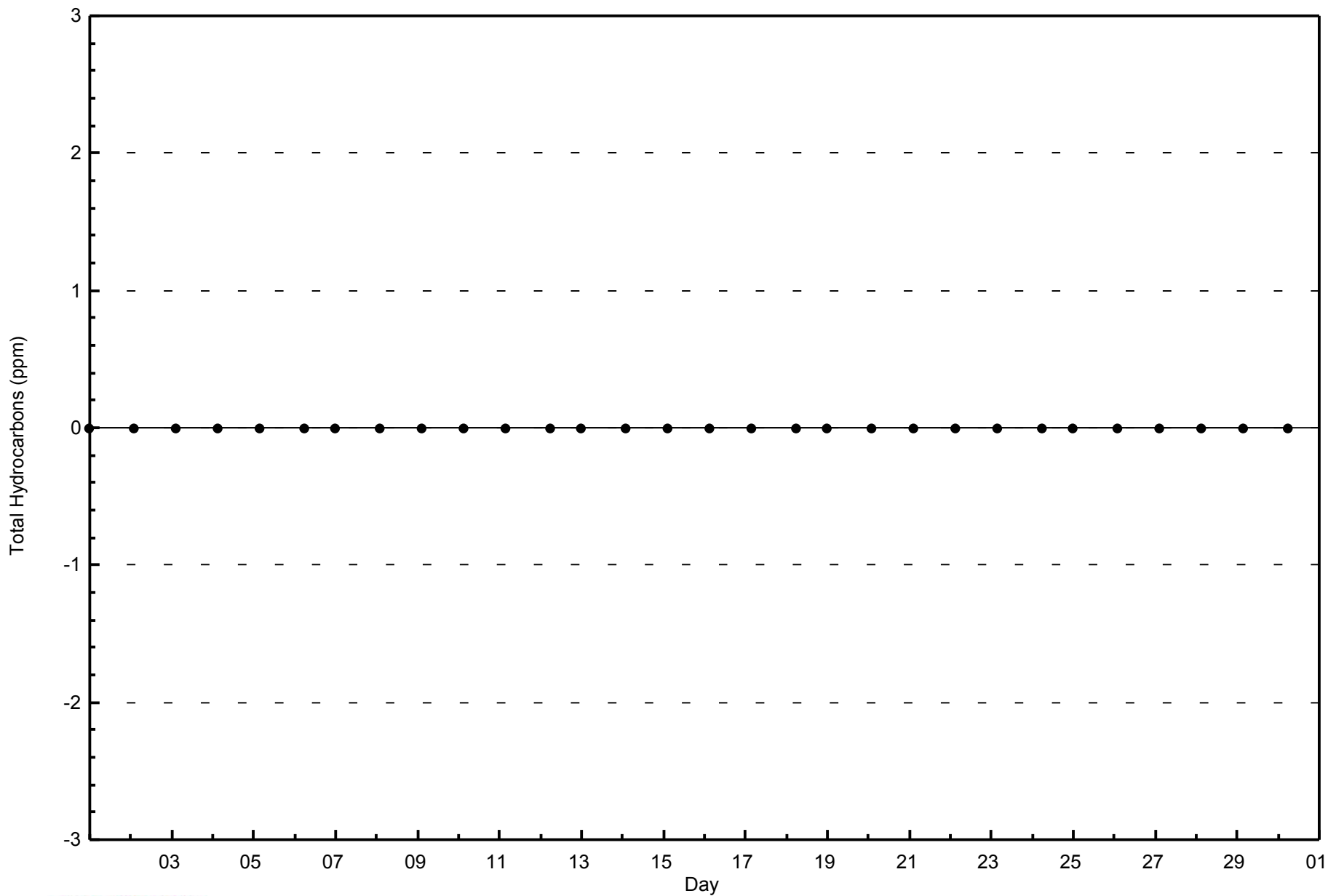
**Total Hydrocarbons (THC) - ppm
Patricia McInnes (AMS 6)**





WBEA
Zero Responses

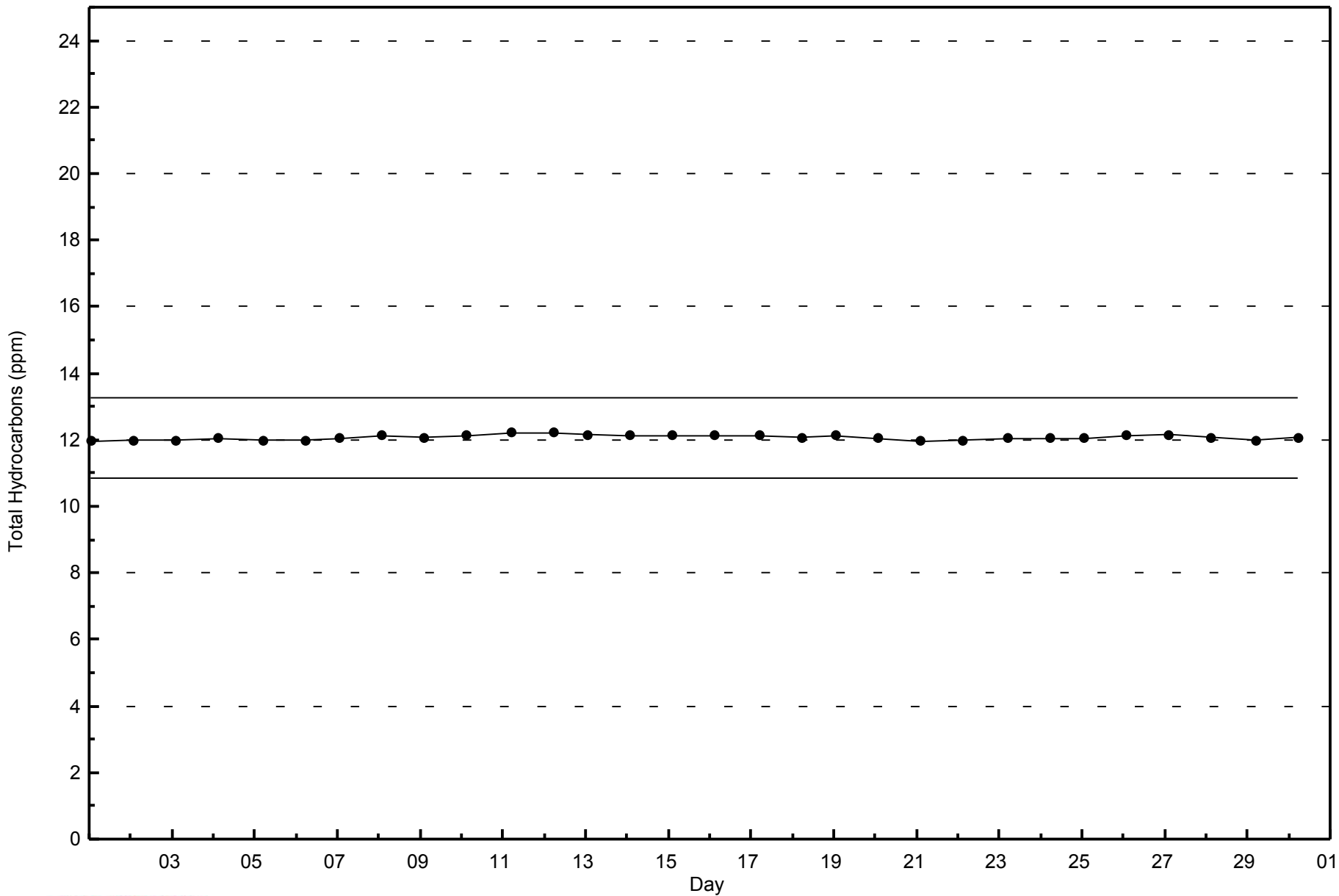
Total Hydrocarbons (THC) - ppm
Patricia McInnes - November 2014





WBEA
Span Responses

Total Hydrocarbons (THC) - ppm
Patricia McInnes - November 2014



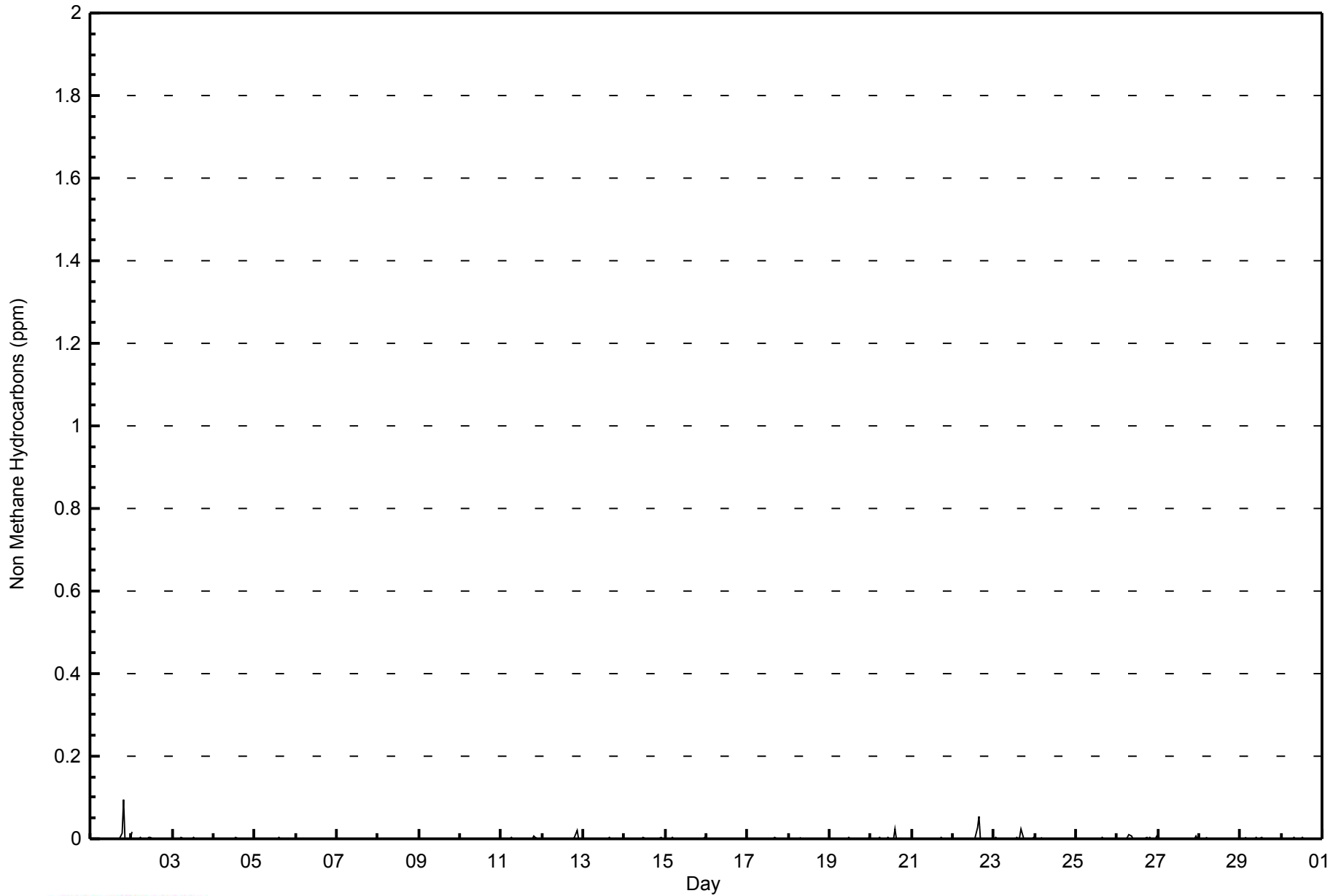


Maximum Value: 0.094 ppm on Nov 1 20:00		Maximum Daily Average: 0.005 ppm on Nov 1		Hours in Service: 720																																												
Minimum Value: 0.000 ppm on Nov 1 02:00		Minimum Daily Average: 0.000 ppm on Nov 16		Hours of Data: 590																																												
Maximum Diurnal Average: 0.004 ppm at hour 20		Minimum Diurnal Average: 0.000 ppm at hour 3		Hours of Missing Data: 130																																												
Monthly Average: 0.001 ppm		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 0.0		Hours of Calibration: 32																																												
				Percent Operational Time: 86.4																																												
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-Nov	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.015	0.094	0.000	0.000	0.000	0.000	0.005	0.094																						
2-Nov	0.018	Z	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.004	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.018																						
3-Nov	0.000	0.000	Z	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003																						
4-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004																						
5-Nov	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	M	0.000	0.000	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002																						
6-Nov	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	C	C	C	C	C	C	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	0.000																						
7-Nov	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-Nov	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-Nov	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-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	--	0.000																						
11-Nov	0.000	0.000	0.000	0.000	Z	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	0.006	0.003	0.000	0.000	0.000	0.001	0.006																						
12-Nov	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.021	0.000	0.000	0.000	0.001	0.021																						
13-Nov	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003																						
14-Nov	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.003																						
15-Nov	0.000	0.000	Z	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.003																						
16-Nov	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																						
17-Nov	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002																						
18-Nov	0.000	0.000	0.000	0.000	0.000	Z	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	0.003																						
19-Nov	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.003																						
20-Nov	0.000	Z	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.024	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.024																						
21-Nov	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	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003																						
22-Nov	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	0.027	0.053	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.053																						
23-Nov	0.000	0.004	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.002	0.023	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.002	0.023																						
24-Nov	0.000	0.000	0.000	0.000	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	0.000	0.000	0.000	0.000	0.003																						
25-Nov	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	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003																						
26-Nov	0.000	Z	0.000	0.000	0.000	0.000	0.004	0.010	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.005	0.000	0.000	0.000	0.005	0.001	0.010																						
27-Nov	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	0.006	0.000	0.000	0.000	0.006																						
28-Nov	0.000	0.000	0.000	Z	0.003	0.000	0.000	0.000	0.000	0.000	M	M	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003																						
29-Nov	0.000	0.000	0.000	0.003	Z	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004																						
30-Nov	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.004	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004																						
																								0.001	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	0.002	0.001	0.000	0.001	0.004	0.001	0.000	0.000	0.001	Diurnal Average	
																								0.018	0.004	0.000	0.003	0.003	0.003	0.004	0.010	0.006	0.003	0.004	0.005	0.004	0.004	0.027	0.053	0.023	0.003	0.015	0.094	0.021	0.003	0.006	0.005	Diurnal Maximum
Z - zerospan																								C - Calibration				M - Maintenance				AF - Analyzer Failure																



WBEA
Hourly Averages

Non Methane Hydrocarbons (NMHC) - ppm
Patricia McInnes - November 2014





WBEA
Cumulative Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm
Patricia McInnes - November 2014

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	578	97.97	97.97
0.006 - 0.05	11	1.86	99.83
0.06 - 0.1	1	0.17	100.00
> 0.1	0	0.00	100.00

Total Number of Valid Hours: 590

Total Number of Hours: 720



WBEA
Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm
Patricia McInnes - November 2014

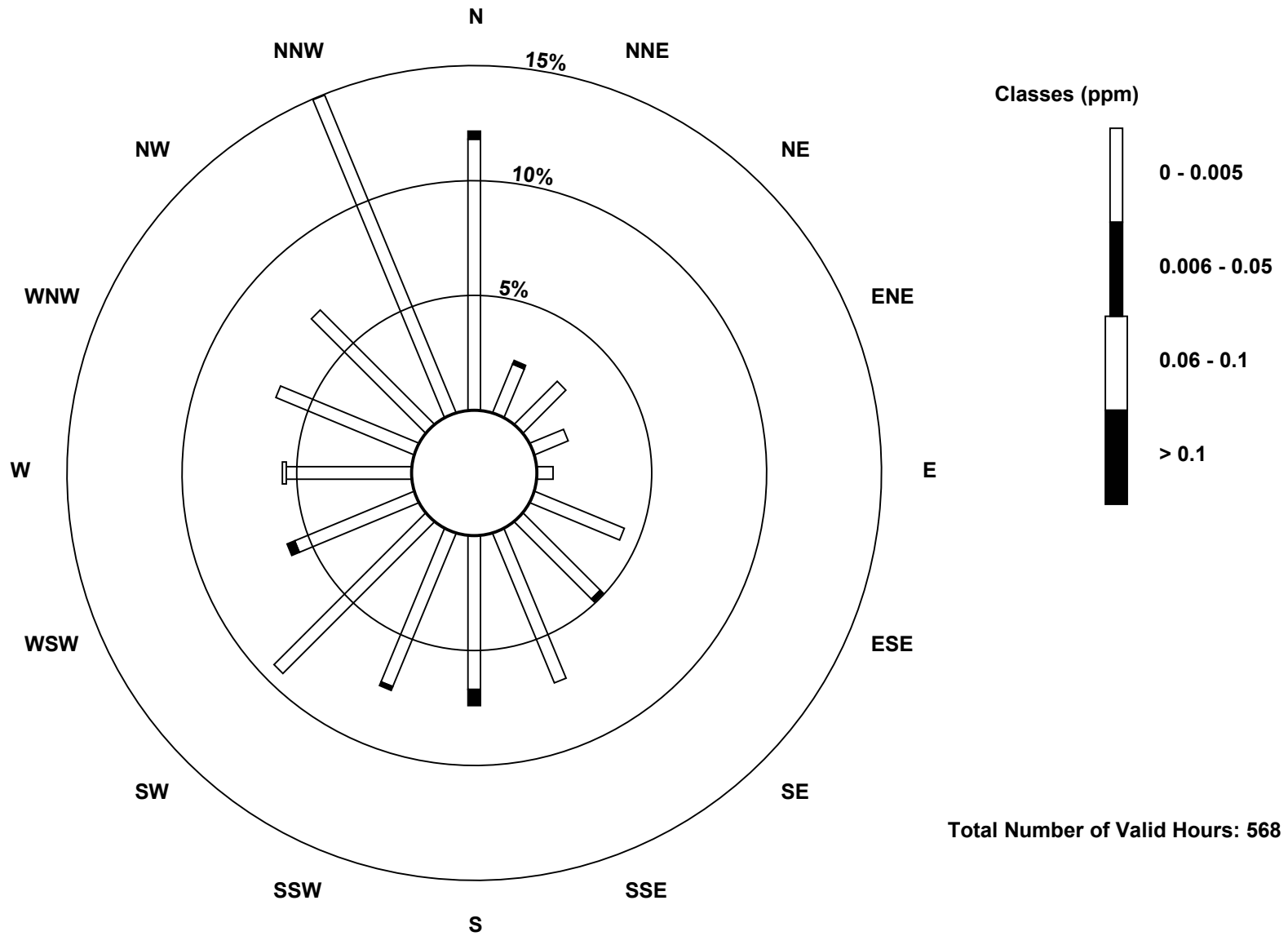
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	67	13	15	9	4	24	27	40	38	41	53	32	31	37	40	85	556
0.006 - 0.05	2	1	0	0	0	0	1	0	4	1	0	2	0	0	0	0	11
0.06 - 0.1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
> 0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	69	14	15	9	4	24	28	40	42	42	53	34	32	37	40	85	568

Total Number of Valid Hours: 568

Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

Non Methane Hydrocarbons (NMHC) - ppm
Patricia McInnes (AMS 6)

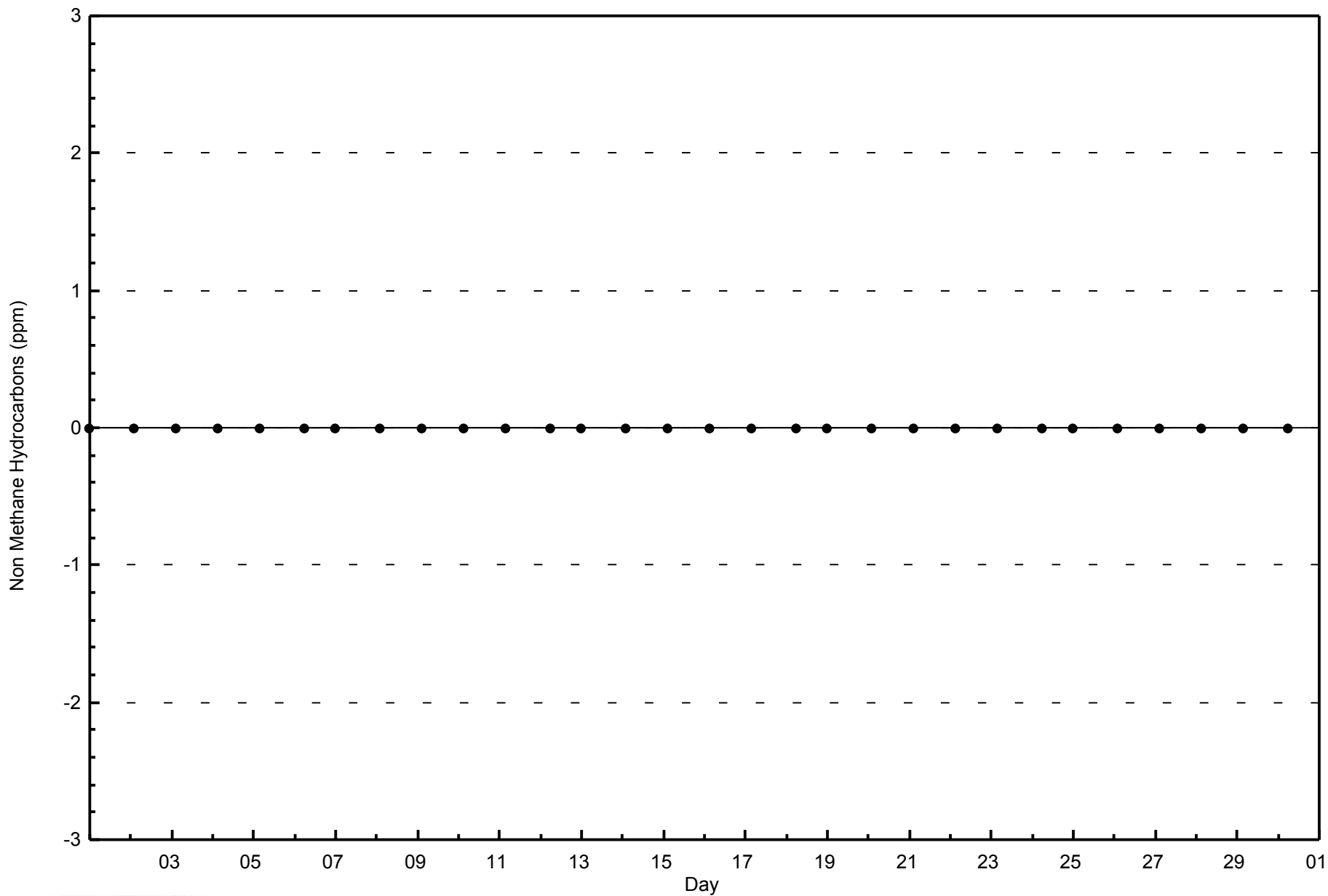




WBEA
Zero Responses

Non Methane Hydrocarbons (NMHC) - ppm

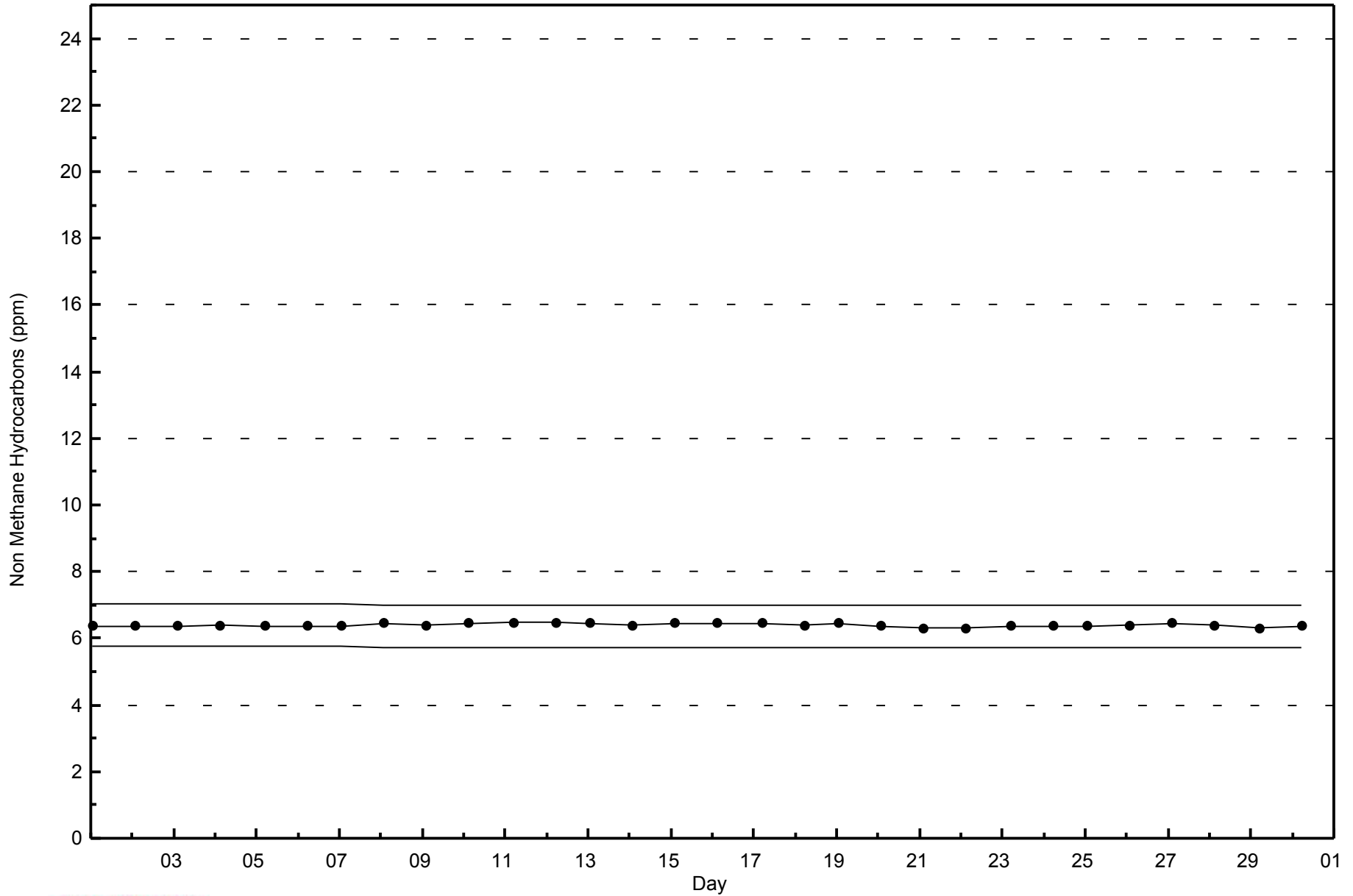
Patricia McInnes - November 2014





WBEA
Span Responses

Non Methane Hydrocarbons (NMHC) - ppm
Patricia McInnes - November 2014





Wood Buffalo Environmental Association

Summary of Hour Averages

Methane (CH₄) - ppm

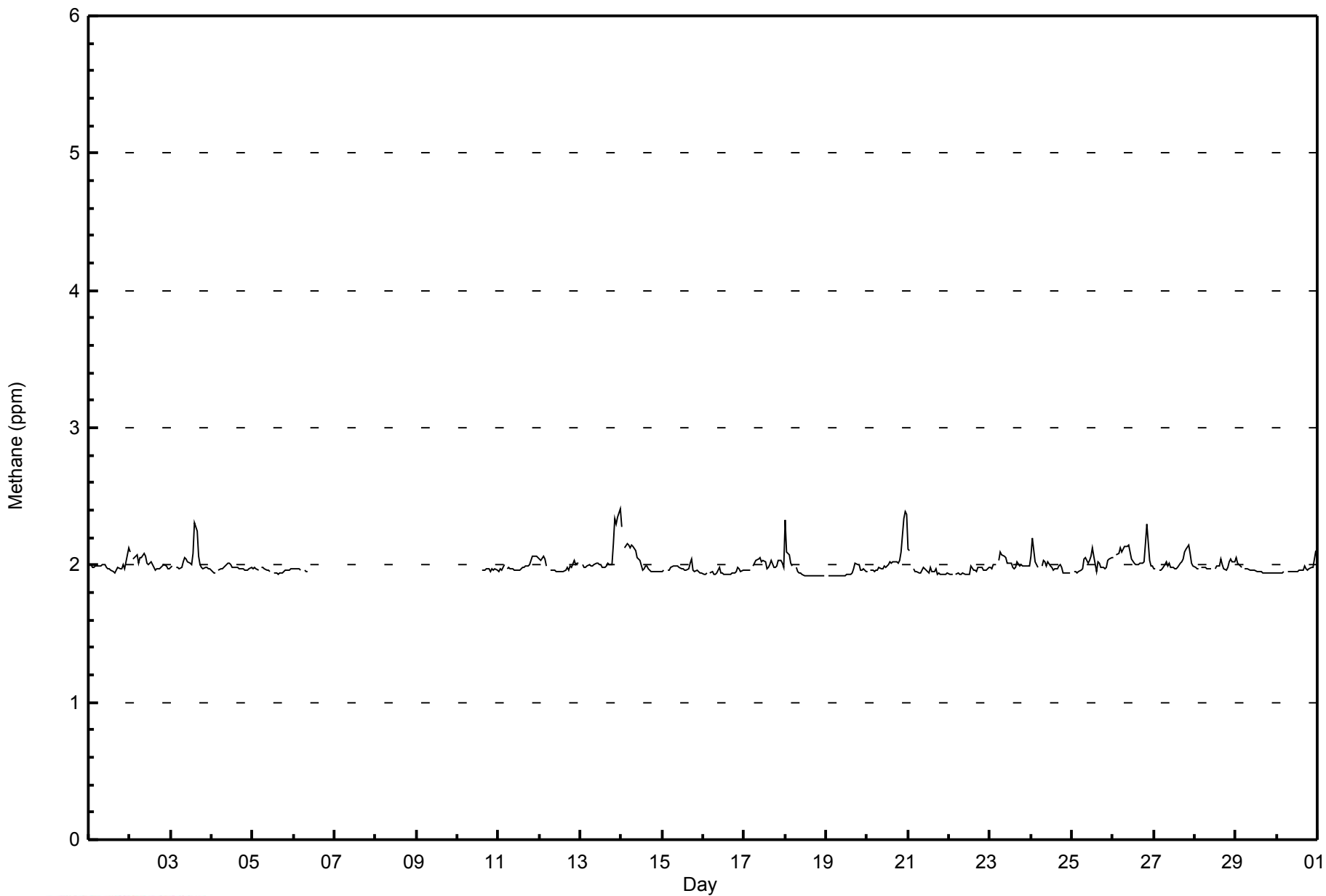
Patricia McInnes - November 2014

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0													Hours in Service: 720													
Maximum Value: 2.4 ppm on Nov 14 00:00													Maximum Daily Average: 2.1 ppm on Nov 26													
Minimum Value: 1.9 ppm on Nov 18 14:00													Minimum Daily Average: 1.9 ppm on Nov 16													
Maximum Diurnal Average: 2.0 ppm at hour 1													Minimum Diurnal Average: 2.0 ppm at hour 13													
Monthly Average: 1.99 ppm													Percentiles: P ₁ = 1.9 P ₁₀ = 1.9 Q ₁ = 2.0 Median = 2.0 Q ₃ = 2.0 P ₉₀ = 2.1 P ₉₉ = 2.3													
													Hours of Data: 590													
													Hours of Missing Data: 130													
													Hours of Calibration: 32													
													Percent Operational Time: 86.4													
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-Nov	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1
2-Nov	2.1	Z	2.0	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
3-Nov	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.3	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.3
4-Nov	1.9	1.9	1.9	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
5-Nov	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	M	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
6-Nov	2.0	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	C	C	C	C	C	C	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	2.0
7-Nov	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-Nov	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-Nov	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-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	--	2.0
11-Nov	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.0	2.1
12-Nov	2.0	2.0	2.1	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
13-Nov	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.3	2.3	2.4	2.4	2.1	2.4
14-Nov	2.3	Z	2.1	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.3
15-Nov	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	2.0	2.0
16-Nov	1.9	1.9	1.9	Z	1.9	2.0	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	1.9	2.0
17-Nov	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
18-Nov	2.3	2.1	2.1	2.0	2.0	Z	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.3
19-Nov	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0
20-Nov	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.3	2.4	2.4	2.4	2.0	2.4
21-Nov	2.1	2.1	Z	2.0	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1
22-Nov	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
23-Nov	2.0	2.0	2.0	2.0	Z	2.0	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
24-Nov	2.1	2.2	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.2
25-Nov	Z	2.0	1.9	1.9	1.9	2.0	2.0	2.0	2.1	2.0	2.0	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.1
26-Nov	2.0	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.3	2.0	2.0	2.0	2.0	2.1	2.3
27-Nov	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.1
28-Nov	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	M	M	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
29-Nov	2.1	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1
30-Nov	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.1
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan													C - Calibration				M - Maintenance				AF - Analyzer Failure					



WBEA
Hourly Averages

Methane (CH₄) - ppm
Patricia McInnes - November 2014





WBEA
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Patricia McInnes - November 2014

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	521	88.31	88.31
2.1 - 3.0	69	11.69	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 590

Total Number of Hours: 720



WBEA
Frequency Distribution

Methane (CH₄) - ppm
Patricia McInnes - November 2014

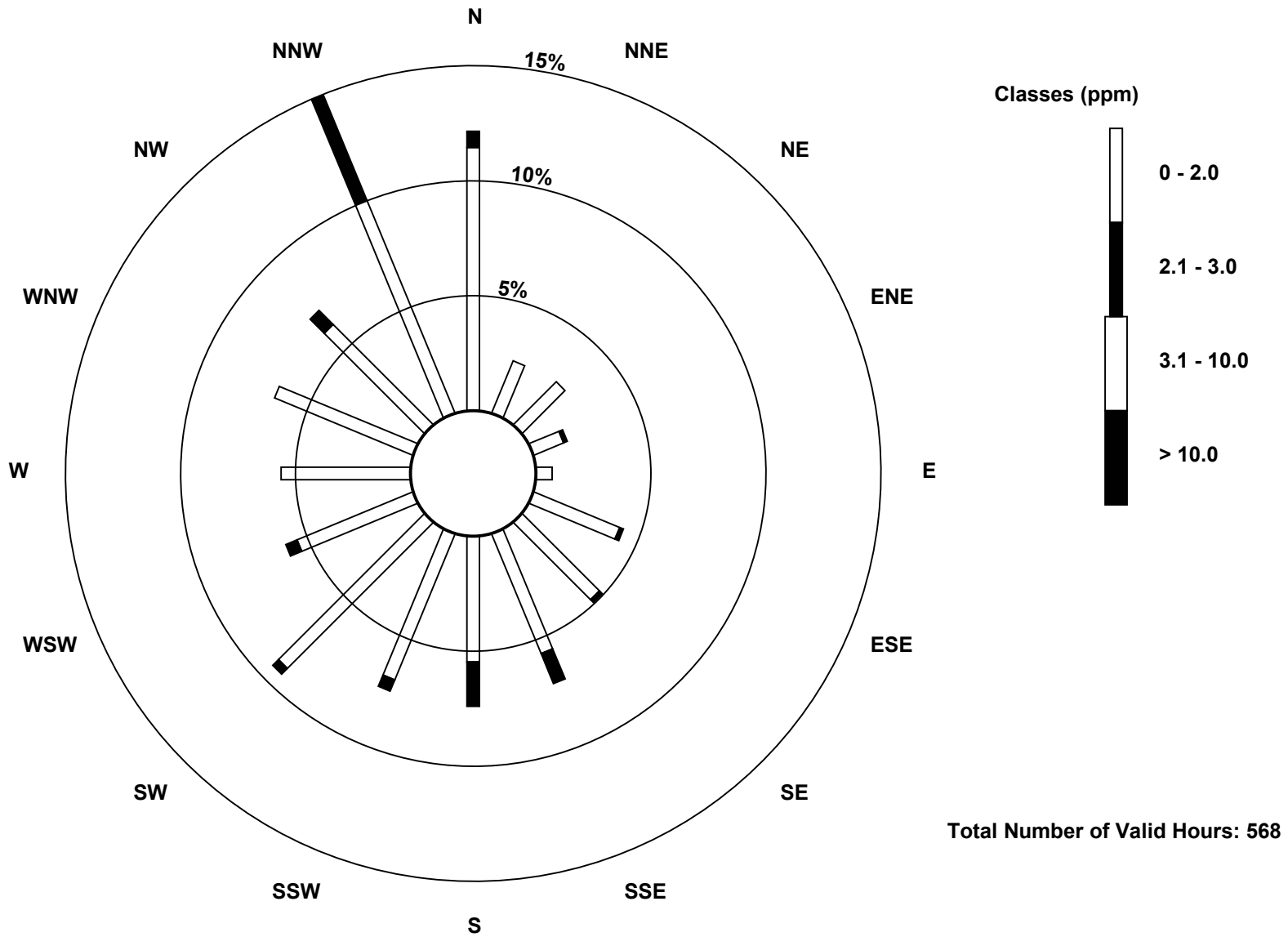
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	65	14	15	8	4	23	27	32	31	39	51	31	32	37	35	57	501
2.1 - 3.0	4	0	0	1	0	1	1	8	11	3	2	3	0	0	5	28	67
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	69	14	15	9	4	24	28	40	42	42	53	34	32	37	40	85	568

Total Number of Valid Hours: 568

Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

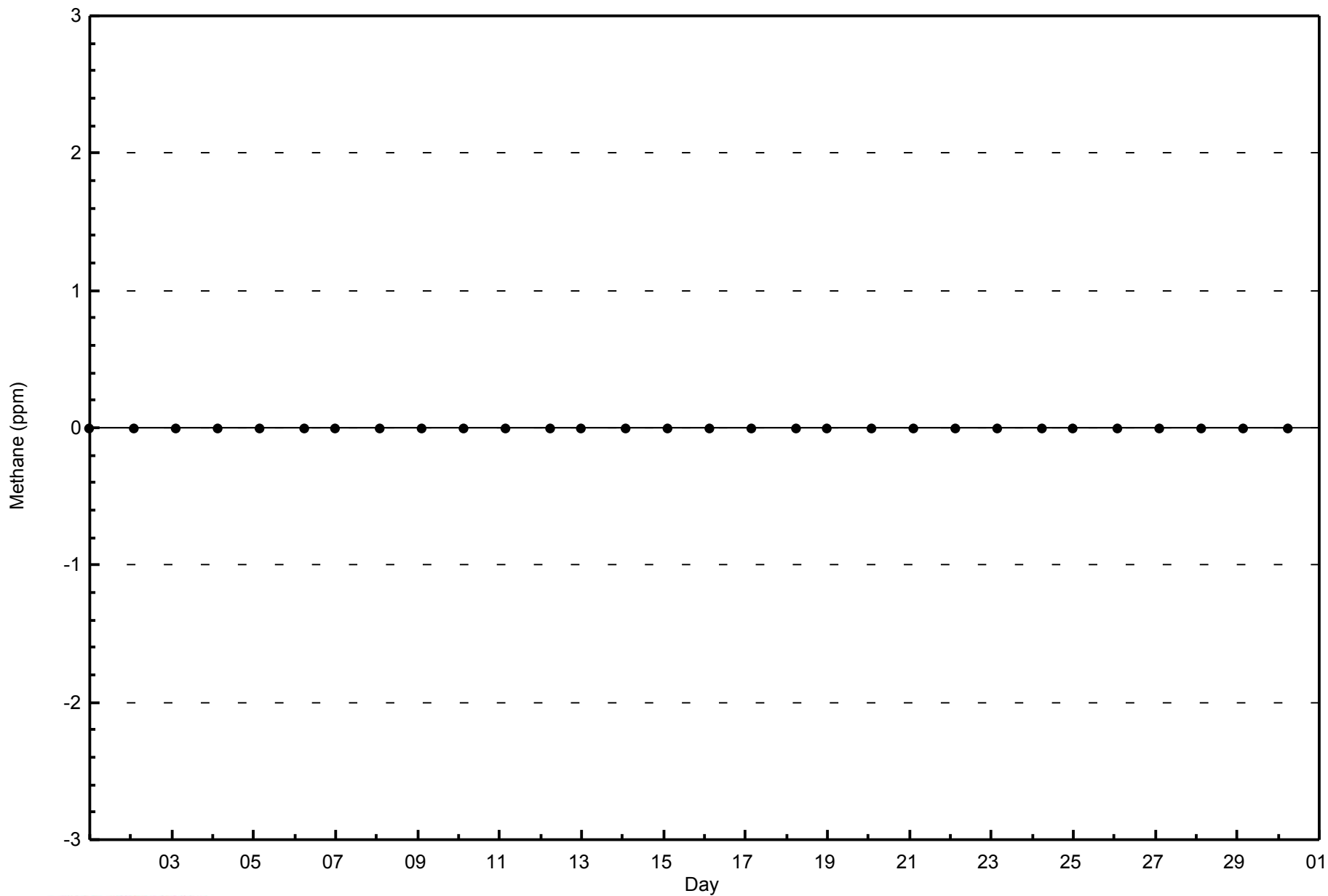
Methane (CH₄) - ppm
Patricia McInnes (AMS 6)





WBEA
Zero Responses

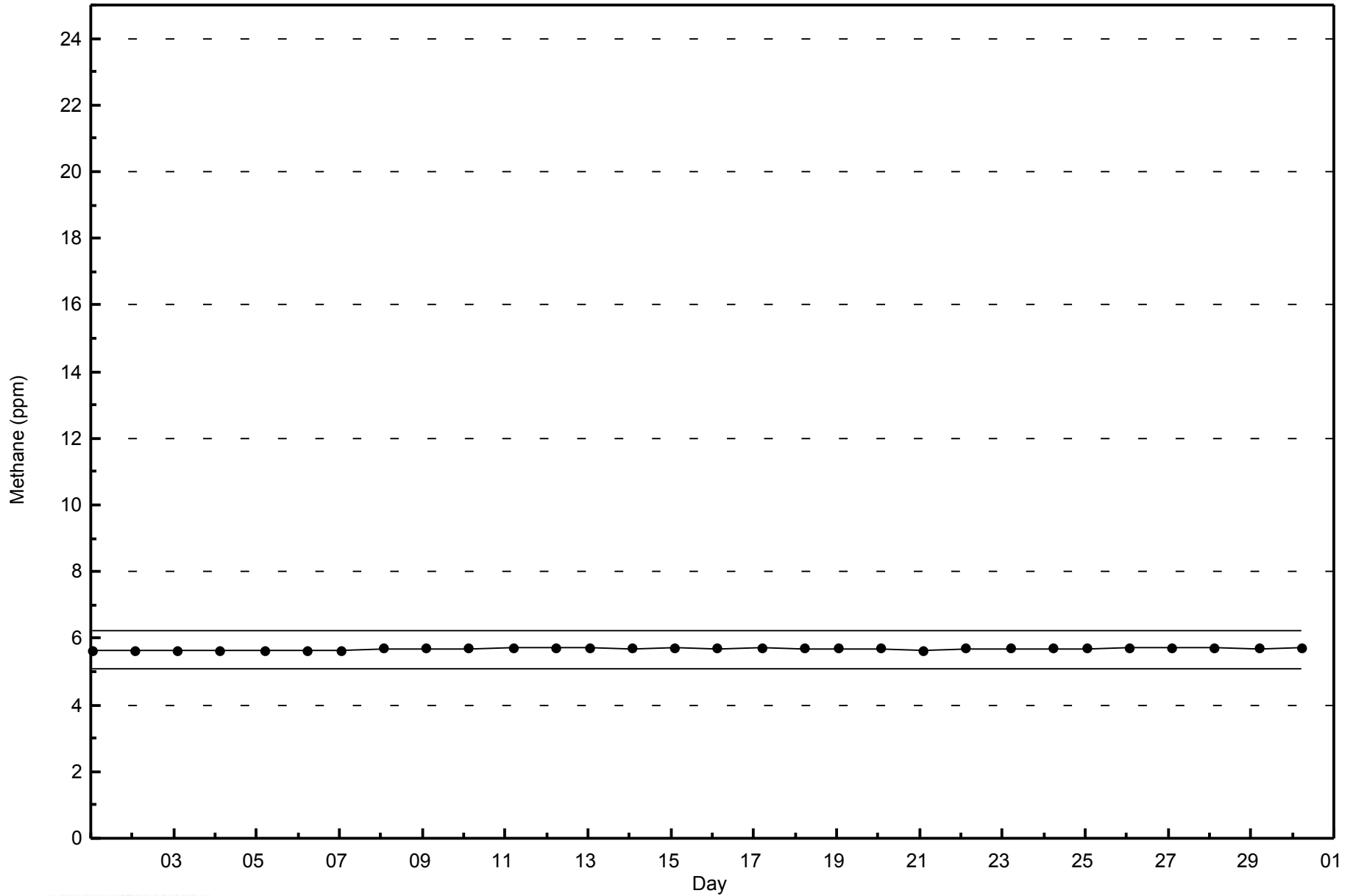
Methane (CH₄) - ppm
Patricia McInnes - November 2014





WBEA
Span Responses

Methane (CH₄) - ppm
Patricia McInnes - November 2014





Summary of Hour Averages

Patricia McInnes - November 2014

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 38 ppb on Nov 16 13:00	Maximum Daily Average: 31.7 ppb on Nov 16		Hours of Data:	576
Minimum Value: 1 ppb on Nov 13 22:00	Minimum Daily Average: 6.1 ppb on Nov 3		Hours of Missing Data:	144
Maximum Diurnal Average: 22.7 ppb at hour 14	Minimum Diurnal Average: 14.9 ppb at hour 21		Hours of Calibration:	30
Monthly Average: 18.7 ppb	Percentiles: P ₁ = 2 P ₁₀ = 6 Q ₁ = 10 Median = 19 Q ₃ = 26 P ₉₀ = 31 P ₉₉ = 38		Percent Operational Time:	84.2

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-Nov	4	5	Z	9	9	9	8	8	9	12	13	15	17	19	22	25	15	12	8	4	8	11	6	2	11.0	25	
2-Nov	5	10	6	Z	4	4	3	2	2	4	7	9	6	6	8	13	10	10	6	7	6	5	7	8	6.4	13	
3-Nov	7	7	7	8	Z	7	5	5	4	4	6	6	7	5	2	2	6	7	7	7	4	6	8	12	6.1	12	
4-Nov	16	16	16	16	13	Z	9	9	8	7	8	9	11	10	8	8	9	8	8	8	8	8	6	6	9.7	16	
5-Nov	7	9	9	10	9	8	Z	10	11	11	11	12	M	13	13	14	15	16	16	13	12	15	14	14	15	12.1	16
6-Nov	15	14	13	14	14	14	13	Z	13	14	14	14	15	17	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	17	
7-Nov	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-Nov	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-Nov	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-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	C	28	27	24	26	28	27	28	29	29	--	29
11-Nov	29	26	27	23	26	26	Z	24	22	26	26	24	25	23	23	23	18	17	9	5	4	4	5	4	19.0	29	
12-Nov	6	5	3	6	16	21	25	Z	26	26	26	27	28	28	28	25	17	22	13	15	6	11	11	13	17.6	28	
13-Nov	16	17	Z	20	20	14	18	20	19	20	21	23	23	26	26	25	18	18	12	9	2	1	1	1	16.2	26	
14-Nov	2	4	8	Z	7	9	7	12	15	18	20	24	29	28	24	20	24	31	28	30	29	28	27	28	19.6	31	
15-Nov	28	28	27	27	Z	26	25	25	25	26	27	29	30	31	32	29	23	18	28	28	27	29	30	32	27.4	32	
16-Nov	32	33	32	34	37	Z	36	38	36	30	35	37	38	38	38	37	35	31	31	27	14	17	21	21	31.7	38	
17-Nov	20	19	22	23	20	14	Z	7	5	9	12	14	16	19	18	10	5	27	27	26	10	14	17	22	16.3	27	
18-Nov	3	15	17	24	28	25	25	Z	29	30	32	34	35	35	35	35	36	36	36	36	36	36	36	36	29.9	36	
19-Nov	35	35	Z	35	35	37	37	34	37	38	37	36	36	38	36	30	13	7	9	12	23	25	24	26	29.3	38	
20-Nov	26	25	25	Z	24	22	14	10	16	17	15	16	14	13	10	6	8	9	12	13	5	2	1	3	13.3	26	
21-Nov	11	14	18	19	Z	24	23	23	22	25	24	25	27	26	23	25	17	23	24	26	27	27	28	28	23.0	28	
22-Nov	28	26	25	23	26	Z	26	26	26	26	26	27	27	19	20	21	22	17	15	18	20	21	21	22	22.9	28	
23-Nov	22	20	21	20	19	16	Z	3	4	12	15	16	18	22	21	16	6	11	10	9	9	11	11	12	14.0	22	
24-Nov	10	4	16	19	23	21	19	Z	14	18	19	20	22	25	21	19	12	AF	AF	AF	AF	AF	AF	AF	--	25	
25-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	C	C	C	C	29	21	20	19	17	16	14	6	7	8	--	29	
26-Nov	9	9	8	Z	2	4	3	2	4	8	10	15	16	16	16	14	9	14	13	8	2	19	22	22	10.5	22	
27-Nov	26	28	28	28	Z	23	22	20	21	22	22	21	26	28	23	22	22	13	7	6	4	7	15	18	19.6	28	
28-Nov	21	24	24	22	20	Z	22	23	24	24	23	23	25	24	24	22	22	23	23	23	22	21	19	15	22.3	25	
29-Nov	9	16	17	22	24	24	Z	24	26	27	29	30	30	31	32	32	31	32	33	33	32	32	32	32	27.3	33	
30-Nov	32	32	31	31	31	31	31	Z	31	30	30	30	30	30	30	27	14	24	29	26	21	22	9	3	26.3	32	

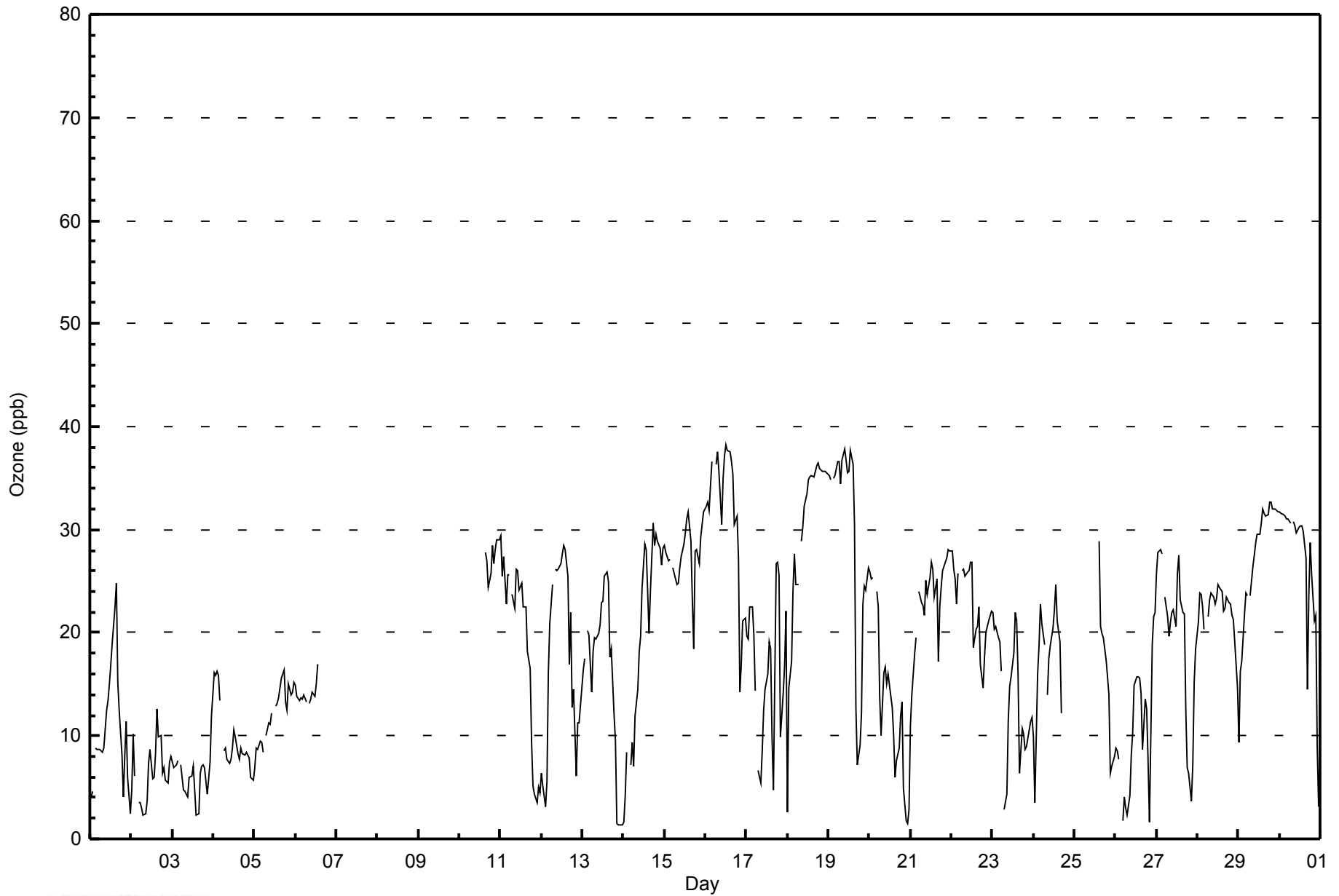
16.8	17.6	18.3	20.5	19.3	18.1	18.5	16.2	18.0	19.4	20.4	21.8	22.4	22.7	22.6	21.1	17.5	18.7	17.8	17.3	14.9	16.2	16.3	16.8	Diurnal Average	
35	35	32	35	37	37	37	38	37	38	37	37	38	38	38	37	36	36	36	36	36	36	36	36	Diurnal Maximum	

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



WBEA
Hourly Averages

Ozone (O₃) - ppb
Patricia McInnes - November 2014





WBEA
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Patricia McInnes - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	305	52.95	52.95
21 - 50	271	47.05	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 576

Total Number of Hours: 720



WBEA
Frequency Distribution

Ozone (O₃) - ppb
Patricia McInnes - November 2014

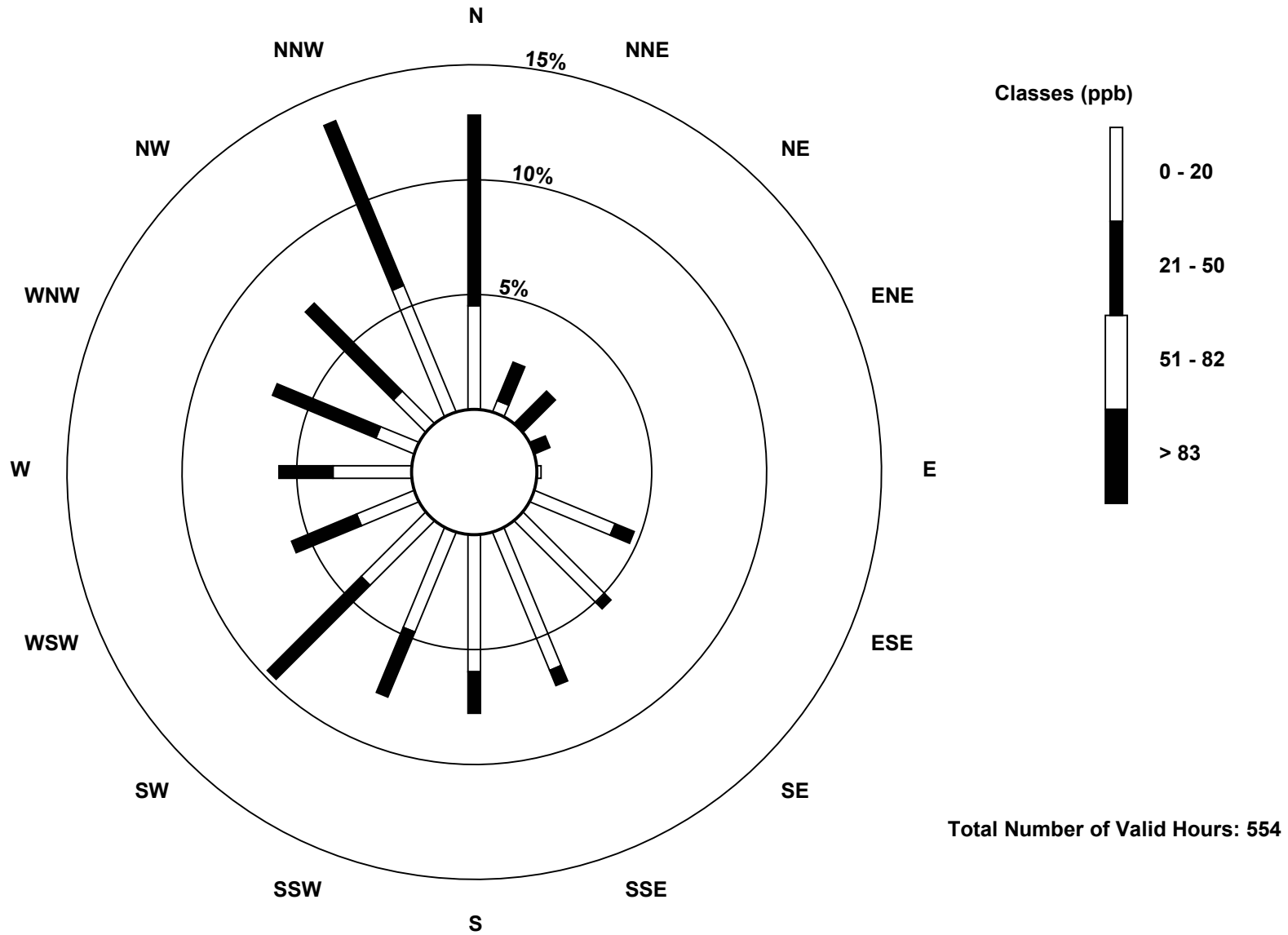
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	25	3	0	0	1	21	28	36	33	26	22	15	19	10	11	33	283
21 - 50	46	10	11	4	0	5	2	4	10	17	32	17	13	27	30	43	271
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	71	13	11	4	1	26	30	40	43	43	54	32	32	37	41	76	554

Total Number of Valid Hours: 554

Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

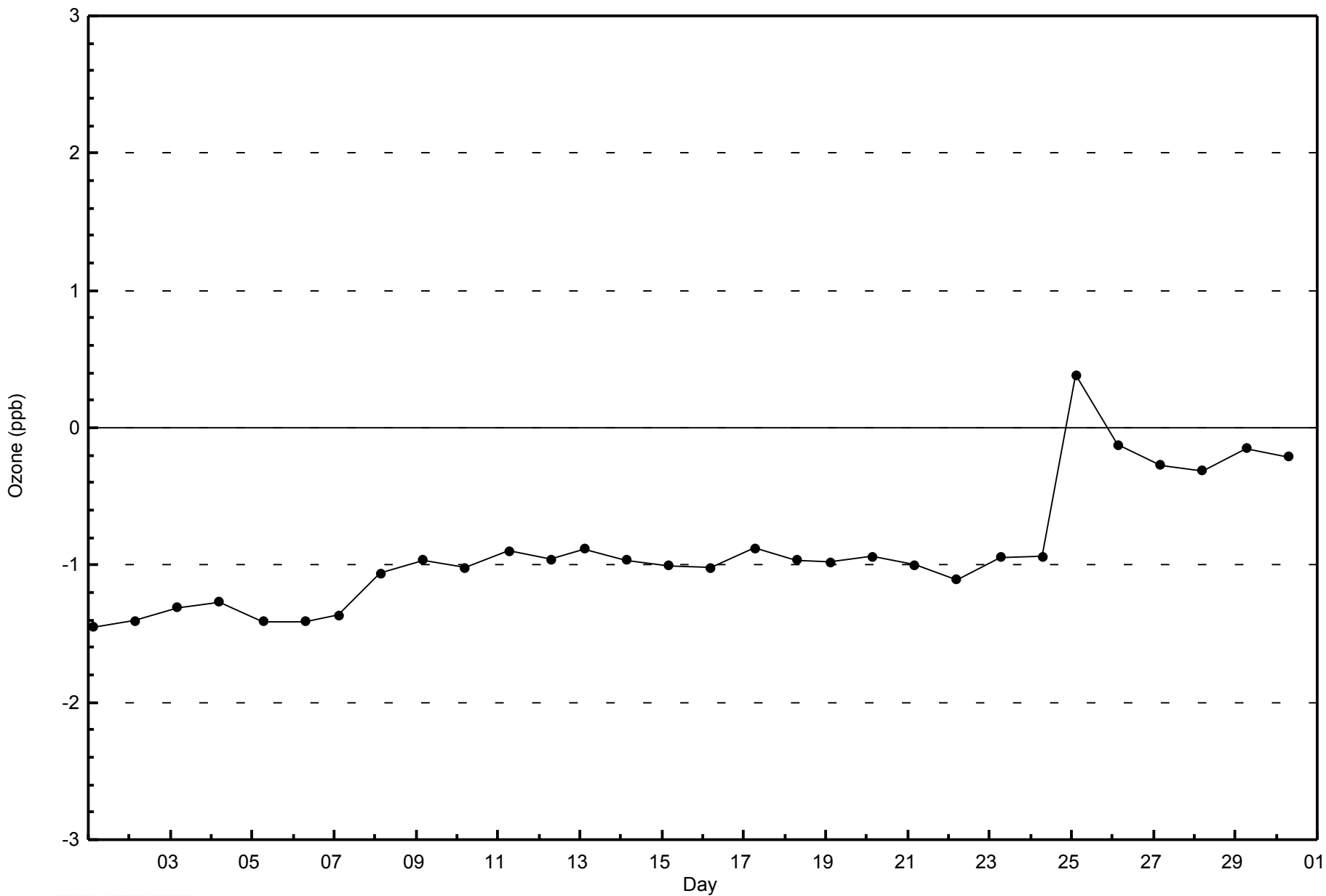
Ozone (O₃) - ppb
Patricia McInnes (AMS 6)





WBEA
Zero Responses

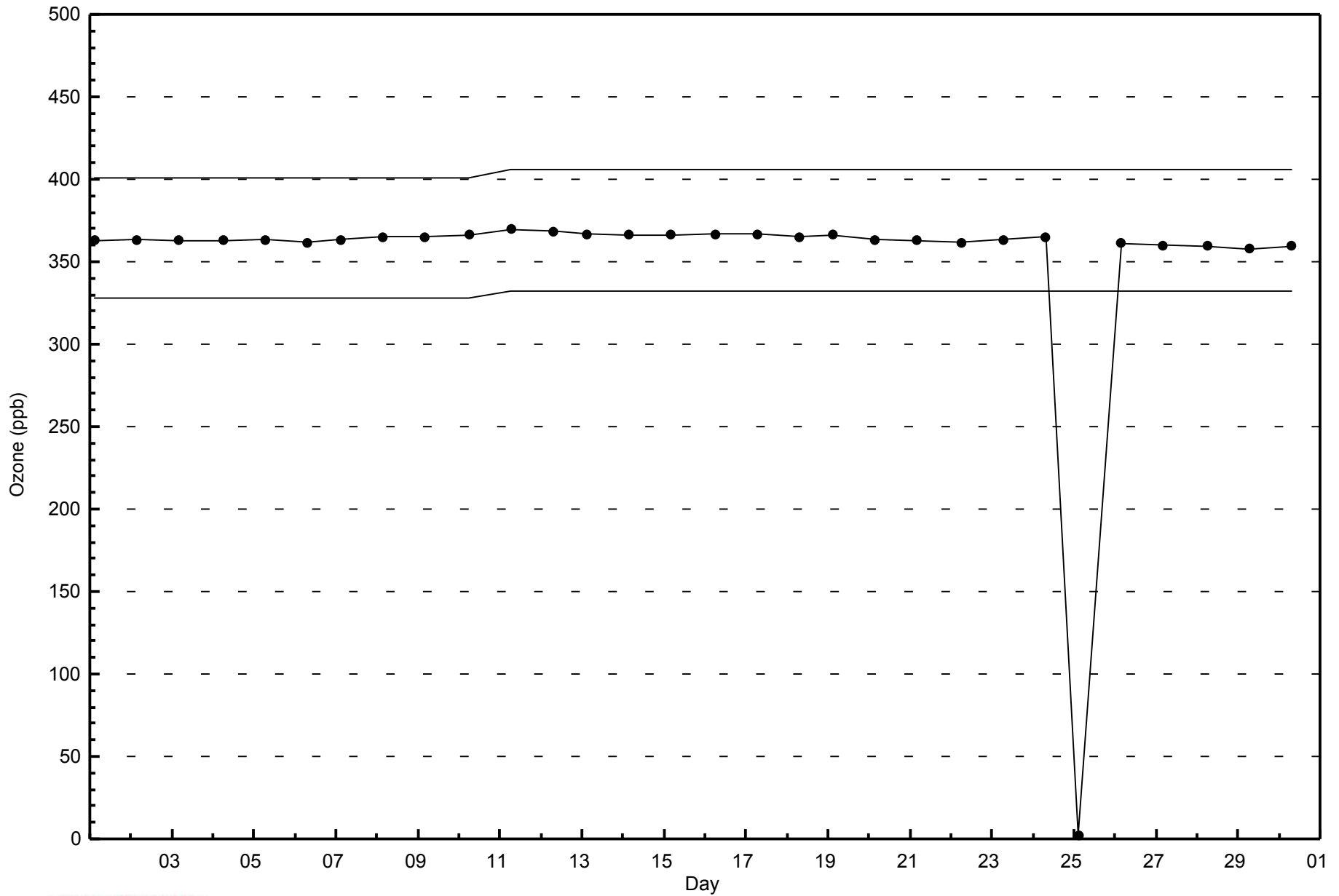
Ozone (O₃) - ppb
Patricia McInnes - November 2014





WBEA
Span Responses

Ozone (O₃) - ppb
Patricia McInnes - November 2014





Maximum Value: 25 ppb on Nov 14 00:00	Maximum Daily Average: 6.9 ppb on Nov 2	Hours in Service: 720
Minimum Value: 0 ppb on Nov 1 04:00	Minimum Daily Average: 0.5 ppb on Nov 16	Hours of Data: 590
Maximum Diurnal Average: 3.6 ppb at hour 7	Minimum Diurnal Average: 0.8 ppb at hour 3	Hours of Missing Data: 130
Monthly Average: 2.4 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 3 P ₉₀ = 7 P ₉₉ = 19	Hours of Calibration: 32
		Percent Operational Time: 86.4

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-Nov	Z	1	0	0	0	0	1	1	1	1	1	1	0	0	0	0	3	0	1	2	4	2	6	11	1.5	11
2-Nov	7	Z	3	5	7	9	15	17	20	17	7	5	11	8	5	2	3	2	6	2	4	2	1	1	6.9	20
3-Nov	1	1	Z	0	1	1	3	2	1	2	1	1	1	4	21	13	1	1	1	1	1	1	0	2.7	21	
4-Nov	0	0	0	Z	2	4	4	3	4	5	3	3	2	3	4	3	2	3	3	2	2	2	1	2.4	5	
5-Nov	1	0	0	0	Z	0	0	1	1	1	0	M	1	1	0	0	0	0	1	1	1	1	1	0.5	1	
6-Nov	1	1	1	1	1	Z	2	1	2	C	C	C	C	C	C	AF	AF	AF	AF	AF	AF	AF	AF	--	2	
7-Nov	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-Nov	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-Nov	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-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	1	1	1	1	1	1	0	0	0	--	1
11-Nov	0	0	0	0	Z	1	1	1	1	1	3	4	4	4	3	2	1	0	0	1	1	2	0	2	1.4	4
12-Nov	1	0	4	2	1	Z	1	0	1	1	1	1	1	1	1	2	3	1	7	2	10	3	3	3	2.1	10
13-Nov	Z	2	1	1	1	5	3	1	1	1	2	1	2	1	1	1	2	1	1	1	8	12	17	25	4.0	25
14-Nov	11	Z	1	1	0	1	1	1	1	1	2	2	2	1	2	2	1	0	0	0	0	0	0	0	1.4	11
15-Nov	0	0	Z	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0.5	1
16-Nov	0	0	0	Z	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	4	1	1	0	0.5	4
17-Nov	1	1	1	1	Z	4	11	11	14	17	14	13	10	6	4	9	14	0	0	0	3	1	0	0	5.9	17
18-Nov	13	2	0	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.8	13
19-Nov	Z	0	0	0	0	0	0	0	0	0	0	1	1	0	1	2	6	21	8	7	2	2	1	1	2.3	21
20-Nov	1	Z	1	1	1	1	2	7	3	2	4	5	6	5	7	8	5	3	1	0	13	12	13	4	4.5	13
21-Nov	1	0	Z	0	0	0	1	0	1	1	1	1	1	2	2	1	1	5	2	1	2	2	1	1	1.2	5
22-Nov	1	1	1	Z	1	1	2	2	1	1	2	2	2	4	3	2	1	1	2	1	1	1	0	0	1.4	4
23-Nov	0	0	0	0	Z	0	11	13	8	4	3	5	4	2	3	3	12	1	14	7	1	1	0	0	4.1	14
24-Nov	3	7	1	0	0	Z	1	1	2	3	5	4	4	2	3	2	3	5	8	2	4	3	1	0	2.8	8
25-Nov	Z	1	1	0	1	7	7	0	1	2	M	M	4	4	2	3	1	2	2	0	0	2	0	1	1.9	7
26-Nov	1	Z	1	3	18	10	19	20	11	10	12	7	5	4	3	3	4	1	2	4	11	1	1	1	6.6	20
27-Nov	0	0	Z	0	1	1	2	2	1	2	4	5	2	2	4	2	1	3	9	2	5	2	1	0	2.3	9
28-Nov	0	0	0	Z	1	1	2	1	1	1	2	2	2	2	2	1	1	1	1	1	0	0	0	0	1.1	2
29-Nov	1	1	1	1	Z	1	2	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.7	2
30-Nov	0	0	0	0	0	Z	0	0	0	0	1	1	1	1	1	2	9	2	1	2	4	3	9	11	2.1	11

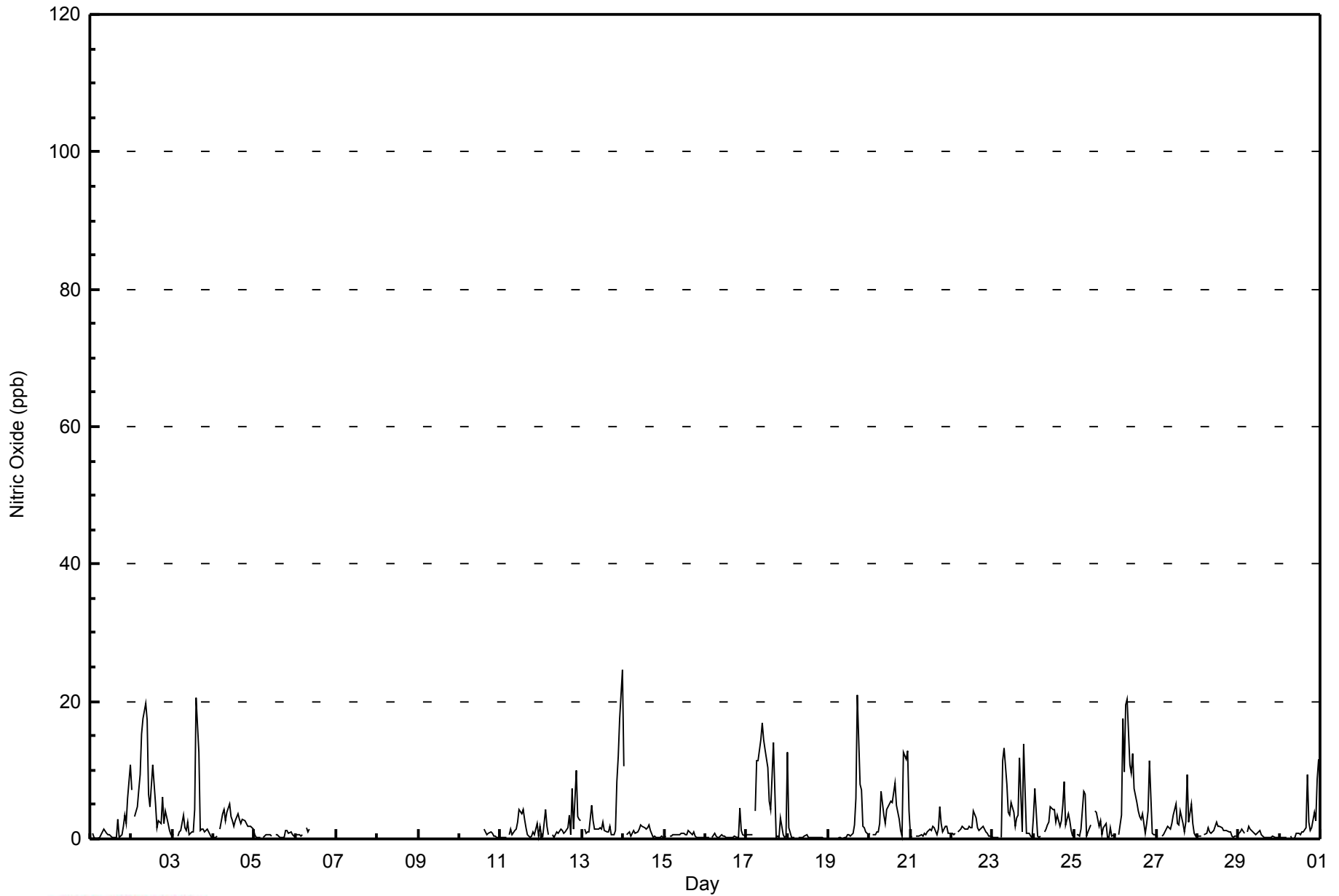
1.9	0.8	0.8	0.8	1.7	2.3	3.6	3.4	3.0	3.1	2.9	2.9	2.7	2.4	2.9	2.4	2.9	2.1	2.8	1.6	3.2	2.1	2.3	2.5	Diurnal Average	
13	7	4	5	18	10	19	20	20	17	14	13	11	8	21	13	14	21	14	7	13	12	17	25	Diurnal Maximum	

Z - zerspan C - Calibration M - Maintenance AF - Analyzer Failure



WBEA
Hourly Averages

Nitric Oxide (NO) - ppb
Patricia McInnes - November 2014





WBEA
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Patricia McInnes - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	587	99.49	99.49
21 - 40	3	0.51	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 590

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitric Oxide (NO) - ppb
Patricia McInnes - November 2014

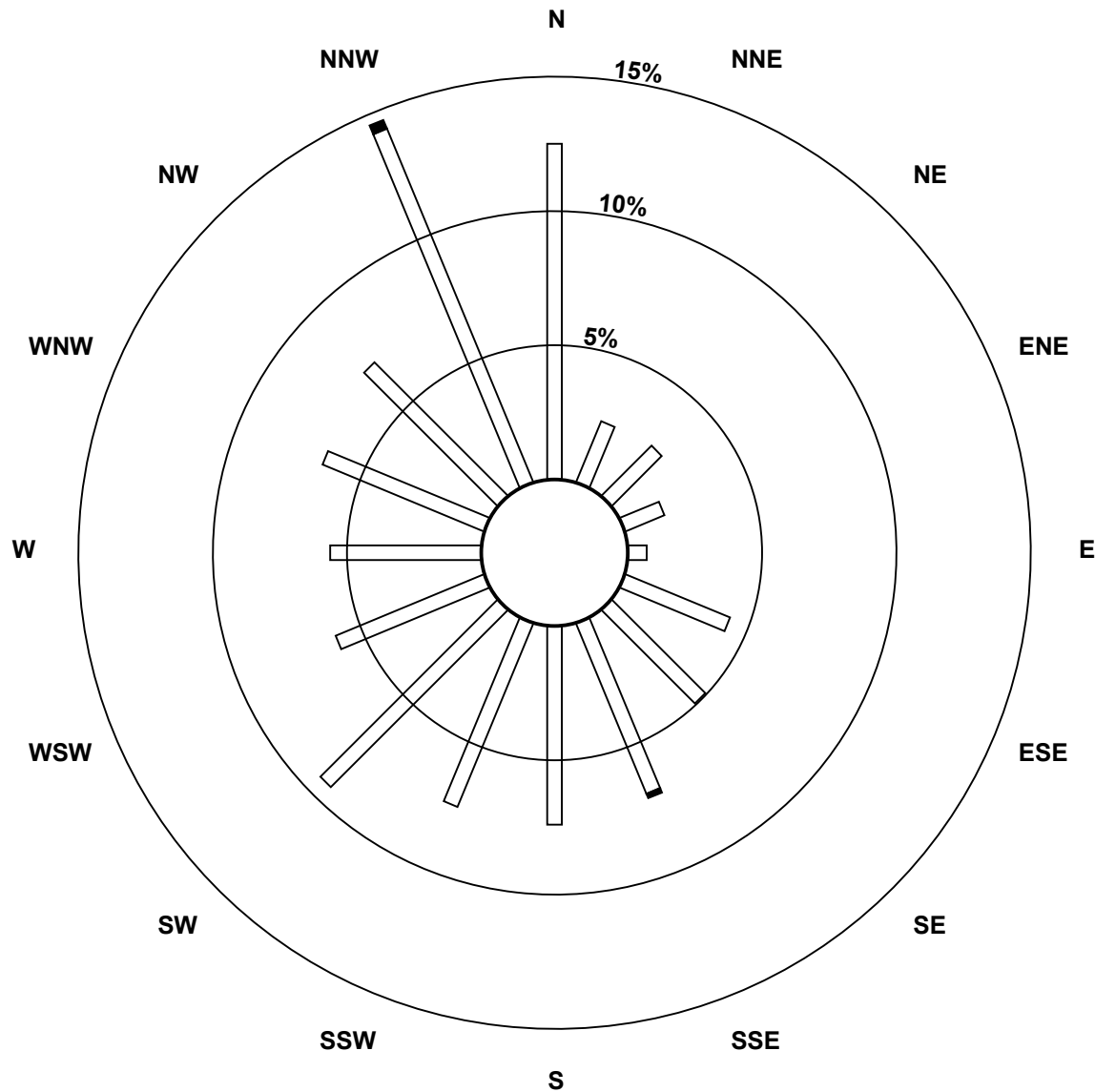
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	71	14	15	9	4	24	28	39	42	42	53	34	32	37	40	81	565
21 - 40	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	3
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	71	14	15	9	4	24	28	40	42	42	53	34	32	37	40	83	568

Total Number of Valid Hours: 568

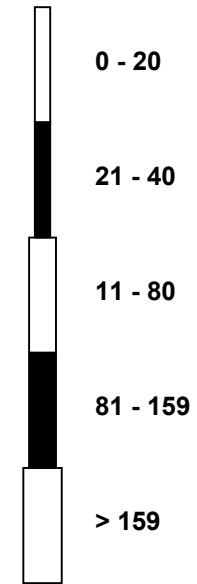
Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

Nitric Oxide (NO) - ppb
Patricia McInnes (AMS 6)



Classes (ppb)

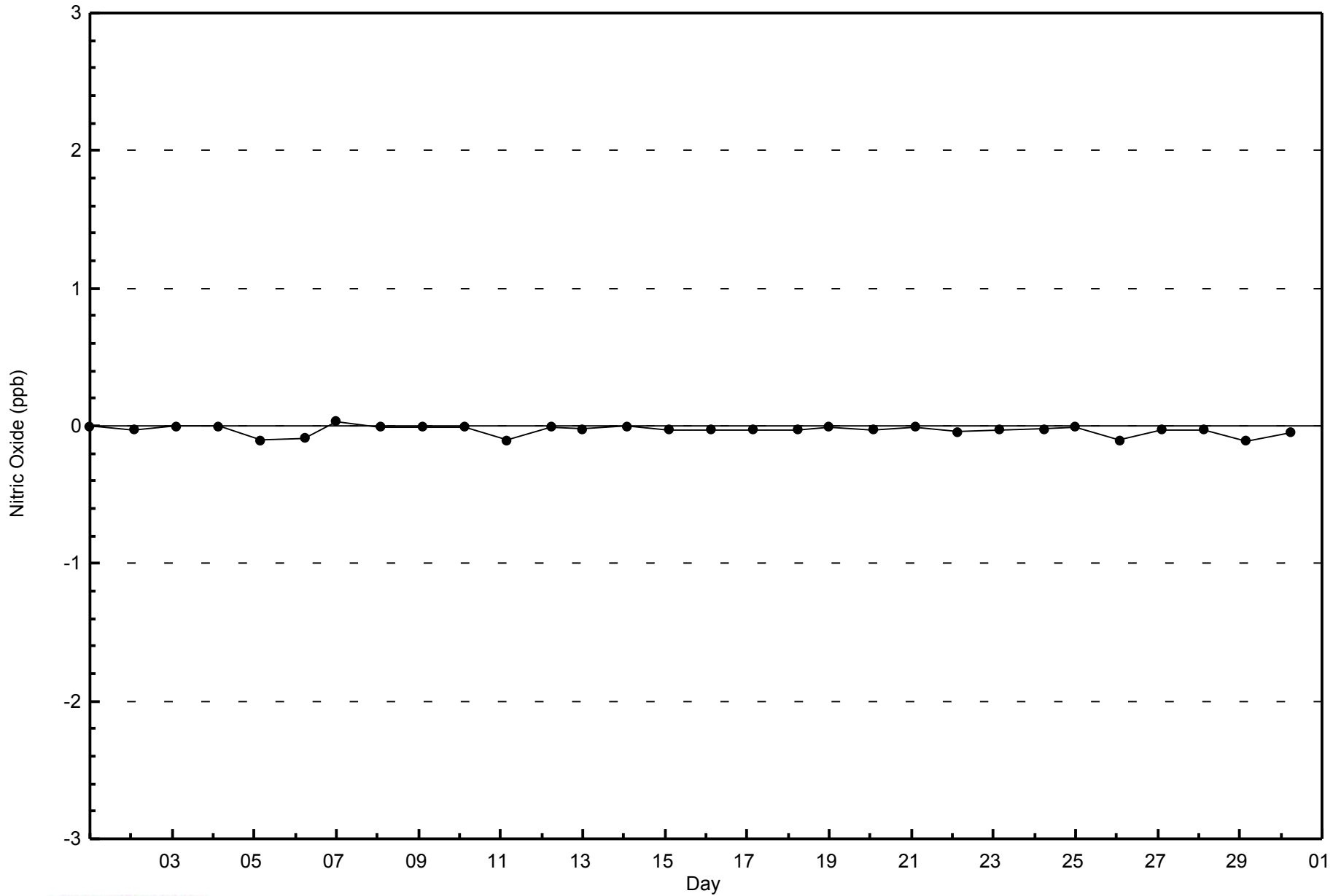


Total Number of Valid Hours: 568



WBEA
Zero Responses

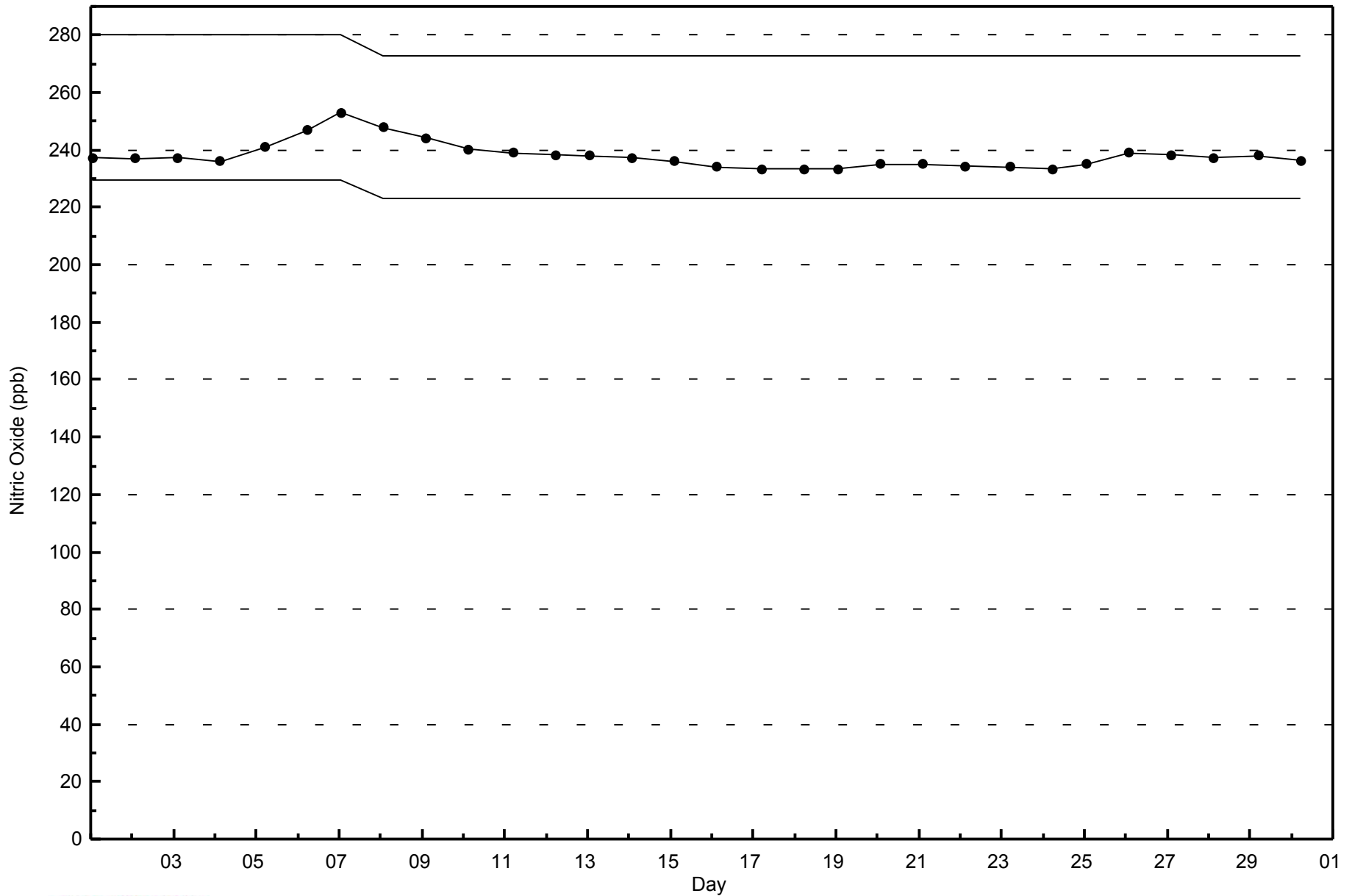
Nitric Oxide (NO) - ppb
Patricia McInnes - November 2014





WBEA
Span Responses

Nitric Oxide (NO) - ppb
Patricia McInnes - November 2014





Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 31 ppb on Dec 1 00:00	Maximum Daily Average: 13.4 ppb on Nov 26		Hours of Data:	590
Minimum Value: 0 ppb on Nov 18 15:00	Minimum Daily Average: 2.1 ppb on Nov 5		Hours of Missing Data:	130
Maximum Diurnal Average: 10.8 ppb at hour 17	Minimum Diurnal Average: 4.2 ppb at hour 13		Hours of Calibration:	32
Monthly Average: 6.7 ppb	Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 2 Median = 5 Q ₃ = 9 P ₉₀ = 14 P ₉₉ = 25		Percent Operational Time:	86.4

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-Nov	Z	2	1	1	1	1	2	3	4	2	1	1	1	1	1	1	11	3	2	4	7	7	11	12	3.4	12	
2-Nov	10	Z	7	7	8	8	11	10	9	8	5	5	7	7	6	4	7	5	9	6	6	5	3	2	6.7	11	
3-Nov	3	4	Z	3	3	4	5	3	2	2	1	2	2	5	12	14	12	10	10	11	14	14	11	7	6.6	14	
4-Nov	3	3	2	Z	4	8	8	7	7	8	6	5	5	5	6	6	5	5	4	4	4	6	5	5	5.2	8	
5-Nov	2	1	1	1	Z	4	5	3	2	2	1	M	1	2	1	1	1	1	4	3	3	4	3	2	2.1	5	
6-Nov	2	3	3	3	3	Z	5	5	6	C	C	C	C	C	C	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	6	
7-Nov	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-Nov	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-Nov	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-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	5	5	5	7	6	4	5	4	3	2	--	7
11-Nov	2	4	3	6	Z	4	4	7	9	6	6	8	8	10	9	9	11	9	8	14	13	13	11	11	8.0	14	
12-Nov	10	7	14	15	8	Z	3	2	2	2	1	2	1	1	2	4	12	5	10	4	13	7	9	8	6.1	15	
13-Nov	Z	5	3	3	3	10	6	3	3	2	2	2	3	2	2	3	9	3	3	9	21	22	23	25	7.2	25	
14-Nov	25	Z	17	20	18	15	18	14	11	8	8	6	4	4	8	13	8	1	3	1	0	1	2	1	9.0	25	
15-Nov	1	1	Z	1	1	1	2	2	2	2	2	2	1	1	2	5	9	13	4	4	4	2	3	2	2.8	13	
16-Nov	2	2	3	Z	2	6	3	1	2	6	2	1	0	0	0	0	0	3	0	1	10	9	4	3	2.7	10	
17-Nov	4	4	3	2	Z	10	18	19	20	19	15	12	11	8	9	19	24	3	2	3	18	10	5	4	10.6	24	
18-Nov	25	14	11	5	2	Z	5	2	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2.9	25	
19-Nov	Z	0	0	0	0	0	1	2	0	0	1	1	1	1	2	8	26	25	19	22	10	9	7	4	6.1	26	
20-Nov	4	Z	3	3	4	5	14	17	11	9	10	9	10	9	12	16	13	10	5	4	14	18	18	18	10.3	18	
21-Nov	10	8	Z	7	4	4	5	7	7	4	5	5	4	5	9	8	14	9	7	5	5	5	4	3	6.2	14	
22-Nov	3	4	5	Z	6	7	5	6	7	5	5	4	3	11	9	9	8	12	14	11	8	7	7	5	7.0	14	
23-Nov	4	6	6	7	Z	8	18	24	23	11	7	6	4	2	4	9	19	6	5	5	4	3	3	3	8.1	24	
24-Nov	9	18	8	6	5	Z	8	14	13	11	11	10	10	8	11	12	19	20	19	7	6	6	3	4	10.3	20	
25-Nov	Z	4	7	3	6	10	14	12	12	9	M	M	7	7	6	15	11	8	8	5	7	12	9	8	8.5	15	
26-Nov	7	Z	9	10	22	18	20	23	20	15	15	10	9	9	10	12	18	11	11	17	26	8	6	5	13.4	26	
27-Nov	5	3	Z	3	4	7	9	10	8	7	8	10	5	5	10	9	8	18	25	25	28	24	15	11	11.1	28	
28-Nov	8	5	5	Z	8	8	7	6	6	6	6	6	5	5	6	7	7	5	6	6	6	5	5	8	6.1	8	
29-Nov	11	8	7	3	Z	3	5	5	3	1	1	1	2	1	1	1	1	1	0	0	1	0	0	0	2.4	11	
30-Nov	0	0	0	0	0	Z	0	0	0	0	1	1	1	1	2	5	22	9	3	7	16	12	27	31	6.0	31	

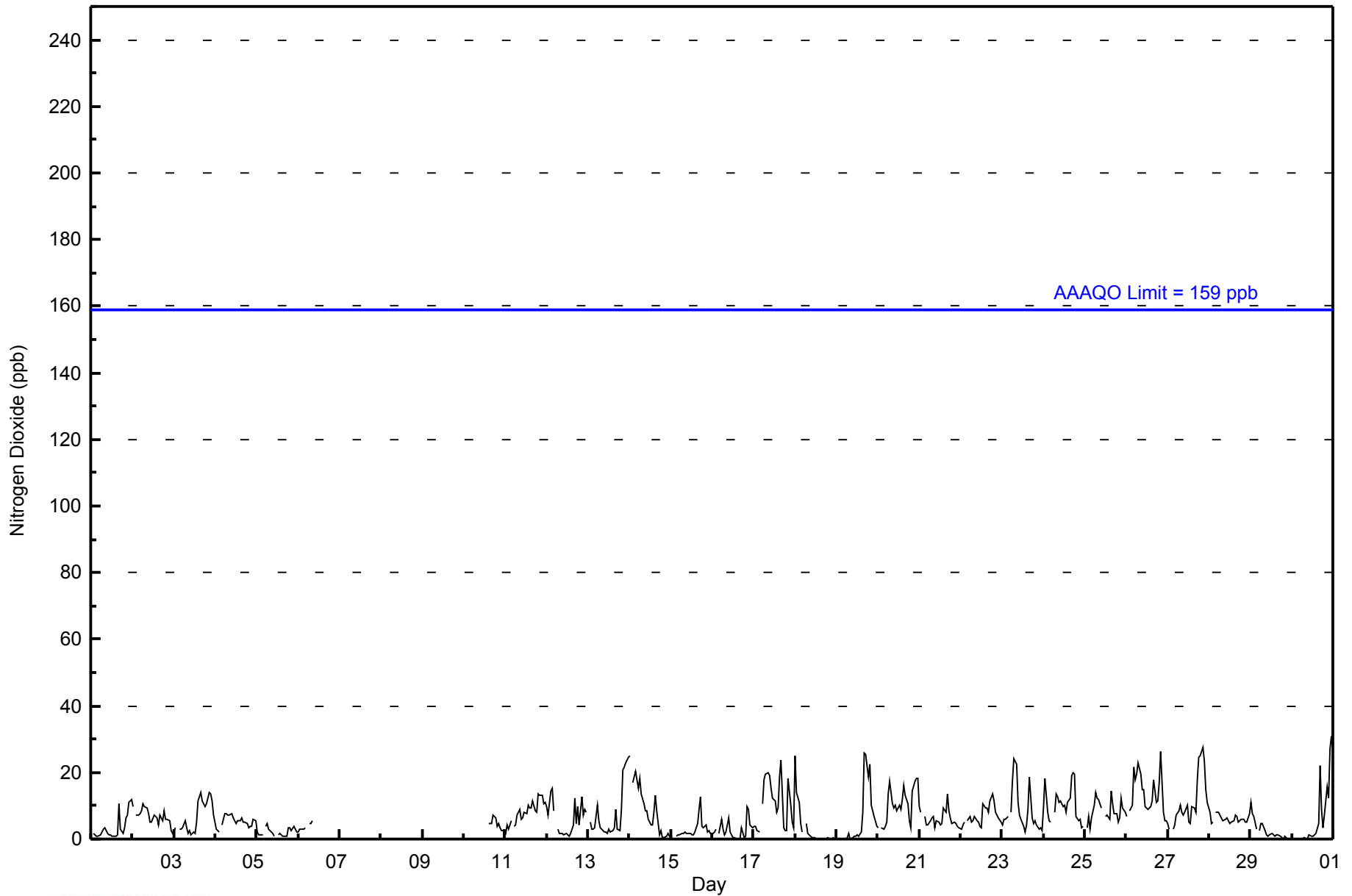
6.7	4.8	5.4	4.9	5.4	6.7	7.6	7.9	7.1	5.9	5.1	4.7	4.2	4.4	5.6	7.5	10.8	7.8	7.1	6.9	9.5	8.0	7.6	7.1	Diurnal Average	
25	18	17	20	22	18	20	24	23	19	15	12	11	11	12	19	26	25	25	25	28	24	27	31	Diurnal Maximum	

Z - zerspan C - Calibration M - Maintenance AF - Analyzer Failure
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb



WBEA
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Patricia McInnes - November 2014





WBEA
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Patricia McInnes - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	568	96.27	96.27
21 - 40	22	3.73	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: 590

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Patricia McInnes - November 2014

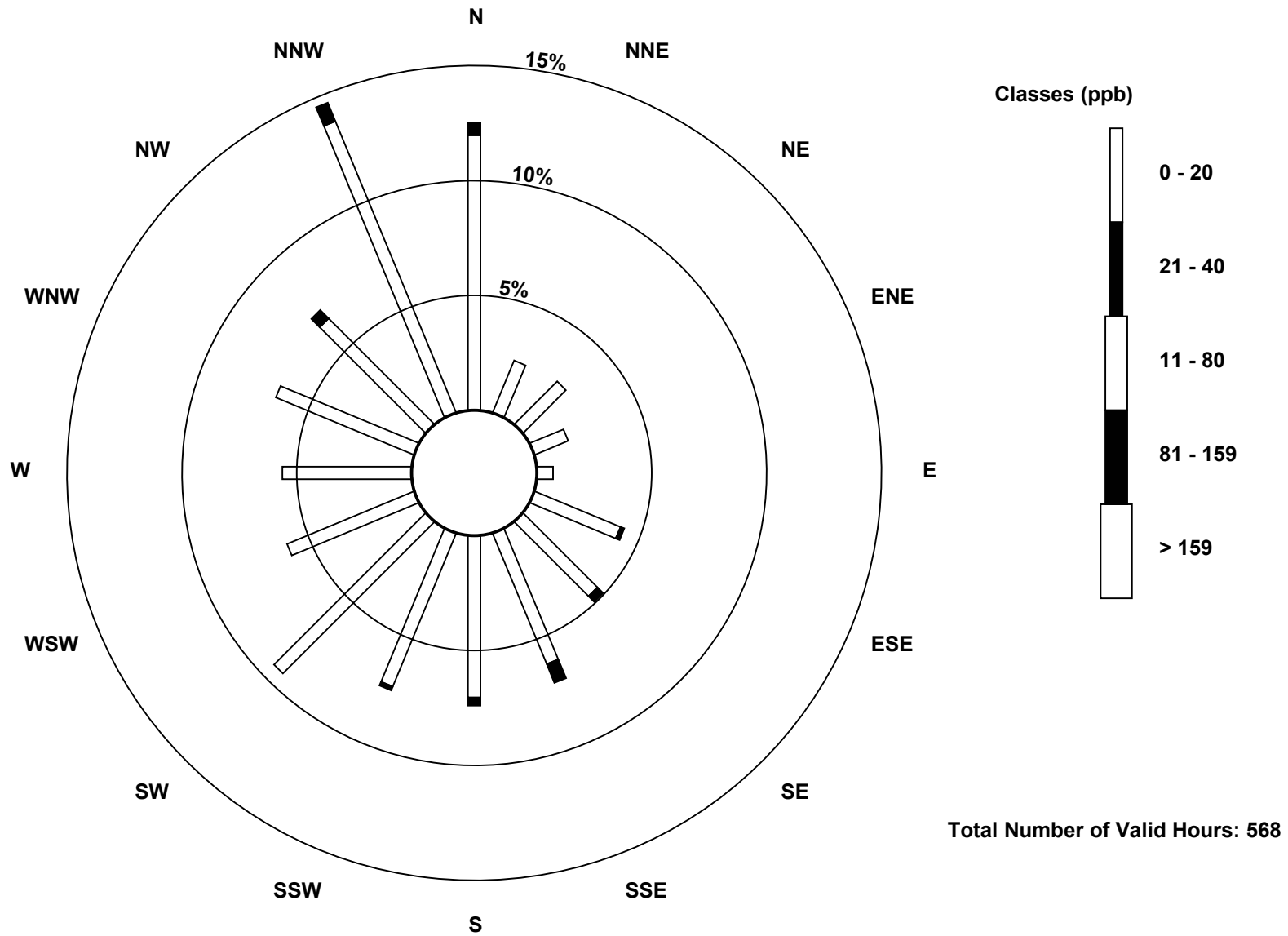
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	68	14	15	9	4	23	26	35	40	41	53	34	32	37	37	78	546
21 - 40	3	0	0	0	0	1	2	5	2	1	0	0	0	0	3	5	22
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	71	14	15	9	4	24	28	40	42	42	53	34	32	37	40	83	568

Total Number of Valid Hours: 568

Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

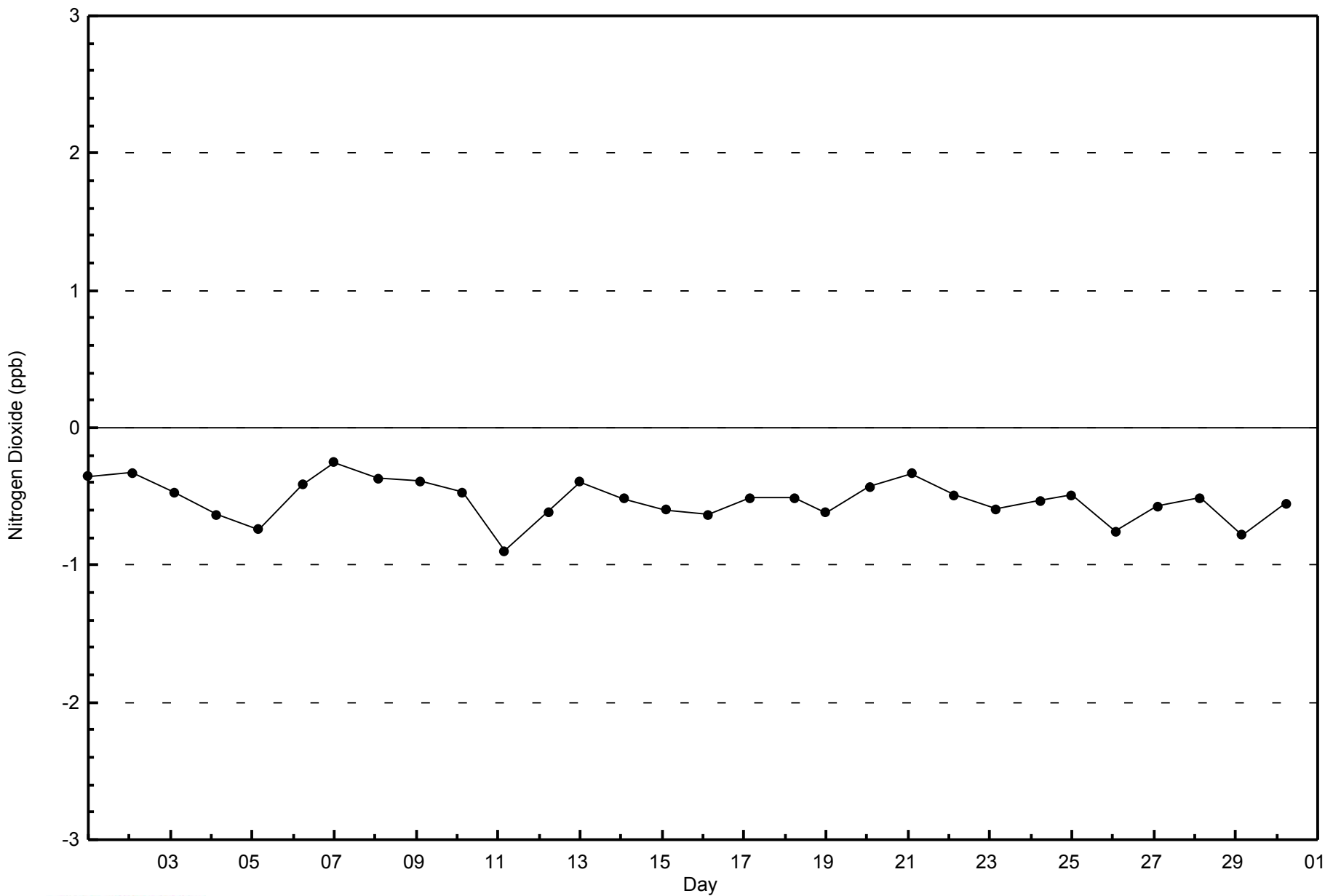
Nitrogen Dioxide (NO₂) - ppb
Patricia McInnes (AMS 6)





WBEA
Zero Responses

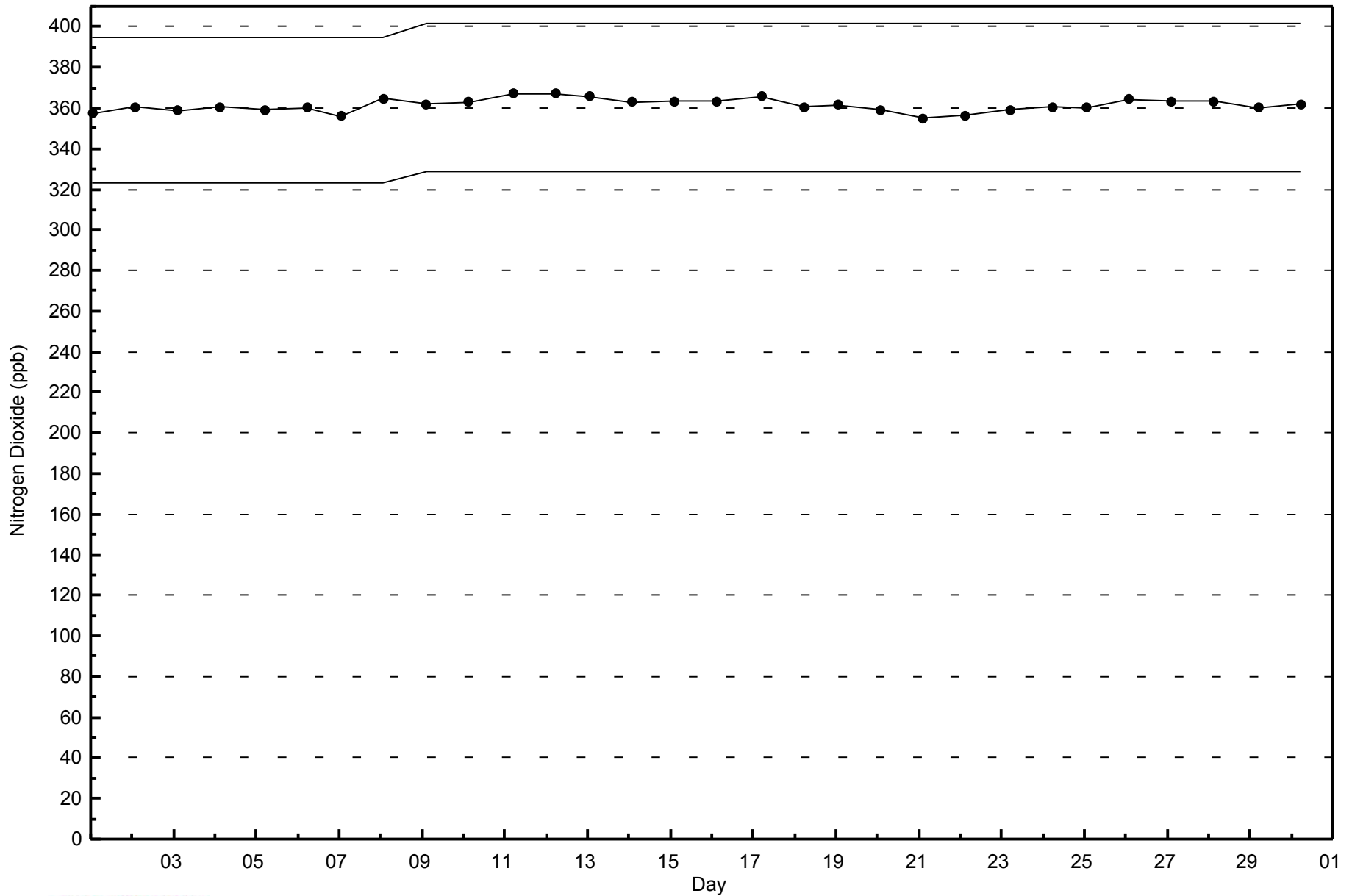
Nitrogen Dioxide (NO₂) - ppb
Patricia McInnes - November 2014





WBEA
Span Responses

Nitrogen Dioxide (NO₂) - ppb
Patricia McInnes - November 2014





Maximum Value: 49 ppb on Nov 14 00:00	Maximum Daily Average: 20.0 ppb on Nov 26	Hours in Service: 720
Minimum Value: 0 ppb on Nov 30 09:00	Minimum Daily Average: 2.6 ppb on Nov 5	Hours of Data: 590
Maximum Diurnal Average: 13.7 ppb at hour 17	Minimum Diurnal Average: 5.6 ppb at hour 2	Hours of Missing Data: 130
Monthly Average: 9.1 ppb	Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 3 Median = 7 Q ₃ = 12 P ₉₀ = 21 P ₉₉ = 38	Hours of Calibration: 32
		Percent Operational Time: 86.4

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-Nov	Z	2	1	1	1	1	3	4	5	3	2	2	1	1	1	2	14	3	2	5	10	9	17	23	4.9	23	
2-Nov	17	Z	10	12	15	18	26	27	29	25	12	10	18	15	11	6	10	8	15	8	10	8	4	3	13.7	29	
3-Nov	3	4	Z	3	4	5	9	5	3	5	2	3	3	9	32	27	13	12	11	12	16	14	12	7	9.3	32	
4-Nov	3	3	3	Z	6	11	12	10	11	12	9	8	7	8	9	9	7	8	7	6	6	6	8	7	7.6	12	
5-Nov	3	2	2	1	Z	4	5	4	3	2	2	M	2	2	2	1	1	1	5	5	3	5	4	3	2.6	5	
6-Nov	3	4	4	3	4	Z	6	6	7	C	C	C	C	C	C	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	7	
7-Nov	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-Nov	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-Nov	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-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	6	5	6	8	7	4	5	4	3	3	--	8
11-Nov	2	4	3	6	Z	5	6	8	10	7	9	12	11	14	12	11	12	9	8	15	14	15	11	13	9.5	15	
12-Nov	10	8	19	17	9	Z	3	2	2	3	2	3	3	2	3	6	16	5	17	6	23	10	12	11	8.2	23	
13-Nov	Z	6	4	4	4	15	8	5	4	4	3	3	5	3	4	4	11	3	3	10	29	34	40	49	11.2	49	
14-Nov	35	Z	18	21	18	16	19	14	12	10	11	8	6	6	10	15	10	1	3	1	1	1	2	1	10.4	35	
15-Nov	1	1	Z	1	2	2	2	2	3	3	3	2	2	2	3	5	10	14	4	4	4	2	3	2	3.4	14	
16-Nov	2	2	3	Z	2	7	3	1	3	7	2	2	0	0	0	0	0	3	0	1	14	10	5	4	3.2	14	
17-Nov	5	5	3	3	Z	15	29	31	34	36	30	25	22	14	14	28	38	4	3	3	21	11	5	4	16.5	38	
18-Nov	38	16	11	5	2	Z	5	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	3.7	38	
19-Nov	Z	0	0	0	0	0	1	2	0	0	1	2	2	1	3	10	32	46	26	30	12	10	8	5	8.4	46	
20-Nov	4	Z	4	4	5	6	16	24	14	12	14	13	16	14	19	24	18	13	6	4	27	29	31	22	14.8	31	
21-Nov	10	8	Z	7	5	5	6	7	8	4	6	6	6	6	11	9	15	13	9	6	7	6	5	4	7.3	15	
22-Nov	4	5	6	Z	7	8	7	7	8	7	7	5	5	15	12	11	10	13	15	13	9	8	7	5	8.4	15	
23-Nov	5	6	6	7	Z	8	29	37	30	15	11	11	8	4	7	12	31	7	19	12	5	4	4	3	12.2	37	
24-Nov	13	26	9	6	6	Z	9	15	14	13	16	14	14	10	15	14	22	25	28	9	9	9	4	4	13.2	28	
25-Nov	Z	4	7	3	8	17	20	12	13	11	M	M	11	11	8	17	11	9	10	5	7	14	10	9	10.4	20	
26-Nov	7	Z	9	14	39	28	39	43	31	24	27	17	14	13	13	14	21	12	14	21	38	9	6	6	20.0	43	
27-Nov	5	3	Z	3	5	8	10	12	9	9	11	15	7	7	14	11	9	20	34	27	33	26	16	11	13.3	34	
28-Nov	8	5	5	Z	9	9	9	7	6	7	8	8	7	7	7	8	8	6	7	7	6	5	6	8	7.1	9	
29-Nov	12	9	8	4	Z	3	6	6	4	2	1	2	3	2	1	1	1	1	1	0	1	0	0	0	3.1	12	
30-Nov	0	0	0	0	0	Z	1	0	0	0	2	2	1	2	3	6	31	11	4	9	19	15	36	42	8.1	42	

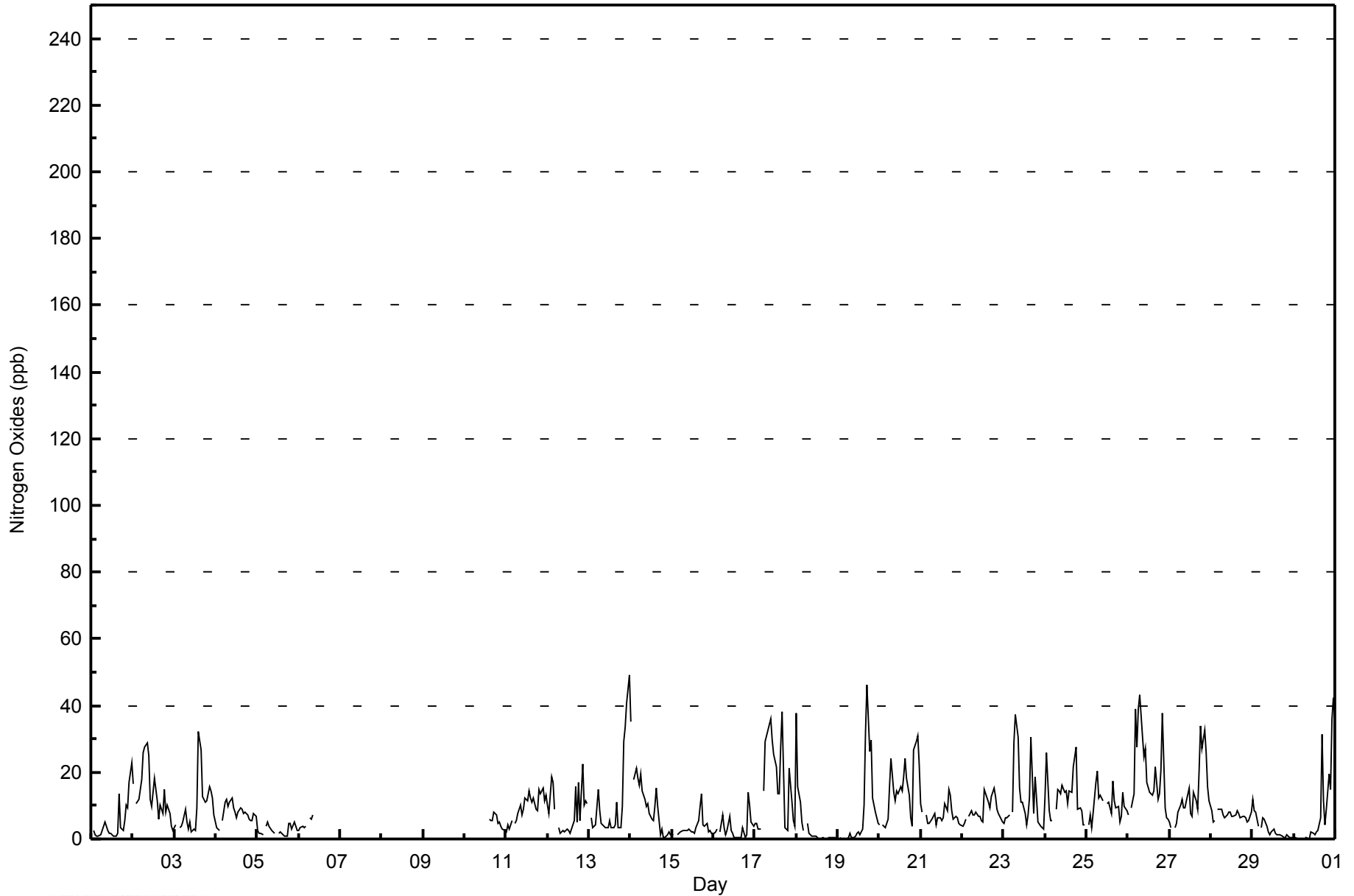
8.7	5.6	6.1	5.7	7.1	9.1	11.1	11.3	10.2	8.9	8.0	7.6	6.9	6.8	8.4	9.9	13.7	9.9	10.0	8.5	12.6	10.2	9.9	9.5	Diurnal Average	
38	26	19	21	39	28	39	43	34	36	30	25	22	15	32	28	38	46	34	30	38	34	40	49	Diurnal Maximum	

Z - zerspan C - Calibration M - Maintenance AF - Analyzer Failure



WBEA
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Patricia McInnes - November 2014





WBEA
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Patricia McInnes - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	530	89.83	89.83
21 - 40	56	9.49	99.32
41 - 80	4	0.68	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 590

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Patricia McInnes - November 2014

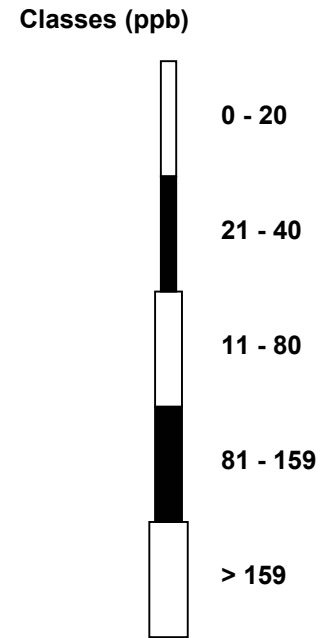
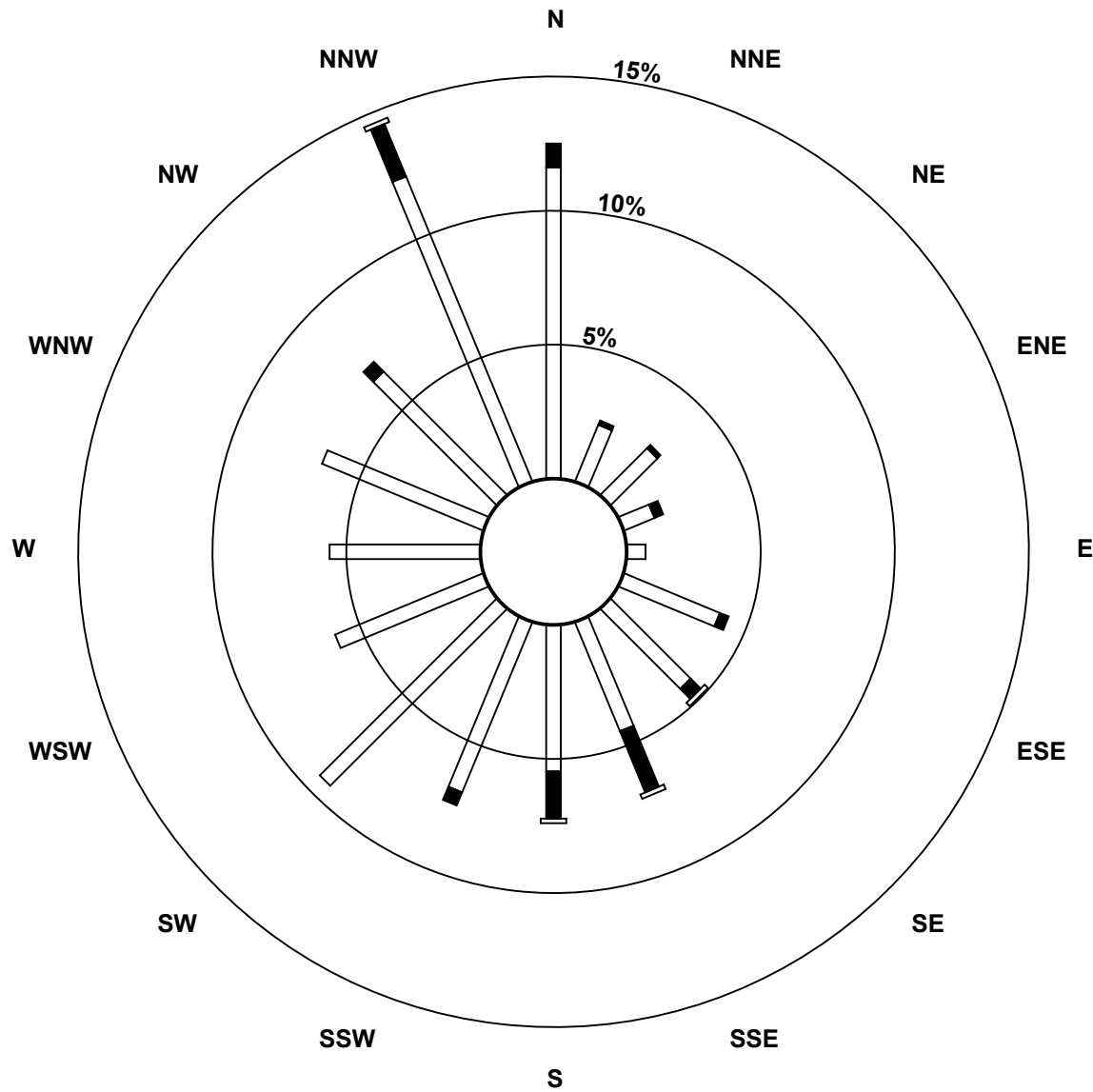
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	66	13	14	7	4	22	24	25	31	39	53	34	32	37	37	70	508
21 - 40	5	1	1	2	0	2	3	14	10	3	0	0	0	0	3	12	56
11 - 80	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	1	4
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	71	14	15	9	4	24	28	40	42	42	53	34	32	37	40	83	568

Total Number of Valid Hours: 568

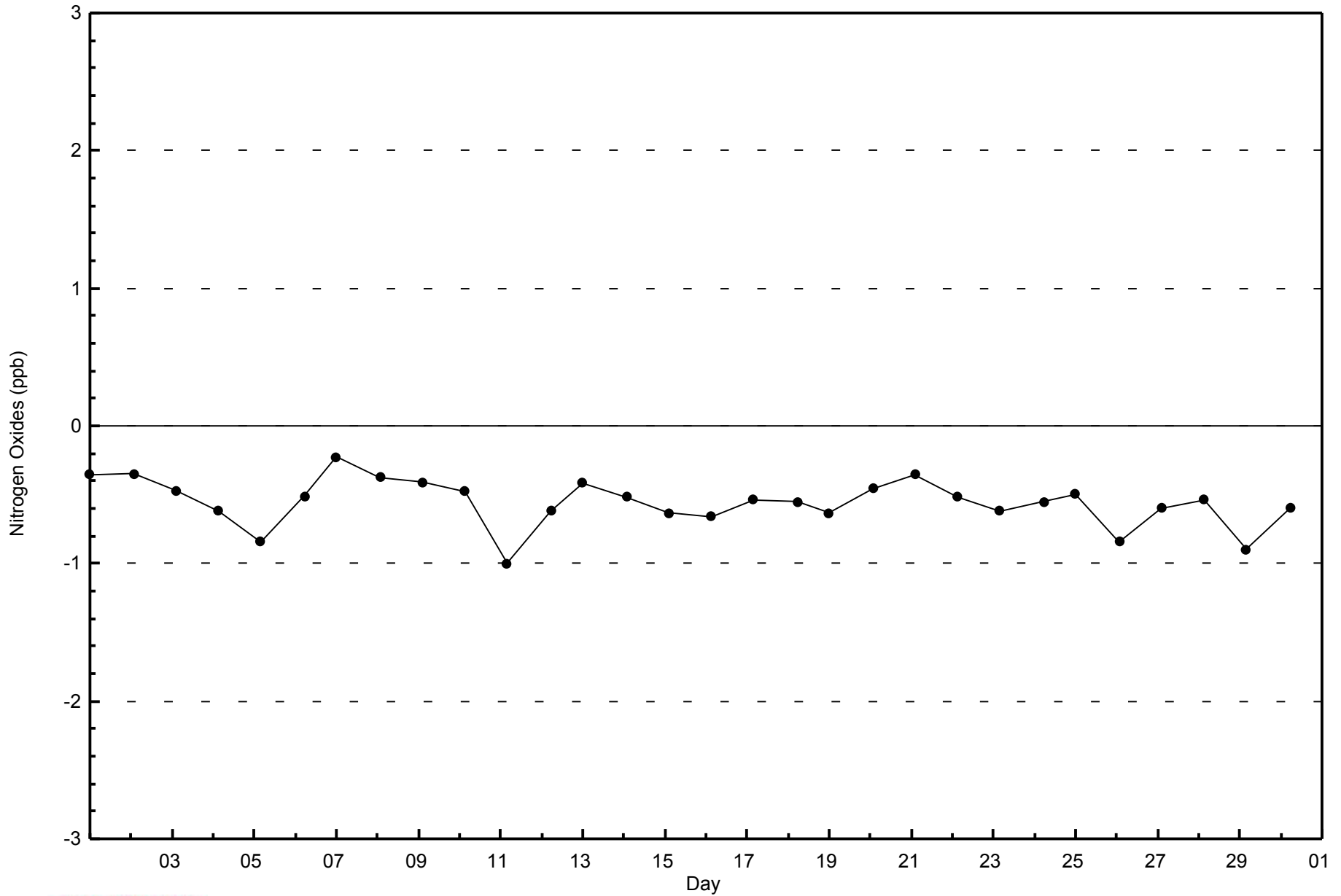
Total Number of Hours: 720

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

**Nitrogen Oxides (NO_x) - ppb
Patricia McInnes (AMS 6)**



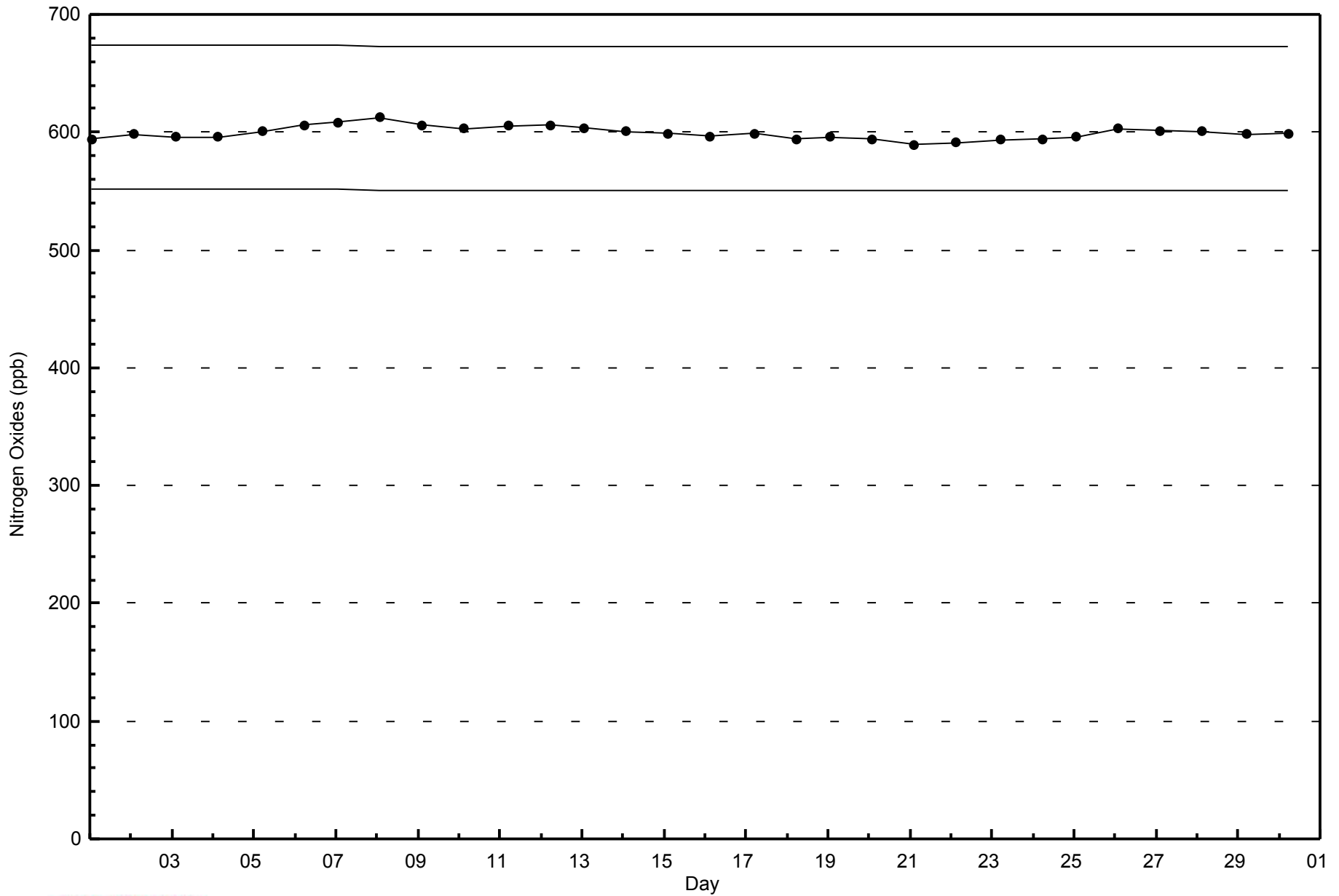
Total Number of Valid Hours: 568





WBEA
Span Responses

Nitrogen Oxides (NO_x) - ppb
Patricia McInnes - November 2014





Number of Exceedences (AAQO): 1-hr: 0	Maximum Value: 0 ppb on Nov 1 01:00	Maximum Daily Average: 0.0 ppb on Nov 1	Hours in Service: 720
Minimum Value: 0 ppb on Nov 1 01:00	Maximum Diurnal Average: 0.0 ppb at hour 1	Minimum Daily Average: 0.0 ppb on Nov 1	Hours of Data: 544
Monthly Average: 0.0 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 0	Minimum Diurnal Average: 0.0 ppb at hour 1	Hours of Missing Data: 176
			Hours of Calibration: 39
			Percent Operational Time: 81.0

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

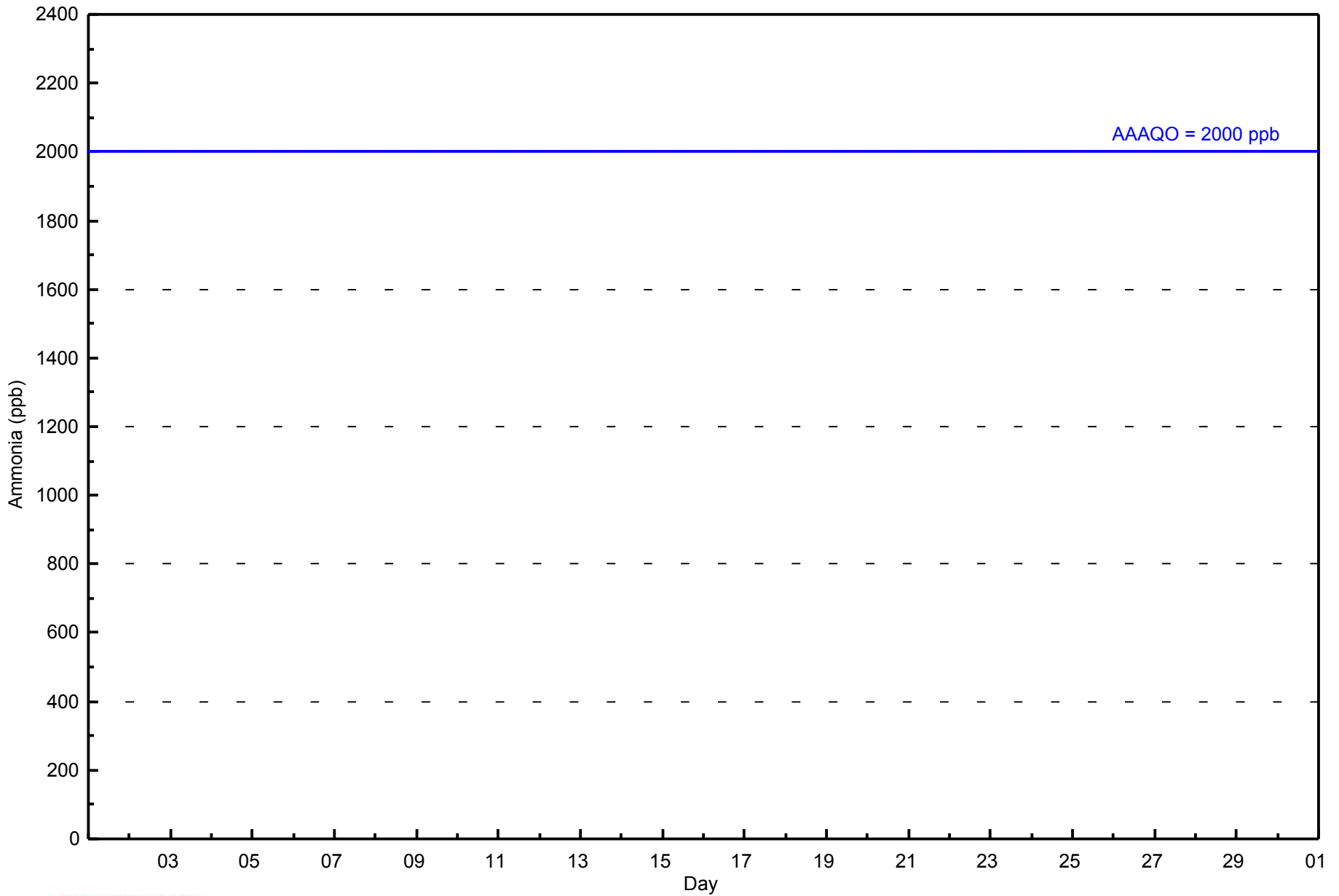
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Diurnal Average
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Diurnal Maximum

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



WBEA
Hourly Averages

Ammonia (NH₃) - ppb
Patricia McInnes - November 2014





WBEA
Cumulative Frequency Distribution

Ammonia (NH₃) - ppb
Patricia McInnes - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 5	544	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: 544

Total Number of Hours: 720



WBEA
Frequency Distribution

Ammonia (NH₃) - ppb
Patricia McInnes - November 2014

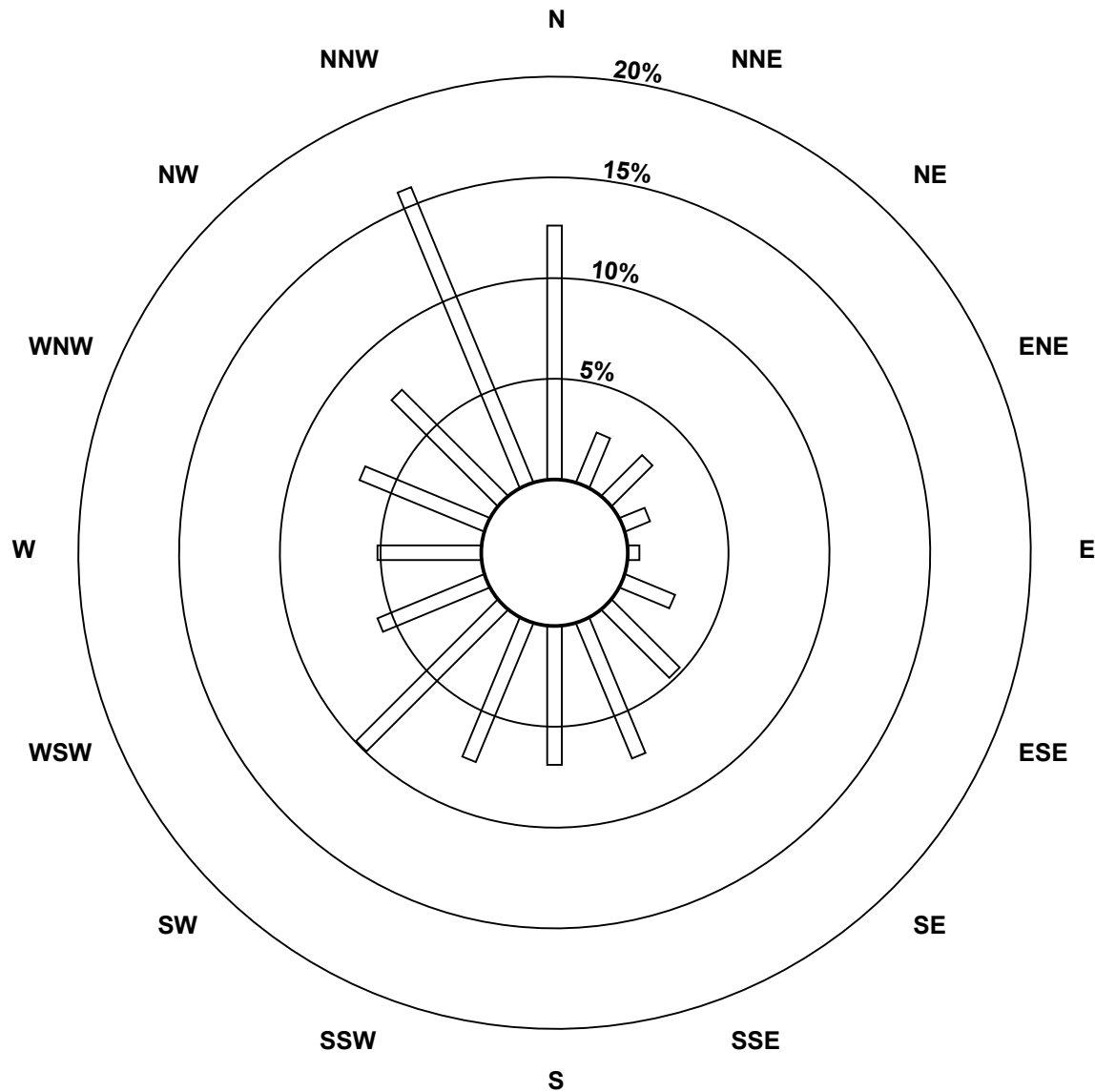
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	66	14	15	7	3	14	25	38	36	39	52	30	27	35	39	83	523
6 - 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	66	14	15	7	3	14	25	38	36	39	52	30	27	35	39	83	523

Total Number of Valid Hours: 523

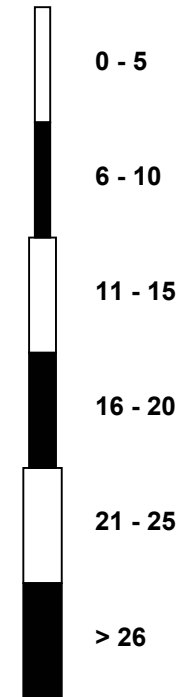
Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

Ammonia (NH₃) - ppb
Patricia McInnes (AMS 6)



Classes (ppb)

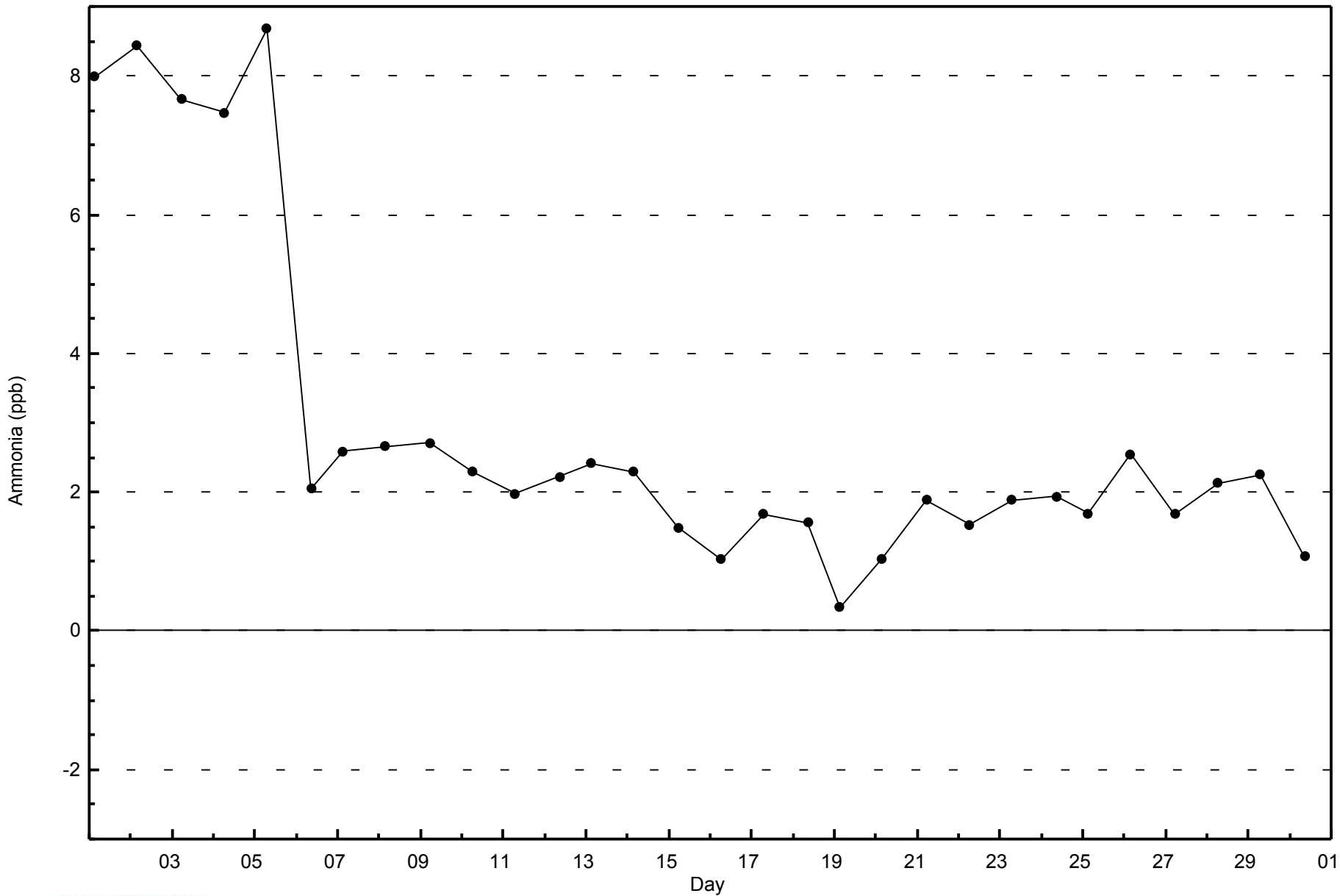


Total Number of Valid Hours: 523



WBEA
Zero Responses

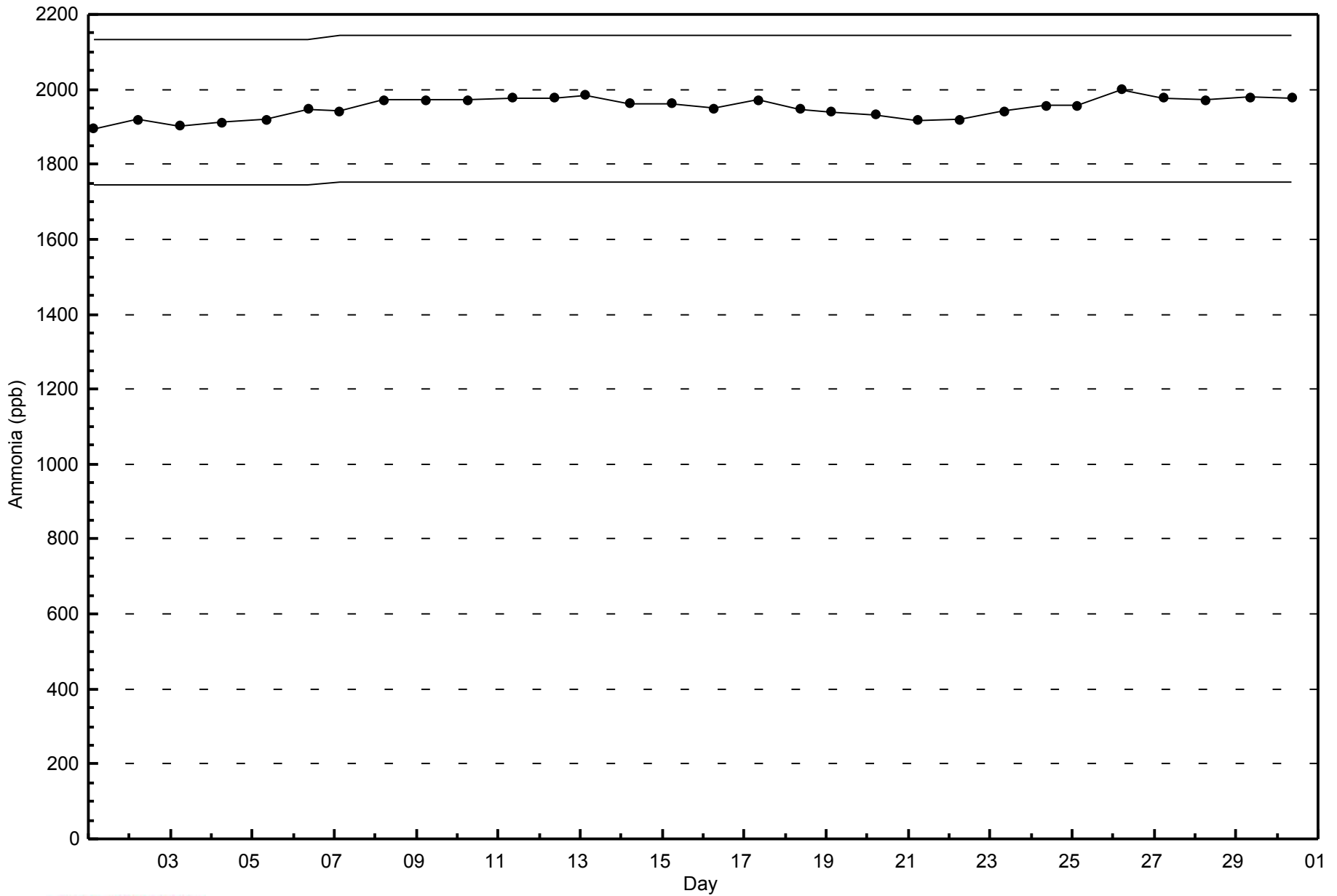
Ammonia (NH₃) - ppb
Patricia McInnes - November 2014





WBEA
Span Responses

Ammonia (NH₃) - ppb
Patricia McInnes - November 2014



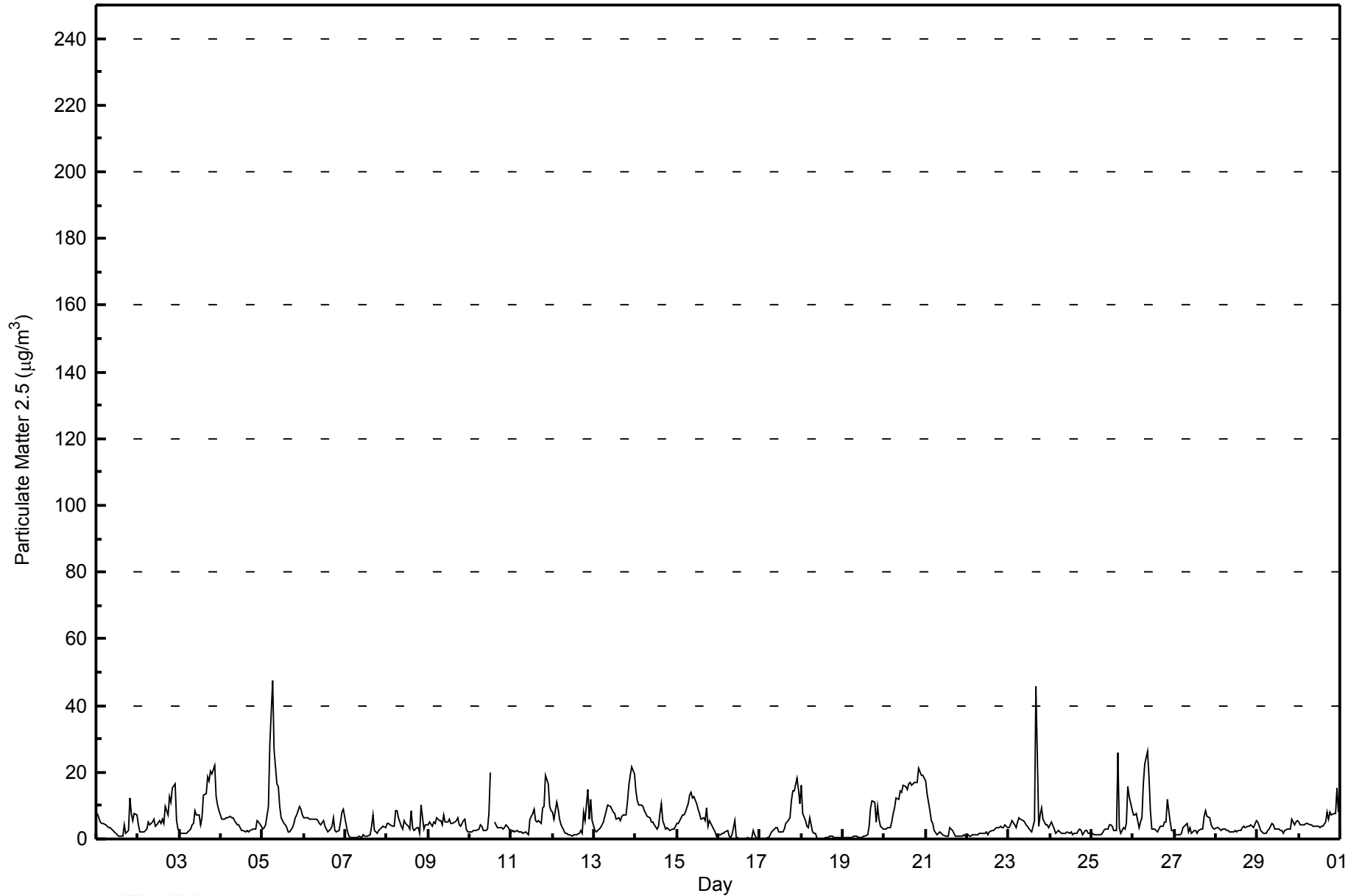


Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 47.4 µg/m ³ on Nov 5 07:00 Minimum Value: 0.0 µg/m ³ on Nov 18 12:00 Maximum Diurnal Average: 7.9 µg/m ³ at hour 21 Monthly Average: 5.15 µg/m ³		Maximum Daily Average: 13.0 µg/m ³ on Nov 20 Minimum Daily Average: 1.0 µg/m ³ on Nov 16 Minimum Diurnal Average: 3.4 µg/m ³ at hour 14 Percentiles: P ₁ = 0.1 P ₁₀ = 1.0 Q ₁ = 2.1 Median = 3.7 Q ₃ = 6.2 P ₉₀ = 11.1 P ₉₉ = 25.8		Hours in Service: 720 Hours of Data: 719 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Nov	7.8	6.2	5.0	4.5	4.5	4.1	4.0	3.5	3.4	2.6	2.1	1.5	1.1	0.9	1.0	0.8	4.2	1.7	2.6	12.3	7.6	5.5	7.8	7.1	4.2	12.3																						
2-Nov	4.2	2.3	2.1	2.2	2.6	2.9	4.9	4.2	5.3	5.8	3.9	4.2	5.7	4.6	5.9	4.7	9.7	7.3	12.7	11.1	15.4	16.4	5.3	2.8	6.1	16.4																						
3-Nov	2.0	1.8	1.5	1.8	1.6	2.0	3.1	4.0	4.7	8.5	7.2	7.4	4.4	6.4	13.2	13.8	18.8	17.2	20.2	19.4	22.0	12.5	10.2	8.4	8.8	22.0																						
4-Nov	5.9	6.0	5.8	6.4	6.2	6.7	6.5	6.4	5.6	4.3	4.2	3.5	2.5	2.4	1.9	2.4	2.3	2.6	3.0	3.0	3.0	5.5	5.1	3.7	4.4	6.7																						
5-Nov	3.0	3.5	4.2	9.8	28.5	38.0	47.4	26.5	16.5	15.7	9.7	6.4	4.6	4.2	3.5	2.0	2.1	3.3	4.7	6.2	7.4	9.7	8.8	7.3	11.4	47.4																						
6-Nov	6.5	6.3	6.2	6.1	5.9	5.9	5.8	5.9	5.3	4.6	4.2	5.5	3.7	3.0	2.0	3.1	3.8	6.3	2.5	2.2	2.6	4.9	7.9	8.9	5.0	8.9																						
7-Nov	4.3	2.2	0.8	0.6	0.3	0.3	0.2	0.3	0.7	0.5	1.1	0.7	0.8	1.0	1.2	4.0	7.3	2.7	1.9	2.6	3.1	3.4	4.0	3.4	2.0	7.3																						
8-Nov	4.6	4.8	4.2	3.8	3.8	8.7	8.4	6.3	3.8	3.0	5.4	4.7	3.8	2.8	8.5	3.4	2.5	3.3	3.4	1.5	10.3	3.0	4.2	4.1	4.7	10.3																						
9-Nov	4.3	5.1	3.9	4.9	4.5	6.4	5.7	5.3	4.2	7.3	5.2	5.1	5.9	4.8	4.6	4.9	5.3	6.2	4.3	3.9	5.4	5.9	2.9	2.2	4.9	7.3																						
10-Nov	2.0	2.2	2.4	2.5	2.5	3.0	4.3	3.8	2.6	2.7	3.2	7.6	20.1	M	5.2	4.2	3.5	3.5	3.6	2.9	3.4	4.2	3.7	2.4	4.1	20.1																						
11-Nov	2.1	2.4	2.2	2.4	2.3	2.2	2.2	1.9	2.2	1.5	1.4	5.9	7.7	9.1	5.6	5.0	5.6	4.6	9.4	9.7	19.0	16.7	9.6	8.4	5.8	19.0																						
12-Nov	8.1	6.1	11.0	8.7	5.8	4.2	2.4	1.6	1.6	1.3	1.1	1.0	1.2	1.2	1.1	1.6	2.4	1.8	8.1	5.5	14.7	6.0	11.9	5.5	4.7	14.7																						
13-Nov	2.3	2.2	2.5	3.1	3.5	4.9	6.8	8.6	10.2	9.6	8.9	7.9	7.5	6.0	6.2	5.5	6.9	7.2	7.2	11.2	16.0	19.0	21.6	19.5	8.5	21.6																						
14-Nov	14.3	11.5	10.1	10.3	9.8	8.5	7.7	6.7	6.2	4.9	5.1	4.3	2.8	3.7	7.6	10.4	5.6	3.1	3.3	2.9	2.7	2.9	3.2	3.9	6.3	14.3																						
15-Nov	4.9	4.8	6.4	7.2	7.3	8.1	10.5	12.9	14.0	12.5	12.6	10.8	8.9	7.5	5.8	6.4	5.6	9.2	4.0	5.3	3.8	2.8	2.3	0.8	7.3	14.0																						
16-Nov	1.2	1.3	1.8	1.5	2.1	2.4	0.8	0.3	1.1	5.4	0.4	0.3	0.2	0.1	0.0	0.0	0.1	0.3	0.2	0.3	2.5	1.5	0.4	0.2	1.0	5.4																						
17-Nov	0.1	0.1	0.1	0.1	0.2	0.6	1.4	1.9	3.0	3.3	3.3	2.0	2.0	2.2	3.0	4.6	5.1	6.4	11.6	14.5	14.5	18.0	14.9	10.4	5.1	18.0																						
18-Nov	16.1	7.5	5.6	3.9	3.3	6.3	2.0	1.5	1.5	0.6	0.1	0.0	0.1	0.2	0.3	0.5	1.0	0.9	0.7	0.6	0.6	0.6	0.5	0.5	2.3	16.1																						
19-Nov	0.5	0.5	0.6	0.6	0.5	0.6	0.7	0.7	0.8	0.6	0.5	0.6	0.9	0.8	1.1	3.8	9.4	11.5	11.1	5.3	9.6	5.8	3.8	3.1	3.1	11.5																						
20-Nov	2.9	3.1	3.4	3.5	5.1	7.6	9.5	12.1	11.7	14.5	13.9	15.9	15.6	14.8	16.7	17.1	16.0	17.1	16.9	16.8	21.3	19.0	19.3	18.4	13.0	21.3																						
21-Nov	17.6	13.4	8.5	5.6	4.7	2.6	1.3	1.7	2.0	1.8	1.4	0.7	0.7	1.0	3.2	2.6	1.9	0.9	0.8	0.7	0.8	0.8	1.1	1.1	3.2	17.6																						
22-Nov	1.3	1.0	0.9	1.1	1.1	1.3	1.4	1.5	1.5	1.8	1.8	2.0	1.4	2.2	2.6	2.4	2.9	3.3	3.6	3.7	3.2	3.5	4.1	3.5	2.2	4.1																						
23-Nov	3.6	4.4	5.7	4.3	3.6	5.2	6.3	5.8	5.5	5.3	4.4	3.7	2.4	2.1	3.6	5.5	45.6	3.9	7.1	9.4	5.7	4.2	4.1	3.6	6.5	45.6																						
24-Nov	4.2	5.2	2.9	1.8	2.1	2.3	1.8	1.7	1.6	1.6	2.0	1.6	2.0	1.4	1.5	1.6	2.3	3.0	2.6	1.4	2.5	2.3	1.5	1.8	2.2	5.2																						
25-Nov	1.5	1.4	1.4	1.2	1.4	1.5	1.8	2.5	3.1	3.0	4.2	4.4	3.7	2.7	2.5	25.9	3.3	1.7	3.2	2.8	4.5	15.6	12.6	8.8	4.8	25.9																						
26-Nov	7.2	7.0	7.8	3.6	5.1	6.5	16.7	22.4	26.2	18.8	8.3	2.8	2.8	2.7	2.2	3.0	4.0	3.9	5.3	4.9	11.8	5.1	2.6	2.3	7.6	26.2																						
27-Nov	1.3	1.3	1.1	1.4	1.6	3.5	4.0	4.6	2.1	3.6	1.7	2.5	2.5	1.9	2.6	2.9	2.9	6.7	8.3	6.6	6.2	4.1	3.4	3.0	3.3	8.3																						
28-Nov	3.5	3.4	2.8	2.7	3.0	3.1	2.4	2.6	2.2	2.3	2.3	2.4	2.2	2.7	2.6	3.4	3.9	3.2	3.7	4.0	4.1	3.7	3.5	5.4	3.1	5.4																						
29-Nov	5.0	3.7	2.7	1.9	1.7	1.8	2.3	3.0	4.8	4.3	3.1	2.8	3.0	2.5	2.6	1.8	2.4	2.8	2.8	2.8	5.8	4.3	5.0	5.5	3.3	5.8																						
30-Nov	5.1	4.2	4.3	4.2	4.5	4.6	4.1	4.1	3.7	3.6	3.7	3.7	3.5	3.8	3.9	5.1	8.1	6.0	8.1	7.0	7.5	7.4	15.3	8.0	5.6	15.3																						
																								4.9	4.2	3.9	3.7	4.3	5.2	5.9	5.5	5.2	5.2	4.2	4.1	4.1	3.4	4.1	5.1	6.5	5.1	5.9	6.0	7.9	7.1	6.7	5.5	Diurnal Average
																								17.6	13.4	11.0	10.3	28.5	38.0	47.4	26.5	26.2	18.8	13.9	15.9	20.1	14.8	16.7	25.9	45.6	17.2	20.2	19.4	22.0	19.0	21.6	19.5	Diurnal Maximum
M - Maintenance																																																
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m ³																																																



WBEA
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Patricia McInnes - November 2014





WBEA
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Patricia McInnes - November 2014

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	427	59.39	59.39
6 - 15	179	24.90	84.28
16 - 25	34	4.73	89.01
26 - 80	7	0.97	89.99
> 81.0	0	0.00	89.99

Total Number of Valid Hours: 719

Total Number of Hours: 720



WBEA
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Patricia McInnes - November 2014

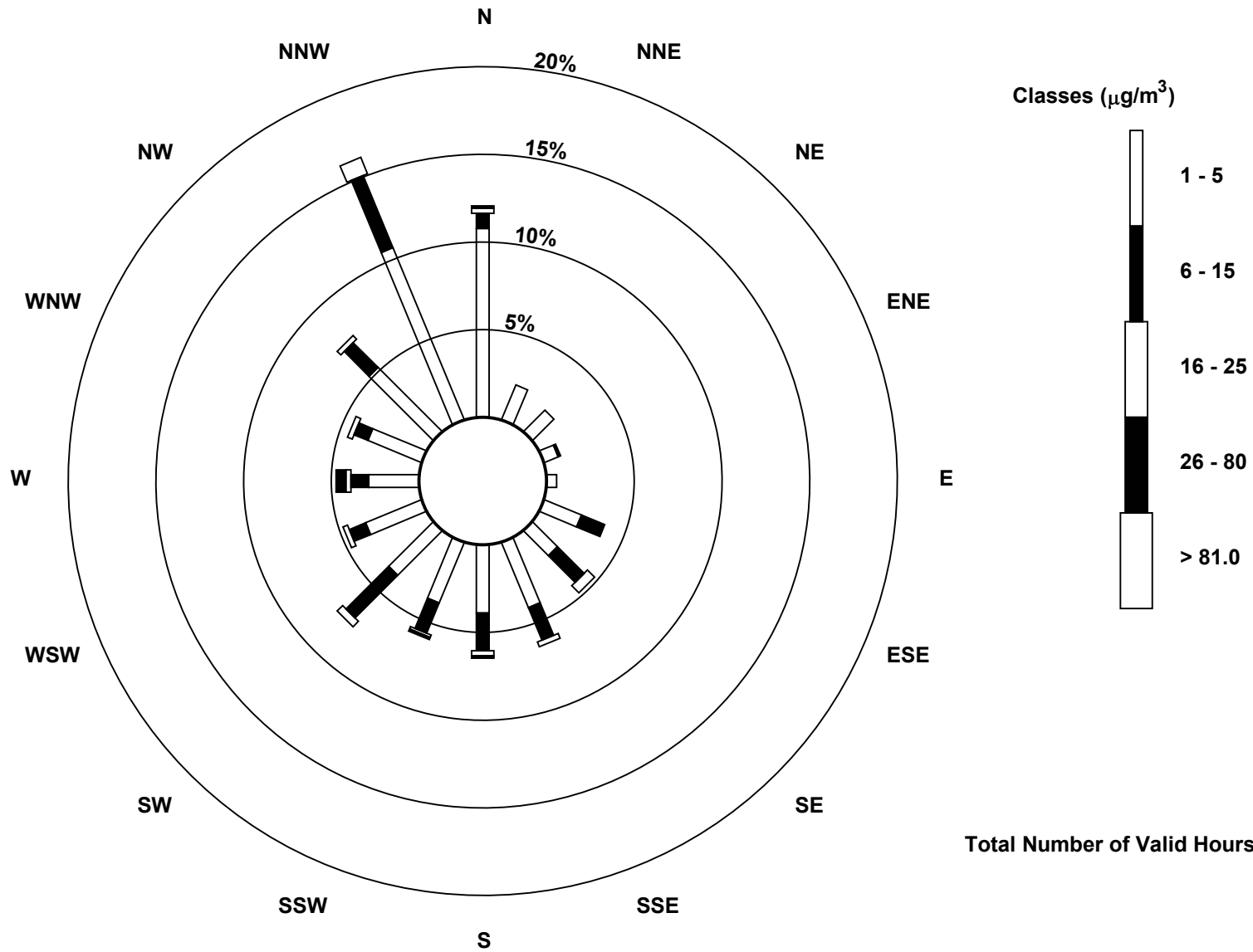
Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	75	15	12	6	4	16	14	28	27	26	25	24	20	23	36	74	425
6 - 15	6	0	0	1	0	10	15	14	15	13	24	7	7	6	14	31	163
16 - 25	2	0	0	0	0	0	4	2	2	1	3	2	2	2	2	7	29
26 - 80	1	0	0	0	0	0	0	0	1	1	0	0	4	0	0	0	7
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	84	15	12	7	4	26	33	44	45	41	52	33	33	31	52	112	624

Total Number of Valid Hours: 696

Total Number of Hours: 720

Wood Buffalo Environmental Association
 Wind Rose Nov 2014

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
 Patricia McInnes (AMS 6)



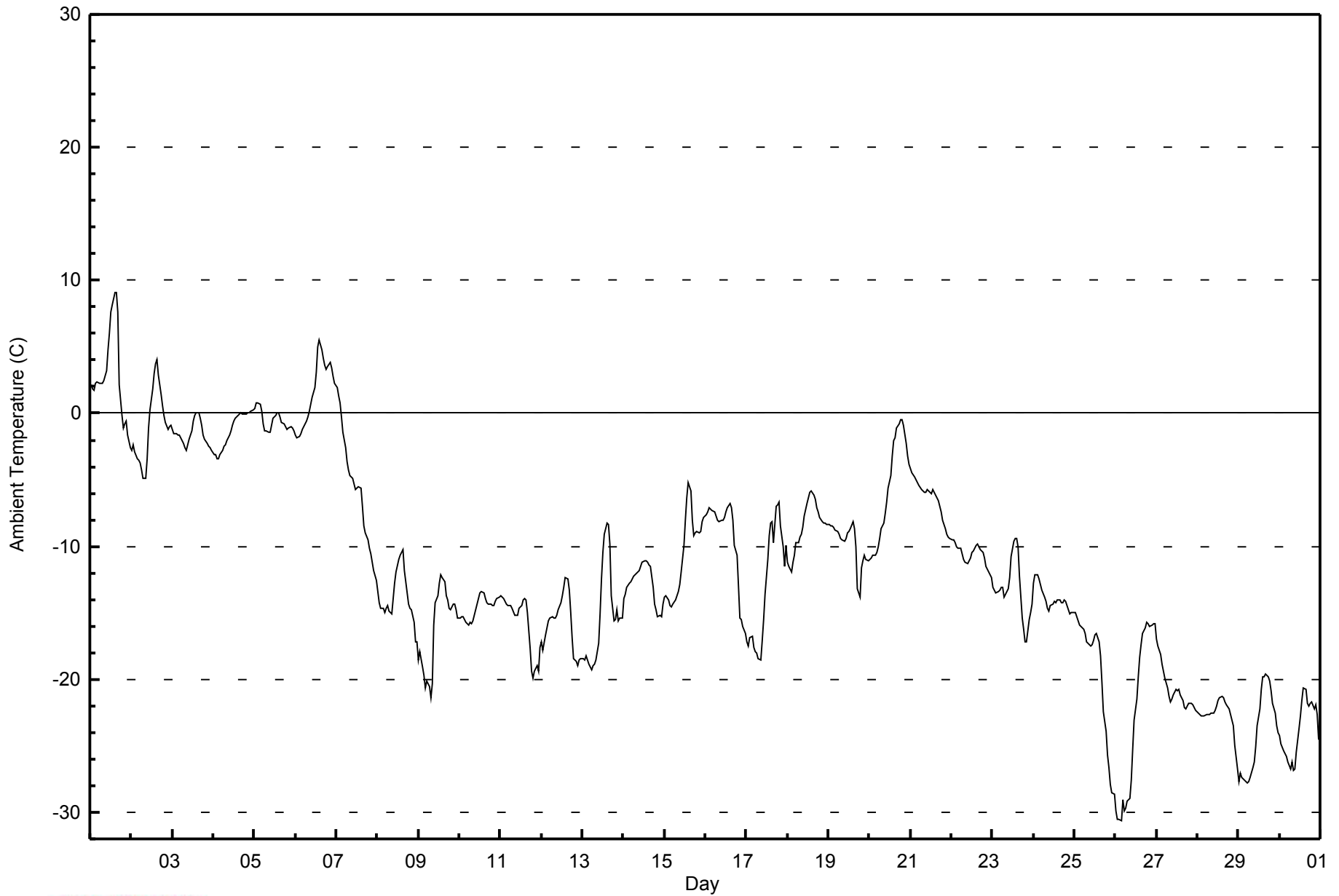


Maximum Value: 9.1 C on Nov 1 16:00		Maximum Daily Average: 2.9 C on Nov 1		Hours in Service: 720																																												
Minimum Value: -30.6 C on Nov 26 04:00		Minimum Daily Average: -24.0 C on Nov 29		Hours of Data: 720																																												
Maximum Diurnal Average: -8.8 C at hour 15		Minimum Diurnal Average: -12.8 C at hour 8		Hours of Missing Data: 0																																												
Monthly Average: -11.48 C		Percentiles: P ₁ = -29.1 P ₁₀ = -22.0 Q ₁ = -16.7 Median = -12.3 Q ₃ = -5.8 P ₉₀ = -0.3 P ₉₉ = 5.1		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-Nov	2.1	1.8	1.8	2.3	2.4	2.2	2.3	2.3	2.5	3.2	4.8	6.0	7.6	8.2	9.0	9.1	7.6	2.2	-0.2	-1.1	-0.7	-0.6	-1.6	-2.5	2.9	9.1																						
2-Nov	-2.7	-2.4	-2.9	-3.4	-3.5	-3.8	-4.3	-4.9	-4.8	-3.4	-1.1	0.3	1.9	3.0	3.7	4.0	2.9	1.4	0.6	-0.1	-0.7	-1.2	-1.0	-0.9	-1.0	4.0																						
3-Nov	-1.2	-1.5	-1.5	-1.6	-1.7	-1.8	-2.2	-2.6	-2.8	-2.4	-2.0	-1.3	-0.6	-0.1	0.0	0.0	-0.3	-0.9	-1.7	-2.0	-2.2	-2.5	-2.5	-2.8	-1.6	0.0																						
4-Nov	-3.0	-3.1	-3.4	-3.4	-3.2	-2.8	-2.5	-2.3	-2.0	-1.7	-1.3	-0.9	-0.6	-0.4	-0.2	0.0	0.0	-0.1	0.0	-0.1	0.0	0.1	0.2	0.3	-1.3	0.3																						
5-Nov	0.4	0.8	0.8	0.6	0.1	-0.7	-1.3	-1.3	-1.4	-1.4	-0.9	-0.4	-0.1	0.0	0.0	-0.2	-0.7	-0.8	-1.0	-1.2	-1.2	-1.0	-1.1	-1.3	-0.6	0.8																						
6-Nov	-1.7	-1.9	-1.7	-1.5	-1.2	-1.0	-0.6	-0.2	0.2	0.7	1.2	1.9	3.1	5.0	5.5	4.8	4.1	3.7	3.3	3.5	3.8	3.4	2.8	2.3	1.6	5.5																						
7-Nov	1.9	1.3	0.8	-0.3	-1.4	-2.6	-3.6	-4.3	-4.7	-4.9	-5.3	-5.8	-5.6	-5.6	-5.6	-7.0	-8.5	-9.0	-9.5	-10.2	-10.5	-11.2	-11.9	-12.6	-5.7	1.9																						
8-Nov	-13.4	-14.2	-14.7	-14.7	-15.0	-14.6	-14.4	-14.9	-15.1	-14.0	-12.7	-11.9	-11.0	-10.6	-10.5	-10.3	-11.8	-13.5	-14.4	-14.6	-14.8	-15.7	-17.2	-17.1	-13.8	-10.3																						
9-Nov	-18.6	-17.9	-19.1	-19.7	-20.6	-20.2	-20.6	-21.4	-20.3	-16.0	-14.3	-13.7	-12.7	-12.2	-12.4	-12.7	-13.7	-14.1	-14.7	-14.8	-14.3	-14.4	-14.8	-15.4	-16.2	-12.2																						
10-Nov	-15.4	-15.3	-15.3	-15.5	-15.7	-16.0	-15.7	-15.8	-15.6	-14.8	-14.3	-14.0	-13.5	-13.4	-13.5	-13.9	-14.2	-14.3	-14.4	-14.4	-14.4	-14.2	-13.9	-13.8	-14.6	-13.4																						
11-Nov	-13.7	-13.8	-13.9	-14.4	-14.4	-14.4	-14.4	-14.7	-15.2	-15.2	-15.1	-14.7	-14.4	-14.1	-14.0	-14.0	-14.9	-17.7	-19.3	-19.9	-19.4	-19.0	-19.3	-17.6	-15.7	-13.7																						
12-Nov	-17.2	-17.8	-16.7	-16.2	-15.6	-15.4	-15.3	-15.4	-15.4	-15.2	-14.8	-14.2	-13.7	-13.1	-12.4	-12.5	-13.3	-15.0	-16.8	-18.4	-18.7	-19.0	-18.6	-18.5	-15.8	-12.4																						
13-Nov	-18.5	-18.5	-18.2	-18.5	-18.9	-19.3	-19.0	-18.9	-18.5	-17.2	-15.1	-12.5	-10.5	-9.1	-8.3	-8.4	-9.9	-13.7	-15.6	-15.5	-14.7	-15.6	-15.4	-15.4	-15.2	-8.3																						
14-Nov	-13.9	-13.6	-13.1	-12.8	-12.6	-12.4	-12.2	-12.1	-12.0	-11.8	-11.5	-11.2	-11.1	-11.1	-11.2	-11.4	-11.5	-13.1	-14.3	-14.8	-15.3	-15.2	-15.3	-14.3	-12.8	-11.1																						
15-Nov	-13.8	-13.7	-14.0	-14.4	-14.6	-14.3	-14.1	-13.7	-13.4	-12.8	-11.9	-9.9	-8.0	-6.4	-5.2	-5.9	-8.0	-9.2	-9.0	-8.9	-9.0	-8.9	-8.2	-7.8	-10.6	-5.2																						
16-Nov	-7.7	-7.4	-7.1	-7.2	-7.3	-7.4	-7.7	-8.0	-8.1	-8.0	-8.0	-7.9	-7.4	-7.1	-6.8	-7.1	-8.0	-9.9	-10.7	-13.0	-15.4	-15.5	-16.0	-16.5	-9.4	-6.8																						
17-Nov	-17.2	-17.5	-16.9	-16.7	-17.6	-17.9	-18.0	-18.4	-18.6	-17.1	-15.5	-13.6	-10.9	-9.2	-8.3	-8.2	-9.7	-7.0	-6.8	-6.7	-8.4	-10.1	-11.5	-10.0	-13.0	-6.7																						
18-Nov	-11.2	-11.5	-11.9	-11.1	-10.7	-9.8	-9.7	-9.3	-9.1	-8.6	-7.7	-6.8	-6.4	-5.9	-5.8	-6.1	-6.5	-7.1	-7.4	-7.9	-8.1	-8.2	-8.3	-8.3	-8.5	-5.8																						
19-Nov	-8.4	-8.4	-8.4	-8.6	-8.8	-8.9	-9.1	-9.4	-9.5	-9.6	-9.4	-9.0	-8.9	-8.7	-8.2	-8.7	-10.0	-13.2	-13.8	-11.6	-11.1	-10.7	-10.9	-11.0	-9.8	-8.2																						
20-Nov	-11.0	-10.9	-10.7	-10.6	-10.4	-10.0	-9.4	-8.7	-8.3	-7.6	-6.7	-5.6	-4.6	-3.2	-2.1	-1.8	-1.1	-0.8	-0.5	-0.5	-0.9	-2.2	-3.2	-3.8	-5.6	-0.5																						
21-Nov	-4.1	-4.5	-4.8	-5.0	-5.2	-5.4	-5.7	-5.8	-6.0	-6.0	-5.8	-5.9	-6.1	-5.8	-5.9	-6.3	-6.6	-7.0	-7.4	-8.1	-8.6	-9.1	-9.3	-9.4	-6.4	-4.1																						
22-Nov	-9.5	-9.5	-9.7	-10.0	-10.1	-10.1	-10.6	-11.0	-11.2	-11.4	-11.1	-10.8	-10.5	-10.4	-10.0	-9.9	-10.1	-10.3	-10.5	-10.9	-11.5	-11.7	-11.9	-12.4	-10.6	-9.5																						
23-Nov	-13.0	-13.3	-13.5	-13.4	-13.3	-13.1	-13.1	-13.8	-13.4	-13.2	-12.4	-10.8	-9.6	-9.4	-9.4	-10.0	-12.3	-15.4	-16.2	-17.2	-17.2	-15.5	-15.0	-14.4	-13.2	-9.4																						
24-Nov	-12.8	-12.1	-12.2	-12.4	-12.8	-13.3	-13.8	-14.1	-14.6	-14.9	-14.5	-14.3	-14.1	-14.3	-14.1	-14.1	-14.3	-14.3	-14.0	-14.2	-14.8	-15.1	-15.0	-15.0	-14.0	-12.1																						
25-Nov	-15.0	-15.3	-15.6	-15.9	-16.1	-16.2	-16.6	-17.1	-17.3	-17.5	-17.4	-17.1	-16.6	-16.6	-17.1	-18.2	-20.2	-22.4	-23.9	-25.7	-26.6	-27.8	-28.5	-28.6	-19.6	-15.0																						
26-Nov	-29.9	-30.5	-30.6	-30.6	-29.1	-29.9	-29.7	-29.2	-28.9	-27.6	-25.3	-23.1	-21.5	-19.9	-18.4	-17.4	-16.5	-16.2	-15.8	-15.8	-16.0	-15.9	-15.8	-15.8	-22.9	-15.8																						
27-Nov	-16.9	-17.5	-18.1	-18.8	-19.4	-20.0	-20.6	-21.2	-21.7	-21.5	-21.1	-20.8	-20.8	-20.8	-21.2	-21.6	-22.1	-22.2	-22.0	-21.8	-21.8	-21.9	-22.1	-22.3	-20.8	-16.9																						
28-Nov	-22.6	-22.6	-22.7	-22.8	-22.7	-22.7	-22.6	-22.6	-22.5	-22.5	-22.3	-22.0	-21.6	-21.4	-21.3	-21.4	-21.7	-21.9	-22.2	-22.6	-23.0	-23.5	-24.9	-26.8	-22.6	-21.3																						
29-Nov	-27.7	-27.1	-27.4	-27.6	-27.7	-27.8	-27.7	-27.4	-26.7	-26.3	-25.1	-23.5	-22.2	-20.7	-19.8	-19.8	-19.6	-19.8	-20.1	-20.9	-21.8	-22.5	-23.4	-24.0	-24.0	-19.6																						
30-Nov	-24.2	-24.9	-25.3	-25.6	-25.8	-26.2	-26.8	-26.3	-26.8	-26.7	-25.4	-23.7	-22.7	-21.6	-20.7	-20.8	-21.8	-22.0	-21.9	-22.2	-21.9	-22.7	-24.5	-23.8	-20.7	-20.7																						
																								-12.0	-12.1	-12.2	-12.3	-12.4	-12.5	-12.6	-12.8	-12.7	-12.2	-11.4	-10.6	-9.8	-9.2	-8.8	-9.0	-9.8	-10.8	-11.3	-11.7	-12.0	-12.2	-12.5	-12.7	Diurnal Average
																								2.1	1.8	1.8	2.3	2.4	2.2	2.3	2.3	2.5	3.2	4.8	6.0	7.6	8.2	9.0	9.1	7.6	3.7	3.3	3.5	3.8	3.4	2.8	2.3	Diurnal Maximum



WBEA
Hourly Averages

Ambient Temperature (AT) - C
Patricia McInnes - November 2014





WBEA
Cumulative Frequency Distribution

Ambient Temperature (AT) - C
Patricia McInnes - November 2014

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	112	15.56	15.56
-20 - 0	549	76.25	91.81
0 - 10	59	8.19	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

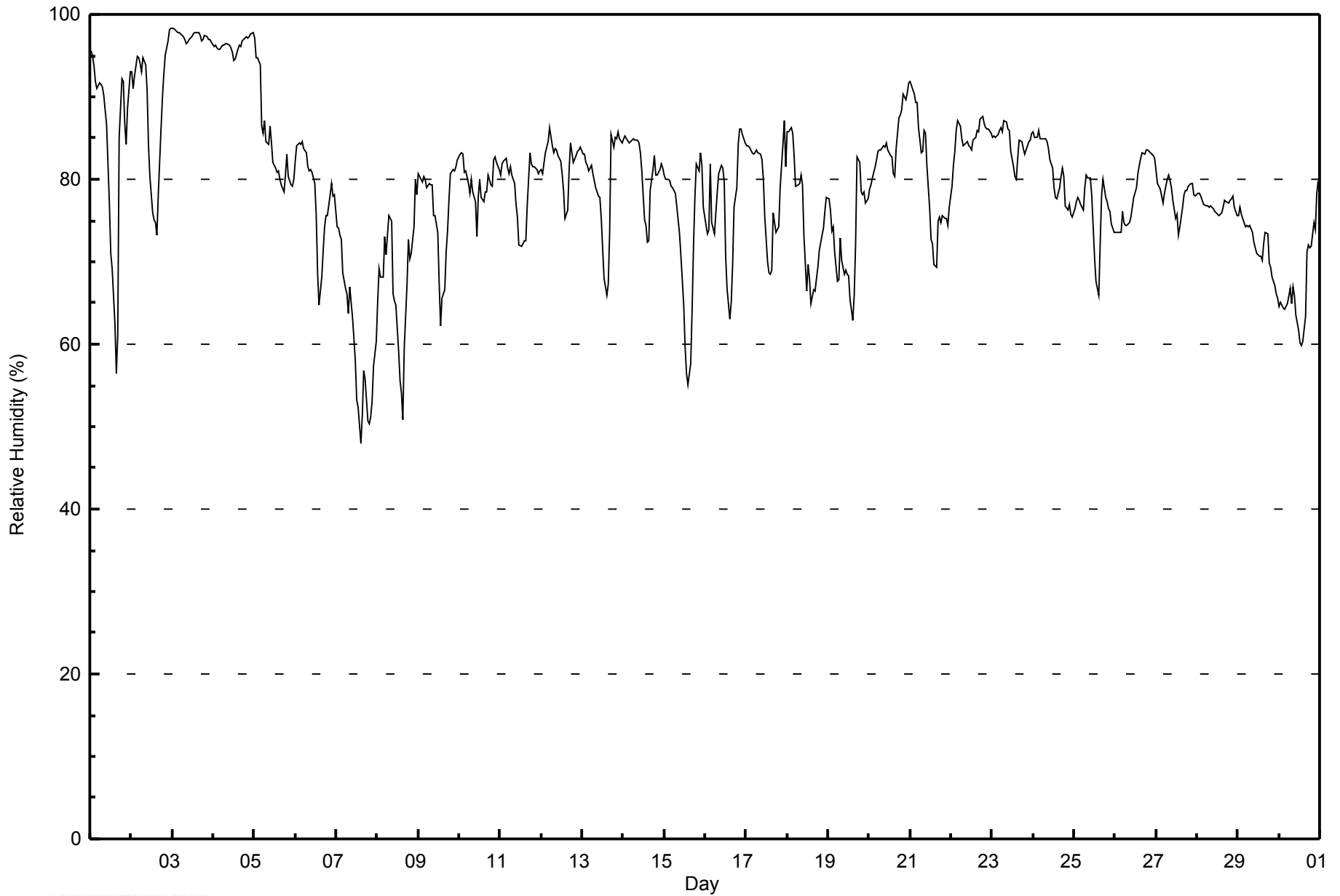


Maximum Value: 98 % on Nov 3 02:00																		Maximum Daily Average: 97.4 % on Nov 3																		Hours in Service: 720			
Minimum Value: 48 % on Nov 7 15:00																		Minimum Daily Average: 60.4 % on Nov 7																		Hours of Data: 720			
Maximum Diurnal Average: 82.4 % at hour 4																		Minimum Diurnal Average: 71.4 % at hour 15																		Hours of Missing Data: 0			
Monthly Average: 79.2 %																		Percentiles: P ₁ = 53 P ₁₀ = 67 Q ₁ = 74 Median = 80 Q ₃ = 84 P ₉₀ = 92 P ₉₉ = 98																		Hours of Calibration: 0			
																																				Percent Operational Time: 100.0			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24															
1-Nov	96	95	94	92	91	92	91	91	90	87	82	77	71	69	62	56	61	85	92	92	87	84	89	93	84.1	96													
2-Nov	93	91	93	95	95	94	93	95	94	91	84	80	76	75	75	73	78	86	90	93	95	97	98	98	88.8	98													
3-Nov	98	98	98	98	98	98	97	97	97	97	97	97	98	98	98	98	97	97	97	97	97	97	97	97	97.4	98													
4-Nov	96	96	96	96	96	96	96	96	96	96	96	96	94	95	96	96	96	97	97	97	97	97	98	98	96.3	98													
5-Nov	97	95	95	94	86	86	87	85	84	87	84	82	81	81	81	80	79	79	81	83	80	79	79	80	84.4	97													
6-Nov	82	84	84	84	85	84	83	82	81	81	81	79	76	69	65	68	71	74	76	76	78	79	78	78	78.3	85													
7-Nov	74	74	73	73	69	67	66	64	67	63	61	58	53	52	48	51	57	56	51	50	51	53	57	60	60.4	74													
8-Nov	65	69	68	68	73	71	73	76	75	66	65	65	59	56	54	51	59	67	73	70	71	74	80	78	67.8	80													
9-Nov	81	80	80	80	80	79	79	79	79	76	76	74	67	62	66	67	71	74	77	81	81	81	82	82	76.4	82													
10-Nov	83	83	83	81	81	79	78	80	78	77	73	78	80	78	77	78	78	81	79	79	82	83	82	81	79.8	83													
11-Nov	81	82	82	83	81	81	82	80	79	77	76	72	72	72	73	73	77	83	82	82	82	81	81	81	78.8	83													
12-Nov	81	81	83	84	85	86	84	83	84	84	83	82	81	79	75	76	81	84	83	82	83	83	84	84	82.3	86													
13-Nov	83	83	82	82	81	82	81	80	79	78	78	75	72	68	66	67	74	85	84	85	85	86	85	84	79.3	86													
14-Nov	85	85	85	84	85	85	85	85	85	84	83	81	75	74	72	73	79	81	83	81	81	81	82	81	81.5	85													
15-Nov	81	80	80	80	79	79	78	77	75	73	71	65	60	56	55	58	64	72	78	82	81	83	82	77	73.5	83													
16-Nov	74	73	74	82	75	73	76	78	81	82	81	80	71	67	63	65	70	77	79	84	86	86	85	84	76.9	86													
17-Nov	84	84	84	83	83	83	84	83	83	82	80	75	70	69	68	69	76	74	74	74	79	84	87	82	79.0	87													
18-Nov	86	86	86	86	83	79	79	79	81	79	73	66	70	68	65	67	66	68	69	71	73	74	76	78	75.4	86													
19-Nov	78	76	74	74	71	68	68	73	70	68	69	68	68	65	63	66	72	83	82	78	78	78	77	78	72.8	83													
20-Nov	79	79	80	81	82	83	84	83	84	84	84	84	83	83	81	80	84	87	88	88	90	90	91	92	84.4	92													
21-Nov	92	91	90	89	89	86	83	83	86	86	82	76	73	72	70	69	75	75	75	76	75	75	74	77	80.0	92													
22-Nov	79	82	83	86	87	86	85	84	84	85	84	84	84	85	85	86	86	87	88	87	86	86	86	86	85.0	88													
23-Nov	85	85	85	85	86	86	86	87	87	86	86	83	81	80	83	85	85	84	83	84	85	85	86	86	84.4	87													
24-Nov	86	85	85	86	85	85	85	85	84	82	81	79	78	78	79	80	81	80	77	76	77	76	75	75	81.3	86													
25-Nov	76	77	78	78	77	76	79	81	80	80	78	74	71	68	66	72	78	80	78	77	76	76	74	74	76.0	81													
26-Nov	73	74	74	74	76	75	74	74	75	75	77	78	79	81	82	82	83	83	84	84	83	83	83	83	78.6	84													
27-Nov	81	80	79	78	77	78	80	81	80	79	77	75	76	73	74	77	78	79	79	79	79	80	78	78	78.1	81													
28-Nov	78	78	78	77	77	77	77	77	77	76	76	76	76	76	76	77	77	77	77	77	78	78	77	76	76.9	78													
29-Nov	76	77	76	75	74	74	74	74	74	72	72	71	71	71	70	72	74	73	70	69	68	67	66	66	71.9	77													
30-Nov	65	65	64	64	65	65	67	65	67	66	64	62	60	60	60	63	71	72	72	72	75	74	80	80	67.3	80													
	82.3	82.3	82.2	82.4	81.7	81.1	81.2	81.3	81.2	80.1	78.5	76.5	74.2	72.6	71.4	72.4	76.0	79.4	80.0	80.2	80.6	81.1	81.5	81.5	Diurnal Average														
	98	98	98	98	98	98	97	97	97	97	97	97	98	98	98	98	97	97	97	97	97	97	98	98	Diurnal Maximum														



WBEA
Hourly Averages

Relative Humidity (RH) - %
Patricia McInnes - November 2014





Maximum Speed: 27 km/h on Nov 7 12:00	Maximum Daily Speed Average: 18.6 km/h on Nov 7	Hours in Service: 720
Minimum Speed Value: 1 km/h on Nov 12 03:00	Minimum Daily Speed Average: 1.0 km/h on Nov 26	Hours of Data: 697
Maximum Diurnal Speed Average: 4.9 km/h at hour 20	Minimum Diurnal Speed Average: 3.3 km/h at hour 17	Hours of Missing Data: 23
Monthly Average Velocity: 4.0 km/h 310.2 deg	Percentiles: P ₁ = 2 P ₁₀ = 4 Q ₁ = 6 Median = 10 Q ₃ = 13 P ₉₀ = 17 P ₉₉ = 23	Percent Operational Time: 96.8

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-Nov	SSW6	SW6	WSW7	WSW11	WSW13	WSW11	SW6	SSW5	SSW6	SW10	SW9	SSW8	SW7	SW9	WSW9	WSW8	SSW5	WSW3	WSW5	W4	SSW6	SSW5	S4	S5	SW6.4	WSW13	
2-Nov	S6	S8	S8	S6	S8	S6	S5	SSE6	SSE4	SSE5	SSE7	SSE7	SSE5	SSE6	SSE7	SE9	SE6	SE11	ESE8	SE9	SE7	SE8	ESE11	SE10	SSE6.6	ESE11	
3-Nov	SE7	SSE6	SE7	SSE6	SE7	SSE6	S6	SSW5	SW4	AF	AF	AF	AF	AF	NNW6	NNW7	AF	AF	AF	AF	AF	AF	AF	AF	----	SE7	
4-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	E12	ESE11	ESE12	ESE12	ESE11	ESE13	ESE11	ESE11	ESE11	ESE10	ESE10	SE7	SSE5	S4	----	ESE13	
5-Nov	SW7	W11	WSW11	W13	W19	W17	W17	W19	WNW19	W17	WNW17	WNW16	W15	W15	WNW13	W13	W15	W14	SSW6	SSW9	S9	SE10	SE11	SSE12	W10.6	W19	
6-Nov	SE11	SE10	SE12	ESE13	ESE17	ESE18	SE18	SE21	SE21	SE16	SE15	ESE9	SE11	SSE8	S10	S8	SSE7	SSE4	SW9	WSW11	WNW15	NW20	NW21	NW21	SE5.6	NW21	
7-Nov	NW22	NW21	NW23	NW25	NW25	NW24	NW25	NW21	NNW16	NW22	NW24	NW27	NW25	NW19	NW21	NNW15	NNW12	NW11	NW14	NNW12	NNW13	NNW15	N11	N12	NW18.6	NW27	
8-Nov	N12	N8	NNW8	NNW6	W6	WNW7	WNW6	NW7	WNW7	NW10	NW11	N15	NNW15	NNW16	NNW13	NNW10	NW5	W6	WNW7	WNW8	NNW5	NW5	WNW5	W4	NW7.6	NNW16	
9-Nov	W4	WNW4	WSW3	SW4	SW4	SW2	WSW2	WSW6	WNW4	SSE3	NNW4	N8	N9	NNW11	N13	N11	NNW9	NNW9	NW7	NNW7	NNW9	N11	N11	NNW8	NNW5.3	N13	
10-Nov	NW7	NW7	NNW11	NNW13	NNW12	NW9	NW11	WNW10	NW11	NNW18	NNW21	NNW16	NNW15	NNW18	N18	N17	NNW16	N12	N15	N15	NNW9	NNW10	NNW10	NNW12	NNW12.6	NNW21	
11-Nov	NNW11	NNW10	NW10	NW8	NNW10	NNW10	NNW10	N11	N11	N11	NNE8	NW10	NNW8	NNW7	NNW6	NNW4	NNW3	W3	W4	WSW2	WSW3	SW2	WSW3	S2	NNW5.9	N11	
12-Nov	WSW1	WNW2	SW1	S3	SSW4	S5	SW5	WSW6	SSW6	S5	SSW5	SSE8	S8	SSW7	S6	S7	S7	SSW3	S2	S2	S4	SW3	S5	S5	SSW4.3	S8	
13-Nov	S5	SSW6	SSW8	SSW9	SSW8	S6	SSW10	SW11	SW11	SW12	SW11	SW10	SSW9	SSW11	SW8	SW8	SW4	WSW3	NW4	NW7	NW4	NW7	NNW6	NNW7	SW5.9	SW12	
14-Nov	NW7	NNW8	NNW10	NNW11	NNW9	NNW13	NNW17	NNW13	NNW10	NNW10	NNW12	N12	N13	NNW13	NNW13	NNW9	NW7	W6	WSW8	WSW11	WSW10	WSW9	WSW9	WSW10	NW8.3	NNW17	
15-Nov	SW12	SW15	SW14	SW13	SW12	SW15	SW16	SW16	SW16	SW18	SW17	SW17	SW16	W11	NW12	NNW16	NNW12	NNW21	NNW23	NW17	NW17	NW17	NNW20	WNW17	W9.8	NNW23	
16-Nov	WNW17	NW17	NW18	NNW22	NW23	NNW16	NNW19	NNW20	NW16	NW12	NW12	NNW13	NW15	NW14	WNW13	WNW10	W8	WSW8	W9	W8	SW4	SSW5	SW6	SW6	NW11.2	NNW23	
17-Nov	SW5	SW5	SW9	SSW10	SSW7	S6	S6	S6	S4	SSE6	SSE7	SSE7	SE6	SE8	SSE7	SSE4	SSW5	WSW14	W14	WNW10	N5	WNW3	W8	NW6	SSW4.1	W14	
18-Nov	N8	NNW14	NW12	NNW14	NNW15	NW12	NW10	NW13	NW15	NW15	NW18	NW19	NW20	WNW19	NW21	NW17	WNW17	WNW16	WNW17	WNW14	WNW12	WNW11	WNW10	WNW9	NW13.9	NW21	
19-Nov	WNW8	WNW7	WNW9	WNW8	W9	W11	WNW10	WNW6	WSW8	WSW7	SW7	SSW8	S11	SSW10	S8	S6	SE4	SSE3	SSE5	SSE7	SSE7	SSE6	ESE9	ESE9	SW3.9	W11	
20-Nov	ESE9	SE8	ESE9	SE9	ESE9	SE9	SE7	ESE6	SE8	SE8	SE6	SE7	SSE4	SSE6	SE5	SE4	S4	SW5	WSW5	W5	N6	NNW11	NNW11	NNW11	SE3.1	NNW11	
21-Nov	NNW10	NNW13	N12	N11	N13	N12	N11	N11	N11	NNW9	NNW9	N13	N11	NNW9	NNW9	NW7	NNE8	NE10	NE10	NE11	NE12	ENE12	NE11	NE10	N9.4	N13	
22-Nov	NE10	NE10	ENE11	NE11	NE11	ENE11	ENE16	ENE14	NE11	NNE12	NNE13	NNE13	NNE15	N15	NNE14	N13	N13	N11	N12	N14	N14	N13	NNW11	NNW12	NNE11.1	ENE16	
23-Nov	NNW12	NNW9	NNW9	N5	NW3	W3	ENE1	ESE4	SSE3	SSW5	SSE5	SSE6	S9	SSW9	SSW8	S5	S4	SSW3	WSW2	NW3	W2	NW3	NNW2	NNW2	SW1.4	NNW12	
24-Nov	NNW9	NNW14	N12	NNW9	N12	N9	N9	NNW9	N7	N8	N5	N8	NNE7	N7	NNE6	N3	NNE7	NE7	ENE8	ENE13	E10	E9	E9	ENE8	NNE6.7	NNW14	
25-Nov	NNE10	NE10	NE10	NNE10	NE8	NE7	NNW5	NNW9	NNW11	NNW12	NNW12	NNW11	NNW10	NNW10	NNW11	N7	NNW6	NW6	NW6	WNW5	W3	SW3	SSW3	S1	N6.0	NNW12	
26-Nov	SW1	SSW2	S2	SSE4	S4	S4	SSE4	S4	SSW5	SSW3	SSE5	SSE6	SSE6	SSE7	SSE7	SSE5	S2	WNW4	NNW8	NNW14	NNW16	N18	N17	N17	N1.0	N18	
27-Nov	N16	N17	N17	N18	N14	N9	NNW9	N10	NNW10	N10	NNE12	NNE7	N10	N12	NNE8	N9	NNW7	NNW8	NNW6	NNW8	N9	N13	N13	N11	N10.8	N18	
28-Nov	N12	N12	N14	N14	N14	N13	N15	N16	N15	N16	N15	N15	N14	N17	N16	NNW15	NNW14	NNW14	NNW14	NNW14	NNW12	NW7	WNW5	WNW5	WSW4	NNW12.2	N17
29-Nov	WSW5	SW8	SW9	SW13	SW13	SW12	SSW9	SSW7	SW13	SW15	WSW22	SW20	SW18	WSW18	WSW16	WSW12	W14	WNW17	WNW21	NW19	NW19	WNW18	WNW16	NW16	WSW12.0	WSW22	
30-Nov	WNW19	WNW16	W15	W17	WNW19	W16	W15	W17	WSW16	WSW15	SW12	SW16	SW19	SSW16	SSW12	SSW9	SSE7	S11	SSW13	SSW9	S8	S8	SSE4	SE5	WSW10.1	WNW19	

NNW4.3	NW4.7	NW4.2	NW4.5	NW4.8	NNW3.8	NNW3.8	NNW4.0	NNW3.9	NNW4.5	NNW3.8	NW3.8	NW3.7	NNW4.3	NW4.4	NW3.6	NW3.3	NNW3.7	NW4.6	NW4.9	NW3.9	NNW4.1	NNW3.8	NW3.6	Diurnal Average
NW22	NW21	NW23	NW25	NW25	NW24	NW25	NW21	SE21	NW22	NW24	NW27	NW25	NW19	NW21	NW17	WNW17	WNW17	NNW21	NNW23	NW19	NW20	NW21	NW21	Diurnal Maximum

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



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 8 km/h on Nov 7 10:00			Hours of Data:	697
Minimum Value: 0 km/h on Nov 13 19:00			Hours of Missing Data:	23
			Hours of Calibration:	0
			Percent Operational Time:	96.8
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 5				

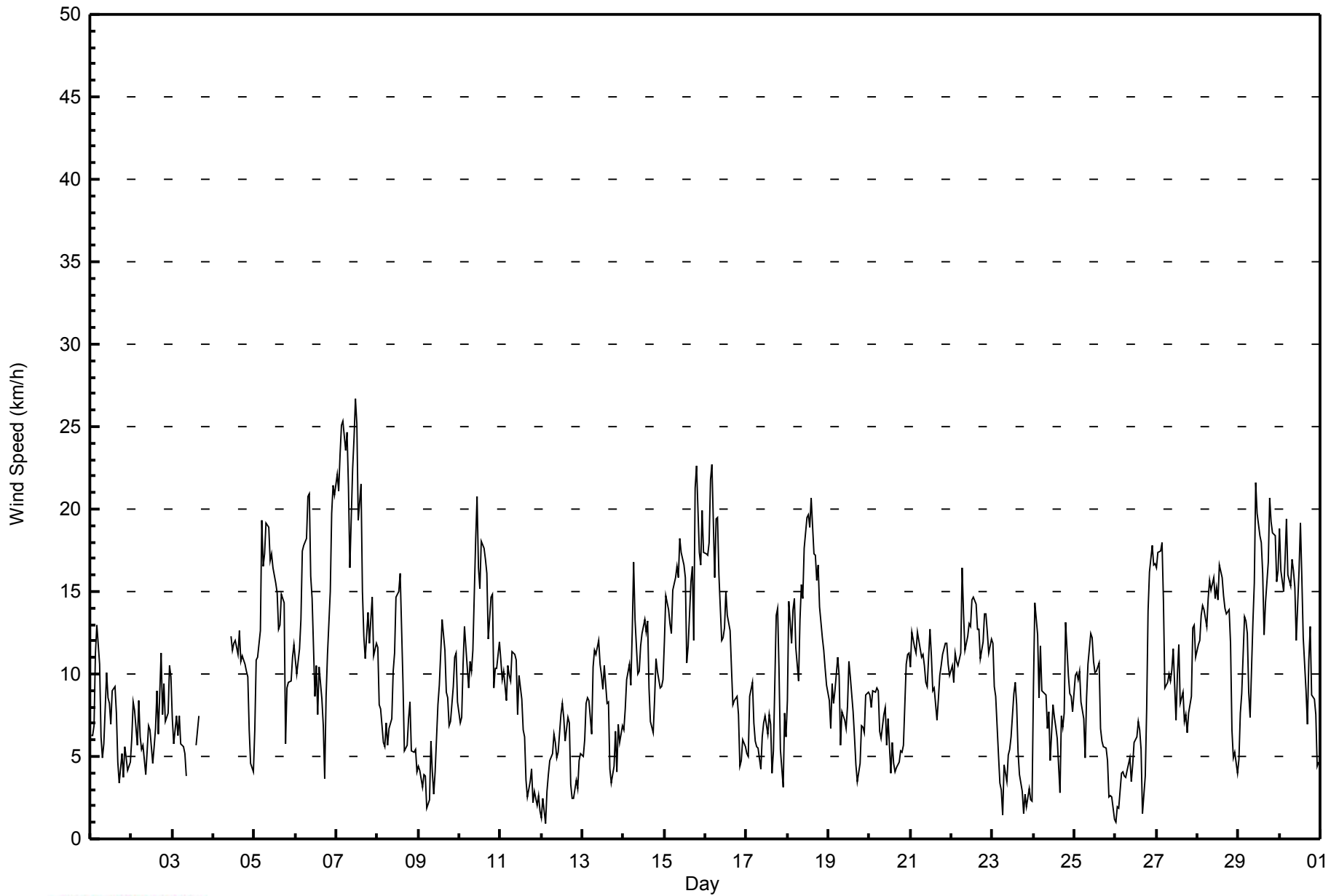
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	2	2	2	3	3	2	3	2	1	2	2	2	2	2	2	2	1	1	1	2	1	2	1	2	3
2-Nov	2	1	2	1	1	1	1	1	1	1	1	1	1	1	2	3	3	3	1	2	1	2	3	3	3
3-Nov	2	1	2	1	2	1	1	1	1	AF	AF	AF	AF	AF	2	3	AF	AF	AF	AF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

AF - Analyzer Failure



WBEA
Hourly Averages

Wind Speed (WS) - km/h
Patricia McInnes - November 2014





WBEA
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Patricia McInnes - November 2014

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	126	18.08	18.08
6 - 11	329	47.20	65.28
12 - 19	212	30.42	95.70
20 - 28	30	4.30	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 697

Total Number of Hours: 720



WBEA
Frequency Distribution

Wind Speed (WS) - km/h
Patricia McInnes - November 2014

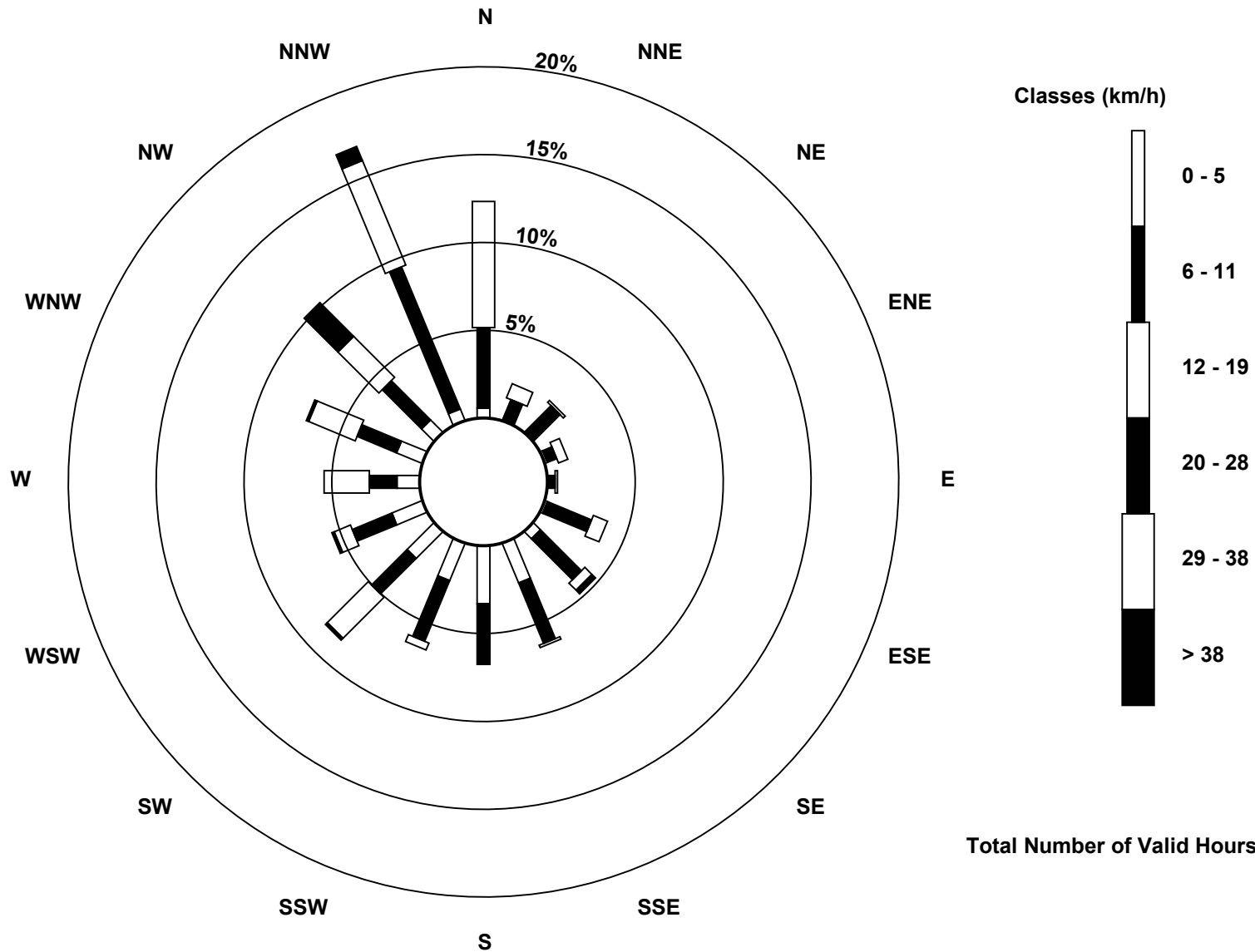
Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	4	0	0	1	0	1	4	17	23	16	15	13	9	11	7	5	126
6 - 11	32	9	15	4	3	19	23	26	24	26	20	17	11	17	22	61	329
12 - 19	50	6	1	4	1	6	4	1	0	3	23	7	18	20	23	45	212
20 - 28	0	0	0	0	0	0	2	0	0	0	1	1	0	1	19	6	30
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	86	15	16	9	4	26	33	44	47	45	59	38	38	49	71	117	697

Total Number of Valid Hours: 697

Total Number of Hours: 720

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

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





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Patricia McInnes - November 2014

Direction of Maximum Speed: 314 deg on Nov 7 12:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 320.8 deg on Nov 7	Hours of Data: 697
Direction of Minimum Speed: 229 deg on Nov 12 03:00	Direction of Minimum Daily Speed Average: 1.0 deg on Nov 26
Direction of Minimum Speed: 229 deg on Nov 12 03:00	Hours of Missing Data: 23
Monthly Average Direction: 299.4 deg	Percent Operational Time: 96.8

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-Nov	194	224	244	252	254	238	219	204	199	220	214	196	216	228	240	239	211	245	246	260	212	210	173	169	224.7
2-Nov	174	186	174	185	172	190	170	165	165	168	155	152	156	151	148	127	134	124	121	124	124	124	118	135	148.4
3-Nov	144	160	142	154	131	164	185	212	233	AF	AF	AF	AF	AF	331	334	AF	AF	AF	AF	AF	AF	AF	AF	--
4-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	100	110	110	108	109	105	115	117	116	118	120	130	154	188	--
5-Nov	232	264	251	268	281	276	274	280	282	279	283	285	280	280	284	266	266	262	200	208	190	145	144	150	263.3
6-Nov	141	137	125	113	118	117	125	130	131	131	131	118	126	162	186	171	152	161	231	256	301	306	311	309	143.3
7-Nov	310	307	307	312	320	324	315	316	328	310	319	314	314	317	325	339	340	317	325	327	329	346	352	357	320.8
8-Nov	1	355	339	337	269	291	302	314	295	305	326	349	344	338	336	332	312	272	288	303	329	307	288	272	322.5
9-Nov	264	292	250	234	236	215	242	255	293	152	327	3	358	348	7	360	339	338	326	330	345	351	353	328	333.9
10-Nov	311	305	333	329	327	305	312	294	307	339	345	336	340	348	350	349	348	349	352	355	343	343	338	330	336.4
11-Nov	330	327	326	312	331	334	335	1	5	9	13	326	327	340	329	336	340	273	281	248	247	228	244	181	332.6
12-Nov	257	284	229	185	212	188	218	240	205	183	200	167	173	193	187	173	178	209	191	180	188	215	187	187	193.8
13-Nov	186	205	205	211	211	189	211	214	215	218	219	217	199	211	219	227	217	252	305	313	321	324	329	328	225.6
14-Nov	326	328	337	336	331	335	329	333	335	335	341	352	5	346	330	337	321	279	251	256	255	253	235	238	318.7
15-Nov	227	225	219	219	226	216	215	216	216	221	222	235	235	267	309	336	334	347	343	335	321	316	314	300	268.0
16-Nov	303	312	322	338	326	328	338	338	326	308	304	327	313	313	302	293	272	251	272	274	221	210	219	227	310.6
17-Nov	220	215	215	211	203	189	176	175	177	153	155	147	142	141	157	151	213	251	268	293	360	286	281	305	210.8
18-Nov	10	347	318	337	336	321	307	309	314	309	308	316	309	300	315	310	300	297	301	301	292	286	294	292	311.3
19-Nov	287	287	284	286	279	275	283	283	257	249	226	204	189	203	183	169	129	166	153	161	152	150	113	118	221.4
20-Nov	117	128	119	127	119	133	143	122	137	141	141	143	152	156	132	137	188	220	243	275	351	342	340	345	129.6
21-Nov	345	343	354	356	352	0	352	350	358	336	330	7	360	339	336	313	26	38	46	36	46	60	41	49	6.1
22-Nov	40	55	59	50	39	62	71	69	46	33	22	16	15	7	13	8	6	359	359	357	357	356	348	342	22.9
23-Nov	333	335	346	356	311	265	72	116	149	196	162	166	180	195	194	191	181	211	249	316	263	318	300	285	236.0
24-Nov	330	344	349	339	358	1	349	345	359	358	10	6	22	10	32	357	29	44	77	73	88	83	82	61	19.0
25-Nov	28	48	41	32	41	43	348	327	336	342	342	345	348	348	346	350	334	308	305	295	273	227	211	182	354.0
26-Nov	232	207	182	164	171	189	167	186	207	199	157	155	157	156	152	157	173	286	345	341	343	354	6	2	352.6
27-Nov	350	355	2	4	3	356	346	352	340	349	13	18	1	8	14	356	339	341	334	346	351	2	6	359	357.2
28-Nov	349	356	359	360	356	349	1	357	356	360	0	358	350	349	349	341	340	338	338	338	325	298	285	252	348.3
29-Nov	237	231	219	221	230	217	210	211	218	234	238	234	234	241	258	258	277	289	299	309	311	301	300	305	258.6
30-Nov	298	294	276	276	283	265	260	263	254	249	227	220	214	212	210	193	165	185	208	198	185	174	153	131	239.7

317.1 313.5 313.7 312.1 309.0 297.2 298.9 299.3 294.3 293.5 301.7 310.3 304.9 303.5 314.5 317.8 317.0 299.3 307.6 317.7 323.1 326.9 328.8 322.4

Diurnal Average

AF - Analyzer Failure

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



Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

Patricia McInnes - November 2014

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 93 deg on Nov 12 03:00			Hours of Data:	697
Minimum Value: 7 deg on Nov 2 06:00			Hours of Missing Data:	23
			Hours of Calibration:	0
Percentiles: P ₁ = 8 P ₁₀ = 10 Q ₁ = 12 Median = 13 Q ₃ = 17 P ₉₀ = 27 P ₉₉ = 63			Percent Operational Time:	96.8

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-Nov	15	14	13	11	12	13	57	26	15	10	15	22	30	22	20	13	21	15	15	42	14	27	32	16	57	
2-Nov	17	11	10	14	9	7	26	14	18	17	14	14	22	16	19	14	17	15	12	11	15	12	13	16	26	
3-Nov	18	23	21	22	17	24	20	16	20	AF	AF	AF	AF	AF	13	13	AF	AF	AF	AF	AF	AF	AF	AF	24	
4-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	12	13	13	13	14	13	15	14	14	14	16	21	14	28	28	
5-Nov	11	11	9	14	12	12	12	11	11	13	12	11	13	13	12	12	11	14	22	14	27	14	14	14	27	
6-Nov	15	14	14	15	14	13	16	14	12	13	13	21	18	27	17	11	20	61	13	20	17	11	12	12	61	
7-Nov	12	12	11	13	11	12	11	11	18	13	13	13	13	17	15	20	12	12	13	12	14	12	13	14	20	
8-Nov	16	23	15	22	14	10	22	10	13	16	20	17	17	17	18	13	18	12	15	13	19	23	11	38	38	
9-Nov	26	38	39	15	28	73	53	18	11	40	61	26	24	24	16	17	11	10	8	9	16	14	13	11	73	
10-Nov	11	13	10	10	17	13	12	12	17	13	13	13	14	12	15	14	12	13	14	13	18	13	12	10	18	
11-Nov	10	10	9	13	10	12	13	15	14	15	20	17	20	29	27	38	46	12	13	36	26	31	22	48	48	
12-Nov	75	40	93	37	38	33	33	25	32	37	39	22	19	25	23	12	10	18	36	32	26	46	12	16	93	
13-Nov	24	21	12	14	11	17	13	13	11	11	12	13	21	12	16	11	31	25	17	10	9	10	8	10	31	
14-Nov	13	12	10	9	10	9	8	10	10	10	11	15	14	16	15	13	17	13	10	9	8	10	9	11	17	
15-Nov	11	11	12	13	14	13	12	13	12	11	11	13	14	31	12	12	10	12	14	11	10	10	12	11	31	
16-Nov	11	11	13	13	11	12	12	12	12	12	12	11	13	12	13	11	14	8	8	8	32	11	9	13	32	
17-Nov	13	14	11	11	13	16	16	17	13	16	12	13	20	16	18	34	22	9	8	27	42	44	17	36	44	
18-Nov	22	13	10	11	12	12	12	11	10	10	10	11	13	12	12	11	11	10	9	10	11	10	9	9	22	
19-Nov	10	15	14	10	10	10	12	20	12	14	25	30	23	20	19	15	13	21	10	14	17	18	15	14	30	
20-Nov	12	15	16	15	17	14	14	23	13	13	15	12	28	15	23	19	19	15	15	13	21	10	10	12	28	
21-Nov	10	10	14	13	13	14	13	15	14	13	13	12	14	16	18	15	30	13	15	13	14	14	13	13	30	
22-Nov	11	16	13	14	10	16	10	12	15	11	11	11	11	12	11	14	12	12	11	13	13	13	11	10	16	
23-Nov	10	11	13	16	34	17	65	15	41	30	18	21	16	15	16	16	23	19	69	31	39	34	40	49	69	
24-Nov	16	14	12	11	14	15	15	19	13	20	21	13	14	17	25	40	19	23	15	12	14	13	14	22	40	
25-Nov	11	14	17	12	13	16	41	11	9	10	9	9	14	14	11	11	8	20	19	19	29	16	39	73	73	
26-Nov	48	30	40	15	19	16	16	22	12	40	27	21	19	16	32	17	82	19	14	10	11	15	14	16	82	
27-Nov	14	15	13	14	14	12	10	12	9	14	13	15	15	14	12	14	12	11	13	12	13	13	13	13	15	
28-Nov	12	14	13	12	12	11	13	13	13	13	13	13	15	13	13	12	12	10	9	9	8	11	14	15	18	18
29-Nov	18	10	14	10	10	11	13	17	13	11	10	11	11	9	12	12	12	11	10	10	12	11	11	11	18	
30-Nov	10	11	13	11	10	12	8	9	9	10	14	11	13	12	14	16	12	16	11	17	9	19	28	15	28	
75 40 93 37 38 73 65 26 41 40 61 30 30 31 32 40 82 61 69 42 42 46 40 73																										

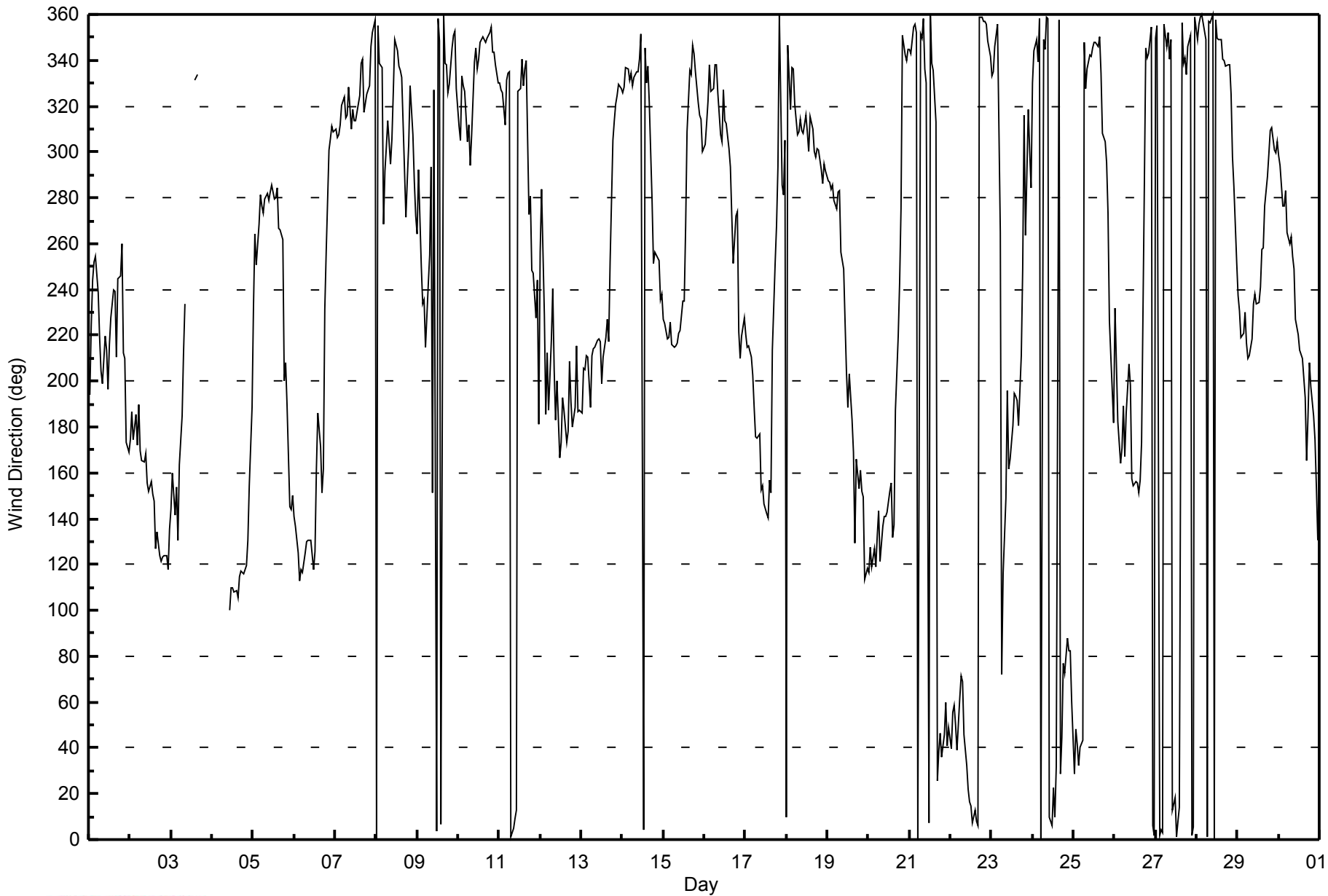
Diurnal Maximum

AF - Analyzer Failure



WBEA
Hourly Averages

Wind Direction (WD) - deg
Patricia McInnes - November 2014



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Wood Buffalo Environmental Association

SO₂ Calibration Report

Station Information

Calibration Date	November 6, 2014	Previous Calibration	October 7, 2014
Station Name	Patricia McInnes	Station Number	AMS 6
Reason:	Routine		
Start Time (MST)	9:05	End Time (MST)	13:45
Barometric Pressure	n/a mmHg	Station temp.	22 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	-677	-677
Analyzer Range (mv)	1000	1000	Lamp voltage	771	771
Calculated slope	0.997410	0.993530	Chamber temp.	45.3	45.0
Calculated intercept	0.452610	0.209072	Pressure (mmHg)	692.2	682.5
Analyzer Background	5.6	5.6	Flow (lpm)	0.443	0.437
Analyzer Coefficient	1.022	1.022	Intensity	91	91

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	-0.2	NA
as found span	5000	55.3	519.8	523.0	0.994
calibrator zero	5000	0.0	0.0	-0.2	NA
high point	5000	55.3	519.8	523.0	0.994
second point	5000	27.7	260.4	261.9	0.994
third point	5000	13.9	130.7	131.3	0.995
calibrator zero					
as left zero	5000	0.0	0.0	0.1	NA
as left span	5000	55.3	519.8	523.3	0.993
Average Correction Factor					0.994

Corrected As found 523.2 Previous response 520.7 % change -0.5%

Notes:

Changed inlet filter.

Calibration Performed By:

Michael Martineau



Wood Buffalo Environmental Association

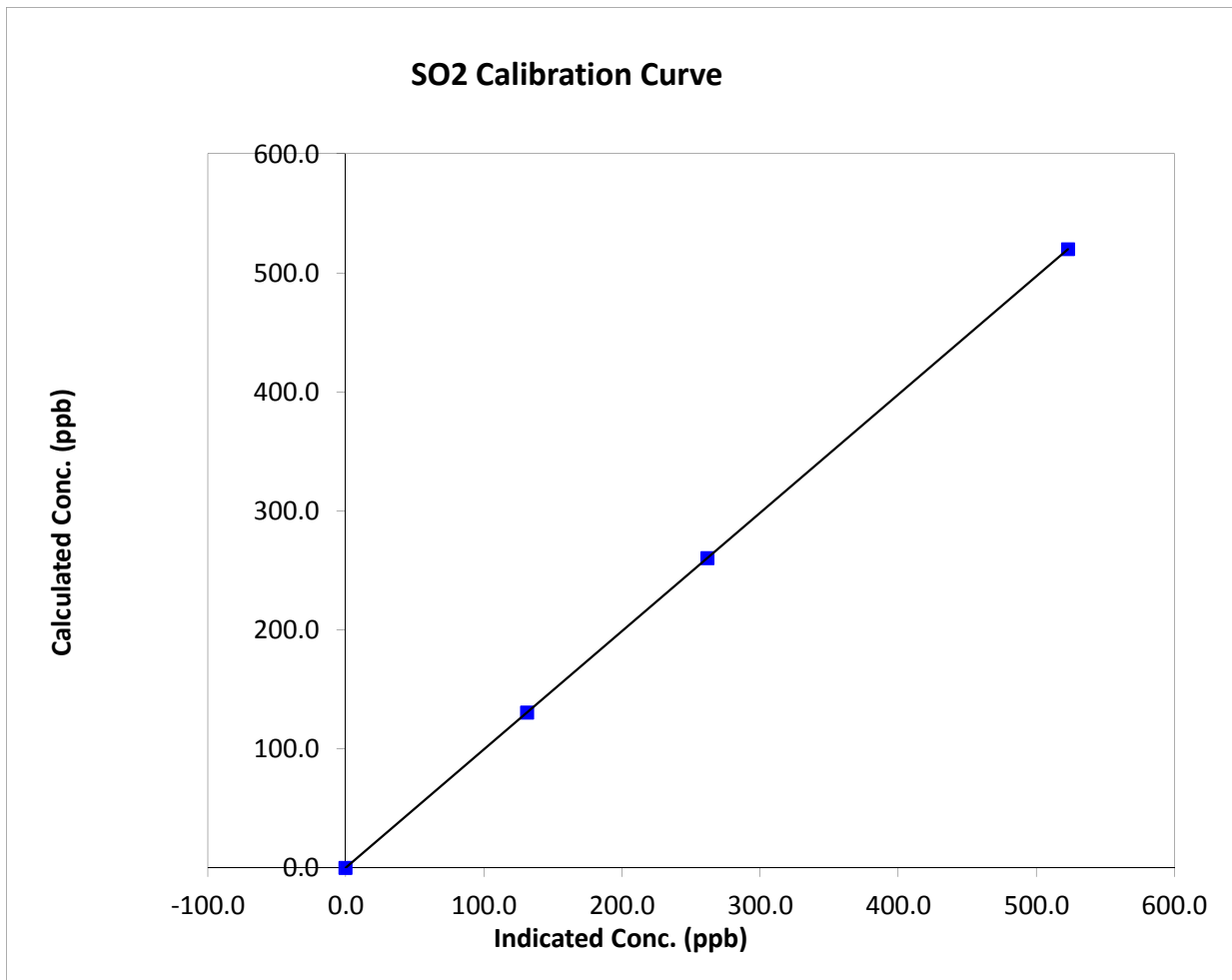
SO₂ Calibration Summary

Station Information

Calibration Date	November 6, 2014	Previous Calibration	October 7, 2014
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	9:05	End Time (MST)	13:45
Analyzer make	Thermo 43i	Analyzer serial #	1008841397

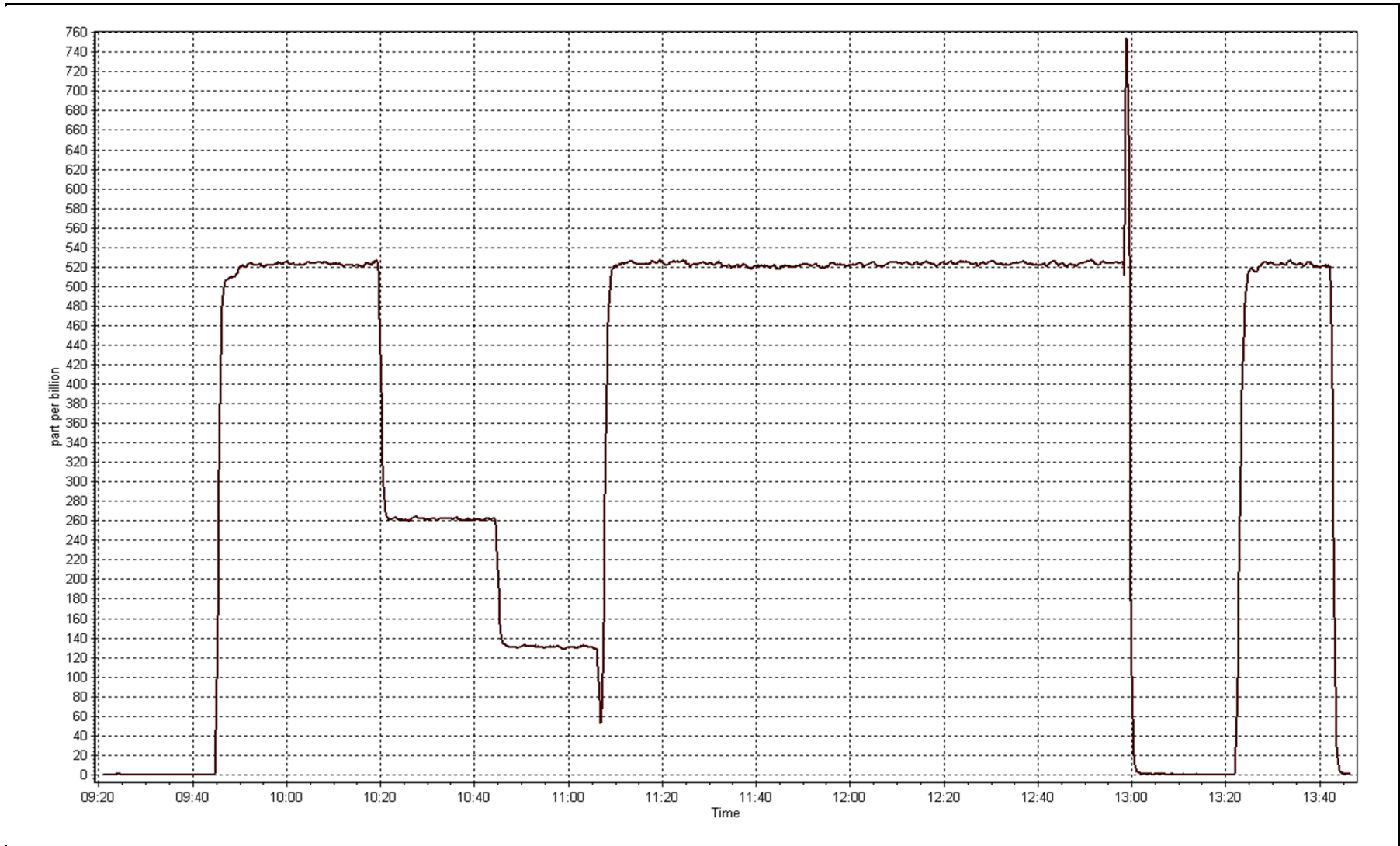
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	N/A	Correlation Coefficient	1.000000
519.8	523.0	0.9939		
260.4	261.9	0.9943	Slope	0.993530
130.7	131.3	0.9952		
			Intercept	0.209072



SO2 Calibration Plot

Date: November 6, 2014





Wood Buffalo Environmental Association

TRS Calibration Report

Station Information

Calibration Date	November 10, 2014	Previous Calibration	October 6, 2014
Station Name	Patricia McInnes	Station Number	AMS 6
Reason:	Routine		
Start Time (MST)	9:35	End Time (MST)	12:00
Barometric Pressure	742 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	0-5000mV	DACS channel #	SE 2

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	100	100	PMT voltage	-675	-675
Analyzer Range (input)	100	100	Lamp voltage	800	802
Calculated slope	0.987370	0.999298	Chamber temp.	45	45
Calculated intercept	0.087047	-0.071700	Pressure	692.1	710.0
Analyzer Background	13.8	13.8	Flow	0.462	0.486
Analyzer Coefficient	1.198	1.198	Intensity	90	90
			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	72.3	70.0	70.0	1.000
SO2 scrubber check	5000	21.3	200.2	0.8	NA
calibrator zero	5000	0.0	0.0	0.1	NA
high point	5000	72.3	70.0	70.0	1.000
second point	5000	36.3	35.1	35.6	0.988
third point	5000	18.7	18.1	18.0	1.006
calibrator zero					
as left zero	5000	0.0	0.0	0.2	NA
as left span	5000	72.3	70.0	71.6	0.978
Average Correction Factor					0.998

Corrected As found	69.9	Previous response	70.8	% change	1.2%
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Notes:

No adjustments required. As found span used as first high point.

Calibration Performed By:

Michael Martineau



Wood Buffalo Environmental Association

TRS Calibration Summary

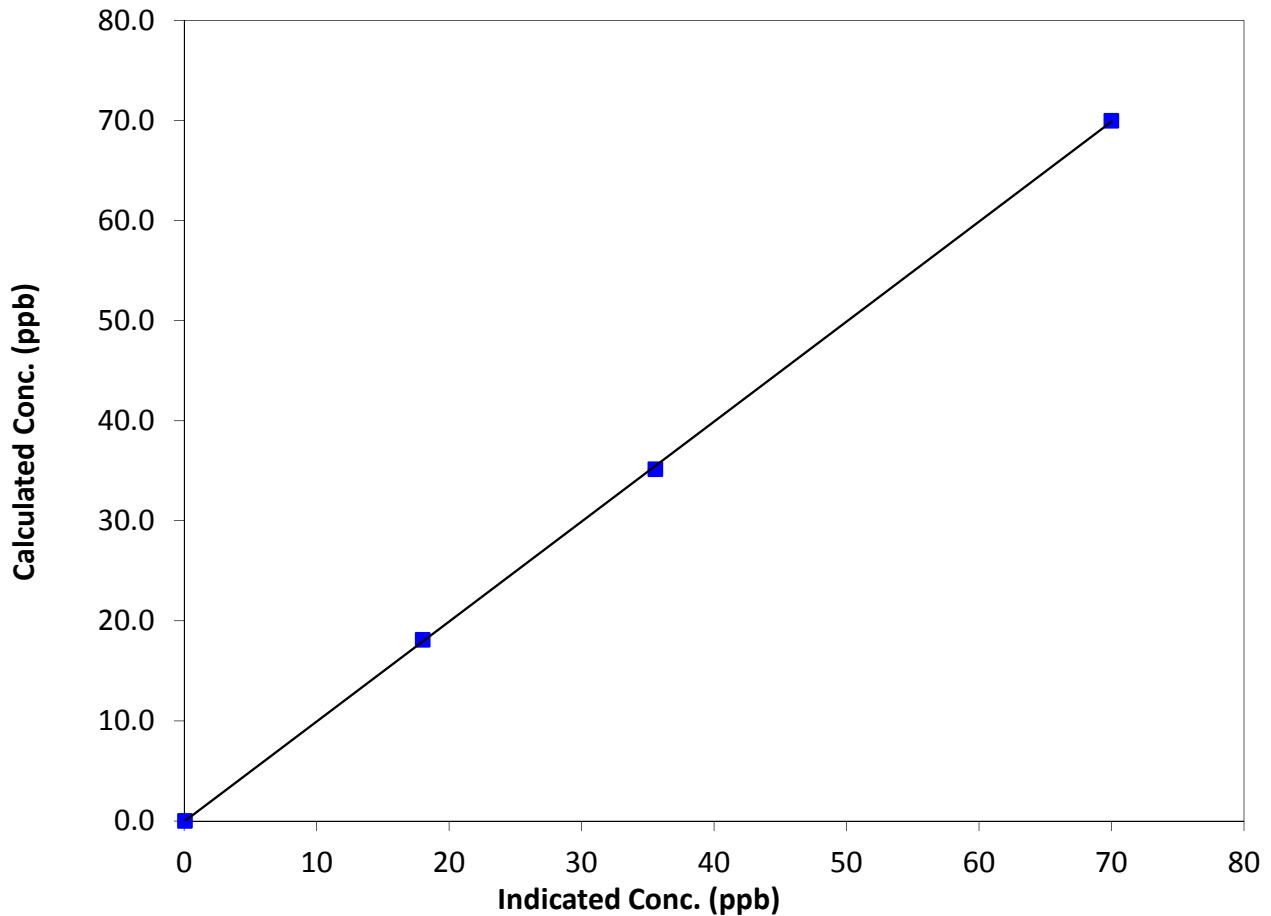
Station Information

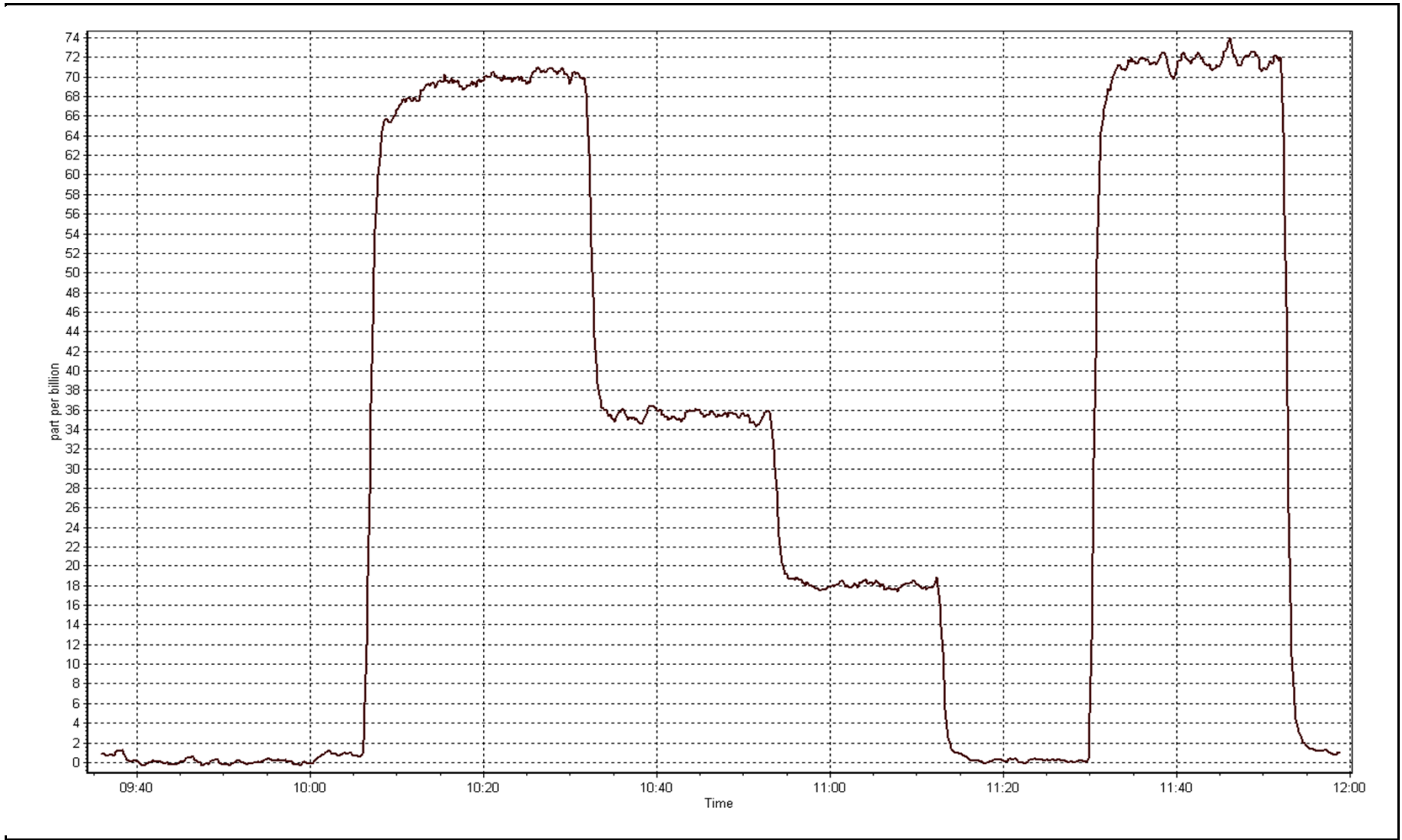
Calibration Date	November 10, 2014	Previous Calibration	October 6, 2014
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	9:35	End Time (MST)	12:00
Analyzer make	TEI 43i	Analyzer serial #	1008841398

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	N/A	Correlation Coefficient	0.999942
70.0	70.0	0.9999		
35.1	35.6	0.9881	Slope	0.999298
18.1	18.0	1.0056		
			Intercept	-0.071700

TRS Calibration Curve







Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Station Information

Calibration Date	Thursday, November 06, 2014	Prev Calibration	Tuesday, October 07, 2014
Station Name	Patricia McInnes	Station Number	AMS 6
Reason:	Routine		
Start Time (MST)	9:05	End Time (MST)	13:45
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
CH4 Range (ppm)	50	50	Internal Temp	34.4	37.6
CH4 Range (input)	50	50	Flame Temp	403.2	403.0
NMHC Range (ppm)	50	50	Carrier Pressure	34.5	34.5
NMHC Range (input)	50	50	Fuel Pressure	42.3	42.3
THC Calc slope	1.008262	1.007799	Air Pressure	32.4	32.4
THC Calc intercept	-0.032092	-0.022092	Detector Temp	175.0	175.0
NMHC Calc slope	1.005402	1.012521	Filter Temp	175.0	175.0
NMHC Calc intercept	-0.031850	-0.024117			

Analyzer make Thermo 55i Analyzer serial # 1331259521

THC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	0.00	N/A
as found span	5000	55.3	12.08	12.00	1.007
calibrator zero	5000	0.0	0.00	0.00	N/A
high point	5000	55.3	12.08	12.00	1.007
second point	5000	27.7	6.05	6.03	1.003
third point	5000	13.8	3.01	3.04	0.992
calibrator zero					
as left zero	5000	0.0	0.00	0.00	N/A
as left span	5000	55.3	12.08	11.96	1.010
Average Correction Factor					1.001

Corrected As found 12.00 Previous response 12.01 % change 0.1%

Notes:

No adjustments made. Changed carrier gas (N2) after as founds.

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	55.3	6.42	6.35	1.011
calibrator zero	5000	0.0	0.00	0.00	N/A
high point	5000	55.3	6.42	6.35	1.011
second point	5000	27.7	3.21	3.21	1.001
third point	5000	13.8	1.60	1.63	0.983
calibrator zero					
as left zero	5000	0.0	0.00	0.00	N/A
as left span	5000	55.3	6.42	6.32	1.015
Average Correction Factor					0.998

Corrected As found 6.35 Previous response 6.41 % change 1.0%

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	5.64	1.004
calibrator zero	5000	0.0	0.00	0.00	N/A
high point	5000	55.3	5.66	5.64	1.004
second point	5000	27.7	2.84	2.81	1.009
third point	5000	13.8	1.41	1.41	1.002
calibrator zero					
as left zero	5000	0.0	0.00	0.00	N/A
as left span	5000	55.3	5.66	5.63	1.006
Average Correction Factor					

Corrected As found 5.64 Previous response 5.60 % change -0.7%



Wood Buffalo Environmental Association

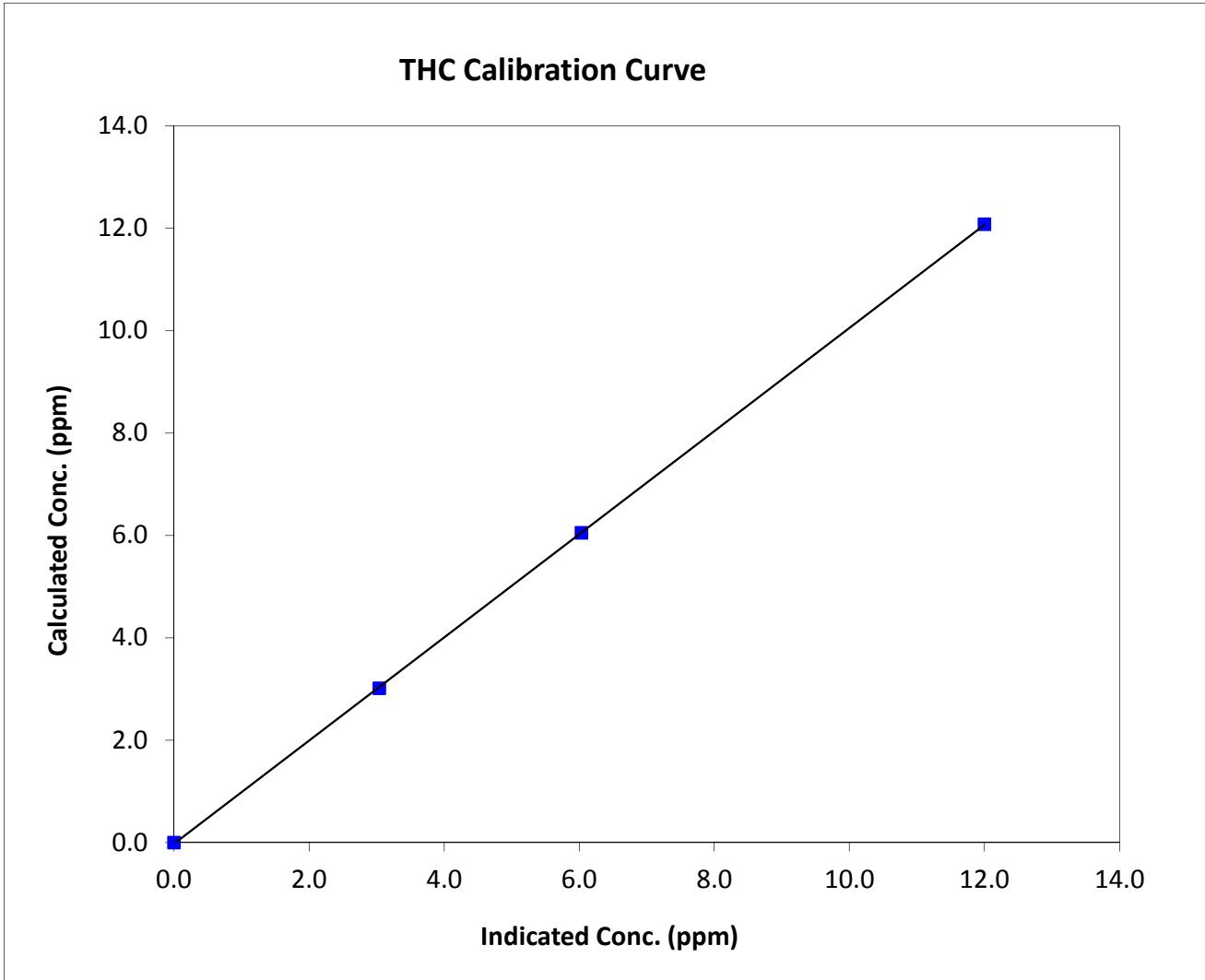
THC Calibration Summary

Station Information

Calibration Date	November 6, 2014	Previous Calibration	October 7, 2014
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	9:05	End Time (MST)	13:45
Analyzer make	Thermo 55i	Analyzer serial #	1331259521

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	N/A	Correlation Coefficient	0.999984
12.08	12.00	1.0067		
6.05	6.03	1.0035	Slope	1.007799
3.01	3.04	0.9916		
			Intercept	-0.022092





Wood Buffalo Environmental Association

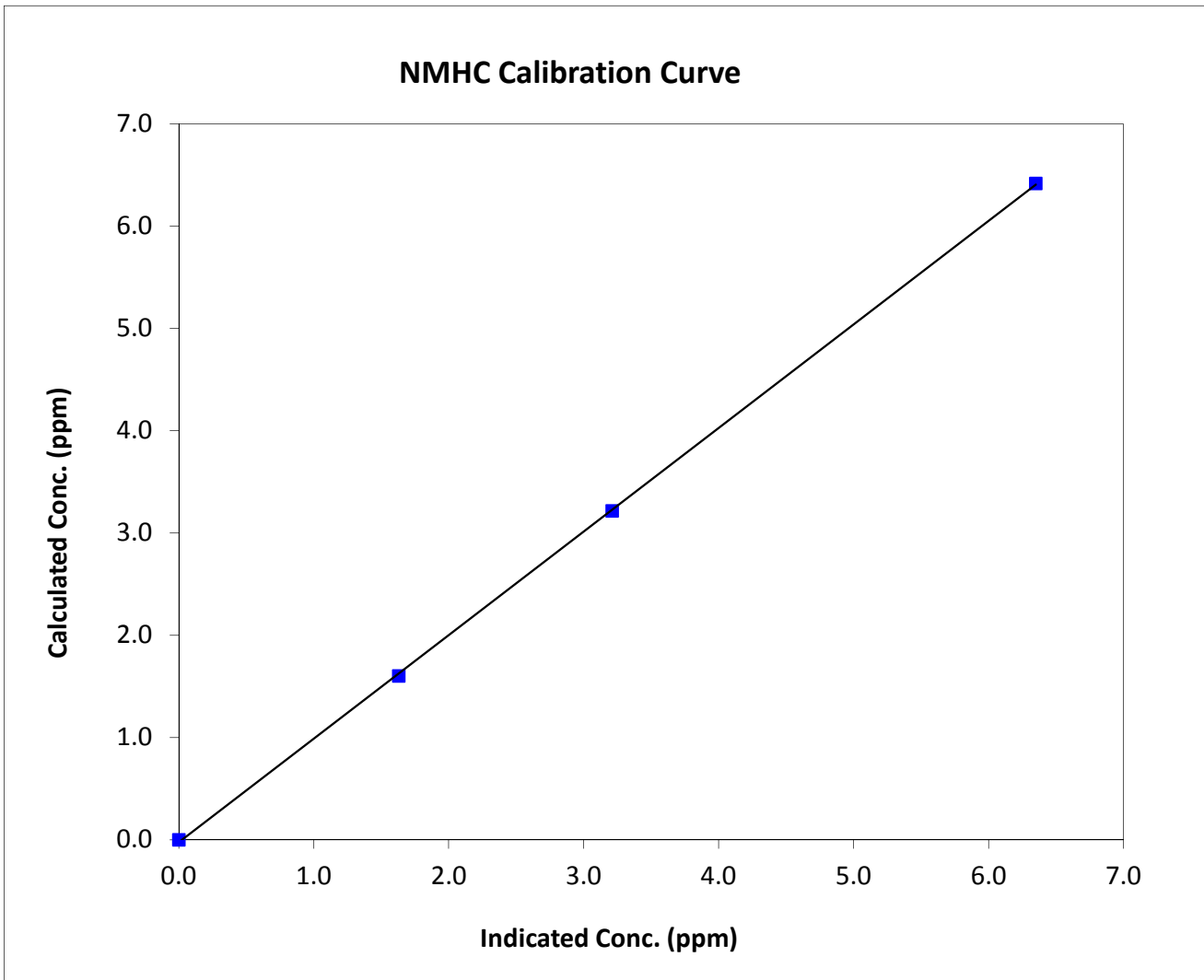
NMHC Calibration Summary

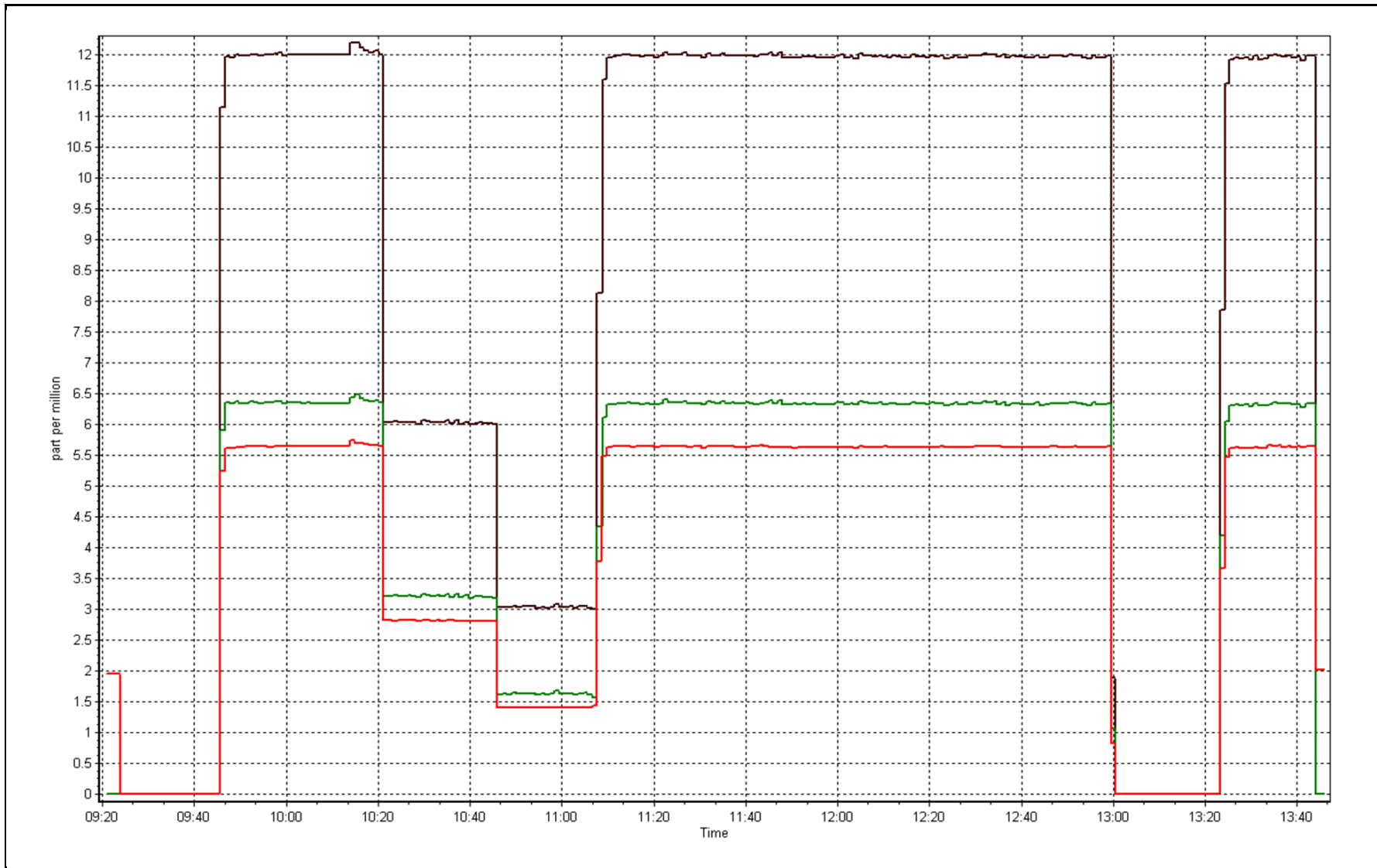
Station Information

Calibration Date	November 6, 2014	Previous Calibration	October 7, 2014
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	9:05	End Time (MST)	13:45
Analyzer make	Thermo 55i	Analyzer serial #	1331259521

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	N/A	Correlation Coefficient	0.999934
6.42	6.35	1.0106		
3.21	3.21	1.0014	Slope	1.012521
1.60	1.63	0.9825		
			Intercept	-0.024117







Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

Calibration Date	November 10, 2014	Previous Calibration	October 8, 2014
Station Name	Patricia McInnes	Station Number	AMS 6
Reason:	Routine		
Start Time (MST)	11:50	End Time (MST)	14:50
Barometric Pressure	742 mmHg	Station temp.	21 Deg C
Calibrator Make/Model	API T700	Serial Number	1220
NO2 calibration used	Monday, November 10, 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.	32.7	33.3
Analyzer Range (input)	500	500	Lamp temp.	53.6	53.6
Calculated slope	0.995891	0.988667	Pressure	679.5	695.6
Calculated intercept	0.383636	-0.103684	Flow cell A	0.605	0.614
Analyzer Background	0.0	0.0	Flow cell B	0.633	0.644
Analyzer Coefficient	1.001	1.001	Cell A Intensity	88000	86850
			Cell B Intensity	81900	80700

Analyzer make Thermo 49i Analyzer serial # 1300156234

Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Gen Drive Vs. Ref (mv)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.000	0.0	-0.6	N/A
as found span	5000	1059 / 622	361.5	365.4	0.989
calibrator zero	5000	0.000	0.0	-0.6	N/A
high point	5000	1059 / 622	361.5	364.5	0.992
second point	5000	964 / 430	244.6	249.2	0.982
third point	5000	838 / 220	125.0	126.8	0.986
calibrator zero					
as left zero	5000	0.000	0.0	-0.4	N/A
as left span	5000	1060 / 615	361.5	368.0	0.982
Average Correction Factor					0.986

Corrected As found 366.0 Previous response 362.6 % change -0.9%

Notes:

GPT on 42i analyzer performed after as founds to determine expected O₃ concentrations. Inlet filter changed.

Calibration Performed By:

Michael Martineau



Wood Buffalo Environmental Association

O₃ Calibration Summary

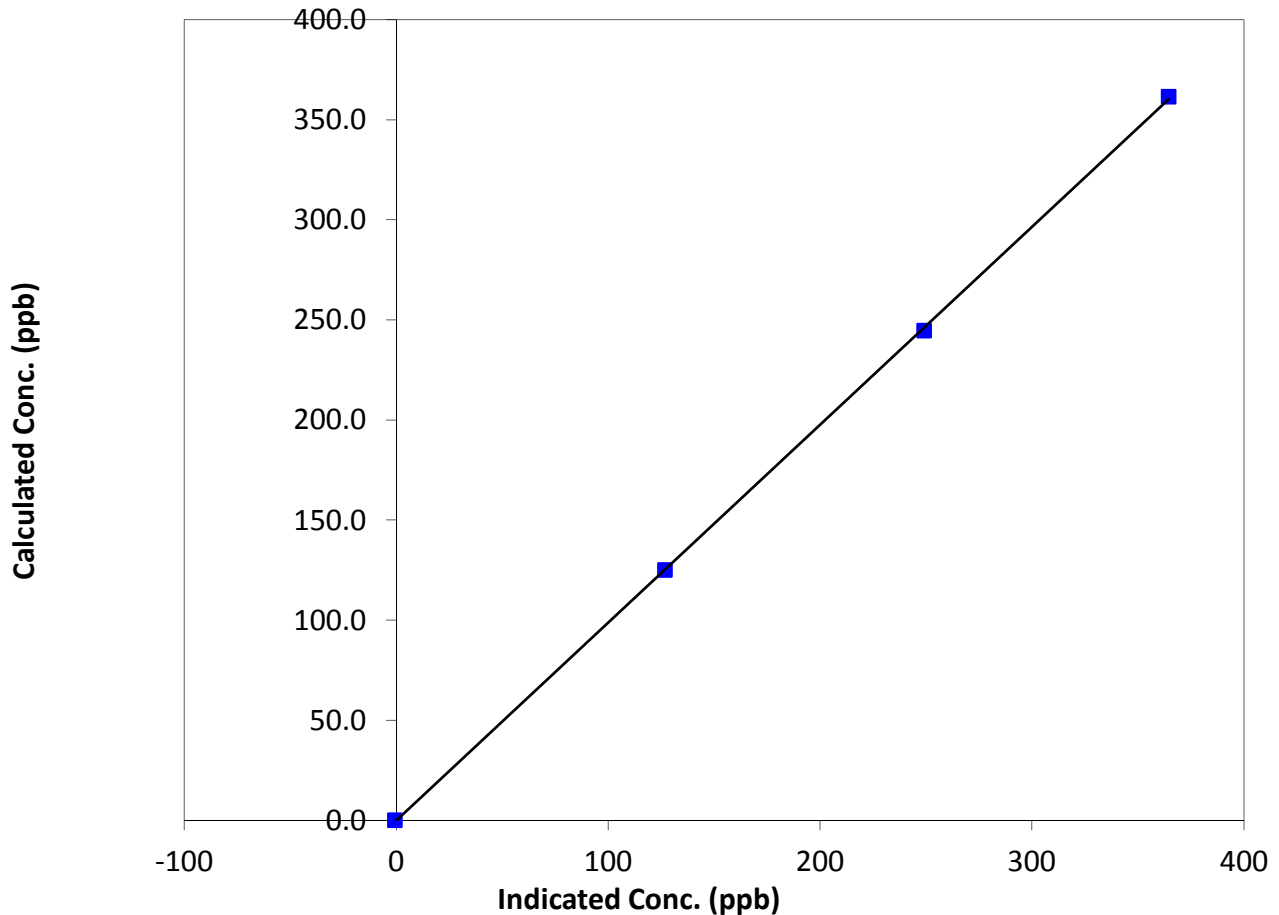
Station Information

Calibration Date	Monday, November 10, 2014	Previous Calibration	October 8, 2014
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	11:50	End Time (MST)	14:50
Analyzer make	Thermo 49i	Analyzer serial #	1300156234

Calibration Data

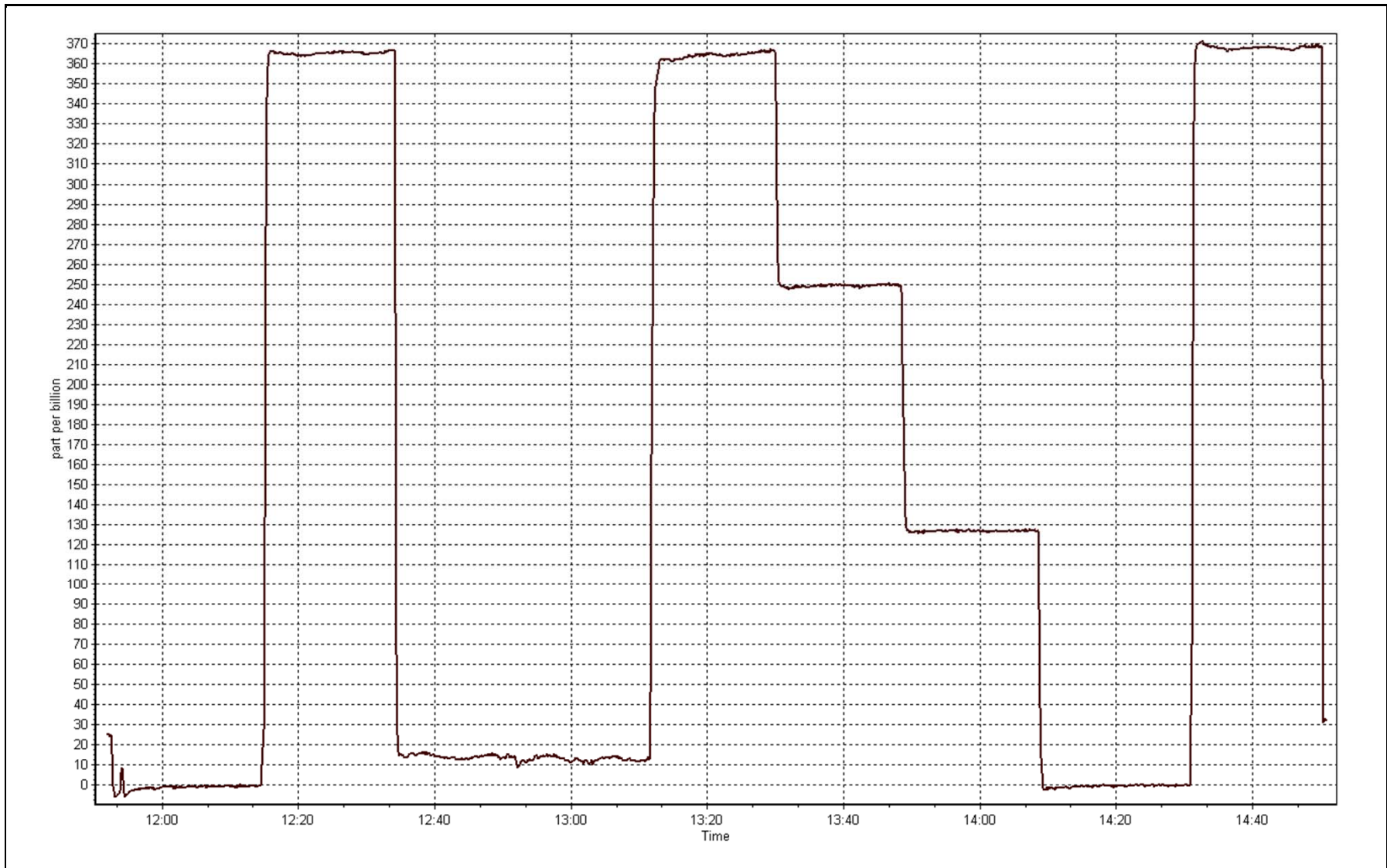
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.6	N/A	Correlation Coefficient	0.999933
361.5	364.5	0.9918		
244.6	249.2	0.9815	Slope	0.988667
125.0	126.8	0.9858		
			Intercept	-0.103684

O₃ Calibration Curve



O3 Calibration Plot

Date: November 10, 2014





Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

Calibration Date	November 25, 2014	Previous Calibration	November 10, 2014
Station Name	Patricia McInnes	Station Number	AMS 6
Reason:	Other:	REPAIR	
Start Time (MST)	9:30	End Time (MST)	13:20
Barometric Pressure	n/a mmHg	Station temp.	21 Deg C
Calibrator Make/Model	API T700	Serial Number	1220
NO2 calibration used	Tuesday, November 25, 2014	Transfer Standard	SA130110A
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2582

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	500	500	Bench temp.	33.3	28.5
Analyzer Range (input)	500	500	Lamp temp.	53.6	53.5
Calculated slope	0.988667	0.998073	Pressure	695.6	678.0
Calculated intercept	-0.103684	0.382214	Flow cell A	0.614	0.707
Analyzer Background	0.0	-0.4	Flow cell B	0.644	0.732
Analyzer Coefficient	1.001	0.982	Cell A Intensity	86850	86050
			Cell B Intensity	80700	80350

Analyzer make Thermo 49i Analyzer serial # 1300156234

Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Gen Drive Vs. Ref (mv)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero					
as found span					
calibrator zero	5000	0.000	0.0	-0.1	N/A
high point	5000	1059 / 622	357.0	357.4	0.999
second point	5000	964 / 430	244.0	244.2	0.999
third point	5000	838 / 220	125.0	124.4	1.005
calibrator zero					
as left zero	5000	0.000	0.0	0.2	N/A
as left span	5000	1060 / 615	357.0	360.0	0.992
Average Correction Factor					1.001

Corrected As found NA Previous response NA % change NA

Notes:

Seized pump removed; external pump installed. GPT on 42i analyzer performed to determine expected O₃ concentrations. Adjusted zero and span.

Calibration Performed By:

Michael Martineau



Wood Buffalo Environmental Association

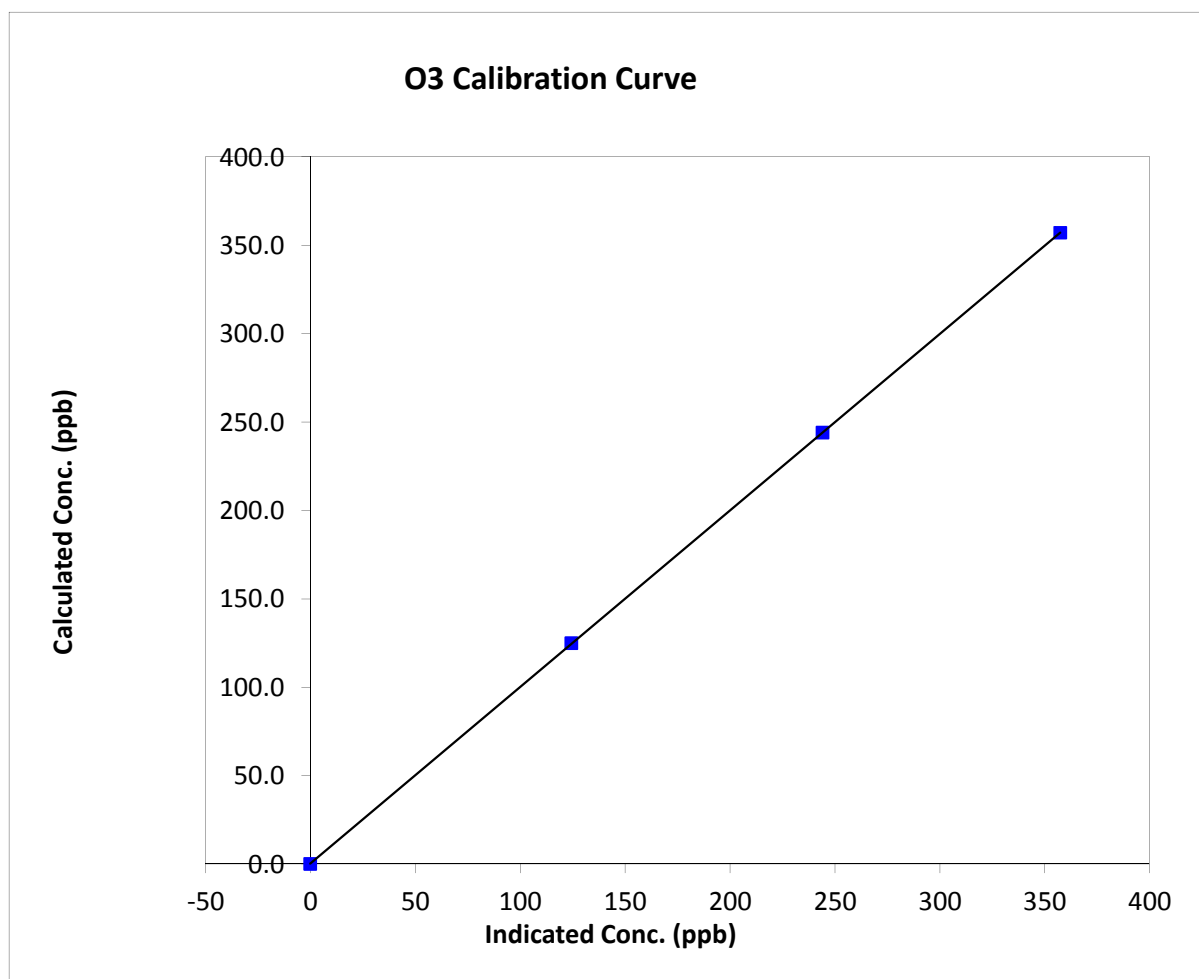
O₃ Calibration Summary

Station Information

Calibration Date	Tuesday, November 25, 2014	Previous Calibration	November 10, 2014
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	9:30	End Time (MST)	13:20
Analyzer make	Thermo 49i	Analyzer serial #	1300156234

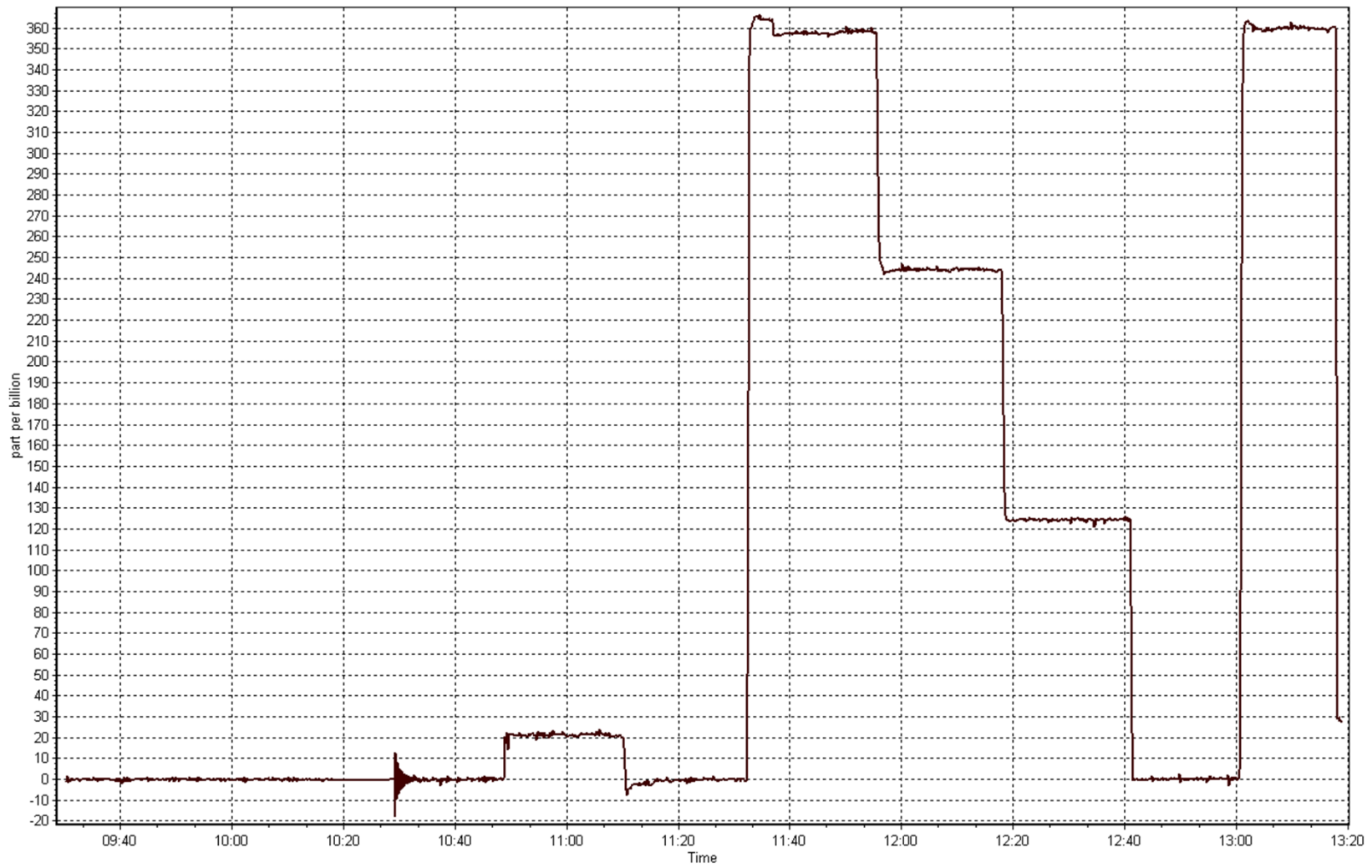
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999995
357.0	357.4	0.9989		
244.0	244.2	0.9992		
125.0	124.4	1.0051	Slope	0.998073
			Intercept	0.382214



O3 Calibration Plot

Date: November 25, 2014





Wood Buffalo Environmental Association

NO_x-NO-NO₂ Calibration Report

Station Information

Calibration Date	November 6, 2014	Previous Calibration	October 7, 2014
Station Name	Patricia McInnes	Station Number	AMS 6
Reason:	Routine		
Start Time (MST)	9:05	End Time (MST)	13:45
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
NOx Cal Gas Conc	54.4 ppm	Cal Gas Serial #	SA130110A

DACs Information

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

Parameter		NOx	NO	NO2
MV conversion	Analyzer Range (ppb)	1000	1000	1000
	Analyzer Range (mv)	1000	1000	1000
Before	Data Slope	0.994168	0.995284	1.014854
	Data Offset	0.673382	0.158789	0.745619
After	Data Slope	0.996941	0.998838	0.994567
	Data Offset	0.355713	0.199395	-0.594054
IP address:		192.168.1.42		
Voltage Range		N/A		

Analyzer Information

Analyzer make/model Thermo Scientific 42i Analyzer serial # 1218153460

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	1.065		1.065	
NOX coefficient	0.997		0.997	
NO2 coefficient	1.000		1.000	
NO bkgnd	2.8		2.8	
NOX bkgnd	4.1		4.1	
Chamber Temp	50	Deg C	50	Deg C
Moly Temp	326	Deg C	326	Deg C
PMT voltage	-761	V	-761	V
PMT Temp	-2.7	Deg C	-2.8	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	175	mmHg	174.1	mmHg
R Cell Press Nox	174.7	mmHg	174.4	mmHg
NO sample flow	0.788	ccm	0.783	ccm
Nox sample Flow	0.787	ccm	0.782	ccm

Notes:

No adjustments required. Changed inlet filter.



Wood Buffalo Environmental Association

NO_x-NO-NO₂ Calibration Report

Station Information

Calibration Date: November 6, 2014 Station Number: AMS 6

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NO _x conc (ppb)	Calculated NO conc (ppb)	Calculated NO ₂ conc (ppb)	Indicated NO _x conc (ppb)	Indicated NO conc (ppb)	Indicated NO ₂ conc (ppb)	NO _x Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	-1.0	0.0	-1.0	N/A	N/A
as found span	5000	55.3	601.7	601.7	0.0	602.8	602.2	0.5	0.9982	0.9991
calibrator zero	5000	0.0	0.0	0.0	0.0	-1.0	0.0	-1.0	N/A	N/A
high point	5000	55.3	601.7	601.7	0.0	602.8	602.2	0.5	0.9982	0.9991
second point	5000	27.7	301.4	301.4	0.0	302.5	301.6	0.9	0.9962	0.9992
third point	5000	13.9	151.2	151.2	0.0	151.8	150.9	0.9	0.9966	1.0023
calibrator zero										
as left zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1	N/A	N/A
as left span	5000	55.3	601.7	257.3	344.4	606.3	258.6	347.6	0.9923	0.9948
Average Correction Factor									0.9970	1.0002

Corrected As found NO_x= 603.7 NO= 602.2 Percent Change NO_x= 0.1% NO= 0.4%
 Previous Response NO_x= 604.5 NO= 604.4

GPT Calibration Data

Dilution Flow 5000 ccm Source Gas Flow 55.30 ccm

O ₃ Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO ₂ conc (ppb)	Indicated NO _x conc (ppb)	Indicated NO conc (ppb)	Indicated NO ₂ conc (ppb)	NO _x Correction factor	NO Correction factor	NO ₂ Correction factor	Converter Efficiency
Cal zero			0.0			-1.0			N/A	
1st NO ₂ (300)	N/A	257.3	345.8	604.4	257.3	347.2	0.9846	1.0000	0.9961	100.4%
2nd NO ₂ (200)	N/A	368.6	234.4	605.5	368.6	236.9	0.9827	1.0000	0.9896	101.0%
3rd NO ₂ (100)	N/A	485.6	117.4	606.4	485.6	120.8	0.9813	1.0000	0.9723	102.9%
4th NO ₂ (0)	603.1	N/A	1.4	604.5	603.1	1.1	0.9845	1.0000	N/A	N/A
Average Correction Factor							0.9833	1.0000	0.9860	101.4%

Calibration Performed By: Michael Martineau



Wood Buffalo Environmental Association

NO_x Calibration Summary

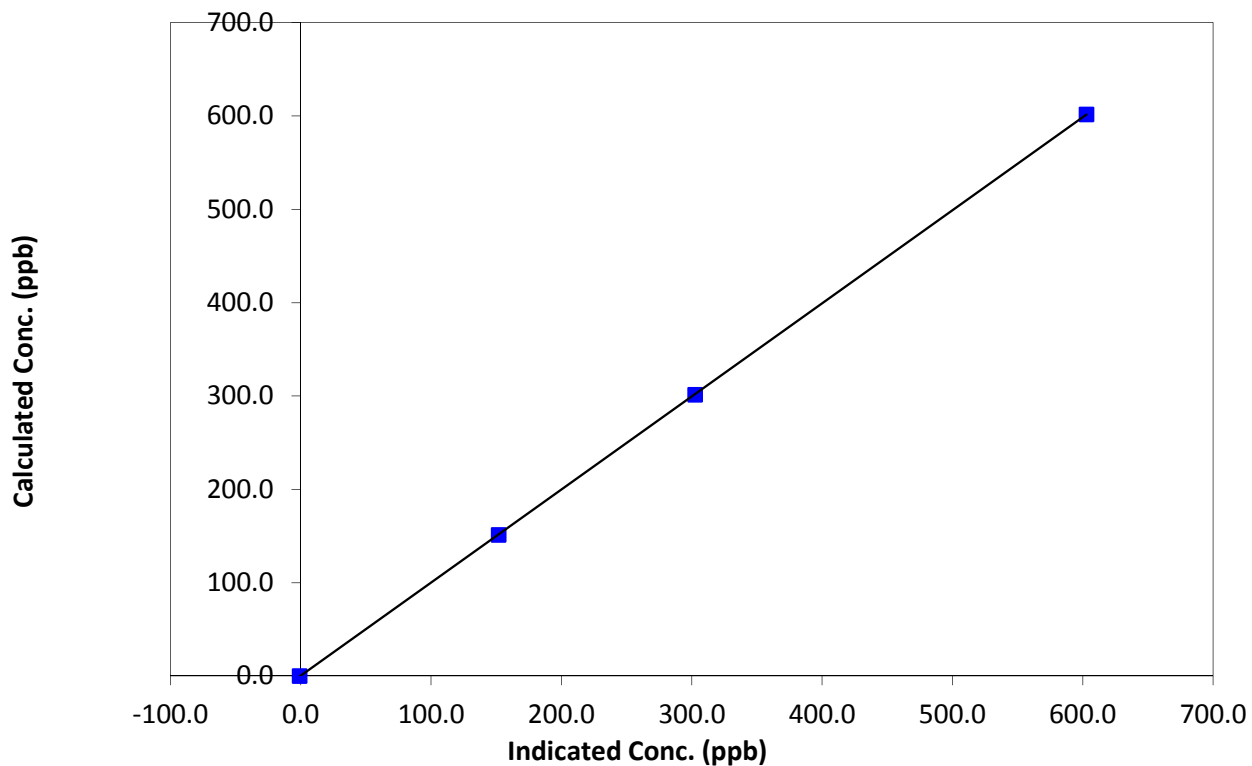
Station Information

Calibration Date	November 6, 2014	Previous Calibration	October 7, 2014
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	9:05	End Time (MST)	13:45
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	-1.0	N/A	Correlation Coefficient	0.999995
601.7	602.8	0.9982		
301.4	302.5	0.9962	Slope	0.996941
151.2	151.8	0.9966		
			Intercept	0.355713

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

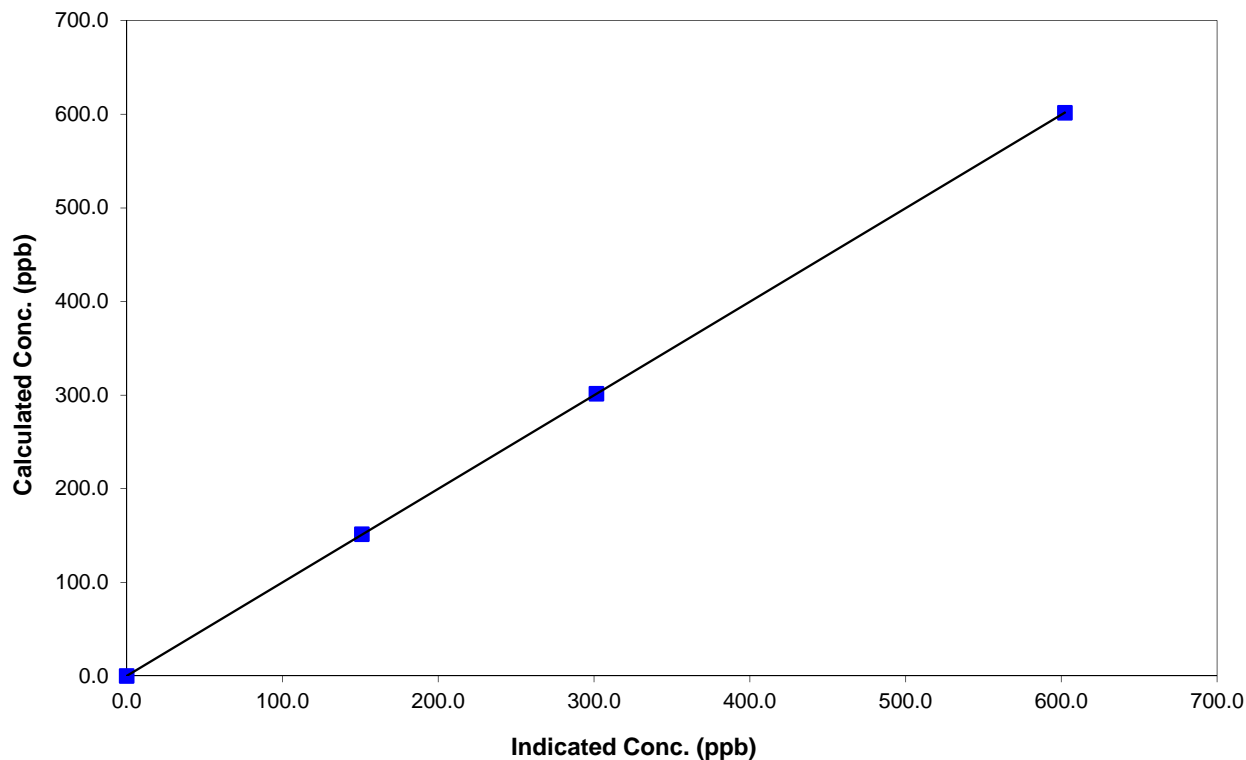
Station Information

Calibration Date	November 6, 2014	Previous Calibration	October 7, 2014
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	9:05	End Time (MST)	13:45
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	0.0	N/A	Correlation Coefficient	0.999999
601.7	602.2	0.9991		
301.4	301.6	0.9992	Slope	0.998838
151.2	150.9	1.0023		
			Intercept	0.199395

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

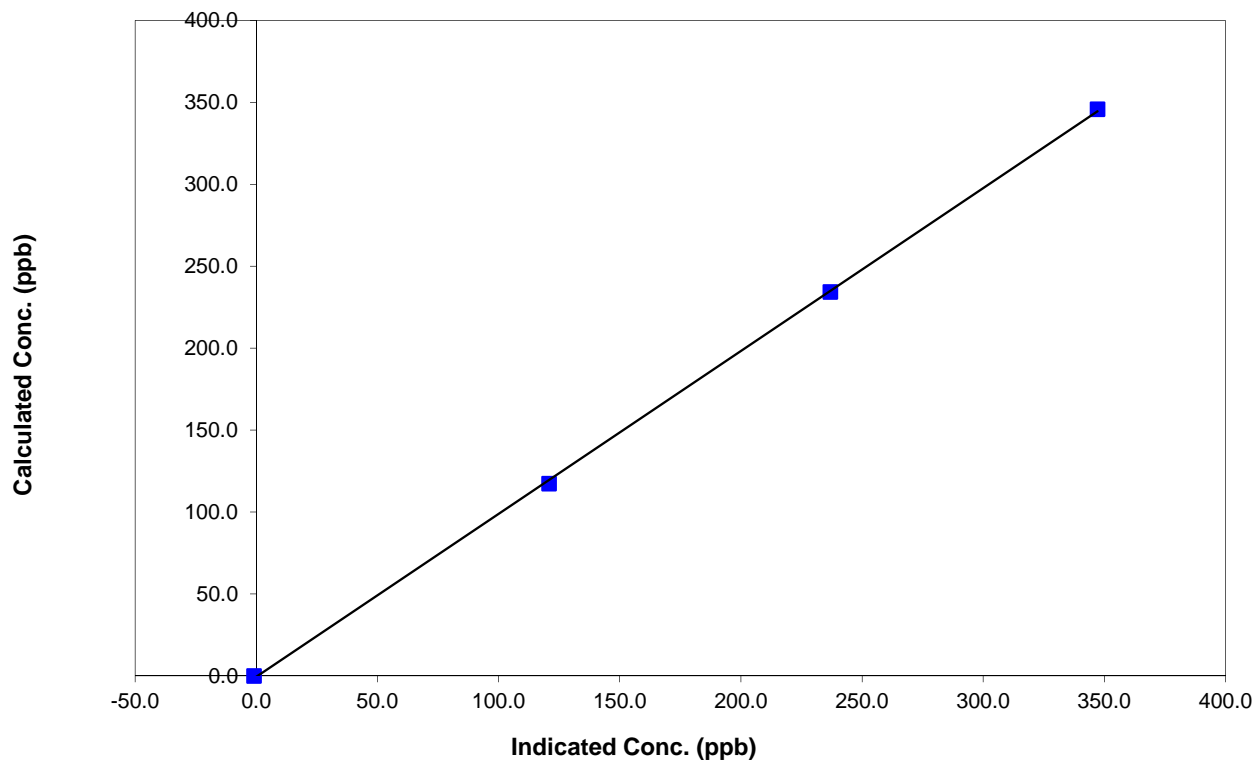
Station Information

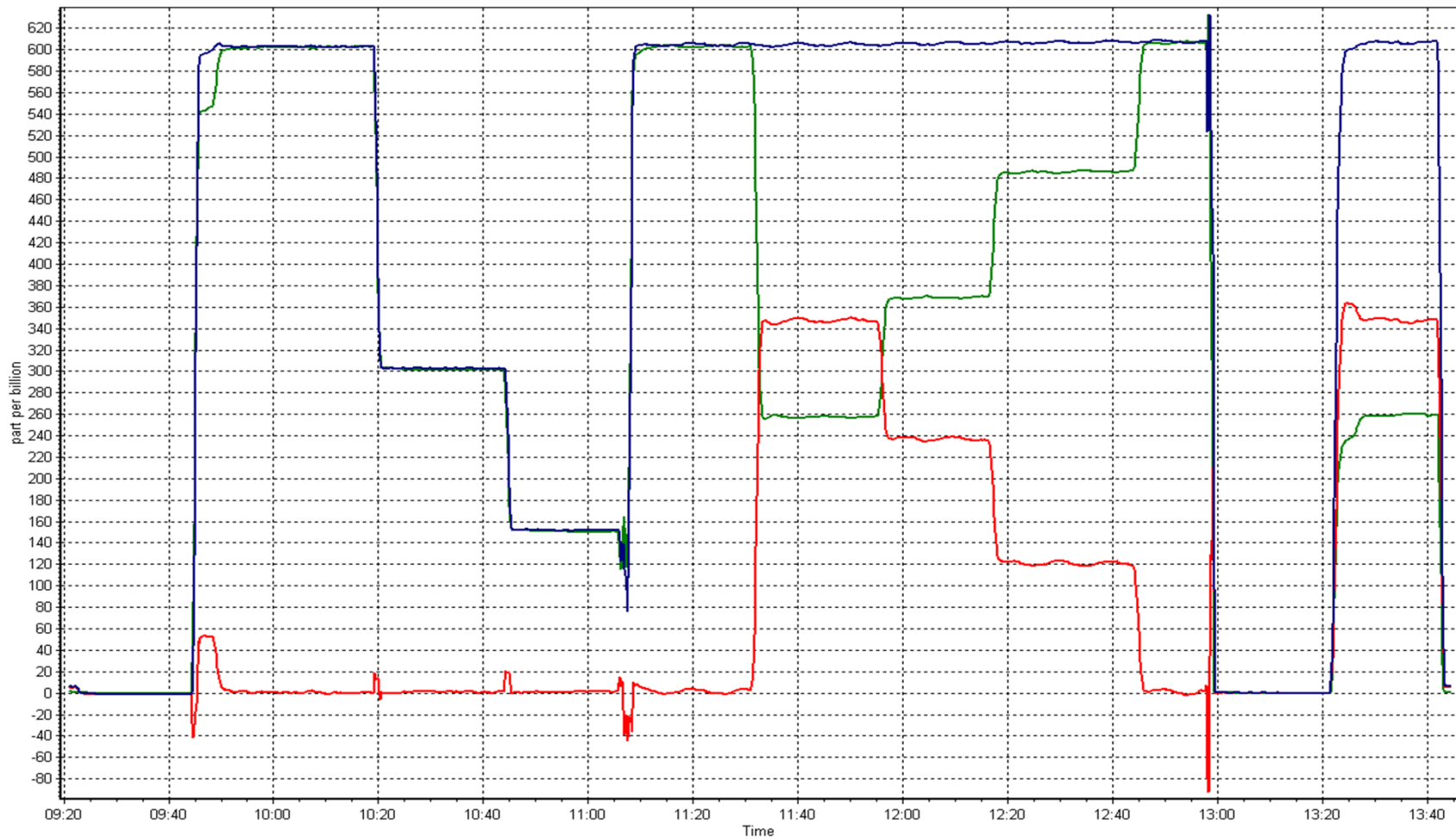
Calibration Date	November 6, 2014	Previous Calibration	October 7, 2014
Station Number	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	9:05	End Time (MST)	13:45
Analyzer make	Thermo Scientific 42i	Analyzer serial #	1218153460

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-1.0	N/A	Correlation Coefficient	0.999874
345.8	347.2	0.9961		
234.4	236.9	0.9896	Slope	0.994567
117.4	120.8	0.9723		
			Intercept	-0.594054

NO₂ Calibration Curve







Wood Buffalo Environmental Association

Nt-NO_x-NH₃ Calibration Report

Station Information

Calibration Date	November 4, 2014	Previous Calibration	October 2, 2014
Station Name	Patricia McInnis	Station Number	AMS 6
Reason:	Removal		
Start Time (MST)	9:55	End Time (MST)	13:40
Barometric Pressure	n/a 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	NOx	NH3
MV conversion	Analyzer Range (ppb)	2500	1000	2500
	Analyzer Range (mv)	2500	1000	2500
Before	Data Slope	1.006931	0.994324	1.007387
	Data Offset	1.843292	-0.004389	1.726329
After	Data Slope	1.005012	0.997950	1.005379
	Data Offset	3.916985	-0.099795	4.050576
Channel #		NA		
Voltage Range		0-5	0-5	0-5

Analyzer Information

Analyzer make/model	Thermo 17c	Analyzer serial #	622817829
		Converter serial #	617817369

Test Point	before		after	
Concentration range	0-2500	ppb	0-2500	ppb
Nt coefficient	0.891	ppb	0.891	ppb
NOX coefficient	0.904	ppb	0.904	ppb
NH3 coefficient	0.933		0.933	
NO coefficient	0.904		0.904	
NO2 coefficient	1.000	ppb	1.000	ppb
No bkgnd	5.8		5.8	
Nt bkgnd	5.9		5.9	
NOX bkgnd	5.1		5.1	
NH3 conv temp	771	DegC	771	Deg C
Chamber Temp	49.7	Deg C	50.2	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	120.1	mmHg	118.7	mmHg
PMT Voltage	-838.0	v	-838.0	v
Sample Flow 1 NO	496.0	ccm	493.0	ccm
Sample Flow 2 Nox	449.0	ccm	446.0	ccm
Sample Flow 3 Nt	501.0	ccm	498.0	ccm

Notes:

no adjustments required. Removal cal for installation of new 17i analyzer tomorrow.



Wood Buffalo Environmental Association

Nt-NO_x-NH₃ Calibration Report

Station Information

Calibration Date:

November 4, 2014

Station Number:

AMS 6

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated Nt conc (ppb)	Calculated NO _x conc (ppb)	Calculated NH ₃ conc (ppb)	Indicated Nt conc (ppb)	Indicated NO _x conc (ppb)	Indicated NH ₃ conc (ppb)	Nt Correction factor	NH ₃ Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	0.4	0.1	0.3	NA	NA
as found NO	5000	55.3	601.7	601.7	NA	604.0	603.0	1.0	0.996	NA
calibrator zero	5000	0.0	0.0	0.0	0.0	0.4	0.1	0.3	NA	NA
high NO point	5000	55.3	601.7	601.7	NA	604.0	603.0	1.0	0.996	NA
NO/O ₃ point	5000	55.3	601.7	601.7	NA	604.4	603.0	1.4	0.995	NA
as found NH ₃	5000	52.8	2006.4	NA	2006.4	1993.2	0.9	1992.3	1.007	1.007
first NH ₃	5000	52.8	2006.4	NA	2006.4	1993.2	0.9	1992.3	1.007	1.007
second NH ₃	5000	26.3	999.4	NA	999.4	992.6	0.6	992.0	1.007	1.007
third NH ₃	5000	13.3	505.4	NA	505.4	492.0	-0.1	492.0	1.027	1.027
as left zero						0.0				
as left span						0.0				
Average Correction Factor									0.9958	1.0139

Corrected As found

Nt = 603.6 ppb

NH₃ = 1992.0 ppb

Previous response

Nt = 595.7 ppb

NH₃ = 1990.0 ppb

Nt percent change -1.3%

NH₃ percent change -0.1%

Converter efficiency 93.3%

Calibration Performed By:

Michael Martineau



Wood Buffalo Environmental Association

NH3 Calibration Summary

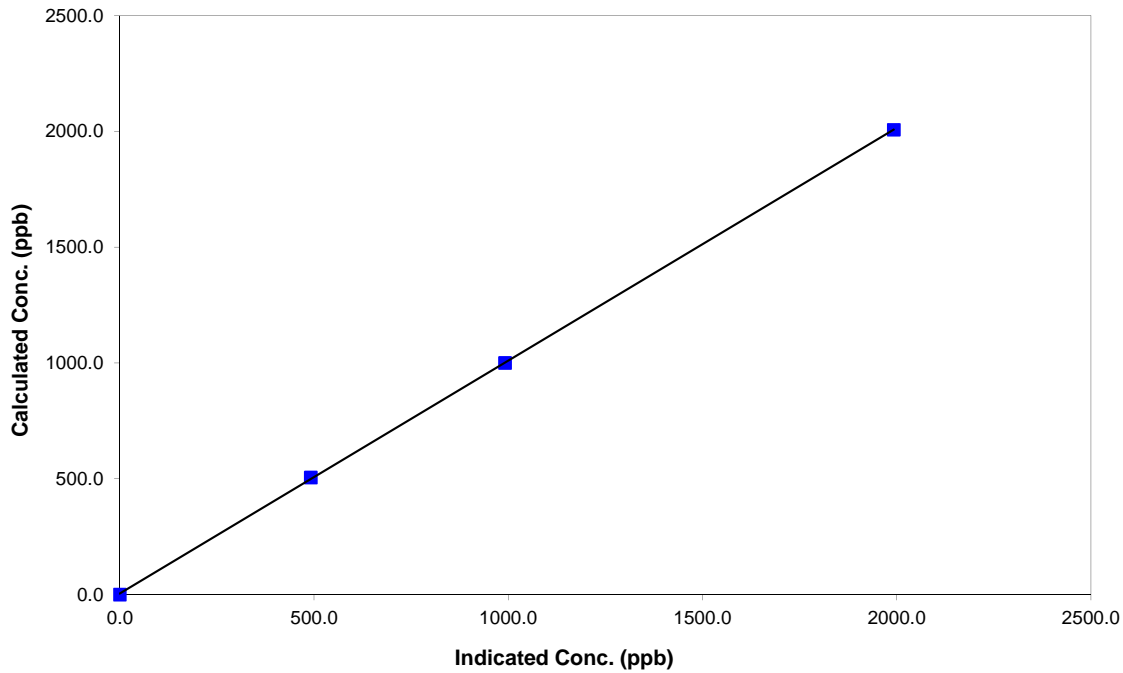
Station Information

Calibration Date	November 4, 2014	Previous Calibration	October 2, 2014
Station Number	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	9:55	End Time (MST)	13:40
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	0.999970
2006.4	1992.3	1.0071		
999.4	992.0	1.0075	Slope	1.005379
505.4	492.0	1.0272		
			Intercept	4.050576

NH3 Calibration Curve





Wood Buffalo Environmental Association

Nt Calibration Summary

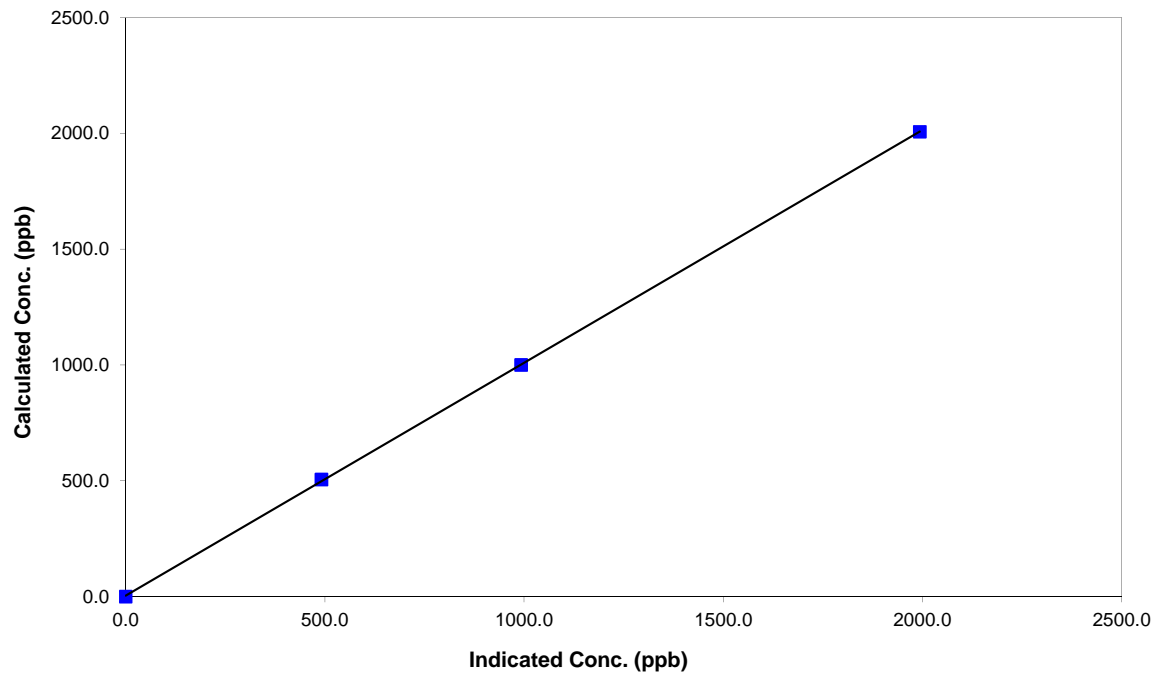
Station Information

Calibration Date	November 4, 2014	Previous Calibration	October 2, 2014
Station Number	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	9:55	End Time (MST)	13:40
Analyzer make	Thermo 17c	Analyzer serial #	622817829

Nt (NH₃) Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.4	N/A	Correlation Coefficient	0.999967
2006.4	1993.2	1.0066		
999.4	992.6	1.0069	Slope	1.005012
505.4	492.0	1.0273		
	0.0		Intercept	3.916985

Nt Calibration Curve





Wood Buffalo Environmental Association

NOx Calibration Summary

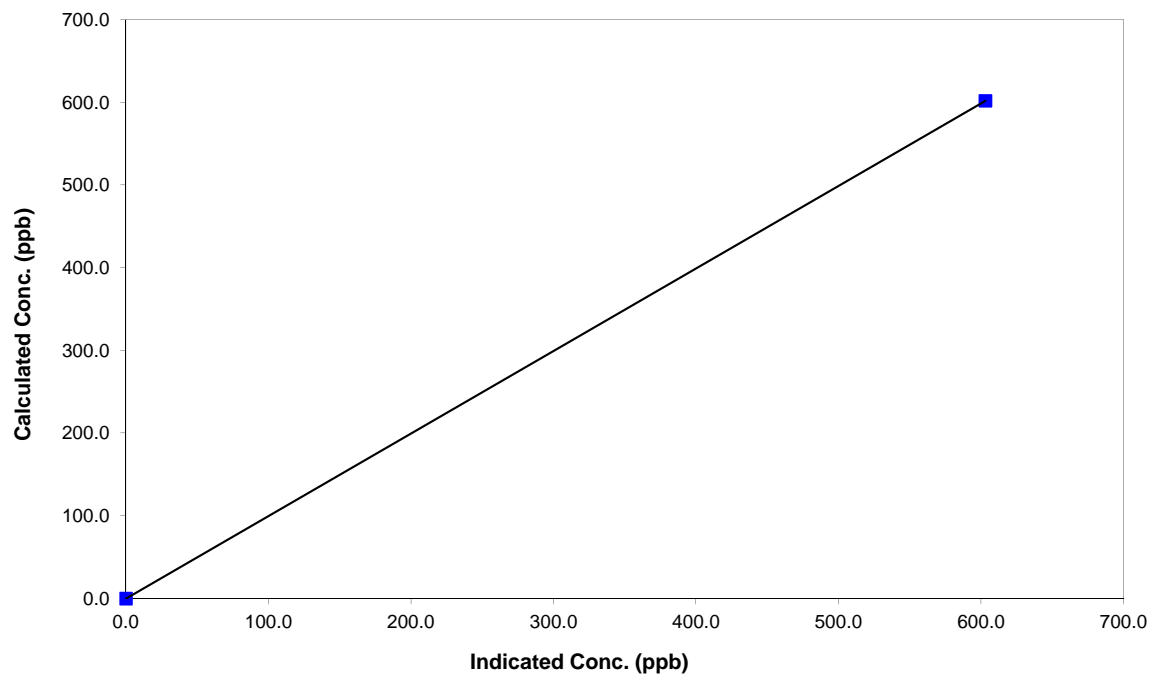
Station Information

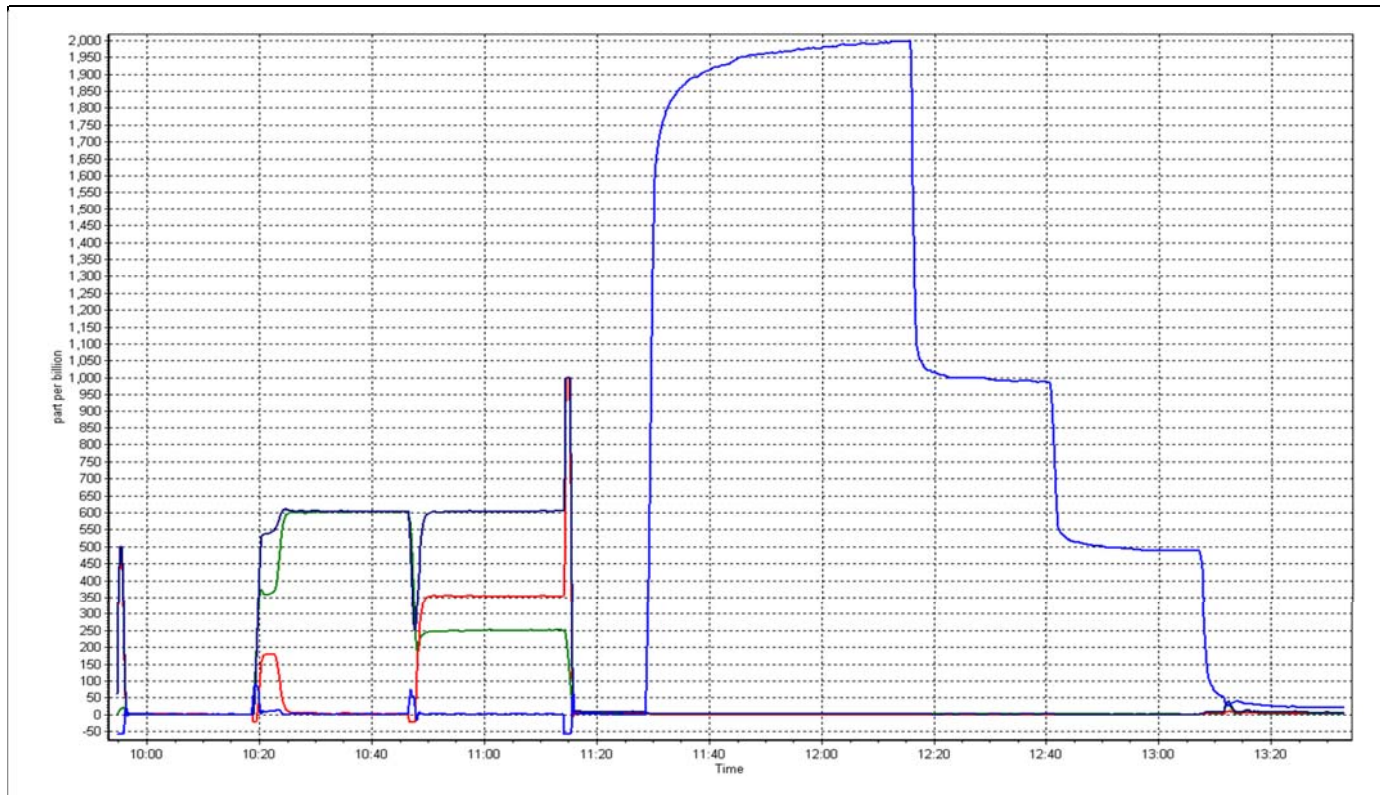
Calibration Date	November 4, 2014	Previous Calibration	October 2, 2014
Station Number	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	9:55	End Time (MST)	13:40
Analyzer make	Thermo 17c	Analyzer serial #	622817829

NO_x Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	N/A	Correlation Coefficient	1.000000
601.7	603.0	0.9978		
601.7	603.0	0.9978		
			Slope	0.997950
			Intercept	-0.099795

NO_x Calibration Curve







Wood Buffalo Environmental Association

Nt-NO_x-NH₃ Calibration Report

Station Information

Calibration Date	November 5, 2014	Previous Calibration	n/a
Station Name	Patricia McInnis	Station Number	AMS 6
Reason:	Install		
Start Time (MST)	11:00	End Time (MST)	16:00
Barometric Pressure	n/a 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	NOx	NH3
MV conversion	Analyzer Range (ppb)	2500	1000	2500
	Analyzer Range (mv)	2500	1000	2500
Before	Data Slope	1.006931	0.994324	1.007387
	Data Offset	1.843292	-0.004389	1.726329
After	Data Slope	0.998627	1.001446	0.999178
	Data Offset	4.021559	0.206964	3.819347
IP address		192.168.1.17		

Analyzer Information

Analyzer make/model	Thermo 17i	Analyzer serial #	1426262596
		Converter serial #	1426262596

Test Point	before		after	
Concentration range	n/a	ppb	0-2500	ppb
NO BKG	n/a	ppb	9.8	ppb
NOx BKG	n/a	ppb	9.1	ppb
Nt BKG	n/a		12.5	
NO coefficient	n/a		1.203	
NO2 coefficient	n/a	ppb	1.000	ppb
NOx coefficient	n/a		0.921	
NH3 coefficient	n/a		0.879	
Nt coefficient	n/a		0.971	
NH3 conv temp	n/a	DegC	750	Deg C
Chamber Temp	n/a	Deg C	50.6	Deg C
Moly Temp	n/a	Deg C	327.0	Deg C
PMT Temp	n/a	Deg C	-8.8	Deg C
O3 flow	n/a	ccm	ok	ccm
R Cell Press	n/a	mmHg	105.1	mmHg
PMT Voltage	n/a	v	-838.1	v
Sample Flow 1 NO	n/a	ccm	510.0	ccm
Sample Flow 2 NOx	n/a	ccm	479.0	ccm
Sample Flow 3 Nt	n/a	ccm	532.0	ccm

Notes:

Adjusted zero, NO/Nox/Nt span, and NH3 span.



Wood Buffalo Environmental Association

Nt-NO_x-NH₃ Calibration Report

Station Information

Calibration Date:

November 5, 2014

Station Number:

AMS 6

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated Nt conc (ppb)	Calculated NO _x conc (ppb)	Calculated NH ₃ conc (ppb)	Indicated Nt conc (ppb)	Indicated NO _x conc (ppb)	Indicated NH ₃ conc (ppb)	Nt Correction factor	NH ₃ Correction factor
as found zero										
as found NO										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.2	0.0	NA	NA
high NO point	5000	55.3	601.7	601.7	NA	602.0	602.0	0.0	1.000	NA
NO/O ₃ point	5000	55.3	601.7	601.7	NA	604.5	599.2	5.3	0.995	NA
as found NH ₃						0.0				
first NH ₃	5000	52.8	2006.4	NA	2006.4	2007.3	0.9	2006.4	1.000	1.000
second NH ₃	5000	26.3	999.4	NA	999.4	994.0	0.3	993.7	1.005	1.006
third NH ₃	5000	13.3	505.4	NA	505.4	498.8	0.1	498.7	1.013	1.013
as left zero						0.0				
as left span						0.0				
Average Correction Factor									0.9974	1.0064

Corrected As found

Nt = NA ppb
NH₃ = NA ppb

Previous response

Nt = 595.7 ppb
NH₃ = NA ppb

Nt percent change NA
NH₃ percent change NA

Converter efficiency 87.9%

Calibration Performed By:

Michael Martineau



Wood Buffalo Environmental Association

NH3 Calibration Summary

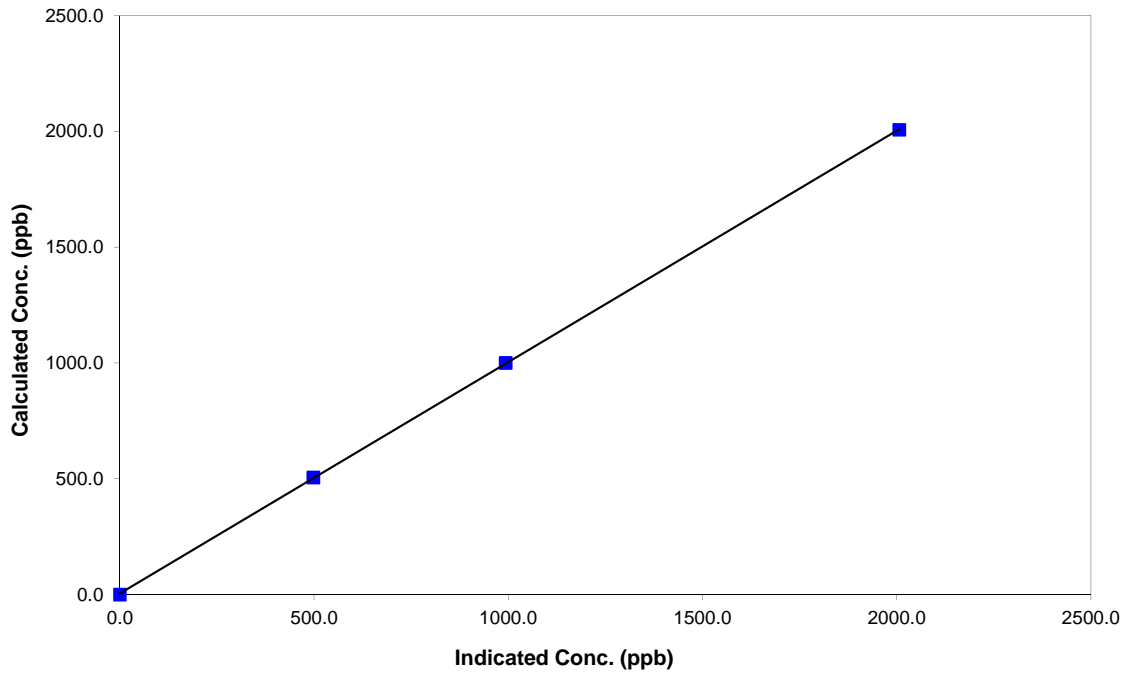
Station Information

Calibration Date	November 5, 2014	Previous Calibration	
Station Number	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	11:00	End Time (MST)	16:00
Analyzer make	Thermo 17i	Analyzer serial #	1426262596

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	0.999983
2006.4	2006.4	1.0000		
999.4	993.7	1.0057	Slope	0.999178
505.4	498.7	1.0134		
			Intercept	3.819347

NH3 Calibration Curve





Wood Buffalo Environmental Association

Nt Calibration Summary

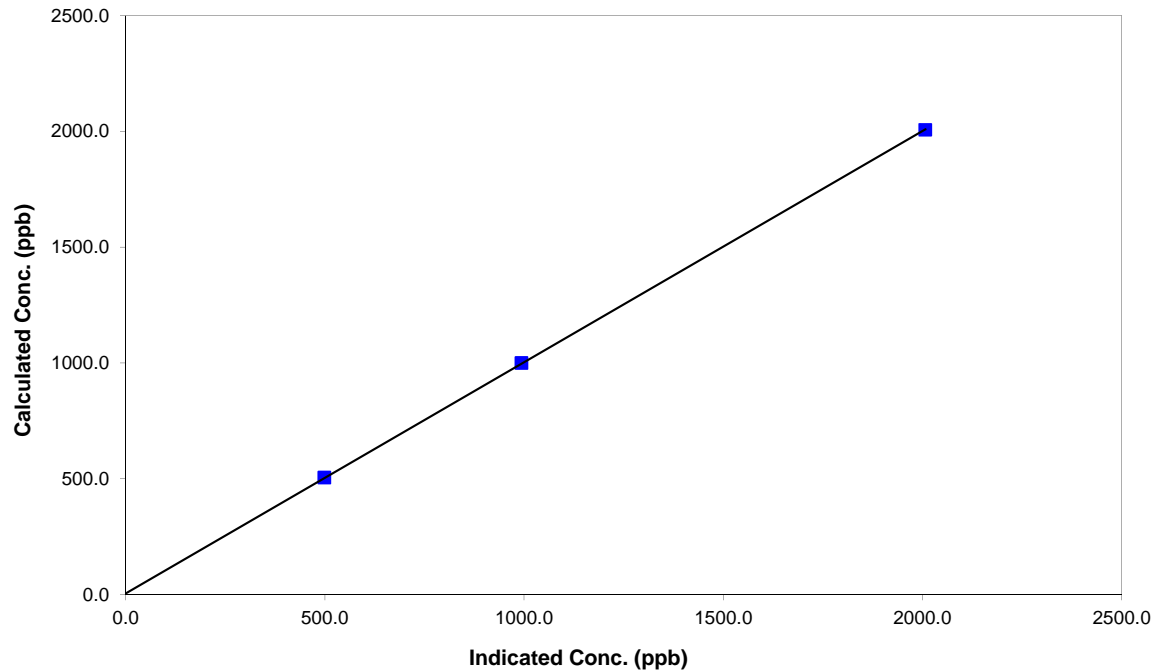
Station Information

Calibration Date	November 5, 2014	Previous Calibration	
Station Number	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	11:00	End Time (MST)	16:00
Analyzer make	Thermo 17i	Analyzer serial #	1426262596

Nt (NH₃) Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	N/A	Correlation Coefficient	0.999983
2006.4	2007.3	0.9996		
999.4	994.0	1.0054	Slope	0.998627
505.4	498.8	1.0132		
	0.0		Intercept	4.021559

Nt Calibration Curve





Wood Buffalo Environmental Association

NOx Calibration Summary

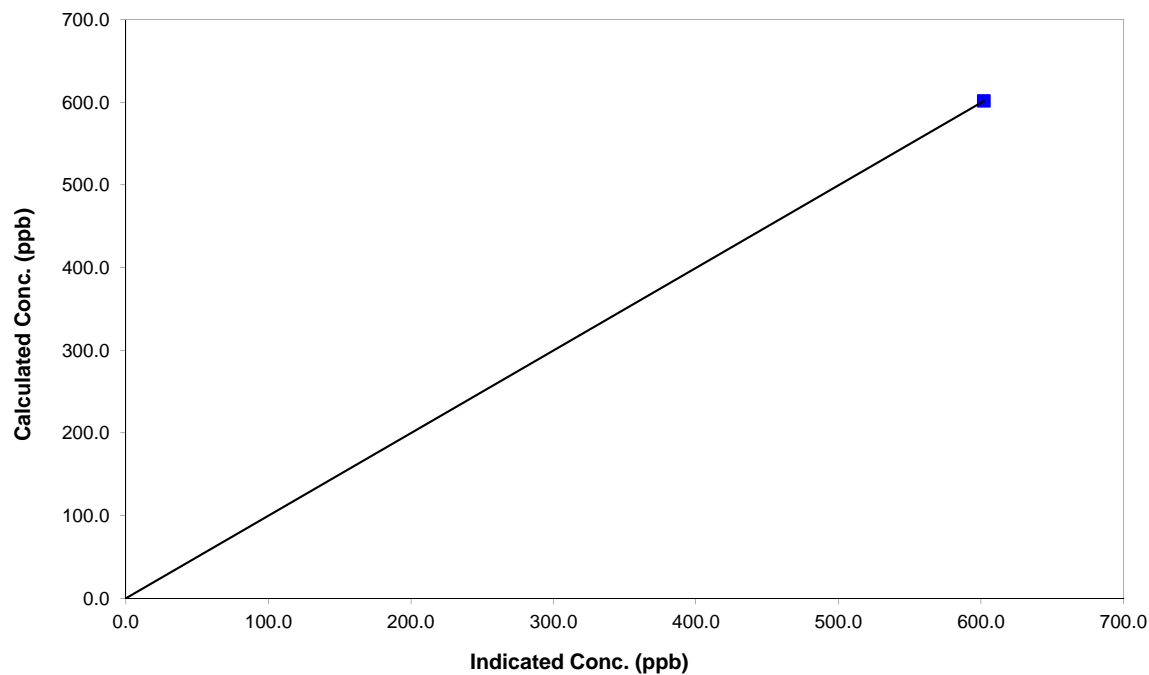
Station Information

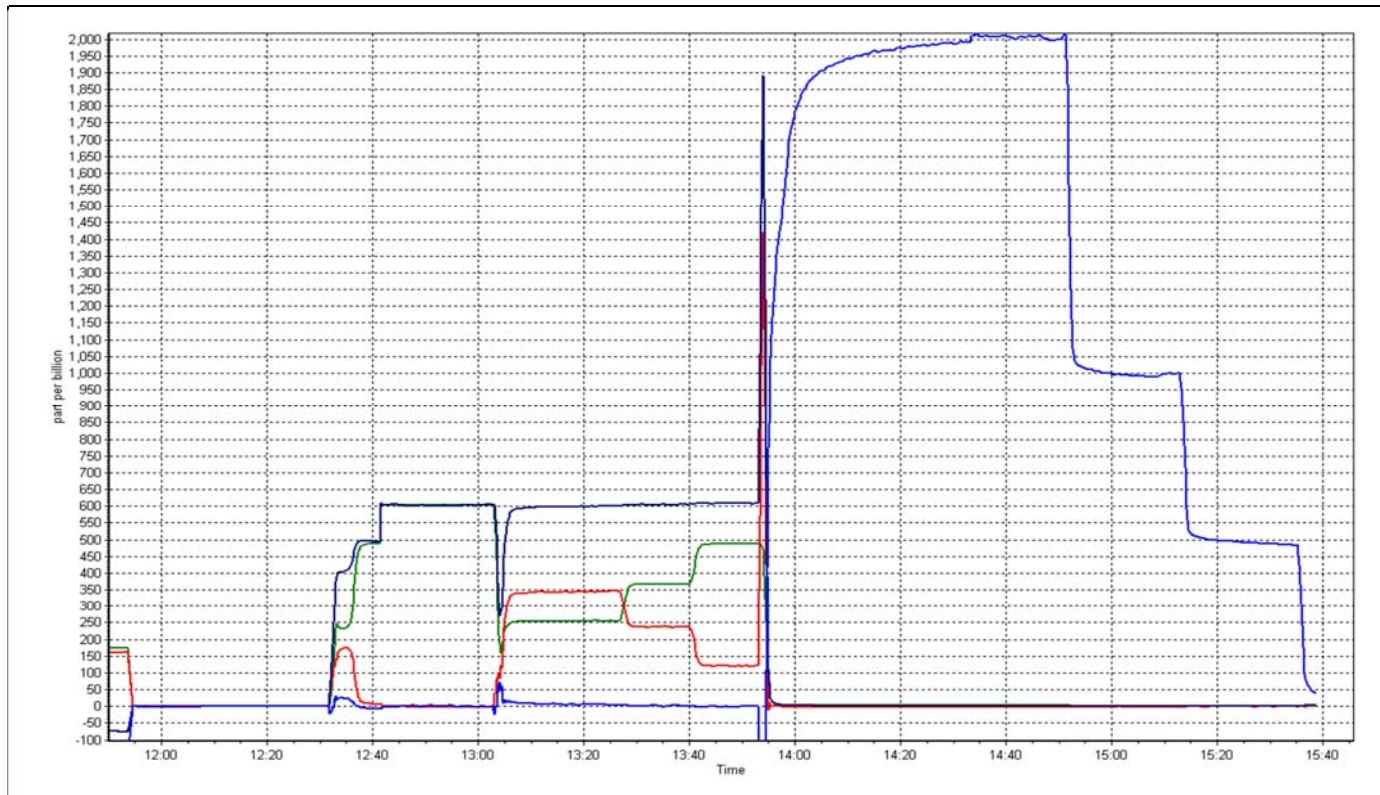
Calibration Date	November 5, 2014	Previous Calibration	
Station Number	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	11:00	End Time (MST)	16:00
Analyzer make	Thermo 17i	Analyzer serial #	1426262596

NO_x Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	N/A	Correlation Coefficient	0.999983
601.7	602.0	0.9994		
601.7	599.2	1.0042	Slope	1.001446
			Intercept	0.206964

NOx Calibration Curve







Wood Buffalo Environmental Association

NO_x-NO-NO₂ Calibration Report

Station Information

Calibration Date	November 5, 2014	Previous Calibration	n/a
Station Name	Patricia McInnes	Station Number	AMS 6
Reason:	<input type="text" value="Install"/>		
Start Time (MST)	11:00	End Time (MST)	16:00
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
NOx 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		NOx	NO	NO2
MV conversion	Analyzer Range (ppb)	1000	1000	1000
	Analyzer Range (mv)	1000	1000	1000
Before	Data Slope	0.997337	0.998287	0.987332
	Data Offset	0.027288	-0.235368	-1.221607
After	Data Slope	0.999110	0.997090	1.016263
	Data Offset	0.199822	0.119651	-2.935315
IP address:		192.168.1.42		
Voltage Range		N/A		

Analyzer Information

Analyzer make/model	Thermo 17i	Analyzer serial #	1426262596
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Test Point	before		after	
Concentration range	n/a	ppb	0-1000	ppb
NO coefficient	n/a		1.203	
NOX coefficient	n/a		0.921	
NO2 coefficient	n/a		1.000	
NO bkgrnd	n/a		9.8	
NOX bkgrnd	n/a		9.1	
Chamber Temp	n/a	Deg C	50.6	Deg C
Moly Temp	n/a	Deg C	327	Deg C
PMT voltage	n/a	V	-838	V
PMT Temp	n/a	Deg C	-8.8	Deg C
O3 flow	n/a	ccm	ok	ccm
R Cell press	n/a	mmHg	105.1	mmHg
sample Flow	n/a	ccm	0.510	ccm

Notes:

Adjusted zero and span



Wood Buffalo Environmental Association

NO_x-NO-NO₂ Calibration Report

Station Information

Calibration Date: November 5, 2014 Station Number: AMS 6

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NO _x conc (ppb)	Calculated NO conc (ppb)	Calculated NO ₂ conc (ppb)	Indicated NO _x conc (ppb)	Indicated NO conc (ppb)	Indicated NO ₂ conc (ppb)	NO _x Correction factor	NO Correction factor
as found zero										
as found span										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.1	-0.1	N/A	N/A
high point	5000	55.3	601.7	601.7	0.0	602.0	603.3	-1.0	0.9994	0.9973
second point										
third point										
calibrator zero										
as left zero										
as left span										
Average Correction Factor									0.9994	0.9973

Corrected As found NO_x= NA NO= NA Percent Change NO_x= N/A NO= N/A
 Previous Response NO_x= NA NO= NA

GPT Calibration Data

Dilution Flow 5000 ccm Source Gas Flow 55.30 ccm

O ₃ Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO ₂ conc (ppb)	Indicated NO _x conc (ppb)	Indicated NO conc (ppb)	Indicated NO ₂ conc (ppb)	NO _x Correction factor	NO Correction factor	NO ₂ Correction factor	Converter Efficiency
Cal zero			0.0			-0.1			N/A	
1st NO ₂ (300)	N/A	255.0	348.3	599.2	255.0	343.0	0.9931	1.0000	1.0155	98.5%
2nd NO ₂ (200)	N/A	366.8	236.6	604.4	366.8	237.6	0.9847	1.0000	0.9957	100.4%
3rd NO ₂ (100)	N/A	488.0	115.3	608.0	488.0	120.0	0.9788	1.0000	0.9605	104.1%
4th NO ₂ (0)	603.3	N/A	-1.3	602.0	603.3	-1.0	0.9885	1.0000	N/A	N/A
Average Correction Factor							0.9863	1.0000	0.9906	101.0%

Calibration Performed By: Michael Martineau



Wood Buffalo Environmental Association

NO_x Calibration Summary

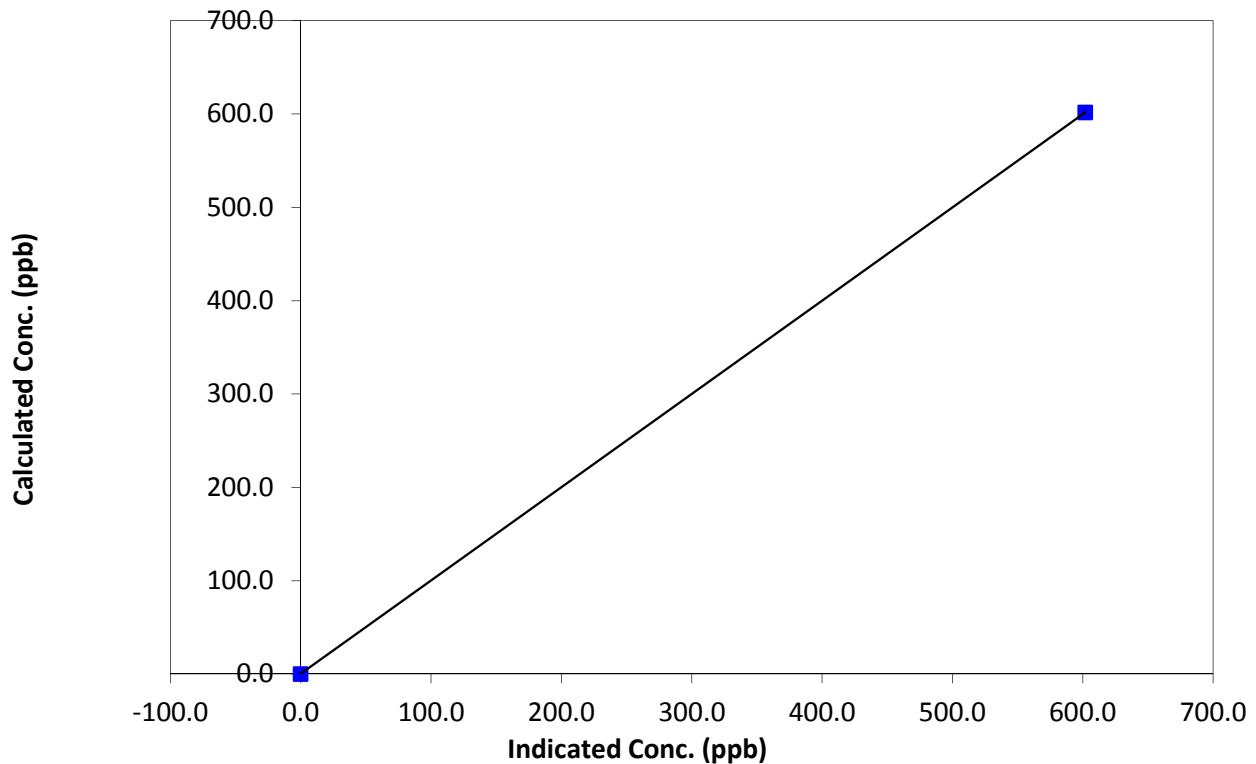
Station Information

Calibration Date	November 5, 2014	Previous Calibration	n/a
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	11:00	End Time (MST)	16:00
Analyzer make	Thermo 17i	Analyzer serial #	1426262596

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
601.7	602.0	0.9994		
			Slope	0.999110
			Intercept	0.199822

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

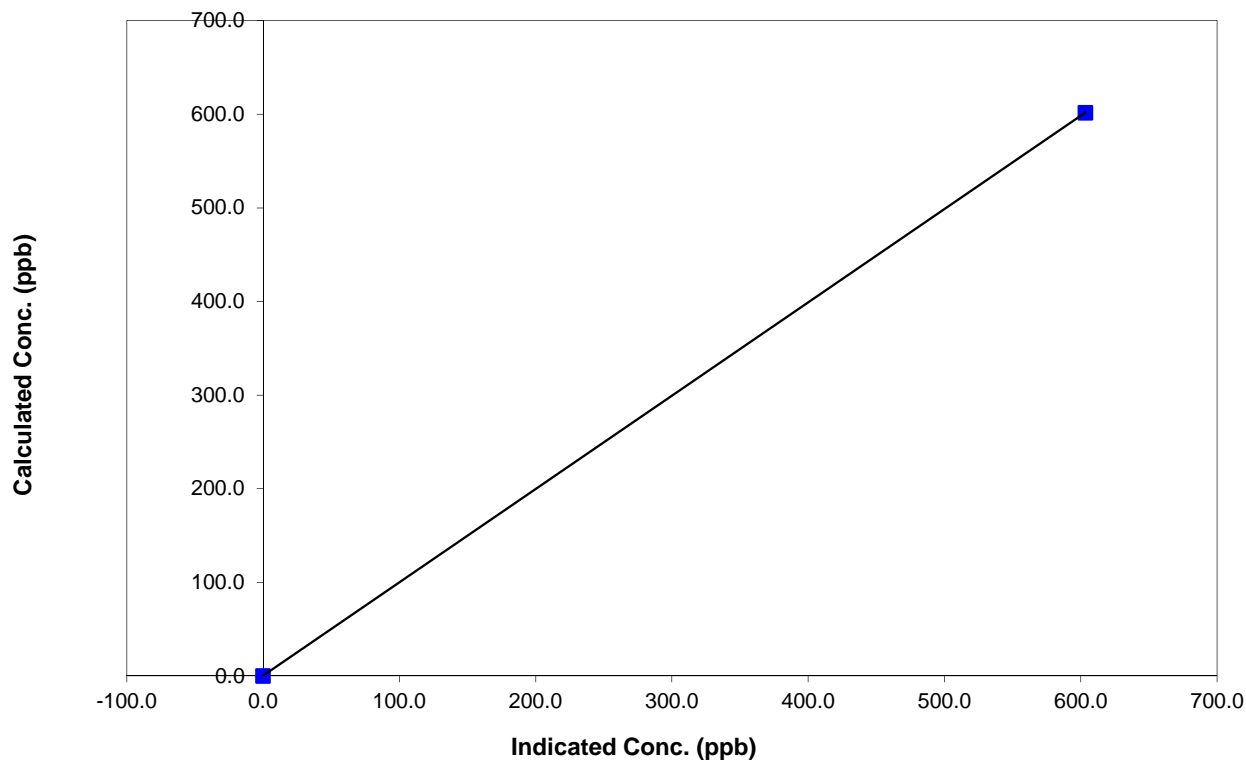
Station Information

Calibration Date	November 5, 2014	Previous Calibration	
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	11:00	End Time (MST)	16:00
Analyzer make	Thermo 17i	Analyzer serial #	1426262596

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	1.000000
601.7	603.3	0.9973		
			Slope	0.997090
			Intercept	0.119651

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

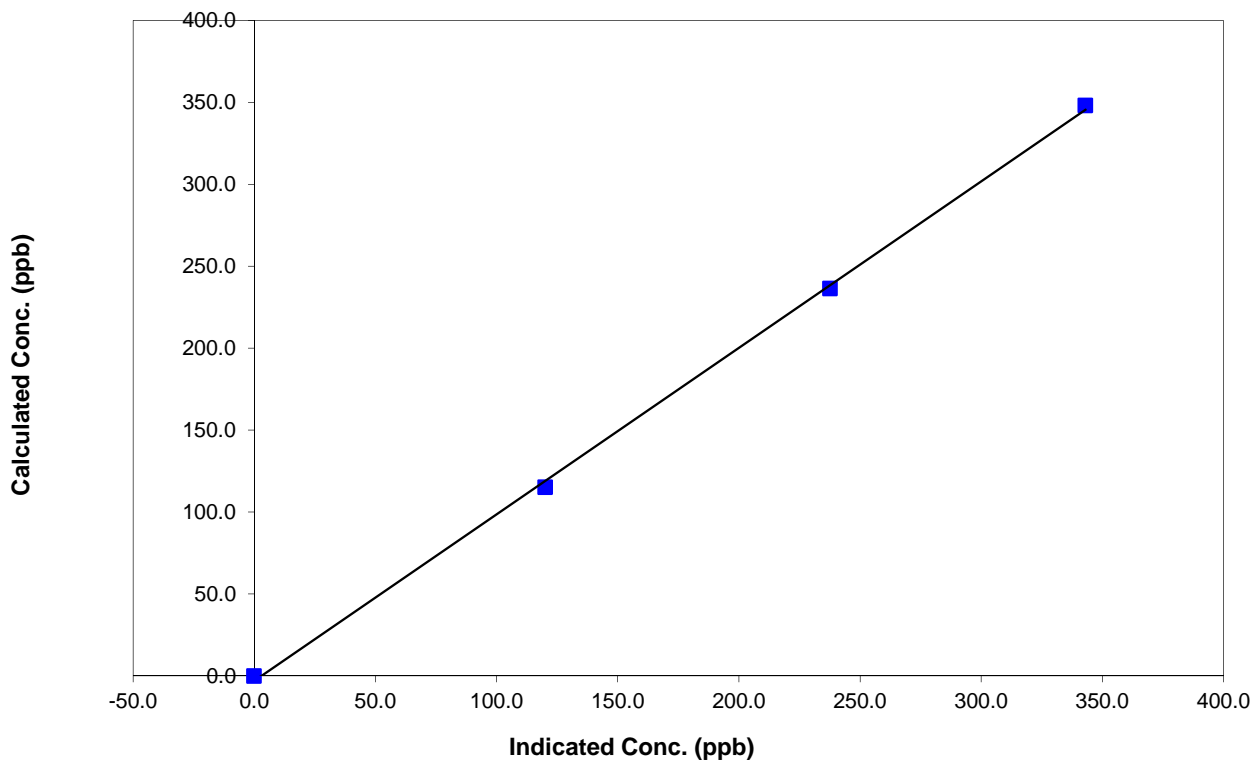
Station Information

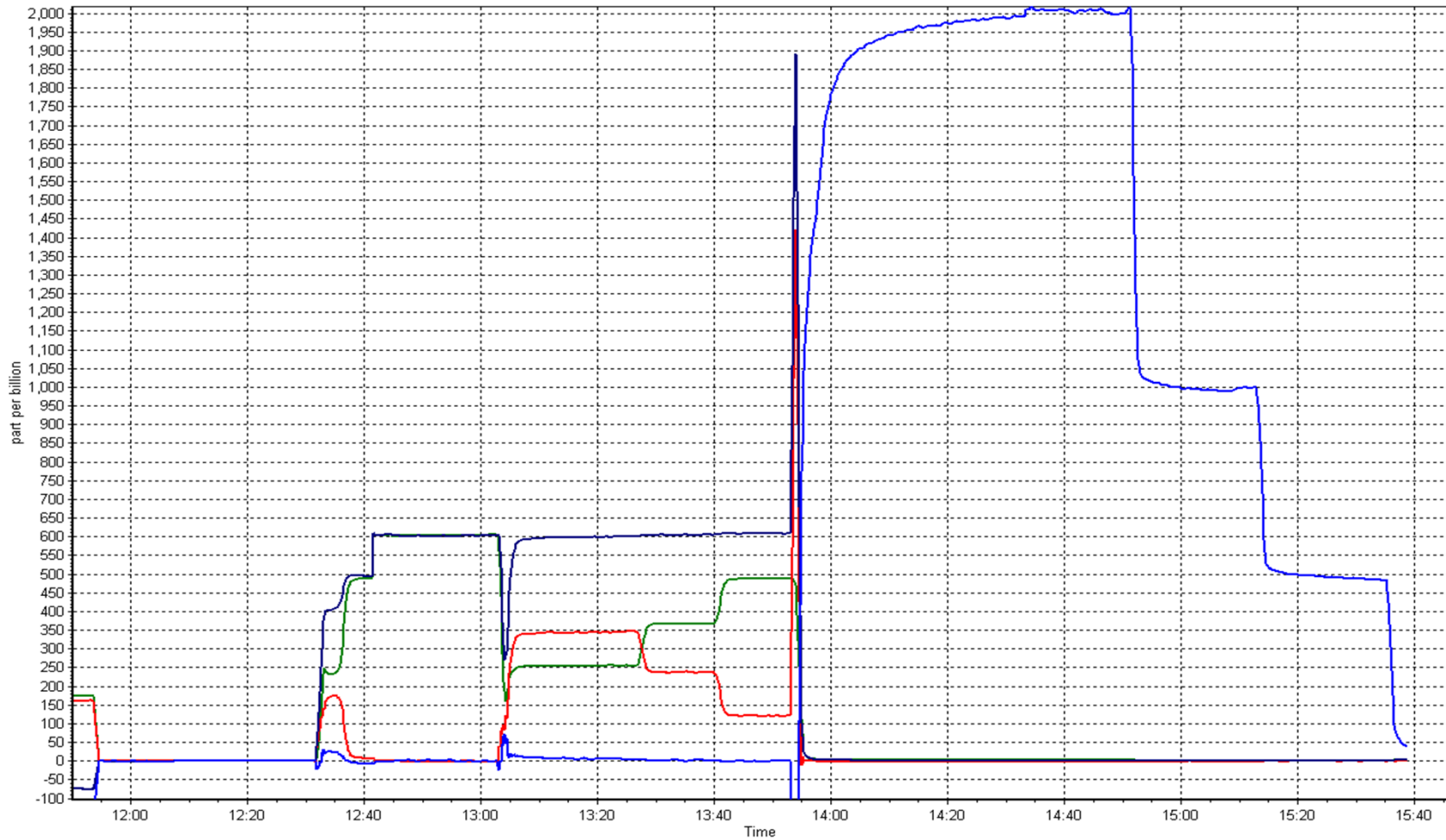
Calibration Date	November 5, 2014	Previous Calibration	n/a
Station Number	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	11:00	End Time (MST)	16:00
Analyzer make	Thermo 17i	Analyzer serial #	1426262596

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999498
348.3	343.0	1.0155		
236.6	237.6	0.9957	Slope	1.016263
115.3	120.0	0.9605		
			Intercept	-2.935315

NO₂ Calibration Curve





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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 7 ATHABASCA VALLEY NOVEMBER 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

December 30, 2014

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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ATHABASCA VALLEY (AMS 7)
NOVEMBER 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	677	35	43	98.89	19	0	3	0
TRS (ppb) Average	680	32	40	98.89	1	0	0	0
THC (ppm) Average	676	35	44	98.75	2.3	-	2	-
NMHC (ppm) Average	676	35	44	98.75	0.29	-	0.034	-
CH4(ppm) Average	676	35	44	98.75	2.2	-	2	-
O3 (ppb) Average	678	34	42	98.89	33	0	26	-
NO2 (ppb) Average	677	35	43	98.89	34	0	16	-
NO (ppb) Average	677	35	43	98.89	61	-	24	-
NOX (ppb) Average	677	35	43	98.89	86	-	40	-
PM2.5 (ug/m3) Average	709	0	11	98.47	52	-	13.9	0
CO(ppm) Average	676	35	44	98.75	0.4	0	0.2	-
Temperature 2 m (C) Average	712	0	8	98.89	10.4	-	3.8	-
Barometric Pressure (inHg) Average	661	0	59	91.81	29.9	-	-	-
Relative Humidity (%) Average	712	0	8	98.89	100	-	-	-
Wind Speed 10 m (km/h) Average	712	0	8	98.89	31	-	-	-
Wind Direction 10 m (deg) Average	712	0	8	98.89	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ATHABASCA VALLEY (AMS 7)
NOVEMBER 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	677	0.9	1	-	0	0	0	0	1	2	19
TRS (ppb) Average	680	0.3	0	-	0	0	0	0	0	0	1
THC (ppm) Average	676	1.9	0.1	-	1.8	1.8	1.9	1.9	1.9	2	2.3
NMHC (ppm) Average	676	0.005	0.022	-	0	0	0	0	0	0	0.29
CH4(ppm) Average	676	1.89	0.1	-	1.8	1.8	1.9	1.9	1.9	2	2.2
O3 (ppb) Average	678	14.4	10	-	0	2	5	14	23	27	33
NO2 (ppb) Average	677	9.1	7	-	0	2	4	7	13	19	34
NO (ppb) Average	677	4.7	8	-	0	0	0	2	5	14	61
NOX (ppb) Average	677	13.8	13	-	0	3	5	9	19	31	86
PM2.5 (ug/m3) Average	709	6.32	4.9	-	0.2	2.1	3.4	5.1	7.7	11.5	52
CO(ppm) Average	676	0.07	0.1	-	0	0	0	0.1	0.1	0.1	0.4
Temperature 2 m (C) Average	712	-10.73	8.2	-	-30	-21.5	-15.8	-11.8	-4.9	0.6	10.4
Barometric Pressure (inHg) Average	661	29.17	0.3	-	28.5	28.7	28.9	29.2	29.4	29.6	29.9
Relative Humidity (%) Average	712	78.3	10	-	48	65	73	78	84	92	100
Wind Speed 10 m (km/h) Average	712	8.2	6	-	0	2	4	7	11	17	31
Wind Direction 10 m (deg) Average	712	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ATHABASCA VALLEY (AMS 7)
NOVEMBER 2014

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
ALL PARAMETERS	28 Nov 2014 14:00	28 Nov 2014 21:00	8	Maintenance - conversion to standardized collection system
NMHC, CH4, THC	22 Nov 2014 12:00	22 Nov 2014 12:00	1	Maintenance - replaced carrier gas
PM2.5	17 Nov 2014 07:00	17 Nov 2014 08:00	2	Maintenance - stn operator on site cleaning
PM2.5	25 Nov 2014 16:00	25 Nov 2014 16:00	1	Maintenance - new sample pump installed
CO	29 Nov 2014 17:00	29 Nov 2014 17:00	1	Maintenance - tested daily zero and span system
Barometric Pressure	28 Nov 2014 14:00	01 Dec 2014 00:00	59	Analyzer failure - data collection error

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Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 19 ppb on Nov 25 15:00	Maximum Daily Average: 2.7 ppb on Nov 11		Hours of Data:	677
Minimum Value: 0 ppb on Nov 5 14:00	Minimum Daily Average: 0.2 ppb on Nov 22		Hours of Missing Data:	43
Maximum Diurnal Average: 2.0 ppb at hour 15	Minimum Diurnal Average: 0.4 ppb at hour 4		Hours of Calibration:	35
Monthly Average: 0.9 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 2 P ₉₉ = 8		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-Nov	1	1	0	Z	1	1	1	1	1	1	1	1	0	1	0	0	1	1	0	0	1	1	1	0	0.6	1
2-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
3-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	2	1	2	5	8	2	1	0	1.2	8
4-Nov	0	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
5-Nov	0	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
6-Nov	0	0	0	Z	1	1	1	1	0	0	0	0	1	1	0	1	1	0	0	0	0	0	0	0	0.5	1
7-Nov	0	0	0	Z	0	0	0	0	1	0	0	1	1	0	0	2	4	2	1	2	5	4	5	7	1.6	7
8-Nov	1	1	1	Z	3	5	3	3	2	2	3	3	5	5	4	8	2	1	1	1	1	0	0	0	2.3	8
9-Nov	1	1	0	Z	0	0	1	1	1	0	1	4	5	9	8	2	3	1	1	0	0	0	0	0	1.7	9
10-Nov	0	1	1	Z	1	1	1	2	1	3	3	2	2	1	3	6	2	1	1	0	0	1	0	0	1.5	6
11-Nov	1	1	1	Z	3	2	1	0	0	0	1	2	11	7	7	7	5	3	4	2	1	1	1	1	2.7	11
12-Nov	1	1	1	Z	2	2	1	1	1	1	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0.8	2
13-Nov	0	0	0	Z	0	0	0	1	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0.6	1
14-Nov	1	1	1	Z	1	1	1	1	0	0	1	0	0	3	4	5	4	1	1	1	0	0	0	1	1.1	5
15-Nov	1	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	1	3	1	0	2	3	3	2	3	1.0	3
16-Nov	2	3	3	Z	1	2	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1.0	3
17-Nov	0	0	0	Z	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0.4	1
18-Nov	0	0	0	Z	1	2	2	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	0	1	0.8	2
19-Nov	0	0	0	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
20-Nov	1	1	0	Z	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	0.6	1
21-Nov	1	1	0	Z	0	0	0	0	0	0	1	0	1	2	2	4	1	0	0	0	0	0	0	0	0.7	4
22-Nov	0	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
23-Nov	0	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.6	1
24-Nov	0	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
25-Nov	0	0	0	Z	0	0	0	0	1	1	0	1	9	11	19	8	2	2	2	1	1	1	1	1	2.6	19
26-Nov	1	1	1	Z	1	1	1	0	1	C	C	C	C	C	1	1	1	1	1	2	2	1	1	0	0.8	2
27-Nov	0	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.4	1
28-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	M	M	M	M	M	M	M	M	1	1	1	--	1
29-Nov	1	1	0	1	Z	0	0	1	1	1	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0.5	1
30-Nov	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0.4	1

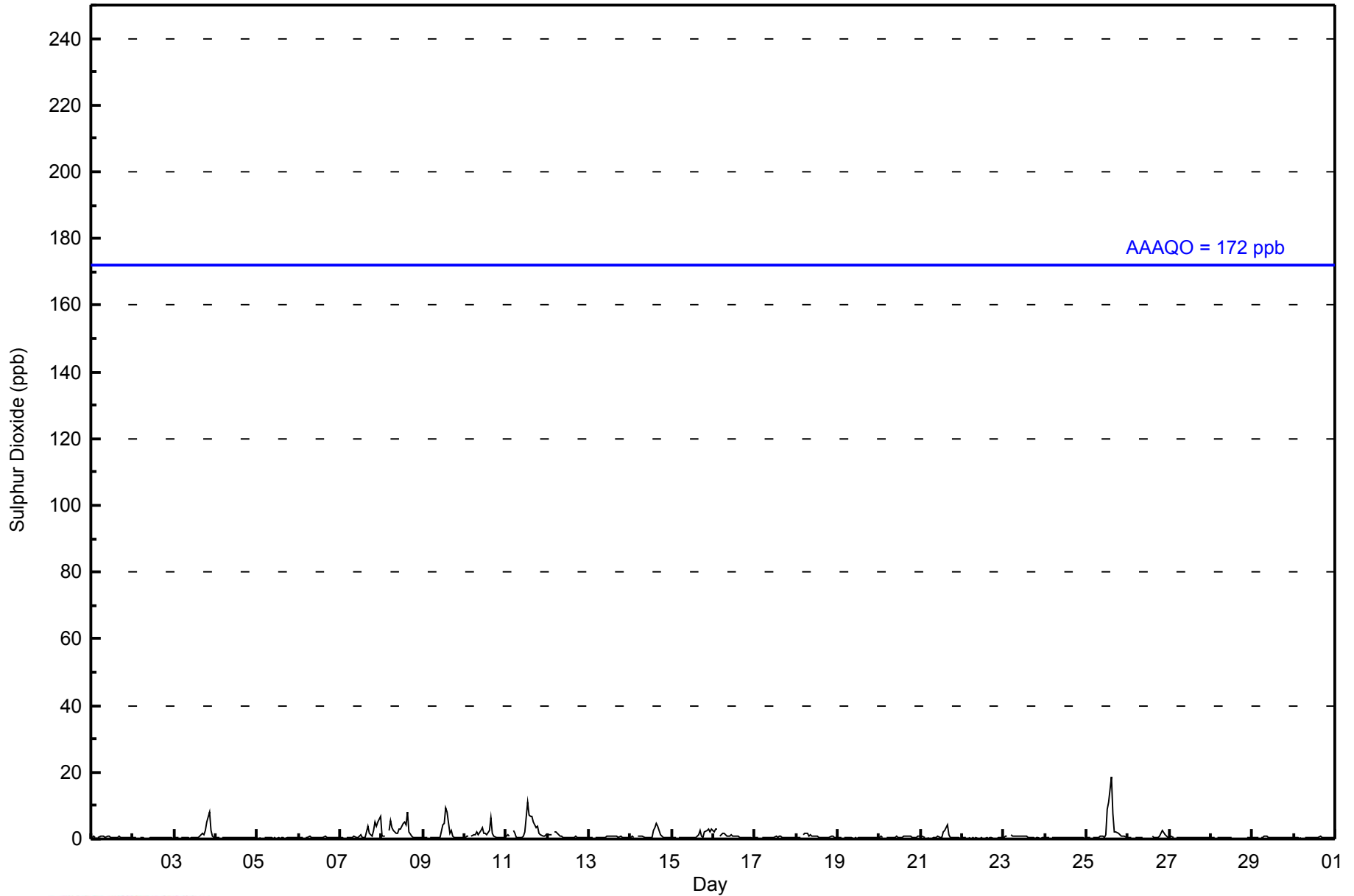
0.5	0.6	0.5	0.4	0.7	0.8	0.7	0.6	0.5	0.6	0.7	0.8	1.5	1.7	2.0	1.9	1.2	0.7	0.7	0.8	1.0	0.7	0.6	0.7	Diurnal Average	
2	3	3	1	3	5	3	3	2	3	3	4	11	11	19	8	5	3	4	5	8	4	5	7	Diurnal Maximum	

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



WBEA
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Athabasca Valley - November 2014





WBEA
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Athabasca Valley - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	674	99.56	99.56
11 - 20	3	0.44	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 677

Total Number of Hours: 720



WBEA
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Athabasca Valley - November 2014

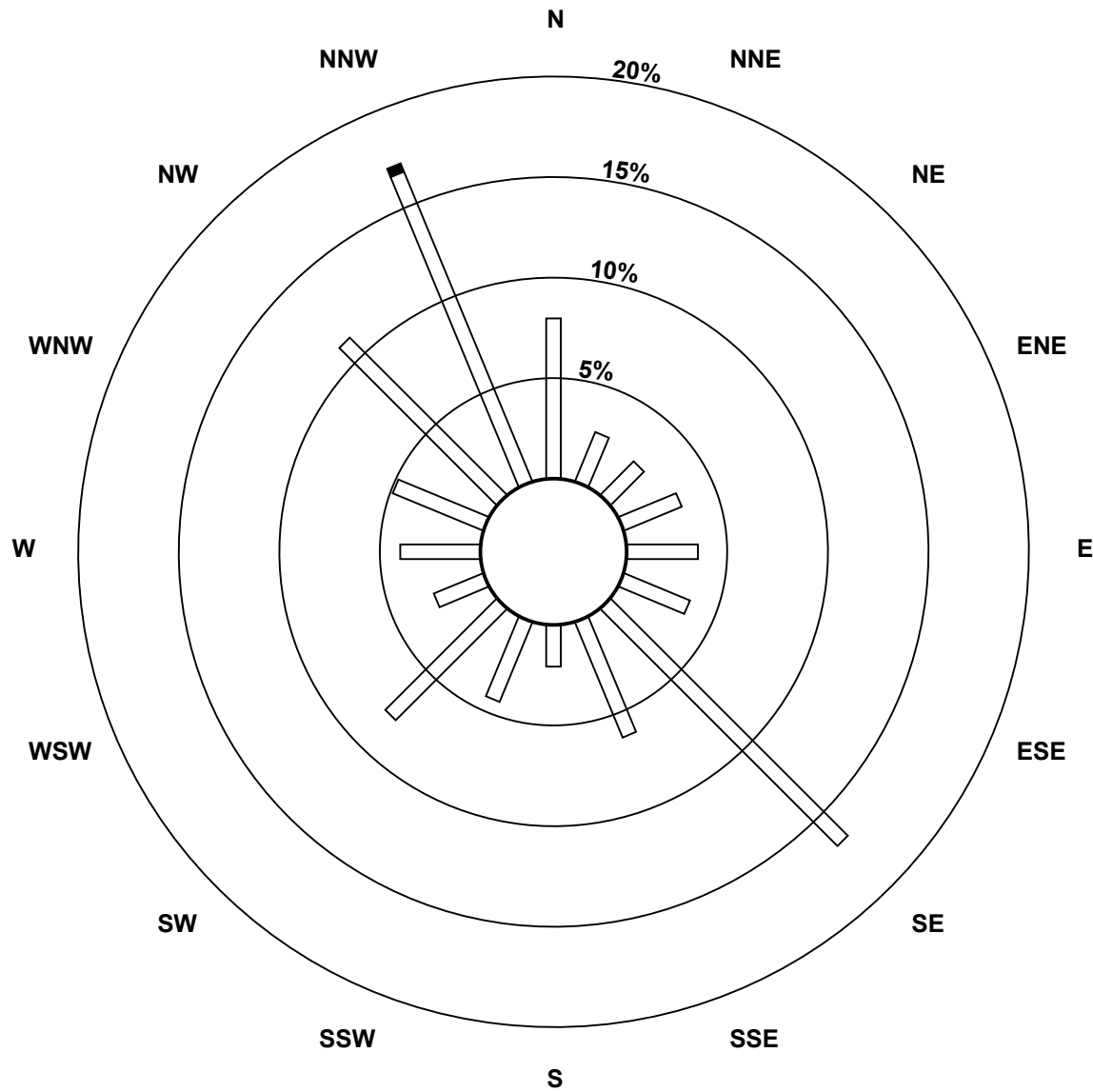
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	54	18	16	21	24	24	113	42	14	29	53	18	27	33	75	113	674
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	54	18	16	21	24	24	113	42	14	29	53	18	27	33	75	116	677

Total Number of Valid Hours: 677

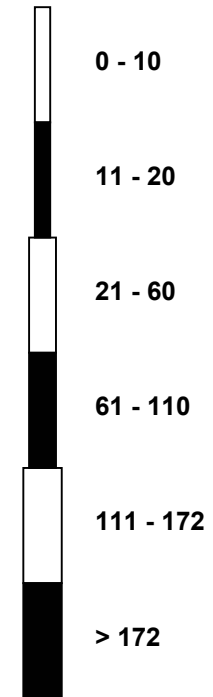
Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

Sulphur Dioxide (SO₂) - ppb
Athabasca Valley (AMS 7)



Classes (ppb)

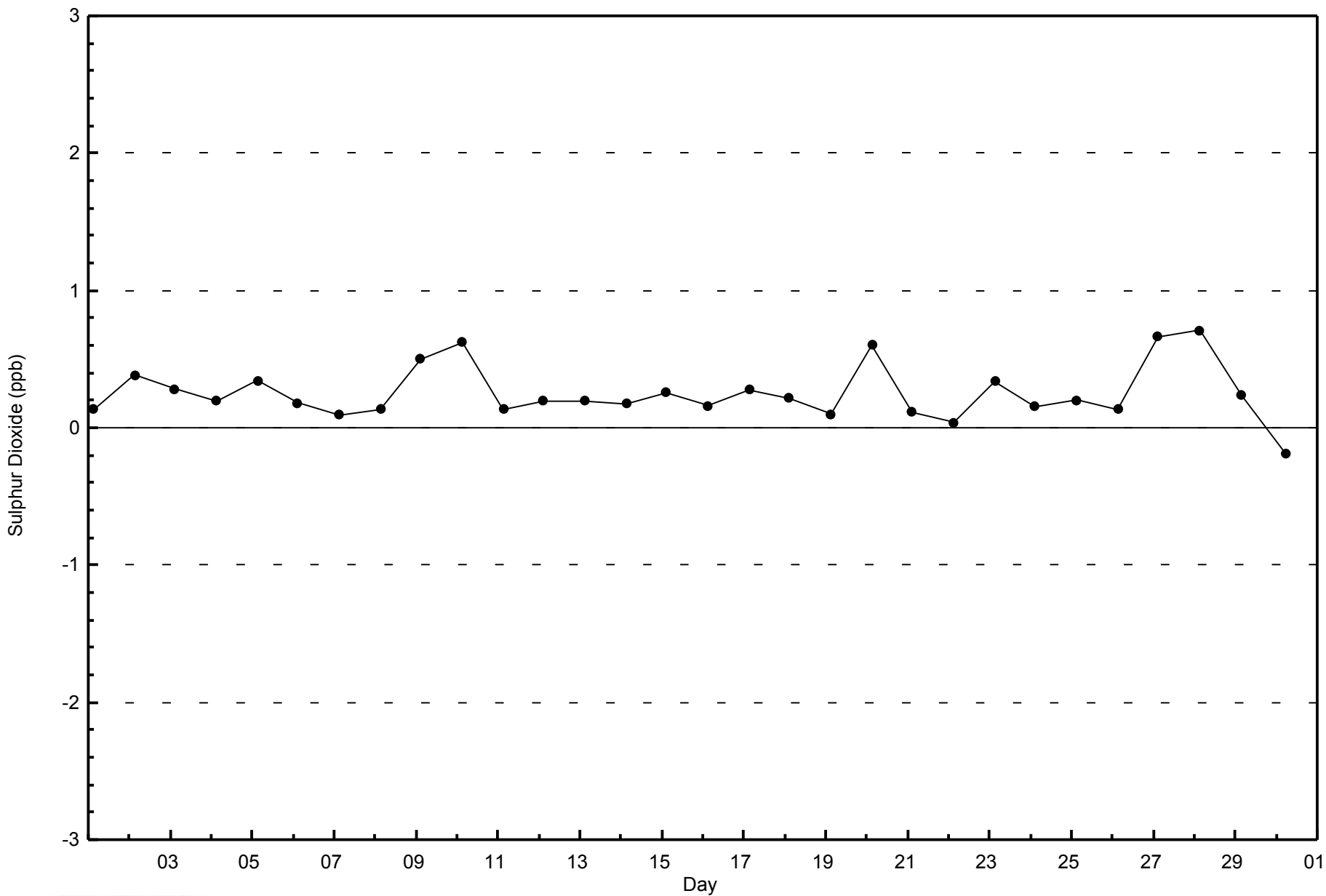


Total Number of Valid Hours: 677



WBEA
Zero Responses

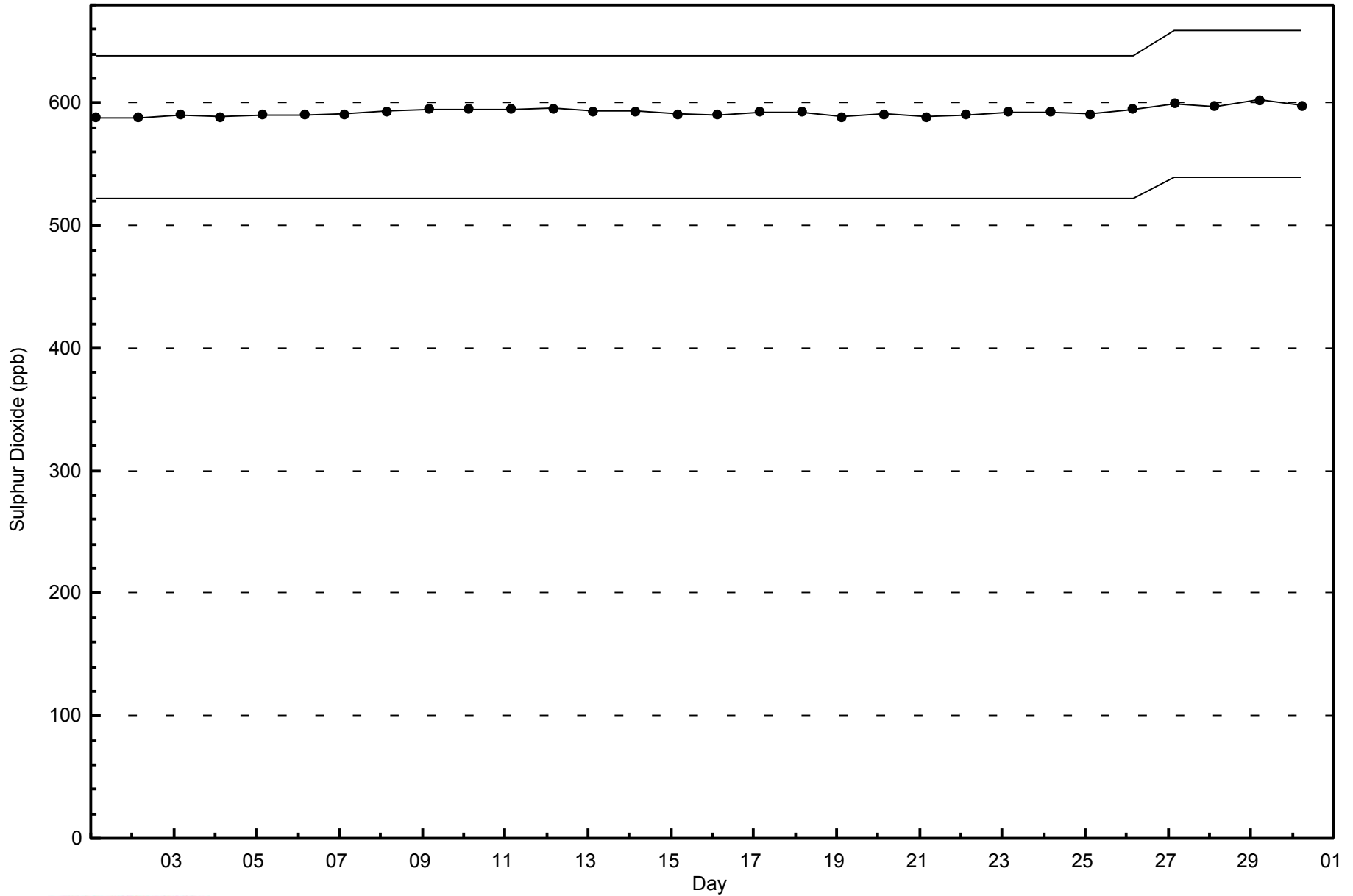
Sulphur Dioxide (SO₂) - ppb
Athabasca Valley - November 2014





WBEA
Span Responses

Sulphur Dioxide (SO₂) - ppb
Athabasca Valley - November 2014





Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 1 ppb on Nov 26 21:00	Maximum Daily Average: 0.5 ppb on Nov 26		Hours of Data:	680
Minimum Value: 0 ppb on Nov 1 02:00	Minimum Daily Average: 0.1 ppb on Nov 6		Hours of Missing Data:	40
Maximum Diurnal Average: 0.3 ppb at hour 16	Minimum Diurnal Average: 0.2 ppb at hour 24		Hours of Calibration:	32
Monthly Average: 0.3 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1		Percent Operational Time:	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-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
2-Nov	0	0	0	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
3-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0.3	1
4-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
5-Nov	0	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
6-Nov	0	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
7-Nov	0	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-Nov	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
9-Nov	0	0	0	0	Z	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0.3	1
10-Nov	0	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
11-Nov	0	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
12-Nov	0	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
13-Nov	0	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
14-Nov	0	0	0	0	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
15-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
16-Nov	0	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
17-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.3	1
18-Nov	0	0	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
19-Nov	0	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
20-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
21-Nov	1	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
22-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
23-Nov	0	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
24-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	C	C	0	0	0	0	0	0	0	0	0.2	0
25-Nov	0	0	0	0	Z	0	0	0	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	0	0.5	1
26-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0.5	1
27-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
28-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	M	M	M	M	M	M	M	M	0	0	0	--	0
29-Nov	0	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
30-Nov	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

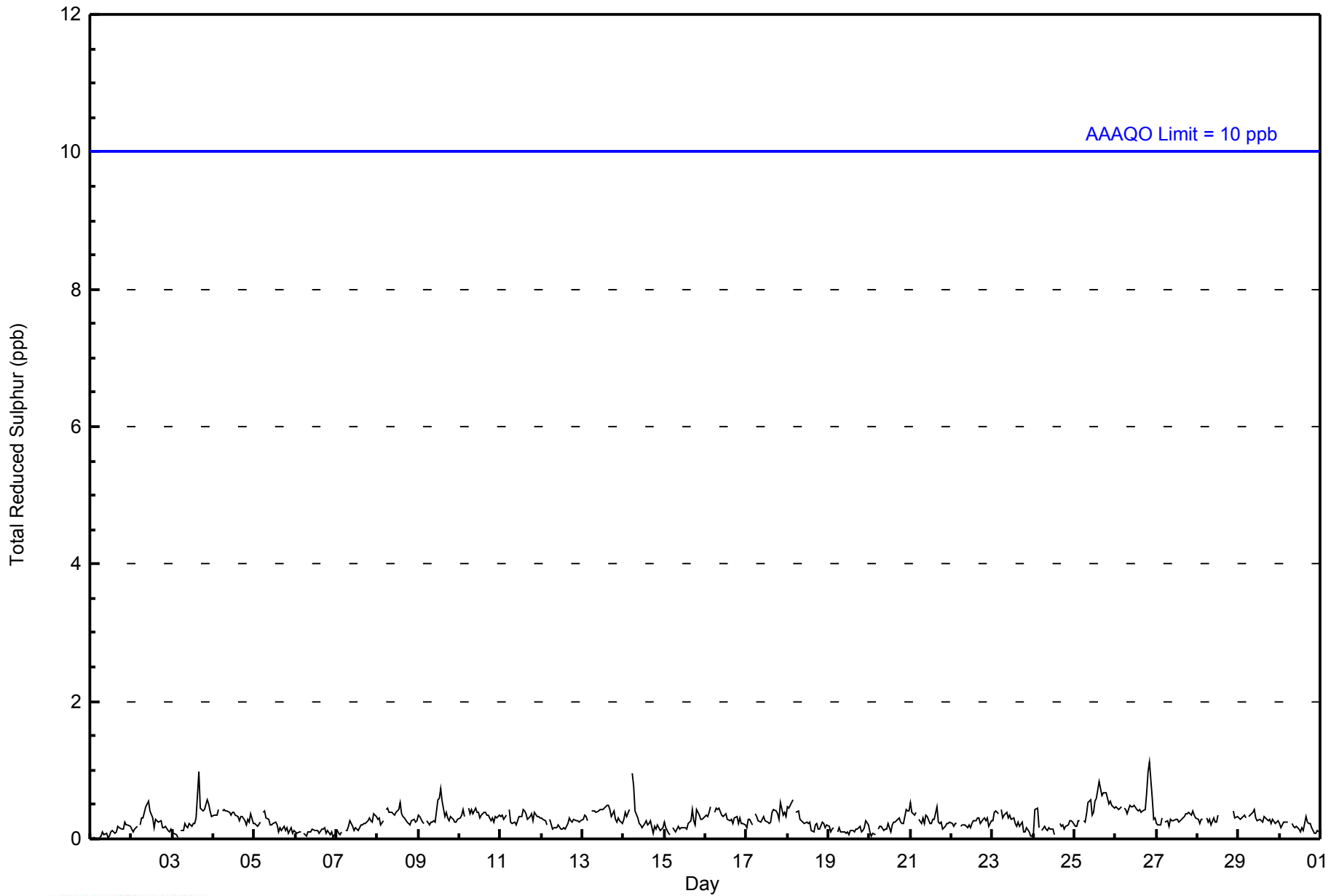
0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	Diurnal Average	
1	0	1	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	Diurnal Maximum

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
Athabasca Valley - November 2014





WBEA
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Athabasca Valley - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	680	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: 680

Total Number of Hours: 720



WBEA
Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Athabasca Valley - November 2014

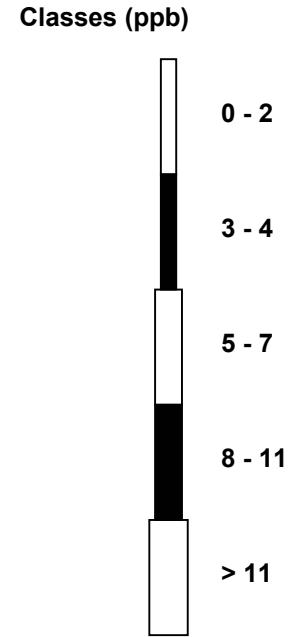
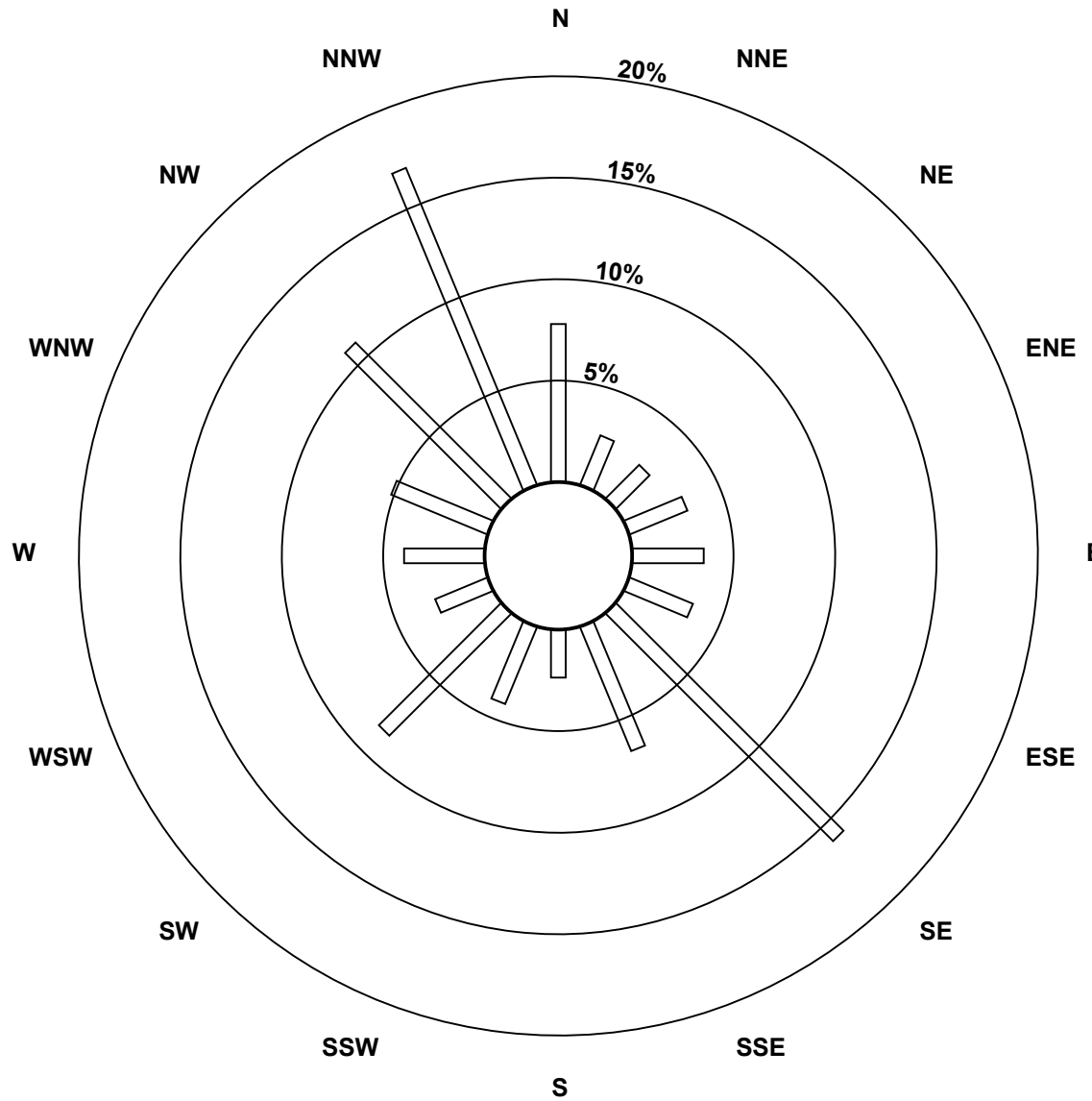
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	53	18	16	21	24	23	108	45	16	28	58	19	27	35	74	115	680
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	53	18	16	21	24	23	108	45	16	28	58	19	27	35	74	115	680

Total Number of Valid Hours: 680

Total Number of Hours: 720

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

**Total Reduced Sulphur (TRS) - ppb
Athabasca Valley (AMS 7)**

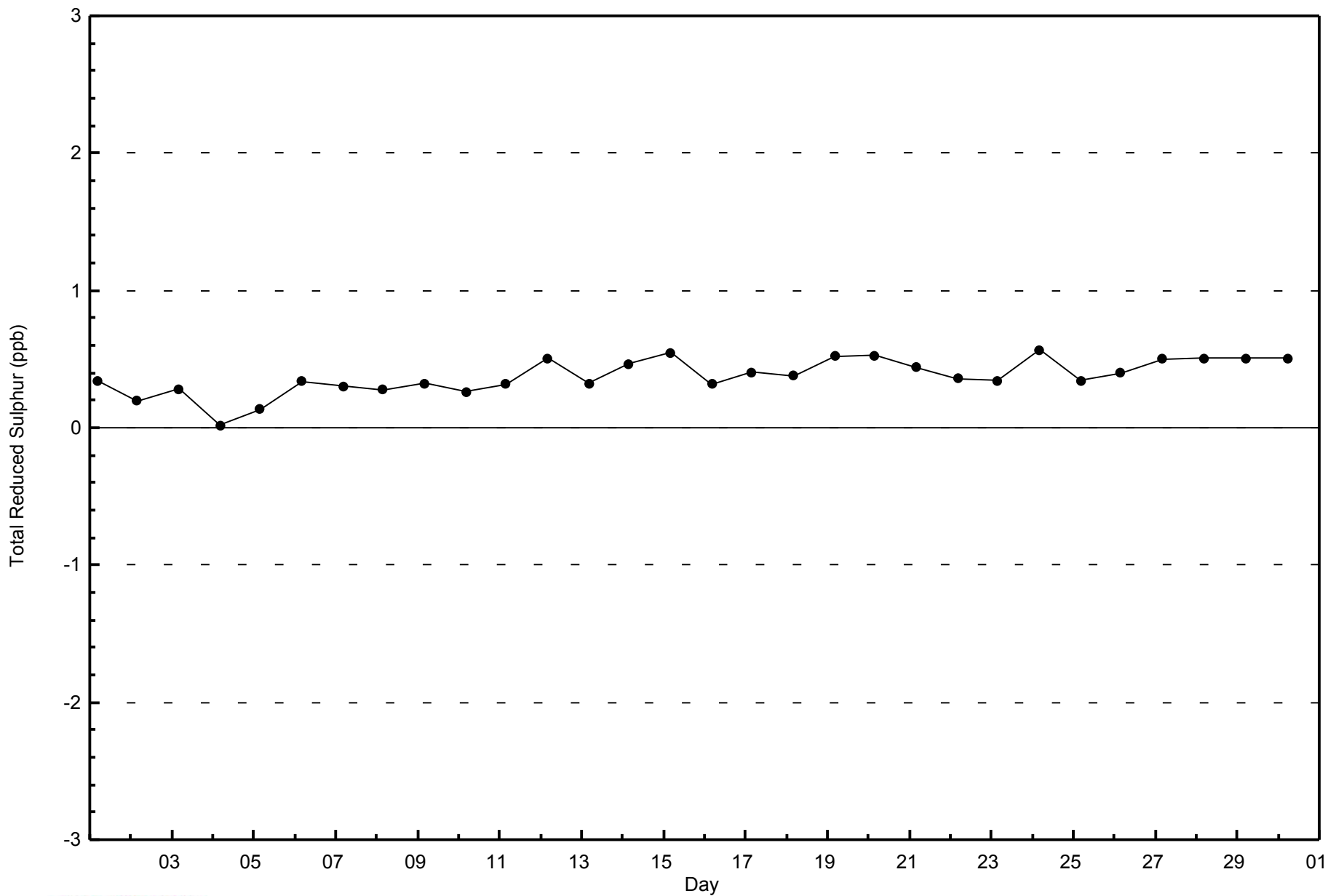


Total Number of Valid Hours: 680



WBEA
Zero Responses

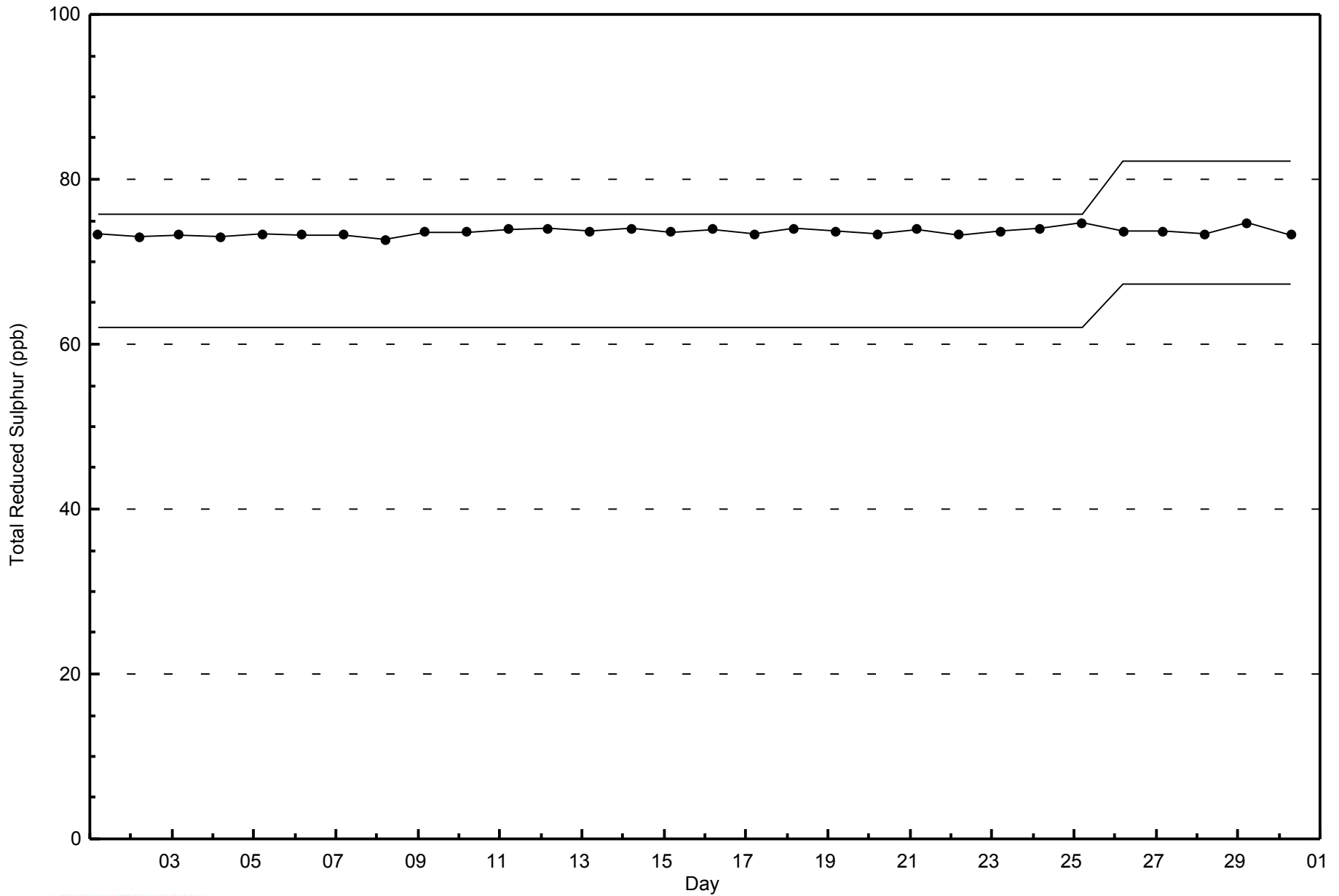
Total Reduced Sulphur (TRS) - ppb
Athabasca Valley - November 2014





WBEA
Span Responses

Total Reduced Sulphur (TRS) - ppb
Athabasca Valley - November 2014



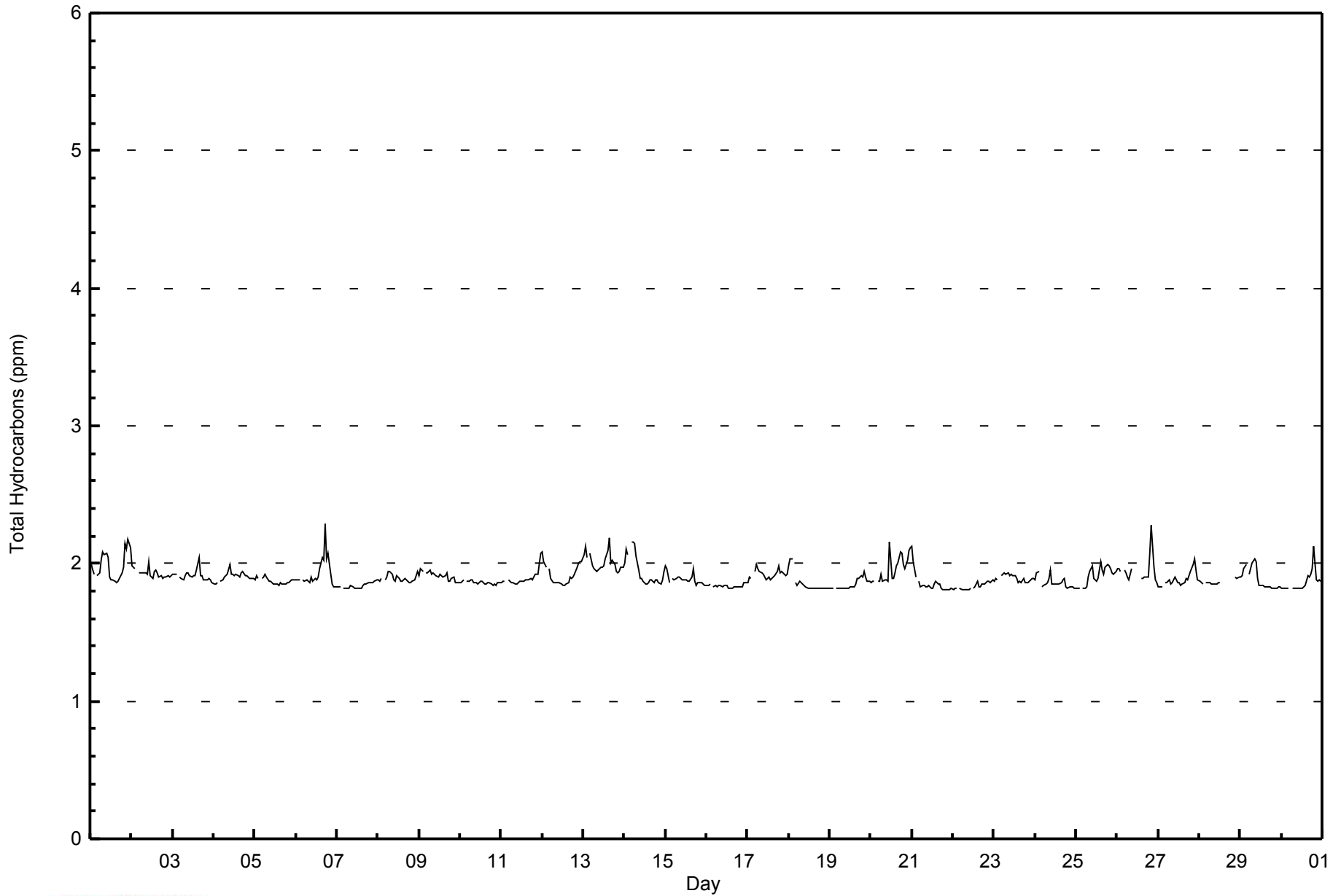


Maximum Value: 2.3 ppm on Nov 6 18:00																	Maximum Daily Average: 2.0 ppm on Nov 13																	Hours in Service: 720	
Minimum Value: 1.8 ppm on Nov 22 08:00																	Minimum Daily Average: 1.8 ppm on Nov 22																	Hours of Data: 676	
Maximum Diurnal Average: 1.9 ppm at hour 2																	Minimum Diurnal Average: 1.9 ppm at hour 13																	Hours of Missing Data: 44	
Monthly Average: 1.90 ppm																	Percentiles: P ₁ = 1.8 P ₁₀ = 1.8 Q ₁ = 1.9 Median = 1.9 Q ₃ = 1.9 P ₉₀ = 2.0 P ₉₉ = 2.1																	Hours of Calibration: 35	
																																		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-Nov	2.0	1.9	1.9	Z	1.9	1.9	2.0	2.1	2.1	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.1	2.2	2.1	2.0	2.2									
2-Nov	2.0	2.0	2.0	Z	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9									
3-Nov	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9									
4-Nov	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9									
5-Nov	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9									
6-Nov	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.3	2.0	2.1	1.9	1.8	1.8	1.8	1.9	2.3									
7-Nov	1.8	1.8	1.8	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9									
8-Nov	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9									
9-Nov	1.9	2.0	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0									
10-Nov	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.9	1.9	1.9	1.9									
11-Nov	1.9	1.9	1.9	Z	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	1.9	2.0	2.1	1.9	2.1									
12-Nov	2.1	2.0	2.0	Z	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	1.9	2.1									
13-Nov	2.1	2.1	2.0	Z	2.1	2.0	2.0	1.9	1.9	2.0	2.0	2.0	2.0	2.1	2.2	2.0	2.0	2.0	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.2									
14-Nov	2.0	2.1	2.1	Z	2.2	2.2	2.1	2.1	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.2									
15-Nov	2.0	2.0	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.8	1.9	1.9	1.8	1.8	1.9	2.0	2.0									
16-Nov	1.8	1.8	1.9	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9									
17-Nov	1.9	1.9	1.9	Z	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	2.0									
18-Nov	2.0	2.0	2.0	Z	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									
19-Nov	1.8	1.8	1.8	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9									
20-Nov	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.2	1.9	1.9	1.9	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.1	2.1	2.0	2.2									
21-Nov	2.1	2.0	1.9	Z	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.1									
22-Nov	1.8	1.8	1.8	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	M	1.8	1.8	1.9	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9									
23-Nov	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9									
24-Nov	1.9	1.9	1.9	Z	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9									
25-Nov	1.8	1.8	1.8	Z	1.8	1.8	1.8	1.9	1.9	2.0	1.9	1.9	1.9	1.9	2.0	2.0	1.9	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	2.0									
26-Nov	2.0	2.0	1.9	Z	2.0	1.9	1.9	1.9	2.0	C	C	C	C	C	1.9	1.9	1.9	1.9	1.9	2.1	2.3	2.0	1.9	1.9	1.9	2.3									
27-Nov	1.8	1.8	1.8	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	2.0	2.0									
28-Nov	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.9	M	M	M	M	M	M	M	M	M	1.9	1.9	1.9									
29-Nov	1.9	1.9	2.0	Z	2.0	Z	1.9	2.0	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	1.8	1.8	2.0									
30-Nov	1.8	1.8	1.8	Z	1.8	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	2.0	2.1	1.9	1.9	1.9	1.9	2.1									
																								Diurnal Average											
																								Diurnal Maximum											
Z - zerospan C - Calibration M - Maintenance																																			



WBEA
Hourly Averages

Total Hydrocarbons (THC) - ppm
Athabasca Valley - November 2014





WBEA
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Athabasca Valley - November 2014

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	645	95.41	95.41
2.1 - 3.0	31	4.59	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 676

Total Number of Hours: 720



WBEA
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Athabasca Valley - November 2014

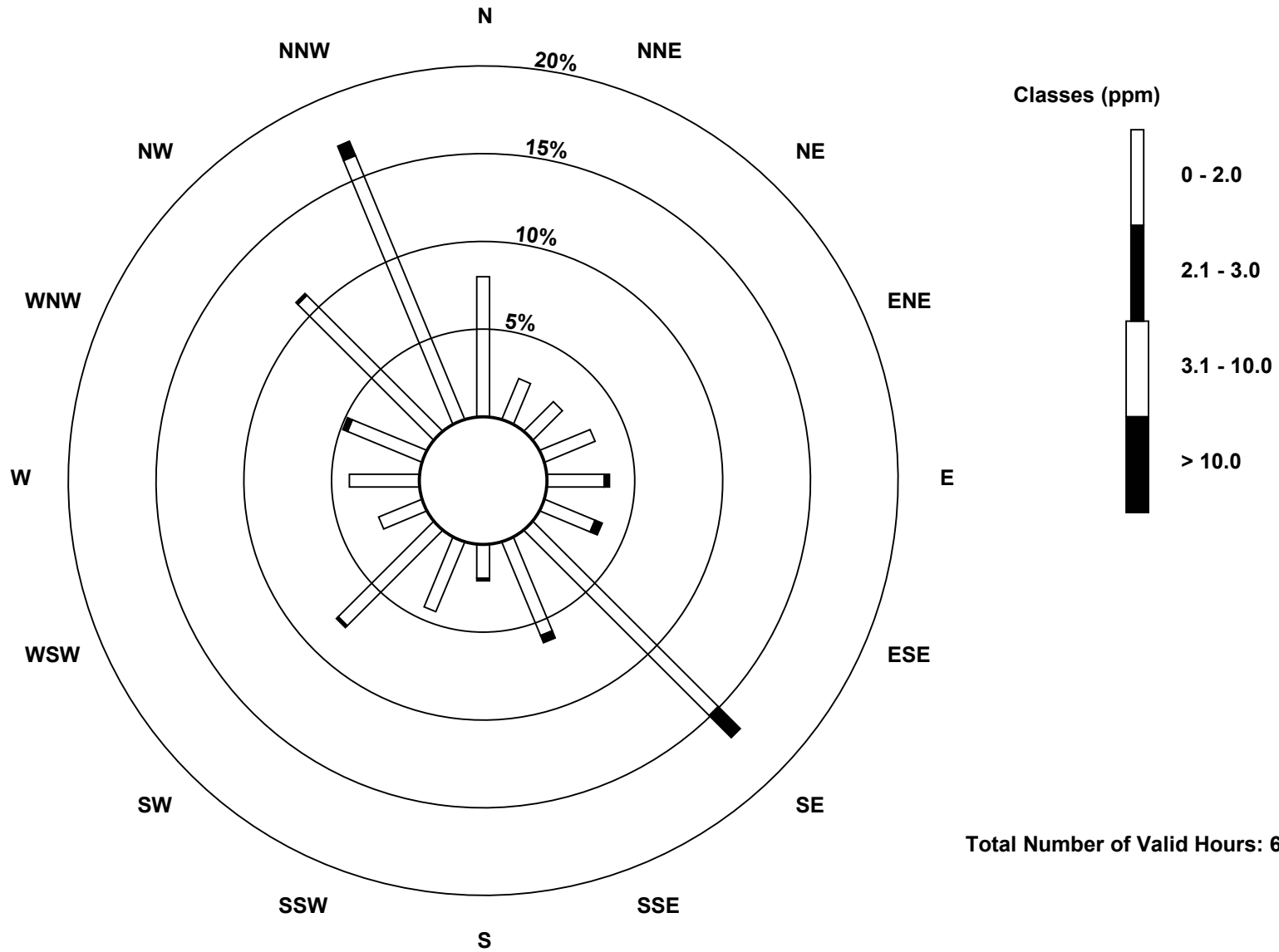
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	54	17	16	21	22	21	101	39	13	29	52	18	27	31	74	110	645
2.1 - 3.0	0	0	0	0	2	3	12	3	1	0	1	0	0	2	1	6	31
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	54	17	16	21	24	24	113	42	14	29	53	18	27	33	75	116	676

Total Number of Valid Hours: 676

Total Number of Hours: 720

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

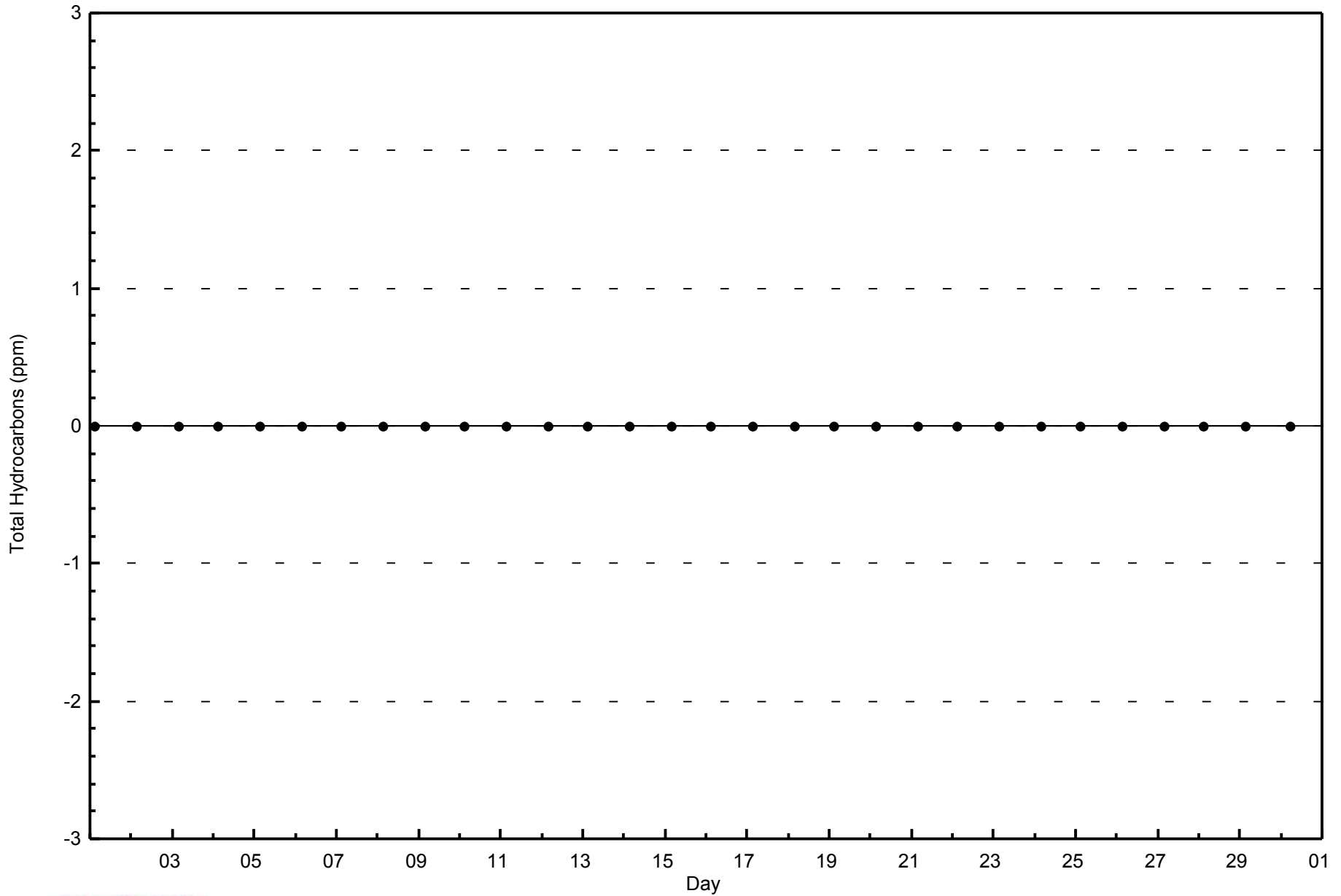
**Total Hydrocarbons (THC) - ppm
Athabasca Valley (AMS 7)**





WBEA
Zero Responses

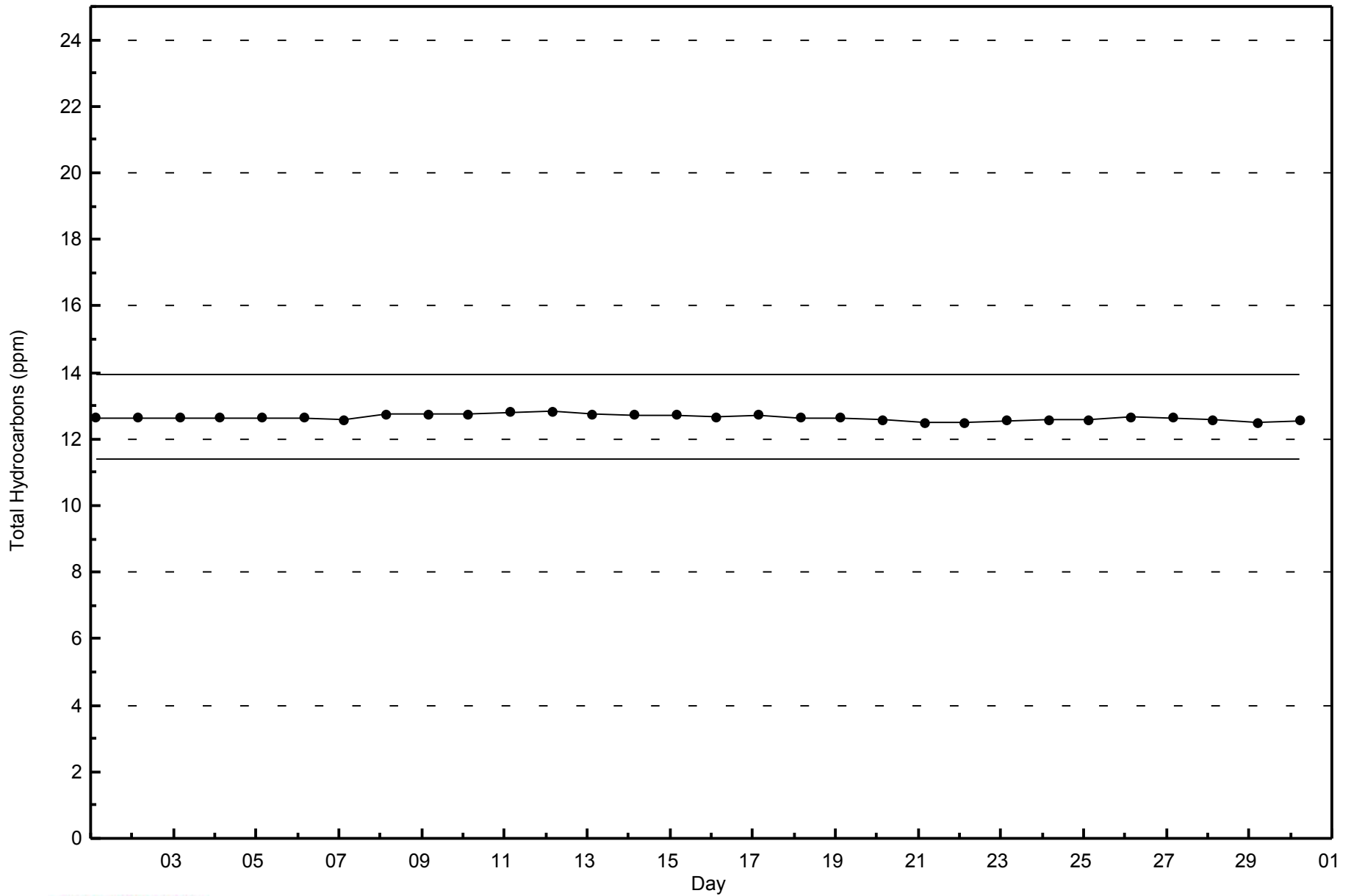
Total Hydrocarbons (THC) - ppm
Athabasca Valley - November 2014





WBEA
Span Responses

Total Hydrocarbons (THC) - ppm
Athabasca Valley - November 2014



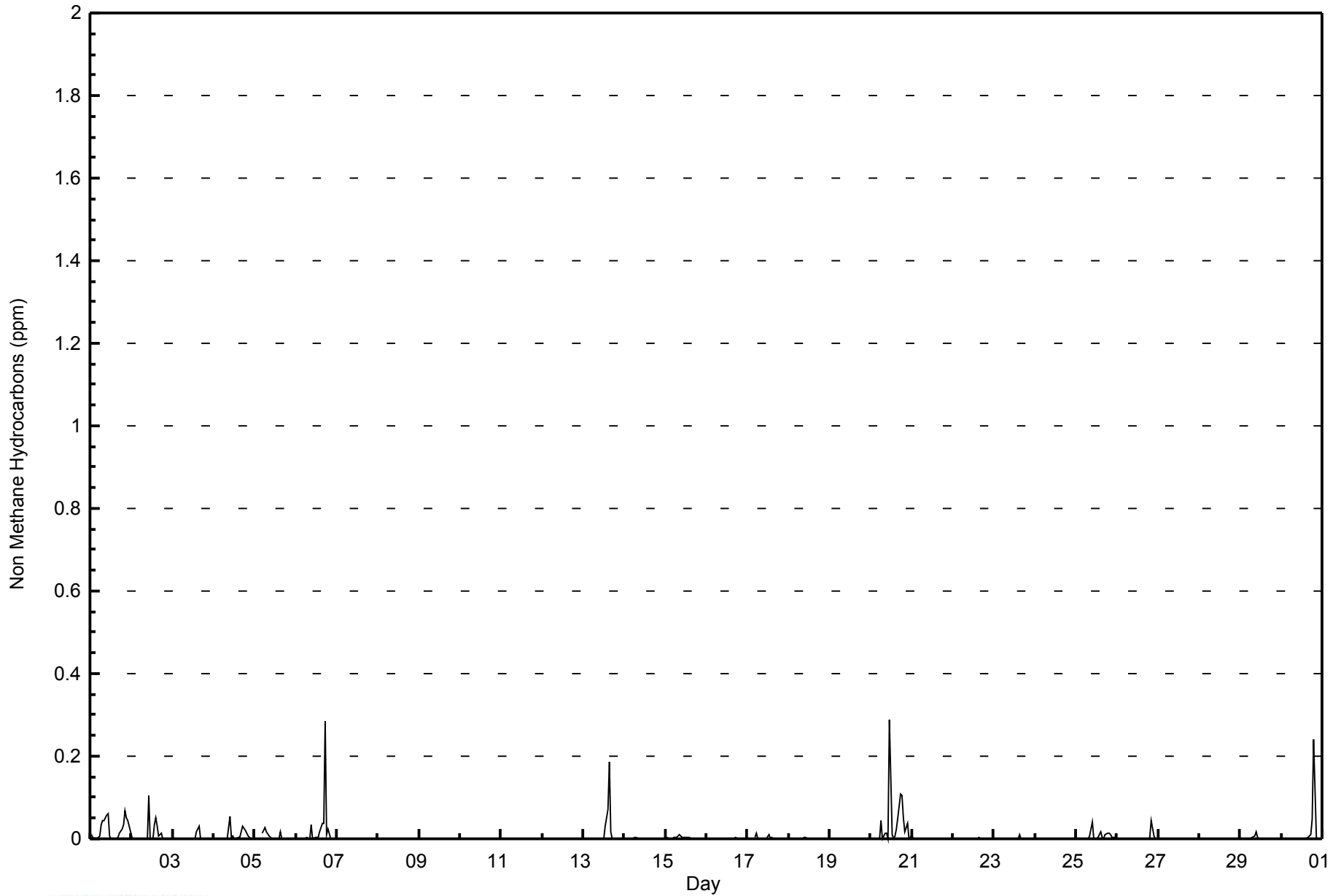


Maximum Value: 0.290 ppm on Nov 20 12:00		Maximum Daily Average: 0.034 ppm on Nov 20		Hours in Service:	720																					
Minimum Value: 0.000 ppm on Nov 2 06:00		Minimum Daily Average: 0.000 ppm on Nov 7		Hours of Data:	676																					
Maximum Diurnal Average: 0.016 ppm at hour 18		Minimum Diurnal Average: 0.000 ppm at hour 3		Hours of Missing Data:	44																					
Monthly Average: 0.005 ppm		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 0.1		Hours of Calibration:	35																					
				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-Nov	0.009	0.002	0.000	Z	0.001	0.006	0.033	0.045	0.043	0.056	0.060	0.008	0.000	0.001	0.001	0.000	0.004	0.013	0.024	0.035	0.069	0.053	0.045	0.016	0.023	0.069
2-Nov	0.002	0.000	0.001	Z	0.000	0.000	0.000	0.000	0.001	0.000	0.104	0.000	0.000	0.034	0.052	0.030	0.005	0.013	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.104
3-Nov	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	0.018	0.029	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.029
4-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.056	0.003	0.006	0.000	0.002	0.002	0.004	0.017	0.030	0.019	0.013	0.007	0.002	0.001	0.000	0.007	0.056
5-Nov	0.000	0.000	0.000	Z	0.013	0.019	0.026	0.018	0.005	0.004	0.001	0.000	0.000	0.000	0.000	0.018	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.026
6-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.002	0.000	0.000	0.033	0.000	0.002	0.002	0.004	0.016	0.038	0.037	0.285	0.012	0.022	0.000	0.000	0.000	0.000	0.020	0.285
7-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8-Nov	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	0.001
9-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
10-Nov	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
11-Nov	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
12-Nov	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
13-Nov	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	0.029	0.072	0.188	0.019	0.000	0.000	0.000	0.000	0.000	0.000	0.013	0.188
14-Nov	0.000	0.001	0.000	Z	0.001	0.001	0.003	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.001	0.003
15-Nov	0.005	0.004	0.000	Z	0.001	0.002	0.003	0.007	0.010	0.008	0.004	0.004	0.002	0.002	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.010
16-Nov	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	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003
17-Nov	0.000	0.000	0.000	Z	0.004	0.012	0.001	0.001	0.000	0.000	0.000	0.001	0.011	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.012
18-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.002	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004
19-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
20-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.044	0.000	0.013	0.015	0.000	0.290	0.009	0.001	0.008	0.025	0.052	0.108	0.106	0.052	0.016	0.036	0.000	0.004	0.034	0.290
21-Nov	0.009	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	0.009
22-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	M	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002
23-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.011
24-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
25-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.006	0.042	0.000	0.000	0.002	0.003	0.018	0.005	0.000	0.009	0.015	0.014	0.009	0.003	0.002	0.004	0.042
26-Nov	0.000	0.001	0.001	Z	0.001	0.001	0.000	0.000	0.000	C	C	C	C	C	0.001	0.000	0.001	0.000	0.000	0.003	0.045	0.007	0.000	0.000	0.003	0.045
27-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
28-Nov	0.001	0.001	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	M	M	M	M	M	M	M	M	M	M	0.000	0.000	0.001
29-Nov	0.000	0.000	0.000	0.001	Z	0.000	0.000	0.004	0.008	0.017	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	0.001	0.017
30-Nov	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.008	0.011	0.047	0.240	0.003	0.002	0.000	0.000	0.014	0.240
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration M - Maintenance																										



WBEA
Hourly Averages

Non Methane Hydrocarbons (NMHC) - ppm
Athabasca Valley - November 2014





WBEA
Cumulative Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm
Athabasca Valley - November 2014

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	596	88.17	88.17
0.006 - 0.05	68	10.06	98.22
0.06 - 0.1	8	1.18	99.41
> 0.1	4	0.59	100.00

Total Number of Valid Hours: 676

Total Number of Hours: 720



WBEA
Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm
Athabasca Valley - November 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	53	17	16	20	23	17	78	34	11	26	49	17	23	28	75	109	596
0.006 - 0.05	1	0	0	1	1	6	24	8	3	3	4	1	4	5	0	7	68
0.06 - 0.1	0	0	0	0	0	1	7	0	0	0	0	0	0	0	0	0	8
> 0.1	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	4
Totals	54	17	16	21	24	24	113	42	14	29	53	18	27	33	75	116	676

Total Number of Valid Hours: 676

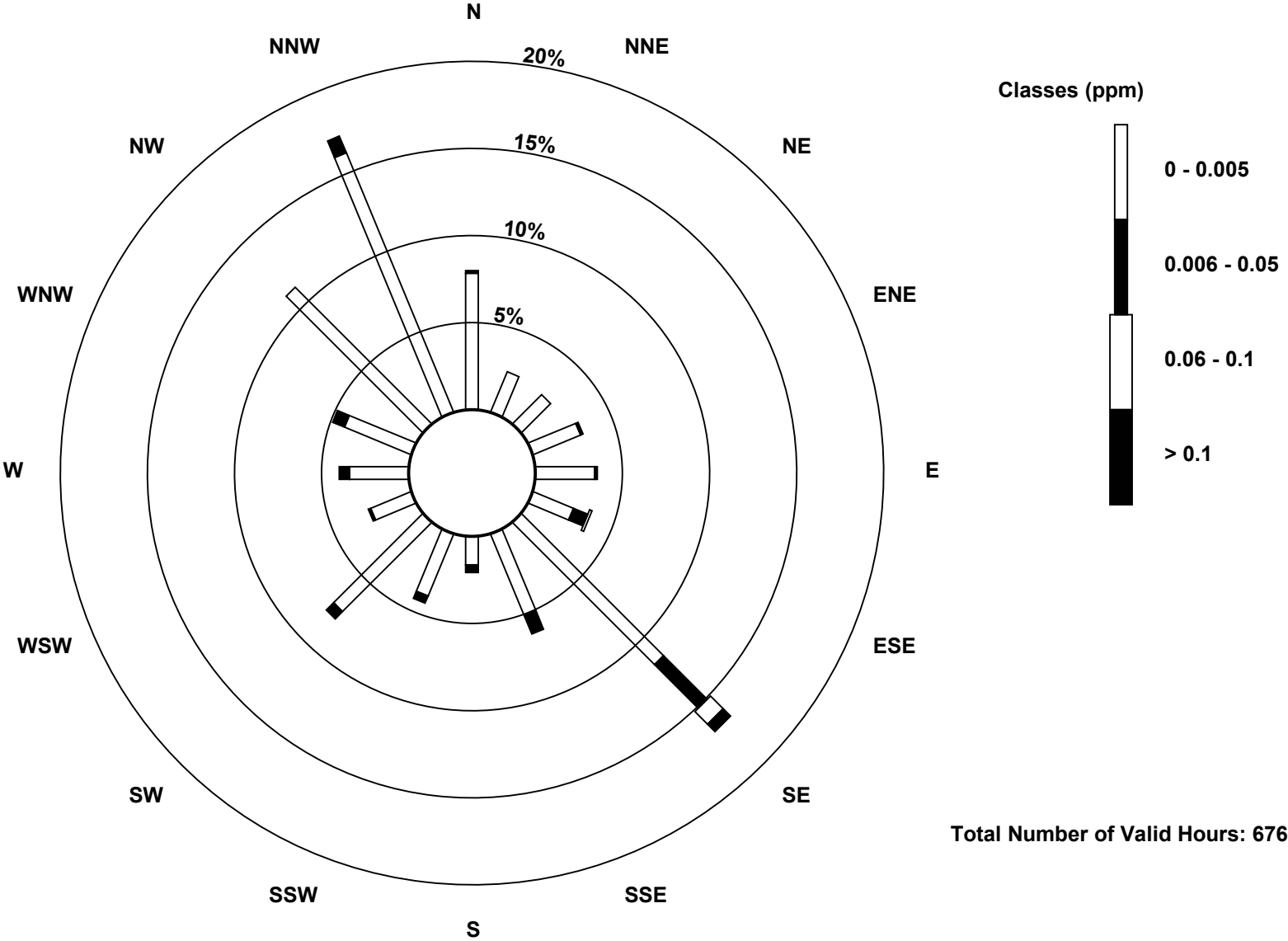
Total Number of Hours: 720

Wood Buffalo Environmental Association

Wind Rose Nov 2014

Non Methane Hydrocarbons (NMHC) - ppm

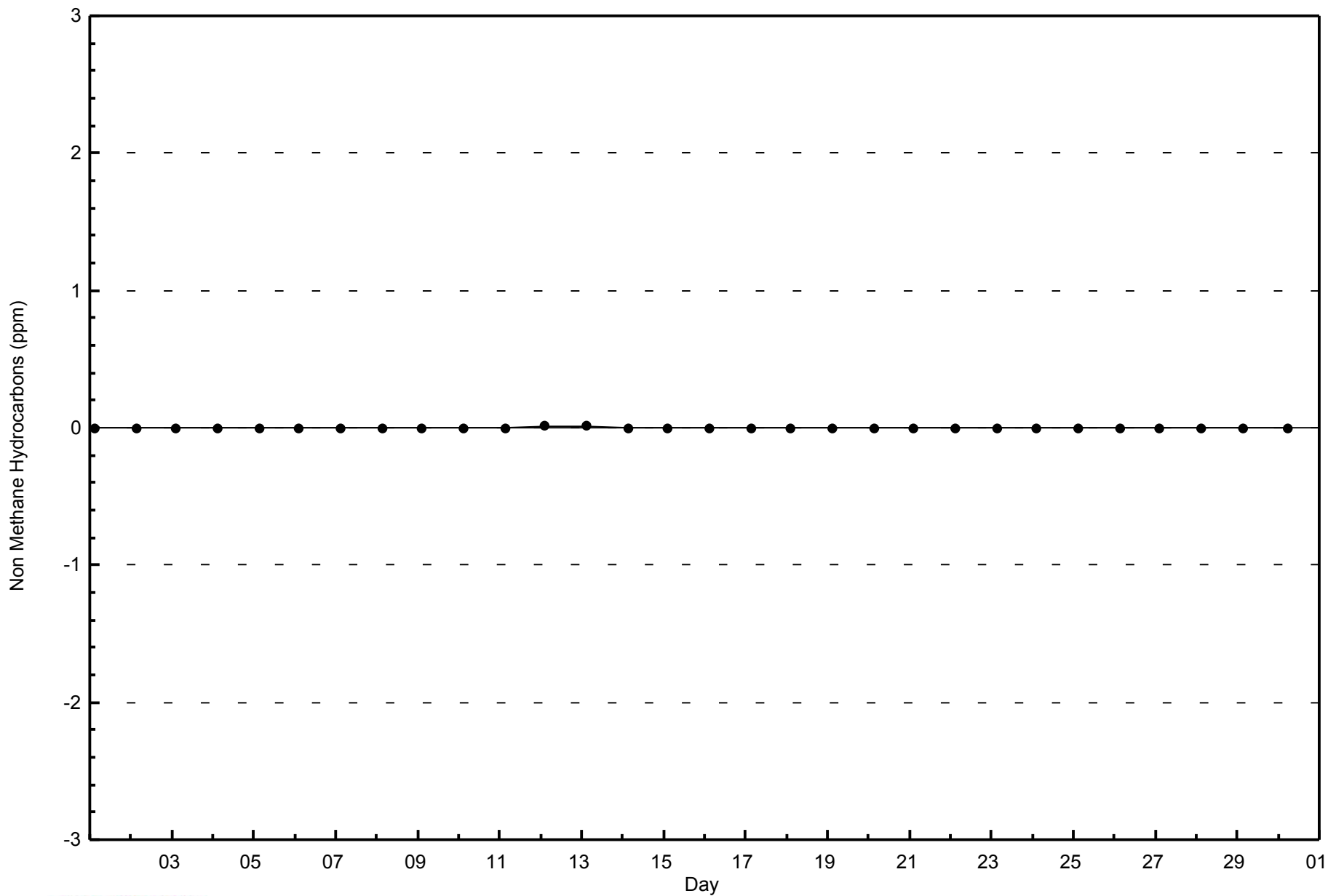
Athabasca Valley (AMS 7)





WBEA
Zero Responses

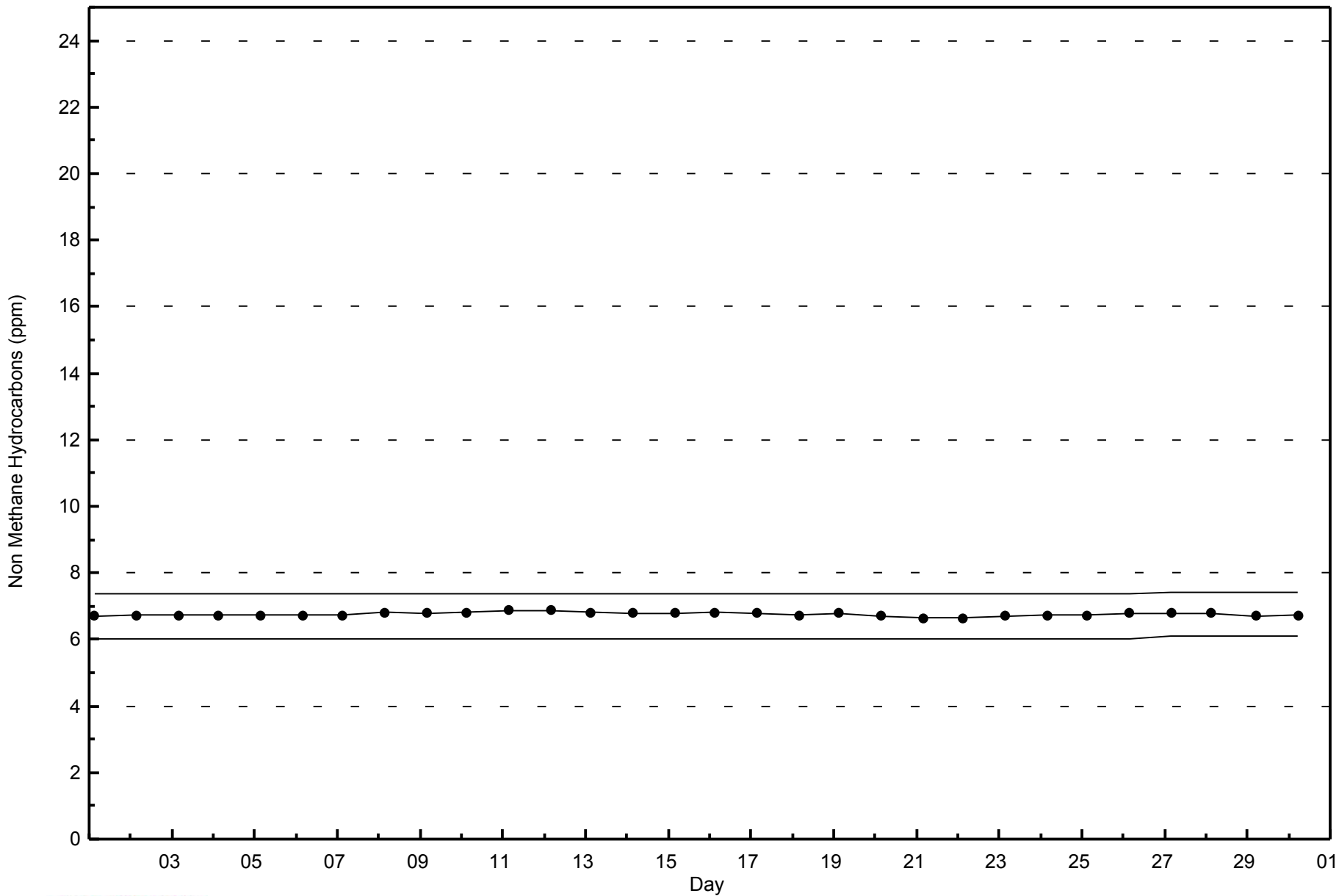
Non Methane Hydrocarbons (NMHC) - ppm
Athabasca Valley - November 2014





WBEA
Span Responses

Non Methane Hydrocarbons (NMHC) - ppm
Athabasca Valley - November 2014





Number of Exceedences (AAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 2.2 ppm on Nov 26 21:00	Maximum Daily Average: 2.0 ppm on Nov 13		Hours of Data:	676
Minimum Value: 1.8 ppm on Nov 22 08:00	Minimum Daily Average: 1.8 ppm on Nov 22		Hours of Missing Data:	44
Maximum Diurnal Average: 1.9 ppm at hour 2	Minimum Diurnal Average: 1.9 ppm at hour 13		Hours of Calibration:	35
Monthly Average: 1.89 ppm	Percentiles: P ₁ = 1.8 P ₁₀ = 1.8 Q ₁ = 1.9 Median = 1.9 Q ₃ = 1.9 P ₉₀ = 2.0 P ₉₉ = 2.1		Percent Operational Time:	98.8

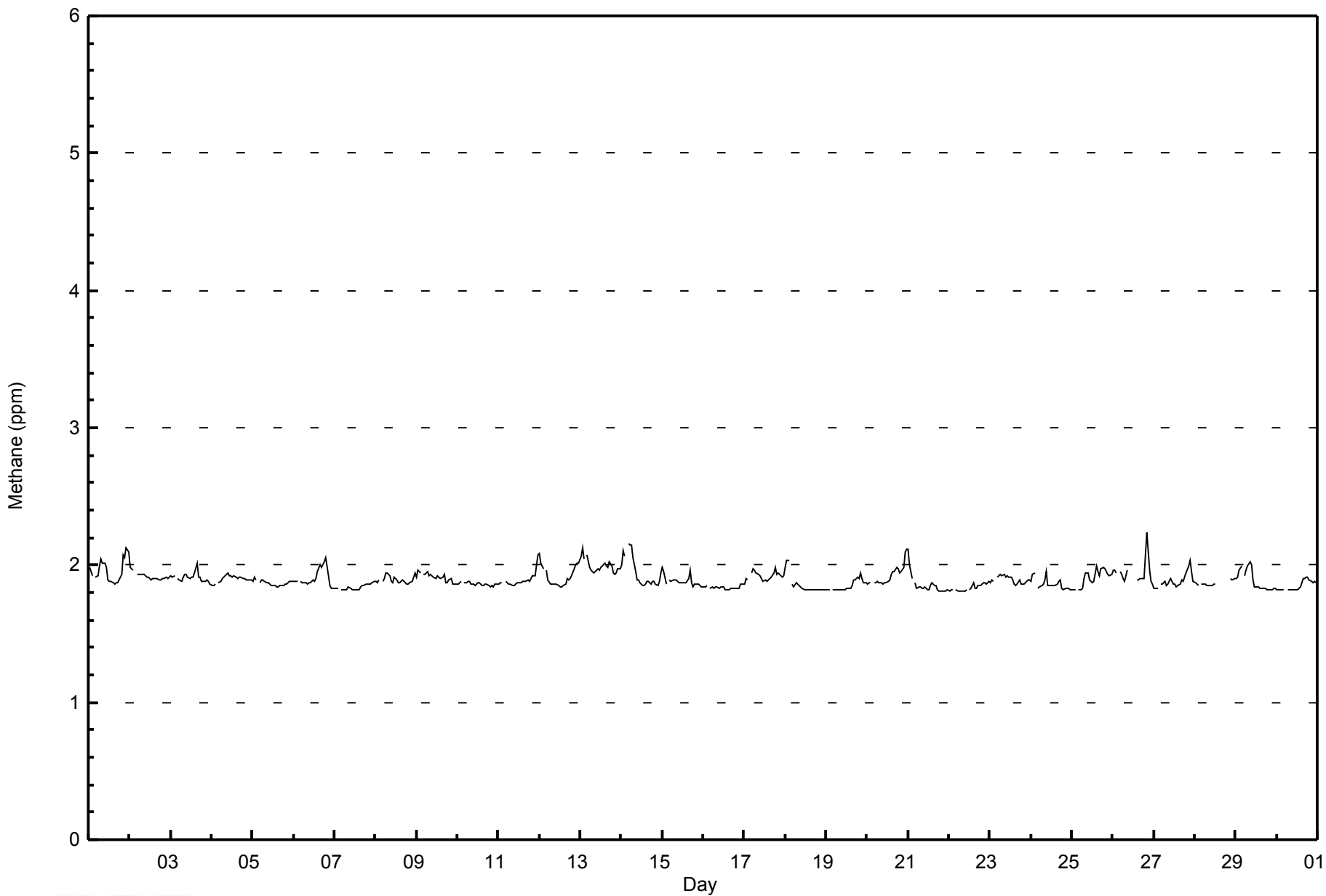
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Nov	2.0	1.9	1.9	Z	1.9	1.9	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	2.1	2.1	2.1	2.0	2.1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

Z - zerspan	C - Calibration	M - Maintenance																									Diurnal Average	Diurnal Maximum
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WBEA
Hourly Averages

Methane (CH₄) - ppm
Athabasca Valley - November 2014





WBEA
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Athabasca Valley - November 2014

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	655	96.89	96.89
2.1 - 3.0	21	3.11	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 676

Total Number of Hours: 720



WBEA
Frequency Distribution

Methane (CH₄) - ppm
Athabasca Valley - November 2014

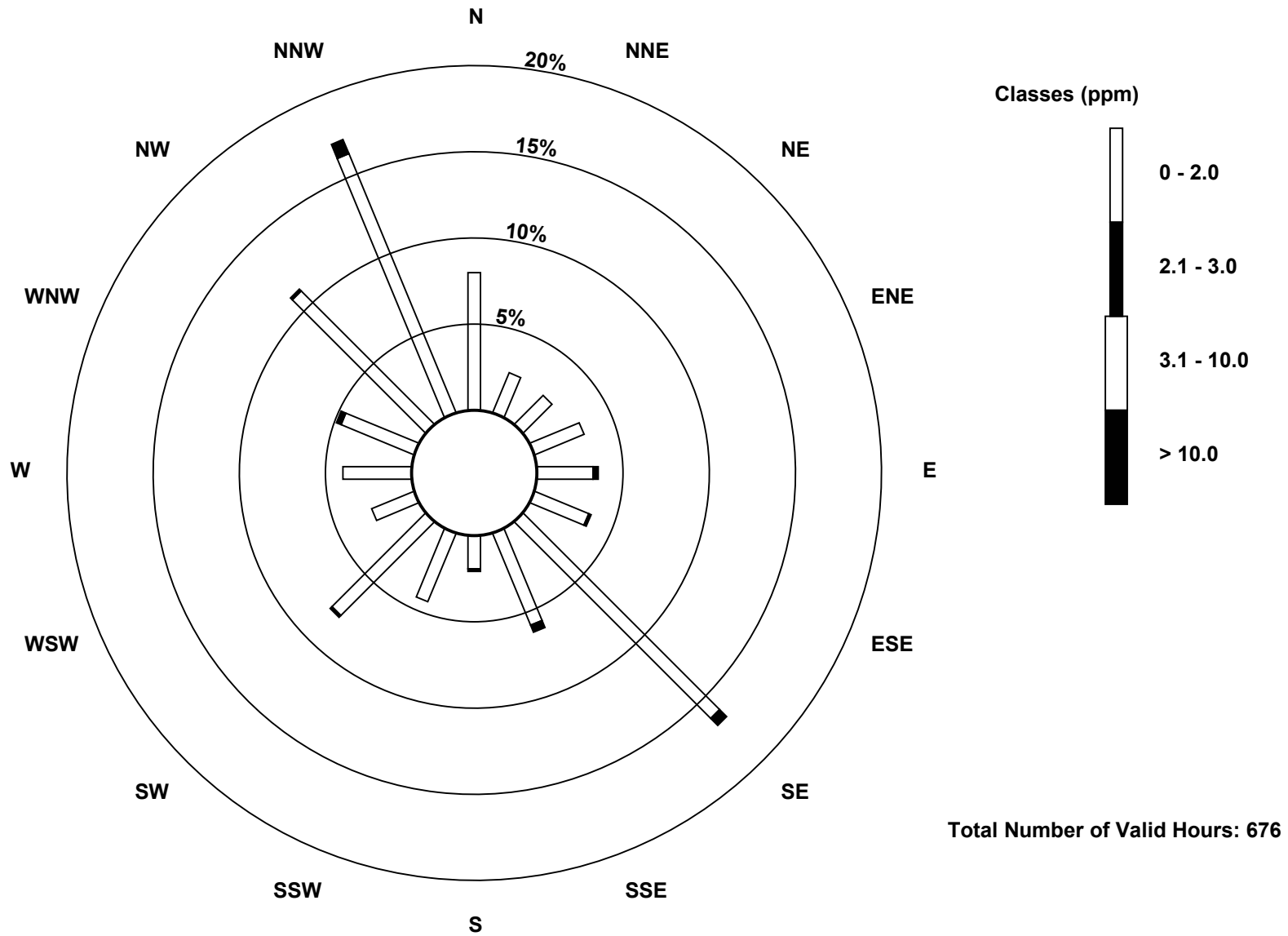
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	54	17	16	21	22	23	109	39	13	29	52	18	27	31	74	110	655
2.1 - 3.0	0	0	0	0	2	1	4	3	1	0	1	0	0	2	1	6	21
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	54	17	16	21	24	24	113	42	14	29	53	18	27	33	75	116	676

Total Number of Valid Hours: 676

Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

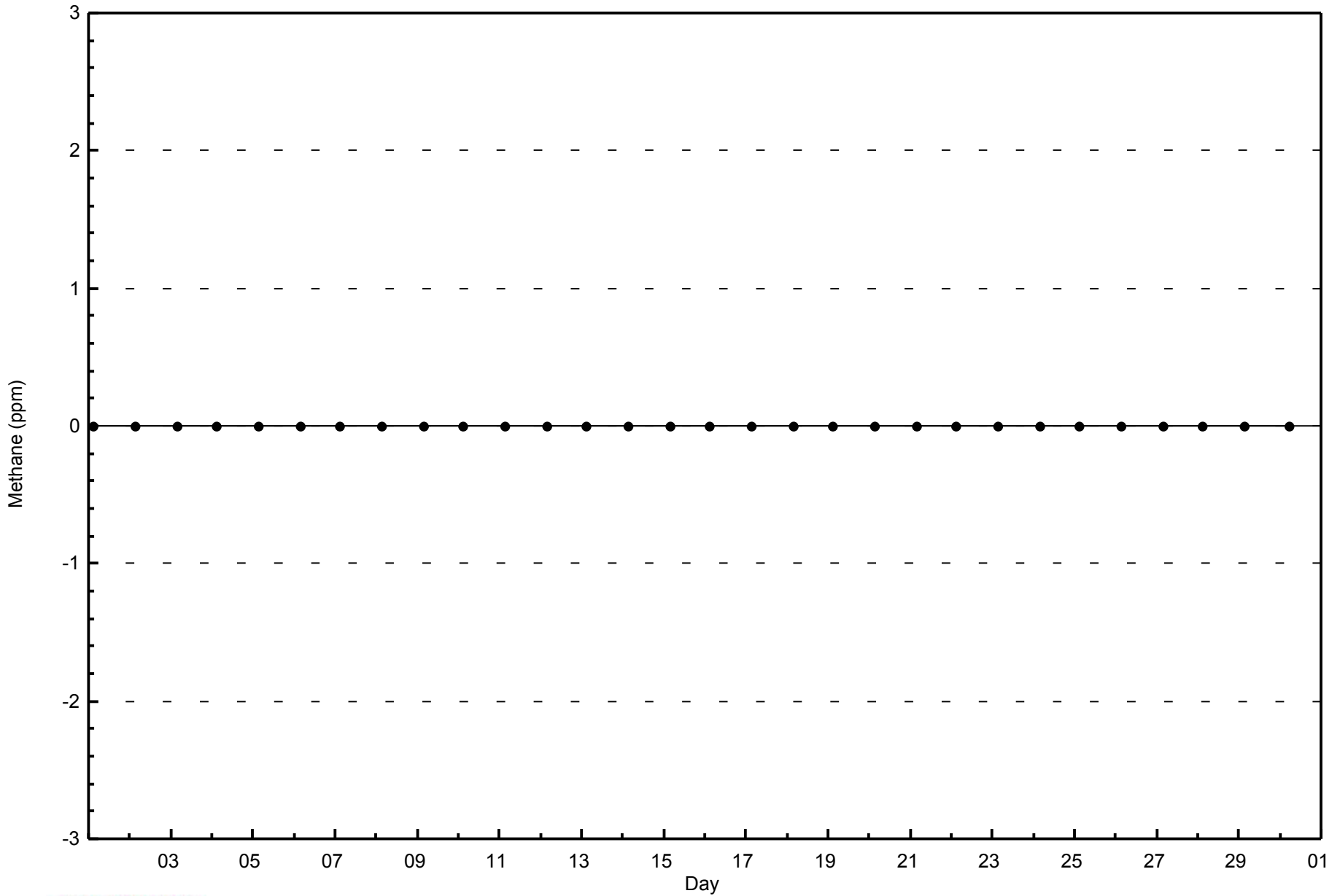
Methane (CH₄) - ppm
Athabasca Valley (AMS 7)





WBEA
Zero Responses

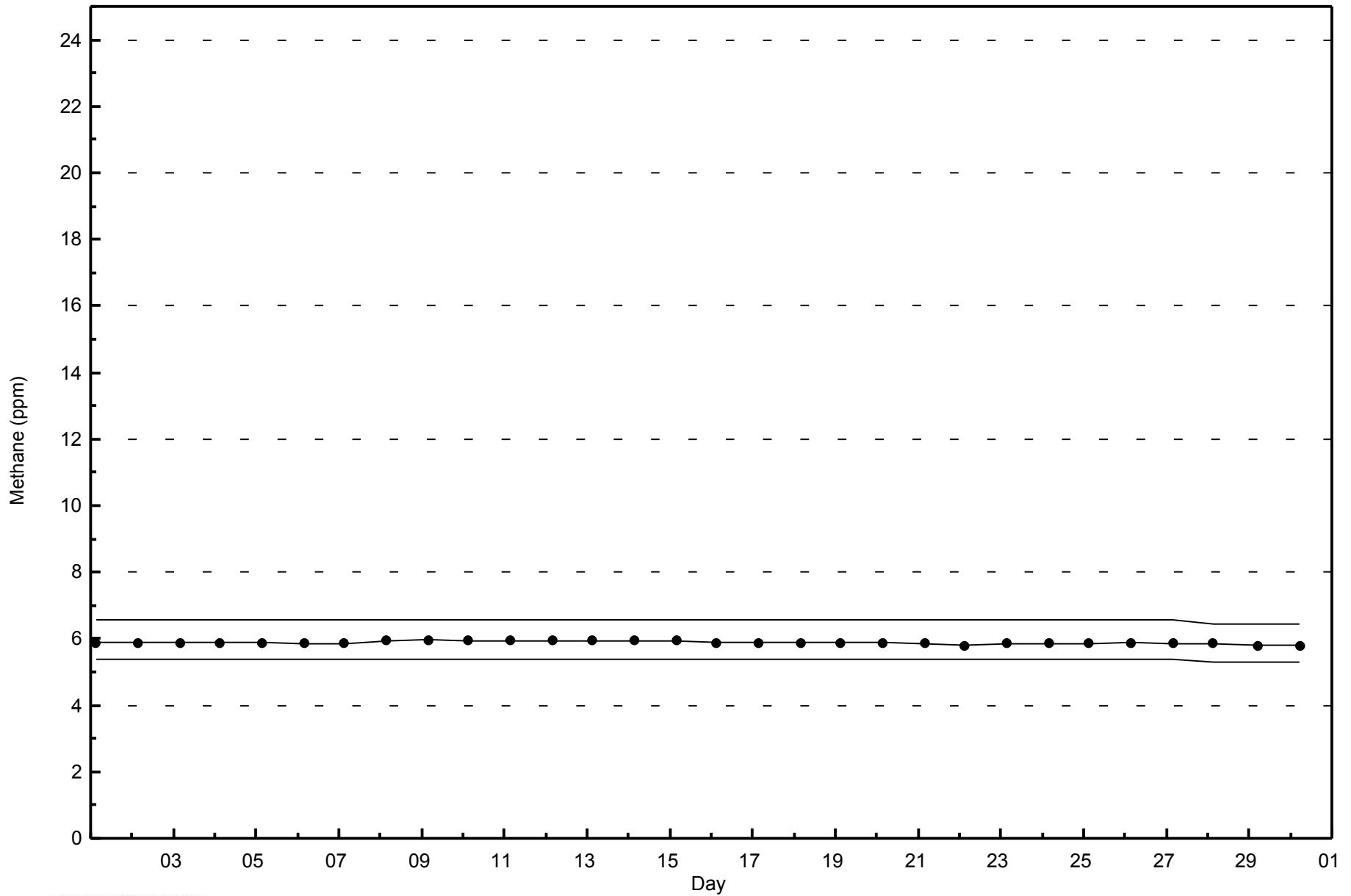
Methane (CH₄) - ppm
Athabasca Valley - November 2014





WBEA
Span Responses

Methane (CH₄) - ppm
Athabasca Valley - November 2014





Summary of Hour Averages

Athabasca Valley - November 2014

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 33 ppb on Nov 16 14:00	Maximum Daily Average: 26.3 ppb on Nov 16		Hours of Data:	678
Minimum Value: 0 ppb on Nov 20 23:00	Minimum Daily Average: 2.7 ppb on Nov 13		Hours of Missing Data:	42
Maximum Diurnal Average: 19.9 ppb at hour 14	Minimum Diurnal Average: 11.8 ppb at hour 17		Hours of Calibration:	34
Monthly Average: 14.4 ppb	Percentiles: P ₁ = 0 P ₁₀ = 2 Q ₁ = 5 Median = 14 Q ₃ = 23 P ₉₀ = 27 P ₉₉ = 31		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-Nov	1	1	4	Z	3	3	2	0	0	1	3	12	15	15	17	17	4	2	2	1	1	0	1	1	4.7	17		
2-Nov	1	1	2	Z	2	1	2	2	2	3	5	4	5	5	4	4	3	3	4	4	3	3	2	5	3.1	5		
3-Nov	6	7	6	Z	6	7	3	3	3	3	4	4	4	3	1	1	7	8	8	5	4	7	12	15	5.5	15		
4-Nov	15	15	14	Z	12	10	7	6	6	6	7	8	9	7	6	7	5	4	4	4	4	5	5	3	7.4	15		
5-Nov	4	4	6	Z	8	6	5	7	9	9	10	11	12	12	12	12	13	11	11	13	11	11	11	9.6	13			
6-Nov	10	10	11	Z	12	12	11	12	12	12	11	10	13	12	8	4	3	1	2	4	16	21	23	22	11.0	23		
7-Nov	22	20	17	Z	21	22	25	25	23	25	27	28	29	30	30	29	26	22	26	27	27	29	26	24	25.2	30		
8-Nov	22	24	20	Z	18	14	18	11	9	18	22	22	26	26	25	21	15	17	19	18	14	13	10	7	17.9	26		
9-Nov	11	3	4	Z	4	3	2	1	2	5	9	15	20	21	20	18	14	21	22	19	19	25	26	26	13.4	26		
10-Nov	23	24	24	Z	26	21	22	19	22	25	26	25	24	25	25	24	22	22	24	25	24	25	24	25	23.8	26		
11-Nov	23	23	23	Z	19	20	22	23	25	24	25	22	19	19	19	19	17	13	11	7	2	2	1	1	16.4	25		
12-Nov	1	1	1	Z	2	14	20	19	22	21	22	24	25	25	24	20	4	6	6	2	2	2	4	5	11.7	25		
13-Nov	4	4	5	Z	3	3	2	2	3	5	6	6	5	4	3	2	1	1	1	1	1	1	0	0	2.7	6		
14-Nov	1	1	1	Z	1	0	0	2	8	18	21	23	27	26	25	20	17	19	12	11	15	14	9	2	11.8	27		
15-Nov	1	5	24	Z	17	21	22	21	22	23	24	24	25	24	22	24	15	23	27	22	19	22	25	27	20.8	27		
16-Nov	27	28	27	Z	30	30	30	29	27	29	29	30	30	33	33	29	28	26	20	20	24	21	14	11	26.3	33		
17-Nov	10	5	6	Z	4	2	2	2	4	8	13	15	15	15	13	7	7	4	3	4	1	1	1	1	6.3	15		
18-Nov	0	0	0	Z	16	20	15	18	19	22	27	29	30	31	30	29	30	30	31	31	30	29	29	30	22.8	31		
19-Nov	31	30	30	Z	29	29	28	29	29	32	32	31	30	32	29	21	6	10	8	9	9	14	19	20	23.4	32		
20-Nov	21	21	21	Z	19	16	14	13	10	12	12	14	11	9	6	2	1	1	2	3	3	0	0	0	9.2	21		
21-Nov	5	10	12	Z	14	20	17	16	19	19	19	23	25	23	21	20	16	23	24	26	26	26	26	27	19.9	27		
22-Nov	27	27	27	Z	26	26	26	27	24	23	25	24	25	22	14	21	22	17	15	15	13	15	17	16	21.5	27		
23-Nov	18	17	7	Z	8	11	10	3	3	6	8	11	11	14	16	11	6	4	7	7	6	7	7	8	9.0	18		
24-Nov	10	3	1	Z	21	17	18	19	15	12	18	22	23	22	21	19	16	14	25	29	27	25	27	28	18.9	29		
25-Nov	28	29	29	Z	28	28	27	10	8	14	19	20	23	24	21	9	4	4	4	4	4	4	5	4	15.2	29		
26-Nov	5	3	5	Z	6	7	6	7	4	6	8	8	C	C	C	C	3	2	1	0	0	11	17	18	6.1	18		
27-Nov	26	27	26	Z	19	16	12	16	13	13	16	21	21	25	19	13	10	12	8	4	1	0	3	13	14.5	27		
28-Nov	15	18	18	Z	16	15	17	18	19	21	21	19	18	M	M	M	M	M	M	M	M	M	M	13	13	12	--	21
29-Nov	10	10	5	6	10	7	Z	2	2	5	18	26	27	26	26	22	23	25	28	28	28	28	28	28	18.1	28		
30-Nov	29	28	27	27	26	25	25	Z	25	26	25	27	27	25	21	3	5	3	4	10	11	13	13	14	19.0	29		

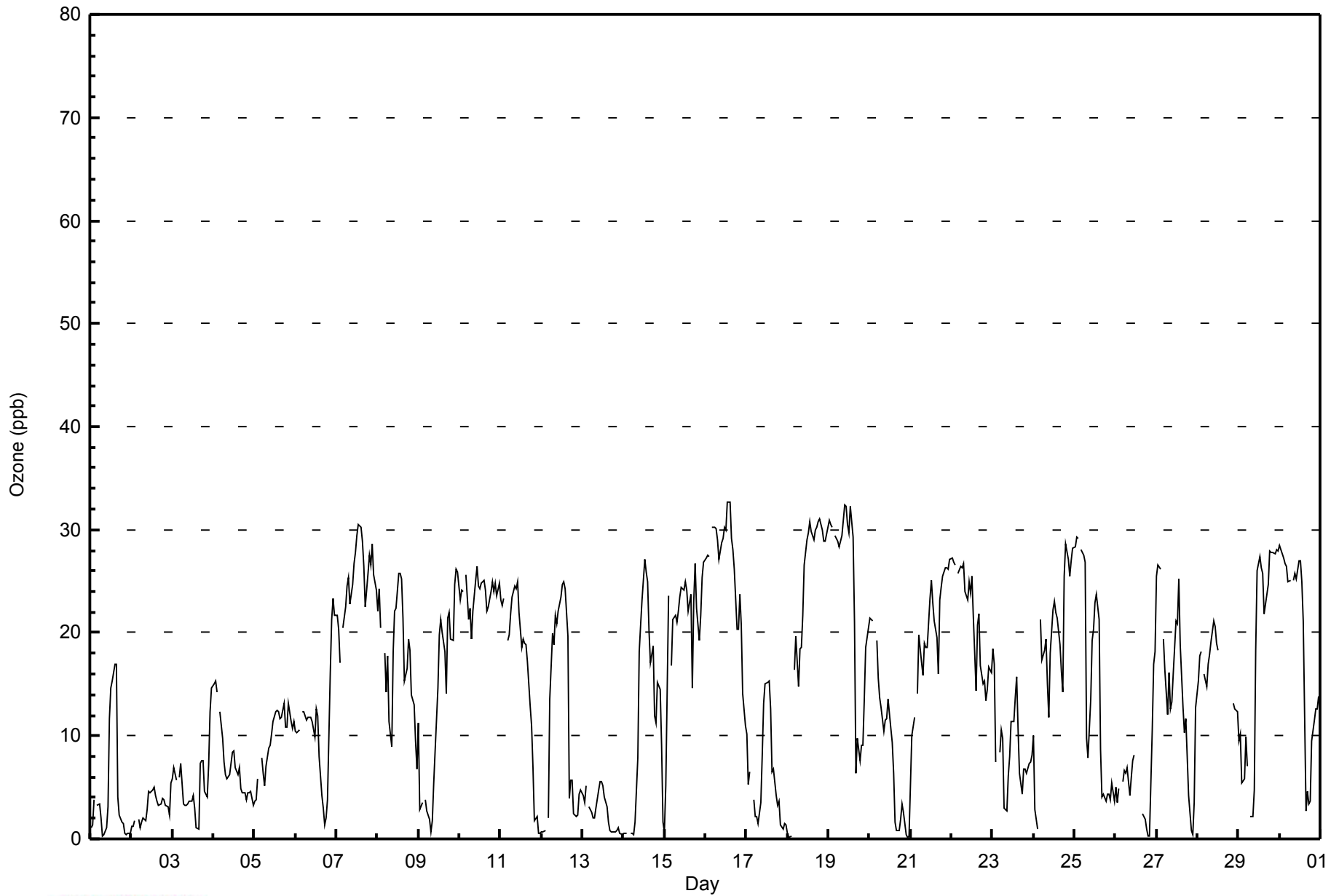
13.6	13.3	13.5	16.3	14.3	14.2	14.2	12.5	12.9	14.9	17.0	18.6	19.8	19.9	18.3	15.2	11.8	12.1	12.3	12.1	12.0	12.9	13.3	13.5	Diurnal Average	
31	30	30	27	30	30	30	29	29	32	32	31	30	33	33	29	30	30	31	31	30	29	29	30	Diurnal Maximum	

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



WBEA
Hourly Averages

Ozone (O₃) - ppb
Athabasca Valley - November 2014





WBEA
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Athabasca Valley - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	446	65.78	65.78
21 - 50	232	34.22	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 678

Total Number of Hours: 720



WBEA
Frequency Distribution

Ozone (O₃) - ppb
Athabasca Valley - November 2014

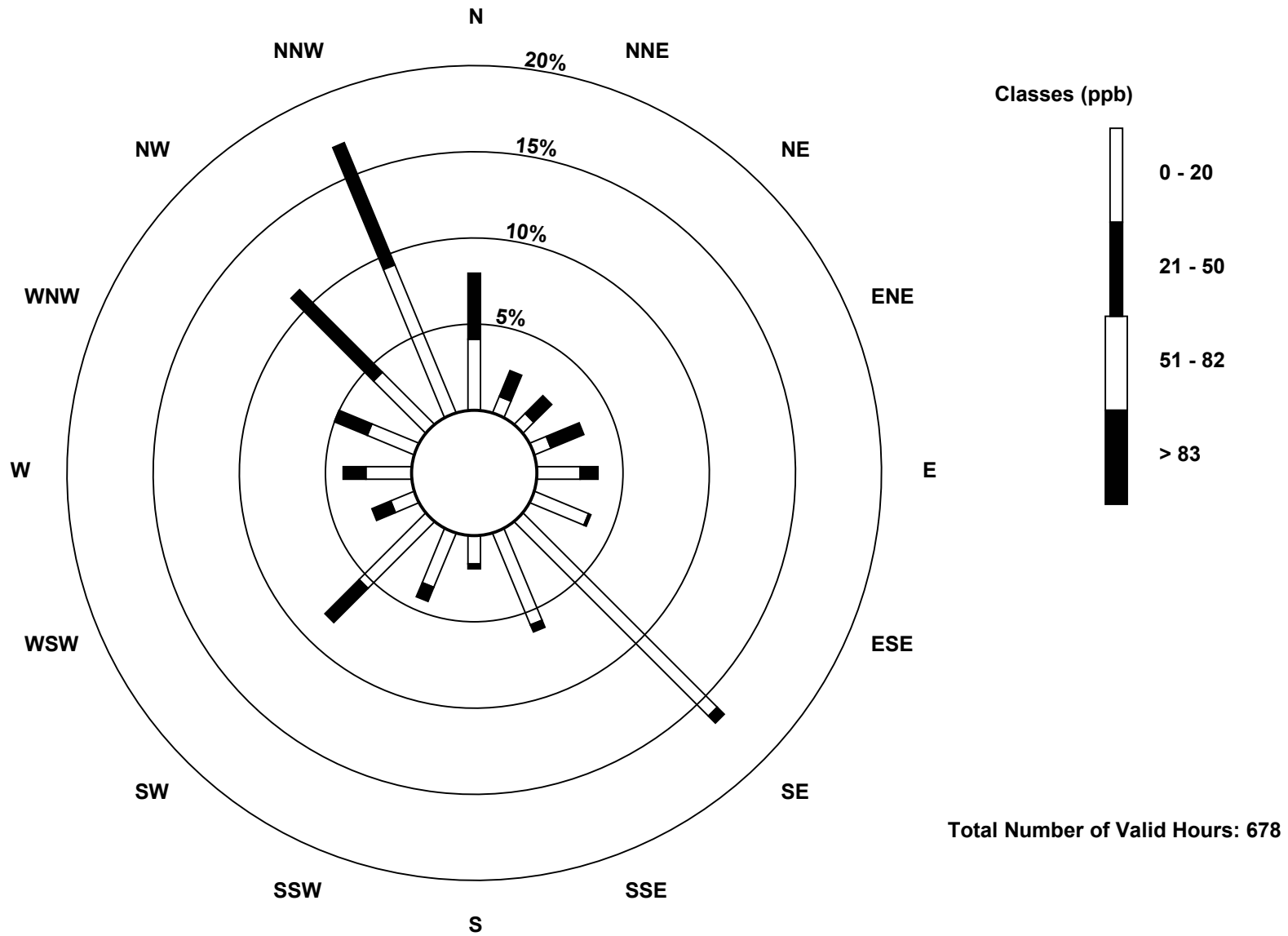
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	28	7	6	7	17	23	108	39	11	23	37	10	18	20	29	63	446
21 - 50	26	11	10	14	7	1	4	3	2	6	19	8	9	14	46	52	232
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	54	18	16	21	24	24	112	42	13	29	56	18	27	34	75	115	678

Total Number of Valid Hours: 678

Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

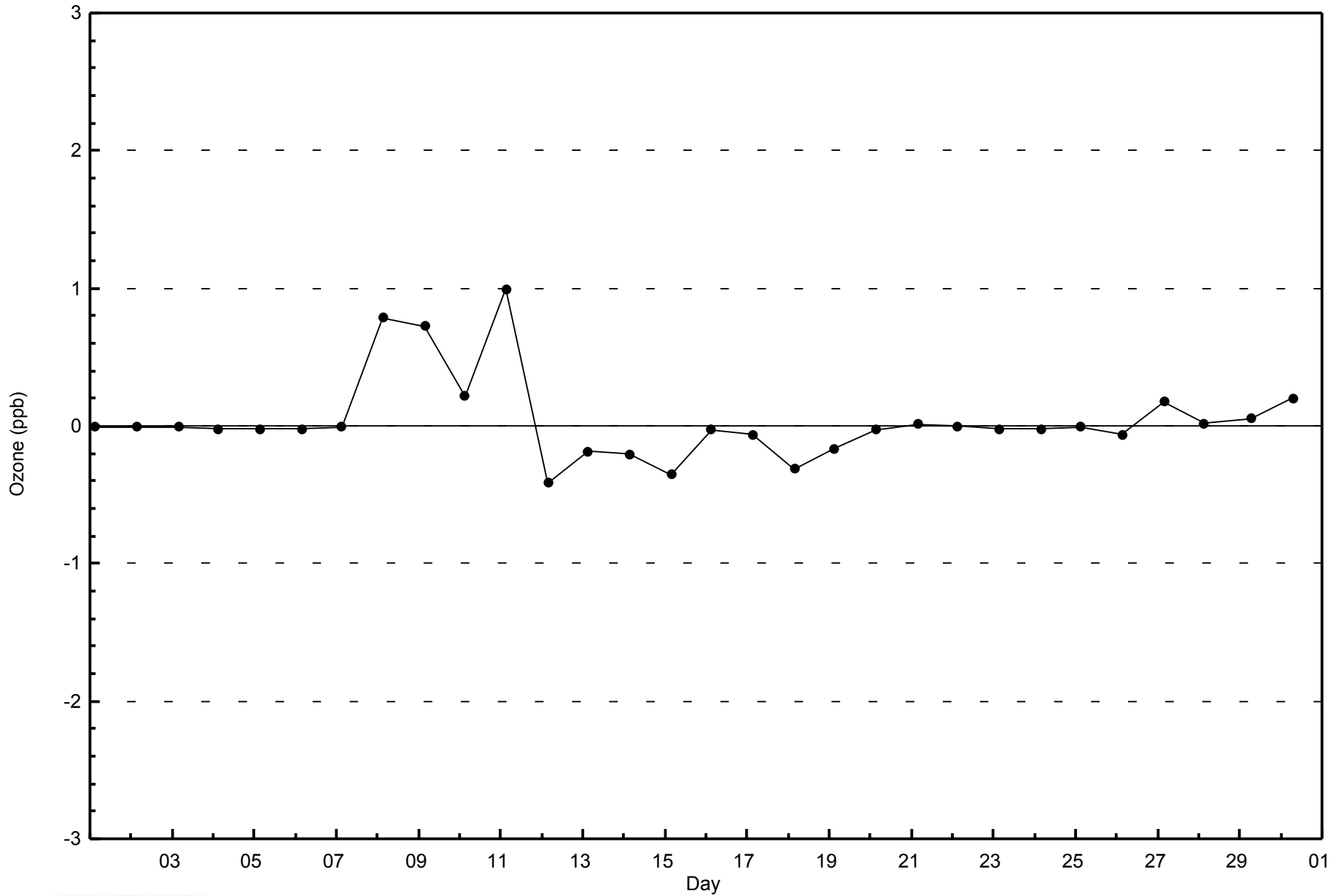
Ozone (O₃) - ppb
Athabasca Valley (AMS 7)





WBEA
Zero Responses

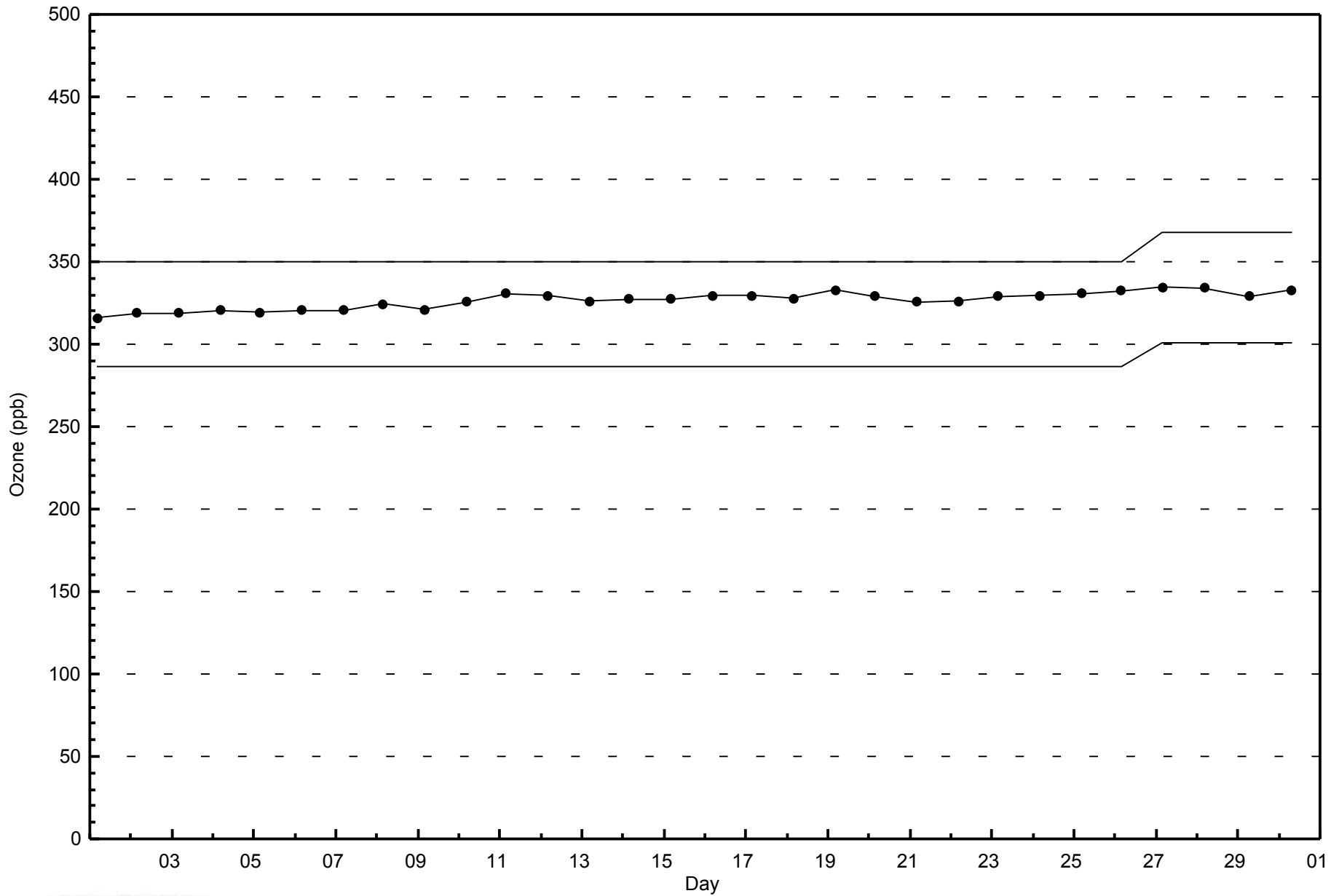
Ozone (O₃) - ppb
Athabasca Valley - November 2014





WBEA
Span Responses

Ozone (O₃) - ppb
Athabasca Valley - November 2014



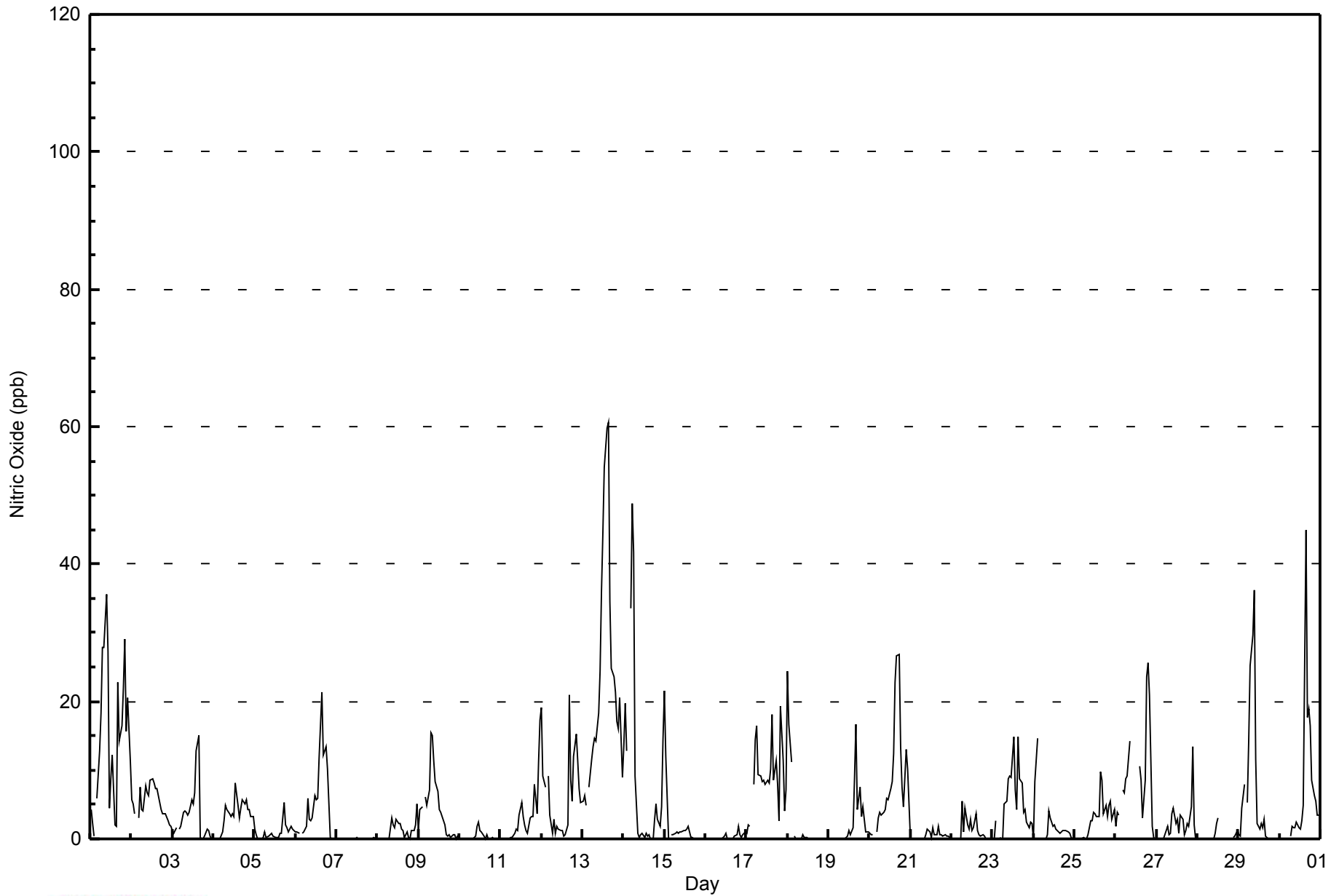


Maximum Value: 61 ppb on Nov 13 16:00																	Maximum Daily Average: 23.6 ppb on Nov 13																	Hours in Service: 720															
Minimum Value: 0 ppb on Nov 3 18:00																	Minimum Daily Average: 0.0 ppb on Nov 7																	Hours of Data: 677															
Maximum Diurnal Average: 8.7 ppb at hour 16																	Minimum Diurnal Average: 2.5 ppb at hour 3																	Hours of Missing Data: 43															
Monthly Average: 4.7 ppb																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 2 Q ₃ = 5 P ₉₀ = 14 P ₉₉ = 41																	Hours of Calibration: 35															
																																		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-Nov	4	2	0	Z	6	13	18	28	28	36	27	4	9	12	2	2	23	14	16	22	29	16	21	11	14.9	36																							
2-Nov	6	5	4	Z	3	7	4	4	8	7	6	8	9	8	7	7	6	4	4	4	4	3	2	2	5.3	9																							
3-Nov	1	1	2	Z	1	2	4	4	4	3	4	6	5	7	13	15	0	0	0	0	1	1	0	0	3.3	15																							
4-Nov	0	0	0	Z	0	1	3	5	4	4	3	4	3	8	5	3	5	6	5	6	4	4	3	3	3.4	8																							
5-Nov	1	1	0	Z	0	0	1	0	0	1	1	0	0	0	0	1	1	5	2	2	1	2	2	1	1.0	5																							
6-Nov	1	1	1	Z	1	1	2	6	3	3	3	6	6	6	12	21	12	13	13	10	0	0	0	0	5.2	21																							
7-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
8-Nov	0	0	0	Z	0	0	0	0	3	2	2	3	2	2	1	1	0	1	0	0	1	1	2	5	1.2	5																							
9-Nov	1	4	5	Z	6	5	7	15	15	11	8	7	4	4	3	2	1	0	1	0	1	1	0	0	4.4	15																							
10-Nov	0	0	0	Z	0	0	0	0	0	0	2	2	1	1	1	0	1	0	0	0	0	0	0	0	0.4	2																							
11-Nov	0	0	0	Z	0	0	0	0	1	1	1	4	5	3	2	1	1	3	3	3	8	4	11	17	3.0	17																							
12-Nov	19	9	7	Z	9	3	1	3	1	2	1	1	1	0	1	2	21	9	5	12	15	11	7	5	6.4	21																							
13-Nov	5	6	5	Z	8	12	13	15	14	18	25	36	45	54	60	61	35	25	24	21	17	16	21	9	23.6	61																							
14-Nov	14	20	13	Z	34	49	42	9	1	0	1	1	0	1	0	1	0	0	3	5	3	2	5	14	9.4	49																							
15-Nov	22	12	0	Z	1	1	1	1	1	1	1	1	1	1	2	0	0	0	0	0	0	0	0	0	2.0	22																							
16-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	2	1	0	1	1	0.3	2																							
17-Nov	1	2	2	Z	8	14	16	9	9	8	9	8	9	8	10	18	8	11	8	3	19	11	4	7	8.9	19																							
18-Nov	24	17	11	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.3	24																							
19-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	1	1	2	9	17	4	8	3	5	3	1	1	2.4	17																							
20-Nov	1	1	1	Z	1	3	4	3	4	4	6	6	7	8	12	23	27	27	13	8	5	13	10	5	8.3	27																							
21-Nov	0	0	0	Z	0	0	0	0	0	1	1	1	0	2	1	1	2	1	1	0	1	1	0	0	0.5	2																							
22-Nov	0	0	0	Z	0	0	6	1	5	2	1	3	1	2	4	1	1	0	1	0	0	0	0	0	1.2	6																							
23-Nov	0	0	3	Z	0	0	0	5	5	9	9	9	15	7	4	15	9	8	4	4	2	2	3	2	5.0	15																							
24-Nov	0	8	15	Z	0	0	0	0	1	4	3	2	2	1	1	1	1	1	1	1	1	1	0	0	1.9	15																							
25-Nov	0	0	0	Z	0	0	0	0	1	3	3	4	4	3	3	10	9	4	5	3	5	6	3	4	2.9	10																							
26-Nov	2	4	3	Z	7	7	9	9	14	C	C	C	C	C	10	9	3	8	24	26	21	2	0	0	8.8	26																							
27-Nov	0	0	0	Z	0	1	2	1	1	4	5	2	3	1	4	3	1	1	2	2	5	14	2	0	2.2	14																							
28-Nov	0	0	0	Z	0	0	0	0	0	0	1	2	3	M	M	M	M	M	M	M	M	M	M	0	0	1	3																						
29-Nov	1	0	4	Z	8	5	14	25	30	36	12	2	1	2	2	3	0	0	0	0	0	0	0	0	6.4	36																							
30-Nov	0	0	0	Z	0	Z	0	2	2	2	2	2	2	1	3	5	45	18	19	16	9	6	5	4	4	6.2	45																						
																								3.4	3.1	2.5	4.0	2.9	4.3	4.9	4.9	5.1	5.6	4.7	4.3	4.8	5.2	5.7	8.7	6.9	5.7	5.5	5.0	5.3	3.9	3.4	3.2	Diurnal Average	
																								24	20	15	8	34	49	42	28	30	36	27	36	45	54	60	61	35	27	24	26	29	16	21	17	Diurnal Maximum	
Z - zerspan																								C - Calibration				M - Maintenance																					



WBEA
Hourly Averages

Nitric Oxide (NO) - ppb
Athabasca Valley - November 2014





WBEA
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Athabasca Valley - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	641	94.68	94.68
21 - 40	29	4.28	98.97
41 - 80	7	1.03	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 677

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitric Oxide (NO) - ppb
Athabasca Valley - November 2014

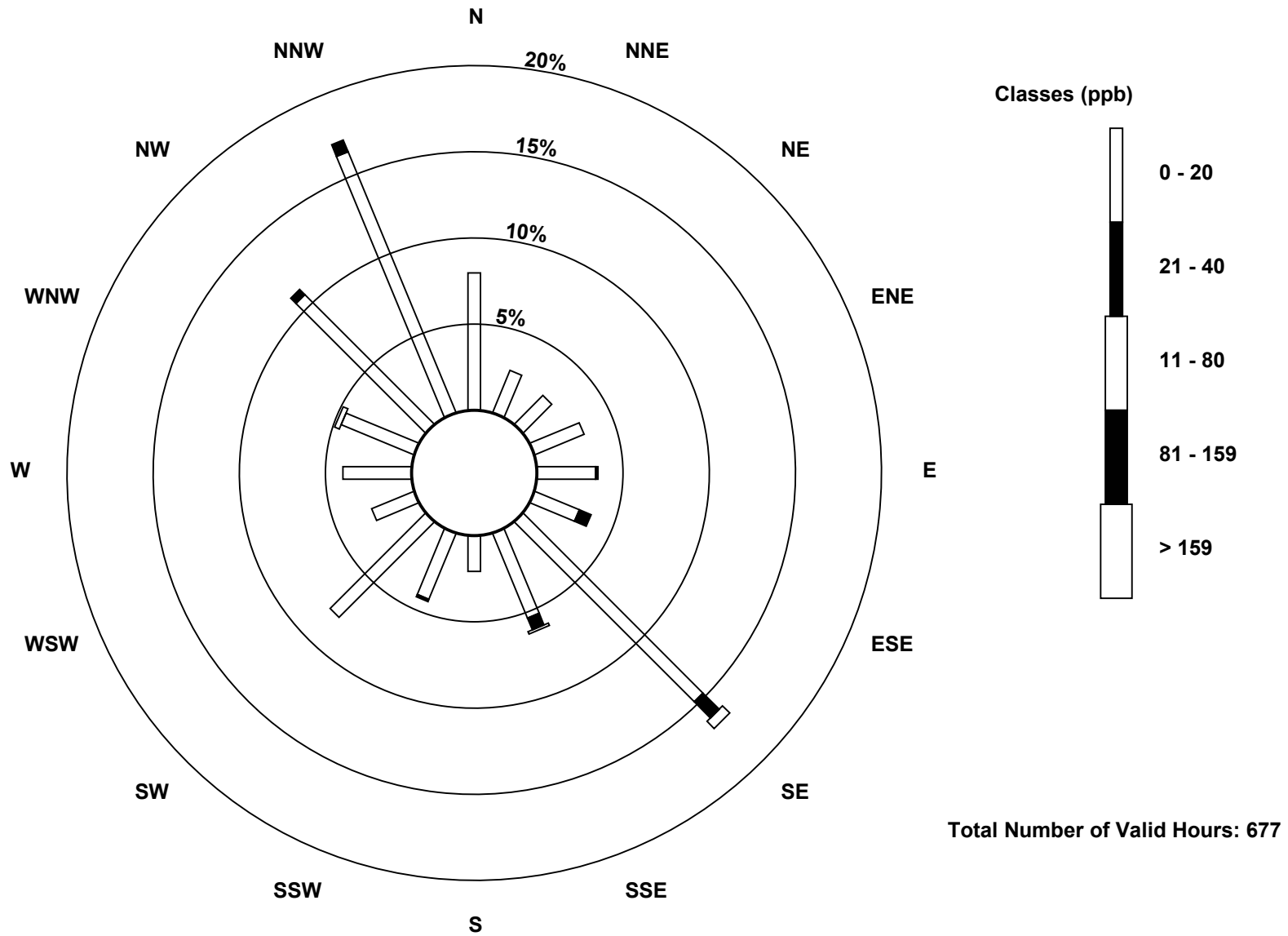
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	54	18	16	21	23	19	100	36	14	28	53	18	27	31	72	111	641
21 - 40	0	0	0	0	1	5	9	5	0	1	0	0	0	0	3	5	29
11 - 80	0	0	0	0	0	0	4	1	0	0	0	0	0	2	0	0	7
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	54	18	16	21	24	24	113	42	14	29	53	18	27	33	75	116	677

Total Number of Valid Hours: 677

Total Number of Hours: 720

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

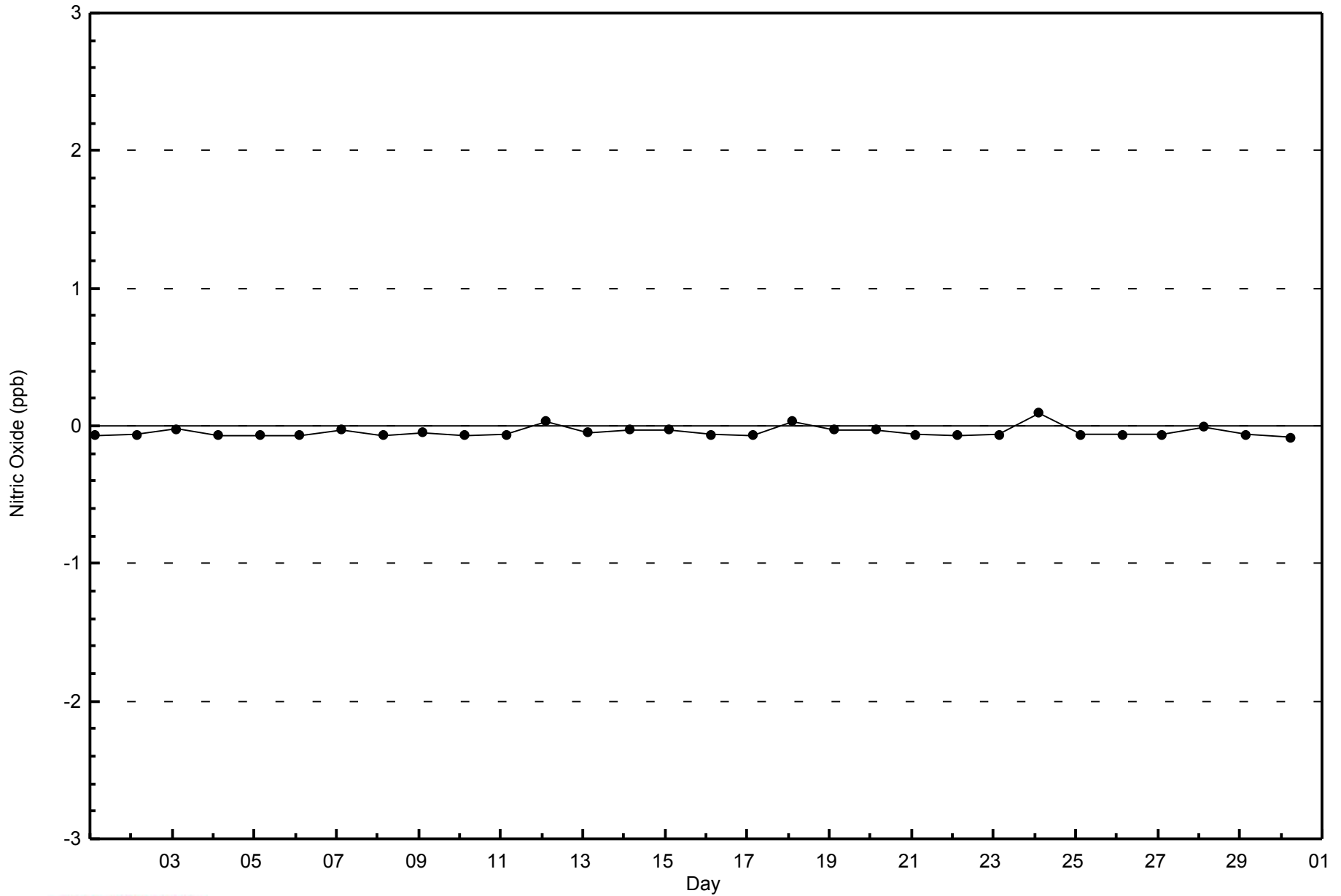
**Nitric Oxide (NO) - ppb
Athabasca Valley (AMS 7)**





WBEA
Zero Responses

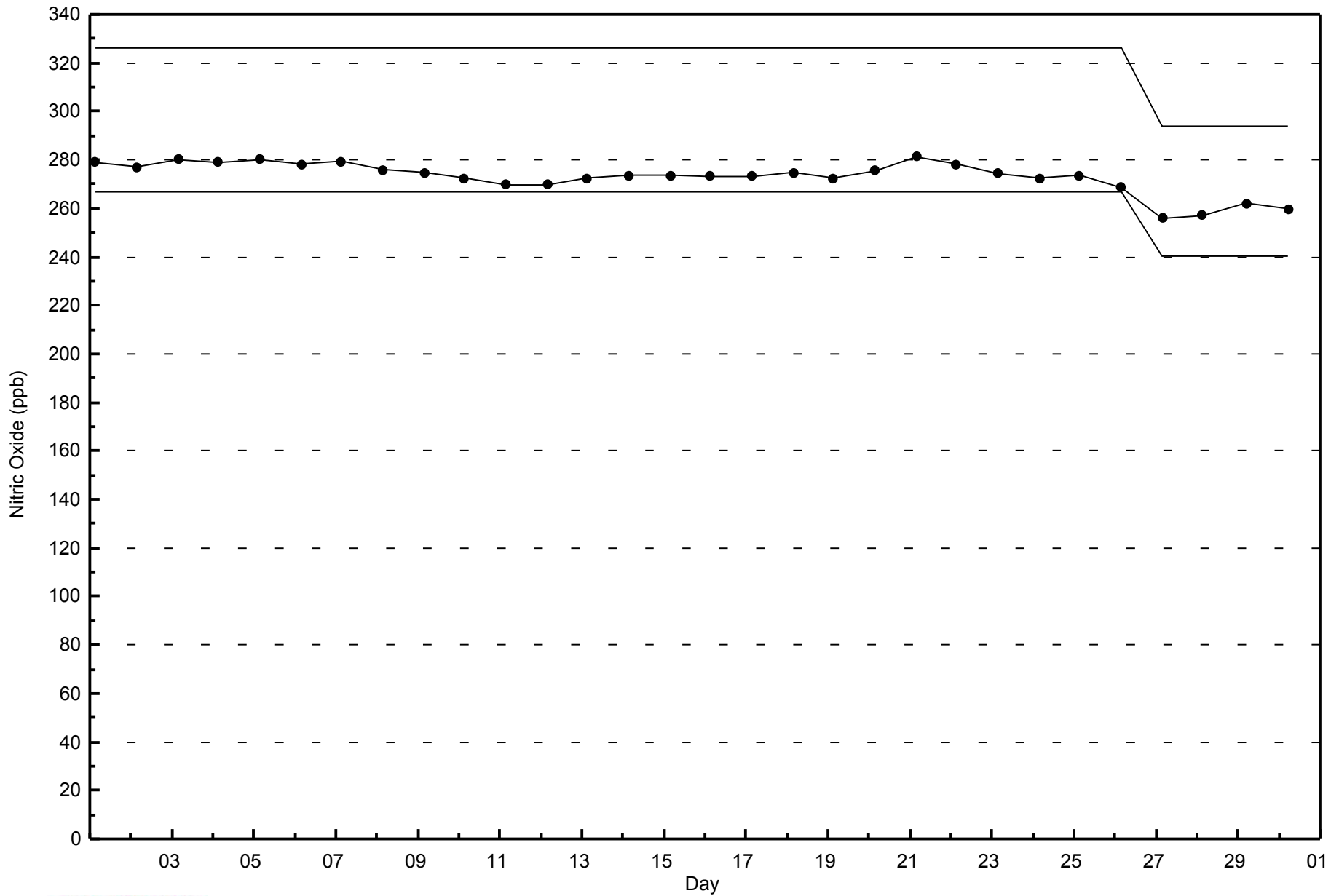
Nitric Oxide (NO) - ppb
Athabasca Valley - November 2014





WBEA
Span Responses

Nitric Oxide (NO) - ppb
Athabasca Valley - November 2014





Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 34 ppb on Nov 30 16:00	Maximum Daily Average: 16.1 ppb on Nov 13		Hours of Data:	677
Minimum Value: 0 ppb on Nov 22 02:00	Minimum Daily Average: 3.5 ppb on Nov 5		Hours of Missing Data:	43
Maximum Diurnal Average: 14.7 ppb at hour 17	Minimum Diurnal Average: 5.7 ppb at hour 12		Hours of Calibration:	35
Monthly Average: 9.1 ppb	Percentiles: P ₁ = 0 P ₁₀ = 2 Q ₁ = 4 Median = 7 Q ₃ = 13 P ₉₀ = 19 P ₉₉ = 28		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-Nov	4	2	1	Z	5	6	9	11	9	10	10	4	5	4	4	6	19	14	12	11	12	9	12	10	8.2	19		
2-Nov	5	5	3	Z	3	4	3	4	4	4	3	4	4	5	5	5	6	4	4	4	5	4	4	4	4.2	6		
3-Nov	4	3	4	Z	4	3	7	5	3	2	3	4	3	3	7	12	9	8	8	12	13	10	4	1	5.8	13		
4-Nov	1	1	2	Z	3	4	6	7	7	7	5	5	6	8	7	5	9	8	7	7	6	6	5	7	5.6	9		
5-Nov	4	4	2	Z	2	5	6	5	3	3	2	2	2	2	2	3	4	3	6	4	3	6	6	5	3.5	6		
6-Nov	5	5	4	Z	3	4	5	5	5	6	7	11	9	10	15	22	21	21	15	13	3	1	1	1	8.3	22		
7-Nov	0	1	0	Z	0	1	1	2	6	3	3	2	1	1	3	4	6	11	8	6	7	4	6	7	3.6	11		
8-Nov	7	5	8	Z	12	14	11	16	18	9	7	8	6	6	7	11	17	14	10	9	11	10	12	14	10.5	18		
9-Nov	10	17	15	Z	14	14	15	17	14	11	8	9	8	9	10	12	17	9	8	9	10	4	3	4	10.7	17		
10-Nov	6	5	5	Z	5	9	7	11	9	5	4	6	6	5	4	5	6	5	4	4	4	3	4	3	5.4	11		
11-Nov	4	4	3	Z	7	6	4	3	3	4	4	7	11	10	11	11	12	16	16	16	21	17	20	21	10.0	21		
12-Nov	22	22	22	Z	21	12	6	7	4	5	4	3	2	2	2	8	27	22	18	22	21	19	15	14	13.0	27		
13-Nov	14	14	11	Z	12	14	14	13	12	11	11	15	18	21	26	25	22	21	21	19	16	15	16	12	16.1	26		
14-Nov	14	16	15	Z	21	22	22	21	15	6	5	4	3	4	5	10	13	12	17	17	11	9	13	21	12.8	22		
15-Nov	24	21	2	Z	8	4	4	4	3	3	3	3	3	4	8	6	16	5	2	6	9	6	4	4	6.5	24		
16-Nov	3	3	4	Z	5	5	6	6	8	6	5	5	5	2	2	5	5	5	10	8	2	2	7	8	5.1	10		
17-Nov	6	10	9	Z	17	22	22	18	15	11	10	9	10	10	15	20	16	19	16	13	17	15	12	12	14.0	22		
18-Nov	15	17	18	Z	11	8	13	9	9	7	3	2	2	1	3	4	3	3	3	2	3	3	4	3	6.3	18		
19-Nov	1	1	1	Z	2	4	6	5	5	3	3	3	4	3	6	16	31	19	20	18	20	15	8	7	8.7	31		
20-Nov	6	6	5	Z	7	11	14	13	15	13	13	11	13	14	18	22	23	24	21	16	16	20	18	20	14.6	24		
21-Nov	14	10	9	Z	10	6	8	10	7	9	9	5	3	6	8	12	12	3	2	2	2	2	2	1	6.5	14		
22-Nov	1	0	0	Z	1	0	1	1	6	5	2	4	1	5	12	8	5	9	11	10	12	10	8	9	5.2	12		
23-Nov	6	7	17	Z	16	13	13	21	19	16	15	11	11	7	7	13	15	15	9	8	6	6	6	6	11.4	21		
24-Nov	4	14	19	Z	5	8	6	5	10	17	11	7	7	8	8	10	12	12	3	2	4	5	2	0	7.6	19		
25-Nov	0	0	0	Z	1	1	1	17	19	13	8	7	7	8	11	26	30	25	23	19	18	17	15	16	12.2	30		
26-Nov	12	14	15	Z	14	13	13	12	13	C	C	C	C	C	15	17	18	19	23	25	25	14	8	6	15.3	25		
27-Nov	2	1	2	Z	8	11	14	10	13	13	11	6	7	3	11	17	18	16	19	23	28	29	25	14	13.0	29		
28-Nov	11	8	8	Z	10	11	9	8	8	6	6	8	9	M	M	M	M	M	M	M	M	M	M	12	12	10	--	12
29-Nov	11	11	16	Z	16	15	20	25	26	24	11	3	2	3	4	9	8	6	3	3	3	2	2	2	9.6	26		
30-Nov	1	1	2	Z	2	4	4	4	4	3	3	2	2	5	10	34	29	30	29	21	17	15	14	13	10.7	34		

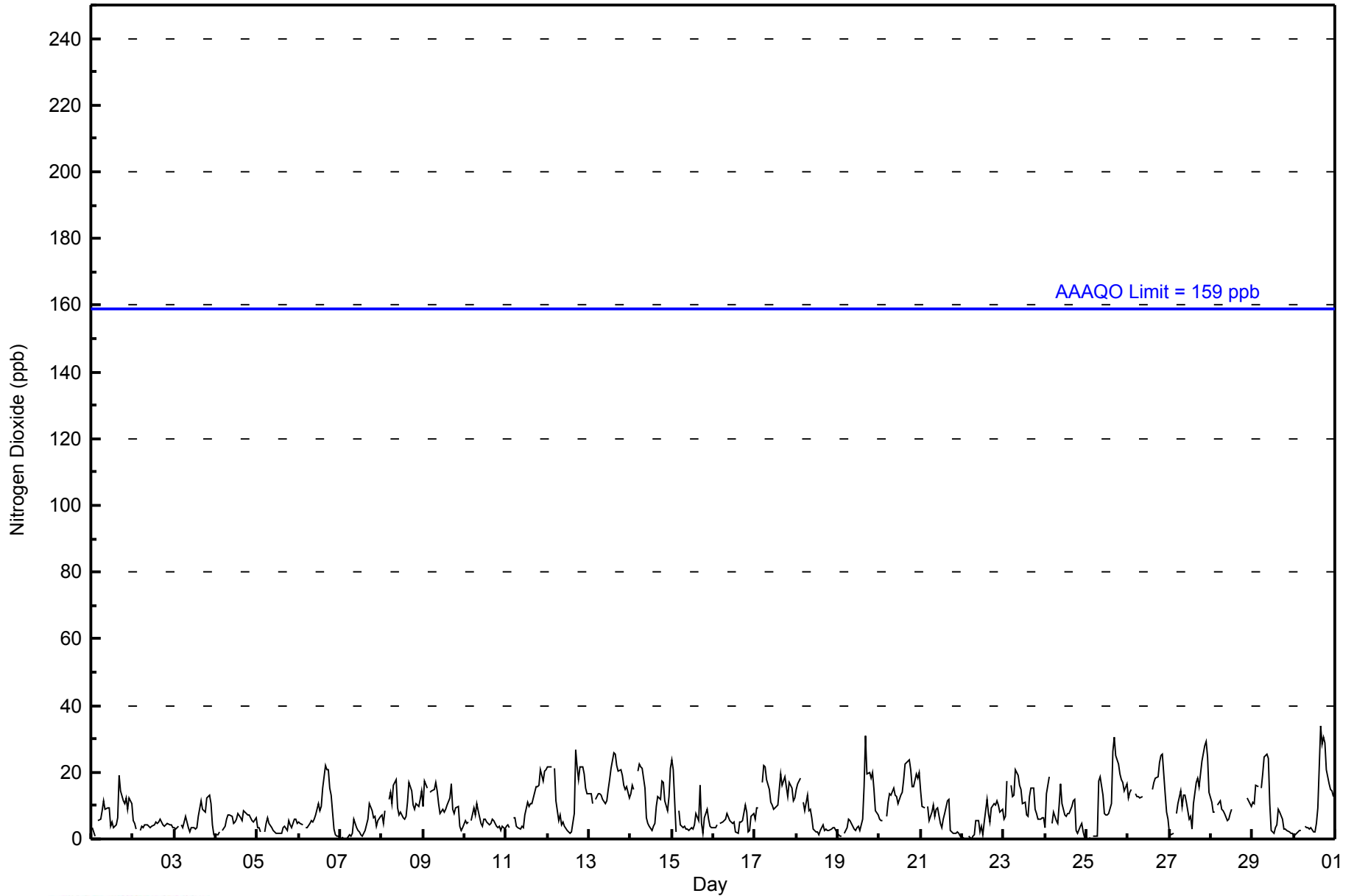
7.1	7.5	7.5	9.0	7.8	8.6	8.8	9.9	9.7	8.0	6.4	5.7	5.8	6.0	8.3	12.3	14.7	13.0	11.9	11.3	11.1	9.7	8.9	8.4	Diurnal Average	
24	22	22	16	21	22	22	25	26	24	15	15	18	21	26	34	31	30	29	25	28	29	25	21	Diurnal Maximum	

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



WBEA
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Athabasca Valley - November 2014





WBEA
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Athabasca Valley - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	624	92.17	92.17
21 - 40	53	7.83	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 677

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Athabasca Valley - November 2014

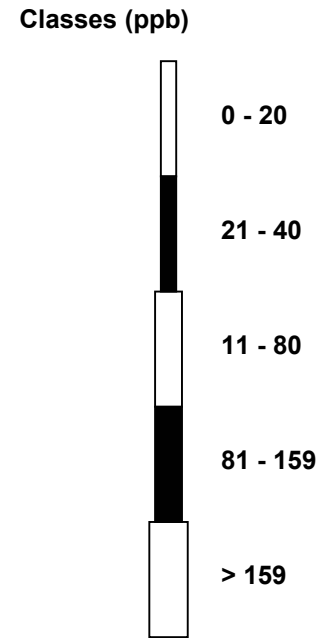
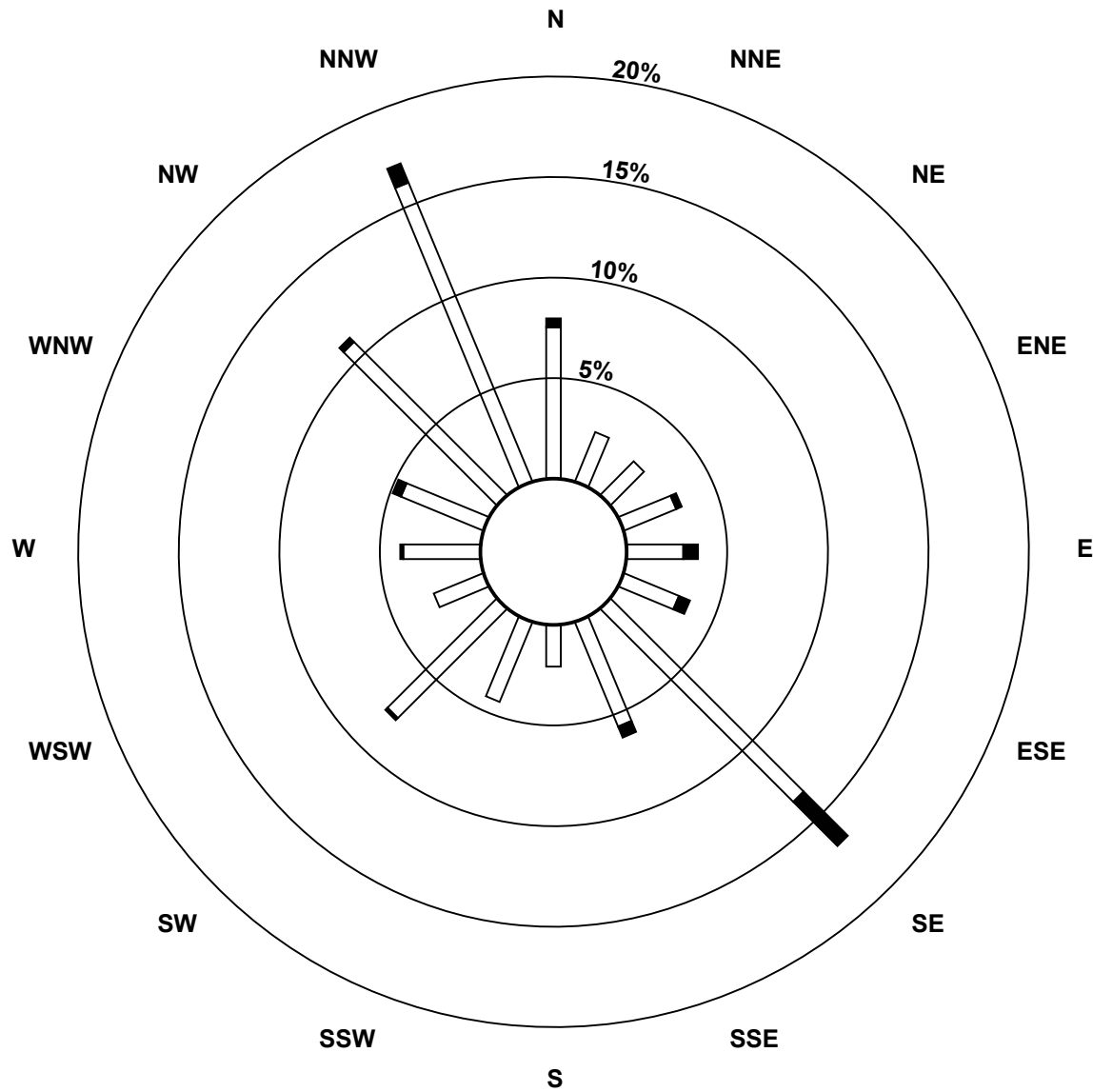
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	51	18	16	19	19	20	92	38	14	29	52	18	26	30	73	109	624
21 - 40	3	0	0	2	5	4	21	4	0	0	1	0	1	3	2	7	53
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	54	18	16	21	24	24	113	42	14	29	53	18	27	33	75	116	677

Total Number of Valid Hours: 677

Total Number of Hours: 720

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

**Nitrogen Dioxide (NO₂) - ppb
Athabasca Valley (AMS 7)**

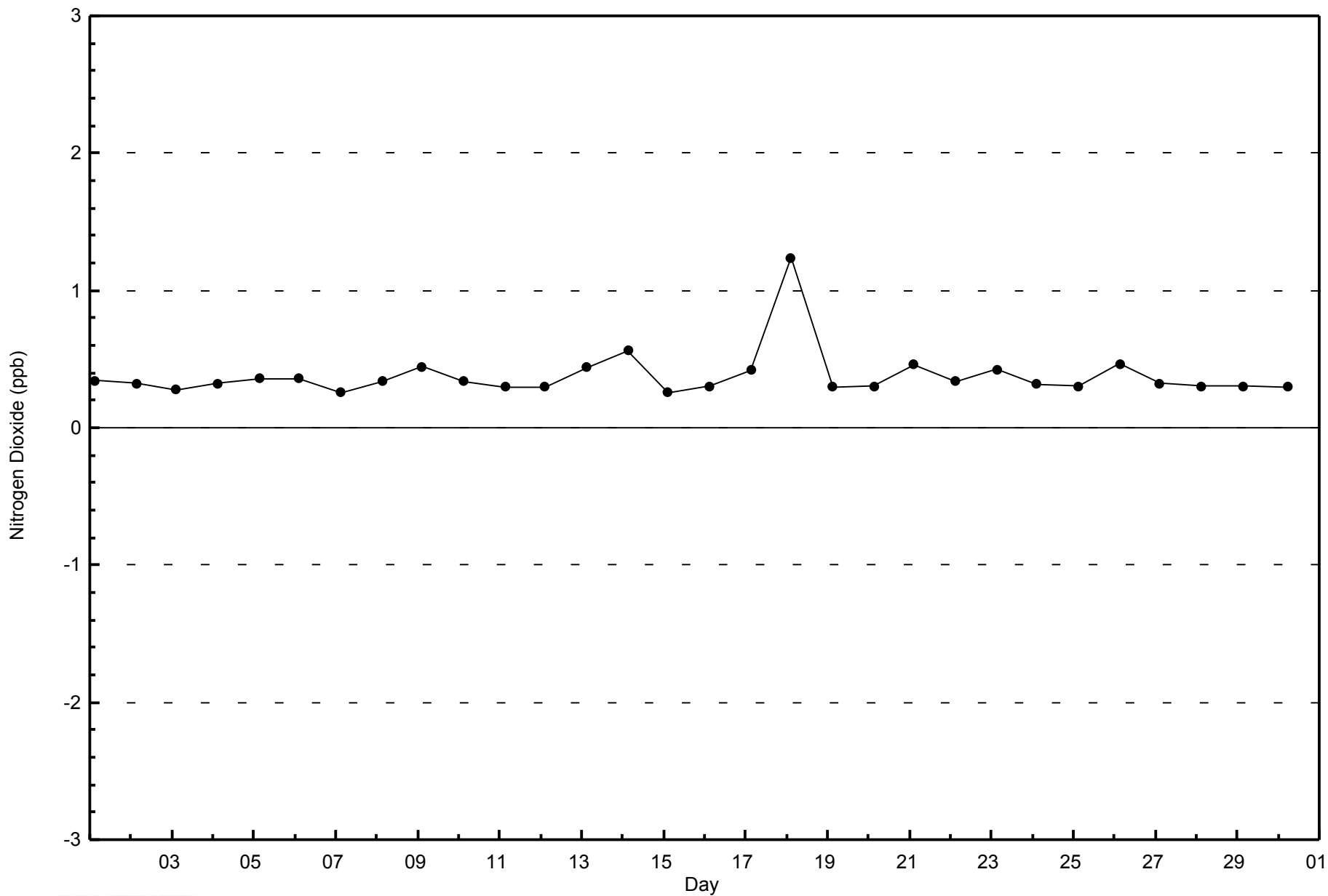


Total Number of Valid Hours: 677



WBEA
Zero Responses

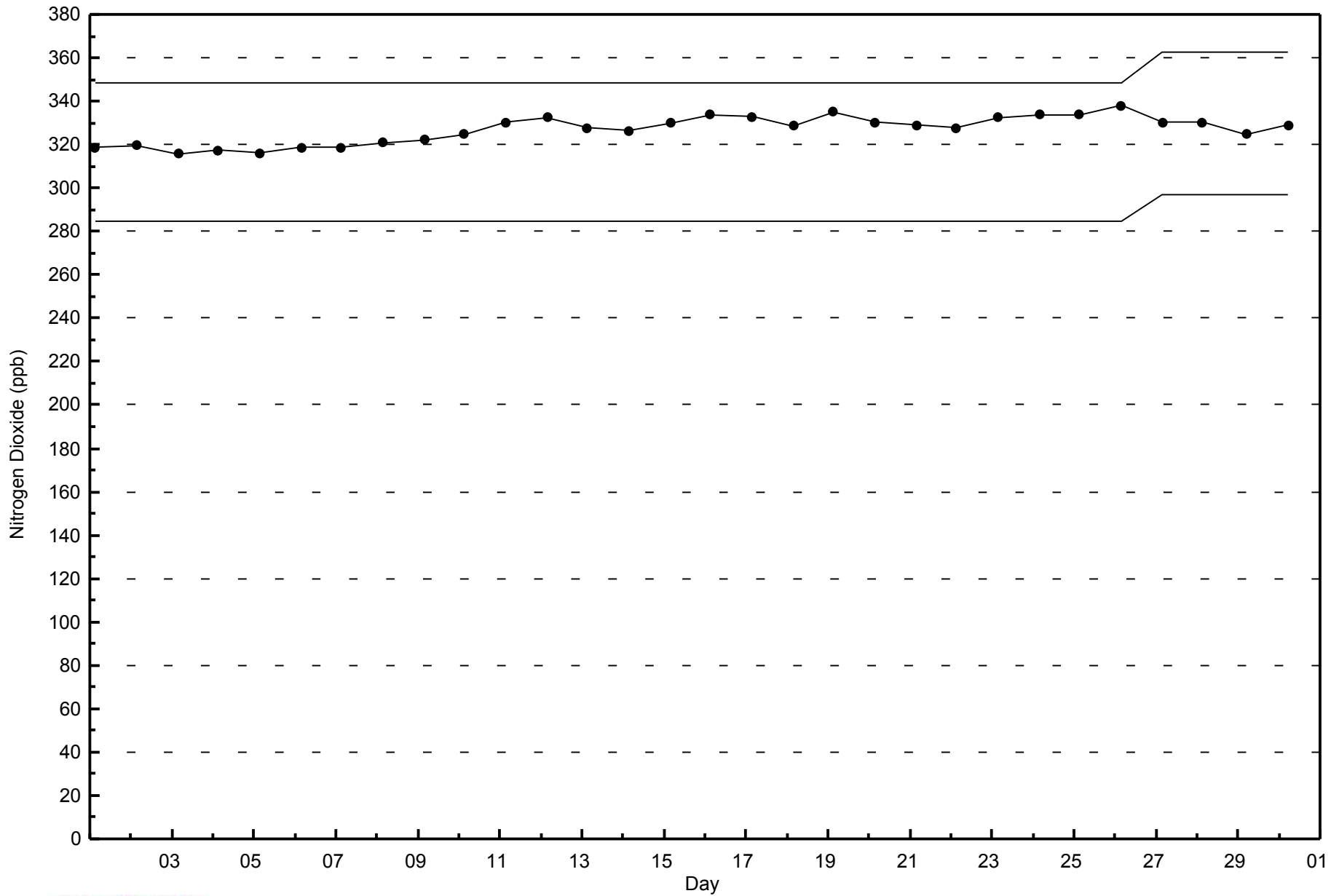
Nitrogen Dioxide (NO₂) - ppb
Athabasca Valley - November 2014





WBEA
Span Responses

Nitrogen Dioxide (NO₂) - ppb
Athabasca Valley - November 2014





Maximum Value: 86 ppb on Nov 13 16:00	Maximum Daily Average: 39.7 ppb on Nov 13	Hours in Service: 720
Minimum Value: 0 ppb on Nov 22 02:00	Minimum Daily Average: 3.6 ppb on Nov 7	Hours of Data: 677
Maximum Diurnal Average: 21.6 ppb at hour 17	Minimum Diurnal Average: 10.0 ppb at hour 3	Hours of Missing Data: 43
Monthly Average: 13.8 ppb	Percentiles: P ₁ = 0 P ₁₀ = 3 Q ₁ = 5 Median = 9 Q ₃ = 19 P ₉₀ = 31 P ₉₉ = 62	Hours of Calibration: 35
		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-Nov	8	4	1	Z	11	19	27	39	37	45	37	8	14	16	6	8	42	29	28	32	41	25	33	22	23.1	45	
2-Nov	11	10	7	Z	6	11	8	8	12	11	10	12	13	13	12	12	12	9	7	8	8	7	6	5	9.5	13	
3-Nov	5	4	6	Z	6	5	11	9	7	6	7	9	8	10	20	27	9	8	8	13	15	12	5	1	9.1	27	
4-Nov	1	1	2	Z	3	5	9	12	12	10	8	9	9	16	11	8	13	14	12	13	11	10	8	10	9.0	16	
5-Nov	5	4	2	Z	2	5	7	5	4	3	3	2	2	2	2	4	5	8	8	6	4	8	8	6	4.5	8	
6-Nov	6	6	5	Z	4	5	6	11	8	8	10	17	14	15	27	43	33	34	29	23	3	1	1	1	13.6	43	
7-Nov	0	1	0	Z	0	1	1	2	6	3	3	2	2	1	3	4	6	10	8	6	7	4	6	7	3.6	10	
8-Nov	7	5	8	Z	12	14	11	16	21	11	9	11	8	8	8	12	17	15	10	9	12	11	14	19	11.7	21	
9-Nov	11	22	20	Z	20	19	22	33	29	22	16	16	12	13	13	14	17	9	8	10	10	4	3	4	15.1	33	
10-Nov	6	5	5	Z	5	9	7	11	9	5	6	8	7	6	5	5	7	5	4	4	4	3	4	3	5.7	11	
11-Nov	4	4	3	Z	6	6	4	3	4	5	5	11	16	13	13	12	13	19	19	19	29	21	31	38	13.0	38	
12-Nov	41	31	29	Z	30	15	6	10	5	7	5	4	4	2	3	10	48	30	23	33	37	31	23	19	19.4	48	
13-Nov	19	20	16	Z	20	25	27	28	26	29	36	51	62	75	85	86	57	45	44	40	33	31	36	21	39.7	86	
14-Nov	27	36	28	Z	54	71	63	30	16	6	5	5	3	5	5	10	13	12	20	22	14	10	18	36	22.2	71	
15-Nov	45	33	2	Z	9	5	4	5	4	4	4	5	4	6	9	6	16	5	2	6	9	6	4	3	8.5	45	
16-Nov	3	3	4	Z	5	5	5	6	8	5	5	5	6	2	2	5	5	6	11	10	2	3	7	8	5.4	11	
17-Nov	7	12	11	Z	25	36	38	27	24	19	19	17	18	18	25	38	25	30	24	15	36	27	15	19	22.8	38	
18-Nov	39	33	29	Z	12	8	13	9	9	7	3	2	2	1	3	4	3	3	3	2	3	3	3	3	8.6	39	
19-Nov	1	1	1	Z	2	4	6	5	5	3	3	4	5	3	8	24	48	23	27	21	25	18	9	8	11.0	48	
20-Nov	7	6	6	Z	8	14	17	17	19	17	19	16	21	22	30	45	50	51	34	23	20	32	28	25	23.0	51	
21-Nov	14	10	9	Z	10	5	8	10	7	9	11	6	4	8	8	12	14	3	3	2	2	3	2	1	7.0	14	
22-Nov	1	0	0	Z	1	0	6	2	10	7	4	6	3	7	16	9	6	10	11	11	12	10	8	9	6.4	16	
23-Nov	6	7	20	Z	16	13	13	26	25	25	24	20	26	15	11	28	24	23	13	12	8	7	9	9	16.4	28	
24-Nov	4	22	33	Z	5	8	6	5	11	21	14	9	9	9	10	12	13	4	3	5	5	3	0	0	9.5	33	
25-Nov	0	0	0	Z	1	1	1	17	19	16	10	11	11	11	14	36	39	29	27	23	23	23	17	21	15.2	39	
26-Nov	14	18	18	Z	21	19	22	21	27	C	C	C	C	C	25	26	21	27	47	51	46	16	8	6	24.1	51	
27-Nov	1	1	2	Z	8	11	16	10	14	17	15	8	10	4	14	20	19	17	22	25	32	43	27	14	15.2	43	
28-Nov	11	8	8	Z	10	11	9	8	8	6	7	10	12	M	M	M	M	M	M	M	M	M	13	12	11	--	13
29-Nov	12	11	20	Z	21	34	50	55	60	22	5	3	6	6	12	8	6	3	3	3	3	2	2	2	16.0	60	
30-Nov	1	1	2	Z	2	4	5	5	4	6	4	4	7	14	79	46	49	45	29	23	20	18	16	16	16.9	79	

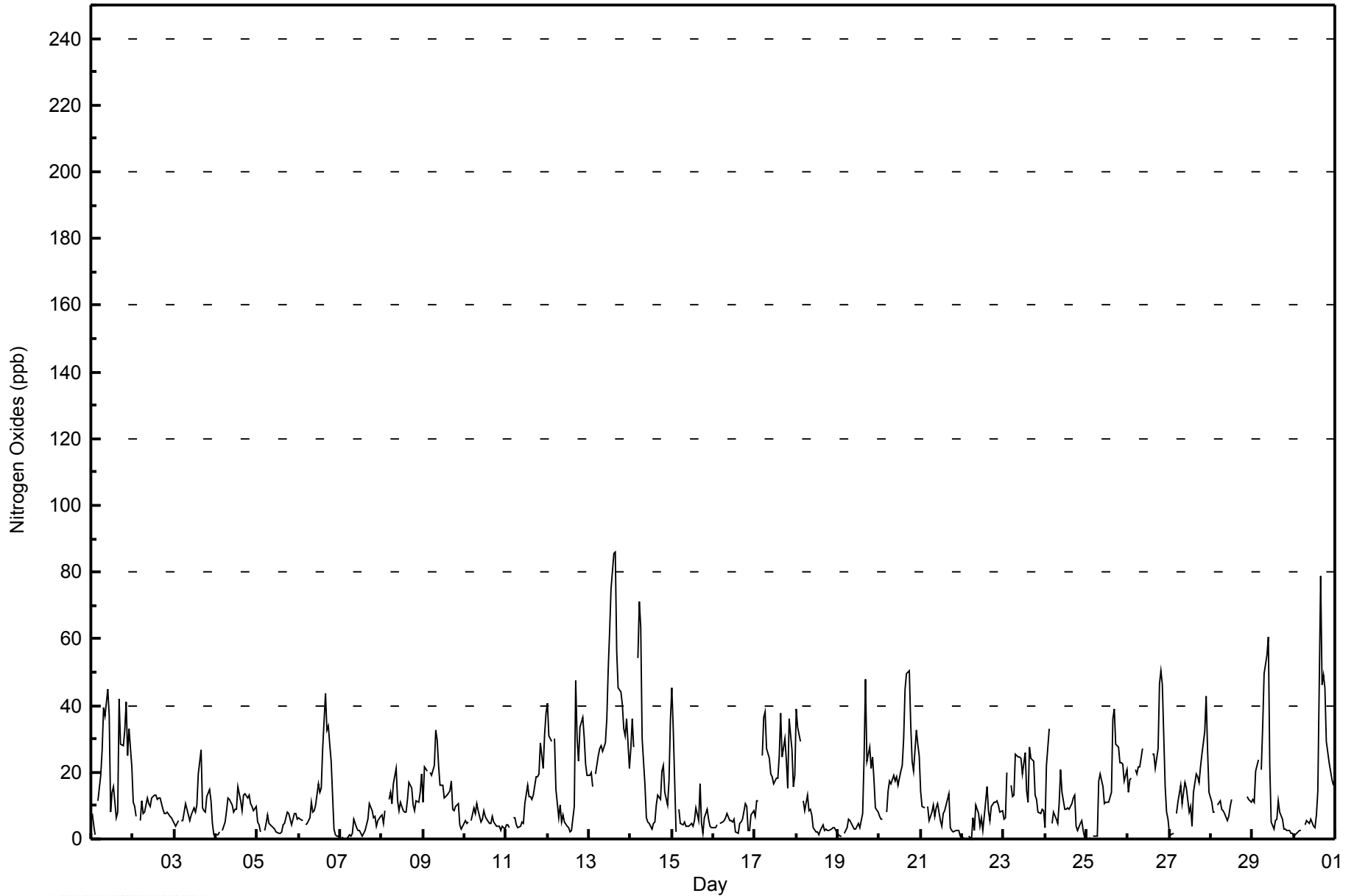
10.6	10.6	10.0	13.0	10.8	12.9	13.8	14.7	14.9	13.6	11.2	10.1	10.7	11.2	14.0	21.0	21.6	18.7	17.4	16.4	16.4	13.6	12.3	11.5	Diurnal Average	
45	36	33	24	54	71	63	50	55	60	37	51	62	75	85	86	57	51	47	51	46	43	36	38	Diurnal Maximum	

Z - zerspan C - Calibration M - Maintenance



WBEA
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Athabasca Valley - November 2014





WBEA
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Athabasca Valley - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	526	77.70	77.70
21 - 40	118	17.43	95.13
41 - 80	31	4.58	99.70
81 - 159	2	0.30	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 677

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Athabasca Valley - November 2014

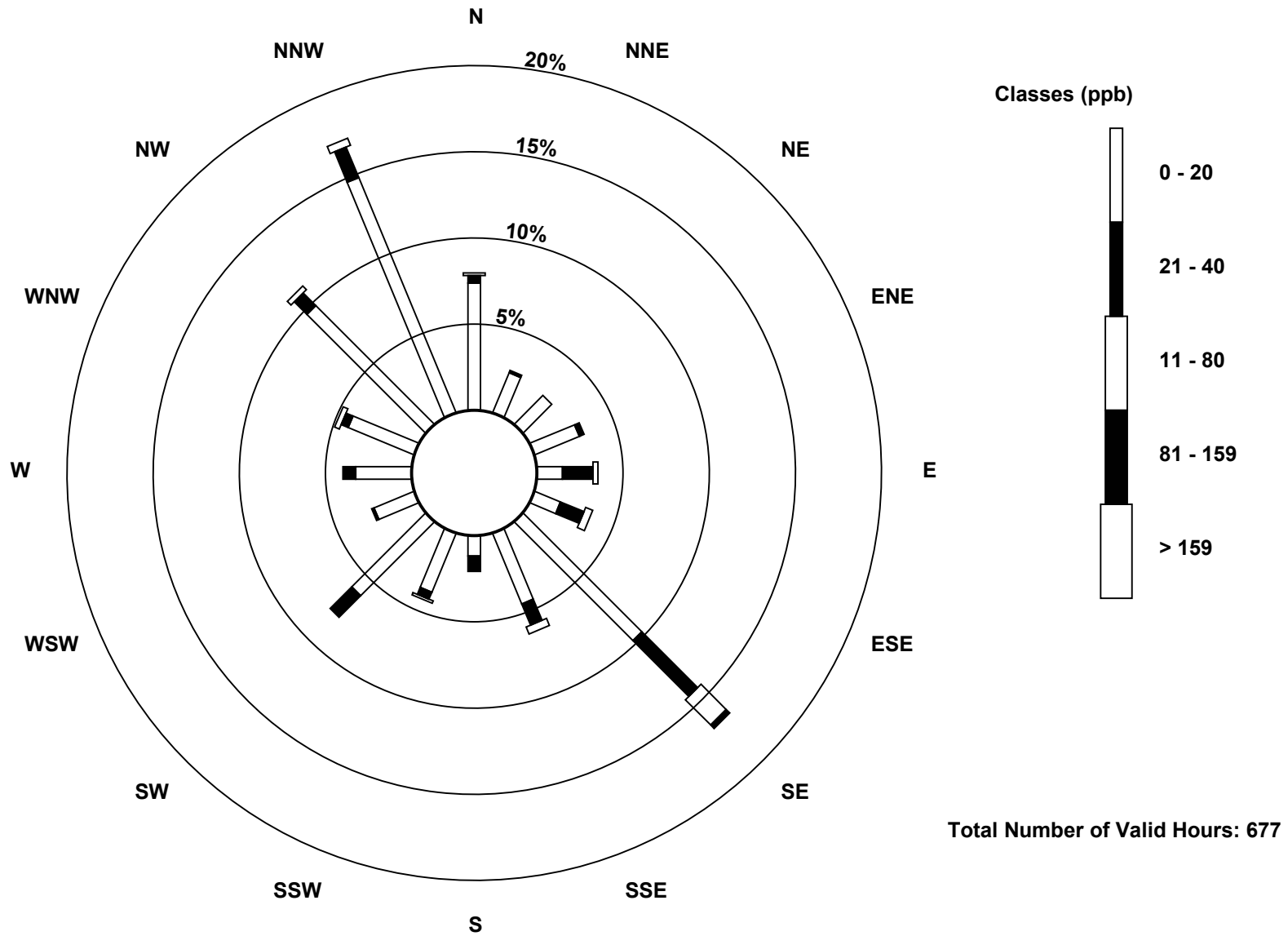
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	50	17	16	19	10	11	66	30	8	25	41	17	22	28	66	100	526
21 - 40	3	1	0	2	12	10	31	9	6	3	12	1	5	3	7	13	118
11 - 80	1	0	0	0	2	3	14	3	0	1	0	0	0	2	2	3	31
81 - 159	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	54	18	16	21	24	24	113	42	14	29	53	18	27	33	75	116	677

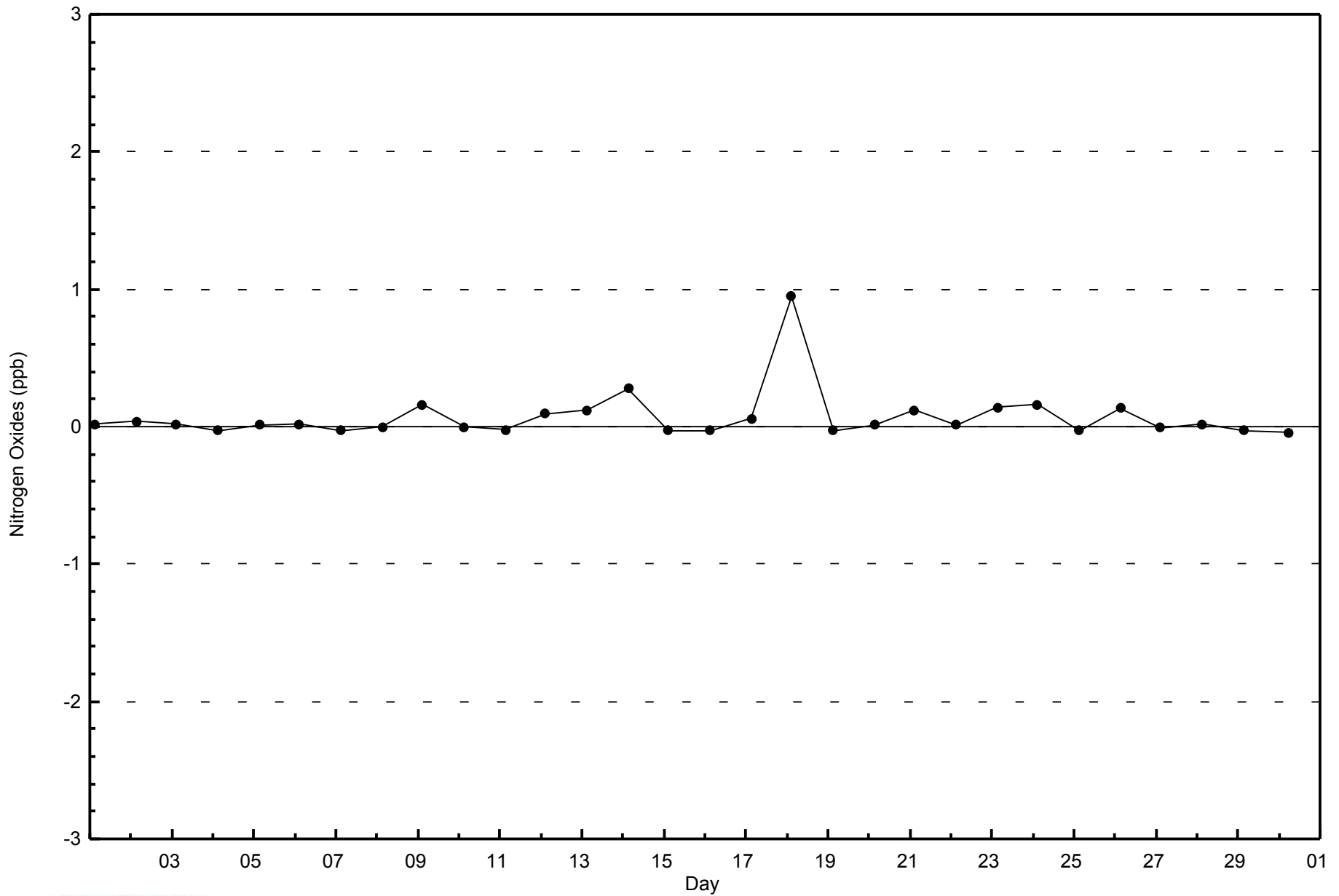
Total Number of Valid Hours: 677

Total Number of Hours: 720

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

**Nitrogen Oxides (NO_x) - ppb
Athabasca Valley (AMS 7)**

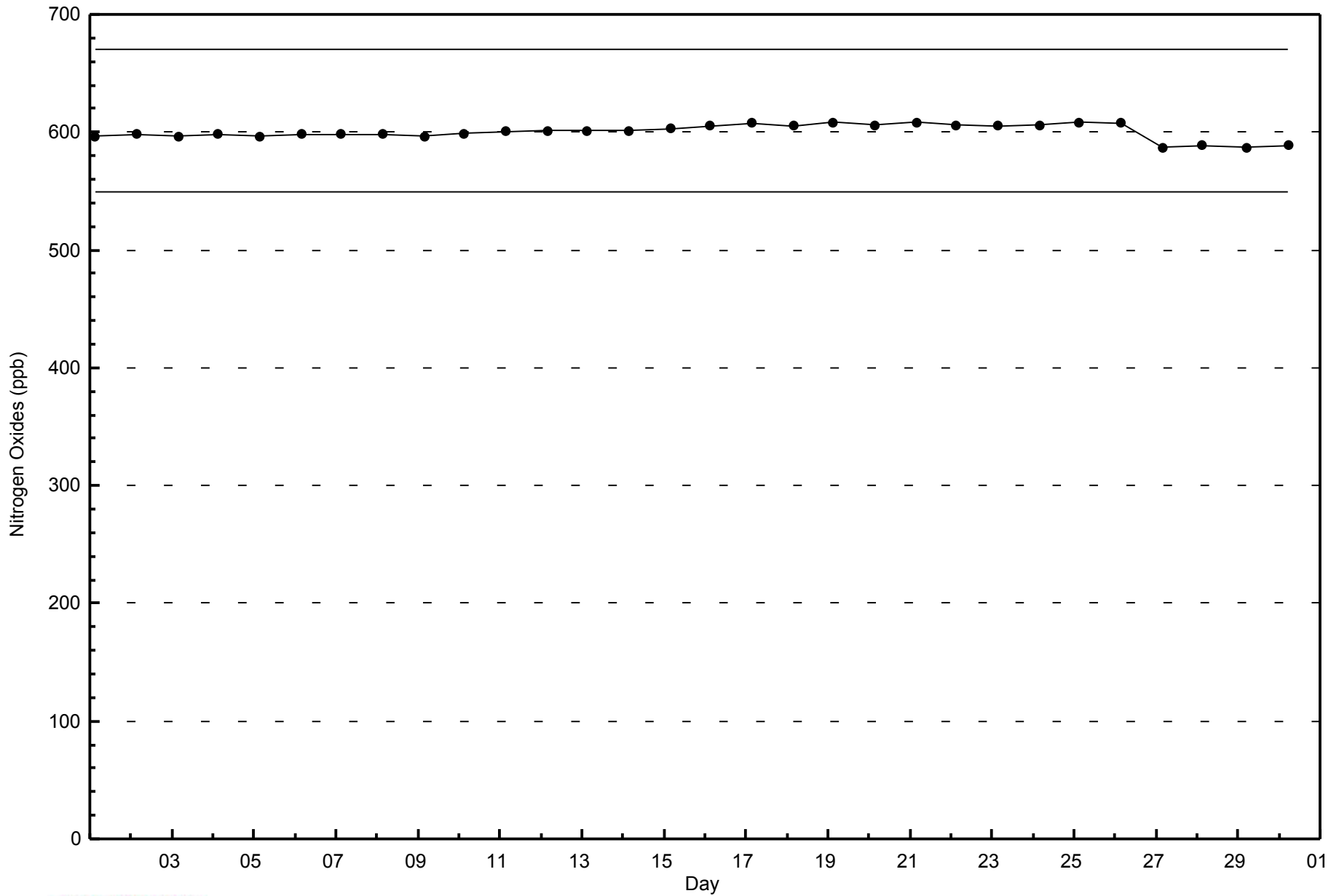






WBEA
Span Responses

Nitrogen Oxides (NO_x) - ppb
Athabasca Valley - November 2014





Number of Exceedences (AAAQO): 24-hr: 0	Hours in Service: 720
Maximum Value: 52.0 µg/m ³ on Nov 5 07:00	Maximum Daily Average: 13.9 µg/m ³ on Nov 20
Minimum Value: 0.2 µg/m ³ on Nov 11 10:00	Hours of Data: 709
Maximum Diurnal Average: 8.1 µg/m ³ at hour 17	Hours of Missing Data: 11
Monthly Average: 6.32 µg/m ³	Hours of Calibration: 0
Minimum Daily Average: 1.5 µg/m ³ on Nov 16	Percent Operational Time: 98.5
Minimum Diurnal Average: 5.1 µg/m ³ at hour 4	
Percentiles: P ₁ = 0.7 P ₁₀ = 2.1 Q ₁ = 3.4 Median = 5.1 Q ₃ = 7.7 P ₉₀ = 11.5 P ₉₉ = 18.1	

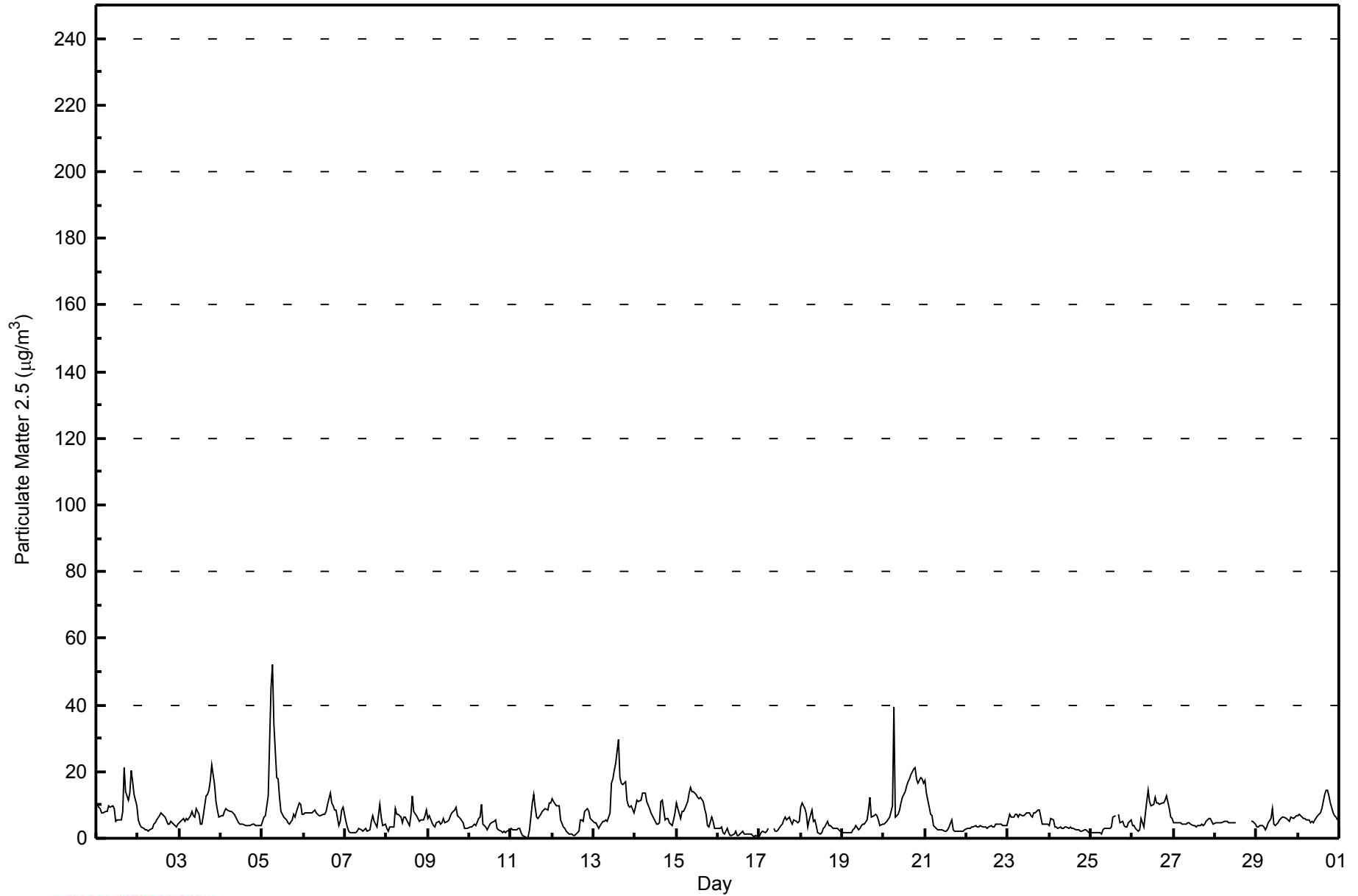
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Nov	10.1	9.5	9.0	7.8	7.8	7.9	8.1	9.7	9.3	9.8	8.8	5.0	5.3	5.4	5.4	8.1	21.2	14.2	11.2	13.4	20.4	17.0	13.3	9.8	10.3	21.2																						
2-Nov	5.7	4.4	3.6	3.0	2.4	2.6	2.2	2.7	3.2	4.3	4.8	5.6	6.9	7.6	7.0	6.6	6.2	4.2	4.1	4.9	4.6	3.7	3.5	4.2	4.5	7.6																						
3-Nov	4.7	5.2	6.1	5.0	5.8	5.4	6.8	8.0	6.9	6.3	8.9	7.2	4.3	4.4	7.0	12.6	12.9	14.6	17.5	22.2	16.2	11.0	8.6	6.5	8.9	22.2																						
4-Nov	6.8	6.7	8.2	8.8	8.4	8.1	8.1	7.7	7.4	5.7	4.6	4.2	4.2	4.1	3.9	3.7	3.9	3.8	4.1	4.1	3.9	3.9	3.7	4.0	5.5	8.8																						
5-Nov	4.9	6.3	6.9	12.9	29.4	45.3	52.0	34.3	18.1	17.7	12.2	8.2	6.2	6.1	5.4	4.8	4.4	5.7	7.2	6.6	8.0	10.5	10.0	7.1	13.8	52.0																						
6-Nov	7.0	7.6	7.6	7.7	7.5	7.7	8.3	7.7	7.3	6.9	6.7	7.1	7.0	8.1	10.0	13.4	10.7	9.8	8.7	8.3	3.9	5.2	8.5	9.4	8.0	13.4																						
7-Nov	5.0	3.6	2.0	1.8	1.6	1.7	1.6	2.3	3.1	2.4	2.2	2.7	2.8	2.2	2.5	5.2	6.8	5.0	3.3	6.6	10.1	6.5	3.9	4.0	3.7	10.1																						
8-Nov	3.2	2.2	3.4	3.4	3.5	9.0	7.0	7.1	6.4	4.8	6.3	6.3	4.8	3.9	6.9	12.5	8.2	6.6	6.1	5.1	5.6	5.7	6.9	8.5	6.0	12.5																						
9-Nov	6.0	6.6	4.7	3.9	3.5	4.7	5.0	4.3	4.6	5.8	4.5	5.2	5.5	6.7	7.7	8.5	9.4	6.7	6.2	5.9	4.5	3.1	3.0	3.0	5.4	9.4																						
10-Nov	3.2	3.3	3.7	4.2	3.7	5.8	6.3	10.3	4.3	3.3	2.7	3.5	4.4	4.8	4.9	5.3	3.1	2.7	2.1	1.9	2.0	1.7	2.2	2.4	3.8	10.3																						
11-Nov	2.8	2.5	2.4	2.4	2.8	2.8	1.8	0.9	0.4	0.2	0.5	2.4	10.5	13.1	9.5	6.4	5.9	7.3	8.0	8.4	9.1	8.3	10.4	10.8	5.4	13.1																						
12-Nov	11.9	10.8	9.6	9.7	9.9	5.6	3.4	2.9	2.0	1.7	1.4	1.2	0.7	1.0	1.3	2.2	5.6	5.4	5.0	8.0	8.9	8.2	5.9	5.4	5.3	11.9																						
13-Nov	4.5	4.7	3.7	2.9	4.0	5.0	5.1	5.6	5.2	7.5	16.6	17.6	20.2	22.3	29.8	18.4	16.6	16.2	16.9	11.6	9.7	9.5	9.7	7.7	11.3	29.8																						
14-Nov	9.1	11.6	11.1	11.5	13.7	13.6	13.4	10.9	9.0	7.4	6.9	6.1	4.1	4.4	4.8	11.0	11.4	5.6	6.0	6.1	4.5	3.8	5.4	7.6	8.3	13.7																						
15-Nov	10.5	8.9	6.1	7.9	8.3	9.0	11.2	13.5	15.3	13.8	14.0	13.2	12.2	11.7	12.4	11.0	9.0	7.1	3.8	3.6	6.2	5.1	3.2	2.8	9.1	15.3																						
16-Nov	3.1	3.0	3.3	1.6	1.5	3.2	1.6	0.9	1.0	1.5	2.0	1.1	0.8	1.4	2.2	1.2	1.4	1.2	1.5	1.3	0.7	0.5	0.6	0.5	1.5	3.3																						
17-Nov	0.8	1.7	2.1	1.6	2.1	2.9	M	M	2.9	2.0	1.9	2.4	3.9	4.3	5.7	6.3	5.7	6.5	5.2	4.2	5.5	5.0	4.7	5.3	3.7	6.5																						
18-Nov	9.2	10.6	9.1	7.3	3.5	5.7	8.6	5.2	5.7	3.7	1.6	1.3	1.9	2.8	3.4	5.0	3.6	3.8	3.2	3.0	2.9	2.8	2.6	2.1	4.5	10.6																						
19-Nov	1.8	1.7	1.7	1.8	1.8	1.9	2.6	3.1	3.6	2.7	3.1	4.0	4.3	4.2	5.5	8.5	12.4	6.3	6.7	7.3	6.9	5.4	4.0	4.1	4.4	12.4																						
20-Nov	4.1	4.7	5.2	6.2	8.0	9.7	39.4	6.4	7.0	8.6	10.6	12.2	13.9	15.5	17.0	17.8	19.1	20.6	21.3	17.8	16.6	18.0	17.7	16.4	13.9	39.4																						
21-Nov	17.3	13.3	9.3	7.1	6.6	3.9	3.1	2.7	2.7	2.5	2.4	2.0	1.9	2.5	3.5	5.3	2.7	2.0	2.0	2.2	2.2	2.3	2.3	2.3	4.3	17.3																						
22-Nov	2.8	3.0	3.1	3.2	3.5	3.6	3.5	3.5	3.7	3.4	3.3	3.4	3.1	3.4	3.8	3.5	3.6	4.1	4.4	4.2	4.1	3.9	3.9	4.0	3.6	4.4																						
23-Nov	5.6	7.2	6.4	6.1	7.3	7.0	6.5	7.1	6.8	6.9	7.2	7.7	7.7	7.0	6.2	7.5	7.5	8.5	8.5	6.1	4.4	4.1	4.2	4.2	6.6	8.5																						
24-Nov	4.0	5.9	5.4	3.4	3.2	3.1	3.2	3.1	3.0	3.3	3.2	2.9	3.3	3.1	2.9	2.7	2.6	2.7	2.1	2.1	2.4	2.7	2.2	1.9	3.1	5.9																						
25-Nov	1.9	1.7	1.7	1.6	1.6	1.5	1.4	2.6	3.0	3.0	2.9	2.9	3.5	6.3	6.9	M	7.2	4.7	5.2	3.7	3.4	3.3	4.7	5.4	3.5	7.2																						
26-Nov	3.9	3.8	3.1	2.1	2.7	5.7	4.7	3.5	11.1	14.5	11.2	9.6	10.1	12.5	10.6	10.7	10.2	10.4	10.7	11.5	12.5	8.8	6.4	6.0	8.2	14.5																						
27-Nov	4.8	4.8	4.8	4.5	4.5	4.3	4.1	4.1	4.7	4.8	4.3	4.0	3.9	3.6	3.8	4.0	4.2	3.9	4.2	5.1	5.8	5.9	4.9	4.3	4.5	5.9																						
28-Nov	4.8	4.8	4.6	4.5	4.7	5.0	5.2	4.9	4.6	4.6	4.6	4.8	4.8	M	M	M	M	M	M	M	M	4.9	4.9	4.3	--	5.2																						
29-Nov	3.6	3.5	3.7	3.8	3.2	2.6	3.4	4.9	5.8	8.7	4.0	3.7	4.7	5.4	6.0	6.4	6.4	6.1	5.7	5.3	6.3	6.1	6.4	6.6	5.1	8.7																						
30-Nov	7.0	7.0	6.5	6.0	6.1	5.6	5.4	4.8	4.9	4.8	5.7	6.6	7.3	7.6	8.9	13.1	14.5	14.2	12.8	10.6	7.4	6.6	6.4	5.6	7.7	14.5																						
																								5.7	5.7	5.3	5.1	5.8	6.7	8.0	6.4	5.8	5.8	5.6	5.5	5.8	6.4	7.1	7.9	8.1	7.2	7.0	6.9	6.8	6.1	5.8	5.5	Diurnal Average
																								17.3	13.3	11.1	12.9	29.4	45.3	52.0	34.3	18.1	17.7	16.6	17.6	20.2	22.3	29.8	18.4	21.2	20.6	21.3	22.2	20.4	18.0	17.7	16.4	Diurnal Maximum

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



WBEA
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Athabasca Valley - November 2014





WBEA
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Athabasca Valley - November 2014

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	373	52.61	52.61
6 - 15	289	40.76	93.37
16 - 25	27	3.81	97.18
26 - 80	6	0.85	98.03
> 81.0	0	0.00	98.03

Total Number of Valid Hours: 709

Total Number of Hours: 720



WBEA
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Athabasca Valley - November 2014

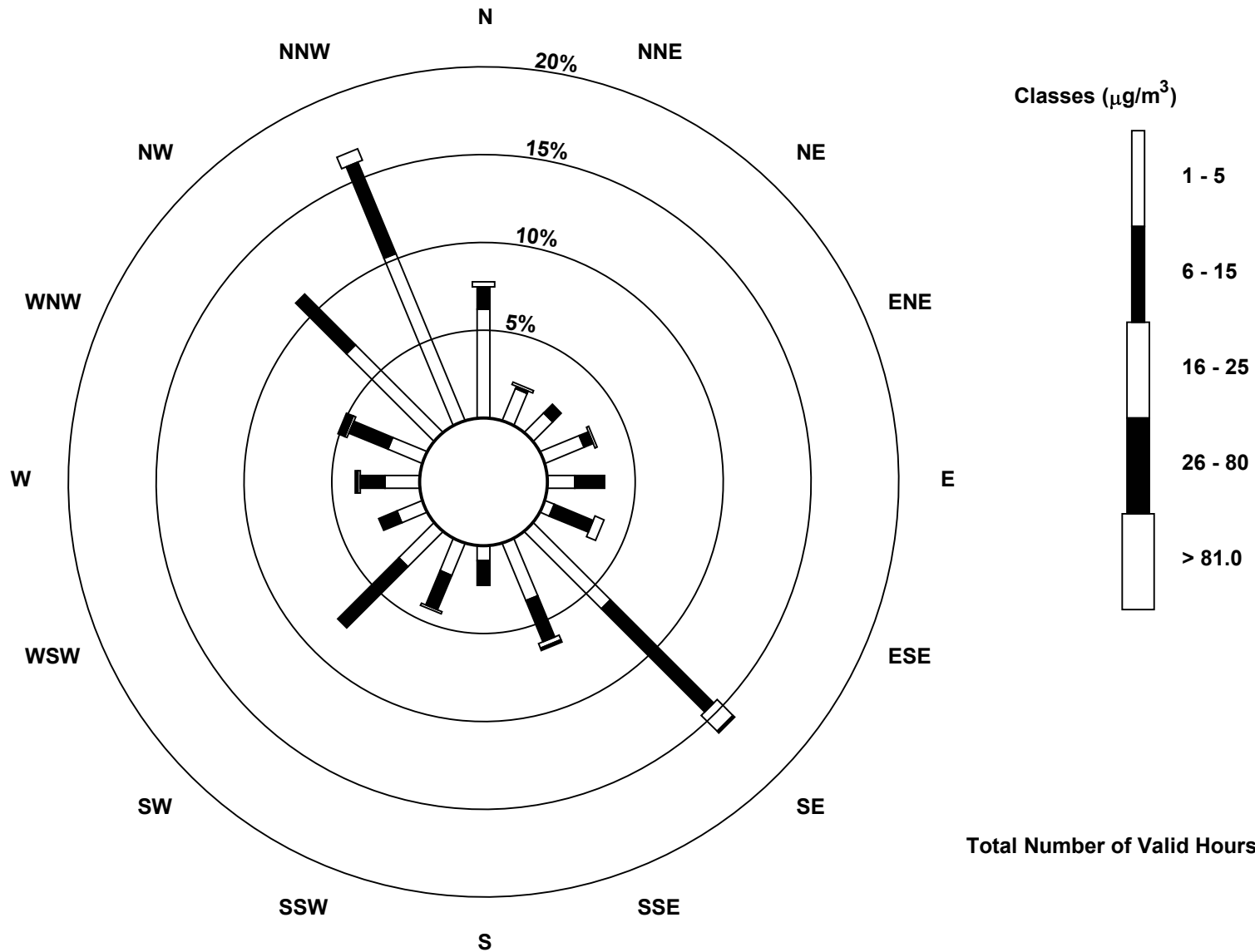
Concentration Ranges (μg/m ³)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	44	14	11	17	11	4	44	25	6	14	20	11	14	15	50	73	373
6 - 15	9	1	5	4	12	17	59	18	10	15	35	8	10	17	29	40	289
16 - 25	2	1	0	1	0	4	9	2	0	1	0	0	1	1	0	5	27
26 - 80	0	0	0	0	0	0	1	1	0	0	0	0	1	3	0	0	6
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	55	16	16	22	23	25	113	46	16	30	55	19	26	36	79	118	695

Total Number of Valid Hours: 709

Total Number of Hours: 720

Wood Buffalo Environmental Association
 Wind Rose Nov 2014

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
 Athabasca Valley (AMS 7)



Total Number of Valid Hours: 709



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 0.4 ppm on Nov 30 18:00	Maximum Daily Average: 0.2 ppm on Nov 13		Hours of Data:	676
Minimum Value: 0.0 ppm on Nov 7 22:00	Minimum Daily Average: 0.0 ppm on Nov 10		Hours of Missing Data:	44
Maximum Diurnal Average: 0.1 ppm at hour 17	Minimum Diurnal Average: 0.0 ppm at hour 4		Hours of Calibration:	35
Monthly Average: 0.07 ppm	Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.1 Q ₃ = 0.1 P ₉₀ = 0.1 P ₉₉ = 0.4		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-Nov	0.1	0.0	0.0	0.0	0.0	Z	0.1	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.3	0.2	0.2	0.2	0.4	0.2	0.3	0.2	0.1	0.4
2-Nov	0.1	0.1	0.1	0.0	0.0	Z	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	0.0	0.1	0.1	0.1
3-Nov	0.1	0.0	0.1	0.0	0.1	Z	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
4-Nov	0.1	0.0	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
5-Nov	0.1	0.1	0.1	0.1	0.2	Z	0.3	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3
6-Nov	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.3
7-Nov	0.1	0.1	0.1	0.0	0.0	Z	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
8-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
9-Nov	0.1	0.1	0.1	0.0	0.0	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
10-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
12-Nov	0.1	0.1	0.1	0.1	0.1	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.2
13-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.4	0.4	0.4	0.3	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.4
14-Nov	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.1
15-Nov	0.2	0.1	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
16-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
17-Nov	0.0	0.0	0.0	0.0	0.1	Z	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	0.2
18-Nov	0.1	0.1	0.1	0.1	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
19-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.2
20-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.3
21-Nov	0.1	0.1	0.1	0.1	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
22-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23-Nov	0.0	0.0	0.0	0.0	0.0	Z	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	0.0	0.1	0.1	0.1	0.1
24-Nov	0.0	0.1	0.1	0.1	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.1
25-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
26-Nov	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.2
27-Nov	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	C	C	C	C	C	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
28-Nov	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	M	M	M	M	M	M	M	M	0.1	0.1	0.1	0.1	0.1
29-Nov	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	Z	0.3	0.1	0.1	0.0	0.0	0.1	0.1	M	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.3
30-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.1	0.4	0.3	0.4	0.4	0.2	0.2	0.1	0.1	0.1	0.1	0.4

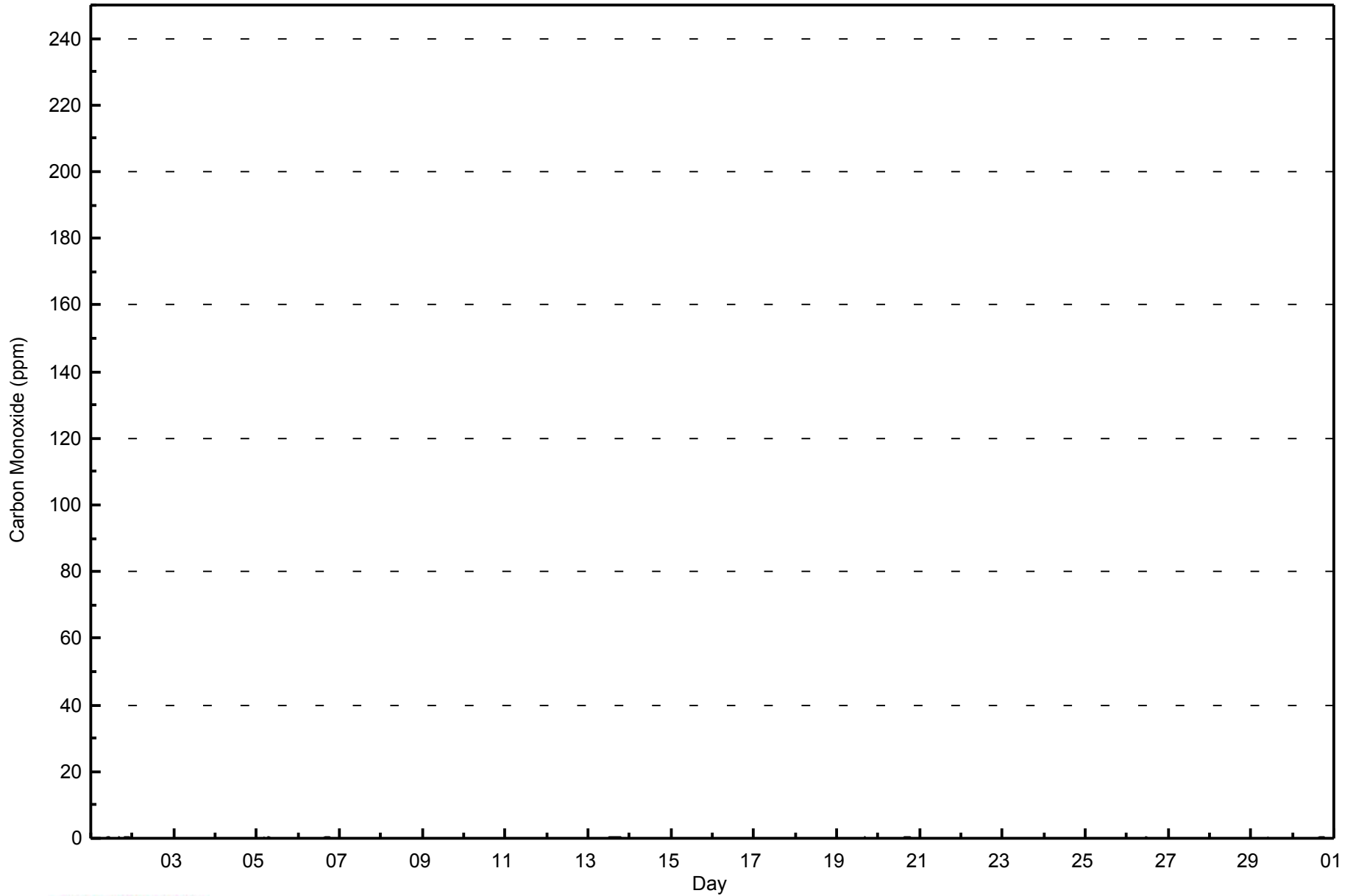
0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Diurnal Average
0.2	0.1	0.1	0.1	0.2	0.1	0.3	0.3	0.2	0.3	0.2	0.2	0.2	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.2	0.4	0.2	0.3	0.2	0.1	0.1	Diurnal Maximum

Z - zerspan C - Calibration M - Maintenance
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 13 ppm



WBEA
Hourly Averages

Carbon Monoxide (CO) - ppm
Athabasca Valley - November 2014





WBEA
Cumulative Frequency Distribution

Carbon Monoxide (CO) - ppm
Athabasca Valley - November 2014

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.3	669	98.96	98.96
0.4 - 0.5	7	1.04	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: 676

Total Number of Hours: 720



WBEA
Frequency Distribution

Carbon Monoxide (CO) - ppm
Athabasca Valley - November 2014

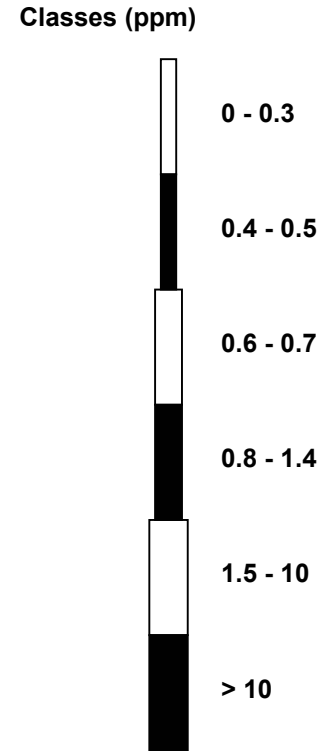
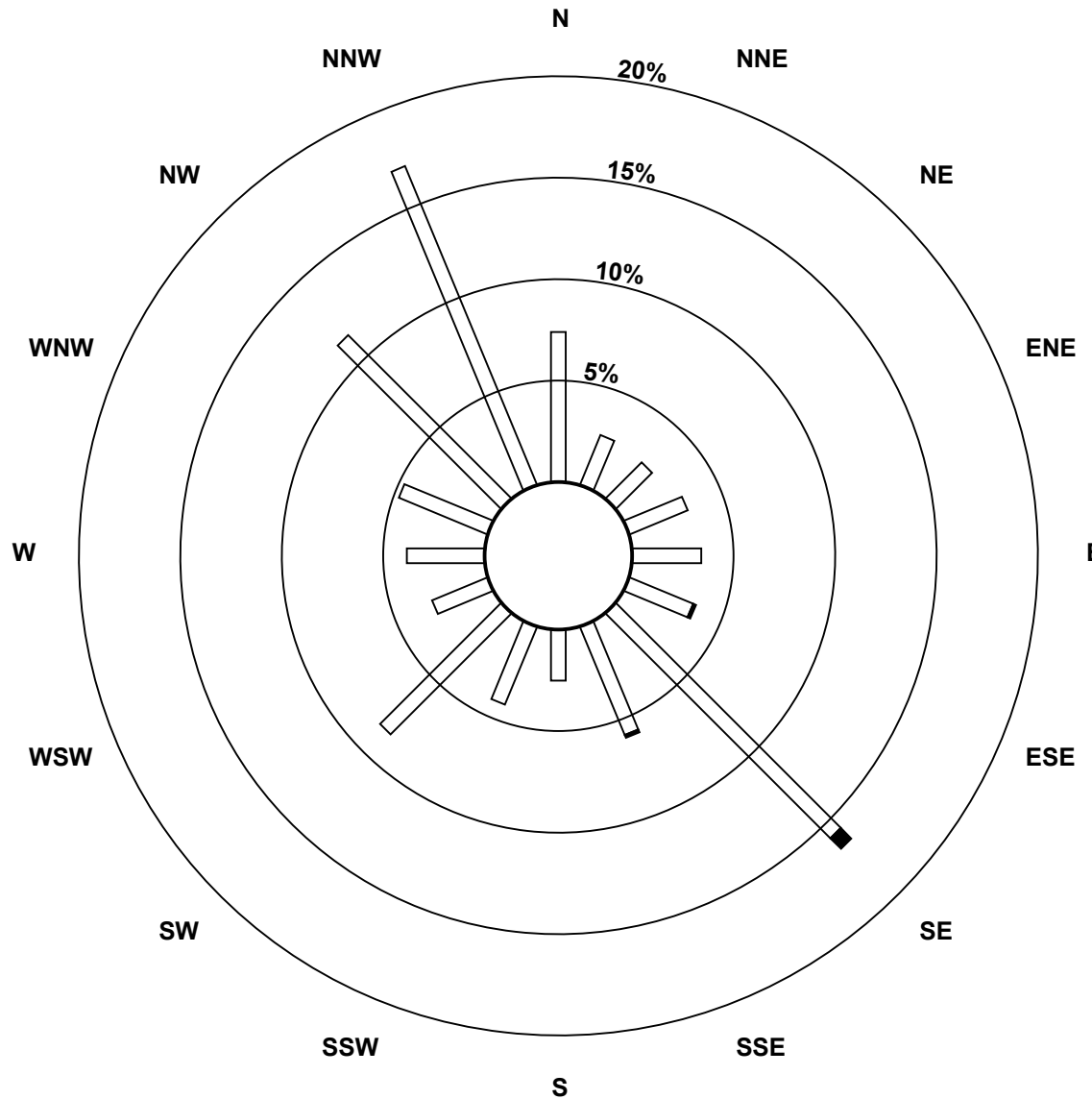
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.3	50	18	17	21	23	23	106	39	17	28	57	20	26	32	77	115	669
0.4 - 0.5	0	0	0	0	0	1	5	1	0	0	0	0	0	0	0	0	7
0.6 - 0.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.8 - 1.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.5 - 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	50	18	17	21	23	24	111	40	17	28	57	20	26	32	77	115	676

Total Number of Valid Hours: 676

Total Number of Hours: 720

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

**Carbon Monoxide (CO) - ppm
Athabasca Valley (AMS 7)**

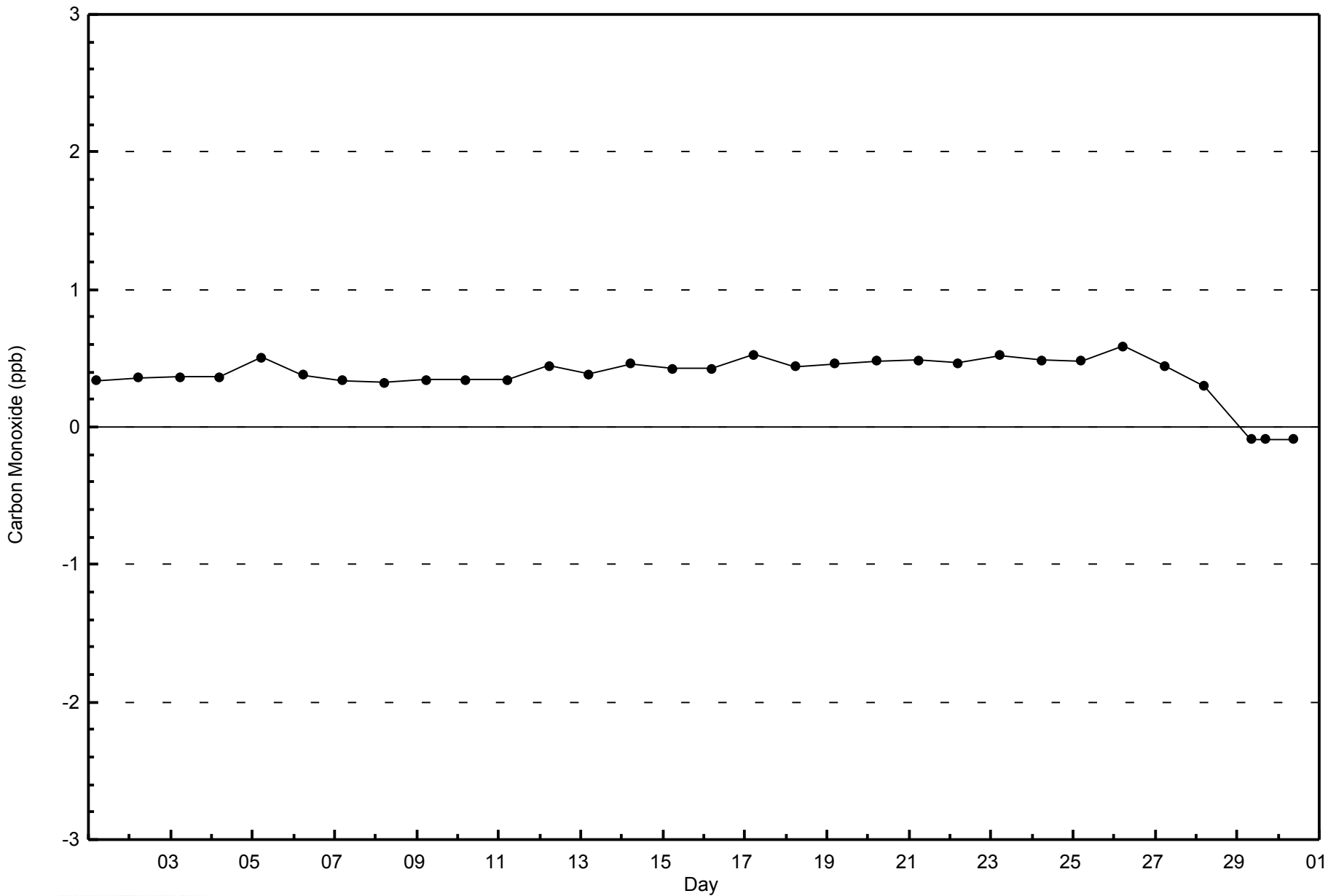


Total Number of Valid Hours: 676



WBEA
Zero Responses

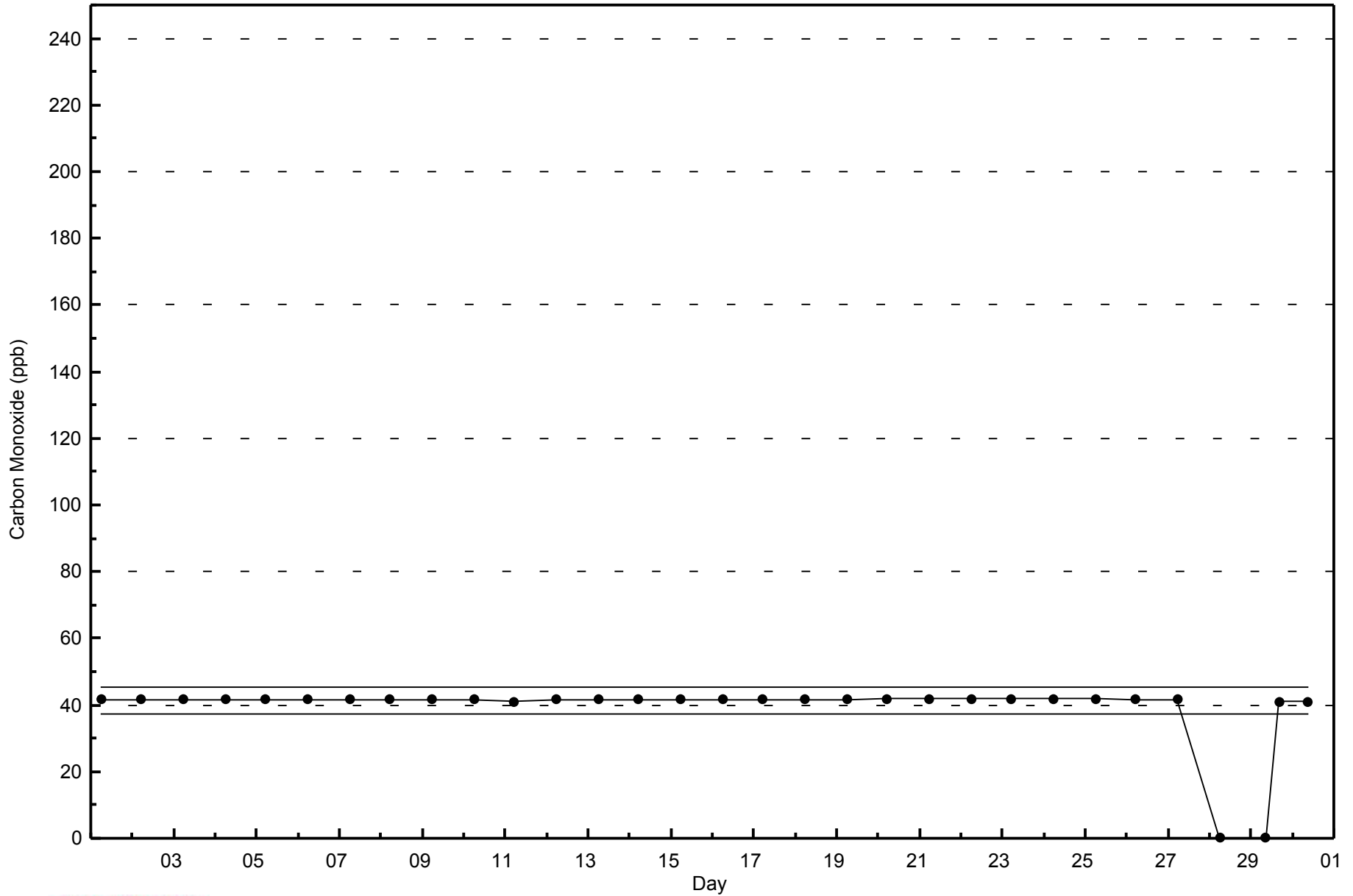
Carbon Monoxide (CO) - ppb
Athabasca Valley - November 2014





WBEA
Span Responses

Carbon Monoxide (CO) - ppb
Athabasca Valley - November 2014



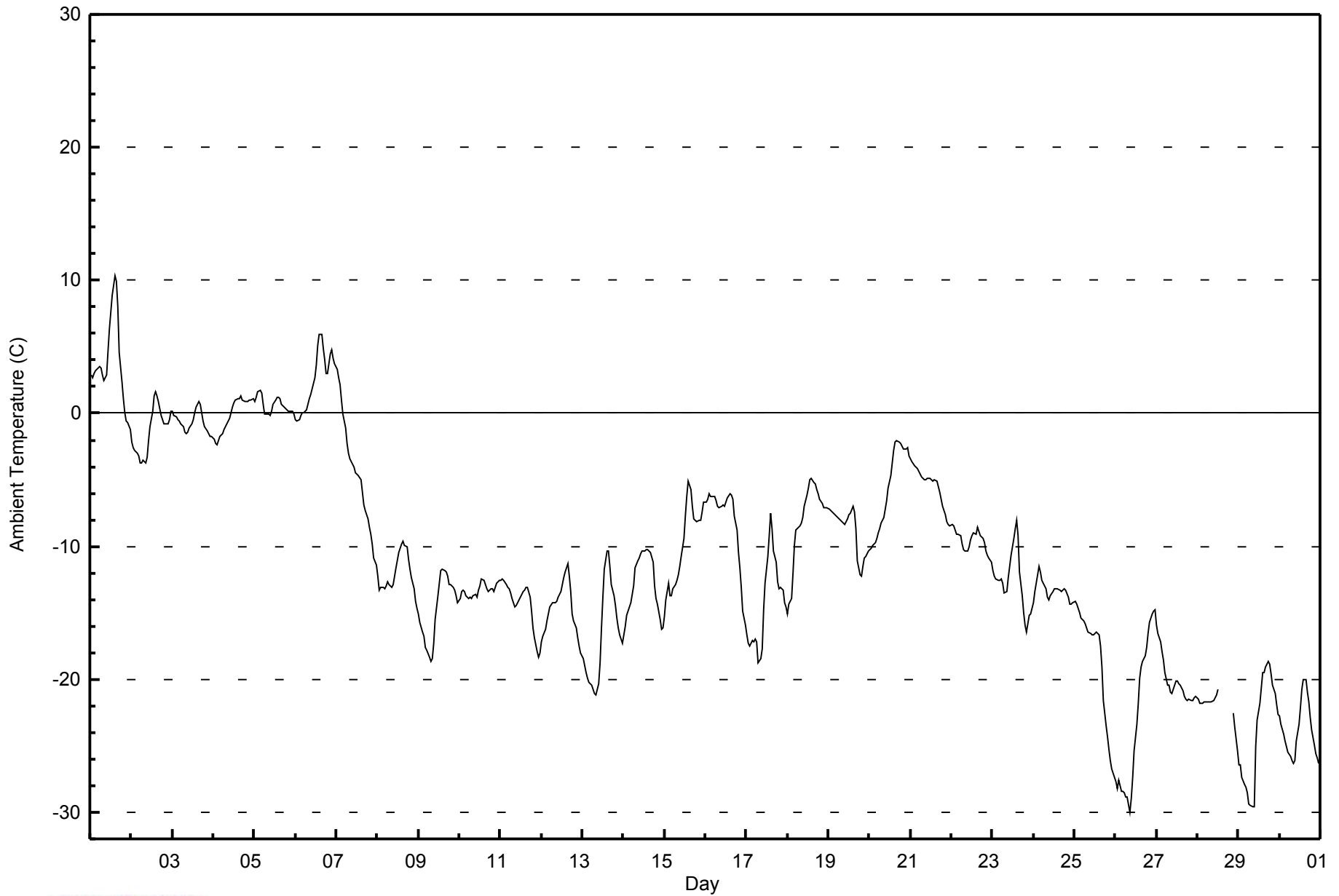


Maximum Value: 10.4 C on Nov 1 15:00		Maximum Daily Average: 3.8 C on Nov 1		Hours in Service: 720																						
Minimum Value: -30.0 C on Nov 26 09:00		Minimum Daily Average: -23.9 C on Nov 29		Hours of Data: 712																						
Maximum Diurnal Average: -7.9 C at hour 15		Minimum Diurnal Average: -12.1 C at hour 24		Hours of Missing Data: 8																						
Monthly Average: -10.73 C		Percentiles: P ₁ = -28.9 P ₁₀ = -21.5 Q ₁ = -15.8 Median = -11.8 Q ₃ = -4.9 P ₉₀ = 0.6 P ₉₉ = 5.7		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-Nov	2.9	2.7	3.0	3.2	3.3	3.5	3.4	2.9	2.4	2.9	4.6	6.3	7.6	8.9	10.4	10.0	8.0	4.6	2.4	1.1	0.0	-0.6	-0.6	-1.2	3.8	10.4
2-Nov	-2.1	-2.5	-2.7	-3.0	-3.3	-3.8	-3.7	-3.5	-3.7	-3.3	-2.1	-1.0	0.1	1.3	1.6	1.3	0.9	-0.2	-0.5	-0.8	-0.8	-0.7	-0.4	0.2	-1.4	1.6
3-Nov	0.2	-0.1	-0.2	-0.4	-0.6	-0.8	-1.0	-1.4	-1.5	-1.4	-1.1	-0.8	-0.5	0.0	0.4	0.9	0.7	0.1	-0.6	-1.0	-1.3	-1.5	-1.8	-1.7	-0.7	0.9
4-Nov	-1.9	-2.3	-2.4	-2.0	-1.8	-1.6	-1.2	-1.0	-0.8	-0.3	0.0	0.5	0.8	1.0	1.1	1.1	1.3	1.0	0.9	0.8	0.9	1.0	1.0	1.1	-0.1	1.3
5-Nov	0.9	1.2	1.7	1.8	1.5	0.7	0.0	-0.1	-0.1	-0.2	0.2	0.7	1.0	1.2	1.2	1.1	0.6	0.4	0.4	0.2	0.1	0.2	0.2	0.0	0.6	1.8
6-Nov	-0.5	-0.6	-0.5	-0.1	0.0	0.1	0.3	0.7	1.1	1.4	1.9	2.6	3.6	5.1	5.9	5.9	4.8	4.1	3.0	3.0	4.5	4.8	4.2	3.7	2.4	5.9
7-Nov	3.3	2.7	2.2	1.0	-0.1	-1.1	-2.2	-3.0	-3.4	-3.8	-4.1	-4.4	-4.6	-4.7	-5.0	-6.0	-6.9	-7.3	-8.0	-8.5	-9.1	-9.9	-10.9	-11.4	-4.4	3.3
8-Nov	-12.3	-13.3	-13.1	-13.1	-13.2	-13.0	-12.7	-12.8	-13.1	-12.9	-12.2	-11.6	-10.5	-10.1	-9.8	-9.6	-9.9	-10.1	-11.0	-11.8	-12.4	-13.2	-14.1	-14.6	-12.1	-9.6
9-Nov	-15.1	-15.7	-16.4	-16.8	-17.6	-17.8	-18.3	-18.7	-18.4	-17.3	-15.5	-13.8	-12.8	-11.8	-11.7	-11.8	-12.0	-12.2	-12.8	-12.9	-13.0	-13.3	-13.7	-14.2	-14.7	-11.7
10-Nov	-13.9	-13.4	-13.2	-13.4	-13.8	-13.9	-13.9	-13.9	-13.7	-13.6	-13.8	-13.3	-13.0	-12.5	-12.6	-12.9	-13.2	-13.4	-13.2	-13.2	-13.4	-13.0	-12.8	-12.5	-13.3	-12.5
11-Nov	-12.5	-12.5	-12.6	-12.8	-13.1	-13.1	-13.5	-14.0	-14.5	-14.5	-14.2	-14.0	-13.6	-13.4	-13.3	-13.1	-13.1	-13.8	-14.9	-16.1	-16.9	-17.9	-18.3	-18.0	-14.3	-12.5
12-Nov	-17.2	-16.7	-16.3	-15.6	-15.1	-14.5	-14.2	-14.2	-14.3	-14.1	-13.8	-13.4	-12.9	-12.3	-11.9	-11.3	-12.3	-13.4	-15.1	-15.6	-16.1	-16.8	-17.5	-18.0	-14.7	-11.3
13-Nov	-18.5	-19.0	-19.5	-19.9	-20.2	-20.5	-20.7	-21.0	-21.2	-20.3	-18.7	-16.2	-13.8	-11.8	-10.3	-10.3	-11.5	-12.9	-13.7	-14.4	-15.4	-16.2	-16.7	-17.3	-16.7	-10.3
14-Nov	-16.7	-16.0	-15.2	-14.6	-14.2	-13.7	-13.0	-11.6	-11.1	-10.9	-10.6	-10.4	-10.3	-10.3	-10.3	-10.5	-11.2	-13.0	-14.0	-14.3	-15.5	-16.3	-16.1	-12.9	-10.3	
15-Nov	-15.3	-14.0	-12.8	-13.7	-13.8	-13.2	-12.9	-12.6	-12.2	-11.5	-10.7	-9.5	-7.8	-6.3	-5.1	-5.8	-7.0	-7.9	-8.1	-8.1	-8.0	-8.0	-7.4	-6.6	-9.9	-5.1
16-Nov	-6.6	-6.4	-6.0	-6.2	-6.3	-6.3	-6.6	-7.0	-7.1	-6.9	-6.9	-7.0	-6.7	-6.3	-6.1	-6.2	-6.4	-7.8	-8.8	-10.5	-11.6	-13.1	-14.9	-15.9	-8.1	-6.0
17-Nov	-16.7	-17.3	-17.5	-17.1	-17.2	-17.0	-17.2	-18.8	-18.5	-17.8	-14.7	-12.7	-10.7	-9.2	-7.5	-8.6	-10.3	-11.2	-12.7	-13.2	-13.0	-13.3	-14.2	-14.5	-14.2	-7.5
18-Nov	-15.1	-14.3	-13.9	-12.0	-10.0	-8.8	-8.6	-8.4	-8.2	-7.8	-7.0	-6.2	-5.7	-5.0	-4.9	-5.2	-5.3	-5.8	-6.1	-6.4	-6.8	-7.1	-7.1	-7.1	-8.0	-4.9
19-Nov	-7.2	-7.3	-7.4	-7.5	-7.6	-7.8	-7.9	-8.1	-8.2	-8.4	-8.2	-7.9	-7.6	-7.5	-7.0	-7.4	-8.7	-11.1	-12.1	-12.3	-11.5	-10.9	-10.8	-10.4	-8.8	-7.0
20-Nov	-10.3	-10.2	-10.0	-9.8	-9.4	-9.0	-8.7	-8.3	-7.9	-7.2	-6.6	-5.6	-4.6	-3.8	-2.8	-2.1	-2.1	-2.2	-2.3	-2.4	-2.7	-2.7	-2.6	-3.2	-5.7	-2.1
21-Nov	-3.4	-3.6	-3.9	-4.1	-4.2	-4.4	-4.8	-4.9	-5.0	-5.0	-4.9	-4.9	-5.0	-5.1	-5.0	-5.1	-5.5	-6.0	-6.5	-7.0	-7.7	-8.1	-8.4	-8.4	-5.5	-3.4
22-Nov	-8.4	-8.5	-8.7	-9.0	-9.1	-9.2	-9.8	-10.2	-10.3	-10.3	-10.0	-9.5	-9.2	-9.0	-9.1	-8.6	-8.9	-9.2	-9.4	-9.7	-10.4	-10.7	-10.9	-11.2	-9.6	-8.4
23-Nov	-11.8	-12.3	-12.5	-12.6	-12.6	-12.5	-12.8	-13.5	-13.4	-12.4	-11.5	-10.6	-9.4	-8.7	-8.1	-9.2	-11.9	-13.7	-15.0	-15.9	-16.4	-15.1	-15.1	-14.6	-12.6	-8.1
24-Nov	-14.2	-13.4	-12.2	-11.6	-11.9	-12.5	-13.0	-13.2	-13.8	-14.0	-13.7	-13.4	-13.2	-13.2	-13.2	-13.3	-13.4	-13.3	-13.2	-13.3	-13.8	-14.3	-14.3	-14.2	-13.3	-11.6
25-Nov	-14.1	-14.3	-14.7	-15.0	-15.4	-15.6	-15.9	-16.1	-16.4	-16.6	-16.6	-16.7	-16.6	-16.5	-16.7	-17.5	-19.1	-21.6	-23.5	-24.3	-25.2	-26.1	-26.7	-27.3	-18.7	-14.1
26-Nov	-27.7	-28.2	-27.6	-28.5	-28.4	-28.5	-28.8	-28.9	-30.0	-28.9	-27.3	-25.4	-23.3	-21.8	-19.9	-19.1	-18.7	-18.2	-17.6	-16.5	-15.7	-15.1	-14.9	-14.8	-23.1	-14.8
27-Nov	-15.9	-16.6	-17.2	-18.0	-18.5	-19.5	-20.4	-20.5	-21.0	-21.0	-20.7	-20.1	-20.2	-20.3	-20.4	-20.9	-21.3	-21.5	-21.6	-21.5	-21.5	-21.6	-21.3	-21.3	-20.1	-15.9
28-Nov	-21.5	-21.8	-21.8	-21.8	-21.7	-21.8	-21.7	-21.7	-21.7	-21.6	-21.4	-21.2	-20.8	M	M	M	M	M	M	M	M	M	M	M	--	-20.8
29-Nov	-26.4	-26.5	-27.4	-27.9	-28.1	-28.5	-29.3	-29.4	-29.6	-29.6	-25.0	-23.1	-21.8	-20.6	-19.4	-19.5	-19.1	-18.6	-18.8	-19.6	-20.4	-21.1	-22.0	-22.6	-23.9	-18.6
30-Nov	-22.8	-23.4	-24.1	-24.7	-25.1	-25.5	-25.8	-26.1	-26.3	-26.1	-24.6	-23.4	-22.2	-20.8	-20.0	-20.0	-21.0	-21.7	-22.8	-23.8	-24.9	-25.6	-25.9	-26.3	-23.9	-20.0
																								Diurnal Average		
																								Diurnal Maximum		
																								M - Maintenance		



WBEA
Hourly Averages

Ambient Temperature (AT) - C
Athabasca Valley - November 2014





WBEA
Cumulative Frequency Distribution

Ambient Temperature (AT) - C
Athabasca Valley - November 2014

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	102	14.33	14.33
-20 - 0	520	73.03	87.36
0 - 10	89	12.50	99.86
10 - 20	1	0.14	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 712

Total Number of Hours: 720

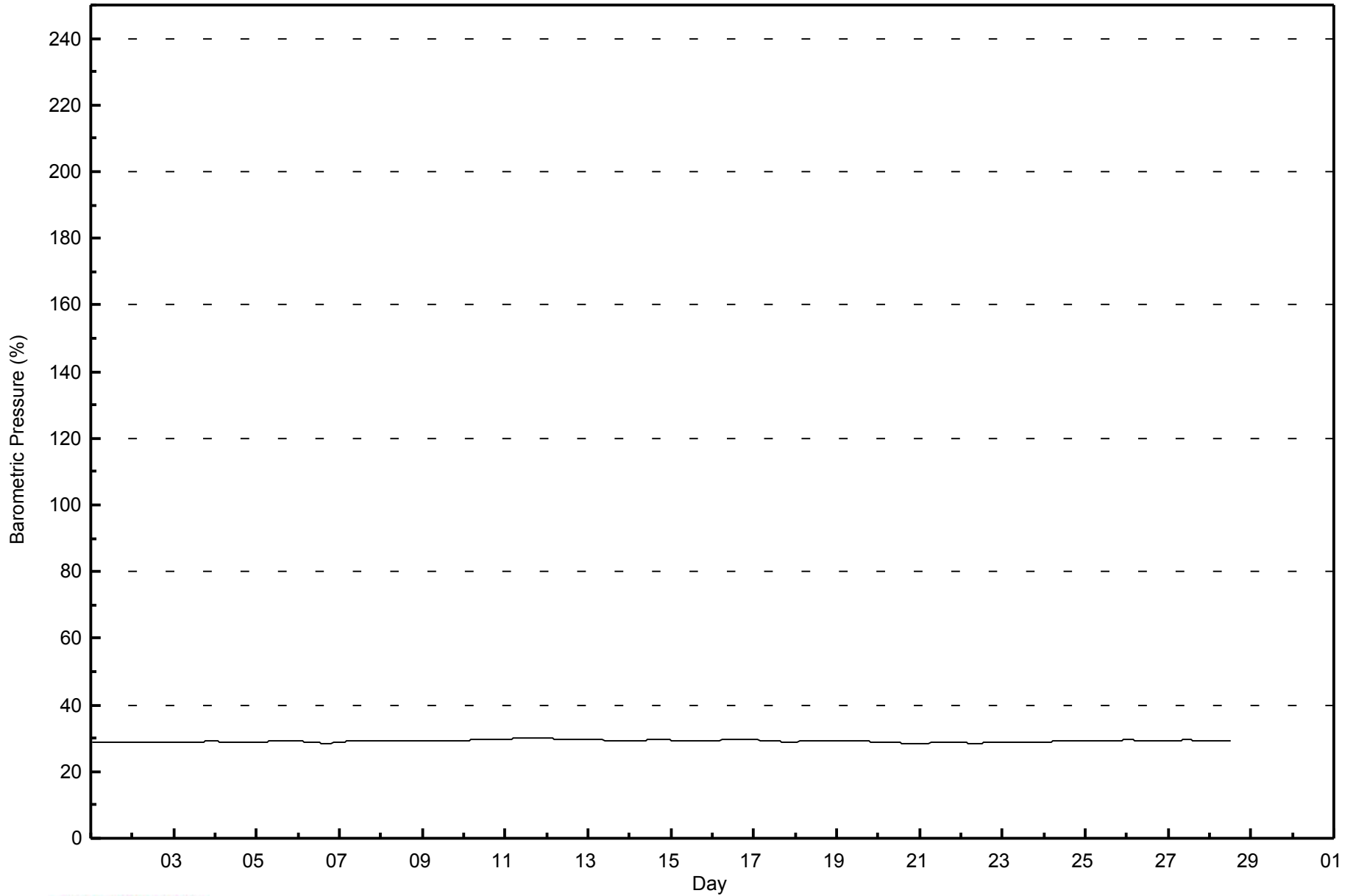


Maximum Value: 29.9 % on Nov 11 10:00																				Maximum Daily Average: 29.9 % on Nov 11					Hours in Service: 720		
Minimum Value: 28.5 % on Nov 20 23:00																				Minimum Daily Average: 28.7 % on Nov 20					Hours of Data: 661		
Maximum Diurnal Average: 29.2 % at hour 24																				Minimum Diurnal Average: 29.2 % at hour 15					Hours of Missing Data: 59		
Monthly Average: 29.17 %																				Percentiles: P ₁ = 28.5 P ₁₀ = 28.7 Q ₁ = 28.9 Median = 29.2 Q ₃ = 29.4 P ₉₀ = 29.6 P ₉₉ = 29.9					Hours of Calibration: 0		
																									Percent Operational Time: 91.8		
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-Nov	28.7	28.7	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.9	
2-Nov	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9
3-Nov	28.9	28.9	28.8	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	28.9	29.0
4-Nov	29.0	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9	29.0
5-Nov	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.1	29.2
6-Nov	29.1	29.1	29.1	29.0	29.0	28.9	28.9	28.8	28.8	28.7	28.7	28.7	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.7	28.7	28.8	29.1
7-Nov	28.8	28.8	28.9	29.0	29.0	29.1	29.1	29.2	29.2	29.3	29.3	29.3	29.3	29.3	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.2	29.4
8-Nov	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.4
9-Nov	29.3	29.3	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.3	29.3	29.3	29.3	29.3	29.2	29.3
10-Nov	29.4	29.4	29.4	29.4	29.5	29.5	29.5	29.5	29.6	29.6	29.6	29.7	29.7	29.7	29.7	29.7	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.6	29.8
11-Nov	29.9	29.9	29.9	29.9	29.9	29.9	29.9	29.9	29.9	29.9	29.9	29.9	29.9	29.9	29.9	29.9	29.9	29.9	29.9	29.9	29.9	29.9	29.9	29.9	29.9	29.9	29.9
12-Nov	29.9	29.9	29.9	29.9	29.9	29.9	29.9	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.7	29.7	29.7	29.7	29.7	29.7	29.7	29.7	29.6	29.8	29.9
13-Nov	29.6	29.6	29.6	29.6	29.5	29.5	29.5	29.5	29.5	29.4	29.4	29.4	29.4	29.4	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.4	29.4	29.4	29.4	29.4	29.6
14-Nov	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.4	29.5
15-Nov	29.4	29.4	29.4	29.4	29.4	29.3	29.3	29.3	29.3	29.2	29.2	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.2	29.2	29.2	29.2	29.2	29.3	29.3	29.2	29.4
16-Nov	29.3	29.4	29.4	29.4	29.4	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5
17-Nov	29.5	29.5	29.5	29.4	29.4	29.4	29.4	29.4	29.3	29.3	29.3	29.2	29.1	29.1	29.1	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.2	29.5
18-Nov	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.1	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.2	29.3
19-Nov	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.0	28.9	28.9	29.2	29.3
20-Nov	28.9	28.9	28.9	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.6	28.6	28.6	28.6	28.6	28.6	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.7	28.9
21-Nov	28.5	28.5	28.5	28.6	28.6	28.6	28.6	28.6	28.6	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7
22-Nov	28.7	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.8
23-Nov	28.8	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.9	28.9	28.9
24-Nov	28.9	28.9	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.1	29.1	29.1	29.1
25-Nov	29.1	29.1	29.1	29.1	29.2	29.2	29.2	29.2	29.3	29.3	29.3	29.3	29.3	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.5	29.5	29.3	29.5
26-Nov	29.5	29.5	29.5	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.4	29.4	29.4	29.5
27-Nov	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.5	29.5	29.5	29.5	29.5	29.5	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.5
28-Nov	29.3	29.3	29.3	29.3	29.3	29.3	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	--	29.3
29-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
30-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
																								Diurnal Average			
																								Diurnal Maximum			
AF - Analyzer Failure																											



WBEA
Hourly Averages

Barometric Pressure (BP) - %
Athabasca Valley - November 2014





Maximum Value: 100 inHg on Nov 3 06:00	Maximum Daily Average: 96.6 inHg on Nov 2	Hours in Service: 720
Minimum Value: 48 inHg on Nov 7 20:00	Minimum Daily Average: 59.3 inHg on Nov 7	Hours of Data: 712
Maximum Diurnal Average: 81.7 inHg at hour 1	Minimum Diurnal Average: 70.5 inHg at hour 15	Hours of Missing Data: 8
Monthly Average: 78.3 inHg	Percentiles: P ₁ = 53 P ₁₀ = 65 Q ₁ = 73 Median = 78 Q ₃ = 84 P ₉₀ = 92 P ₉₉ = 100	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-Nov	97	97	94	91	91	90	90	94	96	95	87	77	72	67	60	59	67	83	91	94	95	96	95	94	86.4	97
2-Nov	97	98	98	98	98	97	97	97	97	97	98	99	98	93	87	88	90	96	98	99	99	99	100	100	96.6	100
3-Nov	100	100	100	100	100	100	100	99	97	95	96	94	94	95	96	95	92	92	93	95	96	95	94	92	96.2	100
4-Nov	92	92	93	92	90	92	91	90	90	89	89	88	86	87	90	92	91	94	95	95	95	95	96	96	91.6	96
5-Nov	97	97	94	91	85	82	84	82	80	83	82	79	78	77	77	76	75	76	77	76	75	75	77	81.3	97	
6-Nov	80	81	81	80	80	80	80	79	79	79	79	77	75	71	68	67	72	76	82	83	77	75	74	73	76.8	83
7-Nov	68	70	70	68	66	66	65	66	65	67	64	60	58	53	50	53	54	53	48	48	50	52	54	56	59.3	70
8-Nov	62	64	64	65	61	64	65	68	71	67	65	70	65	60	59	54	56	60	59	64	72	77	80	81	65.5	81
9-Nov	81	80	80	80	79	80	80	80	80	77	77	76	73	67	68	72	70	70	75	78	79	76	77	78	76.4	81
10-Nov	83	82	81	80	80	78	77	78	77	77	76	78	81	78	79	78	77	77	79	77	80	79	81	82	79.0	83
11-Nov	81	79	78	78	79	79	79	77	75	75	72	72	72	72	71	72	72	76	81	85	85	85	85	84	77.7	85
12-Nov	84	84	84	83	83	82	81	81	81	81	80	79	77	76	76	73	79	81	86	86	84	84	83	82	81.1	86
13-Nov	82	81	81	81	81	81	81	80	79	78	77	75	74	72	71	72	77	82	86	87	87	86	85	85	80.1	87
14-Nov	85	85	84	85	85	86	86	87	85	84	83	82	80	75	74	72	74	75	82	84	83	84	86	86	82.1	87
15-Nov	86	85	78	80	80	76	75	74	71	70	68	65	60	58	55	61	63	69	75	82	83	83	82	74	73.0	86
16-Nov	74	72	72	79	74	72	74	78	80	80	79	77	74	68	64	65	68	72	74	79	82	85	87	87	75.6	87
17-Nov	86	85	85	85	85	85	84	84	84	84	80	76	74	72	66	71	77	81	84	87	87	88	88	88	81.8	88
18-Nov	88	88	87	88	83	77	76	77	79	79	75	67	68	66	63	64	64	65	66	67	70	73	73	74	74.1	88
19-Nov	75	76	76	75	72	68	66	68	67	65	64	65	64	63	59	61	67	77	80	81	78	76	75	75	70.6	81
20-Nov	75	75	76	77	79	80	80	81	81	81	82	82	81	80	79	79	82	84	83	87	90	93	91	94	82.1	94
21-Nov	95	93	91	88	88	83	81	81	83	82	81	73	69	70	69	66	74	74	73	72	72	72	72	73	78.1	95
22-Nov	75	77	80	85	86	83	83	82	80	82	82	79	79	79	84	82	83	87	88	88	87	86	86	86	82.8	88
23-Nov	86	84	84	86	86	87	87	88	88	85	82	80	76	72	67	72	84	88	87	86	86	86	86	86	83.2	88
24-Nov	85	85	86	85	81	80	82	82	80	77	75	73	71	70	71	73	76	78	76	72	70	73	72	72	76.9	86
25-Nov	74	72	72	73	72	72	75	78	79	79	77	74	71	67	68	70	75	81	80	79	78	77	77	76	75.0	81
26-Nov	76	76	76	75	75	75	75	75	74	75	76	77	78	80	81	82	82	83	83	84	84	82	79	78	78.4	84
27-Nov	77	77	77	76	74	76	80	80	81	80	77	73	76	73	71	72	75	77	78	78	78	79	78	77	76.7	81
28-Nov	77	76	75	77	77	77	77	78	77	77	76	76	76	M	M	M	M	M	M	M	M	78	79	78	--	79
29-Nov	78	78	77	77	76	76	76	75	75	75	76	68	64	64	64	66	68	67	62	61	60	58	58	58	68.9	78
30-Nov	57	58	59	61	61	62	63	64	65	64	61	58	56	56	57	63	68	71	74	75	76	77	75	75	64.9	77

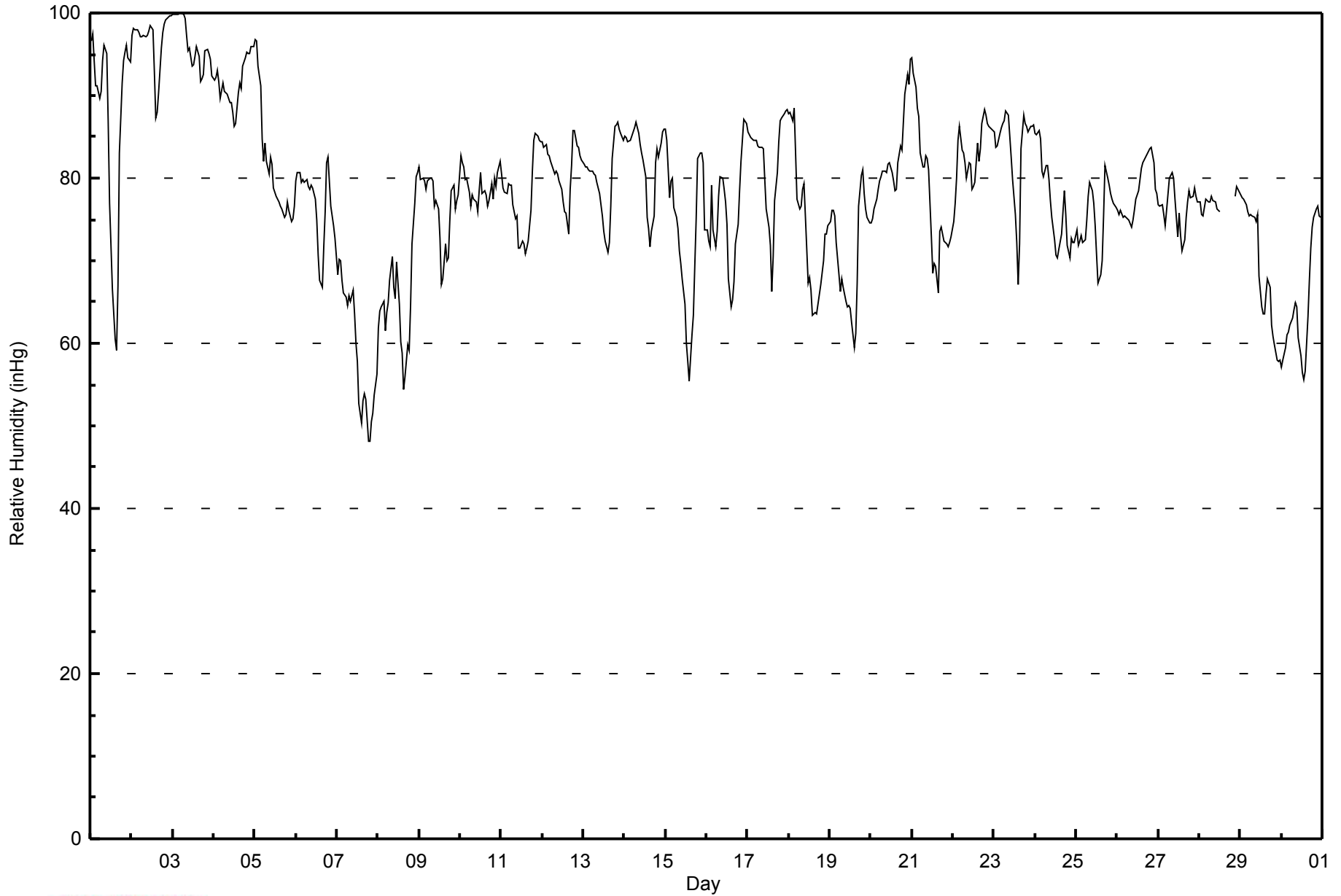
81.7	81.5	81.2	81.2	80.2	79.5	79.6	80.1	79.9	79.3	77.8	75.6	73.9	71.7	70.5	71.4	74.2	77.4	79.1	80.3	80.7	80.8	80.8	80.6	Diurnal Average
100	100	100	100	100	100	100	99	97	97	98	99	98	95	96	95	92	96	98	99	99	99	100	100	Diurnal Maximum

M - Maintenance



WBEA
Hourly Averages

Relative Humidity (RH) - inHg
Athabasca Valley - November 2014





Maximum Speed: 31 km/h on Nov 7 04:00	Maximum Daily Speed Average: 20.9 km/h on Nov 7	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 17 00:00	Minimum Daily Speed Average: 0.6 km/h on Nov 3	Hours of Data: 712
Maximum Diurnal Speed Average: 3.9 km/h at hour 14	Minimum Diurnal Speed Average: 1.5 km/h at hour 7	Hours of Missing Data: 8
Monthly Average Velocity: 2.5 km/h 322.4 deg	Percentiles: P ₁ = 0 P ₁₀ = 2 Q ₁ = 4 Median = 7 Q ₃ = 11 P ₉₀ = 17 P ₉₉ = 26	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-Nov	S4	SSW3	SW6	SSW3	SSW2	SSW4	SSE4	ESE4	ESE3	SE2	SE3	SSW7	SSW8	SSW5	SSW4	WSW4	SSW2	SSW1	E1	SSE2	SE2	ESE2	SSE3	SSE3	S2.7	SSW8		
2-Nov	SSE6	SSE7	SE9	SE8	SE8	SSE7	SSE7	SSE6	SSE5	SSE6	SE6	SE6	SE7	SE7	SE9	SE11	SE11	SE15	SE14	SE12	SE7	SE6	ESE5	SSE8	SE7.9	SE15		
3-Nov	SSE7	SSE7	SSE7	S6	SE6	SSE8	SSW5	SW8	SW6	SW6	SW5	SW5	SW6	SW4	WNW1	NNW7	NNW11	NNW12	N10	N9	NNE8	ENE8	ENE5	NE3	WSW0.6	NNW12		
4-Nov	E5	E7	ESE5	S5	ESE5	ESE7	ESE7	ESE6	SE8	SE9	ESE10	SE10	SE8	SE8	SE7	SE9	SE7	SE8	SE9	SE8	SE8	SE8	SSE6	SE5	SE7.1	SE10		
5-Nov	S2	S2	WSW5	WSW11	WNW16	W18	W17	WNW12	WNW16	W17	W19	WNW20	WNW20	W19	WNW15	W16	WSW9	WSW6	S3	SSW6	SSW9	SSE7	SSE9	SSE9	W9.4	WNW20		
6-Nov	SE9	SE11	SE10	SE13	SE16	SE18	SE18	SE19	SE18	SE17	SE15	SE10	SE13	SE9	SE6	SE7	SE8	SE5	S1	S1	WNW18	NW25	NW25	NW28	SSE5.6	NW28		
7-Nov	NW26	NW25	NW27	NW31	NW27	NW25	NW26	NW25	NNW19	NW22	NNW27	NW25	NW25	NW25	NNW24	NNW21	NNW15	NNW16	NNW18	NNW17	NNW18	NNW15	NNE11	NNE10	NNW20.9	NW31		
8-Nov	NE9	NE6	NW7	NW8	NW8	WNW7	NNW8	NW7	NW7	NW8	NNW10	NW12	NNW14	NNW12	NNW14	NNW12	NW7	W7	WNW7	W6	SW2	SW3	SSW2	S2	NW6.2	NNW14		
9-Nov	SSW2	ESE3	SE3	SSE4	SE5	SE7	SE5	SE4	SE5	SE5	E2	N5	NNW9	N12	NNW12	NNE7	NNW7	N8	NE7	NE5	NE6	NE8	NNE9	NE5	NE3.1	NNW12		
10-Nov	N3	NW8	NNW12	NW14	NNW15	NW11	NW13	WNW11	NW11	N17	N17	NNW16	NNW17	NNW19	NNW21	NNW18	N14	NNW14	N14	N15	N10	NNW10	N8	NNW11	NNW12.8	NNW21		
11-Nov	NW11	NNW12	NW13	NW13	NW11	NNW9	NNE7	NNE8	NNE7	NE5	N7	N6	NNW8	NNW6	NW5	NW4	NE1	SW3	SW7	SSW2	ENE2	E2	E2	E4	NNW4.7	NW13		
12-Nov	E4	ENE2	E3	SSE3	SE3	SSE3	SSW2	S4	SE4	SSE5	SE3	SW6	S3	WSW4	WSW2	SE2	SE7	SE6	E4	ESE4	SE6	SE5	SE8	SE8	SSE3.3	SE8		
13-Nov	SE7	SE6	SE9	SSE9	SE9	SE9	SE9	SE11	SE12	SE11	SE10	SE8	SE8	SE7	SE6	SE7	ESE5	ESE2	NNW1	NW1	NW1	NW3	NNW2	NNW1	SE5.8	SE12		
14-Nov	ESE1	SE1	SW1	WSW0	NW1	WNW1	NNW6	NNW10	NNW12	NNW12	NNW12	NNW10	NNW10	N9	NNW10	NW8	NW8	W2	E0	SW1	SW2	ENE1	E2	NNW4.4	NNW12			
15-Nov	E4	SSE3	SW7	ESE3	ESE3	SSW7	SSW11	SW11	SW15	SW14	SW12	SW8	SW9	WSW6	W3	NNW11	NNW13	N15	N18	NNW18	NNW13	NW10	NW17	WNW24	WNW5.7	WNW24		
16-Nov	NW19	NW21	NW17	NNW19	NNW17	NNW17	NNW17	NW13	NW12	WNW14	NW15	NNW12	NW14	NW11	WNW9	W12	WSW11	WSW3	SW8	SW13	SW5	SE0	SW0	NW10.7	NW21			
17-Nov	W0	SSE1	SSW1	S2	SSE2	SE5	SE6	E1	E2	ESE2	SSE9	SSE11	SSE11	SSE7	S3	SW3	SW3	SW0	WNW2	NW2	W2	W2	WNW3	SSE2.7	SSE11			
18-Nov	NNW4	W3	NW2	WNW4	NW6	WNW8	NW7	NW9	NW9	NNW9	NW11	NW21	NW20	NW19	NW21	NW19	NW17	WNW17	NW19	WNW18	WNW12	WNW5	W6	WNW5	NW11.1	NW21		
19-Nov	WNW6	NW3	NNW3	NNW2	NNW3	NW5	WNW11	W12	W8	W8	SW4	WSW5	SSW8	SW8	SSW5	S4	SE4	SW1	SE2	E5	SE7	SE8	SE8	SE9	SW2.2	W12		
20-Nov	SE10	SSE9	SSE9	SSE11	SE9	SSE8	SSE9	SE9	SE8	SE9	SE8	SE7	SE5	SE6	SE5	SE3	SSE2	SE4	SE5	ESE2	ENE2	NNW3	NNW9	NNW9	SE4.9	SSE11		
21-Nov	NNW11	NNW12	NNW11	NNW10	NNW9	NNW10	NNW8	NNW7	NNW9	NNW9	NNW6	N9	N8	NNW8	NNW4	NW6	ENE7	ENE7	ENE9	ENE10	NE6	ENE5	ENE8	ENE6	N6.5	NNW12		
22-Nov	ENE4	E7	E7	ENE5	NE5	E11	ENE13	ENE10	ENE8	NE5	NNE7	NNE7	NNE8	N8	N6	NNE6	N8	N7	N8	N9	NNW12	NNW11	NNW12	NNW12	NNE6.6	ENE13		
23-Nov	N11	NNW10	NNW8	NW4	NW4	N2	NE2	SW0	ESE1	SW3	ESE4	SE6	ESE2	S2	SW4	SW3	SW2	SW1	SW2	WSW2	WSW3	W1	SW2	WSW2	WNW1.0	NNW11		
24-Nov	W3	WNW5	NW7	NNW11	NNW11	NNW11	NNW9	NNW9	NNE5	NNW6	N6	NNW9	NNW6	N5	N6	N4	NNE5	NE3	E4	E7	ESE7	E4	E5	NE4	N4.6	NNW11		
25-Nov	NNE6	ENE6	ENE6	NE6	ENE6	ENE3	N1	N7	N8	NNW9	N10	NNW10	NNW11	NNW10	NNW9	NNW5	NNW3	WNW3	W3	W4	WSW1	E0	NW0	NNE1	N4.1	NNW11		
26-Nov	WSW1	SW3	SSW2	SW4	S5	SSE6	SE5	SE6	SW6	SW5	SW2	SW1	N1	WNW1	SE3	NNW0	NNW1	W2	NW4	NNW12	NNW10	NNW15	N10	N11	NW1.3	NNW15		
27-Nov	NNW14	N11	N12	N9	N7	N2	NNW3	N8	N7	N7	N6	N4	N6	NNW8	N6	NNE3	NNE3	N4	N4	N4	N4	N6	N7	NNW7	NNW6	N6.2	NNW14	
28-Nov	NNW10	NNW11	NNW11	NNW10	NNW11	NNW12	N12	NNW13	NNW13	NNW13	NNW11	NNW13	NNW13	M	M	M	M	M	M	M	M	M	M	N4	W3	SW5	---	NNW13
29-Nov	SSW1	SSW5	SSW2	SSW3	SW4	SSW3	S2	SE4	SSE3	ESE4	SW6	SW16	WSW24	SW14	WSW9	SW5	W7	WNW17	WNW24	NW23	NW26	NW21	NW19	NW17	W7.8	NW26		
30-Nov	NW23	WNW19	W17	W15	NW5	WNW7	WSW7	SW11	SW10	SW9	SSW7	SW14	SW12	SSW7	SE3	SSE5	SE9	SE9	SE10	SE14	SE14	SE12	SE11	SE10	SSW5.1	NW23		

NNW2.7	NW2.3	NW2.5	NW2.7	NNW2.5	NW1.6	NW1.5	NW1.8	NW1.8	NW2.1	NW2.4	NW3.4	NNW3.8	NW3.9	NW3.6	NNW3.1	NNW2.3	NW2.3	NNW2.5	NNW2.5	NNW2.4	NNW2.5	N2.4	NNW2.3	Diurnal Average	
NW26	NW25	NW27	NW31	NW27	NW25	NW26	NW25	NNW19	NW22	NNW27	NW25	NW25	NW25	NNW24	NNW21	NW17	WNW17	WNW24	NW23	NW26	NW25	NW25	NW28	Diurnal Maximum	

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Athabasca Valley - November 2014

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 7 km/h on Nov 7 13:00	Hours of Data: 712
Minimum Value: 0 km/h on Nov 14 06:00	Hours of Missing Data: 8
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 6	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-Nov	2	2	3	2	1	2	3	2	1	1	2	2	2	2	2	2	1	1	1	1	1	1	1	2	3
2-Nov	1	1	2	2	2	1	1	1	1	1	2	1	2	2	2	2	3	3	3	3	2	2	2	3	3
3-Nov	2	2	2	1	2	2	2	2	1	1	1	1	2	1	4	2	2	3	2	2	2	3	2	4	4
4-Nov	2	3	2	2	2	2	2	2	2	2	3	3	3	2	2	3	2	2	2	2	2	2	2	3	3
5-Nov	1	1	4	2	4	3	3	3	4	4	3	3	3	4	2	3	2	2	2	2	4	2	2	4	4
6-Nov	3	2	3	3	5	5	4	5	4	4	3	3	3	3	2	2	2	2	1	1	7	4	4	6	7
7-Nov	5	5	6	6	5	5	6	5	3	5	6	6	7	5	4	5	3	3	3	3	3	5	3	2	7
8-Nov	3	2	2	1	1	2	2	2	2	2	3	3	4	3	3	2	2	2	2	2	2	3	2	4	4
9-Nov	2	1	1	2	1	1	1	1	1	1	1	3	3	3	3	2	3	3	1	2	2	2	3	2	3
10-Nov	2	2	3	3	3	3	2	3	3	5	4	4	3	5	5	5	4	3	4	4	3	2	3	3	5
11-Nov	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	3	1	2	1	1	1	1	1	3
12-Nov	1	1	2	1	1	2	2	2	2	2	2	3	3	2	2	1	2	2	1	2	1	2	2	2	3
13-Nov	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	2
14-Nov	1	1	1	1	1	0	1	5	3	2	2	3	3	3	3	3	1	2	2	1	1	1	1	1	5
15-Nov	1	2	4	2	2	4	4	4	4	4	3	2	3	3	3	1	3	4	5	5	3	2	5	4	5
16-Nov	3	4	3	4	4	4	4	3	3	3	3	3	4	3	3	2	1	2	1	4	2	3	1	1	4
17-Nov	1	1	1	1	2	3	2	1	2	2	3	3	3	2	3	2	2	2	1	1	1	1	1	1	3
18-Nov	1	1	2	2	3	3	2	1	2	3	5	4	5	4	5	4	3	3	3	3	3	2	2	3	5
19-Nov	3	1	1	1	1	2	2	3	2	2	2	2	3	3	2	1	2	2	2	2	2	2	2	2	3
20-Nov	2	2	2	3	2	2	2	2	2	2	2	2	2	2	1	1	1	1	2	1	1	2	2	2	3
21-Nov	2	2	2	2	2	3	2	1	2	2	3	3	2	2	2	2	2	2	3	3	3	2	3	3	3
22-Nov	2	2	2	2	2	4	3	3	2	2	2	2	2	2	2	3	2	2	1	3	2	2	2	2	4
23-Nov	3	2	2	1	1	1	1	1	1	1	2	2	1	2	1	1	2	2	2	1	1	1	2	2	3
24-Nov	1	1	2	3	2	2	2	3	1	2	1	2	2	1	1	1	2	1	1	2	2	2	1	2	3
25-Nov	2	2	2	2	2	1	1	3	2	2	2	2	2	2	2	1	1	1	2	1	2	2	1	1	3
26-Nov	1	2	2	2	2	2	3	2	1	2	1	1	1	1	2	1	1	1	2	2	2	3	3	4	4
27-Nov	4	3	4	3	2	1	2	2	2	1	2	1	2	2	2	1	1	1	1	1	2	2	2	2	4
28-Nov	2	3	2	3	3	2	3	2	3	3	2	3	2	M	M	M	M	M	M	M	M	1	1	1	3
29-Nov	2	3	1	2	1	1	1	2	2	1	3	4	4	5	3	2	5	4	4	4	4	5	4	4	5
30-Nov	5	4	2	3	2	2	3	2	2	2	2	4	5	3	1	2	2	2	2	3	3	3	3	2	5
	5	5	6	6	5	5	6	5	4	5	6	6	7	5	5	5	5	4	5	5	7	5	5	6	

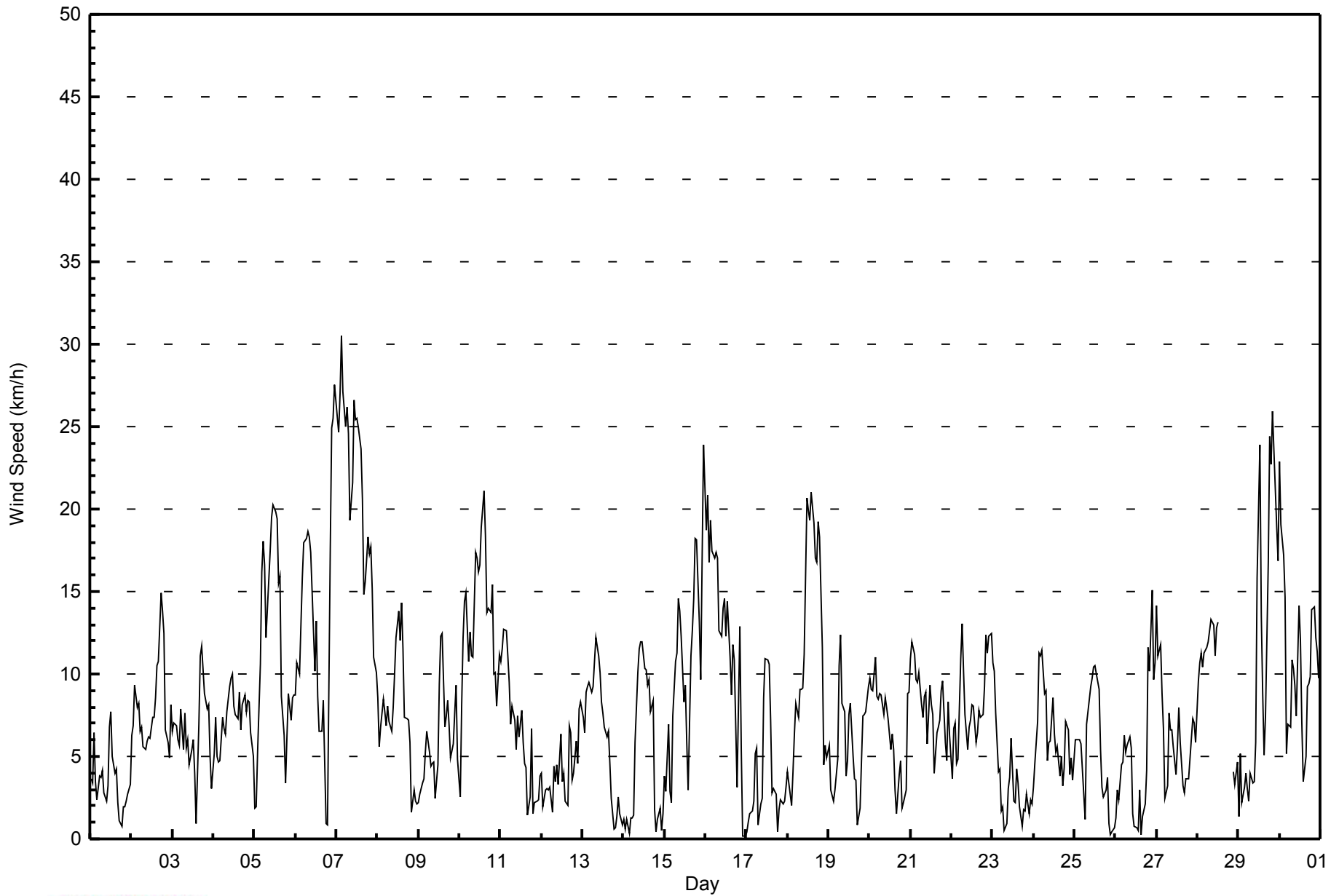
Diurnal Maximum

M - Maintenance



WBEA
Hourly Averages

Wind Speed (WS) - km/h
Athabasca Valley - November 2014





WBEA
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Athabasca Valley - November 2014

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	253	35.53	35.53
6 - 11	307	43.12	78.65
12 - 19	120	16.85	95.51
20 - 28	31	4.35	99.86
29 - 38	1	0.14	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 712

Total Number of Hours: 720



WBEA
Frequency Distribution

Wind Speed (WS) - km/h
Athabasca Valley - November 2014

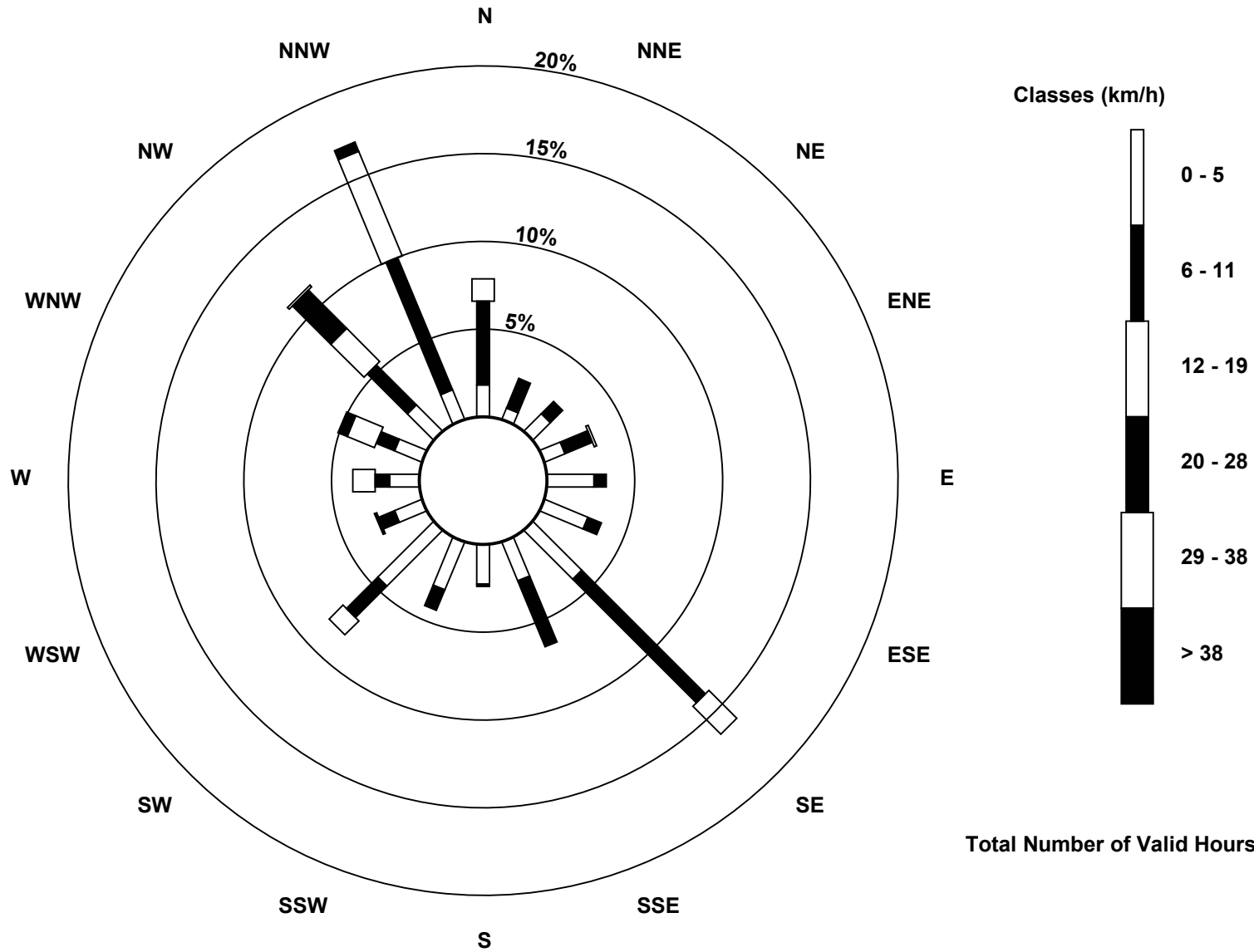
Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	13	5	10	9	19	19	28	17	16	21	32	12	12	12	15	13	253
6 - 11	34	13	7	12	5	6	71	29	1	9	18	7	6	8	23	58	307
12 - 19	9	0	0	1	0	0	16	0	0	0	8	0	9	12	19	46	120
20 - 28	0	0	0	0	0	0	0	0	0	0	0	1	0	4	22	4	31
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	56	18	17	22	24	25	115	46	17	30	58	20	27	36	80	121	712

Total Number of Valid Hours: 712

Total Number of Hours: 720

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

**Wind Speed (WS) - km/h
Athabasca Valley (AMS 7)**





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Athabasca Valley - November 2014

Direction of Maximum Speed: 317 deg on Nov 7 04:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 326.4 deg on Nov 7	Hours of Data: 712
Direction of Minimum Speed: 221 deg on Nov 17 00:00	Hours of Missing Data: 8
Direction of Minimum Daily Speed Average: 0.6 deg on Nov 3	Percent Operational Time: 98.9
Monthly Average Direction: 308.2 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-Nov	191	202	232	207	196	212	161	123	104	131	140	212	211	213	207	243	203	212	90	152	127	113	167	152	188.8
2-Nov	150	147	142	137	141	156	163	153	166	157	141	142	139	136	133	137	136	138	138	140	140	127	111	151	141.8
3-Nov	155	165	154	169	146	147	201	228	228	228	234	226	219	225	286	330	338	340	354	353	20	63	68	43	243.7
4-Nov	91	99	116	175	110	104	117	122	127	124	122	125	129	129	130	126	139	136	135	139	132	143	147	144	127.4
5-Nov	183	191	239	251	288	281	276	291	288	280	280	282	282	281	288	269	257	240	187	196	210	166	147	149	267.2
6-Nov	145	142	138	131	129	133	138	136	137	141	144	144	140	138	143	142	136	135	189	172	285	307	308	308	148.6
7-Nov	313	309	312	317	319	323	316	322	337	324	329	323	316	322	332	344	342	329	332	329	332	348	27	19	326.4
8-Nov	41	50	325	308	305	293	335	326	321	323	338	325	339	345	331	327	325	276	284	265	221	221	198	173	323.2
9-Nov	194	120	136	154	144	133	134	140	126	137	95	9	344	350	346	30	334	353	42	38	53	45	28	43	39.5
10-Nov	0	317	334	325	327	314	309	291	325	351	351	339	336	340	340	345	354	339	351	353	358	347	354	341	338.0
11-Nov	324	327	321	315	324	328	29	22	27	45	0	349	343	343	325	305	42	223	229	211	73	88	79	80	341.9
12-Nov	89	57	81	149	133	155	198	177	146	162	145	214	189	239	240	146	146	125	95	122	129	131	140	144	146.3
13-Nov	141	146	143	148	143	143	140	137	139	144	146	142	141	145	144	140	123	114	334	319	305	320	335	300	141.8
14-Nov	116	141	227	249	312	290	287	331	343	341	342	344	348	349	331	320	315	262	80	228	223	70	91		335.7
15-Nov	98	160	224	106	123	208	210	220	229	226	231	229	222	244	263	345	334	353	349	331	325	320	314	303	285.4
16-Nov	308	306	316	337	331	329	331	332	325	322	300	315	327	320	312	284	274	252	252	231	229	226	131	221	309.1
17-Nov	275	155	204	190	148	138	133	81	97	116	159	151	150	150	156	171	224	216	234	286	326	280	273	293	160.8
18-Nov	335	267	313	291	316	293	306	309	318	327	326	317	315	309	323	323	311	292	304	301	303	295	278	291	309.7
19-Nov	300	316	345	338	345	305	282	279	281	265	229	240	212	233	211	188	135	236	128	93	135	142	136	141	233.4
20-Nov	144	155	147	148	145	155	156	143	140	137	141	135	126	130	128	134	151	135	134	104	65	330	347	346	137.2
21-Nov	341	341	339	337	338	348	343	338	343	338	338	5	350	340	347	326	58	70	68	68	39	72	59	73	3.5
22-Nov	74	84	80	62	56	80	76	75	60	44	19	30	18	11	11	33	5	9	9	357	344	342	341	346	27.0
23-Nov	349	333	338	321	323	7	44	218	104	218	120	132	115	186	217	219	222	221	229	249	237	268	225	242	295.4
24-Nov	259	287	314	331	343	338	339	342	16	342	352	347	347	352	350	350	14	38	79	84	102	100	81	35	356.4
25-Nov	24	73	71	53	67	67	359	354	349	346	350	346	343	344	343	338	344	295	262	259	238	92	326	15	358.1
26-Nov	257	234	195	222	176	167	146	143	216	223	221	219	354	283	143	329	343	259	326	339	341	341	353	358	307.8
27-Nov	346	353	2	4	4	350	347	3	358	2	359	350	359	346	8	12	15	0	9	2	357	353	347	348	357.1
28-Nov	342	345	344	346	344	343	349	343	345	347	347	341	340	M	M	M	M	M	M	M	M	351	261	235	--
29-Nov	207	210	193	212	223	210	181	138	147	118	217	226	239	235	247	229	270	288	301	310	312	310	305	307	274.9
30-Nov	305	292	276	276	314	287	239	218	219	225	203	214	217	202	139	150	137	134	142	140	141	140	135	139	209.7

333.4 318.2 315.5 312.7 333.2 311.8 304.2 312.1 321.1 313.4 319.5 303.8 303.2 310.4 324.3 327.9 333.2 318.2 337.8 337.2 326.7 342.1 351.1 337.0

Diurnal Average

M - Maintenance

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



Summary of Hour Standard Deviations

Athabasca Valley - November 2014

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 100 deg on Nov 26 12:00	Hours of Data: 712
Minimum Value: 5 deg on Nov 16 21:00	Hours of Missing Data: 8
Percentiles: P ₁ = 9 P ₁₀ = 11 Q ₁ = 14 Median = 18 Q ₃ = 29 P ₉₀ = 57 P ₉₉ = 90	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-Nov	29	45	31	40	52	35	49	29	45	61	42	17	12	29	23	22	66	63	83	46	37	25	21	25	83
2-Nov	14	11	11	14	12	15	13	17	15	19	17	16	16	18	14	12	14	12	13	14	17	24	26	18	26
3-Nov	20	17	16	26	21	21	29	16	13	12	17	9	9	14	81	33	10	10	21	19	21	17	61	39	81
4-Nov	34	25	41	36	45	17	19	21	17	15	18	17	23	19	22	18	23	18	16	16	16	17	20	21	45
5-Nov	56	58	42	14	12	11	11	15	13	12	11	10	10	11	12	12	27	21	34	25	29	22	17	17	58
6-Nov	16	13	17	16	15	16	16	15	15	13	13	16	11	15	20	14	13	34	82	99	27	10	9	10	99
7-Nov	10	9	10	11	12	12	12	13	12	14	12	15	20	16	11	14	13	12	12	13	15	22	15	17	22
8-Nov	22	22	44	14	12	20	20	18	26	21	17	16	19	22	16	15	17	19	23	21	86	72	81	65	86
9-Nov	69	26	27	21	11	13	15	17	16	21	61	52	20	18	19	32	22	28	17	20	17	20	20	19	69
10-Nov	57	26	14	13	12	14	14	23	22	18	16	13	12	12	15	16	20	15	18	20	18	17	22	14	57
11-Nov	11	11	10	11	10	18	20	16	23	31	20	20	21	23	32	31	72	79	9	72	19	18	40	8	79
12-Nov	16	36	39	32	26	43	80	29	45	34	62	42	53	43	55	53	16	17	26	31	12	27	13	14	80
13-Nov	14	15	10	12	12	14	12	11	10	10	10	15	13	14	11	10	16	62	52	68	23	19	20	32	68
14-Nov	80	72	30	49	23	29	27	40	12	10	11	13	15	17	17	23	13	22	70	99	85	43	78	78	99
15-Nov	27	57	37	58	65	34	25	27	18	19	16	16	19	24	36	13	12	18	18	11	11	13	10	11	65
16-Nov	11	10	11	13	10	10	11	9	10	12	13	10	11	13	12	12	12	8	34	26	5	44	92	98	98
17-Nov	89	67	55	36	67	15	23	96	72	83	31	17	16	16	26	50	21	43	91	34	40	37	27	21	96
18-Nov	18	20	58	22	32	21	21	10	18	18	18	11	11	11	13	12	12	12	10	10	15	19	24	24	58
19-Nov	27	27	30	28	28	21	14	12	16	17	29	22	29	19	26	31	42	87	73	47	21	17	18	15	87
20-Nov	15	16	15	15	16	16	17	16	17	16	16	16	13	14	23	28	60	20	18	32	39	25	14	14	60
21-Nov	10	10	9	10	8	18	18	11	14	10	21	18	19	16	17	20	21	16	16	19	38	28	19	25	38
22-Nov	33	17	15	21	21	12	10	13	18	20	15	16	14	18	20	30	17	16	14	23	11	10	8	14	33
23-Nov	17	12	12	16	13	32	30	77	85	28	57	11	50	61	13	17	81	90	83	49	20	62	81	50	90
24-Nov	25	24	24	12	14	10	12	16	18	26	20	15	18	19	21	22	22	36	10	15	20	27	19	31	36
25-Nov	16	21	23	23	16	34	51	16	15	15	16	13	11	11	11	17	26	31	51	19	90	87	66	70	90
26-Nov	61	58	78	32	45	35	34	34	12	19	69	100	74	86	66	79	23	27	27	8	11	12	18	20	100
27-Nov	15	18	19	18	18	29	51	15	16	16	21	23	20	14	18	19	15	18	18	17	17	17	15	16	51
28-Nov	10	14	12	14	13	11	16	12	14	13	13	10	10	M	M	M	M	M	M	M	M	15	34	21	34
29-Nov	77	32	52	57	30	39	52	46	78	58	55	15	9	14	17	45	23	16	10	10	9	10	10	11	78
30-Nov	11	16	12	10	40	23	26	12	19	10	27	14	26	27	48	20	14	10	11	11	11	14	13	15	48

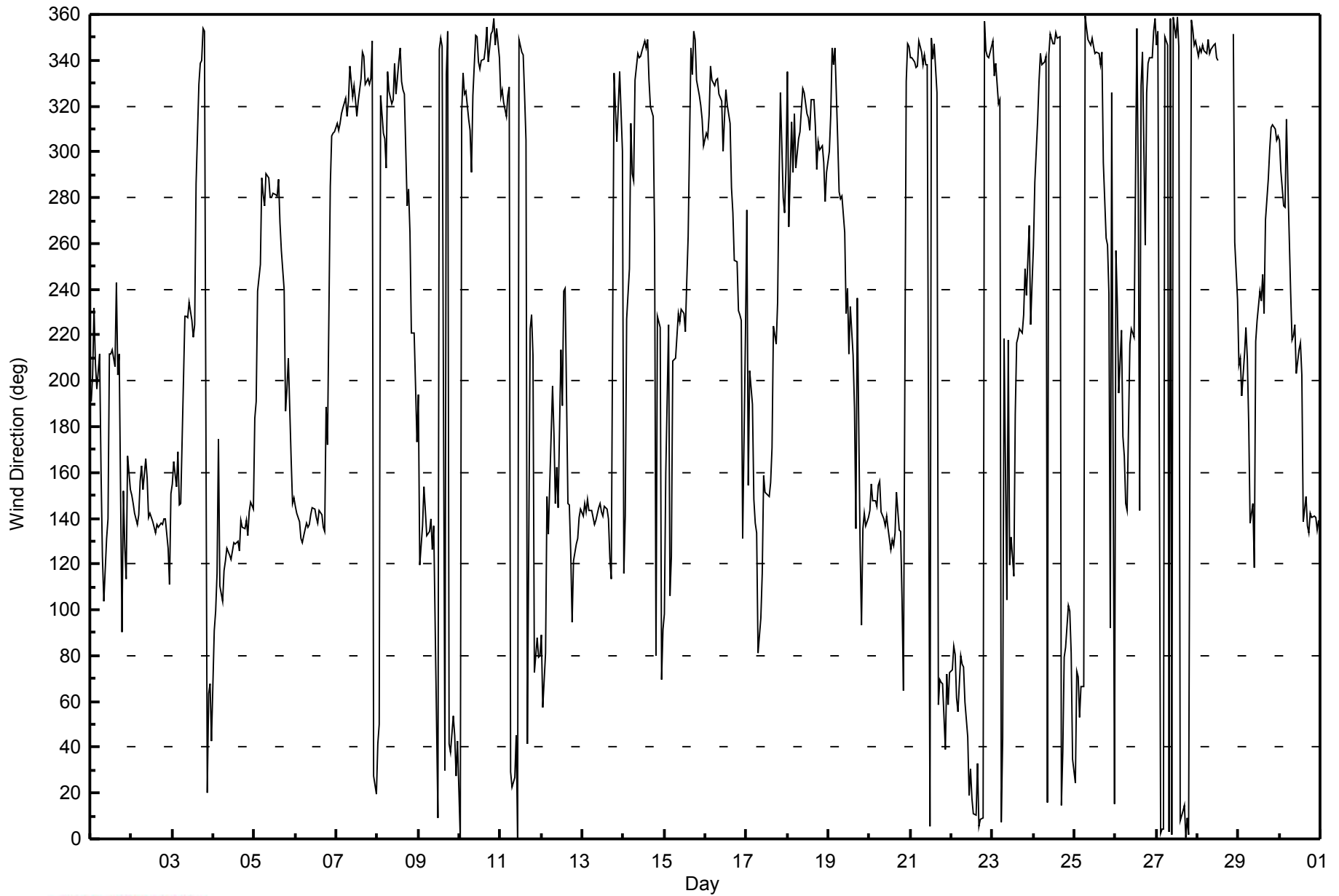
89	72	78	58	67	43	80	96	85	83	69	100	74	86	81	79	81	90	91	99	90	87	92	98	
Diurnal Maximum																								

M - Maintenance



WBEA
Hourly Averages

Wind Direction (WD) - deg
Athabasca Valley - November 2014



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Wood Buffalo Environmental Association

SO₂ Calibration Report

Station Information

Calibration Date	November 26, 2014	Previous Calibration	October 14, 2014
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	9:10	End Time (MST)	13:25
Barometric Pressure	744 mmHg	Station temp.	21 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	8400311
Cal Gas Concentration	50 ppm	Cal Gas Expiry Date	26-Sep-17
Gas Cert Reference	S970259A		
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	801	810
Calculated slope	0.999449	0.998165	Chamber temp.	43.8	43.7
Calculated intercept	1.314380	0.804990	Pressure (mmHg)	701.2	717.8
Analyzer Background	10.7	10.5	Flow (lpm)	0.549	0.556
Analyzer Coefficient	0.829	0.829	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	0.1	NA
as found span	5000	60.7	607.0	608.0	0.998
calibrator zero	5000	0.0	0.0	0.1	NA
high point	5000	60.7	607.0	608.0	0.998
second point	5000	30.4	304.0	302.6	1.005
third point	5000	15.2	152.0	151.0	1.007
calibrator zero					
as left zero	6000	0.0	0.0	0.6	NA
as left span	5000	60.7	607.0	609.8	0.995
Average Correction Factor					1.003

Corrected As found 607.9 Previous response 606.0 % change -0.3%

Notes:

no adjustments required.

Calibration Performed By:

Michael Martineau



Wood Buffalo Environmental Association

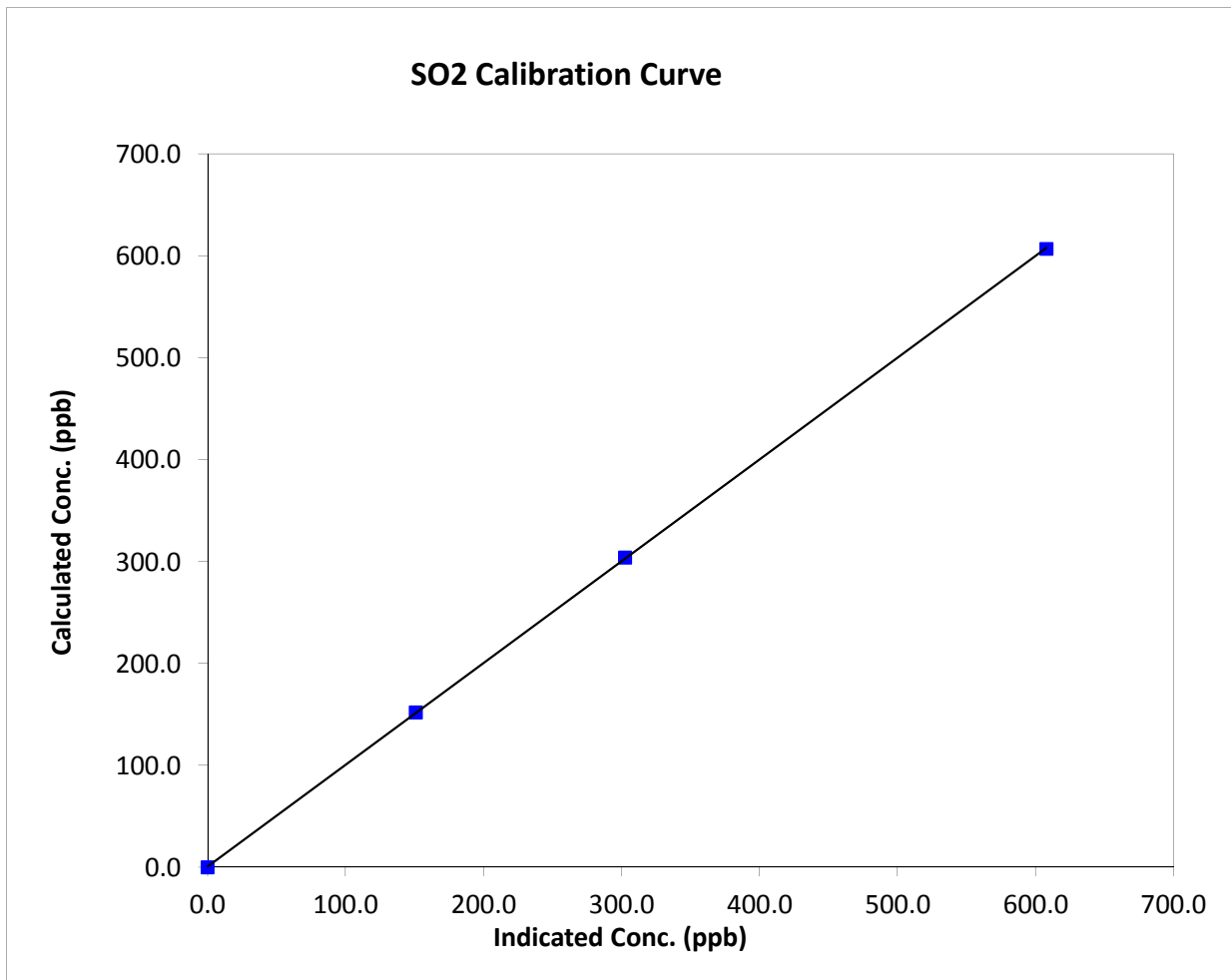
SO₂ Calibration Summary

Station Information

Calibration Date	November 26, 2014	Previous Calibration	October 14, 2014
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	9:10	End Time (MST)	13:25
Analyzer make	Thermo 43c	Analyzer serial #	607415781

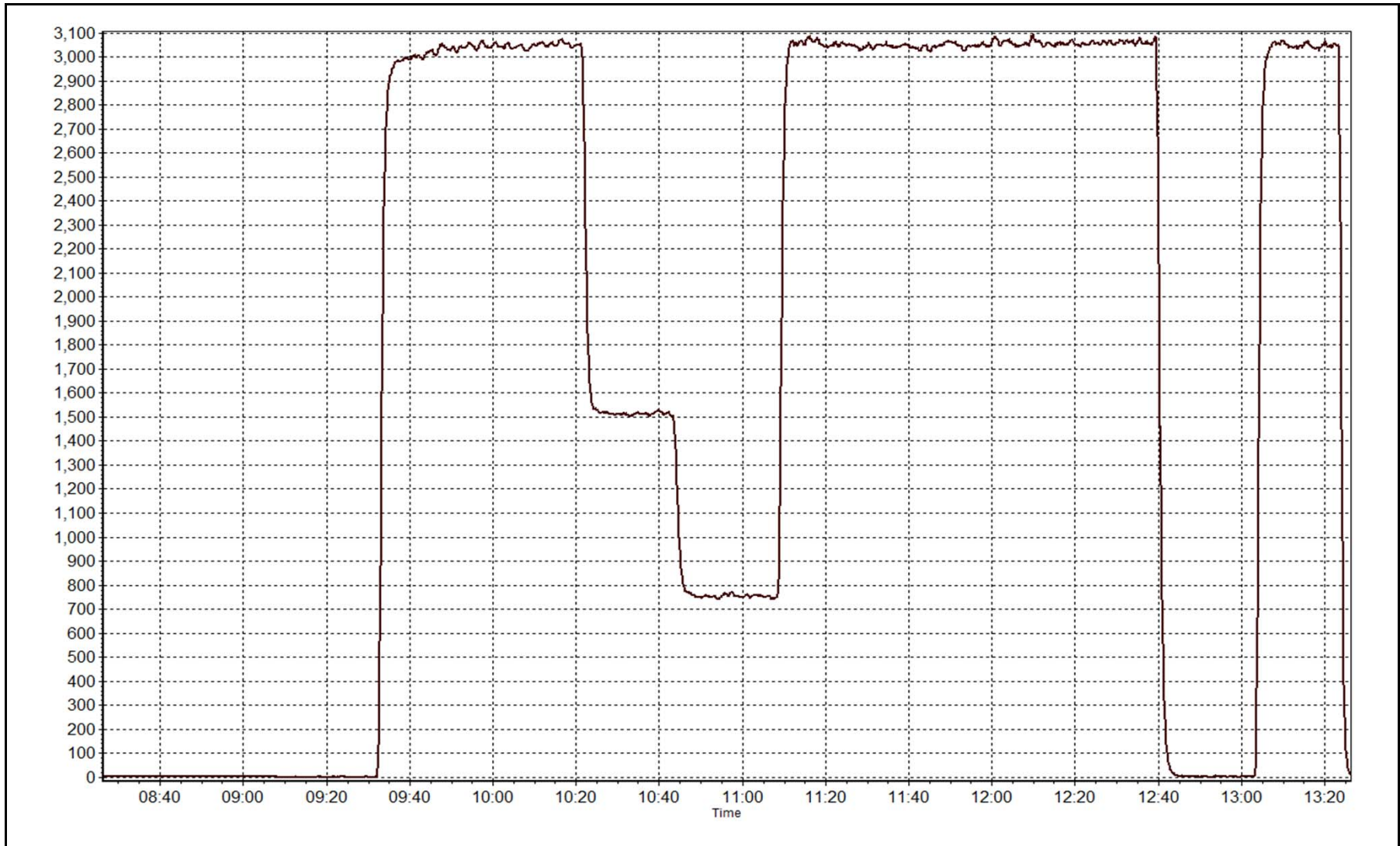
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	N/A	Correlation Coefficient	0.999986
607.0	608.0	0.9984		
304.0	302.6	1.0046	Slope	0.998165
152.0	151.0	1.0066		
			Intercept	0.804990



SO2 Calibration Plot

Date: November 26, 2014





Wood Buffalo Environmental Association

TRS Calibration Report

Station Information

Calibration Date	November 24, 2014	Previous Calibration	October 9, 2014
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	12:45	End Time (MST)	14:55
Barometric Pressure	n/a mmHg	Station temp.	21 Deg C
Calibrator Make/Model	Sabio 4010	Serial number	8400311
Cal Gas Concentration	5.02 ppm H2S	Cal Gas Expiry Date	9/9/2017
Gas Cert Reference	ALMO52589	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	805	808
Calculated slope	1.014514	1.006082	Chamber temp.	44	44
Calculated intercept	-0.063121	-0.632829	Pressure	690.4	684.0
Analyzer Background	17.4	17.4	Flow	0.478	0.474
Analyzer Coefficient	1.061	1.061	Intensity	43500	43500
			Converter temp.	800	800

Analyzer make/model	TEI 45C	Analyzer serial #	630718530
Converter make/model	Model 26 Thermal Oxidizer	Converter serial #	20101-14

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0.0	0.0	0.5	NA
as found span	6000	79.8	75.0	75.1	0.999
SO2 scrubber check	5000	14.7	149.4	0.6	NA
calibrator zero	6000	0.0	0.0	0.6	NA
high point	6000	89.6	75.0	75.1	0.999
second point	6000	50.2	42.0	42.5	0.987
third point	6000	29.9	25.0	25.5	0.983
calibrator zero					
as left zero	5000	0.0	0.0	0.6	NA
as left span	6000	89.6	75.0	75.9	0.988
Average Correction Factor					0.990

Corrected As found	74.6	Previous response	74.0	% change	-0.8%
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Notes:

No adjustments required.

Calibration Performed By:

Mike Martineau



Wood Buffalo Environmental Association

TRS Calibration Summary

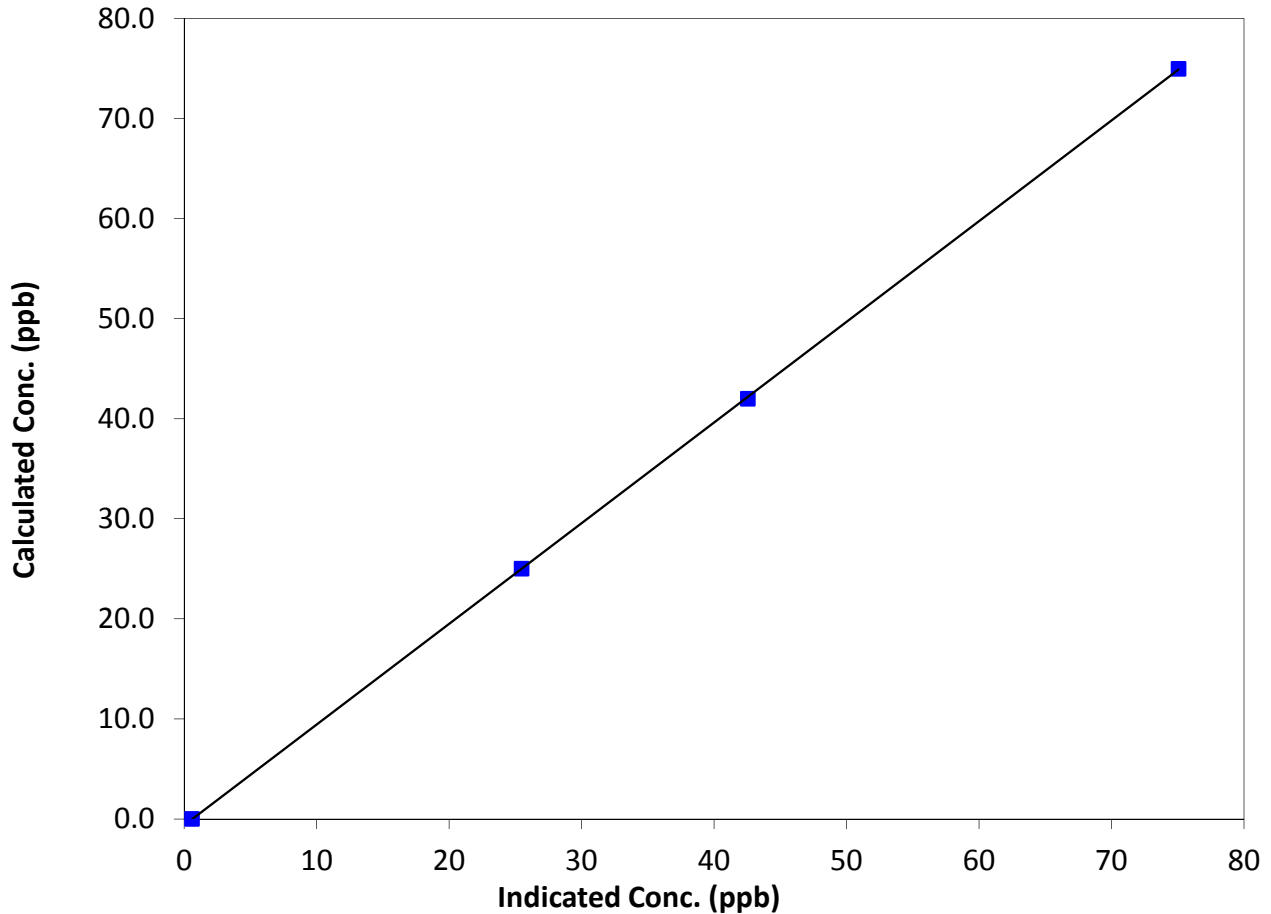
Station Information

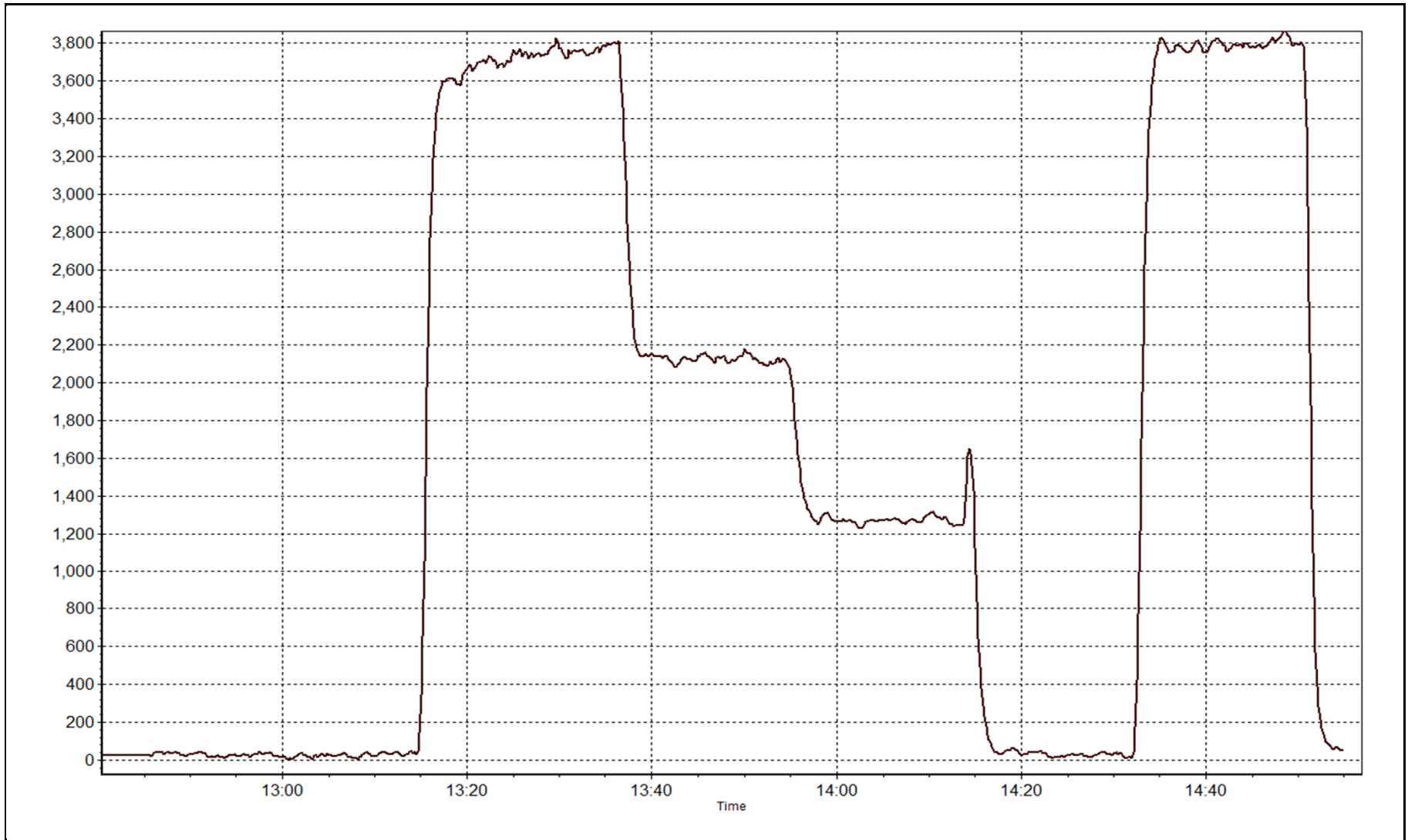
Calibration Date	November 24, 2014	Previous Calibration	October 9, 2014
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	12:45	End Time (MST)	14:55
Analyzer make	TEI 45C	Analyzer serial #	630718530

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.6	N/A	Correlation Coefficient	0.999987
75.0	75.1	0.9987		
42.0	42.5	0.9873	Slope	1.006082
25.0	25.5	0.9826		
			Intercept	-0.632829

TRS Calibration Curve







Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Station Information

Calibration Date	Wednesday, November 26, 2014	Prev Calibration	Tuesday, October 14, 2014
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	9:10	End Time (MST)	13:25
Barometric Pressure	744 mmHg	Station temp.	21 Deg C
Calibrator Model	Sabio 4010	Serial Number	8400311
Gas Cert Reference	S970259A	Cal Gas Expiry Date	Tuesday, September 26, 2017
CH4 Cal Gas Conc.	490.0 ppm	CH4 Equiv Conc.	1040.0 ppm
C3H8 Cal Gas Conc.	200.0 ppm		
DACS make/model	Campbell Scientific CR3000	DACS serial No.	5563

Analyzer Information

	Before	After		Before	After
THC Range (ppm)	50	50	Internal Temp	33.5	34.8
THC Range (input)	50	50	Flame Temp	384.2	384.5
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	0.999245	0.998154	Air Pressure	32.5	32.5
THC Calc intercept	0.024258	0.030264			
NMHC Calc slope	0.998959	0.984616			
NMHC Calc intercept	0.016279	0.026019			

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	60.7	12.63	12.65	0.998
calibrator zero	5000	0.0	0.00	0.00	N/A
high point	5000	60.7	12.63	12.64	0.999
second point	5000	30.4	6.32	6.27	1.008
third point	5000	15.2	3.16	3.12	1.013
calibrator zero					
as left zero	6000	0.0	0.00	0.00	N/A
as left span	5000	60.7	12.63	12.61	1.001
Average Correction Factor					1.007

Corrected As found 12.65 Previous response 12.61 % change -0.3%

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	60.7	6.68	6.77	0.986
calibrator zero	5000	0.0	0.00	0.00	N/A
high point	5000	60.7	6.68	6.77	0.986
second point	5000	30.4	3.34	3.35	0.998
third point	5000	15.2	1.67	1.65	1.013
calibrator zero					
as left zero	6000	0.0	0.00	0.00	N/A
as left span	5000	60.7	6.68	6.75	0.989
Average Correction Factor					0.999

Corrected As found 6.77 Previous response 6.67 % change -1.5%

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	60.7	5.95	5.87	1.013
calibrator zero	5000	0.0	0.00	0.00	N/A
high point	5000	60.7	5.95	5.87	1.013
second point	5000	30.4	2.98	2.92	1.020
third point	5000	15.2	1.49	1.46	1.020
calibrator zero					
as left zero	6000	0.0	0.00	0.00	N/A
as left span	5000	60.7	5.95	5.86	1.015
Average Correction Factor					

Corrected As found 5.87 Previous response 5.94 % change 1.2%



Wood Buffalo Environmental Association

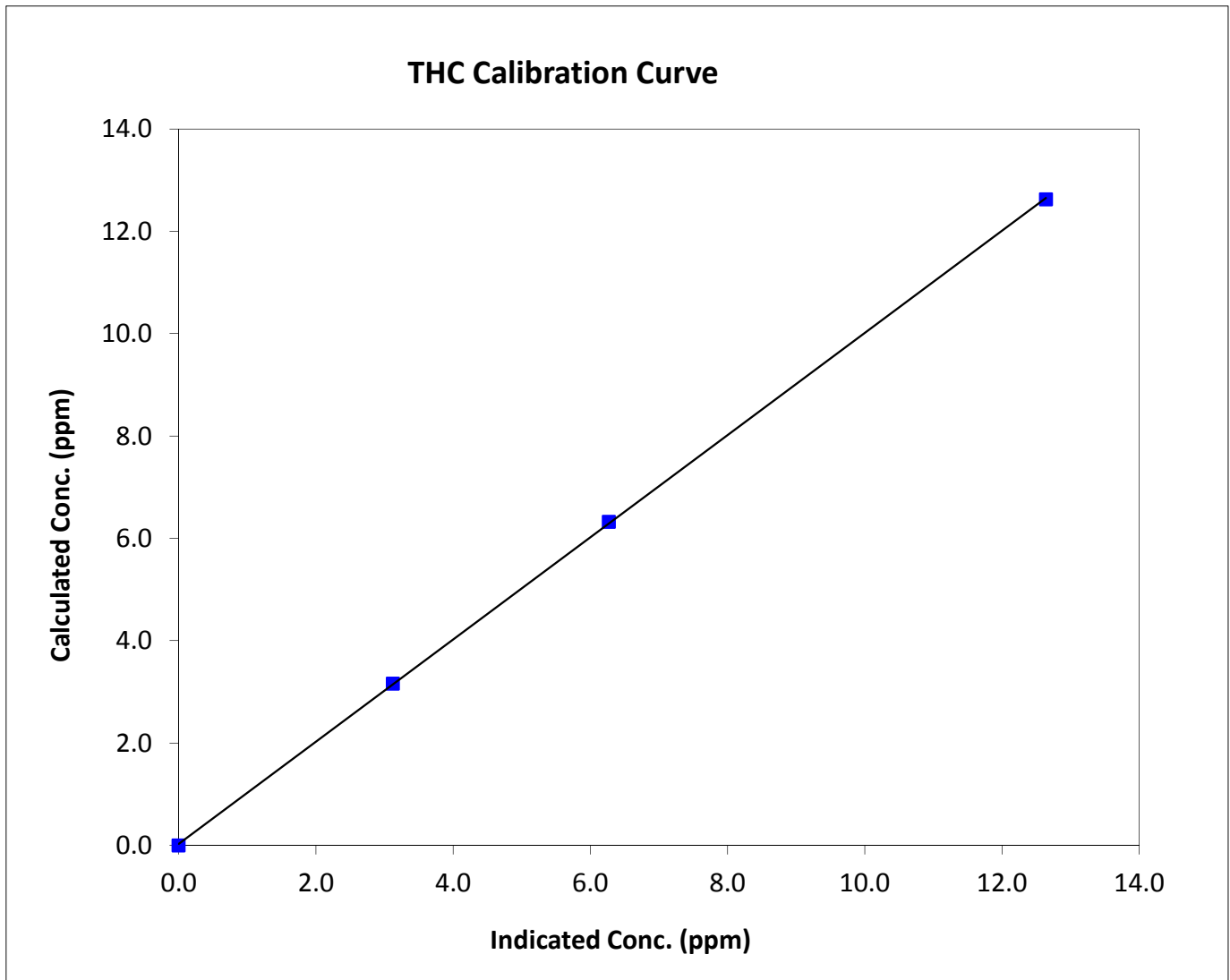
THC Calibration Summary

Station Information

Calibration Date	November 26, 2014	Previous Calibration	October 14, 2014
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	9:10	End Time (MST)	13:25
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	0.999967
12.63	12.64	0.9989		
6.32	6.27	1.0085	Slope	0.998154
3.16	3.12	1.0133		
			Intercept	0.030264





Wood Buffalo Environmental Association

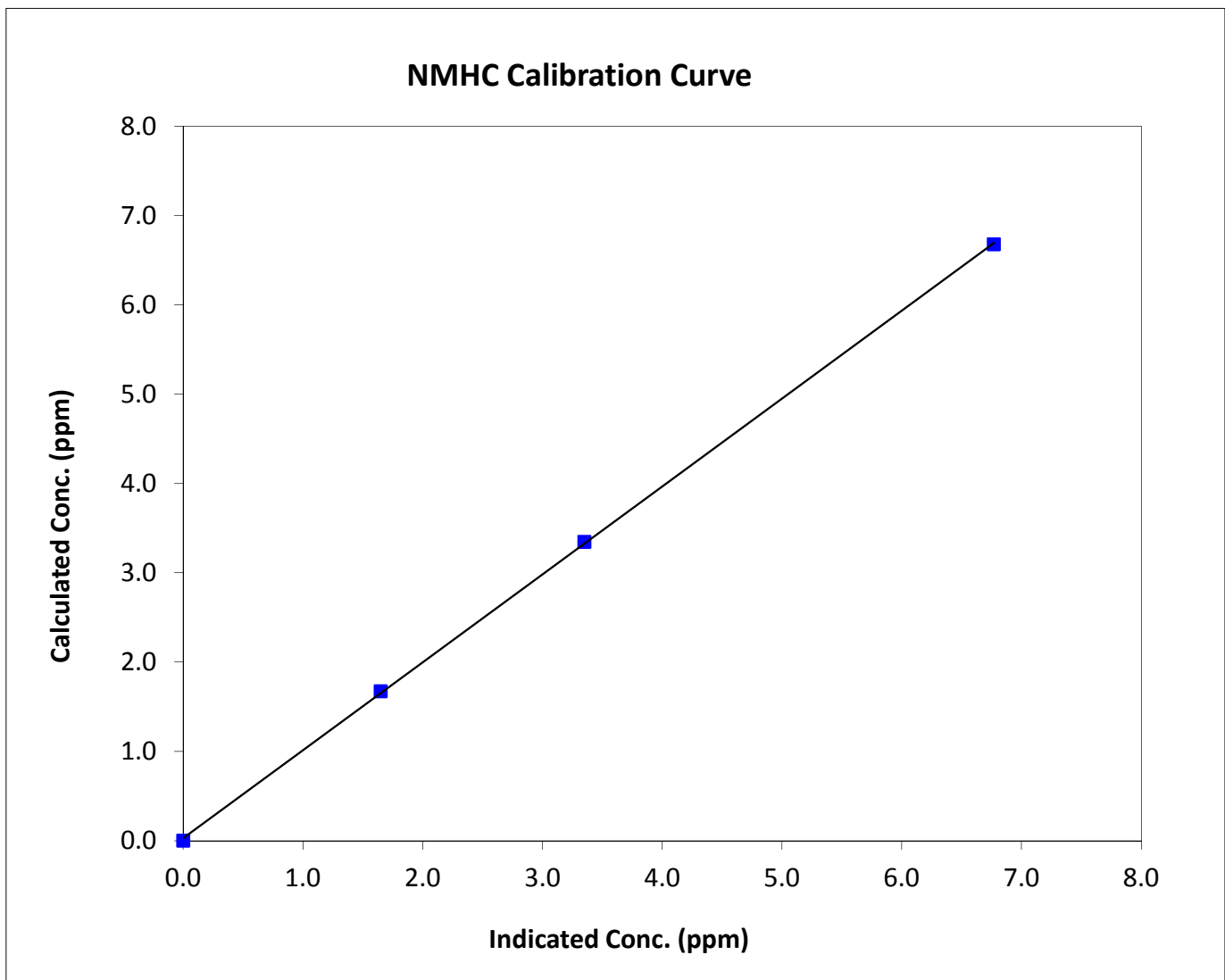
NMHC Calibration Summary

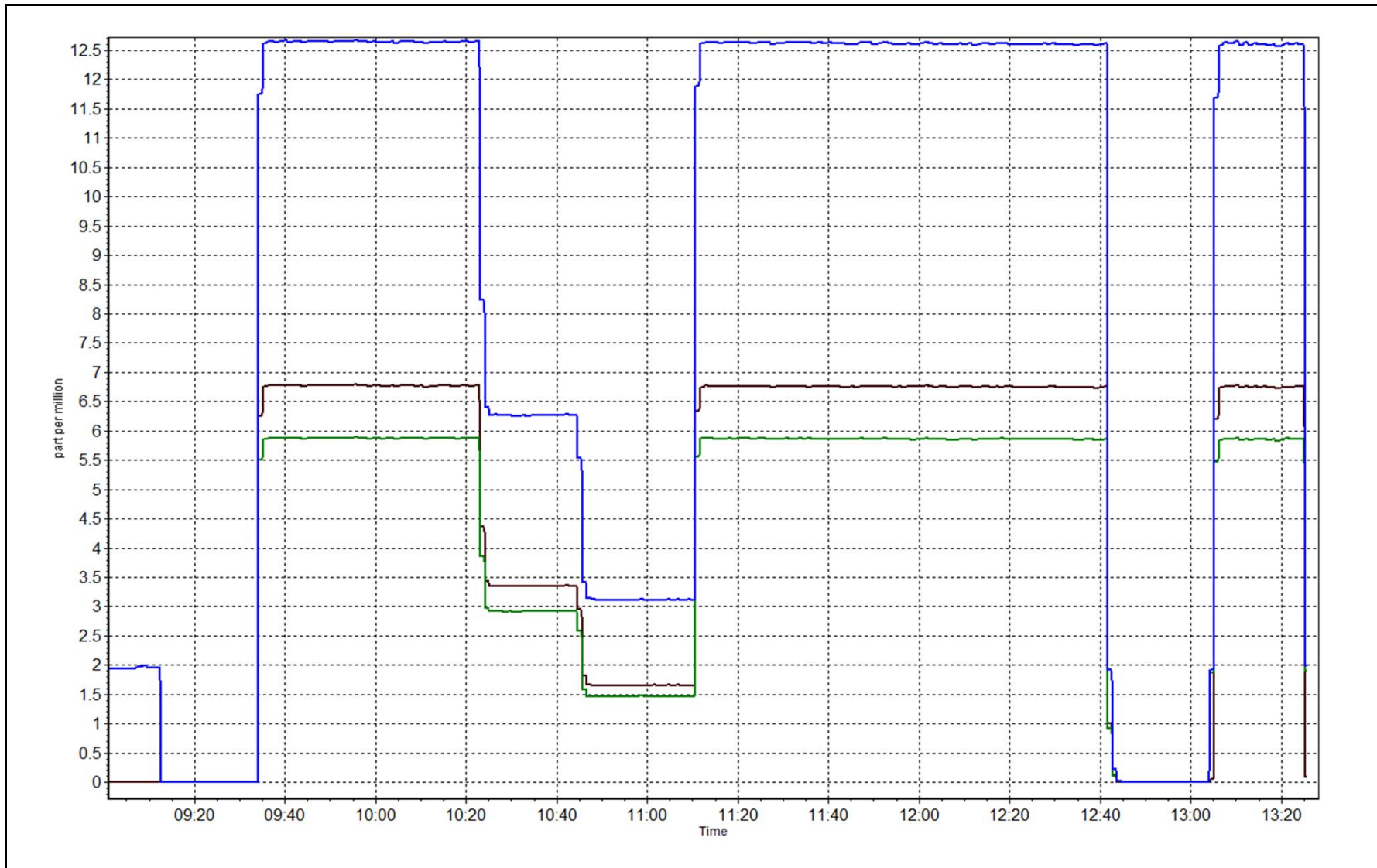
Station Information

Calibration Date	November 26, 2014	Previous Calibration	October 14, 2014
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	9:10	End Time (MST)	13:25
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	0.999929
6.68	6.77	0.9863		
3.34	3.35	0.9982	Slope	0.984616
1.67	1.65	1.0133		
			Intercept	0.026019







Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

Calibration Date	November 26, 2014	Previous Calibration	October 15, 2014
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	12:40	End Time (MST)	15:20
Barometric Pressure	744 mmHg	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11021107
NO2 calibration used	Wednesday, November 26, 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.	27.2	30.1
Analyzer Range (input)	5000	5000	Lamp temp.	70.8	70.9
Calculated slope	1.000124	1.013405	Pressure	727.5	731.6
Calculated intercept	0.515477	0.346708	Flow cell A	0.683	0.685
Analyzer Background	-0.2	-0.2	Flow cell B	0.749	0.750
Analyzer Coefficient	0.972	0.972	Cell A Intensity	10400	106500
			Cell B Intensity	87500	89750

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	-0.1	N/A
as found span	5000	N/A	339.3	334.6	1.014
calibrator zero	5000	0.00	0.0	-0.1	N/A
high point	5000	N/A	339.3	334.6	1.014
second point	5000	N/A	174.4	171.5	1.017
third point	5000	N/A	87.2	85.5	1.020
calibrator zero					
as left zero	5000	0.00	0.0	0.0	N/A
as left span	5000	N/A	339.3	331.4	1.024
Average Correction Factor					1.017

Corrected As found 334.7 Previous response 338.7 % change 1.2%

Notes:

no adjustments required.

Calibration Performed By:

Michael Martineau



Wood Buffalo Environmental Association

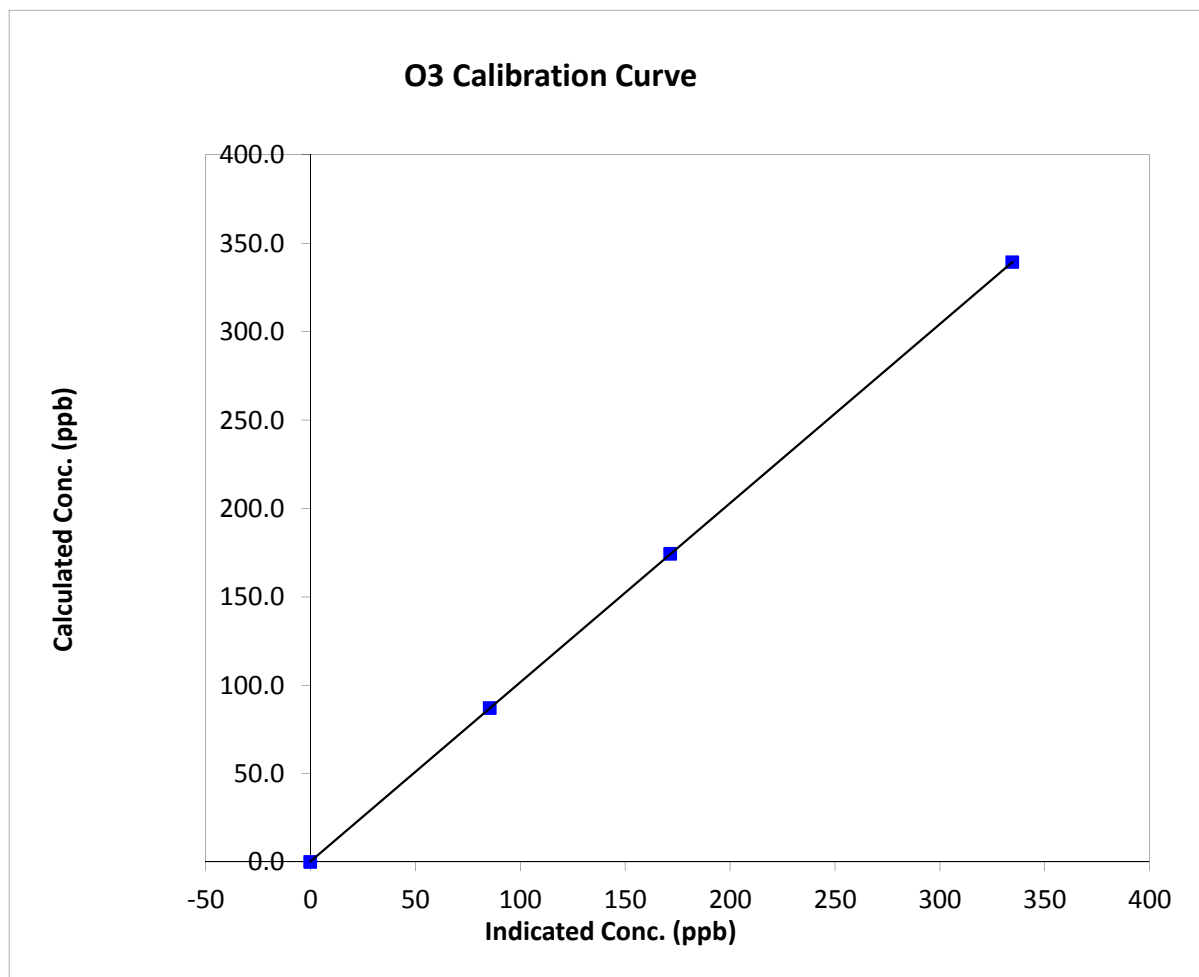
O₃ Calibration Summary

Station Information

Calibration Date	Wednesday, November 26, 2014	Previous Calibration	October 15, 2014
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	12:40	End Time (MST)	15:20
Analyzer make	TEI 49C	Analyzer serial #	607415760

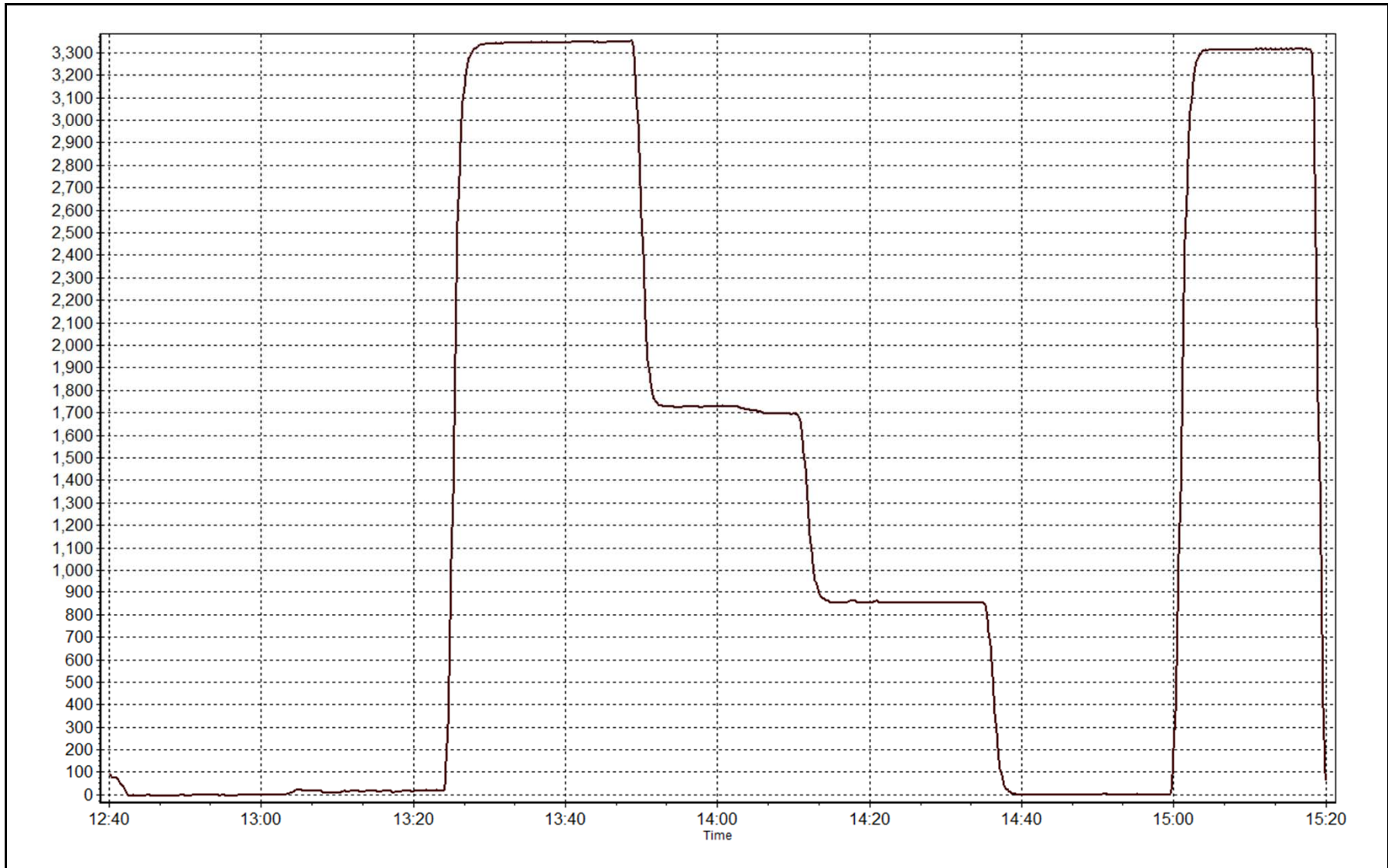
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999997
339.3	334.6	1.0140		
174.4	171.5	1.0167	Slope	1.013405
87.2	85.5	1.0196		
			Intercept	0.346708



O3 Calibration Plot

Date: November 26, 2014





Wood Buffalo Environmental Association

NO_x-NO-NO₂ Calibration Report

Station Information

Calibration Date	November 26, 2014	Previous Calibration	October 14, 2014
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	<input type="text" value="Routine"/>		
Start Time (MST)	9:10	End Time (MST)	13:25
Barometric Pressure	744 mmHg	Station Temperature	21.0 Deg C
Calibrator	Sabio 4010	Serial Number	11021107
NO Cal Gas Conc	49.4 ppm	Cal Gas Expiry Date	September 26, 2017
NO _x Cal Gas Conc	49.4 ppm	Cal Gas Serial #	S970259A

DACS Information

DACS make & model Campbell Scientific CR3000 DACS serial No. 2575

Parameter		NO _x	NO	NO ₂
MV conversion	Analyzer Range (ppb)	1000	1000	1000
	Analyzer Range (mv)	5000	5000	5000
Before	Data Slope	0.998120	1.001567	0.998091
	Data Offset	2.167949	2.153502	-0.612132
After	Data Slope	0.996758	0.997526	0.999207
	Data Offset	2.124464	2.277589	-0.643770
Channel #		4	5	6
Voltage Range		0 - 5V	0 - 5V	0 - 5V

Analyzer Information

Analyzer make/model Thermo 42c Analyzer serial # 601114773

Test Point	before		after	
Concentration range	1000	ppb	1000	ppb
NO coefficient	0.774	ppb	0.753	ppb
NO _x coefficient	1.003	ppb	1.003	ppb
NO ₂ coefficient	1.000	ppb	1.000	ppb
NO bkgrnd	3.3		3.2	
NO _x bkgrnd	3.5		3.4	
Nt coefficient	n/a		n/a	
Chamber Temp	49.6	Deg C	49.7	Deg C
Moly Temp	323.0	Deg C	323.0	Deg C
PMT Temp	-3.5	Deg C	-3.6	Deg C
O ₃ flow	ok	ccm	ok	ccm
R Cell Press	166.2	mmHg	169.6	mmHg
Sample Flow	0.784	ccm	0.803	ccm

Notes:

adjusted span



Wood Buffalo Environmental Association

NO_x-NO-NO₂ Calibration Report

Station Information

Calibration Date:

November 26, 2014

Station Number:

AMS 7

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NO _x conc (ppb)	Calculated NO conc (ppb)	Calculated NO ₂ conc (ppb)	Indicated NO _x conc (ppb)	Indicated NO conc (ppb)	Indicated NO ₂ conc (ppb)	NO _x Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.3	N/A	N/A
as found span	5000	60.7	599.7	599.7	0.0	617.4	617.6	0.2	0.9714	0.9710
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.3	N/A	N/A
high point	5000	60.7	599.7	599.7	0.0	600.8	600.2	1.0	0.9982	0.9992
second point	5000	30.4	300.4	300.4	0.0	297.4	297.1	0.6	1.0099	1.0110
third point	5000	15.2	150.2	150.2	0.0	147.0	146.5	0.7	1.0216	1.0248
calibrator zero										
as left zero	6000	0.0	0.0	0.0	0.0	0.0	-0.1	0.3	N/A	N/A
as left span	5000	60.7	599.7	259.5	340.2	594.9	262.0	333.1	1.0081	0.9905
Average Correction Factor									1.0099	1.0117

Corrected As found
Previous Response

NO_x= 617.5
NO_x= 598.7

NO= 617.7
NO= 596.6

Percent Change

NO_x= -3.0%

NO= -3.4%

GPT Calibration Data

Dilution Flow

5000

ccm

Source Gas Flow

60.70

ccm

O ₃ Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO ₂ conc (ppb)	Indicated NO _x conc (ppb)	Indicated NO conc (ppb)	Indicated NO ₂ conc (ppb)	NO _x Correction factor	NO Correction factor	NO ₂ Correction factor	Converter Efficiency
Cal zero			0.0			0.3			N/A	
1st NO ₂ (300)	N/A	259.5	339.3	599.3	259.5	339.9	0.9887	1.0000	0.9981	100.2%
2nd NO ₂ (200)	N/A	424.4	174.4	599.7	424.4	175.6	0.9880	1.0000	0.9932	100.7%
3rd NO ₂ (100)	N/A	511.6	87.2	599.4	511.6	88.1	0.9886	1.0000	0.9890	101.1%
4th NO ₂ (0)	598.8	N/A	1.3	600.0	598.8	1.5	0.9875	1.0000	N/A	N/A
Average Correction Factor							0.9882	1.0000	0.9935	100.7%

Calibration Performed By:

Michael Martineau



Wood Buffalo Environmental Association

NO_x Calibration Summary

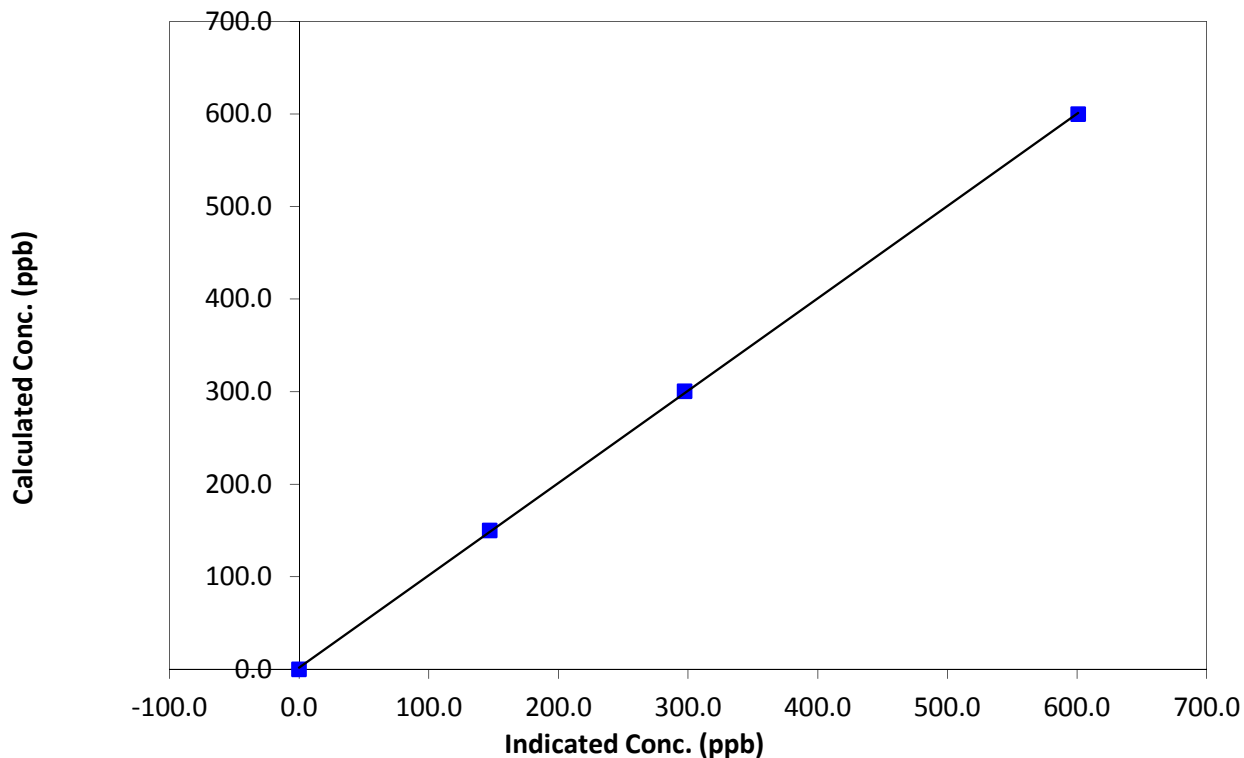
Station Information

Calibration Date	November 26, 2014	Previous Calibration	October 14, 2014
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	9:10	End Time (MST)	13:25
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	0.999942
599.7	600.8	0.9982		
300.4	297.4	1.0099	Slope	0.996758
150.2	147.0	1.0216		
			Intercept	2.124464

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

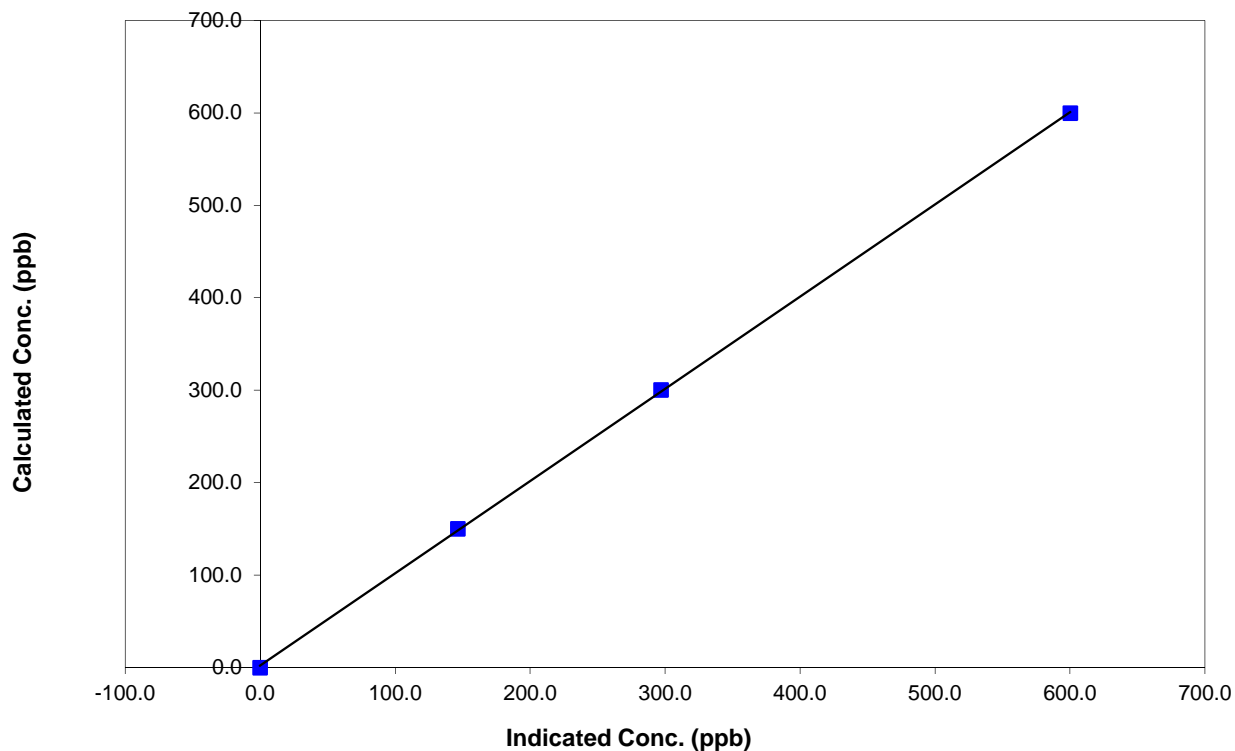
Station Information

Calibration Date	November 26, 2014	Previous Calibration	October 14, 2014
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	9:10	End Time (MST)	13:25
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	0.999937
599.7	600.2	0.9992		
300.4	297.1	1.0110	Slope	0.997526
150.2	146.5	1.0248		
			Intercept	2.277589

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

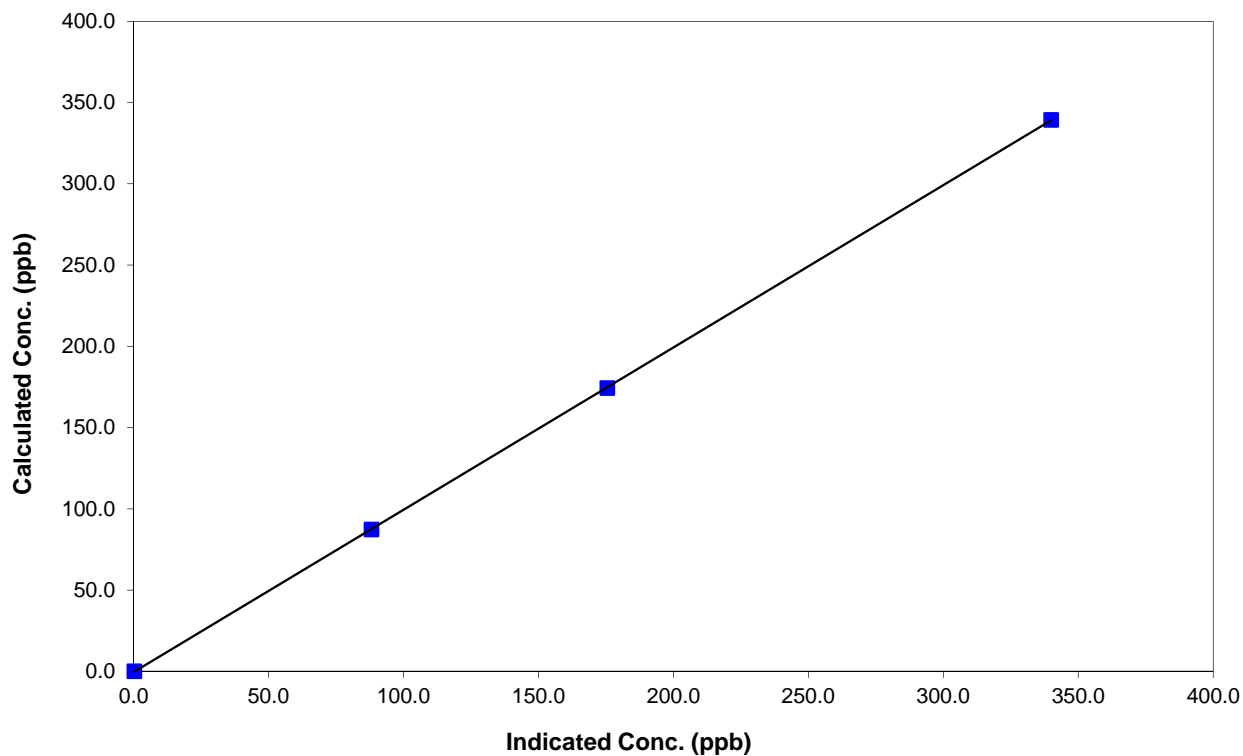
Station Information

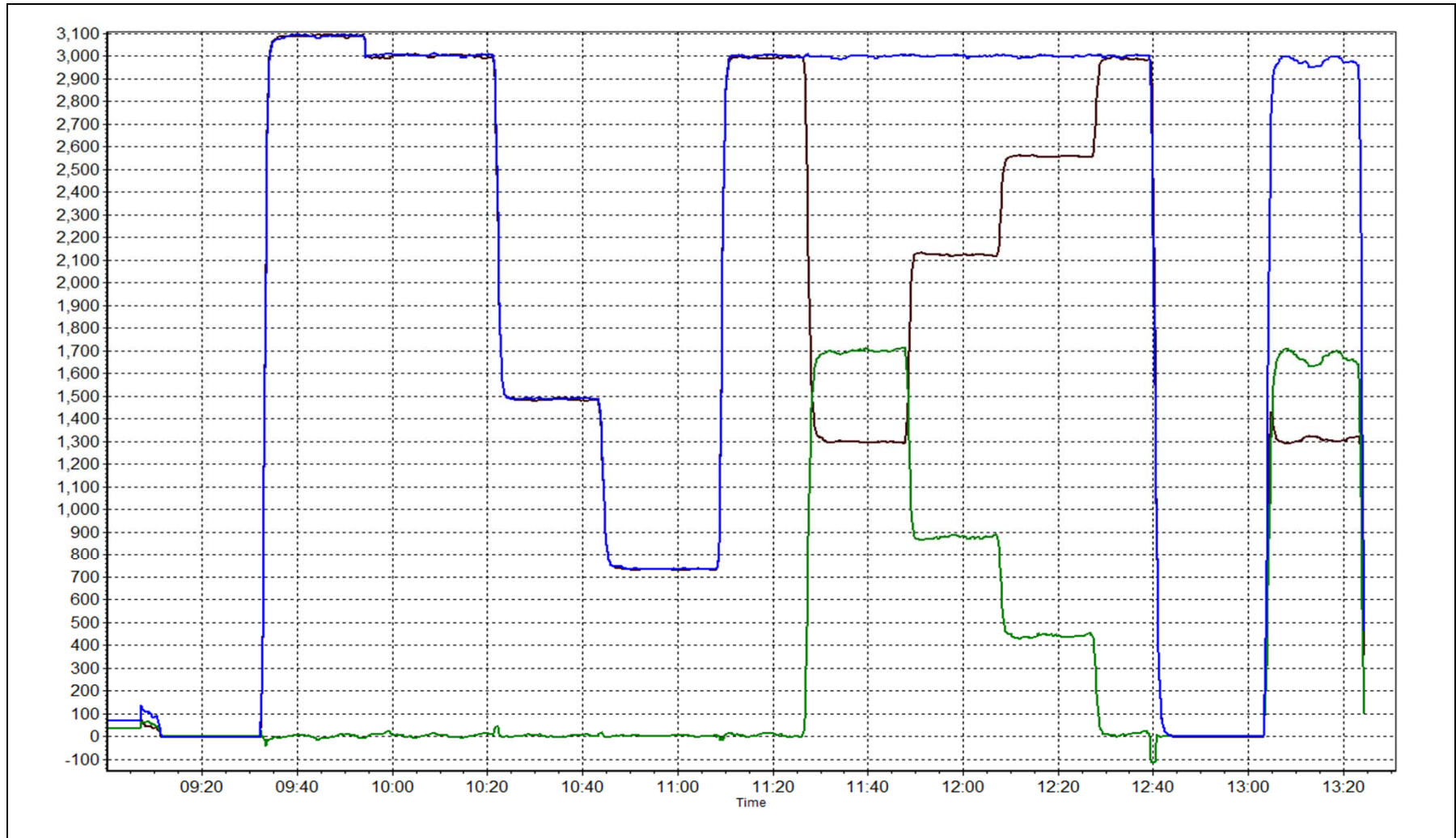
Calibration Date	November 26, 2014	Previous Calibration	October 14, 2014
Station Number	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	9:10	End Time (MST)	13:25
Analyzer make	Thermo 42c	Analyzer serial #	601114773

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.3	N/A	Correlation Coefficient	0.999993
339.3	339.9	0.9981		
174.4	175.6	0.9932	Slope	0.999207
87.2	88.1	0.9890		
			Intercept	-0.643770

NO₂ Calibration Curve







Wood Buffalo Environmental Association

CO Calibration Report

Station Information

Calibration Date	November 27, 2014	Previous Calibration	October 15, 2014
Station Name	Athabasca Valley	Station Number	7
Reason:	<input type="checkbox"/> Routine <input type="checkbox"/> Install <input checked="" type="checkbox"/> Removal <input type="checkbox"/> Other:		
Start Time (MST)	9:20	End Time (MST)	11:00
Barometric Pressure	748 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.	48.0	48.0
Analyzer Range (mv)	5000	5000	Pressure	714.2	733.0
Calculated slope	0.999975	0.997521	Flow	1.251	1.230
Calculated intercept	0.154992	-0.154687	Intensity	200200	200000
Analyzer Background	2.123	2.123	S/R ratio	1.165580	1.164400
Analyzer Coefficient	1.024	1.024			

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	0.0	0.0	0.3	N/A
as found span	5000	67.6	41.4	41.7	0.992
calibrator zero	5000	0.0	0.0	0.3	N/A
high point	5000	67.6	41.4	41.7	0.992
second point	5000	34.2	20.9	21.0	0.998
third point	5000	14.7	9.0	9.1	0.984
calibrator zero					
as left zero					
as left span					
Average Correction Factor					0.991

Corrected As found 41.5 Previous response 41.2 % change -0.6%

Notes:

removal for upgrade to 48i.

Calibration Performed By: Michael Martineau



Wood Buffalo Environmental Association

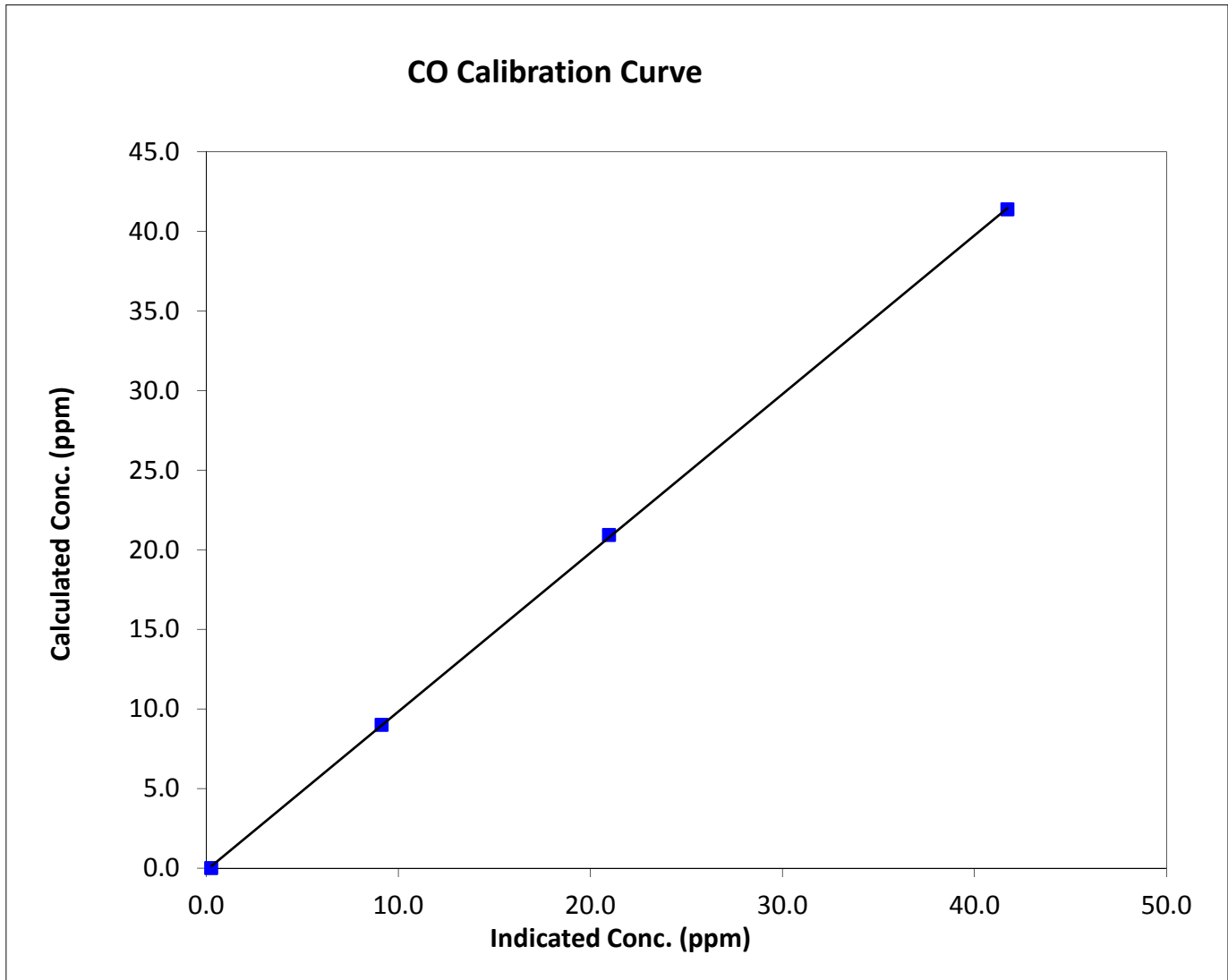
CO Calibration Summary

Station Information

Calibration Date	November 27, 2014	Previous Calibration	October 15, 2014
Station Name	Athabasca Valley	Station Number	7
Start Time (MST)	9:20	End Time (MST)	11:00
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	0.3	N/A	Correlation Coefficient	0.999949
41.4	41.7	0.9916		
20.9	21.0	0.9981	Slope	0.997521
9.0	9.1	0.9843		
			Intercept	-0.154687







Wood Buffalo Environmental Association

CO Calibration Report

Station Information

Calibration Date	November 27, 2014	Previous Calibration	N/A
Station Name	Athabasca Valley	Station Number	7
Reason:	<input type="checkbox"/> Routine <input checked="" type="checkbox"/> Install <input type="checkbox"/> Removal <input type="checkbox"/> Other:		
Start Time (MST)	11:15	End Time (MST)	14:00
Barometric Pressure	748 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

	<i>Before</i>	<i>After</i>		<i>Before</i>	<i>After</i>
Analyzer Range (ppm)	50	50	Chamber temp.	NA	48.6
Analyzer Range (mv)	5000	5000	Pressure	NA	743.5
Calculated slope	NA	0.997559	Flow	NA	0.476
Calculated intercept	NA	0.137730	Intensity	NA	199698
Analyzer Background	NA	-0.105	S/R ratio	NA	1.183300
Analyzer Coefficient	NA	1.006			

Analyzer make Thermo 48i-TLE Analyzer serial # 1408761381

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					
as found span					
calibrator zero	5000	0.00	0.0	0.0	N/A
high point	5000	67.60	41.4	41.4	0.998
second point	5000	34.20	20.9	20.7	1.013
third point	5000	14.70	9.0	8.8	1.021
calibrator zero					
as left zero	5000	0.00	0.0	0.0	N/A
as left span	5000	67.60	41.4	41.3	1.002
Average Correction Factor					1.011

Corrected As found NA Previous response NA % change NA

Notes:

Installation to replace c-series analyzer.

Calibration Performed By: Michael Martineau



Wood Buffalo Environmental Association

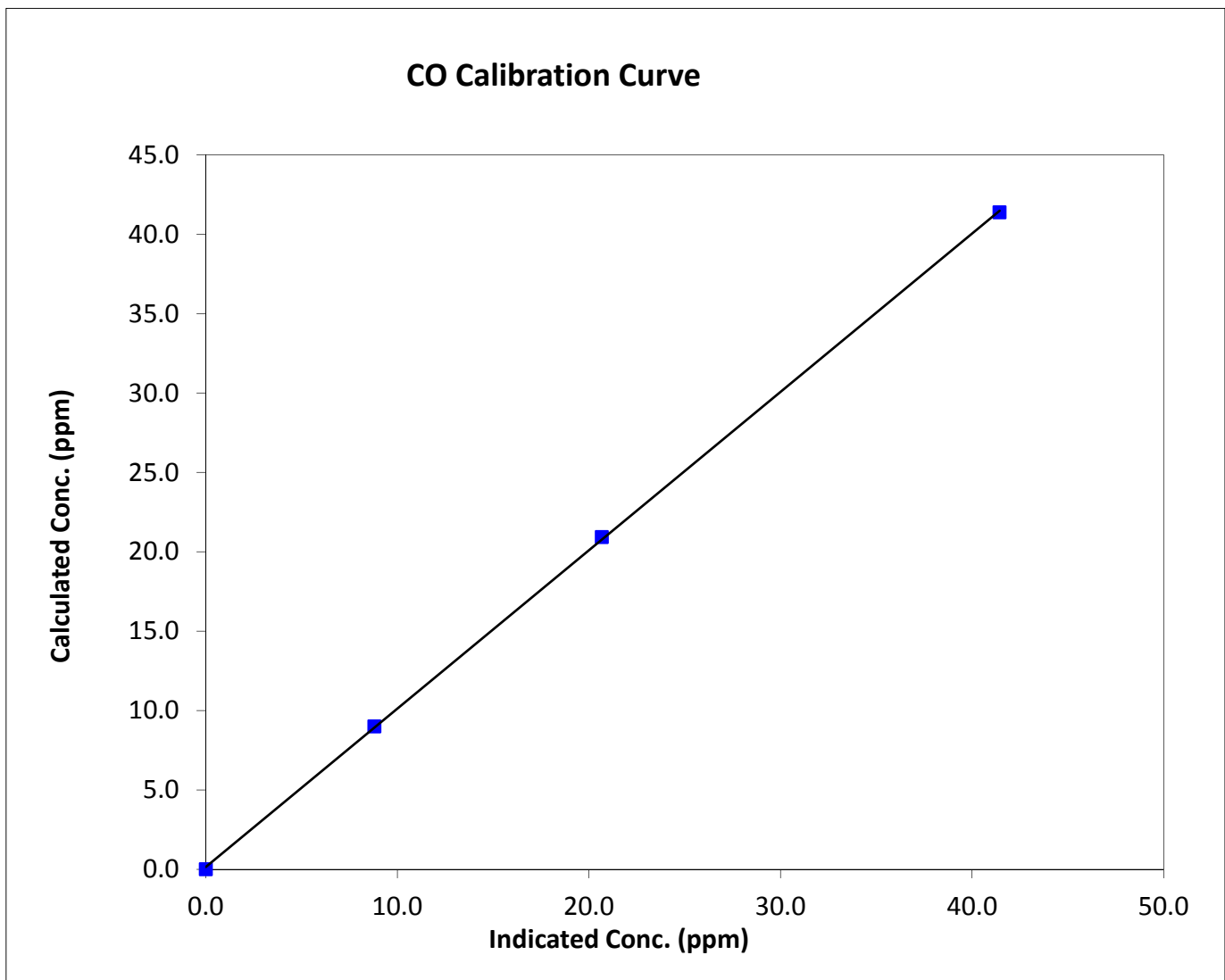
CO Calibration Summary

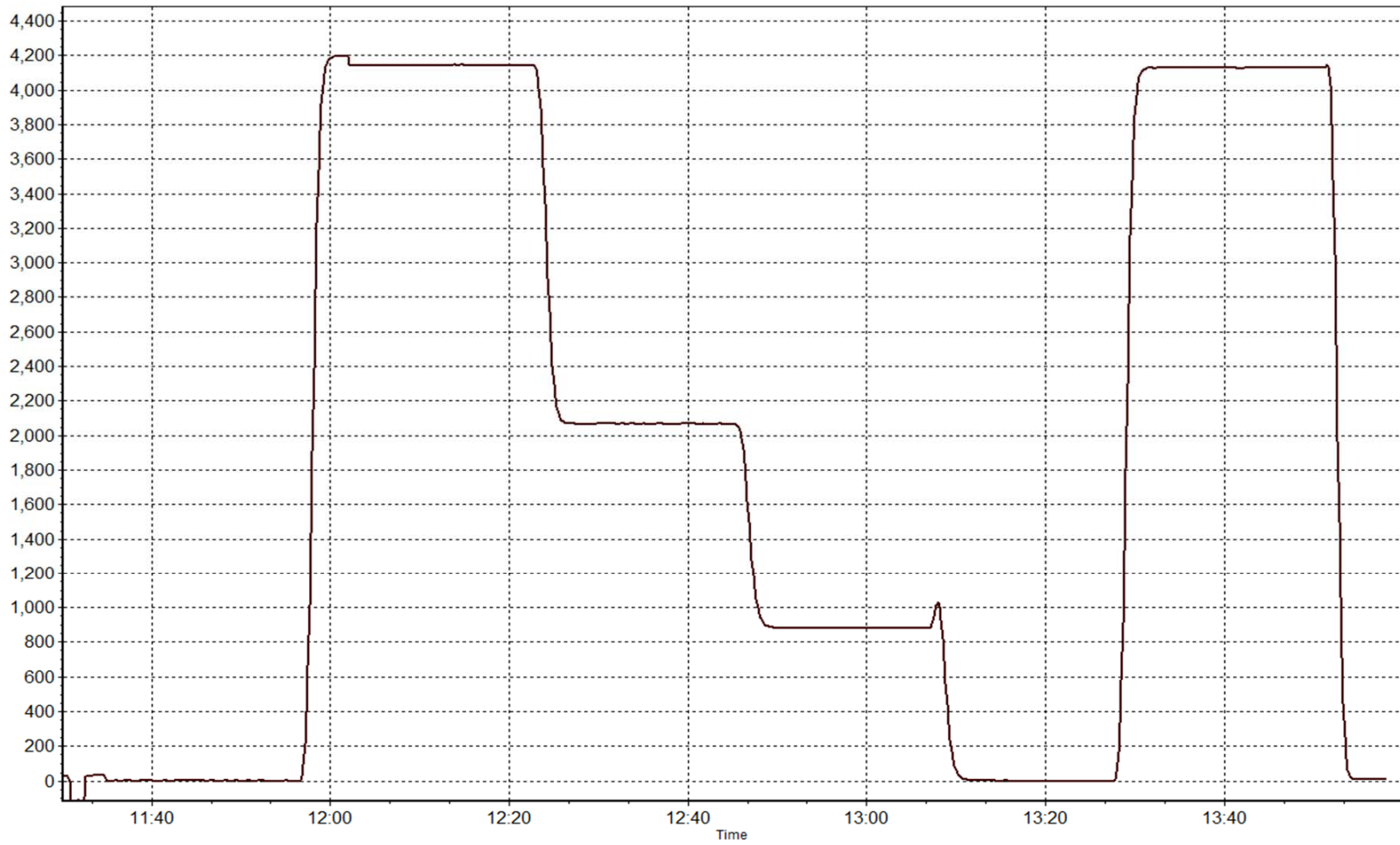
Station Information

Calibration Date	November 27, 2014	Previous Calibration	N/A
Station Name	Athabasca Valley	Station Number	7
Start Time (MST)	11:15	End Time (MST)	14:00
Analyzer make	Thermo 48i-TLE	Analyzer serial #	1408761381

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999933
41.4	41.4	0.9985		
20.9	20.7	1.0126	Slope	0.997559
9.0	8.8	1.0208		
			Intercept	0.137730





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 8
FORT CHIPEWYAN
NOVEMBER 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

December 30, 2014

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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS 8)
NOVEMBER 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	599	33	121	87.78	5	0	1	0
O3(ppb) Average	687	33	33	100.00	37	0	35	-
NO2(ppb) Average	683	36	37	99.86	21	0	8	-
NO(ppb) Average	683	36	37	99.86	5	-	1	-
NOX(ppb) Average	683	36	37	99.86	22	-	10	-
PM2.5(ug/m3) Average	717	0	3	99.58	18.3	-	8.5	0
Wind Speed 10 m (km/h) Average	718	0	2	99.72	34	-	21	-
Wind Direction 10 m (deg) Average	718	0	2	99.72	-	-	-	-
Temperature 2 m (C) Average	720	0	0	100.00	6.7	-	1.8	-
Relative Humidity (%) Average	720	0	0	100.00	98	-	-	-
Precipitation (mm) Total	720	0	0	100.00	0.5	-	-	-
Global Solar Radiation (W/m2) Average	720	0	0	100.00	367	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS 8)
 NOVEMBER 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	599	0.2	0	-	0	0	0	0	0	0	0	5
O3(ppb) Average	687	25.6	7	-	4	16	22	27	30	33	37	37
NO2(ppb) Average	683	1.3	3	-	0	0	0	0	1	4	21	21
NO(ppb) Average	683	0.2	1	-	0	0	0	0	0	0	5	5
NOX(ppb) Average	683	1.5	3	-	0	0	0	0	1	4	22	22
PM2.5(ug/m3) Average	717	3.78	2.8	-	0.6	1.2	1.8	2.9	4.7	7.7	18.3	18.3
Wind Speed 10 m (km/h) Average	718	11	6	-	1	4	7	10	14	20	34	34
Wind Direction 10 m (deg) Average	718	-	-	-	-	-	-	-	-	-	-	-
Temperature 2 m (C) Average	720	-12.52	8.2	-	-28.8	-23.9	-18	-13.2	-7.4	-0.7	6.7	6.7
Relative Humidity (%) Average	720	82	7	-	53	73	78	83	87	91	98	98
Precipitation (mm) Total	720	-	-	0.51	0	0	0	0	0	0	0.5	0.5
Global Solar Radiation (W/m2) Average	720	34.2	71	-	0	0	0	0	31	128	367	367

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS 8)
NOVEMBER 2014

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	27 Nov 2014 09:00	01 Dec 2014 00:00	88	Analyzer failure - new analyzer installed Dec 19, 2014
NO2, NO, NOX	24 Nov 2014 12:00	24 Nov 2014 12:00	1	Unstable operation - baseline collapse
PM2.5	05 Nov 2014 17:00	05 Nov 2014 19:00	3	Maintenance - Flow and zero check, sample head cleaning
Wind Speed, Wind Direction	03 Nov 2014 06:00	03 Nov 2014 06:00	1	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	19 Nov 2014 08:00	19 Nov 2014 08:00	1	Flat line in sensor output signal - Sensor frozen

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Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 5 ppb on Nov 26 10:00	Maximum Daily Average: 1.3 ppb on Nov 26		Hours of Data:	599
Minimum Value: 0 ppb on Nov 1 03:00	Minimum Daily Average: 0.0 ppb on Nov 14		Hours of Missing Data:	121
Maximum Diurnal Average: 0.4 ppb at hour 2	Minimum Diurnal Average: 0.1 ppb at hour 4		Hours of Calibration:	33
Monthly Average: 0.2 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 3		Percent Operational Time:	87.8

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-Nov	0	Z	0	0	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-Nov	0	Z	0	0	0	0	0	0	0	1	1	1	1	1	1	1	2	2	1	0	0	0	1	0	0	0.6	2
3-Nov	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
4-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
5-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	C	C	C	C	C	C	0	0	0	0	0	0	--	0
6-Nov	0	Z	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0.4	1
7-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
8-Nov	0	Z	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
9-Nov	0	Z	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
10-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
11-Nov	0	Z	0	0	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-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1	1	1	0	0	0	0	0	0.4	1
13-Nov	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
14-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
15-Nov	0	Z	0	0	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-Nov	0	Z	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-Nov	0	Z	0	0	0	0	0	1	4	3	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.6	4
18-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
19-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.2	1
20-Nov	1	Z	0	0	1	1	1	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.4	1
21-Nov	0	Z	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
22-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
23-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
24-Nov	0	Z	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-Nov	0	Z	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
26-Nov	0	Z	0	0	0	1	1	2	3	5	4	4	3	3	2	1	0	0	0	0	0	0	0	0	0	1.3	5
27-Nov	0	Z	0	0	0	0	0	0	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	0
28-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
29-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
30-Nov	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	--	--

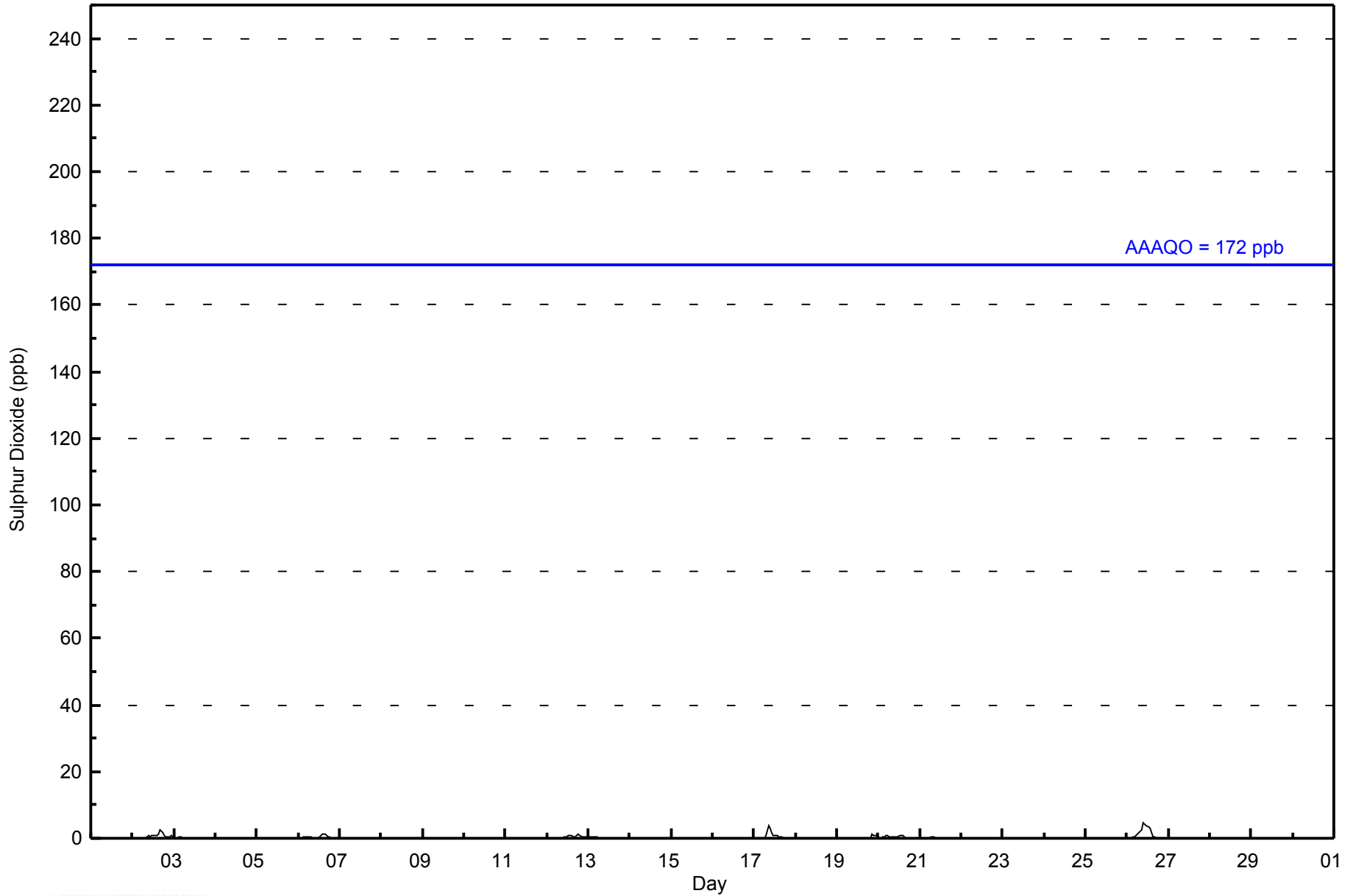
0.1	0.4	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Diurnal Average
1	0	1	1	1	1	1	1	2	4	5	4	4	3	3	2	1	2	2	1	1	1	1	1	1	1	1	Diurnal Maximum

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



WBEA
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Fort Chipewyan - November 2014





WBEA
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Fort Chipewyan - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	599	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: 599

Total Number of Hours: 720



WBEA
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Fort Chipewyan - November 2014

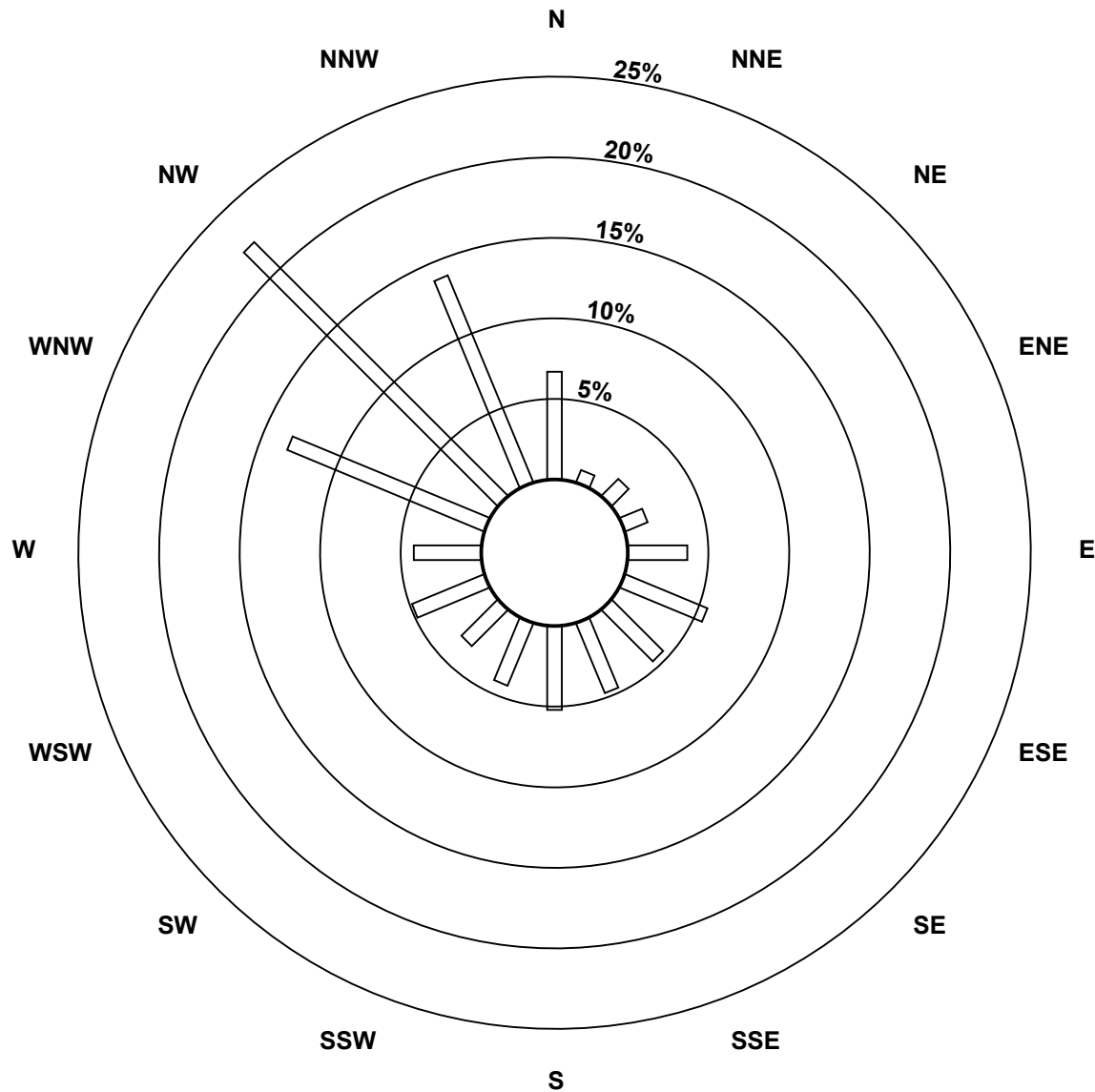
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	40	5	9	9	22	33	27	28	31	25	19	29	25	79	133	83	597
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	40	5	9	9	22	33	27	28	31	25	19	29	25	79	133	83	597

Total Number of Valid Hours: 597

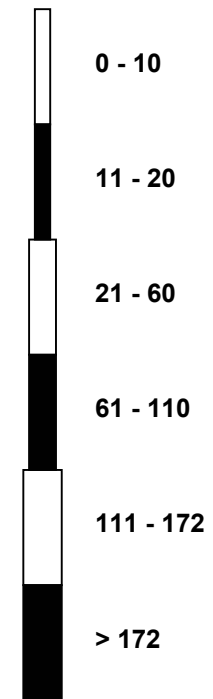
Total Number of Hours: 720

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

**Sulphur Dioxide (SO₂) - ppb
Fort Chipewyan (AMS 8)**



Classes (ppb)

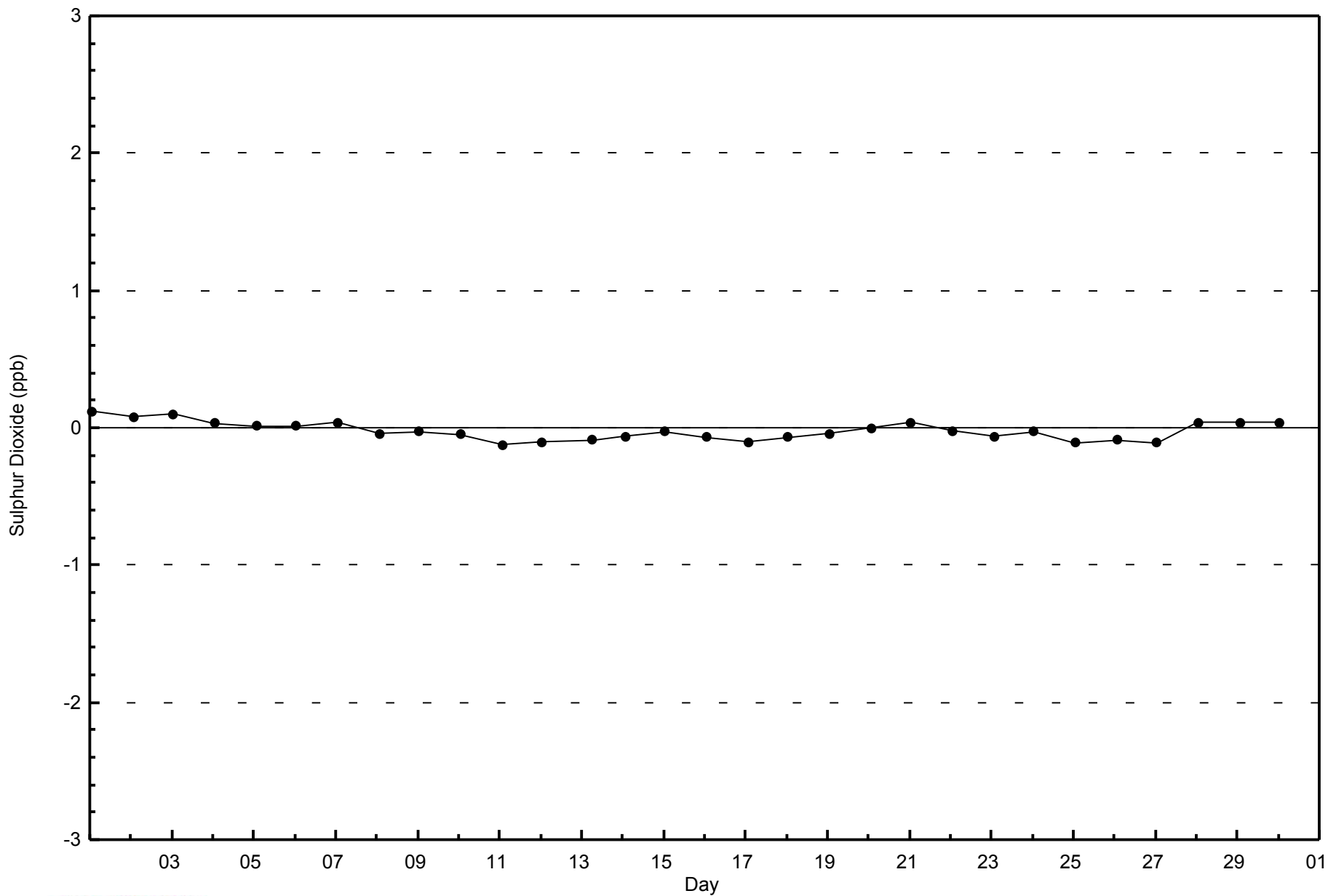


Total Number of Valid Hours: 597



WBEA
Zero Responses

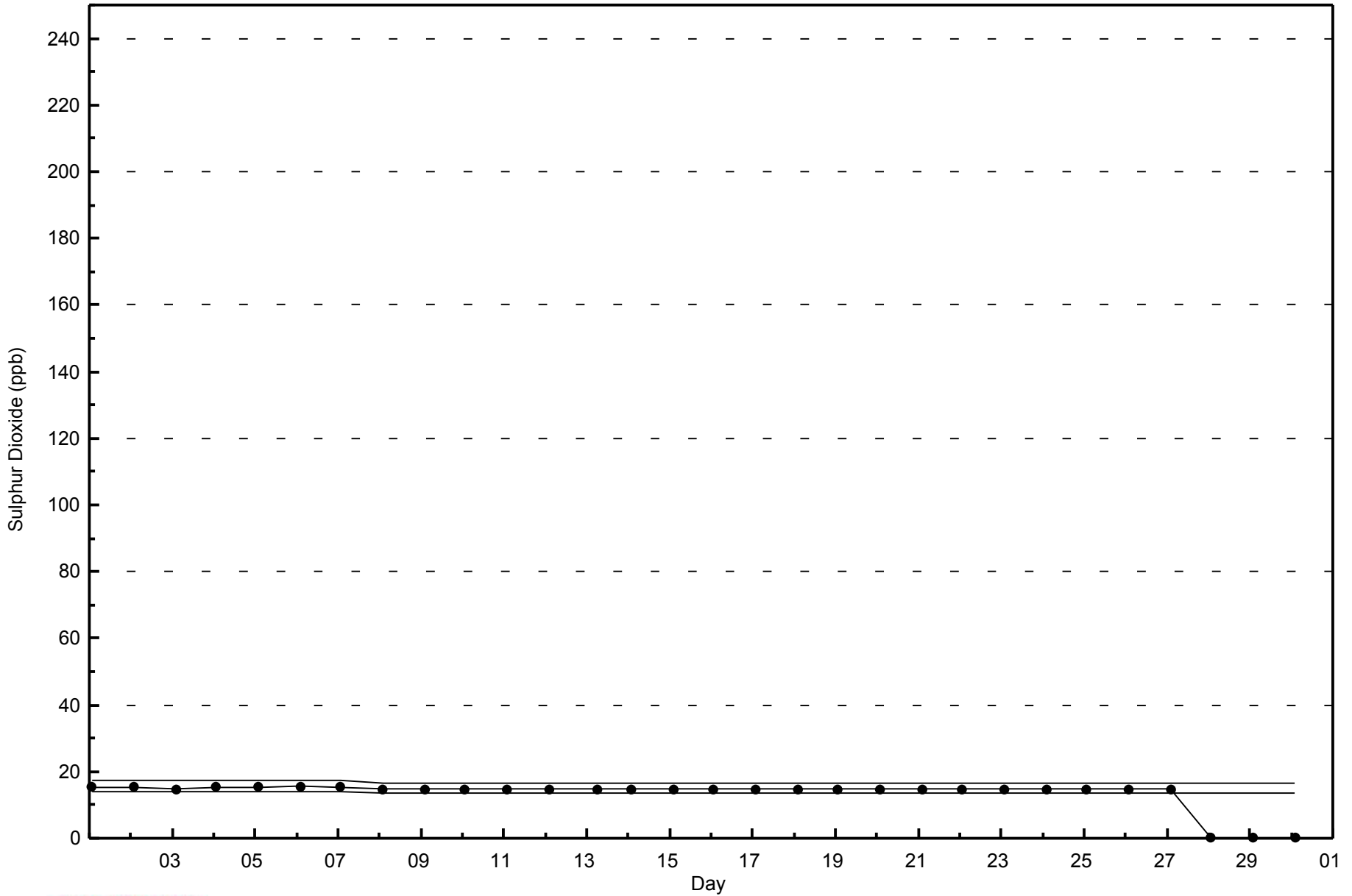
Sulphur Dioxide (SO₂) - ppb
Fort Chipewyan - November 2014





WBEA
Span Responses

Sulphur Dioxide (SO₂) - ppb
Fort Chipewyan - November 2014





Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

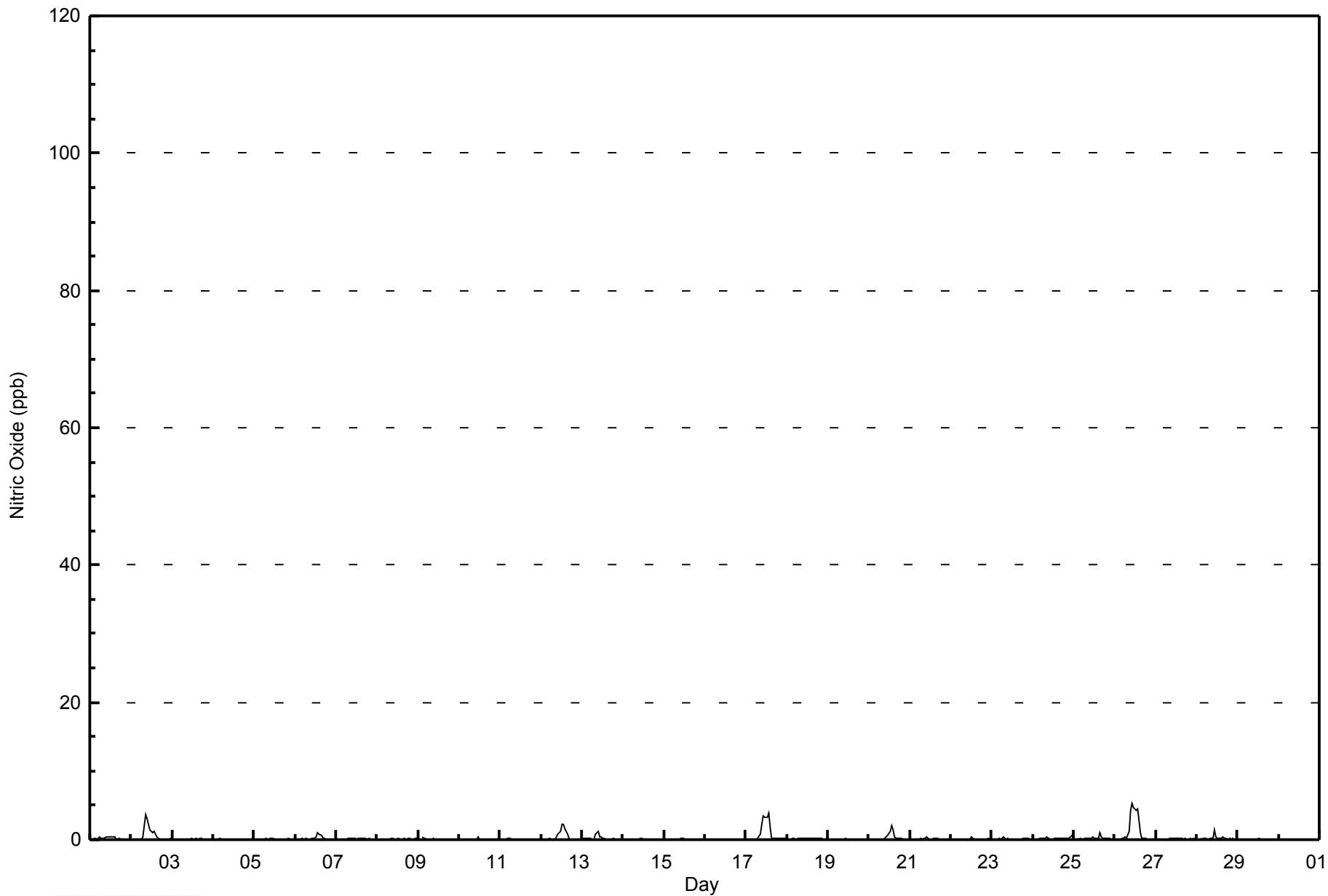
Fort Chipewyan - November 2014

Maximum Value: 5 ppb on Nov 26 11:00														Maximum Daily Average: 1.3 ppb on Nov 26														Hours in Service: 720	
Minimum Value: 0 ppb on Nov 11 21:00														Minimum Daily Average: 0.0 ppb on Nov 30														Hours of Data: 683	
Maximum Diurnal Average: 0.6 ppb at hour 14														Minimum Diurnal Average: 0.1 ppb at hour 1														Hours of Missing Data: 37	
Monthly Average: 0.2 ppb														Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 3														Hours of Calibration: 36	
																												Percent Operational Time: 99.9	
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-Nov	0	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-Nov	0	Z	0	0	0	0	0	1	4	3	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0.7	4			
3-Nov	0	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-Nov	0	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-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	C	C	C	C	C	C	0	0	0	0	0	--	0			
6-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0.2	1			
7-Nov	0	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-Nov	0	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-Nov	0	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-Nov	0	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-Nov	0	Z	0	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-Nov	0	Z	0	0	0	0	0	0	0	0	1	1	2	2	2	1	0	0	0	0	0	0	0	0	0.5	2			
13-Nov	0	0	0	0	0	0	Z	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1			
14-Nov	0	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-Nov	0	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-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0			
17-Nov	0	Z	0	0	0	0	0	0	1	2	3	3	3	4	2	0	0	0	0	0	0	0	0	0	0.9	4			
18-Nov	0	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-Nov	0	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-Nov	0	Z	0	0	0	0	0	0	0	0	1	1	2	1	0	0	0	0	0	0	0	0	0	0	0.3	2			
21-Nov	0	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-Nov	0	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-Nov	0	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-Nov	0	Z	0	0	0	0	0	0	0	0	0	UO	0	0	0	0	0	0	0	0	0	0	1	0	0.2	1			
25-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.2	1			
26-Nov	0	Z	0	0	0	0	0	0	1	4	5	5	4	4	3	1	0	0	0	0	0	0	0	0	1.3	5			
27-Nov	0	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-Nov	0	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1			
29-Nov	0	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-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0			
														0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.3 0.5 0.6 0.5 0.5 0.6 0.4 0.2 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1														Diurnal Average	
														0 0 0 0 0 0 0 0 1 4 4 5 5 4 4 3 1 0 0 0 0 0 0 0 0 0														Diurnal Maximum	
Z - zerospan														C - Calibration						UO - Unstable Operation									



WBEA
Hourly Averages

Nitric Oxide (NO) - ppb
Fort Chipewyan - November 2014





WBEA
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Fort Chipewyan - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	683	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: 683

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitric Oxide (NO) - ppb
Fort Chipewyan - November 2014

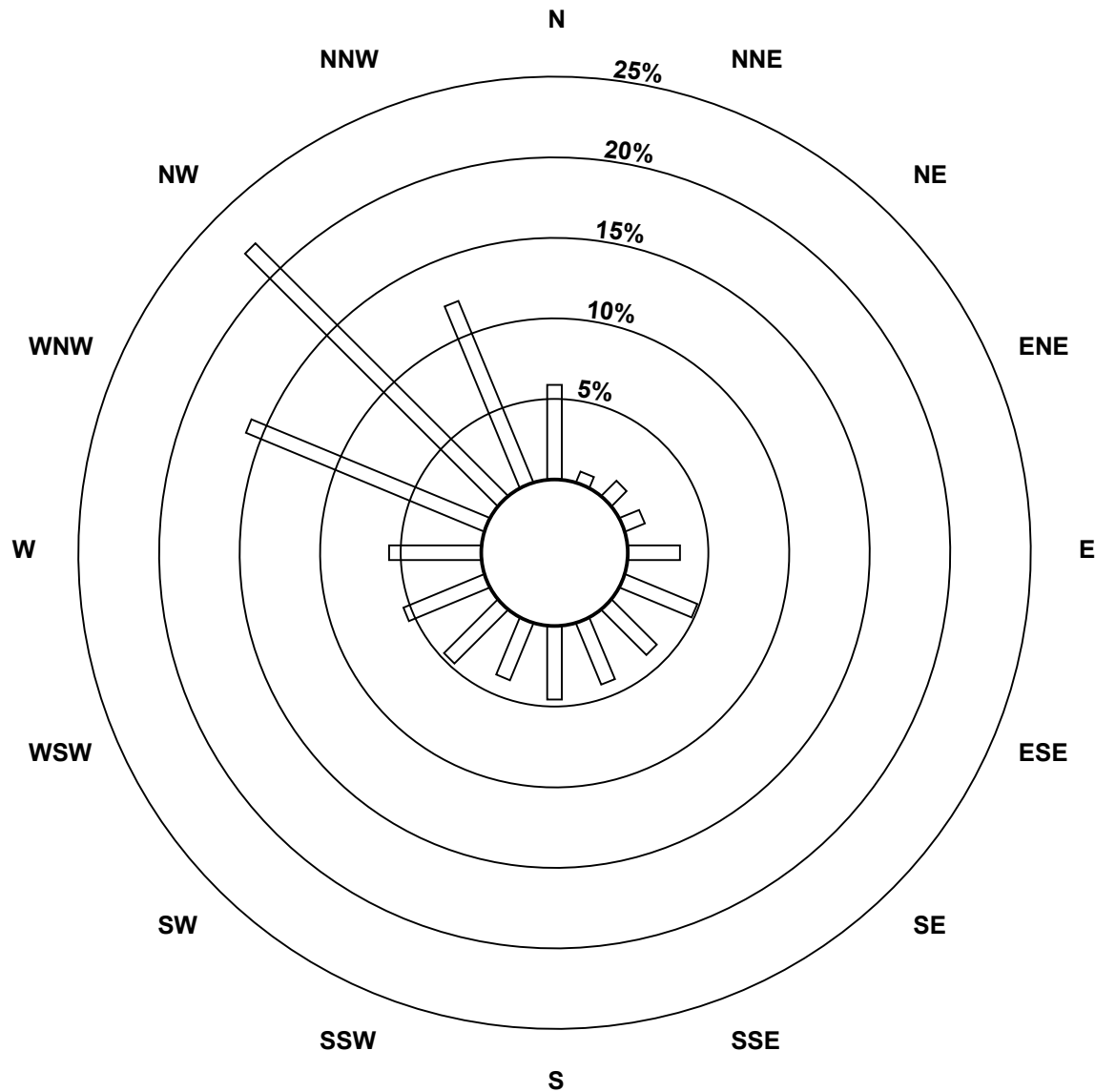
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	40	5	9	9	22	33	27	28	31	26	32	37	39	109	151	83	681
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	40	5	9	9	22	33	27	28	31	26	32	37	39	109	151	83	681

Total Number of Valid Hours: 681

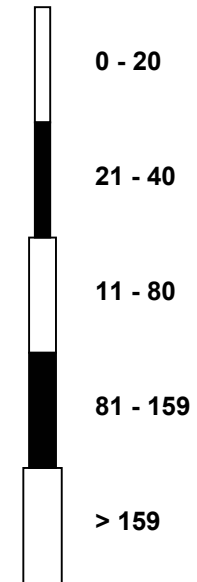
Total Number of Hours: 720

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

**Nitric Oxide (NO) - ppb
Fort Chipewyan (AMS 8)**



Classes (ppb)

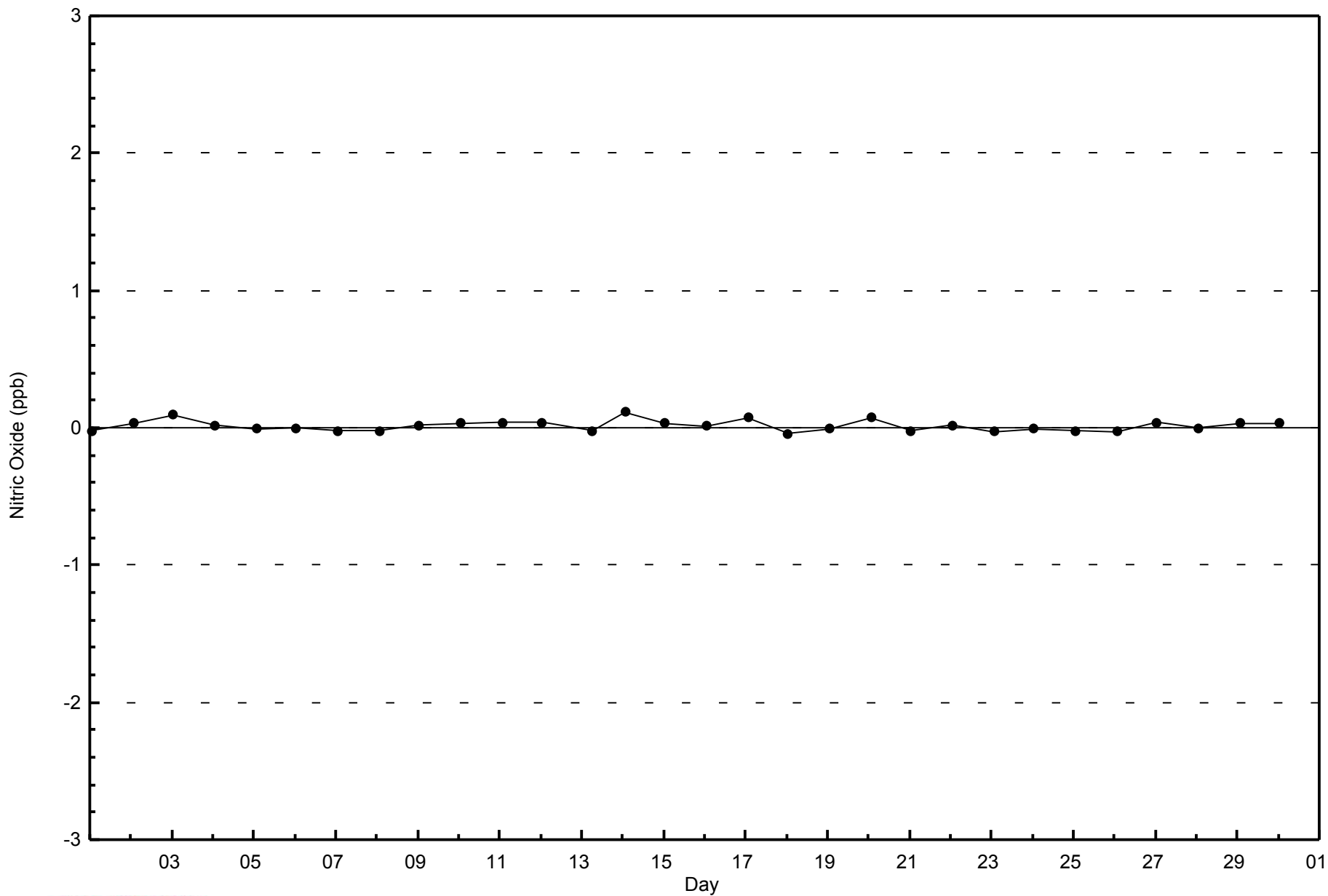


Total Number of Valid Hours: 681



WBEA
Zero Responses

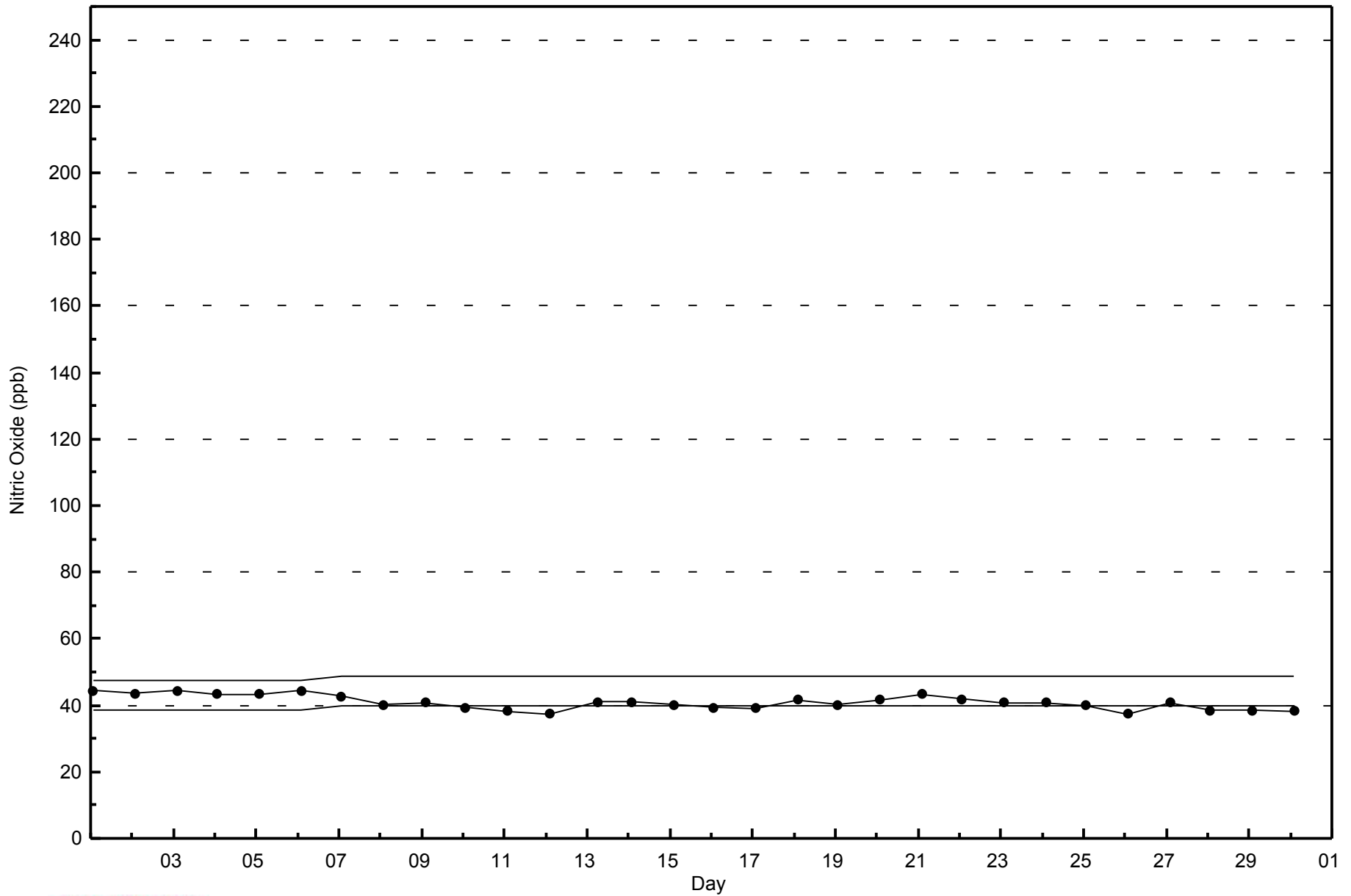
Nitric Oxide (NO) - ppb
Fort Chipewyan - November 2014





WBEA
Span Responses

Nitric Oxide (NO) - ppb
Fort Chipewyan - November 2014





Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 21 ppb on Nov 26 08:00	Maximum Daily Average: 8.3 ppb on Nov 26		Hours of Data:	683
Minimum Value: 0 ppb on Nov 3 21:00	Minimum Daily Average: 0.0 ppb on Nov 16		Hours of Missing Data:	37
Maximum Diurnal Average: 14.6 ppb at hour 2	Minimum Diurnal Average: 0.9 ppb at hour 20		Hours of Calibration:	36
Monthly Average: 1.3 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 4 P ₉₉ = 14		Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	3	Z	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	4	3	2	2	2	2	2	1.3	4
2-Nov	2	Z	2	2	4	8	14	16	14	7	4	3	3	3	3	4	4	4	3	2	2	4	5	5	5.1	16
3-Nov	4	Z	3	4	4	5	3	1	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1.2	5
4-Nov	0	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-Nov	0	Z	0	0	0	0	0	1	0	0	0	0	0	C	C	C	C	C	C	0	0	0	0	0	--	1
6-Nov	0	Z	3	2	1	1	1	1	0	0	0	1	2	4	5	6	6	5	2	1	0	0	0	0	1.8	6
7-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.1	1
8-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0.2	1
9-Nov	1	Z	1	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
10-Nov	0	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-Nov	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
12-Nov	0	Z	0	0	0	0	0	1	1	1	2	2	3	4	4	5	6	7	8	9	11	13	13	12	4.5	13
13-Nov	13	15	15	13	11	10	Z	8	7	4	1	0	0	0	0	0	0	0	1	0	0	0	0	0	4.3	15
14-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.1	1
15-Nov	0	Z	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
16-Nov	0	Z	0	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-Nov	0	Z	0	0	0	0	0	3	12	11	8	6	6	8	6	2	2	2	0	0	0	0	0	0	2.9	12
18-Nov	0	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-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	3	2	0.5	3
20-Nov	1	Z	1	1	1	1	1	1	1	1	2	2	4	7	7	7	4	2	1	1	1	1	1	0	2.0	7
21-Nov	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	0	0	1	1	0	0	0.3	1
22-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0.2	1
23-Nov	0	Z	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
24-Nov	0	Z	0	0	0	0	0	1	1	0	0	UO	0	0	1	1	4	3	1	5	4	5	7	10	2.0	10
25-Nov	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	2	1	1	1	1	3	4	1	0	0.8	4
26-Nov	0	Z	1	4	9	14	16	21	21	15	12	11	11	12	13	12	8	5	3	1	0	0	0	0	8.3	21
27-Nov	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1	0	0	0	0.3	1
28-Nov	0	Z	0	0	0	0	0	0	1	1	1	1	0	1	1	2	1	1	1	0	0	0	0	0	0.5	2
29-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
30-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	2	2	2	2	2	2	0.8	4

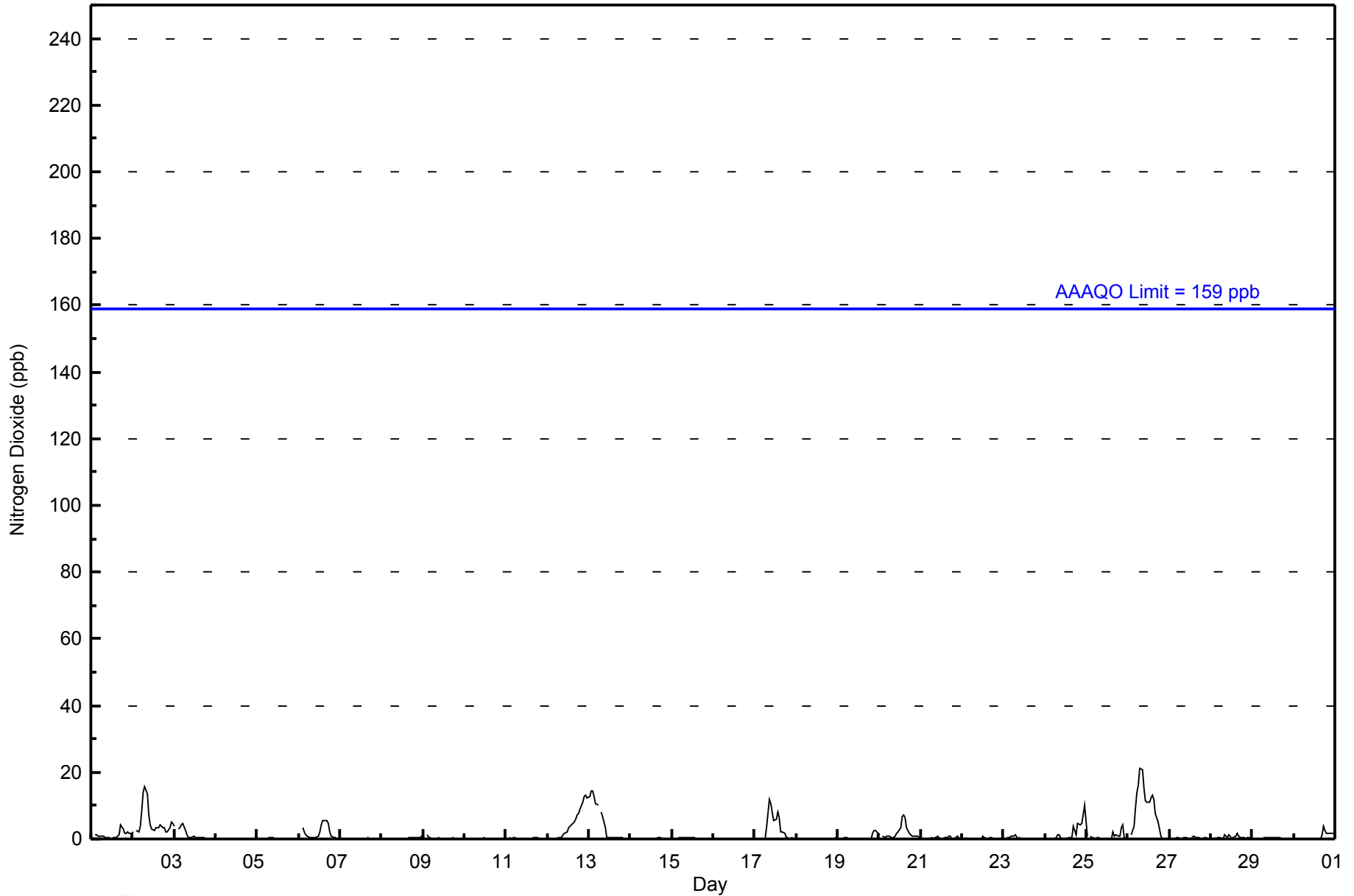
0.9	14.6	1.1	1.0	1.2	1.5	1.3	1.9	2.0	1.5	1.1	1.0	1.1	1.5	1.6	1.5	1.5	1.4	1.0	0.9	1.0	1.2	1.2	1.2	1.2	Diurnal Average	
13	15	15	13	11	14	16	21	21	15	12	11	11	12	13	12	8	7	8	9	11	13	13	12	Diurnal Maximum		

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



WBEA
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Fort Chipewyan - November 2014





WBEA
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Fort Chipewyan - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	681	99.71	99.71
21 - 40	2	0.29	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: 683

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Fort Chipewyan - November 2014

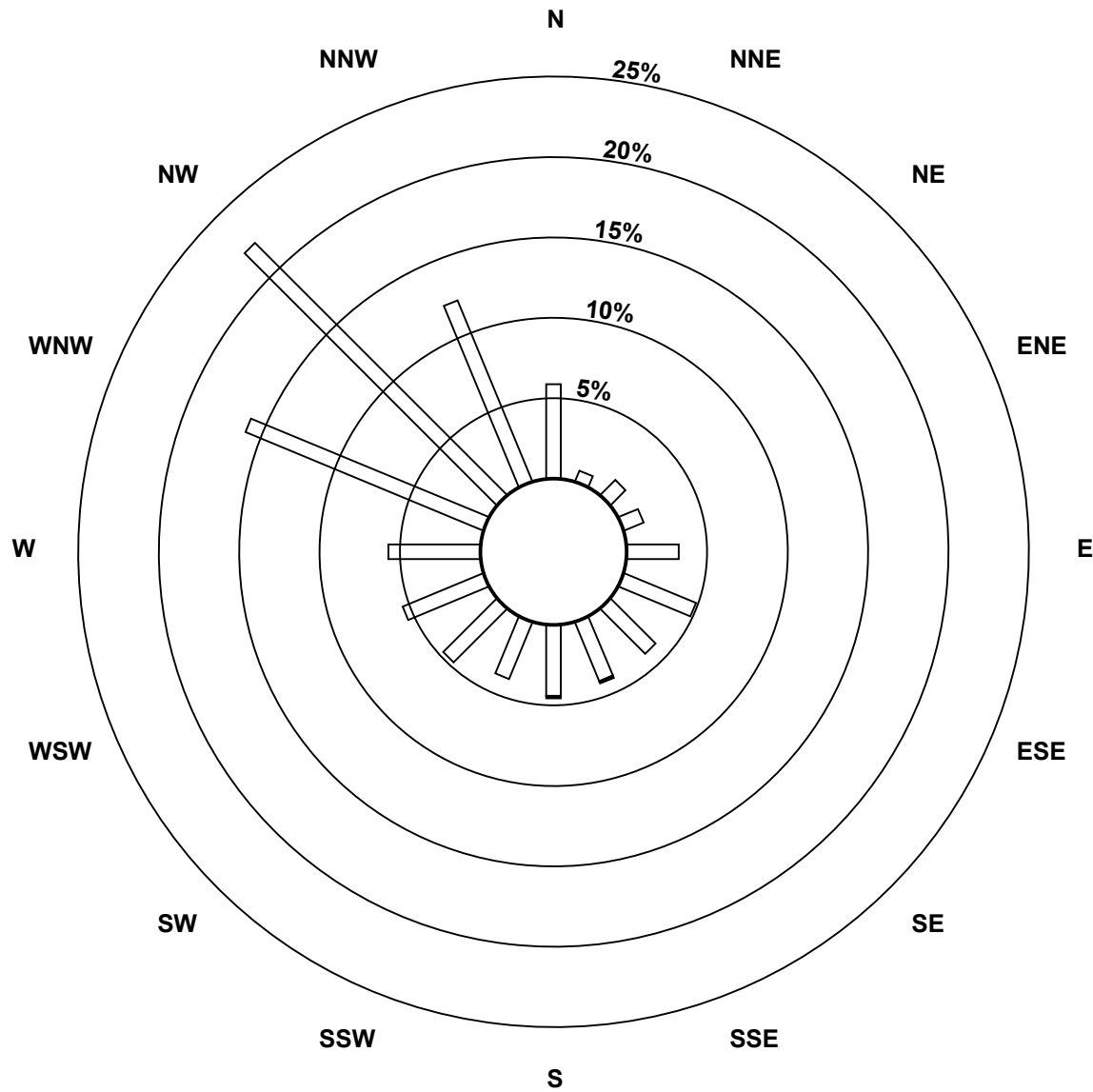
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	40	5	9	9	22	33	27	27	30	26	32	37	39	109	151	83	679
21 - 40	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	2
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	40	5	9	9	22	33	27	28	31	26	32	37	39	109	151	83	681

Total Number of Valid Hours: 681

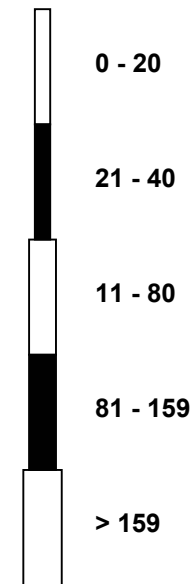
Total Number of Hours: 720

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

**Nitrogen Dioxide (NO₂) - ppb
Fort Chipewyan (AMS 8)**



Classes (ppb)

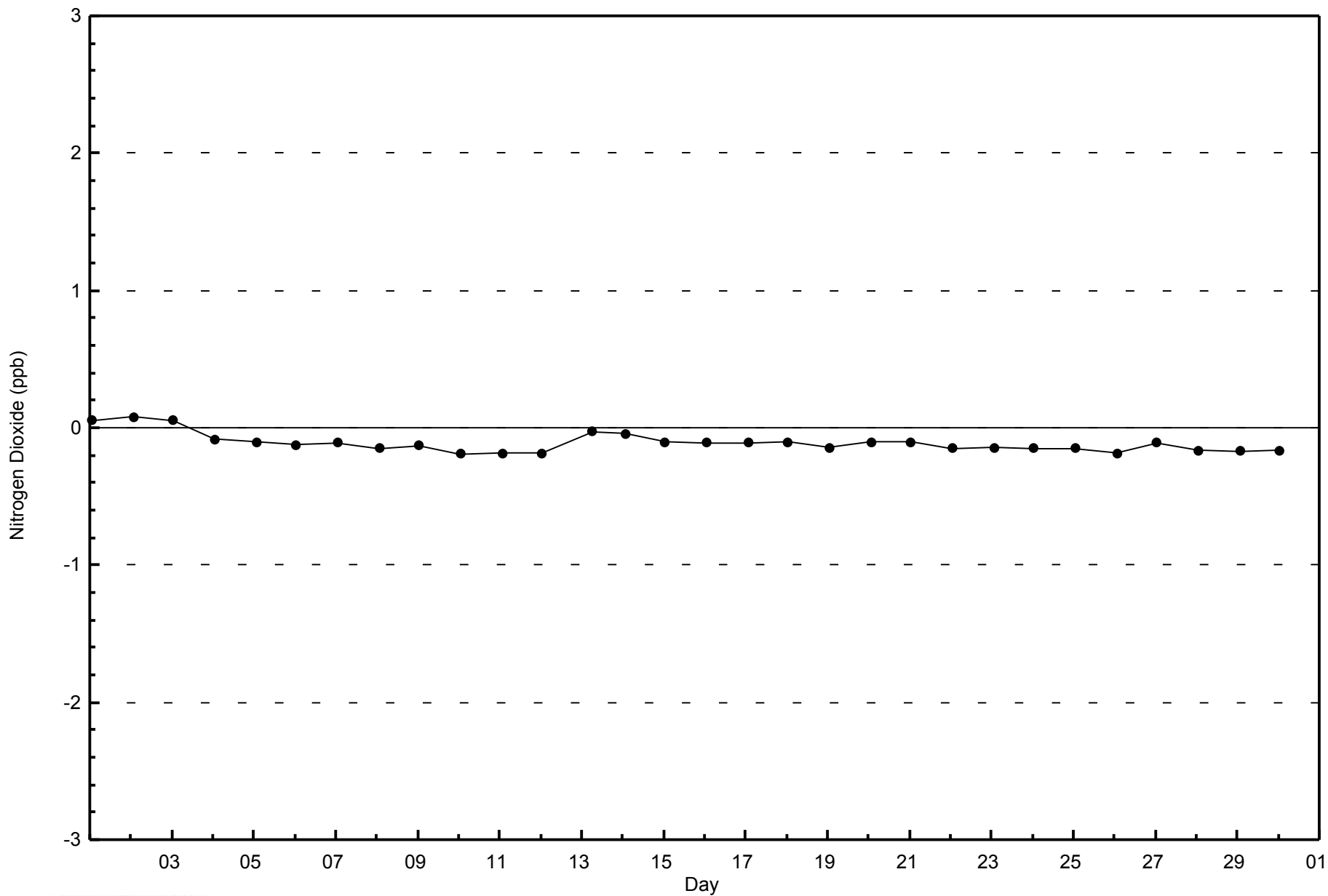


Total Number of Valid Hours: 681



WBEA
Zero Responses

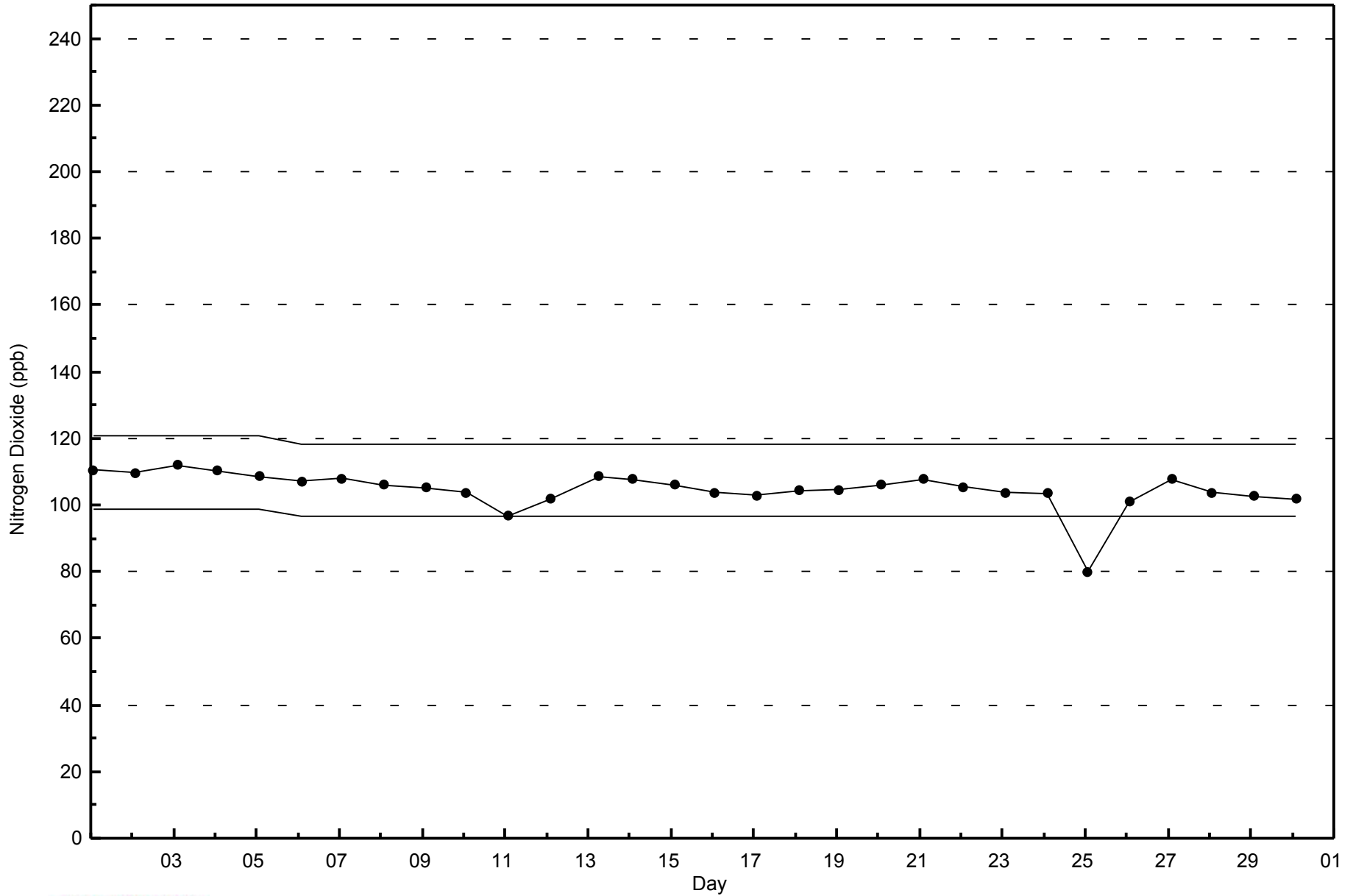
Nitrogen Dioxide (NO₂) - ppb
Fort Chipewyan - November 2014





WBEA
Span Responses

Nitrogen Dioxide (NO₂) - ppb
Fort Chipewyan - November 2014



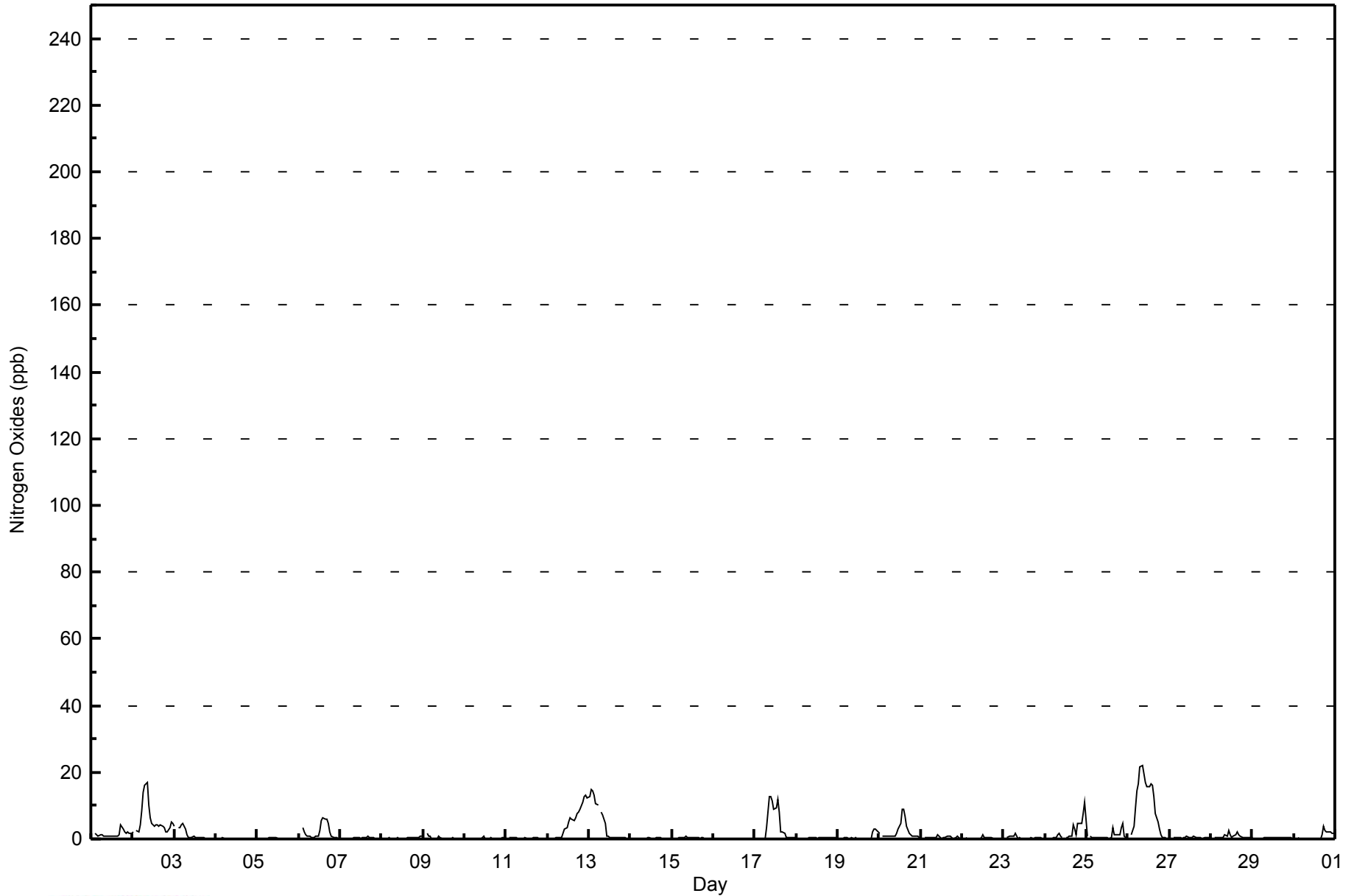


Maximum Value: 22 ppb on Nov 26 09:00										Maximum Daily Average: 9.6 ppb on Nov 26										Hours in Service: 720							
Minimum Value: 0 ppb on Nov 14 07:00										Minimum Daily Average: 0.1 ppb on Nov 4										Hours of Data: 683							
Maximum Diurnal Average: 14.7 ppb at hour 2										Minimum Diurnal Average: 1.0 ppb at hour 20										Hours of Missing Data: 37							
Monthly Average: 1.5 ppb										Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 4 P ₉₉ = 16										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-Nov	3	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4	3	2	2	2	2	2	1.5	4	
2-Nov	2	Z	2	2	4	8	14	16	17	10	7	5	4	4	4	4	4	4	3	2	2	4	5	5	5.8	17	
3-Nov	4	Z	3	4	4	5	3	1	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1.3	5		
4-Nov	0	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-Nov	0	Z	0	0	0	0	0	1	0	0	0	0	0	C	C	C	C	C	C	0	0	0	0	0	--	1	
6-Nov	0	Z	3	2	1	1	1	1	1	0	1	1	3	5	6	6	6	5	2	1	1	1	0	0	2.0	6	
7-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.2	1	
8-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	1	1	0.3	1		
9-Nov	1	Z	2	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2	
10-Nov	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
11-Nov	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.2	1	
12-Nov	0	Z	0	0	0	0	0	1	0	2	3	3	5	6	6	6	6	8	8	9	11	13	13	12	4.9	13	
13-Nov	13	15	15	13	11	10	Z	8	7	5	1	1	0	0	0	1	0	1	0	0	0	0	0	0	4.5	15	
14-Nov	0	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-Nov	0	Z	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
16-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
17-Nov	0	Z	0	0	0	0	0	3	13	13	11	9	9	12	8	2	2	2	1	0	0	0	0	0	3.8	13	
18-Nov	0	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-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	3	2	0.5	3	
20-Nov	2	Z	1	1	1	1	1	1	1	1	2	3	5	9	9	7	4	2	1	1	1	1	1	0	2.3	9	
21-Nov	0	Z	0	0	0	0	0	0	0	1	1	0	0	0	1	1	1	1	0	0	1	1	0	0	0.5	1	
22-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0.2	1	
23-Nov	0	Z	0	1	1	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2	
24-Nov	0	Z	0	0	0	0	0	1	2	1	0	UO	0	0	1	1	4	3	1	5	5	5	8	11	2.2	11	
25-Nov	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	3	1	1	1	1	3	5	1	0	1.0	5	
26-Nov	0	Z	1	4	9	14	17	21	22	20	17	16	15	17	16	13	8	5	3	1	0	0	0	0	9.6	22	
27-Nov	0	Z	0	0	0	0	0	0	1	1	1	0	0	0	1	0	0	1	0	0	1	0	0	0	0.4	1	
28-Nov	0	Z	1	0	0	0	0	0	1	1	3	1	0	1	1	2	1	1	1	1	0	1	0	0	0.8	3	
29-Nov	0	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	
30-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	3	2	2	2	2	2	0.9	4	
		1.0	14.7	1.1	1.1	1.3	1.5	1.4	2.0	2.3	2.0	1.7	1.6	1.6	2.1	2.0	1.7	1.6	1.5	1.1	1.0	1.1	1.3	1.3	1.3	Diurnal Average	
		13	15	15	13	11	14	17	21	22	20	17	16	15	17	16	13	8	8	8	9	11	13	13	12	Diurnal Maximum	
Z - zerspan		C - Calibration					UO - Unstable Operation																				



WBEA
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Fort Chipewyan - November 2014





WBEA
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Fort Chipewyan - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	681	99.71	99.71
21 - 40	2	0.29	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: 683

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Fort Chipewyan - November 2014

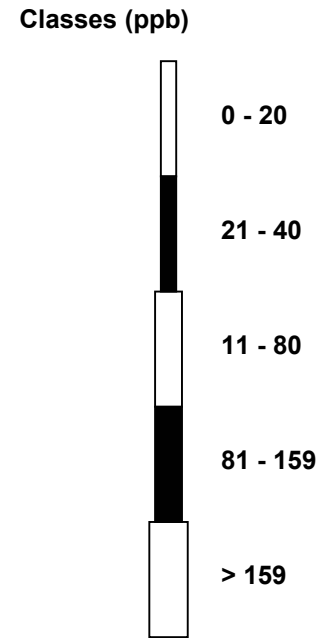
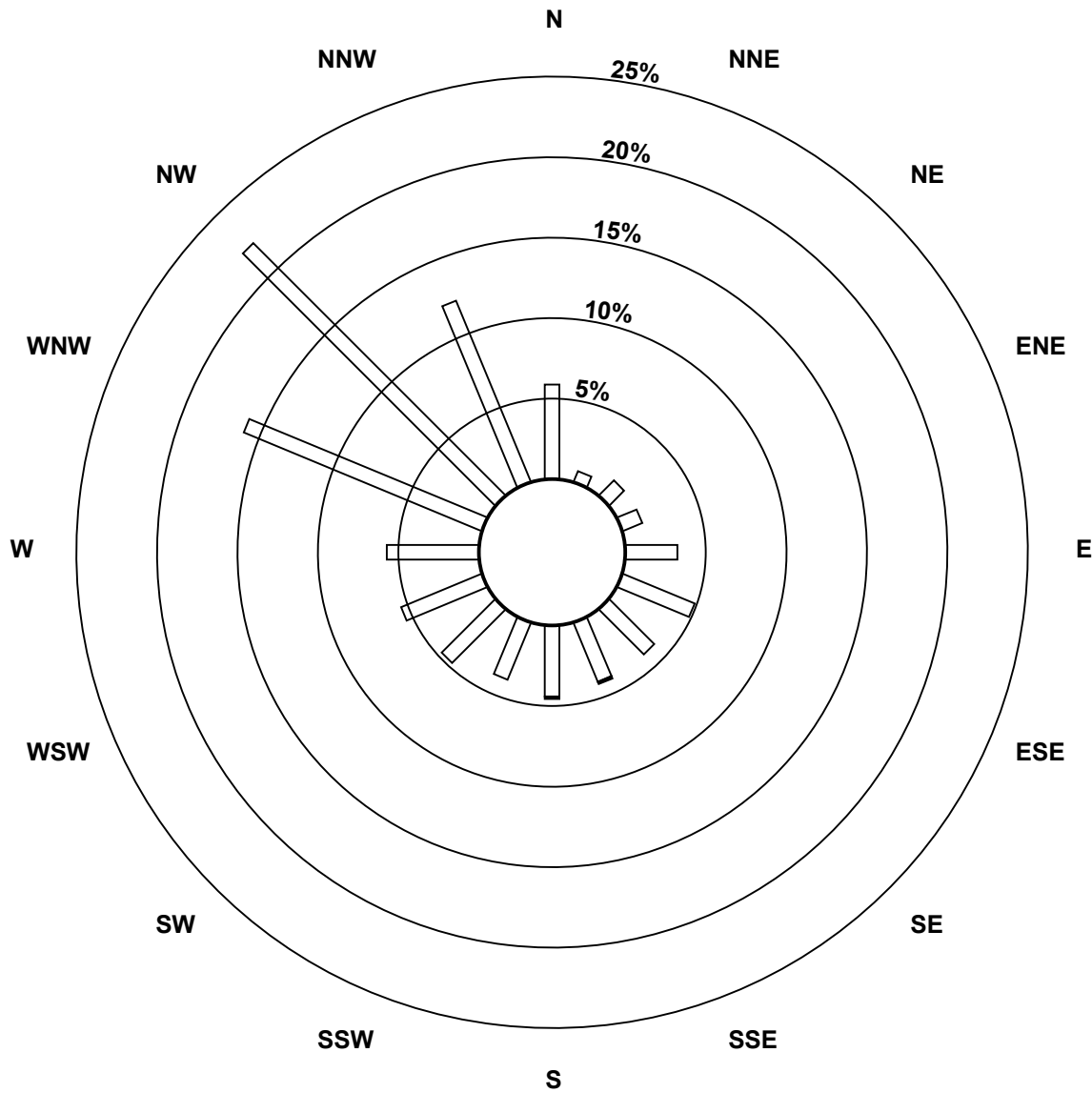
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	40	5	9	9	22	33	27	27	30	26	32	37	39	109	151	83	679
21 - 40	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	2
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	40	5	9	9	22	33	27	28	31	26	32	37	39	109	151	83	681

Total Number of Valid Hours: 681

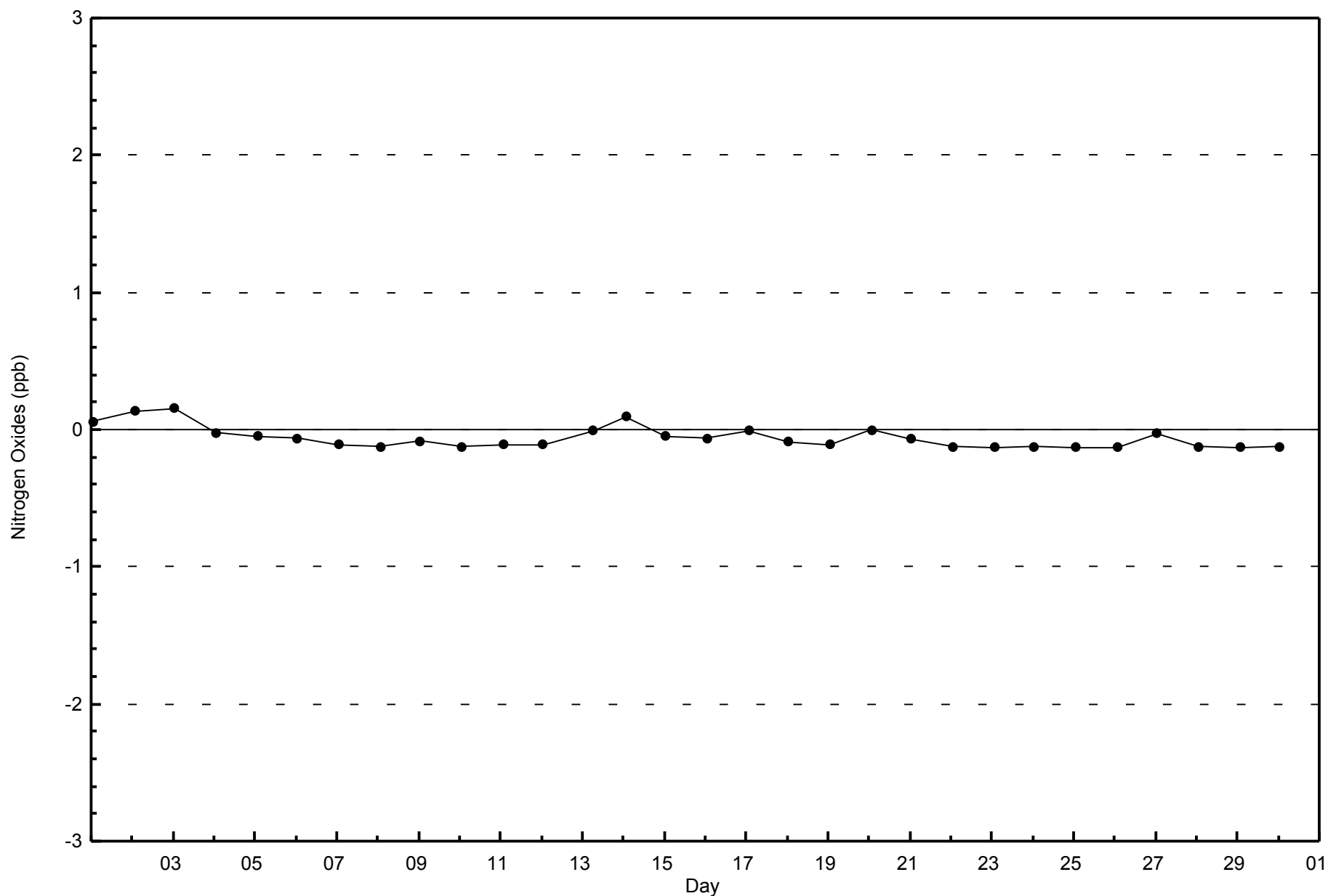
Total Number of Hours: 720

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

**Nitrogen Oxides (NO_x) - ppb
Fort Chipewyan (AMS 8)**



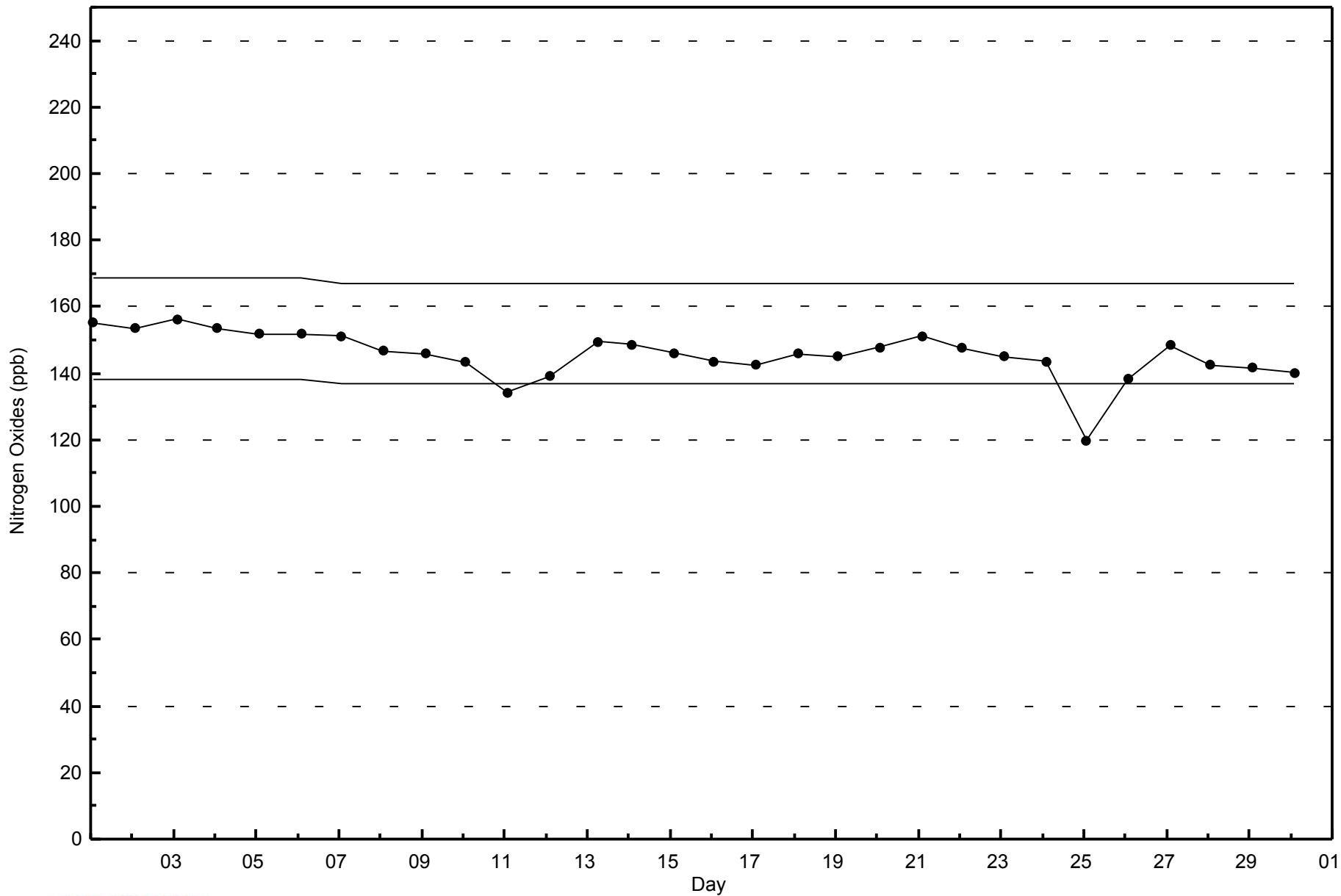
Total Number of Valid Hours: 681





WBEA
Span Responses

Nitrogen Oxides (NO_x) - ppb
Fort Chipewyan - November 2014





Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 37 ppb on Nov 19 13:00	Maximum Daily Average: 35.0 ppb on Nov 16		Hours of Data:	687
Minimum Value: 4 ppb on Nov 2 08:00	Minimum Daily Average: 10.1 ppb on Nov 1		Hours of Missing Data:	33
Maximum Diurnal Average: 27.1 ppb at hour 14	Minimum Diurnal Average: 23.9 ppb at hour 9		Hours of Calibration:	33
Monthly Average: 25.6 ppb	Percentiles: P ₁ = 6 P ₁₀ = 16 Q ₁ = 22 Median = 27 Q ₃ = 30 P ₉₀ = 33 P ₉₉ = 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-Nov	7	8	Z	7	7	6	6	4	5	5	5	7	9	11	13	21	20	13	11	11	14	15	14	13	10.1	21
2-Nov	12	10	Z	15	11	7	4	4	7	14	19	24	28	29	29	28	26	25	25	25	23	19	17	16	18.0	29
3-Nov	15	13	Z	11	9	8	8	14	14	15	16	17	19	20	19	17	17	16	17	18	19	19	17	18	15.4	20
4-Nov	19	20	Z	19	20	19	18	19	20	20	19	19	20	25	27	27	25	25	25	26	27	27	27	27	22.9	27
5-Nov	28	28	Z	28	27	24	22	23	23	23	23	23	23	23	23	23	24	23	C	C	C	19	20	20	23.5	28
6-Nov	19	15	Z	15	15	15	16	17	18	21	21	20	19	16	15	14	13	14	16	22	19	16	15	18	17.0	22
7-Nov	23	27	Z	33	34	35	35	36	36	36	35	34	34	33	33	33	32	32	32	32	32	30	30	31	32.6	36
8-Nov	31	30	Z	29	30	30	30	30	30	30	32	33	33	33	33	34	33	32	32	32	31	30	29	28	31.1	34
9-Nov	28	26	Z	24	23	23	22	23	22	22	24	29	34	36	35	33	33	32	31	31	30	29	30	30	28.2	36
10-Nov	31	31	Z	31	30	30	30	30	30	30	30	30	30	31	31	30	30	30	31	31	31	29	29	29	30.2	31
11-Nov	29	28	Z	28	28	27	29	29	29	29	28	29	31	30	29	29	28	28	28	29	29	30	32	32	29.0	32
12-Nov	33	33	Z	33	32	31	30	29	29	26	25	24	22	21	21	20	17	17	17	14	12	10	9	9	22.3	33
13-Nov	9	7	Z	10	11	10	10	11	12	16	22	24	31	32	32	31	28	26	28	28	27	25	23	24	20.9	32
14-Nov	25	26	Z	28	29	31	31	32	33	33	33	33	32	32	31	30	29	30	30	30	29	29	28	28	30.3	33
15-Nov	28	27	Z	27	28	28	27	27	27	27	27	28	29	29	28	28	31	33	34	35	35	35	35	37	30.0	37
16-Nov	37	37	Z	36	35	35	36	35	34	35	35	35	35	35	34	34	34	34	35	35	35	35	34	34	35.0	37
17-Nov	34	33	Z	31	28	28	28	25	16	18	21	23	22	21	24	27	24	23	25	27	28	28	29	29	25.8	34
18-Nov	29	29	Z	30	31	32	33	31	28	29	30	31	32	32	32	32	33	33	33	32	33	32	32	33	31.4	33
19-Nov	37	36	Z	34	33	34	35	34	34	35	34	35	37	37	36	36	36	34	31	31	29	28	28	29	33.6	37
20-Nov	29	30	Z	30	30	30	31	31	30	29	27	25	23	18	18	19	22	23	22	23	22	21	21	24	25.2	31
21-Nov	24	26	Z	26	27	27	30	30	29	29	29	31	32	33	32	31	29	29	29	28	27	26	25	25	28.5	33
22-Nov	27	27	Z	27	27	26	26	26	26	25	25	25	27	32	33	33	33	30	28	28	27	26	26	27	27.7	33
23-Nov	27	27	Z	26	25	24	23	23	25	24	24	24	24	24	24	24	24	24	24	23	23	24	25	27	24.4	27
24-Nov	28	28	Z	27	27	28	27	24	23	24	25	25	27	27	26	26	22	23	25	22	22	22	17	14	24.4	28
25-Nov	23	23	Z	21	21	20	19	20	19	19	20	20	22	23	22	21	21	19	21	22	19	17	23	24	20.8	24
26-Nov	26	27	Z	23	16	11	10	6	8	13	17	17	17	16	14	15	18	20	22	27	29	29	31	32	19.2	32
27-Nov	31	30	Z	27	26	25	24	25	27	28	28	28	29	27	27	28	26	28	29	29	28	28	26	26	27.3	31
28-Nov	25	25	Z	26	26	26	26	25	24	25	24	25	26	26	26	24	23	23	25	25	24	24	26	27	25.0	27
29-Nov	29	29	Z	27	27	27	28	30	29	28	29	29	30	30	30	31	31	32	32	32	32	31	31	31	29.8	32
30-Nov	31	31	Z	30	30	30	30	30	30	30	30	31	31	31	31	30	28	25	26	27	27	26	26	26	29.0	31

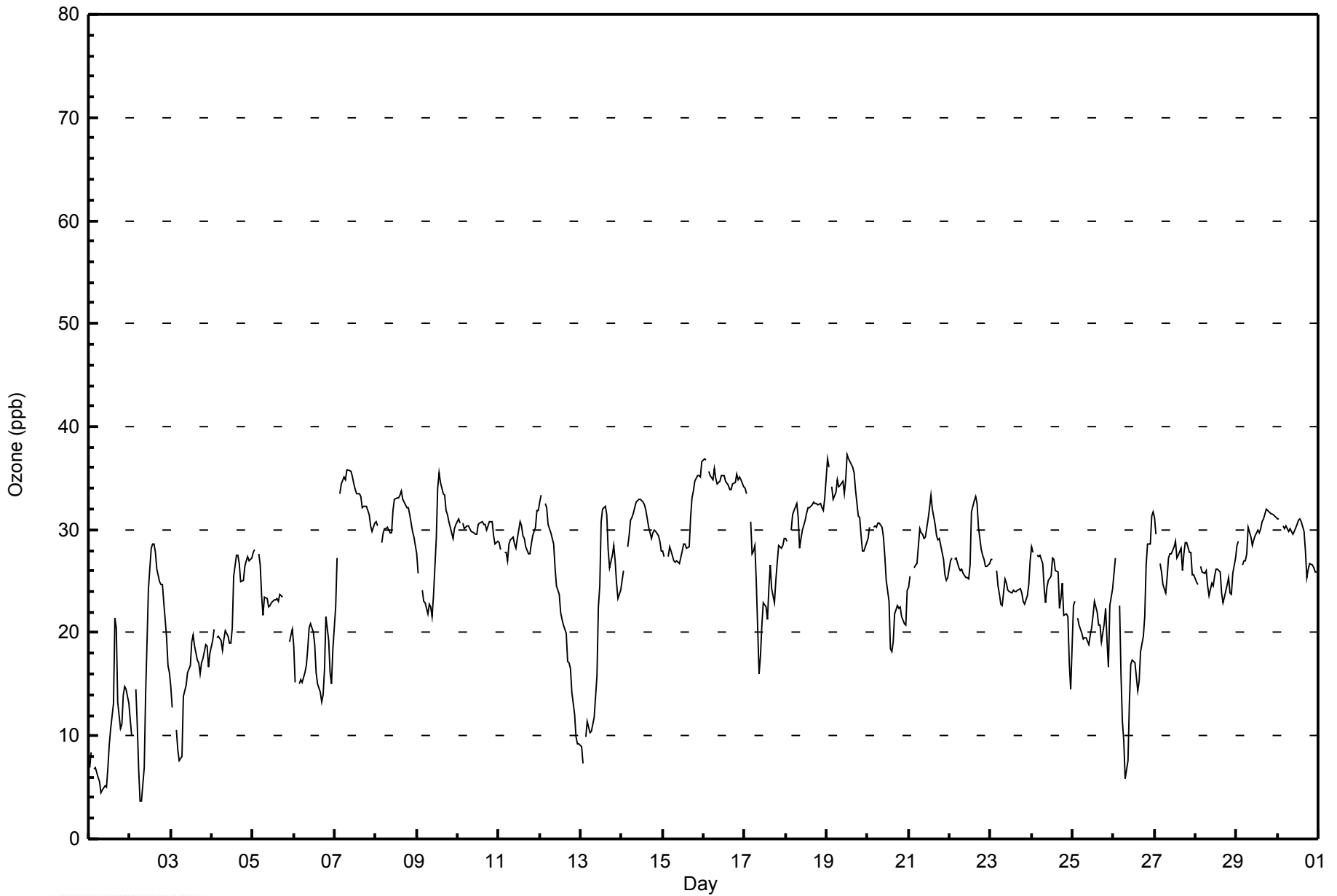
25.7	25.6	--	25.3	24.8	24.2	24.1	24.1	23.9	24.5	25.2	26.0	27.0	27.1	27.1	27.1	26.5	25.9	26.3	26.7	26.3	25.3	25.2	25.7	Diurnal Average	
37	37	--	36	35	35	36	36	36	36	36	35	35	37	37	36	36	36	34	35	35	35	35	37	Diurnal Maximum	

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



WBEA
Hourly Averages

Ozone (O₃) - ppb
Fort Chipewyan - November 2014





WBEA
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Fort Chipewyan - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	142	20.67	20.67
21 - 50	545	79.33	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720



WBEA
Frequency Distribution

Ozone (O₃) - ppb
Fort Chipewyan - November 2014

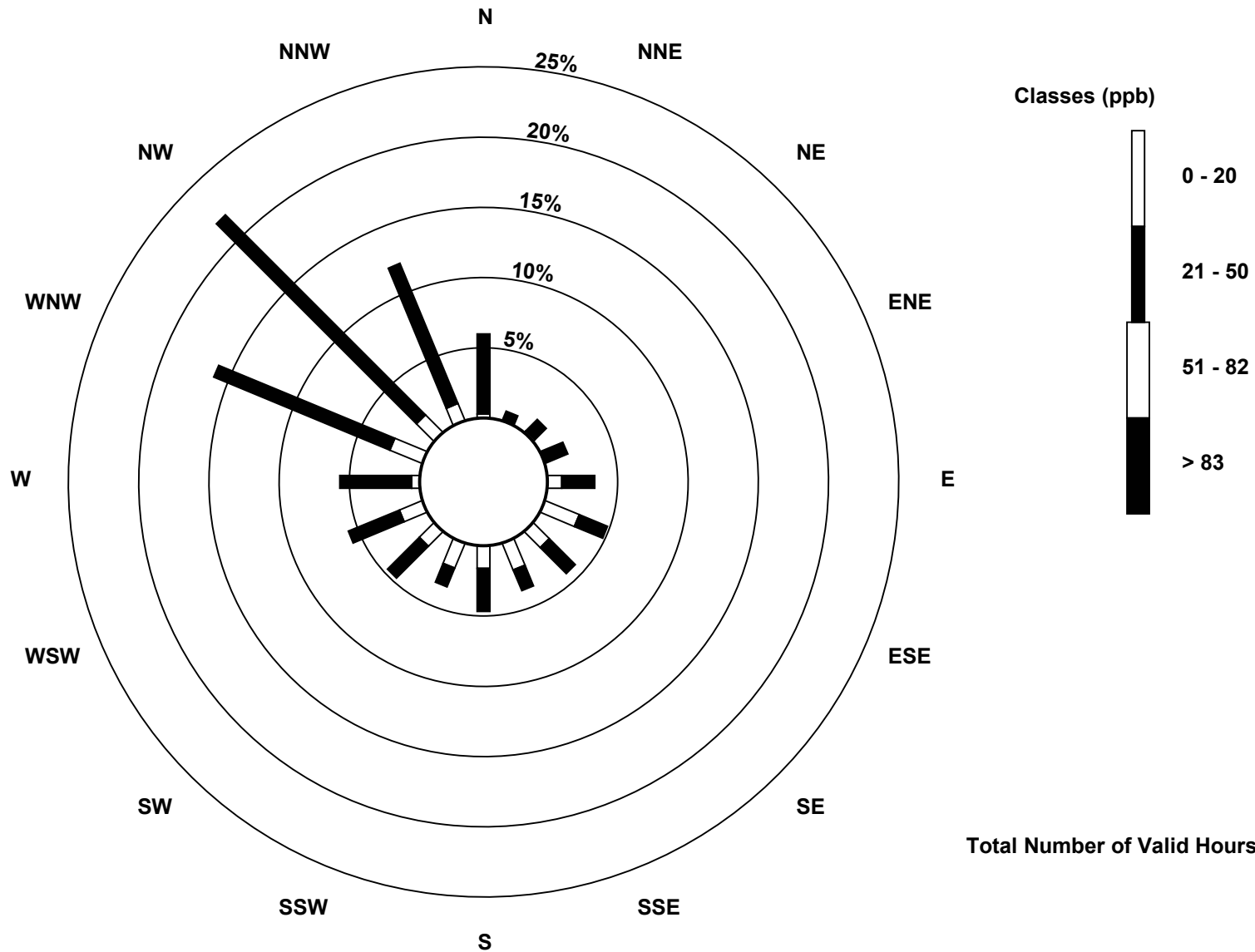
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	2	0	1	0	7	18	11	14	11	13	10	12	4	17	12	9	141
21 - 50	39	5	8	12	16	15	18	11	21	10	22	27	35	93	138	74	544
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	41	5	9	12	23	33	29	25	32	23	32	39	39	110	150	83	685

Total Number of Valid Hours: 685

Total Number of Hours: 720

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

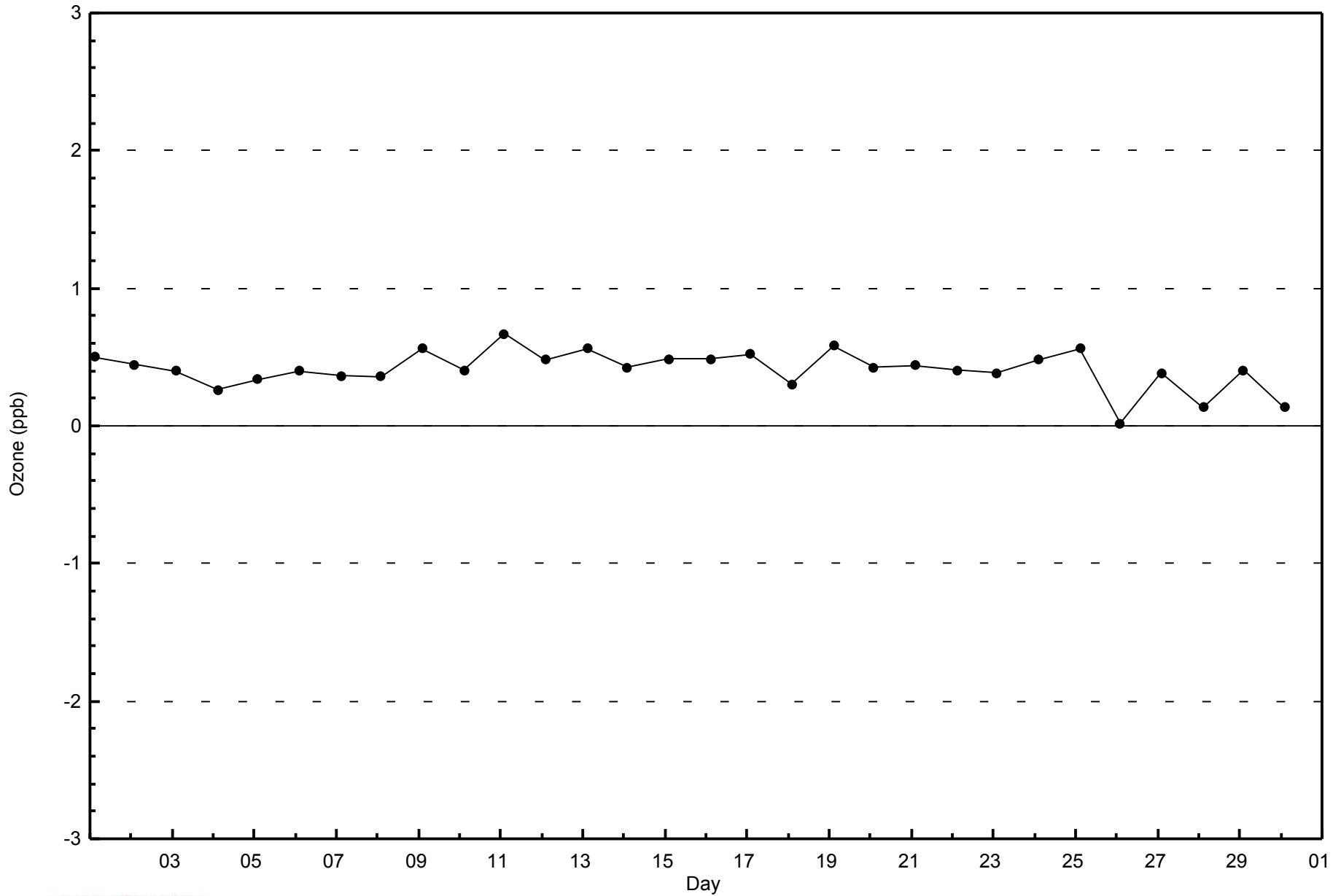
**Ozone (O₃) - ppb
Fort Chipewyan (AMS 8)**





WBEA
Zero Responses

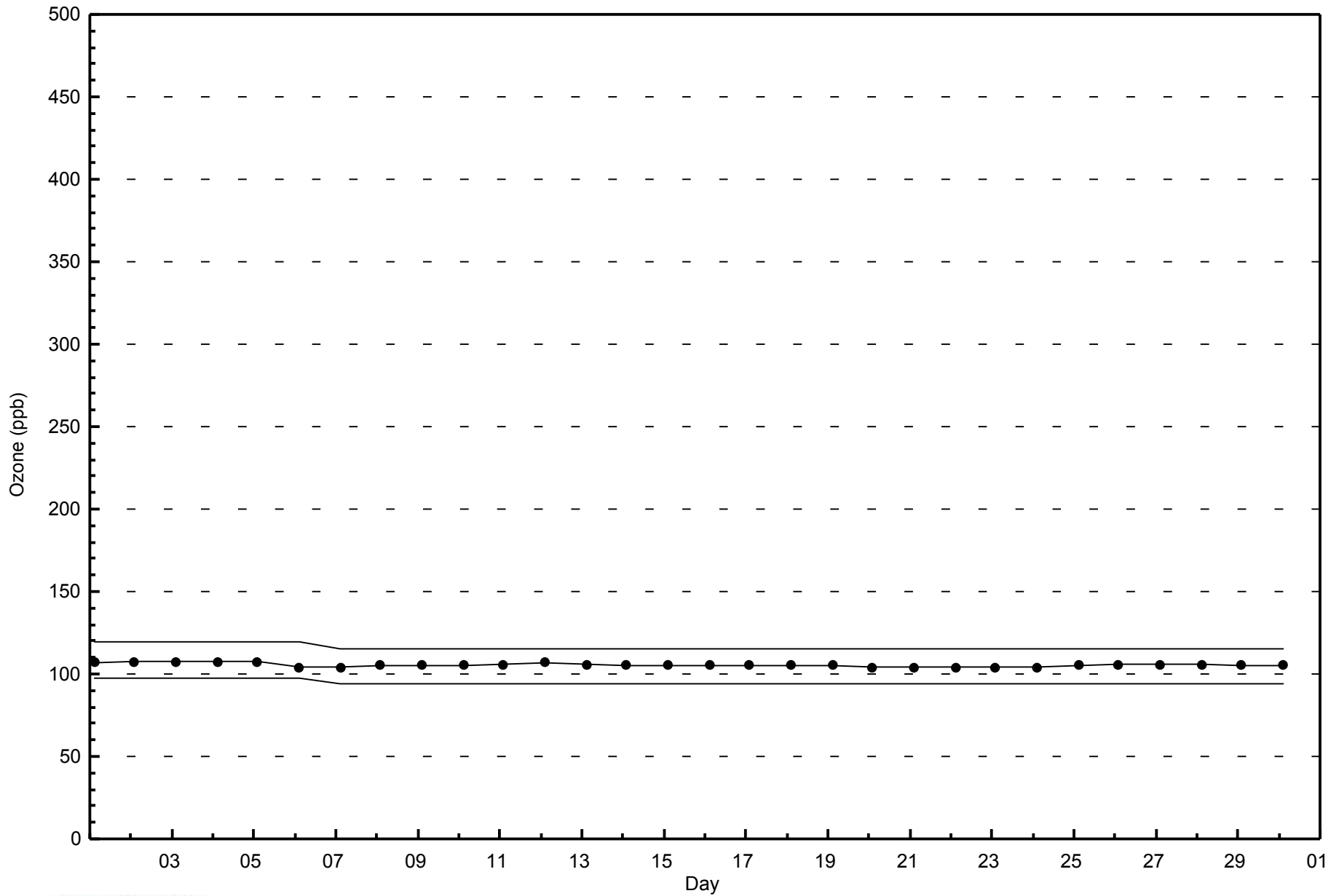
Ozone (O₃) - ppb
Fort Chipewyan - November 2014





WBEA
Span Responses

Ozone (O₃) - ppb
Fort Chipewyan - November 2014



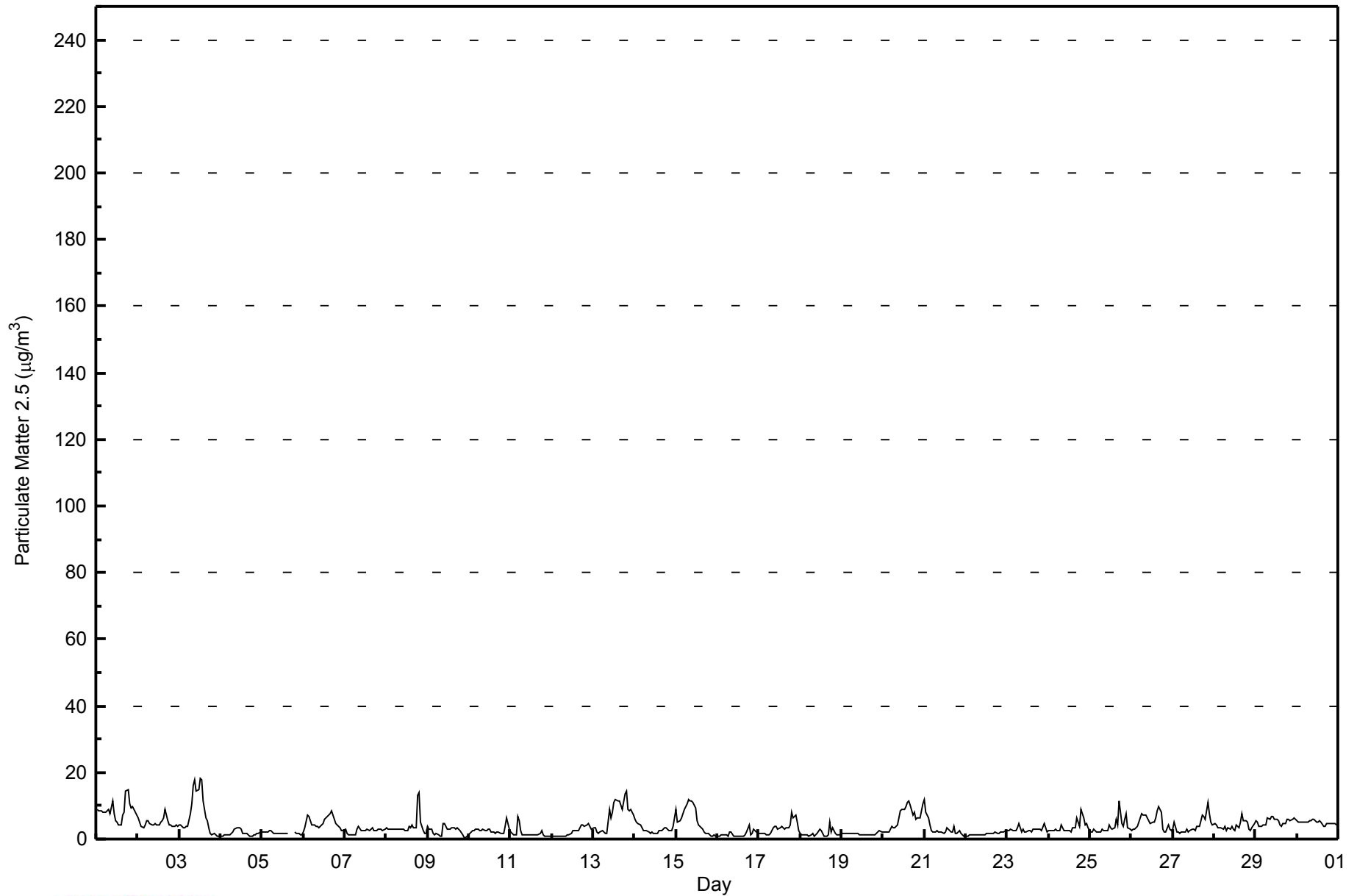


Number of Exceedences (AAAQO): 24-hr: 0		Hours in Service: 720																																														
Maximum Value: 18.3 µg/m ³ on Nov 3 13:00		Maximum Daily Average: 8.5 µg/m ³ on Nov 1																																														
Minimum Value: 0.6 µg/m ³ on Nov 9 22:00		Hours of Data: 717																																														
Maximum Diurnal Average: 4.7 µg/m ³ at hour 18		Hours of Missing Data: 3																																														
Monthly Average: 3.78 µg/m ³		Hours of Calibration: 0																																														
Minimum Daily Average: 1.5 µg/m ³ on Nov 16		Percent Operational Time: 99.6																																														
Minimum Diurnal Average: 2.9 µg/m ³ at hour 4		Percentiles: P ₁ = 0.8 P ₁₀ = 1.2 Q ₁ = 1.8 Median = 2.9 Q ₃ = 4.7 P ₉₀ = 7.7 P ₉₉ = 14.4																																														
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-Nov	8.9	8.5	8.5	8.6	8.2	8.1	8.3	8.7	7.5	11.5	7.8	5.6	4.9	4.3	4.2	7.1	8.3	14.3	14.9	10.6	9.2	9.9	8.8	7.2	8.5	14.9																						
2-Nov	6.4	5.2	3.7	3.3	4.1	5.6	5.5	4.7	4.3	4.0	4.7	4.0	4.3	5.0	5.6	6.3	8.9	5.6	4.2	4.3	4.0	3.9	4.3	3.8	4.8	8.9																						
3-Nov	4.3	4.4	3.5	3.5	3.8	4.0	7.4	10.8	16.1	17.9	14.2	14.7	18.3	17.8	11.3	6.5	5.5	3.3	1.9	1.4	1.6	1.4	1.0	1.0	7.3	18.3																						
4-Nov	0.9	0.9	1.1	1.1	1.2	1.3	1.6	2.2	2.8	3.4	3.5	3.3	2.8	1.7	1.7	1.6	1.2	0.8	0.9	1.2	1.4	1.5	1.5	1.9	1.7	3.5																						
5-Nov	2.0	2.0	2.1	2.1	2.7	2.6	1.9	1.9	1.8	1.9	1.9	1.8	1.8	1.7	1.8	1.8	M	M	M	2.1	1.6	1.5	1.4	1.4	1.9	2.7																						
6-Nov	2.2	3.5	7.1	6.7	5.4	4.4	4.1	3.8	3.9	3.5	4.0	4.6	5.9	6.3	6.9	7.7	8.5	7.3	5.8	4.5	3.8	3.5	2.6	2.6	4.9	8.5																						
7-Nov	2.9	1.8	1.4	1.4	1.2	1.3	1.4	2.8	3.8	2.7	2.5	2.5	2.7	2.8	2.7	3.1	3.2	2.7	2.7	3.1	2.8	2.9	2.7	2.9	2.5	3.8																						
8-Nov	3.5	3.1	3.0	3.0	3.1	2.9	2.8	3.1	3.0	3.0	3.0	2.7	2.6	3.7	3.5	4.3	3.3	3.4	13.2	14.1	5.2	2.6	1.8	1.8	4.0	14.1																						
9-Nov	3.9	3.1	3.0	1.7	1.5	1.6	1.2	0.9	1.0	4.6	4.6	2.9	2.9	2.9	3.4	3.2	3.1	3.3	3.1	2.5	1.2	0.6	0.6	0.8	2.4	4.6																						
10-Nov	1.6	2.3	2.5	2.6	2.8	2.9	2.7	2.5	2.8	2.6	2.7	3.0	3.0	2.2	2.1	1.9	2.0	1.9	1.7	1.6	1.7	3.9	6.3	3.0	2.6	6.3																						
11-Nov	1.9	1.8	1.4	1.4	6.8	5.3	2.5	1.2	1.2	1.3	1.5	1.4	1.4	1.1	1.1	1.1	1.3	1.7	2.5	1.2	1.0	1.0	0.9	0.9	1.8	6.8																						
12-Nov	0.9	0.9	0.9	0.9	0.8	0.9	0.9	0.9	1.0	1.3	1.5	1.6	2.4	2.6	2.5	2.6	3.5	4.2	4.3	4.0	4.3	4.5	3.8	3.1	2.3	4.5																						
13-Nov	3.2	3.2	2.1	1.8	2.0	2.4	2.2	1.6	1.7	8.9	6.4	7.9	10.9	12.1	11.6	11.3	10.0	9.0	13.7	14.5	8.8	8.7	8.7	7.4	7.1	14.5																						
14-Nov	5.9	5.1	4.5	4.1	3.5	2.7	2.6	2.5	2.1	1.9	2.0	1.8	1.7	1.9	2.4	2.7	2.6	3.4	3.2	3.0	2.5	2.4	3.8	6.5	3.1	6.5																						
15-Nov	8.9	5.1	5.7	6.4	7.6	9.1	10.6	12.0	11.6	11.3	11.2	9.2	5.6	4.4	3.8	3.0	2.1	1.5	1.6	1.8	1.0	0.9	1.2	0.8	5.7	12.0																						
16-Nov	0.9	0.8	1.1	1.3	1.4	1.2	1.0	2.0	2.0	0.8	0.8	0.6	0.7	0.6	0.8	1.0	1.2	2.0	4.2	1.4	1.9	2.8	2.4	1.8	1.5	4.2																						
17-Nov	1.8	1.7	1.6	1.7	1.3	1.1	1.2	1.8	3.5	4.0	3.8	2.9	3.4	3.7	3.2	3.0	3.2	3.5	4.3	8.2	6.3	7.0	5.2	2.6	3.3	8.2																						
18-Nov	1.5	1.2	1.4	1.4	1.1	0.9	1.4	1.8	1.0	1.3	1.7	2.9	2.7	1.6	1.0	1.0	1.2	5.1	2.0	3.3	1.6	1.1	1.1	1.4	1.7	5.1																						
19-Nov	1.7	1.6	1.6	1.6	1.6	1.6	1.7	1.5	1.6	1.5	1.5	1.3	1.2	1.4	1.3	1.2	1.1	1.1	1.1	1.2	1.9	2.2	2.4	2.2	1.5	2.4																						
20-Nov	2.2	2.0	2.0	2.2	3.1	3.6	3.4	3.6	4.3	6.3	8.5	8.9	9.0	9.9	11.0	11.4	10.1	7.1	8.2	6.1	6.5	6.4	8.3	10.5	6.4	11.4																						
21-Nov	11.9	8.1	6.5	4.2	2.5	2.0	2.2	2.4	2.2	2.1	1.9	1.6	2.1	3.4	3.0	2.2	2.1	3.6	1.7	1.7	2.4	1.6	1.2	0.9	3.1	11.9																						
22-Nov	1.0	1.0	1.1	1.2	1.2	1.3	1.3	1.3	1.3	1.3	1.4	1.4	1.7	1.8	1.6	1.5	1.8	1.9	1.7	1.8	2.0	2.1	2.2	2.4	1.6	2.4																						
23-Nov	2.5	2.6	2.8	2.7	2.6	2.5	3.2	4.5	2.0	3.1	1.9	2.1	2.4	2.3	2.3	2.8	3.1	3.0	3.1	2.8	2.6	4.8	3.3	2.2	2.8	4.8																						
24-Nov	2.5	2.6	2.6	2.6	2.8	2.7	2.7	4.4	3.5	2.6	2.5	2.6	2.5	2.2	3.3	3.2	6.4	5.1	3.6	8.8	6.3	4.1	4.8	3.6	3.7	8.8																						
25-Nov	2.1	2.1	3.1	2.4	2.3	2.1	2.2	3.0	2.6	2.4	2.5	4.0	3.2	2.9	3.3	6.0	4.2	11.3	4.9	4.0	5.9	7.8	3.4	2.9	3.8	11.3																						
26-Nov	2.7	2.8	3.1	4.0	5.1	6.5	7.5	7.1	7.2	6.2	5.6	4.6	4.9	5.2	6.3	8.6	9.8	8.1	2.8	2.0	1.9	4.1	3.1	2.5	5.1	9.8																						
27-Nov	2.8	4.9	2.3	2.1	1.9	2.0	2.0	2.0	2.9	2.3	2.7	2.9	3.1	2.5	3.7	3.7	5.5	7.1	6.8	5.9	10.9	7.7	4.9	4.4	4.0	10.9																						
28-Nov	4.6	4.2	3.5	3.2	3.2	3.1	3.7	2.7	3.2	3.0	3.6	3.1	2.5	4.2	3.2	5.1	7.6	5.4	5.5	5.1	2.8	2.7	3.6	4.7	3.9	7.6																						
29-Nov	5.7	4.9	3.9	3.7	4.1	4.1	4.1	6.5	6.1	6.8	6.8	5.8	5.8	5.7	4.3	3.9	4.6	4.9	5.9	5.8	5.4	6.0	6.6	6.1	5.3	6.8																						
30-Nov	5.6	5.3	5.0	5.2	4.9	5.0	5.1	5.6	5.6	6.1	5.8	5.1	5.2	5.3	4.9	3.9	3.9	4.5	4.7	4.7	4.6	4.7	4.7	4.4	5.0	6.1																						
																								3.6	3.2	3.1	2.9	3.1	3.2	3.3	3.7	3.8	4.3	4.1	3.9	4.1	4.1	3.9	4.1	4.5	4.7	4.6	4.4	3.8	3.8	3.5	3.3	Diurnal Average
																								11.9	8.5	8.5	8.6	8.2	9.1	10.6	12.0	16.1	17.9	14.2	14.7	18.3	17.8	11.6	11.4	10.1	14.3	14.9	14.5	10.9	9.9	8.8	10.5	Diurnal Maximum
M - Maintenance																																																
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m ³																																																



WBEA
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort Chipewyan - November 2014





WBEA
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort Chipewyan - November 2014

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	540	75.31	75.31
6 - 15	138	19.25	94.56
16 - 25	4	0.56	95.12
26 - 80	0	0.00	95.12
> 81.0	0	0.00	95.12

Total Number of Valid Hours: 717

Total Number of Hours: 720



WBEA
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Fort Chipewyan - November 2014

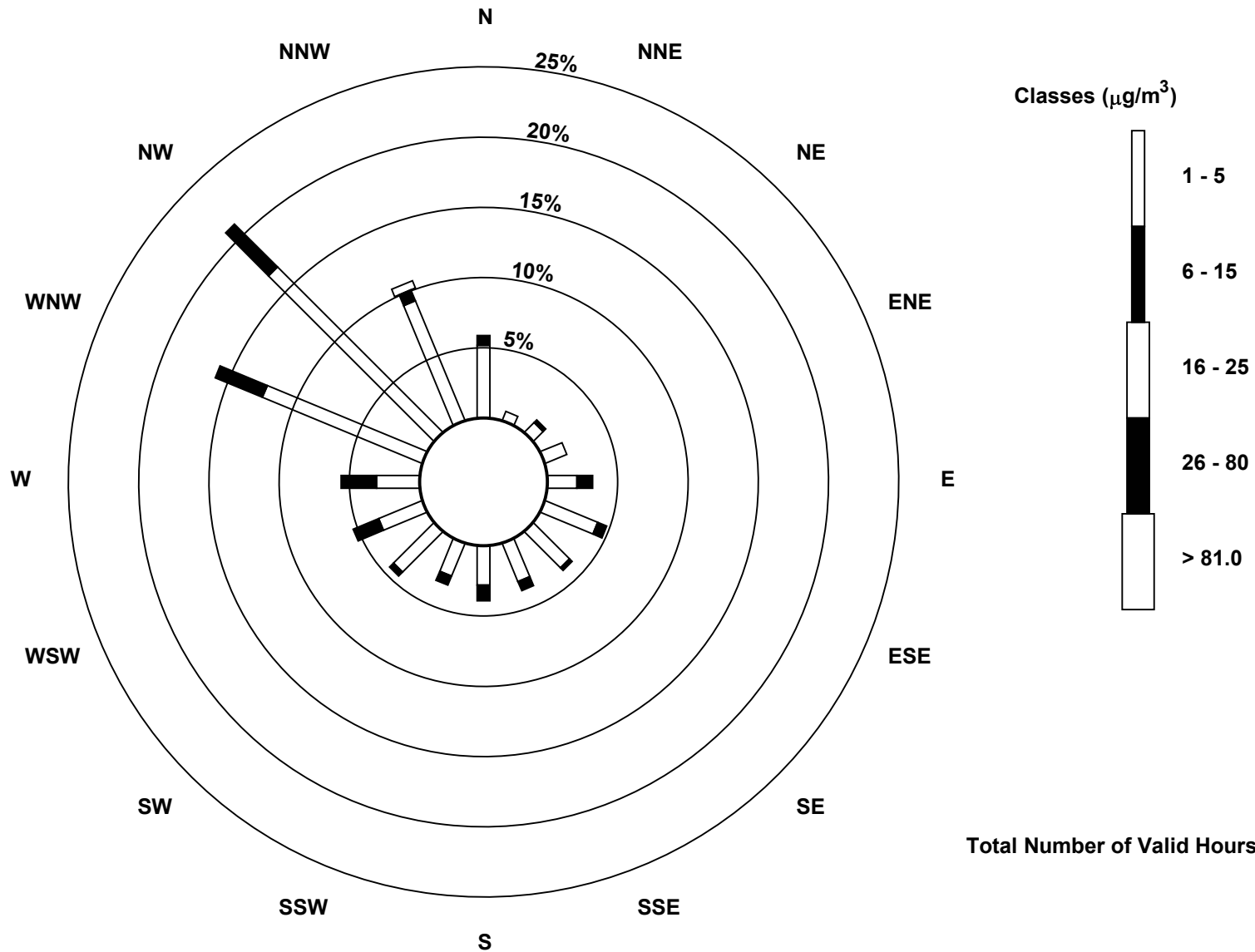
Concentration Ranges (μg/m ³)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	37	5	7	12	15	29	26	21	20	18	29	24	22	88	119	66	538
6 - 15	5	0	2	0	8	5	2	5	8	5	3	14	18	26	31	6	138
16 - 25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	42	5	9	12	23	34	28	26	28	23	32	38	40	114	150	76	680

Total Number of Valid Hours: 715

Total Number of Hours: 720

Wood Buffalo Environmental Association
 Wind Rose Nov 2014

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
 Fort Chipewyan (AMS 8)



Total Number of Valid Hours: 715

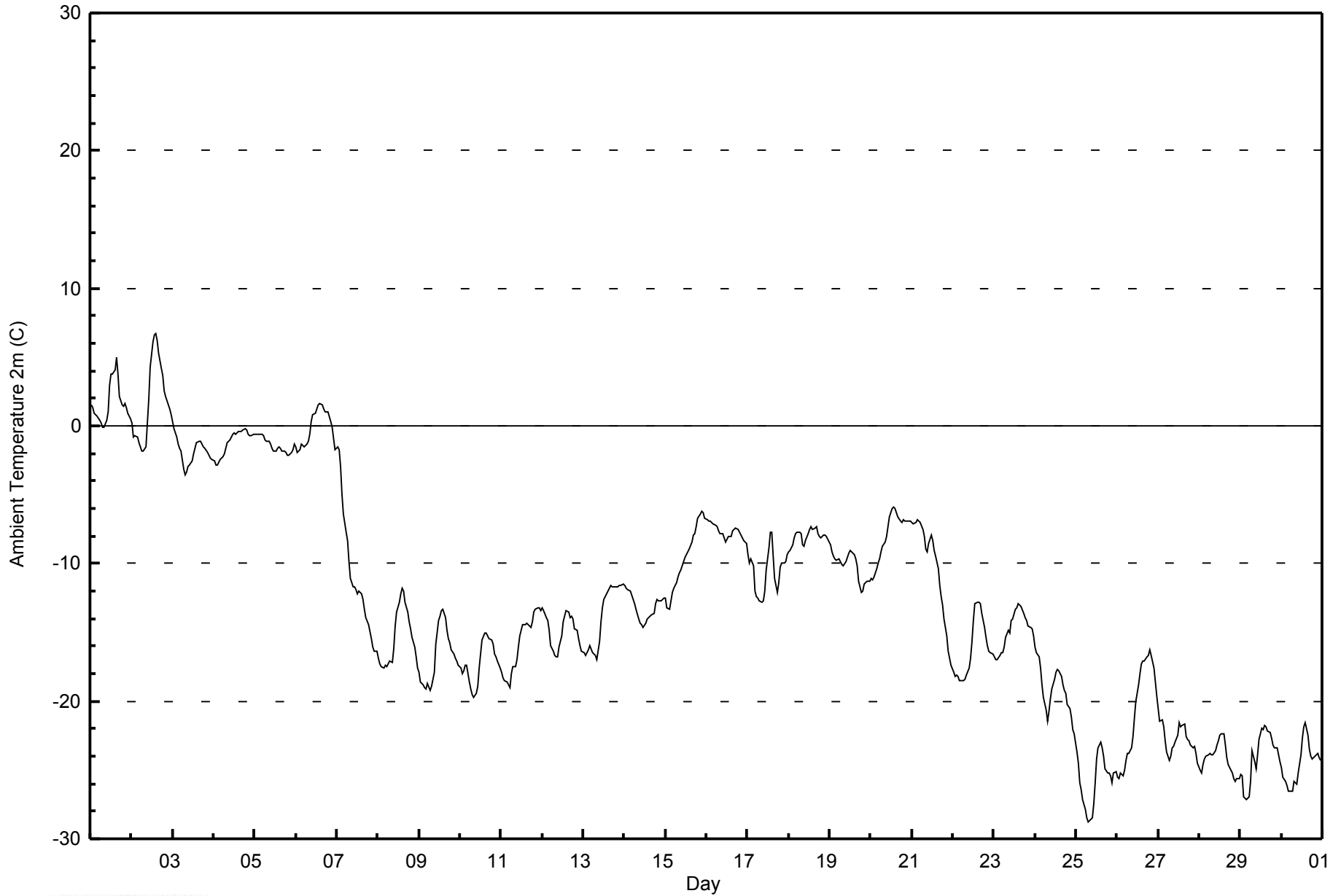


Maximum Value: 6.7 C on Nov 2 15:00		Maximum Daily Average: 1.8 C on Nov 2		Hours in Service: 720																																												
Minimum Value: -28.8 C on Nov 25 08:00		Minimum Daily Average: -25.8 C on Nov 25		Hours of Data: 720																																												
Maximum Diurnal Average: -10.8 C at hour 15		Minimum Diurnal Average: -13.7 C at hour 7		Hours of Missing Data: 0																																												
Monthly Average: -12.52 C		Percentiles: P ₁ = -27.1 P ₁₀ = -23.9 Q ₁ = -18.0 Median = -13.2 Q ₃ = -7.4 P ₉₀ = -0.7 P ₉₉ = 3.8		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-Nov	1.5	1.4	0.9	0.8	0.7	0.4	0.2	-0.1	-0.1	0.4	1.0	2.9	3.8	3.7	4.1	4.9	3.7	2.1	1.5	1.5	1.6	1.3	0.9	0.5	1.7	4.9																						
2-Nov	0.2	-0.8	-0.7	-0.8	-1.2	-1.6	-1.8	-1.9	-1.5	0.2	1.9	4.3	6.1	6.6	6.7	6.2	5.3	4.1	3.7	2.5	2.1	1.6	1.2	0.8	1.8	6.7																						
3-Nov	0.3	-0.2	-0.8	-1.3	-1.7	-1.8	-3.2	-3.6	-3.4	-3.0	-2.8	-2.5	-2.1	-1.6	-1.2	-1.1	-1.1	-1.4	-1.5	-1.6	-1.9	-2.2	-2.3	-2.4	-1.8	0.3																						
4-Nov	-2.6	-2.9	-2.9	-2.6	-2.4	-2.3	-2.0	-1.6	-1.2	-1.0	-0.8	-0.6	-0.5	-0.6	-0.4	-0.4	-0.4	-0.3	-0.2	-0.3	-0.6	-0.7	-0.7	-0.6	-1.2	-0.2																						
5-Nov	-0.6	-0.6	-0.6	-0.6	-0.7	-0.7	-1.1	-1.1	-1.1	-1.3	-1.6	-1.8	-1.8	-1.6	-1.5	-1.6	-1.9	-1.8	-1.9	-2.1	-2.1	-1.9	-1.7	-1.3	-1.4	-0.6																						
6-Nov	-1.5	-1.9	-1.7	-1.3	-1.5	-1.5	-1.3	-1.1	-0.6	0.3	0.8	0.9	1.2	1.6	1.7	1.6	1.2	1.0	1.0	1.1	0.3	-0.1	-0.9	-1.8	-0.1	1.7																						
7-Nov	-1.5	-1.7	-3.0	-5.0	-6.4	-7.8	-8.4	-9.8	-11.1	-11.7	-11.7	-11.9	-12.2	-12.0	-12.2	-12.6	-13.3	-13.9	-14.4	-15.0	-15.5	-16.0	-16.3	-16.4	-10.8	-1.5																						
8-Nov	-16.9	-17.3	-17.4	-17.6	-17.4	-17.5	-17.3	-17.0	-17.2	-16.2	-14.6	-13.6	-12.8	-12.2	-11.8	-12.0	-12.8	-13.5	-14.2	-14.7	-15.4	-16.1	-16.8	-17.6	-15.4	-11.8																						
9-Nov	-17.9	-18.6	-18.8	-19.1	-19.1	-18.8	-19.2	-18.9	-18.4	-17.9	-15.9	-14.1	-13.8	-13.4	-13.4	-13.9	-14.8	-15.4	-15.8	-16.3	-16.6	-16.9	-17.1	-17.4	-16.7	-13.4																						
10-Nov	-17.6	-18.0	-17.8	-17.4	-17.4	-18.6	-19.1	-19.5	-19.8	-19.5	-18.9	-17.6	-16.5	-15.5	-15.1	-15.1	-15.2	-15.5	-15.6	-15.9	-16.6	-16.8	-17.0	-17.6	-17.2	-15.1																						
11-Nov	-17.9	-18.3	-18.5	-18.6	-18.8	-19.0	-18.0	-17.4	-17.5	-17.0	-16.1	-15.2	-14.5	-14.5	-14.4	-14.3	-14.4	-14.6	-14.2	-13.5	-13.3	-13.2	-13.2	-13.4	-15.8	-13.2																						
12-Nov	-13.2	-13.4	-13.9	-14.1	-14.9	-16.0	-16.4	-16.6	-16.8	-16.7	-16.0	-15.3	-14.3	-13.8	-13.4	-13.6	-13.9	-13.8	-14.0	-14.8	-14.9	-15.5	-15.9	-16.4	-14.9	-13.2																						
13-Nov	-16.4	-16.6	-16.5	-16.3	-16.0	-16.5	-16.6	-16.7	-16.9	-15.7	-14.2	-13.2	-12.6	-12.4	-12.0	-11.8	-11.6	-11.7	-11.7	-11.7	-11.7	-11.6	-11.5	-11.5	-13.9	-11.5																						
14-Nov	-11.6	-11.8	-11.9	-12.0	-12.3	-12.6	-13.0	-13.3	-14.0	-14.3	-14.5	-14.6	-14.3	-14.0	-14.0	-13.8	-13.7	-13.6	-12.9	-12.6	-12.7	-12.7	-12.7	-12.5	-13.1	-11.6																						
15-Nov	-12.5	-13.3	-13.3	-12.7	-12.1	-11.8	-11.4	-11.0	-10.6	-10.5	-10.2	-9.5	-9.3	-9.2	-8.9	-8.5	-7.9	-7.8	-7.4	-6.7	-6.4	-6.2	-6.4	-6.7	-9.6	-6.2																						
16-Nov	-6.8	-7.0	-7.0	-7.0	-7.1	-7.3	-7.4	-7.7	-7.8	-7.9	-8.2	-8.4	-8.3	-8.0	-8.0	-7.7	-7.5	-7.4	-7.5	-7.7	-7.9	-8.1	-8.4	-8.6	-7.7	-6.8																						
17-Nov	-9.4	-9.9	-9.7	-10.2	-12.0	-12.4	-12.5	-12.7	-12.9	-12.7	-12.0	-10.5	-8.9	-7.7	-7.7	-9.5	-11.1	-12.1	-11.4	-10.3	-9.9	-10.0	-9.9	-9.4	-10.6	-7.7																						
18-Nov	-9.2	-9.0	-8.6	-8.1	-7.9	-7.7	-7.8	-7.8	-8.6	-8.7	-8.3	-7.9	-7.5	-7.4	-7.5	-7.4	-7.4	-7.8	-8.0	-8.1	-8.0	-7.9	-8.1	-8.2	-8.0	-7.4																						
19-Nov	-8.7	-9.2	-9.5	-9.7	-9.8	-9.7	-9.9	-10.1	-10.1	-9.8	-9.5	-9.3	-9.1	-9.1	-9.3	-9.6	-10.1	-11.3	-12.1	-12.0	-11.5	-11.4	-11.3	-11.3	-10.1	-8.7																						
20-Nov	-11.1	-11.2	-11.0	-10.4	-10.0	-9.6	-9.1	-8.8	-8.4	-8.0	-7.3	-6.6	-6.0	-5.9	-6.0	-6.3	-6.6	-6.9	-7.0	-6.9	-6.9	-6.9	-6.9	-6.9	-7.9	-5.9																						
21-Nov	-7.0	-7.1	-7.0	-6.8	-6.9	-7.0	-7.5	-8.0	-9.0	-9.1	-8.5	-7.9	-8.3	-9.1	-9.5	-10.4	-11.6	-12.4	-13.0	-14.1	-15.3	-16.4	-16.9	-17.4	-10.3	-6.8																						
22-Nov	-17.9	-18.2	-18.1	-18.2	-18.5	-18.5	-18.4	-18.1	-17.6	-16.9	-15.7	-14.1	-13.0	-12.8	-12.8	-12.9	-13.6	-14.6	-15.4	-16.0	-16.3	-16.5	-16.6	-16.6	-16.2	-12.8																						
23-Nov	-16.7	-16.9	-17.0	-16.7	-16.5	-16.5	-16.1	-15.3	-14.9	-15.0	-14.2	-14.0	-13.4	-13.2	-12.9	-13.0	-13.1	-13.6	-14.0	-14.1	-14.5	-14.7	-14.7	-15.2	-14.8	-12.9																						
24-Nov	-16.0	-16.5	-16.8	-17.5	-18.8	-19.8	-20.6	-21.4	-20.7	-19.8	-19.1	-18.4	-17.9	-17.7	-17.8	-18.2	-18.9	-19.2	-19.4	-20.3	-20.5	-21.1	-22.0	-22.4	-19.2	-16.0																						
25-Nov	-23.7	-24.5	-25.9	-26.4	-27.2	-27.9	-28.5	-28.8	-28.7	-28.5	-27.5	-25.9	-24.2	-23.4	-23.0	-23.4	-24.0	-24.9	-25.3	-25.2	-25.4	-25.9	-25.2	-25.1	-25.8	-23.0																						
26-Nov	-25.5	-25.6	-25.3	-25.5	-25.0	-24.3	-23.8	-23.8	-23.4	-22.6	-21.2	-20.0	-18.8	-18.0	-17.3	-17.1	-17.1	-16.8	-16.7	-16.2	-16.7	-17.6	-18.6	-19.7	-20.7	-16.2																						
27-Nov	-20.6	-21.4	-21.4	-21.9	-22.8	-23.6	-24.3	-24.0	-23.4	-23.3	-23.0	-22.4	-21.6	-21.9	-21.7	-21.7	-22.5	-22.8	-22.9	-23.2	-23.4	-23.3	-23.8	-24.5	-22.7	-20.6																						
28-Nov	-25.0	-25.2	-24.6	-24.2	-24.0	-23.9	-23.8	-23.9	-23.8	-23.6	-23.2	-22.8	-22.5	-22.4	-22.4	-23.1	-24.1	-24.6	-25.0	-25.2	-25.7	-25.8	-25.6	-25.6	-24.2	-22.4																						
29-Nov	-25.4	-25.4	-26.9	-27.1	-27.1	-27.0	-25.9	-23.6	-24.4	-24.9	-23.9	-22.8	-22.0	-22.1	-21.8	-21.8	-22.2	-22.3	-22.6	-23.1	-23.4	-23.4	-23.9	-24.4	-24.1	-21.8																						
30-Nov	-24.8	-25.5	-25.9	-26.2	-26.5	-26.5	-25.9	-25.9	-26.1	-25.3	-23.9	-22.7	-21.8	-21.5	-22.5	-23.5	-24.0	-24.2	-24.1	-23.9	-23.8	-24.1	-24.3	-24.5	-24.5	-21.5																						
																								-12.5	-12.9	-13.1	-13.2	-13.4	-13.6	-13.7	-13.7	-13.7	-13.4	-12.7	-12.0	-11.3	-11.0	-10.8	-11.0	-11.5	-11.9	-12.0	-12.2	-12.4	-12.7	-12.9	-13.1	Diurnal Average
																								1.5	1.4	0.9	0.8	0.7	0.4	0.2	-0.1	-0.1	0.4	1.9	4.3	6.1	6.6	6.7	6.2	5.3	4.1	3.7	2.5	2.1	1.6	1.2	0.8	Diurnal Maximum



WBEA
Hourly Averages

Ambient Temperature 2m (AT 2m) - C
Fort Chipewyan - November 2014





WBEA
Cumulative Frequency Distribution

Ambient Temperature 2m (AT 2m) - C
Fort Chipewyan - November 2014

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	140	19.44	19.44
-20 - 0	529	73.47	92.92
0 - 10	51	7.08	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

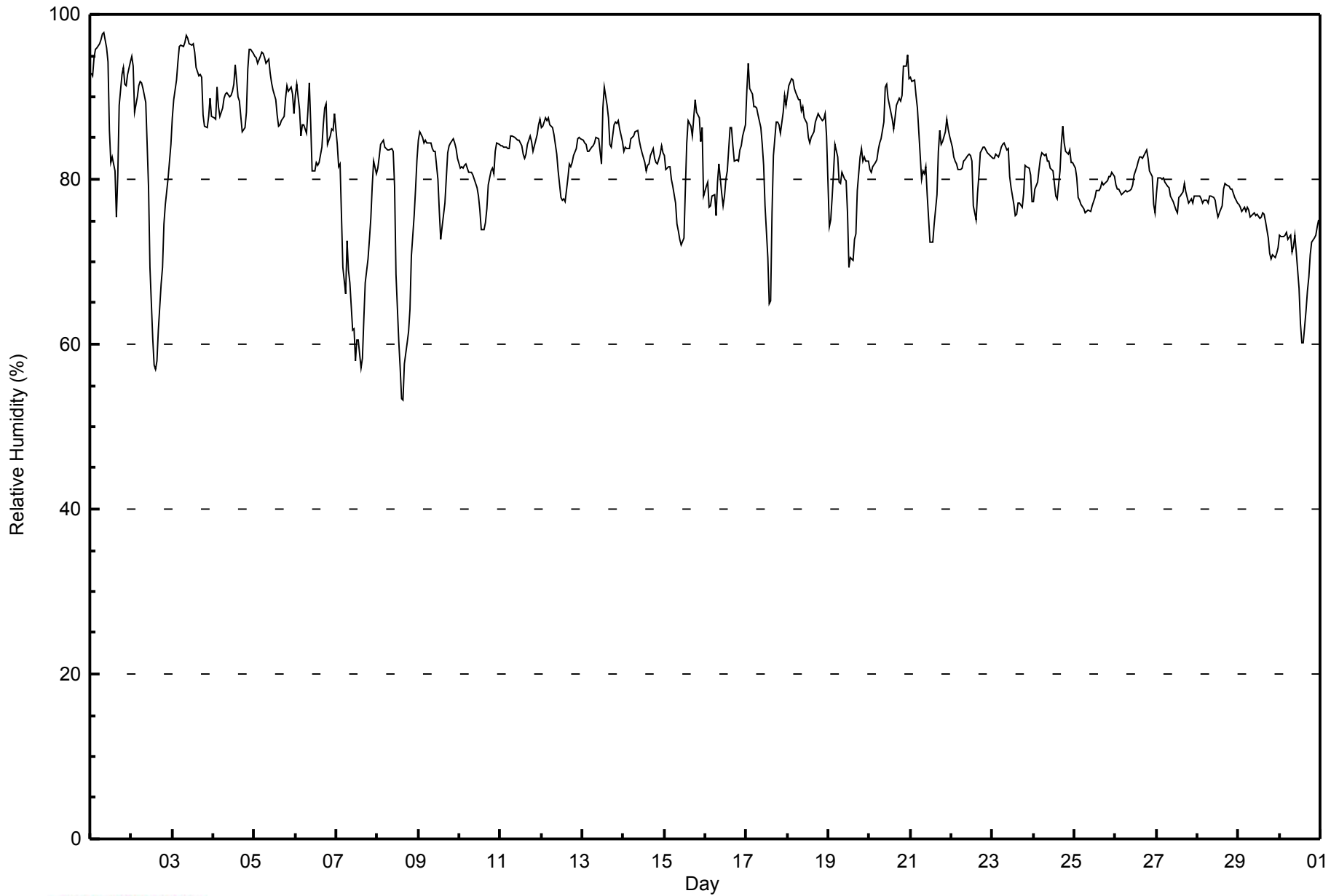


Maximum Value: 98 % on Nov 1 09:00																		Maximum Daily Average: 92.7 % on Nov 3																		Hours in Service: 720														
Minimum Value: 53 % on Nov 8 16:00																		Minimum Daily Average: 69.9 % on Nov 7																		Hours of Data: 720														
Maximum Diurnal Average: 84.2 % at hour 23																		Minimum Diurnal Average: 77.1 % at hour 15																		Hours of Missing Data: 0														
Monthly Average: 82.0 %																		Percentiles: P ₁ = 58 P ₁₀ = 73 Q ₁ = 78 Median = 83 Q ₃ = 87 P ₉₀ = 91 P ₉₉ = 97																		Hours of Calibration: 0														
																																				Percent Operational Time: 100.0														
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																										
1-Nov	93	93	95	96	96	96	97	98	98	96	94	86	82	83	81	76	81	89	93	94	92	91	93	94	91.0	98																								
2-Nov	95	94	88	90	91	92	92	91	89	84	79	69	61	57	57	58	62	67	69	75	77	80	82	84	78.5	95																								
3-Nov	88	90	92	94	96	96	96	97	97	97	97	96	97	95	94	93	93	92	88	86	86	88	90	88	92.7	97																								
4-Nov	87	87	91	89	88	89	90	90	90	90	90	91	92	94	90	90	88	86	86	88	93	96	96	95	90.2	96																								
5-Nov	95	95	94	95	95	95	95	94	95	93	92	91	90	88	86	87	87	88	90	91	91	91	90	88	91.5	95																								
6-Nov	90	92	88	85	87	87	86	88	92	87	81	81	82	82	82	84	87	89	89	84	85	86	86	88	86.1	92																								
7-Nov	84	81	82	76	69	66	73	69	67	62	62	58	61	61	57	58	63	68	70	73	75	79	82	81	69.9	84																								
8-Nov	81	83	84	85	84	84	84	84	84	83	79	68	60	57	53	53	58	60	61	64	71	76	79	82	73.3	85																								
9-Nov	85	86	85	84	85	84	84	84	84	83	83	80	76	73	74	77	80	83	84	84	85	84	84	82	82.4	86																								
10-Nov	81	81	81	82	82	81	81	81	81	79	79	78	76	74	74	75	77	79	81	81	81	83	84	84	79.9	84																								
11-Nov	84	84	84	84	84	84	85	85	85	85	85	85	84	83	83	83	84	85	85	83	84	85	87	87	84.4	87																								
12-Nov	86	86	87	87	87	87	86	85	84	83	81	78	78	78	77	80	82	81	82	83	84	85	85	85	83.3	87																								
13-Nov	85	84	84	83	83	84	84	84	85	85	83	82	89	91	89	87	84	84	87	87	87	87	86	85	85.4	91																								
14-Nov	83	84	84	84	85	85	85	86	86	85	84	83	82	81	82	82	83	84	83	82	82	83	84	83	83.5	86																								
15-Nov	83	81	82	82	80	79	77	75	74	73	72	73	79	84	87	86	85	87	90	88	88	85	86	78	81.4	90																								
16-Nov	79	80	77	77	78	78	76	80	82	78	77	78	80	81	86	86	84	82	82	82	84	84	85	87	80.9	87																								
17-Nov	91	94	91	90	89	89	89	88	86	84	82	77	70	65	65	76	83	87	87	87	86	88	90	89	84.3	94																								
18-Nov	90	91	92	92	91	91	90	90	88	89	88	87	85	84	85	86	87	88	88	88	87	87	88	85	88.2	92																								
19-Nov	74	75	78	81	84	83	80	80	81	80	80	76	69	70	70	73	73	79	83	84	82	83	82	82	78.4	84																								
20-Nov	81	81	82	82	82	84	84	85	87	91	92	90	88	87	86	87	89	90	89	90	94	94	95	92	87.6	95																								
21-Nov	92	92	92	90	89	86	80	81	81	82	78	72	72	72	75	78	83	86	84	85	86	87	86	85	83.1	92																								
22-Nov	84	83	82	82	81	81	81	82	82	83	83	83	82	77	75	78	81	83	84	84	84	83	83	83	81.8	84																								
23-Nov	83	83	83	83	83	84	84	84	84	84	80	79	77	76	76	77	77	77	78	82	81	81	80	77	80.5	84																								
24-Nov	77	79	80	81	82	83	83	83	82	82	81	81	79	78	78	81	84	86	84	83	83	84	82	82	81.7	86																								
25-Nov	81	80	78	78	77	76	76	76	76	76	77	77	78	79	79	79	80	79	80	80	80	80	81	80	78.4	81																								
26-Nov	79	79	79	78	78	78	79	79	79	79	79	81	82	82	83	83	83	83	84	83	81	80	77	76	80.1	84																								
27-Nov	78	80	80	80	80	80	79	79	78	78	77	76	76	78	78	78	80	78	78	77	78	77	78	78	78.3	80																								
28-Nov	78	78	78	77	77	77	77	78	78	78	77	76	75	76	77	79	79	79	79	79	79	78	78	77	77.7	79																								
29-Nov	77	77	76	77	76	77	76	75	76	76	76	76	76	75	75	76	76	75	73	71	70	71	71	72	74.6	77																								
30-Nov	73	73	73	73	74	73	73	71	72	73	71	67	63	60	60	64	66	68	71	72	73	73	74	75	70.3	75																								
	84.0		84.2		84.1		83.9		83.8		83.6		83.4		83.4		83.4		82.6		81.3		79.1		78.0		77.4		77.1		78.3		79.9		81.4		82.0		82.3		82.9		83.7		84.2		83.5		Diurnal Average	
		95	95	95	96	96	96	97	98	98	97	97	96	97	95	94	93	93	92	93	94	94	96	96	95																					Diurnal Maximum				



WBEA
Hourly Averages

Relative Humidity (RH) - %
Fort Chipewyan - November 2014





WBEA
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Fort Chipewyan - November 2014

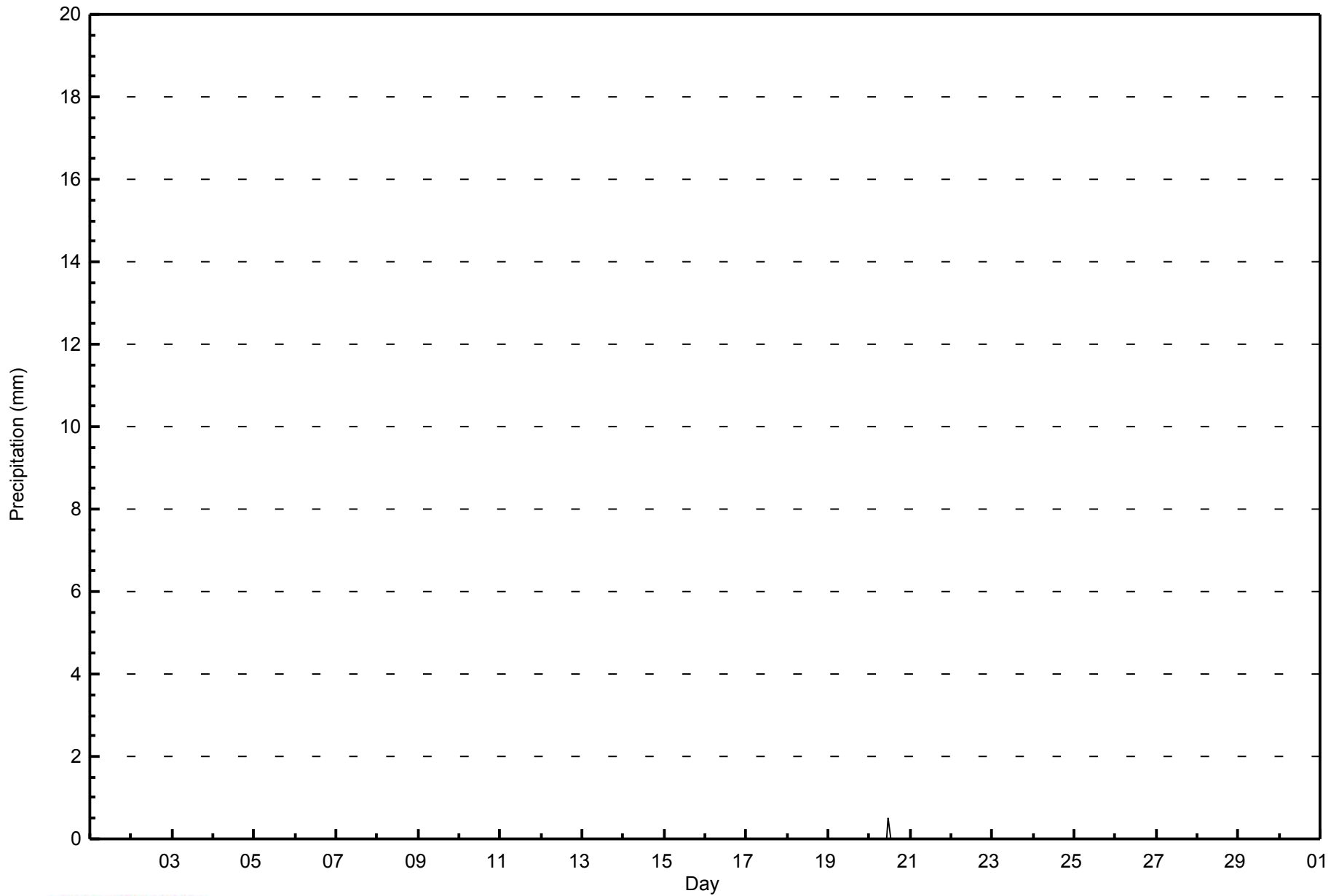
Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	10	1.39	1.39
60 - 80	240	33.33	34.72
80 - 100	470	65.28	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Value: 0.5 mm on Nov 20 12:00		Maximum Daily Total: 0.5 mm on Nov 20		Hours in Service: 720																												
Minimum Value: 0.0 mm on Nov 1 01:00		Minimum Daily Total: 0.0 mm on Nov 1		Hours of Data: 720																												
Maximum Diurnal Total: 0.5 mm at hour 12		Minimum Diurnal Total: 0.0 mm at hour 1		Hours of Missing Data: 0																												
Monthly Total: 0.51 mm		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 0.0		Hours of Calibration: 0																												
				Percent Operational Time: 100.0																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24								
1-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
21-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.5	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	Diurnal Maximum





WBEA
Cumulative Frequency Distribution

Precipitation (PC) - mm
Fort Chipewyan - November 2014

Concentration Ranges (mm)	Number of Hours	%	Cumulative %
0 - 0.3	719	99.86	99.86
0.4 - 0.5	1	0.14	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: 720

Total Number of Hours: 720

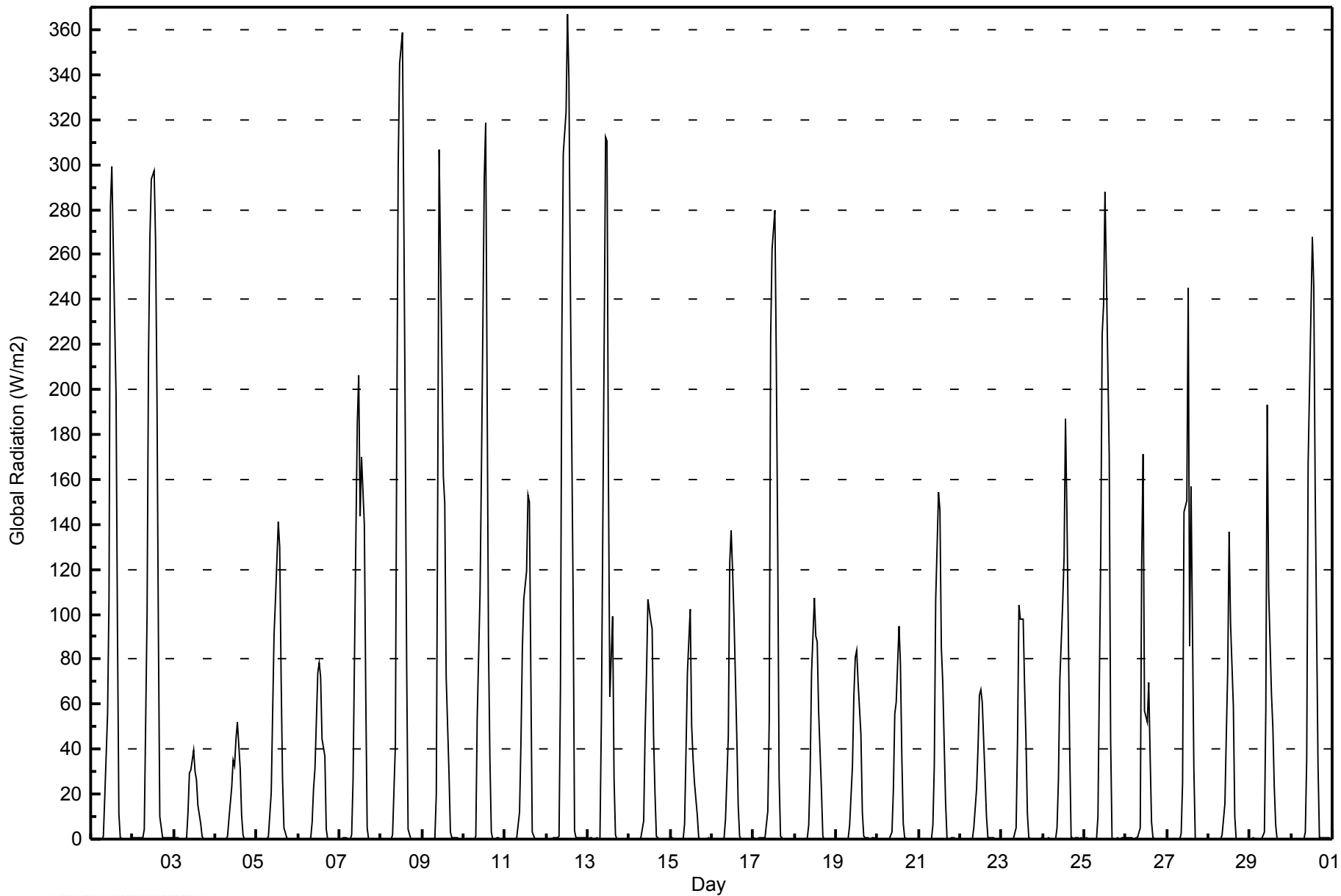


Maximum Value: 367 W/m2 on Nov 12 13:00																			Maximum Daily Average: 83.0 W/m2 on Nov 12						Hours in Service: 720																																							
Minimum Value: 0 W/m2 on Nov 7 18:00																			Minimum Daily Average: 8.2 W/m2 on Nov 3						Hours of Data: 720																																							
Maximum Diurnal Average: 160.1 W/m2 at hour 13																			Minimum Diurnal Average: 0.2 W/m2 at hour 7						Hours of Missing Data: 0																																							
Monthly Average: 34.2 W/m2																			Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 31 P ₉₀ = 128 P ₉₉ = 308						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-Nov	0	0	0	0	0	0	0	1	19	56	106	282	299	265	197	93	12	0	0	0	0	0	0	0	55.5	299																																						
2-Nov	0	1	1	1	1	1	0	5	101	214	268	293	297	266	198	93	10	0	0	1	0	1	0	1	73.0	297																																						
3-Nov	0	0	0	0	0	0	0	1	12	29	31	39	30	26	15	7	1	0	0	0	0	0	0	0	8.2	39																																						
4-Nov	0	0	0	0	0	0	0	1	9	23	35	33	45	52	31	11	2	0	0	0	0	0	0	0	10.2	52																																						
5-Nov	0	0	0	0	0	0	0	1	21	56	91	106	141	130	72	27	5	1	0	0	0	0	0	0	27.2	141																																						
6-Nov	0	0	0	0	0	0	0	0	7	23	31	74	78	72	45	37	5	0	0	0	0	0	0	0	15.6	78																																						
7-Nov	0	0	0	1	0	0	0	2	26	135	185	206	143	170	140	65	5	0	0	0	0	0	0	0	44.9	206																																						
8-Nov	0	0	0	0	0	0	0	2	42	185	300	345	359	274	182	77	4	0	0	0	0	0	0	0	73.7	359																																						
9-Nov	0	0	0	0	0	0	0	1	20	153	307	211	161	149	72	30	3	0	0	0	0	0	0	0	46.2	307																																						
10-Nov	0	0	0	0	0	0	0	1	54	109	165	228	294	318	86	36	3	0	0	0	0	0	0	0	54.1	318																																						
11-Nov	0	0	0	0	0	0	0	1	12	43	84	107	119	153	150	74	3	0	0	0	0	0	0	0	31.2	153																																						
12-Nov	0	0	0	0	0	1	0	1	67	224	305	323	367	338	248	107	4	0	1	0	1	1	0	0	83.0	367																																						
13-Nov	0	0	0	0	0	0	0	1	52	221	312	311	162	63	99	27	2	0	0	0	0	0	0	0	52.3	312																																						
14-Nov	0	0	0	0	0	0	0	1	8	47	73	106	97	94	46	21	1	0	0	0	0	0	0	0	20.7	106																																						
15-Nov	0	0	0	0	0	0	0	0	7	39	74	102	51	36	25	11	1	0	0	0	0	0	0	0	14.5	102																																						
16-Nov	0	0	0	0	0	0	0	0	9	46	123	138	120	99	46	15	1	0	0	0	0	0	0	0	25.0	138																																						
17-Nov	0	0	0	0	1	0	1	1	13	53	222	262	279	213	132	28	1	0	0	0	0	0	0	0	50.3	279																																						
18-Nov	0	0	0	0	0	0	0	0	6	30	74	108	90	88	57	22	1	0	0	0	0	0	0	0	19.9	108																																						
19-Nov	0	0	0	0	0	0	0	0	6	33	64	81	84	70	46	12	1	1	1	0	0	0	0	0	16.7	84																																						
20-Nov	0	0	0	0	0	0	0	0	3	22	56	61	95	78	37	7	1	0	0	0	0	0	0	0	15.1	95																																						
21-Nov	0	0	0	0	0	0	0	0	6	33	106	154	146	85	69	16	1	0	0	0	0	0	0	0	25.9	154																																						
22-Nov	0	0	0	0	0	0	0	0	5	23	41	64	66	61	27	10	1	0	0	0	0	0	0	0	12.5	66																																						
23-Nov	0	0	0	0	0	0	0	0	5	44	104	98	98	68	44	11	0	0	0	0	0	0	0	0	19.8	104																																						
24-Nov	0	0	0	0	0	0	0	0	5	26	71	105	125	187	145	39	1	0	0	0	0	0	0	0	29.5	187																																						
25-Nov	0	0	0	0	0	0	0	0	10	128	224	237	288	251	171	45	0	0	0	0	0	0	0	0	56.5	288																																						
26-Nov	0	0	0	0	0	0	0	0	5	123	171	57	52	70	37	7	0	0	0	0	0	0	0	0	21.9	171																																						
27-Nov	0	0	0	0	0	0	0	0	3	25	145	151	245	86	157	32	0	0	0	0	0	0	0	0	35.2	245																																						
28-Nov	0	0	0	0	0	0	0	0	2	16	46	76	137	96	59	10	0	0	0	0	0	0	0	0	18.4	137																																						
29-Nov	0	0	0	0	0	0	0	0	3	57	193	111	65	49	23	6	0	0	0	0	0	0	0	0	21.2	193																																						
30-Nov	0	0	0	0	0	0	0	0	3	36	167	234	268	246	155	33	1	0	0	0	0	0	0	0	47.8	268																																						
																			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		1		1		1		5		101		224		312		345		367		338		248		107		12		1		1		1		1		1		0		1		Diurnal Maximum	



WBEA
Hourly Averages

Global Radiation (GR) - W/m²
Fort Chipewyan - November 2014





WBEA
Cumulative Frequency Distribution

Global Radiation (GR) - W/m2
Fort Chipewyan - November 2014

Concentration Ranges (W/m2)	Number of Hours	%	Cumulative %
0 - 20	517	71.81	71.81
21 - 100	112	15.56	87.36
101 - 300	81	11.25	98.61
301 - 600	10	1.39	100.00
601 - 900	0	0.00	100.00
> 900	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Speed: 34 km/h on Nov 6 09:00	Maximum Daily Speed Average: 19.2 km/h on Nov 7	Hours in Service: 720
Minimum Speed Value: 1 km/h on Nov 25 20:00	Minimum Daily Speed Average: 1.4 km/h on Nov 1	Hours of Data: 718
Maximum Diurnal Speed Average: 4.7 km/h at hour 20	Minimum Diurnal Speed Average: 2.4 km/h at hour 9	Hours of Missing Data: 2
Monthly Average Velocity: 3.6 km/h 299.5 deg	Percentiles: P ₁ = 1 P ₁₀ = 4 Q ₁ = 7 Median = 10 Q ₃ = 14 P ₉₀ = 20 P ₉₉ = 30	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-Nov	WSW9	W9	WNW6	NW12	NW12	NW8	NW4	W4	WSW6	WNW5	SW3	SSW5	S2	SE2	SSW2	WSW7	WSW1	E6	E6	E6	E6	E7	E8	E8	WNW1.4	NW12	
2-Nov	ESE9	ESE7	SE6	ESE9	ESE10	ESE10	ESE10	ESE11	ESE10	SSE12	S14	S21	S25	S25	S23	S22	S22	S21	S20	SSW14	SSW11	SSW8	S6	S6	SSE12.2	S25	
3-Nov	SSW8	S7	S5	WSW2	ESE1	AF	NNW6	NNW9	NNW8	NNW8	N7	NNW8	NNW9	NNW7	NNW7	NW7	NW6	WNW7	NW6	NNW4	WNW5	W4	WSW4	SW4	NW3.8	NNW9	
4-Nov	SW7	S5	SSW7	SSE2	SSE4	SE6	SE9	ESE14	ESE19	ESE20	ESE20	ESE23	ESE22	ESE24	ESE27	E27	E28	ESE30	E30	E30	E28	E30	E31	E31	ESE18.5	E31	
5-Nov	E31	E30	E33	E31	E30	ENE25	ENE26	ENE24	ENE22	ENE19	ENE18	E15	ENE12	ENE7	ENE4	ENE4	SE9	SE10	SSE11	SSE12	SSE12	SSE13	SE15	SE18	E16.0	E33	
6-Nov	SE21	SE19	SSE20	SSE21	SSE22	SSE23	SSE25	SE28	SE34	SSE24	S28	S30	SSW27	SSW14	SSW10	SSW13	WSW9	WNW13	WNW15	NW21	WNW20	WNW21	WNW22	WNW20	S10.5	SE34	
7-Nov	NW22	NW26	NW24	NW30	NNW21	NNW20	NW19	NW23	NW23	NW24	NW23	NW26	NW21	NW19	NW19	NW17	WNW15	WNW16	WNW16	WNW15	WNW13	W12	W14	WNW15	NW19.2	NW30	
8-Nov	WNW12	WNW12	WNW12	WNW12	WNW13	WNW12	WNW14	WNW15	WNW14	WNW11	NW12	NNW13	NW14	NW15	NW15	NW14	NW14	NW9	NW8	WNW7	NW10	NW8	WNW5	WNW6	NW7	WNW11.0	NW15
9-Nov	NW7	NW8	NW7	NW7	NW8	NNW6	NNW6	NNW7	NNW5	NW2	WNW3	NNE1	N3	N3	NNW5	NNW5	NNW7	N8	N9	N9	NNW8	NNW10	NNW11	NNW12	NNW6.2	NNW12	
10-Nov	NNW17	NNW19	NNW15	NNW15	NNW16	NNW17	NNW17	NNW17	NNW17	NNW17	NNW12	NNW12	NW10	NW11	NNW11	NNW11	NW10	NW9	NNW8	NNW9	N9	NNW10	NNW9	NW10	NW10	NNW12.5	NNW19
11-Nov	NW8	NW7	NW9	NW9	NW11	NW11	NW13	NW11	NW5	NNW3	NW4	NW4	WSW5	WSW5	W7	W8	WNW2	N2	W4	WSW5	SW6	SW5	SSW11	SSW14	WNW5.2	SSW14	
12-Nov	SSW13	S13	S12	S10	S10	S10	SSE8	SSE8	SE8	SSE8	SSE6	ESE4	SE4	E3	E3	ESE4	SSE7	SSE8	SSW7	SW7	SSW5	SSW4	SSW7	SW9	S6.5	SSW13	
13-Nov	SW11	SW7	SSW6	SW8	SW10	SW8	SW5	WSW6	WSW4	W6	WNW10	NW8	N3	WNW4	WNW5	W6	W6	WNW8	NW9	NW8	NNW8	NNW9	N10	N10	WNW4.8	SW11	
14-Nov	N11	N10	N12	N14	N13	N12	N12	N11	NNW10	NNW9	NW8	WNW9	NNW7	NW7	NW8	WNW9	WNW8	WNW6	WNW9	W9	WSW7	WSW9	WSW11	WSW12	NW7.7	N14	
15-Nov	WSW15	WSW18	SW18	WSW17	WSW21	WSW20	WSW19	W19	W17	W18	W18	NW17	NW16	NW18	NW21	NNW20	NNW20	NW15	NW15	NNW13	NNW14	NNW14	NNW14	NNW14	WNW13.8	NW21	
16-Nov	NNW13	NNW14	NNW15	NNW15	NNW12	NW11	NNW11	NW10	NW12	NW13	NW15	NW13	NW14	NW13	NNW10	NNW8	NW7	NW9	NW10	NW11	NW6	NW6	WNW5	W5	NW10.6	NW15	
17-Nov	WSW7	SW8	SSW10	S10	S9	SE13	SE13	SE12	SE12	SE9	SSE10	S13	SSW9	SW10	WSW14	W14	W12	WNW12	WNW15	NW13	NW12	WNW12	WNW12	NW14	SW5.0	WNW15	
18-Nov	NW13	NW13	NW14	NW15	NW14	NNW13	NW12	NW12	WNW15	WNW15	WNW16	NW19	NNW18	NW18	NW16	NW14	NW13	NW12	NW13	NW11	NW8	NNW4	NNW3	NW6	NW12.6	NW19	
19-Nov	NNW10	NNW6	NNW6	NNW5	WNW3	NNW5	NNW3	AF	SSE2	S3	SSE1	SW6	SW6	SW9	SW11	SSW9	SSE11	SE13	SE15	SE15	SE19	SE17	ESE17	ESE18	SE4.5	SE19	
20-Nov	ESE20	ESE20	ESE20	ESE19	ESE20	ESE19	ESE19	SE13	ESE13	SE11	SE8	S5	SW4	WNW8	WNW8	WNW11	WNW11	NW11	NW10	NW11	NW8	NW6	NW7	NW10	ESE3.5	ESE20	
21-Nov	NW9	WNW9	WNW11	NW13	WNW13	NW14	NW16	NW15	NW14	NW13	NW12	NNW14	NNW12	NW10	NNW8	NW8	NNW5	NW5	N8	N11	NNW4	NNW1	N3	N7	NW9.3	NW16	
22-Nov	N5	N5	N6	N5	N7	N8	NNW7	NNW7	NNW7	N9	N12	N9	NE8	NE15	ENE20	NE16	NE11	NNE9	N9	N9	N8	N7	N8	N7	NNE8.1	ENE20	
23-Nov	N7	N9	N8	N8	NNW3	NW4	NNE1	SSE3	SSE3	S2	SSW2	SW7	WSW5	W5	W4	W5	W7	WNW10	WNW10	NW8	NW11	NW12	NNW13	NW14	NW4.5	NW14	
24-Nov	NW13	NNW13	NNW15	NNW13	NW12	NW8	WNW5	WNW8	WNW6	WNW7	WNW6	WNW8	WNW5	NNE3	S2	SSW2	E3	ENE2	NE3	NE5	NE5	NE3	NE3	N6	NW4.9	NNW15	
25-Nov	N6	N7	W2	WNW2	NNW3	WNW2	WNW2	NW3	NW2	WSW2	WNW1	NW4	WNW4	NW5	NW5	WNW3	WNW4	WSW3	WSW3	S1	ESE2	ESE4	SE4	SE4	NW1.5	N7	
26-Nov	ESE6	E8	ESE9	SE7	SSE6	SSE7	SSE7	SSE7	S8	S8	S7	S6	SSW4	WSW5	WNW8	NW9	NW7	WNW7	WNW9	NW13	NW12	NW9	NNW8	NNW10	WSW1.8	NW13	
27-Nov	NNW8	NW7	NNW11	WNW7	WNW6	WNW6	W7	W9	NW12	NW13	WNW10	NW11	WNW10	W8	WNW9	WNW8	WNW10	NW12	NW11	WNW6	WNW7	W3	W7	WNW8	WNW8.3	NW13	
28-Nov	WNW6	WNW7	NW9	NW7	NW7	NW5	WNW5	WNW6	WNW5	NW9	NW9	NW7	NW5	WNW6	WNW6	WNW5	WNW9	WNW8	WNW10	WNW8	W9	W10	WSW12	WSW13	WNW7.0	WSW13	
29-Nov	WSW15	WSW16	SW12	SW12	SW11	SW12	WSW12	W18	W16	W16	W17	W17	WNW19	WNW20	WNW17	WNW19	WNW16	WNW16	NW19	NW20	NW20	NW18	NW18	WNW17	W14.6	NW20	
30-Nov	WNW17	WNW15	WNW18	WNW18	WNW14	WNW16	W13	W15	W16	W16	WSW14	WSW19	WSW20	WSW17	SW16	SW15	SW15	SW13	SW14	SSW11	SW12	SW11	SW11	SW10	WSW12.9	WSW20	

WNW3.5	NW3.1	NW3.2	NW3.8	NW3.1	NW2.8	NW2.6	NNW3.1	NW2.4	NNW3.3	NNW3.6	W4.2	NNW4.4	NNW4.4	NNW4.5	NNW4.7	NNW3.7	NNW3.7	NNW4.6	NW4.7	NW4.0	NW3.3	NNW3.2	NNW3.7	Diurnal Average	
E31	E30	E33	E31	E30	ENE25	ENE26	SE28	SE34	NW24	S28	S30	SSW27	S25	ESE27	E27	E28	ESE30	E30	ESE30	E28	E30	E31	E31	Diurnal Maximum	

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



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 9 km/h on Nov 7 04:00	Hours of Data: 718
Minimum Value: 1 km/h on Nov 1 21:00	Hours of Missing Data: 2
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 2 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 7	Hours of Calibration: 0
	Percent Operational Time: 99.7

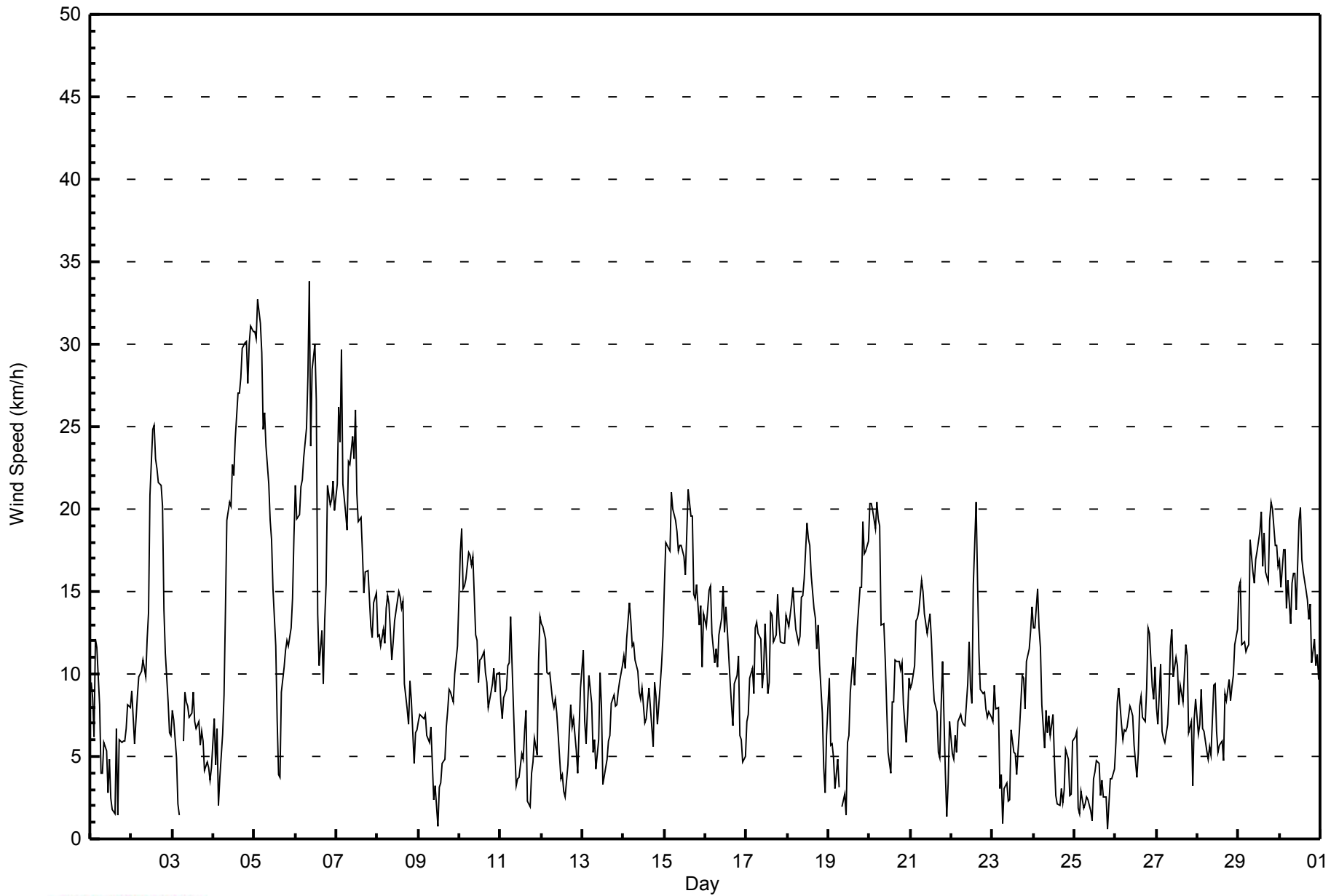
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	2	2	2	3	3	5	2	2	2	2	2	1	1	1	2	2	1	1	1	1	1	1	1	1	5	
2-Nov	2	2	2	2	1	1	1	1	2	2	3	3	3	3	3	3	3	3	3	2	2	2	2	1	3	
3-Nov	2	1	1	1	1	AF	3	4	4	3	3	3	4	3	3	3	2	2	2	2	2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

AF - Analyzer Failure



WBEA
Hourly Averages

Wind Speed (WS) - km/h
Fort Chipewyan - November 2014





WBEA
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Fort Chipewyan - November 2014

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	128	17.83	17.83
6 - 11	302	42.06	59.89
12 - 19	213	29.67	89.55
20 - 28	61	8.50	98.05
29 - 38	14	1.95	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 718

Total Number of Hours: 720



WBEA
Frequency Distribution

Wind Speed (WS) - km/h
Fort Chipewyan - November 2014

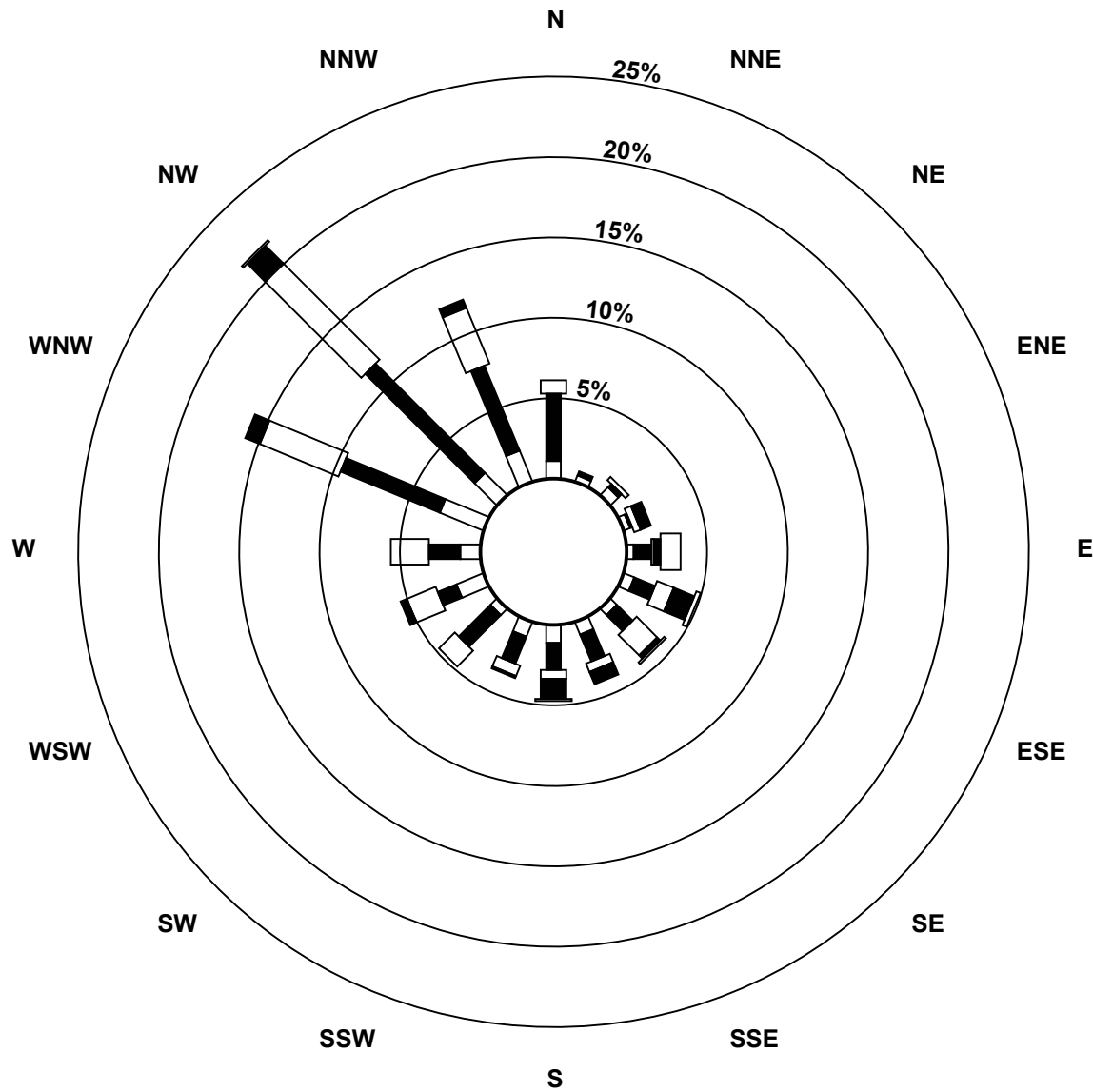
Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	8	3	5	3	3	5	4	6	8	7	4	13	9	21	14	15	128
6 - 11	30	2	2	1	8	10	10	13	12	13	20	9	14	48	69	41	302
12 - 19	6	0	2	3	1	8	13	4	4	5	10	14	17	38	61	27	213
20 - 28	0	0	0	5	3	10	2	6	9	1	0	3	0	7	11	4	61
29 - 38	0	0	0	0	9	2	1	0	1	0	0	0	0	0	1	0	14
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	44	5	9	12	24	35	30	29	34	26	34	39	40	114	156	87	718

Total Number of Valid Hours: 718

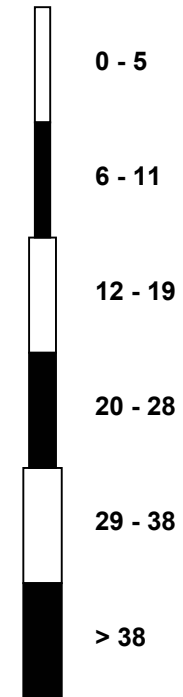
Total Number of Hours: 720

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

**Wind Speed (WS) - km/h
Fort Chipewyan (AMS 8)**



Classes (km/h)



Total Number of Valid Hours: 718



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Fort Chipewyan - November 2014

Direction of Maximum Speed: 129 deg on Nov 6 09:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 310.7 deg on Nov 7	Hours of Data: 718
Direction of Minimum Speed: 184 deg on Nov 25 20:00	Hours of Missing Data: 2
Direction of Minimum Daily Speed Average: 1.4 deg on Nov 1	Percent Operational Time: 99.7
Monthly Average Direction: 301.9 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-Nov	257	267	289	308	315	315	312	274	254	303	221	209	178	124	192	256	240	82	85	85	88	84	81	90	298.7
2-Nov	110	108	135	114	112	114	114	115	113	166	170	177	175	175	171	170	180	186	192	198	201	191	171	163.6	
3-Nov	194	174	185	242	118	AF	342	345	348	348	357	331	338	339	336	323	324	303	306	331	301	280	257	236	318.3
4-Nov	214	182	196	168	160	135	127	113	113	120	112	107	102	103	103	95	98	103	99	101	94	92	93	96	105.3
5-Nov	98	96	90	86	83	74	74	73	74	78	76	83	64	70	75	77	126	126	147	152	151	160	139	133	94.8
6-Nov	136	143	151	160	149	151	154	136	129	159	177	184	197	206	205	209	252	285	293	304	299	298	295	303	184.5
7-Nov	304	315	322	320	332	333	318	313	309	317	315	316	318	319	315	312	303	292	292	296	290	279	280	287	310.7
8-Nov	292	287	283	286	293	291	290	287	291	304	328	324	309	311	315	318	317	309	302	312	310	302	303	306	302.7
9-Nov	313	318	309	313	312	333	333	340	334	305	286	25	1	351	337	337	347	349	360	354	348	342	341	338	335.4
10-Nov	344	343	342	335	339	338	336	334	331	332	334	325	320	332	328	323	326	340	348	354	343	330	321	314	334.6
11-Nov	320	309	310	317	321	318	318	321	322	334	308	306	244	258	260	269	282	357	270	244	225	230	210	209	287.0
12-Nov	195	180	179	175	190	176	157	150	136	151	160	116	133	98	83	122	155	159	196	220	201	195	210	225	173.5
13-Nov	225	221	209	218	221	223	233	238	249	279	291	324	8	298	294	271	266	299	315	321	337	345	354	352	282.2
14-Nov	352	349	349	351	356	2	352	349	348	336	309	301	327	307	313	289	289	292	289	279	258	252	244	246	317.9
15-Nov	248	238	233	247	255	252	251	262	271	278	276	305	311	314	321	327	339	321	319	326	326	334	333	337	290.6
16-Nov	330	335	337	334	331	322	328	314	316	310	310	326	320	324	333	329	325	325	315	319	323	308	292	261	322.1
17-Nov	244	222	212	188	174	146	135	139	139	144	151	187	212	229	257	279	280	283	298	323	320	300	301	304	235.5
18-Nov	312	311	310	315	326	327	316	307	302	300	303	304	303	304	307	307	305	313	315	312	319	330	332	319	310.3
19-Nov	338	335	338	337	299	333	338	AF	168	178	164	218	226	216	214	194	160	131	126	128	132	128	123	117	145.4
20-Nov	118	115	114	119	119	115	121	130	114	125	146	177	233	283	283	290	301	311	315	318	313	307	315	308	119.9
21-Nov	305	300	298	309	295	312	317	315	310	312	319	334	336	324	331	322	333	315	354	8	341	348	353	357	321.1
22-Nov	353	360	350	350	358	355	345	348	347	358	5	1	36	55	59	51	43	19	5	360	358	360	359	357	15.0
23-Nov	1	3	4	11	333	322	12	162	168	176	195	214	241	280	262	265	275	282	294	307	312	319	328	326	309.7
24-Nov	319	327	335	329	318	312	296	303	296	291	284	288	296	21	182	196	80	70	41	36	38	53	41	10	326.0
25-Nov	355	3	276	302	334	291	287	306	309	238	286	308	297	316	310	298	287	249	250	184	107	109	133	142	309.2
26-Nov	116	97	121	137	158	162	168	162	171	177	186	176	212	248	283	310	312	303	290	306	312	322	331	328	251.8
27-Nov	328	321	319	299	294	283	268	279	317	312	300	305	301	276	288	286	286	308	320	297	303	276	271	284	298.8
28-Nov	290	299	317	319	308	318	302	290	295	313	319	324	314	301	293	294	293	291	290	283	267	259	248	252	291.8
29-Nov	247	243	229	234	230	234	247	269	273	272	269	273	282	287	289	283	289	301	308	310	312	310	310	300	279.4
30-Nov	300	295	293	293	282	289	279	279	267	266	252	246	244	240	232	216	215	214	219	212	218	225	224	232	253.7

297.7 305.5 304.3 308.8 306.1 310.4 306.8 303.4 307.8 293.3 285.6 281.2 285.0 292.7 294.4 290.7 293.9 298.8 303.5 314.4 309.2 305.2 300.3 302.4

Diurnal Average

AF - Analyzer Failure

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



Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

Fort Chipewyan - November 2014

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 96 deg on Nov 25 10:00			Hours of Data:	718
Minimum Value: 3 deg on Nov 19 19:00			Hours of Missing Data:	2
			Hours of Calibration:	0
			Percent Operational Time:	99.7
Percentiles: P ₁ = 4 P ₁₀ = 8 Q ₁ = 12 Median = 16 Q ₃ = 21 P ₉₀ = 27 P ₉₉ = 72				

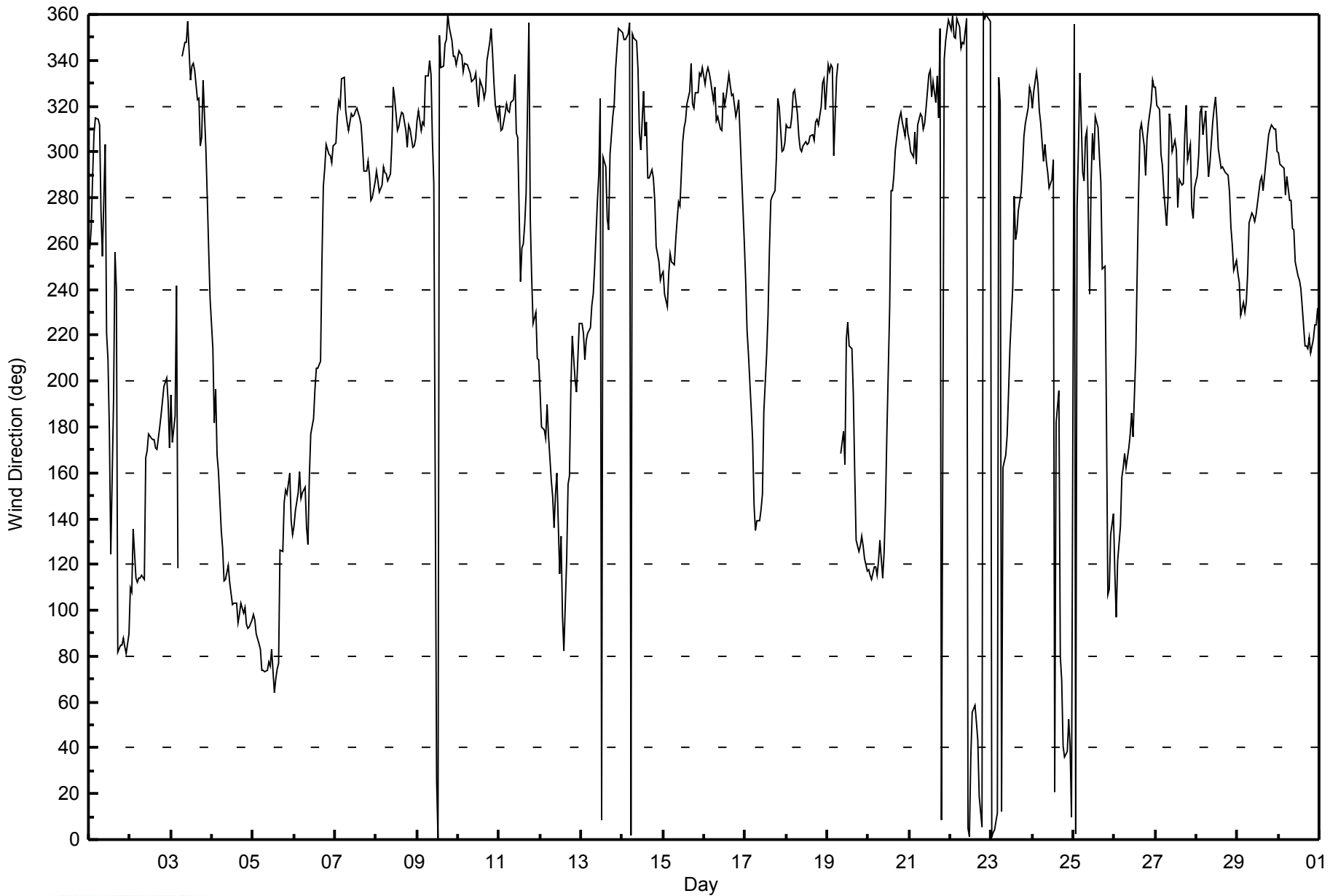
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	18	18	12	10	14	61	41	34	23	21	72	16	48	45	44	15	74	7	8	6	7	6	8	12	74
2-Nov	14	12	16	10	10	12	9	10	22	11	13	8	8	7	7	8	8	7	6	6	7	12	17	13	22
3-Nov	13	12	22	23	45	AF	40	26	31	26	24	24	24	28	24	23	22	16	23	27	25	21	19	18	45
4-Nov	13	51	13	45	22	13	10	7	7	6	6	4	6	4	5	4	5	4	4	4	6	4	5	5	51
5-Nov	5	5	5	5	6	8	7	7	7	9	10	12	14	15	37	36	14	10	11	9	8	9	11	6	37
6-Nov	8	8	12	11	10	8	8	12	9	12	9	7	6	10	9	10	22	13	14	15	15	15	16	15	22
7-Nov	15	16	19	18	24	22	19	17	16	17	18	18	18	19	17	15	13	13	13	13	14	14	13	14	24
8-Nov	14	13	14	14	14	13	14	14	14	20	22	21	17	16	16	15	13	15	14	11	12	21	11	10	22
9-Nov	15	10	9	5	15	19	25	19	46	29	22	86	49	53	28	22	17	15	15	14	15	15	16	16	86
10-Nov	16	15	18	18	19	19	20	18	19	24	22	26	22	26	21	19	21	24	26	26	19	17	15	12	26
11-Nov	14	13	11	14	11	10	10	16	27	31	26	22	30	32	22	16	38	65	24	24	19	25	19	6	65
12-Nov	9	14	21	27	12	9	8	11	11	16	15	32	25	23	21	17	14	9	20	12	9	21	14	11	32
13-Nov	8	8	17	11	7	9	11	8	21	12	13	29	43	45	37	21	17	15	13	17	21	18	19	19	45
14-Nov	19	19	18	19	18	19	18	18	20	21	32	25	28	24	24	17	16	18	15	16	14	12	12	13	32
15-Nov	14	10	9	14	13	13	13	15	14	14	14	17	17	17	18	20	22	20	19	22	21	25	24	23	25
16-Nov	21	22	22	19	21	19	21	17	16	17	17	22	19	21	24	22	20	19	17	19	22	24	22	26	26
17-Nov	22	20	13	20	15	10	11	8	8	12	11	15	11	9	18	13	12	13	18	21	24	16	15	16	24
18-Nov	17	16	15	16	22	22	19	17	15	14	15	14	14	15	16	15	16	16	16	18	28	26	29	20	29
19-Nov	25	22	20	22	19	23	28	AF	44	26	39	20	23	17	13	18	14	4	3	5	9	8	4	4	44
20-Nov	5	6	6	6	5	6	5	7	6	6	15	18	20	15	15	15	15	17	18	16	18	18	17	15	20
21-Nov	15	16	16	17	15	18	17	17	15	15	20	23	25	21	23	18	21	19	23	20	40	80	26	22	80
22-Nov	38	19	15	20	22	15	17	17	36	19	18	17	20	11	10	13	13	22	20	20	21	22	21	29	38
23-Nov	25	17	15	18	39	18	45	56	29	54	27	16	21	20	27	18	15	14	14	15	15	16	19	17	56
24-Nov	15	17	18	17	16	13	15	12	11	11	15	14	16	32	39	44	16	19	24	27	16	45	35	19	45
25-Nov	18	58	79	46	45	61	43	51	82	96	92	22	22	24	23	37	14	15	20	75	44	14	21	16	96
26-Nov	21	13	15	12	14	11	12	14	13	10	10	20	31	24	15	16	15	19	14	15	17	21	23	19	31
27-Nov	19	16	14	15	14	19	11	16	16	13	19	19	18	14	15	16	11	15	20	28	17	33	16	13	33
28-Nov	16	15	11	15	14	21	21	15	13	13	13	22	21	17	13	13	10	9	11	15	10	12	11	11	22
29-Nov	12	11	13	7	7	8	13	14	13	12	12	15	15	15	14	14	15	15	15	15	16	16	16	14	16
30-Nov	14	14	14	14	15	14	14	13	14	14	14	12	12	11	8	7	7	8	7	9	10	9	8	8	15
38	58	79	46	45	61	45	56	82	96	92	86	49	53	44	44	74	65	26	75	44	80	35	29		
Diurnal Maximum																									

AF - Analyzer Failure



WBEA
Hourly Averages

Wind Direction (WD) - deg
Fort Chipewyan - November 2014



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Wood Buffalo Environmental Association

SO₂ Calibration Report

Station Information

Calibration Date	November 5, 2014	Previous Calibration	October 2, 2014
Station Name	Fort Chipewyan	Station Number	AMS 8
Reason:	Routine		
Start Time (MST)	13:20	End Time (MST)	18:34
Barometric Pressure	740 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)	6	7
Analyzer Range (mv)	5000	5000	HV power supply (V)	529	529
Calculated slope	0.983140	1.005937	Chamber temp.	50.0	50.0
Calculated intercept	-0.082890	0.022615	Pressure (in Hg)	26.9	26.9
Analyzer Background	6.5	6.5	Flow (cc/m)	636	635
Analyzer Coefficient	1.083	1.083	UV Lamp (mV)	4405	4405

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	-0.05	NA
as found span	5000	37.1	18.18	17.58	1.034
calibrator zero	5000	0.0	0.0	-0.05	NA
high point	5000	37.1	18.18	18.03	1.008
second point	5000	19.8	9.70	9.64	1.006
third point	5000	9.9	4.85	4.82	1.007
calibrator zero					
as left zero	5000	0.0	0.0	0.0	NA
as left span	5000	37.1	18.2	16.0	1.134
Average Correction Factor					1.007

Corrected As found	17.6	Previous response	18.6	% change	5.4%
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Notes:

No adjustments. Filter changed after As Finds. Calibrator conditioned after initial As Finds

Calibration Performed By: Ryan Power



Wood Buffalo Environmental Association

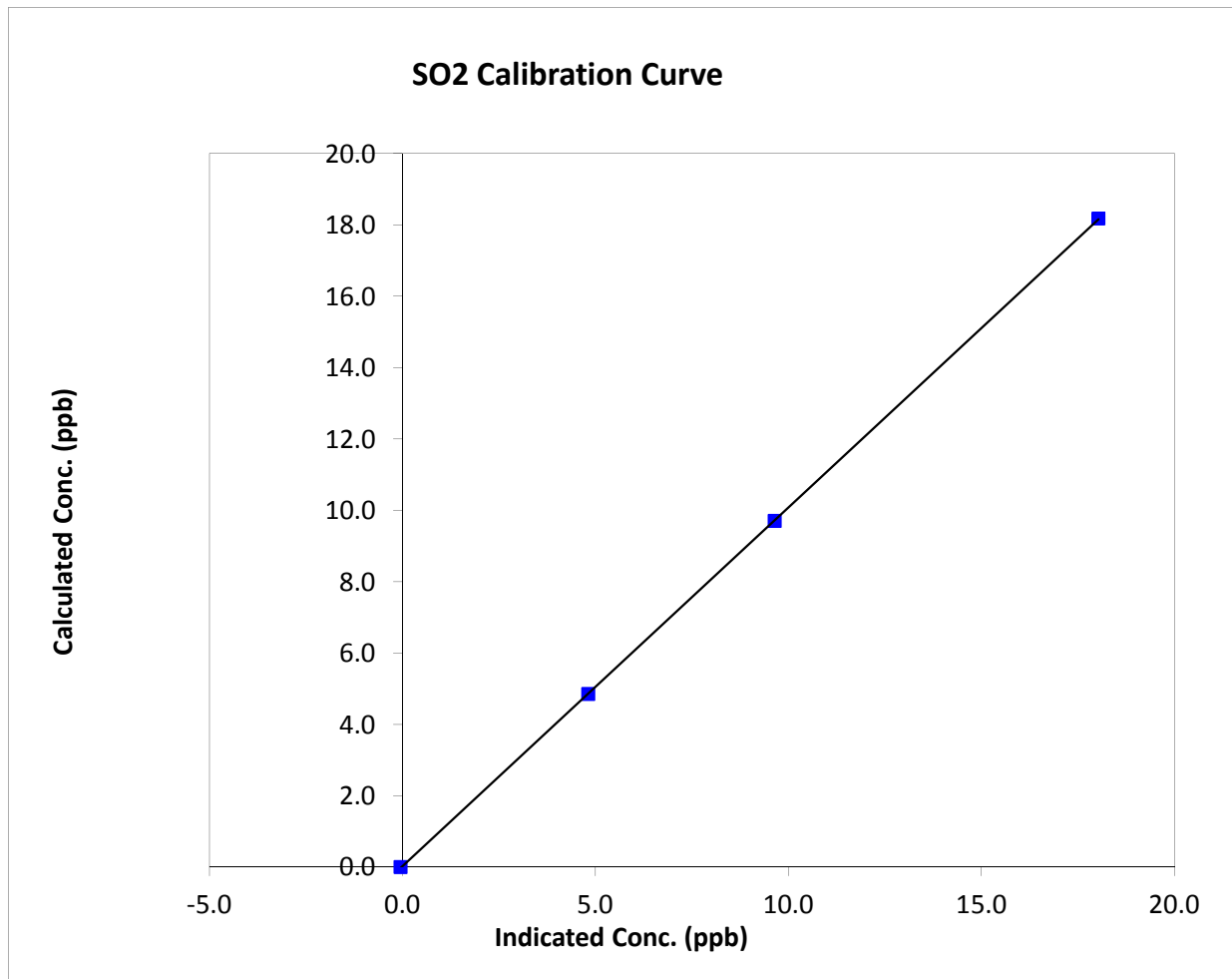
SO₂ Calibration Summary

Station Information

Calibration Date	November 5, 2014	Previous Calibration	October 2, 2014
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	13:20	End Time (MST)	18:34
Analyzer make	T100u	Analyzer serial #	138

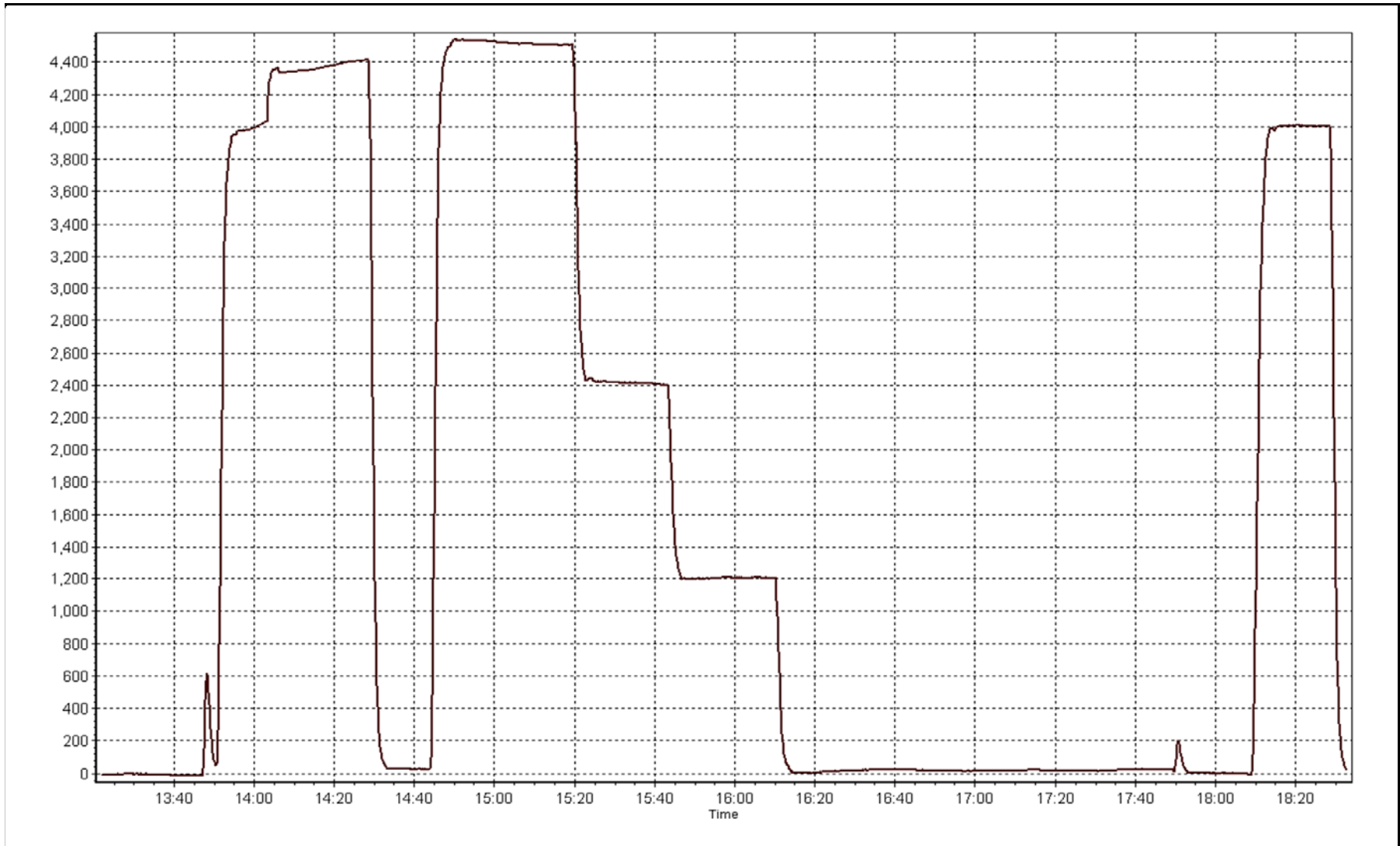
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999990
18.2	18.0	1.0082		
9.7	9.6	1.0060	Slope	1.005937
4.9	4.8	1.0066		
			Intercept	0.022615



SO2 Calibration Plot

Date: November 5, 2014





Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

Calibration Date	November 5, 2014	Previous Calibration	October 2, 2014
Station Name	Fort Chipewyan	Station Number	AMS 8
Reason:	Routine		
Start Time (MST)	18:29	End Time (MST)	20:40
Barometric Pressure	740 mmHg	Station temp.	21 Deg C
Calibrator Make/Model	API T700	Serial Number	735
NO2 calibration used	Wednesday, November 05, 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)	25.7	26.8
Analyzer Range (input)	5000	5000	Lamp temp. (Deg C)	58.0	58.0
Calculated slope	0.998864	0.998480	Pressure (in Hg)	27.3	27.5
Calculated intercept	-0.518084	-0.133575	Flow cell (LPM)	0.727	0.758
Analyzer Background	-0.50	-0.5	Cell A Intensity	NA	NA
Analyzer Coefficient	1.017	0.987	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	0.3	N/A
as found span	5000	197.5 -- 810.1	103.5	106.9	0.969
calibrator zero	5000	0.00	0.0	0.3	N/A
high point	5000	197.5 -- 810.1	103.5	104.0	0.995
second point	5000	148 -- 772	79.1	79.4	0.996
third point	5000	93 -- 715	52.9	52.7	1.004
calibrator zero					
as left zero	5000	0.00	0.0	0.5	N/A
as left span	5000	197.5 -- 810.1	103.5	105.0	0.986
Average Correction Factor					0.999

Corrected As found 106.5 Previous response 104.1 % change -2.2%

Notes:

As found zero used as calibrator zero. Span adjusted. Filter changed after third point. Shortened As Lefts due to late start of calibrations

Calibration Performed By:

Ryan Power



Wood Buffalo Environmental Association

O₃ Calibration Summary

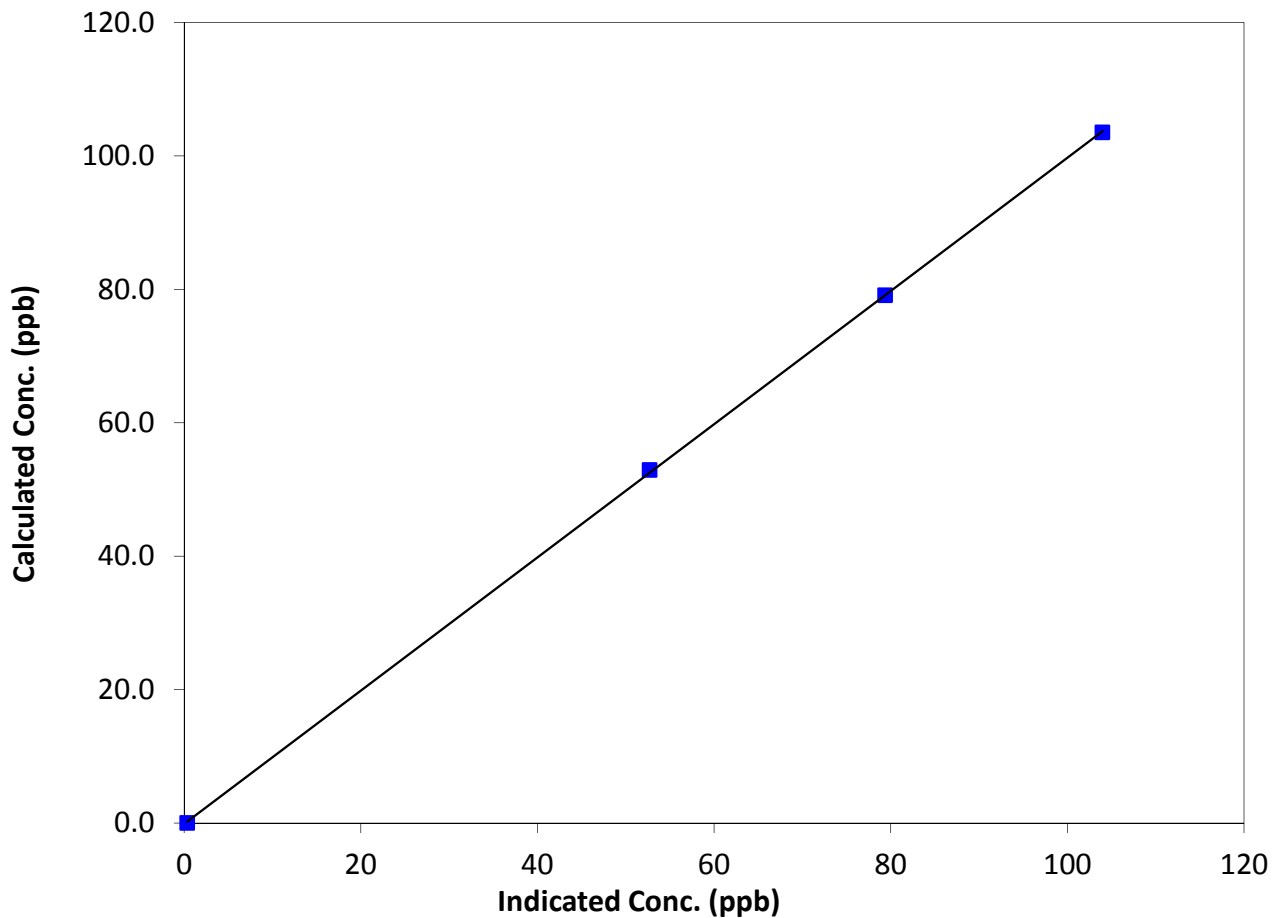
Station Information

Calibration Date	Wednesday, November 05, 2014	Previous Calibration	October 2, 2014
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	18:29	End Time (MST)	20:40
Analyzer make	API T400	Analyzer serial #	1020

Calibration Data

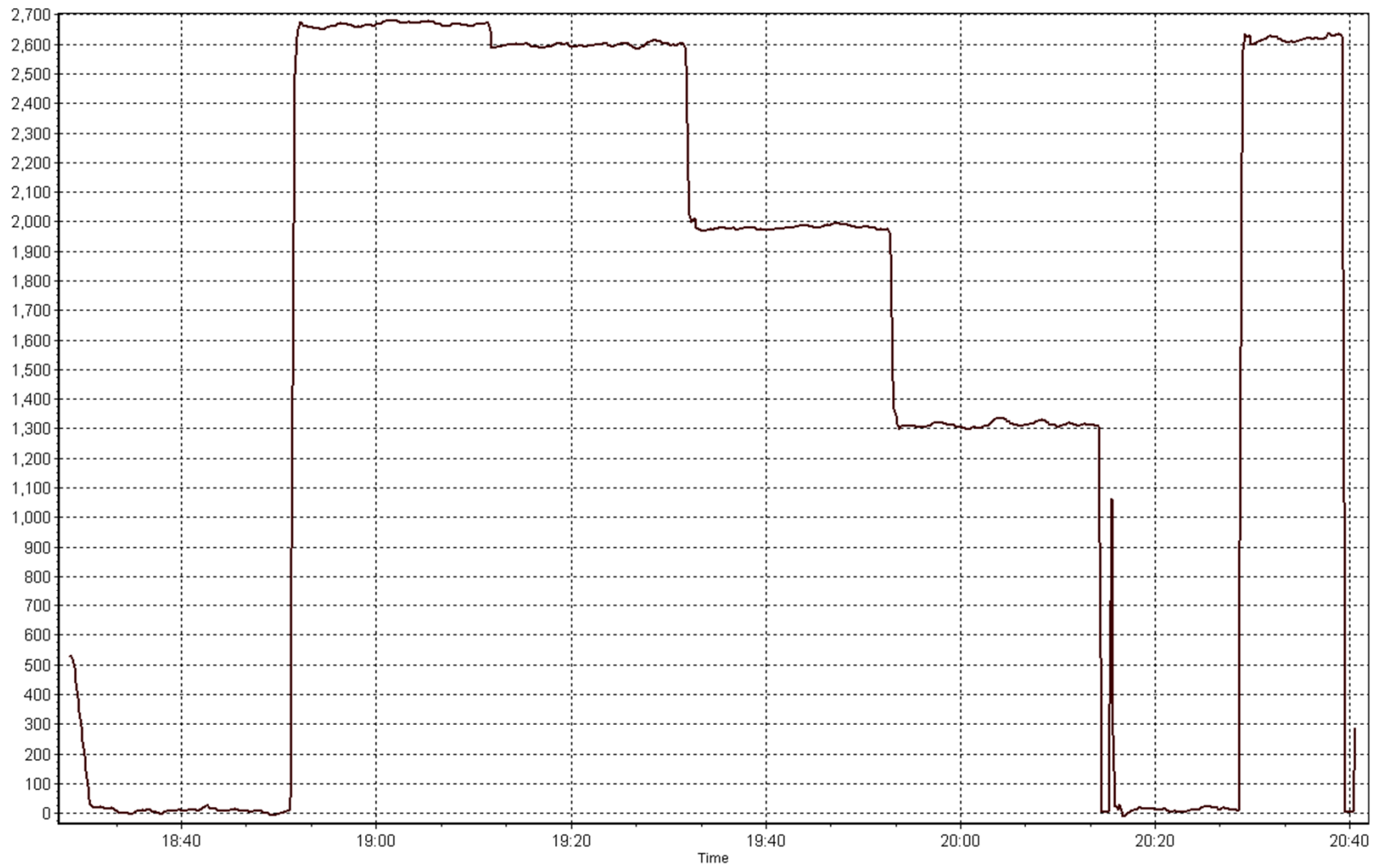
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.3	N/A	Correlation Coefficient	0.999956
103.5	104.0	0.9954		
79.1	79.4	0.9964	Slope	0.998480
52.9	52.7	1.0040		
			Intercept	-0.133575

O₃ Calibration Curve



O3 Calibration Plot

Date: November 5, 2014





Wood Buffalo Environmental Association

NO_x-NO-NO₂ Calibration Report

Station Information

Calibration Date	November 5, 2014	Previous Calibration	October 2, 2014
Station Name	Fort Chipewyan	Station Number	AMS 8
Reason:	Routine		
Start Time (MST)	13:15	End Time (MST)	18:30
Barometric Pressure	740 mmHg	Station Temperature	21.0 Deg C
Calibrator	API T700	Serial Number	747
NO Cal Gas Conc	20.2 ppm	Cal Gas Expiry Date	September 16, 2016
NOx Cal Gas Conc	20.3 ppm	Cal Gas Serial #	LL103809

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	172
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Parameter		NOx	NO	NO2
MV conversion	Analyzer Range (ppb)	200	200	200
	Analyzer Range (mv)	5000	5000	5000
Before	Data Slope	1.001044	0.999021	0.997925
	Data Offset	0.239080	0.503239	0.197156
After	Data Slope	1.003928	1.005885	0.994089
	Data Offset	0.427383	0.419806	0.214539
Channel #		DIFF 3	DIFF 1	DIFF 2
Voltage Range		0 - 5V	0 - 5V	0 - 5V

Analyzer Information

Analyzer make/model	Thermo 42C	Analyzer serial #	2185
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Test Point	before		after	
Concentration range	200	ppb	0-1000	ppb
NO coefficient	1.271	ppb	1.236	ppb
NOX coefficient	1.274	ppb	1.250	ppb
NO bkgrnd	-0.1		-0.1	
NOX bkgrnd	0.1		0.1	
HVPS	502.0		502.0	
Chamber Temp	40.0	Deg C	40.0	Deg C
Moly Temp	314.2	Deg C	314.0	Deg C
PMT Temp	5.1	Deg C	5.1	Deg C
O3 flow	89.0	ccm	89.0	ccm
R Cell Press	2.6	"Hg	2.6	"Hg
Sample Flow	1113	ccm	1113	ccm

Notes:

Small adjustment to span, filter changed after As Finds



Wood Buffalo Environmental Association

NO_x-NO-NO₂ Calibration Report

Station Information

Calibration Date: November 5, 2014 Station Number: AMS 8

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NO _x conc (ppb)	Calculated NO conc (ppb)	Calculated NO ₂ conc (ppb)	Indicated NO _x conc (ppb)	Indicated NO conc (ppb)	Indicated NO ₂ conc (ppb)	NO _x Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	-0.1	0.0	-0.2	N/A	N/A
as found span	5000	37.1	150.6	149.9	0.7	150.9	151.4	-0.6	0.9983	0.9900
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	0.0	-0.2	N/A	N/A
high point	5000	37.1	150.6	149.9	0.7	149.9	148.9	0.9	1.0050	1.0067
second point	5000	19.8	80.4	80.0	0.4	79.2	78.7	0.5	1.0152	1.0167
third point	5000	9.9	40.2	40.0	0.2	39.5	39.1	0.3	1.0172	1.0231
calibrator zero										
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.1	-0.1	N/A	N/A
as left span	5000	37.1	150.6	44.3	106.3	148.5	44.6	103.9	1.0140	0.9948
Average Correction Factor									1.0125	1.0155

Corrected As found NO_x= 151.0 NO= 151.4 Percent Change NO_x= -0.5% NO= -1.3%
 Previous Response NO_x= 150.2 NO= 149.5

GPT Calibration Data

Dilution Flow 5000 ccm Source Gas Flow 37.10 ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO ₂ conc (ppb)	Indicated NO _x conc (ppb)	Indicated NO conc (ppb)	Indicated NO ₂ conc (ppb)	NO _x Correction factor	NO Correction factor	NO ₂ Correction factor	Converter Efficiency
Cal zero			0.0			-0.2			N/A	
1st NO ₂ (100)	N/A	44.3	103.5	148.4	44.3	104.0	1.0078	1.0000	0.9954	100.5%
2nd NO ₂ (75)	N/A	68.7	79.1	148.0	68.7	79.3	1.0104	1.0000	0.9981	100.2%
3rd NO ₂ (50)	N/A	95.0	52.9	148.0	95.0	53.0	1.0105	1.0000	0.9980	100.2%
4th NO ₂ (0)	147.8	N/A	0.8	148.6	147.8	0.7	1.0062	1.0000	N/A	N/A
Average Correction Factor							1.0087	1.0000	0.9972	100.3%

Calibration Performed By: Ryan Power



Wood Buffalo Environmental Association

NO_x Calibration Summary

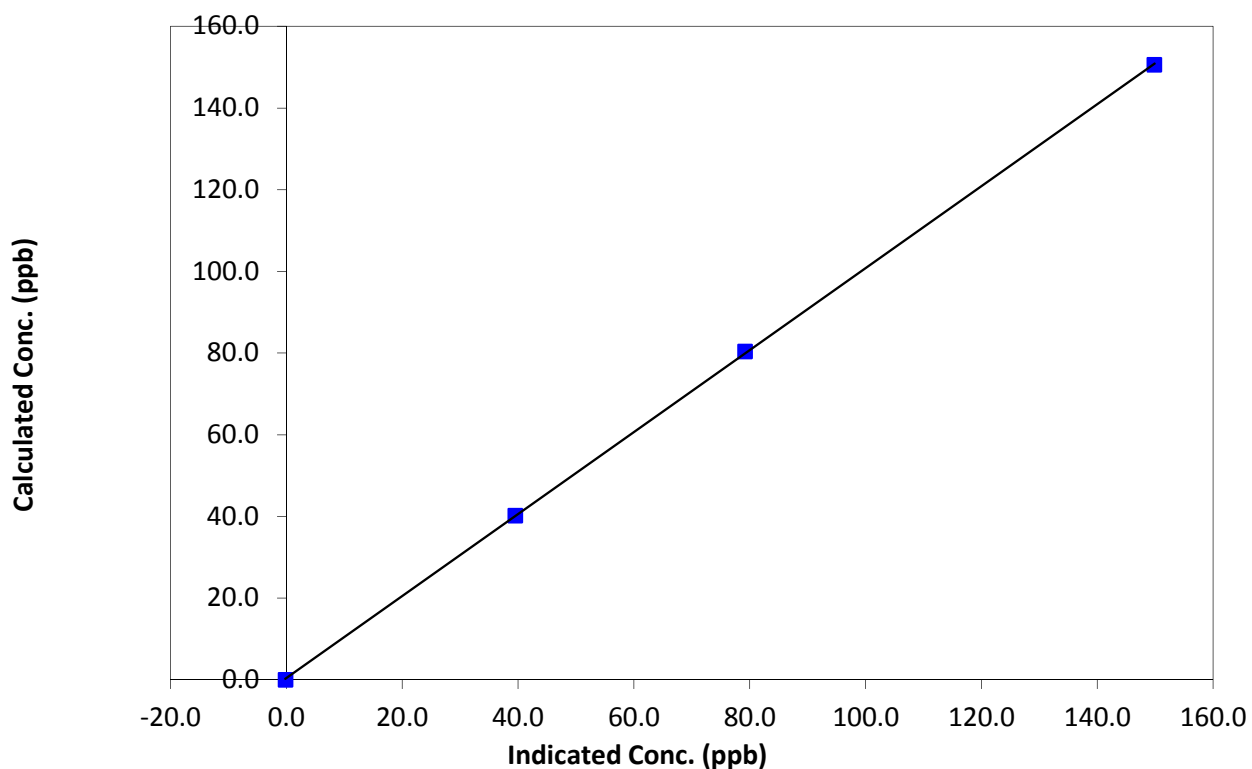
Station Information

Calibration Date	November 5, 2014	Previous Calibration	October 2, 2014
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	13:15	End Time (MST)	18:30
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	0.999969
150.6	149.9	1.0050		
80.4	79.2	1.0152	Slope	1.003928
40.2	39.5	1.0172		
			Intercept	0.427383

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

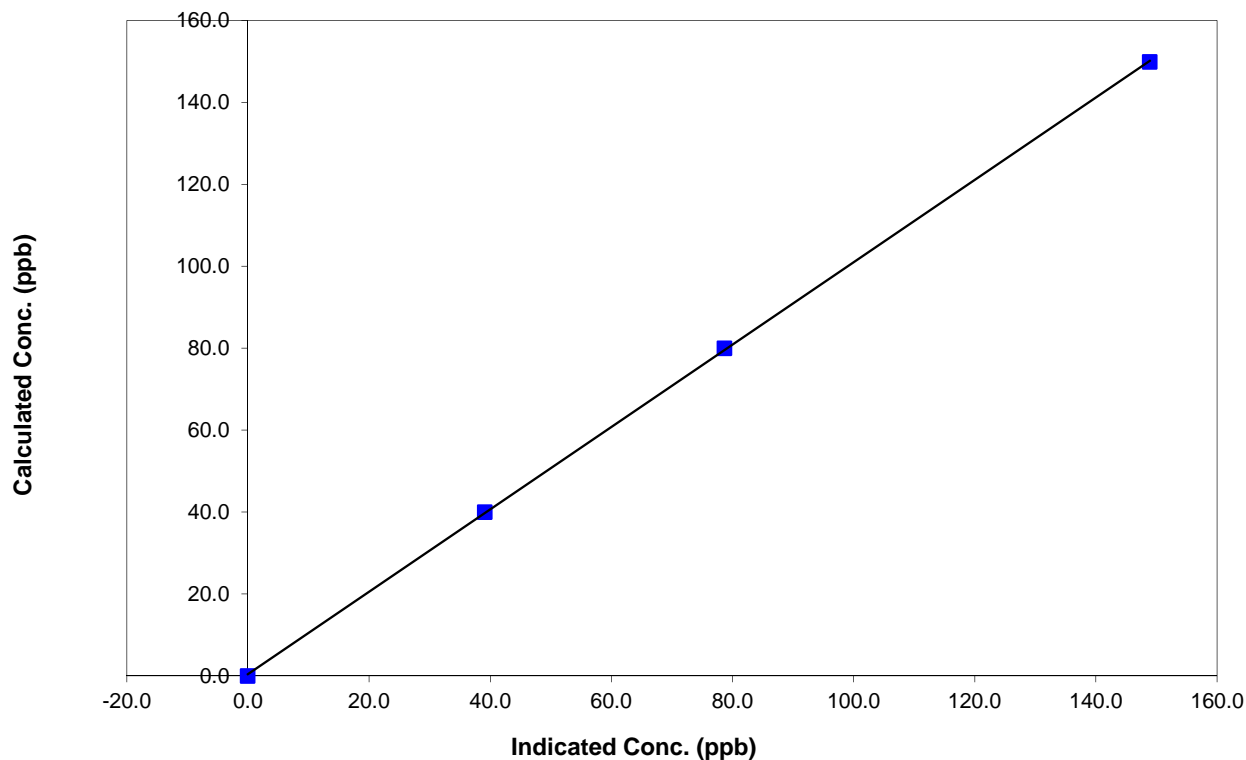
Station Information

Calibration Date	November 5, 2014	Previous Calibration	October 2, 2014
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	13:15	End Time (MST)	18:30
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	0.999961
149.9	148.9	1.0067		
80.0	78.7	1.0167	Slope	1.005885
40.0	39.1	1.0231		
			Intercept	0.419806

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

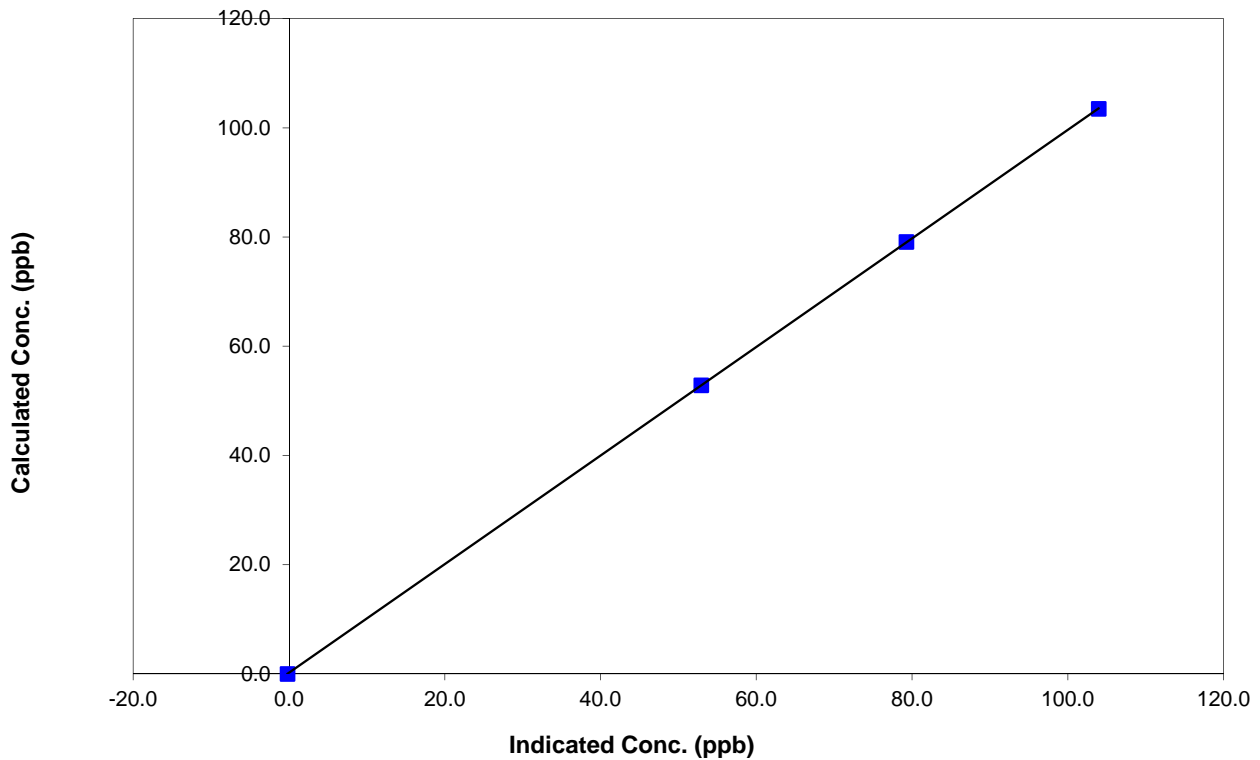
Station Information

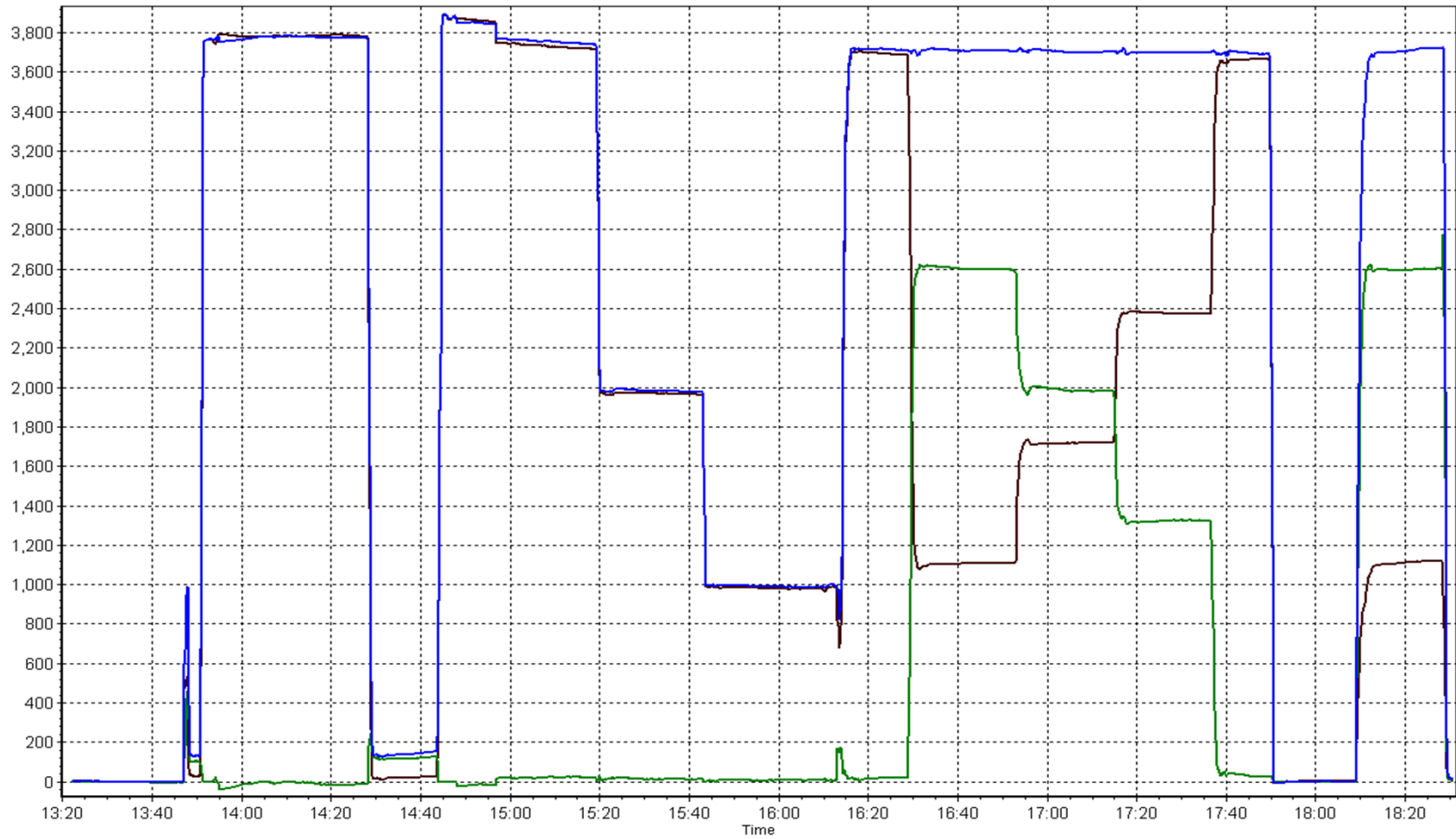
Calibration Date	November 5, 2014	Previous Calibration	October 2, 2014
Station Number	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	13:15	End Time (MST)	18:30
Analyzer make	Thermo 42C	Analyzer serial #	2185

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	N/A	Correlation Coefficient	0.999997
103.5	104.0	0.9954		
79.1	79.3	0.9981	Slope	0.994089
52.9	53.0	0.9980		
			Intercept	0.214539

NO₂ Calibration Curve





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 9
BARGE LANDING
NOVEMBER 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

December 30, 2014

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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS 9)
 NOVEMBER 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	686	34	34	100.00	2	0	1	0
THC(ppm) Average	686	34	34	100.00	14.7	-	3.6	-
Temperature (C) Average	720	0	0	100.00	11.3	-	4.6	-
Wind Speed 10 m (km/h) Average	720	0	0	100.00	15	-	-	-
Wind Direction 10 m (deg) Average	720	0	0	100.00	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS 9)
 NOVEMBER 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	686	0.3	0	-	0	0	0	0	0	1	2
THC(ppm) Average	686	2.29	0.8	-	2	2	2.1	2.2	2.3	2.5	14.7
Temperature (C) Average	720	-10.15	8.1	-	-27.3	-20.6	-15.9	-10.9	-4.2	1.1	11.3
Wind Speed 10 m (km/h) Average	720	5.6	3	-	0	2	4	5	7	9	15
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS 9)
NOVEMBER 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:	720
Maximum Value: 2 ppb on Nov 26 13:00	Maximum Daily Average: 0.7 ppb on Nov 26		Hours of Data:	686
Minimum Value: 0 ppb on Nov 1 17:00	Minimum Daily Average: 0.1 ppb on Nov 7		Hours of Missing Data:	34
Maximum Diurnal Average: 0.4 ppb at hour 19	Minimum Diurnal Average: 0.3 ppb at hour 2		Hours of Calibration:	34
Monthly Average: 0.3 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 1		Percent Operational Time:	100.0

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

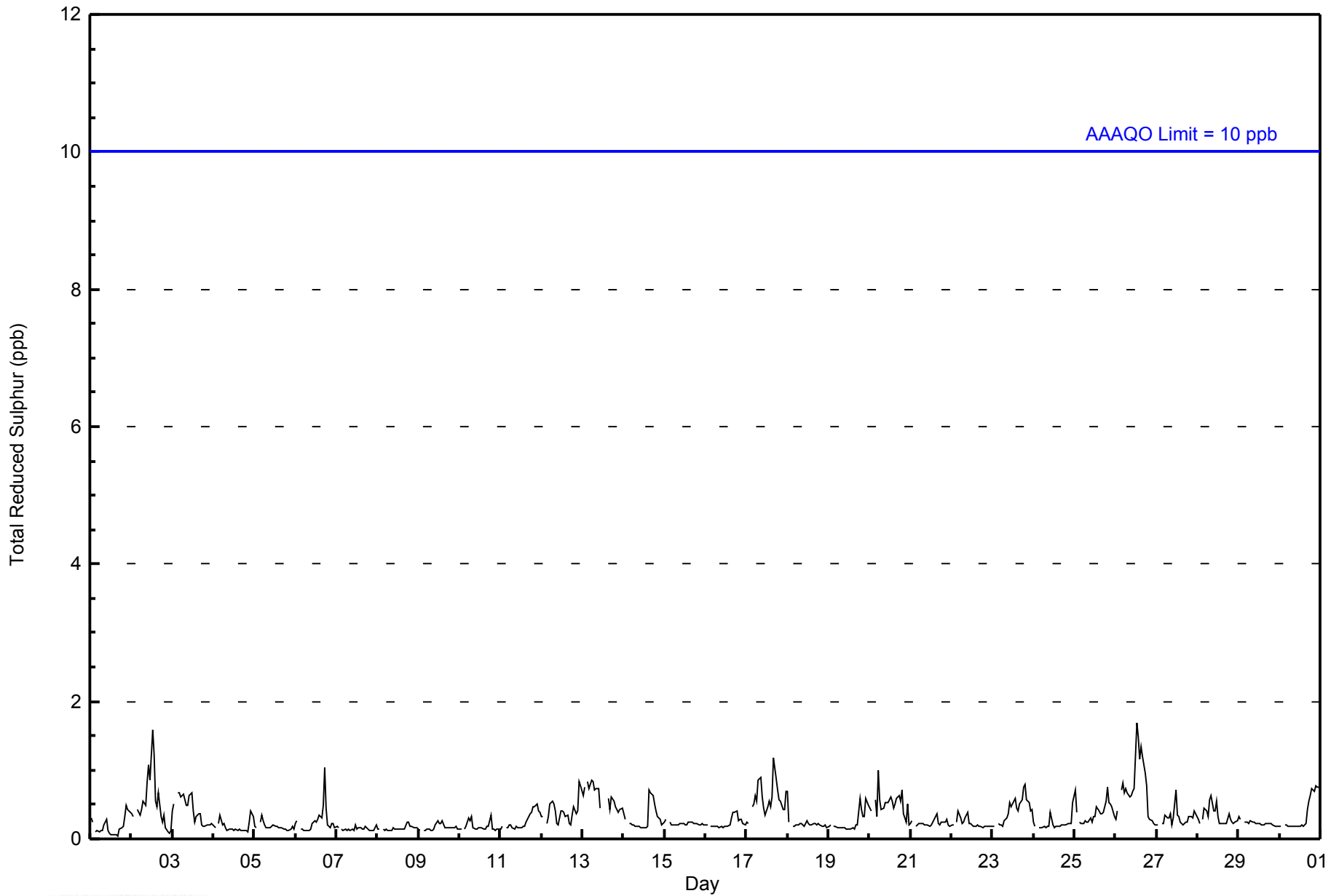
0.3	0.3	--	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	Diurnal Average
1	1	--	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	Diurnal Maximum

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



WBEA
Hourly Averages

Total Reduced Sulphur (TRS) - ppb
Barge Landing - November 2014





WBEA
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Barge Landing - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	686	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



WBEA
Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Barge Landing - November 2014

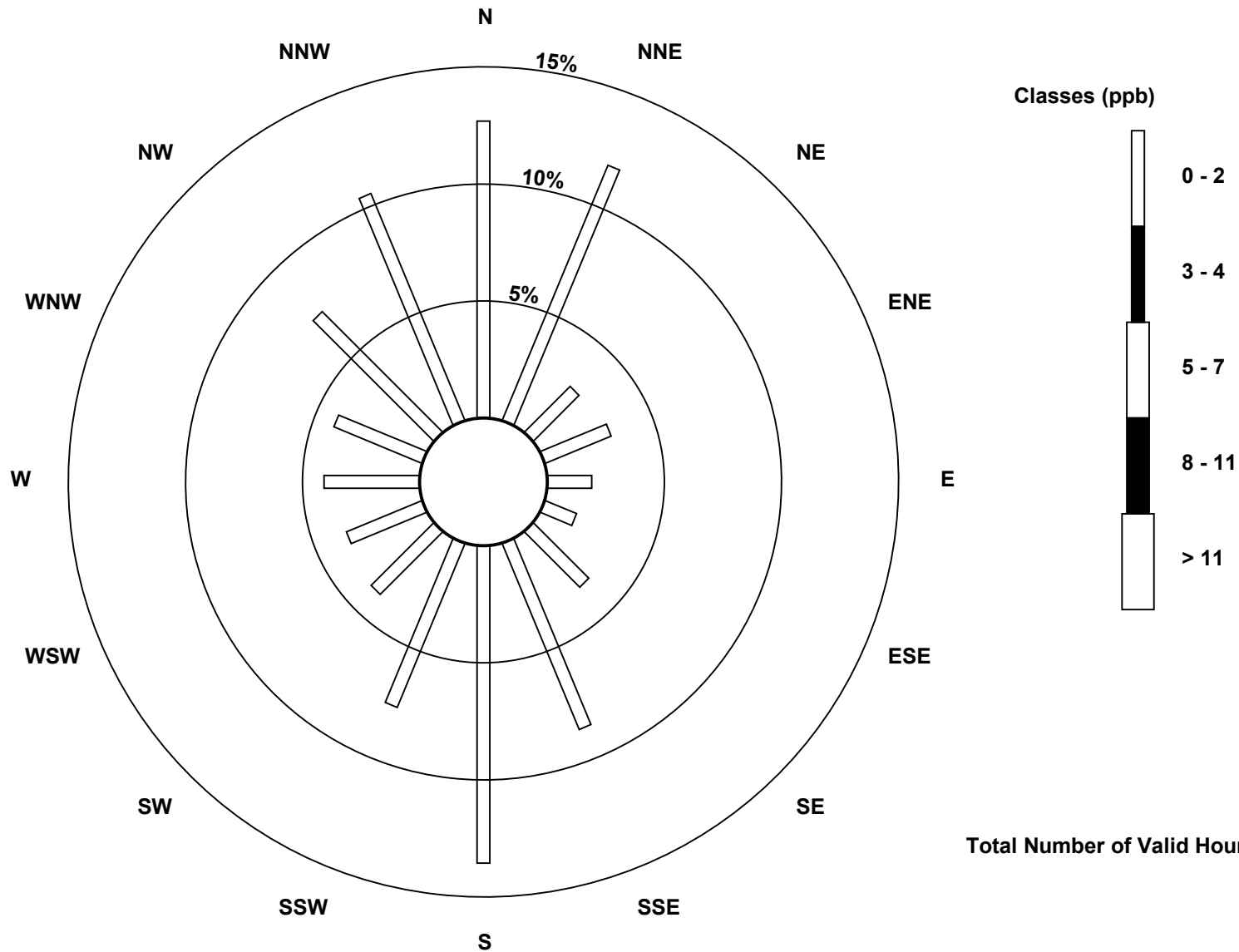
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	87	81	19	21	13	10	23	59	93	52	26	24	28	28	50	72	686
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	87	81	19	21	13	10	23	59	93	52	26	24	28	28	50	72	686

Total Number of Valid Hours: 686

Total Number of Hours: 720

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

**Total Reduced Sulphur (TRS) - ppb
Barge Landing (AMS 9)**

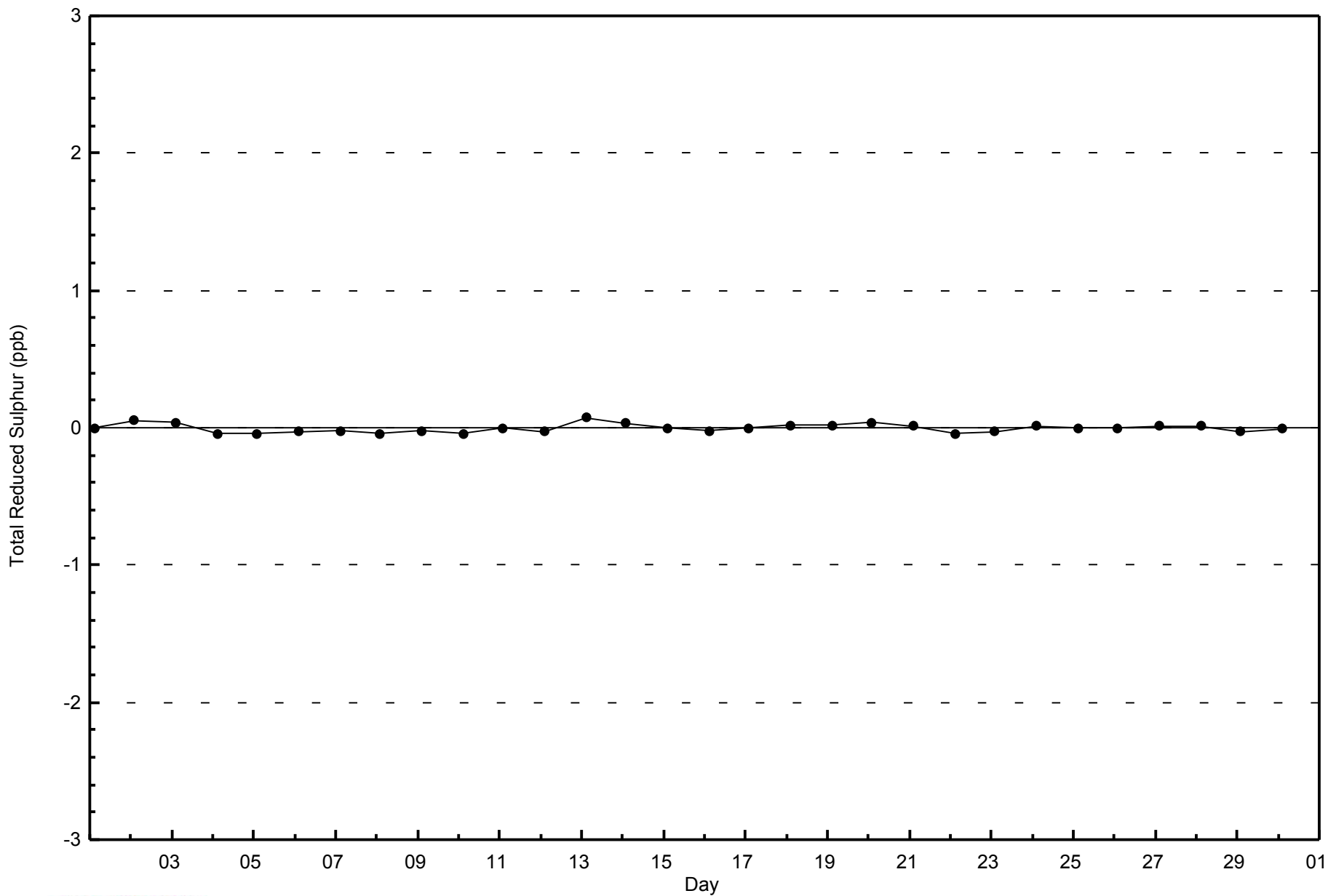


Total Number of Valid Hours: 686



WBEA
Zero Responses

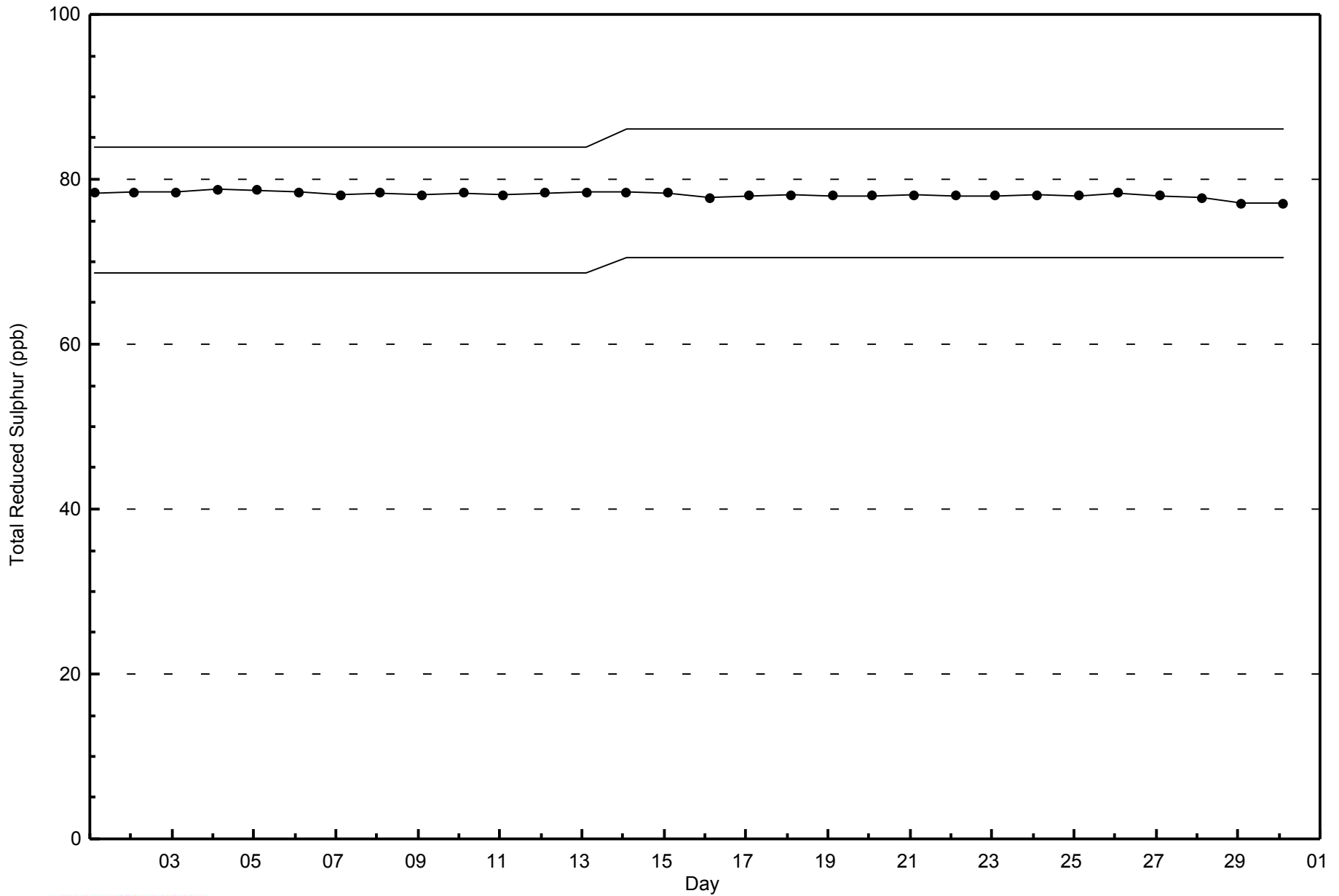
Total Reduced Sulphur (TRS) - ppb
Barge Landing - November 2014





WBEA
Span Responses

Total Reduced Sulphur (TRS) - ppb
Barge Landing - November 2014



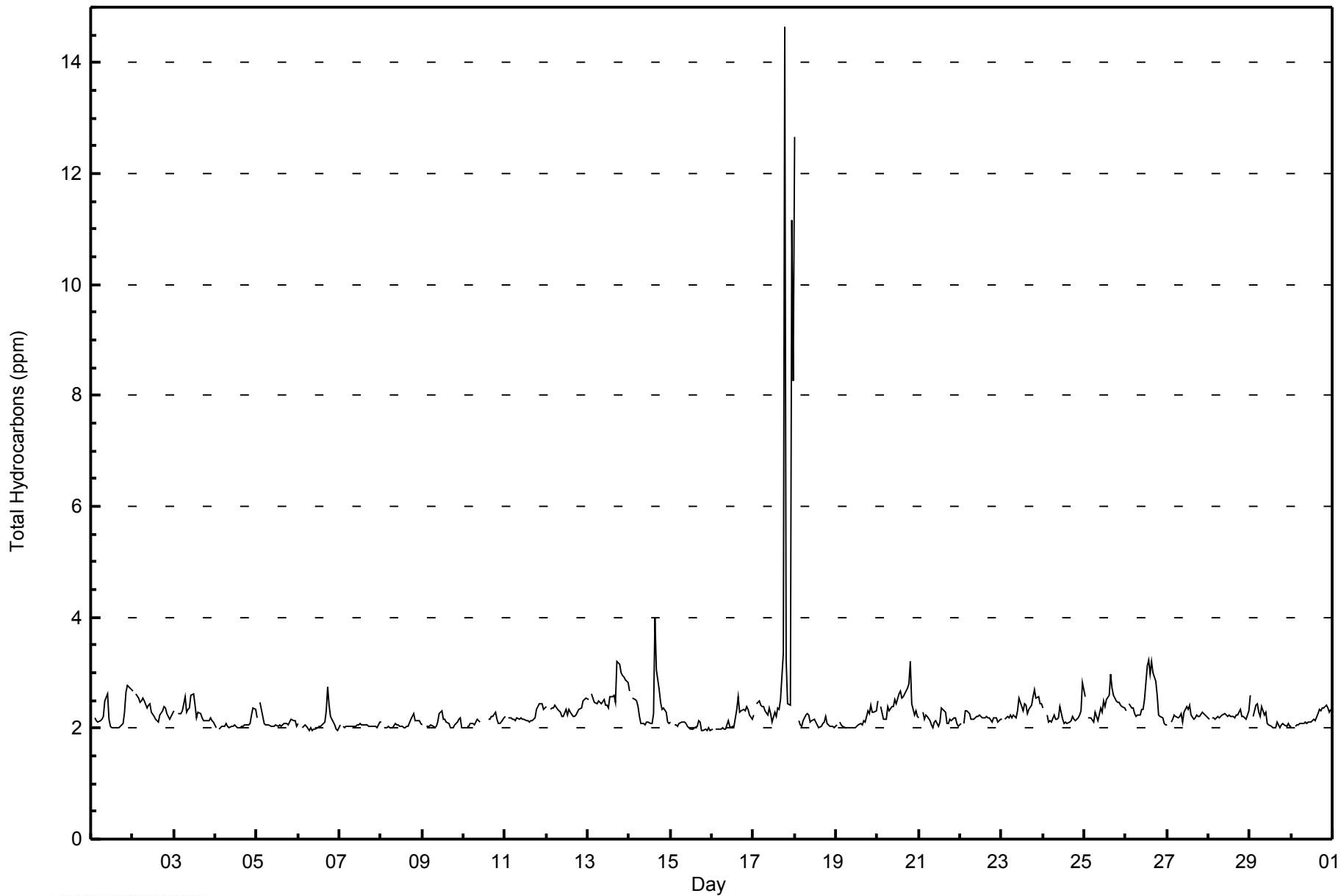


Maximum Value: 14.7 ppm on Nov 17 19:00														Maximum Daily Average: 3.6 ppm on Nov 17														Hours in Service: 720	
Minimum Value: 2.0 ppm on Nov 15 20:00														Minimum Daily Average: 2.0 ppm on Nov 15														Hours of Data: 686	
Maximum Diurnal Average: 2.7 ppm at hour 19														Minimum Diurnal Average: 2.2 ppm at hour 8														Hours of Missing Data: 34	
Monthly Average: 2.29 ppm														Percentiles: P ₁ = 2.0 P ₁₀ = 2.0 Q ₁ = 2.1 Median = 2.2 Q ₃ = 2.3 P ₉₀ = 2.5 P ₉₉ = 3.2														Hours of Calibration: 34	
																												Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Nov	2.3	Z	2.2	2.1	2.1	2.1	2.2	2.2	2.5	2.6	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.3	2.6	2.8	2.7	2.7	2.3	2.8			
2-Nov	2.7	Z	2.6	2.6	2.5	2.5	2.6	2.5	2.4	2.4	2.4	2.3	2.2	2.2	2.1	2.1	2.2	2.3	2.4	2.4	2.3	2.2	2.2	2.3	2.4	2.7			
3-Nov	2.3	Z	2.3	2.3	2.3	2.3	2.6	2.3	2.3	2.4	2.6	2.6	2.4	2.2	2.3	2.3	2.2	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.3	2.6			
4-Nov	2.0	Z	2.0	2.0	2.0	2.0	2.1	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	2.1	2.2	2.4	2.3	2.1	2.4			
5-Nov	2.2	Z	2.5	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.0	2.1	2.5			
6-Nov	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.3	2.8	2.4	2.2	2.1	2.1	2.0	2.0	2.1	2.1	2.8			
7-Nov	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.1			
8-Nov	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.2	2.3	2.1	2.1	2.1	2.1	2.1	2.3			
9-Nov	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.3	2.3	2.2	2.2	2.1	2.1	2.0	2.0	2.0	2.1	2.1	2.2	2.2	2.0	2.1	2.3			
10-Nov	2.0	Z	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	C	C	C	C	2.2	2.2	2.2	2.2	2.3	2.2	2.1	2.1	2.1	2.2	2.1	2.3			
11-Nov	2.2	Z	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.4	2.4	2.4	2.3	2.4	2.2	2.4			
12-Nov	2.4	Z	2.3	2.4	2.4	2.4	2.3	2.3	2.3	2.2	2.2	2.3	2.2	2.3	2.3	2.2	2.2	2.2	2.3	2.3	2.4	2.5	2.5	2.5	2.3	2.5			
13-Nov	2.5	Z	2.6	2.5	2.5	2.5	2.5	2.5	2.4	2.5	2.4	2.4	2.4	2.6	2.6	2.6	2.5	3.2	3.2	3.0	3.0	2.9	2.9	2.8	2.6	3.2			
14-Nov	2.7	Z	2.5	2.5	2.5	2.4	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	4.0	3.0	2.7	2.5	2.4	2.4	2.3	2.1	2.1	2.4	4.0			
15-Nov	2.1	Z	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1			
16-Nov	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.3	2.6	2.3	2.3	2.3	2.3	2.4	2.3	2.2	2.2	2.1	2.6			
17-Nov	2.2	Z	2.4	2.5	2.4	2.4	2.4	2.3	2.2	2.4	2.3	2.1	2.3	2.2	2.4	2.3	2.5	3.4	14.7	3.2	2.4	2.4	11.2	8.3	3.6	14.7			
18-Nov	12.7	Z	2.1	2.1	2.0	2.1	2.2	2.3	2.2	2.1	2.1	2.2	2.1	2.1	2.0	2.0	2.1	2.1	2.2	2.1	2.0	2.0	2.0	2.0	2.6	12.7			
19-Nov	2.0	Z	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.3	2.3	2.4	2.3	2.3	2.3	2.1	2.4			
20-Nov	2.5	Z	2.4	2.2	2.2	2.2	2.4	2.3	2.4	2.4	2.5	2.4	2.6	2.7	2.5	2.6	2.6	2.7	2.8	3.2	2.4	2.2	2.3	2.2	2.5	3.2			
21-Nov	2.2	Z	2.3	2.2	2.2	2.2	2.1	2.1	2.0	2.1	2.1	2.0	2.1	2.4	2.3	2.3	2.1	2.1	2.2	2.1	2.2	2.2	2.1	2.0	2.2	2.4			
22-Nov	2.1	Z	2.1	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	2.1	2.2	2.2	2.2	2.1	2.2	2.2	2.3			
23-Nov	2.1	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.5	2.5	2.3	2.5	2.4	2.3	2.4	2.4	2.6	2.7	2.5	2.6	2.4	2.4	2.4	2.7			
24-Nov	2.4	Z	2.2	2.1	2.1	2.1	2.2	2.1	2.2	2.2	2.4	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.2	2.2	2.3	2.8	2.2	2.8			
25-Nov	2.6	Z	2.2	2.2	2.2	2.1	2.3	2.2	2.1	2.4	2.3	2.5	2.4	2.5	2.6	3.0	2.7	2.6	2.5	2.5	2.5	2.4	2.4	2.4	2.4	3.0			
26-Nov	2.3	Z	2.4	2.4	2.4	2.3	2.2	2.2	2.2	2.3	2.3	2.5	3.1	3.2	3.0	3.2	3.0	2.9	2.6	2.2	2.2	2.2	2.1	2.1	2.5	3.2			
27-Nov	2.1	Z	2.1	2.2	2.2	2.2	2.2	2.2	2.3	2.1	2.3	2.4	2.3	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.4			
28-Nov	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.3	2.2	2.3			
29-Nov	2.6	Z	2.2	2.4	2.4	2.3	2.2	2.4	2.2	2.3	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.1	2.1	2.0	2.1	2.0	2.2	2.6			
30-Nov	2.0	Z	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.3	2.3	2.2	2.4			
		2.6	--	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.7	2.3	2.3	2.3	2.5	2.4	Diurnal Average				
		12.7	--	2.6	2.6	2.5	2.5	2.6	2.5	2.5	2.6	2.6	2.6	3.1	3.2	3.0	4.0	3.0	3.4	14.7	3.2	3.0	2.9	11.2	8.3	Diurnal Maximum			
Z - zerspan		C - Calibration																											



WBEA
Hourly Averages

Total Hydrocarbons (THC) - ppm
Barge Landing - November 2014





WBEA
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Barge Landing - November 2014

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	142	20.70	20.70
2.1 - 3.0	531	77.41	98.10
3.1 - 10.0	10	1.46	99.56
> 10.0	3	0.44	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



WBEA
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Barge Landing - November 2014

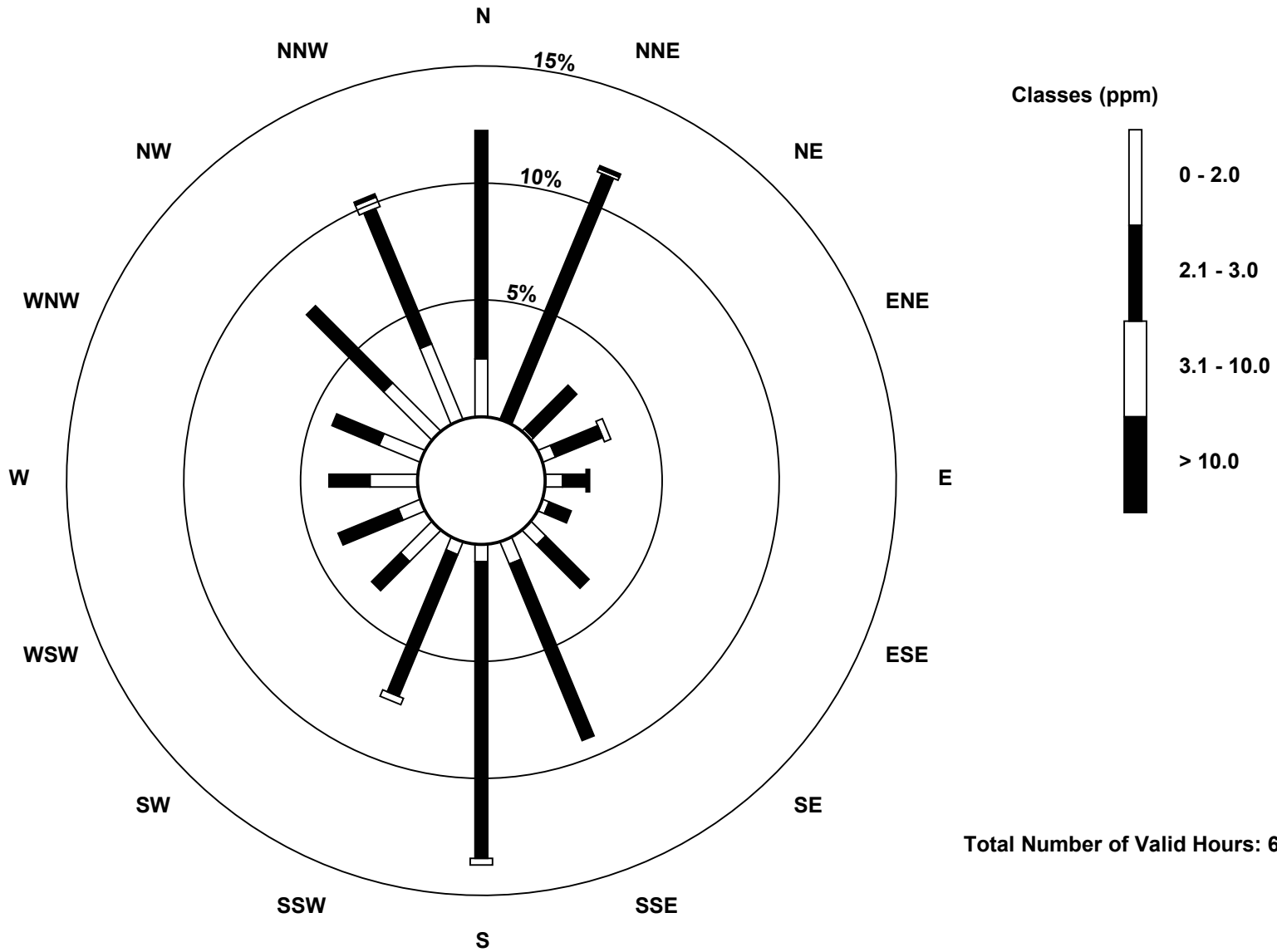
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	17	0	1	4	5	2	6	7	5	4	13	7	14	13	20	24	142
2.1 - 3.0	67	78	18	15	7	7	18	56	87	45	12	19	12	15	32	43	531
3.1 - 10.0	0	1	0	2	0	0	0	0	2	2	0	0	0	0	0	3	10
> 10.0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	3
Totals	84	80	19	21	13	9	24	63	94	51	25	26	26	28	52	71	686

Total Number of Valid Hours: 686

Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

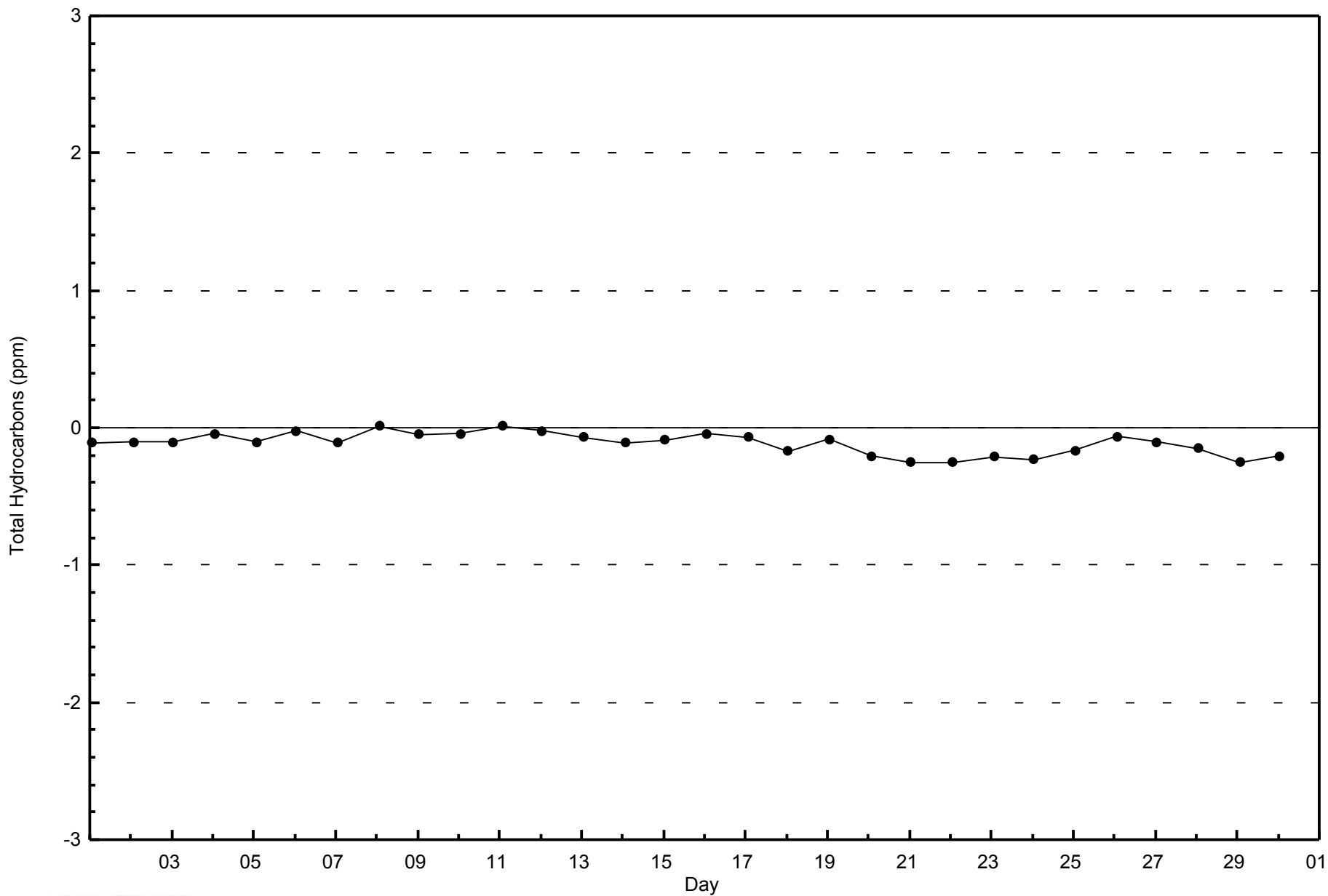
Total Hydrocarbons (THC) - ppm
Barge Landing (AMS 9)





WBEA
Zero Responses

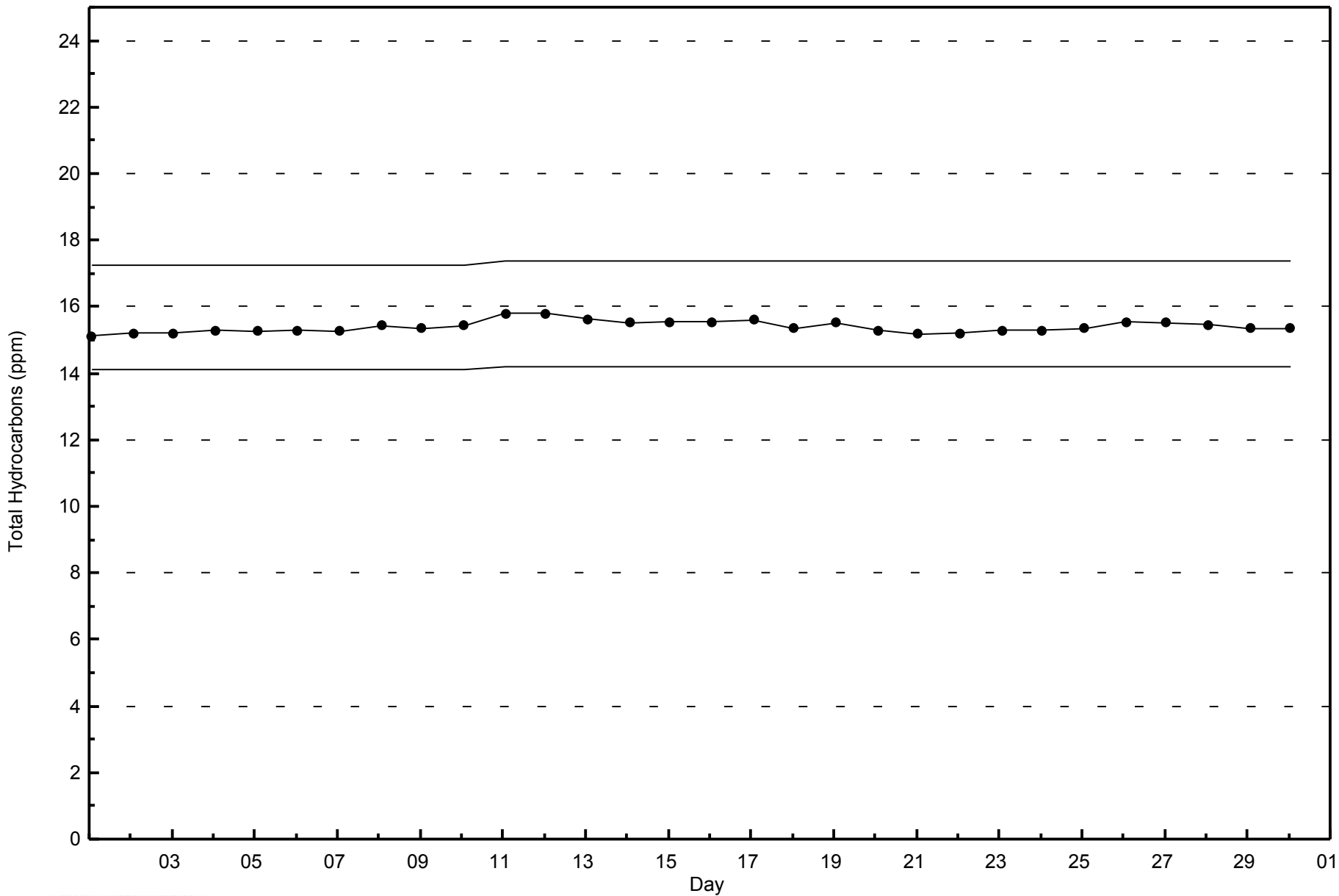
Total Hydrocarbons (THC) - ppm
Barge Landing - November 2014





WBEA
Span Responses

Total Hydrocarbons (THC) - ppm
Barge Landing - November 2014



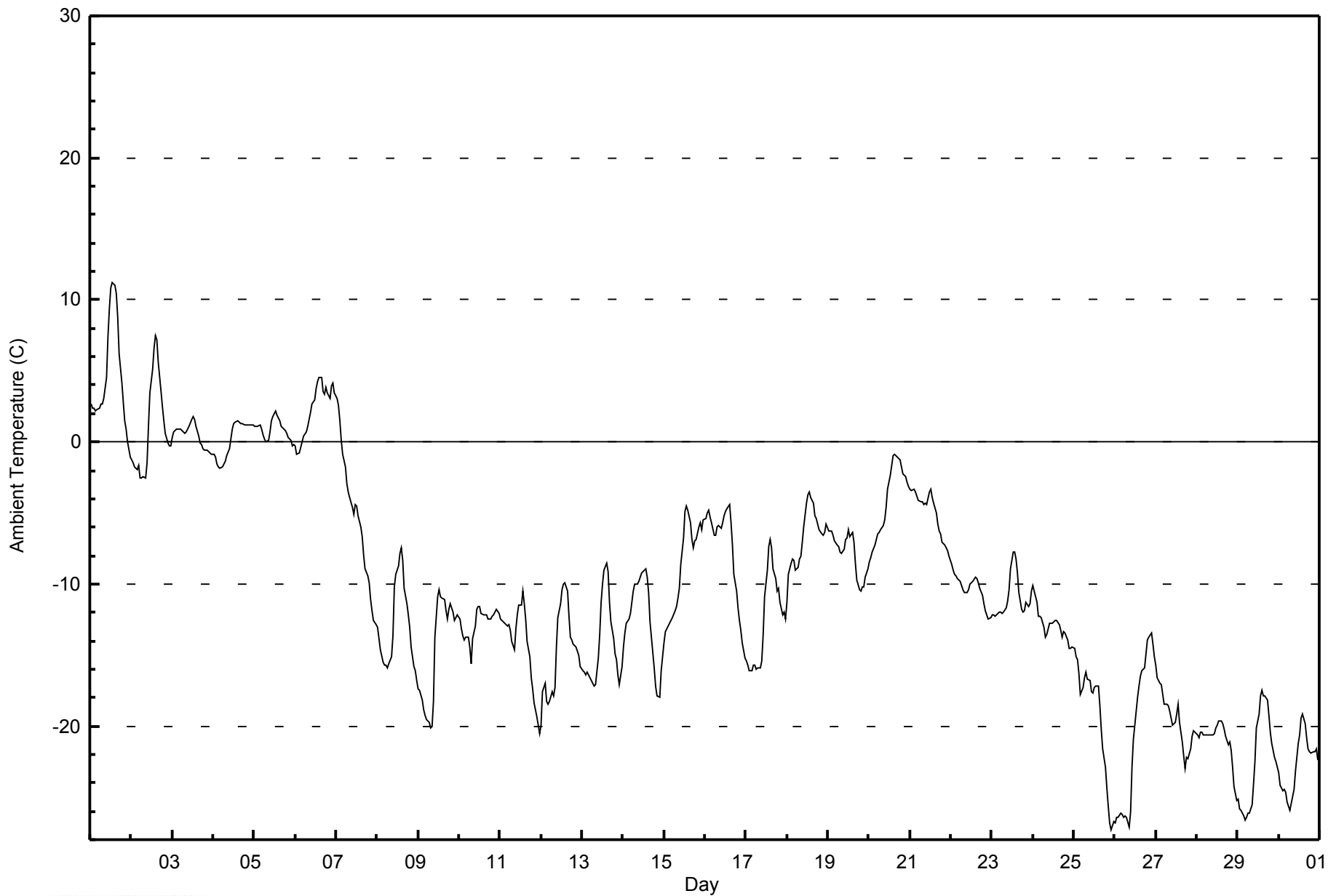


Maximum Value: 11.3 C on Nov 1 14:00		Maximum Daily Average: 4.6 C on Nov 1		Hours in Service: 720																																												
Minimum Value: -27.3 C on Nov 25 23:00		Minimum Daily Average: -22.7 C on Nov 30		Hours of Data: 720																																												
Maximum Diurnal Average: -7.3 C at hour 14		Minimum Diurnal Average: -11.6 C at hour 24		Hours of Missing Data: 0																																												
Monthly Average: -10.15 C		Percentiles: P ₁ = -26.5 P ₁₀ = -20.6 Q ₁ = -15.9 Median = -10.9 Q ₃ = -4.2 P ₉₀ = 1.1 P ₉₉ = 6.6		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-Nov	2.7	2.3	2.4	2.1	2.3	2.4	2.6	2.7	3.1	4.6	7.4	9.4	10.8	11.3	11.1	10.4	8.8	6.2	4.1	2.7	1.5	0.9	0.0	-1.0	4.6	11.3																						
2-Nov	-1.3	-1.5	-1.8	-1.9	-1.7	-2.5	-2.6	-2.5	-2.5	-1.5	1.1	3.5	5.1	6.6	7.5	7.2	5.6	3.5	2.4	1.5	0.6	-0.1	-0.3	-0.3	1.0	7.5																						
3-Nov	0.3	0.7	0.9	0.9	0.9	0.9	0.7	0.6	0.7	0.9	1.1	1.6	1.8	1.6	1.1	0.4	-0.1	-0.2	-0.5	-0.5	-0.6	-0.6	-0.7	-0.9	0.5	1.8																						
4-Nov	-0.9	-1.1	-1.5	-1.8	-1.9	-1.7	-1.6	-1.3	-1.0	-0.4	0.2	0.9	1.3	1.4	1.5	1.4	1.3	1.3	1.2	1.2	1.2	1.2	1.2	1.2	0.1	1.5																						
5-Nov	1.1	1.1	1.1	1.2	0.9	0.5	0.3	0.0	0.2	0.7	1.5	1.8	2.2	1.9	1.7	1.5	1.1	0.9	0.8	0.6	0.3	0.1	-0.2	-0.1	0.9	2.2																						
6-Nov	-0.3	-0.9	-0.7	-0.4	0.0	0.4	0.7	1.1	1.6	2.1	2.6	3.0	3.8	4.2	4.6	4.5	3.6	3.3	3.8	3.5	3.1	4.0	4.1	3.5	2.3	4.6																						
7-Nov	3.0	2.6	1.5	0.2	-0.9	-1.8	-2.9	-3.5	-3.9	-4.6	-5.1	-4.4	-4.5	-5.2	-5.9	-6.7	-7.9	-8.9	-9.4	-9.9	-11.0	-11.9	-12.5	-12.8	-5.3	3.0																						
8-Nov	-13.0	-13.9	-14.6	-15.5	-15.7	-15.7	-15.9	-15.6	-15.1	-13.7	-10.2	-9.3	-8.8	-7.9	-7.5	-8.3	-10.3	-11.4	-12.2	-13.1	-14.4	-15.8	-16.1	-16.8	-12.9	-7.5																						
9-Nov	-17.3	-17.5	-18.2	-18.9	-19.2	-19.6	-19.7	-20.1	-20.1	-18.3	-13.7	-10.9	-10.4	-10.9	-11.0	-11.1	-11.9	-12.4	-11.8	-11.3	-12.0	-12.6	-12.4	-12.2	-14.7	-10.4																						
10-Nov	-12.4	-13.2	-13.6	-14.0	-13.7	-13.7	-14.4	-15.6	-13.9	-13.0	-11.8	-11.6	-11.6	-12.0	-12.2	-12.2	-12.2	-12.5	-12.5	-12.3	-12.1	-12.0	-11.8	-12.1	-12.8	-11.6																						
11-Nov	-12.4	-12.6	-12.6	-12.9	-12.9	-12.8	-13.3	-14.0	-14.7	-13.2	-12.2	-11.5	-11.5	-10.5	-11.4	-12.4	-14.1	-15.2	-16.6	-17.4	-18.4	-19.4	-20.0	-20.5	-14.3	-10.5																						
12-Nov	-19.9	-17.6	-17.0	-18.2	-18.5	-18.2	-17.6	-17.8	-17.3	-14.4	-12.4	-11.3	-10.4	-10.0	-10.0	-10.6	-12.3	-13.7	-13.9	-14.2	-14.4	-14.8	-15.0	-15.8	-14.8	-10.0																						
13-Nov	-16.1	-16.2	-16.4	-16.3	-16.4	-16.8	-17.0	-17.2	-17.1	-15.2	-13.6	-11.2	-10.0	-9.0	-8.5	-9.2	-11.3	-12.7	-13.8	-14.9	-15.3	-16.4	-17.1	-15.8	-14.3	-8.5																						
14-Nov	-14.4	-13.5	-12.8	-12.5	-12.0	-11.3	-10.5	-10.0	-10.0	-9.8	-9.5	-9.2	-9.0	-8.9	-9.5	-10.6	-12.7	-14.8	-15.9	-17.2	-17.8	-17.9	-16.1	-15.1	-12.5	-8.9																						
15-Nov	-14.2	-13.3	-12.9	-12.7	-12.6	-12.3	-11.9	-11.6	-11.0	-10.3	-8.7	-6.7	-4.9	-4.5	-4.8	-5.7	-6.8	-7.5	-7.0	-6.9	-6.0	-5.7	-6.1	-5.5	-8.7	-4.5																						
16-Nov	-5.4	-5.0	-4.8	-5.3	-5.7	-6.6	-6.6	-6.0	-5.9	-6.1	-5.6	-5.2	-4.9	-4.7	-4.4	-5.7	-7.2	-9.3	-10.5	-11.7	-12.5	-13.2	-14.1	-15.2	-7.6	-4.4																						
17-Nov	-15.4	-15.7	-16.1	-16.1	-15.7	-15.7	-16.0	-15.9	-15.9	-15.4	-13.6	-10.9	-9.1	-7.4	-6.9	-7.5	-9.0	-9.6	-10.5	-10.3	-11.3	-12.2	-12.0	-12.4	-12.5	-6.9																						
18-Nov	-11.3	-9.4	-8.5	-8.2	-8.3	-9.0	-8.9	-8.3	-8.0	-7.1	-6.0	-4.3	-3.7	-3.5	-3.9	-4.3	-5.2	-5.4	-5.8	-6.2	-6.5	-6.5	-6.4	-5.8	-6.7	-3.5																						
19-Nov	-6.3	-6.3	-6.3	-6.6	-6.9	-7.2	-7.4	-7.8	-7.9	-7.5	-6.8	-6.8	-6.2	-6.6	-6.4	-7.1	-8.6	-9.8	-10.4	-10.6	-10.2	-10.2	-9.5	-8.9	-7.8	-6.2																						
20-Nov	-8.4	-8.1	-7.7	-7.3	-6.9	-6.5	-6.4	-6.2	-5.9	-5.5	-4.6	-3.3	-2.3	-1.6	-0.9	-0.8	-1.0	-1.2	-1.3	-1.8	-2.2	-2.4	-2.8	-3.1	-4.1	-0.8																						
21-Nov	-3.3	-3.4	-3.4	-3.5	-3.8	-4.1	-4.2	-4.2	-4.4	-4.3	-4.4	-3.5	-3.3	-3.9	-4.4	-5.0	-5.8	-6.2	-6.5	-7.1	-7.3	-7.4	-7.6	-8.0	-5.0	-3.3																						
22-Nov	-8.6	-9.1	-9.3	-9.4	-9.6	-9.8	-10.1	-10.4	-10.6	-10.6	-10.4	-10.0	-9.9	-9.8	-9.5	-9.6	-9.9	-10.3	-10.8	-11.4	-11.9	-12.1	-12.4	-12.3	-10.3	-8.6																						
23-Nov	-12.1	-12.2	-12.2	-12.0	-11.9	-11.9	-12.1	-12.0	-11.7	-11.2	-10.4	-8.9	-7.8	-7.8	-8.2	-9.2	-10.6	-11.8	-12.0	-11.9	-11.3	-11.6	-11.4	-10.5	-11.0	-7.8																						
24-Nov	-10.1	-10.5	-11.3	-12.3	-12.3	-12.4	-13.1	-13.8	-13.6	-13.1	-12.7	-12.8	-12.7	-12.6	-12.5	-12.9	-13.2	-13.8	-13.3	-13.4	-14.0	-14.5	-14.5	-14.4	-12.9	-10.1																						
25-Nov	-14.5	-15.2	-15.3	-16.3	-17.8	-17.2	-16.6	-16.2	-16.7	-16.8	-17.5	-17.7	-17.3	-17.1	-17.2	-18.6	-20.3	-21.6	-22.9	-24.3	-25.6	-26.9	-27.3	-26.8	-19.3	-14.5																						
26-Nov	-26.8	-26.5	-26.4	-26.2	-26.2	-26.4	-26.4	-26.4	-27.1	-26.0	-22.9	-20.9	-19.0	-18.0	-17.1	-16.5	-16.1	-15.9	-14.9	-13.9	-13.7	-13.5	-14.2	-15.1	-20.7	-13.5																						
27-Nov	-15.7	-16.6	-17.0	-17.1	-17.8	-18.4	-18.5	-18.6	-18.9	-19.4	-20.0	-19.8	-19.2	-18.5	-19.8	-21.1	-22.1	-23.0	-22.2	-22.3	-21.6	-20.7	-20.3	-20.5	-19.5	-15.7																						
28-Nov	-20.6	-20.8	-20.4	-20.5	-20.6	-20.6	-20.7	-20.6	-20.6	-20.6	-20.5	-20.2	-19.9	-19.7	-19.6	-19.8	-20.2	-20.7	-21.3	-21.1	-21.7	-22.9	-24.3	-25.3	-21.0	-19.6																						
29-Nov	-25.2	-25.9	-25.9	-26.4	-26.7	-26.4	-26.1	-26.1	-25.6	-24.0	-22.5	-20.1	-19.1	-17.9	-17.5	-17.8	-17.9	-18.2	-19.3	-20.4	-21.2	-22.2	-22.5	-22.9	-22.4	-17.5																						
30-Nov	-23.3	-24.2	-24.6	-24.5	-24.7	-25.3	-26.0	-25.4	-24.9	-24.5	-23.2	-21.2	-20.6	-19.5	-19.2	-19.9	-20.8	-21.6	-21.8	-21.9	-21.8	-21.8	-21.6	-22.4	-22.7	-19.2																						
																								-10.7	-10.8	-10.9	-11.1	-11.2	-11.3	-11.4	-11.4	-11.3	-10.6	-9.5	-8.4	-7.7	-7.3	-7.4	-7.9	-8.9	-9.8	-10.2	-10.6	-10.9	-11.3	-11.5	-11.6	Diurnal Average
																								3.0	2.6	2.4	2.1	2.3	2.4	2.6	2.7	3.1	4.6	7.4	9.4	10.8	11.3	11.1	10.4	8.8	6.2	4.1	3.5	3.1	4.0	4.1	3.5	Diurnal Maximum



WBEA
Hourly Averages

Ambient Temperature (AT) - C
Barge Landing - November 2014





WBEA
Cumulative Frequency Distribution

Ambient Temperature (AT) - C
Barge Landing - November 2014

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	90	12.50	12.50
-20 - 0	520	72.22	84.72
0 - 10	106	14.72	99.44
10 - 20	4	0.56	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Speed: 15 km/h on Nov 7 02:00	Maximum Daily Speed Average: 9.7 km/h on Nov 7	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 11 22:00	Minimum Daily Speed Average: 0.8 km/h on Nov 26	Hours of Data: 720
Maximum Diurnal Speed Average: 2.1 km/h at hour 20	Minimum Diurnal Speed Average: 0.2 km/h at hour 7	Hours of Missing Data: 0
Monthly Average Velocity: 0.7 km/h 330.8 deg	Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 4 Median = 5 Q ₃ = 7 P ₉₀ = 9 P ₉₉ = 13	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	SW3	SW4	WSW3	S2	SSE3	S3	S3	S5	S5	S6	SW6	SW6	SW7	SW8	SW8	SW7	SSW5	S4	SSW4	S4	SE2	S4	SSE3	S3	SSW4.1	SW8
2-Nov	S4	SSW3	SSE4	S5	S4	SSE5	SSE4	SSE5	S4	SSW4	SSW3	S7	SSW7	S7	S7	SSE7	SSE6	S5	SSE6	SSE6	SSE5	SSE4	S5	S6	S5.0	SSE7
3-Nov	S7	S6	S4	S6	S5	SSW5	S5	SSW3	ESE1	NNE2	NNW4	NNW4	N6	NNE7	NNE7	NE7	NNE6	N6	N6	NNE4	NNW5	NNE4	NNE4	NNE3	NNE1.4	NNE7
4-Nov	ENE3	ESE4	SE6	SE5	SE7	SE5	ESE4	E4	E4	E3	E5	E4	ESE4	ESE3	E3	ENE4	ENE3	E3	ENE3	NE2	N2	NNW2	N2	NW2	E2.9	SE7
5-Nov	NW3	W3	WSW4	WSW7	W6	WNW5	W6	W5	W5	WNW5	WNW4	W6	W6	WSW7	WNW4	NW1	SE3	S3	SSE3	SSW5	S6	S6	S5	S7	WSW3.2	S7
6-Nov	SSE5	SSE5	SSE7	SE9	SSE9	SSE10	SE11	SSE11	SSE13	SSE13	S10	S12	S8	SSE7	S7	SSW4	SSW3	SSW4	SSW7	W5	WNW2	NW9	NW9	NNW11	S5.0	SSE13
7-Nov	NW8	NW15	NW14	NW14	NW13	NNW11	NNW11	NNW9	NNW11	NNW11	N10	NNW13	NNW12	NNW12	NNW11	NNW8	NNW8	NW8	NNW7	N9	NNW7	NNW5	N5	NNE4	NNW9.7	NW15
8-Nov	NNE5	N4	NW3	WNW3	W4	W5	NW5	WNW7	NW6	WNW6	WNW6	NNW6	WNW5	W1	W4	NW3	NW2	N4	NNW3	NNW3	NW2	WSW4	W3	W3	NW3.4	WNW7
9-Nov	WSW5	W4	W3	W3	W4	W1	SW2	WSW3	WSW3	W2	WSW3	WSW3	NNW3	NNE6	NNE6	N5	N4	NNW3	NNW5	N10	N9	N6	N5	N8	NNW2.7	N10
10-Nov	N9	N6	N7	NNW5	NW5	NNW5	WNW4	NW2	N9	N9	N8	N11	NNE11	NNE11	N9	NNE9	NNE7	NNE7	NNE9	N7	NNW5	NNW5	NNW4	NNW5	N6.7	NNE11
11-Nov	N6	NNW5	N7	N8	N7	NNE6	NE7	NNE5	N4	N5	NNW4	N4	NNW3	NW5	NNW5	NNW2	S0	SE2	SE1	ENE1	SSW1	ESE0	NW2	SSE1	N3.1	N8
12-Nov	SE3	SE2	SE2	SE4	SE4	SE5	SSE4	S4	S4	SSW5	SSW6	S7	S7	SSE8	SSE8	SSE7	SE6	SSE8	SSE6	SSE6	SSE6	SSE7	SSE6	SSE5	SSE5.1	SSE8
13-Nov	S7	SSE6	S7	S8	S6	S5	S7	S6	SSE5	S6	S5	S6	SSE5	S4	SSE2	NW2	NNW4	NNW3	NNW3	NNW3	NNW3	NNW2	NW2	NW3	S2.6	S8
14-Nov	W3	W3	WNW2	NW3	NW2	NNW3	NNW5	N6	N7	N8	N7	N7	N7	N6	NNE4	ENE3	E3	ESE5	ESE4	SE1	WSW3	SW4	SW5	SSW6	N1.9	N8
15-Nov	SSW7	SSW8	SSW8	SSW8	SSW9	SSW10	SSW10	SSW10	SSW10	SSW10	SSW9	SW10	WSW8	NW4	N6	N9	NNE10	NNE11	N11	NNW12	NNW13	NNW14	NNW11	NNW11	W2.9	NNW14
16-Nov	NNW12	N15	N14	N12	N9	N7	N11	N12	NNW7	NNW5	NNW7	NNW9	N6	NE4	ENE3	E4	ESE2	WSW3	NW3	NNW3	W2	WSW3	WSW3	SSW2	NNW5.3	N15
17-Nov	SSE3	S3	SSE4	S5	S6	SSE6	SSE6	S7	S6	SW5	SSW5	S7	S8	S9	SW6	SSW4	SSE3	SSW1	NNW4	NNW5	NW2	WNW3	E2	ENE3	S3.2	S9
18-Nov	NNE5	N5	NNE9	N9	WNW4	W4	WNW3	W2	WSW3	W4	NW6	NW6	NW8	NW11	NNW8	NW7	NW5	NW6	NW4	WNW4	WNW4	WNW3	W3	NW4	NW4.5	NW11
19-Nov	WSW3	NW4	NW4	NW4	WNW3	WNW4	NW4	NW3	WSW4	SW6	SW7	SW7	SW8	SSW7	SSW8	SSW6	SSE5	SSE5	SE6	SSE6	SSE7	SE7	SSE7	SSE7	SSW3.3	SSW8
20-Nov	S5	S6	S6	S7	S7	S8	S7	S6	S8	S7	S6	S7	S8	SSW6	S4	SSE4	SE3	E2	NNE4	NNE6	NNE6	NNE6	NNE6	NNE5	SSE3.0	S8
21-Nov	NNE7	NNE5	NNE5	N5	N6	N5	N5	N6	N4	NNE5	NNE6	NW5	NNW5	NE5	NNE5	NE6	NE8	ENE8	NE7	NNE7	NNE4	NE5	ENE6	ENE9	NNE5.2	ENE9
22-Nov	ENE7	NE7	NE6	NNE6	NNE8	NNE9	NNE9	NNE9	NNE8	NNE8	NNE9	NNE9	NNE9	NNE9	NNE10	NNE10	NNE8	N9	N9	N9	N7	N6	N6	N5	NNE7.7	NNE10
23-Nov	NNW4	NNW5	N3	NNW3	NW2	WNW2	SE2	SSE4	SSW3	SSW4	S6	SSW6	S6	S6	SSE6	S6	S5	S3	S3	S1	S1	SW2	N2	N4	SSW1.6	S6
24-Nov	N5	N6	N6	N5	NNW4	N5	N6	NNW3	N3	N4	NNE3	ENE4	ENE4	E3	ENE3	NE2	ENE3	ENE3	ENE4	ENE5	ENE6	E4	NE3	N4	NNE3.4	N6
25-Nov	NNE3	N4	NNW4	NW4	N5	NNW4	N3	N5	N6	NE5	NE5	NNE5	NNE5	NNE4	NNE3	NE1	NNE2	ENE1	SW1	SE1	SE0	ESE2	SE4	SE3	NNE2.4	N6
26-Nov	SSW2	S4	SSE5	SSE4	SSE5	SSE4	SSE5	SSW4	SSW3	S4	SSE6	S5	S5	S4	SW3	SSW1	WNW1	NNW4	N5	NNE9	NNE9	NNE8	NNE13	NNE11	ESE0.8	NNE13
27-Nov	N10	N9	N8	NNE9	NNE8	NNE8	NE8	NNE6	NNW4	NNW3	N3	N3	WSW4	SW2	NNW2	WNW2	W2	NNW2	NNW3	WNW1	WNW1	NE5	NNE7	NE7	NNE4.0	N10
28-Nov	NE5	NE4	NE6	NNE8	NNE7	NNE7	NNE7	NNE7	NNE7	NNE7	NNE8	NNE8	NNE7	NNE7	N6	N6	N5	N4	N1	WSW1	S2	SSW2	S3	S4	NNE4.2	NNE8
29-Nov	S4	SSW5	SSW6	S6	S6	S6	SSW7	SSW9	SSW8	S7	SSW6	SW8	WSW9	SW6	W5	NW3	WNW5	NW10	NW10	NW10	NW9	NW7	NW7	NW6	WSW3.9	NW10
30-Nov	WNW7	WNW5	NW6	NW5	W5	WSW6	WSW6	WSW9	WSW10	SW7	SW8	SSW7	SSW11	SSW12	S10	S9	SSE7	SSE7	S7	SSE8	S8	SSE8	S8	SW5	SSW5.6	SSW12

N1.1NNW1.3NNW1.2NNW0.9	W0.8	W0.4	NW0.2WSW0.8WSW0.8	W1.0	W0.9	W1.4	W1.5	W0.8NNW0.5NNE0.7	NE1.0NNE1.2	N1.5	N2.1	N1.5	N1.1	N1.3	N1.4	Diurnal Average									
NNW12	NW15	NW14	NW14	NW13	NNW11	NNW11	N12	SSE13	SSE13	S10	NNW13	NNW12	NNW12	NNW11	NNE10	NNE10	NNE11	N11	NNW12	NNW13	NNW14	NNE13	NNW11	Diurnal Maximum	

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



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 6 km/h on Nov 15 20:00	Hours of Data: 720
Minimum Value: 0 km/h on Nov 13 20:00	Hours of Missing Data: 0
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 2 P ₉₀ = 3 P ₉₉ = 5	Hours of Calibration: 0
	Percent Operational Time: 100.0

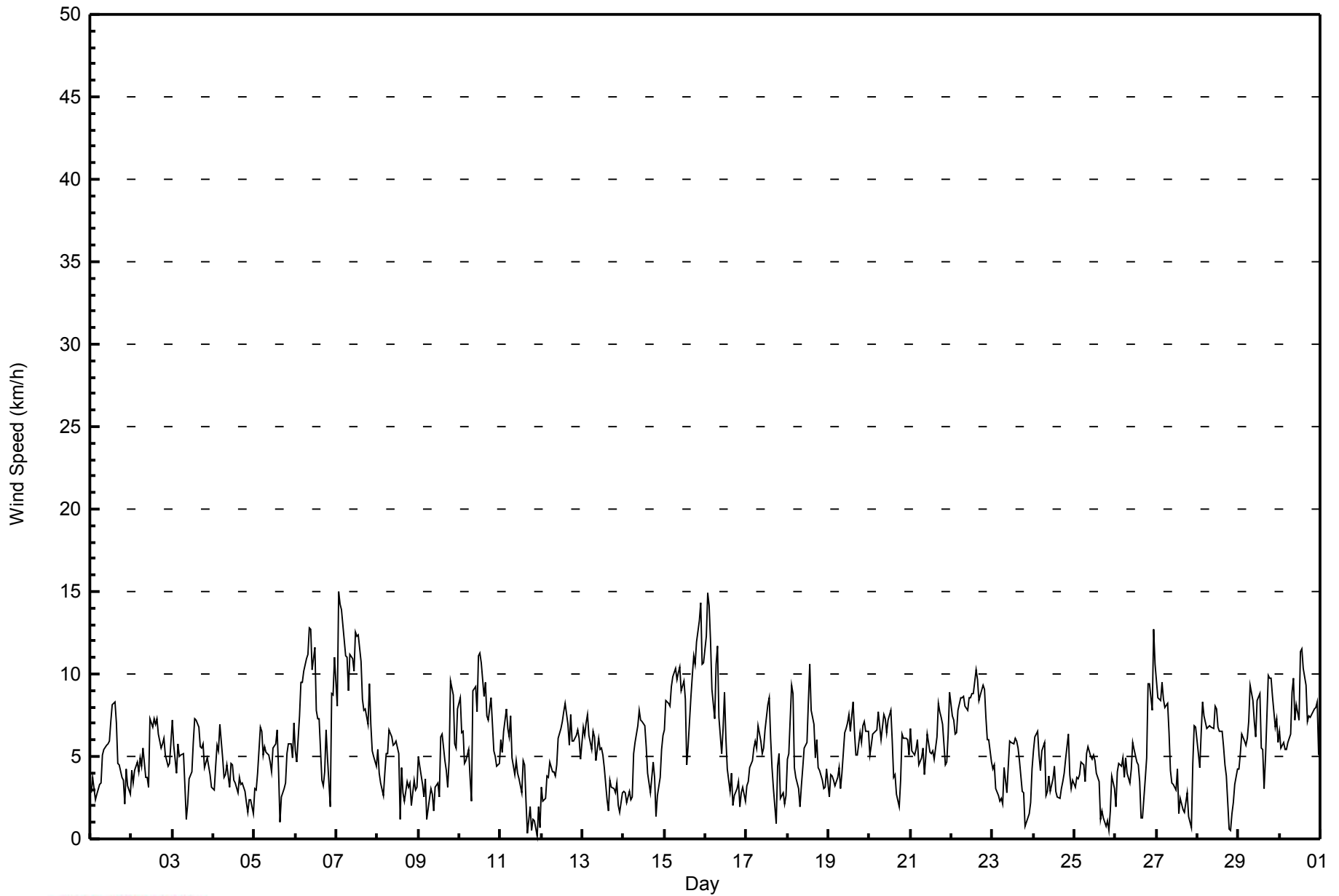
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	1	1	2	1	1	1	1	1	1	2	2	2	2	2	2	2	1	1	1	1	1	1	2	1	2
2-Nov	1	1	1	2	1	1	1	1	1	1	2	3	2	2	2	2	2	2	2	1	2	2	1	2	3
3-Nov	2	2	1	2	2	2	2	1	1	1	1	2	2	2	2	2	2	2	2	2	1	1	1	1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

Diurnal Maximum



WBEA
Hourly Averages

Wind Speed (WS) - km/h
Barge Landing - November 2014





WBEA
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Barge Landing - November 2014

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	386	53.61	53.61
6 - 11	314	43.61	97.22
12 - 19	20	2.78	100.00
20 - 28	0	0.00	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



WBEA
Frequency Distribution

Wind Speed (WS) - km/h
Barge Landing - November 2014

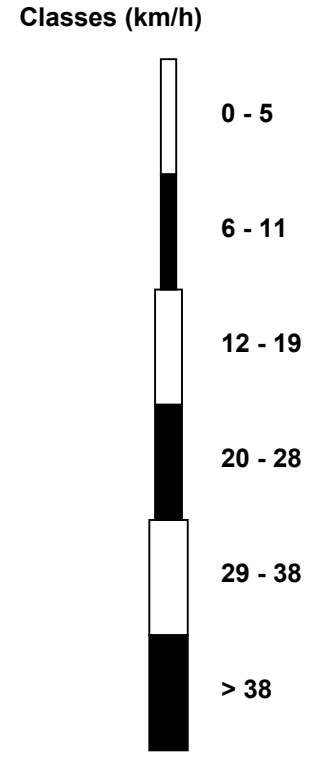
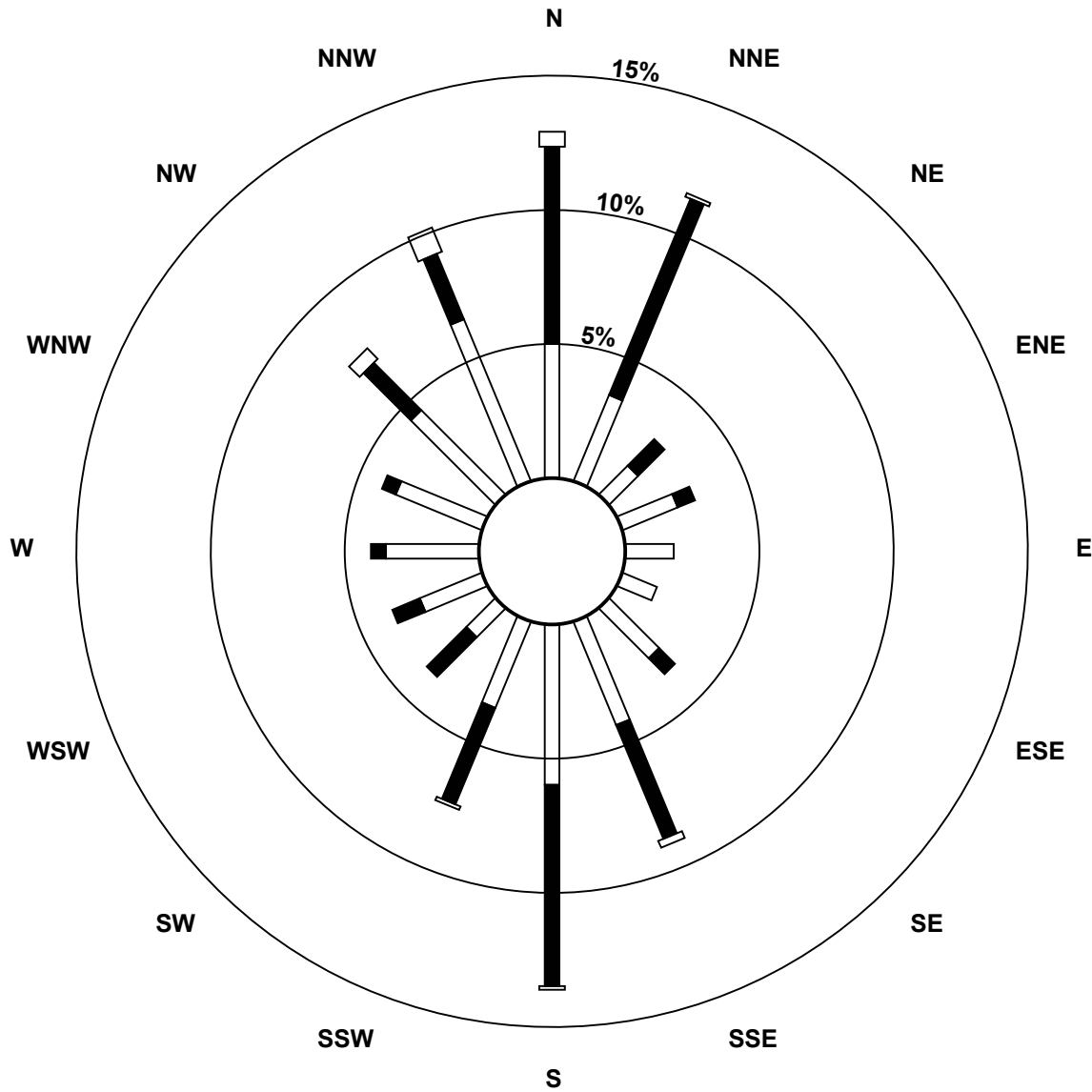
Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	36	25	11	16	13	10	19	30	43	25	11	18	25	25	32	47	386
6 - 11	53	57	10	5	0	0	6	33	54	28	15	8	4	4	18	19	314
12 - 19	4	1	0	0	0	0	0	2	1	1	0	0	0	0	4	7	20
20 - 28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	93	83	21	21	13	10	25	65	98	54	26	26	29	29	54	73	720

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

Wind Speed (WS) - km/h
Barge Landing (AMS 9)



Total Number of Valid Hours: 720



Direction of Maximum Speed: 324 deg on Nov 7 02:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 335.5 deg on Nov 7	Hours of Data: 720
Direction of Minimum Speed: 113 deg on Nov 11 22:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 0.8 deg on Nov 26	Percent Operational Time: 100.0
Monthly Average Direction: 284.3 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-Nov	219	218	249	175	166	172	189	184	188	188	214	226	223	230	227	229	201	191	192	187	142	175	152	180	203.0
2-Nov	181	198	161	180	173	149	161	153	185	205	208	185	194	189	180	168	167	169	168	151	153	163	169	181	173.8
3-Nov	169	170	180	175	181	196	173	193	109	20	331	337	7	12	30	34	27	352	6	18	348	15	31	12	29.2
4-Nov	76	120	128	133	138	135	117	93	95	101	101	95	123	113	93	77	68	84	69	42	6	340	351	326	100.3
5-Nov	325	275	243	253	273	298	265	261	269	287	290	259	272	258	291	317	139	170	149	205	191	179	169	170	244.7
6-Nov	153	156	148	139	152	149	146	156	161	167	170	170	180	163	172	207	210	202	209	260	293	314	325	342	170.7
7-Nov	319	324	324	321	320	332	343	335	339	334	357	339	338	337	344	336	330	322	340	352	342	343	2	18	335.5
8-Nov	13	355	311	288	261	261	320	303	307	295	303	331	294	280	264	317	317	2	338	334	309	242	273	265	305.3
9-Nov	252	266	263	265	264	276	227	242	242	273	253	250	344	26	29	359	354	345	335	11	10	5	2	355	333.0
10-Nov	354	360	357	332	316	347	302	310	7	11	351	9	15	14	11	12	16	13	24	357	335	341	327	346	359.8
11-Nov	350	347	9	5	1	20	37	24	359	0	347	350	333	308	328	328	176	133	129	74	193	113	325	157	360.0
12-Nov	131	138	140	138	146	145	168	169	185	194	205	191	174	167	160	162	138	149	156	161	166	164	168	164	163.6
13-Nov	174	166	169	173	173	181	169	174	166	174	169	186	168	170	156	322	339	347	332	336	340	337	317	309	178.7
14-Nov	279	273	289	313	323	332	346	356	355	359	6	10	4	353	31	74	97	104	108	134	238	215	224	206	351.5
15-Nov	192	194	197	207	206	206	203	199	203	210	201	228	252	305	0	2	12	18	352	342	348	348	334	343	273.8
16-Nov	344	350	356	356	351	354	355	354	342	331	334	329	1	43	63	101	123	247	314	336	279	249	242	211	347.7
17-Nov	167	188	167	170	170	162	165	173	176	229	196	187	182	190	219	212	164	201	336	332	326	286	84	69	187.4
18-Nov	13	360	12	6	283	278	282	263	254	276	306	313	309	323	335	326	326	320	322	293	289	288	269	320	319.4
19-Nov	247	315	307	318	294	292	313	304	243	234	236	233	221	202	192	193	161	167	146	161	164	144	161	167	206.3
20-Nov	177	175	184	173	181	176	173	179	176	179	181	181	186	206	183	157	146	88	16	19	26	18	17	25	167.2
21-Nov	31	29	20	6	2	351	355	359	351	16	13	318	328	39	33	46	55	58	45	23	21	35	59	58	24.7
22-Nov	57	44	42	30	25	29	27	25	24	23	21	21	15	18	19	18	13	8	1	8	5	357	356	359	19.4
23-Nov	345	344	356	333	309	282	145	147	194	198	189	199	190	191	164	175	171	179	179	169	184	230	7	9	192.8
24-Nov	4	2	6	352	346	7	7	348	2	3	30	76	72	91	62	54	70	68	70	67	63	81	37	7	31.7
25-Nov	23	357	338	321	351	344	359	359	11	35	45	28	16	26	25	34	13	70	217	137	130	118	127	145	18.5
26-Nov	197	172	168	162	168	160	162	207	201	185	168	186	174	187	215	200	301	348	2	20	25	32	18	15	113.2
27-Nov	8	10	11	19	31	33	38	33	348	344	11	351	251	230	338	289	277	343	334	284	290	45	28	35	12.1
28-Nov	48	48	35	32	25	14	18	25	29	27	25	23	24	12	9	8	1	357	354	241	185	201	178	190	24.1
29-Nov	183	193	199	186	186	190	201	193	195	175	200	236	242	231	259	307	303	316	322	314	317	314	318	311	246.7
30-Nov	298	292	308	307	271	249	256	247	243	229	228	209	200	202	188	189	164	168	173	168	170	166	174	215	212.5

354.2 335.6 346.0 337.2 281.0 277.2 315.6 239.5 258.3 260.3 269.0 266.7 262.5 270.9 338.7 11.6 40.1 20.3 5.2 358.2 354.3 348.9 359.2 357.9

Diurnal Average

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

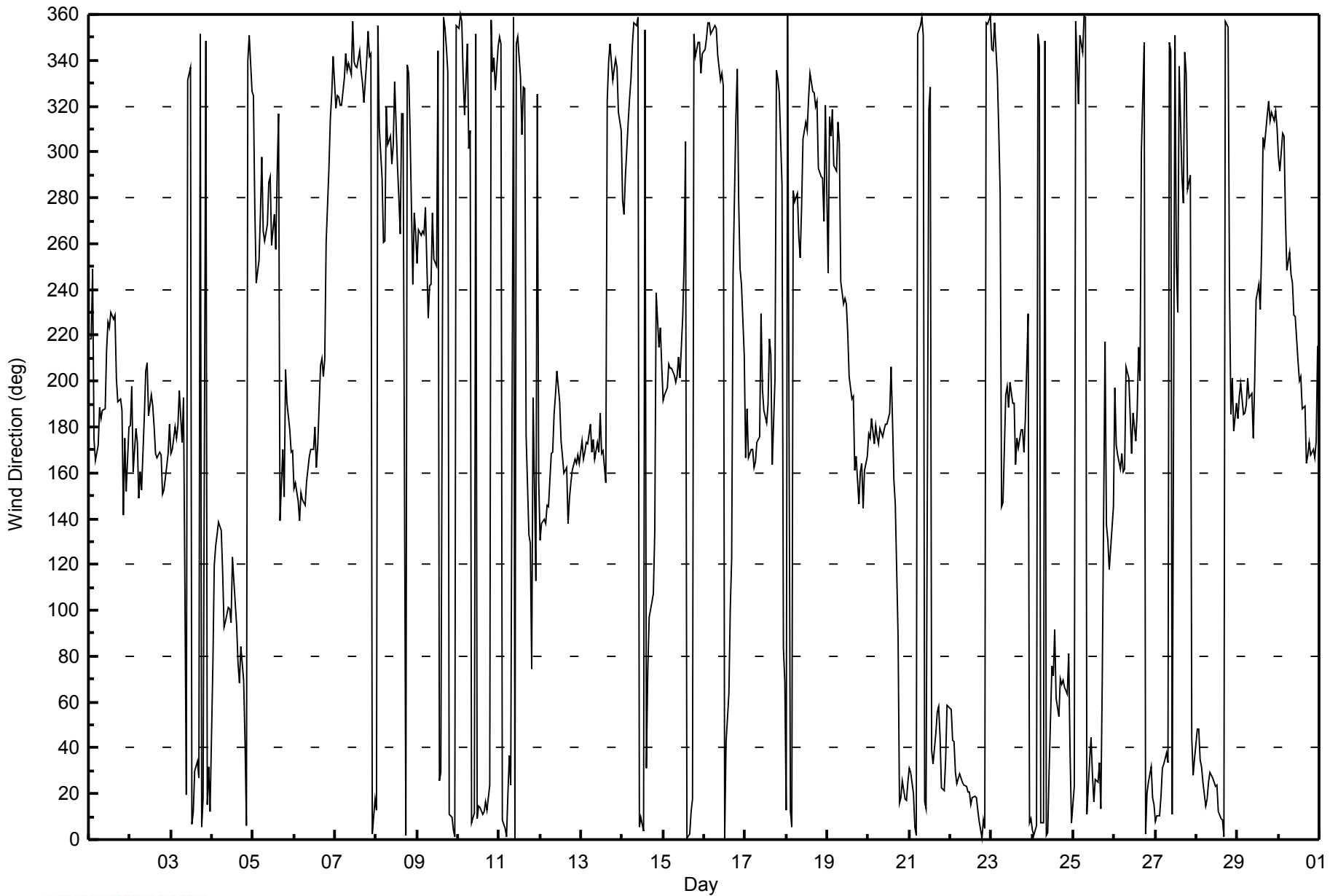


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 98 deg on Nov 5 16:00 Minimum Value: 9 deg on Nov 12 06:00 Percentiles: P ₁ = 10 P ₁₀ = 17 Q ₁ = 19 Median = 22 Q ₃ = 28 P ₉₀ = 38 P ₉₉ = 86																		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0							
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	32	22	70	46	39	44	56	23	21	27	24	28	22	21	20	18	21	15	17	24	49	16	30	42	70
2-Nov	27	25	19	19	17	12	12	12	38	25	36	25	28	25	23	22	17	28	17	15	20	26	26	23	38
3-Nov	23	25	28	27	28	23	25	40	59	48	18	21	23	21	17	19	24	23	27	30	23	30	28	51	59
4-Nov	50	34	24	24	18	23	23	24	24	24	23	25	22	18	24	21	25	19	16	19	34	19	19	44	50
5-Nov	19	33	21	25	27	30	24	26	30	35	31	24	34	24	32	98	20	21	20	28	24	21	24	24	98
6-Nov	17	19	17	18	20	21	28	23	23	26	28	24	40	23	24	35	33	28	24	39	48	21	19	24	48
7-Nov	24	21	20	20	20	21	24	21	22	23	23	24	23	24	23	21	20	18	25	21	22	22	22	31	31
8-Nov	20	20	39	40	27	23	18	14	15	19	31	35	45	92	42	45	31	16	18	13	27	20	19	28	92
9-Nov	13	16	27	29	22	62	23	14	16	46	37	51	77	27	26	26	19	24	23	20	21	21	21	20	77
10-Nov	20	19	19	30	19	24	39	46	21	20	29	24	20	21	23	22	21	19	20	23	17	20	22	27	46
11-Nov	19	18	21	20	22	23	19	22	19	21	32	35	57	37	18	15	87	59	89	60	68	77	26	93	93
12-Nov	26	36	40	10	13	9	16	22	17	22	23	28	31	26	23	20	12	12	13	15	16	16	18	18	40
13-Nov	16	18	19	21	21	21	19	22	22	24	26	31	33	35	40	70	12	14	12	9	10	11	52	16	70
14-Nov	15	32	29	20	26	17	20	21	21	20	21	22	27	24	18	10	9	10	76	32	22	17	24	76	
15-Nov	21	20	21	22	20	21	20	21	24	20	23	30	22	28	27	22	19	18	28	23	22	23	19	20	30
16-Nov	21	23	24	22	22	19	24	21	26	23	21	23	31	28	36	20	46	12	28	31	37	17	15	12	46
17-Nov	17	22	19	21	19	17	19	23	25	22	34	28	25	24	19	20	28	86	15	15	23	38	62	40	86
18-Nov	30	24	21	24	31	50	32	38	32	28	26	23	24	20	23	19	20	16	19	27	22	36	43	51	51
19-Nov	28	22	28	25	29	22	23	23	25	20	33	21	27	26	24	22	16	13	13	16	19	17	21	24	33
20-Nov	25	23	23	26	26	25	26	29	24	24	26	25	26	24	33	25	25	38	39	16	15	15	17	15	39
21-Nov	16	17	19	19	22	21	22	23	21	20	21	34	37	23	17	21	22	20	20	22	19	20	21	19	37
22-Nov	21	18	19	17	17	16	17	16	16	17	17	17	18	17	17	17	18	20	21	20	19	20	19	20	21
23-Nov	18	21	26	23	24	28	44	24	32	25	22	25	33	31	26	17	12	24	22	84	92	67	57	27	92
24-Nov	23	21	20	20	21	25	20	28	26	24	37	20	21	28	34	26	21	31	19	24	20	33	35	31	37
25-Nov	31	22	20	33	23	18	23	22	19	22	19	19	20	20	16	63	31	31	79	64	73	49	10	31	79
26-Nov	73	25	18	19	23	25	25	20	19	28	28	29	29	26	28	80	72	23	28	18	17	19	17	18	80
27-Nov	20	19	19	19	17	16	18	22	29	23	25	50	20	75	28	22	41	18	35	61	84	25	20	20	84
28-Nov	28	28	21	16	16	19	18	18	18	16	16	18	19	20	18	20	20	18	73	82	32	17	14	17	82
29-Nov	17	24	21	18	20	19	20	19	28	26	25	18	15	24	27	30	31	21	20	20	19	21	19	24	31
30-Nov	23	25	25	22	29	18	24	21	18	18	18	26	23	22	22	20	19	18	19	18	18	18	21	38	38
																		73 36 70 46 39 62 56 46 59 48 37 51 77 92 42 98 87 86 89 84 92 77 62 93							
Diurnal Maximum																									



WBEA
Hourly Averages

Wind Direction (WD) - deg
Barge Landing - November 2014





Wood Buffalo Environmental Association

TRS Calibration Report

Station Information

Calibration Date	November 13, 2014	Previous Calibration	October 16, 2014
Station Name	Barge Landing	Station Number	AMS 9
Reason:	Routine		
Start Time (MST)	10:55	End Time (MST)	14:20
Barometric Pressure	NA mmHg	Station temp.	23 Deg C
Calibrator Make/Model	Sabio 4010	Serial number	11071107
Cal Gas Concentration	4.77 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	-689	-690
Analyzer Range (input)	5000	5000	Lamp voltage	1000	1016
Calculated slope	0.989299	1.006467	Chamber temp.	45	45
Calculated intercept	-0.172599	-0.053391	Pressure	690.0	695.2
Analyzer Background	2.03	2.01	Flow	0.436	0.438
Analyzer Coefficient	0.956	0.956	Intensity	91	90
			Converter temp.	800	800

Analyzer make/model	Thermo 43i-TLE	Analyzer serial #	1331259320
Converter make/model	CDN-101	Converter serial #	519

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0.0	0.0	0.0	NA
as found span	5000	83.7	79.8	79.4	1.005
SO2 scrubber check	5000	10.1	119.2	0.3	NA
calibrator zero	5000	0.0	0.0	0.0	NA
high point	5000	83.7	79.8	79.4	1.005
second point	5000	41.9	40.0	39.6	1.009
third point	5000	20.8	19.8	19.9	0.997
calibrator zero	6000	0.0	0.0	0.0	NA
as left zero	6000	0.0	0.0	0.1	NA
as left span	5000	83.7	79.8	79.2	1.008
Average Correction Factor					1.004

Corrected As found	79.4	Previous response	80.9	% change	1.9%
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Notes:

Filter was changed after as founds. Scrubber check after as founds.

Calibration Performed By:

Devin Russell



Wood Buffalo Environmental Association

TRS Calibration Summary

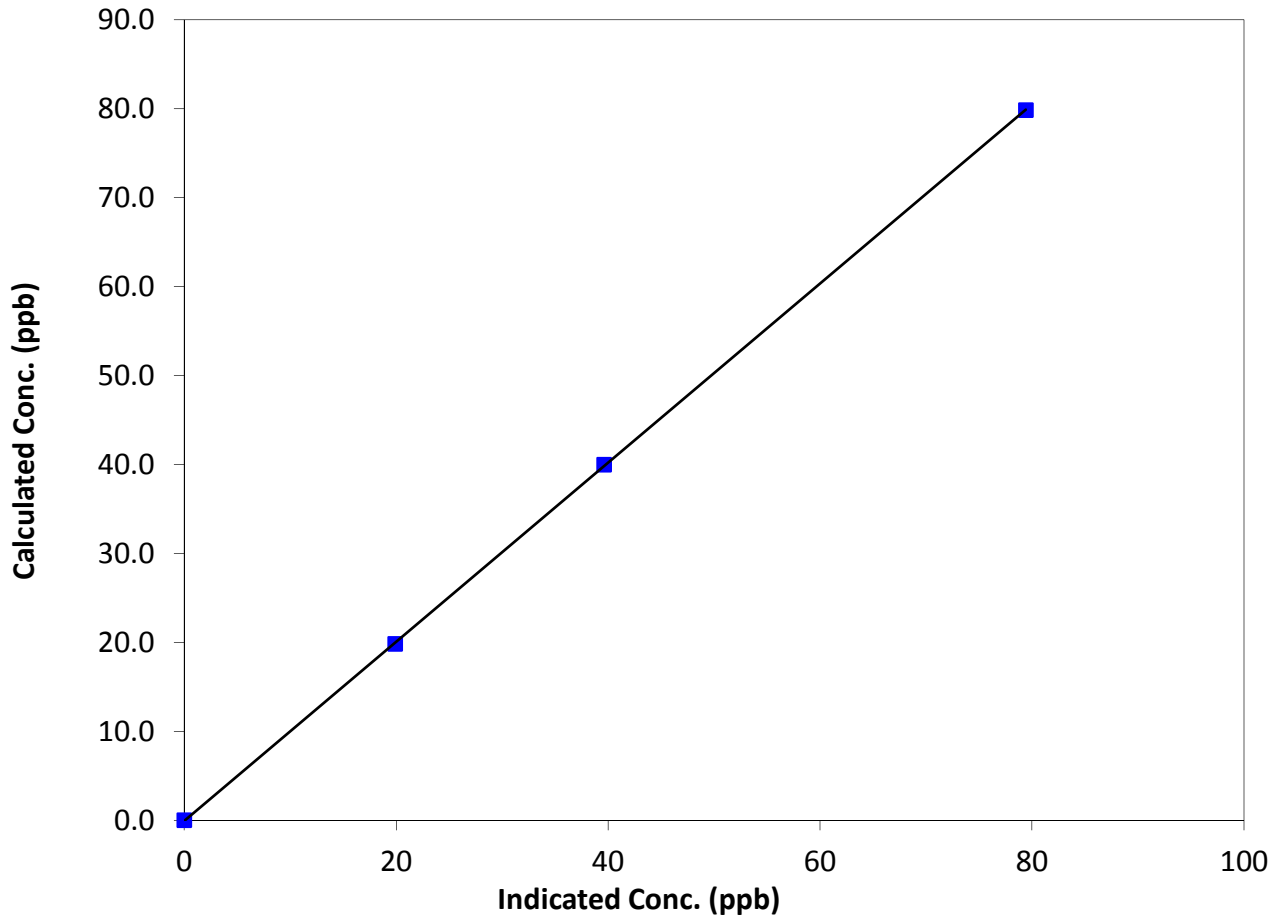
Station Information

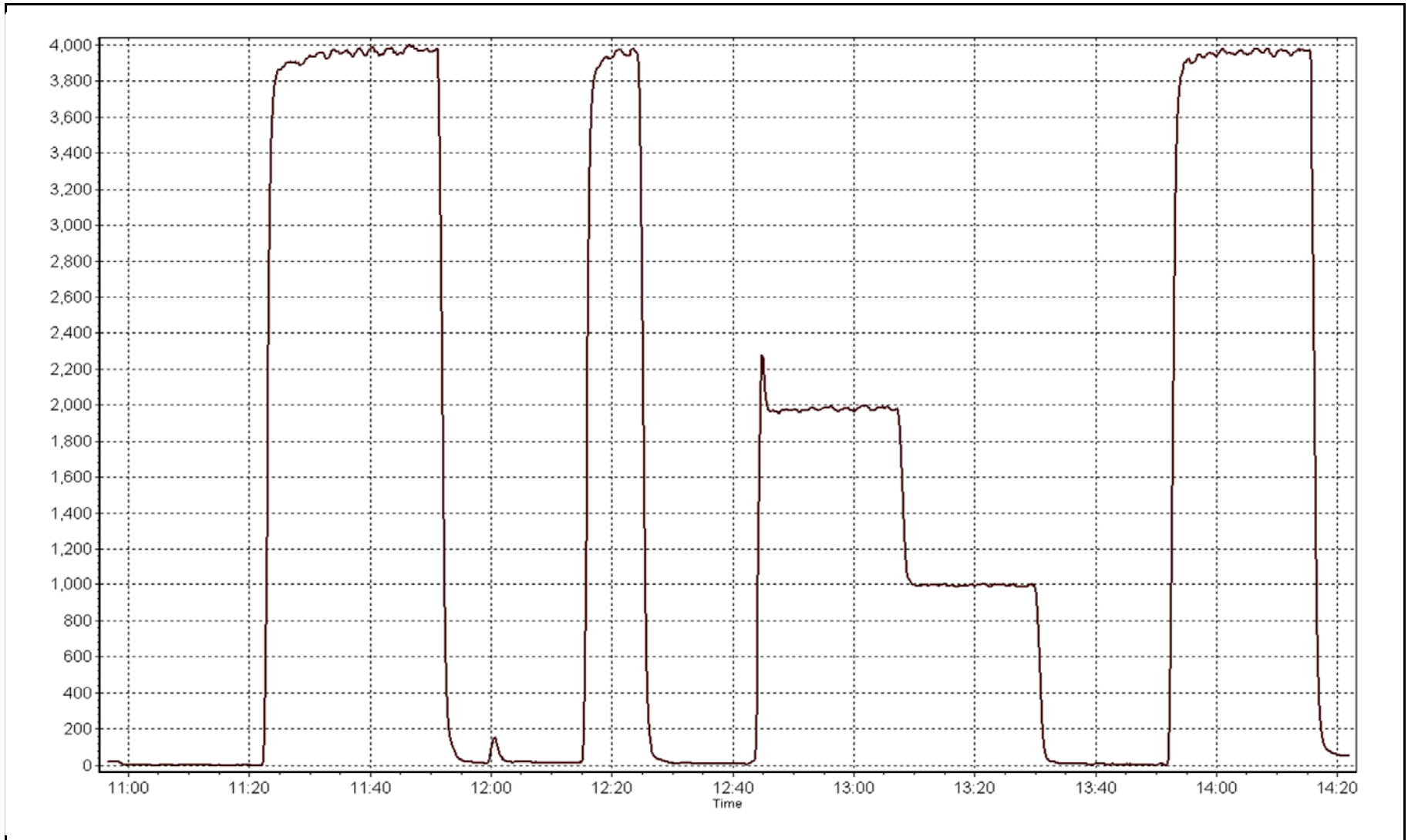
Calibration Date	November 13, 2014	Previous Calibration	October 16, 2014
Station Name	Barge Landing	Station Number	AMS 9
Start Time (MST)	10:55	End Time (MST)	14:20
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1331259320

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999988
79.8	79.4	1.0054		
40.0	39.6	1.0087	Slope	1.006467
19.8	19.9	0.9967		
			Intercept	-0.053391

TRS Calibration Curve







Wood Buffalo Environmental Association

THC Calibration Report

Station Information

Calibration Date	Monday, November 10, 2014	Previous Calibration	Friday, October 17, 2014
Station Name	Barge Landing	Station Number	AMS 9
Reason:	Routine		
Start Time (MST)	10:05	End Time (MST)	13:20
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	0.999725	0.999427	Fuel Pressure	24.1	24.1
Calculated intercept	0.018663	0.026659	BKG	5.68	5.85
			COEF	4.236	4.314

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	0.06	N/A
as found span	6000	89.7	15.69	15.28	1.027
calibrator zero	6000	0.0	0.00	-0.01	N/A
high point	6000	89.7	15.69	15.68	1.000
second point	6000	48.0	8.40	8.36	1.004
third point	6000	18.0	3.15	3.11	1.012
calibrator zero	6000	0.0	0.00	-0.01	N/A
as left zero	6000	0.5	0.09	-0.01	N/A
as left span	6000	89.7	15.69	15.71	0.999
Average Correction Factor					1.006

Corrected As found 15.23 Previous response 15.68 % change 2.9%

Notes:

Changed filter after as founds. Zero and span adjusted.

Calibration Performed By:

Devin Russell



Wood Buffalo Environmental Association

THC Calibration Summary

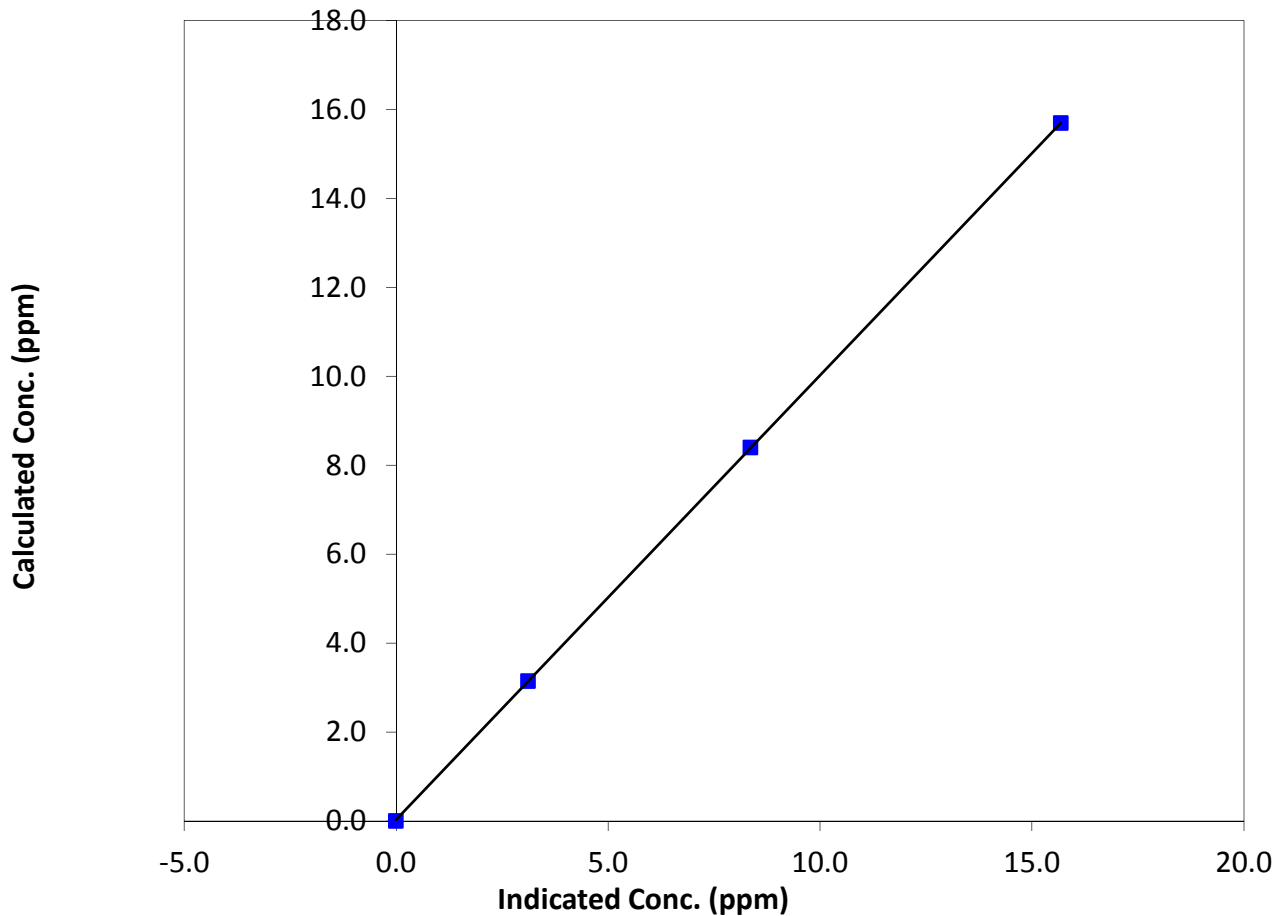
Station Information

Calibration Date	November 10, 2014	Previous Calibration	October 17, 2014
Station Name	Barge Landing	Station Number	AMS 9
Start Time (MST)	10:05	End Time (MST)	13:20
Analyzer make	Thermo 51i-LT	Analyzer serial #	1327059296

Calibration Data

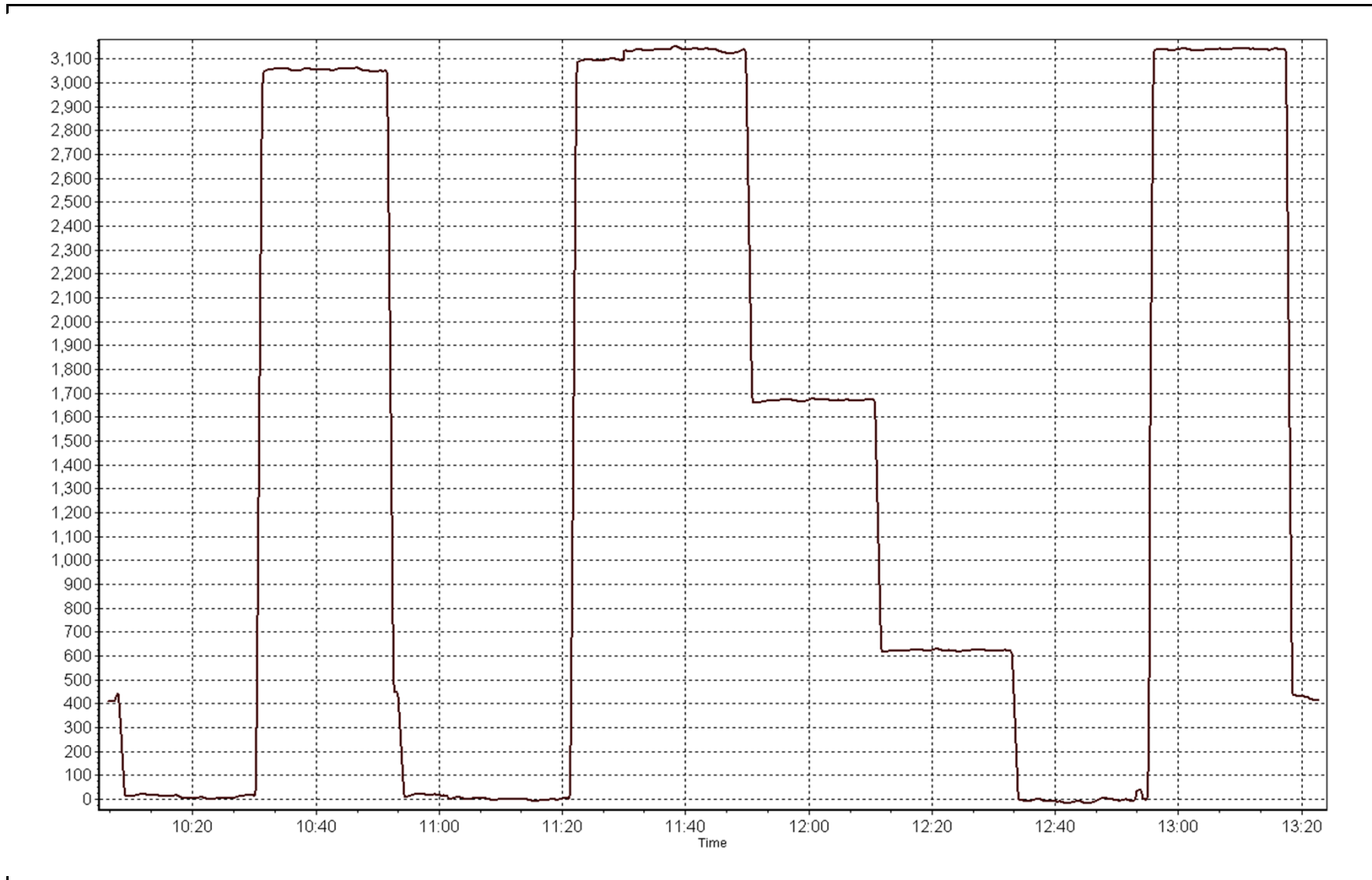
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	-0.01	N/A	Correlation Coefficient	0.999994
15.69	15.68	1.0005		
8.40	8.36	1.0044	Slope	0.999427
3.15	3.11	1.0122		
			Intercept	0.026659

THC Calibration Curve



THC Calibration Plot

Date: November 10, 2014



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

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

**AMS 11
LOWER CAMP
NOVEMBER 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

December 30, 2014

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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS 11)
 NOVEMBER 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	685	35	35	100.00	23	0	5	0
H2S (ppb) Average	685	35	35	100.00	6	0	1	0
THC (ppm) Average	685	35	35	100.00	5.7	-	2.5	-
Temperature (C) Average	720	0	0	100.00	10.6	-	3.7	-
Wind Speed 10 m (km/h) Average	720	0	0	100.00	30	-	-	-
Wind Direction 10 m (deg) Average	720	0	0	100.00	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS 11)
 NOVEMBER 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	685	1.2	2	-	0	0	0	0	1	3	23
H2S (ppb) Average	685	0.6	1	-	0	0	0	0	1	1	6
THC (ppm) Average	685	2.19	0.3	-	1.9	2	2.1	2.1	2.3	2.5	5.7
Temperature 2 m (C) Average	720	-10.83	8.2	-	-28.2	-21.7	-16.1	-12.2	-4.9	0.8	10.6
Wind Speed 10 m (km/h) Average	720	8.7	5	-	0	3	5	8	11	16	30
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS 11)
NOVEMBER 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:	720
Maximum Value: 23 ppb on Nov 12 05:00	Maximum Daily Average: 4.6 ppb on Nov 5		Hours of Data:	685
Minimum Value: 0 ppb on Nov 8 22:00	Minimum Daily Average: 0.1 ppb on Nov 9		Hours of Missing Data:	35
Maximum Diurnal Average: 2.3 ppb at hour 10	Minimum Diurnal Average: 0.5 ppb at hour 23		Hours of Calibration:	35
Monthly Average: 1.2 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 3 P ₉₉ = 12		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	1	Z	0	1	1	1	1	1	1	1	1	2	2	2	1	4	4	4	1	1	1	1	1	1	1.5	4
2-Nov	1	Z	1	1	1	1	1	1	1	1	6	14	4	1	1	1	1	1	1	4	1	1	1	2	2.0	14
3-Nov	7	Z	2	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	0	0	0	0	1.0	7	
4-Nov	1	Z	1	2	2	1	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0.6	2	
5-Nov	1	Z	1	5	10	8	6	5	7	8	5	7	6	5	1	1	1	1	3	4	16	5	1	4.6	16	
6-Nov	2	Z	1	1	1	1	2	4	12	10	4	2	1	1	1	1	1	1	4	3	1	1	0	2.5	12	
7-Nov	1	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0.3	1	
8-Nov	0	Z	0	0	0	0	0	0	0	0	1	1	0	0	0	1	1	1	0	0	0	0	0	0.3	1	
9-Nov	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-Nov	0	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
11-Nov	0	Z	0	0	0	0	0	0	0	0	3	1	0	0	0	0	1	4	11	7	1	0	0	1.3	11	
12-Nov	0	Z	0	2	23	9	12	10	4	1	1	1	1	1	0	0	0	0	0	0	1	1	1	3.2	23	
13-Nov	1	Z	1	1	2	2	1	0	0	1	1	1	1	1	0	2	4	1	1	1	1	0	0	0.9	4	
14-Nov	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	1	1	0.6	1	
15-Nov	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	0.7	1	
16-Nov	1	Z	0	0	0	0	0	1	0	1	1	1	1	3	8	8	12	4	1	1	1	0	0	2.0	12	
17-Nov	0	Z	0	0	0	0	2	11	4	16	4	1	1	1	1	1	1	3	1	1	1	1	2	2.3	16	
18-Nov	1	Z	0	0	0	1	1	1	1	1	C	C	C	C	C	0	0	0	0	0	0	0	0	0.6	1	
19-Nov	0	Z	0	0	0	0	0	0	4	11	10	1	2	3	1	2	1	0	0	0	0	0	0	1.6	11	
20-Nov	1	Z	2	1	1	4	1	5	7	14	3	1	1	1	1	1	1	1	1	1	1	1	1	2.2	14	
21-Nov	1	Z	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0.3	1	
22-Nov	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	
23-Nov	0	Z	0	0	0	0	0	1	1	1	2	1	1	1	1	3	9	3	1	1	1	1	1	1.5	9	
24-Nov	1	Z	0	0	0	0	0	0	0	0	0	1	0	1	1	1	0	0	0	0	0	0	0	0.5	1	
25-Nov	0	Z	0	1	1	0	0	0	0	0	1	0	0	0	0	1	4	5	4	1	0	0	0	1.0	5	
26-Nov	0	Z	0	0	1	2	0	0	1	2	0	0	0	0	0	1	1	2	1	1	1	0	0	0.7	2	
27-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	12	6	3	0	0	0	0	0	0	1.1	12	
28-Nov	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	1	
29-Nov	1	Z	6	1	0	0	0	0	0	0	1	2	2	2	4	2	1	0	0	0	0	0	0	1.2	6	
30-Nov	0	Z	0	0	1	2	0	0	1	2	3	5	1	2	3	1	0	1	1	0	0	0	0	1.1	5	

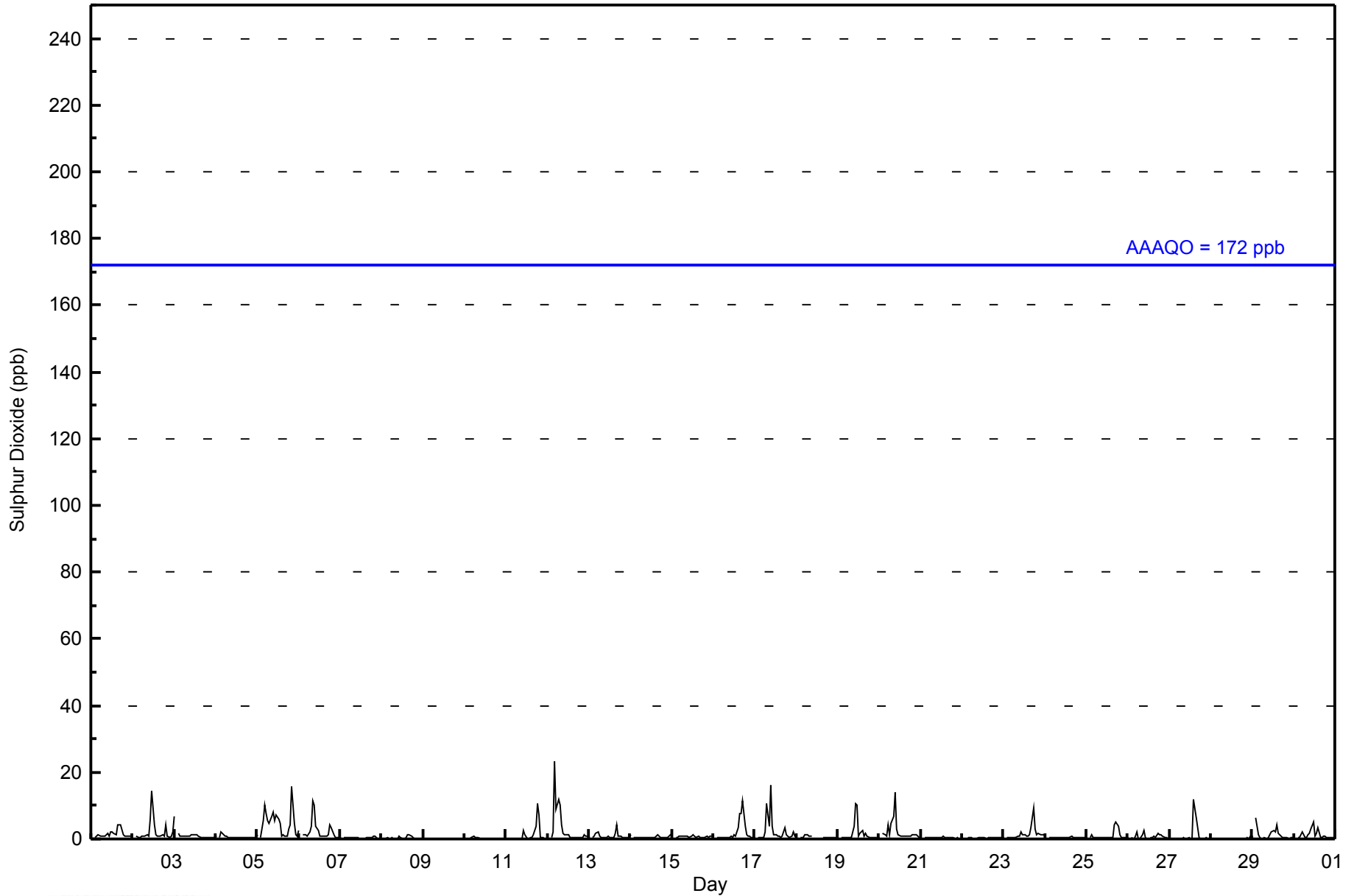
0.8	--	0.7	0.8	1.7	1.3	1.1	1.4	1.5	2.3	1.8	2.0	1.0	0.9	1.3	1.2	1.4	1.7	1.3	1.1	1.0	0.6	0.5	0.5	Diurnal Average	
7	--	6	5	23	9	12	11	12	16	11	14	6	5	12	8	8	12	11	7	16	5	2	2	Diurnal Maximum	

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



WBEA
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Lower Camp - November 2014





WBEA
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Lower Camp - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	673	98.25	98.25
11 - 20	11	1.61	99.85
21 - 60	1	0.15	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



WBEA
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Lower Camp - November 2014

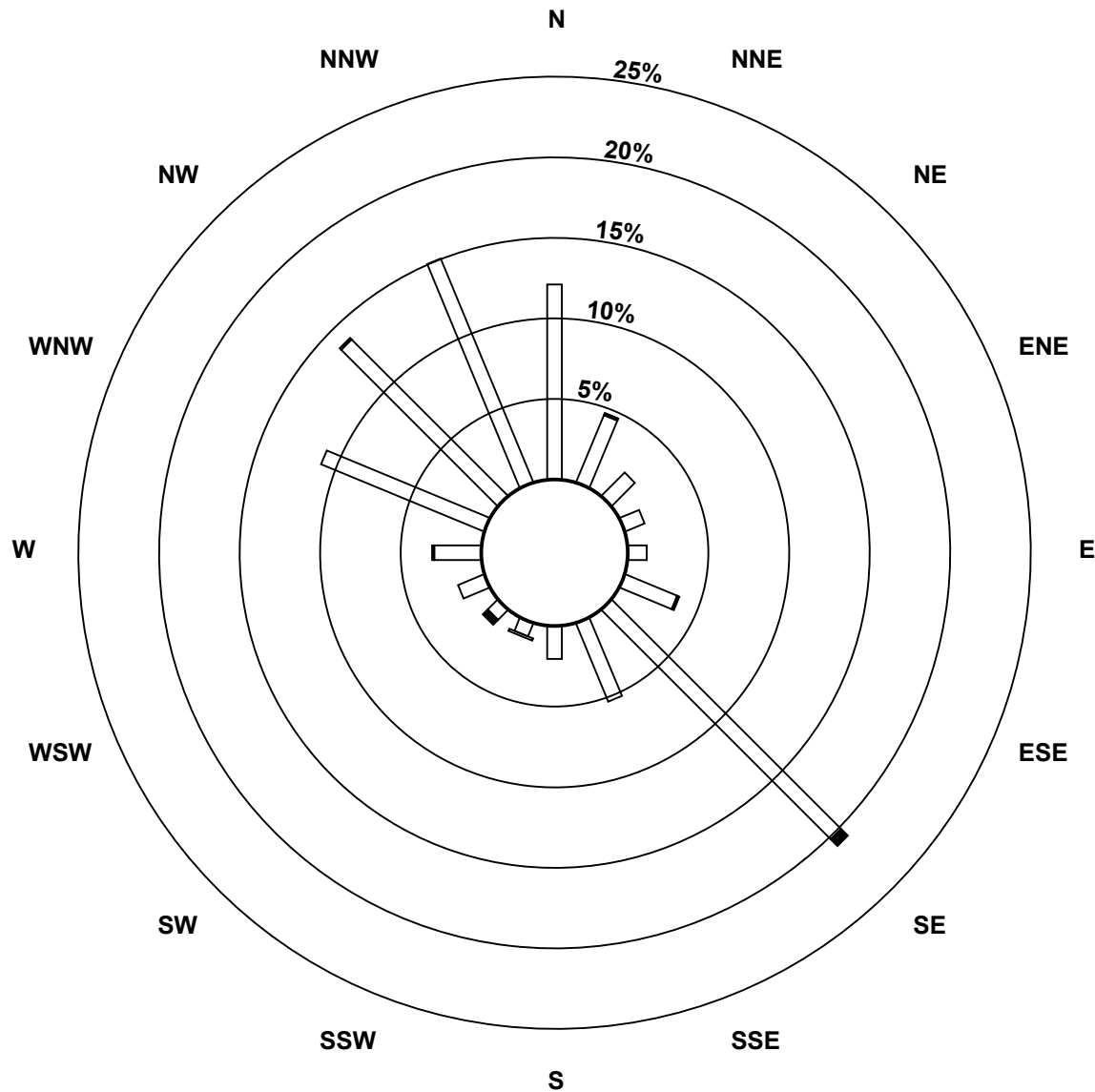
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	83	31	14	9	8	24	138	36	14	6	6	12	20	75	94	103	673
11 - 20	0	1	0	0	0	1	4	0	0	0	3	0	1	0	1	0	11
21 - 60	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	83	32	14	9	8	25	142	36	14	7	9	12	21	75	95	103	685

Total Number of Valid Hours: 685

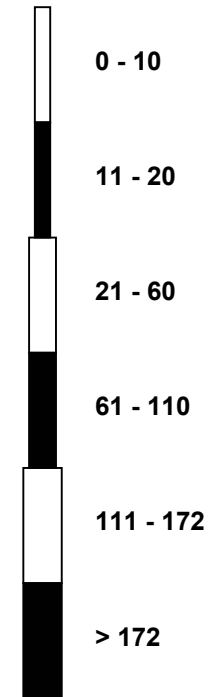
Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

Sulphur Dioxide (SO₂) - ppb
Lower Camp (AMS 11)



Classes (ppb)

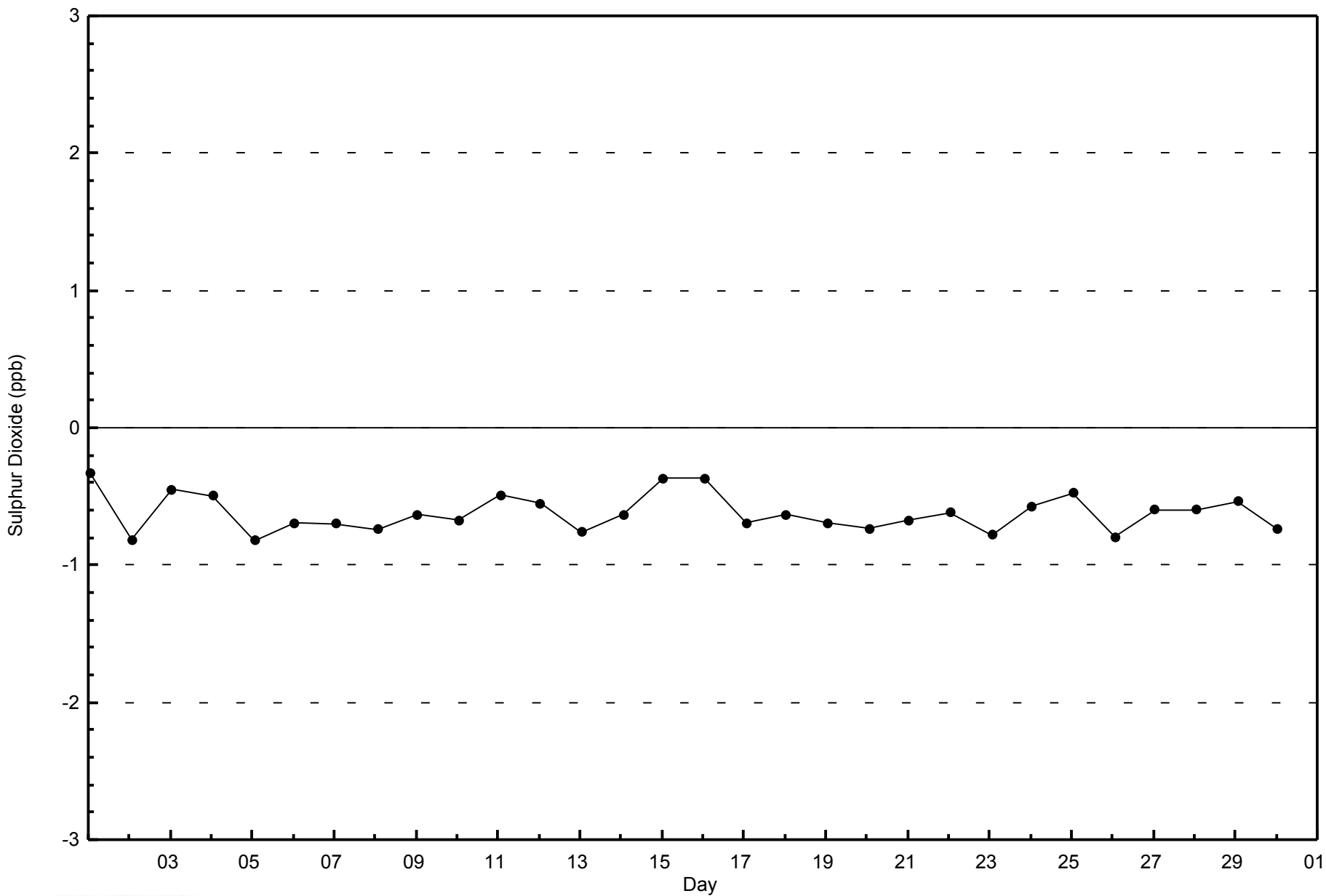


Total Number of Valid Hours: 685



WBEA
Zero Responses

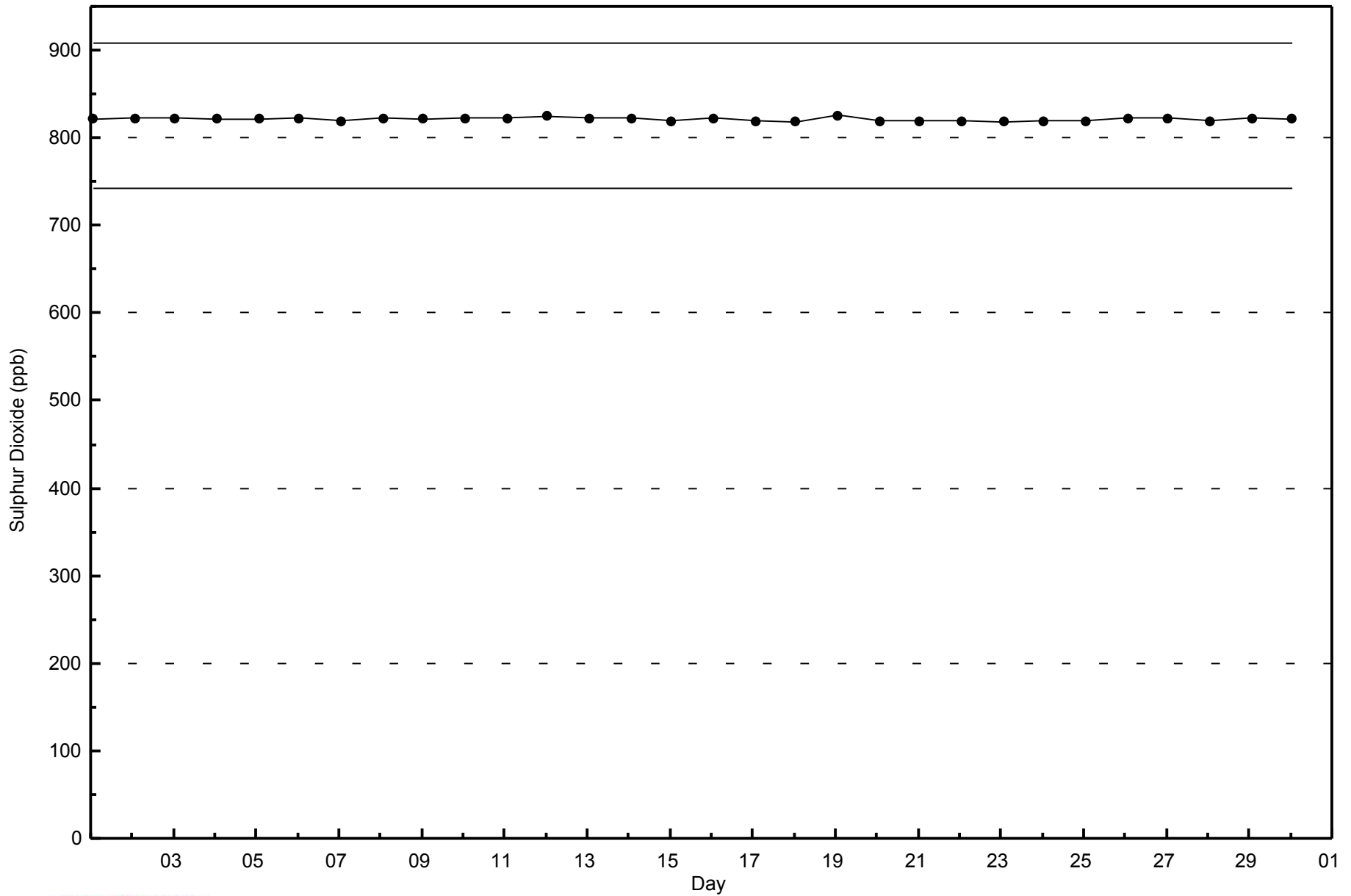
Sulphur Dioxide (SO₂) - ppb
Lower Camp - November 2014





WBEA
Span Responses

Sulphur Dioxide (SO₂) - ppb
Lower Camp - November 2014





Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 6 ppb on Nov 16 18:00	Maximum Daily Average: 1.2 ppb on Nov 16		Hours of Data:	685
Minimum Value: 0 ppb on Nov 4 22:00	Minimum Daily Average: 0.2 ppb on Nov 22		Hours of Missing Data:	35
Maximum Diurnal Average: 1.0 ppb at hour 18	Minimum Diurnal Average: 0.4 ppb at hour 14		Hours of Calibration:	35
Monthly Average: 0.6 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 1 P ₉₉ = 3		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	1	1	Z	1	1	1	1	0	1	1	0	1	0	0	0	2	3	3	1	2	2	1	0	0	1.0	3
2-Nov	0	0	Z	0	0	0	0	0	1	1	1	2	1	1	1	1	1	1	1	1	0	0	0	0	0.6	2
3-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0.3	1
4-Nov	0	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-Nov	1	1	Z	1	1	1	1	1	1	2	1	1	1	1	0	1	0	1	1	1	2	1	1	0	0.9	2
6-Nov	1	1	Z	0	0	0	0	0	1	1	0	0	0	0	0	1	1	1	3	2	1	1	0	0	0.7	3
7-Nov	0	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-Nov	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
9-Nov	0	1	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
10-Nov	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
11-Nov	0	0	Z	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0.4	1
12-Nov	1	1	Z	1	2	2	3	3	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0.8	3
13-Nov	0	0	Z	0	1	1	1	0	0	0	0	0	0	0	0	1	2	1	1	2	1	1	1	1	0.7	2
14-Nov	1	1	Z	1	1	0	0	0	1	1	0	0	0	0	0	0	1	1	0	0	0	0	1	1	0.5	1
15-Nov	1	1	Z	1	1	1	1	1	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0.5	1
16-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	3	4	6	5	2	2	2	1	0	1.2	6	
17-Nov	0	0	Z	0	0	0	0	1	0	1	1	0	0	0	0	0	1	2	2	2	1	2	4	1	0.9	4
18-Nov	1	3	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	3
19-Nov	0	0	Z	0	0	0	0	0	0	2	C	C	C	C	C	0	1	1	0	0	0	0	0	0	0.5	2
20-Nov	0	1	Z	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	1	1	1	0	1	1	0.5	1
21-Nov	0	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
22-Nov	0	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
23-Nov	0	0	Z	0	0	0	0	0	1	0	1	0	0	0	1	1	2	5	3	2	2	3	2	2	1.1	5
24-Nov	1	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
25-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	3	1	1	0	1	1	0.7	3
26-Nov	1	1	Z	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0.7	1
27-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	3	2	2	1	1	1	1	0	0	0	0.7	3
28-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0.3	3
29-Nov	1	1	Z	1	1	0	0	1	1	1	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0.5	1
30-Nov	0	0	Z	0	0	0	0	0	0	1	1	1	0	0	1	0	0	1	1	1	1	1	1	1	0.5	1

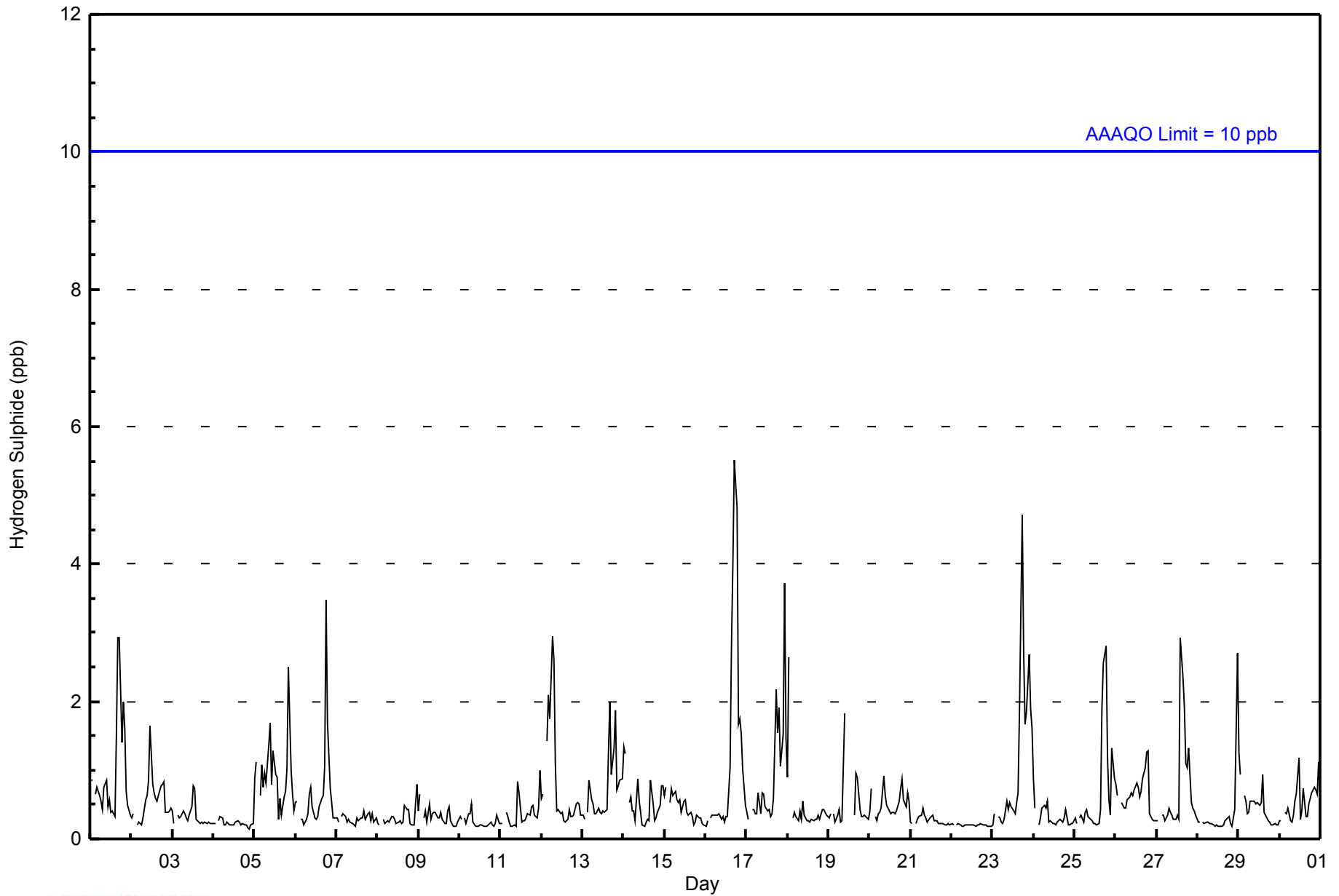
0.5	0.5	--	0.4	0.5	0.4	0.5	0.5	0.5	0.5	0.5	0.4	0.5	0.4	0.4	0.5	0.6	0.8	1.0	0.9	0.8	0.6	0.5	0.6	0.6	Diurnal Average	
1	3	--	1	2	2	3	3	1	2	1	2	1	1	3	3	4	6	5	2	2	3	4	3	Diurnal Maximum		

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



WBEA
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Lower Camp - November 2014





WBEA
Cumulative Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
Lower Camp - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	667	97.37	97.37
3 - 4	15	2.19	99.56
5 - 7	3	0.44	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



WBEA
Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
Lower Camp - November 2014

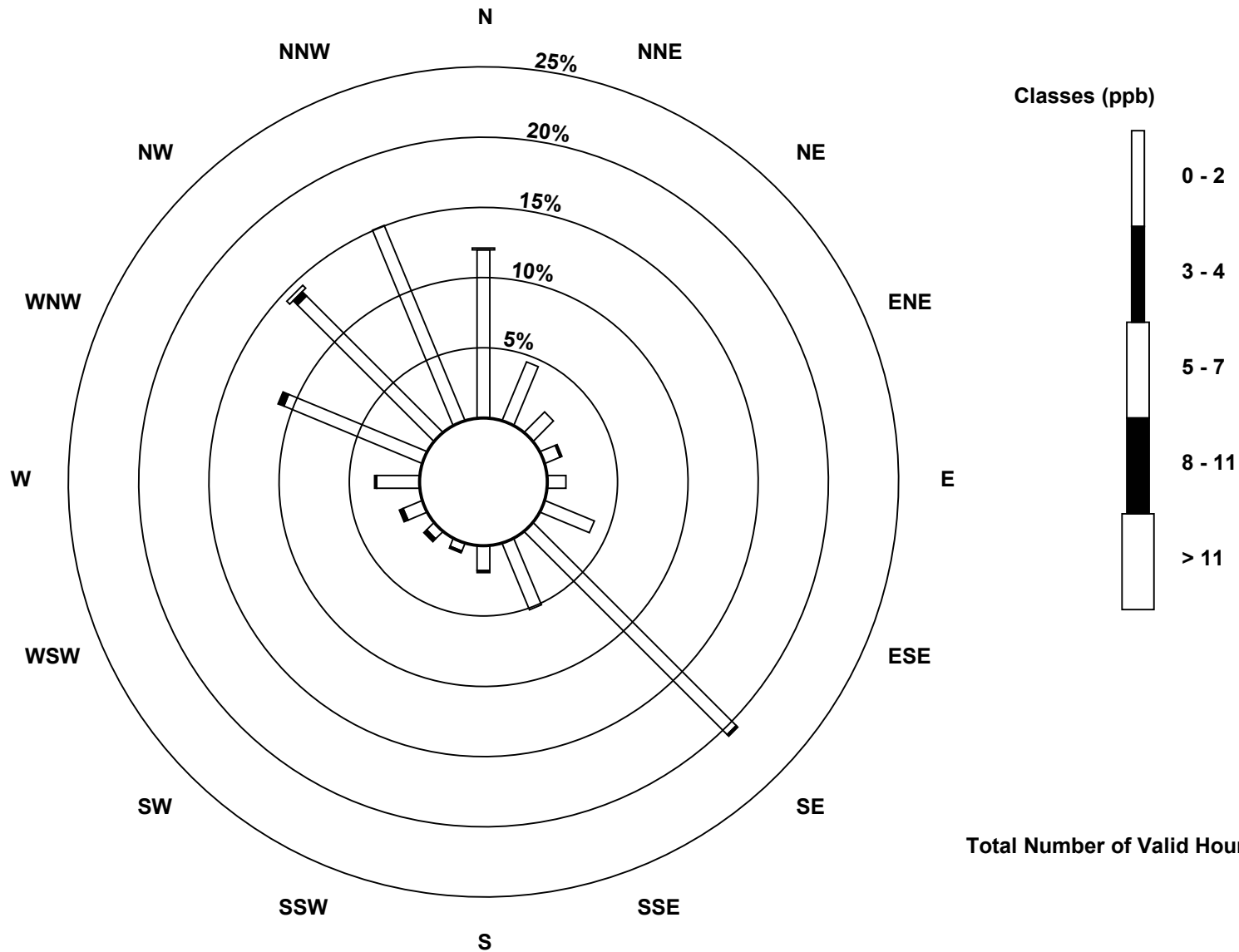
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	82	31	14	8	9	26	140	35	12	4	5	10	21	73	94	103	667
3 - 4	0	0	0	1	0	0	1	0	1	1	2	2	1	3	3	0	15
5 - 7	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	3
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	83	31	14	9	9	26	141	35	13	5	7	12	22	76	99	103	685

Total Number of Valid Hours: 685

Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

Hydrogen Sulphide (H₂S) - ppb
Lower Camp (AMS 11)

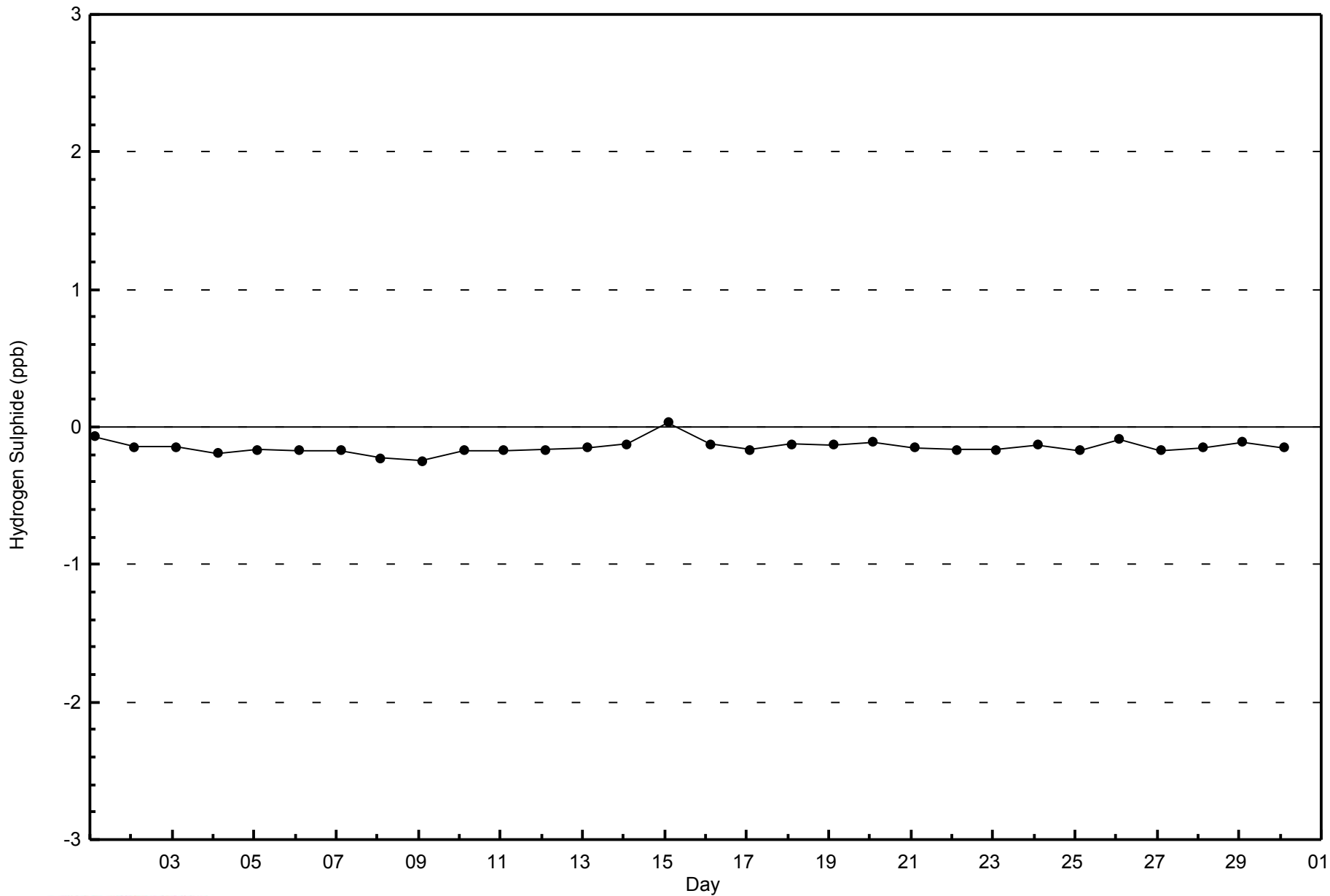


Total Number of Valid Hours: 685



WBEA
Zero Responses

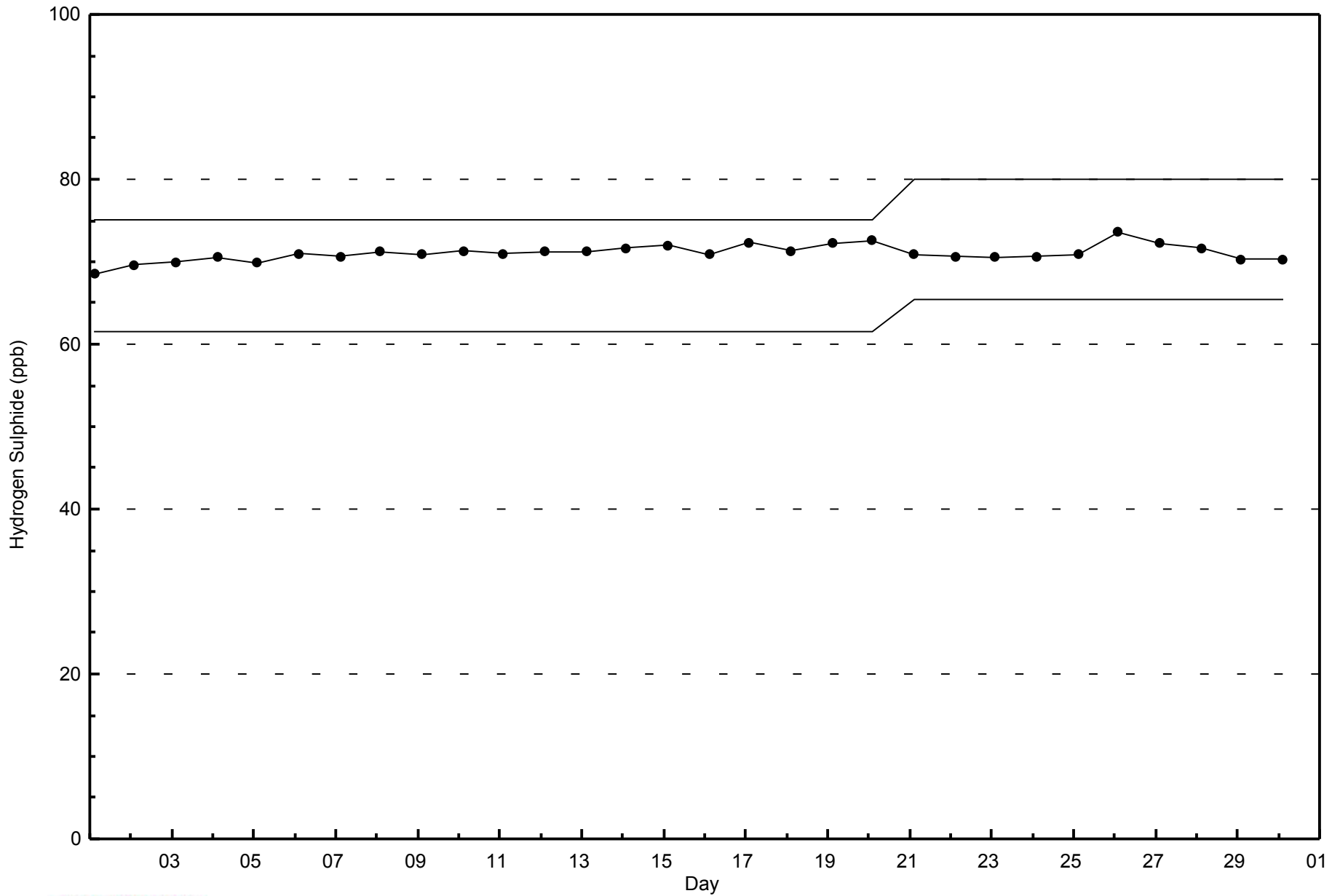
Hydrogen Sulphide (H₂S) - ppb
Lower Camp - November 2014





WBEA
Span Responses

Hydrogen Sulphide (H₂S) - ppb
Lower Camp - November 2014



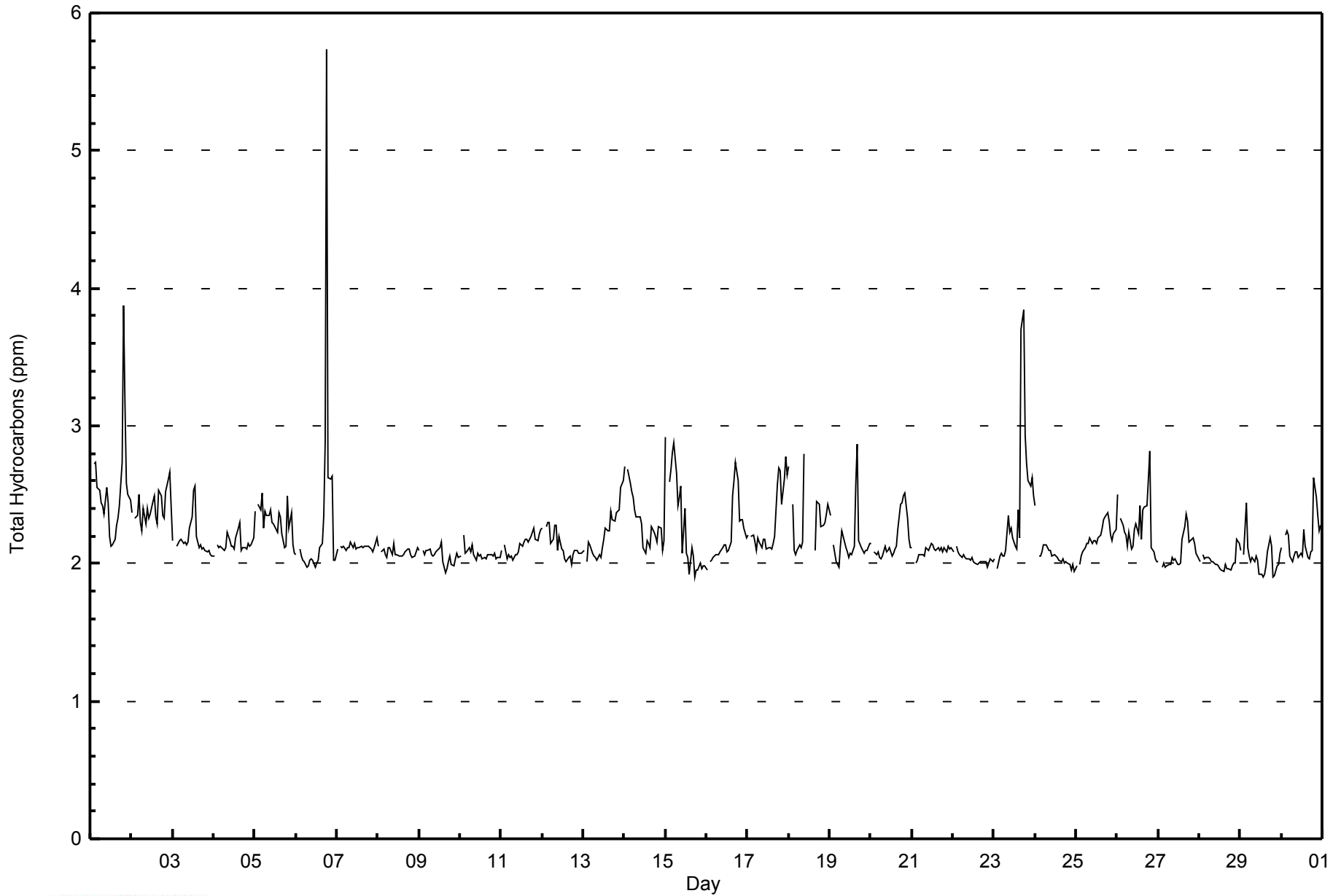


Maximum Value: 5.7 ppm on Nov 6 19:00														Maximum Daily Average: 2.5 ppm on Nov 1														Hours in Service: 720																					
Minimum Value: 1.9 ppm on Nov 29 14:00														Minimum Daily Average: 2.0 ppm on Nov 28														Hours of Data: 685																					
Maximum Diurnal Average: 2.4 ppm at hour 19														Minimum Diurnal Average: 2.1 ppm at hour 13														Hours of Missing Data: 35																					
Monthly Average: 2.19 ppm														Percentiles: P ₁ = 1.9 P ₁₀ = 2.0 Q ₁ = 2.1 Median = 2.1 Q ₃ = 2.3 P ₉₀ = 2.5 P ₉₉ = 2.9														Hours of Calibration: 35																					
																												Percent Operational Time: 100.0																					
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Nov	2.7	Z	2.7	2.7	2.6	2.5	2.4	2.4	2.4	2.6	2.4	2.2	2.1	2.1	2.2	2.3	2.3	2.4	2.7	3.9	3.2	2.6	2.5	2.5	2.5	2.5	3.9																						
2-Nov	2.4	Z	2.3	2.3	2.5	2.3	2.2	2.4	2.3	2.4	2.3	2.4	2.5	2.5	2.3	2.3	2.5	2.5	2.4	2.3	2.5	2.6	2.7	2.4	2.4	2.4	2.7																						
3-Nov	2.2	Z	2.1	2.1	2.2	2.2	2.1	2.2	2.1	2.2	2.3	2.3	2.5	2.6	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.6																						
4-Nov	2.0	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.2	2.3	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.3																						
5-Nov	2.4	Z	2.4	2.4	2.5	2.3	2.4	2.4	2.3	2.4	2.3	2.3	2.3	2.2	2.4	2.3	2.2	2.1	2.1	2.1	2.5	2.3	2.4	2.1	2.1	2.1	2.5																						
6-Nov	2.1	Z	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.4	2.9	5.7	2.6	2.6	2.6	2.0	2.0	2.0	5.7																							
7-Nov	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2																							
8-Nov	2.1	Z	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1																						
9-Nov	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.0	1.9	2.0	2.0	2.1	2.0	2.0	2.0	2.1	2.0	2.0	2.1	2.2																						
10-Nov	2.1	Z	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.2																						
11-Nov	2.1	Z	2.1	2.0	2.1	2.0	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.3	2.1	2.3																						
12-Nov	2.3	Z	2.3	2.3	2.3	2.1	2.2	2.3	2.3	2.1	2.2	2.1	2.1	2.0	2.0	2.0	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3																						
13-Nov	2.1	Z	2.0	2.2	2.1	2.1	2.0	2.0	2.0	2.1	2.0	2.1	2.2	2.3	2.2	2.2	2.2	2.4	2.3	2.3	2.4	2.4	2.4	2.6	2.6	2.2	2.6																						
14-Nov	2.7	Z	2.7	2.6	2.5	2.5	2.4	2.3	2.3	2.3	2.3	2.1	2.1	2.2	2.2	2.1	2.3	2.2	2.2	2.2	2.2	2.3	2.1	2.2	2.3	2.1	2.2																						
15-Nov	2.9	Z	2.6	2.7	2.8	2.9	2.7	2.4	2.5	2.6	2.1	2.4	2.1	2.0	1.9	2.1	2.1	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.3	2.9																						
16-Nov	2.0	Z	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.5	2.6	2.7	2.6	2.3	2.3	2.3	2.3	2.2	2.2	2.7																							
17-Nov	2.2	Z	2.2	2.2	2.2	2.1	2.2	2.2	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.6	2.7	2.7	2.4	2.6	2.8	2.6	2.3	2.8																							
18-Nov	2.7	Z	2.4	2.1	2.1	2.1	2.1	2.1	2.2	2.8	C	C	C	C	C	2.1	2.4	2.4	2.4	2.3	2.3	2.3	2.4	2.4	2.3	2.8																							
19-Nov	2.3	Z	2.1	2.1	2.0	2.0	2.1	2.2	2.2	2.1	2.1	2.0	2.1	2.1	2.1	2.6	2.9	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.9																							
20-Nov	2.1	Z	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	2.3	2.4	2.4	2.5	2.5	2.3	2.2	2.1	2.2	2.5																							
21-Nov	2.1	Z	2.0	2.0	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1																						
22-Nov	2.1	Z	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1																						
23-Nov	2.0	Z	2.0	2.1	2.1	2.1	2.1	2.1	2.3	2.2	2.3	2.2	2.1	2.1	2.4	2.2	3.7	3.8	2.9	2.7	2.6	2.6	2.6	2.5	2.4	3.8																							
24-Nov	2.4	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	2.1	2.4																							
25-Nov	2.0	Z	2.0	2.0	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.4																							
26-Nov	2.5	Z	2.3	2.3	2.2	2.2	2.1	2.2	2.1	2.1	2.2	2.3	2.2	2.4	2.2	2.4	2.4	2.4	2.6	2.8	2.1	2.1	2.0	2.0	2.3	2.8																							
27-Nov	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	2.2	2.3	2.4	2.3	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.4																							
28-Nov	2.0	Z	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.1	2.0	2.2																							
29-Nov	2.1	Z	2.1	2.4	2.1	2.1	2.0	2.0	2.0	2.1	2.0	1.9	1.9	1.9	1.9	2.0	2.1	2.2	2.1	1.9	1.9	2.0	2.0	2.1	2.0	2.4																							
30-Nov	2.1	Z	2.2	2.2	2.2	2.0	2.0	2.1	2.1	2.1	2.0	2.1	2.0	2.2	2.1	2.0	2.0	2.1	2.1	2.6	2.5	2.3	2.2	2.3	2.2	2.6																							
																								2.2	--	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.3	2.4	2.3	2.2	2.2	2.2	2.2	2.2	Diurnal Average
																								2.9	--	2.7	2.7	2.8	2.9	2.7	2.4	2.5	2.8	2.4	2.4	2.5	2.6	2.4	2.6	3.7	3.8	5.7	3.9	3.2	2.6	2.8	2.6	2.6	Diurnal Maximum
Z - zerospan																								C - Calibration																									



WBEA
Hourly Averages

Total Hydrocarbons (THC) - ppm
Lower Camp - November 2014





WBEA
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Lower Camp - November 2014

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	151	22.04	22.04
2.1 - 3.0	529	77.23	99.27
3.1 - 10.0	5	0.73	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



WBEA
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Lower Camp - November 2014

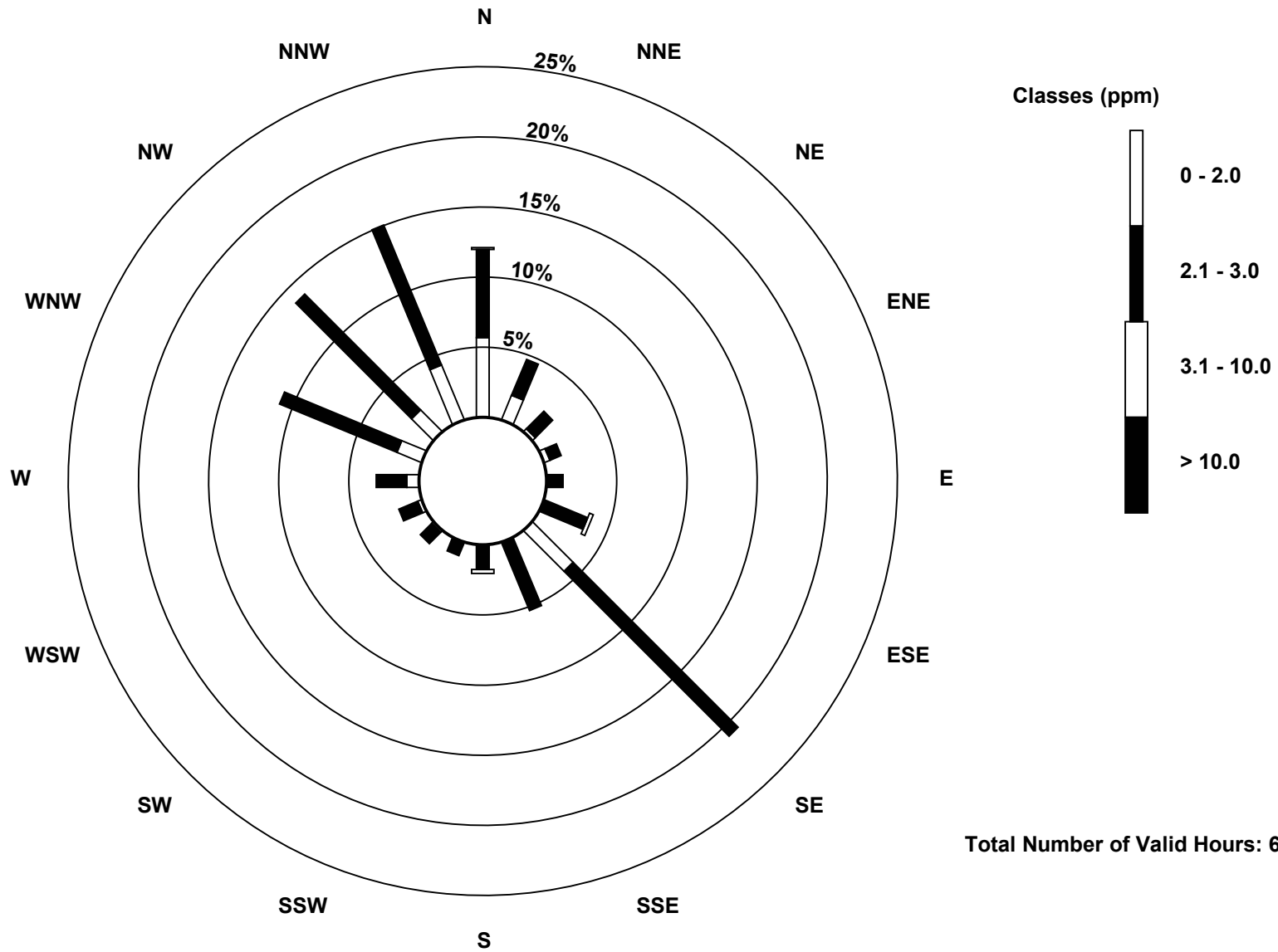
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	39	13	2	3	0	0	28	0	0	0	1	2	6	13	15	29	151
2.1 - 3.0	43	19	12	6	8	23	114	36	12	7	8	10	15	62	80	74	529
3.1 - 10.0	1	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	5
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	83	32	14	9	8	25	142	36	14	7	9	12	21	75	95	103	685

Total Number of Valid Hours: 685

Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

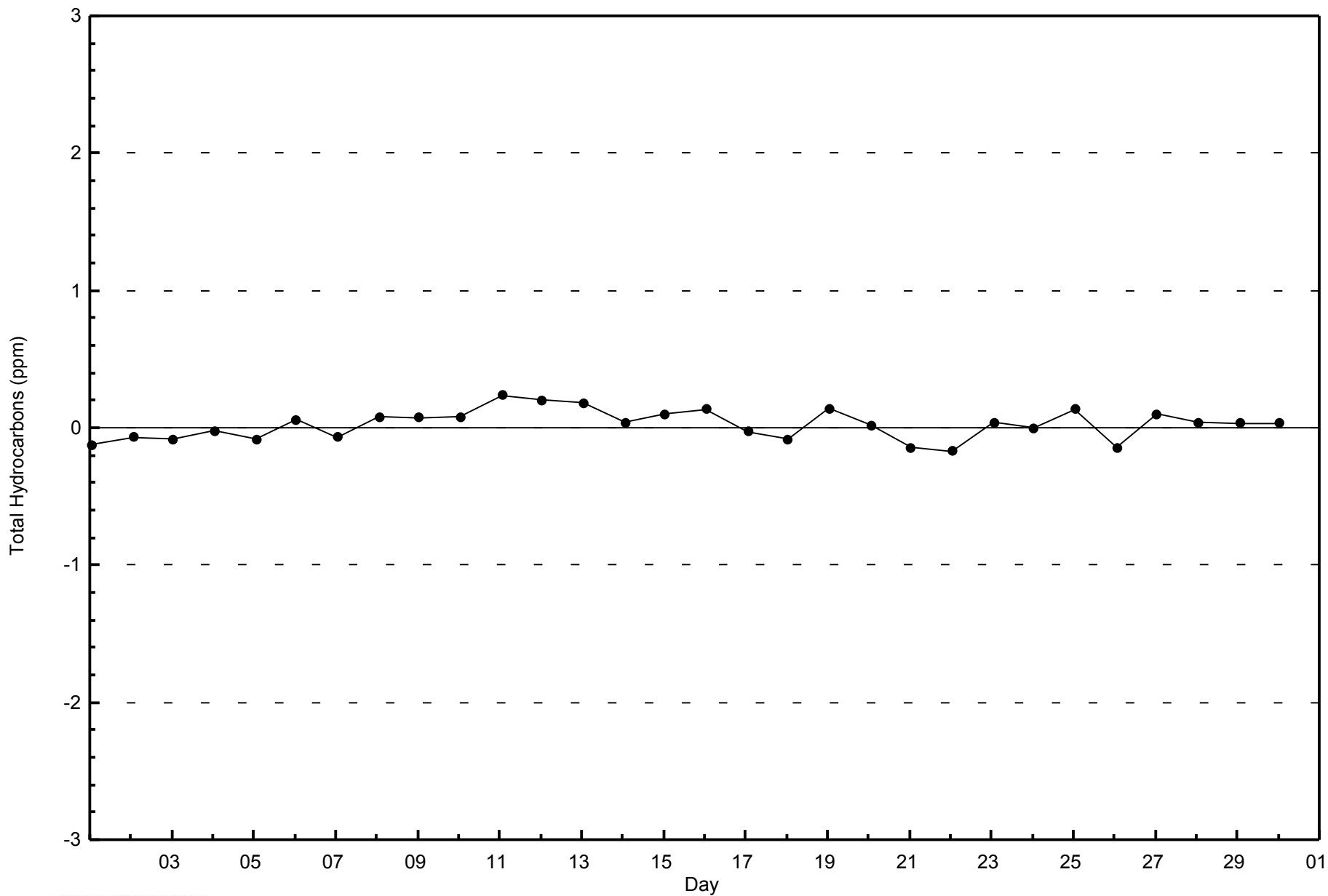
Total Hydrocarbons (THC) - ppm
Lower Camp (AMS 11)





WBEA
Zero Responses

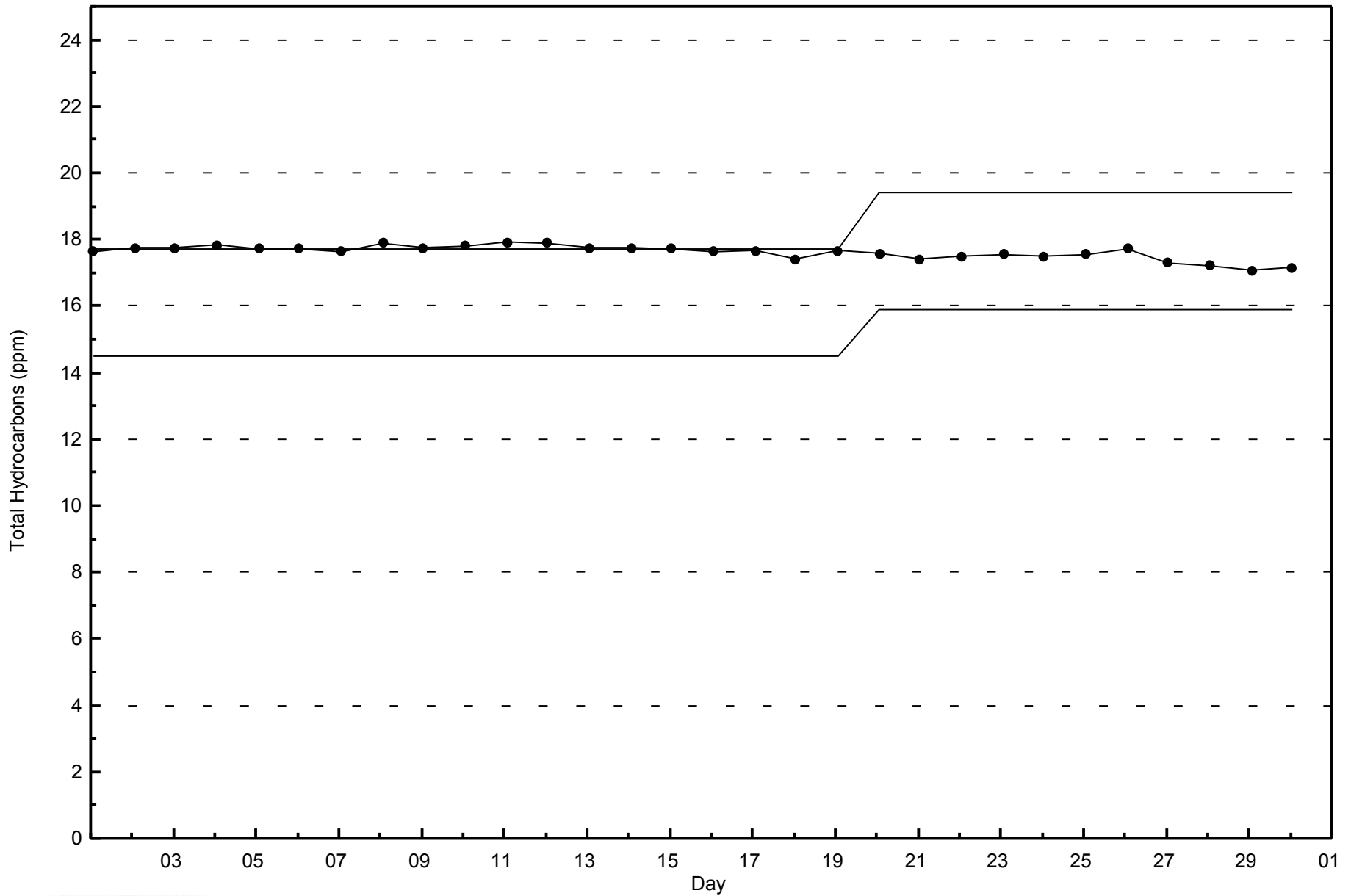
Total Hydrocarbons (THC) - ppm
Lower Camp - November 2014





WBEA
Span Responses

Total Hydrocarbons (THC) - ppm
Lower Camp - November 2014



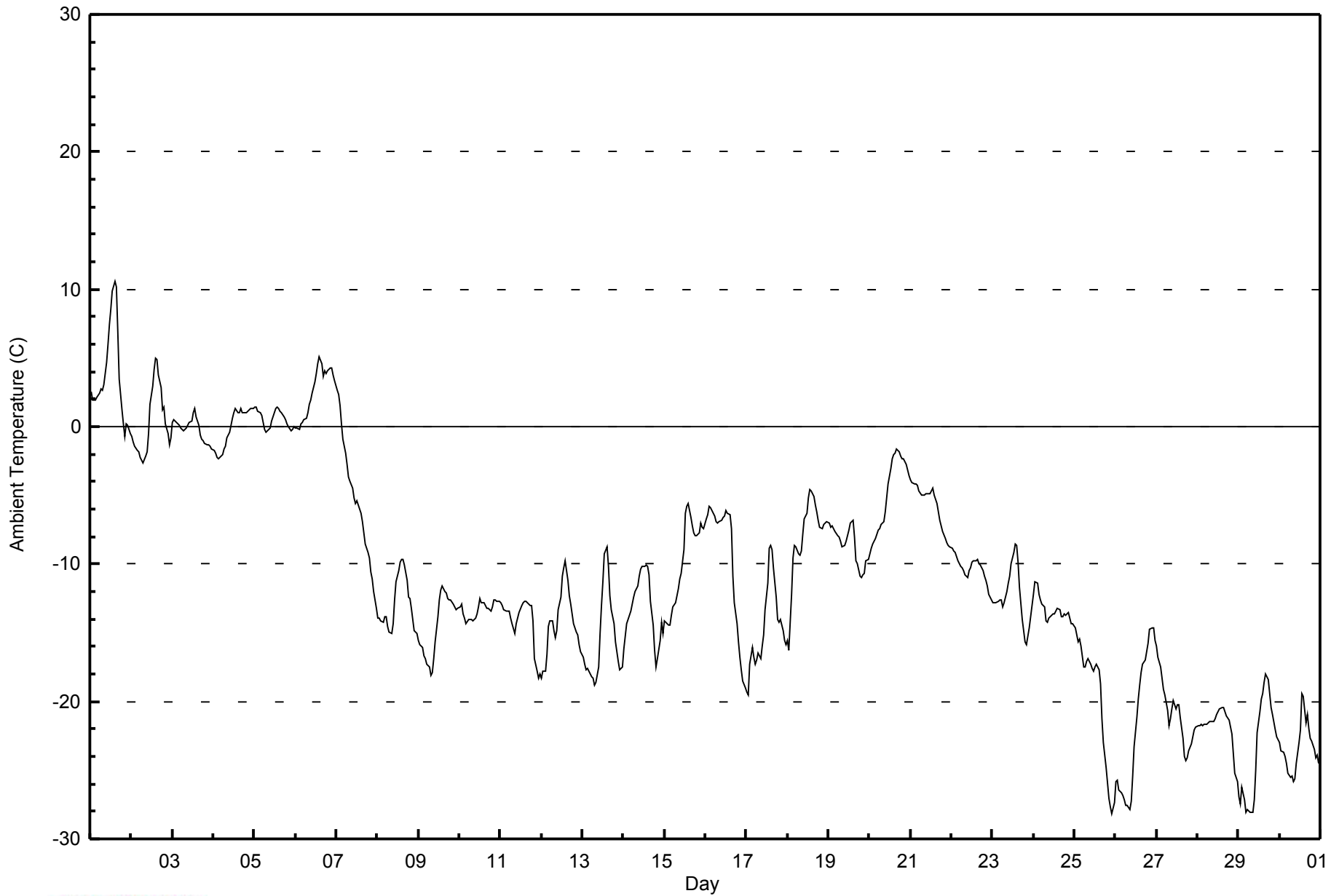


Maximum Value: 10.6 C on Nov 1 15:00		Maximum Daily Average: 3.7 C on Nov 1		Hours in Service: 720																																												
Minimum Value: -28.2 C on Nov 25 23:00		Minimum Daily Average: -23.6 C on Nov 29		Hours of Data: 720																																												
Maximum Diurnal Average: -8.2 C at hour 15		Minimum Diurnal Average: -12.3 C at hour 24		Hours of Missing Data: 0																																												
Monthly Average: -10.83 C		Percentiles: P ₁ = -27.7 P ₁₀ = -21.7 Q ₁ = -16.1 Median = -12.2 Q ₃ = -4.9 P ₉₀ = 0.8 P ₉₉ = 5.3		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-Nov	2.5	1.9	1.9	2.0	2.2	2.4	2.8	2.6	3.0	4.7	6.0	7.4	8.5	9.8	10.6	10.2	6.9	3.4	1.2	0.2	-0.7	0.2	0.1	-0.5	3.7	10.6																						
2-Nov	-0.7	-1.1	-1.4	-1.7	-1.8	-2.3	-2.4	-2.7	-2.2	-1.9	-0.6	1.6	2.9	4.2	5.0	4.9	3.8	2.9	1.3	1.4	0.2	-0.6	-1.3	-0.8	0.3	5.0																						
3-Nov	0.3	0.5	0.3	0.2	0.1	-0.1	-0.3	-0.2	-0.1	0.1	0.3	0.4	1.0	1.4	0.7	0.1	-0.6	-0.9	-1.0	-1.2	-1.3	-1.4	-1.5	-1.6	-0.2	1.4																						
4-Nov	-1.7	-1.9	-2.2	-2.3	-2.2	-2.1	-1.6	-1.4	-0.8	-0.5	0.1	0.6	1.0	1.3	1.0	1.0	1.3	1.0	1.0	1.0	1.2	1.2	1.3	1.3	-0.1	1.3																						
5-Nov	1.4	1.4	1.1	1.0	0.9	0.3	-0.2	-0.4	-0.2	-0.1	0.4	0.7	1.3	1.4	1.3	1.2	1.0	0.7	0.5	0.2	0.0	-0.3	-0.2	0.0	0.6	1.4																						
6-Nov	-0.1	-0.1	-0.2	0.2	0.3	0.5	0.6	1.0	1.6	1.9	2.5	3.3	3.9	4.5	5.1	4.5	3.7	4.1	3.8	4.1	4.3	4.2	3.8	3.3	2.5	5.1																						
7-Nov	2.6	2.4	1.5	0.2	-0.9	-2.0	-2.8	-3.7	-4.0	-4.5	-5.2	-5.6	-5.4	-5.7	-6.3	-7.0	-7.7	-8.5	-9.2	-9.6	-10.5	-11.1	-12.0	-13.2	-5.3	2.6																						
8-Nov	-13.9	-13.9	-14.2	-14.2	-13.9	-13.9	-14.5	-14.9	-15.0	-14.3	-12.6	-11.3	-10.5	-9.9	-9.7	-9.7	-10.1	-11.2	-12.4	-12.5	-13.3	-14.9	-14.9	-15.0	-12.9	-9.7																						
9-Nov	-15.6	-15.8	-16.1	-16.6	-16.8	-17.3	-17.5	-18.1	-17.9	-16.9	-15.7	-13.9	-12.6	-11.9	-11.6	-12.0	-12.1	-12.5	-12.6	-12.6	-12.9	-13.1	-13.3	-13.3	-14.5	-11.6																						
10-Nov	-13.2	-12.9	-13.6	-13.9	-14.3	-14.0	-14.0	-14.0	-14.1	-14.0	-13.6	-13.1	-12.5	-12.8	-12.8	-13.0	-13.2	-13.3	-13.5	-13.1	-12.7	-12.6	-12.7	-12.8	-13.3	-12.5																						
11-Nov	-12.8	-13.0	-13.3	-13.4	-13.4	-13.4	-13.9	-14.4	-15.0	-14.4	-14.0	-13.5	-13.0	-12.8	-12.7	-12.7	-12.8	-13.0	-13.0	-14.1	-16.8	-17.8	-18.3	-18.0	-14.2	-12.7																						
12-Nov	-18.3	-17.8	-17.8	-16.6	-14.5	-14.2	-14.2	-14.9	-15.3	-14.8	-13.3	-12.4	-10.9	-10.3	-9.8	-11.2	-12.3	-13.0	-13.6	-14.3	-14.9	-15.1	-15.9	-16.4	-14.2	-9.8																						
13-Nov	-16.8	-17.3	-17.6	-17.6	-17.7	-18.2	-18.3	-18.9	-18.6	-17.5	-15.1	-13.0	-11.3	-9.2	-8.7	-10.2	-12.3	-13.3	-14.4	-15.7	-16.3	-17.1	-17.7	-17.5	-15.4	-8.7																						
14-Nov	-16.2	-15.2	-14.4	-13.8	-13.5	-12.9	-12.4	-12.0	-11.6	-10.9	-10.4	-10.2	-10.1	-10.0	-10.2	-10.8	-12.7	-14.4	-16.3	-17.5	-16.8	-15.6	-14.2	-15.0	-13.2	-10.0																						
15-Nov	-14.2	-14.2	-14.5	-14.5	-13.7	-13.1	-12.8	-12.3	-11.8	-11.1	-10.7	-8.9	-6.3	-5.8	-5.6	-6.6	-6.6	-7.2	-7.7	-8.0	-8.0	-7.7	-7.0	-7.3	-7.4	-9.8	-5.6																					
16-Nov	-6.7	-6.4	-5.8	-5.9	-6.1	-6.5	-6.9	-7.0	-6.9	-6.8	-6.6	-6.5	-6.1	-6.3	-6.4	-7.4	-10.9	-12.8	-14.4	-15.7	-16.8	-17.7	-18.5	-19.0	-9.6	-5.8																						
17-Nov	-19.3	-19.5	-17.2	-16.1	-16.8	-17.3	-17.0	-16.5	-16.9	-15.9	-15.1	-13.3	-11.4	-8.9	-8.7	-9.0	-10.3	-12.4	-14.0	-14.2	-14.0	-14.9	-15.5	-15.9	-14.6	-8.7																						
18-Nov	-15.6	-16.2	-12.2	-9.6	-8.6	-8.8	-9.2	-9.4	-9.1	-7.8	-6.8	-6.3	-5.2	-4.6	-4.7	-5.1	-5.7	-6.2	-6.8	-7.4	-7.4	-7.1	-7.0	-6.9	-8.1	-4.6																						
19-Nov	-7.0	-7.3	-7.3	-7.4	-7.7	-7.9	-8.1	-8.4	-8.7	-8.7	-8.3	-8.0	-7.5	-7.1	-6.8	-8.0	-9.8	-10.0	-10.9	-11.0	-10.8	-10.7	-9.8	-9.7	-8.6	-6.8																						
20-Nov	-9.3	-8.8	-8.6	-8.1	-7.8	-7.5	-7.4	-7.2	-6.9	-6.2	-5.2	-4.2	-3.0	-2.3	-2.0	-1.9	-1.7	-1.8	-2.1	-2.3	-2.4	-2.8	-3.2	-3.5	-4.8	-1.7																						
21-Nov	-3.8	-4.0	-4.1	-4.2	-4.3	-4.7	-4.9	-4.9	-5.0	-4.9	-4.9	-4.9	-4.7	-4.4	-5.0	-5.6	-6.2	-6.8	-7.2	-7.7	-8.1	-8.5	-8.6	-8.7	-5.7	-3.8																						
22-Nov	-8.8	-9.0	-9.1	-9.5	-9.7	-10.2	-10.3	-10.5	-10.8	-11.0	-10.5	-10.3	-9.8	-9.7	-9.7	-9.6	-10.0	-10.1	-10.5	-10.9	-11.2	-11.6	-12.2	-12.6	-10.3	-8.8																						
23-Nov	-12.8	-12.8	-12.8	-12.7	-12.6	-12.6	-13.1	-12.8	-12.0	-11.4	-10.9	-9.9	-9.2	-8.6	-8.7	-9.9	-11.7	-14.0	-14.9	-15.7	-15.9	-14.6	-13.9	-13.0	-12.3	-8.6																						
24-Nov	-12.2	-11.3	-11.4	-12.2	-12.6	-12.9	-13.1	-14.1	-14.2	-13.9	-13.8	-13.6	-13.6	-13.4	-13.2	-13.3	-13.9	-13.9	-13.6	-13.7	-13.5	-13.9	-14.4	-14.3	-13.3	-11.3																						
25-Nov	-14.6	-15.2	-15.7	-15.4	-16.0	-17.5	-17.5	-17.1	-16.9	-17.2	-17.6	-17.7	-17.5	-17.3	-17.7	-18.7	-21.2	-22.9	-24.8	-25.9	-27.0	-27.7	-28.2	-27.4	-19.8	-14.6																						
26-Nov	-25.9	-25.7	-26.4	-26.6	-26.8	-27.1	-27.5	-27.6	-27.8	-27.2	-25.5	-23.3	-21.2	-19.8	-18.8	-17.9	-17.3	-17.0	-16.4	-15.8	-14.7	-14.6	-14.6	-15.6	-21.7	-14.6																						
27-Nov	-16.0	-16.8	-17.5	-18.3	-19.1	-19.6	-20.7	-21.8	-21.3	-20.5	-20.0	-20.5	-20.3	-20.3	-21.2	-22.6	-24.0	-24.3	-24.1	-23.6	-23.1	-22.6	-22.1	-21.8	-20.9	-16.0																						
28-Nov	-21.7	-21.8	-21.7	-21.8	-21.7	-21.6	-21.6	-21.5	-21.5	-21.4	-21.3	-21.0	-20.8	-20.6	-20.4	-20.4	-20.7	-21.1	-21.4	-21.9	-22.4	-23.8	-25.2	-25.8	-21.8	-20.4																						
29-Nov	-27.0	-27.5	-26.2	-27.2	-28.1	-27.9	-27.9	-28.1	-28.1	-27.1	-25.0	-22.3	-20.8	-19.8	-19.5	-18.6	-18.0	-18.4	-19.4	-20.4	-21.0	-22.0	-22.6	-22.8	-23.6	-18.0																						
30-Nov	-22.9	-23.5	-23.7	-24.0	-24.6	-25.2	-25.5	-25.4	-25.8	-25.6	-24.5	-23.0	-22.1	-19.4	-19.6	-21.6	-21.0	-22.0	-22.7	-22.9	-23.5	-24.1	-23.9	-24.5	-23.4	-19.4																						
																								-11.3	-11.4	-11.3	-11.3	-11.4	-11.6	-11.7	-11.9	-11.8	-11.3	-10.6	-9.8	-8.9	-8.3	-8.2	-8.7	-9.6	-10.3	-11.0	-11.4	-11.7	-11.9	-12.1	-12.3	Diurnal Average
																								2.6	2.4	1.9	2.0	2.2	2.4	2.8	2.6	3.0	4.7	6.0	7.4	8.5	9.8	10.6	10.2	6.9	4.1	3.8	4.1	4.3	4.2	3.8	3.3	Diurnal Maximum



WBEA
Hourly Averages

Ambient Temperature (AT) - C
Lower Camp - November 2014





WBEA
Cumulative Frequency Distribution

Ambient Temperature (AT) - C
Lower Camp - November 2014

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	102	14.17	14.17
-20 - 0	519	72.08	86.25
0 - 10	97	13.47	99.72
10 - 20	2	0.28	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Speed: 30 km/h on Nov 6 07:00	Maximum Daily Speed Average: 16.1 km/h on Nov 7	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 1 18:00	Minimum Daily Speed Average: 0.8 km/h on Nov 23	Hours of Data: 720
Maximum Diurnal Speed Average: 2.7 km/h at hour 20	Minimum Diurnal Speed Average: 0.2 km/h at hour 8	Hours of Missing Data: 0
Monthly Average Velocity: 1.7 km/h 345.2 deg	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 5 Median = 8 Q ₃ = 11 P ₉₀ = 16 P ₉₉ = 24	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	SSW1	E1	S1	ENE1	SSE2	SE3	SE6	SE7	SE6	SE6	SE8	SW6	WSW9	WSW8	WSW5	SW5	WSW5	ENE0	ESE1	ESE4	ESE3	SE9	SE10	SE8	SSE3.1	SE10
2-Nov	SE7	SE8	SE8	SE9	SE7	SE8	SE11	ESE11	SE10	ESE9	SE12	SE10	SE11	SE13	SE15	SE14	SSE11	SE12	SE14	SSE9	ESE10	ESE13	SE9	SE6	SE10.0	SE15
3-Nov	SE9	SE12	SSE8	SSE6	SE9	SSE6	SSE5	ESE7	E4	NW4	WNW4	WNW7	NNW8	NNE11	N12	N12	N10	N11	N9	NNE8	NNE6	ENE8	NE4	NE2.9	N12	
4-Nov	ENE7	E8	E10	SE7	SSE5	S6	E12	ESE12	ESE10	E11	ESE14	ESE12	ESE14	SE15	ESE14	ESE12	ESE15	ESE16	ESE17	ESE17	ESE16	SE13	SE5	S2	ESE10.8	ESE17
5-Nov	NW2	W10	WNW8	W16	WNW21	WNW17	W16	W16	W18	WNW17	WNW15	W14	WNW15	W14	WNW13	WNW9	W9	WSW9	SSW5	SSW7	SW9	S6	S8	S10	W10.0	WNW21
6-Nov	SSE11	SSE12	SE16	SE26	SE30	SE29	SE30	SE27	SE22	SE23	SE21	SE18	SE18	SE10	SE12	SE10	SE7	SSE4	S3	W10	NW10	WNW17	WNW21	NW16	SE10.7	SE30
7-Nov	NW13	NW20	NW24	NW24	NW22	NW20	NNW19	NW17	NW18	NNW18	N19	N17	NNW20	NNW19	NNW19	NNW15	NNW12	NW14	NW15	NNW13	NNW14	NNW11	N10	NNE7	NNW16.1	NW24
8-Nov	NNE6	N7	NNE5	NW5	NW5	N3	N5	NNW8	NNW10	NNW9	NW11	NNW11	N15	NW12	WNW12	NW8	NNW6	NNE3	N3	N6	NNE3	NE2	NNW3	NNW3	NNW6.1	N15
9-Nov	N3	NW3	NNW3	WNW3	NNW3	NNE3	NW4	NW3	NW4	N3	NW3	NNW5	NNW7	N11	NNE11	NNE9	NNE9	NNW6	NNW6	N9	NNE8	NNE11	NNE7	N7	N5.3	NNE11
10-Nov	NNW6	N10	NW12	NW12	NW9	NW10	WNW9	NW9	NNW10	N15	N14	N15	N18	N19	N14	N14	N10	NNW8	NNW9	N10	N11	NNW9	NW8	WNW9	NNW10.6	N19
11-Nov	WNW10	NW10	NW9	NW9	NNW8	N8	NNE7	NE7	N5	ENE4	N1	WSW5	NNW6	NW7	NNW5	NW7	N6	NNE6	NNE3	NW6	WNW5	WNW4	WNW5	NW4	NNW4.9	NW10
12-Nov	WNW3	NW3	NW3	NNE1	SSW6	SW8	SW8	SSW6	S6	SSE7	S7	S8	SSE7	SE11	SE11	SE11	SSE8	SE9	SE6	SE7	SE9	SE12	SE9	SE10	SSE5.7	SE12
13-Nov	SE11	SE10	SE10	SE12	SE11	SE11	SE9	SE9	SE11	SE10	SE10	SE10	SE11	SE9	SE6	SE2	WNW4	WNW4	NW4	NW4	WNW4	NW3	WNW3	WNW4	SE5.1	SE12
14-Nov	NW4	NW4	WNW4	WNW4	NW5	WNW5	NW3	NW5	NW4	NW5	NNW7	N10	N9	NNW10	NNW9	N6	W1	E1	N2	NNE3	N2	WNW4	WSW10	SSE3	NNW3.9	N10
15-Nov	SSE6	SSE7	SSE7	SSE6	SSE5	SSE6	SSE6	SSE6	SSE5	SSE7	SE10	SSE7	SW7	WNW7	NNW9	NNW11	NNW11	N19	NNW18	NW14	NNW13	NNW15	NW18	NW14	NW2.7	N19
16-Nov	WNW13	NW14	NNW17	NNW17	NW16	NNW14	NNW15	NW14	NW13	NW12	NW12	NW12	NW14	NNW7	NNW4	SW2	WSW1	NW2	NW2	NNW2	NNW2	NNW1	NE1	E0	NW8.3	NNW17
17-Nov	E1	ESE2	SE7	SE8	SE8	SE9	SE10	SE9	SE11	E6	ESE9	SE12	SE14	SE17	SE16	SE9	SE4	WNW2	WNW3	WNW4	WNW3	NW2	WNW3	WNW3	SE5.4	SE17
18-Nov	W6	WNW5	WNW8	NNW11	NW14	NW10	NNW6	NW4	WNW4	WNW8	WNW13	WNW15	WNW17	NW17	NW16	WNW14	WNW16	WNW16	NW11	NNW9	NW7	NW7	NW8	NW8	NW10.1	WNW17
19-Nov	NW11	NNW6	NNW7	NNW6	N5	NW3	NW3	WNW4	NW3	WSW6	SW8	SW8	SSE6	SSW7	SSW5	S5	SSE5	SSE6	SE10	SE11	SE10	SE12	SE9	SE8	S2.3	SE12
20-Nov	ESE5	SE7	SE7	SE9	ESE9	SE10	SE12	SE8	ESE4	SE5	SE6	SE12	SE11	SE10	SE9	SE7	SE4	N2	WNW3	NW5	NNW8	N7	NNW7	NNW7	ESE4.2	SE12
21-Nov	NNW8	NNW7	N8	N7	NNW7	NNW6	NW7	NNW8	NW6	NW7	N10	NNW10	NW10	NW10	NNE9	NNE6	NE11	NE14	NE10	NE12	NE8	NE4	NNE6	NE10	N6.8	NE14
22-Nov	NE10	NE11	NE6	N6	N7	N9	NNE9	NE8	NNE8	NNE10	NNE11	NNE13	N15	N14	N11	NNW10	NNW10	N9	N12	N11	N10	NNW8	NNW11	N10	N9.4	N15
23-Nov	NNW7	NW6	NW4	NW5	WNW4	NW4	ENE1	SE1	SSE5	SSE6	SSE7	SE7	SE8	SE10	SSE7	S6	S3	N3	WNW2	WNW1	NNW0	NW1	NW2	WNW3	SSE0.8	SE10
24-Nov	WNW4	NNW7	N8	N10	NNW7	NNW7	NNW6	NW5	NW5	NNW4	NNW6	N7	NNE6	NNW4	NNW2	NNW3	NW3	NNE3	WNW5	NW2	ENE5	ENE3	NNE5	N6	NNW4.4	N10
25-Nov	NNW4	NNE4	NNE5	NNW4	NNW9	NNW8	NNW6	NW6	NNW7	N10	N8	NNW9	NNW9	NNW8	N8	NNW6	WNW3	NW2	NW3	NW2	E1	NNW2	NNW2	NNW1	NNW5.0	N10
26-Nov	SE6	SE11	SE11	SE9	SE10	SE9	SE11	SE8	SE10	SE8	SE8	SE8	SE5	SE7	SE7	SE5	NNW2	NW5	NW7	NW7	N11	N9	N12	N15	ESE3.5	N15
27-Nov	N13	N13	N9	NNW7	NNW6	NNW8	NW6	NNW3	WNW4	NNW3	N11	N7	NW4	NW3	W5	W3	WNW2	NW4	NW2	NNW2	WNW4	WNW3	NNW4	NNW5	NNW4.8	N13
28-Nov	N7	N8	N9	N11	N8	NNW8	N7	N8	N8	N8	N12	N11	N12	N13	N13	NNW8	NNW9	NNW7	NNW6	WNW4	WNW4	NW2	NW1	SE3	N7.2	N13
29-Nov	ENE1	S2	S4	SE6	SE10	SE10	SE10	SE9	SE9	SE9	SE6	W7	W16	W15	WSW16	W13	WNW15	WNW17	WNW17	WNW17	WNW18	WNW17	WNW18	WNW21	W6.0	WNW21
30-Nov	WNW22	WNW20	WNW20	WNW17	W17	W17	W20	W19	W20	WSW14	WSW12	SSE6	SE10	SSE7	SSE7	SE11	SE13	SE13	SE15	SE13	SE13	SE16	SE19	SE16	SW6.1	WNW22
NNW2.5 NNW2.2 NNW2.2 NNW2.1 NW1.7 NW1.1 NNE0.3 NNE0.2 NNW0.3 NNE1.1 NNE1.6 N1.4 NNW2.3 NNW2.1 N1.9 N1.6 NNW1.8 N2.3 N2.5 NNW2.7 N2.4 N1.8 NNW2.2 NNW2.3																								Diurnal Average		
WNW22 NW20 NW24 SE26 SE30 SE29 SE30 SE27 SE22 SE23 SE21 SE18 NNW20 N19 NNW19 NNW15 NNW16 N19 NNW18 NNW18 NNW17 NNW21 NNW21																								Diurnal Maximum		

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

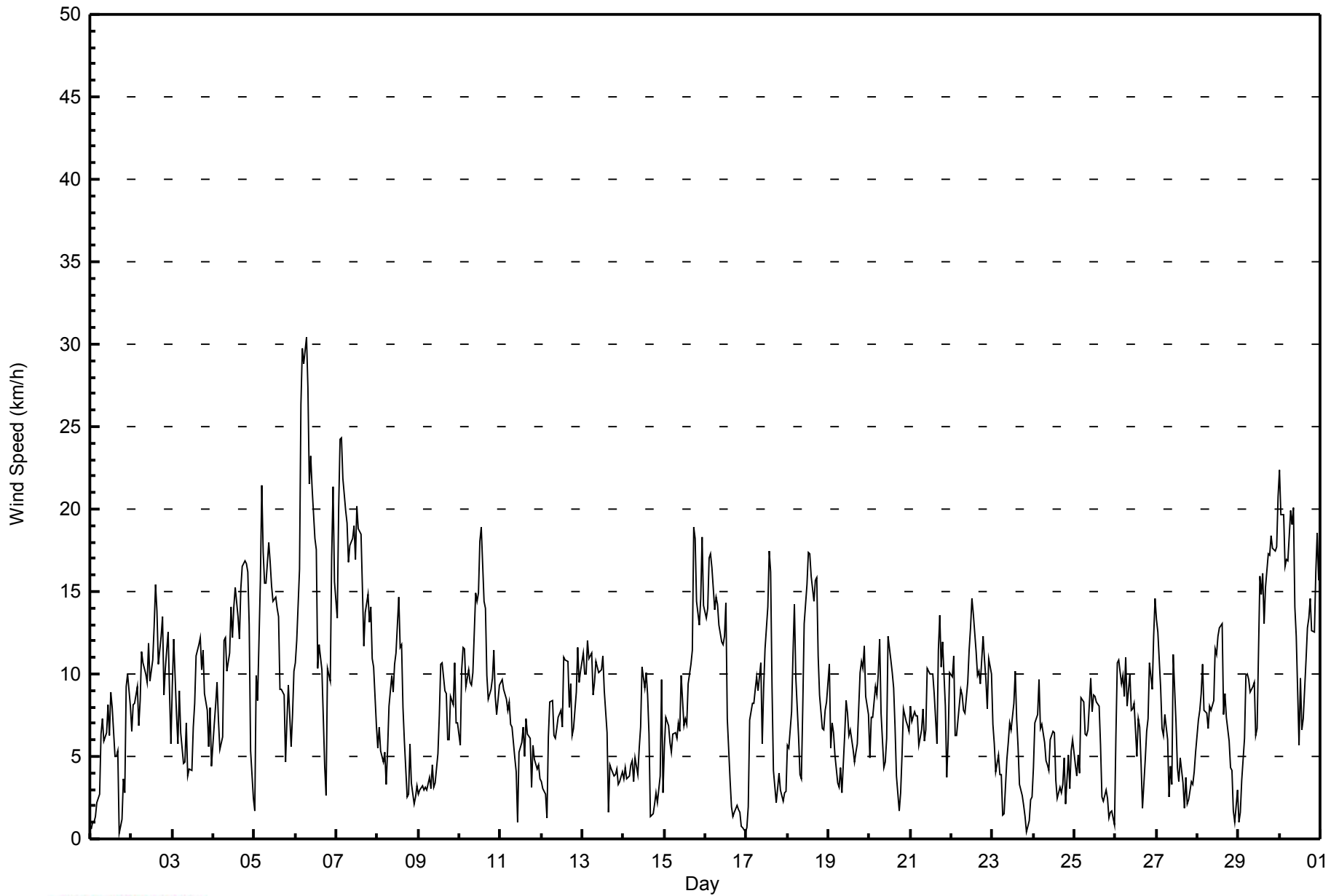


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 7 km/h on Nov 6 08:00 Minimum Value: 1 km/h on Nov 13 22:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 6																	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	1	1	1	1	1	1	2	3	2	2	2	3	2	2	2	3	3	1	2	1	2	2	2	2	3
2-Nov	2	3	3	3	2	3	3	3	2	4	4	3	2	2	2	2	2	4	4	3	3	4	3	3	4
3-Nov	3	3	3	2	3	3	2	3	2	2	1	1	2	2	2	2	3	2	2	2	2	2	2	2	3
4-Nov	1	2	3	3	2	3	2	2	2	2	2	3	3	3	2	2	4	2	2	2	2	4	4	1	4
5-Nov	2	2	2	4	5	4	3	3	3	4	3	3	3	3	4	2	2	2	3	4	3	2	3	3	5
6-Nov	4	4	5	5	6	6	7	7	6	6	6	4	4	4	2	3	2	2	1	6	3	6	4	3	7
7-Nov	4	4	5	5	5	5	4	4	4	5	4	4	4	5	5	3	3	3	3	3	3	3	3	3	5
8-Nov	2	1	2	1	1	1	2	2	3	2	2	3	3	3	2	2	1	2	2	1	1	2	1	1	3
9-Nov	1	1	1	1	1	1	1	1	1	1	1	2	3	3	3	3	1	1	1	3	2	2	2	2	3
10-Nov	2	3	2	2	2	2	2	2	3	3	3	3	4	5	3	4	2	2	2	3	3	2	2	2	5
11-Nov	2	1	2	2	2	2	2	1	1	2	2	2	2	2	2	2	1	1	1	1	2	1	1	1	2
12-Nov	1	1	1	1	3	2	2	2	2	2	3	3	3	2	2	2	2	2	2	2	2	3	3	3	3
13-Nov	3	2	2	3	3	2	3	2	2	2	2	2	2	2	1	2	1	1	1	1	1	1	1	1	3
14-Nov	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	3	2	1	1	1	2	3	3	2	3
15-Nov	2	2	2	2	2	2	1	2	2	2	3	2	4	2	2	2	3	6	5	3	3	4	4	2	6
16-Nov	2	3	5	4	4	3	4	4	3	2	2	2	3	2	1	1	1	2	1	1	2	1	1	1	5
17-Nov	1	1	2	1	2	2	2	2	3	3	4	3	3	3	3	5	2	2	1	1	1	2	2	1	5
18-Nov	1	2	2	4	3	2	2	1	1	4	3	3	3	4	4	3	3	3	3	2	1	2	3	3	4
19-Nov	2	1	2	1	2	1	1	2	3	2	2	2	2	3	2	1	1	1	2	2	2	3	3	2	3
20-Nov	2	3	2	3	3	3	3	3	2	2	4	2	2	2	2	3	2	1	1	2	2	2	1	1	4
21-Nov	2	2	2	2	2	1	2	2	1	2	3	3	3	2	2	2	3	3	2	2	2	1	2	1	3
22-Nov	2	3	2	1	1	2	1	2	1	1	2	2	3	3	2	2	2	2	3	2	2	2	3	2	3
23-Nov	1	1	1	1	1	1	1	2	1	2	2	2	2	2	1	1	1	1	2	1	1	2	1	1	2
24-Nov	1	2	2	2	2	2	2	1	1	1	2	1	1	1	1	2	1	1	1	1	1	1	1	1	2
25-Nov	2	1	2	2	3	2	1	1	2	2	2	2	2	2	2	1	2	1	2	1	1	1	1	1	3
26-Nov	3	3	2	2	2	2	3	2	2	3	2	2	2	2	2	3	1	1	2	2	2	2	5	5	5
27-Nov	4	3	3	2	2	2	1	2	1	2	3	4	2	1	1	1	1	1	1	1	1	1	1	1	4
28-Nov	1	2	2	2	1	2	1	2	2	2	3	2	2	3	3	2	2	2	2	1	1	1	2	1	3
29-Nov	1	1	1	2	2	2	2	2	2	2	2	3	4	3	3	3	3	3	3	4	3	3	3	4	4
30-Nov	4	4	4	3	3	4	3	4	4	5	3	3	3	2	3	2	3	2	2	2	2	2	3	3	5
Diurnal Maximum																									



WBEA
Hourly Averages

Wind Speed (WS) - km/h
Lower Camp - November 2014





WBEA
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Lower Camp - November 2014

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	197	27.36	27.36
6 - 11	355	49.31	76.67
12 - 19	146	20.28	96.94
20 - 28	19	2.64	99.58
29 - 38	3	0.42	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



WBEA
Frequency Distribution

Wind Speed (WS) - km/h
Lower Camp - November 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	11	11	4	7	6	6	11	8	7	3	2	4	3	40	50	24	197
6 - 11	52	21	9	2	3	8	98	29	8	4	7	5	5	11	27	66	355
12 - 19	24	1	2	0	1	12	30	1	0	0	0	3	12	23	22	15	146
20 - 28	0	0	0	0	0	0	5	0	0	0	0	0	2	6	5	1	19
29 - 38	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	3
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	87	33	15	9	10	26	147	38	15	7	9	12	22	80	104	106	720

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

**Wind Direction (WD) - deg
Lower Camp - November 2014**

Direction of Maximum Speed: 132 deg on Nov 6 07:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 330.5 deg on Nov 7	Hours of Data: 720
Direction of Minimum Speed: 78 deg on Nov 1 18:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 0.8 deg on Nov 23	Percent Operational Time: 100.0
Monthly Average Direction: 319.7 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	212	93	177	76	149	134	145	143	146	137	137	223	258	243	255	231	240	78	118	118	118	139	135	134	165.1
2-Nov	133	134	127	124	127	134	130	118	129	114	133	135	141	141	140	140	152	144	132	154	112	109	131	127	132.1
3-Nov	142	144	156	155	145	149	152	136	122	80	313	291	302	345	14	11	11	9	3	1	27	16	67	42	48.1
4-Nov	63	83	97	136	158	175	99	104	114	99	107	109	114	125	116	104	119	118	109	113	116	124	142	185	113.6
5-Nov	312	280	283	281	286	287	277	275	278	282	287	281	288	279	303	302	275	243	200	210	216	184	178	178	272.2
6-Nov	162	148	127	125	131	129	132	131	133	131	132	132	129	136	137	139	144	152	171	271	308	297	299	313	137.5
7-Nov	306	305	321	319	322	320	333	326	318	346	350	355	328	331	334	336	332	320	326	332	335	348	10	28	330.5
8-Nov	12	9	23	325	317	6	352	333	332	334	326	334	353	318	300	304	328	26	352	0	26	38	342	339	338.5
9-Nov	7	314	328	302	331	25	325	311	305	351	323	338	347	357	22	23	18	330	327	350	21	20	16	349	354.8
10-Nov	344	355	322	319	306	316	302	311	348	3	5	5	360	352	357	352	360	347	341	352	354	336	317	301	342.8
11-Nov	302	307	313	323	332	3	29	38	358	62	10	257	333	323	336	322	351	25	26	323	282	289	303	307	332.6
12-Nov	297	307	309	13	207	223	225	203	173	167	172	180	155	126	136	140	149	146	124	144	137	135	138	137	158.0
13-Nov	136	136	135	134	135	134	129	131	133	133	134	133	129	137	134	135	290	295	312	312	295	309	291	298	136.9
14-Nov	313	307	287	294	316	297	306	311	316	325	335	7	354	347	341	351	260	83	356	12	7	290	251	148	326.3
15-Nov	158	149	150	153	164	163	157	157	151	156	140	154	233	303	333	328	341	1	348	317	318	328	304	307	313.9
16-Nov	300	313	339	333	322	327	330	326	323	311	319	313	319	337	341	214	238	321	305	339	292	291	38	79	321.9
17-Nov	81	102	135	140	135	136	135	142	133	101	116	138	126	138	140	133	130	301	298	295	295	319	303	298	134.5
18-Nov	280	292	284	336	325	315	338	317	288	299	301	296	300	304	317	299	290	288	307	332	318	313	304	313	305.9
19-Nov	310	333	329	342	349	309	308	301	315	239	228	217	165	199	208	184	160	160	142	144	146	133	140	134	186.3
20-Nov	106	132	131	132	122	133	127	132	105	137	141	136	136	131	130	127	132	2	286	316	346	349	327	330	122.1
21-Nov	342	347	1	356	343	341	309	330	317	323	2	336	311	326	24	28	43	48	50	48	55	53	32	44	6.5
22-Nov	43	45	50	11	2	359	20	43	20	13	13	13	6	10	357	348	348	352	356	354	351	347	348	356	7.2
23-Nov	343	323	319	315	298	319	58	140	150	149	165	139	131	138	147	174	178	8	294	296	347	309	305	292	163.2
24-Nov	287	339	357	5	340	327	332	326	323	339	348	355	30	339	338	335	320	28	299	321	70	58	16	1	348.5
25-Nov	341	20	13	342	346	347	329	320	329	356	356	347	338	344	356	338	289	314	323	310	98	330	341	329	343.0
26-Nov	136	139	136	140	140	137	133	134	138	135	135	137	137	141	136	140	333	310	317	321	358	6	7	353	114.6
27-Nov	350	358	352	336	339	342	316	330	284	334	10	7	320	323	263	264	297	304	310	306	283	293	331	331	333.3
28-Nov	350	351	5	9	1	348	349	351	349	358	8	356	356	1	360	344	333	331	327	295	287	313	309	136	351.1
29-Nov	74	178	176	146	139	140	138	139	137	145	130	264	265	261	255	276	289	301	298	298	303	297	300	299	271.0
30-Nov	295	290	292	294	279	262	262	264	259	257	251	162	141	163	162	143	145	141	138	140	140	140	140	138	221.3

329.6 338.3 347.4 346.0 320.3 317.1 31.5 14.9 297.2 25.2 25.2 359.0 341.8 338.7 359.1 348.9 337.1 349.8 349.3 336.0 356.1 358.1 330.3 337.3
Diurnal Average

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

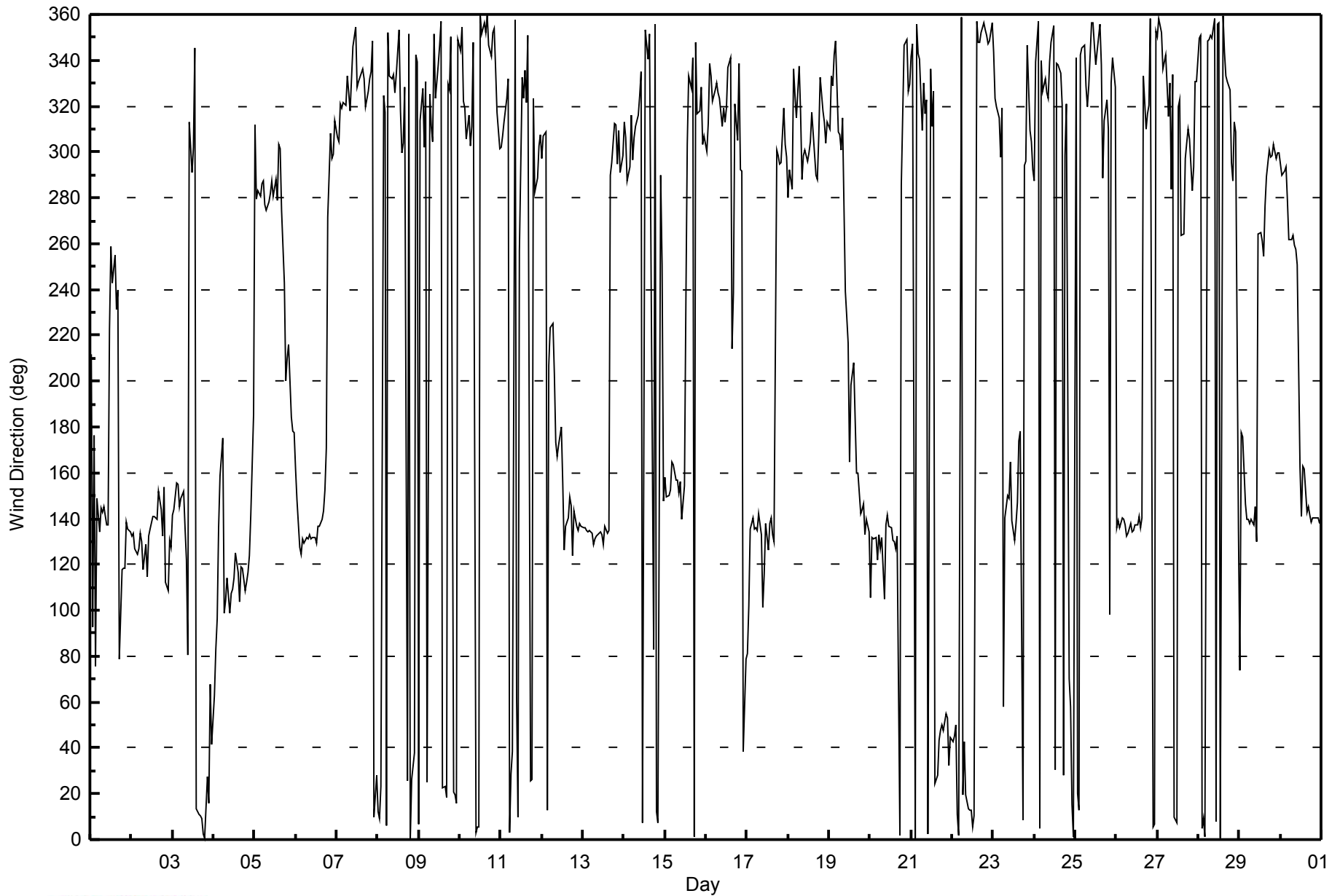


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 97 deg on Nov 1 01:00 Minimum Value: 6 deg on Nov 30 22:00 Percentiles: P ₁ = 8 P ₁₀ = 11 Q ₁ = 14 Median = 18 Q ₃ = 26 P ₉₀ = 44 P ₉₉ = 79																	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0										
Day	Hourly Period Ending At (MST)																								Daily Maximum		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	97	77	79	50	60	39	18	14	19	21	13	54	15	20	45	45	60	95	59	24	39	12	12	17	97		
2-Nov	29	22	23	17	24	20	15	21	16	39	18	17	13	11	9	10	13	15	20	32	17	9	17	48	48		
3-Nov	25	20	24	27	19	29	28	38	18	34	28	13	13	32	18	21	16	19	16	18	22	38	24	49	49		
4-Nov	19	18	19	29	43	37	12	12	11	11	10	10	13	11	11	9	14	9	8	8	10	16	48	48	48		
5-Nov	76	16	15	13	11	12	11	10	12	11	12	12	12	13	15	22	14	12	45	21	15	30	23	24	76		
6-Nov	27	24	18	11	11	11	12	14	18	16	15	15	14	28	12	13	12	21	44	42	20	14	10	22	44		
7-Nov	15	13	11	12	12	16	24	20	14	20	20	19	15	18	19	17	14	13	13	16	16	24	18	29	29		
8-Nov	29	22	24	29	26	55	33	16	14	16	16	25	21	24	17	13	13	63	50	31	38	44	30	30	63		
9-Nov	54	24	18	25	31	34	23	40	23	47	29	27	31	22	23	19	16	19	17	21	14	13	19	27	54		
10-Nov	30	22	13	14	17	12	16	19	20	17	15	17	17	20	19	18	18	21	20	19	18	25	16	12	30		
11-Nov	13	10	11	13	19	33	22	15	22	40	89	40	33	25	36	16	23	15	40	20	21	13	14	16	89		
12-Nov	16	20	26	69	34	20	19	22	17	18	27	30	38	14	10	13	17	13	38	15	11	13	17	18	69		
13-Nov	14	16	15	13	14	14	20	16	15	12	12	13	10	9	10	80	19	16	21	13	16	13	22	17	80		
14-Nov	21	18	17	21	15	18	18	11	12	14	19	16	18	20	18	21	86	34	56	48	68	59	16	53	86		
15-Nov	22	13	14	23	22	20	17	23	18	21	16	26	55	41	16	18	20	18	20	15	21	19	13	10	55		
16-Nov	11	18	20	20	13	14	15	16	13	15	15	11	13	23	55	48	68	57	39	40	78	43	68	93	93		
17-Nov	61	64	13	12	16	17	14	19	16	42	25	15	11	9	8	44	56	33	34	34	41	55	46	45	64		
18-Nov	27	26	17	24	12	11	15	17	30	21	12	10	13	11	12	14	11	10	15	14	18	19	20	19	30		
19-Nov	13	15	18	19	27	41	26	19	78	14	17	26	28	30	31	14	16	18	10	10	14	12	23	16	78		
20-Nov	38	28	24	21	21	16	18	28	42	32	42	10	14	13	13	15	17	57	23	26	17	21	13	14	57		
21-Nov	16	17	14	18	18	21	19	14	26	28	19	24	16	19	28	26	12	10	11	12	12	16	17	9	28		
22-Nov	11	11	18	12	15	12	14	12	11	8	12	13	13	14	17	18	17	15	16	16	17	17	18	15	18		
23-Nov	17	15	14	9	16	22	50	61	28	29	26	27	13	9	17	13	53	31	73	67	64	68	58	63	73		
24-Nov	19	21	24	17	16	14	14	27	20	30	19	18	20	32	43	39	26	33	23	56	16	42	14	20	56		
25-Nov	26	26	33	34	18	17	16	17	26	17	17	17	18	18	15	29	45	35	31	52	76	49	41	52	76		
26-Nov	67	10	11	12	16	15	12	13	13	25	15	15	16	14	13	48	64	23	22	17	18	16	20	19	67		
27-Nov	18	15	19	22	19	17	18	35	20	24	14	34	22	29	35	39	44	27	31	24	27	27	27	20	44		
28-Nov	16	16	14	11	13	17	17	15	16	14	15	16	16	13	15	18	16	16	15	23	11	44	75	53	75		
29-Nov	77	74	32	23	12	8	10	15	10	15	37	39	16	14	12	18	12	10	9	10	10	9	10	10	77		
30-Nov	10	10	10	11	11	12	11	11	11	16	15	46	16	21	32	12	12	8	8	9	8	6	8	9	46		
																	97 77 79 69 60 55 50 61 78 47 89 54 55 41 55 80 86 95 73 67 78 68 75 93										
Diurnal Maximum																											



WBEA
Hourly Averages

Wind Direction (WD) - deg
Lower Camp - November 2014





Wood Buffalo Environmental Association

SO₂ Calibration Report

Station Information

Calibration Date	November 18, 2014	Previous Calibration	October 14, 2014
Station Name	Lower Camp	Station Number	AMS 11
Reason:	Install		
Start Time (MST)	10:30	End Time (MST)	14:00
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	-626	-626
Analyzer Range (mv)	5000	5000	Lamp voltage	854	861
Calculated slope	0.995721	0.999671	Chamber temp.	43.3	43.2
Calculated intercept	1.765339	1.647431	Pressure (mmHg)	716.4	733.2
Analyzer Background	28.1	27.7	Flow (lpm)	0.469	0.493
Analyzer Coefficient	1.007	1.009	Intensity	35xxx	35xxx

Analyzer make TEI 43C Analyzer serial # 613516794

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.6	NA
as found span	5000	80.9	830.0	826.8	1.004
calibrator zero	5000	0.0	0.0	-0.6	NA
high point	5000	80.9	830.0	829.5	1.001
second point	5000	40.9	419.6	416.8	1.007
third point	5002	20.4	209.2	207.1	1.010
calibrator zero	5000	0.0	0.0	-0.6	NA
as left zero	5000	0.0	0.0	0.0	NA
as left span	5000	80.9	830.0	833.0	0.996
Average Correction Factor					1.006

Corrected As found 827.3 Previous response 831.8 % change 0.5%

Notes:

Filter changed after as founds. No adjustments made.

Calibration Performed By:

Devin Russell



Wood Buffalo Environmental Association

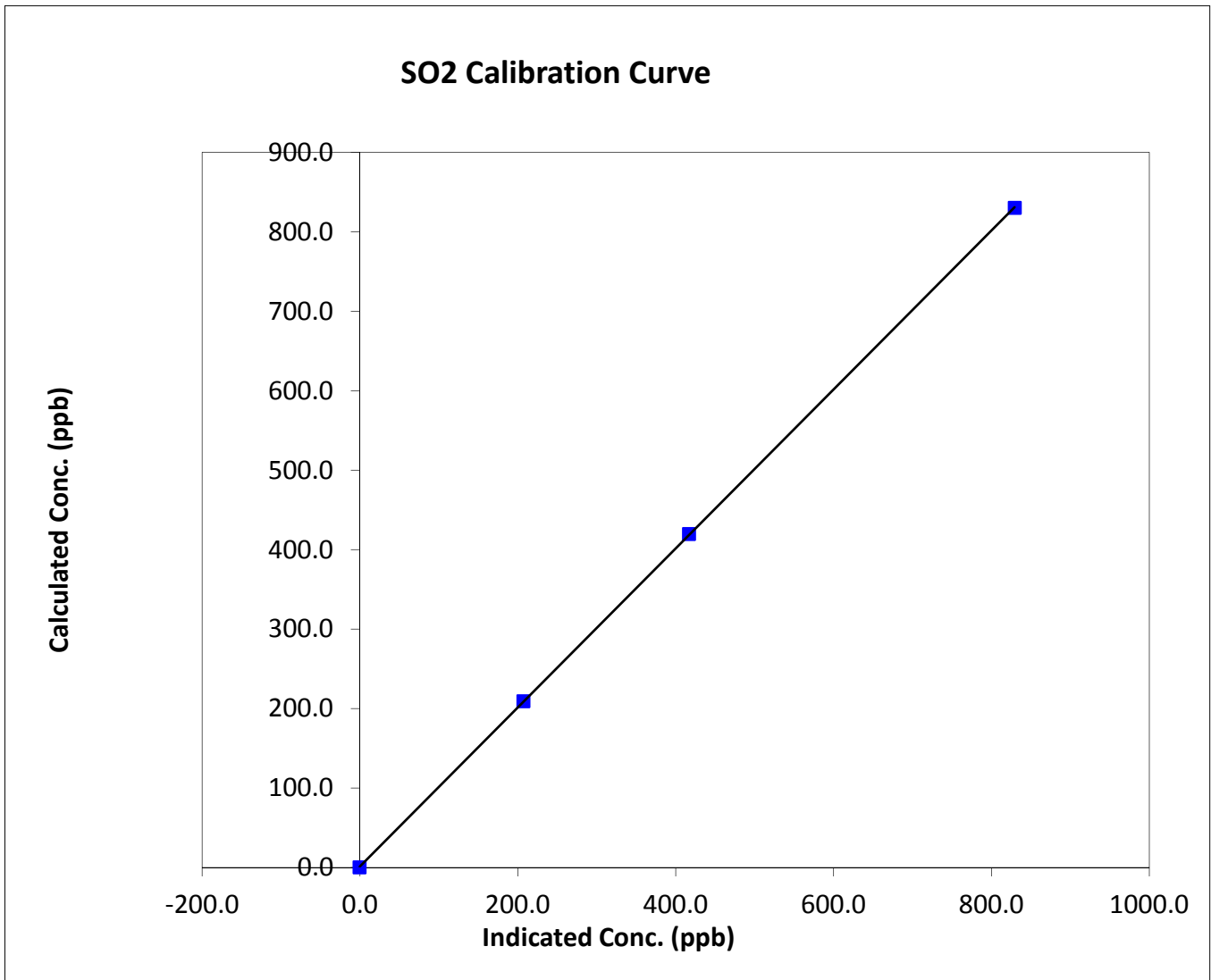
SO₂ Calibration Summary

Station Information

Calibration Date	November 18, 2014	Previous Calibration	October 14, 2014
Station Name	Lower Camp	Station Number	AMS 11
Start Time (MST)	10:30	End Time (MST)	14:00
Analyzer make	TEI 43C	Analyzer serial #	613516794

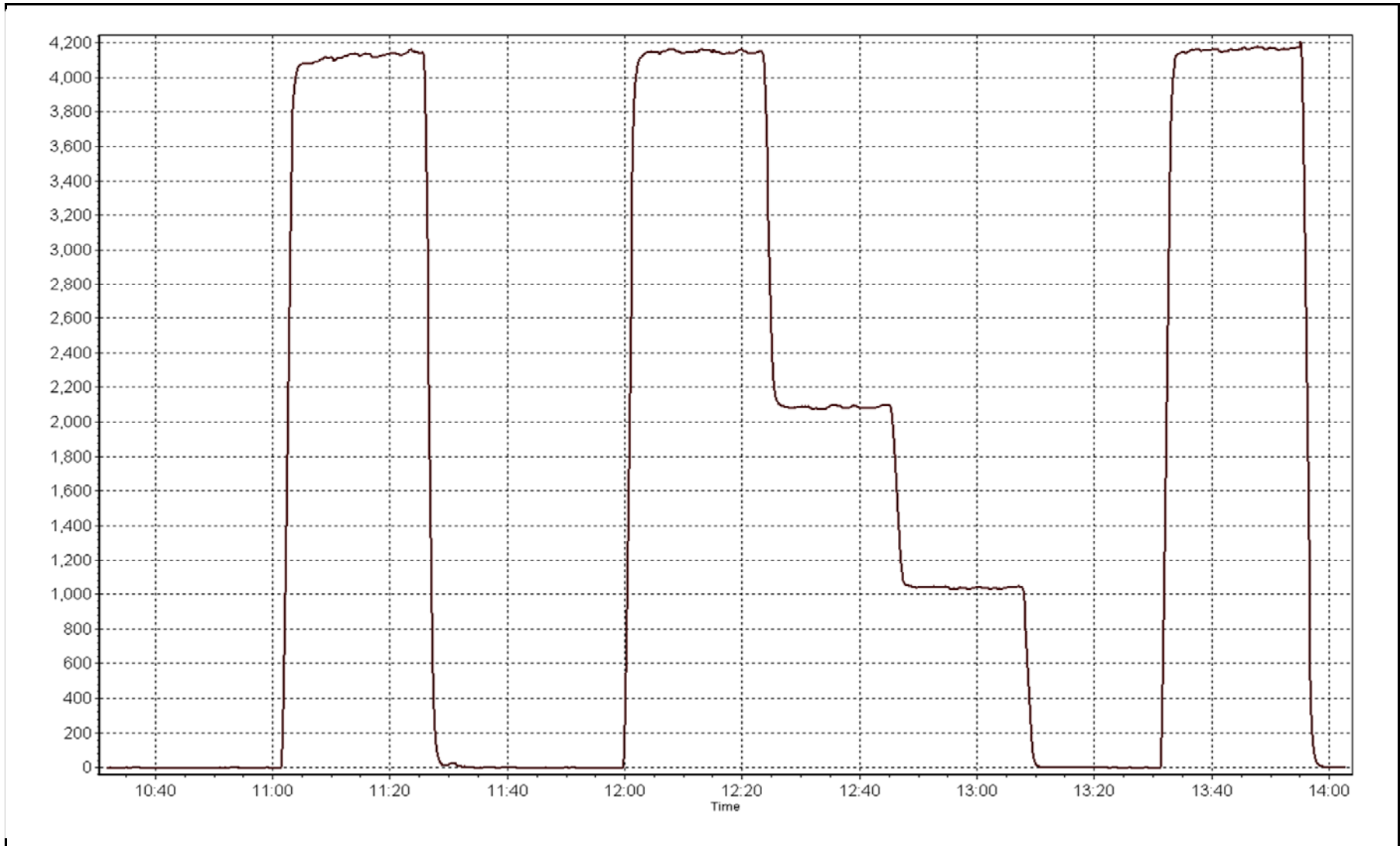
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.6	N/A	Correlation Coefficient	0.999990
830.0	829.5	1.0007		
419.6	416.8	1.0068	Slope	0.999671
209.2	207.1	1.0103		
			Intercept	1.647431



SO2 Calibration Plot

Date: November 18, 2014





Wood Buffalo Environmental Association

H2S Calibration Report

Station Information

Calibration Date	November 19, 2014	Previous Calibration	October 15, 2014
Station Name	Lower Camp	Station Number	AMS 11
Reason:	Routine		
Start Time (MST)	10:05	End Time (MST)	13:50
Barometric Pressure	760 mmHg	Station temp.	21 Deg C
Calibrator Make/Model	Sabio 4010	Serial number	11051107
Cal Gas Concentration	5.15 ppm H2S	Cal Gas Expiry Date	9/9/2017
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)	973	980
Calculated slope	0.997283	0.993169	Chamber temp. (deg C)	45	45
Calculated intercept	0.287768	0.210931	Pressure (mmHg)	503.6	492.4
Analyzer Background	1.85	1.88	Flow(LPM)	0.347	0.335
Analyzer Coefficient	0.924	0.906	Intensity(%)	91	90
			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	72.9	75.1	76.0	0.988
SO2 scrubber check	5000	20.5	210.3	1.7	NA
calibrator zero	5000	0.0	0.0	-0.2	NA
high point	5001	72.9	75.1	75.4	0.995
second point	5002	38.8	39.9	39.9	1.001
third point	5002	19.4	20.0	19.9	1.005
calibrator zero	5000	0.0	0.0	-0.2	NA
as left zero	5000	0.0	0.0	-0.1	NA
as left span	4999	72.9	75.1	75.4	0.996
Average Correction Factor					1.000

Corrected As found	76.1	Previous response	75.0	% change	-1.5%
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Notes:

Filter changed after as founds. Adjusted span. Scrubber check completed after as founds.

Calibration Performed By: Devin Russell



Wood Buffalo Environmental Association

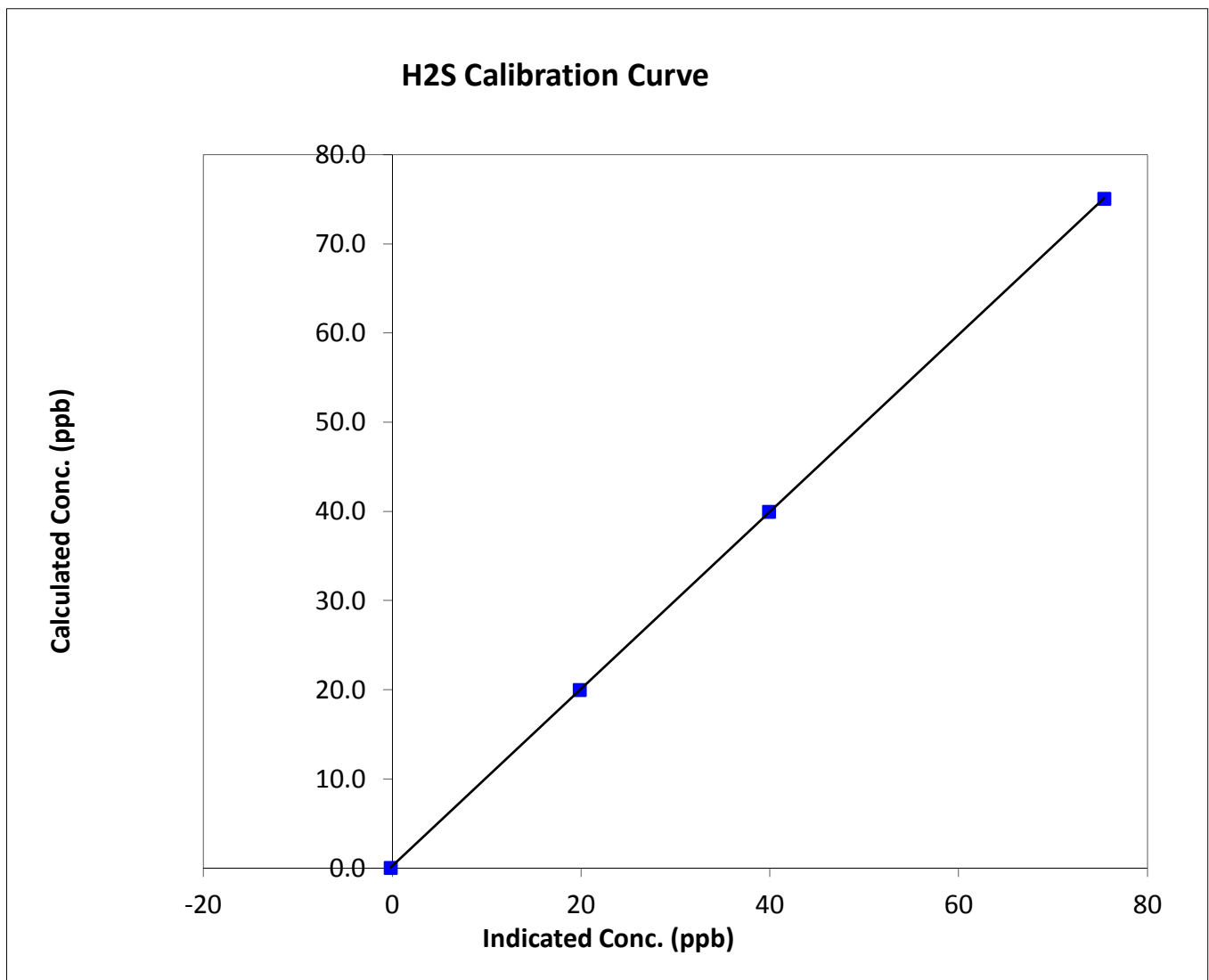
H2S Calibration Summary

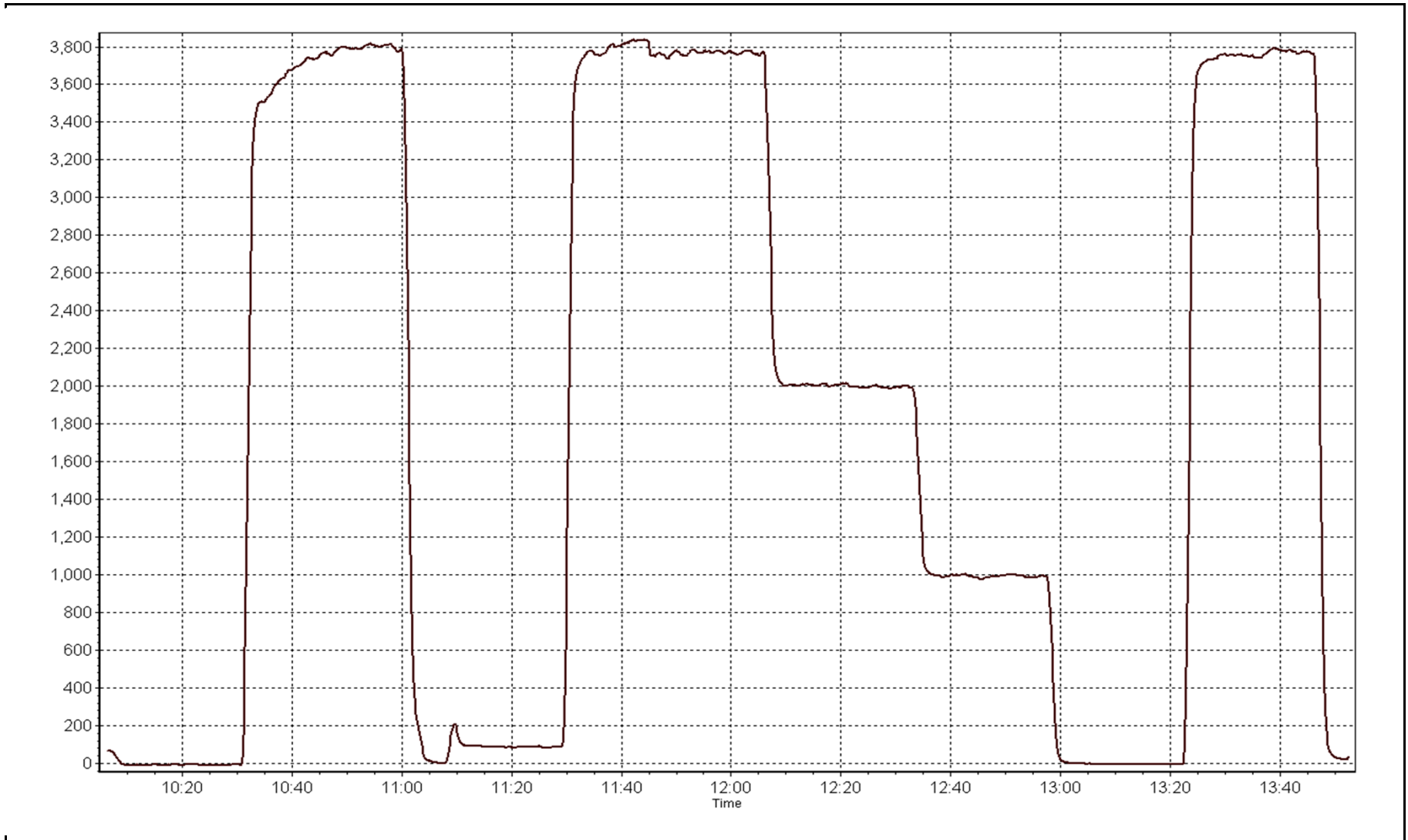
Station Information

Calibration Date	November 19, 2014	Previous Calibration	October 15, 2014
Station Name	Lower Camp	Station Number	AMS 11
Start Time (MST)	10:05	End Time (MST)	13:50
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	0.999995
75.1	75.4	0.9952		
39.9	39.9	1.0008	Slope	0.993169
20.0	19.9	1.0048		
			Intercept	0.210931







Wood Buffalo Environmental Association

THC Calibration Report

Station Information

Calibration Date	Tuesday, November 18, 2014	Previous Calibration	Tuesday, October 14, 2014
Station Name	Lower Camp	Station Number	AMS 11
Reason:	Routine		
Start Time (MST)	10:30	End Time (MST)	14:00
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	8.2	8.2
Analyzer Range (mv)	5000	5000	Air or Bypass press	37.8	37.8
Calculated slope	0.998216	1.009261	Fuel Pressure	24.2	24.2
Calculated intercept	0.030446	-0.045676			

Analyzer make 51i-LT Analyzer serial # 1218153580

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	-0.10	N/A
as found span	5001	80.9	17.37	17.27	1.006
calibrator zero	5000	0.0	0.00	0.05	N/A
high point	5001	80.9	17.37	17.26	1.006
second point	5000	40.9	8.78	8.72	1.007
third point	5002	20.4	4.38	4.40	0.995
calibrator zero	5000	0.0	0.00	0.05	N/A
as left zero	5000	0.0	0.00	0.06	N/A
as left span	5000	80.9	17.37	17.63	0.985
Average Correction Factor					1.003

Corrected As found 17.37 Previous response 17.37 % change 0.0%

Notes:

Filter changed after as founds. Zero adjusted.

Calibration Performed By:

Devin Russell



Wood Buffalo Environmental Association

THC Calibration Summary

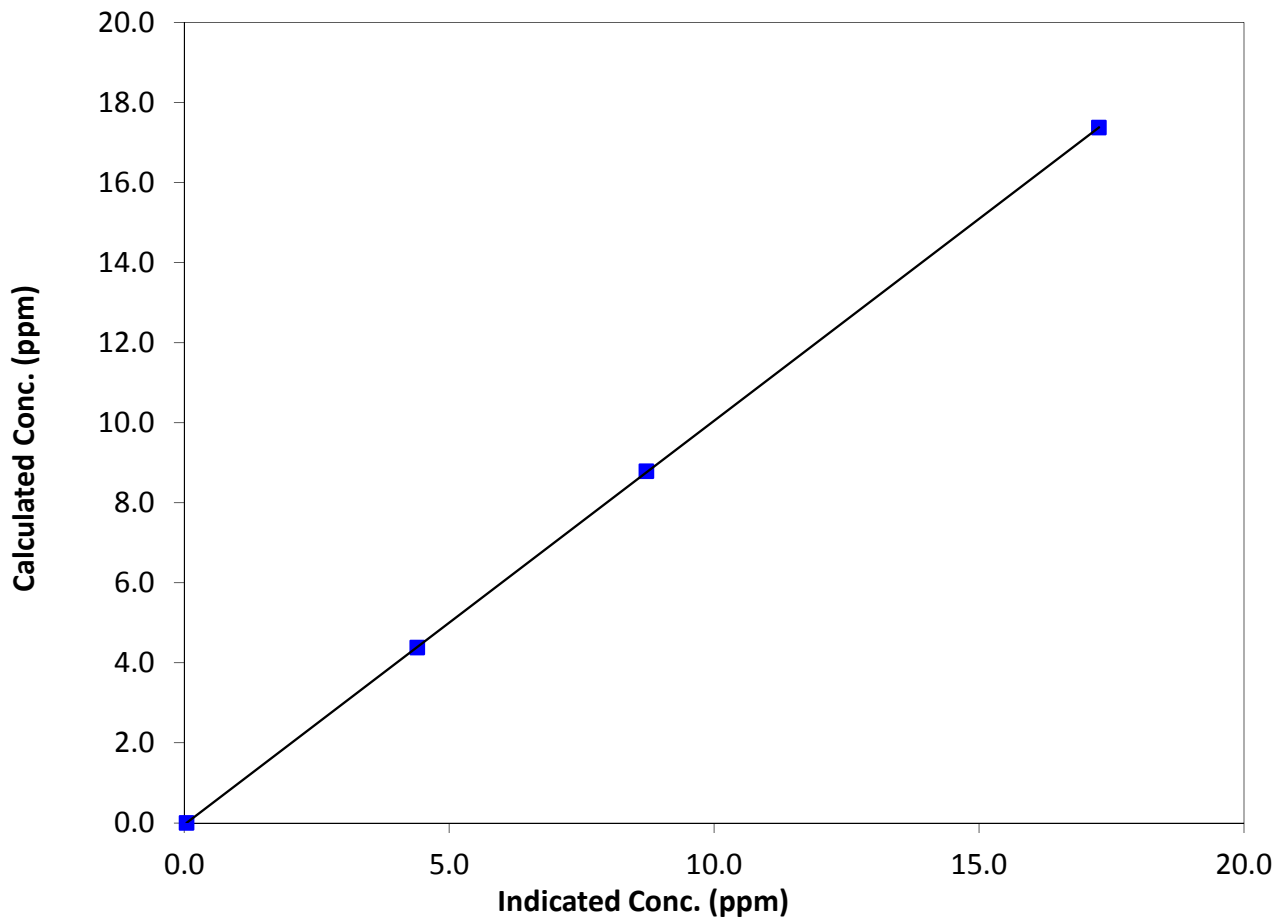
Station Information

Calibration Date	November 18, 2014	Previous Calibration	October 14, 2014
Station Name	Lower Camp	Station Number	AMS 11
Start Time (MST)	10:30	End Time (MST)	14:00
Analyzer make	51i-LT	Analyzer serial #	1218153580

Calibration Data

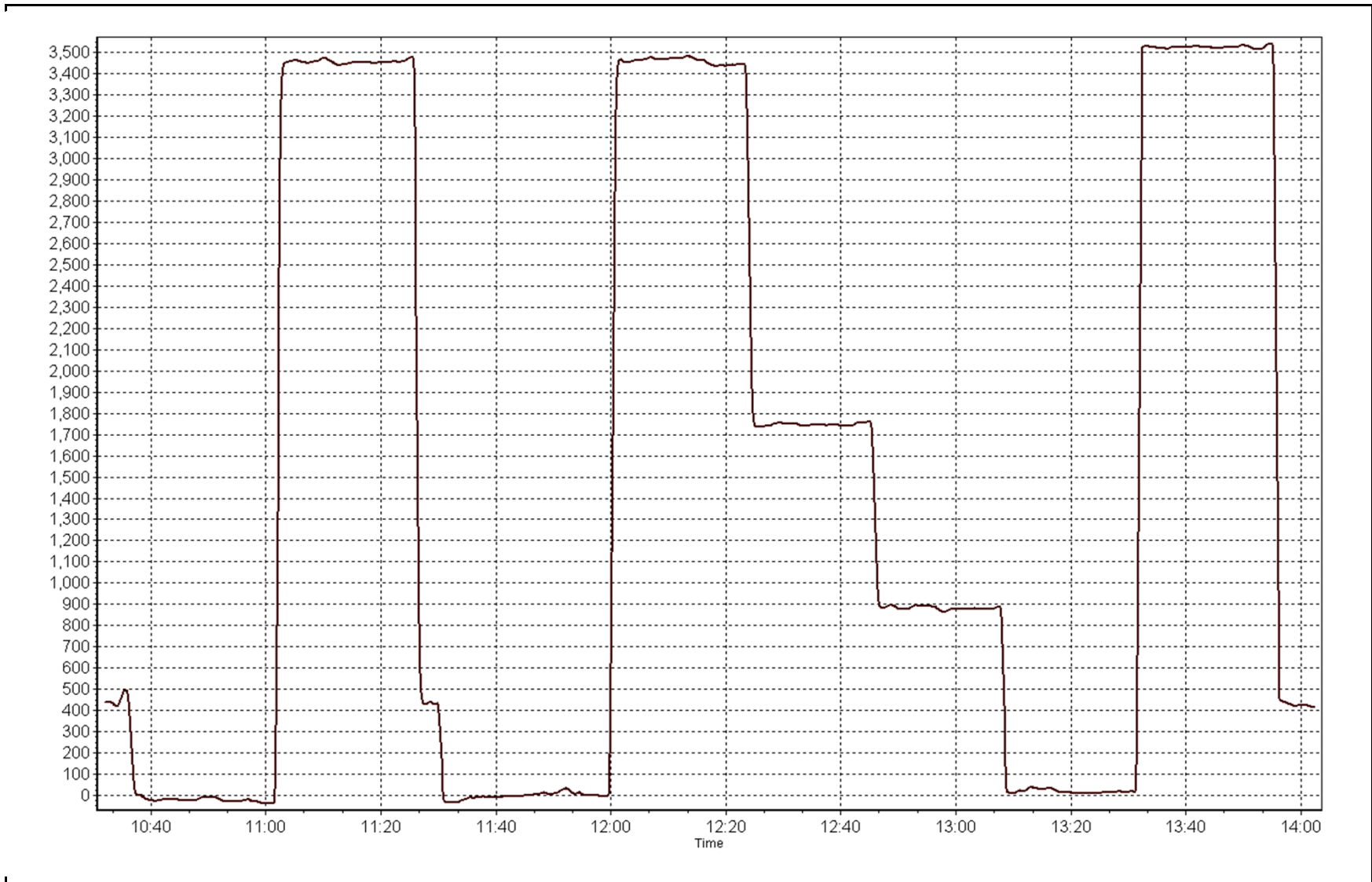
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.05	N/A	Correlation Coefficient	0.999994
17.37	17.26	1.0061		
8.78	8.72	1.0070	Slope	1.009261
4.38	4.40	0.9954		
			Intercept	-0.045676

THC Calibration Curve



THC Calibration Plot

Date: November 18, 2014



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 12
MILLENNIUM MINE
NOVEMBER 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

December 30, 2014

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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MILLENNIUM MINE (AMS 12)
 NOVEMBER 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	684	36	36	100.00	23	0	3	0
TRS(ppb) Average	686	33	34	99.86	1	0	1	0
THC(ppm) Average	684	36	36	100.00	4.5	-	2.7	-
NO2(ppb) Average	682	36	38	99.72	44	0	23	-
NO(ppb) Average	682	36	38	99.72	241	-	44	-
NOX(ppb) Average	682	36	38	99.72	280	-	65	-
PM2.5(ug/m3) Average	719	0	1	99.86	37.2	-	16.6	0
Temperature 2 m (C) Average	720	0	0	100.00	9.2	-	3.5	-
Wind Speed 10 m (km/h) Average	720	0	0	100.00	25	-	-	-
Wind Direction 10 m (deg) Average	720	0	0	100.00	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MILLENNIUM MINE (AMS 12)
 NOVEMBER 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	684	0.6	1	-	0	0	0	0	0	1	23
TRS(ppb) Average	686	0.4	0	-	0	0	0	0	0	1	1
THC(ppm) Average	684	2.34	0.3	-	2.1	2.1	2.2	2.2	2.4	2.7	4.5
NO2(ppb) Average	682	12.5	8	-	0	4	6	10	18	25	44
NO(ppb) Average	682	9.6	21	-	0	0	1	3	9	26	241
NOX(ppb) Average	682	22.1	27	-	1	5	8	13	27	50	280
PM2.5(ug/m3) Average	719	7.21	5.1	-	1	2.6	3.7	5.6	9.2	14.3	37.2
Temperature 2 m (C) Average	720	-11.25	8	-	-29.3	-22.5	-15.8	-12.1	-5.9	-0.1	9.2
Wind Speed 10 m (km/h) Average	720	8.6	4	-	1	4	5	8	12	15	25
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION -MILLENNIUM MINE (AMS 12)
NOVEMBER 2014

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
TRS	18 Nov 2014 12:00	18 Nov 2014 12:00	1	Maintenance - manifold cleaning
NO2, NO, NOX	04 Nov 2014 15:00	04 Nov 2014 16:00	2	Power spikes
PM2.5	18 Nov 2014 13:00	18 Nov 2014 13:00	1	Maintenance - Flow and zero check, sample head cleaning

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Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 23 ppb on Nov 29 23:00	Maximum Daily Average: 2.6 ppb on Nov 29		Hours of Data:	684
Minimum Value: 0 ppb on Nov 3 04:00	Minimum Daily Average: 0.2 ppb on Nov 3		Hours of Missing Data:	36
Maximum Diurnal Average: 1.4 ppb at hour 23	Minimum Diurnal Average: 0.3 ppb at hour 9		Hours of Calibration:	36
Monthly Average: 0.6 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 7		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0	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
2-Nov	0	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-Nov	0	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-Nov	0	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-Nov	0	Z	0	0	0	1	0	0	0	2	4	2	1	0	0	1	0	0	0	0	0	0	0	0	0.7	4
6-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2	5	1	0.7	5
7-Nov	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	1	1	1	0	0	0	0	0.4	1
8-Nov	0	Z	0	0	0	0	1	0	2	1	0	0	0	1	3	1	0	0	0	0	0	0	0	0	0.5	3
9-Nov	0	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
10-Nov	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
11-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	7	9	2	1	2	3	1.3	9	
12-Nov	4	Z	7	4	8	6	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	8	
13-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	5	2	2	1	1	0.9	5	
14-Nov	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
15-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0.2	1	
16-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	1	0	0.4	1	
17-Nov	0	Z	1	0	0	0	0	0	0	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0.5	1	
18-Nov	1	Z	0	0	0	0	3	4	1	1	C	C	C	C	C	C	1	3	1	0	1	0	0	--	4	
19-Nov	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	
20-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0.5	1	
21-Nov	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	
22-Nov	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	
23-Nov	0	Z	0	0	0	0	0	0	0	0	0	1	1	1	0	0	1	1	1	1	2	1	1	0.6	2	
24-Nov	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	
25-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0.4	1	
26-Nov	1	Z	1	1	0	0	0	1	0	1	1	1	1	1	1	1	1	1	2	1	0	0	0	0.6	2	
27-Nov	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	
28-Nov	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-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	12	1	1	9	23	7	2.6	23
30-Nov	8	Z	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	8	

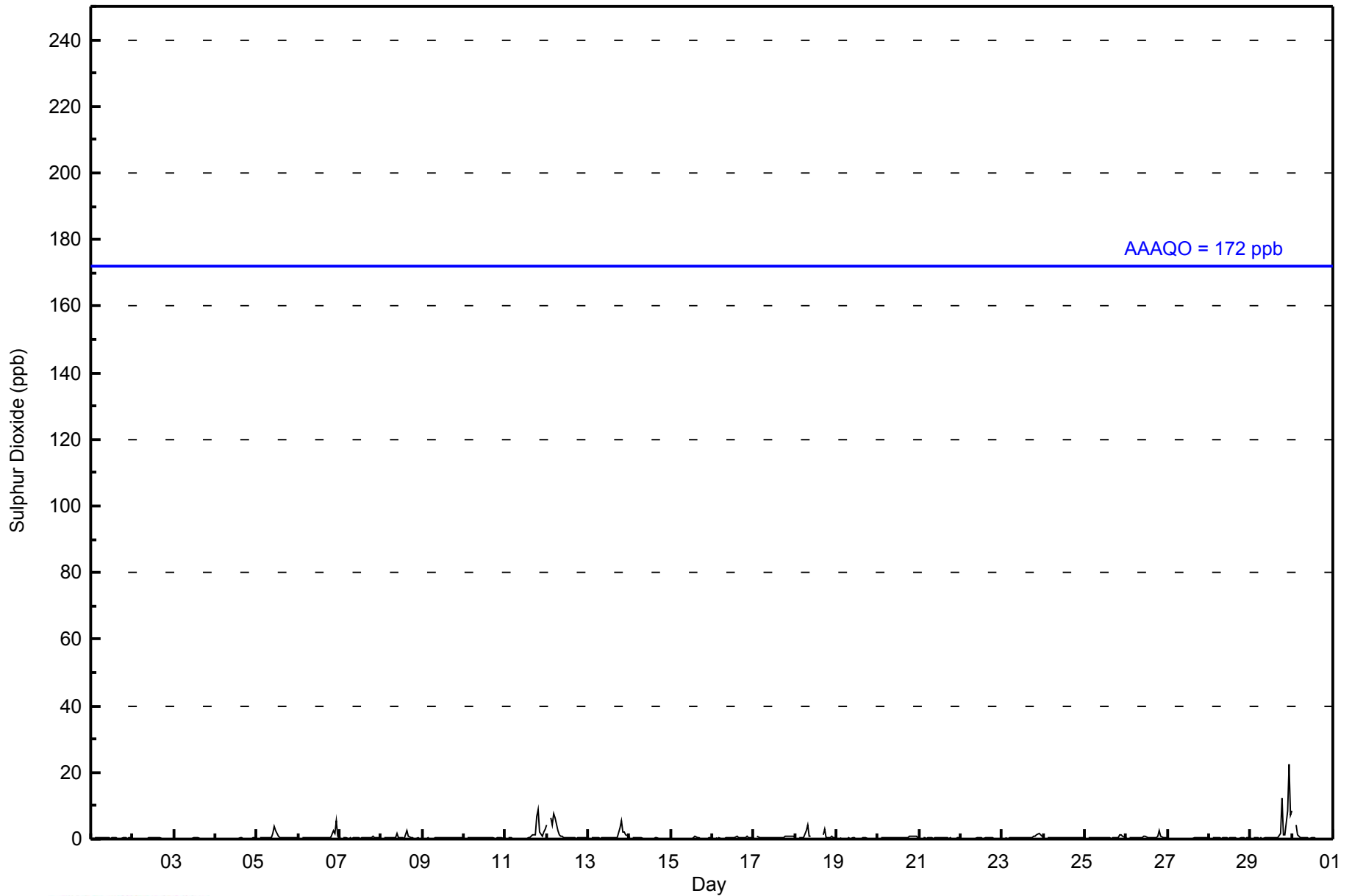
0.7	--	0.6	0.4	0.5	0.5	0.4	0.4	0.3	0.4	0.4	0.4	0.3	0.3	0.4	0.4	0.4	0.5	1.1	0.9	0.6	0.8	1.4	0.7	Diurnal Average	
8	--	7	4	8	6	3	4	1	2	4	2	1	1	1	3	1	3	12	9	3	9	23	7	Diurnal Maximum	

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



WBEA
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Millennium - November 2014





WBEA
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Millennium - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	682	99.71	99.71
11 - 20	1	0.15	99.85
21 - 60	1	0.15	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



WBEA
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Millennium - November 2014

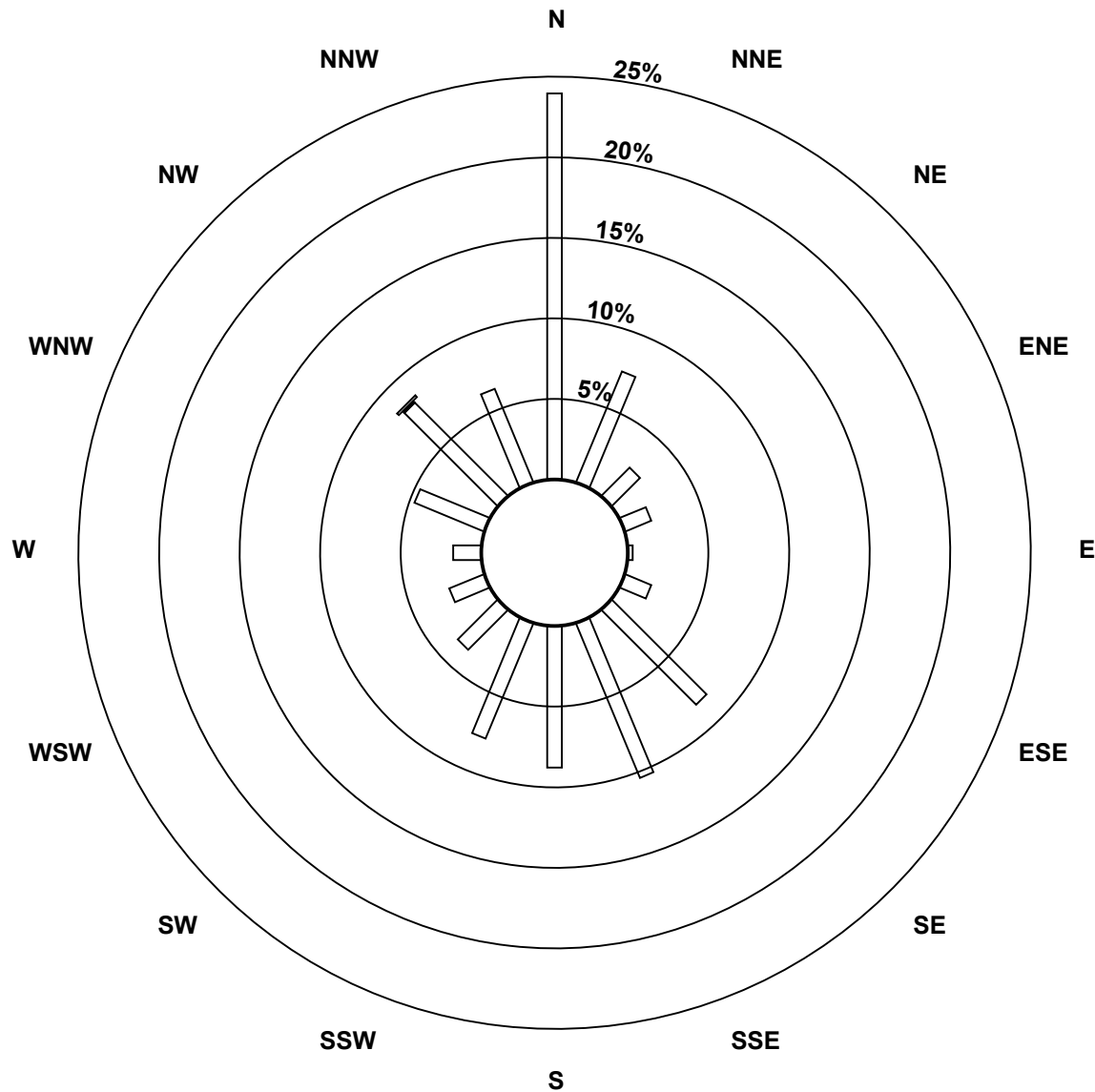
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	164	51	17	12	2	12	57	71	60	53	24	16	12	32	56	43	682
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	164	51	17	12	2	12	57	71	60	53	24	16	12	32	58	43	684

Total Number of Valid Hours: 684

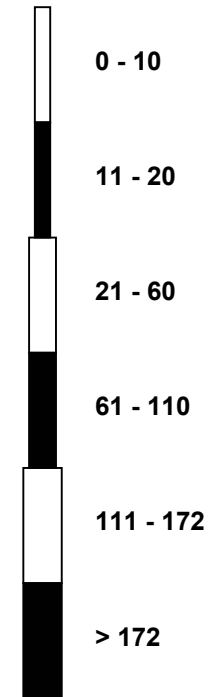
Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

Sulphur Dioxide (SO₂) - ppb
Millennium (AMS 12)



Classes (ppb)

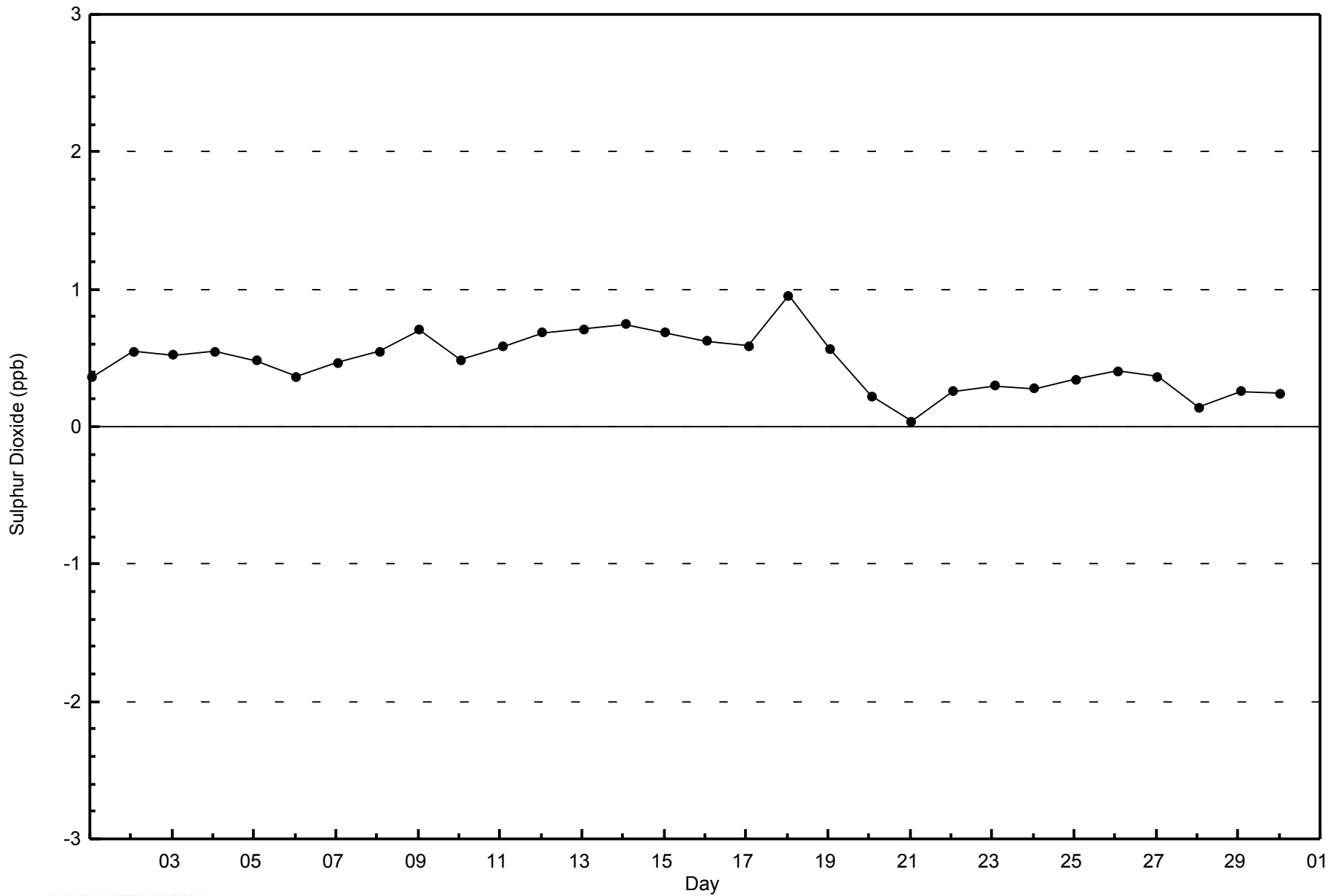


Total Number of Valid Hours: 684



WBEA
Zero Responses

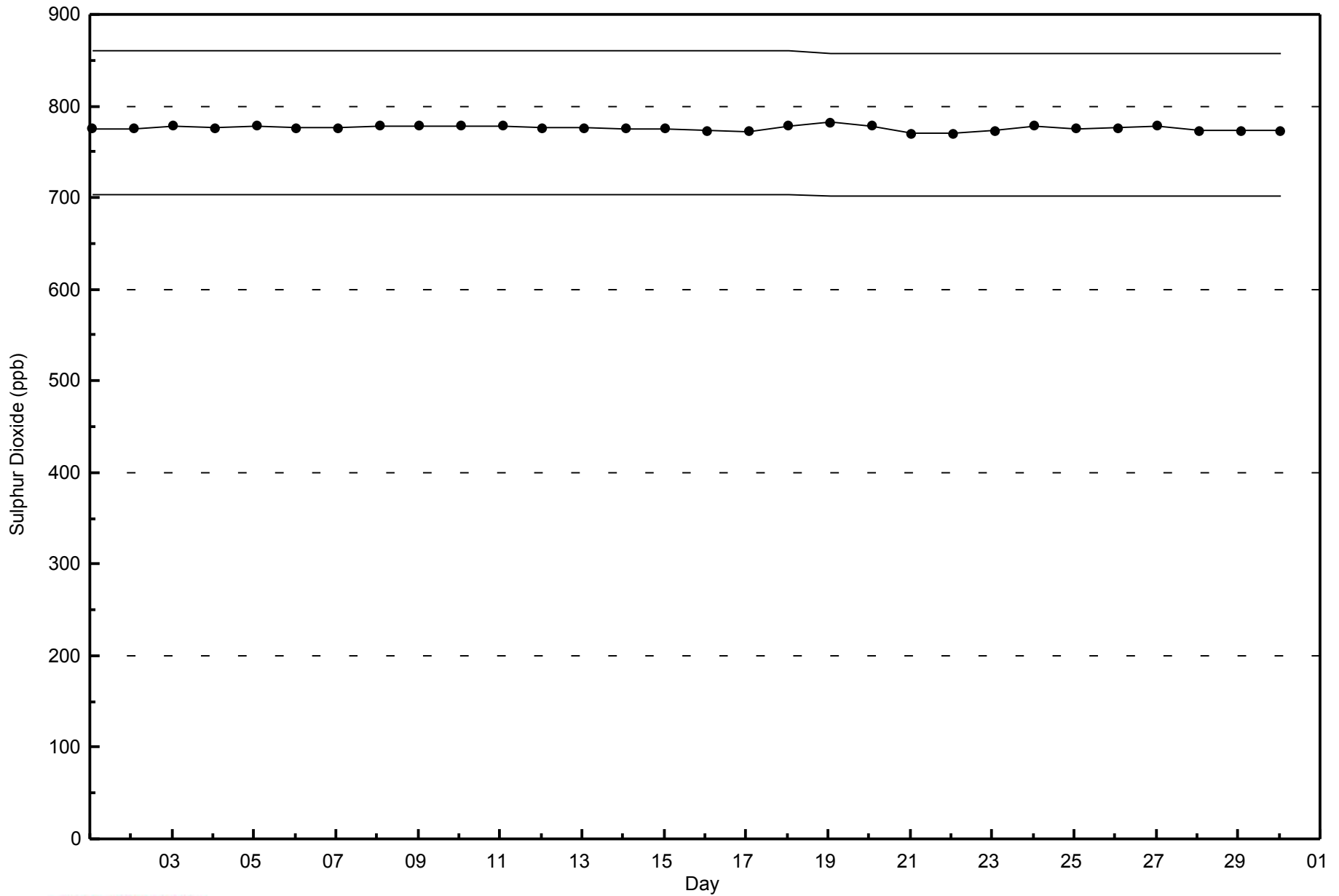
Sulphur Dioxide (SO₂) - ppb
Millennium - November 2014





WBEA
Span Responses

Sulphur Dioxide (SO₂) - ppb
Millennium - November 2014



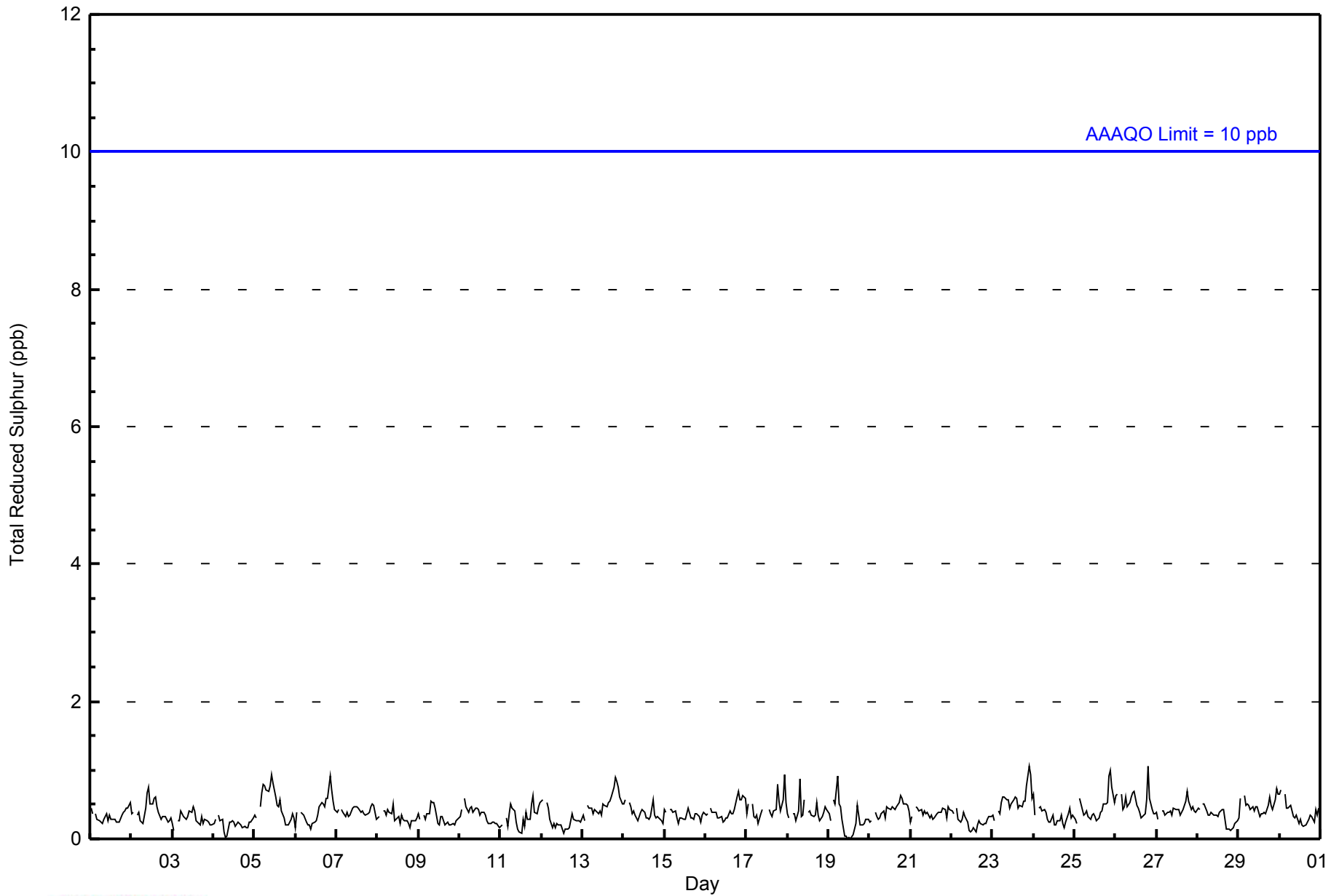


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 720																																							
Maximum Value: 1 ppb on Nov 26 20:00										Maximum Daily Average: 0.6 ppb on Nov 23										Hours of Data: 686																													
Minimum Value: 0 ppb on Nov 19 12:00										Minimum Daily Average: 0.2 ppb on Nov 4										Hours of Missing Data: 34																													
Maximum Diurnal Average: 0.5 ppb at hour 4										Minimum Diurnal Average: 0.3 ppb at hour 13										Hours of Calibration: 33																													
Monthly Average: 0.4 ppb										Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 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-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.3	1																							
2-Nov	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	0.4	1																						
3-Nov	0	0	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-Nov	0	0	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-Nov	0	0	Z	0	1	1	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0.5	1																						
6-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	1	1	1	1	0	0.4	1																							
7-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.4	1																							
8-Nov	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																							
9-Nov	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																							
10-Nov	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																							
11-Nov	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0.3	1																							
12-Nov	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																							
13-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	1	1	1	1	1	1	1	1	1	0.5	1																							
14-Nov	1	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.4	1																							
15-Nov	0	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																							
16-Nov	0	0	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																							
17-Nov	0	0	Z	1	0	0	0	0	0	0	C	C	C	0	0	0	0	0	1	1	0	1	1	1	0.5	1																							
18-Nov	0	0	Z	0	0	0	0	1	0	0	1	M	0	0	0	0	0	1	0	0	0	0	0	0	0.4	1																							
19-Nov	0	0	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																							
20-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0.4	1																							
21-Nov	0	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																							
22-Nov	0	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-Nov	0	0	Z	0	0	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	1	1	0.6	1																							
24-Nov	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																							
25-Nov	0	0	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0.5	1																							
26-Nov	1	1	Z	1	0	0	1	0	1	1	1	1	0	0	0	0	0	0	1	1	1	0	0	0	0.5	1																							
27-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0.4	1																							
28-Nov	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																							
29-Nov	0	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	1	0.5	1																							
30-Nov	1	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1																							
																								0.4	0.4	--	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	Diurnal Average		
																								1	1	--	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	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
Millennium - November 2014





WBEA
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Millennium - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	686	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



WBEA
Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Millennium - November 2014

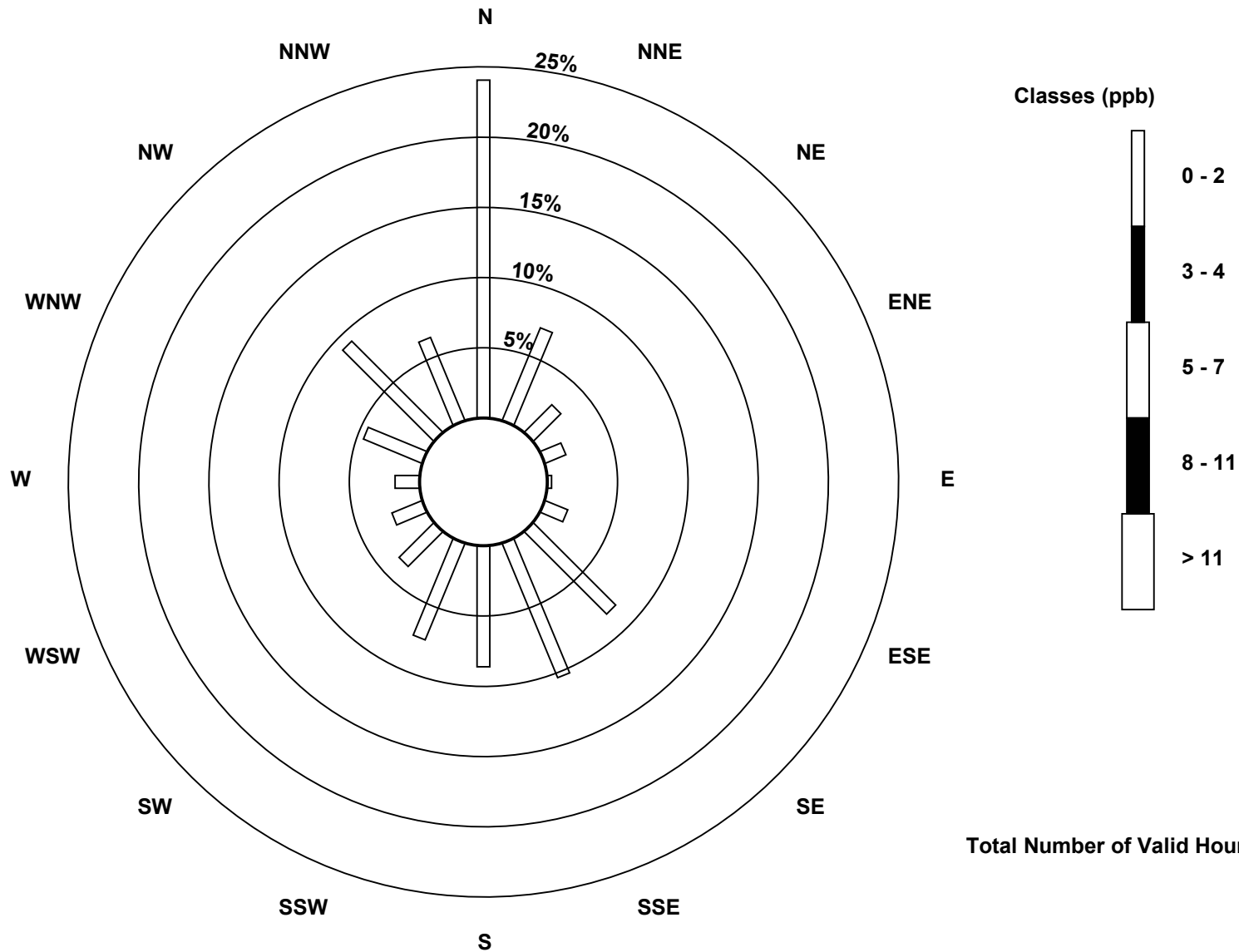
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	165	49	19	11	2	12	57	71	59	51	24	16	12	31	63	44	686
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	165	49	19	11	2	12	57	71	59	51	24	16	12	31	63	44	686

Total Number of Valid Hours: 686

Total Number of Hours: 720

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

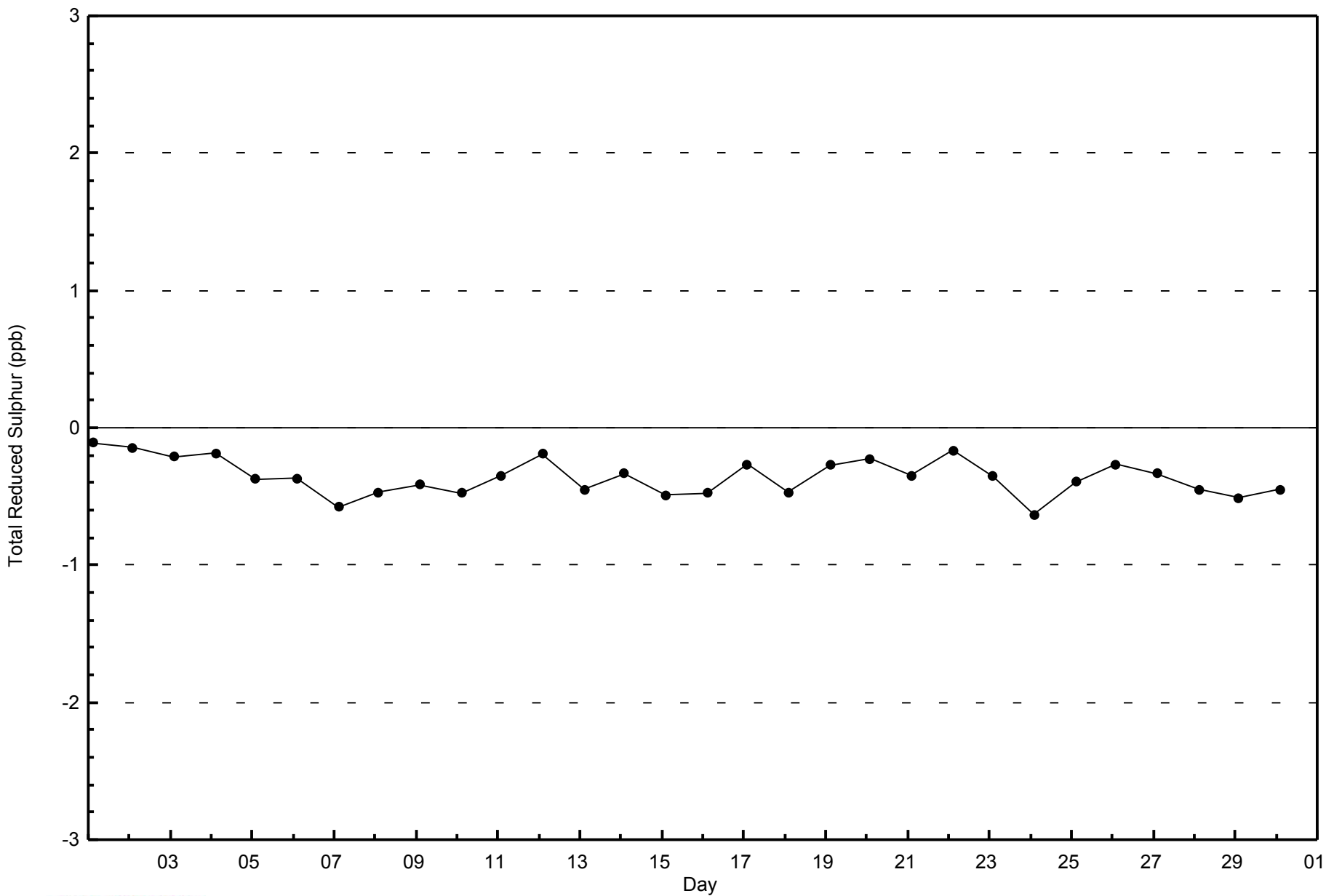
**Total Reduced Sulphur (TRS) - ppb
Millennium (AMS 12)**





WBEA
Zero Responses

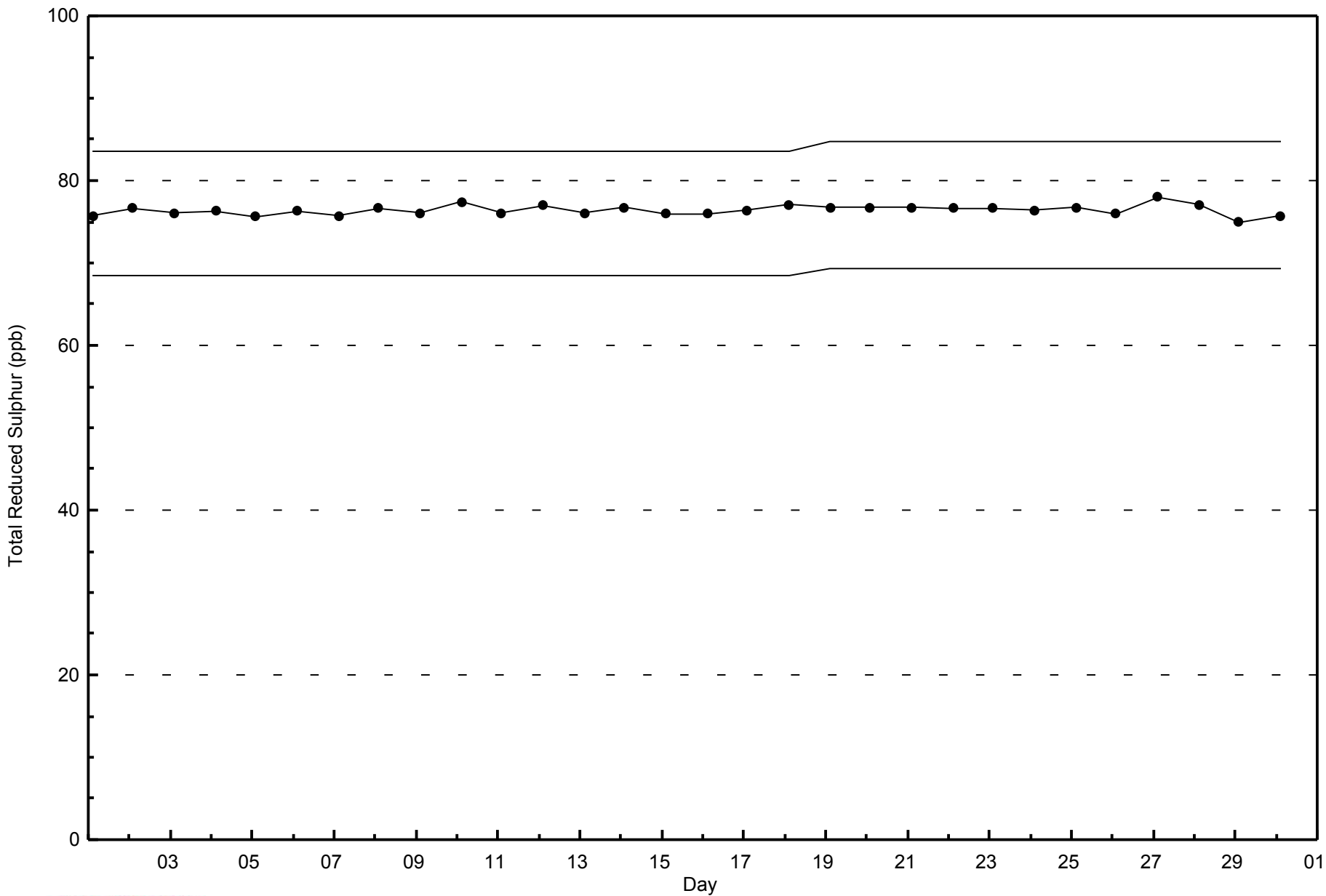
Total Reduced Sulphur (TRS) - ppb
Millennium - November 2014





WBEA
Span Responses

Total Reduced Sulphur (TRS) - ppb
Millennium - November 2014



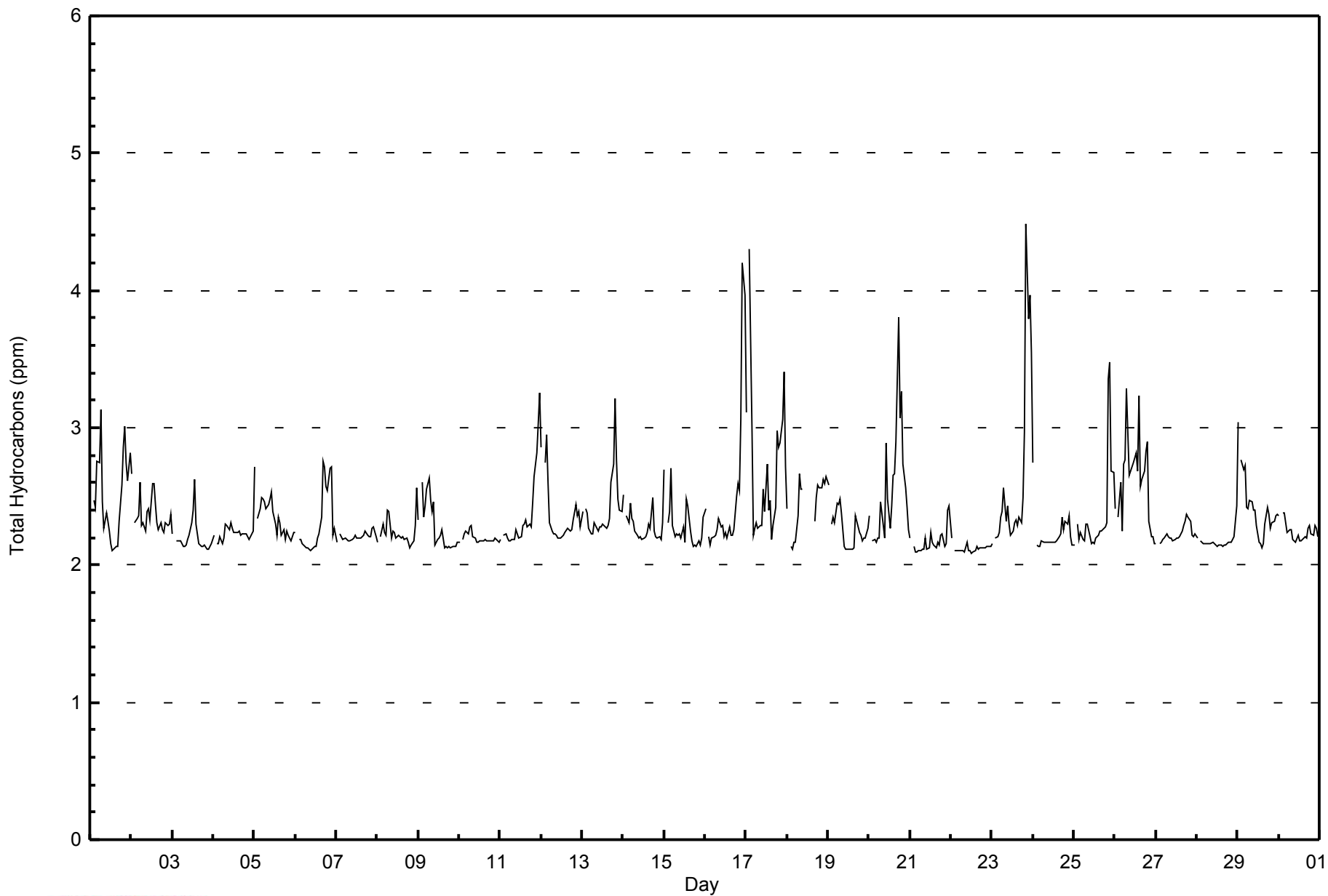


Maximum Value: 4.5 ppm on Nov 23 21:00																	Maximum Daily Average: 2.7 ppm on Nov 17																	Hours in Service: 720	
Minimum Value: 2.1 ppm on Nov 22 13:00																	Minimum Daily Average: 2.1 ppm on Nov 22																	Hours of Data: 684	
Maximum Diurnal Average: 2.5 ppm at hour 23																	Minimum Diurnal Average: 2.2 ppm at hour 12																	Hours of Missing Data: 36	
Monthly Average: 2.34 ppm																	Percentiles: P ₁ = 2.1 P ₁₀ = 2.1 Q ₁ = 2.2 Median = 2.2 Q ₃ = 2.4 P ₉₀ = 2.7 P ₉₉ = 3.8																	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-Nov	2.6	Z	2.5	2.4	2.8	2.8	3.1	2.5	2.3	2.4	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.3	2.6	2.9	3.0	2.7	2.6	2.8	2.5	3.1									
2-Nov	2.7	Z	2.3	2.3	2.4	2.6	2.3	2.3	2.3	2.4	2.4	2.3	2.6	2.6	2.4	2.3	2.3	2.3	2.2	2.3	2.3	2.3	2.4	2.4	2.4	2.7									
3-Nov	2.2	Z	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.3	2.4	2.6	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.6									
4-Nov	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.3									
5-Nov	2.7	Z	2.3	2.4	2.5	2.5	2.5	2.4	2.4	2.5	2.5	2.4	2.3	2.2	2.3	2.3	2.2	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.4	2.7									
6-Nov	2.2	Z	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.3	2.8	2.7	2.6	2.5	2.7	2.7	2.2	2.3	2.3	2.8									
7-Nov	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	2.3	2.2	2.2	2.3									
8-Nov	2.2	Z	2.2	2.3	2.2	2.2	2.4	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.3	2.6	2.2	2.6									
9-Nov	2.3	Z	2.6	2.3	2.4	2.5	2.6	2.5	2.4	2.5	2.1	2.2	2.2	2.2	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.6									
10-Nov	2.2	Z	2.2	2.2	2.3	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3									
11-Nov	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.5	2.6	2.8	3.0	3.3	2.4	3.3									
12-Nov	2.9	Z	2.7	3.0	2.6	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.3	2.3	2.4	2.4	2.4	2.3	2.4	3.0									
13-Nov	2.4	Z	2.4	2.4	2.3	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.6	2.7	3.2	2.8	2.5	2.4	2.4	2.4	3.2									
14-Nov	2.5	Z	2.4	2.3	2.5	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.5	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.5									
15-Nov	2.7	Z	2.3	2.4	2.7	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.5	2.4	2.3	2.2	2.1	2.1	2.2	2.1	2.2	2.4	2.3	2.7									
16-Nov	2.4	Z	2.2	2.1	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.3	2.2	2.2	2.3	2.5	2.6	2.5	3.1	4.2	4.0	2.5	4.2									
17-Nov	3.1	Z	4.3	3.0	2.2	2.3	2.3	2.3	2.3	2.3	2.5	2.4	2.7	2.4	2.5	2.2	2.3	2.4	3.0	2.9	2.9	3.1	3.4	2.7	2.7	4.3									
18-Nov	2.4	Z	2.1	2.1	2.2	2.2	2.4	2.7	2.5	2.6	C	C	C	C	C	C	2.3	2.5	2.6	2.6	2.6	2.6	2.6	2.6	--	2.7									
19-Nov	2.6	Z	2.3	2.4	2.3	2.5	2.4	2.5	2.4	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.4	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.6									
20-Nov	2.4	Z	2.2	2.2	2.2	2.2	2.2	2.5	2.3	2.2	2.9	2.5	2.3	2.4	2.7	2.7	2.9	3.8	3.1	3.3	2.7	2.6	2.4	2.3	2.5	3.8									
21-Nov	2.2	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.2	2.2	2.1	2.1	2.2	2.1	2.2	2.2	2.1	2.2	2.4	2.4	2.2	2.4									
22-Nov	2.2	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2									
23-Nov	2.2	Z	2.2	2.2	2.2	2.4	2.4	2.6	2.3	2.4	2.3	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.5	3.0	4.5	3.8	4.0	3.5	2.6	4.5									
24-Nov	2.7	Z	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4	2.3	2.3	2.4	2.2	2.1	2.2	2.7									
25-Nov	2.1	Z	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	2.2	2.2	2.3	2.3	3.4	3.5	2.7	2.7	2.4	3.5									
26-Nov	2.4	Z	2.3	2.6	2.2	2.7	2.8	3.3	2.7	2.7	2.7	2.7	2.8	2.7	3.2	2.6	2.6	2.7	2.8	2.9	2.3	2.2	2.2	2.2	2.6	3.3									
27-Nov	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	2.3	2.3	2.3	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.4									
28-Nov	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.4	2.2	2.4									
29-Nov	3.0	Z	2.8	2.7	2.7	2.4	2.4	2.5	2.5	2.4	2.4	2.3	2.2	2.2	2.1	2.2	2.3	2.4	2.4	2.3	2.3	2.3	2.4	2.4	2.4	3.0									
30-Nov	2.4	Z	2.4	2.4	2.3	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.3	2.3	2.2	2.2	2.4									
																								Diurnal Average											
																								Diurnal Maximum											
2.4 -- 2.4 2.3 2.3 2.3 2.3 2.3 2.3 2.3 2.3 2.3 2.2 2.3 2.3 2.3 2.2 2.3 2.4 2.4 2.4 2.5 2.5 2.5 2.5 2.5 2.5 4.0																																			
3.1 -- 4.3 3.0 2.8 2.8 3.1 3.3 2.7 2.7 2.9 2.7 2.8 2.7 3.2 2.7 2.9 3.8 3.1 3.3 4.5 3.8 4.2 4.0																																			
Z - zerospan C - Calibration																																			



WBEA
Hourly Averages

Total Hydrocarbons (THC) - ppm
Millennium - November 2014





WBEA
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Millennium - November 2014

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	0	0.00	0.00
2.1 - 3.0	663	96.93	96.93
3.1 - 10.0	21	3.07	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



WBEA
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Millennium - November 2014

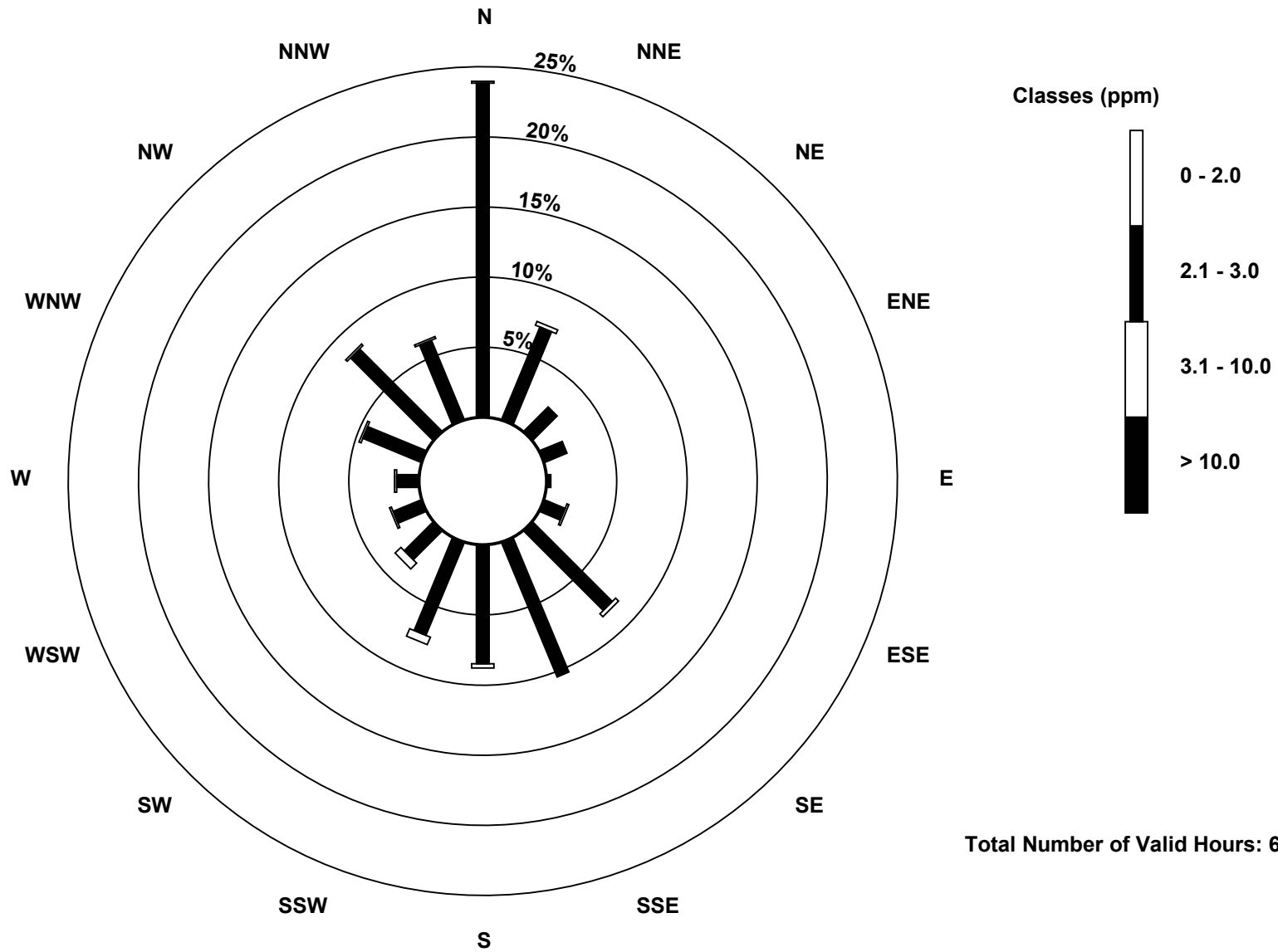
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.1 - 3.0	163	49	17	12	2	11	55	71	58	49	20	15	11	31	57	42	663
3.1 - 10.0	1	2	0	0	0	1	2	0	2	4	4	1	1	1	1	1	21
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	164	51	17	12	2	12	57	71	60	53	24	16	12	32	58	43	684

Total Number of Valid Hours: 684

Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

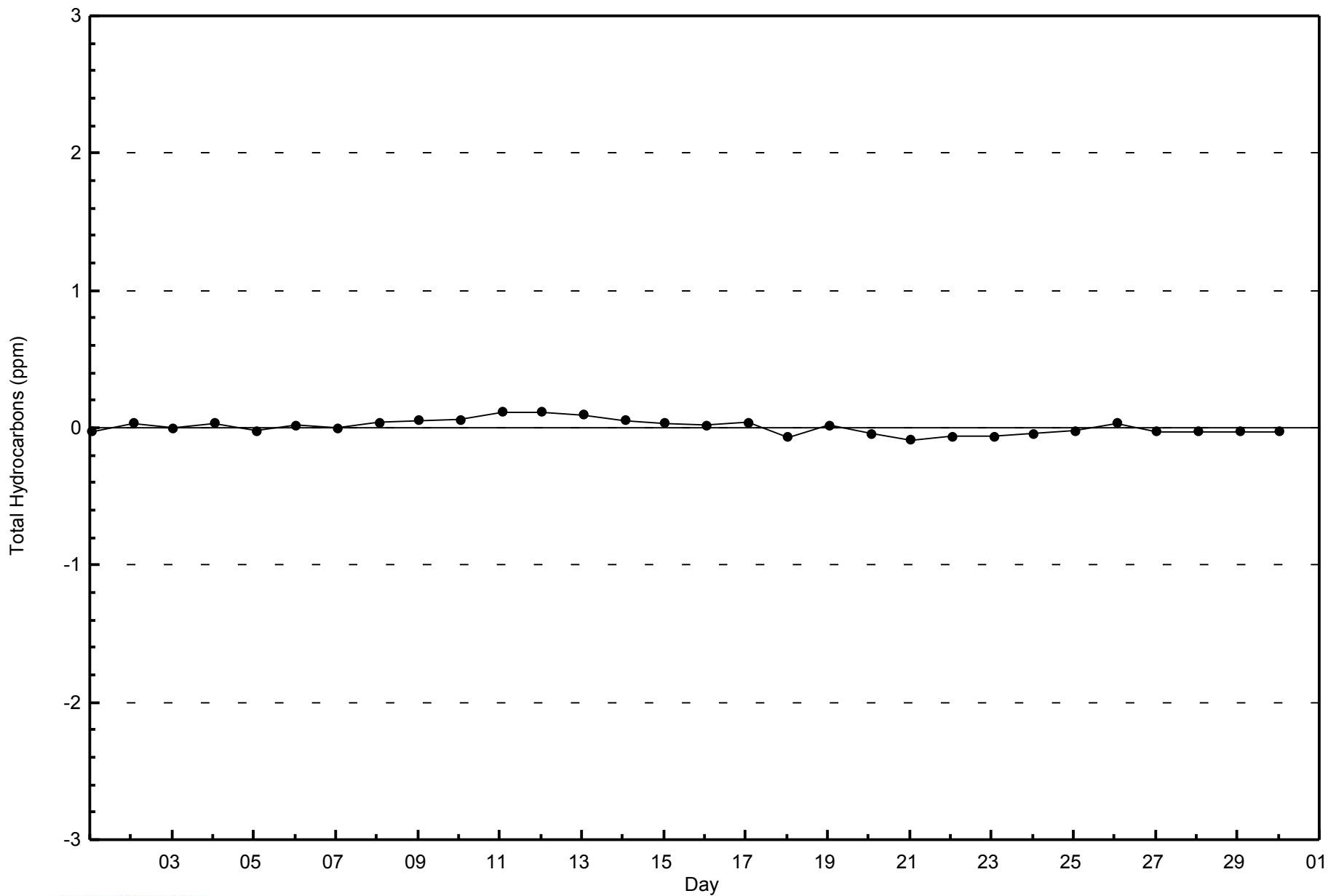
Total Hydrocarbons (THC) - ppm
Millennium (AMS 12)





WBEA
Zero Responses

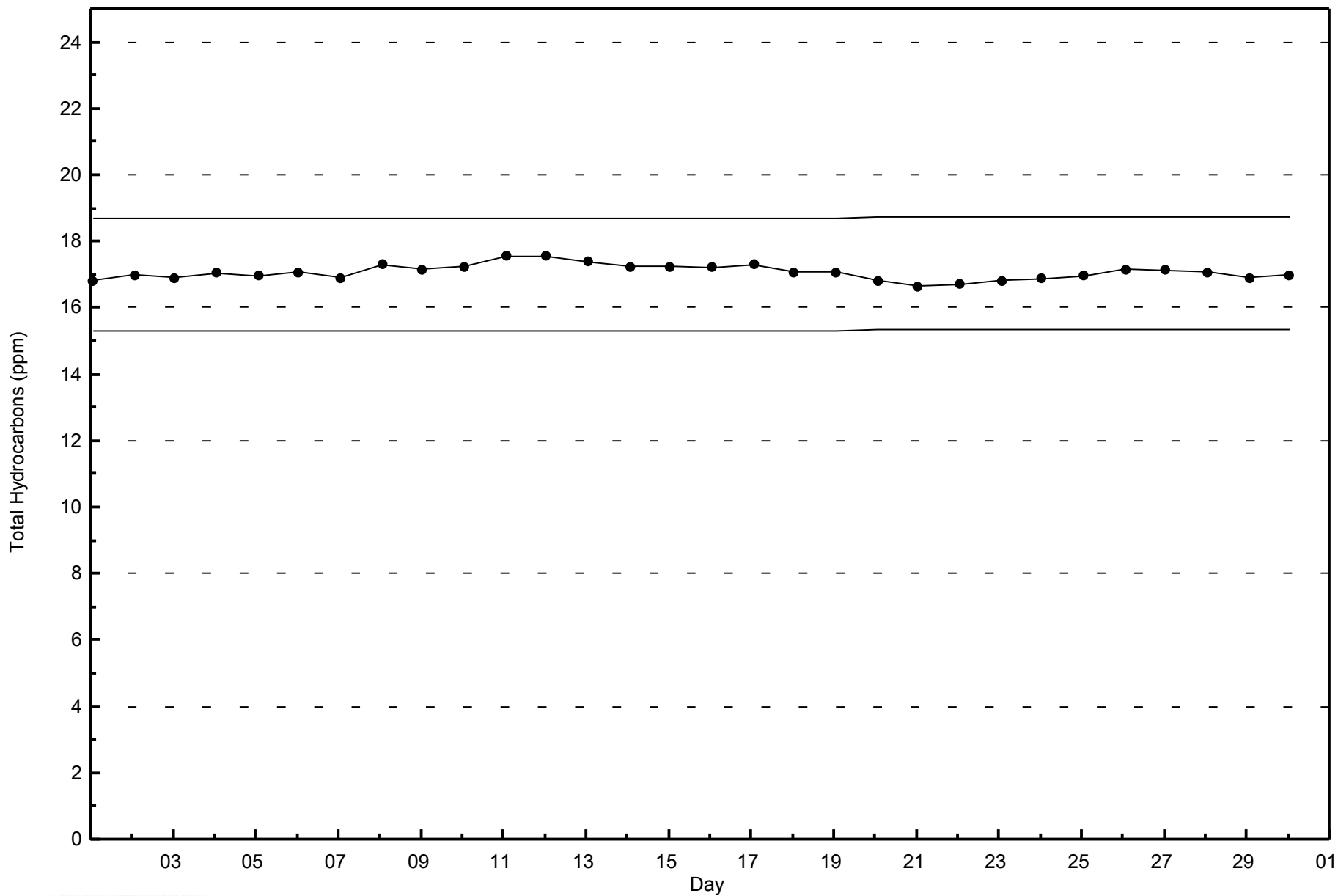
Total Hydrocarbons (THC) - ppm
Millennium - November 2014





WBEA
Span Responses

Total Hydrocarbons (THC) - ppm
Millennium - November 2014



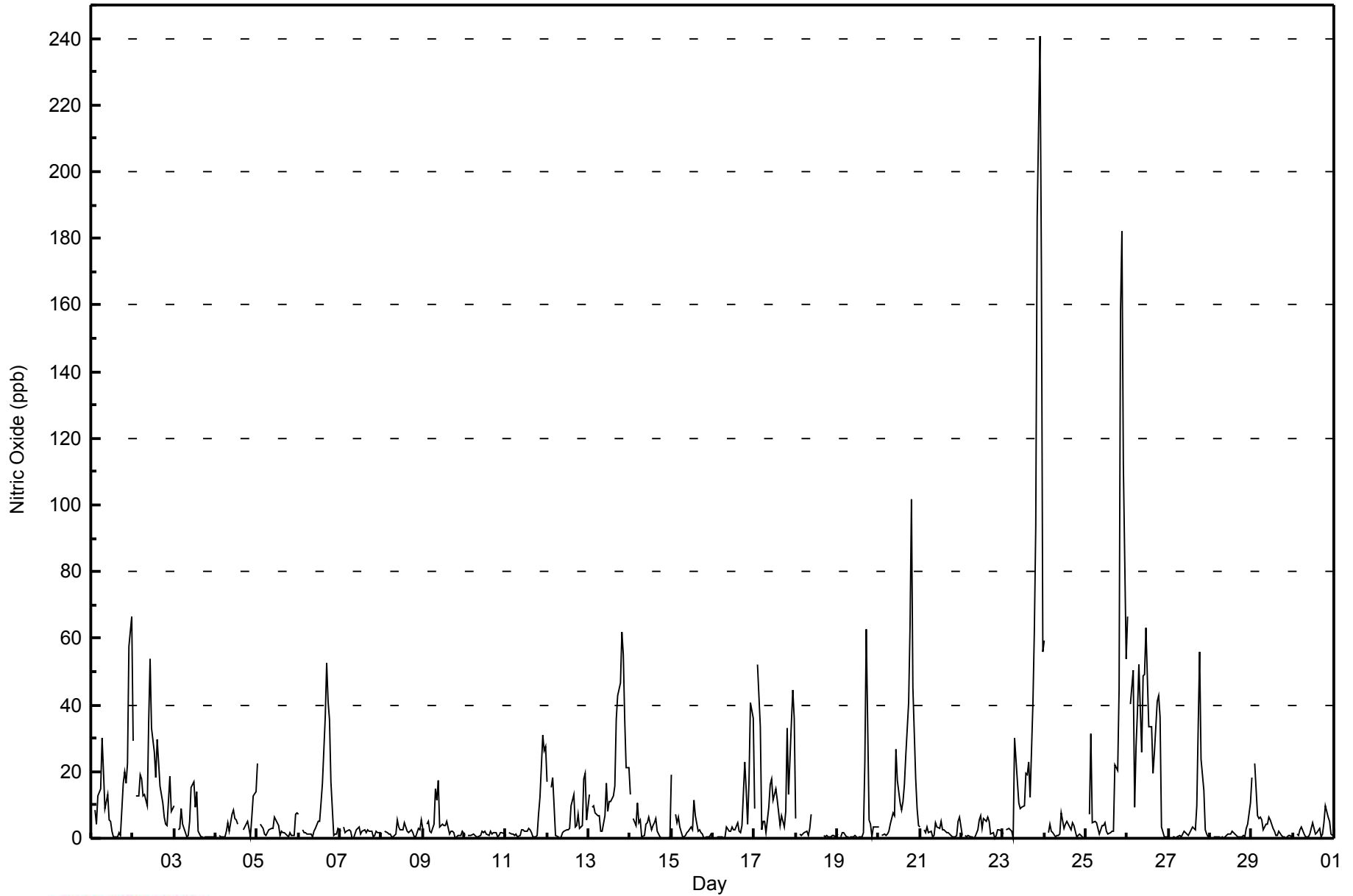


Maximum Value: 241 ppb on Nov 23 22:00																		Maximum Daily Average: 44.4 ppb on Nov 23																		Hours in Service: 720	
Minimum Value: 0 ppb on Nov 14 23:00																		Minimum Daily Average: 1.2 ppb on Nov 10																		Hours of Data: 682	
Maximum Diurnal Average: 21.8 ppb at hour 22																		Minimum Diurnal Average: 4.0 ppb at hour 9																		Hours of Missing Data: 38	
Monthly Average: 9.6 ppb																		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 3 Q ₃ = 9 P ₉₀ = 26 P ₉₉ = 98																		Hours of Calibration: 36	
																																				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-Nov	28	Z	8	4	13	15	30	20	9	13	5	5	2	1	1	0	2	1	16	20	17	22	58	67	15.5	67											
2-Nov	29	Z	13	13	19	18	13	13	10	35	54	33	26	18	29	23	16	10	6	4	4	19	8	9	18.4	54											
3-Nov	10	Z	3	3	9	4	2	0	1	5	15	17	9	14	2	1	1	0	0	0	0	0	0	0	4.2	17											
4-Nov	1	Z	1	1	0	0	2	5	2	7	9	6	6	4	PF	PF	3	4	5	3	0	6	13	14	4.3	14											
5-Nov	23	Z	4	3	1	1	2	3	3	3	6	6	4	1	2	2	2	1	0	2	1	1	7	8	3.7	23											
6-Nov	7	Z	2	2	2	1	1	1	0	2	3	5	5	11	17	36	53	41	36	17	1	1	1	3	10.8	53											
7-Nov	2	Z	3	2	2	3	2	0	0	3	3	4	1	2	2	3	2	2	0	1	2	2	2	2	1.9	4											
8-Nov	1	Z	2	2	1	1	1	0	1	5	3	3	3	5	3	2	2	3	2	0	1	3	3	5	2.3	5											
9-Nov	3	Z	4	5	2	2	4	15	12	17	4	4	4	4	5	1	2	2	2	0	1	1	1	2	4.2	17											
10-Nov	1	Z	1	1	1	1	1	0	0	1	2	2	2	1	1	2	1	2	2	0	1	2	2	1	1.2	2											
11-Nov	1	Z	2	1	1	1	1	0	1	2	2	2	2	3	2	2	0	0	1	7	12	31	26	27	5.7	31											
12-Nov	17	Z	15	18	10	1	0	0	0	2	2	2	2	3	10	13	3	4	7	3	4	18	20	5	7.0	20											
13-Nov	13	Z	9	10	8	7	7	2	2	7	17	8	11	11	13	16	36	43	47	62	55	36	21	21	20.0	62											
14-Nov	13	Z	6	4	11	5	6	0	1	4	5	6	3	4	5	6	2	1	0	0	0	0	0	1	3.5	13											
15-Nov	19	Z	7	5	6	3	0	1	1	2	2	4	2	11	7	2	3	2	1	0	0	0	0	1	3.5	19											
16-Nov	1	Z	0	0	0	1	0	0	3	2	2	3	2	3	5	2	2	4	23	15	4	17	41	36	7.3	41											
17-Nov	9	Z	52	33	2	5	5	1	9	16	18	12	15	11	8	4	7	4	8	33	13	35	45	36	16.5	52											
18-Nov	6	Z	1	1	1	2	2	1	3	7	C	C	C	C	C	C	1	1	1	0	0	1	1	1	--	7											
19-Nov	1	Z	1	2	2	1	0	0	0	0	1	0	0	0	1	2	23	63	6	4	1	3	3	4	5.1	63											
20-Nov	3	Z	1	1	1	1	2	4	7	7	27	17	10	9	11	16	25	41	64	101	45	18	9	4	18.4	101											
21-Nov	3	Z	3	2	3	2	2	0	1	5	4	3	5	3	3	2	2	1	1	0	0	1	5	6	2.5	6											
22-Nov	1	Z	1	0	1	0	0	0	0	3	5	7	3	6	5	6	5	1	2	0	1	2	3	2	2.4	7											
23-Nov	1	Z	2	3	3	2	0	30	17	10	9	9	10	20	19	23	12	41	62	94	186	241	171	56	44.4	241											
24-Nov	59	Z	2	4	2	2	0	1	1	1	8	3	4	5	4	2	5	4	2	1	1	1	0	0	4.9	59											
25-Nov	0	Z	7	31	5	5	4	3	1	4	4	4	2	1	2	2	2	22	20	45	158	182	112	54	29.3	182											
26-Nov	67	Z	40	50	9	28	38	52	26	49	49	63	33	33	34	19	26	41	43	36	3	0	0	0	32.3	67											
27-Nov	0	Z	0	0	0	0	1	1	1	2	2	1	2	2	3	2	10	34	56	24	14	3	1	1	7.0	56											
28-Nov	0	Z	1	1	0	0	0	0	0	1	1	1	1	2	1	1	0	0	1	1	0	3	4	11	1.4	11											
29-Nov	18	Z	23	7	6	7	6	3	4	4	6	5	3	2	1	1	2	1	0	0	0	1	1	1	4.4	23											
30-Nov	1	Z	1	1	2	4	1	0	0	1	1	5	3	1	2	3	1	1	5	10	7	5	1	1	2.5	10											
																								Diurnal Average													
																								Diurnal Maximum													
11.4 -- 7.2 7.0 4.2 4.0 4.5 5.3 4.0 7.4 9.3 8.3 6.1 6.6 7.0 6.9 8.3 12.4 14.0 16.1 17.8 21.8 18.7 12.6																																					
67 -- 52 50 19 28 38 52 26 49 54 63 33 33 34 36 53 63 64 101 186 241 171 67																																					
Z - zerspan C - Calibration PF - Power Failure																																					



WBEA
Hourly Averages

Nitric Oxide (NO) - ppb
Millennium - November 2014





WBEA
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Millennium - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	599	87.83	87.83
21 - 40	44	6.45	94.28
41 - 80	31	4.55	98.83
81 - 159	4	0.59	99.41
> 159	4	0.59	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitric Oxide (NO) - ppb
Millennium - November 2014

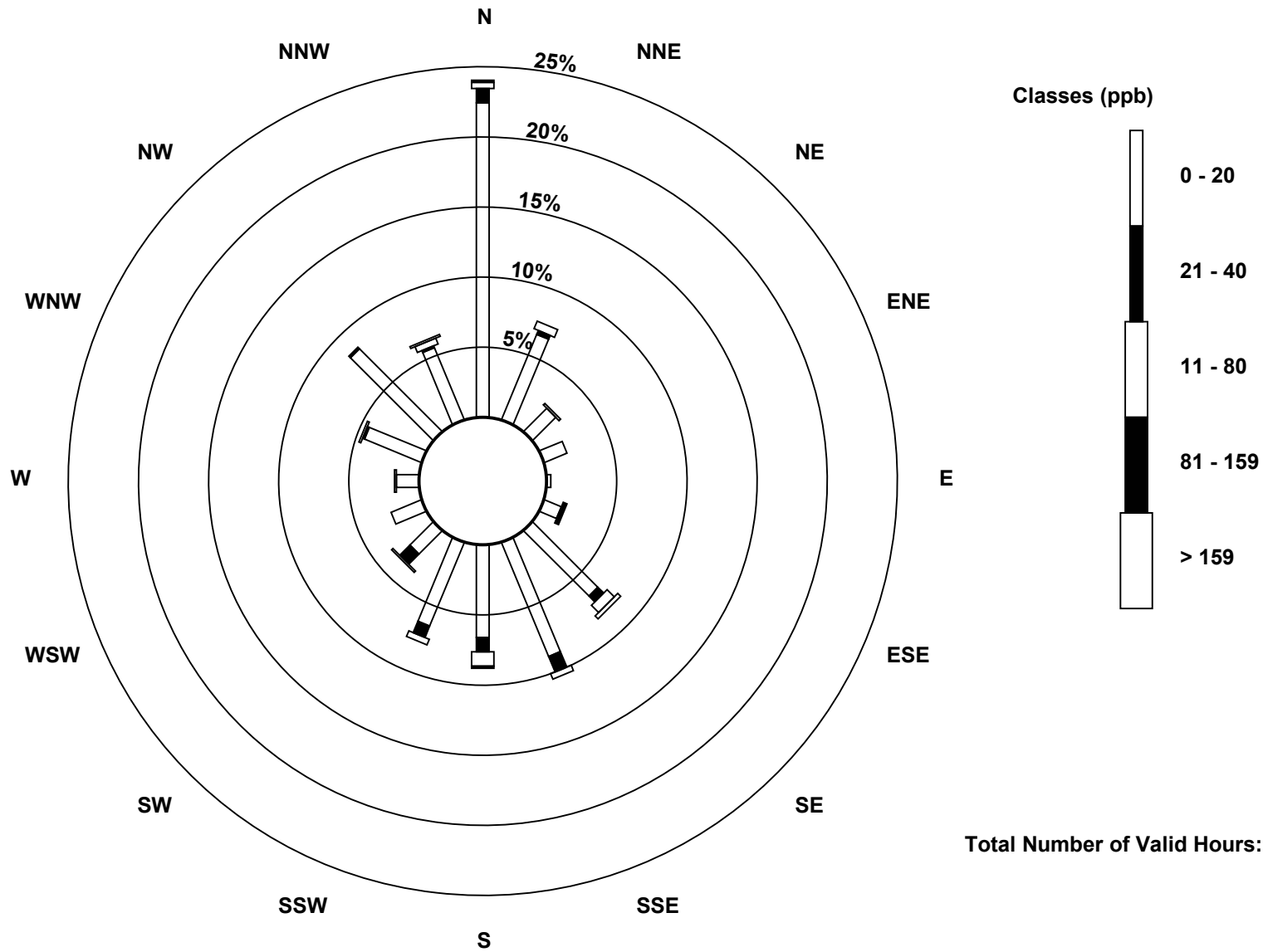
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	153	45	16	12	2	9	45	60	45	44	16	16	11	30	57	38	599
21 - 40	7	2	0	0	0	0	4	8	7	6	7	0	0	1	1	1	44
41 - 80	3	4	1	0	0	0	5	3	7	3	0	0	1	1	0	3	31
81 - 159	1	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	4
> 159	0	0	0	0	0	0	2	0	0	0	1	0	0	0	0	1	4
Totals	164	51	17	12	2	11	56	71	60	53	24	16	12	32	58	43	682

Total Number of Valid Hours: 682

Total Number of Hours: 720

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

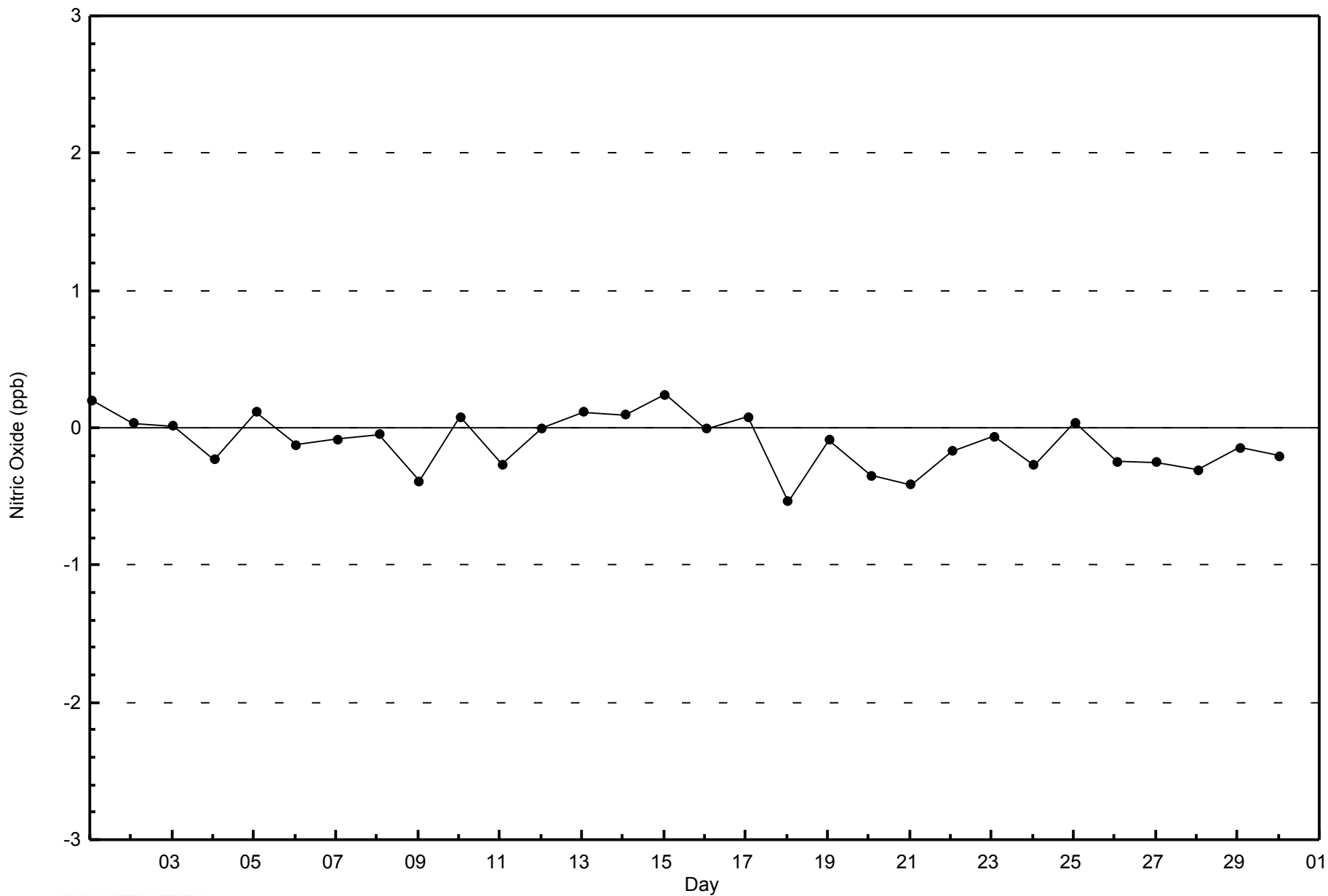
**Nitric Oxide (NO) - ppb
Millennium (AMS 12)**





WBEA
Zero Responses

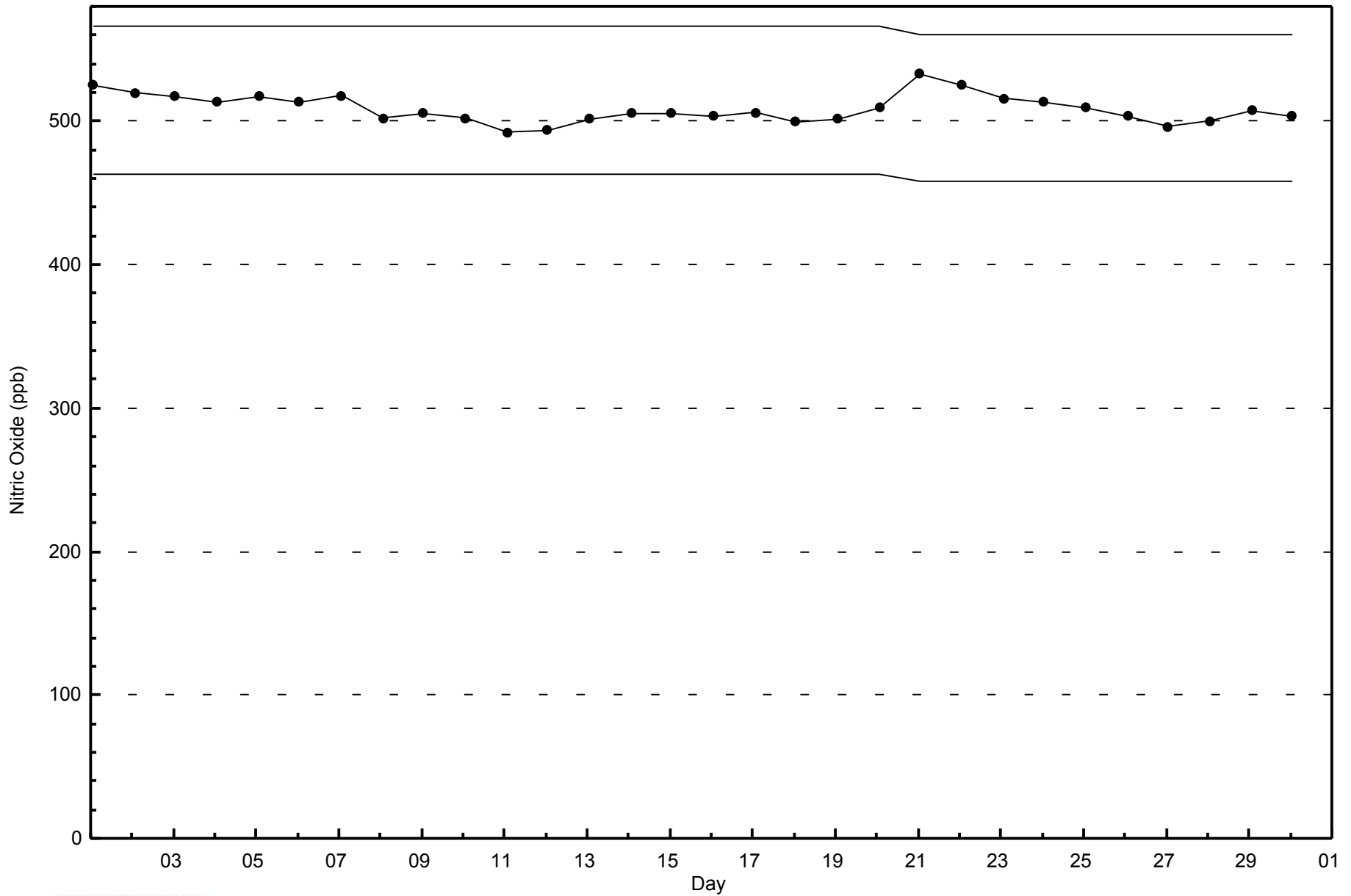
Nitric Oxide (NO) - ppb
Millennium - November 2014





WBEA
Span Responses

Nitric Oxide (NO) - ppb
Millennium - November 2014





Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 44 ppb on Nov 25 22:00	Maximum Daily Average: 22.9 ppb on Nov 26
Minimum Value: 0 ppb on Nov 3 21:00	Hours of Data: 682
Maximum Diurnal Average: 16.9 ppb at hour 19	Hours of Missing Data: 38
Monthly Average: 12.5 ppb	Hours of Calibration: 36
Minimum Daily Average: 4.7 ppb on Nov 10	Percent Operational Time: 99.7
Minimum Diurnal Average: 7.0 ppb at hour 13	
Percentiles: P ₁ = 1 P ₁₀ = 4 Q ₁ = 6 Median = 10 Q ₃ = 18 P ₉₀ = 25 P ₉₉ = 35	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	7	Z	4	4	5	6	8	9	8	8	5	5	2	1	1	1	6	15	24	23	20	21	21	20	9.6	24
2-Nov	14	Z	18	18	21	17	21	17	12	15	14	15	12	9	13	19	18	13	15	12	8	12	12	10	14.5	21
3-Nov	10	Z	7	7	10	8	5	3	3	6	9	9	6	9	6	3	2	1	2	3	0	1	5	8	5.2	10
4-Nov	8	Z	6	3	4	4	6	10	6	9	9	8	9	9	PF	PF	9	9	10	8	3	9	10	11	7.6	11
5-Nov	10	Z	7	7	6	5	6	7	7	6	7	8	6	3	6	8	8	7	5	8	5	5	12	12	6.9	12
6-Nov	13	Z	9	8	7	6	5	5	4	7	8	9	9	13	16	19	21	22	21	19	11	11	5	6	11.1	22
7-Nov	6	Z	4	4	4	4	4	2	2	4	5	5	2	3	4	4	6	7	8	3	3	8	11	9	4.8	11
8-Nov	6	Z	7	12	10	8	13	11	6	11	7	5	5	8	9	8	7	9	9	6	4	8	15	24	9.0	24
9-Nov	15	Z	20	21	16	18	20	23	20	19	6	6	7	8	11	4	6	7	8	3	2	3	3	6	10.8	23
10-Nov	5	Z	4	10	11	9	10	9	5	4	3	3	3	4	3	5	3	3	3	1	1	4	4	4	4.7	11
11-Nov	4	Z	6	6	5	3	5	5	4	8	5	4	4	8	10	12	11	15	17	26	25	27	27	25	11.3	27
12-Nov	24	Z	25	23	21	11	6	4	4	6	5	4	4	6	15	21	16	20	21	19	22	22	23	18	14.8	25
13-Nov	20	Z	18	20	19	19	19	15	11	12	14	9	12	13	16	21	26	26	27	28	25	24	24	25	19.1	28
14-Nov	20	Z	18	14	19	16	17	6	4	8	7	7	4	6	9	13	13	15	9	7	9	7	3	11	10.5	20
15-Nov	27	Z	20	17	23	17	8	7	6	7	6	8	6	17	14	8	7	4	3	2	4	3	6	13	10.0	27
16-Nov	14	Z	5	1	6	8	7	10	18	12	8	10	7	6	13	11	19	29	33	36	28	31	34	31	16.3	36
17-Nov	23	Z	26	23	14	18	19	15	22	20	16	12	14	14	13	14	22	22	25	28	24	27	28	26	20.1	28
18-Nov	18	Z	3	3	6	7	13	16	17	17	C	C	C	C	C	C	10	13	15	14	13	15	19	17	--	19
19-Nov	16	Z	8	13	12	14	8	4	11	5	4	1	1	2	3	10	29	34	28	23	13	19	24	24	13.3	34
20-Nov	22	Z	15	16	13	15	17	21	21	18	23	17	13	14	16	19	19	23	21	21	19	21	19	14	18.1	23
21-Nov	12	Z	12	6	8	6	7	6	6	13	6	5	10	7	10	10	10	8	11	11	10	15	27	20	10.2	27
22-Nov	14	Z	7	6	10	5	2	2	4	11	12	11	4	9	9	13	20	10	12	6	5	12	8	8	8.6	20
23-Nov	8	Z	14	23	22	18	10	21	22	17	14	12	10	15	17	22	18	27	27	29	35	39	35	25	20.9	39
24-Nov	25	Z	5	6	5	7	6	15	8	5	11	6	9	13	13	16	25	23	18	12	8	11	8	6	11.4	25
25-Nov	14	Z	26	29	23	19	18	21	14	9	6	7	4	4	6	10	22	35	34	31	41	44	36	35	21.2	44
26-Nov	33	Z	31	31	26	27	27	27	23	25	26	26	22	23	25	23	25	28	28	28	12	4	5	4	22.9	33
27-Nov	3	Z	1	4	6	11	13	9	10	9	5	2	5	6	10	15	26	30	32	29	26	20	16	9	12.9	32
28-Nov	8	Z	4	6	7	4	5	3	2	5	4	3	3	5	5	6	7	7	11	16	13	21	22	24	8.3	24
29-Nov	29	Z	26	21	21	22	24	20	21	14	14	11	6	6	4	8	16	13	7	3	3	7	9	6	13.4	29
30-Nov	15	Z	15	9	14	18	12	5	6	4	4	8	6	3	6	15	9	18	25	30	25	26	19	18	13.4	30

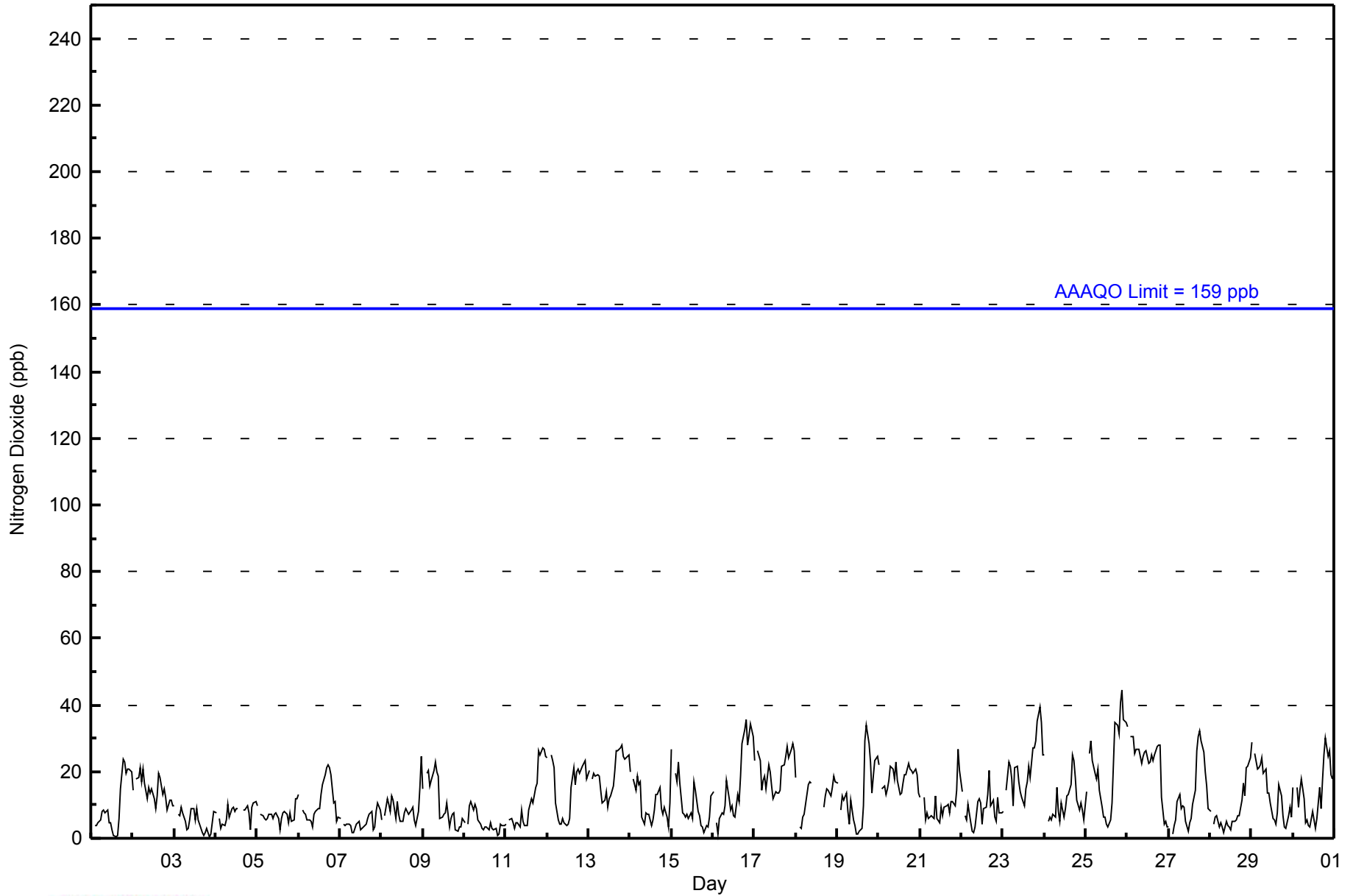
14.8	--	12.3	12.3	12.5	11.5	11.3	10.9	10.1	10.4	9.0	8.1	7.0	8.2	10.0	12.0	14.5	16.3	16.9	16.1	13.9	15.9	16.3	15.5			Diurnal Average
33	--	31	31	26	27	27	27	23	25	26	26	22	23	25	23	29	35	34	36	41	44	36	35			Diurnal Maximum

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



WBEA
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Millennium - November 2014





WBEA
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Millennium - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	546	80.06	80.06
21 - 40	134	19.65	99.71
41 - 80	2	0.29	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Millennium - November 2014

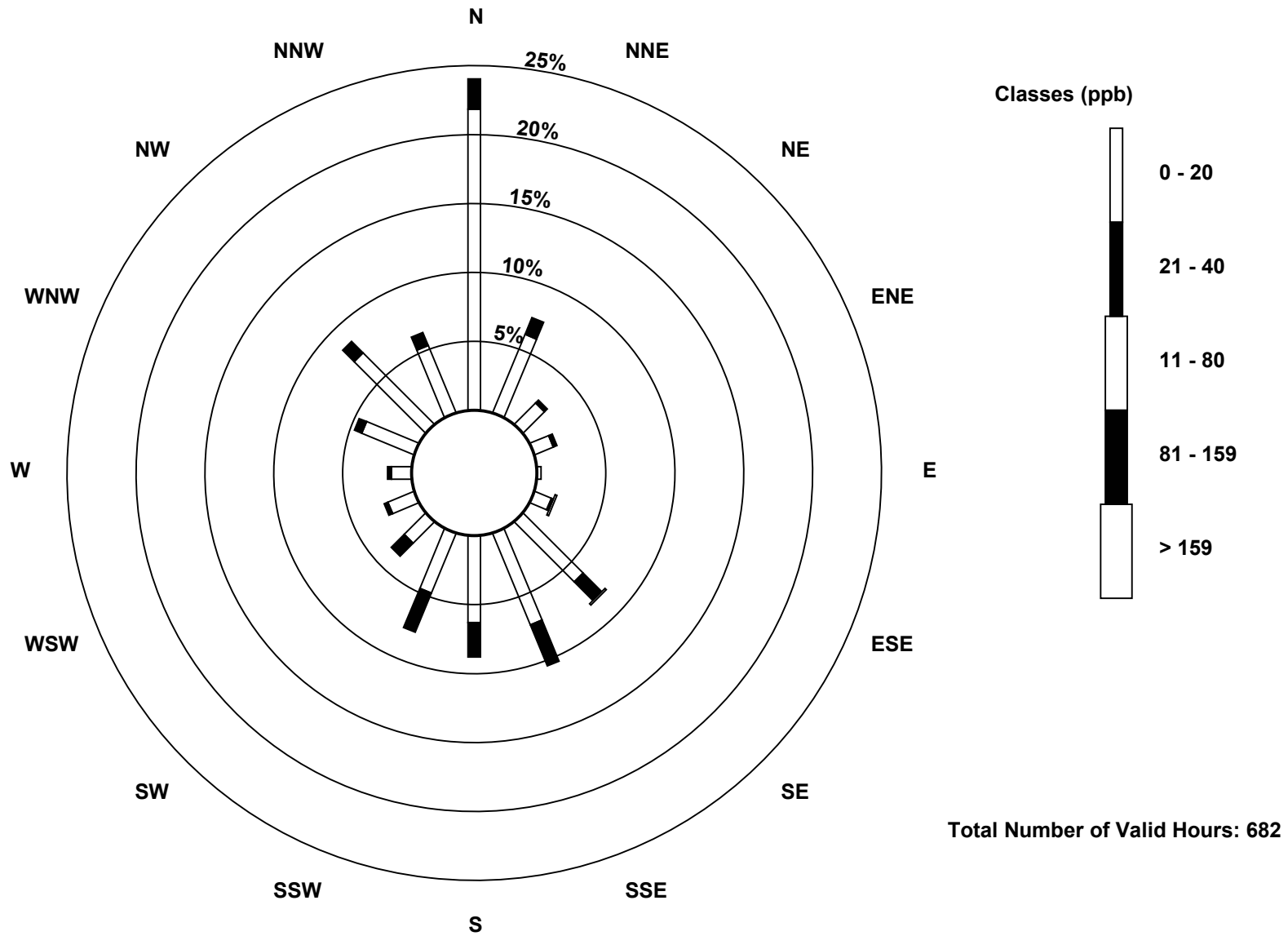
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	149	42	15	10	2	9	42	49	43	32	15	14	10	28	50	36	546
21 - 40	15	9	2	2	0	1	13	22	17	21	9	2	2	4	8	7	134
11 - 80	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	2
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	164	51	17	12	2	11	56	71	60	53	24	16	12	32	58	43	682

Total Number of Valid Hours: 682

Total Number of Hours: 720

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

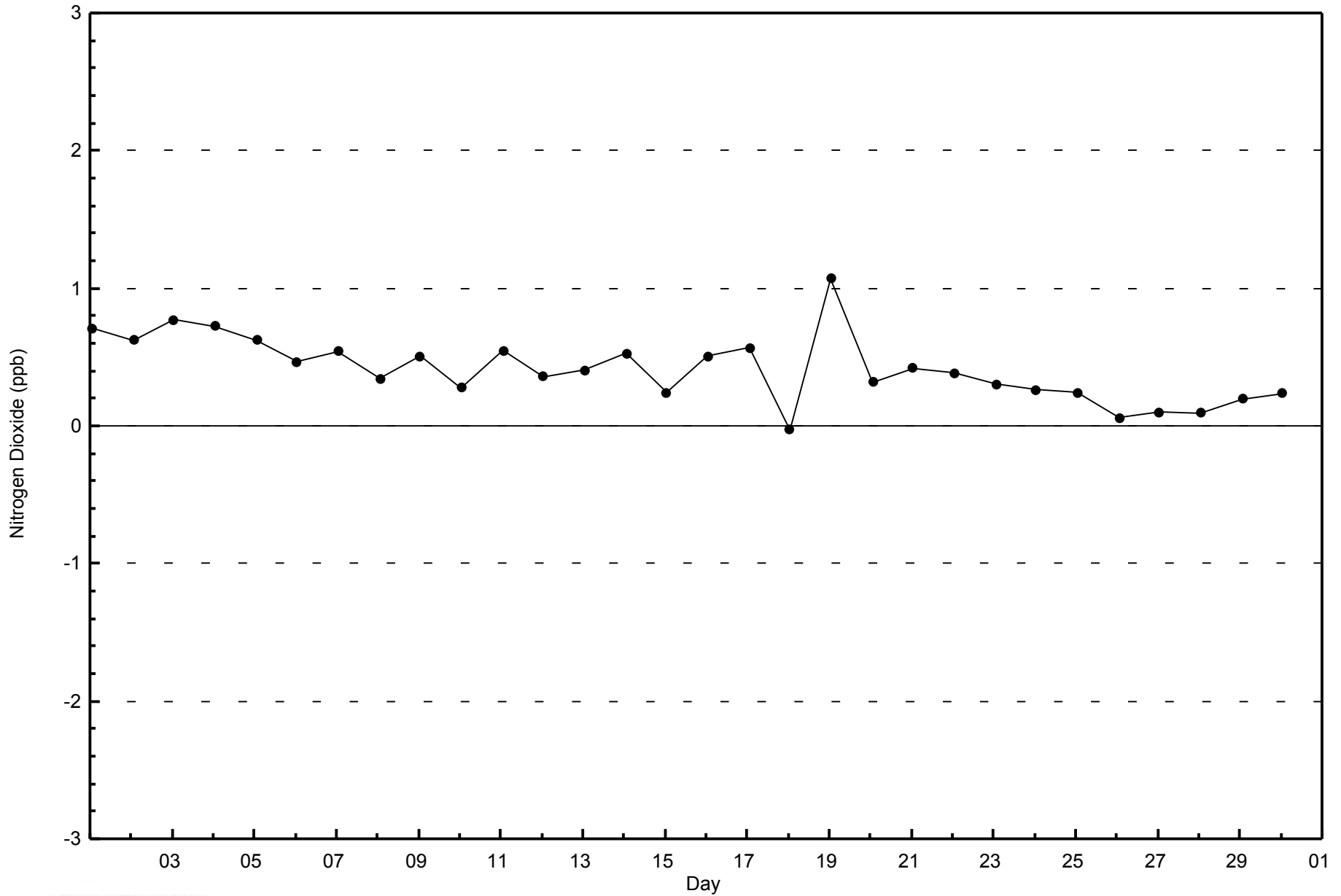
**Nitrogen Dioxide (NO₂) - ppb
Millennium (AMS 12)**





WBEA
Zero Responses

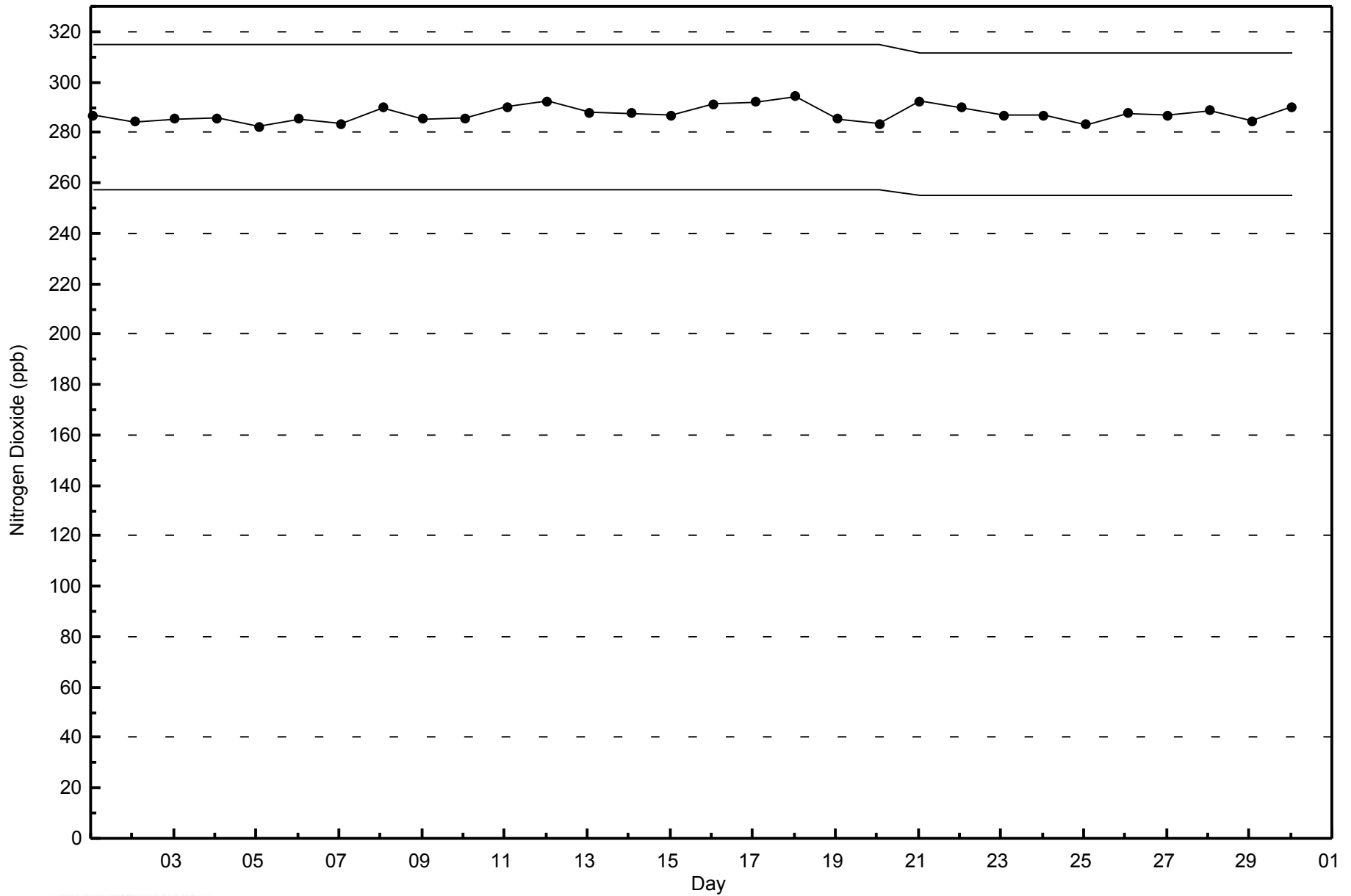
Nitrogen Dioxide (NO₂) - ppb
Millennium - November 2014





WBEA
Span Responses

Nitrogen Dioxide (NO₂) - ppb
Millennium - November 2014





Wood Buffalo Environmental Association
Summary of Hour Averages

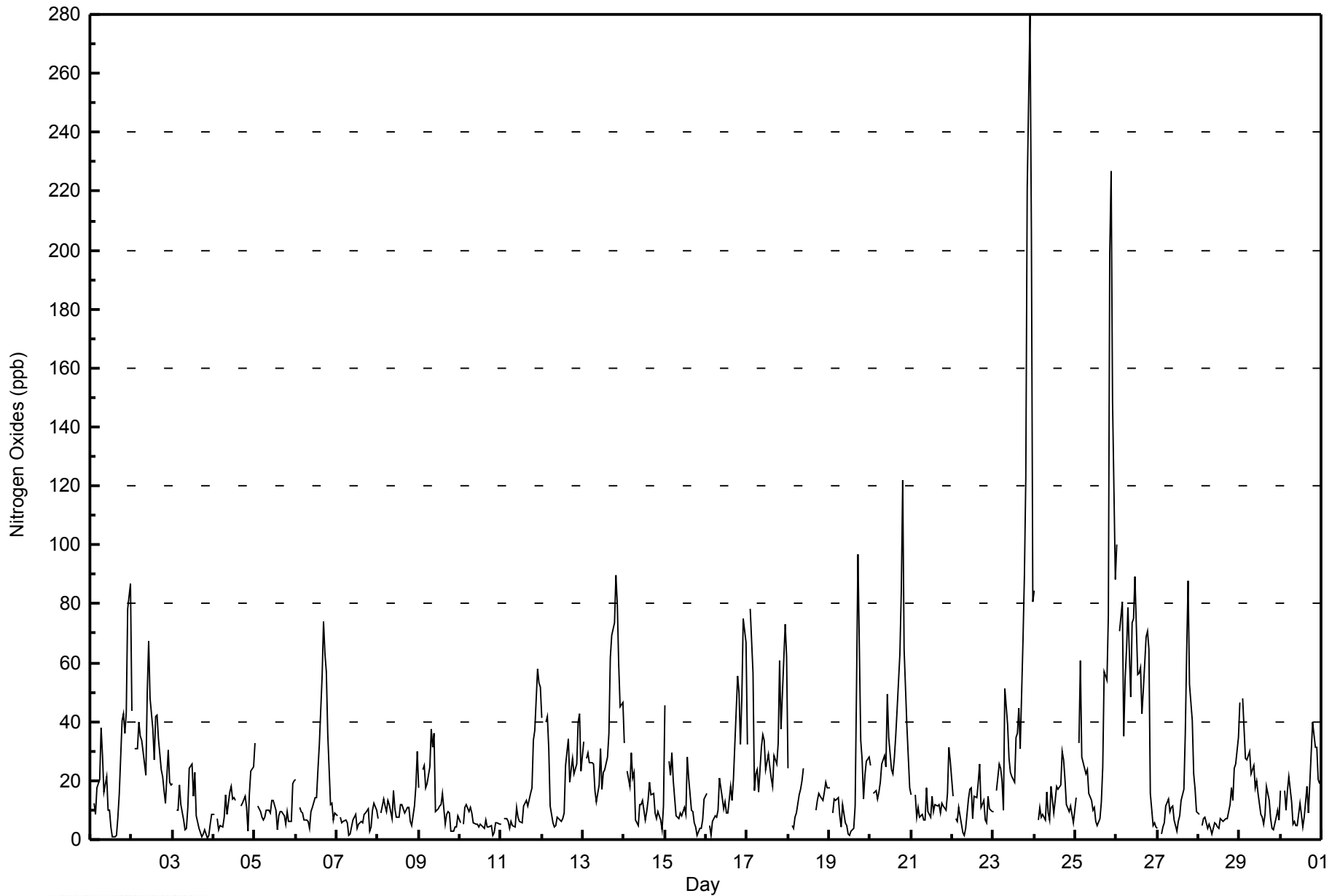
Nitrogen Oxides (NO_x) - ppb
Millennium - November 2014

Maximum Value: 280 ppb on Nov 23 22:00																			Maximum Daily Average: 65.3 ppb on Nov 23						Hours in Service: 720		
Minimum Value: 1 ppb on Nov 3 21:00																			Minimum Daily Average: 6.0 ppb on Nov 10						Hours of Data: 682		
Maximum Diurnal Average: 37.7 ppb at hour 22																			Minimum Diurnal Average: 13.1 ppb at hour 13						Hours of Missing Data: 38		
Monthly Average: 22.1 ppb																			Percentiles: P ₁ = 1 P ₁₀ = 5 Q ₁ = 8 Median = 13 Q ₃ = 27 P ₉₀ = 50 P ₉₉ = 115						Hours of Calibration: 36		
																									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-Nov	35	Z	12	8	18	20	38	28	16	21	10	10	4	1	1	1	8	16	40	43	36	43	78	87	25.1	87	
2-Nov	44	Z	31	31	40	35	34	30	22	50	68	48	38	27	42	42	34	24	21	16	12	30	20	19	32.9	68	
3-Nov	19	Z	10	10	19	12	7	3	4	11	24	26	15	23	8	4	2	1	2	3	1	1	5	8	9.4	26	
4-Nov	9	Z	7	3	5	4	8	15	9	16	18	14	14	13	PF	PF	11	12	15	11	3	16	23	25	11.9	25	
5-Nov	33	Z	11	10	7	6	7	10	10	9	13	13	10	3	8	10	9	8	5	9	6	6	19	20	10.6	33	
6-Nov	21	Z	11	10	9	7	6	6	4	9	11	14	14	24	32	56	74	63	57	36	12	12	6	9	21.9	74	
7-Nov	8	Z	8	6	6	7	6	2	2	7	8	9	4	5	6	6	9	9	10	3	4	10	12	10	6.7	12	
8-Nov	7	Z	9	14	11	9	13	12	7	17	11	8	8	12	12	10	9	11	11	6	5	11	18	30	11.3	30	
9-Nov	18	Z	24	25	18	19	25	38	31	36	9	11	11	12	16	5	8	10	9	3	3	4	4	8	15.1	38	
10-Nov	6	Z	5	11	12	10	11	9	6	5	5	4	5	5	4	6	4	4	5	1	2	6	6	5	6.0	12	
11-Nov	5	Z	7	7	6	4	6	5	4	11	8	6	6	11	12	13	11	16	17	34	37	58	53	52	16.9	58	
12-Nov	41	Z	40	42	31	11	6	4	5	8	7	6	7	9	25	34	19	24	28	22	25	40	43	23	21.8	43	
13-Nov	33	Z	28	29	26	26	25	17	13	18	31	17	23	24	28	36	62	69	73	90	80	59	45	46	39.1	90	
14-Nov	33	Z	23	18	29	21	23	7	5	12	12	13	6	9	13	19	15	16	9	7	9	7	3	11	14.0	33	
15-Nov	46	Z	27	22	29	20	8	8	7	9	8	11	8	28	21	10	9	6	4	1	4	4	7	14	13.5	46	
16-Nov	15	Z	5	2	6	8	7	10	21	14	11	13	9	9	18	13	21	32	56	50	32	48	75	67	23.6	75	
17-Nov	32	Z	78	56	17	22	24	16	31	36	33	24	29	25	21	18	28	25	33	61	37	61	73	62	36.7	78	
18-Nov	24	Z	5	4	8	9	15	17	20	24	C	C	C	C	C	C	10	13	16	15	13	16	19	17	--	24	
19-Nov	17	Z	9	14	13	14	8	4	12	6	5	2	1	3	4	11	52	97	34	27	14	22	27	28	18.4	97	
20-Nov	25	Z	16	17	14	16	19	26	28	24	50	34	24	22	27	35	44	63	84	122	65	38	28	17	36.5	122	
21-Nov	15	Z	15	8	11	8	9	7	6	18	10	8	15	10	12	11	12	9	12	11	10	15	31	27	12.6	31	
22-Nov	15	Z	7	6	11	5	3	2	4	14	17	17	7	15	14	19	26	11	13	7	6	15	10	10	11.0	26	
23-Nov	10	Z	17	26	24	20	10	51	39	27	23	21	20	35	36	44	31	68	90	123	221	280	205	81	65.3	280	
24-Nov	84	Z	7	11	8	9	7	16	9	7	18	9	13	18	17	18	30	27	20	12	9	12	9	6	16.3	84	
25-Nov	14	Z	33	61	28	24	22	24	16	13	10	11	6	5	7	13	25	57	54	76	199	227	148	88	50.5	227	
26-Nov	100	Z	71	81	35	54	65	79	49	73	75	89	56	56	58	43	51	69	71	65	16	5	6	4	55.1	100	
27-Nov	4	Z	2	4	6	11	14	9	11	11	7	3	6	8	13	17	36	64	88	53	40	23	17	10	19.9	88	
28-Nov	9	Z	5	7	7	4	5	4	2	6	5	4	4	7	6	7	7	7	12	17	13	24	26	35	9.7	35	
29-Nov	47	Z	48	27	27	29	30	22	25	18	20	16	9	8	5	8	18	13	7	4	3	7	10	7	17.7	48	
30-Nov	17	Z	16	10	17	21	13	5	6	5	5	13	8	4	7	18	9	19	30	40	31	31	20	19	15.9	40	
		26.2	--	19.5	19.3	16.6	15.5	15.8	16.2	14.1	17.8	18.3	16.4	13.1	14.8	17.0	18.9	22.8	28.7	30.9	32.3	31.7	37.7	34.9	28.1	Diurnal Average	
		100	--	78	81	40	54	65	79	49	73	75	89	56	56	58	56	74	97	90	123	221	280	205	88	Diurnal Maximum	
Z - zerspan		C - Calibration				PF - Power Failure																					



WBEA
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Millennium - November 2014





WBEA
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Millennium - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	450	65.98	65.98
21 - 40	143	20.97	86.95
41 - 80	69	10.12	97.07
81 - 159	13	1.91	98.97
> 159	5	0.73	99.71

Total Number of Valid Hours: 682

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Millennium - November 2014

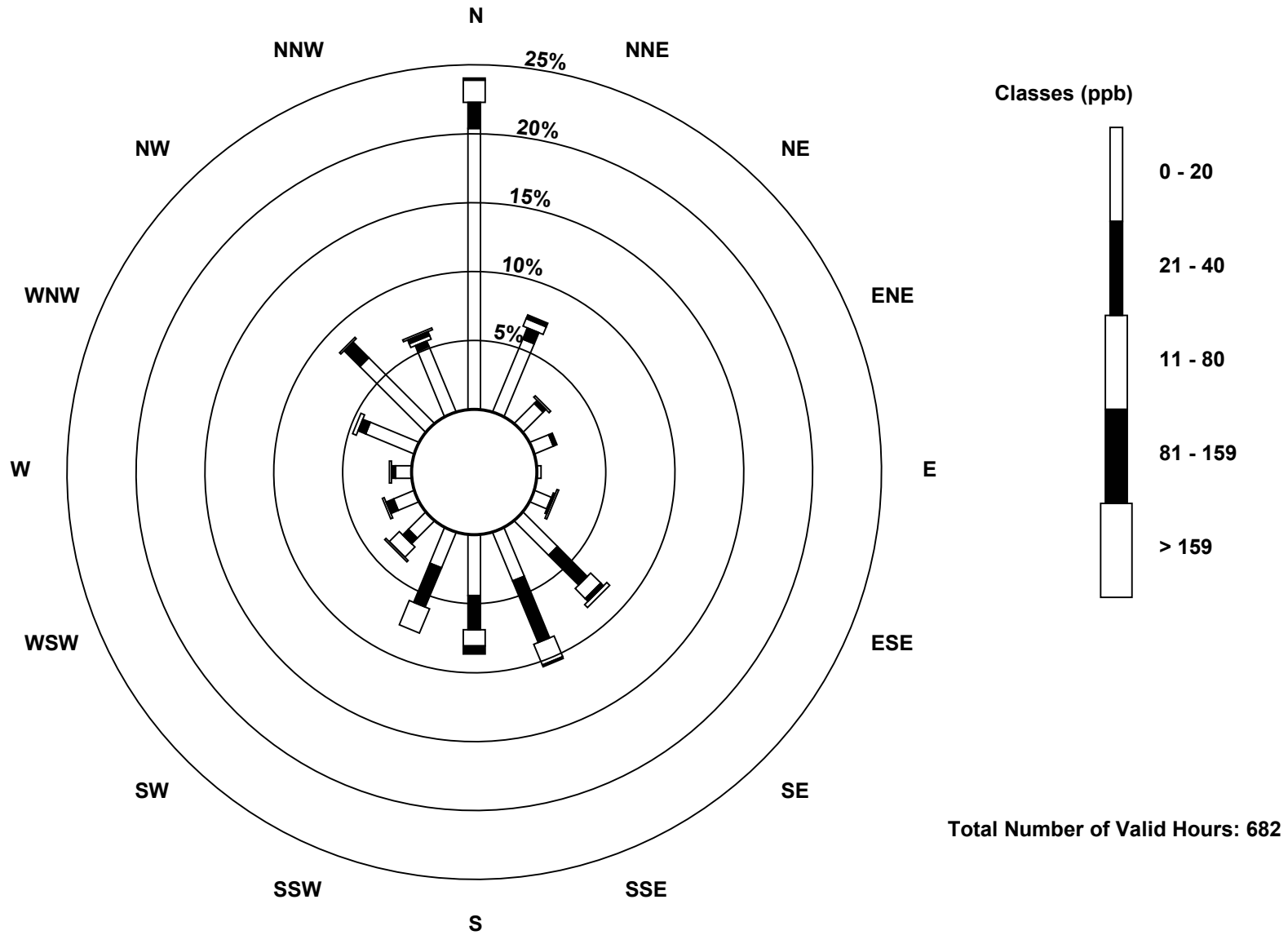
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	139	39	14	10	2	9	24	26	30	19	12	11	8	26	46	35	450
21 - 40	13	6	2	2	0	0	21	33	17	21	4	4	2	4	11	3	143
11 - 80	11	4	1	0	0	0	7	11	8	13	7	1	1	2	1	2	69
81 - 159	1	2	0	0	0	1	2	1	4	0	0	0	0	0	0	2	13
> 159	0	0	0	0	0	1	2	0	0	0	1	0	0	0	0	1	5
Totals	164	51	17	12	2	11	56	71	59	53	24	16	11	32	58	43	680

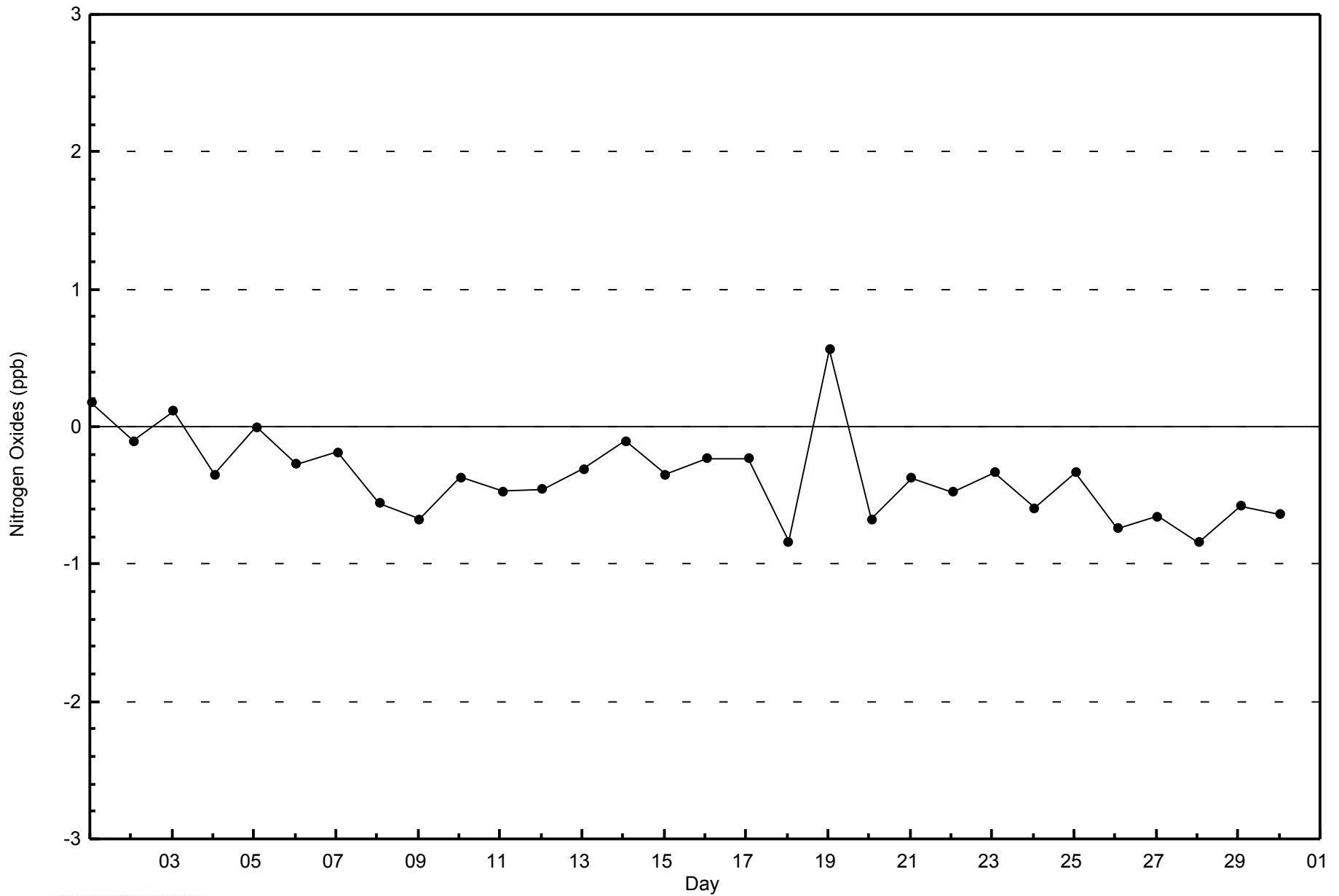
Total Number of Valid Hours: 682

Total Number of Hours: 720

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

**Nitrogen Oxides (NO_x) - ppb
Millennium (AMS 12)**

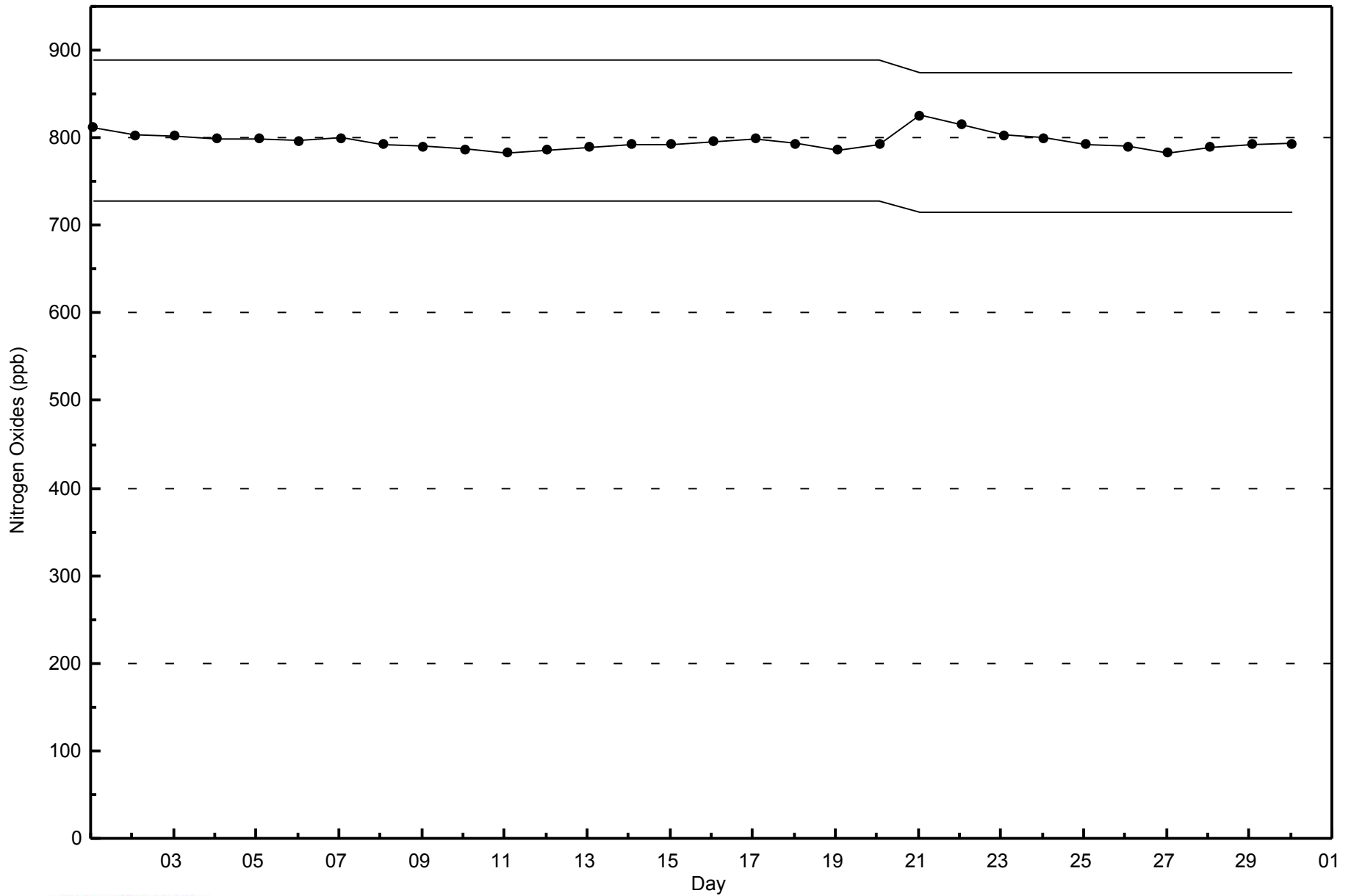






WBEA
Span Responses

Nitrogen Oxides (NO_x) - ppb
Millennium - November 2014





Summary of Hour Averages

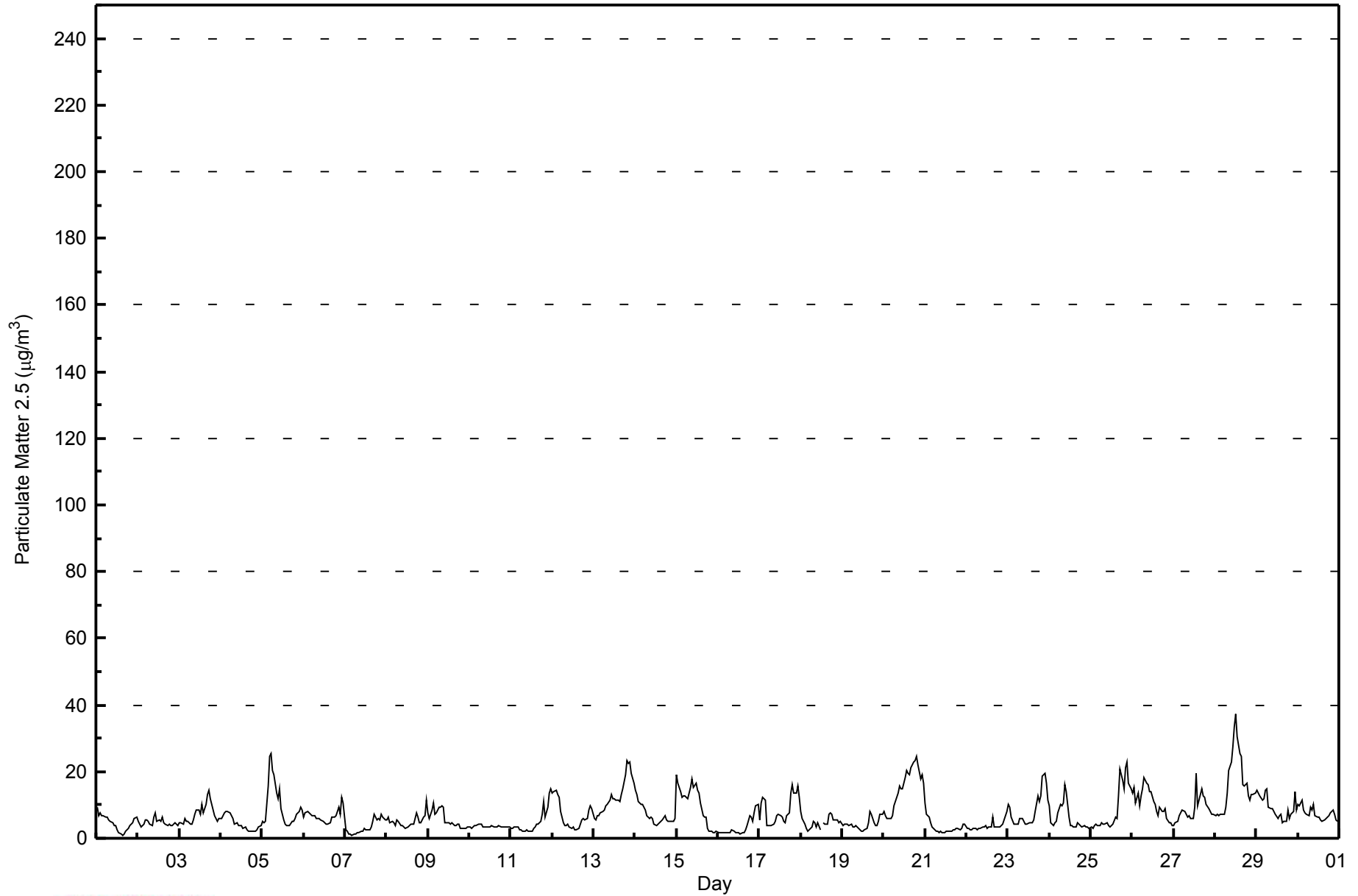
Millennium - November 2014

Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 37.2 µg/m ³ on Nov 28 13:00		Maximum Daily Average: 16.6 µg/m ³ on Nov 28		Hours in Service: 720 Hours of Data: 719																																												
Minimum Value: 1.0 µg/m ³ on Nov 1 16:00 Maximum Diurnal Average: 8.5 µg/m ³ at hour 23 Monthly Average: 7.21 µg/m ³		Minimum Daily Average: 3.3 µg/m ³ on Nov 16 Minimum Diurnal Average: 6.1 µg/m ³ at hour 15 Percentiles: P ₁ = 1.4 P ₁₀ = 2.6 Q ₁ = 3.7 Median = 5.6 Q ₃ = 9.2 P ₉₀ = 14.3 P ₉₉ = 24.2		Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Nov	9.4	6.7	7.5	6.9	6.8	6.3	6.6	5.5	5.2	4.7	3.7	3.6	2.6	1.6	1.2	1.0	1.2	2.3	3.2	3.8	4.4	4.7	5.9	6.5	4.6	9.4																						
2-Nov	4.9	4.2	3.2	4.3	5.6	5.6	5.3	4.3	3.6	6.5	7.8	5.0	5.4	4.9	6.3	4.8	4.4	3.7	4.1	3.9	3.6	4.7	4.3	4.0	4.8	7.8																						
3-Nov	4.5	4.5	4.2	5.8	5.2	4.9	4.3	4.1	5.4	7.3	8.6	8.6	7.3	10.4	7.8	10.0	13.0	14.4	11.9	10.3	6.7	6.1	5.2	5.8	7.3	14.4																						
4-Nov	6.0	6.9	7.4	8.0	8.0	7.8	6.8	5.9	4.4	4.6	4.0	3.8	3.7	3.0	3.3	2.5	2.0	2.1	2.3	2.1	2.1	2.6	3.4	3.7	4.4	8.0																						
5-Nov	5.1	4.7	5.0	15.9	24.7	25.5	20.4	18.9	13.6	11.9	15.0	8.9	5.6	4.1	3.9	3.7	4.0	4.9	5.2	6.1	7.1	8.2	9.3	8.5	10.0	25.5																						
6-Nov	6.5	7.6	8.0	7.6	7.2	6.8	6.7	6.1	5.8	5.8	5.4	4.9	4.5	4.4	4.1	4.8	6.5	6.4	6.5	6.6	9.5	7.1	12.1	10.4	6.7	12.1																						
7-Nov	2.7	1.9	1.3	1.1	1.1	1.2	1.4	1.6	1.6	2.1	2.3	2.8	2.7	2.6	2.7	3.3	5.2	7.2	5.6	6.1	5.4	7.0	6.3	5.3	3.3	7.2																						
8-Nov	5.7	6.4	4.5	4.9	4.6	3.7	5.4	5.1	3.9	3.7	3.3	3.2	3.6	3.8	4.2	4.1	4.3	7.4	6.3	4.7	4.8	6.3	6.6	11.5	5.1	11.5																						
9-Nov	7.4	5.7	8.5	10.8	7.4	7.4	9.2	9.2	9.7	9.4	4.7	4.5	4.7	4.4	4.6	3.7	3.7	4.2	4.4	3.2	2.9	3.1	3.0	3.3	5.8	10.8																						
10-Nov	3.3	3.2	3.2	3.6	3.9	4.0	4.3	4.2	3.5	3.3	3.4	3.2	3.3	3.6	3.4	3.3	3.5	3.6	3.5	3.4	3.3	3.5	3.4	3.3	3.5	4.3																						
11-Nov	3.2	3.1	3.2	3.3	3.2	2.5	2.4	2.2	2.2	2.4	2.2	2.3	2.3	3.2	3.3	4.1	4.2	5.1	7.2	11.0	6.3	9.5	13.4	15.0	4.9	15.0																						
12-Nov	13.4	14.1	14.2	13.0	12.1	7.8	4.8	3.9	4.0	4.2	3.6	3.1	3.2	2.7	2.7	3.1	4.3	5.5	5.7	5.7	6.0	8.4	9.9	8.9	6.8	14.2																						
13-Nov	5.9	5.7	6.6	7.0	7.6	8.0	8.6	9.6	10.1	11.6	13.2	11.9	12.1	11.5	11.4	11.2	13.3	14.9	19.0	23.3	22.3	22.8	19.3	16.7	12.6	23.3																						
14-Nov	14.6	13.2	11.1	10.0	10.3	9.5	8.7	6.8	6.0	6.3	5.8	4.2	3.8	4.2	4.8	5.3	5.5	6.7	5.4	5.2	4.9	5.2	5.0	6.0	7.0	14.6																						
15-Nov	19.2	16.3	13.9	12.4	12.9	12.5	11.9	13.8	15.2	18.0	15.4	16.5	14.6	13.4	10.4	7.0	6.5	6.3	3.1	2.3	2.1	1.8	1.8	2.0	10.4	19.2																						
16-Nov	1.8	1.6	1.5	1.7	1.6	1.8	1.7	1.9	2.7	2.0	1.9	1.9	1.7	1.5	1.8	1.5	2.4	3.6	6.8	6.3	5.0	7.7	9.6	10.0	3.3	10.0																						
17-Nov	5.4	10.7	12.3	11.3	3.7	3.9	3.9	3.6	4.1	5.0	6.7	7.2	6.8	6.3	5.2	4.8	6.8	7.7	13.8	16.1	13.5	13.7	15.7	12.5	8.4	16.1																						
18-Nov	8.2	5.9	4.3	2.9	2.3	2.4	3.4	5.0	4.5	3.4	4.6	2.3	M	4.7	4.2	4.4	7.4	7.5	7.2	5.5	5.4	5.6	4.6	5.0	4.8	8.2																						
19-Nov	4.0	4.3	4.1	4.3	3.7	4.3	3.4	3.2	3.7	3.1	2.6	2.1	2.1	2.6	2.8	4.6	8.0	7.1	4.7	3.8	3.8	4.9	7.1	7.0	4.2	8.0																						
20-Nov	7.9	6.8	5.8	5.8	5.8	6.9	9.6	11.2	13.7	15.5	14.9	14.7	18.2	20.5	19.5	19.2	21.1	22.9	23.2	24.6	22.0	17.9	19.2	16.5	15.1	24.6																						
21-Nov	10.7	7.4	6.3	4.8	3.5	2.8	2.3	2.2	1.9	1.9	1.8	1.8	2.0	1.9	2.0	2.1	2.5	2.6	3.0	3.1	2.7	3.1	4.3	4.3	3.4	10.7																						
22-Nov	3.1	2.8	2.6	2.6	2.8	2.8	2.7	2.8	2.8	3.2	3.2	3.7	3.1	3.4	3.5	6.4	3.6	3.4	3.5	3.6	4.0	4.1	5.4	8.2	3.6	8.2																						
23-Nov	10.2	9.5	6.3	4.1	4.2	4.3	4.4	6.0	5.9	5.0	4.4	4.4	4.6	4.7	4.5	5.3	8.0	12.5	11.1	12.5	18.8	19.7	16.5	11.3	8.3	19.7																						
24-Nov	9.6	4.7	4.0	4.7	5.1	7.5	10.2	9.6	10.7	15.9	14.2	6.3	4.0	3.7	3.6	3.6	4.5	4.3	3.9	3.5	3.8	3.5	3.2	3.0	6.1	15.9																						
25-Nov	3.2	3.1	3.7	4.4	3.8	4.0	4.5	4.3	4.3	4.7	3.9	3.6	3.6	4.2	6.2	5.9	12.7	20.9	17.4	15.0	21.2	22.7	16.5	14.7	8.7	22.7																						
26-Nov	13.5	15.3	10.4	13.7	9.9	12.7	15.0	18.0	16.7	16.2	14.2	14.2	10.9	10.3	8.3	6.9	9.4	8.0	8.0	9.0	5.9	4.5	4.5	3.6	10.8	18.0																						
27-Nov	3.8	4.5	5.2	6.8	7.6	8.3	7.9	7.0	6.5	6.6	6.1	6.1	9.2	19.3	9.8	13.2	15.0	12.8	12.3	10.1	9.0	8.0	7.4	7.4	8.7	19.3																						
28-Nov	7.0	7.0	6.7	7.1	7.0	7.3	9.3	13.7	20.4	22.7	27.4	33.4	37.2	30.3	25.4	24.5	16.1	15.9	16.6	12.6	11.4	13.0	13.1	13.7	16.6	37.2																						
29-Nov	14.4	13.8	12.7	11.6	11.9	14.3	14.7	9.4	8.9	8.8	8.1	7.3	5.8	6.8	7.3	4.7	5.0	5.2	8.3	5.9	7.1	8.1	13.8	8.4	9.3	14.7																						
30-Nov	10.1	9.6	11.4	8.4	7.7	7.0	6.7	9.4	8.5	10.3	6.8	6.4	6.3	5.5	5.1	5.4	5.9	6.6	6.6	7.5	8.5	7.1	5.5	5.1	7.4	11.4																						
																								7.5	7.0	6.6	7.0	6.7	6.8	6.9	6.9	7.0	7.5	7.3	6.7	6.7	6.8	6.1	6.1	7.0	7.9	8.0	7.9	7.8	8.1	8.5	8.1	Diurnal Average
																								19.2	16.3	14.2	15.9	24.7	25.5	20.4	18.9	20.4	22.7	27.4	33.4	37.2	30.3	25.4	24.5	21.1	22.9	23.2	24.6	22.3	22.8	19.3	16.7	Diurnal Maximum
M - Maintenance																																																
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m ³																																																



WBEA
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Millennium - November 2014





WBEA
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Millennium - November 2014

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	353	49.10	49.10
6 - 15	312	43.39	92.49
16 - 25	49	6.82	99.30
26 - 80	4	0.56	99.86
> 81.0	0	0.00	99.86

Total Number of Valid Hours: 719

Total Number of Hours: 720



WBEA
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Millennium - November 2014

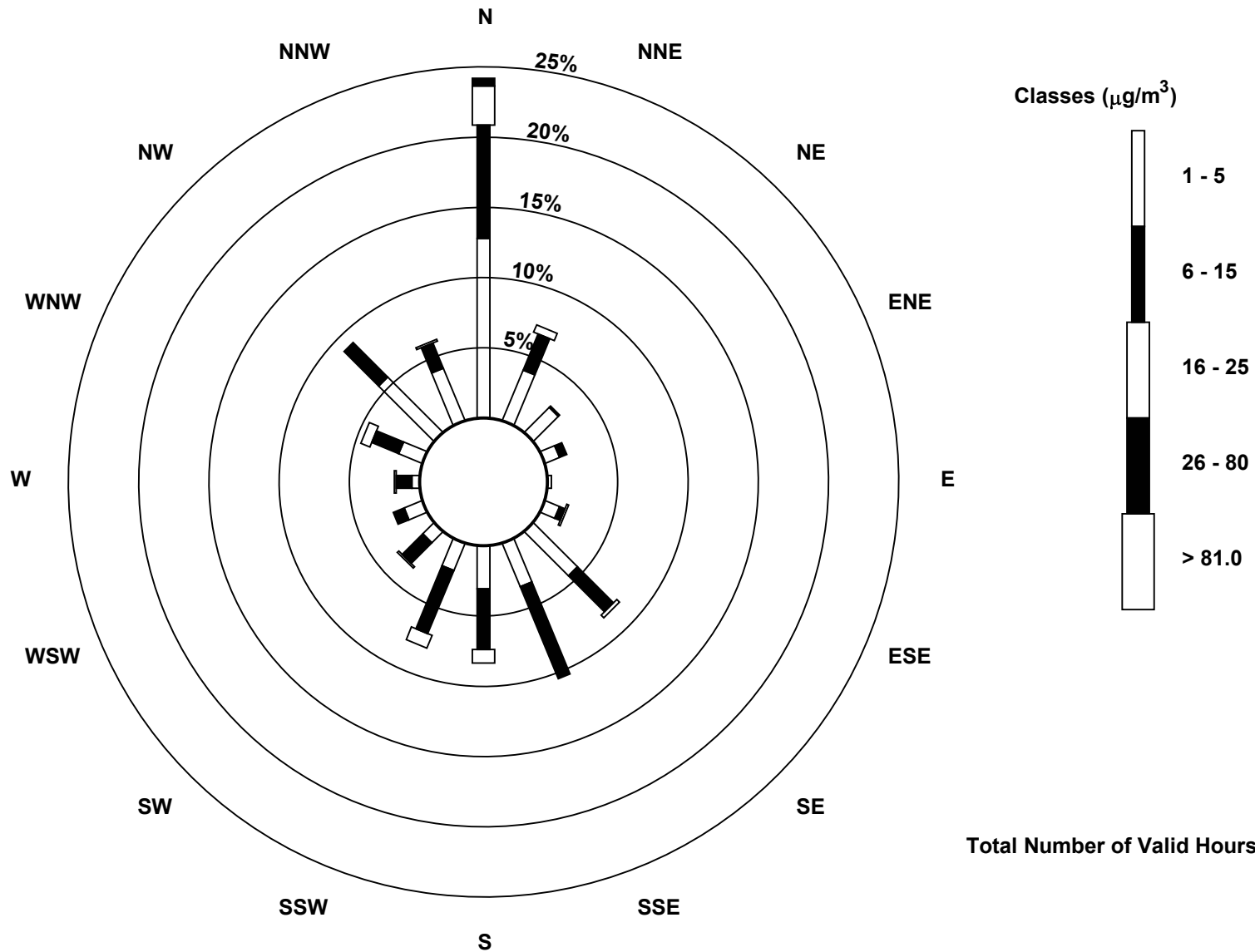
Concentration Ranges (μg/m ³)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	92	28	18	8	2	8	32	24	22	15	8	10	4	13	40	29	353
6 - 15	58	20	1	4	0	3	26	51	31	35	15	6	8	15	25	14	312
16 - 25	20	4	0	0	0	1	2	0	7	7	1	0	1	5	0	1	49
26 - 80	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	174	52	19	12	2	12	60	75	60	57	24	16	13	33	65	44	718

Total Number of Valid Hours: 719

Total Number of Hours: 720

Wood Buffalo Environmental Association
 Wind Rose Nov 2014

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
 Millennium (AMS 12)



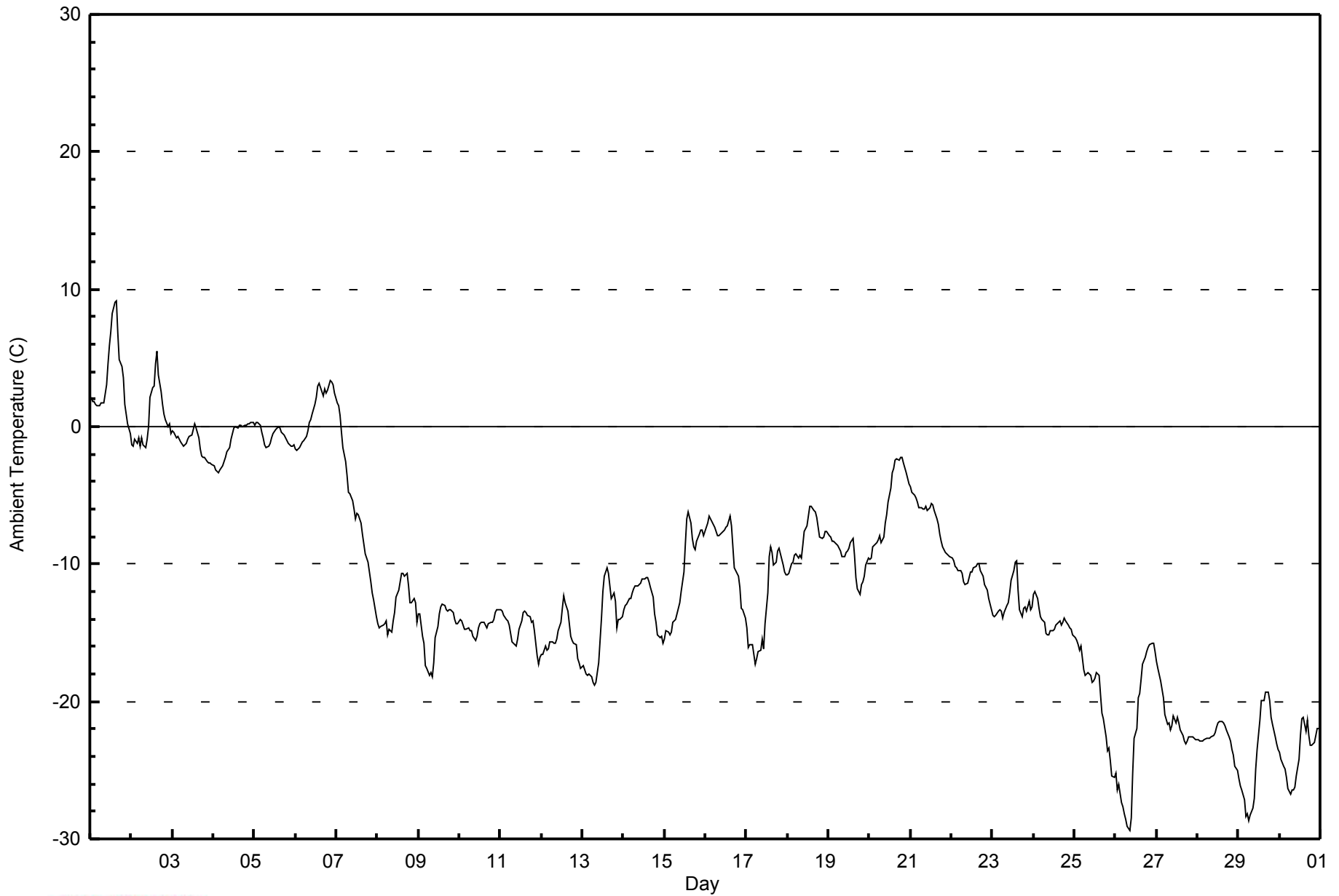


Maximum Value: 9.2 C on Nov 1 16:00		Maximum Daily Average: 3.5 C on Nov 1		Hours in Service: 720																																												
Minimum Value: -29.3 C on Nov 26 09:00		Minimum Daily Average: -23.9 C on Nov 29		Hours of Data: 720																																												
Maximum Diurnal Average: -9.2 C at hour 15		Minimum Diurnal Average: -12.5 C at hour 8		Hours of Missing Data: 0																																												
Monthly Average: -11.25 C		Percentiles: P ₁ = -28.2 P ₁₀ = -22.5 Q ₁ = -15.8 Median = -12.1 Q ₃ = -5.9 P ₉₀ = -0.1 P ₉₉ = 5.1		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-Nov	2.1	1.8	1.8	1.6	1.5	1.5	1.7	1.7	1.8	3.1	4.6	5.9	7.0	8.2	9.0	9.2	6.9	4.8	4.3	3.6	1.6	0.9	0.3	-0.5	3.5	9.2																						
2-Nov	-1.3	-1.4	-0.9	-1.2	-0.8	-1.4	-0.8	-1.3	-1.5	-1.0	0.0	2.2	2.8	3.0	4.5	5.5	3.7	2.5	1.6	0.9	0.5	0.0	0.2	-0.6	0.6	5.5																						
3-Nov	-0.3	-0.5	-0.8	-0.7	-0.9	-1.1	-1.4	-1.4	-1.2	-1.0	-0.8	-0.6	-0.2	0.2	-0.1	-0.9	-1.6	-2.1	-2.2	-2.2	-2.5	-2.6	-2.6	-2.7	-1.3	0.2																						
4-Nov	-2.9	-3.1	-3.3	-3.4	-3.2	-2.8	-2.6	-2.3	-1.8	-1.5	-1.0	-0.5	-0.1	0.0	-0.1	0.1	0.1	0.0	0.1	0.2	0.2	0.3	0.3	0.3	-1.1	0.3																						
5-Nov	0.1	0.3	0.3	0.1	-0.4	-0.8	-1.3	-1.5	-1.5	-1.2	-0.8	-0.5	-0.2	-0.1	0.0	-0.1	-0.4	-0.6	-0.9	-1.1	-1.2	-1.5	-1.4	-1.4	-0.7	0.3																						
6-Nov	-1.6	-1.7	-1.5	-1.3	-1.2	-1.0	-0.7	-0.3	0.3	0.5	0.9	1.6	2.2	3.0	3.1	2.6	2.2	2.7	2.4	2.6	3.4	3.2	3.1	2.4	1.1	3.4																						
7-Nov	1.7	1.5	0.8	-0.4	-1.5	-2.6	-3.6	-4.8	-4.9	-5.3	-6.0	-6.7	-6.3	-6.4	-7.1	-7.9	-8.6	-9.3	-9.8	-10.5	-11.3	-12.1	-12.6	-13.9	-6.1	1.7																						
8-Nov	-14.4	-14.6	-14.6	-14.5	-14.3	-14.2	-15.2	-14.7	-15.0	-14.2	-13.5	-12.4	-11.9	-11.2	-10.7	-10.7	-10.9	-10.7	-11.6	-12.9	-12.8	-12.5	-12.8	-14.2	-13.1	-10.7																						
9-Nov	-13.7	-13.6	-15.3	-15.8	-17.4	-17.6	-18.1	-17.9	-18.2	-17.2	-15.3	-14.5	-13.6	-13.1	-12.9	-13.0	-13.3	-13.4	-13.4	-13.3	-13.6	-14.0	-14.3	-14.3	-14.9	-12.9																						
10-Nov	-14.0	-14.1	-14.5	-14.7	-14.8	-14.7	-14.8	-14.8	-15.2	-15.6	-15.2	-14.6	-14.3	-14.2	-14.2	-14.4	-14.7	-14.3	-14.2	-14.3	-14.0	-13.5	-13.3	-13.3	-14.4	-13.3																						
11-Nov	-13.4	-13.5	-13.7	-14.1	-14.1	-14.4	-15.0	-15.6	-15.9	-16.0	-15.5	-14.8	-14.2	-13.5	-13.4	-13.6	-13.7	-13.9	-14.2	-14.1	-14.8	-16.7	-17.3	-16.8	-14.7	-13.4																						
12-Nov	-16.6	-16.6	-16.0	-16.3	-16.2	-15.6	-15.7	-15.8	-15.8	-15.5	-14.8	-14.2	-13.3	-12.3	-12.8	-13.4	-14.4	-15.2	-15.6	-15.7	-15.9	-16.9	-17.2	-17.6	-15.4	-12.3																						
13-Nov	-17.3	-17.7	-18.0	-18.1	-18.0	-18.3	-18.6	-18.8	-18.6	-17.2	-15.5	-13.9	-12.0	-10.9	-10.3	-10.7	-11.5	-12.5	-12.1	-12.7	-14.6	-14.0	-14.1	-13.9	-15.0	-10.3																						
14-Nov	-13.3	-13.0	-12.9	-12.5	-12.5	-12.1	-11.7	-11.6	-11.5	-11.3	-11.1	-11.1	-11.0	-10.9	-11.3	-11.7	-12.5	-13.6	-14.3	-15.1	-15.4	-15.2	-15.7	-15.7	-12.6	-10.9																						
15-Nov	-15.5	-14.9	-14.9	-15.2	-14.9	-14.3	-14.1	-13.6	-13.2	-12.8	-12.0	-10.6	-8.5	-6.7	-6.2	-7.0	-8.1	-8.8	-8.9	-8.3	-7.9	-7.5	-7.5	-7.9	-10.8	-6.2																						
16-Nov	-7.4	-7.0	-6.5	-6.7	-7.0	-7.3	-7.6	-7.9	-7.9	-7.7	-7.6	-7.5	-7.3	-7.2	-6.6	-7.2	-8.7	-10.3	-10.6	-10.9	-11.7	-13.2	-13.4	-14.0	-8.7	-6.5																						
17-Nov	-14.6	-16.0	-15.9	-15.9	-16.6	-17.3	-16.9	-16.4	-16.3	-15.5	-16.1	-14.3	-12.1	-9.5	-8.8	-9.1	-10.0	-9.9	-9.1	-8.8	-9.3	-10.1	-10.6	-10.8	-12.9	-8.8																						
18-Nov	-10.8	-10.6	-9.9	-9.9	-9.4	-9.2	-9.5	-9.4	-9.6	-8.7	-7.6	-7.2	-6.5	-5.8	-5.8	-6.1	-6.2	-6.6	-7.3	-8.0	-8.1	-8.0	-7.6	-7.6	-8.2	-5.8																						
19-Nov	-7.9	-8.1	-8.3	-8.3	-8.5	-8.7	-8.8	-9.1	-9.4	-9.5	-9.2	-9.0	-8.8	-8.4	-8.1	-9.3	-10.9	-11.8	-12.2	-11.4	-11.3	-10.9	-10.1	-9.5	-9.5	-7.9																						
20-Nov	-9.6	-9.6	-8.7	-8.6	-8.4	-8.3	-7.9	-8.4	-8.0	-7.0	-6.5	-5.5	-4.5	-3.4	-3.0	-2.5	-2.4	-2.5	-2.2	-2.2	-2.6	-3.4	-3.7	-4.1	-5.5	-2.2																						
21-Nov	-4.4	-4.8	-5.0	-5.1	-5.4	-5.9	-5.9	-6.0	-6.0	-5.8	-6.1	-5.9	-5.6	-5.7	-6.2	-6.7	-7.1	-7.8	-8.3	-8.7	-9.1	-9.3	-9.3	-9.5	-6.7	-4.4																						
22-Nov	-9.6	-9.7	-10.1	-10.3	-10.4	-10.4	-10.7	-11.2	-11.5	-11.4	-11.0	-10.6	-10.6	-10.2	-10.2	-10.0	-10.0	-10.4	-10.9	-11.5	-11.7	-11.9	-12.5	-13.3	-10.8	-9.6																						
23-Nov	-13.7	-13.8	-13.7	-13.4	-13.3	-13.4	-13.9	-13.6	-13.1	-12.8	-12.1	-11.2	-10.5	-9.8	-9.7	-11.9	-13.3	-13.9	-13.2	-13.1	-13.4	-12.7	-13.3	-13.2	-12.7	-9.7																						
24-Nov	-12.2	-12.0	-12.5	-13.3	-13.8	-14.1	-14.2	-15.0	-15.2	-15.1	-14.9	-14.9	-14.7	-14.4	-14.3	-14.2	-14.4	-14.3	-13.9	-14.2	-14.5	-14.7	-14.8	-15.2	-14.2	-12.0																						
25-Nov	-15.3	-15.6	-15.9	-16.2	-16.0	-17.7	-18.1	-18.0	-17.9	-18.1	-18.6	-18.5	-18.3	-17.9	-18.1	-19.5	-20.8	-21.3	-22.6	-23.6	-23.4	-24.3	-25.4	-25.5	-19.4	-15.3																						
26-Nov	-25.3	-26.5	-26.1	-27.3	-27.6	-28.2	-28.6	-29.1	-29.3	-28.5	-25.2	-22.7	-21.9	-19.7	-19.5	-18.4	-17.3	-16.7	-16.3	-16.1	-15.9	-15.8	-15.7	-16.4	-22.3	-15.7																						
27-Nov	-17.1	-17.6	-18.5	-19.1	-19.7	-20.9	-21.7	-21.6	-22.1	-21.1	-21.5	-21.1	-21.5	-22.1	-22.5	-22.9	-23.0	-22.9	-22.5	-22.5	-22.6	-22.7	-22.8	-21.3	-17.1																							
28-Nov	-22.8	-22.9	-22.8	-22.9	-22.8	-22.7	-22.7	-22.6	-22.6	-22.5	-22.2	-21.9	-21.5	-21.4	-21.5	-21.6	-21.8	-22.1	-22.6	-22.9	-23.5	-23.9	-24.7	-25.1	-22.7	-21.4																						
29-Nov	-25.7	-26.1	-26.4	-27.1	-28.3	-28.2	-28.6	-28.3	-27.7	-27.1	-24.9	-23.5	-21.3	-19.9	-19.9	-19.9	-19.3	-19.3	-20.0	-21.1	-21.7	-22.5	-23.1	-23.5	-23.9	-19.3																						
30-Nov	-23.7	-24.2	-24.7	-25.0	-25.6	-26.3	-26.8	-26.4	-26.4	-26.2	-25.5	-24.2	-22.4	-21.3	-21.1	-22.2	-21.4	-22.5	-23.2	-23.2	-23.0	-22.5	-21.9	-21.9	-23.8	-21.1																						
																								-11.3	-11.5	-11.6	-11.9	-12.0	-12.3	-12.5	-12.5	-12.5	-12.1	-11.5	-10.8	-10.0	-9.4	-9.2	-9.6	-10.1	-10.5	-10.8	-11.0	-11.3	-11.6	-11.8	-12.1	Diurnal Average
																								2.1	1.8	1.8	1.6	1.5	1.5	1.7	1.7	1.8	3.1	4.6	5.9	7.0	8.2	9.0	9.2	6.9	4.8	4.3	3.6	3.4	3.2	3.1	2.4	Diurnal Maximum



WBEA
Hourly Averages

Ambient Temperature (AT) - C
Millennium - November 2014





WBEA
Cumulative Frequency Distribution

Ambient Temperature (AT) - C
Millennium - November 2014

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	106	14.72	14.72
-20 - 0	546	75.83	90.56
0 - 10	68	9.44	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Speed: 25 km/h on Nov 15 18:00	Maximum Daily Speed Average: 15.0 km/h on Nov 7	Hours in Service: 720
Minimum Speed Value: 1 km/h on Nov 9 07:00	Minimum Daily Speed Average: 0.4 km/h on Nov 26	Hours of Data: 720
Maximum Diurnal Speed Average: 4.1 km/h at hour 20	Minimum Diurnal Speed Average: 1.0 km/h at hour 9	Hours of Missing Data: 0
Monthly Average Velocity: 2.9 km/h 357.0 deg	Percentiles: P ₁ = 2 P ₁₀ = 4 Q ₁ = 5 Median = 8 Q ₃ = 12 P ₉₀ = 15 P ₉₉ = 20	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	SW4	SSW5	SW4	SSW3	S3	S2	S4	S4	S4	S6	SSW6	SSW6	SW8	WSW7	WSW6	SW6	SW3	SSW4	SSW5	SW6	SSW4	SSE4	SSE4	S4	SSW4.3	SW8
2-Nov	S4	SSE4	SE6	SSE5	SSE6	SSE5	SE7	SE9	SE10	SSE7	SSE4	SSE5	S5	SSW6	SSE4	SE9	SE9	SE11	SE9	SE9	SE9	SE10	SSE7	SSW6.7	SE11	
3-Nov	SSE8	SE8	SSE6	SSE5	SE6	S6	S6	S6	S4	SW2	WSW3	W3	WNW5	NNW8	N12	N14	N12	N13	NNE12	N8	NNE9	NNE6	NE6	ENE3	NNE2.1	N14
4-Nov	ENE4	SE5	SE6	SSE6	SSE6	SSE6	ESE9	ESE8	ESE9	ESE11	ESE13	ESE13	ESE12	SE11	SE11	ESE12	SE12	SE11	SE10	SE11	SE9	SE8	SE6	SSE4	SE8.6	ESE13
5-Nov	SW5	W8	W6	WNW10	WNW12	WNW11	WNW12	W10	WNW11	WNW12	WNW11	WNW10	WNW8	W9	WNW7	WNW7	WSW4	SW6	SSW4	SSW7	SSW7	S6	SSE7	SSE7	W6.4	WNW12
6-Nov	SE9	SE11	SE14	SE15	SE17	SE17	SE21	SE21	SE20	SE20	SE18	SE14	SE15	SE9	SE9	SE7	SE5	SE4	SE4	W3	NW11	NW11	NW17	NNW14	SE8.1	SE21
7-Nov	NNW12	NW15	NW16	NW17	NW16	NNW14	N19	N17	NNW13	N17	NNW17	N18	NNW15	NNW16	NNW17	N15	N16	N14	NNW15	N14	NNW13	N14	N16	NNE14	NNW15.0	N19
8-Nov	NNE16	N14	N12	N9	NW7	NW7	W5	NW7	NW10	NW10	NW10	NNW11	N12	N12	NW8	NW8	NNW9	N12	NNE13	NNE14	NNE14	N13	N9	NW5	N9.0	NNE16
9-Nov	N9	N10	NW5	WNW3	SW5	SW2	WSW1	WNW1	SW6	WSW4	N9	N8	N9	N12	N11	N12	N10	N9	NNE11	N14	N16	NNE17	NNE12	N11	N7.1	NNE17
10-Nov	N15	N15	N15	NNW13	NNW11	NNW10	NW9	NW10	N16	N19	N17	N18	N16	N17	N17	N15	N14	N19	N18	N16	N14	N15	N17	N13	N14.7	N19
11-Nov	N10	N12	N11	N12	N10	NNE12	NNE14	NNE11	NNE12	NE12	NE11	NNE9	N8	WNW5	WNW4	NW4	NNE1	ENE2	ENE3	ENE3	SSE3	S4	SW5	SW4	NNE5.5	NNE14
12-Nov	SW5	SW6	SSW6	SSW5	SSW5	SSW6	SSW6	SSW6	SSW5	S5	S7	S7	S6	SSE5	SE7	SE8	SSE4	SSE4	SSE3	SSE4	SSE3	S4	SSE4	SSE4	S4.8	SE8
13-Nov	SSE5	SSE4	SSE5	SE5	SSE5	SSE5	SSE4	SSE4	SSE5	SSE5	SSE5	SSE5	SSE5	SE7	SE7	SE5	SE4	NE3	NNE10	NNE6	N1	N5	N6	N8	SE2.7	NNE10
14-Nov	N8	N9	N11	N9	N8	N13	N12	N12	N12	N14	N14	N11	N9	N10	NW5	W3	WSW3	WSW5	WSW4	WSW5	WSW5	WSW5	WSW3	SSW3	N7.2	N14
15-Nov	SSW6	SSW8	SSW7	SSW6	SSW8	SSW10	S10	S10	S11	S11	S9	S8	SSE4	WNW5	NW8	N14	N20	N25	N19	N20	NNW15	NNW15	NW15	NW13	NW3.1	N25
16-Nov	NW11	NNW11	N15	N19	NNW12	NNW12	NNW12	NNW10	NW9	NW10	NW12	NNW10	NNW11	NNW9	NW5	N5	NNE3	N3	WNW3	W4	NW4	WSW3	SSW5	SW7	NNW7.3	N19
17-Nov	SSW6	SSW5	S4	S5	SSE5	SSE5	SSE7	SSE7	SSE6	SSE6	SSW7	SSW7	SSW6	SSW7	SSW8	S6	SSW6	SW5	NW5	N6	NW5	NW5	WNW5	NNE7	SSW3.1	SSW8
18-Nov	N18	N18	N21	N22	NNW14	NNW10	NW8	NW9	NW8	NW8	WNW9	NW10	NW11	NW12	NW12	NW10	NW12	NW11	NW10	NW9	WNW8	NW8	NW10	NW8	NNW10.6	N22
19-Nov	NW7	NW6	WNW6	NW7	NW7	WNW6	WNW5	WNW5	SW2	SW5	SW7	SSW7	SSW8	SSW9	S7	S5	SSE5	SSE5	SSE5	SSE5	SSE6	SE6	SSE6	SSE5	SW2.8	SSW9
20-Nov	SSE6	SSE6	SSE7	SE9	SSE8	SSE7	SSE6	S6	S5	S5	SSW6	SSW6	S7	S7	SSW5	S2	SSW2	SSW3	NNE2	N3	N10	N10	N8	N7	SSE2.4	N10
21-Nov	N11	NNE12	NNE10	N13	N13	NNE13	N10	N13	N11	N9	N15	N12	NW7	N9	NNE10	NNE11	NE12	NE13	NE11	NE12	NE8	NE6	NE7	NE11	NNE10.2	N15
22-Nov	NE12	NE13	ENE10	NE10	NE9	ENE8	ENE9	ENE8	NE9	NE9	NNE10	NNE11	N14	NNE14	NNE14	NNE10	NNE10	NNE11	N12	N15	N12	N11	N12	N13	NNE10.3	N15
23-Nov	N10	N8	N5	NW3	WSW2	WSW4	S1	SSE3	SSE5	S6	S6	S5	S5	SE5	SSE4	SSE4	SSE4	SE4	SE3	ESE2	SE2	SW2	NNW1	W3	S1.3	N10
24-Nov	NNW7	N15	N14	N15	N14	N10	N9	NNE7	NNE8	NNE8	N6	NNE8	NNE5	NNW3	N4	NNW3	NNE5	ENE4	ESE5	ESE7	E6	E7	ENE7	NE9	NNE6.3	N15
25-Nov	ENE6	NE6	NNE5	NNE8	NNE8	N8	N8	N7	N8	N9	N9	N6	NNW6	NNW6	NNW5	NNW2	NNW4	N6	N4	NNE4	ESE3	SE5	S3	S4	N4.4	N9
26-Nov	SE5	SSE5	SSE4	S5	S5	S5	S5	SSW7	SSW7	S5	S4	S3	SSW5	SSW5	SW5	SSW6	SW2	NNW3	N8	N10	N16	N16	N13	N19	WNW0.4	N19
27-Nov	N14	N21	N18	N15	N12	NNW5	N7	N11	N8	NNE11	NNE15	N8	NW3	N6	NNW4	NNW5	NNW5	N5	NNW3	NNW3	N8	NNE11	NNE10	N9	N8.9	N21
28-Nov	N10	N11	NNE12	NNE14	NNE13	N12	N11	N13	N13	N10	N11	N14	N15	N13	N13	N14	N11	N10	N9	N7	N4	NW3	NW3	SSW3	N9.9	N15
29-Nov	SSW5	SSW7	SSW8	SSW6	S5	SSE5	S4	SSW7	SSW9	SSW8	SSW7	S3	SSW3	WNW5	W6	WNW7	WNW10	NW11	NW15	NW16	NW15	NW14	NW15	NW15	W4.9	NW16
30-Nov	NW14	NW14	WNW13	WNW13	WNW12	WNW11	W9	W8	WSW8	WSW8	SW8	S8	S9	S11	S7	S7	S12	SSE7	SE7	SE9	SE8	SSE7	SSE6	SSE6	SW4.5	NW14
N3.8 N4.0 N3.7 N3.9 NNW2.6 NNW2.1 N1.6 N1.4 NNW1.0 N1.4 NNW2.1 N2.2 NNW2.2 NNW2.7 NNW2.6 N2.8 N2.9 NNE3.7 NNE4.0 N4.1 N3.9 N3.7 N3.5 N3.4																								Diurnal Average		
N18 N21 N21 N22 SE17 SE17 SE21 SE21 SE20 SE20 SE18 N18 N16 N17 NNW17 N15 N20 N25 N19 N20 N16 NNE17 NW17 N19																								Diurnal Maximum		

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

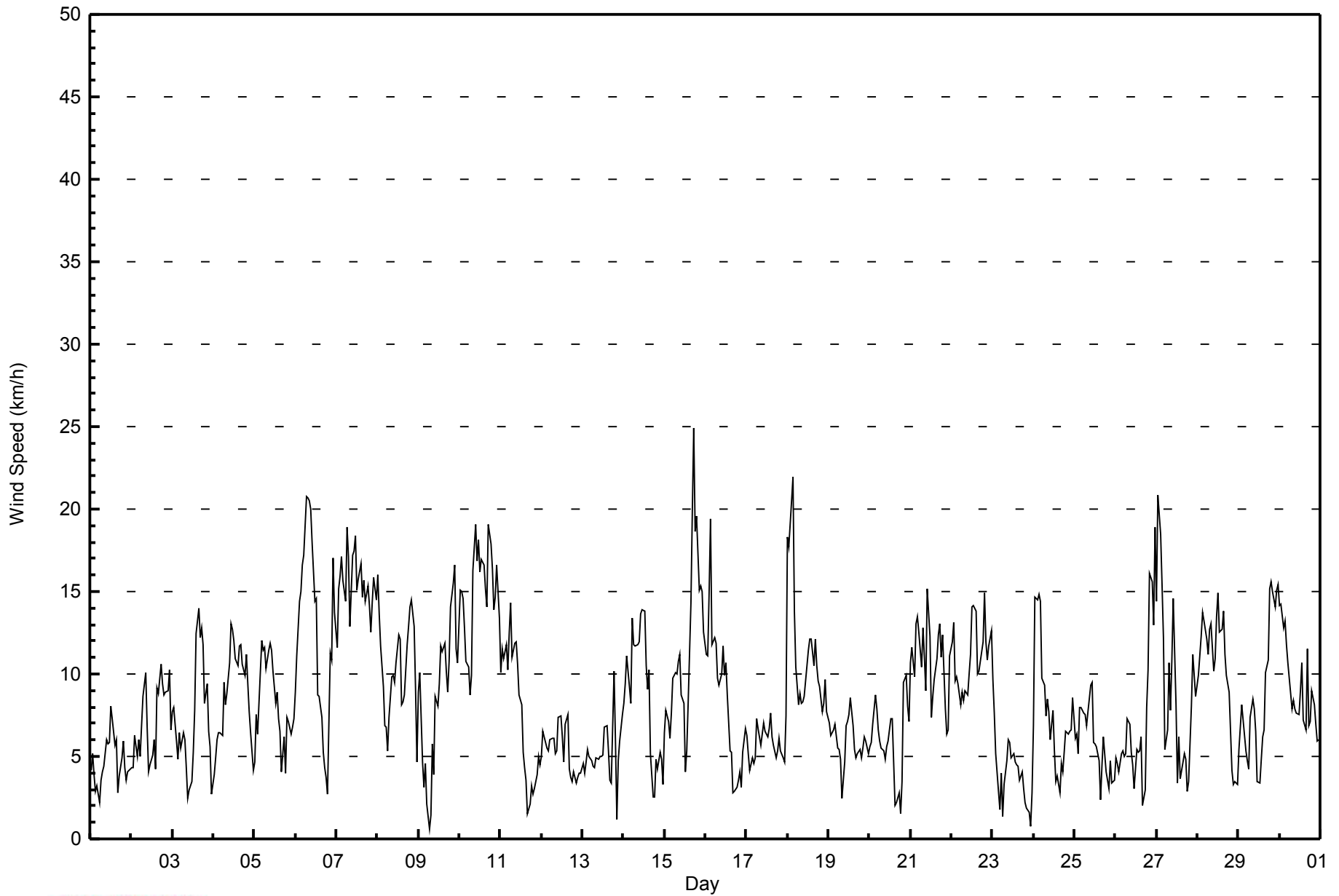


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 9 km/h on Nov 7 07:00 Minimum Value: 0 km/h on Nov 23 17:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 6																	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	1	1	2	2	1	1	1	1	2	2	2	2	2	2	2	2	2	1	1	2	1	1	1	1	2
2-Nov	1	1	1	1	2	1	2	2	2	3	1	1	1	2	1	2	2	3	3	2	3	4	2	3	4
3-Nov	3	3	2	2	2	2	1	2	1	1	1	1	2	4	3	3	3	2	3	3	3	3	2	2	4
4-Nov	2	2	2	2	2	2	3	3	3	3	4	4	4	4	3	3	3	3	3	3	3	2	2	1	4
5-Nov	1	2	2	4	5	4	4	3	4	4	4	3	3	3	3	3	1	2	2	3	2	2	2	2	5
6-Nov	3	3	4	4	5	5	7	6	6	6	5	4	4	4	3	4	1	1	1	3	4	4	6	5	7
7-Nov	4	6	6	6	6	6	9	6	5	6	6	6	5	6	6	5	4	4	5	5	4	5	4	3	9
8-Nov	3	3	3	3	3	3	2	3	4	4	4	5	4	3	3	3	3	3	2	3	3	3	3	2	5
9-Nov	4	3	3	2	1	1	2	2	2	2	2	3	3	3	3	3	2	2	3	3	3	4	3	3	4
10-Nov	4	4	4	5	4	4	3	3	5	6	6	5	4	4	4	4	4	5	4	4	3	4	4	4	6
11-Nov	3	3	3	3	3	3	3	2	3	2	2	2	3	2	2	2	1	2	1	2	1	1	1	1	3
12-Nov	1	1	1	1	2	2	2	2	1	1	2	2	2	2	2	2	1	1	1	1	1	1	1	1	2
13-Nov	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	1	2	3	2	1	2	2	3
14-Nov	4	3	3	2	3	3	3	2	3	3	3	3	4	3	3	3	2	2	2	2	1	1	2	1	4
15-Nov	1	2	2	1	2	3	3	3	3	3	3	2	2	2	3	4	5	6	6	6	7	6	5	4	7
16-Nov	4	4	5	8	4	4	4	4	3	4	4	4	4	3	2	2	2	1	1	1	1	2	1	1	8
17-Nov	1	1	1	1	1	1	2	2	2	2	2	2	1	2	2	1	2	1	1	2	2	2	1	3	3
18-Nov	5	4	5	6	6	4	3	3	3	3	3	4	4	5	4	4	4	4	3	3	2	3	3	2	6
19-Nov	2	2	2	2	2	2	2	2	1	2	2	2	3	2	3	2	1	1	2	1	2	2	2	2	3
20-Nov	2	2	2	2	2	2	2	1	1	1	2	1	2	2	2	1	2	1	1	1	2	2	2	2	2
21-Nov	2	3	2	3	3	3	3	3	4	3	3	4	3	2	2	2	3	3	2	2	2	1	2	2	4
22-Nov	2	3	2	2	2	2	2	2	2	2	2	2	2	3	3	2	2	2	3	3	2	2	2	2	3
23-Nov	2	2	2	1	1	1	1	1	1	2	2	1	2	2	2	1	0	1	1	1	1	1	1	1	2
24-Nov	3	3	3	3	3	3	2	2	2	3	2	2	1	1	1	1	1	2	2	2	2	2	2	2	3
25-Nov	2	2	1	1	1	2	2	2	2	2	2	2	2	2	2	1	2	1	1	2	1	1	1	1	2
26-Nov	1	2	1	1	1	1	2	2	1	1	1	1	1	1	1	2	2	1	3	3	4	4	3	5	5
27-Nov	4	6	4	3	3	3	2	2	2	2	3	3	1	2	1	1	1	1	1	1	2	2	2	2	6
28-Nov	2	2	2	2	2	2	2	3	3	2	3	3	3	3	3	3	3	3	2	1	2	1	1	1	3
29-Nov	1	1	1	2	2	1	1	2	2	2	2	2	1	2	2	3	4	4	6	6	5	5	5	5	6
30-Nov	5	5	4	4	4	4	3	2	2	2	2	2	2	3	3	3	3	2	2	2	2	2	1	1	5
																	Diurnal Maximum								



WBEA
Hourly Averages

Wind Speed (WS) - km/h
Millennium - November 2014





WBEA
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Millennium - November 2014

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	211	29.31	29.31
6 - 11	329	45.69	75.00
12 - 19	170	23.61	98.61
20 - 28	10	1.39	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



WBEA
Frequency Distribution

Wind Speed (WS) - km/h
Millennium - November 2014

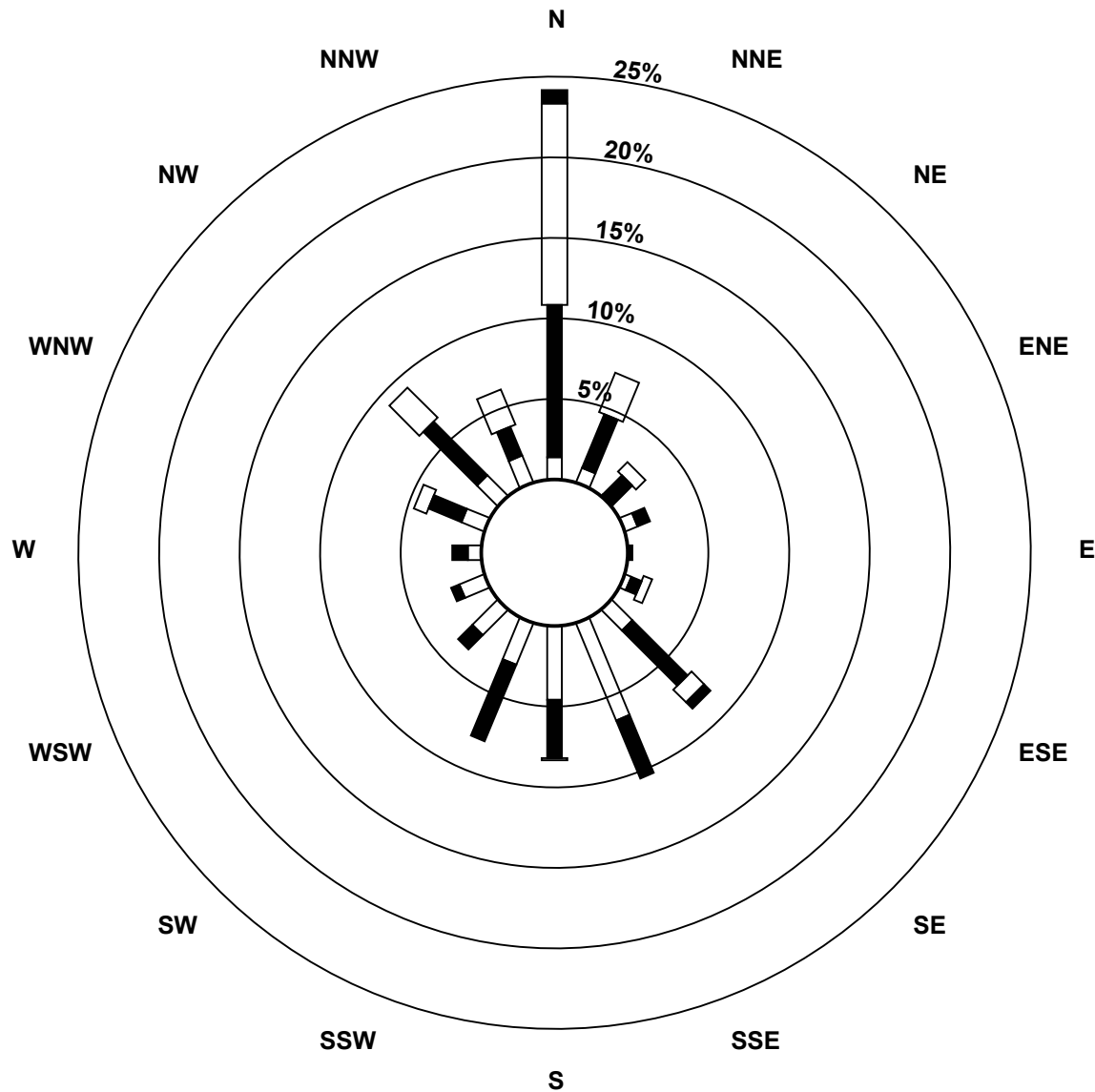
Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	10	7	1	6	0	3	13	47	33	20	16	12	6	11	13	13	211
6 - 11	68	26	12	6	2	5	35	28	26	37	9	4	7	16	34	14	329
12 - 19	90	19	6	0	0	4	8	0	1	0	0	0	0	6	19	17	170
20 - 28	6	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	10
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	174	52	19	12	2	12	60	75	60	57	25	16	13	33	66	44	720

Total Number of Valid Hours: 720

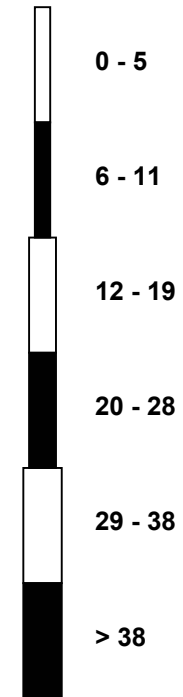
Total Number of Hours: 720

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

**Wind Speed (WS) - km/h
Millennium (AMS 12)**



Classes (km/h)



Total Number of Valid Hours: 720



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Millennium - November 2014

Direction of Maximum Speed: 5 deg on Nov 15 18:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 345.4 deg on Nov 7	Hours of Data: 720
Direction of Minimum Speed: 258 deg on Nov 9 07:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 0.4 deg on Nov 26	Percent Operational Time: 100.0
Monthly Average Direction: 296.8 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	215	210	222	202	188	174	178	178	178	191	195	203	225	239	238	220	216	198	196	214	204	151	150	170	202.2
2-Nov	189	155	146	158	149	158	142	130	139	154	162	157	190	206	168	140	141	131	143	139	132	140	138	156	148.2
3-Nov	149	145	159	162	144	173	189	182	170	228	251	260	292	342	3	3	6	10	13	355	21	19	55	57	23.7
4-Nov	61	133	135	155	168	151	120	116	119	122	118	121	119	130	125	121	132	126	130	129	130	139	146	166	128.5
5-Nov	216	259	276	284	288	283	282	280	283	284	289	282	285	273	297	285	241	224	213	202	203	178	154	156	264.3
6-Nov	144	143	138	127	131	135	132	137	139	139	139	137	135	133	134	141	144	142	143	278	304	307	315	331	137.5
7-Nov	340	319	322	323	326	327	350	353	339	351	348	354	344	347	348	349	355	351	348	351	347	355	360	21	345.4
8-Nov	14	11	3	0	310	320	279	313	312	321	316	347	354	356	307	318	334	2	29	33	16	10	353	307	349.8
9-Nov	352	352	305	291	232	229	258	285	226	246	359	359	4	11	3	10	9	8	13	9	10	21	15	1	0.2
10-Nov	0	357	352	344	333	338	324	320	356	358	355	357	4	3	1	9	7	4	5	6	4	2	4	0	357.1
11-Nov	357	356	352	354	2	20	23	33	30	48	34	25	2	300	301	315	21	65	75	75	159	191	215	217	12.8
12-Nov	217	216	211	211	205	206	200	212	213	191	176	176	170	154	142	143	161	159	153	151	159	173	163	159	181.6
13-Nov	150	162	151	146	156	155	150	162	166	161	161	157	152	131	135	138	127	52	29	31	349	356	360	9	124.7
14-Nov	354	353	357	357	352	4	4	2	357	358	0	6	7	356	352	359	316	260	246	258	255	242	239	192	350.3
15-Nov	199	199	195	198	202	194	189	186	184	187	180	189	155	293	325	356	8	5	354	352	345	347	324	318	314.2
16-Nov	321	328	350	354	338	340	339	331	318	321	320	330	333	345	315	0	32	8	288	275	305	240	212	215	329.7
17-Nov	213	203	190	172	163	152	148	151	161	164	201	194	207	200	201	187	203	222	311	351	320	316	298	16	198.1
18-Nov	11	7	2	358	342	339	323	312	310	319	295	310	310	317	319	321	318	318	319	319	301	304	311	318	330.2
19-Nov	321	312	291	304	307	298	299	294	220	225	218	198	201	194	186	176	147	150	150	166	166	144	149	160	213.8
20-Nov	168	158	149	143	148	154	155	182	180	178	195	193	188	190	192	183	196	193	17	354	3	10	355	353	164.9
21-Nov	7	12	12	10	4	15	2	6	356	353	4	353	325	7	30	30	37	35	46	43	45	48	41	44	17.3
22-Nov	47	56	61	55	53	66	67	66	53	37	27	19	10	12	30	25	19	27	8	10	11	10	3	3	29.6
23-Nov	359	352	3	318	255	250	179	155	168	182	181	178	173	145	151	168	154	139	135	104	143	236	340	263	170.0
24-Nov	347	7	10	5	2	355	1	19	14	15	358	14	16	335	357	344	15	71	108	107	93	95	78	55	20.6
25-Nov	69	54	26	14	30	355	0	358	353	3	8	354	347	342	342	330	333	358	353	29	114	126	185	169	10.3
26-Nov	146	157	153	191	170	191	173	206	199	188	186	188	207	196	218	205	228	339	353	355	8	10	5	0	297.7
27-Nov	357	7	8	10	2	348	355	6	7	12	17	10	322	3	346	334	347	5	340	347	3	17	17	3	4.2
28-Nov	4	7	13	13	12	8	5	7	9	7	6	9	5	2	359	1	358	356	356	360	6	321	306	212	3.7
29-Nov	208	205	207	196	187	150	176	200	203	193	196	187	212	283	263	282	289	312	317	319	319	315	313	318	272.6
30-Nov	307	307	302	297	287	287	276	266	245	247	234	187	186	183	174	173	183	152	146	142	146	151	158	158	229.3

356.8 356.5 357.0 354.0 342.9 342.3 0.2 352.5 340.3 349.0 347.2 355.8 339.7 339.1 346.5 2.1 4.4 13.9 11.6 9.1 3.3 5.2 353.3 356.5
 Diurnal Average

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



Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

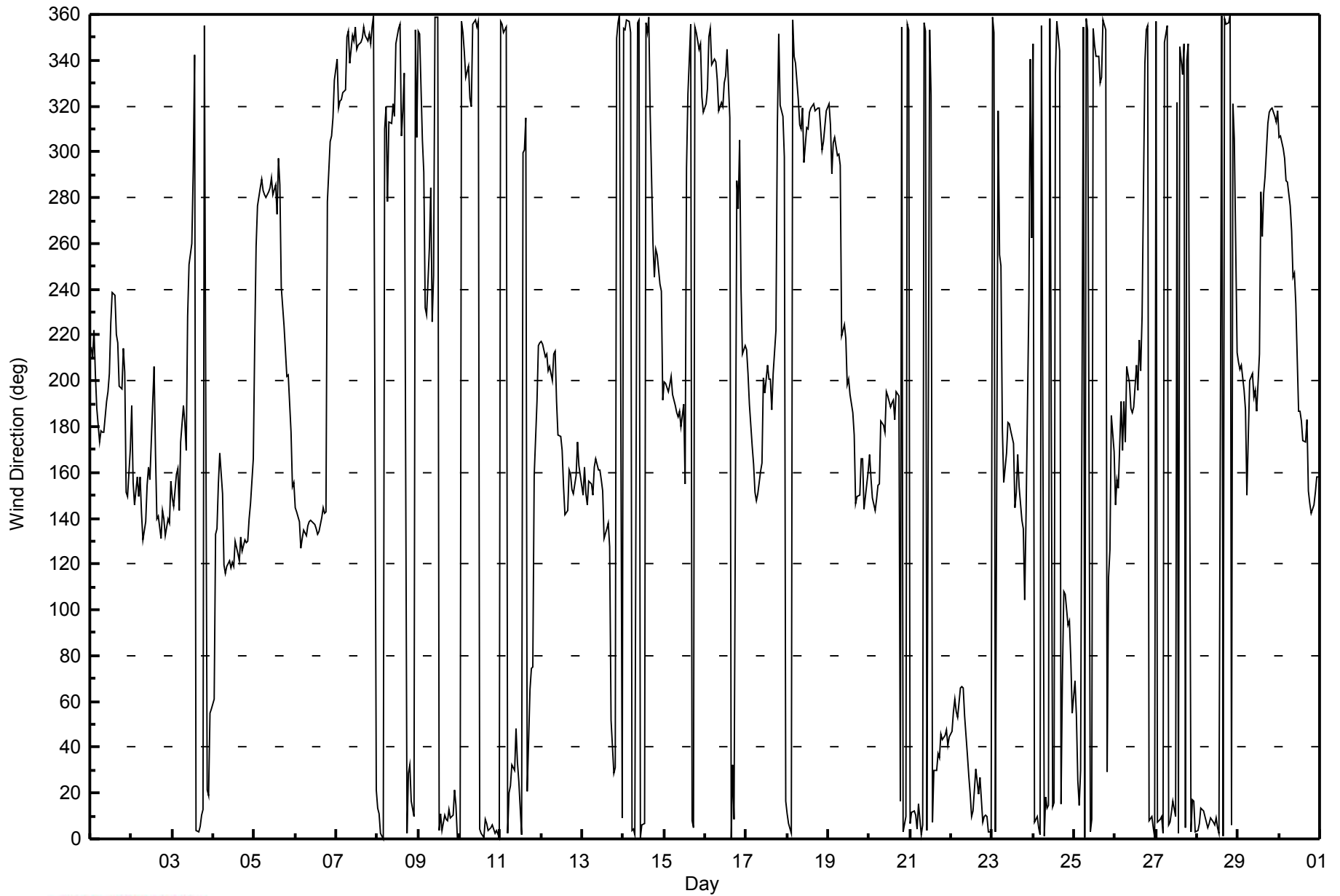
Wind Direction (WD) - deg
Millennium - November 2014

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0																			Hours in Service: 720						
Maximum Value: 89 deg on Nov 11 17:00																			Hours of Data: 720						
Minimum Value: 7 deg on Nov 12 21:00																			Hours of Missing Data: 0						
Percentiles: P ₁ = 10 P ₁₀ = 13 Q ₁ = 16 Median = 19 Q ₃ = 27 P ₉₀ = 32 P ₉₉ = 75																			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-Nov	20	17	24	31	16	47	35	30	23	20	26	33	34	30	30	18	29	13	15	21	21	21	13	19	47
2-Nov	14	12	11	14	22	12	13	14	14	27	16	18	19	16	24	14	13	16	16	16	19	17	15	22	27
3-Nov	17	16	21	28	20	24	18	20	22	40	29	27	25	34	17	16	20	16	16	25	23	40	28	67	67
4-Nov	44	33	26	24	34	27	20	25	21	19	19	18	18	19	18	17	18	17	17	18	16	16	16	32	44
5-Nov	23	25	24	28	27	28	24	24	26	24	25	28	32	28	31	32	32	17	42	23	21	19	19	18	42
6-Nov	17	16	16	16	17	17	18	17	16	16	17	17	16	22	18	21	12	18	17	80	27	28	31	33	80
7-Nov	31	31	31	32	31	33	30	24	30	25	29	21	30	28	28	26	21	23	25	24	28	23	19	15	33
8-Nov	14	14	18	18	31	38	33	28	30	32	31	32	26	22	34	32	28	17	16	13	14	14	24	39	39
9-Nov	29	28	48	51	24	61	81	62	20	38	25	27	22	22	19	17	19	20	16	14	14	16	19	19	81
10-Nov	18	20	22	27	31	30	31	28	23	19	25	21	16	19	19	17	16	18	17	17	16	17	15	18	31
11-Nov	25	21	24	21	23	19	17	16	19	11	18	23	23	42	47	45	89	78	29	54	21	10	12	16	89
12-Nov	17	13	14	12	20	23	21	18	18	18	15	15	21	25	16	14	14	12	9	8	7	11	12	13	25
13-Nov	12	10	10	11	13	13	12	14	14	17	19	22	23	17	14	10	24	18	11	17	80	21	16	16	80
14-Nov	33	27	17	19	24	15	15	16	19	21	18	17	19	26	32	26	37	33	40	21	19	23	22	17	40
15-Nov	13	15	18	17	15	18	18	19	18	18	17	19	43	44	32	21	18	16	22	24	31	28	31	26	44
16-Nov	29	31	26	27	30	31	29	32	30	31	30	33	33	31	36	21	33	28	23	25	18	37	10	12	37
17-Nov	12	15	17	20	13	13	15	14	15	20	21	18	16	18	19	16	22	17	20	24	28	31	25	21	31
18-Nov	12	14	18	22	31	29	35	27	27	28	28	32	30	31	30	32	28	29	31	31	30	28	26	30	35
19-Nov	32	37	25	29	28	27	27	27	35	29	26	27	23	22	19	14	10	15	18	16	16	17	18	20	37
20-Nov	21	21	16	15	15	19	20	24	21	16	18	19	19	18	21	46	56	27	52	21	15	10	17	19	56
21-Nov	14	12	13	12	15	13	16	15	21	24	16	28	30	24	16	13	12	12	12	11	14	12	10	10	30
22-Nov	10	14	16	13	12	20	19	20	12	13	12	15	11	11	16	17	14	11	12	11	11	11	13	13	20
23-Nov	15	17	17	34	50	25	59	16	16	20	19	21	21	19	19	12	10	11	18	38	28	65	87	38	87
24-Nov	26	14	13	16	16	19	19	14	13	17	23	14	24	33	26	35	19	44	31	28	31	29	22	15	44
25-Nov	17	16	17	13	19	17	15	22	19	15	12	23	27	32	35	41	24	9	39	39	31	13	27	14	41
26-Nov	14	21	13	15	10	21	28	15	10	23	20	37	22	19	22	20	76	38	20	20	16	14	15	17	76
27-Nov	21	15	14	13	17	30	20	13	14	13	13	14	33	24	26	20	18	11	30	27	14	13	13	14	33
28-Nov	14	12	12	11	11	13	15	14	13	15	14	12	14	17	17	16	18	18	17	18	24	19	21	24	24
29-Nov	11	10	10	19	16	21	15	14	13	17	23	38	50	43	26	34	29	28	31	28	28	29	29	30	50
30-Nov	28	27	25	27	25	24	20	26	23	24	28	18	18	17	17	20	17	16	12	13	15	14	14	14	28
Diurnal Maximum																									
44 37 48 51 50 61 81 62 35 40 31 38 50 44 47 46 89 78 52 80 80 65 87 67																									



WBEA
Hourly Averages

Wind Direction (WD) - deg
Millennium - November 2014



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Wood Buffalo Environmental Association

SO₂ Calibration Report

Station Information

Calibration Date	November 18, 2014	Previous Calibration	October 23, 2014
Station Name	Millenium Mine	Station Number	AMS 12
Reason:	Routine		
Start Time (MST)	10:35	End Time (MST)	15:05
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	5/29/2014
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	788	788
Calculated slope	1.017695	1.013713	Chamber temp.	45.0	45.0
Calculated intercept	-2.464779	-0.571233	Pressure (mmHg)	712.5	712.5
Analyzer Background	8.4	8.4	Flow (lpm)	403.000	402.000
	1.199	1.199	Intensity	92	92

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	0.7	NA
as found span	6000	94.1	801.4	788.4	1.017
calibrator zero	6000	0.0	0.0	0.1	NA
high point	6000	94.1	801.4	790.8	1.013
second point	6000	47.1	401.1	396.8	1.011
third point	6000	23.5	200.1	198.3	1.009
calibrator zero	6000	0.0	0.0	0.5	NA
as left zero	6000	0.0	0.0	0.5	NA
as left span	6000	94.1	801.4	788.2	1.017
Average Correction Factor					1.011

Corrected As found	787.7	Previous response	789.9	% change	0.3%
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Notes:

Filter changed pump changed out NO adjustments made

Calibration Performed By:

Melissa Lemay



Wood Buffalo Environmental Association

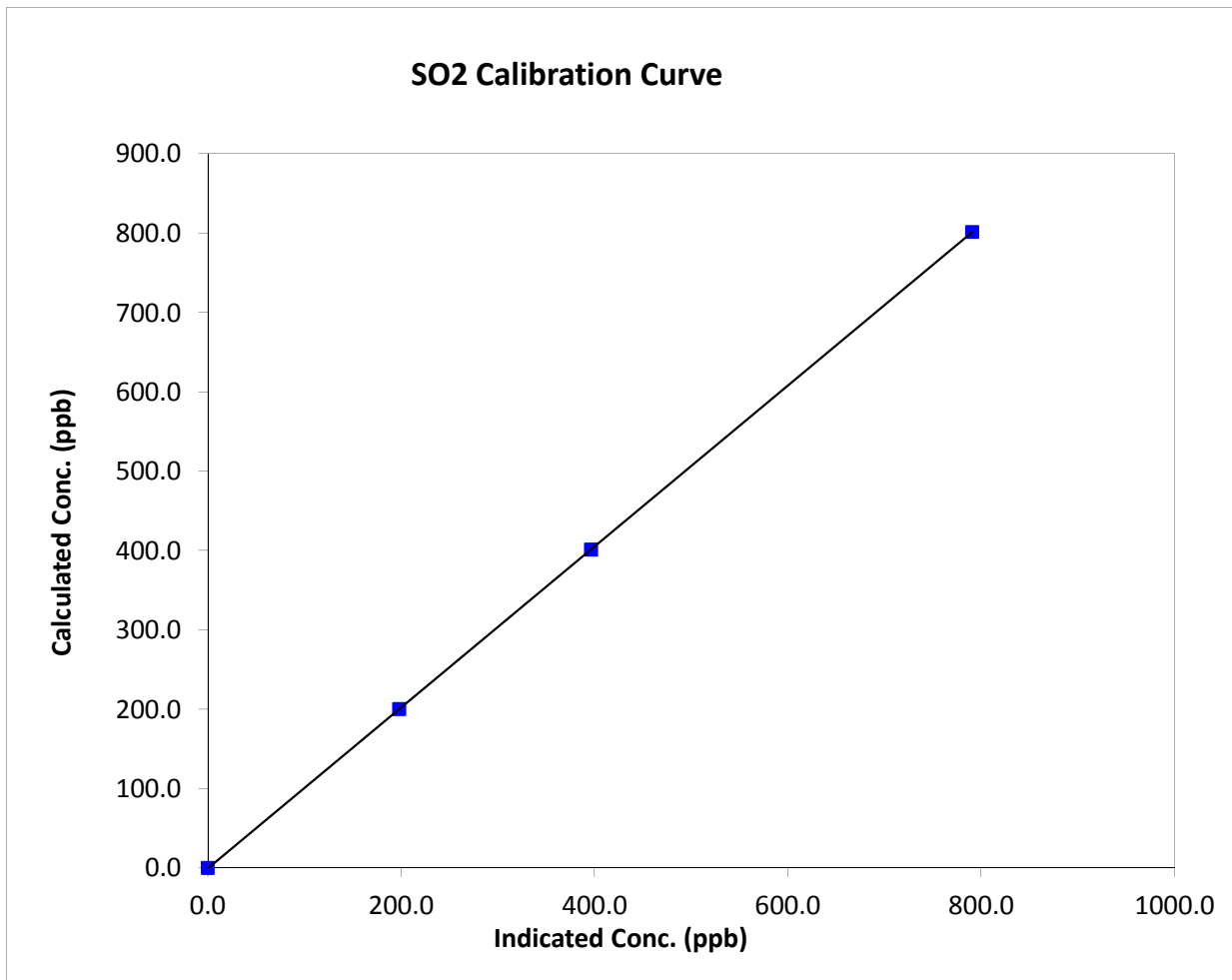
SO₂ Calibration Summary

Station Information

Calibration Date	November 18, 2014	Previous Calibration	October 23, 2014
Station Name	Millenium Mine	Station Number	AMS 12
Start Time (MST)	10:35	End Time (MST)	15:05
Analyzer make	43i Thermo	Analyzer serial #	1118148499

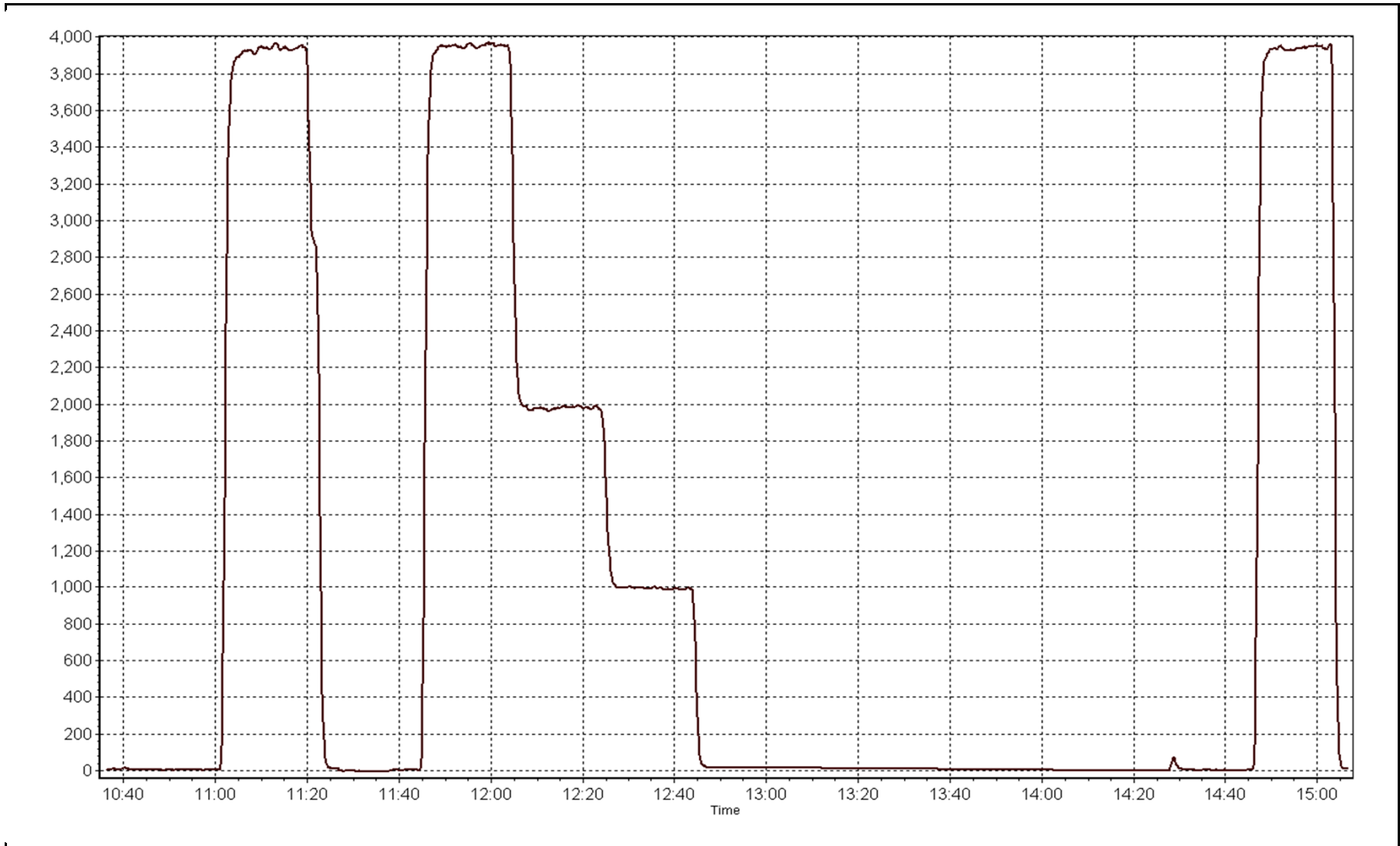
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	N/A	Correlation Coefficient	0.999998
801.4	790.8	1.0134		
401.1	396.8	1.0109	Slope	1.013713
200.1	198.3	1.0093		
			Intercept	-0.571233



SO2 Calibration Plot

Date: November 18, 2014





Wood Buffalo Environmental Association

TRS Calibration Report

Station Information

Calibration Date	November 17, 2014	Previous Calibration	October 23, 2014
Station Name	Millenium Mine	Station Number	Ams 12
Reason:	Routine		
Start Time (MST)	9:50	End Time (MST)	12:10
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	5/29/2014
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	886	886
Calculated slope	1.000178	0.992641	Chamber temp.	43.9	43.9
Calculated intercept	0.117832	0.046611	Pressure	691.3	691.3
Analyzer Background	18.9	18.9	Flow	606.000	606.000
Analyzer Coefficient	0.640	0.64	Intensity	46600	46600
			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	-0.4	NA
as found span	5000	38.5	80.1	80.3	0.997
SO2 scrubber check	6000	47.1	401.1	0.7	NA
calibrator zero	5000	0.0	0.0	-0.4	NA
high point	5000	38.5	80.1	80.3	0.997
second point	5000	19.2	39.9	40.8	0.980
third point	5000	9.6	20.0	20.2	0.989
calibrator zero	6000	0.0	0.0	0.0	NA
as left zero	6000	0.0	0.0	0.0	NA
as left span	5000	38.5	80.1	80.1	0.999
Average Correction Factor					0.989

Corrected As found	80.7	Previous response	79.9	% change	-1.0%
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Notes:

Filter changed out, No maintenance or adjustments made

Calibration Performed By:

Melissa Lemay



Wood Buffalo Environmental Association

TRS Calibration Summary

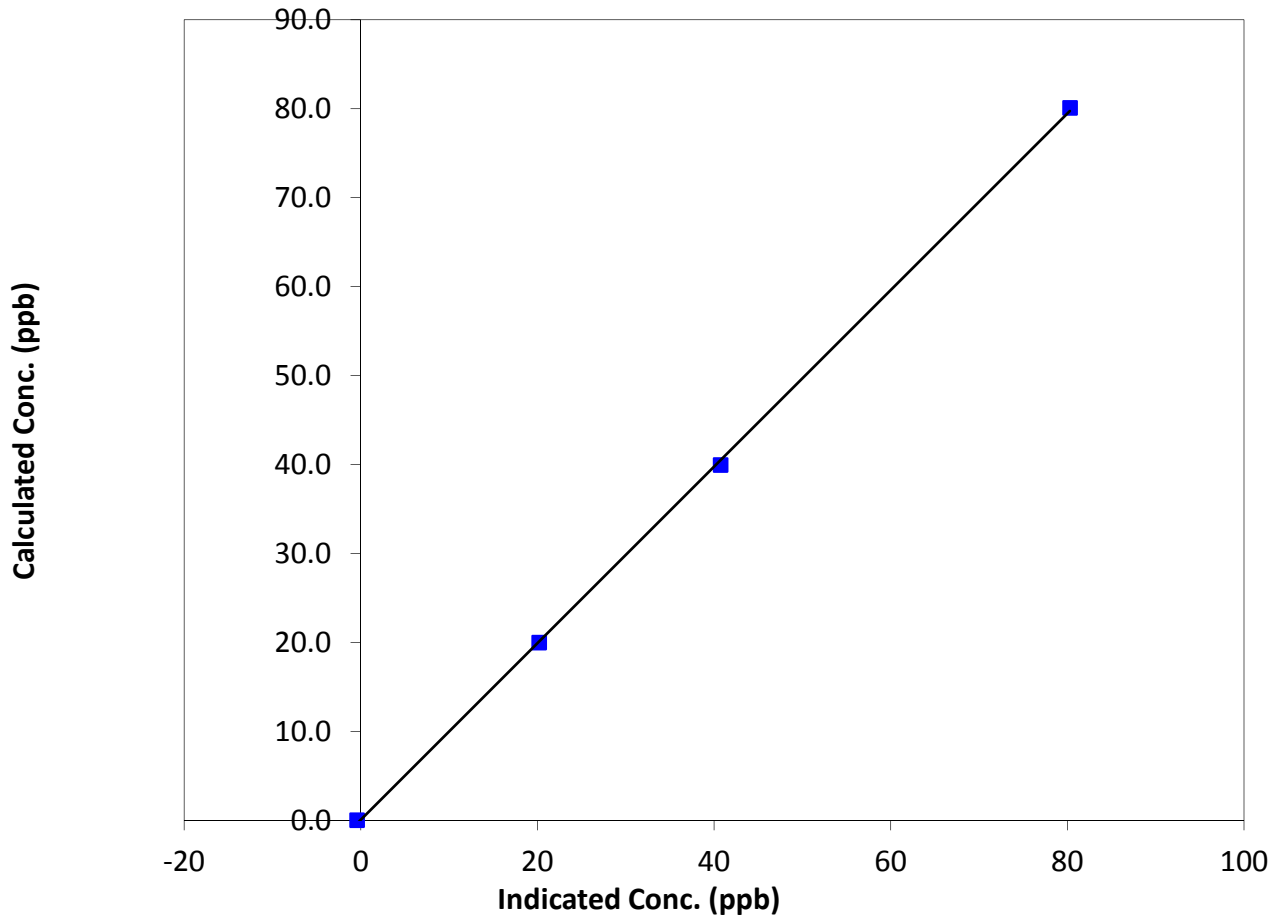
Station Information

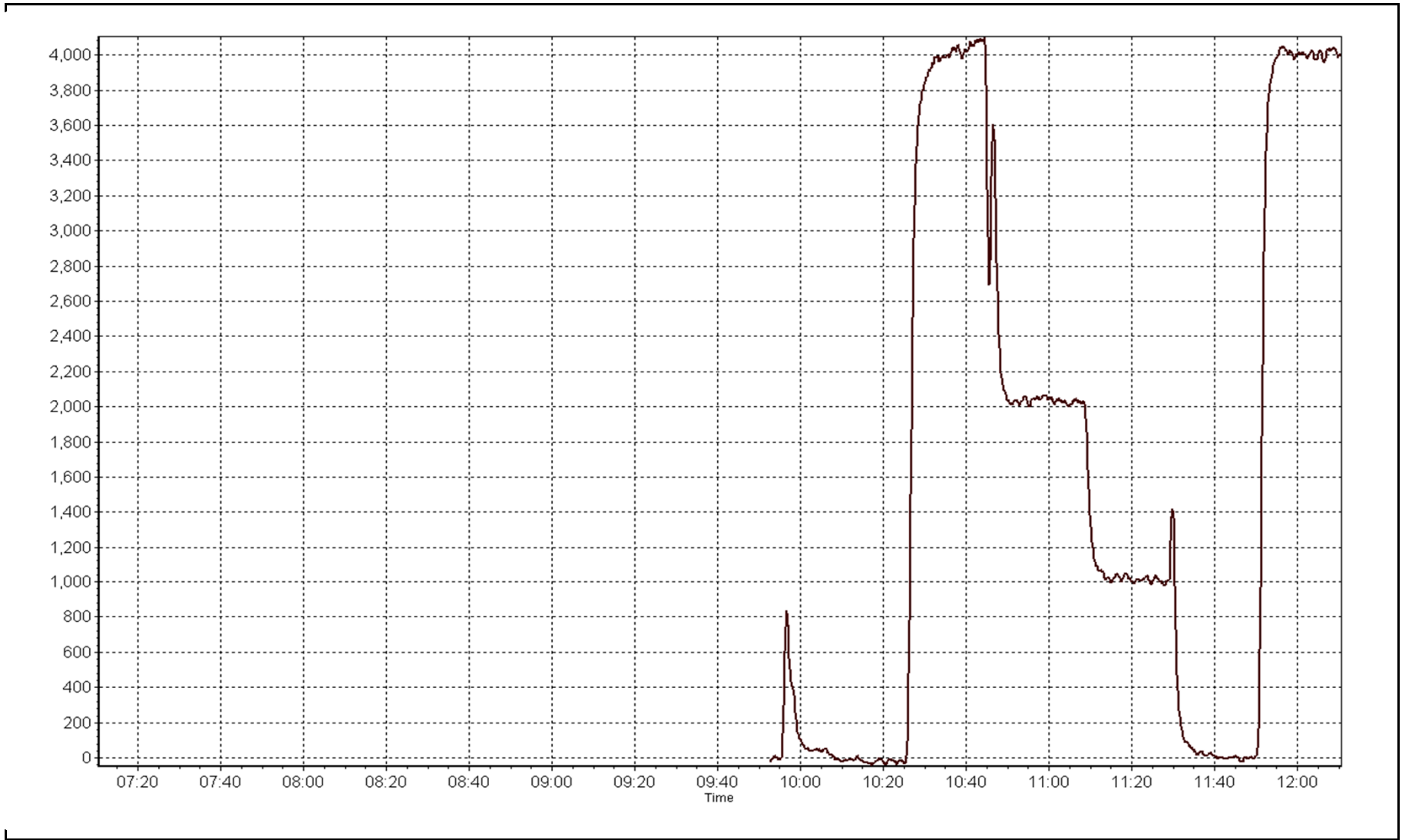
Calibration Date	November 17, 2014	Previous Calibration	October 23, 2014
Station Name	Millenium Mine	Station Number	Ams 12
Start Time (MST)	9:50	End Time (MST)	12:10
Analyzer make	TEI 43C	Analyzer serial #	0509110887

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.4	N/A	Correlation Coefficient	0.999832
80.1	80.3	0.9973		
39.9	40.8	0.9798	Slope	0.992641
20.0	20.2	0.9885		
			Intercept	0.046611

TRS Calibration Curve







Wood Buffalo Environmental Association

THC Calibration Report

Station Information

Calibration Date	Tuesday, November 18, 2014	Previous Calibration	Thursday, October 23, 2014
Station Name	Millennium	Station Number	AMS 12
Reason:	Routine		
Start Time (MST)	10:35	End Time (MST)	15:05
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	11.8	11.8
Analyzer Range (mv)	5000	5000	Air or Bypass press	42.9	42.9
Calculated slope	1.011568	0.991547	Fuel Pressure	19.3	19.3
Calculated intercept	0.005004	0.052917		3.87	3.87
				2.23	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	6000	0.0	0.00	-0.05	N/A
as found span	6000	94.1	16.93	17.03	0.994
calibrator zero	6000	0.0	0.00	-0.05	N/A
high point	6000	94.1	16.93	17.03	0.994
second point	6000	47.1	8.47	8.46	1.002
third point	6000	23.5	4.23	4.23	0.999
calibrator zero	6000	0.0	0.00	0.01	N/A
as left zero	6000	0.0	0.00	0.01	N/A
as left span	6000	94.1	16.93	17.07	0.992
Average Correction Factor					0.998

Corrected As found	17.08	Previous response	16.73	% change	-2.1%
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Notes:

Filter changed out, No adjustments made, NO maintenance done,

Calibration Performed By:

Melissa Lemay



Wood Buffalo Environmental Association

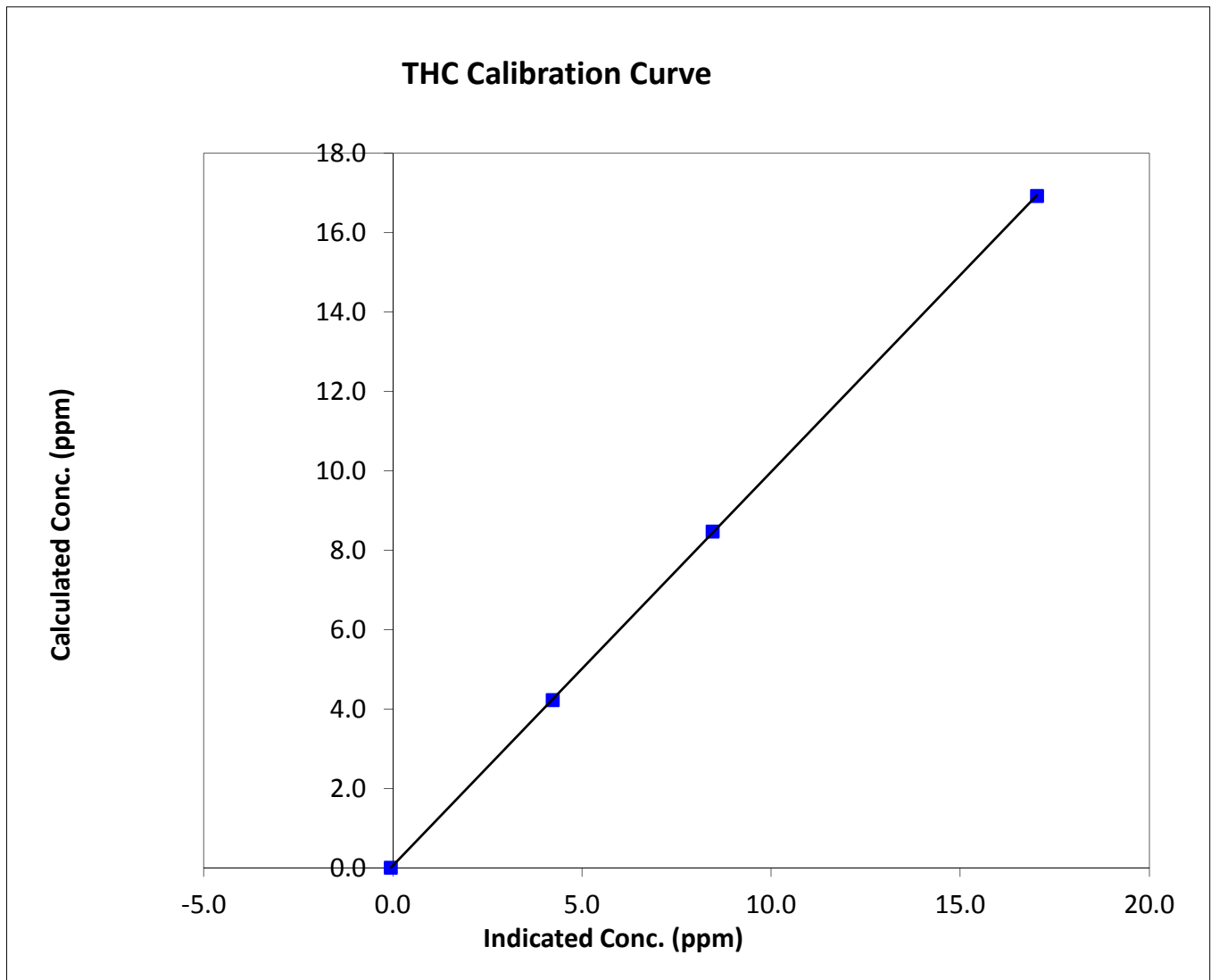
THC Calibration Summary

Station Information

Calibration Date	November 18, 2014	Previous Calibration	October 23, 2014
Station Name	Millennium	Station Number	AMS 12
Start Time (MST)	10:35	End Time (MST)	15:05
Analyzer make	Thermo 51i-LT	Analyzer serial #	1317958296

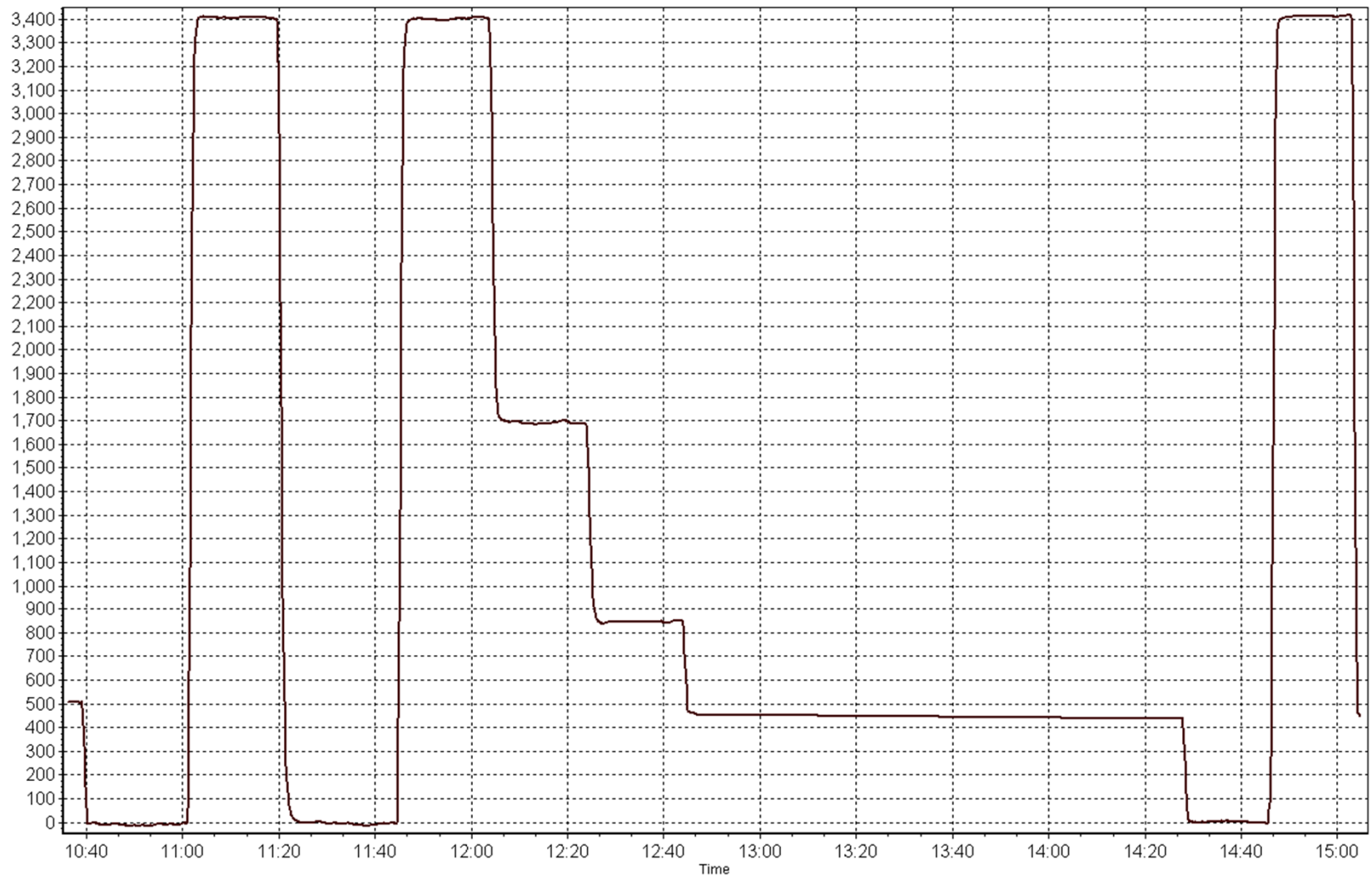
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	-0.05	N/A	Correlation Coefficient	0.999988
16.93	17.03	0.9939		
8.47	8.46	1.0020	Slope	0.991547
4.23	4.23	0.9993		
			Intercept	0.052917



THC Calibration Plot

Date: November 18, 2014





Wood Buffalo Environmental Association

NO_x-NO-NO₂ Calibration Report

Station Information

Calibration Date	November 18, 2014	Previous Calibration	October 23, 2014
Station Name	Millenium Mine	Station Number	AMS 12
Reason:	<input type="text" value="Routine"/>		
Start Time (MST)	10:35	End Time (MST)	15:05
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	0.989542	0.990127	1.013309
	Data Offset	-0.108311	-0.349928	-0.507519
After	Data Slope	1.005354	1.006099	1.010982
	Data Offset	1.159120	0.686895	0.851143
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	1.148	ppb	1.148	ppb
NOX coefficient	1.141	ppb	1.141	ppb
NO2 coefficient		ppb		ppb
NO bkgrnd	0.5		0.5	
NOX bkgrnd	1.6		1.6	
Nt coefficient				
Chamber Temp	50.0	Deg C	50.0	Deg C
Moly Temp	316.3	Deg C	316.3	Deg C
PMT Temp	6.8	Deg C	6.8	Deg C
O3 flow	88.0	ccm	88.0	ccm
R Cell Press	2.9	mmHg	2.9	mmHg
Sample Flow	508.000	ccm	508.000	ccm

Notes:

Filter changed, No maintenance or adjustments made



Wood Buffalo Environmental Association

NO_x-NO-NO₂ Calibration Report

Station Information

Calibration Date:

November 18, 2014

Station Number:

AMS 12

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NO _x conc (ppb)	Calculated NO conc (ppb)	Calculated NO ₂ conc (ppb)	Indicated NO _x conc (ppb)	Indicated NO conc (ppb)	Indicated NO ₂ conc (ppb)	NO _x Correction factor	NO Correction factor
as found zero	6000	0.0	0.0	0.0	0.0	-0.9	-0.5	-0.2	N/A	N/A
as found span	6000	94.1	799.9	799.9	0.0	795.2	795.0	0.3	1.0058	1.0061
calibrator zero	6000	0.0	0.0	0.0	0.0	-0.9	-0.5	-0.2	N/A	N/A
high point	6000	94.1	799.9	799.9	0.0	795.2	795.0	0.3	1.0058	1.0061
second point	6000	47.1	400.4	400.4	0.0	395.8	396.2	0.4	1.0115	1.0105
third point	6000	23.5	199.8	199.8	0.0	197.0	197.2	0.7	1.0140	1.0129
calibrator zero	6000	0.0	0.0	0.0	0.0	-0.4	0.1	-0.1	N/A	N/A
as left zero	6000	0.0	0.0	0.0	0.0	-0.4	0.1	-0.1	N/A	N/A
as left span	6000	94.1	799.9	488.4	311.5	790.4	499.8	290.6	1.0120	0.9772
Average Correction Factor									1.0104	1.0098

Corrected As found

NO_x= 796.1

NO= 795.5

Percent Change

NO_x= 1.5%

NO= 1.6%

Previous Response

NO_x= 808.4

NO= 808.2

GPT Calibration Data

Dilution Flow

6000

ccm

Source Gas Flow

94.10

ccm

O ₃ Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO ₂ conc (ppb)	Indicated NO _x conc (ppb)	Indicated NO conc (ppb)	Indicated NO ₂ conc (ppb)	NO _x Correction factor	NO Correction factor	NO ₂ Correction factor	Converter Efficiency
Cal zero			0.0			-0.2			N/A	
1st NO ₂ (300)	N/A	488.4	307.2	792.2	488.4	303.4	0.9941	1.0000	1.0125	98.8%
2nd NO ₂ (200)	N/A	592.6	203.0	791.6	592.6	199.8	0.9948	1.0000	1.0160	98.4%
3rd NO ₂ (100)	N/A	693.4	102.2	792.6	693.4	99.4	0.9936	1.0000	1.0282	97.3%
4th NO ₂ (0)	795.6	N/A	-1.0	794.6	795.6	-0.7	0.9911	1.0000	N/A	N/A
Average Correction Factor							0.9934	1.0000	1.0189	98.1%

Calibration Performed By:

Melissa Lemay



Wood Buffalo Environmental Association

NO_x Calibration Summary

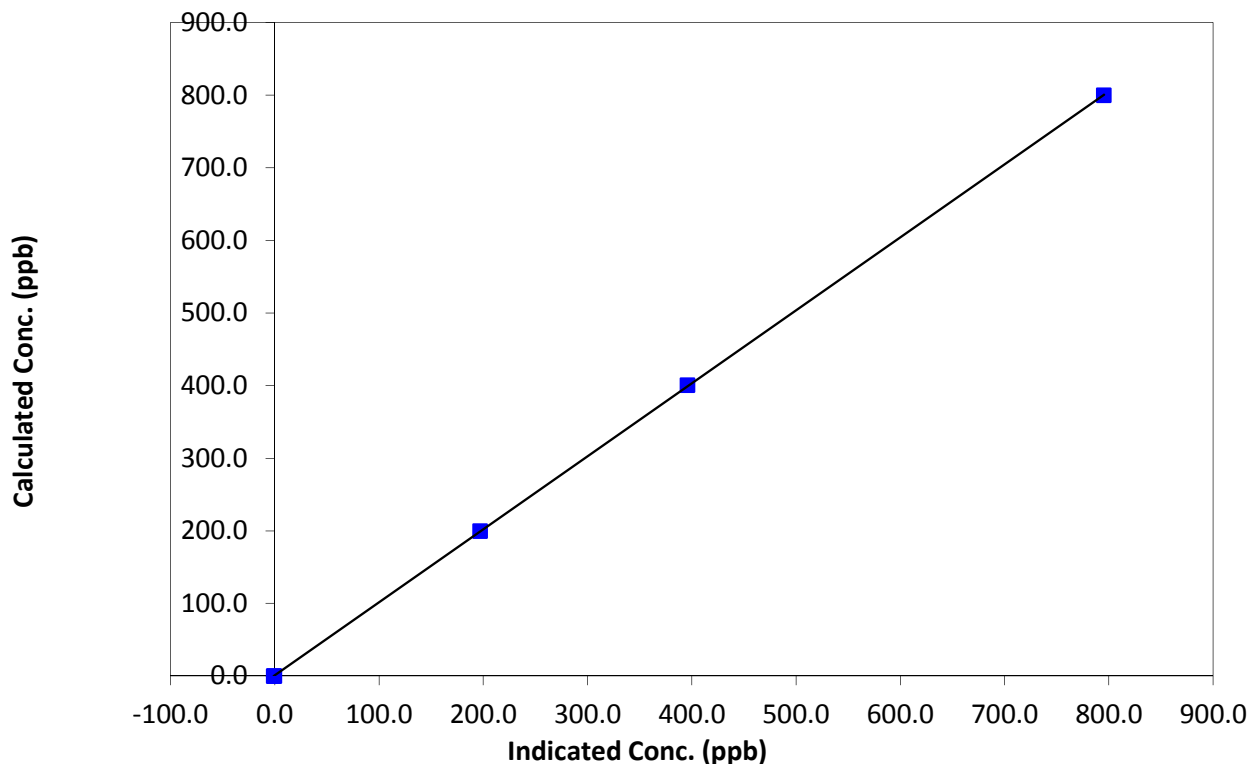
Station Information

Calibration Date	November 18, 2014	Previous Calibration	October 23, 2014
Station Name	Millenium Mine	Station Number	AMS 12
Start Time (MST)	10:35	End Time (MST)	15:05
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	-0.9	N/A	Correlation Coefficient	0.999993
799.9	795.2	1.0058		
400.4	395.8	1.0115	Slope	1.005354
199.8	197.0	1.0140		
0.0	-0.4	0.0000	Intercept	1.159120

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

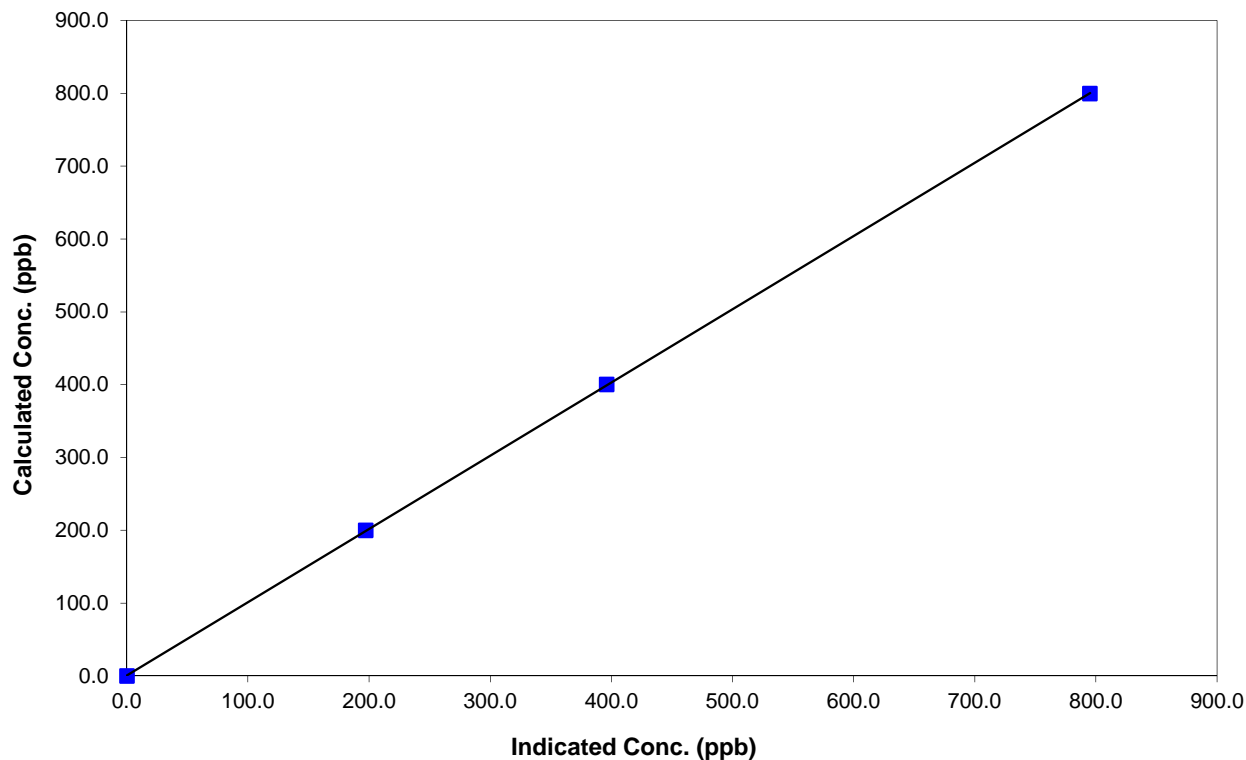
Station Information

Calibration Date	November 18, 2014	Previous Calibration	October 23, 2014
Station Name	Millenium Mine	Station Number	AMS 12
Start Time (MST)	10:35	End Time (MST)	15:05
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	0.999994
799.9	795.0	1.0061		
400.4	396.2	1.0105	Slope	1.006099
199.8	197.2	1.0129		
0.0	0.1	0.0000	Intercept	0.686895

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

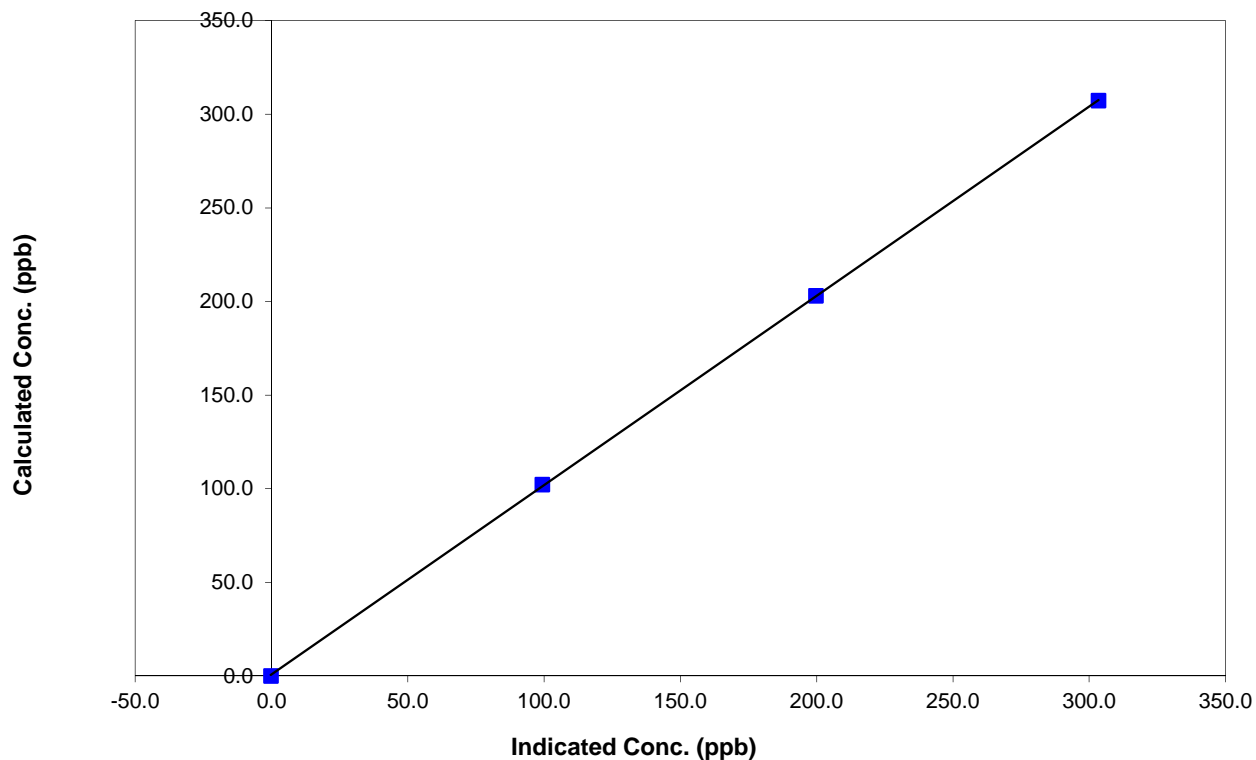
Station Information

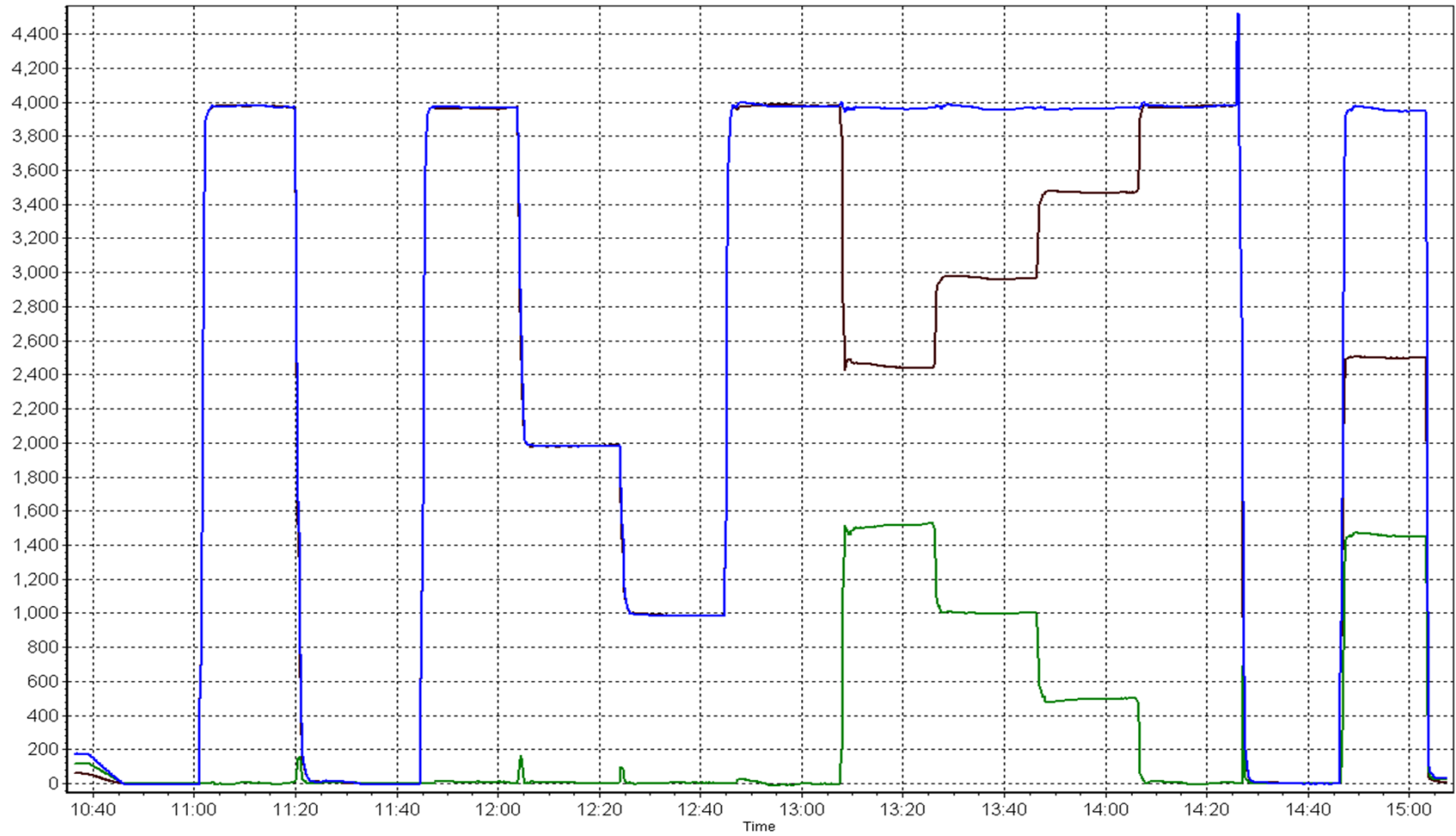
Calibration Date	November 18, 2014	Previous Calibration	October 23, 2014
Station Number	Millenium Mine	Station Number	AMS 12
Start Time (MST)	10:35	End Time (MST)	15:05
Analyzer make	API T200	Analyzer serial #	723

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	N/A	Correlation Coefficient	0.999975
307.2	303.4	1.0125		
203.0	199.8	1.0160	Slope	1.010982
102.2	99.4	1.0282		
			Intercept	0.851143

NO₂ Calibration Curve





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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 13
FORT MCKAY SOUTH
NOVEMBER 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

December 30, 2014

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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT MCKAY SOUTH (AMS 13)
NOVEMBER 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	669	38	51	98.19	4	0	1	0
TRS(ppb) Average	686	34	34	100.00	1	0	1	0
THC(ppm) Average	683	37	37	100.00	4	-	2.6	-
O3(ppb) Average	686	34	34	100.00	37	0	28	-
NO2(ppb) Average	682	38	38	100.00	31	0	18	-
NO(ppb) Average	682	38	38	100.00	65	-	15	-
NOX(ppb) Average	682	38	38	100.00	89	-	31	-
PM2.5(ug/m3) Average	719	0	1	99.86	18.6	-	11.8	0
Temperature 2 m (C) Average	720	0	0	100.00	9.6	-	1.3	-
Relative Humidity (%) Average	720	0	0	100.00	99	-	-	-
Wind Speed 10 m (km/h) Average	719	0	1	99.86	13	-	-	-
Wind Direction 10 m (deg) Average	719	0	1	99.86	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT MCKAY SOUTH (AMS 13)
 NOVEMBER 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	669	0.7	0	-	0	0	0	1	1	1	4
TRS(ppb) Average	686	0.2	0	-	0	0	0	0	0	0	1
THC(ppm) Average	683	2.24	0.2	-	1.9	2	2.1	2.2	2.3	2.6	4
O3(ppb) Average	686	14.4	11	-	0	0	5	13	23	31	37
NO2(ppb) Average	682	7.5	6	-	0	1	2	6	12	17	31
NO(ppb) Average	682	3.2	7	-	0	0	0	0	2	12	65
NOX(ppb) Average	682	10.7	12	-	0	1	2	7	15	28	89
PM2.5(ug/m3) Average	719	4.17	3	-	0.4	1.7	2.3	3.1	5.3	8.1	18.6
Temperature 2 m (C) Average	720	-12.64	8.8	-	-33.7	-23.9	-19.6	-13.2	-5.8	-0.5	9.6
Relative Humidity (%) Average	720	80.3	9	-	49	69	76	81	85	93	99
Wind Speed 10 m (km/h) Average	719	4.3	3	-	0	2	2	4	6	8	13
Wind Direction 10 m (deg) Average	719	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION -FORT McKAY SOUTH (AMS 13)
NOVEMBER 2014

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	29 Nov 2014 08:00	29 Nov 2014 09:00	2	Intermittent unstable operation - excessive noise in signal
SO2	29 Nov 2014 14:00	29 Nov 2014 14:00	1	Intermittent unstable operation - excessive noise in signal
SO2	30 Nov 2014 01:00	30 Nov 2014 01:00	1	Intermittent unstable operation - excessive noise in signal
SO2	30 Nov 2014 03:00	30 Nov 2014 04:00	2	Intermittent unstable operation - excessive noise in signal
SO2	30 Nov 2014 09:00	30 Nov 2014 10:00	2	Intermittent unstable operation - excessive noise in signal
SO2	30 Nov 2014 12:00	30 Nov 2014 12:00	1	Intermittent unstable operation - excessive noise in signal
SO2	30 Nov 2014 14:00	30 Nov 2014 15:00	2	Intermittent unstable operation - excessive noise in signal
SO2	30 Nov 2014 17:00	30 Nov 2014 17:00	1	Intermittent unstable operation - excessive noise in signal
SO2	30 Nov 2014 23:00	30 Nov 2014 23:00	1	Intermittent unstable operation - excessive noise in signal
PM2.5	17 Nov 2014 13:00	17 Nov 2014 13:00	1	Maintenance - Flow and zero check, sample head cleaning
Wind Speed, Wind Direction	02 Nov 2014 11:00	02 Nov 2014 11:00	1	Flat line in sensor output signal -sensor frozen

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Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 4 ppb on Nov 6 08:00	Maximum Daily Average: 1.4 ppb on Nov 6		Hours of Data:	669
Minimum Value: 0 ppb on Nov 5 18:00	Minimum Daily Average: 0.3 ppb on Nov 5		Hours of Missing Data:	51
Maximum Diurnal Average: 1.1 ppb at hour 14	Minimum Diurnal Average: 0.6 ppb at hour 1		Hours of Calibration:	38
Monthly Average: 0.7 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 1 P ₉₀ = 1 P ₉₉ = 3		Percent Operational Time:	98.2

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-Nov	1	Z	0	0	1	1	1	1	1	1	1	1	0	0	0	1	1	0	1	1	1	1	1	1	0.6	1
2-Nov	1	Z	1	1	1	1	1	1	1	1	1	1	2	3	2	1	1	1	1	1	1	1	1	1	1.0	3
3-Nov	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	
4-Nov	0	Z	1	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0.8	3	
5-Nov	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	
6-Nov	0	Z	1	2	3	4	2	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.4	4	
7-Nov	1	Z	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.4	1	
8-Nov	0	Z	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0.5	1	
9-Nov	0	Z	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0.5	1	
10-Nov	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	1	
11-Nov	1	Z	1	1	0	1	1	1	1	1	1	2	2	1	1	1	1	1	1	1	1	1	1	0.8	2	
12-Nov	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.8	1	
13-Nov	1	Z	1	1	1	1	1	1	1	1	1	3	4	4	2	1	1	1	1	1	1	1	1	1.3	4	
14-Nov	1	Z	1	1	1	1	1	1	1	1	C	C	C	C	C	C	C	C	0	0	0	0	0	--	1	
15-Nov	0	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.2	1	
16-Nov	1	Z	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0.4	1	
17-Nov	0	Z	1	0	0	1	1	1	1	1	1	2	3	3	1	1	1	1	1	1	0	0	0	1.0	3	
18-Nov	0	Z	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1	
19-Nov	1	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	
20-Nov	1	Z	1	1	1	1	1	1	1	1	1	2	1	1	2	2	1	1	1	1	2	1	1	1.2	2	
21-Nov	1	Z	1	1	1	0	0	0	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	0.6	1	
22-Nov	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0.7	1	
23-Nov	1	Z	0	0	1	0	0	1	0	1	1	2	2	1	1	1	1	1	1	1	1	1	1	0.9	2	
24-Nov	0	Z	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1	1	1	1	1	0	1	0.5	1	
25-Nov	1	1	Z	1	1	1	1	1	1	1	1	0	1	0	1	0	0	0	0	0	0	1	0	0.5	1	
26-Nov	0	Z	1	1	1	1	1	1	1	1	2	2	2	1	2	1	1	1	1	1	1	1	1	1.0	2	
27-Nov	0	Z	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0.4	1	
28-Nov	1	Z	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	0	1	1	1	1	1	0.6	1	
29-Nov	1	Z	1	1	1	1	2	UO	UO	0	1	1	1	UO	2	3	1	1	1	1	1	2	1	1.1	3	
30-Nov	UO	Z	UO	UO	1	0	0	1	UO	UO	1	UO	1	UO	UO	1	UO	1	1	1	1	1	UO	--	1	

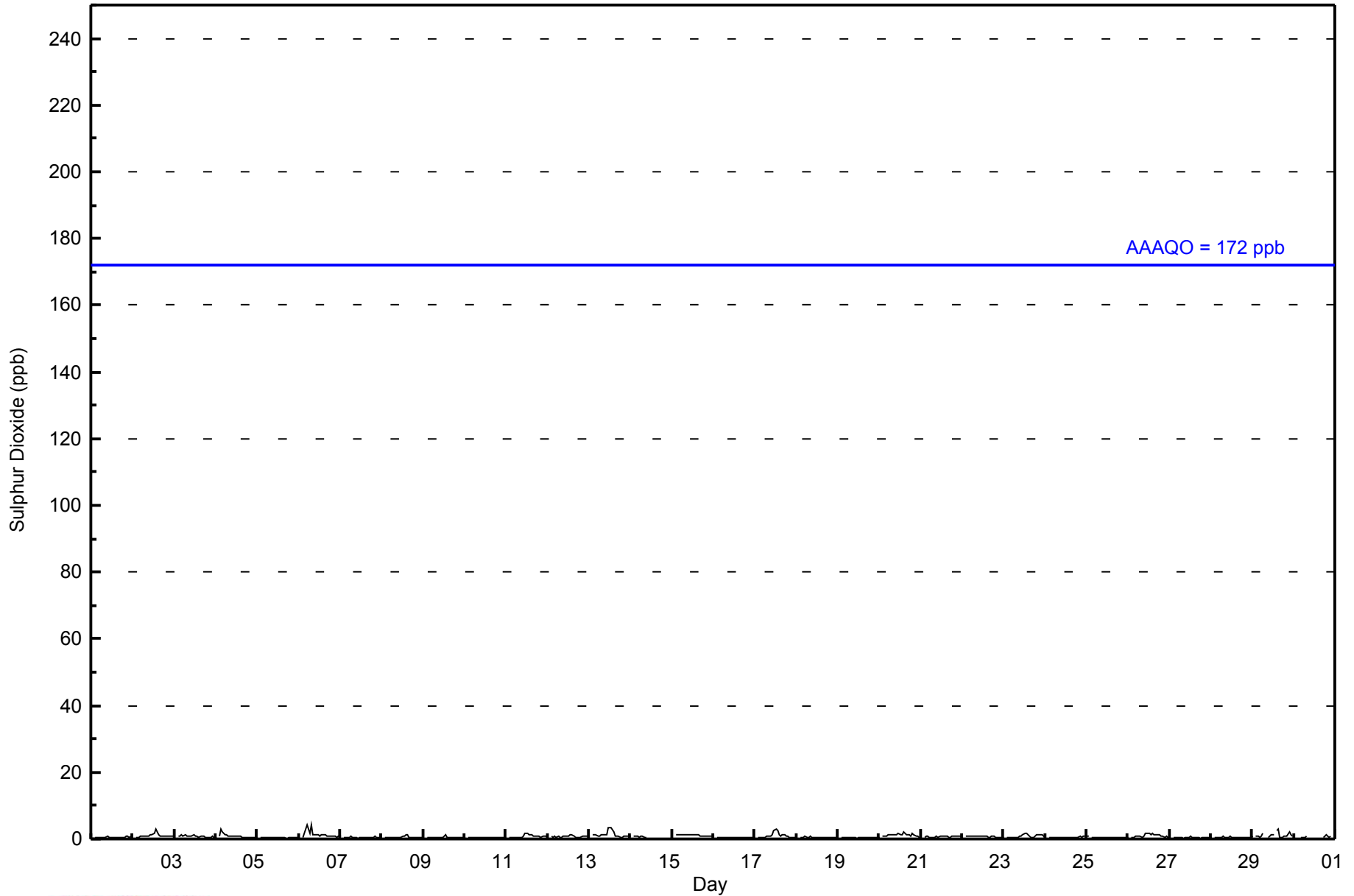
0.6	0.7	0.6	0.7	0.7	0.8	0.7	0.7	0.6	0.7	0.8	1.0	1.0	1.1	1.0	0.8	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	Diurnal Average
1	1	1	3	3	4	2	4	1	1	2	3	4	4	2	3	1	1	1	1	2	1	2	1	1	Diurnal Maximum

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



WBEA
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Fort McKay South - November 2014





WBEA
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Fort McKay South - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	669	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: 669

Total Number of Hours: 720



WBEA
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Fort McKay South - November 2014

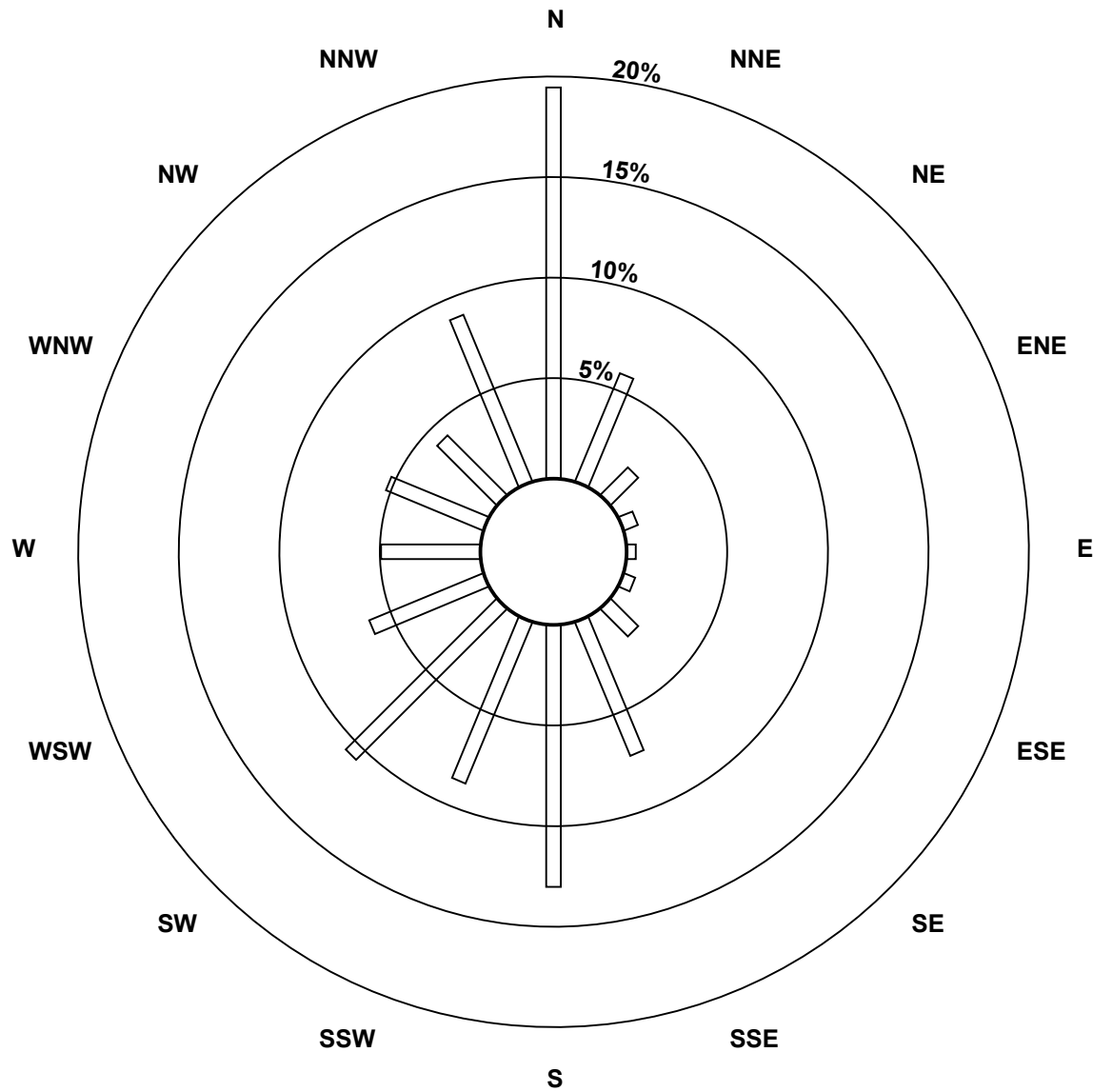
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	130	39	13	5	3	4	13	48	87	58	71	41	33	35	28	60	668
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	130	39	13	5	3	4	13	48	87	58	71	41	33	35	28	60	668

Total Number of Valid Hours: 668

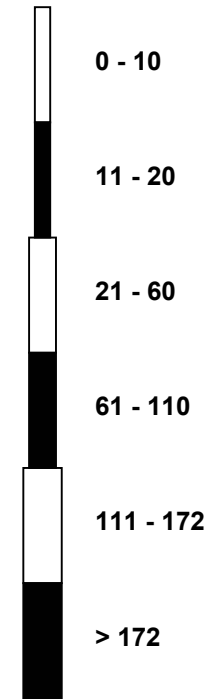
Total Number of Hours: 720

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

**Sulphur Dioxide (SO₂) - ppb
Fort McKay South (AMS 13)**



Classes (ppb)

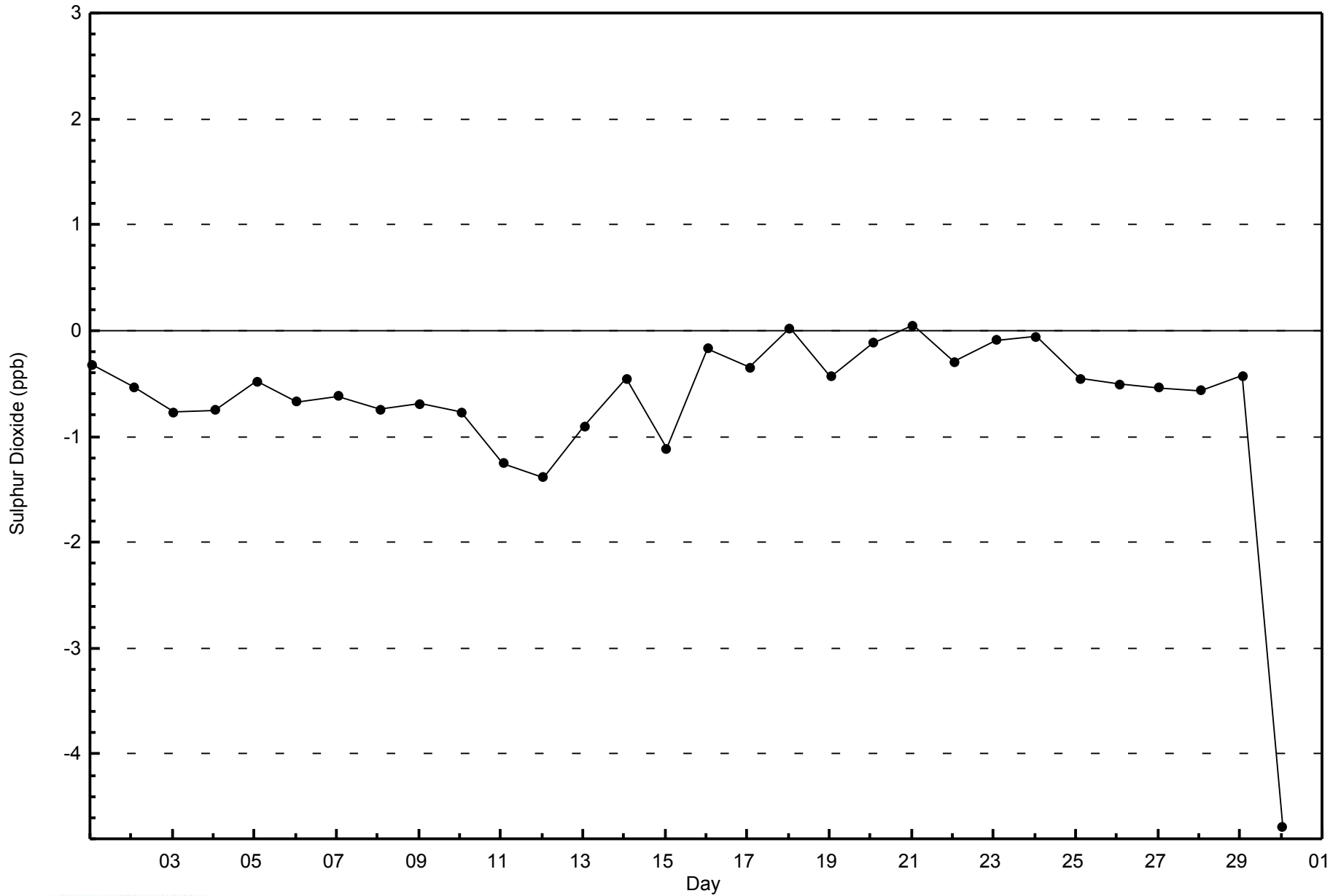


Total Number of Valid Hours: 668



WBEA
Zero Responses

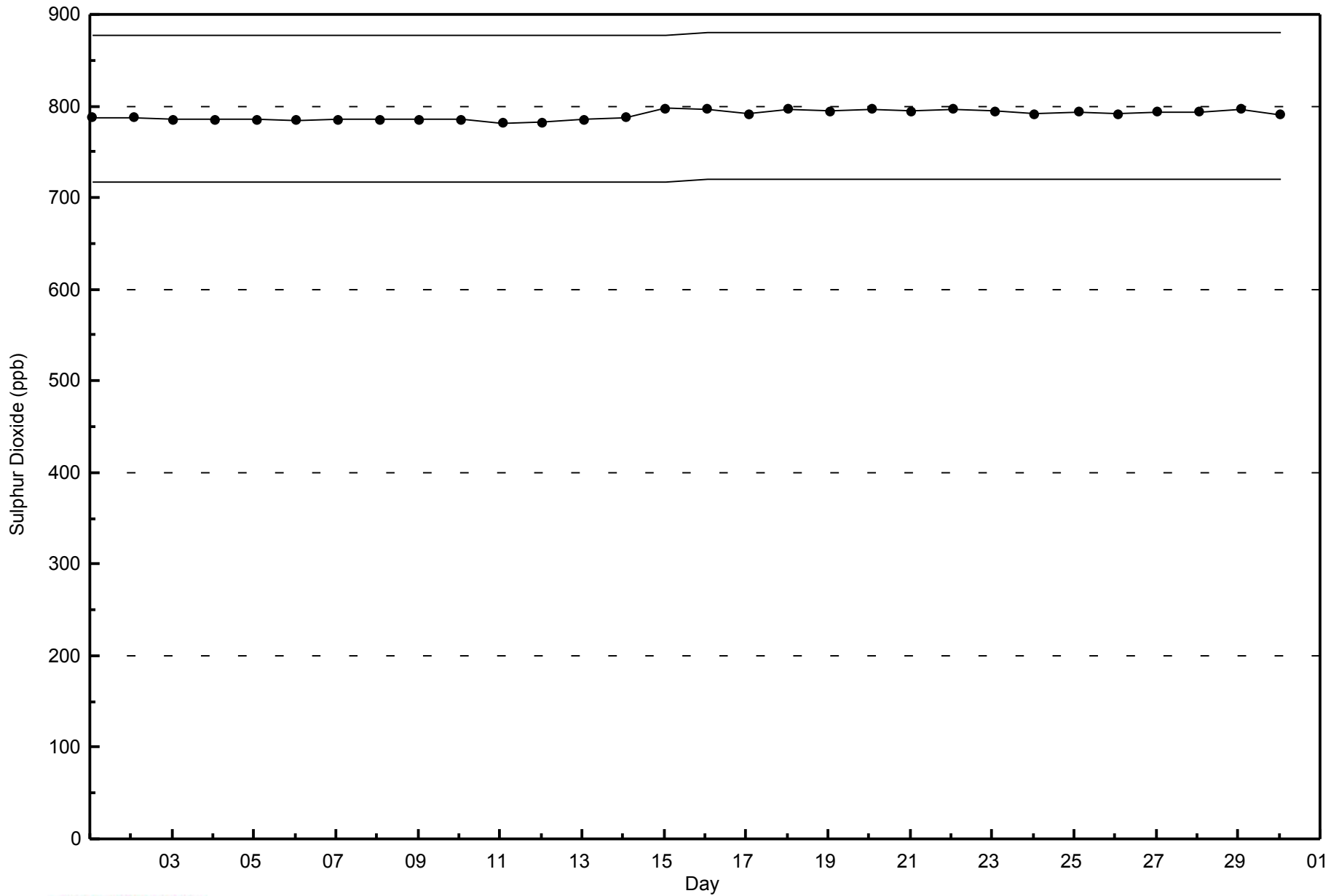
Sulphur Dioxide (SO₂) - ppb
Fort McKay South - November 2014





WBEA
Span Responses

Sulphur Dioxide (SO₂) - ppb
Fort McKay South - November 2014





Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 1 ppb on Nov 17 12:00	Maximum Daily Average: 0.5 ppb on Nov 2		Hours of Data:	686
Minimum Value: 0 ppb on Nov 1 19:00	Minimum Daily Average: 0.1 ppb on Nov 1		Hours of Missing Data:	34
Maximum Diurnal Average: 0.3 ppb at hour 12	Minimum Diurnal Average: 0.2 ppb at hour 4		Hours of Calibration:	34
Monthly Average: 0.2 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0	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-Nov	0	0	Z	0	0	0	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0.5	1
3-Nov	0	0	Z	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
4-Nov	0	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-Nov	0	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-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0.3	1
7-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
8-Nov	0	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-Nov	0	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-Nov	0	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-Nov	0	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-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.2	1
13-Nov	0	0	Z	0	0	0	0	0	0	0	C	C	C	C	1	1	0	0	0	0	0	0	0	0	0.3	1
14-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
15-Nov	0	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
16-Nov	0	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-Nov	0	0	Z	0	0	0	0	0	0	0	0	1	1	0	1	1	1	0	0	0	0	0	0	0	0.4	1
18-Nov	0	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-Nov	0	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-Nov	0	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	1	1	0	0	0	0.3	1
21-Nov	0	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-Nov	0	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
23-Nov	0	0	Z	0	0	0	0	0	0	1	1	0	0	1	1	1	0	1	1	1	1	1	0	0	0.4	1
24-Nov	0	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-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
26-Nov	0	0	Z	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0.5	1
27-Nov	0	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-Nov	0	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-Nov	0	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-Nov	0	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

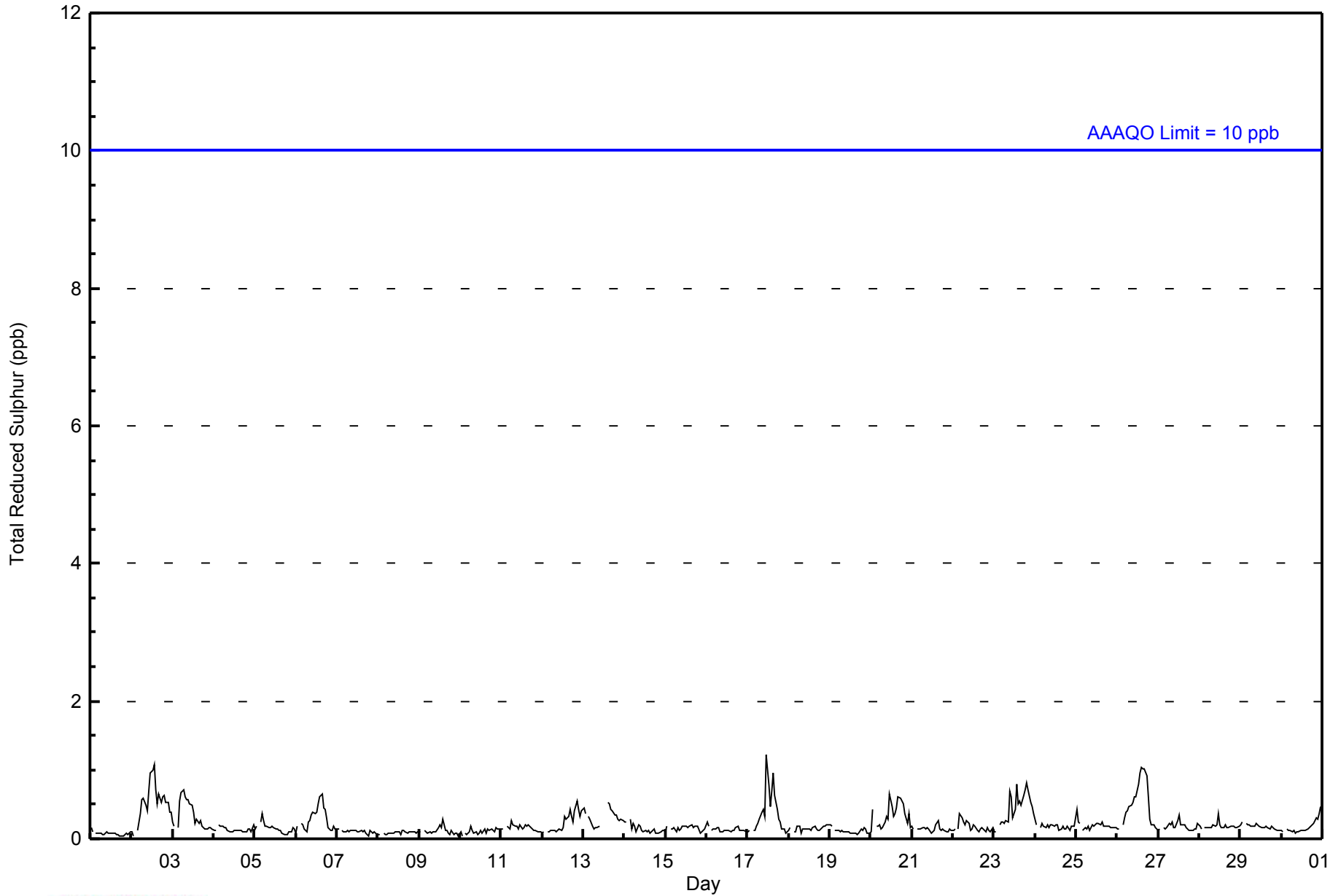
0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	Diurnal Average
0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	Diurnal Maximum

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
Fort McKay South - November 2014





WBEA
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Fort McKay South - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	686	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



WBEA
Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Fort McKay South - November 2014

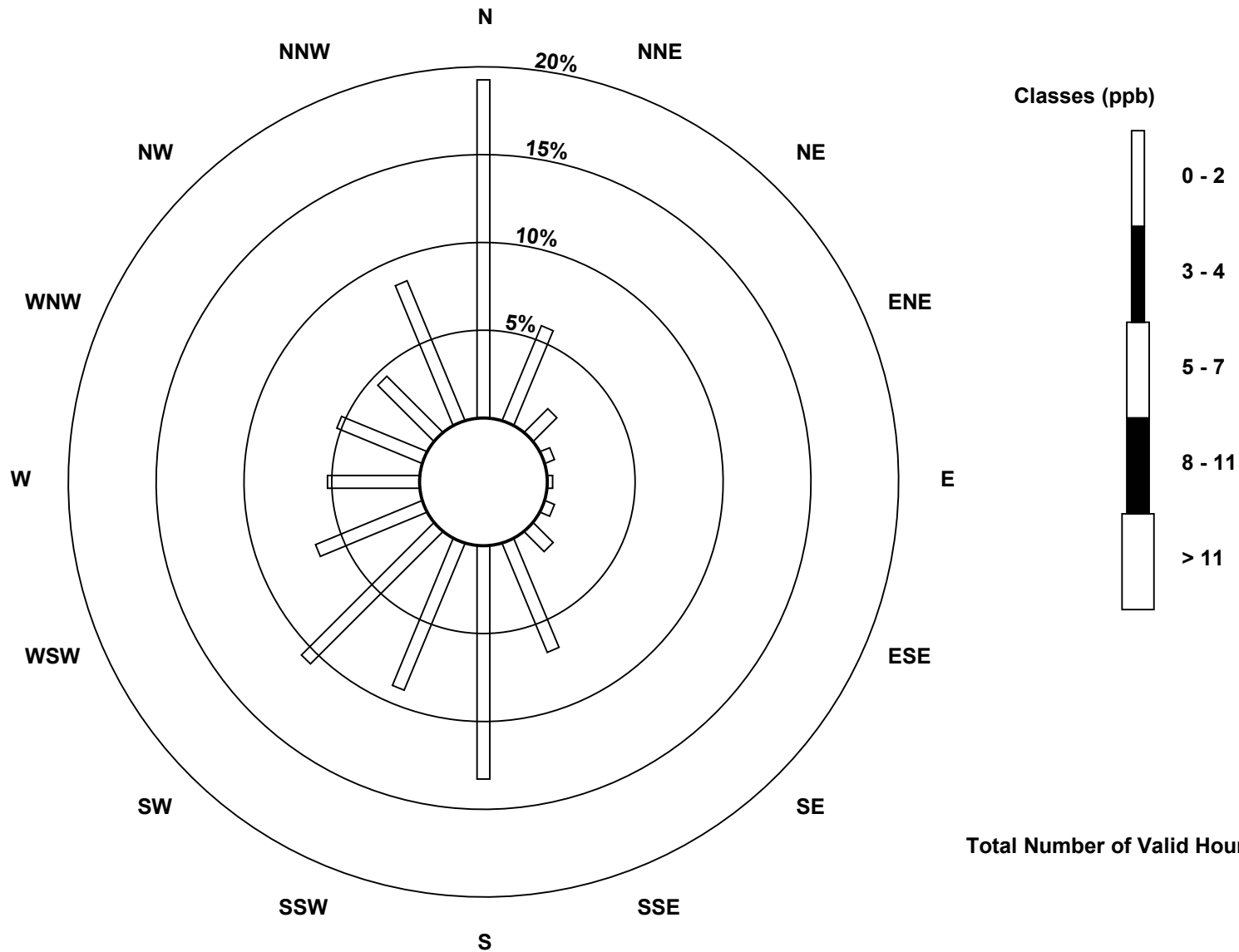
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	132	40	13	4	2	4	11	46	91	62	73	45	36	36	31	59	685
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	132	40	13	4	2	4	11	46	91	62	73	45	36	36	31	59	685

Total Number of Valid Hours: 685

Total Number of Hours: 720

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

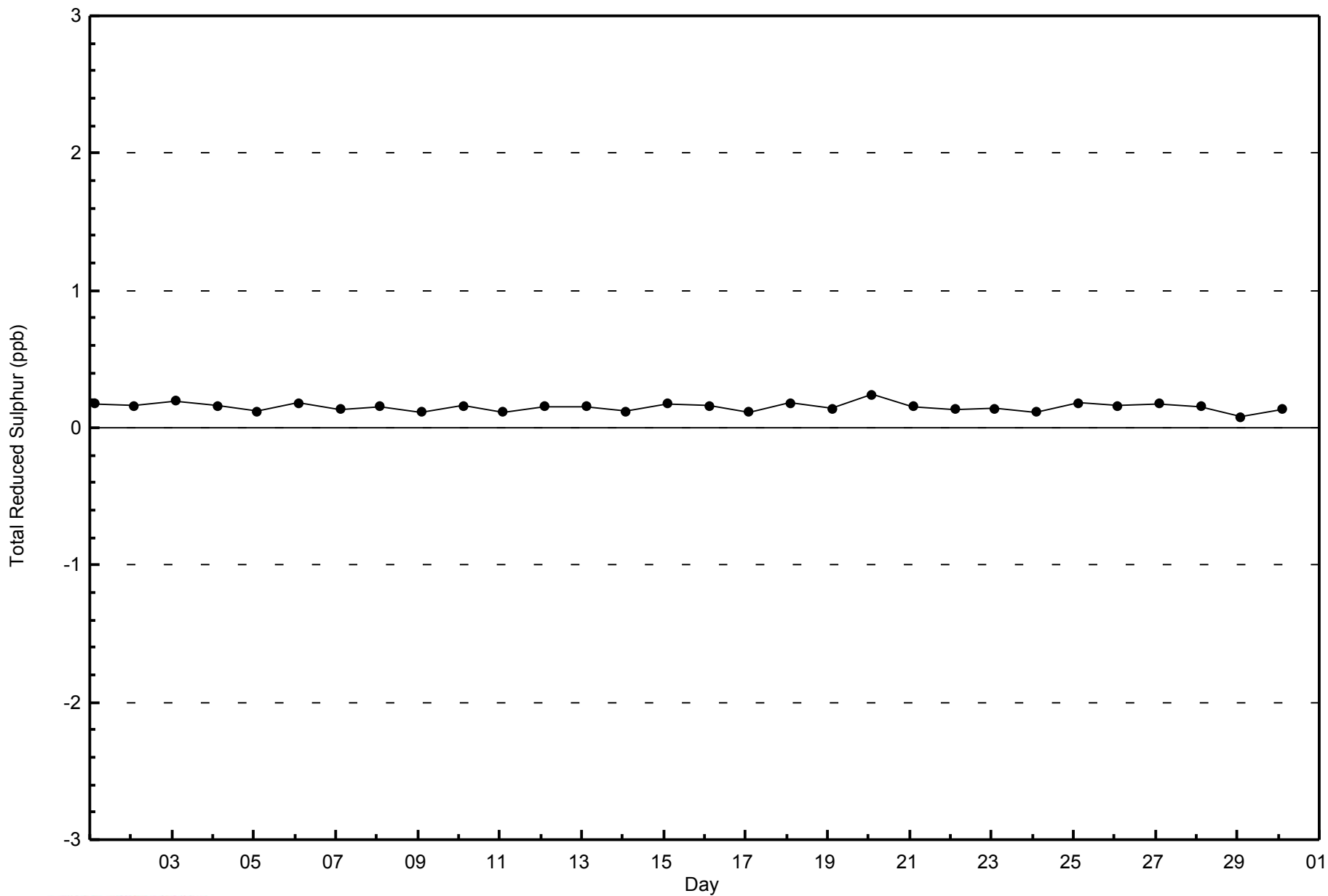
**Total Reduced Sulphur (TRS) - ppb
Fort McKay South (AMS 13)**





WBEA
Zero Responses

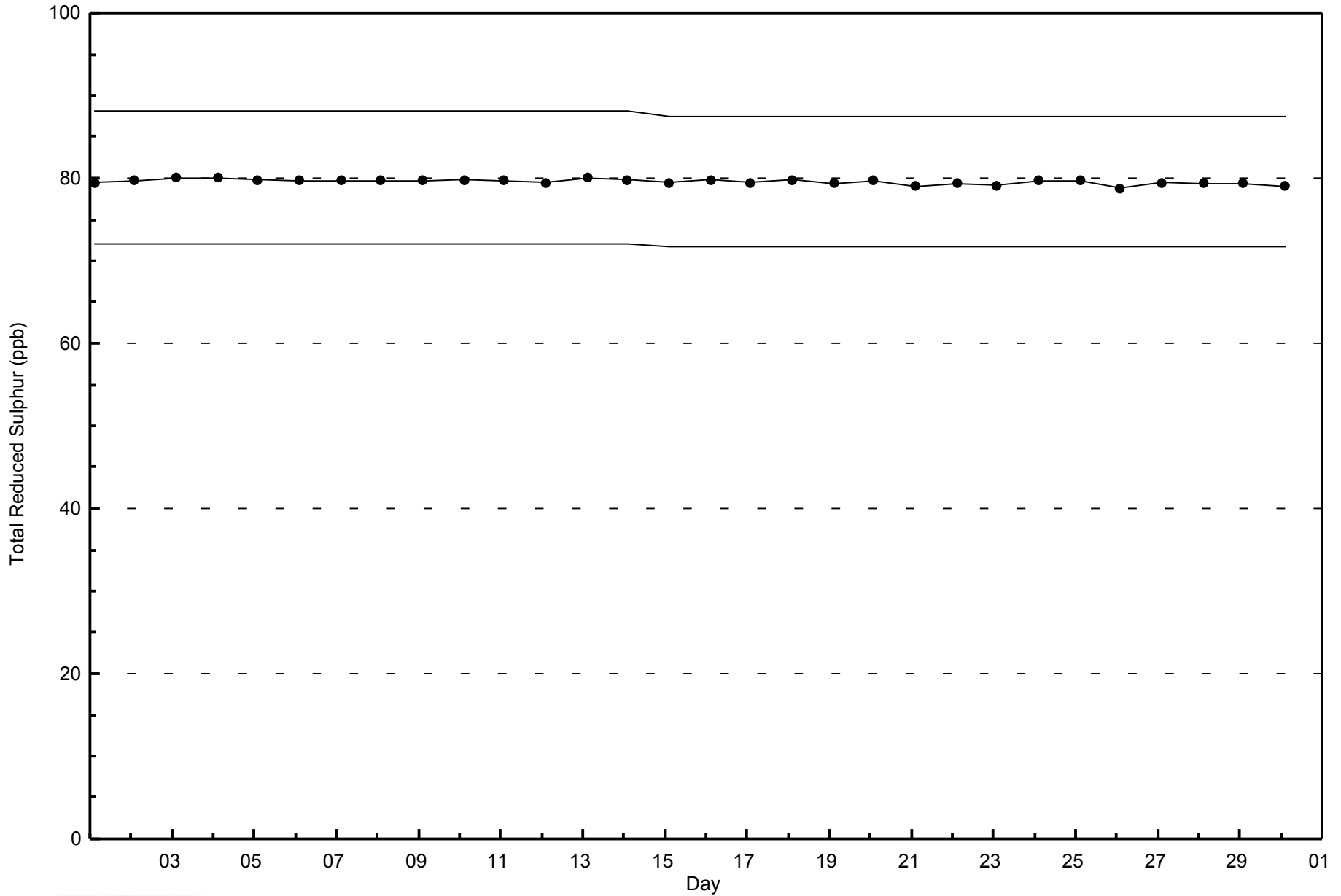
Total Reduced Sulphur (TRS) - ppb
Fort McKay South - November 2014





WBEA
Span Responses

Total Reduced Sulphur (TRS) - ppb
Fort McKay South - November 2014



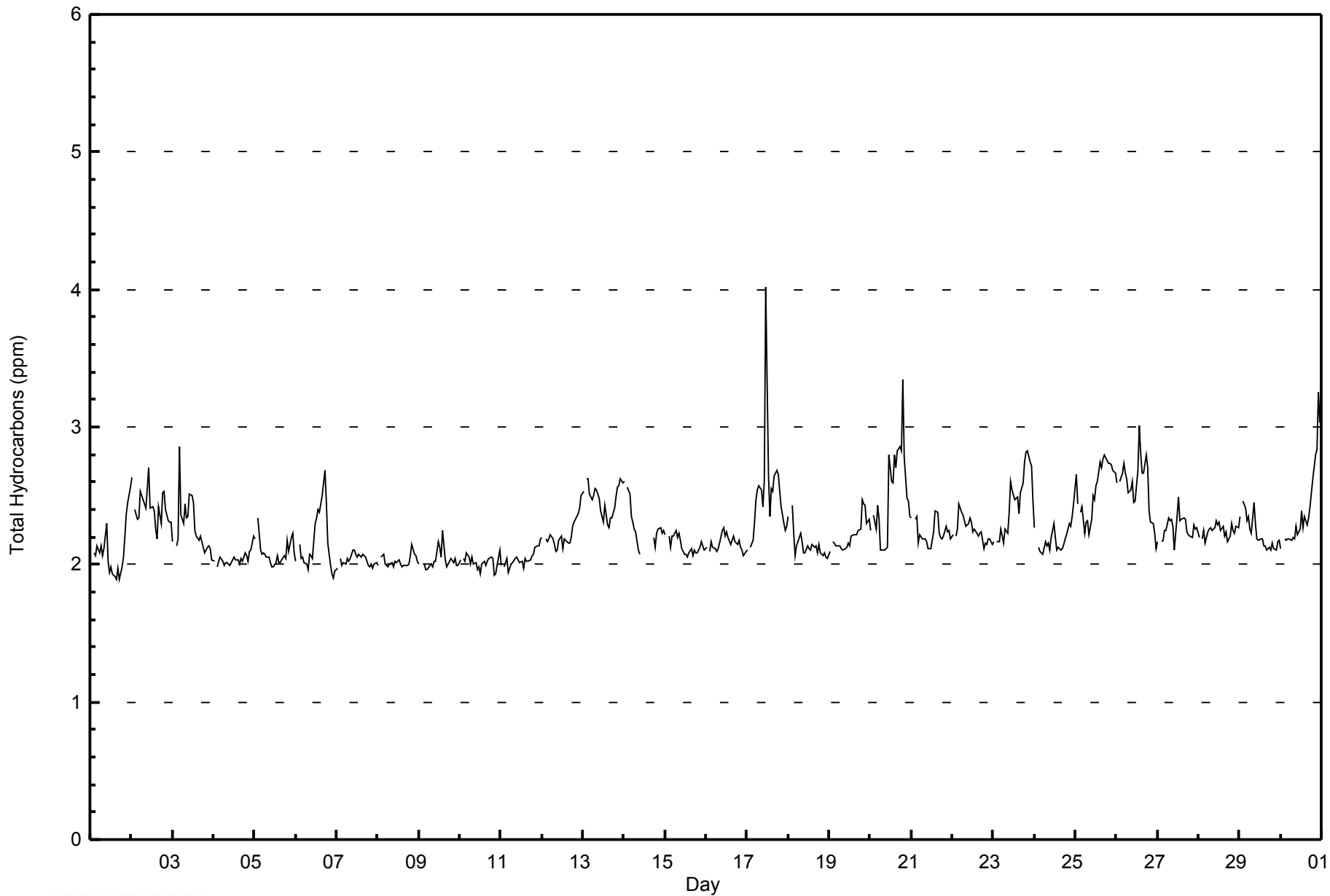


Maximum Value: 4.0 ppm on Nov 17 12:00																			Maximum Daily Average: 2.6 ppm on Nov 26						Hours in Service: 720	
Minimum Value: 1.9 ppm on Nov 1 18:00																			Minimum Daily Average: 2.0 ppm on Nov 10						Hours of Data: 683	
Maximum Diurnal Average: 2.4 ppm at hour 2																			Minimum Diurnal Average: 2.2 ppm at hour 9						Hours of Missing Data: 37	
Monthly Average: 2.24 ppm																			Percentiles: P ₁ = 1.9 P ₁₀ = 2.0 Q ₁ = 2.1 Median = 2.2 Q ₃ = 2.3 P ₉₀ = 2.6 P ₉₉ = 2.9						Hours of Calibration: 37	
																									Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	2.4	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.0	1.9	2.0	1.9	1.9	1.9	2.0	1.9	2.0	2.1	2.2	2.4	2.5	2.6	2.1	2.6
2-Nov	2.6	Z	2.4	2.3	2.3	2.5	2.5	2.5	2.4	2.6	2.7	2.4	2.4	2.4	2.3	2.2	2.4	2.3	2.5	2.5	2.4	2.3	2.3	2.3	2.4	2.7
3-Nov	2.2	Z	2.1	2.2	2.9	2.4	2.3	2.4	2.3	2.4	2.5	2.5	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.0	2.3	2.9	
4-Nov	2.0	Z	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.1	2.1	2.2	2.0	2.2
5-Nov	2.2	Z	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.1	2.0	2.2	2.1	2.2	2.2	2.1	2.1	2.3
6-Nov	2.0	Z	2.2	2.0	2.1	2.0	2.0	2.0	2.1	2.1	2.0	2.3	2.3	2.4	2.4	2.5	2.6	2.7	2.5	2.2	2.0	1.9	1.9	1.9	2.2	2.7
7-Nov	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
8-Nov	2.0	Z	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.0	2.0	2.1
9-Nov	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.1	2.1	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2
10-Nov	2.0	Z	2.0	2.0	2.1	2.1	2.0	2.1	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.1	2.0	1.9	1.9	2.0	2.1	2.0	2.1
11-Nov	2.0	Z	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.2	2.0	2.2
12-Nov	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.4	2.4	2.5	2.2	2.5
13-Nov	2.5	Z	2.6	2.6	2.5	2.5	2.5	2.6	2.5	2.5	2.4	2.3	2.3	2.4	2.3	2.3	2.3	2.3	2.4	2.5	2.6	2.6	2.6	2.6	2.5	2.6
14-Nov	2.6	Z	2.6	2.5	2.4	2.3	2.3	2.2	2.1	2.1	C	C	C	C	C	C	C	C	2.2	2.1	2.2	2.3	2.2	2.3	-	2.6
15-Nov	2.2	Z	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.2
16-Nov	2.1	Z	2.1	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.2	2.3
17-Nov	2.1	Z	2.1	2.2	2.3	2.5	2.5	2.6	2.5	2.4	2.6	4.0	2.6	2.4	2.6	2.5	2.6	2.7	2.7	2.5	2.4	2.3	2.2	2.3	2.5	4.0
18-Nov	2.4	Z	2.4	2.2	2.1	2.1	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.4
19-Nov	2.1	Z	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.3	2.5	2.4	2.4	2.3	2.3	2.2	2.5
20-Nov	2.2	Z	2.4	2.3	2.4	2.3	2.1	2.1	2.1	2.1	2.1	2.8	2.6	2.6	2.8	2.7	2.8	2.9	2.8	3.3	2.8	2.5	2.5	2.3	2.5	3.3
21-Nov	2.3	Z	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.4	2.4	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.4
22-Nov	2.2	Z	2.2	2.3	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.1	2.2	2.1	2.2	2.2	2.1	2.2	2.4
23-Nov	2.2	Z	2.2	2.2	2.3	2.2	2.2	2.3	2.2	2.4	2.6	2.5	2.5	2.5	2.5	2.4	2.5	2.6	2.7	2.8	2.8	2.7	2.7	2.5	2.5	2.8
24-Nov	2.3	Z	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.1	2.2	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.3	2.3	2.3	2.4	2.2	2.4
25-Nov	2.7	2.4	Z	2.4	2.4	2.2	2.3	2.3	2.2	2.3	2.5	2.5	2.6	2.6	2.7	2.7	2.8	2.8	2.8	2.7	2.7	2.7	2.7	2.7	2.6	2.8
26-Nov	2.6	Z	2.6	2.7	2.7	2.7	2.6	2.5	2.5	2.6	2.4	2.5	2.7	3.0	2.8	2.7	2.7	2.8	2.7	2.4	2.3	2.3	2.2	2.1	2.6	3.0
27-Nov	2.2	Z	2.2	2.2	2.3	2.2	2.3	2.3	2.3	2.3	2.1	2.4	2.5	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.5
28-Nov	2.2	Z	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.3	2.2	2.3
29-Nov	2.4	Z	2.5	2.4	2.3	2.3	2.3	2.2	2.4	2.3	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.2	2.2	2.2	2.5
30-Nov	2.1	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.3	2.4	2.3	2.4	2.3	2.3	2.4	2.5	2.6	2.8	2.8	3.3	3.0	2.4	3.3
																								Diurnal Average		
																								Diurnal Maximum		
																								Z - zerospan C - Calibration		



WBEA
Hourly Averages

Total Hydrocarbons (THC) - ppm
Fort McKay South - November 2014





WBEA
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Fort McKay South - November 2014

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	131	19.18	19.18
2.1 - 3.0	549	80.38	99.56
3.1 - 10.0	3	0.44	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 720



WBEA
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Fort McKay South - November 2014

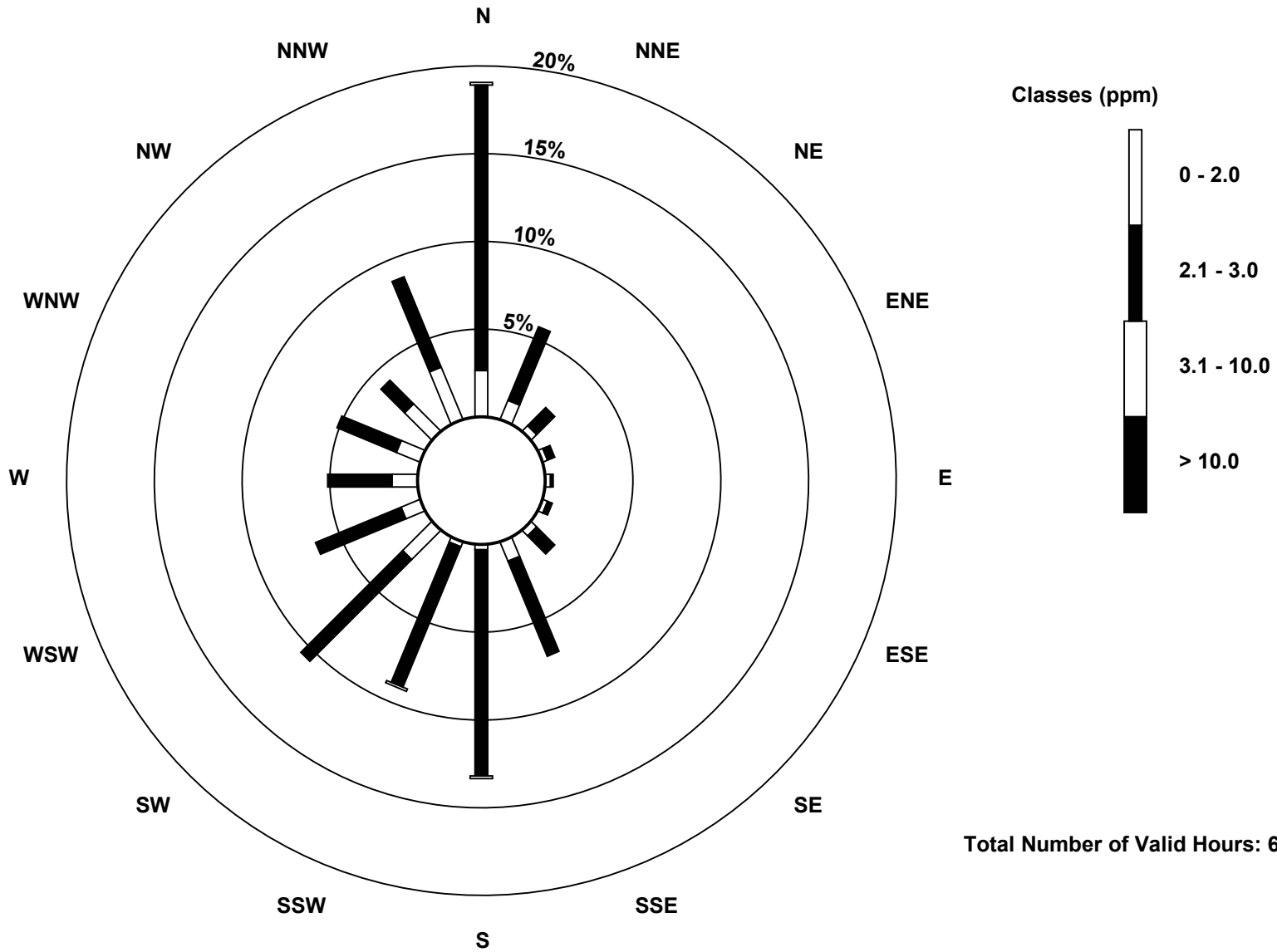
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	18	8	3	2	2	2	3	8	2	2	16	8	10	10	15	22	131
2.1 - 3.0	111	31	10	3	1	2	10	40	88	59	56	36	25	25	13	38	548
3.1 - 10.0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	3
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	130	39	13	5	3	4	13	48	91	62	72	44	35	35	28	60	682

Total Number of Valid Hours: 682

Total Number of Hours: 720

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

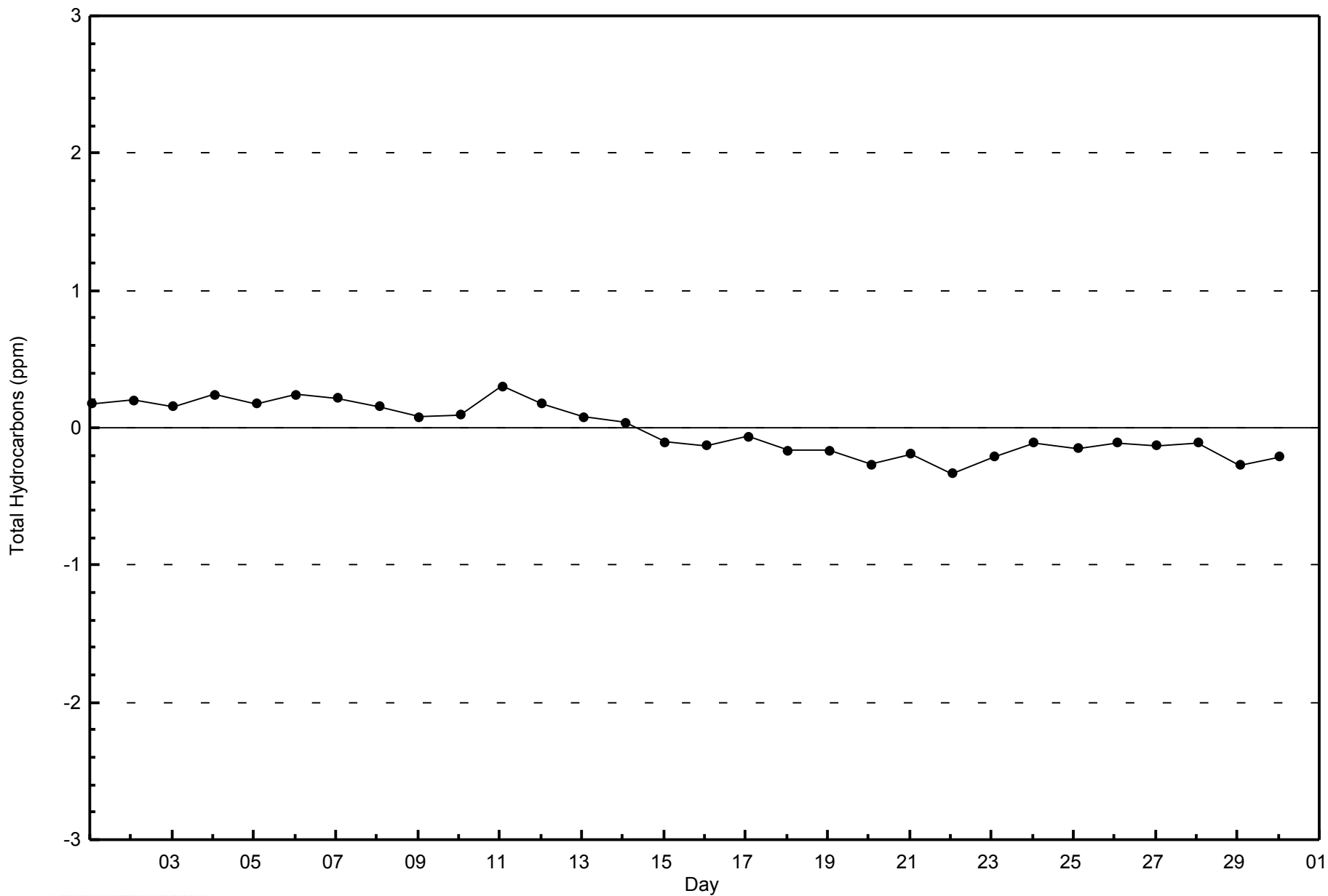
**Total Hydrocarbons (THC) - ppm
Fort McKay South (AMS 13)**





WBEA
Zero Responses

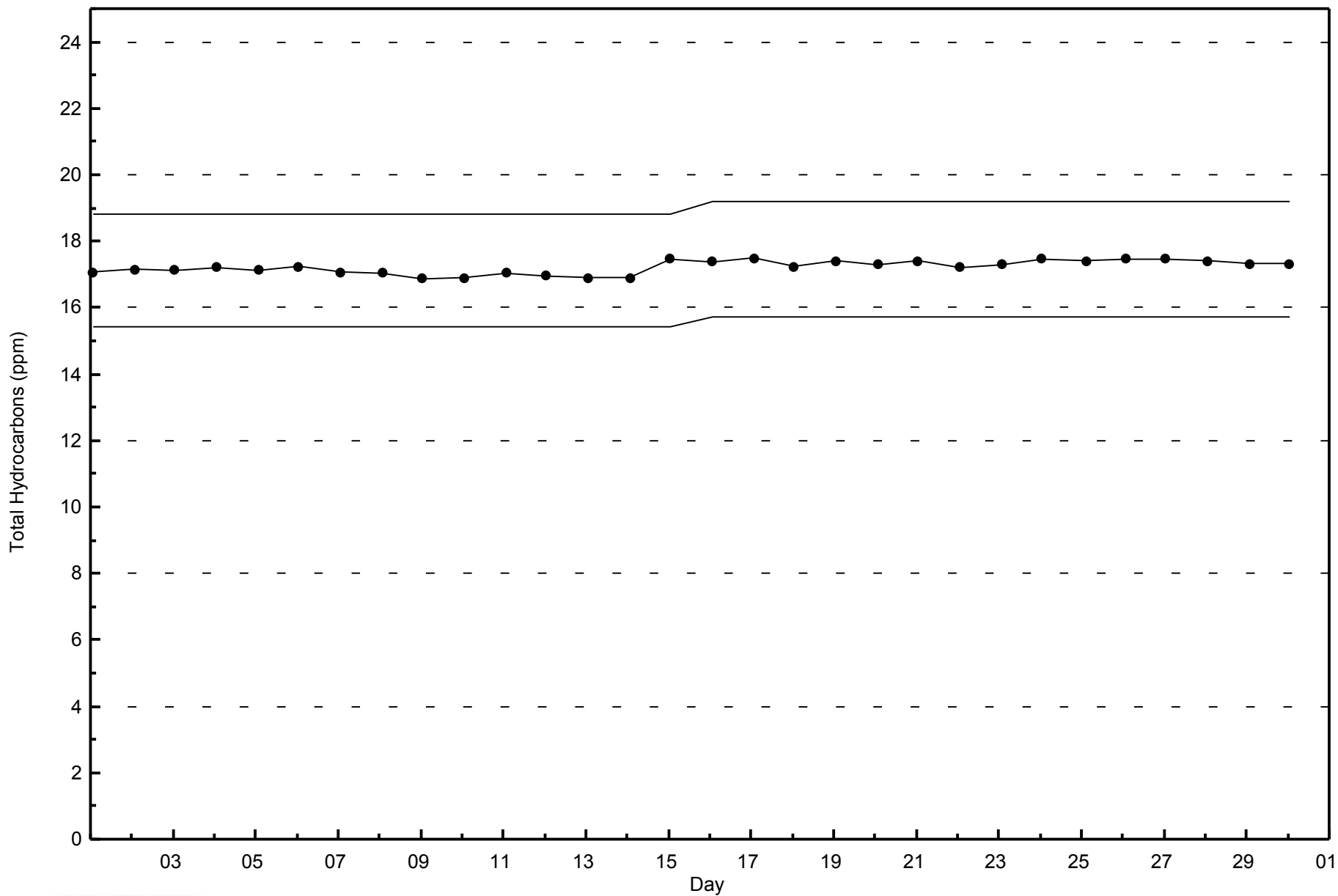
Total Hydrocarbons (THC) - ppm
Fort McKay South - November 2014





WBEA
Span Responses

Total Hydrocarbons (THC) - ppm
Fort McKay South - November 2014





Summary of Hour Averages

Fort McKay South - November 2014

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 37 ppb on Nov 19 11:00	Maximum Daily Average: 27.6 ppb on Nov 7		Hours of Data:	686
Minimum Value: 0 ppb on Nov 1 23:00	Minimum Daily Average: 2.5 ppb on Nov 17		Hours of Missing Data:	34
Maximum Diurnal Average: 21.4 ppb at hour 14	Minimum Diurnal Average: 3.5 ppb at hour 3		Hours of Calibration:	34
Monthly Average: 14.4 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 5 Median = 13 Q ₃ = 23 P ₉₀ = 31 P ₉₉ = 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-Nov	0	0	Z	0	0	0	0	0	0	2	11	17	20	23	23	21	10	3	1	0	0	0	0	0	5.8	23
2-Nov	0	0	Z	0	0	0	0	0	0	0	2	7	12	18	14	11	8	2	6	4	1	0	0	1	3.8	18
3-Nov	6	6	Z	5	2	3	1	0	1	1	1	2	3	8	7	7	5	8	8	10	9	7	8	13	5.3	13
4-Nov	12	15	Z	9	8	11	11	8	6	7	7	7	7	8	7	3	4	3	2	2	2	0	0	6.4	15	
5-Nov	0	0	Z	4	7	7	8	8	9	10	10	11	12	13	12	11	7	4	4	3	10	2	5	12	7.3	13
6-Nov	12	12	Z	7	7	8	11	10	14	14	15	14	14	12	11	5	0	0	5	6	10	19	18	18	10.7	19
7-Nov	17	16	Z	21	23	26	31	30	29	30	31	32	34	34	35	33	30	33	33	32	31	22	16	16	27.6	35
8-Nov	12	11	Z	10	9	20	23	19	27	30	32	32	32	32	32	27	18	13	11	8	6	7	7	11	18.6	32
9-Nov	16	14	Z	14	13	14	15	11	12	17	19	22	25	28	21	27	19	14	11	24	31	29	26	31	19.7	31
10-Nov	32	29	Z	24	23	23	20	15	13	24	29	32	31	28	27	27	24	22	20	24	25	25	21	21	24.4	32
11-Nov	19	19	Z	23	25	24	24	23	19	21	24	27	28	26	26	22	14	10	8	7	6	6	5	5	17.9	28
12-Nov	4	3	Z	3	4	1	3	7	9	11	11	16	21	22	22	19	11	5	3	2	0	0	0	0	7.7	22
13-Nov	0	0	Z	0	0	0	0	0	1	3	6	8	11	13	12	4	2	1	0	0	0	0	0	0	2.8	13
14-Nov	0	0	Z	3	9	7	6	9	23	23	24	28	29	30	29	22	14	10	7	6	5	11	17	13	14.1	30
15-Nov	8	9	Z	23	18	19	20	15	16	18	23	28	30	30	28	22	25	24	27	27	28	27	26	30	22.6	30
16-Nov	31	33	Z	36	37	34	34	32	31	30	28	33	34	35	34	26	15	10	10	10	10	11	9	8	24.8	37
17-Nov	7	7	Z	4	1	1	0	0	1	4	C	C	C	C	10	2	1	0	0	0	1	3	4	3	2.5	10
18-Nov	1	1	Z	20	21	20	18	19	21	26	30	29	31	34	33	33	31	32	33	32	32	32	32	32	25.8	34
19-Nov	31	31	Z	33	32	32	32	31	34	36	37	34	35	24	28	25	15	8	6	6	7	11	9	15	24.0	37
20-Nov	17	13	Z	24	22	22	21	17	14	13	10	11	11	3	1	3	3	1	1	0	1	7	6	13	10.2	24
21-Nov	12	17	Z	16	22	17	19	20	21	19	22	26	31	28	13	14	25	27	27	28	25	16	22	26	21.4	31
22-Nov	23	22	Z	22	12	11	17	18	16	16	15	16	16	18	19	20	18	18	22	22	20	20	19	20	18.2	23
23-Nov	19	20	Z	14	11	13	11	7	9	7	7	8	10	15	11	6	3	1	0	0	0	0	0	0	7.5	20
24-Nov	6	18	Z	23	24	23	23	17	19	17	15	14	23	25	27	24	16	12	9	7	13	4	1	1	15.7	27
25-Nov	1	4	3	Z	12	14	13	16	23	16	20	21	19	18	16	10	4	2	0	0	0	0	0	0	9.3	23
26-Nov	0	0	Z	0	0	0	0	0	1	2	5	6	6	5	2	1	1	1	1	11	18	17	25	29	5.8	29
27-Nov	29	29	Z	27	23	22	18	17	14	15	18	13	13	15	10	5	3	7	7	6	6	2	4	16	13.9	29
28-Nov	23	24	Z	24	25	20	22	20	19	19	17	19	20	20	19	21	22	21	15	12	10	8	7	6	18.0	25
29-Nov	1	3	Z	0	1	0	2	3	1	14	27	29	30	31	32	32	31	32	33	32	32	32	32	32	19.9	33
30-Nov	31	31	Z	30	29	30	30	31	31	30	29	27	20	24	17	17	8	2	2	4	5	6	8	7	19.5	31

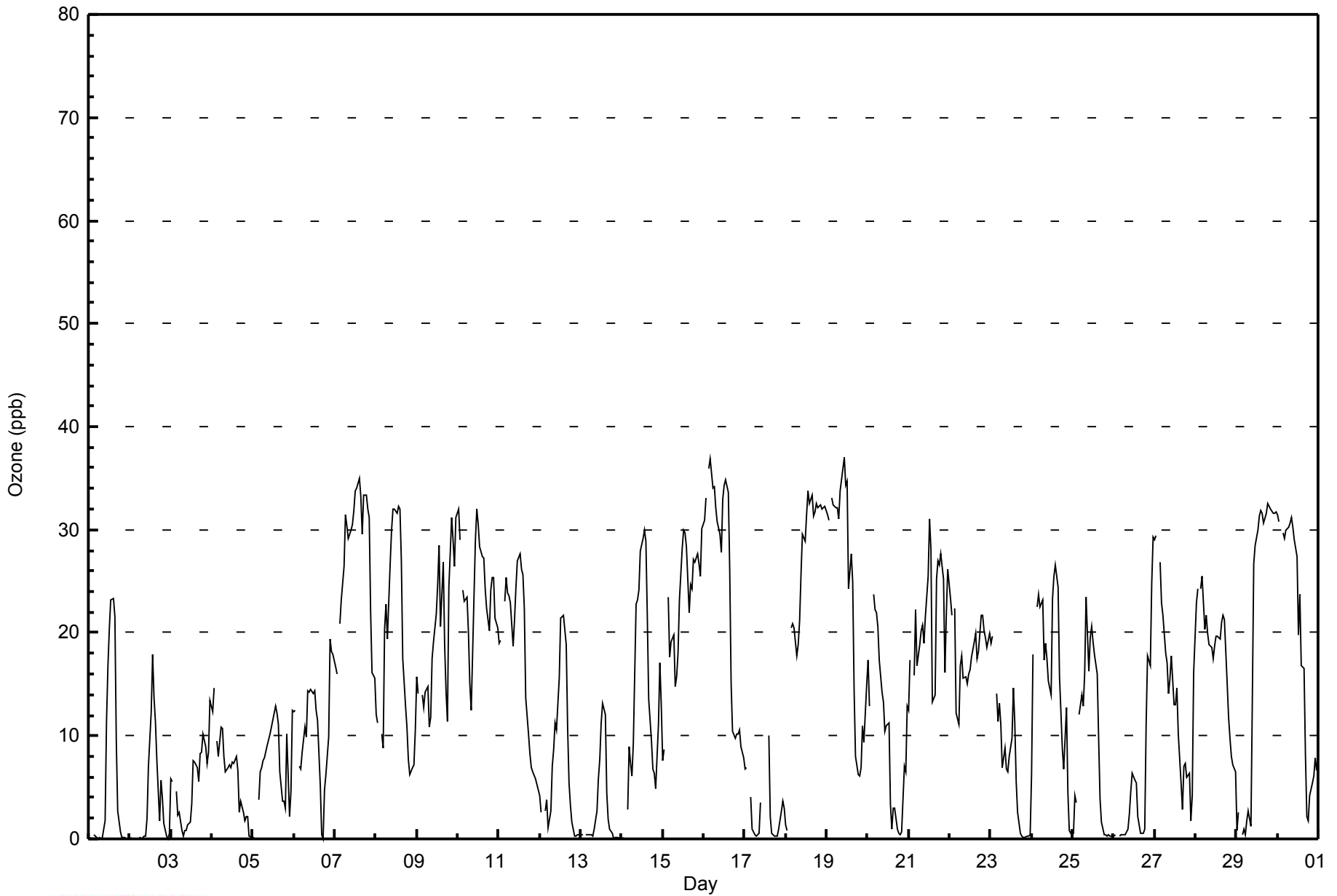
12.4	12.9	3.5	14.5	14.1	14.2	14.4	13.5	14.4	15.8	18.1	19.5	21.0	21.4	19.3	16.8	12.7	10.9	10.4	10.9	11.6	10.9	11.0	12.6	Diurnal Average	
32	33	3	36	37	34	34	32	34	36	37	34	35	35	35	33	31	33	33	32	32	32	32	32	Diurnal Maximum	

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



WBEA
Hourly Averages

Ozone (O₃) - ppb
Fort McKay South - November 2014





WBEA
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Fort McKay South - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	468	68.22	68.22
21 - 50	218	31.78	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



WBEA
Frequency Distribution

Ozone (O₃) - ppb
Fort McKay South - November 2014

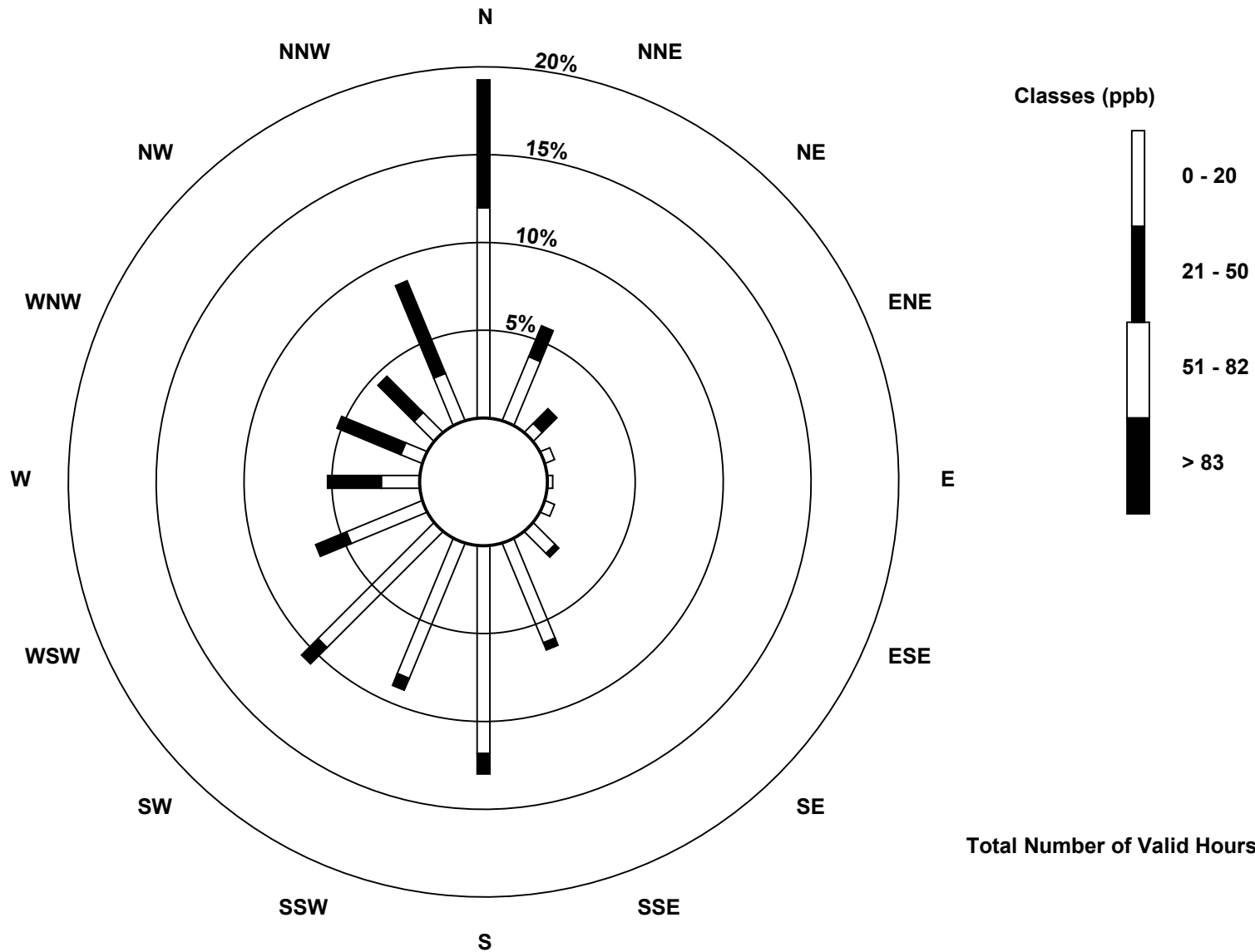
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	82	27	5	4	2	4	12	42	81	57	64	32	15	9	11	20	467
21 - 50	50	13	8	0	0	0	2	3	8	5	9	13	21	27	20	39	218
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	132	40	13	4	2	4	14	45	89	62	73	45	36	36	31	59	685

Total Number of Valid Hours: 685

Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

Ozone (O₃) - ppb
Fort McKay South (AMS 13)

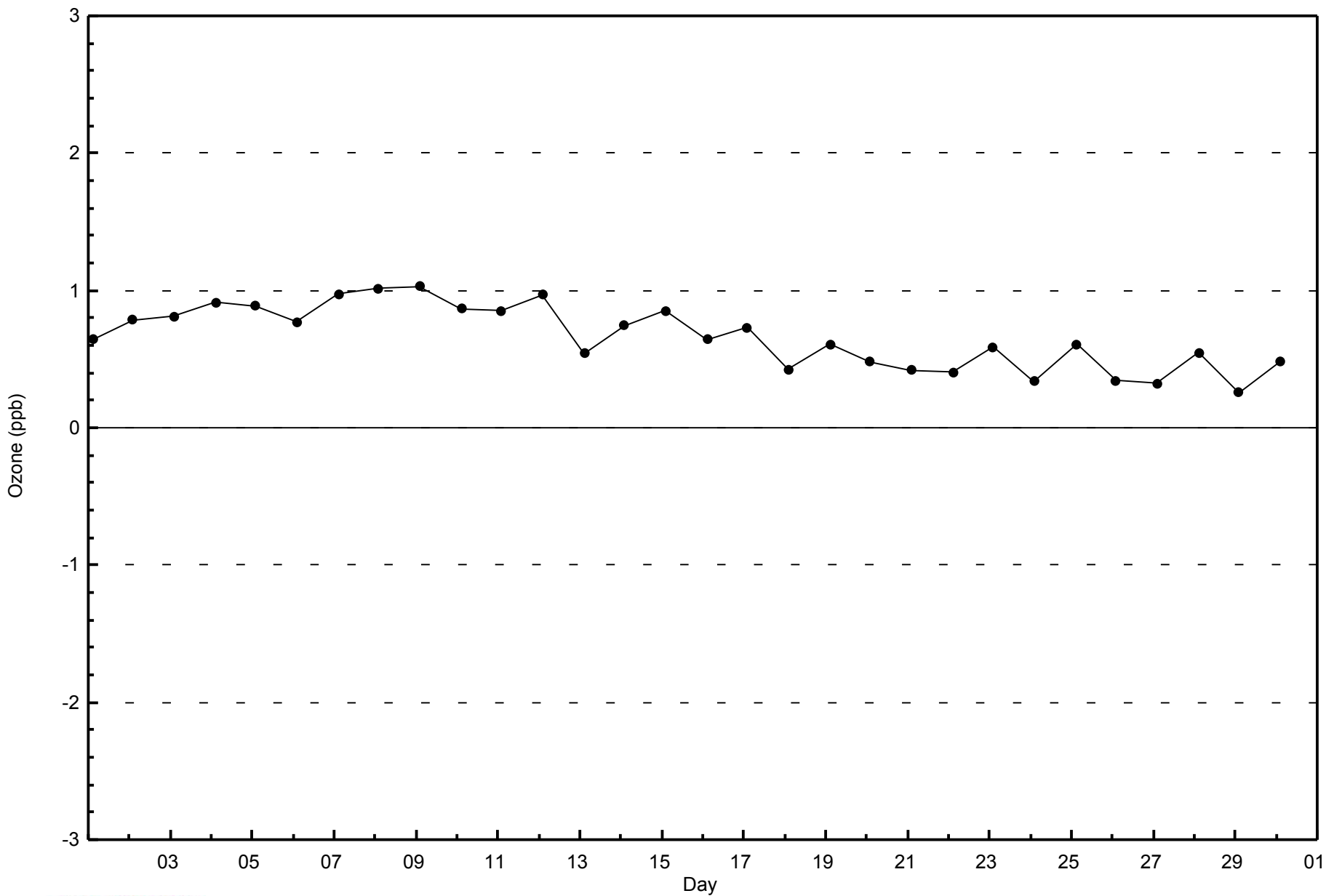


Total Number of Valid Hours: 685



WBEA
Zero Responses

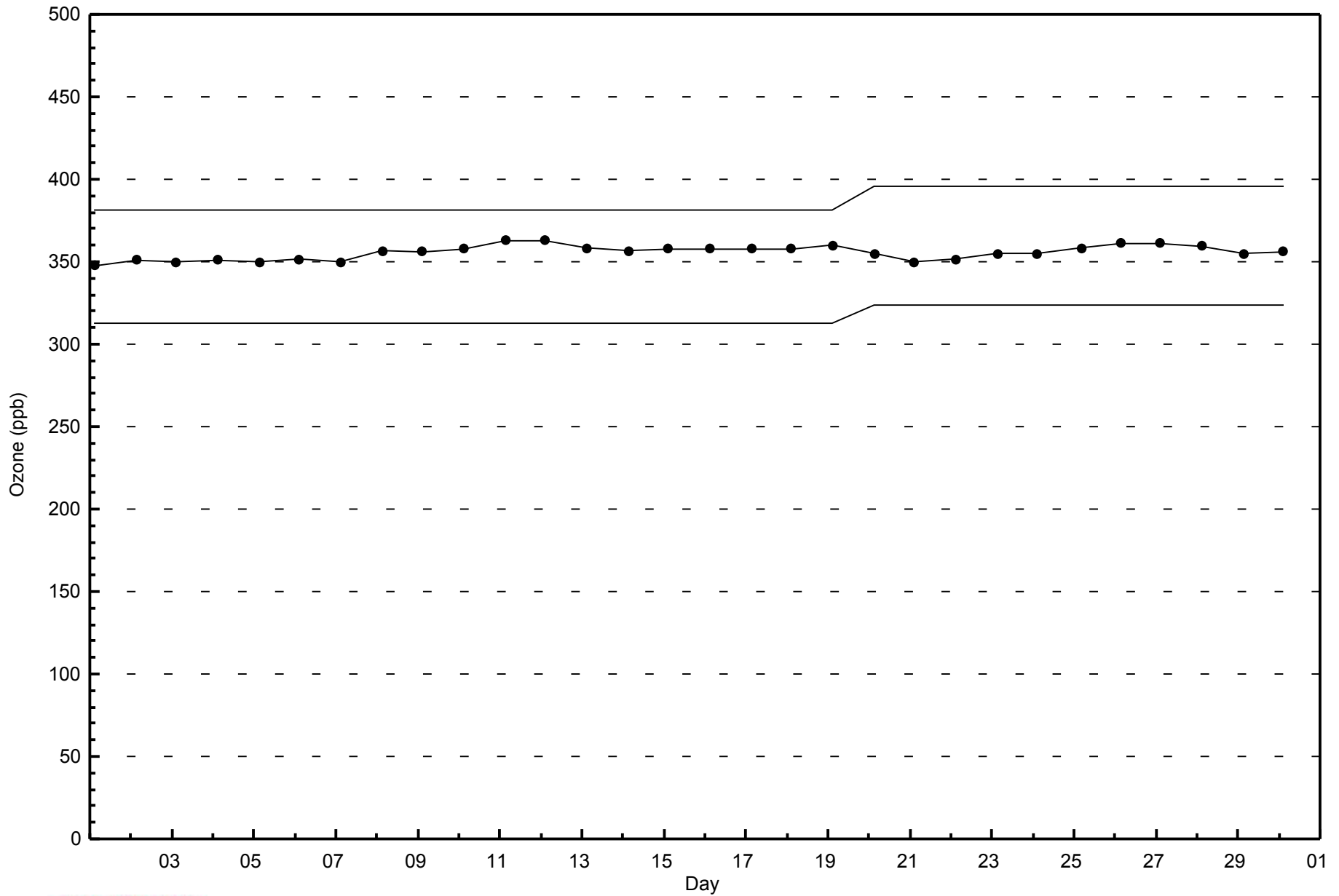
Ozone (O₃) - ppb
Fort McKay South - November 2014





WBEA
Span Responses

Ozone (O₃) - ppb
Fort McKay South - November 2014



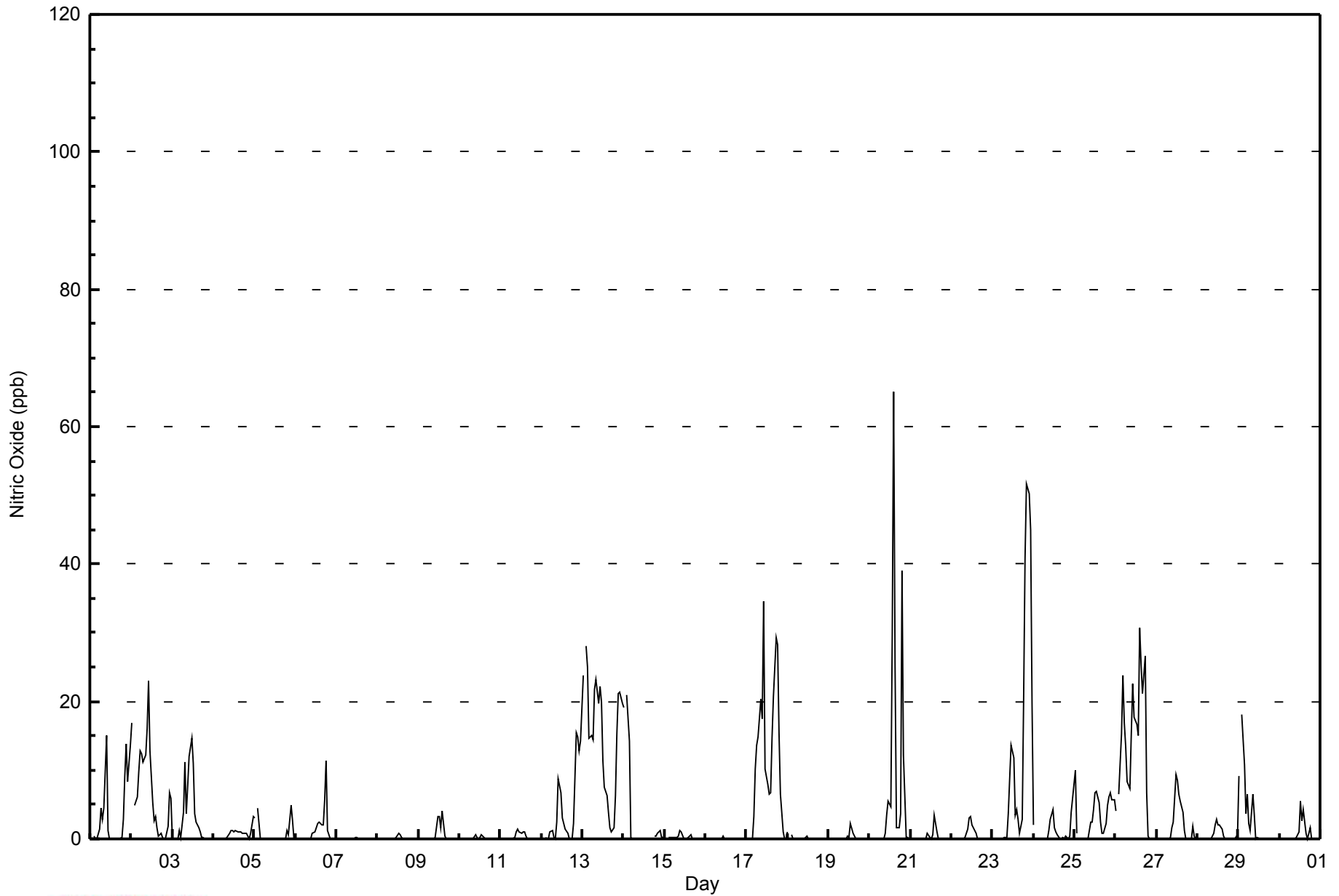


Maximum Value: 65 ppb on Nov 20 15:00										Maximum Daily Average: 15.0 ppb on Nov 13										Hours in Service: 720							
Minimum Value: 0 ppb on Nov 1 05:00										Minimum Daily Average: 0.0 ppb on Nov 7										Hours of Data: 682							
Maximum Diurnal Average: 5.4 ppb at hour 11										Minimum Diurnal Average: 0.8 ppb at hour 2										Hours of Missing Data: 38							
Monthly Average: 3.2 ppb										Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 2 P ₉₀ = 12 P ₉₉ = 33										Hours of Calibration: 38							
																				Percent Operational Time: 100.0							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	9	Z	0	0	0	1	4	3	4	15	1	0	0	0	0	0	0	0	0	3	9	14	8	14	3.7	15	
2-Nov	17	Z	5	6	10	13	12	11	12	16	23	13	5	3	3	2	0	1	0	0	0	2	7	6	7.2	23	
3-Nov	0	Z	0	0	1	0	4	11	4	8	12	15	11	4	2	2	1	0	0	0	0	0	0	0	3.3	15	
4-Nov	0	Z	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0	1	3	3	0.7	3	
5-Nov	3	Z	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	5	3	0	0.7	5	
6-Nov	0	Z	0	0	0	0	0	0	0	0	1	1	2	2	2	2	2	6	11	1	0	0	0	0	1.3	11	
7-Nov	0	Z	0	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-Nov	0	Z	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0.1	1	
9-Nov	0	Z	0	0	0	0	0	0	0	0	3	3	2	4	0	0	0	0	0	0	0	0	0	0	0.6	4	
10-Nov	0	Z	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.1	1	
11-Nov	0	Z	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.3	1	
12-Nov	0	Z	0	0	0	1	1	0	0	3	9	7	3	2	1	1	0	0	0	2	15	15	13	14	3.8	15	
13-Nov	24	Z	28	25	15	15	14	22	23	20	22	20	11	7	6	4	2	1	2	6	15	21	21	20	15.0	28	
14-Nov	19	Z	21	14	0	0	0	0	0	0	C	C	C	C	C	C	C	C	0	0	1	1	0	0	--	21	
15-Nov	0	Z	0	0	0	0	0	0	1	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0.2	1	
16-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
17-Nov	0	Z	0	0	3	10	14	15	20	18	35	10	8	6	7	15	21	29	28	16	6	1	0	0	11.4	35	
18-Nov	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1	
19-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0.2	2	
20-Nov	0	Z	0	0	0	0	0	0	0	1	3	5	5	30	65	26	2	2	4	39	12	0	0	0	8.4	65	
21-Nov	0	Z	0	0	0	0	0	0	0	0	1	0	0	1	3	1	0	0	0	0	0	0	0	0	0.3	3	
22-Nov	0	Z	0	0	0	0	0	0	0	2	3	3	2	2	1	0	0	0	0	0	0	0	0	0	0.5	3	
23-Nov	0	Z	0	0	0	0	0	0	0	4	9	14	12	3	4	3	1	3	21	41	52	50	45	20	12.2	52	
24-Nov	2	Z	0	0	0	0	0	0	0	1	3	4	2	1	1	0	0	0	0	0	0	0	4	6	1.1	6	
25-Nov	10	1	Z	0	0	0	0	0	0	3	2	4	7	7	5	3	1	1	2	5	6	7	6	6	3.2	10	
26-Nov	4	Z	7	15	24	17	13	8	7	15	23	18	17	15	31	26	21	27	7	0	0	0	0	0	12.8	31	
27-Nov	0	Z	0	0	0	0	0	0	0	2	2	9	9	6	6	4	1	0	0	0	0	2	0	0	1.8	9	
28-Nov	0	Z	0	0	0	0	0	0	0	1	2	3	2	2	1	0	0	0	0	0	0	0	0	1	0.5	3	
29-Nov	9	Z	18	11	4	7	2	1	6	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.7	18	
30-Nov	0	Z	0	0	0	0	0	0	0	0	0	1	6	3	4	1	0	1	2	0	0	0	0	0	0.7	6	
		3.3	0.8	2.9	2.4	1.9	2.1	2.2	2.4	2.6	3.8	5.4	4.6	3.7	3.5	5.2	3.1	1.8	2.4	2.6	3.9	3.9	3.9	3.6	3.0	Diurnal Average	
		24	1	28	25	24	17	14	22	23	20	35	20	17	30	65	26	21	29	28	41	52	50	45	20	Diurnal Maximum	
Z - zerospan		C - Calibration																									



WBEA
Hourly Averages

Nitric Oxide (NO) - ppb
Fort McKay South - November 2014





WBEA
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Fort McKay South - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	653	95.75	95.75
21 - 40	24	3.52	99.27
41 - 80	5	0.73	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitric Oxide (NO) - ppb
Fort McKay South - November 2014

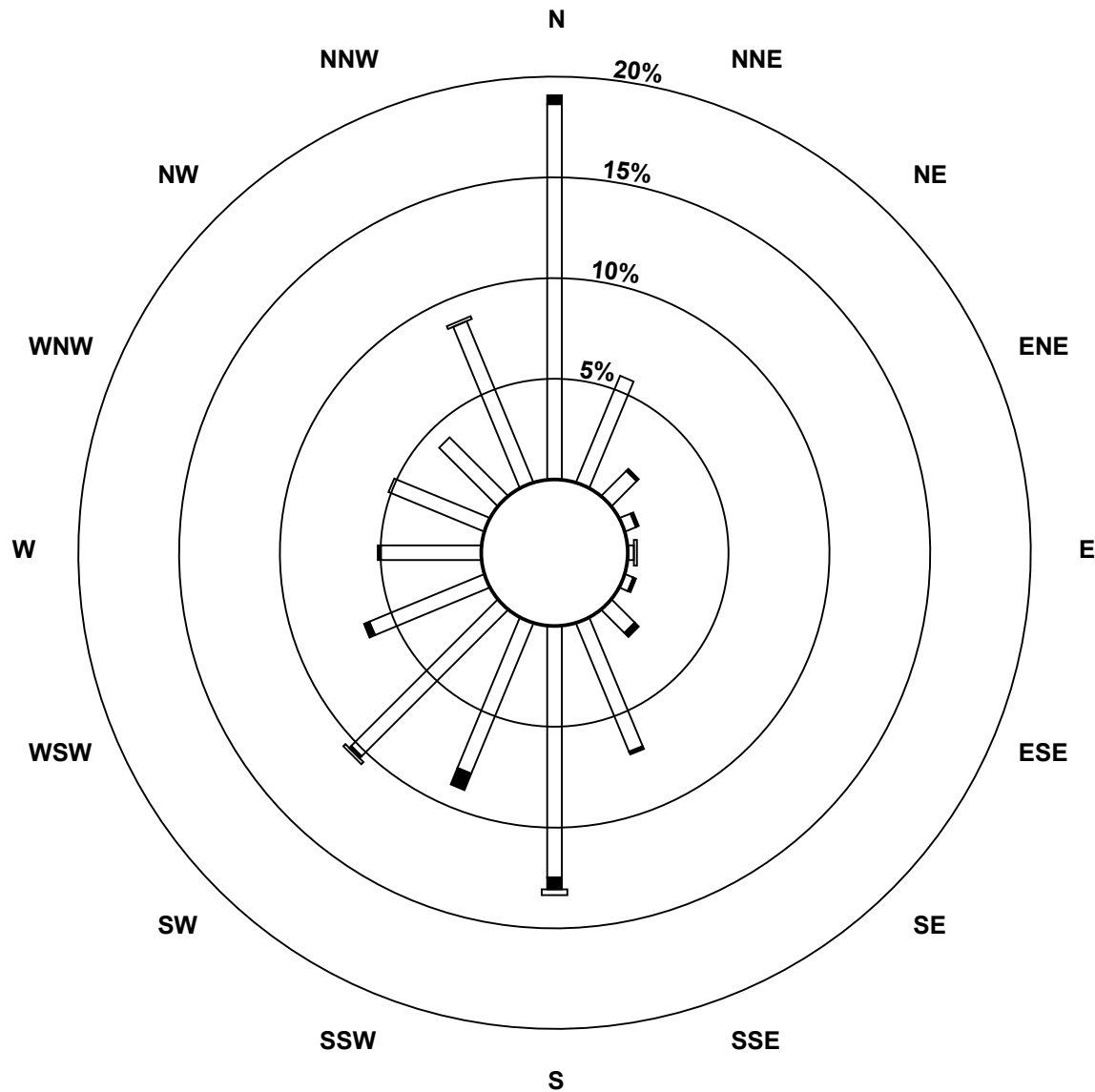
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	127	39	12	4	2	3	11	47	85	55	70	42	34	35	28	59	653
21 - 40	3	0	1	1	0	1	2	1	4	6	1	2	1	0	0	0	23
11 - 80	0	0	0	0	1	0	0	0	2	0	1	0	0	0	0	1	5
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	130	39	13	5	3	4	13	48	91	61	72	44	35	35	28	60	681

Total Number of Valid Hours: 681

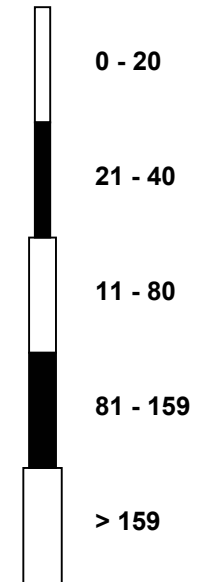
Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

Nitric Oxide (NO) - ppb
Fort McKay South (AMS 13)



Classes (ppb)

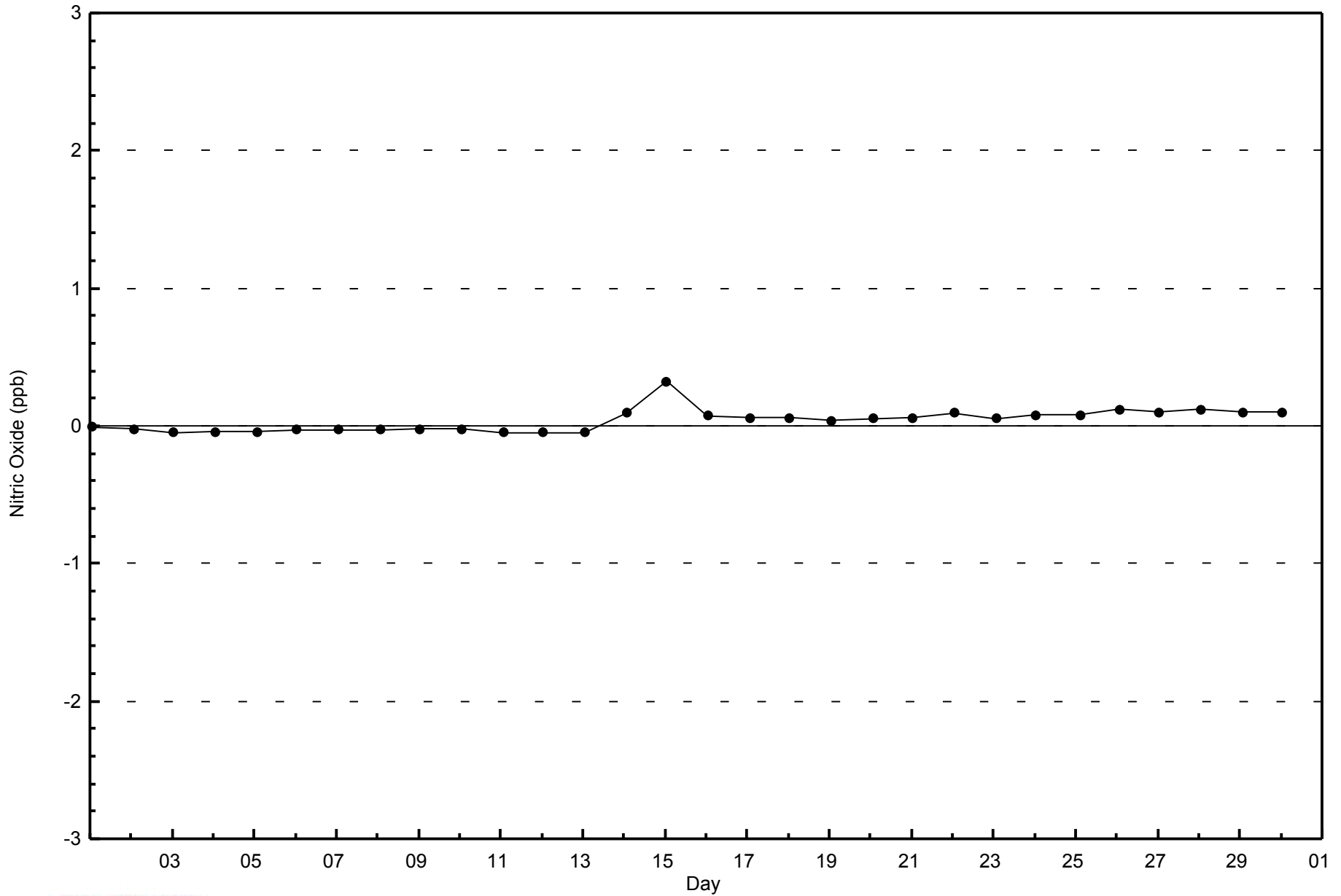


Total Number of Valid Hours: 681



WBEA
Zero Responses

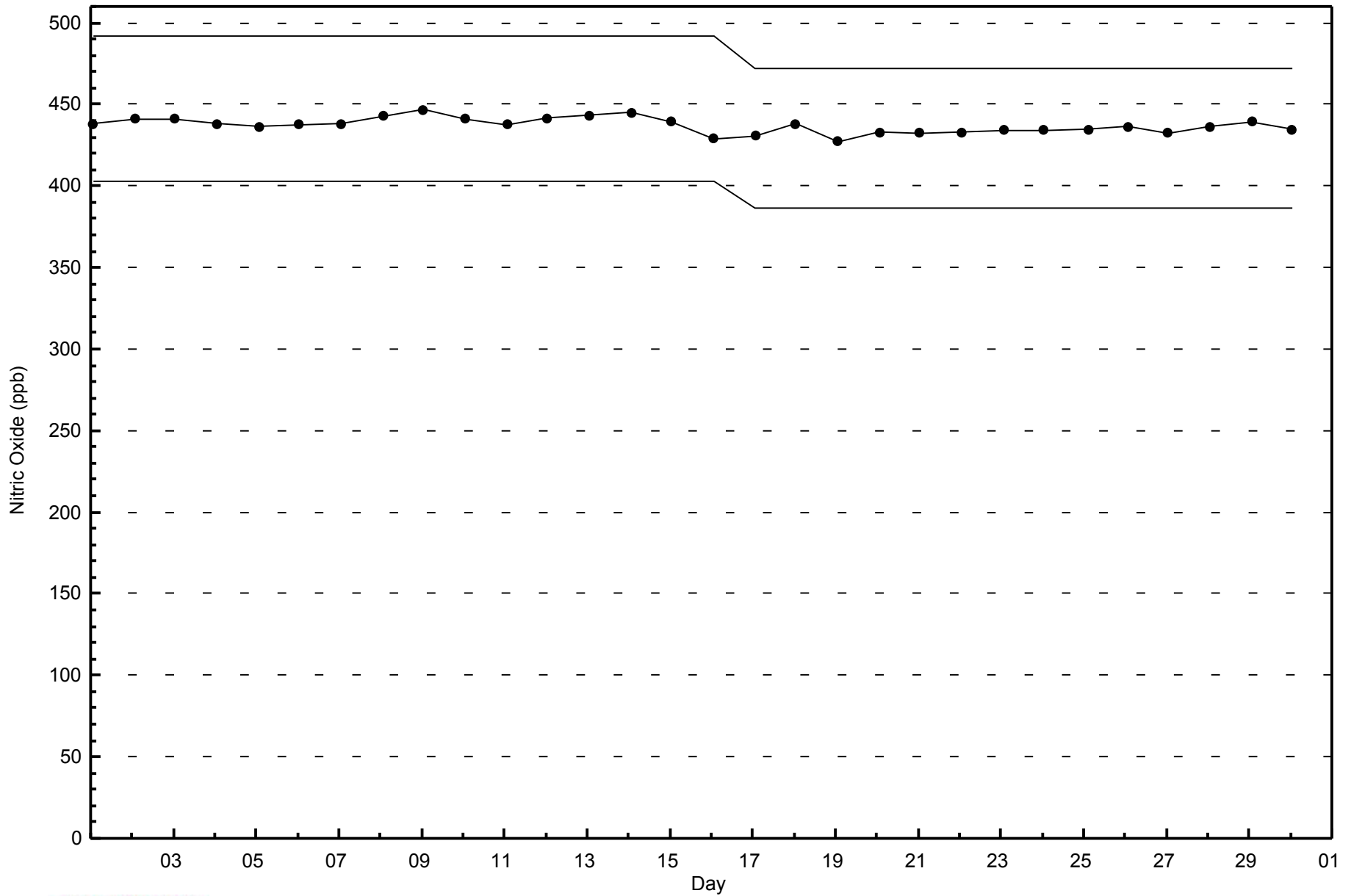
Nitric Oxide (NO) - ppb
Fort McKay South - November 2014





WBEA
Span Responses

Nitric Oxide (NO) - ppb
Fort McKay South - November 2014





Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 31 ppb on Nov 25 00:00	Maximum Daily Average: 18.2 ppb on Nov 26
Minimum Value: 0 ppb on Nov 5 16:00	Hours of Data: 682
Maximum Diurnal Average: 24.0 ppb at hour 2	Hours of Missing Data: 38
Monthly Average: 7.5 ppb	Hours of Calibration: 38
Minimum Daily Average: 1.7 ppb on Nov 7	Percent Operational Time: 100.0
Minimum Diurnal Average: 5.9 ppb at hour 3	
Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 2 Median = 6 Q ₃ = 12 P ₉₀ = 17 P ₉₉ = 28	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	1	Z	1	1	1	1	2	1	1	6	2	1	1	1	1	1	0	1	2	4	4	3	3	3	1.7	6	
2-Nov	3	Z	2	2	2	2	2	2	3	2	7	11	9	9	10	9	7	11	10	6	6	6	5	6	5.6	11	
3-Nov	3	Z	3	4	7	6	7	7	5	6	6	7	11	10	10	10	12	9	9	7	9	11	11	6	7.7	12	
4-Nov	6	Z	1	7	8	5	5	6	6	4	4	4	4	6	5	6	7	5	5	5	5	4	3	4	5.0	8	
5-Nov	4	Z	7	4	3	2	2	2	1	1	1	1	1	0	0	0	0	1	3	8	5	14	9	2	3.1	14	
6-Nov	2	Z	3	9	10	9	7	8	4	4	4	5	5	6	8	7	3	3	6	4	1	2	2	2	4.8	10	
7-Nov	2	Z	2	1	1	1	1	1	2	3	2	2	1	2	2	3	5	2	2	2	2	1	0	1	1.7	5	
8-Nov	1	Z	2	1	1	0	0	0	1	0	1	2	3	2	3	3	3	2	2	3	5	4	2	1	1.8	5	
9-Nov	1	Z	0	0	0	0	0	0	0	0	1	7	8	7	16	7	4	3	2	3	2	3	3	1	2.9	16	
10-Nov	0	Z	1	1	5	2	2	1	1	4	2	1	3	4	4	4	7	9	10	6	2	1	5	6	3.5	10	
11-Nov	4	Z	7	6	3	5	6	7	9	9	6	4	3	4	5	6	5	4	4	3	3	3	2	2	4.8	9	
12-Nov	2	Z	8	5	6	10	10	5	3	7	16	13	7	7	6	6	8	8	11	12	16	15	16	17	9.3	17	
13-Nov	17	Z	16	14	15	16	14	14	14	12	18	17	14	13	14	12	11	11	12	13	14	14	13	12	13.9	18	
14-Nov	12	Z	15	14	9	8	6	6	4	5	C	C	C	C	C	C	C	C	2	3	4	7	4	4	-	15	
15-Nov	4	Z	7	1	7	7	6	11	11	10	5	2	1	1	3	9	5	5	2	1	2	2	3	2	4.6	11	
16-Nov	2	Z	0	0	0	0	1	1	1	4	8	4	3	2	2	3	4	4	4	2	0	0	0	0	1.9	8	
17-Nov	0	Z	0	3	8	14	15	16	14	15	23	17	15	15	16	19	17	16	15	13	11	6	4	4	12.0	23	
18-Nov	6	Z	11	5	2	4	6	5	3	1	1	4	2	1	2	1	0	0	0	0	0	0	0	0	2.3	11	
19-Nov	0	Z	1	0	0	0	0	0	0	0	0	3	2	12	9	10	11	11	11	11	9	10	14	10	5.4	14	
20-Nov	8	Z	6	4	5	6	6	8	11	12	15	15	12	20	24	20	18	17	14	22	21	16	18	10	13.4	24	
21-Nov	12	Z	11	10	5	8	6	5	3	4	6	4	1	4	16	16	4	3	3	3	3	4	3	3	5.8	16	
22-Nov	6	Z	8	7	17	18	12	11	13	13	14	13	12	10	9	9	11	10	5	5	6	7	8	6	9.9	18	
23-Nov	7	Z	8	12	14	10	8	15	14	17	19	16	13	8	12	12	10	11	12	12	14	15	15	16	12.6	19	
24-Nov	15	Z	6	5	2	3	5	7	7	12	15	17	8	8	6	7	14	18	22	24	16	24	29	31	13.0	31	
25-Nov	30	Z	24	Z	21	17	15	15	13	7	14	11	10	14	16	18	19	20	20	19	18	18	17	15	14	16.7	30
26-Nov	15	Z	12	13	17	18	18	19	17	17	23	22	23	24	29	28	28	28	27	16	9	10	5	1	18.2	29	
27-Nov	2	Z	4	4	7	7	11	12	16	15	12	18	19	16	16	17	15	9	6	5	5	13	19	11	11.1	19	
28-Nov	5	Z	4	4	3	9	8	10	11	11	12	11	10	10	10	8	7	6	10	8	7	6	6	6	7.9	12	
29-Nov	13	Z	25	22	20	21	18	16	20	15	3	1	2	1	1	1	1	0	0	0	0	0	0	0	7.8	25	
30-Nov	0	Z	0	0	0	0	0	0	0	0	2	4	13	8	16	15	19	23	21	18	18	18	15	12	8.8	23	

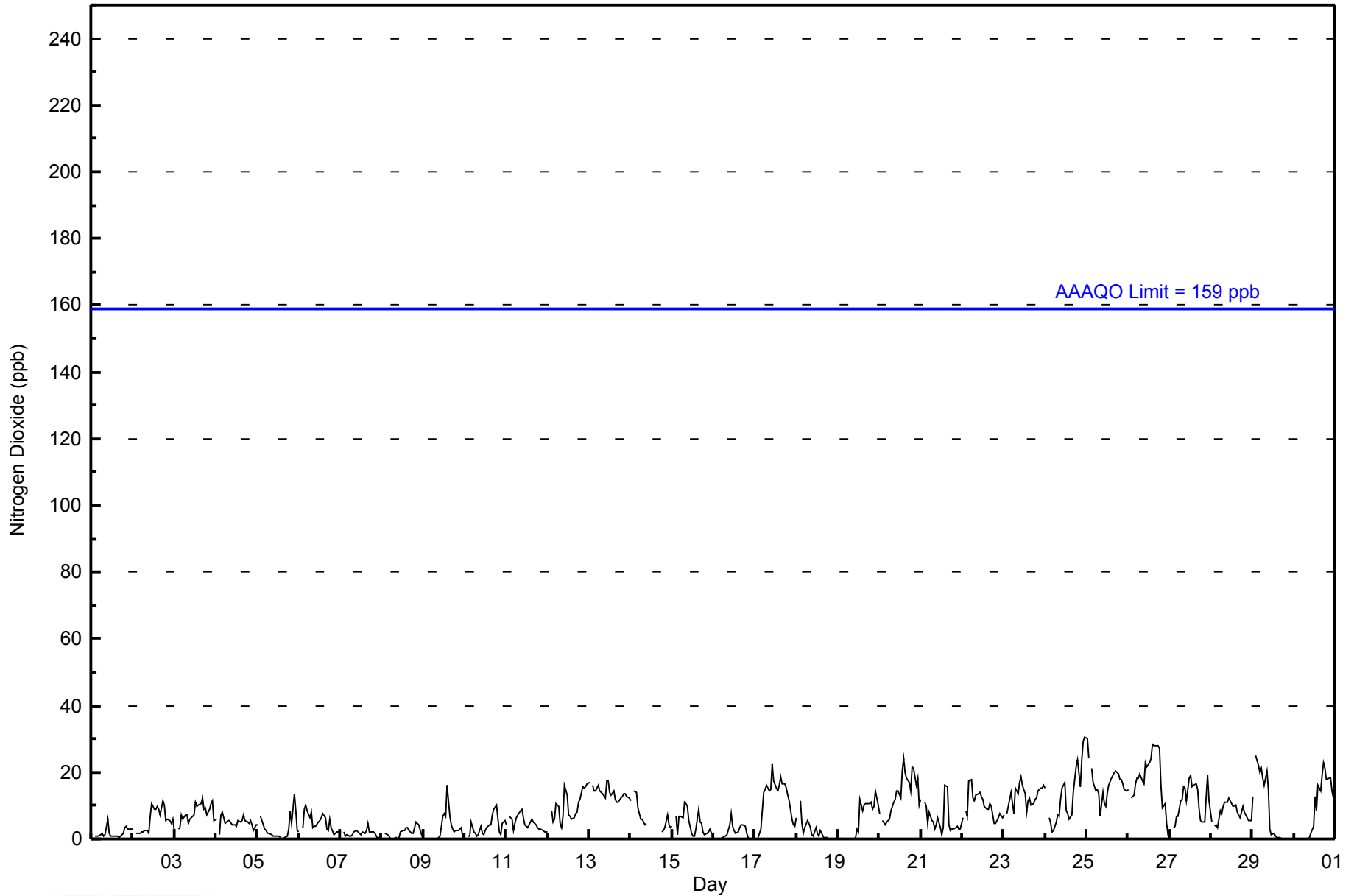
6.1	24.0	5.9	6.0	6.5	6.9	6.6	7.0	6.7	7.4	8.1	8.1	7.6	7.7	9.4	9.1	8.8	8.6	8.4	7.8	7.2	7.9	7.7	6.4	Diurnal Average	
30	24	25	22	20	21	18	19	20	17	23	22	23	24	29	28	28	28	27	24	21	24	29	31	Diurnal Maximum	

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



WBEA
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Fort McKay South - November 2014





WBEA
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Fort McKay South - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	656	96.19	96.19
21 - 40	26	3.81	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Fort McKay South - November 2014

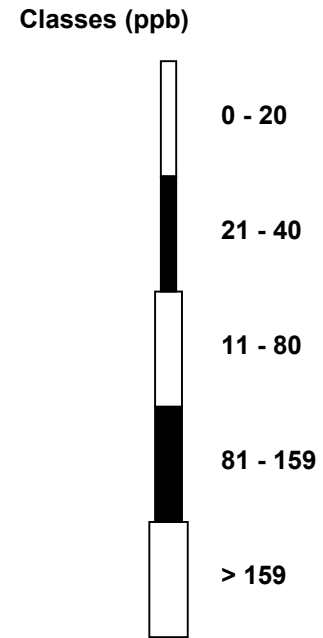
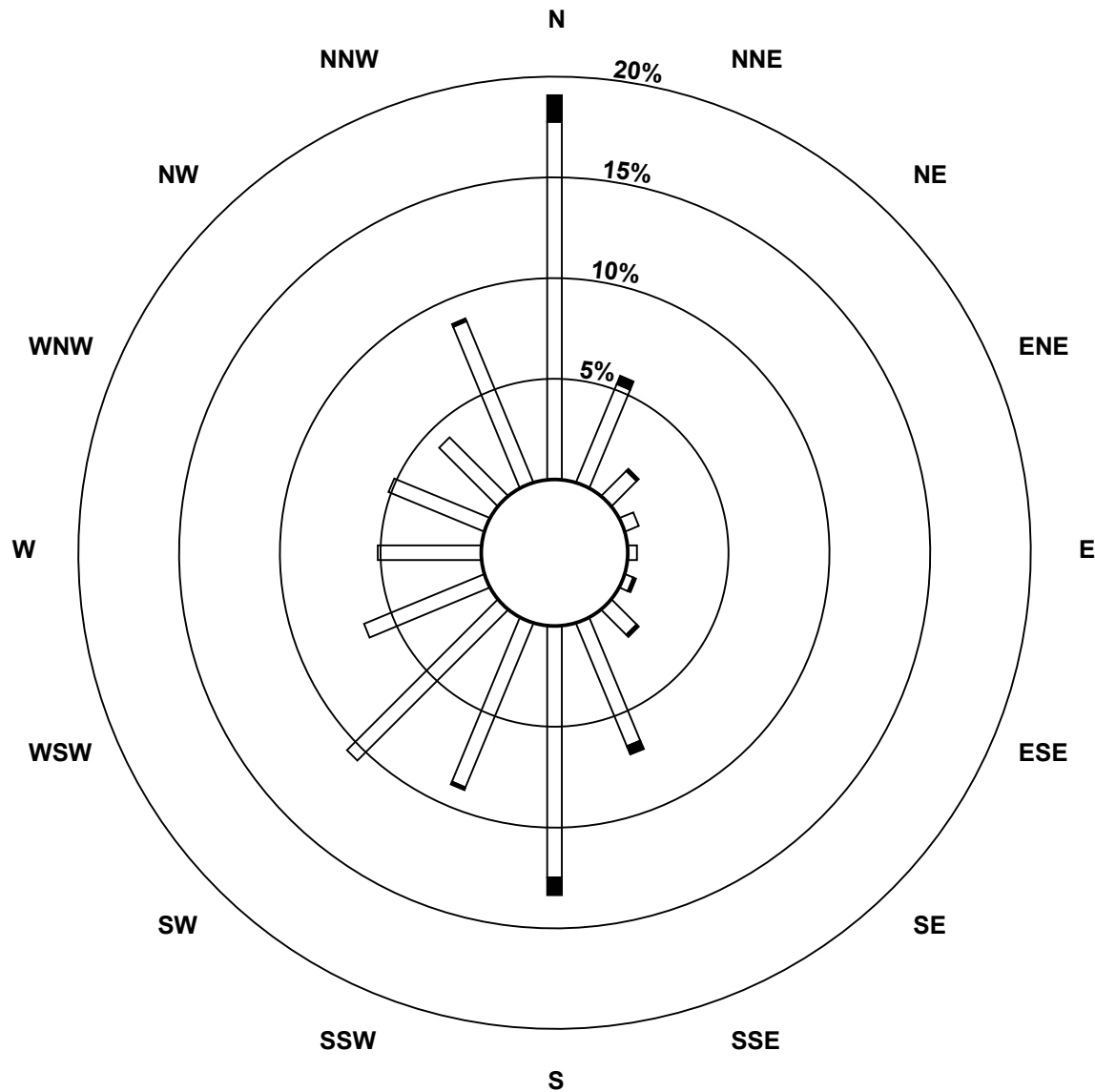
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	121	36	12	5	3	3	12	45	85	60	72	44	35	35	28	59	655
21 - 40	9	3	1	0	0	1	1	3	6	1	0	0	0	0	0	1	26
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	130	39	13	5	3	4	13	48	91	61	72	44	35	35	28	60	681

Total Number of Valid Hours: 681

Total Number of Hours: 720

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

**Nitrogen Dioxide (NO₂) - ppb
Fort McKay South (AMS 13)**

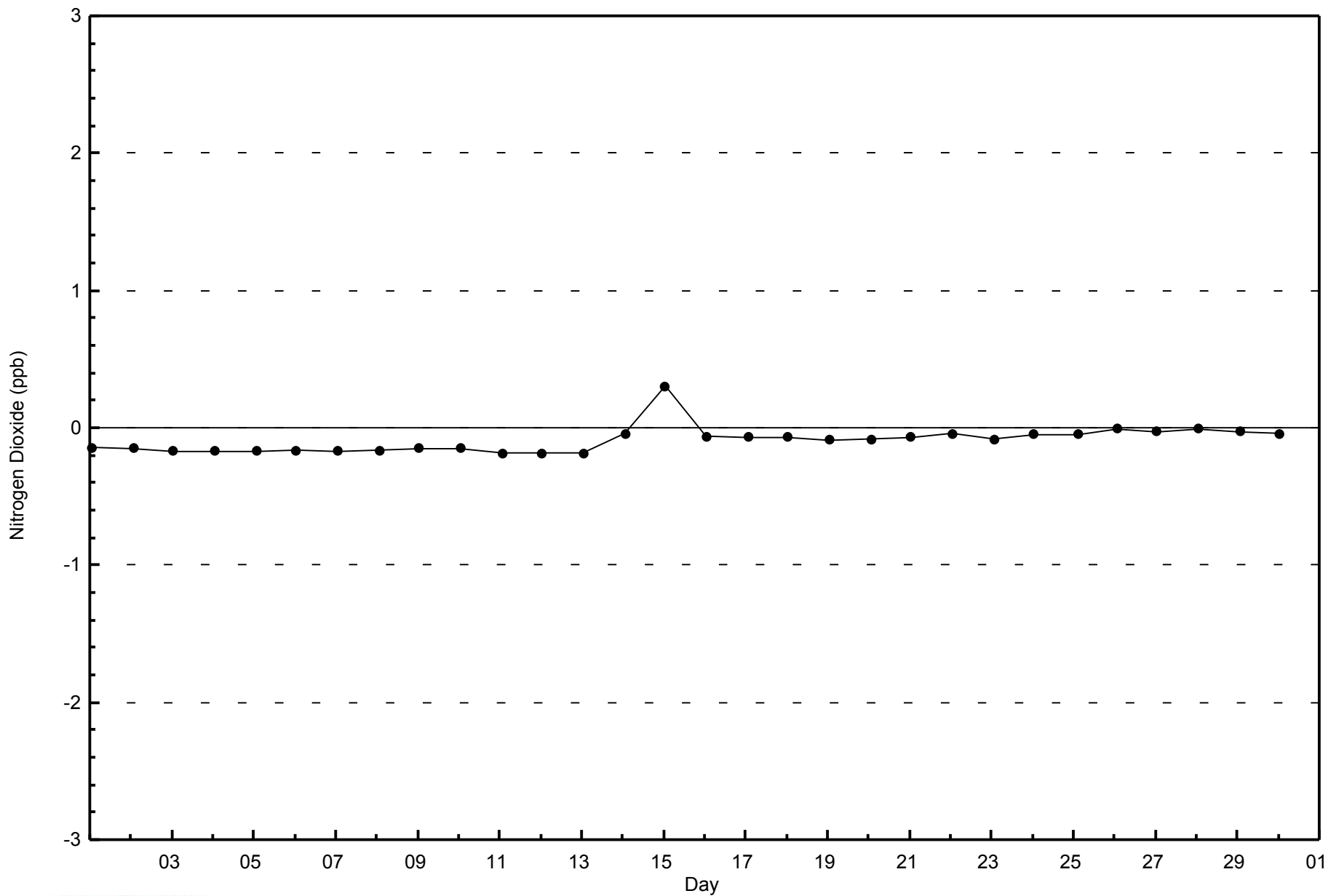


Total Number of Valid Hours: 681



WBEA
Zero Responses

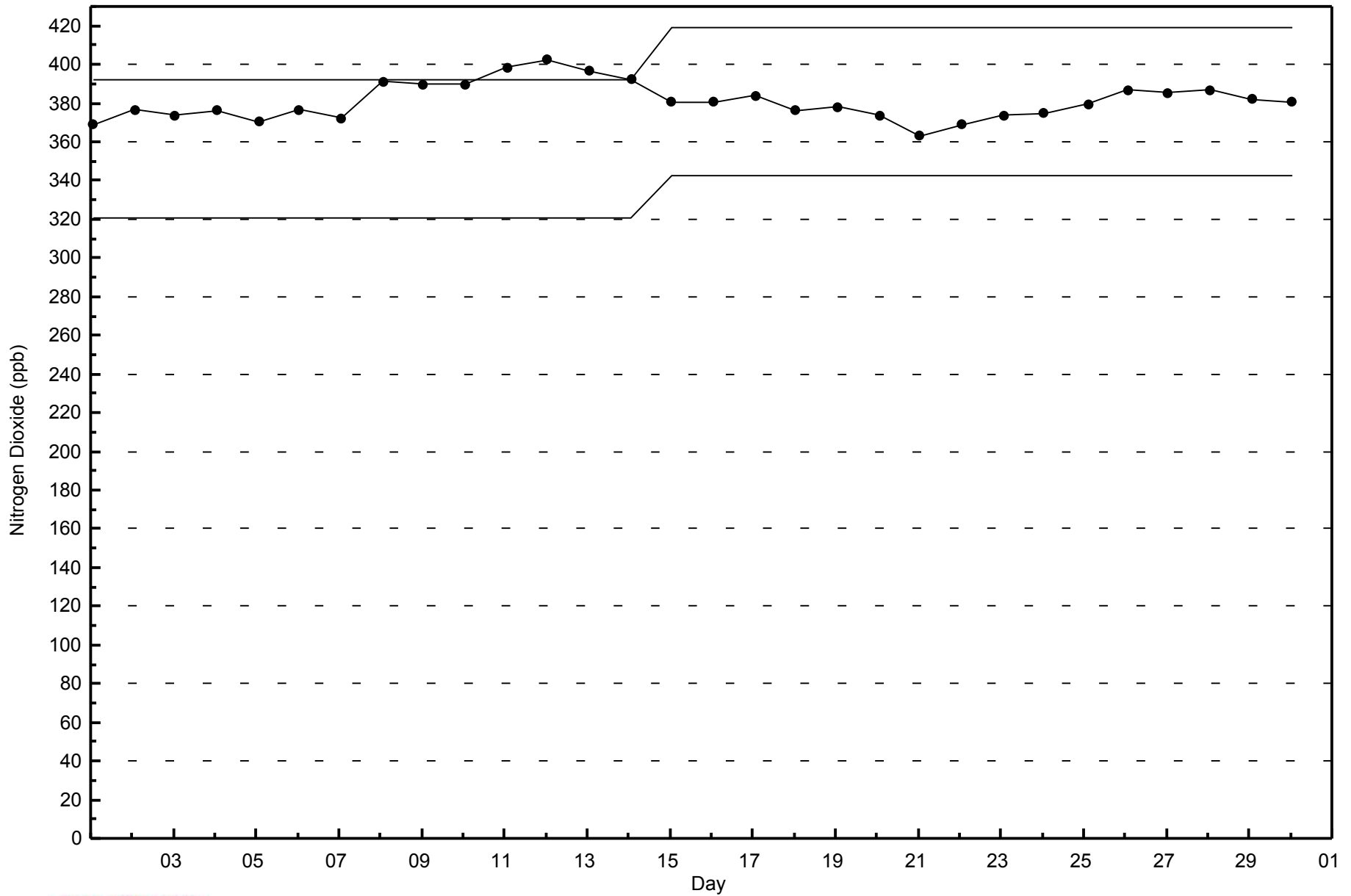
Nitrogen Dioxide (NO₂) - ppb
Fort McKay South - November 2014





WBEA
Span Responses

Nitrogen Dioxide (NO₂) - ppb
Fort McKay South - November 2014





Maximum Value: 89 ppb on Nov 20 15:00	Maximum Daily Average: 31.0 ppb on Nov 26	Hours in Service: 720
Minimum Value: 0 ppb on Nov 5 16:00	Minimum Daily Average: 1.7 ppb on Nov 7	Hours of Data: 682
Maximum Diurnal Average: 24.8 ppb at hour 2	Minimum Diurnal Average: 8.3 ppb at hour 4	Hours of Missing Data: 38
Monthly Average: 10.7 ppb	Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 2 Median = 7 Q ₃ = 15 P ₉₀ = 28 P ₉₉ = 57	Hours of Calibration: 38
		Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	10	Z	1	1	1	2	6	4	6	21	3	1	1	1	1	1	0	1	2	7	13	17	11	17	5.5	21	
2-Nov	20	Z	7	8	12	15	14	14	15	18	30	23	14	12	13	10	8	12	10	6	6	7	11	12	12.8	30	
3-Nov	3	Z	3	4	9	6	11	19	8	14	18	22	22	13	12	12	13	9	10	7	9	11	11	5	10.9	22	
4-Nov	6	Z	1	7	8	5	5	6	6	5	5	5	5	7	6	6	8	6	6	5	6	4	3	8	5.7	8	
5-Nov	7	Z	11	4	3	2	2	2	1	1	1	1	1	0	0	0	0	1	3	10	5	18	11	2	3.9	18	
6-Nov	2	Z	3	9	10	9	7	8	3	4	4	6	7	8	10	9	5	8	17	5	1	2	2	2	6.2	17	
7-Nov	2	Z	2	1	1	1	1	1	2	3	2	2	1	2	2	3	5	2	2	2	1	1	0	1	1.7	5	
8-Nov	1	Z	2	1	1	0	0	0	1	0	1	2	3	3	3	3	3	2	2	3	5	4	2	1	1.9	5	
9-Nov	0	Z	0	0	0	0	0	0	0	0	1	10	11	8	20	7	4	3	2	2	2	3	3	1	3.5	20	
10-Nov	0	Z	1	1	5	2	2	1	1	4	2	1	3	4	5	4	7	9	10	6	2	1	5	6	3.6	10	
11-Nov	4	Z	7	6	3	5	6	7	9	10	8	5	4	5	6	6	5	4	4	3	3	3	2	2	5.1	10	
12-Nov	2	Z	9	5	6	11	11	5	3	9	25	20	10	9	7	7	8	8	11	14	31	30	29	31	13.1	31	
13-Nov	41	Z	44	39	29	31	29	36	37	32	40	37	25	21	21	16	13	12	14	19	29	35	34	32	28.9	44	
14-Nov	31	Z	35	28	9	8	6	6	4	5	C	C	C	C	C	C	C	C	3	3	4	9	4	4	-	35	
15-Nov	4	Z	7	1	7	7	6	11	11	11	6	2	1	1	3	10	5	5	2	1	2	2	3	2	4.8	11	
16-Nov	2	Z	0	0	0	0	1	1	1	4	8	4	2	2	2	3	4	4	4	2	0	0	0	0	2.0	8	
17-Nov	0	Z	0	3	12	24	29	31	35	33	57	27	23	21	23	33	37	46	43	29	18	7	4	4	23.4	57	
18-Nov	7	Z	12	5	2	4	6	4	3	1	1	4	2	1	2	1	0	0	0	0	0	0	0	0	2.4	12	
19-Nov	0	Z	1	0	0	0	0	0	0	0	0	3	2	14	9	10	11	11	11	11	9	10	14	10	5.5	14	
20-Nov	8	Z	6	4	5	6	6	8	11	12	18	20	17	50	89	46	20	18	18	61	33	16	19	10	21.9	89	
21-Nov	12	Z	11	10	5	8	5	5	3	4	7	4	1	4	19	16	4	3	3	3	3	4	3	3	6.1	19	
22-Nov	6	Z	8	7	17	18	12	11	13	15	17	16	14	11	10	9	11	10	5	5	5	7	8	6	10.5	18	
23-Nov	7	Z	8	12	14	10	8	16	14	21	27	30	25	12	16	15	11	13	32	53	66	66	60	36	24.8	66	
24-Nov	17	Z	6	5	2	3	5	7	7	13	18	21	10	8	6	7	14	18	22	24	15	24	33	36	14.0	36	
25-Nov	40	Z	25	Z	21	17	15	15	13	7	16	13	14	20	23	23	22	21	21	22	23	24	23	21	20	19.9	40
26-Nov	19	Z	19	29	41	35	32	28	25	32	45	39	39	39	59	53	49	55	34	16	9	10	5	1	31.0	59	
27-Nov	2	Z	4	4	7	7	11	12	16	17	14	28	28	22	21	20	16	9	6	5	5	15	19	11	12.9	28	
28-Nov	5	Z	4	4	3	9	8	10	11	12	14	14	12	12	11	9	7	6	10	8	7	6	6	6	8.4	14	
29-Nov	22	Z	43	33	24	28	20	18	27	18	3	2	2	1	0	1	1	0	0	0	0	0	0	0	10.5	43	
30-Nov	0	Z	0	0	0	0	0	0	0	0	2	5	19	11	20	15	19	24	23	18	18	18	15	12	9.5	24	

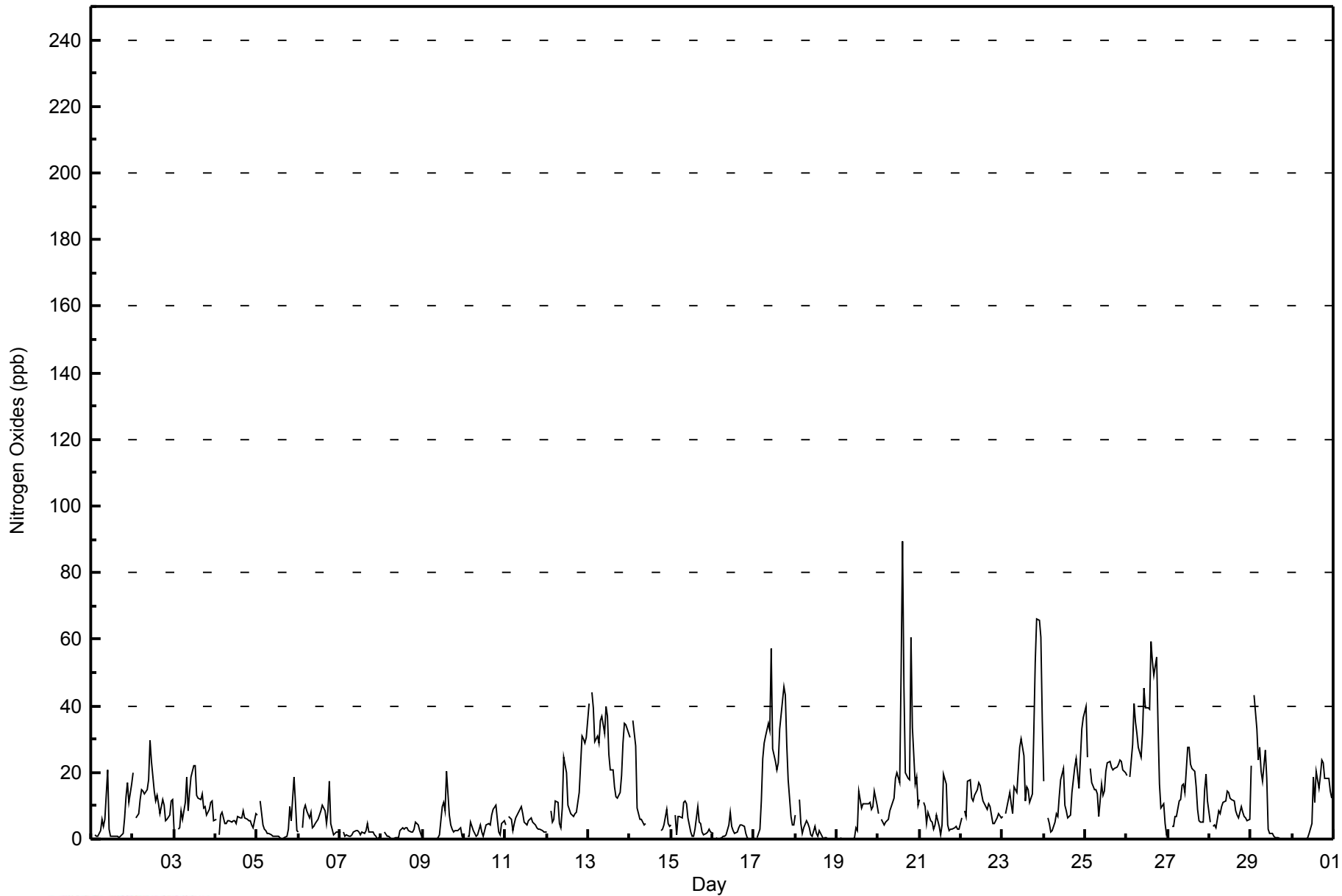
9.4	24.8	8.8	8.3	8.4	9.0	8.8	9.4	9.3	11.2	13.5	12.7	11.2	11.3	14.6	12.2	10.6	11.0	10.9	11.7	11.1	11.8	11.3	9.4	Diurnal Average	
41	25	44	39	41	35	32	36	37	33	57	39	39	50	89	53	49	55	43	61	66	66	60	36	Diurnal Maximum	

Z - zerospan C - Calibration



WBEA
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Fort McKay South - November 2014





WBEA
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Fort McKay South - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	574	84.16	84.16
21 - 40	88	12.90	97.07
41 - 80	19	2.79	99.85
81 - 159	1	0.15	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720



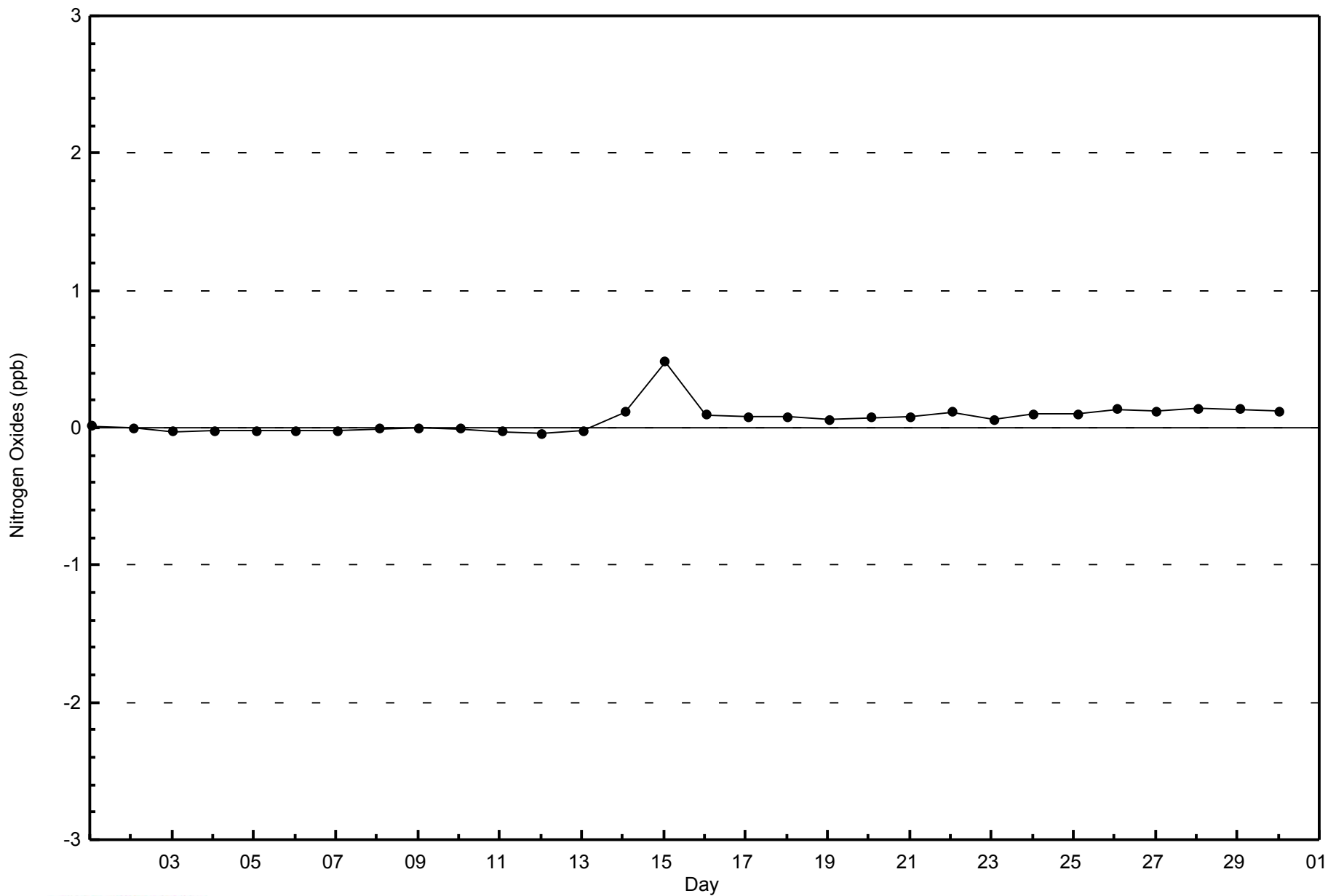
WBEA
Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Fort McKay South - November 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	32	12	4	2	2	7	39	62	46	59	40	34	34	28	55	574
21 - 40	9	7	0	1	0	1	5	8	23	13	12	3	0	1	0	4	87
41 - 80	3	0	1	0	1	1	1	1	5	2	1	1	1	0	0	1	19
81 - 159	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	130	39	13	5	3	4	13	48	91	61	72	44	35	35	28	60	681

Total Number of Valid Hours: 681

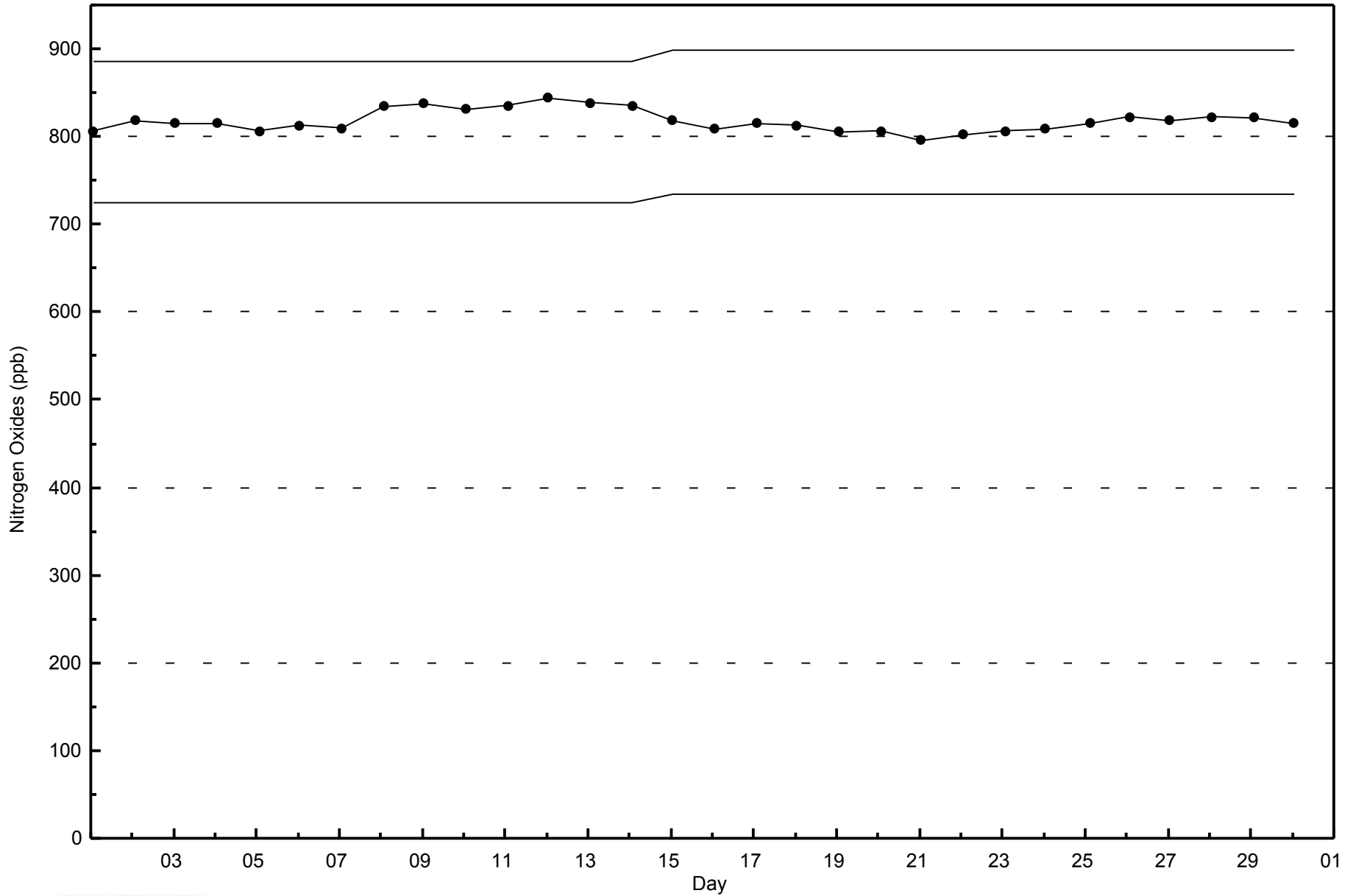
Total Number of Hours: 720





WBEA
Span Responses

Nitrogen Oxides (NO_x) - ppb
Fort McKay South - November 2014





Number of Exceedences (AAAQO): 24-hr: 0	Hours in Service: 720
Maximum Value: 18.6 µg/m ³ on Nov 20 17:00	Maximum Daily Average: 11.8 µg/m ³ on Nov 20
Minimum Value: 0.4 µg/m ³ on Nov 7 04:00	Hours of Data: 719
Maximum Diurnal Average: 4.8 µg/m ³ at hour 11	Hours of Missing Data: 1
Monthly Average: 4.17 µg/m ³	Hours of Calibration: 0
Minimum Daily Average: 1.1 µg/m ³ on Nov 16	Percent Operational Time: 99.9
Minimum Diurnal Average: 3.7 µg/m ³ at hour 24	
Percentiles: P ₁ = 0.8 P ₁₀ = 1.7 Q ₁ = 2.3 Median = 3.1 Q ₃ = 5.3 P ₉₀ = 8.1 P ₉₉ = 15.5	

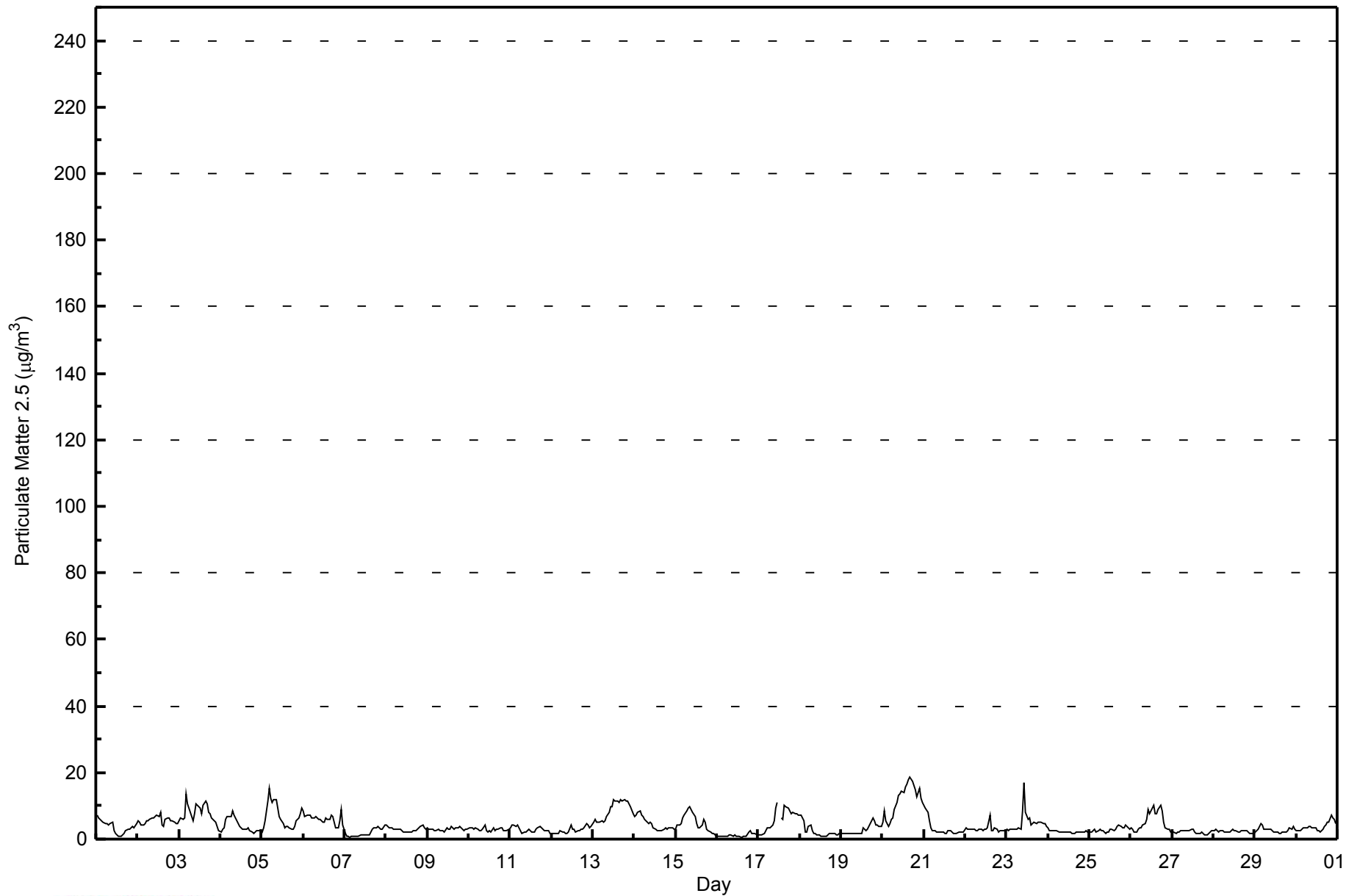
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Nov	7.0	6.2	6.1	5.4	5.1	4.5	4.6	4.4	4.7	4.9	2.4	1.6	1.2	1.0	1.0	1.2	1.8	2.7	3.0	3.0	3.3	3.6	3.3	4.5	3.6	7.0																						
2-Nov	5.6	5.1	4.4	4.3	4.8	5.5	5.6	6.1	6.5	6.2	6.9	7.2	6.8	8.2	4.0	3.7	6.0	6.2	6.2	5.5	5.4	5.0	4.7	4.8	5.6	8.2																						
3-Nov	5.7	6.3	5.9	6.6	13.8	10.6	7.9	6.7	5.7	7.6	10.6	9.8	9.2	7.8	10.2	11.5	10.6	8.0	7.4	6.5	5.6	4.9	3.8	2.5	7.7	13.8																						
4-Nov	2.1	2.8	3.5	5.7	6.7	7.0	8.4	7.0	5.6	4.7	3.7	3.2	3.2	3.0	3.0	3.4	2.6	2.2	1.8	2.1	2.3	2.4	2.7	4.0	8.4																							
5-Nov	2.1	3.3	5.7	11.5	15.0	12.4	11.0	12.0	11.7	9.2	7.0	5.8	4.7	3.5	3.7	3.7	3.3	3.0	2.9	4.0	5.3	6.5	7.6	9.3	6.8	15.0																						
6-Nov	8.5	6.9	7.1	7.2	7.1	6.5	6.4	6.7	6.2	6.1	6.0	5.3	5.2	6.2	5.8	5.8	7.0	6.6	5.1	3.5	3.5	5.7	9.0	4.1	6.1	9.0																						
7-Nov	1.9	1.0	0.7	0.4	0.8	0.7	0.8	0.9	1.0	1.3	1.2	1.2	1.1	1.2	1.3	2.1	3.2	3.5	3.5	3.7	3.5	3.0	3.0	4.1	1.9	4.1																						
8-Nov	4.1	4.0	3.6	3.4	2.9	2.9	2.8	2.8	2.9	2.6	2.1	2.0	1.9	1.9	2.0	2.1	2.4	2.7	3.0	3.4	3.6	4.1	3.6	3.0	2.9	4.1																						
9-Nov	3.3	3.2	3.0	3.0	2.5	2.6	2.8	2.6	2.4	2.3	2.1	3.2	2.9	2.9	3.7	2.9	3.6	3.5	3.3	3.8	2.9	2.7	2.8	3.1	3.0	3.8																						
10-Nov	3.4	3.6	3.6	3.2	3.5	2.9	2.7	2.7	2.9	4.2	2.4	2.0	2.3	2.2	3.3	2.7	3.1	2.9	3.3	3.5	2.6	2.5	2.4	3.0	2.9	4.2																						
11-Nov	3.6	4.1	4.4	3.9	4.2	3.4	2.7	1.8	2.1	2.2	2.4	3.2	1.9	2.0	2.2	2.8	3.3	3.6	3.5	2.9	2.5	2.4	2.5	1.8	2.9	4.4																						
12-Nov	1.6	1.8	1.8	1.6	1.9	2.4	2.3	2.0	1.9	1.8	2.3	4.3	2.9	2.8	2.3	2.5	2.5	3.2	3.1	3.4	4.8	4.4	3.6	4.0	2.7	4.8																						
13-Nov	5.2	6.1	5.3	5.1	5.0	5.3	5.0	5.7	6.6	8.0	9.7	9.8	11.9	11.4	11.4	11.2	11.7	11.5	11.9	11.6	11.4	10.8	9.5	7.7	8.7	11.9																						
14-Nov	6.8	7.1	8.0	8.5	7.1	6.6	6.1	5.3	4.8	4.9	4.7	3.6	2.9	2.4	2.7	2.6	2.7	3.2	3.5	3.2	3.3	3.5	3.6	3.0	4.6	8.5																						
15-Nov	2.9	4.1	4.3	4.9	6.3	7.3	8.4	9.5	9.7	8.7	8.2	6.6	4.6	3.3	3.3	4.3	5.8	5.0	2.9	2.5	2.1	1.9	1.7	1.3	5.0	9.7																						
16-Nov	1.0	1.1	0.9	0.9	0.8	0.9	1.0	1.1	1.1	1.0	1.1	0.9	0.8	0.7	0.6	0.7	0.9	1.0	2.1	2.5	1.7	1.5	1.6	1.5	1.1	2.5																						
17-Nov	1.4	1.4	1.5	1.8	2.6	3.2	3.3	3.5	4.4	5.7	9.2	11.0	M	6.4	5.8	10.0	9.6	9.5	8.3	7.7	8.0	7.6	7.8	7.4	6.0	11.0																						
18-Nov	7.3	7.3	5.4	2.2	2.0	3.7	4.3	2.7	1.8	1.8	1.3	1.2	1.0	0.7	0.9	0.9	1.1	1.8	1.8	1.6	1.6	1.5	1.5	1.5	2.4	7.3																						
19-Nov	1.6	1.7	1.7	1.7	1.6	1.6	1.7	1.7	1.7	1.8	1.6	1.7	1.8	3.2	2.7	3.1	3.9	4.9	6.2	5.5	4.4	4.1	3.8	4.0	2.8	6.2																						
20-Nov	5.0	8.5	5.7	3.9	4.6	6.1	6.3	8.7	11.2	13.2	13.4	14.3	14.2	15.7	16.5	17.9	18.6	17.2	16.0	14.8	12.8	15.2	12.1	11.1	11.8	18.6																						
21-Nov	10.2	9.3	8.2	5.5	3.6	2.7	2.4	2.3	2.1	2.1	2.1	2.2	1.7	1.7	2.5	2.6	2.0	1.9	1.8	1.8	2.1	2.3	1.9	2.2	3.2	10.2																						
22-Nov	3.4	3.1	3.1	2.9	3.0	3.0	2.4	2.4	2.8	3.2	2.7	2.8	3.1	3.4	7.0	2.7	2.6	3.4	2.8	2.1	2.3	2.4	2.4	2.7	3.0	7.0																						
23-Nov	2.8	2.7	2.9	3.1	2.8	2.8	3.0	3.3	3.1	8.3	16.8	7.9	5.8	6.4	4.4	4.8	5.0	4.8	5.2	5.1	5.2	4.7	4.5	3.8	5.0	16.8																						
24-Nov	3.4	2.6	2.7	2.6	2.5	2.4	2.3	2.1	2.0	2.3	2.1	2.2	2.0	1.7	1.8	2.0	2.2	2.3	2.2	2.0	2.1	2.4	2.1	2.2	2.2	3.4																						
25-Nov	2.3	2.0	2.4	2.9	2.3	2.6	2.9	2.7	2.4	1.8	2.1	2.2	3.0	3.1	2.5	2.9	3.6	4.3	3.8	3.5	3.3	4.1	4.0	3.1	2.9	4.3																						
26-Nov	3.2	2.8	2.2	2.1	2.8	3.3	3.5	4.3	4.6	6.1	8.9	7.5	9.3	10.3	7.8	7.6	9.0	10.0	8.5	5.1	3.6	3.2	2.8	2.2	5.4	10.3																						
27-Nov	2.3	2.0	1.8	1.9	2.0	2.3	2.6	2.4	2.6	2.5	2.6	2.9	3.0	2.2	1.8	1.8	1.9	2.0	1.8	1.5	1.4	1.6	2.3	2.5	2.2	3.0																						
28-Nov	2.7	2.8	2.4	2.3	2.4	2.5	2.1	2.1	2.3	2.2	2.3	3.0	2.4	2.4	2.1	2.0	2.4	2.3	2.5	2.5	2.2	1.9	1.7	1.6	2.3	3.0																						
29-Nov	2.0	2.4	2.8	4.7	4.1	3.2	2.8	2.8	2.8	3.1	2.4	2.0	2.1	2.0	1.6	1.8	2.1	2.0	2.2	2.7	3.2	3.1	3.6	2.9	2.7	4.7																						
30-Nov	2.4	2.3	2.7	2.8	3.5	3.4	3.4	3.7	4.0	3.5	3.4	3.2	2.5	2.4	2.2	2.9	3.9	4.0	5.1	5.3	7.0	6.3	6.1	4.6	3.8	7.0																						
																								3.8	3.9	3.8	3.9	4.2	4.1	4.0	4.1	4.2	4.5	4.8	4.5	4.0	4.1	4.0	4.2	4.6	4.7	4.5	4.2	4.1	4.2	4.1	3.7	Diurnal Average
																								10.2	9.3	8.2	11.5	15.0	12.4	11.0	12.0	11.7	13.2	16.8	14.3	14.2	15.7	16.5	17.9	18.6	17.2	16.0	14.8	12.8	15.2	12.1	11.1	Diurnal Maximum

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



WBEA
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort McKay South - November 2014





WBEA
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort McKay South - November 2014

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	527	73.30	73.30
6 - 15	163	22.67	95.97
16 - 25	7	0.97	96.94
26 - 80	0	0.00	96.94
> 81.0	0	0.00	96.94

Total Number of Valid Hours: 719

Total Number of Hours: 720



WBEA
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Fort McKay South - November 2014

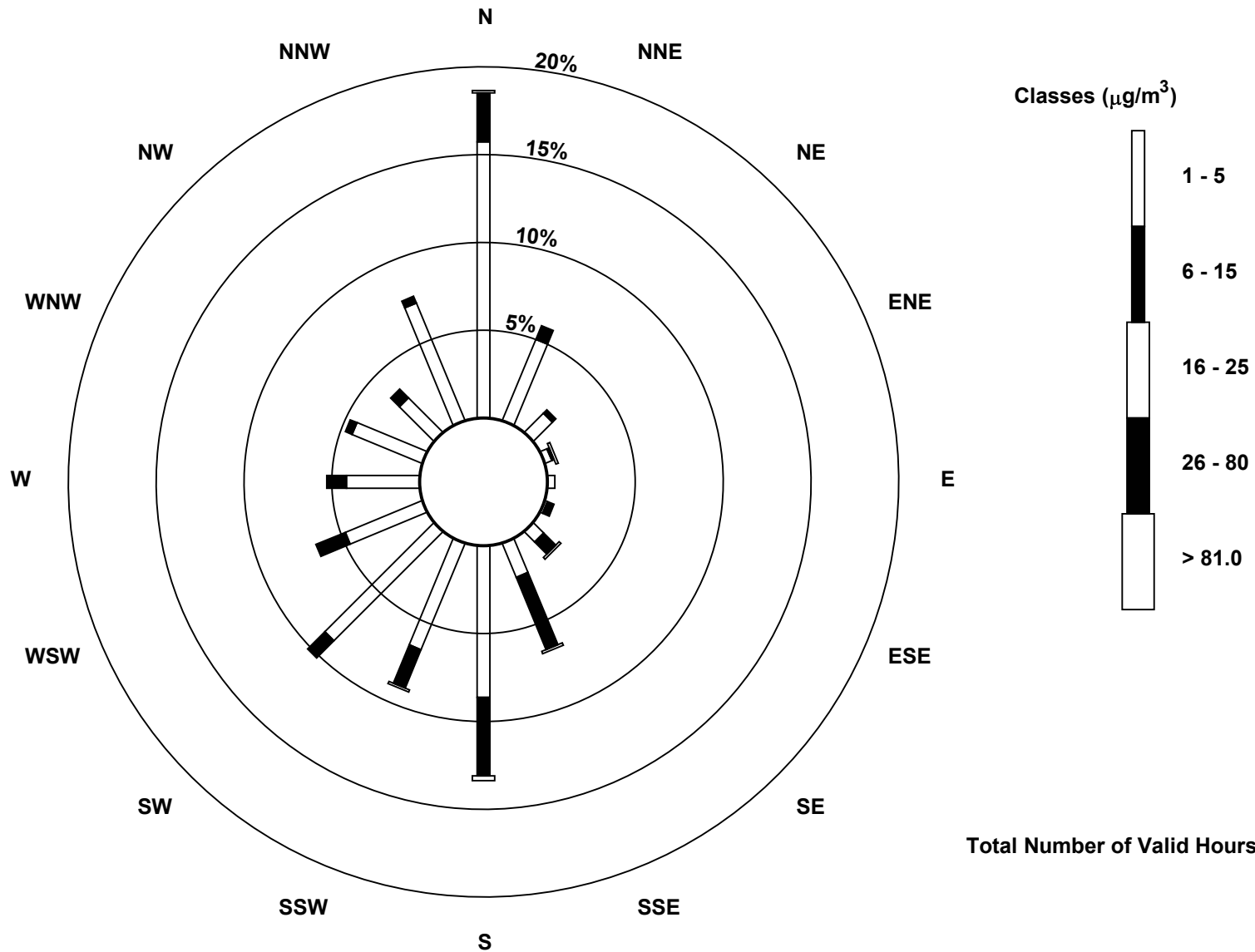
Concentration Ranges (μg/m ³)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	113	36	11	3	3	1	6	15	62	47	63	34	30	31	20	52	527
6 - 15	20	6	2	1	0	3	7	32	32	17	10	13	8	3	5	3	162
16 - 25	1	0	0	1	0	0	1	1	2	1	0	0	0	0	0	0	7
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	134	42	13	5	3	4	14	48	96	65	73	47	38	34	25	55	696

Total Number of Valid Hours: 718

Total Number of Hours: 720

Wood Buffalo Environmental Association
 Wind Rose Nov 2014

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
 Fort McKay South (AMS 13)



Total Number of Valid Hours: 718

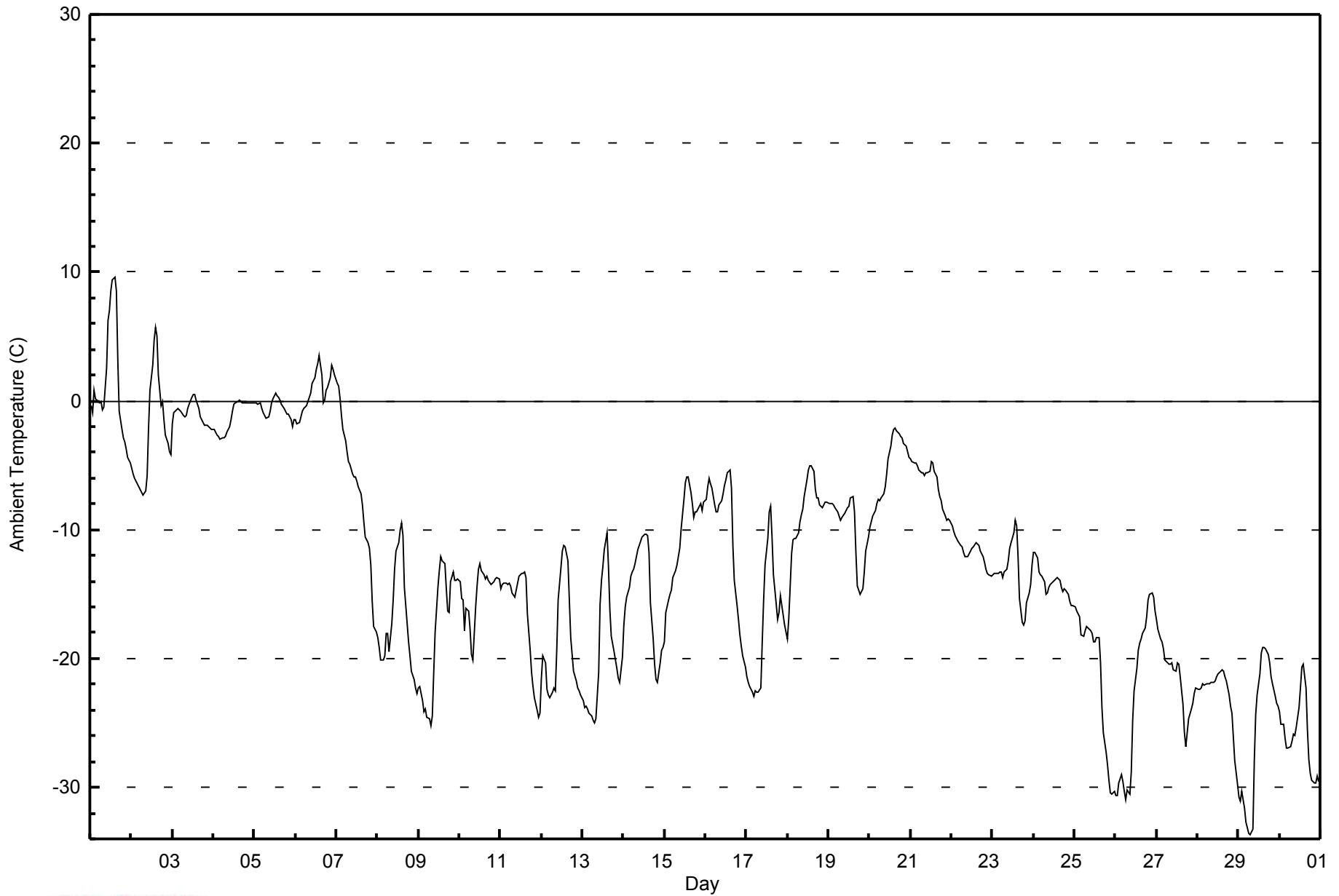


Maximum Value: 9.6 C on Nov 1 15:00		Maximum Daily Average: 1.3 C on Nov 1		Hours in Service: 720																																												
Minimum Value: -33.7 C on Nov 29 08:00		Minimum Daily Average: -26.0 C on Nov 30		Hours of Data: 720																																												
Maximum Diurnal Average: -8.7 C at hour 15		Minimum Diurnal Average: -14.6 C at hour 24		Hours of Missing Data: 0																																												
Monthly Average: -12.64 C		Percentiles: P ₁ = -31.0 P ₁₀ = -23.9 Q ₁ = -19.6 Median = -13.2 Q ₃ = -5.8 P ₉₀ = -0.5 P ₉₉ = 5.3		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-Nov	-0.4	-0.9	0.8	0.2	0.0	-0.1	-0.1	-0.7	-0.5	2.6	6.3	7.0	8.5	9.4	9.6	8.5	3.2	-0.8	-2.2	-2.8	-3.2	-3.8	-4.4	-4.9	1.3	9.6																						
2-Nov	-5.2	-5.6	-6.0	-6.4	-6.6	-6.9	-7.1	-7.3	-7.0	-5.8	-2.1	0.8	2.7	4.8	5.7	5.1	2.0	-0.4	0.0	-1.4	-2.6	-3.3	-4.0	-4.1	-2.5	5.7																						
3-Nov	-1.8	-0.9	-0.7	-0.6	-0.7	-0.8	-1.2	-1.3	-1.1	-0.6	-0.3	0.2	0.5	0.5	0.1	-0.6	-1.2	-1.4	-1.7	-1.9	-1.9	-2.0	-2.1	-2.2	-1.0	0.5																						
4-Nov	-2.2	-2.4	-2.6	-2.8	-2.9	-2.9	-2.8	-2.7	-2.4	-2.0	-1.5	-0.8	-0.3	-0.2	0.0	0.1	0.0	-0.1	-0.2	-0.2	-0.1	-0.1	-0.2	-0.1	-1.2	0.1																						
5-Nov	-0.1	-0.2	-0.2	-0.2	-0.6	-0.9	-1.1	-1.3	-1.3	-0.8	-0.1	0.2	0.6	0.4	0.3	0.1	-0.3	-0.6	-0.8	-1.0	-1.0	-1.4	-2.0	-1.5	-0.6	0.6																						
6-Nov	-1.5	-1.8	-1.7	-1.3	-0.8	-0.6	-0.4	-0.1	0.3	0.6	1.3	1.8	2.4	2.9	3.5	2.1	-0.2	0.1	0.8	1.1	1.8	2.8	2.4	2.1	0.7	3.5																						
7-Nov	1.4	1.1	0.2	-1.1	-2.2	-3.1	-4.0	-4.7	-5.0	-5.6	-5.9	-5.9	-6.2	-6.7	-7.2	-8.1	-9.4	-10.6	-11.0	-11.4	-12.7	-15.6	-17.5	-17.9	-7.0	1.4																						
8-Nov	-18.4	-19.2	-20.2	-20.2	-19.8	-18.1	-18.1	-19.5	-17.3	-15.5	-13.1	-11.6	-11.0	-10.0	-9.4	-10.4	-14.4	-17.3	-18.7	-19.8	-21.0	-21.6	-22.2	-22.7	-17.1	-9.4																						
9-Nov	-22.3	-22.2	-23.3	-24.1	-23.9	-24.5	-24.7	-25.2	-24.4	-21.1	-17.9	-14.5	-13.2	-12.1	-12.4	-12.7	-14.6	-16.4	-16.4	-14.0	-13.2	-13.9	-14.0	-13.8	-18.1	-12.1																						
10-Nov	-14.1	-15.3	-15.5	-17.8	-16.2	-16.4	-17.7	-19.7	-20.2	-16.0	-14.3	-13.1	-12.6	-13.2	-13.5	-13.8	-13.7	-14.0	-14.3	-14.1	-14.0	-13.8	-13.7	-13.8	-15.0	-12.6																						
11-Nov	-14.6	-14.3	-14.2	-14.1	-14.3	-14.2	-14.3	-14.9	-15.3	-14.7	-14.1	-13.6	-13.4	-13.4	-13.3	-13.8	-16.6	-19.4	-21.1	-22.2	-23.0	-24.0	-24.5	-24.2	-16.7	-13.3																						
12-Nov	-21.6	-19.8	-20.3	-22.4	-22.8	-23.0	-22.6	-22.3	-22.5	-19.4	-15.4	-13.0	-11.7	-11.3	-11.3	-12.4	-15.5	-18.4	-19.7	-21.0	-21.7	-22.2	-22.5	-22.8	-19.0	-11.3																						
13-Nov	-23.3	-23.8	-23.7	-23.9	-24.3	-24.5	-24.8	-25.0	-24.7	-21.0	-15.7	-13.9	-12.8	-11.6	-10.3	-12.8	-16.2	-18.3	-19.4	-20.1	-20.8	-21.5	-21.8	-19.9	-19.8	-10.3																						
14-Nov	-17.4	-16.0	-15.2	-14.5	-13.6	-13.3	-13.1	-12.7	-11.5	-11.2	-10.9	-10.5	-10.3	-10.3	-10.4	-11.8	-15.6	-18.5	-20.4	-21.6	-21.8	-20.4	-19.4	-19.1	-15.0	-10.3																						
15-Nov	-18.7	-16.4	-15.5	-15.0	-14.6	-13.7	-13.2	-12.8	-12.1	-11.5	-9.9	-7.7	-6.4	-5.9	-5.9	-7.1	-8.0	-9.1	-8.7	-8.7	-8.1	-7.9	-8.5	-7.8	-10.5	-5.9																						
16-Nov	-7.6	-6.6	-6.1	-6.4	-6.8	-8.0	-8.7	-8.6	-8.1	-7.7	-7.2	-6.5	-6.1	-5.6	-5.4	-6.8	-11.2	-13.9	-15.8	-16.9	-18.1	-19.0	-19.8	-20.7	-10.3	-5.4																						
17-Nov	-21.4	-21.8	-22.2	-22.6	-23.0	-22.5	-22.6	-22.6	-22.3	-18.7	-15.4	-12.7	-10.7	-8.7	-8.2	-10.5	-13.5	-15.8	-17.0	-16.4	-15.1	-16.6	-17.4	-17.9	-17.3	-8.2																						
18-Nov	-18.5	-16.9	-11.8	-10.7	-10.6	-10.6	-10.3	-9.4	-8.8	-8.4	-7.4	-6.1	-5.3	-5.0	-5.0	-5.5	-6.9	-7.5	-7.5	-8.1	-8.3	-8.0	-7.9	-7.8	-8.9	-5.0																						
19-Nov	-7.9	-8.0	-7.9	-8.1	-8.3	-8.6	-8.9	-9.3	-9.0	-8.8	-8.5	-8.3	-8.2	-7.5	-7.5	-8.6	-11.7	-14.4	-15.1	-14.8	-14.6	-13.2	-11.6	-10.5	-10.0	-7.5																						
20-Nov	-9.8	-9.4	-8.9	-8.5	-8.0	-7.6	-7.8	-7.6	-7.2	-6.7	-5.7	-4.5	-3.5	-2.7	-2.2	-2.1	-2.4	-2.5	-2.7	-2.8	-3.3	-3.6	-4.0	-4.3	-5.3	-2.1																						
21-Nov	-4.5	-4.7	-4.8	-4.8	-5.0	-5.4	-5.5	-5.6	-5.7	-5.6	-5.5	-5.4	-4.8	-4.8	-5.5	-5.9	-6.9	-7.5	-7.8	-8.4	-8.9	-9.3	-9.2	-9.3	-6.3	-4.5																						
22-Nov	-9.7	-10.1	-10.5	-10.7	-10.9	-11.2	-11.4	-11.7	-12.1	-12.1	-11.9	-11.6	-11.4	-11.4	-11.0	-11.1	-11.2	-11.6	-12.1	-12.6	-13.0	-13.4	-13.5	-13.6	-11.7	-9.7																						
23-Nov	-13.5	-13.4	-13.4	-13.4	-13.3	-13.2	-13.7	-13.3	-13.1	-12.4	-11.5	-11.0	-10.2	-9.3	-9.7	-12.1	-15.3	-17.1	-17.4	-17.1	-15.7	-14.9	-14.2	-12.8	-13.4	-9.3																						
24-Nov	-11.8	-11.8	-12.2	-13.3	-13.5	-13.6	-14.0	-15.0	-14.9	-14.5	-14.2	-14.0	-13.9	-13.8	-13.8	-13.9	-14.5	-14.8	-14.6	-14.7	-15.0	-15.6	-15.8	-15.9	-14.1	-11.8																						
25-Nov	-16.0	-16.4	-16.6	-16.8	-18.2	-18.2	-17.9	-17.5	-17.6	-17.9	-18.0	-18.7	-18.7	-18.4	-18.4	-20.4	-23.8	-25.8	-27.2	-28.3	-29.4	-30.4	-30.5	-30.3	-21.3	-16.0																						
26-Nov	-30.6	-30.6	-29.7	-29.0	-29.5	-30.3	-30.9	-30.2	-30.6	-28.8	-24.8	-22.5	-20.7	-19.4	-18.8	-18.5	-18.1	-17.6	-16.8	-15.4	-15.0	-14.9	-15.2	-16.3	-23.1	-14.9																						
27-Nov	-17.0	-17.7	-18.5	-18.7	-19.3	-20.2	-20.3	-20.5	-20.5	-20.3	-20.9	-21.0	-20.3	-20.4	-21.4	-23.6	-25.7	-26.8	-25.7	-24.7	-23.9	-23.5	-22.7	-22.2	-21.5	-17.0																						
28-Nov	-22.4	-22.4	-22.3	-22.0	-22.1	-22.0	-22.0	-21.9	-21.9	-21.9	-21.8	-21.4	-21.2	-21.1	-20.9	-21.0	-21.4	-21.8	-22.8	-23.7	-24.2	-26.0	-27.9	-29.7	-22.7	-20.9																						
29-Nov	-30.8	-31.1	-30.3	-31.6	-32.7	-33.1	-33.6	-33.7	-33.2	-27.9	-24.4	-22.9	-21.2	-19.6	-19.1	-19.1	-19.3	-19.7	-20.4	-21.4	-22.0	-22.9	-23.5	-23.7	-25.7	-19.1																						
30-Nov	-24.1	-25.1	-25.1	-26.2	-27.0	-27.0	-26.8	-26.4	-25.8	-26.0	-25.3	-23.8	-22.2	-20.7	-20.4	-22.3	-25.6	-27.8	-28.9	-29.4	-29.7	-29.6	-29.2	-29.5	-26.0	-20.4																						
																								-13.5	-13.5	-13.3	-13.6	-13.7	-13.8	-14.0	-14.1	-13.9	-12.7	-11.2	-10.2	-9.4	-8.8	-8.7	-9.6	-11.6	-13.0	-13.5	-13.8	-14.0	-14.3	-14.6	-14.6	Diurnal Average
																								1.4	1.1	0.8	0.2	0.0	-0.1	-0.1	-0.1	0.3	2.6	6.3	7.0	8.5	9.4	9.6	8.5	3.2	0.1	0.8	1.1	1.8	2.8	2.4	2.1	Diurnal Maximum



WBEA
Hourly Averages

Ambient Temperature (AT) - C
Fort McKay South - November 2014





WBEA
Cumulative Frequency Distribution

Ambient Temperature (AT) - C
Fort McKay South - November 2014

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	172	23.89	23.89
-20 - 0	503	69.86	93.75
0 - 10	45	6.25	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

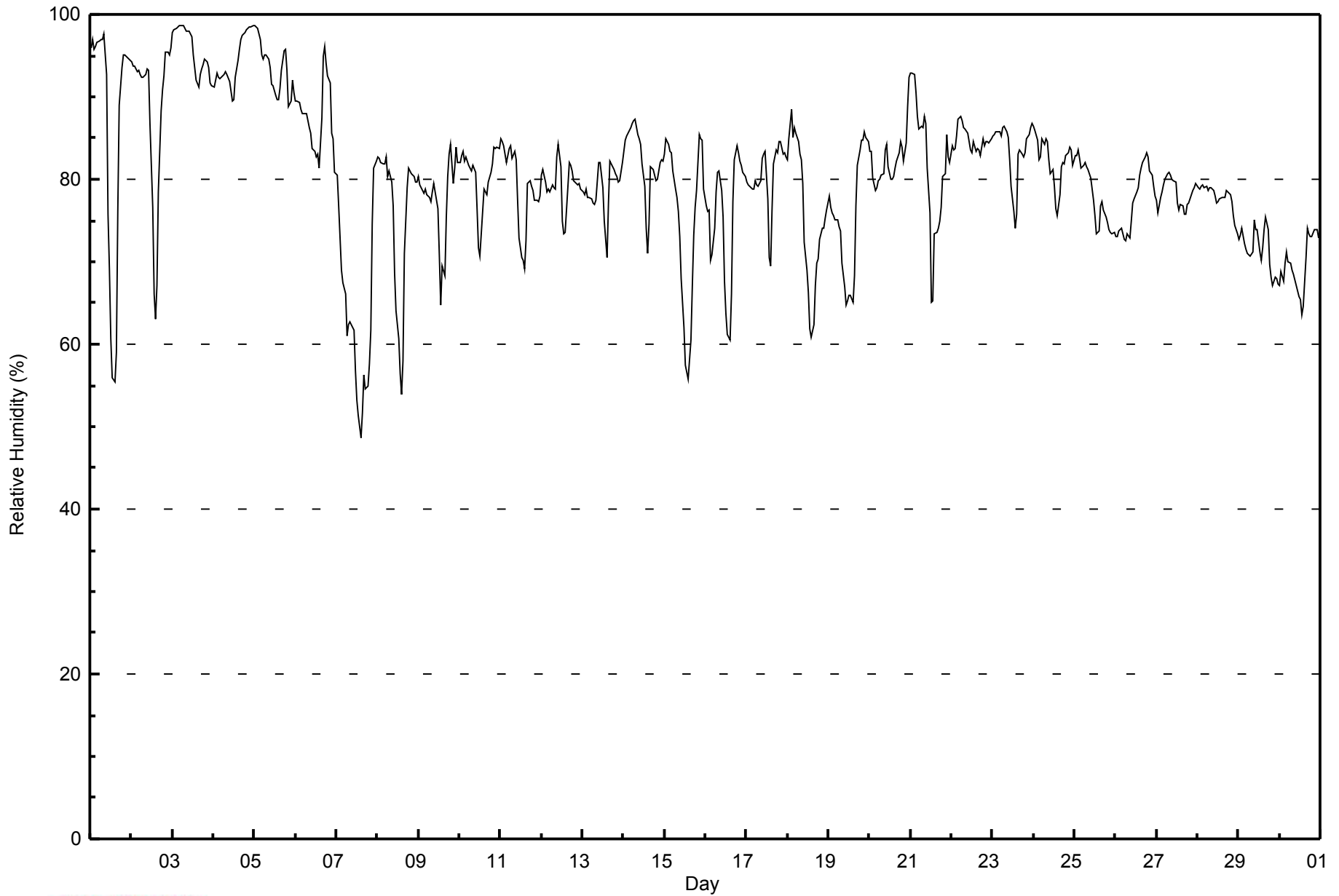


Maximum Value: 99 % on Nov 3 06:00 Maximum Daily Average: 95.6 % on Nov 3																		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Minimum Value: 49 % on Nov 7 15:00 Minimum Daily Average: 63.6 % on Nov 7 Maximum Diurnal Average: 83.5 % at hour 2 Minimum Diurnal Average: 71.8 % at hour 14 Monthly Average: 80.3 % Percentiles: P ₁ = 55 P ₁₀ = 69 Q ₁ = 76 Median = 81 Q ₃ = 85 P ₉₀ = 93 P ₉₉ = 98																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	96	97	96	96	97	97	97	97	98	93	76	69	61	56	55	59	76	89	94	95	95	95	95	94	86.3	98
2-Nov	94	94	94	93	93	93	92	92	93	93	93	87	77	66	63	67	78	88	91	93	95	95	95	96	88.2	96
3-Nov	98	98	98	98	99	99	99	98	98	98	98	97	95	94	92	91	93	93	94	95	94	94	92	91	95.6	99
4-Nov	91	92	93	92	92	93	93	93	93	92	91	89	90	92	94	96	97	97	98	98	98	98	99	99	94.2	99
5-Nov	99	99	98	97	95	95	95	95	95	94	92	91	90	90	90	91	93	96	96	93	89	90	92	90	93.4	99
6-Nov	90	89	89	89	88	88	88	87	86	86	84	83	83	83	81	88	95	96	94	92	92	86	85	81	87.6	96
7-Nov	80	77	73	69	67	66	61	62	63	62	62	57	53	51	49	52	56	55	55	58	62	75	81	82	63.6	82
8-Nov	83	83	82	82	82	83	80	81	80	77	69	64	61	56	54	58	71	79	81	81	81	80	80	80	75.2	83
9-Nov	80	79	79	78	79	78	78	77	78	80	79	76	71	65	69	68	75	80	83	84	80	81	84	82	77.7	84
10-Nov	82	83	83	82	83	82	81	81	82	81	76	72	71	73	79	78	78	80	81	82	84	84	84	84	80.2	84
11-Nov	85	85	84	82	83	84	84	83	83	82	77	73	71	70	69	72	79	80	79	79	77	78	77	78	78.9	85
12-Nov	80	81	80	78	79	79	79	79	79	83	84	82	75	73	74	79	82	82	81	80	79	79	79	79	79.4	84
13-Nov	78	78	79	78	78	78	77	77	77	82	82	80	79	75	70	77	82	82	81	81	80	80	80	82	78.9	82
14-Nov	83	85	85	86	86	87	87	87	85	85	84	82	79	74	71	75	81	81	80	80	80	82	82	82	82.1	87
15-Nov	83	85	84	83	83	81	79	78	76	73	68	62	57	57	56	60	67	73	77	79	85	85	85	79	74.8	85
16-Nov	77	76	76	70	71	74	78	81	81	79	75	68	64	61	61	66	77	82	84	83	82	82	81	80	75.4	84
17-Nov	80	79	79	79	79	80	79	79	80	83	83	83	78	70	70	76	82	84	83	85	84	83	83	83	80.1	85
18-Nov	82	85	88	85	86	86	85	83	82	79	72	69	66	62	61	62	67	70	70	73	74	74	75	76	75.6	88
19-Nov	78	77	76	76	75	75	74	74	70	67	65	65	66	66	65	68	77	82	84	85	85	86	85	85	75.1	86
20-Nov	83	83	80	79	79	80	80	81	81	83	84	82	80	80	80	81	82	83	85	84	82	84	89	92	82.4	92
21-Nov	93	93	93	91	88	86	86	86	88	87	81	76	65	65	73	74	74	75	77	80	81	85	83	82	81.7	93
22-Nov	84	84	84	85	87	88	87	86	86	86	85	84	83	85	83	84	84	83	85	84	85	85	84	85	84.7	88
23-Nov	85	86	86	86	86	85	86	86	86	85	82	79	76	74	76	83	84	83	83	83	85	85	86	87	83.5	87
24-Nov	86	86	85	82	83	85	84	85	85	82	81	81	79	76	76	78	81	82	82	83	83	84	84	82	82.3	86
25-Nov	83	83	84	82	81	82	82	82	81	80	79	77	76	73	74	77	77	76	75	75	74	74	73	74	78.1	84
26-Nov	73	73	74	74	73	73	73	73	73	75	77	78	78	79	81	81	82	83	83	83	81	81	79	78	77.4	83
27-Nov	77	76	78	79	79	80	81	81	80	80	80	80	77	76	77	77	76	76	77	77	78	79	79	79	78.3	81
28-Nov	79	79	79	79	79	79	79	79	79	79	78	77	77	78	78	78	78	79	78	78	77	76	74	73	77.9	79
29-Nov	73	73	74	72	72	71	71	71	71	75	74	74	71	70	72	74	75	74	70	68	67	68	68	67	71.5	75
30-Nov	67	69	68	70	71	70	70	69	68	68	67	66	66	64	65	71	74	73	73	73	74	74	73	73	69.8	74
83.5 83.5 83.3 82.4 82.4 82.4 82.2 82.1 81.9 81.6 79.3 76.8 73.8 71.8 71.9 74.7 79.2 81.2 81.8 82.1 82.2 82.7 82.9 82.5																		Diurnal Average								
99 99 98 98 99 99 99 98 98 98 98 97 95 94 94 96 97 97 98 98 98 98 99 99																		Diurnal Maximum								



WBEA
Hourly Averages

Relative Humidity (RH) - %
Fort McKay South - November 2014





Maximum Speed: 13 km/h on Nov 16 03:00	Maximum Daily Speed Average: 8.1 km/h on Nov 7	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 16 20:00	Minimum Daily Speed Average: 1.1 km/h on Nov 23	Hours of Data: 719
Maximum Diurnal Speed Average: 1.7 km/h at hour 20	Minimum Diurnal Speed Average: 0.9 km/h at hour 8	Hours of Missing Data: 1
Monthly Average Velocity: 1.2 km/h 309.9 deg	Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 2 Median = 4 Q ₃ = 6 P ₉₀ = 8 P ₉₉ = 12	Percent Operational Time: 99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	SSW2	SSW3	WSW2	SSE2	SSE1	S2	S1	S2	S2	SSE3	S4	SW5	SW6	SW7	SW7	SW5	SW3	SW3	S3	SW2	SSW2	SSW2	SSW1	SW2	SSW2.7	SW7
2-Nov	SSW2	SW2	SSW2	SW2	SW2	SSW1	SSW2	S2	SW1	SW1	AF	ESE4	SSE5	SSE5	SE5	SSE4	S5	S4	S5	S3	S3	SSW2	SSW2	S4	S2.6	SE5
3-Nov	S6	S4	S3	S4	SSE4	SSW4	S4	SSW3	SW1	N3	NNW4	NNW4	N6	N7	NNE6	NNE6	NNE6	N6	N6	N4	N4	N4	NE5	ENE4	NNE1.6	N7
4-Nov	E2	SE3	E4	SE4	SE4	SSE4	ESE3	NE4	N2	NNE2	NNE3	NE2	N2	NNE2	ENE2	NE3	N3	NE2	NNE3	N2	N2	N2	N1	NNW1	NE1.6	SE4
5-Nov	NW2	WSW2	WSW2	WSW6	W6	W4	WSW3	WSW4	W6	W5	W5	WSW6	WSW7	WSW7	W5	W4	SE1	SSE2	SE2	SSW5	SSW5	S4	SSE3	S5	WSW3.4	WSW7
6-Nov	SSE5	SSE5	SSE6	SSE6	SSE8	SSE7	SSE8	SSE8	SSE10	SSE9	SSE8	SSE8	S6	SSE5	SSE5	SSW3	SW2	SSW3	SSW5	WSW3	W5	NW8	NW8	NNW9	S3.8	SSE10
7-Nov	NW6	NW10	NW11	NW12	NW11	NW10	NNW12	NNW9	NNW8	NNW12	NNW10	NNW12	NNW13	NNW12	NNW11	NNW8	NNW6	NW6	NNW5	NNW6	NNW5	W2	WNW2	WNW2	NNW8.1	NNW13
8-Nov	SW2	WSW3	WSW3	WSW2	SW2	WSW6	W3	W2	WNW5	WNW5	WNW6	NW6	NW6	NNW4	NW4	NW3	WSW3	WSW3	WSW3	SW3	SW3	SW3	SW3	SW2	W2.7	WNW6
9-Nov	SSE1	WSW1	S1	SW3	ESE0	SW2	SW3	SW2	SSW1	NNW1	NNE1	NW2	NE4	N7	NNE6	NNW5	WNW3	WSW2	W2	NNW5	N10	N5	NNW3	NNW5	NNW1.9	N10
10-Nov	NNW5	NNW5	NNW6	WNW3	WNW5	WNW4	WSW3	WSW1	NW3	NNW5	NNW6	NNW7	N11	N12	N11	N10	N9	N7	N6	NNW6	WNW4	WNW4	WNW4	WNW3	NNW5.0	N12
11-Nov	NW3	NW3	NNW5	N7	NNW6	N5	NNE6	NNE4	NNE1	N3	N4	NW5	N4	N4	NNW2	N1	SW2	SW2	WSW2	SW3	SW3	SW2	SW2	SW2	NNW2.2	N7
12-Nov	SSW1	S1	SSW1	SSW2	SSW1	SSW2	SW3	SW2	SSW3	S3	SSW4	S6	S6	SE6	SE6	SSE4	SSW2	S4	SW3	SSW2	S2	S3	S3	S3	S2.6	SE6
13-Nov	S3	S3	S4	S3	S2	SW1	SW2	SSW2	SSW2	SSE2	SE3	SSE3	SE5	SE4	SE3	WSW1	W2	W2	WSW3	SW3	WSW2	SW3	WSW2	SSW1	S1.8	SE5
14-Nov	S1	NW0	ENE1	NNW1	NW1	N0	SW0	NNW1	N5	NNW6	N7	N8	N7	N6	NW4	W1	WSW2	SSW2	SW2	SW2	ENE1	SW3	SSW4	SSE3	NNW1.4	N8
15-Nov	S4	S5	S5	S5	S6	S7	S8	S7	S8	S7	S8	SW7	WSW5	WNW5	N7	N8	N9	N9	NNW10	WNW4	NNW6	WNW5	WNW6	NW7	WSW1.9	NNW10
16-Nov	NW6	N10	N13	N11	NNW8	N4	NNW7	NW5	WNW4	WNW4	NW5	NW7	NNW7	N5	N4	N3	WSW2	SW3	WSW1	S0	SW2	SW2	SSW2	SSW1	NNW4.0	N13
17-Nov	SSW2	SSW2	SSW2	S2	S2	S3	S3	S2	S2	SW4	S4	S5	SSE5	SSE5	SSW4	SSW3	SSW2	WSW2	W2	WNW2	NW1	SW1	WSW1	NW2	SSW2.1	SSE5
18-Nov	W2	WNW2	N5	NNW4	W4	W6	WNW3	WNW4	W4	W5	WNW6	NW6	WNW8	NW9	NNW9	WNW7	W4	WNW6	WNW6	W5	W6	W4	W5	W4	WNW4.7	NW9
19-Nov	W4	W4	W5	W5	W4	W3	WSW4	WSW3	WSW4	SW4	SW6	SSW6	SSW5	SSW6	S7	S5	SSW2	S2	S3	S2	S3	SSE3	S3	SSE3	SW3.2	S7
20-Nov	S3	S3	SSE5	SSE5	S5	SSE6	SSE7	SSE5	SSE6	SSE6	SSE4	S5	S5	SSW6	S3	SE3	SSE2	ENE0	N3	N7	N6	N5	N6	N5	SSE2.0	SSE7
21-Nov	NNE5	NNE6	N3	N5	N6	NNW4	NNW4	N5	NNW3	N3	N8	NW4	WNW6	NNW6	NNE6	NNE6	NE8	NNE6	NE6	NNE7	N3	NNW1	NE4	NE7	N4.6	NNE8
22-Nov	NNE6	NNE7	NNE6	NNE7	N7	N6	N7	N8	N7	N9	N9	N10	N10	N10	N10	N10	N9	N8	N8	N9	N7	N7	N6	N5	N7.8	N10
23-Nov	NNW4	N4	N4	NNW3	WNW2	W1	SSE1	SSE2	S2	S3	S5	S5	S5	S5	SSE4	S3	SW2	SW1	SSW2	SW2	S2	E0	NNW1	N2	SSW1.1	S5
24-Nov	N4	N6	N7	N6	N5	NNW4	N5	NNW1	N3	N4	N4	NNE3	NNE4	NE3	NE1	N2	N3	NNE3	N2	NNE3	N3	NNW3	N5	N6	N3.6	N7
25-Nov	N5	N5	N5	N6	NNW5	N4	N4	N5	N6	NNE6	NNE6	NNE6	NNE6	NNE5	NNE4	N2	WSW2	SW2	SW2	SW2	SW2	SW2	S1	SSW2	N2.7	NNE6
26-Nov	SW2	SW2	SW2	SSW1	SSW2	SSW1	SSW2	SW1	SW2	SSE1	SSE4	SE3	SSE3	SSE2	ESE2	NE2	N1	N3	N4	N10	N10	NNE8	N12	N11	NNE1.6	N12
27-Nov	N10	N8	N7	N8	N7	N5	N5	N4	NNW3	N4	N4	NNE2	SW3	S2	NNW1	WSW1	SW2	WSW2	SSW1	SSW1	N1	N1	N1	NNE4	N2.7	N10
28-Nov	NNE4	NNE4	NNE4	NE5	NE6	N6	N7	N7	N7	N7	N8	N9	N8	N8	N6	N6	N5	NNW3	NNW1	SW2	SW2	SW2	S2	S2	N4.1	N9
29-Nov	SSW2	SSW4	S4	S2	S2	SSW2	SW3	S3	S4	S5	S4	S4	SW8	WSW6	WSW7	WSW6	W4	WNW5	NW8	WNW8	WNW8	WNW7	WNW6	W7	WSW3.5	SW8
30-Nov	W7	W6	W7	WSW5	WSW6	WSW7	WSW9	WSW10	WSW10	SW8	SW9	SSW9	S8	S9	S7	S6	SSW3	S3	S3	S4	S4	SSW3	SSW3	SSW3	SW5.1	WSW10

NW1.1 NW1.3NNW1.4NNW1.3NNW1.2 W1.3NNW1.0 W0.9 W1.2NNW1.2 NW1.2NNW1.1 NW1.3NNW1.4NNW1.3NNW1.4 NW1.3 NW1.3 NW1.3 NW1.7 NW1.8NNW1.5 NW1.4NNW1.3 N10 N10 N13 NW12 NW11 NW10NNW12WSW10WSW10NNW12NNW10NNW12NNW13NNW12NNW11 N10 N9 N9NNW10 N10 N10 NW8 N12 N11	Diurnal Average	Diurnal Maximum
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AF - Analyzer Failure
 All monthly, daily, and diurnal averages have been calculated using vector methods



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 5 km/h on Nov 7 04:00	Hours of Data: 719
Minimum Value: 0 km/h on Nov 2 07:00	Hours of Missing Data: 1
Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 1 Median = 1 Q ₃ = 2 P ₉₀ = 3 P ₉₉ = 4	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-Nov	1	2	2	1	1	1	1	1	1	1	1	2	2	3	2	1	1	1	1	1	1	1	1	1	3
2-Nov	1	1	1	1	1	1	0	0	1	1	AF	1	2	2	2	2	1	1	1	1	1	1	1	1	2
3-Nov	2	1	1	1	1	1	1	1	1	1	1	2	2	2	3	3	2	2	2	2	1	1	2	1	3
4-Nov	1	1	1	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2
5-Nov	1	1	1	2	2	2	1	2	2	2	2	2	2	2	2	2	1	1	1	2	2	2	1	2	2
6-Nov	2	2	3	2	3	3	4	4	3	3	3	3	3	2	2	1	1	1	1	2	2	4	3	3	4
7-Nov	2	4	5	5	4	4	5	3	3	4	3	4	4	4	4	3	2	2	2	2	1	1	1	1	5
8-Nov	1	1	1	1	2	1	2	1	2	2	2	2	2	2	1	1	1	1	0	1	1	1	1	1	2
9-Nov	1	1	1	1	1	1	1	1	1	1	1	1	2	3	2	2	1	1	1	3	4	3	1	2	4
10-Nov	2	2	2	1	2	1	1	1	1	2	2	3	3	4	3	3	3	2	2	2	1	1	1	1	4
11-Nov	1	1	2	3	2	2	2	2	1	1	2	2	1	1	1	1	1	1	1	0	1	1	1	1	3
12-Nov	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	0	1	1	0	1	1	1	1	2
13-Nov	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	0	1	1	1	1	1	1	1	2
14-Nov	1	1	1	1	1	1	1	1	2	2	2	3	2	2	2	1	1	0	0	1	1	2	1	1	3
15-Nov	1	1	2	2	2	2	3	2	2	3	3	3	2	2	3	2	3	3	4	2	3	2	3	3	4
16-Nov	3	4	5	4	3	2	3	2	1	2	2	3	3	2	1	1	1	1	1	1	1	1	1	1	5
17-Nov	1	0	0	1	1	1	1	1	0	2	1	2	2	2	1	1	1	1	1	1	1	1	1	1	2
18-Nov	1	1	2	2	2	2	1	1	2	2	3	2	3	4	3	3	1	2	2	2	2	2	2	1	4
19-Nov	1	1	2	2	1	1	1	2	1	2	2	2	2	2	2	2	1	0	1	1	1	1	1	1	2
20-Nov	1	1	2	2	2	2	2	2	2	2	1	2	2	1	1	1	1	1	1	2	2	1	2	1	2
21-Nov	2	2	1	2	2	2	2	2	1	1	2	2	2	2	2	2	3	2	2	2	1	1	2	3	3
22-Nov	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	2	2	2	2	3
23-Nov	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	1	1	1	1	1	1	1	1	1	2
24-Nov	2	2	2	3	2	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3
25-Nov	1	1	1	2	1	1	1	2	2	2	2	1	2	2	1	1	1	0	1	1	1	1	1	1	2
26-Nov	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	3	3	2	4	4	4
27-Nov	4	3	3	3	2	2	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	4
28-Nov	1	1	1	2	2	2	2	2	2	2	2	3	2	2	2	2	2	1	1	1	1	0	1	0	3
29-Nov	0	2	1	1	1	1	1	1	1	2	2	2	3	3	3	3	1	2	3	3	3	3	3	3	3
30-Nov	3	2	3	1	2	2	3	3	3	3	3	4	3	3	2	2	1	1	1	1	1	1	1	1	4
	4	4	5	5	4	4	5	4	3	4	3	4	4	4	4	3	3	3	4	3	4	4	4	4	

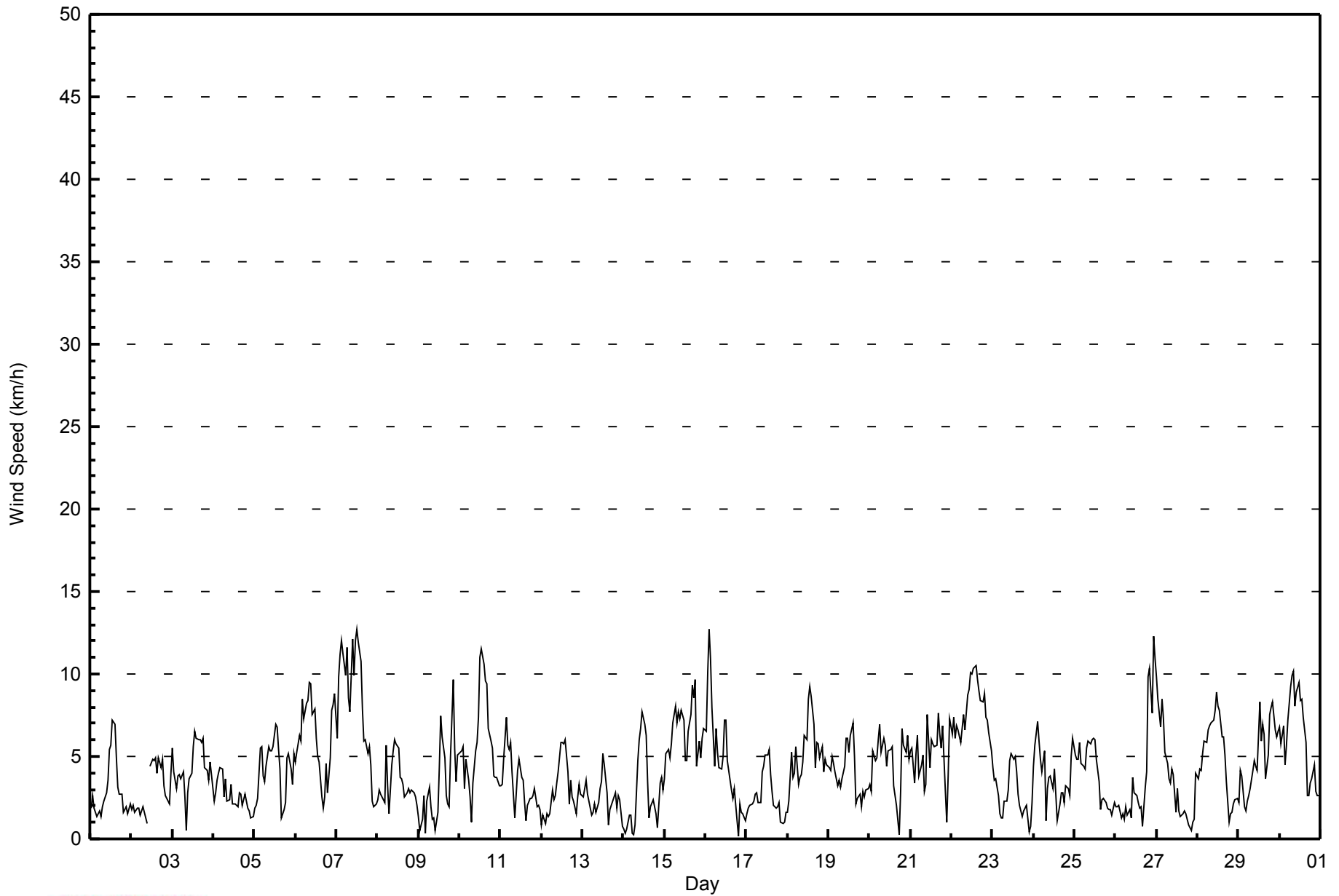
Diurnal Maximum

AF - Analyzer Failure



WBEA
Hourly Averages

Wind Speed (WS) - km/h
Fort McKay South - November 2014





WBEA
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Fort McKay South - November 2014

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	501	69.68	69.68
6 - 11	209	29.07	98.75
12 - 19	9	1.25	100.00
20 - 28	0	0.00	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 719

Total Number of Hours: 720



WBEA
Frequency Distribution

Wind Speed (WS) - km/h
Fort McKay South - November 2014

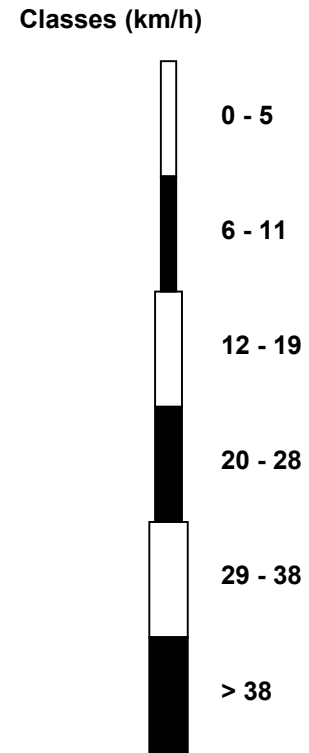
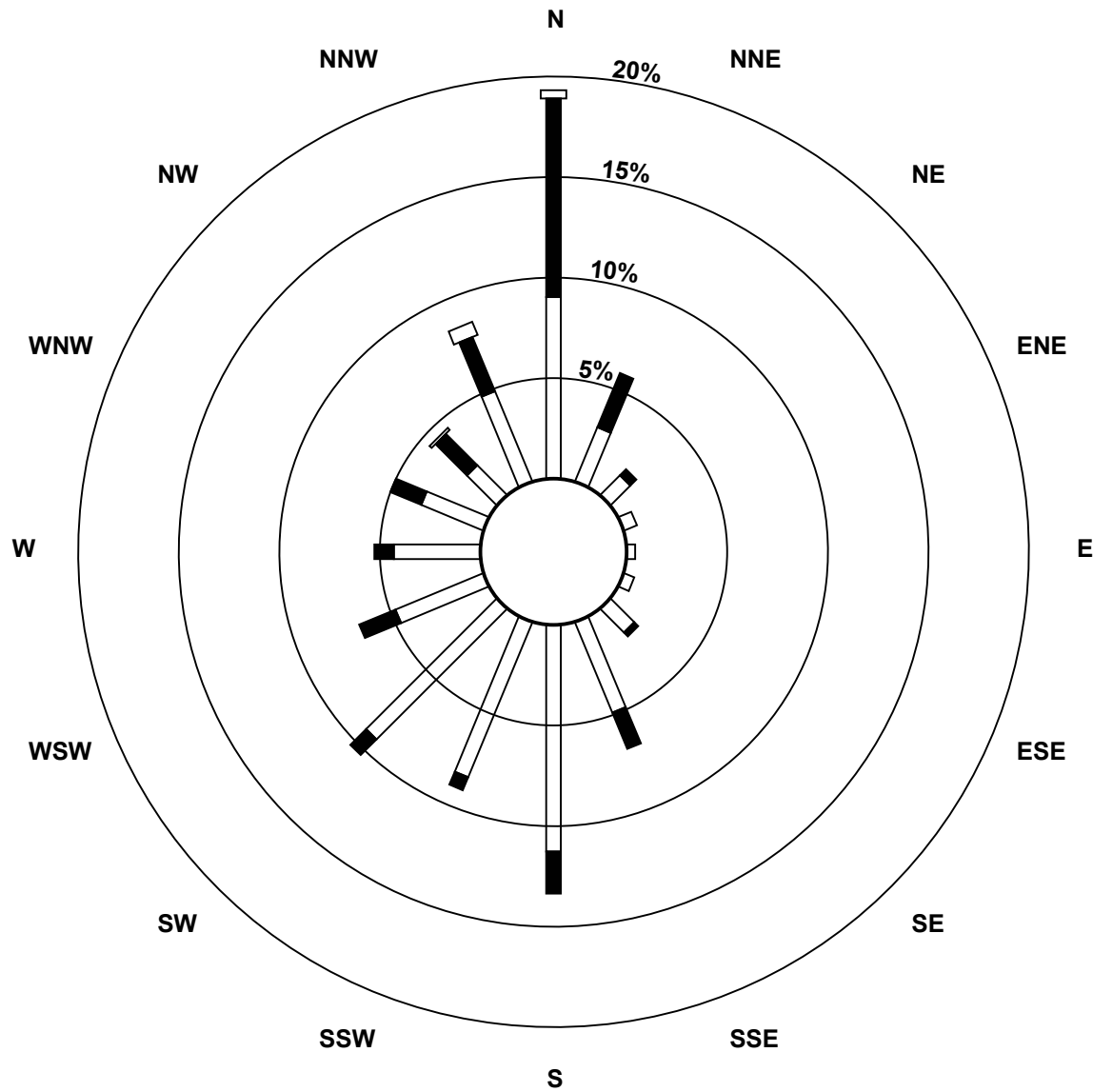
Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	65	21	10	5	3	4	12	35	81	60	66	34	31	24	15	35	501
6 - 11	71	21	3	0	0	0	2	14	15	5	8	14	7	12	16	21	209
12 - 19	3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5	9
20 - 28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	139	42	13	5	3	4	14	49	96	65	74	48	38	36	32	61	719

Total Number of Valid Hours: 719

Total Number of Hours: 720

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

**Wind Speed (WS) - km/h
Fort McKay South (AMS 13)**



Total Number of Valid Hours: 719



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Fort McKay South - November 2014

Direction of Maximum Speed: 356 deg on Nov 16 03:00		Hours in Service: 720
Direction of Maximum Daily Speed Average: 329.2 deg on Nov 7		Hours of Data: 719
Direction of Minimum Speed: 172 deg on Nov 16 20:00		Hours of Missing Data: 1
Direction of Minimum Daily Speed Average: 1.1 deg on Nov 23		Percent Operational Time: 99.9
Monthly Average Direction: 268.9 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-Nov	213	210	242	159	160	186	169	187	175	159	191	216	225	223	229	224	216	218	191	234	212	206	211	216	209.6
2-Nov	211	224	199	216	223	197	198	182	215	230	AF	120	147	149	135	151	180	191	175	184	178	195	198	183	175.3
3-Nov	169	173	172	170	161	193	184	194	223	360	347	340	355	4	15	27	21	359	11	354	0	351	40	75	19.1
4-Nov	101	128	88	128	136	159	103	34	7	17	21	34	359	12	62	46	10	51	14	6	4	2	358	335	53.6
5-Nov	312	250	237	252	259	271	254	257	260	260	270	256	257	257	270	263	133	168	134	212	205	182	167	170	242.5
6-Nov	167	163	166	147	154	157	149	160	165	164	167	166	171	168	166	209	229	198	193	248	271	305	318	336	176.5
7-Nov	304	317	324	323	326	307	333	337	334	339	338	341	342	340	335	337	332	312	336	337	327	272	289	297	329.2
8-Nov	227	240	241	237	228	255	274	263	290	290	284	316	326	344	307	309	239	237	239	224	222	230	230	225	269.5
9-Nov	163	247	185	232	106	234	234	218	201	347	32	325	35	5	28	345	302	248	276	342	4	352	339	335	340.0
10-Nov	338	339	343	286	285	287	245	252	318	344	337	347	7	8	4	359	358	353	351	340	287	301	290	293	340.0
11-Nov	311	322	342	1	346	6	16	23	33	4	1	326	355	354	334	2	225	221	237	231	234	228	232	232	336.4
12-Nov	213	173	201	206	213	196	214	235	208	186	199	181	173	132	134	154	201	190	218	200	181	181	179	178	181.5
13-Nov	188	181	178	181	185	225	229	199	195	161	130	149	130	141	254	266	266	241	235	243	234	242	209	187.0	
14-Nov	191	318	71	333	324	8	216	335	357	347	354	1	4	354	308	276	242	204	217	199	65	225	203	166	332.1
15-Nov	175	176	178	180	183	184	188	178	185	190	191	215	258	298	352	354	3	3	347	297	327	284	298	315	248.1
16-Nov	324	350	356	352	338	349	336	323	295	290	325	323	328	352	359	8	246	231	242	172	229	229	205	210	330.7
17-Nov	212	208	203	186	175	178	176	185	189	232	188	169	152	167	209	198	204	238	263	292	304	233	258	313	197.3
18-Nov	281	299	355	341	259	261	288	284	276	269	288	306	300	313	327	294	272	301	286	265	263	266	265	264	290.6
19-Nov	267	271	274	277	275	266	257	245	238	220	225	210	208	192	181	180	198	176	187	182	181	149	174	162	218.6
20-Nov	176	175	167	164	169	164	160	166	167	167	164	173	184	203	187	142	154	59	351	359	9	10	5	8	160.8
21-Nov	15	12	4	355	355	348	344	351	332	9	6	324	303	338	12	22	34	27	37	25	8	331	34	36	6.4
22-Nov	33	21	15	13	5	5	6	5	8	3	2	3	2	5	4	4	358	358	354	0	356	355	354	355	3.8
23-Nov	347	350	358	344	292	260	157	159	175	173	181	182	174	176	150	186	223	216	208	229	181	89	330	354	192.4
24-Nov	353	357	4	357	350	343	9	337	352	0	8	26	25	34	55	6	8	26	11	17	350	348	3	11	4.5
25-Nov	4	3	3	354	341	353	349	352	6	14	29	27	26	15	27	358	240	226	224	217	230	220	189	199	359.7
26-Nov	233	214	231	203	204	203	204	215	221	161	160	131	147	150	105	38	4	358	354	10	10	14	8	2	11.6
27-Nov	1	3	8	8	4	8	9	359	345	350	6	15	226	181	345	238	216	243	208	201	3	350	4	33	359.1
28-Nov	31	25	31	38	37	9	5	1	7	5	11	10	6	5	357	356	350	340	328	224	225	224	190	189	7.2
29-Nov	197	208	183	169	190	197	232	189	189	186	181	183	231	245	252	257	267	296	311	301	299	285	291	277	249.8
30-Nov	278	273	280	248	250	246	251	251	245	224	229	209	180	189	177	180	195	190	188	181	187	194	194	200	223.6
314.4	318.0	332.2	328.2	300.4	270.3	283.0	278.5	271.6	295.9	307.1	301.3	313.7	331.2	343.6	332.8	319.5	306.1	310.0	313.0	308.8	292.0	310.7	326.6		
Diurnal Average																									

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Fort McKay South - November 2014

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 100 deg on Nov 23 22:00	Hours in Service: 720 Hours of Data: 719 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9
Minimum Value: 5 deg on Nov 11 21:00	
Percentiles: P ₁ = 11 P ₁₀ = 20 Q ₁ = 24 Median = 29 Q ₃ = 38 P ₉₀ = 51 P ₉₉ = 91	

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	33	43	93	49	67	46	67	41	37	36	46	33	38	32	27	24	21	18	24	53	41	21	58	31	93
2-Nov	58	35	60	29	27	43	31	23	34	64	AF	26	33	41	31	31	17	23	20	17	39	39	28	18	64
3-Nov	24	24	33	25	28	23	23	42	82	28	24	30	27	23	25	29	29	27	27	37	43	44	40	43	82
4-Nov	72	61	43	37	39	36	41	28	28	33	25	45	33	29	34	33	22	36	19	18	31	52	30	39	72
5-Nov	39	32	31	30	36	41	42	32	31	32	35	30	28	27	29	28	67	29	28	25	23	38	29	24	67
6-Nov	26	27	33	39	31	38	41	31	28	30	31	28	41	28	30	37	60	29	23	48	29	39	32	31	60
7-Nov	36	35	36	36	36	39	32	29	33	30	33	33	29	32	35	30	29	33	28	29	28	20	40	65	65
8-Nov	15	12	14	34	62	18	48	82	50	35	37	50	39	76	51	33	22	25	21	18	30	50	27	53	82
9-Nov	67	88	46	20	95	43	11	20	80	76	92	79	51	35	31	32	29	17	31	34	26	26	31	31	95
10-Nov	32	24	27	27	33	33	23	90	31	27	31	31	29	25	26	27	26	26	24	32	37	38	31	36	90
11-Nov	35	30	25	25	27	32	28	32	63	49	47	45	54	44	58	53	17	20	26	9	5	18	20	13	63
12-Nov	33	33	50	23	33	26	23	23	23	20	23	27	37	33	28	30	21	12	20	23	43	20	15	27	50
13-Nov	13	16	11	15	13	59	47	29	25	21	40	55	30	33	39	63	23	25	8	10	27	22	13	27	63
14-Nov	74	100	35	59	54	100	76	90	24	25	26	27	29	30	45	81	39	20	25	55	88	43	21	22	100
15-Nov	17	15	19	19	19	20	23	23	22	25	25	34	50	40	33	25	24	25	28	42	46	41	39	32	50
16-Nov	40	33	29	26	29	32	29	29	32	41	41	38	40	51	46	36	23	20	71	98	16	25	32	38	98
17-Nov	34	30	33	27	23	13	13	18	28	24	24	27	34	38	29	16	39	43	40	46	76	79	68	51	79
18-Nov	41	46	24	35	23	24	48	33	30	29	40	41	42	39	33	36	29	32	31	26	28	41	22	24	48
19-Nov	24	25	28	35	31	24	29	39	25	29	40	33	35	32	25	18	31	22	21	23	21	49	21	28	49
20-Nov	21	21	24	25	26	24	28	30	28	33	32	28	29	27	42	37	31	81	23	23	22	23	22	20	81
21-Nov	22	24	27	26	25	27	30	27	43	28	24	49	39	40	28	23	30	29	36	30	26	48	31	32	49
22-Nov	28	24	25	24	24	22	23	23	22	24	24	24	24	23	24	24	24	26	25	23	23	24	24	26	28
23-Nov	24	31	25	29	38	84	33	30	27	28	24	31	28	30	35	18	21	35	42	22	44	100	91	48	100
24-Nov	26	25	23	23	27	29	23	73	39	28	32	43	31	56	77	31	23	38	30	20	26	24	18	18	77
25-Nov	21	23	23	23	25	24	27	25	25	24	26	24	26	31	32	59	8	17	22	19	22	30	27	55	59
26-Nov	44	29	16	27	44	42	23	41	25	41	33	36	35	46	45	34	88	33	26	22	26	23	24	23	88
27-Nov	23	24	24	22	23	23	25	28	30	24	21	85	44	55	60	33	54	23	45	51	84	56	75	29	85
28-Nov	30	23	27	29	28	23	23	22	23	22	24	23	24	22	26	23	25	23	58	18	39	16	19	22	58
29-Nov	17	22	19	33	29	21	26	18	13	31	31	44	23	35	29	27	38	39	34	36	36	36	42	36	44
30-Nov	33	29	35	24	18	20	21	22	19	22	23	26	24	22	20	15	17	19	13	12	17	23	30	25	35

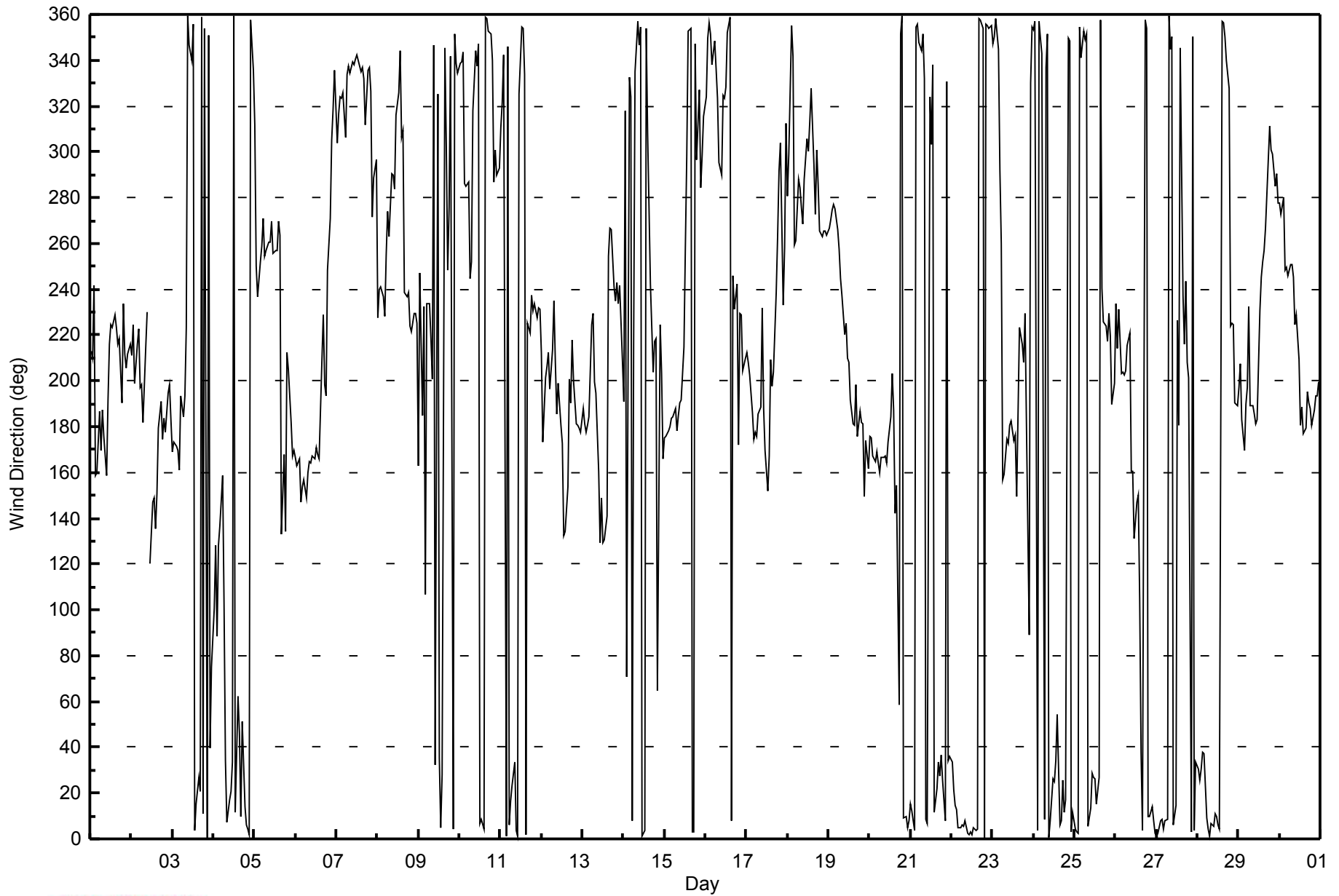
74	100	93	59	95	100	76	90	82	76	92	85	54	76	77	81	88	81	71	98	88	100	91	65	
Diurnal Maximum																								

AF - Analyzer Failure



WBEA
Hourly Averages

Wind Direction (WD) - deg
Fort McKay South - November 2014





Wood Buffalo Environmental Association

SO₂ Calibration Report

Station Information

Calibration Date	November 14, 2014	Previous Calibration	October 20, 2014
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Routine		
Start Time (MST)	10:30	End Time (MST)	16:40
Barometric Pressure	729 mmHg	Station temp.	24 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	1377
Cal Gas Concentration	51.1 ppm	Cal Gas Expiry Date	5/29/2014
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	HVPS voltage	512	512
Analyzer Range (mv)	5000	5000	Lamp voltage	2109	2108
Calculated slope	0.998822	0.998654	Chamber temp.	50.0	50.0
Calculated intercept	-0.100080	1.215157	Pressure ("Hg)	26.6	26.3
Analyzer Background	24.8	24.4	Flow (lpm)	696	684
Analyzer Coefficient	1.633	1.652	Intensity	72	78

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	-0.6	NA
as found span	5000	78.9	806.4	798.4	1.010
calibrator zero	5000	0.0	0.0	-0.1	NA
high point	5000	78.9	806.4	807.0	0.999
second point	5000	39.4	402.7	400.7	1.005
third point	5000	19.7	201.3	199.8	1.008
calibrator zero					
as left zero	5000	0.0	0.0	-0.4	NA
as left span	5000	78.9	806.4	802.8	1.004
Average Correction Factor					1.004

Corrected As found	799.0	Previous response	807.4	% change	1.1%
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Notes:

Pump changed after As Finds, slight adjustment to span and zero, filter changed after third point

Calibration Performed By: Ryan Power



Wood Buffalo Environmental Association

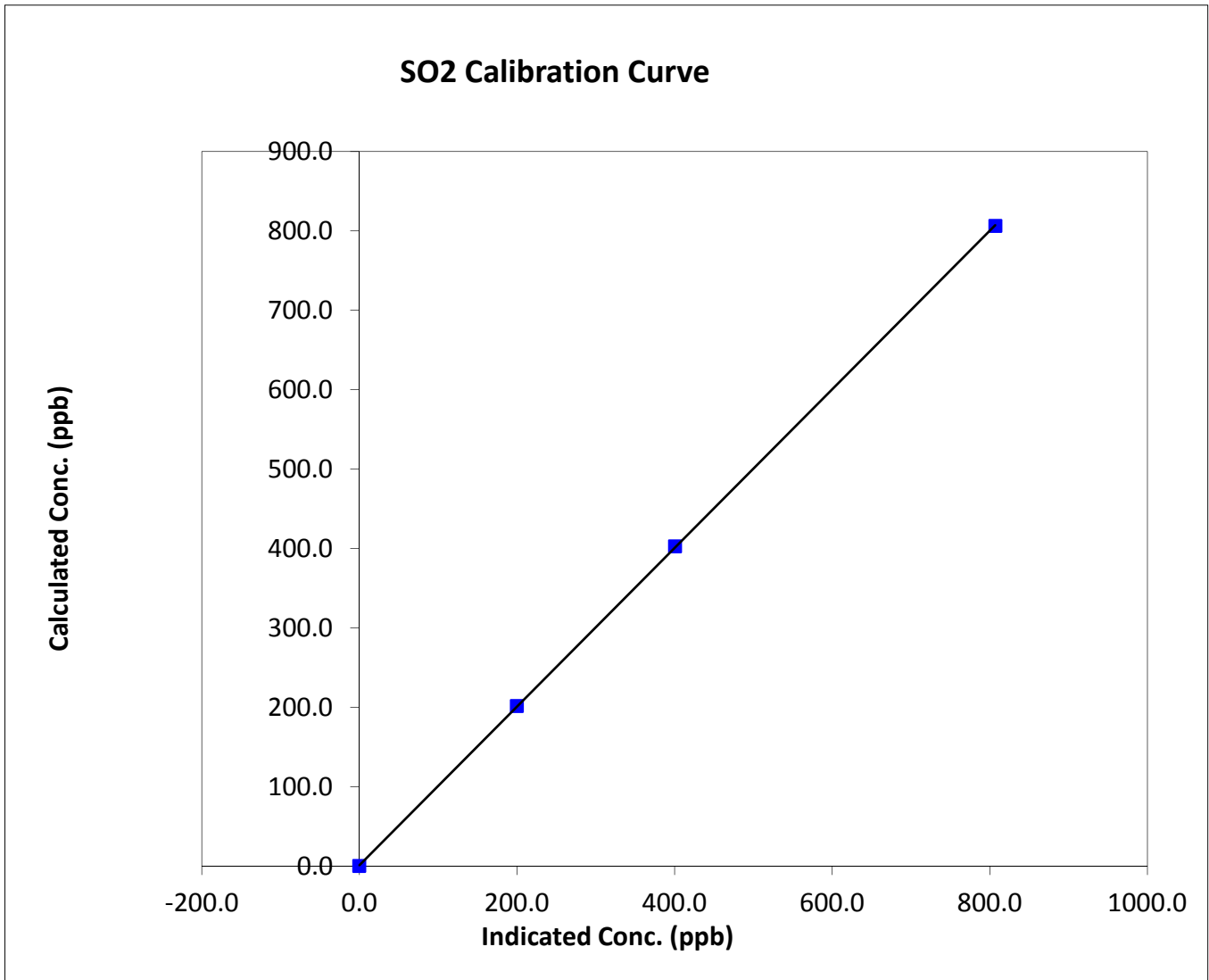
SO₂ Calibration Summary

Station Information

Calibration Date	November 14, 2014	Previous Calibration	October 20, 2014
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	10:30	End Time (MST)	16:40
Analyzer make	API T100	Analyzer serial #	599

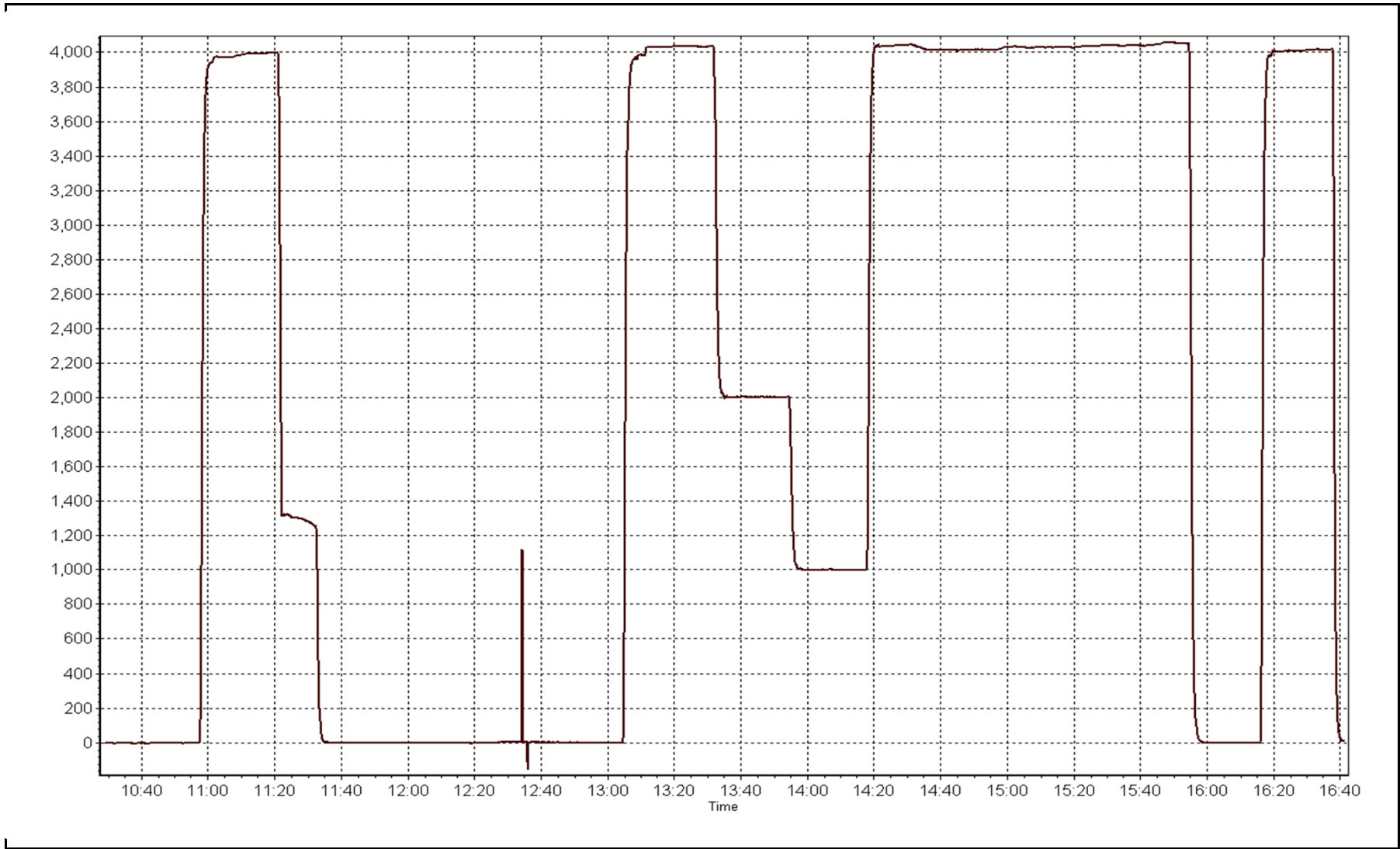
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999989
806.4	807.0	0.9992		
402.7	400.7	1.0049	Slope	0.998654
201.3	199.8	1.0078		
			Intercept	1.215157



SO2 Calibration Plot

Date: November 14, 2014





Wood Buffalo Environmental Association

TRS Calibration Report

Station Information

Calibration Date	November 13, 2014	Previous Calibration	October 22, 2014
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Routine		
Start Time (MST)	10:45	End Time (MST)	13:48
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	5/30/2013
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	1000	998
Calculated slope	1.000566	0.997132	Chamber temp.	45	45
Calculated intercept	-0.245577	0.017253	Pressure	697.4	696.2
Analyzer Background	1.79	1.78	Flow	0.447	0.447
Analyzer Coefficient	1.027	1.017	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	80.7	0.992
SO2 scrubber check	5000	39.4	402.7	0.5	NA
calibrator zero	5000	0.0	0.0	0.1	NA
high point	5000	38.5	80.1	80.3	0.997
second point	5000	19.2	39.9	40.1	0.997
third point	5000	9.6	20.0	19.8	1.010
calibrator zero					
as left zero	5000	0.0	0.0	0.2	NA
as left span	4000	30.8	80.1	80.3	0.997
Average Correction Factor					1.001

Corrected As found	80.6	Previous response	80.3	% change	-0.4%
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Notes:

As found zero used as calibrator zero, scrubber check before As Finds, filter changed after third point

Calibration Performed By:

Ryan Power



Wood Buffalo Environmental Association

TRS Calibration Summary

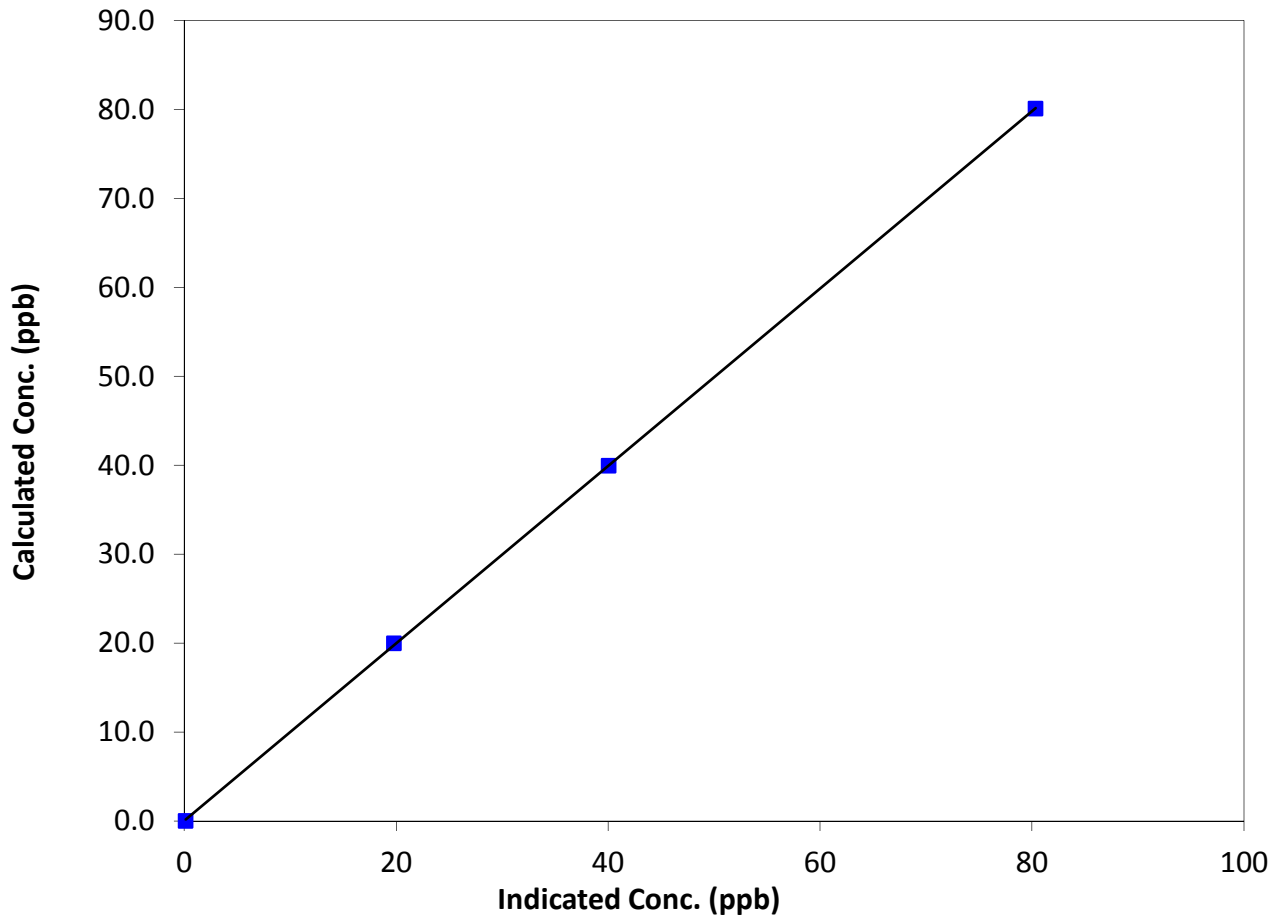
Station Information

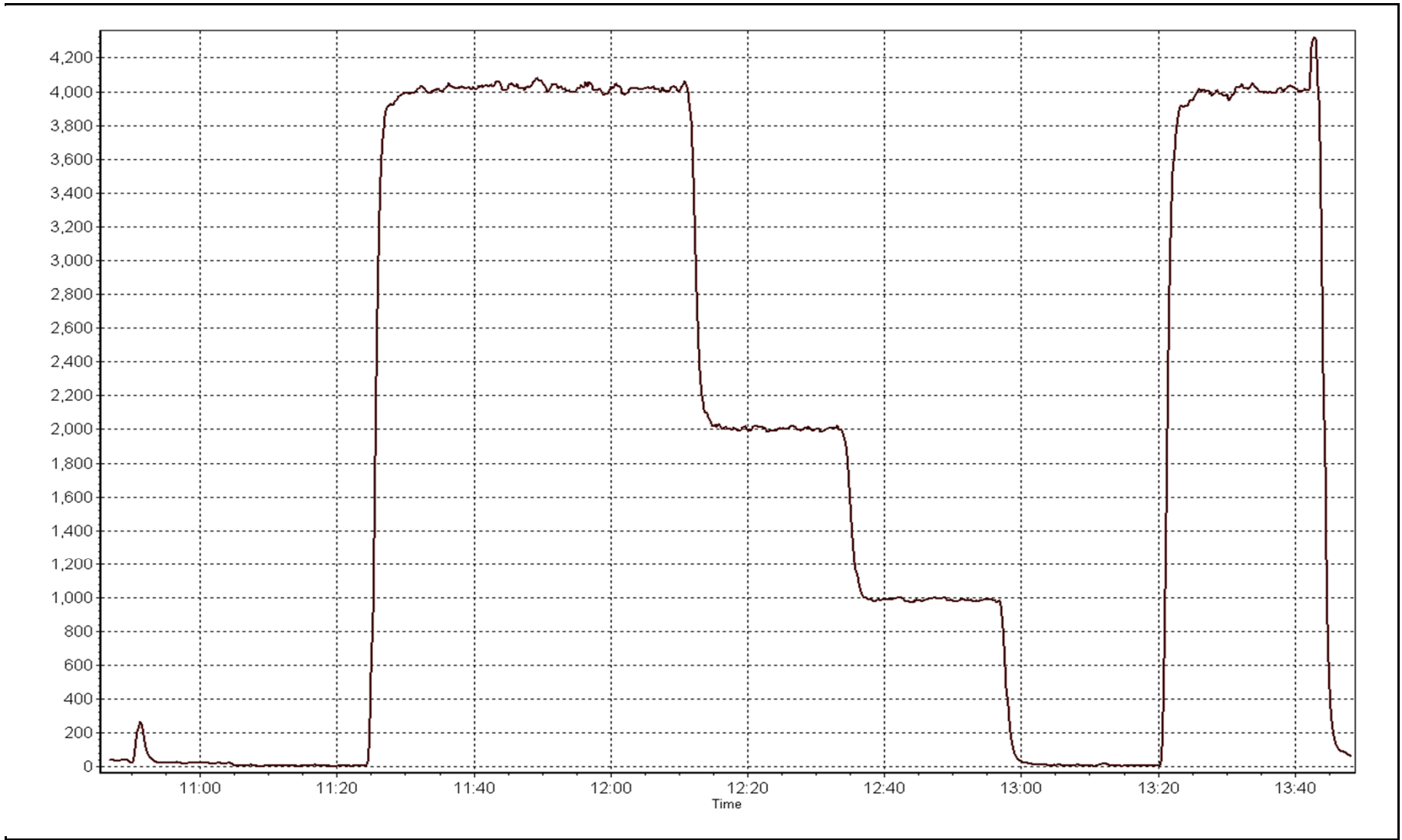
Calibration Date	November 13, 2014	Previous Calibration	October 22, 2014
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	10:45	End Time (MST)	13:48
Analyzer make	TEI 43i-TLE	Analyzer serial #	1218153359

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	N/A	Correlation Coefficient	0.999977
80.1	80.3	0.9968		
39.9	40.1	0.9969	Slope	0.997132
20.0	19.8	1.0096		
			Intercept	0.017253

TRS Calibration Curve







Wood Buffalo Environmental Association

THC Calibration Report

Station Information

Calibration Date	Friday, November 14, 2014	Previous Calibration	Monday, October 20, 2014
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Routine		
Start Time (MST)	10:30	End Time (MST)	16:40
Barometric Pressure	729 mmHg	Station temp.	24 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11041107
Gas Cert Reference	LL107918	Cal Gas Expiry Date	5/29/2014
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	42.0	42.0
Calculated slope	1.002392	0.990184	Fuel Pressure	22.6	22.6
Calculated intercept	0.019480	0.045112	Flame Temp		161.3
BKG	2.5	2.7			
COEF	4.842	5.054			

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	0.09	N/A
as found span	5000	78.9	16.98	16.83	1.009
calibrator zero	5000	0.0	0.00	-0.03	N/A
high point	5000	78.9	16.98	17.11	0.992
second point	5000	39.4	8.48	8.51	0.996
third point	5000	19.7	4.24	4.22	1.005
calibrator zero					
as left zero	5000	0.0	0.00	-0.13	N/A
as left span	5000	78.9	16.98	17.27	0.983
Average Correction Factor					0.998

Corrected As found 16.74 Previous response 16.92 % change 1.1%

Notes:

Pump changed after As Found, zero and span with small adjustments, filter changed after third point

Calibration Performed By:

Ryan Power



Wood Buffalo Environmental Association

THC Calibration Summary

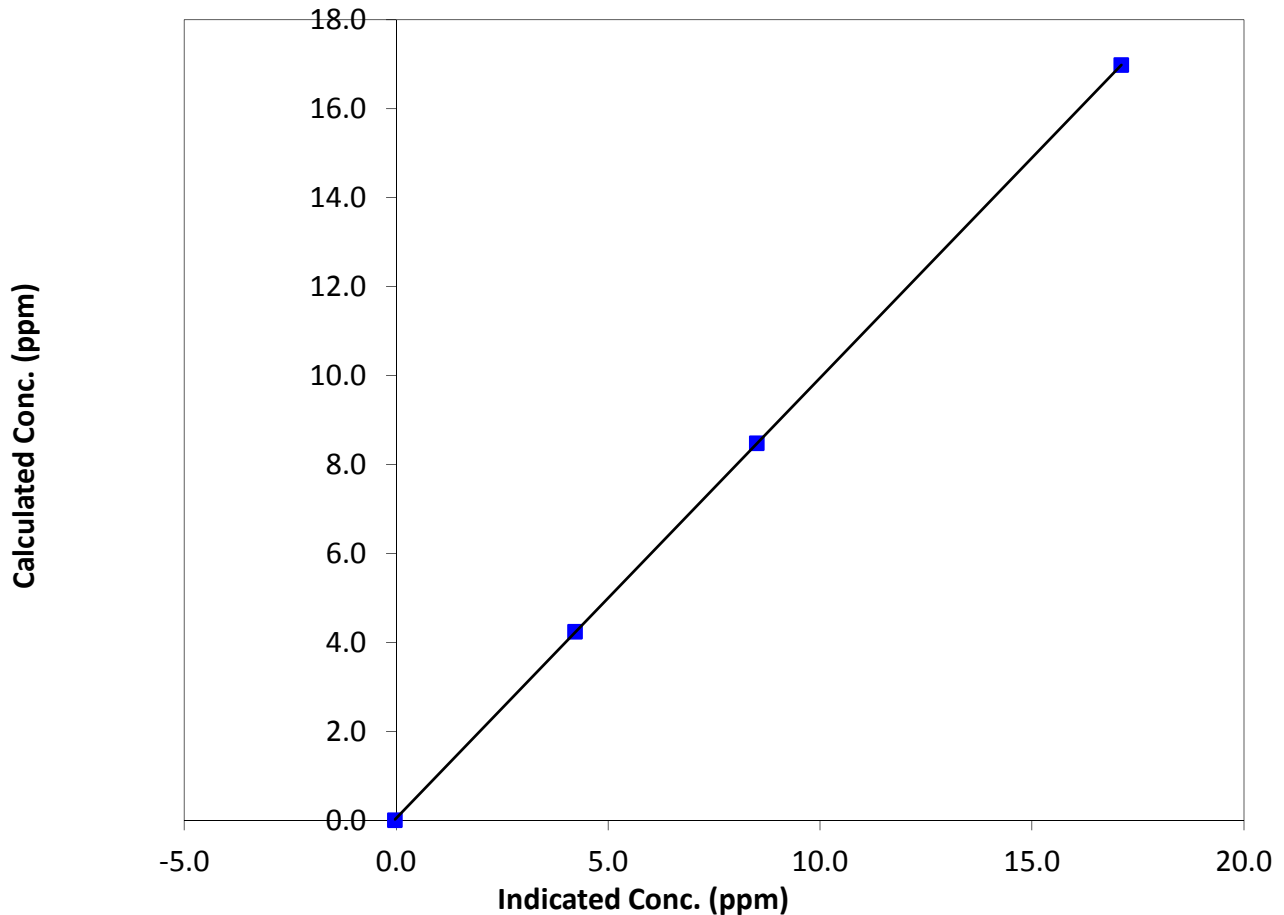
Station Information

Calibration Date	November 14, 2014	Previous Calibration	October 20, 2014
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	10:30	End Time (MST)	16:40
Analyzer make	Thermo Model 51iLT	Analyzer serial #	1236656114

Calibration Data

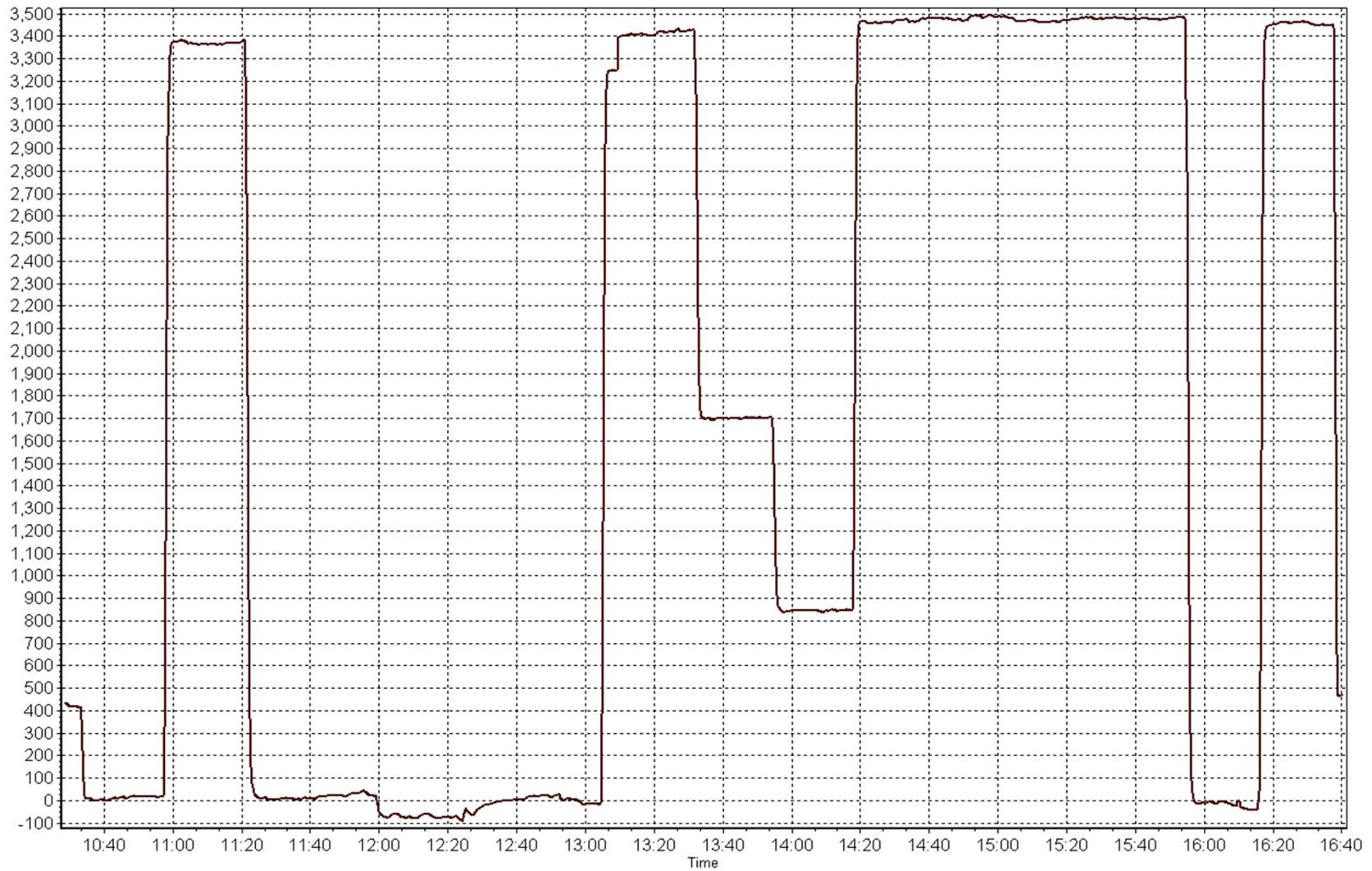
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	-0.03	N/A	Correlation Coefficient	0.999996
16.98	17.11	0.9924		
8.48	8.51	0.9963	Slope	0.990184
4.24	4.22	1.0046		
			Intercept	0.045112

THC Calibration Curve



THC Calibration Plot

Date: November 14, 2014





Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

Calibration Date	November 17, 2014	Previous Calibration	October 21, 2014
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Routine		
Start Time (MST)	10:50	End Time (MST)	13:37
Barometric Pressure	728 mmHg	Station temp.	23 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11041107
NO2 calibration used	Friday, November 14, 2014	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.	25.6	25.7
Analyzer Range (input)	5000	5000	Lamp temp.	58.0	58.0
Calculated slope	1.002548	1.002661	Pressure ("Hg)	26.7	26.6
Calculated intercept	-0.724725	-0.828909	Flow cell A	745	742
Analyzer Background	-1.1	-1.1			
Analyzer Coefficient	1.013	1.024			

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	0.6	N/A
as found span	5000	0.90	361.4	357.5	1.011
calibrator zero	5000	0.000	0.0	0.6	N/A
high point	5000	0.903	361.4	361.2	1.001
second point	5000	0.585	214.7	215.0	0.999
third point	5000	0.358	112.6	113.5	0.992
calibrator zero					
as left zero	5000	0.00	0.0	1.0	N/A
as left span	5000	0.903	361.4	355.2	N/A
Average Correction Factor					0.997

Corrected As found 356.9 Previous response 361.2 % change 1.2%

Notes:

Small change to span, filter changed after third point

Calibration Performed By:

Ryan Power



Wood Buffalo Environmental Association

O₃ Calibration Summary

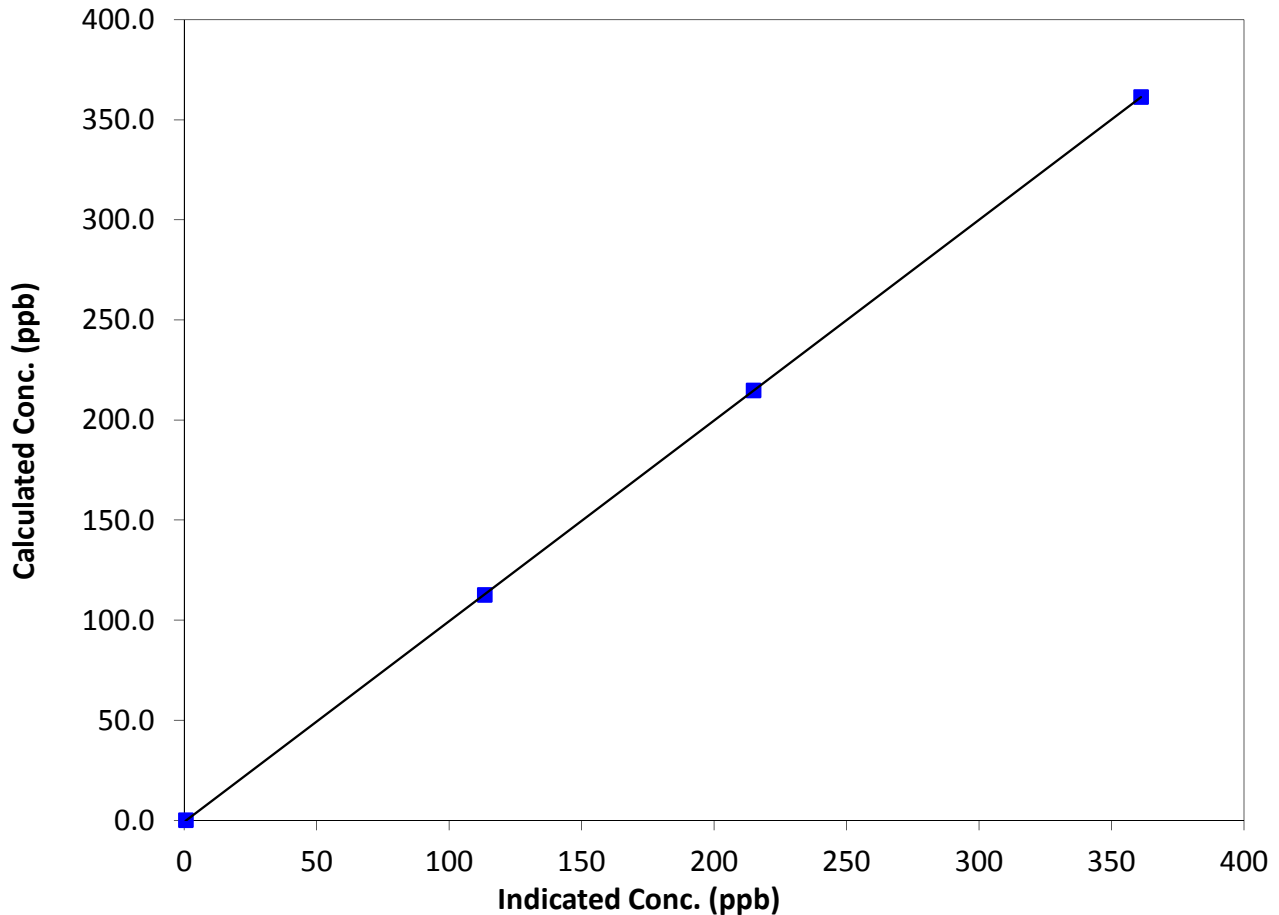
Station Information

Calibration Date	Monday, November 17, 2014	Previous Calibration	October 21, 2014
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	10:50	End Time (MST)	13:37
Analyzer make	API T400	Analyzer serial #	825

Calibration Data

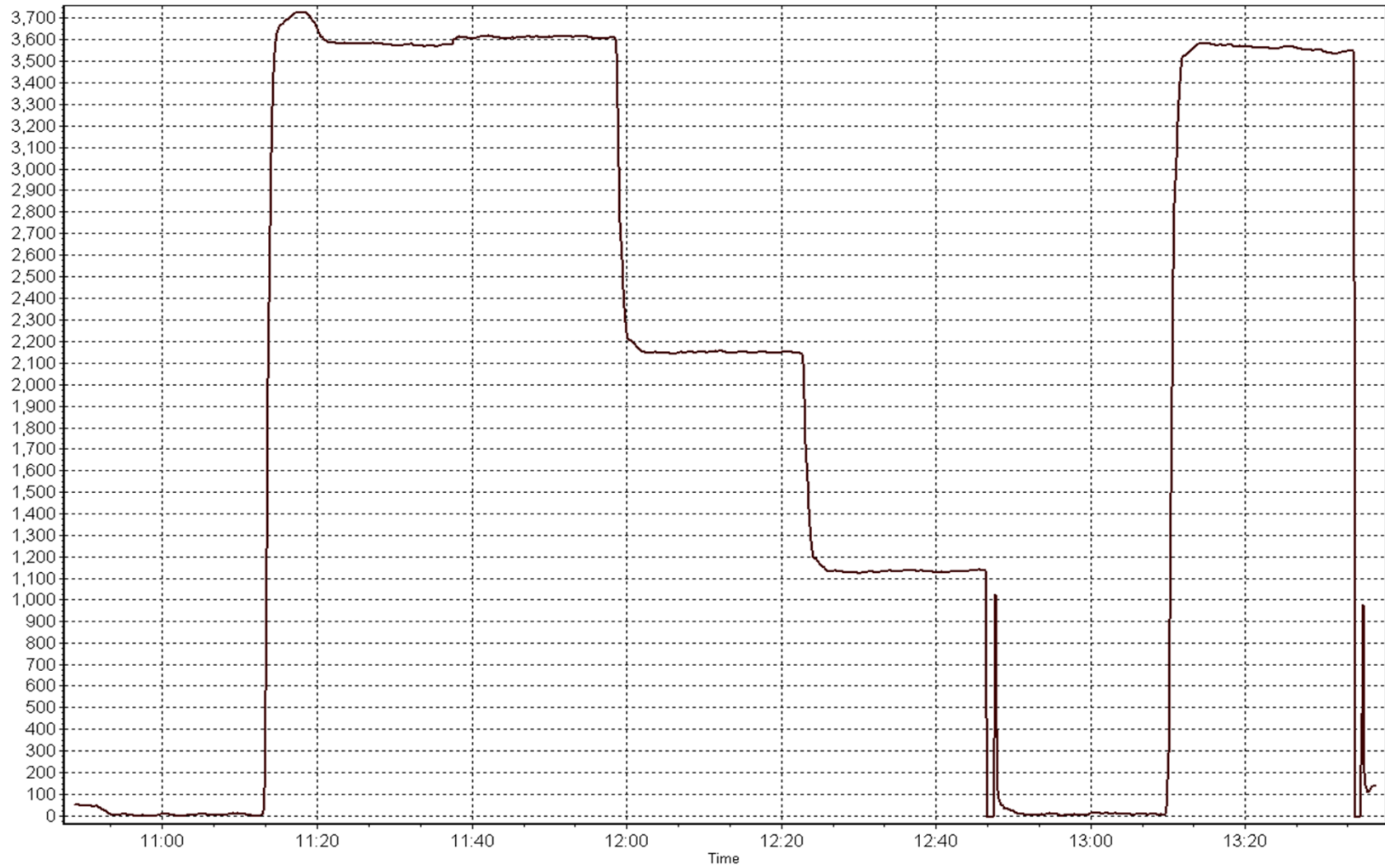
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.6	N/A	Correlation Coefficient	0.999998
361.4	361.2	1.0006		
214.7	215.0	0.9988	Slope	1.002661
112.6	113.5	0.9925		
			Intercept	-0.828909

O₃ Calibration Curve



O3 Calibration Plot

Date: November 17, 2014





Wood Buffalo Environmental Association

NO_x-NO-NO₂ Calibration Report

Station Information

Calibration Date	November 14, 2014	Previous Calibration	October 20, 2014
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	<input type="text" value="Routine"/>		
Start Time (MST)	10:30	End Time (MST)	16:40
Barometric Pressure	729 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
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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	0.999404	0.998756	0.997169
	Data Offset	2.053770	2.011817	-0.251679
After	Data Slope	1.000480	0.999070	0.996932
	Data Offset	1.450439	1.536223	-0.766842
Channel #		3	2	1
Voltage Range		0 - 5V	0 - 5V	0 - 5V

Analyzer Information

Analyzer make/model	Thermo 42C	Analyzer serial #	2185
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Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	0.877	ppb	0.885	ppb
NOx coefficient	1.001	ppb	1.001	ppb
NO2 coefficient	1.000	ppb	1.000	ppb
NO bkgrnd	4.0		4.1	
NOx bkgrnd	4.1		4.2	
Nt coefficient	N/A		N/A	
Chamber Temp	49.8	Deg C	49.7	Deg C
Moly Temp	325.0	Deg C	325.0	Deg C
PMT Temp	-3.7	Deg C	-3.7	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell Press	204.4	mmHg	211.4	mmHg
Sample Flow	0.819	ccm	0.810	ccm

Notes:

Pump changed after As Finds, span with small adjustment, filter changed after GPT



Wood Buffalo Environmental Association

NO_x-NO-NO₂ Calibration Report

Station Information

Calibration Date:

November 14, 2014

Station Number:

AMS 13

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NO _x conc (ppb)	Calculated NO conc (ppb)	Calculated NO ₂ conc (ppb)	Indicated NO _x conc (ppb)	Indicated NO conc (ppb)	Indicated NO ₂ conc (ppb)	NO _x Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	0.2	0.2	0.1	N/A	N/A
as found span	5000	78.9	801.6	800.0	1.6	828.3	826.6	2.3	0.9678	0.9679
calibrator zero	5000	0.0	0.0	0.0	0.0	0.3	0.3	0.2	N/A	N/A
high point	5000	78.9	801.6	800.0	1.6	800.9	800.5	1.1	1.0009	0.9995
second point	5000	39.4	400.3	399.5	0.8	397.1	396.5	0.9	1.0080	1.0076
third point	5000	19.7	200.2	199.8	0.4	197.2	197.2	0.4	1.0147	1.0131
calibrator zero	5000	0.0	0.0	0.0	0.0					
as left zero	5000	0.0	0.0	0.0	0.0	0.5	0.3	0.3	N/A	N/A
as left span	5000	78.9	801.6	437.8	363.8	803.4	453.4	350.8	0.9977	0.9656
Average Correction Factor									1.0079	1.0067

Corrected As found

NO_x= 828.0

NO= 826.4

Percent Change

NO_x= -3.4%

NO= -3.3%

Previous Response

NO_x= 800.0

NO= 799.0

GPT Calibration Data

Dilution Flow

5000

ccm

Source Gas Flow

78.90

ccm

O ₃ Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO ₂ conc (ppb)	Indicated NO _x conc (ppb)	Indicated NO conc (ppb)	Indicated NO ₂ conc (ppb)	NO _x Correction factor	NO Correction factor	NO ₂ Correction factor	Converter Efficiency
Cal zero			0.0			0.2			N/A	
1st NO ₂ (350)	N/A	437.8	361.4	800.1	437.8	363.0	0.9864	1.0000	0.9957	100.4%
2nd NO ₂ (200)	N/A	584.5	214.7	800.0	584.5	216.3	0.9864	1.0000	0.9927	100.7%
3rd NO ₂ (100)	N/A	686.6	112.6	800.3	686.6	114.4	0.9862	1.0000	0.9836	101.7%
4th NO ₂ (0)	799.2	N/A	0.5	799.7	799.2	1.3	0.9868	1.0000	N/A	N/A
Average Correction Factor							0.9864	1.0000	0.9907	100.9%

Calibration Performed By:

Ryan Power



Wood Buffalo Environmental Association

NO_x Calibration Summary

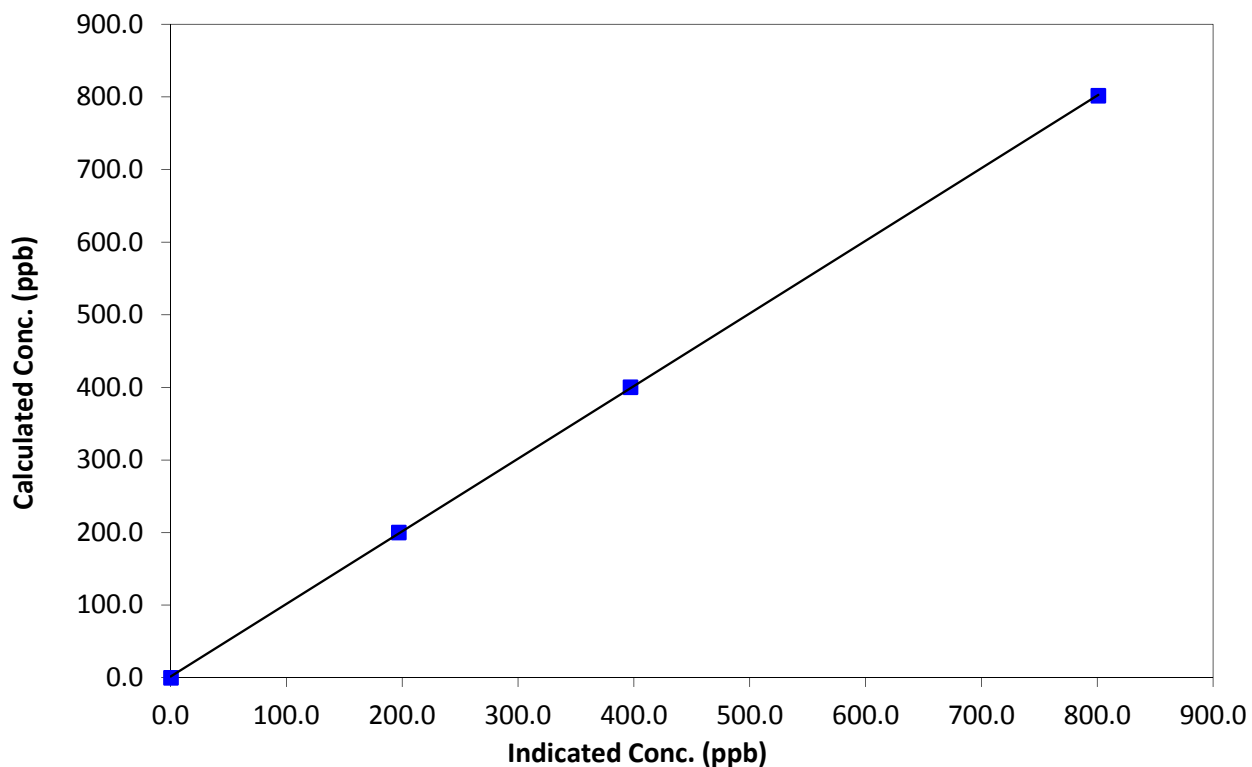
Station Information

Calibration Date	November 14, 2014	Previous Calibration	October 20, 2014
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	10:30	End Time (MST)	16:40
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	0.3	N/A	Correlation Coefficient	0.999976
801.6	800.9	1.0009		
400.3	397.1	1.0080	Slope	1.000480
200.2	197.2	1.0147		
0.0			Intercept	1.450439

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

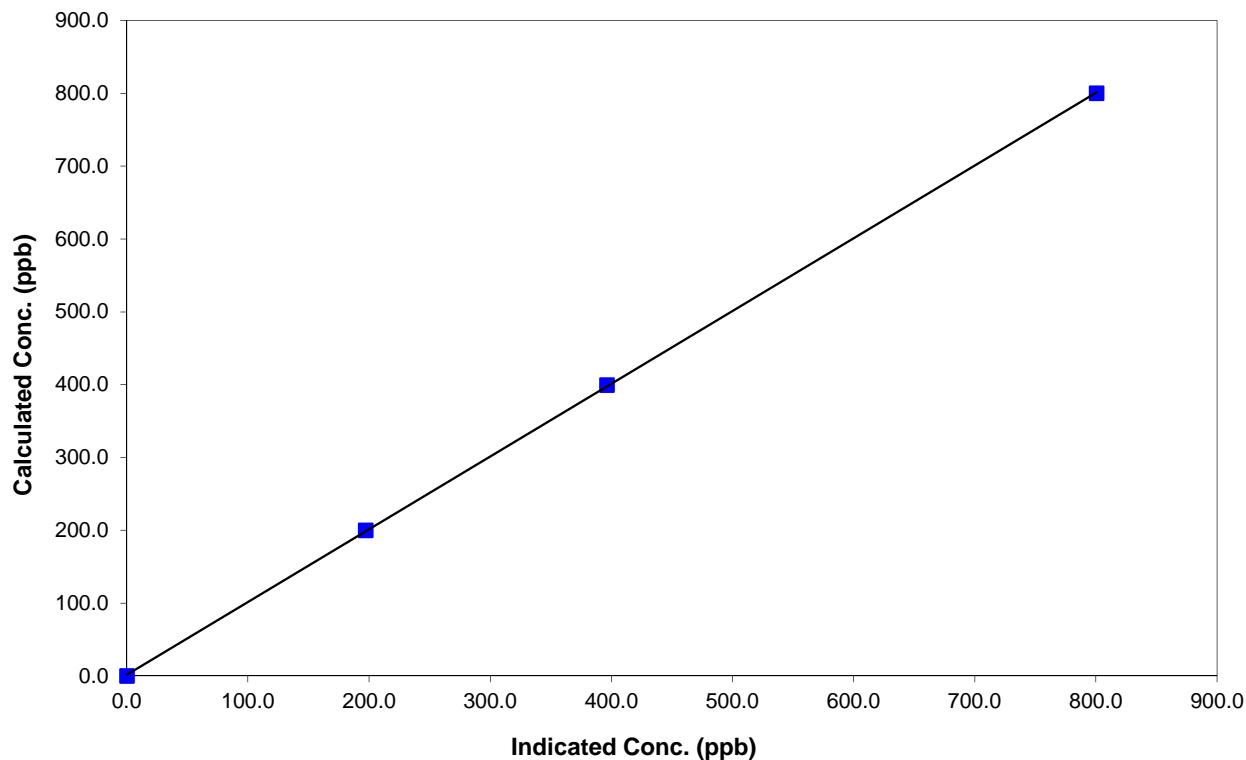
Station Information

Calibration Date	November 14, 2014	Previous Calibration	October 20, 2014
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	10:30	End Time (MST)	16:40
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	0.3	N/A	Correlation Coefficient	0.999972
800.0	800.5	0.9995		
399.5	396.5	1.0076	Slope	0.999070
199.8	197.2	1.0131		
0.0			Intercept	1.536223

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

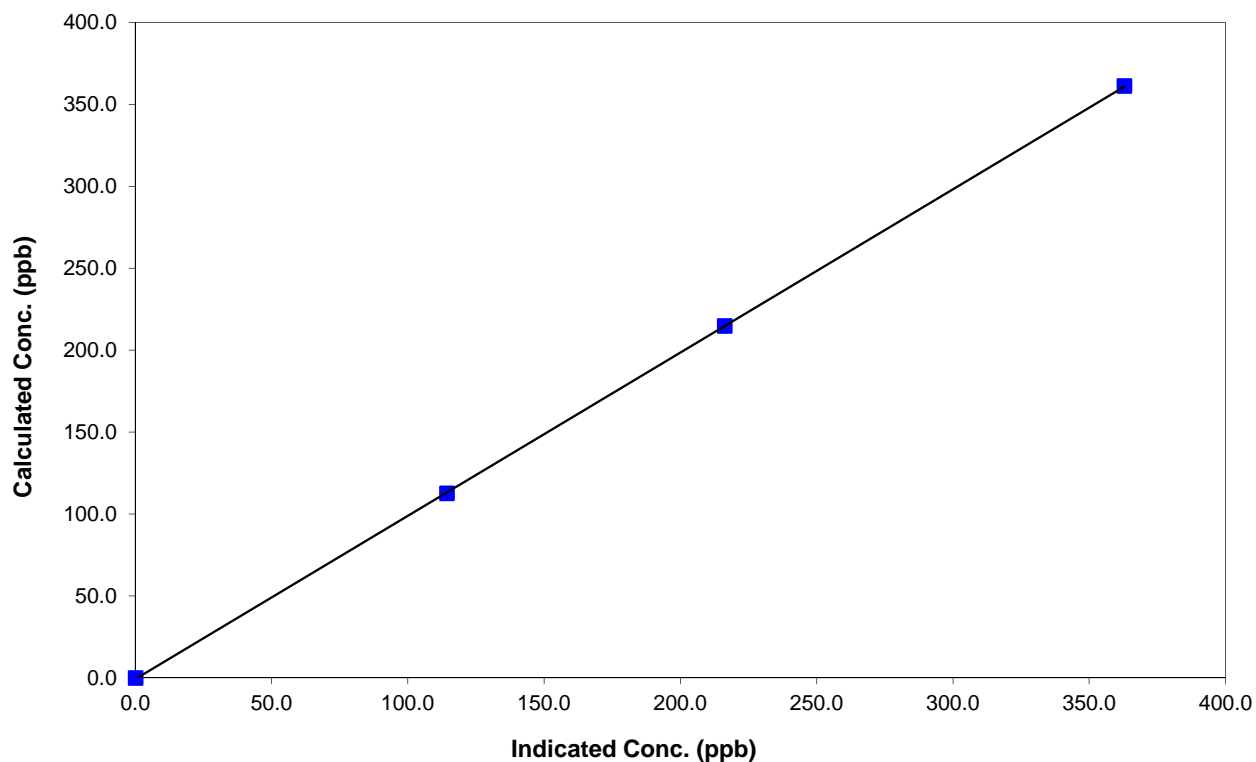
Station Information

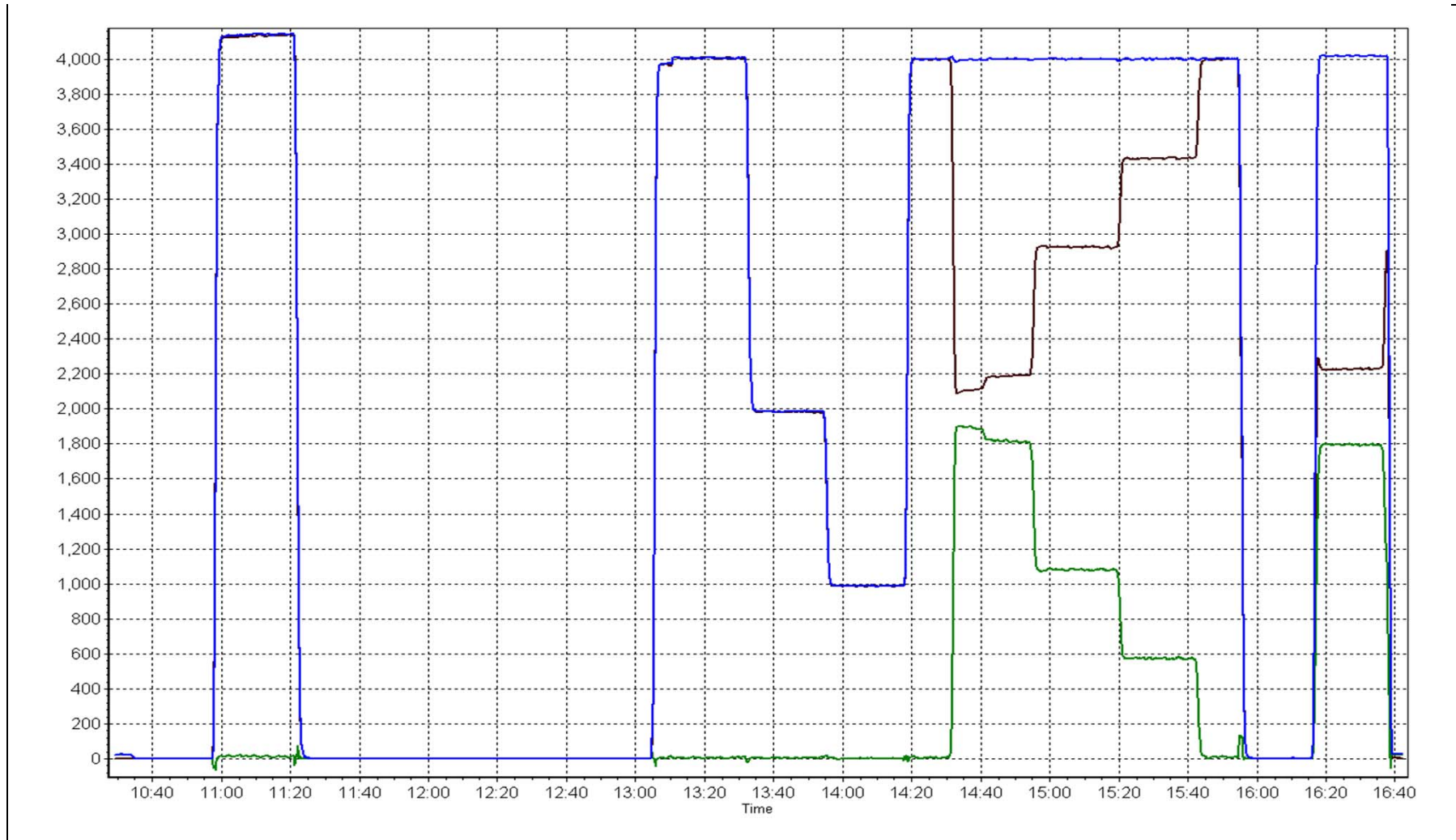
Calibration Date	November 14, 2014	Previous Calibration	October 20, 2014
Station Number	Fort McKay South	Station Number	AMS 13
Start Time (MST)	10:30	End Time (MST)	16:40
Analyzer make	Thermo 42C	Analyzer serial #	2185

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	N/A	Correlation Coefficient	0.999985
361.4	363.0	0.9957		
214.7	216.3	0.9927	Slope	0.996932
112.6	114.4	0.9836		
			Intercept	-0.766842

NO₂ Calibration Curve





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 14
ANZAC
NOVEMBER 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

December 30, 2014

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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS 14)
NOVEMBER 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	685	35	35	100.00	8	0	3	0
TRS(ppb) Average	687	33	33	100.00	3	0	1	0
THC(ppm) Average	685	35	35	100.00	3.9	-	2.2	-
NMHC(ppm) Average	685	35	35	100.00	0.171	-	0.039	-
CH4(ppm) Average	685	35	35	100.00	3.9	-	2.1	-
NO2(ppb) Average	685	35	35	100.00	29	0	10	-
NO(ppb) Average	685	35	35	100.00	22	-	2	-
NOX(ppb) Average	685	35	35	100.00	46	-	12	-
O3(ppb) Average	685	35	35	100.00	38	0	33	-
PM2.5(ug/m3) Average	717	0	3	99.58	33.2	-	11.5	0
Temperature 2 m (C) Average	720	0	0	100.00	8	-	2.3	-
Relative Humidity (%) Average	720	0	0	100.00	99	-	-	-
Surface Wetness (% of range) Average	720	0	0	100.00	44	-	-	-
Wind Speed 10 m (km/h) Average	711	0	9	98.75	23	-	-	-
Wind Direction 10 m (deg) Average	711	0	9	98.75	-	-	-	-
Precipitation (mm) Total	720	0	0	100.00	0.8	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS 14)
NOVEMBER 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	685	0.6	1	-	0	0	0	0	1	1	8
TRS(ppb) Average	687	0.3	0	-	0	0	0	0	0	0	3
THC(ppm) Average	685	1.91	0.2	-	1.8	1.8	1.8	1.9	1.9	2	3.9
NMHC (ppm) Average	685	0.006	0.018	-	0	0	0	0	0	0	0.171
CH4(ppm) Average	685	1.91	0.2	-	1.8	1.8	1.8	1.9	1.9	2	3.9
NO2(ppb) Average	685	4.1	4	-	0	1	1	3	6	10	29
NO(ppb) Average	685	0.6	2	-	0	0	0	0	1	1	22
NOX(ppb) Average	685	4.7	5	-	0	1	1	3	6	11	46
O3(ppb) Average	685	22.1	9	-	0	8	15	24	29	32	38
PM2.5(ug/m3) Average	717	4.12	3.9	-	0.6	1.3	1.9	2.9	4.8	8.7	33.2
Temperature 2 m (C) Average	720	-11.85	7.9	-	-28.9	-22.5	-17	-12.6	-6.7	-0.5	8
Relative Humidity (%) Average	720	82	8	-	56	72	78	83	86	94	99
Surface Wetness (% of range) Average	720	0.5	3	-	0	0	0	0	0	0	44
Wind Speed 20 m (km/h) Average	711	7.4	4	-	1	3	5	7	9	12	23
Wind Direction 20 m (deg) Average	711	-	-	-	-	-	-	-	-	-	0
Precipitation (mm) Total	720	-	-	8.38	0	0	0	0	0	0	0.8

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS 14)
NOVEMBER 2014

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
PM2.5	05 Nov 2014 12:00	05 Nov 2014 14:00	3	Maintenance - Flow and zero check, sample head cleaning
Wind Speed, Wind Direction	05 Nov 2014 06:00	05 Nov 2014 13:00	8	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	12 Nov 2014 23:00	12 Nov 2014 23:00	1	Flat line in sensor output signal -sensor frozen

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Summary of Hour Averages

Anzac - November 2014

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 8 ppb on Nov 11 11:00	Maximum Daily Average: 2.7 ppb on Nov 11		Hours of Data:	685
Minimum Value: 0 ppb on Nov 5 09:00	Minimum Daily Average: 0.1 ppb on Nov 19		Hours of Missing Data:	35
Maximum Diurnal Average: 0.9 ppb at hour 14	Minimum Diurnal Average: 0.3 ppb at hour 5		Hours of Calibration:	35
Monthly Average: 0.6 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 1 P ₉₉ = 5		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0.3	1
2-Nov	0	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-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	2	1	1	3	2	5	4	4	3	3	1.3	5
4-Nov	1	2	2	Z	1	1	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0.6	2
5-Nov	0	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-Nov	0	1	1	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.3	1
7-Nov	0	0	0	0	0	0	Z	1	0	1	0	1	0	0	0	0	1	3	3	1	5	7	4	1	1.3	7
8-Nov	Z	0	0	0	0	0	1	3	2	2	3	2	2	1	1	3	2	3	0	0	0	0	0	0	1.1	3
9-Nov	0	Z	0	0	0	0	0	0	0	0	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0.1	1
10-Nov	0	0	Z	0	0	0	1	1	1	1	0	0	2	2	3	1	0	0	0	0	0	0	0	0	0.6	3
11-Nov	0	0	0	Z	0	0	0	0	1	5	8	7	4	5	5	6	6	5	3	2	1	1	1	1	2.7	8
12-Nov	1	1	1	1	Z	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
13-Nov	0	0	0	0	0	Z	0	0	0	0	0	1	2	2	2	1	1	0	0	1	1	1	0	0	0.6	2
14-Nov	0	0	1	1	0	1	Z	1	1	1	0	0	0	0	0	0	3	3	1	1	1	1	0	0	0.8	3
15-Nov	Z	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	1	1	2	0.5	2
16-Nov	2	Z	2	1	1	1	2	1	1	2	1	2	1	1	3	1	0	0	0	0	0	0	0	0	1.0	3
17-Nov	0	0	Z	0	0	0	0	0	0	0	1	1	1	2	1	0	0	2	2	1	1	1	0	0	0.6	2
18-Nov	0	0	0	Z	0	0	1	2	1	1	1	1	2	1	0	0	0	0	0	0	0	0	0	0	0.5	2
19-Nov	0	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
20-Nov	0	0	0	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.6	1
21-Nov	1	3	1	1	1	0	Z	0	0	0	0	0	1	2	3	0	0	0	0	0	0	0	0	0	0.6	3
22-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
23-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0.2	1
24-Nov	0	0	Z	1	0	1	5	2	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	5
25-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	1	0	0	1	1	1	1	1	1	1	1	1	0.4	1
26-Nov	1	1	1	1	Z	1	1	1	0	1	2	2	2	3	1	1	1	1	1	1	1	1	1	1	1.0	3
27-Nov	1	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.3	1
28-Nov	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
29-Nov	Z	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2
30-Nov	0	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

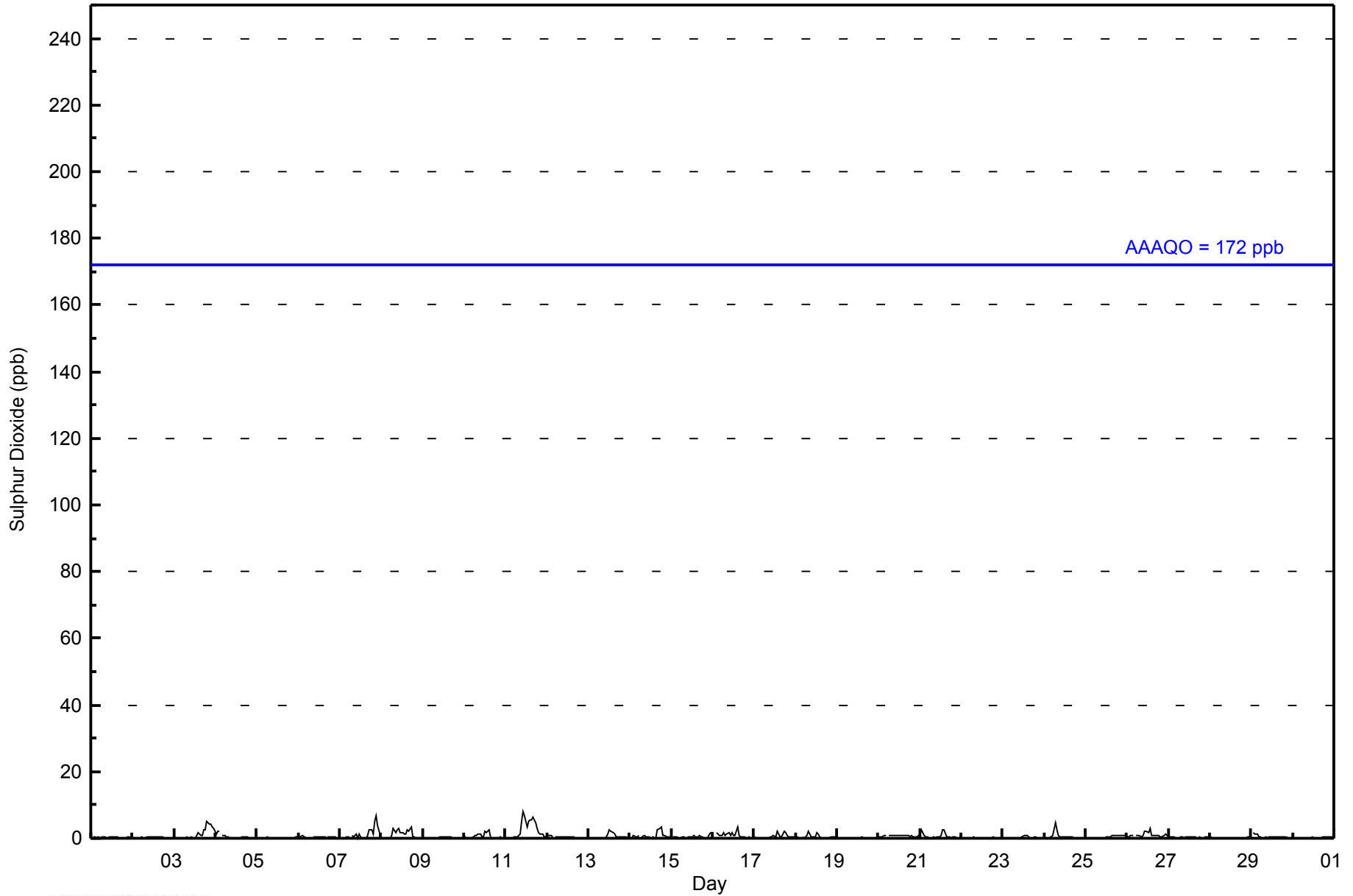
0.4	0.5	0.4	0.3	0.3	0.3	0.5	0.5	0.5	0.6	0.7	0.8	0.8	0.9	0.9	0.7	0.7	0.8	0.6	0.5	0.6	0.7	0.5	0.4	Diurnal Average	
2	3	2	1	1	1	5	3	2	5	8	7	4	5	5	6	6	5	3	5	5	7	4	3	Diurnal Maximum	

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



WBEA
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Anzac - November 2014





WBEA
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Anzac - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	685	100.00	100.00
11 - 20	0	0.00	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



WBEA
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Anzac - November 2014

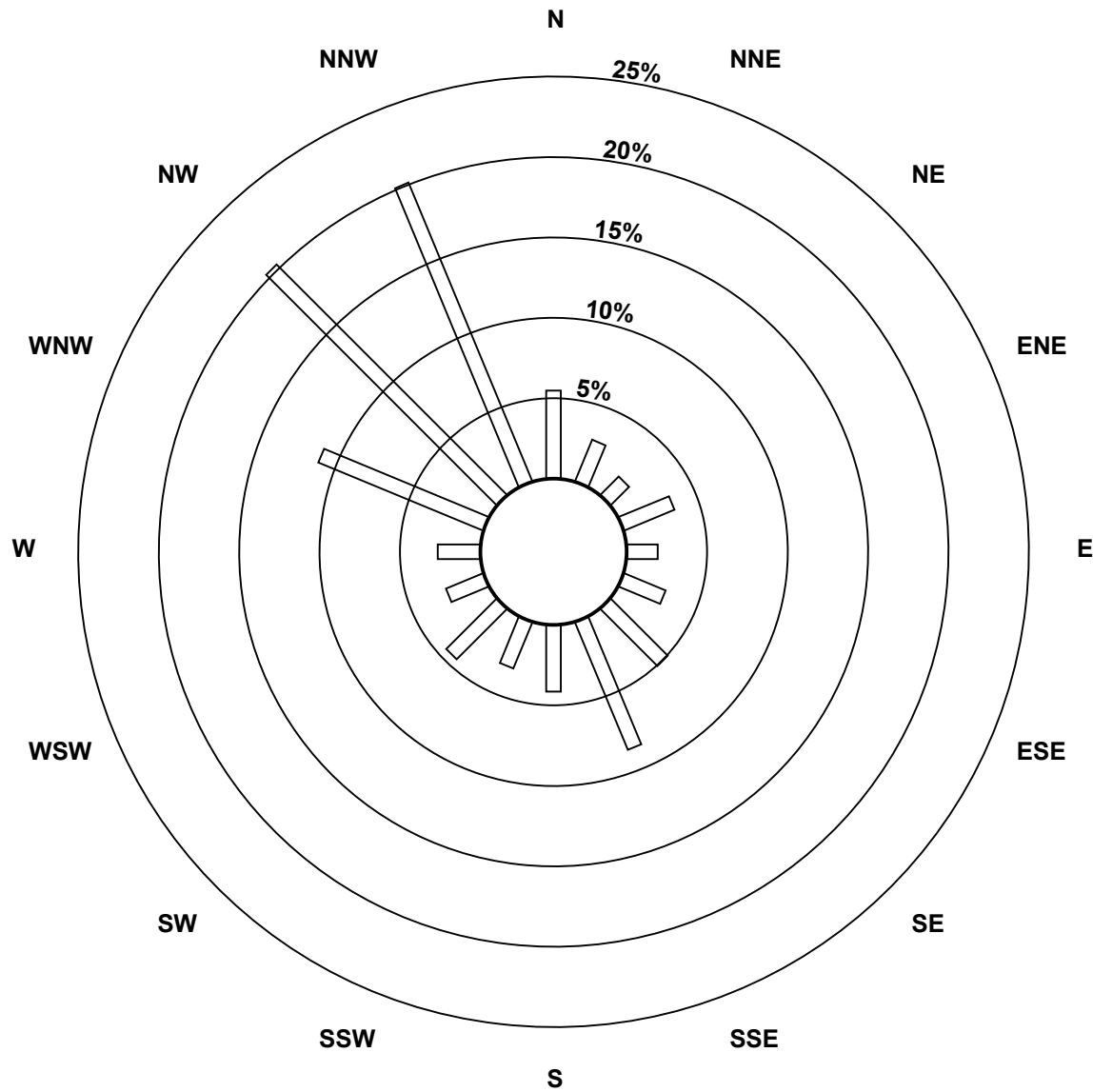
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	37	19	11	23	13	19	34	58	28	21	30	17	18	75	137	136	676
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	37	19	11	23	13	19	34	58	28	21	30	17	18	75	137	136	676

Total Number of Valid Hours: 676

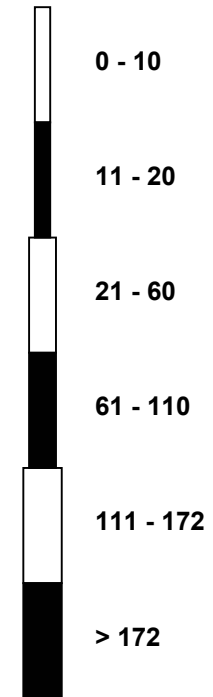
Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

Sulphur Dioxide (SO₂) - ppb
Anzac (AMS 14)



Classes (ppb)

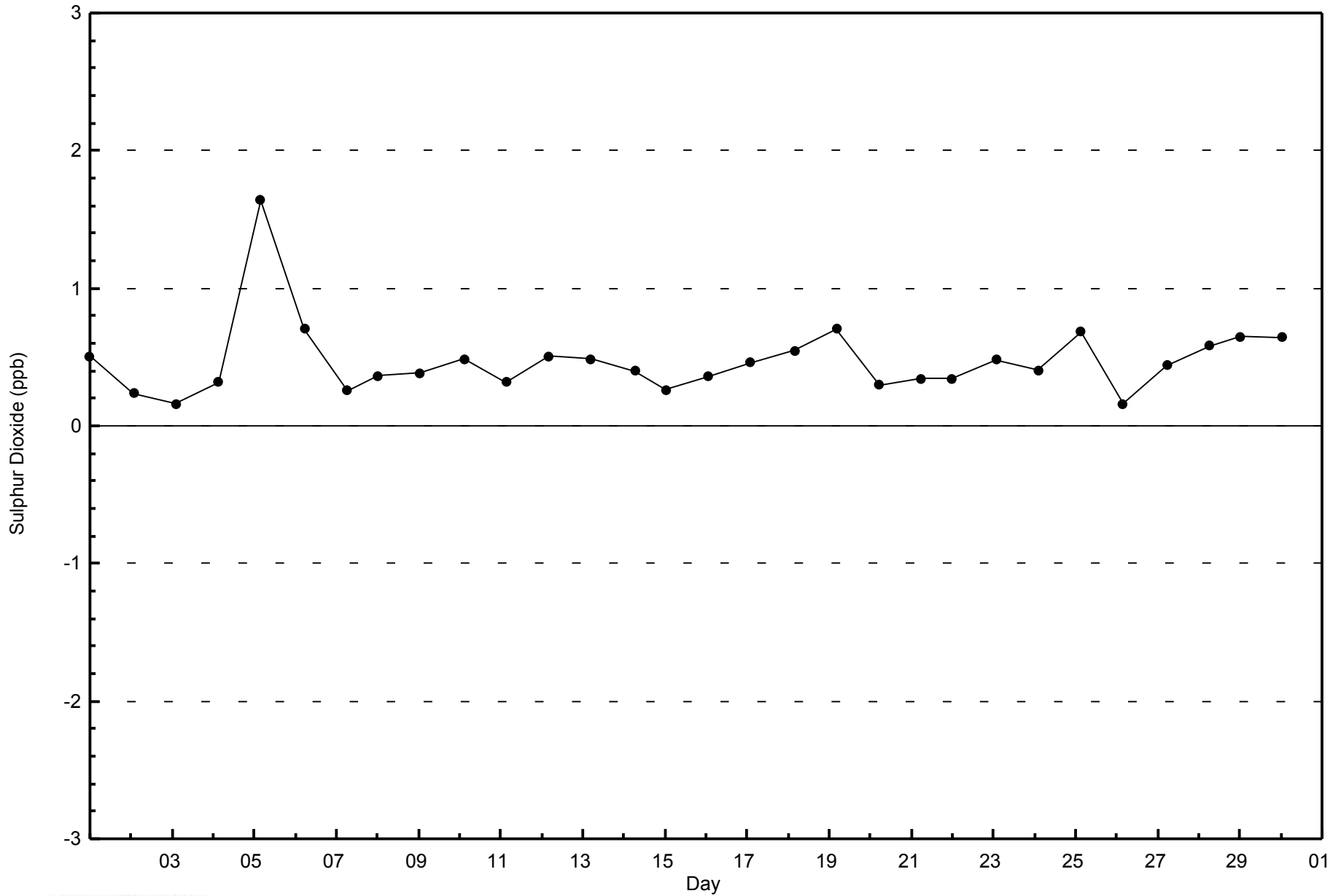


Total Number of Valid Hours: 676



WBEA
Zero Responses

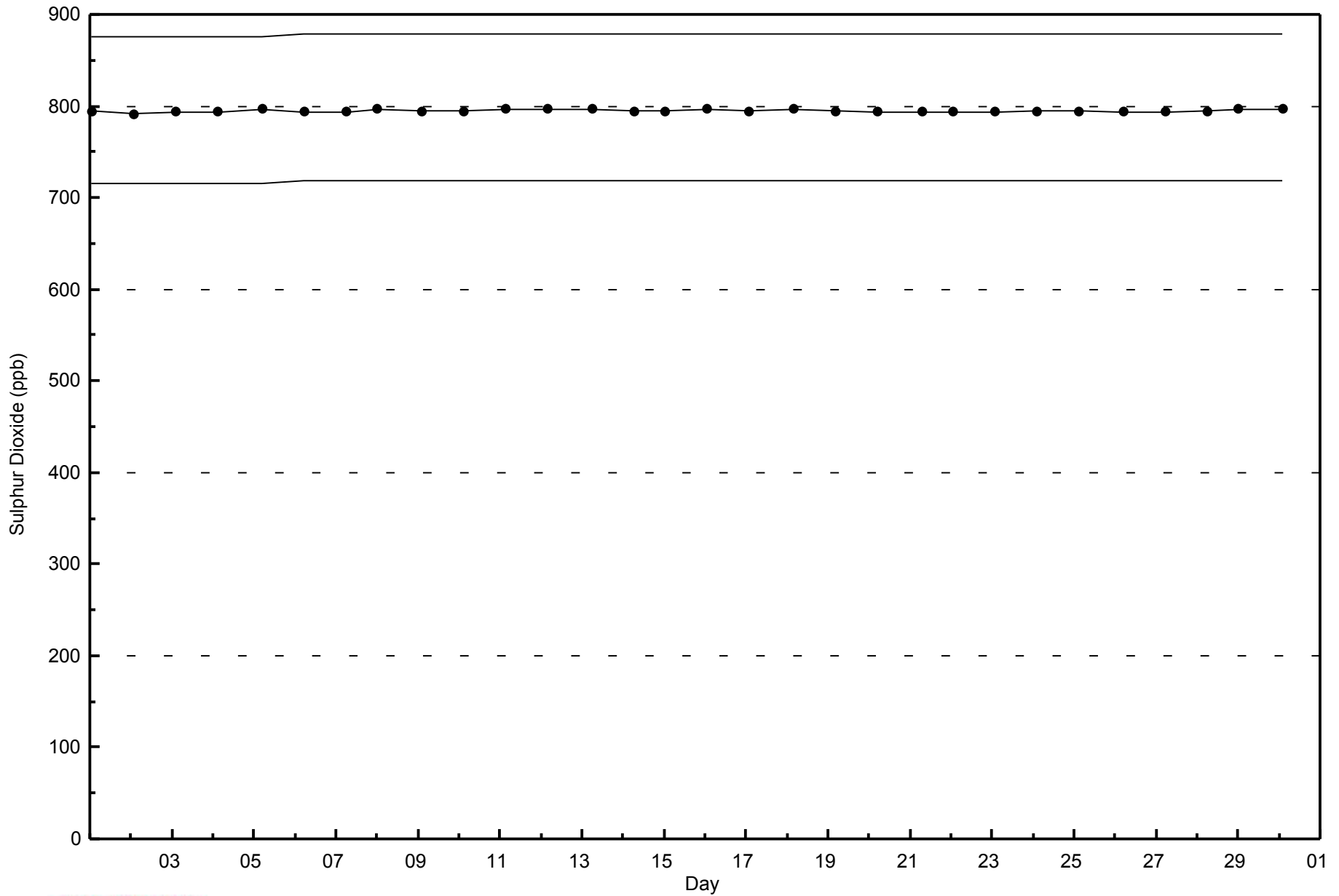
Sulphur Dioxide (SO₂) - ppb
Anzac - November 2014





WBEA
Span Responses

Sulphur Dioxide (SO₂) - ppb
Anzac - November 2014



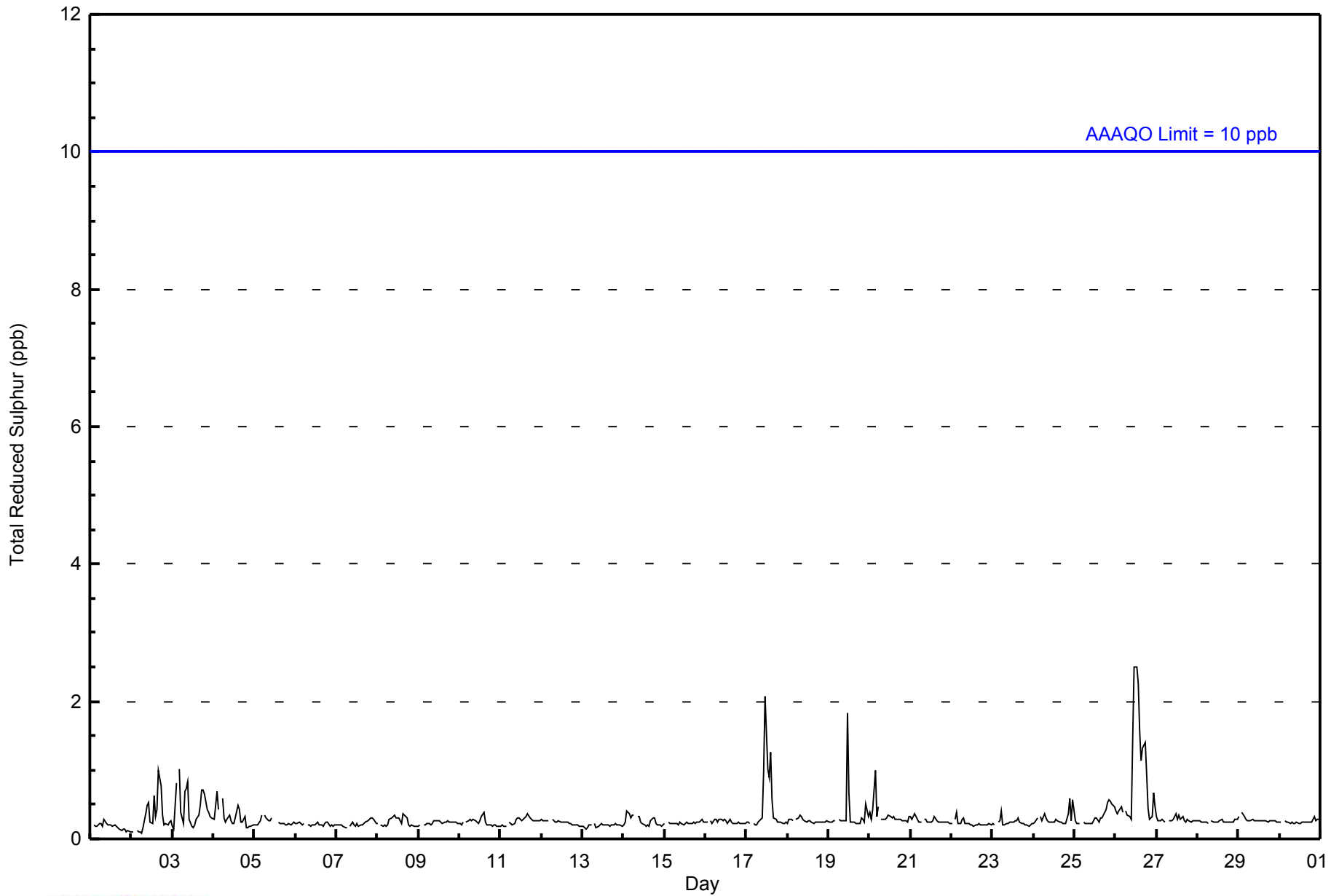


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 720																
Maximum Value: 3 ppb on Nov 26 13:00										Maximum Daily Average: 0.9 ppb on Nov 26										Hours of Data: 687						
Minimum Value: 0 ppb on Nov 2 07:00										Minimum Daily Average: 0.2 ppb on Nov 1										Hours of Missing Data: 33						
Maximum Diurnal Average: 0.4 ppb at hour 12										Minimum Diurnal Average: 0.2 ppb at hour 1										Hours of Calibration: 33						
Monthly Average: 0.3 ppb										Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1										Percent Operational Time: 100.0						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0	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-Nov	0	0	Z	0	0	0	0	0	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	0	0.3	1
3-Nov	0	0	1	Z	1	0	0	1	1	1	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0.5	1
4-Nov	0	0	1	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
5-Nov	0	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
6-Nov	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
7-Nov	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
8-Nov	0	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
9-Nov	0	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-Nov	0	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
11-Nov	0	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
12-Nov	0	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
13-Nov	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
14-Nov	0	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
15-Nov	0	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
16-Nov	0	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-Nov	0	0	0	Z	0	0	0	0	0	0	1	2	1	1	1	1	0	0	0	0	0	0	0	0	0.5	2
18-Nov	0	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
19-Nov	0	0	0	0	0	Z	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	1	0	0.4	2
20-Nov	0	0	0	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
21-Nov	0	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
22-Nov	0	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-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
24-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0.3	1
25-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.3	1
26-Nov	0	0	0	0	0	Z	0	0	0	0	1	3	3	2	2	1	1	1	1	0	0	0	1	0	0.9	3
27-Nov	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
28-Nov	0	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
29-Nov	0	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
30-Nov	0	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
																								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 - November 2014





WBEA
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Anzac - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	685	99.71	99.71
3 - 4	2	0.29	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720



WBEA
Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Anzac - November 2014

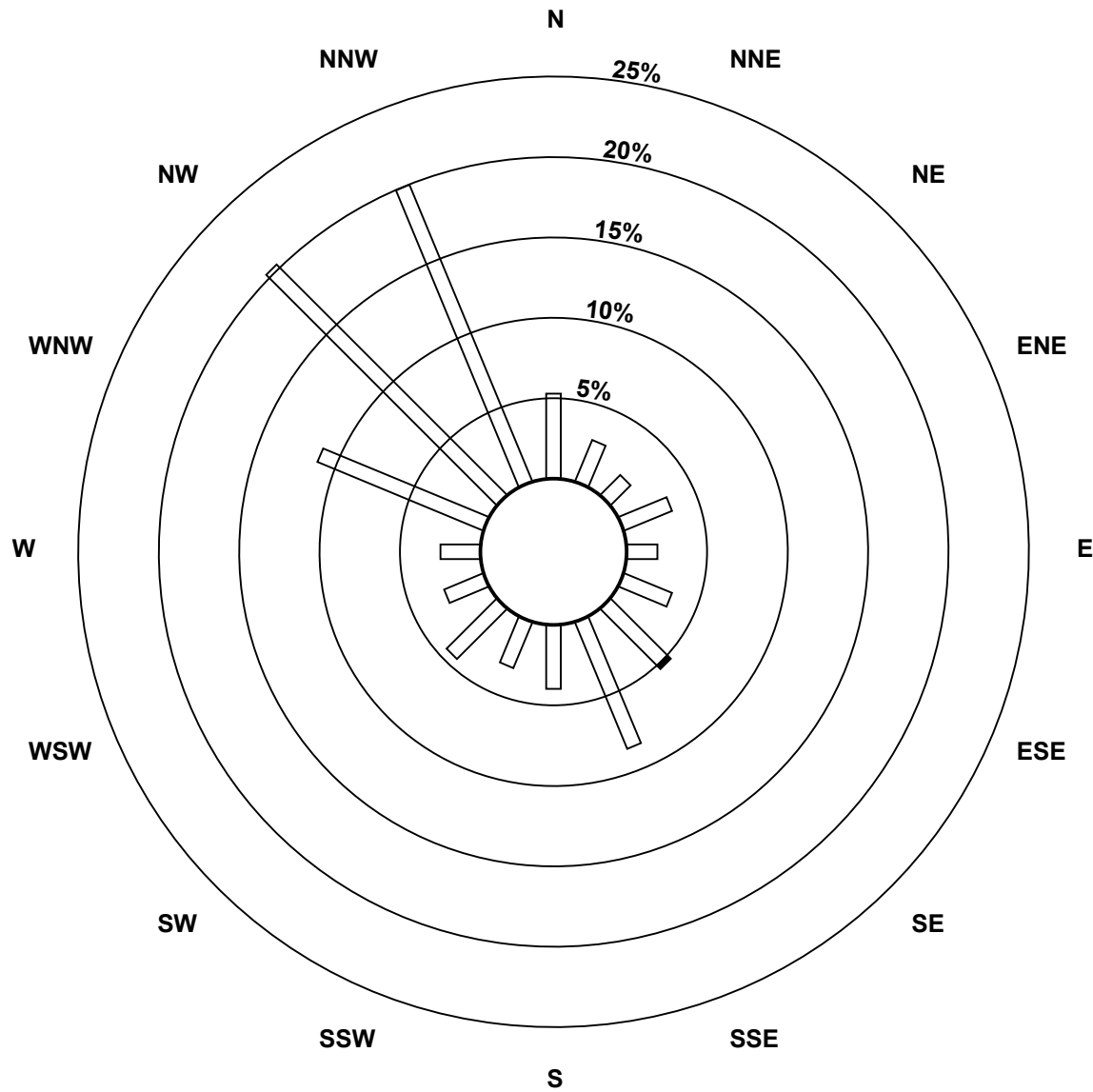
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	36	19	12	22	13	22	34	58	27	21	30	18	17	76	138	136	679
3 - 4	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	36	19	12	22	13	22	36	58	27	21	30	18	17	76	138	136	681

Total Number of Valid Hours: 681

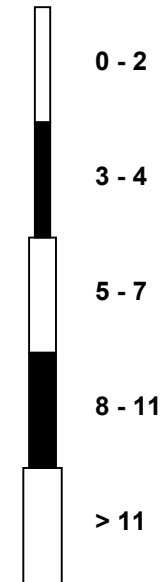
Total Number of Hours: 720

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

**Total Reduced Sulphur (TRS) - ppb
Anzac (AMS 14)**



Classes (ppb)

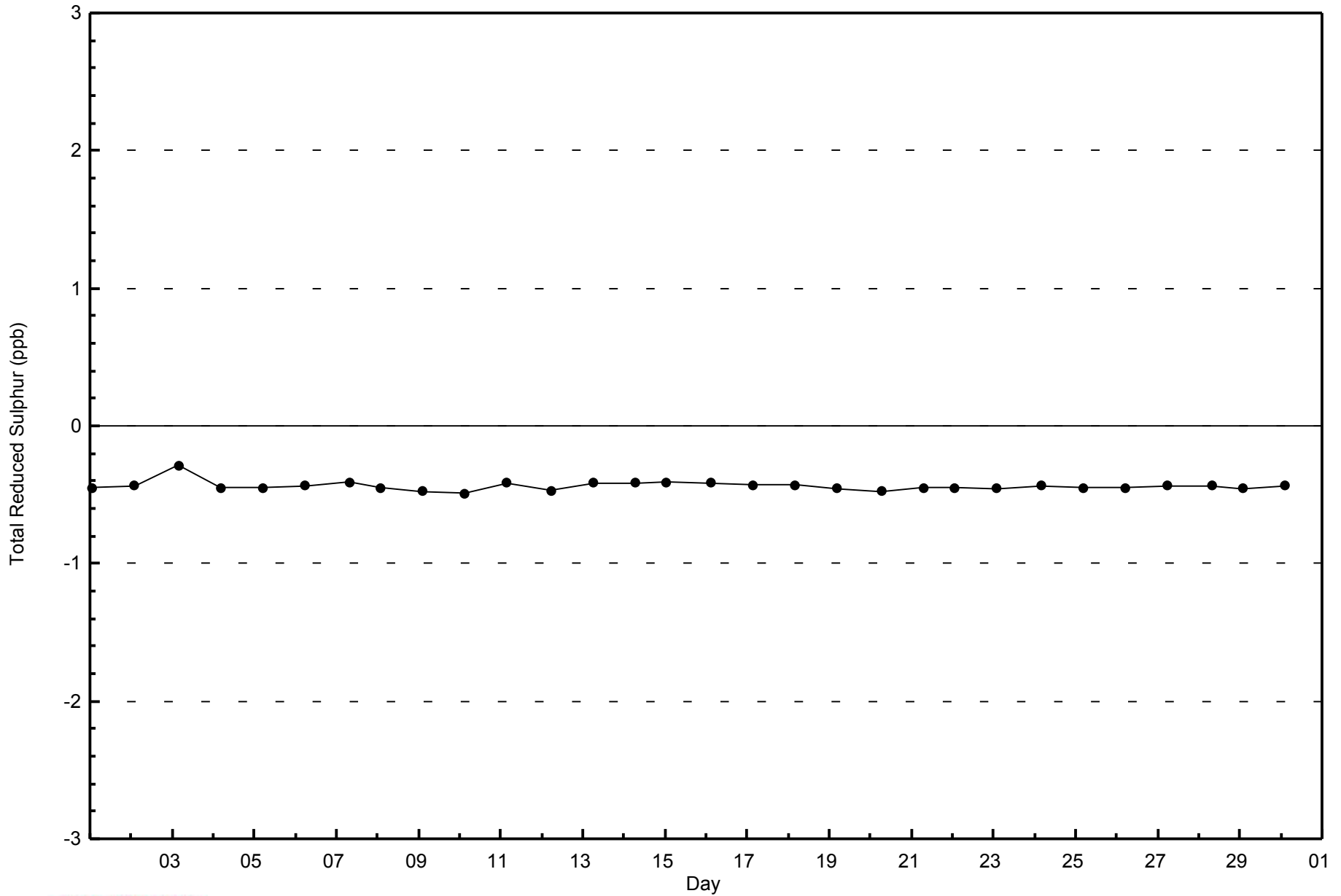


Total Number of Valid Hours: 681



WBEA
Zero Responses

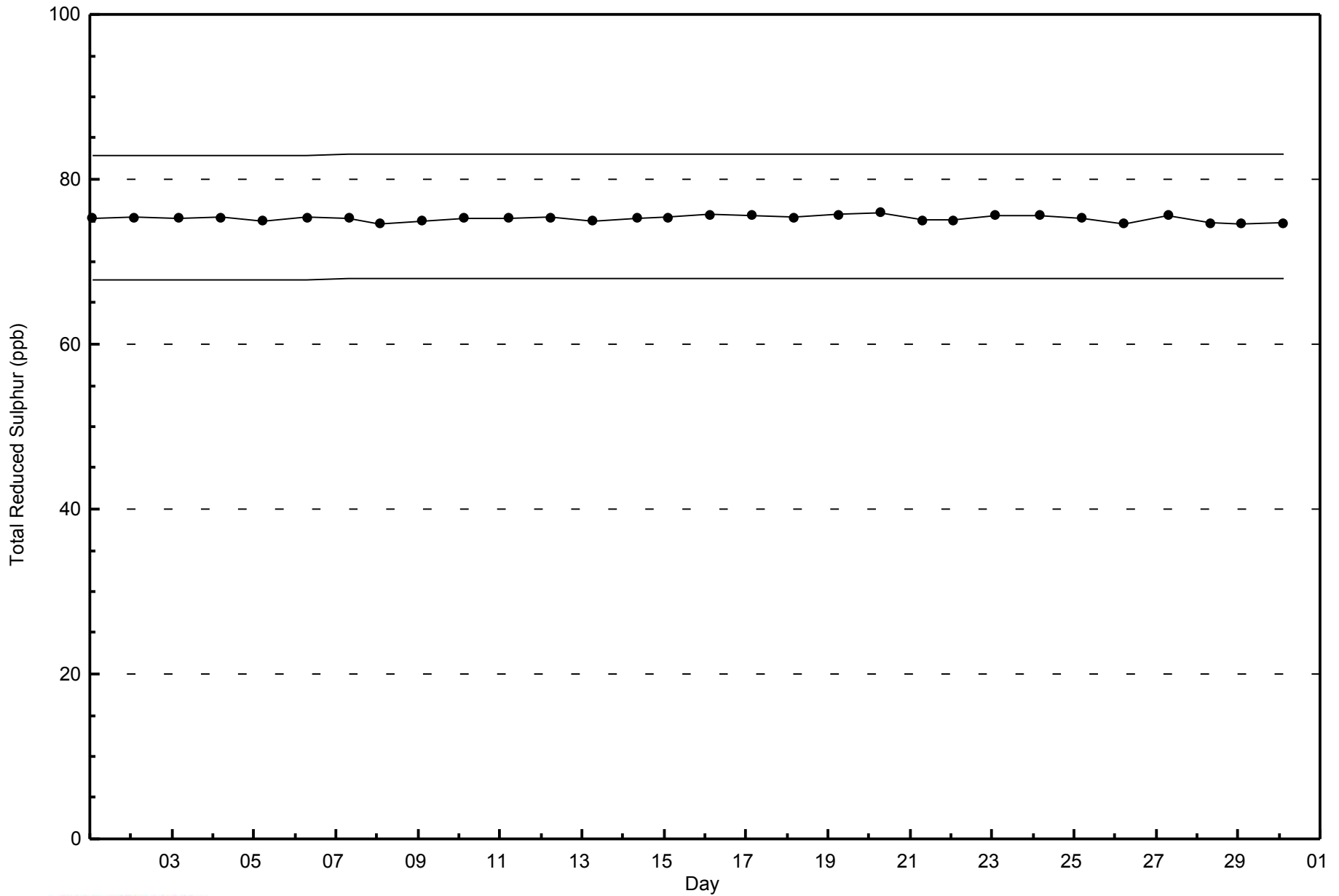
Total Reduced Sulphur (TRS) - ppb
Anzac - November 2014





WBEA
Span Responses

Total Reduced Sulphur (TRS) - ppb
Anzac - November 2014



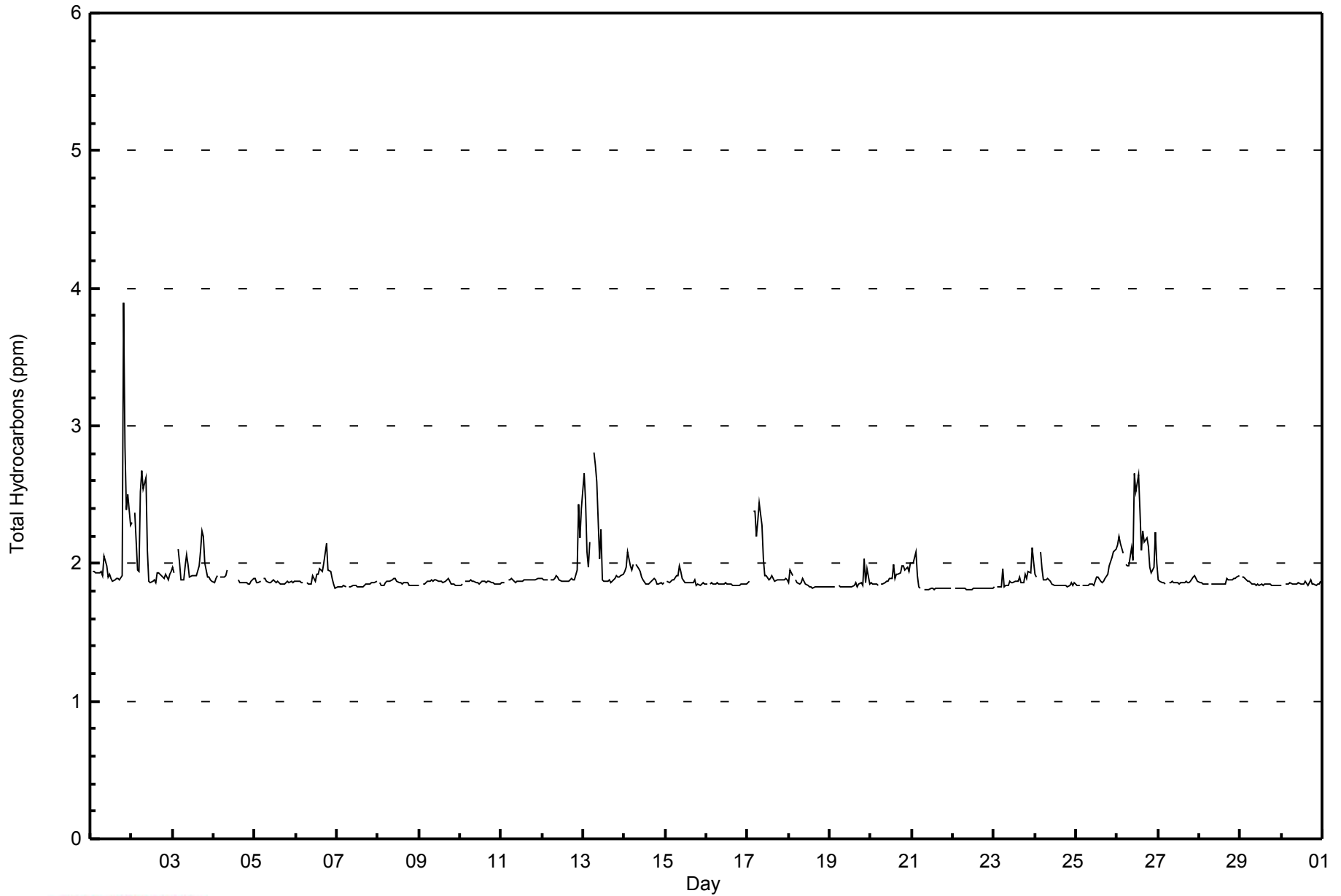


Maximum Value: 3.9 ppm on Nov 1 20:00																	Maximum Daily Average: 2.2 ppm on Nov 26																	Hours in Service: 720	
Minimum Value: 1.8 ppm on Nov 21 11:00																	Minimum Daily Average: 1.8 ppm on Nov 22																	Hours of Data: 685	
Maximum Diurnal Average: 2.0 ppm at hour 7																	Minimum Diurnal Average: 1.9 ppm at hour 15																	Hours of Missing Data: 35	
Monthly Average: 1.91 ppm																	Percentiles: P ₁ = 1.8 P ₁₀ = 1.8 Q ₁ = 1.8 Median = 1.9 Q ₃ = 1.9 P ₉₀ = 2.0 P ₉₉ = 2.7																	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-Nov	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	3.9	2.8	2.4	2.5	2.3	2.1	3.9									
2-Nov	2.3	Z	2.4	2.0	1.9	2.5	2.7	2.5	2.6	2.1	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	2.7									
3-Nov	2.0	1.9	Z	2.1	2.0	1.9	1.9	2.0	2.1	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.2	2.2	2.0	1.9	1.9	1.9	1.9	2.0	2.2									
4-Nov	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	C	C	C	C	C	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9									
5-Nov	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9									
6-Nov	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.0	2.1	2.1	1.9	1.9	1.9	1.9	1.8	1.9	2.1									
7-Nov	1.8	1.8	1.8	1.8	1.8	1.8	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9									
8-Nov	Z	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9									
9-Nov	1.8	Z	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.9	1.9									
10-Nov	1.8	1.8	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9									
11-Nov	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9									
12-Nov	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.4	2.2	2.4	1.9	2.4									
13-Nov	2.7	2.5	2.1	2.0	2.2	Z	2.8	2.7	2.6	2.0	2.2	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	2.8									
14-Nov	1.9	2.0	2.1	2.0	1.9	2.0	Z	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.9	2.1									
15-Nov	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.9	1.9	1.9	2.0									
16-Nov	1.8	Z	1.9	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.8	1.9									
17-Nov	1.9	1.9	Z	2.4	2.4	2.2	2.3	2.4	2.3	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.4									
18-Nov	1.9	2.0	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.0									
19-Nov	1.8	1.8	1.8	1.8	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.0	1.9	2.0	1.9	1.9	2.0									
20-Nov	1.9	1.9	1.8	1.9	1.8	Z	1.8	1.8	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	1.9	2.0	1.9	2.0									
21-Nov	2.0	2.0	2.1	1.9	1.8	1.8	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.1									
22-Nov	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									
23-Nov	1.8	Z	1.8	1.8	1.8	2.0	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	2.0	1.9	1.9	2.1									
24-Nov	1.9	1.9	Z	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.8	1.9	1.9	2.1									
25-Nov	1.8	1.8	1.8	Z	1.8	1.8	1.8	1.8	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.1	2.1	1.9	2.1									
26-Nov	2.1	2.2	2.1	2.1	Z	2.0	2.0	2.0	2.1	2.0	2.7	2.5	2.6	2.4	2.1	2.2	2.2	2.2	2.1	2.0	1.9	2.0	2.2	2.0	2.2	2.7									
27-Nov	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9									
28-Nov	1.9	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9									
29-Nov	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9									
30-Nov	1.8	Z	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.9	1.9	1.9									
																								Diurnal Average											
																								Diurnal Maximum											
Z - zerospan C - Calibration																																			



WBEA
Hourly Averages

Total Hydrocarbons (THC) - ppm
Anzac - November 2014





WBEA
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Anzac - November 2014

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	627	91.53	91.53
2.1 - 3.0	57	8.32	99.85
3.1 - 10.0	1	0.15	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



WBEA
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Anzac - November 2014

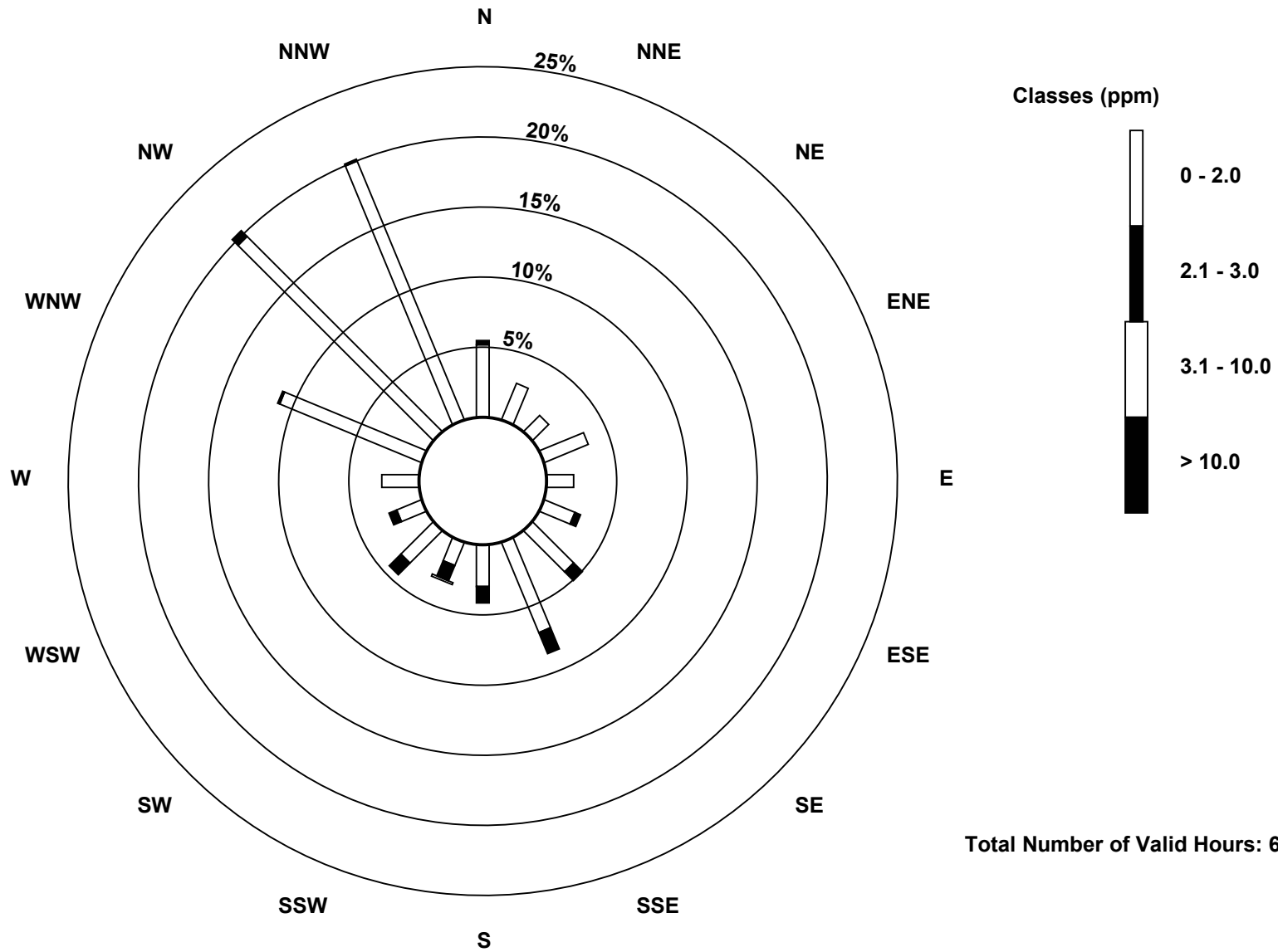
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	35	19	11	23	13	16	28	47	20	12	22	13	18	74	133	135	619
2.1 - 3.0	2	0	0	0	0	3	6	11	8	8	8	4	0	1	4	1	56
3.1 - 10.0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	37	19	11	23	13	19	34	58	28	21	30	17	18	75	137	136	676

Total Number of Valid Hours: 676

Total Number of Hours: 720

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

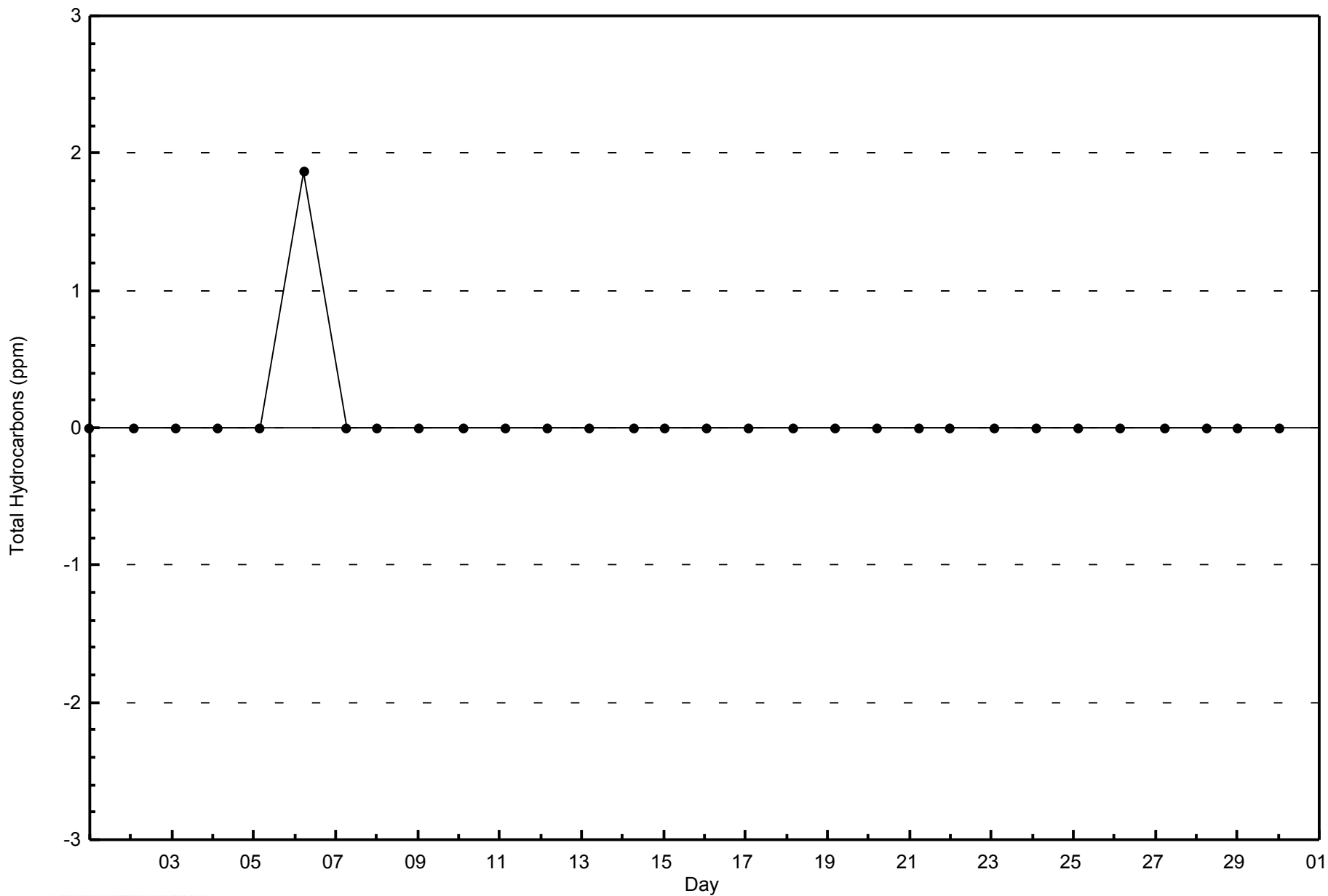
**Total Hydrocarbons (THC) - ppm
Anzac (AMS 14)**





WBEA
Zero Responses

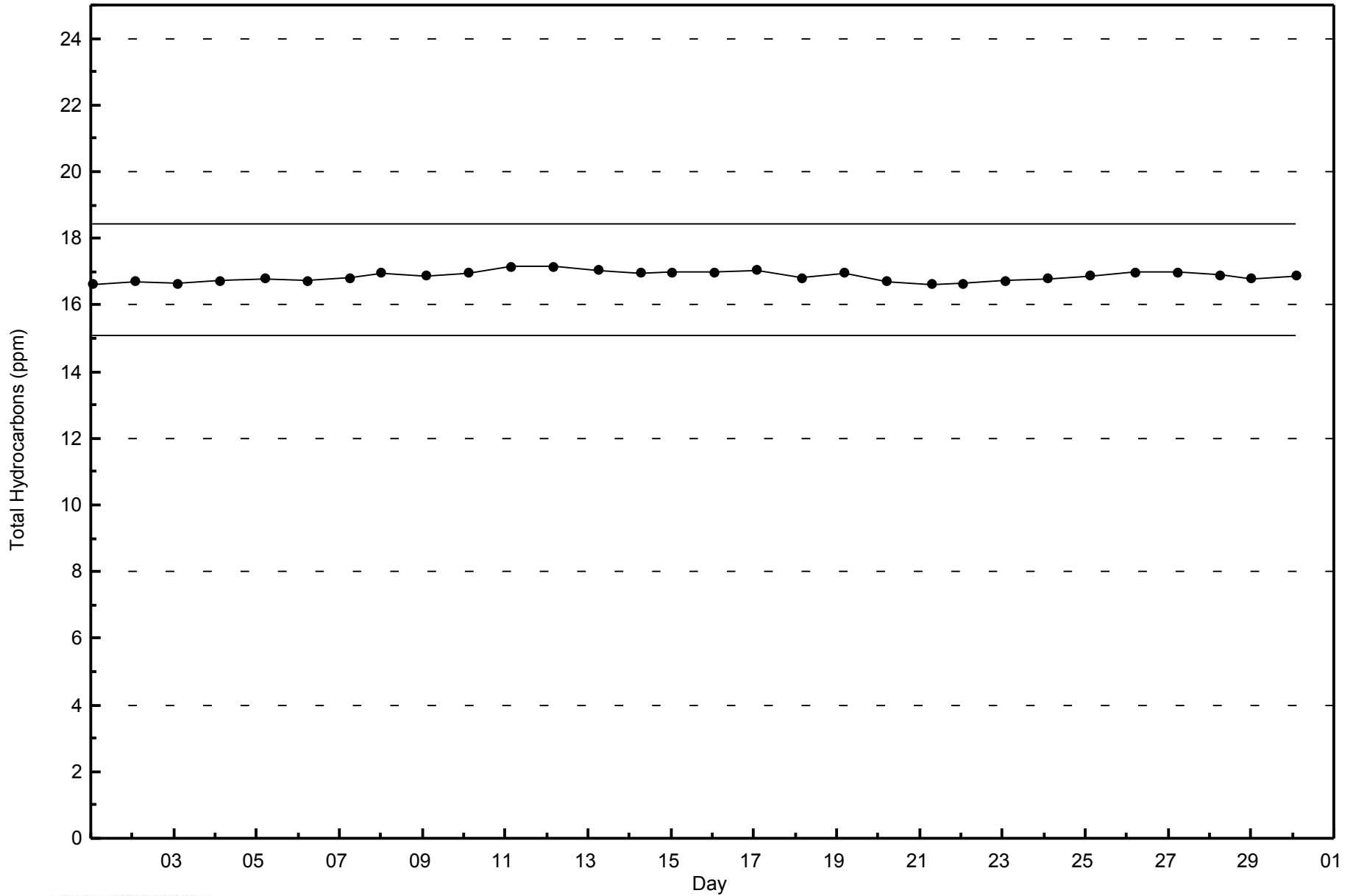
Total Hydrocarbons (THC) - ppm
Anzac - November 2014





WBEA
Span Responses

Total Hydrocarbons (THC) - ppm
Anzac - November 2014



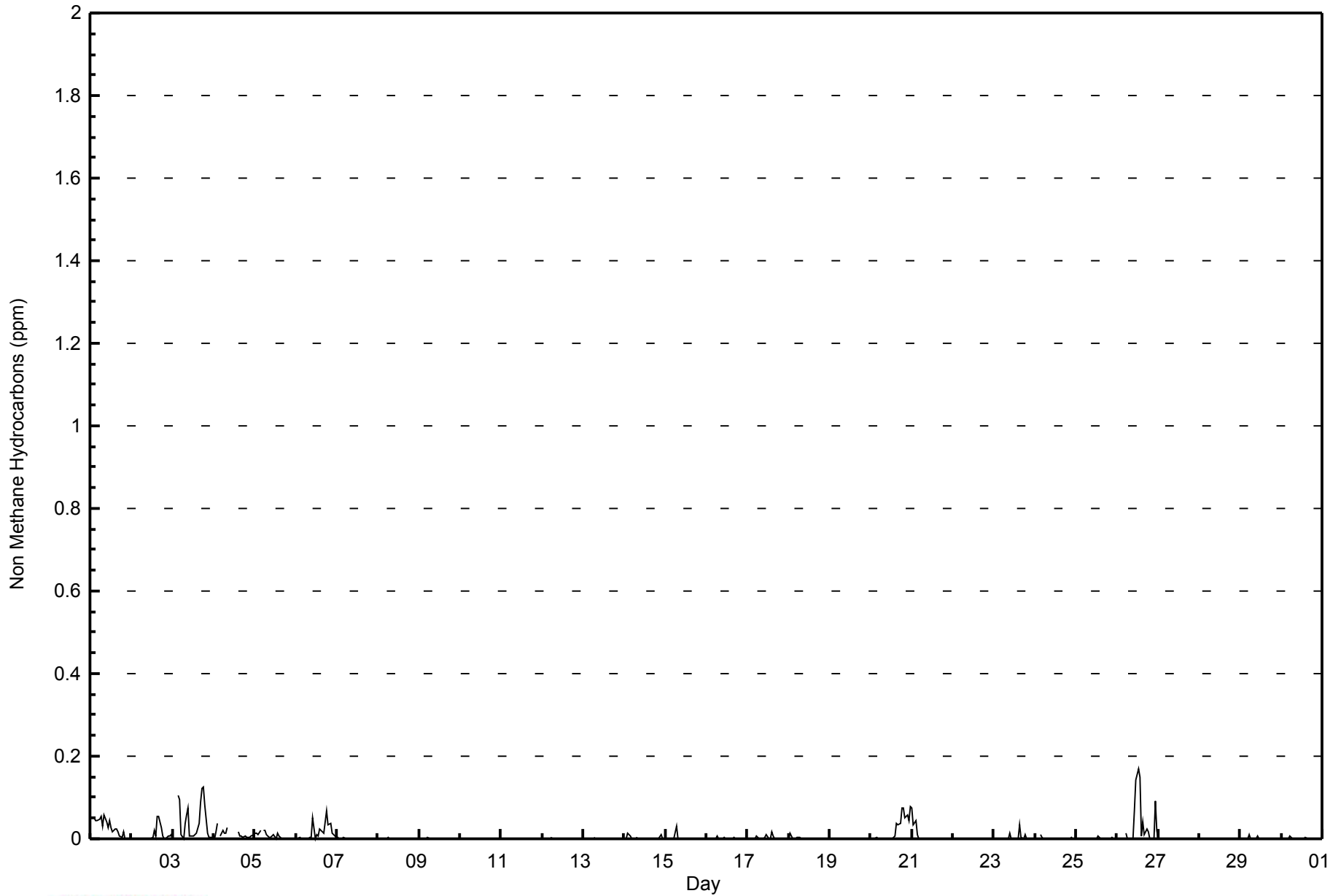


Maximum Value: 0.171 ppm on Nov 26 13:00		Maximum Daily Average: 0.039 ppm on Nov 3		Hours in Service: 720																						
Minimum Value: 0.000 ppm on Nov 1 22:00		Minimum Daily Average: 0.000 ppm on Nov 10		Hours of Data: 685																						
Maximum Diurnal Average: 0.010 ppm at hour 19		Minimum Diurnal Average: 0.003 ppm at hour 8		Hours of Missing Data: 35																						
Monthly Average: 0.006 ppm		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 0.1		Hours 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-Nov	Z	0.049	0.051	0.043	0.043	0.049	0.053	0.029	0.057	0.040	0.029	0.043	0.026	0.016	0.023	0.024	0.017	0.008	0.005	0.017	0.001	0.000	0.001	0.000	0.027	0.057
2-Nov	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.021	0.007	0.055	0.054	0.028	0.005	0.000	0.001	0.006	0.006	0.010	0.009	0.055
3-Nov	0.001	0.000	Z	0.104	0.096	0.010	0.000	0.038	0.057	0.075	0.006	0.007	0.006	0.011	0.014	0.036	0.087	0.124	0.124	0.081	0.014	0.004	0.003	0.005	0.039	0.124
4-Nov	0.001	0.019	0.038	Z	0.006	0.020	0.013	0.014	0.026	C	C	C	C	C	0.017	0.007	0.006	0.002	0.006	0.003	0.002	0.002	0.007	0.009	0.011	0.038
5-Nov	0.014	0.013	0.011	0.020	Z	0.021	0.019	0.012	0.002	0.003	0.006	0.012	0.001	0.015	0.006	0.002	0.001	0.001	0.000	0.000	0.000	0.001	0.000	0.007	0.021	
6-Nov	0.000	0.000	0.002	0.000	0.000	Z	0.000	0.001	0.002	0.002	0.051	0.002	0.009	0.006	0.023	0.016	0.014	0.041	0.069	0.034	0.036	0.012	0.011	0.005	0.015	0.069
7-Nov	0.002	0.001	0.000	0.000	0.003	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	
8-Nov	Z	0.000	0.000	0.000	0.000	0.000	0.004	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	0.004	
9-Nov	0.000	Z	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	
10-Nov	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	
11-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	
12-Nov	0.000	0.000	0.000	0.000	Z	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	0.003	
13-Nov	0.000	0.000	0.000	0.000	0.000	Z	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	
14-Nov	0.000	0.000	0.013	0.005	0.000	0.002	Z	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.000	0.000	0.001	0.013	
15-Nov	Z	0.000	0.000	0.000	0.000	0.000	0.029	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.029	
16-Nov	0.000	Z	0.000	0.000	0.000	0.000	0.008	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.008	
17-Nov	0.000	0.000	Z	0.000	0.000	0.008	0.004	0.000	0.000	0.000	0.002	0.011	0.000	0.000	0.016	0.008	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.002	0.016	
18-Nov	0.000	0.012	0.001	Z	0.000	0.003	0.003	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.012	
19-Nov	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
20-Nov	0.000	0.000	0.000	0.002	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.004	0.007	0.039	0.034	0.039	0.073	0.073	0.049	0.059	0.045	0.077	0.022	0.077
21-Nov	0.073	0.033	0.043	0.012	0.002	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.073	
22-Nov	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	0.001	
23-Nov	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.000	0.000	0.000	0.000	0.000	0.034	0.003	0.000	0.010	0.000	0.000	0.000	0.000	0.003	0.034	
24-Nov	0.000	0.000	Z	0.009	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	0.003	0.000	0.000	0.001	0.009	
25-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.000	0.000	0.008	
26-Nov	0.000	0.000	0.000	0.000	Z	0.015	0.001	0.000	0.000	0.000	0.067	0.142	0.171	0.151	0.007	0.042	0.011	0.023	0.017	0.000	0.000	0.093	0.020	0.033	0.171	
27-Nov	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
28-Nov	0.000	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
29-Nov	Z	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.011	
30-Nov	0.000	Z	0.000	0.000	0.001	0.007	0.001	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	0.001	0.000	0.000	0.001	0.007	
																								Diurnal Average		
																								Diurnal Maximum		
0.004 0.005 0.006 0.007 0.006 0.006 0.005 0.003 0.005 0.005 0.006 0.008 0.008 0.008 0.004 0.009 0.008 0.009 0.010 0.007 0.003 0.003 0.006 0.004																										
0.073 0.049 0.051 0.104 0.096 0.049 0.053 0.038 0.057 0.075 0.067 0.142 0.171 0.151 0.023 0.055 0.087 0.124 0.124 0.081 0.049 0.059 0.093 0.077																										
Z - zerospan C - Calibration																										



WBEA
Hourly Averages

Non Methane Hydrocarbons (NMHC) - ppm
Anzac - November 2014





WBEA
Cumulative Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm
Anzac - November 2014

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	564	82.34	82.34
0.006 - 0.05	101	14.74	97.08
0.06 - 0.1	18	2.63	99.71
> 0.1	2	0.29	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



WBEA
Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm
Anzac - November 2014

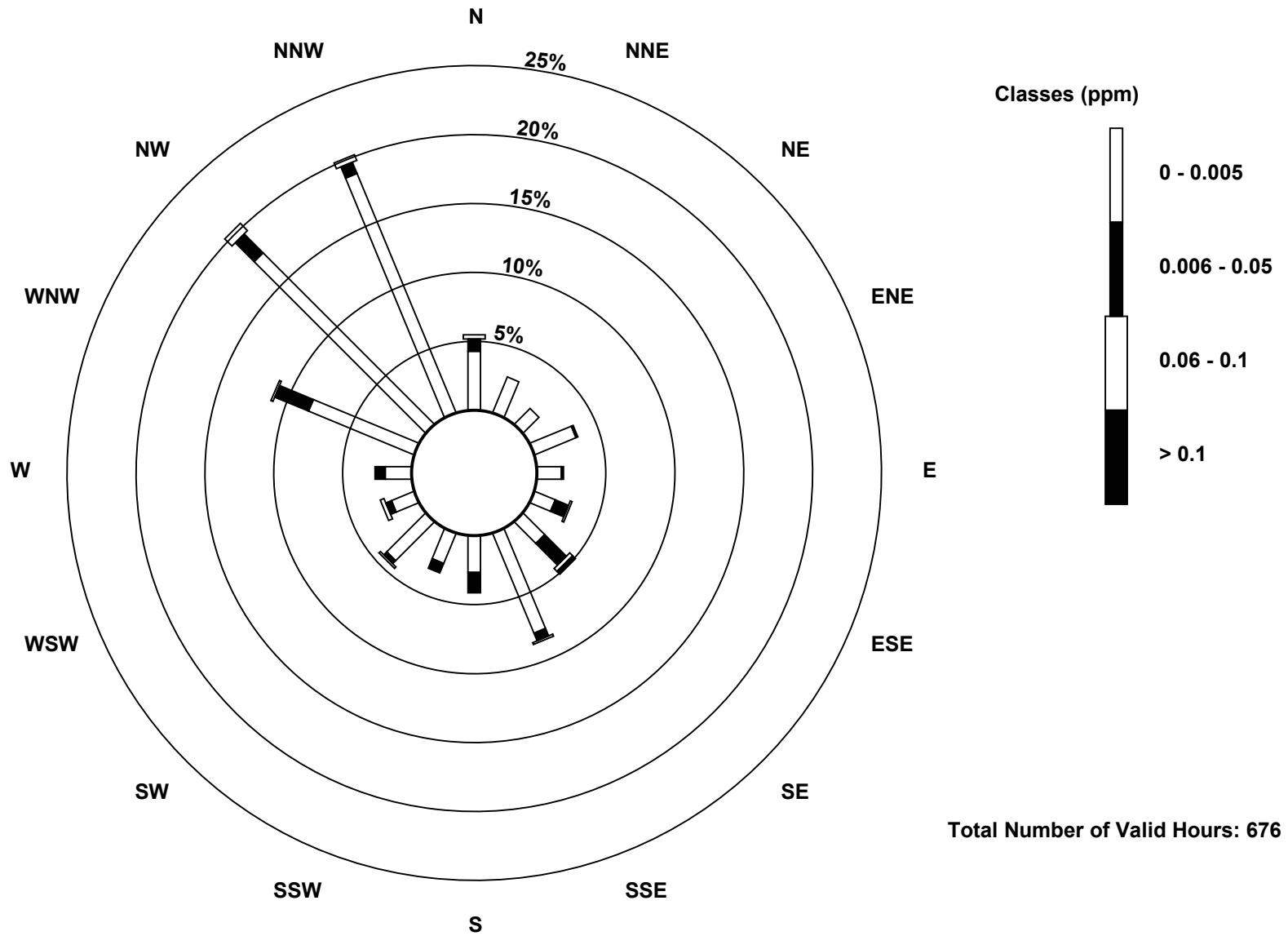
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	29	19	11	22	12	11	15	53	18	16	27	12	13	56	119	127	560
0.006 - 0.05	6	0	0	1	1	7	15	4	10	5	2	3	5	18	13	6	96
0.06 - 0.1	2	0	0	0	0	1	2	1	0	0	1	2	0	1	5	3	18
> 0.1	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2
Totals	37	19	11	23	13	19	34	58	28	21	30	17	18	75	137	136	676

Total Number of Valid Hours: 676

Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

Non Methane Hydrocarbons (NMHC) - ppm
Anzac (AMS 14)

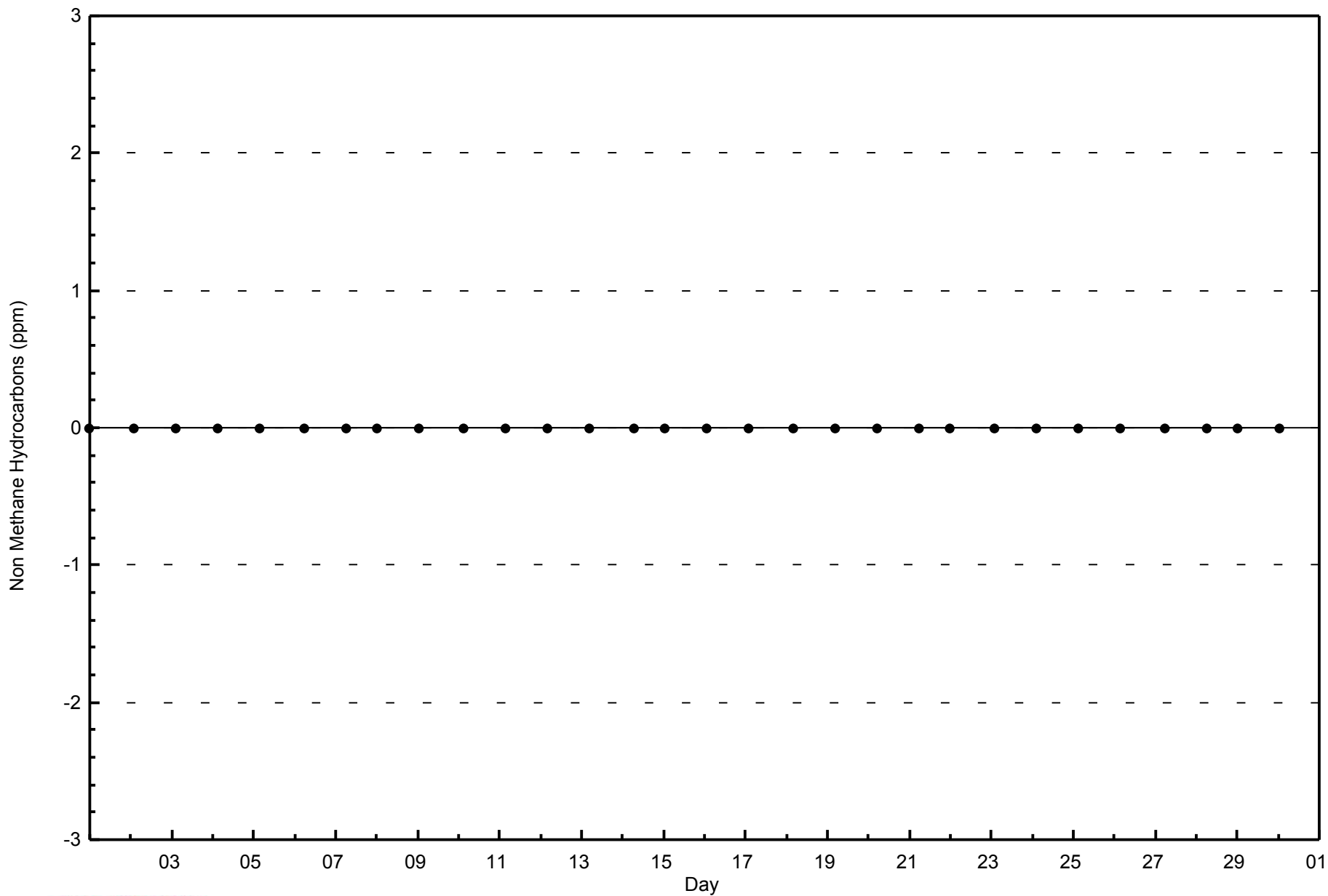




WBEA
Zero Responses

Non Methane Hydrocarbons (NMHC) - ppm

Anzac - November 2014

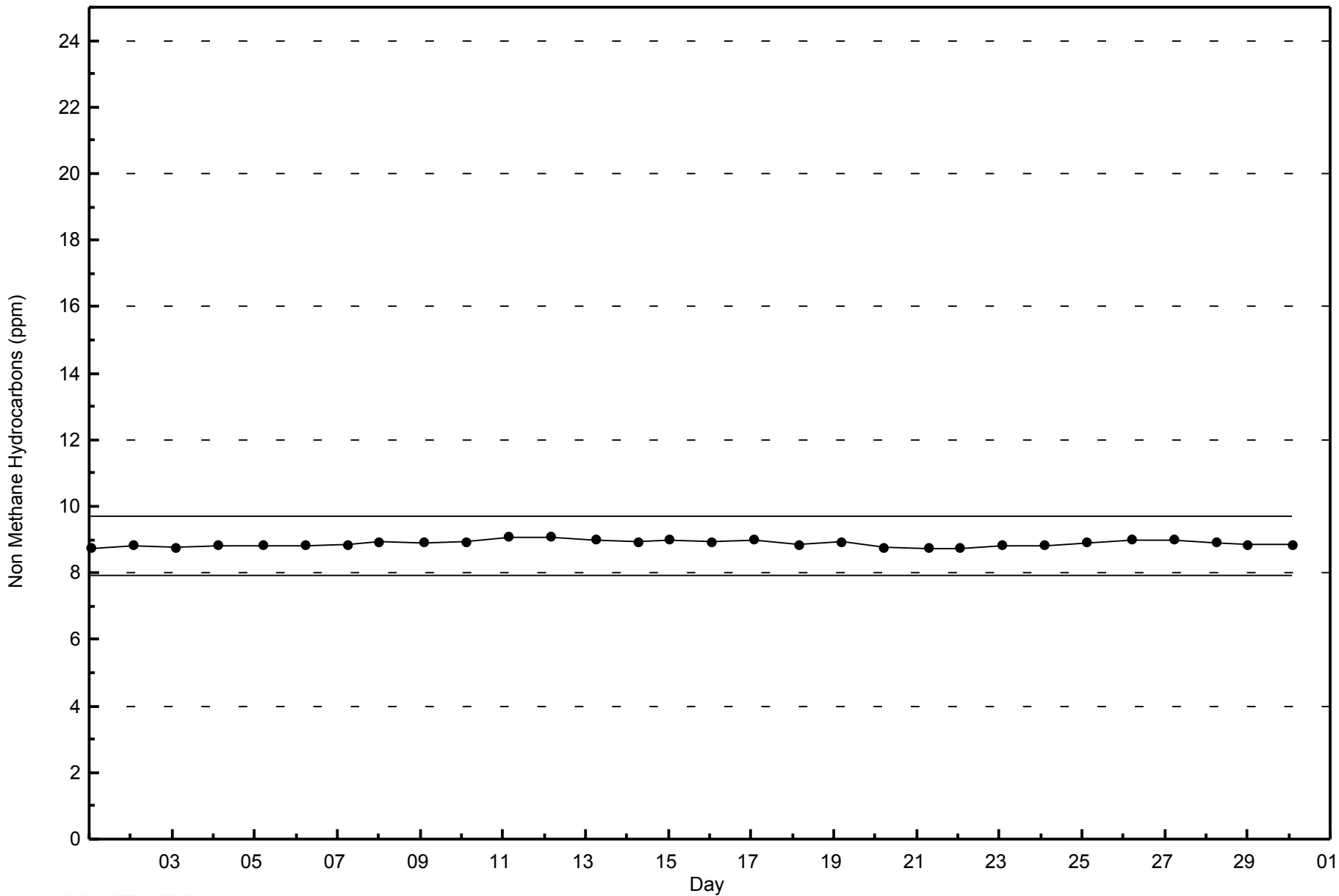




WBEA
Span Responses

Non Methane Hydrocarbons (NMHC) - ppm

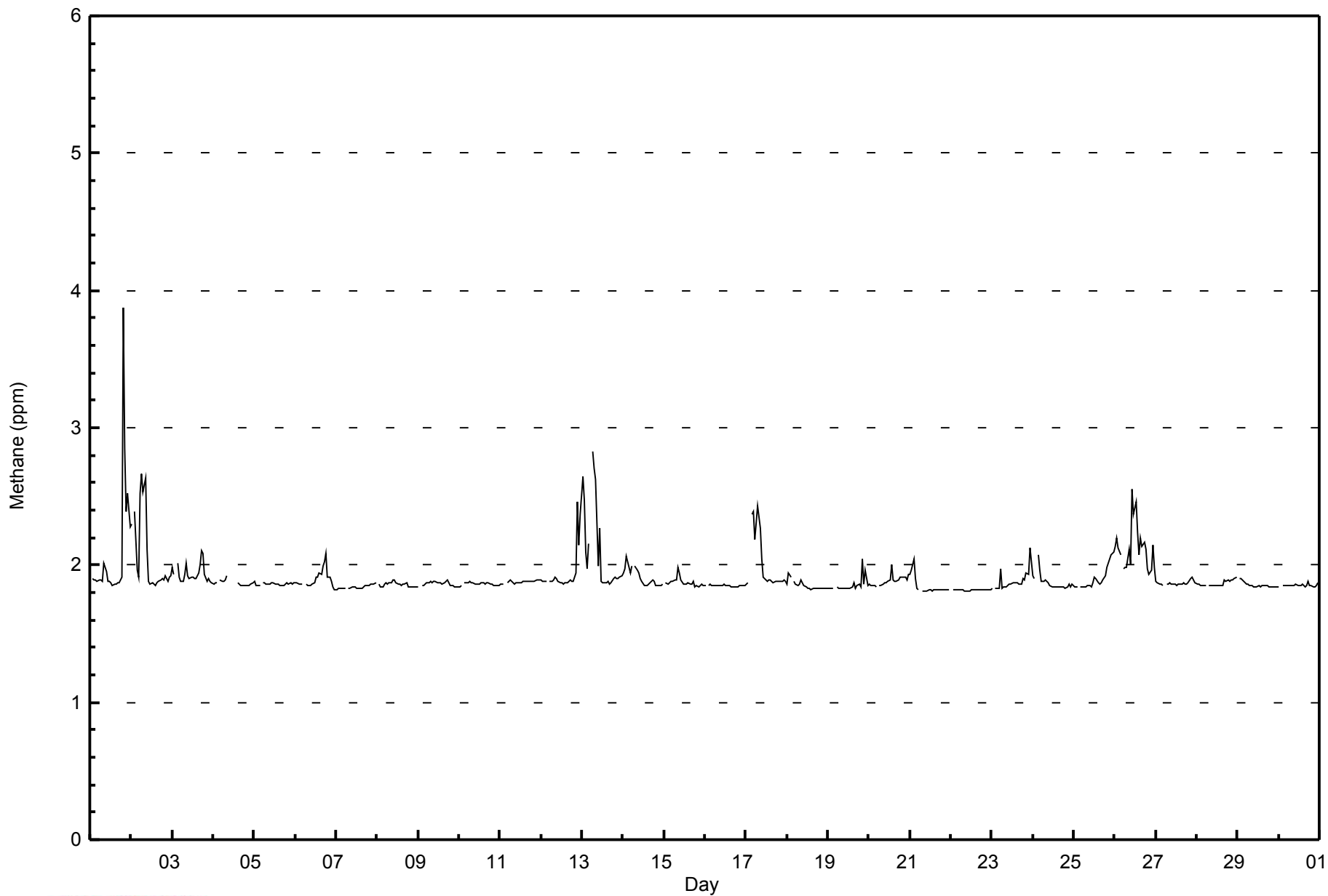
Anzac - November 2014





WBEA
Hourly Averages

Methane (CH₄) - ppm
Anzac - November 2014





WBEA
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Anzac - November 2014

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	633	92.41	92.41
2.1 - 3.0	51	7.45	99.85
3.1 - 10.0	1	0.15	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



WBEA
Frequency Distribution

Methane (CH₄) - ppm
Anzac - November 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	36	19	11	23	13	16	28	48	20	12	24	14	18	74	134	135	625
2.1 - 3.0	1	0	0	0	0	3	6	10	8	8	6	3	0	1	3	1	50
3.1 - 10.0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	37	19	11	23	13	19	34	58	28	21	30	17	18	75	137	136	676

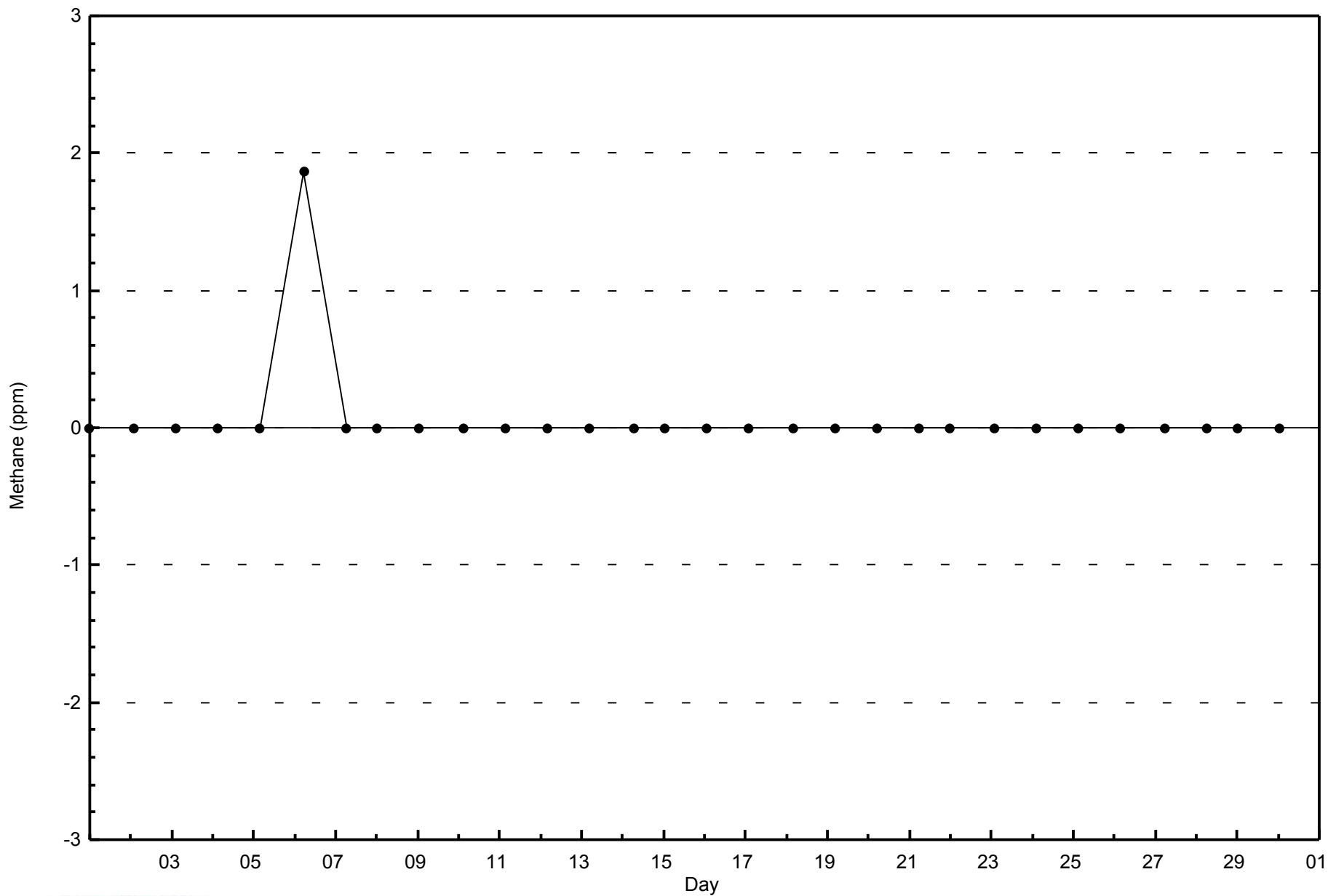
Total Number of Valid Hours: 676

Total Number of Hours: 720



WBEA
Zero Responses

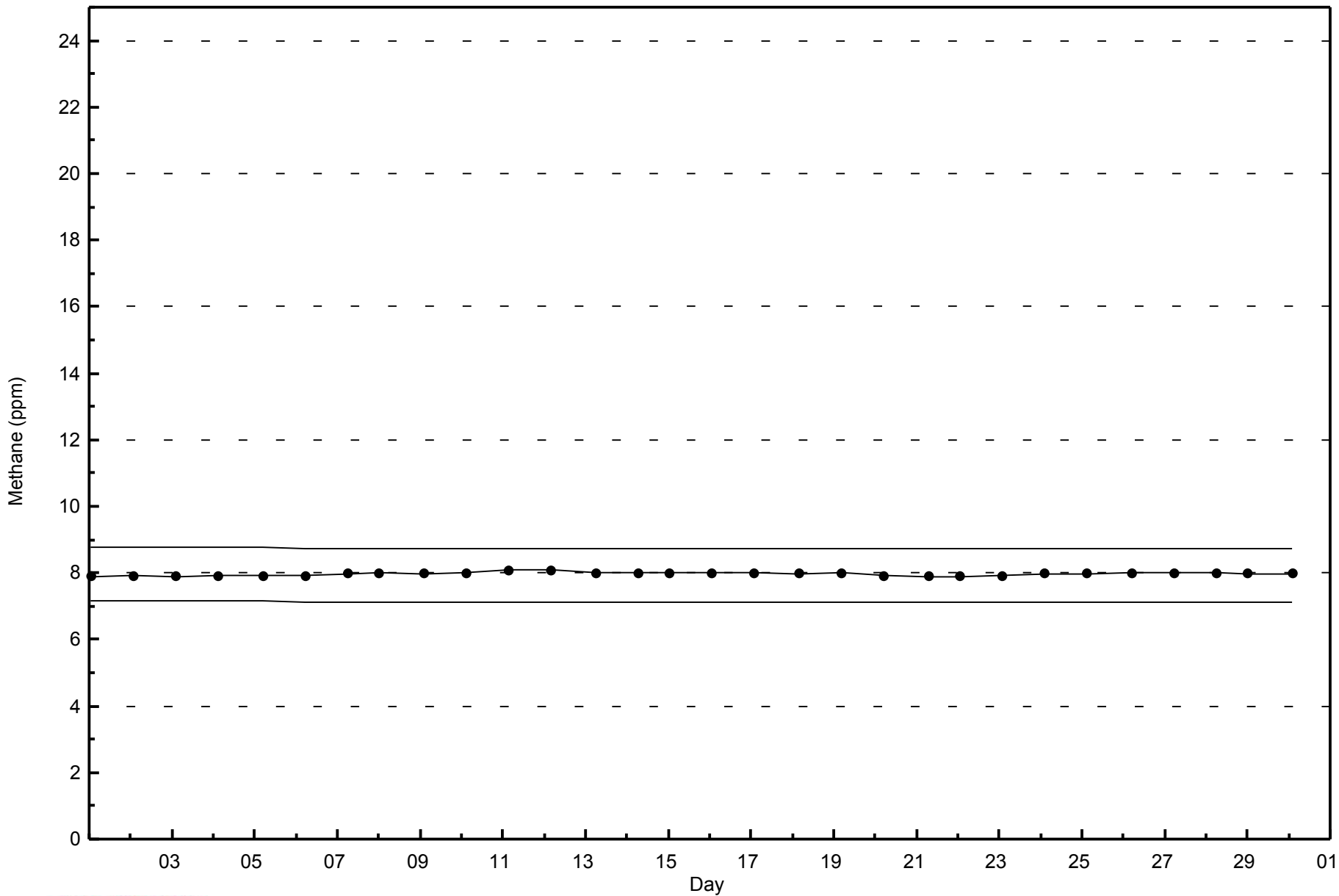
Methane (CH₄) - ppm
Anzac - November 2014





WBEA
Span Responses

Methane (CH₄) - ppm
Anzac - November 2014





Maximum Value: 22 ppb on Nov 19 12:00	Maximum Daily Average: 2.1 ppb on Nov 26	Hours in Service: 720
Minimum Value: 0 ppb on Nov 1 13:00	Minimum Daily Average: 0.0 ppb on Nov 7	Hours of Data: 685
Maximum Diurnal Average: 1.8 ppb at hour 12	Minimum Diurnal Average: 0.1 ppb at hour 1	Hours of Missing Data: 35
Monthly Average: 0.6 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 1 P ₉₉ = 8	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-Nov	Z	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	1	0	0.2	1	
2-Nov	0	Z	0	0	0	0	0	0	0	1	1	1	2	0	0	0	0	0	0	0	0	0	0	0.3	2	
3-Nov	0	0	Z	0	0	0	0	0	0	2	1	1	1	0	1	4	4	11	9	1	0	0	0	1.4	11	
4-Nov	0	7	1	Z	0	0	0	0	1	C	C	C	C	C	1	0	0	0	0	0	0	0	0	0.5	7	
5-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0.2	2	
6-Nov	0	7	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	7	
7-Nov	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	
8-Nov	Z	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0.4	1	
9-Nov	0	Z	0	0	0	0	0	0	1	2	2	2	2	2	1	1	0	0	0	0	0	0	0	0.5	2	
10-Nov	0	0	Z	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0.3	1	
11-Nov	0	0	0	Z	0	0	0	0	0	1	2	2	2	2	2	2	1	0	0	0	0	0	0	0.6	2	
12-Nov	0	0	0	1	Z	1	0	1	1	1	1	2	2	2	1	1	0	4	1	3	2	1	0	1.1	4	
13-Nov	0	0	0	0	3	Z	1	1	0	1	3	2	2	2	1	0	0	1	0	0	0	0	0	0.8	3	
14-Nov	0	4	6	0	0	0	Z	0	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0.7	6	
15-Nov	Z	0	0	0	0	1	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
16-Nov	0	Z	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0.1	1	
17-Nov	0	0	Z	1	0	0	0	0	1	2	1	3	6	3	1	1	0	0	0	0	0	0	0	0.9	6	
18-Nov	0	0	0	Z	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.1	1	
19-Nov	0	0	0	0	Z	0	0	0	0	0	0	22	3	0	0	0	0	0	0	0	0	0	0	1.2	22	
20-Nov	0	0	0	3	0	Z	0	0	0	1	1	1	1	2	1	0	0	0	0	0	0	0	0	0.4	3	
21-Nov	0	2	5	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.4	5	
22-Nov	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	1	
23-Nov	0	Z	0	1	0	0	0	0	0	1	1	2	2	1	2	12	0	0	0	7	1	0	1	1.4	12	
24-Nov	0	0	Z	10	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	10	
25-Nov	0	0	0	Z	0	0	0	0	0	0	6	3	5	4	2	1	0	0	0	2	13	6	4	2.1	13	
26-Nov	0	1	1	1	Z	1	1	1	1	1	3	5	3	3	1	1	0	0	0	0	0	8	17	2.1	17	
27-Nov	0	0	0	0	0	Z	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
28-Nov	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
29-Nov	Z	0	0	0	0	1	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0.5	1	
30-Nov	1	Z	0	0	0	1	0	0	0	1	1	1	1	1	2	2	0	1	1	1	1	1	1	0.8	2	

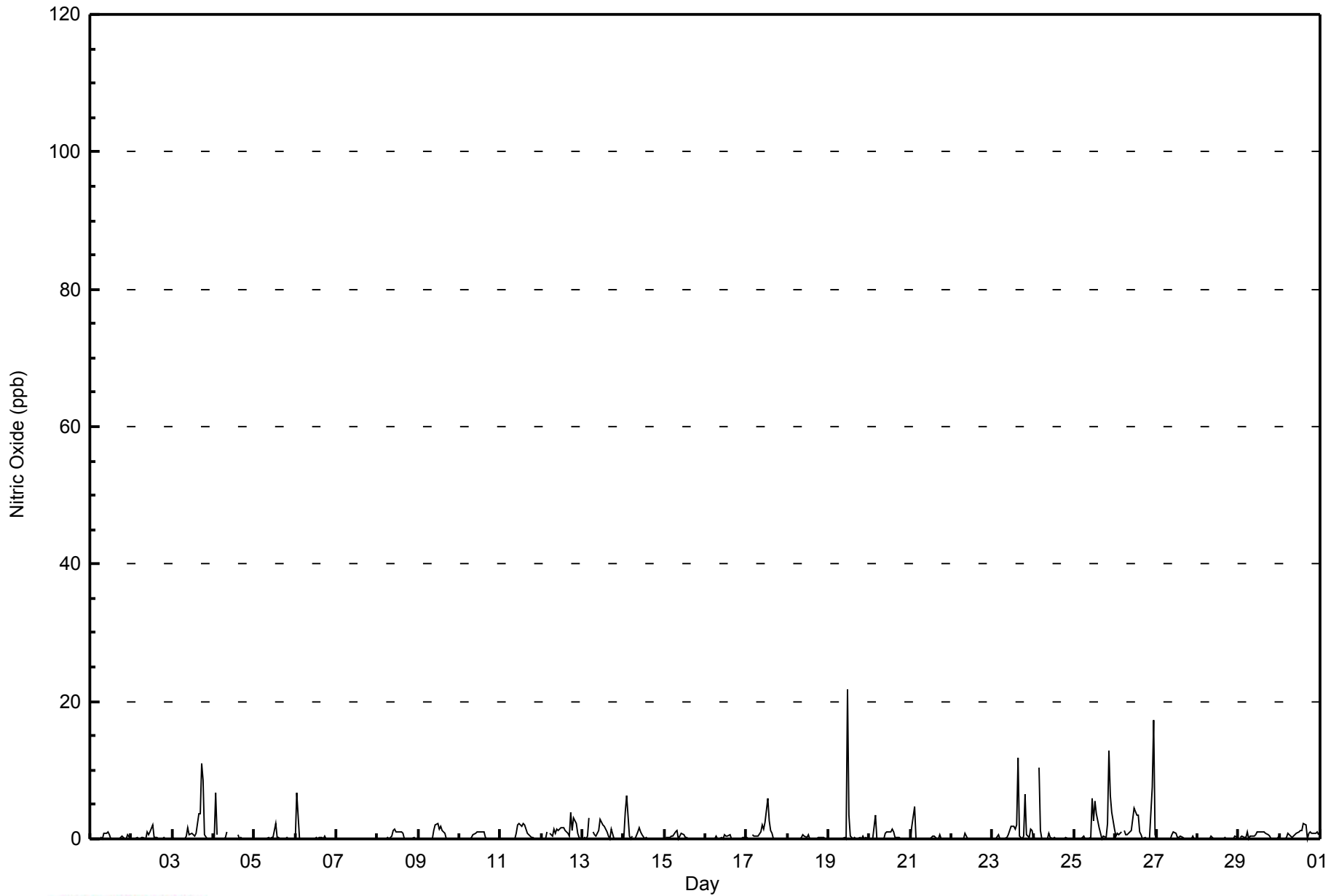
0.1	0.8	0.5	0.7	0.2	0.2	0.2	0.2	0.3	0.7	1.1	1.8	1.4	0.9	0.7	0.9	0.2	0.7	0.4	0.5	0.6	0.6	0.8	0.2	Diurnal Average	
1	7	6	10	3	1	1	1	1	1	2	6	22	6	4	2	12	4	11	9	7	13	8	17	1	Diurnal Maximum

Z - zerospan C - Calibration



WBEA
Hourly Averages

Nitric Oxide (NO) - ppb
Anzac - November 2014





WBEA
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Anzac - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	684	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: 685

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitric Oxide (NO) - ppb
Anzac - November 2014

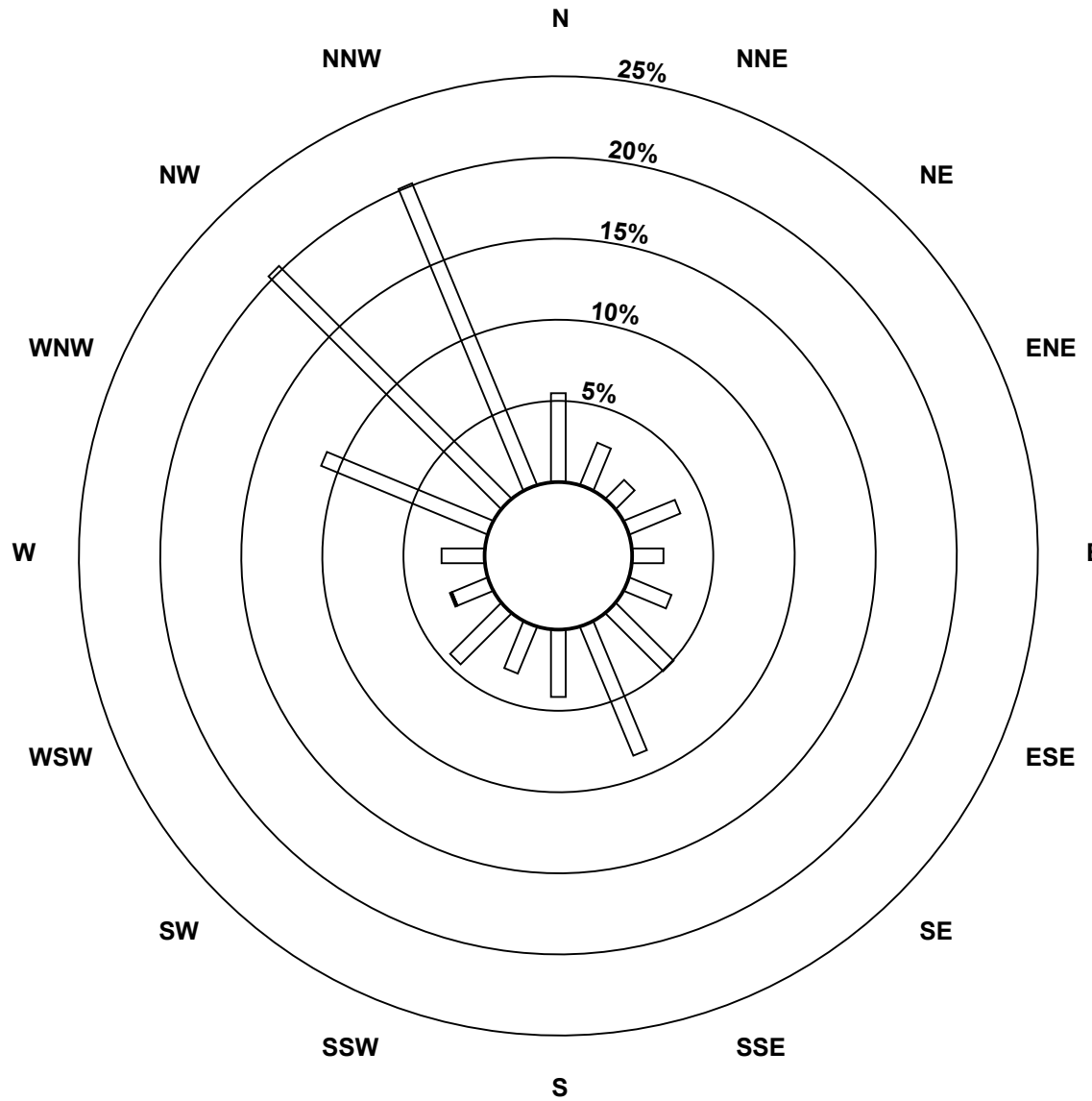
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	37	19	11	23	13	19	34	58	28	21	30	16	18	75	137	136	675
21 - 40	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	37	19	11	23	13	19	34	58	28	21	30	17	18	75	137	136	676

Total Number of Valid Hours: 676

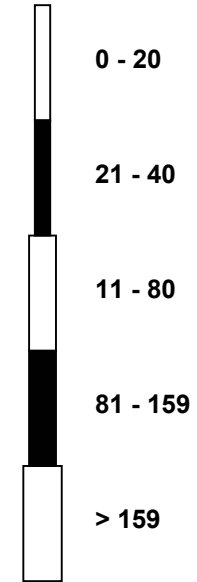
Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

Nitric Oxide (NO) - ppb
Anzac (AMS 14)



Classes (ppb)

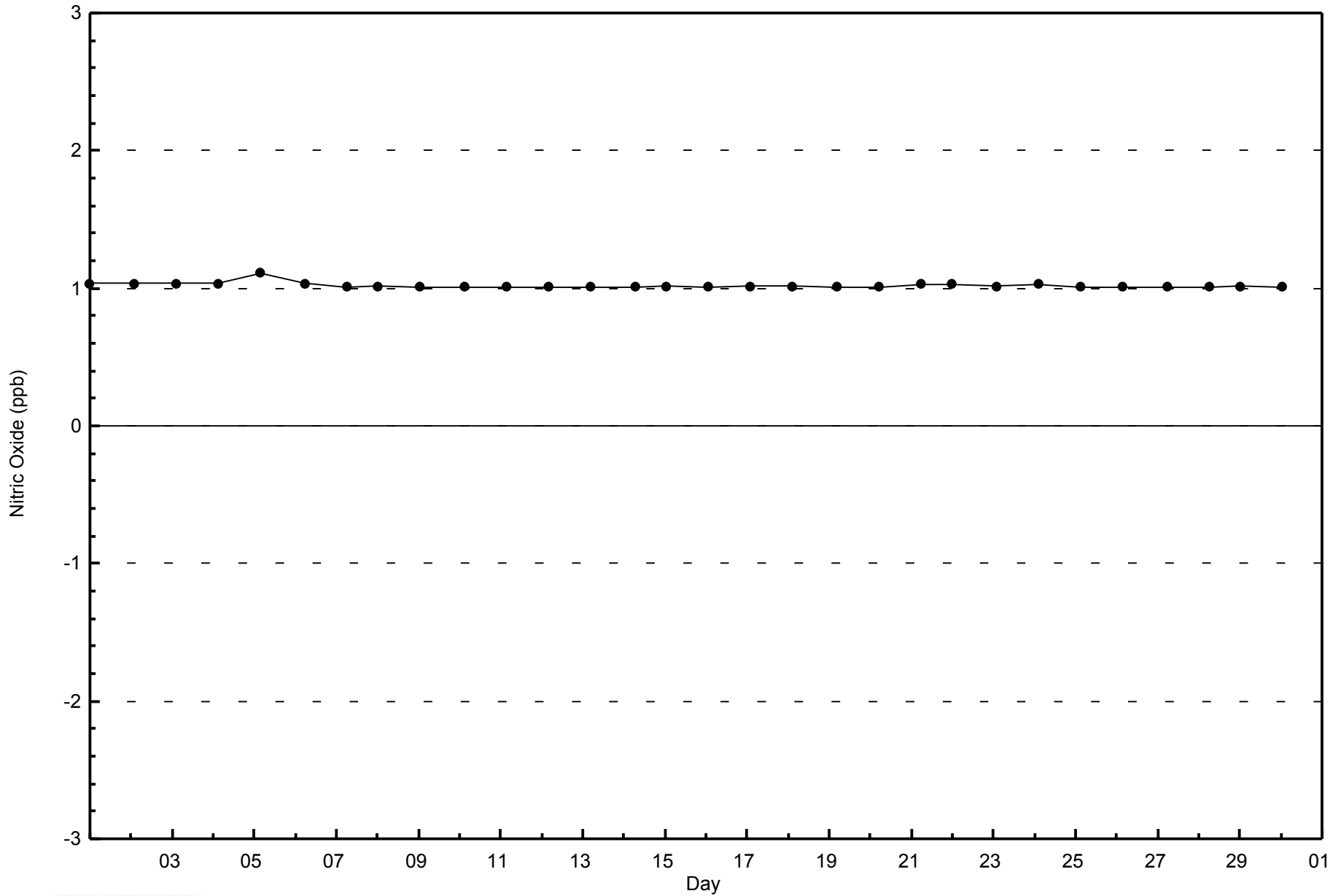


Total Number of Valid Hours: 676



WBEA
Zero Responses

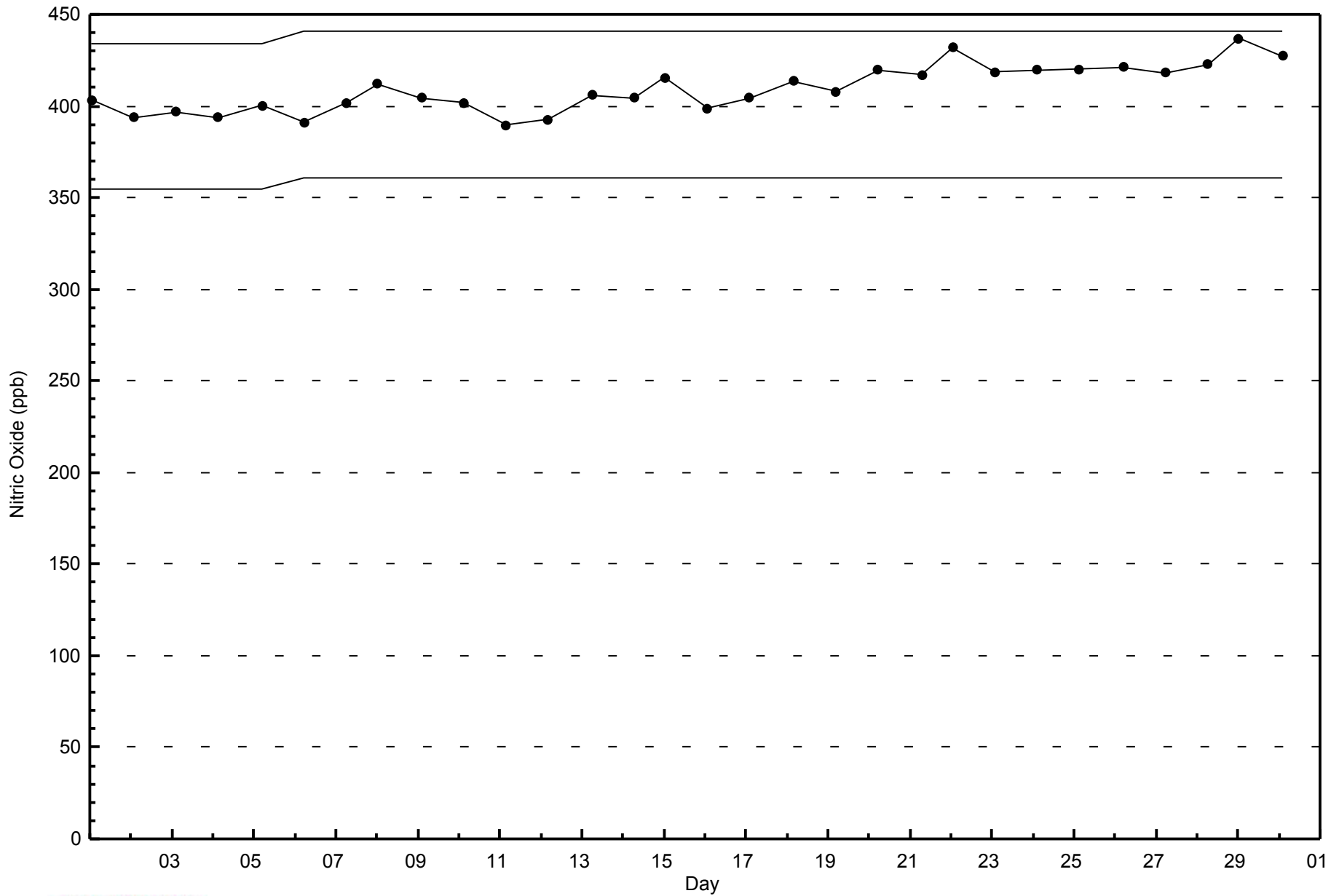
Nitric Oxide (NO) - ppb
Anzac - November 2014





WBEA
Span Responses

Nitric Oxide (NO) - ppb
Anzac - November 2014





Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 29 ppb on Nov 26 23:00	Maximum Daily Average: 10.3 ppb on Nov 26		Hours of Data:	685
Minimum Value: 0 ppb on Nov 22 02:00	Minimum Daily Average: 0.1 ppb on Nov 22		Hours of Missing Data:	35
Maximum Diurnal Average: 5.4 ppb at hour 18	Minimum Diurnal Average: 3.2 ppb at hour 11		Hours of Calibration:	35
Monthly Average: 4.1 ppb	Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 1 Median = 3 Q ₃ = 6 P ₉₀ = 10 P ₉₉ = 22		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	Z	1	1	1	1	2	2	2	4	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1.5	4
2-Nov	1	Z	0	1	1	1	1	1	1	2	2	3	3	3	3	3	4	3	3	5	4	3	3	2	2.3	5
3-Nov	2	2	Z	3	2	1	1	3	2	3	2	2	2	2	5	10	12	14	15	14	10	10	7	6	5.7	15
4-Nov	4	9	10	Z	6	5	2	2	3	C	C	C	C	C	2	2	1	1	1	1	1	1	1	1	3.1	10
5-Nov	1	1	1	1	Z	2	3	2	2	2	2	2	2	2	1	1	1	1	1	2	1	1	1	2	1.6	3
6-Nov	3	5	2	1	1	Z	1	1	1	1	2	2	2	2	3	3	2	4	4	3	2	1	1	1	2.1	5
7-Nov	1	1	1	1	1	1	Z	2	1	4	1	2	1	0	0	1	2	5	5	5	6	7	6	6	2.6	7
8-Nov	Z	3	0	1	3	5	6	8	7	7	7	6	4	5	4	7	8	7	2	1	1	4	2	1	4.3	8
9-Nov	1	Z	2	3	4	4	5	4	4	5	6	5	4	6	7	9	12	11	6	3	1	1	1	1	4.5	12
10-Nov	2	1	Z	4	5	5	6	5	5	4	3	3	5	6	6	4	4	4	2	2	1	1	1	1	3.5	6
11-Nov	1	3	2	Z	4	4	5	5	3	6	8	7	6	8	10	13	15	12	9	8	7	7	7	6	6.7	15
12-Nov	6	4	4	5	Z	4	4	8	6	4	3	3	3	3	3	4	4	9	7	10	11	11	6	6	5.5	11
13-Nov	4	3	2	3	11	Z	7	6	4	3	6	6	6	5	5	6	5	10	6	7	8	6	5	4	5.4	11
14-Nov	8	13	22	15	13	19	Z	19	14	11	6	3	1	1	2	4	7	8	7	2	1	1	1	1	7.8	22
15-Nov	Z	2	2	2	2	2	3	8	4	3	3	3	2	2	2	2	4	6	1	3	3	3	5	3	3.0	8
16-Nov	3	Z	4	4	3	3	4	3	4	4	3	4	4	3	4	2	1	1	1	1	1	1	2	2	2.7	4
17-Nov	3	3	Z	4	4	3	4	5	7	6	4	6	7	6	5	5	3	9	6	5	3	3	3	3	4.6	9
18-Nov	2	10	8	Z	6	5	5	6	7	4	3	2	3	2	1	1	1	1	1	1	2	1	1	2	3.2	10
19-Nov	1	1	1	1	Z	2	1	1	1	2	1	11	3	2	1	2	2	2	2	3	5	3	5	2	2.3	11
20-Nov	3	3	3	5	3	Z	3	4	5	5	4	4	4	6	7	6	5	6	6	7	5	4	3	8	4.8	8
21-Nov	10	14	16	7	3	2	Z	1	1	1	1	2	2	2	4	2	1	3	1	1	1	1	1	0	3.3	16
22-Nov	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
23-Nov	0	Z	0	1	1	1	1	1	2	2	3	4	3	4	5	15	4	3	4	5	5	6	10	12	4.0	15
24-Nov	8	5	Z	23	15	7	11	11	6	5	2	1	1	1	1	1	1	2	1	1	0	1	0	1	4.5	23
25-Nov	0	0	0	Z	0	1	0	0	1	1	3	6	11	10	7	7	8	11	15	20	26	25	24	22	8.5	26
26-Nov	17	12	11	13	Z	12	9	6	7	4	7	8	8	12	7	9	8	10	8	6	5	16	29	16	10.3	29
27-Nov	3	2	1	1	1	Z	1	1	3	3	2	1	1	1	2	3	3	4	5	7	11	14	10	6	3.8	14
28-Nov	4	2	1	1	1	1	Z	0	1	0	0	1	0	1	1	2	11	11	10	9	10	9	11	11	4.2	11
29-Nov	Z	12	11	6	3	3	2	2	3	2	2	2	2	2	3	3	3	3	2	1	1	1	1	1	3.0	12
30-Nov	1	Z	1	1	1	1	1	1	2	1	1	1	2	3	6	9	3	3	3	3	3	3	3	3	2.6	9

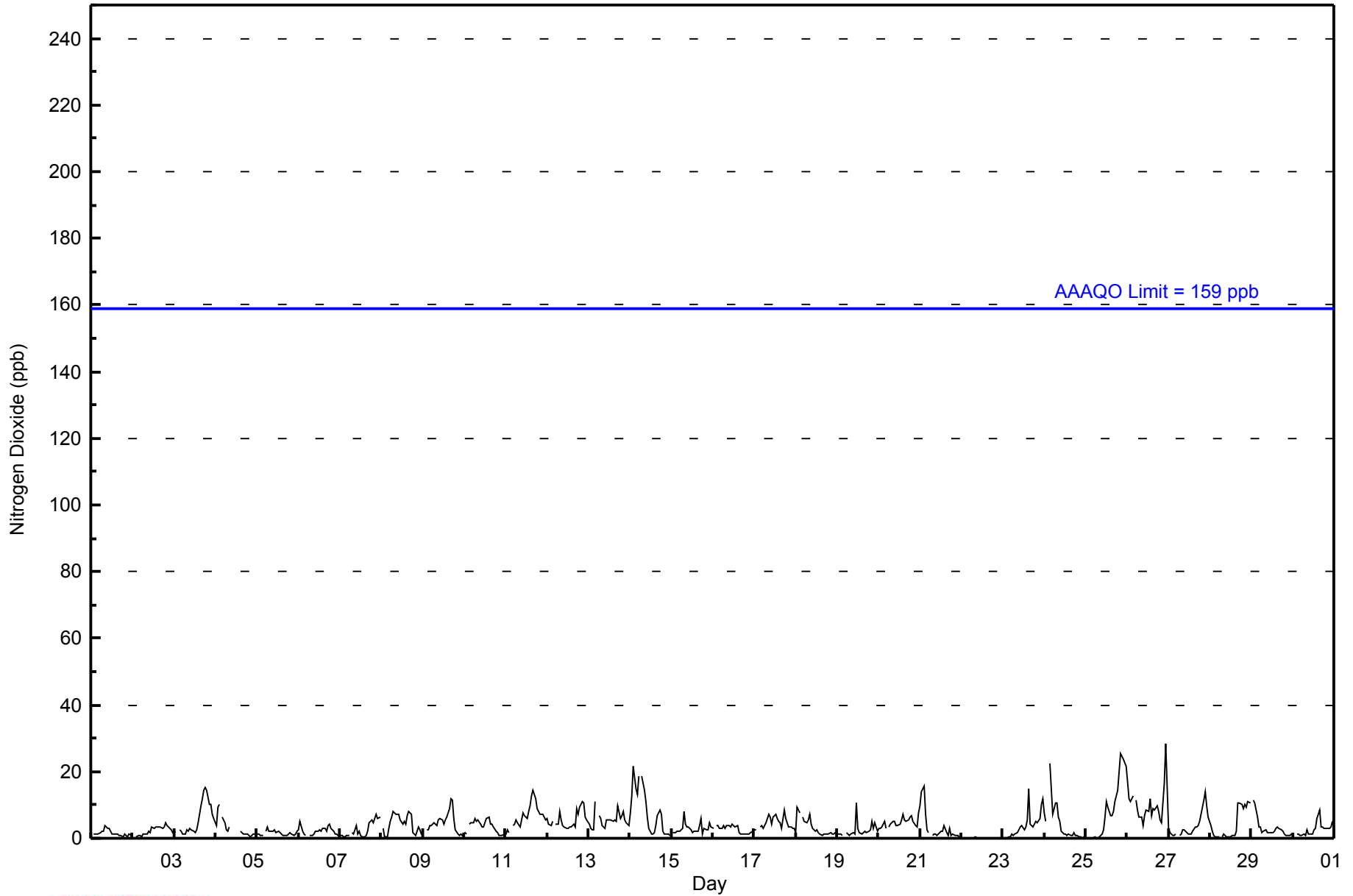
3.5	4.4	4.1	4.0	3.6	3.6	3.4	3.9	3.8	3.5	3.2	3.5	3.2	3.5	3.6	4.5	4.5	5.4	4.6	4.5	4.5	4.8	5.0	4.4	Diurnal Average	
17	14	22	23	15	19	11	19	14	11	8	11	11	12	10	15	15	14	15	20	26	25	29	22	Diurnal Maximum	

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



WBEA
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Anzac - November 2014





WBEA
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Anzac - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	678	98.98	98.98
21 - 40	7	1.02	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Anzac - November 2014

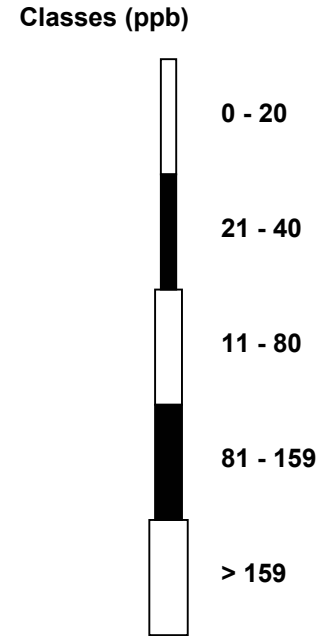
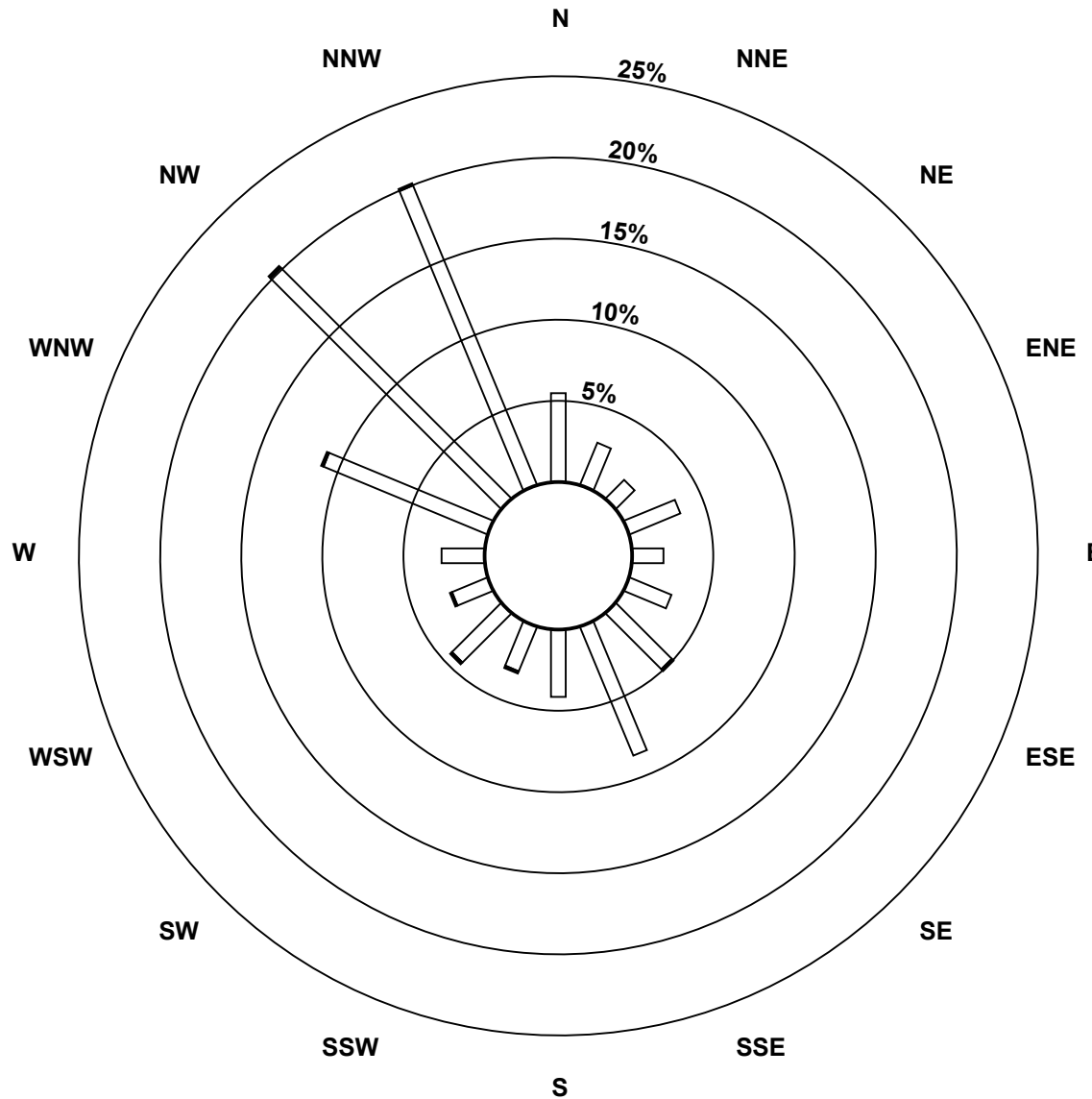
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	37	19	11	23	13	19	33	58	28	20	29	16	18	74	136	135	669
21 - 40	0	0	0	0	0	0	1	0	0	1	1	1	0	1	1	1	7
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	37	19	11	23	13	19	34	58	28	21	30	17	18	75	137	136	676

Total Number of Valid Hours: 676

Total Number of Hours: 720

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

**Nitrogen Dioxide (NO₂) - ppb
Anzac (AMS 14)**

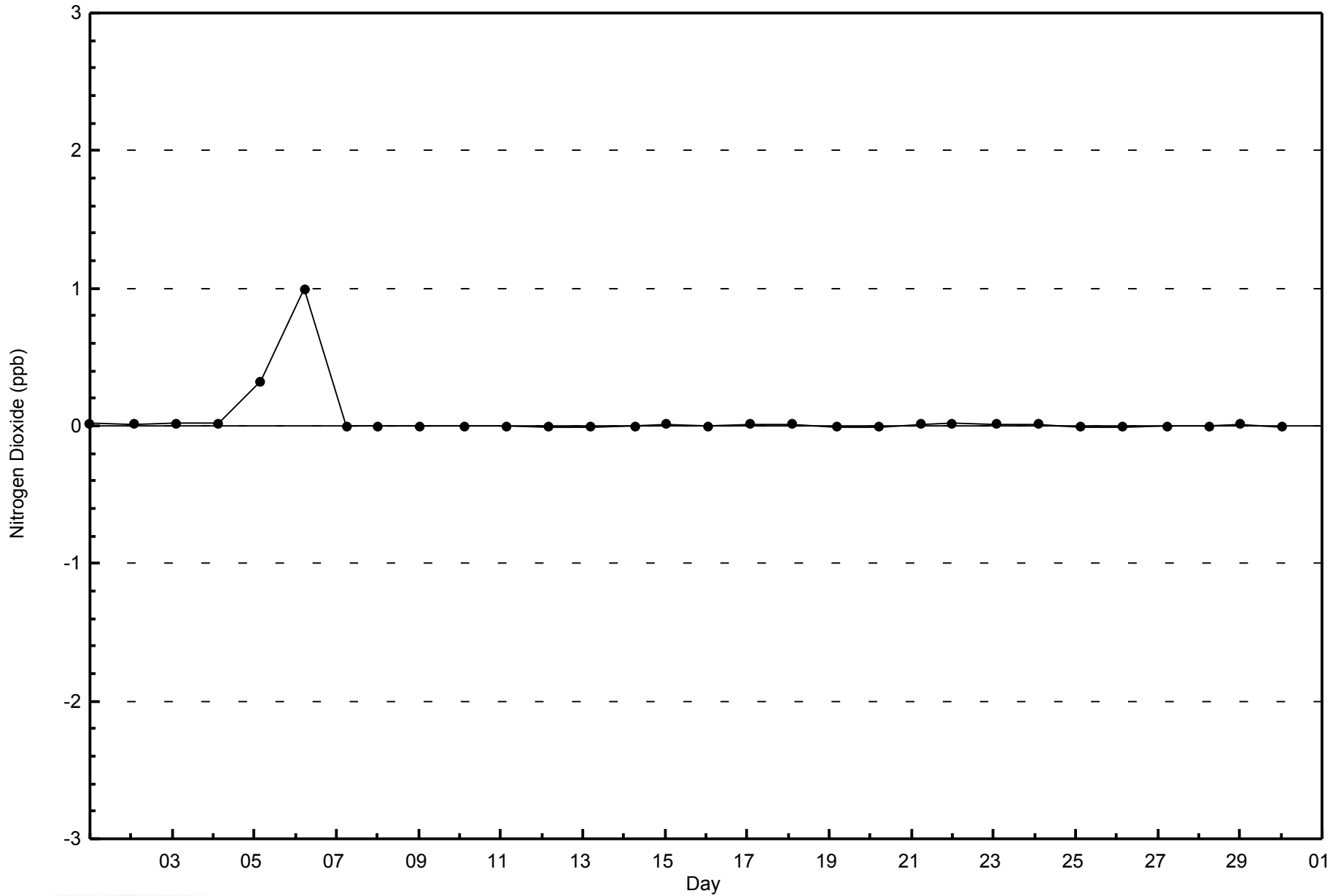


Total Number of Valid Hours: 676



WBEA
Zero Responses

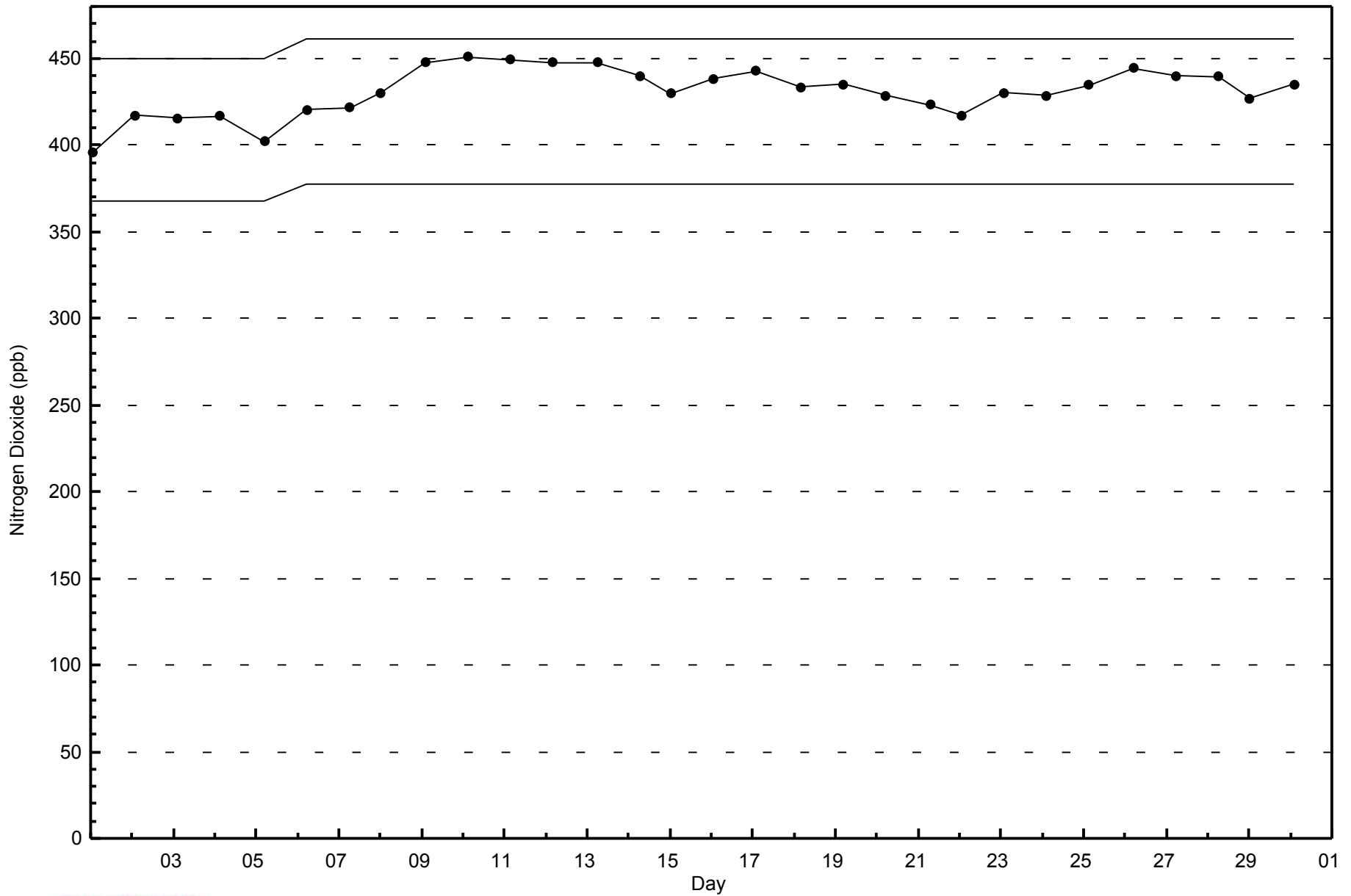
Nitrogen Dioxide (NO₂) - ppb
Anzac - November 2014





WBEA
Span Responses

Nitrogen Dioxide (NO₂) - ppb
Anzac - November 2014





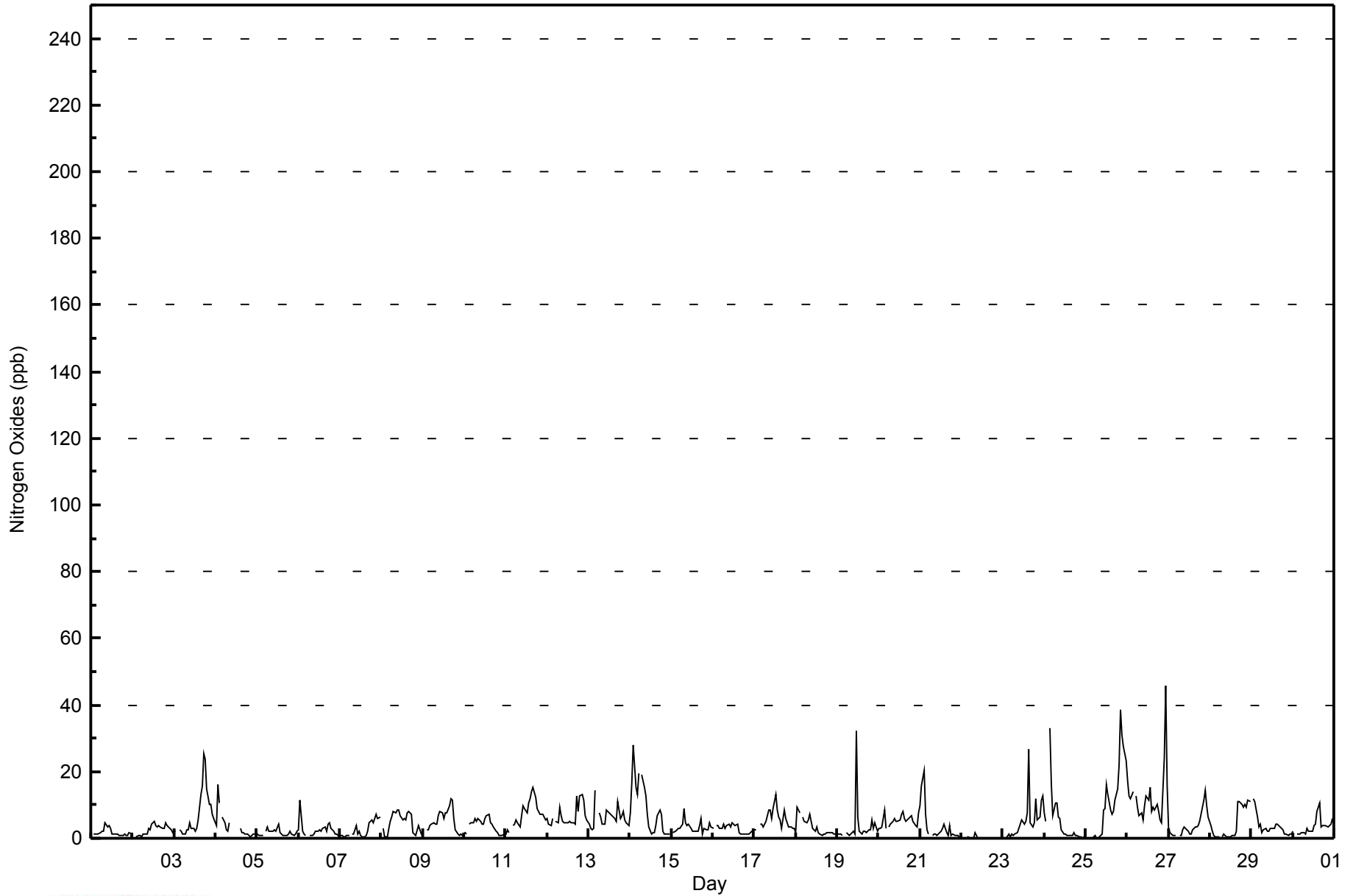
Maximum Value: 46 ppb on Nov 26 23:00																		Maximum Daily Average: 12.5 ppb on Nov 26						Hours in Service: 720		
Minimum Value: 0 ppb on Nov 22 21:00																		Minimum Daily Average: 0.1 ppb on Nov 22						Hours of Data: 685		
Maximum Diurnal Average: 6.1 ppb at hour 18																		Minimum Diurnal Average: 3.5 ppb at hour 1						Hours of Missing Data: 35		
Monthly Average: 4.7 ppb																		Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 1 Median = 3 Q ₃ = 6 P ₉₀ = 11 P ₉₉ = 28						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-Nov	Z	1	1	1	1	2	2	2	5	4	4	3	1	1	1	1	1	1	1	1	1	1	2	1	1.7	5
2-Nov	1	Z	0	1	1	1	1	1	1	3	3	4	5	4	3	4	4	3	3	5	4	3	2	2	2.5	5
3-Nov	2	2	Z	2	2	1	1	3	3	5	3	3	2	3	5	13	16	25	24	15	10	10	7	6	7.1	25
4-Nov	4	16	11	Z	6	5	2	2	4	C	C	C	C	C	3	2	2	1	1	1	1	1	1	1	3.6	16
5-Nov	1	1	1	1	Z	2	3	2	2	2	3	2	4	2	1	1	1	1	1	2	1	1	1	2	1.8	4
6-Nov	3	11	2	1	1	Z	1	1	1	1	2	2	3	2	3	3	2	4	4	3	2	1	1	1	2.5	11
7-Nov	1	1	1	1	1	1	Z	1	1	4	1	2	1	0	0	1	2	5	5	5	6	7	6	6	2.6	7
8-Nov	Z	3	0	0	3	5	6	8	7	9	8	7	5	6	5	8	8	7	2	1	1	4	2	1	4.7	9
9-Nov	1	Z	2	3	4	4	5	4	4	7	8	7	6	8	8	10	12	11	6	2	1	1	1	1	5.0	12
10-Nov	2	1	Z	4	4	4	6	5	6	5	4	4	6	7	7	5	4	4	2	2	1	1	1	1	3.8	7
11-Nov	1	3	2	Z	4	4	5	5	3	7	10	9	8	10	12	14	15	12	9	8	7	7	7	6	7.3	15
12-Nov	6	4	4	6	Z	5	5	9	7	5	5	5	5	5	5	5	4	13	8	13	13	11	7	6	6.7	13
13-Nov	4	3	2	3	14	Z	8	6	4	4	8	8	8	7	6	6	5	11	6	7	8	6	4	4	6.2	14
14-Nov	8	16	28	15	13	19	Z	19	15	13	7	4	1	2	2	4	7	8	7	2	1	1	1	1	8.4	28
15-Nov	Z	2	2	2	3	3	4	9	4	4	4	3	2	2	2	2	4	6	1	3	3	3	5	3	3.3	9
16-Nov	3	Z	4	4	3	3	4	3	4	4	3	5	4	4	4	2	1	1	1	1	1	1	2	2	2.8	5
17-Nov	3	3	Z	4	4	3	4	5	8	8	6	9	13	8	6	5	3	8	6	5	4	3	3	3	5.5	13
18-Nov	2	9	8	Z	6	5	5	6	7	5	3	2	3	2	1	1	1	1	2	2	2	2	1	1	3.4	9
19-Nov	1	1	1	1	Z	2	1	1	1	2	1	32	6	2	1	2	2	2	2	3	5	3	5	2	3.5	32
20-Nov	3	3	3	8	3	Z	3	4	5	6	5	5	5	7	8	6	5	6	6	7	5	4	3	8	5.2	8
21-Nov	10	16	20	7	3	1	Z	1	1	1	1	2	2	3	4	2	1	4	1	1	1	1	1	0	3.6	20
22-Nov	Z	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	2
23-Nov	0	Z	0	1	0	1	1	1	2	3	4	6	4	5	7	27	4	3	5	12	6	6	12	13	5.4	27
24-Nov	8	5	Z	33	16	7	11	11	6	6	2	1	1	1	1	1	1	2	1	1	0	1	0	0	5.1	33
25-Nov	0	0	0	Z	0	1	0	0	1	1	9	9	16	13	8	7	8	11	15	22	38	31	28	23	10.5	38
26-Nov	17	13	12	14	Z	13	9	7	7	5	10	13	11	15	8	9	8	10	8	6	5	24	46	16	12.5	46
27-Nov	3	2	1	1	1	Z	1	1	3	3	3	2	1	1	2	3	3	4	5	7	11	14	10	6	3.9	14
28-Nov	4	2	1	0	1	0	Z	0	1	0	0	0	0	1	1	2	11	11	10	9	10	9	11	11	4.3	11
29-Nov	Z	12	11	6	3	4	2	2	3	2	2	3	3	3	4	4	4	3	2	1	1	1	1	1	3.5	12
30-Nov	2	Z	1	1	1	2	2	1	3	2	2	2	4	4	8	11	4	4	4	4	4	4	4	6	3.4	11
																		Diurnal Average		Diurnal Maximum						
																		3.5		17						
																		5.2		16						
																		4.6		28						
																		4.8		33						
																		3.8		16						
																		3.8		19						
																		3.6		11						
																		4.1		19						
																		4.1		15						
																		4.2		13						
																		4.2		10						
																		5.3		32						
																		4.6		16						
																		4.4		15						
																		4.3		12						
																		5.3		27						
																		4.8		16						
																		6.1		25						
																		5.0		24						
																		5.0		22						
																		5.1		38						
																		5.4		31						
																		5.8		46						
																		4.5		23						

Z - zerospan C - Calibration



WBEA
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Anzac - November 2014





WBEA
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Anzac - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	672	98.10	98.10
21 - 40	12	1.75	99.85
41 - 80	1	0.15	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Anzac - November 2014

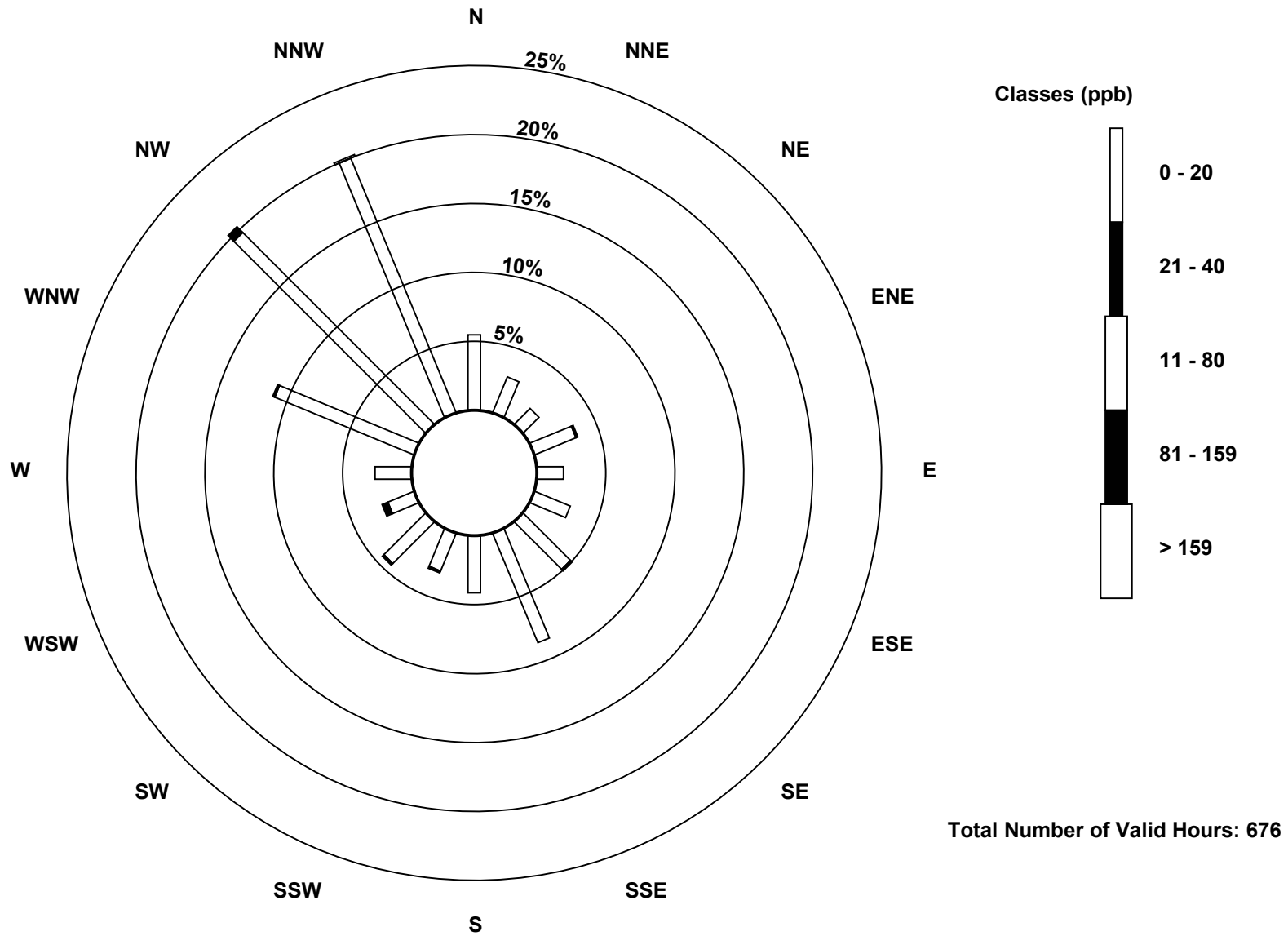
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	37	19	11	22	13	19	33	58	28	20	29	14	18	74	133	135	663
21 - 40	0	0	0	1	0	0	1	0	0	1	1	3	0	1	4	0	12
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	37	19	11	23	13	19	34	58	28	21	30	17	18	75	137	136	676

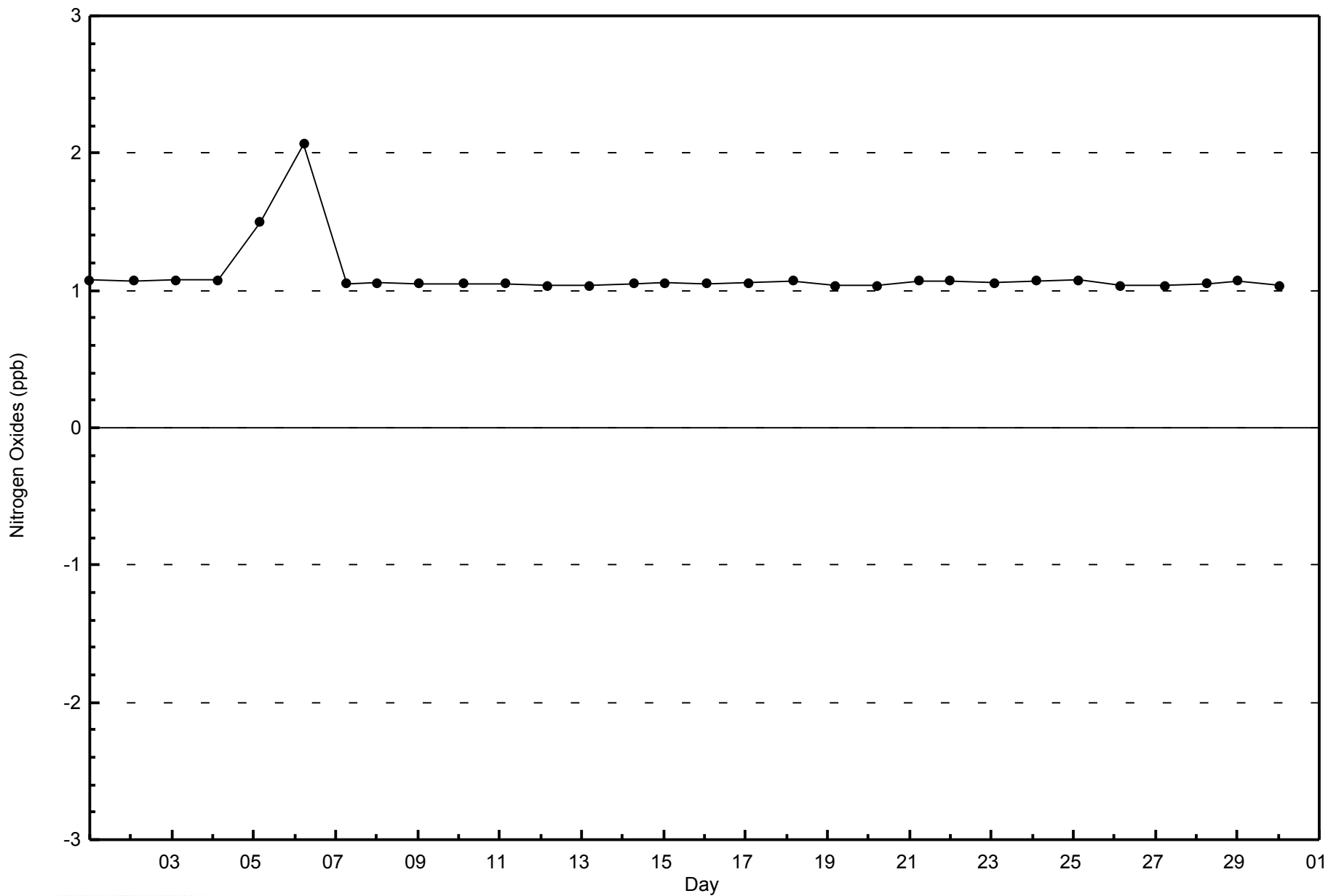
Total Number of Valid Hours: 676

Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

Nitrogen Oxides (NO_x) - ppb
Anzac (AMS 14)

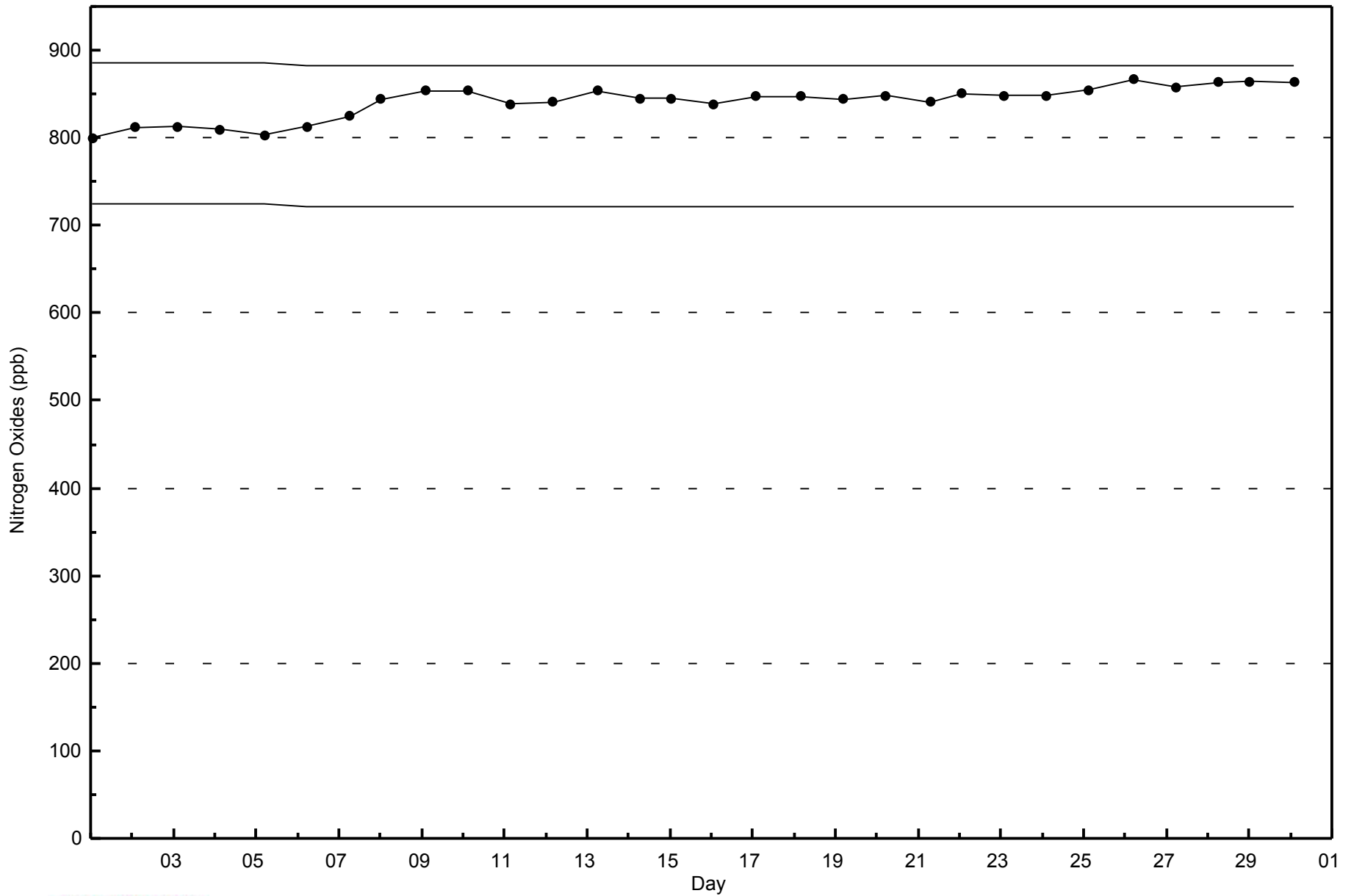






WBEA
Span Responses

Nitrogen Oxides (NO_x) - ppb
Anzac - November 2014





Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 38 ppb on Nov 19 11:00	Maximum Daily Average: 33.3 ppb on Nov 16		Hours of Data:	685
Minimum Value: 0 ppb on Nov 3 18:00	Minimum Daily Average: 5.2 ppb on Nov 3		Hours of Missing Data:	35
Maximum Diurnal Average: 26.6 ppb at hour 14	Minimum Diurnal Average: 19.2 ppb at hour 2		Hours of Calibration:	35
Monthly Average: 22.1 ppb	Percentiles: P ₁ = 1 P ₁₀ = 8 Q ₁ = 15 Median = 24 Q ₃ = 29 P ₉₀ = 32 P ₉₉ = 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-Nov	6	Z	11	11	13	14	16	15	12	11	15	21	24	26	26	24	9	6	3	3	3	3	2	2	12.0	26
2-Nov	2	1	Z	6	5	3	3	2	6	13	14	20	25	23	21	15	11	9	9	8	8	10	8	3	9.7	25
3-Nov	4	2	3	Z	3	6	6	5	5	5	11	9	9	10	8	3	1	0	0	2	5	5	9	10	5.2	11
4-Nov	12	7	5	9	Z	10	10	9	8	9	10	11	10	12	13	12	12	12	12	12	12	10	7	10.2	13	
5-Nov	13	13	13	14	12	Z	10	11	12	12	13	13	14	14	15	16	15	16	15	16	17	17	16	13.9	17	
6-Nov	16	14	17	16	16	17	Z	17	C	C	C	C	C	24	19	20	18	18	14	22	22	22	24	26	19.0	26
7-Nov	24	23	22	19	19	22	25	Z	29	28	30	30	32	34	34	34	33	30	29	30	30	30	29	29	28.1	34
8-Nov	27	Z	32	32	30	28	26	23	22	24	26	28	31	31	32	29	26	26	30	29	29	25	24	21	27.5	32
9-Nov	20	24	Z	15	15	15	15	12	15	25	26	28	29	29	28	26	21	19	23	27	28	28	29	29	23.0	29
10-Nov	26	28	27	Z	26	28	27	28	28	30	29	30	29	28	27	28	28	30	30	31	31	30	30	28.5	31	
11-Nov	29	27	29	29	Z	25	23	25	27	25	24	25	26	24	23	20	18	20	24	24	23	21	17	14	23.6	29
12-Nov	18	23	25	24	24	Z	24	20	20	24	25	25	25	26	26	24	15	10	8	6	4	4	7	7	18.2	26
13-Nov	8	9	9	8	4	5	Z	9	11	13	20	26	27	28	29	27	19	14	12	13	15	17	15	11	15.3	29
14-Nov	8	2	1	11	12	6	5	Z	10	13	19	25	30	31	31	29	26	22	25	31	32	33	31	31	20.2	33
15-Nov	30	Z	29	27	26	26	27	22	23	25	30	34	33	32	32	31	29	26	30	28	29	29	27	30	28.6	34
16-Nov	31	31	Z	31	33	34	33	35	34	33	34	34	35	35	34	35	35	35	34	34	34	33	31	29	33.3	35
17-Nov	29	27	24	Z	17	15	14	14	15	20	24	23	21	22	21	20	15	22	26	26	26	25	24	24	21.4	29
18-Nov	27	19	22	20	Z	24	24	23	21	24	26	29	31	33	35	34	33	34	35	35	34	34	34	34	29.0	35
19-Nov	34	33	33	33	33	Z	35	36	35	37	38	32	35	36	37	31	23	23	18	20	21	23	26	30	30.5	38
20-Nov	28	27	26	24	26	25	Z	21	19	18	19	19	19	19	18	20	20	19	17	16	16	15	15	10	19.7	28
21-Nov	6	3	1	13	22	24	26	Z	27	28	31	31	31	31	29	29	28	26	28	29	29	28	27	28	24.2	31
22-Nov	30	Z	30	30	31	31	31	31	30	31	31	31	30	30	29	29	29	28	29	29	29	29	29	28	29.8	31
23-Nov	29	28	Z	27	26	25	25	23	23	22	21	20	21	20	19	8	11	10	8	7	6	4	4	1	17.0	29
24-Nov	8	14	7	Z	10	21	17	16	21	22	29	32	32	33	32	31	30	25	26	30	31	29	30	30	24.2	33
25-Nov	30	29	32	32	Z	31	30	29	28	28	29	25	22	22	27	26	19	14	8	4	0	0	1	3	20.5	32
26-Nov	5	9	11	14	17	Z	20	22	17	19	19	20	21	20	22	20	19	16	16	18	20	9	1	12	15.9	22
27-Nov	25	27	29	29	29	28	Z	28	24	25	26	27	30	30	28	26	24	23	23	21	18	15	18	21	25.0	30
28-Nov	24	26	29	29	29	28	29	Z	28	29	29	29	30	30	30	28	19	19	19	20	18	19	17	17	25.0	30
29-Nov	19	Z	17	23	27	29	31	31	32	33	34	34	33	33	32	31	32	32	32	34	34	33	33	33	30.6	34
30-Nov	32	32	Z	32	32	32	31	32	30	31	32	32	33	32	31	23	25	32	33	34	36	37	37	34	32.0	37

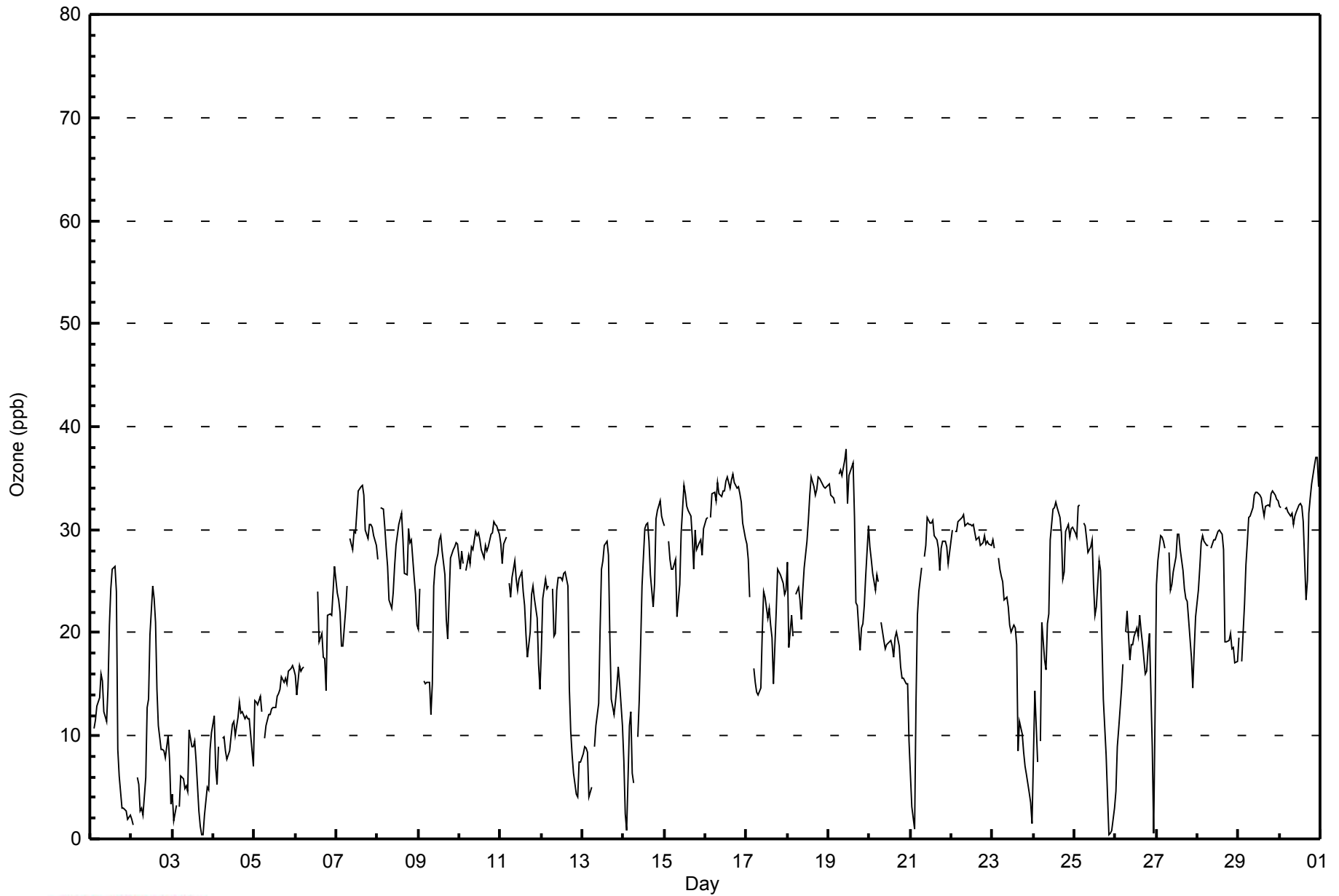
20.0	19.2	19.3	21.6	20.7	21.2	21.7	20.8	21.2	22.7	24.6	25.6	26.4	26.6	26.1	24.4	21.5	20.5	20.6	21.3	21.3	20.6	20.2	20.1	Diurnal Average		
34	33	33	33	33	34	35	36	35	37	38	34	35	36	37	35	35	35	35	35	35	36	37	37	34	Diurnal Maximum	

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



WBEA
Hourly Averages

Ozone (O₃) - ppb
Anzac - November 2014





WBEA
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Anzac - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	264	38.54	38.54
21 - 50	421	61.46	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



WBEA
Frequency Distribution

Ozone (O₃) - ppb
Anzac - November 2014

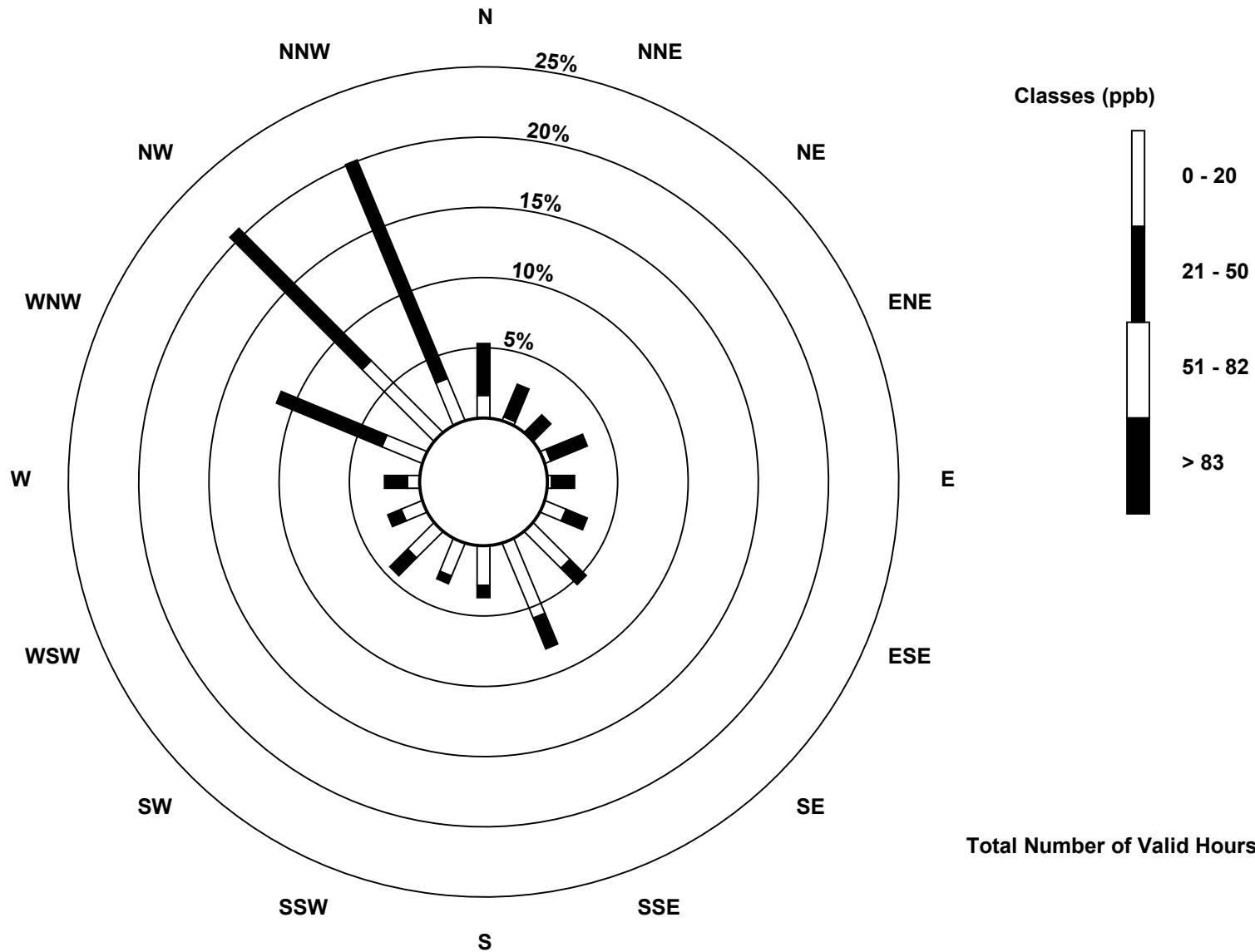
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	11	2	0	3	2	11	25	39	19	17	18	11	6	21	49	22	256
21 - 50	25	17	12	19	11	11	11	16	6	4	12	7	11	55	90	114	421
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	36	19	12	22	13	22	36	55	25	21	30	18	17	76	139	136	677

Total Number of Valid Hours: 677

Total Number of Hours: 720

Wood Buffalo Environmental Association
 Wind Rose Nov 2014

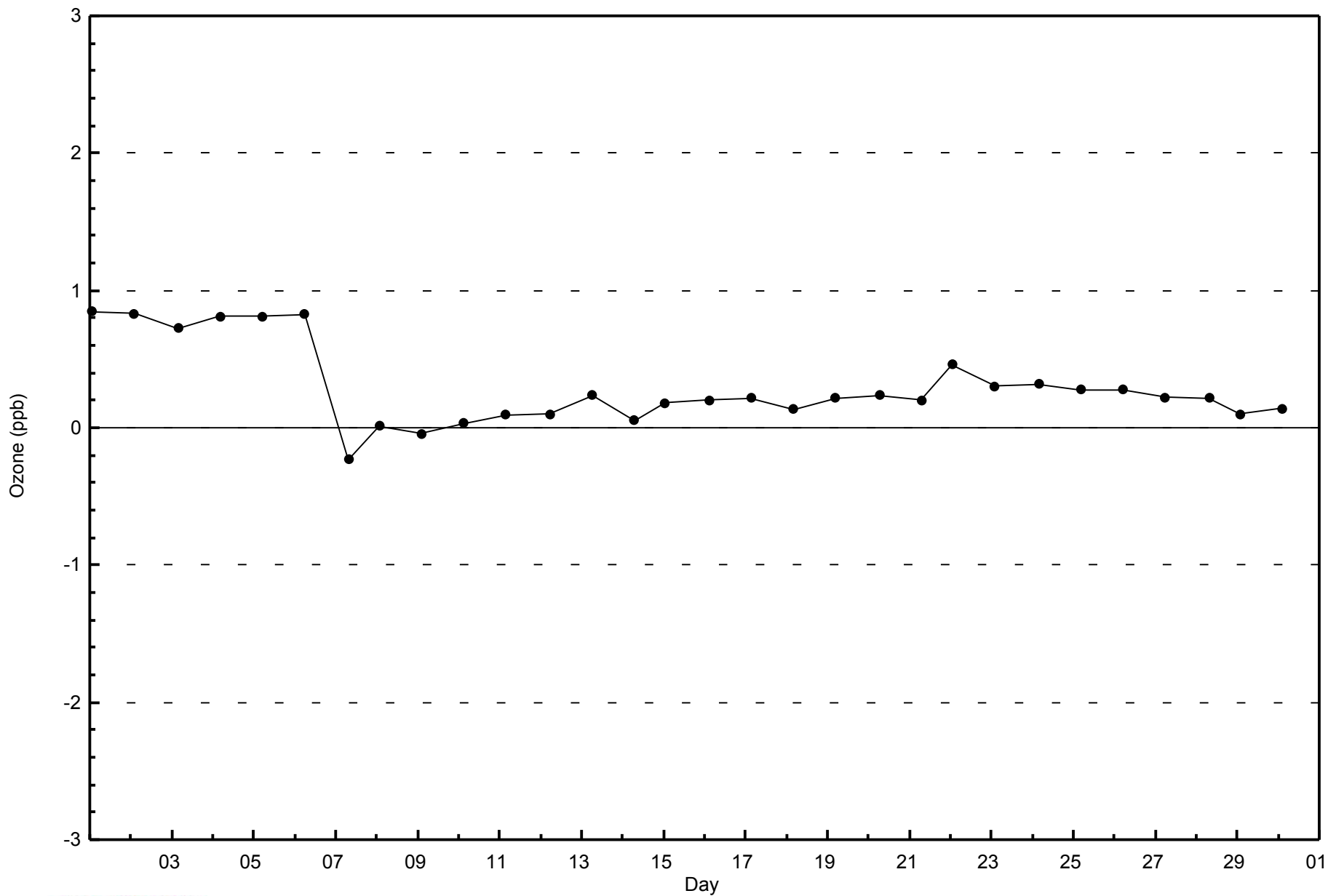
Ozone (O₃) - ppb
 Anzac (AMS 14)





WBEA
Zero Responses

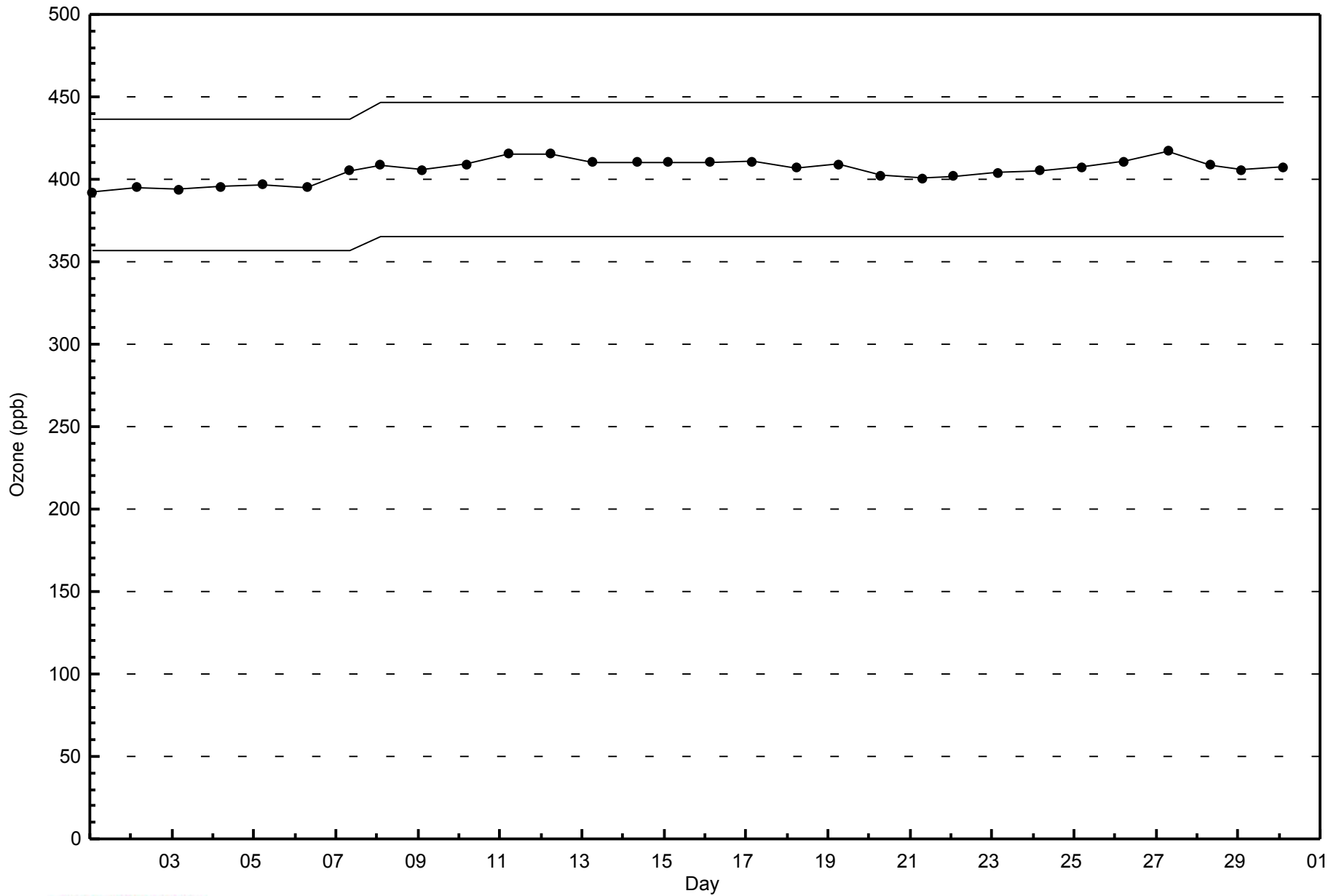
Ozone (O₃) - ppb
Anzac - November 2014





WBEA
Span Responses

Ozone (O₃) - ppb
Anzac - November 2014





Summary of Hour Averages

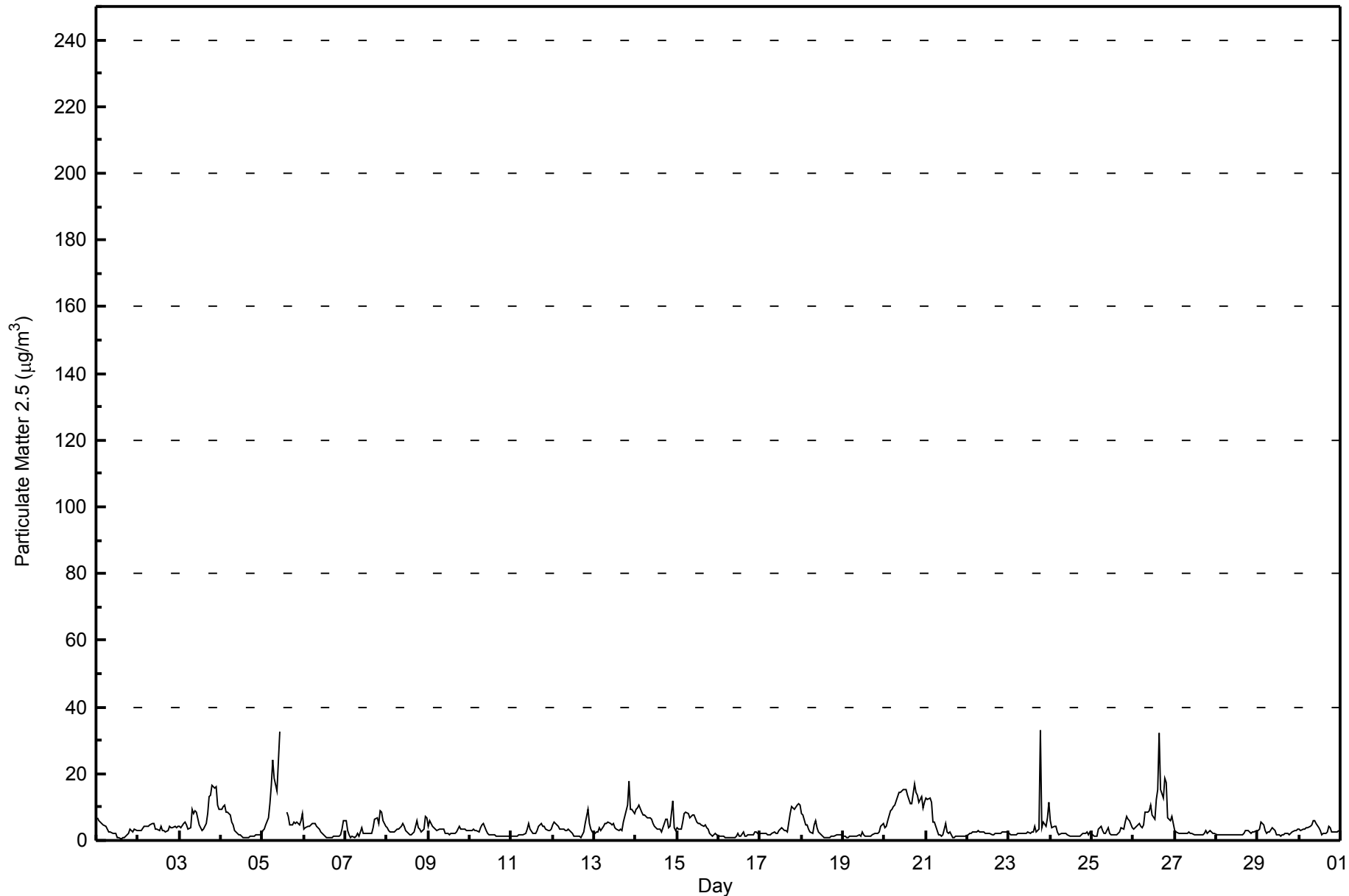
Anzac - November 2014

Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 33.2 µg/m ³ on Nov 23 19:00		Maximum Daily Average: 11.5 µg/m ³ on Nov 20		Hours in Service: 720 Hours of Data: 717																						
Minimum Value: 0.6 µg/m ³ on Nov 1 15:00 Maximum Diurnal Average: 5.7 µg/m ³ at hour 19 Monthly Average: 4.12 µg/m ³		Minimum Daily Average: 1.4 µg/m ³ on Nov 16 Minimum Diurnal Average: 2.8 µg/m ³ at hour 14 Percentiles: P ₁ = 0.7 P ₁₀ = 1.3 Q ₁ = 1.9 Median = 2.9 Q ₃ = 4.8 P ₉₀ = 8.7 P ₉₉ = 18.5		Hours of Missing Data: 3 Hours of Calibration: 0 Percent Operational Time: 99.6																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	6.8	6.0	5.4	4.9	4.7	4.1	3.4	2.5	2.5	2.2	2.0	2.0	0.9	0.7	0.6	0.7	0.7	1.4	2.2	3.3	2.9	2.6	3.2	3.0	2.9	6.8
2-Nov	3.0	3.0	3.1	4.3	4.4	4.1	4.2	4.5	5.0	5.2	3.6	3.2	3.0	4.3	2.9	2.9	2.7	3.0	4.3	3.7	3.8	4.1	3.8	4.1	3.8	5.2
3-Nov	4.2	4.0	4.9	5.7	4.6	3.3	4.0	9.4	8.2	8.9	8.4	4.6	4.0	3.0	3.2	4.9	7.9	13.3	13.7	16.4	15.5	16.0	10.7	9.5	7.8	16.4
4-Nov	9.5	10.2	10.5	8.6	8.4	7.6	5.4	4.7	2.8	2.3	1.8	1.6	1.3	1.0	1.0	0.9	1.0	1.2	1.1	1.2	1.7	1.7	1.7	1.8	3.7	10.5
5-Nov	3.0	3.4	4.5	6.7	11.1	16.5	24.2	18.5	15.0	23.5	32.5	M	M	M	8.7	7.2	4.8	4.5	5.7	5.3	5.4	4.5	5.8	7.9	10.4	32.5
6-Nov	3.6	3.8	4.1	4.4	4.6	5.1	4.9	4.4	4.0	3.5	2.4	1.5	1.3	1.1	0.8	0.7	0.7	1.3	1.3	1.2	1.1	1.5	3.4	6.0	2.8	6.0
7-Nov	6.0	3.1	1.5	0.9	1.3	1.0	1.3	2.0	1.2	3.6	2.0	2.2	2.2	2.2	2.0	2.2	3.8	6.5	6.8	5.3	8.8	8.4	5.8	4.1	3.5	8.8
8-Nov	3.9	3.0	2.5	2.6	2.7	3.1	3.3	3.5	4.3	5.0	4.1	2.9	2.2	1.7	1.7	1.9	2.7	6.1	3.6	3.3	2.6	3.5	7.1	6.7	3.5	7.1
9-Nov	4.2	6.0	4.2	3.9	3.5	3.1	3.3	3.2	3.2	3.3	2.3	1.9	1.9	2.0	2.0	2.2	2.5	3.6	4.1	3.4	3.3	3.2	3.2	3.0	3.2	6.0
10-Nov	2.8	2.9	3.4	3.0	2.8	2.6	3.6	4.7	5.2	2.8	2.1	1.7	1.5	1.7	1.7	1.5	1.4	1.3	1.4	1.3	1.3	1.4	1.3	1.5	2.3	5.2
11-Nov	1.4	1.4	1.4	1.4	1.7	1.7	1.8	1.6	2.0	3.6	5.3	3.5	2.0	2.2	2.3	2.9	4.4	4.9	4.3	4.4	3.6	2.9	3.0	3.2	2.8	5.3
12-Nov	4.8	5.5	4.8	4.2	3.4	3.2	3.4	3.1	3.2	3.5	2.9	2.0	1.4	1.4	1.2	1.2	1.0	1.6	2.6	5.2	9.2	4.9	3.5	2.7	3.3	9.2
13-Nov	2.3	2.6	2.5	3.8	3.2	4.3	5.1	5.1	5.3	5.1	4.8	5.2	3.7	3.2	3.1	3.4	2.8	5.7	8.7	10.5	17.7	9.2	9.4	8.2	5.6	17.7
14-Nov	9.4	9.8	10.6	8.6	7.6	7.7	7.4	6.7	6.9	6.3	5.2	4.2	3.3	3.4	3.4	2.7	3.9	6.2	6.6	3.9	4.0	12.1	3.6	3.1	6.1	12.1
15-Nov	3.6	3.5	3.6	5.6	7.9	8.5	7.9	6.9	7.2	7.7	7.8	5.6	5.0	4.9	4.5	4.1	4.5	3.9	3.2	2.1	1.4	1.7	2.3	1.7	4.8	8.5
16-Nov	1.4	1.4	1.5	1.3	0.7	0.7	0.8	0.9	0.8	1.0	1.1	2.2	1.4	1.3	2.4	1.3	1.2	1.6	1.9	1.5	1.6	2.4	2.4	1.9	1.4	2.4
17-Nov	2.0	2.2	2.2	1.9	1.7	1.8	1.8	2.1	2.4	2.2	2.1	2.9	4.0	3.3	2.9	3.0	2.6	8.1	10.2	9.5	9.4	10.5	11.0	10.6	4.6	11.0
18-Nov	8.1	7.6	4.8	4.5	3.4	2.5	1.9	4.8	6.0	3.6	2.7	1.9	1.4	0.8	1.0	1.1	0.8	1.2	1.3	1.4	1.7	1.8	1.9	1.6	2.8	8.1
19-Nov	1.1	1.1	1.0	1.0	1.1	1.2	1.2	1.2	1.4	1.7	1.1	2.7	1.8	1.2	1.4	1.3	1.1	1.8	2.1	1.9	2.2	2.7	4.1	4.9	1.8	4.9
20-Nov	3.6	4.2	5.9	8.8	9.2	10.0	10.6	12.0	14.3	14.3	14.8	15.3	15.3	13.7	12.2	10.9	10.9	17.1	14.6	13.4	11.6	13.2	9.9	11.6	11.5	17.1
21-Nov	12.6	12.3	12.8	11.2	5.5	5.6	3.0	1.7	1.5	1.4	1.6	5.2	2.5	2.1	2.7	1.0	1.0	1.1	1.1	1.1	1.2	1.1	1.1	1.2	3.8	12.8
22-Nov	1.5	2.0	2.1	2.3	2.7	2.7	2.9	2.7	2.5	2.5	2.3	2.0	1.9	2.0	1.8	1.8	1.9	2.1	2.1	2.2	2.4	2.5	2.4	2.4	2.2	2.9
23-Nov	2.0	1.8	1.8	1.8	1.9	2.0	2.0	2.0	2.0	2.0	2.2	2.5	2.3	2.5	2.7	4.1	2.6	3.5	33.2	3.8	5.7	4.3	7.0	11.6	4.5	33.2
24-Nov	5.8	3.6	4.3	4.1	2.7	1.9	2.2	2.2	2.0	2.0	1.7	1.3	1.3	1.1	1.1	1.1	1.3	1.5	1.9	2.1	2.3	2.7	1.7	2.4	2.3	5.8
25-Nov	1.5	1.4	1.5	1.5	3.3	4.4	3.0	2.1	2.1	3.6	1.9	1.7	1.9	1.7	1.6	2.0	2.6	3.8	3.2	5.6	7.2	6.3	6.0	3.9	3.1	7.2
26-Nov	3.3	3.7	4.3	5.1	4.1	3.8	4.7	8.5	8.6	9.1	10.6	7.7	6.5	12.3	15.3	32.4	15.4	12.8	18.5	17.5	6.7	6.1	7.0	5.2	9.6	32.4
27-Nov	2.9	2.4	1.9	2.0	2.0	2.0	2.1	2.2	2.7	2.2	2.1	1.8	1.6	1.6	1.6	1.7	1.9	2.1	3.1	2.3	2.8	2.5	1.9	2.1	2.1	3.1
28-Nov	1.9	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	1.8	2.2	3.0	2.8	2.7	2.3	2.7	2.7	2.9	2.1	3.0
29-Nov	3.1	3.3	5.3	4.5	2.8	2.3	2.4	2.5	3.9	3.4	3.0	1.9	1.6	1.5	1.5	1.7	2.1	2.1	1.9	1.9	2.6	3.0	3.1	3.6	2.7	5.3
30-Nov	3.4	3.1	3.3	3.3	3.6	3.7	4.2	4.8	5.7	5.9	5.3	4.0	2.9	1.9	2.2	2.1	2.6	4.1	3.9	2.5	2.5	2.4	2.7	3.1	3.5	5.9
																								Diurnal Average		
																								Diurnal Maximum		
4.1 4.0 4.0 4.1 3.9 4.1 4.2 4.4 4.5 4.8 4.7 3.3 2.8 2.8 3.0 3.5 3.2 4.3 5.7 4.7 4.8 4.7 4.4 4.5																										
12.6 12.3 12.8 11.2 11.1 16.5 24.2 18.5 15.0 23.5 32.5 15.3 15.3 13.7 15.3 32.4 15.4 17.1 33.2 17.5 17.7 16.0 11.0 11.6																										
M - Maintenance Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m ³																										



WBEA
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Anzac - November 2014





WBEA
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Anzac - November 2014

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	554	77.27	77.27
6 - 15	128	17.85	95.12
16 - 25	10	1.39	96.51
26 - 80	3	0.42	96.93
> 81.0	0	0.00	96.93

Total Number of Valid Hours: 717

Total Number of Hours: 720



WBEA
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Anzac - November 2014

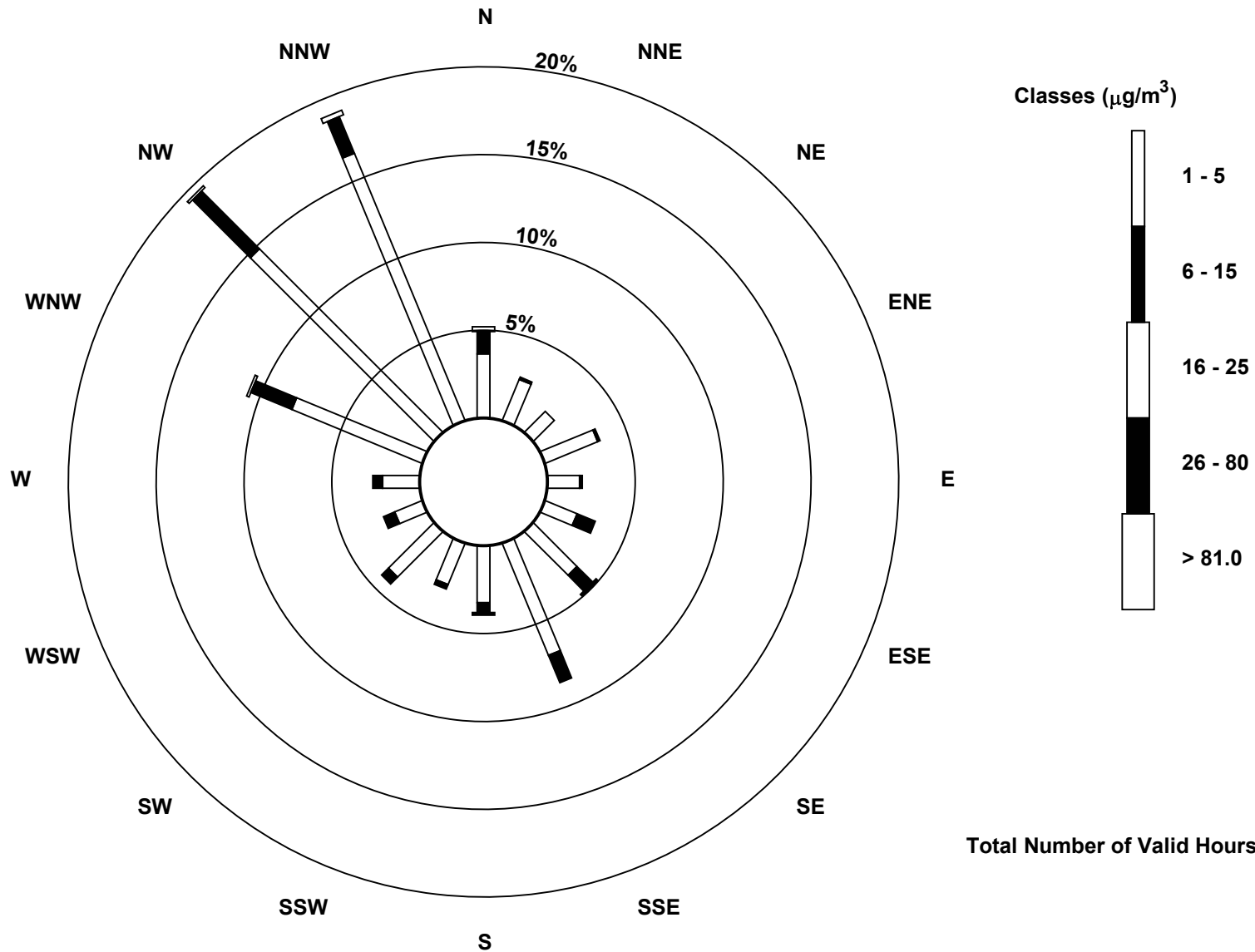
Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	26	18	12	23	13	14	25	49	23	18	26	12	15	57	105	117	553
6 - 15	9	1	0	1	1	8	9	12	4	2	4	5	4	18	33	16	127
16 - 25	2	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	6
26 - 80	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	2
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	37	19	12	24	14	22	35	61	28	20	30	17	19	76	139	135	688

Total Number of Valid Hours: 710

Total Number of Hours: 720

Wood Buffalo Environmental Association
 Wind Rose Nov 2014

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
 Anzac (AMS 14)



Total Number of Valid Hours: 710

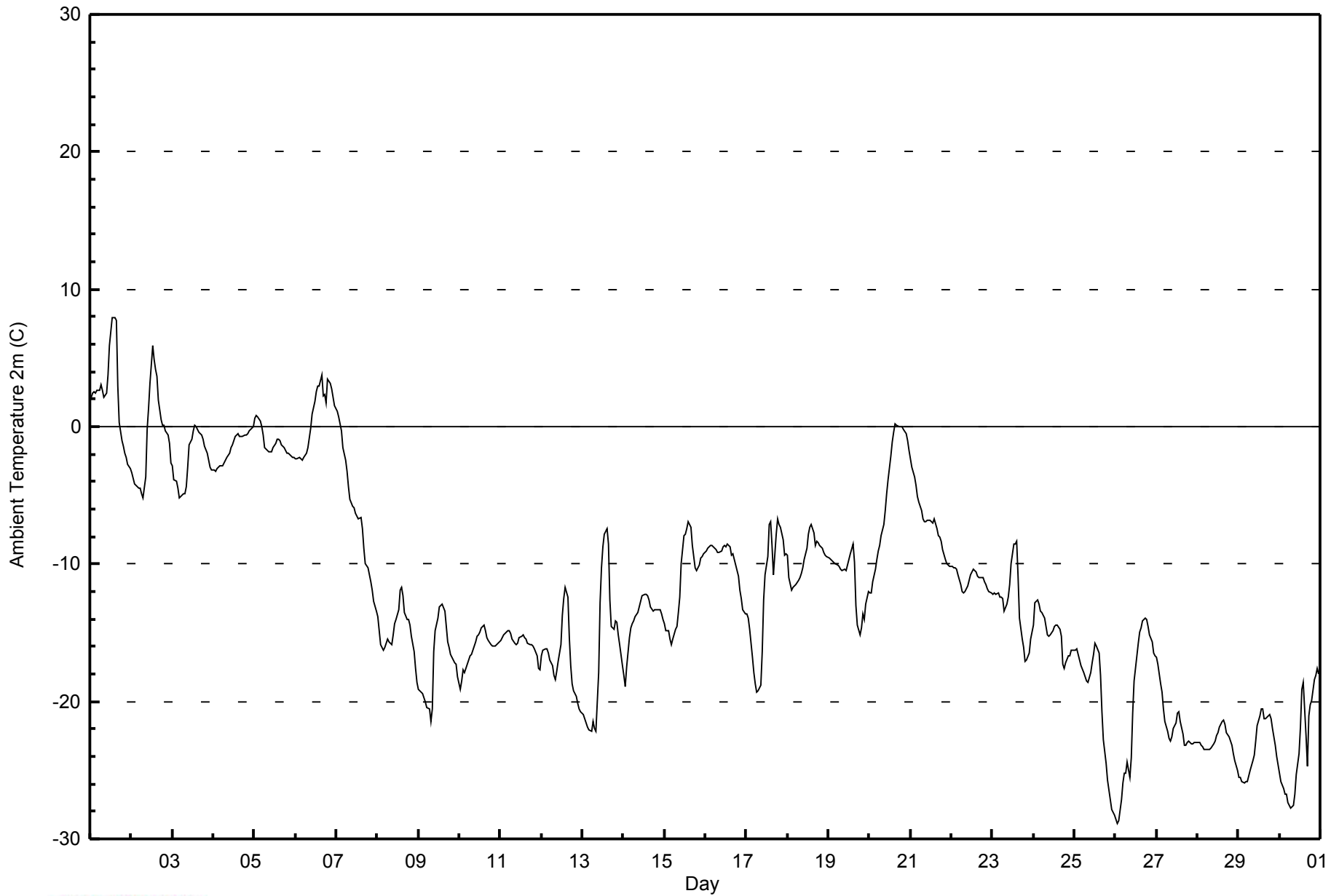


Maximum Value: 8.0 C on Nov 1 15:00		Maximum Daily Average: 2.3 C on Nov 1		Hours in Service: 720																																												
Minimum Value: -28.9 C on Nov 26 02:00		Minimum Daily Average: -23.3 C on Nov 29		Hours of Data: 720																																												
Maximum Diurnal Average: -9.0 C at hour 15		Minimum Diurnal Average: -13.4 C at hour 8		Hours of Missing Data: 0																																												
Monthly Average: -11.85 C		Percentiles: P ₁ = -27.6 P ₁₀ = -22.5 Q ₁ = -17.0 Median = -12.6 Q ₃ = -6.7 P ₉₀ = -0.5 P ₉₉ = 4.2		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-Nov	2.2	2.4	2.5	2.4	2.7	2.6	3.0	2.7	2.2	2.5	3.8	5.9	6.9	7.9	8.0	7.7	3.0	0.3	-1.1	-1.4	-2.0	-2.3	-2.7	-3.1	2.3	8.0																						
2-Nov	-3.3	-3.7	-4.2	-4.3	-4.4	-4.5	-4.8	-5.2	-3.6	-0.2	1.3	3.2	5.9	4.9	4.2	3.6	2.0	0.5	0.1	0.1	-0.3	-0.6	-1.2	-2.6	-0.7	5.9																						
3-Nov	-2.9	-3.8	-3.9	-4.5	-5.2	-5.1	-4.8	-4.9	-4.4	-2.9	-1.3	-0.9	-0.3	0.1	0.0	-0.4	-0.5	-0.6	-0.9	-1.4	-1.9	-2.4	-2.9	-3.2	-2.5	0.1																						
4-Nov	-3.2	-3.3	-3.1	-3.0	-2.9	-2.8	-2.7	-2.4	-2.2	-1.9	-1.5	-1.3	-1.0	-0.7	-0.5	-0.7	-0.7	-0.7	-0.7	-0.6	-0.5	-0.3	-0.2	0.0	-1.5	0.0																						
5-Nov	0.6	0.8	0.7	0.4	0.0	-0.6	-1.5	-1.6	-1.8	-1.8	-1.8	-1.5	-1.2	-0.9	-0.9	-1.0	-1.3	-1.6	-1.8	-1.9	-2.0	-2.1	-2.2	-2.3	-1.1	0.8																						
6-Nov	-2.4	-2.4	-2.2	-2.3	-2.4	-2.2	-1.9	-1.5	-0.8	-0.1	0.9	1.9	2.5	3.0	3.0	3.7	2.2	2.4	1.7	3.5	3.1	2.7	2.2	1.5	0.7	3.7																						
7-Nov	1.1	0.7	0.2	-0.3	-1.5	-2.4	-3.3	-4.4	-5.3	-5.8	-5.9	-6.3	-6.6	-6.8	-6.6	-7.4	-8.8	-10.0	-10.3	-10.8	-11.3	-11.9	-12.7	-13.4	-6.2	1.1																						
8-Nov	-13.8	-14.8	-15.8	-16.3	-16.0	-15.8	-15.4	-15.7	-15.8	-15.2	-14.4	-14.0	-13.3	-11.9	-11.7	-12.3	-13.5	-14.0	-14.1	-14.5	-15.3	-16.4	-17.6	-18.7	-14.8	-11.7																						
9-Nov	-19.1	-19.2	-19.4	-19.7	-20.1	-20.4	-20.6	-21.5	-20.6	-16.4	-14.8	-14.0	-13.2	-13.0	-12.9	-13.5	-14.6	-15.7	-16.1	-16.6	-17.0	-17.1	-17.3	-18.2	-17.1	-12.9																						
10-Nov	-19.1	-18.5	-17.7	-17.9	-17.6	-17.0	-16.7	-16.6	-16.2	-15.7	-15.3	-15.1	-15.0	-14.6	-14.4	-14.9	-15.3	-15.6	-15.8	-16.0	-16.0	-16.0	-15.9	-15.7	-16.2	-14.4																						
11-Nov	-15.5	-15.4	-15.2	-15.0	-14.9	-14.8	-15.1	-15.5	-15.8	-15.8	-15.8	-15.4	-15.2	-15.2	-15.3	-15.5	-15.7	-15.8	-15.9	-15.9	-16.1	-16.7	-17.6	-17.7	-15.7	-14.8																						
12-Nov	-16.7	-16.3	-16.2	-16.2	-16.5	-17.0	-17.4	-18.1	-18.4	-17.8	-17.0	-15.9	-13.7	-12.5	-11.7	-12.4	-15.3	-17.4	-18.7	-19.3	-19.7	-20.2	-20.5	-20.7	-16.9	-11.7																						
13-Nov	-21.0	-21.3	-21.6	-21.8	-22.0	-22.1	-21.5	-22.0	-22.1	-17.9	-12.8	-10.3	-8.8	-7.8	-7.5	-8.5	-12.6	-14.5	-14.8	-14.2	-14.2	-15.1	-15.8	-17.4	-16.1	-7.5																						
14-Nov	-18.1	-18.9	-17.5	-15.3	-14.7	-14.4	-14.2	-13.8	-13.5	-13.1	-12.7	-12.3	-12.2	-12.2	-12.3	-12.7	-13.1	-13.4	-13.3	-13.3	-13.3	-13.3	-13.6	-14.0	-14.0	-12.2																						
15-Nov	-14.3	-14.9	-14.9	-15.4	-15.9	-15.5	-14.7	-14.5	-13.5	-12.4	-10.0	-7.9	-7.8	-7.4	-7.0	-7.3	-8.6	-9.5	-10.2	-10.5	-10.0	-9.6	-9.5	-9.2	-11.3	-7.0																						
16-Nov	-9.0	-8.8	-8.7	-8.6	-8.7	-8.9	-9.0	-9.1	-9.2	-9.0	-8.7	-8.7	-8.7	-8.6	-8.7	-9.3	-9.3	-9.6	-10.5	-10.9	-11.9	-12.6	-13.3	-13.6	-9.7	-8.6																						
17-Nov	-13.7	-13.9	-14.8	-16.8	-17.9	-18.7	-19.3	-19.2	-18.9	-16.3	-12.6	-10.8	-9.5	-7.2	-7.0	-8.6	-10.8	-7.8	-6.7	-7.1	-7.3	-8.2	-9.4	-9.3	-12.2	-6.7																						
18-Nov	-9.3	-11.0	-11.9	-11.7	-11.6	-11.5	-11.2	-11.0	-10.7	-10.2	-9.7	-8.8	-7.8	-7.3	-7.1	-7.7	-8.7	-8.4	-8.5	-8.7	-8.9	-9.2	-9.3	-9.4	-9.6	-7.1																						
19-Nov	-9.6	-9.7	-9.7	-9.9	-10.0	-10.1	-10.1	-10.3	-10.5	-10.4	-10.5	-10.1	-9.7	-9.2	-8.5	-9.9	-13.0	-14.4	-15.1	-14.7	-13.7	-14.0	-12.9	-12.0	-11.2	-8.5																						
20-Nov	-12.1	-12.1	-11.3	-10.3	-9.6	-9.0	-8.6	-8.0	-7.1	-6.1	-4.9	-3.8	-2.2	-1.1	-0.4	0.2	0.1	0.0	0.0	0.0	-0.2	-0.5	-1.0	-1.8	-4.6	0.2																						
21-Nov	-2.3	-2.9	-3.6	-4.3	-5.1	-5.5	-6.1	-6.7	-6.9	-7.0	-6.8	-6.8	-6.9	-7.0	-6.7	-7.4	-8.0	-8.0	-8.3	-9.0	-9.7	-9.9	-10.1	-10.2	-6.9	-2.3																						
22-Nov	-10.2	-10.2	-10.3	-10.3	-10.8	-11.5	-12.0	-12.1	-12.0	-11.6	-11.2	-10.8	-10.6	-10.4	-10.6	-10.9	-11.0	-11.0	-11.0	-11.3	-11.5	-11.8	-12.0	-12.1	-11.1	-10.2																						
23-Nov	-12.2	-12.1	-12.2	-12.1	-12.4	-12.4	-12.5	-13.4	-12.9	-12.4	-11.5	-10.0	-8.6	-8.5	-8.3	-10.9	-14.0	-15.5	-16.1	-17.1	-17.0	-16.5	-15.4	-15.0	-12.9	-8.3																						
24-Nov	-14.4	-12.8	-12.6	-12.9	-13.4	-13.5	-14.0	-14.6	-15.2	-15.2	-15.1	-14.8	-14.6	-14.4	-14.5	-14.7	-15.2	-17.3	-17.6	-17.2	-16.7	-16.7	-16.3	-16.3	-15.0	-12.6																						
25-Nov	-16.2	-16.2	-16.6	-16.9	-17.4	-17.9	-18.2	-18.5	-18.7	-17.9	-17.2	-16.6	-15.8	-15.9	-16.5	-18.1	-20.7	-22.8	-24.5	-25.7	-26.4	-27.2	-27.9	-28.3	-19.9	-15.8																						
26-Nov	-28.6	-28.9	-28.6	-27.1	-26.0	-25.2	-25.2	-24.4	-25.6	-24.1	-20.9	-18.6	-16.7	-15.8	-15.0	-14.7	-14.2	-13.9	-14.0	-14.5	-15.1	-15.6	-16.5	-16.6	-20.2	-13.9																						
27-Nov	-16.8	-17.3	-18.7	-19.3	-20.5	-21.4	-22.1	-22.6	-22.9	-22.5	-21.9	-21.6	-20.8	-20.8	-21.4	-22.4	-23.2	-23.2	-23.0	-22.9	-23.1	-23.1	-23.0	-23.0	-21.6	-16.8																						
28-Nov	-23.0	-23.0	-23.1	-23.3	-23.5	-23.5	-23.5	-23.5	-23.3	-23.1	-22.9	-22.5	-22.2	-21.8	-21.5	-21.4	-21.7	-22.2	-22.6	-22.8	-23.2	-23.8	-24.3	-25.0	-22.9	-21.4																						
29-Nov	-25.6	-25.6	-25.8	-25.9	-25.8	-25.8	-25.4	-25.0	-24.3	-23.9	-22.8	-21.8	-21.1	-20.5	-20.6	-21.2	-21.3	-21.0	-21.0	-21.3	-22.0	-23.1	-24.0	-24.7	-23.3	-20.5																						
30-Nov	-25.2	-25.9	-26.4	-26.7	-26.7	-27.3	-27.7	-27.6	-27.6	-26.8	-25.3	-23.8	-21.8	-19.1	-18.6	-22.5	-24.7	-21.1	-20.2	-19.9	-18.4	-18.1	-17.6	-18.0	-23.2	-17.6																						
																								-12.5	-12.6	-12.7	-12.9	-13.0	-13.1	-13.2	-13.4	-13.2	-12.4	-11.3	-10.4	-9.7	-9.2	-9.0	-9.7	-10.9	-11.4	-11.7	-11.9	-12.0	-12.4	-12.7	-13.0	Diurnal Average
																								2.2	2.4	2.5	2.4	2.7	2.6	3.0	2.7	2.2	2.5	3.8	5.9	6.9	7.9	8.0	7.7	3.0	2.4	1.7	3.5	3.1	2.7	2.2	1.5	Diurnal Maximum



WBEA
Hourly Averages

Ambient Temperature 2m (AT 2m) - C
Anzac - November 2014





WBEA
Cumulative Frequency Distribution

Ambient Temperature 2m (AT 2m) - C
Anzac - November 2014

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	121	16.81	16.81
-20 - 0	545	75.69	92.50
0 - 10	54	7.50	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

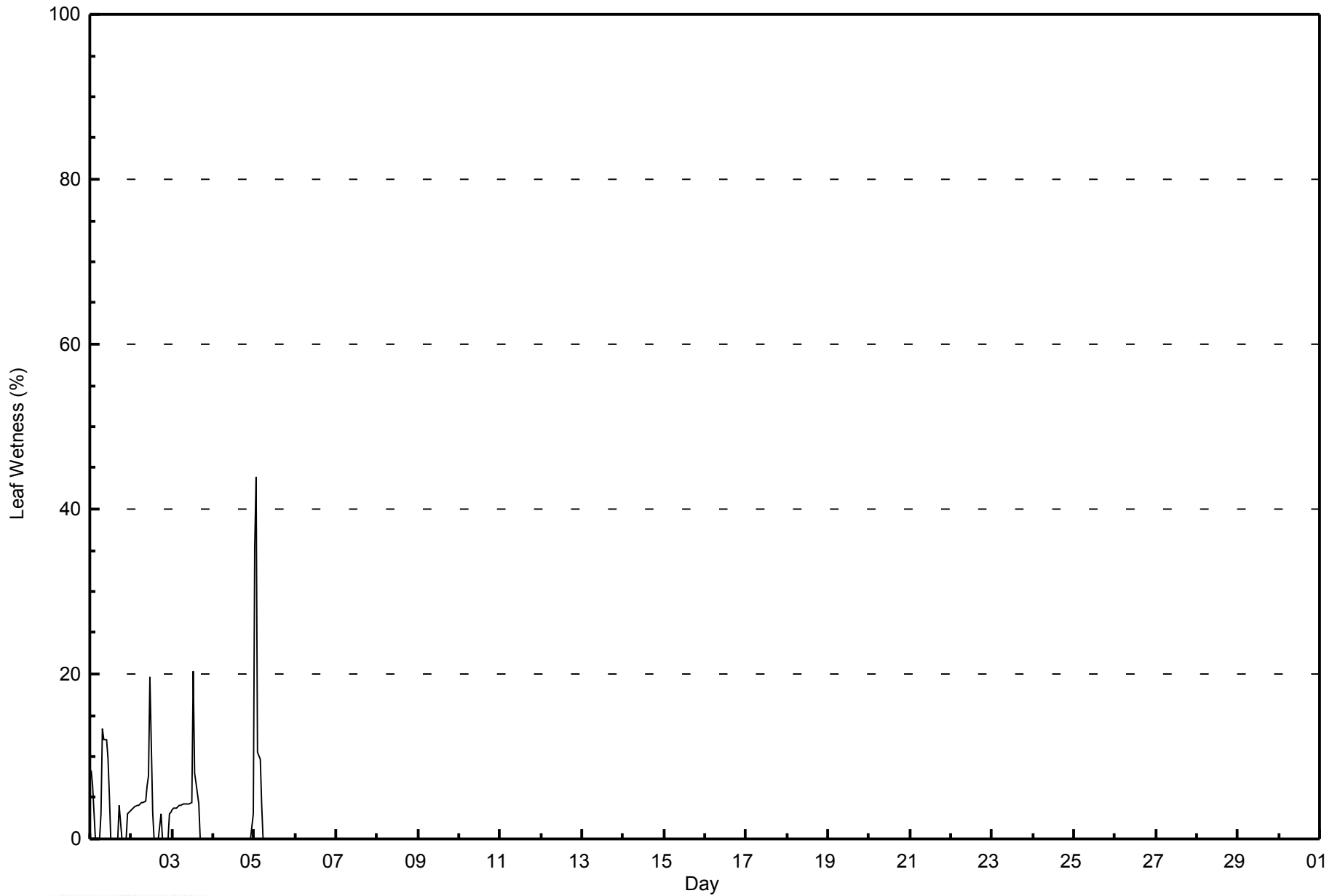


Maximum Value: 44 % on Nov 5 02:00														Maximum Daily Average: 4.3 % on Nov 5														Hours in Service: 720	
Minimum Value: 0 % on Nov 1 04:00														Minimum Daily Average: 0.0 % on Nov 6														Hours of Data: 720	
Maximum Diurnal Average: 1.9 % at hour 2														Minimum Diurnal Average: 0.0 % at hour 17														Hours of Missing Data: 0	
Monthly Average: 0.5 %														Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 12														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-Nov	8	6	3	0	0	0	3	13	12	12	10	5	0	0	0	0	0	4	0	0	0	0	3	3	3.5	13			
2-Nov	4	4	4	4	4	4	4	4	4	6	8	20	3	0	0	0	0	3	0	0	0	0	3	3	3.5	20			
3-Nov	3	4	4	4	4	4	4	4	4	4	4	4	20	8	7	4	0	0	0	0	0	0	0	0	3.7	20			
4-Nov	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0.1	3			
5-Nov	35	44	11	10	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.3	44			
6-Nov	0	0	0	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-Nov	0	0	0	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-Nov	0	0	0	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-Nov	0	0	0	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-Nov	0	0	0	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-Nov	0	0	0	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-Nov	0	0	0	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-Nov	0	0	0	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-Nov	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0			
15-Nov	0	0	0	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-Nov	0	0	0	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-Nov	0	0	0	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-Nov	0	0	0	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-Nov	0	0	0	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-Nov	0	0	0	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-Nov	0	0	0	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-Nov	0	0	0	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-Nov	0	0	0	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-Nov	0	0	0	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-Nov	0	0	0	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-Nov	0	0	0	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-Nov	0	0	0	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-Nov	0	0	0	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-Nov	0	0	0	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-Nov	0	0	0	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	
1.7 1.9 0.7 0.6 0.4 0.3 0.4 0.7 0.7 0.8 0.7 1.0 0.8 0.3 0.2 0.1 0.0 0.2 0.0 0.0 0.0 0.0 0.2 0.3																													
35 44 11 10 4 4 4 13 12 12 10 20 20 8 7 4 0 4 0 0 0 0 0 3 3																													



WBEA
Hourly Averages

Leaf Wetness (SW) - %
Anzac - November 2014





WBEA
Cumulative Frequency Distribution

Leaf Wetness (SW) - %
Anzac - November 2014

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 0.3	670	93.06	93.06
0.4 - 0.5	0	0.00	93.06
0.6 - 0.7	0	0.00	93.06
0.8 - 1.4	0	0.00	93.06
1.5 - 10	42	5.83	98.89
> 10	8	1.11	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

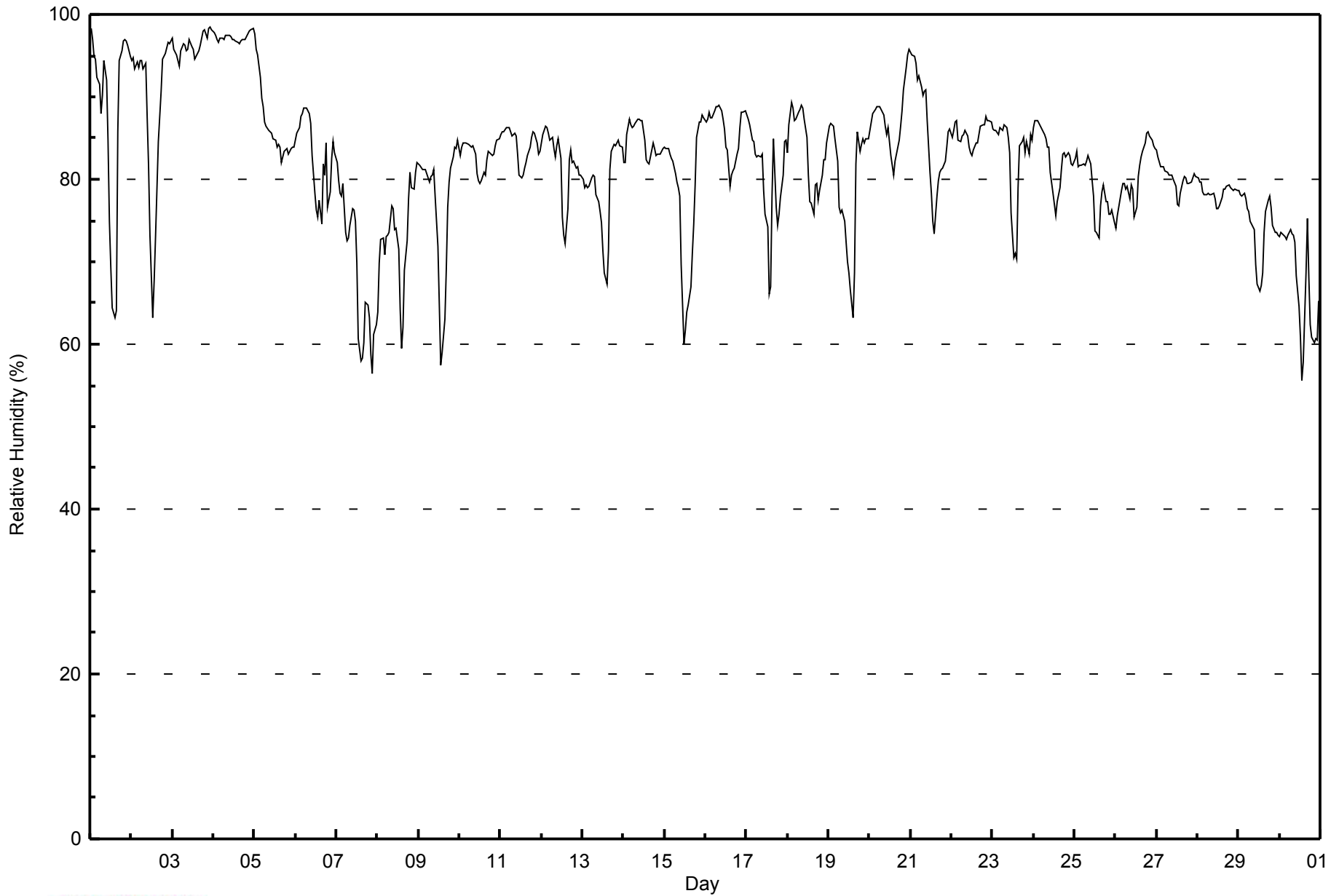


Maximum Value: 99 % on Nov 3 23:00 Maximum Daily Average: 97.2 % on Nov 4																		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0									
Minimum Value: 56 % on Nov 30 14:00 Minimum Daily Average: 67.5 % on Nov 30 Maximum Diurnal Average: 85.4 % at hour 3 Minimum Diurnal Average: 74.1 % at hour 15 Monthly Average: 82.0 % Percentiles: P ₁ = 59 P ₁₀ = 72 Q ₁ = 78 Median = 83 Q ₃ = 86 P ₉₀ = 94 P ₉₉ = 98																											
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	98	97	95	95	92	92	88	90	94	92	85	75	69	64	63	64	86	94	96	97	97	97	96	95	88.0	98	
2-Nov	94	95	93	94	94	94	94	93	94	88	82	73	63	68	73	79	85	91	95	95	95	97	96	97	88.4	97	
3-Nov	97	96	95	94	94	96	96	96	96	96	97	96	96	95	95	96	96	97	98	98	97	98	99	98	96.3	99	
4-Nov	98	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	98	98	98	98	97.2	98	
5-Nov	98	96	95	92	90	89	87	86	86	86	86	85	85	84	84	84	82	83	84	84	83	84	84	84	86.6	98	
6-Nov	85	86	86	88	88	89	89	88	88	87	83	78	76	75	77	74	82	80	84	77	78	82	85	83	82.9	89	
7-Nov	82	80	78	78	79	74	73	73	74	76	76	75	70	61	58	58	60	65	65	63	59	57	61	62	69.1	82	
8-Nov	64	70	73	73	71	73	73	74	77	76	74	74	72	64	59	62	69	72	78	81	79	79	81	82	72.9	82	
9-Nov	82	82	81	81	81	81	80	80	81	81	78	72	65	57	59	63	69	77	80	81	83	84	84	85	76.9	85	
10-Nov	83	84	84	84	84	84	84	84	84	83	81	80	80	80	81	80	82	83	83	83	83	84	85	85	82.9	85	
11-Nov	85	86	86	86	86	86	86	85	86	85	83	80	80	80	81	82	83	84	85	86	86	84	83	83	84.1	86	
12-Nov	84	85	86	86	86	85	85	84	83	84	85	82	75	73	72	76	82	84	82	82	81	82	81	81	82.0	86	
13-Nov	80	79	79	79	79	80	81	80	78	77	76	75	71	69	67	71	81	83	84	84	84	85	84	84	78.9	85	
14-Nov	82	82	85	87	87	86	86	87	87	87	87	87	85	82	82	83	84	84	83	83	83	83	84	84	84.6	87	
15-Nov	84	84	84	83	83	82	81	80	79	78	70	60	62	64	65	67	71	75	79	85	87	87	88	88	77.6	88	
16-Nov	87	87	88	87	87	88	89	89	89	88	87	86	84	84	79	80	81	81	83	84	86	88	88	88	85.9	89	
17-Nov	88	87	87	85	84	83	83	83	83	83	79	76	74	66	67	78	85	77	74	76	78	80	85	85	80.2	88	
18-Nov	83	87	89	89	87	87	88	88	89	89	87	85	81	77	77	76	79	79	78	79	81	82	82	84	83.5	89	
19-Nov	86	87	87	86	85	82	77	76	76	75	72	70	69	67	63	69	82	86	83	84	85	84	85	85	79.2	87	
20-Nov	86	87	88	88	89	89	89	88	88	86	85	86	83	82	81	82	83	85	86	88	91	94	95	96	87.3	96	
21-Nov	95	95	95	94	92	93	91	90	91	91	87	81	78	75	73	78	80	81	81	81	82	84	86	86	85.9	95	
22-Nov	85	86	87	87	85	85	85	85	86	85	84	83	83	84	84	84	85	87	87	87	88	87	87	87	85.5	88	
23-Nov	86	86	86	86	86	86	86	87	86	85	83	76	71	71	70	79	84	85	85	83	85	83	85	85	82.7	87	
24-Nov	86	87	87	87	86	86	85	85	84	84	81	78	77	76	77	79	81	83	83	83	83	83	82	82	82.7	87	
25-Nov	82	83	82	82	82	82	82	82	83	82	80	78	74	74	73	77	78	79	77	77	76	76	75	75	78.8	83	
26-Nov	74	76	77	79	80	80	79	79	78	79	79	75	77	80	82	83	83	84	86	86	85	85	84	84	80.5	86	
27-Nov	84	83	82	81	82	81	81	81	80	80	80	79	77	77	78	80	80	80	80	80	79	80	80	81	80	80.2	84
28-Nov	80	80	80	78	78	78	78	78	78	78	78	76	77	77	78	79	79	79	79	79	79	79	79	79	78.4	80	
29-Nov	79	78	78	78	78	76	76	75	74	74	70	67	66	67	69	74	76	77	78	77	74	74	74	73	74.2	79	
30-Nov	73	74	73	73	73	73	74	73	73	72	68	65	61	56	58	69	75	68	62	61	60	61	61	65	67.5	75	
85.1 85.3 85.4 85.3 84.8 84.5 84.1 84.0 84.1 83.6 81.3 78.4 75.8 74.1 74.1 76.7 80.7 82.1 82.5 82.6 82.9 83.3 83.9 84.1																		Diurnal Average									
98 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 98 98 98 98 99 98																		Diurnal Maximum									



WBEA
Hourly Averages

Relative Humidity (RH) - %
Anzac - November 2014





WBEA
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Anzac - November 2014

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	9	1.25	1.25
60 - 80	243	33.75	35.00
80 - 100	468	65.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Speed: 23 km/h on Nov 6 10:00	Maximum Daily Speed Average: 13.2 km/h on Nov 7	Hours in Service: 720
Minimum Speed Value: 1 km/h on Nov 26 18:00	Minimum Daily Speed Average: 1.5 km/h on Nov 20	Hours of Data: 711
Maximum Diurnal Speed Average: 4.6 km/h at hour 15	Minimum Diurnal Speed Average: 1.8 km/h at hour 9	Hours of Missing Data: 9
Monthly Average Velocity: 3.2 km/h 318.3 deg	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 5 Median = 7 Q ₃ = 9 P ₉₀ = 12 P ₉₉ = 18	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-Nov	WNW6	WNW9	WNW10	WNW10	WNW10	WNW11	W13	WSW5	WSW6	W5	WSW5	W6	WNW8	WNW9	WNW8	WSW6	SW3	SSW3	SW3	SSW5	SW4	SSW4	SW4	SW4	W5.7	W13		
2-Nov	SW4	SW5	SW5	SW4	SSW3	S5	S6	S6	SSE6	S5	SSE5	SSE6	SSE5	SE7	SSE8	SE6	SE8	SE6	SSE8	SSE7	SSE6	SE8	SSE5	SSE5	SSE5.3	SSE8		
3-Nov	SSE4	SSE5	SE5	SSE5	SE4	E4	SE4	S3	SW2	NNW3	NW5	NNW7	NW6	NW6	NW7	NW7	NW8	NW8	NW7	NNW8	N7	N6	NNE5	ENE2	NNW2.2	NW8		
4-Nov	E2	ESE3	ESE4	SSE5	SE6	ESE8	ESE5	ESE6	SE8	ESE8	ESE7	ESE10	SE10	SE8	SE9	SE9	SE9	SE9	SE8	SE8	SSE8	SE6	SSW3	SE6.6	ESE10			
5-Nov	WNW9	WNW12	WNW12	WNW13	WNW14	AF	AF	AF	AF	AF	AF	AF	AF	NW6	NW7	NW8	NW7	NW6	WSW4	SW7	SSW5	SSE7	SSE11	S15	---	S15		
6-Nov	SSE14	SSE15	SSE18	SSE17	SSE16	SSE17	SSE17	SSE20	SSE22	SSE23	S21	SSE18	S11	S9	SSW4	S7	SSW7	SW8	W6	WNW11	NW14	NW12	NW15	NW16	S8.4	SSE23		
7-Nov	NW15	NW14	NW16	NW18	NNW19	NNW18	NNW16	NNW17	NNW14	NNW12	NNW16	NNW15	NNW14	NNW17	NNW15	NNW12	NNW10	NNW9	NNW9	NNW8	NNW10	NNW10	N8	N7	NNW13.2	NNW19		
8-Nov	NNW8	N7	N5	NNW6	NNW6	NNW6	NNW6	NNW5	NW5	NW7	NW9	NNW10	NW9	NNW10	NNW11	NNW10	NW8	NW9	NW9	NW8	NW8	NW6	WNW5	WNW5	NNW7.2	NNW11		
9-Nov	NW5	NNW6	NNW4	NW5	NW5	NW3	WNW2	NW3	NW4	NW4	NNW6	NNW8	NNW8	N8	N8	N7	NNW6	NNW6	NNW6	NNW6	N6	N6	NNW7	NNW6	NNW5.5	N8		
10-Nov	NNW6	NW7	NNW7	NW7	NW7	NW8	NW9	NW10	NW10	NW12	NNW14	NNW15	NNW17	NNW17	NNW15	NNW16	NNW14	NNW12	NNW11	NNW11	NNW11	NNW11	NNW11	NNW9	NNW8	NNW10.8	NNW17	
11-Nov	NW7	NW8	NNW8	NNW8	NNW7	NNW7	NNW8	NNW9	NNW7	NNW9	NNW9	NW8	NW8	NW7	NNW6	NNW5	NW5	NW5	WNW4	WNW3	NNW3	NE2	SE2	ESE2	NNW5.5	NNW9		
12-Nov	ENE1	NNW3	SW2	SW4	WSW4	W4	W3	WSW4	SSW2	SSW3	S2	WNW4	WNW4	WNW3	W4	WSW3	SW2	S2	S1	SW1	SW2	S2	AF	SSW3	WSW2.1	W4		
13-Nov	SSW3	S3	SSW2	W1	SSW3	SSW4	SSW4	SW4	SSW2	SW3	WSW4	WNW6	WNW8	WNW8	WNW7	WNW5	NW4	NW5	WNW5	NW6	NW6	NW6	NW5	NW4	WNW3.3	WNW8		
14-Nov	WNW3	W5	WNW4	WNW4	NW4	NW4	NW4	NNW5	NNW6	NNW5	NNW5	NNW7	NNW7	NNW7	NNW9	NNW8	NW9	NNW7	NW8	NW7	NW7	WNW8	WNW9	WNW9	NW6.0	WNW9		
15-Nov	W10	W10	W9	W7	WNW7	W10	W7	SW6	ESE2	E1	WSW3	WNW9	WNW14	WNW16	NW12	NW11	NNW14	N13	NNW14	NNW16	NNW15	NNW16	NNW13	NW15	NW8.9	WNW16		
16-Nov	NW13	NW14	NNW14	NNW14	NNW14	NNW10	NNW9	NNW11	NNW11	NW10	NW11	NNW12	NNW12	NW11	NNW12	NW8	NW9	NW9	NW10	WNW11	WNW9	WNW9	WNW6	WNW7	NW10.5	NW14		
17-Nov	NW8	NW7	WNW5	S3	SSE5	SSE5	SSE4	SSE4	SSE5	SSE5	SE5	SE6	SE7	ESE8	SE7	S6	WSW5	WNW9	WNW11	NW13	NW10	NW9	NW9	NW11	W1.8	NW13		
18-Nov	NW11	NNW12	NW11	NW10	NW11	NW10	NW9	NW10	NW10	NW10	NNW10	NNW11	NW10	NW12	NW14	NNW14	NNW14	NW10	NW11	NW11	NW10	NW9	NW8	NW8	NW8	NW10.4	NNW14	
19-Nov	WNW8	NW7	NW6	NW6	NW5	NW6	NW7	NW6	NW5	W6	WSW7	WSW4	SW5	SW7	SW5	S4	SSE5	SSE5	SSE5	SSE5	SSE6	SE5	SSE7	SSE9	WSW2.4	SSE9		
20-Nov	SSE8	SSE8	SE7	SSE8	SE8	SSE8	SSE9	SSE7	SE6	SE5	SSE5	SSE5	SSE5	SSE3	S2	N1	NW6	NW7	WNW8	WNW7	NW6	NW6	NW6	NW6	SSE1.5	SSE9		
21-Nov	N5	N6	N7	N8	N7	NNW8	NNW9	NNW9	NNW8	NNW8	NNW10	N11	NNW12	NNW8	NNW7	N5	NNE5	NE3	ENE5	NE8	NE8	ENE7	ENE7	ENE9	N6.4	NNW12		
22-Nov	E10	E10	E10	ESE10	ESE14	ESE13	ESE11	ESE9	E10	E11	E12	ENE10	ENE9	ENE9	ENE10	ENE9	ENE9	ENE4	ENE5	NE6	NNE5	NE6	ENE6	NE5	E8.3	ESE14		
23-Nov	ENE5	NE3	ENE3	E3	SE5	SSE4	SE4	SSE4	SSE7	S5	S3	W1	SSW1	NW3	N2	ENE1	SSE3	S4	S4	SE1	SSW2	SW2	WSW3	NW3	SSE1.6	SSE7		
24-Nov	NW4	NW5	NW7	NW6	NNW8	NNW10	NNW9	NNW8	NNW7	NNW8	NNW8	NNW7	N4	NNE3	NNE4	NNE3	ENE5	E5	E7	E6	E6	ESE5	ESE5	E6	N3.5	NNW10		
25-Nov	ENE6	ENE7	ENE9	ENE7	ENE6	NE6	NE5	N3	NNW3	NW3	NW5	NNW5	NNW6	NNW6	NNW8	NNW6	NNW3	WNW3	W2	WSW2	SW2	SW2	SSW2	SE1	N2.4	ENE9		
26-Nov	SSE3	SSE5	SSE6	S6	S6	S5	S5	S5	SSE4	SSE4	ESE5	SE5	SE6	SE6	ESE4	SE4	ESE4	SE1	N3	NNW5	NNW7	NW7	NNW8	NNW9	SSE1.6	NNW9		
27-Nov	NNW7	NNW9	N8	N7	N6	N6	N5	NNW4	NNW4	N6	N5	N6	NNE5	N6	N5	N5	N4	NNW3	NNW3	NNW3	N4	NNW3	N3	NNE4	N4.9	NNW9		
28-Nov	NNE5	NNE5	NE6	NE6	NNE6	NNE5	NNE5	NNE6	NNE6	NNE6	NNE6	NNE6	N6	N7	N6	NNW6	NW7	NNW8	NW6	NNW7	NW6	NW5	WNW6	NW5	N5.1	NNW8		
29-Nov	WNW6	WNW6	WNW6	WNW8	WNW8	W7	WNW10	WNW9	W10	WNW11	WNW11	WNW12	WNW13	WNW12	WNW12	WNW12	WNW12	WNW12	WNW12	WNW12	NW11	NW15	NNW15	NW15	NW13	NW12	WNW10.4	NNW15
30-Nov	NW11	NW12	NW13	NW13	NW12	WNW11	WNW11	WNW11	WNW11	WNW11	WNW12	WNW13	WNW12	WNW6	SSW2	WNW4	SE1	SSW6	SW12	SW16	WSW11	SW16	SW10	SW12	SW11	W8.4	SW16	

NNW3.2	NW3.4	NW2.9	NW2.9	NW2.7	NW2.3	NW2.3	NW2.2	NW1.8	NW2.1	NW3.0	NW3.6	NW4.2	NW4.5	WNW4.6	NNW3.7	NW3.3	NW3.4	NW3.5	NW4.0	NW4.1	NW3.4	NW3.1	NW2.7	Diurnal Average	
NNW15	SSE15	SSE18	NW18	NNW19	NNW18	SSE17	SSE20	SSE22	SSE23	S21	SSE18	NNW17	NNW17	NNW15	NNW16	NNW14	NNW13	SW16	NNW16	SW16	NNW16	NW15	NW16	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 - November 2014

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 6 km/h on Nov 7 04:00	Hours of Data: 711
Minimum Value: 1 km/h on Nov 9 07:00	Hours of Missing Data: 9
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 6	Hours of Calibration: 0
	Percent Operational Time: 98.8

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

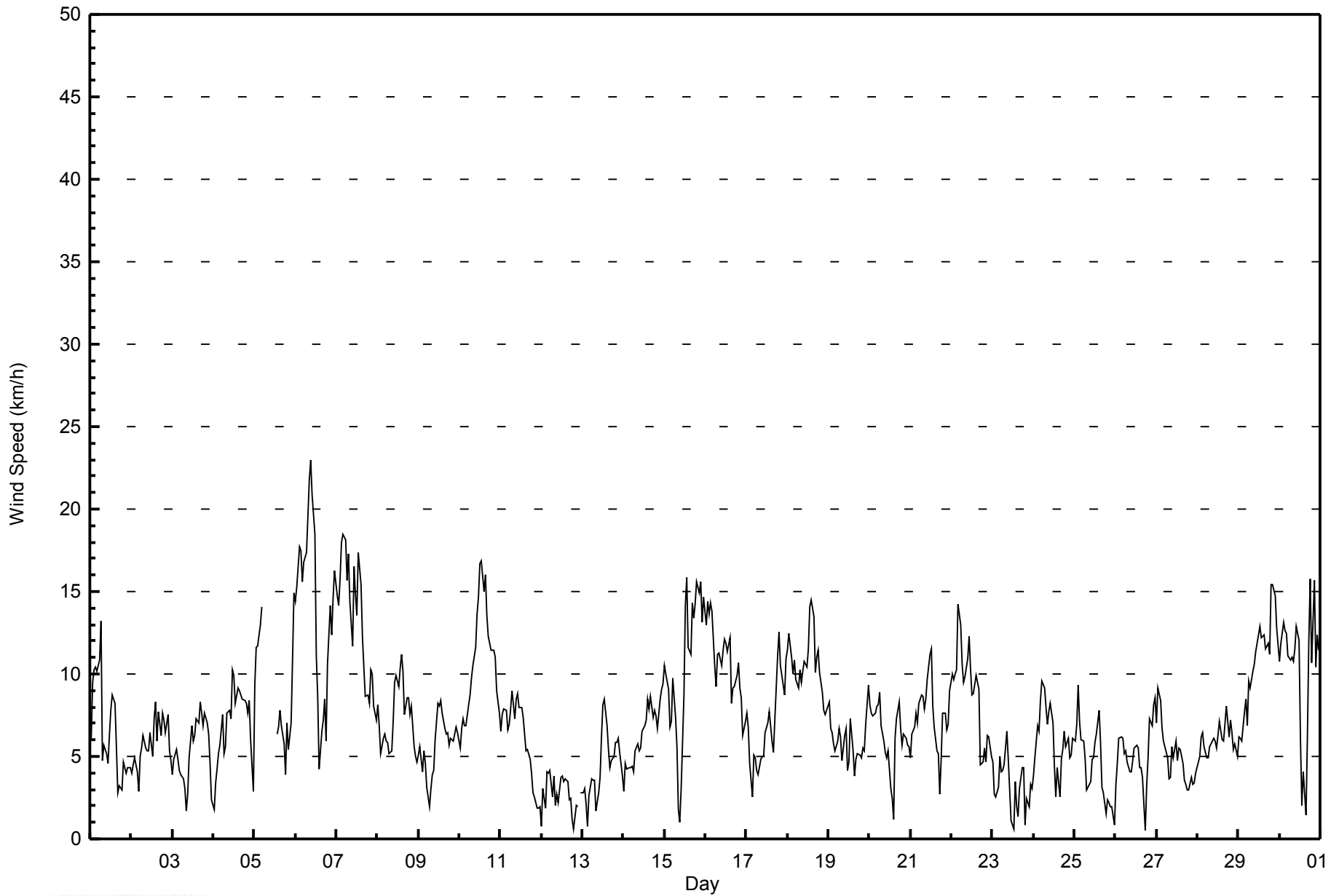
Diurnal Maximum

AF - Analyzer Failure



WBEA
Hourly Averages

Wind Speed (WS) - km/h
Anzac - November 2014





WBEA
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Anzac - November 2014

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	242	34.04	34.04
6 - 11	370	52.04	86.08
12 - 19	95	13.36	99.44
20 - 28	4	0.56	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 711

Total Number of Hours: 720



WBEA
Frequency Distribution

Wind Speed (WS) - km/h
Anzac - November 2014

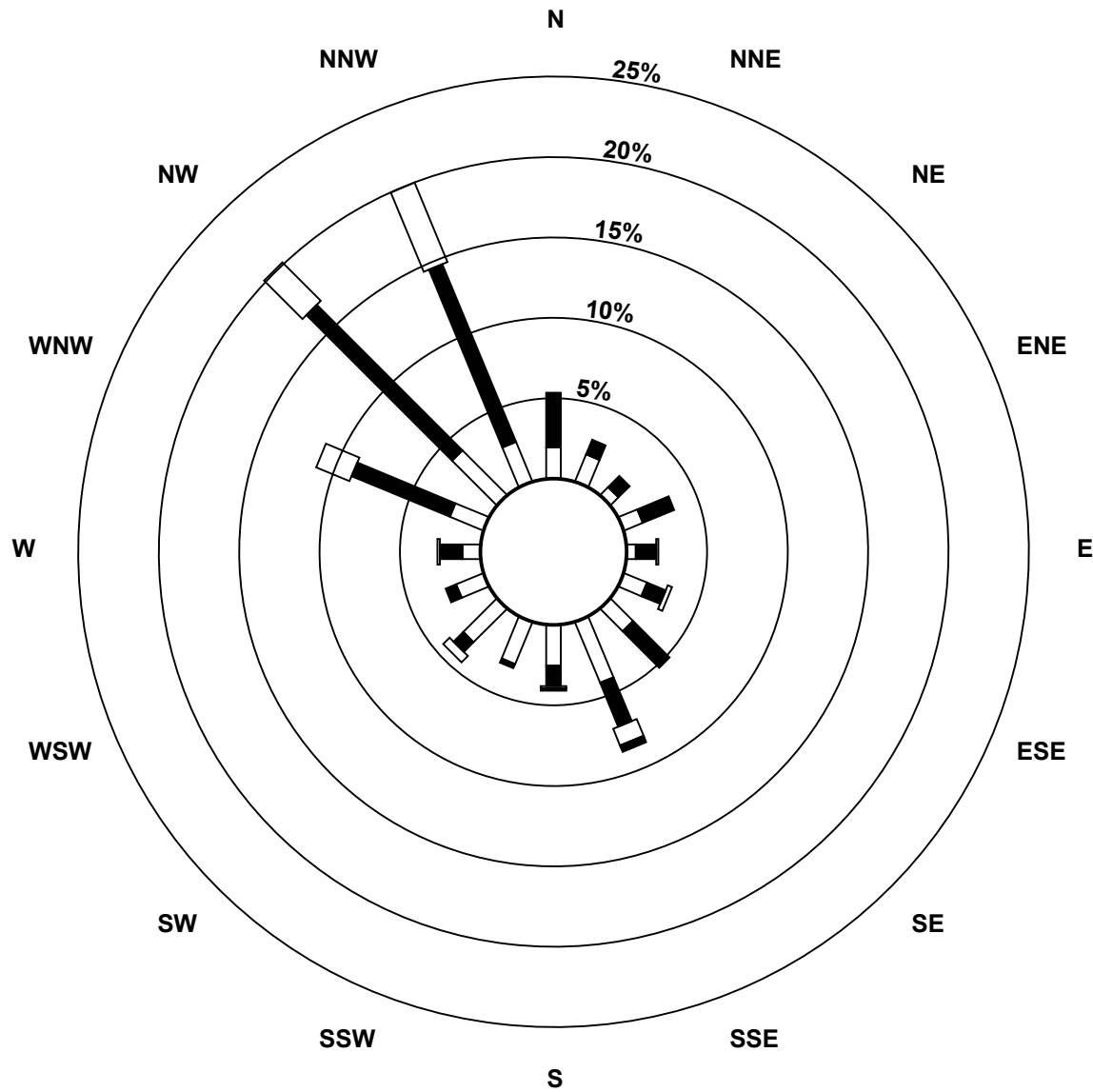
Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	14	13	5	9	4	11	14	29	18	20	21	13	8	16	28	19	242
6 - 11	24	7	7	15	9	9	23	21	9	2	6	5	10	47	91	85	370
12 - 19	0	0	0	0	1	2	0	8	1	0	4	0	1	16	24	38	95
20 - 28	0	0	0	0	0	0	0	3	1	0	0	0	0	0	0	0	4
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	38	20	12	24	14	22	37	61	29	22	31	18	19	79	143	142	711

Total Number of Valid Hours: 711

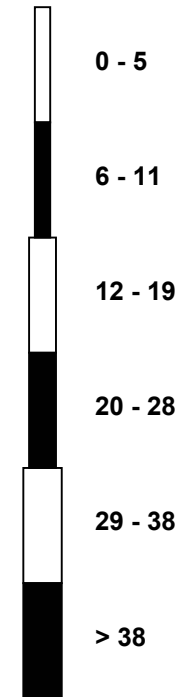
Total Number of Hours: 720

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

**Wind Speed (WS) - km/h
Anzac (AMS 14)**



Classes (km/h)



Total Number of Valid Hours: 711



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Anzac - November 2014

Direction of Maximum Speed: 162 deg on Nov 6 10:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 334.3 deg on Nov 7	Hours of Data: 711
Direction of Minimum Speed: 125 deg on Nov 26 18:00	Direction of Minimum Daily Speed Average: 1.5 deg on Nov 20
Direction of Minimum Speed: 125 deg on Nov 26 18:00	Hours of Missing Data: 9
Monthly Average Direction: 312.7 deg	Percent Operational Time: 98.8

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-Nov	296	300	295	296	296	299	277	257	257	267	257	280	291	295	292	257	232	192	229	200	214	207	226	223	273.7
2-Nov	214	219	226	221	198	176	174	175	168	173	157	160	158	134	149	140	137	141	154	162	154	131	160	164	162.9
3-Nov	158	148	144	154	127	97	127	181	230	342	324	329	317	310	306	312	314	316	325	340	349	358	21	76	332.3
4-Nov	79	121	123	159	129	103	111	113	130	119	115	120	128	129	133	129	131	137	144	146	151	151	172	197	132.1
5-Nov	289	293	295	288	298	AF	AF	AF	AF	AF	AF	AF	AF	310	316	318	310	316	237	225	211	167	163	171	--
6-Nov	165	162	161	154	149	150	148	152	160	162	171	165	184	174	197	169	198	223	259	290	304	315	319	323	175.5
7-Nov	324	325	323	326	334	338	334	330	336	342	328	336	330	328	334	342	341	343	347	345	346	354	352	352	334.3
8-Nov	346	358	355	347	336	330	318	333	324	319	324	328	317	327	333	332	325	314	307	310	322	320	302	299	326.2
9-Nov	312	328	328	306	321	310	298	308	319	324	328	347	329	352	349	349	335	344	346	348	357	353	348	348	336.9
10-Nov	329	321	328	321	314	316	315	308	313	321	328	328	329	328	332	337	337	331	337	338	337	333	340	336	328.4
11-Nov	319	324	339	336	333	327	329	338	344	344	327	313	325	321	343	329	311	304	292	283	331	56	129	111	328.7
12-Nov	64	344	227	222	251	259	270	252	208	192	187	290	283	282	259	256	217	173	190	228	222	186	AF	199	242.5
13-Nov	194	187	203	267	210	205	210	215	195	215	245	288	299	300	300	289	318	309	302	311	311	316	315	322	283.4
14-Nov	298	265	288	298	308	304	316	330	331	333	340	345	345	336	333	335	325	328	326	319	306	297	297	290	318.0
15-Nov	279	275	262	275	282	281	272	235	102	101	249	284	290	300	311	318	334	349	341	336	337	335	327	321	309.5
16-Nov	323	323	328	335	336	331	333	335	334	324	324	331	331	326	330	324	311	307	307	303	300	296	297	301	322.4
17-Nov	306	305	289	185	165	165	165	152	155	156	132	129	130	123	132	170	244	287	297	304	312	316	314	315	262.8
18-Nov	324	344	322	321	322	320	316	315	307	307	301	306	319	326	328	328	324	322	324	322	321	315	313	304	319.6
19-Nov	303	314	312	319	318	304	305	315	318	279	248	244	224	233	214	180	163	168	165	160	161	139	152	149	243.9
20-Nov	153	157	132	148	141	156	159	152	139	137	149	159	165	185	352	320	315	302	301	307	321	317	343	360	168.0
21-Nov	354	350	353	355	357	347	341	343	343	348	348	351	348	343	347	11	23	45	69	56	47	57	64	73	6.4
22-Nov	80	93	98	103	111	114	107	103	89	84	84	74	68	61	59	71	69	66	63	56	26	46	60	51	81.8
23-Nov	62	53	65	96	131	148	141	149	183	178	262	205	315	11	67	148	178	190	125	213	216	251	304	152.7	
24-Nov	320	304	321	310	328	328	330	338	331	335	331	341	353	15	30	63	81	79	90	96	116	105	100	100	0.6
25-Nov	76	62	77	72	62	55	47	9	347	317	326	338	331	333	329	328	327	291	268	258	236	217	201	134	10.5
26-Nov	148	166	163	174	173	177	174	178	163	153	120	131	130	133	123	125	115	125	350	348	332	320	327	339	148.1
27-Nov	343	345	351	353	354	353	1	346	329	351	352	356	12	11	352	354	355	347	332	344	349	345	349	20	352.2
28-Nov	24	33	37	43	27	18	16	18	18	28	31	31	10	5	353	338	324	333	325	333	324	316	303	305	359.2
29-Nov	302	299	294	294	287	276	290	283	281	286	290	290	289	293	293	295	297	303	307	323	329	323	321	315	300.4
30-Nov	305	307	312	310	307	300	298	293	293	291	289	287	284	199	283	167	204	218	230	240	228	233	235	221	271.3

318.0 319.0 319.8 314.9 321.0 317.2 308.7 308.1 313.0 314.4 314.2 322.2 319.6 323.5 327.8 328.3 323.2 311.0 309.0 317.2 317.6 322.4 316.0 315.8
 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

Anzac - November 2014

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 96 deg on Nov 23 13:00	Hours of Data: 711
Minimum Value: 9 deg on Nov 2 03:00	Hours of Missing Data: 9
Percentiles: P ₁ = 12 P ₁₀ = 16 Q ₁ = 17 Median = 20 Q ₃ = 24 P ₉₀ = 32 P ₉₉ = 78	Hours of Calibration: 0
	Percent Operational Time: 98.8

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-Nov	20	21	21	21	24	25	26	61	19	21	26	35	28	25	23	26	44	47	24	13	13	12	20	13	61
2-Nov	10	13	9	15	27	16	10	9	11	20	21	21	28	17	16	18	14	13	19	20	20	17	29	21	29
3-Nov	23	14	16	18	22	26	23	28	25	18	19	17	21	21	19	19	19	20	20	16	18	18	30	63	63
4-Nov	81	42	32	23	29	23	24	27	24	26	22	20	21	23	21	23	25	22	21	21	20	18	38	39	81
5-Nov	29	26	26	28	25	AF	AF	AF	AF	AF	AF	AF	AF	19	20	20	25	25	47	19	20	22	19	19	47
6-Nov	18	18	17	17	19	18	20	19	19	18	19	19	37	29	26	17	24	14	29	26	22	19	19	19	37
7-Nov	19	18	19	18	18	18	19	17	19	16	18	18	19	18	19	18	18	16	16	16	16	17	18	16	19
8-Nov	16	18	20	19	21	21	21	18	16	19	20	18	22	24	18	18	16	18	19	18	15	18	19	19	24
9-Nov	17	14	17	15	17	26	32	15	18	21	26	20	22	21	22	15	15	17	16	13	11	13	13	14	32
10-Nov	16	15	16	19	18	20	20	21	20	20	18	18	16	17	17	17	16	17	16	17	16	16	17	16	21
11-Nov	18	17	18	16	17	17	17	17	20	18	22	23	25	23	22	22	22	24	28	36	37	49	50	46	50
12-Nov	79	29	84	33	34	33	50	23	40	41	55	40	46	54	46	33	22	48	69	75	50	79	AF	27	84
13-Nov	25	13	29	59	22	16	19	18	27	14	30	30	24	23	21	21	13	16	19	16	16	18	16	14	59
14-Nov	22	16	25	29	23	19	22	17	16	17	17	17	18	22	19	19	16	15	18	22	24	24	28	29	29
15-Nov	28	27	25	31	28	25	30	20	65	85	76	40	30	24	22	19	17	17	17	17	16	17	18	20	85
16-Nov	20	17	17	17	18	18	17	16	16	19	18	18	18	18	17	16	20	21	21	20	20	23	22	24	24
17-Nov	21	22	29	28	15	15	12	15	16	23	23	22	14	20	13	21	37	21	22	22	20	18	17	19	37
18-Nov	16	16	17	18	16	19	19	18	20	21	21	22	20	19	17	16	17	17	17	16	18	19	21	22	22
19-Nov	23	20	20	19	21	24	23	21	31	31	36	58	43	24	32	22	13	17	22	18	17	15	19	17	58
20-Nov	17	20	21	22	19	21	18	19	21	21	24	21	32	31	76	22	19	23	21	25	17	19	18	15	76
21-Nov	16	15	15	15	16	17	18	17	16	18	18	18	17	19	23	22	17	44	20	21	19	20	17	20	44
22-Nov	20	24	23	24	23	23	24	25	22	22	20	24	22	24	22	20	20	22	26	24	20	21	19	20	26
23-Nov	21	21	27	27	16	25	19	17	19	28	40	81	96	35	50	53	28	12	12	69	16	27	31	28	96
24-Nov	34	25	18	18	18	16	16	18	19	18	21	19	34	68	32	37	15	15	15	22	22	23	28	25	68
25-Nov	24	23	19	20	23	19	19	31	22	24	21	24	24	24	17	16	16	28	38	17	18	15	52	70	70
26-Nov	23	20	13	16	19	21	22	21	17	19	28	18	19	23	34	21	32	94	19	16	16	19	17	18	94
27-Nov	17	17	16	14	12	14	15	24	24	15	18	18	26	23	17	13	9	18	22	19	20	18	16	24	26
28-Nov	22	24	23	22	20	19	18	21	20	21	24	27	19	18	16	16	17	16	18	17	17	18	20	25	27
29-Nov	23	23	23	22	24	21	24	26	25	26	30	29	28	31	29	25	26	23	22	19	18	18	18	21	31
30-Nov	22	19	20	20	23	25	25	25	25	26	24	23	39	56	35	48	17	16	15	20	17	19	19	15	56
	81	42	84	59	34	33	50	61	65	85	76	81	96	68	76	53	44	94	69	75	50	79	52	70	

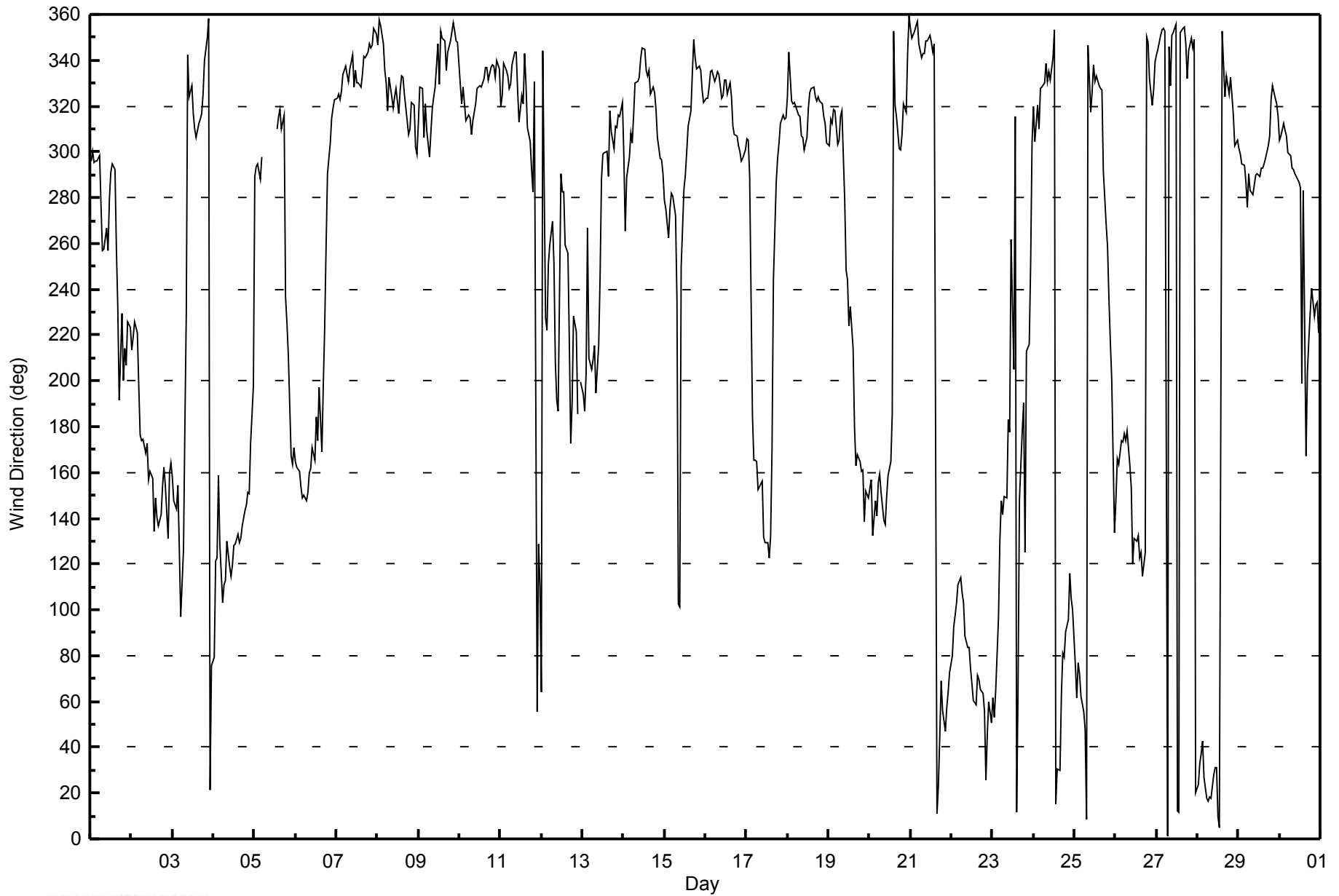
Diurnal Maximum

AF - Analyzer Failure



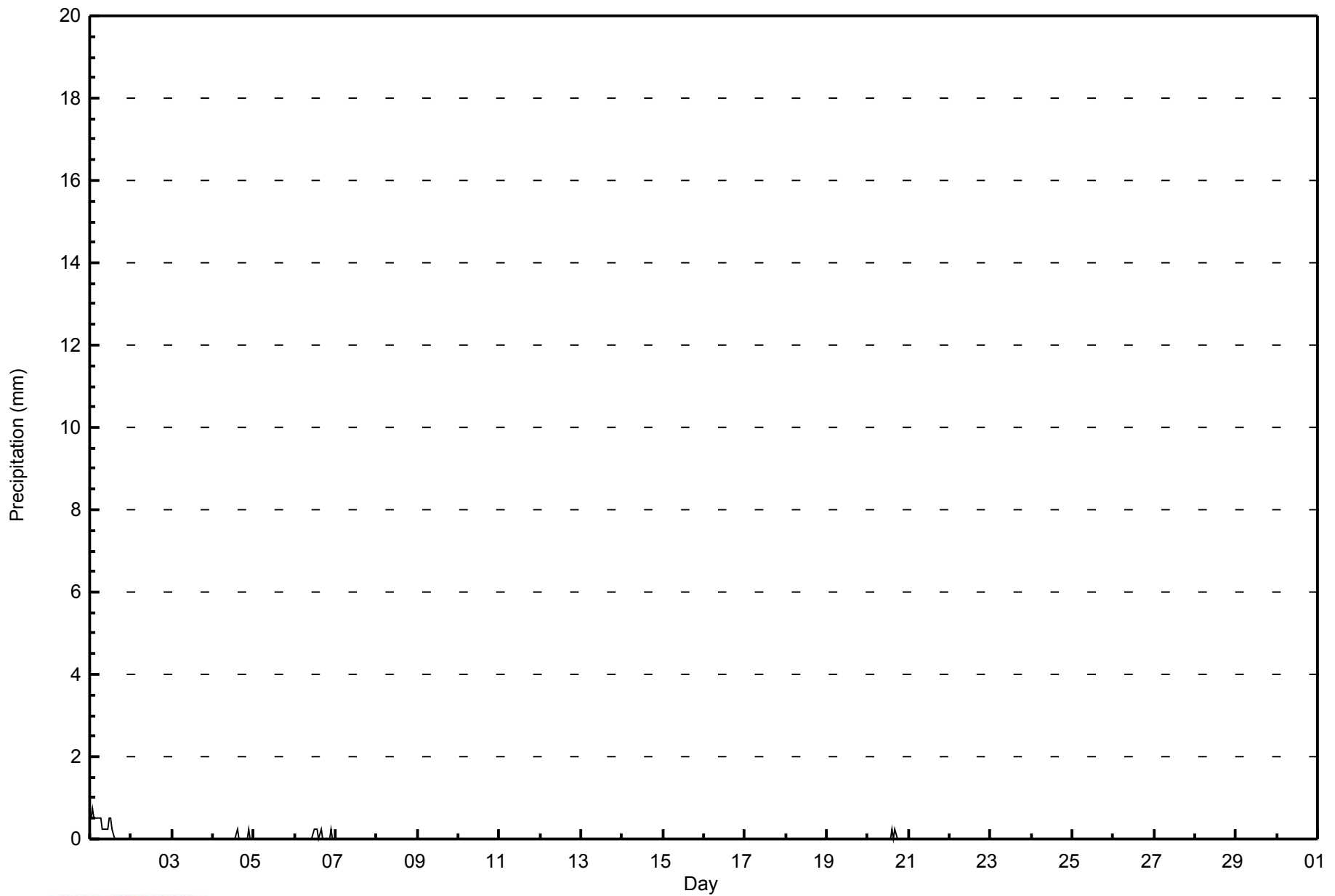
WBEA
Hourly Averages

Wind Direction (WD) - deg
Anzac - November 2014





Maximum Value: 0.8 mm on Nov 1 02:00																			Maximum Daily Total: 6.1 mm on Nov 1																			Hours in Service: 720	
Minimum Value: 0.0 mm on Nov 1 15:00																			Minimum Daily Total: 0.0 mm on Nov 2																			Hours of Data: 720	
Maximum Diurnal Total: 0.8 mm at hour 2																			Minimum Diurnal Total: 0.0 mm at hour 18																			Hours of Missing Data: 0	
Monthly Total: 8.38 mm																			Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 0.5																			Hours 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-Nov	0.5	0.8	0.5	0.5	0.5	0.5	0.5	0.3	0.3	0.3	0.3	0.5	0.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.1	0.8													
2-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	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	0.0	0.0	0.5	0.3													
5-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	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	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	1.3	0.3													
7-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0													
15-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	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	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.3													
21-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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		0.5		0.5		0.3		0.3		0.0		0.0		0.0		Diurnal Average														
	0.5		0.8		0.5		0.5		0.5		0.5		0.3		0.3		0.3		0.0		0.0		0.3		Diurnal Maximum														





Wood Buffalo Environmental Association

SO₂ Calibration Report

Station Information

Calibration Date	November 4, 2014	Previous Calibration	October 15, 2014
Station Name	Anzac	Station Number	AMS 14
Reason:	Routine		
Start Time (MST)	9:26	End Time (MST)	13:12
Barometric Pressure	n/a mmHg	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	8400311
Cal Gas Concentration	51 ppm	Cal Gas Expiry Date	5/29/2014
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	803	803
Calculated slope	0.996989	0.996356	Chamber temp.	44.4	44.4
Calculated intercept	-0.220165	0.384907	Pressure (mmHg)	685.0	685.0
Analyzer Background	12.4	12.4	Flow (lpm)	0.390	0.390
Analyzer Coefficient	0.930	0.930	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	802.0	0.996
calibrator zero	5000	0.0	0.0	0.2	NA
high point	5000	78.3	798.7	802.0	0.996
second point	5000	39.1	398.8	398.0	1.002
third point	5000	19.6	199.9	200.8	0.996
calibrator zero	5000	0.0	0.0	0.9	NA
as left zero	5000	0.0	0.0	0.9	NA
as left span	5000	78.3	798.7	800.2	0.998
Average Correction Factor					0.998

Corrected As found 801.8 Previous response 801.3 % change -0.1%

Notes:

no adjusted or maintenance done, filter changed out

Calibration Performed By:

Melissa Lemay



Wood Buffalo Environmental Association

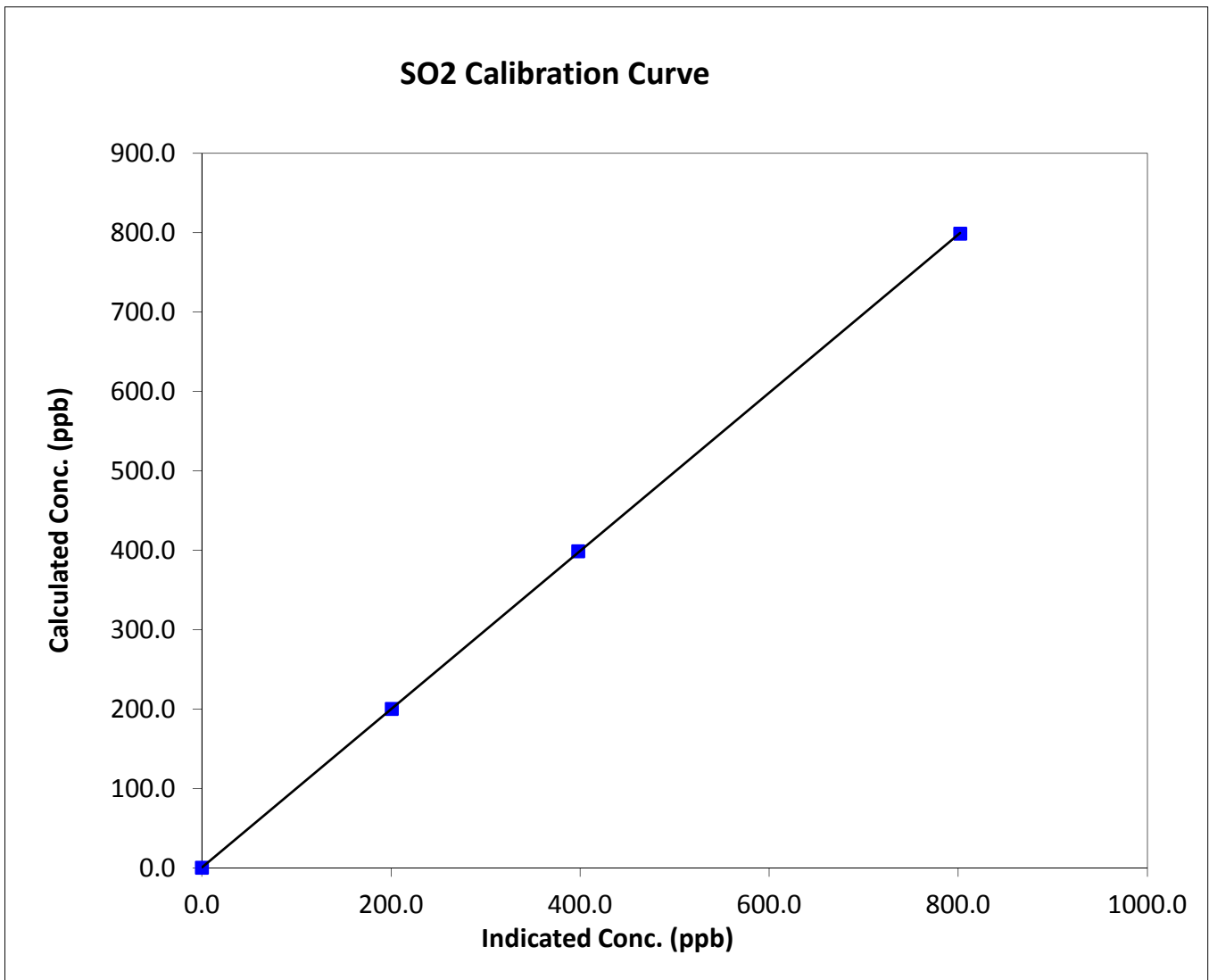
SO₂ Calibration Summary

Station Information

Calibration Date	November 4, 2014	Previous Calibration	October 15, 2014
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	9:26	End Time (MST)	13:12
Analyzer make	TEI 43C	Analyzer serial #	613516095

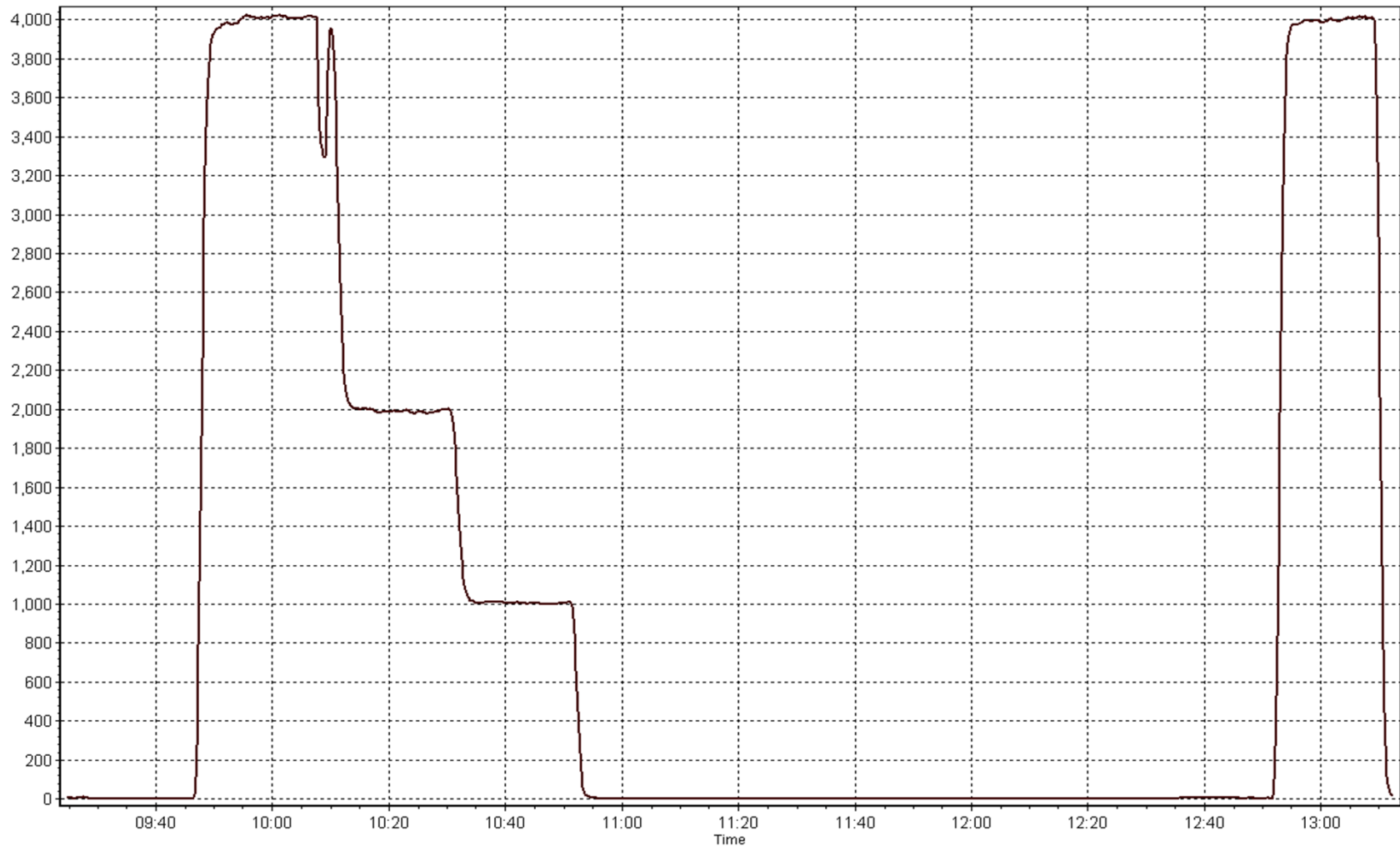
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	N/A	Correlation Coefficient	0.999986
798.7	802.0	0.9958		
398.8	398.0	1.0021	Slope	0.996356
199.9	200.8	0.9956		
			Intercept	0.384907



SO2 Calibration Plot

Date: November 4, 2014





Wood Buffalo Environmental Association

TRS Calibration Report

Station Information

Calibration Date	November 5, 2014	Previous Calibration	October 14, 2014
Station Name	Anzac	Station Number	AMS 14
Reason:	Routine		
Start Time (MST)	10:55	End Time (MST)	13:12
Barometric Pressure	732 mmHg	Station temp.	22
Calibrator Make/Model	Sabio 4010	Serial number	8400311
Cal Gas Concentration	9.6 ppm H2S	Cal Gas Expiry Date	2/22/2016
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	990	990
Calculated slope	0.992783	0.990845	Chamber temp.	45	45
Calculated intercept	0.073757	-0.012900	Pressure	662	662
Analyzer Background	2.01	2.01	Flow	0.396	0.396
Analyzer Coefficient	1.118	1.118	Intensity	98	98
			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	75.4	0.996
SO2 scrubber check	5000	39.1	398.8	0.2	NA
calibrator zero	5000	0.0	0.0	-0.5	NA
high point	5000	39.1	75.1	75.4	0.996
second point	5000	20.8	39.9	40.9	0.976
third point	5000	10.4	20.0	20.5	0.976
calibrator zero	5000	0.0	0.0	-0.4	NA
as left zero	5000	0.0	0.0	-0.4	NA
as left span	5000	39.1	75.1	75.6	0.994
Average Correction Factor					0.983

Corrected As found	75.8	Previous response	75.5	% change	-0.4%
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Notes:

scrubber checked before as lefts, filter change out, No maintenance and adjustments made

Calibration Performed By:

Melissa Lemay



Wood Buffalo Environmental Association

TRS Calibration Summary

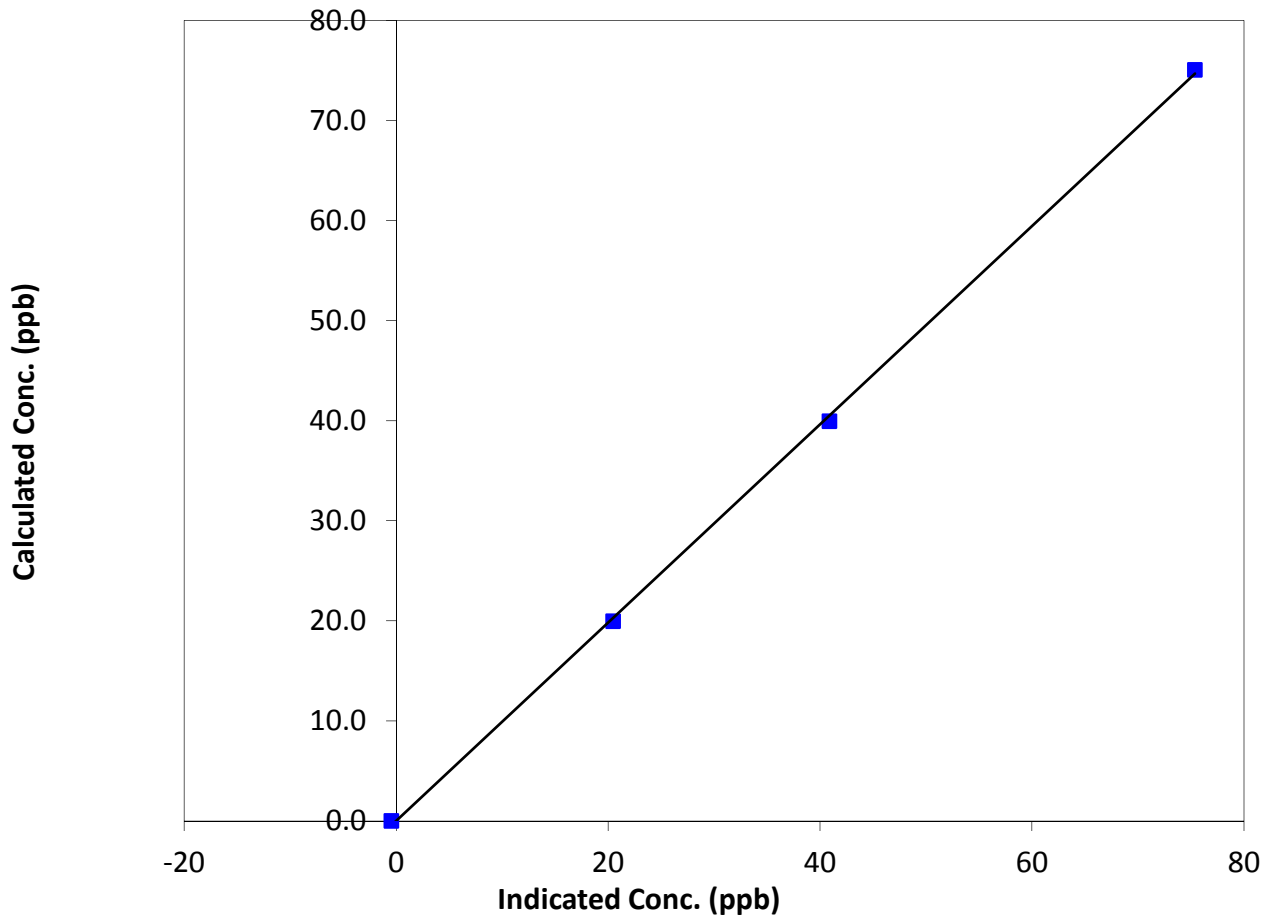
Station Information

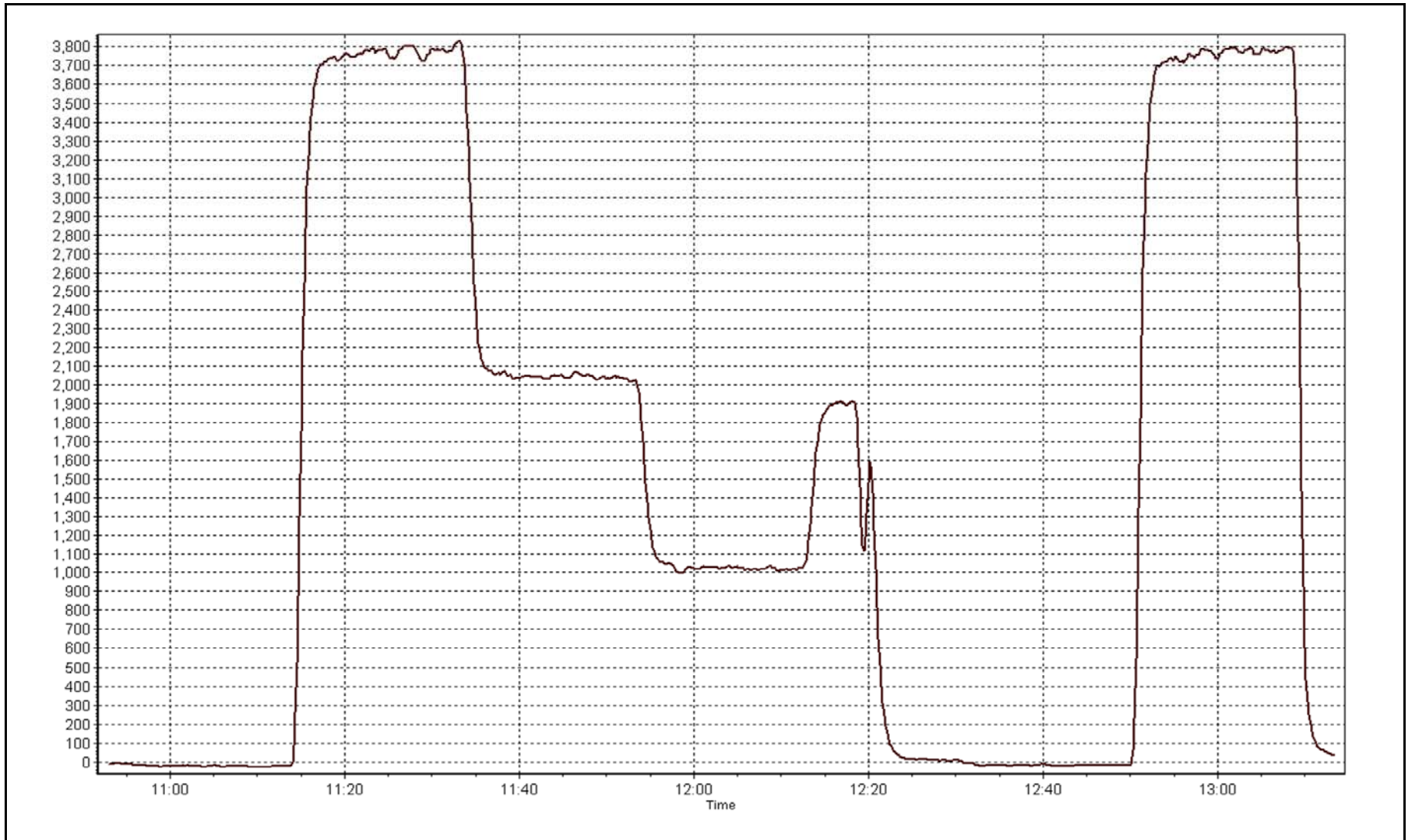
Calibration Date	November 5, 2014	Previous Calibration	October 14, 2014
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	10:55	End Time (MST)	13:12
Analyzer make	43i-TL	Analyzer serial #	1300156232

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.5	N/A	Correlation Coefficient	0.999741
75.1	75.4	0.9959		
39.9	40.9	0.9764	Slope	0.990845
20.0	20.5	0.9760		
			Intercept	-0.012900

TRS Calibration Curve







Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Station Information

Calibration Date	Tuesday, November 04, 2014	Prev Calibration	Wednesday, October 15, 2014
Station Name	Anzac	Station Number	AMS 14
Reason:	Routine		
Start Time (MST)	9:26	End Time (MST)	13:12
Barometric Pressure	n/a mmHg	Station temp.	21 Deg C
Calibrator Model	Sabio 4010	Serial Number	8400311
Gas Cert Reference	LL107928	Cal Gas Expiry Date	Thursday, May 29, 2014
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	34.5	34.5
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	1.000735	0.994529	Air Pressure	32.5	32.5
THC Calc intercept	0.014244	0.022145			
NMHC Calc slope	1.002017	0.994760			
NMHC Calc intercept	-0.009906	-0.001899			

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	16.79	0.994
calibrator zero	5000	0.0	0.00	0.00	N/A
high point	5000	78.3	16.69	16.79	0.994
second point	5000	39.1	8.34	8.30	1.004
third point	5000	19.6	4.18	4.19	0.997
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	16.70	1.000
Average Correction Factor					0.999

Corrected As found 16.79 Previous response 16.67 % change -0.7%

Notes:

Filter changed, No maintenance or adjustments done

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	8.84	0.994
calibrator zero	5000	0.0	0.00	0.00	N/A
high point	5000	78.3	8.79	8.84	0.994
second point	5000	39.1	4.39	4.39	0.999
third point	5000	19.6	2.20	2.23	0.986
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	8.79	0.999
Average Correction Factor					0.993

Corrected As found 8.84 Previous response 8.78 % 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	78.3	7.91	7.95	0.995
calibrator zero	5000	0.0	0.00	0.00	N/A
high point	5000	78.3	7.91	7.95	0.995
second point	5000	39.1	3.95	3.91	1.010
third point	5000	19.6	1.98	1.96	1.010
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	7.91	1.000
Average Correction Factor					

Corrected As found 7.95 Previous response 7.89 % change -0.8%



Wood Buffalo Environmental Association

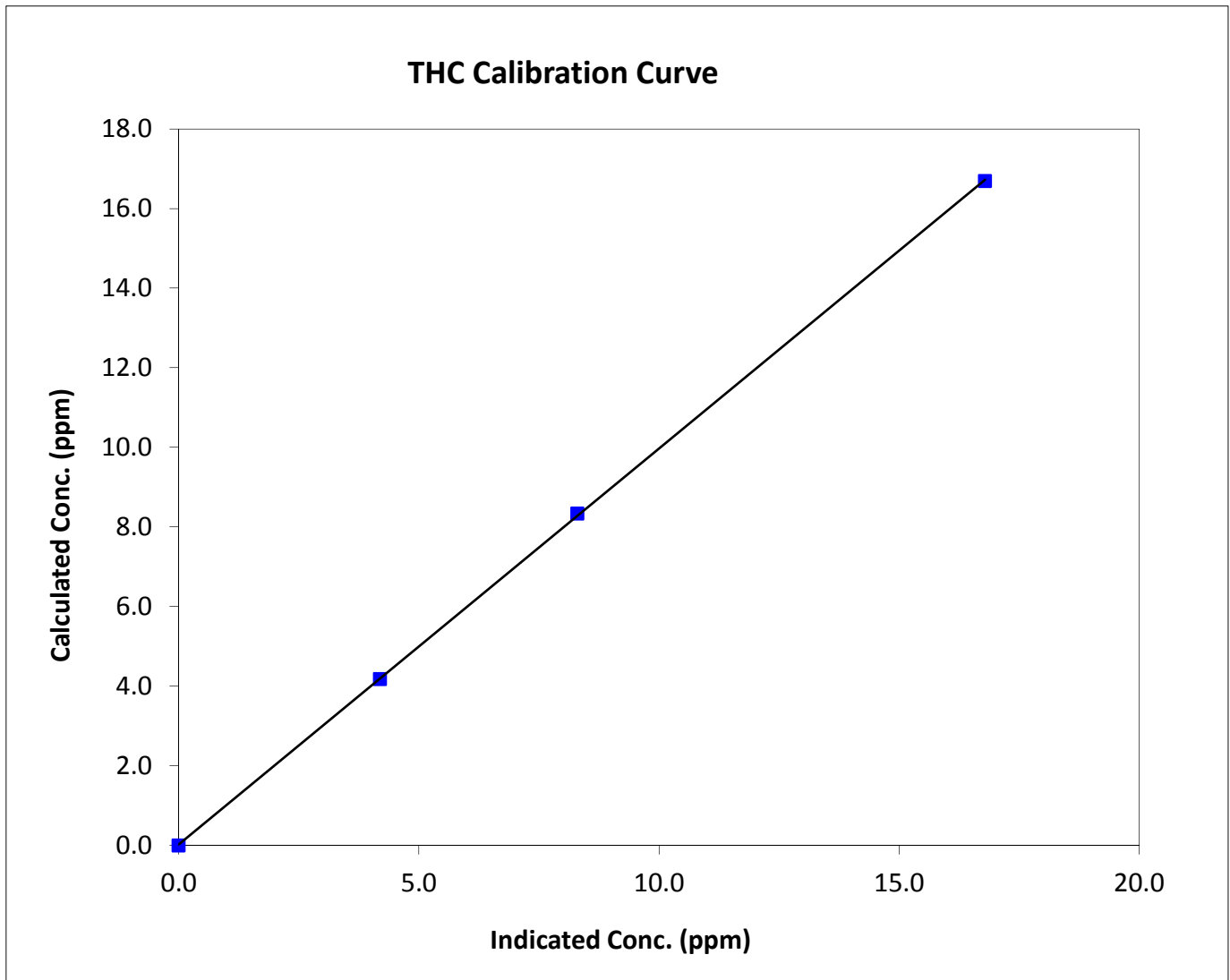
THC Calibration Summary

Station Information

Calibration Date	November 4, 2014	Previous Calibration	October 15, 2014
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	9:26	End Time (MST)	13:12
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	0.999968
16.69	16.79	0.9943		
8.34	8.30	1.0044	Slope	0.994529
4.18	4.19	0.9973		
			Intercept	0.022145





Wood Buffalo Environmental Association

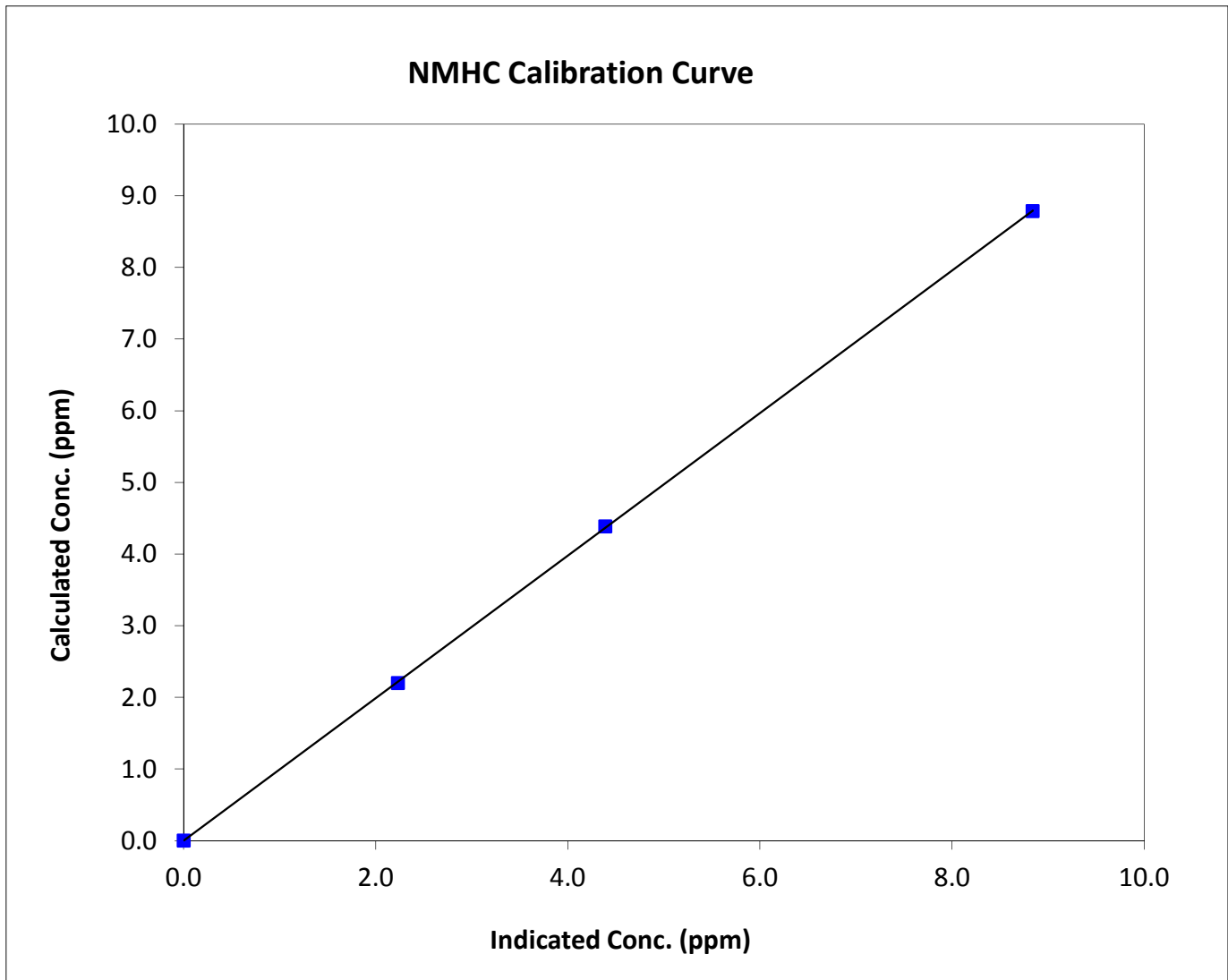
NMHC Calibration Summary

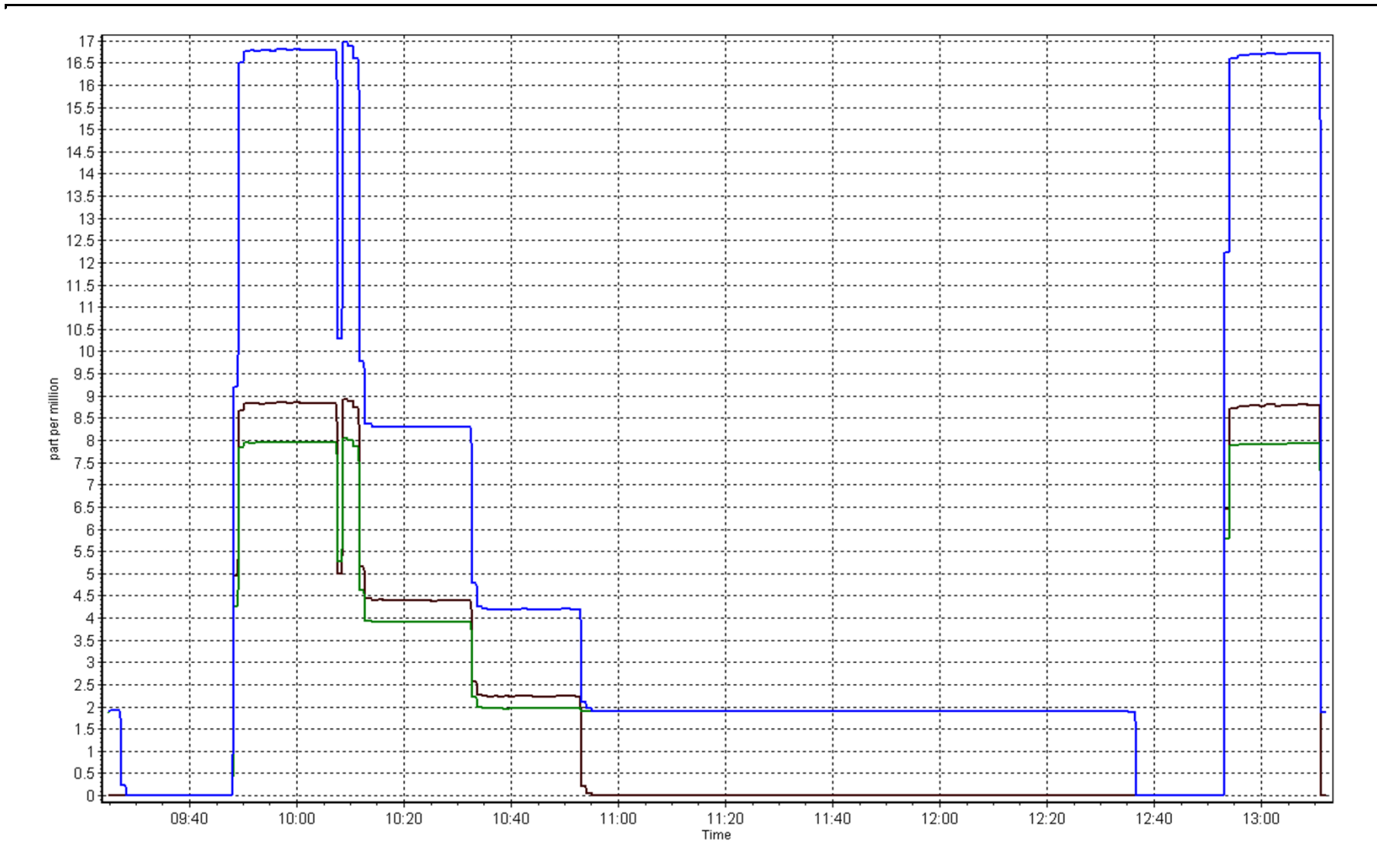
Station Information

Calibration Date	November 4, 2014	Previous Calibration	October 15, 2014
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	9:26	End Time (MST)	13:12
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	0.999980
8.79	8.84	0.9938		
4.39	4.39	0.9993	Slope	0.994760
2.20	2.23	0.9862		
			Intercept	-0.001899







Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

Calibration Date	November 6, 2014	Previous Calibration	October 15, 2014
Station Name	Anzac	Station Number	AMS 14
Reason:	Routine		
Start Time (MST)	11:35	End Time (MST)	13:30
Barometric Pressure	732 mmHg	Station temp.	23 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	8400311
NO2 calibration used	Tuesday, November 04, 2014	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.	29.4	29.4
Analyzer Range (input)	5000	5000	Lamp temp.	55.8	55.8
Calculated slope	0.986170	1.003564	Pressure	703.7	703.5
Calculated intercept	-0.838760	-0.469525	Flow cell A	0.875	0.821
Analyzer Background	0.3	0	Flow cell B	0.768	0.765
Analyzer Coefficient	1.032	1.051	Cell A Intensity	93001	84642
			Cell B Intensity	66728	65900

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	0.4	N/A
as found span	5000	1.19	409.2	405.6	1.009
calibrator zero	5000	0.00	0.0	0.2	N/A
high point	5000	1.19	409.2	407.9	1.003
second point	5000	0.85	280.2	280.0	1.001
third point	5000	0.50	146.2	146.4	0.999
calibrator zero	5000	0.00	0.0	0.1	N/A
as left zero	5000	0.00	0.0	0.1	N/A
as left span	5000	N/A	409.2	397.3	1.030
Average Correction Factor					1.001

Corrected As found 405.2 Previous response 415.8 % change 2.6%

Notes:

Cells A and B cleaned out, Readjusted lamp, blew mirrors for any dust. Zero and span adjusted, filter changed out

Calibration Performed By:

Melissa Lemay



Wood Buffalo Environmental Association

O₃ Calibration Summary

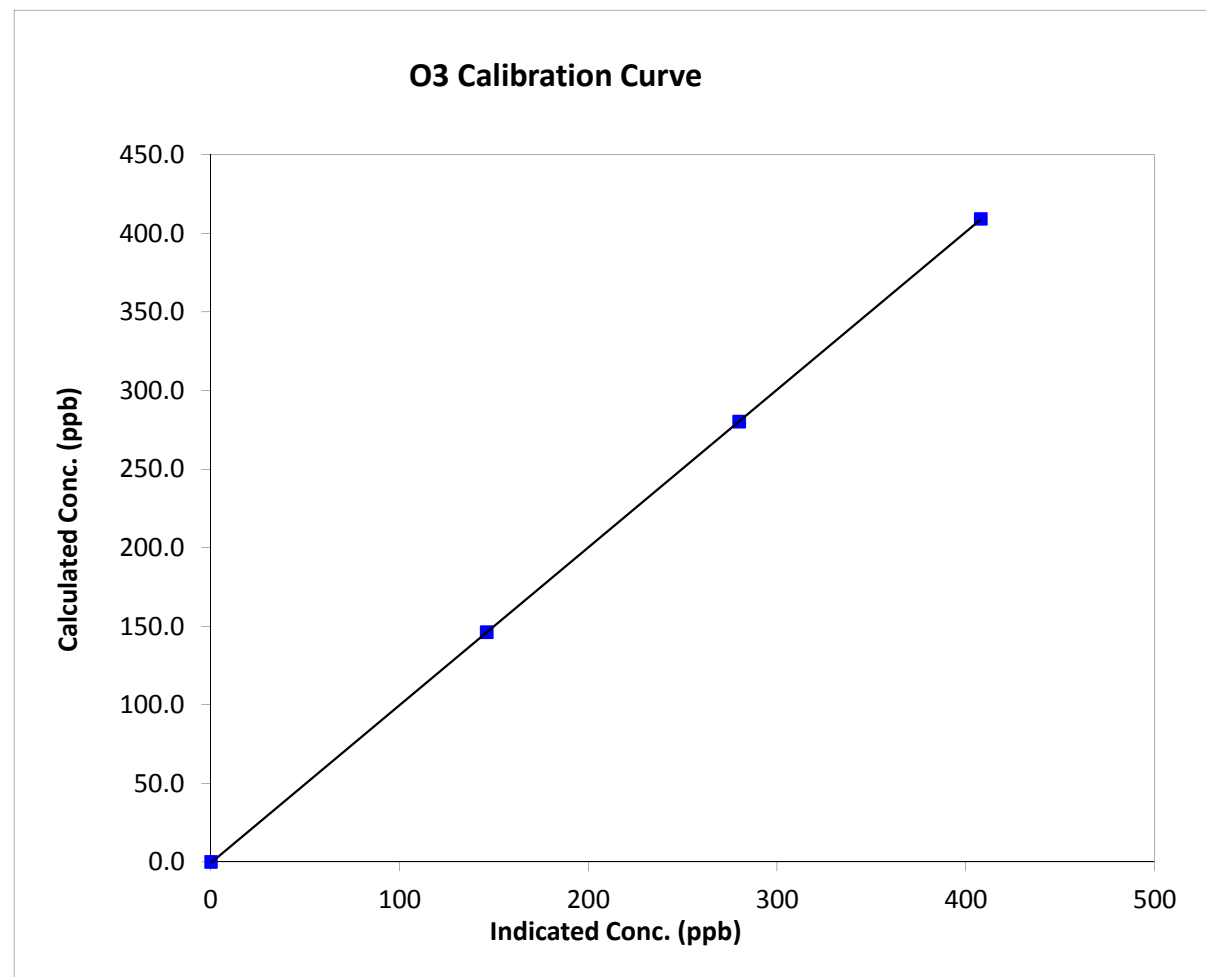
Station Information

Calibration Date	Thursday, November 06, 2014	Previous Calibration	October 15, 2014
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	11:35	End Time (MST)	13:30
Analyzer make	49C	Analyzer serial #	509110892

Calibration Data

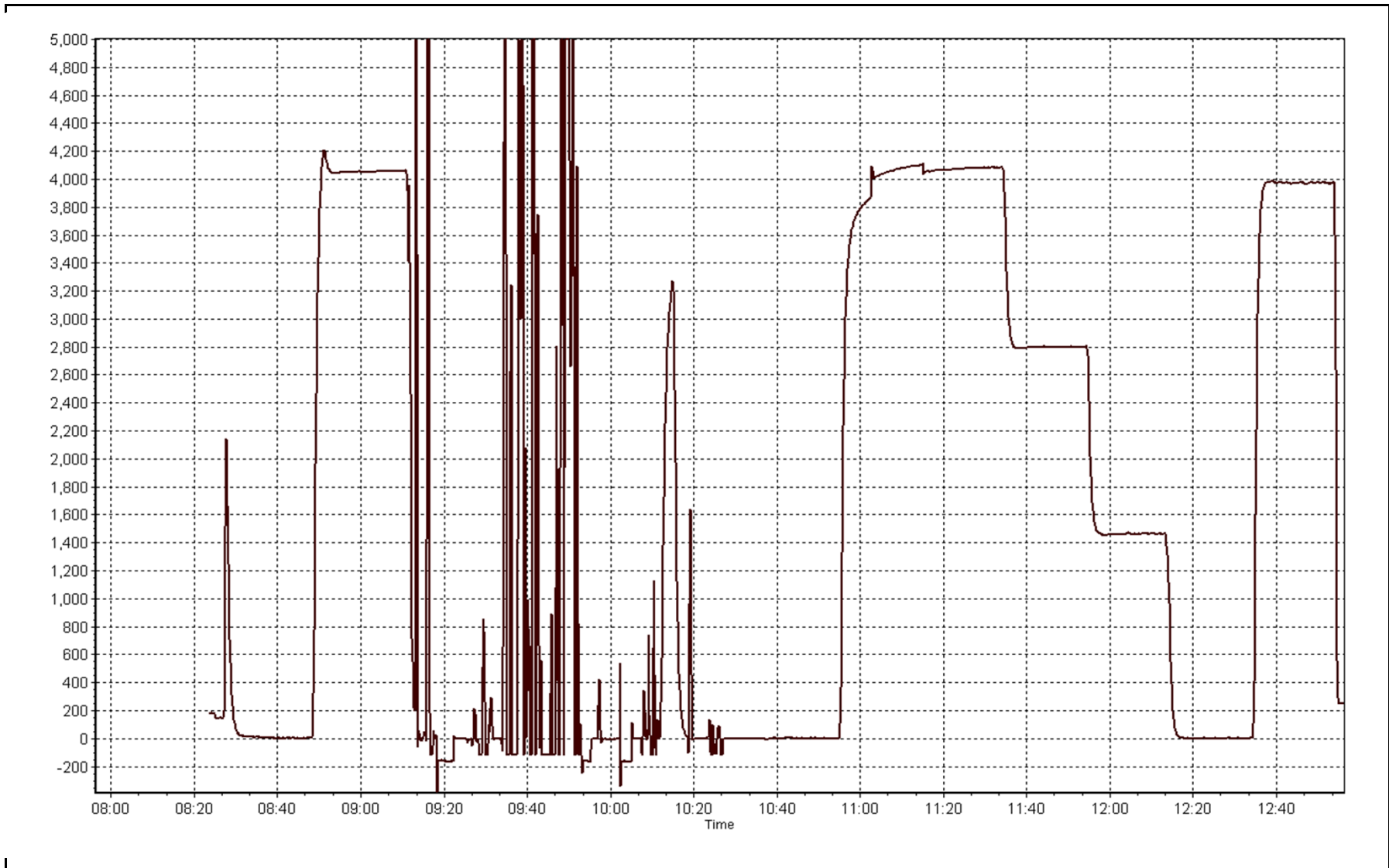
Calculated concentration (ppb) (C _c)	Indicated concentration (ppb) (I _c)	Correction factor (C _c /I _c)	Statistical Evaluation	
0.0	0.2	N/A	Correlation Coefficient	0.999996
409.2	407.9	1.0032		
280.2	280.0	1.0007	Slope	1.003564
146.2	146.4	0.9986		
			Intercept	-0.469525

O₃ Calibration Curve



O3 Calibration Plot

Date: November 6, 2014





Wood Buffalo Environmental Association

NO_x-NO-NO₂ Calibration Report

Station Information

Calibration Date	November 4, 2014	Previous Calibration	October 15, 2014
Station Name	Anzac	Station Number	AMS 14
Reason:	Rotine		
Start Time (MST)	9:26	End Time (MST)	13:11
Barometric Pressure	n/a 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	1.004459	1.002016	1.007718
	Data Offset	0.940203	1.255986	-0.612214
After	Data Slope	0.990950	0.989672	1.006528
	Data Offset	-0.084361	-0.058698	0.145652
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	0.921	ppb	0.921	ppb
NOx coefficient	0.997	ppb	0.997	ppb
NO2 coefficient	1.002	ppb	1.002	ppb
NO bkgrnd	14.5		14.5	
NOx bkgrnd	14.4		14.4	
Nt coefficient	n/a		n/a	
Chamber Temp	49.9	Deg C	49.9	Deg C
Moly Temp	318.0	Deg C	318.0	Deg C
PMT Temp	-2.7	Deg C	-2.7	Deg C
O3 flow	Ok	ccm	Ok	ccm
R Cell Press	202.4	mmHg	202.4	mmHg
Sample Flow	0.550	ccm	0.550	ccm

Notes:

Filter changed out, NO maintenance or adjustments done



Wood Buffalo Environmental Association

NO_x-NO-NO₂ Calibration Report

Station Information

Calibration Date:

November 4, 2014

Station Number:

AMS 14

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NO _x conc (ppb)	Calculated NO conc (ppb)	Calculated NO ₂ conc (ppb)	Indicated NO _x conc (ppb)	Indicated NO conc (ppb)	Indicated NO ₂ conc (ppb)	NO _x Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	1.1	1.0	0.0	N/A	N/A
as found span	5000	78.3	801.8	800.2	1.6	810.8	810.2	-0.4	0.9889	0.9877
calibrator zero	5000	0.0	0.0	0.0	0.0	1.1	1.0	0.0	N/A	N/A
high point	5000	78.3	801.8	800.2	1.6	810.8	810.2	-0.4	0.9889	0.9877
second point	5000	39.1	400.4	399.6	0.8	401.2	401.0	-0.5	0.9980	0.9965
third point	5000	19.6	200.7	200.3	0.4	202.0	201.8	0.0	0.9936	0.9926
calibrator zero	5000	0.0	0.0	0.0	0.0	1.1	1.0	0.0	N/A	N/A
as left zero	5000	0.0	0.0	0.0	0.0	1.1	1.0	0.0	N/A	N/A
as left span	5000	78.3	801.8	398.4	403.4	805.0	410.6	393.0	0.9960	0.9703
Average Correction Factor									0.9935	0.9923

Corrected As found

NO_x= 809.7

NO= 809.2

Percent Change

NO_x= -1.5%

NO= -1.5%

Previous Response

NO_x= 797.3

NO= 797.4

GPT Calibration Data

Dilution Flow

5000

ccm

Source Gas Flow

78.30

ccm

O ₃ Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO ₂ conc (ppb)	Indicated NO _x conc (ppb)	Indicated NO conc (ppb)	Indicated NO ₂ conc (ppb)	NO _x Correction factor	NO Correction factor	NO ₂ Correction factor	Converter Efficiency
Cal zero			0.0			0.0			N/A	
1st NO ₂ (300)	N/A	398.4	409.2	807.6	398.4	406.4	0.9775	1.0000	1.0069	99.3%
2nd NO ₂ (200)	N/A	527.4	280.2	806.6	527.4	278.4	0.9787	1.0000	1.0065	99.4%
3rd NO ₂ (100)	N/A	661.4	146.2	807.0	661.4	144.8	0.9782	1.0000	1.0097	99.0%
4th NO ₂ (0)	807.6	N/A	-1.4	806.2	807.6	-2.5	0.9792	1.0000	N/A	N/A
Average Correction Factor							0.9784	1.0000	1.0077	99.2%

Calibration Performed By:

Melissa Lemay



Wood Buffalo Environmental Association

NO_x Calibration Summary

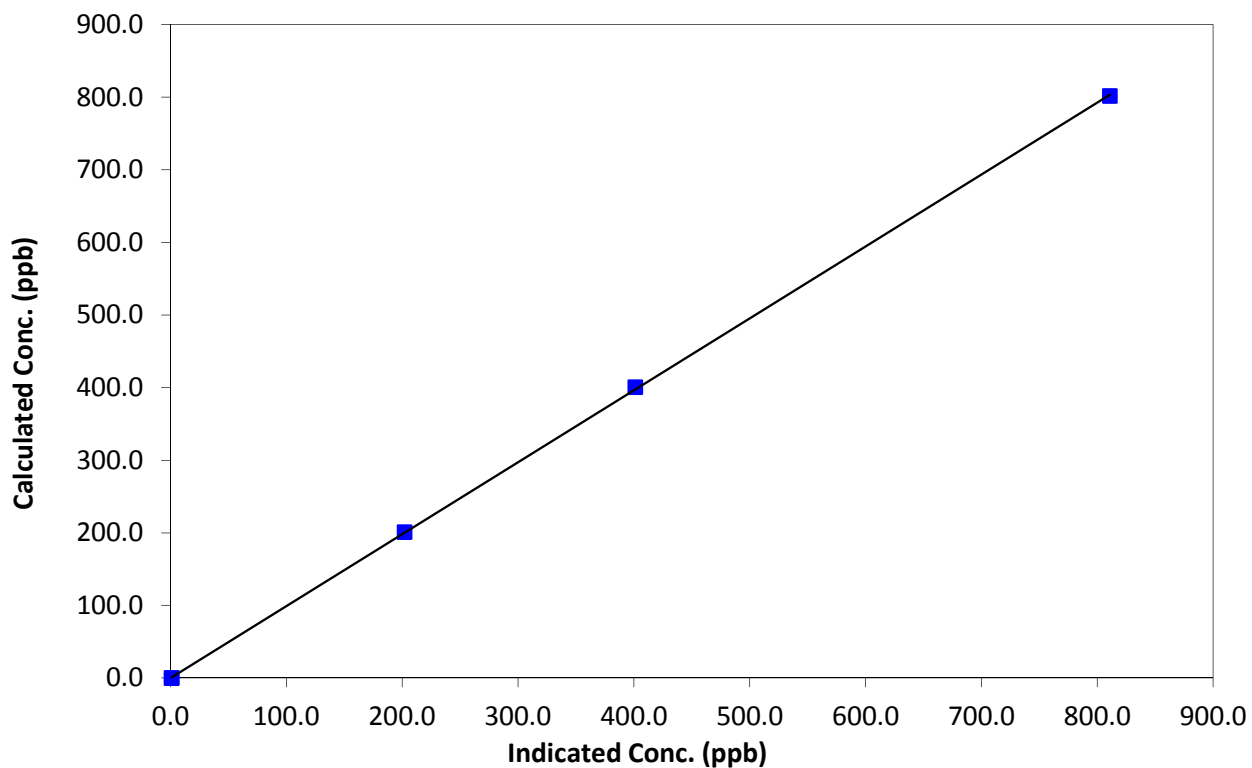
Station Information

Calibration Date	November 4, 2014	Previous Calibration	October 15, 2014
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	9:26	End Time (MST)	13:11
Analyzer make	42C	Analyzer serial #	509110890

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	1.1	N/A	Correlation Coefficient	0.999971
801.8	810.8	0.9889		
400.4	401.2	0.9980	Slope	0.990950
200.7	202.0	0.9936		
0.0	1.1	0.0000	Intercept	-0.084361

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

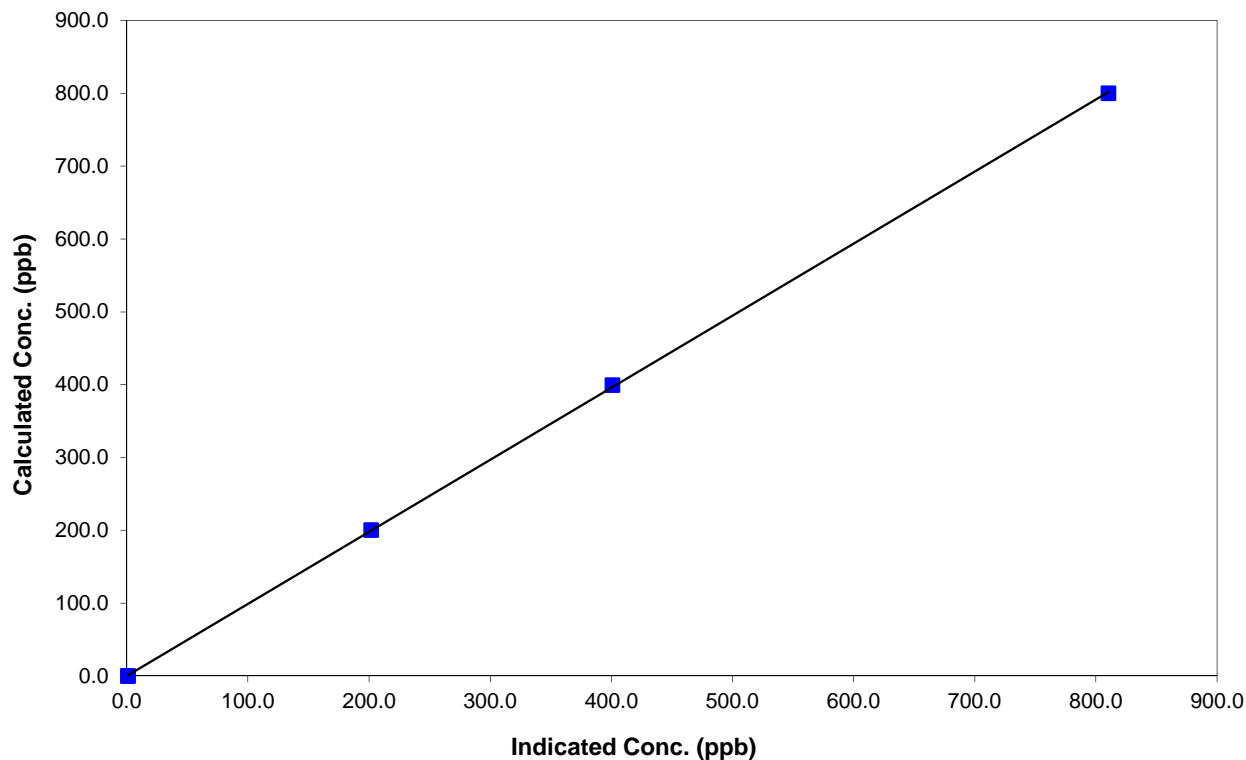
Station Information

Calibration Date	November 4, 2014	Previous Calibration	October 15, 2014
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	9:26	End Time (MST)	13:11
Analyzer make	42C	Analyzer serial #	509110890

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	1.0	N/A	Correlation Coefficient	0.999972
800.2	810.2	0.9877		
399.6	401.0	0.9965	Slope	0.989672
200.3	201.8	0.9926		
0.0	1.0	0.0000	Intercept	-0.058698

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

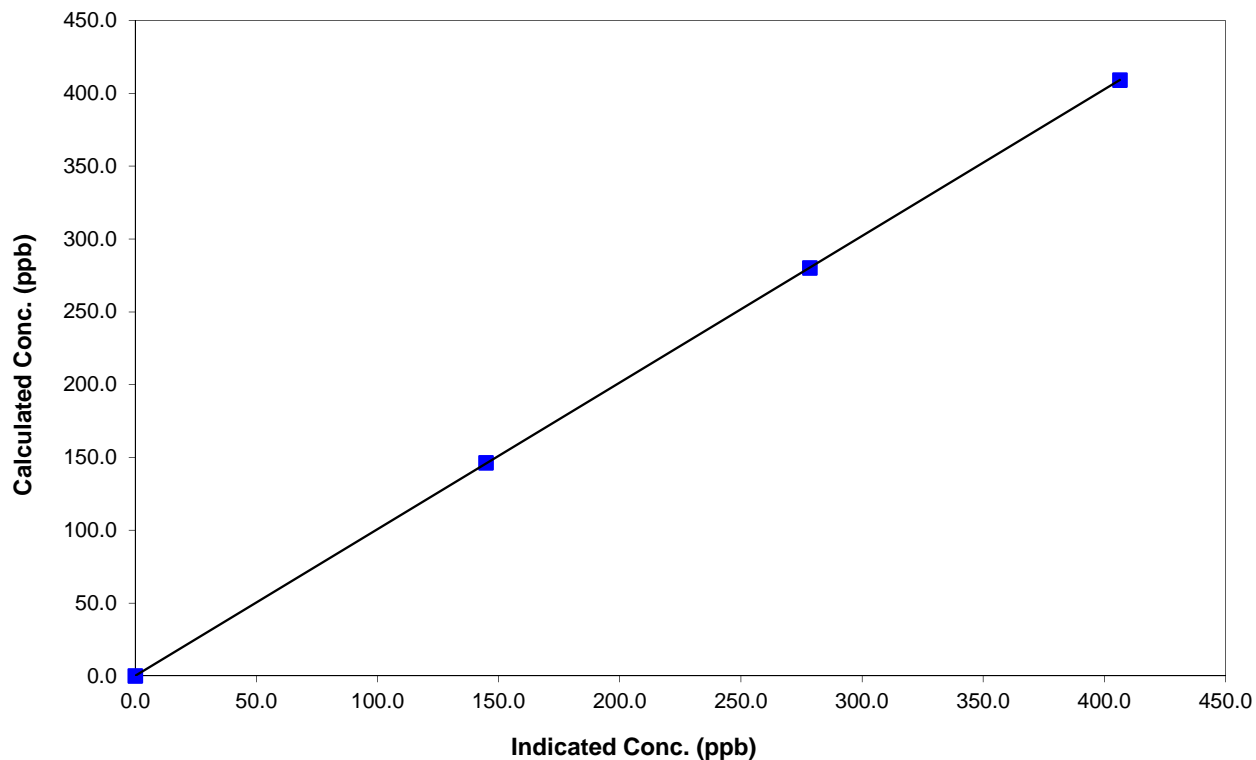
Station Information

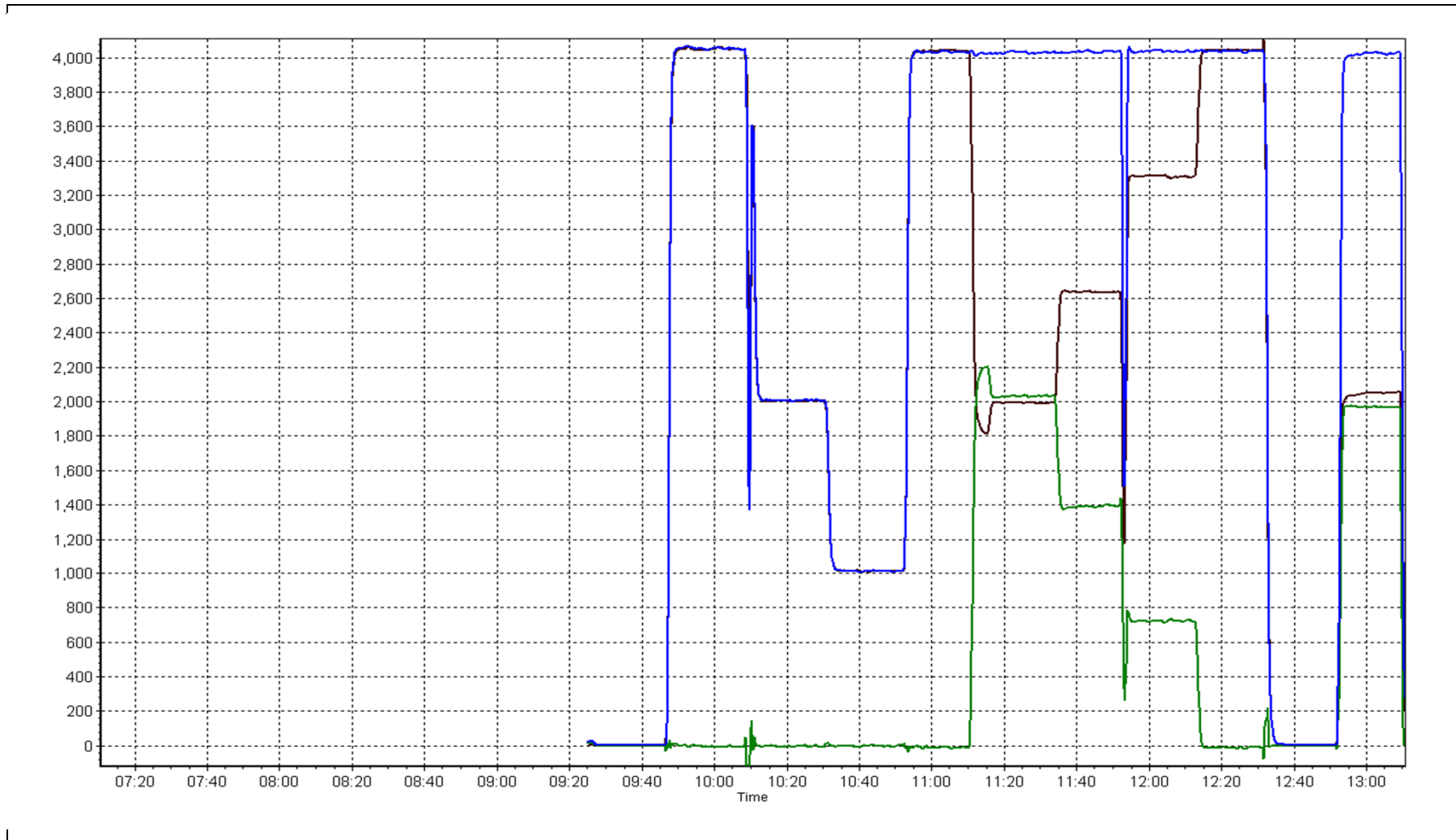
Calibration Date	November 4, 2014	Previous Calibration	October 15, 2014
Station Number	Anzac	Station Number	AMS 14
Start Time (MST)	9:26	End Time (MST)	13:11
Analyzer make	42C	Analyzer serial #	509110890

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999998
409.2	406.4	1.0069		
280.2	278.4	1.0065	Slope	1.006528
146.2	144.8	1.0097		
			Intercept	0.145652

NO₂ Calibration Curve





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 15
CNRL HORIZON
NOVEMBER 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

December 30, 2014

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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CNRL HORIZON (AMS 15)
NOVEMBER 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	657	34	63	95.97	9	0	1	0
TRS (ppb) Average	676	34	44	98.61	4	0	0	0
THC (ppm) Average	679	30	41	98.47	3.7	-	2.7	-
NO2 (ppb) Average	653	44	67	96.81	35	0	18	-
NO (ppb) Average	653	44	67	96.81	68	-	16	-
NOX (ppb) Average	653	44	67	96.81	95	-	34	-
PM2.5 (ug/m3) Average	715	0	5	99.31	37.3	-	13.5	0
Temperature 2 m (C) Average	715	0	5	99.31	9.6	-	2.7	-
Wind Speed 10 m (km/h) Average	714	0	6	99.17	25	-	-	-
Wind Direction 10 m (deg) Average	714	0	6	99.17	-	-	-	-
Precipitation (mm) Total	713	0	7	99.03	1.5	-	-	-
Relative Humidity (%) Average	715	0	5	99.31	99	-	-	-
Global Solar Radiation (W/m2) Average	695	0	25	96.53	235	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CNRL HORIZON (AMS 15)
NOVEMBER 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	657	0.5	1	-	0	0	0	0	0	1	9
TRS (ppb) Average	676	0.2	0	-	0	0	0	0	0	0	4
THC (ppm) Average	679	2.38	0.2	-	2	2.1	2.2	2.3	2.4	2.7	3.7
NO2 (ppb) Average	653	6.6	7	-	0	0	1	4	9	18	35
NO (ppb) Average	653	2.6	8	-	0	0	0	0	1	6	68
NOX (ppb) Average	653	9.1	13	-	0	0	1	4	11	25	95
PM2.5 (ug/m3) Average	715	4.43	4	-	0.2	1	1.8	3.3	5.5	9.8	37.3
Temperature 2 m (C) Average	715	-12.19	8.3	-	-30.2	-23.2	-18.1	-12.9	-5.9	-0.9	9.6
Wind Speed 10 m (km/h) Average	714	7.8	4	-	1	4	5	7	10	13	25
Wind Direction 10 m (deg) Average	714	-	-	-	-	-	-	-	-	-	-
Precipitation (mm) Total	713	-	-	7.11	0	0	0	0	0	0	1.5
Relative Humidity (%) Average	715	79.1	10	-	51	66	74	80	84	93	99
Global Solar Radiation (W/m2) Average	695	24.2	48	-	0	0	0	0	24	98	235

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CNRL HORIZON (AMS 15)
NOVEMBER 2014

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	05 Nov 2014 03:00	05 Nov 2014 05:00	3	Intermittent unstable operation - excessive baseline drift
SO2	05 Nov 2014 10:00	05 Nov 2014 12:00	3	Intermittent unstable operation - excessive baseline drift
SO2	05 Nov 2014 16:00	05 Nov 2014 18:00	3	Intermittent unstable operation - excessive baseline drift
SO2	05 Nov 2014 22:00	06 Nov 2014 01:00	4	Intermittent unstable operation - excessive baseline drift
SO2	06 Nov 2014 03:00	06 Nov 2014 05:00	3	Intermittent unstable operation - excessive baseline drift
SO2	07 Nov 2014 03:00	07 Nov 2014 06:00	4	Intermittent unstable operation - excessive baseline drift
SO2	20 Nov 2014 11:00	20 Nov 2014 17:00	7	Maintenance - conversion to standardized collection system
SO2	21 Nov 2014 13:00	21 Nov 2014 14:00	2	Maintenance - conversion to standardized collection system
TRS	20 Nov 2014 12:00	20 Nov 2014 19:00	8	Maintenance - conversion to standardized collection system
TRS	21 Nov 2014 13:00	21 Nov 2014 14:00	2	Maintenance - conversion to standardized collection system
THC	20 Nov 2014 11:00	20 Nov 2014 19:00	9	Maintenance - conversion to standardized collection system
THC	21 Nov 2014 13:00	21 Nov 2014 14:00	2	Maintenance - conversion to standardized collection system
NO2, NO, NOX	01 Nov 2014 03:00	01 Nov 2014 03:00	1	Intermittent unstable operation - NOx channel interference
NO2, NO, NOX	02 Nov 2014 03:00	02 Nov 2014 03:00	1	Intermittent unstable operation - NOx channel interference
NO2, NO, NOX	03 Nov 2014 03:00	03 Nov 2014 03:00	1	Intermittent unstable operation - NOx channel interference
NO2, NO, NOX	04 Nov 2014 03:00	04 Nov 2014 03:00	1	Intermittent unstable operation - NOx channel interference
NO2, NO, NOX	05 Nov 2014 03:00	05 Nov 2014 03:00	1	Intermittent unstable operation - NOx channel interference
NO2, NO, NOX	06 Nov 2014 03:00	06 Nov 2014 03:00	1	Intermittent unstable operation - NOx channel interference
NO2, NO, NOX	07 Nov 2014 03:00	07 Nov 2014 03:00	1	Intermittent unstable operation - NOx channel interference
NO2, NO, NOX	09 Nov 2014 03:00	09 Nov 2014 03:00	1	Intermittent unstable operation - NOx channel interference
NO2, NO, NOX	10 Nov 2014 03:00	10 Nov 2014 03:00	1	Intermittent unstable operation - NOx channel interference
NO2, NO, NOX	11 Nov 2014 03:00	11 Nov 2014 03:00	1	Intermittent unstable operation - NOx channel interference
NO2, NO, NOX	12 Nov 2014 03:00	12 Nov 2014 03:00	1	Intermittent unstable operation - NOx channel interference
NO2, NO, NOX	13 Nov 2014 03:00	13 Nov 2014 03:00	1	Intermittent unstable operation - NOx channel interference
NO2, NO, NOX	14 Nov 2014 03:00	14 Nov 2014 03:00	1	Intermittent unstable operation - NOx channel interference
NO2, NO, NOX	15 Nov 2014 03:00	15 Nov 2014 03:00	1	Intermittent unstable operation - NOx channel interference
NO2, NO, NOX	16 Nov 2014 03:00	16 Nov 2014 03:00	1	Intermittent unstable operation - NOx channel interference
NO2, NO, NOX	17 Nov 2014 03:00	17 Nov 2014 03:00	1	Intermittent unstable operation - NOx channel interference
NO2, NO, NOX	18 Nov 2014 03:00	18 Nov 2014 03:00	1	Intermittent unstable operation - NOx channel interference
NO2, NO, NOX	19 Nov 2014 03:00	19 Nov 2014 03:00	1	Intermittent unstable operation - NOx channel interference
NO2, NO, NOX	21 Nov 2014 13:00	21 Nov 2014 14:00	2	Maintenance - conversion to standardized collection system
NO2, NO, NOX	24 Nov 2014 11:00	24 Nov 2014 13:00	3	Maintenance - verified operation of the daily QA checks
PM2.5	19 Nov 2014 17:00	19 Nov 2014 17:00	1	Maintenance - Flow and zero check, sample head cleaning
PM2.5	20 Nov 2014 13:00	20 Nov 2014 16:00	4	Maintenance - conversion to standardized collection system

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CNRL HORIZON (AMS 15)
NOVEMBER 2014

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
Temperature/ Relative Humidity	20 Nov 2014 13:00	20 Nov 2014 16:00	4	Maintenance - conversion to standardized collection system
Temperature/ Relative Humidity	21 Nov 2014 13:00	21 Nov 2014 13:00	1	Maintenance - conversion to standardized collection system
Wind Speed, Wind Direction	20 Nov 2014 12:00	20 Nov 2014 16:00	5	Maintenance - conversion to standardized collection system
Wind Speed, Wind Direction	21 Nov 2014 13:00	21 Nov 2014 13:00	1	Maintenance - conversion to standardized collection system
Precipitation Collector	20 Nov 2014 12:00	20 Nov 2014 16:00	5	Maintenance - conversion to standardized collection system
Precipitation Collector	21 Nov 2014 13:00	21 Nov 2014 14:00	2	Maintenance - conversion to standardized collection system
Solar Global Radiation	20 Nov 2014 12:00	21 Nov 2014 12:00	25	Maintenance - conversion to standardized collection system

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Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 9 ppb on Nov 16 05:00	Maximum Daily Average: 1.4 ppb on Nov 4		Hours of Data:	657
Minimum Value: 0 ppb on Nov 1 11:00	Minimum Daily Average: 0.2 ppb on Nov 25		Hours of Missing Data:	63
Maximum Diurnal Average: 0.8 ppb at hour 8	Minimum Diurnal Average: 0.2 ppb at hour 2		Hours of Calibration:	34
Monthly Average: 0.5 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 6		Percent Operational Time:	96.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	0	Z	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0.5	1	
2-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	3	2	1	1	0	0	1	1	2	0.8	3	
3-Nov	6	Z	1	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0.7	6	
4-Nov	0	Z	0	0	0	7	7	8	2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1.4	8	
5-Nov	0	Z	UO	UO	UO	0	0	0	0	UO	UO	UO	0	0	0	UO	UO	UO	0	0	0	UO	UO	UO	--	0	
6-Nov	UO	Z	UO	UO	UO	1	0	1	2	0	2	2	3	1	1	1	0	0	0	1	1	1	1	2	1.1	3	
7-Nov	1	Z	UO	UO	UO	UO	1	1	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	--	1	
8-Nov	1	Z	0	0	0	0	0	0	0	0	0	3	3	1	1	0	0	0	0	0	0	0	0	0	0.5	3	
9-Nov	0	Z	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	1	0.3	1	
10-Nov	0	Z	0	2	2	0	0	1	0	5	4	4	0	0	0	0	0	0	0	0	0	0	0	0	1.0	5	
11-Nov	0	Z	0	0	0	0	0	0	0	0	0	1	1	2	5	1	1	1	0	0	0	0	0	0	0.7	5	
12-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.3	1	
13-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	1	0	0.4	1	
14-Nov	0	Z	0	0	2	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2	
15-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	3	4	3	6	2	1.1	6
16-Nov	3	Z	1	1	9	2	0	1	1	1	0	2	1	1	1	1	1	0	0	0	0	0	0	0	1.2	9	
17-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0.4	1	
18-Nov	0	Z	0	0	1	0	1	7	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.8	7	
19-Nov	0	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-Nov	0	Z	0	0	0	0	1	0	0	0	M	M	M	M	M	M	M	0	1	1	0	0	0	0	--	1	
21-Nov	0	0	Z	0	0	0	0	0	1	0	2	0	M	M	0	0	0	0	0	0	0	0	0	0	0.4	2	
22-Nov	0	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	
23-Nov	0	0	0	0	Z	0	0	0	0	0	0	1	1	2	2	1	1	0	1	1	1	0	0	0	0.6	2	
24-Nov	0	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	
25-Nov	Z	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	
26-Nov	0	Z	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	1	1	1	0	0	0	0	0.5	1	
27-Nov	0	0	Z	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	1	0	0	0	0	0	0.4	1	
28-Nov	0	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	
29-Nov	0	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	
30-Nov	0	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	

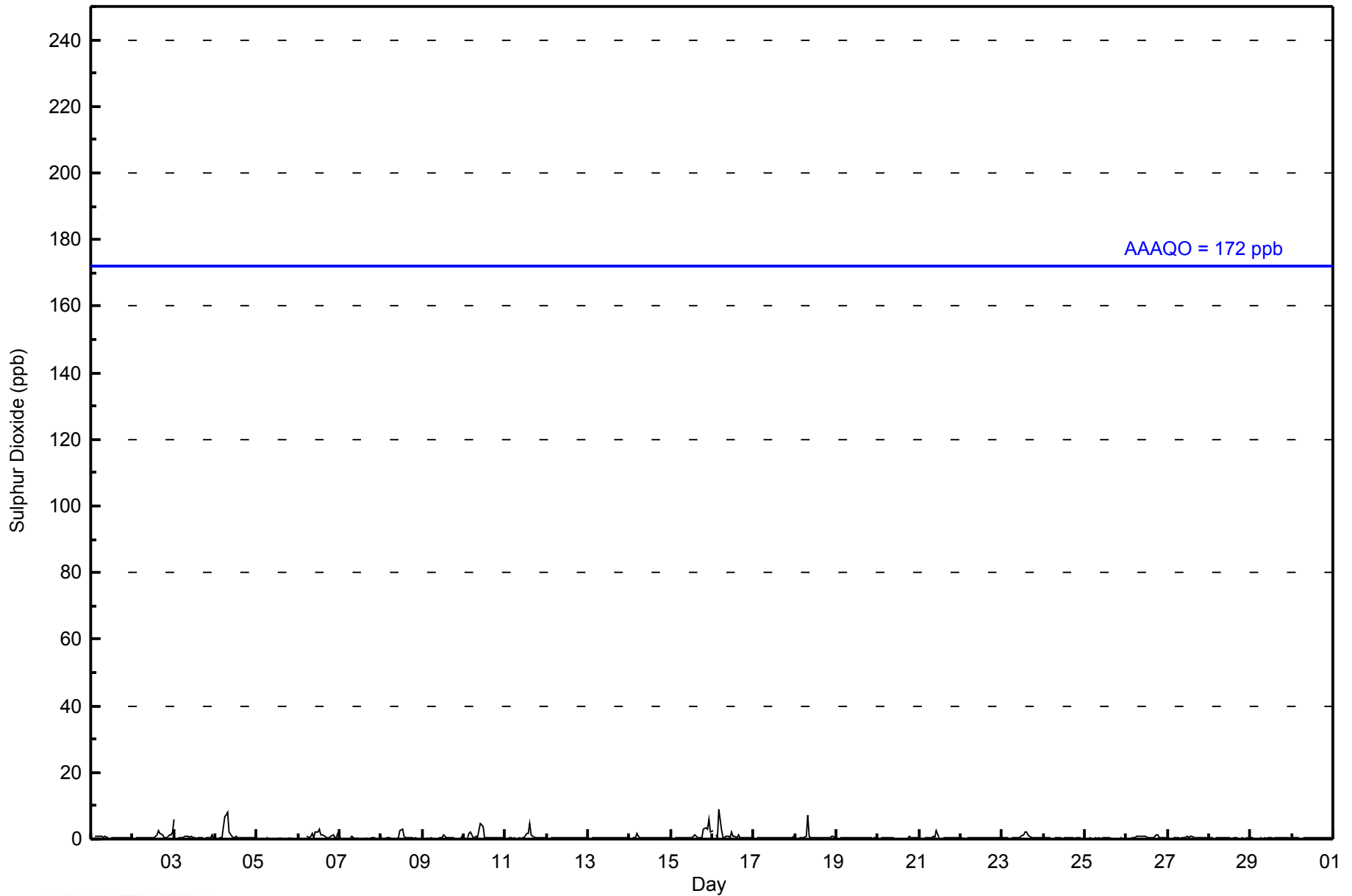
0.6	0.2	0.3	0.4	0.8	0.7	0.6	0.8	0.5	0.5	0.6	0.7	0.7	0.6	0.7	0.5	0.4	0.4	0.4	0.4	0.5	0.5	0.4	0.6	0.5	Diurnal Average
6	0	1	2	9	7	7	8	2	5	4	4	3	2	5	3	2	1	1	3	4	3	6	2	Diurnal Maximum	

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



WBEA
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
CNRL Horizon - November 2014





WBEA
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
CNRL Horizon - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	657	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: 657

Total Number of Hours: 720



WBEA
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
CNRL Horizon - November 2014

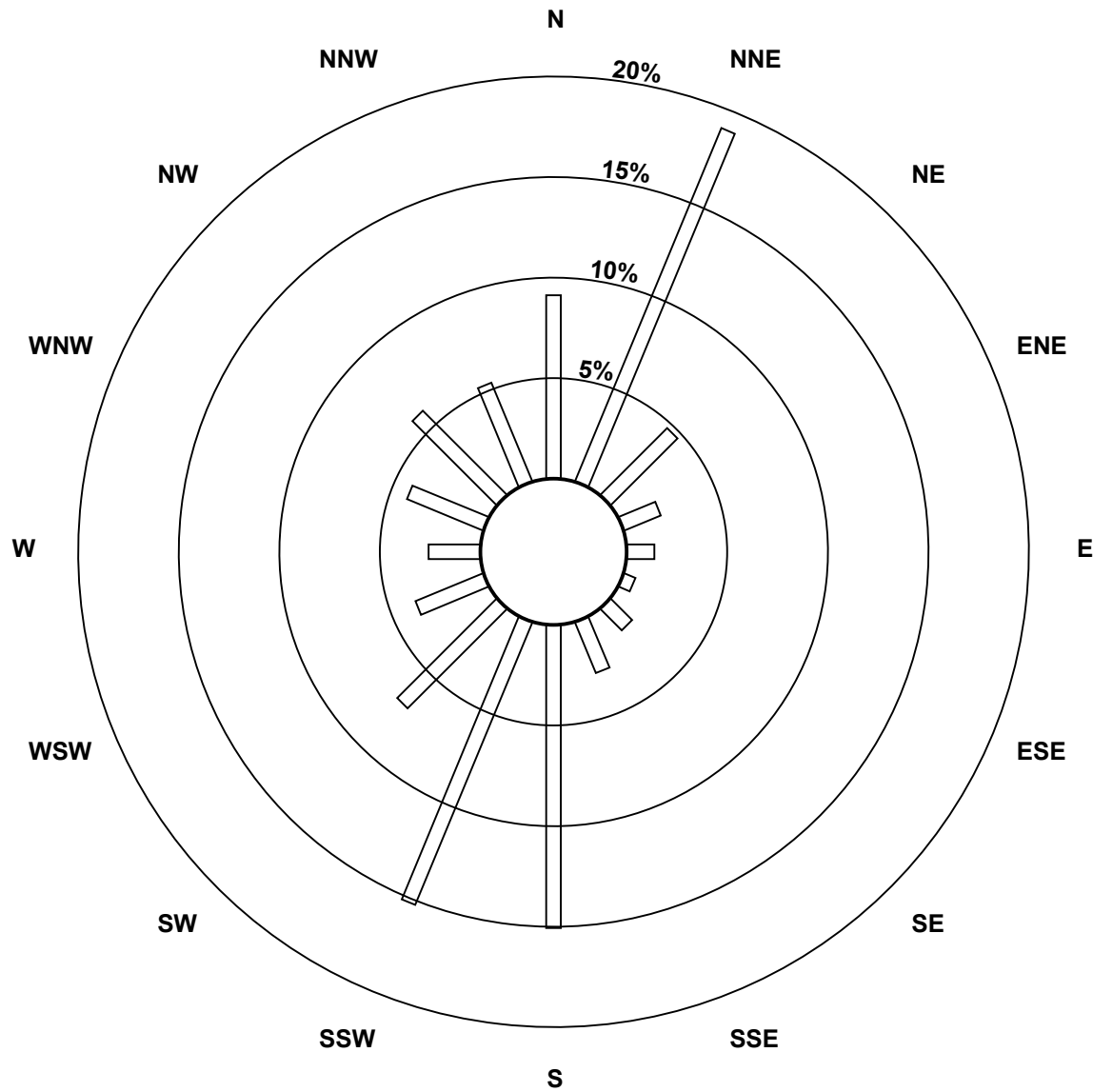
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	60	125	31	13	9	4	10	18	99	100	46	24	17	27	39	35	657
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	60	125	31	13	9	4	10	18	99	100	46	24	17	27	39	35	657

Total Number of Valid Hours: 657

Total Number of Hours: 720

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

**Sulphur Dioxide (SO₂) - ppb
CNRL Horizon (AMS 15)**



Classes (ppb)

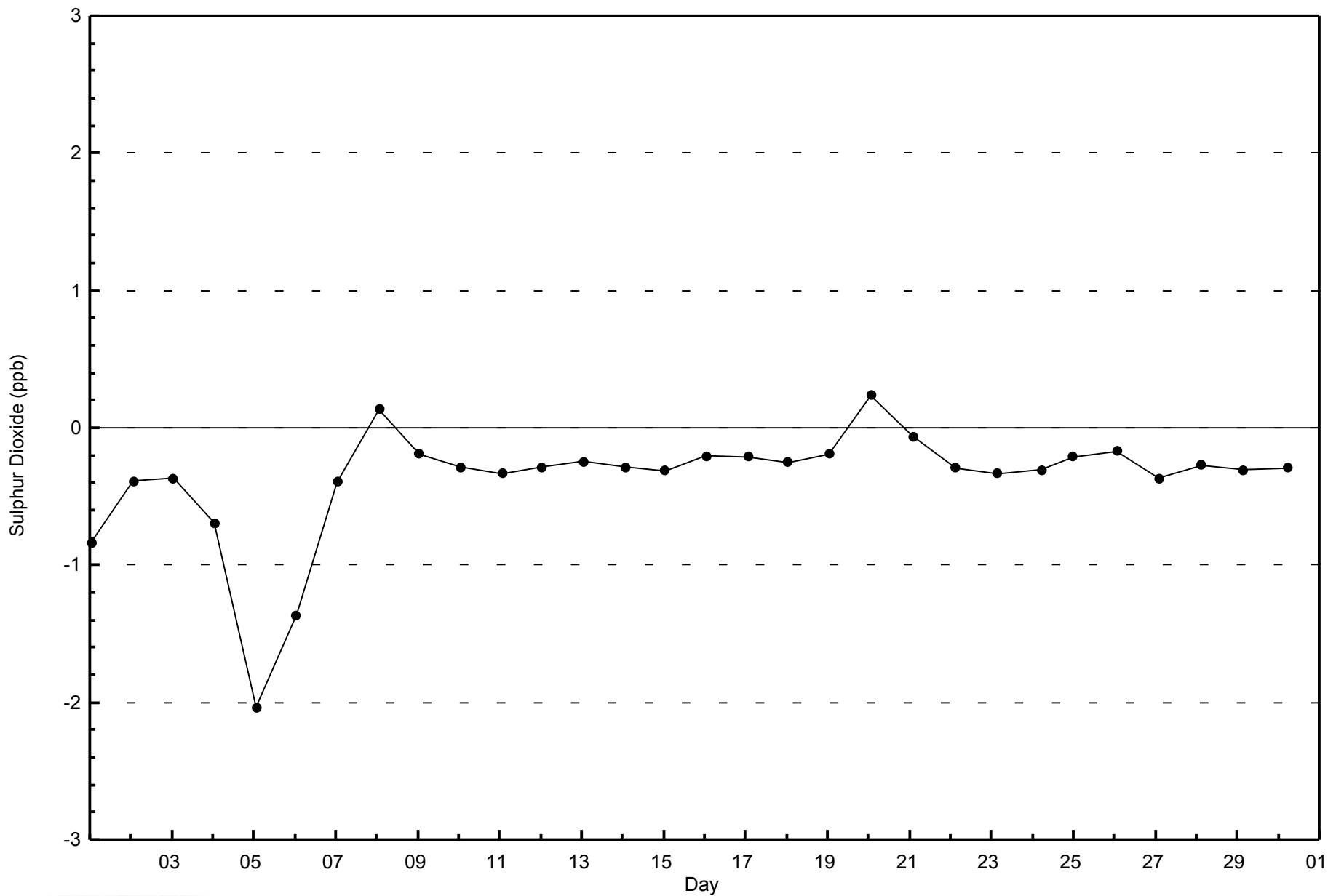


Total Number of Valid Hours: 657



WBEA
Zero Responses

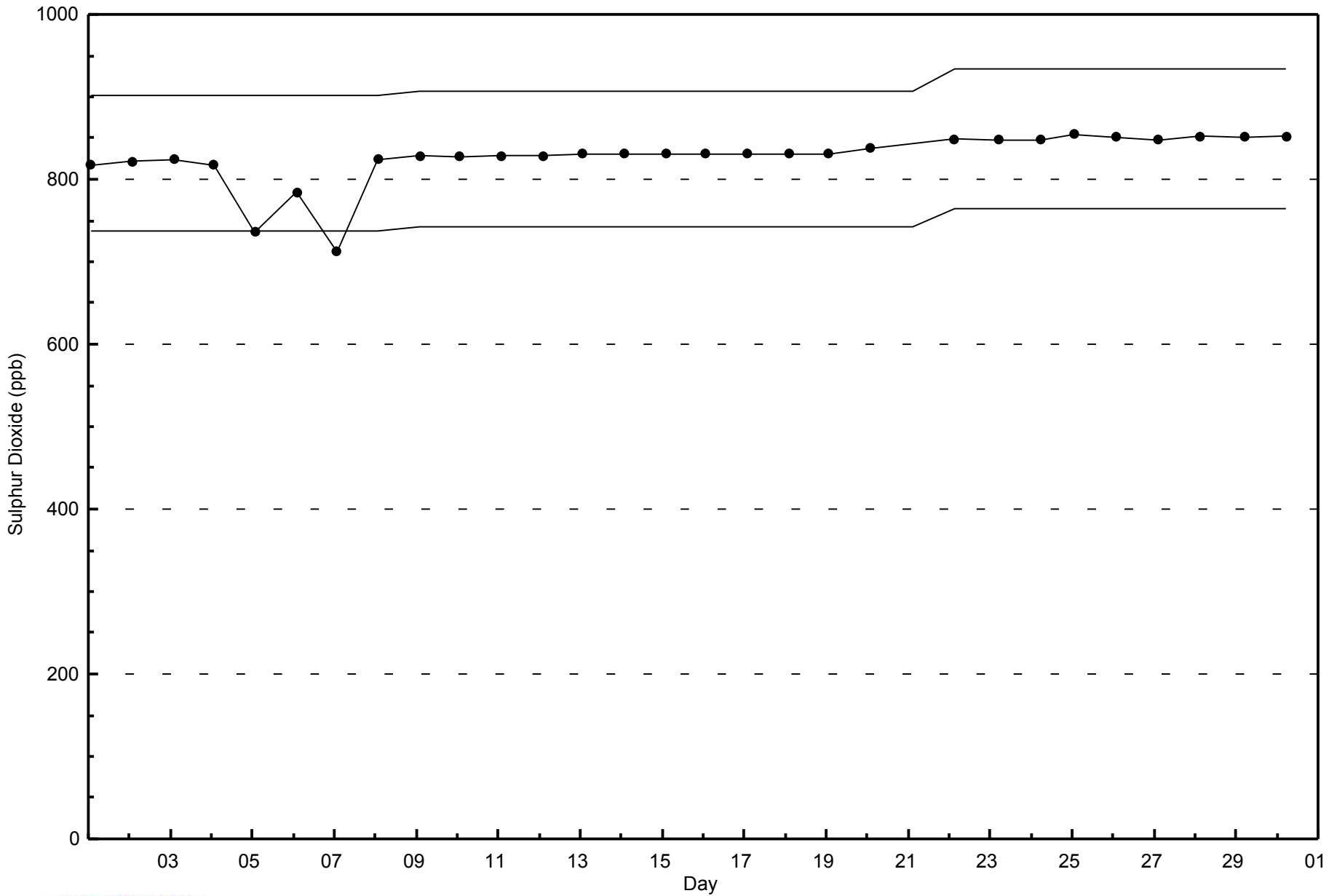
Sulphur Dioxide (SO₂) - ppb
CNRL Horizon - November 2014





WBEA
Span Responses

Sulphur Dioxide (SO₂) - ppb
CNRL Horizon - November 2014





Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 4 ppb on Nov 10 05:00	Maximum Daily Average: 0.4 ppb on Nov 2		Hours of Data:	676
Minimum Value: 0 ppb on Nov 9 05:00	Minimum Daily Average: 0.0 ppb on Nov 9		Hours of Missing Data:	44
Maximum Diurnal Average: 0.3 ppb at hour 5	Minimum Diurnal Average: 0.1 ppb at hour 3		Hours of Calibration:	34
Monthly Average: 0.2 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1		Percent Operational Time:	98.6

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

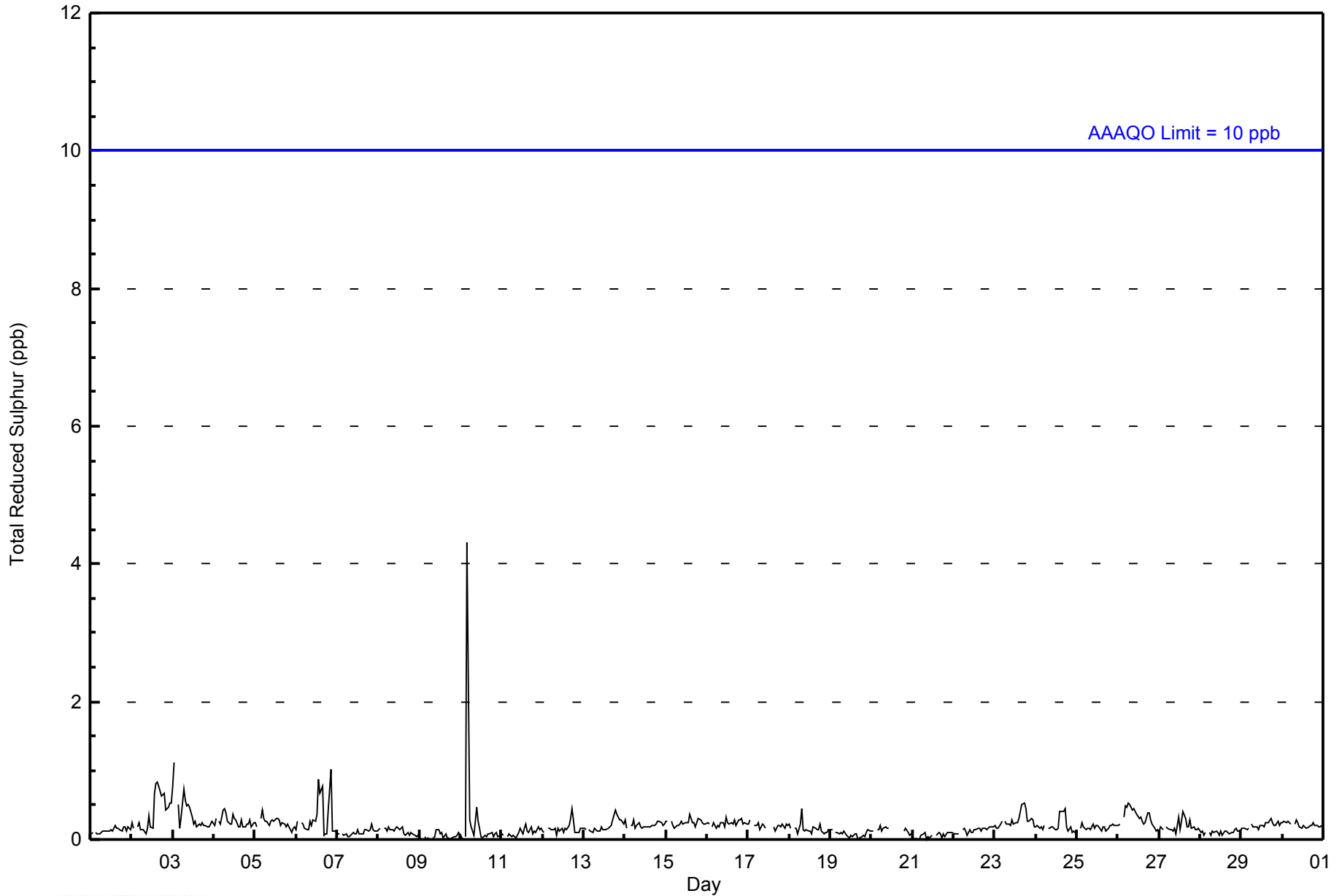
0.2	0.2	0.1	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	Diurnal Average
1	1	0	1	4	0	1	1	0	1	0	0	0	1	1	1	1	1	1	1	1	1	0	1	1	1	Diurnal Maximum

Z - zerspan 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 - November 2014





WBEA
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
CNRL Horizon - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	675	99.85	99.85
3 - 4	1	0.15	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 676

Total Number of Hours: 720



WBEA
Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
CNRL Horizon - November 2014

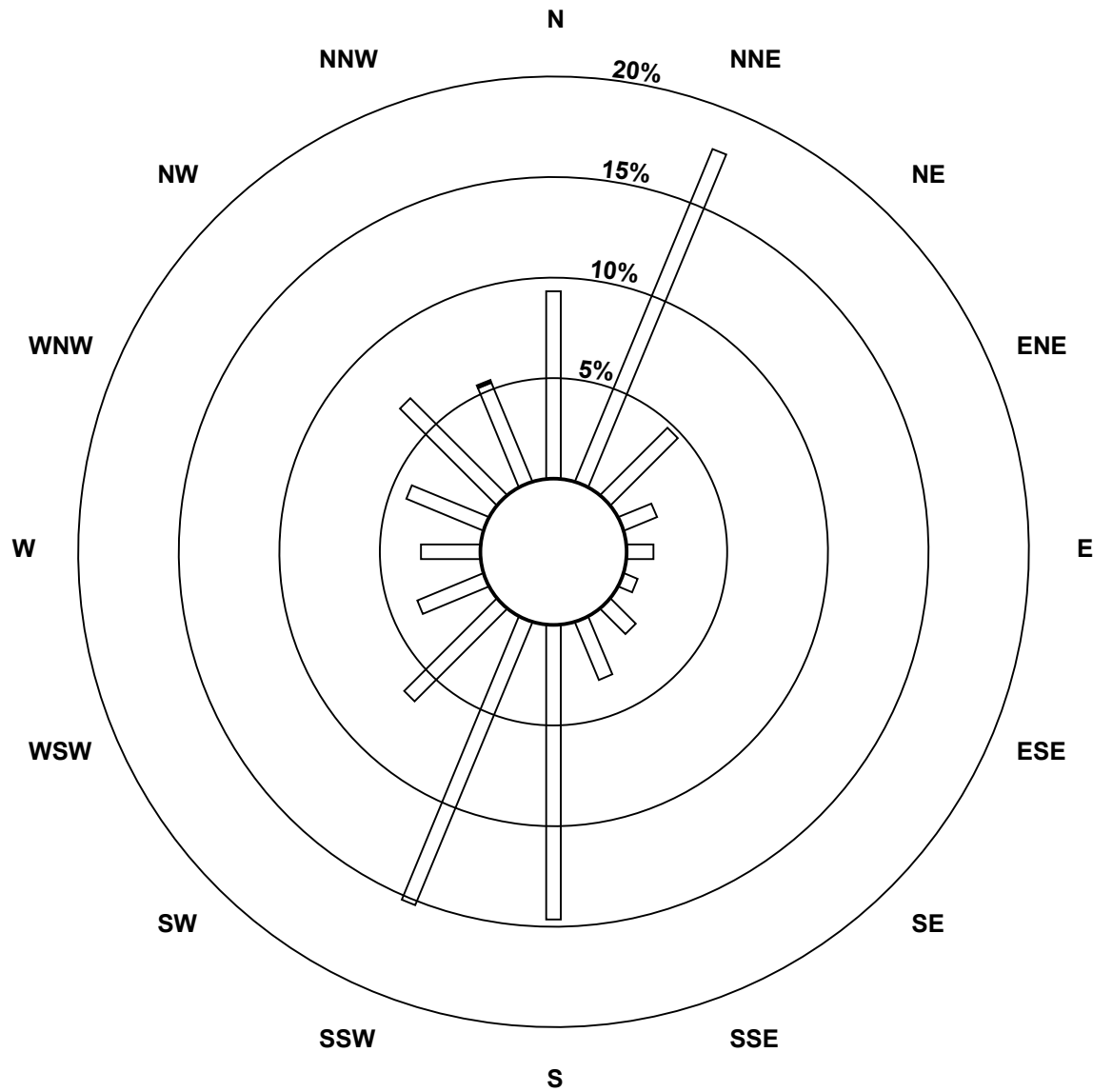
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	63	121	32	12	9	5	12	21	99	103	44	24	20	28	46	36	675
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	63	121	32	12	9	5	12	21	99	103	44	24	20	28	46	37	676

Total Number of Valid Hours: 676

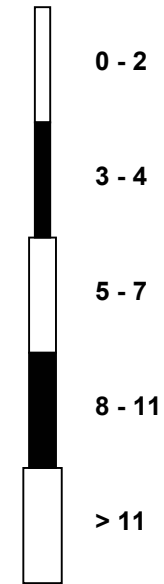
Total Number of Hours: 720

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

**Total Reduced Sulphur (TRS) - ppb
CNRL Horizon (AMS 15)**



Classes (ppb)

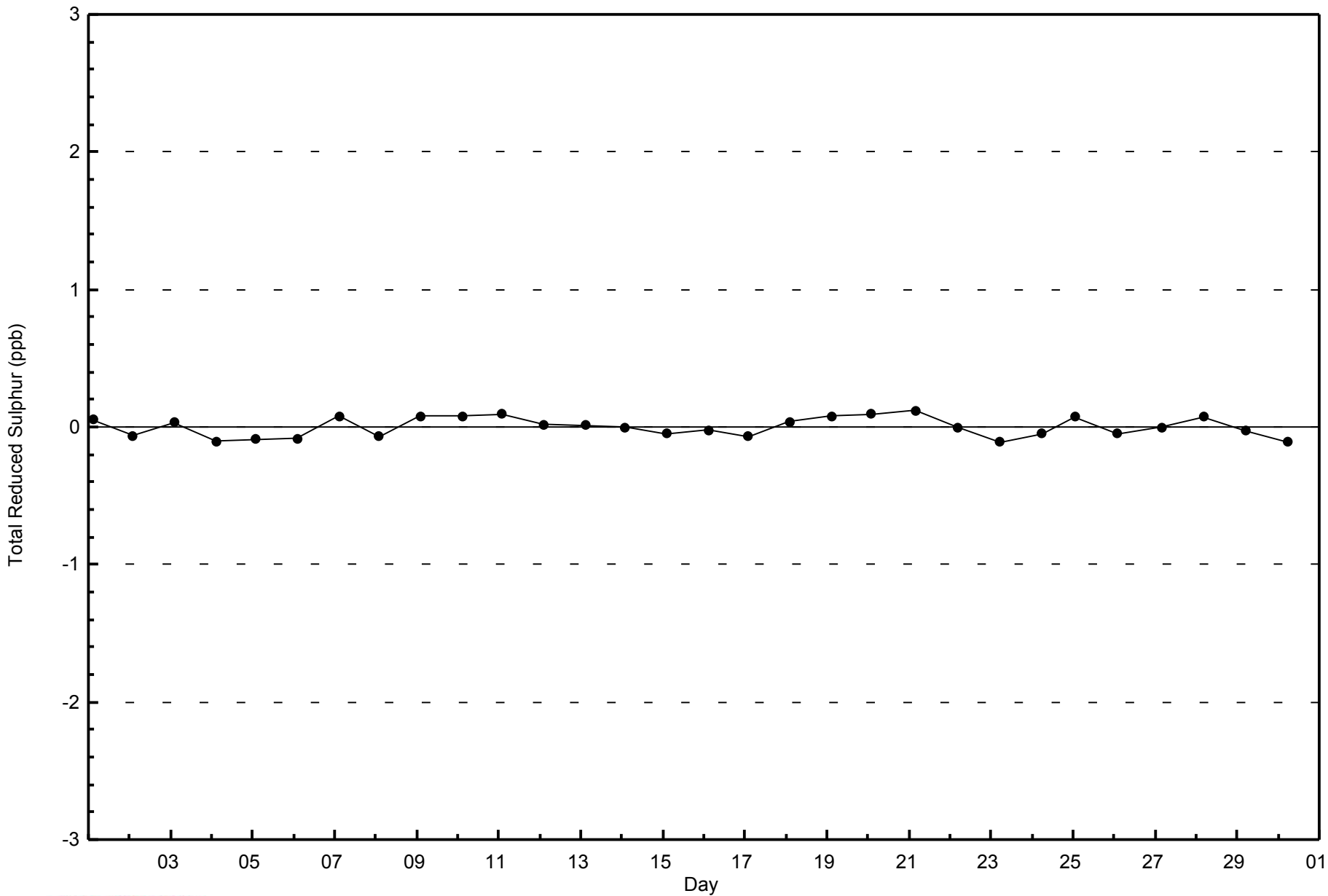


Total Number of Valid Hours: 676



WBEA
Zero Responses

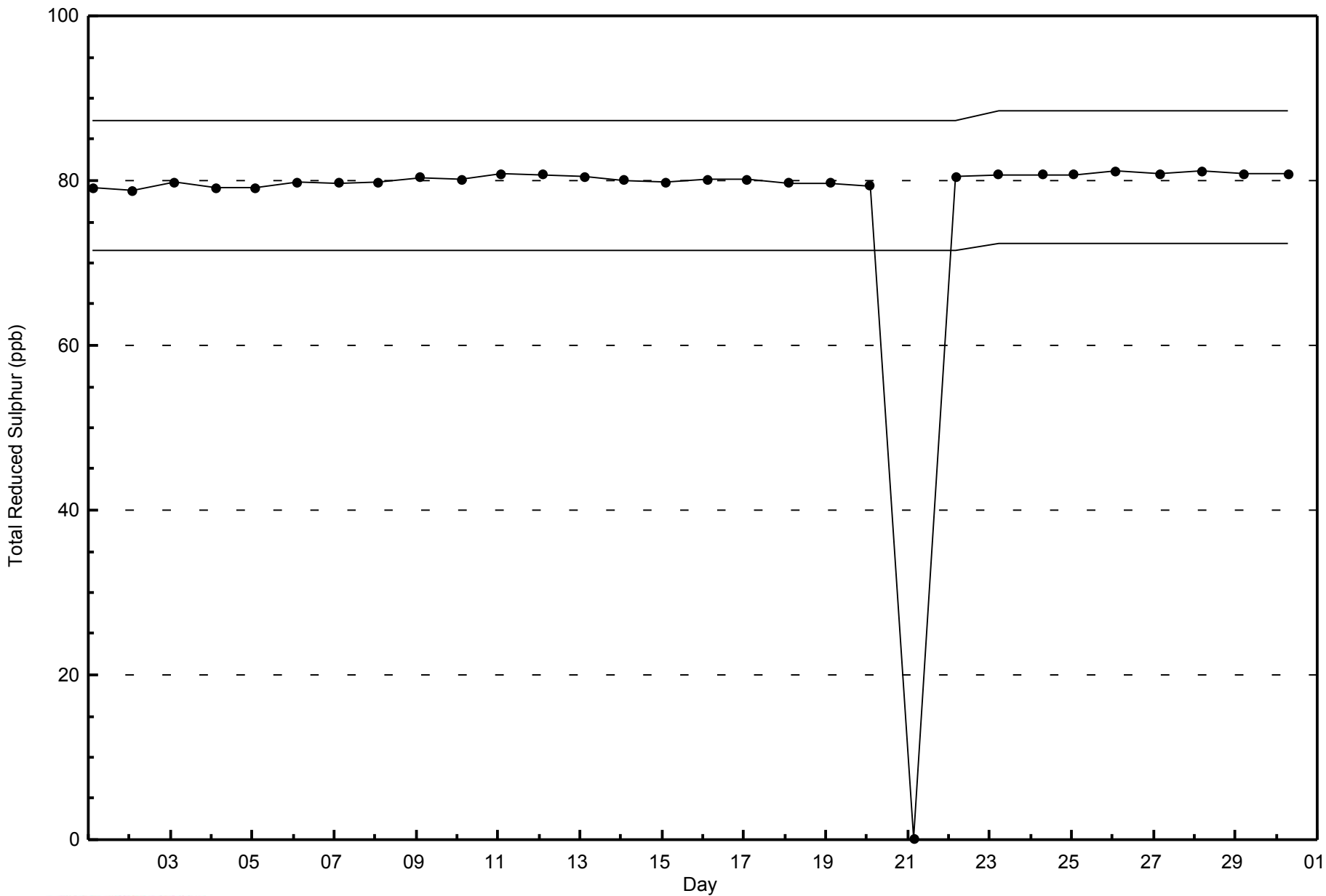
Total Reduced Sulphur (TRS) - ppb
CNRL Horizon - November 2014





WBEA
Span Responses

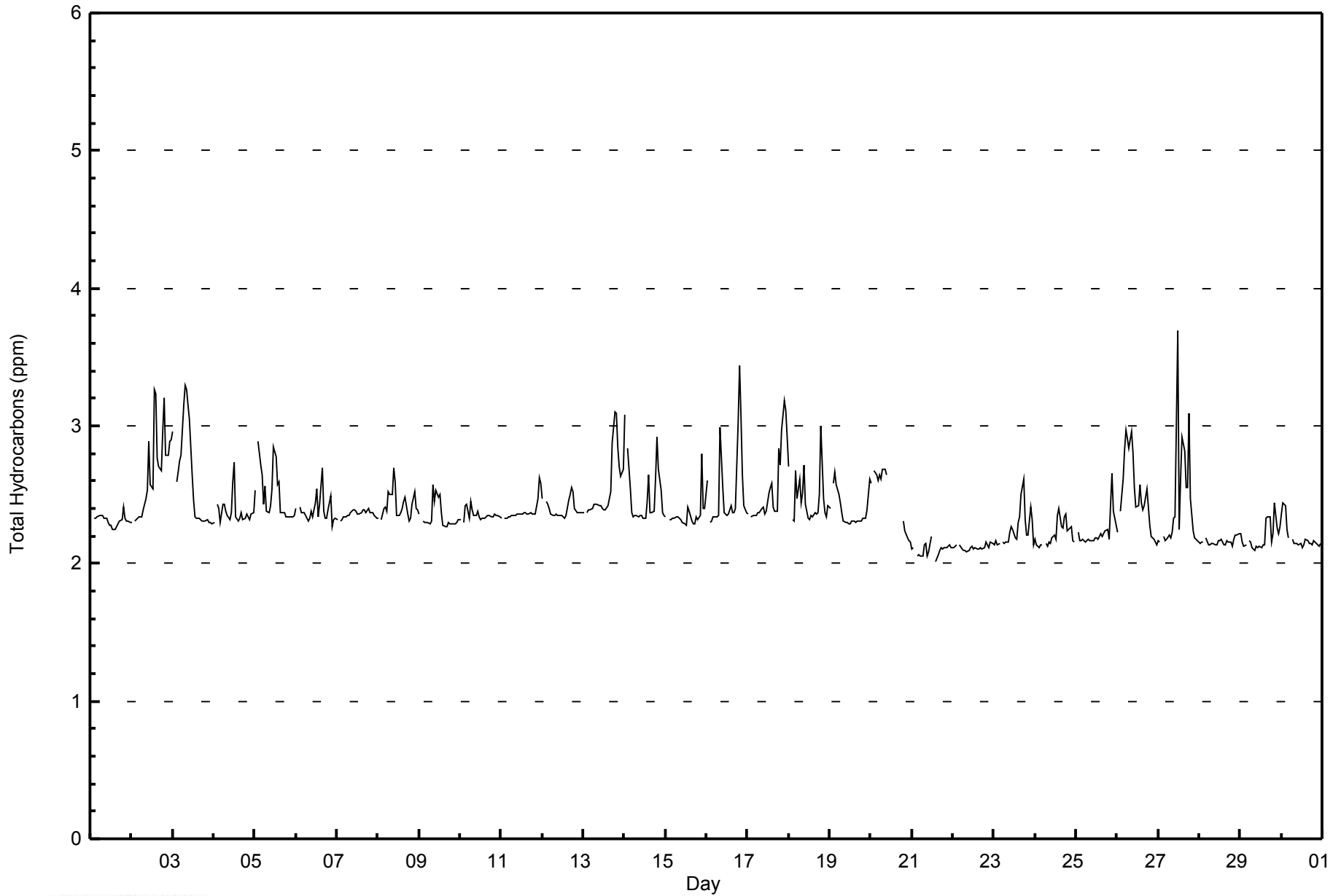
Total Reduced Sulphur (TRS) - ppb
CNRL Horizon - November 2014





WBEA
Hourly Averages

Total Hydrocarbons (THC) - ppm
CNRL Horizon - November 2014





WBEA
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
CNRL Horizon - November 2014

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	1	0.15	0.15
2.1 - 3.0	662	97.50	97.64
3.1 - 10.0	16	2.36	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 679

Total Number of Hours: 720



WBEA
Frequency Distribution

Total Hydrocarbons (THC) - ppm
CNRL Horizon - November 2014

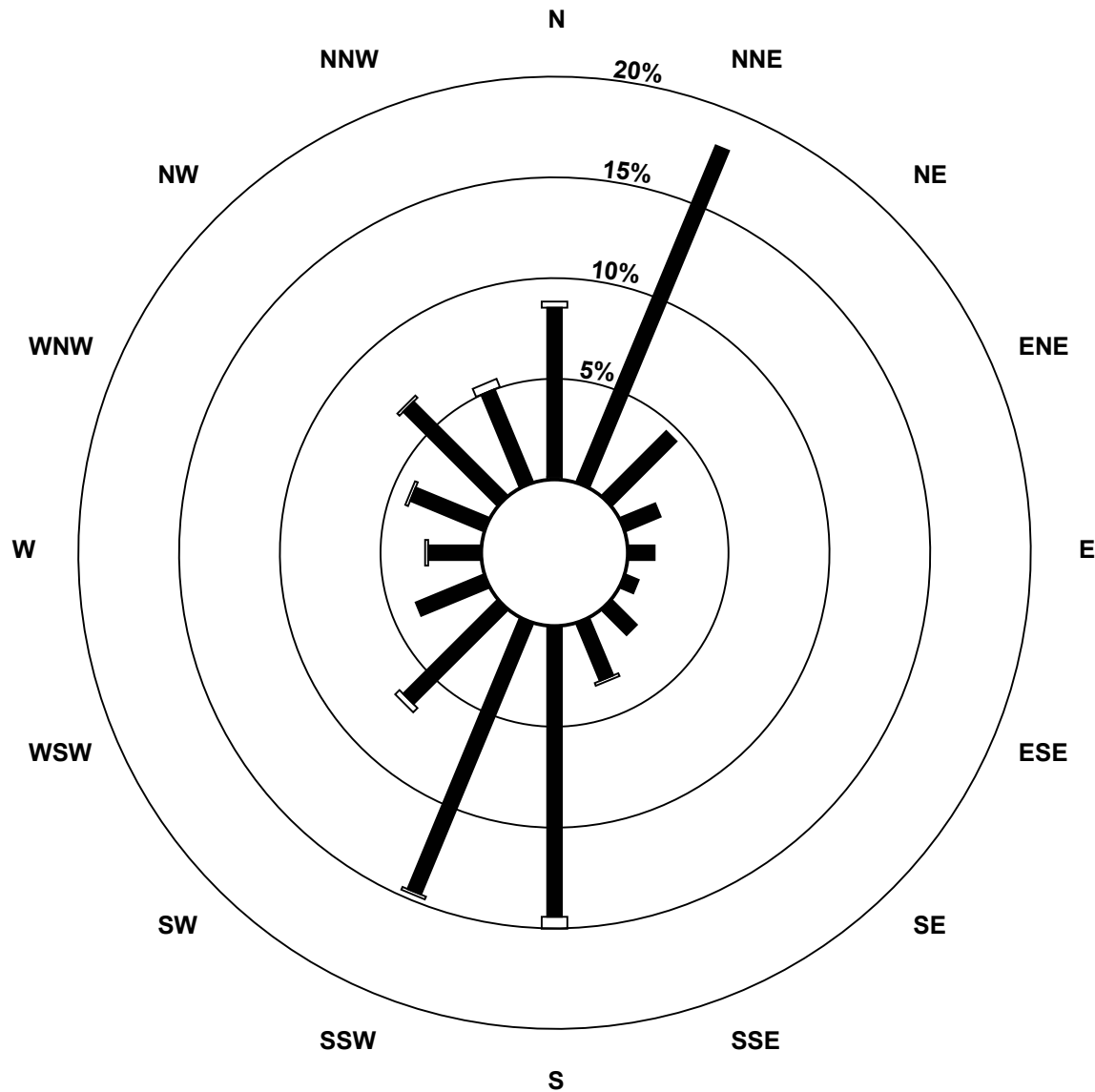
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
2.1 - 3.0	57	123	31	13	9	5	12	21	98	99	45	25	18	27	45	34	662
3.1 - 10.0	2	0	0	0	0	0	0	1	4	1	2	0	1	1	1	3	16
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	60	123	31	13	9	5	12	22	102	100	47	25	19	28	46	37	679

Total Number of Valid Hours: 679

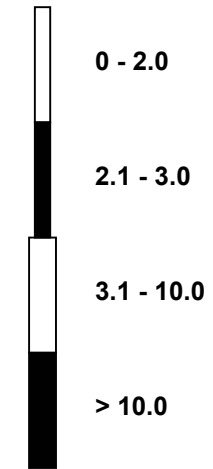
Total Number of Hours: 720

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

**Total Hydrocarbons (THC) - ppm
CNRL Horizon (AMS 15)**



Classes (ppm)

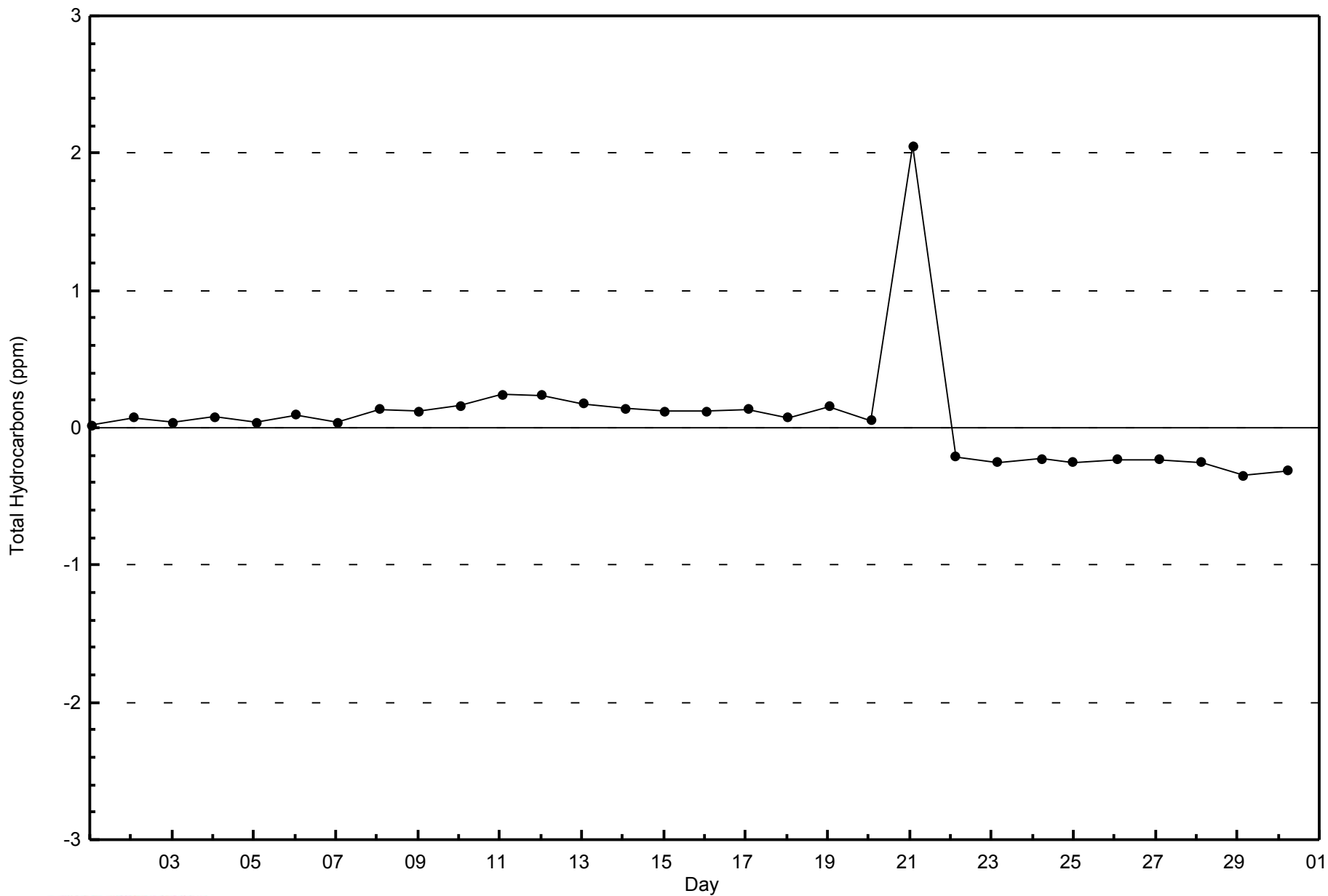


Total Number of Valid Hours: 679



WBEA
Zero Responses

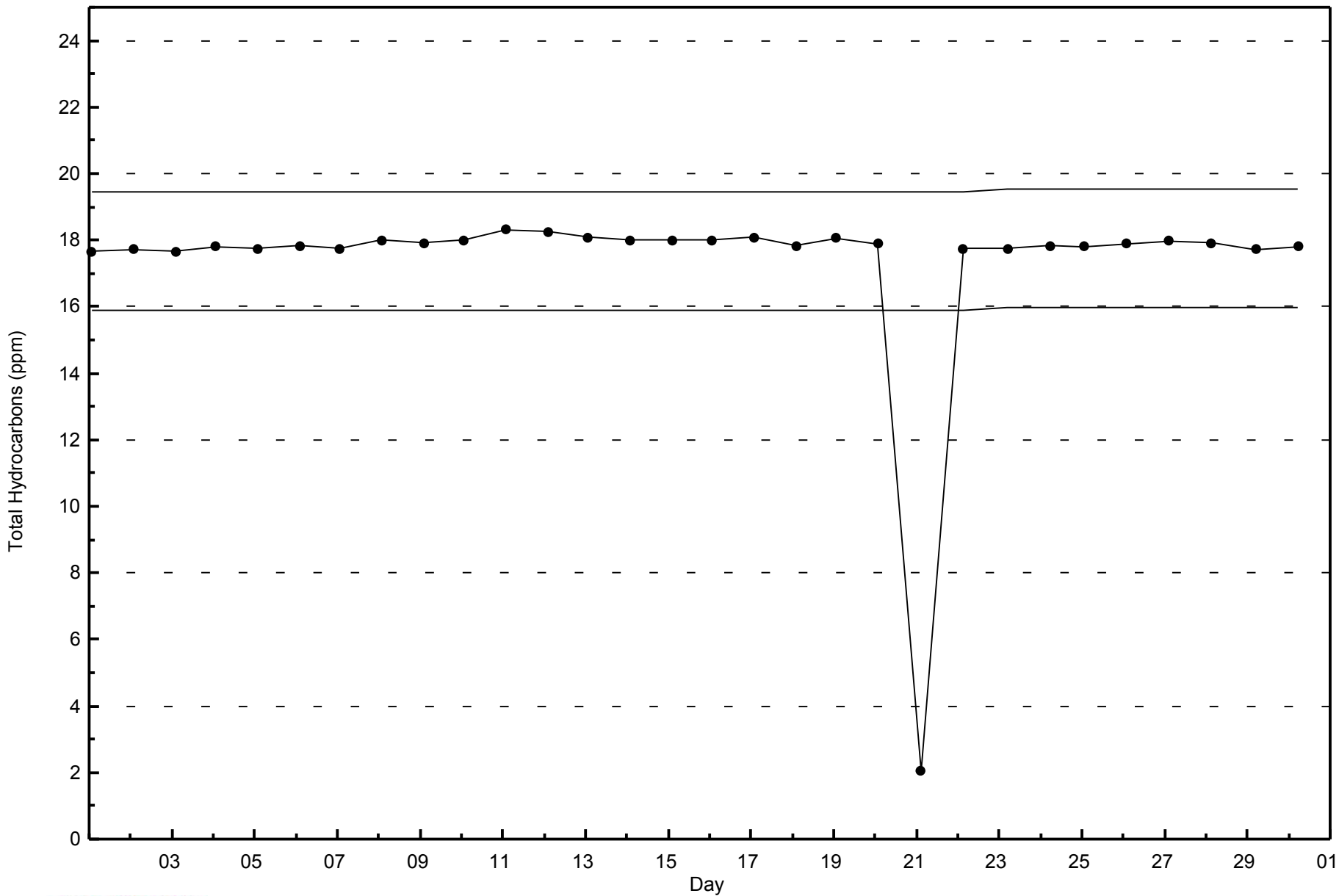
Total Hydrocarbons (THC) - ppm
CNRL Horizon - November 2014





WBEA
Span Responses

Total Hydrocarbons (THC) - ppm
CNRL Horizon - November 2014



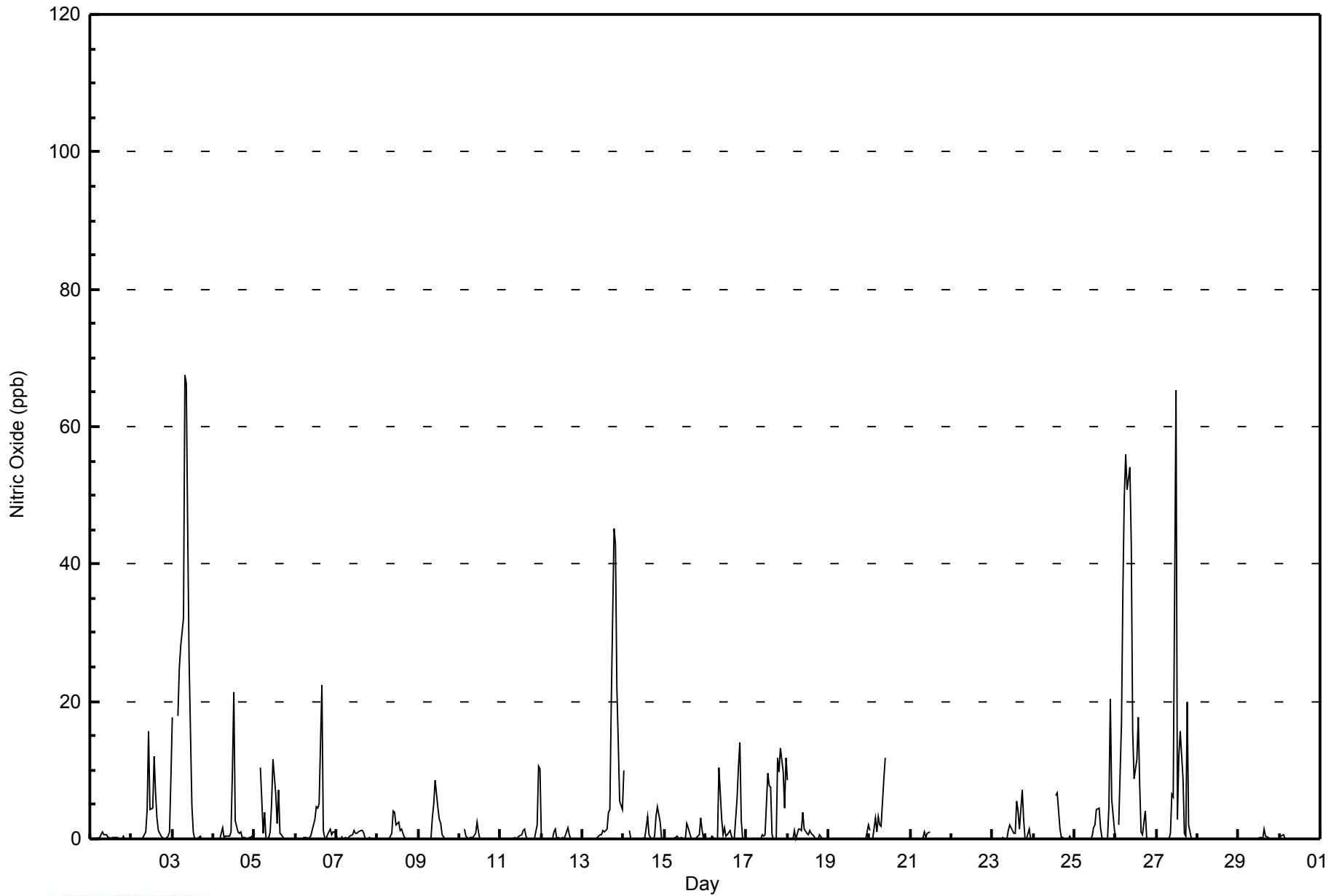


Maximum Value: 68 ppb on Nov 3 08:00																	Maximum Daily Average: 16.4 ppb on Nov 26																	Hours in Service: 720	
Minimum Value: 0 ppb on Nov 8 01:00																	Minimum Daily Average: 0.0 ppb on Nov 22																	Hours of Data: 653	
Maximum Diurnal Average: 5.1 ppb at hour 9																	Minimum Diurnal Average: 0.0 ppb at hour 2																	Hours of Missing Data: 67	
Monthly Average: 2.6 ppb																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 6 P ₉₉ = 50																	Hours of Calibration: 44	
																	Percent Operational Time: 96.8																		
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-Nov	0	Z	UO	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1									
2-Nov	0	Z	UO	0	0	0	0	0	1	4	16	4	4	12	7	3	1	0	0	0	0	0	1	9	2.9	16									
3-Nov	18	Z	UO	18	25	28	32	68	66	45	26	5	1	0	0	0	0	0	0	0	0	0	0	15.1	68										
4-Nov	0	Z	UO	0	0	2	0	0	0	0	1	10	21	3	1	1	1	0	0	0	0	0	1	1.9	21										
5-Nov	1	Z	UO	10	6	1	4	0	0	1	5	12	7	2	7	1	1	0	0	0	0	0	0	2.6	12										
6-Nov	0	Z	UO	0	0	0	0	0	0	0	1	3	5	4	5	22	1	0	0	1	1	1	1	2.2	22										
7-Nov	0	Z	UO	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0.4	1										
8-Nov	0	Z	0	0	0	0	0	0	1	4	4	2	2	1	1	1	0	0	0	0	0	0	0	0.7	4										
9-Nov	0	Z	UO	0	0	0	0	0	3	5	9	4	3	2	1	0	0	0	0	0	0	0	0	1.3	9										
10-Nov	0	Z	UO	1	0	0	0	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0.3	2										
11-Nov	0	Z	UO	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	2	10	1.2	10										
12-Nov	0	Z	UO	0	0	0	0	1	1	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0.3	2										
13-Nov	0	Z	UO	0	0	0	0	0	0	0	1	1	1	1	2	4	4	20	45	43	22	14	5	7.6	45										
14-Nov	10	Z	UO	1	0	0	0	0	0	0	0	0	0	2	3	1	0	0	1	3	5	2	0	1.3	10										
15-Nov	0	Z	UO	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	1	3	1	0	0.5	3										
16-Nov	0	Z	UO	0	0	0	0	0	10	3	1	2	0	1	1	0	0	0	6	11	14	3	0	2.4	14										
17-Nov	0	Z	UO	0	0	0	0	0	0	1	0	1	10	8	7	1	0	0	12	10	13	10	5	4.0	13										
18-Nov	9	Z	UO	0	1	0	1	2	1	4	1	1	1	1	0	0	0	0	1	0	0	0	0	1.1	9										
19-Nov	0	Z	UO	0	0	0	0	0	0	0	0	0	C	C	C	C	C	0	0	0	0	0	2	--	2										
20-Nov	1	Z	0	3	1	3	2	2	9	12	C	C	C	C	C	C	C	C	C	0	0	0	0	--	12										
21-Nov	0	0	Z	0	0	0	0	0	1	0	1	1	M	M	0	0	0	0	0	0	0	0	0	0.2	1										
22-Nov	0	0	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-Nov	0	0	0	0	Z	0	0	0	0	1	2	2	1	1	6	4	1	7	3	0	0	1	0	1.3	7										
24-Nov	0	0	0	0	0	Z	0	0	0	0	M	M	M	6	7	2	0	0	0	0	0	0	0	0.8	7										
25-Nov	Z	0	0	0	0	0	0	0	0	0	0	2	4	4	2	0	0	0	0	5	20	6	1	2.0	20										
26-Nov	0	Z	2	17	36	50	56	51	54	43	16	9	12	18	8	1	1	4	0	0	0	0	0	16.4	56										
27-Nov	0	0	Z	0	0	0	0	0	1	7	6	65	3	12	16	9	1	0	20	2	0	0	0	6.1	65										
28-Nov	0	0	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-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.1	1										
30-Nov	0	0	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1										
																								Diurnal Average											
																								Diurnal Maximum											
																								Z - zerospan											
																								C - Calibration											
																								M - Maintenance											
																								UO - Unstable Operation											



WBEA
Hourly Averages

Nitric Oxide (NO) - ppb
CNRL Horizon - November 2014





WBEA
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
CNRL Horizon - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	634	97.09	97.09
21 - 40	8	1.23	98.32
41 - 80	11	1.68	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 653

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitric Oxide (NO) - ppb
CNRL Horizon - November 2014

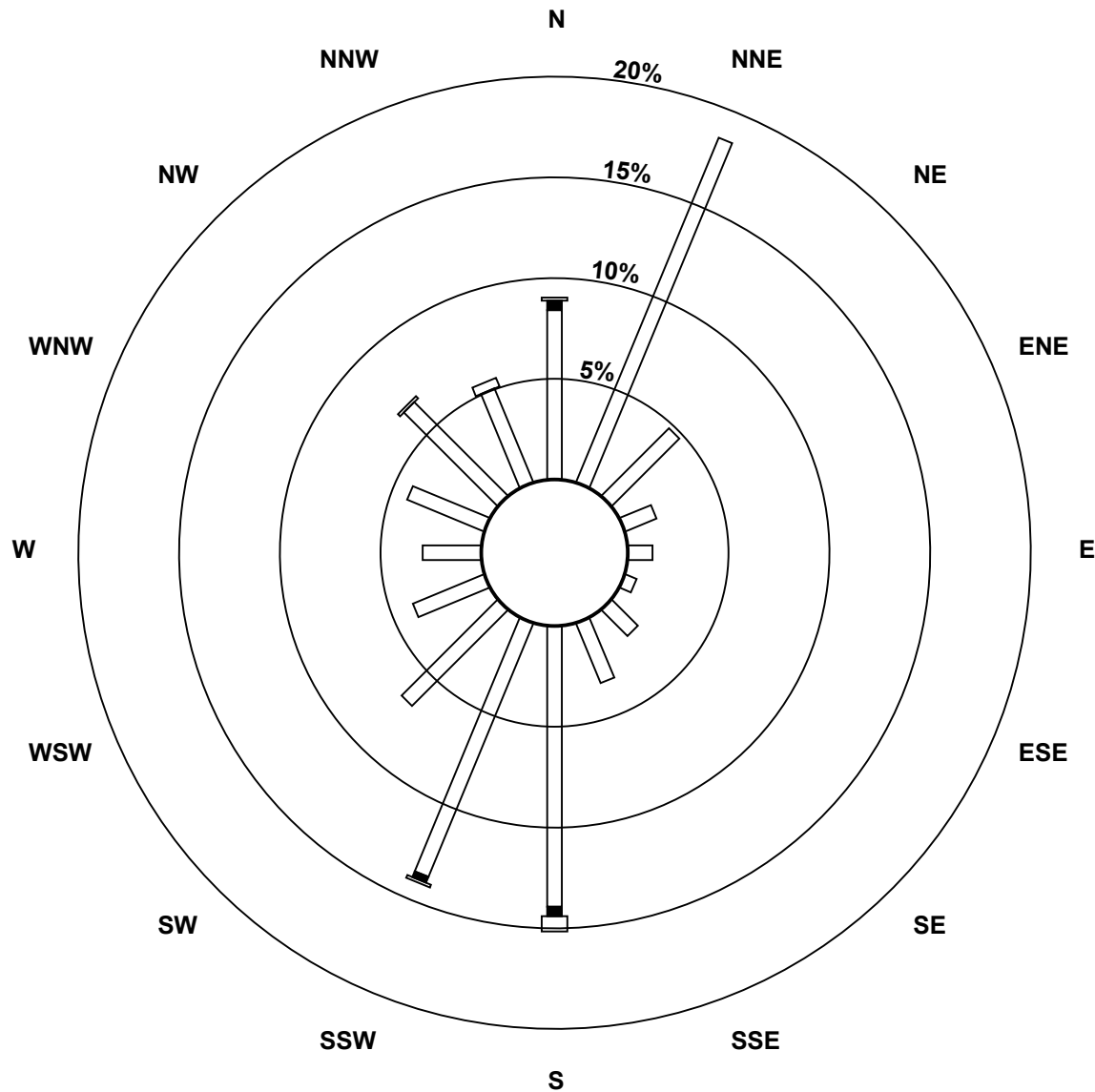
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	55	121	31	11	8	4	12	21	91	89	44	25	19	27	43	33	634
21 - 40	3	0	0	0	0	0	0	0	3	2	0	0	0	0	0	0	8
41 - 80	1	0	0	0	0	0	0	0	5	1	0	0	0	0	1	3	11
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	59	121	31	11	8	4	12	21	99	92	44	25	19	27	44	36	653

Total Number of Valid Hours: 653

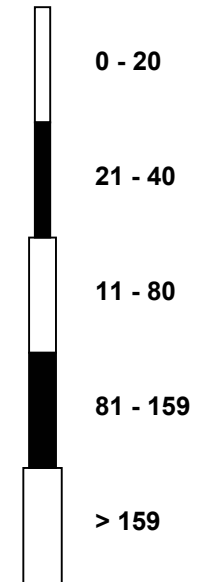
Total Number of Hours: 720

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

**Nitric Oxide (NO) - ppb
CNRL Horizon (AMS 15)**



Classes (ppb)

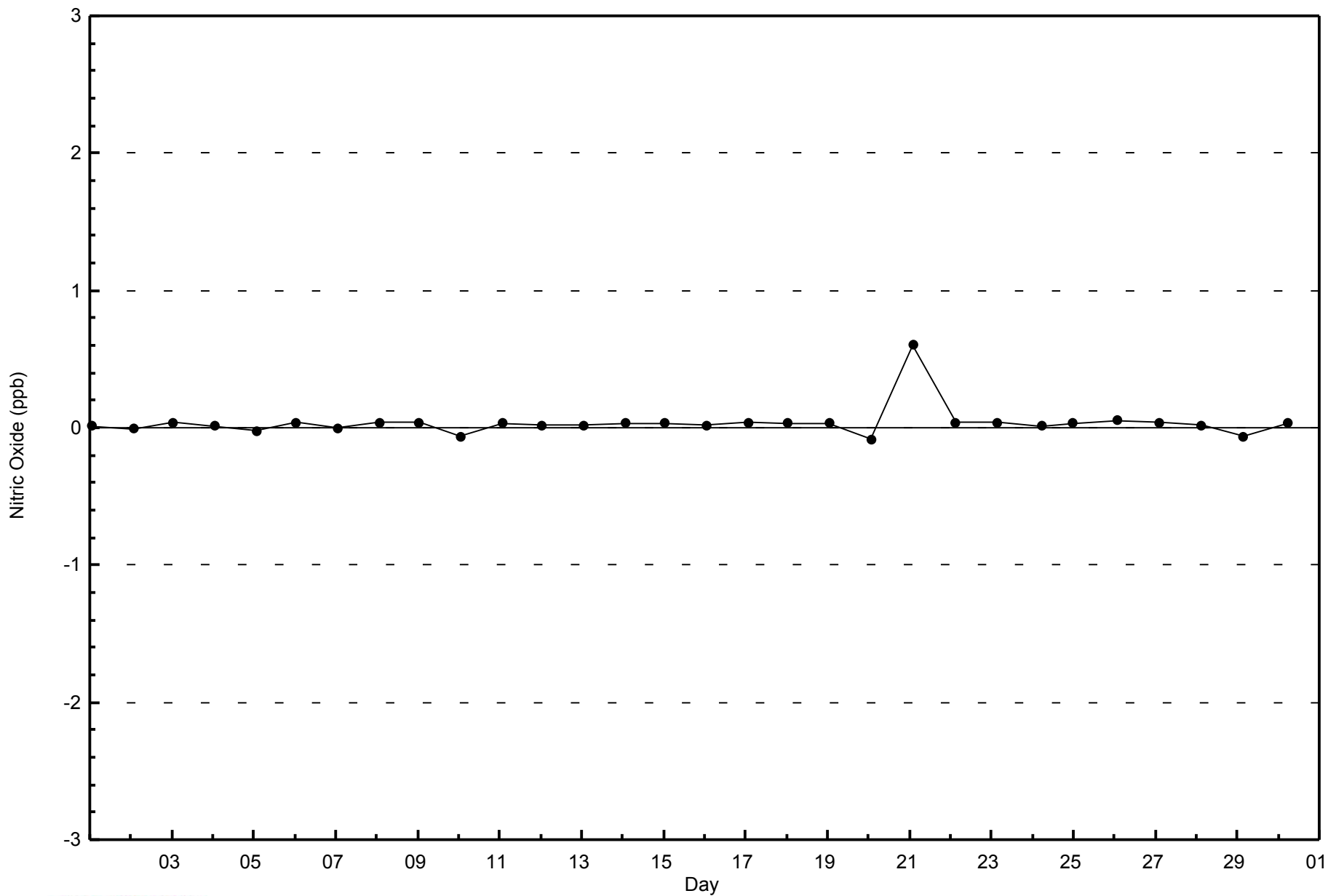


Total Number of Valid Hours: 653



WBEA
Zero Responses

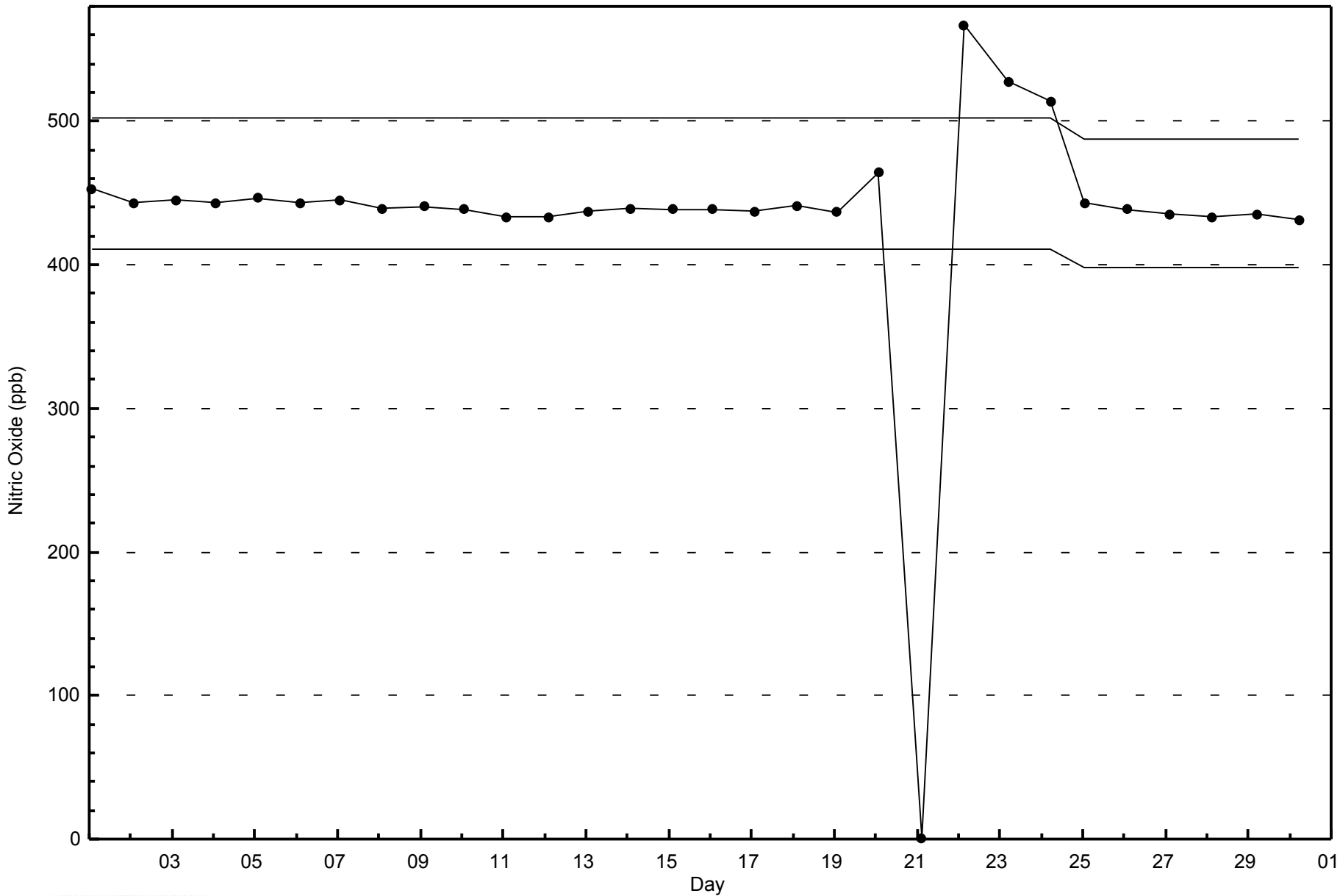
Nitric Oxide (NO) - ppb
CNRL Horizon - November 2014





WBEA
Span Responses

Nitric Oxide (NO) - ppb
CNRL Horizon - November 2014





Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 35 ppb on Nov 20 06:00	Maximum Daily Average: 17.7 ppb on Nov 26		Hours of Data:	653
Minimum Value: 0 ppb on Nov 10 17:00	Minimum Daily Average: 0.9 ppb on Nov 22		Hours of Missing Data:	67
Maximum Diurnal Average: 8.8 ppb at hour 20	Minimum Diurnal Average: 2.0 ppb at hour 2		Hours of Calibration:	44
Monthly Average: 6.6 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 4 Q ₃ = 9 P ₉₀ = 18 P ₉₉ = 32		Percent Operational Time:	96.8

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-Nov	2	Z	UO	1	1	1	2	3	2	1	1	1	1	2	2	2	4	3	1	7	4	1	1	1	2.0	7	
2-Nov	1	Z	UO	1	1	1	2	2	5	6	11	6	6	14	13	13	16	15	14	13	9	12	11	11	8.2	16	
3-Nov	11	Z	UO	11	10	9	9	9	8	9	9	8	4	1	1	1	1	1	1	1	1	1	3	5	5.0	11	
4-Nov	4	Z	UO	9	2	14	12	12	6	4	5	11	13	8	5	5	9	5	6	6	6	7	8	8	7.4	14	
5-Nov	8	Z	UO	7	6	5	7	2	2	2	4	8	9	6	10	7	10	6	2	1	1	1	1	1	4.8	10	
6-Nov	5	Z	UO	5	7	6	5	5	5	3	4	6	8	7	9	19	6	4	2	4	12	5	7	7	6.5	19	
7-Nov	3	Z	UO	2	1	2	2	5	5	4	4	2	2	3	5	7	11	5	7	4	4	3	1	0	3.8	11	
8-Nov	1	Z	3	4	4	3	10	7	7	14	10	5	6	4	6	7	8	4	2	4	7	10	6	8	6.1	14	
9-Nov	6	Z	UO	2	2	1	3	5	11	11	12	9	7	7	3	1	2	5	3	1	0	4	2	1	4.3	12	
10-Nov	2	Z	UO	14	11	4	9	7	4	4	6	3	0	0	0	0	0	0	1	2	2	2	2	1	3.5	14	
11-Nov	0	Z	UO	0	1	1	0	0	1	0	1	1	2	3	5	3	3	4	5	6	11	13	17	16	4.2	17	
12-Nov	6	Z	UO	3	2	0	1	9	5	0	0	0	0	0	2	10	10	11	10	3	1	1	0	1	3.4	11	
13-Nov	1	Z	UO	1	1	1	2	1	1	1	1	1	2	2	4	13	21	26	29	29	25	24	24	19	10.4	29	
14-Nov	19	Z	UO	14	5	3	2	1	1	2	1	1	1	5	11	7	6	6	12	22	17	10	1	0	6.7	22	
15-Nov	0	Z	UO	0	0	1	2	3	2	1	1	1	1	6	7	3	5	1	5	8	8	22	13	7	4.3	22	
16-Nov	12	Z	UO	1	10	5	4	5	23	15	4	6	2	3	7	5	8	9	22	33	31	20	8	5	10.7	33	
17-Nov	2	Z	UO	0	0	0	1	1	2	3	1	2	12	12	14	5	3	4	23	24	22	23	22	24	9.0	24	
18-Nov	24	Z	UO	4	16	11	17	16	21	14	6	3	2	5	5	6	6	4	4	19	6	5	4	4	9.1	24	
19-Nov	2	Z	UO	8	5	9	9	4	1	1	1	1	C	C	C	C	C	C	4	3	6	7	4	9	30	--	30
20-Nov	28	Z	15	32	33	35	34	32	32	29	C	C	C	C	C	C	C	C	C	12	6	6	4	2	--	35	
21-Nov	2	1	Z	1	1	0	2	5	14	2	4	5	M	M	1	3	2	1	1	0	1	1	2	6	2.5	14	
22-Nov	6	2	1	Z	1	1	0	0	0	1	1	1	1	0	1	1	1	1	1	0	0	1	1	0	0.9	6	
23-Nov	1	0	1	1	Z	2	7	5	5	8	9	4	2	2	11	17	22	26	13	5	6	18	11	2	7.7	26	
24-Nov	1	1	0	2	1	Z	1	1	4	1	M	M	M	16	21	17	18	24	18	6	13	24	4	2	8.7	24	
25-Nov	Z	2	0	1	1	1	1	1	0	0	1	4	5	9	14	13	16	21	17	15	20	22	20	15	8.5	22	
26-Nov	10	Z	16	24	27	29	30	29	29	26	21	16	20	25	22	14	18	26	16	6	1	1	1	1	17.7	30	
27-Nov	1	1	Z	0	6	9	13	13	11	17	13	30	8	15	25	25	21	19	32	19	8	6	2	1	12.7	32	
28-Nov	0	0	0	Z	0	0	1	2	2	1	0	0	0	0	0	0	0	0	1	2	4	6	5	4	1.3	6	
29-Nov	2	1	0	1	Z	0	1	1	0	0	0	1	1	1	1	9	11	7	3	3	6	3	2	4	2.4	11	
30-Nov	7	10	17	12	5	Z	1	1	0	0	0	0	0	0	1	1	1	1	2	4	5	2	1	1	3.1	17	

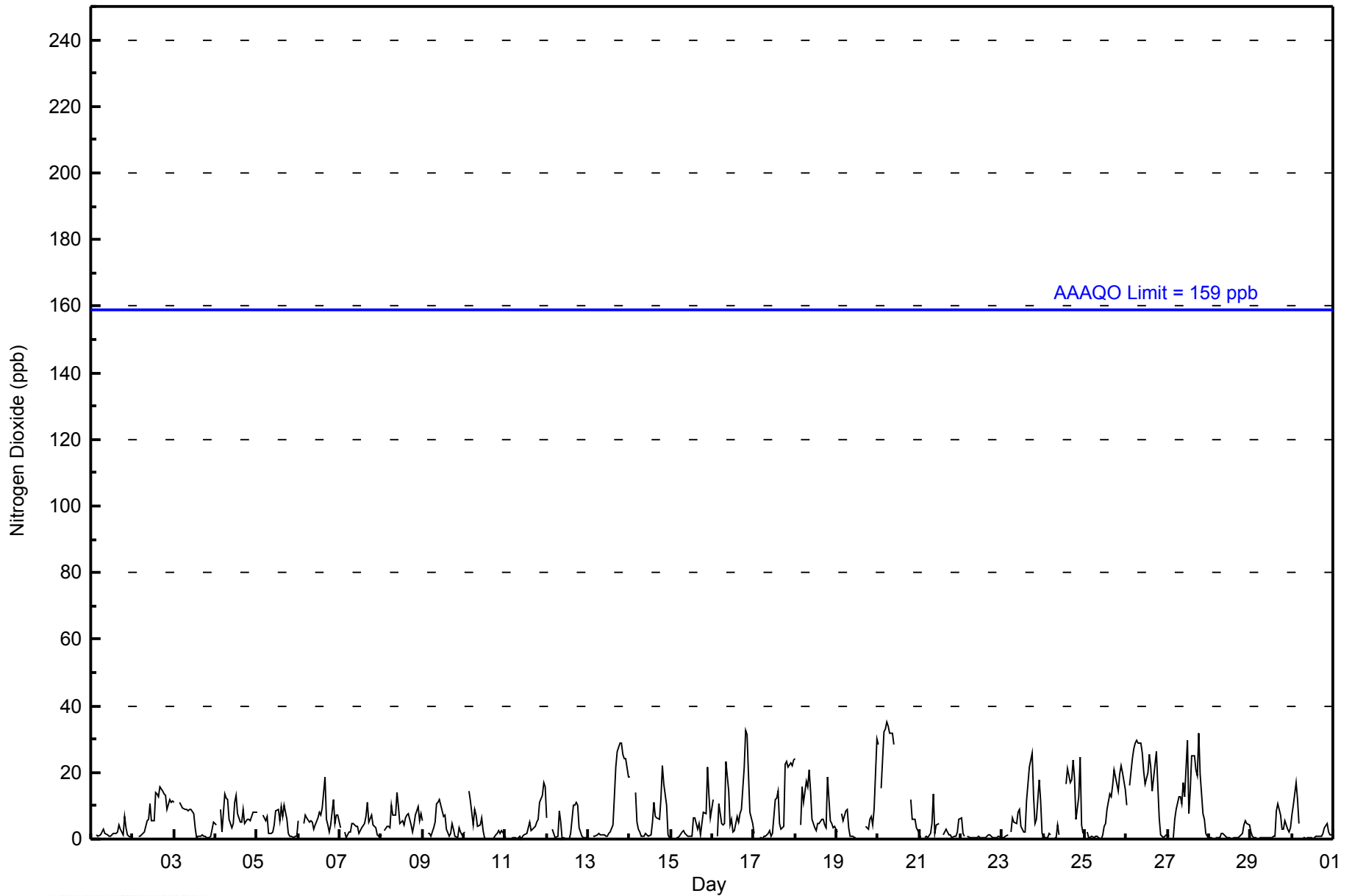
5.8	2.0	5.4	5.7	5.7	5.6	6.3	6.1	6.9	5.9	4.7	4.8	4.4	5.8	7.3	7.5	8.5	8.4	8.8	8.8	8.0	8.4	6.4	6.2	Diurnal Average	
28	10	17	32	33	35	34	32	32	29	21	30	20	25	25	25	22	26	32	33	31	24	24	30	Diurnal Maximum	

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



WBEA
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
CNRL Horizon - November 2014





WBEA
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
CNRL Horizon - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	600	91.88	91.88
21 - 40	53	8.12	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: 653

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
CNRL Horizon - November 2014

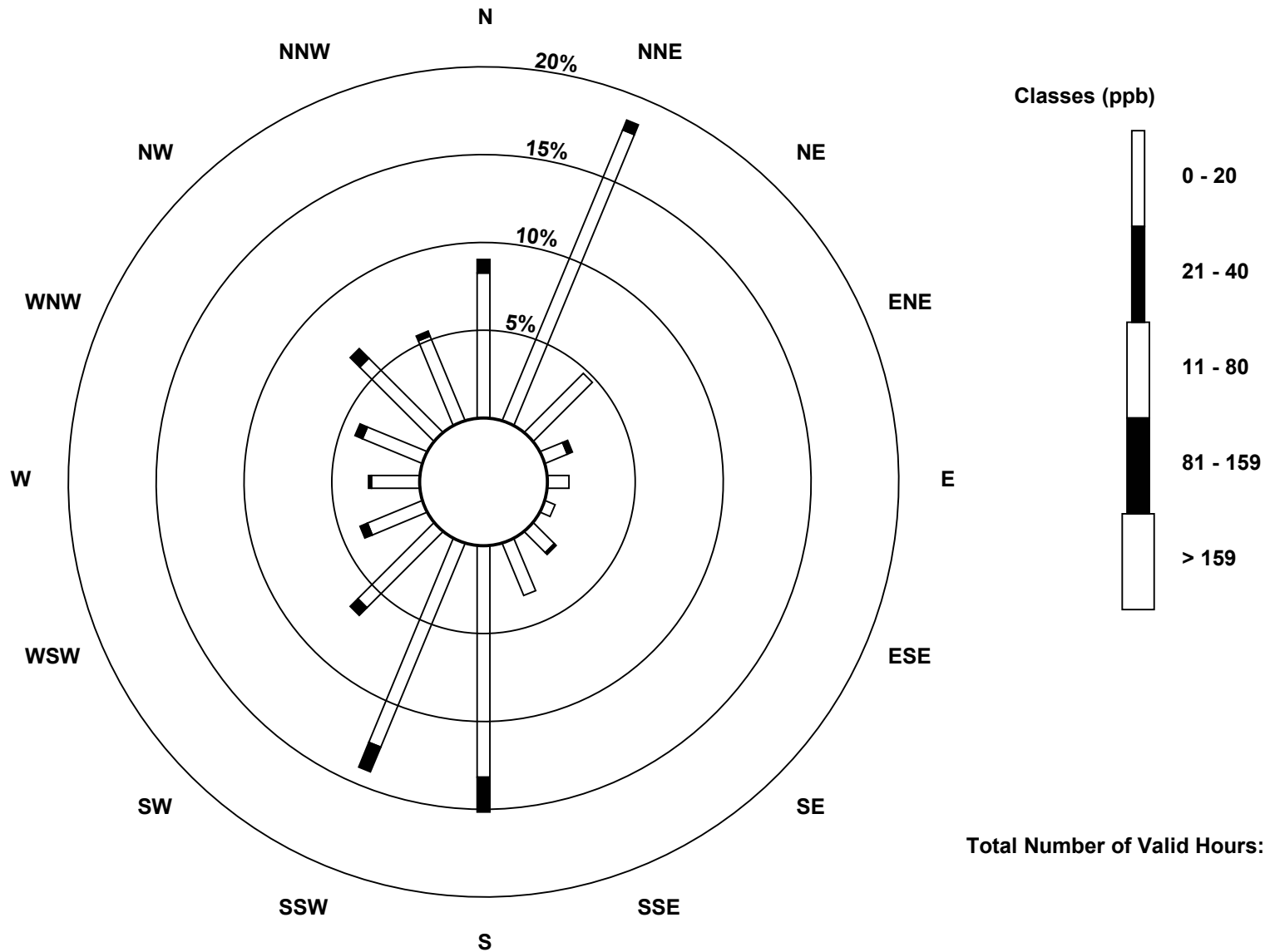
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	54	117	31	9	8	4	11	21	86	82	40	22	18	24	39	34	600
21 - 40	5	4	0	2	0	0	1	0	13	10	4	3	1	3	5	2	53
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	59	121	31	11	8	4	12	21	99	92	44	25	19	27	44	36	653

Total Number of Valid Hours: 653

Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

Nitrogen Dioxide (NO₂) - ppb
CNRL Horizon (AMS 15)

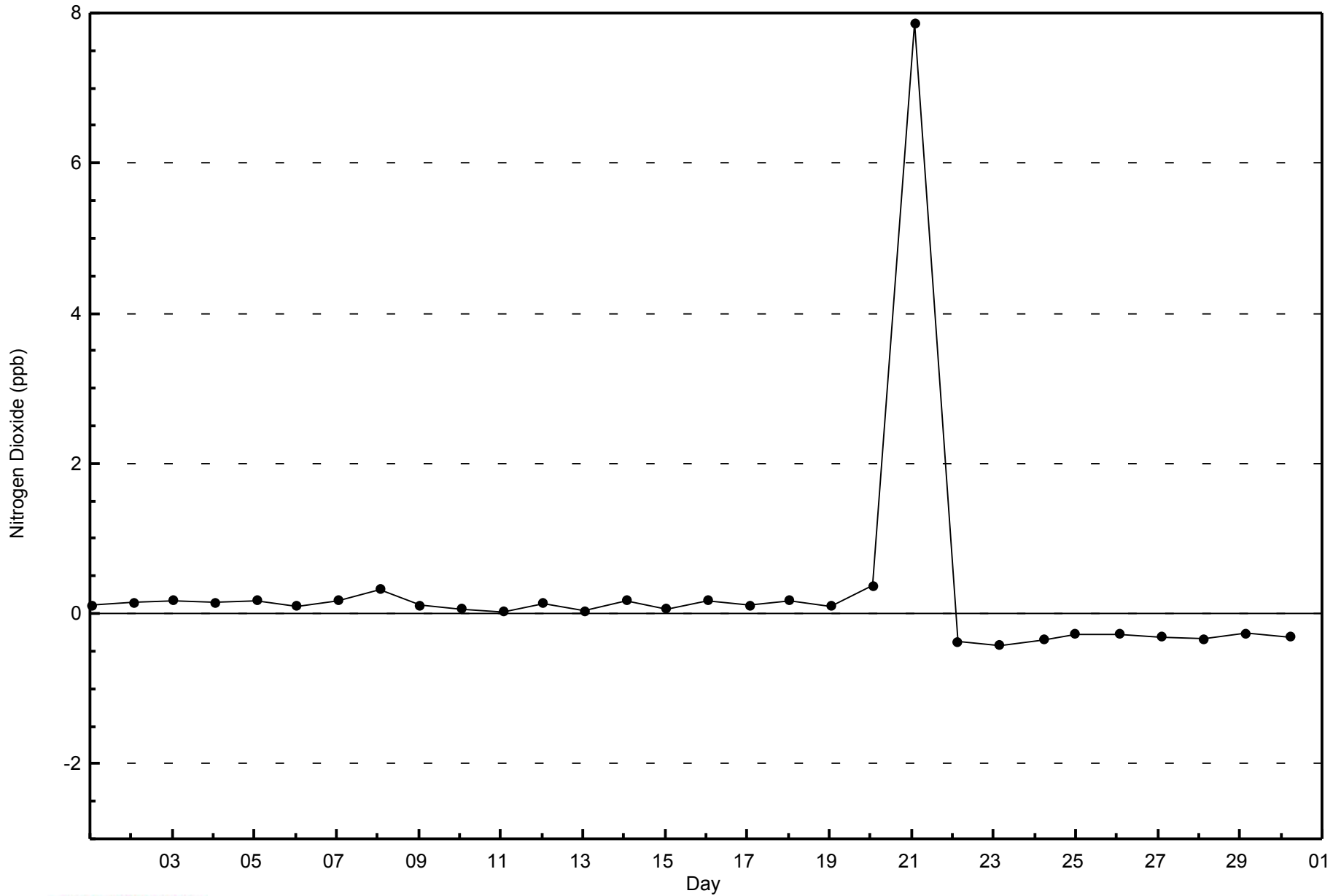


Total Number of Valid Hours: 653



WBEA
Zero Responses

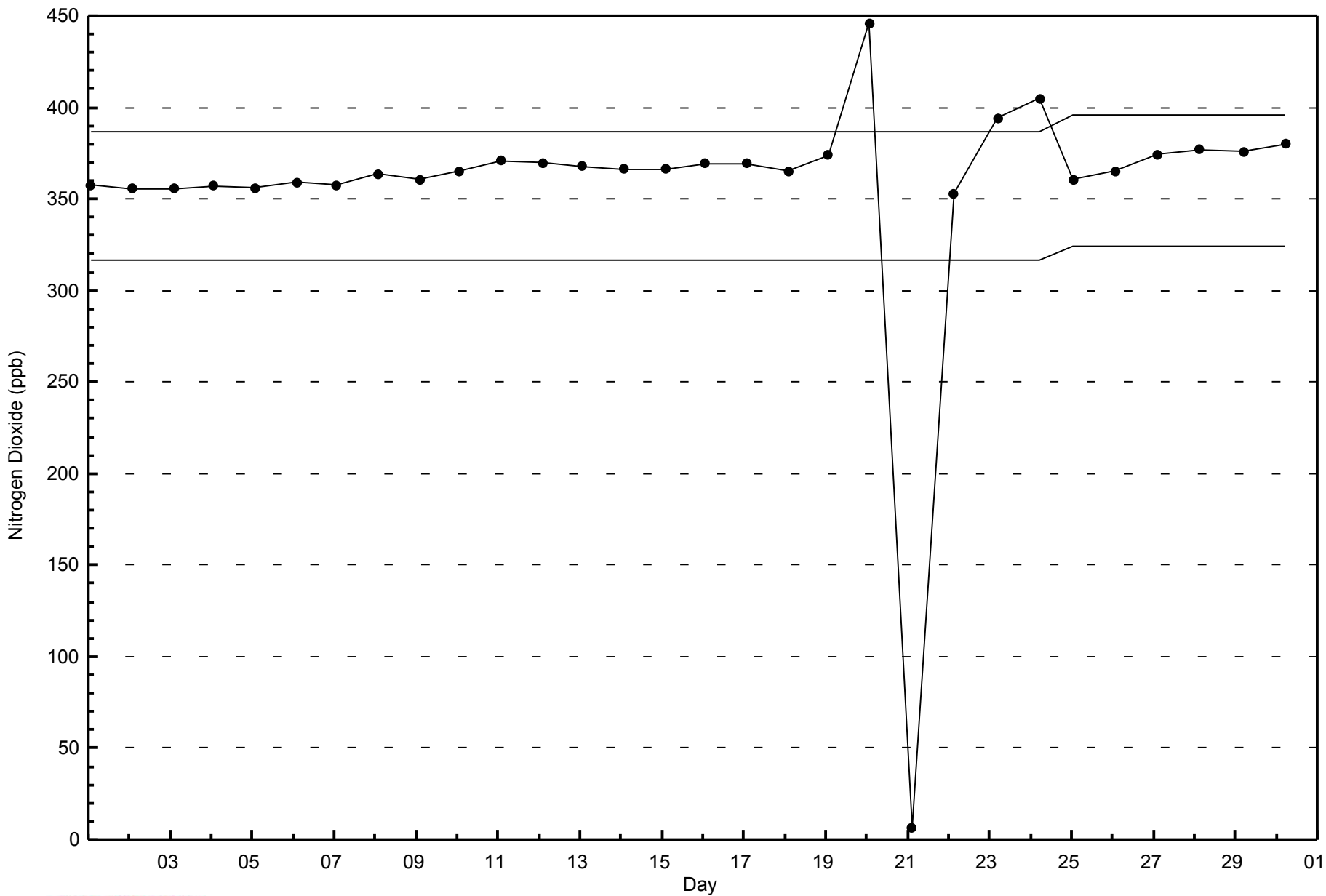
Nitrogen Dioxide (NO₂) - ppb
CNRL Horizon - November 2014





WBEA
Span Responses

Nitrogen Dioxide (NO₂) - ppb
CNRL Horizon - November 2014



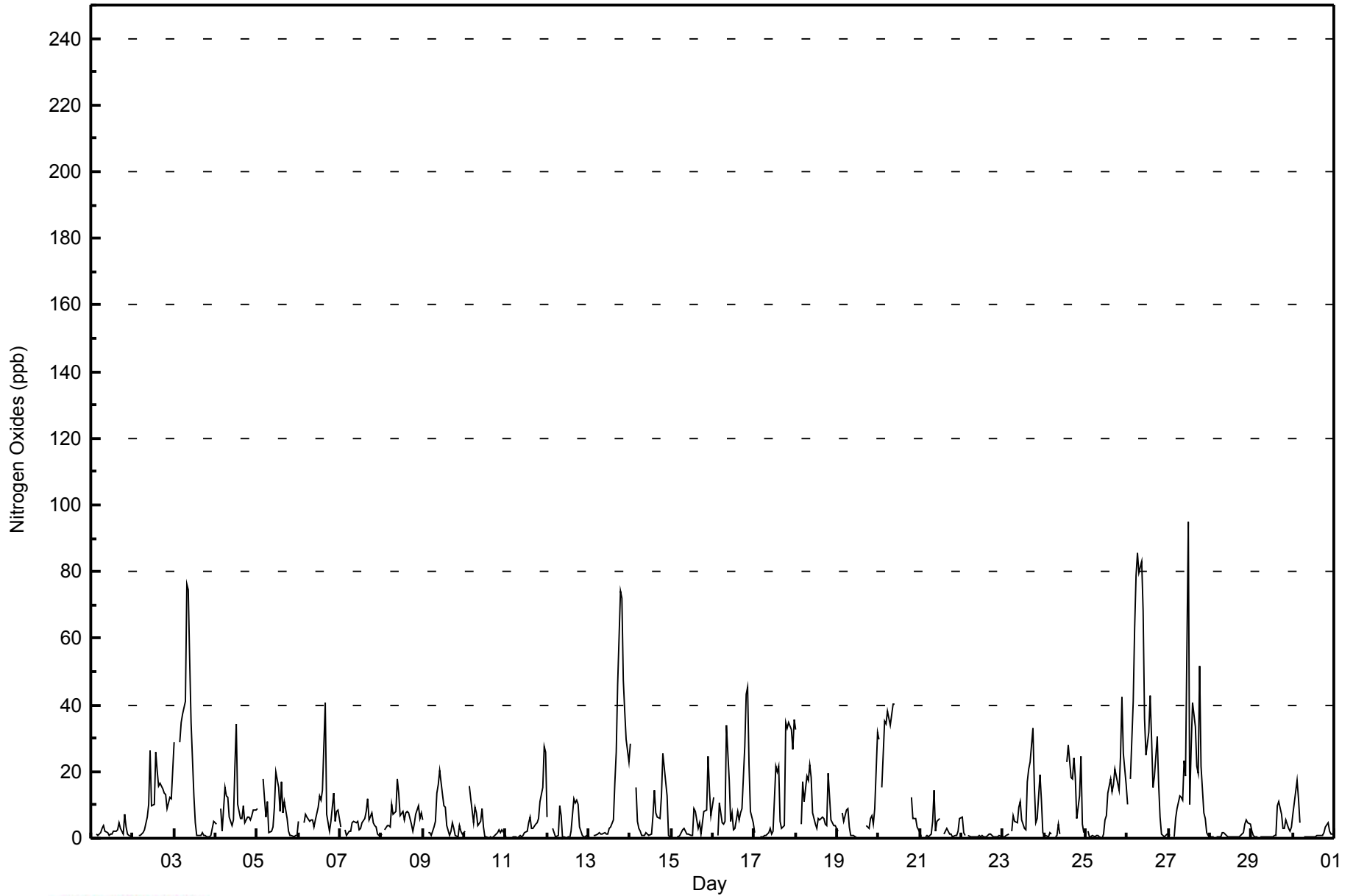


Maximum Value: 95 ppb on Nov 27 12:00																		Maximum Daily Average: 34.1 ppb on Nov 26																		Hours in Service: 720	
Minimum Value: 0 ppb on Nov 12 14:00																		Minimum Daily Average: 0.9 ppb on Nov 22																		Hours of Data: 653	
Maximum Diurnal Average: 12.0 ppb at hour 9																		Minimum Diurnal Average: 2.0 ppb at hour 2																		Hours of Missing Data: 67	
Monthly Average: 9.1 ppb																		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 4 Q ₃ = 11 P ₉₀ = 25 P ₉₉ = 75																		Hours of Calibration: 44	
																																				Percent Operational Time: 96.8	
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-Nov	3	Z	UO	1	1	2	3	4	2	2	1	1	1	2	2	2	5	3	1	7	3	1	1	0	2.2	7											
2-Nov	1	Z	UO	1	1	1	2	2	6	10	26	10	10	26	20	16	17	15	14	13	9	12	12	20	11.1	26											
3-Nov	29	Z	UO	29	35	37	41	76	75	54	35	13	5	1	1	1	2	1	1	1	1	3	5	20.1	76												
4-Nov	4	Z	UO	9	2	15	13	12	6	4	6	21	34	10	6	6	10	5	6	6	6	7	8	9	9.3	34											
5-Nov	9	Z	UO	18	12	6	11	2	2	3	9	20	15	8	17	8	11	6	2	1	1	1	1	7.4	20												
6-Nov	5	Z	UO	5	7	6	5	5	5	3	6	9	13	12	15	41	7	5	2	5	13	5	8	9	8.7	41											
7-Nov	4	Z	UO	3	1	2	2	5	5	5	5	3	3	4	6	8	12	5	8	4	4	3	1	0	4.2	12											
8-Nov	1	Z	2	4	4	3	10	7	8	18	14	7	8	5	8	8	8	4	2	4	7	10	6	8	6.8	18											
9-Nov	5	Z	UO	2	2	1	3	5	14	16	20	13	10	9	4	1	2	5	3	1	0	4	2	1	5.6	20											
10-Nov	2	Z	UO	16	12	4	9	8	4	5	9	4	0	0	0	0	0	0	1	2	2	2	2	1	3.9	16											
11-Nov	0	Z	UO	0	1	0	0	0	1	0	1	2	2	5	6	3	3	4	5	6	11	15	28	26	5.4	28											
12-Nov	6	Z	UO	3	2	0	1	10	7	0	0	0	0	0	2	12	11	11	10	3	1	1	0	1	3.7	12											
13-Nov	1	Z	UO	1	1	1	2	1	1	1	1	1	3	3	6	16	26	46	74	72	47	38	30	23	18.0	74											
14-Nov	29	Z	UO	15	5	3	2	1	1	2	1	1	1	7	14	7	6	13	25	21	13	1	0	0	8.0	29											
15-Nov	0	Z	UO	0	0	1	2	3	2	1	1	1	1	9	8	3	5	1	4	8	8	25	14	7	4.8	25											
16-Nov	12	Z	UO	1	11	5	4	5	34	17	5	7	2	3	8	5	7	9	28	43	45	22	8	5	13.1	45											
17-Nov	2	Z	UO	0	0	0	1	1	2	3	1	2	22	20	22	5	3	4	35	33	35	33	27	36	13.0	36											
18-Nov	33	Z	UO	4	17	11	19	17	22	18	8	4	3	6	5	6	6	4	4	19	6	5	4	4	10.2	33											
19-Nov	2	Z	UO	8	5	9	9	4	1	1	0	1	C	C	C	C	C	C	4	3	6	7	4	9	32	--	32										
20-Nov	30	Z	15	35	34	38	36	34	40	40	C	C	C	C	C	C	C	C	C	12	6	6	4	2	--	40											
21-Nov	2	1	Z	1	1	0	1	5	14	2	5	6	M	M	1	3	2	1	1	0	1	1	2	6	2.7	14											
22-Nov	6	2	1	Z	1	1	0	0	0	1	1	1	1	0	0	1	1	1	0	0	0	1	1	0	0.9	6											
23-Nov	1	0	1	1	Z	2	7	5	5	9	11	5	3	3	17	21	23	33	16	5	6	19	11	2	8.9	33											
24-Nov	1	1	0	2	1	Z	1	1	4	1	M	M	M	23	28	18	18	24	18	6	13	25	4	2	9.5	28											
25-Nov	Z	2	0	1	1	0	1	1	0	0	1	5	7	13	18	14	16	21	17	14	24	42	26	16	10.5	42											
26-Nov	10	Z	18	41	63	79	86	80	83	68	36	25	32	43	30	15	19	30	16	6	1	0	1	1	34.1	86											
27-Nov	1	1	Z	0	6	9	13	12	12	23	18	95	10	27	41	34	21	19	52	21	8	6	2	1	18.8	95											
28-Nov	0	0	0	Z	0	0	0	2	2	1	1	0	0	0	0	0	0	0	1	2	4	5	5	4	1.3	5											
29-Nov	2	1	0	0	Z	0	1	0	0	0	0	1	1	1	1	10	11	7	3	3	5	3	2	4	2.5	11											
30-Nov	7	11	18	12	5	Z	1	1	0	0	0	0	0	0	1	1	1	1	2	4	5	2	1	1	3.1	18											
																		7.2 2.0 5.6 7.5 8.2 8.6 9.5 10.3 12.0 10.4 8.0 9.2 7.2 8.9 10.2 9.5 9.0 9.5 11.8 11.1 10.1 10.3 7.4 7.5																		Diurnal Average	
																		33 11 18 41 63 79 86 80 83 68 36 95 34 43 41 41 26 46 74 72 47 42 30 36																		Diurnal Maximum	
Z - zerospan			C - Calibration			M - Maintenance			UO - Unstable Operation																												



WBEA
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
CNRL Horizon - November 2014





WBEA
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
CNRL Horizon - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	569	87.14	87.14
21 - 40	61	9.34	96.48
41 - 80	20	3.06	99.54
81 - 159	3	0.46	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 653

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
CNRL Horizon - November 2014

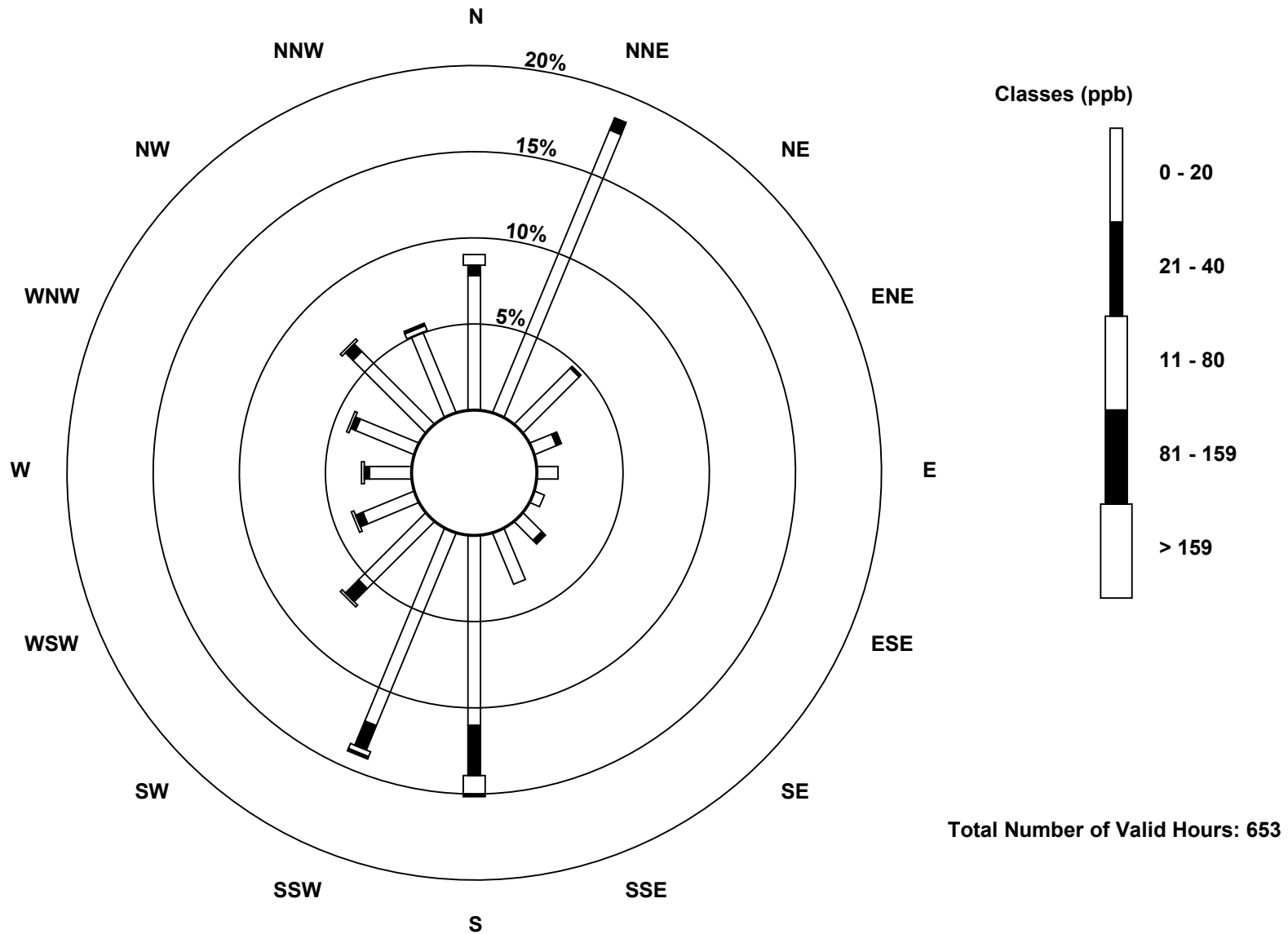
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	51	116	30	9	8	4	10	21	72	79	36	21	16	24	39	33	569
21 - 40	4	5	1	2	0	0	2	0	19	10	7	3	2	2	4	0	61
11 - 80	4	0	0	0	0	0	0	0	7	2	1	1	1	1	1	2	20
81 - 159	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	3
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	59	121	31	11	8	4	12	21	99	92	44	25	19	27	44	36	653

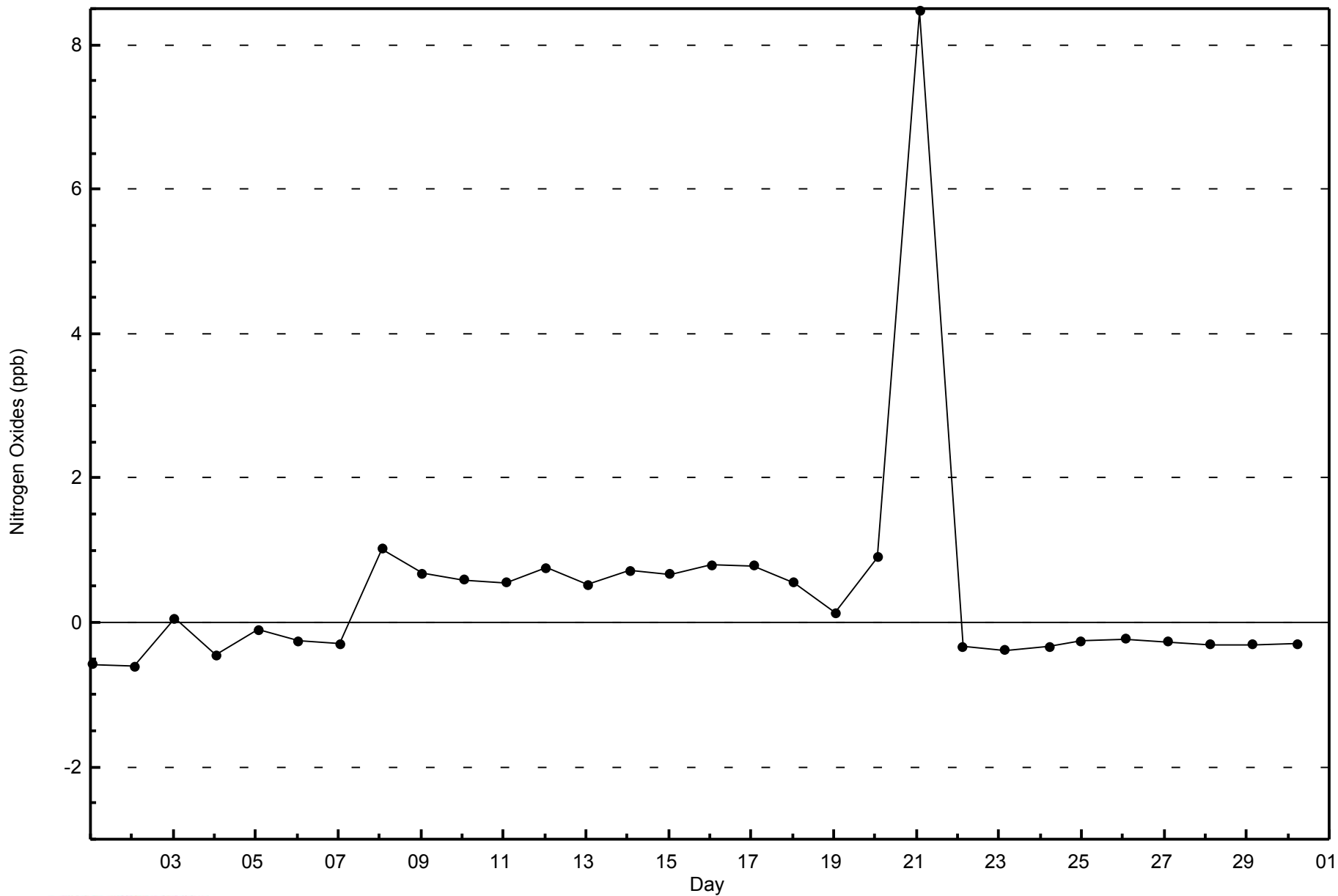
Total Number of Valid Hours: 653

Total Number of Hours: 720

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

**Nitrogen Oxides (NO_x) - ppb
CNRL Horizon (AMS 15)**

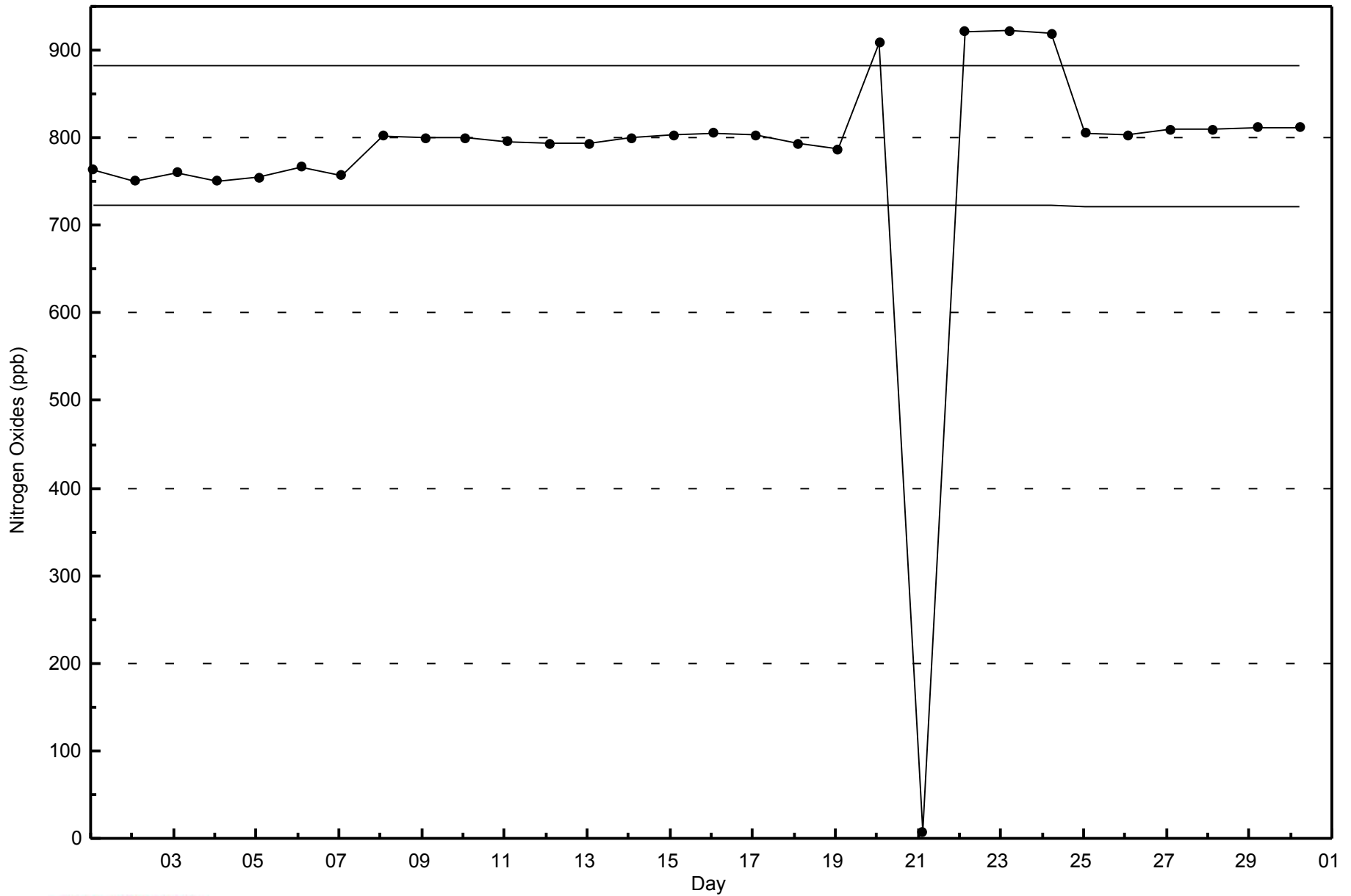






WBEA
Span Responses

Nitrogen Oxides (NO_x) - ppb
CNRL Horizon - November 2014





Number of Exceedences (AAAQO):	24-hr: 0	Hours in Service:	720
Maximum Value: 37.3 µg/m ³ on Nov 20 04:00	Maximum Daily Average: 13.5 µg/m ³ on Nov 20	Hours of Data:	715
Minimum Value: 0.2 µg/m ³ on Nov 17 03:00	Minimum Daily Average: 1.0 µg/m ³ on Nov 22	Hours of Missing Data:	5
Maximum Diurnal Average: 6.2 µg/m ³ at hour 18	Minimum Diurnal Average: 3.2 µg/m ³ at hour 13	Hours of Calibration:	0
Monthly Average: 4.43 µg/m ³	Percentiles: P ₁ = 0.5 P ₁₀ = 1.0 Q ₁ = 1.8 Median = 3.3 Q ₃ = 5.5 P ₉₀ = 9.8 P ₉₉ = 18.6	Percent Operational Time:	99.3

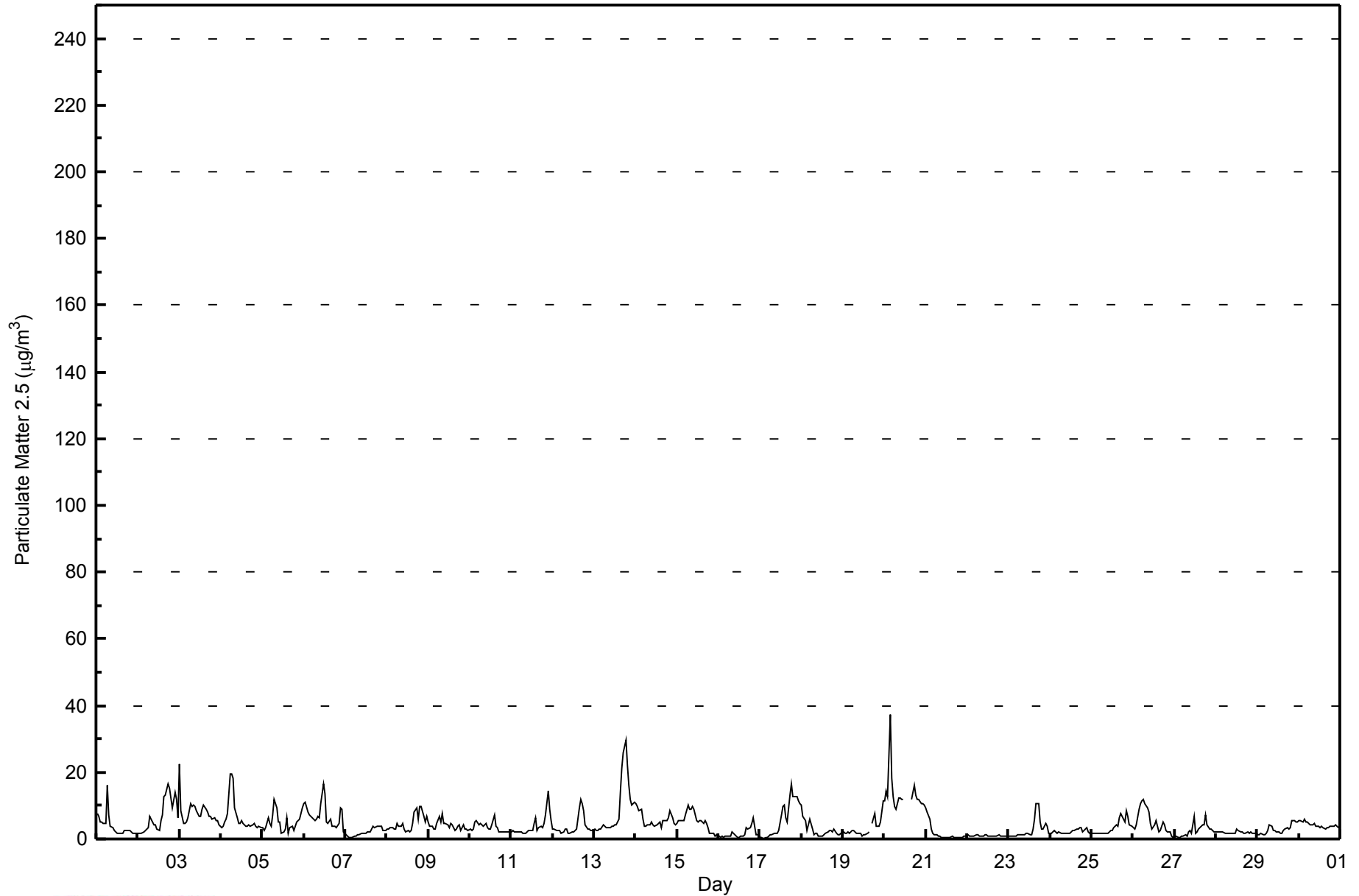
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Nov	7.6	6.7	5.2	5.1	4.6	4.7	16.0	7.2	3.8	3.3	2.5	2.0	1.6	1.7	1.6	1.7	2.4	2.5	2.6	2.7	2.2	1.8	1.6	1.6	3.9	16.0																						
2-Nov	1.6	1.6	1.8	2.1	2.4	2.8	3.3	6.9	5.0	4.1	4.3	2.9	2.7	5.5	7.2	12.8	13.1	16.4	15.3	12.1	9.3	14.0	12.1	6.4	6.9	16.4																						
3-Nov	22.6	8.5	4.4	4.5	5.1	6.2	10.6	9.9	10.0	9.7	8.5	6.7	6.8	8.8	10.3	8.8	7.9	7.0	6.7	6.1	6.3	5.4	5.4	4.1	7.9	22.6																						
4-Nov	3.3	3.6	5.2	6.1	7.8	19.5	19.6	18.1	9.4	6.4	4.8	4.6	5.5	4.6	4.0	3.7	4.1	4.0	4.4	4.7	3.7	3.4	3.9	3.3	6.6	19.6																						
5-Nov	3.3	2.6	3.4	6.2	4.7	3.7	7.2	11.7	9.3	4.9	4.9	1.8	1.9	2.9	6.1	1.8	3.2	3.8	2.4	3.6	5.1	5.9	7.5	9.3	4.9	11.7																						
6-Nov	10.5	11.1	8.1	7.1	6.8	6.3	5.7	6.0	6.6	6.4	10.8	16.6	13.5	5.1	4.8	5.8	4.0	4.0	4.0	3.5	4.6	9.4	8.8	2.0	7.1	16.6																						
7-Nov	1.1	0.8	0.6	0.5	0.5	0.7	0.9	1.1	1.3	1.6	1.6	1.8	1.8	2.1	2.3	2.8	3.7	3.5	3.6	3.7	3.8	3.6	2.7	2.6	2.0	3.8																						
8-Nov	3.2	3.2	3.4	3.5	3.2	3.1	4.6	3.7	4.0	4.8	2.9	2.2	2.3	2.1	2.6	4.5	8.0	9.3	5.8	9.6	9.5	6.8	4.9	6.8	4.7	9.6																						
9-Nov	5.0	3.8	3.9	3.2	3.1	4.5	6.6	5.1	7.8	4.8	4.7	4.3	3.2	4.7	4.2	2.7	2.8	4.0	4.2	2.7	4.1	3.0	3.0	2.7	4.1	7.8																						
10-Nov	2.8	2.4	2.8	5.1	5.7	4.2	4.8	4.3	3.7	4.7	3.2	2.8	2.8	4.2	7.3	3.9	3.2	2.2	2.0	2.0	2.3	2.3	2.2	2.2	3.5	7.3																						
11-Nov	2.1	2.4	2.3	2.3	2.3	2.2	2.2	1.7	1.5	2.3	2.6	2.6	2.8	4.5	6.2	2.4	3.4	3.9	3.5	4.5	7.2	14.3	9.1	5.7	3.9	14.3																						
12-Nov	3.1	3.0	2.6	2.6	2.4	1.8	2.1	2.8	2.8	1.8	1.9	2.3	2.3	2.6	3.1	9.3	11.7	10.5	8.4	4.4	3.1	3.0	2.7	2.6	3.9	11.7																						
13-Nov	2.9	2.7	2.7	2.8	2.9	4.1	3.9	3.2	3.5	3.6	3.7	3.7	4.3	4.4	5.9	14.0	21.0	25.9	29.8	21.9	15.9	11.7	10.2	11.0	9.0	29.8																						
14-Nov	10.7	9.8	8.4	8.9	5.9	3.9	3.9	4.3	4.3	5.0	4.3	3.9	4.1	4.6	4.9	3.4	5.5	5.6	5.7	6.3	8.5	6.6	4.6	4.4	5.7	10.7																						
15-Nov	4.9	5.4	5.5	5.4	5.7	7.4	10.2	8.9	9.0	9.6	9.1	5.6	4.9	5.6	5.3	4.8	5.7	4.9	3.4	1.9	1.6	1.9	0.9	1.3	5.4	10.2																						
16-Nov	0.9	0.5	0.8	0.6	0.8	0.8	0.9	0.9	2.3	1.4	0.7	0.6	0.5	0.7	1.0	1.3	3.3	3.0	3.3	4.8	6.5	3.9	1.5	1.2	1.8	6.5																						
17-Nov	0.5	0.3	0.2	0.4	0.4	0.8	1.3	1.2	1.5	1.8	1.8	2.6	7.0	9.8	10.1	6.3	5.2	13.1	16.5	12.8	12.9	12.7	11.6	10.8	5.9	16.5																						
18-Nov	10.2	6.7	5.4	2.6	4.3	5.9	2.9	1.2	1.8	1.8	1.0	0.7	1.0	1.4	1.7	2.0	2.5	2.4	2.2	2.8	1.5	1.2	1.3	1.9	2.8	10.2																						
19-Nov	2.1	1.6	1.7	2.0	1.8	2.4	2.5	1.9	1.6	1.8	1.5	1.0	1.1	1.4	1.6	2.2	M	4.6	7.5	4.0	3.9	3.7	5.2	11.4	3.0	11.4																						
20-Nov	11.6	14.5	12.8	37.3	18.2	12.7	9.8	9.1	12.1	12.3	11.9	11.8	M	M	M	M	11.9	16.1	13.0	11.8	11.9	10.7	10.8	10.2	13.5	37.3																						
21-Nov	9.2	7.9	6.0	3.1	1.8	1.2	1.1	1.1	0.7	0.4	0.5	0.5	0.4	0.5	0.5	0.7	0.5	0.5	0.6	0.5	0.5	0.5	0.7	0.9	1.7	9.2																						
22-Nov	1.1	0.7	0.7	0.8	0.8	1.3	1.2	0.9	1.0	1.0	1.1	1.1	1.0	1.0	0.9	0.9	0.9	0.9	1.2	1.0	0.8	1.0	0.9	1.0	1.0	1.3																						
23-Nov	1.0	1.0	1.0	1.0	1.0	1.1	1.4	1.2	1.2	1.4	1.8	1.6	1.2	1.4	3.2	6.1	10.4	10.7	5.3	3.1	3.0	4.5	3.9	1.9	2.9	10.7																						
24-Nov	1.6	1.9	2.4	2.0	1.8	1.9	1.5	1.5	1.7	1.6	1.5	1.8	2.2	2.4	2.7	2.8	2.9	3.6	3.3	2.2	3.0	3.5	2.0	1.7	2.2	3.6																						
25-Nov	1.8	1.9	1.6	1.7	1.6	1.6	1.6	1.7	1.6	1.6	2.2	2.5	2.7	3.4	4.3	3.9	6.3	7.4	6.0	5.1	8.7	7.0	4.2	3.8	3.5	8.7																						
26-Nov	3.4	3.1	4.4	9.0	10.4	11.5	11.7	10.4	9.4	7.9	4.8	3.1	4.3	5.6	3.6	2.2	2.4	5.0	4.4	2.7	2.3	1.9	0.7	0.4	5.2	11.7																						
27-Nov	0.8	0.8	0.6	0.6	0.8	0.9	1.1	1.0	2.0	2.4	1.8	6.8	1.5	2.2	3.1	4.0	4.1	4.1	7.3	4.1	3.1	2.8	2.4	2.3	2.5	7.3																						
28-Nov	2.3	2.0	2.0	1.9	1.9	1.8	1.8	1.9	1.6	1.7	1.7	1.9	3.0	2.4	2.3	2.1	1.7	1.8	1.9	1.9	2.0	1.7	1.9	1.7	1.9	3.0																						
29-Nov	1.5	1.5	1.6	1.5	1.5	1.7	2.6	4.1	3.8	2.7	2.6	2.3	1.9	1.8	1.8	2.6	3.0	3.2	2.9	3.4	5.4	5.3	5.1	5.3	2.9	5.4																						
30-Nov	5.7	5.5	5.1	6.1	4.9	5.0	4.2	4.2	4.3	4.5	3.9	3.8	3.3	3.7	3.2	2.9	3.3	3.5	3.9	3.7	4.0	4.3	3.8	3.3	4.2	6.1																						
																								4.6	3.9	3.6	4.5	3.8	4.2	4.9	4.6	4.3	3.9	3.6	3.5	3.2	3.5	4.0	4.2	5.5	6.2	6.0	5.1	5.2	5.3	4.5	4.1	Diurnal Average
																								22.6	14.5	12.8	37.3	18.2	19.5	19.6	18.1	12.1	12.3	11.9	16.6	13.5	9.8	10.3	14.0	21.0	25.9	29.8	21.9	15.9	14.3	12.1	11.4	Diurnal Maximum

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



WBEA
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
CNRL Horizon - November 2014





WBEA
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
CNRL Horizon - November 2014

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	469	65.59	65.59
6 - 15	162	22.66	88.25
16 - 25	13	1.82	90.07
26 - 80	3	0.42	90.49
> 81.0	0	0.00	90.49

Total Number of Valid Hours: 715

Total Number of Hours: 720



WBEA
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
CNRL Horizon - November 2014

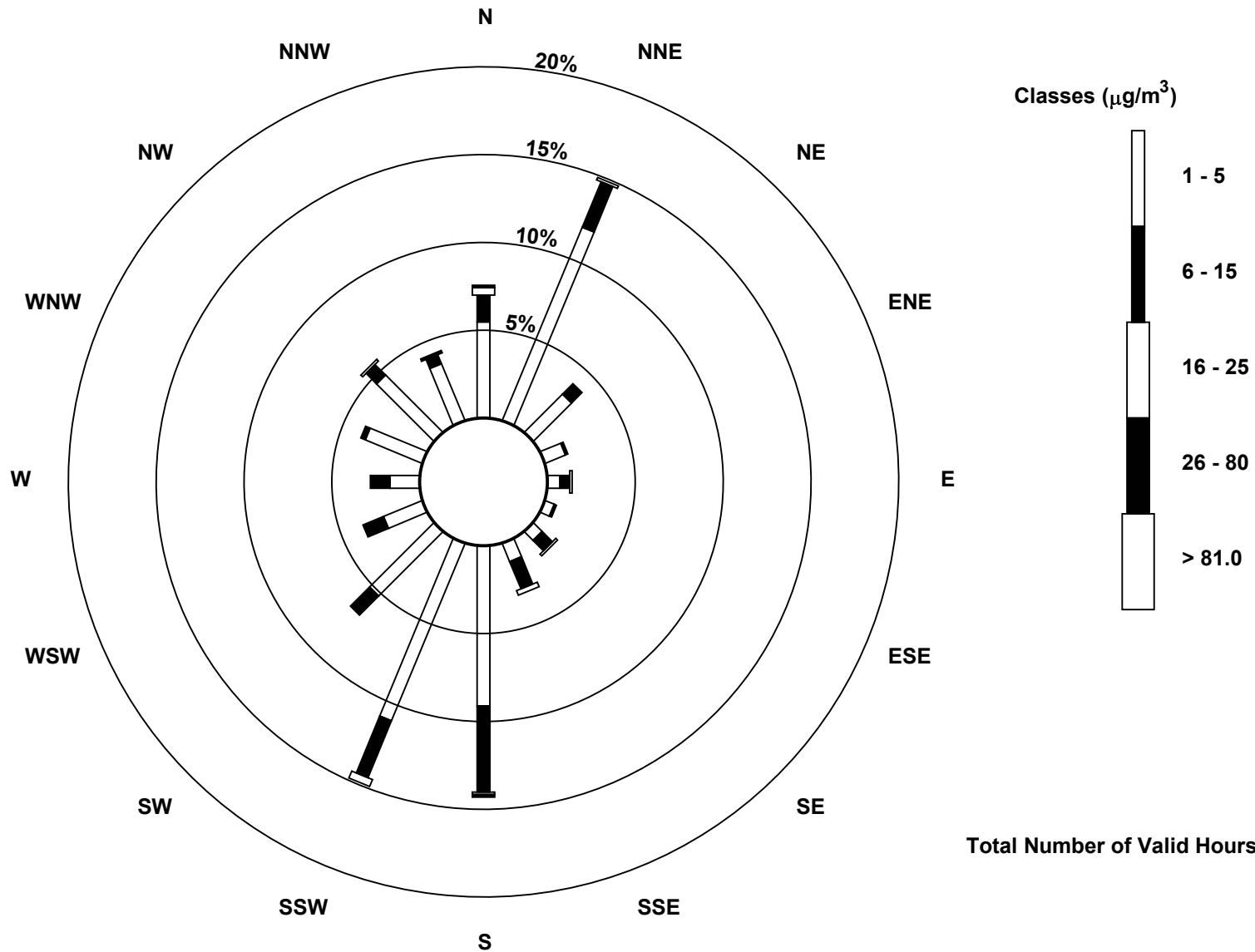
Concentration Ranges (μg/m ³)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	39	85	22	9	5	4	5	8	65	78	37	17	12	25	33	25	469
6 - 15	11	20	6	1	4	1	6	12	35	25	11	9	8	2	6	4	161
16 - 25	3	1	0	0	1	0	1	2	1	3	0	0	0	0	1	0	13
26 - 80	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	3
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	54	106	28	10	10	5	12	22	102	106	48	26	20	27	40	30	646

Total Number of Valid Hours: 713

Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
CNRL Horizon (AMS 15)



Total Number of Valid Hours: 713



Maximum Value: 9.6 C on Nov 1 14:00	Maximum Daily Average: 2.7 C on Nov 1	Hours in Service: 720
Minimum Value: -30.2 C on Nov 25 22:00	Minimum Daily Average: -24.4 C on Nov 30	Hours of Data: 715
Maximum Diurnal Average: -9.4 C at hour 15	Minimum Diurnal Average: -13.6 C at hour 24	Hours of Missing Data: 5
Monthly Average: -12.19 C	Percentiles: P ₁ = -28.3 P ₁₀ = -23.2 Q ₁ = -18.1 Median = -12.9 Q ₃ = -5.9 P ₉₀ = -0.9 P ₉₉ = 4.8	Hours of Calibration: 0
		Percent Operational Time: 99.3

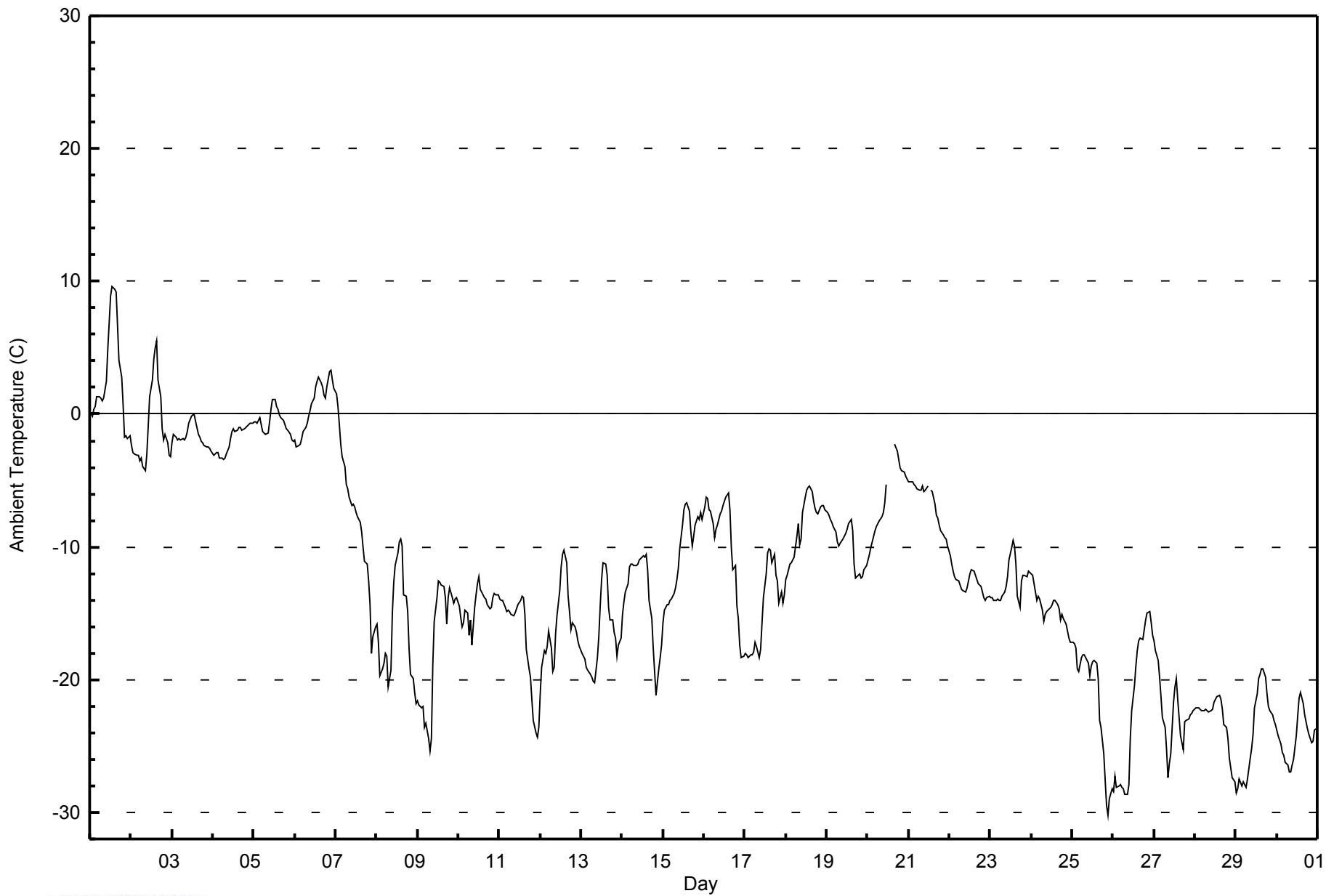
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Nov	0.1	-0.2	0.4	0.6	1.3	1.4	1.2	1.0	1.2	2.5	4.9	6.9	8.8	9.6	9.4	9.2	6.6	4.0	2.8	0.7	-1.7	-1.6	-1.9	-1.7	2.7	9.6																						
2-Nov	-2.4	-2.9	-3.0	-3.1	-3.1	-3.6	-3.3	-3.9	-4.3	-3.0	-0.9	1.3	2.6	4.1	5.0	5.5	2.6	1.3	-1.1	-1.9	-1.5	-2.2	-3.1	-3.2	-1.0	5.5																						
3-Nov	-2.2	-1.5	-1.7	-1.9	-1.8	-1.9	-1.8	-2.0	-1.7	-1.3	-0.7	-0.2	0.0	0.0	-0.6	-1.5	-1.8	-2.1	-2.2	-2.4	-2.4	-2.5	-2.6	-2.8	-1.7	0.0																						
4-Nov	-3.1	-3.0	-2.9	-2.9	-3.3	-3.3	-3.4	-3.3	-3.0	-2.5	-1.9	-1.3	-1.1	-1.3	-1.2	-1.0	-1.0	-1.2	-1.1	-1.0	-0.9	-0.8	-0.7	-0.7	-1.9	-0.7																						
5-Nov	-0.6	-0.6	-0.7	-0.3	-0.8	-1.3	-1.4	-1.6	-1.4	-0.6	0.4	1.1	1.1	0.6	0.3	0.0	-0.3	-0.5	-0.8	-1.1	-1.2	-1.6	-1.9	-2.0	-0.6	1.1																						
6-Nov	-1.9	-2.4	-2.3	-2.2	-1.8	-1.3	-1.0	-0.6	-0.2	0.3	0.8	1.2	2.0	2.4	2.8	2.4	2.0	1.4	1.2	2.0	3.2	3.3	2.6	2.0	0.7	3.3																						
7-Nov	1.5	0.6	-0.8	-2.3	-3.3	-4.0	-5.3	-5.6	-6.2	-6.9	-6.8	-7.0	-7.4	-7.7	-8.2	-8.9	-10.0	-11.1	-11.3	-12.6	-14.4	-18.0	-16.7	-16.0	-7.8	1.5																						
8-Nov	-15.8	-17.2	-19.7	-19.2	-18.7	-18.0	-18.2	-20.5	-19.3	-15.0	-12.7	-11.4	-10.5	-9.6	-9.4	-10.0	-13.6	-13.7	-14.9	-17.7	-19.6	-19.9	-21.0	-21.8	-16.1	-9.4																						
9-Nov	-21.6	-21.9	-22.1	-22.0	-23.6	-23.3	-24.4	-25.4	-24.5	-18.8	-15.7	-13.8	-12.6	-12.6	-12.8	-13.0	-13.8	-15.8	-13.8	-13.1	-13.8	-14.2	-14.0	-13.8	-17.5	-12.6																						
10-Nov	-14.4	-15.3	-16.0	-15.7	-14.8	-15.0	-16.7	-15.5	-17.4	-14.5	-13.6	-12.8	-12.2	-13.2	-13.7	-13.8	-14.0	-14.3	-14.6	-14.5	-13.8	-13.5	-13.6	-13.6	-14.4	-12.2																						
11-Nov	-13.9	-14.0	-14.1	-14.6	-14.8	-14.8	-14.9	-15.1	-15.2	-15.0	-14.6	-14.3	-14.0	-13.7	-13.8	-15.1	-17.7	-19.2	-19.9	-21.5	-23.0	-24.0	-24.4	-23.6	-16.9	-13.7																						
12-Nov	-21.0	-19.0	-17.8	-18.0	-17.5	-16.3	-17.6	-19.4	-19.1	-16.5	-15.2	-13.3	-11.5	-10.6	-10.3	-11.2	-13.7	-14.8	-16.3	-15.7	-16.1	-16.4	-17.1	-17.5	-15.9	-10.3																						
13-Nov	-18.1	-18.3	-18.4	-19.1	-19.2	-19.6	-19.8	-20.1	-20.2	-18.4	-16.8	-14.5	-12.4	-11.2	-11.3	-12.1	-14.6	-15.5	-15.5	-16.5	-16.9	-18.3	-17.4	-16.9	-16.7	-11.2																						
14-Nov	-15.1	-14.2	-13.4	-12.8	-11.5	-11.3	-11.3	-11.4	-11.4	-11.3	-11.0	-10.9	-10.7	-10.7	-10.6	-11.7	-14.1	-15.4	-17.6	-19.4	-21.2	-19.2	-18.4	-17.4	-13.8	-10.6																						
15-Nov	-15.7	-14.8	-14.4	-14.4	-14.0	-13.9	-13.5	-13.1	-12.5	-11.6	-10.2	-8.4	-7.2	-6.7	-6.7	-7.3	-8.8	-9.9	-9.2	-8.4	-7.7	-7.9	-7.4	-8.0	-10.5	-6.7																						
16-Nov	-7.0	-6.3	-6.3	-7.2	-7.3	-8.2	-9.3	-8.6	-8.3	-7.5	-7.3	-6.9	-6.6	-6.3	-5.9	-7.2	-10.1	-11.8	-11.4	-14.4	-15.4	-17.4	-18.4	-18.2	-9.7	-5.9																						
17-Nov	-18.0	-18.1	-18.4	-18.2	-18.1	-18.0	-17.2	-17.6	-18.3	-17.7	-15.7	-13.8	-12.0	-10.5	-10.1	-10.2	-11.2	-10.5	-12.2	-12.6	-14.2	-13.4	-14.2	-13.6	-14.7	-10.1																						
18-Nov	-12.5	-12.1	-11.3	-11.2	-11.0	-10.8	-9.2	-8.2	-9.8	-9.4	-7.4	-6.3	-5.7	-5.5	-5.4	-5.9	-6.6	-7.1	-7.4	-7.5	-7.0	-6.8	-6.9	-7.2	-8.3	-5.4																						
19-Nov	-7.4	-7.6	-7.9	-8.2	-8.4	-8.9	-9.6	-9.9	-9.7	-9.4	-9.1	-9.0	-8.6	-8.2	-7.9	-8.8	-11.3	-12.4	-12.1	-12.0	-12.3	-12.3	-11.7	-11.4	-9.8	-7.4																						
20-Nov	-11.0	-10.6	-10.0	-9.2	-8.8	-8.5	-8.3	-8.1	-7.8	-7.4	-6.6	-5.3	M	M	M	M	-2.3	-2.8	-3.4	-4.0	-4.2	-4.4	-4.6	-4.9	-6.6	-2.3																						
21-Nov	-5.0	-5.1	-5.1	-5.3	-5.4	-5.7	-5.7	-5.8	-5.4	-5.8	-5.7	-5.5	M	-5.7	-5.8	-6.7	-7.6	-7.9	-8.3	-8.8	-9.1	-9.3	-9.5	-9.9	-6.7	-5.0																						
22-Nov	-10.7	-11.3	-11.8	-12.2	-12.5	-12.5	-12.9	-13.2	-13.3	-13.4	-13.1	-12.6	-12.0	-11.7	-11.8	-12.2	-12.5	-12.7	-13.0	-13.4	-13.8	-14.0	-13.8	-13.8	-12.7	-10.7																						
23-Nov	-13.8	-13.8	-14.0	-14.1	-13.9	-14.0	-14.0	-13.7	-13.4	-13.0	-12.3	-10.9	-10.1	-9.5	-9.9	-11.3	-13.8	-14.5	-12.6	-12.1	-12.2	-12.3	-11.8	-12.0	-12.6	-9.5																						
24-Nov	-12.0	-12.2	-13.4	-14.0	-13.7	-14.0	-14.8	-15.6	-15.1	-14.9	-14.8	-14.5	-14.4	-14.1	-14.1	-14.3	-14.7	-15.5	-15.1	-15.4	-15.9	-16.3	-16.9	-17.2	-14.7	-12.0																						
25-Nov	-17.2	-17.3	-17.6	-19.2	-19.4	-18.3	-18.2	-18.1	-18.3	-18.8	-19.7	-19.0	-18.7	-18.5	-18.8	-19.9	-23.1	-23.6	-25.5	-27.6	-29.4	-30.2	-29.0	-28.2	-21.4	-17.2																						
26-Nov	-28.4	-27.3	-28.1	-28.0	-27.9	-28.1	-28.2	-28.6	-28.6	-27.9	-24.4	-22.3	-20.5	-19.0	-17.8	-17.1	-16.8	-17.0	-16.2	-15.5	-15.0	-14.9	-15.7	-16.6	-22.1	-14.9																						
27-Nov	-17.1	-17.9	-18.6	-19.8	-21.3	-22.8	-23.6	-25.3	-27.4	-26.3	-25.6	-21.7	-20.5	-20.0	-21.5	-24.3	-24.7	-25.3	-23.2	-23.0	-22.9	-22.7	-22.6	-22.3	-22.5	-17.1																						
28-Nov	-22.1	-22.1	-22.2	-22.2	-22.3	-22.3	-22.3	-22.3	-22.4	-22.4	-22.2	-21.8	-21.5	-21.2	-21.2	-21.5	-22.3	-23.4	-23.6	-24.4	-25.9	-26.6	-27.4	-27.7	-23.0	-21.2																						
29-Nov	-28.5	-28.3	-27.4	-28.0	-27.7	-27.9	-28.1	-27.5	-25.9	-25.2	-24.1	-22.1	-21.1	-19.9	-19.6	-19.2	-19.2	-19.8	-21.1	-22.0	-22.4	-22.6	-23.0	-23.4	-23.9	-19.2																						
30-Nov	-23.8	-24.2	-24.8	-25.5	-25.7	-26.3	-26.4	-26.9	-27.0	-26.4	-26.0	-24.2	-22.8	-21.4	-20.9	-21.8	-22.6	-23.2	-23.7	-24.2	-24.7	-24.6	-23.8	-23.7	-24.4	-20.9																						
																								-12.6	-12.6	-12.8	-13.0	-13.0	-13.1	-13.3	-13.5	-13.5	-12.6	-11.6	-10.4	-10.0	-9.4	-9.4	-10.0	-11.0	-11.8	-12.1	-12.7	-13.2	-13.5	-13.6	-13.6	Diurnal Average
																								1.5	0.6	0.4	0.6	1.3	1.4	1.2	1.0	1.2	2.5	4.9	6.9	8.8	9.6	9.4	9.2	6.6	4.0	2.8	2.0	3.2	3.3	2.6	2.0	Diurnal Maximum

M - Maintenance



WBEA
Hourly Averages

Ambient Temperature (AT) - C
CNRL Horizon - November 2014





WBEA
Cumulative Frequency Distribution

Ambient Temperature (AT) - C
CNRL Horizon - November 2014

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	128	17.90	17.90
-20 - 0	539	75.38	93.29
0 - 10	48	6.71	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

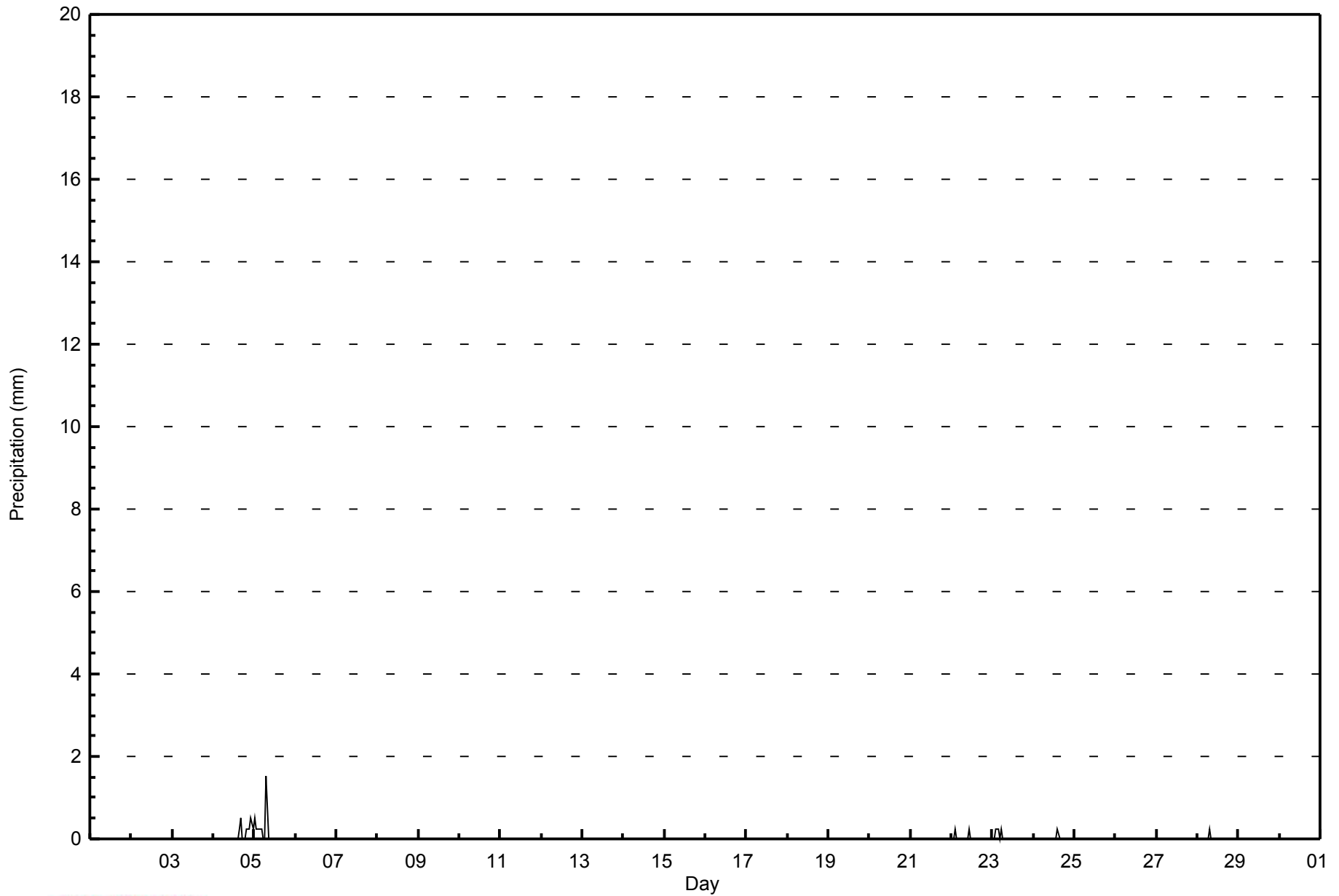
Total Number of Valid Hours: 715

Total Number of Hours: 720



Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
CNRL Horizon - November 2014





Maximum Value: 99 % on Nov 3 05:00	Maximum Daily Average: 95.8 % on Nov 3	Hours in Service: 720
Minimum Value: 51 % on Nov 7 15:00	Minimum Daily Average: 62.6 % on Nov 7	Hours of Data: 715
Maximum Diurnal Average: 82.4 % at hour 2	Minimum Diurnal Average: 70.5 % at hour 14	Hours of Missing Data: 5
Monthly Average: 79.1 %	Percentiles: P ₁ = 53 P ₁₀ = 66 Q ₁ = 74 Median = 80 Q ₃ = 84 P ₉₀ = 93 P ₉₉ = 98	Hours of Calibration: 0
		Percent Operational Time: 99.3

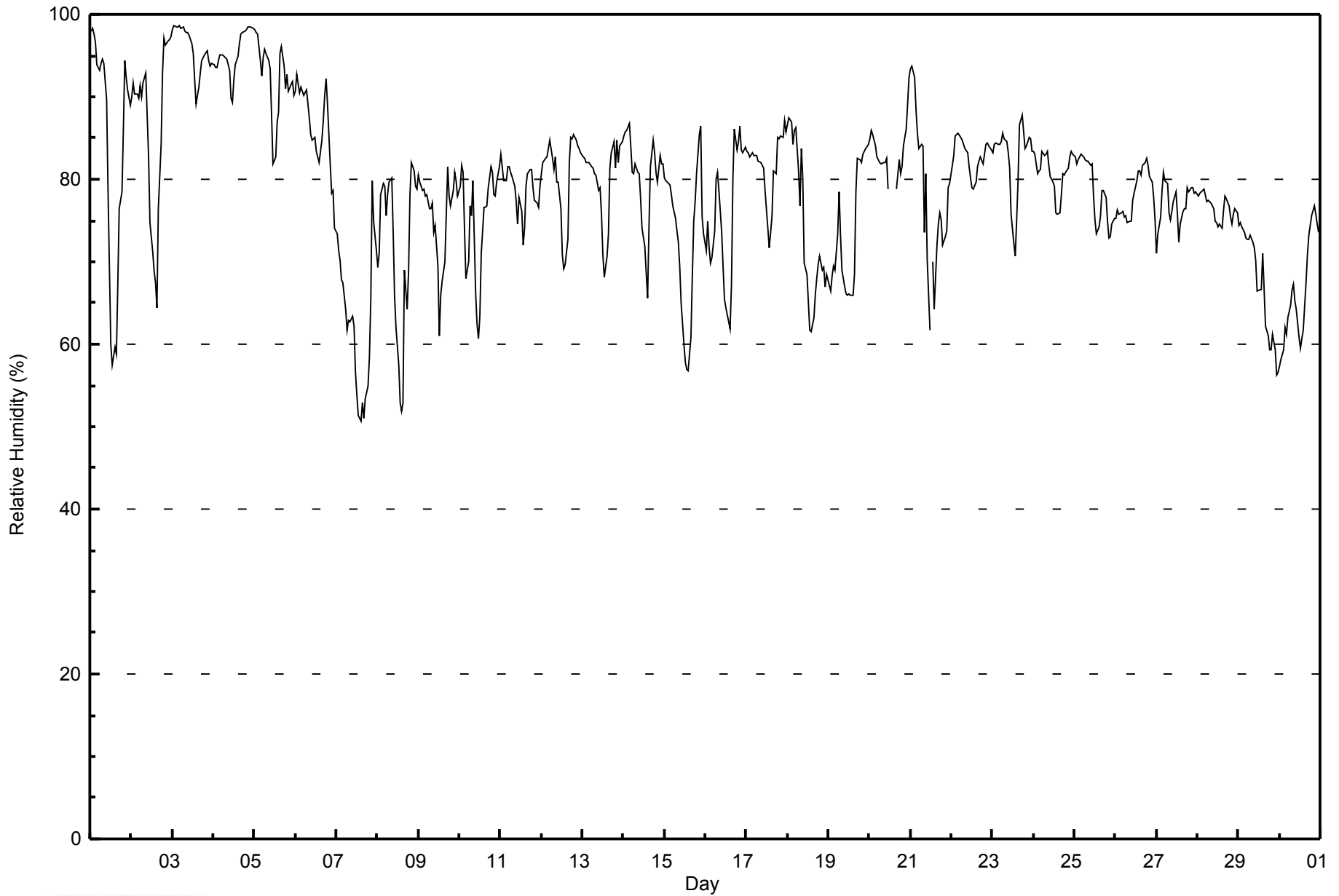
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Nov	98	98	98	97	94	93	94	95	94	90	79	69	60	57	60	59	67	76	79	86	94	92	91	89	83.7	98																							
2-Nov	90	92	90	90	90	91	90	92	93	88	83	75	71	69	67	64	76	84	93	97	96	97	97	97	86.4	97																							
3-Nov	98	99	99	99	99	98	98	98	98	98	98	96	95	92	89	91	93	94	95	95	96	94	94	94	95.8	99																							
4-Nov	94	94	94	94	95	95	95	95	95	93	90	89	92	94	95	97	98	98	98	98	98	98	98	98	95.2	98																							
5-Nov	98	98	98	94	93	95	96	95	94	93	88	82	83	87	88	95	96	94	91	93	91	92	92	90	92.3	98																							
6-Nov	91	93	91	91	91	90	91	89	87	85	85	85	83	83	82	85	87	90	92	89	82	78	79	74	86.4	93																							
7-Nov	73	71	70	68	68	64	62	63	63	63	62	57	54	51	51	53	51	53	55	58	66	80	75	71	62.6	80																							
8-Nov	69	71	78	79	79	76	78	80	80	74	66	62	58	53	52	53	69	64	69	78	82	81	79	79	71.2	82																							
9-Nov	80	80	79	79	78	78	76	76	77	74	74	69	61	66	68	70	76	82	78	77	79	81	80	78	75.6	82																							
10-Nov	79	82	81	74	68	70	77	76	80	66	62	61	63	71	77	77	77	79	82	81	78	78	80	82	74.9	82																							
11-Nov	83	82	80	80	82	82	81	80	79	77	75	78	76	72	74	79	81	81	81	79	77	77	77	79	78.8	83																							
12-Nov	81	82	83	83	84	85	83	81	83	80	80	76	71	69	70	73	82	85	85	85	85	84	84	83	80.6	85																							
13-Nov	83	83	82	82	82	82	81	81	81	79	79	76	71	68	71	73	81	83	85	81	85	82	84	85	79.9	85																							
14-Nov	85	86	86	87	84	81	81	82	81	81	78	74	72	69	66	74	81	85	83	81	80	83	82	82	80.1	87																							
15-Nov	80	80	80	79	78	77	75	74	72	69	65	60	58	57	57	61	68	75	77	81	86	86	75	73	72.6	86																							
16-Nov	71	75	72	70	70	74	80	81	79	74	69	65	64	63	62	67	80	86	84	85	86	84	83	84	75.4	86																							
17-Nov	83	83	83	83	83	83	83	82	82	82	81	79	74	72	74	76	81	81	85	85	85	85	87	86	81.5	87																							
18-Nov	87	87	87	84	86	86	81	77	84	80	70	68	65	62	62	63	66	68	70	71	69	69	67	68	74.1	87																							
19-Nov	67	66	68	70	69	73	78	73	69	67	66	66	66	66	66	69	79	82	82	82	83	83	84	84	73.3	84																							
20-Nov	85	86	85	84	83	82	82	82	82	82	83	79	M	M	M	M	79	82	81	82	84	86	89	92	83.5	92																							
21-Nov	93	94	92	89	86	84	84	84	74	81	70	62	M	70	64	72	75	76	75	72	73	74	79	79	78.3	94																							
22-Nov	82	83	85	85	86	85	85	84	84	83	82	80	79	79	80	81	82	83	82	83	84	84	84	84	82.8	86																							
23-Nov	83	84	84	84	84	85	86	85	85	83	81	76	72	71	75	80	87	88	86	84	84	85	85	83	82.5	88																							
24-Nov	83	83	81	81	81	83	83	83	83	82	80	80	79	76	76	78	81	80	81	81	81	83	83	83	80.9	83																							
25-Nov	83	82	82	83	83	83	82	82	82	82	82	78	75	73	74	76	79	79	78	75	73	73	75	75	78.7	83																							
26-Nov	75	76	76	76	76	75	76	75	75	75	77	78	80	81	81	80	82	82	82	82	80	80	78	75	78.1	82																							
27-Nov	71	73	75	79	81	80	79	76	75	76	77	78	76	72	75	76	76	76	79	78	79	79	78	78	76.9	81																							
28-Nov	78	78	79	79	79	77	77	77	77	77	75	75	74	75	74	76	78	78	77	75	75	76	77	76	76.6	79																							
29-Nov	74	75	74	74	73	73	73	73	72	72	70	66	67	67	71	67	62	61	59	59	61	59	56	57	67.3	75																							
30-Nov	57	58	59	62	61	63	65	67	67	65	64	61	60	61	62	67	71	73	74	76	77	76	74	66.4	77																								
																								81.9	82.4	82.3	81.9	81.4	81.4	81.7	81.2	80.9	79.0	76.4	73.4	71.4	70.5	71.0	73.5	77.9	80.0	80.5	80.9	81.6	82.0	81.5	81.1	Diurnal Average	
																								98	99	99	99	99	98	98	98	98	98	98	96	95	94	95	97	98	98	98	98	98	98	98	98	Diurnal Maximum	

M - Maintenance



WBEA
Hourly Averages

Relative Humidity (RH) - %
CNRL Horizon - November 2014





WBEA
Cumulative Frequency Distribution

Relative Humidity (RH) - %
CNRL Horizon - November 2014

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	29	4.06	4.06
60 - 80	335	46.85	50.91
80 - 100	351	49.09	100.00

Total Number of Valid Hours: 715

Total Number of Hours: 720

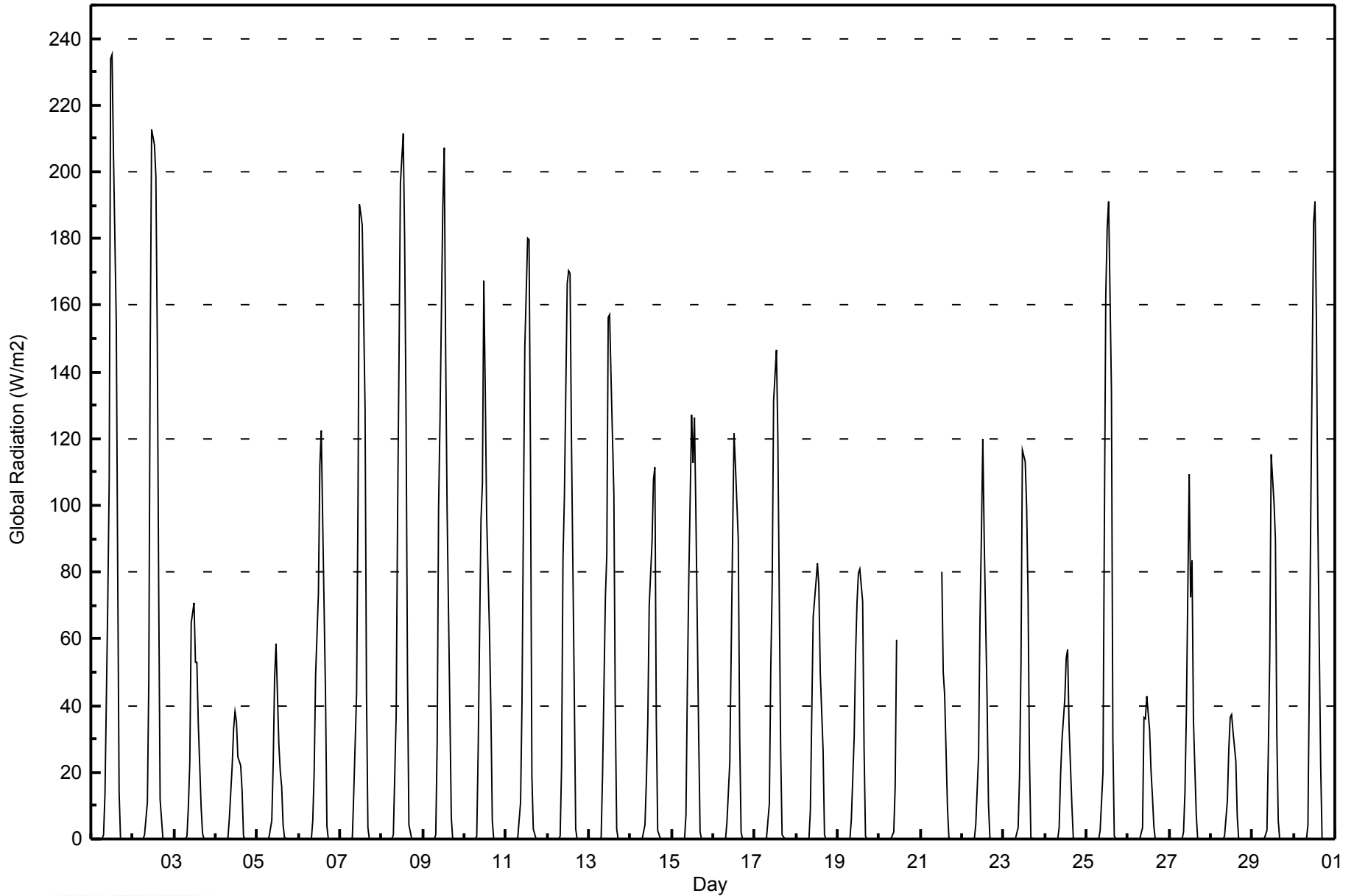


Maximum Value: 235 W/m2 on Nov 1 13:00																	Maximum Daily Average: 46.6 W/m2 on Nov 1										Hours in Service: 720																	
Minimum Value: 0 W/m2 on Nov 21 18:00																	Minimum Daily Average: 7.3 W/m2 on Nov 28										Hours of Data: 695																	
Maximum Diurnal Average: 122.0 W/m2 at hour 13																	Minimum Diurnal Average: 0.0 W/m2 at hour 24										Hours of Missing Data: 25																	
Monthly Average: 24.2 W/m2																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 24 P ₉₀ = 98 P ₉₉ = 205										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-Nov	0	0	0	0	0	0	0	1	13	71	108	234	235	206	155	80	14	0	0	0	0	0	0	0	46.6	235																		
2-Nov	0	0	0	0	0	0	0	1	11	47	147	213	208	199	150	75	12	0	0	0	0	0	0	0	44.3	213																		
3-Nov	0	0	0	0	0	0	0	1	10	23	65	71	53	53	35	10	2	0	0	0	0	0	0	0	13.4	71																		
4-Nov	0	0	0	0	0	0	0	1	6	22	33	38	35	24	22	14	1	0	0	0	0	0	0	0	8.2	38																		
5-Nov	0	0	0	0	0	0	0	0	5	22	48	59	28	20	16	4	0	0	0	0	0	0	0	0	8.5	59																		
6-Nov	0	0	0	0	0	0	0	0	6	20	49	74	112	122	96	44	4	0	0	0	0	0	0	0	21.9	122																		
7-Nov	0	0	0	0	0	0	0	1	14	43	101	190	187	184	129	44	3	0	0	0	0	0	0	0	37.4	190																		
8-Nov	0	0	0	0	0	0	0	1	37	98	144	196	212	179	126	50	4	0	0	0	0	0	0	0	43.6	212																		
9-Nov	0	0	0	0	0	0	0	1	29	99	126	190	207	146	100	38	6	0	0	0	0	0	0	0	39.3	207																		
10-Nov	0	0	0	0	0	0	0	1	27	96	106	167	135	97	62	39	6	0	0	0	0	0	0	0	30.6	167																		
11-Nov	0	0	0	0	0	0	0	1	11	41	96	147	180	180	115	19	3	0	0	0	0	0	0	0	33.0	180																		
12-Nov	0	0	0	0	0	0	0	1	21	84	102	167	170	169	120	44	3	0	0	0	0	0	0	0	36.7	170																		
13-Nov	0	0	0	0	0	0	0	1	20	72	85	156	157	138	103	39	3	0	0	0	0	0	0	0	32.3	157																		
14-Nov	0	0	0	0	0	0	0	0	4	17	35	70	89	108	112	37	2	0	0	0	0	0	0	0	19.8	112																		
15-Nov	0	0	0	0	0	0	0	0	7	46	78	127	113	126	98	31	2	0	0	0	0	0	0	0	26.2	127																		
16-Nov	0	0	0	0	0	0	0	0	5	23	56	90	122	112	90	31	2	0	0	0	0	0	0	0	22.1	122																		
17-Nov	0	0	0	0	0	0	0	0	11	51	76	131	146	121	73	27	1	0	0	0	0	0	0	0	26.6	146																		
18-Nov	0	0	0	0	0	0	0	0	8	38	67	77	83	76	50	27	1	0	0	0	0	0	0	0	17.8	83																		
19-Nov	0	0	0	0	0	0	0	0	6	31	55	71	80	81	71	27	1	0	0	0	0	0	0	0	17.6	81																		
20-Nov	0	0	0	0	0	0	0	0	2	16	60	M	M	M	M	M	M	M	M	M	M	M	M	M	--	60																		
21-Nov	M	M	M	M	M	M	M	M	M	M	M	M	80	50	43	9	0	0	0	0	0	0	0	0	--	80																		
22-Nov	0	0	0	0	0	0	0	0	4	25	66	91	120	89	42	11	0	0	0	0	0	0	0	0	18.7	120																		
23-Nov	0	0	0	0	0	0	0	0	3	19	52	116	113	99	73	24	1	0	0	0	0	0	0	0	20.9	116																		
24-Nov	0	0	0	0	0	0	0	0	3	19	30	42	54	57	34	10	0	0	0	0	0	0	0	0	10.4	57																		
25-Nov	0	0	0	0	0	0	0	0	3	20	95	163	184	191	134	30	1	0	0	0	0	0	0	0	34.2	191																		
26-Nov	0	0	0	0	0	0	0	0	3	37	36	43	33	20	13	4	0	0	0	0	0	0	0	0	7.8	43																		
27-Nov	0	0	0	0	0	0	0	0	2	14	38	109	72	83	35	7	0	0	0	0	0	0	0	0	15.1	109																		
28-Nov	0	0	0	0	0	0	0	0	1	11	27	36	37	32	23	7	0	0	0	0	0	0	0	0	7.3	37																		
29-Nov	0	0	0	0	0	0	0	0	2	27	54	115	101	90	31	5	0	0	0	0	0	0	0	0	17.8	115																		
30-Nov	0	0	0	0	0	0	0	0	4	49	98	185	191	155	95	23	0	0	0	0	0	0	0	0	33.3	191																		
																	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		Diurnal Maximum	
M - Maintenance																																												



WBEA
Hourly Averages

Global Radiation (GR) - W/m²
CNRL Horizon - November 2014





Maximum Speed: 25 km/h on Nov 16 03:00	Maximum Daily Speed Average: 13.6 km/h on Nov 7	Hours in Service: 720
Minimum Speed Value: 1 km/h on Nov 14 19:00	Minimum Daily Speed Average: 1.4 km/h on Nov 20	Hours of Data: 714
Maximum Diurnal Speed Average: 2.6 km/h at hour 19	Minimum Diurnal Speed Average: 0.2 km/h at hour 14	Hours of Missing Data: 6
Monthly Average Velocity: 1.2 km/h 287.9 deg	Percentiles: P ₁ = 1 P ₁₀ = 4 Q ₁ = 5 Median = 7 Q ₃ = 10 P ₉₀ = 13 P ₉₉ = 19	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-Nov	SSW5	SSW6	SSW6	SW6	SW8	SSW5	SSW7	SSW7	S8	SSW7	SW6	SW7	SW7	SSW7	S10	SSW8	SSW7	S8	SW7	SW8	SW6	SSW9	SSW10	SW10	SSW7.1	SSW10
2-Nov	SSW7	S9	SSW9	S10	SSW9	S9	SSW10	S8	S8	S7	S6	S7	SSE7	S8	SSE6	S4	S4	SSW7	SW2	S6	S7	S7	SSW4	S6	S6.8	S10
3-Nov	S7	S7	S6	S6	S4	S5	S5	S1	NNW2	N5	N5	NNE5	NNE7	NE9	NE10	NE9	NE8	NNE7	NNE6	NE5	NE5	NE5	NNE6	NE5	NE2.7	NE10
4-Nov	NE4	NW1	ENE4	SE5	SE6	SSE6	SE5	E4	ESE4	E5	ENE5	NE5	N5	N6	NNE6	NNE6	NNE5	NNE5	NNE5	NNE5	NNE5	N5	NNW4	NNW4	NE3.0	SE6
5-Nov	NW5	W3	SW4	W7	W9	W6	WSW6	WSW7	WSW6	WSW5	NW2	WNNW4	NW5	NW4	NNE2	ESE3	SE4	S4	S4	SSW7	SSW6	S7	SSE6	S7	SW3.1	W9
6-Nov	SSE4	S5	SSE8	SE4	SSE7	SSE9	SE10	SSE9	SSE13	S12	S11	SSE12	S8	S8	S10	SSW5	SW7	S7	SSW8	WSW5	NNW9	NW17	NNW13	NNW13	S4.4	NW17
7-Nov	NW16	NW21	NW22	NW22	NW19	NNW17	NW14	NNW14	NW18	NNW14	NNW15	NW19	NW18	NW18	NNW16	NW14	NW13	NW11	NNW11	NNW8	N5	SE3	NNE6	N7	NW13.6	NW22
8-Nov	N6	N4	WSW5	SW8	SW9	WSW9	W7	WSW5	WSW5	W6	WNNW9	NNW6	W2	SSW5	SSW5	SSE4	SE2	NNE7	N5	W2	SW4	SW6	SW5	WSW4	W3.1	SW9
9-Nov	SW7	SW7	SW6	SW6	SSW5	SSW6	SW6	SW5	SW6	SSW4	SSW4	ESE1	SE2	NE8	NE7	NNE6	N3	WNNW4	N8	N11	N11	N7	N9	N9	NW1.5	N11
10-Nov	N10	N11	NNW7	NW9	NNW7	N8	WNNW7	N7	N4	N12	NNW12	N8	NNE11	NE11	NE12	NE10	NNE8	NNE7	N7	N5	N9	N7	N5	NNE4	N7.5	NNW12
11-Nov	NE4	NE5	NNE7	NNE9	NNE8	NNE9	NNE9	NE10	NE8	NE9	NNE6	N6	NW5	NNW5	N4	NNW3	NE1	NW2	WNNW2	S1	WSW2	SW2	S2	SSW5	NNE3.7	NE10
12-Nov	SSW4	SSW5	S5	SSW6	SSW5	SSW7	SSW5	SSW5	SSW7	SSW9	SSW10	SSW10	SSW8	S8	S7	SSE7	SSE6	SSE9	S9	S10	S12	S11	S12	S13	S7.8	S13
13-Nov	S12	SSW10	S9	S9	S8	S8	S9	S8	S8	S8	S6	SSE5	SSE4	SSE2	N4	N5	N4	N4	NNW5	NW5	N5	NW3	NW5	W2	S2.9	S12
14-Nov	SW3	SSW2	NW1	NNE3	N9	N8	N8	N7	N8	N8	N10	N10	NNW6	NW5	NNE3	E6	E5	E4	NW1	WSW2	WSW5	SW9	SW7	SSW11	N2.4	SSW11
15-Nov	SSW14	SSW15	SW14	SW14	SSW15	SSW18	SSW18	SSW15	SSW17	SSW19	SSW15	SW14	WSW4	N4	NNE9	N11	NNE9	NNE9	NNW6	NNW8	NNW12	NW7	NNW10	NW7	SW5.5	SSW19
16-Nov	NW9	N17	N25	N18	NNW14	N10	N6	NNW6	WNNW6	NW11	NW13	NNW11	N5	ENE2	NW2	E3	SSE3	W5	WNNW7	WNNW5	W5	SW5	SW7	SW8	NNW5.9	N25
17-Nov	SSW7	SSW7	SSW9	S10	S12	S14	SSW12	S13	S12	S12	S12	S13	S12	S13	S13	S8	SSW7	W6	N5	NW4	WSW5	SW6	SSW2	NNE5	SSW7.6	S14
18-Nov	NNE7	NNE5	NNE6	NNW5	WSW7	WSW7	NW6	NNW11	S2	W4	NW15	NW17	NW17	NW14	NW15	NW12	NW12	NW12	WNNW8	WNNW7	WNNW7	NNW7	NW9	WNNW9	NW7.9	NW17
19-Nov	NW11	WNNW11	WNNW9	WNNW8	WNNW7	WSW5	W4	W6	WSW5	SW6	SSW8	SSW8	SSW8	SSW9	SSW7	SSW6	S6	S8	S8	SSW7	SSW7	S6	S7	SSW6	SW5.1	WNNW11
20-Nov	SSW5	SSW6	SSW6	S7	SSW8	SSW7	SSW7	S8	S8	SSW8	S9	M	M	M	M	M	E3	NNE5	NNE10	NNE9	NNE7	N7	NNE8	NNE5	S1.4	NNE10
21-Nov	NNE7	NNE6	NNE4	NNE7	NNE6	NNE6	NNE6	NNW5	NNW10	NNE6	NNW11	WNNW9	M	N7	N8	NE10	NE9	NNE10	NNE12	NNE10	NNE7	NNE6	NE8	NE12	NNE7.2	NE12
22-Nov	NE11	NNE9	NNE9	NNE11	NNE12	NNE13	NNE12	NNE13	NNE14	NNE13	NNE15	NNE15	NNE14	NNE16	NNE16	NNE15	NNE13	N13	NNE15	NNE13	NNE11	NNE10	NNE8	NNE9	NNE12.4	NNE16
23-Nov	NNE8	NNE5	NNE6	NNE4	NNW2	SW2	SSE4	S4	S6	S8	S8	S8	S8	S8	S7	S6	S6	SSW7	SW7	WSW5	SSW4	N4	NNE7	NNE8	S2.1	S8
24-Nov	NNE8	NNE8	NNE8	N7	N7	NNE7	NNE6	NNE4	NNE3	NE5	ENE3	ESE4	E4	SE4	SE4	ESE4	E3	ENE4	NE4	ENE5	NE6	NNE5	N7	N7	NE4.2	NNE8
25-Nov	N7	NNE9	NNE10	NNE10	NNE8	NNE8	NNE7	NNE6	NNE5	NNE5	NE7	NE5	NE4	ENE5	ENE5	ENE4	SE2	ENE2	W2	WSW2	W3	SW4	SSW6	SSW6	NNE3.5	NNE10
26-Nov	S7	SSW7	S8	S8	SSW9	S8	S8	S8	SSW9	S10	S9	S10	S12	S10	S9	SSW2	NNW2	NNE7	NNE9	NNE11	NNE11	NNE11	NNE14	N11	SSE2.7	NNE14
27-Nov	N16	NNE11	NNE8	NNE7	ENE5	ENE5	E2	WNNW3	SW4	SW5	WNNW2	NNW3	S1	SW3	WSW2	SW4	SW4	WNNW4	N4	NNE5	NNE4	NNE6	NNE7	NNE9	N2.8	N16
28-Nov	NNE9	NNE9	NNE9	NNE9	NNE8	NNE10	NNE8	NE8	NNE9	NNE9	NNE12	NNE11	NNE12	NNE10	NNE10	NNE6	NE4	N2	NW2	WSW1	SSW3	SSW6	S6	SSW8	NNE5.5	NNE12
29-Nov	SSW7	SSW9	SSW10	SSW11	SSW11	SSW14	SSW14	SSW14	SW16	SSW13	SW12	SSW10	SSW9	SSW9	SW5	WNNW7	WNNW15	WNNW16	NW15	WNNW14	WNNW14	NW19	WNNW19	WNNW15	WSW8.4	NW19
30-Nov	WNNW16	WNNW13	W10	W9	W9	WSW10	WSW13	WSW13	SW12	SSW12	SSW13	SSW13	SSW16	SSW17	SSW15	SSW12	S13	SSW11	S12	S10	S10	S13	S15	S14	SW10.0	SSW17

NW2.1	NW2.0	NNW1.6	NNW1.9	W2.2	SW1.8	SW2.0	SW1.6	SW2.5	SW2.0	W1.5	W1.6	W1.0	WSW0.2	NNE0.6	NNE1.2	N0.6	NNW1.6	NNW2.6	NNW2.1	NW2.0	NNW1.8	NW1.9	NW1.5	Diurnal Average	
N16	NW21	N25	NW22	NW19	SSW18	SSW18	SSW15	NW18	SSW19	NW15	NW19	NW18	NW18	NNE16	NNE15	WNNW15	WNNW16	NW15	WNNW14	WNNW14	NW19	WNNW19	WNNW15	Diurnal Maximum	

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



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 7 km/h on Nov 16 03:00	Hours of Data: 714
Minimum Value: 0 km/h on Nov 11 22:00	Hours of Missing Data: 6
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 2 P ₉₀ = 3 P ₉₉ = 5	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-Nov	1	1	1	2	2	2	2	1	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	2
2-Nov	1	2	2	2	2	1	2	1	2	1	2	2	2	2	1	1	2	1	2	1	1	1	2	1	2
3-Nov	2	2	2	1	1	1	2	1	1	1	1	2	2	2	3	3	2	2	1	2	2	1	2	2	3
4-Nov	2	1	2	2	2	2	1	1	1	2	1	2	1	1	1	1	1	2	1	1	1	1	1	1	2
5-Nov	1	1	1	2	2	2	2	1	1	1	1	1	2	2	2	1	1	1	1	2	2	1	1	2	2
6-Nov	1	1	2	2	2	2	3	3	3	3	2	3	3	2	3	1	2	1	2	2	6	5	4	3	6
7-Nov	5	6	6	6	6	4	4	3	4	4	3	5	4	4	4	3	3	3	3	3	2	1	2	1	6
8-Nov	1	2	1	1	1	2	1	1	1	2	2	2	2	2	2	1	1	1	1	1	1	1	2	1	2
9-Nov	1	1	2	2	2	1	1	1	1	1	1	1	1	2	3	2	1	1	3	3	3	2	2	3	3
10-Nov	2	2	2	3	2	2	2	3	4	3	3	3	3	3	3	2	2	2	2	2	2	2	1	1	4
11-Nov	1	2	2	2	2	2	2	3	2	2	2	1	1	2	1	1	2	1	1	1	1	0	1	1	3
12-Nov	1	1	1	1	1	2	1	1	2	2	3	3	2	2	2	1	1	1	1	2	2	2	2	3	3
13-Nov	2	3	2	2	2	2	1	1	1	2	1	1	1	1	1	1	1	1	0	1	1	1	1	2	3
14-Nov	1	1	1	1	3	2	2	2	2	3	3	2	1	1	1	1	1	1	1	1	1	1	1	2	3
15-Nov	4	4	4	3	4	4	4	4	4	5	5	5	3	2	3	3	2	2	2	3	4	2	3	2	5
16-Nov	4	5	7	5	4	2	1	1	2	3	3	3	2	1	2	2	1	1	1	1	1	1	1	1	7
17-Nov	1	1	2	2	2	2	3	2	2	2	2	3	3	3	3	2	1	3	2	1	1	2	1	2	3
18-Nov	2	1	2	1	2	2	2	3	1	4	3	4	4	3	4	3	3	2	2	1	2	2	2	2	4
19-Nov	2	2	2	2	2	1	1	2	2	2	3	3	3	3	2	2	1	1	1	1	1	1	1	1	3
20-Nov	1	1	1	2	2	2	2	2	2	2	2	M	M	M	M	M	1	2	2	2	2	1	2	1	2
21-Nov	2	2	1	2	1	1	2	2	3	2	4	3	M	2	2	3	3	2	3	4	2	1	2	3	4
22-Nov	2	2	2	2	3	3	3	3	3	3	4	4	4	5	4	4	4	3	4	3	3	2	2	2	5
23-Nov	2	1	2	1	1	1	1	1	1	2	2	2	2	2	2	1	1	1	2	1	2	2	2	3	3
24-Nov	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2
25-Nov	2	2	3	2	2	2	2	2	1	2	2	1	1	1	1	1	1	2	1	1	1	1	1	1	3
26-Nov	1	1	1	1	2	1	1	2	2	2	2	2	2	2	3	2	2	3	4	3	3	3	4	3	4
27-Nov	5	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	5
28-Nov	3	2	2	2	2	2	2	2	2	2	3	3	3	2	3	2	1	1	1	1	1	1	2	1	3
29-Nov	1	2	2	2	3	3	3	3	5	3	3	3	2	2	2	4	4	4	3	3	3	5	5	4	5
30-Nov	4	4	3	3	2	3	4	3	3	3	4	4	5	4	4	3	2	3	2	1	2	3	3	3	5
	5	6	7	6	6	4	4	4	5	5	5	5	5	5	4	4	4	4	4	4	6	5	5	4	

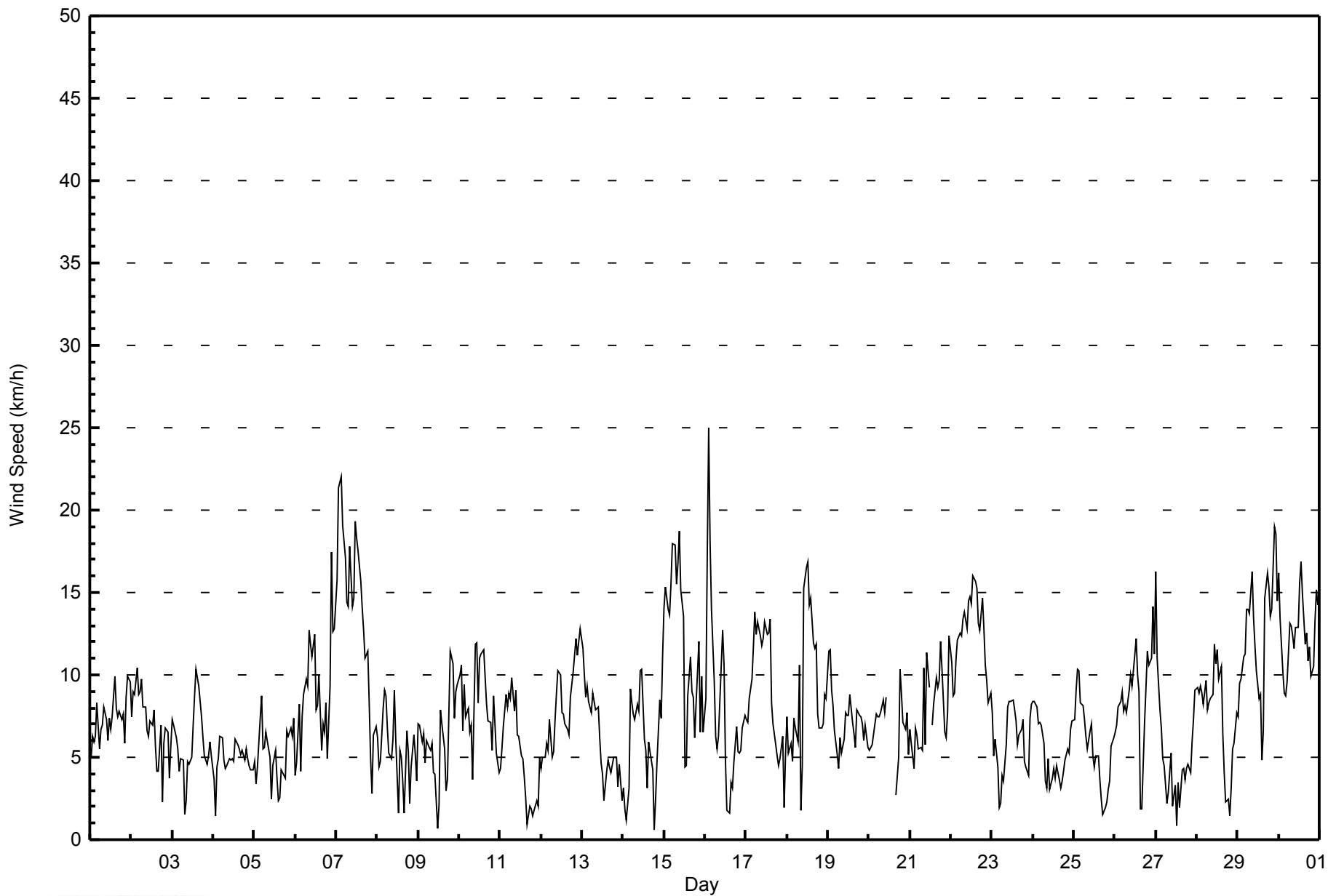
Diurnal Maximum

M - Maintenance



WBEA
Hourly Averages

Wind Speed (WS) - km/h
CNRL Horizon - November 2014





WBEA
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
CNRL Horizon - November 2014

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	216	30.25	30.25
6 - 11	377	52.80	83.05
12 - 19	117	16.39	99.44
20 - 28	4	0.56	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 714

Total Number of Hours: 720



WBEA
Frequency Distribution

Wind Speed (WS) - km/h
CNRL Horizon - November 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	23	23	13	13	9	5	10	8	13	22	16	17	10	7	16	11	216
6 - 11	36	89	17	0	1	0	2	12	72	66	26	7	10	14	8	17	377
12 - 19	5	19	2	0	0	0	0	2	21	21	6	2	0	8	21	10	117
20 - 28	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	4
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	65	131	32	13	10	5	12	22	106	109	48	26	20	29	48	38	714

Total Number of Valid Hours: 714

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg
CNRL Horizon - November 2014

Direction of Maximum Speed: 359 deg on Nov 16 03:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 324.3 deg on Nov 7	Hours of Data: 714
Direction of Minimum Speed: 315 deg on Nov 14 19:00	Direction of Minimum Daily Speed Average: 1.4 deg on Nov 20
Direction of Minimum Speed: 315 deg on Nov 14 19:00	Hours of Missing Data: 6
Monthly Average Direction: 250.9 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-Nov	206	209	211	214	226	199	202	197	191	212	230	220	232	198	188	207	198	189	229	234	218	210	211	227	210.4
2-Nov	194	185	197	189	193	185	193	188	186	190	177	184	168	172	166	169	176	193	224	175	184	182	210	191	185.7
3-Nov	172	183	185	187	185	176	180	178	345	2	4	19	33	34	39	40	44	28	20	34	47	46	33	56	51.7
4-Nov	56	310	76	138	129	149	126	83	102	95	72	49	359	4	19	23	16	22	13	13	13	1	346	334	45.7
5-Nov	311	278	215	278	269	265	246	245	240	244	306	284	304	324	17	121	140	179	169	197	197	186	164	181	234.4
6-Nov	161	176	158	124	155	158	143	165	167	169	171	167	186	185	187	203	219	185	205	254	327	316	328	339	187.6
7-Nov	310	321	314	315	307	327	323	331	323	329	328	324	319	325	329	322	323	313	331	346	350	138	30	11	324.3
8-Nov	6	8	241	225	228	250	269	251	249	268	303	341	279	196	211	166	143	28	357	274	229	234	229	245	259.7
9-Nov	233	226	221	223	201	208	221	222	225	197	204	105	144	39	36	19	356	287	11	6	11	4	357	355	317.0
10-Nov	1	4	347	314	335	0	287	6	7	354	346	359	29	42	38	37	27	20	9	360	351	355	356	23	4.0
11-Nov	48	34	13	24	15	17	15	38	36	38	23	2	326	335	350	346	44	306	286	190	249	227	189	203	14.3
12-Nov	193	208	191	199	197	204	208	201	201	194	192	197	198	189	169	164	160	168	183	191	186	188	189	186	189.1
13-Nov	190	196	189	181	181	176	178	176	172	174	170	161	160	154	2	2	359	351	334	310	357	316	319	268	190.5
14-Nov	222	210	309	13	353	2	7	11	8	8	4	9	346	325	20	82	91	87	315	250	246	215	215	200	354.9
15-Nov	211	211	215	214	209	209	207	201	199	210	206	214	250	352	17	8	18	22	337	346	342	325	330	326	232.4
16-Nov	326	355	359	353	344	354	6	342	298	326	318	331	360	76	317	80	161	274	292	282	265	225	214	216	331.1
17-Nov	213	208	199	191	186	185	193	179	180	185	181	175	174	177	183	181	198	262	351	313	248	219	195	14	191.3
18-Nov	27	20	14	335	253	239	318	336	172	270	319	316	317	322	321	317	316	313	296	284	299	329	312	298	315.5
19-Nov	304	302	292	295	285	247	260	260	253	228	201	209	199	200	206	198	172	184	179	194	197	186	190	197	227.3
20-Nov	209	208	205	187	194	197	194	190	187	193	178	M	M	M	M	M	82	24	17	21	18	9	17	24	179.1
21-Nov	26	24	18	15	18	16	16	348	335	21	347	295	M	9	5	39	40	29	32	25	12	16	34	39	15.3
22-Nov	36	28	19	14	12	18	20	22	18	19	19	18	17	17	22	19	12	9	17	20	20	16	16	23	18.7
23-Nov	16	29	19	22	335	222	154	174	186	184	185	189	182	180	171	175	175	197	225	247	204	1	16	15	182.6
24-Nov	13	21	20	5	8	33	32	31	15	44	59	118	100	128	133	120	95	58	51	57	42	29	1	1	37.9
25-Nov	7	16	13	14	19	27	27	20	30	32	41	36	44	68	74	68	135	78	272	241	260	215	209	194	28.3
26-Nov	191	193	181	183	198	182	188	187	192	184	184	178	181	174	176	208	328	19	28	28	28	24	16	8	166.2
27-Nov	8	16	31	31	61	76	79	291	235	236	298	347	178	217	251	230	227	282	360	19	20	25	25	27	8.0
28-Nov	25	28	32	23	23	21	30	34	31	30	26	25	25	29	17	22	45	6	310	251	202	201	190	203	26.1
29-Nov	208	207	209	197	201	204	205	201	215	206	214	211	206	205	220	303	297	301	313	301	298	305	302	298	247.6
30-Nov	300	296	279	259	270	248	244	238	226	207	205	207	198	198	199	194	191	194	186	178	177	184	183	185	214.6

315.0 308.6 298.7 281.8 259.4 229.7 226.3 230.7 221.1 221.2 264.0 270.5 258.8 240.2 28.1 25.9 8.7 331.6 336.6 327.7 318.6 295.5 316.4 309.8

Diurnal Average

M - Maintenance

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



Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg
CNRL Horizon - November 2014

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value:	99 deg on Nov 9 12:00		Hours of Data:	714
Minimum Value:	5 deg on Nov 23 17:00		Hours of Missing Data:	6
Percentiles:	P ₁ = 8 P ₁₀ = 12 Q ₁ = 15 Median = 18 Q ₃ = 22 P ₉₀ = 33 P ₉₉ = 81		Hours of Calibration:	0
			Percent Operational Time:	99.2

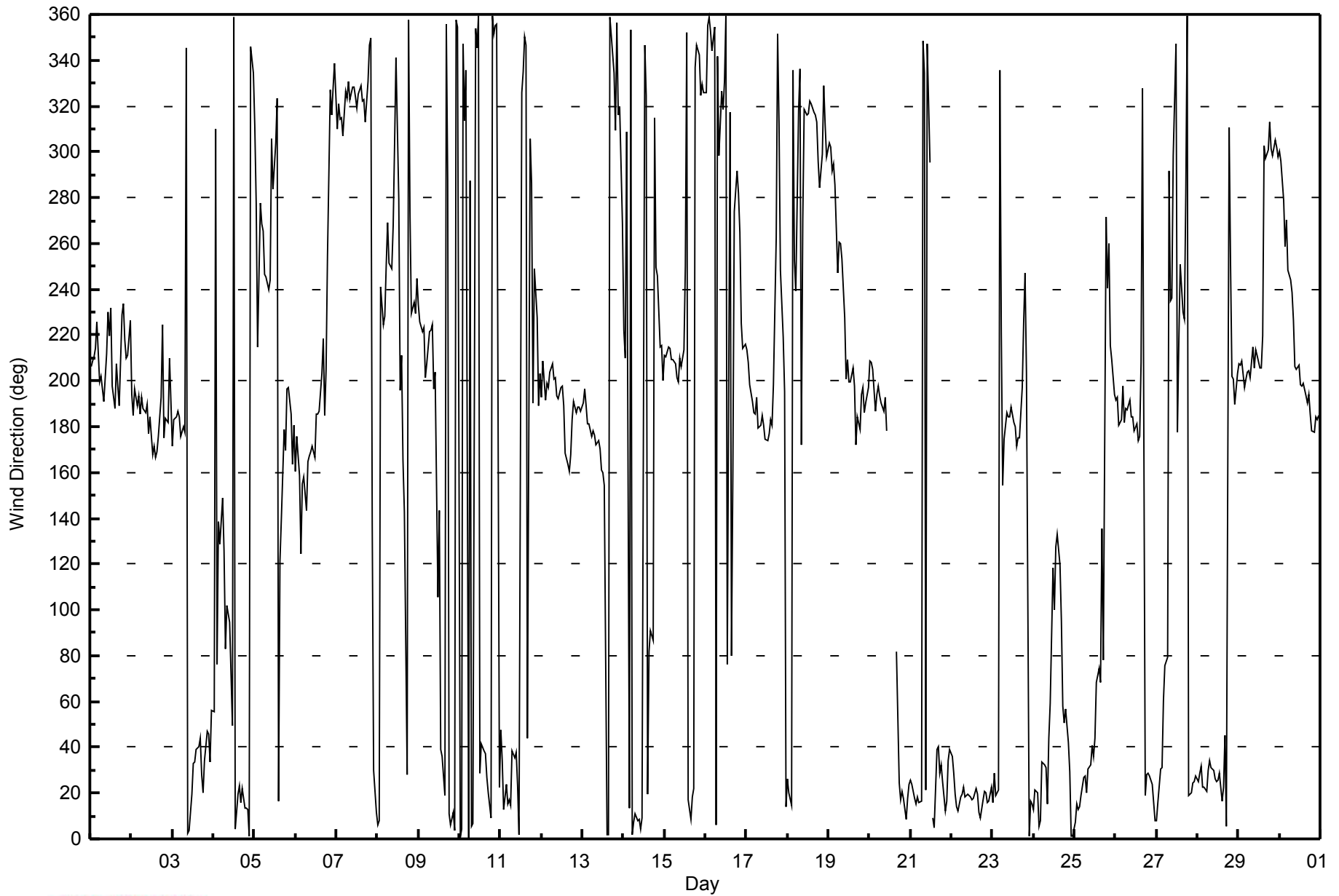
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	18	23	20	16	15	32	29	18	14	19	27	23	32	26	18	20	9	6	30	15	17	12	11	10	32
2-Nov	16	12	15	16	12	10	13	13	20	16	17	21	24	23	23	27	41	15	65	12	16	14	43	19	65
3-Nov	13	17	20	20	21	16	19	73	34	17	22	21	18	18	16	18	17	17	18	27	19	16	20	32	73
4-Nov	38	70	39	38	21	21	27	20	23	21	24	32	21	17	15	18	18	22	16	16	18	23	16	15	70
5-Nov	15	32	14	26	19	19	17	15	14	17	54	32	36	51	81	42	18	19	29	17	18	15	14	14	81
6-Nov	18	14	15	36	17	18	23	18	17	16	16	18	30	23	16	23	18	14	21	51	22	17	18	23	51
7-Nov	15	15	15	15	19	21	17	17	16	18	17	18	17	17	16	15	14	16	26	40	37	19	12	40	
8-Nov	15	35	29	10	12	13	16	17	29	22	22	33	95	40	26	24	39	10	19	60	20	16	19	45	95
9-Nov	9	16	20	14	29	9	7	16	17	25	30	99	76	22	26	19	47	24	21	17	18	15	19	17	99
10-Nov	17	17	29	16	26	21	17	28	81	18	20	26	21	17	16	15	18	15	18	18	16	18	18	19	81
11-Nov	19	22	19	18	19	18	17	16	19	17	24	23	24	34	24	37	65	15	6	43	27	25	25	12	65
12-Nov	14	13	12	12	17	20	16	12	16	16	18	21	25	24	23	14	12	7	8	12	11	13	13	13	25
13-Nov	13	17	15	11	9	10	10	9	10	13	16	32	35	66	28	14	14	30	12	10	13	28	23	59	66
14-Nov	30	35	58	28	17	17	20	19	17	18	20	20	30	22	35	13	12	16	78	68	12	9	15	15	78
15-Nov	20	19	20	17	17	16	17	18	18	18	21	23	51	35	23	19	15	17	22	19	26	35	16	19	51
16-Nov	30	19	21	19	18	15	15	30	20	17	16	18	41	63	92	38	41	31	10	10	10	6	11	8	92
17-Nov	10	14	14	13	12	12	16	13	13	13	13	14	15	15	13	13	18	58	19	33	18	24	66	32	66
18-Nov	17	18	19	29	17	19	33	22	71	51	14	15	17	16	16	15	12	13	19	18	17	28	18	15	71
19-Nov	14	14	16	16	19	19	18	15	22	23	28	29	29	25	24	20	12	9	10	11	12	11	12	14	29
20-Nov	15	16	18	17	15	21	19	17	17	17	17	M	M	M	M	M	35	25	16	17	19	16	18	14	35
21-Nov	17	19	18	17	17	18	17	26	24	24	24	20	M	28	21	17	17	17	16	20	16	15	20	14	28
22-Nov	15	18	17	17	17	18	18	18	18	18	17	18	20	18	18	18	16	18	19	18	18	17	16	17	20
23-Nov	18	21	19	20	37	39	19	21	14	14	16	19	18	17	17	9	5	8	15	23	24	44	21	18	44
24-Nov	16	17	20	15	17	17	19	22	23	19	37	27	32	30	19	20	22	33	12	11	13	19	14	17	37
25-Nov	16	17	18	15	15	20	18	18	18	17	17	23	29	26	19	49	30	68	31	27	10	33	8	10	68
26-Nov	9	11	9	9	13	12	14	11	14	12	15	14	13	13	15	75	93	30	24	17	17	16	18	18	93
27-Nov	20	16	13	11	16	21	48	32	8	8	57	41	91	25	72	23	21	25	21	12	11	16	18	17	91
28-Nov	17	16	16	18	18	19	18	16	17	18	17	19	18	18	17	15	14	40	42	29	22	16	23	9	42
29-Nov	13	14	16	17	17	14	16	16	18	16	19	21	22	18	30	29	16	15	14	14	15	14	15	16	30
30-Nov	16	17	18	18	17	19	18	18	17	18	18	21	21	17	18	15	13	14	12	10	12	12	12	13	21
Diurnal Maximum																									
38 70 58 38 37 39 48 73 81 51 57 99 95 66 92 75 93 68 78 68 40 44 66 59																									

M - Maintenance



WBEA
Hourly Averages

Wind Direction (WD) - deg
CNRL Horizon - November 2014



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Wood Buffalo Environmental Association

SO₂ Calibration Report

Station Information

Calibration Date	November 7, 2014	Previous Calibration	October 21, 2014
Station Name	CNRL	Station Number	15
Reason:	Other: repair		
Start Time (MST)	11:05	End Time (MST)	14:40
Barometric Pressure	723 mmHg	Station temp.	20 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	10880507
Cal Gas Concentration	50.3 ppm	Cal Gas Expiry Date	11/6/2014
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	-622
Analyzer Range (mv)	5000	5000	Lamp voltage	767	864
Calculated slope	0.993669	0.989772	Chamber temp.	45.4	45.4
Calculated intercept	0.606764	-0.587385	Pressure (mmHg)	716.7	716.7
Analyzer Background	12.8	17.8	Flow (lpm)	0.437	0.437
Analyzer Coefficient	1.017	0.950	Intensity	77-88	90-92

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	-0.4	NA
as found span	5000	82.3	827.9	829.2	0.998
calibrator zero	5000	0.0	0.0	-0.2	NA
high point	5000	82.3	827.9	836.4	0.990
second point	5000	41.2	414.5	420.6	0.985
third point	5000	20.6	207.2	210.2	0.986
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	82.3	827.9	831.8	0.995
Average Correction Factor					0.987

Corrected As found 829.6 Previous response 832.6 % change 0.4%

Notes:

lamp and socket changed out, flash was increased, PMT adjusted, Lamp intensity set to 90%

Calibration Performed By:

Melissa Lemay



Wood Buffalo Environmental Association

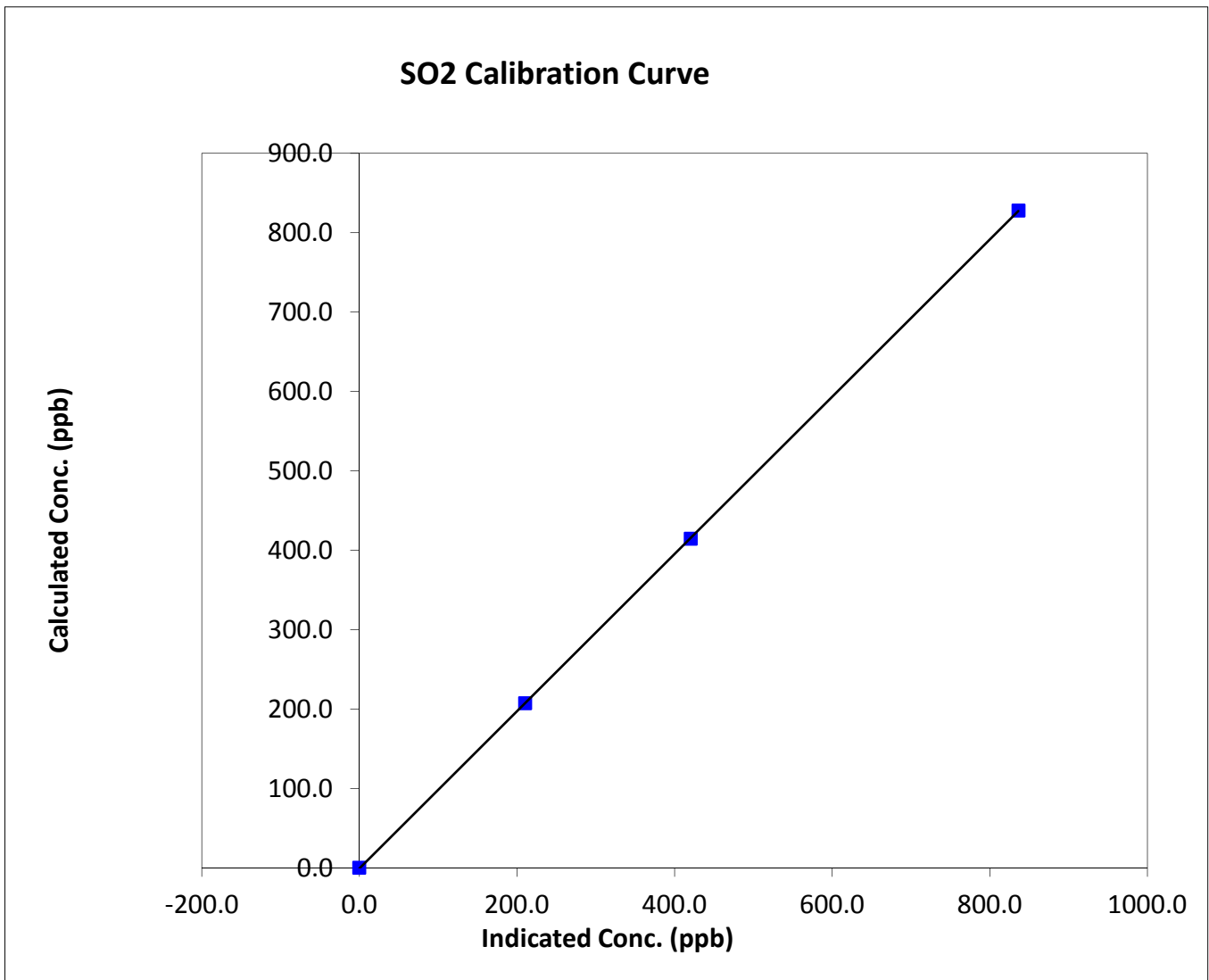
SO₂ Calibration Summary

Station Information

Calibration Date	November 7, 2014	Previous Calibration	October 21, 2014
Station Name	CNRL	Station Number	15
Start Time (MST)	11:05	End Time (MST)	14:40
Analyzer make	43i	Analyzer serial #	10710321322

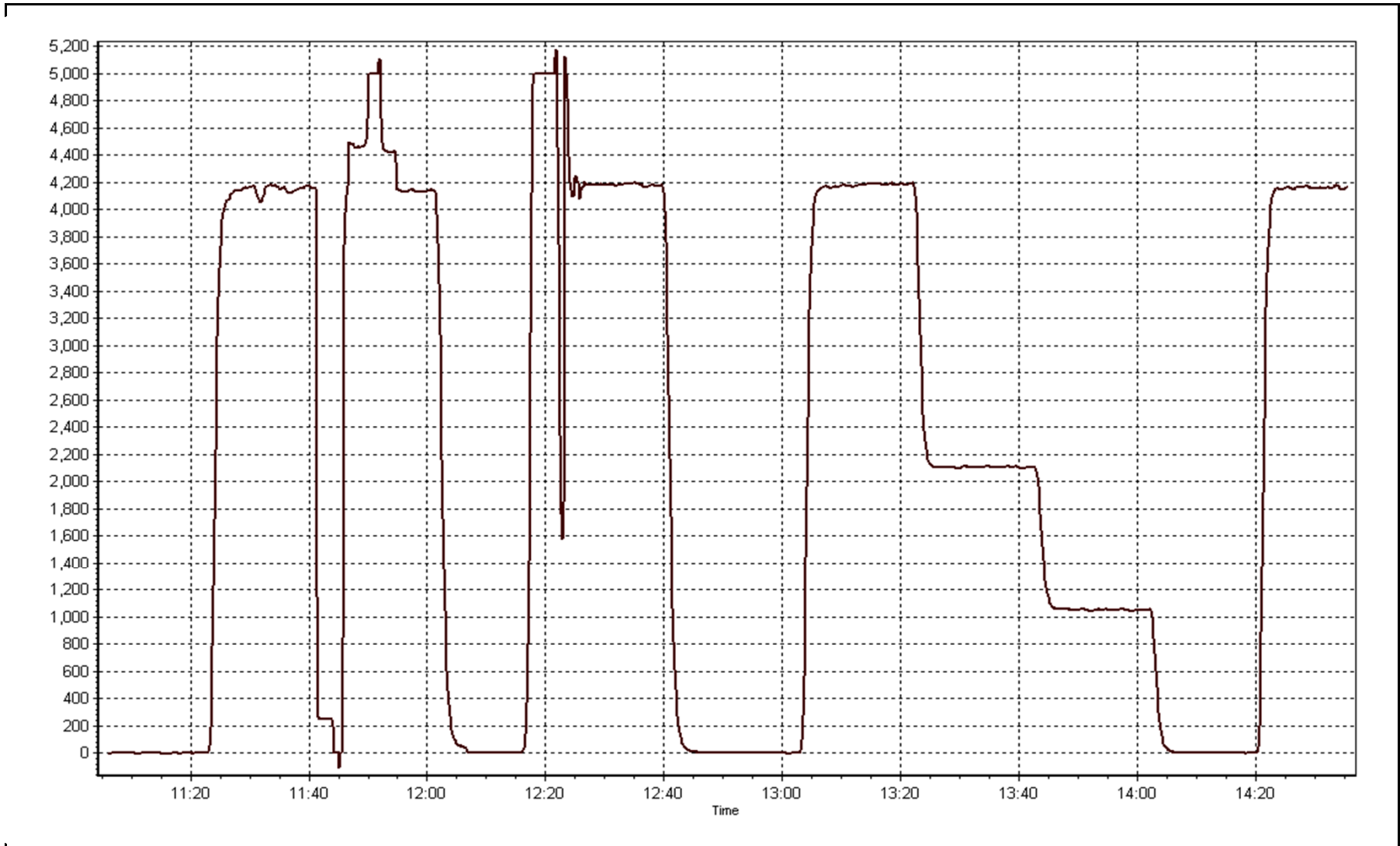
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	N/A	Correlation Coefficient	0.999993
827.9	836.4	0.9899		
414.5	420.6	0.9854	Slope	0.989772
207.2	210.2	0.9859		
			Intercept	-0.587385



SO2 Calibration Plot

Date: November 7, 2014





Wood Buffalo Environmental Association

TRS Calibration Report

Station Information

Calibration Date	November 17, 2014	Previous Calibration	October 20, 2014
Station Name	CNRL Horizon	Station Number	15
Reason:	Routine		
Start Time (MST)	11:15	End Time (MST)	14:20
Barometric Pressure	n/a 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	-673	-672
Analyzer Range (input)	5000	5000	Lamp voltage	760	765
Calculated slope	1.004342	0.995790	Chamber temp.	45	45
Calculated intercept	-0.321683	-0.092050	Pressure	677.4	689.4
Analyzer Background	9.2	9.2	Flow	0.412	0.418
Analyzer Coefficient	0.927	0.918	Intensity	92	91
			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	0.0	NA
as found span	5000	38.5	80.1	81.2	0.986
SO2 scrubber check	5000	20.6	207.2	0.3	NA
calibrator zero	5000	0.0	0.0	0.0	NA
high point	5000	38.5	80.1	80.4	0.996
second point	5000	19.2	39.9	40.5	0.987
third point	5000	9.6	20.0	20.1	0.995
calibrator zero					
as left zero	5000	0.0	0.0	0.1	NA
as left span	5000	38.5	80.1	80.0	1.000
Average Correction Factor					0.993

Corrected As found	81.2	Previous response	80.1	% change	-1.4%
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Notes:

Adjusted span.

Calibration Performed By:

Mike Martineau



Wood Buffalo Environmental Association

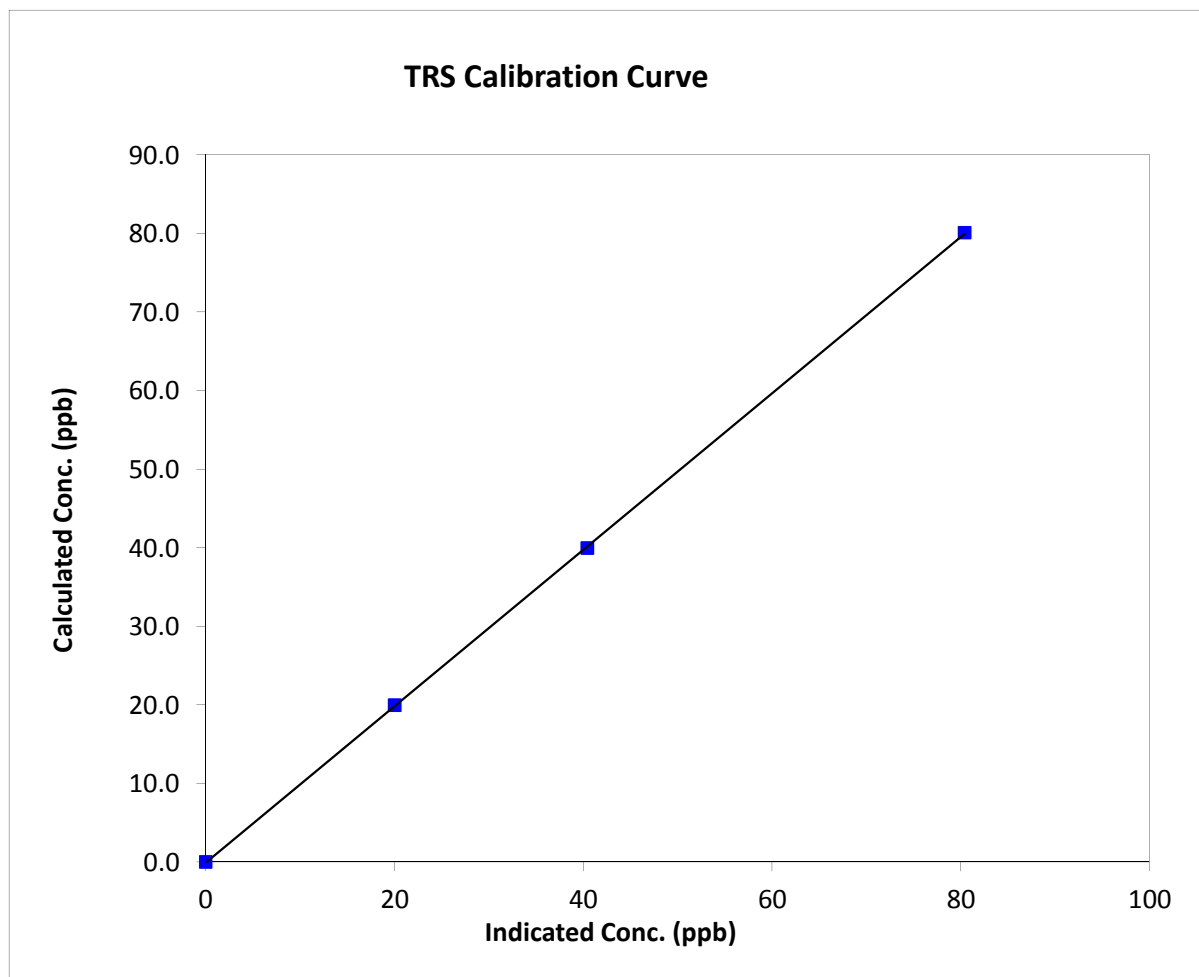
TRS Calibration Summary

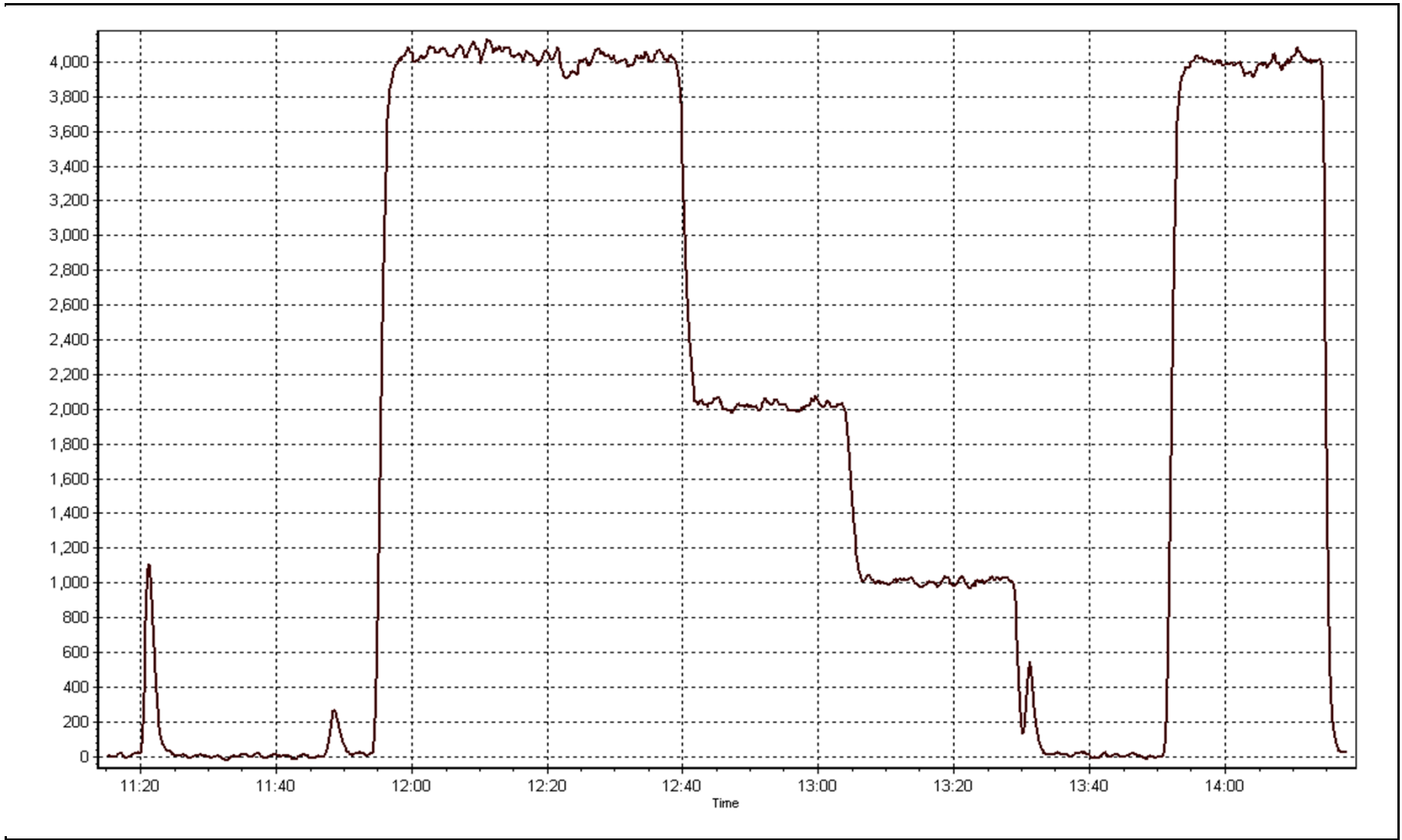
Station Information

Calibration Date	November 17, 2014	Previous Calibration	October 20, 2014
Station Name	CNRL Horizon	Station Number	15
Start Time (MST)	11:15	End Time (MST)	14:20
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	0.0	N/A	Correlation Coefficient	0.999974
80.1	80.4	0.9960		
39.9	40.5	0.9870	Slope	0.995790
20.0	20.1	0.9954		
			Intercept	-0.092050







Wood Buffalo Environmental Association

THC Calibration Report

Station Information

Calibration Date	November 20, 2014	Previous Calibration	October 21, 2014
Station Name	CNRL Horizon	Station Number	AMS 15
Reason:	Removal		
Start Time (MST)	10:10	End Time (MST)	11:30
Barometric Pressure	n/a mmHg	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	10880507
Gas Cert Reference	LL107945	Cal Gas Expiry Date	11/6/2014
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	0.998531	0.989992	Fuel Pressure	18.0	18.0
Calculated intercept	0.047533	-0.030816			

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	0.03	N/A
as found span	5000	82.3	17.48	17.68	0.989
calibrator zero	5000	0.0	0.00	0.03	N/A
high point	5000	82.3	17.48	17.68	0.989
second point	5000	41.2	8.75	8.89	0.984
third point	5000	20.6	4.38	4.45	0.984
calibrator zero					
as left zero					
as left span					
Average Correction Factor					0.986

Corrected As found	17.65	Previous response	17.46	% change	-1.1%
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Notes:

removal cal for equipment upgrade.

Calibration Performed By:

Michael Martineau



Wood Buffalo Environmental Association

THC Calibration Summary

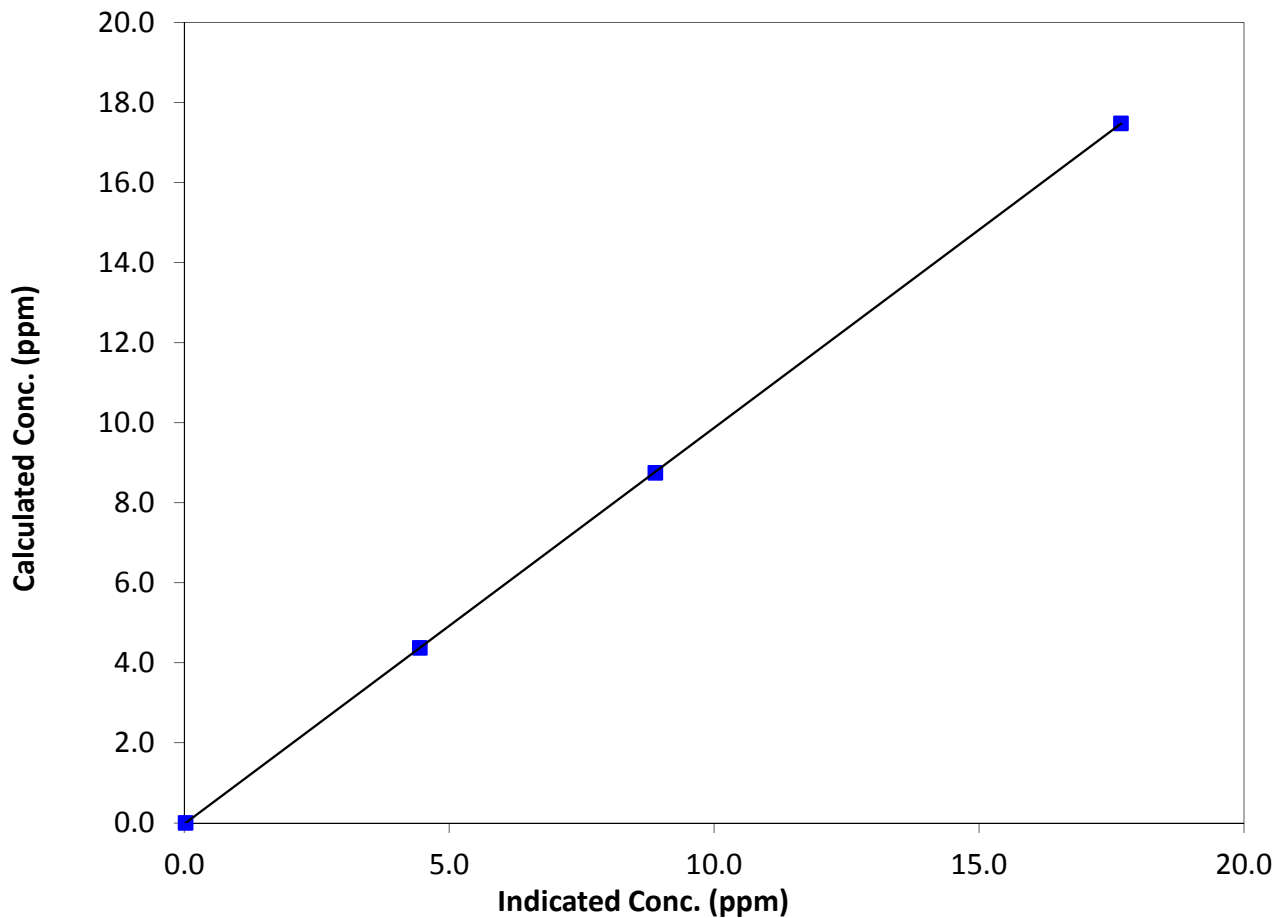
Station Information

Calibration Date	November 20, 2014	Previous Calibration	October 21, 2014
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	10:10	End Time (MST)	11:30
Analyzer make	TEI 51C-LT	Analyzer serial #	76232382

Calibration Data

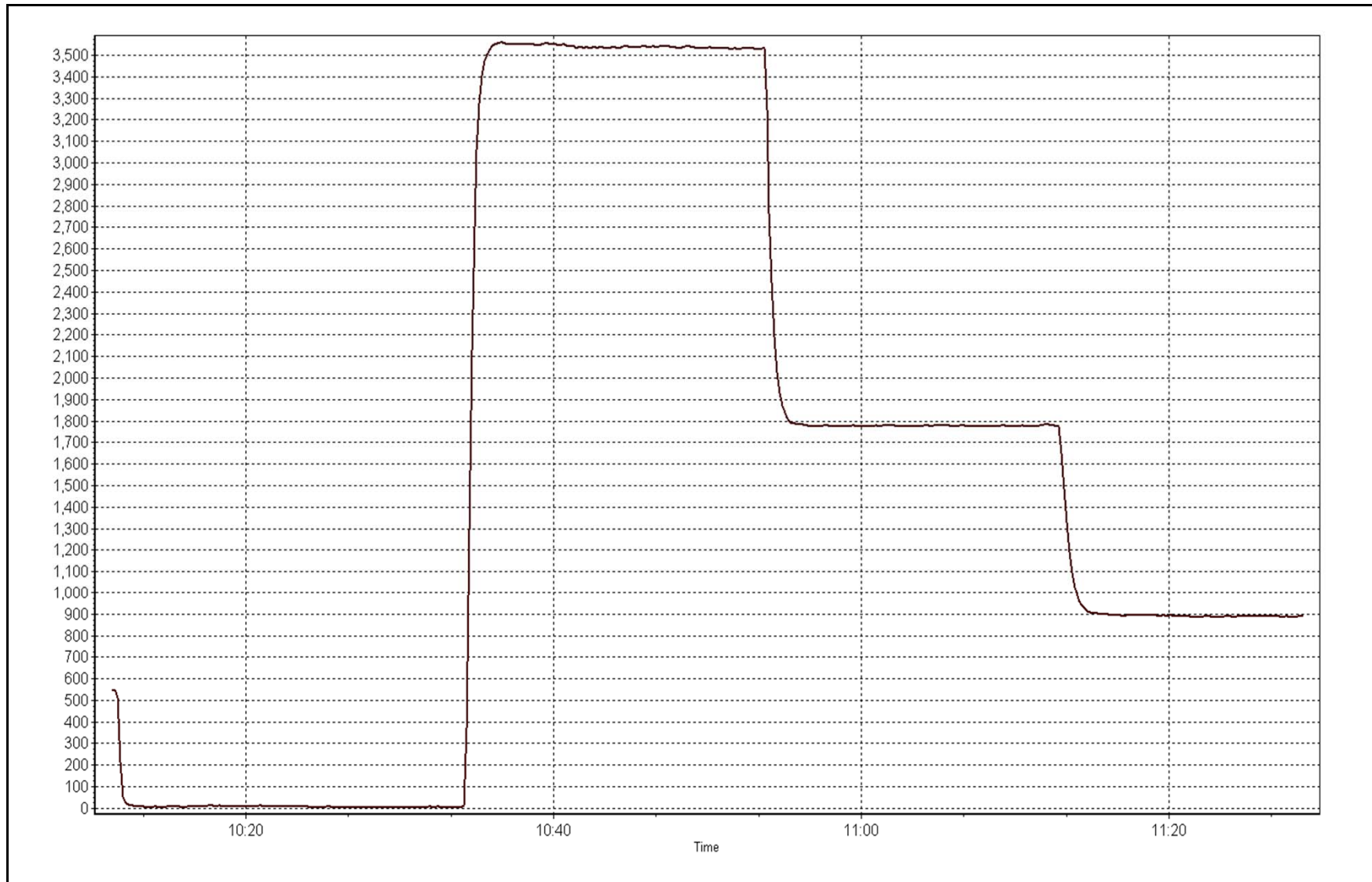
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.03	N/A	Correlation Coefficient	0.999997
17.48	17.68	0.9887		
8.75	8.89	0.9844	Slope	0.989992
4.38	4.45	0.9844		
			Intercept	-0.030816

THC Calibration Curve



THC Calibration Plot

Date: November 20, 2014





Wood Buffalo Environmental Association

THC Calibration Report

Station Information

Calibration Date	November 20, 2014	Previous Calibration	NA
Station Name	CNRL Horizon	Station Number	AMS 15
Reason:	Install		
Start Time (MST)	15:00	End Time (MST)	18:20
Barometric Pressure	n/a mmHg	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	10880507
Gas Cert Reference	LL107945	Cal Gas Expiry Date	11/6/2014
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.	n/a
DACS voltage range	ethernet connection	DACS channel #	n/a

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppm)	25	25	Sample Pressure	NA	8.7
Analyzer Range (mv)	25	25	Air or Bypass press	NA	38.0
Calculated slope	NA	1.001368	Fuel Pressure	NA	26.3
Calculated intercept	NA	0.006263			

Analyzer make Thermo 51i Analyzer serial # 1327059295

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero					
as found span					
calibrator zero	5000	0.0	0.00	0.00	N/A
high point	5000	82.3	17.48	17.45	1.002
second point	5000	41.2	8.75	8.74	1.001
third point	5000	20.6	4.38	4.35	1.006
calibrator zero					
as left zero	5000	0.0	0.00	-0.08	N/A
as left span	5000	82.3	17.48	17.50	0.999
Average Correction Factor					1.003

Corrected As found NA Previous response NA % change NA

Notes:

install cal for equipment upgrade

Calibration Performed By:

Michael Martineau



Wood Buffalo Environmental Association

THC Calibration Summary

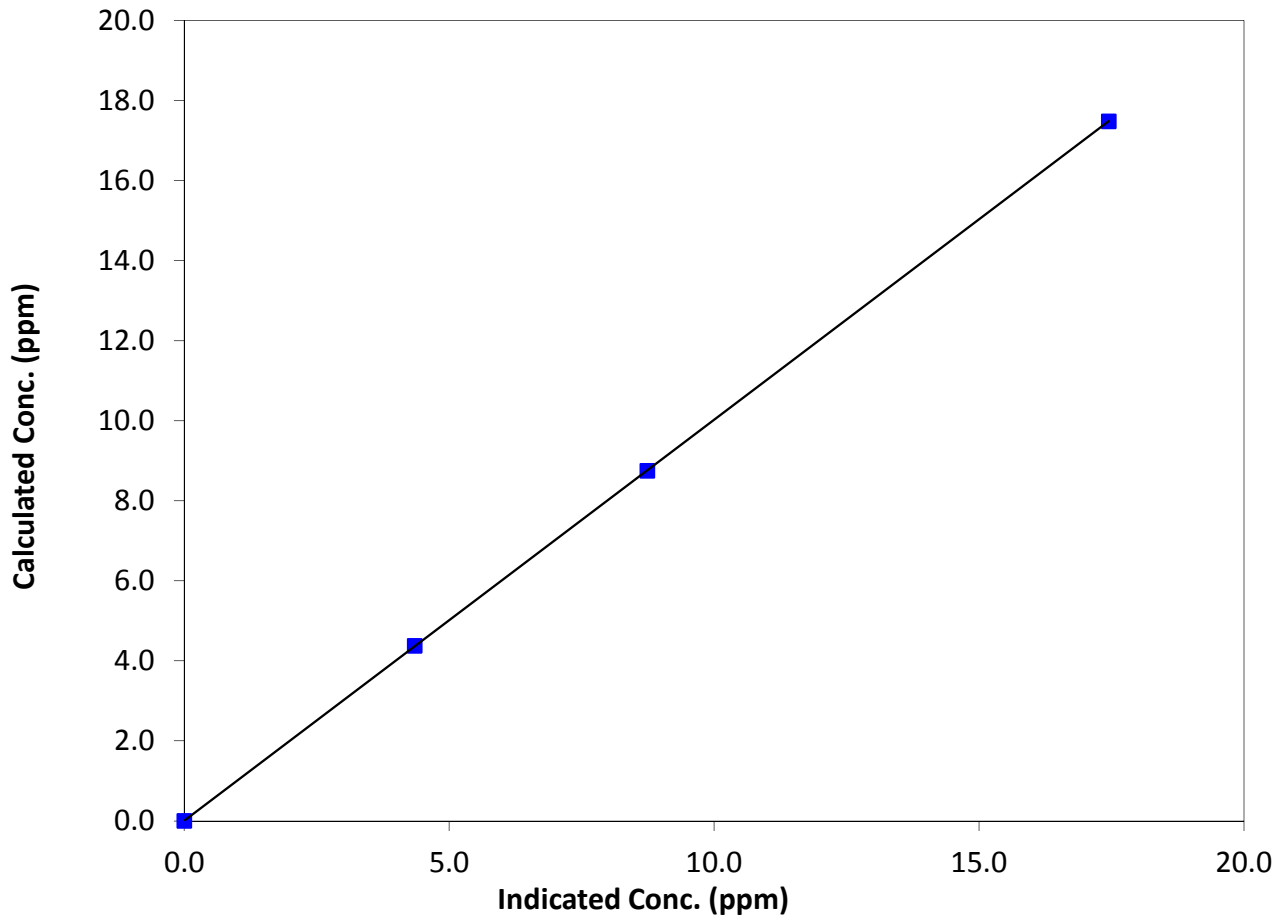
Station Information

Calibration Date	November 20, 2014	Previous Calibration	NA
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	15:00	End Time (MST)	18:20
Analyzer make	Thermo 51i	Analyzer serial #	1327059295

Calibration Data

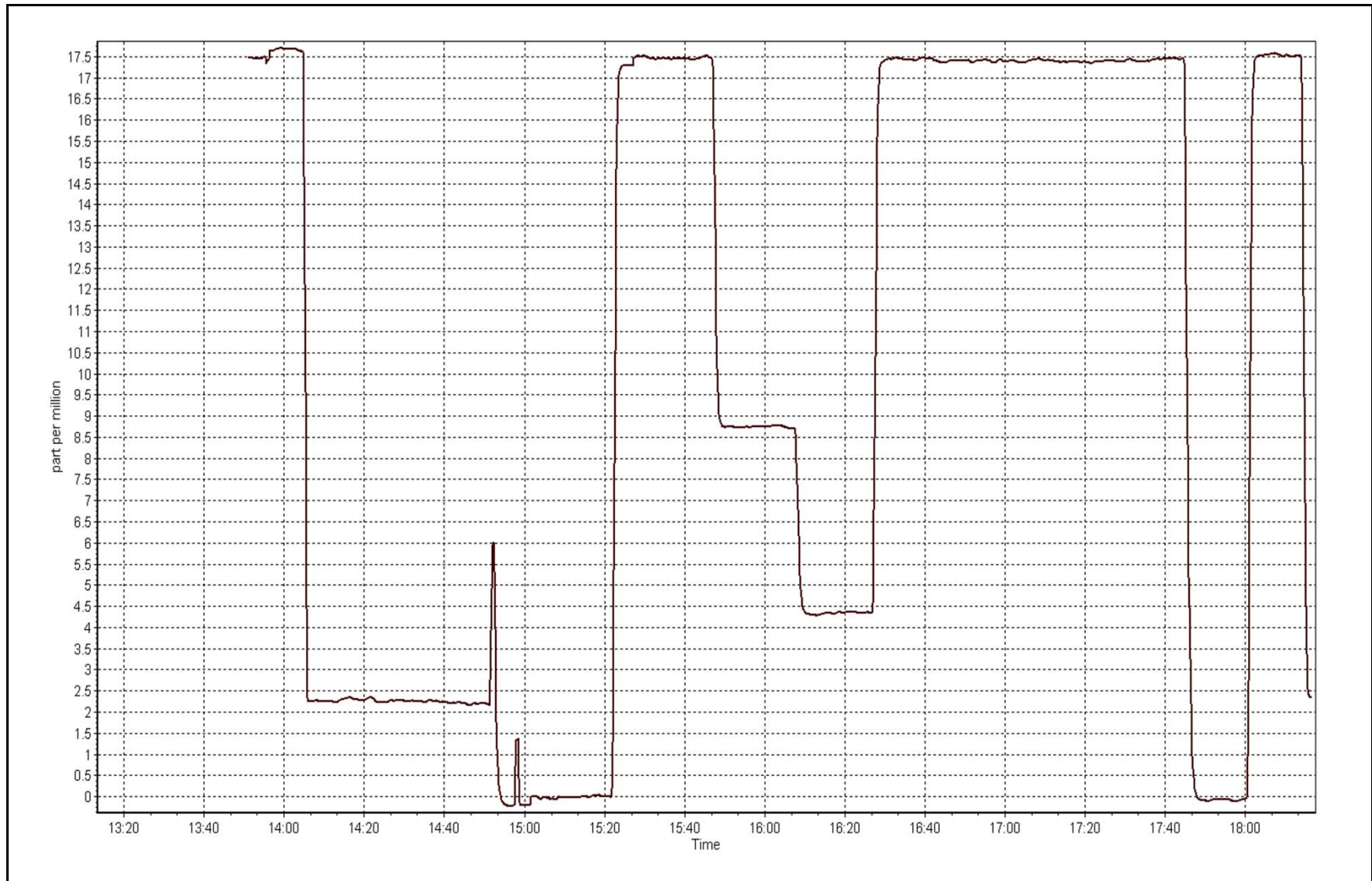
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	N/A	Correlation Coefficient	0.999998
17.48	17.45	1.0017		
8.75	8.74	1.0012	Slope	1.001368
4.38	4.35	1.0058		
			Intercept	0.006263

THC Calibration Curve



THC Calibration Plot

Date: November 20, 2014





Wood Buffalo Environmental Association

NO_x-NO-NO₂ Calibration Report

Station Information

Calibration Date	November 19, 2014	Previous Calibration	October 21, 2014
Station Name	CNRL Horizon	Station Number	AMS 15
Reason:	Routine		
Start Time (MST)	11:45	End Time (MST)	16:45
Barometric Pressure	734 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
NO _x Cal Gas Conc	48.6 ppm	Cal Gas Serial #	LL107945

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	2632
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Parameter		NO _x	NO	NO ₂
MV conversion	Analyzer Range (ppb)	1000	1000	1000
	Analyzer Range (mv)	5000	5000	5000
Before	Data Slope	1.004812	1.002412	1.000304
	Data Offset	-1.562354	-0.797425	0.253318
After	Data Slope	1.001681	1.000651	1.001476
	Data Offset	-1.405891	-0.733432	-2.284097
Channel #		Diff 3	Diff 4	Diff 5
Voltage Range		0-5000mv	0-5000mv	0-5000mv

Analyzer Information

Analyzer make/model	42i	Analyzer serial #	710321429
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Test Point	before		after	
Concentration range	1000	ppb	1000	ppb
NO coefficient	0.704	ppb	1.104	ppb
NO _x coefficient	1.000	ppb	1.013	ppb
NO ₂ coefficient	1.000	ppb	1.000	ppb
NO bkgrnd	9.0		12.8	
NO _x bkgrnd	9.2		13.3	
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	-2.7	Deg C
O ₃ flow	ok	ccm	ok	ccm
R Cell Press	155.4	mmHg	195.1	mmHg
Sample Flow	0.749	ccm	0.599	ccm

Notes:

Changed charcoal cannister location and refilled. Adjusted span.



Wood Buffalo Environmental Association

NO_x-NO-NO₂ Calibration Report

Station Information

Calibration Date:

November 19, 2014

Station Number:

AMS 15

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NO _x conc (ppb)	Calculated NO conc (ppb)	Calculated NO ₂ conc (ppb)	Indicated NO _x conc (ppb)	Indicated NO conc (ppb)	Indicated NO ₂ conc (ppb)	NO _x Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1	N/A	N/A
as found span	5000	82.3	800.0	800.0	0.0	814.0	815.0	0.4	0.9827	0.9815
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1	N/A	N/A
high point	5000	82.3	800.0	800.0	0.0	798.9	799.6	0.8	1.0014	1.0005
second point	5000	41.2	400.5	400.5	0.0	403.3	402.1	1.6	0.9929	0.9960
third point	5000	20.6	200.2	200.2	0.0	201.6	201.0	0.9	0.9931	0.9961
calibrator zero										
as left zero	5000	0.0	0.0	0.0	0.0	3.2	2.6	0.1	N/A	N/A
as left span	5000	82.3	800.0	421.7	378.2	813.8	432.3	383.1	0.9830	0.9756
Average Correction Factor									0.9958	0.9976

Corrected As found

NO_x= 813.9

NO= 815.0

Percent Change

NO_x= -2.0%

NO= -2.0%

Previous Response

NO_x= 797.7

NO= 798.8

GPT Calibration Data

Dilution Flow

5000

ccm

Source Gas Flow

82.30

ccm

O ₃ Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO ₂ conc (ppb)	Indicated NO _x conc (ppb)	Indicated NO conc (ppb)	Indicated NO ₂ conc (ppb)	NO _x Correction factor	NO Correction factor	NO ₂ Correction factor	Converter Efficiency
Cal zero			0.0			0.1			N/A	
1st NO ₂ (300)	N/A	421.7	382.6	803.4	421.7	383.2	0.9796	1.0000	0.9983	100.2%
2nd NO ₂ (200)	N/A	565.7	238.6	805.1	565.7	241.1	0.9776	1.0000	0.9896	101.1%
3rd NO ₂ (100)	N/A	708.3	96.0	808.1	708.3	100.8	0.9739	1.0000	0.9523	105.0%
4th NO ₂ (0)	804.3	N/A	7.3	811.6	804.3	8.6	0.9697	1.0000	N/A	N/A
Average Correction Factor							0.9752	1.0000	0.9801	102.1%

Calibration Performed By:

Michael Martineau



Wood Buffalo Environmental Association

NO_x Calibration Summary

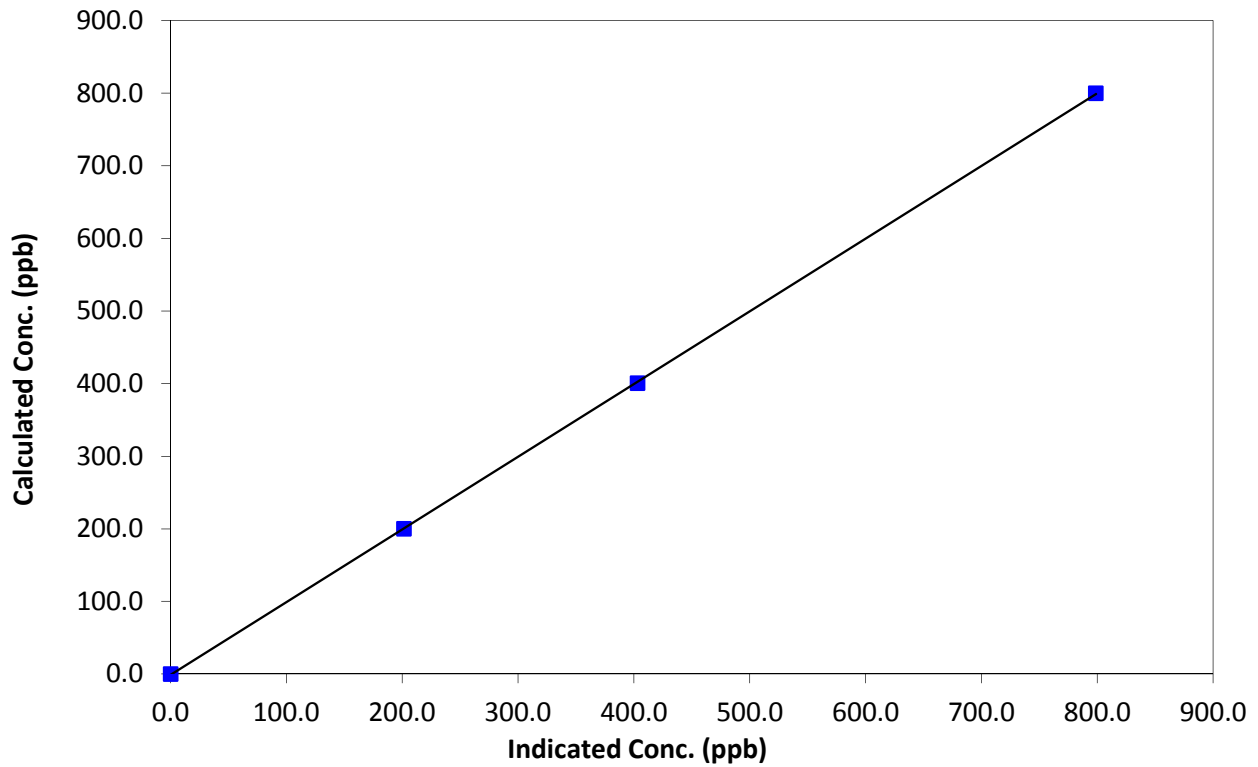
Station Information

Calibration Date	November 19, 2014	Previous Calibration	October 21, 2014
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	11:45	End Time (MST)	16:45
Analyzer make	42i	Analyzer serial #	710321429

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	N/A	Correlation Coefficient	0.999978
800.0	798.9	1.0014		
400.5	403.3	0.9929	Slope	1.001681
200.2	201.6	0.9931		
			Intercept	-1.405891

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

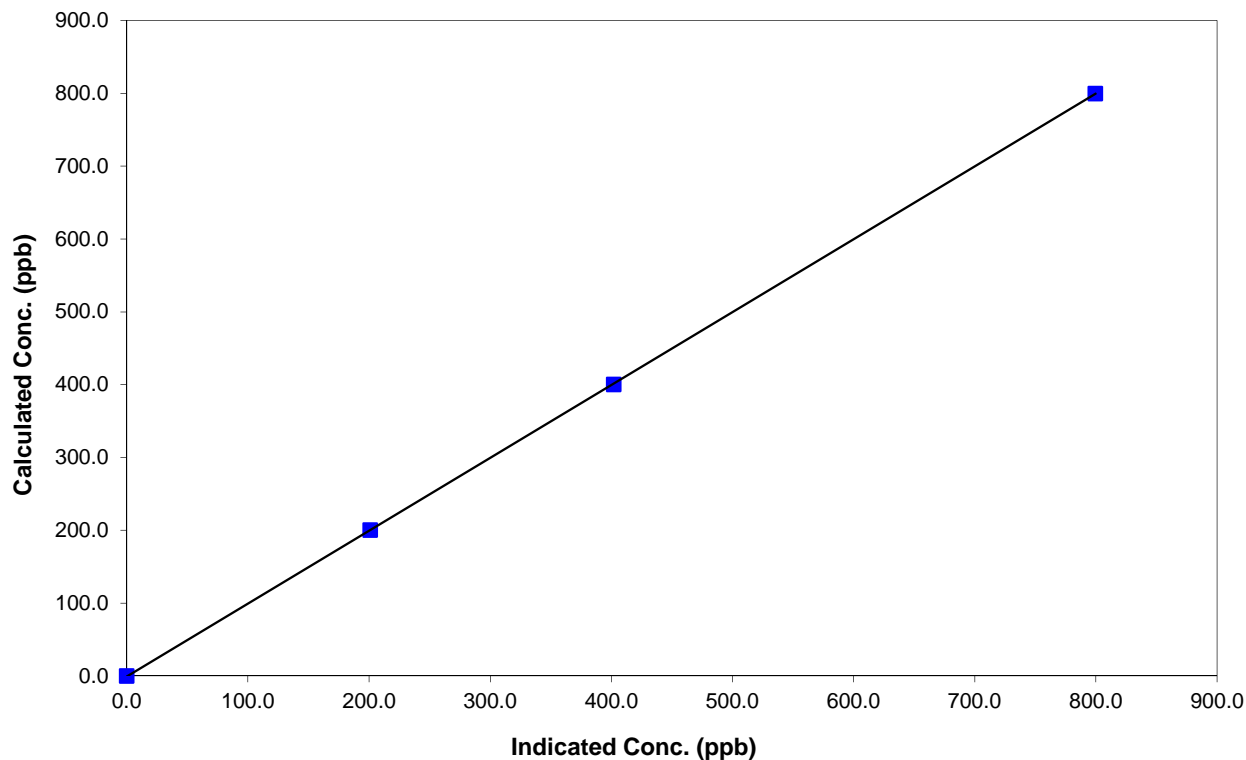
Station Information

Calibration Date	November 19, 2014	Previous Calibration	October 21, 2014
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	11:45	End Time (MST)	16:45
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	0.999994
800.0	799.6	1.0005		
400.5	402.1	0.9960	Slope	1.000651
200.2	201.0	0.9961		
			Intercept	-0.733432

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

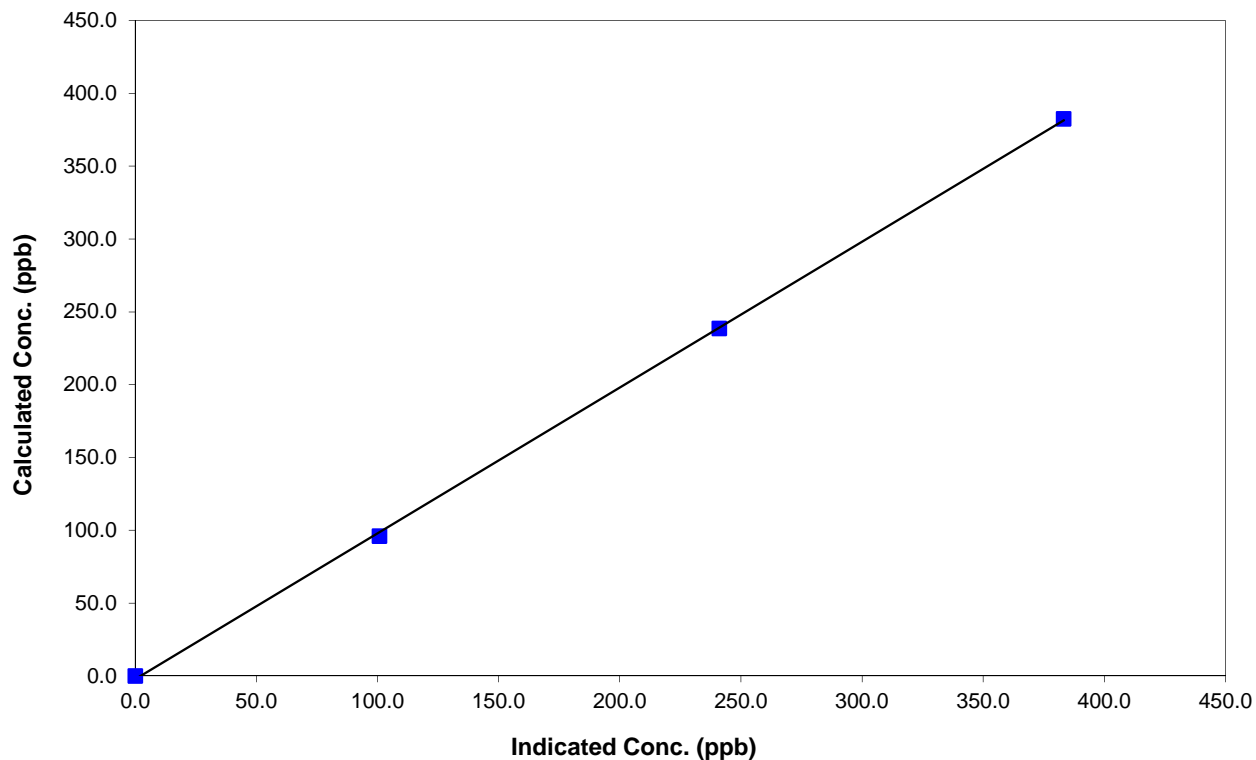
Station Information

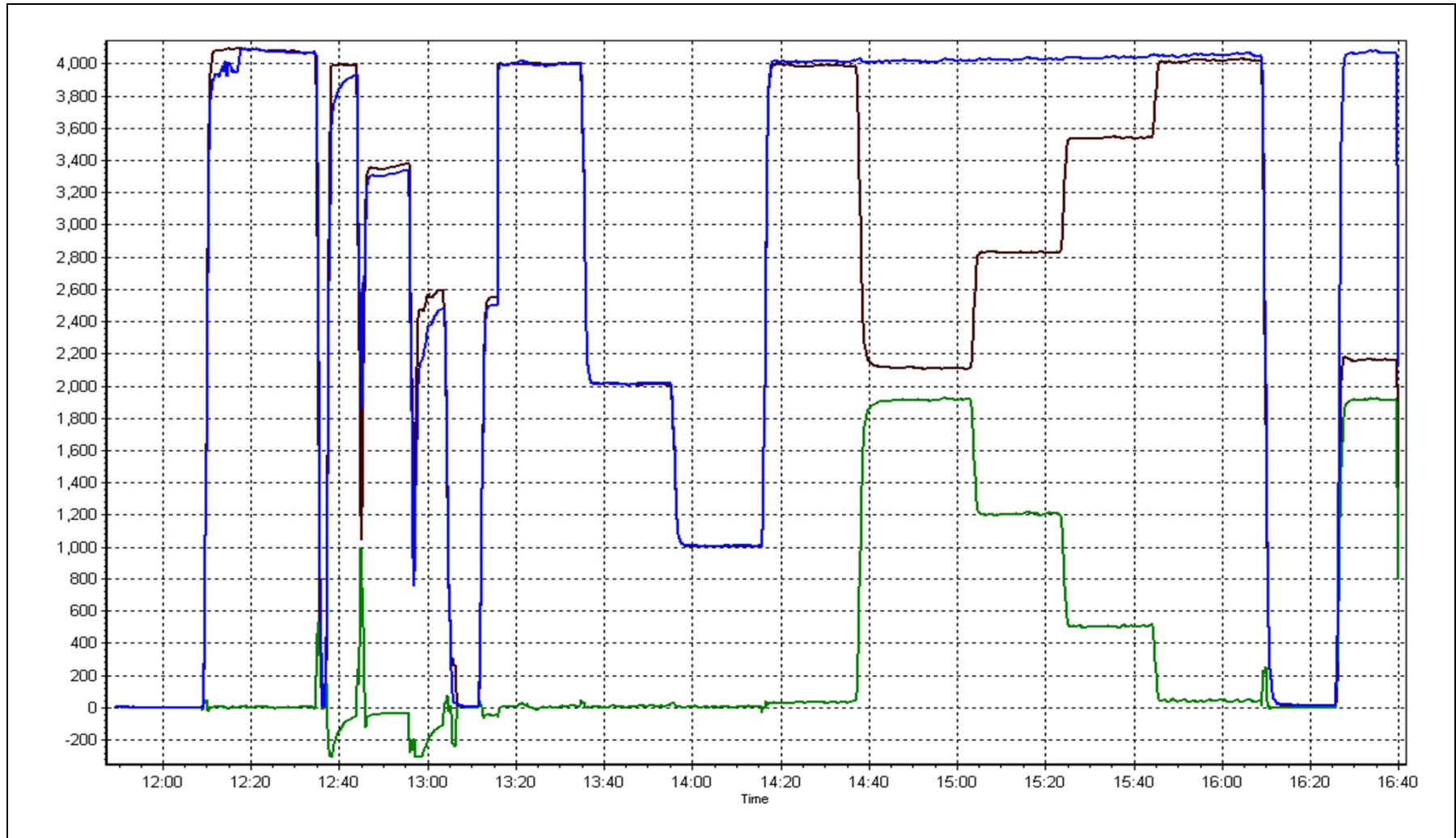
Calibration Date	November 19, 2014	Previous Calibration	October 21, 2014
Station Number	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	11:45	End Time (MST)	16:45
Analyzer make	42i	Analyzer serial #	710321429

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	N/A	Correlation Coefficient	0.999840
382.6	383.2	0.9983		
238.6	241.1	0.9896	Slope	1.001476
96.0	100.8	0.9523		
			Intercept	-2.284097

NO₂ Calibration Curve







Wood Buffalo Environmental Association

NO_x-NO-NO₂ Calibration Report

Station Information

Calibration Date	November 19, 2014	Previous Calibration	October 21, 2014
Station Name	CNRL Horizon	Station Number	AMS 15
Reason:	Routine		
Start Time (MST)	11:45	End Time (MST)	18:20
Barometric Pressure	734 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
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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	1.004812	1.002412	1.000304
	Data Offset	-1.562354	-0.797425	0.253318
After	Data Slope	1.002823	1.001397	1.002041
	Data Offset	-1.060837	-1.089544	-1.182707
Channel #		ethernet connection		
Voltage Range		n/a		

Analyzer Information

Analyzer make/model	42i	Analyzer serial #	710321429
---------------------	-----	-------------------	-----------

Test Point	before		after	
Concentration range	1000	ppb	1000	ppb
NO coefficient	1.104	ppb	0.915	ppb
NOx coefficient	1.013	ppb	0.999	ppb
NO2 coefficient	1.000	ppb	1.000	ppb
NO bkgrnd	12.8		10.7	
NOx bkgrnd	13.3		11.0	
Nt coefficient				
Chamber Temp	50.0	Deg C	50.0	Deg C
Moly Temp	325.0	Deg C	325.0	Deg C
PMT Temp	-2.7	Deg C	-3.0	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell Press	195.1	mmHg	173.4	mmHg
Sample Flow	0.599	ccm	0.667	ccm

Notes:

as founds performed prior to CR3000 switch over from analog to digital. Adjusted zero and span. Pressure and flow has stabilized from exhaust charcoal scrubber move Nov 19.



Wood Buffalo Environmental Association

NO_x-NO-NO₂ Calibration Report

Station Information

Calibration Date: November 19, 2014 Station Number: AMS 15

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NO _x conc (ppb)	Calculated NO conc (ppb)	Calculated NO ₂ conc (ppb)	Indicated NO _x conc (ppb)	Indicated NO conc (ppb)	Indicated NO ₂ conc (ppb)	NO _x Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	0.6	-0.2	0.2	N/A	N/A
as found span	5000	82.3	800.0	800.0	0.0	955.8	943.2	13.6	0.8369	0.8481
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	N/A	N/A
high point	5000	82.3	800.0	800.0	0.0	797.8	799.0	-1.2	1.0027	1.0012
second point	5000	41.2	400.5	400.5	0.0	402.1	402.7	-0.6	0.9961	0.9945
third point	5000	20.6	200.2	200.2	0.0	201.2	201.4	-0.2	0.9950	0.9942
calibrator zero										
as left zero	5000	0.0	0.0	0.0	0.0	0.7	0.9	-0.2	N/A	N/A
as left span	5000	82.3	800.0	432.0	367.9	807.0	437.7	369.4	0.9913	0.9870
Average Correction Factor									0.9979	0.9967

Corrected As found NO_x= 955.2 NO= 943.4 Percent Change NO_x= -16.5% NO= -15.3%
 Previous Response NO_x= 797.7 NO= 798.8

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 ₂ conc (ppb)	Indicated NO _x conc (ppb)	Indicated NO conc (ppb)	Indicated NO ₂ conc (ppb)	NO _x Correction factor	NO Correction factor	NO ₂ Correction factor	Converter Efficiency
Cal zero			0.0			-0.1			N/A	
1st NO ₂ (300)	N/A	432.0	368.8	800.7	432.0	368.7	0.9829	1.0000	1.0003	100.0%
2nd NO ₂ (200)	N/A	573.3	227.5	801.8	573.3	228.5	0.9816	1.0000	0.9958	100.4%
3rd NO ₂ (100)	N/A	714.1	86.7	803.5	714.1	89.4	0.9795	1.0000	0.9706	103.0%
4th NO ₂ (0)	800.8	N/A	-1.2	799.6	800.8	-1.2	0.9842	1.0000	N/A	N/A
Average Correction Factor							0.9821	1.0000	0.9889	101.1%

Calibration Performed By: Michael Martineau



Wood Buffalo Environmental Association

NO_x Calibration Summary

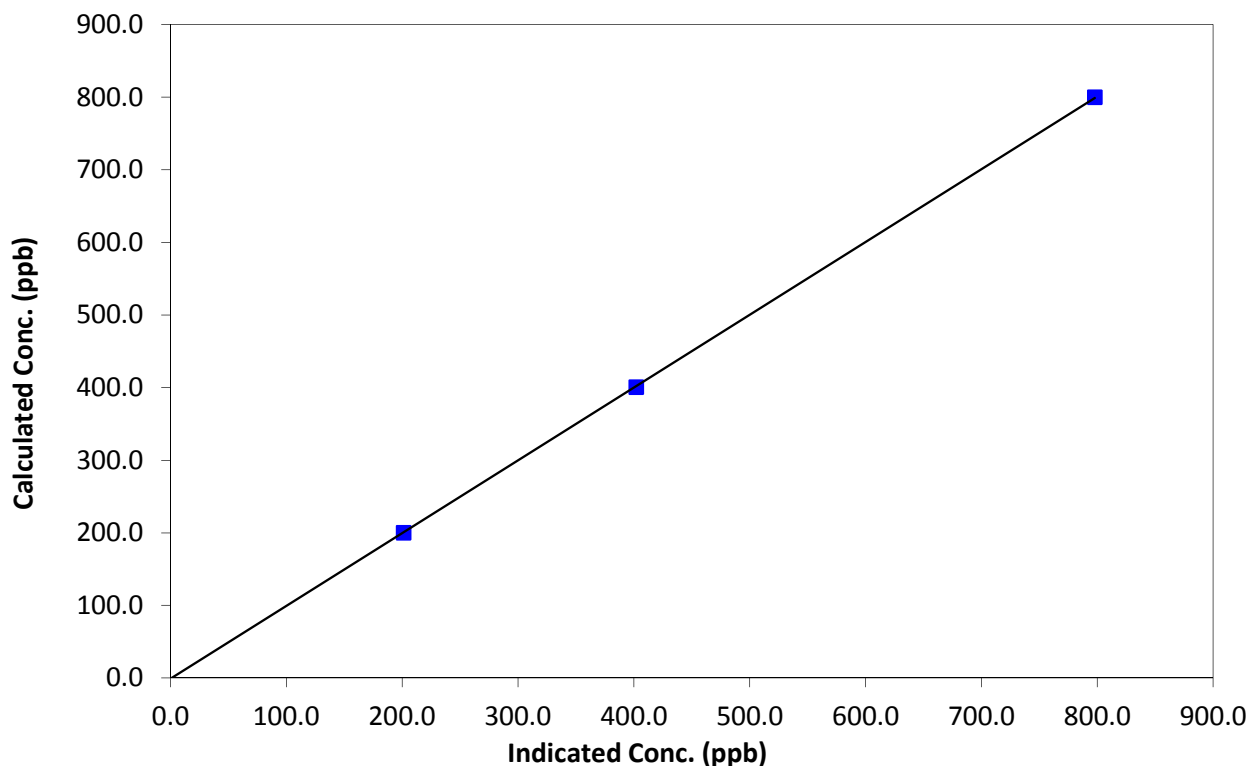
Station Information

Calibration Date	November 19, 2014	Previous Calibration	October 21, 2014
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	11:45	End Time (MST)	18:20
Analyzer make	42i	Analyzer serial #	710321429

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999985
800.0	797.8	1.0027		
400.5	402.1	0.9961	Slope	1.002823
200.2	201.2	0.9950		
			Intercept	-1.060837

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

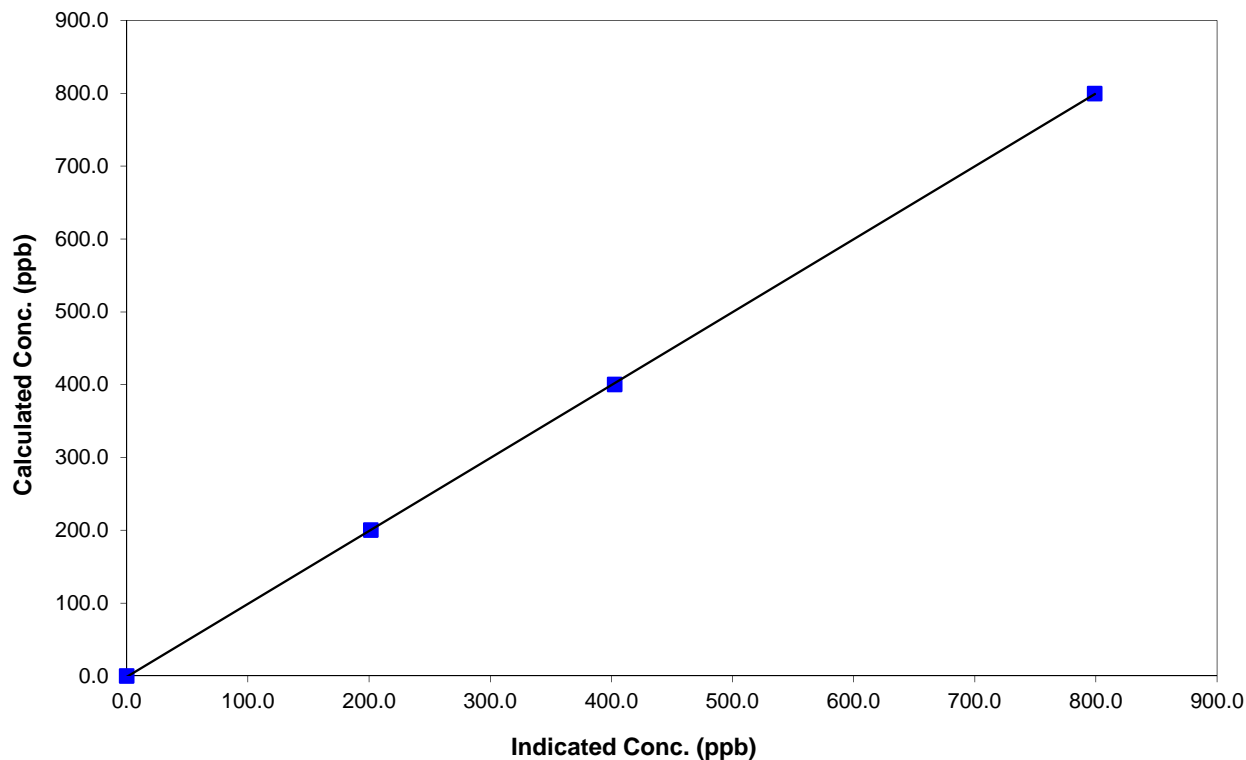
Station Information

Calibration Date	November 19, 2014	Previous Calibration	October 21, 2014
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	11:45	End Time (MST)	18:20
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	0.999986
800.0	799.0	1.0012		
400.5	402.7	0.9945	Slope	1.001397
200.2	201.4	0.9942		
			Intercept	-1.089544

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

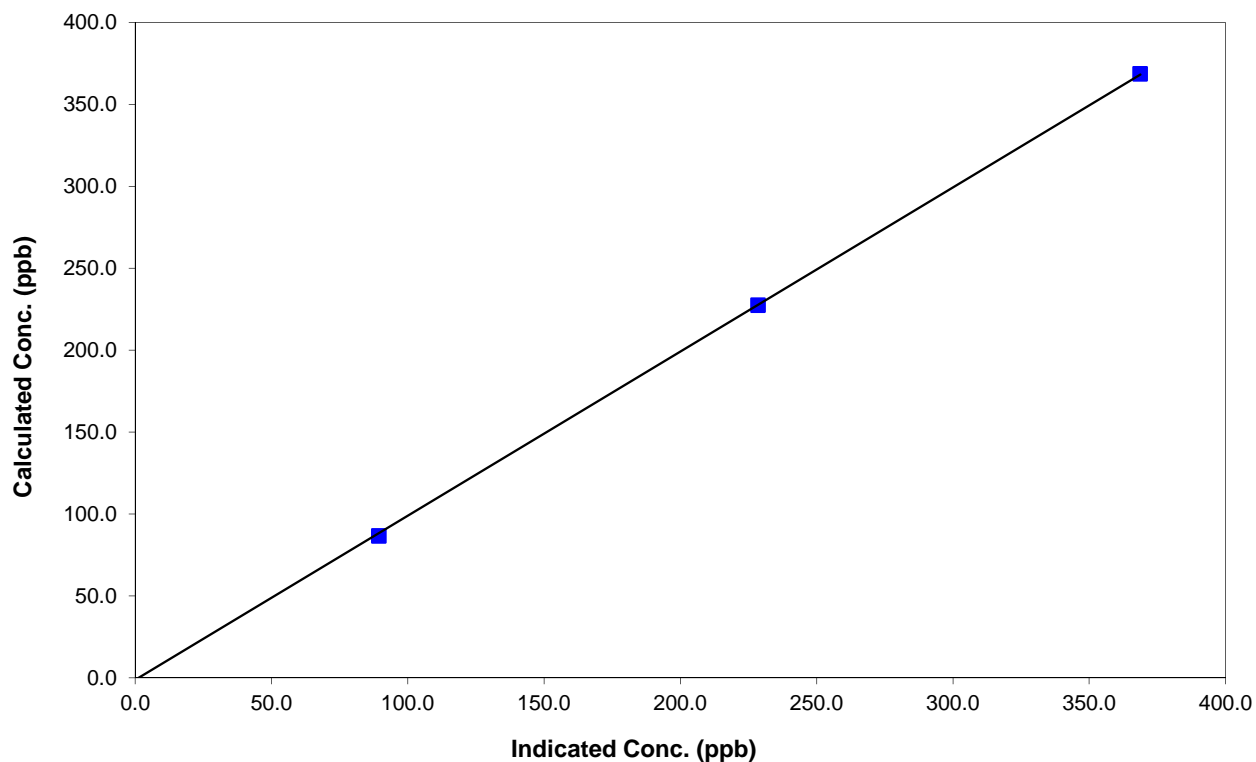
Station Information

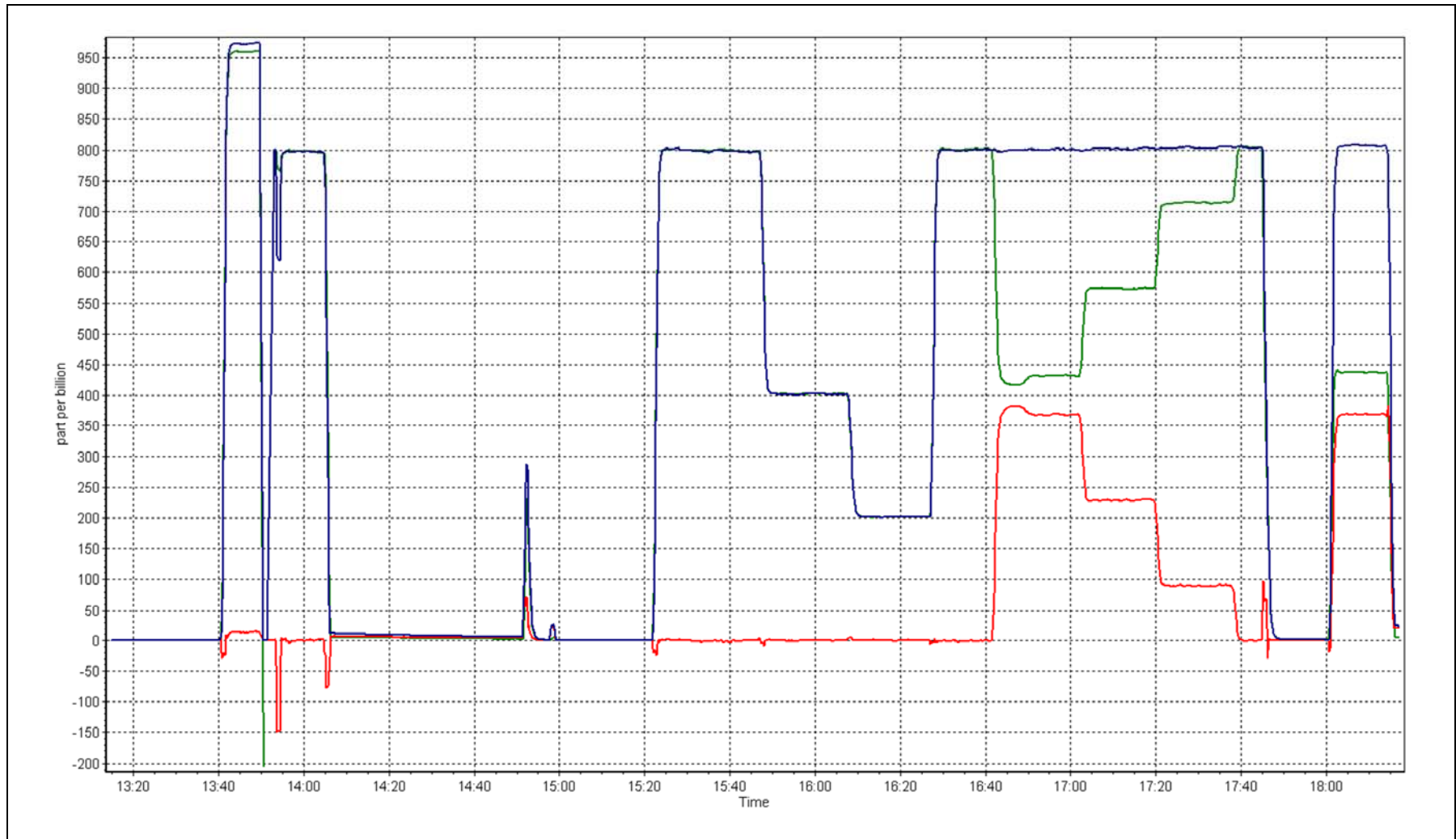
Calibration Date	November 19, 2014	Previous Calibration	October 21, 2014
Station Number	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	11:45	End Time (MST)	18:20
Analyzer make	42i	Analyzer serial #	710321429

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999940
368.8	368.7	1.0003		
227.5	228.5	0.9958	Slope	1.002041
86.7	89.4	0.9706		
			Intercept	-1.182707

NO₂ Calibration Curve







Wood Buffalo Environmental Association

NO_x-NO-NO₂ Calibration Report

Station Information

Calibration Date	November 24, 2014	Previous Calibration	November 19, 2014
Station Name	CNRL Horizon	Station Number	AMS 15
Reason:	Routine		
Start Time (MST)	10:30	End Time (MST)	12:15
Barometric Pressure	n/a 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)	1000	1000	1000
Before	Data Slope	1.002823	1.001397	1.002041
	Data Offset	-1.060837	-1.089544	-1.182707
After	Data Slope	0.997327	0.998223	0.997650
	Data Offset	0.329118	-0.049911	0.369131
Channel #		ethernet connection		
Voltage Range		n/a		

Analyzer Information

Analyzer make/model 42i Analyzer serial # 710321429

Test Point	before		after	
Concentration range	1000	ppb	1000	ppb
NO coefficient	0.915	ppb	0.798	ppb
NOX coefficient	0.999	ppb	1.003	ppb
NO2 coefficient	1.000	ppb	1.000	ppb
NO bkgrnd	10.7		9.5	
NOX bkgrnd	11.0		9.8	
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	173.4	mmHg	173.4	mmHg
Sample Flow	0.667	ccm	0.722	ccm

Notes:

adjusted span to address change in pressure. Linearity proven Nov 19 cal.



Wood Buffalo Environmental Association

NO_x-NO-NO₂ Calibration Report

Station Information

Calibration Date:

November 24, 2014

Station Number:

AMS 15

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NO _x conc (ppb)	Calculated NO conc (ppb)	Calculated NO ₂ conc (ppb)	Indicated NO _x conc (ppb)	Indicated NO conc (ppb)	Indicated NO ₂ conc (ppb)	NO _x Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	0.6	-0.2	0.2	N/A	N/A
as found span	5000	82.3	800.0	800.0	0.0	955.8	943.2	13.6	0.8369	0.8481
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.3	0.1	-0.4	N/A	N/A
high point	5000	82.3	800.0	800.0	0.0	801.8	801.4	0.4	0.9977	0.9982
second point										
third point										
calibrator zero										
as left zero										
as left span										
Average Correction Factor									0.9977	0.9982

Corrected As found

NO_x= 955.2

NO= 943.4

Percent Change

NO_x= -16.4%

NO= -15.2%

Previous Response

NO_x= 798.8

NO= 799.9

GPT Calibration Data

Dilution Flow

5000

ccm

Source Gas Flow

82.30

ccm

O ₃ Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO ₂ conc (ppb)	Indicated NO _x conc (ppb)	Indicated NO conc (ppb)	Indicated NO ₂ conc (ppb)	NO _x Correction factor	NO Correction factor	NO ₂ Correction factor	Converter Efficiency
Cal zero			0.0			-0.4			N/A	
1st NO ₂ (300)	N/A	444.8	356.6	801.9	444.8	357.1	0.9814	1.0000	0.9987	100.1%
2nd NO ₂ (200)										
3rd NO ₂ (100)										
4th NO ₂ (0)	801.4	N/A	0.3	801.8	801.4	0.4	0.9816	1.0000	N/A	N/A
Average Correction Factor							0.9815	1.0000	0.9987	100.1%

Calibration Performed By:

Michael Martineau



Wood Buffalo Environmental Association

NO_x Calibration Summary

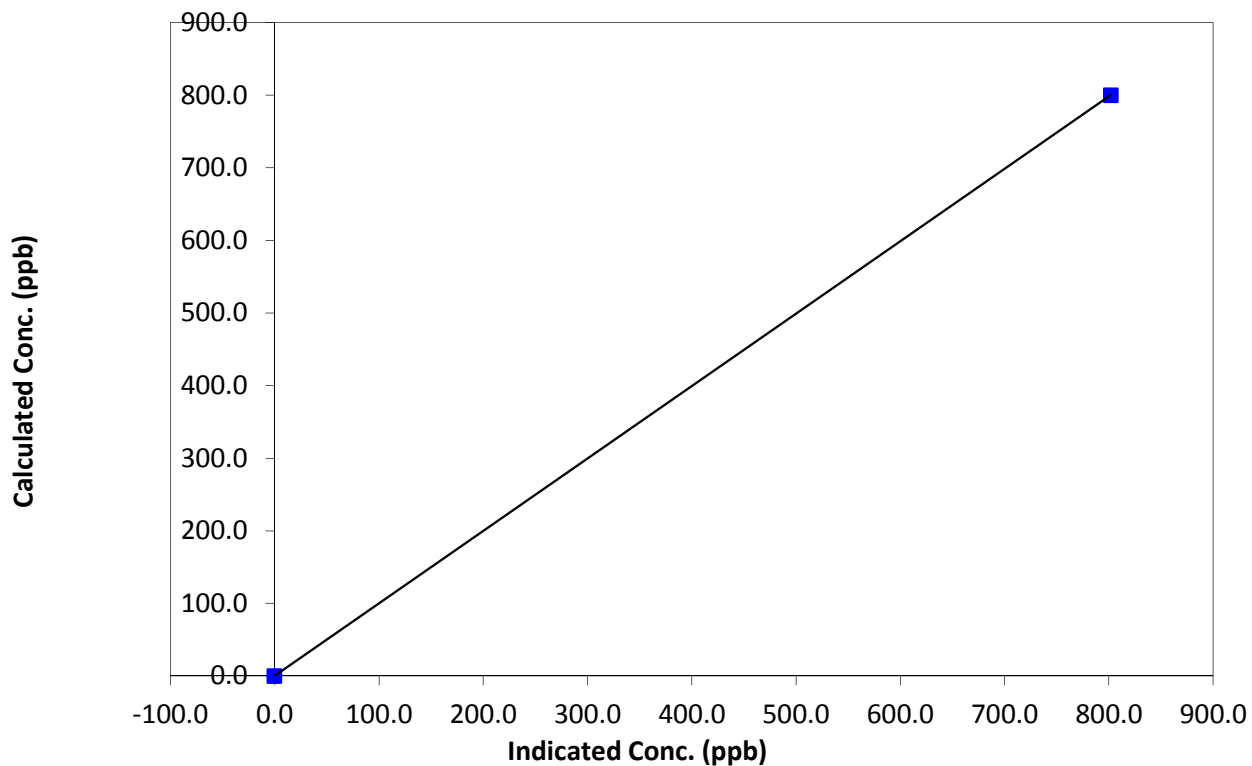
Station Information

Calibration Date	November 24, 2014	Previous Calibration	November 19, 2014
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	10:30	End Time (MST)	12:15
Analyzer make	42i	Analyzer serial #	710321429

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.3	N/A	Correlation Coefficient	1.000000
800.0	801.8	0.9977		
			Slope	0.997327
			Intercept	0.329118

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

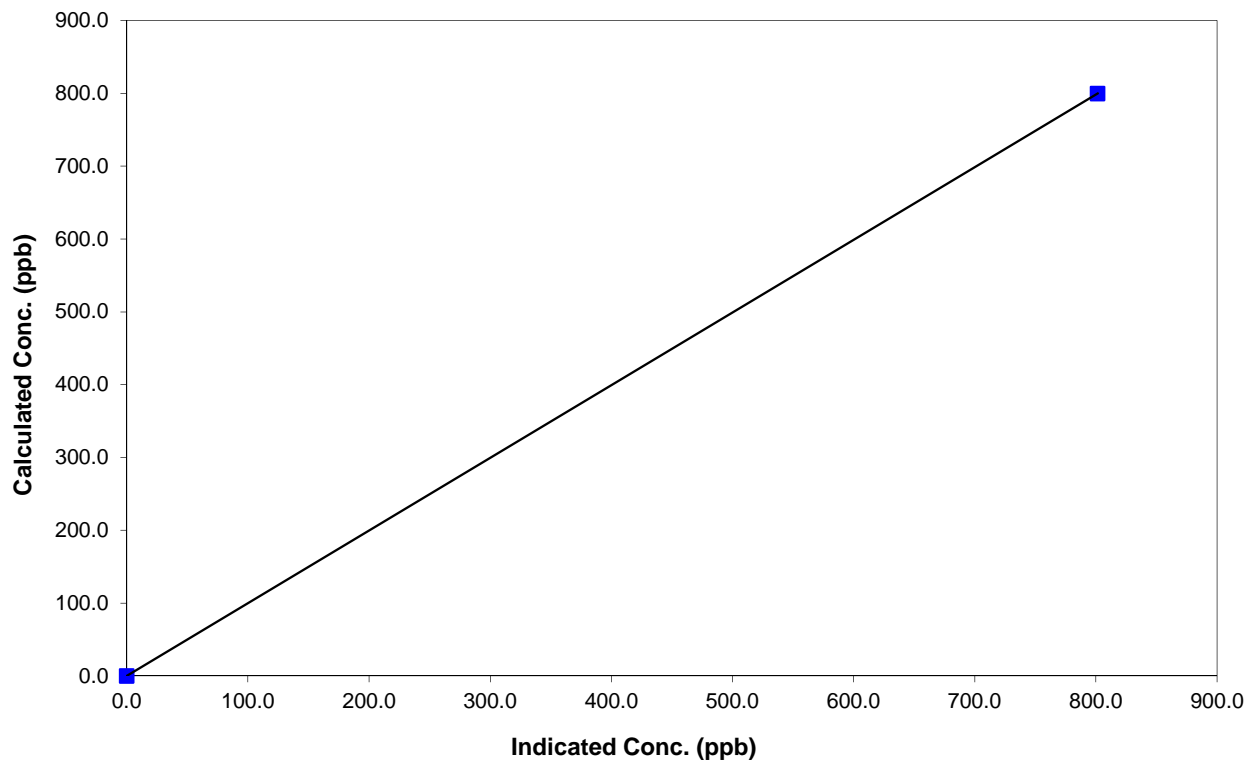
Station Information

Calibration Date	November 19, 2014	Previous Calibration	November 19, 2014
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	10:30	End Time (MST)	12:15
Analyzer make	42i	Analyzer serial #	710321429

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	N/A	Correlation Coefficient	1.000000
800.0	801.4	0.9982		
			Slope	0.998223
			Intercept	-0.049911

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

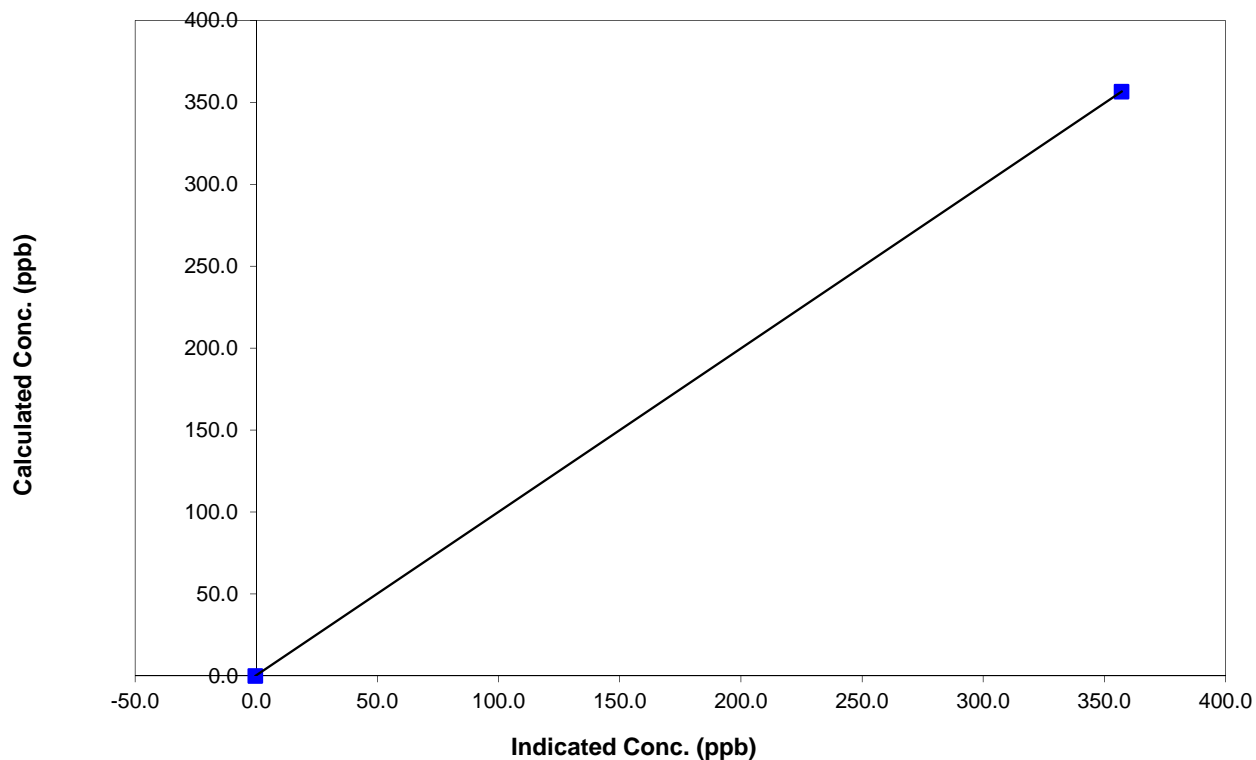
Station Information

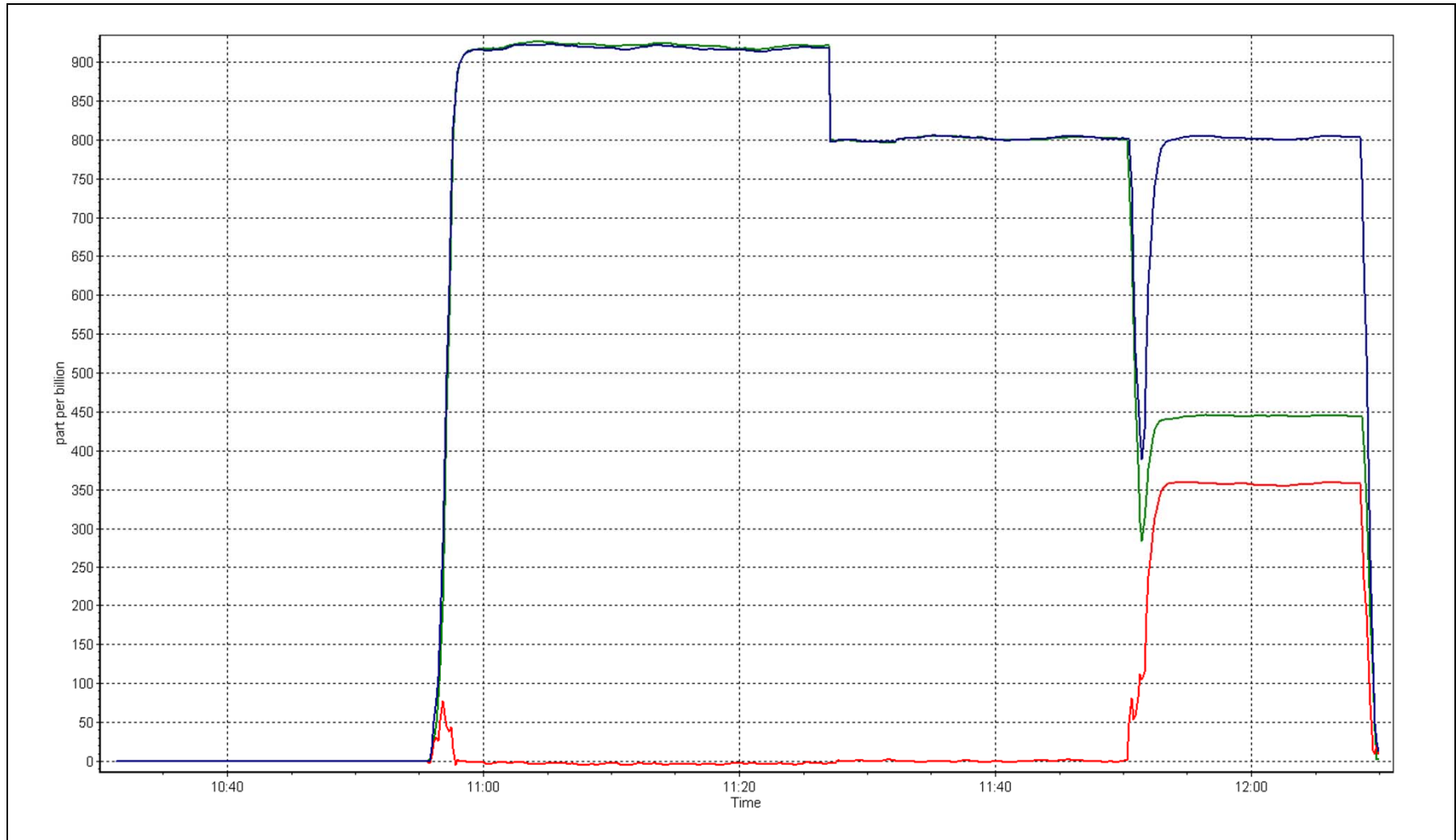
Calibration Date	November 24, 2014	Previous Calibration	November 19, 2014
Station Number	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	10:30	End Time (MST)	12:15
Analyzer make	42i	Analyzer serial #	710321429

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.4	N/A	Correlation Coefficient	1.000000
356.6	357.1	0.9987		
			Slope	0.997650
			Intercept	0.369131

NO₂ Calibration Curve





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 16
SHELL MUSKEG RIVER
NOVEMBER 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

December 30, 2014

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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SHELL MUSKEG RIVER (AMS 16)
 NOVEMBER 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	682	38	38	100.00	14	0	3	0
THC (ppm) Average	682	38	38	100.00	4.4	-	2.8	-
NO2 (ppb) Average	681	38	39	99.86	38	0	25	-
NO (ppb) Average	681	38	39	99.86	112	-	24	-
NOX (ppb) Average	681	38	39	99.86	144	-	48	-
PM2.5 (ug/m3) Average	709	0	11	98.47	34	-	10.3	0
Temperature 2 m (C) Average	720	0	0	100.00	9.2	-	2.3	-
Relative Humidity (%) Average	714	0	6	99.17	100	-	-	-
Barometric Pressure (inHg) Average	717	0	3	99.58	29.8	-	-	-
Wind Speed 10 m (km/h) Average	720	0	0	100.00	26	-	-	-
Wind Direction 10 m (deg) Average	720	0	0	100.00	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SHELL MUSKEG RIVER (AMS 16)
 NOVEMBER 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	682	0.7	1	-	0	0	0	0	0	1	14
THC (ppm) Average	682	2.44	0.3	-	2	2.2	2.2	2.4	2.6	2.8	4.4
NO2 (ppb) Average	681	13.8	8	-	0	3	8	14	19	25	38
NO (ppb) Average	681	8.3	12	-	0	0	1	5	10	19	112
NOX (ppb) Average	681	22.1	17	-	0	4	10	19	29	43	144
PM2.5 (ug/m3) Average	709	6.19	3.9	-	1.1	2.4	3.5	5.2	7.7	11.2	34
Temperature 2 m (C) Average	720	-11.63	8.1	-	-30.4	-22.4	-17.6	-12.2	-5.7	-0.4	9.2
Relative Humidity (%) Average	714	80.8	9	-	50	67	76	82	86	94	100
Barometric Pressure (inHg) Average	717	29.06	0.3	-	28.4	28.6	28.8	29.1	29.3	29.4	29.8
Wind Speed 10 m (km/h) Average	720	10.4	5	-	1	4	6	9	14	18	26
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SHELL MUSKEG RIVER (AMS 16)
NOVEMBER 2014

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
NO ₂ , NO, NO _X	17 Nov 2014 14:00	17 Nov 2014 14:00	1	Maintenance - tested daily zero and span system
PM _{2.5}	12 Nov 2014 15:00	12 Nov 2014 16:00	2	Maintenance - Flow and zero check, sample head cleaning
PM _{2.5}	20 Nov 2014 01:00	20 Nov 2014 09:00	9	Analyzer failure - filter failed to advance
Relative Humidity	03 Nov 2014 07:00	03 Nov 2014 12:00	6	Unstable operation - exceed upper range
Barometric Pressure	12 Nov 2014 16:00	12 Nov 2014 16:00	1	Flat line in sensor output signal
Barometric Pressure	13 Nov 2014 09:00	13 Nov 2014 10:00	2	Flat line in sensor output signal

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Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 14 ppb on Nov 26 13:00	Maximum Daily Average: 2.6 ppb on Nov 17		Hours of Data:	682
Minimum Value: 0 ppb on Nov 1 18:00	Minimum Daily Average: 0.2 ppb on Nov 16		Hours of Missing Data:	38
Maximum Diurnal Average: 1.6 ppb at hour 13	Minimum Diurnal Average: 0.4 ppb at hour 22		Hours of Calibration:	38
Monthly Average: 0.7 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 7		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
2-Nov	Z	0	0	0	0	0	0	0	0	0	1	2	6	11	9	2	1	1	0	0	0	0	0	0	0	1.7	11
3-Nov	Z	1	8	5	6	3	3	2	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1.6	8	
4-Nov	Z	0	0	0	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2	
5-Nov	Z	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	
6-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0.3	1	
7-Nov	Z	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-Nov	Z	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.4	1	
9-Nov	Z	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	
10-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0.4	1	
11-Nov	Z	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	
12-Nov	Z	0	0	1	1	3	7	5	C	C	C	C	C	C	C	C	1	0	0	0	1	1	1	3	--	7	
13-Nov	Z	2	2	3	2	2	3	3	2	1	1	1	1	1	2	2	1	1	1	0	0	0	0	0	1.4	3	
14-Nov	Z	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	
15-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0.2	1	
16-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.2	1	
17-Nov	Z	0	0	0	0	1	1	1	0	7	3	14	13	8	4	1	1	1	0	1	1	0	0	0	2.6	14	
18-Nov	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
19-Nov	Z	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	
20-Nov	Z	0	0	0	0	1	1	2	1	1	4	4	3	2	1	1	1	1	1	1	1	1	1	1	1.2	4	
21-Nov	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
22-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0	
23-Nov	Z	0	0	0	0	0	0	0	0	1	1	2	2	3	2	2	1	1	0	1	1	0	1	1	0.8	3	
24-Nov	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
25-Nov	Z	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1	
26-Nov	Z	0	0	0	0	0	1	1	1	4	4	10	14	4	2	3	1	2	3	1	1	1	0	0	2.4	14	
27-Nov	Z	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	
28-Nov	Z	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	
29-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0.3	2	
30-Nov	Z	2	3	2	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	2	3	3	3	3	1.2	3	

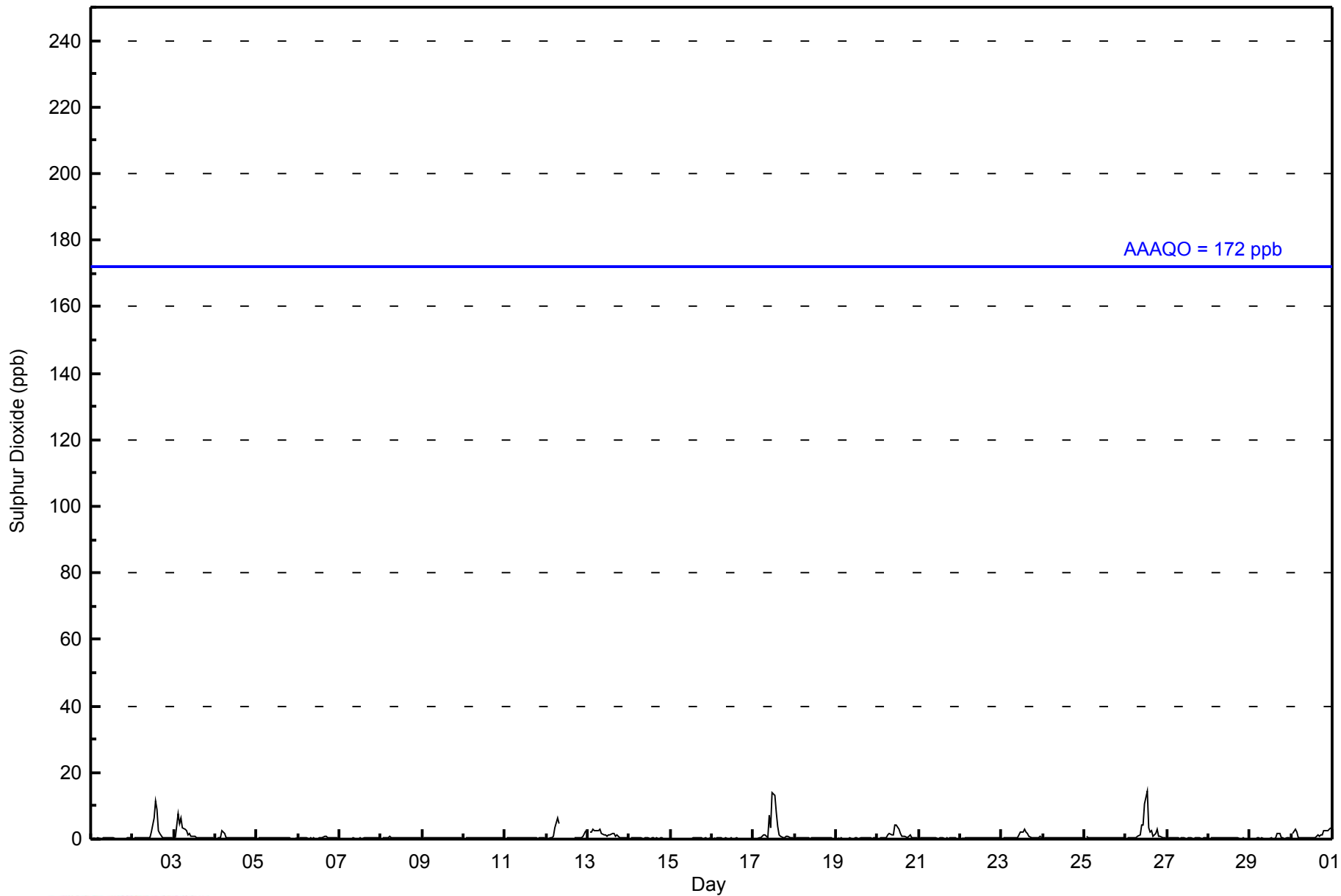
--	0.4	0.7	0.6	0.7	0.7	0.7	0.7	0.7	0.5	0.8	0.7	1.4	1.6	1.2	0.9	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.5	Diurnal Average	
--	2	8	5	6	3	7	5	2	7	4	14	14	11	9	3	2	2	3	2	3	2	3	3	3	Diurnal Maximum	

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



WBEA
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Shell Muskeg River - November 2014





WBEA
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Shell Muskeg River - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	678	99.41	99.41
11 - 20	4	0.59	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720



WBEA
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Shell Muskeg River - November 2014

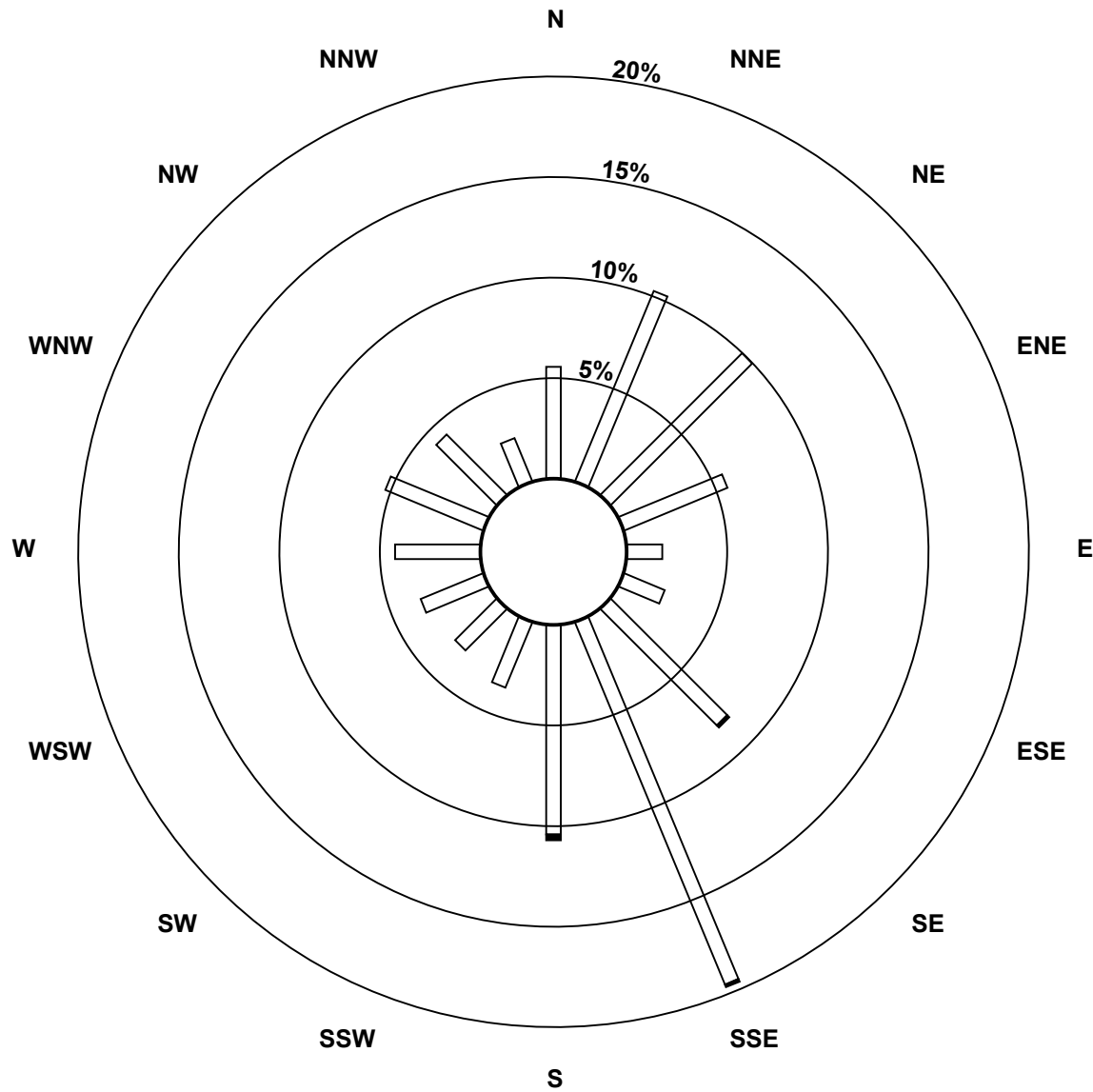
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	38	70	68	38	12	15	56	133	71	24	20	23	29	36	29	16	678
11 - 20	0	0	0	0	0	0	1	1	2	0	0	0	0	0	0	0	4
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	38	70	68	38	12	15	57	134	73	24	20	23	29	36	29	16	682

Total Number of Valid Hours: 682

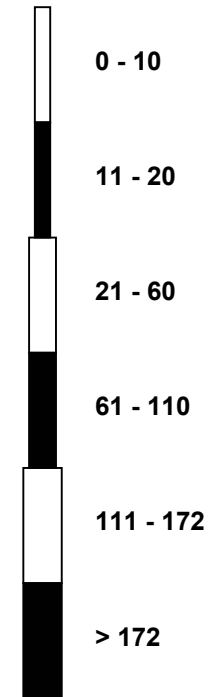
Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

Sulphur Dioxide (SO₂) - ppb
Shell Muskeg River (AMS 16)



Classes (ppb)

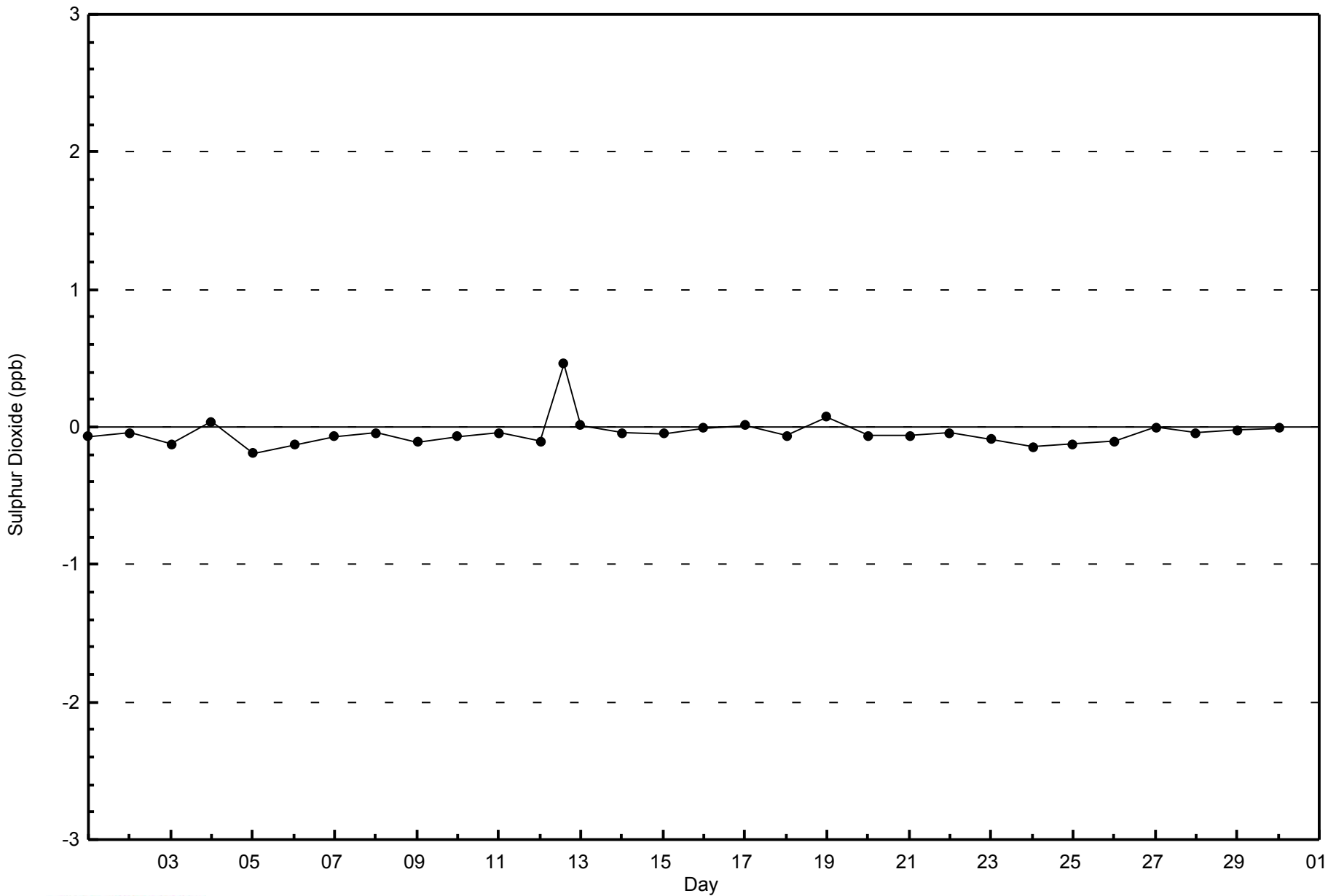


Total Number of Valid Hours: 682



WBEA
Zero Responses

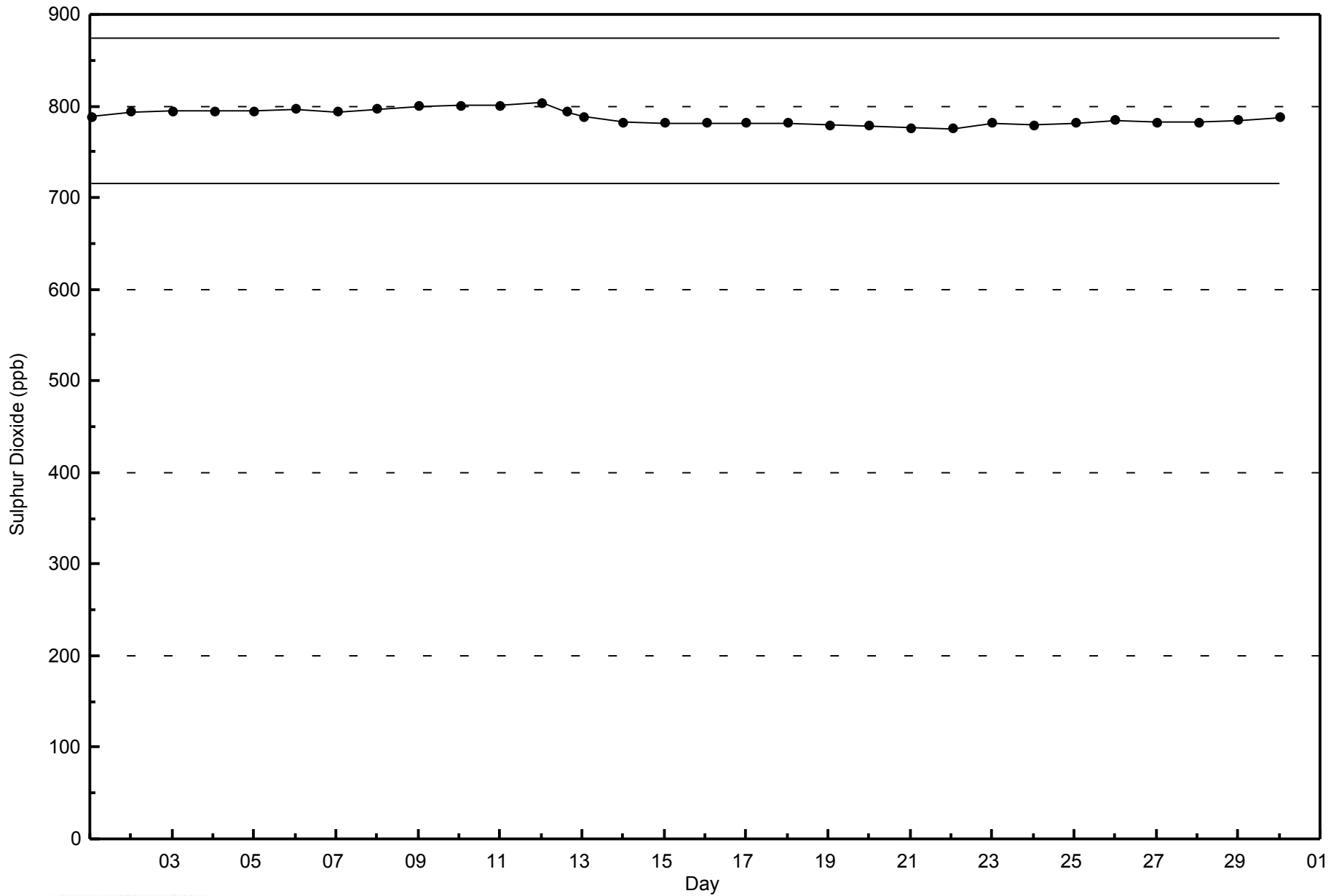
Sulphur Dioxide (SO₂) - ppb
Shell Muskeg River - November 2014





WBEA
Span Responses

Sulphur Dioxide (SO₂) - ppb
Shell Muskeg River - November 2014



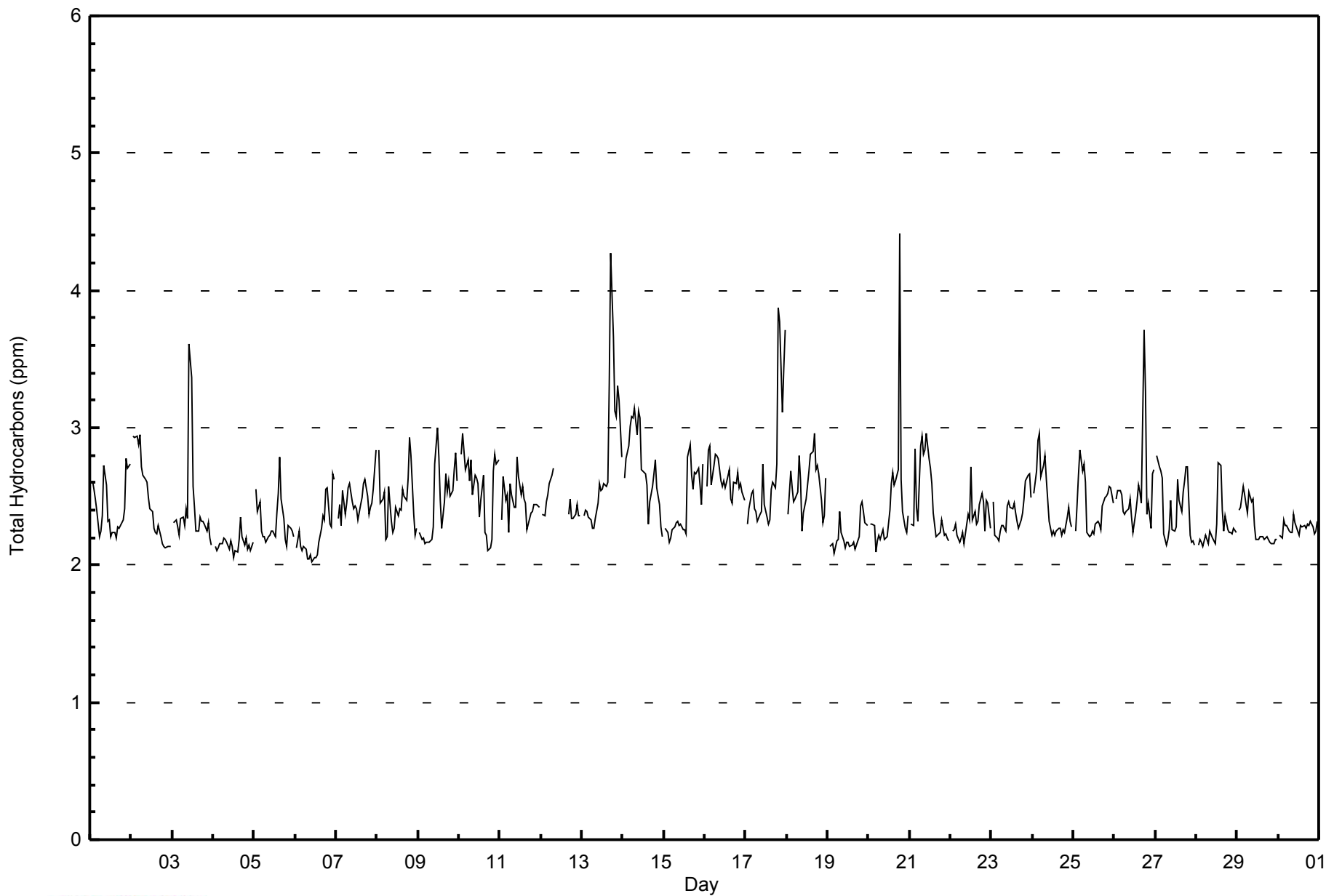


Maximum Value: 4.4 ppm on Nov 20 19:00																	Maximum Daily Average: 2.8 ppm on Nov 13										Hours in Service: 720	
Minimum Value: 2.0 ppm on Nov 6 11:00																	Minimum Daily Average: 2.2 ppm on Nov 4										Hours of Data: 682	
Maximum Diurnal Average: 2.6 ppm at hour 19																	Minimum Diurnal Average: 2.4 ppm at hour 13										Hours of Missing Data: 38	
Monthly Average: 2.44 ppm																	Percentiles: P ₁ = 2.1 P ₁₀ = 2.2 Q ₁ = 2.2 Median = 2.4 Q ₃ = 2.6 P ₉₀ = 2.8 P ₉₉ = 3.6										Hours of Calibration: 38	
																											Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
1-Nov	Z	2.6	2.6	2.5	2.4	2.2	2.3	2.4	2.7	2.6	2.3	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.4	2.8	2.7	2.7	2.4	2.8		
2-Nov	Z	2.9	2.9	2.9	2.9	3.0	2.7	2.7	2.6	2.6	2.5	2.4	2.4	2.3	2.2	2.2	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.5	3.0		
3-Nov	Z	2.3	2.3	2.3	2.2	2.3	2.3	2.3	2.4	2.3	3.6	3.4	2.6	2.4	2.3	2.2	2.3	2.3	2.3	2.3	2.2	2.3	2.2	2.1	2.4	3.6		
4-Nov	Z	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.1	2.1	2.1	2.2	2.4	2.2	2.1	2.2	2.1	2.1	2.1	2.2	2.2	2.4		
5-Nov	Z	2.6	2.4	2.5	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.4	2.5	2.8	2.5	2.3	2.2	2.1	2.3	2.3	2.2	2.2	2.8		
6-Nov	Z	2.1	2.2	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.0	2.1	2.1	2.1	2.2	2.3	2.4	2.3	2.5	2.6	2.3	2.3	2.7	2.6	2.2	2.7		
7-Nov	Z	2.3	2.4	2.3	2.5	2.4	2.4	2.6	2.6	2.5	2.4	2.4	2.4	2.3	2.4	2.5	2.6	2.6	2.5	2.4	2.4	2.5	2.6	2.8	2.5	2.8		
8-Nov	Z	2.8	2.5	2.5	2.5	2.2	2.2	2.6	2.3	2.2	2.3	2.4	2.4	2.4	2.4	2.5	2.5	2.5	2.6	2.9	2.8	2.4	2.2	2.3	2.5	2.9		
9-Nov	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.7	3.0	2.8	2.5	2.3	2.5	2.7	2.5	2.6	2.5	2.5	2.7	2.8	2.6	2.5	3.0	
10-Nov	Z	2.8	3.0	2.8	2.7	2.8	2.6	2.8	2.5	2.7	2.6	2.6	2.4	2.5	2.7	2.2	2.2	2.1	2.1	2.2	2.7	2.8	2.7	2.8	2.6	3.0		
11-Nov	Z	2.3	2.6	2.5	2.5	2.2	2.6	2.5	2.4	2.4	2.8	2.6	2.5	2.6	2.5	2.4	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.8		
12-Nov	Z	2.4	2.4	2.5	2.5	2.6	2.7	2.7	C	C	C	C	C	C	C	C	2.4	2.5	2.3	2.3	2.4	2.4	2.4	2.4	--	2.7		
13-Nov	Z	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.4	2.6	2.5	2.5	2.6	2.6	2.6	3.3	4.3	3.7	3.1	3.1	3.3	3.2	2.8	2.8	4.3		
14-Nov	Z	2.6	2.8	2.9	3.0	3.1	3.1	3.1	2.9	3.1	3.1	2.7	2.7	2.7	2.6	2.3	2.5	2.6	2.7	2.8	2.6	2.4	2.3	2.2	2.7	3.1		
15-Nov	Z	2.3	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.8	2.9	2.7	2.5	2.7	2.7	2.7	2.6	2.4	2.7	2.4	2.9		
16-Nov	Z	2.6	2.8	2.9	2.6	2.7	2.8	2.8	2.8	2.6	2.6	2.6	2.6	2.6	2.7	2.5	2.5	2.6	2.6	2.7	2.6	2.6	2.5	2.5	2.6	2.9		
17-Nov	Z	2.3	2.4	2.5	2.5	2.4	2.4	2.3	2.4	2.4	2.7	2.4	2.4	2.3	2.3	2.6	2.6	2.6	2.7	3.9	3.8	3.1	3.4	3.7	2.7	3.9		
18-Nov	Z	2.4	2.7	2.6	2.5	2.5	2.5	2.8	2.6	2.2	2.4	2.5	2.6	2.7	2.8	2.8	3.0	2.7	2.7	2.7	2.5	2.3	2.4	2.6	2.6	3.0		
19-Nov	Z	2.1	2.1	2.2	2.1	2.2	2.2	2.4	2.2	2.2	2.1	2.2	2.2	2.1	2.1	2.2	2.1	2.1	2.2	2.4	2.5	2.4	2.3	2.3	2.2	2.5		
20-Nov	Z	2.3	2.3	2.3	2.1	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.4	2.6	2.7	2.6	2.6	2.7	4.4	2.6	2.4	2.3	2.2	2.4	2.4	4.4		
21-Nov	Z	2.3	2.3	2.8	2.4	2.3	2.9	2.9	2.8	2.8	3.0	2.8	2.7	2.6	2.4	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.5	3.0		
22-Nov	Z	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.3	2.7	2.3	2.4	2.3	2.3	2.4	2.5	2.5	2.2	2.5	2.5	2.3	2.3	2.7		
23-Nov	Z	2.5	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.4	2.5	2.4	2.4	2.5	2.4	2.3	2.3	2.3	2.4	2.5	2.6	2.7	2.7	2.5	2.4	2.7		
24-Nov	Z	2.5	2.7	2.9	3.0	2.6	2.7	2.8	2.6	2.5	2.3	2.2	2.3	2.2	2.3	2.3	2.3	2.3	2.2	2.3	2.2	2.3	2.4	2.3	2.3	2.4	3.0	
25-Nov	Z	2.2	2.4	2.7	2.8	2.7	2.7	2.6	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.4	2.5	2.5	2.5	2.6	2.6	2.5	2.4	2.8	
26-Nov	Z	2.5	2.5	2.5	2.5	2.4	2.4	2.4	2.4	2.5	2.3	2.2	2.4	2.5	2.6	2.5	2.4	3.7	3.3	2.4	2.4	2.3	2.7	2.7	2.5	3.7		
27-Nov	Z	2.8	2.7	2.7	2.6	2.2	2.1	2.2	2.3	2.5	2.3	2.3	2.3	2.6	2.5	2.4	2.5	2.6	2.7	2.7	2.2	2.2	2.2	2.1	2.4	2.8		
28-Nov	Z	2.1	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.7	2.7	2.4	2.2	2.4	2.3	2.2	2.2	2.2	2.3	2.2	2.3	2.7		
29-Nov	Z	2.4	2.4	2.6	2.5	2.4	2.4	2.5	2.5	2.5	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.6		
30-Nov	Z	2.2	2.2	2.3	2.3	2.3	2.2	2.2	2.2	2.4	2.3	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.3	2.3	2.3	2.4		
	--	2.4	2.4	2.5	2.4	2.4	2.4	2.5	2.4	2.4	2.5	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.6	2.5	2.5	2.4	2.5	2.5	2.5	Diurnal Average		
	--	2.9	3.0	2.9	3.0	3.1	3.1	3.1	2.9	3.1	3.6	3.4	2.8	2.7	2.8	2.9	3.3	4.3	4.4	3.9	3.8	3.3	3.4	3.7	3.7	Diurnal Maximum		
Z - zerospan		C - Calibration																										



WBEA
Hourly Averages

Total Hydrocarbons (THC) - ppm
Shell Muskeg River - November 2014





WBEA
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Shell Muskeg River - November 2014

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	3	0.44	0.44
2.1 - 3.0	657	96.33	96.77
3.1 - 10.0	22	3.23	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720



WBEA
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Shell Muskeg River - November 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	3	0	0	0	0	0	0	0	0	0	3
2.1 - 3.0	34	66	63	36	12	15	54	133	73	23	20	23	28	36	28	13	657
3.1 - 10.0	4	4	5	2	0	0	0	1	0	1	0	0	1	0	1	3	22
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	38	70	68	38	12	15	57	134	73	24	20	23	29	36	29	16	682

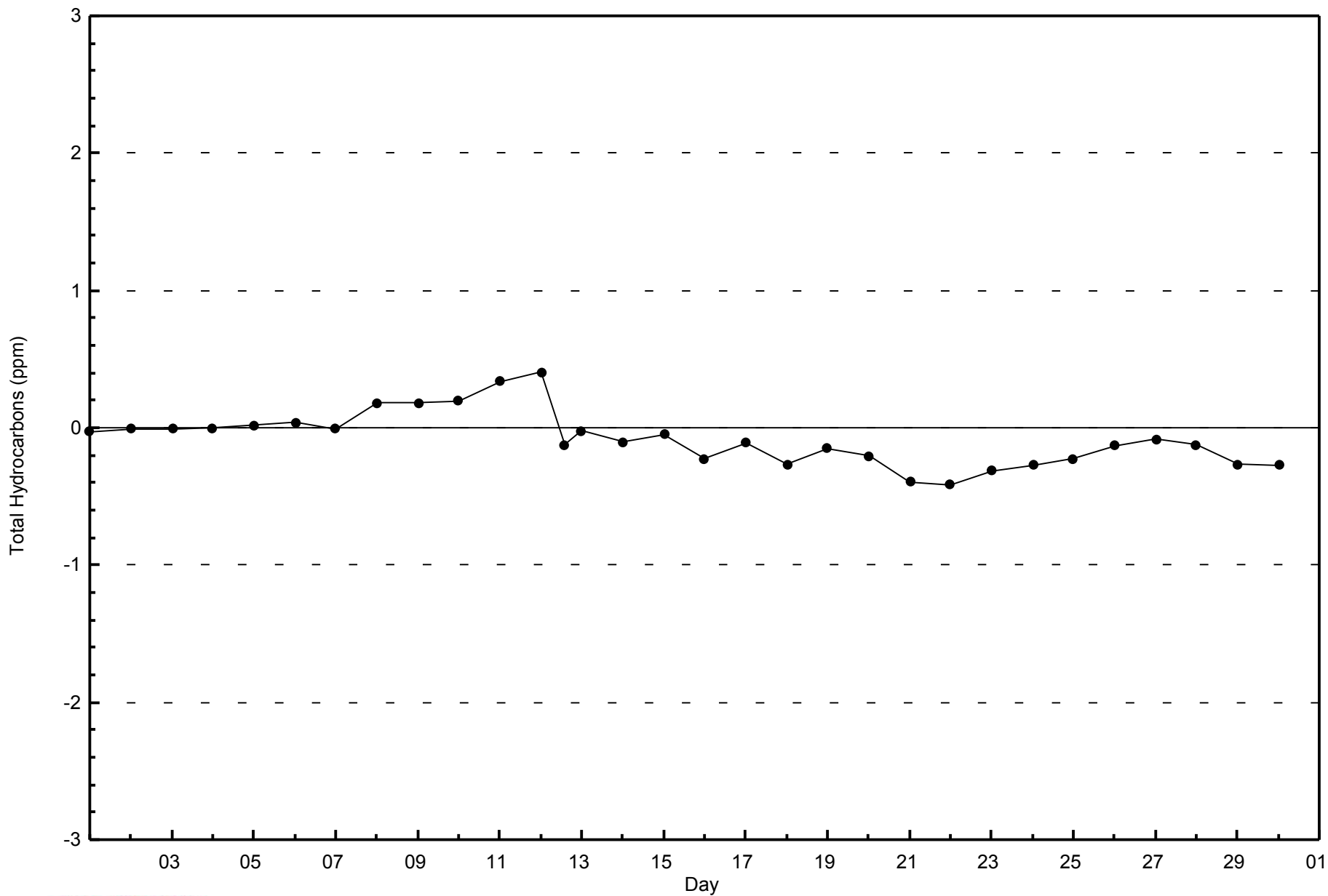
Total Number of Valid Hours: 682

Total Number of Hours: 720



WBEA
Zero Responses

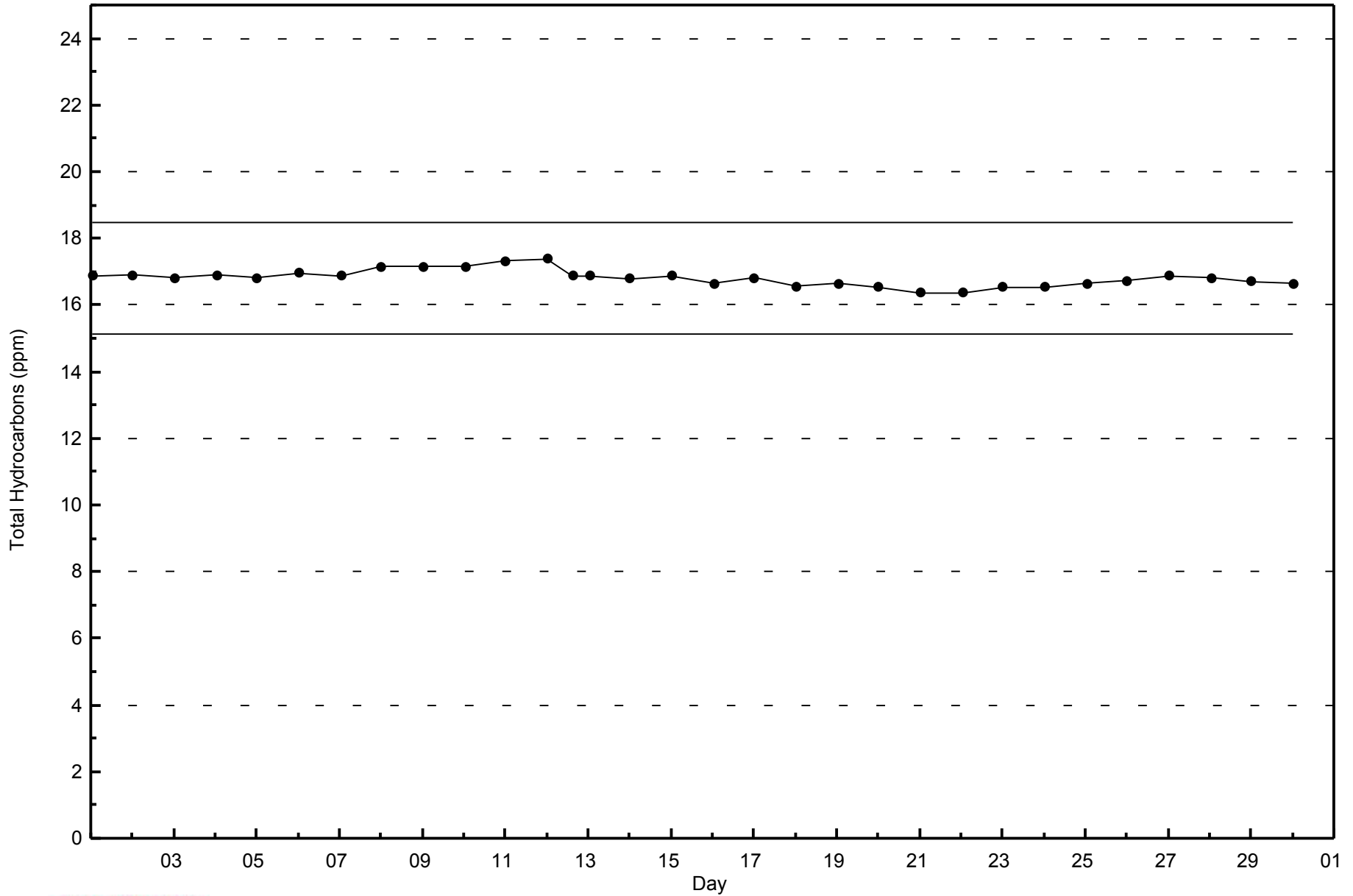
Total Hydrocarbons (THC) - ppm
Shell Muskeg River - November 2014





WBEA
Span Responses

Total Hydrocarbons (THC) - ppm
Shell Muskeg River - November 2014



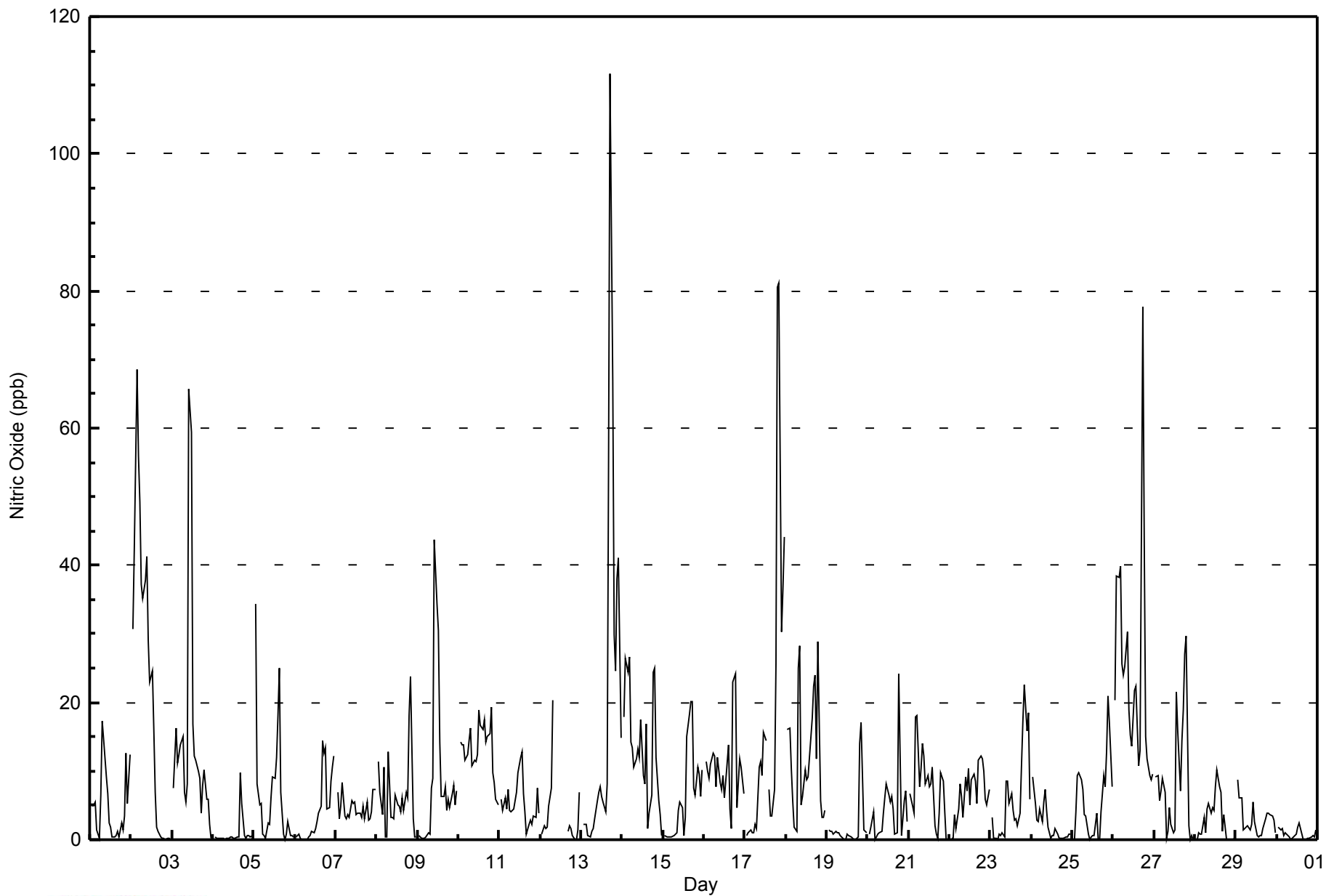


Maximum Value: 112 ppb on Nov 13 18:00														Maximum Daily Average: 23.9 ppb on Nov 26														Hours in Service: 720	
Minimum Value: 0 ppb on Nov 6 07:00														Minimum Daily Average: 0.8 ppb on Nov 30														Hours of Data: 681	
Maximum Diurnal Average: 12.5 ppb at hour 18														Minimum Diurnal Average: 5.8 ppb at hour 24														Hours of Missing Data: 39	
Monthly Average: 8.3 ppb														Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 5 Q ₃ = 10 P ₉₀ = 19 P ₉₉ = 65														Hours of Calibration: 38	
																												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-Nov	Z	5	5	5	1	0	7	17	15	9	7	3	2	0	0	1	1	0	2	1	3	13	5	12	5.1	17			
2-Nov	Z	31	42	69	56	49	37	35	38	41	29	23	25	16	7	2	1	0	0	0	0	0	0	0	21.8	69			
3-Nov	Z	8	16	11	12	14	15	7	6	8	66	59	17	12	12	10	9	4	8	10	6	6	2	0	13.8	66			
4-Nov	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	5	1	0	1	1	0	1	1.0	10				
5-Nov	Z	34	8	5	5	1	1	0	2	2	6	9	12	18	25	7	1	0	1	3	1	1	0	6.6	34				
6-Nov	Z	0	1	0	0	0	0	0	0	1	1	1	2	3	4	5	14	13	13	5	5	9	10	12	4.3	14			
7-Nov	Z	7	3	5	8	3	3	4	3	6	5	6	4	4	4	3	5	3	6	3	3	4	7	7	4.6	8			
8-Nov	Z	11	7	4	11	0	0	13	3	3	3	6	5	5	4	6	4	7	6	18	24	3	0	1	6.3	24			
9-Nov	Z	1	0	0	0	0	1	1	7	9	44	34	30	14	6	6	8	4	6	5	7	8	5	7	8.9	44			
10-Nov	Z	14	14	14	12	12	15	16	11	12	11	12	19	17	16	18	14	15	15	19	10	8	6	5	13.3	19			
11-Nov	Z	6	4	6	4	7	4	4	5	6	7	10	12	13	7	4	1	2	3	2	3	3	8	4	5.5	13			
12-Nov	Z	1	2	2	2	5	7	20	C	C	C	C	C	C	C	C	1	2	2	1	0	0	1	7	--	20			
13-Nov	Z	2	2	2	1	0	1	2	3	6	7	8	6	6	4	8	55	112	67	30	25	38	41	15	19.2	112			
14-Nov	Z	18	26	24	27	14	13	11	12	13	12	18	9	8	17	2	4	7	24	25	12	6	4	1	13.3	27			
15-Nov	Z	1	0	0	0	0	1	1	1	4	5	5	1	3	15	18	20	20	8	7	11	9	6	10	6.4	20			
16-Nov	Z	11	10	9	11	13	12	8	12	8	7	9	6	9	14	4	2	23	24	5	8	12	11	7	10.2	24			
17-Nov	Z	1	1	1	1	1	2	2	11	11	9	16	14	M	7	3	3	7	26	81	81	30	37	44	17.7	81			
18-Nov	Z	16	16	10	6	2	1	25	28	5	6	10	9	9	12	18	22	24	12	29	6	3	3	4	12.0	29			
19-Nov	Z	1	1	1	1	1	1	1	1	0	0	0	1	1	1	0	0	0	0	14	17	9	1	1	2.4	17			
20-Nov	Z	1	2	4	0	0	1	1	1	4	6	8	7	5	6	4	1	1	24	12	1	6	7	3	4.6	24			
21-Nov	Z	7	5	4	18	18	8	10	14	12	8	9	8	8	11	2	1	0	4	10	8	4	0	0	7.4	18			
22-Nov	Z	0	0	4	2	5	8	6	3	9	7	10	5	9	10	9	5	12	12	12	10	6	5	7	6.8	12			
23-Nov	Z	3	0	0	0	1	1	1	0	9	9	5	7	4	3	3	2	4	11	17	23	16	19	6	6.2	23			
24-Nov	Z	9	5	3	3	4	3	6	7	4	2	0	1	1	2	1	0	0	0	0	0	0	1	1	2.3	9			
25-Nov	Z	0	4	9	10	9	7	4	4	1	0	0	1	1	4	0	0	4	9	8	13	21	17	8	5.8	21			
26-Nov	Z	20	38	38	40	26	24	25	30	19	15	14	22	22	16	11	13	78	43	15	12	9	9	10	23.9	78			
27-Nov	Z	9	9	6	7	9	7	0	1	5	2	1	1	22	16	7	15	19	27	30	2	0	1	0	8.5	30			
28-Nov	Z	0	1	1	1	3	1	5	5	4	5	4	8	10	8	7	1	4	0	0	0	0	0	0	2.9	10			
29-Nov	Z	9	6	6	1	2	2	2	1	2	6	3	1	0	1	1	2	3	4	4	4	4	3	3	1	2.8	9		
30-Nov	Z	2	2	2	1	1	1	0	0	0	0	0	1	2	2	0	0	0	0	0	0	1	0	1	0.8	2			
--		7.6	7.8	8.2	8.0	6.7	6.1	7.5	7.8	7.4	9.9	9.8	8.0	7.7	7.7	6.1	7.4	12.5	11.9	12.1	9.9	7.7	7.0	5.8	Diurnal Average				
--		34	42	69	56	49	37	35	38	41	66	59	30	22	18	25	55	112	67	81	81	38	41	44	Diurnal Maximum				
Z - zerspan		C - Calibration					M - Maintenance																						



WBEA
Hourly Averages

Nitric Oxide (NO) - ppb
Shell Muskeg River - November 2014





WBEA
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Shell Muskeg River - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	619	90.90	90.90
21 - 40	45	6.61	97.50
41 - 80	14	2.06	99.56
81 - 159	1	0.15	99.71
> 159	0	0.00	99.71

Total Number of Valid Hours: 681

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitric Oxide (NO) - ppb
Shell Muskeg River - November 2014

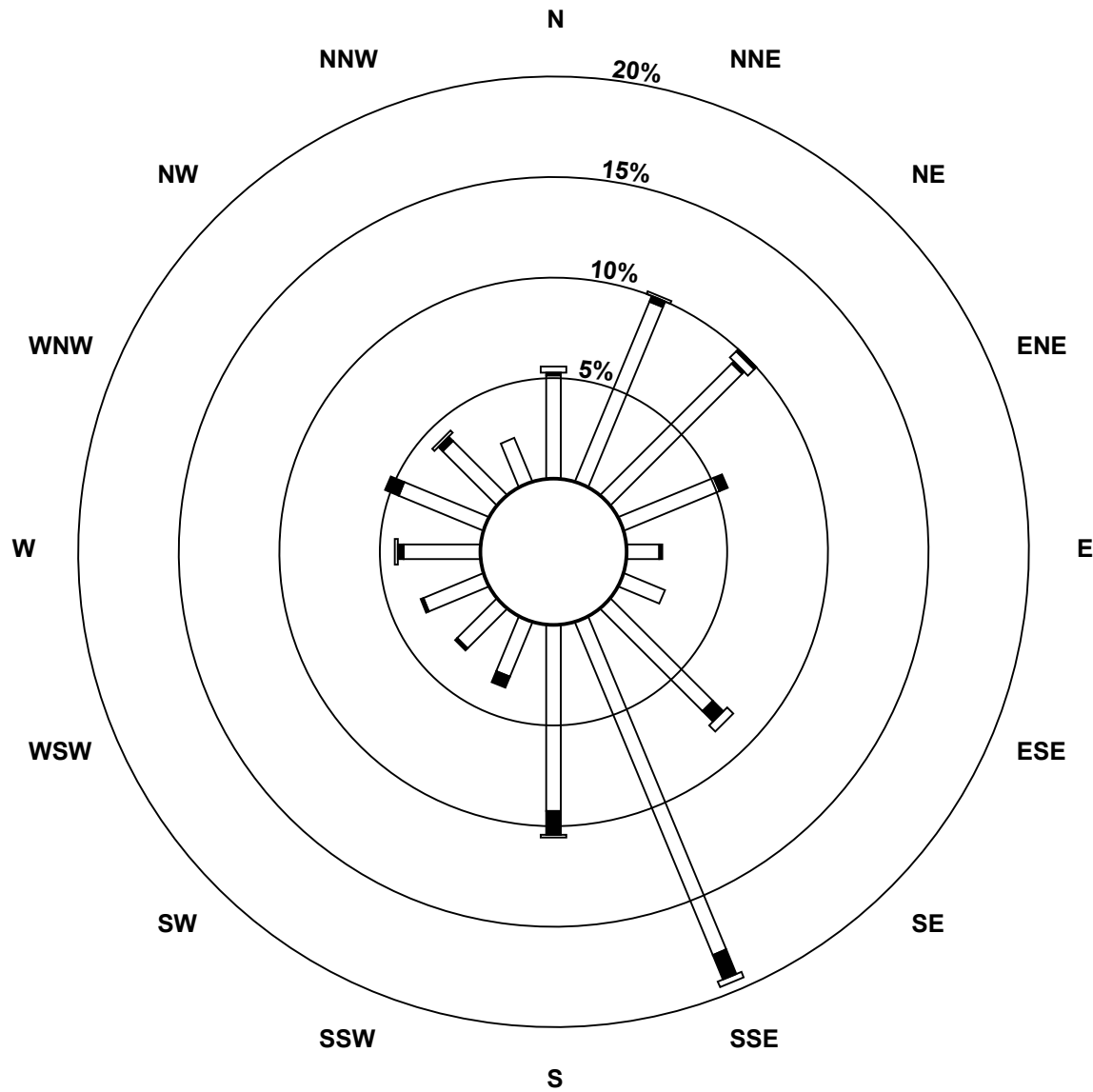
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	35	66	63	35	11	15	49	122	63	20	19	22	26	31	26	16	619
21 - 40	1	2	1	3	1	0	5	9	8	4	1	1	2	5	2	0	45
41 - 80	2	1	3	0	0	0	3	2	1	0	0	0	1	0	1	0	14
81 - 159	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	38	69	68	38	12	15	57	133	72	24	20	23	29	36	29	16	679

Total Number of Valid Hours: 681

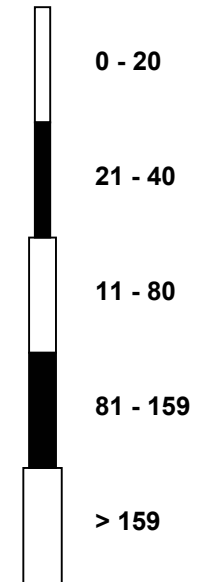
Total Number of Hours: 720

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

**Nitric Oxide (NO) - ppb
Shell Muskeg River (AMS 16)**



Classes (ppb)

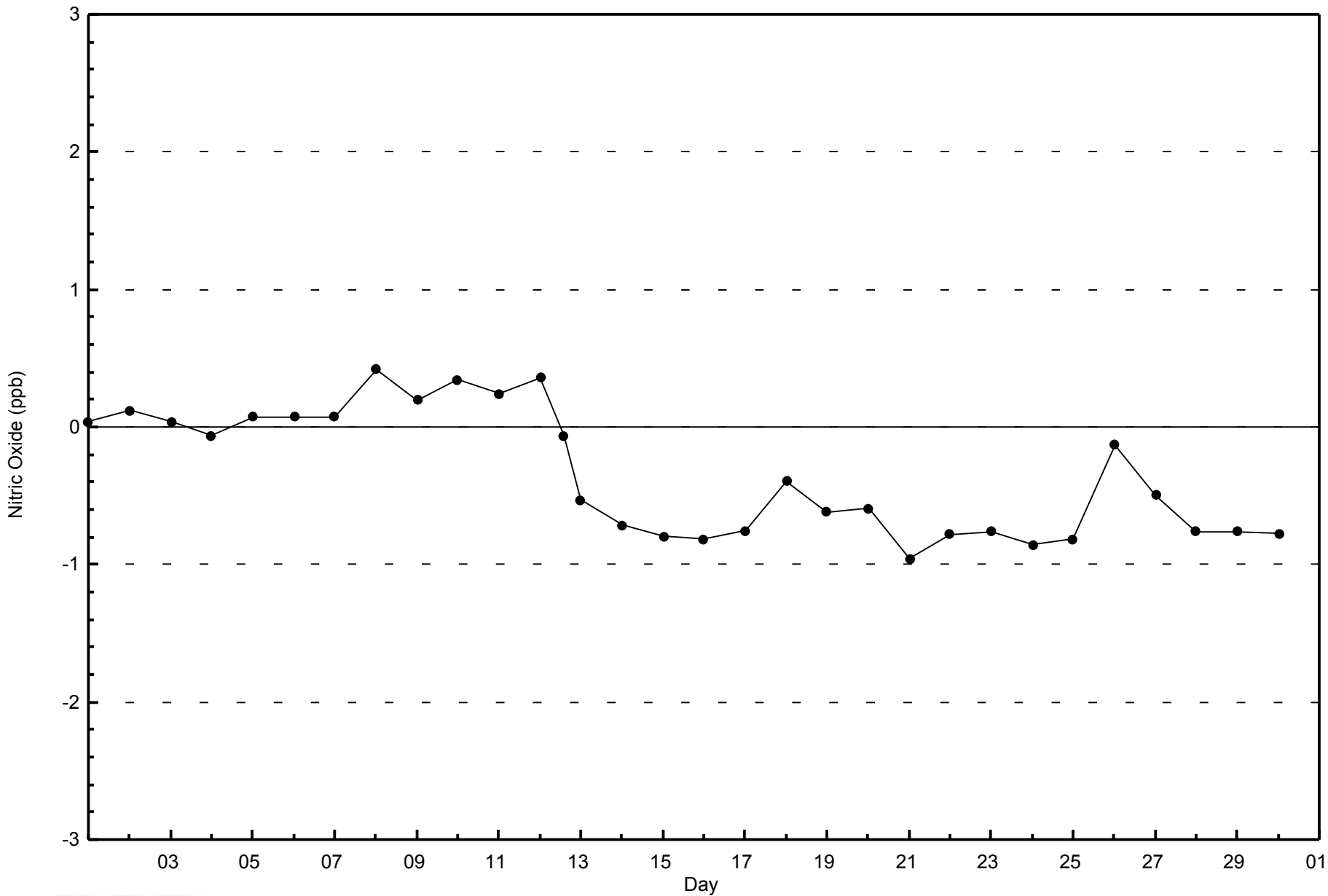


Total Number of Valid Hours: 681



WBEA
Zero Responses

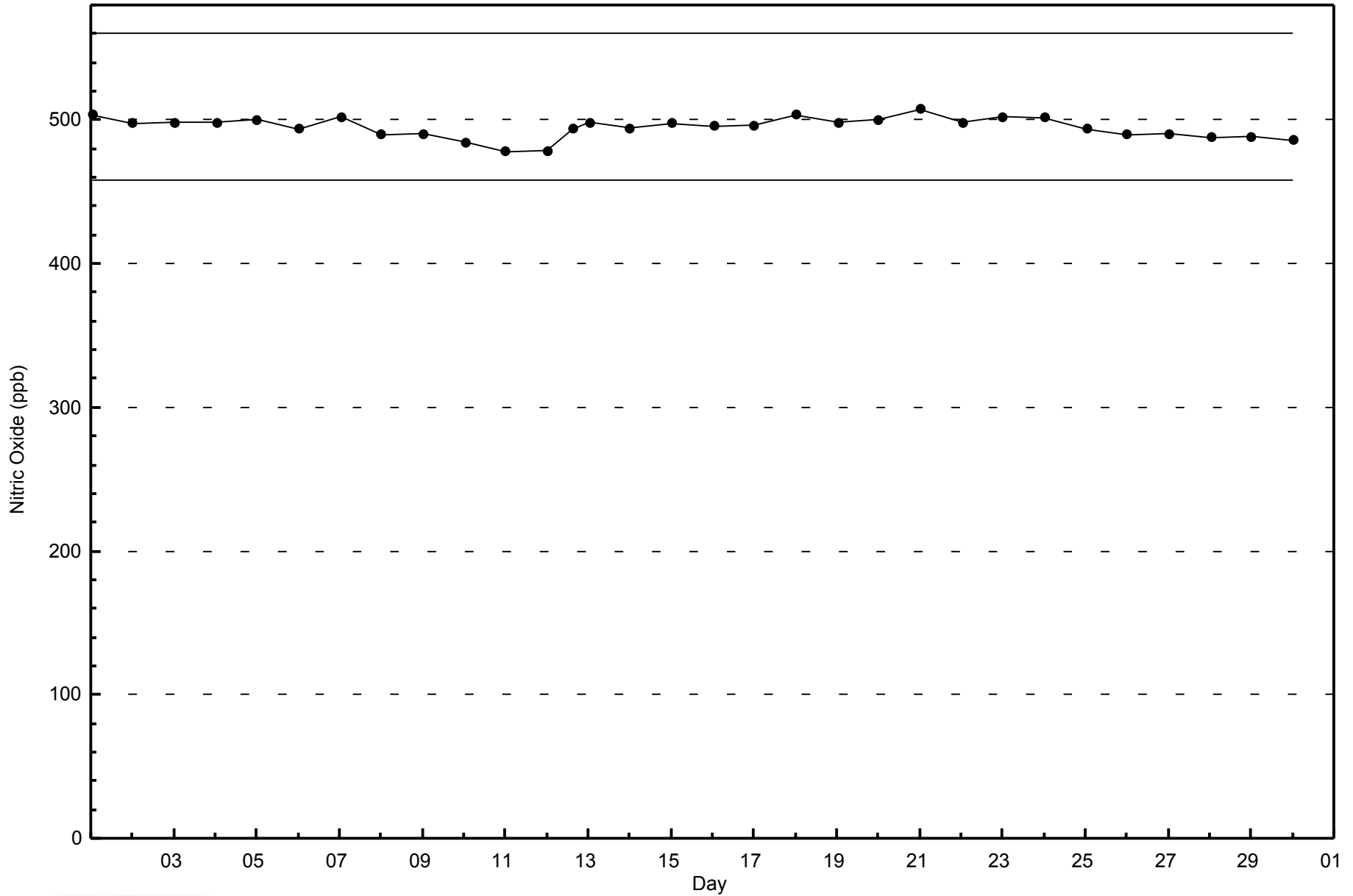
Nitric Oxide (NO) - ppb
Shell Muskeg River - November 2014





WBEA
Span Responses

Nitric Oxide (NO) - ppb
Shell Muskeg River - November 2014





Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 38 ppb on Nov 18 20:00	Maximum Daily Average: 24.5 ppb on Nov 16		Hours of Data:	681
Minimum Value: 0 ppb on Nov 28 02:00	Minimum Daily Average: 4.1 ppb on Nov 4		Hours of Missing Data:	39
Maximum Diurnal Average: 16.7 ppb at hour 18	Minimum Diurnal Average: 10.7 ppb at hour 13		Hours of Calibration:	38
Monthly Average: 13.8 ppb	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 8 Median = 14 Q ₃ = 19 P ₉₀ = 25 P ₉₉ = 33		Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	Z	5	5	4	3	3	5	9	8	7	7	4	3	1	1	4	12	11	16	11	10	16	16	15	7.6	16
2-Nov	Z	15	14	16	16	14	16	14	15	16	13	13	16	16	14	10	13	3	1	2	2	1	1	1	10.5	16
3-Nov	Z	8	13	12	13	11	11	10	8	9	14	17	13	12	9	8	9	7	9	13	11	12	5	0	10.2	17
4-Nov	Z	5	2	1	4	6	5	1	1	1	1	2	1	2	3	3	14	13	6	5	5	5	4	6	4.1	14
5-Nov	Z	12	9	8	7	4	4	2	4	4	6	7	8	11	16	22	18	12	3	7	13	9	6	5	8.5	22
6-Nov	Z	7	9	2	1	1	1	1	2	4	4	3	4	5	8	13	18	19	20	15	14	18	18	19	9.0	20
7-Nov	Z	11	8	14	20	15	15	18	16	16	13	12	8	9	11	14	22	19	24	18	19	22	24	16	15.8	24
8-Nov	Z	30	22	16	22	4	5	28	14	11	8	15	13	12	13	22	23	17	15	31	33	19	9	10	17.0	33
9-Nov	Z	9	7	7	6	8	15	11	17	15	24	28	29	20	11	20	17	14	11	10	14	15	17	25	15.1	29
10-Nov	Z	28	28	29	30	27	28	27	16	18	16	16	16	17	16	18	15	14	14	18	14	13	12	11	19.1	30
11-Nov	Z	9	10	12	9	9	12	12	10	11	14	17	18	20	15	18	13	17	22	18	16	16	16	12	14.2	22
12-Nov	Z	9	14	16	19	20	21	22	C	C	C	C	C	C	C	C	19	24	24	20	12	12	21	25	--	25
13-Nov	Z	22	22	22	17	16	20	21	16	12	11	10	9	10	10	18	30	33	25	20	19	17	18	18	18.1	33
14-Nov	Z	23	20	21	24	25	26	22	23	24	20	18	16	16	24	7	17	21	25	20	14	14	17	8	19.3	26
15-Nov	Z	12	8	5	5	8	11	13	10	15	14	11	2	8	23	25	22	22	16	17	21	24	25	27	15.0	27
16-Nov	Z	28	22	25	31	35	29	23	29	28	22	23	17	21	27	23	22	32	29	23	21	20	16	20	24.5	35
17-Nov	Z	14	19	19	18	18	23	19	22	18	15	18	18	M	17	17	23	25	25	30	27	20	19	20	20.2	30
18-Nov	Z	17	18	23	19	15	15	30	32	19	17	20	21	21	25	32	36	36	31	38	25	24	21	23	24.3	38
19-Nov	Z	14	13	12	11	12	13	19	14	3	0	2	5	4	5	5	7	3	10	31	33	31	24	26	12.8	33
20-Nov	Z	19	25	27	3	13	23	21	19	20	17	15	12	13	16	18	15	16	20	19	8	8	8	5	15.6	27
21-Nov	Z	9	7	12	19	19	14	23	27	18	16	16	17	14	14	5	3	2	5	12	9	5	1	2	11.5	27
22-Nov	Z	5	4	7	6	8	9	9	5	12	9	10	6	10	11	11	8	13	13	12	11	11	9	11	9.1	13
23-Nov	Z	11	2	3	3	11	15	15	7	19	17	10	9	8	8	12	17	18	17	20	22	20	19	11	12.8	22
24-Nov	Z	13	9	9	10	10	11	20	17	12	5	1	2	3	9	8	9	5	4	5	10	11	11	8	8.8	20
25-Nov	Z	5	16	17	19	19	13	13	7	2	1	2	3	4	7	4	4	14	22	18	18	20	17	16	11.3	22
26-Nov	Z	25	28	29	30	29	28	27	26	21	20	19	22	24	23	24	26	36	28	17	16	12	18	20	23.7	36
27-Nov	Z	15	15	12	13	10	8	2	5	11	5	3	5	25	25	20	26	25	25	23	5	0	1	0	12.2	26
28-Nov	Z	0	3	3	3	6	4	6	7	6	6	5	9	11	10	9	3	8	1	0	1	3	3	6	4.9	11
29-Nov	Z	21	23	24	19	19	18	20	16	11	15	6	2	2	4	7	10	14	14	16	14	15	12	5	13.3	24
30-Nov	Z	10	10	11	9	5	3	4	1	2	2	2	5	8	7	3	4	8	9	12	16	16	13	21	8.0	21

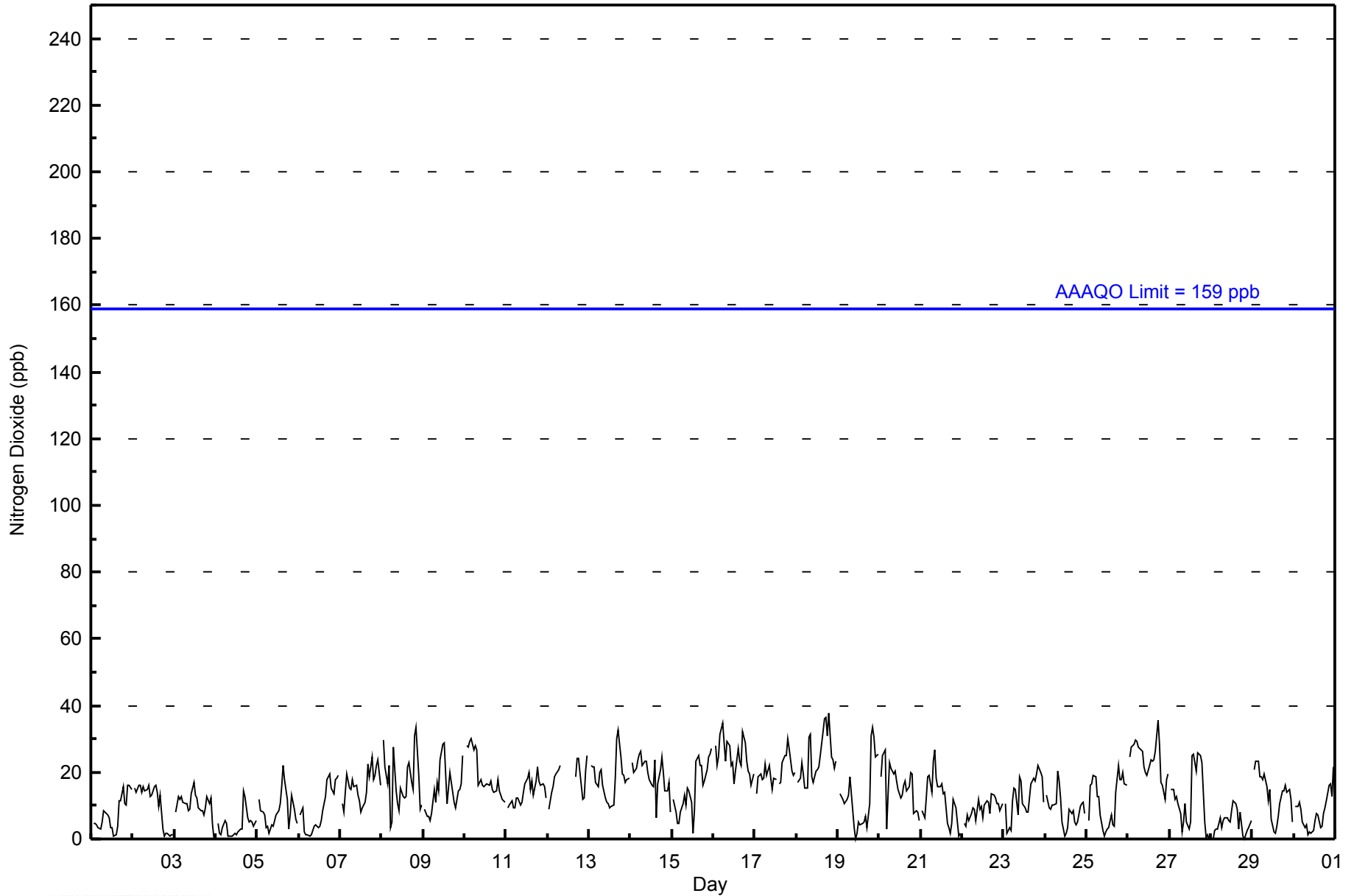
--	13.6	13.3	13.9	13.5	13.3	13.9	15.4	13.6	12.6	11.4	11.2	10.7	11.7	13.2	13.7	15.7	16.7	16.2	16.6	15.1	14.3	13.3	13.1	Diurnal Average	
--	30	28	29	31	35	29	30	32	28	24	28	29	25	27	32	36	36	31	38	33	31	25	27	Diurnal Maximum	

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



WBEA
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Shell Muskeg River - November 2014





WBEA
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Shell Muskeg River - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	544	79.88	79.88
21 - 40	137	20.12	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: 681

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Shell Muskeg River - November 2014

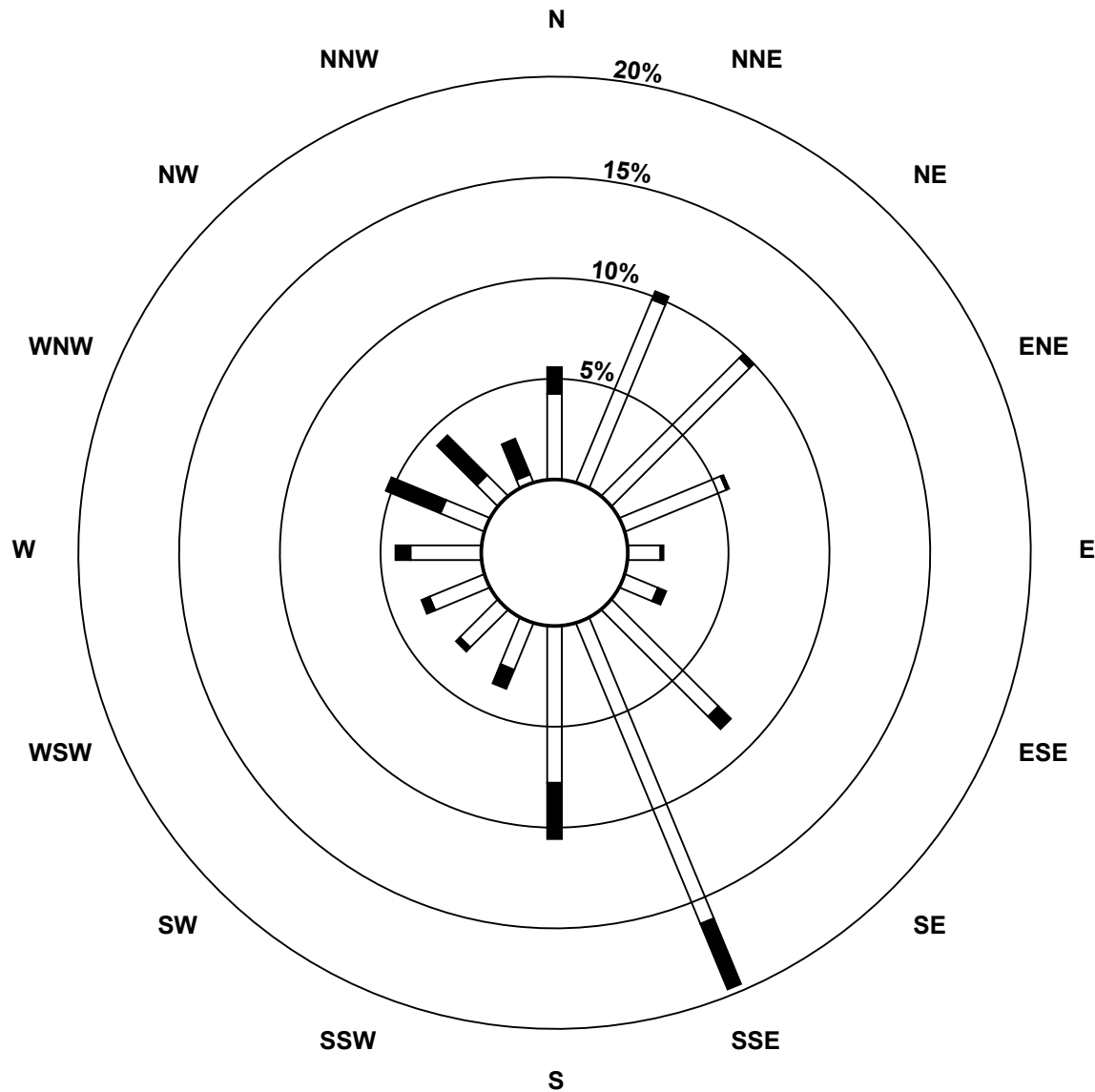
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	29	67	66	37	11	12	51	110	53	17	18	20	24	16	10	3	544
21 - 40	9	3	2	1	1	3	6	24	19	7	2	3	5	20	19	13	137
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	38	70	68	38	12	15	57	134	72	24	20	23	29	36	29	16	681

Total Number of Valid Hours: 681

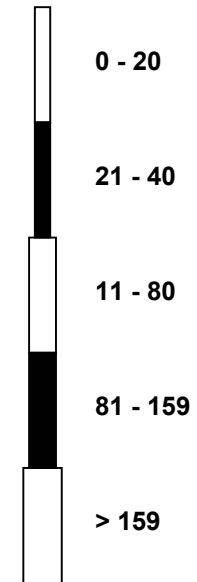
Total Number of Hours: 720

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

**Nitrogen Dioxide (NO₂) - ppb
Shell Muskeg River (AMS 16)**



Classes (ppb)

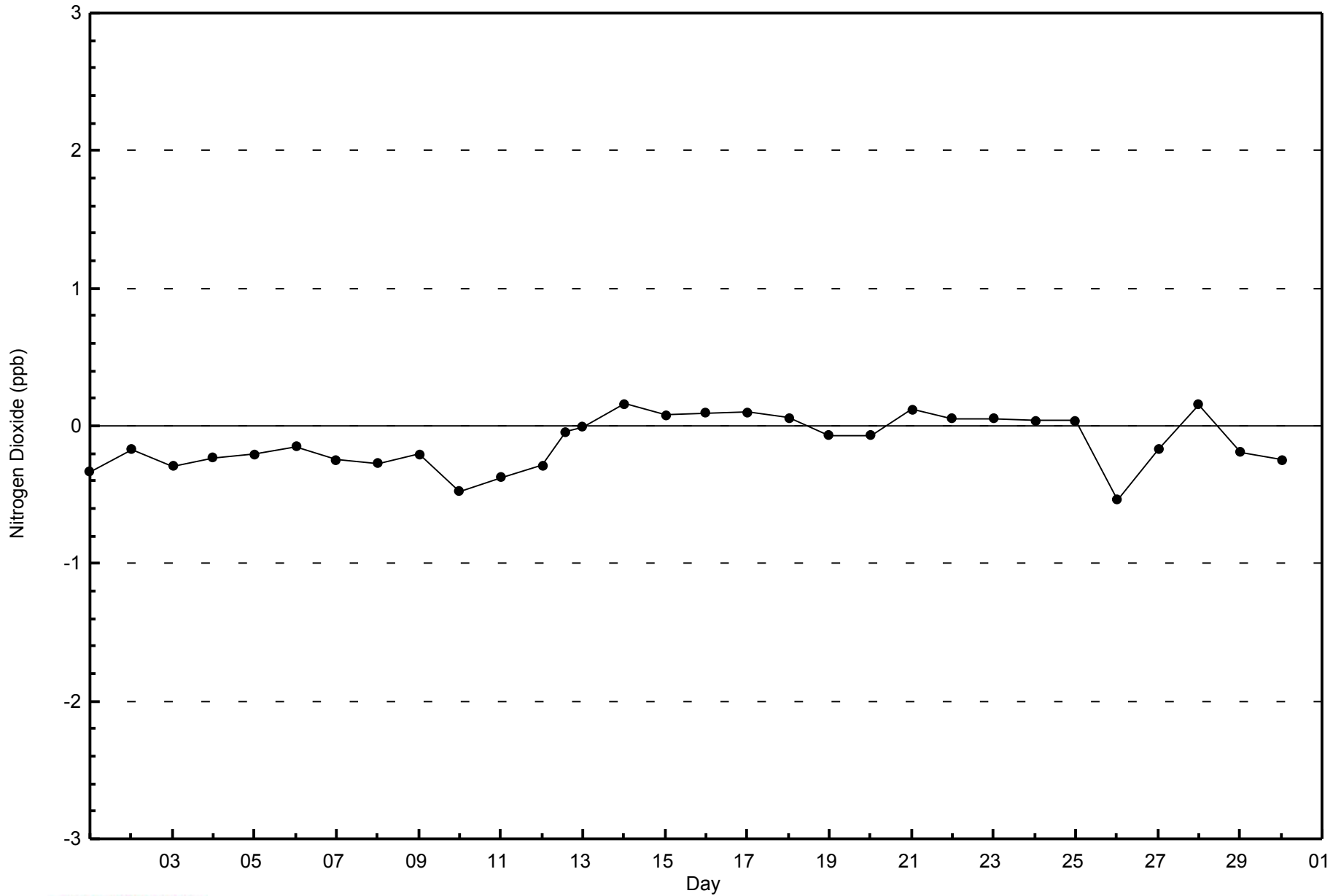


Total Number of Valid Hours: 681



WBEA
Zero Responses

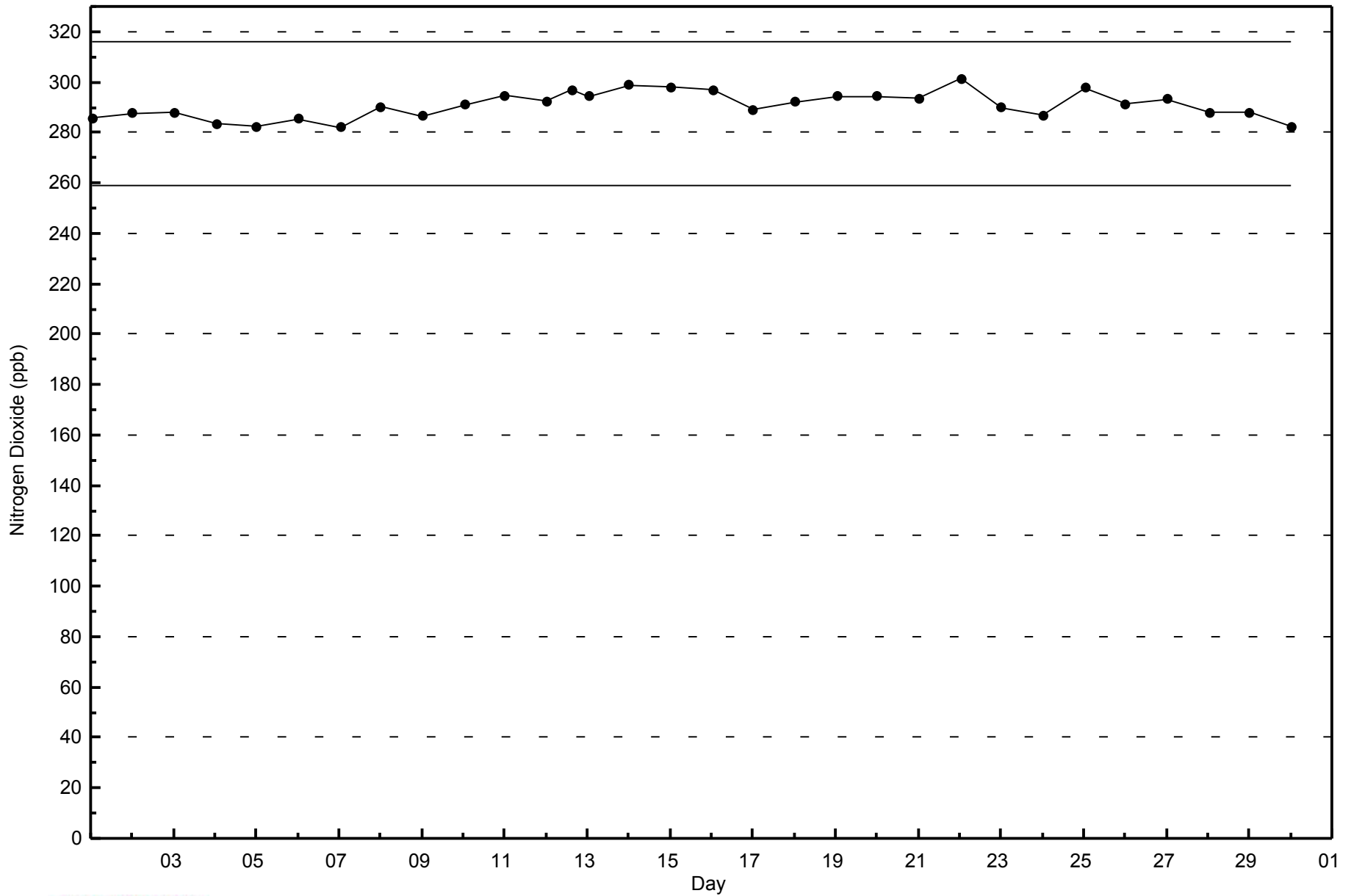
Nitrogen Dioxide (NO₂) - ppb
Shell Muskeg River - November 2014





WBEA
Span Responses

Nitrogen Dioxide (NO₂) - ppb
Shell Muskeg River - November 2014





Maximum Value: 144 ppb on Nov 13 18:00	Maximum Daily Average: 47.7 ppb on Nov 26	Hours in Service: 720
Minimum Value: 0 ppb on Nov 28 02:00	Minimum Daily Average: 5.0 ppb on Nov 4	Hours of Data: 681
Maximum Diurnal Average: 29.1 ppb at hour 18	Minimum Diurnal Average: 18.6 ppb at hour 13	Hours of Missing Data: 39
Monthly Average: 22.1 ppb	Percentiles: P ₁ = 1 P ₁₀ = 4 Q ₁ = 10 Median = 19 Q ₃ = 29 P ₉₀ = 43 P ₉₉ = 85	Hours of Calibration: 38
		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-Nov	Z	10	10	10	5	3	12	26	23	17	13	6	5	1	2	5	13	12	18	12	14	29	21	27	12.7	29
2-Nov	Z	46	57	85	72	63	53	49	53	57	42	36	40	32	21	12	14	3	1	2	2	1	1	2	32.3	85
3-Nov	Z	16	29	23	25	25	26	17	14	17	79	77	30	24	21	18	17	11	17	23	16	18	7	1	24.0	79
4-Nov	Z	5	2	1	4	6	5	1	1	1	2	2	1	2	3	3	24	18	7	5	6	6	4	6	5.0	24
5-Nov	Z	46	17	13	13	4	4	2	7	6	12	16	17	23	34	47	25	13	3	8	16	10	6	5	15.1	47
6-Nov	Z	7	10	2	1	1	1	1	3	4	6	4	5	8	12	17	32	31	33	20	18	27	29	31	13.3	33
7-Nov	Z	18	11	19	28	19	18	22	19	22	18	17	12	13	15	17	27	22	30	20	22	26	31	23	20.4	31
8-Nov	Z	41	29	20	32	4	5	40	18	14	11	22	18	17	17	28	27	24	21	49	57	22	9	11	23.3	57
9-Nov	Z	10	7	7	6	8	16	12	25	23	67	63	59	34	17	26	25	18	17	14	21	22	22	32	24.0	67
10-Nov	Z	42	41	43	42	39	42	43	27	30	27	28	35	33	32	35	29	29	30	37	24	21	18	16	32.4	43
11-Nov	Z	15	14	18	14	17	16	16	15	17	21	26	30	33	22	22	14	20	24	20	19	20	23	16	19.7	33
12-Nov	Z	9	16	17	20	25	28	42	C	C	C	C	C	C	C	C	20	26	26	21	12	12	22	32	--	42
13-Nov	Z	24	24	24	18	16	21	23	19	18	18	18	16	15	14	26	85	144	92	50	43	55	59	33	37.2	144
14-Nov	Z	41	46	45	51	40	40	33	35	37	32	35	26	24	41	8	20	27	49	45	26	20	21	9	32.6	51
15-Nov	Z	12	8	5	5	9	11	14	11	20	20	16	3	12	38	43	42	42	24	24	32	34	32	38	21.4	43
16-Nov	Z	39	32	33	42	47	41	31	41	36	29	32	22	29	41	27	24	55	53	28	29	31	27	26	34.7	55
17-Nov	Z	14	20	21	19	19	25	21	33	30	24	34	32	M	24	20	26	32	51	111	108	50	56	64	37.9	111
18-Nov	Z	33	34	33	25	17	17	55	60	23	23	31	29	31	37	50	58	60	43	67	30	27	24	28	36.3	67
19-Nov	Z	15	14	13	11	13	14	20	14	3	0	2	6	5	5	5	7	3	11	45	50	40	26	27	15.2	50
20-Nov	Z	20	26	31	3	14	24	22	21	24	23	23	19	19	22	22	15	17	44	31	8	14	15	8	20.2	44
21-Nov	Z	15	11	16	37	37	22	34	41	31	24	25	24	22	24	7	4	2	9	21	18	9	1	2	18.9	41
22-Nov	Z	5	4	11	7	12	17	15	9	21	16	20	12	19	21	19	13	25	25	24	21	17	14	18	15.9	25
23-Nov	Z	14	2	4	2	12	16	16	7	27	26	16	16	12	11	15	19	22	28	37	44	36	37	17	19.0	44
24-Nov	Z	22	15	12	13	14	13	26	25	16	7	1	3	4	10	9	5	5	5	10	11	12	9	9	11.1	26
25-Nov	Z	5	20	26	29	27	20	16	11	3	1	3	3	4	11	4	4	18	31	25	30	41	34	24	17.0	41
26-Nov	Z	45	66	67	69	55	51	53	56	40	36	33	44	46	40	34	39	114	72	32	28	21	27	29	47.7	114
27-Nov	Z	24	24	18	20	19	15	2	7	15	7	4	6	46	41	27	40	44	52	53	7	0	2	0	20.7	53
28-Nov	Z	0	4	4	4	10	5	10	12	10	10	9	16	21	18	16	4	11	1	0	1	3	3	6	7.8	21
29-Nov	Z	29	29	29	20	20	20	22	17	14	21	9	3	2	4	7	12	17	18	20	17	18	15	6	16.1	29
30-Nov	Z	12	11	13	10	6	4	5	1	3	2	3	7	10	9	3	4	8	9	12	17	17	13	23	8.7	23

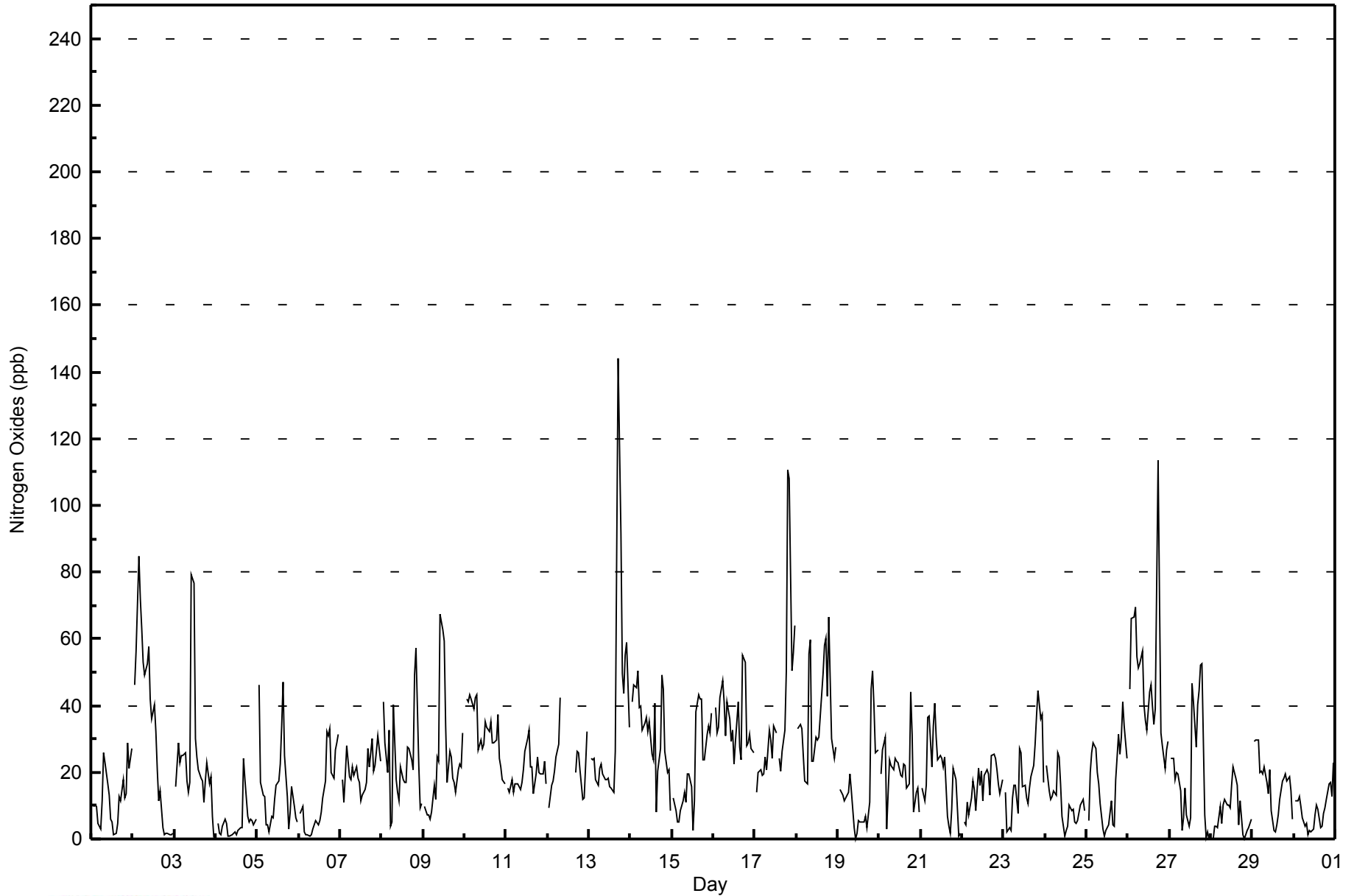
--	21.2	21.1	22.1	21.5	20.1	20.0	23.0	21.4	20.0	21.3	21.0	18.6	19.4	21.0	19.8	23.1	29.1	28.1	28.7	24.9	22.0	20.3	18.9	Diurnal Average	
--	46	66	85	72	63	53	55	60	57	79	77	59	46	41	50	85	144	92	111	108	55	59	64	Diurnal Maximum	

Z - zerspan C - Calibration M - Maintenance



WBEA
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Shell Muskeg River - November 2014





WBEA
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Shell Muskeg River - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	370	54.33	54.33
21 - 40	224	32.89	87.22
41 - 80	80	11.75	98.97
81 - 159	7	1.03	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 681

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Shell Muskeg River - November 2014

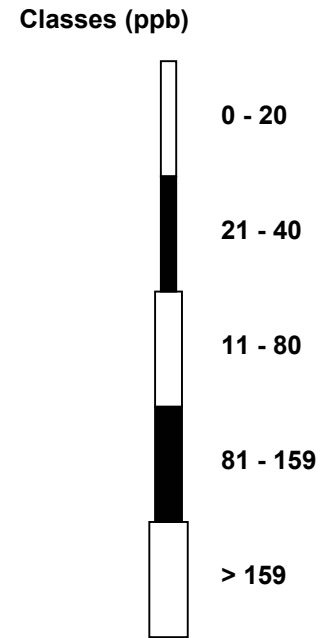
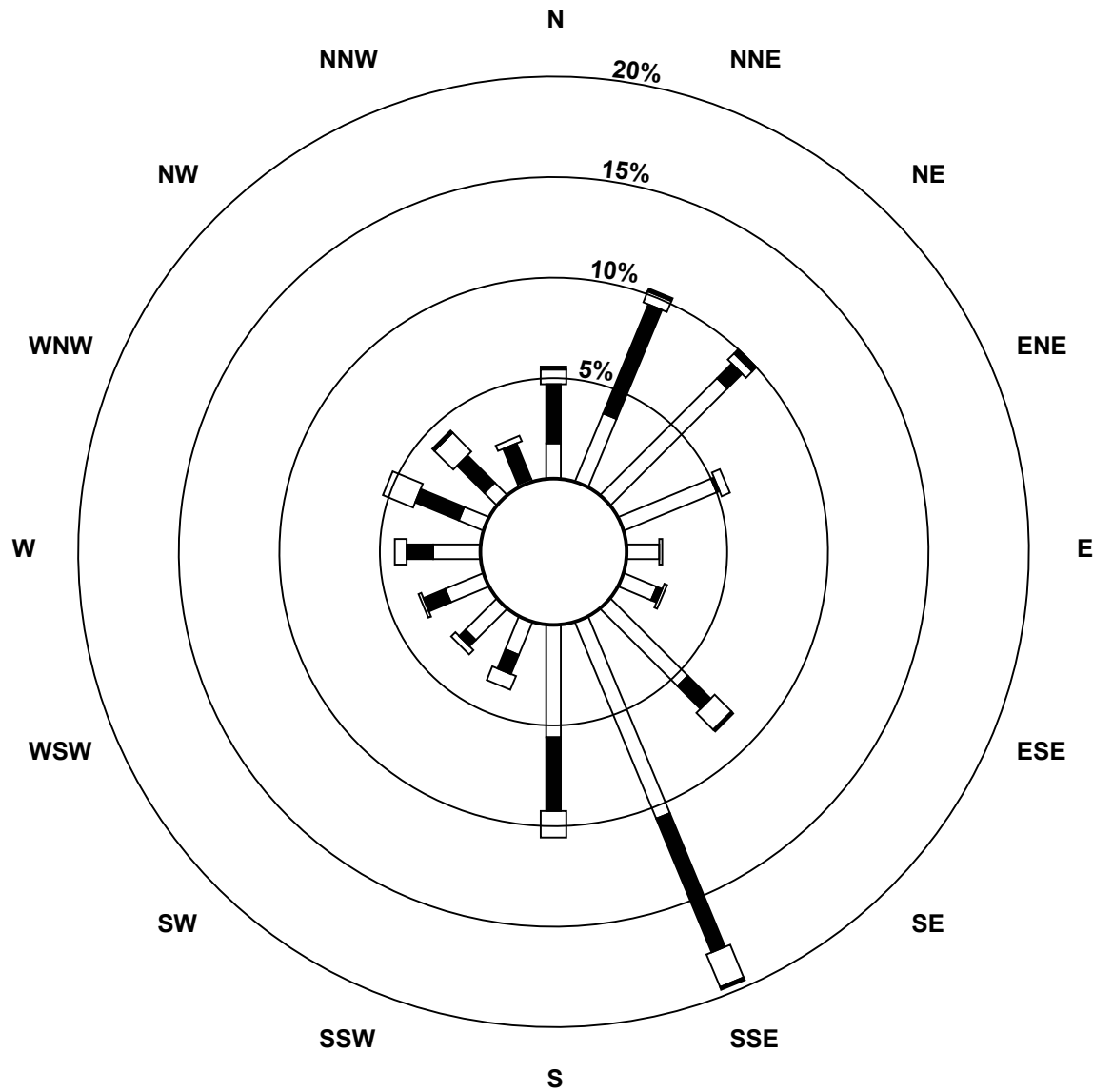
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	12	25	56	34	11	12	37	72	38	12	15	14	16	9	6	1	370
21 - 40	20	40	7	1	0	2	11	49	25	7	3	8	9	16	13	13	224
11 - 80	5	4	3	3	1	1	8	12	9	5	2	1	4	11	9	2	80
81 - 159	1	1	2	0	0	0	1	1	0	0	0	0	0	0	1	0	7
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	38	70	68	38	12	15	57	134	72	24	20	23	29	36	29	16	681

Total Number of Valid Hours: 681

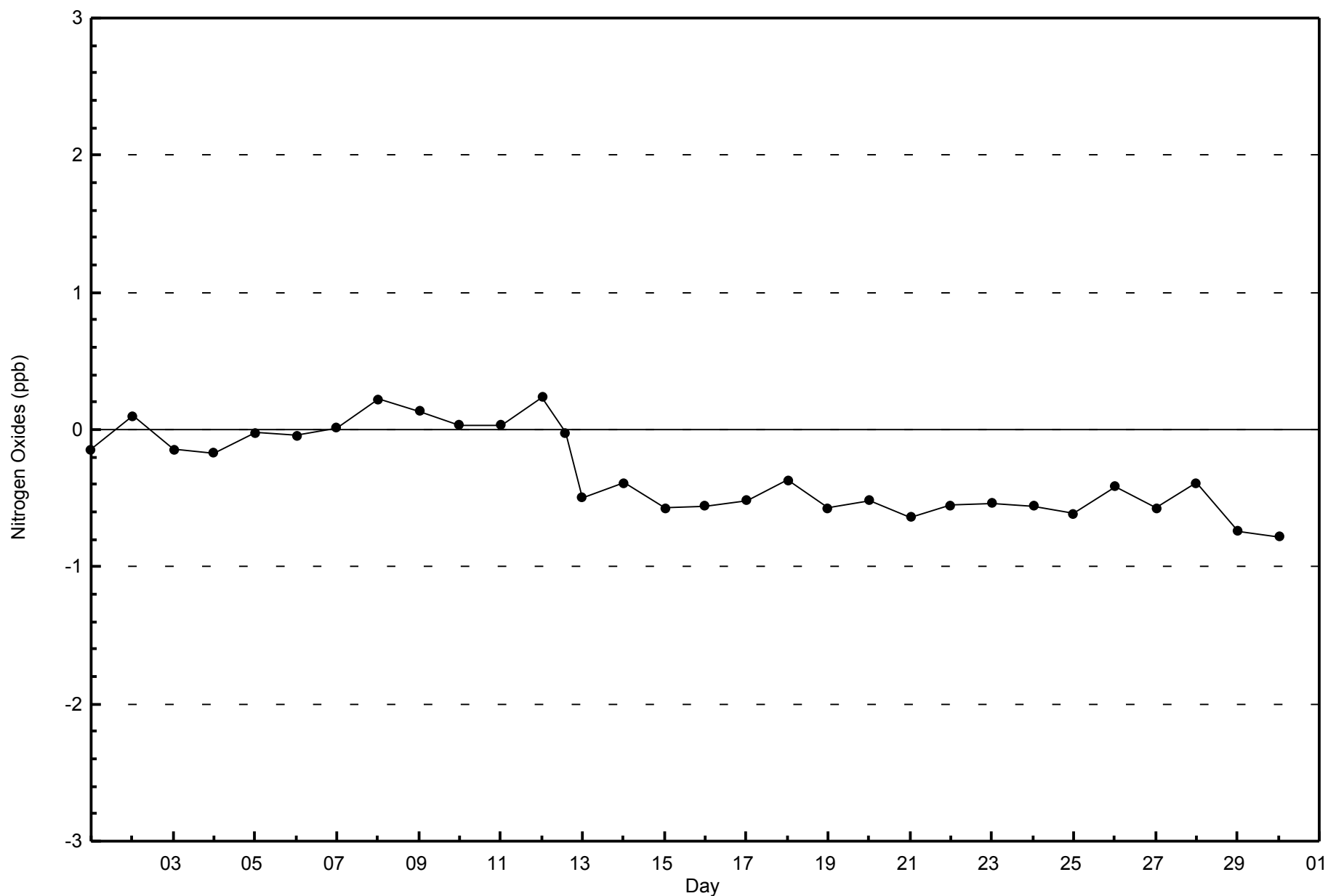
Total Number of Hours: 720

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

**Nitrogen Oxides (NO_x) - ppb
Shell Muskeg River (AMS 16)**



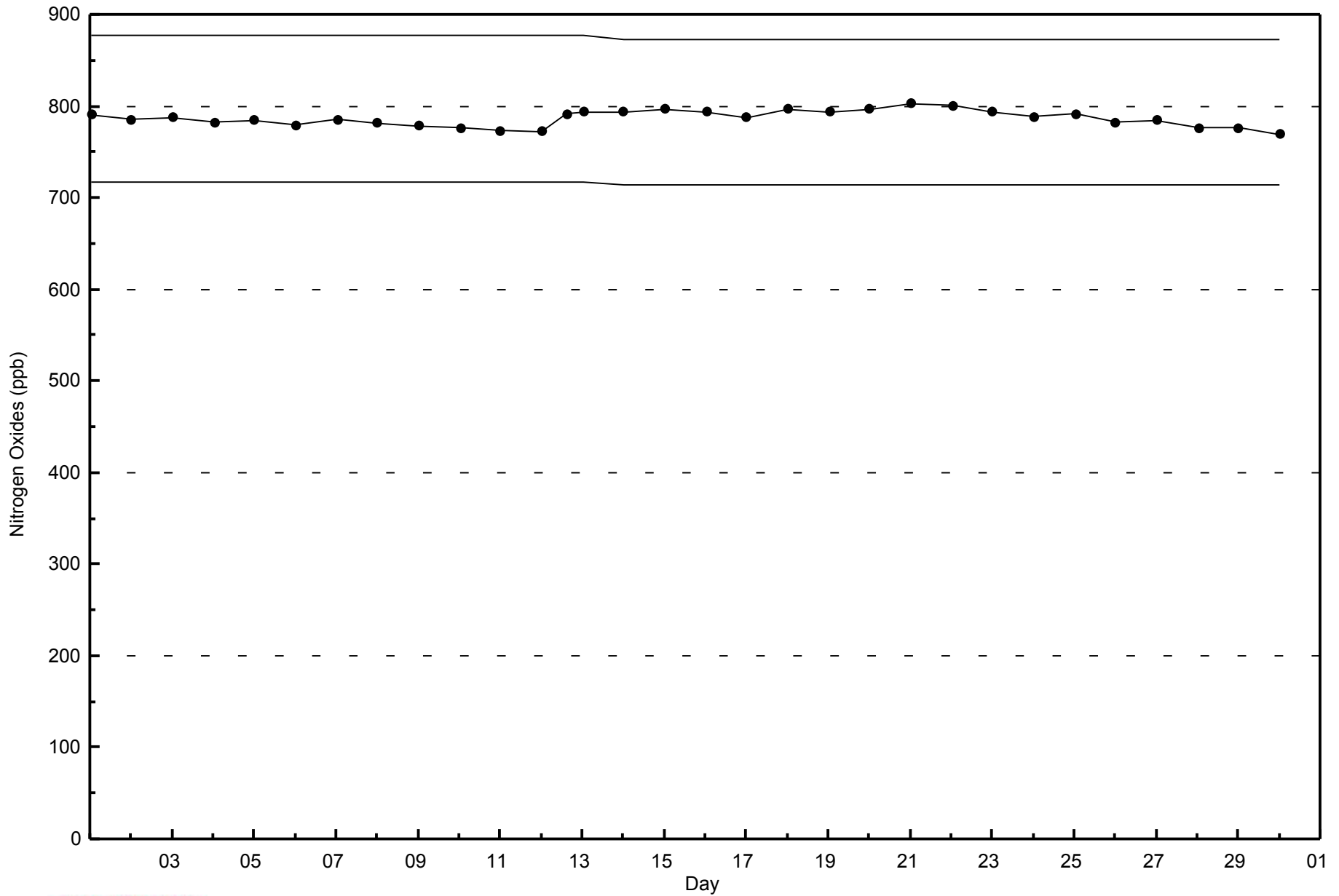
Total Number of Valid Hours: 681





WBEA
Span Responses

Nitrogen Oxides (NO_x) - ppb
Shell Muskeg River - November 2014





Number of Exceedences (AAAQO):	24-hr: 0	Hours in Service:	720
Maximum Value: 34.0 µg/m ³ on Nov 16 18:00	Maximum Daily Average: 10.3 µg/m ³ on Nov 3	Hours of Data:	709
Minimum Value: 1.1 µg/m ³ on Nov 1 14:00	Minimum Daily Average: 2.7 µg/m ³ on Nov 21	Hours of Missing Data:	11
Maximum Diurnal Average: 7.5 µg/m ³ at hour 18	Minimum Diurnal Average: 5.2 µg/m ³ at hour 24	Hours of Calibration:	0
Monthly Average: 6.19 µg/m ³	Percentiles: P ₁ = 1.7 P ₁₀ = 2.4 Q ₁ = 3.5 Median = 5.2 Q ₃ = 7.7 P ₉₀ = 11.2 P ₉₉ = 19.9	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-Nov	9.3	9.7	8.5	8.2	6.9	6.4	6.6	6.8	6.5	6.3	3.9	2.9	1.8	1.1	1.1	1.4	3.0	4.9	6.7	5.7	5.8	5.8	6.6	7.0	5.5	9.7
2-Nov	7.9	9.2	8.0	7.3	6.9	7.1	6.1	7.1	7.8	8.3	7.2	7.2	7.2	5.1	5.0	3.5	4.1	4.3	4.3	4.5	4.4	4.3	4.4	4.3	6.1	9.2
3-Nov	5.2	8.1	13.5	14.0	17.1	11.5	13.9	19.9	16.1	14.5	19.6	12.9	9.5	9.9	10.6	9.3	8.7	7.5	6.5	5.4	4.0	3.3	2.9	2.9	10.3	19.9
4-Nov	4.7	6.5	6.8	7.2	9.3	9.7	9.0	8.3	7.2	4.7	3.6	3.8	4.1	4.1	3.7	3.6	3.5	3.0	2.4	2.5	2.3	2.2	2.0	2.1	4.8	9.7
5-Nov	2.8	6.6	6.9	9.0	8.9	4.7	4.7	8.8	10.7	8.3	5.5	5.2	4.2	5.4	5.0	3.9	3.3	4.3	4.1	4.3	6.2	7.1	7.2	6.8	6.0	10.7
6-Nov	7.1	5.8	5.1	5.4	4.8	4.8	4.6	4.5	4.4	4.1	4.0	3.6	3.3	3.0	2.4	2.9	4.4	5.2	6.4	4.7	4.5	4.9	7.7	3.2	4.6	7.7
7-Nov	2.7	2.3	2.1	2.3	3.0	4.1	5.2	7.7	8.9	7.6	8.1	8.8	7.9	8.0	10.5	13.4	14.7	17.5	11.5	10.3	9.8	10.0	7.7	6.7	7.9	17.5
8-Nov	7.8	9.1	9.6	10.9	15.2	12.2	9.2	17.3	9.0	6.0	5.4	7.0	6.8	5.4	5.0	7.0	8.3	6.5	5.2	11.6	16.8	11.4	11.3	11.6	9.4	17.3
9-Nov	15.6	9.8	7.4	5.7	5.1	7.5	7.3	6.3	12.1	15.6	23.5	11.5	7.8	5.5	4.2	6.0	6.0	6.1	5.6	5.2	4.9	5.1	5.8	5.8	8.1	23.5
10-Nov	6.3	6.7	6.0	7.8	10.0	7.8	7.9	8.6	6.0	7.1	7.3	8.1	9.5	13.0	8.3	6.8	5.1	4.7	3.9	3.9	4.1	4.4	3.8	4.0	6.7	13.0
11-Nov	4.2	4.0	5.0	4.8	5.0	3.6	4.0	3.7	3.1	3.3	3.2	2.7	2.7	2.8	3.1	4.3	5.2	6.2	5.7	5.2	5.1	4.7	5.5	5.1	4.3	6.2
12-Nov	9.7	10.6	6.8	7.2	10.1	13.8	16.2	14.7	9.3	6.4	5.2	4.1	3.4	3.1	M	M	2.7	3.0	3.4	3.4	3.2	3.1	3.6	3.7	6.7	16.2
13-Nov	3.8	3.7	4.0	4.2	4.5	5.0	5.4	5.5	5.4	6.2	7.1	7.3	7.9	8.5	8.7	13.7	19.9	18.2	21.4	16.0	14.6	12.9	10.8	7.4	9.2	21.4
14-Nov	6.2	7.1	8.5	7.1	6.0	5.2	4.7	4.9	5.4	5.5	4.6	3.9	3.8	3.5	3.7	3.1	4.3	5.3	7.6	8.3	4.5	4.5	4.4	3.6	5.2	8.5
15-Nov	3.9	4.2	4.4	4.3	4.8	5.8	6.7	7.7	8.5	8.9	11.1	8.0	5.9	7.1	7.8	8.0	7.0	7.5	5.5	2.9	2.6	2.4	1.7	1.9	5.8	11.1
16-Nov	1.7	2.0	2.8	2.2	2.0	1.9	2.1	2.2	2.1	2.1	1.9	6.0	1.7	2.0	3.5	2.7	5.6	34.0	21.4	6.2	7.0	6.8	5.5	4.7	5.4	34.0
17-Nov	3.2	2.6	2.5	2.8	2.7	2.2	2.2	2.2	2.6	4.3	3.8	4.1	4.8	3.7	5.5	4.1	5.6	6.6	9.1	10.7	11.0	8.5	9.2	8.5	5.1	11.0
18-Nov	4.6	3.8	3.8	2.8	2.9	3.1	4.1	4.8	4.9	2.4	2.0	2.2	2.4	2.7	3.0	4.1	4.2	3.5	2.2	2.8	2.6	2.0	2.0	2.4	3.1	4.9
19-Nov	2.5	2.2	2.3	2.2	2.2	2.6	2.4	4.4	2.5	2.7	2.0	2.2	2.0	2.2	2.6	3.1	3.5	2.7	3.9	5.1	4.8	4.4	3.7	5.4	3.1	5.4
20-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	9.4	11.6	14.4	16.3	17.3	17.0	16.8	16.6	16.5	16.0	13.3	14.4	11.0	9.1	7.7	--	17.3
21-Nov	7.7	6.4	4.6	3.6	2.5	2.0	2.5	2.5	2.2	2.2	2.8	2.6	2.5	2.3	2.0	1.7	1.7	1.6	1.7	1.9	2.1	1.8	1.7	1.8	2.7	7.7
22-Nov	2.2	2.3	2.3	2.5	2.4	5.0	4.3	2.6	2.5	3.1	4.8	4.3	3.8	4.3	2.8	2.6	2.6	2.4	2.6	3.7	2.6	2.6	2.9	2.7	3.1	5.0
23-Nov	4.8	4.0	2.9	2.6	2.4	2.5	2.4	2.6	2.5	3.4	4.3	4.8	5.3	4.7	4.9	3.8	3.2	3.4	3.7	4.7	4.6	4.0	3.8	2.8	3.7	5.3
24-Nov	5.7	4.1	4.9	4.1	4.1	3.8	4.7	4.1	3.5	2.8	2.4	2.1	2.0	2.0	2.1	2.2	2.5	2.6	2.6	2.5	2.9	2.9	2.8	2.7	3.2	5.7
25-Nov	2.5	2.6	3.2	3.5	3.1	5.9	7.1	5.6	3.5	2.9	2.7	2.6	2.7	3.4	3.1	3.1	3.7	4.7	5.8	5.5	8.2	12.0	16.2	7.6	5.0	16.2
26-Nov	4.8	5.9	7.1	7.0	9.3	8.4	8.9	12.0	12.9	15.0	11.9	7.3	7.8	8.6	8.6	7.5	8.2	17.4	14.2	5.8	5.1	5.1	7.4	7.6	8.9	17.4
27-Nov	8.9	5.3	4.8	5.7	5.1	3.5	5.0	5.6	5.4	7.0	5.2	5.8	10.0	6.3	5.9	5.2	9.9	7.6	6.2	5.2	4.0	4.1	5.2	4.5	5.9	10.0
28-Nov	4.2	4.0	4.4	4.2	4.6	6.5	10.2	11.9	13.2	13.7	14.2	15.4	13.0	12.2	11.8	10.9	9.5	7.0	6.8	6.6	6.0	5.6	7.0	9.2	8.8	15.4
29-Nov	9.8	14.9	10.2	9.4	8.9	9.8	8.5	8.9	8.5	7.9	7.3	6.0	6.7	17.2	3.6	3.6	4.6	4.9	5.0	5.5	6.9	7.3	7.3	7.5	7.9	17.2
30-Nov	6.9	6.7	6.1	6.7	5.9	5.9	5.8	5.7	26.2	15.5	8.7	10.6	7.4	6.5	6.0	10.6	7.6	6.7	6.3	6.5	7.0	6.4	5.9	6.2	8.1	26.2

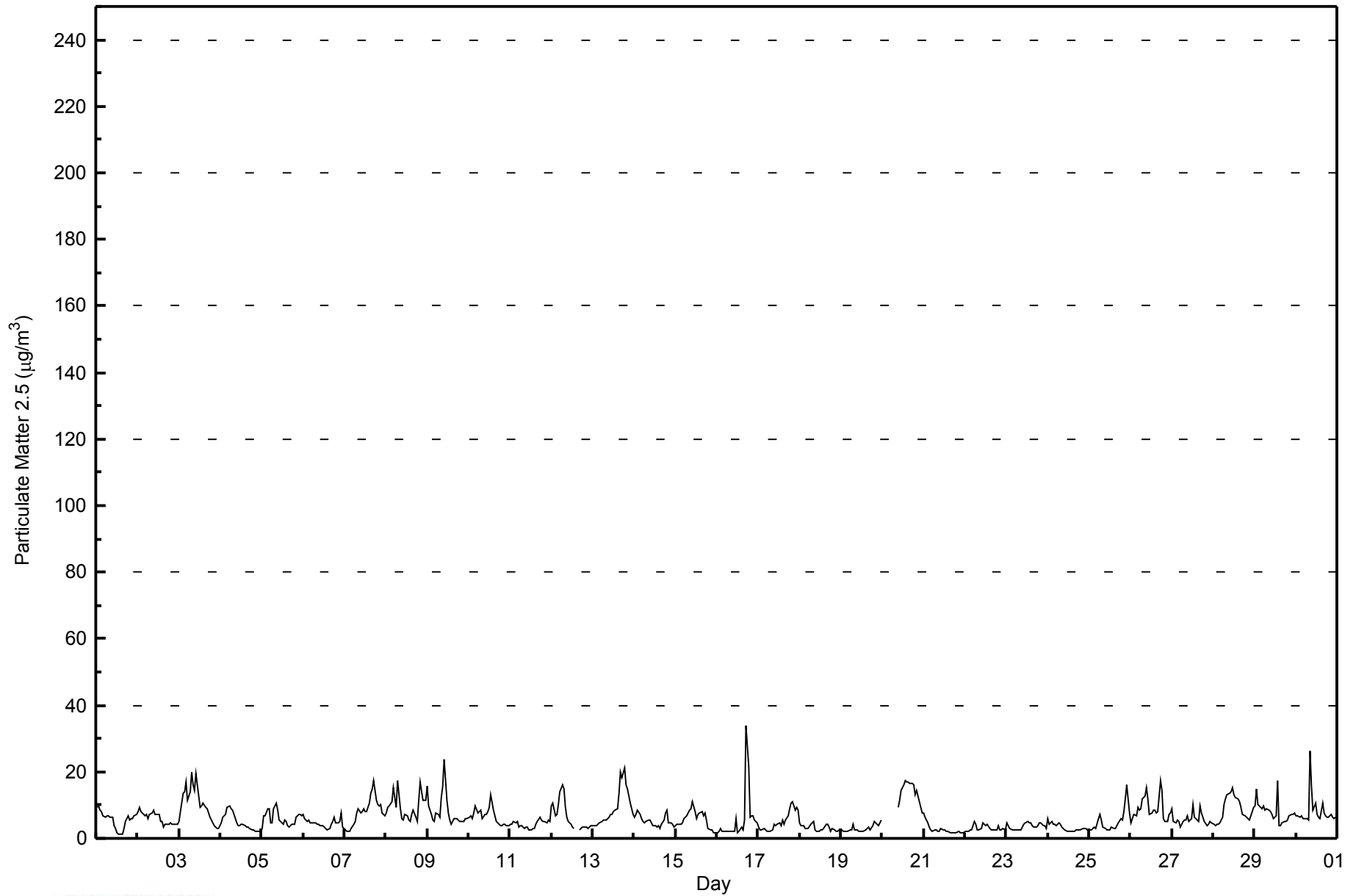
5.8	5.9	5.7	5.7	6.1	5.9	6.3	7.1	7.3	6.9	6.8	6.2	5.8	6.0	5.6	5.8	6.3	7.5	6.9	6.0	6.1	5.7	5.8	5.2	Diurnal Average	
15.6	14.9	13.5	14.0	17.1	13.8	16.2	19.9	26.2	15.6	23.5	15.4	16.3	17.3	17.0	16.8	19.9	34.0	21.4	16.0	16.8	12.9	16.2	11.6	Diurnal Maximum	

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



WBEA
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Shell Muskeg River - November 2014





WBEA
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Shell Muskeg River - November 2014

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	381	53.74	53.74
6 - 15	300	42.31	96.05
16 - 25	26	3.67	99.72
26 - 80	2	0.28	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 720



WBEA
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Shell Muskeg River - November 2014

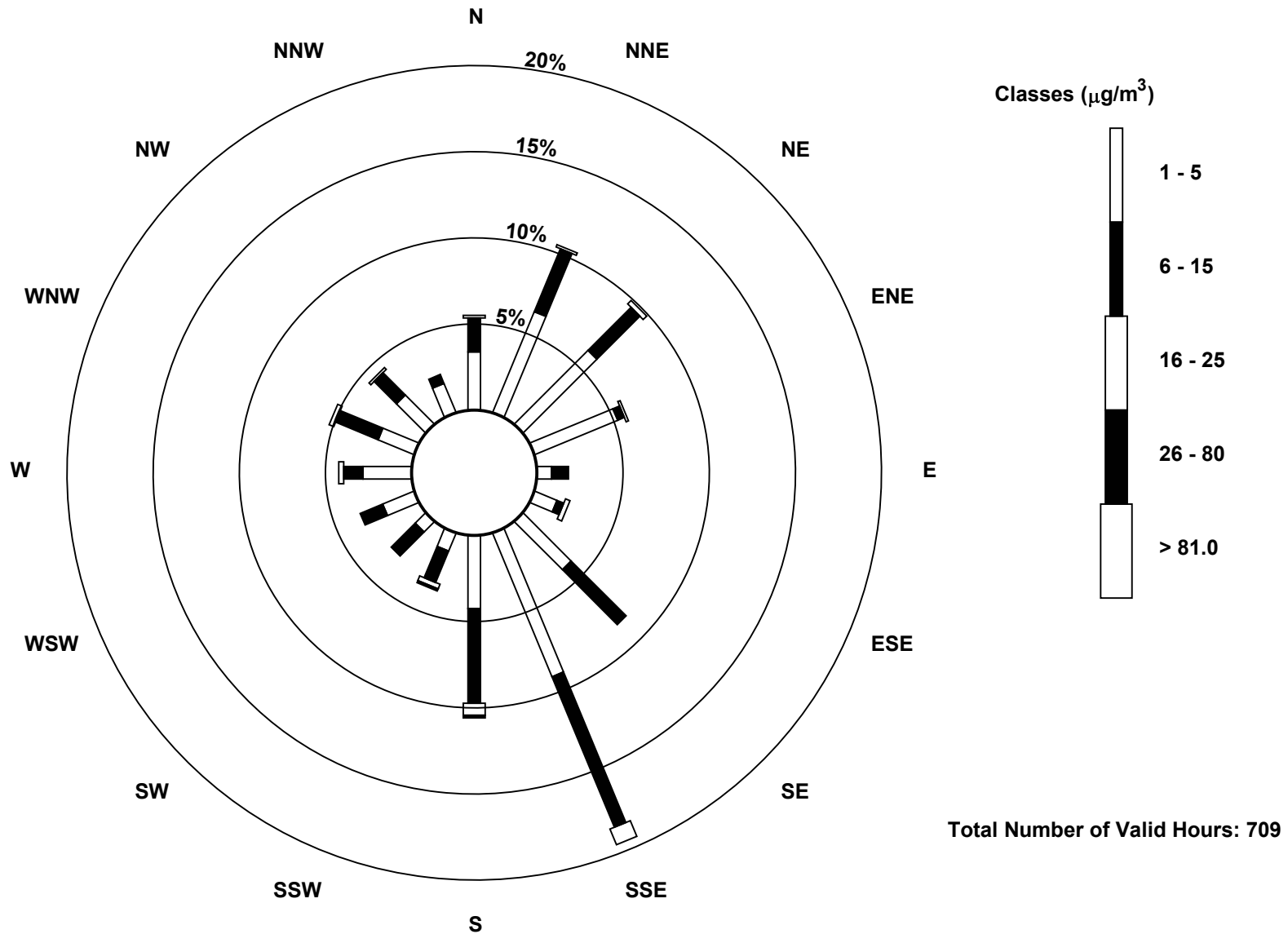
Concentration Ranges (μg/m ³)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	24	45	43	37	6	10	28	64	30	8	6	14	20	16	17	13	381
6 - 15	14	28	25	3	7	3	32	67	39	14	14	10	8	19	13	4	300
16 - 25	1	1	2	1	0	2	0	7	5	2	0	0	2	2	1	0	26
26 - 80	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	2
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	39	74	70	41	13	15	60	138	75	25	20	24	30	37	31	17	709

Total Number of Valid Hours: 709

Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Shell Muskeg River (AMS 16)



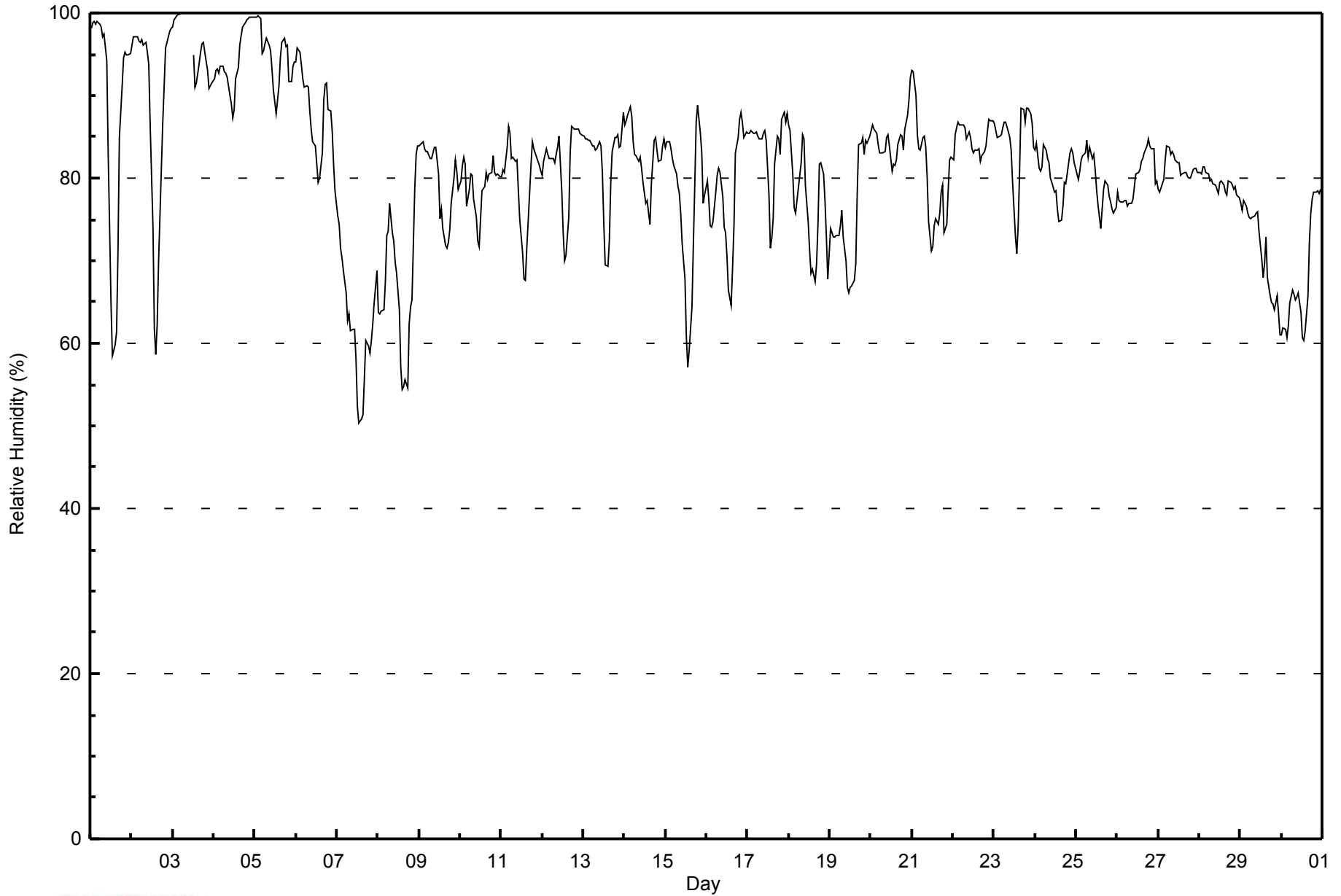


Maximum Value: 100 % on Nov 3 06:00														Maximum Daily Average: 95.4 % on Nov 3														Hours in Service: 720			
Minimum Value: 50 % on Nov 7 14:00														Minimum Daily Average: 62.2 % on Nov 7														Hours of Data: 714			
Maximum Diurnal Average: 83.9 % at hour 2														Minimum Diurnal Average: 72.7 % at hour 14														Hours of Missing Data: 6			
Monthly Average: 80.8 %														Percentiles: P ₁ = 56 P ₁₀ = 67 Q ₁ = 76 Median = 82 Q ₃ = 86 P ₉₀ = 94 P ₉₉ = 99														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-Nov	98	99	99	99	99	99	98	97	97	94	83	74	65	58	60	61	71	85	91	95	95	95	95	95	87.6	99					
2-Nov	96	97	97	97	97	96	97	96	96	95	94	87	74	62	59	62	70	81	87	91	96	97	98	98	88.3	98					
3-Nov	98	99	100	100	100	100	UO	UO	UO	UO	UO	UO	95	91	92	94	95	96	97	95	93	91	91	92	95.4	100					
4-Nov	92	93	93	93	94	94	93	93	92	90	89	87	88	92	93	96	97	98	99	99	99	100	100	100	94.3	100					
5-Nov	100	100	100	99	95	95	96	97	96	95	93	91	88	90	91	95	96	97	96	96	92	92	94	94	94.9	100					
6-Nov	94	96	95	94	92	91	91	91	88	86	84	84	82	79	80	83	89	91	91	88	88	86	82	78	87.7	96					
7-Nov	75	74	72	70	69	66	63	64	62	62	58	52	50	51	51	56	60	60	59	60	62	65	69	62.2	75						
8-Nov	64	64	64	64	67	73	74	77	73	72	70	69	64	57	54	55	56	55	62	64	65	79	83	84	67.0	84					
9-Nov	84	84	84	84	83	83	82	82	83	84	84	81	75	76	74	72	72	72	74	77	80	82	81	79	79.7	84					
10-Nov	80	81	83	82	77	79	80	80	77	75	72	72	75	78	79	81	80	80	81	83	81	80	81	80	79.0	83					
11-Nov	80	81	81	84	86	85	82	82	82	82	78	75	71	68	68	72	75	82	84	84	83	82	82	81	79.6	86					
12-Nov	80	82	84	83	82	82	82	82	83	84	85	79	73	70	71	75	83	86	86	86	86	86	85	85	81.7	86					
13-Nov	85	85	85	84	85	84	84	83	84	84	84	81	75	70	69	73	79	83	85	85	85	84	84	88	82.0	88					
14-Nov	87	87	88	89	87	84	83	83	82	82	81	79	77	77	76	74	79	85	85	83	82	82	84	85	82.6	89					
15-Nov	84	84	84	84	82	82	81	79	78	76	72	68	61	57	59	64	72	79	87	89	85	83	77	78	76.9	89					
16-Nov	80	77	74	74	75	78	80	81	81	78	74	73	70	66	65	69	74	83	85	87	88	87	85	86	78.0	88					
17-Nov	85	86	86	85	85	86	85	85	85	85	86	85	78	72	73	75	82	85	85	83	87	88	87	88	83.5	88					
18-Nov	86	86	80	76	76	77	80	82	85	85	79	75	71	68	69	67	70	74	82	82	81	77	73	68	77.1	86					
19-Nov	74	73	73	73	73	73	74	76	73	70	67	66	67	67	68	70	78	84	84	85	83	85	84	85	75.2	85					
20-Nov	86	86	86	86	84	83	83	83	83	85	85	84	81	82	81	82	84	85	85	83	86	88	90	92	84.7	92					
21-Nov	93	93	90	85	84	83	85	85	84	80	75	71	72	74	75	74	76	78	79	73	74	78	82	83	80.3	93					
22-Nov	82	85	86	87	86	87	87	86	85	86	85	84	83	83	83	84	82	83	83	84	86	87	87	87	84.8	87					
23-Nov	87	86	85	85	85	86	87	87	86	85	83	80	73	71	74	81	88	88	87	89	88	88	87	84	84.1	89					
24-Nov	83	84	81	81	81	84	83	82	82	80	79	78	76	75	75	77	79	79	79	81	83	84	83	82	80.5	84					
25-Nov	80	80	81	82	83	83	85	83	84	82	83	81	79	77	74	76	79	80	79	78	77	76	76	76	79.7	85					
26-Nov	78	77	77	77	77	77	77	77	77	78	79	81	81	81	82	82	83	84	85	84	84	84	79	80	80.0	85					
27-Nov	79	78	79	80	82	84	84	83	83	83	82	82	82	80	81	81	81	80	80	80	81	81	81	81	81.1	84					
28-Nov	81	81	81	81	81	80	80	80	79	79	79	78	80	80	79	78	78	80	79	79	79	79	78	78	79.4	81					
29-Nov	77	76	77	77	76	75	75	75	75	76	76	74	70	68	70	73	68	66	65	65	64	66	64	61	71.2	77					
30-Nov	61	62	62	61	62	65	66	66	65	66	66	64	61	60	62	66	72	76	78	78	78	78	79	79	68.0	79					
83.6 83.9 83.5 83.1 82.8 83.2 82.7 82.7 82.1 81.4 79.6 77.1 74.7 72.7 72.8 74.7 78.1 81.2 82.6 82.8 83.0 83.5 83.1 83.1																								Diurnal Average							
100 100 100 100 100 100 98 97 97 95 94 91 95 92 93 96 97 98 99 99 99 100 100 100																								Diurnal Maximum							
UO - Unstable Operation																															



WBEA
Hourly Averages

Relative Humidity (RH) - %
Shell Muskeg River - November 2014





WBEA
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Shell Muskeg River - November 2014

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	18	2.52	2.52
60 - 80	268	37.54	40.06
80 - 100	428	59.94	100.00

Total Number of Valid Hours: 714

Total Number of Hours: 720

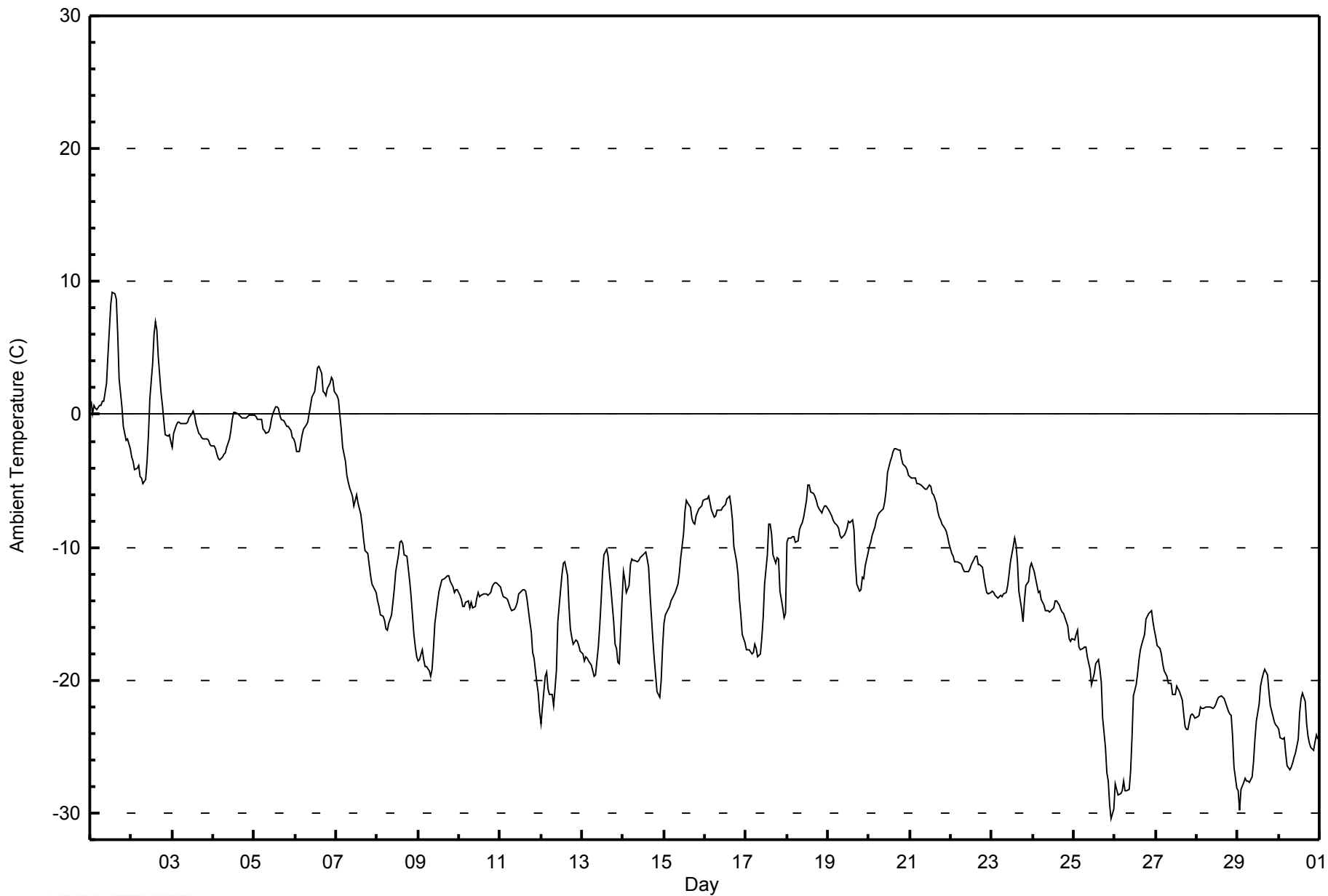


Maximum Value: 9.2 C on Nov 1 14:00		Maximum Daily Average: 2.3 C on Nov 1		Hours in Service: 720																																												
Minimum Value: -30.4 C on Nov 25 23:00		Minimum Daily Average: -24.4 C on Nov 30		Hours of Data: 720																																												
Maximum Diurnal Average: -8.9 C at hour 15		Minimum Diurnal Average: -13.1 C at hour 23		Hours of Missing Data: 0																																												
Monthly Average: -11.63 C		Percentiles: P ₁ = -28.3 P ₁₀ = -22.4 Q ₁ = -17.6 Median = -12.2 Q ₃ = -5.7 P ₉₀ = -0.4 P ₉₉ = 6.4		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-Nov	1.0	0.0	0.7	0.5	0.4	0.6	0.7	1.0	1.0	2.4	4.5	6.4	8.2	9.2	9.1	8.7	6.1	2.6	0.5	-0.9	-1.5	-1.9	-1.8	-2.5	2.3	9.2																						
2-Nov	-3.3	-3.5	-4.2	-4.1	-3.8	-4.6	-4.8	-5.2	-4.9	-3.5	-1.6	1.2	3.9	6.0	7.0	6.4	4.3	1.6	0.6	-0.5	-1.5	-1.6	-1.6	-2.0	-0.8	7.0																						
3-Nov	-2.5	-1.5	-0.8	-0.6	-0.6	-0.7	-0.7	-0.7	-0.7	-0.5	-0.2	0.1	0.3	-0.1	-0.7	-1.4	-1.5	-1.7	-1.8	-1.8	-1.9	-2.0	-2.2	-2.4	-1.1	0.3																						
4-Nov	-2.4	-2.6	-3.0	-3.3	-3.5	-3.2	-3.0	-2.8	-2.5	-1.8	-1.2	-0.4	0.1	0.1	0.1	-0.1	-0.1	-0.3	-0.3	-0.2	-0.2	-0.1	-0.1	-0.1	-1.3	0.1																						
5-Nov	-0.1	-0.1	-0.4	-0.4	-0.4	-1.1	-1.3	-1.4	-1.4	-1.0	-0.4	0.1	0.6	0.6	0.5	-0.1	-0.4	-0.5	-0.7	-0.9	-0.9	-1.2	-1.7	-1.8	-0.6	0.6																						
6-Nov	-2.2	-2.8	-2.8	-2.1	-1.5	-1.1	-0.8	-0.5	0.1	0.7	1.3	1.7	2.6	3.6	3.6	3.1	1.7	1.6	1.5	1.9	2.3	2.7	2.5	1.7	0.8	3.6																						
7-Nov	1.5	1.1	0.0	-1.1	-2.4	-3.5	-4.6	-5.1	-5.5	-6.2	-6.9	-6.4	-6.1	-6.7	-7.5	-8.4	-9.5	-10.2	-10.5	-11.3	-12.2	-12.8	-13.0	-13.4	-6.7	1.5																						
8-Nov	-14.0	-14.4	-15.1	-15.2	-15.5	-16.2	-16.2	-15.7	-15.1	-14.2	-13.1	-11.8	-10.6	-9.6	-9.5	-9.7	-10.5	-10.7	-11.6	-12.6	-13.7	-16.5	-17.5	-18.2	-13.6	-9.5																						
9-Nov	-18.5	-18.5	-17.7	-18.4	-19.0	-19.0	-19.3	-19.7	-19.2	-17.6	-15.7	-14.0	-13.3	-12.8	-12.5	-12.4	-12.2	-12.2	-12.1	-12.5	-12.9	-13.4	-13.2	-13.2	-15.4	-12.1																						
10-Nov	-13.6	-13.9	-14.5	-14.5	-14.1	-14.0	-14.6	-14.2	-14.6	-14.4	-13.8	-13.5	-13.7	-13.6	-13.5	-13.5	-13.5	-13.6	-13.4	-13.0	-12.8	-12.7	-12.7	-12.8	-13.7	-12.7																						
11-Nov	-13.0	-13.4	-13.7	-13.9	-13.9	-14.3	-14.5	-14.8	-14.7	-14.4	-14.1	-13.6	-13.3	-13.2	-13.1	-13.3	-13.9	-15.6	-16.3	-17.9	-18.3	-20.3	-21.0	-22.5	-15.3	-13.0																						
12-Nov	-23.3	-22.0	-19.7	-19.4	-20.7	-21.0	-21.1	-21.9	-20.7	-19.3	-15.6	-13.2	-12.0	-11.1	-11.1	-12.2	-14.5	-16.1	-16.7	-17.3	-17.0	-17.1	-17.4	-17.8	-17.4	-11.1																						
13-Nov	-18.0	-18.6	-18.2	-18.4	-18.5	-18.9	-19.3	-19.7	-19.6	-17.5	-16.0	-14.0	-12.0	-10.6	-10.1	-10.7	-12.1	-13.1	-15.7	-17.3	-17.6	-18.7	-18.7	-13.9	-16.1	-10.1																						
14-Nov	-11.8	-12.4	-13.4	-12.9	-11.3	-10.9	-11.0	-11.0	-11.1	-11.0	-10.8	-10.7	-10.4	-10.4	-10.9	-11.5	-13.5	-16.8	-18.3	-19.6	-20.9	-21.3	-20.1	-17.5	-13.7	-10.4																						
15-Nov	-15.8	-15.0	-14.6	-14.5	-14.1	-13.8	-13.4	-13.1	-12.7	-12.0	-10.7	-9.0	-7.3	-6.4	-6.7	-7.0	-7.8	-8.2	-8.3	-7.7	-7.1	-7.0	-6.9	-6.4	-10.2	-6.4																						
16-Nov	-6.3	-6.4	-6.2	-6.6	-7.2	-7.8	-7.6	-7.2	-7.2	-7.2	-7.0	-6.9	-6.8	-6.3	-6.1	-6.8	-8.0	-9.9	-11.0	-12.0	-13.9	-15.1	-16.5	-17.2	-8.9	-6.1																						
17-Nov	-17.7	-17.7	-17.7	-18.0	-17.9	-17.2	-17.6	-18.3	-18.0	-16.9	-15.3	-12.8	-10.5	-8.3	-8.3	-9.0	-10.6	-11.2	-10.8	-10.9	-13.3	-14.6	-15.3	-15.0	-14.3	-8.3																						
18-Nov	-9.6	-9.4	-9.3	-9.2	-9.2	-9.6	-9.5	-8.6	-8.3	-8.2	-7.7	-6.5	-5.3	-5.3	-5.8	-5.9	-6.2	-6.4	-6.9	-7.1	-7.4	-7.1	-6.9	-6.8	-7.6	-5.3																						
19-Nov	-7.2	-7.4	-7.7	-7.9	-8.1	-8.3	-8.6	-9.1	-9.3	-9.1	-8.9	-8.5	-8.1	-8.2	-8.0	-8.7	-11.2	-12.7	-13.3	-13.2	-12.2	-12.4	-11.4	-10.5	-9.6	-7.2																						
20-Nov	-9.9	-9.6	-9.1	-8.5	-8.0	-7.6	-7.4	-7.3	-7.0	-6.5	-5.7	-4.4	-3.5	-3.2	-2.8	-2.5	-2.6	-2.7	-2.7	-3.3	-3.8	-3.9	-4.2	-4.5	-5.5	-2.5																						
21-Nov	-4.7	-4.8	-4.8	-4.8	-5.2	-5.2	-5.3	-5.4	-5.5	-5.6	-5.7	-5.3	-5.4	-5.9	-6.0	-6.7	-7.3	-7.7	-7.9	-8.3	-8.5	-8.8	-9.2	-9.7	-6.4	-4.7																						
22-Nov	-10.4	-10.7	-11.1	-11.0	-11.1	-11.1	-11.3	-11.6	-11.9	-11.8	-11.8	-11.6	-11.3	-11.1	-10.6	-10.7	-11.3	-11.3	-11.5	-12.3	-12.9	-13.4	-13.5	-13.4	-11.6	-10.4																						
23-Nov	-13.3	-13.4	-13.7	-13.8	-13.7	-13.6	-13.8	-13.5	-13.4	-12.9	-12.1	-11.0	-9.9	-9.3	-9.8	-11.1	-13.3	-14.7	-15.7	-14.0	-12.9	-12.5	-11.5	-11.2	-12.7	-9.3																						
24-Nov	-11.5	-11.8	-12.8	-13.3	-13.3	-13.9	-14.3	-14.7	-14.8	-14.9	-14.7	-14.5	-14.0	-14.1	-14.4	-14.6	-14.9	-15.0	-15.3	-16.0	-16.9	-17.0	-16.8	-16.8	-14.5	-11.5																						
25-Nov	-16.9	-16.6	-16.2	-17.6	-17.8	-17.6	-17.5	-17.5	-18.2	-19.2	-20.3	-19.9	-19.5	-18.8	-18.4	-19.1	-20.2	-22.9	-25.1	-27.0	-27.6	-29.4	-30.4	-29.7	-21.0	-16.2																						
26-Nov	-27.8	-28.2	-28.7	-28.5	-28.3	-27.6	-28.4	-28.3	-28.2	-26.9	-24.4	-21.2	-20.4	-19.5	-18.5	-17.8	-17.3	-16.5	-15.4	-15.2	-15.0	-14.7	-15.6	-16.2	-22.0	-14.7																						
27-Nov	-16.7	-17.4	-17.6	-18.1	-18.7	-19.3	-19.7	-20.2	-20.2	-20.3	-21.0	-21.1	-20.4	-20.6	-20.8	-21.5	-22.6	-23.4	-23.7	-23.7	-22.6	-22.6	-22.7	-22.9	-20.7	-16.7																						
28-Nov	-22.8	-22.7	-22.0	-22.1	-22.2	-22.0	-22.1	-22.0	-22.0	-22.1	-22.0	-21.8	-21.5	-21.3	-21.1	-21.3	-21.4	-21.7	-22.3	-22.5	-22.7	-24.2	-26.5	-28.1	-22.5	-21.1																						
29-Nov	-28.3	-29.8	-28.3	-27.7	-27.4	-27.5	-27.6	-27.7	-27.3	-26.1	-24.5	-23.1	-21.8	-20.5	-19.9	-19.5	-19.1	-19.6	-20.8	-21.9	-22.3	-23.2	-23.4	-23.5	-24.2	-19.1																						
30-Nov	-23.7	-24.3	-24.5	-24.4	-25.5	-26.5	-26.7	-26.5	-26.2	-25.8	-25.5	-24.5	-22.5	-21.4	-21.0	-21.6	-23.3	-24.3	-24.8	-25.1	-25.3	-24.7	-24.2	-24.5	-24.4	-21.0																						
																								-12.1	-12.3	-12.2	-12.3	-12.4	-12.6	-12.7	-12.8	-12.6	-12.1	-11.4	-10.3	-9.5	-9.0	-8.9	-9.3	-10.2	-11.1	-11.7	-12.1	-12.4	-12.9	-13.1	-13.1	Diurnal Average
																								1.5	1.1	0.7	0.5	0.4	0.6	0.7	1.0	1.0	2.4	4.5	6.4	8.2	9.2	9.1	8.7	6.1	2.6	1.5	1.9	2.3	2.7	2.5	1.7	Diurnal Maximum



WBEA
Hourly Averages

Ambient Temperature (AT) - C
Shell Muskeg River - November 2014





WBEA
Cumulative Frequency Distribution

Ambient Temperature (AT) - C
Shell Muskeg River - November 2014

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	120	16.67	16.67
-20 - 0	546	75.83	92.50
0 - 10	54	7.50	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

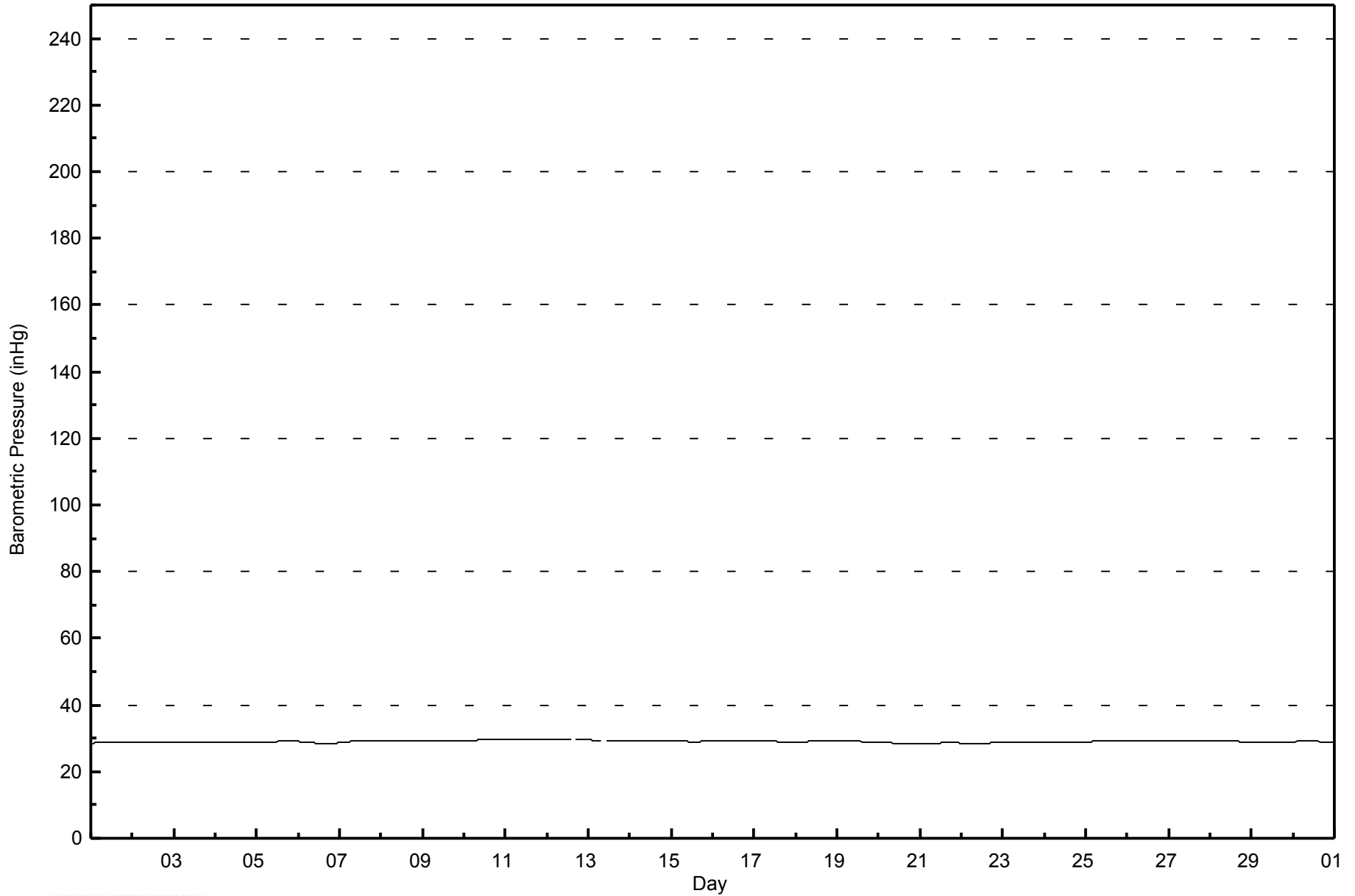
Total Number of Valid Hours: 720

Total Number of Hours: 720



WBEA
Hourly Averages

Barometric Pressure (BP) - inHg
Shell Muskeg River - November 2014





Maximum Speed: 26 km/h on Nov 10 19:00	Maximum Daily Speed Average: 19.1 km/h on Nov 22	Hours in Service: 720
Minimum Speed Value: 1 km/h on Nov 25 19:00	Minimum Daily Speed Average: 0.9 km/h on Nov 15	Hours of Data: 720
Maximum Diurnal Speed Average: 4.1 km/h at hour 19	Minimum Diurnal Speed Average: 0.4 km/h at hour 5	Hours of Missing Data: 0
Monthly Average Velocity: 1.5 km/h 50.4 deg	Percentiles: P ₁ = 2 P ₁₀ = 4 Q ₁ = 6 Median = 9 Q ₃ = 14 P ₉₀ = 18 P ₉₉ = 23	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	SSE6	SSE7	S6	SE5	SSE6	SE6	SSE7	SSE7	SSE8	SE7	SSE8	SSE12	SSE11	SSE12	SSE13	SSE10	SSE6	SSE6	SSE6	SSE7	SE6	SE8	SSE8	SE6	SSE7.6	SSE13	
2-Nov	SE6	SSE6	SE6	SE8	SSE6	SE8	SE7	SE7	SE6	SSE5	SSE4	SSE5	S5	SE8	SE9	SE11	SE8	SE8	SE9	SE7	SE7	SE7	SE6	SE7	SE6.9	SE11	
3-Nov	SSE8	SSE9	SSE7	SE7	SSE7	SE4	SSE5	SSE4	SSW3	SE1	W3	N6	NE16	NNE17	NE18	NNE17	NNE14	NNE9	NNE10	NNE7	NNE7	N6	ENE7	ENE7	NE4.7	NE18	
4-Nov	E6	E6	E5	ESE7	SE8	SE6	E5	E7	E8	ESE6	E6	E8	ESE7	ESE5	ESE6	ENE6	ENE7	ENE6	E4	ENE5	ENE4	NE2	ENE3	ENE4	E5.3	E8	
5-Nov	SSW2	SW6	SSW8	SSW9	SW13	SW12	SW11	SW12	SW8	SW9	WSW9	WSW7	WSW4	SW4	WNW5	WSW5	S6	S6	SSE6	S7	S9	SE8	SSE8	SSE8	SSW6.2	SW13	
6-Nov	SE6	SSE7	SE9	SE11	SE12	SE13	SE12	SE11	SE17	SE15	SE13	SE16	SSE10	SE10	SSE9	SSE6	S7	SSE7	S9	SSW9	WSW8	W11	W16	WNW13	SSE7.3	SE17	
7-Nov	WNW12	W18	WNW22	WNW19	NW19	NW20	NW18	WNW15	WNW16	NW20	NW23	NW20	WNW16	WNW17	WNW15	WNW15	WNW12	WNW12	NW13	WNW16	WNW15	WNW14	NNW10	NNE15	WNW15.5	NW23	
8-Nov	NNW14	NW9	WSW9	W8	SW9	SW11	SW8	W9	WSW12	W14	W11	WNW11	WNW12	NW12	NW10	WNW8	NW7	NNE14	NNE13	NW8	WNW6	SW5	SSE4	SSE3	WNW6.1	NNW14	
9-Nov	SSE3	SSE6	SE4	SSE5	SSE4	SE5	SE4	SSE5	SSE4	SSE3	S4	NW2	WNW5	NNE10	NNE10	WNW7	N12	NNE11	NNE16	N17	NNE15	NNE13	N14	WNW15	NNE3.7	N17	
10-Nov	NW14	NW14	NW15	WNW11	WNW11	NW13	WNW11	N13	NNE17	N17	N17	NNE20	NNE23	NNE21	NNE20	NNE22	NNE24	NNE22	NNE26	NNE23	NNE18	NNE17	NNE14	N14	N14.7	NNE26	
11-Nov	NNE14	NNE17	N15	N15	NNE14	NE20	NNW11	N7	NNE11	NNE8	W5	W8	WSW7	WSW7	SW5	SSW6	S4	SE4	SE3	SE3	SSE3	SSE4	SE3	SE3	N3.6	NE20	
12-Nov	SE5	SSE5	SE4	SE5	SSE6	SSE6	SSE5	SE5	SSE5	SSE4	SSE6	SSE9	SSE10	SSE9	SSE10	SE9	SE9	SSE9	SSE9	SSE8	SSE10	SSE10	SSE8	SSE8	SSE7.2	SSE10	
13-Nov	SSE8	SE10	SSE10	SSE10	SSE8	SSE7	SSE8	SE7	SSE8	SSE8	SSE7	SSE8	SSE6	SSE6	SSE3	WSW2	N2	NE6	NE5	ENE3	NNE5	NE6	NE5	NNE9	SE4.5	SE10	
14-Nov	NNE10	ESE2	SSE2	SSW2	N7	NNW11	NNW13	N13	NNW13	NNW13	N13	N13	NW10	W10	WNW7	ENE4	ESE2	ESE5	SE3	SSE4	SSE5	SSE7	S8	SSE10	NNW2.9	NNW13	
15-Nov	S14	S13	S13	S12	S17	S17	S19	S17	S17	S14	SSE11	S9	SSW9	WSW8	NNW9	N18	NNE19	N25	N26	N24	N22	NNW21	NW18	NNW19	W0.9	N26	
16-Nov	NW20	NW24	N26	N22	NW14	WNW13	NW16	NNW18	NNW15	WNW12	NW15	NW14	NW10	NW6	W3	ESE4	SE3	S5	SSW3	SSW2	SSW3	SSW5	SSW4	SSE6	NW7.9	N26	
17-Nov	SSE7	SSE7	SSE7	SSE7	SSE9	SSE10	SSE9	SSE9	SSE8	S9	S10	SSE9	S9	S10	S13	S10	S6	SSW3	W7	NNE3	SSE5	SSW5	ENE6	NE7	S6.2	S13	
18-Nov	NNE16	NNE21	NNE20	NW16	W11	WSW10	WSW7	WNW8	W8	WSW7	WSW7	W9	WNW10	WNW14	WNW11	WNW11	WNW10	NW10	NW11	WNW7	WSW8	W9	WNW9	NNW12	WNW7.8	NNE21	
19-Nov	W7	W10	W11	W10	W10	W10	W9	WSW10	SW8	SW10	SSW10	SSW10	S9	S10	S9	S9	SSE7	S7	SSE7	S8	SSE9	SSE7	SSE9	SSE8	SSW6.3	W11	
20-Nov	SSE7	SSE8	SSE7	SSE6	SSE10	SSE10	SSE9	S8	SSE10	SSE10	SSE9	S10	S11	S9	S6	SSE5	SE2	ESE3	NNE10	NE16	NE15	NE14	NE16	NE13	SE5.1	NE16	
21-Nov	NE16	NE14	NE13	N13	NNE15	NNE14	N13	NNW12	NNW12	N14	N13	NNW10	NNW8	NNE10	NE13	NE17	NE16	NE16	NE18	NE15	NE15	NE14	ENE13	NE17	NNE12.2	NE18	
22-Nov	ENE14	NE14	NE15	NE16	NE20	NE22	NE21	NE20	NE21	NE18	NE20	NNE21	NNE21	NNE24	NNE23	NE22	NNE24	NNE21	NNE20	NNE22	NNE22	NNE14	NNE14	NE15	NE19.1	NNE24	
23-Nov	NE12	NE10	ENE8	ENE5	ESE2	SSW5	SSE3	SE5	S5	S7	SSE9	S9	S8	S7	SSE8	SSE7	SSE6	SSE7	SSE6	SSE5	SSE5	SSW4	NE12	NE13	SE3.7	NE13	
24-Nov	NNE15	NNE16	NNE17	N12	N13	NNE14	N10	N6	NNE6	NE9	ENE9	ENE6	ENE7	ESE5	ESE4	ENE5	ENE9	ENE10	ENE11	ENE12	ENE10	ENE6	NE9	NE8.0	NNE17		
25-Nov	ENE9	NE12	NE15	NNE14	NNE12	NNE11	NNE12	N13	NE14	ENE11	ENE12	ENE10	NE10	NE8	NE10	ENE11	ENE6	E4	SSE1	SSE4	SSE4	SE5	SSE5	SSE7	NE7.5	NE15	
26-Nov	S5	SSE7	SSE7	SSE8	S8	S8	SSE7	S6	S8	S10	SSE10	S8	S8	S7	S7	S4	S3	NW6	NNE13	NNE21	NNE18	NNE16	N22	N19	ESE1.8	N22	
27-Nov	N23	N16	N17	N19	NNE15	NE20	NE19	NE14	NE11	NNE12	NE12	NE15	NE4	SSW6	SW4	S2	S3	SSW3	E2	ENE6	ENE9	ENE12	ENE13	ENE11	NE8.7	N23	
28-Nov	ENE9	ENE10	NE17	NE18	NE18	NE16	NE17	NE18	NE19	NE19	NE20	NE20	NE17	NNE16	NNE15	NE18	NE16	NE11	ENE10	E3	ESE2	S4	SSE6	SSE7	NE12.3	NE20	
29-Nov	SSE7	S8	S10	S13	S14	S14	S17	S12	S10	SSE9	SSE7	S11	SSW14	S11	SSW7	SW10	WSW14	W18	W17	W15	W19	W16	W16	WSW15	SW9.3	W19	
30-Nov	WSW16	WSW16	WSW18	WSW16	SW15	SW13	SW15	SW18	SSW21	SSW15	S16	S16	S16	S16	S16	S16	SSE13	SSE12	SSE13	SSE11	SSE10	SSE11	SSE12	SSE9	S7	SSW11.4	SSW21

NNE2.8	NE2.0	NNE2.0	NNE1.2	ESE0.4	E0.5	SSE0.4	E0.4	SE1.0	ESE1.1	ESE0.8	ESE0.9	SSE0.6	SSE0.4	ENE1.1	ENE2.0	NE2.9	NE2.9	NE4.1	NE3.8	NE2.9	NE1.8	NE2.6	NE3.3	Diurnal Average	
N23	NW24	N26	N22	NE20	NE22	NE21	NE20	NE21	NW20	NW23	NNE21	NNE23	NNE24	NNE23	NE22	NNE24	N25	NNE26	N24	N22	NNW21	N22	N19	Diurnal Maximum	

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

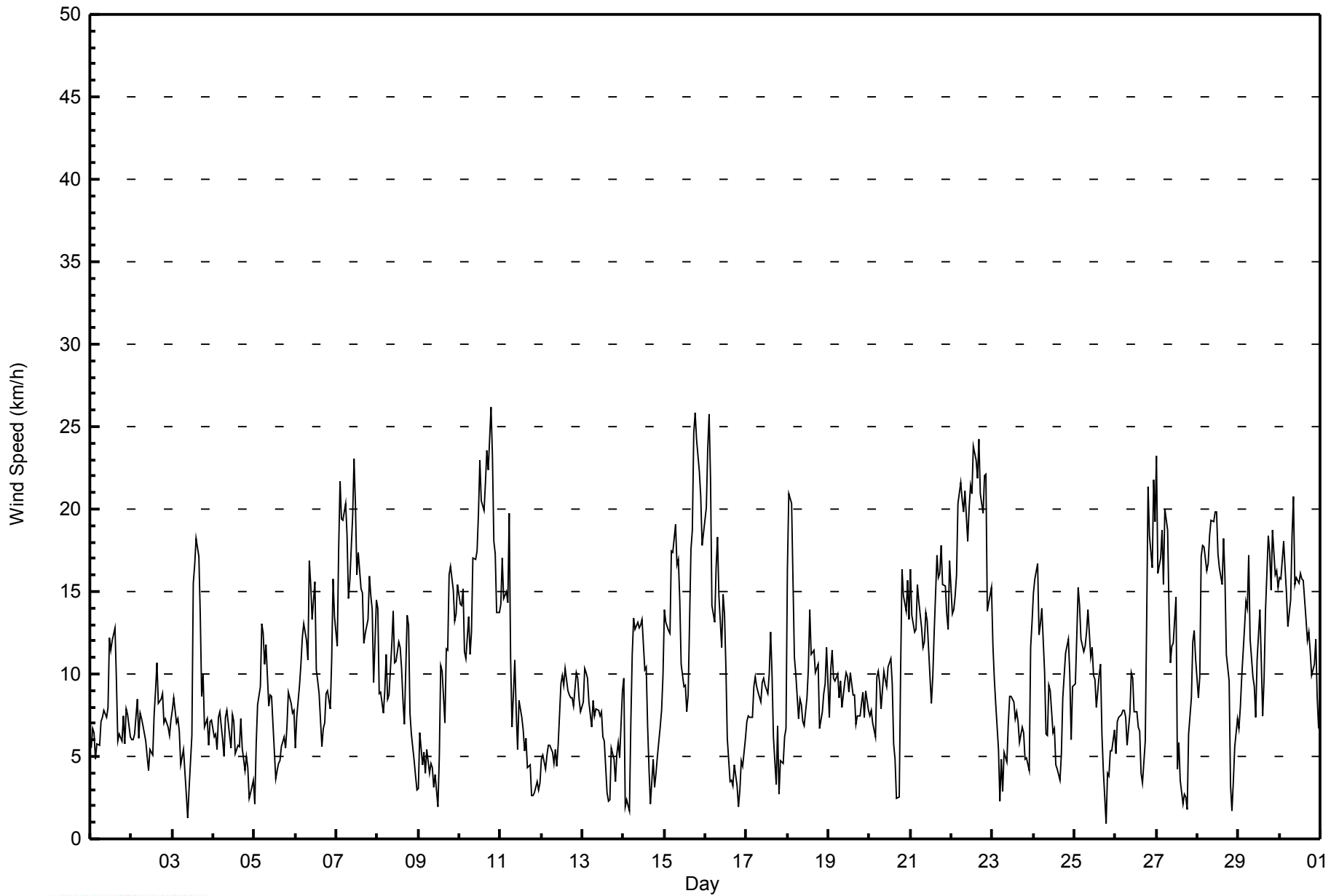


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 9 km/h on Nov 15 18:00																	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Minimum Value: 0 km/h on Nov 11 20:00																									
Percentiles: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



WBEA
Hourly Averages

Wind Speed (WS) - km/h
Shell Muskeg River - November 2014





WBEA
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Shell Muskeg River - November 2014

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	121	16.81	16.81
6 - 11	336	46.67	63.47
12 - 19	214	29.72	93.19
20 - 28	49	6.81	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



WBEA
Frequency Distribution

Wind Speed (WS) - km/h
Shell Muskeg River - November 2014

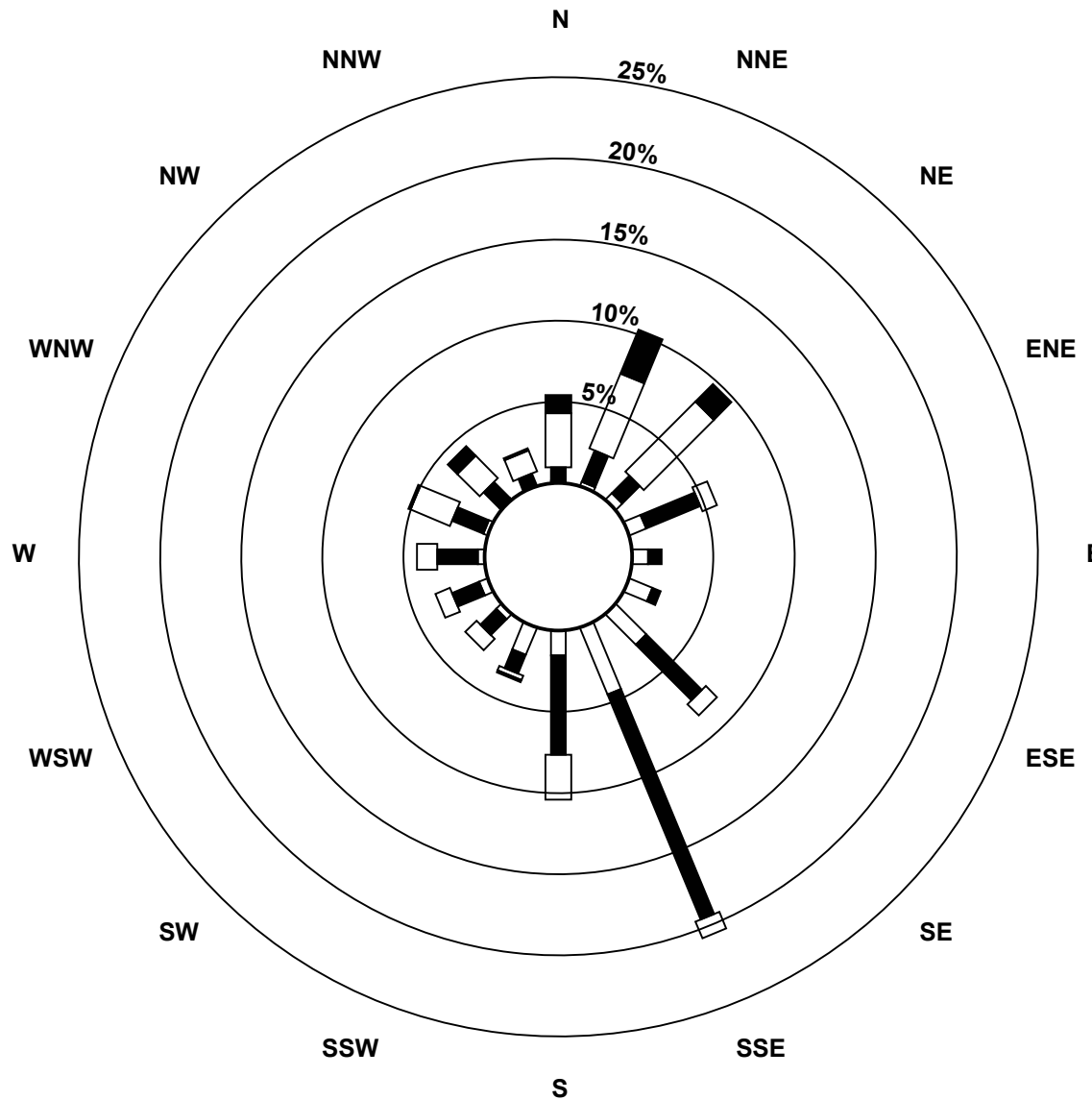
Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	1	2	4	8	7	11	19	32	11	13	3	4	3	2	1	0	121
6 - 11	6	15	11	26	6	4	35	108	44	9	10	13	18	15	10	6	336
12 - 19	24	36	44	7	0	0	7	8	20	2	7	7	9	19	14	10	214
20 - 28	8	21	11	0	0	0	0	0	0	1	0	0	0	1	6	1	49
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	39	74	70	41	13	15	61	148	75	25	20	24	30	37	31	17	720

Total Number of Valid Hours: 720

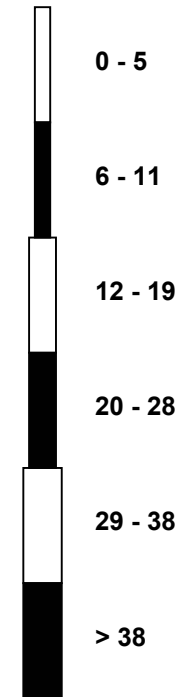
Total Number of Hours: 720

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

**Wind Speed (WS) - km/h
Shell Muskeg River (AMS 16)**



Classes (km/h)



Total Number of Valid Hours: 720



Direction of Maximum Speed: 29 deg on Nov 10 19:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 37.8 deg on Nov 22	Hours of Data: 720
Direction of Minimum Speed: 165 deg on Nov 25 19:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 0.9 deg on Nov 15	Percent Operational Time: 100.0
Monthly Average Direction: 212.1 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-Nov	161	150	175	142	151	145	147	149	148	144	158	168	162	163	163	160	153	154	155	158	145	141	147	142	154.8
2-Nov	143	148	142	143	151	141	144	134	142	152	149	155	170	146	137	133	134	136	139	132	133	140	144	145	141.9
3-Nov	147	159	156	138	149	144	148	168	204	132	267	352	39	28	34	33	29	12	31	21	26	4	61	75	53.2
4-Nov	80	99	101	123	130	125	99	96	100	103	98	94	108	115	103	74	57	69	87	63	61	52	62	72	93.8
5-Nov	201	220	194	199	224	228	219	218	221	224	242	242	238	236	290	256	173	170	152	171	170	161	148	149	205.6
6-Nov	140	147	136	131	137	139	134	146	146	144	144	142	158	146	147	167	171	165	170	203	256	262	278	298	160.1
7-Nov	285	278	287	292	311	305	305	300	292	310	309	305	285	286	293	289	300	282	306	301	303	298	334	16	300.0
8-Nov	346	321	253	271	235	225	227	266	253	262	259	293	303	324	311	302	326	28	29	323	285	234	166	168	290.1
9-Nov	148	162	145	147	159	145	130	164	168	161	182	309	297	29	29	301	3	12	13	6	15	13	358	301	12.9
10-Nov	310	326	311	288	283	311	286	350	18	8	7	12	27	25	14	29	27	29	29	30	17	17	15	11	5.9
11-Nov	18	29	2	6	25	34	340	357	29	30	268	263	257	254	229	204	191	139	136	134	154	154	133	143	10.5
12-Nov	146	147	145	145	158	152	150	144	154	151	157	154	153	153	148	143	144	151	153	147	152	151	153	155	150.5
13-Nov	154	146	147	149	147	149	148	144	148	149	152	151	155	156	150	243	1	40	50	57	33	53	54	20	130.3
14-Nov	33	115	167	198	352	327	331	354	327	346	358	10	304	272	292	68	112	111	125	162	165	167	173	168	342.4
15-Nov	172	171	171	174	178	177	177	174	174	174	166	171	205	249	337	360	14	11	357	354	357	336	313	330	278.7
16-Nov	319	321	355	357	317	302	324	344	329	286	317	319	313	304	270	103	140	189	198	207	198	194	195	164	320.8
17-Nov	163	166	158	159	160	159	159	157	160	187	178	167	172	181	187	180	173	210	271	18	167	213	59	44	169.3
18-Nov	25	29	12	326	276	246	239	290	260	247	237	266	282	289	292	296	295	307	313	292	253	269	296	330	302.9
19-Nov	272	269	271	269	269	269	265	243	236	218	210	197	176	186	175	175	150	170	165	174	167	161	156	156	210.0
20-Nov	148	158	161	154	155	160	160	169	165	166	168	176	180	187	176	159	124	119	33	48	52	45	46	50	127.3
21-Nov	46	46	46	2	29	33	6	332	339	7	359	329	329	13	35	51	53	54	47	35	48	50	60	54	30.0
22-Nov	57	50	47	51	48	45	45	45	46	40	35	33	30	32	32	37	32	31	27	30	29	30	30	38	37.8
23-Nov	41	43	60	69	108	210	154	140	177	179	166	169	173	172	168	159	159	162	158	149	165	195	37	38	131.7
24-Nov	26	24	16	356	351	12	353	355	20	43	58	74	76	117	119	96	70	67	65	64	62	65	58	47	38.6
25-Nov	58	53	53	28	33	19	15	5	50	66	57	59	44	49	53	60	71	83	165	165	147	126	156	151	53.0
26-Nov	183	163	168	167	173	171	162	177	175	180	163	169	177	176	186	186	176	310	16	29	28	29	1	1	104.8
27-Nov	0	9	10	356	17	34	43	56	50	30	55	53	47	202	218	170	190	205	85	71	72	62	62	65	36.5
28-Nov	75	69	51	51	52	46	50	46	41	46	44	47	38	29	25	34	48	47	63	83	116	173	164	163	49.3
29-Nov	166	171	178	179	177	175	184	178	170	156	156	180	193	190	196	230	251	265	275	266	270	266	263	255	215.8
30-Nov	252	254	258	254	236	224	220	216	212	194	185	182	175	172	169	165	159	157	156	155	152	157	161	179	197.2
	32.7	43.6	29.5	14.0	116.6	96.7	153.0	86.7	124.7	122.5	110.9	107.8	158.6	148.5	68.8	63.0	54.6	48.7	35.5	34.7	40.1	42.9	35.9	36.5	

Diurnal Average

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



Summary of Hour Standard Deviations

Shell Muskeg River - November 2014

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 90 deg on Nov 9 12:00	Hours of Data: 720
Minimum Value: 5 deg on Nov 28 05:00	Hours of Missing Data: 0
Percentiles: P ₁ = 6 P ₁₀ = 9 Q ₁ = 11 Median = 15 Q ₃ = 33 P ₉₀ = 46 P ₉₉ = 74	Hours of Calibration: 0
	Percent Operational Time: 100.0

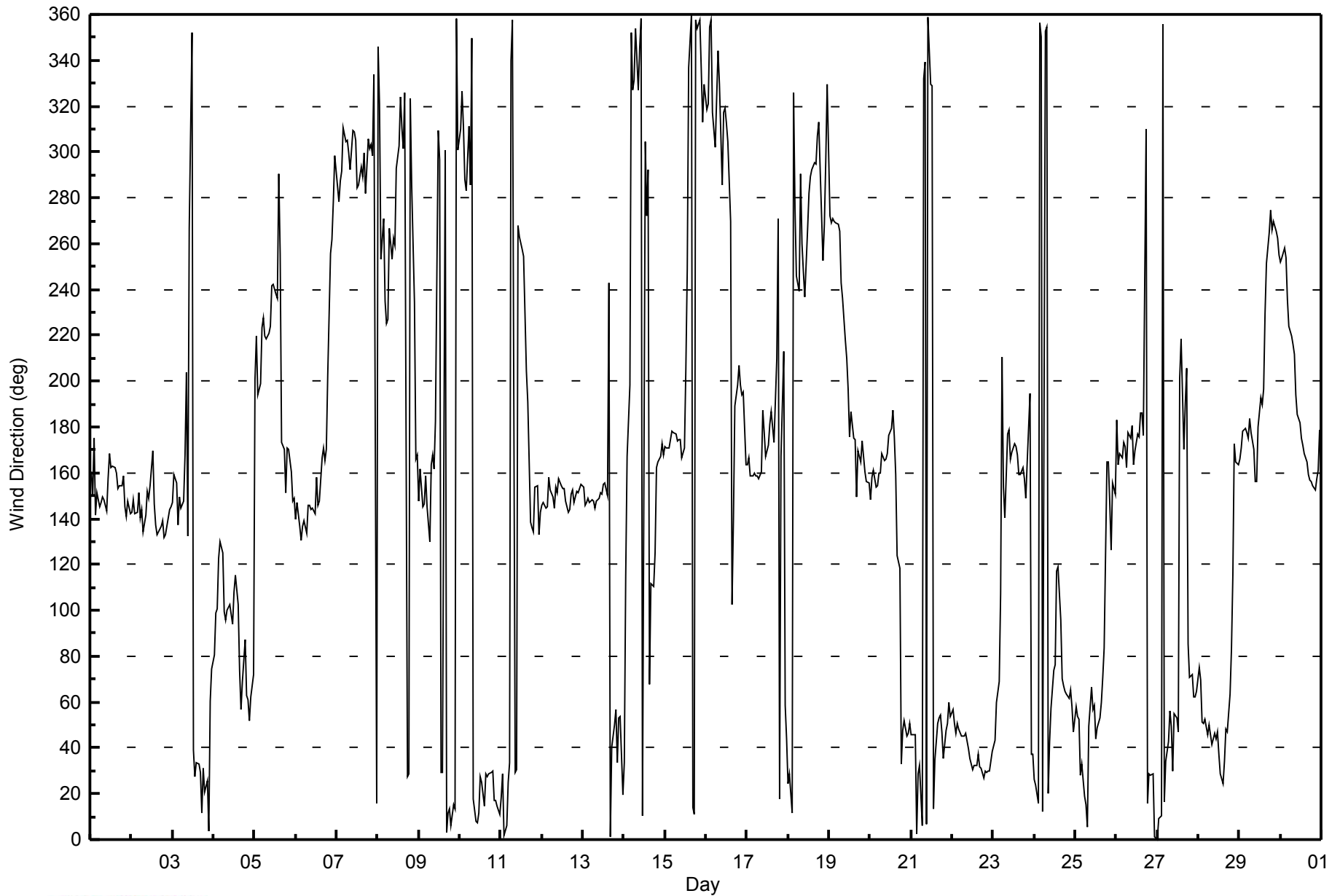
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	13	10	26	19	16	16	26	14	12	15	16	9	11	11	8	9	10	9	8	8	16	9	8	12	26
2-Nov	15	9	10	8	12	6	8	6	17	11	19	20	18	14	13	8	9	14	11	12	9	13	10	11	20
3-Nov	15	14	18	12	17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

Diurnal Maximum



WBEA
Hourly Averages

Wind Direction (WD) - deg
Shell Muskeg River - November 2014





Wood Buffalo Environmental Association

SO₂ Calibration Report

Station Information

Calibration Date	November 12, 2014	Previous Calibration	October 17, 2014
Station Name	Shell Muskeg River	Station Number	AMS 16
Reason:	Routine		
Start Time (MST)	8:45	End Time (MST)	15:00
Barometric Pressure	752 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	-709
Analyzer Range (mv)	5000	5000	Lamp voltage	805	811
Calculated slope	0.983937	0.997832	Chamber temp.	45.0	45.0
Calculated intercept	3.051608	2.462740	Pressure (mmHg)	705.0	726.0
Analyzer Background	6.4	3.1	Flow (lpm)	0.449	0.465
Analyzer Coefficient	1.290	1.253	Intensity	90	90

Analyzer make	Thermo 43i	Analyzer serial #	1118148498
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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	-0.1	NA
as found span	5000	78.7	799.6	821.8	0.973
calibrator zero	5000	0.0	0.0	0.4	NA
high point	5000	78.7	799.6	800.8	0.998
second point	5000	39.4	400.3	395.6	1.012
third point	5000	19.7	200.2	196.5	1.019
calibrator zero					
as left zero					
as left span					
Average Correction Factor					1.010

Corrected As found	821.9	Previous response	809.6	% change	-1.5%
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Notes:

adjusted span

Calibration Performed By: Michael Martineau



Wood Buffalo Environmental Association

SO₂ Calibration Summary

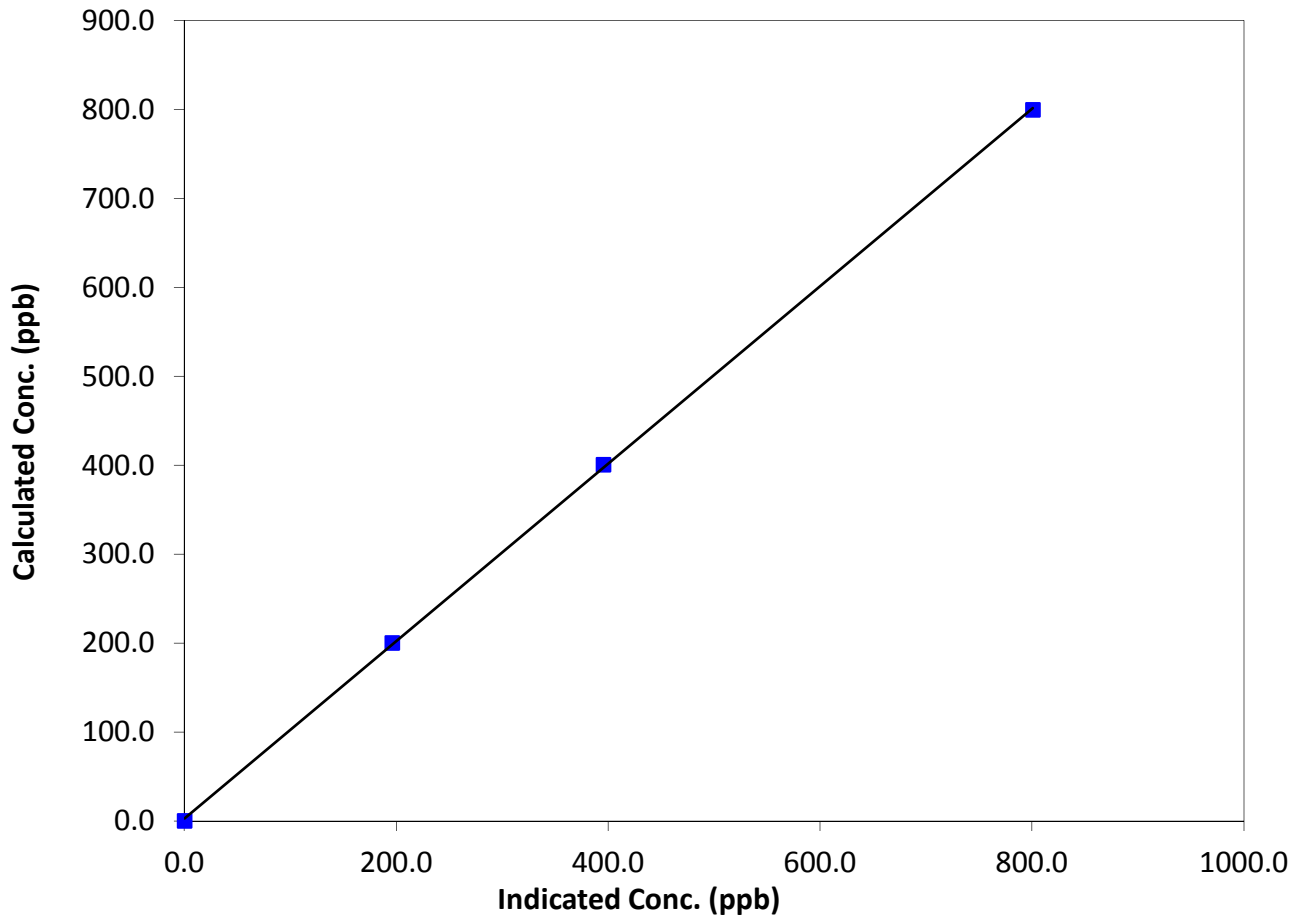
Station Information

Calibration Date	November 12, 2014	Previous Calibration	October 17, 2014
Station Name	Shell Muskeg River	Station Number	AMS 16
Start Time (MST)	8:45	End Time (MST)	15:00
Analyzer make	Thermo 43i	Analyzer serial #	1118148498

Calibration Data

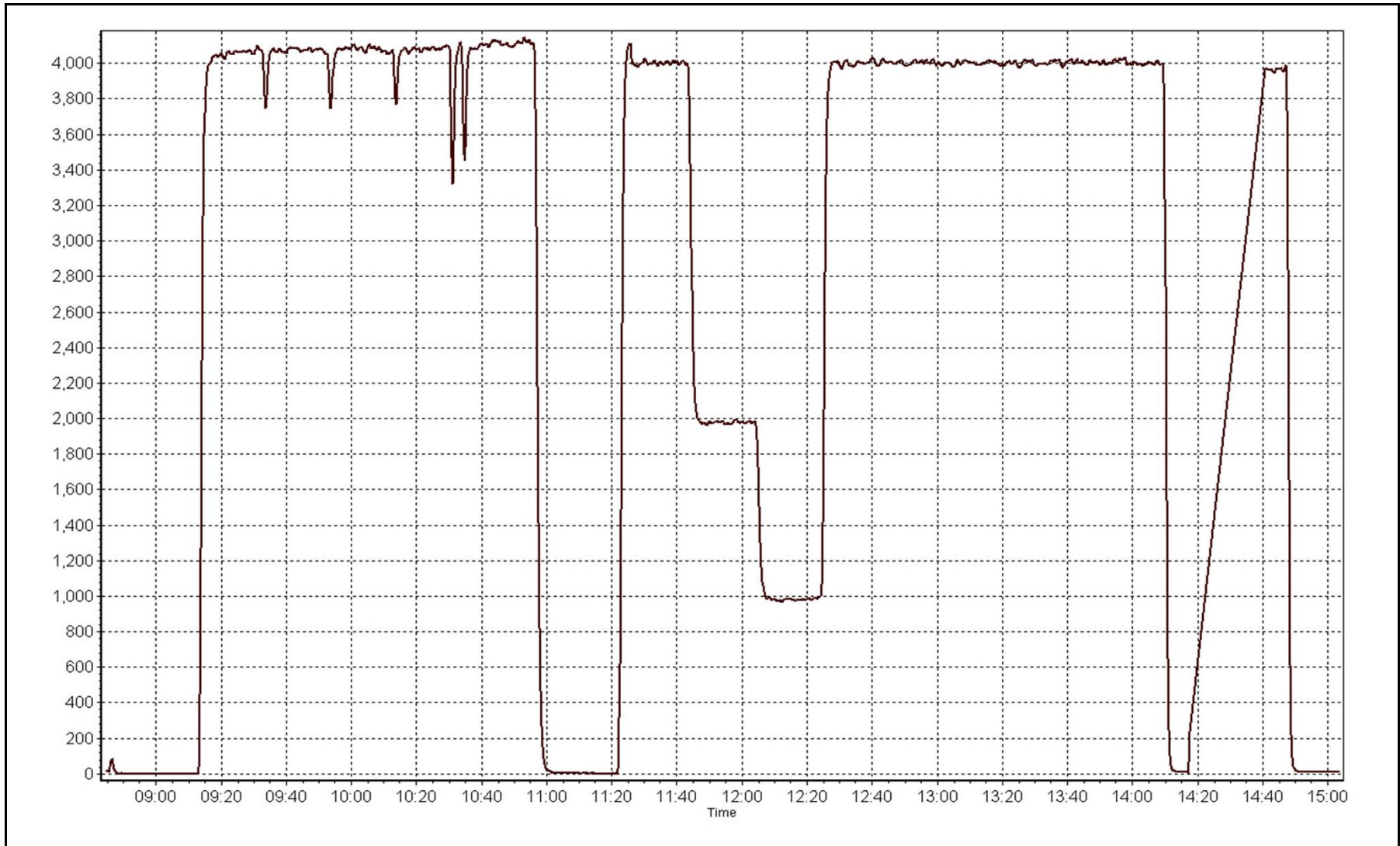
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.4	N/A	Correlation Coefficient	0.999931
799.6	800.8	0.9985		
400.3	395.6	1.0119	Slope	0.997832
200.2	196.5	1.0188		
			Intercept	2.462740

SO₂ Calibration Curve



SO2 Calibration Plot

Date: November 12, 2014





Wood Buffalo Environmental Association

THC Calibration Report

Station Information

Calibration Date	Wednesday, November 12, 2014	Previous Calibration	Friday, October 17, 2014
Station Name	Shell Muskeg River	Station Number	AMS 16
Reason:	Routine		
Start Time (MST)	8:45	End Time (MST)	15:00
Barometric Pressure	752 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	34.9	34.9
Calculated slope	0.994163	1.000679	Fuel Pressure	24.2	24.2
Calculated intercept	0.091934	0.059049	Flame	157.2	159.0

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	0.30	N/A
as found span	5000	78.7	16.98	17.31	0.981
calibrator zero	5000	0.0	0.00	0.02	N/A
high point	5000	78.7	16.98	16.98	1.000
second point	5000	39.4	8.50	8.31	1.023
third point	5000	19.7	4.25	4.17	1.019
calibrator zero					
as left zero					
as left span					
Average Correction Factor					1.014

Corrected As found 17.01 Previous response 16.99 % change -0.1%

Notes:

Adjusted zero and span.

Calibration Performed By:

Michael Martineau



Wood Buffalo Environmental Association

THC Calibration Summary

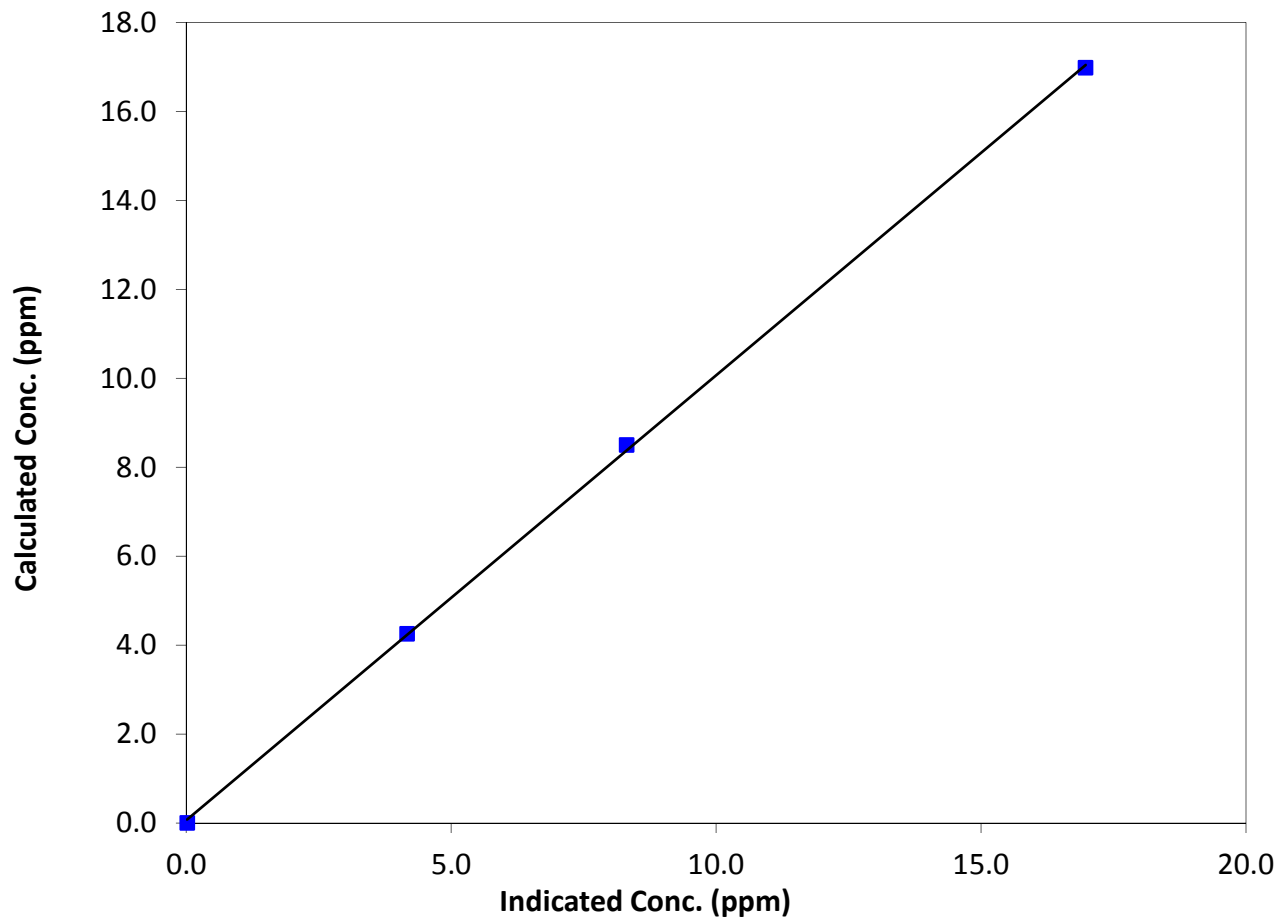
Station Information

Calibration Date	November 12, 2014	Previous Calibration	October 17, 2014
Station Name	Shell Muskeg River	Station Number	AMS 16
Start Time (MST)	8:45	End Time (MST)	15:00
Analyzer make	Thermo 51i-LT	Analyzer serial #	1218153485

Calibration Data

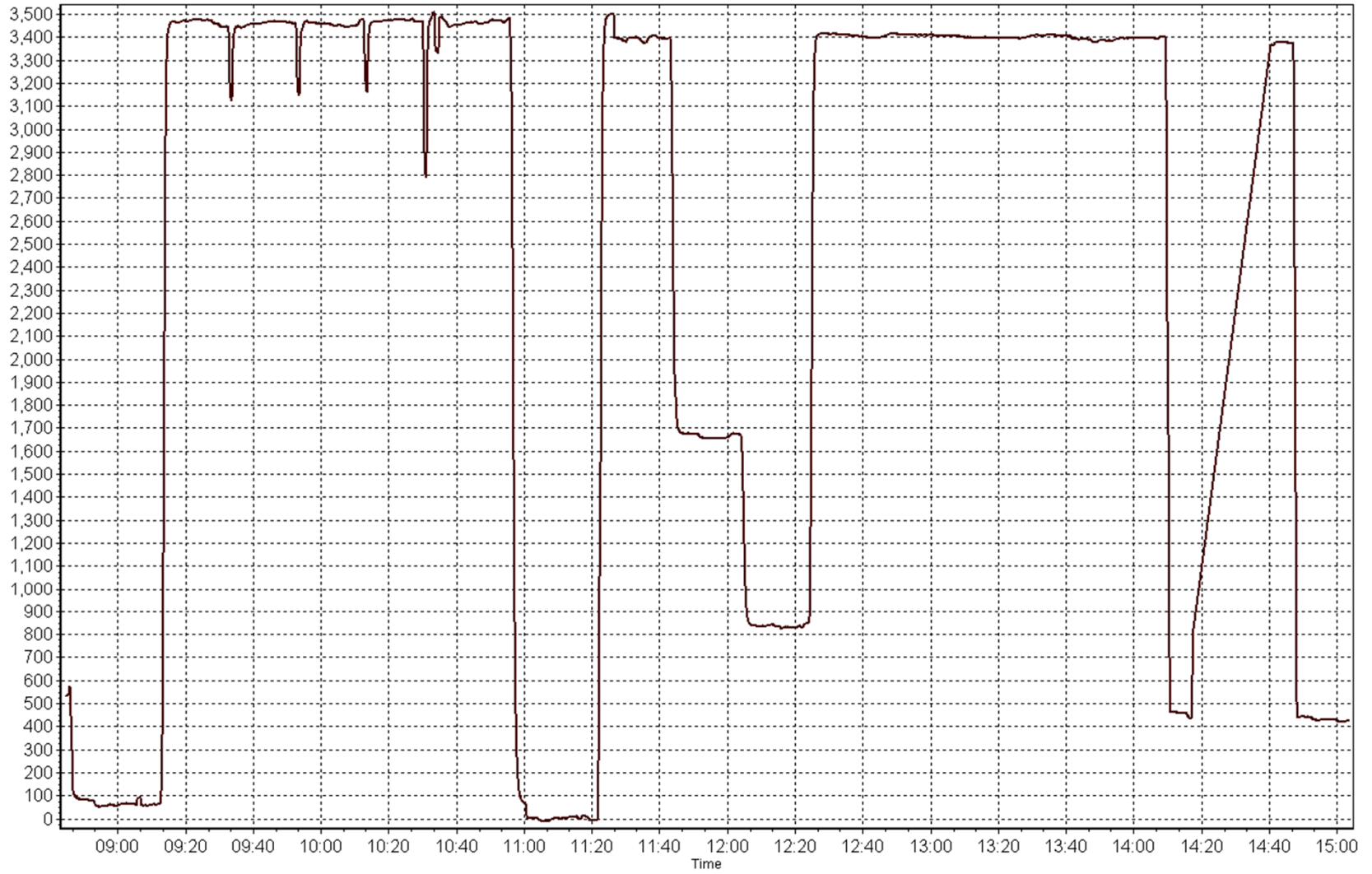
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.02	N/A	Correlation Coefficient	0.999831
16.98	16.98	1.0003		
8.50	8.31	1.0229	Slope	1.000679
4.25	4.17	1.0193		
			Intercept	0.059049

THC Calibration Curve



THC Calibration Plot

Date: November 12, 2014





Wood Buffalo Environmental Association

NO_x-NO-NO₂ Calibration Report

Station Information

Calibration Date	November 12, 2014	Previous Calibration	October 17, 2014
Station Name	Shell Muskeg River	Station Number	AMS 16
Reason:	<input type="text" value="Routine"/>		
Start Time (MST)	8:45	End Time (MST)	15:00
Barometric Pressure	752 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

Parameter		NOx	NO	NO2
MV conversion	Analyzer Range (ppb)	1000	1000	1000
	Analyzer Range (mv)	5000	5000	5000
Before	Data Slope	0.998670	1.000228	1.003873
	Data Offset	2.920892	3.855097	-0.451251
After	Data Slope	0.998390	0.996203	1.010450
	Data Offset	3.916655	4.645987	1.331022
Channel #		3	2	1
Voltage Range		0 - 5V	0 - 5V	0 - 5V

Analyzer Information

Analyzer make/model API T200 Analyzer serial # 724

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	1.423	ppb	1.460	ppb
NOX coefficient	1.423	ppb	1.456	ppb
NO2 coefficient	n/a	ppb	n/a	ppb
NO bkgrnd	-0.2		1.1	
NOX bkgrnd	0.2		1.0	
Nt coefficient	n/a		n/a	
Chamber Temp	50.0	Deg C	50.0	Deg C
Moly Temp	315.0	Deg C	316.7	Deg C
PMT Temp	7.0	Deg C	7.0	Deg C
O3 flow	86.0	ccm	88.0	ccm
R Cell Press	2.9	mmHg	2.9	mmHg
Sample Flow	492	ccm	511	ccm

Notes:

adjusted zero and span



Wood Buffalo Environmental Association

NO_x-NO-NO₂ Calibration Report

Station Information

Calibration Date:

November 12, 2014

Station Number:

AMS 16

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NO _x conc (ppb)	Calculated NO conc (ppb)	Calculated NO ₂ conc (ppb)	Indicated NO _x conc (ppb)	Indicated NO conc (ppb)	Indicated NO ₂ conc (ppb)	NO _x Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	0.2	0.2	0.0	N/A	N/A
as found span	5000	78.7	807.5	805.9	1.6	791.4	786.8	4.2	1.0203	1.0243
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.5	-0.5	-0.3	N/A	N/A
high point	5000	78.7	807.5	805.9	1.6	807.2	807.4	-0.4	1.0003	0.9981
second point	5000	39.4	404.2	403.5	0.8	397.1	394.9	0.8	1.0179	1.0218
third point	5000	19.7	202.1	201.7	0.4	196.6	196.1	-0.5	1.0279	1.0288
calibrator zero										
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.1	-0.1	N/A	N/A
as left span	5000	78.1	801.3	495.8	305.5	796.0	494.0	300.0	1.0067	1.0036
Average Correction Factor									1.0154	1.0162

Corrected As found
Previous Response

NO_x= 791.2
NO_x= 805.6

NO= 786.6
NO= 801.8

Percent Change

NO_x= 1.8%

NO= 1.9%

GPT Calibration Data

Dilution Flow

5000

ccm

Source Gas Flow

78.70

ccm

O ₃ Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO ₂ conc (ppb)	Indicated NO _x conc (ppb)	Indicated NO conc (ppb)	Indicated NO ₂ conc (ppb)	NO _x Correction factor	NO Correction factor	NO ₂ Correction factor	Converter Efficiency
Cal zero			0.0			-0.3			N/A	
1st NO ₂ (300)	N/A	495.8	312.0	805.2	495.8	308.2	0.9873	1.0000	1.0123	98.8%
2nd NO ₂ (200)	N/A	598.2	209.6	804.7	598.2	205.7	0.9879	1.0000	1.0191	98.1%
3rd NO ₂ (100)	N/A	697.5	110.3	804.5	697.5	106.5	0.9882	1.0000	1.0353	96.6%
4th NO ₂ (0)	807.8	N/A	0.4	808.2	807.8	0.4	0.9836	1.0000	N/A	N/A
Average Correction Factor							0.9867	1.0000	1.0222	97.8%

Calibration Performed By:

Michael Martineau



Wood Buffalo Environmental Association

NO_x Calibration Summary

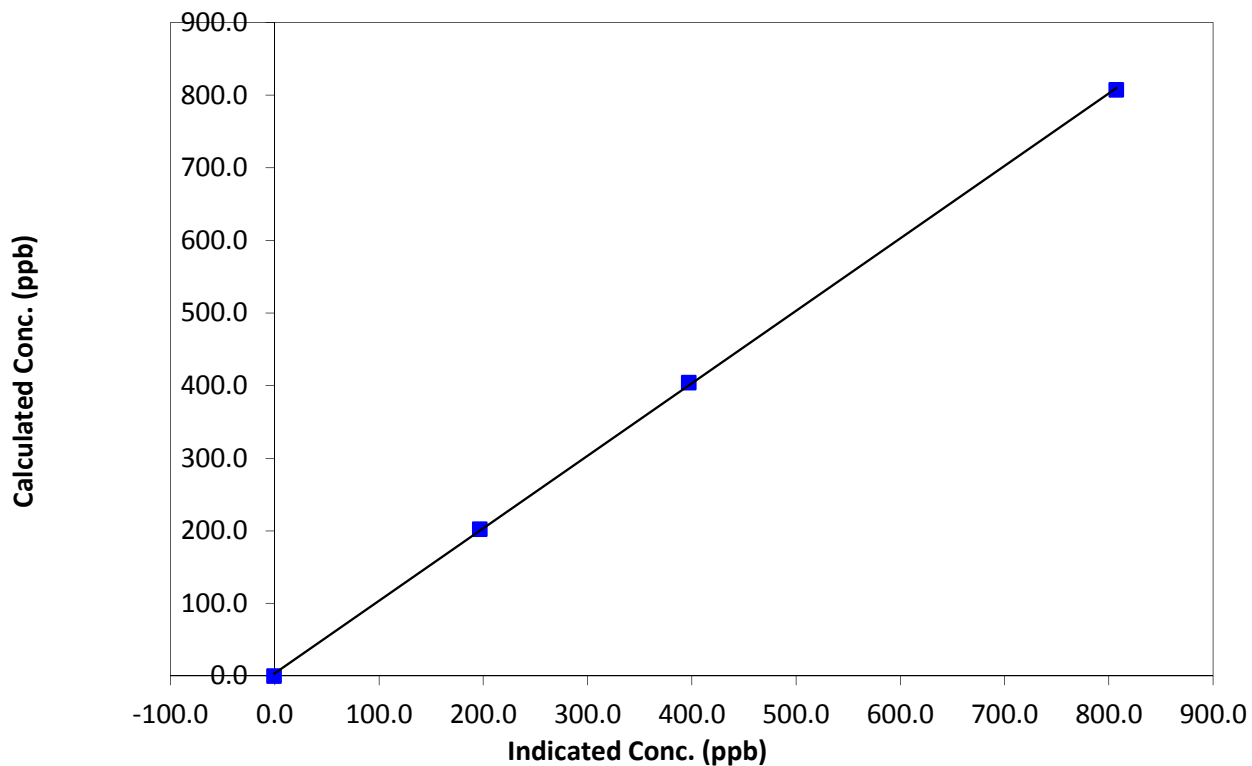
Station Information

Calibration Date	November 12, 2014	Previous Calibration	October 17, 2014
Station Name	Shell Muskeg River	Station Number	AMS 16
Start Time (MST)	8:45	End Time (MST)	15:00
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	-0.5	N/A	Correlation Coefficient	0.999901
807.5	807.2	1.0003		
404.2	397.1	1.0179	Slope	0.998390
202.1	196.6	1.0279		
			Intercept	3.916655

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

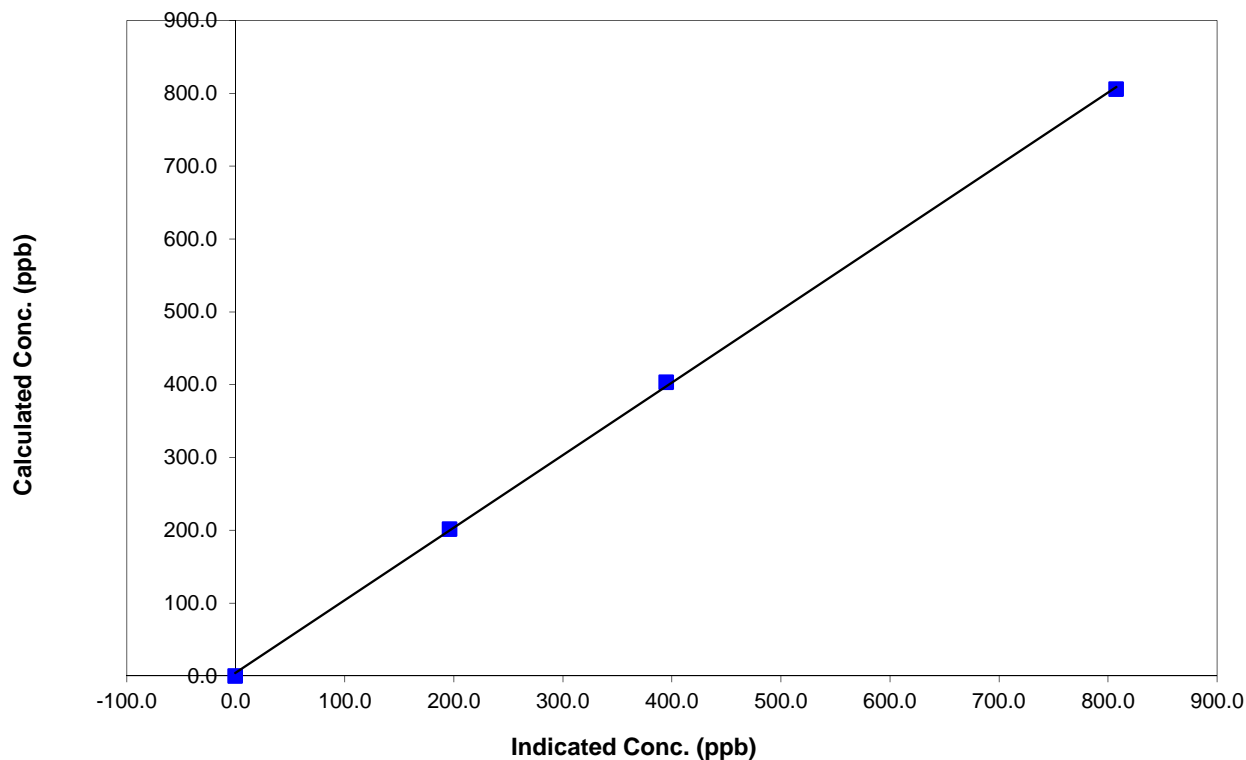
Station Information

Calibration Date	November 12, 2014	Previous Calibration	October 17, 2014
Station Name	Shell Muskeg River	Station Number	AMS 16
Start Time (MST)	8:45	End Time (MST)	15:00
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	-0.5	N/A	Correlation Coefficient	0.999833
805.9	807.4	0.9981		
403.5	394.9	1.0218	Slope	0.996203
201.7	196.1	1.0288		
			Intercept	4.645987

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

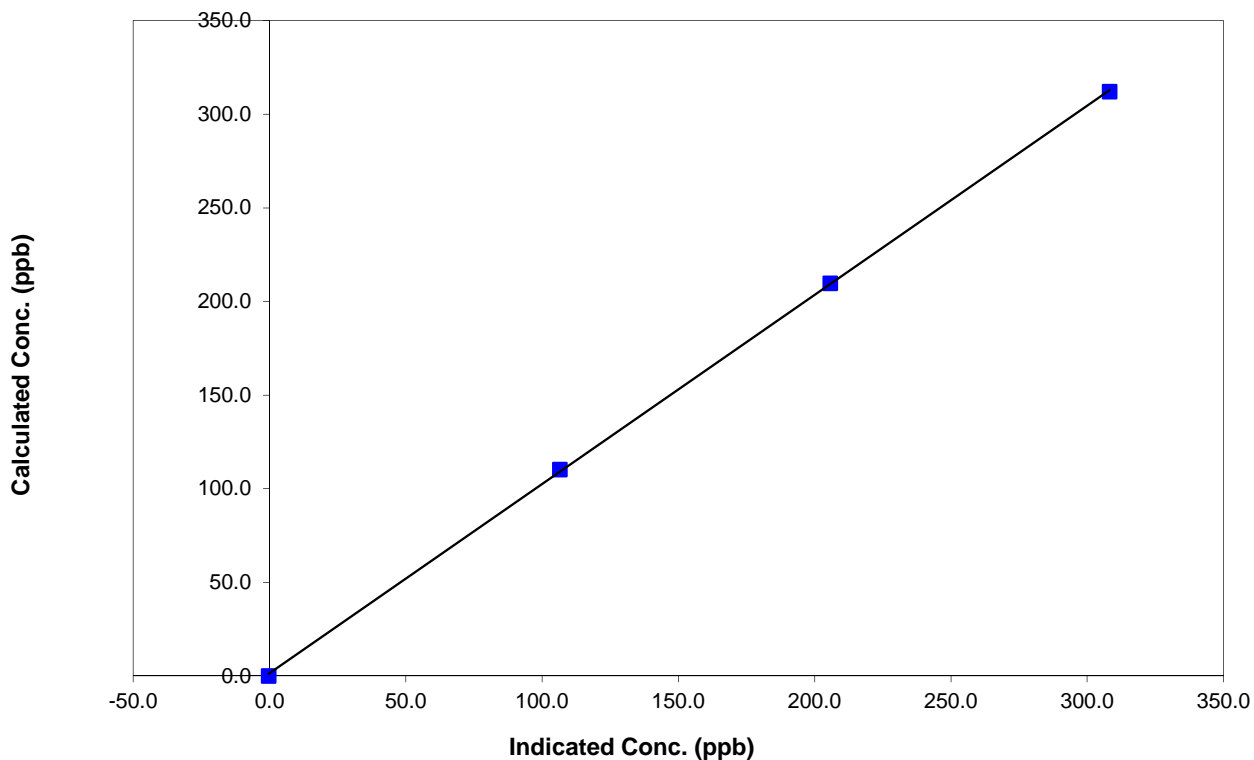
Station Information

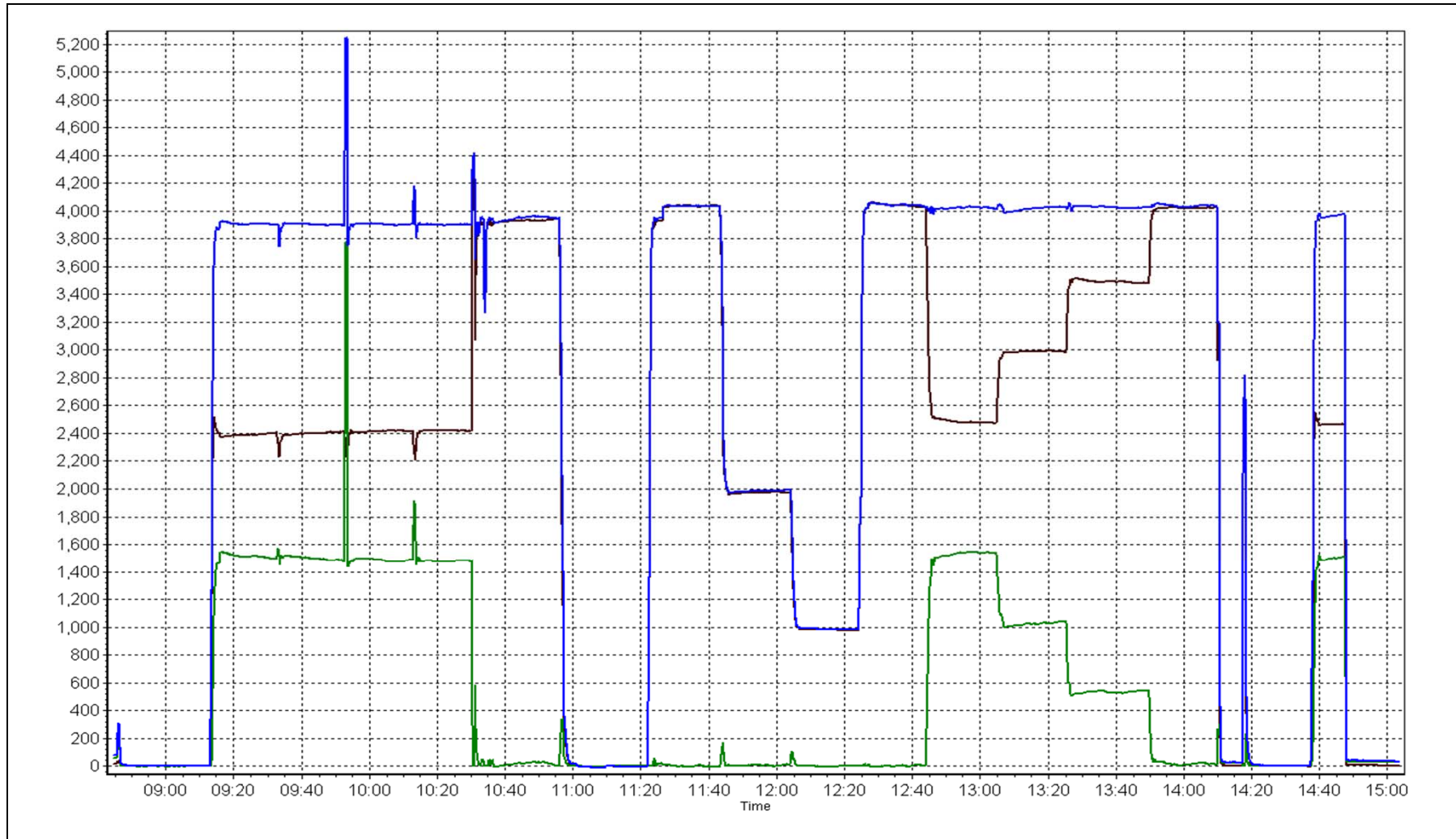
Calibration Date	November 12, 2014	Previous Calibration	October 17, 2014
Station Number	Shell Muskeg River	Station Number	AMS 16
Start Time (MST)	8:45	End Time (MST)	15:00
Analyzer make	API T200	Analyzer serial #	724

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.3	N/A	Correlation Coefficient	0.999935
312.0	308.2	1.0123		
209.6	205.7	1.0191	Slope	1.010450
110.3	106.5	1.0353		
			Intercept	1.331022

NO₂ Calibration Curve





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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT

AMS 17 WAPASU NOVEMBER 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

December 30, 2014

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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS 17)
NOVEMBER 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	682	35	38	99.58	13	0	4	0
H2S (ppb) Average	684	33	36	99.58	1	0	0	0
THC (ppm) Average	683	34	37	99.58	2.6	-	2.3	-
O3 (ppb) Average	678	34	42	98.89	38	0	33	-
NO2 (ppb) Average	683	34	37	99.58	26	0	9	-
NO (ppb) Average	683	34	37	99.58	16	-	5	-
NOX (ppb) Average	683	34	37	99.58	30	-	12	-
PM2.5 (ug/m3) Average	708	0	12	98.33	22.3	-	14.2	0
Temperature 2 m (C) Average	717	0	3	99.58	7	-	1.7	-
Relative Humidity (%) Average	717	0	3	99.58	99	-	-	-
Wind Speed 10 m (km/h) Average	717	0	3	99.58	26	-	-	-
Wind Direction 10 m (deg) Average	717	0	3	99.58	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS 17)
 NOVEMBER 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	682	0.8	2	-	0	0	0	0	0	2	13
H2S (ppb) Average	684	0.3	0	-	0	0	0	0	0	0	1
THC (ppm) Average	683	2.1	0.1	-	2	2	2.1	2.1	2.1	2.2	2.6
O3 (ppb) Average	678	22.7	9	-	1	11	17	25	30	32	38
NO2 (ppb) Average	683	3.7	5	-	0	0	1	2	5	11	26
NO (ppb) Average	683	1	2	-	0	0	0	1	1	2	16
NOX (ppb) Average	683	4.8	6	-	0	1	1	2	6	13	30
PM2.5 (ug/m3) Average	708	3.9	3.7	-	0.1	0.7	1.7	2.7	4.8	8.9	22.3
Temperature 2 m (C) Average	717	-12.88	8.2	-	-31.4	-23.8	-18.4	-13.3	-7.7	-1.3	7
Relative Humidity (%) Average	717	84.6	8	-	51	76	80	85	89	96	99
Wind Speed 10 m (km/h) Average	717	7.2	4	-	1	3	5	6	9	12	26
Wind Direction 10 m (deg) Average	717	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS 17)
NOVEMBER 2014

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
ALL PARAMETERS	25 Nov 2014 14:00	25 Nov 2014 16:00	3	Maintenance - conversion to standardized collection system
O3	19 Nov 2014 09:00	19 Nov 2014 09:00	1	Maintenance - cleaned glass manifold
O3	26 Nov 2014 07:00	26 Nov 2014 10:00	4	Maintenance - tested daily zero and span system
PM2.5	16 Nov 2014 13:00	16 Nov 2014 16:00	4	Intermittent unstable operation - excessive baseline drift
PM2.5	18 Nov 2014 11:00	18 Nov 2014 12:00	2	Intermittent unstable operation - excessive baseline drift
PM2.5	24 Nov 2014 13:00	24 Nov 2014 15:00	3	Maintenance - Flow and zero check, sample head cleaning

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Summary of Hour Averages

Wapasu - November 2014

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 13 ppb on Nov 12 05:00	Maximum Daily Average: 3.7 ppb on Nov 13		Hours of Data:	682
Minimum Value: 0 ppb on Nov 21 05:00	Minimum Daily Average: 0.1 ppb on Nov 21		Hours of Missing Data:	38
Maximum Diurnal Average: 1.3 ppb at hour 14	Minimum Diurnal Average: 0.3 ppb at hour 22		Hours of Calibration:	35
Monthly Average: 0.8 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 2 P ₉₉ = 6		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-Nov	1	Z	0	1	0	0	0	0	1	2	4	3	2	2	3	2	2	1	1	0	0	0	0	0	1.2	4
2-Nov	1	Z	1	0	0	0	0	0	0	0	1	1	1	0	0	0	0	1	0	1	0	0	0	0	0.4	1
3-Nov	0	Z	0	0	0	1	0	0	0	0	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0.4	2
4-Nov	0	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-Nov	0	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-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	0	0	0	0.4	2
7-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
8-Nov	0	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
9-Nov	0	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
10-Nov	0	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-Nov	0	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-Nov	0	Z	3	10	13	6	4	4	5	4	4	6	4	2	1	0	0	0	0	0	1	2	3	4	3.4	13
13-Nov	4	Z	5	6	6	7	5	4	4	6	6	5	5	5	5	2	1	1	1	1	1	1	1	0	3.7	7
14-Nov	0	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
15-Nov	1	Z	2	3	3	5	6	5	4	4	5	6	6	3	1	0	0	0	0	0	0	0	0	0	2.5	6
16-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
17-Nov	0	Z	0	0	0	1	0	0	0	0	0	1	1	1	0	0	1	1	1	1	1	1	0	0	0.5	1
18-Nov	0	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-Nov	0	Z	0	0	0	0	0	0	C	C	C	C	C	3	3	1	0	0	0	0	0	0	0	0	0.5	3
20-Nov	0	Z	0	0	1	1	1	1	1	1	1	1	2	4	3	3	2	1	1	1	1	0	0	0	1.1	4
21-Nov	0	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-Nov	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
23-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	3	6	3	1	0	0	0	0	0	0	0	1	0.8	6
24-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	10	0.9	10	
25-Nov	6	Z	0	0	0	0	0	0	0	0	0	0	0	M	M	M	0	0	0	0	0	0	0	0	0.5	6
26-Nov	0	Z	0	0	0	1	3	1	1	1	1	1	0	1	1	1	1	1	2	2	1	0	0	0	0.9	3
27-Nov	0	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
28-Nov	0	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-Nov	0	0	1	2	Z	6	4	5	6	6	6	4	2	1	1	0	0	0	0	0	0	0	0	0	2.1	6
30-Nov	0	0	0	0	0	Z	0	0	0	0	0	2	9	7	4	3	1	1	1	0	0	0	0	0	1.3	9

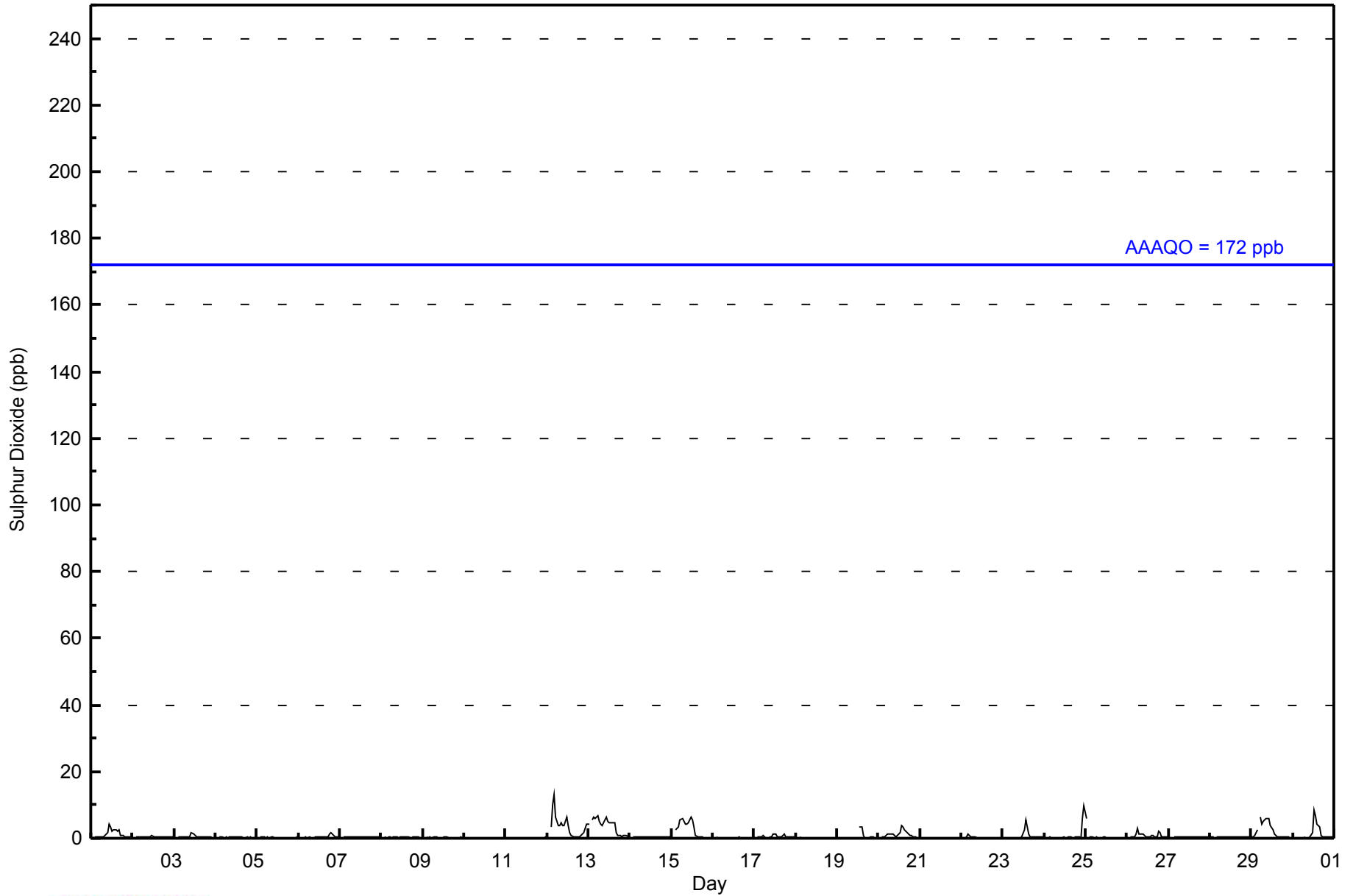
0.6	0.3	0.6	1.0	1.1	1.1	1.0	0.9	0.9	1.0	1.2	1.2	1.3	1.3	1.0	0.7	0.5	0.4	0.4	0.4	0.4	0.4	0.3	0.5	0.7	Diurnal Average	
6	0	5	10	13	7	6	5	6	6	6	6	9	7	5	5	2	1	2	2	2	1	2	6	10	Diurnal Maximum	

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



WBEA
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Wapasu - November 2014





WBEA
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Wapasu - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	681	99.85	99.85
11 - 20	1	0.15	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720



WBEA
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Wapasu - November 2014

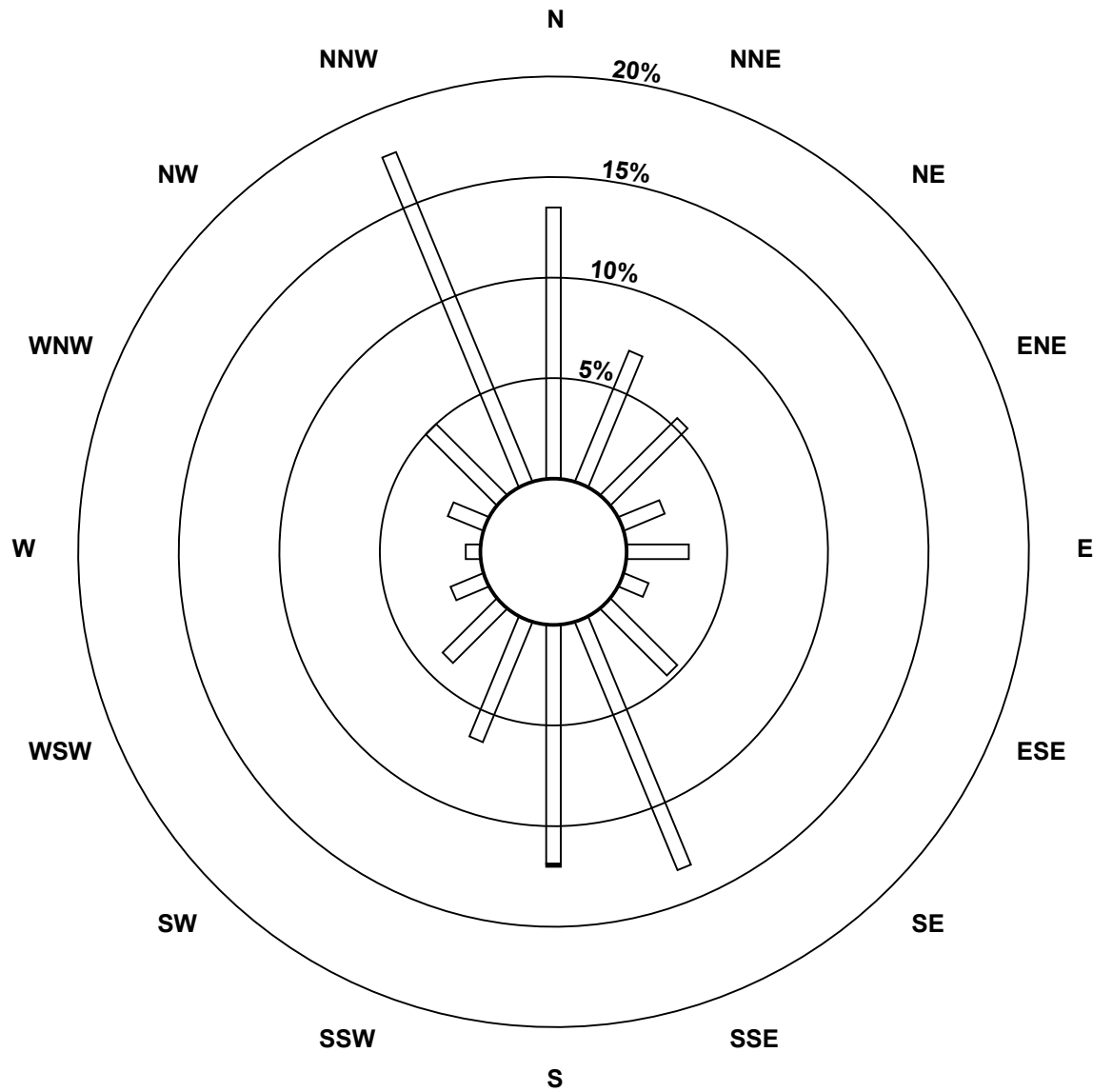
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	92	48	37	15	21	9	32	91	81	44	26	12	5	13	34	121	681
11 - 20	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	92	48	37	15	21	9	32	91	82	44	26	12	5	13	34	121	682

Total Number of Valid Hours: 682

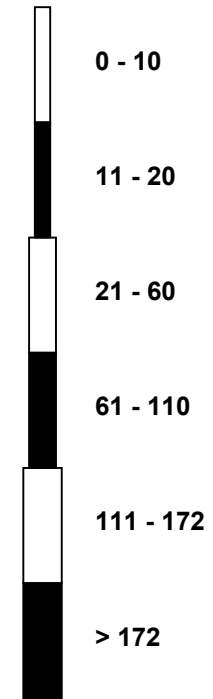
Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

Sulphur Dioxide (SO₂) - ppb
Wapasu (AMS 17)



Classes (ppb)

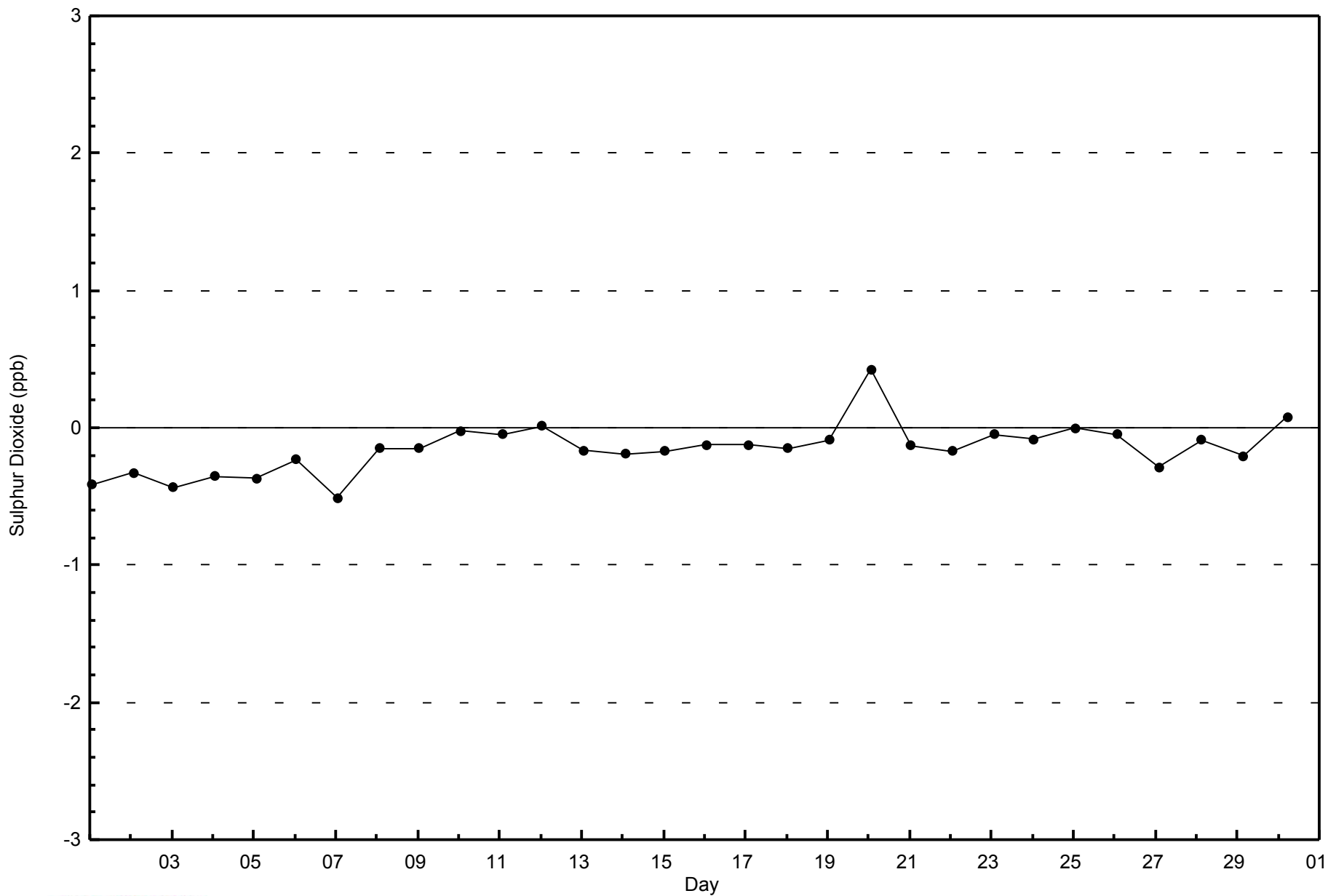


Total Number of Valid Hours: 682



WBEA
Zero Responses

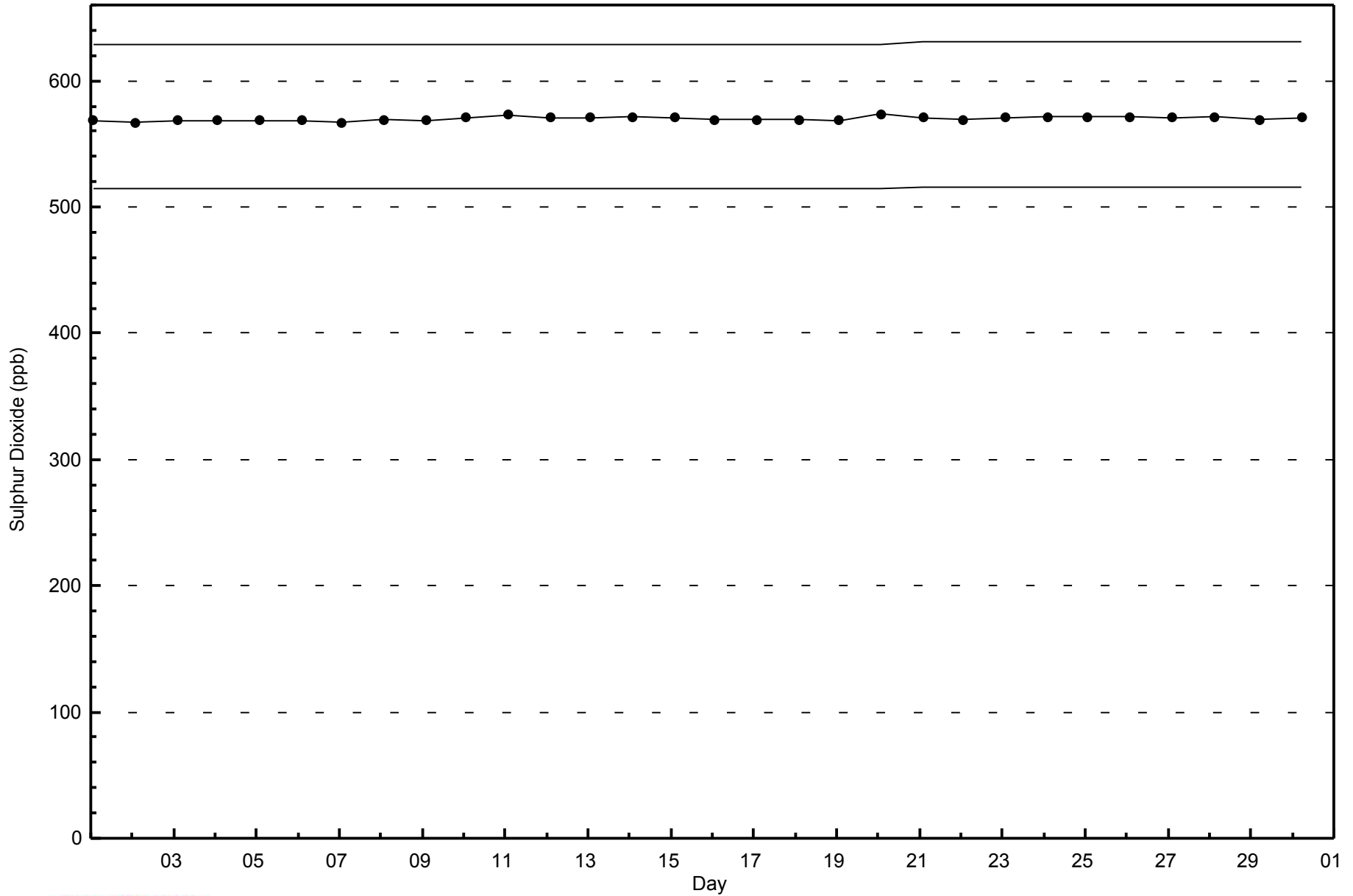
Sulphur Dioxide (SO₂) - ppb
Wapasu - November 2014





WBEA
Span Responses

Sulphur Dioxide (SO₂) - ppb
Wapasu - November 2014





Number of Exceedences (AAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 1 ppb on Nov 12 05:00	Maximum Daily Average: 0.5 ppb on Nov 12		Hours of Data:	684
Minimum Value: 0 ppb on Nov 20 01:00	Minimum Daily Average: 0.2 ppb on Nov 2		Hours of Missing Data:	36
Maximum Diurnal Average: 0.4 ppb at hour 4	Minimum Diurnal Average: 0.2 ppb at hour 3		Hours of Calibration:	33
Monthly Average: 0.3 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1		Percent Operational Time:	99.6

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-Nov	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
2-Nov	0	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-Nov	0	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
4-Nov	0	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
5-Nov	0	0	Z	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
6-Nov	0	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-Nov	0	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-Nov	0	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
9-Nov	0	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
10-Nov	0	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
11-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
12-Nov	0	0	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1
13-Nov	0	0	Z	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.4	1
14-Nov	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
15-Nov	0	1	Z	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
16-Nov	0	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-Nov	0	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
18-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
19-Nov	0	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-Nov	0	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-Nov	0	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-Nov	0	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
23-Nov	0	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
24-Nov	0	0	Z	0	0	0	0	0	0	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0.2	0
25-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	M	M	M	0	0	0	0	0	0	0	0	0.3	0
26-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0.3	1
27-Nov	0	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
28-Nov	0	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-Nov	0	0	0	0	1	Z	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
30-Nov	0	0	0	0	0	0	Z	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0.3	1

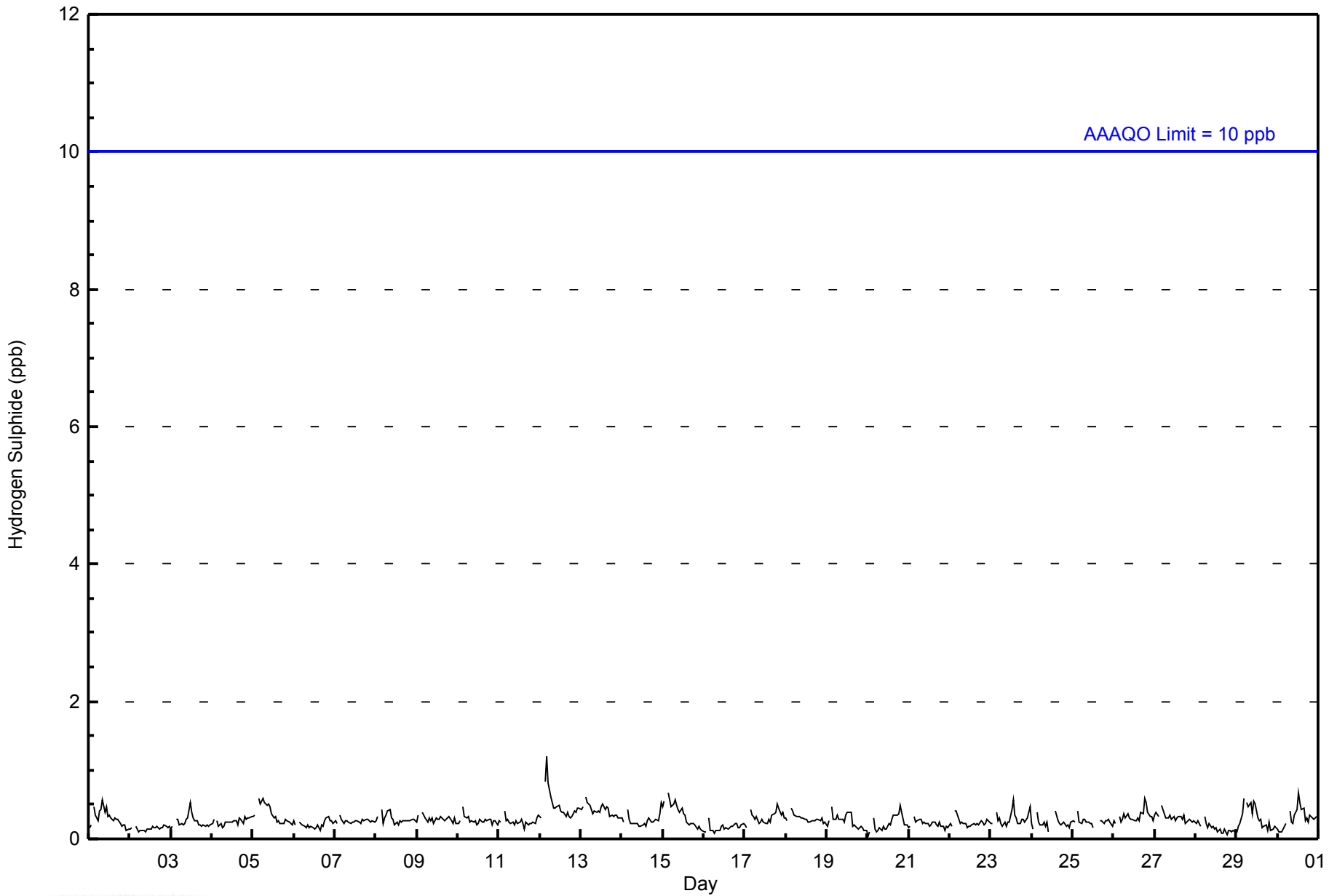
0.2	0.2	0.2	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.3	Diurnal Average
0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	0	0	0	1	Diurnal Maximum

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



WBEA
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Wapasu - November 2014





WBEA
Cumulative Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
Wapasu - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	684	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



WBEA
Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
Wapasu - November 2014

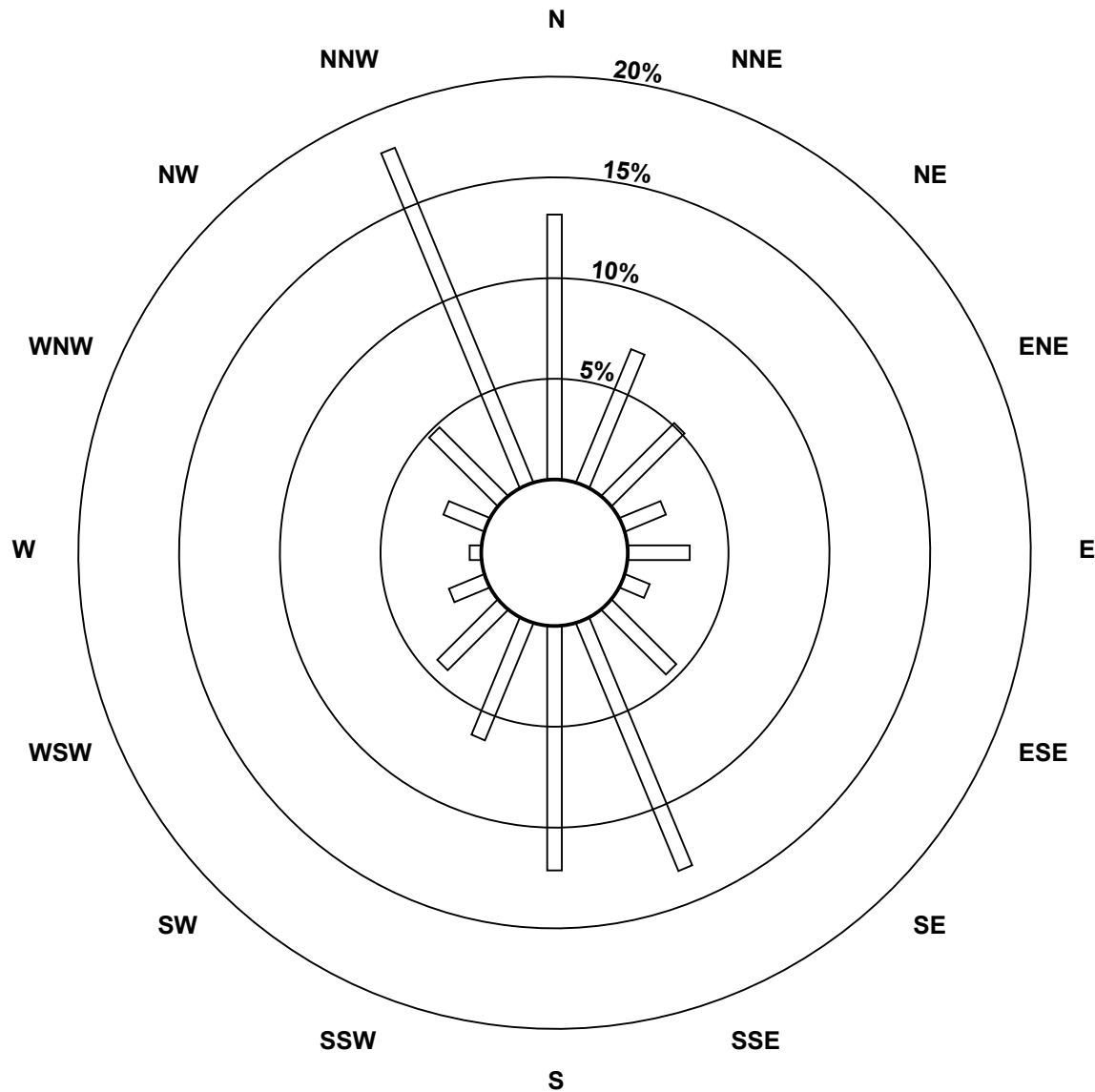
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	90	49	35	15	21	9	31	91	83	43	29	13	4	15	33	123	684
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	90	49	35	15	21	9	31	91	83	43	29	13	4	15	33	123	684

Total Number of Valid Hours: 684

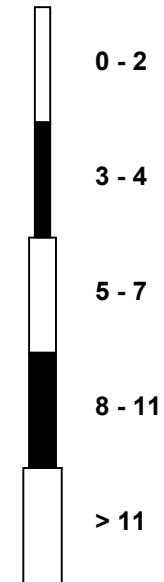
Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

Hydrogen Sulphide (H₂S) - ppb
Wapasu (AMS 17)



Classes (ppb)

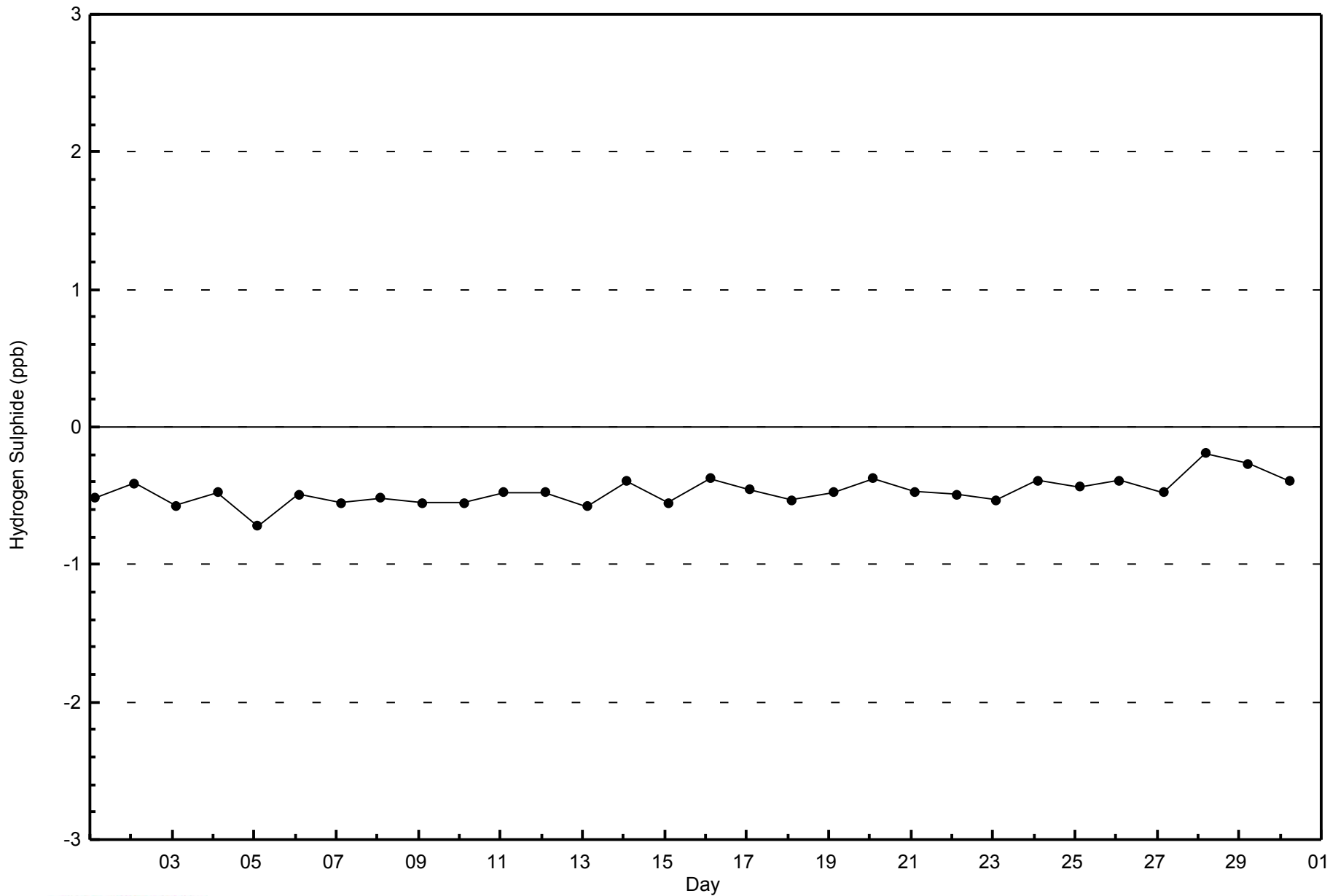


Total Number of Valid Hours: 684



WBEA
Zero Responses

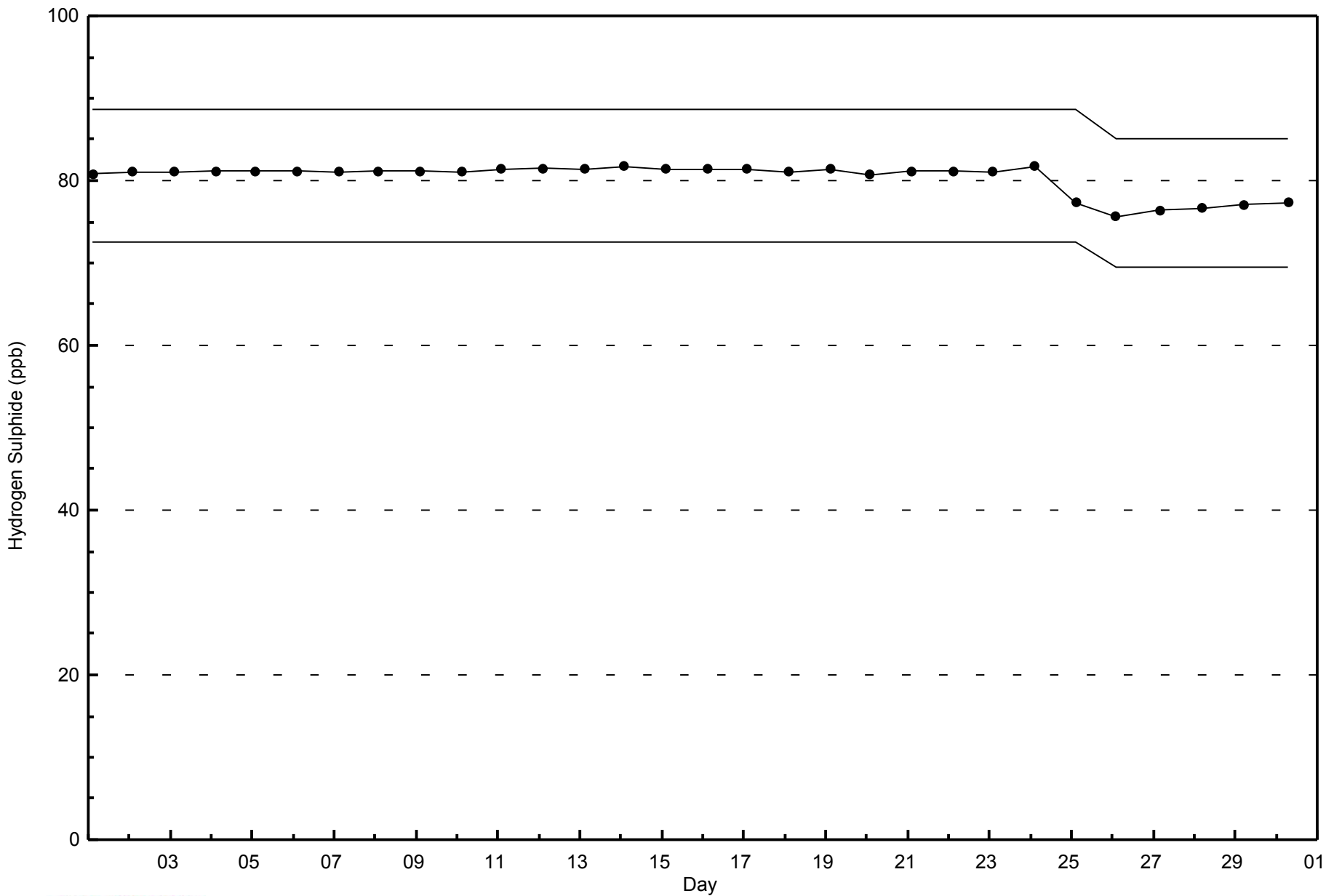
Hydrogen Sulphide (H₂S) - ppb
Wapasu - November 2014





WBEA
Span Responses

Hydrogen Sulphide (H₂S) - ppb
Wapasu - November 2014



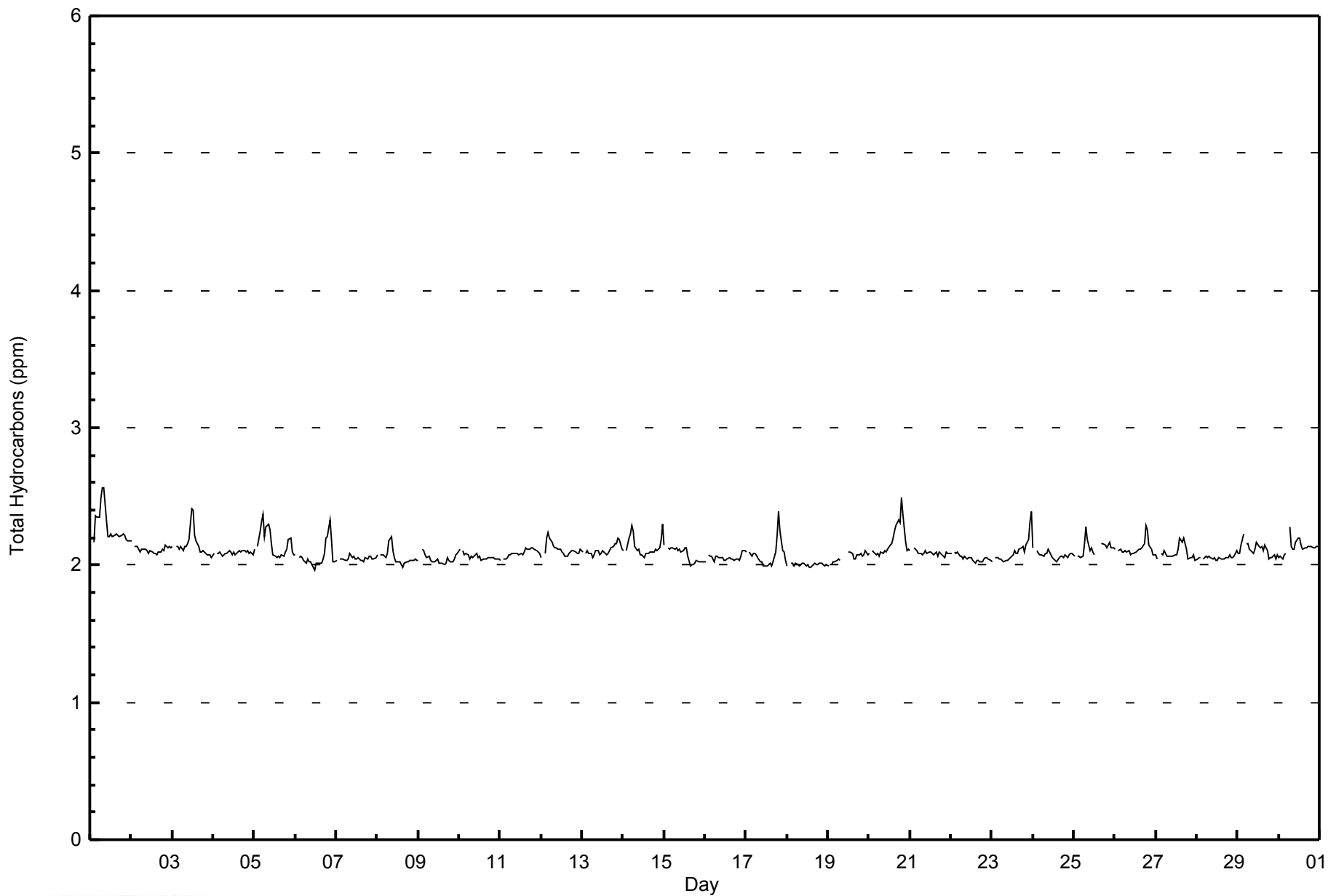


Maximum Value: 2.6 ppm on Nov 1 08:00														Maximum Daily Average: 2.3 ppm on Nov 1														Hours in Service: 720	
Minimum Value: 2.0 ppm on Nov 6 12:00														Minimum Daily Average: 2.0 ppm on Nov 18														Hours of Data: 683	
Maximum Diurnal Average: 2.1 ppm at hour 20														Minimum Diurnal Average: 2.1 ppm at hour 2														Hours of Missing Data: 37	
Monthly Average: 2.10 ppm														Percentiles: P ₁ = 2.0 P ₁₀ = 2.0 Q ₁ = 2.1 Median = 2.1 Q ₃ = 2.1 P ₉₀ = 2.2 P ₉₉ = 2.4														Hours of Calibration: 34	
																												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-Nov	2.2	Z	2.2	2.4	2.3	2.4	2.5	2.6	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	2.3	2.6			
2-Nov	2.2	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2			
3-Nov	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.4	2.4	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.4			
4-Nov	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1			
5-Nov	2.1	Z	2.1	2.3	2.3	2.4	2.2	2.3	2.3	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.4			
6-Nov	2.1	Z	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.2	2.3	2.2	2.0	2.0	2.3				
7-Nov	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.1	2.0	2.1	2.1	2.0	2.0	2.1	2.1	2.1			
8-Nov	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2			
9-Nov	2.0	Z	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1			
10-Nov	2.1	Z	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.1			
11-Nov	2.0	Z	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1			
12-Nov	2.1	Z	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2			
13-Nov	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	2.2	2.2	2.2	2.2	2.1	2.2	2.2			
14-Nov	2.1	Z	2.1	2.2	2.2	2.3	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.1	2.3			
15-Nov	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1			
16-Nov	2.0	Z	2.1	2.1	2.1	2.0	2.1	2.1	2.0	2.1	2.1	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1			
17-Nov	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.4	2.2	2.1	2.1	2.0	2.1	2.4			
18-Nov	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0			
19-Nov	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	C	C	C	C	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			
20-Nov	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.3	2.3	2.5	2.4	2.2	2.1	2.1	2.2	2.5			
21-Nov	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1			
22-Nov	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.0	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.1	2.1			
23-Nov	2.0	Z	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.4	2.1	2.4			
24-Nov	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1			
25-Nov	2.1	Z	2.1	2.1	2.1	2.1	2.2	2.3	2.2	2.1	2.1	2.1	2.1	M	M	M	2.2	2.2	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.3			
26-Nov	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	2.2	2.3	2.3	2.1	2.1	2.1	2.1	2.1	2.3			
27-Nov	2.1	2.0	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.0	2.1	2.1	2.1	2.0	2.2			
28-Nov	2.0	2.0	2.1	Z	2.0	2.1	2.1	2.1	2.1	2.0	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1			
29-Nov	2.1	2.1	2.1	2.2	Z	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.0	2.1	2.2			
30-Nov	2.1	2.1	2.0	2.1	2.1	Z	2.3	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3			
																								Diurnal Average					
																								Diurnal Maximum					
Z - zerospan C - Calibration M - Maintenance																													



WBEA
Hourly Averages

Total Hydrocarbons (THC) - ppm
Wapasu - November 2014





WBEA
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Wapasu - November 2014

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	169	24.74	24.74
2.1 - 3.0	514	75.26	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 720



WBEA
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Wapasu - November 2014

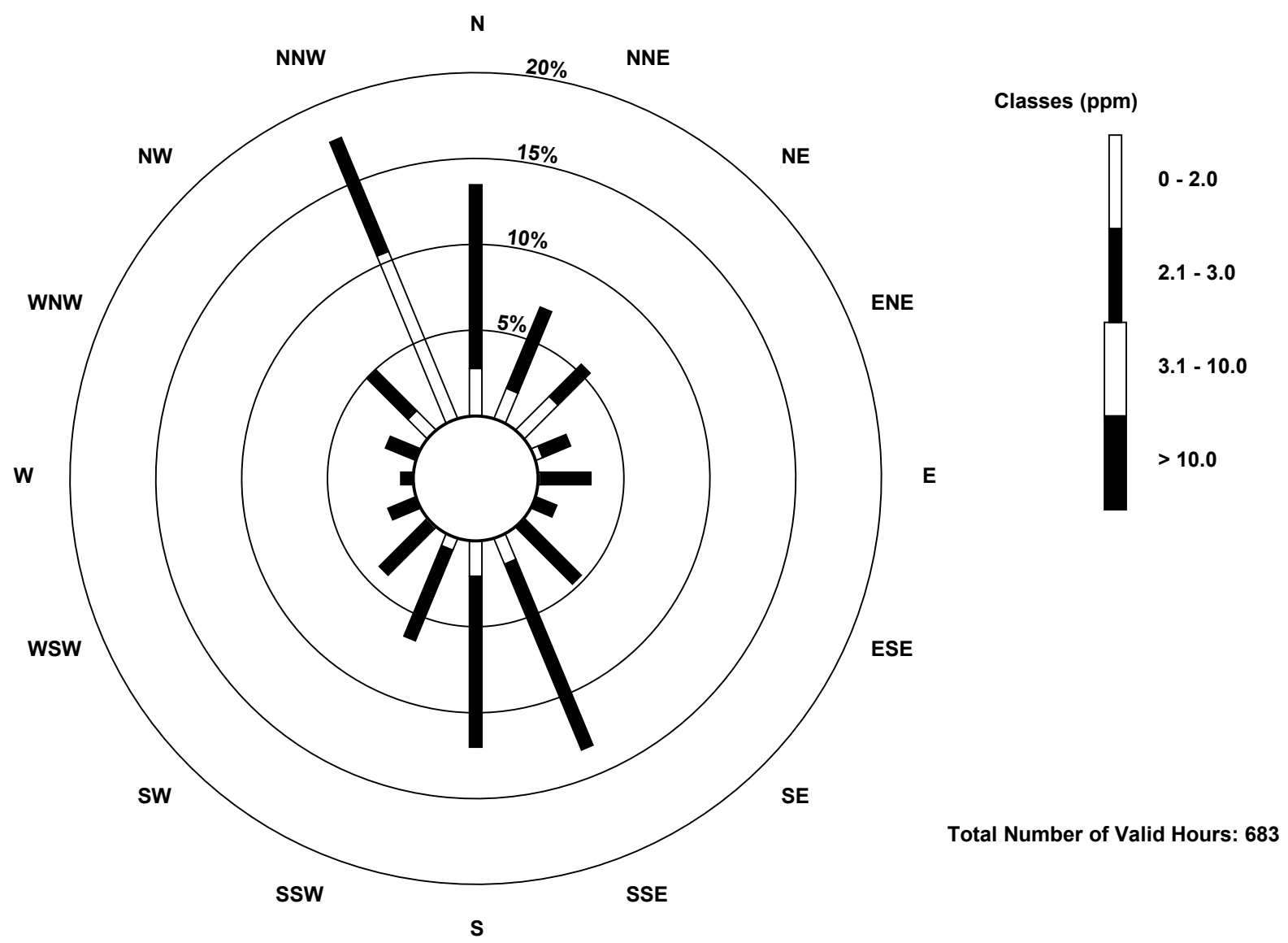
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	19	13	19	3	1	0	0	11	14	5	1	0	0	0	11	72	169
2.1 - 3.0	73	35	18	12	20	9	32	80	68	39	26	12	5	13	23	49	514
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	92	48	37	15	21	9	32	91	82	44	27	12	5	13	34	121	683

Total Number of Valid Hours: 683

Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

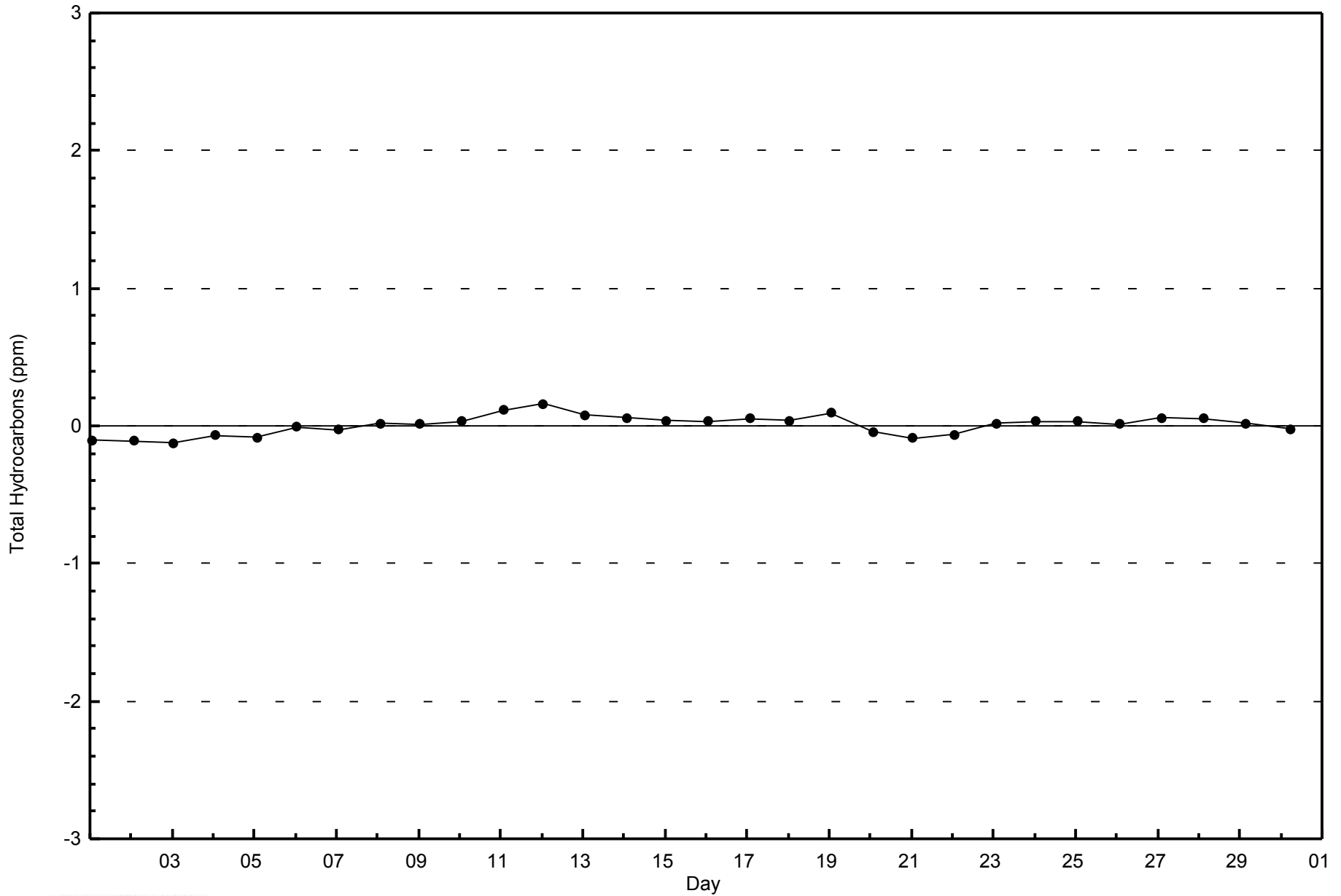
Total Hydrocarbons (THC) - ppm
Wapasu (AMS 17)





WBEA
Zero Responses

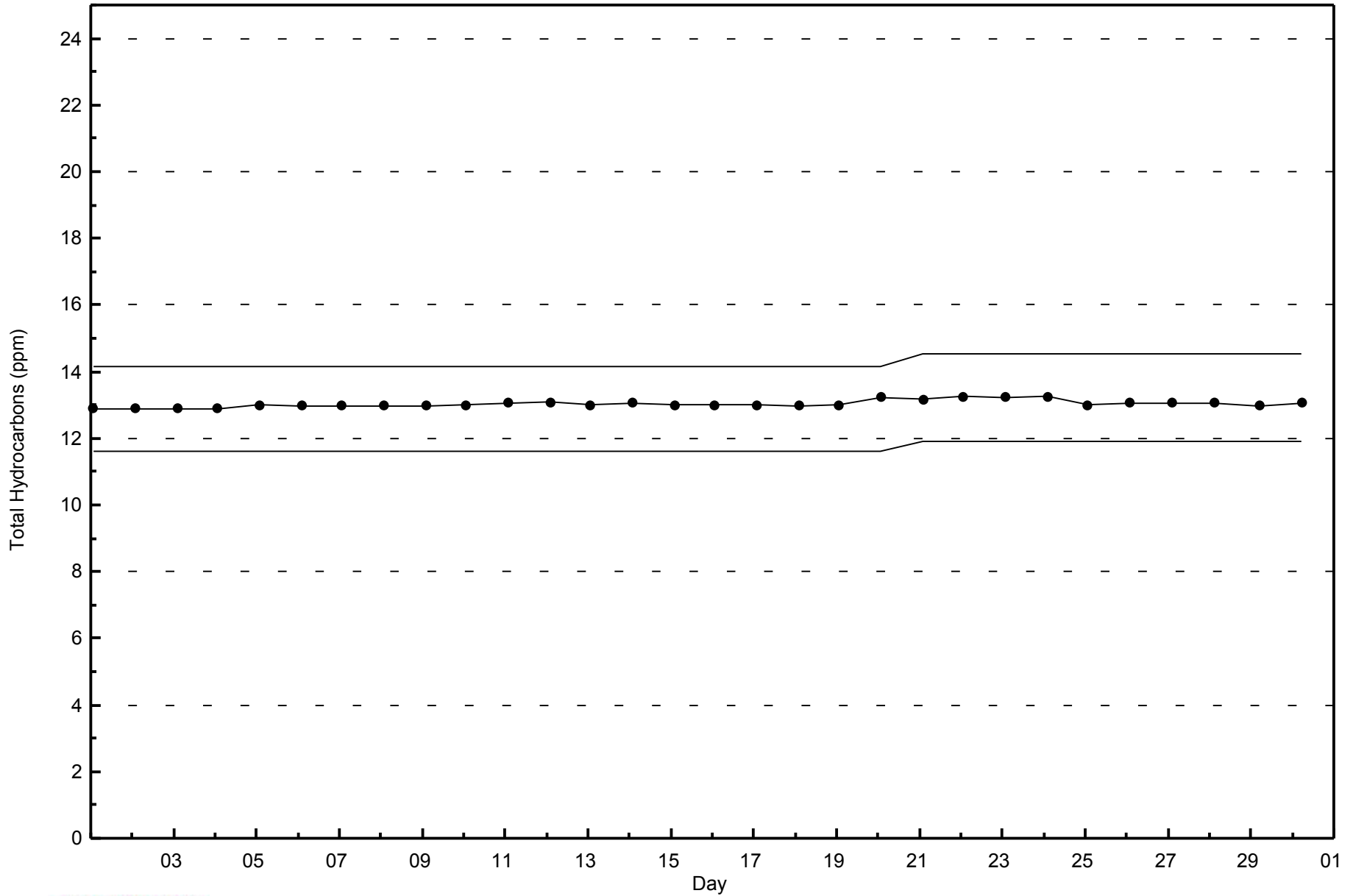
Total Hydrocarbons (THC) - ppm
Wapasu - November 2014





WBEA
Span Responses

Total Hydrocarbons (THC) - ppm
Wapasu - November 2014





Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 38 ppb on Nov 7 16:00	Maximum Daily Average: 32.8 ppb on Nov 16		Hours of Data:	678
Minimum Value: 1 ppb on Nov 1 07:00	Minimum Daily Average: 7.5 ppb on Nov 1		Hours of Missing Data:	42
Maximum Diurnal Average: 25.9 ppb at hour 14	Minimum Diurnal Average: 20.2 ppb at hour 19		Hours of Calibration:	34
Monthly Average: 22.7 ppb	Percentiles: P ₁ = 1 P ₁₀ = 11 Q ₁ = 17 Median = 25 Q ₃ = 30 P ₉₀ = 32 P ₉₉ = 36		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-Nov	2	2	2	Z	1	1	1	1	2	4	8	12	15	19	19	18	7	5	5	8	6	9	12	14	7.5	19	
2-Nov	15	16	19	Z	23	24	25	27	28	28	27	27	28	30	29	27	24	22	20	18	17	15	14	14	22.4	30	
3-Nov	14	13	12	Z	13	12	11	9	4	4	6	4	7	11	12	15	17	18	18	18	19	19	17	12.7	19		
4-Nov	14	17	19	Z	18	18	17	17	18	18	18	20	19	16	14	15	14	12	14	13	13	13	12	15.9	20		
5-Nov	11	9	6	Z	1	1	4	4	3	5	9	16	19	20	20	19	15	12	5	8	4	4	11	13	9.6	20	
6-Nov	16	17	17	Z	17	18	18	20	20	20	20	20	21	20	21	20	19	16	8	11	6	14	20	20	17.4	21	
7-Nov	21	18	23	Z	28	31	32	33	33	35	36	35	36	36	36	38	36	33	32	28	28	28	31	29	31.1	38	
8-Nov	27	28	24	Z	14	15	17	11	13	25	31	32	35	35	36	36	35	31	29	30	31	31	27	23	26.8	36	
9-Nov	22	17	13	Z	19	16	13	18	26	31	32	28	28	31	30	30	28	26	28	31	30	32	32	31	25.7	32	
10-Nov	30	28	31	Z	31	30	27	30	31	31	31	30	30	30	31	31	31	31	31	31	30	30	29	31	30.2	31	
11-Nov	30	30	30	Z	30	31	32	33	33	33	32	31	30	28	28	29	26	21	17	15	14	12	12	17	25.8	33	
12-Nov	23	23	20	Z	2	6	11	12	13	17	19	21	21	19	19	21	11	20	21	22	19	20	20	21	17.4	23	
13-Nov	20	18	19	Z	18	19	19	17	16	18	20	21	20	16	18	17	10	7	6	5	3	5	13	23	15.1	23	
14-Nov	23	23	23	Z	21	22	24	25	26	27	32	34	34	34	31	29	26	20	15	13	11	12	12	9	22.8	34	
15-Nov	18	15	16	Z	15	15	15	15	16	18	18	17	22	25	27	29	28	28	29	31	33	34	34	34	23.1	34	
16-Nov	35	35	36	Z	37	36	35	35	35	35	35	36	36	36	35	34	33	33	32	31	31	28	20	15	32.8	37	
17-Nov	12	11	20	Z	24	23	24	25	25	28	29	32	34	32	30	19	10	14	13	6	16	24	23	27	21.8	34	
18-Nov	30	29	29	Z	27	29	28	30	30	30	30	31	32	33	34	34	32	32	31	32	33	32	30	33	30.9	34	
19-Nov	33	33	32	Z	29	31	27	29	M	30	27	28	25	27	27	28	26	29	31	31	33	32	32	34	29.7	34	
20-Nov	34	33	32	Z	31	28	26	25	C	C	C	C	17	15	14	8	4	3	4	2	8	19	23	24	18.3	34	
21-Nov	27	27	27	Z	26	25	25	28	28	27	27	28	28	29	28	29	30	31	32	30	28	28	31	30	28.1	32	
22-Nov	31	31	31	Z	27	28	30	27	27	29	28	29	29	30	30	30	29	28	28	29	29	28	28	27	28.8	31	
23-Nov	24	25	23	Z	26	23	20	24	26	24	24	23	17	19	11	13	9	9	7	13	12	4	3	17.4	26		
24-Nov	20	24	26	Z	25	29	28	26	26	27	29	31	32	33	33	32	31	30	29	23	24	25	29	29	27.9	33	
25-Nov	26	26	27	Z	31	31	18	14	20	25	24	29	33	M	M	M	22	18	23	19	17	17	25	29	23.7	33	
26-Nov	29	30	28	Z	30	28	M	M	M	M	26	24	22	24	22	19	7	13	1	13	22	24	26	28	21.8	30	
27-Nov	29	29	29	Z	29	Z	26	28	28	28	29	28	28	28	25	22	20	14	13	13	25	28	28	28	25.4	29	
28-Nov	27	27	26	Z	27	Z	27	27	26	27	27	27	27	27	27	27	27	27	26	25	23	21	17	14	14	24.9	27
29-Nov	14	11	12	Z	8	7	8	Z	13	14	17	17	17	24	24	21	23	21	25	32	32	31	30	30	20.1	32	
30-Nov	30	30	30	Z	29	20	15	Z	28	28	23	19	21	24	24	24	28	28	27	27	28	30	30	30	26.4	30	

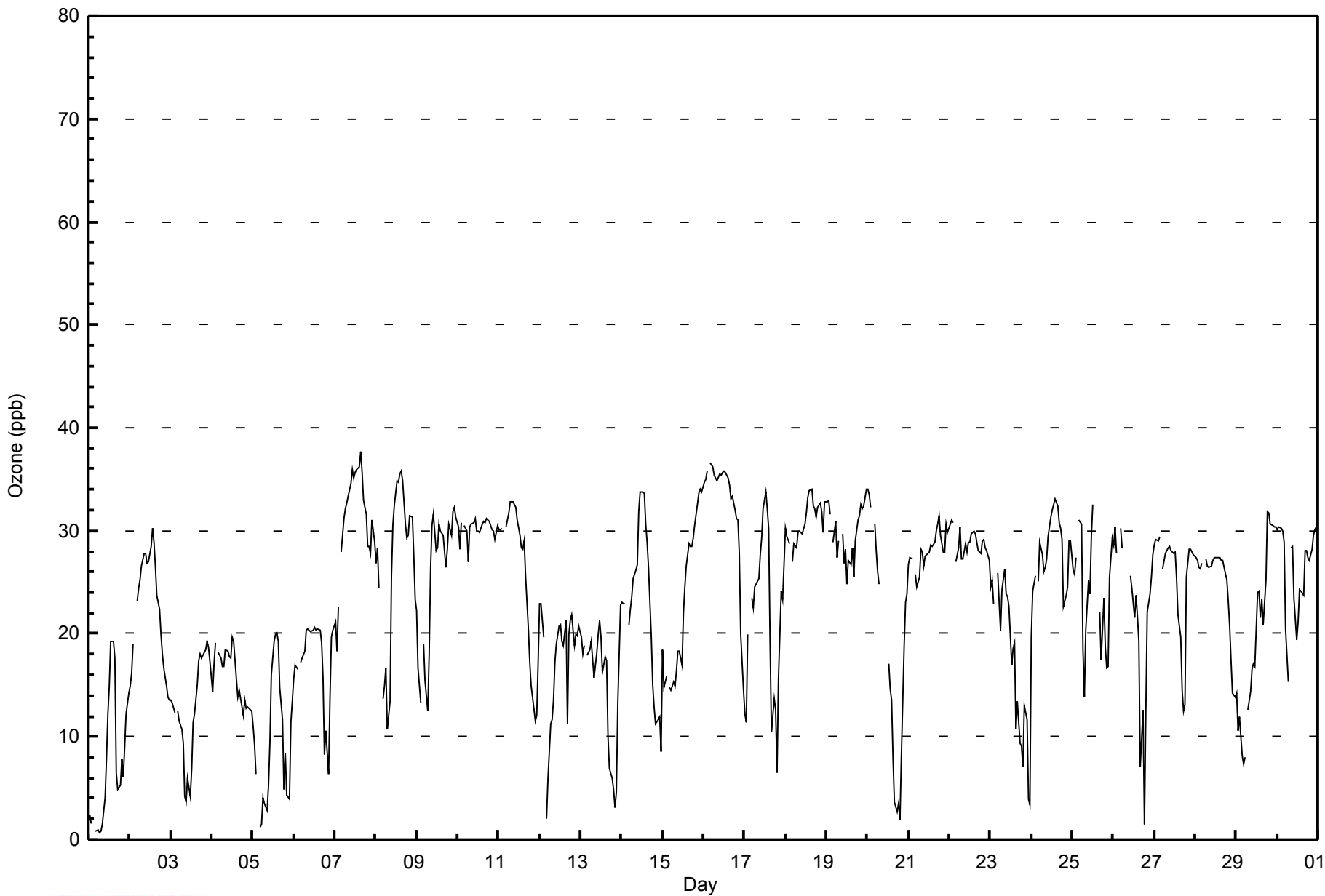
22.9	22.6	22.7	23.5	21.5	21.5	21.4	21.5	22.2	23.9	24.6	25.2	25.6	25.9	25.4	24.5	21.8	21.2	20.2	20.4	20.8	21.7	22.4	23.0	Diurnal Average	
35	35	36	30	37	36	35	35	35	35	35	36	36	36	36	38	36	33	32	32	33	34	34	34	Diurnal Maximum	

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



WBEA
Hourly Averages

Ozone (O₃) - ppb
Wapasu - November 2014





WBEA
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Wapasu - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	262	38.64	38.64
21 - 50	416	61.36	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 678

Total Number of Hours: 720



WBEA
Frequency Distribution

Ozone (O₃) - ppb
Wapasu - November 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	14	6	6	6	6	6	29	56	41	27	21	8	3	9	14	10	262
21 - 50	76	45	31	11	14	3	3	31	38	14	8	5	1	5	19	112	416
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	90	51	37	17	20	9	32	87	79	41	29	13	4	14	33	122	678

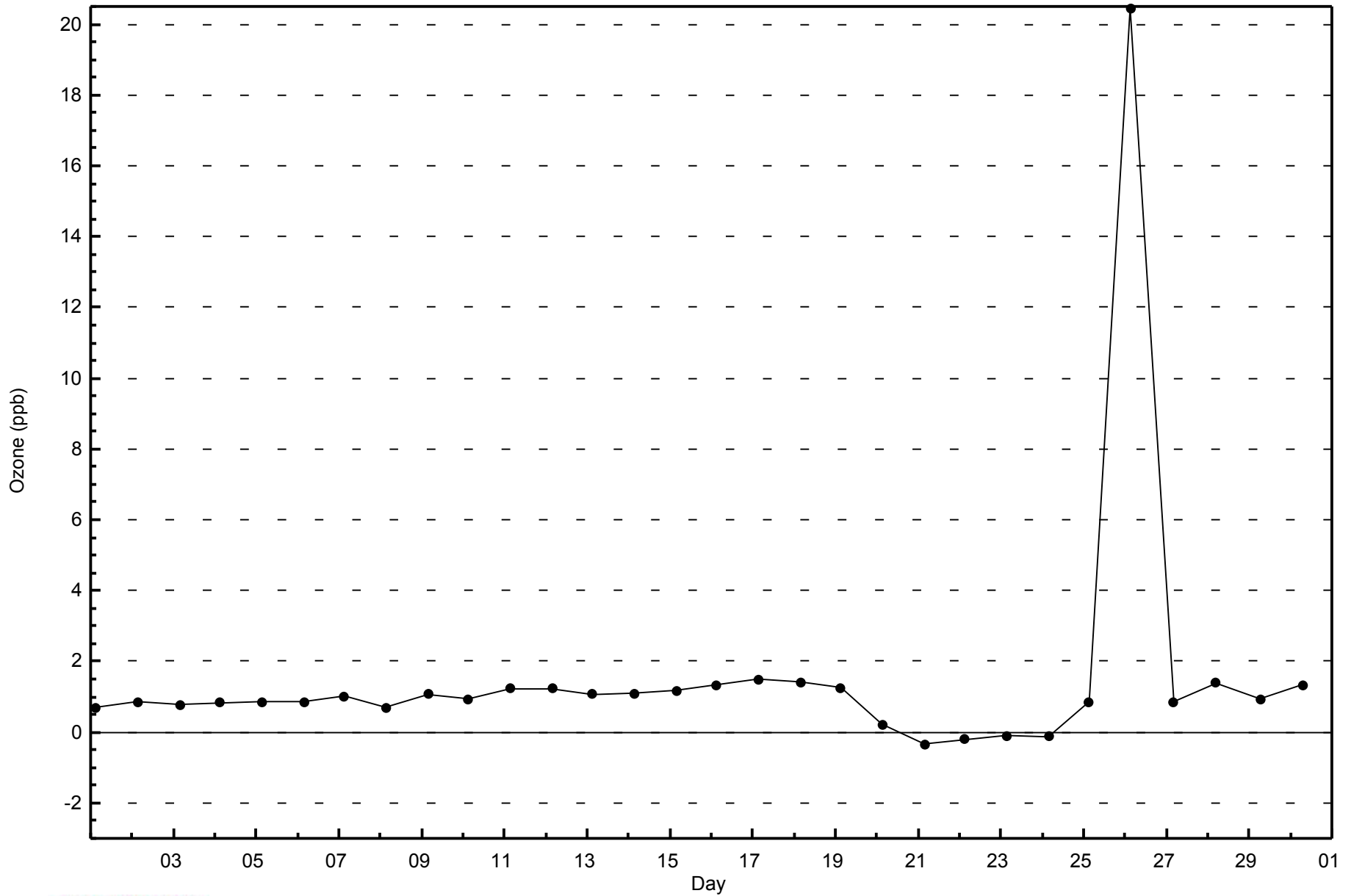
Total Number of Valid Hours: 678

Total Number of Hours: 720



WBEA
Zero Responses

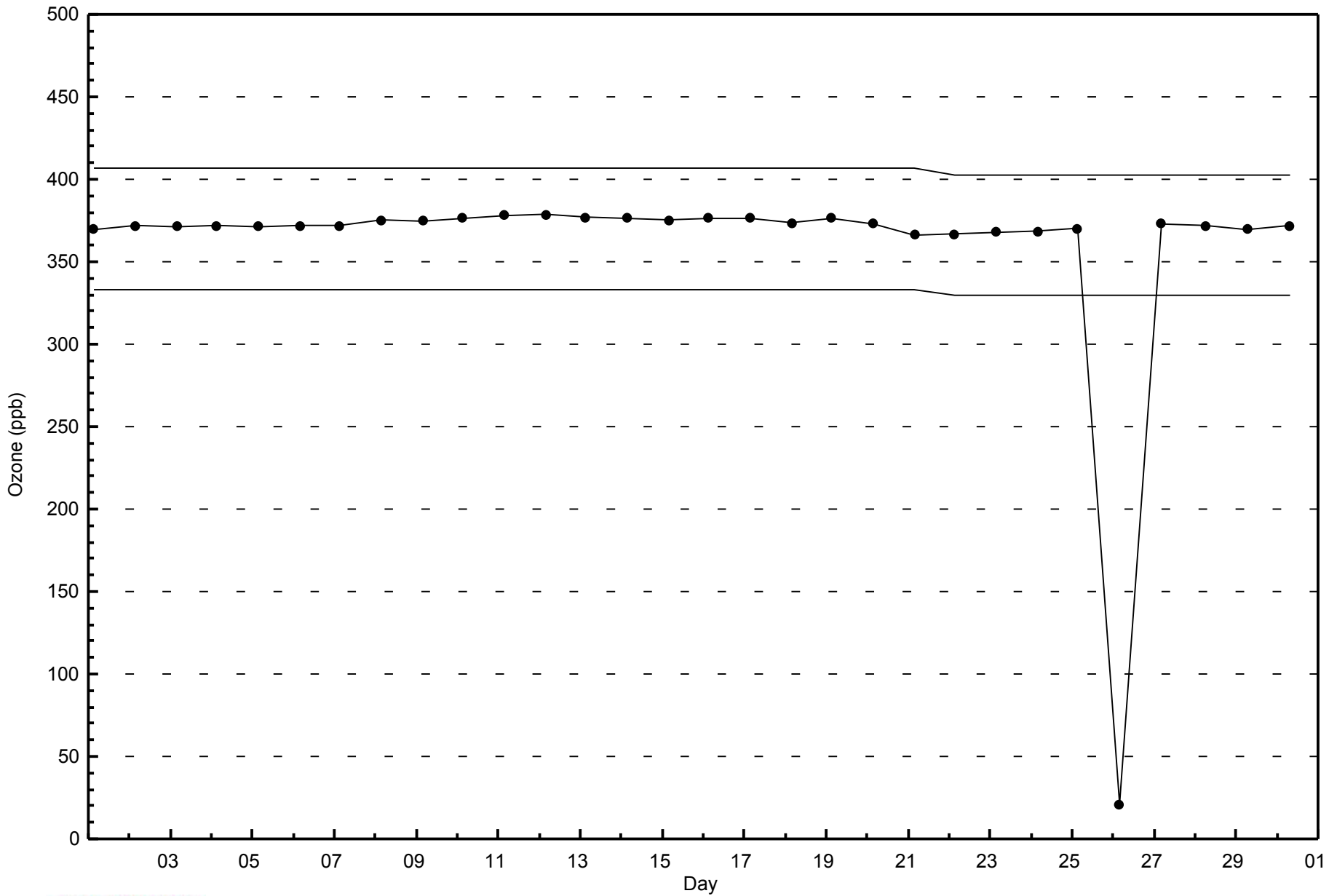
Ozone (O₃) - ppb
Wapasu - November 2014





WBEA
Span Responses

Ozone (O₃) - ppb
Wapasu - November 2014



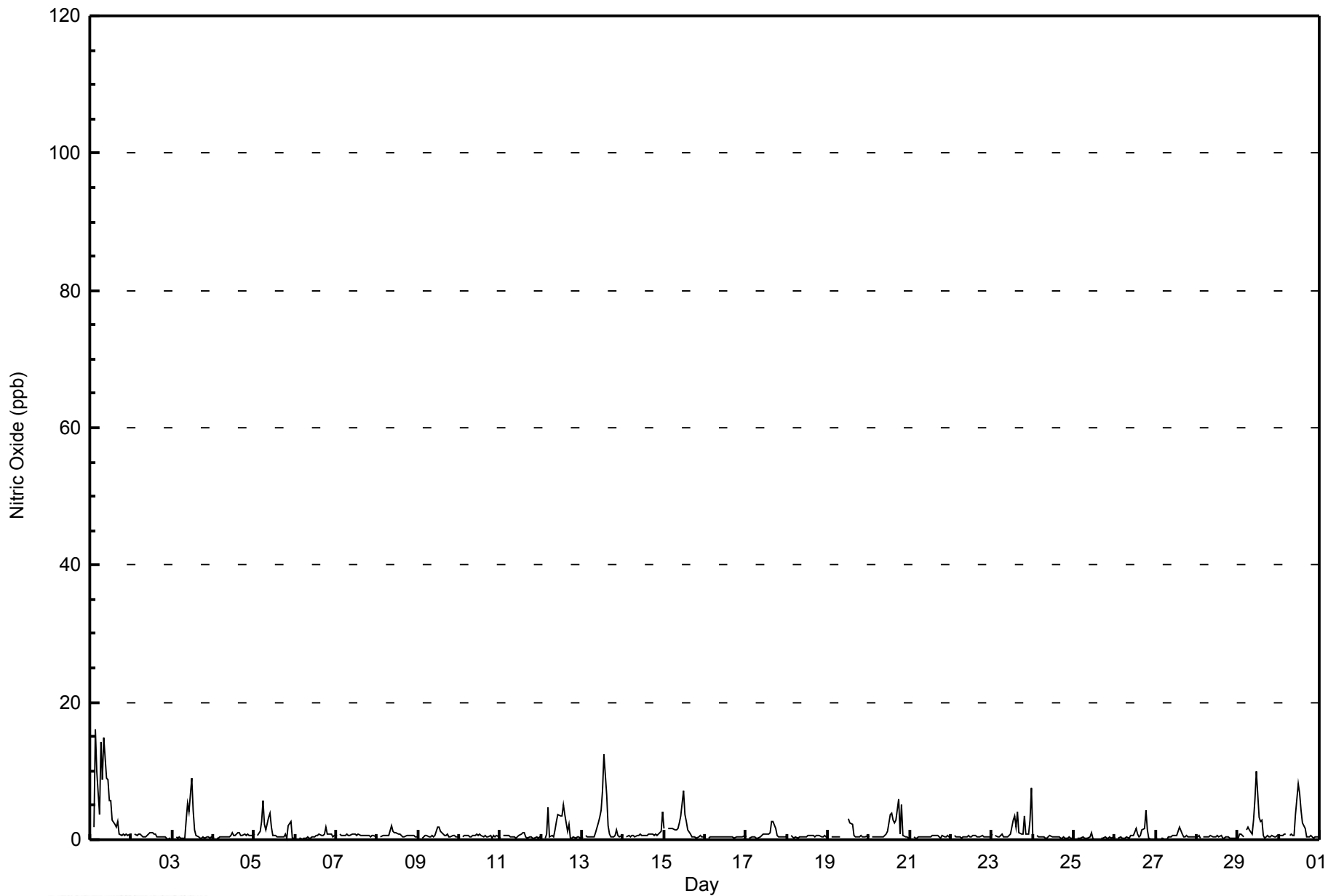


Maximum Value: 16 ppb on Nov 1 04:00																	Maximum Daily Average: 5.0 ppb on Nov 1																	Hours in Service: 720															
Minimum Value: 0 ppb on Nov 6 05:00																	Minimum Daily Average: 0.3 ppb on Nov 25																	Hours of Data: 683															
Maximum Diurnal Average: 2.2 ppb at hour 12																	Minimum Diurnal Average: 0.5 ppb at hour 1																	Hours of Missing Data: 37															
Monthly Average: 1.0 ppb																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 1 P ₉₀ = 2 P ₉₉ = 9																	Hours of Calibration: 34															
																	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-Nov	1	Z	2	16	10	4	14	9	15	9	9	6	6	3	2	2	3	1	1	1	1	1	1	1	5.0	16																							
2-Nov	1	Z	1	1	1	1	1	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.6	1																							
3-Nov	0	Z	0	0	0	0	0	0	3	5	4	9	4	1	1	0	0	0	0	0	0	0	0	0	1.4	9																							
4-Nov	0	Z	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.6	1																							
5-Nov	1	Z	1	1	3	6	2	1	3	4	2	1	1	0	0	0	0	1	1	0	2	3	0	0	1.4	6																							
6-Nov	0	Z	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	2	1	1	1	1	1	0.5	2																							
7-Nov	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-Nov	0	Z	0	1	1	1	1	1	2	1	1	1	1	1	1	0	1	1	1	1	1	1	0	0	0.7	2																							
9-Nov	0	Z	0	0	1	1	0	0	1	1	1	2	2	1	1	1	1	1	1	0	1	1	0	0	0.7	2																							
10-Nov	0	Z	0	1	1	1	0	0	1	1	1	1	1	1	0	1	0	0	1	0	1	0	1	0	0.5	1																							
11-Nov	0	Z	1	1	1	1	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0.4	1																							
12-Nov	0	Z	0	1	5	0	1	0	1	3	4	4	3	5	4	1	2	0	0	0	0	0	0	0	1.6	5																							
13-Nov	0	Z	1	0	0	0	0	0	1	2	3	4	7	12	6	2	1	0	0	1	1	1	0	1	2.1	12																							
14-Nov	1	Z	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4	0.8	4																							
15-Nov	2	Z	2	2	2	2	1	1	2	3	3	7	4	3	1	1	0	0	0	0	0	1	0	0	1.6	7																							
16-Nov	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0.4	1																							
17-Nov	0	Z	0	0	0	0	0	0	0	1	1	1	1	1	1	3	3	2	1	0	0	0	0	0	0.8	3																							
18-Nov	1	Z	1	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1	1	1	0	0	1	0	0.4	1																							
19-Nov	0	Z	1	0	0	0	0	0	C	C	C	C	3	2	2	1	0	0	0	1	0	0	0	1	0.8	3																							
20-Nov	0	Z	0	0	0	0	1	0	0	1	1	1	4	4	3	3	3	6	1	5	1	0	0	0	1.5	6																							
21-Nov	0	Z	0	0	0	0	0	0	1	0	0	0	0	1	1	1	1	0	0	1	0	0	1	0	0.4	1																							
22-Nov	1	Z	1	0	0	0	0	0	0	0	1	0	1	1	1	0	0	0	1	1	0	0	0	0	0.5	1																							
23-Nov	1	Z	1	0	0	1	1	0	0	1	1	1	3	3	2	4	1	1	1	3	1	1	3	8	1.6	8																							
24-Nov	0	Z	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																							
25-Nov	0	Z	0	0	0	0	0	0	0	0	1	0	0	M	M	M	0	0	0	0	0	0	0	0	0.3	1																							
26-Nov	0	Z	0	0	0	0	0	0	0	1	1	1	2	1	0	1	1	2	4	1	0	0	0	0	0.7	4																							
27-Nov	0	0	Z	0	0	0	0	0	0	0	1	1	1	1	2	1	0	0	1	0	0	0	0	0	0.5	2																							
28-Nov	0	1	0	Z	0	0	0	0	1	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0.4	1																							
29-Nov	0	1	1	0	Z	1	2	1	1	3	6	10	3	3	3	1	0	1	0	0	1	0	0	1	1.7	10																							
30-Nov	1	1	1	1	1	Z	1	1	1	1	4	8	7	4	2	2	0	0	0	1	0	0	0	0	1.6	8																							
																								0.5	0.6	0.5	1.0	1.0	0.8	1.0	0.8	1.3	1.4	1.7	2.2	1.9	1.9	1.4	1.0	0.8	0.7	0.7	0.7	0.5	0.5	0.5	0.8	Diurnal Average	
																								2	1	2	16	10	6	14	9	15	9	9	10	7	12	6	4	3	6	4	5	2	3	3	8	Diurnal Maximum	
Z - zerspan																								C - Calibration				M - Maintenance																					



WBEA
Hourly Averages

Nitric Oxide (NO) - ppb
Wapasu - November 2014





WBEA
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Wapasu - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	683	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: 683

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitric Oxide (NO) - ppb
Wapasu - November 2014

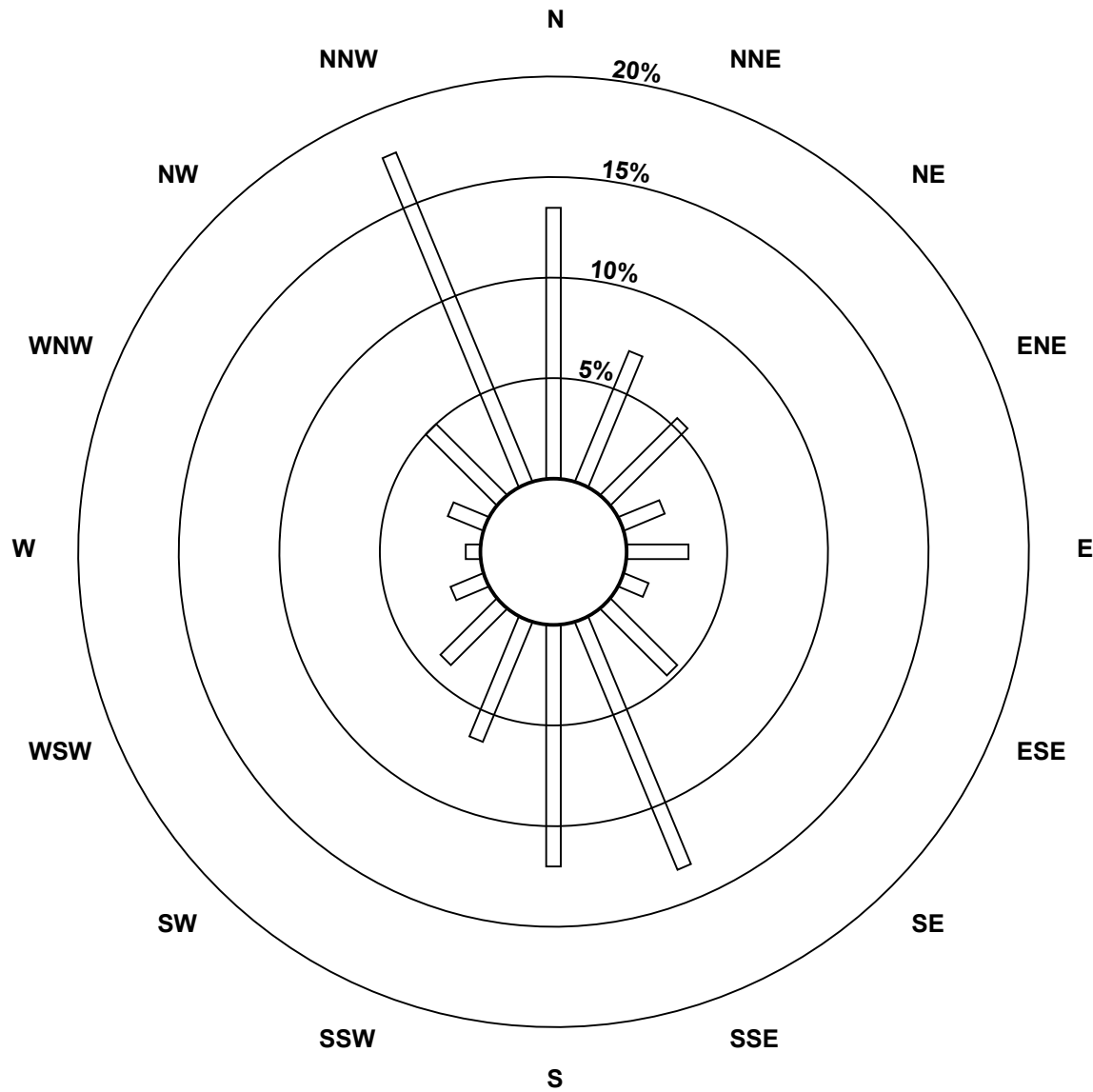
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	92	48	37	15	21	9	32	91	82	44	27	12	5	13	34	121	683
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	92	48	37	15	21	9	32	91	82	44	27	12	5	13	34	121	683

Total Number of Valid Hours: 683

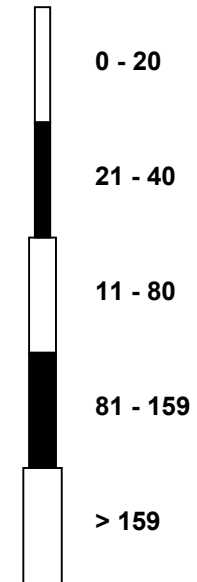
Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

Nitric Oxide (NO) - ppb
Wapasu (AMS 17)



Classes (ppb)

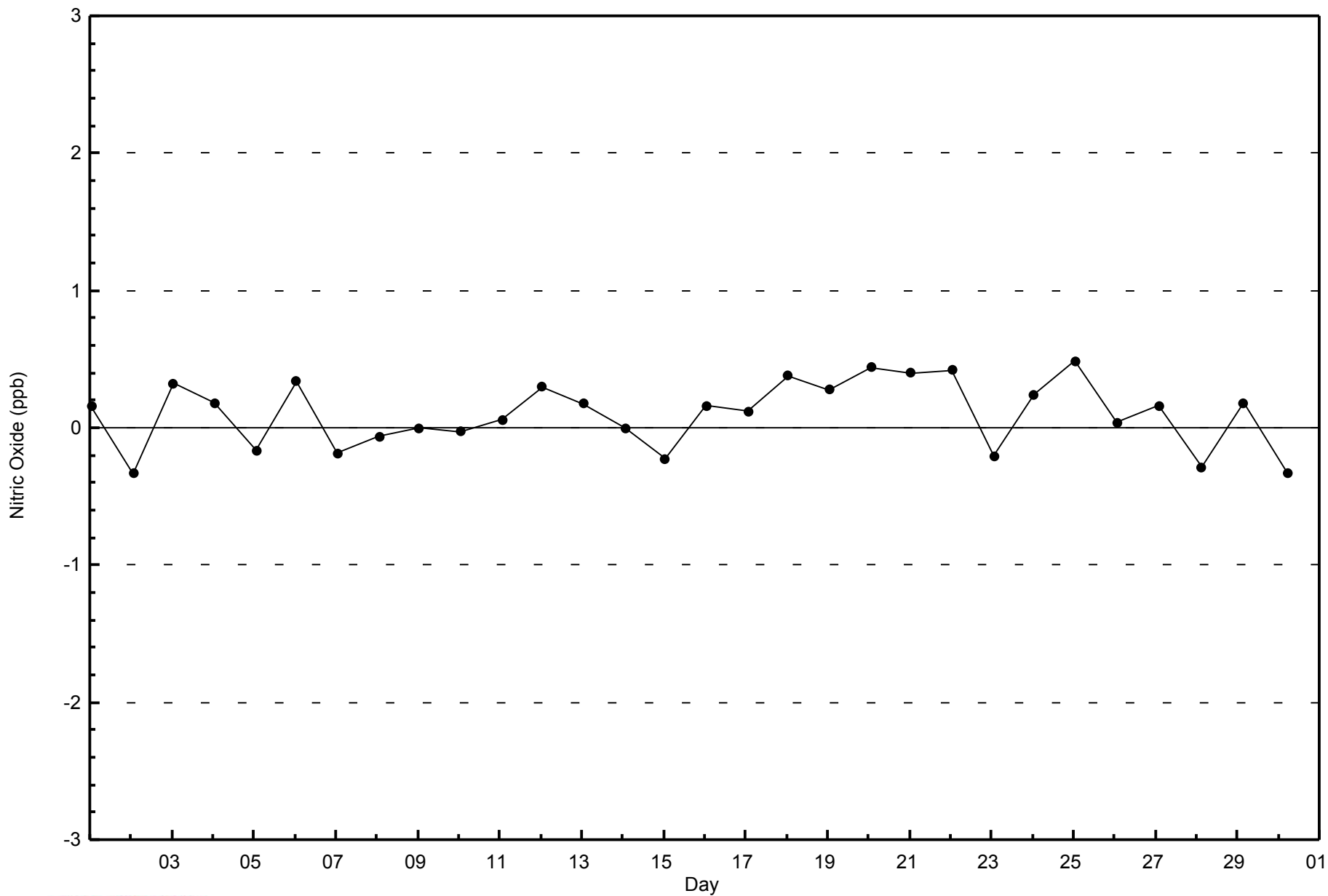


Total Number of Valid Hours: 683



WBEA
Zero Responses

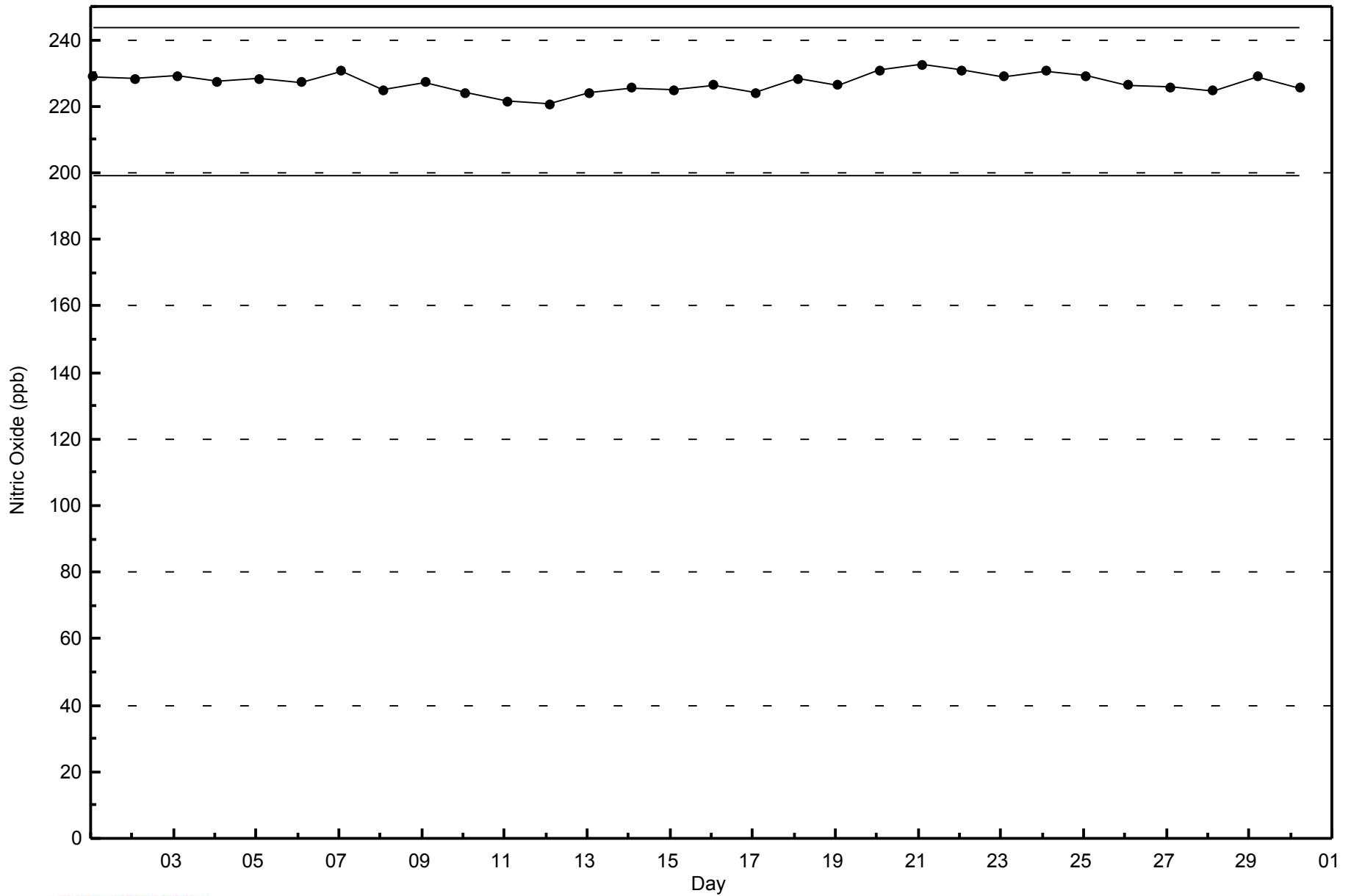
Nitric Oxide (NO) - ppb
Wapasu - November 2014





WBEA
Span Responses

Nitric Oxide (NO) - ppb
Wapasu - November 2014





Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 26 ppb on Nov 26 19:00	Maximum Daily Average: 9.2 ppb on Nov 13		Hours of Data:	683
Minimum Value: 0 ppb on Nov 5 00:00	Minimum Daily Average: 0.3 ppb on Nov 28		Hours of Missing Data:	37
Maximum Diurnal Average: 5.3 ppb at hour 17	Minimum Diurnal Average: 2.1 ppb at hour 1		Hours of Calibration:	34
Monthly Average: 3.7 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 2 Q ₃ = 5 P ₉₀ = 11 P ₉₉ = 20		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-Nov	5	Z	5	8	7	7	10	10	11	8	7	7	7	5	6	6	14	7	9	6	5	7	4	3	7.0	14
2-Nov	3	Z	1	1	0	1	1	0	1	0	1	2	2	1	1	2	1	1	1	1	1	1	1	1	1.0	3
3-Nov	1	Z	1	1	1	1	1	1	5	4	5	10	8	4	2	2	0	1	1	1	0	0	0	1	2.1	10
4-Nov	5	Z	1	1	0	0	1	1	0	0	1	3	1	1	3	3	1	2	3	0	0	0	0	0	1.1	5
5-Nov	0	Z	2	6	9	9	6	7	9	7	3	0	0	0	0	0	2	3	11	4	9	11	2	2	4.5	11
6-Nov	1	Z	1	1	1	1	0	1	1	1	1	1	1	1	2	2	5	15	10	13	8	1	2	3.0	15	
7-Nov	1	Z	1	1	1	1	1	1	0	1	0	0	0	0	0	1	3	3	5	2	2	2	2	1.3	5	
8-Nov	2	Z	1	2	2	3	11	18	14	6	3	2	1	1	1	1	2	4	3	2	2	5	6	4.1	18	
9-Nov	4	Z	1	1	1	1	2	2	1	0	0	3	3	2	2	2	2	2	1	0	0	0	1	1	1.4	4
10-Nov	1	Z	2	5	2	2	4	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1.0	5	
11-Nov	0	Z	0	0	0	0	0	0	0	0	0	1	2	3	4	3	4	3	3	2	2	4	7	6	2.0	7
12-Nov	3	Z	6	17	25	19	13	12	11	8	6	5	6	8	9	5	15	5	4	4	7	6	6	6	9.0	25
13-Nov	7	Z	8	9	8	8	6	7	9	7	6	7	10	17	13	10	11	10	9	9	14	14	10	3	9.2	17
14-Nov	2	Z	1	2	2	2	1	2	2	2	1	0	0	1	1	1	1	1	1	1	2	4	13	21	2.7	21
15-Nov	9	Z	13	14	13	13	12	13	11	10	10	14	8	6	5	2	2	2	1	1	1	1	2	2	7.1	14
16-Nov	1	Z	1	1	1	1	1	1	2	1	1	1	1	1	1	2	1	2	3	2	2	1	1	1.2	3	
17-Nov	0	Z	9	7	6	6	4	4	4	3	2	2	2	2	4	16	24	17	12	18	12	6	6	4	7.3	24
18-Nov	1	Z	1	1	2	1	1	1	0	1	1	1	1	1	0	1	2	1	2	1	1	2	4	1	1.2	4
19-Nov	1	Z	2	4	5	3	6	4	C	C	C	C	11	10	11	6	7	4	2	2	1	1	2	1	4.3	11
20-Nov	1	Z	2	2	3	3	3	4	5	4	3	3	8	10	9	14	18	20	15	20	14	6	2	1	7.4	20
21-Nov	0	Z	1	1	2	2	2	1	1	2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.8	2
22-Nov	0	Z	0	2	4	3	1	3	3	1	1	0	1	0	0	1	1	0	0	0	0	0	0	0	0.9	4
23-Nov	2	Z	1	1	0	2	6	2	0	2	2	2	7	6	5	14	8	11	12	16	10	11	18	20	6.8	20
24-Nov	5	Z	2	1	1	1	2	3	2	3	2	0	0	0	1	0	0	0	1	1	1	1	1	1	1.3	5
25-Nov	2	Z	2	0	1	0	7	12	7	2	3	0	0	M	M	M	2	1	1	1	2	5	3	1	2.6	12
26-Nov	2	Z	3	1	1	2	4	6	7	4	3	3	5	3	5	6	21	13	26	15	4	3	2	2	6.1	26
27-Nov	1	1	Z	0	0	2	1	1	1	1	1	1	1	4	7	7	6	5	4	1	0	0	0	0	2.0	7
28-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.3	1
29-Nov	1	13	13	18	Z	20	19	17	14	13	15	17	7	7	10	6	9	7	1	1	1	1	1	1	9.1	20
30-Nov	1	1	1	1	2	Z	15	4	1	2	8	14	12	9	8	9	3	2	3	3	3	3	3	3	4.8	15

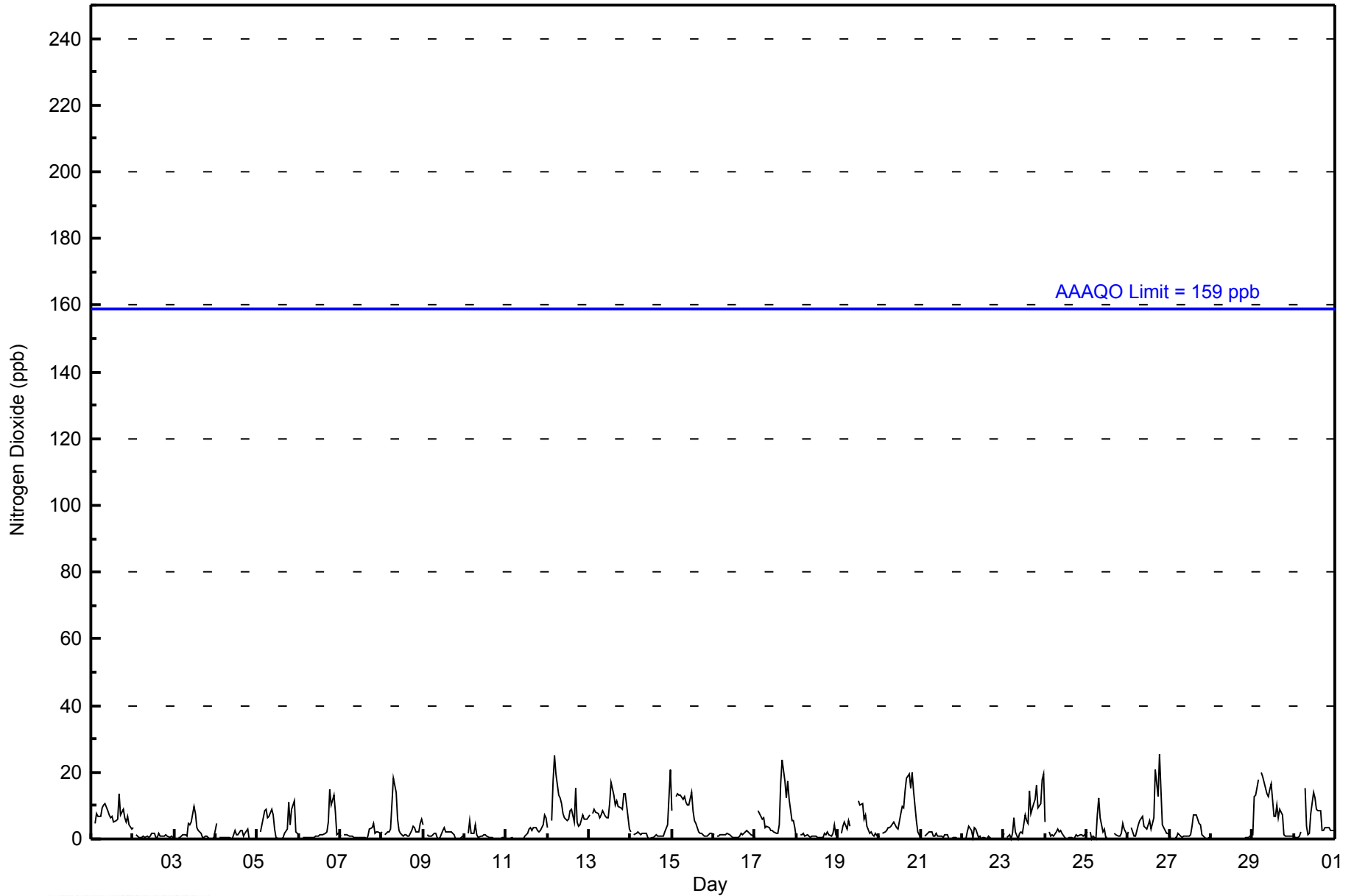
2.1	3.5	2.7	3.7	3.4	3.9	4.7	4.5	4.1	3.2	3.1	3.4	3.6	3.5	3.8	4.2	5.3	4.3	4.9	4.3	3.7	3.3	3.2	3.0	Diurnal Average	
9	13	13	18	25	20	19	18	14	13	15	17	12	17	13	16	24	20	26	20	14	14	18	21	Diurnal Maximum	

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



WBEA
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Wapasu - November 2014





WBEA
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Wapasu - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	678	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: 683

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Wapasu - November 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	92	48	37	15	21	9	32	91	81	43	25	12	5	13	34	120	678
21 - 40	0	0	0	0	0	0	0	0	1	1	2	0	0	0	0	1	5
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	92	48	37	15	21	9	32	91	82	44	27	12	5	13	34	121	683

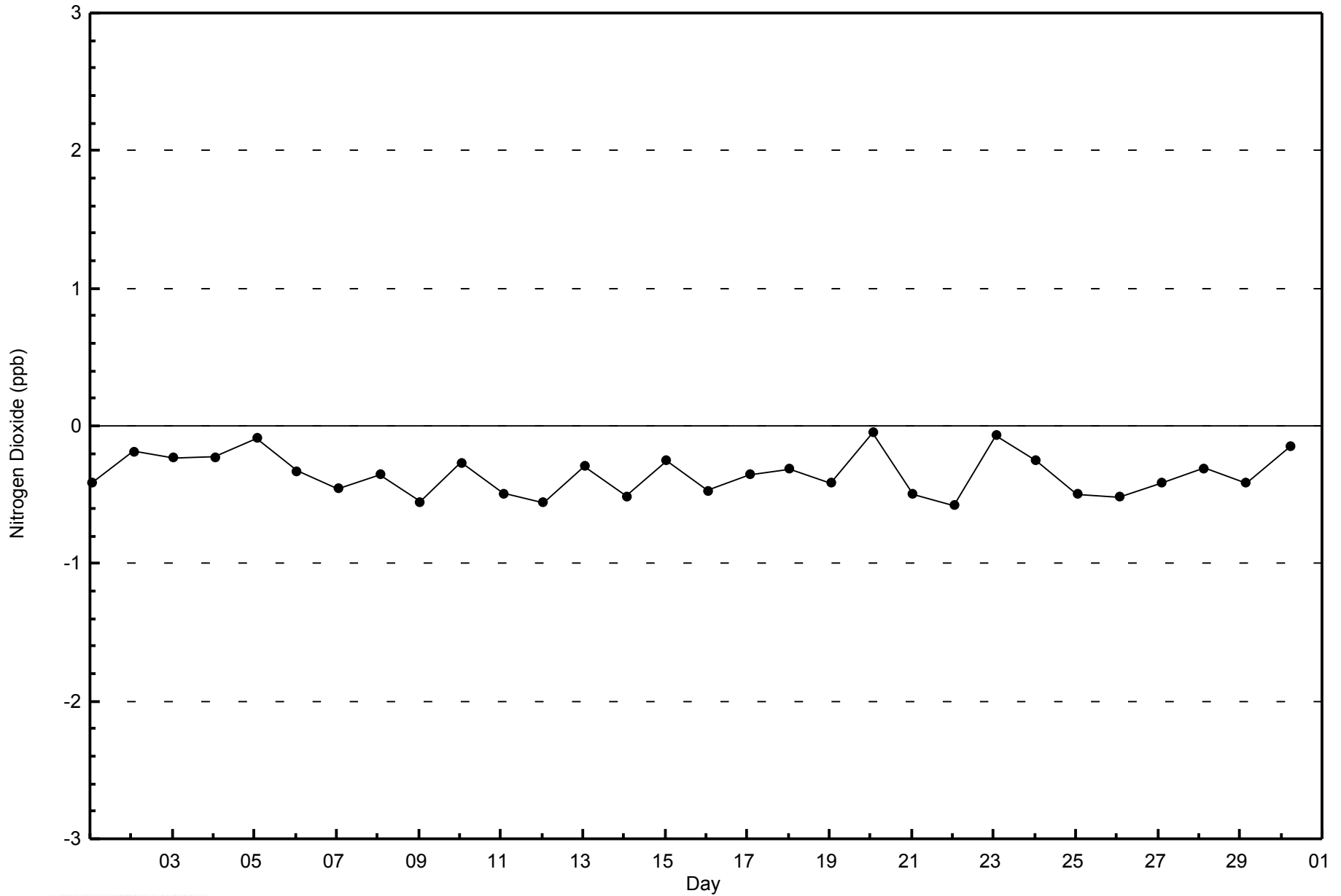
Total Number of Valid Hours: 683

Total Number of Hours: 720



WBEA
Zero Responses

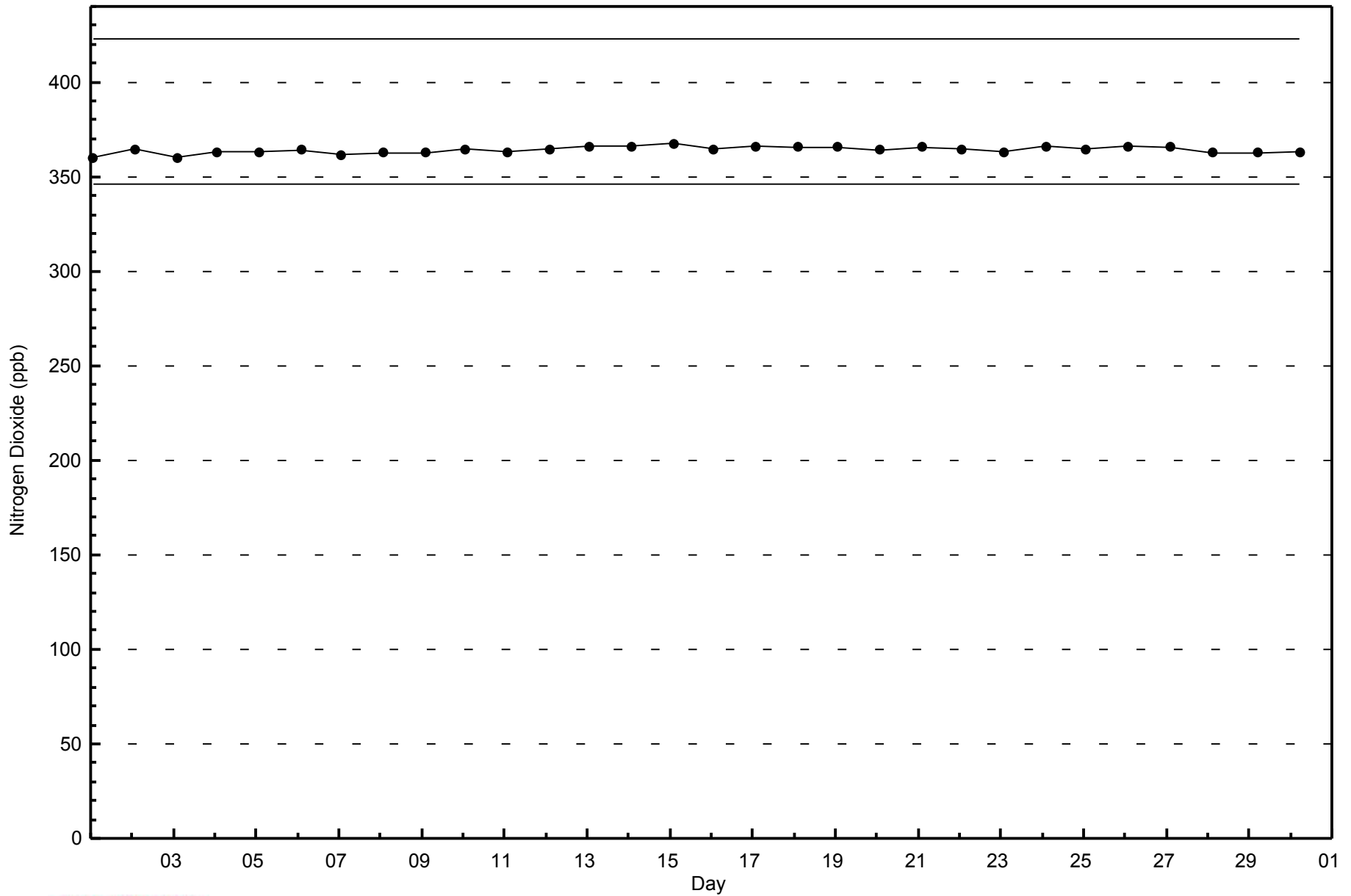
Nitrogen Dioxide (NO₂) - ppb
Wapasu - November 2014





WBEA
Span Responses

Nitrogen Dioxide (NO₂) - ppb
Wapasu - November 2014



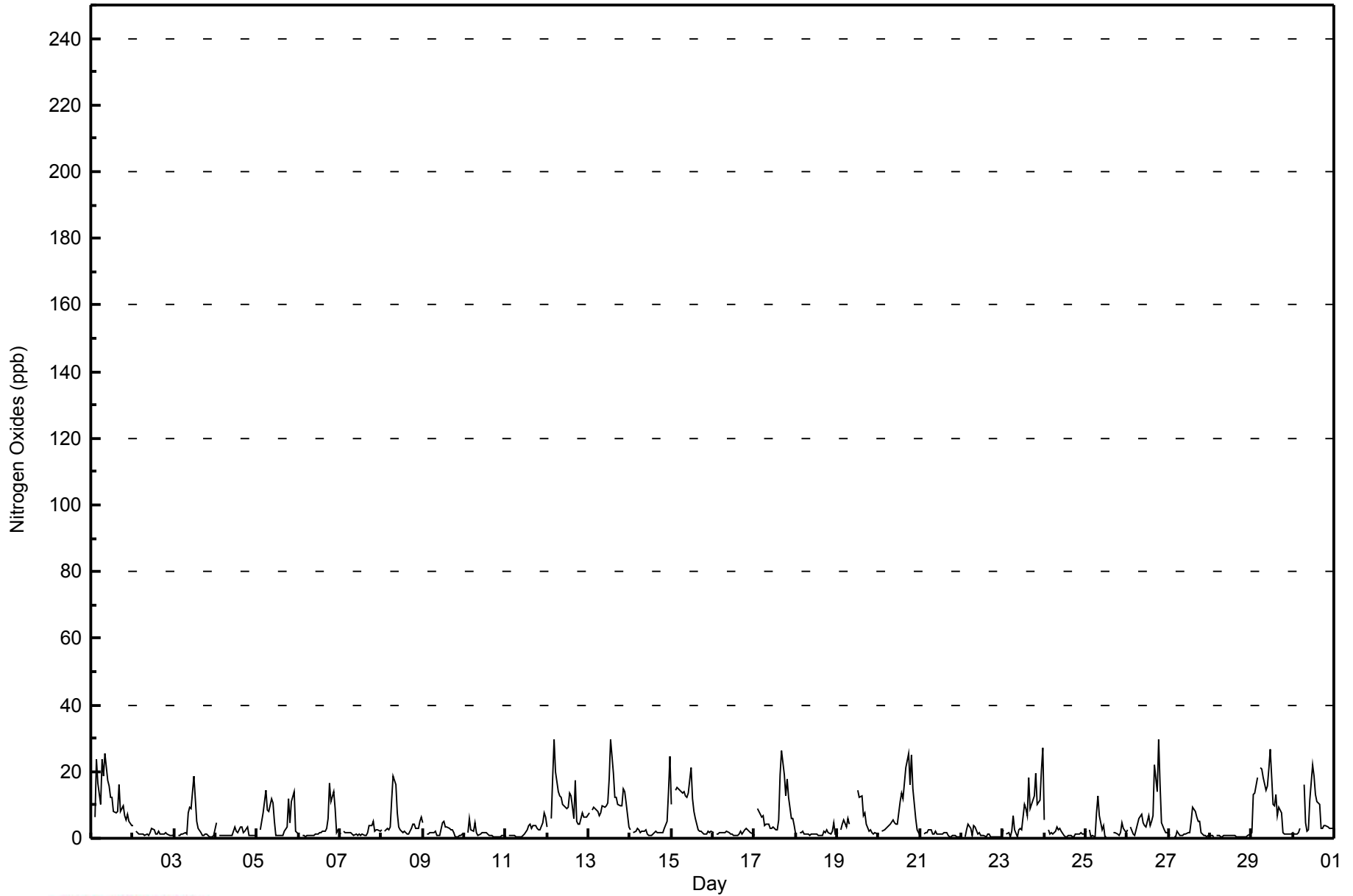


Maximum Value: 30 ppb on Nov 26 19:00																		Maximum Daily Average: 12.0 ppb on Nov 1						Hours in Service: 720		
Minimum Value: 0 ppb on Nov 25 04:00																		Minimum Daily Average: 0.7 ppb on Nov 28						Hours of Data: 683		
Maximum Diurnal Average: 6.1 ppb at hour 17																		Minimum Diurnal Average: 2.6 ppb at hour 1						Hours of Missing Data: 37		
Monthly Average: 4.8 ppb																		Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 6 P ₉₀ = 13 P ₉₉ = 25						Hours of Calibration: 34		
																		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-Nov	6	Z	6	24	17	10	24	19	25	17	16	12	12	8	8	8	16	8	10	7	6	7	5	4	12.0	25
2-Nov	4	Z	2	1	1	1	1	1	1	1	2	3	3	1	1	2	1	1	1	2	1	1	1	1	1.5	4
3-Nov	1	Z	1	1	1	1	2	1	7	10	9	19	12	5	3	2	1	1	1	0	0	0	1	3.5	19	
4-Nov	5	Z	1	1	1	1	1	1	1	1	2	3	2	2	4	3	2	2	4	1	1	1	1	1.7	5	
5-Nov	1	Z	3	8	11	15	8	8	12	11	5	1	1	1	1	2	4	12	5	11	14	2	2	5.9	15	
6-Nov	1	Z	1	1	1	1	1	1	1	1	1	1	2	2	2	2	3	6	16	11	14	9	2	3.5	16	
7-Nov	1	Z	2	2	2	2	2	1	1	1	1	1	1	1	1	2	4	4	4	5	2	3	3	1.9	5	
8-Nov	2	Z	2	3	3	3	11	19	16	7	4	3	2	2	2	1	1	3	4	4	3	3	5	4.8	19	
9-Nov	5	Z	1	1	2	2	2	2	1	1	1	5	5	3	3	3	3	3	2	1	1	1	1	2.0	5	
10-Nov	1	Z	2	6	3	2	5	2	1	1	2	2	2	2	1	1	1	1	1	0	1	1	1	1.6	6	
11-Nov	1	Z	1	1	1	1	0	1	0	0	1	1	3	4	4	3	4	4	3	2	3	4	7	2.4	7	
12-Nov	4	Z	6	18	30	20	14	13	12	10	10	9	9	13	13	6	18	5	4	4	7	6	6	10.6	30	
13-Nov	7	Z	8	9	9	8	7	8	10	9	10	11	18	29	20	12	12	10	10	10	15	14	11	11.3	29	
14-Nov	3	Z	2	2	3	2	2	2	2	2	1	1	1	1	2	2	2	2	2	2	3	5	14	3.5	25	
15-Nov	10	Z	14	15	15	14	14	14	13	12	14	21	12	8	6	3	2	2	2	1	1	2	2	8.7	21	
16-Nov	2	Z	1	1	2	2	2	2	2	2	1	1	1	1	1	2	1	2	3	2	2	2	1	1.6	3	
17-Nov	1	Z	9	7	6	7	4	4	4	3	3	3	2	3	5	19	26	19	13	18	12	6	6	8.0	26	
18-Nov	1	Z	2	2	2	1	1	1	1	1	1	1	1	1	1	2	2	3	2	1	2	5	1	1.6	5	
19-Nov	2	Z	2	4	6	3	6	4	C	C	C	C	14	12	13	7	7	4	2	3	2	1	2	5.1	14	
20-Nov	1	Z	2	3	3	4	4	4	5	5	4	4	11	14	12	17	21	26	16	25	15	6	2	8.9	26	
21-Nov	1	Z	1	2	2	2	3	1	1	2	1	1	1	1	2	2	1	0	0	1	1	0	1	1.2	3	
22-Nov	1	Z	1	3	4	3	1	4	3	1	2	1	1	1	1	1	1	0	1	1	0	0	1	1.3	4	
23-Nov	2	Z	1	2	1	2	7	3	0	2	3	3	10	9	7	18	9	11	13	19	10	11	27	8.4	27	
24-Nov	6	Z	3	1	2	1	2	3	2	3	2	1	0	1	1	1	0	1	1	1	1	2	1	1.7	6	
25-Nov	2	Z	2	0	1	0	7	13	7	2	4	1	0	M	M	M	2	1	1	1	2	5	3	2.8	13	
26-Nov	2	Z	4	1	1	3	4	6	7	5	4	3	7	4	5	7	22	14	30	16	5	3	2	6.8	30	
27-Nov	1	1	Z	1	1	2	1	1	1	1	1	2	2	5	9	8	6	5	5	2	1	1	1	2.5	9	
28-Nov	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	0	1	0	1	0.7	1	
29-Nov	2	13	14	18	Z	21	21	18	15	16	21	27	10	10	13	7	9	8	2	1	1	1	1	10.8	27	
30-Nov	1	1	1	2	3	Z	16	5	2	3	11	22	19	13	11	10	3	3	4	4	3	3	3	6.4	22	
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration M - Maintenance																										



WBEA
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Wapasu - November 2014





WBEA
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Wapasu - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	663	97.07	97.07
21 - 40	20	2.93	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: 683

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Wapasu - November 2014

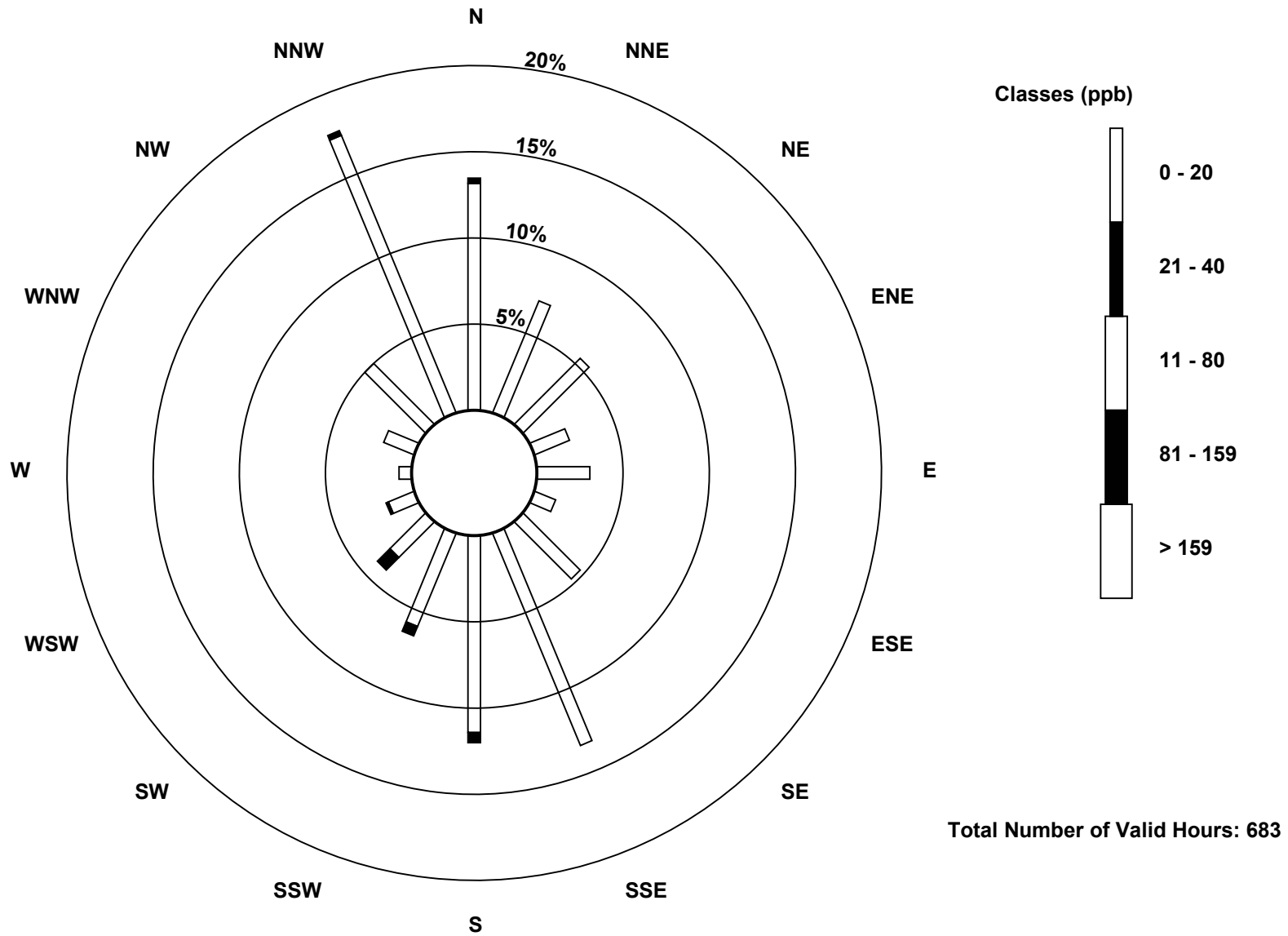
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	90	48	37	15	21	9	32	91	78	40	20	11	5	13	34	119	663
21 - 40	2	0	0	0	0	0	0	0	4	4	7	1	0	0	0	2	20
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	92	48	37	15	21	9	32	91	82	44	27	12	5	13	34	121	683

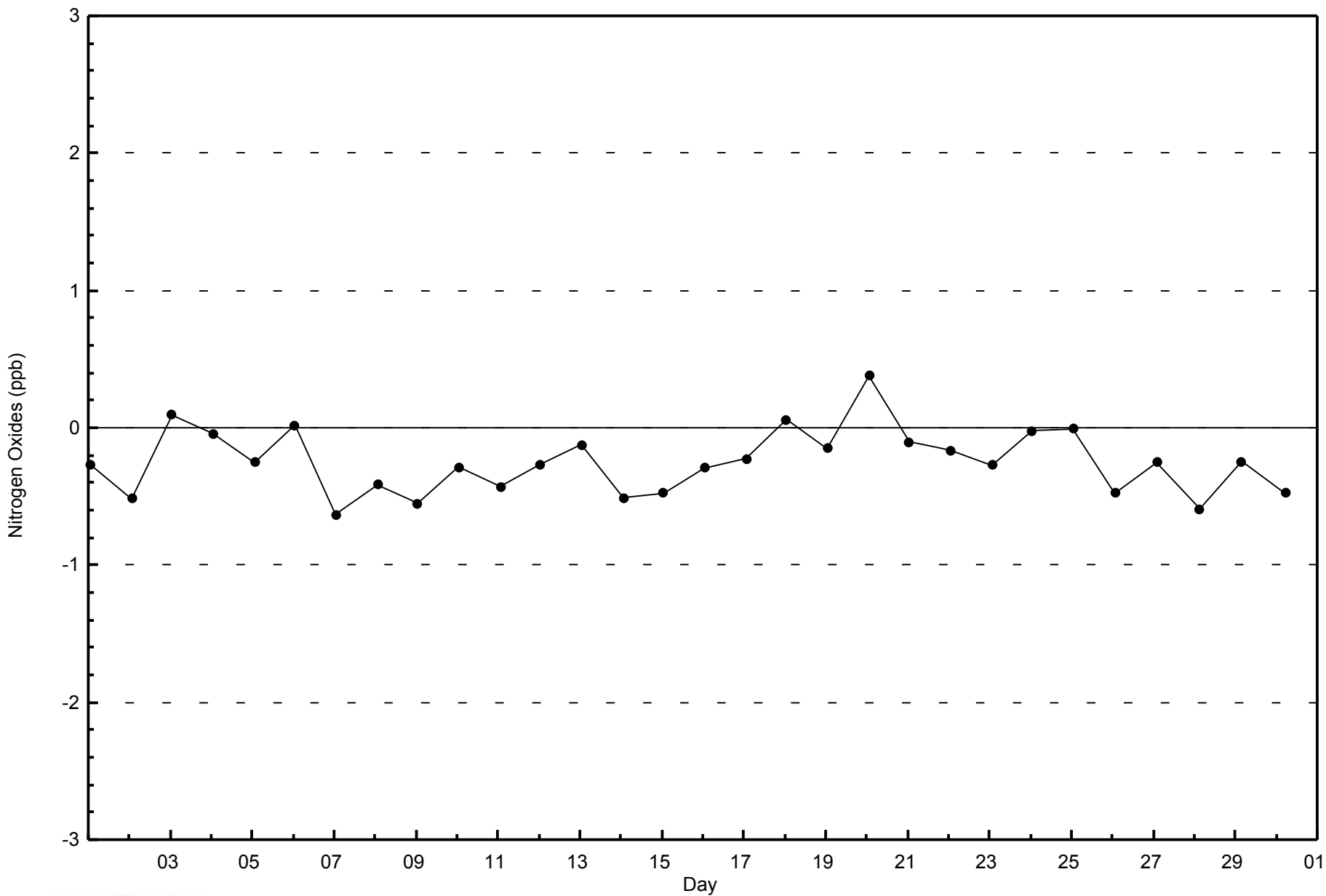
Total Number of Valid Hours: 683

Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

Nitrogen Oxides (NO_x) - ppb
Wapasu (AMS 17)

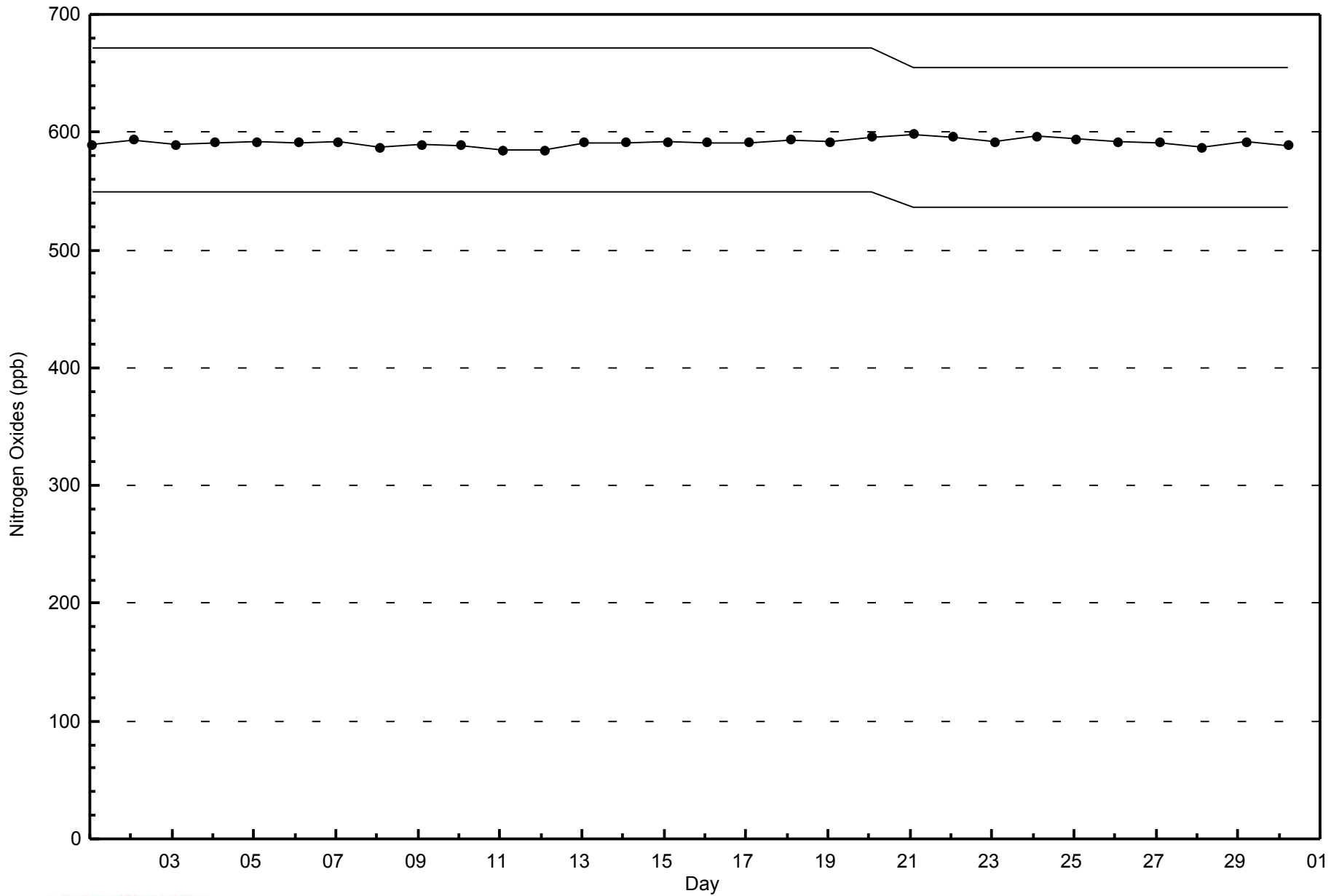






WBEA
Span Responses

Nitrogen Oxides (NO_x) - ppb
Wapasu - November 2014





Summary of Hour Averages

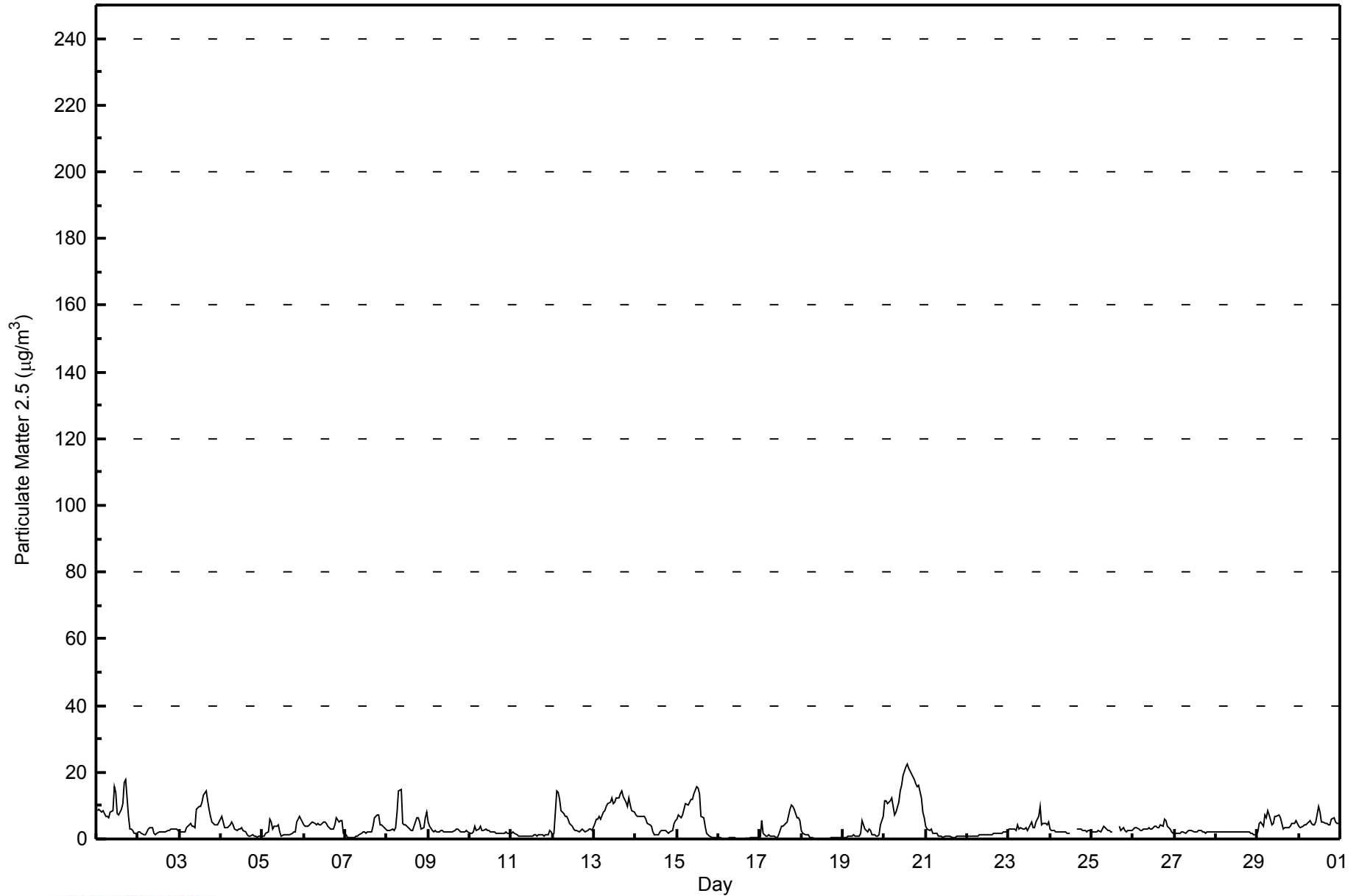
Wapasu - November 2014

Number of Exceedences (AAAQO): 24-hr: 0		Hours in Service: 720																																														
Maximum Value: 22.3 µg/m ³ on Nov 20 14:00		Maximum Daily Average: 14.2 µg/m ³ on Nov 20																																														
Minimum Value: 0.1 µg/m ³ on Nov 16 12:00		Hours of Data: 708																																														
Maximum Diurnal Average: 4.7 µg/m ³ at hour 13		Hours of Missing Data: 12																																														
Monthly Average: 3.90 µg/m ³		Hours of Calibration: 0																																														
Minimum Daily Average: 0.3 µg/m ³ on Nov 16		Percent Operational Time: 98.3																																														
Minimum Diurnal Average: 3.2 µg/m ³ at hour 1		Percentiles: P ₁ = 0.1 P ₁₀ = 0.7 Q ₁ = 1.7 Median = 2.7 Q ₃ = 4.8 P ₉₀ = 8.9 P ₉₉ = 17.2																																														
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-Nov	8.3	8.9	8.3	7.8	8.6	6.8	6.7	6.3	8.0	8.7	15.9	14.1	7.5	7.3	9.0	10.4	17.1	17.6	6.9	3.1	2.9	2.4	1.7	1.7	8.2	17.6																						
2-Nov	1.9	2.0	1.5	1.4	1.4	2.2	3.0	3.4	3.3	1.6	1.2	1.5	2.2	2.2	2.0	2.0	2.3	2.7	2.6	2.8	3.0	3.2	2.9	2.3	2.3	3.4																						
3-Nov	2.0	2.0	2.0	2.3	3.5	3.9	4.5	4.0	3.9	3.3	8.9	9.6	9.6	11.0	13.2	14.5	11.3	9.1	7.0	5.2	4.4	4.3	4.4	5.2	6.2	14.5																						
4-Nov	6.6	5.1	3.5	3.4	3.4	4.3	4.9	4.3	3.1	2.7	3.0	2.9	3.2	2.7	2.0	1.4	1.0	1.0	1.4	0.8	0.7	0.6	0.7	0.8	2.6	6.6																						
5-Nov	0.7	0.9	1.8	1.9	6.0	5.0	3.0	3.6	3.7	4.4	2.2	1.0	1.1	1.3	1.3	1.2	1.4	1.5	2.1	2.1	5.2	6.6	5.8	5.1	2.9	6.6																						
6-Nov	4.2	3.6	4.0	4.2	4.8	5.1	4.5	4.3	4.5	4.1	4.4	4.9	4.9	4.5	3.8	2.9	3.0	3.1	4.2	6.4	4.9	5.7	5.3	1.8	4.3	6.4																						
7-Nov	1.2	0.5	0.4	0.3	0.4	0.5	0.8	1.0	1.1	1.5	2.1	2.2	1.9	1.9	2.0	2.2	3.9	6.2	7.4	7.3	4.0	4.0	3.8	3.1	2.5	7.4																						
8-Nov	2.6	2.4	2.5	3.1	2.6	3.3	8.1	14.4	14.9	4.9	4.1	4.4	3.5	2.8	2.4	2.5	4.0	6.5	6.3	4.9	3.2	3.5	6.3	7.9	5.0	14.9																						
9-Nov	5.0	3.7	2.5	2.1	2.5	2.2	2.2	2.5	2.4	2.3	2.0	2.2	2.3	2.1	2.3	2.5	3.1	3.1	2.6	2.3	2.3	2.3	2.4	2.0	2.5	5.0																						
10-Nov	1.8	1.9	2.2	3.8	2.7	2.9	3.7	2.5	2.7	2.8	2.7	2.6	2.2	2.3	2.0	1.8	1.8	1.6	1.5	1.5	1.7	1.9	1.9	1.7	2.3	3.8																						
11-Nov	1.8	2.0	1.9	1.4	1.0	0.9	0.8	0.7	0.7	0.7	0.6	0.7	0.9	1.1	1.1	1.0	1.2	1.2	1.1	1.0	1.1	1.1	2.4	2.2	1.2	2.4																						
12-Nov	1.4	1.9	14.6	14.0	12.0	8.7	7.6	6.8	6.6	5.9	4.5	3.8	3.0	2.7	2.4	2.3	2.8	3.0	2.5	2.3	2.7	3.0	3.0	2.7	5.0	14.6																						
13-Nov	4.6	6.1	5.9	6.7	6.0	8.2	8.5	9.6	10.6	11.0	12.2	10.6	11.0	12.2	12.1	13.5	14.2	12.6	11.0	9.5	12.4	10.3	8.5	8.0	9.8	14.2																						
14-Nov	7.2	6.8	6.7	7.0	7.0	6.8	5.8	4.7	4.1	3.8	1.9	1.3	1.2	1.3	2.0	2.3	2.7	2.5	2.0	1.9	1.9	2.7	4.8	5.5	3.9	7.2																						
15-Nov	5.9	7.3	6.4	7.2	8.9	10.7	10.3	10.8	11.9	12.0	13.6	15.8	15.4	13.5	6.6	6.4	3.8	1.9	1.3	1.0	0.5	0.4	0.4	0.4	7.2	15.8																						
16-Nov	0.4	0.4	0.2	0.1	0.1	0.2	0.3	0.4	0.5	0.3	0.2	0.1	UO	UO	UO	UO	0.2	0.2	0.2	0.4	0.4	0.5	0.5	0.5	0.3	0.5																						
17-Nov	0.5	5.4	1.7	0.8	0.9	1.2	1.0	0.7	0.8	0.5	0.5	1.3	3.9	3.7	4.0	4.7	5.2	9.1	10.0	9.6	9.1	6.4	6.4	5.4	3.9	10.0																						
18-Nov	2.4	1.6	1.5	1.4	1.1	0.5	0.4	0.2	0.1	0.1	UO	UO	0.1	0.1	0.1	0.1	0.2	0.3	0.4	0.4	0.3	0.4	0.5	0.3	0.6	2.4																						
19-Nov	0.3	0.4	0.5	0.7	0.9	0.9	1.1	1.0	0.9	0.9	1.6	5.6	4.4	2.8	2.1	2.9	2.6	1.3	1.1	1.0	0.9	1.2	4.2	6.7	1.9	6.7																						
20-Nov	11.2	11.3	10.6	11.4	12.1	9.8	7.0	8.1	11.0	14.4	16.2	18.9	21.4	22.3	21.1	20.4	19.6	17.8	16.5	15.8	16.2	12.3	8.1	6.5	14.2	22.3																						
21-Nov	3.7	2.9	2.6	2.8	1.8	1.8	1.5	0.9	0.8	0.7	0.6	0.7	0.7	0.7	0.8	0.5	0.5	0.5	0.6	0.7	0.7	0.7	0.8	0.7	1.2	3.7																						
22-Nov	0.7	0.7	0.7	0.8	0.9	1.0	1.0	1.2	1.2	1.3	1.1	1.1	1.2	1.2	1.3	1.5	1.5	1.6	1.7	1.8	1.7	2.0	2.1	2.0	1.3	2.1																						
23-Nov	2.8	3.2	2.9	2.8	2.7	4.3	3.0	3.3	2.9	3.0	3.6	2.7	4.2	4.9	3.5	3.3	4.9	6.8	9.9	4.4	4.5	4.6	4.4	5.2	4.1	9.9																						
24-Nov	2.9	2.7	2.4	2.2	2.3	2.3	2.3	2.3	2.3	2.1	1.9	1.6	M	M	M	3.1	3.0	2.9	2.9	2.4	2.5	2.3	2.4	2.4	2.4	3.1																						
25-Nov	2.1	2.3	2.2	2.2	2.3	2.3	3.0	4.0	3.2	2.4	2.4	2.0	1.9	M	M	M	M	3.7	2.7	3.2	2.5	2.3	2.4	2.7	2.4	4.0																						
26-Nov	2.9	3.2	3.3	2.8	2.4	2.5	3.0	3.0	2.9	3.2	2.8	3.1	3.9	3.8	3.6	3.4	4.3	4.0	5.9	5.5	3.7	3.0	2.2	1.8	3.3	5.9																						
27-Nov	1.7	1.7	1.8	1.9	2.1	2.1	1.8	2.1	2.4	2.4	2.4	2.2	1.9	2.1	2.3	2.5	2.1	1.9	1.8	2.3	2.2	2.1	2.1	2.1	2.1	2.5																						
28-Nov	2.1	2.0	2.1	2.1	2.2	2.0	2.0	2.0	2.0	2.1	2.1	2.3	2.2	2.3	2.3	2.1	2.0	2.0	2.3	2.2	1.8	1.7	1.4	1.5	2.0	2.3																						
29-Nov	2.1	4.7	5.2	4.0	7.2	6.2	8.6	7.1	4.3	4.6	6.6	6.8	7.2	6.3	4.6	2.9	3.3	3.4	3.5	3.8	4.7	4.8	5.4	4.7	5.1	8.6																						
30-Nov	4.0	3.5	3.9	4.2	4.1	4.8	5.5	4.8	4.2	4.3	5.1	9.7	8.2	5.0	4.9	4.5	4.6	4.3	4.2	5.8	6.4	5.2	4.9	4.5	5.0	9.7																						
																								3.2	3.4	3.5	3.6	3.8	3.8	3.9	4.0	4.0	3.7	4.4	4.7	4.7	4.6	4.3	4.2	4.4	4.4	4.1	3.7	3.6	3.4	3.4	3.2	Diurnal Average
																								11.2	11.3	14.6	14.0	12.1	10.7	10.3	14.4	14.9	14.4	16.2	18.9	21.4	22.3	21.1	20.4	19.6	17.8	16.5	15.8	16.2	12.3	8.5	8.0	Diurnal Maximum
M - Maintenance UO - Unstable Operation																																																
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m ³																																																



WBEA
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Wapasu - November 2014





WBEA
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Wapasu - November 2014

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	456	64.41	64.41
6 - 15	132	18.64	83.05
16 - 25	15	2.12	85.17
26 - 80	0	0.00	85.17
> 81.0	0	0.00	85.17

Total Number of Valid Hours: 708

Total Number of Hours: 720



WBEA
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Wapasu - November 2014

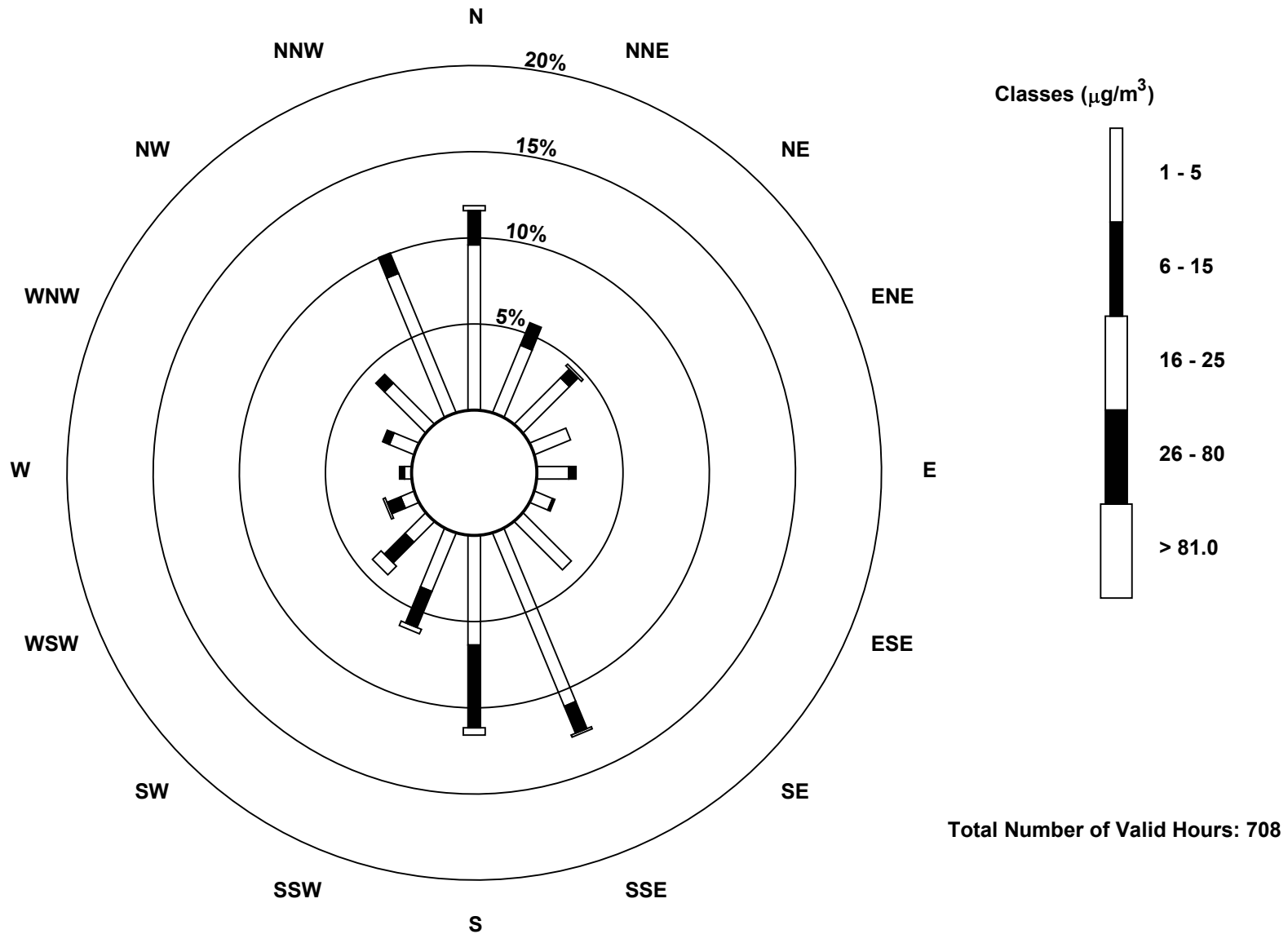
Concentration Ranges (μg/m ³)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	68	30	27	16	13	8	28	77	45	26	12	6	3	11	24	62	456
6 - 15	14	10	5	0	3	1	0	12	34	16	12	6	2	3	5	9	132
16 - 25	2	0	1	0	0	0	0	1	3	2	5	1	0	0	0	0	15
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	84	40	33	16	16	9	28	90	82	44	29	13	5	14	29	71	603

Total Number of Valid Hours: 708

Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Wapasu (AMS 17)



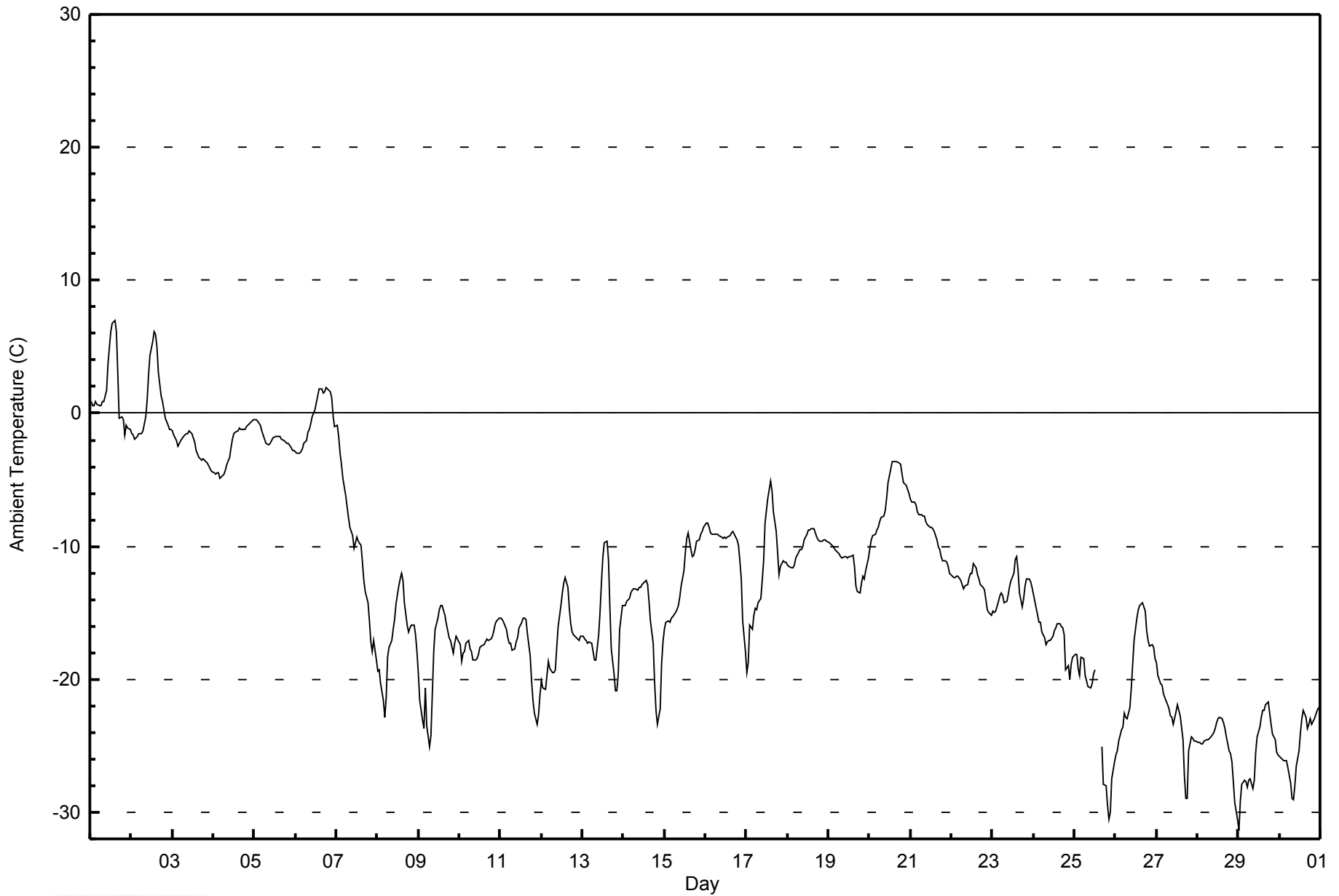


Maximum Value: 7.0 C on Nov 1 15:00		Maximum Daily Average: 1.7 C on Nov 1		Hours in Service: 720																						
Minimum Value: -31.4 C on Nov 29 01:00		Minimum Daily Average: -25.5 C on Nov 29		Hours of Data: 717																						
Maximum Diurnal Average: -10.1 C at hour 15		Minimum Diurnal Average: -14.1 C at hour 22		Hours of Missing Data: 3																						
Monthly Average: -12.88 C		Percentiles: P ₁ = -29.1 P ₁₀ = -23.8 Q ₁ = -18.4 Median = -13.3 Q ₃ = -7.7 P ₉₀ = -1.3 P ₉₉ = 5.0		Hours of Calibration: 0																						
				Percent Operational Time: 99.6																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0.9	0.5	0.6	0.9	0.6	0.5	0.6	0.8	0.9	1.7	3.7	5.0	6.2	6.8	7.0	6.1	3.0	-0.4	-0.3	-0.4	-1.6	-0.9	-1.1	-1.2	1.7	7.0
2-Nov	-1.5	-1.7	-2.0	-1.7	-1.6	-1.6	-1.5	-1.3	-0.2	1.0	2.9	4.4	5.4	6.1	5.9	5.0	3.1	1.4	0.9	0.3	-0.4	-0.9	-1.2	-1.2	0.8	6.1
3-Nov	-1.3	-1.7	-2.0	-2.4	-2.2	-2.0	-1.8	-1.7	-1.6	-1.5	-1.4	-1.5	-1.9	-2.2	-2.7	-3.3	-3.4	-3.5	-3.4	-3.5	-3.7	-4.0	-4.2	-4.4	-2.5	-1.3
4-Nov	-4.5	-4.5	-4.5	-4.5	-4.9	-4.7	-4.6	-4.3	-3.9	-3.3	-2.6	-1.9	-1.5	-1.4	-1.3	-1.1	-1.2	-1.2	-1.3	-1.0	-0.9	-0.7	-0.7	-0.5	-2.5	-0.5
5-Nov	-0.5	-0.5	-0.6	-0.9	-1.3	-1.7	-2.0	-2.3	-2.4	-2.3	-2.1	-1.8	-1.8	-1.7	-1.7	-1.7	-1.9	-2.1	-2.1	-2.3	-2.3	-2.5	-2.7	-2.8	-1.8	-0.5
6-Nov	-2.9	-3.0	-3.0	-2.9	-2.6	-2.3	-2.1	-1.5	-1.2	-0.8	-0.3	0.3	0.8	1.3	1.9	1.8	1.5	1.6	1.9	1.8	1.6	1.2	-0.1	-1.0	-0.3	1.9
7-Nov	-0.9	-1.8	-3.0	-3.9	-4.9	-6.1	-7.0	-7.9	-8.5	-9.2	-10.1	-9.7	-9.3	-9.6	-10.0	-11.2	-12.6	-13.4	-14.3	-15.6	-17.2	-17.9	-17.1	-18.5	-10.0	-0.9
8-Nov	-19.4	-19.3	-20.3	-21.6	-22.9	-21.4	-18.4	-17.6	-17.1	-16.3	-15.5	-14.4	-12.9	-12.4	-12.0	-12.5	-14.2	-15.9	-16.4	-16.2	-15.9	-15.9	-16.7	-17.9	-16.8	-12.0
9-Nov	-19.6	-21.6	-23.1	-23.7	-20.6	-23.5	-25.1	-24.2	-21.1	-17.9	-16.2	-15.3	-14.8	-14.5	-14.5	-15.2	-15.9	-16.4	-16.9	-17.1	-18.0	-17.3	-16.8	-17.0	-18.6	-14.5
10-Nov	-17.4	-18.7	-18.0	-17.9	-17.3	-17.1	-17.7	-18.0	-18.5	-18.5	-18.4	-18.1	-17.6	-17.5	-17.4	-17.2	-17.0	-17.1	-17.0	-16.8	-16.3	-15.8	-15.6	-15.4	-17.3	-15.4
11-Nov	-15.4	-15.5	-15.8	-16.2	-16.9	-17.3	-17.3	-17.8	-17.7	-17.2	-16.9	-16.1	-15.7	-15.4	-15.3	-15.5	-16.6	-18.2	-20.1	-21.6	-22.6	-23.3	-22.7	-21.2	-17.8	-15.3
12-Nov	-20.1	-20.7	-20.7	-19.7	-18.6	-19.2	-19.5	-19.4	-19.3	-17.6	-16.1	-14.5	-13.5	-12.8	-12.4	-13.1	-14.6	-15.9	-16.4	-16.6	-16.9	-17.0	-17.1	-16.7	-17.0	-12.4
13-Nov	-16.8	-17.0	-17.1	-17.3	-17.2	-17.3	-17.9	-18.5	-18.6	-16.6	-14.9	-12.6	-10.8	-9.7	-9.6	-11.0	-14.5	-17.7	-19.6	-20.8	-20.9	-19.6	-16.3	-14.5	-16.1	-9.6
14-Nov	-14.5	-14.4	-14.1	-13.9	-13.5	-13.3	-13.2	-13.2	-13.3	-13.1	-13.0	-12.9	-12.7	-12.6	-12.9	-14.1	-15.7	-17.3	-20.2	-22.3	-23.4	-22.2	-18.8	-17.2	-15.5	-12.6
15-Nov	-16.2	-15.7	-15.7	-15.7	-15.4	-15.2	-15.0	-14.7	-14.4	-13.8	-13.0	-11.8	-10.5	-9.4	-9.0	-10.2	-10.8	-10.7	-10.3	-9.6	-9.5	-9.1	-8.9	-8.6	-12.2	-8.6
16-Nov	-8.3	-8.3	-8.6	-9.0	-9.1	-9.1	-9.1	-9.1	-9.2	-9.3	-9.4	-9.3	-9.4	-9.3	-9.2	-9.0	-8.9	-9.1	-9.5	-10.0	-11.1	-12.5	-15.6	-18.0	-10.0	-8.3
17-Nov	-19.5	-18.8	-15.9	-16.2	-15.2	-14.6	-14.7	-14.2	-13.9	-12.6	-11.1	-8.2	-6.4	-5.7	-5.1	-5.8	-7.4	-8.9	-10.5	-12.1	-11.5	-11.1	-11.2	-11.2	-11.7	-5.1
18-Nov	-11.4	-11.5	-11.6	-11.6	-11.4	-10.9	-10.5	-10.2	-10.3	-10.0	-9.6	-9.1	-8.8	-8.7	-8.6	-8.7	-9.0	-9.3	-9.6	-9.6	-9.6	-9.5	-9.5	-9.6	-9.9	-8.6
19-Nov	-9.7	-9.8	-9.9	-10.1	-10.2	-10.4	-10.6	-10.8	-10.9	-10.8	-10.8	-10.9	-10.7	-10.7	-10.6	-11.5	-13.0	-13.4	-13.5	-12.7	-12.3	-12.5	-11.8	-10.9	-11.2	-9.7
20-Nov	-10.1	-9.5	-9.2	-9.1	-8.8	-8.5	-8.1	-7.9	-7.7	-7.3	-6.4	-5.2	-4.1	-3.7	-3.6	-3.6	-3.6	-3.7	-3.9	-4.6	-5.2	-5.4	-5.8	-6.1	-6.3	-3.6
21-Nov	-6.4	-6.7	-6.7	-6.8	-7.4	-7.6	-7.6	-7.7	-7.8	-8.1	-8.4	-8.5	-8.6	-8.7	-8.9	-9.5	-10.1	-10.3	-10.8	-11.1	-11.1	-11.2	-11.6	-12.1	-8.9	-6.4
22-Nov	-12.2	-12.3	-12.3	-12.2	-12.3	-12.5	-12.9	-13.2	-13.0	-12.8	-12.4	-12.0	-12.1	-11.3	-11.6	-12.2	-12.5	-12.9	-13.1	-13.3	-14.0	-14.8	-15.0	-15.2	-12.8	-11.3
23-Nov	-14.9	-15.0	-14.8	-14.2	-13.7	-13.5	-13.7	-14.2	-14.1	-13.6	-13.0	-12.5	-12.1	-11.0	-10.8	-11.8	-13.5	-14.6	-13.9	-13.0	-12.5	-12.5	-12.7	-13.1	-13.3	-10.8
24-Nov	-13.6	-14.2	-15.2	-15.7	-15.7	-16.5	-16.9	-17.3	-17.2	-17.1	-17.1	-16.8	-16.3	-16.1	-15.8	-15.8	-16.0	-16.1	-16.6	-19.3	-18.9	-20.0	-18.9	-18.3	-16.7	-13.6
25-Nov	-18.1	-18.2	-19.2	-19.7	-18.4	-18.5	-19.7	-20.2	-20.5	-20.7	-20.3	-19.6	-19.3	M	M	M	-25.1	-27.9	-28.0	-29.5	-30.5	-30.0	-27.5	-26.2	-22.7	-18.1
26-Nov	-25.7	-25.4	-24.7	-23.8	-23.5	-22.6	-22.8	-22.9	-22.1	-20.7	-18.8	-17.0	-15.4	-14.8	-14.5	-14.3	-14.2	-14.9	-16.3	-17.1	-17.5	-17.4	-17.6	-18.4	-19.3	-14.2
27-Nov	-18.7	-19.7	-20.3	-20.4	-21.1	-21.4	-21.9	-22.3	-22.7	-22.9	-23.4	-22.4	-21.9	-22.3	-22.8	-24.5	-27.3	-29.0	-29.0	-25.3	-24.4	-24.5	-24.6	-24.7	-23.2	-18.7
28-Nov	-24.7	-24.8	-24.9	-24.9	-24.6	-24.6	-24.5	-24.5	-24.3	-24.0	-23.7	-23.3	-22.9	-22.9	-22.9	-23.3	-23.7	-24.3	-25.3	-25.6	-26.3	-27.7	-29.3	-30.5	-24.9	-22.9
29-Nov	-31.4	-29.2	-27.9	-27.6	-27.7	-28.1	-27.6	-27.5	-28.2	-27.5	-25.5	-24.4	-23.6	-22.8	-22.4	-22.4	-21.9	-21.7	-22.6	-23.4	-24.1	-24.6	-25.5	-25.7	-25.5	-21.7
30-Nov	-25.8	-25.9	-26.1	-26.2	-26.2	-26.6	-27.8	-29.0	-29.1	-28.0	-26.6	-25.4	-24.0	-23.0	-22.4	-22.9	-23.7	-23.4	-23.0	-23.4	-23.0	-22.7	-22.3	-22.1	-24.9	-22.1
																								Diurnal Average		
																								Diurnal Maximum		
-13.3 -13.5 -13.5 -13.6 -13.5 -13.6 -13.7 -13.7 -13.6 -13.0 -12.3 -11.5 -10.9 -10.2 -10.1 -10.6 -12.0 -12.9 -13.4 -13.7 -14.0 -14.1 -14.0 -14.0																										
0.9 0.5 0.6 0.9 0.6 0.5 0.6 0.8 0.9 1.7 3.7 5.0 6.2 6.8 7.0 6.1 3.1 1.6 1.9 1.8 1.6 1.2 -0.1 -0.5																										
M - Maintenance																										



WBEA
Hourly Averages

Ambient Temperature (AT) - C
Wapasu - November 2014





WBEA
Cumulative Frequency Distribution

Ambient Temperature (AT) - C
Wapasu - November 2014

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	144	20.08	20.08
-20 - 0	534	74.48	94.56
0 - 10	39	5.44	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 717

Total Number of Hours: 720

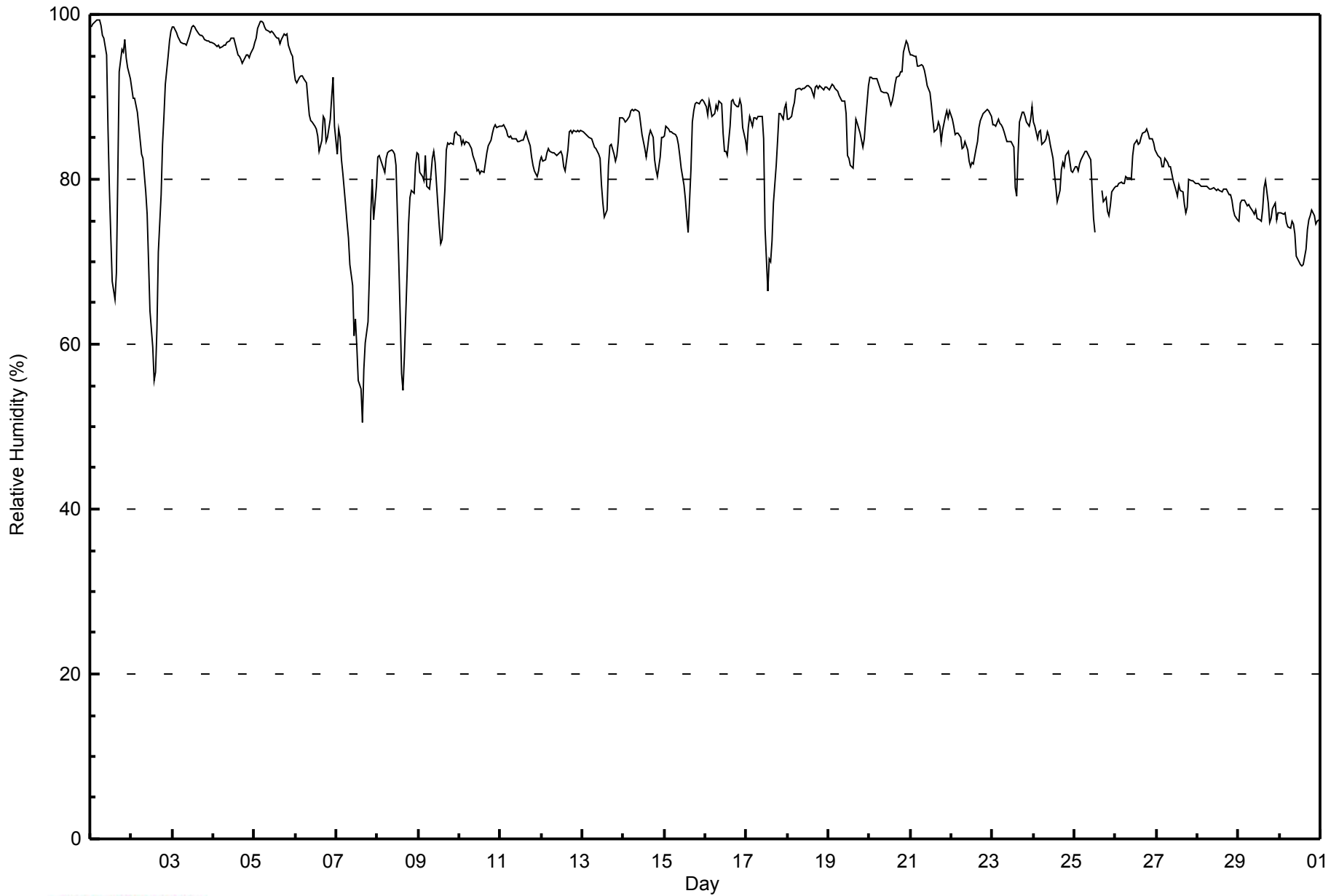


Maximum Value: 99 % on Nov 1 05:00																		Maximum Daily Average: 97.3 % on Nov 3						Hours in Service: 720																								
Minimum Value: 51 % on Nov 7 16:00																		Minimum Daily Average: 70.1 % on Nov 7						Hours of Data: 717																								
Maximum Diurnal Average: 87.0 % at hour 3																		Minimum Diurnal Average: 79.0 % at hour 15						Hours of Missing Data: 3																								
Monthly Average: 84.6 %																		Percentiles: P ₁ = 56 P ₁₀ = 76 Q ₁ = 80 Median = 85 Q ₃ = 89 P ₉₀ = 96 P ₉₉ = 99						Hours of Calibration: 0																								
																								Percent Operational Time: 99.6																								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Nov	98	99	99	99	99	99	99	97	97	95	86	79	73	68	65	69	80	93	96	95	97	95	94	92	90.2	99																						
2-Nov	91	90	90	88	86	85	83	83	78	76	70	64	60	56	57	62	71	78	84	88	92	95	97	98	80.0	98																						
3-Nov	99	98	98	97	97	97	96	97	96	97	97	98	99	99	98	98	97	97	97	97	97	97	97	97	97.3	99																						
4-Nov	96	96	96	96	96	96	96	96	97	97	97	97	97	95	95	95	94	95	95	95	95	95	95	96	95.8	97																						
5-Nov	97	97	98	99	99	99	98	98	98	98	98	98	97	97	96	97	98	98	98	98	96	95	95	93	97.3	99																						
6-Nov	92	92	92	93	93	92	92	90	88	87	87	86	86	85	83	85	88	87	85	85	87	90	92	86	88.5	93																						
7-Nov	83	86	85	82	81	77	75	73	70	67	61	63	60	56	55	51	57	60	63	69	76	80	75	79	70.1	86																						
8-Nov	83	83	82	81	81	83	83	83	84	83	83	82	70	63	56	54	59	69	75	78	79	78	82	83	76.6	84																						
9-Nov	83	81	80	80	83	79	79	80	82	83	82	77	74	72	73	79	84	84	84	84	84	86	86	86	81.1	86																						
10-Nov	85	84	85	84	85	84	84	84	83	82	81	81	81	81	81	82	83	84	85	86	86	87	86	86	83.8	87																						
11-Nov	87	86	87	86	85	85	85	85	85	85	85	85	85	85	86	85	84	83	82	81	80	81	82	84.3	87																							
12-Nov	83	82	82	83	84	83	83	83	83	83	83	83	82	81	84	86	86	86	86	86	86	86	86	86	83.8	86																						
13-Nov	86	86	85	85	85	85	84	84	84	83	83	79	77	75	76	82	84	84	83	82	83	85	87	87	83.1	87																						
14-Nov	87	87	87	88	88	88	88	88	88	88	87	85	84	83	84	85	86	85	82	81	80	83	85	85	85.6	88																						
15-Nov	85	86	86	86	86	86	85	85	84	83	81	79	78	75	74	81	87	88	89	89	89	89	90	89	84.7	90																						
16-Nov	89	88	90	89	88	88	89	88	89	89	86	83	83	83	86	90	90	89	89	89	90	89	86	85	87.7	90																						
17-Nov	84	86	88	86	87	88	87	88	88	88	85	74	66	70	70	73	77	82	85	88	88	87	89	89	83.0	89																						
18-Nov	87	87	88	89	89	91	91	91	91	91	91	91	91	91	91	90	91	91	91	91	91	91	91	91	90.4	91																						
19-Nov	91	91	92	91	91	91	90	90	90	89	88	83	83	82	81	84	87	87	86	85	84	85	87	91	87.4	92																						
20-Nov	92	92	92	92	92	92	91	91	90	90	90	90	89	90	90	92	92	93	93	93	95	97	96	96	92.2	97																						
21-Nov	95	95	95	95	94	94	94	94	93	92	91	90	89	87	86	86	87	86	85	86	88	88	88	88	90.3	95																						
22-Nov	87	86	85	86	86	85	84	84	85	83	82	82	82	82	84	85	86	87	88	88	88	88	88	88	85.4	88																						
23-Nov	87	87	87	87	87	87	86	86	85	85	85	85	84	79	78	83	87	88	88	88	87	86	87	89	85.6	89																						
24-Nov	87	86	85	86	86	84	85	85	86	85	84	83	81	79	77	79	81	82	81	83	83	82	81	81	83.0	87																						
25-Nov	82	82	81	82	82	83	83	83	83	82	79	75	74	M	M	M	79	77	78	76	76	77	79	79	79.6	83																						
26-Nov	79	79	80	80	79	80	80	80	80	80	83	84	85	84	84	85	86	86	86	86	85	85	84	84	82.7	86																						
27-Nov	83	83	83	82	82	83	82	82	81	81	80	79	78	79	79	78	77	76	77	80	80	80	80	80	80.1	83																						
28-Nov	79	79	79	79	79	79	79	79	79	79	79	79	79	79	78	79	79	79	78	78	78	76	76	75	78.4	79																						
29-Nov	75	77	77	77	77	77	77	77	76	76	76	75	75	75	76	79	80	77	75	75	76	77	75	76	76.4	80																						
30-Nov	76	76	76	76	75	74	74	75	75	73	71	70	70	70	70	72	74	75	76	76	76	75	75	75	73.8	76																						
																								86.9	87.0	87.0	86.8	86.7	86.4	86.2	85.9	85.6	85.0	83.7	82.0	80.4	79.4	79.0	80.7	83.0	84.2	84.6	85.2	85.7	86.1	86.3	86.4	Diurnal Average
																								99	99	99	99	99	99	99	98	98	98	98	98	99	99	98	98	97	98	98	98	97	97	97	98	Diurnal Maximum
M - Maintenance																																																



WBEA
Hourly Averages

Relative Humidity (RH) - %
Wapasu - November 2014





WBEA
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Wapasu - November 2014

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	11	1.53	1.53
60 - 80	163	22.73	24.27
80 - 100	543	75.73	100.00

Total Number of Valid Hours: 717

Total Number of Hours: 720



Maximum Speed: 26 km/h on Nov 6 09:00	Maximum Daily Speed Average: 13.0 km/h on Nov 7	Hours in Service: 720
Minimum Speed Value: 1 km/h on Nov 11 17:00	Minimum Daily Speed Average: 1.9 km/h on Nov 3	Hours of Data: 717
Maximum Diurnal Speed Average: 2.6 km/h at hour 14	Minimum Diurnal Speed Average: 0.2 km/h at hour 7	Hours of Missing Data: 3
Monthly Average Velocity: 0.8 km/h 342.3 deg	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 5 Median = 6 Q ₃ = 9 P ₉₀ = 12 P ₉₉ = 18	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-Nov	SSE3	SSE4	S4	SSW4	S4	S4	S4	SSW5	S6	S5	SSW7	SW7	SW7	WSW8	WSW7	SW6	S3	SSE5	SSE6	SSE6	SSE6	SSE7	SSE6	SSE7	S4.6	WSW8	
2-Nov	SSE6	SSE7	SSE7	SSE6	SE6	SSE6	SSE7	SSE7	SSE9	SSE10	SSE10	SSE10	S8	S8	S8	SSE10	SSE10	SSE12	SSE12	SSE11	SSE10	SSE10	SSE10	SSE9	SSE8.7	SSE12	
3-Nov	SSE9	SSE7	SE6	SSE6	SSE6	SSE5	SSE3	S1	NW1	NW4	NW6	N7	N8	N7	N7	N7	NNE6	NNE6	NNE4	NNE4	NE4	NE4	ENE4	E4	NE1.9	SSE9	
4-Nov	E4	SE6	SE6	SSE6	SSE7	SSE7	SSE6	SE7	SSE7	SE8	SE9	SE8	SE12	SE11	SE11	SE11	SE12	SE11	SE12	SE12	SE13	SE12	SSE10	SSE9	SE8.9	SE13	
5-Nov	SSE6	S4	WSW6	W7	W10	WNNW9	NW9	WNNW7	WNNW8	WNNW8	NW9	NW9	NW9	NW9	NW7	NW7	NW5	W1	SW3	SE2	SSE4	SSW6	SSW6	SSE7	S8	W3.8	W10
6-Nov	SSE10	SSE13	SSE16	SSE18	SE19	SSE21	SSE21	SSE23	SSE26	SSE25	SSE24	S19	SSE18	S13	S12	S10	S9	SSW8	SSW6	WSW6	WNNW6	NNW12	NNW14	NNW15	SSE10.7	SSE26	
7-Nov	NW15	NNW19	NNW18	NNW19	NNW15	NNW19	NNW16	NNW16	NNW17	NNW18	NNW17	NNW16	NNW16	NNW15	NNW14	NW14	NW9	NNW9	NNW7	NNW6	NW4	N4	NNW7	NW4	NNW13.0	NNW19	
8-Nov	NNW4	NNW6	N3	N2	SW1	WSW2	WNNW3	NW3	NW2	NW7	NNW9	NNW10	NNW13	NNW11	NNW11	NNW10	NNW7	NNW5	N6	N6	N7	NNW8	NNW6	NNE4	NNW5.7	NNW13	
9-Nov	N3	ENE2	SSE3	SE3	NNW3	ESE3	SE3	ENE4	NE5	NE4	N5	NNW5	NNW5	NNW6	NW7	NNW5	NNW2	NNW3	NNE4	NNE4	NNE4	NNE4	N5	N5	N2.8	NW7	
10-Nov	N5	N5	N6	NNW7	N7	NNW7	NNW8	N11	N10	N12	N14	N11	N12	NNW13	N12	N12	N10	NNE9	NNE8	N8	N8	N7	N5	N8	N9.0	N14	
11-Nov	N7	NNE7	NNE7	NNE6	NNE7	NNE6	NNE6	NNE7	NNE6	NNE5	NNW5	N5	NNW6	NNW5	N4	N4	N1	E1	E2	ESE3	SE4	SE4	SE5	SE5	NNE3.3	NNE7	
12-Nov	SSE4	SSE4	SSE4	S4	S3	S3	S4	S4	SSE4	S5	SSW5	SSW5	SSW5	SW5	SSW5	SSW5	SSW4	S6	S6	S6	S6	S6	S6	S6	S4.6	S6	
13-Nov	S6	S6	S6	S6	S5	S5	S5	SSE5	SSE6	S5	S5	S5	SW4	WSW3	WNNW3	NW4	NNE3	ESE3	E3	E3	NE4	NE4	NE4	NNE4	S2.1	S6	
14-Nov	NNE4	NNE3	NNE3	N3	N3	N4	N4	N5	N6	N6	N7	N6	N5	N5	NNW5	NNW4	NNW3	ENE1	ESE2	SE3	SE3	SSE4	S4	SW6	N2.3	N7	
15-Nov	SW8	SW8	SSW9	SSW8	SSW8	SSW9	SSW9	SSW10	SSW10	SSW9	SSW10	SSW9	SSW7	WSW7	WNNW6	NNW11	N15	NNW15	NNW17	NNW18	N17	NNW16	NNW18	NNW18	NNW16	WNNW5.4	NNW18
16-Nov	NNW17	N16	N16	N15	N14	N13	N11	N12	NNW12	NNW13	NNW13	NNW13	NNW12	NNW13	NNW11	NNW10	NNW9	NNW9	NNW8	NNW7	N5	N3	NNE2	SE3	NNW10.4	NNW17	
17-Nov	SSE4	SSE4	SSE3	SSE4	SSE5	S5	SSE7	SSE7	S7	SSE8	S9	S11	S12	SSW11	SSW10	SW9	SSW6	WSW5	NW4	N4	N7	N8	NNW12	N14	S3.1	NNW14	
18-Nov	N16	NNW13	NNW12	NNW10	NNW10	NNW12	NNW11	NNW13	NNW11	NNW11	NNW11	NNW11	NNW12	NNW13	NNW14	NNW12	NW13	NNW10	NNW12	NNW10	NNW8	NNW7	NNW7	NNW6	NW6	NNW10.8	N16
19-Nov	NNW7	NNW6	NW5	NW5	NNW5	NNW5	NNW4	NNW2	WNNW2	WSW3	WSW5	SW6	SW6	SW7	SSW6	S5	S5	S6	SSE7	S9	S9	S8	S8	S8	SW2.6	S9	
20-Nov	S8	S8	SSE7	S10	SSE9	S9	S9	S8	SSE9	SSE9	S8	S9	SSW8	SW8	WSW6	SW4	SW3	SW3	N3	N5	NE6	NE6	NE6	NNE6	S4.0	S10	
21-Nov	NNE6	NNE7	N7	N8	NNW8	NNW7	NNW10	NNW11	NNW11	NNW9	NNW10	NNW11	NNW9	NNW9	N8	N6	NNE5	NNE6	NNE6	NNE3	NNE1	NE4	NE5	NE5	N6.6	NNW11	
22-Nov	E6	E5	E6	E5	E5	E8	E8	E7	ENE6	ENE6	E7	ENE7	ENE8	NE9	NE10	NE10	NE8	NE6	NNE6	NE7	NE5	NE5	NE5	NE5	ENE6.2	NE10	
23-Nov	NNE3	NNE3	ENE3	SSE3	SSE5	S5	SSW5	SSE7	SSE8	S7	S8	SSW8	SW7	SSW7	SSW6	SSW5	S4	S4	S5	SSW3	SW4	WNNW3	NNW4	N6	S3.2	SSE8	
24-Nov	N8	N8	N8	N6	NNW8	NNW10	NNW7	N5	NNW5	NNW6	N5	N4	NE3	NE3	ENE2	ENE2	E3	ESE4	SE2	E4	E3	ESE5	SE5	E4	NNE3.4	NNW10	
25-Nov	ENE3	ENE3	ENE4	E3	NE4	NNW5	NNW5	NNW5	N4	N3	NNW4	NNE5	N5	M	M	M	E3	ESE4	ESE4	SE5	SSE3	SSE6	SSE6	SSE6	ENE1.9	SSE6	
26-Nov	SSE5	SSE6	SSE7	SSE7	SSE8	SSE10	SSE10	SSE8	S9	S9	S9	S8	SSW7	SSW8	S6	SSW4	SW2	NNW5	NNW7	N8	N9	NNE7	N10	N10	S2.7	SSE10	
27-Nov	N12	N10	N8	N8	N5	N6	N7	N6	N7	N7	N5	N5	NNW5	WNNW4	NNW3	N2	SE2	ESE2	ENE3	NE5	NNE5	NNE5	NE5	NE6	N5.0	N12	
28-Nov	NE7	NE6	NE5	NE6	NE6	NE6	NE6	NE5	NNE6	NNE5	NNE7	NE8	NE7	NNE7	NNE7	NNE6	NNE5	NNE4	NNE3	NNE2	ENE2	E1	SE3	SE4	NE4.6	NE8	
29-Nov	SSE4	SSE5	S5	S6	S6	S7	SSW7	SSW7	S7	S6	SSW7	SW8	SW7	SW6	SW5	WSW6	W6	NW10	NW12	NW10	NW9	NW8	NW8	WNNW8	WSW4.1	NW12	
30-Nov	NW10	NW10	NW9	NNW10	WNNW10	WNNW9	W6	WSW6	WSW7	SW7	SW8	SW8	SSW9	SSW11	SSW11	SSW10	S10	SSW10	S11	S11	S11	S9	S11	S8	SW6.3	SSW11	

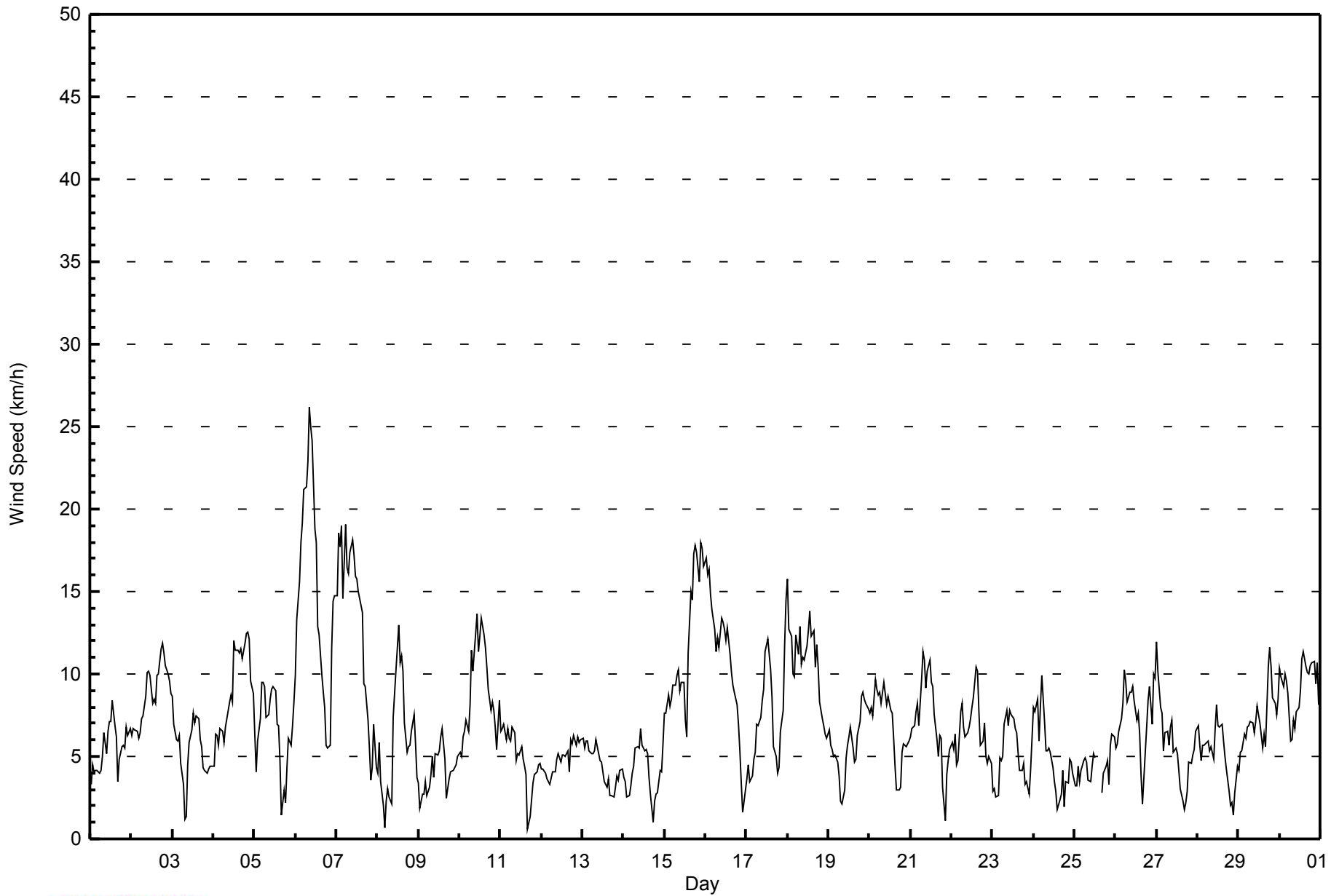
NNE1.6	NNE1.3	NNE0.9	N0.3	N0.3	NW0.4	NW0.2	N0.3	SSE0.2	W0.6	W1.2	NNW1.6	NNW2.2	NNW2.6	NW2.2	NW1.9	N0.8	N1.0	NNE1.3	NE1.3	NE1.2	NE1.4	NNE1.4	NNE1.3	Diurnal Average																							
NNW17																							NNW19	NNW18	NNW19	SE19	SSE21	SSE21	SSE23	SSE26	SSE25	SSE24	S19	SSE18	NNW15	NNW14	N15	NNW15	NNW17	NNW18	N17	NNW16	NNW18	NNW18	NNW16	Diurnal Maximum	

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



WBEA
Hourly Averages

Wind Speed (WS) - km/h
Wapasu - November 2014





WBEA
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Wapasu - November 2014

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	260	36.26	36.26
6 - 11	372	51.88	88.15
12 - 19	79	11.02	99.16
20 - 28	6	0.84	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 717

Total Number of Hours: 720



WBEA
Frequency Distribution

Wind Speed (WS) - km/h
Wapasu - November 2014

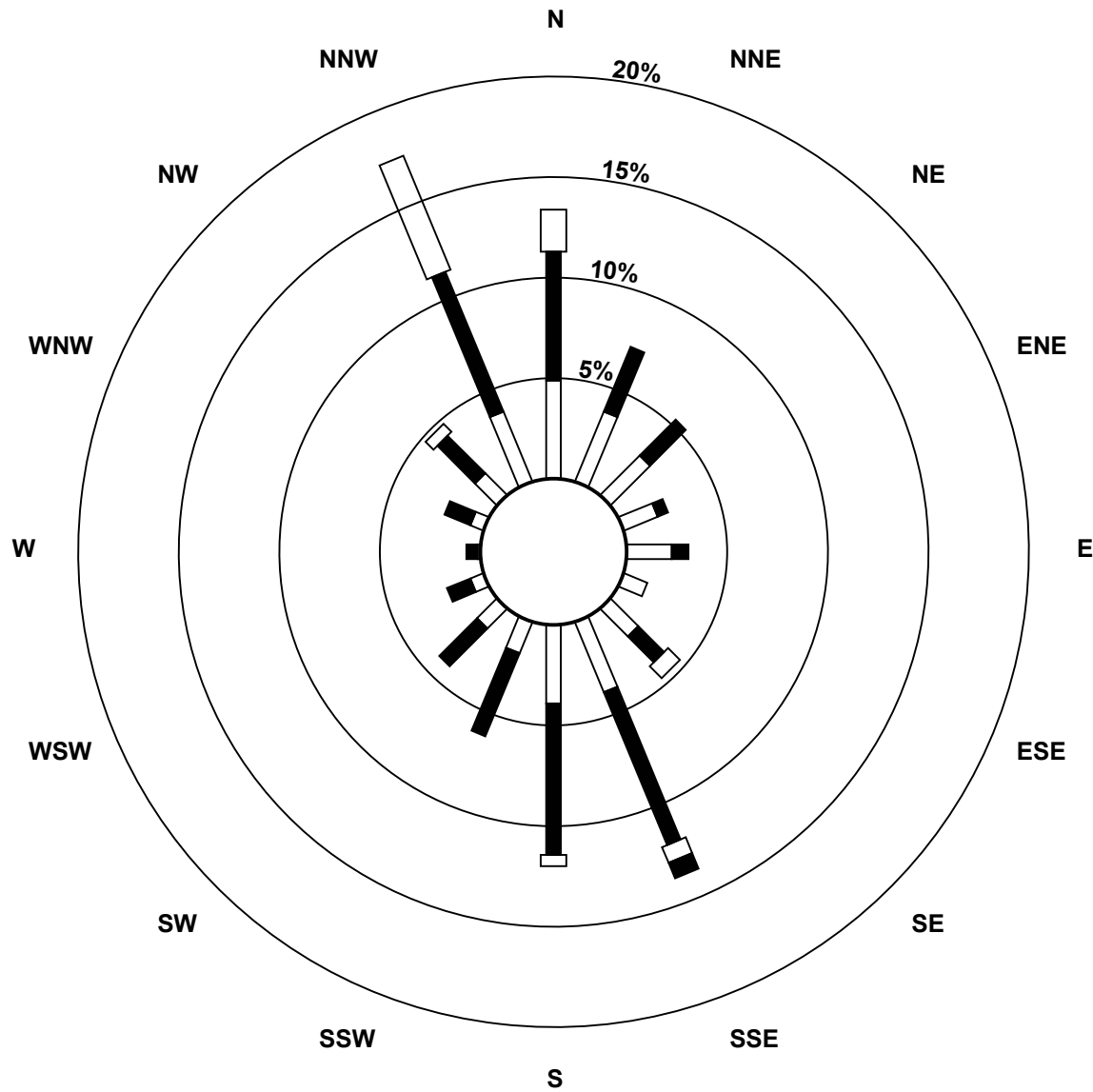
Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	35	27	20	13	16	9	14	27	28	12	10	5	1	5	11	27	260
6 - 11	46	25	18	4	6	0	13	59	54	32	19	9	4	10	19	54	372
12 - 19	15	0	0	0	0	0	6	6	4	0	0	0	0	0	4	44	79
20 - 28	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	6
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	96	52	38	17	22	9	33	98	86	44	29	14	5	15	34	125	717

Total Number of Valid Hours: 717

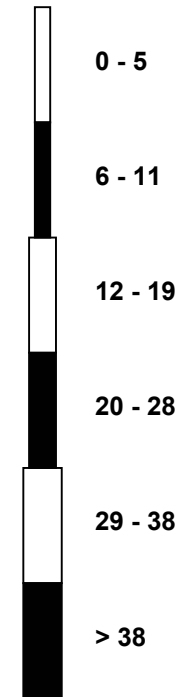
Total Number of Hours: 720

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

**Wind Speed (WS) - km/h
Wapasu (AMS 17)**



Classes (km/h)



Total Number of Valid Hours: 717



Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed (WS) - km/h

Wapasu - November 2014

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 8 km/h on Nov 6 10:00			Hours of Data:	717
Minimum Value: 0 km/h on Nov 14 20:00			Hours of Missing Data:	3
			Hours of Calibration:	0
			Percent Operational Time:	99.6
Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 6				

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

6	6	6	7	5	6	6	6	6	7	8	8	7	6	5	5	6	5	6	6	7	5	5	5	5
Diurnal Maximum																								

M - Maintenance



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Wapasu - November 2014

Direction of Maximum Speed: 152 deg on Nov 6 09:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 335.7 deg on Nov 7	Hours of Data: 717
Direction of Minimum Speed: 10 deg on Nov 11 17:00	Hours of Missing Data: 3
Direction of Minimum Daily Speed Average: 1.9 deg on Nov 3	Percent Operational Time: 99.6
Monthly Average Direction: 315.5 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-Nov	160	156	185	198	175	171	175	192	169	191	197	215	229	246	246	233	177	150	153	149	149	151	153	150	184.3
2-Nov	152	152	150	148	144	152	156	161	158	159	167	168	172	178	173	159	152	147	149	147	149	154	151	155	156.2
3-Nov	152	152	145	149	150	149	148	172	304	314	326	352	349	351	8	5	13	19	14	19	42	56	65	98	43.8
4-Nov	99	141	142	158	157	163	154	142	152	145	139	130	129	128	131	131	125	127	137	143	142	145	149	150	139.2
5-Nov	148	180	247	262	266	287	304	290	296	300	311	320	318	312	312	317	261	226	144	161	206	193	168	170	271.9
6-Nov	165	161	159	150	146	147	147	147	152	160	162	170	167	179	176	174	185	196	212	254	299	344	347	335	162.6
7-Nov	326	338	341	337	343	343	343	337	337	337	334	334	332	336	331	326	324	335	344	335	325	351	331	320	335.7
8-Nov	334	333	358	359	220	239	294	313	305	326	333	335	333	340	336	328	335	341	359	355	356	336	342	19	336.5
9-Nov	8	63	150	145	347	120	142	61	52	39	350	348	340	343	319	332	340	340	14	23	29	19	358	352	7.6
10-Nov	355	359	349	347	355	347	344	359	1	356	357	351	350	344	355	359	4	13	18	11	4	8	4	10	357.9
11-Nov	7	12	24	16	16	19	23	24	25	21	341	6	335	337	358	6	10	84	87	113	135	146	143	145	23.7
12-Nov	147	150	149	170	179	185	178	172	168	179	196	198	211	228	208	196	192	171	182	185	184	181	181	184	183.3
13-Nov	181	183	178	183	179	177	180	166	166	172	177	188	216	252	295	313	12	104	100	81	39	37	35	29	169.4
14-Nov	27	22	30	10	359	0	1	358	354	357	8	7	360	354	342	330	338	68	121	134	130	155	185	214	5.5
15-Nov	227	220	211	213	207	211	211	209	207	205	210	223	248	303	337	349	343	347	347	355	345	340	340	344	300.8
16-Nov	345	351	353	354	351	350	350	355	343	330	335	331	332	329	335	335	340	340	345	338	358	360	23	144	343.7
17-Nov	148	152	157	158	158	169	168	167	170	167	170	178	188	194	201	219	204	242	314	353	359	356	342	349	189.8
18-Nov	351	347	343	332	335	332	337	337	336	333	332	330	336	331	330	325	335	334	336	330	333	329	331	321	334.8
19-Nov	329	330	325	320	327	348	343	332	289	255	242	235	226	218	201	181	169	172	168	170	173	174	174	174	213.9
20-Nov	170	171	166	169	167	169	170	171	166	166	179	190	207	230	241	227	221	235	357	11	39	40	34	33	175.3
21-Nov	31	12	358	354	347	341	334	337	343	346	330	328	328	331	349	9	22	17	19	15	15	50	36	50	353.2
22-Nov	85	84	86	100	94	84	82	80	77	77	82	66	59	51	48	56	54	37	30	36	36	38	34	49	63.1
23-Nov	30	20	69	154	157	187	195	160	161	175	188	197	224	202	195	205	182	177	183	211	224	287	342	7	188.1
24-Nov	358	352	355	352	345	343	346	349	345	348	2	4	39	51	78	67	84	107	126	101	90	105	124	101	16.6
25-Nov	76	57	71	79	49	341	332	342	360	359	338	14	11	M	M	M	96	104	103	142	150	150	150	149	64.8
26-Nov	156	151	160	160	158	162	162	165	170	177	188	191	197	194	179	198	222	341	345	360	11	13	350	352	170.7
27-Nov	356	2	5	11	357	357	5	354	3	359	7	354	333	301	348	4	127	112	69	37	33	30	37	42	8.0
28-Nov	42	34	38	45	41	38	38	35	31	33	32	36	34	26	25	19	20	27	32	31	68	95	139	146	37.9
29-Nov	160	168	182	187	186	190	193	195	188	191	211	224	235	231	231	254	277	309	318	317	318	314	311	299	245.3
30-Nov	304	306	304	302	301	299	265	255	242	236	228	221	206	206	202	198	190	192	190	178	181	175	188	182	224.6
	15.6	18.1	24.1	356.4	8.4	324.4	309.2	6.1	154.6	273.7	277.0	285.8	291.0	292.4	307.6	317.7	351.2	7.2	23.6	34.9	37.0	36.5	18.7	28.3	

Diurnal Average

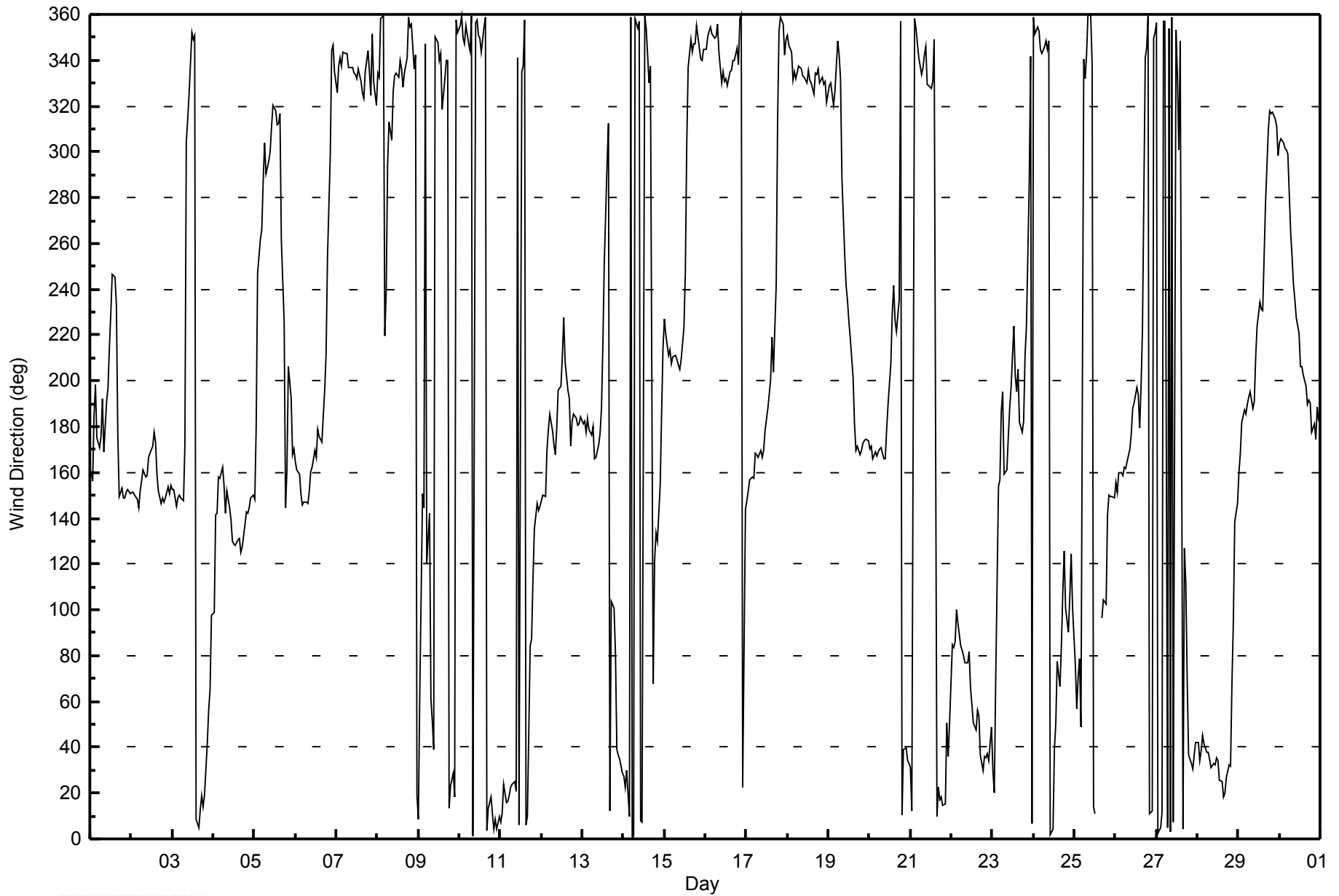
M - Maintenance

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



WBEA
Hourly Averages

Wind Direction (WD) - deg
Wapasu - November 2014





Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

Wapasu - November 2014

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 76 deg on Nov 8 05:00	Hours of Data: 717
Minimum Value: 6 deg on Nov 11 22:00	Hours of Missing Data: 3
Percentiles: P ₁ = 8 P ₁₀ = 19 Q ₁ = 23 Median = 29 Q ₃ = 34 P ₉₀ = 38 P ₉₉ = 62	Hours of Calibration: 0
	Percent Operational Time: 99.6

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	26	21	38	37	24	25	37	43	29	36	38	37	31	29	28	32	18	8	7	8	7	7	11	8	43
2-Nov	9	9	14	15	13	15	15	18	20	22	26	26	33	29	30	21	19	17	19	18	18	21	20	22	33
3-Nov	19	18	16	14	21	16	38	73	54	18	25	32	34	37	41	39	38	39	40	38	44	42	43	37	73
4-Nov	39	22	24	33	29	31	30	21	22	20	19	20	19	19	20	18	19	19	19	18	18	20	19	39	39
5-Nov	18	36	23	24	24	26	23	25	24	24	23	21	21	24	22	22	66	23	41	36	36	37	24	30	66
6-Nov	29	27	24	20	20	19	20	21	21	24	26	31	28	34	32	29	31	32	35	33	26	30	34	23	35
7-Nov	20	26	28	26	31	28	31	26	26	25	24	25	27	26	24	22	21	23	29	20	28	31	24	24	31
8-Nov	22	20	25	33	76	35	40	45	50	24	26	23	27	31	27	22	22	25	26	30	33	23	28	27	76
9-Nov	24	36	22	23	23	22	16	33	18	39	39	41	47	38	26	24	39	25	27	27	23	36	34	34	47
10-Nov	34	31	32	28	38	32	28	36	37	34	34	32	34	28	35	35	35	37	41	33	35	36	33	37	41
11-Nov	38	35	36	41	40	38	39	37	36	48	34	38	29	38	38	38	61	23	13	13	10	6	7	11	61
12-Nov	14	15	12	18	22	26	28	24	20	31	37	38	40	41	41	32	27	23	32	30	27	27	28	28	41
13-Nov	24	27	25	29	25	25	28	22	20	26	28	34	34	36	35	14	30	21	24	21	18	18	25	37	37
14-Nov	33	29	32	34	35	35	36	38	33	37	36	40	37	38	34	17	27	63	27	13	15	13	25	35	63
15-Nov	32	37	35	34	37	37	39	35	38	36	39	33	33	28	25	34	30	31	36	31	25	25	29	39	39
16-Nov	28	34	35	36	34	32	36	36	28	21	25	23	24	22	23	24	28	27	28	27	33	22	63	11	63
17-Nov	13	12	20	17	20	25	25	27	29	26	29	29	33	37	32	33	30	38	34	25	32	35	25	34	38
18-Nov	33	29	29	24	24	23	26	26	25	23	22	23	23	21	22	20	25	22	25	21	21	19	20	19	33
19-Nov	21	23	20	21	21	29	29	41	42	28	27	30	39	38	42	27	19	22	22	27	27	25	28	32	42
20-Nov	29	29	29	27	29	29	31	30	27	26	30	36	40	31	25	34	32	31	35	40	32	29	34	32	40
21-Nov	35	34	35	32	32	26	23	26	28	32	21	20	24	23	29	33	40	35	37	29	75	28	29	25	75
22-Nov	25	25	25	27	30	24	25	22	25	23	26	24	25	27	29	26	22	35	30	35	34	34	33	28	35
23-Nov	36	32	28	25	22	32	33	24	24	32	33	37	33	40	35	33	22	18	25	32	36	49	26	38	49
24-Nov	33	34	36	32	34	29	31	34	35	33	36	38	46	51	73	31	26	22	63	16	18	17	21	26	73
25-Nov	19	20	23	18	30	32	23	25	35	38	27	36	40	M	M	M	22	13	19	9	15	13	9	9	40
26-Nov	14	14	19	23	22	25	25	23	26	31	34	34	38	35	30	39	41	36	28	37	39	39	36	34	41
27-Nov	35	35	37	35	33	33	38	32	35	36	37	35	30	22	31	17	31	34	34	29	37	35	33	29	38
28-Nov	30	33	34	30	29	30	31	34	32	34	33	32	37	36	37	37	37	33	26	21	18	41	31	8	41
29-Nov	11	21	27	34	32	31	32	33	30	33	36	32	27	30	34	21	30	23	21	21	21	20	22	24	36
30-Nov	23	23	23	23	23	25	27	23	23	28	30	36	38	38	37	36	33	33	35	31	29	27	31	33	38
	39	37	38	41	76	38	40	73	54	48	39	41	47	51	73	39	66	63	63	40	75	49	63	38	
	Diurnal Maximum																								

M - Maintenance

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Wood Buffalo Environmental Association

SO₂ Calibration Report

Station Information

Calibration Date	November 19, 2014	Previous Calibration	October 22, 2014
Station Name	Wapasu	Station Number	AMS 17
Reason:	Routine		
Start Time (MST)	8:00	End Time (MST)	11:50
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	884	884
Calculated slope	0.999552	1.001301	Chamber temp.	44.9	44.9
Calculated intercept	0.685935	-0.240527	Pressure (mmHg)	695.8	695.8
Analyzer Background	8.3	8.3	Flow (lpm)	0.455	0.455
Analyzer Coefficient	0.808	0.808	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	-0.2	NA
as found span	5000	60.4	577.4	576.3	1.002
calibrator zero	5000	0.0	0.0	-0.2	NA
high point	5000	60.4	577.4	576.3	1.002
second point	5000	30.2	288.7	290.0	0.996
third point	5000	15.1	144.4	144.0	1.002
calibrator zero	6000	0.0	0.0	0.1	NA
as left zero	6000	0.0	0.0	0.1	NA
as left span	5000	60.4	577.4	580.0	0.996
Average Correction Factor					1.000

Corrected As found	576.5	Previous response	577.0	% change	0.1%
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Notes:

No Maintenance Done, Filter changed out, No adjustments made

Calibration Performed By:

Melissa Lemay



Wood Buffalo Environmental Association

SO₂ Calibration Summary

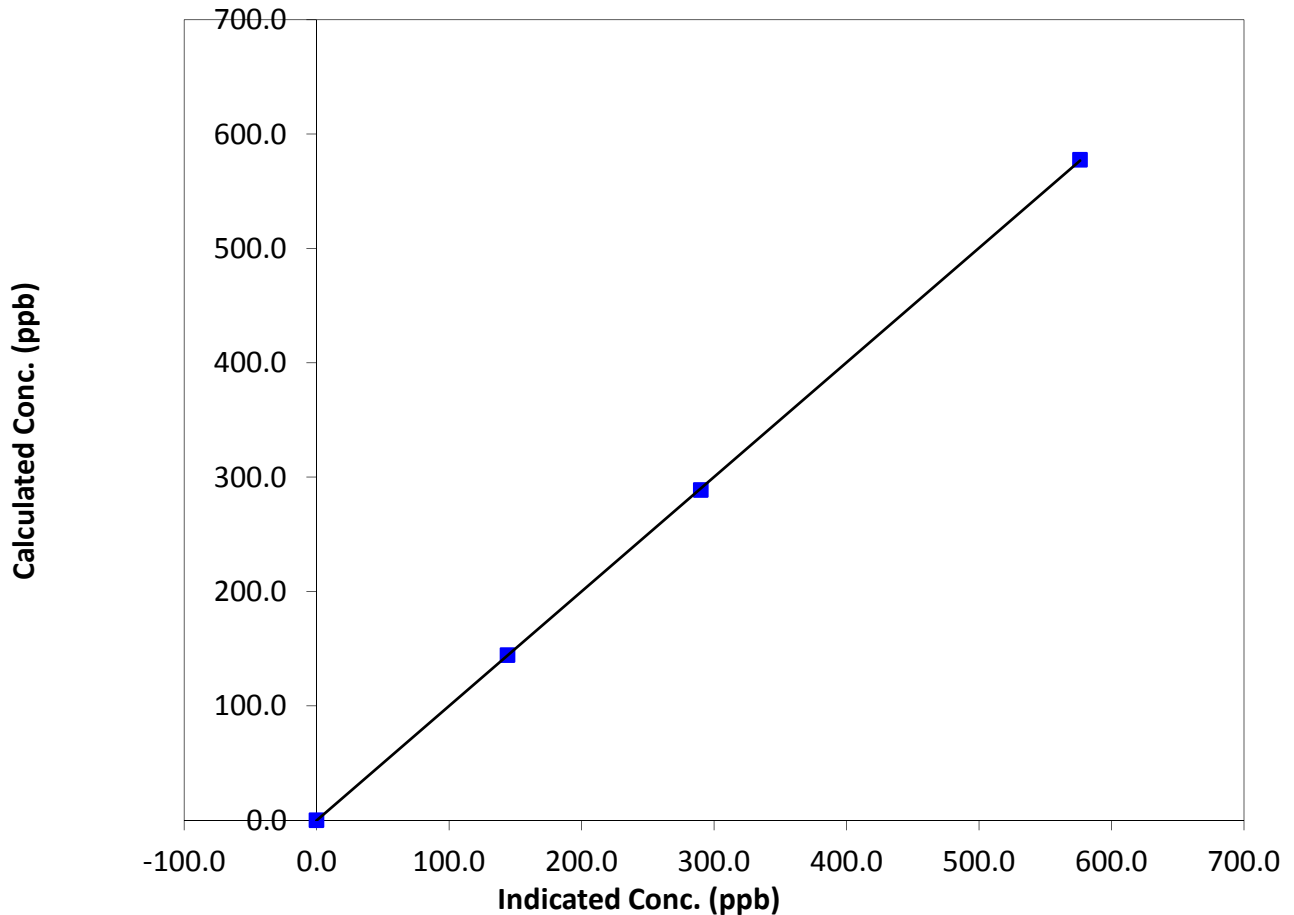
Station Information

Calibration Date	November 19, 2014	Previous Calibration	October 22, 2014
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	8:00	End Time (MST)	11:50
Analyzer make	Thermo 43i	Analyzer serial #	1218153459

Calibration Data

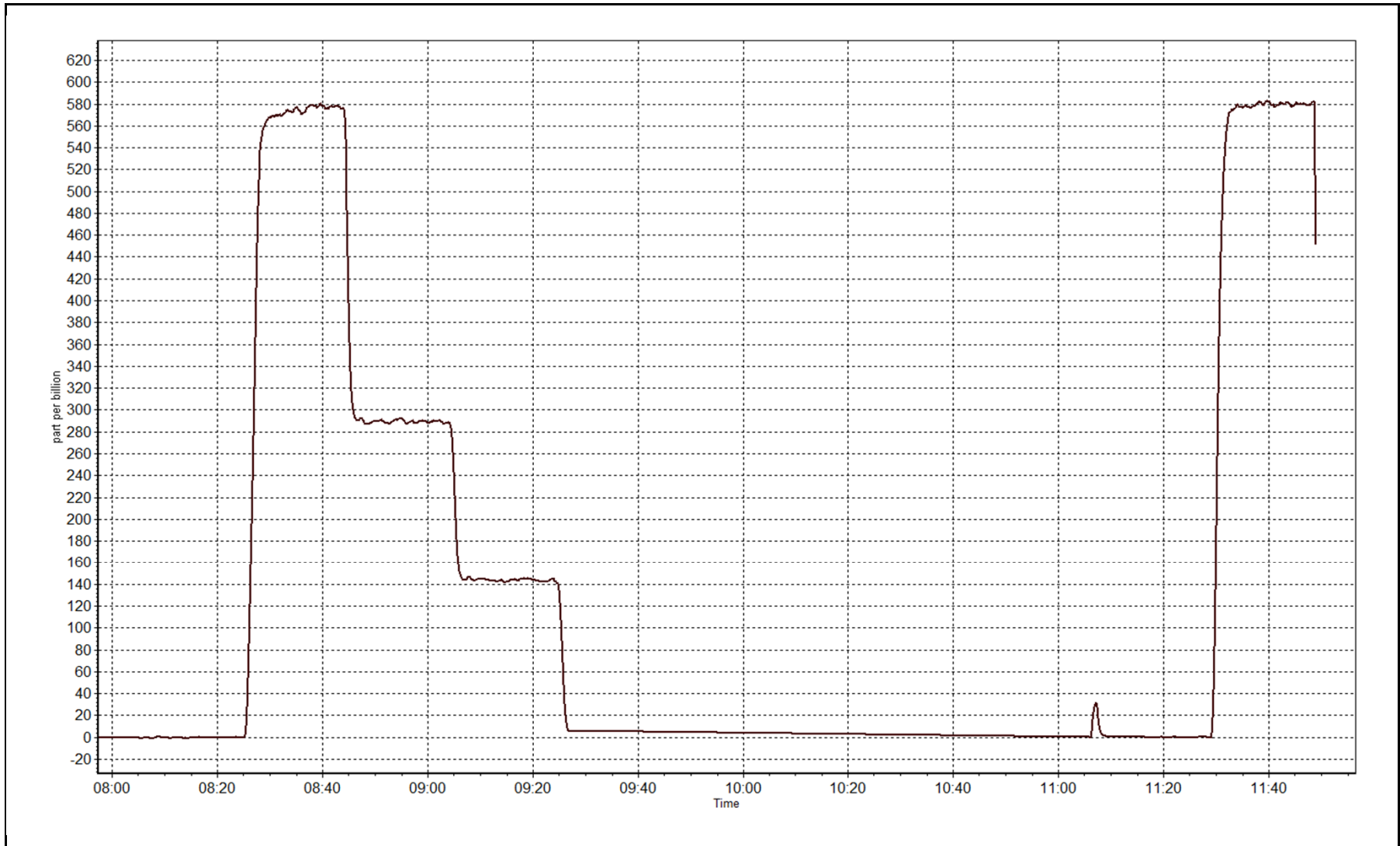
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	N/A	Correlation Coefficient	0.999985
577.4	576.3	1.0020		
288.7	290.0	0.9956	Slope	1.001301
144.4	144.0	1.0025		
			Intercept	-0.240527

SO₂ Calibration Curve



SO2 Calibration Plot

Date: November 19, 2014





Wood Buffalo Environmental Association

H2S Calibration Report

Station Information

Calibration Date	November 24, 2014	Previous Calibration	October 21, 2014
Station Name	Wapasu	Station Number	AMS 17
Reason:	Routine		
Start Time (MST)	11:50	End Time (MST)	13:50
Barometric Pressure	mmHg	Station temp.	22 Deg C
Calibrator Make/Model	API T700	Serial number	997
Cal Gas Concentration	5.1 ppm H2S	Cal Gas Expiry Date	9-Sep-17
Gas Cert Reference	CC107167	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	810	810
Calculated slope	0.978977	1.003588	Chamber temp.	45	45
Calculated intercept	0.244026	-0.270056	Pressure	561.2	561.2
Analyzer Background	11.8	12	Flow	0.981	0.981
Analyzer Coefficient	0.830	0.855	Intensity	91	91
			Converter temp.	338	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					
as found span					
SO2 scrubber check					
calibrator zero	5000	0.0	0.0	0.3	NA
high point	5000	78.4	80.0	79.9	1.001
second point	5000	39.2	40.0	40.4	0.991
third point	5000	19.6	20.0	20.1	0.997
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	78.4	80.0	79.6	1.005
Average Correction Factor					0.996

Corrected As found NA Previous response NA % change NA

Notes:

Cal Gas Changed out, Filter changed out, span adjusted

Calibration Performed By:

Melissa Lemay



Wood Buffalo Environmental Association

H2S Calibration Summary

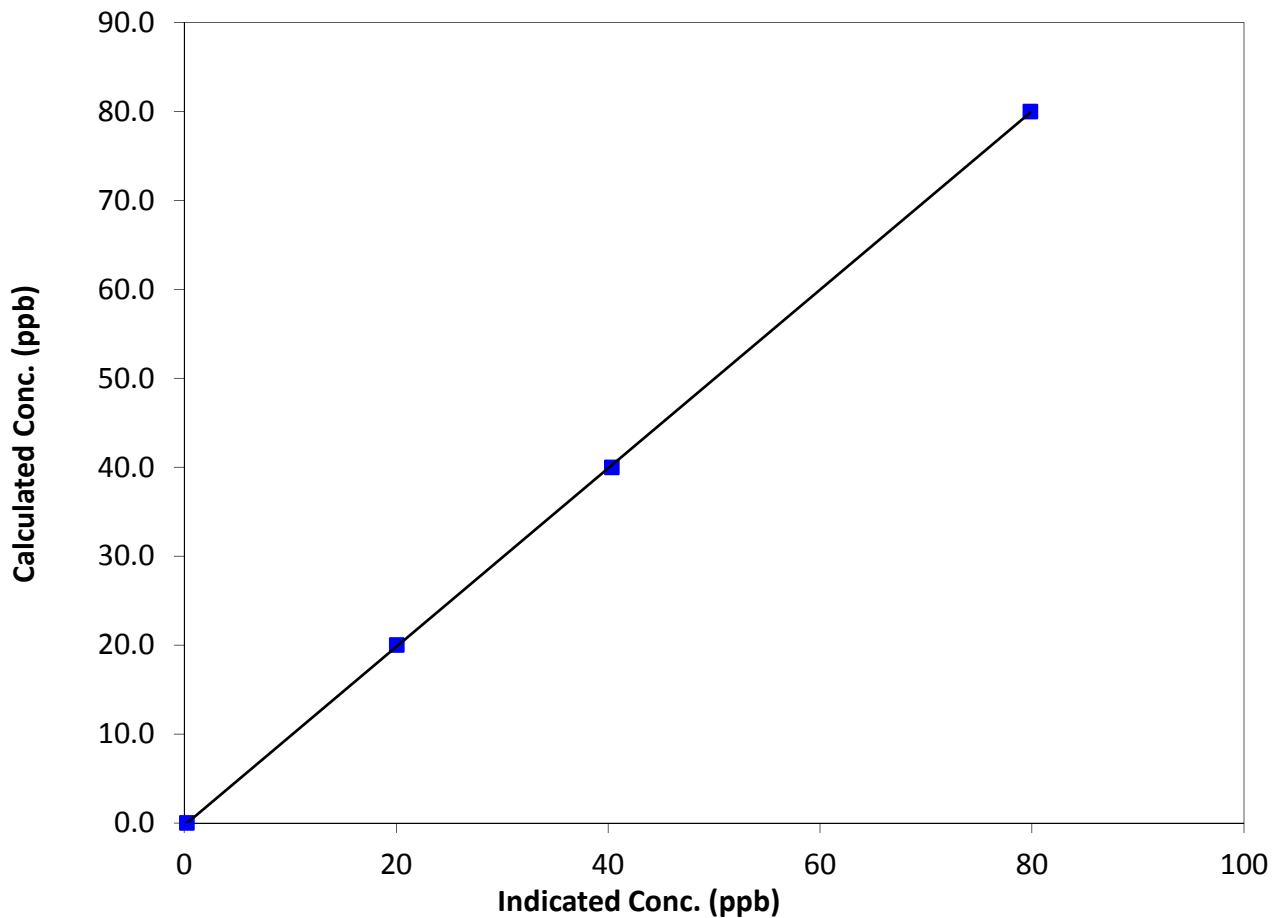
Station Information

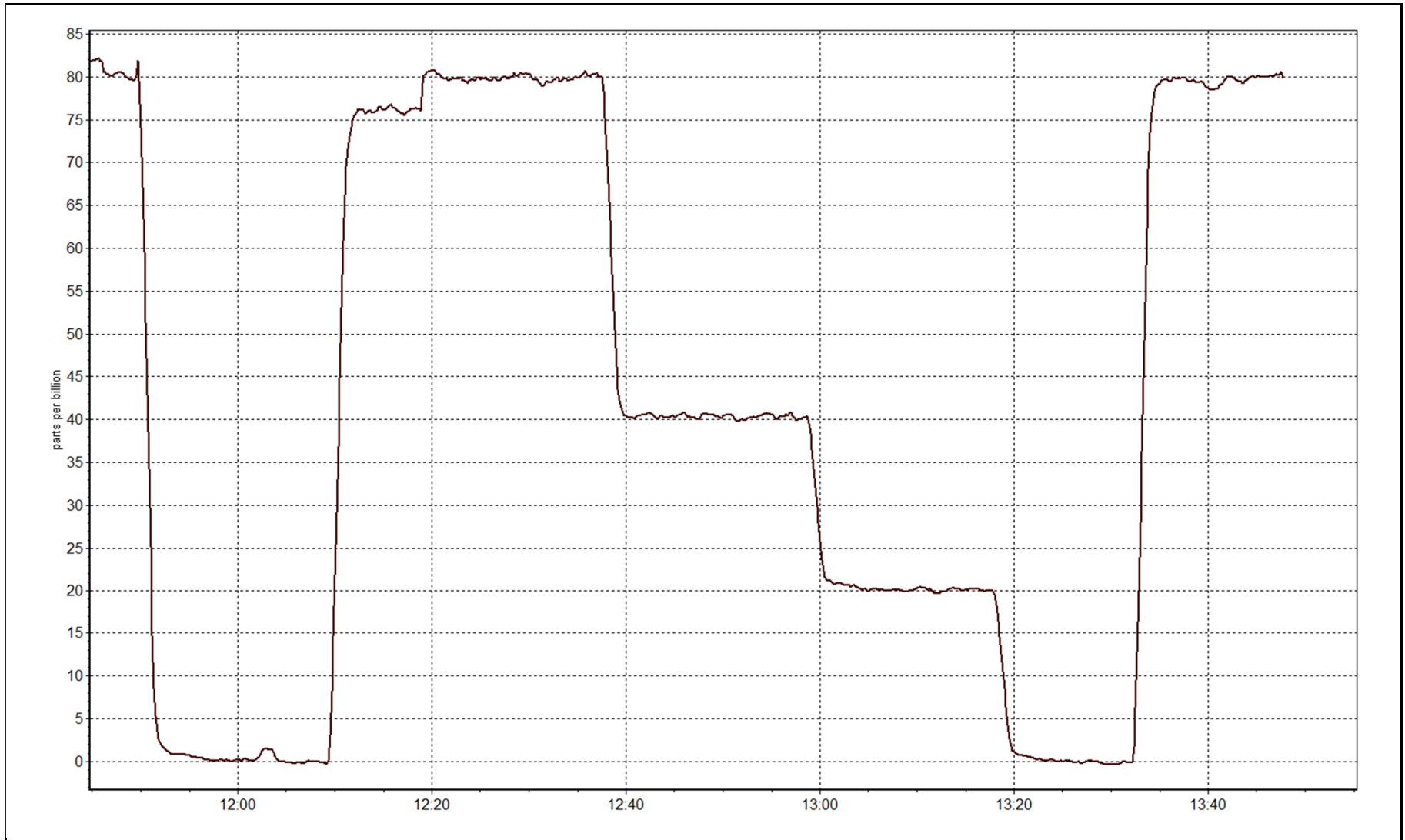
Calibration Date	November 24, 2014	Previous Calibration	October 21, 2014
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	11:50	End Time (MST)	13:50
Analyzer make	450i	Analyzer serial #	1218153583

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.3	N/A	Correlation Coefficient	0.999974
80.0	79.9	1.0014		
40.0	40.4	0.9907	Slope	1.003588
20.0	20.1	0.9971		
			Intercept	-0.270056

H2S Calibration Curve







Wood Buffalo Environmental Association

THC Calibration Report

Station Information

Calibration Date	Wednesday, November 19, 2014	Previous Calibration	Wednesday, October 22, 2014
Station Name	Wapasu	Station Number	AMS 17
Reason:	Routine		
Start Time (MST)	8:00	End Time (MST)	11:50
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	40.5	40.5
Calculated slope	1.008376	1.013668	Fuel Pressure	24.8	24.8
Calculated intercept	-0.055873	-0.048447		2.7	2.7
				4.976	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	0.02	N/A
as found span	5000	60.4	13.19	13.04	1.012
calibrator zero	5000	0.0	0.00	0.02	N/A
high point	5000	60.4	13.19	13.04	1.012
second point	5000	30.2	6.60	6.60	1.000
third point	5000	15.1	3.30	3.31	0.997
calibrator zero	5000	0.0	0.00	0.03	N/A
as left zero	5000	0.0	0.00	0.03	N/A
as left span	5000	60.4	13.19	13.27	0.994
Average Correction Factor					1.003

Corrected As found	13.02	Previous response	13.14	% change	0.9%
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Notes:

Filter changed, no adjustments or maintenance made,

Calibration Performed By:

Melissa Lemay



Wood Buffalo Environmental Association

THC Calibration Summary

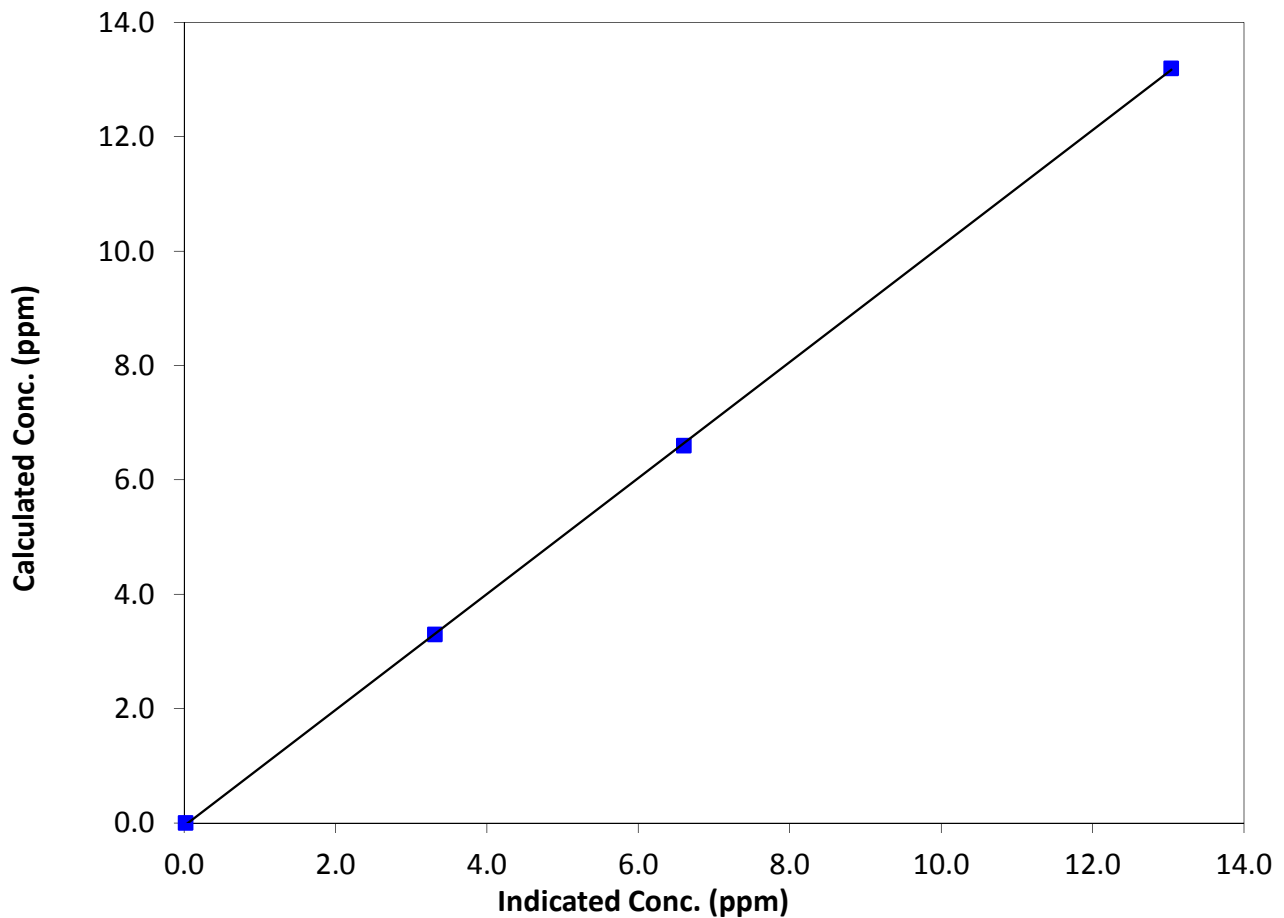
Station Information

Calibration Date	November 19, 2014	Previous Calibration	October 22, 2014
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	8:00	End Time (MST)	11:50
Analyzer make	Thermo 51i-LT	Analyzer serial #	1218153352

Calibration Data

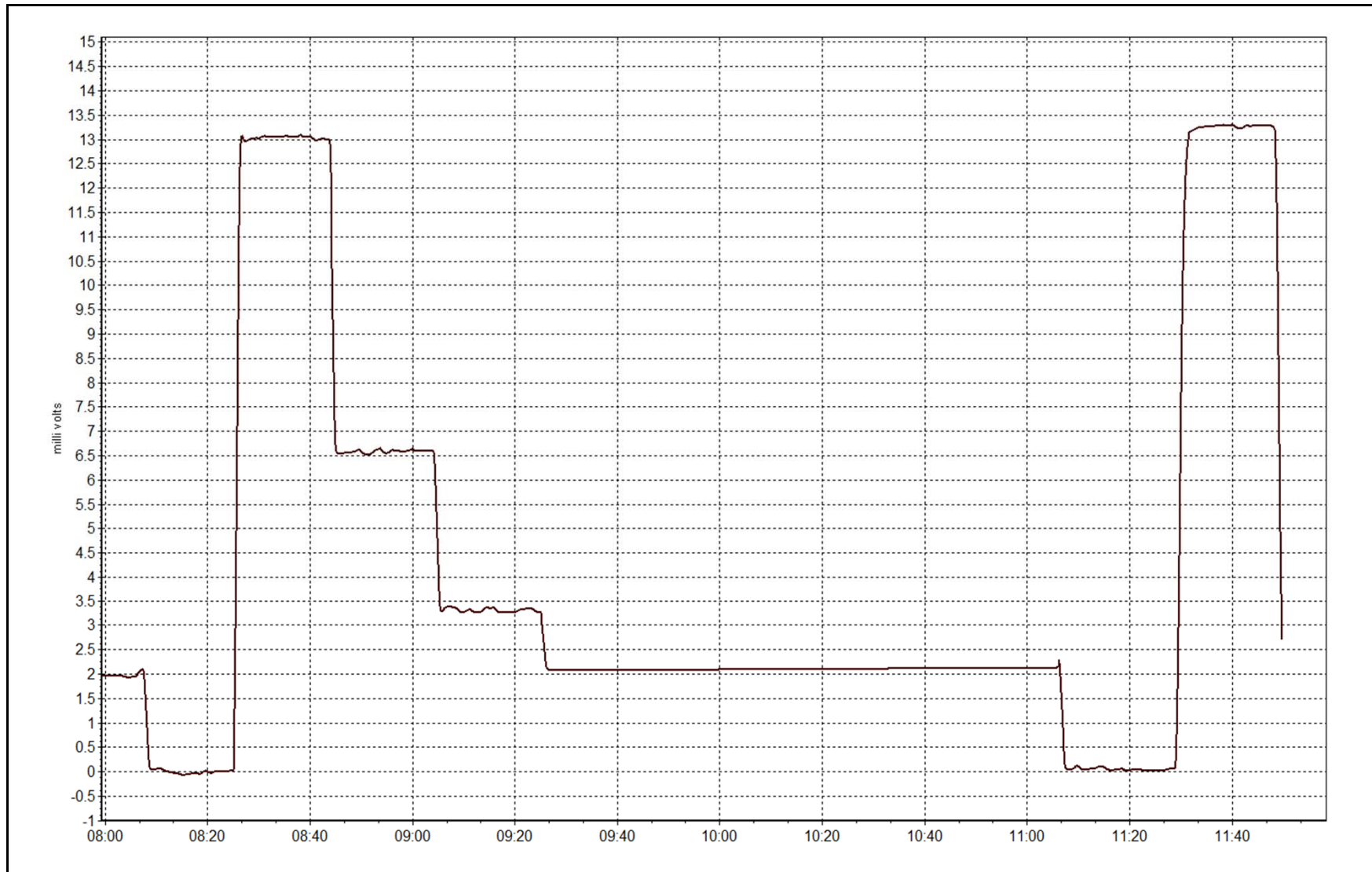
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.02	N/A	Correlation Coefficient	0.999964
13.19	13.04	1.0118		
6.60	6.60	0.9996	Slope	1.013668
3.30	3.31	0.9966		
			Intercept	-0.048447

THC Calibration Curve



THC Calibration Plot

Date: November 19, 2014





Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

Calibration Date	November 20, 2014	Previous Calibration	October 22, 2014
Station Name	Wapasu	Station Number	AMS 17
Reason:	Routine		
Start Time (MST)	8:00	End Time (MST)	11:10
Barometric Pressure	23 mmHg	Station temp.	23 Deg C
Calibrator Make/Model	T700	Serial Number	997
NO2 calibration used	Wednesday, November 19, 2014	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.	25.7	25.7
Analyzer Range (input)	500	500	Photo Lamp Temp.	58.0	58.0
Calculated slope	0.983326	0.997350	Pressure	25.7	25.7
Calculated intercept	-0.382664	0.718401	Flow	715-702	727-703
Analyzer Background	4.193	4.761			
Analyzer Coefficient	0.990	0.980			

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	0.00	0.0	1.1	N/A
as found span	5000	932.00	365.0	371.1	0.984
calibrator zero	5000	0.00	0.0	0.0	N/A
high point	5000	713.5	365.0	365.7	0.998
second point	5000	495.5	248.0	247.8	1.001
third point	5000	260.7	129.0	127.6	1.011
calibrator zero	5000	0.00	0.0	-0.2	N/A
as left zero	5000	0.00	0.0	-0.2	N/A
as left span	5000	714.70	365.0	367.7	0.993
Average Correction Factor					1.003

Corrected As found	370.0	Previous response	371.6	% change	0.4%
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Notes:

Filter changed out, zero and span adjusted, no maintenance done

Calibration Performed By:

Melissa Lemay



Wood Buffalo Environmental Association

O₃ Calibration Summary

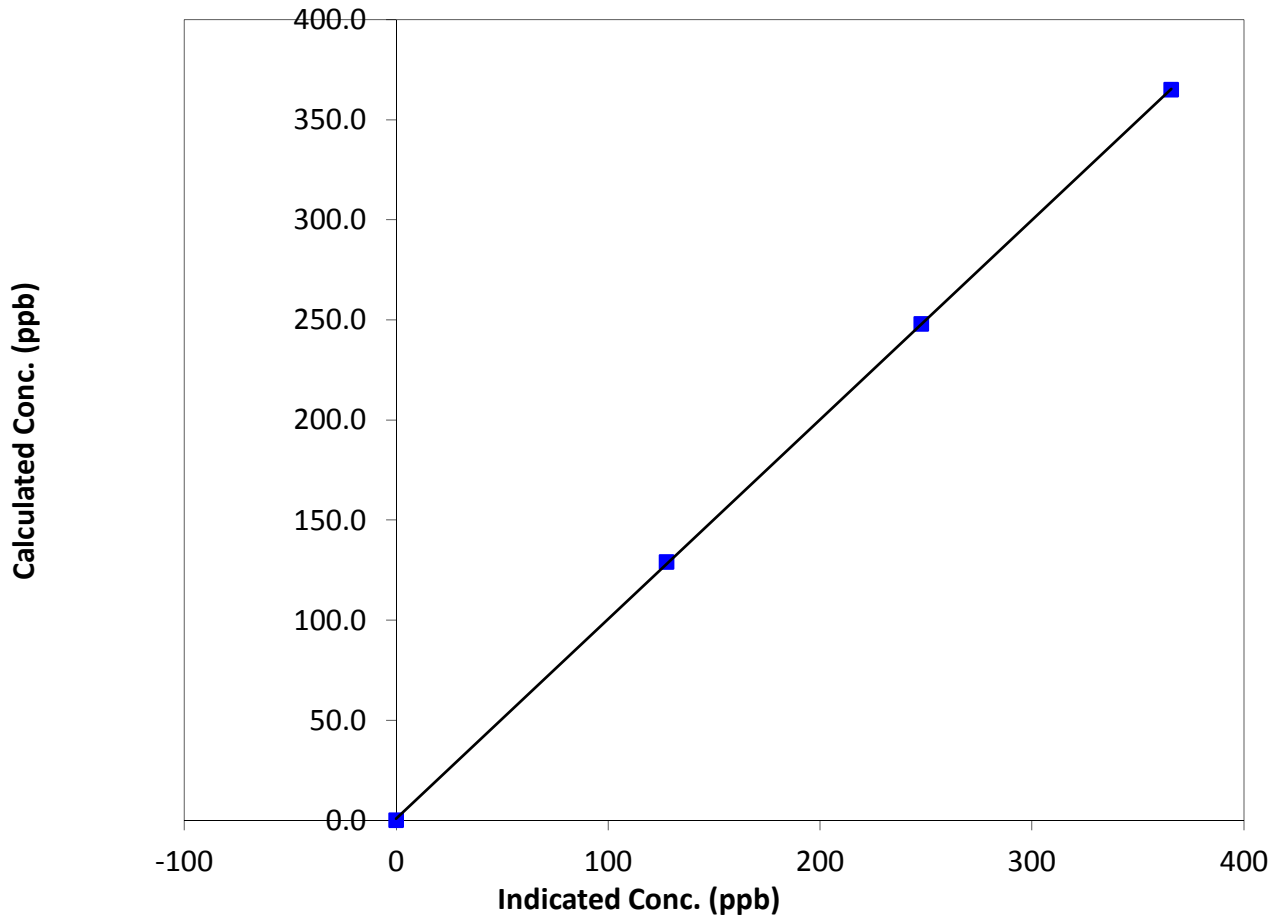
Station Information

Calibration Date	Thursday, November 20, 2014	Previous Calibration	October 22, 2014
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	8:00	End Time (MST)	11:10
Analyzer make	T400	Analyzer serial #	824

Calibration Data

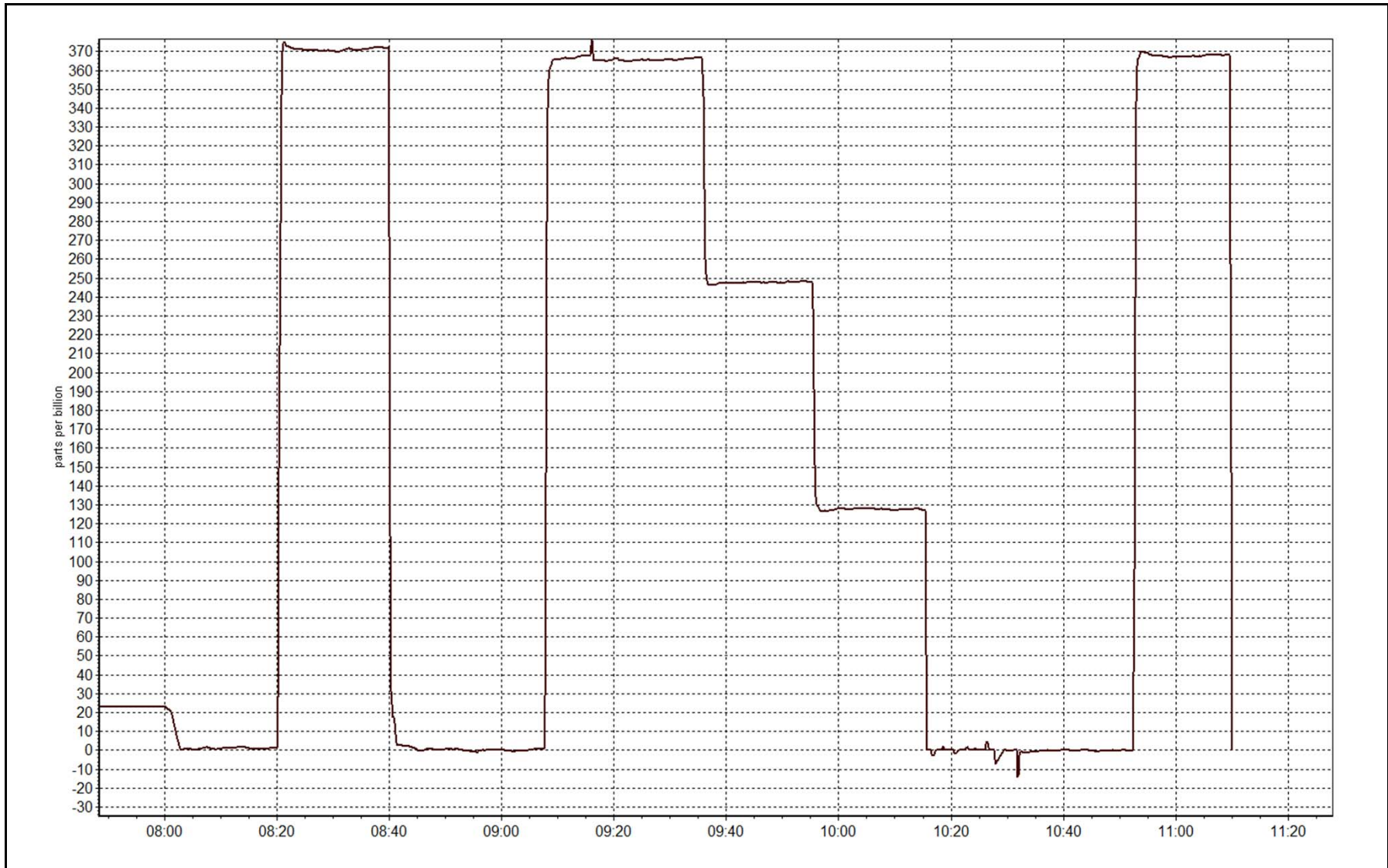
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999976
365.0	365.7	0.9981		
248.0	247.8	1.0008	Slope	0.997350
129.0	127.6	1.0110		
			Intercept	0.718401

O₃ Calibration Curve



O3 Calibration Plot

Date: November 20, 2014





Wood Buffalo Environmental Association

NO_x-NO-NO₂ Calibration Report

Station Information

Calibration Date	November 19, 2014	Previous Calibration	October 22, 2014
Station Name	Wapasu	Station Number	AMS 17
Reason:	Routine		
Start Time (MST)	8:00	End Time (MST)	11:50
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	1.002474	1.003684	0.996794
	Data Offset	0.099176	0.028473	0.345415
After	Data Slope	1.012704	1.014992	1.002401
	Data Offset	0.119102	-0.058967	0.652275
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	0.993	ppb	0.993	ppb
NOX coefficient	0.993	ppb	0.993	ppb
NO2 coefficient	1.000	ppb	1.000	ppb
NO bkgrnd	-0.4		-0.4	
NOX bkgrnd	0.7		0.7	
Nt coefficient				
Chamber Temp	50.0	Deg C	50.0	Deg C
Moly Temp	314.9	Deg C	314.9	Deg C
PMT Temp	7.0	Deg C	7.0	Deg C
O3 flow	72.0	ccm	72.0	ccm
R Cell Press	5.9	mmHg	5.9	mmHg
Sample Flow	447	ccm	447	ccm

Notes:

Filter changed, No Maintenance or adjustments Done



Wood Buffalo Environmental Association

NO_x-NO-NO₂ Calibration Report

Station Information

Calibration Date:

November 19, 2014

Station Number:

AMS 17

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NO _x conc (ppb)	Calculated NO conc (ppb)	Calculated NO ₂ conc (ppb)	Indicated NO _x conc (ppb)	Indicated NO conc (ppb)	Indicated NO ₂ conc (ppb)	NO _x Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	-0.4	-0.1	-0.4	N/A	N/A
as found span	5000	60.4	600.4	600.4	0.0	592.2	591.0	1.0	1.0138	1.0159
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.4	-0.1	-0.4	N/A	N/A
high point	5000	60.4	600.4	600.4	0.0	592.2	591.0	1.0	1.0138	1.0159
second point	5000	30.2	300.2	300.2	0.0	297.4	297.4	-0.3	1.0094	1.0094
third point	5000	15.1	150.1	150.1	0.0	148.0	147.0	0.8	1.0141	1.0210
calibrator zero	6000	0.0	0.0	0.0	0.0	-0.3	0.1	-0.4	N/A	N/A
as left zero	6000	0.0	0.0	0.0	0.0	-0.3	0.1	-0.4	N/A	N/A
as left span	5000	60.4	600.4	231.0	369.4	599.0	232.0	367.0	1.0023	0.9957
Average Correction Factor									1.0124	1.0154

Corrected As found

NO_x= 592.6

NO= 591.1

Percent Change

NO_x= 1.0%

NO= 1.2%

Previous Response

NO_x= 598.8

NO= 598.1

GPT Calibration Data

Dilution Flow

5000

ccm

Source Gas Flow

60.40

ccm

O ₃ Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO ₂ conc (ppb)	Indicated NO _x conc (ppb)	Indicated NO conc (ppb)	Indicated NO ₂ conc (ppb)	NO _x Correction factor	NO Correction factor	NO ₂ Correction factor	Converter Efficiency
Cal zero			0.0			-0.4			N/A	
1st NO ₂ (300)	N/A	231.0	365.0	595.0	231.0	364.0	0.9970	1.0000	1.0027	99.7%
2nd NO ₂ (200)	N/A	348.0	248.0	595.0	348.0	246.0	0.9970	1.0000	1.0081	99.2%
3rd NO ₂ (100)	N/A	467.0	129.0	595.0	467.0	128.0	0.9970	1.0000	1.0078	99.2%
4th NO ₂ (0)	596.0	N/A	0.0	596.0	596.0	0.3	0.9953	1.0000	N/A	N/A
Average Correction Factor							0.9966	1.0000	1.0062	99.4%

Calibration Performed By:

Melissa Lemay



Wood Buffalo Environmental Association

NO_x Calibration Summary

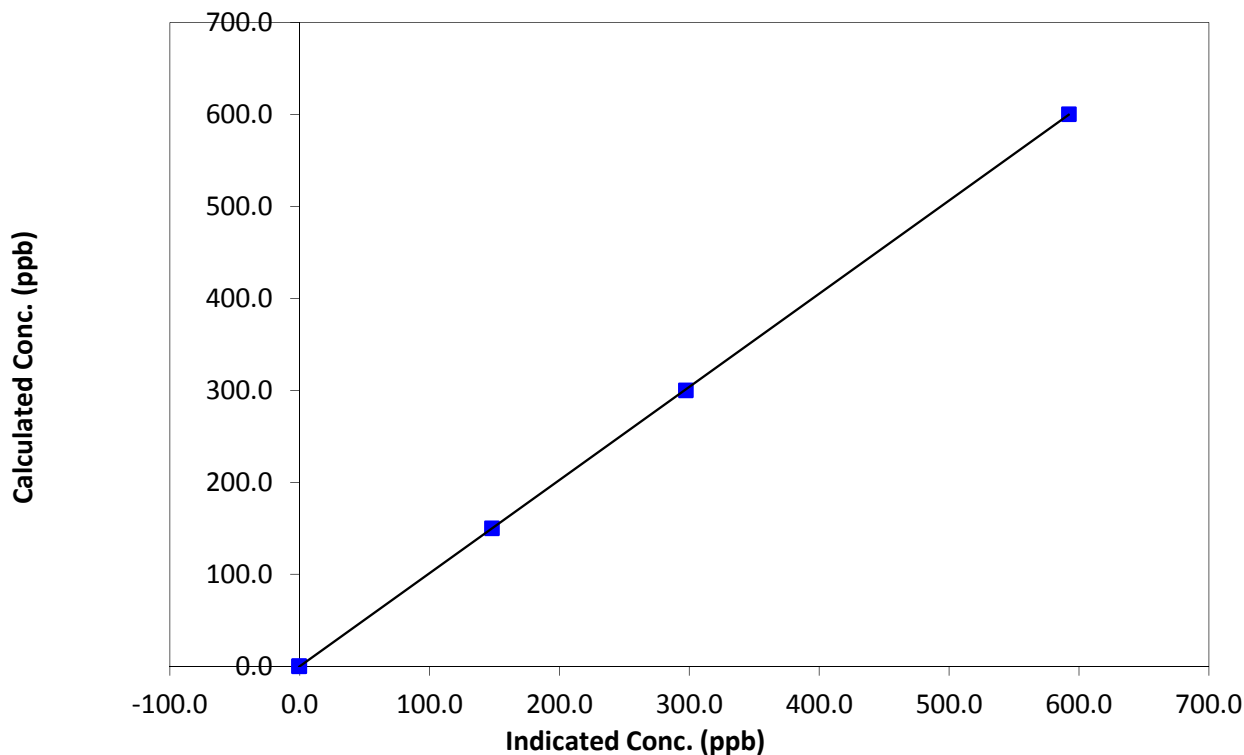
Station Information

Calibration Date	November 19, 2014	Previous Calibration	October 22, 2014
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	8:00	End Time (MST)	11:50
Analyzer make	API T200	Analyzer serial #	833

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.4	N/A	Correlation Coefficient	0.999993
600.4	592.2	1.0138		
300.2	297.4	1.0094	Slope	1.012704
150.1	148.0	1.0141		
0.0	-0.3	0.0000	Intercept	0.119102

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

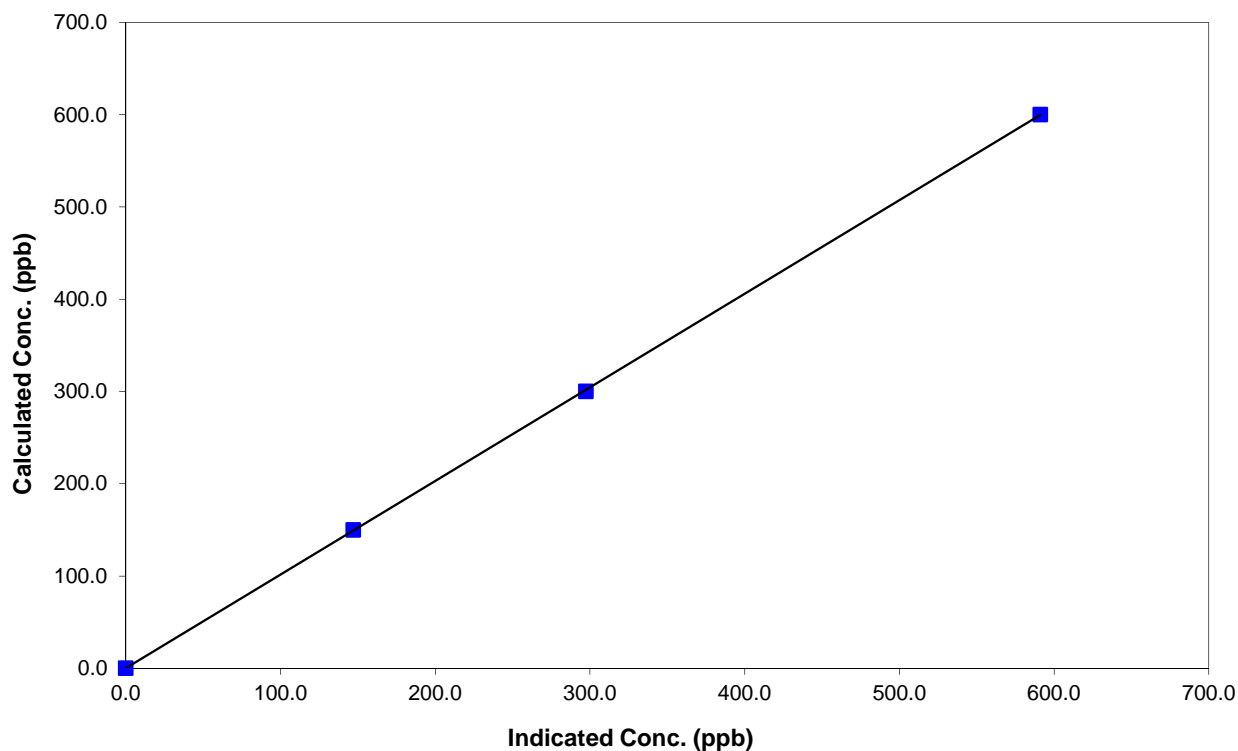
Station Information

Calibration Date	November 19, 2014	Previous Calibration	October 22, 2014
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	8:00	End Time (MST)	11:50
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	0.999985
600.4	591.0	1.0159		
300.2	297.4	1.0094	Slope	1.014992
150.1	147.0	1.0210		
0.0	0.1	0.0000	Intercept	-0.058967

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

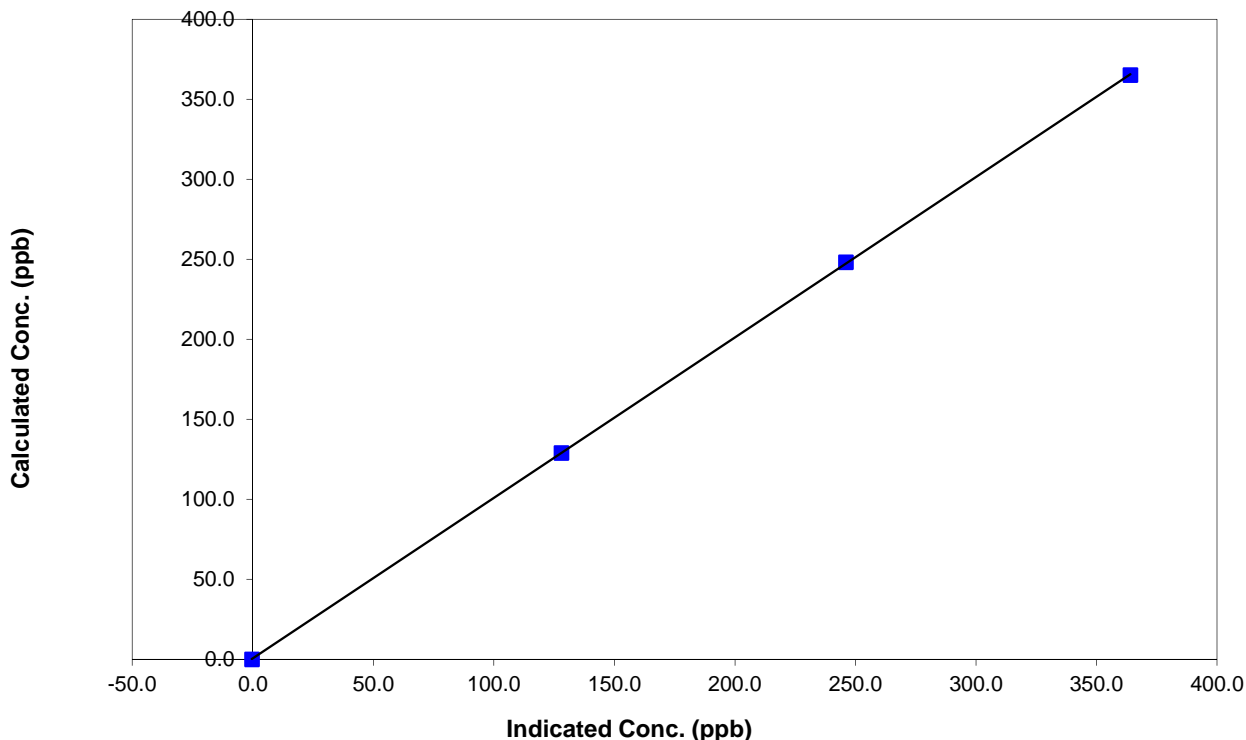
Station Information

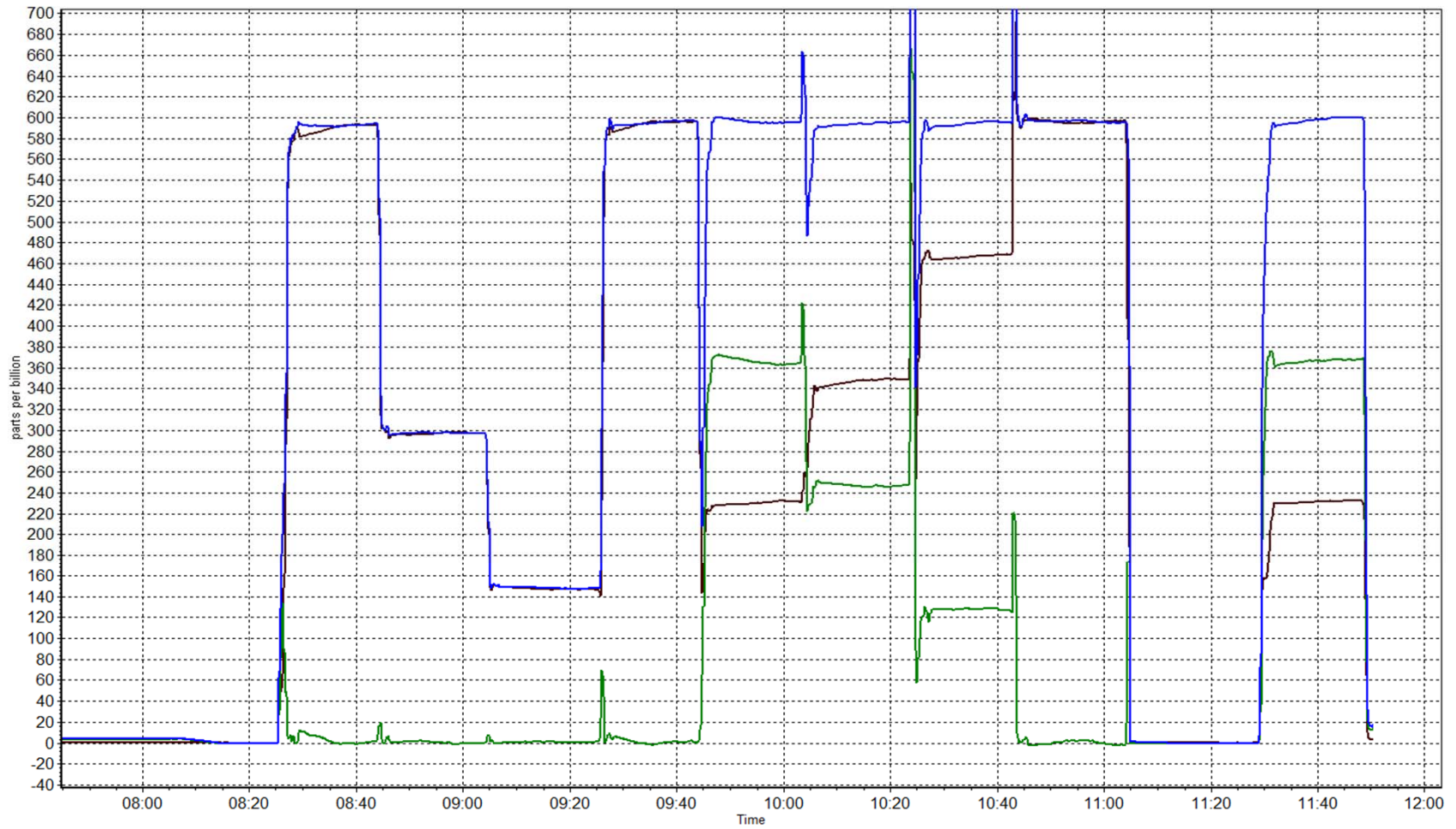
Calibration Date	November 19, 2014	Previous Calibration	October 22, 2014
Station Number	Wapasu	Station Number	AMS 17
Start Time (MST)	8:00	End Time (MST)	11:50
Analyzer make	API T200	Analyzer serial #	833

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.4	N/A	Correlation Coefficient	0.999987
365.0	364.0	1.0027		
248.0	246.0	1.0081	Slope	1.002401
129.0	128.0	1.0078		
			Intercept	0.652275

NO₂ Calibration Curve





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT

AMS 19 FIREBAG NOVEMBER 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

December 22, 2014

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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FIREBAG (AMS 19)
NOVEMBER 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	686	34	34	100.00	19	0	5	0
H2S (ppb) Average	684	35	36	99.86	2	0	1	0
THC (ppm) Average	686	34	34	100.00	2.6	-	2.3	-
NO2 (ppb) Average	686	34	34	100.00	31	0	8	-
NO (ppb) Average	686	34	34	100.00	41	-	7	-
NOX (ppb) Average	686	34	34	100.00	68	-	15	-
Temperature 2 m (C) Average	720	0	0	100.00	5.6	-	1.9	-
Relative Humidity (%) Average	720	0	0	100.00	99	-	-	-
Wind Speed 10 m (km/h) Average	705	0	15	97.92	37	-	-	-
Wind Direction 10 m (deg) Average	705	0	15	97.92	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FIREBAG (AMS 19)
 NOVEMBER 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	686	1.1	2	-	0	0	0	0	1	3	19
H2S (ppb) Average	684	0.4	0	-	0	0	0	0	0	1	2
THC (ppm) Average	686	2.16	0.1	-	2	2.1	2.1	2.2	2.2	2.2	2.6
NO2 (ppb) Average	686	3.5	4	-	0	0	0	2	5	9	31
NO (ppb) Average	686	1.4	4	-	0	0	0	0	1	4	41
NOX (ppb) Average	686	4.8	7	-	0	0	0	2	7	13	68
Temperature 2 m (C) Average	720	-13.11	7.9	-	-29.3	-23.9	-18.1	-13.8	-8.7	-1.6	5.6
Relative Humidity (%) Average	720	85.4	7	-	57	77	82	85	90	96	99
Wind Speed 10 m (km/h) Average	705	11.3	7	-	0	4	7	10	14	20	37
Wind Direction 10 m (deg) Average	705	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FIREBAG (AMS 19)
NOVEMBER 2014

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
H2S	13 Nov 2014 13:00	13 Nov 2014 13:00	1	Unstable operation - excessive baseline drift
Wind Speed, Wind Direction	03 Nov 2014 07:00	03 Nov 2014 11:00	5	Flat line in sensor output signal
Wind Speed, Wind Direction	11 Nov 2014 20:00	11 Nov 2014 23:00	4	Flat line in sensor output signal
Wind Speed, Wind Direction	13 Nov 2014 18:00	13 Nov 2014 18:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	14 Nov 2014 19:00	14 Nov 2014 22:00	4	Flat line in sensor output signal
Wind Speed, Wind Direction	28 Nov 2014 23:00	28 Nov 2014 23:00	1	Flat line in sensor output signal

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Summary of Hour Averages

Firebag - November 2014

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 19 ppb on Nov 26 07:00	Maximum Daily Average: 4.9 ppb on Nov 26
Minimum Value: 0 ppb on Nov 18 19:00	Hours of Data: 686
Maximum Diurnal Average: 2.1 ppb at hour 5	Hours of Missing Data: 34
Monthly Average: 1.1 ppb	Hours of Calibration: 34
Minimum Daily Average: 0.1 ppb on Nov 21	Percent Operational Time: 100.0
Minimum Diurnal Average: 0.4 ppb at hour 1	
Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 3 P ₉₉ = 14	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	Z	0	0	0	0	0	0	0	1	2	6	12	5	3	4	4	5	5	1	0	0	0	0	0	2.2	12
2-Nov	1	Z	3	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.5	3
3-Nov	0	0	Z	0	0	0	0	0	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0.4	2
4-Nov	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
5-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.2	1	
6-Nov	1	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0.4	1
7-Nov	Z	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-Nov	0	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
9-Nov	0	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
10-Nov	0	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
11-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.3	1
12-Nov	0	0	4	16	14	Z	6	4	5	5	5	4	4	3	1	1	1	0	0	0	1	2	8	6	4.0	16
13-Nov	Z	9	10	14	10	9	6	7	C	C	C	C	3	2	1	2	2	2	1	1	1	1	1	0	4.3	14
14-Nov	0	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-Nov	2	6	Z	2	2	5	5	4	4	4	3	7	6	3	1	0	0	0	0	0	0	0	0	0	2.4	7
16-Nov	0	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
17-Nov	0	0	0	0	Z	1	1	0	0	0	1	2	2	1	1	1	0	1	1	1	1	1	0	0	0.6	2
18-Nov	0	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
19-Nov	Z	0	0	0	0	0	0	0	0	0	0	3	9	2	1	0	0	0	0	0	0	0	0	0	0.8	9
20-Nov	0	Z	0	0	1	1	1	1	1	1	1	1	2	5	5	4	3	2	1	1	1	1	0	0	1.6	5
21-Nov	0	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-Nov	0	0	0	Z	7	1	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	7
23-Nov	1	0	0	0	Z	1	5	6	14	9	6	9	2	7	4	2	4	3	1	0	1	1	1	1	3.4	14
24-Nov	1	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	0	1	0	0	2	0	0	0	0.4	2
25-Nov	Z	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
26-Nov	0	Z	0	5	14	19	19	12	1	5	7	3	1	0	19	1	1	1	1	2	1	0	0	0	4.9	19
27-Nov	0	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
28-Nov	0	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
29-Nov	0	0	2	4	Z	7	5	5	6	7	8	5	3	1	1	0	0	0	0	0	0	0	0	0	2.4	8
30-Nov	0	0	0	0	0	Z	0	0	0	0	0	2	13	3	2	2	1	0	0	0	0	1	1	1	1.3	13

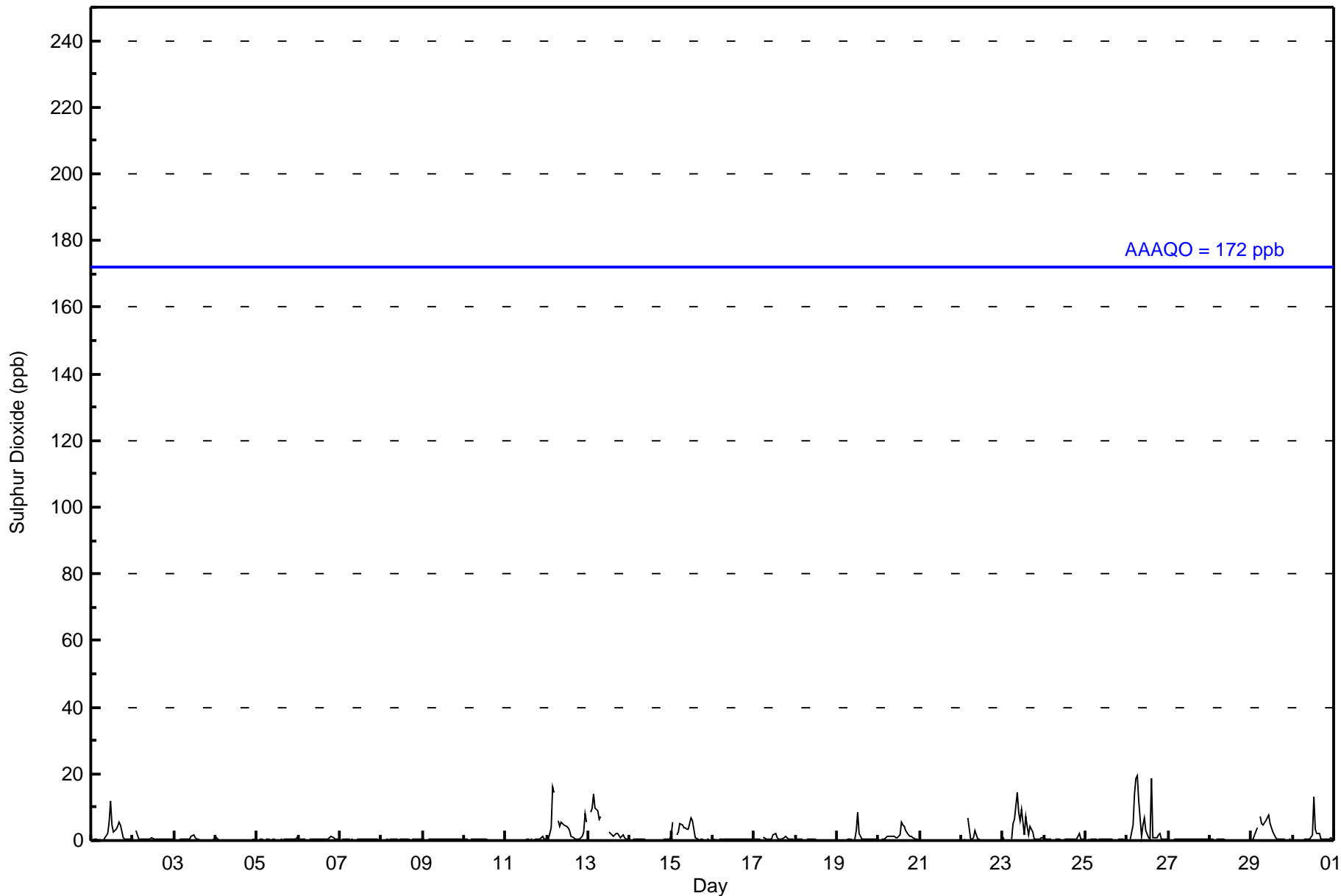
0.4	0.8	0.9	1.8	2.1	1.9	1.8	1.5	1.4	1.3	1.4	1.8	1.8	1.2	1.4	0.7	0.7	0.6	0.4	0.4	0.5	0.4	0.5	0.5	Diurnal Average
2	9	10	16	14	19	19	12	14	9	8	12	13	7	19	4	5	5	1	2	2	2	8	6	Diurnal Maximum

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



WBEA NETWORK
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Firebag - November 2014





WBEA NETWORK
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Firebag - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	675	98.40	98.40
11 - 20	11	1.60	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



WBEA NETWORK
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Firebag - November 2014

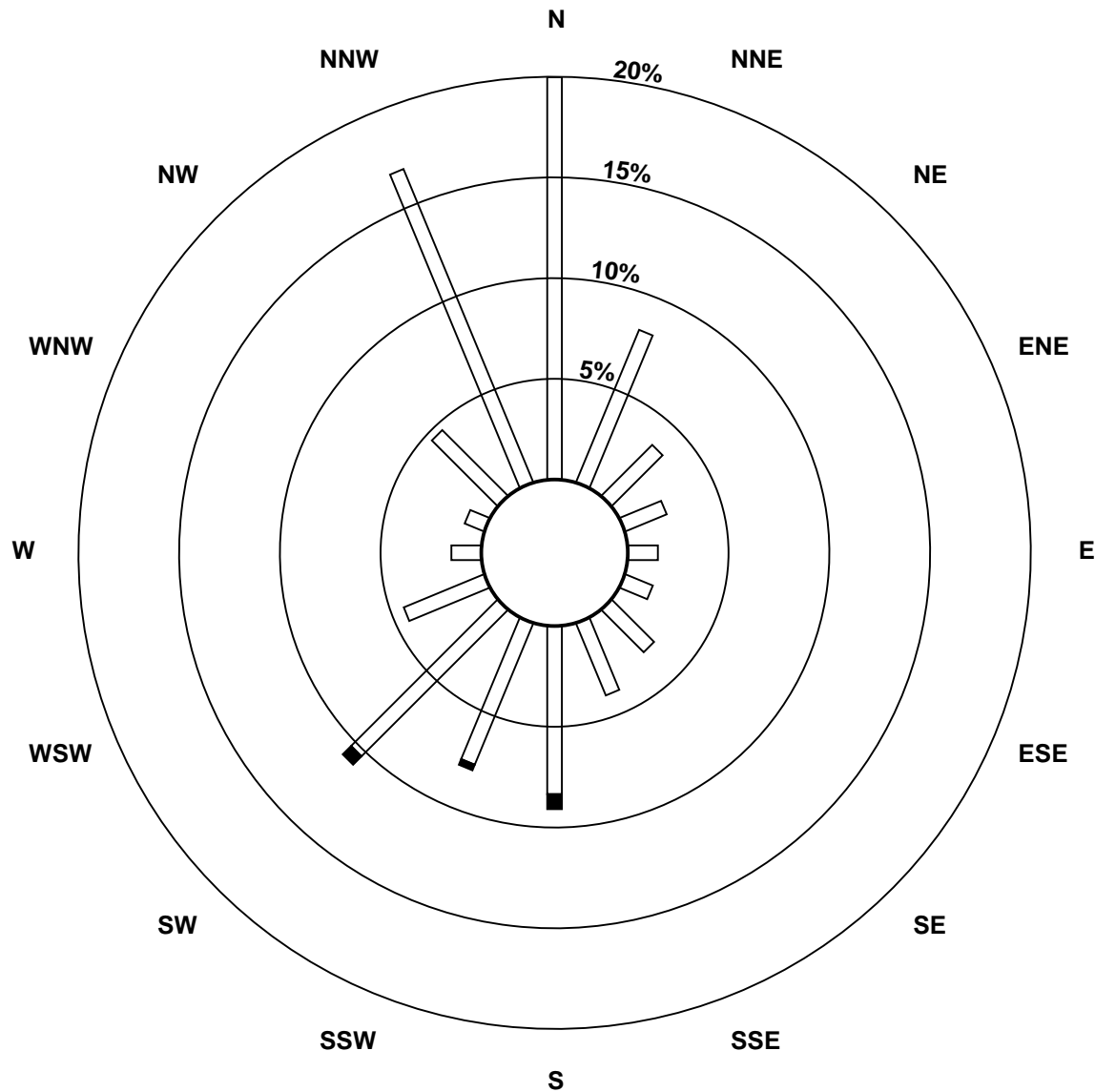
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	134	55	24	15	10	10	20	26	56	51	69	29	10	7	31	113	660
11 - 20	0	0	0	0	0	0	0	0	5	2	4	0	0	0	0	0	11
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	134	55	24	15	10	10	20	26	61	53	73	29	10	7	31	113	671

Total Number of Valid Hours: 671

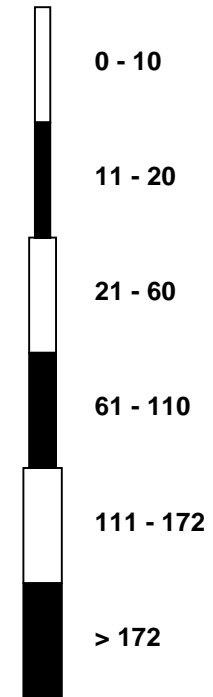
Total Number of Hours: 720

Wood Buffalo Environmental Association
 Wind Rose Nov 2014

Sulphur Dioxide (SO₂) - ppb
 Firebag (AMS 19)



Classes (ppb)



Total Number of Valid Hours: 671

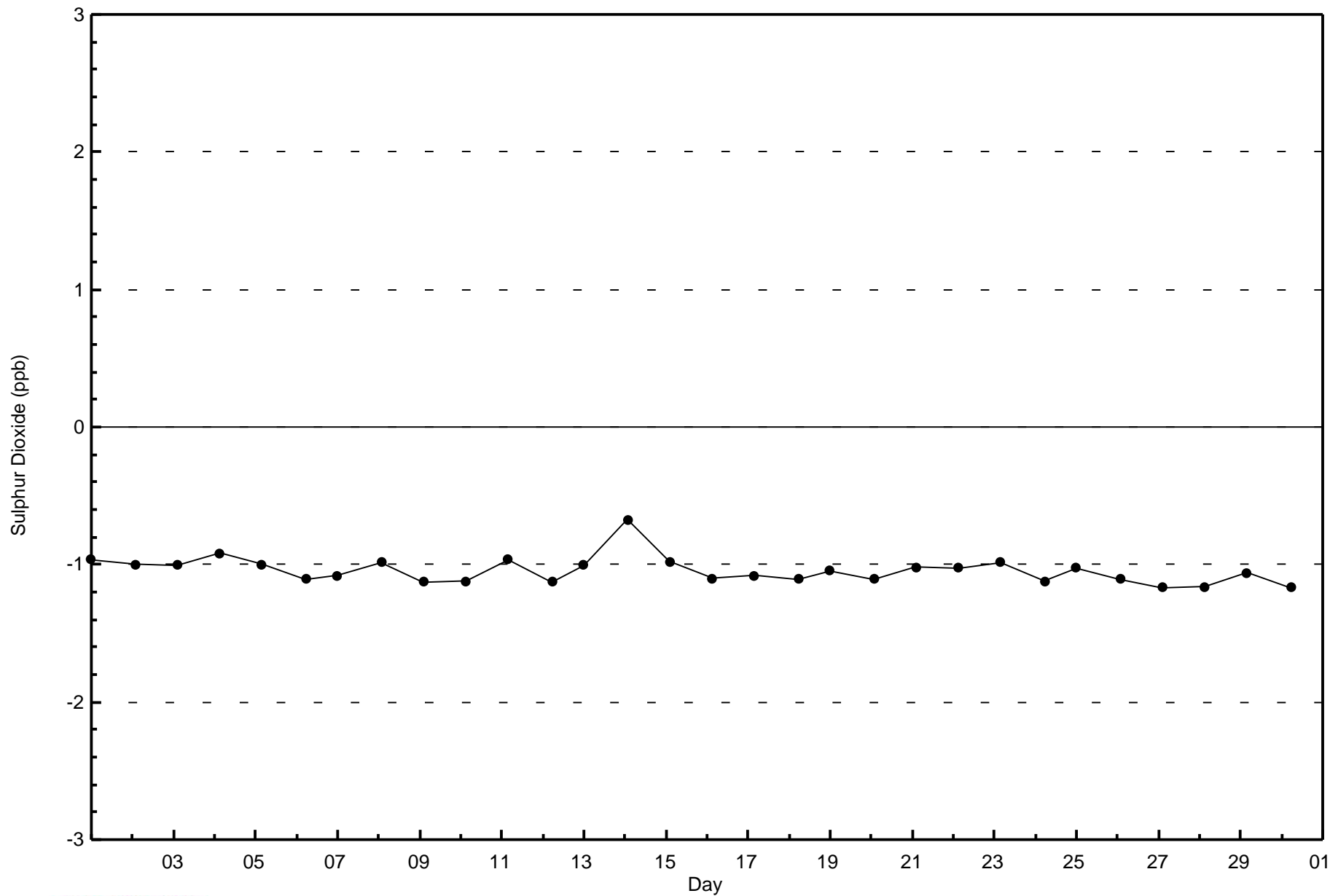


WBEA NETWORK

Zero Responses

Sulphur Dioxide (SO₂) - ppb

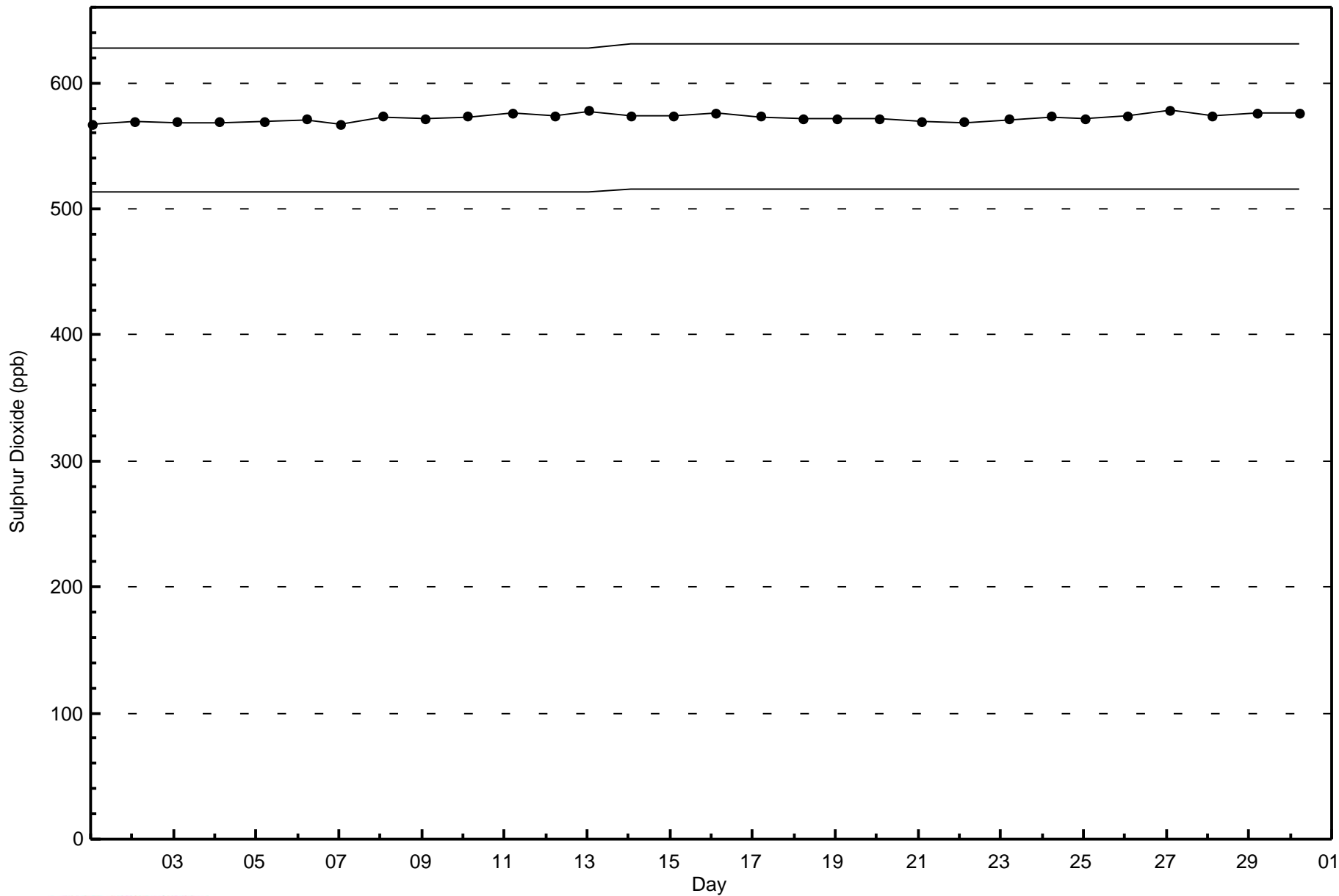
Firebag - November 2014





WBEA NETWORK
Span Responses

Sulphur Dioxide (SO₂) - ppb
Firebag - November 2014





Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 2 ppb on Nov 25 21:00	Maximum Daily Average: 0.6 ppb on Nov 12		Hours of Data:	684
Minimum Value: 0 ppb on Nov 16 02:00	Minimum Daily Average: 0.2 ppb on Nov 16		Hours of Missing Data:	36
Maximum Diurnal Average: 0.5 ppb at hour 5	Minimum Diurnal Average: 0.3 ppb at hour 2		Hours of Calibration:	35
Monthly Average: 0.4 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 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-Nov	0	Z	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
2-Nov	0	0	Z	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.4	1
3-Nov	0	0	1	Z	0	0	1	0	1	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.4	1
4-Nov	0	0	0	0	Z	0	0	1	1	1	1	0	0	0	0	0	0	1	0	0	0	1	1	1	1	0.5	1
5-Nov	1	0	0	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
6-Nov	0	0	0	0	1	1	Z	1	0	0	0	0	0	1	1	1	1	0	0	0	1	1	1	0	0	0.5	1
7-Nov	0	Z	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-Nov	0	0	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
9-Nov	0	0	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
10-Nov	0	0	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
11-Nov	0	0	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-Nov	0	0	0	1	1	1	Z	0	0	0	C	C	C	C	C	1	1	1	1	1	1	1	1	1	1	0.6	1
13-Nov	1	Z	1	1	1	1	1	1	1	1	1	0	UO	1	1	1	1	1	0	0	0	1	0	0	0	0.5	1
14-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	0	0	0	0.4	2
15-Nov	0	0	1	Z	0	0	0	0	0	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.4	1
16-Nov	0	0	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
17-Nov	0	0	1	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0.4	1
18-Nov	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	0.3	0
19-Nov	0	Z	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
20-Nov	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	0.4	1
21-Nov	0	0	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-Nov	0	0	0	1	Z	0	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
23-Nov	1	0	0	0	0	Z	0	0	0	0	0	0	0	1	1	1	1	1	0	0	1	1	1	1	1	0.5	1
24-Nov	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1	0.4	1
25-Nov	1	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1	2	1	1	0	0.5	2
26-Nov	1	1	Z	0	1	1	1	1	1	1	0	0	0	0	1	1	1	0	1	1	0	0	1	0	0	0.5	1
27-Nov	0	0	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
28-Nov	0	0	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-Nov	0	0	0	1	1	Z	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.5	1
30-Nov	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0

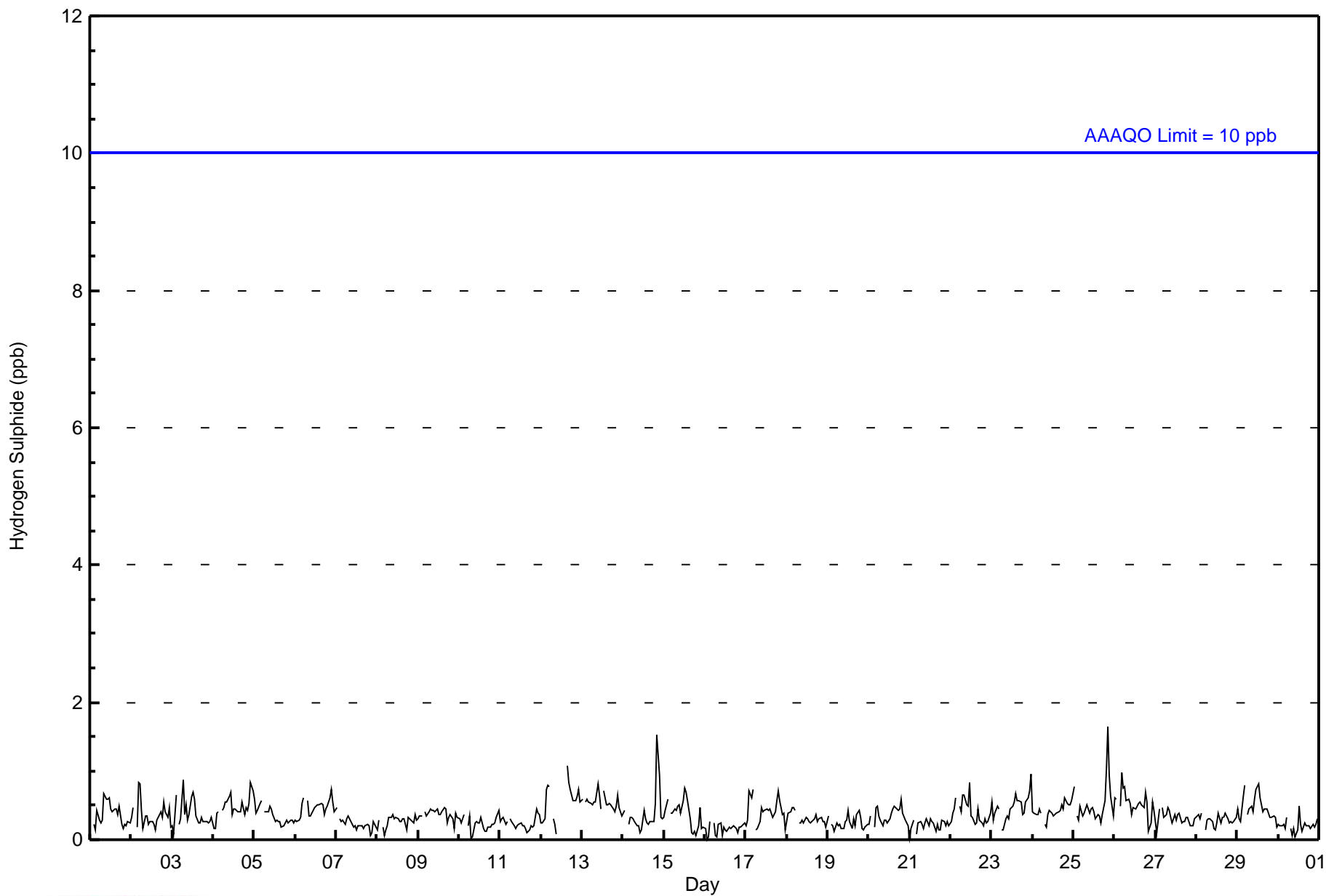
0.3	0.3	0.4	0.4	0.5	0.4	0.4	0.3	0.3	0.4	0.3	0.4	0.4	0.4	0.3	0.4	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.3	Diurnal Average		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	Diurnal Maximum	

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



WBEA NETWORK
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Firebag - November 2014





WBEA NETWORK
Cumulative Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
Firebag - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	684	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



WBEA NETWORK
Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
Firebag - November 2014

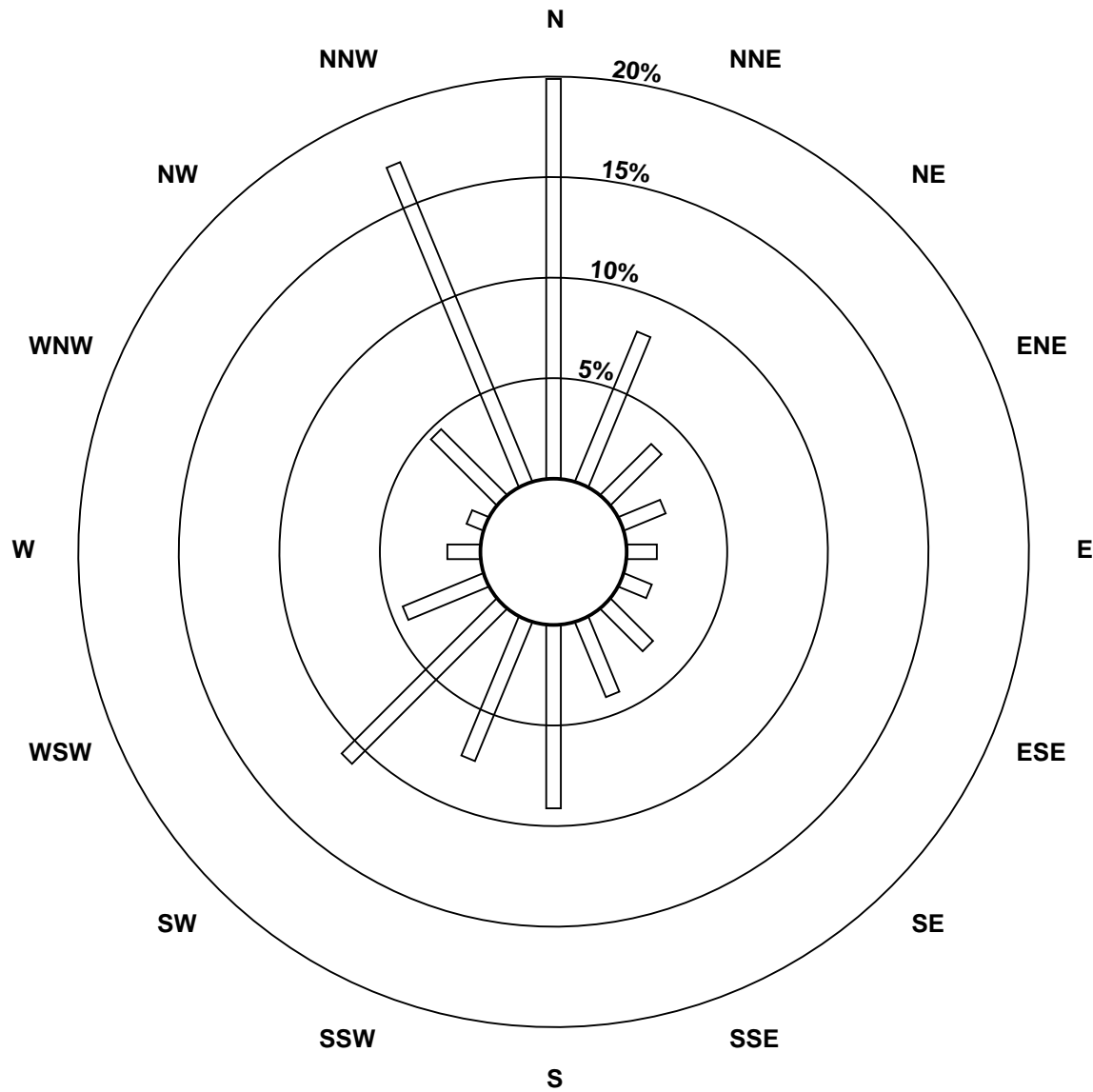
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	133	54	24	15	10	10	20	27	61	50	73	29	11	6	31	115	669
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	133	54	24	15	10	10	20	27	61	50	73	29	11	6	31	115	669

Total Number of Valid Hours: 669

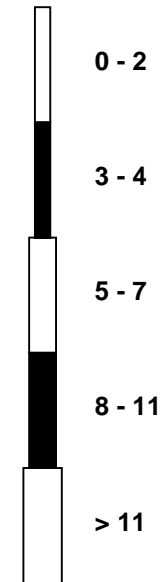
Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

Hydrogen Sulphide (H₂S) - ppb
Firebag (AMS 19)



Classes (ppb)

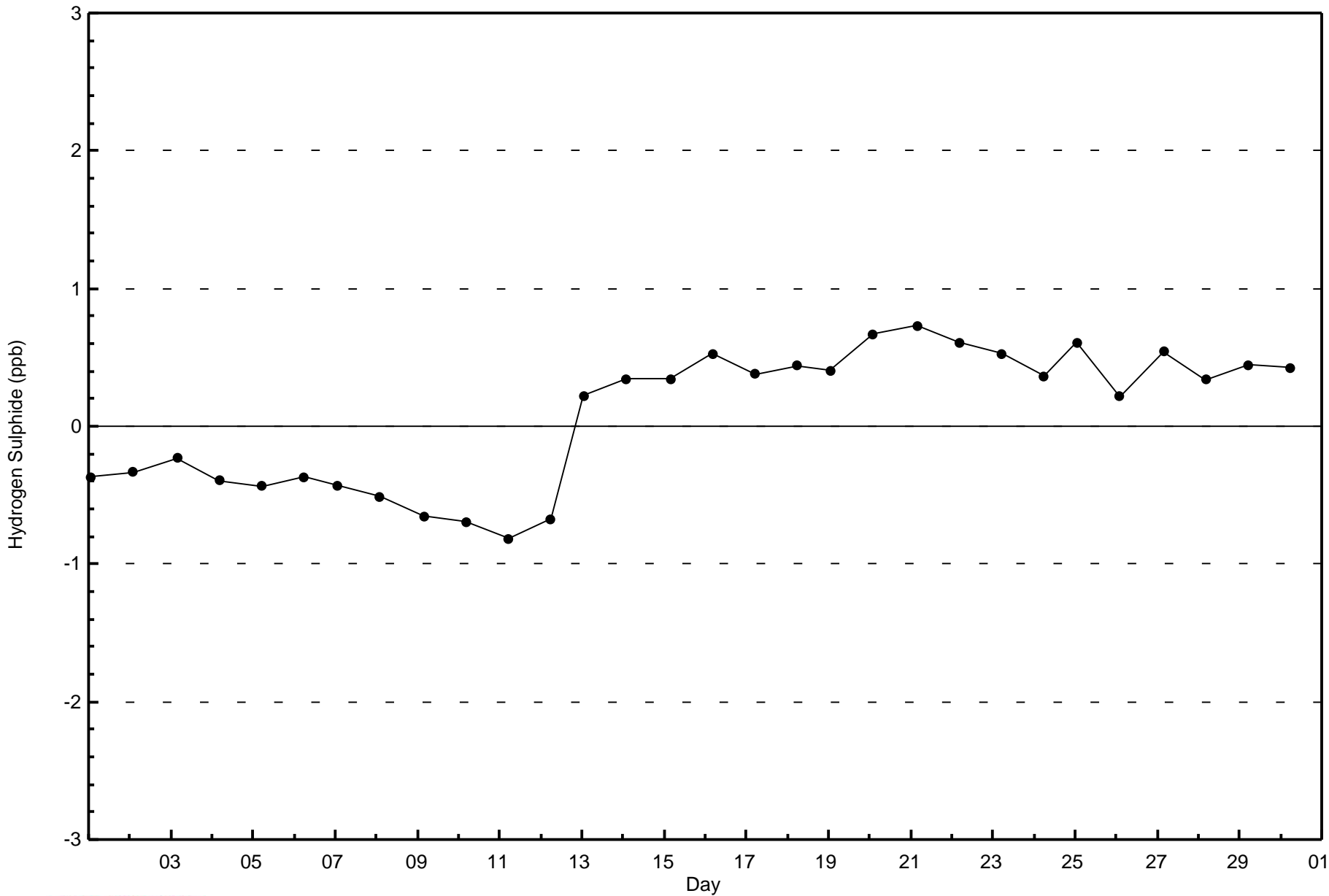


Total Number of Valid Hours: 669



WBEA NETWORK
Zero Responses

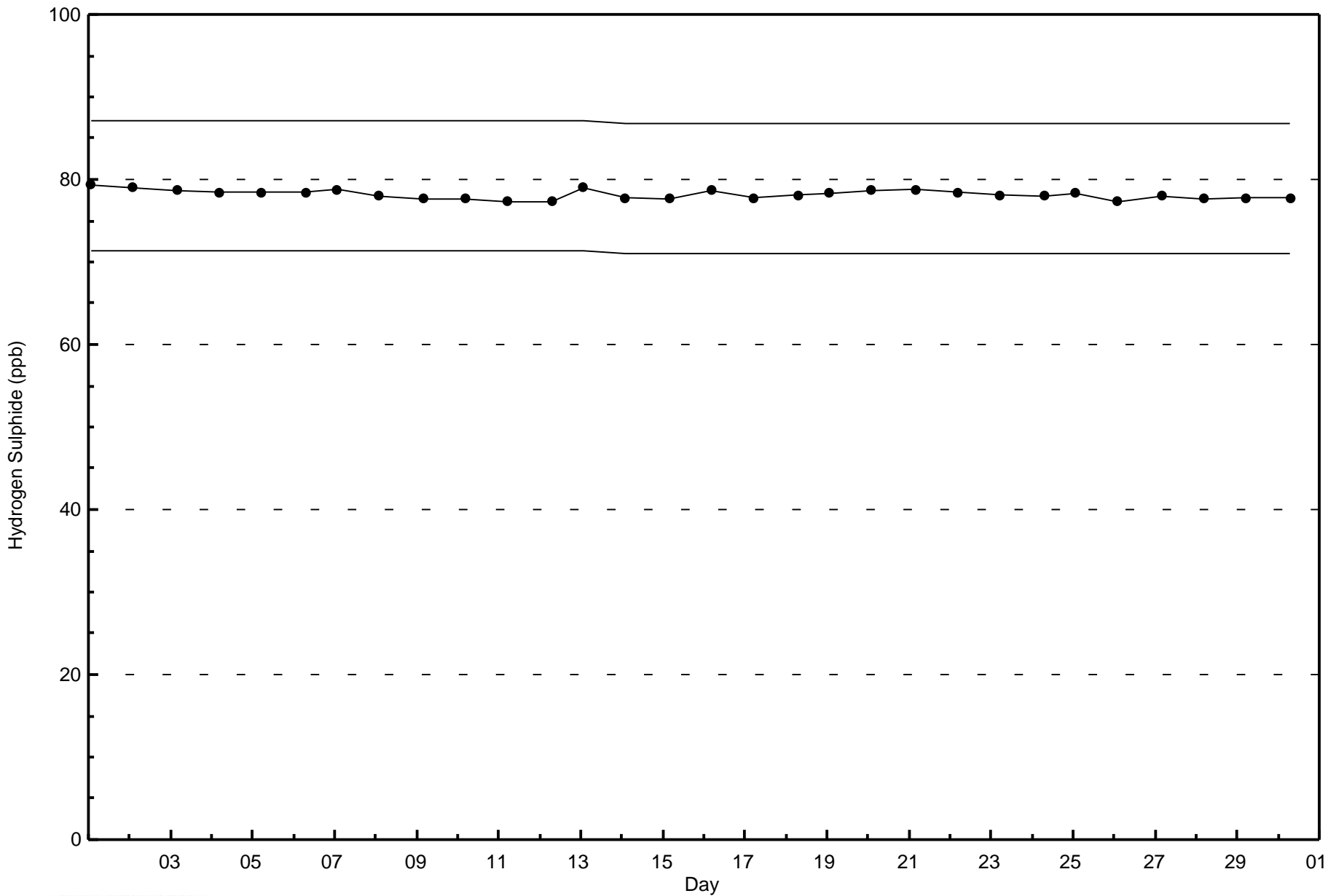
Hydrogen Sulphide (H₂S) - ppb
Firebag - November 2014





WBEA NETWORK
Span Responses

Hydrogen Sulphide (H₂S) - ppb
Firebag - November 2014



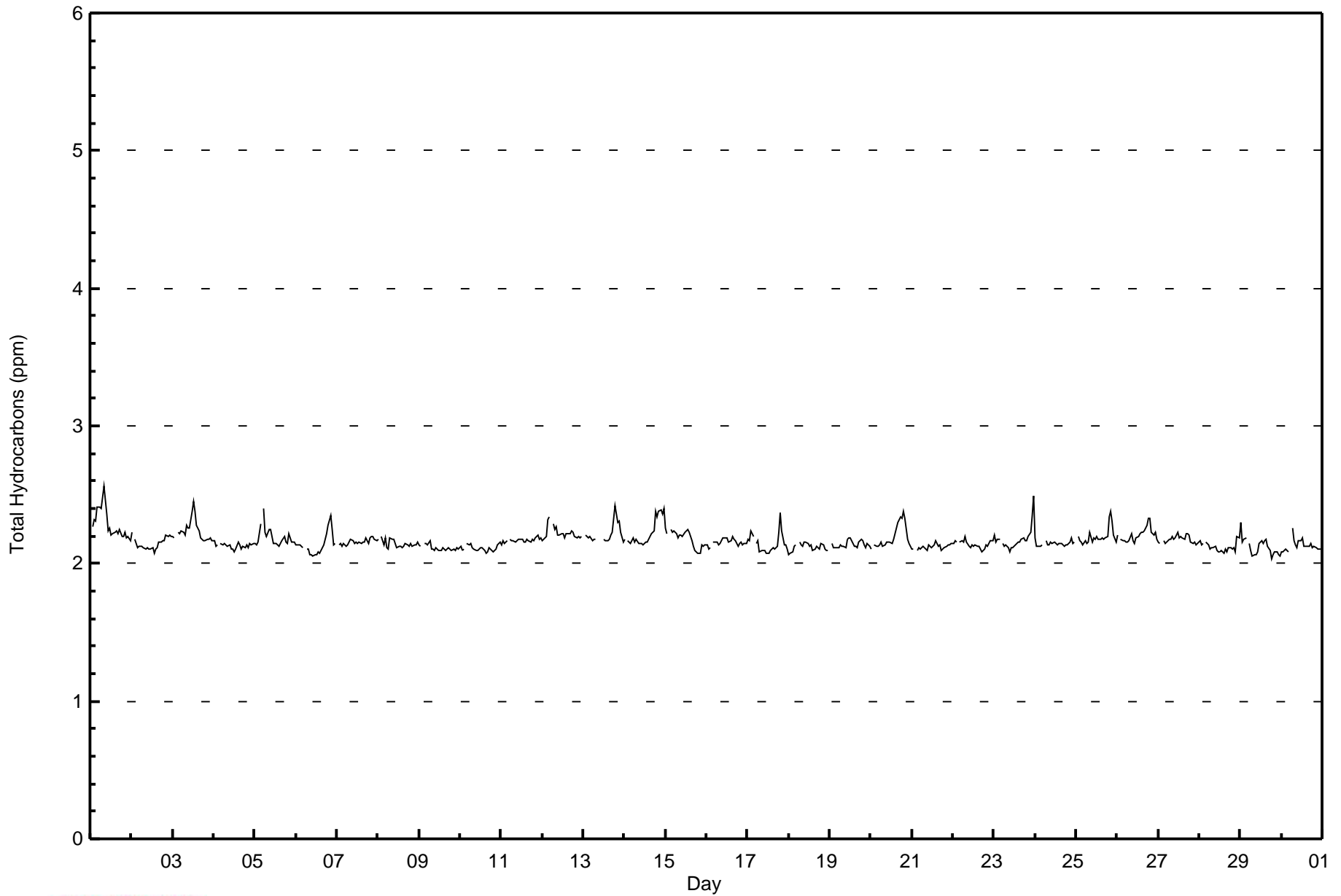


Maximum Value: 2.6 ppm on Nov 1 09:00		Maximum Daily Average: 2.3 ppm on Nov 1		Hours in Service: 720																						
Minimum Value: 2.0 ppm on Nov 29 19:00		Minimum Daily Average: 2.1 ppm on Nov 10		Hours of Data: 686																						
Maximum Diurnal Average: 2.2 ppm at hour 20		Minimum Diurnal Average: 2.1 ppm at hour 2		Hours of Missing Data: 34																						
Monthly Average: 2.16 ppm		Percentiles: P ₁ = 2.1 P ₁₀ = 2.1 Q ₁ = 2.1 Median = 2.2 Q ₃ = 2.2 P ₉₀ = 2.2 P ₉₉ = 2.4		Hours of Calibration: 34																						
				Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	Z	2.3	2.3	2.3	2.4	2.4	2.4	2.5	2.6	2.4	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.6
2-Nov	2.2	Z	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2
3-Nov	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.4	2.5	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.5
4-Nov	2.2	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2
5-Nov	2.1	2.1	2.2	2.3	Z	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.4
6-Nov	2.1	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.3	2.4	2.3	2.1	2.1	2.1	2.4
7-Nov	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2
8-Nov	2.2	Z	2.2	2.1	2.2	2.1	2.1	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2
9-Nov	2.1	2.1	Z	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2
10-Nov	2.1	2.1	2.1	Z	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2
11-Nov	2.1	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
12-Nov	2.2	2.2	2.2	2.3	2.3	Z	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
13-Nov	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	C	C	C	C	2.2	2.2	2.2	2.2	2.2	2.4	2.4	2.3	2.3	2.2	2.2	2.2	2.4
14-Nov	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.4	2.3	2.4	2.4	2.4	2.4	2.4
15-Nov	2.3	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3
16-Nov	2.1	2.1	2.1	Z	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.2
17-Nov	2.2	2.2	2.2	2.2	Z	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.4	2.2	2.1	2.1	2.1	2.1	2.4
18-Nov	2.1	2.1	2.1	2.1	2.1	Z	2.2	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2
19-Nov	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2
20-Nov	2.1	Z	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.2	2.2	2.2	2.1	2.2	2.2	2.3	2.3	2.3	2.3	2.4	2.3	2.2	2.1	2.1	2.1	2.4
21-Nov	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2
22-Nov	2.1	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2
23-Nov	2.2	2.2	2.2	2.2	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4	2.5	2.2	2.5
24-Nov	2.2	2.1	2.1	2.1	2.1	Z	2.2	2.1	2.1	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2
25-Nov	Z	2.2	2.2	2.2	2.1	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.3	2.2	2.2	2.2	2.4
26-Nov	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.3
27-Nov	2.2	2.1	Z	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.1	2.1	2.2	2.2
28-Nov	2.2	2.1	2.1	Z	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2
29-Nov	2.3	2.2	2.2	2.2	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.2	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.3
30-Nov	2.1	2.1	2.1	2.1	2.1	Z	2.3	2.2	2.1	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3
																								Diurnal Average		
																								Diurnal Maximum		
																								2.2		
																								2.3		
																								Z - zerospan C - Calibration		



WBEA NETWORK
Hourly Averages

Total Hydrocarbons (THC) - ppm
Firebag - November 2014





WBEA NETWORK
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Firebag - November 2014

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	1	0.15	0.15
2.1 - 3.0	685	99.85	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



WBEA NETWORK
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Firebag - November 2014

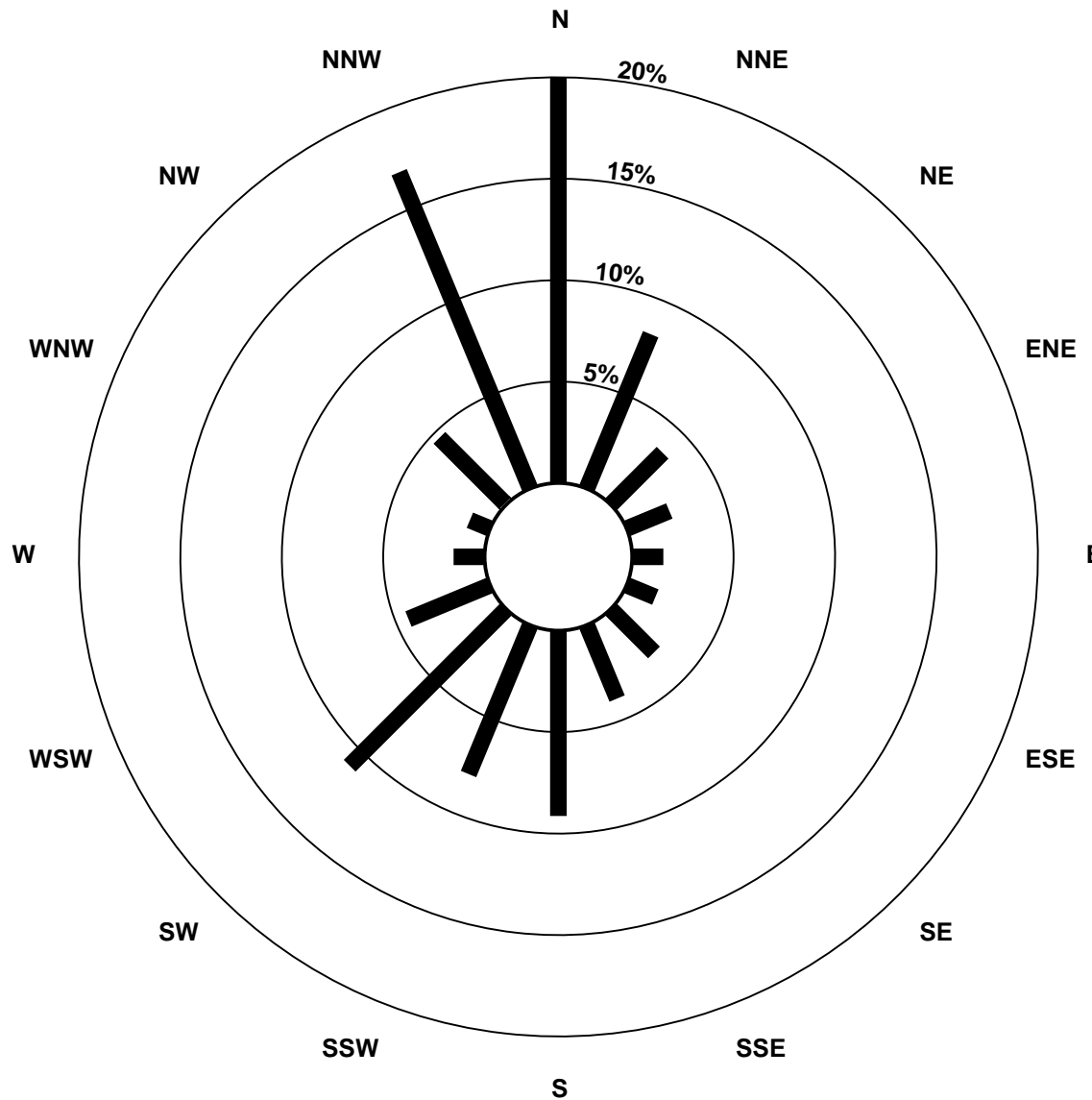
Concentration Ranges (ppm)	Wind Direction																Totals	
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW		
0 - 2.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
2.1 - 3.0	134	55	24	15	10	10	20	26	61	53	73	29	10	7	30	113	670	
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	134	55	24	15	10	10	20	26	61	53	73	29	10	7	31	113	671	

Total Number of Valid Hours: 671

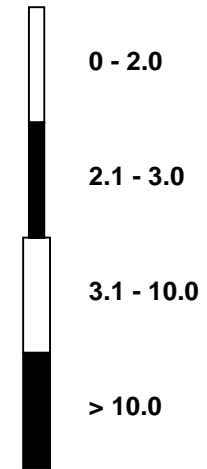
Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

Total Hydrocarbons (THC) - ppm
Firebag (AMS 19)



Classes (ppm)



Total Number of Valid Hours: 671

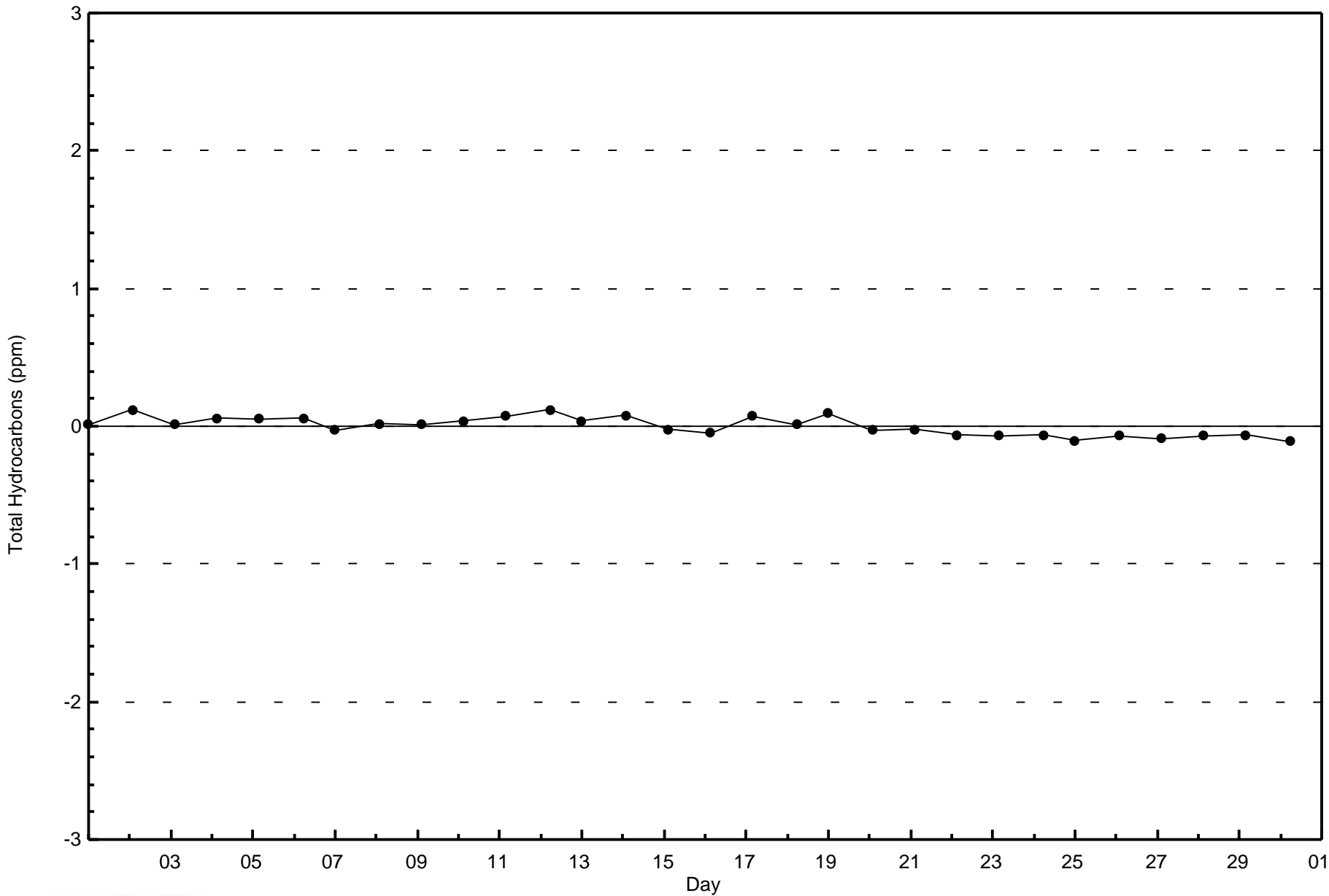


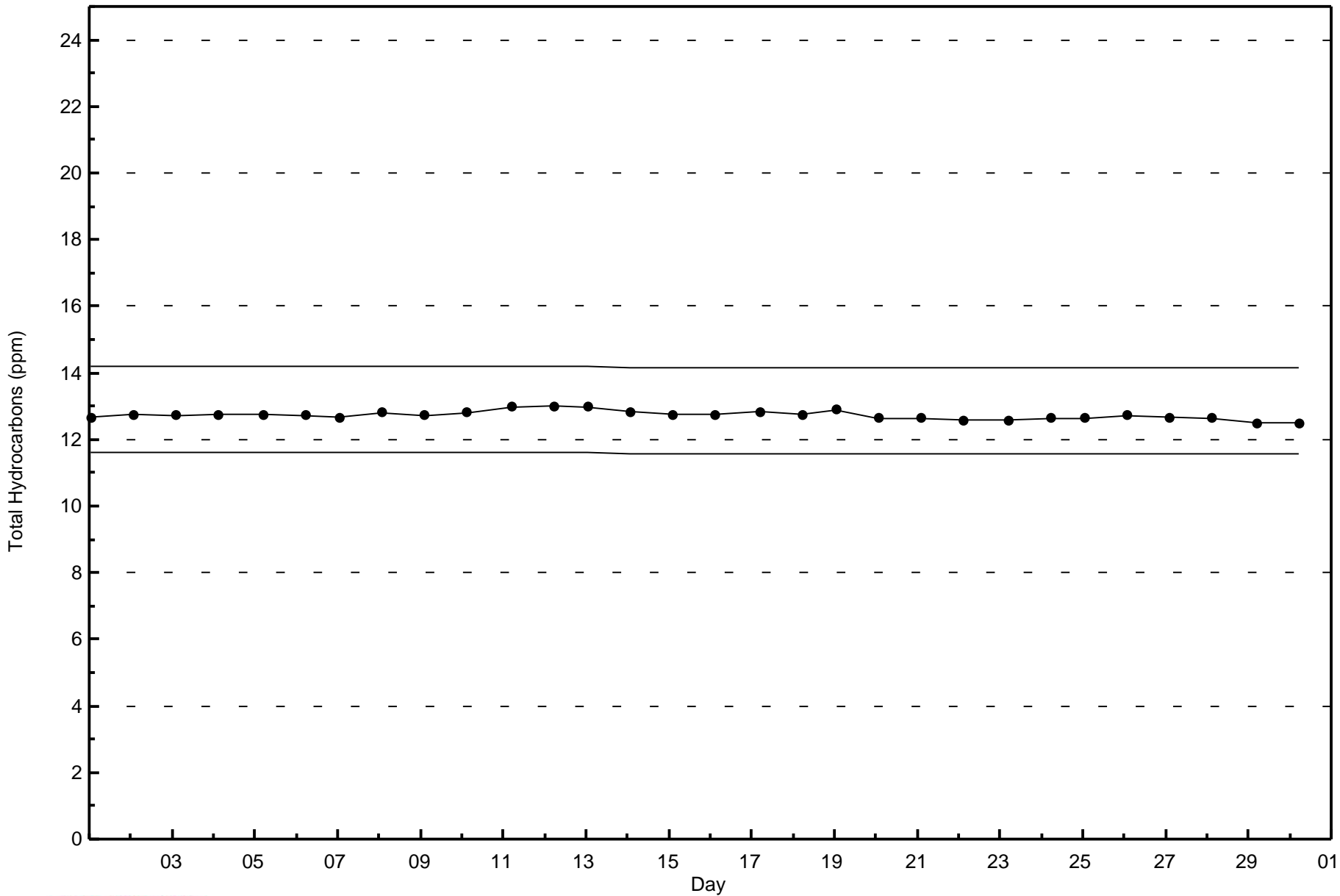
WBEA NETWORK

Zero Responses

Total Hydrocarbons (THC) - ppm

Firebag - November 2014





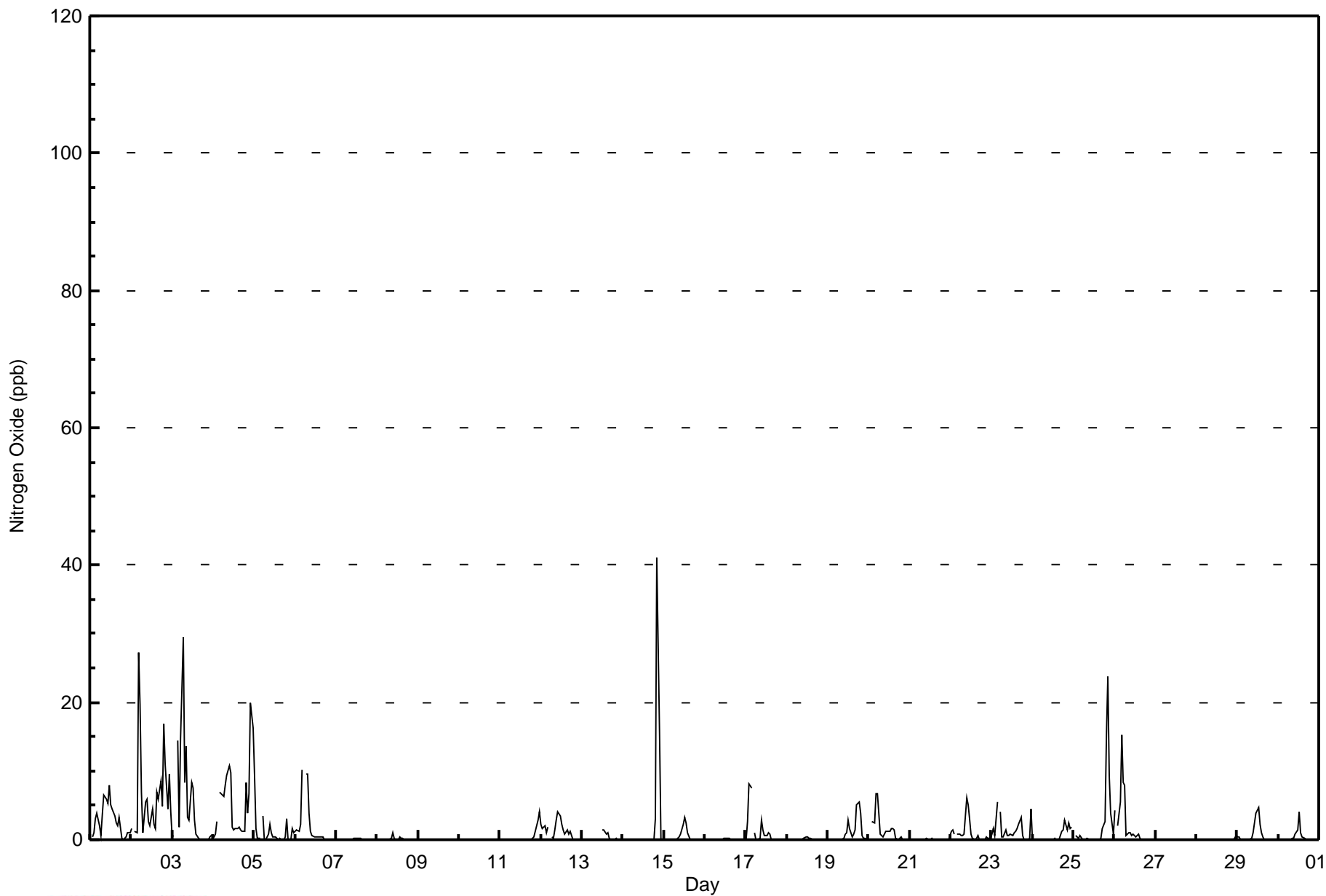


Maximum Value: 41 ppb on Nov 14 21:00																	Maximum Daily Average: 6.8 ppb on Nov 2																	Hours in Service: 720	
Minimum Value: 0 ppb on Nov 3 18:00																	Minimum Daily Average: 0.0 ppb on Nov 27																	Hours of Data: 686	
Maximum Diurnal Average: 3.0 ppb at hour 5																	Minimum Diurnal Average: 0.5 ppb at hour 2																	Hours of Missing Data: 34	
Monthly Average: 1.4 ppb																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 4 P ₉₉ = 16																	Hours of Calibration: 34	
																																		Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24											
1-Nov	Z	0	1	3	4	2	1	4	7	6	5	8	5	5	3	2	2	3	0	0	0	0	1	1	2.8	8									
2-Nov	2	Z	1	1	27	20	7	1	5	6	3	2	5	2	2	7	6	9	5	17	11	4	10	4	6.8	27									
3-Nov	0	1	Z	15	2	15	29	8	14	3	3	8	8	3	1	0	0	0	0	0	0	0	1	1	4.8	29									
4-Nov	0	1	3	Z	7	6	6	8	9	11	10	2	1	2	2	2	2	1	1	8	4	7	20	16	5.6	20									
5-Nov	9	2	0	0	Z	4	0	0	1	2	1	0	0	0	0	0	0	0	0	3	0	0	2	1	1.1	9									
6-Nov	1	1	1	2	10	Z	10	9	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.9	10									
7-Nov	Z	0	0	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-Nov	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									
9-Nov	0	0	Z	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-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0									
11-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	4	0.4	4									
12-Nov	2	2	2	1	2	Z	0	0	1	3	4	3	2	2	1	1	1	1	1	0	0	0	0	0	1.3	4									
13-Nov	Z	0	0	0	0	0	0	0	C	C	C	C	1	1	1	1	0	0	0	0	0	0	0	0.3	1										
14-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	41	15	0	2.6	41										
15-Nov	0	0	Z	0	0	0	0	0	0	0	1	2	3	2	1	0	0	0	0	0	0	0	0	0	0.5	3									
16-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0									
17-Nov	0	3	8	8	Z	1	0	0	0	3	2	1	1	1	1	0	0	0	0	0	0	0	0	0	1.2	8									
18-Nov	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0									
19-Nov	Z	0	0	0	0	0	0	0	0	0	1	1	3	2	0	1	1	5	6	4	1	0	0	0	1.1	6									
20-Nov	0	Z	3	2	7	7	4	1	1	1	1	1	1	2	2	1	0	0	0	0	0	0	0	0	1.5	7									
21-Nov	0	0	Z	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-Nov	1	1	1	Z	1	1	1	1	1	6	5	3	1	0	0	1	0	0	0	0	0	0	0	0	1.1	6									
23-Nov	1	2	1	6	Z	4	0	0	1	1	1	1	1	1	2	2	3	1	0	0	0	0	4	4	1.4	6									
24-Nov	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	3	1	2	2	2	0.6	3									
25-Nov	Z	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	3	15	24	9	4	1	2.6	24									
26-Nov	4	Z	2	5	15	8	8	1	1	1	1	1	0	1	1	0	0	0	0	0	0	0	0	0	2.2	15									
27-Nov	0	0	Z	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-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.0	1									
29-Nov	0	0	0	0	Z	0	0	0	0	1	2	4	5	2	1	0	0	0	0	0	0	0	0	0	0.7	5									
30-Nov	0	0	0	0	0	Z	0	0	0	0	1	1	4	1	0	0	0	0	0	0	0	0	0	0	0.4	4									
																	0.9 0.5 0.9 1.7 3.0 2.7 2.2 1.1 1.6 1.6 1.4 1.4 1.4 0.9 0.6 0.7 0.5 0.9 0.6 1.8 2.8 1.4 1.4 1.2																	Diurnal Average	
																	9 3 8 15 27 20 29 9 14 11 10 8 8 5 3 7 6 9 6 17 41 15 20 16																	Diurnal Maximum	
Z - zerospan																	C - Calibration																		



WBEA NETWORK
Hourly Averages

Nitrogen Oxide (NO) - ppb
Firebag - November 2014





WBEA NETWORK
Cumulative Frequency Distribution

Nitrogen Oxide (NO) - ppb
Firebag - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	682	99.42	99.42
21 - 40	3	0.44	99.85
41 - 80	1	0.15	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



WBEA NETWORK
Frequency Distribution

Nitrogen Oxide (NO) - ppb
Firebag - November 2014

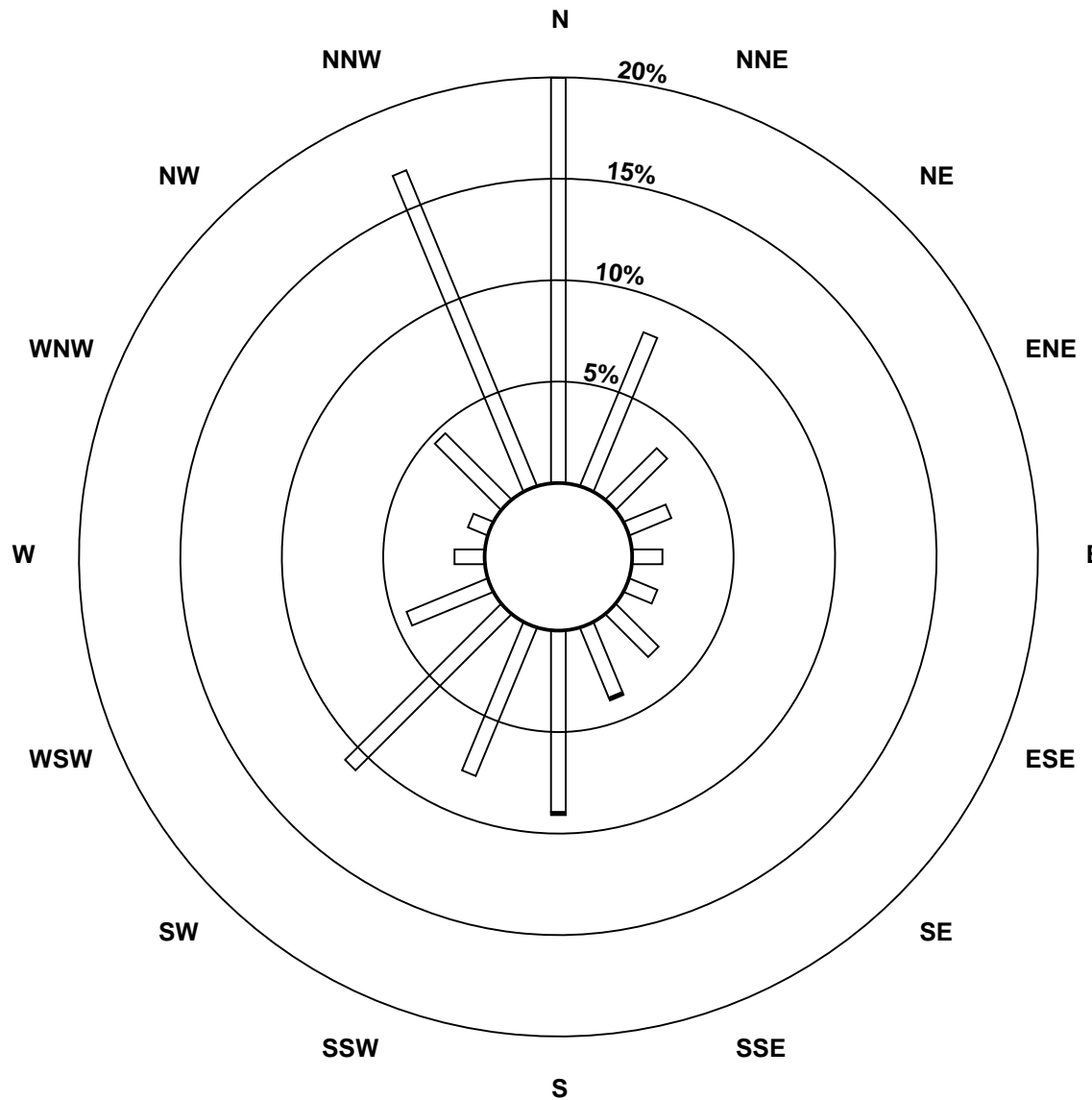
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	134	55	24	15	10	10	20	25	60	53	73	29	10	7	31	113	669
21 - 40	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	2
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	134	55	24	15	10	10	20	26	61	53	73	29	10	7	31	113	671

Total Number of Valid Hours: 671

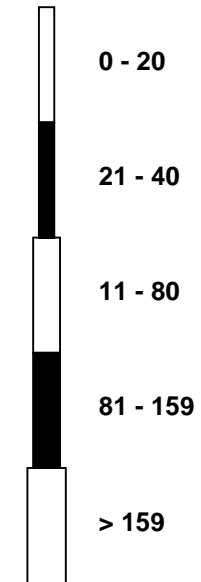
Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

Nitrogen Oxide (NO) - ppb
Firebag (AMS 19)



Classes (ppb)

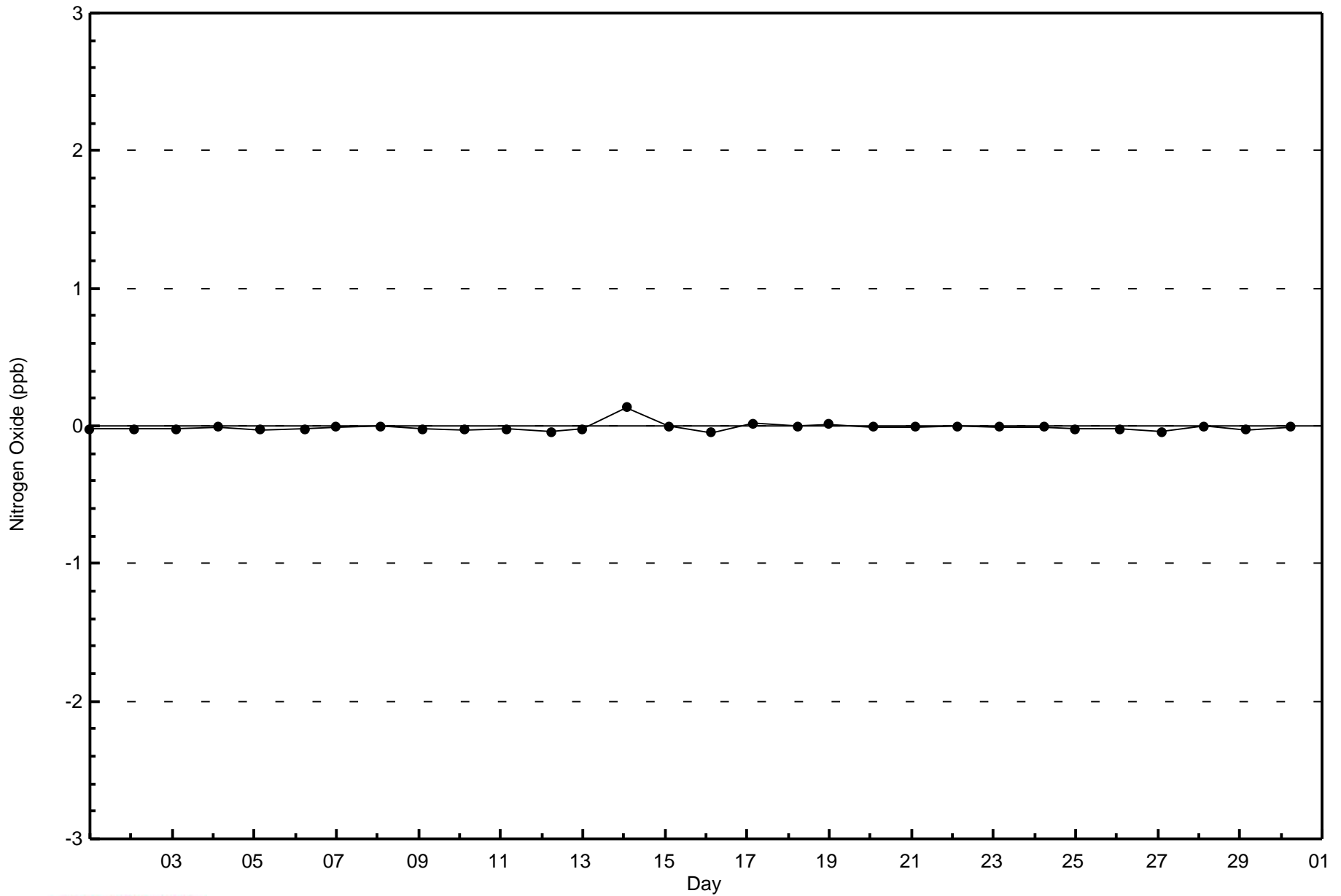


Total Number of Valid Hours: 671



WBEA NETWORK
Zero Responses

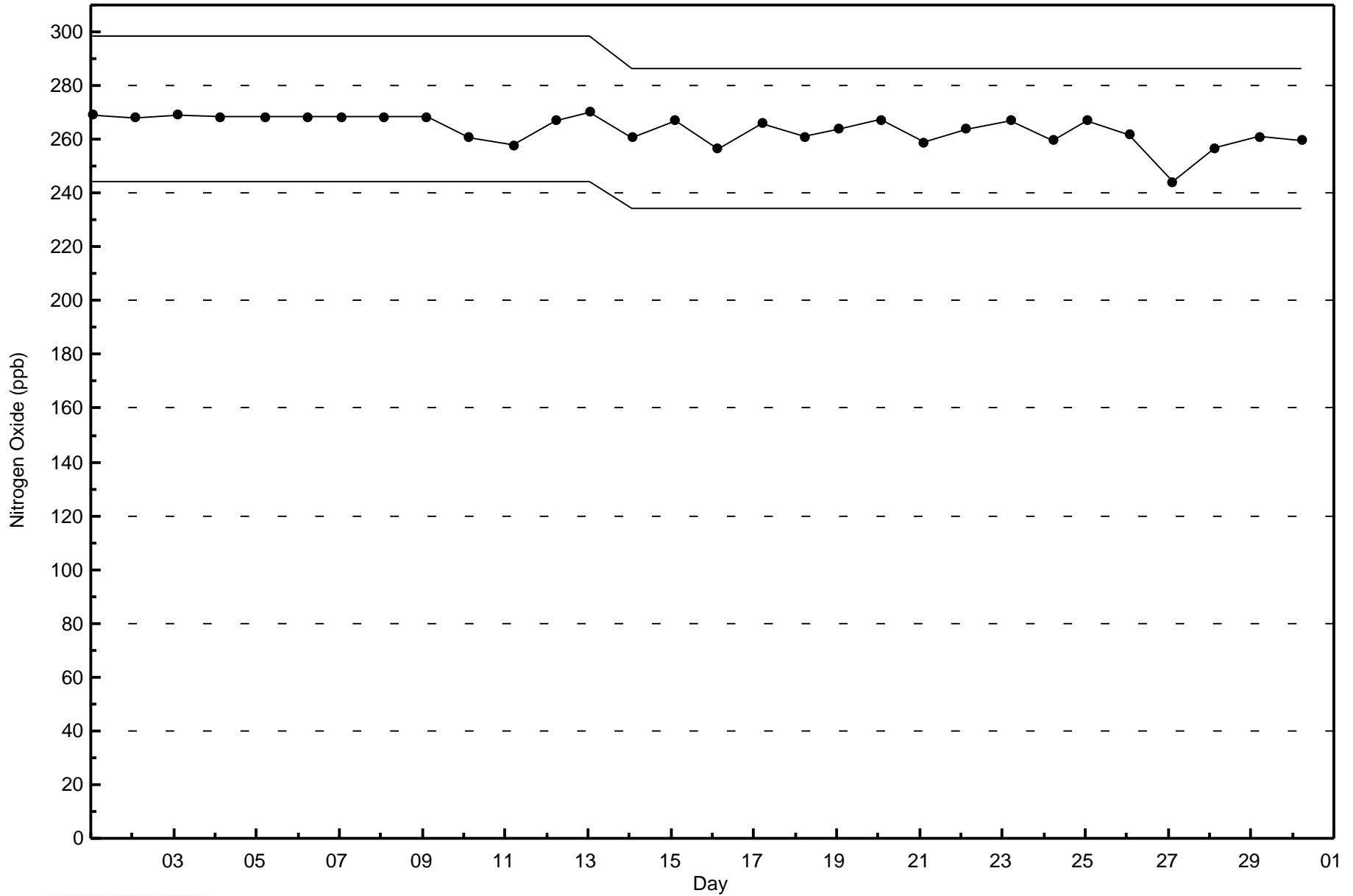
Nitrogen Oxide (NO) - ppb
Firebag - November 2014





WBEA NETWORK
Span Responses

Nitrogen Oxide (NO) - ppb
Firebag - November 2014





Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 31 ppb on Nov 25 21:00	Maximum Daily Average: 8.2 ppb on Nov 2
Minimum Value: 0 ppb on Nov 9 09:00	Hours of Data: 686
Maximum Diurnal Average: 5.4 ppb at hour 6	Hours of Missing Data: 34
Monthly Average: 3.5 ppb	Hours of Calibration: 34
Minimum Daily Average: 0.1 ppb on Nov 10	Percent Operational Time: 100.0
Minimum Diurnal Average: 1.9 ppb at hour 15	
Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 2 Q ₃ = 5 P ₉₀ = 9 P ₉₉ = 21	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	Z	4	4	6	7	8	8	11	10	8	5	7	6	7	7	8	12	16	8	5	7	9	10	7	7.6	16
2-Nov	13	Z	10	8	23	23	13	5	7	7	3	3	5	3	3	7	9	10	6	10	8	5	6	4	8.2	23
3-Nov	2	3	Z	8	5	8	12	8	8	4	5	8	7	5	3	2	1	1	0	0	0	0	1	2	4.0	12
4-Nov	2	2	3	Z	7	6	6	6	7	8	7	3	3	3	3	3	3	2	2	5	3	5	8	8	4.5	8
5-Nov	6	2	2	6	Z	9	4	2	3	4	2	1	1	1	0	1	3	3	2	5	5	3	3	2	3.0	9
6-Nov	2	2	1	2	6	Z	6	6	3	1	1	1	1	1	1	2	3	2	3	5	9	6	1	1	2.8	9
7-Nov	Z	1	1	0	0	0	1	0	0	1	1	1	1	1	1	1	1	1	0	0	0	1	0	0	0.6	1
8-Nov	1	Z	2	1	1	3	4	6	4	5	1	0	0	1	1	1	0	1	0	0	0	0	0	0	1.4	6
9-Nov	0	0	Z	1	3	5	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0.6	5
10-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
11-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	2	4	4	5	16	14	9	2.4	16
12-Nov	10	7	11	22	23	Z	15	11	9	6	5	4	3	2	2	5	5	6	5	2	3	4	7	3	7.3	23
13-Nov	Z	7	8	10	7	6	4	5	C	C	C	C	3	3	3	7	9	8	6	6	13	12	5	2	6.4	13
14-Nov	1	Z	1	1	1	1	1	0	0	0	0	0	0	0	1	1	3	3	15	28	21	9	8	4.1	28	
15-Nov	5	8	Z	7	6	10	8	3	4	3	3	6	8	6	4	1	0	0	0	0	0	0	0	0	3.6	10
16-Nov	0	0	0	Z	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0.4	1
17-Nov	0	11	24	16	Z	6	4	2	2	5	3	2	2	3	3	1	2	2	10	13	6	2	2	1	5.2	24
18-Nov	0	0	0	0	0	Z	1	0	1	1	1	2	2	2	2	2	1	1	0	1	3	1	0	1	0.9	3
19-Nov	Z	2	3	3	3	3	1	0	1	2	4	4	8	6	2	4	5	11	11	7	2	2	2	1	3.8	11
20-Nov	1	Z	5	5	13	12	7	4	4	5	4	4	4	6	7	11	13	14	16	17	12	5	2	1	7.4	17
21-Nov	1	1	Z	0	0	0	1	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.4	1
22-Nov	3	4	3	Z	4	3	3	5	4	6	4	3	1	1	0	1	1	0	0	0	0	1	1	1	2.1	6
23-Nov	4	5	3	8	Z	7	2	2	3	2	1	2	2	2	3	4	8	8	3	2	4	8	15	19	5.0	19
24-Nov	5	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	3	6	6	12	5	7	6	7	2.6	12
25-Nov	Z	2	1	0	2	0	0	2	5	0	0	0	0	0	0	0	1	6	12	21	31	21	12	4	5.3	31
26-Nov	11	Z	5	7	21	12	12	6	6	4	2	2	2	2	3	2	3	5	13	10	4	2	1	0	5.9	21
27-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	0	0	0	0	0	0.3	2
28-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0.3	6
29-Nov	7	6	7	13	Z	13	9	8	8	6	6	7	8	5	4	7	9	6	1	1	1	2	1	0	5.8	13
30-Nov	0	0	0	0	1	Z	12	7	4	2	3	3	7	2	2	2	1	1	1	1	1	1	1	1	2.3	12

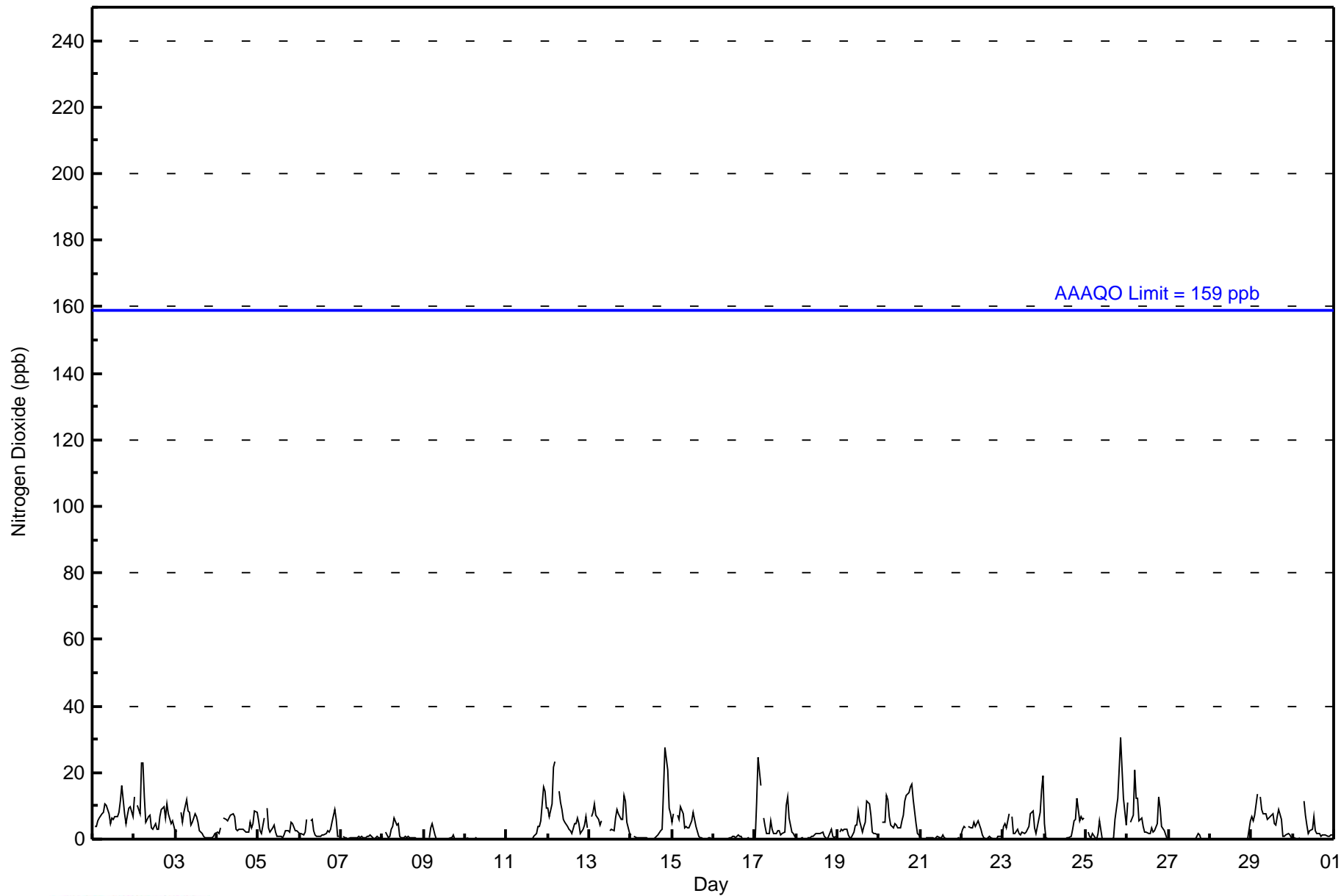
3.0	2.6	3.8	5.0	5.3	5.4	4.4	3.4	3.2	2.8	2.2	2.2	2.4	2.1	1.9	2.5	3.1	3.9	3.8	4.8	5.1	4.4	3.6	2.9	Diurnal Average	
13	11	24	22	23	23	15	11	10	8	7	8	8	7	7	11	13	16	16	21	31	21	15	19	Diurnal Maximum	

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



WBEA NETWORK
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Firebag - November 2014





WBEA NETWORK
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Firebag - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	675	98.40	98.40
21 - 40	11	1.60	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: 686

Total Number of Hours: 720



WBEA NETWORK
Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Firebag - November 2014

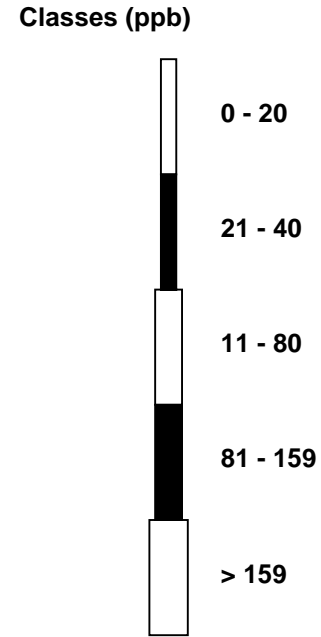
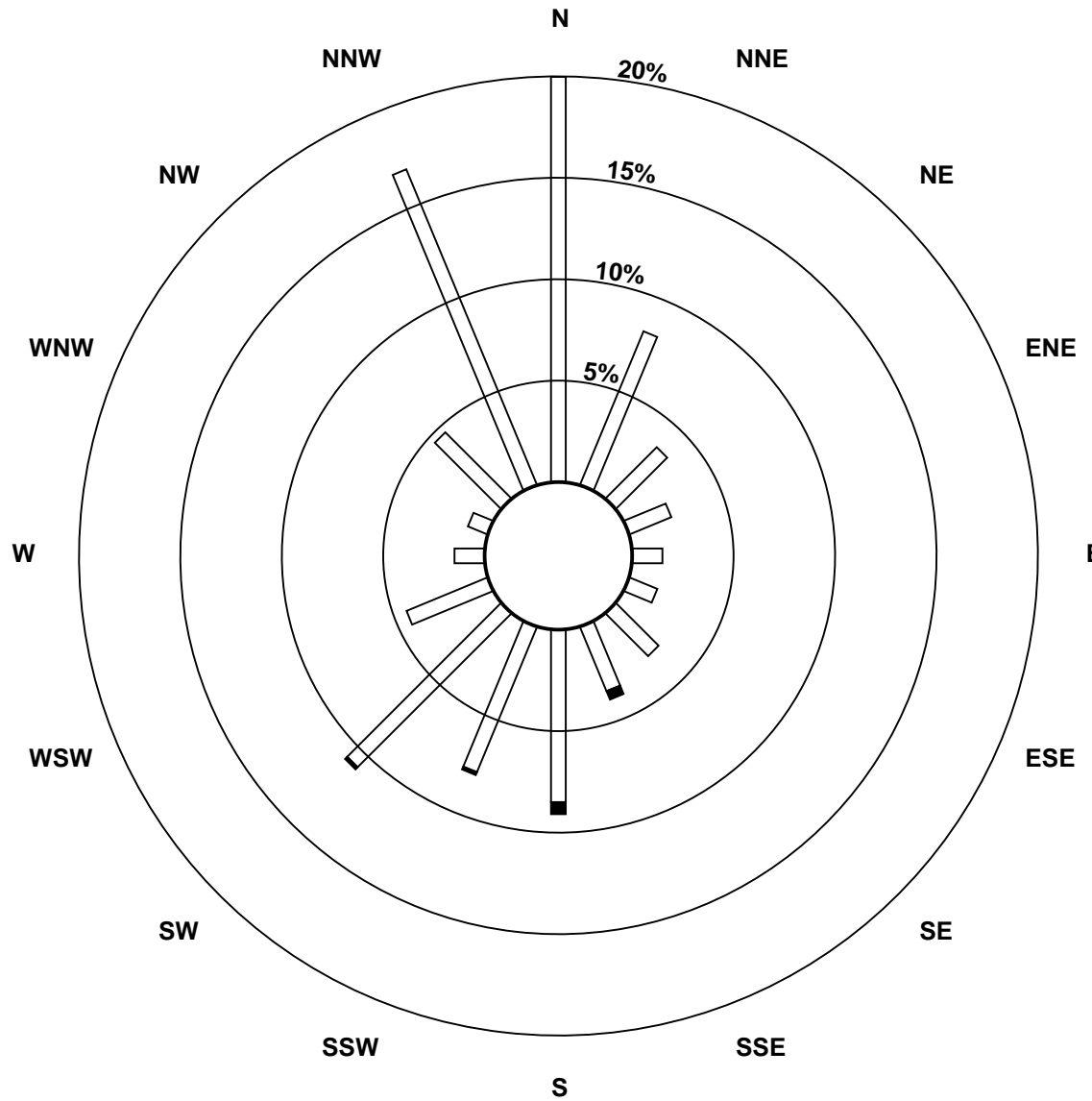
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	134	55	24	15	10	10	20	23	57	52	72	29	10	7	31	113	662
21 - 40	0	0	0	0	0	0	0	3	4	1	1	0	0	0	0	0	9
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	134	55	24	15	10	10	20	26	61	53	73	29	10	7	31	113	671

Total Number of Valid Hours: 671

Total Number of Hours: 720

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

**Nitrogen Dioxide (NO₂) - ppb
Firebag (AMS 19)**

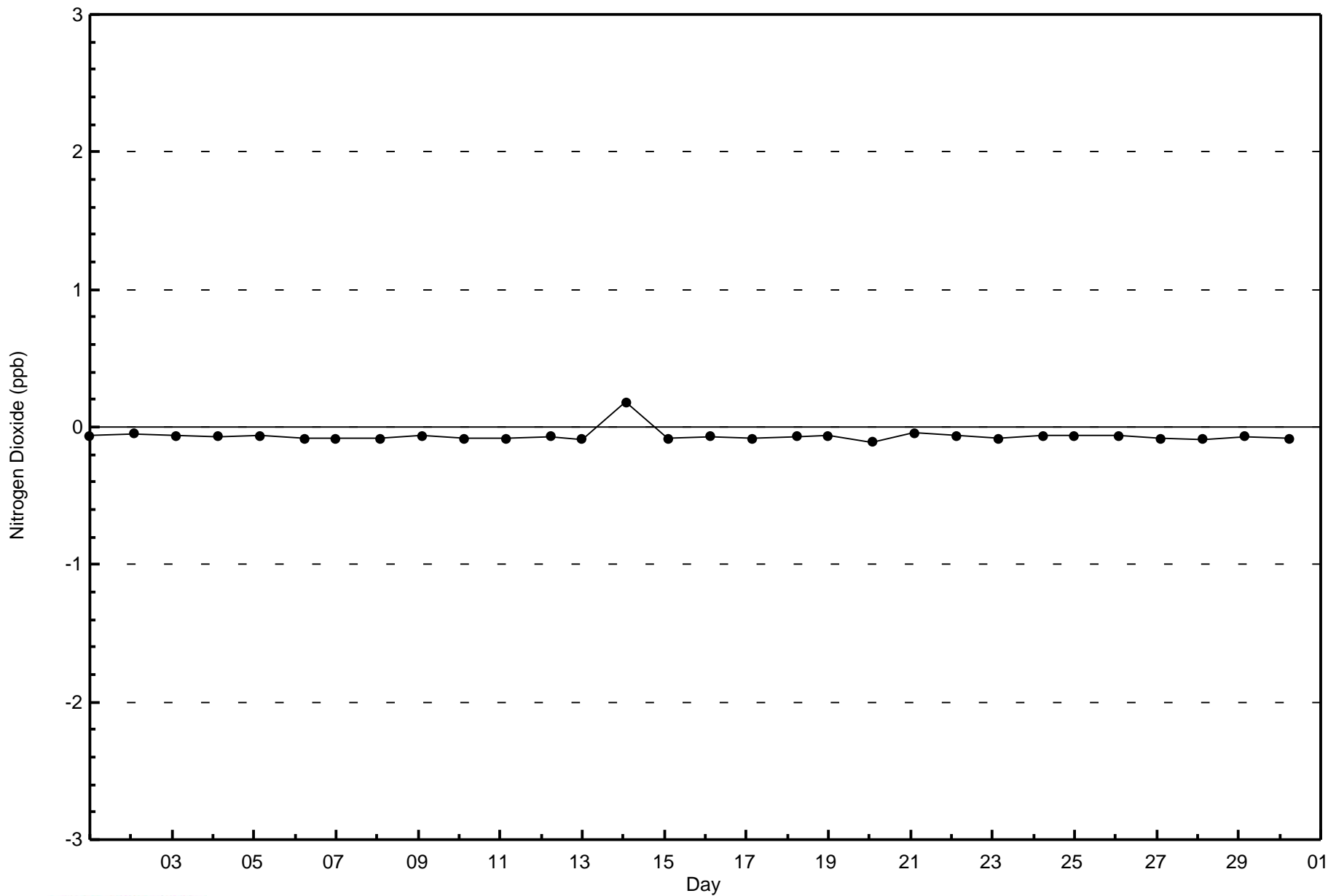


Total Number of Valid Hours: 671



WBEA NETWORK
Zero Responses

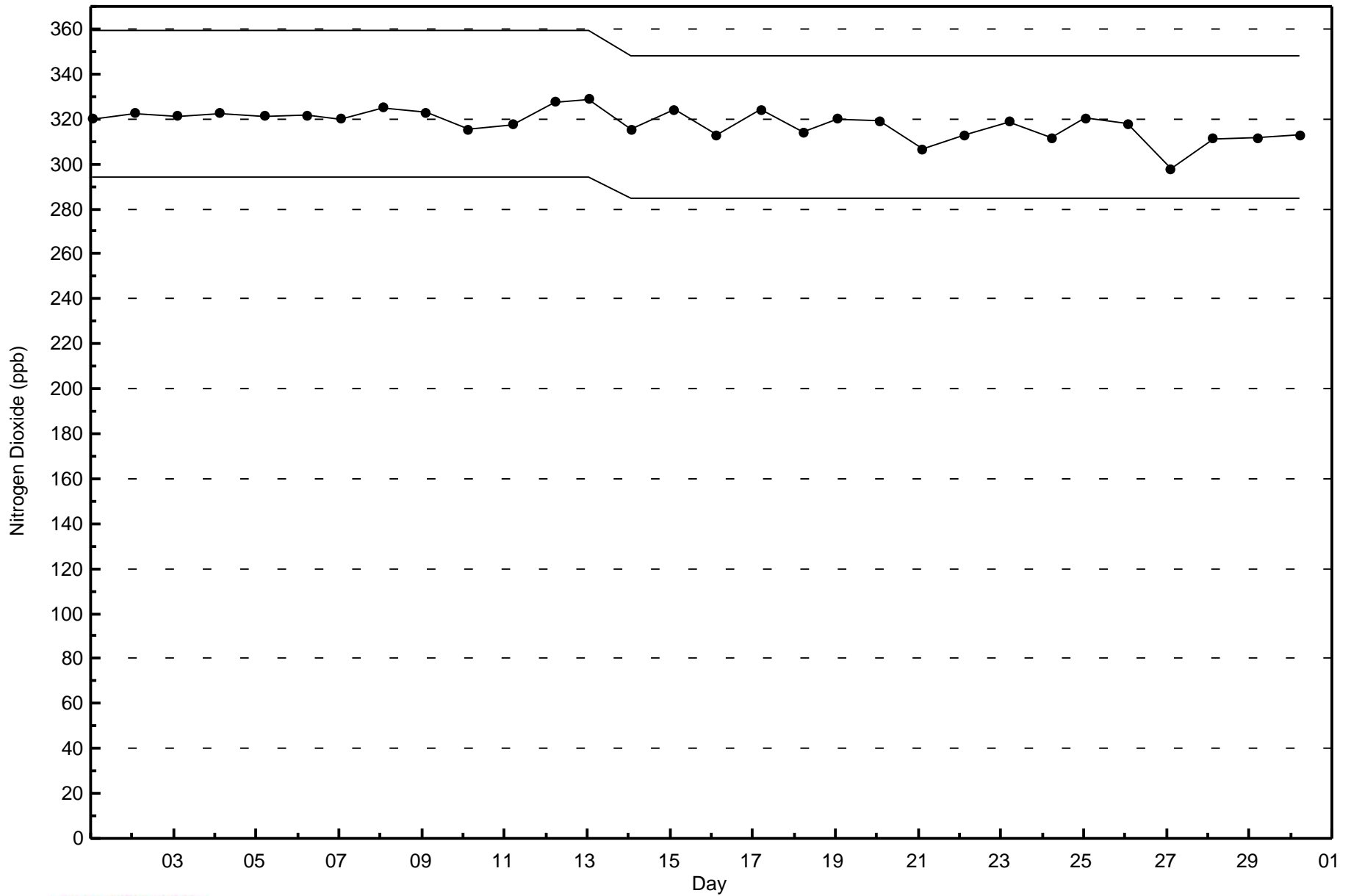
Nitrogen Dioxide (NO₂) - ppb
Firebag - November 2014





WBEA NETWORK
Span Responses

Nitrogen Dioxide (NO₂) - ppb
Firebag - November 2014



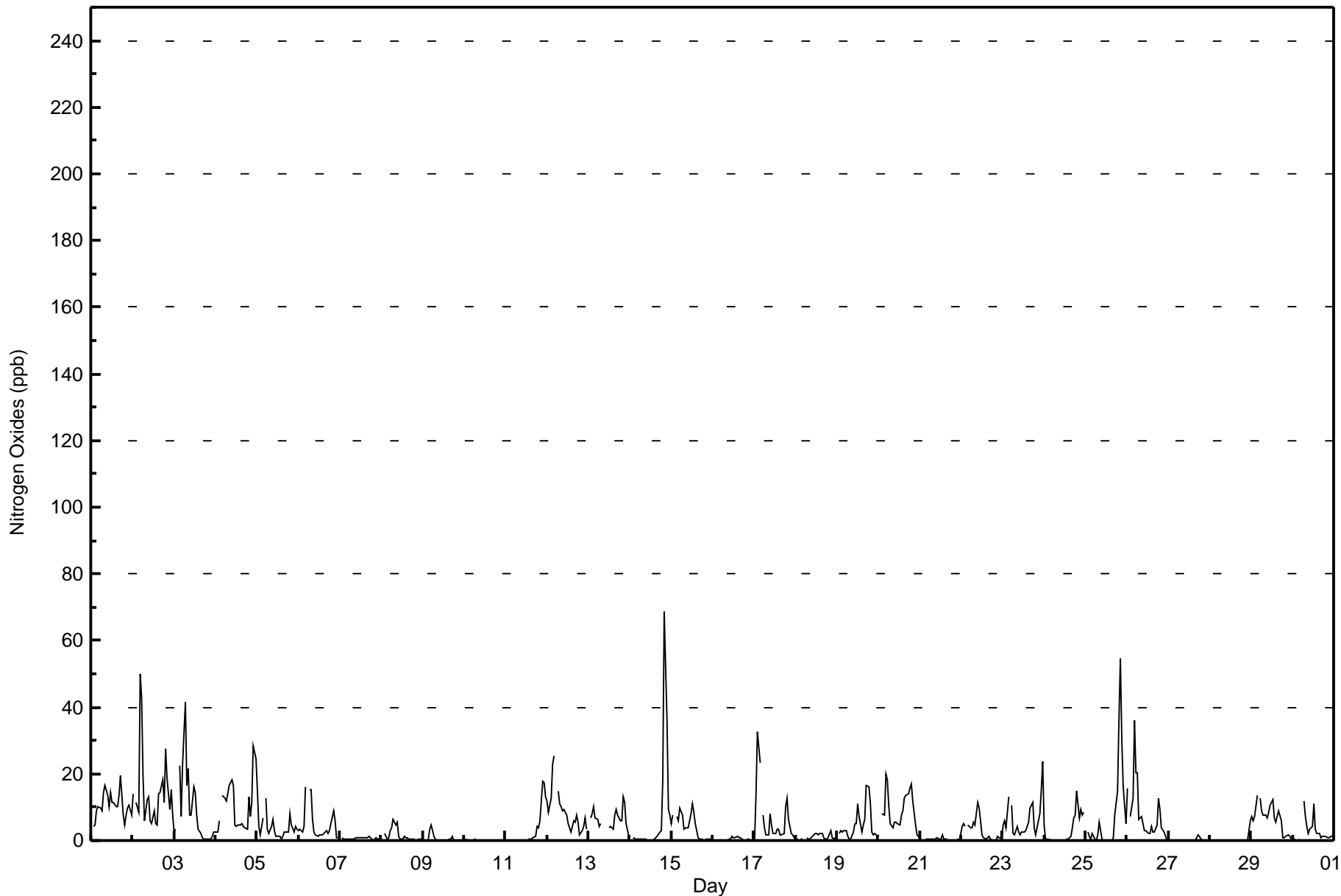


Maximum Value: 68 ppb on Nov 14 21:00																		Maximum Daily Average: 14.9 ppb on Nov 2						Hours in Service: 720		
Minimum Value: 0 ppb on Nov 10 19:00																		Minimum Daily Average: 0.1 ppb on Nov 10						Hours of Data: 686		
Maximum Diurnal Average: 8.3 ppb at hour 5																		Minimum Diurnal Average: 2.5 ppb at hour 15						Hours of Missing Data: 34		
Monthly Average: 4.8 ppb																		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 2 Q ₃ = 7 P ₉₀ = 13 P ₉₉ = 36						Hours of Calibration: 34		
																		Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	Z	4	5	9	10	10	9	14	17	13	10	15	11	11	10	10	13	19	8	5	8	10	11	8	10.4	19
2-Nov	14	Z	11	9	50	43	19	6	12	13	6	5	9	5	5	14	14	18	11	27	19	9	15	8	14.9	50
3-Nov	2	3	Z	22	7	23	41	17	22	8	8	16	14	8	3	2	1	0	0	0	0	0	1	2	8.8	41
4-Nov	2	3	6	Z	13	13	12	14	16	18	17	5	4	5	5	4	4	3	13	7	11	28	24	10.1	28	
5-Nov	15	4	2	7	Z	13	4	2	4	6	3	1	1	1	0	1	3	2	2	8	5	3	4	3	4.2	15
6-Nov	3	3	3	4	16	Z	15	15	6	2	2	1	1	2	2	2	3	2	3	5	9	6	1	1	4.7	16
7-Nov	Z	1	1	0	0	0	1	0	0	1	1	1	1	1	1	1	1	1	0	0	0	1	0	0	0.6	1
8-Nov	1	Z	2	0	1	3	4	6	5	5	1	0	0	1	1	1	0	1	0	0	0	0	0	0	1.5	6
9-Nov	0	0	Z	1	3	5	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0.6	5
10-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
11-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	4	4	6	18	17	13	2.9	18
12-Nov	12	8	13	23	25	Z	15	11	10	9	9	8	5	4	3	6	6	8	5	2	3	4	7	3	8.6	25
13-Nov	Z	7	8	10	7	6	4	5	C	C	C	C	4	4	4	7	9	8	6	6	13	12	5	1	6.7	13
14-Nov	1	Z	1	1	1	1	1	0	0	0	0	0	0	0	1	1	3	3	18	68	36	9	7	6.7	68	
15-Nov	5	7	Z	7	6	10	8	3	4	4	4	8	11	9	5	1	0	0	0	0	0	0	0	0	4.1	11
16-Nov	0	0	0	Z	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0.4	1
17-Nov	0	14	33	23	Z	7	4	2	2	8	5	2	2	3	3	2	2	2	10	13	6	2	2	1	6.4	33
18-Nov	0	0	0	0	0	Z	1	0	1	1	1	2	2	2	2	2	1	1	0	1	3	1	0	1	1.0	3
19-Nov	Z	2	3	3	3	3	1	0	1	2	5	5	11	7	3	5	6	17	16	11	3	2	2	1	4.8	17
20-Nov	2	Z	8	7	20	18	11	5	4	6	6	5	5	7	9	13	14	14	16	17	12	5	2	1	8.9	20
21-Nov	1	0	Z	0	0	0	1	0	0	0	1	1	1	2	1	0	0	0	0	0	0	0	0	0	0.4	2
22-Nov	4	5	4	Z	5	4	4	6	5	12	10	6	2	1	0	1	1	0	0	0	0	1	1	1	3.2	12
23-Nov	5	6	4	13	Z	11	2	2	4	2	2	3	3	3	4	6	10	12	4	2	4	8	15	24	6.4	24
24-Nov	4	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	4	7	15	7	9	7	8	3.2	15
25-Nov	Z	3	1	1	2	0	0	2	5	0	0	0	0	0	0	0	1	8	15	37	54	30	16	5	7.9	54
26-Nov	16	Z	7	13	36	20	20	6	7	5	3	3	2	2	4	2	3	5	13	9	4	2	1	0	8.0	36
27-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	0	0	0	0	0	0.3	2
28-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0.4	6
29-Nov	7	6	7	14	Z	13	9	7	8	7	9	10	12	7	5	7	9	6	1	1	1	2	1	0	6.5	14
30-Nov	0	0	0	0	1	Z	12	7	4	2	3	4	11	3	2	2	1	1	1	1	1	1	1	1	2.7	12
																		Diurnal Average								
																		Diurnal Maximum								
Z - zerospan																		C - Calibration								



WBEA NETWORK
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Firebag - November 2014





WBEA NETWORK
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Firebag - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	666	97.08	97.08
21 - 40	15	2.19	99.27
41 - 80	5	0.73	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



WBEA NETWORK
Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Firebag - November 2014

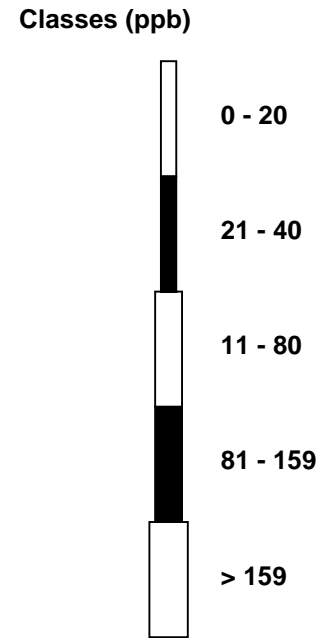
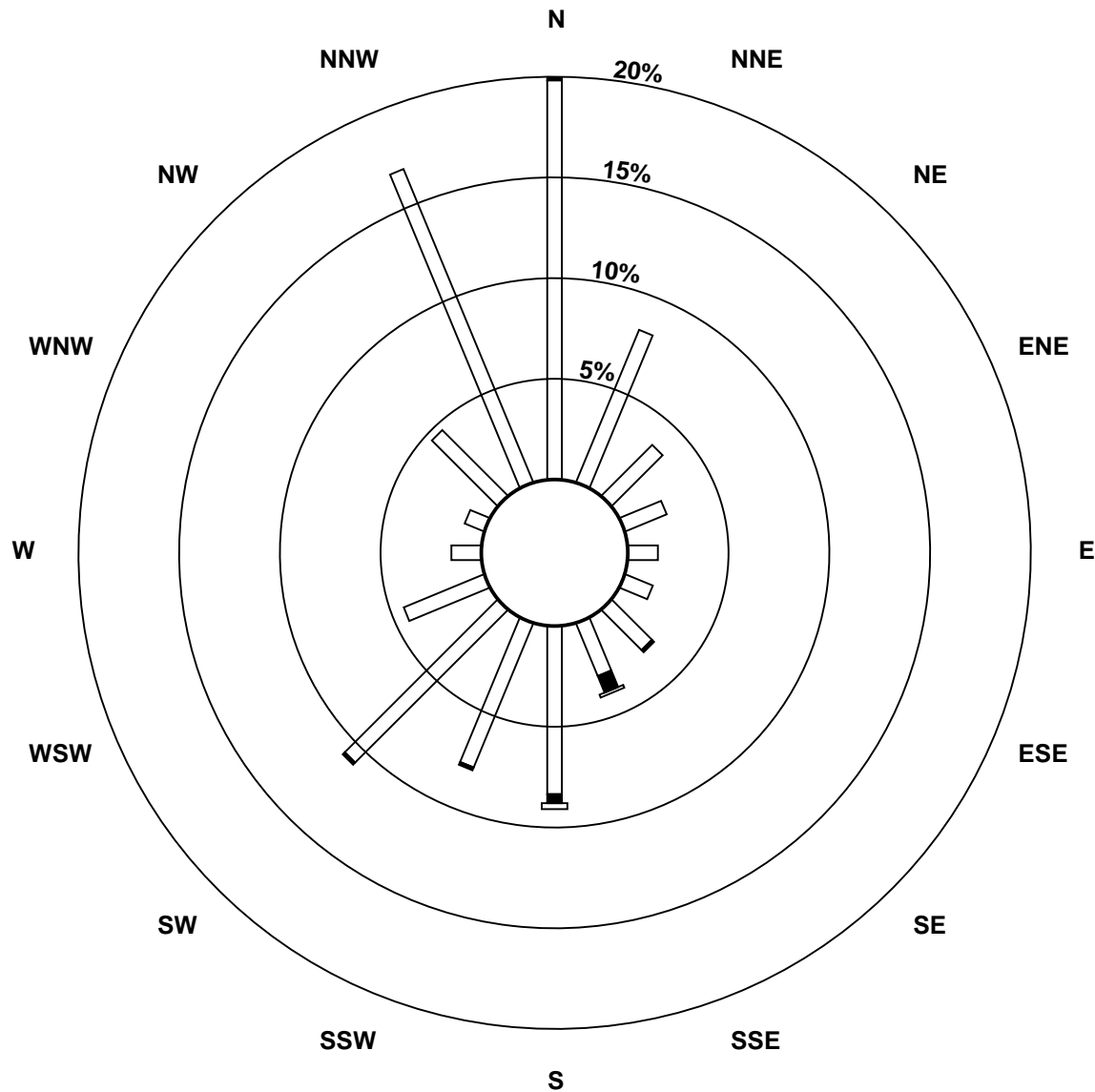
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	133	55	24	15	10	10	19	19	56	52	72	29	10	7	31	113	655
21 - 40	1	0	0	0	0	0	1	6	3	1	1	0	0	0	0	0	13
11 - 80	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	3
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	134	55	24	15	10	10	20	26	61	53	73	29	10	7	31	113	671

Total Number of Valid Hours: 671

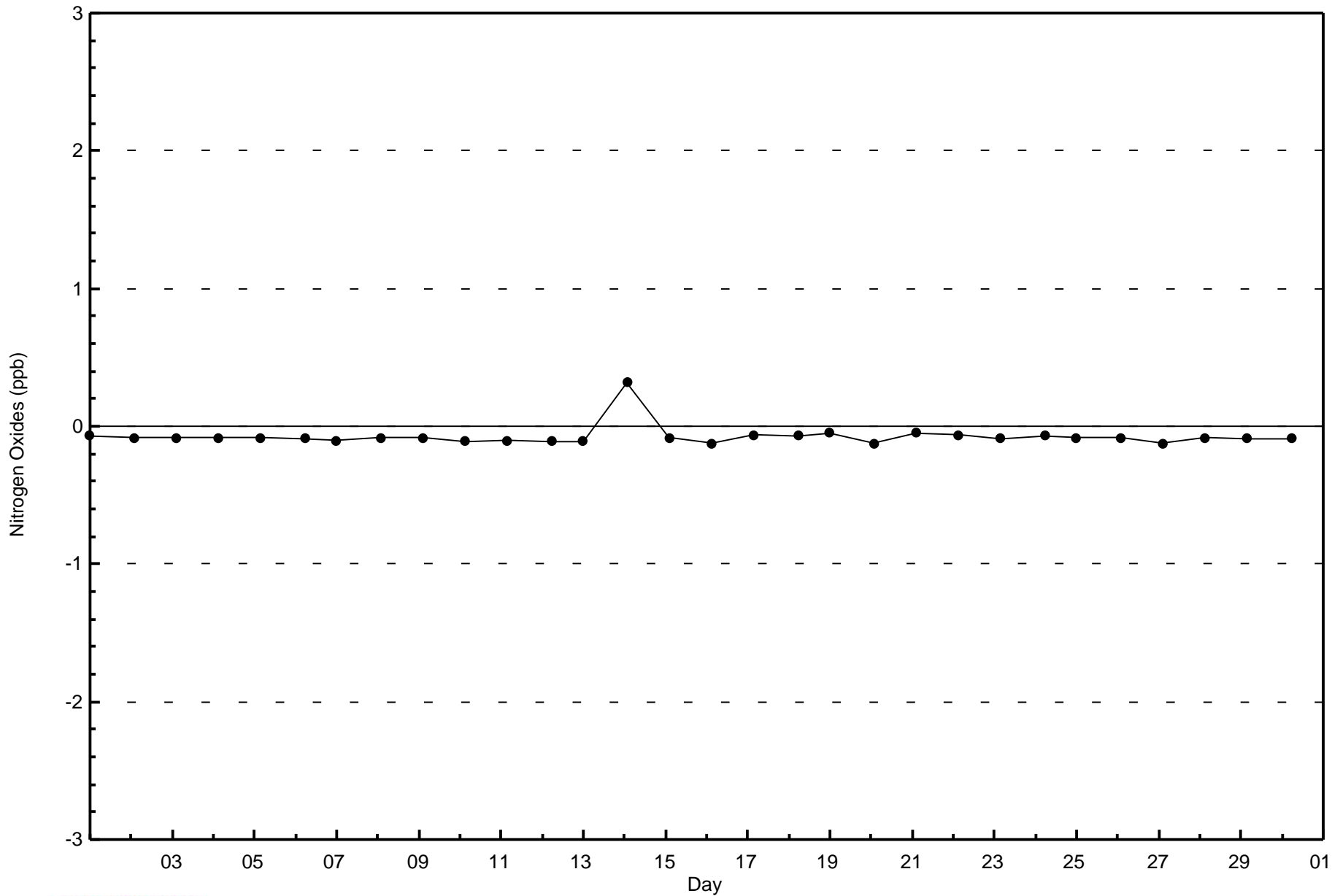
Total Number of Hours: 720

Wood Buffalo Environmental Association
 Wind Rose Nov 2014

Nitrogen Oxides (NO_x) - ppb
 Firebag (AMS 19)



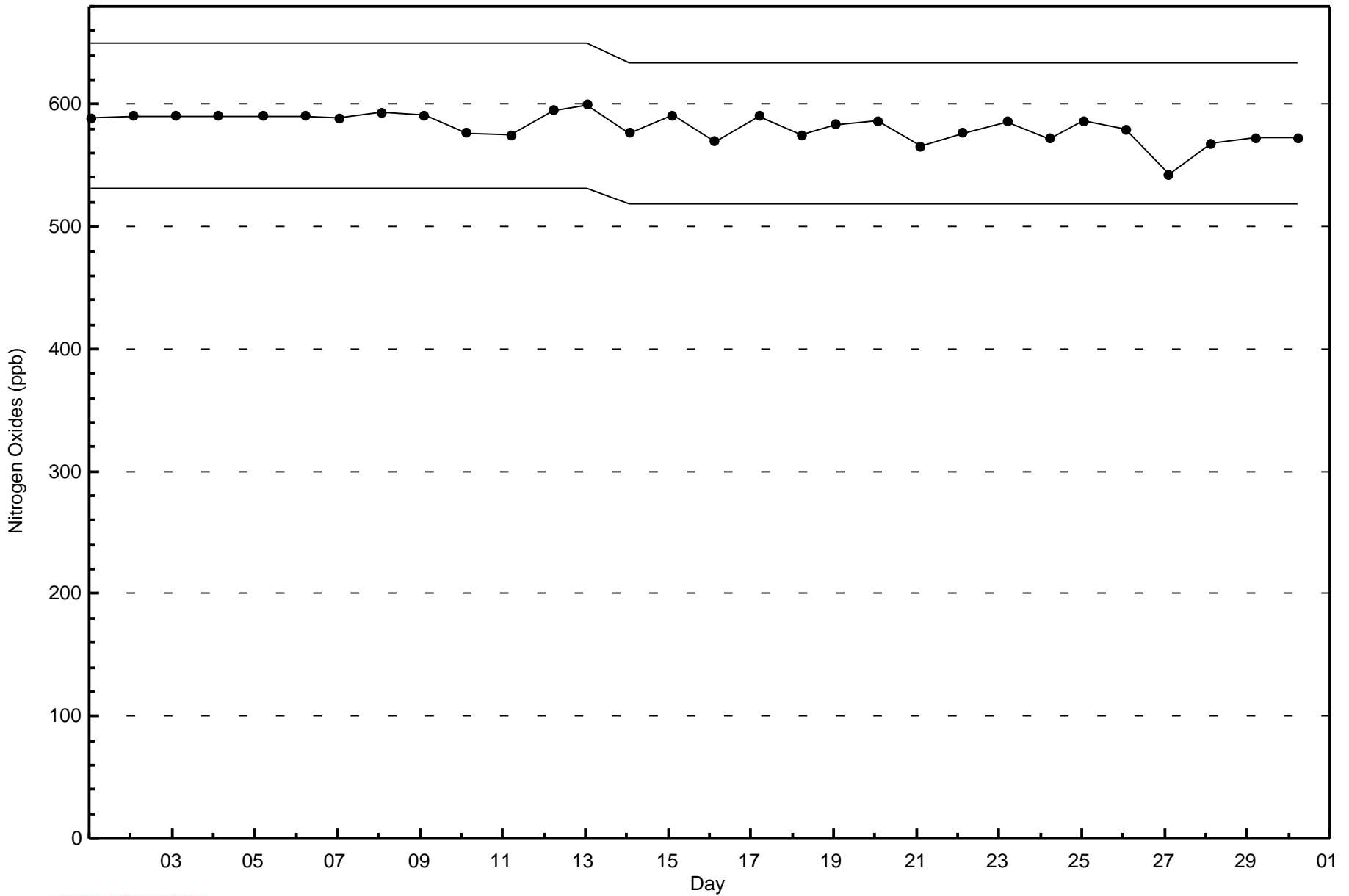
Total Number of Valid Hours: 671





WBEA NETWORK
Span Responses

Nitrogen Oxides (NO_x) - ppb
Firebag - November 2014



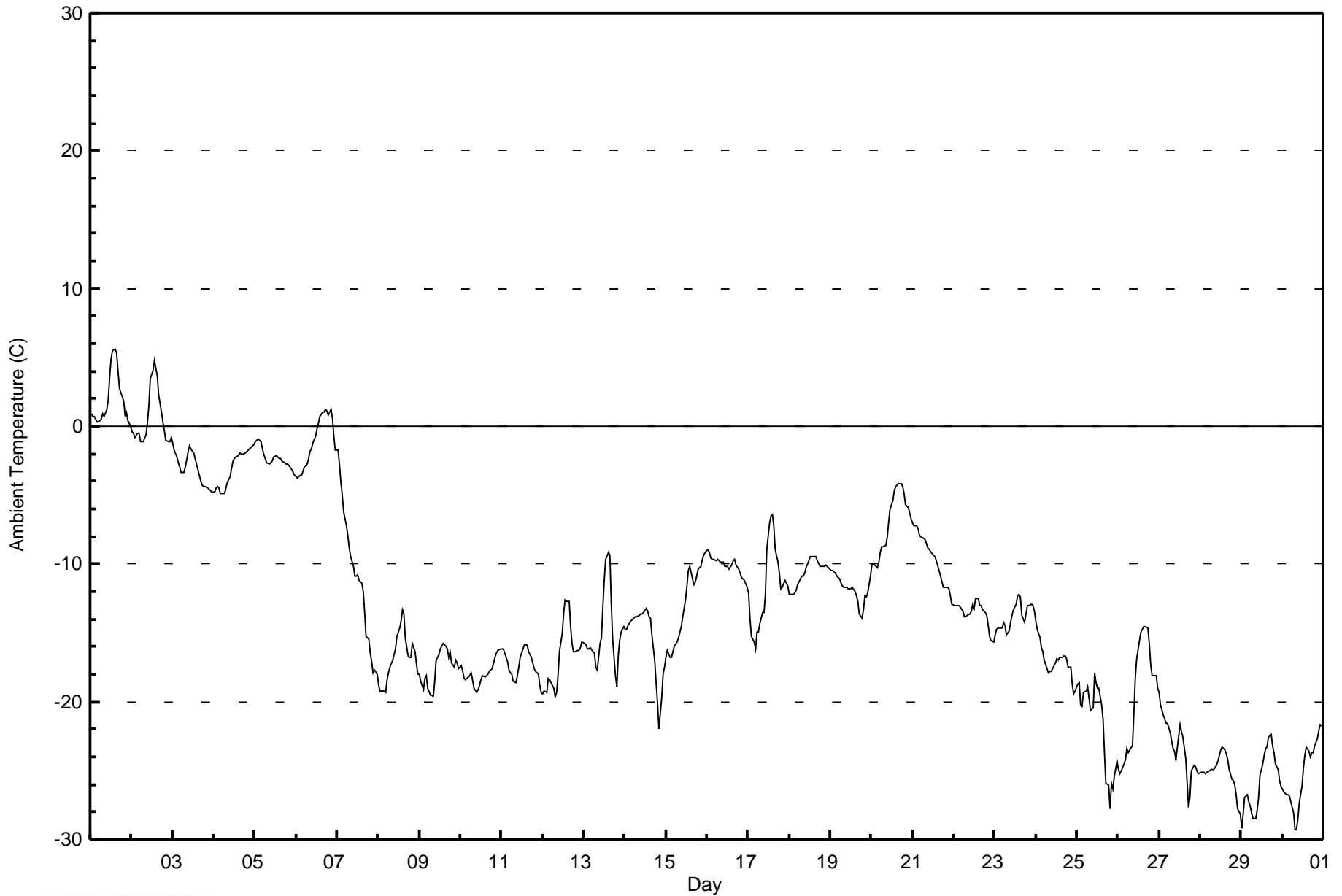


Maximum Value: 5.6 C on Nov 1 15:00		Maximum Daily Average: 1.9 C on Nov 1		Hours in Service: 720																																												
Minimum Value: -29.3 C on Nov 30 09:00		Minimum Daily Average: -25.8 C on Nov 29		Hours of Data: 720																																												
Maximum Diurnal Average: -11.3 C at hour 15		Minimum Diurnal Average: -14.0 C at hour 8		Hours of Missing Data: 0																																												
Monthly Average: -13.11 C		Percentiles: P ₁ = -28.1 P ₁₀ = -23.9 Q ₁ = -18.1 Median = -13.8 Q ₃ = -8.7 P ₉₀ = -1.6 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-Nov	1.0	0.7	0.7	0.5	0.3	0.4	0.5	0.9	0.7	1.2	2.0	3.6	4.9	5.5	5.6	5.3	4.0	2.7	2.1	1.8	0.8	1.0	0.5	0.0	1.9	5.6																						
2-Nov	-0.4	-0.5	-0.8	-0.5	-0.6	-1.1	-1.2	-1.1	-0.6	0.3	1.5	3.4	4.1	4.8	4.1	3.6	2.3	1.0	0.3	-0.3	-1.0	-1.1	-1.1	-0.9	0.6	4.8																						
3-Nov	-1.2	-1.7	-2.2	-2.6	-3.0	-3.4	-3.3	-3.0	-2.5	-1.8	-1.5	-1.8	-1.9	-2.3	-2.7	-3.6	-4.0	-4.3	-4.4	-4.4	-4.5	-4.6	-4.7	-4.8	-3.1	-1.2																						
4-Nov	-4.7	-4.5	-4.4	-4.5	-4.9	-4.9	-4.8	-4.5	-4.0	-3.6	-3.0	-2.5	-2.3	-2.2	-2.1	-2.0	-2.0	-2.0	-2.0	-1.8	-1.8	-1.6	-1.5	-1.3	-3.0	-1.3																						
5-Nov	-1.1	-1.0	-0.9	-1.2	-1.6	-2.0	-2.3	-2.7	-2.8	-2.7	-2.6	-2.3	-2.1	-2.3	-2.3	-2.4	-2.5	-2.6	-2.7	-2.7	-2.8	-3.1	-3.3	-3.5	-2.3	-0.9																						
6-Nov	-3.6	-3.8	-3.6	-3.5	-3.3	-3.0	-2.8	-2.3	-1.8	-1.6	-1.2	-0.7	-0.2	0.3	0.8	1.1	1.0	1.2	1.1	0.8	1.2	0.6	-0.7	-1.7	-1.1	1.2																						
7-Nov	-1.7	-2.7	-4.0	-5.0	-6.2	-7.2	-7.9	-8.9	-9.4	-10.1	-10.8	-10.9	-10.8	-11.2	-11.4	-12.0	-13.6	-15.3	-15.4	-16.5	-17.1	-17.9	-17.7	-18.0	-10.9	-1.7																						
8-Nov	-18.8	-19.2	-19.2	-19.2	-19.3	-18.4	-17.9	-17.5	-16.9	-16.5	-16.1	-15.2	-14.6	-14.1	-13.4	-13.6	-15.3	-16.7	-16.7	-16.8	-15.8	-16.4	-17.3	-18.0	-16.8	-13.4																						
9-Nov	-18.0	-18.5	-19.1	-18.4	-18.1	-19.0	-19.5	-19.5	-19.6	-18.5	-17.0	-16.6	-16.1	-16.0	-15.8	-15.9	-16.1	-16.8	-16.4	-17.2	-17.5	-16.9	-17.2	-17.6	-17.6	-15.8																						
10-Nov	-17.4	-17.8	-18.3	-18.4	-18.3	-18.1	-17.9	-18.4	-19.0	-19.3	-19.1	-18.8	-18.4	-18.1	-18.2	-18.1	-18.0	-17.8	-17.6	-17.2	-16.8	-16.4	-16.2	-16.2	-17.9	-16.2																						
11-Nov	-16.2	-16.2	-16.5	-17.1	-17.6	-17.9	-18.0	-18.5	-18.6	-18.1	-17.5	-16.8	-16.2	-15.8	-15.9	-15.9	-16.4	-16.8	-17.2	-17.6	-17.8	-18.0	-18.8	-19.3	-17.3	-15.8																						
12-Nov	-19.4	-19.2	-19.3	-18.3	-18.4	-18.6	-19.1	-19.6	-19.3	-18.1	-16.3	-15.0	-13.6	-12.6	-12.7	-12.7	-14.6	-15.8	-16.4	-16.4	-16.2	-16.3	-16.1	-15.7	-16.7	-12.6																						
13-Nov	-15.7	-15.9	-16.2	-16.1	-16.1	-16.3	-16.5	-17.5	-17.7	-15.8	-15.4	-13.1	-11.2	-9.6	-9.2	-9.3	-12.8	-15.5	-18.1	-18.9	-16.7	-15.6	-15.0	-14.5	-14.9	-9.2																						
14-Nov	-14.8	-14.7	-14.4	-14.2	-14.0	-13.9	-13.8	-13.7	-13.6	-13.5	-13.2	-13.5	-13.8	-13.9	-15.1	-17.0	-18.6	-20.0	-21.9	-19.8	-18.0	-17.5	-17.5	-15.4	-13.2	-15.4																						
15-Nov	-16.7	-16.2	-16.8	-16.8	-16.3	-15.9	-15.6	-15.4	-15.0	-14.5	-13.8	-12.7	-11.5	-10.5	-10.2	-11.1	-11.5	-11.3	-10.9	-10.3	-10.2	-9.7	-9.4	-9.2	-13.0	-9.2																						
16-Nov	-9.0	-9.2	-9.6	-9.7	-9.7	-9.7	-9.7	-9.8	-9.9	-9.9	-10.2	-10.1	-10.2	-10.3	-10.1	-9.8	-9.6	-10.0	-10.4	-10.7	-11.0	-11.1	-11.2	-11.7	-10.1	-9.0																						
17-Nov	-12.1	-13.9	-15.2	-15.7	-16.2	-15.0	-15.0	-14.4	-13.5	-13.5	-12.2	-8.9	-7.0	-6.5	-6.4	-7.2	-8.9	-9.9	-10.7	-11.8	-11.7	-11.2	-11.4	-11.6	-11.7	-6.4																						
18-Nov	-12.2	-12.2	-12.2	-12.1	-11.9	-11.4	-11.1	-10.9	-10.9	-10.6	-10.3	-9.8	-9.5	-9.4	-9.5	-9.4	-9.8	-10.0	-10.2	-10.1	-10.1	-10.1	-10.1	-10.3	-10.6	-9.4																						
19-Nov	-10.4	-10.5	-10.6	-10.7	-10.9	-11.1	-11.4	-11.6	-11.7	-11.7	-11.8	-11.8	-11.8	-11.7	-12.0	-12.3	-12.7	-13.6	-13.9	-13.3	-12.3	-12.4	-12.1	-10.9	-11.8	-10.4																						
20-Nov	-10.1	-10.0	-10.1	-10.3	-9.8	-9.2	-8.8	-8.7	-8.6	-8.0	-6.9	-6.0	-5.4	-4.7	-4.4	-4.3	-4.2	-4.2	-4.3	-4.9	-5.7	-5.9	-6.4	-6.7	-7.0	-4.2																						
21-Nov	-7.0	-7.2	-7.3	-7.4	-7.9	-8.0	-8.1	-8.2	-8.5	-8.9	-9.0	-9.2	-9.4	-9.4	-9.7	-10.5	-10.9	-11.3	-11.7	-11.7	-11.7	-11.8	-12.3	-12.9	-9.6	-7.0																						
22-Nov	-13.0	-13.0	-13.0	-13.0	-13.2	-13.4	-13.8	-13.9	-13.7	-13.7	-13.4	-12.9	-13.2	-12.5	-12.5	-13.0	-13.1	-13.3	-13.5	-13.8	-14.4	-15.3	-15.6	-15.6	-13.6	-12.5																						
23-Nov	-15.2	-14.7	-14.6	-14.6	-14.6	-14.3	-14.5	-15.1	-14.9	-14.3	-13.7	-13.3	-12.9	-12.3	-12.2	-12.4	-13.8	-14.2	-13.6	-13.0	-13.0	-13.0	-13.0	-13.4	-13.8	-12.2																						
24-Nov	-14.1	-14.7	-15.4	-16.1	-16.4	-17.0	-17.6	-17.9	-17.8	-17.7	-17.6	-17.2	-16.9	-16.8	-16.7	-16.7	-16.7	-16.7	-16.9	-17.5	-17.5	-18.7	-19.4	-19.2	-17.1	-14.1																						
25-Nov	-18.7	-18.6	-20.3	-20.3	-19.3	-19.2	-18.9	-19.7	-20.7	-20.4	-17.9	-18.6	-19.0	-19.0	-20.2	-21.2	-23.7	-25.9	-26.1	-27.8	-26.0	-26.3	-25.4	-24.4	-21.6	-17.9																						
26-Nov	-24.9	-25.3	-25.0	-24.5	-24.2	-23.4	-23.7	-23.5	-23.2	-20.9	-18.4	-16.9	-15.5	-14.9	-14.7	-14.5	-14.6	-14.7	-15.8	-17.3	-18.1	-18.1	-18.2	-19.0	-19.5	-14.5																						
27-Nov	-19.3	-20.3	-20.9	-21.3	-21.5	-21.6	-22.2	-22.9	-23.4	-23.6	-24.2	-22.5	-21.7	-22.2	-22.6	-24.1	-25.9	-27.6	-26.9	-25.0	-24.6	-24.7	-25.0	-25.2	-23.3	-19.3																						
28-Nov	-25.1	-25.1	-25.2	-25.2	-25.1	-25.0	-24.9	-25.0	-24.9	-24.7	-24.3	-23.9	-23.5	-23.3	-23.5	-23.8	-24.2	-24.9	-25.6	-25.8	-26.0	-26.8	-27.8	-28.1	-25.1	-23.3																						
29-Nov	-29.1	-28.2	-26.9	-26.8	-27.3	-27.5	-28.1	-28.5	-28.5	-27.8	-27.0	-25.4	-24.5	-23.9	-23.4	-23.2	-22.5	-22.4	-23.1	-23.7	-24.5	-25.0	-25.7	-26.1	-25.8	-22.4																						
30-Nov	-26.4	-26.5	-26.7	-26.7	-26.8	-27.3	-28.0	-29.2	-29.3	-28.6	-27.4	-26.2	-24.8	-23.9	-23.3	-23.5	-24.0	-23.7	-23.7	-23.1	-22.6	-22.1	-21.7	-21.7	-25.3	-21.7																						
																								-13.2	-13.4	-13.6	-13.7	-13.7	-13.8	-13.9	-14.0	-14.0	-13.6	-13.0	-12.2	-11.6	-11.3	-11.3	-11.6	-12.3	-13.0	-13.3	-13.6	-13.6	-13.6	-13.7	-13.8	Diurnal Average
																								1.0	0.7	0.7	0.5	0.3	0.4	0.5	0.9	0.7	1.2	2.0	3.6	4.9	5.5	5.6	5.3	4.0	2.7	2.1	1.8	1.2	1.0	0.5	0.0	Diurnal Maximum



WBEA NETWORK
Hourly Averages

Ambient Temperature (AT) - C
Firebag - November 2014





WBEA NETWORK
Cumulative Frequency Distribution

Ambient Temperature (AT) - C
Firebag - November 2014

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	121	16.81	16.81
-20 - 0	557	77.36	94.17
0 - 10	42	5.83	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

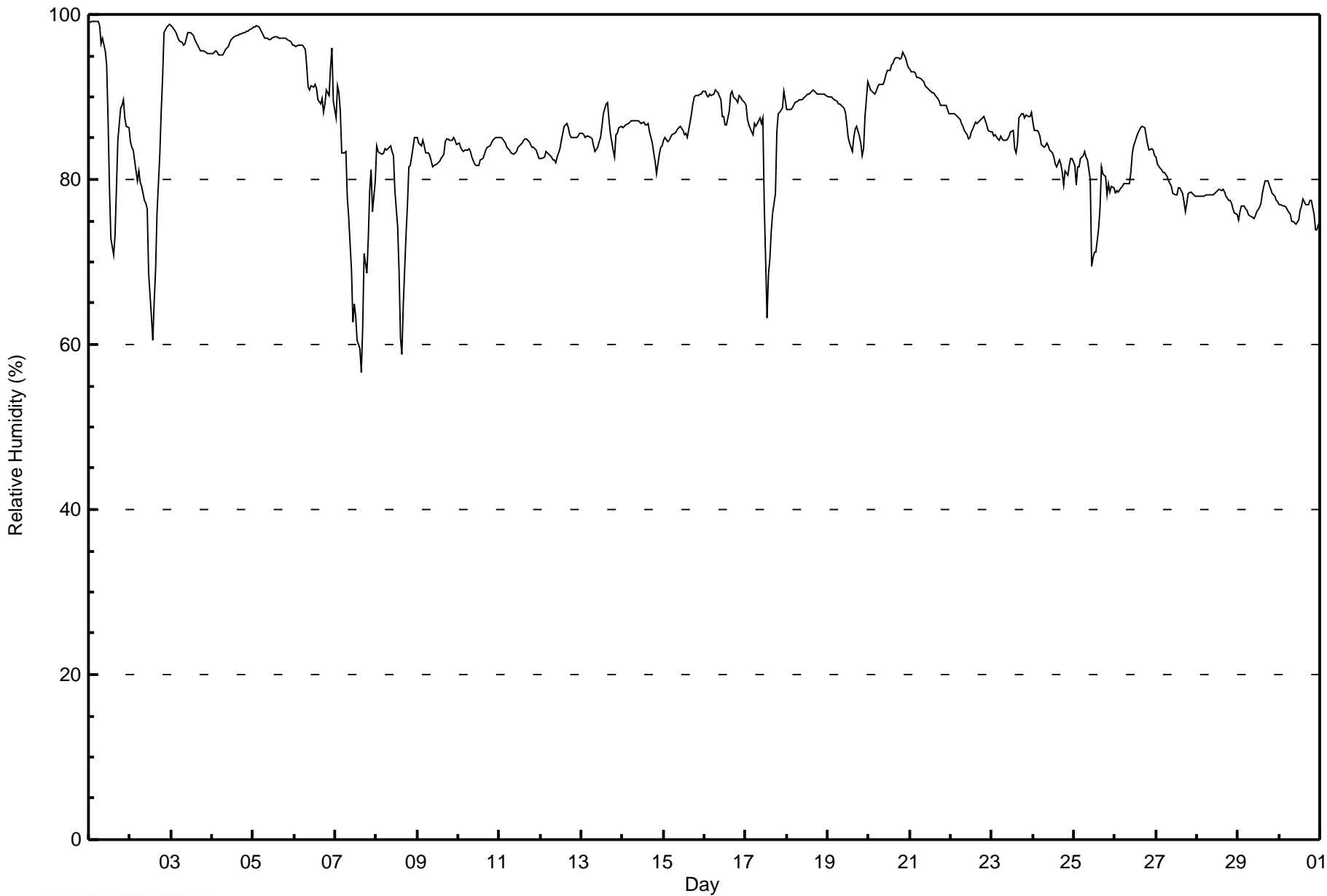


Maximum Value: 99 % on Nov 1 05:00																		Maximum Daily Average: 97.4 % on Nov 5																		Hours in Service: 720			
Minimum Value: 57 % on Nov 7 16:00																		Minimum Daily Average: 74.5 % on Nov 7																		Hours of Data: 720			
Maximum Diurnal Average: 87.1 % at hour 1																		Minimum Diurnal Average: 82.5 % at hour 14																		Hours of Missing Data: 0			
Monthly Average: 85.4 %																		Percentiles: P ₁ = 63 P ₁₀ = 77 Q ₁ = 82 Median = 85 Q ₃ = 90 P ₉₀ = 96 P ₉₉ = 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-Nov	99	99	99	99	99	99	99	96	97	96	94	87	79	73	71	73	79	85	89	89	90	87	86	86	89.6	99													
2-Nov	85	84	83	81	80	81	80	79	78	77	76	69	63	60	65	69	76	83	88	92	98	99	99	99	81.0	99													
3-Nov	99	98	98	98	97	97	97	96	97	97	98	98	98	97	97	96	96	96	96	96	95	95	95	95	96.7	99													
4-Nov	95	95	96	95	95	95	95	95	96	96	97	97	97	97	97	98	98	98	98	98	98	98	98	98	96.7	98													
5-Nov	98	99	99	99	98	98	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	96	97.4	99													
6-Nov	96	96	96	96	96	96	96	94	91	91	91	91	91	91	90	89	90	88	89	91	90	93	96	89	92.5	96													
7-Nov	88	91	91	88	83	83	83	78	75	69	63	65	63	60	59	57	62	71	69	73	79	81	76	80	74.5	91													
8-Nov	84	83	83	83	83	84	84	84	84	83	83	79	74	69	61	59	65	73	77	82	82	84	85	85	78.8	85													
9-Nov	85	84	84	85	84	83	83	83	82	81	82	82	82	82	83	83	85	85	85	85	85	85	85	84	83.6	85													
10-Nov	84	84	84	83	84	84	84	83	83	82	82	82	82	82	83	83	84	84	84	84	85	85	85	85	83.5	85													
11-Nov	85	85	85	84	84	84	84	83	83	83	83	84	84	84	85	85	85	85	84	84	84	84	83	83	84.0	85													
12-Nov	83	83	83	83	83	83	83	82	82	82	83	84	85	86	86	87	86	85	85	85	85	85	85	86	84.2	87													
13-Nov	86	85	85	85	85	85	85	84	83	84	85	85	86	88	89	89	87	86	84	83	85	86	86	86	85.6	89													
14-Nov	86	86	87	87	87	87	87	87	87	87	87	87	87	87	87	86	84	83	82	81	83	84	84	84	85.7	87													
15-Nov	85	85	85	85	85	85	86	86	86	86	86	86	86	85	86	85	87	88	89	90	90	90	90	91	87.0	91													
16-Nov	91	90	90	90	90	90	91	91	90	90	88	88	87	87	88	90	91	90	90	89	90	90	90	89	89.5	91													
17-Nov	89	87	87	86	86	87	86	87	87	87	87	77	63	68	70	74	76	78	86	88	88	89	91	90	83.1	91													
18-Nov	89	89	89	89	89	89	90	90	90	90	90	90	90	90	91	91	91	90	90	90	90	90	90	90	89.8	91													
19-Nov	90	90	90	90	90	90	89	89	89	89	88	87	85	84	83	85	86	86	85	84	83	84	88	92	87.3	92													
20-Nov	91	91	91	90	91	91	91	92	92	92	93	93	93	94	94	95	95	95	95	95	95	95	94	94	92.9	95													
21-Nov	93	93	93	93	92	92	92	92	92	91	91	91	91	91	90	90	90	89	89	89	89	89	89	88	90.8	93													
22-Nov	88	88	88	88	88	87	87	86	86	85	85	85	86	86	87	87	87	87	87	88	87	87	86	86	86.7	88													
23-Nov	86	85	85	85	85	85	85	85	85	85	85	86	86	84	83	84	87	88	88	87	88	88	88	88	85.9	88													
24-Nov	87	86	86	86	85	84	84	84	84	84	84	83	83	82	82	82	82	81	79	81	81	82	83	83	83.2	87													
25-Nov	82	79	81	82	83	83	83	83	82	80	70	70	71	71	74	77	81	81	80	78	79	79	79	79	78.7	83													
26-Nov	78	79	78	79	79	79	79	80	79	81	83	84	85	86	86	86	86	86	85	84	84	84	84	83	82.4	86													
27-Nov	83	82	81	81	81	81	80	80	79	79	78	78	78	79	79	78	77	76	77	78	78	78	78	78	79.2	83													
28-Nov	78	78	78	78	78	78	78	78	78	78	78	78	79	79	79	79	79	78	77	78	77	76	76	76	77.9	79													
29-Nov	75	76	77	77	76	76	76	76	76	75	75	76	76	77	77	78	79	80	80	79	79	78	77	77	77.1	80													
30-Nov	77	77	77	77	77	76	76	75	75	75	75	75	75	76	77	78	77	77	78	77	76	74	74	75	76.0	78													
87.1																		87.0																		Diurnal Average			
99																		99																		Diurnal Maximum			



WBEA NETWORK
Hourly Averages

Relative Humidity (RH) - %
Firebag - November 2014





WBEA NETWORK
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Firebag - November 2014

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	3	0.42	0.42
60 - 80	156	21.67	22.08
80 - 100	561	77.92	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Speed: 37 km/h on Nov 16 02:00	Maximum Daily Speed Average: 21.9 km/h on Nov 7	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 12 01:00	Minimum Daily Speed Average: 2.5 km/h on Nov 13	Hours of Data: 705
Maximum Diurnal Speed Average: 4.7 km/h at hour 14	Minimum Diurnal Speed Average: 2.2 km/h at hour 9	Hours of Missing Data: 15
Monthly Average Velocity: 3.2 km/h 324.8 deg	Percentiles: P ₁ = 2 P ₁₀ = 4 Q ₁ = 7 Median = 10 Q ₃ = 14 P ₉₀ = 20 P ₉₉ = 35	Percent Operational Time: 97.9

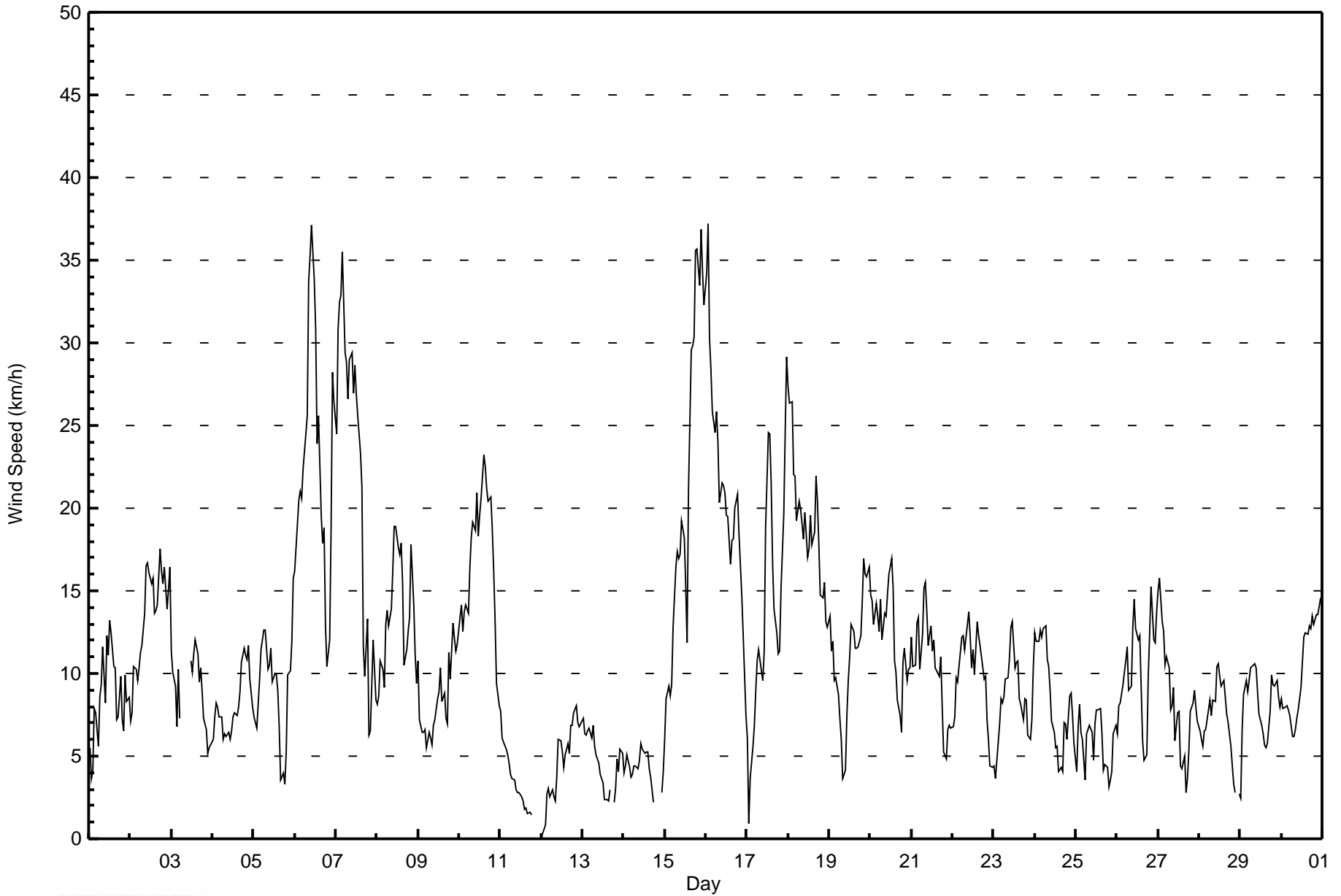
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	WSW6	SW4	SW4	WSW8	WSW8	SW6	WSW9	SW9	SW12	SW8	SW12	SW11	WSW13	WSW12	WSW10	WSW10	SSW7	SSW7	SSW10	SW7	SSW7	SSW10	S8	S9	SW8.1	WSW13
2-Nov	S7	S8	S10	S10	S10	S10	S11	S12	S14	S16	S17	S16	S15	S16	S14	S14	SSE14	SSE18	SSE16	SSE15	SSE16	SSE14	SSE15	SSE16	S13.4	SSE18
3-Nov	S11	S10	SSE9	SE7	SE10	SSE7	AF	AF	AF	AF	AF	NNW11	N10	N11	N12	NNE11	N9	N10	N9	N7	NNE7	NNE5	ENE6	E6	NE3.5	N12
4-Nov	ESE6	SE7	SE8	SE8	SSE7	SSE7	SSE6	SE6	SSE6	SSE6	SE6	SE7	SE7	SE8	SE8	SE7	SE8	SE9	SE11	SE12	SE11	SE12	SSW10	SSE8	SE7.9	SE12
5-Nov	SSE7	S7	SW7	W10	W11	NNW12	NW13	NW13	NW10	NW11	NW9	NW9	NW10	NW10	NW9	NNW7	NW4	WSW4	SW3	S5	SW10	SSW10	S12	S16	W5.0	S16
6-Nov	S16	S18	S20	SSE21	SSE21	SSE22	SSE25	SSE26	SSE34	S35	S37	S34	S31	SSW24	SSW26	SSW19	SSW18	SW19	WSW13	W10	NW12	N19	N28	NNW26	S14.8	S37
7-Nov	NNW24	NNW31	NNW32	NNW33	NNW36	NNW29	NNW29	NNW27	NNW29	NNW29	NNW27	NNW29	NNW27	NNW26	NNW23	NNW21	NNW12	NNW10	NNW13	NNW6	NNW7	NNW9	NNW12	NW8	NNW21.9	NNW36
8-Nov	NNW8	NNW9	N11	NNW10	NNW9	NNW13	NNW14	NW13	NW14	NNW16	NNW19	NNW19	NNW18	NNW17	NNW18	NNW16	NNW10	NNW11	NNW13	NNW13	N18	NNW14	NNW11	NNW9	NNW13.1	NNW19
9-Nov	N11	NNW7	NNW6	NNW6	NNW7	N6	NNE6	NNE6	NNE6	NNE7	N7	N8	N9	N10	N8	N9	NNW7	NNW7	N11	NNE10	NNE13	NNE12	N11	N12	N8.2	NNE13
10-Nov	N13	N14	N13	N14	N14	N14	N16	N18	N19	N19	N21	N18	N20	N21	N23	N23	N21	N20	N21	N19	N16	N13	N9	N8	N16.9	N23
11-Nov	N8	N6	NNE6	NNE5	N5	NNE5	NNE4	N4	NNE4	NNE3	N3	N3	NNE3	N2	NNE2	N2	NNW2	N2	N1	AF	AF	AF	AF	S0	N3.3	N8
12-Nov	S0	S0	SSW1	SW3	SSW3	SSW3	SSW3	SSW3	SSW2	SSW4	SSW6	SSW6	SW5	SW4	SW5	SSW6	SSW5	SSW7	SSW7	SW8	SW8	SW7	SW7	SW7	SW4.5	SW8
13-Nov	SW7	SW6	SW6	SW7	SW7	SW6	SW7	SW6	SW5	SW5	SW4	SW4	WSW3	W2	NW2	NW2	N3	AF	N2	N3	NNE5	N4	N5	NNE5	WSW2.5	SW7
14-Nov	NNE4	N4	N5	N4	N4	N4	N4	N4	N4	N5	N6	N5	N5	N5	NNW5	NNW4	NW4	NNW2	AF	AF	AF	AF	SW3	WSW4	N3.8	N6
15-Nov	WSW6	SW8	SW9	SW9	SW9	SW13	SW16	SW17	SW17	SW19	WSW18	W15	NW12	NNW21	N30	N30	N30	N30	N36	N36	N33	N37	N34	N32	NW12.4	N37
16-Nov	N34	N37	N30	N28	N26	N25	N26	N24	N20	NNW22	N21	NNW21	NNW20	NW20	NNW17	NNW18	NNW18	NNW20	NNW21	NNW19	NNW17	N15	N12	NNW7	N21.2	N37
17-Nov	NW6	S1	S4	S6	S7	SSW9	SSW11	SSW11	SSW10	S10	S11	SSW19	SSW25	SSW25	SSW21	SW17	SW14	WSW12	NW11	NNW11	N15	N20	NNW25	N29	WSW5.8	N29
18-Nov	N27	N26	NNW26	NNW22	NNW22	NNW19	NNW20	NNW20	NNW19	NNW18	NNW20	NNW17	NNW18	NNW20	NNW18	NNW19	NNW22	NNW20	NNW18	NNW15	NNW15	NNW16	NNW13	NNW13	NNW19.2	N27
19-Nov	NNW13	NNW11	NNW12	NNW10	NW10	NNW9	N7	NNW6	NNW4	W4	WSW7	SW10	SW11	SW13	SSW13	SSW11	SSW12	S12	S12	S14	SSW17	SSW16	SSW16	SSW16	SW5.4	SSW17
20-Nov	SSW15	S14	S13	S14	S13	S13	S15	S12	S14	S13	SSW15	SSW16	SW17	WSW15	W11	WSW10	WSW8	W7	NW6	N11	NNE12	NNE10	NNE10	NNE10	SSW6.4	SW17
21-Nov	NNE12	N10	N11	N13	N13	N10	NNW12	NNW15	N16	NNW14	NNW12	NNW13	NNW11	NNW12	NNW10	N10	NNE10	N11	NNE8	N5	NNE5	NE7	NE7	NE7	N10.1	NNW16
22-Nov	ENE7	E7	E10	ESE9	ESE10	E12	E12	ESE11	E12	E14	E12	ENE10	ENE11	ENE10	NE13	ENE12	ENE12	NE11	NE10	NNE10	NE7	ENE6	NE4	NE4	ENE9.2	E14
23-Nov	ESE4	SE4	ESE5	SSE7	SSE8	S8	SSW9	S10	S10	SSW11	SSW13	SSW13	SW10	SSW11	SSW11	SW8	SSW8	SSW7	SW8	WSW8	WSW6	NNW6	NNW7	N10	SSW5.9	SSW13
24-Nov	N12	N12	N12	N13	NNW12	NNW13	N13	N11	N10	NNW9	N7	N6	NNE5	NE6	ENE4	ENE4	E4	ESE7	SE7	SE6	ESE9	ESE9	SE7	ESE6	NNE5.0	N13
25-Nov	ENE4	ENE7	ENE8	ENE6	ENE6	N4	N6	NNW7	NNW7	N6	N5	N7	N8	N8	N8	NNE6	NE4	ENE4	E4	SSE4	SSE4	S6	SSW7	NNE3.2	ENE8	
26-Nov	S6	S8	S8	S9	S10	S11	S12	S9	S9	SSW13	SSW15	SW13	SW12	SW12	SSW9	SW6	WSW5	NNW5	NNW10	N12	N15	NNE12	N12	N14	SW3.6	NNE15
27-Nov	N15	N16	NNE13	NNE13	NNE10	NNE11	N10	N8	N8	N9	N6	N8	N8	N4	NNE4	NNE5	NNW3	N4	NNE5	NNE8	NNE8	NNE9	NE8	NE7	NNE8.2	N16
28-Nov	NE7	NE6	NE6	NE7	NE7	NE8	NE8	NE7	NE8	NE8	NE10	NE11	NE10	NNE9	NNE10	NNE9	NNE8	NNE7	NNE6	NNE4	NNE3	N3	AF	SW3	NNE6.7	NE11
29-Nov	SW2	SW6	SW9	SW10	SW9	SW10	SW10	SW10	SW11	SW10	WSW9	WSW8	WSW7	WSW6	WSW6	WSW6	WNNW6	NW8	NW10	NW9	NNW9	NNW10	NW9	NW8	W6.1	SW11
30-Nov	NW8	NW8	NW8	NW8	WNNW8	WNNW7	WNNW6	W6	W7	W7	WSW8	WSW9	SW11	SW12	SW12	SW12	SW13	SW13	SW13	SW13	SW14	SW14	SW14	SW15	WSW8.7	SW15
NNW4.1 N3.5 N3.0 NNW2.7 NNW2.5 NW2.5 NW3.0 NW2.5 NW2.2 NNW2.4 W3.1 NNW3.8 NNW4.3 NNW4.7 NW4.3 NW3.9 NW3.1 NNW3.2 NNW4.2 NNW4.1 N4.4 N4.6 N4.4 NNW3.6																								Diurnal Average		
N34 N37 NNW32 NNW33 NNW36 NNW29 NNW29 NNW27 SSE34 S35 S37 S34 S31 NNW26 SSW26 N30 N30 N30 N36 N36 N33 N37 N34 N32																								Diurnal Maximum		

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



WBEA NETWORK
Hourly Averages

Wind Speed (WS) - km/h
Firebag - November 2014





WBEA NETWORK
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Firebag - November 2014

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	109	15.46	15.46
6 - 11	328	46.52	61.99
12 - 19	186	26.38	88.37
20 - 28	55	7.80	96.17
29 - 38	27	3.83	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 720



WBEA NETWORK
Frequency Distribution

Wind Speed (WS) - km/h
Firebag - November 2014

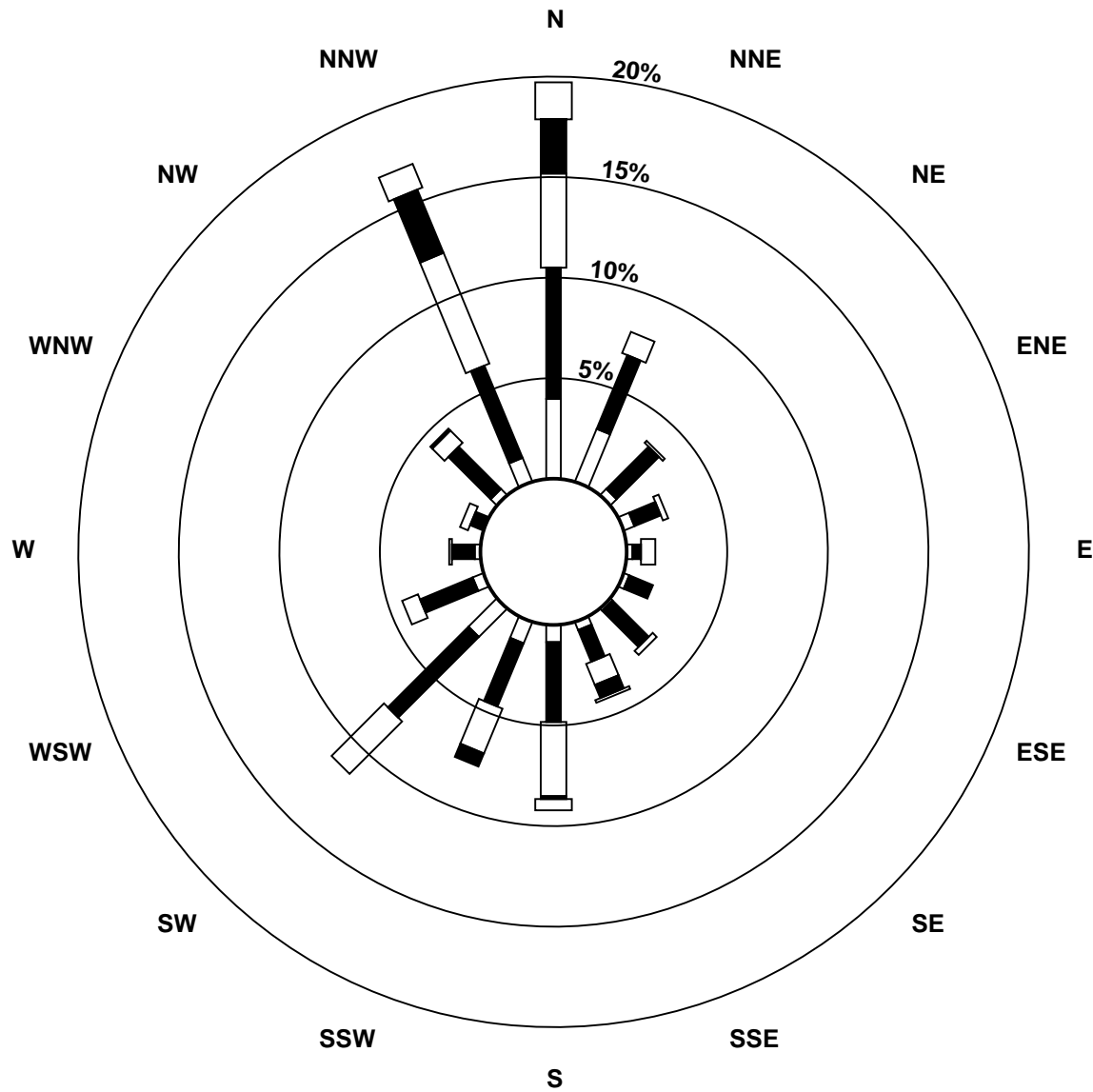
Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	28	20	3	4	2	2	1	3	6	8	14	4	2	0	3	9	109
6 - 11	46	28	21	10	3	9	18	12	28	24	40	20	8	5	21	35	328
12 - 19	33	8	1	2	5	0	2	8	26	17	26	6	1	3	6	42	186
20 - 28	19	0	0	0	0	0	0	5	1	5	0	0	0	0	1	24	55
29 - 38	13	0	0	0	0	0	0	1	4	0	0	0	0	0	0	9	27
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	139	56	25	16	10	11	21	29	65	54	80	30	11	8	31	119	705

Total Number of Valid Hours: 705

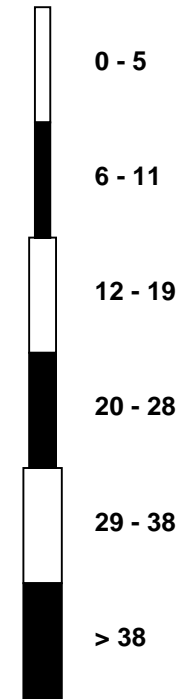
Total Number of Hours: 720

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

**Wind Speed (WS) - km/h
Firebag (AMS 19)**



Classes (km/h)



Total Number of Valid Hours: 705



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Firebag - November 2014

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 8 km/h on Nov 15 19:00	Hours of Data: 705
Minimum Value: 0 km/h on Nov 12 06:00	Hours of Missing Data: 15
Percentiles: P ₁ = 0 P ₁₀ = 1 O ₁ = 1 Median = 2 O ₃ = 2 P ₉₀ = 4 P ₉₉ = 7	Hours of Calibration: 0
	Percent Operational Time: 97.9

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

Diurnal Maximum

AF - Analyzer Failure



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Firebag - November 2014

Direction of Maximum Speed: 0 deg on Nov 16 02:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 336.3 deg on Nov 7	Hours of Data: 705
Direction of Minimum Speed: 179 deg on Nov 12 01:00	Hours of Missing Data: 15
Direction of Minimum Daily Speed Average: 2.5 deg on Nov 13	Percent Operational Time: 97.9
Monthly Average Direction: 304.8 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	244	218	221	248	244	233	241	214	221	214	221	230	242	250	257	246	212	207	213	216	204	196	191	190	225.0
2-Nov	185	189	181	184	180	178	178	176	176	174	172	184	185	189	188	172	164	163	166	161	163	167	164	166	174.1
3-Nov	174	175	157	145	138	155	AF	AF	AF	AF	AF	337	351	1	7	17	8	357	11	7	20	33	58	83	34.8
4-Nov	118	128	133	146	161	166	161	146	151	157	143	129	130	129	133	129	127	124	137	144	142	146	150	150	140.4
5-Nov	153	174	224	271	277	290	314	318	310	310	315	321	317	322	321	332	320	255	228	173	217	205	180	178	275.4
6-Nov	177	171	171	167	160	160	158	151	164	170	176	182	182	193	197	195	207	221	239	265	307	350	353	338	183.6
7-Nov	331	334	337	340	344	344	339	340	341	334	327	333	329	335	331	330	329	341	345	335	331	345	343	326	336.3
8-Nov	340	342	353	341	329	303	300	317	320	335	342	341	334	332	339	337	337	337	346	346	351	342	345	348	335.8
9-Nov	357	342	344	333	340	2	30	16	18	19	354	0	353	356	352	5	346	340	4	16	19	18	359	2	1.1
10-Nov	358	357	354	355	356	349	349	360	358	353	353	356	350	353	356	358	3	7	9	10	9	7	0	8	358.5
11-Nov	6	6	13	14	11	17	14	8	13	28	6	10	13	8	14	3	333	359	358	AF	AF	AF	AF	174	10.0
12-Nov	179	188	196	215	208	197	211	211	202	213	210	212	223	223	224	203	212	211	209	220	230	227	228	229	216.8
13-Nov	230	233	227	226	219	221	224	225	217	221	224	232	254	266	326	315	1	AF	1	4	12	4	11	13	250.7
14-Nov	13	7	10	3	358	357	356	359	359	5	8	3	349	353	343	340	326	329	AF	AF	AF	AF	234	239	352.1
15-Nov	246	234	227	230	232	229	230	229	230	231	234	245	267	308	341	351	353	355	358	353	350	350	350	352	319.4
16-Nov	353	0	2	2	356	355	355	358	351	339	352	339	333	322	331	339	341	344	348	341	345	354	358	347	349.2
17-Nov	324	187	183	172	189	201	195	194	195	183	190	196	201	210	212	224	225	249	306	342	351	349	346	352	237.5
18-Nov	350	350	347	343	342	338	338	340	342	340	341	334	337	329	329	331	342	339	345	333	337	343	341	334	340.1
19-Nov	340	340	342	329	319	337	353	348	348	264	252	236	226	224	212	196	196	180	186	184	194	195	196	196	229.4
20-Nov	196	185	177	176	176	184	185	178	178	183	200	213	224	238	259	248	250	261	315	4	22	28	25	20	205.2
21-Nov	17	8	357	352	356	350	344	345	349	346	343	344	342	337	347	5	12	11	13	11	18	39	49	53	358.3
22-Nov	73	82	94	112	110	94	95	102	100	87	89	71	65	57	54	61	66	55	37	33	44	63	54	54	75.0
23-Nov	104	128	115	153	166	182	206	186	174	193	199	211	220	212	204	215	204	207	222	239	252	290	330	4	203.3
24-Nov	0	359	352	349	346	345	351	353	352	347	357	0	25	56	60	60	99	116	127	129	121	120	131	118	20.7
25-Nov	64	61	58	60	62	1	356	334	347	5	356	358	1	358	1	16	52	72	93	148	154	165	180	196	30.1
26-Nov	188	178	185	177	176	183	175	185	189	199	213	214	222	221	210	224	255	333	346	359	11	12	355	357	216.2
27-Nov	3	8	12	17	13	14	9	7	5	5	11	11	9	354	17	12	330	2	14	22	22	25	36	44	12.9
28-Nov	41	39	45	45	48	41	45	40	34	35	36	38	34	24	18	20	14	18	20	17	17	6	AF	224	31.7
29-Nov	234	221	226	223	223	225	226	225	227	230	237	249	251	253	247	258	286	309	321	324	328	330	321	309	259.4
30-Nov	305	306	304	304	298	296	282	267	262	259	250	240	226	221	222	223	220	219	218	215	219	216	218	224	240.6
	346.7	349.2	348.9	334.6	328.8	313.9	313.0	317.5	305.1	292.4	280.7	287.0	287.1	293.4	306.7	321.4	323.2	329.1	341.3	346.1	349.7	353.9	350.7	345.3	

Diurnal Average

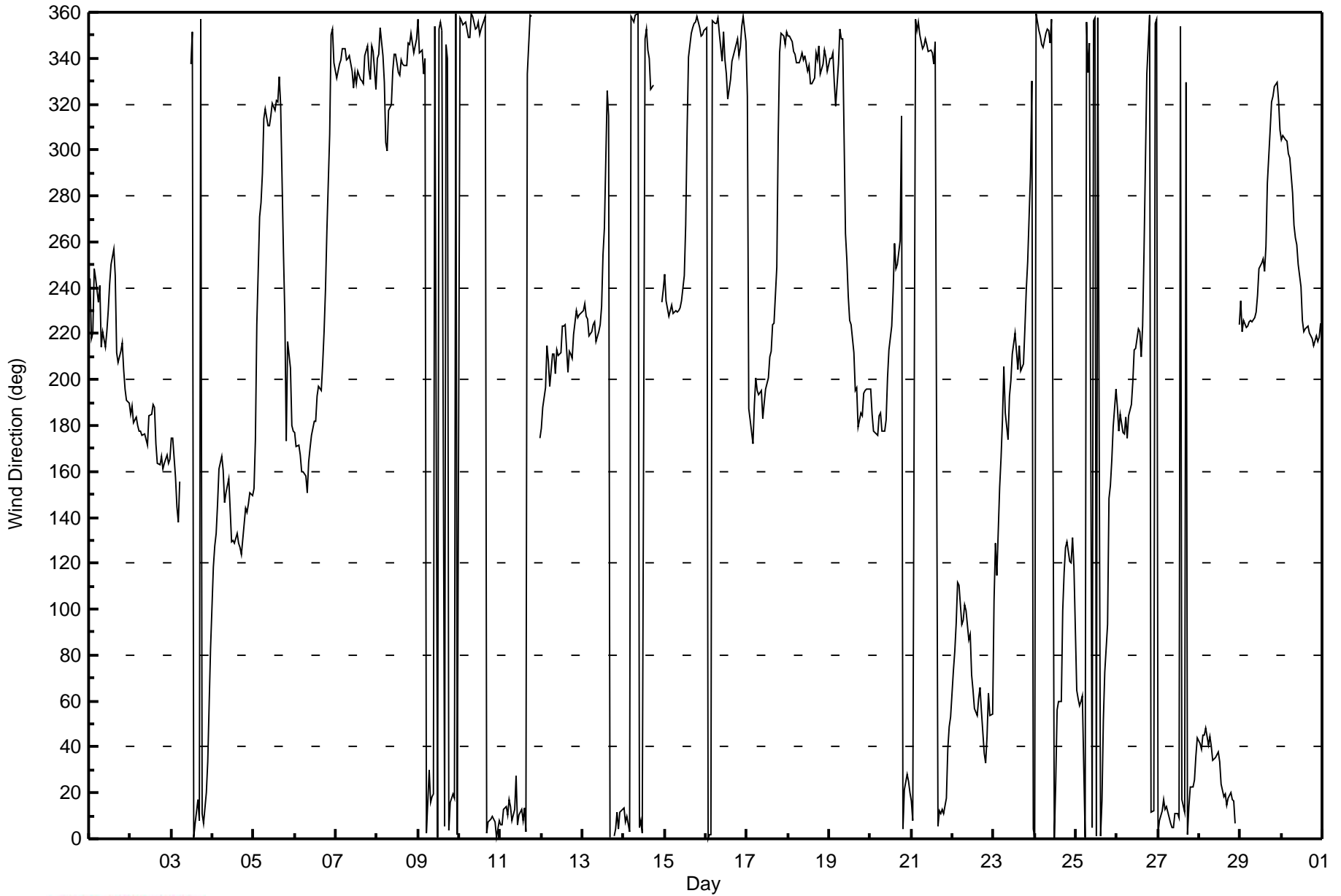
AF - Analyzer Failure

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



WBEA NETWORK
Hourly Averages

Wind Direction (WD) - deg
Firebag - November 2014





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Firebag - November 2014

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 85 deg on Nov 17 02:00	Hours of Data: 705
Minimum Value: 0 deg on Nov 19 09:00	Hours of Missing Data: 15
Percentiles: P ₁ = 6 P ₁₀ = 8 Q ₁ = 9 Median = 11 Q ₃ = 13 P ₉₀ = 17 P ₉₉ = 28	Hours of Calibration: 0
	Percent Operational Time: 97.9

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-Nov	17	33	28	15	12	19	23	24	22	18	10	17	13	13	12	10	9	7	9	9	6	6	7	9	33
2-Nov	4	8	6	6	6	7	6	7	7	7	8	7	7	9	6	9	7	7	8	8	7	7	9	7	9
3-Nov	7	9	12	11	8	22	AF	AF	AF	AF	AF	11	14	12	14	13	19	15	15	18	17	23	18	18	23
4-Nov	13	16	16	17	14	14	16	12	13	10	12	13	12	12	12	12	12	11	11	10	10	9	9	10	17
5-Nov	13	10	27	12	10	14	13	12	12	11	11	13	12	12	12	15	22	16	19	24	8	10	10	9	27
6-Nov	8	9	9	8	9	9	9	10	8	8	8	9	8	11	7	7	10	8	10	19	11	18	14	11	19
7-Nov	11	11	11	11	12	12	11	12	11	12	12	12	12	12	12	10	10	8	10	27	14	10	10	14	27
8-Nov	9	18	9	9	12	11	11	12	10	11	10	11	12	11	14	9	8	8	9	8	9	9	8	10	18
9-Nov	11	13	9	15	12	18	8	9	13	10	12	14	17	17	22	12	16	15	13	9	11	12	12	12	22
10-Nov	13	13	11	12	12	12	12	15	14	12	13	14	12	13	13	14	13	14	12	13	12	12	13	13	15
11-Nov	14	13	14	13	16	16	15	15	15	16	18	17	17	21	20	24	27	19	21	AF	AF	AF	AF	7	27
12-Nov	64	11	11	9	10	8	8	10	11	9	12	14	14	15	11	8	9	8	9	8	7	7	8	8	64
13-Nov	8	9	8	8	8	8	8	8	8	9	9	13	9	19	27	16	15	AF	8	8	8	11	10	10	27
14-Nov	10	10	11	13	12	11	12	13	14	15	14	16	14	17	16	21	9	14	AF	AF	AF	AF	8	8	21
15-Nov	8	9	7	8	9	8	9	8	8	8	9	9	15	20	11	13	12	14	15	16	13	11	13	13	20
16-Nov	14	16	15	16	13	14	14	14	12	11	14	12	12	11	11	10	11	10	10	10	12	12	13	10	16
17-Nov	27	85	9	11	7	7	6	5	7	7	6	7	8	8	8	8	9	19	20	9	9	12	13	13	85
18-Nov	12	12	11	10	10	10	10	10	11	11	11	11	11	11	11	13	11	11	10	10	9	10	10	10	13
19-Nov	10	10	11	12	10	11	7	0	0	51	16	15	12	14	11	8	9	7	6	8	7	7	7	6	51
20-Nov	7	8	8	9	8	7	7	9	7	9	9	8	9	10	10	9	9	11	23	16	9	10	10	10	23
21-Nov	10	12	13	13	13	12	10	13	12	11	13	11	14	11	12	13	12	13	14	14	20	14	12	8	20
22-Nov	11	13	11	13	13	10	11	11	12	10	10	11	9	13	10	10	10	10	9	10	10	10	22	21	22
23-Nov	26	26	16	12	7	13	9	11	8	11	6	8	11	13	11	8	5	8	9	11	16	27	19	11	27
24-Nov	13	12	9	8	10	11	10	13	13	10	13	17	19	14	24	17	39	14	14	18	12	9	13	21	39
25-Nov	26	16	14	10	11	29	16	12	12	9	9	11	10	10	10	7	14	10	11	23	14	17	10	4	29
26-Nov	6	6	7	6	6	8	6	8	6	8	10	9	10	8	11	14	13	30	9	13	13	11	12	14	30
27-Nov	14	14	12	11	11	11	13	11	12	12	10	11	12	16	9	28	21	8	9	10	10	10	10	9	28
28-Nov	9	9	10	10	10	10	10	10	10	10	9	10	11	10	11	10	10	9	8	8	10	13	AF	21	21
29-Nov	18	10	7	7	7	8	8	7	7	8	8	10	8	8	10	11	15	13	12	11	12	10	11	12	18
30-Nov	11	12	12	12	12	13	11	9	10	9	9	9	9	8	8	8	8	8	8	8	7	7	7	7	13

64	85	28	17	16	29	23	24	22	51	18	17	19	21	27	28	39	30	23	27	20	27	22	21	
Diurnal Maximum																								

AF - Analyzer Failure



Wood Buffalo Environmental Association

SO₂ Calibration Report

Station Information

Calibration Date	November 13, 2014	Previous Calibration	October 16, 2014
Station Name	Firebag	Station Number	AMS 19
Reason:	Routine		
Start Time (MST)	8:50	End Time (MST)	11:40
Barometric Pressure	mmHg	Station temp.	22 Deg C
Calibrator Make/Model	API T700	Serial Number	996
Cal Gas Concentration	49.3 ppm	Cal Gas Expiry Date	12-Dec-16
Gas Cert Reference	SA130123A		
DACS make/model	Campbell Scientific CR3000	DACS serial No.	9037
DACS voltage range	NA	DACS channel #	N/A

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	1000	1000	PMT voltage	-605	-605
Analyzer Range (mv)	1000	1000	Lamp voltage	798	798
Calculated slope	0.999982	0.990488	Chamber temp.	45.3	45.3
Calculated intercept	0.268482	0.493575	Pressure (mmHg)	693.5	693.5
Analyzer Background	9.3	9.3	Flow (lpm)	0.453	0.453
Analyzer Coefficient	0.958	0.958	Intensity	90	90

Analyzer make Thermo 43i Analyzer serial # 1410661308

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-1.2	NA
as found span	5000	58.3	574.8	578.8	0.993
calibrator zero	5000	0.0	0.0	-1.2	NA
high point	5000	58.3	574.8	578.8	0.993
second point	5000	29.1	286.9	291.6	0.984
third point	5000	14.7	144.9	145.2	0.998
calibrator zero	6000	0.0	0.0	-0.9	NA
as left zero	6000	0.0	0.0	-0.9	NA
as left span	5000	58.3	574.8	578.0	0.995
Average Correction Factor					0.992

Corrected As found 580.0 Previous response 574.6 % change -0.9%

Notes:

No Maintenance or adjustments Done, Filter changed out,

Calibration Performed By:

Melissa Lemay



Wood Buffalo Environmental Association

SO₂ Calibration Summary

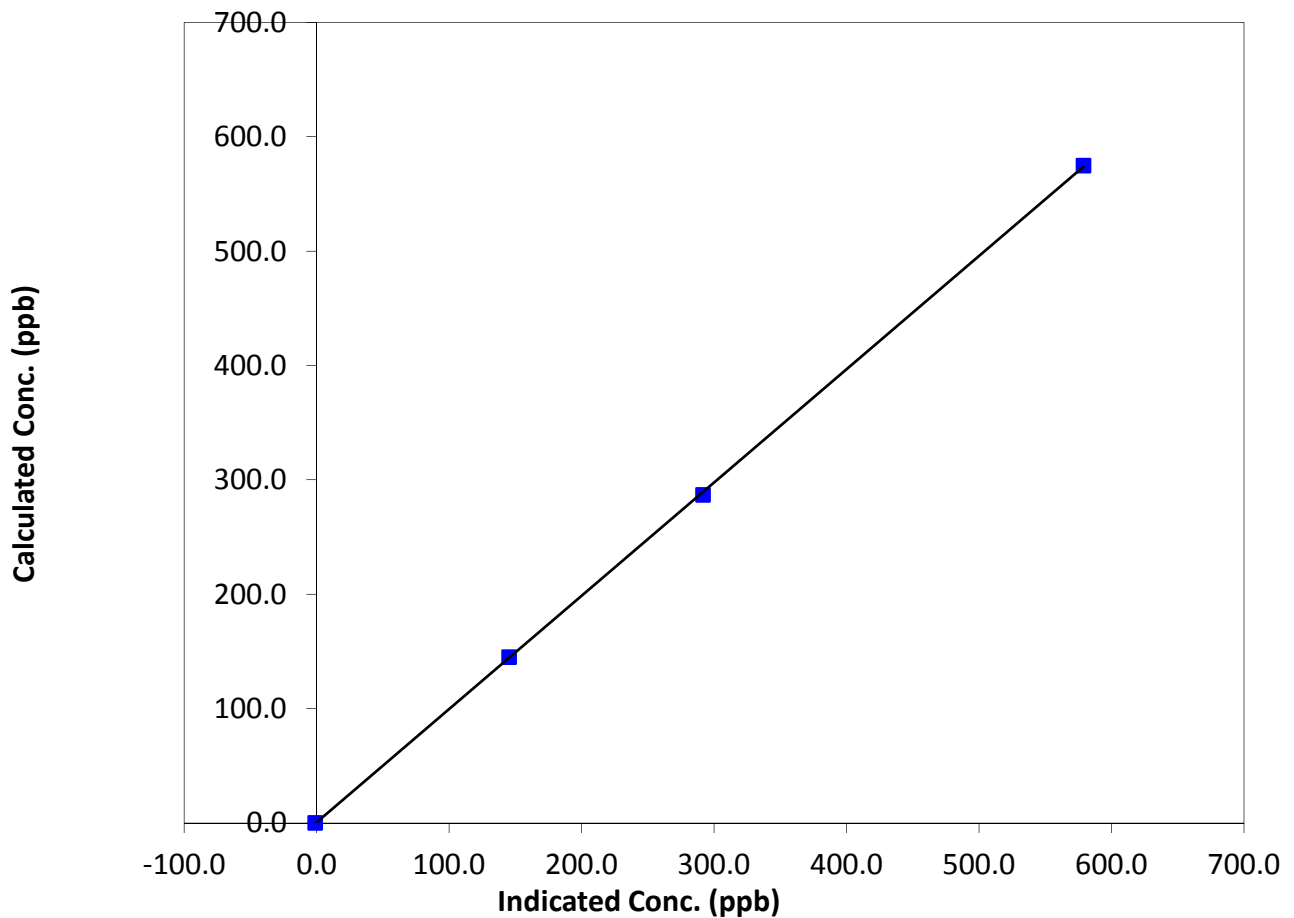
Station Information

Calibration Date	November 13, 2014	Previous Calibration	October 16, 2014
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	8:50	End Time (MST)	11:40
Analyzer make	Thermo 43i	Analyzer serial #	1410661308

Calibration Data

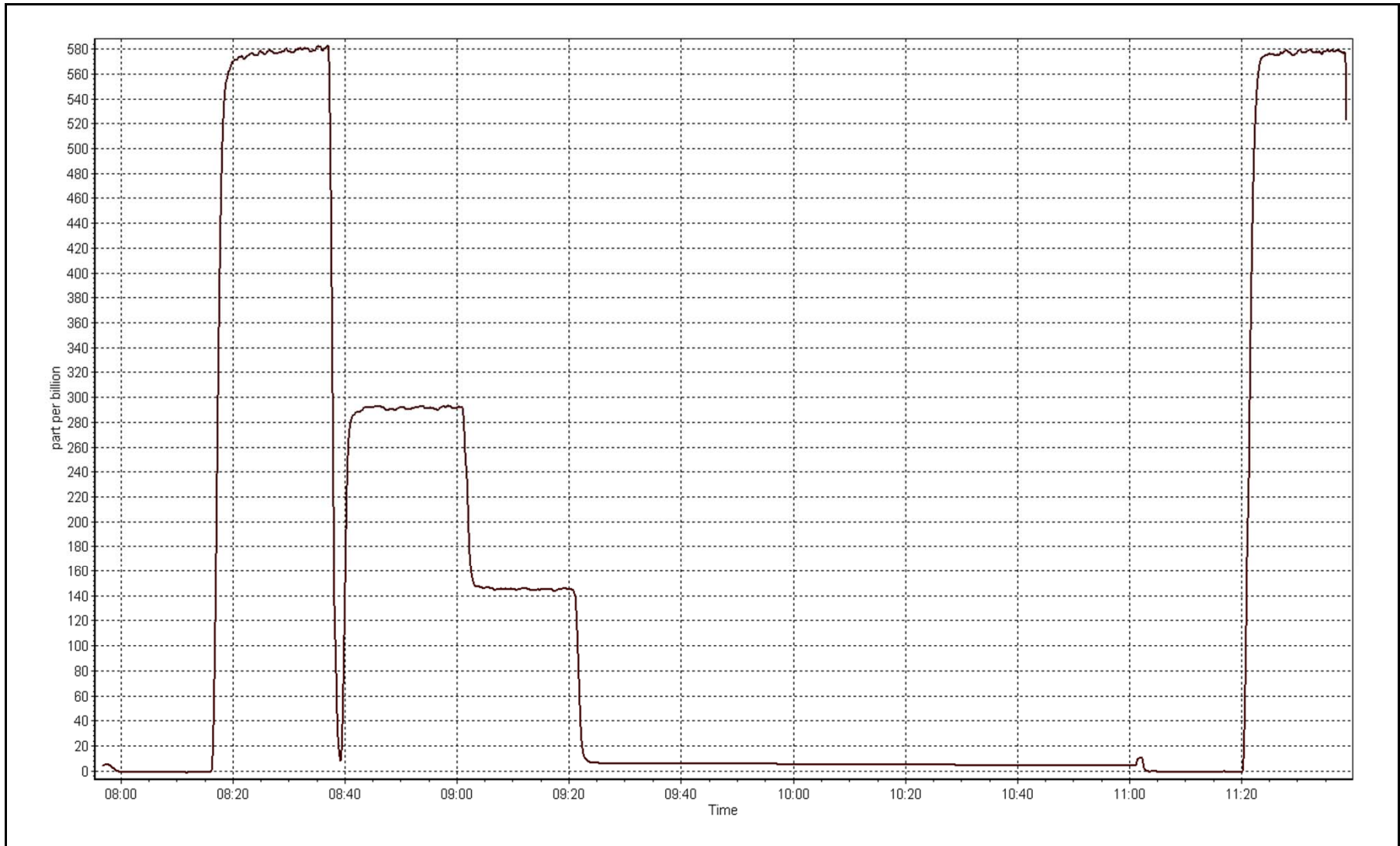
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-1.2	N/A	Correlation Coefficient	0.999957
574.8	578.8	0.9932		
286.9	291.6	0.9840	Slope	0.990488
144.9	145.2	0.9982		
			Intercept	0.493575

SO₂ Calibration Curve



SO2 Calibration Plot

Date: November 13, 2014





Wood Buffalo Environmental Association

H2S Calibration Report

Station Information

Calibration Date	November 12, 2014	Previous Calibration	October 21, 2014
Station Name	Firebag	Station Number	AMS 19
Reason:	Routine		
Start Time (MST)	10:00	End Time (MST)	13:50
Barometric Pressure	mmHg	Station temp.	22 Deg C
Calibrator Make/Model	API T700	Serial number	996
Cal Gas Concentration	4.85 ppm H2S	Cal Gas Expiry Date	10-Jun-14
Gas Cert Reference	ALM066720	SO2 gas conc.	49.3 ppm SO2
DACS make/model	Campbell Scientific CR3000	DACS serial No.	N/A
DACS voltage range	NA	DACS channel #	TCP/IP

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	100	100	HVPS	488	488
Analyzer Range (mv)	100	100	Lamp voltage	2233	2233
Calculated slope	0.988453	1.010581	Chamber temp.	28	28
Calculated intercept	0.018369	0.277213	Pressure	24.1	24.0
Analyzer Background	19.6	17.9	Flow	625	630
Analyzer Coefficient	1.092	1.080	Intensity	55	55
			Converter temp.	316	316

Analyzer make/model	API H2S T101	Analyzer serial #	158
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	-1.1	NA
as found span	5000	83.3	80.8	78.6	1.029
SO2 scrubber check	5000	29.2	287.9	4.1	NA
calibrator zero	5000	0.0	0.0	0.0	NA
high point	5000	83.3	80.8	79.9	1.012
second point	5000	41.7	40.4	39.5	1.024
third point	5000	21.0	20.4	19.7	1.034
calibrator zero	5000	0.0	0.0	-0.5	NA
as left zero	5000	0.0	0.0	-0.5	NA
as left span	5000	83.3	80.8	79.0	1.023
Average Correction Factor					1.023

Corrected As found	79.6	Previous response	81.7	% change	2.7%
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Notes:

Scrubber changed, put vertical on the outside of the analyzer, zero and span adjusted

Calibration Performed By:

Melissa Lemay



Wood Buffalo Environmental Association

H2S Calibration Summary

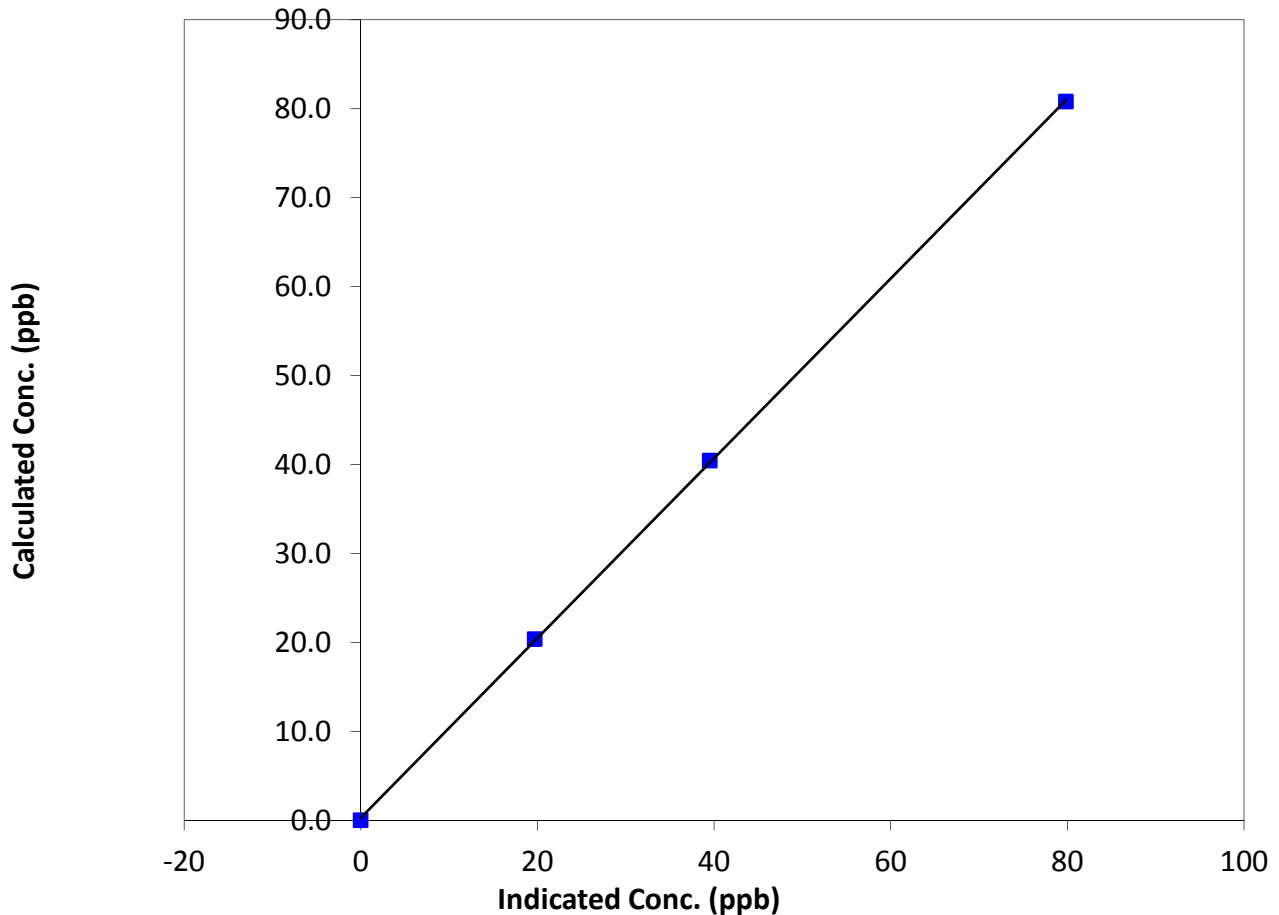
Station Information

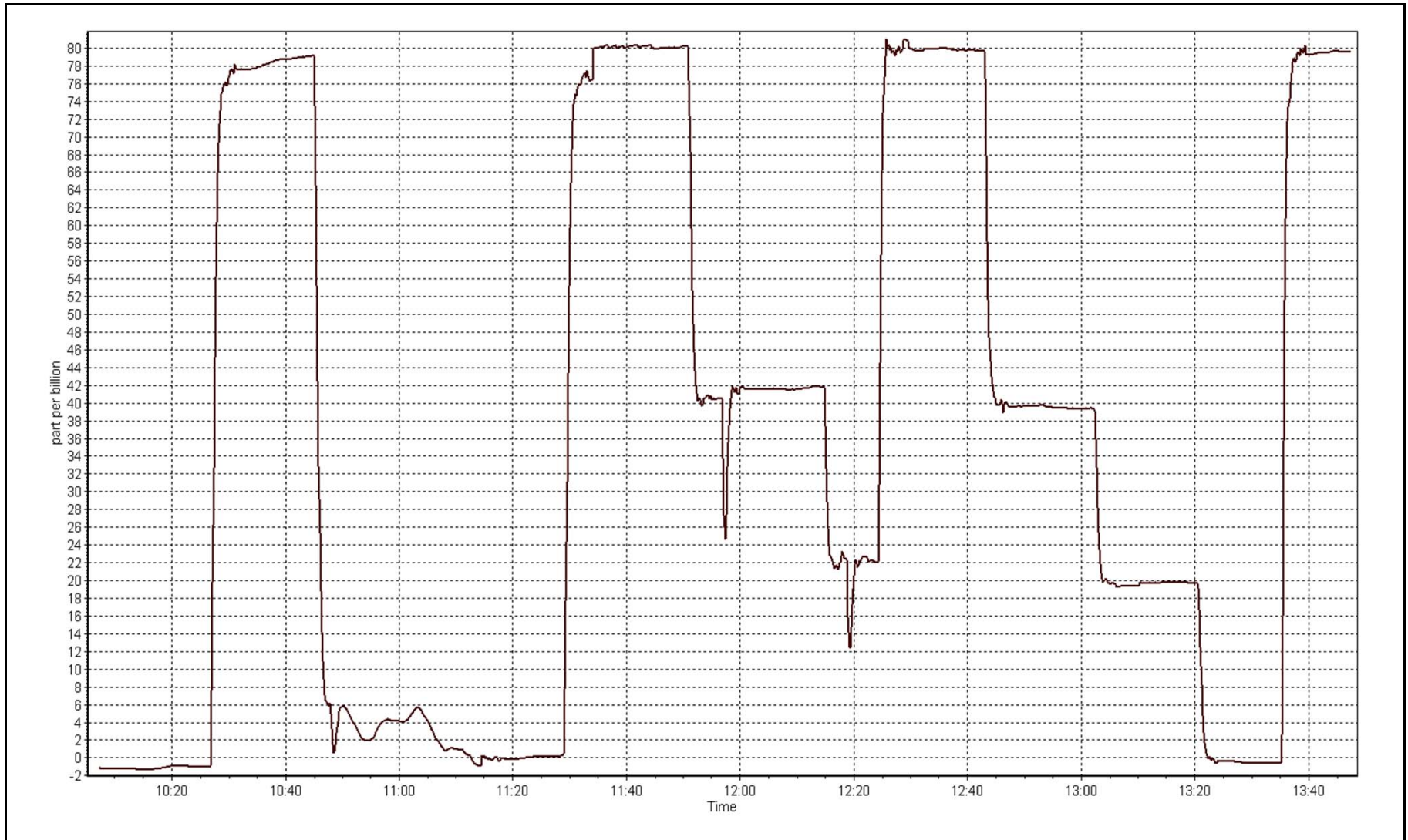
Calibration Date	November 12, 2014	Previous Calibration	October 21, 2014
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	10:00	End Time (MST)	13:50
Analyzer make	API H2S T101	Analyzer serial #	158

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999944
80.8	79.9	1.0119		
40.4	39.5	1.0240	Slope	1.010581
20.4	19.7	1.0340		
			Intercept	0.277213

H2S Calibration Curve







Wood Buffalo Environmental Association

THC Calibration Report

Station Information

Calibration Date	Thursday, November 13, 2014	Previous Calibration	Thursday, October 16, 2014
Station Name	Firebag	Station Number	AMS 19
Reason:	Routine		
Start Time (MST)	7:50	End Time (MST)	11:40
Barometric Pressure	mmHg	Station temp.	22 Deg C
Calibrator Make/Model	API T700	Serial Number	996
Gas Cert Reference	SA130123A	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.	9037
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	34.9	34.9
Calculated slope	0.999766	0.999504	Fuel Pressure	23.0	23.0
Calculated intercept	0.005200	-0.060805		4.4	4.4
				3.415	3.415

Analyzer make	Thermo 51i-LT	Analyzer serial #	1336160089
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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	0.05	N/A
as found span	5000	58.3	12.74	12.80	0.995
calibrator zero	5000	0.0	0.00	0.05	N/A
high point	5000	58.3	12.74	12.80	0.995
second point	5000	29.2	6.38	6.44	0.990
third point	5000	14.7	3.21	3.29	0.976
calibrator zero	5000	0.0	0.00	0.06	N/A
as left zero	5000	0.0	0.00	0.06	N/A
as left span	5000	58.3	12.74	12.85	0.991
Average Correction Factor					0.987

Corrected As found 12.75 Previous response 12.73 % change -0.1%

Notes:

Filter changed out, No Maintenance or adjustments done,

Calibration Performed By:

Melissa Lemay



Wood Buffalo Environmental Association

THC Calibration Summary

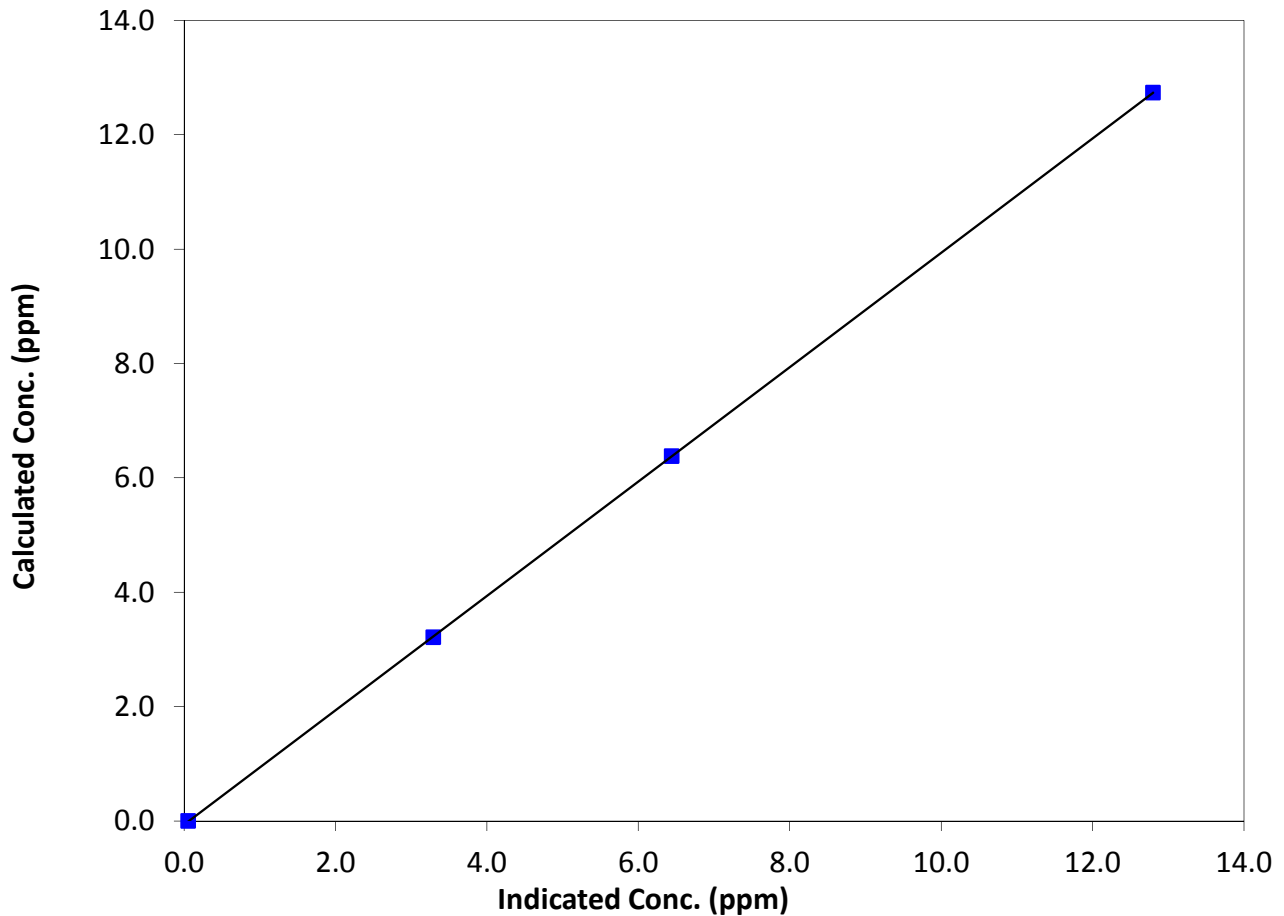
Station Information

Calibration Date	November 13, 2014	Previous Calibration	October 16, 2014
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	7:50	End Time (MST)	11:40
Analyzer make	Thermo 51i-LT	Analyzer serial #	1336160089

Calibration Data

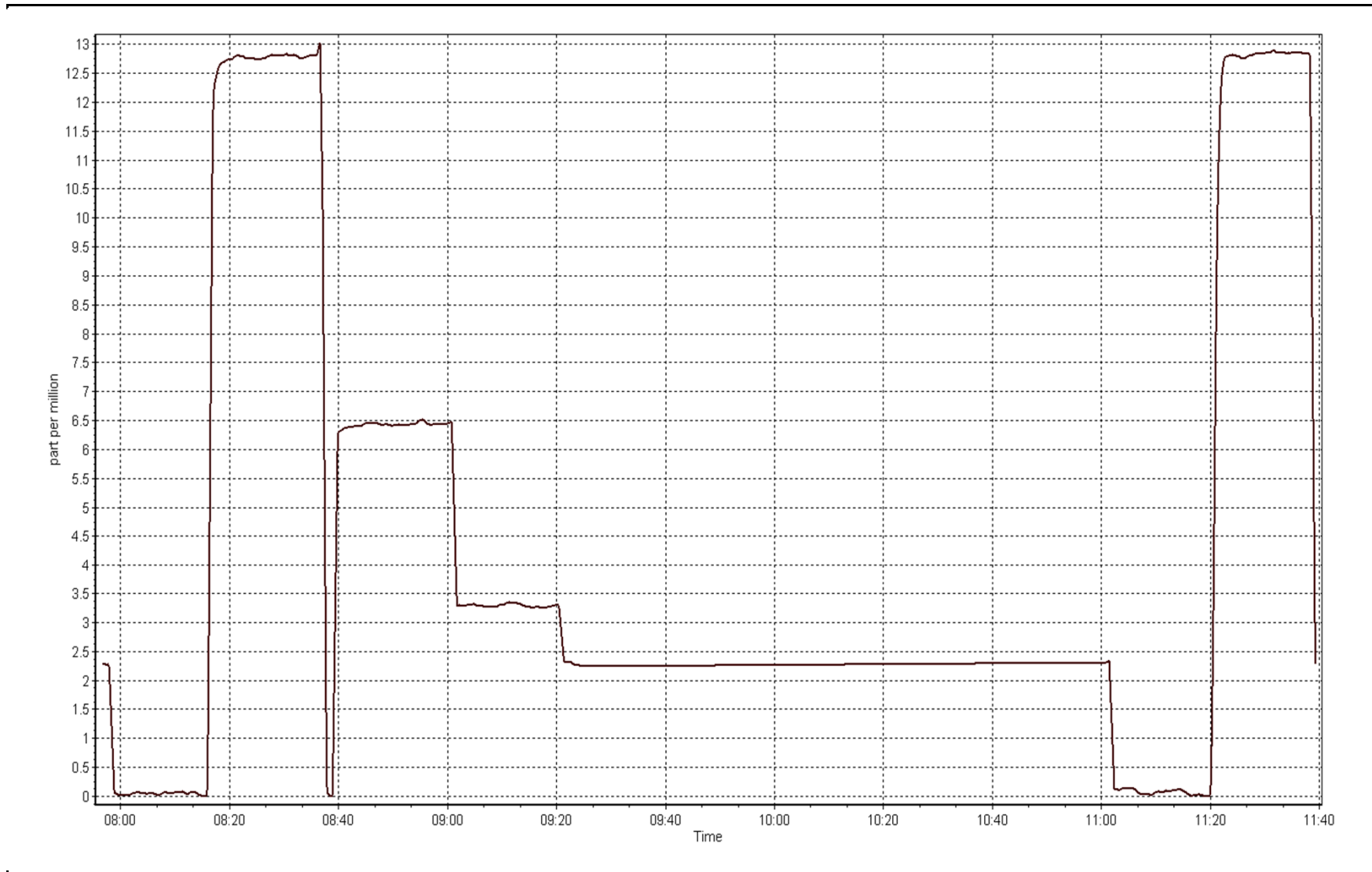
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.05	N/A	Correlation Coefficient	0.999995
12.74	12.80	0.9950		
6.38	6.44	0.9905	Slope	0.999504
3.21	3.29	0.9761		
			Intercept	-0.060805

THC Calibration Curve



THC Calibration Plot

Date: November 13, 2014





Wood Buffalo Environmental Association

NO_x-NO-NO₂ Calibration Report

Station Information

Calibration Date	November 13, 2014	Previous Calibration	October 16, 2014
Station Name	Firebag	Station Number	AMS 19
Reason:	Routine		
Start Time (MST)	7:50	End Time (MST)	11:40
Barometric Pressure	mmHg	Station Temperature	22.0 Deg C
Calibrator	API T700	Serial Number	996
NO Cal Gas Conc	51.5 ppm	Cal Gas Expiry Date	December 12, 2016
NO _x Cal Gas Conc	51.5 ppm	Cal Gas Serial #	SA130123A

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	6894
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Parameter		NO _x	NO	NO ₂
MV conversion	Analyzer Range (ppb)	1000	1000	1000
	Analyzer Range (mv)	1000	1000	1000
Before	Data Slope	0.999860	0.998678	1.008146
	Data Offset	-0.378411	-0.215272	0.229865
After	Data Slope	1.004102	1.004851	1.003469
	Data Offset	-0.426896	-0.375244	0.883279
Channel #				
Voltage Range				

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1410661309
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Test Point	before		after	
Concentration range	1000	ppb	1000	ppb
NO coefficient	0.837	ppb	0.837	ppb
NO _x coefficient	0.998	ppb	0.998	ppb
NO ₂ coefficient	1.000	ppb	1.000	ppb
NO bkgrnd	3.5		3.5	
NO _x bkgrnd	3.6		3.6	
Nt coefficient	N/A		N/A	
Chamber Temp	50.4	Deg C	50.4	Deg C
Moly Temp	326.6	Deg C	326.6	Deg C
PMT Temp	-2.7	Deg C	-2.7	Deg C
O ₃ flow	ok	ccm	ok	ccm
R Cell Press	163.0	mmHg	163.0	mmHg
Sample Flow	0.650	ccm	0.650	ccm

Notes:

Filter changed out, No maintenance or adjustments done



Wood Buffalo Environmental Association

NO_x-NO-NO₂ Calibration Report

Station Information

Calibration Date:

November 13, 2014

Station Number:

AMS 19

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NO _x conc (ppb)	Calculated NO conc (ppb)	Calculated NO ₂ conc (ppb)	Indicated NO _x conc (ppb)	Indicated NO conc (ppb)	Indicated NO ₂ conc (ppb)	NO _x Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	N/A	N/A
as found span	5000	58.3	600.5	600.5	0.0	597.5	597.1	0.4	1.0050	1.0057
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	N/A	N/A
high point	5000	58.3	600.5	600.5	0.0	597.5	597.1	0.4	1.0050	1.0057
second point	5000	29.1	299.7	299.7	0.0	300.9	300.6	0.3	0.9961	0.9971
third point	5000	14.7	151.4	151.4	0.0	151.1	150.6	0.5	1.0021	1.0054
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	58.3	600.5	273.7	326.8	601.3	275.4	325.9	0.9987	0.9938
Average Correction Factor									1.0011	1.0027

Corrected As found

NO_x= 597.6

NO= 597.1

Percent Change

NO_x= 0.6%

NO= 0.7%

Previous Response

NO_x= 601.0

NO= 601.5

GPT Calibration Data

Dilution Flow

5000

ccm

Source Gas Flow

58.30

ccm

O ₃ Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO ₂ conc (ppb)	Indicated NO _x conc (ppb)	Indicated NO conc (ppb)	Indicated NO ₂ conc (ppb)	NO _x Correction factor	NO Correction factor	NO ₂ Correction factor	Converter Efficiency
Cal zero			0.0			-0.1			N/A	
1st NO ₂ (300)	N/A	273.7	323.8	595.6	273.7	322.3	0.9966	1.0000	1.0047	99.5%
2nd NO ₂ (200)	N/A	378.7	218.8	596.0	378.7	217.0	0.9959	1.0000	1.0083	99.2%
3rd NO ₂ (100)	N/A	483.7	113.8	595.1	483.7	111.4	0.9974	1.0000	1.0215	97.9%
4th NO ₂ (0)	597.5	N/A	-0.9	596.6	597.5	-0.8	0.9949	1.0000	N/A	N/A
Average Correction Factor							0.9962	1.0000	1.0115	98.9%

Calibration Performed By:

Melissa Lemay



Wood Buffalo Environmental Association

NO_x Calibration Summary

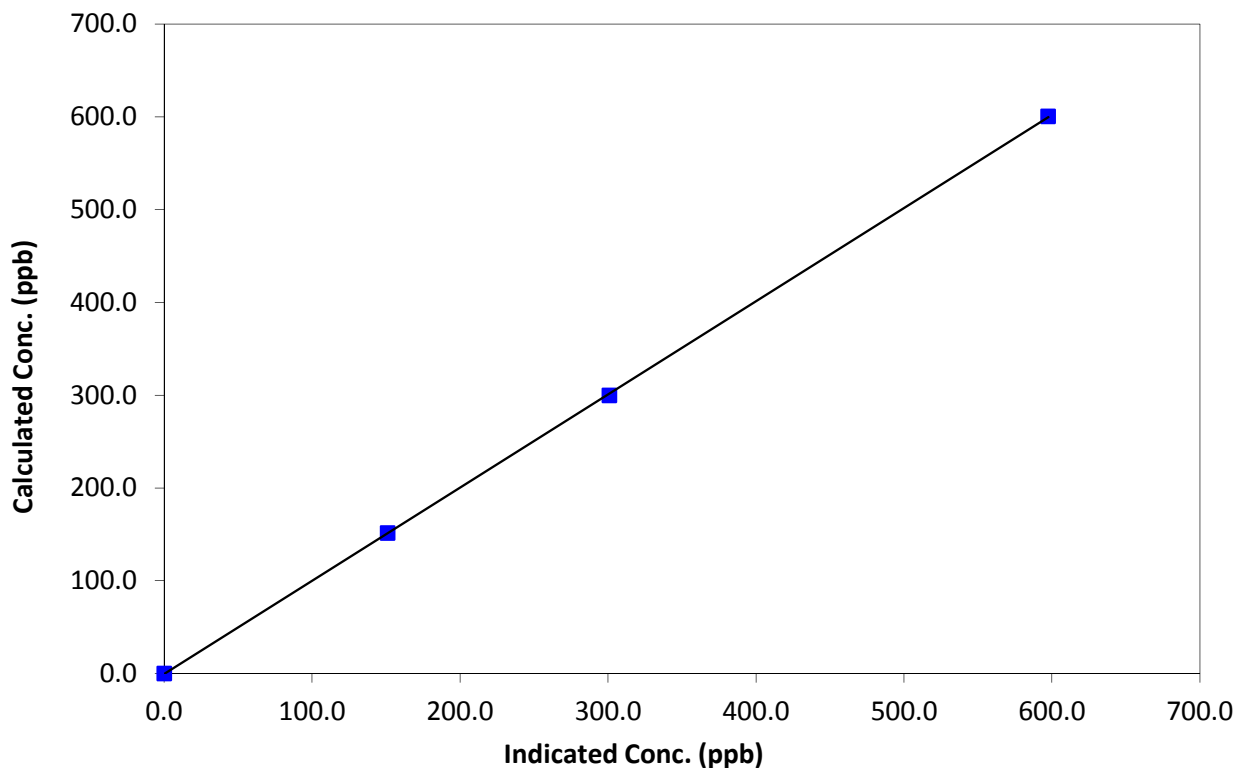
Station Information

Calibration Date	November 13, 2014	Previous Calibration	October 16, 2014
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	7:50	End Time (MST)	11:40
Analyzer make	Thermo 42i	Analyzer serial #	1410661309

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999979
600.5	597.5	1.0050		
299.7	300.9	0.9961	Slope	1.004102
151.4	151.1	1.0021		
0.0	0.1	0.0000	Intercept	-0.426896

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

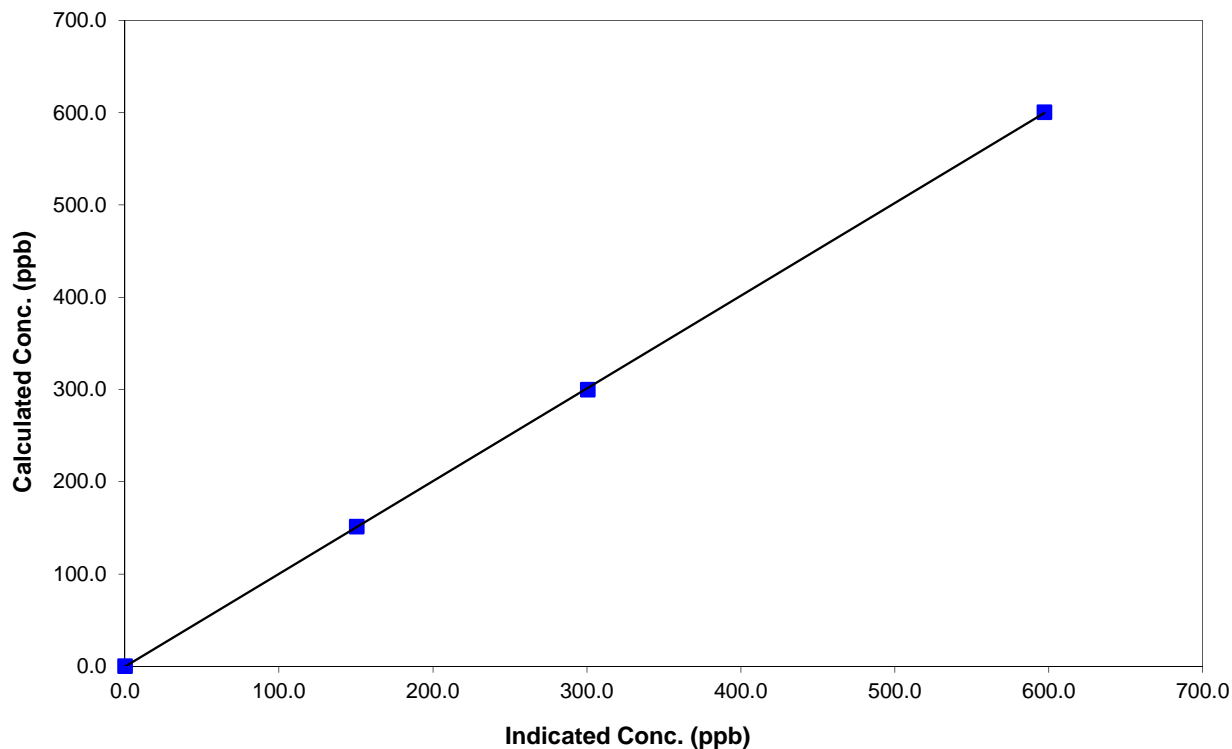
Station Information

Calibration Date	November 13, 2014	Previous Calibration	October 16, 2014
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	7:50	End Time (MST)	11:40
Analyzer make	Thermo 42i	Analyzer serial #	1410661309

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999980
600.5	597.1	1.0057		
299.7	300.6	0.9971	Slope	1.004851
151.4	150.6	1.0054		
0.0	0.1	0.0000	Intercept	-0.375244

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

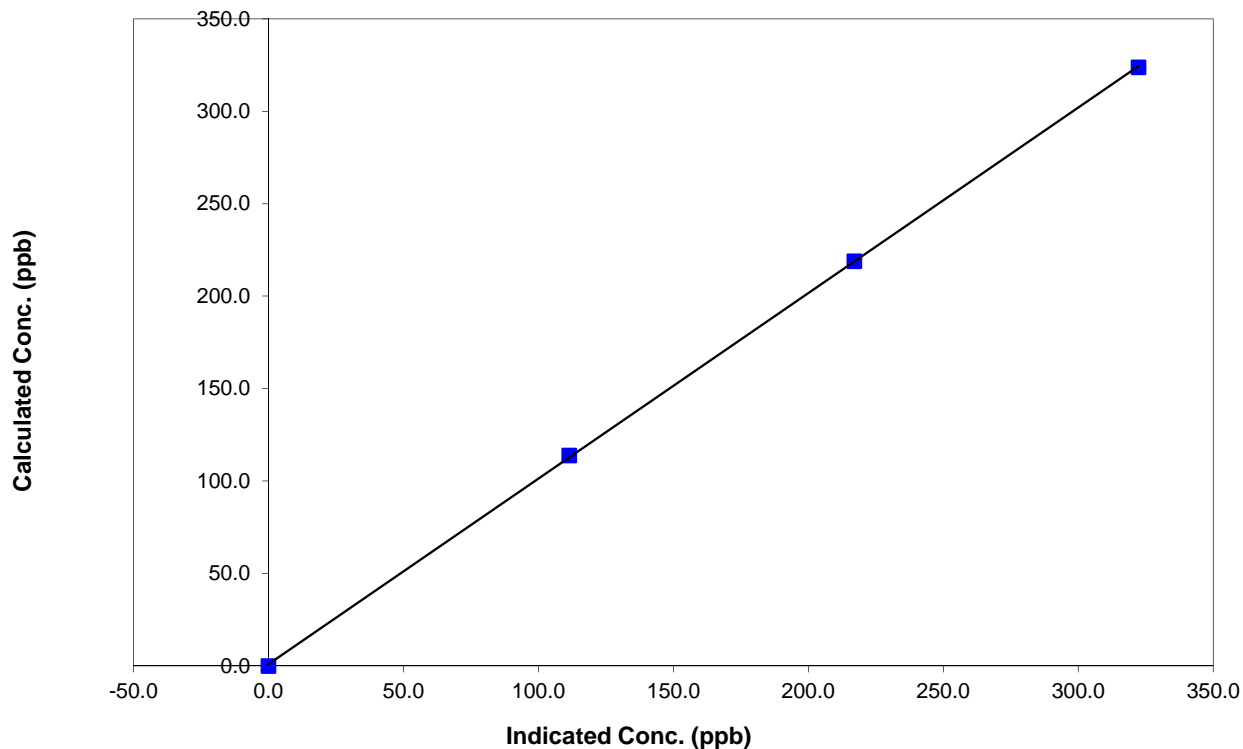
Station Information

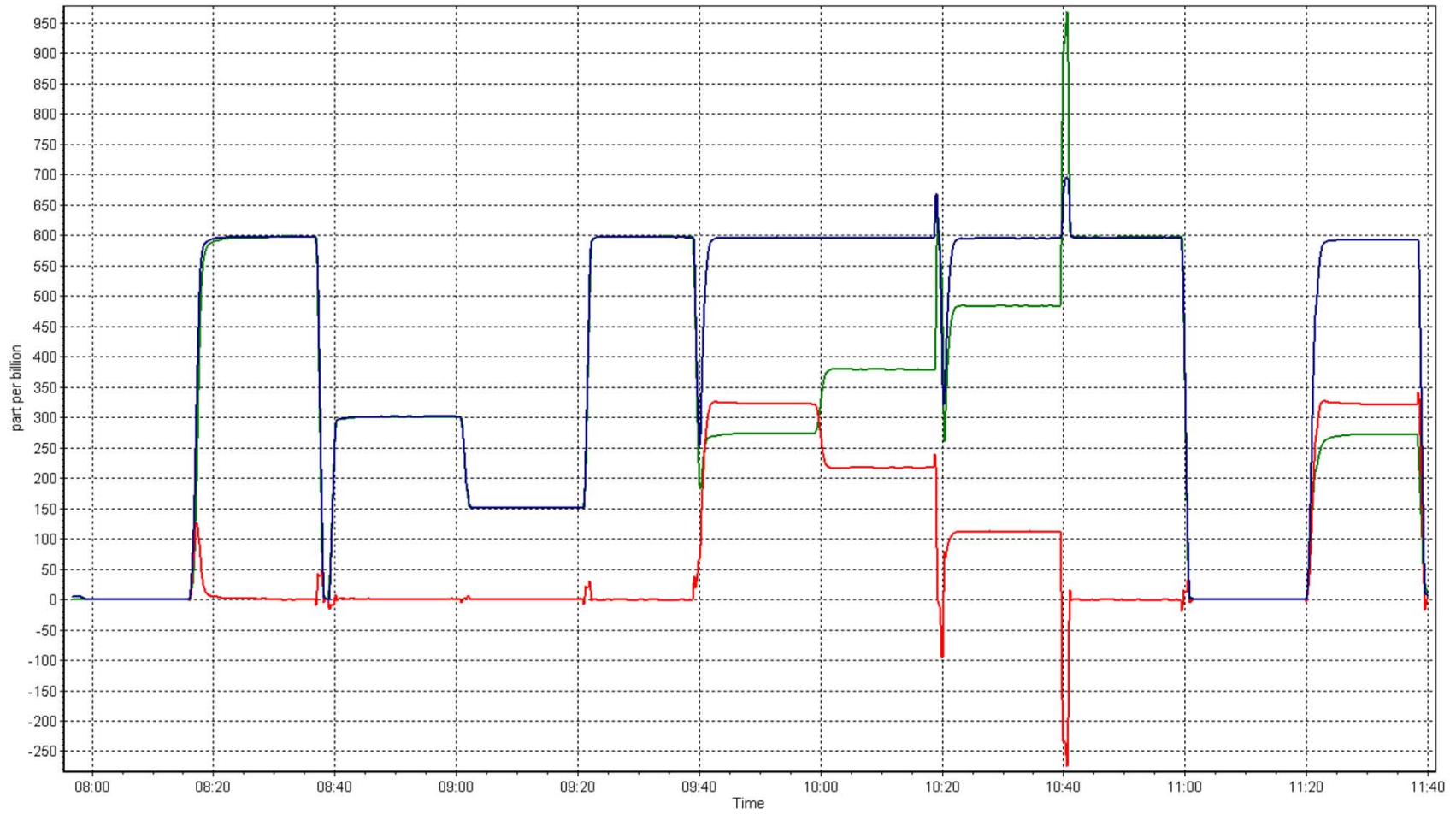
Calibration Date	November 13, 2014	Previous Calibration	October 16, 2014
Station Number	Firebag	Station Number	AMS 19
Start Time (MST)	7:50	End Time (MST)	11:40
Analyzer make	Thermo 42i	Analyzer serial #	1410661309

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999962
323.8	322.3	1.0047		
218.8	217.0	1.0083	Slope	1.003469
113.8	111.4	1.0215		
			Intercept	0.883279

NO₂ Calibration Curve





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 502
CONOCOPHILLIPS SURMONT
NOVEMBER 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

December 22, 2014

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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONOCOPHILLIPS SURMONT (AMS 502)
 NOVEMBER 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	656	35	64	95.97	13	0	6	0
H2S (ppb) Average	682	35	40	99.31	2	0	1	0
NO2 (ppb) Average	684	34	36	99.72	27	0	14	-
NO (ppb) Average	684	34	36	99.72	50	-	11	-
NOX (ppb) Average	684	34	36	99.72	73	-	25	-
Temperature 2 m (C) Average	720	0	0	100.00	7.4	-	3.6	-
Relative Humidity (%) Average	720	0	0	100.00	100	-	-	-
Wind Speed 10 m (km/h) Average	702	0	18	97.50	32	-	-	-
Wind Direction 10 m (deg) Average	702	0	18	97.50	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONOCOPHILLIPS SURMONT (AMS 502)
 NOVEMBER 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	656	1.5	2	-	0	0	0	1	2	4	13
H2S (ppb) Average	680	0.4	0	-	0	0	0	0	1	1	2
NO2 (ppb) Average	684	6.7	4	-	1	2	4	6	9	12	27
NO (ppb) Average	684	3.6	5	-	0	0	1	2	4	9	50
NOX (ppb) Average	684	10.3	8	-	1	3	5	8	13	20	73
Temperature 2 m (C) Average	720	-11.29	7.8	-	-27.8	-21.8	-16.2	-12.4	-5.3	0.4	7.4
Relative Humidity (%) Average	720	82	9	-	43	70	79	84	87	92	100
Wind Speed 10 m (km/h) Average	702	13.7	7	-	1	6	9	12	18	24	32
Wind Direction 10 m (deg) Average	702	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONOCOPHILLIPS SURMONT (AMS 502)
NOVEMBER 2014

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	01 Nov 2014 02:00	29 Nov 2014 06:00	27	Stabilization after daily span
SO2	12 Nov 2014 13:00	12 Nov 2014 14:00	2	Maintenance - replace sample manifold
H2S	12 Nov 2014 13:00	12 Nov 2014 14:00	2	Maintenance - replace sample manifold
H2S	16 Nov 2014 22:00	16 Nov 2014 23:00	2	Unstable operation - excessive baseline drift
H2S	30 Nov 2014 22:00	30 Nov 2014 22:00	1	Unstable operation - excessive baseline drift
NO2, NO, NOX	12 Nov 2014 13:00	12 Nov 2014 14:00	2	Maintenance - replace sample manifold
Wind Speed, Wind Direction	04 Nov 2014 08:00	05 Nov 2014 01:00	18	Flat line in sensor output signal

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Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 13 ppb on Nov 15 16:00	Maximum Daily Average: 6.3 ppb on Nov 18
Minimum Value: 0 ppb on Nov 12 20:00	Hours of Data: 656
Maximum Diurnal Average: 2.1 ppb at hour 16	Hours of Missing Data: 64
Monthly Average: 1.5 ppb	Hours of Calibration: 35
Minimum Daily Average: 0.3 ppb on Nov 22	Percent Operational Time: 96.0
Minimum Diurnal Average: 0.9 ppb at hour 7	
Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 2 P ₉₀ = 4 P ₉₉ = 10	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	Z	RE	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0.4	1
2-Nov	0	Z	RE	0	1	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0.4	1
3-Nov	0	1	Z	RE	1	1	1	1	1	1	1	1	1	1	1	1	1	2	3	2	1	1	1	2	1.2	3
4-Nov	2	1	1	Z	RE	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2
5-Nov	0	0	0	0	Z	RE	0	1	2	1	2	2	1	3	4	2	1	1	0	0	0	0	0	0	1.1	4
6-Nov	0	0	0	0	0	Z	RE	0	0	0	C	C	C	C	C	1	1	1	1	1	1	8	9	9	--	9
7-Nov	Z	RE	9	9	6	4	3	2	3	4	6	4	5	6	5	4	3	5	4	1	1	1	3	3	4.1	9
8-Nov	1	Z	RE	1	0	1	1	1	2	1	2	2	3	4	5	4	2	3	1	1	1	2	1	1	1.8	5
9-Nov	1	1	Z	RE	1	1	0	1	1	1	3	1	1	1	1	1	1	2	2	1	0	0	0	1	1.0	3
10-Nov	1	2	0	Z	RE	1	2	4	5	4	4	2	3	2	3	3	3	3	1	1	1	0	0	0	2.1	5
11-Nov	0	0	0	0	Z	RE	1	1	1	1	2	4	2	1	2	1	1	2	2	1	1	1	1	1	1.2	4
12-Nov	0	0	0	0	0	Z	RE	0	0	0	0	0	M	M	0	0	0	0	0	0	0	0	0	0	0.3	0
13-Nov	Z	RE	1	1	1	1	1	2	1	2	3	3	2	2	3	2	1	1	2	1	1	1	1	1	1.4	3
14-Nov	1	Z	2	1	1	0	0	0	0	1	1	0	1	1	1	1	4	3	5	4	2	1	0	0	1.3	5
15-Nov	0	0	Z	RE	0	0	0	1	1	1	1	1	1	1	5	13	13	3	2	2	1	2	3	4	2.4	13
16-Nov	4	4	3	Z	RE	2	1	2	3	4	3	3	7	5	6	5	3	4	1	0	0	0	1	0	2.9	7
17-Nov	0	0	0	0	Z	RE	1	1	1	2	1	1	0	0	1	5	5	3	2	1	7	5	4	3	2.0	7
18-Nov	8	5	1	1	2	Z	RE	4	8	8	10	11	11	10	9	8	8	7	6	6	6	5	3	2	6.3	11
19-Nov	Z	RE	2	2	1	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	2
20-Nov	0	Z	RE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0.8	1
21-Nov	1	1	Z	RE	2	1	0	1	0	1	1	1	1	1	4	4	2	0	0	0	0	0	0	0	1.1	4
22-Nov	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
23-Nov	0	0	0	0	Z	RE	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	1	1	0.5	1
24-Nov	1	0	1	3	1	Z	3	2	3	3	4	3	5	3	2	2	1	1	0	0	0	0	0	0	1.7	5
25-Nov	Z	RE	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	3	4	3	3	8	3	1.4	8
26-Nov	2	Z	RE	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	2	1.0	2
27-Nov	1	1	Z	RE	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.5	1
28-Nov	0	0	0	Z	RE	0	0	0	0	1	0	0	0	1	1	1	0	0	0	0	0	0	1	0	0.5	1
29-Nov	1	1	2	4	Z	RE	0	1	1	1	1	1	1	1	1	1	1	1	2	9	11	10	9	7	2.8	11
30-Nov	6	3	1	2	2	Z	0	1	1	0	0	0	1	1	0	0	0	0	1	1	1	1	2	2	1.2	6

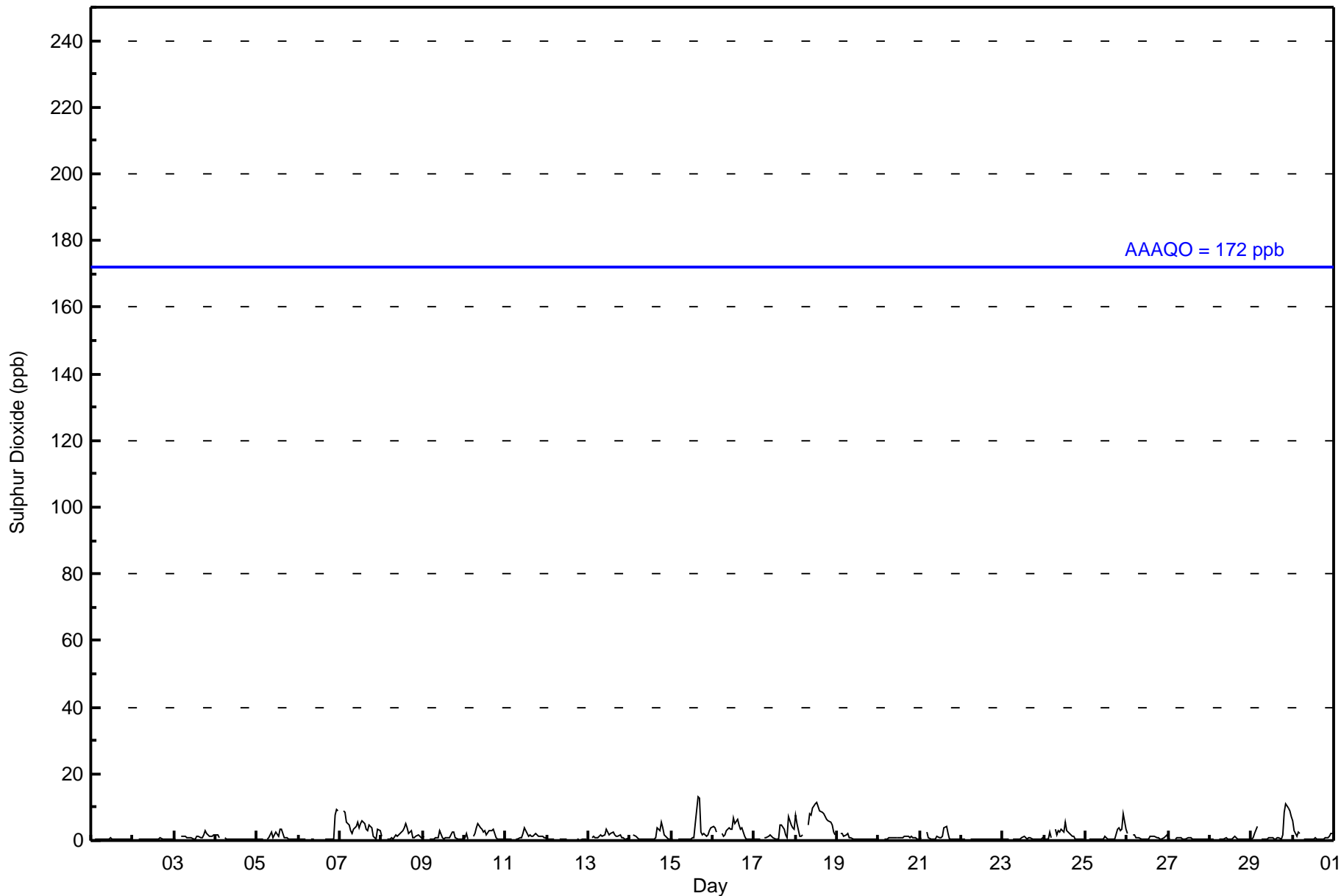
1.3	1.1	1.2	1.5	1.1	1.0	0.9	1.0	1.3	1.3	1.7	1.6	1.9	1.8	2.0	2.1	1.9	1.6	1.4	1.3	1.5	1.5	1.8	1.5	Diurnal Average	
8	5	9	9	6	4	3	4	8	8	10	11	11	10	9	13	13	7	6	9	11	10	9	9	Diurnal Maximum	

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



WBEA NETWORK
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
ConocoPhillips - Surmont - November 2014





WBEA NETWORK
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
ConocoPhillips - Surmont - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	651	99.24	99.24
11 - 20	5	0.76	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: 656

Total Number of Hours: 720



WBEA NETWORK
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
ConocoPhillips - Surmont - November 2014

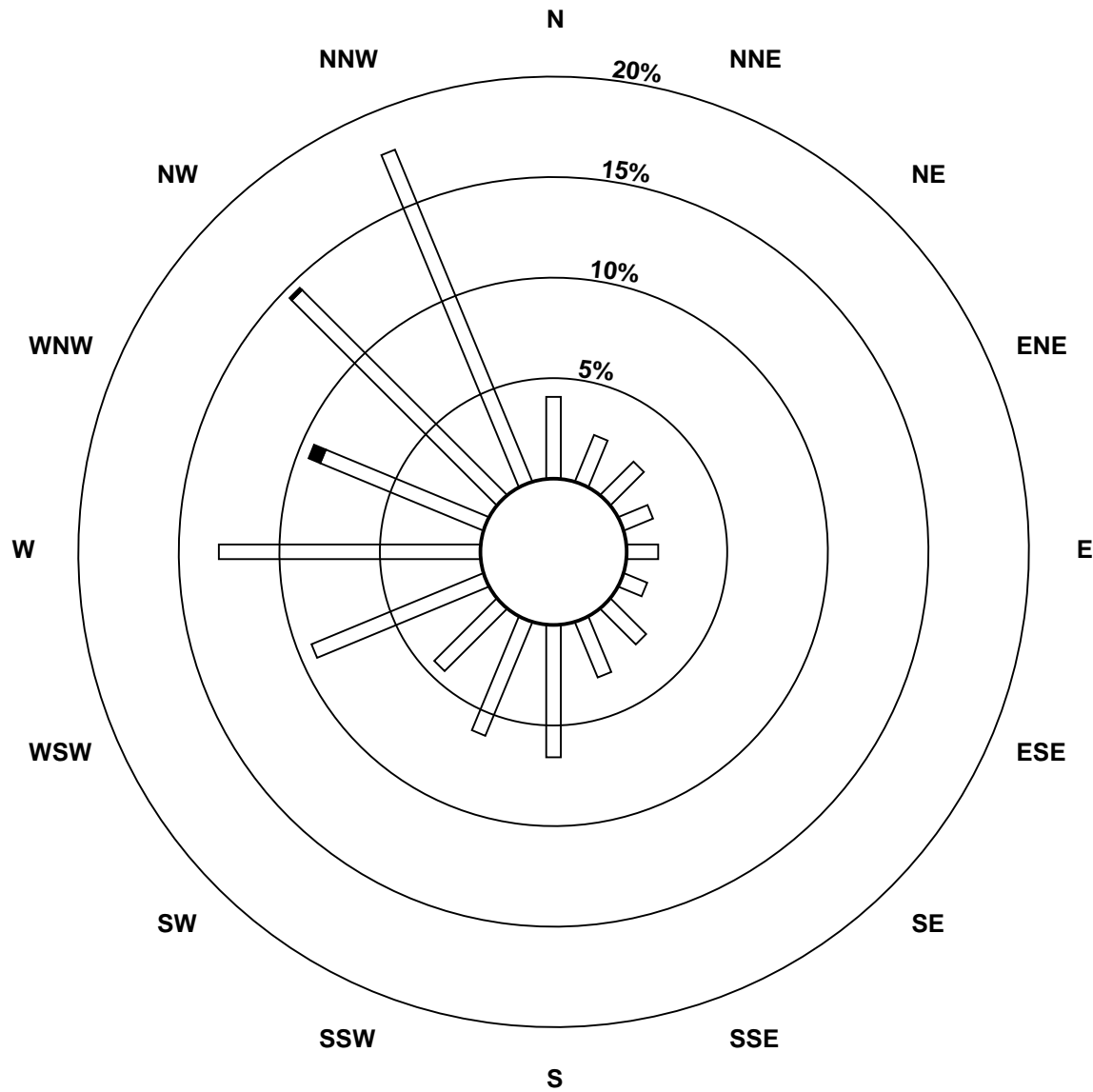
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	26	16	15	10	10	8	16	19	42	39	28	59	83	56	92	114	633
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0	5
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	26	16	15	10	10	8	16	19	42	39	28	59	83	60	93	114	638

Total Number of Valid Hours: 638

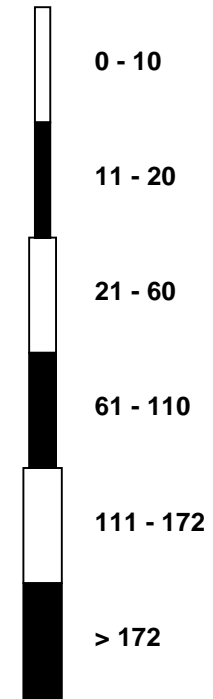
Total Number of Hours: 720

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

**Sulphur Dioxide (SO₂) - ppb
ConocoPhillips - Surmont (AMS502)**



Classes (ppb)

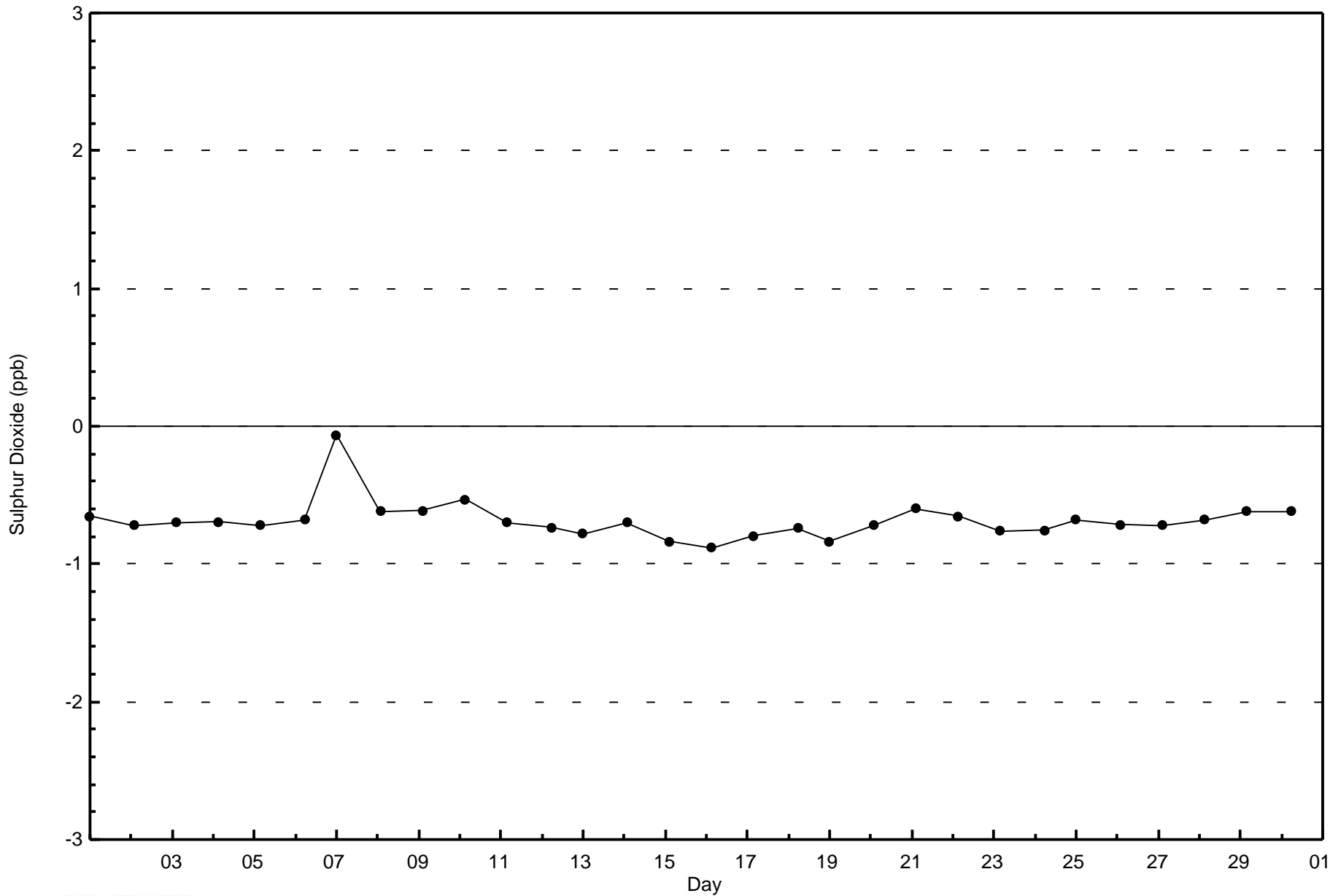


Total Number of Valid Hours: 638



WBEA NETWORK
Zero Responses

Sulphur Dioxide (SO₂) - ppb
ConocoPhillips - Surrmont - November 2014



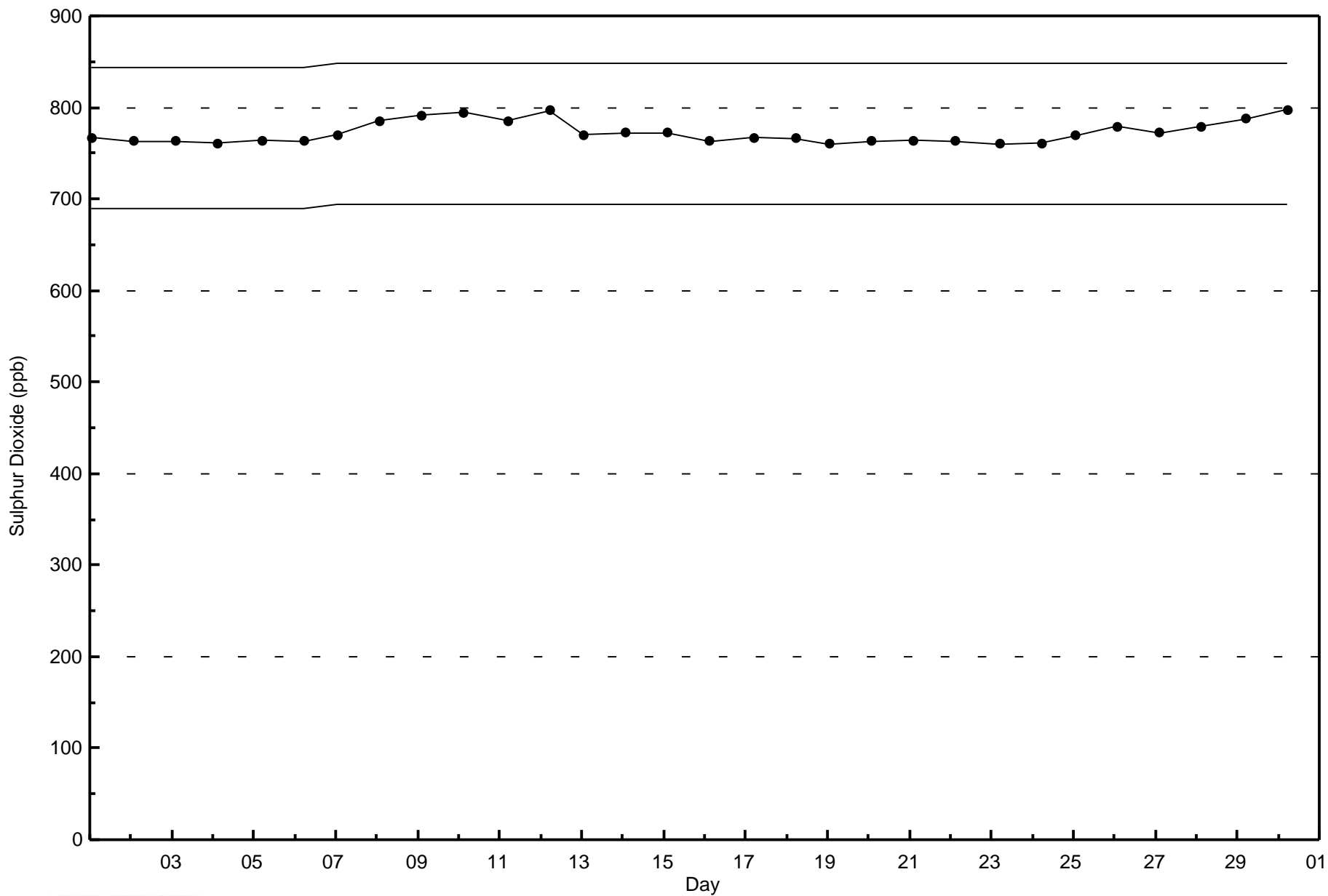


WBEA NETWORK

Span Responses

Sulphur Dioxide (SO₂) - ppb

ConocoPhillips - Surmont - November 2014





Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 2 ppb on Nov 24 01:00	Maximum Daily Average: 0.8 ppb on Nov 9
Minimum Value: 0 ppb on Nov 30 18:00	Hours of Data: 680
Maximum Diurnal Average: 0.5 ppb at hour 17	Hours of Missing Data: 40
Monthly Average: 0.4 ppb	Hours of Calibration: 35
Minimum Daily Average: 0.2 ppb on Nov 1	Percent Operational Time: 99.3
Minimum Diurnal Average: 0.3 ppb at hour 3	
Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 1 P ₉₀ = 1 P 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-Nov	0	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-Nov	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0.3	1
3-Nov	0	0	0	Z	0	0	0	0	1	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1
4-Nov	1	1	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
5-Nov	0	0	0	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
6-Nov	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.3	1
7-Nov	1	Z	1	1	1	1	1	1	1	1	C	C	C	C	C	0	0	0	0	1	1	1	0	0	0.5	1
8-Nov	0	1	Z	0	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0.5	1
9-Nov	0	0	0	Z	1	1	1	1	0	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	0.8	1
10-Nov	1	0	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0.6	1
11-Nov	1	1	1	1	1	Z	1	1	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0.5	1
12-Nov	0	0	0	0	0	0	Z	0	0	0	0	0	M	M	0	0	0	0	0	0	0	0	0	0	0.2	0
13-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.2	1
14-Nov	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0.7	1
15-Nov	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0.3	1
16-Nov	0	0	0	0	Z	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	UO	UO	0	0.4	1
17-Nov	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.3	1
18-Nov	0	1	1	1	0	1	Z	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	0.6	1
19-Nov	0	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-Nov	0	0	Z	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
21-Nov	0	0	1	Z	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.5	1
22-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
23-Nov	0	0	0	0	0	Z	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1	0.4	1
24-Nov	2	2	1	1	1	1	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.6	2
25-Nov	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0.3	1
26-Nov	1	1	Z	0	0	0	0	0	0	0	1	0	0	1	1	1	1	0	0	1	1	1	1	1	0.6	1
27-Nov	1	1	0	Z	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
28-Nov	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0	0.5	1
29-Nov	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0.3	1
30-Nov	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	UO	0	0	0.2	0

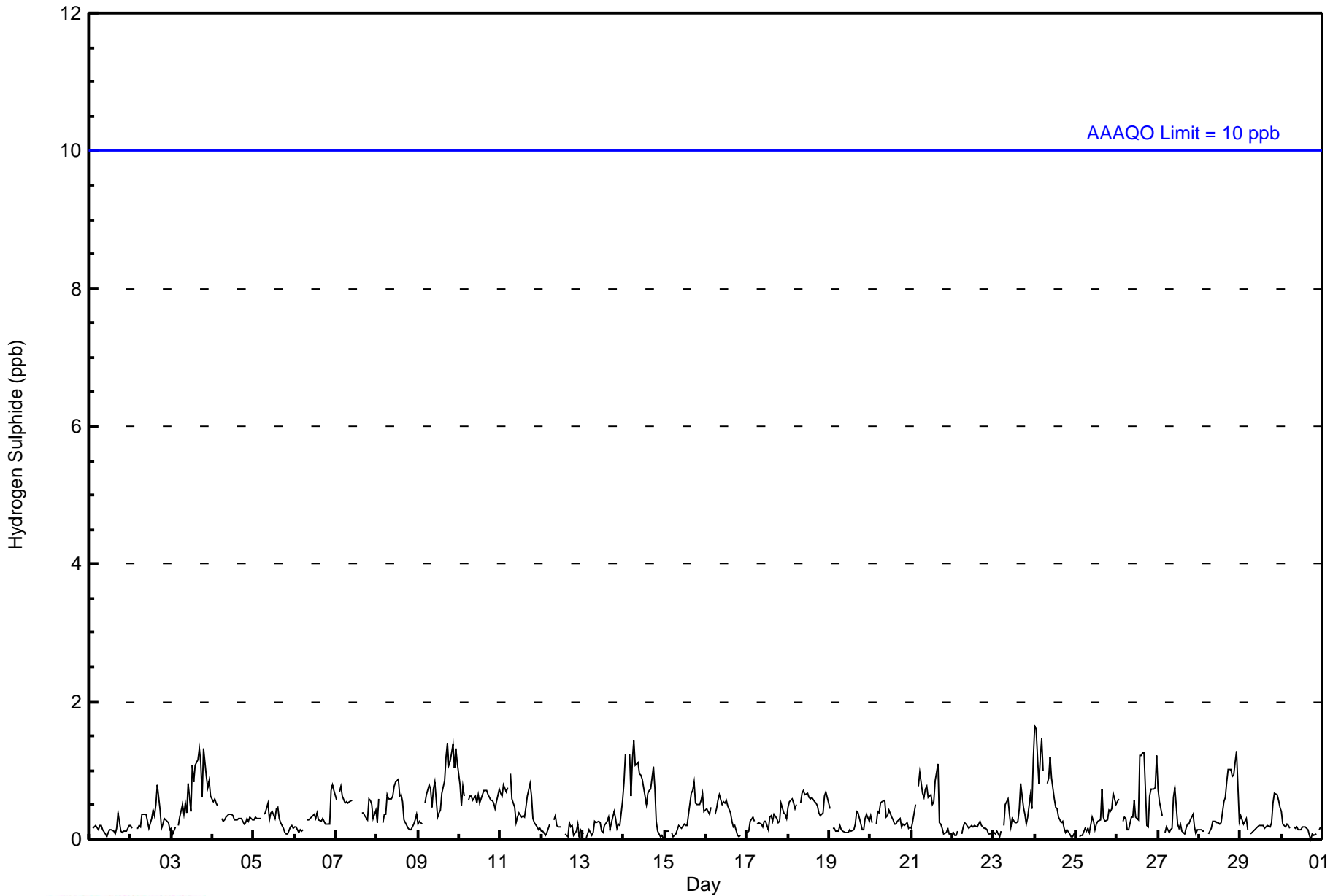
0.4	0.4	0.3	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.4	Diurnal Average
2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Diurnal Maximum

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



WBEA NETWORK
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
ConocoPhillips - Surrmont - November 2014





WBEA NETWORK
Cumulative Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
ConocoPhillips - Surmont - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	680	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: 680

Total Number of Hours: 720



WBEA NETWORK
Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
ConocoPhillips - Surmont - November 2014

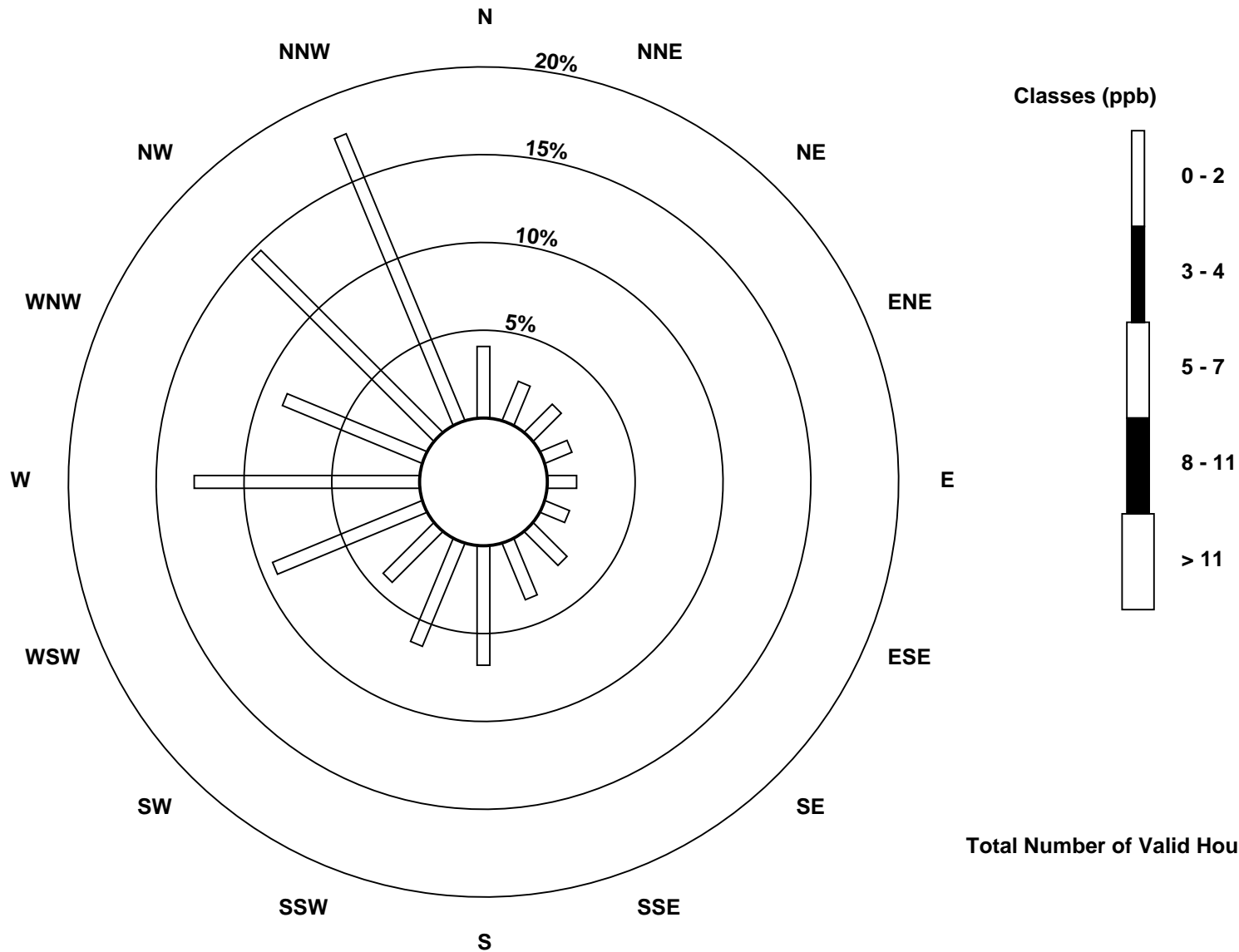
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	27	16	15	11	11	10	18	23	45	42	27	61	85	57	97	117	662
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	27	16	15	11	11	10	18	23	45	42	27	61	85	57	97	117	662

Total Number of Valid Hours: 662

Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

Hydrogen Sulphide (H₂S) - ppb
ConocoPhillips - Surmont (AMS502)



Total Number of Valid Hours: 662

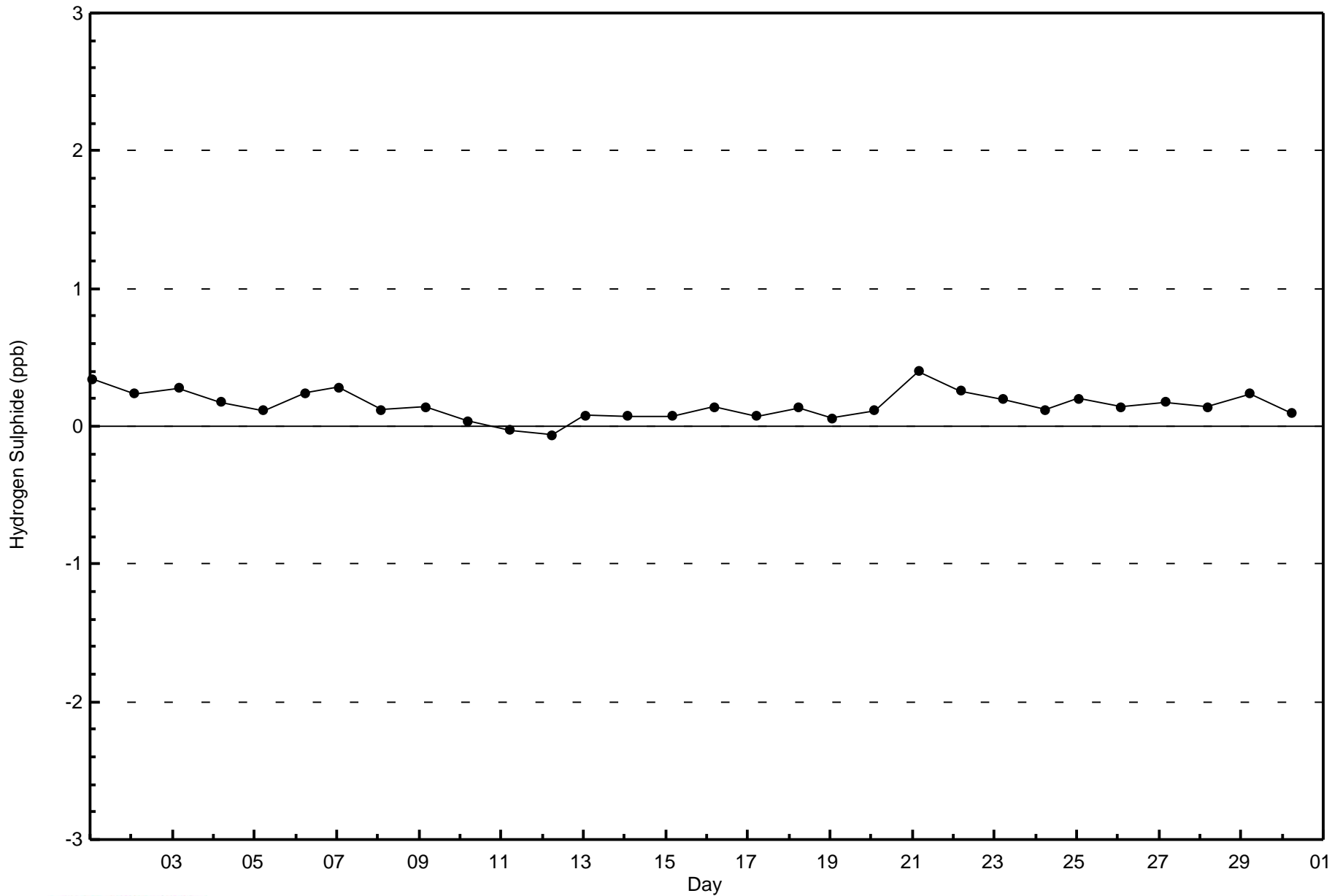


WBEA NETWORK

Zero Responses

Hydrogen Sulphide (H₂S) - ppb

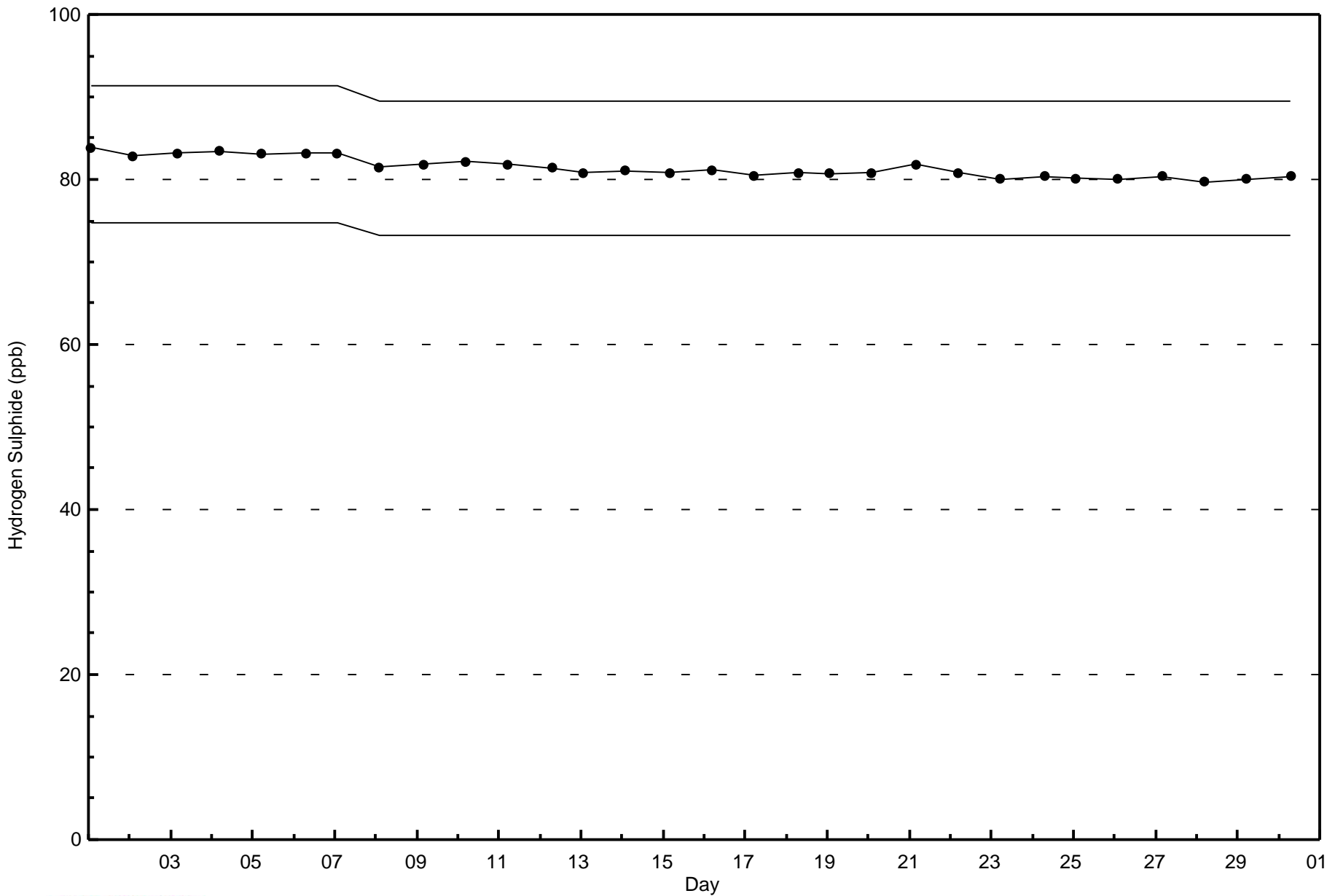
ConocoPhillips - Surrmont - November 2014





WBEA NETWORK
Span Responses

Hydrogen Sulphide (H₂S) - ppb
ConocoPhillips - Surmont - November 2014





Maximum Value: 50 ppb on Nov 26 14:00																	Maximum Daily Average: 10.9 ppb on Nov 26																	Hours in Service: 720			
Minimum Value: 0 ppb on Nov 9 23:00																	Minimum Daily Average: 1.1 ppb on Nov 1																	Hours of Data: 684			
Maximum Diurnal Average: 6.5 ppb at hour 14																	Minimum Diurnal Average: 2.0 ppb at hour 20																	Hours of Missing Data: 36			
Monthly Average: 3.6 ppb																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 2 Q ₃ = 4 P ₉₀ = 9 P ₉₉ = 24																	Hours of Calibration: 34			
																																		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-Nov	Z	1	1	1	1	0	1	2	1	0	1	2	2	1	1	1	2	4	1	1	0	1	1	1	1.1	4											
2-Nov	1	Z	1	1	1	1	1	2	5	6	6	3	5	8	10	12	22	9	3	2	3	3	1	0	4.6	22											
3-Nov	0	1	Z	2	0	6	6	3	16	8	3	5	5	7	3	1	1	5	3	3	4	2	1	0	3.8	16											
4-Nov	1	1	1	Z	1	1	2	2	3	4	3	4	4	2	3	3	4	4	1	1	2	3	3	1	2.4	4											
5-Nov	1	0	1	0	Z	2	2	3	10	4	7	9	6	13	12	6	4	3	1	1	1	3	3	3	4.1	13											
6-Nov	3	3	1	1	1	Z	4	5	5	4	C	C	C	C	2	2	2	0	0	0	1	24	24	24	5.7	24											
7-Nov	Z	23	23	23	16	11	8	5	9	14	17	9	14	16	13	9	8	12	8	0	1	0	0	1	10.6	23											
8-Nov	1	Z	1	0	1	0	0	1	1	2	3	4	7	10	12	8	2	1	1	1	3	4	3	2	2.9	12											
9-Nov	2	4	Z	4	2	1	1	2	4	3	5	4	2	2	1	1	0	1	2	1	0	1	0	0	1.9	5											
10-Nov	1	4	1	Z	3	4	5	9	14	10	9	7	10	5	6	6	4	3	1	2	2	2	1	0	4.7	14											
11-Nov	1	1	1	0	Z	1	1	1	2	2	4	6	4	4	3	2	1	2	1	0	0	0	0	0	1.6	6											
12-Nov	0	1	0	0	1	Z	7	5	5	3	4	3	M	M	4	4	10	4	3	1	2	1	1	1	2.9	10											
13-Nov	Z	0	0	0	1	0	3	8	6	6	6	3	2	4	5	6	2	3	5	2	1	2	2	2	3.1	8											
14-Nov	1	Z	2	0	2	1	1	1	2	2	3	4	4	4	4	4	9	6	5	3	1	1	0	0	2.6	9											
15-Nov	0	0	Z	0	0	0	1	2	2	2	1	1	1	1	7	17	15	1	2	5	2	3	5	6	3.2	17											
16-Nov	6	6	4	Z	2	3	2	3	4	7	7	6	12	5	12	9	6	6	2	0	0	1	1	1	4.6	12											
17-Nov	1	0	5	4	Z	2	2	2	2	2	4	4	1	5	4	2	3	1	1	1	13	8	6	5	3.3	13											
18-Nov	13	8	2	3	5	Z	3	5	14	15	19	20	20	19	17	16	15	13	11	9	9	6	3	2	10.6	20											
19-Nov	Z	3	1	2	0	2	2	1	1	0	1	1	1	1	1	1	3	2	1	0	0	1	1	0	1.3	3											
20-Nov	2	Z	4	1	3	4	7	7	8	3	4	6	5	3	2	2	3	4	1	2	2	1	0	1	3.3	8											
21-Nov	1	1	Z	2	2	1	1	1	2	2	2	2	2	2	2	1	2	2	1	1	1	1	1	1	1.4	2											
22-Nov	1	1	1	Z	1	2	2	3	3	2	2	2	2	2	1	2	3	2	1	1	1	1	1	0	1.6	3											
23-Nov	1	1	1	1	Z	2	2	9	10	5	4	6	4	4	3	9	17	5	2	1	4	3	4	5	4.4	17											
24-Nov	1	1	1	2	1	Z	1	3	4	6	5	5	4	3	2	1	2	1	1	1	1	0	0	0	2.0	6											
25-Nov	Z	1	0	0	0	2	2	1	1	1	2	2	1	2	3	3	4	3	2	1	1	6	8	5	2.2	8											
26-Nov	5	Z	4	2	3	2	1	1	4	4	11	7	8	50	45	47	43	2	2	1	1	1	2	4	10.9	50											
27-Nov	1	0	Z	1	1	1	1	1	2	1	3	2	2	3	1	1	2	1	1	2	3	1	0	1	1.5	3											
28-Nov	0	0	0	Z	0	1	1	2	2	3	3	4	2	2	1	2	1	1	1	1	1	0	1	1	1.3	4											
29-Nov	3	2	1	1	Z	0	0	0	1	1	0	1	0	2	1	2	2	1	4	15	20	19	14	13	4.5	20											
30-Nov	12	4	2	4	4	Z	1	1	2	1	1	1	2	1	3	2	1	0	0	0	0	0	0	1	2.0	12											
																	Diurnal Average																				
																	Diurnal Maximum																				
Z - zerspan																	C - Calibration																	M - Maintenance			

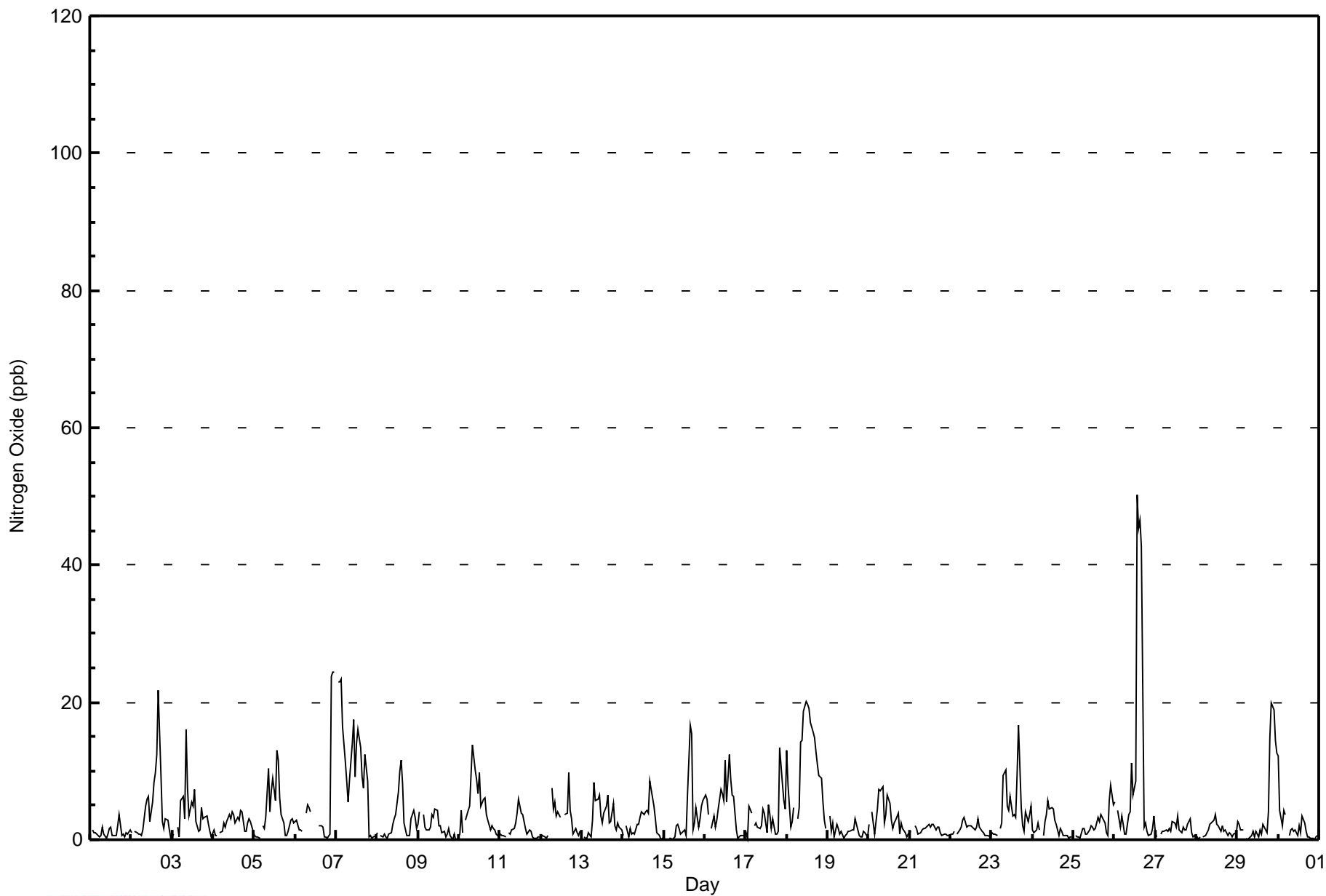


WBEA NETWORK

Hourly Averages

Nitrogen Oxide (NO) - ppb

ConocoPhillips - Surrmont - November 2014





WBEA NETWORK
Cumulative Frequency Distribution

Nitrogen Oxide (NO) - ppb
ConocoPhillips - Surmont - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	673	98.39	98.39
21 - 40	7	1.02	99.42
41 - 80	4	0.58	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



WBEA NETWORK
Frequency Distribution

Nitrogen Oxide (NO) - ppb
ConocoPhillips - Surmont - November 2014

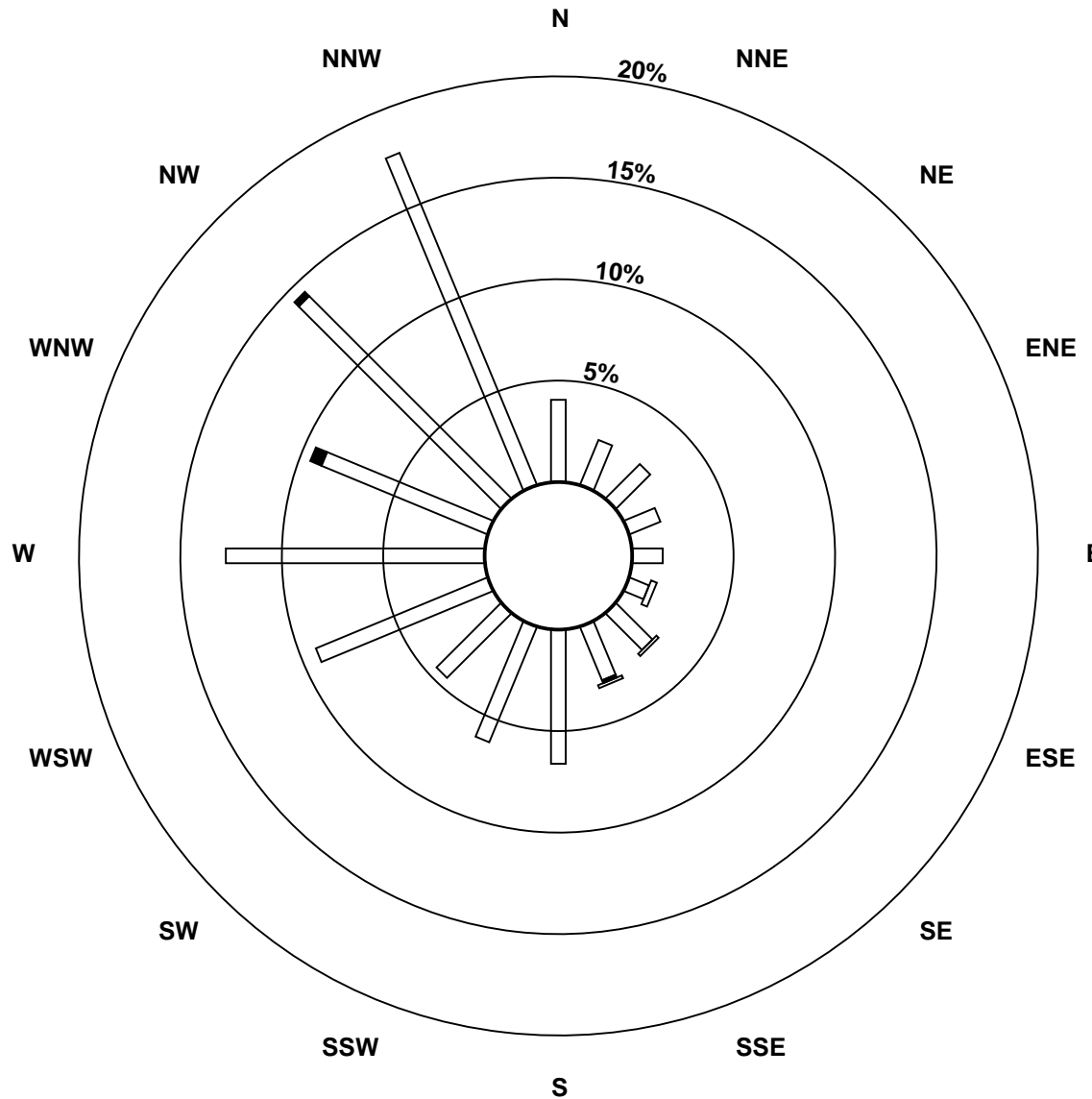
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	27	16	16	11	10	7	17	19	44	41	30	61	85	59	94	118	655
21 - 40	0	0	0	0	0	0	0	1	0	0	0	0	0	4	2	0	7
41 - 80	0	0	0	0	0	2	1	1	0	0	0	0	0	0	0	0	4
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	27	16	16	11	10	9	18	21	44	41	30	61	85	63	96	118	666

Total Number of Valid Hours: 666

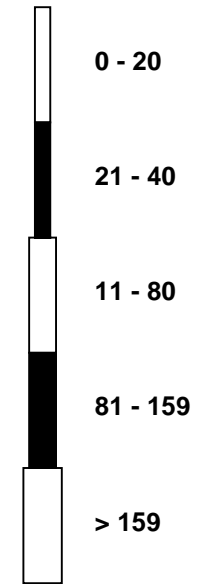
Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

Nitrogen Oxide (NO) - ppb
ConocoPhillips - Surmont (AMS502)



Classes (ppb)



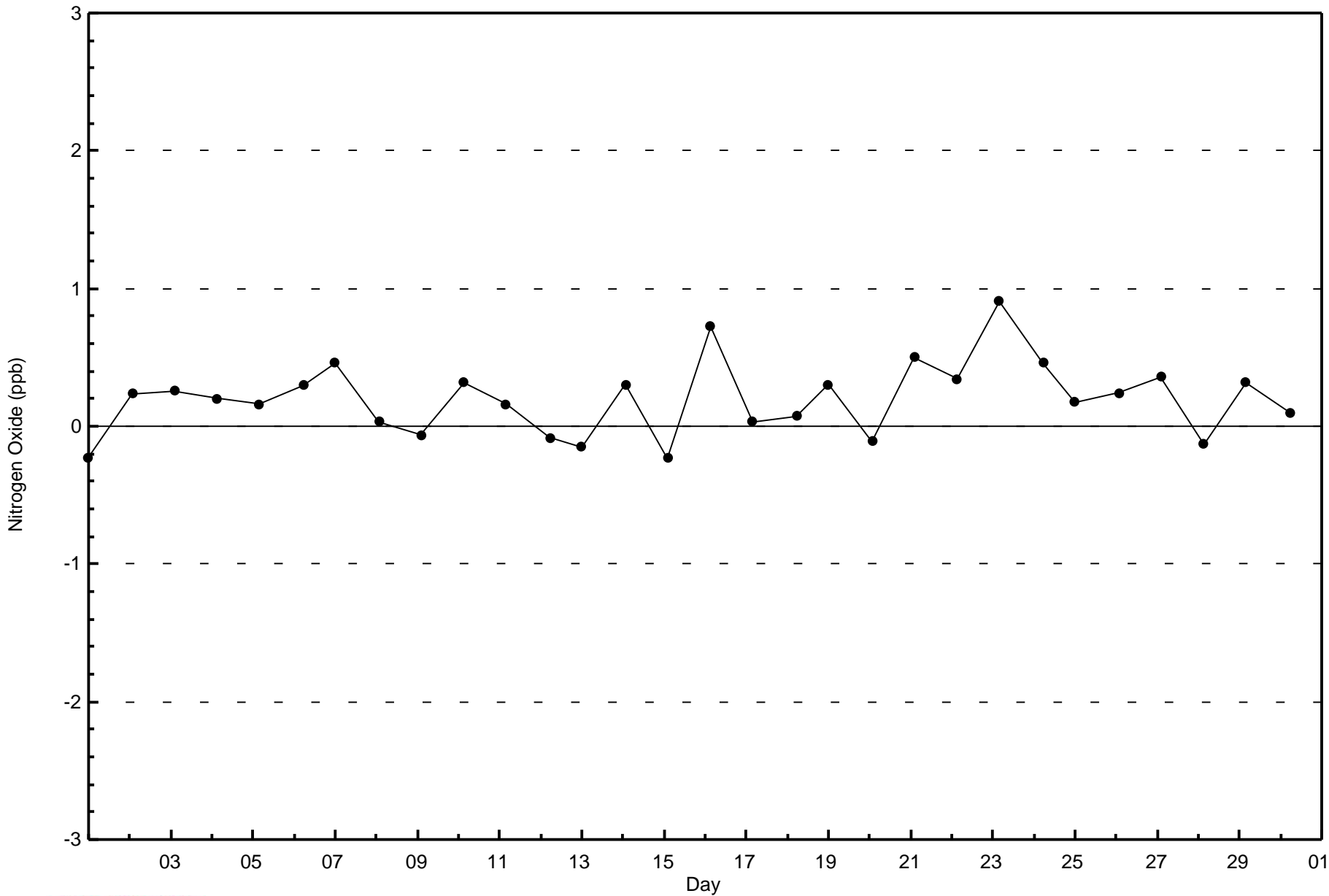
Total Number of Valid Hours: 666



WBEA NETWORK

Zero Responses

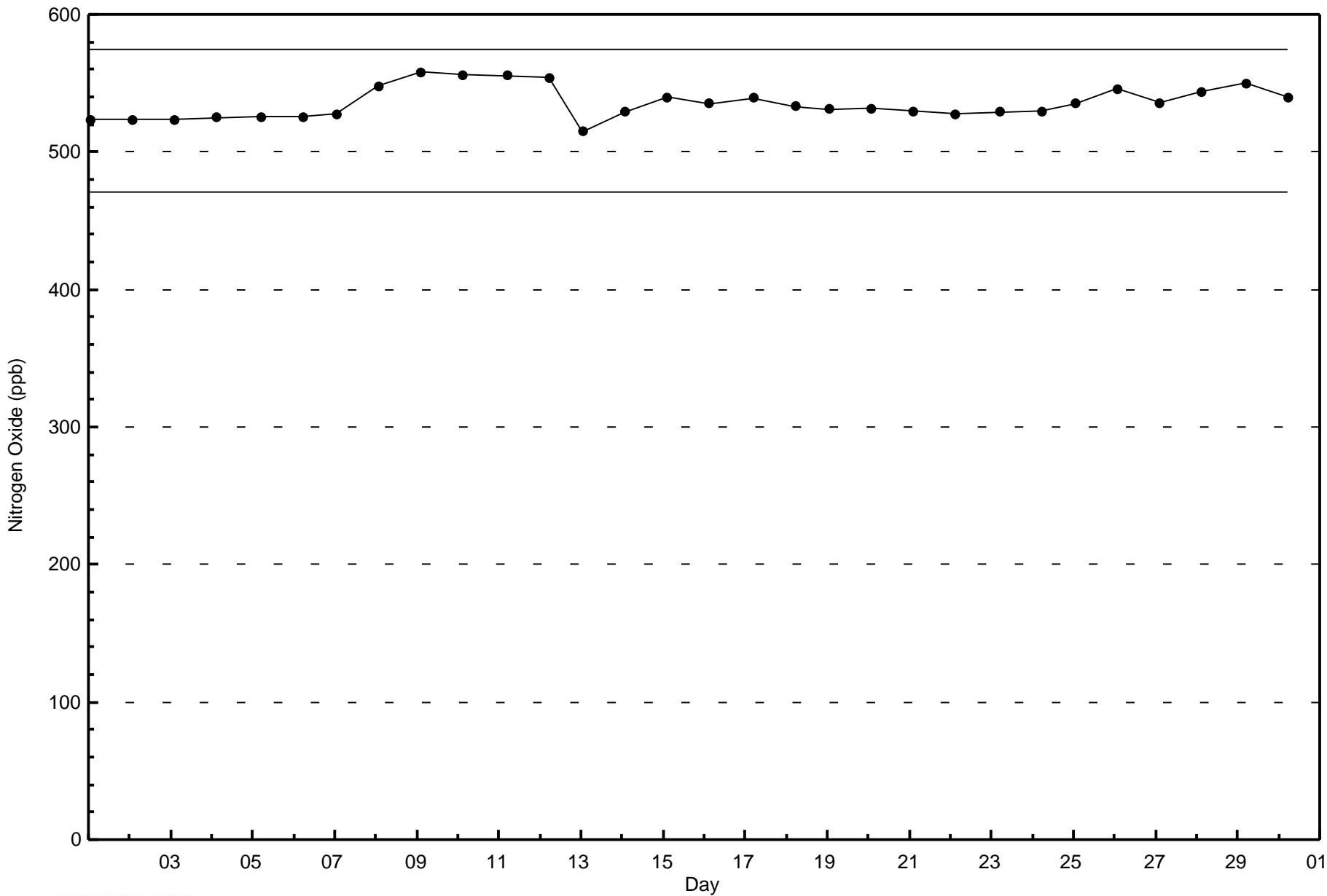
Nitrogen Oxide (NO) - ppb
ConocoPhillips - Surmont - November 2014





WBEA NETWORK
Span Responses

Nitrogen Oxide (NO) - ppb
ConocoPhillips - Surmont - November 2014





Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 27 ppb on Nov 26 15:00	Maximum Daily Average: 14.0 ppb on Nov 26
Minimum Value: 1 ppb on Nov 29 07:00	Hours of Data: 684
Maximum Diurnal Average: 10.0 ppb at hour 17	Hours of Missing Data: 36
Monthly Average: 6.7 ppb	Hours of Calibration: 34
Minimum Daily Average: 3.2 ppb on Nov 22	Percent Operational Time: 99.7
Minimum Diurnal Average: 4.5 ppb at hour 2	
Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 4 Median = 6 Q ₃ = 9 P ₉₀ = 12 P ₉₉ = 22	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	Z	3	3	2	2	2	1	4	2	1	1	2	3	1	2	1	6	15	5	4	4	6	6	9	3.7	15
2-Nov	8	Z	10	9	11	10	11	18	19	18	17	6	10	13	15	16	21	16	11	12	16	13	10	4	12.7	21
3-Nov	4	6	Z	12	7	13	22	12	12	10	4	5	5	5	4	5	6	10	15	16	16	15	13	12	9.9	22
4-Nov	13	13	10	Z	8	5	5	4	6	6	5	5	5	4	3	4	5	3	2	3	6	8	8	4	5.8	13
5-Nov	3	2	2	2	Z	2	3	4	5	3	4	4	3	5	4	3	3	3	2	2	5	6	6	6	3.5	6
6-Nov	6	6	4	3	3	Z	5	7	7	6	C	C	C	C	4	6	7	3	2	2	2	9	11	9	5.3	11
7-Nov	Z	8	8	6	5	3	4	2	5	7	7	5	6	7	7	5	6	7	6	5	2	4	8	7	5.7	8
8-Nov	8	Z	7	6	4	3	3	5	7	6	7	7	9	9	11	11	9	7	4	3	3	4	7	5	6.3	11
9-Nov	5	5	Z	6	6	6	6	7	8	6	7	6	4	5	4	7	7	9	12	9	6	7	3	3	6.3	12
10-Nov	2	5	4	Z	6	5	7	10	11	9	7	5	7	6	9	9	8	7	5	5	4	2	2	2	5.9	11
11-Nov	2	3	4	4	Z	6	5	7	8	7	8	7	6	7	8	8	9	11	9	6	5	5	5	4	6.2	11
12-Nov	4	4	3	3	5	Z	18	12	13	5	5	4	M	M	4	7	17	19	16	5	8	6	4	13	8.2	19
13-Nov	Z	5	4	4	12	5	7	12	9	8	8	5	4	7	8	11	8	10	15	11	7	9	8	8	8.1	15
14-Nov	6	Z	9	6	7	6	8	8	9	8	9	8	7	7	6	8	12	11	11	8	5	4	2	2	7.2	12
15-Nov	3	2	Z	2	2	2	3	4	3	3	2	2	2	3	5	10	10	7	5	3	2	4	4	5	3.8	10
16-Nov	4	4	3	Z	3	4	3	4	6	7	6	7	9	7	9	7	6	7	3	3	3	3	3	4	4.9	9
17-Nov	4	3	11	14	Z	7	8	10	9	8	11	9	3	9	10	10	13	8	6	5	10	8	6	5	8.1	14
18-Nov	7	6	7	4	4	Z	5	6	10	9	12	12	11	11	11	10	11	9	8	7	7	5	4	3	7.8	12
19-Nov	Z	5	4	3	2	3	4	4	4	2	2	2	2	3	4	8	20	19	9	6	5	13	11	8	6.3	20
20-Nov	14	Z	18	8	13	13	20	20	18	8	9	12	7	5	5	6	8	9	5	5	5	6	6	8	9.9	20
21-Nov	7	6	Z	14	12	5	4	3	3	3	4	4	4	5	6	7	8	10	4	1	2	5	1	2	5.2	14
22-Nov	2	2	2	Z	1	2	3	6	5	2	2	2	3	4	3	5	7	6	2	4	3	2	3	2	3.2	7
23-Nov	3	1	3	2	Z	6	11	21	19	9	4	5	3	3	4	13	22	16	7	5	10	13	11	9	8.6	22
24-Nov	5	3	4	10	13	Z	9	10	11	12	10	9	8	8	8	6	10	5	2	3	2	2	2	2	6.6	13
25-Nov	Z	1	2	2	1	10	9	6	5	4	5	3	2	3	7	12	16	13	13	13	9	18	26	23	8.9	26
26-Nov	26	Z	19	12	16	13	4	4	11	10	16	8	7	21	27	25	26	9	10	9	6	7	15	24	14.0	27
27-Nov	10	4	Z	3	3	4	5	5	6	5	6	4	3	5	5	4	7	6	7	8	9	5	3	4	5.2	10
28-Nov	3	2	2	Z	2	3	4	5	5	5	5	6	4	5	5	6	4	11	9	7	7	7	7	7	5.3	11
29-Nov	9	10	7	9	Z	1	1	1	1	1	1	2	1	2	2	4	3	3	3	6	8	8	8	7	4.2	10
30-Nov	7	3	2	3	2	Z	3	4	4	3	3	2	3	2	4	5	5	3	3	2	2	3	5	6	3.3	7

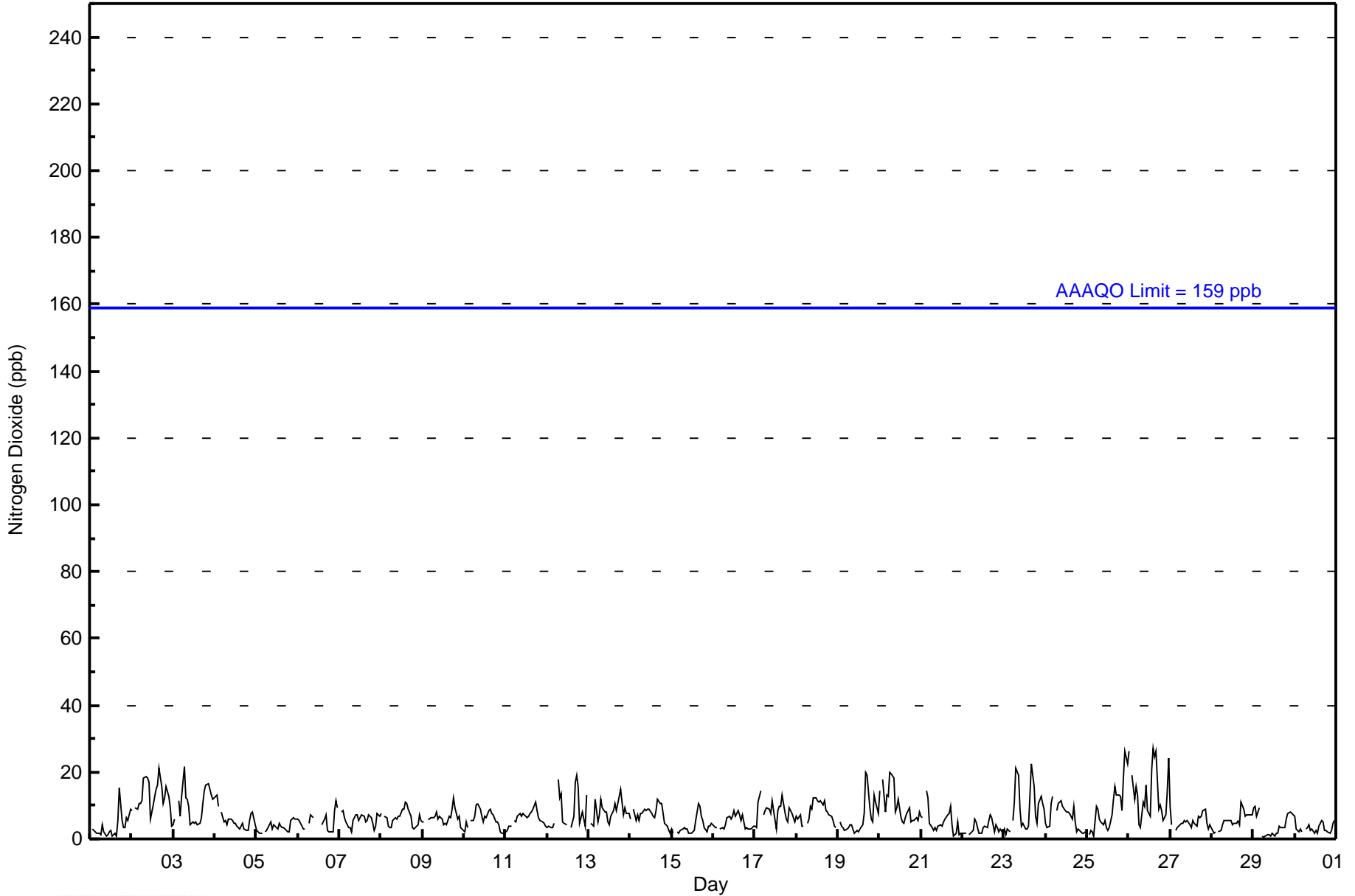
6.5	4.5	6.0	6.0	6.0	5.5	6.6	7.5	8.0	6.3	6.4	5.5	5.1	6.0	6.7	7.9	10.0	9.1	7.0	5.9	5.9	6.9	6.8	6.9		Diurnal Average
26	13	19	14	16	13	22	21	19	18	17	12	11	21	27	25	26	19	16	16	16	18	26	24		Diurnal Maximum

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



WBEA NETWORK
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
ConocoPhillips - Surmont - November 2014





WBEA NETWORK
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
ConocoPhillips - Surmont - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	672	98.25	98.25
21 - 40	12	1.75	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



WBEA NETWORK
Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
ConocoPhillips - Surmont - November 2014

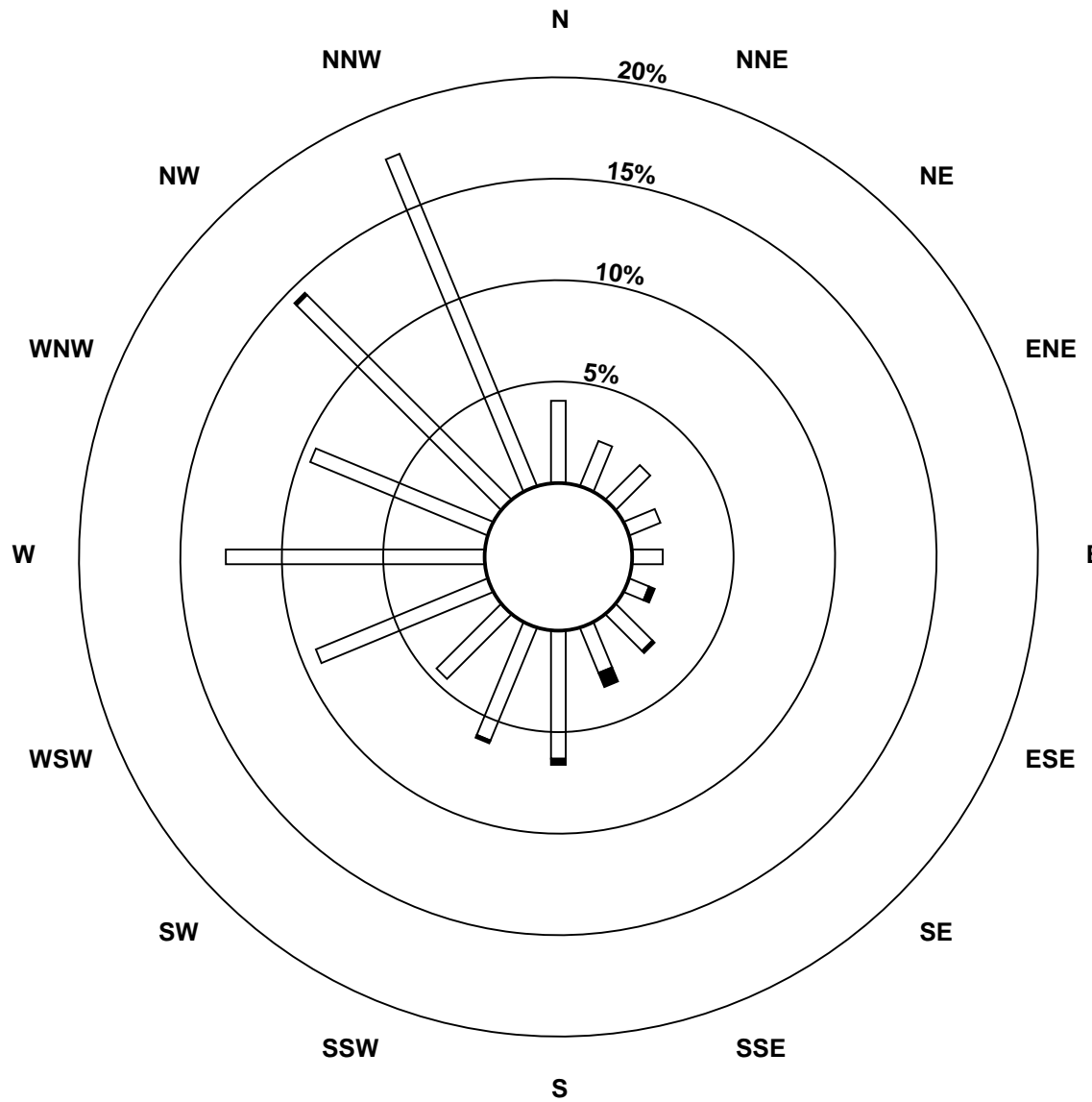
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	27	16	16	11	10	7	17	16	42	40	30	61	85	63	95	118	654
21 - 40	0	0	0	0	0	2	1	5	2	1	0	0	0	0	1	0	12
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	27	16	16	11	10	9	18	21	44	41	30	61	85	63	96	118	666

Total Number of Valid Hours: 666

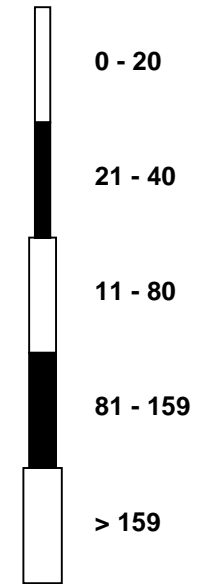
Total Number of Hours: 720

Wood Buffalo Environmental Association
Wind Rose Nov 2014

Nitrogen Dioxide (NO₂) - ppb
ConocoPhillips - Surmont (AMS502)



Classes (ppb)

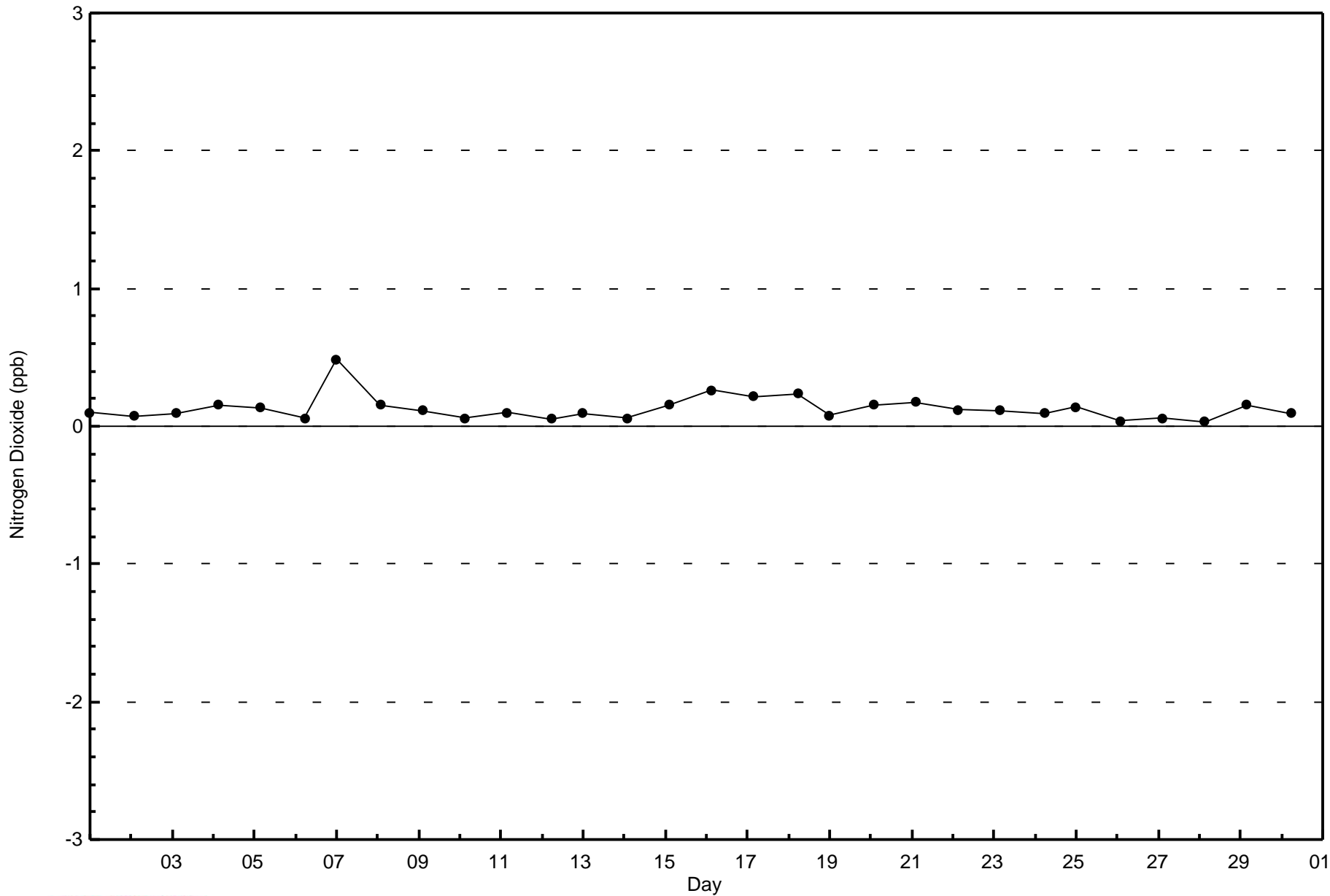


Total Number of Valid Hours: 666



WBEA NETWORK
Zero Responses

Nitrogen Dioxide (NO₂) - ppb
ConocoPhillips - Surrmont - November 2014



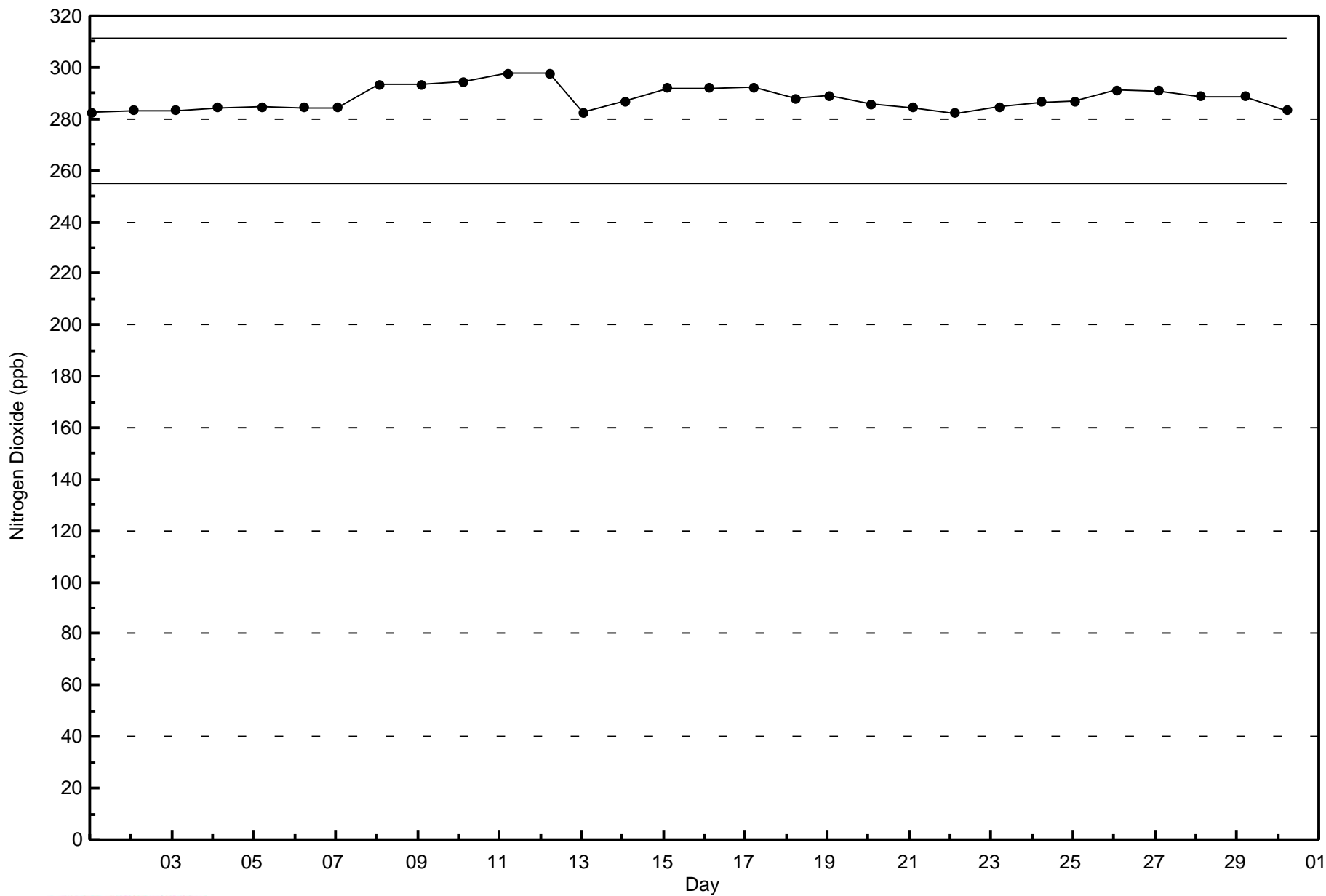


WBEA NETWORK

Span Responses

Nitrogen Dioxide (NO₂) - ppb

ConocoPhillips - Surmont - November 2014



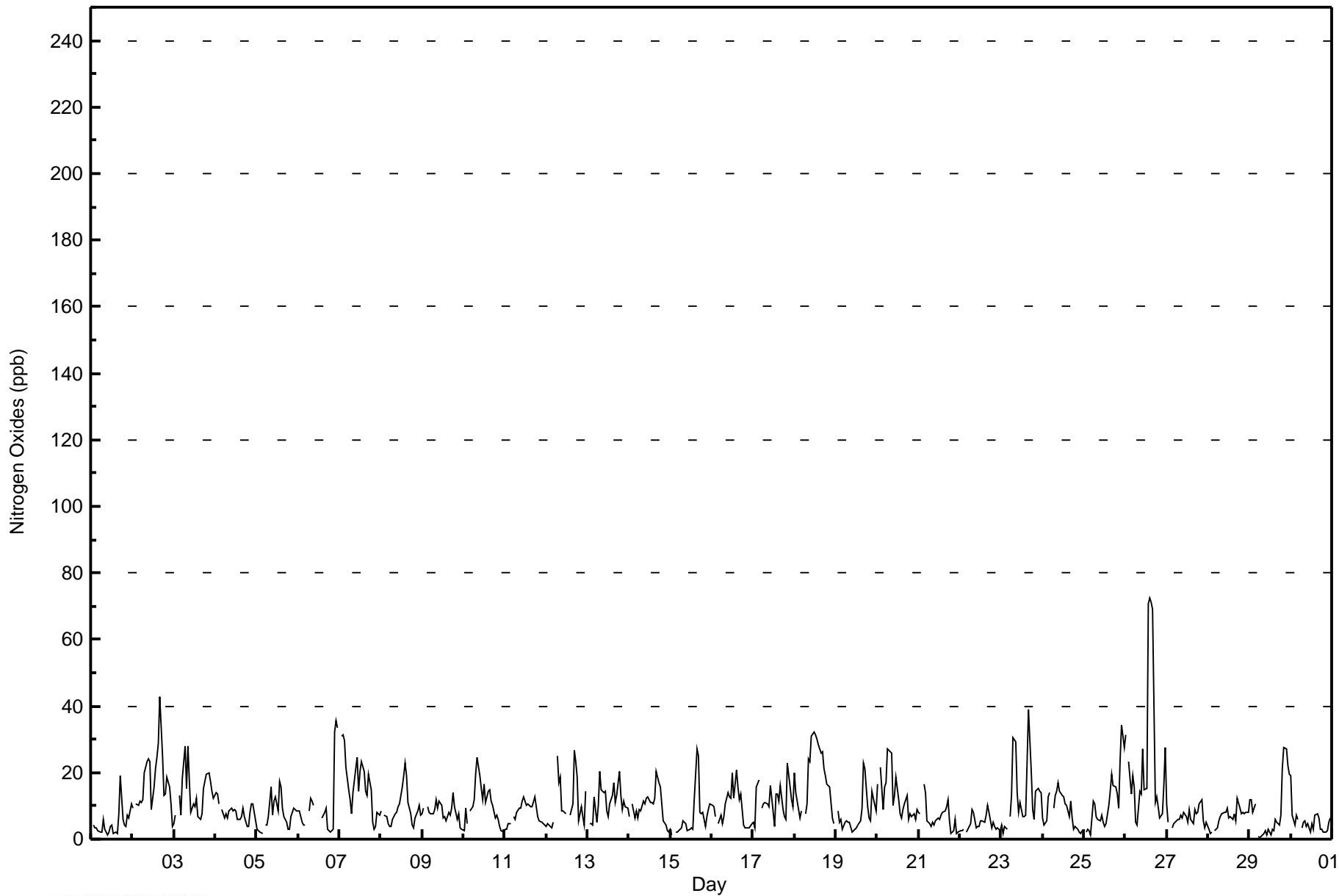


Maximum Value: 73 ppb on Nov 26 15:00																			Maximum Daily Average: 24.9 ppb on Nov 26						Hours in Service: 720							
Minimum Value: 1 ppb on Nov 29 07:00																			Minimum Daily Average: 4.7 ppb on Nov 1						Hours of Data: 684							
Maximum Diurnal Average: 16.4 ppb at hour 17																			Minimum Diurnal Average: 7.1 ppb at hour 2						Hours of Missing Data: 36							
Monthly Average: 10.3 ppb																			Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 5 Median = 8 Q ₃ = 13 P ₉₀ = 20 P ₉₉ = 35						Hours of Calibration: 34							
																									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-Nov	Z	4	4	3	3	2	2	6	3	1	2	4	4	2	2	2	8	19	6	4	4	7	6	10	4.7	19						
2-Nov	9	Z	11	10	11	11	12	20	23	24	23	9	16	21	24	29	43	25	13	14	19	15	11	4	17.3	43						
3-Nov	5	7	Z	13	7	18	28	15	28	17	8	11	10	12	7	6	8	15	18	19	20	17	14	12	13.7	28						
4-Nov	14	14	10	Z	9	6	8	6	9	9	8	9	8	6	6	7	9	7	4	4	8	11	11	5	8.2	14						
5-Nov	3	2	2	2	Z	4	4	7	16	7	11	13	9	18	16	9	7	5	3	3	7	9	9	9	7.6	18						
6-Nov	9	9	5	4	4	Z	8	12	11	10	C	C	C	C	6	8	9	3	2	2	3	32	36	33	11.0	36						
7-Nov	Z	31	31	30	22	15	12	8	14	21	25	14	20	23	20	14	13	19	15	5	3	4	8	7	16.3	31						
8-Nov	9	Z	7	7	5	4	4	6	8	8	10	10	16	19	23	19	11	8	4	4	6	9	10	7	9.2	23						
9-Nov	7	9	Z	10	8	8	8	9	12	9	11	10	6	7	5	8	7	9	14	10	6	8	3	3	8.1	14						
10-Nov	3	9	4	Z	8	10	12	19	25	19	15	12	17	11	14	15	12	10	6	7	6	4	2	2	10.5	25						
11-Nov	3	3	5	4	Z	7	6	8	9	9	11	13	10	10	10	10	10	13	10	7	6	5	5	4	7.7	13						
12-Nov	4	4	4	3	5	Z	25	17	19	8	9	7	M	M	7	10	27	23	19	5	10	7	4	14	11.1	27						
13-Nov	Z	5	5	4	13	5	10	20	15	14	14	8	7	10	13	17	11	13	20	13	9	12	10	9	11.2	20						
14-Nov	7	Z	11	6	9	6	9	9	11	11	12	13	11	11	11	12	20	17	15	11	6	4	2	2	9.8	20						
15-Nov	3	1	Z	2	2	2	3	6	5	5	3	3	4	3	12	27	25	8	8	8	4	7	9	11	7.0	27						
16-Nov	10	10	7	Z	5	7	5	7	11	14	13	12	20	12	21	16	12	14	4	4	3	3	3	4	9.4	21						
17-Nov	5	4	16	18	Z	9	11	11	10	10	16	12	4	14	13	11	16	9	7	6	23	16	12	10	11.4	23						
18-Nov	20	14	9	6	8	Z	8	11	24	23	31	32	31	30	28	26	26	21	19	17	16	11	6	5	18.4	32						
19-Nov	Z	8	5	6	3	5	5	5	5	2	3	3	3	4	6	9	23	21	10	6	5	14	12	8	7.5	23						
20-Nov	17	Z	22	9	16	17	27	27	26	10	13	18	12	8	6	9	11	13	6	8	7	7	6	9	13.2	27						
21-Nov	8	8	Z	16	14	6	5	4	5	4	6	6	6	7	8	9	10	12	5	2	2	6	2	2	6.6	16						
22-Nov	3	2	3	Z	2	4	5	9	8	4	4	4	5	6	5	7	10	8	3	5	4	3	4	2	4.7	10						
23-Nov	4	2	4	3	Z	7	13	30	29	14	8	11	7	7	7	22	39	20	9	6	14	15	14	14	13.0	39						
24-Nov	6	4	5	13	14	Z	9	13	15	17	14	13	13	11	10	7	11	6	3	4	3	2	2	2	8.6	17						
25-Nov	Z	2	3	2	1	11	11	7	6	6	7	5	4	5	10	14	19	16	16	14	9	24	34	27	11.1	34						
26-Nov	31	Z	23	14	19	15	5	4	15	14	27	15	15	71	73	71	69	11	13	10	6	8	16	28	24.9	73						
27-Nov	11	5	Z	4	5	5	6	6	7	6	8	7	5	9	6	5	9	8	8	11	12	6	4	5	6.8	12						
28-Nov	3	2	2	Z	3	3	5	7	8	8	8	9	6	7	6	8	5	12	9	8	8	8	8	8	6.6	12						
29-Nov	12	12	8	11	Z	1	1	1	2	2	1	3	1	3	2	6	5	4	7	21	28	27	22	20	8.7	28						
30-Nov	19	7	4	7	6	Z	3	5	6	4	4	2	5	3	7	8	6	3	3	2	2	3	5	6	5.2	19						
																			9.0 7.1 8.4 8.3 8.0 7.6 8.9 10.5 12.8 10.4 11.3 10.0 9.8 12.5 12.9 14.0 16.4 12.5 9.3 7.9 8.6 10.1 9.7 9.5						Diurnal Average							
																			31 31 31 30 22 18 28 30 29 24 31 32 31 71 73 71 69 25 20 21 28 32 36 33						Diurnal Maximum							
Z - zerspan																			C - Calibration						M - Maintenance							



WBEA NETWORK
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
ConocoPhillips - Surmont - November 2014





WBEA NETWORK
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
ConocoPhillips - Surmont - November 2014

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	620	90.64	90.64
21 - 40	59	8.63	99.27
41 - 80	5	0.73	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



WBEA NETWORK
Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
ConocoPhillips - Surmont - November 2014

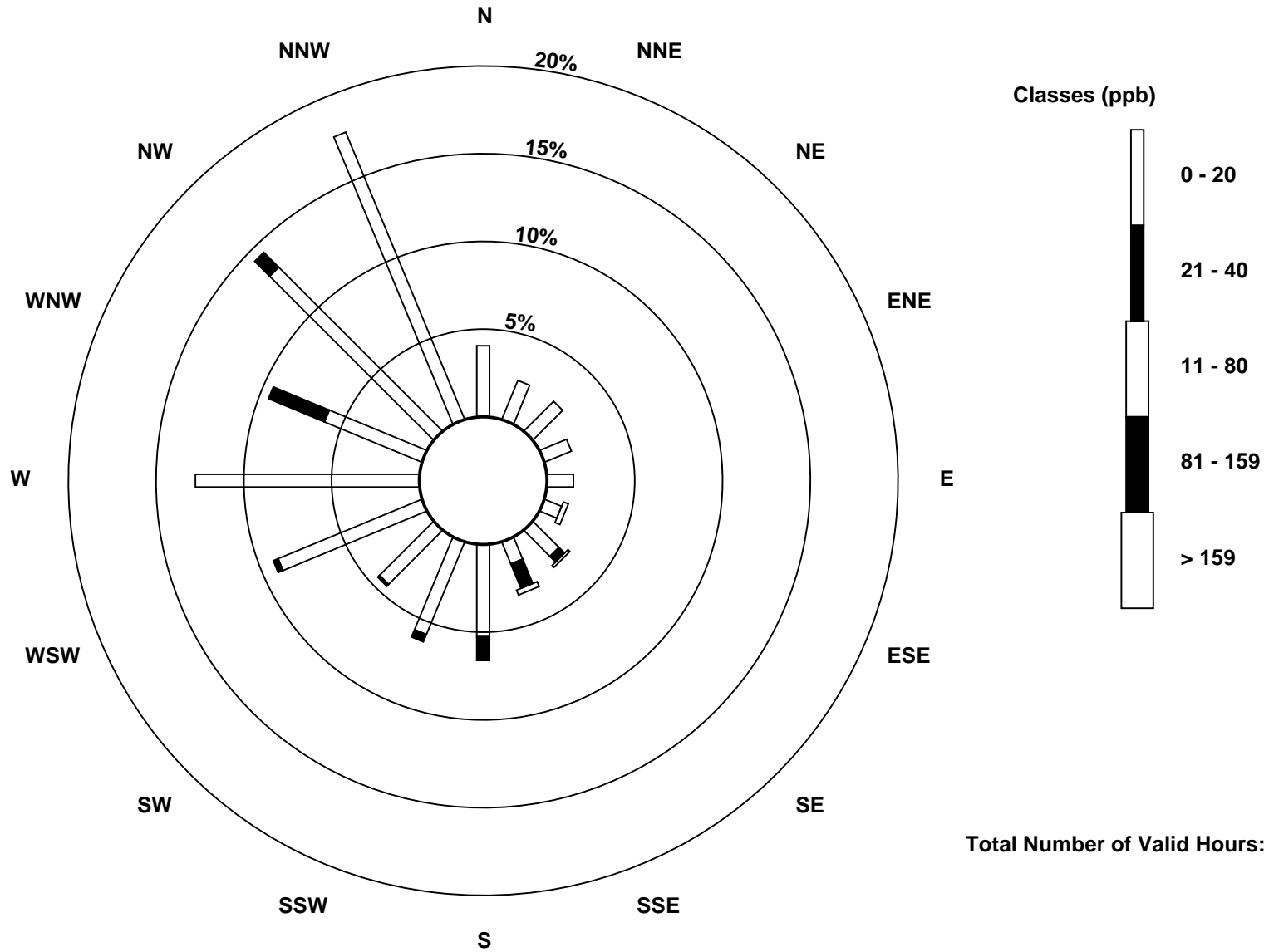
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	27	16	16	11	10	7	14	9	35	38	29	59	85	40	88	118	602
21 - 40	0	0	0	0	0	0	3	10	9	3	1	2	0	23	8	0	59
11 - 80	0	0	0	0	0	2	1	2	0	0	0	0	0	0	0	0	5
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	27	16	16	11	10	9	18	21	44	41	30	61	85	63	96	118	666

Total Number of Valid Hours: 666

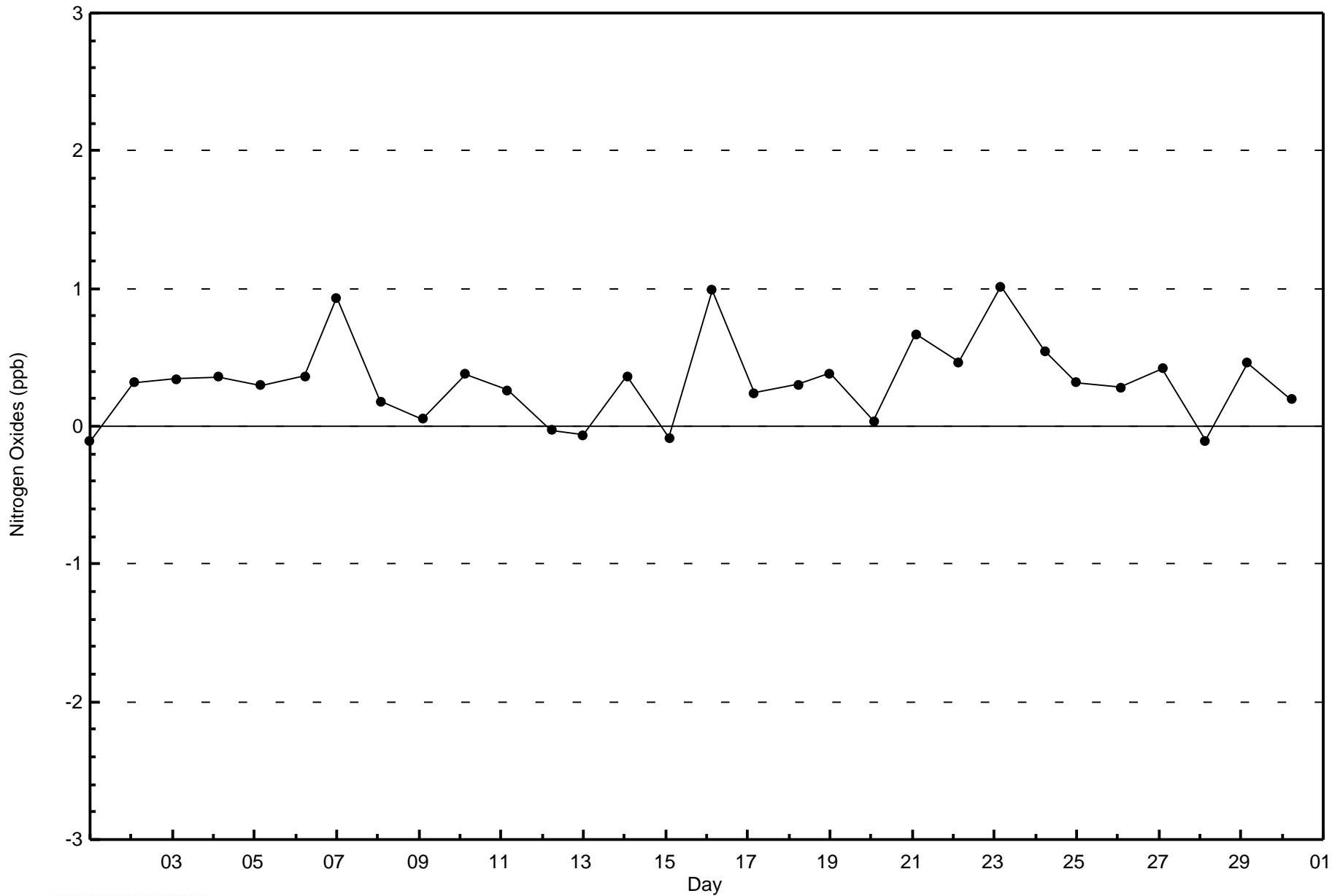
Total Number of Hours: 720

Wood Buffalo Environmental Association
 Wind Rose Nov 2014

Nitrogen Oxides (NO_x) - ppb
 ConocoPhillips - Surmont (AMS502)



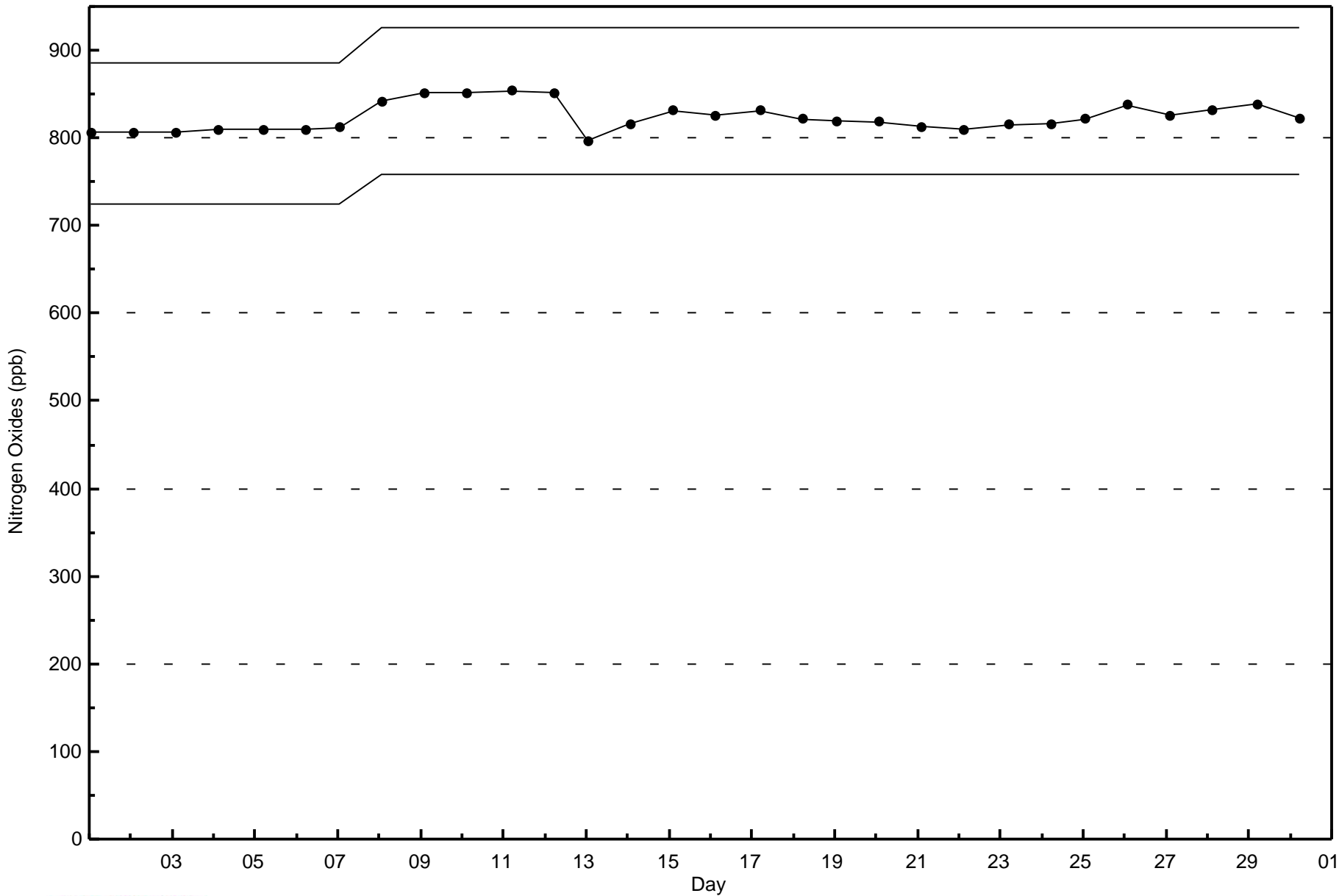
Total Number of Valid Hours: 666





WBEA NETWORK
Span Responses

Nitrogen Oxides (NO_x) - ppb
ConocoPhillips - Surmont - November 2014



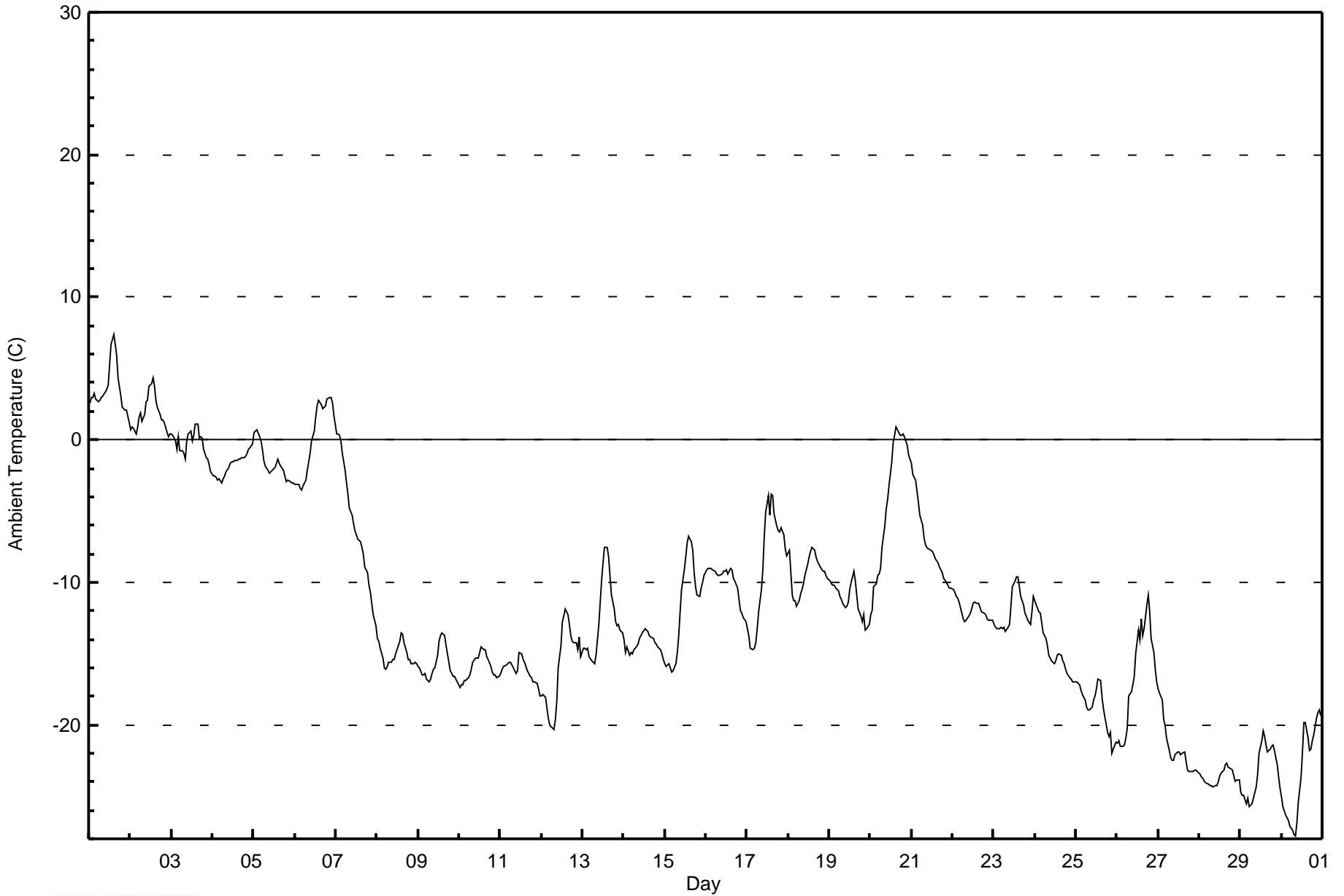


Maximum Value: 7.4 C on Nov 1 15:00		Maximum Daily Average: 3.6 C on Nov 1		Hours in Service: 720																																												
Minimum Value: -27.8 C on Nov 30 09:00		Minimum Daily Average: -23.7 C on Nov 28		Hours of Data: 720																																												
Maximum Diurnal Average: -9.4 C at hour 15		Minimum Diurnal Average: -12.5 C at hour 7		Hours of Missing Data: 0																																												
Monthly Average: -11.29 C		Percentiles: P ₁ = -26.5 P ₁₀ = -21.8 Q ₁ = -16.2 Median = -12.4 Q ₃ = -5.3 P ₉₀ = 0.4 P ₉₉ = 4.3		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-Nov	2.6	2.9	2.9	3.2	2.9	2.7	2.8	3.0	3.1	3.3	3.5	3.9	5.3	6.7	7.4	6.7	5.9	4.3	3.0	2.2	2.2	2.1	2.1	1.2	3.6	7.4																						
2-Nov	0.7	0.9	0.8	0.4	0.9	1.6	1.8	1.3	1.8	2.7	2.8	3.7	4.0	4.3	3.8	2.8	2.3	1.8	1.4	1.4	1.2	0.5	0.2	0.4	1.8	4.3																						
3-Nov	0.4	0.3	-0.1	-0.6	0.2	-0.8	-0.7	-1.0	-1.3	-0.1	0.4	0.6	0.0	0.3	1.1	1.1	0.1	0.2	0.1	-0.7	-1.3	-1.4	-1.8	-2.3	-0.3	1.1																						
4-Nov	-2.5	-2.5	-2.7	-2.9	-2.7	-3.0	-2.8	-2.6	-2.3	-2.0	-1.7	-1.6	-1.5	-1.5	-1.4	-1.4	-1.4	-1.3	-1.3	-1.2	-1.0	-0.7	-0.6	-0.3	-1.8	-0.3																						
5-Nov	0.5	0.6	0.7	0.2	-0.1	-0.6	-1.5	-1.8	-2.1	-2.3	-2.3	-2.1	-2.0	-1.7	-1.4	-1.6	-1.9	-2.1	-2.5	-2.9	-2.8	-2.9	-3.0	-3.0	-1.6	0.7																						
6-Nov	-3.1	-3.1	-3.2	-3.4	-3.5	-3.2	-2.8	-2.1	-1.5	-1.0	-0.1	0.6	1.6	2.4	2.7	2.5	2.2	2.3	2.4	2.8	3.0	2.9	2.6	1.7	0.1	3.0																						
7-Nov	0.4	0.4	0.3	-0.1	-1.0	-2.1	-3.0	-3.8	-4.8	-5.3	-5.9	-6.4	-6.7	-7.0	-7.2	-7.6	-8.0	-8.9	-9.3	-10.2	-10.7	-11.4	-12.3	-13.1	-6.0	0.4																						
8-Nov	-14.0	-14.2	-14.7	-15.3	-16.0	-16.2	-15.9	-15.6	-15.6	-15.5	-15.4	-15.0	-14.4	-14.2	-13.6	-13.7	-14.3	-14.9	-15.4	-15.4	-15.7	-15.7	-15.6	-15.7	-15.1	-13.6																						
9-Nov	-15.9	-16.0	-16.5	-16.5	-16.4	-16.8	-17.0	-16.8	-16.4	-16.1	-16.0	-15.1	-14.1	-13.8	-13.6	-13.7	-14.4	-15.0	-15.6	-16.2	-16.6	-16.6	-16.8	-17.0	-15.8	-13.6																						
10-Nov	-17.3	-17.2	-17.2	-16.9	-16.8	-16.7	-16.5	-16.1	-15.6	-15.3	-15.3	-15.3	-14.9	-14.5	-14.7	-14.8	-15.2	-15.5	-15.9	-16.3	-16.5	-16.5	-16.7	-16.6	-16.0	-14.5																						
11-Nov	-16.4	-16.1	-15.9	-15.8	-15.7	-15.6	-15.6	-15.8	-16.2	-16.4	-16.2	-14.9	-15.0	-15.4	-15.7	-15.9	-16.2	-16.6	-16.7	-16.9	-17.0	-17.1	-17.5	-18.0	-16.2	-14.9																						
12-Nov	-18.0	-17.9	-18.1	-18.9	-19.6	-20.1	-20.2	-20.4	-19.6	-18.3	-16.0	-14.4	-12.8	-12.4	-11.9	-12.3	-13.0	-13.7	-14.2	-14.2	-14.2	-14.7	-13.8	-15.2	-16.0	-11.9																						
13-Nov	-14.6	-14.7	-14.8	-14.7	-15.2	-15.6	-15.6	-15.7	-15.1	-13.0	-11.4	-9.8	-8.6	-7.6	-7.6	-8.2	-9.6	-10.9	-11.9	-12.8	-13.0	-13.0	-13.3	-13.5	-12.5	-7.6																						
14-Nov	-14.0	-14.9	-14.6	-15.1	-15.0	-15.0	-14.7	-14.6	-14.3	-14.0	-13.7	-13.5	-13.2	-13.4	-13.5	-13.7	-13.8	-13.9	-14.2	-14.3	-14.5	-14.7	-15.0	-15.4	-14.3	-13.2																						
15-Nov	-15.7	-15.9	-15.7	-16.0	-16.3	-16.2	-15.7	-15.0	-13.7	-12.1	-10.5	-9.1	-8.3	-7.3	-6.8	-7.1	-7.8	-9.3	-10.3	-10.9	-11.0	-10.4	-10.1	-9.6	-11.7	-6.8																						
16-Nov	-9.1	-9.0	-9.0	-9.0	-9.2	-9.3	-9.5	-9.5	-9.5	-9.5	-9.3	-9.2	-9.2	-9.4	-9.0	-9.2	-9.7	-9.9	-10.4	-11.2	-11.9	-12.1	-12.4	-12.7	-9.9	-9.0																						
17-Nov	-13.3	-13.7	-14.6	-14.7	-14.6	-14.2	-13.3	-12.1	-10.5	-9.1	-6.9	-5.1	-3.9	-5.3	-3.8	-4.0	-5.2	-6.1	-6.4	-6.5	-6.2	-6.6	-7.6	-8.2	-8.8	-3.8																						
18-Nov	-7.9	-7.7	-10.9	-11.3	-11.3	-11.7	-11.3	-10.8	-10.5	-10.1	-9.6	-8.7	-8.3	-7.9	-7.6	-7.7	-8.2	-8.6	-8.7	-8.9	-9.2	-9.2	-9.5	-9.8	-9.4	-7.6																						
19-Nov	-9.9	-10.1	-10.2	-10.2	-10.4	-10.6	-11.0	-11.2	-11.5	-11.8	-11.6	-11.4	-10.5	-10.0	-9.3	-9.9	-10.9	-11.9	-12.4	-12.7	-12.3	-13.4	-13.2	-13.0	-11.2	-9.3																						
20-Nov	-12.2	-12.0	-10.3	-10.1	-9.6	-9.4	-9.0	-7.6	-6.1	-4.9	-4.2	-3.2	-1.6	-0.2	0.3	0.9	0.7	0.3	0.3	0.4	0.2	-0.4	-1.1	-1.3	-4.2	0.9																						
21-Nov	-1.7	-2.4	-2.8	-3.6	-4.4	-5.3	-6.0	-6.8	-7.3	-7.5	-7.7	-7.8	-7.9	-8.0	-8.3	-8.6	-8.9	-9.1	-9.3	-9.7	-10.0	-10.2	-10.4	-10.4	-7.3	-1.7																						
22-Nov	-10.5	-10.7	-11.0	-11.1	-11.4	-12.2	-12.6	-12.8	-12.7	-12.4	-12.2	-11.9	-11.5	-11.3	-11.5	-11.5	-11.8	-12.1	-12.1	-12.2	-12.6	-12.6	-12.7	-12.7	-11.9	-10.5																						
23-Nov	-12.9	-13.1	-13.2	-13.3	-13.2	-13.3	-13.2	-13.4	-13.2	-13.0	-11.7	-10.3	-9.9	-9.6	-9.6	-10.3	-11.0	-11.6	-12.1	-12.4	-12.6	-12.9	-12.1	-11.0	-12.0	-9.6																						
24-Nov	-11.3	-11.6	-12.1	-12.2	-12.9	-13.5	-13.9	-14.4	-15.1	-15.3	-15.5	-15.7	-15.5	-15.1	-15.0	-15.1	-15.5	-15.8	-16.1	-16.4	-16.7	-16.8	-17.0	-17.0	-14.8	-11.3																						
25-Nov	-17.0	-17.1	-17.2	-17.6	-17.9	-18.3	-18.8	-18.9	-19.0	-18.8	-18.3	-18.0	-17.5	-16.8	-16.9	-18.0	-18.8	-19.4	-20.5	-20.8	-20.5	-22.0	-21.7	-21.2	-18.8	-16.8																						
26-Nov	-21.3	-21.1	-21.5	-21.5	-21.4	-20.9	-20.2	-18.0	-17.7	-17.2	-16.6	-15.1	-13.4	-14.0	-12.6	-13.7	-13.2	-11.6	-10.9	-12.1	-13.9	-14.9	-16.1	-17.0	-16.5	-10.9																						
27-Nov	-17.5	-17.8	-18.3	-19.6	-20.0	-20.9	-21.8	-22.3	-22.5	-22.5	-22.1	-21.9	-21.9	-22.1	-22.0	-22.0	-22.6	-23.2	-23.3	-23.3	-23.3	-23.2	-23.2	-23.2	-21.7	-17.5																						
28-Nov	-23.5	-23.7	-23.8	-24.0	-24.1	-24.2	-24.2	-24.2	-24.3	-24.3	-24.3	-24.0	-23.6	-23.3	-23.2	-22.8	-22.7	-23.0	-23.1	-23.2	-23.6	-23.9	-23.9	-23.9	-23.7	-22.7																						
29-Nov	-24.7	-24.9	-24.9	-25.5	-25.1	-25.8	-25.6	-25.5	-24.7	-24.4	-23.5	-22.0	-21.1	-20.5	-20.8	-21.4	-21.9	-21.7	-21.6	-21.4	-21.8	-22.7	-23.7	-24.5	-23.3	-20.5																						
30-Nov	-25.0	-25.7	-26.3	-26.6	-26.8	-27.1	-27.4	-27.7	-27.8	-26.9	-25.4	-23.7	-21.9	-19.9	-19.8	-20.9	-21.8	-21.8	-21.1	-20.7	-19.6	-19.1	-19.0	-19.3	-23.4	-19.0																						
																								-11.5	-11.6	-11.8	-12.1	-12.2	-12.5	-12.5	-12.4	-12.2	-11.8	-11.2	-10.5	-9.9	-9.6	-9.4	-9.7	-10.2	-10.6	-10.9	-11.2	-11.4	-11.7	-11.8	-12.1	Diurnal Average
																								2.6	2.9	2.9	3.2	2.9	2.7	2.8	3.0	3.1	3.3	3.5	3.9	5.3	6.7	7.4	6.7	5.9	4.3	3.0	2.8	3.0	2.9	2.6	1.7	Diurnal Maximum



WBEA NETWORK
Hourly Averages

Ambient Temperature (AT) - C
ConocoPhillips - Surmont - November 2014





WBEA NETWORK
Cumulative Frequency Distribution

Ambient Temperature (AT) - C
ConocoPhillips - Surmont - November 2014

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	101	14.03	14.03
-20 - 0	533	74.03	88.06
0 - 10	86	11.94	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

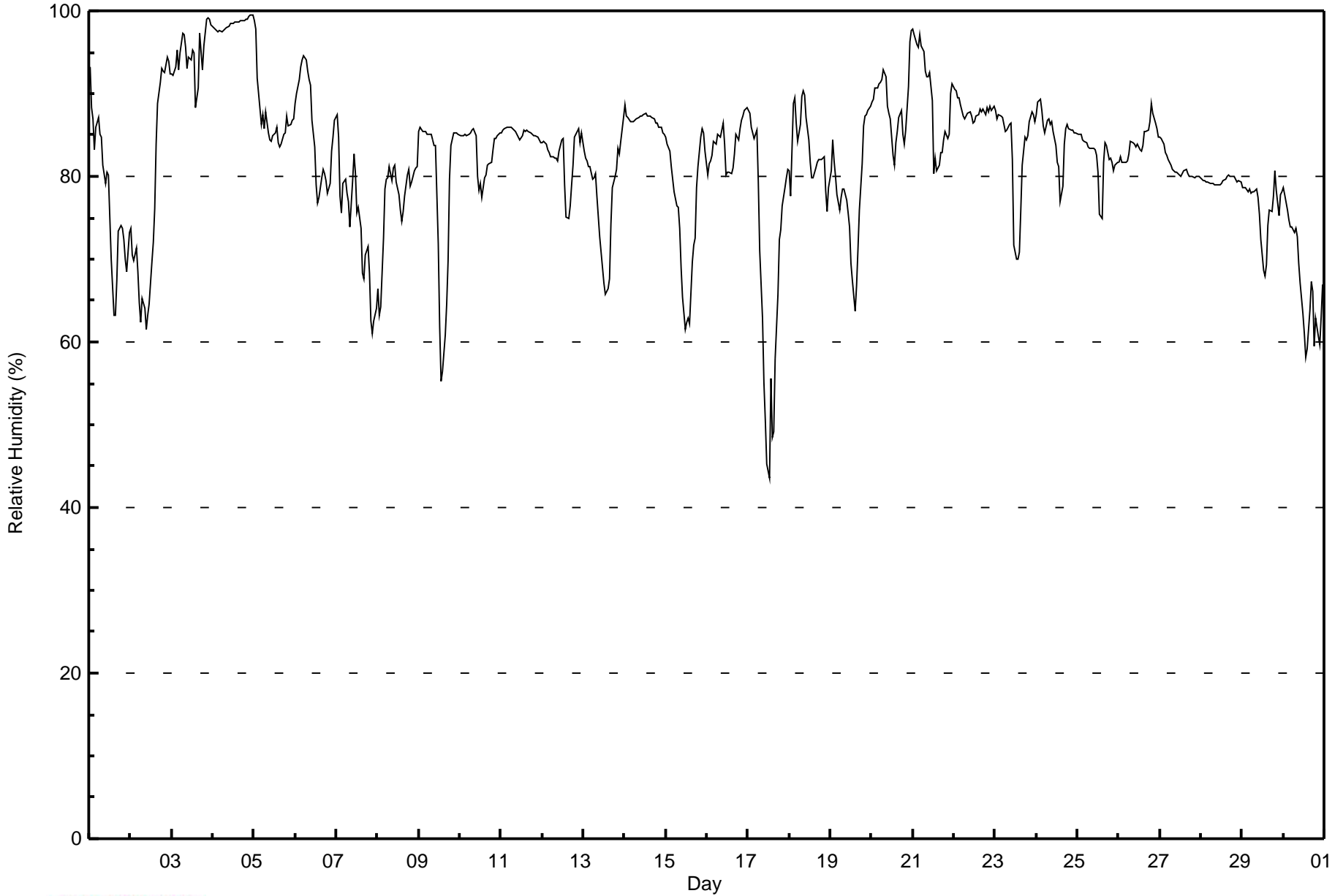


Maximum Value: 100 % on Nov 5 00:00																	Maximum Daily Average: 98.4 % on Nov 4																	Hours in Service: 720	
Minimum Value: 43 % on Nov 17 13:00																	Minimum Daily Average: 67.6 % on Nov 30																	Hours of Data: 720	
Maximum Diurnal Average: 85.5 % at hour 1																	Minimum Diurnal Average: 75.6 % at hour 15																	Hours of Missing Data: 0	
Monthly Average: 82.0 %																	Percentiles: P ₁ = 55 P ₁₀ = 70 Q ₁ = 79 Median = 84 O ₃ = 87 P ₉₀ = 92 P ₉₉ = 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-Nov	93	88	87	83	86	87	85	85	81	79	81	80	75	70	63	63	67	73	74	74	72	70	69	73	77.5	93									
2-Nov	74	71	70	71	69	65	62	65	64	62	63	65	70	72	76	84	89	91	93	93	93	94	94	92	76.7	94									
3-Nov	92	92	93	95	93	95	97	97	96	93	94	94	95	95	88	91	97	95	93	96	99	99	99	98	94.9	99									
4-Nov	98	98	98	98	98	97	98	98	98	98	98	98	99	99	99	99	99	99	99	99	99	99	100	98.4	100										
5-Nov	99	98	92	88	86	87	86	88	85	84	84	85	85	86	84	84	84	85	85	87	86	86	87	87	87.0	99									
6-Nov	89	90	92	93	94	95	94	93	92	91	87	84	79	77	78	80	81	80	79	78	79	83	85	87	85.7	95									
7-Nov	87	85	78	76	79	80	78	77	74	79	83	80	76	76	74	68	68	71	71	68	63	61	63	64	74.1	87									
8-Nov	66	63	64	73	78	80	80	81	80	81	81	79	78	76	75	76	78	80	81	79	79	81	81	81	77.1	81									
9-Nov	85	86	85	85	85	85	85	85	84	84	84	72	62	55	56	61	65	70	80	84	85	85	85	85	78.3	86									
10-Nov	85	85	85	85	85	85	85	86	86	85	80	78	79	77	80	80	81	81	82	83	85	85	85	85	83.1	86									
11-Nov	85	86	86	86	86	86	86	86	86	85	85	84	85	86	85	86	86	85	85	85	85	85	84	84	85.3	86									
12-Nov	84	84	84	83	83	82	82	82	82	82	83	84	85	79	75	75	76	79	81	85	85	86	84	85	82.2	86									
13-Nov	83	82	82	81	81	80	80	80	78	73	71	69	67	66	66	68	74	79	80	81	83	83	84	87	77.4	87									
14-Nov	89	87	87	87	87	87	87	87	87	87	87	87	88	87	87	87	87	87	87	86	86	86	85	85	86.8	89									
15-Nov	85	84	83	81	80	78	76	76	74	69	65	61	62	63	62	70	72	73	79	81	85	86	85	83	75.5	86									
16-Nov	80	81	82	83	84	84	85	85	85	87	84	80	80	80	80	81	83	85	84	86	87	87	88	88	83.8	88									
17-Nov	88	88	86	85	85	86	79	71	63	55	51	45	43	56	48	49	58	66	72	74	76	79	80	81	69.3	88									
18-Nov	81	78	89	89	87	84	86	90	90	90	87	84	82	80	80	81	82	82	82	82	82	78	76	79	83.3	90									
19-Nov	81	84	82	80	78	76	77	78	78	77	76	74	69	67	64	67	71	76	81	86	87	87	88	88	78.1	88									
20-Nov	89	89	91	91	91	91	92	93	92	89	88	87	83	81	84	85	87	88	85	84	86	91	96	98	88.7	98									
21-Nov	98	97	96	96	97	96	95	93	92	92	93	89	80	82	81	81	83	83	84	85	85	85	90	91	89.4	98									
22-Nov	91	90	90	90	89	87	87	87	88	88	87	86	87	87	87	88	88	88	87	88	88	89	88	88	88.1	91									
23-Nov	88	87	87	87	87	86	86	86	86	86	82	72	70	70	71	76	81	85	84	85	87	88	87	87	83.0	88									
24-Nov	87	89	89	88	86	85	87	87	86	87	85	84	82	81	77	79	84	86	86	86	86	86	85	85	85.1	89									
25-Nov	85	85	85	84	84	84	84	83	83	83	83	83	81	75	75	82	84	84	82	82	82	81	81	82	82.4	85									
26-Nov	82	82	82	82	82	82	83	84	84	84	84	84	83	83	84	85	85	86	87	89	88	87	86	85	84.2	89									
27-Nov	85	85	84	83	83	82	81	81	81	81	80	80	80	80	81	81	80	80	80	80	80	80	80	80	81.1	85									
28-Nov	80	80	80	79	79	79	79	79	79	79	79	79	79	79	80	80	80	80	80	80	80	79	79	79	79.5	80									
29-Nov	79	79	79	78	79	78	78	78	78	77	75	72	69	68	69	74	76	76	78	81	78	75	78	78	76.3	81									
30-Nov	79	78	76	75	74	74	73	74	73	69	67	63	61	58	59	64	67	66	59	63	61	60	63	67	67.6	79									
85.5																	85.0																	Diurnal Average	
99																	98																	Diurnal Maximum	



WBEA NETWORK
Hourly Averages

Relative Humidity (RH) - %
ConocoPhillips - Surmont - November 2014





WBEA NETWORK
Cumulative Frequency Distribution

Relative Humidity (RH) - %
ConocoPhillips - Surmont - November 2014

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	14	1.94	1.94
60 - 80	222	30.83	32.78
80 - 100	484	67.22	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Speed: 32 km/h on Nov 15 20:00	Maximum Daily Speed Average: 23.3 km/h on Nov 10	Hours in Service: 720
Minimum Speed Value: 1 km/h on Nov 3 07:00	Minimum Daily Speed Average: 2.8 km/h on Nov 12	Hours of Data: 702
Maximum Diurnal Speed Average: 9.0 km/h at hour 21	Minimum Diurnal Speed Average: 6.9 km/h at hour 1	Hours of Missing Data: 18
Monthly Average Velocity: 7.8 km/h 292.7 deg	Percentiles: P ₁ = 3 P ₁₀ = 6 Q ₁ = 9 Median = 12 Q ₃ = 18 P ₉₀ = 24 P ₉₉ = 29	Percent Operational Time: 97.5

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-Nov	W12	W18	W17	W18	W18	W19	W25	W18WSW11	WSW12	WSW12	WSW13	WSW16	WSW17	W11WSW12	SW7	SSW8	SSW10	SW11	SW11	SW10	SW10	SSW11	WSW12.8	W25			
2-Nov	SSW11	SSW10	SSW10	SSW10	SSW10	SSW9	S8	S8	SSW8	S7	S6	SSW9	S9	SSE8	S8	SE9	SSE8	S9	S10	S7	S7	S8	S10	SSW12	S8.3	SSW12	
3-Nov	SSW12	SSW9	S5	SSE3	SSW6	ESE2	SSE1	SW4	WSW8	WNW9	WNW9	WNW7	NNW10	NNW13	NNW16	NNW13	NNW14	WNW12	W12	NNW11	NNW11	NNW10	NNW8	N6	NNW5.5	NW16	
4-Nov	ENE3	SE4	ESE7	SE6	ESE6	ESE8	ESE8	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	---	ESE8	
5-Nov	AF	W19	W23	W24	W24	W24	W27	W23	WNW25	W26	W25	W22	W20	WNW17	WNW16	WNW13	W12	W10	W2	SSW7	S7	SSE11	SSE15	SSE17	W14.3	W27	
6-Nov	SE18	SSE18	SE17	SE20	SE16	SE18	SE21	SE22	SE26	SSE26	SSE24	SSE26	SSE22	SSE20	S12	S9	S8	SW16	WSW25	WSW24	W24	WNW28	WNW21	WNW26	S11.3	WNW28	
7-Nov	WNW27	WNW23	NW23	NW23	NW28	NW25	NW23	NW22	NW21	WNW19	WNW23	WNW24	WNW26	WNW22	WNW20	WNW20	WNW17	WNW16	WNW16	NNW14	NNW18	NNW16	NNW12	NNW14	NW19.7	NW28	
8-Nov	NNW12	NNW15	NNW13	NNW9	NNW12	NNW15	NNW18	NNW14	NNW17	NNW18	NNW19	NW19	NW16	WNW15	NW16	WNW16	W15	W15	W16	W15	W13	WNW12	WNW13	NW13	NW13.7	NNW19	
9-Nov	WNW14	WNW13	W9	WNW12	NW13	NW13	NW10	NW11	NW10	NW9	NNW10	NNW13	NNW13	NNW13	NNW14	NNW13	NNW14	NNW15	NW14	NNW16	NW15	NNW13	NNW13	NNW15	NW12.3	NNW16	
10-Nov	NNW16	NW15	NW16	NW21	NW20	NW21	NW21	NW18	WNW19	NW23	NW27	NW26	NW27	NW28	NW28	NW28	NW27	NW27	NW29	NW26	NW25	NW25	NW25	NW22	NW23.3	NW29	
11-Nov	NW21	NW22	NW21	NW21	NNW18	NNW18	NNW16	NW17	NNW15	NNW14	NNW11	WNW6	NNW9	NNW11	NNW11	NNW9	NNW9	NNW10	NNW9	NNW7	WNW5	W4	WSW7	WSW7	NW11.7	NW22	
12-Nov	WSW6	SW5	SW4	WSW5	WSW3	W3	SW3	SW4	SW3	S2	S2	S4	E2	E5	E5	ESE6	SE5	S5	S7	SW10	WNW5	W7	WSW10	E3	SSW2.8	SW10	
13-Nov	SSW6	SW7	SW14	SW16	WSW4	WSW9	WSW9	SW14	SW11	WSW14	SW13	WSW11	WSW10	WSW8	WSW10	WSW9	WSW6	WSW8	W9	W9	W11	W10	W9	WNW9	WSW9.2	SW16	
14-Nov	NW14	NW14	NW9	NNW9	NW8	NW10	NNW11	NNW12	NNW11	NNW12	NNW13	NNW12	NNW12	NNW12	NNW13	NNW13	NW14	NW12	NW13	WNW12	W10	W10	WSW9	WSW9	NW10.5	NW14	
15-Nov	WSW7	WSW11	WSW11	WSW11	WSW12	WSW10	WSW12	WSW16	WSW21	WSW24	WSW25	WSW30	WSW29	W22	W23	WNW22	WNW21	NW27	NW31	NW32	NW29	NW28	NW26	NW27	W17.3	NW32	
16-Nov	NW28	NW28	NW28	NW26	NW28	NW25	NW22	NW20	NW20	NW20	NW21	NW21	NW20	WNW19	WNW18	WNW17	WNW16	W17	W15	W15	W15	W14	W11	NW19.0	NW28		
17-Nov	W12	W10	SW10	SSW6	SSW9	SSW7	SSW8	SSW10	SSW12	SSW13	S12	S13	SSW18	SE11	SSE11	S14	SSW14	WSW13	W16	W20	WNW19	WNW17	WNW16	W18	SW9.2	W20	
18-Nov	WNW17	NW20	NW27	NW27	NW28	NW28	NW27	NW25	NW22	NW23	WNW22	WNW22	WNW23	WNW23	WNW21	WNW20	WNW19	WNW17	WNW16	WNW17	WNW16	NW16	NW18	NW15	NW20.8	NW28	
19-Nov	WNW13	WNW12	W12	W12	W12	W13	W13	W11	W11	WSW9	WSW7	SSW7	SSW8	S8	SSW7	SSW6	SSE7	SSE8	S10	S8	S6	SE6	E5	ESE7	WSW5.4	WNW13	
20-Nov	SE8	ESE9	SSE9	SE9	SE8	SE8	SE8	SSE7	S9	SSW11	S11	S8	SSW10	SW11	WSW12	W10	W9	W9	WSW9	W10	W8	NNW6	ENE3	NNE3	SSW4.3	WSW12	
21-Nov	NNE6	N9	NNW11	NNW14	NNW13	NNW16	NNW18	NNW20	NNW18	NW19	NNW17	NNW17	NNW19	NNW16	NNW13	NNW13	N10	NNE5	NE6	NE7	NE7	NNE7	NE7	ENE8	NNW11.0	NNW20	
22-Nov	ENE10	E11	E12	E13	ENE14	ENE14	E13	ENE12	ENE11	NE11	NE11	NE11	NNE12	NNE12	NNE13	NNE11	NNE12	NNE12	NE9	NNE9	NNE8	NNE9	NNE7	N6	NE9.8	ENE14	
23-Nov	NE5	ENE4	NE4	E3	ESE6	SE8	SSE8	SSE9	SSE11	S10	SW9	SW9	SW11	SSW10	SSW7	SSW5	SSE6	S9	SSW11	SSW8	SW5	WNW3	W5	WNW7	S4.7	SSW11	
24-Nov	NW10	NNW15	NNW16	NW18	NNW14	NW18	NNW13	NNW13	NNW15	NNW13	NNW14	NNW11	N10	NW6	N6	N7	NNE7	NE6	NE7	ENE8	ENE8	E9	E9	E8	N8.2	NW18	
25-Nov	ENE7	NE8	NE9	NE8	NE8	NNE9	N7	NNW7	N8	NNW9	N7	N8	NNW9	NNW10	NNW11	WNW9	W9	W8	W6	WSW2	WSW5	WSW5	SSW7	S6	NNW4.4	NNW11	
26-Nov	S5	S8	S9	S9	S10	S8	SSW12	SSW14	S12	S9	SSE10	S11	S10	ESE6	SE7	ESE7	SSE7	SW6	W9	NW11	NNW16	NNW19	NNW18	NW21	SSW3.6	NW21	
27-Nov	NNW21	NNW18	NNW21	NNW16	NNW15	NNW15	NNW13	NNW12	NNW11	NNW10	N12	N14	N12	N12	N12	N13	NNW11	NNW10	NNW8	NNW8	N8	N9	N10	NNW12.7	NW21		
28-Nov	N10	N10	N11	N11	N11	N11	N12	NNW12	NNW14	NNW14	NNW13	N12	NNW13	NNW13	NNW14	NNW14	NNW17	NNW17	NNW17	NNW17	NNW17	NNW17	NNW15	NW11	WNW9	NNW12.6	NNW17
29-Nov	W8	W11	W12	WSW8	WSW17	WSW25	WSW25	WSW25	WSW24	WSW28	WSW23	W17	WSW22	W22	W24	W18	W24	W26	W23	WNW25	NW24	NW26	WNW22	WNW22	W19.8	WSW28	
30-Nov	WNW21	W23	W22	W22	W22	W23	W21	W22	W23	W23	W19	WSW12	WSW12	WSW15	SW15	SSW11	S11	SSW14	SSW16	SW30	SW32	SW27	SW31	SW27	WSW18.0	SW32	

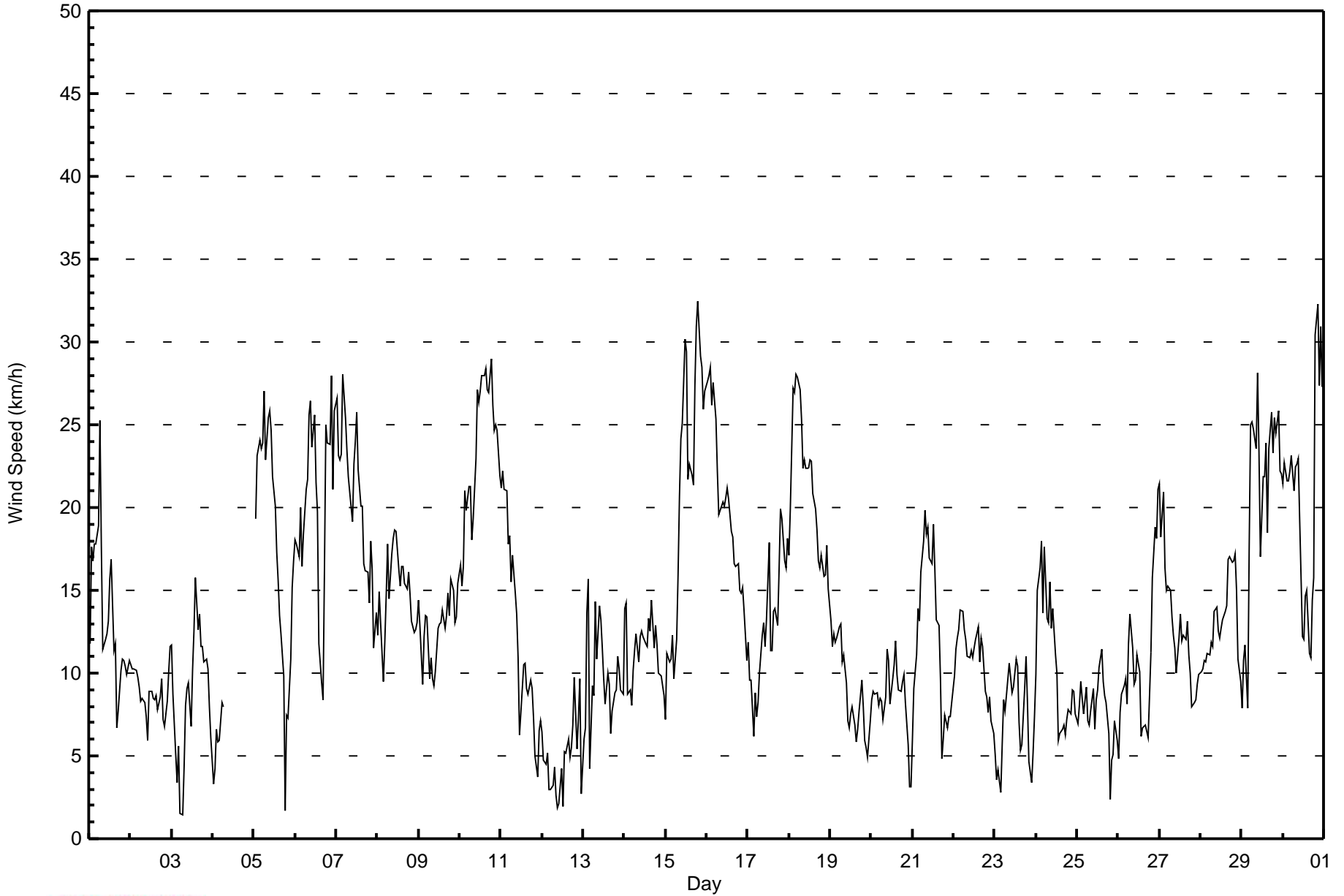
WNW6.9	NNW7.5	WNW7.4	NNW7.2	NNW7.2	NNW7.8	NNW7.7	NNW7.9	NNW7.9	NNW8.5	NNW8.4	NNW7.7	NNW8.2	NNW7.8	NNW8.3	NNW7.6	NNW7.0	NNW7.8	NNW8.5	NNW9.0	NNW9.0	NNW8.5	NNW7.3	NNW7.0	Diurnal Average
NW28	NW28	NW28	NW27	NW28	NW28	NW27	NW25	SE26	WSW28	NW27	WSW30	WSW29	NW28	NW28	NW28	NW27	NW27	NW31	NW32	SW32	NW28	SW31	SW27	Diurnal Maximum

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



WBEA NETWORK
Hourly Averages

Wind Speed (WS) - km/h
ConocoPhillips - Surmont - November 2014





WBEA NETWORK
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
ConocoPhillips - Surmont - November 2014

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	45	6.41	6.41
6 - 11	273	38.89	45.30
12 - 19	237	33.76	79.06
20 - 28	138	19.66	98.72
29 - 38	9	1.28	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 702

Total Number of Hours: 720



WBEA NETWORK
Frequency Distribution

Wind Speed (WS) - km/h
ConocoPhillips - Surmont - November 2014

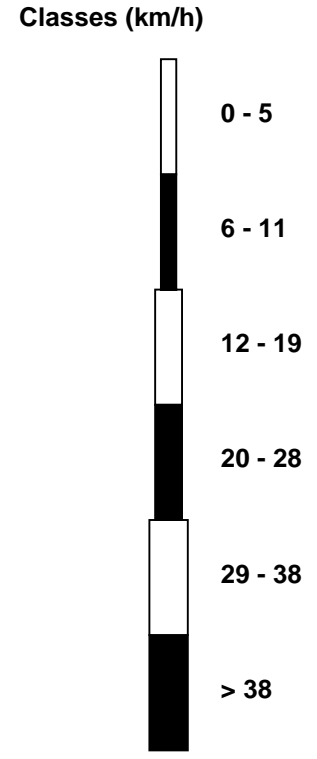
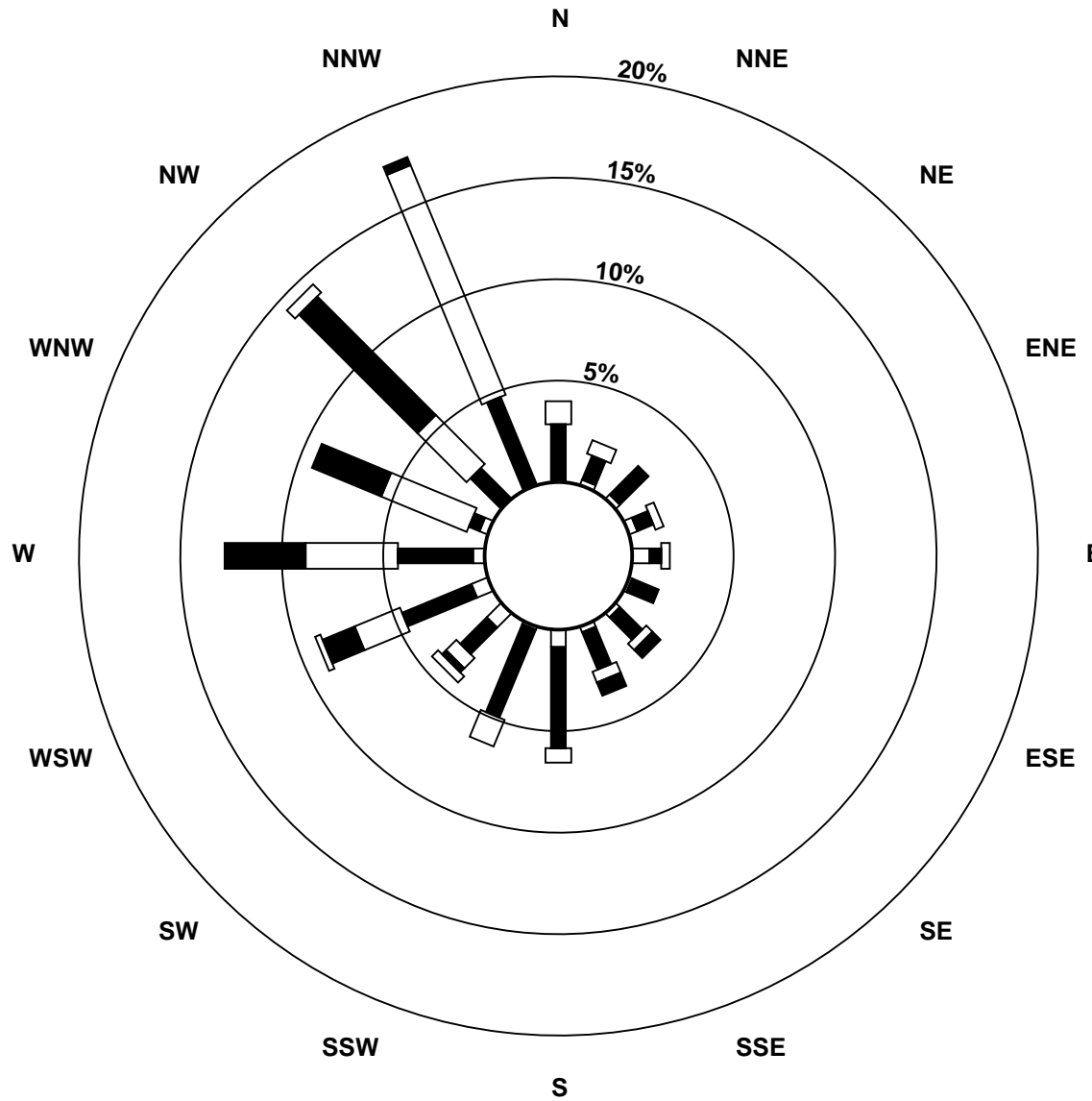
Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	0	2	2	3	6	1	2	2	6	1	7	6	4	3	0	0	45
6 - 11	20	9	14	6	4	10	11	14	35	33	13	26	26	4	15	33	273
12 - 19	8	5	0	3	3	0	3	4	5	10	5	17	32	32	24	86	237
20 - 28	0	0	0	0	0	0	4	5	0	0	2	12	28	26	58	3	138
29 - 38	0	0	0	0	0	0	0	0	0	0	3	2	0	0	4	0	9
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	28	16	16	12	13	11	20	25	46	44	30	63	90	65	101	122	702

Total Number of Valid Hours: 702

Total Number of Hours: 720

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

**Wind Speed (WS) - km/h
ConocoPhillips - Surmont (AMS502)**



Total Number of Valid Hours: 702



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 8 km/h on Nov 30 20:00			Hours of Data:	702
Minimum Value: 0 km/h on Nov 2 06:00			Hours of Missing Data:	18
			Hours of Calibration:	0
			Percent Operational Time:	97.5
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 6				

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

AF - Analyzer Failure



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

ConocoPhillips - Surmont - November 2014

Direction of Maximum Speed: 318 deg on Nov 15 20:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 319.0 deg on Nov 10	Hours of Data: 702
Direction of Minimum Speed: 152 deg on Nov 3 07:00	Hours of Missing Data: 18
Direction of Minimum Daily Speed Average: 2.8 deg on Nov 12	Percent Operational Time: 97.5
Monthly Average Direction: 293.4 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-Nov	271	267	270	267	261	262	262	270	251	253	247	248	244	248	262	251	226	209	209	217	218	229	236	212	250.0		
2-Nov	209	211	212	209	211	212	191	183	198	188	184	203	175	161	174	132	162	173	183	178	169	177	187	195	188.2		
3-Nov	210	198	180	154	208	122	152	218	238	282	311	317	329	318	323	329	329	294	277	337	337	341	348	10	304.3		
4-Nov	77	139	116	142	113	105	112	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--		
5-Nov	AF	269	268	263	270	272	275	276	282	275	281	280	279	286	295	285	282	277	270	281	263	203	178	147	150	151	267.4
6-Nov	146	150	139	140	137	129	133	140	145	147	162	152	159	168	188	184	176	229	238	253	267	293	298	294	178.2		
7-Nov	287	295	305	305	310	315	318	317	316	300	291	283	286	292	293	286	297	288	288	328	327	329	344	342	303.9		
8-Nov	345	332	338	347	342	333	327	330	328	329	327	325	318	303	304	286	278	275	278	276	280	284	296	311	312.0		
9-Nov	302	292	273	293	324	324	315	317	310	325	335	342	334	339	331	329	331	331	320	328	325	330	329	327	322.2		
10-Nov	327	312	324	323	320	318	317	306	301	314	316	319	315	321	319	319	321	321	322	322	323	321	324	326	319.0		
11-Nov	326	325	326	326	329	327	327	326	331	338	341	294	335	339	343	344	335	337	335	329	286	272	246	253	326.0		
12-Nov	246	229	229	241	244	262	223	218	215	182	186	184	94	83	92	109	137	185	187	221	290	266	244	84	211.5		
13-Nov	202	230	227	230	240	238	244	236	230	241	234	250	254	238	246	254	247	249	278	272	273	270	267	313	247.6		
14-Nov	325	323	311	328	317	326	327	331	333	330	329	328	333	335	328	330	311	314	307	286	274	266	258	253	315.5		
15-Nov	250	246	244	241	244	249	243	241	243	238	245	245	248	263	281	290	302	323	321	318	322	320	320	317	281.0		
16-Nov	318	318	320	320	322	321	323	321	319	314	318	319	311	315	299	293	285	285	275	267	266	270	275	270	306.5		
17-Nov	262	260	226	204	198	199	198	192	193	193	188	181	193	138	167	185	205	238	267	276	289	288	283	281	227.8		
18-Nov	292	312	323	320	318	319	319	319	310	310	297	296	297	298	299	296	293	293	294	290	291	314	322	318	307.1		
19-Nov	298	283	276	279	273	276	281	270	267	249	239	193	201	182	203	210	163	157	174	173	189	126	98	119	238.0		
20-Nov	126	121	151	124	136	131	141	165	172	203	187	177	192	234	239	261	268	275	258	270	275	347	67	14	198.2		
21-Nov	18	1	338	329	337	328	328	327	327	326	330	328	328	334	333	335	355	21	45	46	41	33	52	62	343.0		
22-Nov	77	83	81	79	78	77	81	76	71	55	48	40	27	20	24	31	27	25	39	19	24	12	21	11	49.6		
23-Nov	54	73	47	101	120	140	147	151	155	179	214	217	214	206	194	206	163	176	196	198	226	289	273	292	185.1		
24-Nov	323	331	331	324	327	324	331	335	331	331	334	342	351	312	355	1	30	49	56	75	73	87	88	83	349.2		
25-Nov	59	39	34	43	49	23	8	346	349	348	351	352	347	340	344	325	267	277	264	258	255	237	209	187	345.0		
26-Nov	186	170	179	182	173	177	197	194	176	173	163	183	175	115	143	115	150	224	272	312	327	327	328	326	209.4		
27-Nov	324	330	330	333	339	337	338	339	338	330	332	349	351	355	353	356	354	346	339	340	343	354	357	9	341.4		
28-Nov	6	1	1	2	353	350	349	343	337	342	346	349	341	338	332	332	328	327	328	328	329	332	321	284	338.3		
29-Nov	266	270	266	258	254	249	247	249	252	246	251	264	252	260	260	277	270	267	278	290	305	304	292	289	267.4		
30-Nov	287	279	278	280	279	278	274	273	269	265	268	247	240	241	226	200	185	197	201	223	224	220	224	226	247.9		

301.2 297.1 298.2 297.9 300.2 301.5 295.7 289.7 285.7 283.3 286.2 284.4 284.6 293.1 295.4 296.8 293.5 286.4 283.2 287.0 293.5 300.9 295.7 298.1

Diurnal Average

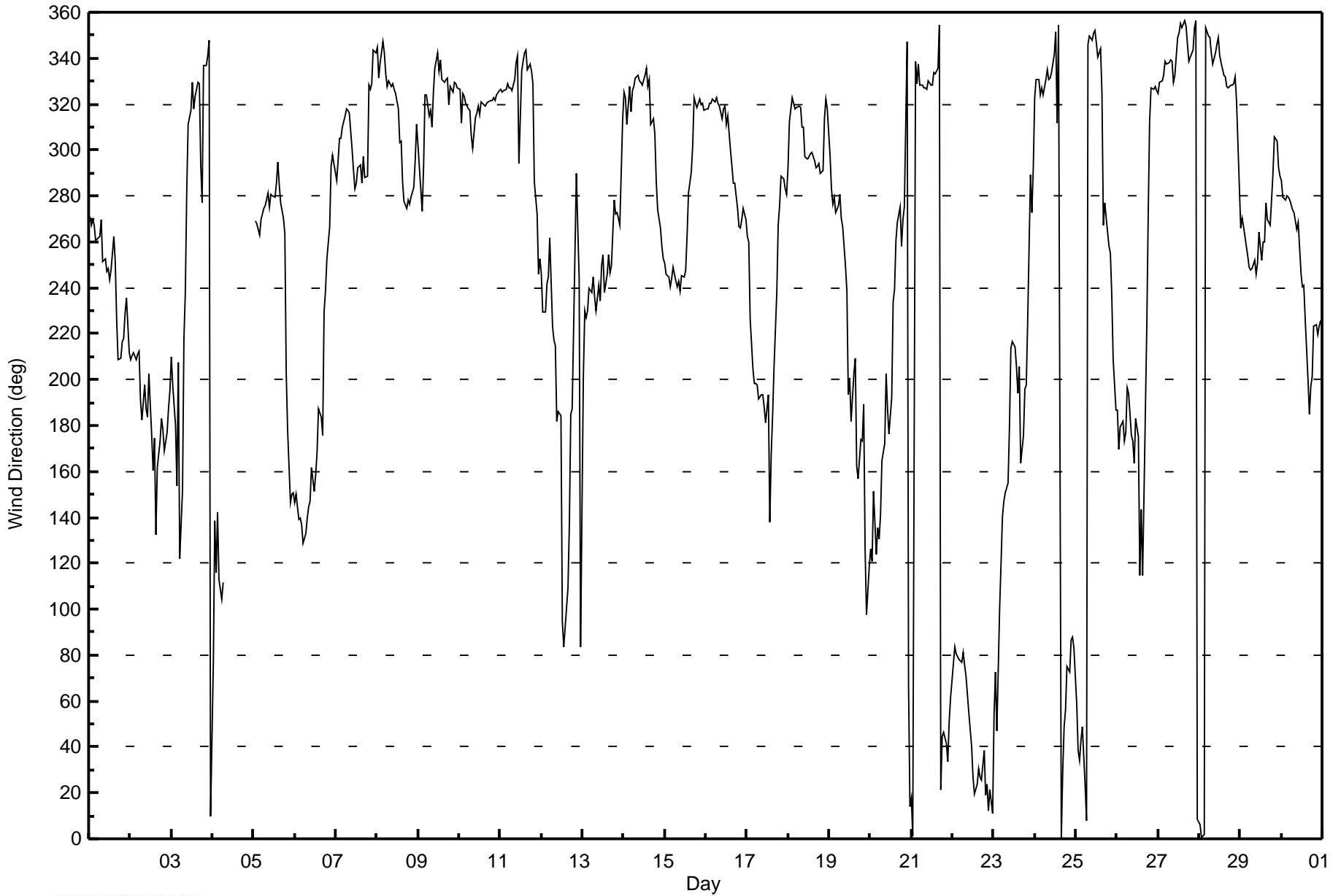
AF - Analyzer Failure

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



WBEA NETWORK
Hourly Averages

Wind Direction (WD) - deg
ConocoPhillips - Surmont - November 2014





Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 78 deg on Nov 5 19:00			Hours of Data:	702
Minimum Value: 5 deg on Nov 2 05:00			Hours of Missing Data:	18
Percentiles: P ₁ = 7 P ₁₀ = 9 Q ₁ = 11 Median = 13 Q ₃ = 16 P ₉₀ = 23 P ₉₉ = 70			Hours of Calibration:	0
			Percent Operational Time:	97.5

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-Nov	9	7	9	9	9	10	9	8	10	9	13	22	11	10	17	8	17	12	16	8	7	8	8	8	22
2-Nov	6	6	6	5	5	6	11	9	8	14	19	18	17	21	16	15	14	11	10	11	15	14	12	10	21
3-Nov	12	29	32	47	14	71	53	23	19	15	28	39	15	17	13	12	10	21	11	17	12	14	18	21	71
4-Nov	43	50	23	26	26	12	13	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	50
5-Nov	AF	10	10	9	10	11	10	10	10	10	9	11	11	11	18	16	17	15	78	16	22	16	13	14	78
6-Nov	13	14	11	11	12	10	11	11	11	11	15	11	15	16	24	19	31	25	9	8	11	14	13	15	31
7-Nov	11	15	15	15	16	14	14	14	14	16	16	12	12	16	17	18	18	12	14	13	10	12	14	13	18
8-Nov	12	12	16	15	15	12	9	11	10	12	10	11	15	16	17	13	8	8	8	9	9	12	14	16	17
9-Nov	11	15	11	18	10	12	21	19	18	15	13	14	15	15	13	13	11	8	15	8	9	12	10	9	21
10-Nov	9	14	10	11	12	12	12	14	15	13	13	13	12	11	11	11	11	11	10	10	11	11	9	9	15
11-Nov	9	9	9	9	10	10	10	10	13	13	15	40	29	14	13	14	15	15	17	36	50	70	21	10	70
12-Nov	15	19	16	13	28	38	12	17	22	51	44	33	76	21	25	10	22	16	14	17	28	23	26	59	76
13-Nov	24	32	12	15	70	16	15	11	16	12	13	15	17	17	13	12	9	16	12	8	9	8	9	22	70
14-Nov	9	7	14	18	23	13	11	9	11	9	10	10	12	14	14	12	18	17	22	17	14	12	11	13	23
15-Nov	13	14	17	18	17	16	18	16	16	13	12	11	16	16	12	13	17	10	11	12	12	11	12	13	18
16-Nov	13	13	12	11	11	12	10	12	13	14	14	14	15	18	16	14	11	11	9	8	8	9	8	8	18
17-Nov	9	10	14	26	9	12	21	13	11	11	12	16	15	28	29	17	14	17	12	9	11	12	9	10	29
18-Nov	13	15	10	11	11	11	11	12	14	15	14	15	14	14	14	13	13	14	13	12	14	18	14	18	18
19-Nov	24	14	10	10	9	13	16	14	12	18	41	35	30	26	22	15	17	14	16	20	28	20	30	21	41
20-Nov	13	12	16	16	18	14	13	19	20	17	17	21	22	19	17	18	13	27	15	13	27	23	31	29	31
21-Nov	10	17	13	10	14	10	11	10	11	11	15	13	12	13	13	12	17	24	14	15	14	16	12	13	24
22-Nov	13	12	13	12	12	12	13	10	13	13	13	15	14	14	15	14	13	13	14	16	16	14	14	14	16
23-Nov	24	32	19	15	16	14	14	13	12	20	17	16	18	16	20	16	23	12	12	13	22	72	64	30	72
24-Nov	26	9	11	12	15	11	11	12	12	14	12	15	17	45	16	21	19	15	12	15	17	16	14	15	45
25-Nov	15	20	15	18	18	15	16	15	13	12	21	13	14	14	12	31	14	14	67	72	22	19	7	21	72
26-Nov	18	15	14	15	14	17	15	13	14	17	14	17	30	16	27	21	29	36	42	28	10	10	9	8	42
27-Nov	10	12	11	12	12	11	11	11	11	11	14	16	14	15	13	14	14	12	10	12	12	16	12	13	16
28-Nov	15	13	14	15	14	13	13	12	12	13	14	14	14	12	12	12	8	9	9	8	9	9	19	10	19
29-Nov	18	8	13	15	11	9	9	10	10	10	13	14	10	10	11	12	11	9	10	13	14	15	15	13	18
30-Nov	11	10	9	10	10	9	10	10	9	9	10	18	15	14	16	18	18	22	22	13	11	13	11	11	22
	43	50	32	47	70	71	53	23	22	51	44	40	76	45	29	31	31	36	78	72	50	72	64	59	

Diurnal Maximum

AF - Analyzer Failure



Wood Buffalo Environmental Association

SO₂ Calibration Report

Station Information

Calibration Date	November 6, 2014	Previous Calibration	October 28, 2014
Station Name	ConocoPhillips - Surmont	Station Number	AMS 502
Reason:	Routine		
Start Time (MST)	9:55	End Time (MST)	13:55
Barometric Pressure	n/a mmHg	Station temp.	22 Deg C
Calibrator Make/Model	API T700	Serial Number	622
Cal Gas Concentration	51.1 ppm	Cal Gas Expiry Date	5/29/2014
Gas Cert Reference	LL110503		
DACS make/model	Campbell Scientific CR3000	DACS serial No.	7882
DACS voltage range	n/a	DACS channel #	TCP/IP

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	1000	1000	PMT voltage	16	17
Analyzer Range (mv)	1000	1000	Lamp voltage	2941	2932
Calculated slope	0.999358	0.999695	Chamber temp.	50.0	50.0
Calculated intercept	0.626548	0.368658	Pressure (mmHg)	24.7	24.4
Analyzer Background	16.9	16.9	Flow (lpm)	0.636	0.623
Analyzer Coefficient	1.024	1.024	Intensity	73	72

Analyzer make	API T100	Analyzer serial #	598
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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	76.7	783.9	783.8	1.000
calibrator zero	5000	0.0	0.0	0.0	NA
high point	5000	76.7	783.9	783.8	1.000
second point	5000	38.4	392.4	392.3	1.000
third point	5000	19.2	196.2	195.4	1.004
calibrator zero	5000	0.0	0.0	0.0	NA
as left zero	5000	0.0	0.0	-1.2	NA
as left span	6000	92.0	783.5	770.5	1.017
Average Correction Factor					1.002

Corrected As found	783.9	Previous response	783.8	% change	0.0%
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Notes:

No adjustments made. Good cal.

Calibration Performed By: Devin Russell



Wood Buffalo Environmental Association

SO₂ Calibration Summary

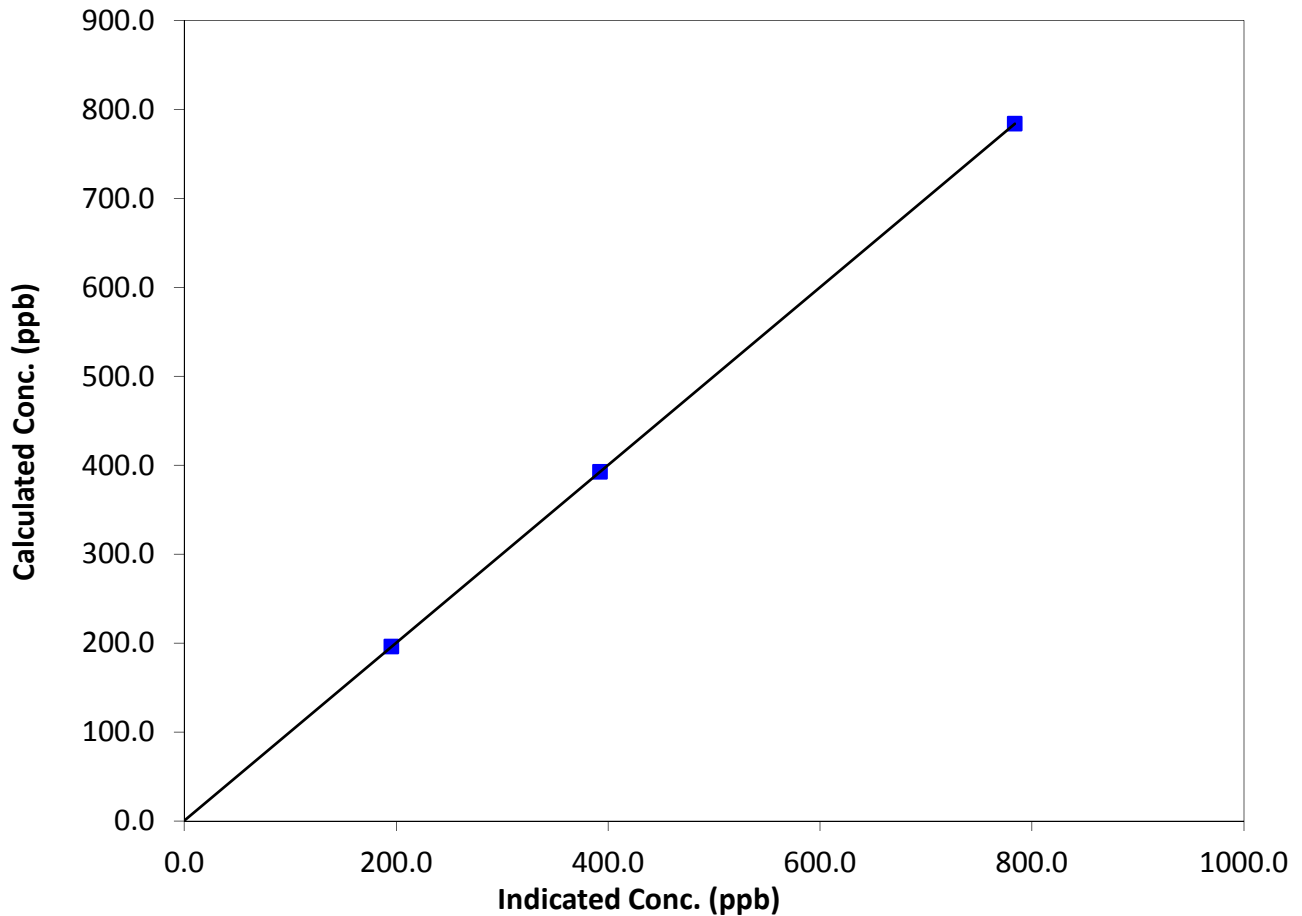
Station Information

Calibration Date	November 6, 2014	Previous Calibration	October 28, 2014
Station Name	ConocoPhillips - Surmont	Station Number	AMS 502
Start Time (MST)	9:55	End Time (MST)	13:55
Analyzer make	API T100	Analyzer serial #	598

Calibration Data

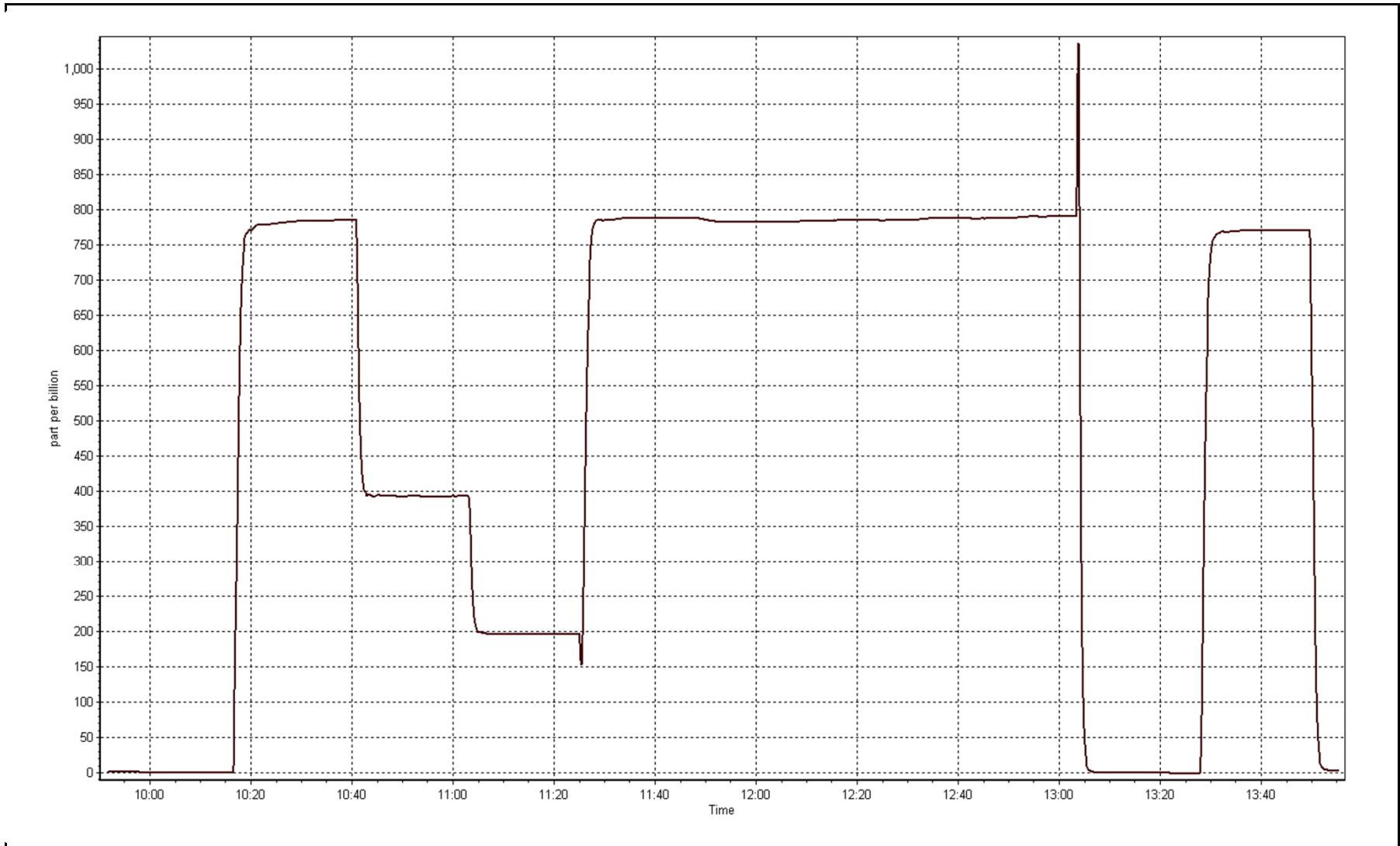
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999999
783.9	783.8	1.0001		
392.4	392.3	1.0004	Slope	0.999695
196.2	195.4	1.0042		
			Intercept	0.368658

SO₂ Calibration Curve



SO2 Calibration Plot

Date: November 6, 2014





Wood Buffalo Environmental Association

H2S Calibration Report

Station Information

Calibration Date	November 7, 2014	Previous Calibration	October 29, 2014
Station Name	ConocoPhillips - Surmont	Station Number	AMS 502
Reason:	Routine		
Start Time (MST)	10:30	End Time (MST)	14:20
Barometric Pressure	n/a mmHg	Station temp.	22 Deg C
Calibrator Make/Model	API T700	Serial number	622
Cal Gas Concentration	10.4 ppm H2S	Cal Gas Expiry Date	30 May, 2016
Gas Cert Reference	LL34303	SO2 gas conc.	51.1 ppm SO2
DACS make/model	Campbell Scientific CR3000	DACS serial No.	7882
DACS voltage range	n/a	DACS channel #	TC/IP

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	100	100	PMT voltage	21	21
Analyzer Range (mv)	100	100	Lamp voltage	3405	3333
Calculated slope	0.995727	0.996615	Chamber temp.	50	50
Calculated intercept	-0.165046	-0.033092	Pressure	23.1	23.2
Analyzer Background	18	18	Flow	564	567
Analyzer Coefficient	1.012	0.998	Intensity	75	74
			Converter temp.	315	314

Analyzer make/model	API T101	Analyzer serial #	197
Converter make/model	n/a	Converter serial #	n/a

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.0	NA
as found span	5000	38.5	80.1	82.8	0.967
SO2 scrubber check	5000	19.6	200.3	4.0	NA
calibrator zero	5000	0.0	0.0	0.0	NA
high point	5000	38.5	80.1	80.4	0.997
second point	5000	19.3	40.1	40.4	0.994
third point	5000	12.0	25.0	25.1	0.994
calibrator zero	5000	0.0	0.0	0.0	NA
as left zero	5000	0.0	0.0	0.5	NA
as left span	5000	38.5	80.1	77.6	1.032
Average Correction Factor					0.995

Corrected As found	82.8	Previous response	80.6	% change	-2.7%
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Notes:

Pump replaced after as founds. Scrubber check performed after as founds. Adjusted span.

Calibration Performed By:

Devin Russell



Wood Buffalo Environmental Association

H2S Calibration Summary

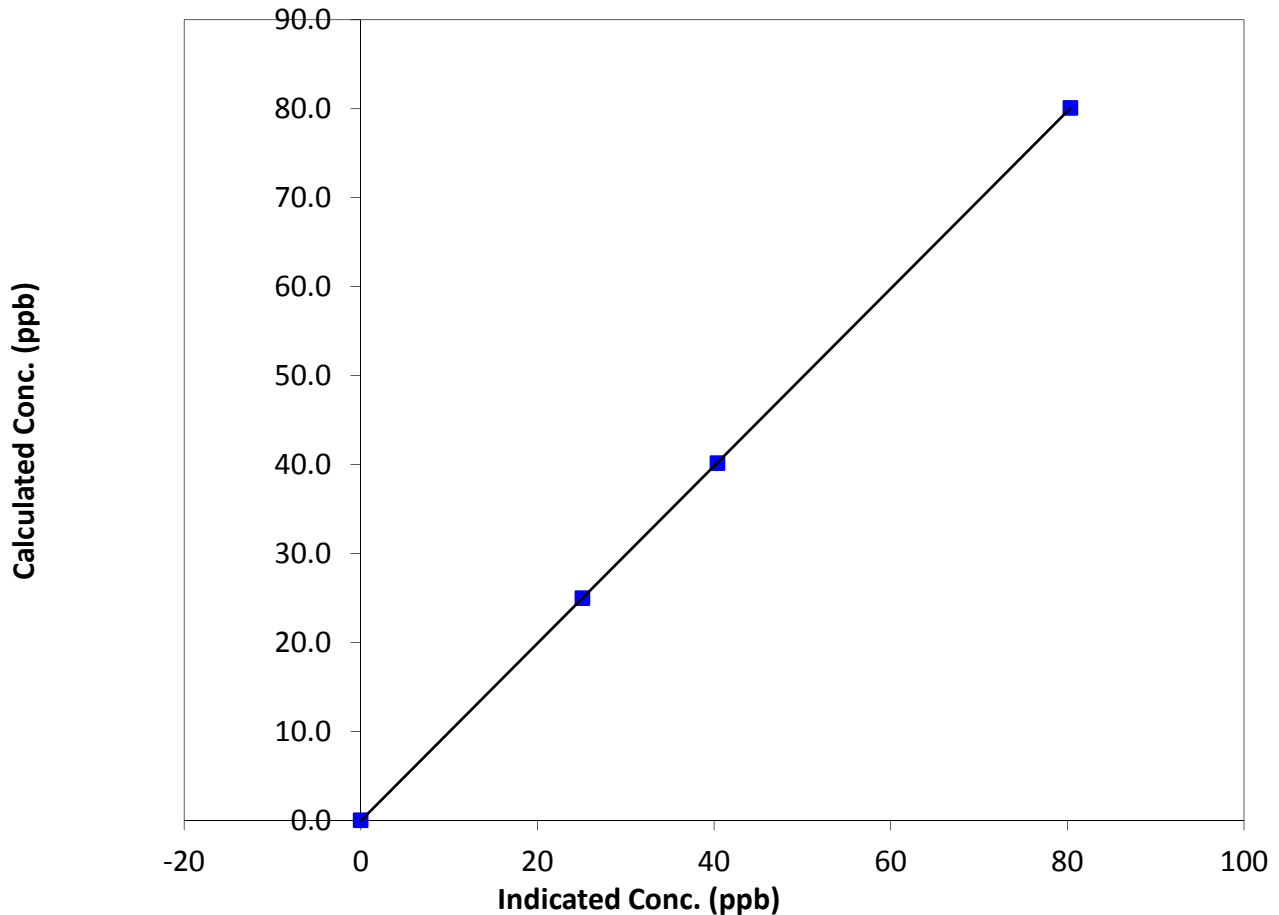
Station Information

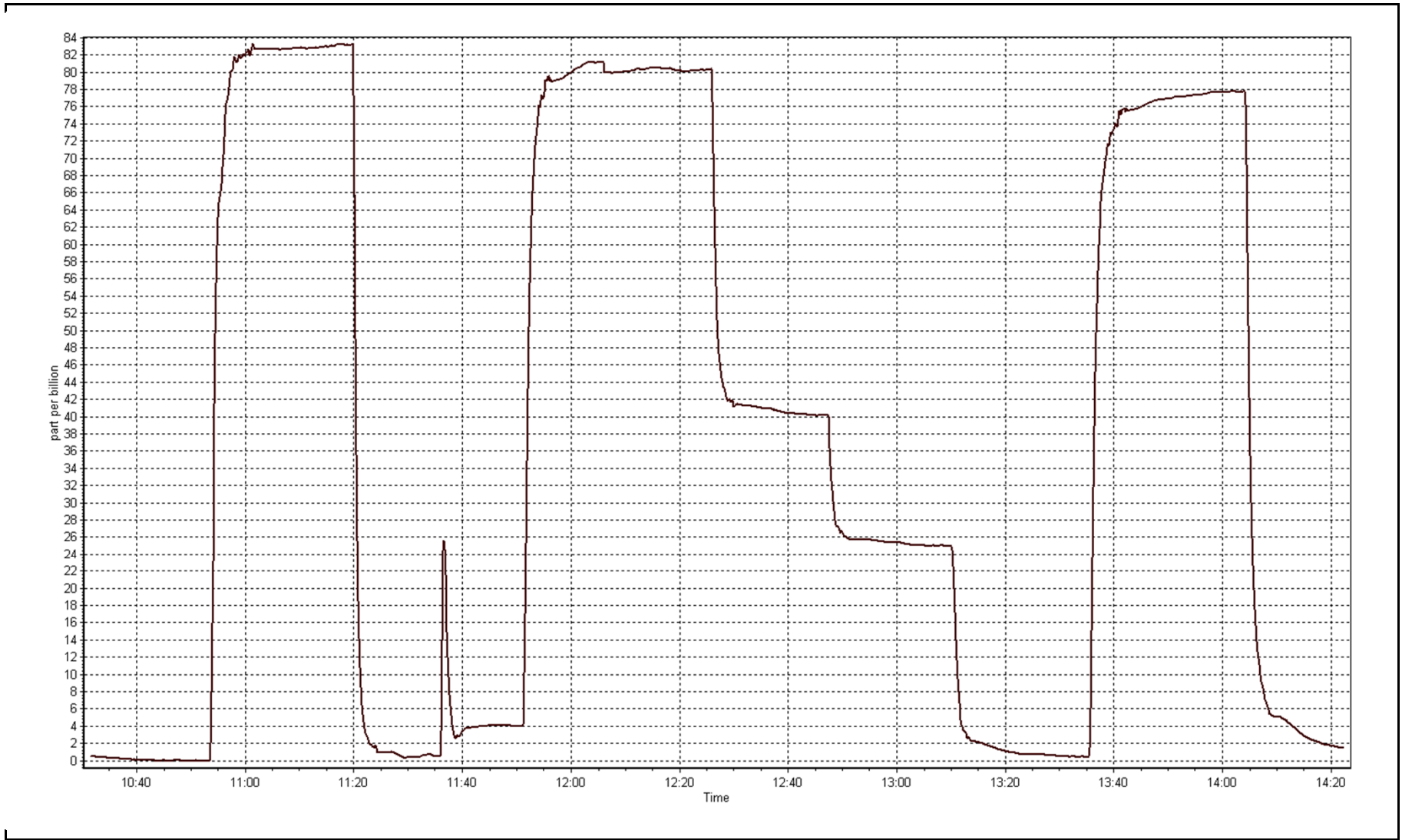
Calibration Date	November 7, 2014	Previous Calibration	October 29, 2014
Station Name	ConocoPhillips - Surmont	Station Number	AMS 502
Start Time (MST)	10:30	End Time (MST)	14:20
Analyzer make	API T101	Analyzer serial #	197

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999998
80.1	80.4	0.9966		
40.1	40.4	0.9944	Slope	0.996615
25.0	25.1	0.9944		
			Intercept	-0.033092

H2S Calibration Curve







Wood Buffalo Environmental Association

NO_x-NO-NO₂ Calibration Report

Station Information

Calibration Date	November 6, 2014	Previous Calibration	October 28, 2014
Station Name	ConocoPhillips	Station Number	AMS 102
Reason:	Routine		
Start Time (MST)	9:55	End Time (MST)	13:55
Barometric Pressure	n/a mmHg	Station Temperature	22.0 Deg C
Calibrator	API T700	Serial Number	622
NO Cal Gas Conc	52.2 ppm	Cal Gas Expiry Date	May 29, 2014
NO _x Cal Gas Conc	52.4 ppm	Cal Gas Serial #	LL110503

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	7882
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Parameter		NO _x	NO	NO ₂
MV conversion	Analyzer Range (ppb)	1000	1000	1000
	Analyzer Range (mv)	1000	1000	1000
Before	Data Slope	1.005735	0.999664	1.000317
	Data Offset	-1.147109	-0.309038	-0.351249
After	Data Slope	1.004433	1.000365	1.000945
	Data Offset	-0.890911	-0.187350	-0.526934
Channel #		TCP/IP	TCP/IP	TCP/IP
Voltage Range				

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1218153356
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Test Point	before		after	
Concentration range	1000	ppb	1000	ppb
NO coefficient	0.738	ppb	0.738	ppb
NO _x coefficient	0.997	ppb	0.997	ppb
NO ₂ coefficient	1.000	ppb	1.000	ppb
NO bkgrnd	5.0		5.0	
NO _x bkgrnd	4.9		4.9	
PMT	-940		-940.500	
Chamber Temp	50.5	Deg C	50.5	Deg C
Moly Temp	322.4	Deg C	325.3	Deg C
Cooler Temp	-2.7	Deg C	-3.0	Deg C
O ₃ flow		ccm		ccm
Chamber Press	202.0	mmHg	200.2	mmHg
Sample Flow	0.509	ccm	0.503	ccm

Notes:

No adjustments made. Good cal.



Wood Buffalo Environmental Association

NO_x-NO-NO₂ Calibration Report

Station Information

Calibration Date: November 6, 2014 Station Number: AMS 102

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NO _x conc (ppb)	Calculated NO conc (ppb)	Calculated NO ₂ conc (ppb)	Indicated NO _x conc (ppb)	Indicated NO conc (ppb)	Indicated NO ₂ conc (ppb)	NO _x Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	0.6	0.3	0.3	N/A	N/A
as found span	5000	76.7	803.8	800.7	3.1	801.0	800.7	0.3	1.0036	1.0000
calibrator zero	5000	0.0	0.0	0.0	0.0	0.6	0.3	0.3	N/A	N/A
high point	5000	76.7	803.8	800.7	3.1	801.0	800.7	0.3	1.0035	1.0001
second point	5000	38.4	402.4	400.9	1.5	401.7	400.9	0.8	1.0017	1.0000
third point	5000	19.2	201.2	200.4	0.8	201.4	200.4	1.1	0.9989	1.0003
calibrator zero										
as left zero	5000	0.0	0.0	0.0	0.0	0.7	0.6	0.1	N/A	N/A
as left span	6000	92.0	803.5	519.4	284.1	807.5	526.0	281.5	0.9950	0.9874
Average Correction Factor									1.0014	1.0001

Corrected As found NO_x= 800.4 NO= 800.4 Percent Change NO_x= 0.0% NO= 0.1%
 Previous Response NO_x= 800.4 NO= 801.3

GPT Calibration Data

Dilution Flow 5000 ccm Source Gas Flow 76.70 ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO ₂ conc (ppb)	Indicated NO _x conc (ppb)	Indicated NO conc (ppb)	Indicated NO ₂ conc (ppb)	NO _x Correction factor	NO Correction factor	NO ₂ Correction factor	Converter Efficiency
Cal zero			0.0			0.3			N/A	
1st NO ₂ (300)	N/A	519.4	280.9	800.4	519.4	281.0	0.9891	1.0000	0.9997	100.0%
2nd NO ₂ (200)	N/A	606.0	194.3	800.7	606.0	194.7	0.9887	1.0000	0.9978	100.2%
3rd NO ₂ (100)	N/A	697.6	102.7	801.0	697.6	103.4	0.9884	1.0000	0.9927	100.7%
4th NO ₂ (0)	800.3	N/A	0.6	800.8	800.3	0.6	0.9886	1.0000	N/A	N/A
Average Correction Factor							0.9887	1.0000	0.9968	100.3%

Calibration Performed By: Devin Russell



Wood Buffalo Environmental Association

NO_x Calibration Summary

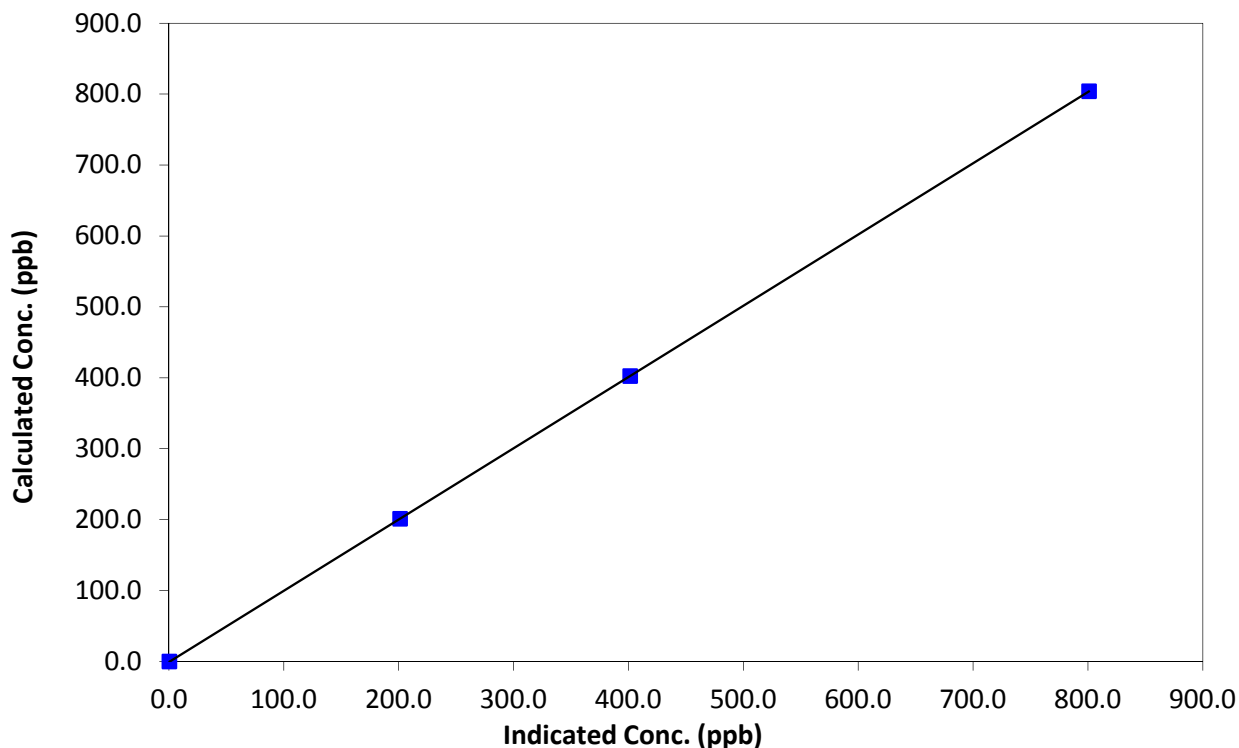
Station Information

Calibration Date	November 6, 2014	Previous Calibration	October 28, 2014
Station Name	ConocoPhillips	Station Number	AMS 102
Start Time (MST)	9:55	End Time (MST)	13:55
Analyzer make	Thermo 42i	Analyzer serial #	1218153356

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.6	N/A	Correlation Coefficient	0.999999
803.8	801.0	1.0035		
402.4	401.7	1.0017	Slope	1.004433
201.2	201.4	0.9989		
			Intercept	-0.890911

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

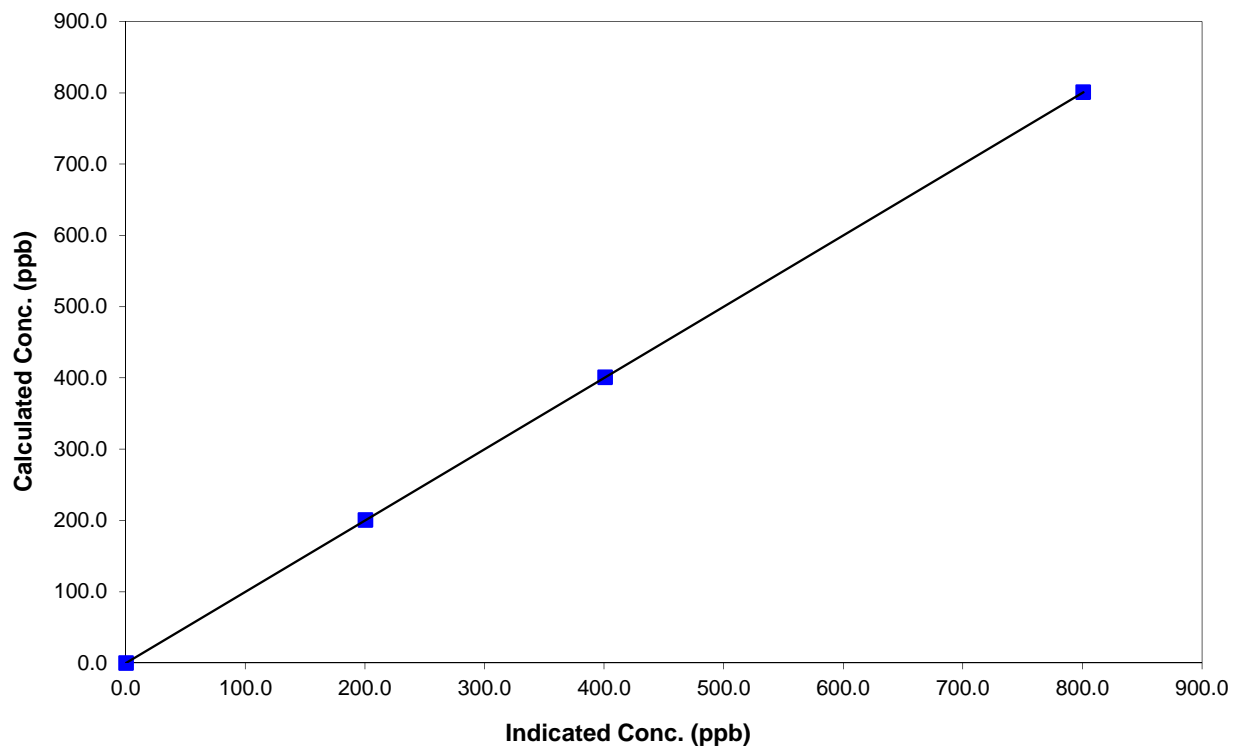
Station Information

Calibration Date	November 6, 2014	Previous Calibration	October 28, 2014
Station Name	ConocoPhillips	Station Number	AMS 102
Start Time (MST)	9:55	End Time (MST)	13:55
Analyzer make	Thermo 42i	Analyzer serial #	1218153356

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.3	N/A	Correlation Coefficient	1.000000
800.7	800.7	1.0001		
400.9	400.9	1.0000	Slope	1.000365
200.4	200.4	1.0003		
			Intercept	-0.187350

NO Calibration Curve





Wood Buffalo Environmental Association

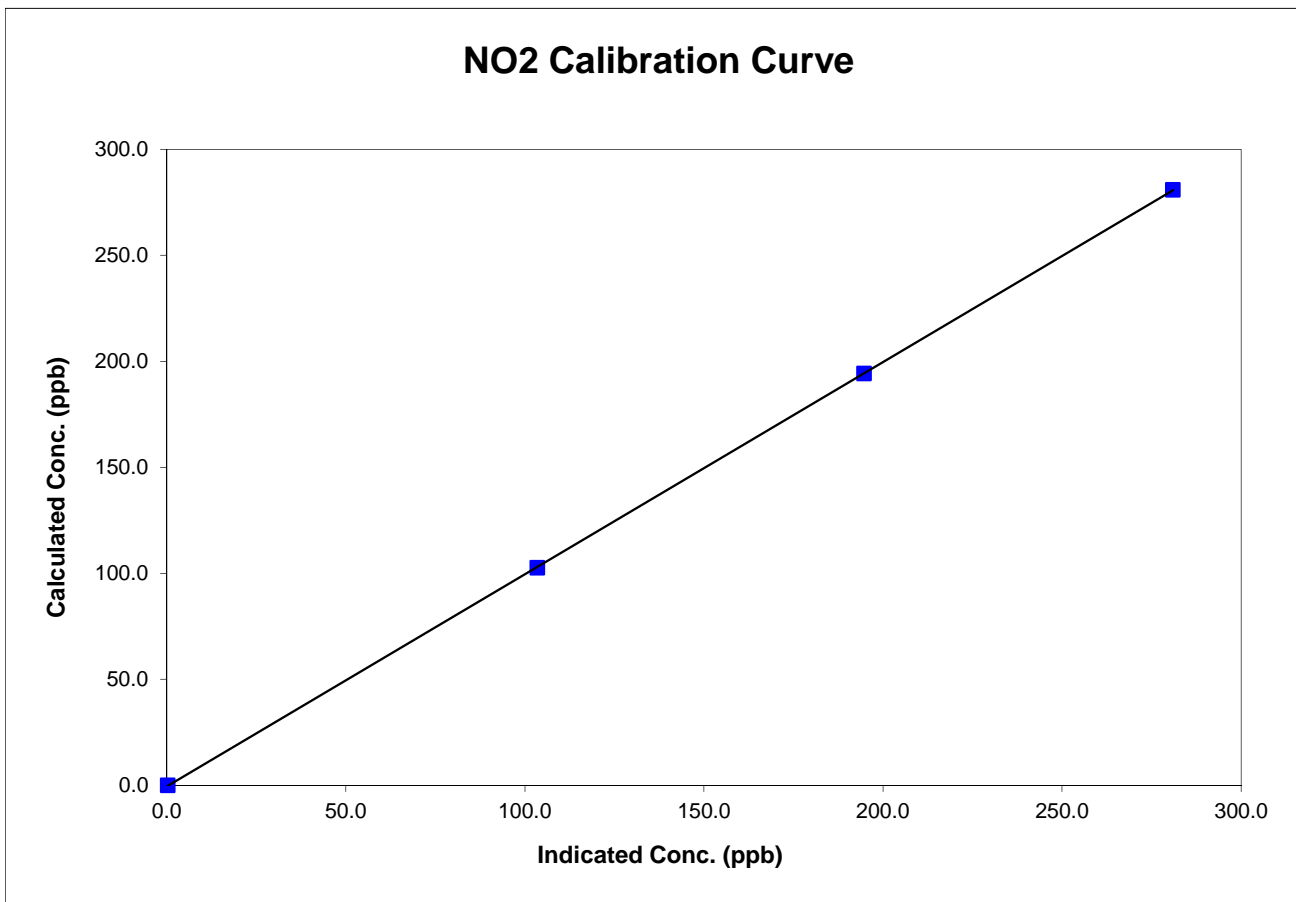
NO₂ Calibration Summary

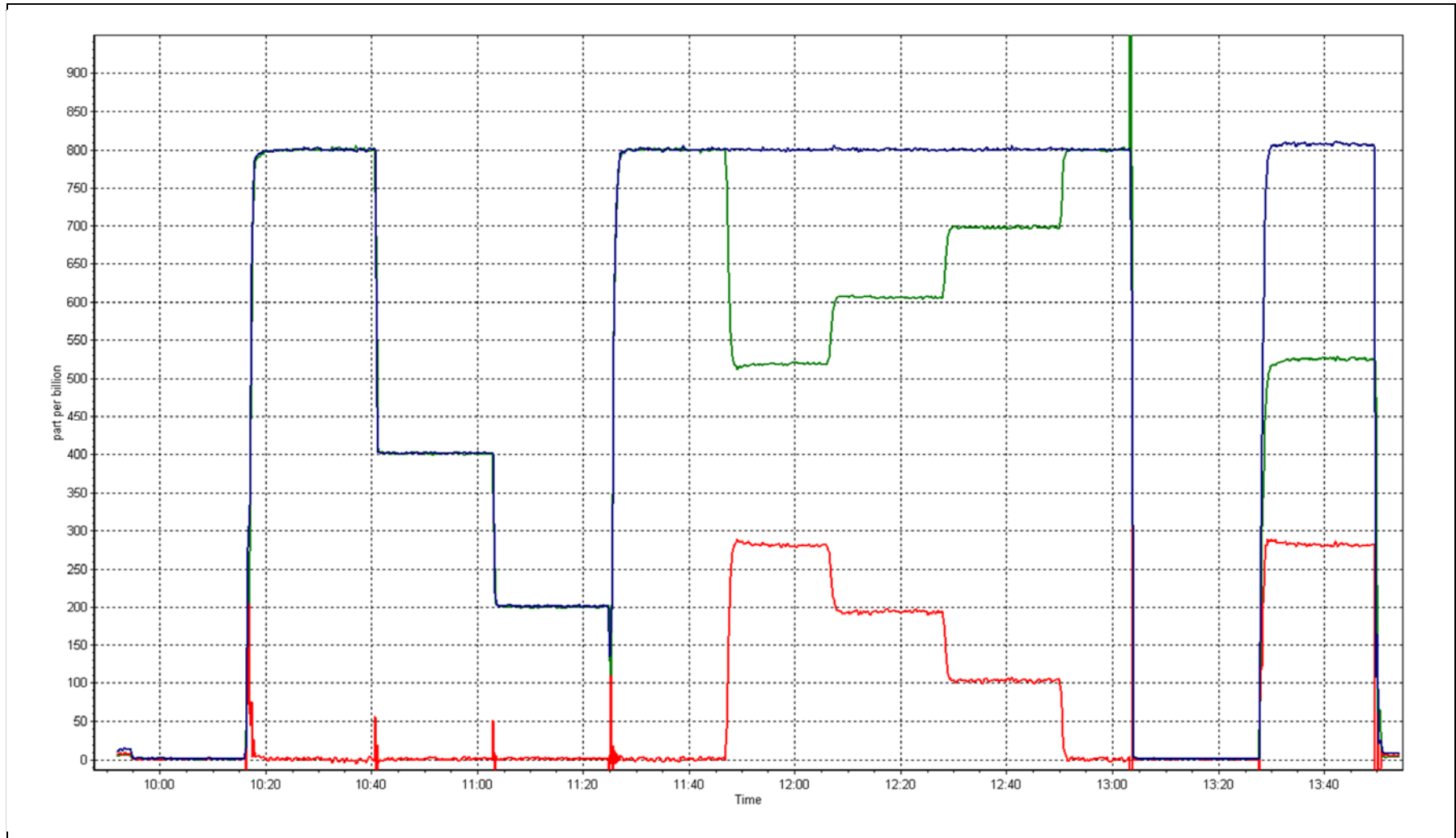
Station Information

Calibration Date	November 6, 2014	Previous Calibration	October 28, 2014
Station Number	ConocoPhillips	Station Number	AMS 102
Start Time (MST)	9:55	End Time (MST)	13:55
Analyzer make	Thermo 42i	Analyzer serial #	1218153356

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.3	N/A	Correlation Coefficient	0.999996
280.9	281.0	0.9997		
194.3	194.7	0.9978	Slope	1.000945
102.7	103.4	0.9927		
			Intercept	-0.526934





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

INTEGRATED MONITORING PROGRAM MONTHLY REPORT

DATA SUMMARY SEPTEMBER - AUGUST 2014

Prepared
December 30, 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 14 Repeat
	Fort McKay 01-Nov	Patricia McInnes 01-Nov	Athabasca Valley 01-Nov	Anzac 01-Nov	01-Nov	01-Nov	Anzac 01-Nov
Naphthalene	20.6	46	48.4	20	0.01	0.115	19.9
Acenaphthylene	2.99	7.12	9.9	0.162	0.002	0.016	0.148
Acenaphthene	2.44	1.65	2.03	12.1	0.006	0.057	12.7
Fluorene	3.24	4.1	5.39	5.95	0.001	0.065	6.19
Phenanthrene	4.18	5.87	7.65	4.13	0.002	0.141	4.38
Anthracene	0.492	0.811	0.871	0.266	0.001	0.01	0.277
Acridine	0.203	0.084	0.281	0.105	0.001	0.015	0.113
Fluoranthene	0.49	0.971	1.16	0.245	0.001	0.015	0.246
Pyrene	0.418	0.765	1.24	0.115	0.001	0.016	0.116
Benzo(c)phenanthrene	0.04	0.057	0.048	0.008	0.001	0.004	0.008
Benzo(a)anthracene	0.046	0.084	0.103	0.005	0.001	<0.001	0.004
Chrysene	0.071	0.11	0.16	0.008	0.001	<0.001	0.006
7,12-Dimethylbenz(a)anthracene	0.018	0.016	0.019	0.011	0.001	0.004	0.011
Benzo(b)fluoranthene	0.047	0.118	0.183	0.011	0.001	0.002	0.011
Benzo(k)fluoranthene	0.061	0.148	0.238	0.012	0.001	0.002	0.012
Benzo(a)pyrene	0.058	0.118	0.288	0.014	0.001	<0.001	0.015
3-Methylcholanthrene	0.006	0.023	0.014	0.016	0.001	0.001	0.018
Indeno(123-cd)pyrene	0.017	0.046	0.071	0.006	0.001	<0.001	0.007
Dibenz(a,h)anthracene	0.01	0.011	0.019	0.006	0.001	<0.001	0.006
Benzo(ghi)perylene	0.066	0.199	0.338	0.02	0.001	<0.001	0.02
Dibenzo(a,l)pyrene	0.039	0.044	0.126	0.005	0.001	<0.001	0.006
Dibenzo(a,i)pyrene	0.007	0.045	0.05	0.013	0.001	<0.001	0.014
Dibenzo(a,h)pyrene	0.004	0.004	0.004	0.005	0.001	<0.001	0.006



Compound Name	Results (ng/m3)						
	AMS 1	AMS 6	AMS 7	AMS 14	Lab Blank	Field Blank	AMS 1 Repeat
	Fort McKay 07-Nov	Patricia McInnes 07-Nov	Athabasca Valley 07-Nov	Anzac 07-Nov	07-Nov	07-Nov	Fort McKay 07-Nov
Naphthalene	4.53	7.02	7.8	10.1	0.01	0.785	4.23
Acenaphthylene	0.276	0.082	0.158	1.08	0.002	0.009	0.264
Acenaphthene	1.48	1.3	1.16	1.39	0.006	0.014	1.42
Fluorene	1.07	0.889	1.07	1.15	0.001	0.042	1.03
Phenanthrene	0.814	1.09	1.32	1.44	0.002	0.132	0.861
Anthracene	0.07	0.085	0.163	0.082	0.001	0.007	0.07
Acridine	0.097	0.056	0.138	0.076	0.001	0.007	0.093
Fluoranthene	0.051	0.149	0.115	0.115	0.001	0.008	0.051
Pyrene	0.046	0.113	0.104	0.08	0.001	0.009	0.041
Benzo(c)phenanthrene	0.008	0.01	0.016	0.019	0.001	<0.001	0.007
Benzo(a)anthracene	0.006	0.014	0.011	0.01	0.001	<0.001	0.005
Chrysene	0.007	0.022	0.019	0.022	0.001	<0.001	0.008
7,12-Dimethylbenz(a)anthracene	0.016	0.012	0.019	0.016	0.001	<0.001	0.016
Benzo(b)fluoranthene	0.014	0.018	0.017	0.015	0.001	0.003	0.006
Benzo(k)fluoranthene	0.008	0.026	0.019	0.018	0.001	<0.001	0.007
Benzo(a)pyrene	0.014	0.019	0.013	0.018	0.001	<0.001	0.015
3-Methylcholanthrene	0.018	0.013	0.009	0.01	0.001	<0.001	0.017
Indeno(123-cd)pyrene	0.01	0.011	0.007	0.008	0.001	<0.001	0.011
Dibenz(a,h)anthracene	0.009	0.008	0.007	0.008	0.001	<0.001	0.009
Benzo(ghi)perylene	0.018	0.02	0.023	0.02	0.001	<0.001	0.016
Dibenzo(a,l)pyrene	0.007	0.009	0.006	0.013	0.001	<0.001	0.007
Dibenzo(a,i)pyrene	0.015	0.01	0.007	0.018	0.001	0.002	0.016
Dibenzo(a,h)pyrene	0.007	0.005	0.005	0.006	0.001	<0.001	0.007



Compound Name	Results (ng/m3)						
	AMS 1	AMS 6	AMS 7	AMS 14	Lab Blank	Field Blank	AMS 6 Repeat
	Fort McKay 13-Nov	Patricia McInnes 13-Nov	Athabasca Valley 13-Nov	Anzac 13-Nov	13-Nov	13-Nov	Patricia McInnes 13-Nov
Naphthalene	19.4	9.89	20.3	5.51	0.003	0.1	10.9
Acenaphthylene	1.81	0.328	5.04	0.218	0.002	0.004	0.396
Acenaphthene	1.47	0.603	1.47	0.955	0.001	0.012	0.605
Fluorene	1.65	0.779	1.86	0.713	0.001	0.011	0.803
Phenanthrene	2.78	1.25	3.57	0.865	0.002	0.036	1.31
Anthracene	0.393	0.113	0.595	0.094	0.001	0.008	0.114
Acridine	0.177	0.054	0.108	0.028	0.001	0.002	0.056
Fluoranthene	0.45	0.218	0.724	0.124	0.002	0.004	0.214
Pyrene	0.819	0.211	0.957	0.106	0.002	0.005	0.21
Benzo(c)phenanthrene	0.074	0.028	0.065	0.02	0.001	<0.001	0.024
Benzo(a)anthracene	0.246	0.078	0.128	0.058	0.001	<0.001	0.082
Chrysene	0.271	0.092	0.16	0.06	0.001	<0.001	0.1
7,12-Dimethylbenz(a)anthracene	0.183	0.118	0.059	0.027	0.001	0.002	0.12
Benzo(b)fluoranthene	0.094	0.082	0.158	0.064	0.001	0.001	0.084
Benzo(k)fluoranthene	0.105	0.093	0.178	0.072	0.001	0.001	0.095
Benzo(a)pyrene	0.193	0.039	0.108	0.029	0.001	<0.001	0.04
3-Methylcholanthrene	0.072	0.032	0.047	0.031	0.001	0.002	0.033
Indeno(123-cd)pyrene	0.118	0.031	0.105	0.039	0.001	<0.001	0.033
Dibenz(a,h)anthracene	0.032	0.007	0.01	0.005	0.001	<0.001	0.007
Benzo(ghi)perylene	0.082	0.045	0.055	0.034	0.001	<0.001	0.048
Dibenzo(a,l)pyrene	0.063	0.024	0.041	0.015	0.001	<0.001	0.022
Dibenzo(a,i)pyrene	0.031	0.005	0.011	0.011	0.001	<0.001	0.005
Dibenzo(a,h)pyrene	0.004	0.005	0.004	0.004	0.001	<0.001	0.005



Compound Name	Results (ng/m3)						
	AMS 1	AMS 6	AMS 7	AMS 14	Lab Blank	Field Blank	AMS 1 Repeat
	Fort McKay 19-Nov	Patricia McInnes 19-Nov	Athabasca Valley 19-Nov	Anzac 19-Nov	19-Nov	19-Nov	Fort McKay 19-Nov
Naphthalene	8.77	7.32	13.4	3.5	0.003	0.079	8.27
Acenaphthylene	0.243	1.19	0.95	0.012	0.002	<0.001	0.219
Acenaphthene	0.593	0.465	0.537	0.368	0.001	0.005	0.536
Fluorene	0.717	0.91	0.841	0.421	0.001	0.011	0.721
Phenanthrene	1.51	1.86	1.39	0.551	0.002	0.016	1.44
Anthracene	0.202	0.209	0.278	0.06	0.001	0.002	0.209
Acridine	0.081	0.027	0.036	0.022	0.001	<0.001	0.085
Fluoranthene	0.243	0.387	0.239	0.055	0.002	0.002	0.231
Pyrene	0.34	0.413	0.324	0.05	0.002	0.004	0.325
Benzo(c)phenanthrene	0.028	0.034	0.024	0.003	0.001	<0.001	0.029
Benzo(a)anthracene	0.155	0.066	0.045	0.022	0.001	0.001	0.154
Chrysene	0.133	0.071	0.059	0.019	0.001	<0.001	0.134
7,12-Dimethylbenz(a)anthracene	0.081	0.029	0.024	0.02	0.001	<0.001	0.073
Benzo(b)fluoranthene	0.088	0.094	0.061	0.009	0.001	<0.001	0.084
Benzo(k)fluoranthene	0.1	0.107	0.069	0.01	0.001	<0.001	0.095
Benzo(a)pyrene	0.123	0.067	0.045	0.007	0.001	<0.001	0.125
3-Methylcholanthrene	0.064	0.044	0.036	0.037	0.001	0.003	0.067
Indeno(123-cd)pyrene	0.053	0.073	0.04	0.014	0.001	<0.001	0.055
Dibenz(a,h)anthracene	0.025	0.006	0.007	0.005	0.001	<0.001	0.026
Benzo(ghi)perylene	0.059	0.078	0.078	0.015	0.001	<0.001	0.057
Dibenzo(a,l)pyrene	0.053	0.037	0.022	0.006	0.001	<0.001	0.06
Dibenzo(a,i)pyrene	0.009	0.009	0.007	0.006	0.001	<0.001	0.009
Dibenzo(a,h)pyrene	0.006	0.004	0.004	0.004	0.001	<0.001	0.006



Compound Name	Results (ng/m3)						
	AMS 1	AMS 6	AMS 7	AMS 14	Lab Blank	Field Blank	AMS 7 Repeat
	Fort McKay 25-Nov	Patricia McInnes 25-Nov	Athabasca Valley 25-Nov	Anzac 25-Nov	25-Nov	25-Nov	Athabasca Valley 25-Nov
Naphthalene	2.79	0.563	9.05	2.51	0.003	0.077	9.74
Acenaphthylene	0.125	0.013	0.706	0.184	0.002	<0.001	0.696
Acenaphthene	0.338	0.021	0.464	0.402	0.001	0.004	0.48
Fluorene	0.381	0.163	0.966	0.421	0.001	0.003	0.987
Phenanthrene	0.696	0.138	1.08	0.395	0.002	0.03	1.04
Anthracene	0.058	0.046	0.126	0.062	0.001	0.002	0.137
Acridine	0.098	0.012	0.055	0.013	0.001	<0.001	0.056
Fluoranthene	0.083	0.02	0.13	0.093	0.002	0.003	0.131
Pyrene	0.129	0.024	0.175	0.096	0.002	0.006	0.173
Benzo(c)phenanthrene	0.007	0.006	0.017	0.018	0.001	0.001	0.015
Benzo(a)anthracene	0.021	0.018	0.034	0.035	0.001	0.001	0.038
Chrysene	0.021	0.011	0.044	0.054	0.001	<0.001	0.044
7,12-Dimethylbenz(a)anthracene	0.014	0.01	0.021	0.015	0.001	<0.001	0.024
Benzo(b)fluoranthene	0.015	0.016	0.036	0.057	0.001	0.003	0.037
Benzo(k)fluoranthene	0.017	0.018	0.041	0.064	0.001	0.003	0.042
Benzo(a)pyrene	0.043	0.018	0.032	0.041	0.001	<0.001	0.031
3-Methylcholanthrene	0.394	0.04	0.047	0.058	0.001	0.001	0.046
Indeno(123-cd)pyrene	0.012	0.013	0.018	0.04	0.001	<0.001	0.019
Dibenz(a,h)anthracene	0.007	0.008	0.008	0.007	0.001	<0.001	0.009
Benzo(ghi)perylene	0.02	0.015	0.038	0.041	0.001	<0.001	0.04
Dibenzo(a,l)pyrene	0.01	0.012	0.007	0.018	0.001	<0.001	0.007
Dibenzo(a,i)pyrene	0.005	0.005	0.005	0.006	0.001	<0.001	0.006
Dibenzo(a,h)pyrene	0.004	0.008	0.004	0.004	0.001	<0.001	0.005

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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION
Particulate Matter - Metals

2014
Indicated Sites and Dates

Station #	AMS 1	AMS 6	AMS 7	AMS 14	MDL	Lab Blank	Travel Blank			
Station Name	Fort McKay	Patricia McInnes	Athabasca Valley	Anzac						
Sample Date	1-Nov	1-Nov	1-Nov	1-Nov						
PM Size(µm)	2.5	2.5	2.5	2.5						
Total Air Volume (m3)	24	24	24	24						
Units	µg/M3	µg/M3	µg/M3	µg/M3						
Particulate Matter (µg)	174	129	251	121						
Unit	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg)	(µg)	(µg)			
Aluminum	0.0601	0.0907	0.0884	0.0334	0.2	<	<0.00833			
Arsenic	<0.000208	0.00342	0.00112	<0.000208	0.005	<	<0.000208			
Barium	0.00134	0.00212	0.00667	0.000811	0.005	<	<0.000208			
Beryllium	<0.000208	<0.000208	<0.000208	<0.000208	0.005	<	<0.000208			
Boron	<0.00833	<0.00833	<0.00833	<0.00833	0.2	<	<0.00833			
Cadmium	<0.000208	<0.000208	<0.000208	<0.000208	0.005	<	<0.000208			
Chromium	0.00295	0.00284	0.00244	0.00243	0.02	0.072573469	0.00303			
Cobalt	0.00227	0.00265	0.00228	0.00308	0.002	0.156239063	0.00335			
Copper	0.00144	0.00278	0.00498	0.00254	0.01	0.026200588	<0.000417			
Lead	0.000881	0.000623	0.000814	0.000618	0.005	<	<0.000208			
Manganese	0.00808	0.00275	0.00537	0.00165	0.002	0.052012209	0.00155			
Molybdenum	<0.0000833	<0.0000833	0.000153	0.000115	0.002	<	0.000962			
Nickel	<0.000833	<0.000833	<0.000833	<0.000833	0.02	<	<0.000833			
Silver	<0.0000833	<0.0000833	<0.0000833	<0.0000833	0.002	<	<0.0000833			
Strontium	0.000435	0.000269	0.000711	0.000770	0.005	0.005859788	<0.000208			
Titanium	0.0153	<0.000833	0.00371	<0.000833	0.02	<	<0.000833			
Uranium	<0.0000833	<0.0000833	<0.0000833	<0.0000833	0.002	<	<0.0000833			
Vanadium	0.000870	<0.000833	<0.000833	<0.000833	0.02	<	<0.000833			
Zinc	0.0145	0.0732	0.0269	0.0342	0.02	0.328430334	0.0145			
Iron	0.658	0.0712	0.262	0.0262	0.2	0.537075591	<0.00833			
Phosphorus	<0.208	<0.208	<0.208	<0.208	5	<	<0.208			

Station #	AMS 1	AMS 6	AMS 7	AMS 14	AMS 12	AMS 13	AMS 15	AMS 16	Travel Blank
Station Name	Fort McKay	Patricia McInnes	Athabasca Valley	Anzac	Millenium	Fort McKay South	CNRL Horizon	Shell Muskeg River	
Sample Date	1-Nov	1-Nov	1-Nov	1-Nov	1-Nov	1-Nov	1-Nov	1-Nov	1-Nov
PM Size(µm)	10	10	10	10	10	10	10	10	10
Total Air Volume (m3)	24	24	24	24	24	24	24.1	24	24
Units	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3
Particulate Matter (µg)	630	303	952	155	203	120	194	268	20
Unit	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg)
Aluminum	0.425	0.172	0.998	0.0264	0.0858	0.0302	0.0242	0.143	0.0362
Arsenic	0.000225	0.00407	0.00171	<0.000208	0.000213	<0.000208	<0.000207	<0.000208	<0.000208
Barium	0.00721	0.00549	0.0325	0.000769	0.00267	0.000898	0.000836	0.00271	<0.000208
Beryllium	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208	<0.000207	<0.000208	<0.000208
Boron	<0.00833	<0.00833	<0.00833	<0.00833	<0.00833	<0.00833	<0.00830	<0.00833	<0.00833
Cadmium	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208	<0.000207	<0.000208	<0.000208
Chromium	0.00344	0.00274	0.00419	0.00232	0.0195	0.00250	0.00236	0.00266	0.00221
Cobalt	0.00332	0.00302	0.00671	0.00428	0.00562	0.00507	0.00529	0.00645	0.00460
Copper	0.00357	0.00446	0.0184	0.000938	0.0175	0.0158	0.00121	0.00160	0.00146
Lead	0.000798	0.000741	0.00161	0.000388	0.000607	0.000499	0.000313	0.000442	<0.000208
Manganese	0.0242	0.00961	0.0434	0.00162	0.00879	0.00165	0.00148	0.00867	0.00133
Molybdenum	<0.0000833	0.0000934	0.000610	0.000192	0.000695	0.000492	0.000269	0.000387	0.00159
Nickel	0.00103	0.00109	0.00195	<0.000833	0.000905	<0.000833	<0.000830	<0.000833	<0.000833
Silver	<0.0000833	<0.0000833	<0.0000833	<0.0000833	<0.0000833	<0.0000833	<0.0000830	<0.0000833	<0.0000833
Strontium	0.00324	0.00118	0.00571	0.000285	0.000727	0.000418	0.000347	0.00155	<0.000208
Titanium	0.0159	0.00553	0.0349	<0.000833	<0.000833	<0.000833	<0.000830	0.00525	<0.000833
Uranium	<0.0000833	<0.0000833	<0.0000833	<0.0000833	<0.0000833	<0.0000833	<0.0000830	<0.0000833	<0.0000833
Vanadium	0.00215	0.00104	0.00342	<0.000833	0.00101	<0.000833	<0.000830	0.00108	<0.000833
Zinc	0.0238	0.0177	0.0321	0.0207	0.0307	0.0109	0.00959	0.0289	0.0115
Iron	1.46	0.531	2.77	0.0314	0.381	0.0399	0.0885	0.469	<0.00833



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Station #	AMS 1	AMS 6	AMS 7	AMS 14	MDL	Lab Blank	Travel Blank			
Station Name	Fort McKay	Patricia McInnes	Athabasca Valley	Anzac						
Sample Date	7-Nov	7-Nov	7-Nov	7-Nov						
PM Size(µm)	2.5	2.5	2.5	2.5						
Total Air Volume (m3)	24	24	24	24						
Units	µg/M3	µg/M3	µg/M3	µg/M3						
Particulate Matter (µg)	53	92	71	83						
Unit	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg)	(µg)	(µg)			
Aluminum	0.0178	0.0439	0.0334	0.0158	0.2	<	<0.00833			
Arsenic	0.000395	0.000340	<0.000208	<0.000208	0.005	<	<0.000208			
Barium	0.000552	0.000619	0.000772	0.000409	0.005	<	0.000684			
Beryllium	<0.000208	<0.000208	<0.000208	<0.000208	0.005	<	<0.000208			
Boron	<0.00833	<0.00833	<0.00833	<0.00833	0.2	<	<0.00833			
Cadmium	<0.000208	<0.000208	<0.000208	<0.000208	0.005	<	<0.000208			
Chromium	0.00205	0.00195	0.00203	0.00192	0.02	0.072573469	0.00185			
Cobalt	0.00190	0.00187	0.00210	0.00193	0.002	0.156239063	0.00328			
Copper	0.000726	0.00179	0.00239	0.000574	0.01	0.026200588	<0.000417			
Lead	0.000362	0.000343	0.000239	0.000266	0.005	<	<0.000208			
Manganese	0.00179	0.00331	0.00254	0.00119	0.002	0.052012209	0.00125			
Molybdenum	0.000130	<0.0000833	<0.0000833	0.000132	0.002	<	0.000482			
Nickel	<0.000833	<0.000833	<0.000833	<0.000833	0.02	<	<0.000833			
Silver	<0.0000833	<0.0000833	<0.0000833	<0.0000833	0.002	<	<0.0000833			
Strontium	0.000252	0.000262	0.000311	0.000273	0.005	0.005859788	0.000272			
Titanium	<0.000833	<0.000833	0.00169	<0.000833	0.02	<	<0.000833			
Uranium	<0.0000833	<0.0000833	<0.0000833	<0.0000833	0.002	<	<0.0000833			
Vanadium	<0.000833	<0.000833	0.000841	<0.000833	0.02	<	<0.000833			
Zinc	0.0102	0.0152	0.00875	0.00885	0.02	0.328430334	0.00707			
Iron	0.0225	0.0582	0.0694	0.0270	0.2	0.537075591	<0.00833			
Phosphorus	<0.208	<0.208	<0.208	<0.208	5	<	<0.208			

Station #	AMS 1	AMS 6	AMS 7	AMS 14	AMS 12	AMS 13	AMS 15	AMS 16	Travel Blank
Station Name	Fort McKay	Patricia McInnes	Athabasca Valley	Anzac	Millenium	Fort McKay South	CNRL Horizon	Shell Muskeg River	
Sample Date	7-Nov	7-Nov	7-Nov	7-Nov	7-Nov	7-Nov	7-Nov	7-Nov	7-Nov
PM Size(µm)	10	10	10	10	10	10	10	10	10
Total Air Volume (m3)	24	24	24	24	24	24	24	24	24
Units	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3
Particulate Matter (µg)	202	275	433	236	320	102	188	1370	6
Unit	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg)
Aluminum	0.0925	0.125	0.277	0.143	0.182	0.0702	0.135	1.08	0.0163
Arsenic	<0.000208	0.000394	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208	0.000535	<0.000208
Barium	0.00170	0.00193	0.00466	0.00313	0.00270	0.00126	0.00279	0.0140	0.00136
Beryllium	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208
Boron	<0.00833	<0.00833	<0.00833	<0.00833	<0.00833	<0.00833	<0.00833	<0.00833	<0.00833
Cadmium	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208
Chromium	0.00242	0.00235	0.00242	0.00226	0.00220	0.00132	0.00248	0.00339	0.00234
Cobalt	0.00218	0.00250	0.00288	0.00315	0.00349	0.00425	0.00432	0.00925	0.00341
Copper	0.000748	0.000747	0.00199	0.00262	0.000918	0.00680	0.000758	0.00273	0.000714
Lead	0.000304	0.000338	0.000510	0.000435	0.000436	0.000296	0.000330	0.00110	<0.000208
Manganese	0.00641	0.00866	0.0152	0.00680	0.0110	0.0172	0.00938	0.0792	0.00103
Molybdenum	<0.0000833	<0.0000833	0.000131	0.000168	0.0000877	0.000200	0.000475	0.000601	0.00143
Nickel	<0.000833	<0.000833	0.00136	0.00222	<0.000833	0.00566	<0.000833	0.00218	<0.000833
Silver	<0.0000833	<0.0000833	<0.0000833	<0.0000833	<0.0000833	<0.0000833	<0.0000833	<0.0000833	<0.0000833
Strontium	0.000890	0.00105	0.00239	0.00511	0.00214	0.000665	0.00108	0.00848	<0.000208
Titanium	0.00266	0.00458	0.00751	0.00281	0.0688	0.00146	0.00363	0.0368	<0.000833
Uranium	<0.0000833	<0.0000833	<0.0000833	<0.0000833	<0.0000833	<0.0000833	<0.0000833	0.0000901	<0.0000833
Vanadium	0.000949	0.00111	0.00174	0.00112	0.00105	<0.000833	0.00102	0.00413	<0.000833
Zinc	0.00989	0.0115	0.0433	0.0118	0.0113	0.0147	0.00822	0.0157	0.0976
Iron	0.264	0.359	0.785	0.313	0.540	0.157	0.593	4.29	0.125



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Station #	AMS 1	AMS 6	AMS 7	AMS 14	MDL	Lab Blank	Travel Blank			
Station Name	Fort McKay	Patricia McInnes	Athabasca Valley	Anzac						
Sample Date	13-Nov	13-Nov	13-Nov	13-Nov						
PM Size(µm)	2.5	2.5	2.5	2.5						
Total Air Volume (m3)	24	24	24	24						
Units	µg/M3	µg/M3	µg/M3	µg/M3						
Particulate Matter (µg)	294	335	283	179						
Unit	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg)	(µg)	(µg)			
Aluminum	0.119	0.0180	0.0413	0.0191	0.2	<	0.0120			
Arsenic	0.000512	0.000451	0.000269	0.000302	0.005	<	<0.000208			
Barium	0.00277	0.00339	0.00510	0.00159	0.005	<	<0.000208			
Beryllium	<0.000208	<0.000208	<0.000208	<0.000208	0.005	<	<0.000208			
Boron	<0.00833	<0.00833	<0.00833	<0.00833	0.2	<	<0.00833			
Cadmium	<0.000208	<0.000208	<0.000208	<0.000208	0.005	<	<0.000208			
Chromium	0.00253	0.00266	0.00267	0.00275	0.02	0.072573469	0.00238			
Cobalt	0.00380	0.00201	0.00331	0.00493	0.002	0.156239063	0.00475			
Copper	0.00185	0.00114	0.00445	0.00282	0.01	0.026200588	0.000667			
Lead	0.000636	0.000802	0.000652	0.00131	0.005	<	<0.000208			
Manganese	0.00863	0.00201	0.00428	0.00343	0.002	0.052012209	0.000565			
Molybdenum	0.000400	0.000160	0.000270	0.000185	0.002	<	0.000593			
Nickel	<0.000833	<0.000833	<0.000833	0.00133	0.02	<	<0.000833			
Silver	<0.0000833	<0.0000833	<0.0000833	<0.0000833	0.002	<	<0.0000833			
Strontium	0.000910	0.000316	0.000650	0.000406	0.005	0.005859788	0.000498			
Titanium	0.00142	<0.000833	0.00195	<0.000833	0.02	<	<0.000833			
Uranium	<0.0000833	<0.0000833	<0.0000833	<0.0000833	0.002	<	<0.0000833			
Vanadium	0.00133	0.00126	0.00165	<0.000833	0.02	<	<0.000833			
Zinc	0.0276	0.0169	0.0140	0.0291	0.02	0.328430334	0.0160			
Iron	0.338	0.0495	0.181	0.0214	0.2	0.537075591	0.0126			
Phosphorus	<0.208	<0.208	<0.208	<0.208	5	<	<0.208			

Station #	AMS 1	AMS 6	AMS 7	AMS 14	AMS 12	AMS 13	AMS 15	AMS 16	Travel Blank
Station Name	Fort McKay	Patricia McInnes	Athabasca Valley	Anzac	Millenium	Fort McKay South	CNRL Horizon	Shell Muskeg River	
Sample Date	13-Nov	13-Nov	13-Nov	13-Nov	13-Nov	13-Nov	13-Nov	13-Nov	13-Nov
PM Size(µm)	10	10	10	10	10	10	10	10	10
Total Air Volume (m3)	24	24	24	24	24	24	24	24	24
Units	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3
Particulate Matter (µg)	997	492	842	180	1235	648	683	1572	7
Unit	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg)
Aluminum	0.701	0.171	0.366	0.0398	0.602	0.384	0.547	1.02	<0.00833
Arsenic	0.000655	0.000506	0.000542	0.000278	0.000839	0.000464	0.000432	0.000949	<0.000208
Barium	0.0108	0.00409	0.0218	0.00162	0.00913	0.00781	0.0110	0.0168	<0.000208
Beryllium	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208
Boron	<0.00833	<0.00833	<0.00833	<0.00833	<0.00833	<0.00833	<0.00833	<0.00833	<0.00833
Cadmium	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208
Chromium	0.00340	0.00355	0.0114	0.00247	0.00367	0.00306	0.00336	0.00408	0.00201
Cobalt	0.00263	0.00359	0.00287	0.00308	0.00550	0.00665	0.00603	0.0115	0.00381
Copper	0.00447	0.00217	0.0140	0.00106	0.00208	0.0220	0.00219	0.00677	0.000906
Lead	0.00102	0.000899	0.00104	0.000613	0.00136	0.000765	0.000903	0.00175	<0.000208
Manganese	0.0429	0.0138	0.0254	0.00271	0.0339	0.0233	0.0443	0.0801	0.000396
Molybdenum	0.000572	0.000279	0.000684	0.000256	0.000734	0.000982	0.000467	0.00117	0.00155
Nickel	0.00233	0.000911	0.00128	<0.000833	0.00193	0.0129	0.00200	0.0115	<0.000833
Silver	<0.0000833	<0.0000833	<0.0000833	<0.0000833	<0.0000833	<0.0000833	<0.0000833	<0.0000833	<0.0000833
Strontium	0.00513	0.00197	0.00446	0.000409	0.00666	0.00327	0.00439	0.00897	<0.000208
Titanium	0.0205	0.00534	0.0107	<0.000833	0.0169	0.0114	0.0252	0.0332	<0.000833
Uranium	<0.0000833	<0.0000833	<0.0000833	<0.0000833	<0.0000833	<0.0000833	<0.0000833	0.0000953	<0.0000833
Vanadium	0.00501	0.00219	0.00537	<0.000833	0.00488	0.00385	0.00326	0.00712	<0.000833
Zinc	0.0296	0.0167	0.0246	0.0158	0.0272	0.0424	0.0211	0.0790	0.0170
Iron	2.10	0.686	1.72	0.0656	2.00	1.36	2.75	4.55	0.0126



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Station #	AMS 1	AMS 6	AMS 7	AMS 14	MDL	Lab Blank	Travel Blank		
Station Name	Fort McKay	Patricia McInnes	Athabasca Valley	Anzac					
Sample Date	19-Nov	19-Nov	19-Nov	19-Nov				19-Nov	
PM Size(µm)	2.5	2.5	2.5	2.5				2.5	
Total Air Volume (m3)	24	24	24	24				24	
Units	µg/M3	µg/M3	µg/M3	µg/M3				µg/M3	
Particulate Matter (µg)	117	121	248	180				8	
Unit	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg)	(µg)	(µg)	(µg)	(µg)
Aluminum	0.0416	0.0240	0.0324	0.0149	0.2	<	<	<0.00833	
Arsenic	0.000415	0.000408	<0.000208	<0.000208	0.005	<	<	<0.000208	
Barium	0.00119	0.000801	0.00186	<0.000208	0.005	<	<	<0.000208	
Beryllium	<0.000208	<0.000208	<0.000208	<0.000208	0.005	<	<	<0.000208	
Boron	<0.00833	<0.00833	<0.00833	<0.00833	0.2	<	<	<0.00833	
Cadmium	<0.000208	<0.000208	<0.000208	<0.000208	0.005	<	<	<0.000208	
Chromium	0.00225	0.00247	0.00219	0.00253	0.02	0.072573469		0.00217	
Cobalt	0.00398	0.00393	0.00479	0.00586	0.002	0.156239063		0.00770	
Copper	0.00102	0.00162	0.00176	0.00122	0.01	0.026200588		<0.000417	
Lead	0.000430	0.000361	0.000469	0.000212	0.005	<	<	<0.000208	
Manganese	0.00427	0.00256	0.00221	0.00155	0.002	0.052012209		0.000655	
Molybdenum	0.000247	<0.0000833	<0.0000833	0.000139	0.002	<	<	0.000500	
Nickel	<0.000833	0.00123	<0.000833	<0.000833	0.02	<	<	<0.000833	
Silver	<0.0000833	<0.0000833	<0.0000833	<0.0000833	0.002	<	<	<0.0000833	
Strontium	0.000548	0.000220	0.000375	0.000245	0.005	0.005859788		<0.000208	
Titanium	<0.000833	<0.000833	<0.000833	<0.000833	0.02	<	<	<0.000833	
Uranium	<0.0000833	<0.0000833	<0.0000833	<0.0000833	0.002	<	<	<0.0000833	
Vanadium	<0.000833	<0.000833	<0.000833	<0.000833	0.02	<	<	<0.000833	
Zinc	0.0126	0.0179	0.00863	0.00738	0.02	0.328430334		0.0107	
Iron	0.138	0.0318	0.0952	0.0505	0.2	0.537075591		<0.00833	
Phosphorus	<0.208	<0.208	<0.208	<0.208	5	<	<	<0.208	

Station #	AMS 1	AMS 6	AMS 7	AMS 12	AMS 13	AMS 15	AMS 16	Travel Blank
Station Name	Fort McKay	Patricia McInnes	Athabasca Valley	Millenium	Fort McKay South	CNRL Horizon	Shell Muskeg River	
Sample Date	19-Nov	19-Nov	19-Nov	19-Nov	19-Nov	19-Nov	19-Nov	19-Nov
PM Size(µm)	10	10	10	10	10	10	10	10
Total Air Volume (m3)	24	24	24	24	24	24	24	24
Units	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3
Particulate Matter (µg)	647	305	508	855	295	281	957	19
Unit	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg)
Aluminum	0.577	0.107	0.179	0.644	0.272	0.176	0.693	0.00971
Arsenic	0.000458	0.000507	<0.000208	0.000291	0.000220	<0.000208	0.000373	<0.000208
Barium	0.00896	0.00460	0.00733	0.00683	0.00434	0.00290	0.00821	<0.000208
Beryllium	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208
Boron	<0.00833	<0.00833	<0.00833	<0.00833	<0.00833	<0.00833	<0.00833	<0.00833
Cadmium	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208
Chromium	0.00369	0.00269	0.00317	0.00294	0.00289	0.00239	0.00338	0.00218
Cobalt	0.00502	0.00579	0.00490	0.00720	0.00965	0.00660	0.0138	0.00617
Copper	0.00243	0.00435	0.00577	0.00257	0.0156	0.000910	0.00282	0.000432
Lead	0.000822	0.000468	0.000771	0.000783	0.000604	0.000424	0.000924	<0.000208
Manganese	0.0300	0.00862	0.0104	0.0313	0.0172	0.0109	0.0435	0.00114
Molybdenum	0.000372	0.000125	0.000229	0.000383	0.000741	0.000347	0.000636	0.00138
Nickel	0.00202	<0.000833	0.00111	0.00170	0.000873	<0.000833	0.00159	<0.000833
Silver	<0.0000833	<0.0000833	<0.0000833	<0.0000833	<0.0000833	<0.0000833	<0.0000833	<0.0000833
Strontium	0.00604	0.00121	0.00177	0.00501	0.00198	0.00160	0.00553	<0.000208
Titanium	0.0181	0.00366	0.00590	0.0136	0.00930	0.00364	0.0173	<0.000833
Uranium	<0.0000833	<0.0000833	<0.0000833	<0.0000833	<0.0000833	<0.0000833	<0.0000833	<0.0000833
Vanadium	0.00415	0.000917	0.00108	0.00243	0.00167	0.00108	0.00293	<0.000833
Zinc	0.0128	0.0121	0.0217	0.0240	0.0186	0.00739	0.0196	0.00587
Iron	1.65	0.416	0.673	1.70	0.918	0.545	2.28	<0.00833



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Station #	AMS 1	AMS 6	AMS 7	AMS 14	MDL	Lab Blank	Travel Blank			
Station Name	Fort McKay	Patricia McInnes	Athabasca Valley	Anzac						
Sample Date	25-Nov	25-Nov	25-Nov	25-Nov						
PM Size(µm)	2.5	2.5	2.5	2.5						
Total Air Volume (m3)	24	24	24	24						
Units	µg/M3	µg/M3	µg/M3	µg/M3						
Particulate Matter (µg)	78	12	86	84						
Unit	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg)	(µg)	(µg)			
Aluminum	0.0819	0.0113	0.0300	0.0200	0.2	<				0.0138
Arsenic	0.000313	<0.000208	<0.000208	<0.000208	0.005	<				<0.000208
Barium	0.000536	0.000267	0.00110	0.000341	0.005	<				0.000385
Beryllium	<0.000208	<0.000208	<0.000208	<0.000208	0.005	<				<0.000208
Boron	<0.00833	<0.00833	<0.00833	<0.00833	0.2	<				<0.00833
Cadmium	<0.000208	<0.000208	<0.000208	<0.000208	0.005	<				<0.000208
Chromium	0.00273	0.00319	0.00340	0.00311	0.02	0.072573469				0.00313
Cobalt	0.000304	0.000450	0.00124	0.000458	0.002	0.156239063				0.000419
Copper	0.00362	0.000529	0.00302	0.00107	0.01	0.026200588				0.000695
Lead	0.000594	<0.000208	0.000521	0.000453	0.005	<				<0.000208
Manganese	0.00284	0.00141	0.00825	0.00237	0.002	0.052012209				0.00267
Molybdenum	0.000138	<0.0000833	0.000570	0.000568	0.002	<				0.000552
Nickel	<0.000833	<0.000833	<0.000833	<0.000833	0.02	<				<0.000833
Silver	<0.0000833	<0.0000833	<0.0000833	<0.0000833	0.002	<				<0.0000833
Strontium	0.000304	0.000438	0.00101	<0.000208	0.005	0.005859788				<0.000208
Titanium	<0.000833	<0.000833	<0.000833	<0.000833	0.02	<				<0.000833
Uranium	<0.0000833	<0.0000833	<0.0000833	<0.0000833	0.002	<				<0.0000833
Vanadium	<0.000833	<0.000833	0.00360	0.00327	0.02	<				0.000837
Zinc	0.00782	0.0140	0.0105	0.0207	0.02	0.328430334				0.0550
Iron	0.0313	0.0175	0.0528	0.0393	0.2	0.537075591				<0.00833
Phosphorus	<0.208	<0.208	<0.208	<0.208	5	<				<0.208

Station #	AMS 1	AMS 6	AMS 7	AMS 14	AMS 12	AMS 13	AMS 15	AMS 16	Travel Blank
Station Name	Fort McKay	Patricia McInnes	Athabasca Valley	Anzac	Millenium	Fort McKay South	CNRL Horizon	Shell Muskeg River	
Sample Date	25-Nov	25-Nov	25-Nov	25-Nov	25-Nov	25-Nov	25-Nov	25-Nov	25-Nov
PM Size(µm)	10	10	10	10	10	10	10	10	10
Total Air Volume (m3)	24	24	24	24	24	24	24	24	24
Units	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3
Particulate Matter (µg)	178	6	200	101	502	274	109	230	21
Unit	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg)
Aluminum	0.103	0.0182	0.0480	0.0266	0.314	0.0595	0.0407	0.117	<0.00833
Arsenic	<0.000208	<0.000208	<0.000208	<0.000208	0.000247	<0.000208	<0.000208	<0.000208	<0.000208
Barium	0.00120	0.000215	0.00327	0.00121	0.00462	0.00103	0.000880	0.00197	0.000216
Beryllium	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208
Boron	<0.00833	<0.00833	<0.00833	<0.00833	<0.00833	<0.00833	<0.00833	<0.00833	<0.00833
Cadmium	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208	<0.000208
Chromium	0.00290	0.00315	0.00349	0.00318	0.00420	0.00331	0.00338	0.00339	0.00269
Cobalt	0.000269	0.000521	0.000467	0.00133	0.00107	0.000477	0.000574	0.000317	0.000362
Copper	0.00110	0.00303	0.00402	0.000993	0.00565	0.000818	0.00576	0.0102	0.000477
Lead	0.000450	0.000805	0.000768	0.000429	0.000739	0.000428	0.000640	0.000536	<0.000208
Manganese	0.00473	0.00342	0.00558	0.00232	0.0417	0.00452	0.00559	0.0117	0.00114
Molybdenum	0.0000954	<0.0000833	0.000639	0.000515	0.000349	0.000193	0.000262	0.000405	0.00154
Nickel	<0.000833	<0.000833	0.000839	<0.000833	0.0137	<0.000833	<0.000833	<0.000833	<0.000833
Silver	<0.0000833	<0.0000833	<0.0000833	<0.0000833	<0.0000833	<0.0000833	<0.0000833	<0.0000833	<0.0000833
Strontium	0.000604	0.000218	0.000720	0.000337	0.00333	0.000508	0.000463	0.00106	<0.000208
Titanium	0.00427	<0.000833	0.00143	<0.000833	0.00710	<0.000833	<0.000833	0.00228	<0.000833
Uranium	<0.0000833	<0.0000833	<0.0000833	<0.0000833	<0.0000833	<0.0000833	<0.0000833	<0.0000833	<0.0000833
Vanadium	0.00101	<0.000833	0.00402	0.00246	0.00170	0.00100	0.000935	0.00114	<0.000833
Zinc	0.00742	0.0138	0.0104	0.00873	0.0194	0.00819	0.00931	0.00744	0.00439
Iron	0.170	0.0158	0.192	0.119	1.07	0.143	0.135	0.410	0.0134

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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION
Particulate Matter - Ions

2014
Indicated Sites and Dates

Station #	AMS 1	AMS 6	AMS 7	AMS 14	MDL	Lab Blank	Travel Blank
Station Name	Fort McKay	Patricia McInnes	Athabasca Valley	Anzac			
Sample Date	1-Nov	1-Nov	1-Nov	1-Nov			1-Nov
PM Size(µm)	2.5	2.5	2.5	2.5			2.5
Total Air Volume (m3)	24	24	24	24			24
Particulate Matter (µg)	µg/M3	µg/M3	µg/M3	µg/M3			µg/M3
Unit	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg)	(µg)	(µg)
Chloride	0.0184	0.0196	0.0254	0.0177	0.4	<	0.0224
Nitrate	0.0909	0.0945	0.158	0.0798	0.2	1.437005335	0.0632
Sulphate	0.843	0.978	1.02	0.908	1	2.0506367	0.0925
Ammonium (as N)	0.331	0.285	0.343	0.343	0.5	<	<0.0208
Calcium	0.159	<0.0833	0.140	<0.0833	2	<	<0.0833
Magnesium	<0.0417	<0.0417	<0.0417	<0.0417	1	<	<0.0417
Potassium	0.0580	0.0553	0.0696	0.0529	0.2	0.4682455	0.0225

Station #	AMS 1	AMS 6	AMS 7	AMS 14	AMS 12	AMS 13	AMS 15	AMS 16	Travel Blank
Station Name	Fort McKay	Patricia McInnes	Athabasca Valley	Anzac	Millenium	Fort McKay South	CNRL Horizon	Shell Muskeg River	
Sample Date	41944	41944	41944	41944	41944	41944	41944	41944	41944
PM Size(µm)	10	10	10	10	10	10	10	10	10
Total Air Volume (m3)	24	24	24	24	24	24	24.1	24	24
Particulate Matter (µg)	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3
Unit	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg)
Chloride	0.0351	0.0369	0.170	0.0193	0.0418	0.0180	0.0173	0.0254	0.0255
Nitrate	0.158	0.171	0.268	0.117	0.245	0.0814	0.0767	0.155	0.0526
Sulphate	0.903	0.828	1.10	0.707	0.974	0.677	0.779	0.819	0.0616
Ammonium (as N)	0.257	0.277	0.295	0.278	0.361	0.288	0.317	0.291	<0.0208
Calcium	1.76	0.412	1.60	<0.0833	0.218	0.110	0.0968	0.776	<0.0833
Magnesium	0.0638	0.0591	0.136	<0.0417	<0.0417	<0.0417	<0.0415	<0.0417	<0.0417
Potassium	0.0621	0.0698	0.0896	0.0688	0.0855	0.0620	0.0569	0.0457	0.0176



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION
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Station #	AMS 1	AMS 6	AMS 7	AMS 14	MDL	Lab Blank	Travel Blank
Station Name	Fort McKay	Patricia McInnes	Athabasca Valley	Anzac			
Sample Date	7-Nov	7-Nov	7-Nov	7-Nov			7-Nov
PM Size(µm)	2.5	2.5	2.5	2.5			2.5
Total Air Volume (m3)	24	24	24	24			24
Particulate Matter (µg)	µg/M3	µg/M3	µg/M3	µg/M3			µg/M3
Unit	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg)	(µg)	(µg)
Chloride	0.0228	0.0245	0.0215	<0.0167	0.4	<	<0.0167
Nitrate	0.0850	0.143	0.0956	0.0624	0.2	1.437005335	0.0462
Sulphate	0.519	0.546	0.801	0.718	1	2.0506367	0.0634
Ammonium (as N)	0.174	0.198	0.268	0.302	0.5	<	<0.0208
Calcium	<0.0833	<0.0833	<0.0833	<0.0833	2	<	<0.0833
Magnesium	<0.0417	<0.0417	<0.0417	<0.0417	1	<	<0.0417
Potassium	0.0230	0.0297	0.0347	0.0522	0.2	0.4682455	0.0200

Station #	AMS 1	AMS 6	AMS 7	AMS 14	AMS 12	AMS 13	AMS 15	AMS 16	Travel Blank
Station Name	Fort McKay	Patricia McInnes	Athabasca Valley	Anzac	Millenium	Fort McKay South	CNRL Horizon	Shell Muskeg River	
Sample Date	41950	41950	41950	41950	41950	41950	41950	41950	41950
PM Size(µm)	10	10	10	10	10	10	10	10	10
Total Air Volume (m3)	24	24	24	24	24	24	24	24	24
Particulate Matter (µg)	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3
Unit	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg)
Chloride	0.0378	0.0313	0.0871	0.0355	0.106	0.120	0.0407	0.0933	0.0195
Nitrate	0.102	0.115	0.149	0.101	0.104	0.0996	0.0711	0.0941	0.0779
Sulphate	0.519	0.587	0.717	0.630	0.571	0.534	0.505	0.678	0.0766
Ammonium (as N)	0.203	0.184	0.212	0.232	0.154	0.174	1.10	0.121	<0.0208
Calcium	0.277	0.319	0.618	0.289	1.22	0.238	1.37	2.84	<0.0833
Magnesium	<0.0417	<0.0417	0.0603	<0.0417	0.0447	<0.0417	0.0673	0.192	<0.0417
Potassium	0.0313	0.0357	0.0427	0.0580	0.0357	0.0270	2.07	0.0403	0.0210



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION
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Station #	AMS 1	AMS 6	AMS 7	AMS 14	MDL	Lab Blank	Travel Blank
Station Name	Fort McKay	Patricia McInnes	Athabasca Valley	Anzac			
Sample Date	13-Nov	13-Nov	13-Nov	13-Nov			13-Nov
PM Size(µm)	2.5	2.5	2.5	2.5			2.5
Total Air Volume (m3)	24	24	24	24			24
Particulate Matter (µg)	µg/M3	µg/M3	µg/M3	µg/M3			µg/M3
Unit	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg)	(µg)	(µg)
Chloride	0.0199	<0.0167	0.0552	0.0217	0.4	<	<0.0167
Nitrate	0.554	0.536	0.716	0.466	0.2	1.437005335	0.0569
Sulphate	0.712	1.16	0.759	0.671	1	2.0506367	0.0760
Ammonium (as N)	0.304	0.568	0.387	0.353	0.5	<	<0.0208
Calcium	0.189	<0.0833	0.131	<0.0833	2	<	<0.0833
Magnesium	<0.0417	<0.0417	<0.0417	<0.0417	1	<	<0.0417
Potassium	0.0892	0.105	0.0734	0.0798	0.2	0.4682455	0.0193

Station #	AMS 1	AMS 6	AMS 7	AMS 14	AMS 12	AMS 13	AMS 15	AMS 16	Travel Blank
Station Name	Fort McKay	Patricia McInnes	Athabasca Valley	Anzac	Millenium	Fort McKay South	CNRL Horizon	Shell Muskeg River	
Sample Date	41956	41956	41956	41956	41956	41956	41956	41956	41956
PM Size(µm)	10	10	10	10	10	10	10	10	10
Total Air Volume (m3)	24	24	24	24	24	24	24	24	24
Particulate Matter (µg)	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3
Unit	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg)
Chloride	0.157	0.0512	3.91	0.0205	0.0594	0.0977	0.0821	0.0946	<0.0167
Nitrate	0.916	0.873	0.976	0.419	1.04	0.750	0.398	0.927	0.0451
Sulphate	1.14	1.19	0.911	0.619	2.03	0.912	0.606	1.81	0.0572
Ammonium (as N)	0.328	0.443	0.338	0.328	0.567	0.298	0.179	0.431	<0.0208
Calcium	1.84	0.983	1.28	0.218	3.10	1.25	1.86	3.46	<0.0833
Magnesium	0.154	0.0695	0.123	<0.0417	0.119	0.103	0.162	0.201	<0.0417
Potassium	0.146	0.101	0.151	0.0946	0.128	0.113	0.0731	0.113	0.0211



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION
Particulate Matter - Ions

2014
Indicated Sites and Dates

Station #	AMS 1	AMS 6	AMS 7	AMS 14	MDL	Lab Blank	Travel Blank
Station Name	Fort McKay	Patricia McInnes	Athabasca Valley	Anzac			
Sample Date	19-Nov	19-Nov	19-Nov	19-Nov			19-Nov
PM Size(µm)	2.5	2.5	2.5	2.5			2.5
Total Air Volume (m3)	24	24	24	24			24
Particulate Matter (µg)	µg/M3	µg/M3	µg/M3	µg/M3			µg/M3
Unit	117	121	248	180			8
	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg)	(µg)	(µg)
Chloride	0.0291	0.0203	0.215	0.0176	0.4	<	<0.0167
Nitrate	0.154	0.110	0.155	0.0636	0.2	1.437005335	0.0482
Sulphate	0.476	0.423	0.405	0.343	1	2.0506367	0.0778
Ammonium (as N)	0.168	0.162	0.146	0.106	0.5	<	<0.0208
Calcium	0.198	0.0846	0.128	<0.0833	2	<	<0.0833
Magnesium	<0.0417	<0.0417	<0.0417	<0.0417	1	<	<0.0417
Potassium	0.0499	0.0513	0.0511	0.0347	0.2	0.4682455	0.0169

Station #	AMS 1	AMS 6	AMS 7	AMS 14	AMS 12	AMS 13	AMS 15	AMS 16	Travel Blank
Station Name	Fort McKay	Patricia McInnes	Athabasca Valley	Anzac	Millenium	Fort McKay South	CNRL Horizon	Shell Muskeg River	
Sample Date	41962	41962	41962	41962	41962	41962	41962	41962	41962
PM Size(µm)	10	10	10	10	10	10	10	10	10
Total Air Volume (m3)	24	24	24	24	24	24	24	24	24
Particulate Matter (µg)	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3
Unit	647	305	508	97	855	295	281	957	19
	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg)
Chloride	0.186	1.17	3.12	0.0221	0.0825	0.0622	0.0531	0.0798	<0.0167
Nitrate	0.236	0.170	0.148	0.0648	0.197	0.139	0.127	0.153	0.0470
Sulphate	0.551	0.428	0.405	0.312	0.492	0.445	0.489	0.504	0.0907
Ammonium (as N)	0.120	0.191	0.181	0.121	0.103	0.133	0.135	0.0980	<0.0208
Calcium	2.44	0.565	0.606	0.0844	2.73	0.608	0.989	2.65	<0.0833
Magnesium	0.0997	0.0614	0.0614	<0.0417	0.0912	0.0666	<0.0417	0.122	<0.0417
Potassium	0.0553	0.0836	0.119	0.0343	0.0536	0.0416	0.0401	0.0429	0.0192



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION
Particulate Matter - Ions

2014
Indicated Sites and Dates

Station #	AMS 1	AMS 6	AMS 7	AMS 14	MDL	Lab Blank	Travel Blank
Station Name	Fort McKay	Patricia McInnes	Athabasca Valley	Anzac			
Sample Date	25-Nov	25-Nov	25-Nov	25-Nov			25-Nov
PM Size(µm)	2.5	2.5	2.5	2.5			2.5
Total Air Volume (m3)	24	24	24	24			24
Particulate Matter (µg)	µg/M3	µg/M3	µg/M3	µg/M3			µg/M3
Unit	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg)	(µg)	(µg)
Chloride	0.0248	<0.0167	0.0274	0.0209	0.4	<	<0.0167
Nitrate	0.194	0.0454	0.163	0.106	0.2	1.437005335	0.0379
Sulphate	0.741	0.0795	1.22	0.837	1	2.0506367	0.0500
Ammonium (as N)	0.272	<0.0208	0.448	0.322	0.5	<	<0.0208
Calcium	<0.0833	<0.0833	0.0867	<0.0833	2	<	<0.0833
Magnesium	<0.0417	<0.0417	<0.0417	<0.0417	1	<	<0.0417
Potassium	0.0420	0.0239	0.0499	0.0274	0.2	0.4682455	0.0179

Station #	AMS 1	AMS 6	AMS 7	AMS 14	AMS 12	AMS 13	AMS 15	AMS 16	Travel Blank
Station Name	Fort McKay	Patricia McInnes	Athabasca Valley	Anzac	Millenium	Fort McKay South	CNRL Horizon	Shell Muskeg River	
Sample Date	41968	41968	41968	41968	41968	41968	41968	41968	41968
PM Size(µm)	10	10	10	10	10	10	10	10	10
Total Air Volume (m3)	24	24	24	24	24	24	24	24	24
Particulate Matter (µg)	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3	µg/M3
Unit	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg)
Chloride	0.108	<0.0167	0.213	0.0248	0.0780	0.0252	0.0805	0.0962	<0.0167
Nitrate	0.252	0.0458	0.299	0.143	0.182	0.176	0.133	0.143	0.0581
Sulphate	0.668	0.102	1.22	0.781	0.718	0.660	0.604	0.676	0.0636
Ammonium (as N)	0.252	<0.0208	0.461	0.292	0.192	0.229	0.226	0.243	<0.0208
Calcium	0.169	<0.0833	0.256	0.0946	1.72	0.151	0.161	0.398	<0.0833
Magnesium	<0.0417	<0.0417	<0.0417	<0.0417	0.0555	<0.0417	<0.0417	0.0438	<0.0417
Potassium	0.0325	0.0233	0.0563	0.0458	0.0313	0.0489	0.0338	0.0372	0.0187

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October - December 2014

**WOOD BUFFALO ENVIRONMENTAL ASSOCIATION
Passive Monitoring Results
Continuous Air Monitoring Stations**

Station	Start	End	Result Type	NO ₂ (ppb)	O ₃ (ppb)	SO ₂ (ppb)
AMS 1 - Fort McKay	30-Sep-14	27-Nov-14	Sample	5.5	12.2	1
			Sample	5.6	12.2	1
			Sample	4.9	14.6	0.8
			Average	5.3	13.0	0.9
AMS 2 - Mildred Lake	30-Sep-14	27-Nov-14	Sample	7.5	13.5	2.3
			Sample	8.7	12.7	missing
			Sample	6	13.4	2.6
			Average	7.4	13.2	2.5
AMS 6 - Patricia McInnes	29-Sep-14	28-Nov-14	Sample	3.6	17.4	1.4
			Sample	4.7	17.2	1.2
			Sample	3.5	17.9	1.1
			Average	3.9	17.5	1.2
AMS 8 - Fort Chipewyan	02-Oct-14	03-Dec-14	Sample	0.6	23.6	0.4
			Sample	0.5	24.8	0.4
			Sample	0.7	missing	0.4
			Average	0.6	24.2	0.4
AMS 14 - Anzac	29-Sep-14	28-Nov-14	Sample	1.7	19.8	0.6
			Sample	1.4	18.8	0.6
			Sample	1.3	19.5	0.7
			Average	1.5	19.4	0.6

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October-December 2014
WOOD BUFFALO ENVIRONMENTAL ASSOCIATION
Passive Monitoring Results
Remote Forestry and Lake Sites

Station	Start	End	Result Type	NO ₂ (ppb)	O ₃ (ppb)	SO ₂ (ppb)	
1	AH3	01-Oct-14	08-Dec-14	Sample	1.3	21.7	0.7
				Sample	1.8	21.9	0.9
				Average	1.6	21.8	0.8
2	AH7	03-Oct-14	04-Dec-14	Sample	2.1	22.3	1.0
				Sample	3.9	19.7	1.1
				Average	3.0	21.0	1.1
3	AH8-R	02-Oct-14	04-Dec-14	Sample	2.8	18.3	1.0
				Sample	2.2	21.0	1.0
				Average	2.5	19.7	1.0
4	BM7	03-Oct-14	01-Dec-14	Sample	0.3	26.6	0.6
5	BM10	02-Oct-14	04-Dec-14	Sample	0.8	18.7	0.6
6	BM11	03-Oct-14	01-Dec-14	Sample	0.6	25.0	1.1
7	JE 306	03-Sep-14	03-Dec-14	Sample	0.8	18.64	0.7
8	JE 308	05-Sep-14	04-Dec-14	Sample	0.3	18.94	0.3
9	JE 312	01-Oct-14	08-Dec-14	Sample	0.5	22.56	0.4
10	JP101	02-Oct-14	09-Dec-14	Sample	1.0	21.4	0.6
				Sample	1.2	20.9	2.1
				Average	1.1	21.2	1.4
11	JP102	02-Oct-14	04-Dec-14	Sample	3.2	21.4	0.9
				Sample	3.5	20.8	1.0
				Average	3.4	21.1	1.0
12	JP104	30-Sep-14	27-Nov-14	Sample	8.7	20.5	1.0
				Sample	4.9	19.8	1.0
				Average	6.8	20.2	1.0
13	JP107	03-Oct-14	01-Dec-14	Sample	1.9	27.6	0.8
				Sample	2.6	21.7	0.8
				Average	2.3	24.7	0.8

14	JP108	01-Oct-14	08-Dec-14	Sample	0.4	22.0	0.3
				Sample	0.3	20.5	0.3
				Average	0.4	21.2	0.3
15	JP201	02-Oct-14	04-Dec-14	Sample	0.4	24.6	0.4
				Sample	0.4	22.6	0.4
				Average	0.4	23.6	0.4
16	JP205	03-Oct-14	01-Dec-14	Sample	0.5	24.4	0.6
				Sample	0.5	28.1	0.6
				Average	0.5	26.2	0.6
17	JP210	01-Oct-14	08-Dec-14	Sample	0.9	13.3	0.5
				Sample	0.6	11.8	0.5
				Average	0.8	12.6	0.5
18	JP212	03-Oct-14	01-Dec-14	Sample	4.4	15.4	0.6
19	JP213	01-Oct-14	08-Dec-14	Sample	0.3	32.14	0.5
				Sample	0.3	30.8	0.5
				Average	0.3	31.5	0.5
20	JP311	02-Oct-14	04-Dec-14	Sample	1.0	23.7	0.9
				Sample	1.1	22.0	0.9
				Average	1.1	22.9	0.9
21	JP316	01-Oct-14	08-Dec-14	Sample	0.5	23.3	0.5
				Sample	0.4	24.3	0.5
				Average	0.5	23.8	0.5
22	NE7	03-Oct-14	01-Dec-14	Sample	0.7	23.7	0.8
23	NE10	01-Oct-14	08-Dec-14	Sample	0.3	20.3	0.3
24	NE11	03-Sep-14	01-Dec-14	Sample	1.4	15.7	0.7
25	R2	30-Sep-14	27-Nov-14	Sample	5.7	14.0	0.6
26	SM7	01-Oct-14	10-Dec-14	Sample	0.9	25.5	0.4
27	SM8	01-Oct-14	10-Dec-14	Sample	0.6	24.5	0.6
28	WF4	02-Oct-14	04-Dec-14	Sample	1.7	15.8	0.8
29	JE 323	01-May-14	08-Dec-14	Sample	0.4	16.68	0.8
30	JE 316	01-May-14	10-Dec-14	Sample	0.2	22.21	0.4



VOC Canisters		Results (ppbv)			
		AMS 9 Barge Landing 01-Nov	AMS 12 Millennium Mine 01-Nov	AMS 13 Fort McKay South 01-Nov	AMS 15 CNRL Horizon 01-Nov
#	Compound Name	MDL			
	1,2,4-Trimethylbenzene	0.03			
	1,3,5-Trimethylbenzene	0.03			
	1,3-Butadiene	0.03			
	1-Butene	0.03			
	1-Pentene	0.03			
	2,2,4-Trimethylpentane	0.03			
	2,2-Dimethylbutane	0.03			
	2,3,4-Trimethylpentane	0.03			
	2,3-Dimethylbutane	0.03			
	2,3-Dimethylpentane	0.03			
	2,4-Dimethylpentane	0.03			
	2-Methyl-1-pentene	0.03			
	2-Methyl-2-butene	0.03			
	2-Methylheptane	0.03			
	2-Methylhexane	0.03			
	2-Methylpentane	0.03			
	3-Methyl-1-butene	0.03			
	3-Methylheptane	0.03			
	3-Methylhexane	0.03			
	3-Methylpentane	0.03			
	4-Methyl-1-pentene	0.03			
	Acetaldehyde	0.03			
	Acetone	0.03	1.96	1.93	
	alpha-Pinene	0.03			
	Benzene	0.03			
	beta-Pinene	0.03			
	cis-2-Butene	0.03			
	cis-2-Hexene	0.03			
	cis-2-Pentene	0.03			
	Cyclohexane	0.03			
	Cyclopentane	0.03			
	Cyclopentene	0.03			
	Ethanol	0.03			
	Ethylbenzene	0.03			
	Formaldehyde	0.03			
	Isobutane	0.03			
	Isopentane	0.03	0.13	0.26	
	Isoprene	0.03			
	Isopropyl alcohol	0.03			
	Isopropylbenzene	0.03			
	m,p-Xylene	0.03			
	Methanol	0.03			
	Methyl ethyl ketone	0.03			
	Methyl isobutyl ketone	0.03			
	Methylcyclohexane	0.03			
	Methylcyclopentane	0.03			
	n-Butane	0.03	1.13	1.33	1.02
	n-Decane	0.03			
	n-Dodecane	0.03			
	n-Heptane	0.03			
	n-Hexane	0.03			
	n-Nonane	0.03			
	n-Octane	0.03			
	n-Pentane	0.03			
	n-Propylbenzene	0.03			
	n-Undecane	0.03			
	Naphthalene	0.03			
	o-Xylene	0.03			
	Styrene	0.03			
	Toluene	0.03			
	trans-2-Butene	0.03			
	trans-2-Hexene	0.03			
	trans-2-Pentene	0.03			



VOC Canisters			Results (ppbv)			
#	Compound Name	MDL	AMS 1	AMS 6	AMS 7	AMS 14
			Fort McKay 01-Nov	Patricia McInnes 01-Nov	Athabasca Valley 01-Nov	Anzac 01-Nov
	1,2,4-Trimethylbenzene	0.03				
	1,3,5-Trimethylbenzene	0.03				
	1,3-Butadiene	0.03				
	1-Butene	0.03				
	1-Pentene	0.03				
	2,2,4-Trimethylpentane	0.03				
	2,2-Dimethylbutane	0.03				
	2,3,4-Trimethylpentane	0.03				
	2,3-Dimethylbutane	0.03				
	2,3-Dimethylpentane	0.03				
	2,4-Dimethylpentane	0.03				
	2-Methyl-1-pentene	0.03				
	2-Methyl-2-butene	0.03				
	2-Methylheptane	0.03				
	2-Methylhexane	0.03				
	2-Methylpentane	0.03				
	3-Methyl-1-butene	0.03				
	3-Methylheptane	0.03				
	3-Methylhexane	0.03				
	3-Methylpentane	0.03				
	4-Methyl-1-pentene	0.03				
	Acetaldehyde	0.03				
	Acetone	0.03	1.18	1.53	2.39	
	alpha-Pinene	0.03				
	Benzene	0.03				
	beta-Pinene	0.03				
	cis-2-Butene	0.03				
	cis-2-Hexene	0.03				
	cis-2-Pentene	0.03				
	Cyclohexane	0.03				
	Cyclopentane	0.03				
	Cyclopentene	0.03				
	Ethanol	0.03				
	Ethylbenzene	0.03				
	Formaldehyde	0.03				
	Isobutane	0.03				
	Isopentane	0.03	0.43	0.32	0.55	0.58
	Isoprene	0.03				
	Isopropyl alcohol	0.03				
	Isopropylbenzene	0.03				
	m,p-Xylene	0.03				
	Methanol	0.03				
	Methyl ethyl ketone	0.03				
	Methyl isobutyl ketone	0.03				
	Methylcyclohexane	0.03				
	Methylcyclopentane	0.03				
	n-Butane	0.03	1.05	1.61	2.44	1.34
	n-Decane	0.03				
	n-Dodecane	0.03				
	n-Heptane	0.03				
	n-Hexane	0.03				
	n-Nonane	0.03				
	n-Octane	0.03				
	n-Pentane	0.03				
	n-Propylbenzene	0.03				
	n-Undecane	0.03				
	Naphthalene	0.03				
	o-Xylene	0.03				
	Styrene	0.03				
	Toluene	0.03				
	trans-2-Butene	0.03				
	trans-2-Hexene	0.03				
	trans-2-Pentene	0.03				



VOC Canisters			Results (ppbv)			
			AMS 9 Barge Landing 07-Nov	AMS 12 Millennium Mine 07-Nov	AMS 13 Fort McKay South 07-Nov	AMS 15 CNRL Horizon 07-Nov
#	Compound Name	MDL				
	1,2,4-Trimethylbenzene	0.03				
	1,3,5-Trimethylbenzene	0.03				
	1,3-Butadiene	0.03				
	1-Butene	0.03				
	1-Pentene	0.03				
	2,2,4-Trimethylpentane	0.03				
	2,2-Dimethylbutane	0.03				
	2,3,4-Trimethylpentane	0.03				
	2,3-Dimethylbutane	0.03				
	2,3-Dimethylpentane	0.03				
	2,4-Dimethylpentane	0.03				
	2-Methyl-1-pentene	0.03				
	2-Methyl-2-butene	0.03				
	2-Methylheptane	0.03				
	2-Methylhexane	0.03				
	2-Methylpentane	0.03				
	3-Methyl-1-butene	0.03				
	3-Methylheptane	0.03				
	3-Methylhexane	0.03				
	3-Methylpentane	0.03				
	4-Methyl-1-pentene	0.03				
	Acetaldehyde	0.03				
	Acetone	0.03				
	alpha-Pinene	0.03				
	Benzene	0.03			0.23	0.18
	beta-Pinene	0.03				
	cis-2-Butene	0.03				
	cis-2-Hexene	0.03				
	cis-2-Pentene	0.03				
	Cyclohexane	0.03				
	Cyclopentane	0.03				
	Cyclopentene	0.03				
	Ethanol	0.03				
	Ethylbenzene	0.03				
	Formaldehyde	0.03				
	Isobutane	0.03				
	Isopentane	0.03				
	Isoprene	0.03				
	Isopropyl alcohol	0.03				
	Isopropylbenzene	0.03				
	m,p-Xylene	0.03				
	Methanol	0.03				
	Methyl ethyl ketone	0.03				
	Methyl isobutyl ketone	0.03				
	Methylcyclohexane	0.03				
	Methylcyclopentane	0.03				
	n-Butane	0.03				
	n-Decane	0.03				
	n-Dodecane	0.03				
	n-Heptane	0.03				
	n-Hexane	0.03				
	n-Nonane	0.03				
	n-Octane	0.03				
	n-Pentane	0.03				
	n-Propylbenzene	0.03				
	n-Undecane	0.03				
	Naphthalene	0.03				
	o-Xylene	0.03				
	Styrene	0.03				
	Toluene	0.03	11.1	7.18		
	trans-2-Butene	0.03				
	trans-2-Hexene	0.03				
	trans-2-Pentene	0.03				



VOC Canisters			Results (ppbv)			
#	Compound Name	MDL	AMS 1	AMS 6	AMS 7	AMS 14
			Fort McKay 07-Nov	Patricia McInnes 07-Nov	Athabasca Valley 07-Nov	Anzac 07-Nov
	1,2,4-Trimethylbenzene	0.03				
	1,3,5-Trimethylbenzene	0.03				
	1,3-Butadiene	0.03				
	1-Butene	0.03				
	1-Pentene	0.03				
	2,2,4-Trimethylpentane	0.03				
	2,2-Dimethylbutane	0.03				
	2,3,4-Trimethylpentane	0.03				
	2,3-Dimethylbutane	0.03				
	2,3-Dimethylpentane	0.03				
	2,4-Dimethylpentane	0.03				
	2-Methyl-1-pentene	0.03				
	2-Methyl-2-butene	0.03				
	2-Methylheptane	0.03				
	2-Methylhexane	0.03				
	2-Methylpentane	0.03				
	3-Methyl-1-butene	0.03				
	3-Methylheptane	0.03				
	3-Methylhexane	0.03				
	3-Methylpentane	0.03				
	4-Methyl-1-pentene	0.03				
	Acetaldehyde	0.03			115	
	Acetone	0.03				
	alpha-Pinene	0.03				
	Benzene	0.03				
	beta-Pinene	0.03				
	cis-2-Butene	0.03				
	cis-2-Hexene	0.03				
	cis-2-Pentene	0.03				
	Cyclohexane	0.03				
	Cyclopentane	0.03				
	Cyclopentene	0.03				
	Ethanol	0.03				
	Ethylbenzene	0.03				
	Formaldehyde	0.03				
	Isobutane	0.03				
	Isopentane	0.03				
	Isoprene	0.03				
	Isopropyl alcohol	0.03				
	Isopropylbenzene	0.03				
	m,p-Xylene	0.03				
	Methanol	0.03			178	
	Methyl ethyl ketone	0.03				
	Methyl isobutyl ketone	0.03				
	Methylcyclohexane	0.03				
	Methylcyclopentane	0.03				
	n-Butane	0.03				
	n-Decane	0.03				
	n-Dodecane	0.03				
	n-Heptane	0.03				
	n-Hexane	0.03				
	n-Nonane	0.03				
	n-Octane	0.03				
	n-Pentane	0.03				
	n-Propylbenzene	0.03				
	n-Undecane	0.03				
	Naphthalene	0.03				
	o-Xylene	0.03				
	Styrene	0.03				
	Toluene	0.03				
	trans-2-Butene	0.03				
	trans-2-Hexene	0.03				
	trans-2-Pentene	0.03				



VOC Canisters			Results (ppbv)			
			AMS 9 Barge Landing 13-Nov	AMS 12 Millennium Mine 13-Nov	AMS 13 Fort McKay South 13-Nov	AMS 15 CNRL Horizon 13-Nov
#	Compound Name	MDL				
	1,2,4-Trimethylbenzene	0.03	0.06			
	1,3,5-Trimethylbenzene	0.03				
	1,3-Butadiene	0.03				
	1-Butene	0.03		0.23		
	1-Pentene	0.03				
	2,2,4-Trimethylpentane	0.03				
	2,2-Dimethylbutane	0.03				
	2,3,4-Trimethylpentane	0.03				
	2,3-Dimethylbutane	0.03				
	2,3-Dimethylpentane	0.03				
	2,4-Dimethylpentane	0.03				
	2-Methyl-1-pentene	0.03				
	2-Methyl-2-butene	0.03				
	2-Methylheptane	0.03	0.26			
	2-Methylhexane	0.03				
	2-Methylpentane	0.03		0.29		
	3-Methyl-1-butene	0.03				
	3-Methylheptane	0.03				
	3-Methylhexane	0.03				
	3-Methylpentane	0.03				
	4-Methyl-1-pentene	0.03				
	Acetaldehyde	0.03				
	Acetone	0.03				
	alpha-Pinene	0.03				
	Benzene	0.03	0.28		0.25	
	beta-Pinene	0.03				
	cis-2-Butene	0.03				
	cis-2-Hexene	0.03				
	cis-2-Pentene	0.03				
	Cyclohexane	0.03				
	Cyclopentane	0.03				
	Cyclopentene	0.03				
	Ethanol	0.03				
	Ethylbenzene	0.03				
	Formaldehyde	0.03				
	Isobutane	0.03	0.52	0.4	0.45	0.34
	Isopentane	0.03	2.01	0.42	1.19	0.85
	Isoprene	0.03				
	Isopropyl alcohol	0.03				
	Isopropylbenzene	0.03				
	m,p-Xylene	0.03	0.08			
	Methanol	0.03				
	Methyl ethyl ketone	0.03				
	Methyl isobutyl ketone	0.03				
	Methylcyclohexane	0.03	0.32		0.21	
	Methylcyclopentane	0.03	0.09			
	n-Butane	0.03	1.09	0.72	1.19	0.69
	n-Decane	0.03				
	n-Dodecane	0.03				
	n-Heptane	0.03	0.94			
	n-Hexane	0.03				
	n-Nonane	0.03				
	n-Octane	0.03	0.4			
	n-Pentane	0.03	1.86		1.02	0.41
	n-Propylbenzene	0.03				
	n-Undecane	0.03				
	Naphthalene	0.03				
	o-Xylene	0.03				
	Styrene	0.03				
	Toluene	0.03	0.42		0.23	
	trans-2-Butene	0.03				
	trans-2-Hexene	0.03				
	trans-2-Pentene	0.03				



VOC Canisters			Results (ppbv)			
			AMS 1 Fort McKay 13-Nov	AMS 6 Patricia McInnes 13-Nov	AMS 7 Athabasca Valley 13-Nov	AMS 14 Anzac 13-Nov
#	Compound Name	MDL				
	1,2,4-Trimethylbenzene	0.03				
	1,3,5-Trimethylbenzene	0.03				
	1,3-Butadiene	0.03				
	1-Butene	0.03				
	1-Pentene	0.03				
	2,2,4-Trimethylpentane	0.03				
	2,2-Dimethylbutane	0.03				
	2,3,4-Trimethylpentane	0.03				
	2,3-Dimethylbutane	0.03				
	2,3-Dimethylpentane	0.03				
	2,4-Dimethylpentane	0.03				
	2-Methyl-1-pentene	0.03				
	2-Methyl-2-butene	0.03				
	2-Methylheptane	0.03	0.2			
	2-Methylhexane	0.03				
	2-Methylpentane	0.03			0.15	
	3-Methyl-1-butene	0.03				
	3-Methylheptane	0.03				
	3-Methylhexane	0.03				
	3-Methylpentane	0.03				
	4-Methyl-1-pentene	0.03				
	Acetaldehyde	0.03				
	Acetone	0.03			1.43	0.89
	alpha-Pinene	0.03				
	Benzene	0.03	0.26		0.31	0.22
	beta-Pinene	0.03				
	cis-2-Butene	0.03				
	cis-2-Hexene	0.03				
	cis-2-Pentene	0.03				
	Cyclohexane	0.03				
	Cyclopentane	0.03				
	Cyclopentene	0.03				
	Ethanol	0.03				
	Ethylbenzene	0.03				
	Formaldehyde	0.03				
	Isobutane	0.03	0.73	0.4	0.86	0.21
	Isopentane	0.03	1.66	0.44	0.68	0.24
	Isoprene	0.03				
	Isopropyl alcohol	0.03				
	Isopropylbenzene	0.03				
	m,p-Xylene	0.03			0.14	
	Methanol	0.03		12	160	
	Methyl ethyl ketone	0.03				
	Methyl isobutyl ketone	0.03				
	Methylcyclohexane	0.03	0.3			
	Methylcyclopentane	0.03				
	n-Butane	0.03	1.01	0.96	2.11	0.7
	n-Decane	0.03				
	n-Dodecane	0.03				
	n-Heptane	0.03				
	n-Hexane	0.03				
	n-Nonane	0.03				
	n-Octane	0.03				
	n-Pentane	0.03	0.94	0.34		
	n-Propylbenzene	0.03				
	n-Undecane	0.03				
	Naphthalene	0.03				
	o-Xylene	0.03				
	Styrene	0.03				
	Toluene	0.03	0.32	0.1	2.71	0.39
	trans-2-Butene	0.03				
	trans-2-Hexene	0.03				
	trans-2-Pentene	0.03				



VOC Canisters			Results (ppbv)			
			AMS 9 Barge Landing 19-Nov	AMS 12 Millennium Mine 19-Nov	AMS 13 Fort McKay South 19-Nov	AMS 15 CNRL Horizon 19-Nov
#	Compound Name	MDL				
	1,2,4-Trimethylbenzene	0.03				
	1,3,5-Trimethylbenzene	0.03				
	1,3-Butadiene	0.03				
	1-Butene	0.03				
	1-Pentene	0.03				
	2,2,4-Trimethylpentane	0.03				
	2,2-Dimethylbutane	0.03				
	2,3,4-Trimethylpentane	0.03				
	2,3-Dimethylbutane	0.03				
	2,3-Dimethylpentane	0.03				
	2,4-Dimethylpentane	0.03				
	2-Methyl-1-pentene	0.03				
	2-Methyl-2-butene	0.03				
	2-Methylheptane	0.03				
	2-Methylhexane	0.03				
	2-Methylpentane	0.03				
	3-Methyl-1-butene	0.03				
	3-Methylheptane	0.03				
	3-Methylhexane	0.03				
	3-Methylpentane	0.03		0.13		0.1
	4-Methyl-1-pentene	0.03				
	Acetaldehyde	0.03				
	Acetone	0.03	1.14			
	alpha-Pinene	0.03				
	Benzene	0.03				
	beta-Pinene	0.03				
	cis-2-Butene	0.03				
	cis-2-Hexene	0.03				
	cis-2-Pentene	0.03				
	Cyclohexane	0.03				
	Cyclopentane	0.03				
	Cyclopentene	0.03				
	Ethanol	0.03				
	Ethylbenzene	0.03				
	Formaldehyde	0.03				
	Isobutane	0.03	0.27		0.19	1.01
	Isopentane	0.03	0.26			1.45
	Isoprene	0.03				
	Isopropyl alcohol	0.03				
	Isopropylbenzene	0.03				
	m,p-Xylene	0.03		0.11		
	Methanol	0.03		10.4		
	Methyl ethyl ketone	0.03				
	Methyl isobutyl ketone	0.03				
	Methylcyclohexane	0.03				
	Methylcyclopentane	0.03				
	n-Butane	0.03		0.68		0.71
	n-Decane	0.03				
	n-Dodecane	0.03				
	n-Heptane	0.03				
	n-Hexane	0.03				
	n-Nonane	0.03				
	n-Octane	0.03				
	n-Pentane	0.03				
	n-Propylbenzene	0.03				
	n-Undecane	0.03				
	Naphthalene	0.03				
	o-Xylene	0.03				
	Styrene	0.03				
	Toluene	0.03	11.7	10.2	3.98	1.24
	trans-2-Butene	0.03				
	trans-2-Hexene	0.03				
	trans-2-Pentene	0.03				



VOC Canisters			Results (ppbv)			
#	Compound Name	MDL	AMS 1	AMS 6	AMS 7	AMS 14
			Fort McKay 19-Nov	Patricia McInnes 19-Nov	Athabasca Valley 19-Nov	Anzac 19-Nov
	1,2,4-Trimethylbenzene	0.03				
	1,3,5-Trimethylbenzene	0.03				
	1,3-Butadiene	0.03				
	1-Butene	0.03				
	1-Pentene	0.03				
	2,2,4-Trimethylpentane	0.03				
	2,2-Dimethylbutane	0.03				
	2,3,4-Trimethylpentane	0.03				
	2,3-Dimethylbutane	0.03				
	2,3-Dimethylpentane	0.03				
	2,4-Dimethylpentane	0.03				
	2-Methyl-1-pentene	0.03				
	2-Methyl-2-butene	0.03				
	2-Methylheptane	0.03				
	2-Methylhexane	0.03				
	2-Methylpentane	0.03				
	3-Methyl-1-butene	0.03				
	3-Methylheptane	0.03				
	3-Methylhexane	0.03				
	3-Methylpentane	0.03	0.08		0.11	
	4-Methyl-1-pentene	0.03				
	Acetaldehyde	0.03				
	Acetone	0.03	1.22		1.83	0.87
	alpha-Pinene	0.03				
	Benzene	0.03				
	beta-Pinene	0.03				
	cis-2-Butene	0.03				
	cis-2-Hexene	0.03				
	cis-2-Pentene	0.03				
	Cyclohexane	0.03				
	Cyclopentane	0.03				
	Cyclopentene	0.03				
	Ethanol	0.03				
	Ethylbenzene	0.03				
	Formaldehyde	0.03				
	Isobutane	0.03	0.22	0.14	0.38	
	Isopentane	0.03			0.37	
	Isoprene	0.03				
	Isopropyl alcohol	0.03				
	Isopropylbenzene	0.03				
	m,p-Xylene	0.03			0.12	
	Methanol	0.03			36.5	
	Methyl ethyl ketone	0.03				
	Methyl isobutyl ketone	0.03				
	Methylcyclohexane	0.03				
	Methylcyclopentane	0.03				
	n-Butane	0.03		0.68	1.24	0.47
	n-Decane	0.03				
	n-Dodecane	0.03				
	n-Heptane	0.03				
	n-Hexane	0.03				
	n-Nonane	0.03				
	n-Octane	0.03				
	n-Pentane	0.03				
	n-Propylbenzene	0.03				
	n-Undecane	0.03				
	Naphthalene	0.03				
	o-Xylene	0.03				
	Styrene	0.03				
	Toluene	0.03	12.7	4.52	5.02	5.67
	trans-2-Butene	0.03				
	trans-2-Hexene	0.03				
	trans-2-Pentene	0.03				



VOC Canisters			Results (ppbv)			
#	Compound Name	MDL	AMS 1	AMS 6	AMS 7	AMS 14
			Fort McKay 25-Nov	Patricia McInnes 25-Nov	Athabasca Valley 25-Nov	Anzac 25-Nov
	1,2,4-Trimethylbenzene	0.03				
	1,3,5-Trimethylbenzene	0.03				
	1,3-Butadiene	0.03				
	1-Butene	0.03			0.14	
	1-Pentene	0.03				
	2,2,4-Trimethylpentane	0.03				
	2,2-Dimethylbutane	0.03				
	2,3,4-Trimethylpentane	0.03	0.08			
	2,3-Dimethylbutane	0.03	0.43			
	2,3-Dimethylpentane	0.03				
	2,4-Dimethylpentane	0.03				
	2-Methyl-1-pentene	0.03				
	2-Methyl-2-butene	0.03				
	2-Methylheptane	0.03				
	2-Methylhexane	0.03	0.1			
	2-Methylpentane	0.03	1.08	0.2		0.17
	3-Methyl-1-butene	0.03				
	3-Methylheptane	0.03				
	3-Methylhexane	0.03				
	3-Methylpentane	0.03	0.87	0.32		
	4-Methyl-1-pentene	0.03				
	Acetaldehyde	0.03	1.72	1.5	2.56	1.4
	Acetone	0.03		2.84	3.77	2.13
	alpha-Pinene	0.03				
	Benzene	0.03	0.28	0.21	0.29	0.17
	beta-Pinene	0.03				
	cis-2-Butene	0.03				
	cis-2-Hexene	0.03				
	cis-2-Pentene	0.03				
	Cyclohexane	0.03				
	Cyclopentane	0.03	0.52			
	Cyclopentene	0.03				
	Ethanol	0.03	1.47			1.21
	Ethylbenzene	0.03				
	Formaldehyde	0.03				
	Isobutane	0.03	1	1.04	1.64	0.87
	Isopentane	0.03	2.24	0.98	1.38	0.46
	Isoprene	0.03				
	Isopropyl alcohol	0.03	10.1	13.8	12.7	12.9
	Isopropylbenzene	0.03				
	m,p-Xylene	0.03				
	Methanol	0.03				
	Methyl ethyl ketone	0.03				
	Methyl isobutyl ketone	0.03			1.13	
	Methylcyclohexane	0.03				
	Methylcyclopentane	0.03	0.28		0.14	0.09
	n-Butane	0.03	1.09	0.94	1.76	0.98
	n-Decane	0.03				
	n-Dodecane	0.03				
	n-Heptane	0.03				
	n-Hexane	0.03	1.34	0.78	0.42	
	n-Nonane	0.03				
	n-Octane	0.03				
	n-Pentane	0.03	4.32	2.33		
	n-Propylbenzene	0.03				
	n-Undecane	0.03				
	Naphthalene	0.03				
	o-Xylene	0.03				
	Styrene	0.03				
	Toluene	0.03	16.5	9.8	4.94	5.94
	trans-2-Butene	0.03				
	trans-2-Hexene	0.03				
	trans-2-Pentene	0.03				



VOC Canisters			Results (ppbv)			
			AMS 9 Barge Landing 25-Nov	AMS 12 Millennium Mine 25-Nov	AMS 13 Fort McKay South 25-Nov	AMS 15 CNRL Horizon 25-Nov
#	Compound Name	MDL				
	1,2,4-Trimethylbenzene	0.03				
	1,3,5-Trimethylbenzene	0.03				
	1,3-Butadiene	0.03				
	1-Butene	0.03				
	1-Pentene	0.03				
	2,2,4-Trimethylpentane	0.03				
	2,2-Dimethylbutane	0.03	0.31			
	2,3,4-Trimethylpentane	0.03				
	2,3-Dimethylbutane	0.03	0.35		0.77	
	2,3-Dimethylpentane	0.03				
	2,4-Dimethylpentane	0.03				
	2-Methyl-1-pentene	0.03				
	2-Methyl-2-butene	0.03				
	2-Methylheptane	0.03				
	2-Methylhexane	0.03				
	2-Methylpentane	0.03	1.92		5.31	
	3-Methyl-1-butene	0.03				
	3-Methylheptane	0.03				
	3-Methylhexane	0.03				
	3-Methylpentane	0.03	0.73		2.35	
	4-Methyl-1-pentene	0.03				
	Acetaldehyde	0.03				
	Acetone	0.03				
	alpha-Pinene	0.03				
	Benzene	0.03	0.48	0.22	0.63	
	beta-Pinene	0.03				
	cis-2-Butene	0.03				
	cis-2-Hexene	0.03				
	cis-2-Pentene	0.03				
	Cyclohexane	0.03				
	Cyclopentane	0.03			2.75	
	Cyclopentene	0.03				
	Ethanol	0.03				
	Ethylbenzene	0.03				
	Formaldehyde	0.03				
	Isobutane	0.03	0.33	0.26		0.14
	Isopentane	0.03	6.05	1.78	11	0.56
	Isoprene	0.03				
	Isopropyl alcohol	0.03				
	Isopropylbenzene	0.03				
	m,p-Xylene	0.03				
	Methanol	0.03				
	Methyl ethyl ketone	0.03				
	Methyl isobutyl ketone	0.03				
	Methylcyclohexane	0.03				
	Methylcyclopentane	0.03				
	n-Butane	0.03	0.94		0.71	0.58
	n-Decane	0.03				
	n-Dodecane	0.03				
	n-Heptane	0.03				
	n-Hexane	0.03				
	n-Nonane	0.03				
	n-Octane	0.03				
	n-Pentane	0.03	6.9	2.12	14.4	0.59
	n-Propylbenzene	0.03				
	n-Undecane	0.03				
	Naphthalene	0.03				
	o-Xylene	0.03				
	Styrene	0.03				
	Toluene	0.03		0.07		
	trans-2-Butene	0.03				
	trans-2-Hexene	0.03				
	trans-2-Pentene	0.03				



RSC Canisters		MDL	Results (ppbv)			
			AMS 9 Barge Landing 01-Nov	AMS 12 Millennium Mine 01-Nov	AMS 13 Fort McKay South 01-Nov	AMS 15 CNRL Horizon 01-Nov
#	Compound Name					
	2,5-Dimethylthiophene	0.1				
	2-Ethylthiophene	0.1				
	2-Methylthiophene	0.1				
	3-Methylthiophene	0.1				
	Butyl mercaptan	0.1				
	Carbon disulphide	0.1				
	Carbonyl sulphide	0.1				
	Dimethyl disulphide	0.1				
	Dimethyl sulphide	0.1				
	Ethyl mercaptan	0.1				
	Ethyl sulphide	0.1				
	Hydrogen sulphide	0.1				
	Isobutyl mercaptan	0.1				
	Isopropyl mercaptan	0.1				
	Methyl mercaptan	0.1				
	Pentyl mercaptan	0.1				
	Propyl mercaptan	0.1				
	tert-Butyl mercaptan	0.1				
	Thiophene	0.1				



RSC Canisters		Results (ppbv)				
#	Compound Name	MDL	AMS 1	AMS 6	AMS 7	AMS 14
			Fort McKay 01-Nov	Patricia McInnes 01-Nov	Athabasca Valley 01-Nov	Anzac 01-Nov
	2,5-Dimethylthiophene	0.1				
	2-Ethylthiophene	0.1				
	2-Methylthiophene	0.1				
	3-Methylthiophene	0.1				
	Butyl mercaptan	0.1				
	Carbon disulphide	0.1				
	Carbonyl sulphide	0.1				
	Dimethyl disulphide	0.1				
	Dimethyl sulphide	0.1				
	Ethyl mercaptan	0.1				
	Ethyl sulphide	0.1				
	Hydrogen sulphide	0.1				
	Isobutyl mercaptan	0.1				
	Isopropyl mercaptan	0.1				
	Methyl mercaptan	0.1				
	Pentyl mercaptan	0.1				
	Propyl mercaptan	0.1				
	tert-Butyl mercaptan	0.1				
	Thiophene	0.1				



RSC Canisters		Results (ppbv)				
#	Compound Name	MDL	AMS 9	AMS 12	AMS 13	AMS 15
			Barge Landing 07-Nov	Millennium Mine 07-Nov	Fort McKay South 07-Nov	CNRL Horizon 07-Nov
	2,5-Dimethylthiophene	0.1				
	2-Ethylthiophene	0.1				
	2-Methylthiophene	0.1				
	3-Methylthiophene	0.1				
	Butyl mercaptan	0.1				
	Carbon disulphide	0.1				
	Carbonyl sulphide	0.1				
	Dimethyl disulphide	0.1				
	Dimethyl sulphide	0.1				
	Ethyl mercaptan	0.1				
	Ethyl sulphide	0.1				
	Hydrogen sulphide	0.1				
	Isobutyl mercaptan	0.1				
	Isopropyl mercaptan	0.1				
	Methyl mercaptan	0.1				
	Pentyl mercaptan	0.1				
	Propyl mercaptan	0.1				
	tert-Butyl mercaptan	0.1				
	Thiophene	0.1				



RSC Canisters		MDL	Results (ppbv)			
			AMS 1 Fort McKay 07-Nov	AMS 6 Patricia McInnes 07-Nov	AMS 7 Athabasca Valley 07-Nov	AMS 14 Anzac 07-Nov
#	Compound Name					
	2,5-Dimethylthiophene	0.1				
	2-Ethylthiophene	0.1				
	2-Methylthiophene	0.1				
	3-Methylthiophene	0.1				
	Butyl mercaptan	0.1				
	Carbon disulphide	0.1				
	Carbonyl sulphide	0.1				
	Dimethyl disulphide	0.1				
	Dimethyl sulphide	0.1				
	Ethyl mercaptan	0.1				
	Ethyl sulphide	0.1				
	Hydrogen sulphide	0.1				
	Isobutyl mercaptan	0.1				
	Isopropyl mercaptan	0.1				
	Methyl mercaptan	0.1				
	Pentyl mercaptan	0.1				
	Propyl mercaptan	0.1				
	tert-Butyl mercaptan	0.1				
	Thiophene	0.1				



RSC Canisters			Results (ppbv)			
			AMS 9	AMS 12	AMS 13	AMS 15
#	Compound Name	MDL	Barge Landing 13-Nov	Millennium Mine 13-Nov	Fort McKay South 13-Nov	CNRL Horizon 13-Nov
	2,5-Dimethylthiophene	0.1				
	2-Ethylthiophene	0.1				
	2-Methylthiophene	0.1				
	3-Methylthiophene	0.1				
	Butyl mercaptan	0.1				
	Carbon disulphide	0.1				0.4
	Carbonyl sulphide	0.1				0.5
	Dimethyl disulphide	0.1				
	Dimethyl sulphide	0.1				
	Ethyl mercaptan	0.1				
	Ethyl sulphide	0.1				
	Hydrogen sulphide	0.1				
	Isobutyl mercaptan	0.1				
	Isopropyl mercaptan	0.1				
	Methyl mercaptan	0.1				
	Pentyl mercaptan	0.1				
	Propyl mercaptan	0.1				
	tert-Butyl mercaptan	0.1				
	Thiophene	0.1				



RSC Canisters			Results (ppbv)			
#	Compound Name	MDL	AMS 1	AMS 6	AMS 7	AMS 14
			Fort McKay 13-Nov	Patricia McInnes 13-Nov	Athabasca Valley 13-Nov	Anzac 13-Nov
	2,5-Dimethylthiophene	0.1				
	2-Ethylthiophene	0.1				
	2-Methylthiophene	0.1				
	3-Methylthiophene	0.1				
	Butyl mercaptan	0.1				
	Carbon disulphide	0.1			0.2	
	Carbonyl sulphide	0.1				
	Dimethyl disulphide	0.1				
	Dimethyl sulphide	0.1				
	Ethyl mercaptan	0.1				
	Ethyl sulphide	0.1				
	Hydrogen sulphide	0.1				
	Isobutyl mercaptan	0.1				
	Isopropyl mercaptan	0.1				
	Methyl mercaptan	0.1				
	Pentyl mercaptan	0.1				
	Propyl mercaptan	0.1				
	tert-Butyl mercaptan	0.1				
	Thiophene	0.1				



RSC Canisters			Results (ppbv)			
#	Compound Name	MDL	AMS 9	AMS 12	AMS 13	AMS 15
			Barge Landing 19-Nov	Millennium Mine 19-Nov	Fort McKay South 19-Nov	CNRL Horizon 19-Nov
	2,5-Dimethylthiophene	0.1				
	2-Ethylthiophene	0.1				
	2-Methylthiophene	0.1				
	3-Methylthiophene	0.1				
	Butyl mercaptan	0.1				
	Carbon disulphide	0.1				
	Carbonyl sulphide	0.1				
	Dimethyl disulphide	0.1				
	Dimethyl sulphide	0.1				
	Ethyl mercaptan	0.1				
	Ethyl sulphide	0.1				
	Hydrogen sulphide	0.1				
	Isobutyl mercaptan	0.1				
	Isopropyl mercaptan	0.1				
	Methyl mercaptan	0.1				
	Pentyl mercaptan	0.1				
	Propyl mercaptan	0.1				
	tert-Butyl mercaptan	0.1				
	Thiophene	0.1				



RSC Canisters			Results (ppbv)			
#	Compound Name	MDL	AMS 1	AMS 6	AMS 7	AMS 14
			Fort McKay 19-Nov	Patricia McInnes 19-Nov	Athabasca Valley 19-Nov	Anzac 19-Nov
	2,5-Dimethylthiophene	0.1				
	2-Ethylthiophene	0.1				
	2-Methylthiophene	0.1				
	3-Methylthiophene	0.1				
	Butyl mercaptan	0.1				
	Carbon disulphide	0.1				
	Carbonyl sulphide	0.1				
	Dimethyl disulphide	0.1				
	Dimethyl sulphide	0.1				
	Ethyl mercaptan	0.1				
	Ethyl sulphide	0.1				
	Hydrogen sulphide	0.1				
	Isobutyl mercaptan	0.1				
	Isopropyl mercaptan	0.1				
	Methyl mercaptan	0.1				
	Pentyl mercaptan	0.1				
	Propyl mercaptan	0.1				
	tert-Butyl mercaptan	0.1				
	Thiophene	0.1				



RSC Canisters			Results (ppbv)			
#	Compound Name	MDL	AMS 9	AMS 12	AMS 13	AMS 15
			Barge Landing 25-Nov	Millennium Mine 25-Nov	Fort McKay South 25-Nov	CNRL Horizon 25-Nov
	2,5-Dimethylthiophene	0.1				
	2-Ethylthiophene	0.1				
	2-Methylthiophene	0.1				
	3-Methylthiophene	0.1				
	Butyl mercaptan	0.1				
	Carbon disulphide	0.1				
	Carbonyl sulphide	0.1		0.8	0.8	0.7
	Dimethyl disulphide	0.1				
	Dimethyl sulphide	0.1				
	Ethyl mercaptan	0.1				
	Ethyl sulphide	0.1				
	Hydrogen sulphide	0.1				
	Isobutyl mercaptan	0.1				
	Isopropyl mercaptan	0.1				
	Methyl mercaptan	0.1				
	Pentyl mercaptan	0.1				
	Propyl mercaptan	0.1				
	tert-Butyl mercaptan	0.1				
	Thiophene	0.1				



RSC Canisters			Results (ppbv)			
#	Compound Name	MDL	AMS 1	AMS 6	AMS 7	AMS 14
			Fort McKay 25-Nov	Patricia McInnes 25-Nov	Athabasca Valley 25-Nov	Anzac 25-Nov
	2,5-Dimethylthiophene	0.1				
	2-Ethylthiophene	0.1				
	2-Methylthiophene	0.1				
	3-Methylthiophene	0.1				
	Butyl mercaptan	0.1				
	Carbon disulphide	0.1				
	Carbonyl sulphide	0.1			0.5	0.4
	Dimethyl disulphide	0.1				
	Dimethyl sulphide	0.1				
	Ethyl mercaptan	0.1				
	Ethyl sulphide	0.1				
	Hydrogen sulphide	0.1				
	Isobutyl mercaptan	0.1				
	Isopropyl mercaptan	0.1				
	Methyl mercaptan	0.1				
	Pentyl mercaptan	0.1				
	Propyl mercaptan	0.1				
	tert-Butyl mercaptan	0.1				
	Thiophene	0.1				