



Wood Buffalo Environmental Association

ANNUAL REPORT – VOLUME 1

CONTINUOUS DATA

March 2017

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



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March 22, 2016

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**RE: Annual Ambient Air Quality Monitoring Report 2016
Wood Buffalo Environmental Association**

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

The continuous ambient air quality monitoring network stations are:

AMS 1 - Fort McKay – Bertha Ganter
AMS 2 - Mildred Lake
AMS 3 - Lower Camp B (meteorology)
AMS 4 - Buffalo Viewpoint
AMS 5 - Mannix
AMS 6 - Patricia McInnes
AMS 7 - Athabasca Valley
AMS 8 - Fort Chipewyan
AMS 9 - Barge Landing
AMS 11 - Lower Camp (air quality)
AMS 13 - Fort McKay South
AMS 14 - Anzac
AMS 15 - CNRL Horizon
AMS 16 - Shell Muskeg River
AMS 17 - Wapasu
AMS 18 - Stony Mountain
AMS 19 - Firebag
AMS 20 - Brion MacKay River
AMS 21 - Conklin Community
AMS 500 - Cenovus Christina Lake
AMS 501 - Statoil Leismer
AMS 502 - ConocoPhillips Surmont

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

Member	EPEA Approval No.
Athabasca Oil Corporation	289664-00-00
Brion Energy	254465-00-00
Canadian Natural Resources Ltd.	149968-00-01
Cenovus Energy	48522-01-00
Connacher Oil and Gas Ltd.	240008-00-03
ConocoPhillips Canada	48263-01-00
Devon Canada Corporation	224816-00-03
Finning Canada Ltd.	Not Applicable
Hammerstone Corporation	189942-00-02
Husky Oil Operations Ltd.	206355-00-00
Imperial Oil Ltd.	00046586-00-00
MEG Energy Corporation	00216466-00-04
Nexen Energy ULC.	137467-00-00; 236394-00-00
Shell Canada Energy	20809-01-00
Statoil Canada Ltd.	241311-00-02
Suncor Energy Inc.	094-02-00
Sunshine Oilsands Ltd.	305529-00-00
Syncrude Canada Ltd.	026-02-00
Teck Resources Ltd.	EIA Application
Total E&P Canada Ltd.	228044-00-00
Williams Energy (Canada) Inc.	73203-01-00

Aboriginal Communities

- Chipewyan Prairie Dene First Nation
- Christina River Dene Nation Council
- Conklin Resource Development Advisory Council
- Fort McKay First Nation
- Fort McKay Métis Local 63
- Fort McMurray First Nation 468
- Fort McMurray Métis Local 1935

Government and Non-Industrial Organizations

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

1. Introduction

An Air Quality Task Force was established in 1985 to address environmental concerns related to oil sands development raised by the Fort McKay First Nation. In 1990, this Task Force became the Regional Air Quality Coordinating Committee which, in 1996, was endorsed by the Clean Air Strategic Alliance (CASA) as a regional air shed. In 1998, the Wood Buffalo Environmental Association (WBEA) assumed responsibility for air quality monitoring in the regional air shed aligned with the boundary of the Regional Municipality of Wood Buffalo (RMWB), including the Athabasca Oil Sands. In 2014, WBEA's became a working partner of the Alberta Environmental Monitoring, Evaluation and Reporting Agency (AEMERA). On April 5, 2016, the functions of AEMERA were brought back into the department of Environment and Parks under a new Monitoring and Science division. WBEA continues to work with government partners within the new Environmental Monitoring and Science Division.

WBEA operates the largest air shed in the largest municipality in Canada. Today, as a multi-stakeholder, community-based, not-for-profit association, WBEA monitors the air in the RMWB 24 hours a day and 365 days a year. WBEA does this through a variety of air, land and human monitoring programs. The information collected from WBEA's air monitoring stations between Conklin and Fort Chipewyan - most located at or near oil sands plants - is openly and continuously shared with stakeholders and the public on our website www.wbea.org and through Community Reports and outreach activities.

Air Monitoring

Ambient air quality is measured both continuously and non-continuously by the Wood Buffalo Environmental Association.

Continuous monitoring is performed using electronic instrumentation. Atmospheric gas concentrations are measured by parameter-specific electronic analyzers housed in stationary shelters. Meteorological parameters are measured with sensors mounted on meteorological towers, with standard heights of 10 meters, and 20 meters in forested areas. Meteorological towers with heights of 90 and 167 meters, with an expanded program of meteorological measurements are in place at two locations. Air quality analyzer and meteorological sensor signals are measured approximately once per second by a computerized data acquisition system, and processed into averages every 5 minutes, 1 hour and 24 hours, depending on the parameter and data requirements. There is a maximum of 8760 hours in a year, during which 1-hour concentrations may be reported. Continuous monitoring sites are equipped with permanent electrical power, heating and air conditioning systems, and telephone and internet connections.

Non-continuous monitoring consists of collecting air samples or exposing pollutant-sensitive, chemically treated sample media to the atmosphere for a period of time. Air pollutant concentrations are determined by laboratory analysis of the samples and exposed media. Exposure periods range from 24 hours to 1 month for various sample modes. Non-continuous monitoring is often referred to as integrated sampling, and is performed by both active and passive methods. Active methods utilize a computer controlled pump to draw air through or into the sample collector. Active methods are limited to sites where electrical power is available. Passive methods simply expose a chemically treated medium to the atmosphere. Without the need for support equipment, passive sampling can be performed at remote and isolated locations.

Table 1 provides a listing of stations with their names and corresponding WBEA identification number and the air quality parameters measured by continuous methods at each site. Parameters measured include hydrogen sulphide (H₂S), total reduced sulphur (TRS), sulphur dioxide (SO₂), nitrogen dioxide (NO₂), total hydrocarbons (THC), methane (CH₄), non-methane hydrocarbons (NMHC) and ammonia. Sites are categorized as industrial or community, based on the setting in which they are located.

Table 1: Summary of stations and parameters measured continuously at WBEA sites.

WBEA ID	LOCALE	STATION NAME	SO ₂	NO/NO ₂ / NO _x	O ₃	PM _{2.5}	TRS	H ₂ S	THC	Methane/ NMHC	CO	NH ₃
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X		X	X		X
2	INDUSTRIAL	MILDRED LAKE	X					X	X			
3	METEOROLOGICAL	LOWER CAMP - meteorological										
4	INDUSTRIAL	BUFFALO VIEWPOINT*	X					X	X			
5	INDUSTRIAL	MANNIX	X					X	X			
6	COMMUNITY	PATRICIA MCINNES	X	X	X	X	X		X	X		X
7	COMMUNITY	ATHABASCA VALLEY	X	X	X	X	X		X	X	X	
8	COMMUNITY	FORT CHIPEWYAN	X	X	X	X						
9	INDUSTRIAL	BARGE LANDING					X		X			
11	INDUSTRIAL	LOWER CAMP	X					X	X			
13	INDUSTRIAL	FORT MCKAY SOUTH	X	X	X	X	X		X			
14	COMMUNITY	ANZAC	X	X	X	X	X		X	X		
15	INDUSTRIAL	CNRL HORIZON	X	X		X	X		X			
16	INDUSTRIAL	SHELL MUSKEG RIVER	X	X		X			X			
17	INDUSTRIAL	WAPASU*	X	X		X		X	X			
18	ENHANCED	STONY MOUNTAIN	X	X	X	X	X		X	X		
19	INDUSTRIAL	FIREBAG	X	X				X	X			
20	INDUSTRIAL	BRION-MACKAY RIVER	X	X				X	X			
21	COMMUNITY	CONKLIN	X	X	X	X	X		X	X		
100	PORTABLE	AIM ^y				X						
101	PORTABLE	MAHIHKAN	X	X				X				
102	PORTABLE	NORTHERN LIGHTS	X	X				X				
103	PORTABLE	NISKA	X	X				X				
104	PORTABLE	HEMP					X		X	X		

* Also functions as an enhanced deposition station.

y Monitoring data used for research and development purposes only.

Table 2 provides a listing of stations and meteorological parameters measured by continuous methods. Parameters measured include ambient temperature, relative humidity, wind speed, wind direction, vertical wind speed, solar radiation, precipitation, and leaf wetness.

Table 2: Summary of stations and meteorological parameters measured continuously at WBEA sites.

WBEA ID	LOCALE	STATION NAME	Temperature	RH	Wind Speed	Wind Direction	Vertical Wind Speed	Solar Radiation	Precipitation	Leaf Wetness
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X		X	X	X
2	INDUSTRIAL	MILDRED LAKE	X	X	X	X				
3	METEOROLOGICAL	LOWER CAMP - meteorological	X	X	X	X	X			
4	INDUSTRIAL	BUFFALO	X	X	X	X				
5	INDUSTRIAL	VIEWPOINT*	X	X	X	X	X			
6	COMMUNITY	MANNIX	X	X	X	X				
7	COMMUNITY	PATRICIA MCINNES	X	X	X	X				
8	COMMUNITY	ATHABASCA VALLEY	X	X	X	X		X	X	X
9	INDUSTRIAL	FORT CHIPEWYAN	X	X	X	X				
11	INDUSTRIAL	BARGE LANDING	X	X	X	X				
13	INDUSTRIAL	LOWER CAMP	X	X	X	X				
14	COMMUNITY	FORT MCKAY SOUTH ANZAC	X	X	X	X			X	X
15	INDUSTRIAL	CNRL HORIZON	X	X	X	X		X	X	
16	INDUSTRIAL	SHELL MUSKEG RIVER	X	X	X	X				
17	INDUSTRIAL	WAPASU*	X	X	X	X			X	
18	ENHANCED	STONY MOUNTAIN*	X	X	X	X		X	X	X
19	INDUSTRIAL	FIREBAG	X	X	X	X				
20	INDUSTRIAL	BRION-MACKAY RIVER	X	X	X	X				
21	COMMUNITY	CONKLIN	X	X	X	X				
100	PORTABLE	AIM ^y								
101	PORTABLE	MAHIKAN	X	X	X	X				
102	PORTABLE	NORTHERN LIGHTS	X	X	X	X				
103	PORTABLE	NISKA	X	X	X	X				
104	PORTABLE	HEMPY	X	X	X	X				

* Also functions as an enhanced deposition station.
 y Monitoring data used for research and development purposes only.

Table 3 provides a listing of stations and air quality parameters measured by integrated methods. Parameters measured include volatile organic compounds (VOC) and reduced sulphur compounds (RSC), particulate matter less than 2.5 µm aerodynamic diameter (PM_{2.5}) including associated metal and ion analysis, particulate matter less than 10 µm aerodynamic diameter (PM₁₀), including associated metal and ion analysis, polycyclic aromatic hydrocarbons (PAH), wet precipitation, including major ion analysis. Particulate matter samples, coarse and fine (dichot) and sequential automated speciated samples (SASS) are collected on behalf of Environment Canada.

Table 3: Summary of parameters measured using integrated methods at WBEA sites

WBEA ID	LOCALE	STATION NAME	VOC/RSC	PM _{2.5} Mass, Metals and Ions	PM ₁₀ Mass, Metals and Ions	PAH	DICHOT	SASS	PRECIP
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X	X	X
5	INDUSTRIAL	MANNIX*		X		X			
6	COMMUNITY	PATRICIA MCINNES	X	X	X	X			X
7	COMMUNITY	ATHABASCA VALLEY	X	X	X	X			
9	INDUSTRIAL	BARGE LANDING	X						
11	INDUSTRIAL	LOWER CAMP*		X		X			
13	INDUSTRIAL	FORT MCKAY SOUTH	X		X				
14	COMMUNITY	ANZAC	X	X	X	X			
15	INDUSTRIAL	CNRL HORIZON	X		X				
16	INDUSTRIAL	SHELL MUSKEG RIVER			X				
17	INDUSTRIAL	WAPASU*				X	X		
18	ENHANCED	STONY MOUNTAIN*	X			X	X	X	

* Also functions as an enhanced deposition station.

All WBEA air monitoring data are fully quality-assured and then sent within four weeks of month-end to the AEP Airdata Warehouse (www.airdata.alberta.ca), an on-line database for all of Alberta's air monitoring data. In 2016, WBEA operated 19 permanent, three portable, and two research and development air monitoring stations. WBEA uses continuous, time-integrated and passive techniques to measure air quality in the air shed.

WBEA's air quality data are used by Alberta Environment and Parks to calculate the hourly Air Quality Health Index (AQHI), which is one measure of air quality. Fort McKay also operates their own Air Quality Index (FMAQI). WBEA transmits raw data, in real time, to AEP where the index is calculated. The AQHI is calculated every hour for six Community Air Monitoring Stations in Wood Buffalo: Fort Chipewyan, Fort McKay South, Athabasca Valley, Anzac, Janvier, and Conklin.

Deposition Monitoring

The Terrestrial Environmental Effects Monitoring (TEEM) program monitors and reports on certain possible effects of air emissions on terrestrial ecosystems and plant life. TEEM does this through an integrated suite of measurements of air emission sources linked to terrestrial receptors. TEEM's monitoring work is centered upon a regional network of forest health and peat land monitoring sites. These sites were established to detect early warning of change in key indicators and medium-to-long term detection and quantification of effect or impact. TEEM also operates a Traditional Environmental Knowledge project focused on berry health.

Odour Monitoring

The Human Exposure Monitoring Program (HEMP) is focused on better understanding the frequency and nature of regional odours through an array of specialized air analyzers designed to chemically characterize odour events.

Monitoring Site Locations

The map in Figure 1 shows the locations of all WBEA continuous air quality monitoring sites and the map in Figure 2 shows the locations of all WBEA passive sites. Continuous monitoring sites are located in areas of development, primarily along the Athabasca River valley and cover the region from Conklin to Fort Chipewyan. Passive sites are located throughout the region, including in remote forest health sites.

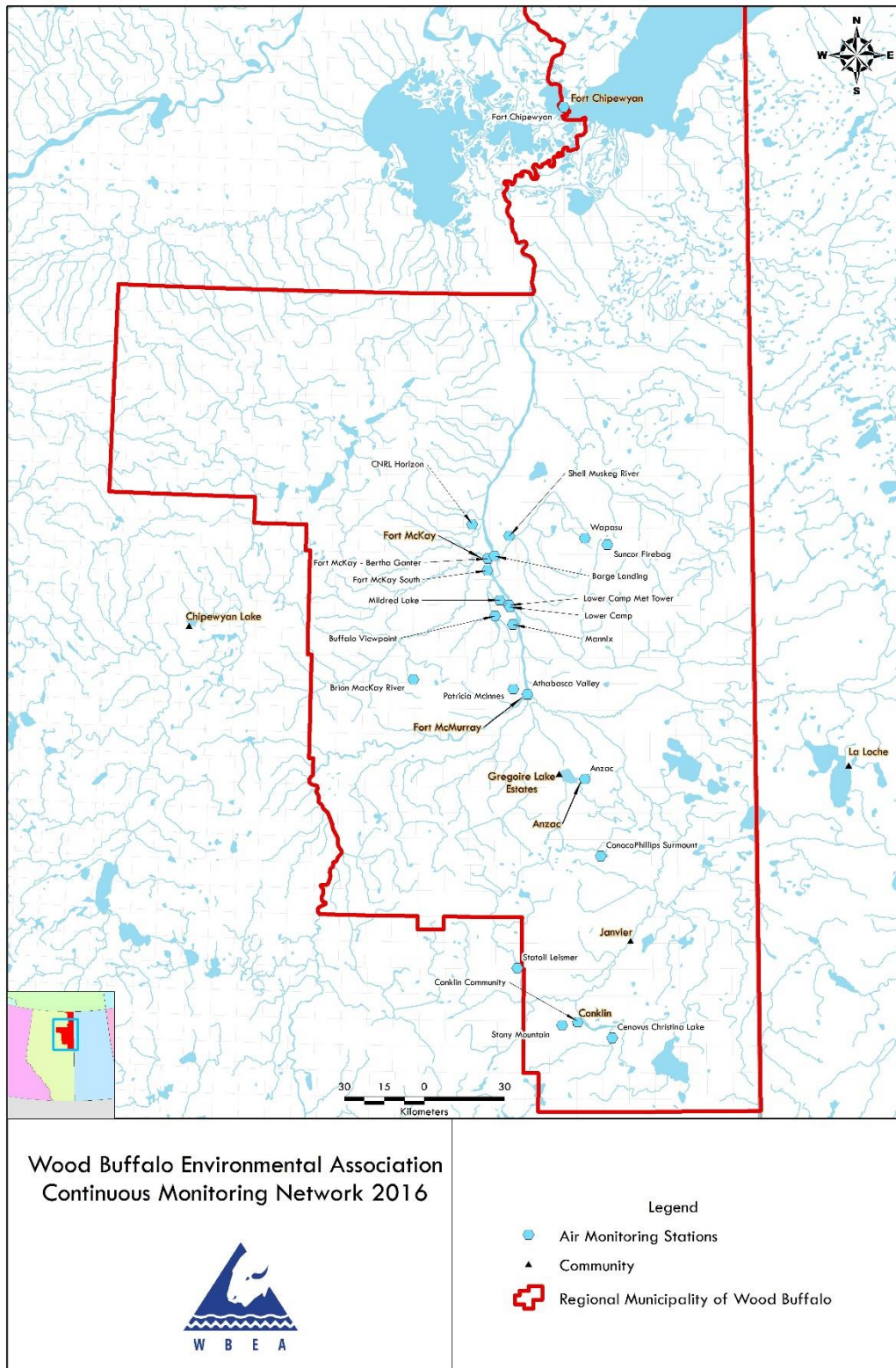


Figure 1: Continuous Air Monitoring Station Locations

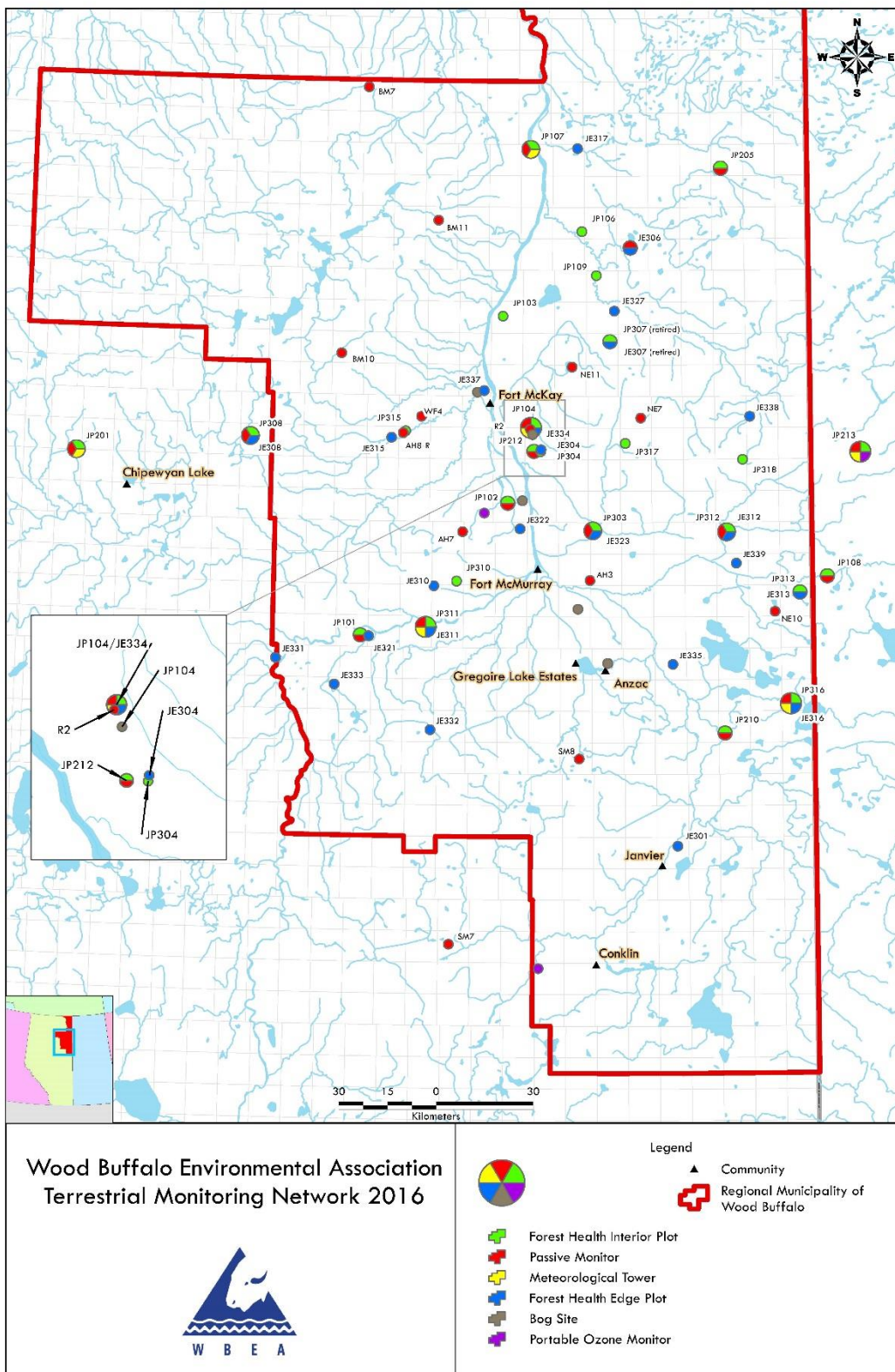


Figure 2: Passive Monitoring Site Locations

2. Summary of Changes to the WBEA Air Monitoring Network

The WBEA air monitoring network expanded in 2016 to include 2 additional permanent air monitoring stations.

The WBEA commissioned a permanent air monitoring station at the Brion MacKay River SAGD facility in early January 2016 to fulfill Alberta Environment's Environmental Protection and Enhancement Act facility approval number 254465-00-00. The station is located approximately 30 km northwest of Fort McMurray. This station is equipped with ambient air quality analyzers for SO₂, H₂S, THC, NO, NO₂, and NO_x. Temperature, wind speed and direction, and relative humidity are also continuously measured.

The WBEA commissioned a permanent air monitoring station in the community of Conklin on April 1, 2016. This station is equipped with ambient air quality analyzers for SO₂, TRS, THC, CH₄, NMHC, NO, NO₂, NO_x, O₃, and PM_{2.5}. Temperature, humidity, and wind speed and direction are also continuously measured.

In early December 2015, the WBEA commissioned a portable air monitoring station at the Cenovus Energy Christina Lake facility. The survey at this location will be conducted from January until May 2017 to fulfill Alberta Environment's Environmental Protection and Enhancement Act facility approval number 48522-01-00. This station is equipped with ambient air quality analyzers for SO₂, H₂S, NO, NO₂, NO_x and meteorological sensors for ambient temperature, relative humidity, and wind speed and direction.

The WBEA commenced an ambient air quality monitoring survey at the Statoil Leismer facility on October 1, 2015 until April 2016, to fulfill EPEA approval number 241311-00-02. 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 WBEA commissioned a portable air monitoring station at the ConocoPhillips Surmont facility on July 1, 2014 to fulfill EPEA approval number 48263-01-00. 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 current EPEA Approval for the ConocoPhillips Surmont Phase 1 project requires ambient air monitoring at the facility continuously. A permanent air monitoring station will be installed on site in mid 2017.

The following operational modifications are provided as per the Air Monitoring Directive requirements:

Table 4: Parameter changes to the WBEA network – 2016

Station	Station Name	Parameter	Date Effective	Comment
AMS 20	Brion-MacKay River	SO2	6-Jan-16	New station
AMS 20	Brion-MacKay River	H2S	8-Jan-16	New station
AMS 20	Brion-MacKay River	THC	6-Jan-16	New station
AMS 20	Brion-MacKay River	NO, NO2, NOx	6-Jan-16	New station
AMS 20	Brion-MacKay River	Wind speed and direction	6-Jan-16	New station
AMS 20	Brion-MacKay River	Temperature	14-Jan-16	New station
AMS 20	Brion-MacKay River	Relative Humidity	14-Jan-16	New station
AMS 21	Conklin	SO2	1-Apr-16	New station
AMS 21	Conklin	TRS	1-Apr-16	New station
AMS 21	Conklin	THC, CH4, NMHC	1-Apr-16	New station
AMS 21	Conklin	O3	1-Apr-16	New station
AMS 21	Conklin	NO, NO2, NOx	1-Apr-16	New station
AMS 21	Conklin	PM2.5	1-Apr-16	New station
AMS 21	Conklin	Wind speed and direction	1-Apr-16	New station
AMS 21	Conklin	Temperature	1-Apr-16	New station
AMS 21	Conklin	Relative Humidity	1-Apr-16	New station

3. Concentrations in Excess of Alberta Ambient Air Quality Objectives (AAAQO)

The ambient concentrations in excess of the air quality objectives as indicated in the Air Monitoring Directive, Section III.A.3 (a & b) for CO, H₂S, NO₂, NH₃, O₃, PM_{2.5}, and SO₂ are provided in the Annual Network Summary. A detailed summary of ambient concentrations in excess of the AAAQO, including site, parameter, date & time, reference number, exceedance period, reported and final concentration, and status are included in Appendix I of the report.

The WBEA airshed reports to Alberta Environments and Parks (AEP) ambient air concentrations for total reduced sulphur (TRS) in excess of the H₂S Ambient Air Quality Objectives. The statistical summary of the previous 5-year comparisons for ambient concentrations in excess of the AAAQOs are shown in Figure 3. The H₂S summary includes the TRS concentrations in excess of the H₂S objectives.

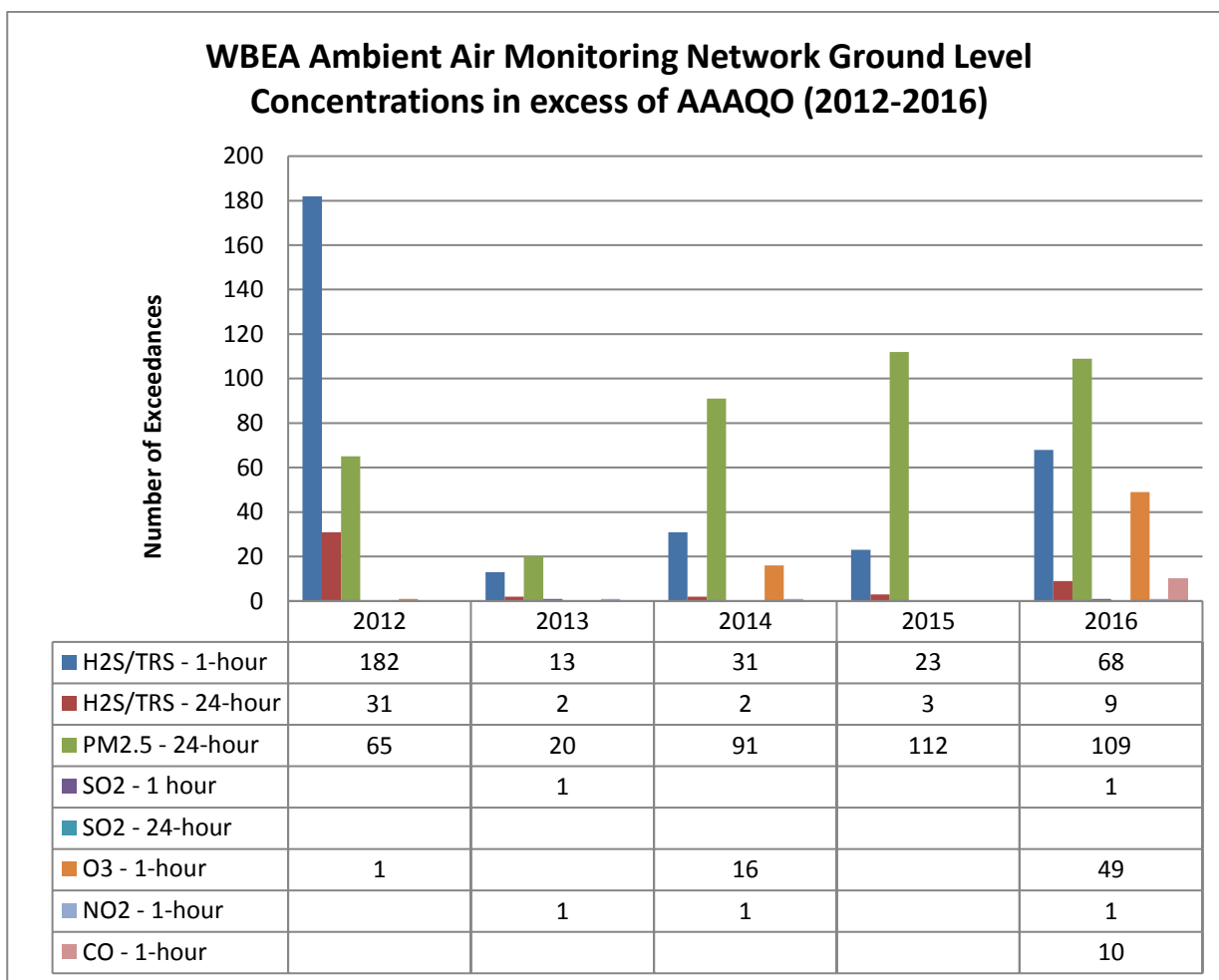


Figure 3 Ambient Air Concentrations in excess of the AAAQO (2012-2016)

4. Operational Status – Instrument Operation Below 90 Percent of the Time

In 2016, there were 25 incidents resulting in compliance monitoring instruments operating less than 90% of the time. A detailed summary of these incidents, including date, reference number, description, location, issue, and remedial action are included in Appendix II of the report.

5. External Audits and Results

Alberta Environment and Parks (AEP) audited the continuous monitoring stations of the Wood Buffalo Environmental Association’s (WBEA) ambient air quality monitoring network from September 20 to 28, 2016. During the audit, the following instruments and sensors were found to be outside the Alberta Air Monitoring Directive (AMD) – Chapter 8 Audit Assessment Criteria:

Station	Audit Findings	Cause	Corrective Actions
Mildred Lake (AMS 2)	SO ₂ analyzer response was 11% below the calculated audit gas concentration.	Calibration gas concentration not as indicated.	Data was reviewed and corrected from August 19, 2015 to October 4, 2016.
Buffalo Viewpoint (AMS 4)	H ₂ S analyzer did not meet audit criteria for linearity.	Analyzer SO _x scrubber required replacement.	SO _x scrubber was replaced. Previous calibrations and data were reviewed; data was invalidated from September 27-28, 2017 from the last valid daily zero span until repairs and recalibration was conducted.
Mannix (AMS 5)	H ₂ S analyzer response was 32% above the calculated audit gas concentration.	Calibration gas may have become contaminated.	Data has been invalidated for the time the calibration cylinder was used at the station: February 6, 2015 to September 28, 2016.
Athabasca Valley (AMS 7)	NO _x analyzer response was 12% below the calculated audit gas concentration.	Calibration gas concentration not as indicated.	Data was reviewed and corrected from October 14, 2014 to September 26, 2016.
Athabasca Valley (AMS 7)	TRS analyzer was 12% below the calculated audit gas concentration	Analyzer had a leak in the ambient sample stream.	Analyzer was repaired, recalibrated, and re-audited. Data was invalidated from the installation of this analyzer on July 30 to September 26, 2016, following repairs and re-audit.
Anzac (AMS 14)	SO ₂ analyzer response was 12% below the calculated audit gas concentration.	Calibration gas concentration not as indicated.	Data was reviewed and corrected from March 17, 2015 to September 27, 2016.

Station	Audit Findings	Cause	Corrective Actions
CNRL Horizon (AMS 15)	PM _{2.5} analyzer span response was 34% above the target sensitivity factor.	Previous foil calibration was beyond audit criteria.	The analyzer was re-calibrated and data was invalidated from June 21 to September 23, 2016.
Wapasu (AMS 17)	Wind direction was out of alignment by 16 degrees.	The wind direction sensor was aligned to magnetic north rather than true north.	The wind direction sensor alignment was corrected and verified by WBEA and AEP on September 21, 2016. Data was assessed by a third party and has been corrected from August 17 to September 21, 2016.
Firebag (AMS 19)	THC analyzer response was 11% above the calculated audit gas concentration.	A component failure was identified as the cause of the out of criteria analyzer response.	Analyzer was repaired and recalibrated. Data was invalidated from September 15-21, 2016 based on a review of diagnostics.

Corrected data will be uploaded to the AEP airdata warehouse by April 30, 2017.

6. Monthly Report Revisions

The following revisions were made to monthly reports:

May: Revised H₂S calibrations from AMS 502 – ConocoPhillips Surmont were included with the May report. Corrections were made to the calibration cylinder details from July 2015 to March 2016 calibration reports.

September: As a result of the Alberta Environment and Parks (AEP) audit, data for Athabasca Valley (AMS 7) was re-submitted to reflect invalidation of TRS data effective July 30, 2016. Revised summary tables for Athabasca Valley and network summary for July 2016 were submitted with the September report.

Data for AMS 17 – Wapasu precipitation has been reported since January, 2016, but data upload to the AEP airdata warehouse was not successfully completed. Data from this station has been re-submitted to include the finalized data for precipitation collection. There were no changes to any other parameters or monthly report summaries for the Wapasu air monitoring station.

November: Wind speed and wind direction data was revised and resubmitted to the AEP Airdata Warehouse for Firebag air monitoring station (AMS 19) for October 2016. Revised summary tables for Firebag AMS and Network Summary for October 2016 were submitted with the November report.

December: H₂S data was revised and resubmitted to the AEP Airdata Warehouse for Buffalo Viewpoint air monitoring station (AMS 4) for September 2016. Revised summary tables for Buffalo Viewpoint AMS and Network Summary for September 2016 were submitted with the December report. The WBEA performed a thorough six-month review of the ambient air data at AMS 4 and found that the H₂S analyzer has performed in accordance with AMD criteria up until the AEP audit conducted on September 27, 2016. All the calibrations between April 2016 and September 2016 met AMD requirements for response and linearity. As such, the WBEA

has invalidated the data between the last daily span that occurred on 02:00 MST September 27, 2016 and 16:00 MST September 28, 2016 when the SO₂ scrubber was replaced and the analyzer was recalibrated. AEP supports the removal of the above data in a letter dated January 11, 2017, File No(s). 2016-206A/297A, Subject: 2016 WBEA Ambient Air Monitoring Network Audit Results.

Precipitation collector data has been revised and resubmitted to the AEP Airdata Warehouse for Fort Chipewyan air monitoring station (AMS 8) for November 2016. The precipitation collector was found to be unresponsive on January 5, 2017 and was removed from site for repairs. Data was invalidated back to the last precipitation event on November 28, 2016. Revised summary tables for Fort Chipewyan AMS for November 2016 have been submitted with this report.

7. 2012-2016 WBEA Data Compared to LARP Triggers and Limits

A summary of data from WBEA air monitoring stations compared to the Lower Athabasca Regional Plan (LARP) trigger levels and limits for NO₂ and SO₂ is provided in Appendix III.

8. 2016 Annual Air Concentrations

This report contains a summary of operational times for the year, the monthly averages, the number of readings in excess of the AAAQO, and frequency distributions of 1-hour data.

The results of passive and integrated monitoring of VOC, PM_{2.5}, PM₁₀, PAH, and precipitation are also included in this report. The integrated results for daily and annual averages are provided for all species analyzed, as well as the monthly averages for passive monitoring.

If additional information is required, please contact the undersigned at (780) 715 1770 or the Wood Buffalo Environmental Association at (780) 799 4420.

Yours sincerely,


Wood Buffalo Environmental Association

Michael Martineau
Data Lead

Sanjay Prasad
Executive Director

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

2016
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Prepared: Mar 3 2017

APPROVAL NUMBERS	REPORT DATE						
	MONTH	YEAR					
289664-00-00	--	2016					
254465-00-00	CONTINUOUS AMBIENT MONITORING						
149968-00-01							
48522-01-00							
240008-00-03				ONE-HOUR AVERAGE		24-HOUR AVERAGE	
48263-00-00	PARAMETER	STN. NO.	% TIME OPERATIONAL	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION
224816-00-03	O3(ppm)	7	99.53	0.355	32	0.094	-
189942-00-02	O3(ppm)	8	95.23	0.063	0	0.052	-
206355-00-00	O3(ppm)	13	99.29	0.067	0	0.047	-
46586-00-00	O3(ppm)	14	96.48	1.612	2	0.122	-
216466-00-04	O3(ppm)	17	99.01	0.077	0	0.049	-
137467-00-00	O3(ppm)	18	99.23	0.073	0	0.057	-
20809-01-00	O3(ppm)	21	99.83	0.069	0	0.051	-
241311-00-02	NO2(ppm)	1	98.62	0.048	0	0.024	-
094-02-00	NO2(ppm)	6	99.58	0.064	0	0.022	-
305529-00-00	NO2(ppm)	7	99.27	0.055	0	0.027	-
026-02-00	NO2(ppm)	8	99.77	0.030	0	0.014	-
228044-00-00	NO2(ppm)	13	99.48	0.044	0	0.022	-
73203-01-00	NO2(ppm)	14	96.49	0.291	1	0.019	-
236394-00-00	NO2(ppm)	15	99.62	0.045	0	0.025	-
	NO2(ppm)	16	99.69	0.066	0	0.033	-
	NO2(ppm)	17	99.59	0.035	0	0.013	-
	NO2(ppm)	18	99.20	0.019	0	0.008	-
	NO2(ppm)	19	99.48	0.038	0	0.015	-
	NO2(ppm)	20	99.88	0.046	0	0.025	-
	NO2(ppm)	21	99.64	0.019	0	0.010	-
	NO2(ppm)	500	98.88	0.038	0	0.016	-
	NO2(ppm)	502	99.91	0.015	0	0.007	-
	NO2(ppm)	501	93.51	0.029	0	0.012	-
	CO(ppm)	7	99.36	17.0	10	6.4	-
	NH3(ppm)	1	91.89	0.233	0	0.094	-
	NH3(ppm)	6	94.36	1.588	0	0.458	-
	PM2.5(ug/m3)	1	99.43	3151.6	-	1158.5	7
	PM2.5(ug/m3)	6	99.40	5197.9	-	1131.0	17
	PM2.5(ug/m3)	7	97.84	3261.4	-	1034.9	18
	PM2.5(ug/m3)	8	96.63	623.5	-	114.4	5
	PM2.5(ug/m3)	13	99.27	3866.6	-	1140.6	8
	PM2.5(ug/m3)	14	96.93	3182.4	-	267.3	13
	PM2.5(ug/m3)	15	73.18	2027.8	-	438.7	6
	PM2.5(ug/m3)	16	99.72	6070.2	-	1444.5	10
	PM2.5(ug/m3)	17	97.97	1238.2	-	350.3	9
	PM2.5(ug/m3)	18	98.66	389.4	-	152.6	8
	PM2.5(ug/m3)	21	96.32	353.7	-	137	8
	WS(km/h)	1	99.85	-	-	-	-
	WS(km/h)	2	98.72	-	-	-	-
	WS(km/h)	4	99.66	-	-	-	-
	WS(km/h)	5	98.99	-	-	-	-
	WS(km/h)	6	99.85	-	-	-	-
	WS(km/h)	7	99.78	-	-	-	-
	WS(km/h)	8	98.09	-	-	-	-
	WS(km/h)	9	98.99	-	-	-	-
	WS(km/h)	11	99.76	-	-	-	-
	WS(km/h)	13	98.85	-	-	-	-
	WS(km/h)	14	96.97	-	-	-	-
	WS(km/h)	15	98.75	-	-	-	-
	WS(km/h)	16	99.90	-	-	-	-
	WS(km/h)	17	99.39	-	-	-	-
	WS(km/h)	18	97.55	-	-	-	-
	WS(km/h)	19	89.00	-	-	-	-
	WS(km/h)	20	98.90	-	-	-	-
	WS(km/h)	21	98.36	-	-	-	-
	WS(km/h)	500	99.20	-	-	-	-
	WS(km/h)	502	99.77	-	-	-	-
	WS(km/h)	501	93.18	-	-	-	-
							
SIGNATURE OF ASSOCIATION REPRESENTATIVE				FOR ALBERTA ENVIRONMENT USE ONLY			



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM ANNUAL REPORT

ANNUAL 2016

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

March 2017



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
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SULPHUR DIOXIDE ANNUAL 2016

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Wood Buffalo Environmental Association - Fort McKay - Bertha Ganter (AMS 1)
Annual Summary for the Year 2016
Sulphur Dioxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value	Number of Values Exceeding 24-Hour Guidance	% of Data in Each Concentration Range					
								0 - 20	21 - 60	61 - 110	111 - 170	171 - 340	>340
Jan	100	709	0.9	14	0	2	0	100	0	0	0	0	0
Feb	98.99	657	1.2	29	0	5	0	99.54	0.46	0	0	0	0
Mar	99.33	704	1.7	55	0	8	0	98.15	1.85	0	0	0	0
Apr	99.72	684	1.3	51	0	8	0	99.42	0.58	0	0	0	0
May	99.6	707	0.6	29	0	7	0	99.58	0.42	0	0	0	0
Jun	99.72	681	1.4	78	0	8	0	98.83	1.03	0.15	0	0	0
Jul	99.6	706	0.7	59	0	5	0	99.72	0.28	0	0	0	0
Aug	99.46	705	0.7	20	0	4	0	100	0	0	0	0	0
Sep	99.58	678	1.2	39	0	6	0	99.12	0.88	0	0	0	0
Oct	100	709	0.4	21	0	5	0	99.86	0.14	0	0	0	0
Nov	99.86	684	0.7	31	0	3	0	99.85	0.15	0	0	0	0
Dec	97.98	693	0.6	20	0	3	0	100	0	0	0	0	0
Annual	99.49	8317	0.9	78	0	8	0	99.51	0.48	0.01	0	0	0



Wood Buffalo Environmental Association - Mildred Lake (AMS 2)
Annual Summary for the Year 2016
Sulphur Dioxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value	Number of Values Exceeding 24-Hour Guidance	% of Data in Each Concentration Range					
								0 - 20	21 - 60	61 - 110	111 - 170	171 - 340	>340
Jan	100	709	2.5	43	0	13	0	97.6	2.4	0	0	0	0
Feb	99.28	656	3.0	36	0	8	0	97.41	2.59	0	0	0	0
Mar	99.33	705	3.5	112	0	17	0	95.32	4.4	0.14	0.14	0	0
Apr	99.31	682	2.6	49	0	14	0	97.21	2.79	0	0	0	0
May	100	711	1.5	32	0	8	0	98.45	1.55	0	0	0	0
Jun	100	685	2.7	88	0	16	0	97.08	2.48	0.44	0	0	0
Jul	100	709	1.8	64	0	9	0	98.03	1.83	0.14	0	0	0
Aug	99.73	707	2.0	44	0	7	0	97.6	2.4	0	0	0	0
Sep	99.72	681	1.9	36	0	6	0	98.83	1.17	0	0	0	0
Oct	99.6	706	1.3	33	0	10	0	98.87	1.13	0	0	0	0
Nov	99.86	684	3.3	85	0	21	0	96.64	3.07	0.29	0	0	0
Dec	100	707	2.0	32	0	13	0	98.3	1.7	0	0	0	0
Annual	99.74	8342	2.3	112	0	21	0	97.61	2.29	0.08	0.01	0	0



Wood Buffalo Environmental Association - Buffalo Viewpoint (AMS 4)
Annual Summary for the Year 2016
Sulphur Dioxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value	Number of Values Exceeding 24-Hour Guidance	% of Data in Each Concentration Range					
								0 - 20	21 - 60	61 - 110	111 - 170	171 - 340	>340
Jan	100	709	0.5	18	0	3	0	100	0	0	0	0	0
Feb	100	662	0.8	39	0	4	0	99.55	0.45	0	0	0	0
Mar	100	710	1.7	68	0	8	0	98.87	0.85	0.28	0	0	0
Apr	100	687	0.6	25	0	3	0	99.85	0.15	0	0	0	0
May	100	710	0.4	20	0	2	0	100	0	0	0	0	0
Jun	100	684	0.9	41	0	4	0	99.56	0.44	0	0	0	0
Jul	99.06	703	1.6	113	0	11	0	98.15	1.71	0	0.14	0	0
Aug	100	708	1.5	55	0	7	0	99.01	0.99	0	0	0	0
Sep	100	682	0.6	34	0	6	0	99.27	0.73	0	0	0	0
Oct	100	710	0.4	16	0	2	0	100	0	0	0	0	0
Nov	100	686	0.5	26	0	6	0	99.71	0.29	0	0	0	0
Dec	100	710	0.5	15	0	3	0	100	0	0	0	0	0
Annual	99.92	8361	0.8	113	0	11	0	99.5	0.47	0.02	0.01	0	0



Wood Buffalo Environmental Association - Mannix (AMS 5)
Annual Summary for the Year 2016
Sulphur Dioxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value	Number of Values Exceeding 24-Hour Guidance	% of Data in Each Concentration Range					
								0 - 20	21 - 60	61 - 110	111 - 170	171 - 340	>340
Jan	100	707	1.8	42	0	9	0	98.87	1.13	0	0	0	0
Feb	100	664	4.1	81	0	23	0	96.08	3.46	0.45	0	0	0
Mar	98.92	701	6.0	117	0	21	0	90.73	8.99	0.14	0.14	0	0
Apr	100	687	1.9	35	0	10	0	99.56	0.44	0	0	0	0
May	99.87	708	1.1	29	0	5	0	99.72	0.28	0	0	0	0
Jun	100	686	1.9	91	0	10	0	98.25	1.31	0.44	0	0	0
Jul	99.33	705	4.0	150	0	16	0	95.18	4.11	0.57	0.14	0	0
Aug	99.46	706	3.5	95	0	19	0	96.32	2.97	0.71	0	0	0
Sep	100	683	2.2	124	0	36	0	97.8	1.61	0.44	0.15	0	0
Oct	100	709	3.5	185	1	42	0	95.91	2.54	1.13	0.28	0.14	0
Nov	100	688	0.9	29	0	11	0	99.56	0.44	0	0	0	0
Dec	99.6	707	1.8	36	0	9	0	98.16	1.84	0	0	0	0
Annual	99.76	8351	2.7	185	1	42	0	97.15	2.45	0.33	0.06	0.01	0



Wood Buffalo Environmental Association - Patricia McInnes (AMS 6)
Annual Summary for the Year 2016
Sulphur Dioxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value	Number of Values Exceeding 24-Hour Guidance	% of Data in Each Concentration Range					
								0 - 20	21 - 60	61 - 110	111 - 170	171 - 340	>340
Jan	100	708	1.0	36	0	5	0	99.86	0.14	0	0	0	0
Feb	100	664	1.7	21	0	8	0	99.85	0.15	0	0	0	0
Mar	100	709	1.8	47	0	9	0	99.15	0.85	0	0	0	0
Apr	100	687	0.7	39	0	5	0	99.85	0.15	0	0	0	0
May	100	706	0.7	13	0	4	0	100	0	0	0	0	0
Jun	99.86	679	0.9	40	0	6	0	99.71	0.29	0	0	0	0
Jul	100	709	1.9	56	0	9	0	99.44	0.56	0	0	0	0
Aug	99.87	705	0.9	17	0	3	0	100	0	0	0	0	0
Sep	99.86	682	0.6	19	0	7	0	100	0	0	0	0	0
Oct	99.87	708	0.6	17	0	4	0	100	0	0	0	0	0
Nov	100	686	0.4	17	0	5	0	100	0	0	0	0	0
Dec	100	710	0.7	13	0	3	0	100	0	0	0	0	0
Annual	99.95	8353	1.0	56	0	9	0	99.82	0.18	0	0	0	0



Wood Buffalo Environmental Association - Athabasca Valley (AMS 7)
Annual Summary for the Year 2016
Sulphur Dioxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value	Number of Values Exceeding 24-Hour Guidance	% of Data in Each Concentration Range					
								0 - 20	21 - 60	61 - 110	111 - 170	171 - 340	>340
Jan	99.87	706	0.7	15	0	3	0	100	0	0	0	0	0
Feb	99.57	658	1.1	23	0	5	0	99.85	0.15	0	0	0	0
Mar	98.92	700	1.5	35	0	8	0	99.43	0.57	0	0	0	0
Apr	99.44	681	0.7	19	0	3	0	100	0	0	0	0	0
May	99.87	711	1.0	36	0	10	0	99.3	0.7	0	0	0	0
Jun	99.86	684	0.9	17	0	3	0	100	0	0	0	0	0
Jul	98.52	690	1.4	25	0	6	0	99.57	0.43	0	0	0	0
Aug	99.87	707	0.9	15	0	4	0	100	0	0	0	0	0
Sep	99.72	676	0.7	18	0	6	0	100	0	0	0	0	0
Oct	99.6	706	0.5	12	0	4	0	100	0	0	0	0	0
Nov	99.86	684	0.5	11	0	2	0	100	0	0	0	0	0
Dec	100	708	0.5	10	0	2	0	100	0	0	0	0	0
Annual	99.59	8311	0.9	36	0	10	0	99.84	0.16	0	0	0	0



Wood Buffalo Environmental Association - Fort Chipewyan (AMS 8)
Annual Summary for the Year 2016
Sulphur Dioxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value	Number of Values Exceeding 24-Hour Guidance	% of Data in Each Concentration Range					
								0 - 20	21 - 60	61 - 110	111 - 170	171 - 340	>340
Jan	99.6	705	0.6	10	0	4	0	100	0	0	0	0	0
Feb	100	658	0.2	2	0	1	0	100	0	0	0	0	0
Mar	100	708	0.1	3	0	1	0	100	0	0	0	0	0
Apr	99.44	680	0.1	4	0	1	0	100	0	0	0	0	0
May	100	707	0.1	3	0	1	0	100	0	0	0	0	0
Jun	99.86	680	0.1	3	0	1	0	100	0	0	0	0	0
Jul	99.73	705	0.1	13	0	2	0	100	0	0	0	0	0
Aug	100	708	0.1	5	0	1	0	100	0	0	0	0	0
Sep	100	685	0.2	10	0	1	0	100	0	0	0	0	0
Oct	99.87	707	0.1	5	0	1	0	100	0	0	0	0	0
Nov	100	685	0.4	11	0	3	0	100	0	0	0	0	0
Dec	100	708	0.8	21	0	6	0	99.86	0.14	0	0	0	0
Annual	99.87	8336	0.2	21	0	6	0	99.99	0.01	0	0	0	0



Wood Buffalo Environmental Association - Lower Camp (AMS 11)
Annual Summary for the Year 2016
Sulphur Dioxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value	Number of Values Exceeding 24-Hour Guidance	% of Data in Each Concentration Range					
								0 - 20	21 - 60	61 - 110	111 - 170	171 - 340	>340
Jan	99.73	706	2.1	87	0	17	0	98.3	1.42	0.28	0	0	0
Feb	100	663	1.9	65	0	8	0	98.34	1.51	0.15	0	0	0
Mar	99.87	703	2.4	140	0	15	0	97.58	2.13	0	0.28	0	0
Apr	99.86	685	2.2	98	0	14	0	97.52	2.19	0.29	0	0	0
May	100	711	2.8	148	0	22	0	97.05	1.69	0.98	0.28	0	0
Jun	100	685	4.4	124	0	17	0	93.28	6.13	0.44	0.15	0	0
Jul	99.73	706	3.6	95	0	14	0	95.33	4.53	0.14	0	0	0
Aug	100	708	3.0	86	0	18	0	96.47	3.39	0.14	0	0	0
Sep	100	684	3.7	60	0	14	0	95.91	4.09	0	0	0	0
Oct	100	709	3.6	143	0	19	0	95.35	3.53	0.85	0.28	0	0
Nov	100	687	3.8	101	0	25	0	95.63	3.35	1.02	0	0	0
Dec	100	709	1.8	64	0	10	0	98.73	1.13	0.14	0	0	0
Annual	99.93	8356	2.9	148	0	25	0	96.62	2.93	0.37	0.08	0	0



Wood Buffalo Environmental Association - Fort McKay South (AMS 13)
Annual Summary for the Year 2016
Sulphur Dioxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value	Number of Values Exceeding 24-Hour Guidance	% of Data in Each Concentration Range					
								0 - 20	21 - 60	61 - 110	111 - 170	171 - 340	>340
Jan	100	708	0.5	5	0	1	0	100	0	0	0	0	0
Feb	99.43	657	1.0	21	0	3	0	99.85	0.15	0	0	0	0
Mar	99.6	706	1.9	52	0	10	0	97.73	2.27	0	0	0	0
Apr	100	682	1.2	43	0	6	0	99.12	0.88	0	0	0	0
May	99.87	708	0.5	29	0	5	0	99.58	0.42	0	0	0	0
Jun	99.86	682	1.5	87	0	7	0	98.53	1.32	0.15	0	0	0
Jul	99.87	707	0.6	37	0	4	0	99.29	0.71	0	0	0	0
Aug	99.87	707	0.8	25	0	4	0	99.58	0.42	0	0	0	0
Sep	99.86	681	1.0	40	0	6	0	98.97	1.03	0	0	0	0
Oct	99.73	707	0.5	20	0	4	0	100	0	0	0	0	0
Nov	100	686	0.7	18	0	3	0	100	0	0	0	0	0
Dec	100	710	0.5	11	0	2	0	100	0	0	0	0	0
Annual	99.84	8341	0.9	87	0	10	0	99.38	0.61	0.01	0	0	0



Wood Buffalo Environmental Association - Anzac (AMS 14)
Annual Summary for the Year 2016
Sulphur Dioxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value	Number of Values Exceeding 24-Hour Guidance	% of Data in Each Concentration Range					
								0 - 20	21 - 60	61 - 110	111 - 170	171 - 340	>340
Jan	93.41	659	1.0	17	0	3	0	100	0	0	0	0	0
Feb	99.28	656	0.6	9	0	3	0	100	0	0	0	0	0
Mar	99.46	703	0.7	16	0	3	0	100	0	0	0	0	0
Apr	99.72	683	0.4	5	0	1	0	100	0	0	0	0	0
May	72.58	514	1.0	69	0	5	0	99.61	0.19	0.19	0	0	0
Jun	86.67	590	0.6	6	0	1	0	100	0	0	0	0	0
Jul	98.12	694	0.6	7	0	2	0	100	0	0	0	0	0
Aug	91.8	646	0.2	4	0	1	0	100	0	0	0	0	0
Sep	99.17	676	0.3	13	0	2	0	100	0	0	0	0	0
Oct	99.6	706	0.3	12	0	4	0	100	0	0	0	0	0
Nov	99.17	681	0.3	5	0	1	0	100	0	0	0	0	0
Dec	91.13	646	0.6	9	0	2	0	100	0	0	0	0	0
Annual	94.13	7854	0.6	69	0	5	0	99.97	0.01	0.01	0	0	0



Wood Buffalo Environmental Association - CNRL Horizon (AMS 15)
Annual Summary for the Year 2016
Sulphur Dioxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value	Number of Values Exceeding 24-Hour Guidance	% of Data in Each Concentration Range					
								0 - 20	21 - 60	61 - 110	111 - 170	171 - 340	>340
Jan	98.92	702	0.7	19	0	6	0	100	0	0	0	0	0
Feb	100	660	0.9	31	0	5	0	99.85	0.15	0	0	0	0
Mar	100	708	1.4	30	0	9	0	99.58	0.42	0	0	0	0
Apr	100	686	0.8	21	0	5	0	99.85	0.15	0	0	0	0
May	99.46	706	0.3	21	0	2	0	99.86	0.14	0	0	0	0
Jun	99.86	682	0.7	27	0	4	0	99.56	0.44	0	0	0	0
Jul	99.73	704	0.5	23	0	4	0	99.86	0.14	0	0	0	0
Aug	99.73	706	0.4	14	0	4	0	100	0	0	0	0	0
Sep	100	683	0.8	26	0	4	0	99.71	0.29	0	0	0	0
Oct	100	708	0.6	31	0	9	0	99.58	0.42	0	0	0	0
Nov	99.03	678	0.6	51	0	3	0	99.85	0.15	0	0	0	0
Dec	97.18	687	0.6	15	0	5	0	100	0	0	0	0	0
Annual	99.49	8310	0.7	51	0	9	0	99.81	0.19	0	0	0	0



Wood Buffalo Environmental Association - Shell Muskeg River (AMS 16)
Annual Summary for the Year 2016
Sulphur Dioxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value	Number of Values Exceeding 24-Hour Guidance	% of Data in Each Concentration Range					
								0 - 20	21 - 60	61 - 110	111 - 170	171 - 340	>340
Jan	100	707	1.9	32	0	15	0	99.29	0.71	0	0	0	0
Feb	100	663	1.4	35	0	9	0	98.94	1.06	0	0	0	0
Mar	99.19	701	1.4	29	0	10	0	99.14	0.86	0	0	0	0
Apr	100	683	1.1	21	0	6	0	99.85	0.15	0	0	0	0
May	99.73	707	0.7	37	0	4	0	99.86	0.14	0	0	0	0
Jun	99.86	683	1.1	24	0	6	0	98.98	1.02	0	0	0	0
Jul	97.45	693	0.6	27	0	5	0	99.13	0.87	0	0	0	0
Aug	100	707	0.6	19	0	2	0	100	0	0	0	0	0
Sep	100	681	1.0	45	0	6	0	99.12	0.88	0	0	0	0
Oct	100	707	0.4	14	0	4	0	100	0	0	0	0	0
Nov	100	682	1.5	27	0	6	0	98.97	1.03	0	0	0	0
Dec	99.73	704	1.3	29	0	6	0	99.72	0.28	0	0	0	0
Annual	99.66	8318	1.1	45	0	15	0	99.42	0.58	0	0	0	0



Wood Buffalo Environmental Association - Wapasu (AMS 17)
Annual Summary for the Year 2016
Sulphur Dioxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value	Number of Values Exceeding 24-Hour Guidance	% of Data in Each Concentration Range					
								0 - 20	21 - 60	61 - 110	111 - 170	171 - 340	>340
Jan	100	708	1.5	53	0	6	0	99.58	0.42	0	0	0	0
Feb	100	662	1.0	16	0	4	0	100	0	0	0	0	0
Mar	100	709	0.6	24	0	2	0	99.86	0.14	0	0	0	0
Apr	100	685	0.3	7	0	1	0	100	0	0	0	0	0
May	100	708	0.5	12	0	3	0	100	0	0	0	0	0
Jun	99.72	684	0.6	23	0	3	0	99.85	0.15	0	0	0	0
Jul	99.73	705	0.7	18	0	3	0	100	0	0	0	0	0
Aug	100	707	1.0	61	0	8	0	99.29	0.57	0.14	0	0	0
Sep	100	682	1.0	29	0	5	0	99.85	0.15	0	0	0	0
Oct	100	709	0.7	41	0	7	0	99.72	0.28	0	0	0	0
Nov	100	685	1.6	26	0	7	0	99.56	0.44	0	0	0	0
Dec	100	708	1.7	26	0	8	0	99.29	0.71	0	0	0	0
Annual	99.95	8352	0.9	61	0	8	0	99.75	0.24	0.01	0	0	0



Wood Buffalo Environmental Association - Stony Mountain (AMS 18)
Annual Summary for the Year 2016
Sulphur Dioxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value	Number of Values Exceeding 24-Hour Guidance	% of Data in Each Concentration Range					
								0 - 20	21 - 60	61 - 110	111 - 170	171 - 340	>340
Jan	100	709	0.6	5	0	2	0	100	0	0	0	0	0
Feb	100	662	0.3	5	0	2	0	100	0	0	0	0	0
Mar	100	708	0.5	4	0	2	0	100	0	0	0	0	0
Apr	100	686	0.3	2	0	1	0	100	0	0	0	0	0
May	100	709	0.6	11	0	4	0	100	0	0	0	0	0
Jun	99.31	679	0.2	2	0	1	0	100	0	0	0	0	0
Jul	99.87	706	0.2	3	0	1	0	100	0	0	0	0	0
Aug	100	708	0.2	1	0	0	0	100	0	0	0	0	0
Sep	92.22	626	0.2	2	0	1	0	100	0	0	0	0	0
Oct	100	707	0.3	4	0	1	0	100	0	0	0	0	0
Nov	99.31	681	0.3	2	0	1	0	100	0	0	0	0	0
Dec	100	707	0.3	5	0	1	0	100	0	0	0	0	0
Annual	99.24	8288	0.3	11	0	4	0	100	0	0	0	0	0



Wood Buffalo Environmental Association - Firebag (AMS 19)
Annual Summary for the Year 2016
Sulphur Dioxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value	Number of Values Exceeding 24-Hour Guidance	% of Data in Each Concentration Range					
								0 - 20	21 - 60	61 - 110	111 - 170	171 - 340	>340
Jan	100	708	1.7	82	0	9	0	99.29	0.56	0.14	0	0	0
Feb	100	662	1.0	16	0	4	0	100	0	0	0	0	0
Mar	100	708	0.7	12	0	2	0	100	0	0	0	0	0
Apr	100	686	0.4	20	0	2	0	100	0	0	0	0	0
May	100	707	0.5	9	0	3	0	100	0	0	0	0	0
Jun	99.44	682	0.5	16	0	2	0	100	0	0	0	0	0
Jul	99.73	705	0.7	30	0	3	0	99.86	0.14	0	0	0	0
Aug	100	707	0.8	30	0	3	0	99.72	0.28	0	0	0	0
Sep	99.86	677	0.9	16	0	4	0	100	0	0	0	0	0
Oct	99.73	705	1.2	47	0	8	0	99.43	0.57	0	0	0	0
Nov	99.58	683	1.7	28	0	8	0	99.12	0.88	0	0	0	0
Dec	100	708	1.8	32	0	9	0	98.73	1.27	0	0	0	0
Annual	99.86	8338	1.0	82	0	9	0	99.76	0.23	0.01	0	0	0



Wood Buffalo Environmental Association - Brion MacKay River (AMS 20)
Annual Summary for the Year 2016
Sulphur Dioxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value	Number of Values Exceeding 24-Hour Guidance	% of Data in Each Concentration Range					
								0 - 20	21 - 60	61 - 110	111 - 170	171 - 340	>340
Jan	100	582	1.0	44	0	3	0	99.66	0.34	0	0	0	0
Feb	100	662	1.0	14	0	4	0	100	0	0	0	0	0
Mar	100	708	1.0	23	0	7	0	99.72	0.28	0	0	0	0
Apr	100	684	0.6	11	0	3	0	100	0	0	0	0	0
May	99.73	706	0.2	23	0	2	0	99.86	0.14	0	0	0	0
Jun	99.86	683	0.2	11	0	2	0	100	0	0	0	0	0
Jul	99.46	705	0.3	11	0	4	0	100	0	0	0	0	0
Aug	99.87	707	0.4	27	0	4	0	99.86	0.14	0	0	0	0
Sep	100	680	0.1	6	0	1	0	100	0	0	0	0	0
Oct	100	707	0.4	8	0	2	0	100	0	0	0	0	0
Nov	100	685	0.4	21	0	6	0	99.85	0.15	0	0	0	0
Dec	100	708	0.7	46	0	10	0	99.15	0.85	0	0	0	0
Annual	99.91	8217	0.5	46	0	10	0	99.84	0.16	0	0	0	0



Wood Buffalo Environmental Association - Conklin Community (AMS 21)
 Annual Summary for the Year 2016
 Sulphur Dioxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value	Number of Values Exceeding 24-Hour Guidance	% of Data in Each Concentration Range					
								0 - 20	21 - 60	61 - 110	111 - 170	171 - 340	>340
Apr	99.31	681	0.3	6	0	1	0	100	0	0	0	0	0
May	99.33	703	0.3	2	0	0	0	100	0	0	0	0	0
Jun	99.86	682	0.2	1	0	0	0	100	0	0	0	0	0
Jul	99.73	705	0.3	2	0	1	0	100	0	0	0	0	0
Aug	99.73	707	0.2	2	0	0	0	100	0	0	0	0	0
Sep	99.86	680	0.2	3	0	1	0	100	0	0	0	0	0
Oct	99.87	707	0.2	3	0	1	0	100	0	0	0	0	0
Nov	99.86	684	0.3	2	0	1	0	100	0	0	0	0	0
Dec	100	709	0.3	6	0	1	0	100	0	0	0	0	0
Annual	99.73	6258	0.3	6	0	1	0	100	0	0	0	0	0



Wood Buffalo Environmental Association - Cenovus - Christina Lake (AMS500)
Annual Summary for the Year 2016
Sulphur Dioxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value	Number of Values Exceeding 24-Hour Guidance	% of Data in Each Concentration Range					
								0 - 20	21 - 60	61 - 110	111 - 170	171 - 340	>340
Jan	100	706	0.6	16	0	2	0	100	0	0	0	0	0
Feb	99.86	655	0.7	11	0	2	0	100	0	0	0	0	0
Mar	99.87	707	0.7	18	0	3	0	100	0	0	0	0	0
Apr	100	682	0.8	9	0	2	0	100	0	0	0	0	0
May	100	708	0.8	11	0	3	0	100	0	0	0	0	0
Jun	100	684	0.9	11	0	3	0	100	0	0	0	0	0
Jul	99.19	701	0.5	6	0	2	0	100	0	0	0	0	0
Aug	99.87	708	0.9	19	0	7	0	100	0	0	0	0	0
Sep	99.86	681	1.0	19	0	3	0	100	0	0	0	0	0
Oct	99.87	707	0.2	2	0	1	0	100	0	0	0	0	0
Nov	100	685	0.4	7	0	2	0	100	0	0	0	0	0
Dec	100	708	1.6	17	0	10	0	100	0	0	0	0	0
Annual	99.87	8332	0.8	19	0	10	0	100	0	0	0	0	0



Wood Buffalo Environmental Association - Statoil - Leismer (AMS501)
 Annual Summary for the Year 2016
 Sulphur Dioxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value	Number of Values Exceeding 24-Hour Guidance	% of Data in Each Concentration Range					
								0 - 20	21 - 60	61 - 110	111 - 170	171 - 340	>340
Jan	99.87	708	0.7	13	0	2	0	100	0	0	0	0	0
Feb	96.26	634	0.7	9	0	2	0	100	0	0	0	0	0
Mar	97.04	687	0.7	11	0	3	0	100	0	0	0	0	0
Annual	97.72	2029	0.7	13	0	3	0	100	0	0	0	0	0



Wood Buffalo Environmental Association - ConocoPhillips - Surmont (AMS502)
Annual Summary for the Year 2016
Sulphur Dioxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value	Number of Values Exceeding 24-Hour Guidance	% of Data in Each Concentration Range					
								0 - 20	21 - 60	61 - 110	111 - 170	171 - 340	>340
Jan	95.3	672	1.2	18	0	4	0	100	0	0	0	0	0
Feb	97.99	649	1.1	25	0	7	0	99.69	0.31	0	0	0	0
Mar	100	708	1.1	22	0	5	0	99.86	0.14	0	0	0	0
Apr	99.72	683	1.2	34	0	8	0	99.41	0.59	0	0	0	0
May	28.76	199	0.6	11	0	2	0	100	0	0	0	0	0
Jun	92.92	634	1.0	13	0	5	0	100	0	0	0	0	0
Jul	99.73	706	1.7	19	0	5	0	100	0	0	0	0	0
Aug	100	708	1.6	18	0	8	0	100	0	0	0	0	0
Sep	100	682	1.2	20	0	6	0	100	0	0	0	0	0
Oct	100	710	0.5	5	0	2	0	100	0	0	0	0	0
Nov	99.86	684	0.9	10	0	4	0	100	0	0	0	0	0
Dec	99.73	706	1.5	16	0	5	0	100	0	0	0	0	0
Annual	92.75	7741	1.2	34	0	8	0	99.93	0.07	0	0	0	0



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
ANNUAL REPORT

HYDROGEN SULPHIDE ANNUAL 2016

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

March 2017



Wood Buffalo Environmental Association - Mildred Lake (AMS 2)
Annual Summary for the Year 2016
Hydrogen Sulphide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Number of Values		Number of Values		% of Data in Each Concentration Range			
				Maximum 1-Hour Value	Exceeding 1-Hour Guideline	Maximum 24-Hour Value	Exceeding 24-Hour Guidance	0 - 3	4 - 10	11 - 50	> 50
Jan	100	709	0.6	10	0	3	0	97.88	2.12	0	0
Feb	99.43	654	0.9	10	0	2	0	93.73	6.27	0	0
Mar	99.33	706	0.5	8	0	2	0	98.16	1.84	0	0
Apr	99.44	682	0.5	6	0	2	0	97.51	2.49	0	0
May	100	710	0.5	8	0	3	0	97.18	2.82	0	0
Jun	100	685	0.5	29	5	5	1	98.54	0.73	0.73	0
Jul	99.87	709	0.4	4	0	1	0	99.86	0.14	0	0
Aug	99.73	707	0.5	6	0	2	0	98.16	1.84	0	0
Sep	99.58	680	0.5	4	0	2	0	99.56	0.44	0	0
Oct	99.87	709	0.3	3	0	1	0	100	0	0	0
Nov	99.86	685	0.7	17	1	2	0	97.37	2.48	0.15	0
Dec	100	708	0.7	6	0	1	0	99.29	0.71	0	0
Annual	99.76	8344	0.6	29	6	5	1	98.22	1.71	0.07	0



Wood Buffalo Environmental Association - Buffalo Viewpoint (AMS 4)
Annual Summary for the Year 2016
Hydrogen Sulphide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Number of Values		Number of Values		% of Data in Each Concentration Range			
				Maximum 1-Hour Value	Exceeding 1-Hour Guideline	Maximum 24-Hour Value	Exceeding 24-Hour Guidance	0 - 3	4 - 10	11 - 50	> 50
Jan	100	709	0.4	5	0	1	0	99.86	0.14	0	0
Feb	100	663	0.5	10	0	2	0	99.4	0.6	0	0
Mar	100	709	0.4	4	0	1	0	99.58	0.42	0	0
Apr	100	687	0.3	4	0	1	0	99.85	0.15	0	0
May	99.87	710	0.3	5	0	2	0	99.01	0.99	0	0
Jun	99.86	686	0.3	2	0	0	0	100	0	0	0
Jul	98.92	702	0.3	7	0	1	0	99.72	0.28	0	0
Aug	99.87	710	0.4	5	0	1	0	99.72	0.28	0	0
Sep	95.42	650	0.2	2	0	1	0	100	0	0	0
Oct	99.33	705	0.2	5	0	1	0	99.86	0.14	0	0
Nov	100	687	0.3	5	0	1	0	99.42	0.58	0	0
Dec	100	710	0.4	4	0	1	0	99.72	0.28	0	0
Annual	99.44	8328	0.3	10	0	2	0	99.67	0.33	0	0



**Wood Buffalo Environmental Association - Mannix (AMS 5)
Annual Summary for the Year 2016
Hydrogen Sulphide (ppb) Average**

Month	Operational Time (%)	Number of Data	Mean Value	Number of Values		Number of Values		% of Data in Each Concentration Range			
				Maximum 1-Hour Value	Exceeding 1-Hour Guideline	Maximum 24-Hour Value	Exceeding 24-Hour Guidance	0 - 3	4 - 10	11 - 50	> 50
Jan	99.73	698	0.8	5	0	2	0	99.14	0.86	0	0
Feb	100	662	1.3	17	2	3	0	92.9	6.8	0.3	0
Mar	99.6	706	1.0	9	0	2	0	95.33	4.67	0	0
Apr	99.86	686	0.5	6	0	2	0	98.54	1.46	0	0
May	99.33	706	0.7	12	2	3	0	95.89	3.82	0.28	0
Jun	100	685	0.4	6	0	1	0	99.71	0.29	0	0
Jul	99.19	703	1.0	12	2	2	0	94.45	5.41	0.14	0
Aug	99.46	705	2.4	54	39	12	6	84.11	10.5	5.25	0.14
Sep	98.89	674	0.6	12	1	3	0	97.63	2.23	0.15	0
Oct	100	710	0.6	6	0	2	0	99.3	0.7	0	0
Nov	100	687	0.4	3	0	2	0	100	0	0	0
Dec	99.6	706	0.6	7	0	2	0	98.73	1.27	0	0
Annual	99.64	8328	0.9	54	46	12	6	96.27	3.2	0.52	0.01



Wood Buffalo Environmental Association - Lower Camp (AMS 11)
Annual Summary for the Year 2016
Hydrogen Sulphide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Number of Values		Number of Values		% of Data in Each Concentration Range			
				Maximum 1-Hour Value	Exceeding 1-Hour Guideline	Maximum 24-Hour Value	Exceeding 24-Hour Guidance	0 - 3	4 - 10	11 - 50	> 50
Jan	100	706	0.7	11	1	2	0	98.16	1.7	0.14	0
Feb	100	662	0.9	15	2	3	0	96.98	2.72	0.3	0
Mar	99.87	709	0.6	8	0	2	0	98.31	1.69	0	0
Apr	100	686	0.4	8	0	2	0	99.13	0.87	0	0
May	100	709	0.7	16	3	2	0	95.77	3.81	0.42	0
Jun	100	687	0.5	8	0	1	0	99.13	0.87	0	0
Jul	99.73	707	0.6	9	0	2	0	98.44	1.56	0	0
Aug	99.87	709	0.8	11	1	2	0	96.47	3.39	0.14	0
Sep	100	684	0.6	11	1	2	0	97.81	2.05	0.15	0
Oct	100	710	0.6	24	6	3	0	95.49	3.66	0.85	0
Nov	100	686	0.7	21	8	5	1	97.96	0.87	1.17	0
Dec	100	709	0.6	9	0	2	0	98.59	1.41	0	0
Annual	99.95	8364	0.6	24	22	5	1	97.68	2.06	0.26	0



Wood Buffalo Environmental Association - Wapasu (AMS 17)
Annual Summary for the Year 2016
Hydrogen Sulphide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Number of Values		Number of Values		% of Data in Each Concentration Range			
				Maximum 1-Hour Value	Exceeding 1-Hour Guideline	Maximum 24-Hour Value	Exceeding 24-Hour Guidance	0 - 3	4 - 10	11 - 50	> 50
Jan	100	709	0.3	1	0	1	0	100	0	0	0
Feb	100	663	0.3	2	0	1	0	100	0	0	0
Mar	100	709	0.2	1	0	0	0	100	0	0	0
Apr	100	687	0.2	1	0	0	0	100	0	0	0
May	99.73	708	0.2	3	0	1	0	100	0	0	0
Jun	100	686	0.1	1	0	0	0	100	0	0	0
Jul	99.73	707	0.1	1	0	0	0	100	0	0	0
Aug	100	709	0.2	3	0	1	0	100	0	0	0
Sep	99.86	683	0.1	1	0	0	0	100	0	0	0
Oct	100	711	0.1	1	0	0	0	100	0	0	0
Nov	100	684	0.2	4	0	1	0	99.71	0.29	0	0
Dec	100	709	0.2	1	0	0	0	100	0	0	0
Annual	99.94	8365	0.2	4	0	1	0	99.98	0.02	0	0



Wood Buffalo Environmental Association - Firebag (AMS 19)
Annual Summary for the Year 2016
Hydrogen Sulphide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Number of Values		Number of Values		% of Data in Each Concentration Range			
				Maximum 1-Hour Value	Exceeding 1-Hour Guideline	Maximum 24-Hour Value	Exceeding 24-Hour Guidance	0 - 3	4 - 10	11 - 50	> 50
Jan	99.73	707	0.2	2	0	1	0	100	0	0	0
Feb	100	663	0.3	3	0	1	0	100	0	0	0
Mar	100	710	0.2	1	0	0	0	100	0	0	0
Apr	100	687	0.2	1	0	0	0	100	0	0	0
May	100	710	0.3	4	0	1	0	99.86	0.14	0	0
Jun	99.86	683	0.2	1	0	0	0	100	0	0	0
Jul	99.73	708	0.2	2	0	0	0	100	0	0	0
Aug	100	709	0.3	3	0	1	0	100	0	0	0
Sep	99.72	679	0.2	1	0	0	0	100	0	0	0
Oct	99.46	704	0.2	2	0	0	0	100	0	0	0
Nov	99.86	685	0.2	7	0	2	0	99.42	0.58	0	0
Dec	100	709	0.2	1	0	0	0	100	0	0	0
Annual	99.86	8354	0.2	7	0	2	0	99.99	0.01	0	0



Wood Buffalo Environmental Association - Brion MacKay River (AMS 20)
Annual Summary for the Year 2016
Hydrogen Sulphide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Number of Values		Number of Values		% of Data in Each Concentration Range			
				Maximum 1-Hour Value	Exceeding 1-Hour Guideline	Maximum 24-Hour Value	Exceeding 24-Hour Guidance	0 - 3	4 - 10	11 - 50	> 50
Jan	99.82	531	0.4	4	0	1	0	99.81	0.19	0	0
Feb	100	663	0.3	2	0	1	0	100	0	0	0
Mar	100	709	0.3	1	0	1	0	100	0	0	0
Apr	100	687	0.2	1	0	0	0	100	0	0	0
May	99.46	705	0.2	2	0	0	0	100	0	0	0
Jun	99.17	679	0.2	1	0	0	0	100	0	0	0
Jul	99.33	705	0.2	2	0	0	0	100	0	0	0
Aug	99.73	708	0.3	1	0	0	0	100	0	0	0
Sep	100	684	0.2	0	0	0	0	100	0	0	0
Oct	98.52	697	0.2	1	0	0	0	100	0	0	0
Nov	99.44	682	0.2	2	0	1	0	100	0	0	0
Dec	99.6	706	0.3	3	0	1	0	100	0	0	0
Annual	99.58	8156	0.2	4	0	1	0	99.99	0.01	0	0



Wood Buffalo Environmental Association - Cenovus - Christina Lake (AMS500)
Annual Summary for the Year 2016
Hydrogen Sulphide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Number of Values		Number of Values		% of Data in Each Concentration Range			
				Maximum 1-Hour Value	Exceeding 1-Hour Guideline	Maximum 24-Hour Value	Exceeding 24-Hour Guidance	0 - 3	4 - 10	11 - 50	> 50
Jan	100	709	0.2	1	0	0	0	100	0	0	0
Feb	100	664	0.2	2	0	0	0	100	0	0	0
Mar	100	710	0.1	1	0	0	0	100	0	0	0
Apr	100	687	0.1	1	0	0	0	100	0	0	0
May	100	710	0.1	3	0	0	0	100	0	0	0
Jun	99.72	683	0.1	1	0	0	0	100	0	0	0
Jul	99.06	701	0.1	1	0	0	0	100	0	0	0
Aug	99.6	706	0.2	2	0	0	0	100	0	0	0
Sep	100	683	0.2	1	0	0	0	100	0	0	0
Oct	99.73	708	0.1	4	0	1	0	99.86	0.14	0	0
Nov	100	687	0.1	3	0	0	0	100	0	0	0
Dec	99.6	707	0.2	1	0	0	0	100	0	0	0
Annual	99.81	8355	0.1	4	0	1	0	100	0	0	0



Wood Buffalo Environmental Association - Statoil - Leismer (AMS501)
Annual Summary for the Year 2016
Hydrogen Sulphide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Number of Values		Number of Values		% of Data in Each Concentration Range			
				Maximum Exceeding 1-Hour Value	1-Hour Guideline	Maximum Exceeding 24-Hour Value	24-Hour Guidance	0 - 3	4 - 10	11 - 50	> 50
Jan	97.31	690	0.2	1	0	0	0	100	0	0	0
Feb	99.14	653	0.2	1	0	0	0	100	0	0	0
Mar	99.87	708	0.2	0	0	0	0	100	0	0	0
Annual	98.77	2051	0.2	1	0	0	0	100	0	0	0



Wood Buffalo Environmental Association - ConocoPhillips - Surmont (AMS502)
Annual Summary for the Year 2016
Hydrogen Sulphide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Number of Values		Number of Values		% of Data in Each Concentration Range			
				Maximum 1-Hour Value	Exceeding 1-Hour Guideline	Maximum 24-Hour Value	Exceeding 24-Hour Guidance	0 - 3	4 - 10	11 - 50	> 50
Jan	99.06	699	0.3	1	0	1	0	100	0	0	0
Feb	100	664	0.3	2	0	1	0	100	0	0	0
Mar	99.87	708	0.3	2	0	1	0	100	0	0	0
Apr	99.31	682	0.2	1	0	1	0	100	0	0	0
May	27.28	191	0.1	1	0	0	0	100	0	0	0
Jun	97.22	667	0.3	3	0	1	0	100	0	0	0
Jul	99.73	706	0.4	3	0	1	0	100	0	0	0
Aug	99.6	706	0.4	3	0	1	0	100	0	0	0
Sep	99.86	682	0.2	2	0	1	0	100	0	0	0
Oct	99.06	703	0.3	2	0	1	0	100	0	0	0
Nov	99.03	680	0.3	3	0	1	0	100	0	0	0
Dec	99.73	707	0.4	4	0	1	0	99.86	0.14	0	0
Annual	93.21	7795	0.3	4	0	1	0	99.99	0.01	0	0



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

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Wood Buffalo Environmental Association
Fort McMurray, Alberta

March 2017



Wood Buffalo Environmental Association - Fort McKay - Bertha Ganter (AMS 1)
Annual Summary for the Year 2016
Total Reduced Sulphur (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Number of Values		Number of Values		% of Data in Each Concentration Range			
				Maximum 1-Hour Value	Exceeding 1-Hour Guideline	Maximum 24-Hour Value	Exceeding 24-Hour Guidance	0 - 3	4 - 10	11 - 50	> 50
Jan	100	709	0.8	5	0	3	0	99.01	0.99	0	0
Feb	99.28	658	0.9	6	0	2	0	98.78	1.22	0	0
Mar	99.46	704	0.6	3	0	1	0	100	0	0	0
Apr	99.72	684	0.6	3	0	1	0	100	0	0	0
May	99.33	705	0.6	7	0	3	0	98.44	1.56	0	0
Jun	99.72	684	0.5	3	0	1	0	100	0	0	0
Jul	99.6	706	0.5	4	0	1	0	99.86	0.14	0	0
Aug	99.6	704	0.5	4	0	1	0	99.72	0.28	0	0
Sep	99.72	680	0.4	2	0	1	0	100	0	0	0
Oct	100	708	0.4	11	1	2	0	99.72	0.14	0.14	0
Nov	99.86	686	0.5	3	0	1	0	100	0	0	0
Dec	95.83	682	0.6	2	0	1	0	100	0	0	0
Annual	99.34	8310	0.6	11	1	3	0	99.63	0.36	0.01	0



Wood Buffalo Environmental Association - Patricia McInnes (AMS 6)
Annual Summary for the Year 2016
Total Reduced Sulphur (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Number of Values		Number of Values		% of Data in Each Concentration Range			
				Maximum 1-Hour Value	Exceeding 1-Hour Guideline	Maximum 24-Hour Value	Exceeding 24-Hour Guidance	0 - 3	4 - 10	11 - 50	> 50
Jan	99.46	705	0.3	1	0	1	0	100	0	0	0
Feb	100	663	0.3	3	0	1	0	100	0	0	0
Mar	100	709	0.2	5	0	1	0	99.86	0.14	0	0
Apr	99.86	686	0.1	1	0	0	0	100	0	0	0
May	99.73	708	0.8	17	5	4	2	94.07	5.23	0.71	0
Jun	99.72	684	0.2	2	0	0	0	100	0	0	0
Jul	100	708	0.2	2	0	1	0	100	0	0	0
Aug	99.87	707	0.2	3	0	1	0	100	0	0	0
Sep	100	681	0.1	1	0	0	0	100	0	0	0
Oct	99.87	707	0.1	2	0	0	0	100	0	0	0
Nov	97.08	662	0.2	2	0	1	0	100	0	0	0
Dec	100	707	0.3	1	0	1	0	100	0	0	0
Annual	99.64	8327	0.3	17	5	4	2	99.48	0.46	0.06	0



Wood Buffalo Environmental Association - Athabasca Valley (AMS 7)
Annual Summary for the Year 2016
Total Reduced Sulphur (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Number of Values		Number of Values		% of Data in Each Concentration Range			
				Maximum 1-Hour Value	Exceeding 1-Hour Guideline	Maximum 24-Hour Value	Exceeding 24-Hour Guidance	0 - 3	4 - 10	11 - 50	> 50
Jan	99.87	708	0.4	2	0	1	0	100	0	0	0
Feb	99.43	659	0.5	4	0	1	0	99.7	0.3	0	0
Mar	99.06	703	0.4	4	0	1	0	99.86	0.14	0	0
Apr	99.17	682	0.2	1	0	0	0	100	0	0	0
May	99.87	711	1.3	13	2	5	3	88.47	11.25	0.28	0
Jun	99.72	685	0.3	1	0	1	0	100	0	0	0
Jul	83.6	592	0.4	2	0	1	0	100	0	0	0
Aug	0	0	--	--	--	--	--	--	--	--	--
Sep	15.56	100	0.4	1	0	0	0	100	0	0	0
Oct	99.6	705	0.3	1	0	1	0	100	0	0	0
Nov	99.86	685	0.3	1	0	1	0	100	0	0	0
Dec	100	710	0.4	2	0	1	0	100	0	0	0
Annual	82.93	6940	0.5	13	2	5	3	98.77	1.2	0.03	0



Wood Buffalo Environmental Association - Barge Landing (AMS 9)
Annual Summary for the Year 2016
Total Reduced Sulphur (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Number of Values		Number of Values		% of Data in Each Concentration Range			
				Maximum 1-Hour Value	Exceeding 1-Hour Guideline	Maximum 24-Hour Value	Exceeding 24-Hour Guidance	0 - 3	4 - 10	11 - 50	> 50
Jan	100	709	0.6	4	0	2	0	99.86	0.14	0	0
Feb	99.43	659	0.7	4	0	1	0	99.85	0.15	0	0
Mar	99.6	706	0.4	2	0	1	0	100	0	0	0
Apr	98.89	678	0.3	3	0	1	0	100	0	0	0
May	100	709	0.4	5	0	2	0	98.87	1.13	0	0
Jun	98.33	674	0.2	2	0	0	0	100	0	0	0
Jul	99.87	707	0.3	6	0	1	0	99.72	0.28	0	0
Aug	100	709	0.4	3	0	1	0	100	0	0	0
Sep	100	683	0.3	2	0	1	0	100	0	0	0
Oct	100	710	0.2	1	0	1	0	100	0	0	0
Nov	100	687	0.4	2	0	1	0	100	0	0	0
Dec	100	710	0.5	2	0	1	0	100	0	0	0
Annual	99.68	8341	0.4	6	0	2	0	99.85	0.15	0	0



Wood Buffalo Environmental Association - Fort McKay South (AMS 13)
Annual Summary for the Year 2016
Total Reduced Sulphur (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Number of Values		Number of Values		% of Data in Each Concentration Range			
				Maximum 1-Hour Value	Exceeding 1-Hour Guideline	Maximum 24-Hour Value	Exceeding 24-Hour Guidance	0 - 3	4 - 10	11 - 50	> 50
Jan	100	709	0.3	3	0	1	0	100	0	0	0
Feb	99.43	660	0.5	4	0	1	0	99.85	0.15	0	0
Mar	99.46	707	0.3	4	0	1	0	99.72	0.28	0	0
Apr	99.72	685	0.3	6	0	1	0	99.85	0.15	0	0
May	99.73	708	0.3	8	0	3	0	98.31	1.69	0	0
Jun	99.31	682	0.2	5	0	1	0	99.56	0.44	0	0
Jul	99.73	708	0.2	3	0	0	0	100	0	0	0
Aug	99.73	707	0.3	5	0	1	0	99.58	0.42	0	0
Sep	99.86	683	0.2	2	0	1	0	100	0	0	0
Oct	99.73	708	0.2	12	1	2	0	99.58	0.28	0.14	0
Nov	99.86	686	0.3	2	0	1	0	100	0	0	0
Dec	100	710	0.3	2	0	1	0	100	0	0	0
Annual	99.72	8353	0.3	12	1	3	0	99.7	0.29	0.01	0



**Wood Buffalo Environmental Association - Anzac (AMS 14)
Annual Summary for the Year 2016
Total Reduced Sulphur (ppb) Average**

Month	Operational Time (%)	Number of Data	Mean Value	Number of Values		Number of Values		% of Data in Each Concentration Range			
				Maximum 1-Hour Value	Exceeding 1-Hour Guideline	Maximum 24-Hour Value	Exceeding 24-Hour Guidance	0 - 3	4 - 10	11 - 50	> 50
Jan	96.1	681	0.4	2	0	1	0	100	0	0	0
Feb	99.57	660	0.3	5	0	1	0	99.85	0.15	0	0
Mar	99.33	705	0.3	2	0	0	0	100	0	0	0
Apr	99.72	685	0.2	1	0	0	0	100	0	0	0
May	72.58	515	0.8	42	5	4	1	96.31	2.72	0.97	0
Jun	90.69	622	0.2	1	0	0	0	100	0	0	0
Jul	99.33	704	0.3	2	0	0	0	100	0	0	0
Aug	99.87	708	0.2	1	0	0	0	100	0	0	0
Sep	97.5	666	0.2	1	0	0	0	100	0	0	0
Oct	100	707	0.2	1	0	0	0	100	0	0	0
Nov	100	687	0.2	1	0	0	0	100	0	0	0
Dec	99.87	709	0.3	1	0	1	0	100	0	0	0
Annual	96.19	8049	0.3	42	5	4	1	99.75	0.19	0.06	0



Wood Buffalo Environmental Association - CNRL Horizon (AMS 15)
Annual Summary for the Year 2016
Total Reduced Sulphur (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Number of Values		Number of Values		% of Data in Each Concentration Range			
				Maximum 1-Hour Value	Exceeding 1-Hour Guideline	Maximum 24-Hour Value	Exceeding 24-Hour Guidance	0 - 3	4 - 10	11 - 50	> 50
Jan	95.83	680	0.3	1	0	1	0	100	0	0	0
Feb	100	662	0.4	4	0	1	0	99.85	0.15	0	0
Mar	99.87	707	0.3	2	0	1	0	100	0	0	0
Apr	96.81	664	0.2	2	0	0	0	100	0	0	0
May	74.06	524	0.3	6	0	1	0	99.62	0.38	0	0
Jun	100	686	0.2	2	0	1	0	100	0	0	0
Jul	99.6	705	0.4	20	4	3	0	99.15	0.28	0.57	0
Aug	99.6	707	1.2	33	22	4	1	91.8	5.09	3.11	0
Sep	99.86	683	0.2	1	0	0	0	100	0	0	0
Oct	99.87	709	0.2	1	0	0	0	100	0	0	0
Nov	100	684	0.2	1	0	0	0	100	0	0	0
Dec	94.89	674	0.3	1	0	1	0	100	0	0	0
Annual	96.65	8085	0.4	33	26	4	1	99.17	0.5	0.33	0



Wood Buffalo Environmental Association - Stony Mountain (AMS 18)
Annual Summary for the Year 2016
Total Reduced Sulphur (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Number of Values		Number of Values		% of Data in Each Concentration Range			
				Maximum 1-Hour Value	Exceeding 1-Hour Guideline	Maximum 24-Hour Value	Exceeding 24-Hour Guidance	0 - 3	4 - 10	11 - 50	> 50
Jan	99.6	707	0.4	1	0	1	0	100	0	0	0
Feb	100	663	0.3	1	0	0	0	100	0	0	0
Mar	100	710	0.3	1	0	0	0	100	0	0	0
Apr	100	686	0.3	1	0	0	0	100	0	0	0
May	100	710	0.4	1	0	1	0	100	0	0	0
Jun	99.03	680	0.3	0	0	0	0	100	0	0	0
Jul	99.87	708	0.3	0	0	0	0	100	0	0	0
Aug	100	710	0.3	1	0	0	0	100	0	0	0
Sep	92.22	627	0.3	0	0	0	0	100	0	0	0
Oct	100	709	0.2	0	0	0	0	100	0	0	0
Nov	99.31	681	0.3	0	0	0	0	100	0	0	0
Dec	100	708	0.3	1	0	0	0	100	0	0	0
Annual	99.18	8299	0.3	1	0	1	0	100	0	0	0



Wood Buffalo Environmental Association - Conklin Community (AMS 21)
Annual Summary for the Year 2016
Total Reduced Sulphur (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Number of Values		Number of Values		% of Data in Each Concentration Range			
				Maximum 1-Hour Value	Exceeding 1-Hour Guideline	Maximum 24-Hour Value	Exceeding 24-Hour Guidance	0 - 3	4 - 10	11 - 50	> 50
Apr	100	684	0.2	0	0	0	0	100	0	0	0
May	98.92	701	0.3	1	0	1	0	100	0	0	0
Jun	72.78	488	0.4	1	0	1	0	100	0	0	0
Jul	100	708	0.5	1	0	1	0	100	0	0	0
Aug	99.6	706	0.4	2	0	0	0	100	0	0	0
Sep	99.86	683	0.3	1	0	0	0	100	0	0	0
Oct	99.46	703	0.3	1	0	0	0	100	0	0	0
Nov	100	686	0.3	0	0	0	0	100	0	0	0
Dec	100	710	0.4	1	0	0	0	100	0	0	0
Annual	96.74	6069	0.3	2	0	1	0	100	0	0	0



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Wood Buffalo Environmental Association
Fort McMurray, Alberta

March 2017



Wood Buffalo Environmental Association - Fort McKay - Bertha Ganter (AMS 1)
Annual Summary for the Year 2016
Nitrogen Dioxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value	% of Data in Each Concentration Range			
							0 - 40	41 - 80	81 - 159	>159
Jan	99.73	706	13.3	33	0	24	100	0	0	0
Feb	99.14	650	13.0	33	0	21	100	0	0	0
Mar	99.19	701	9.2	38	0	21	100	0	0	0
Apr	99.72	682	6.5	39	0	12	100	0	0	0
May	99.6	705	2.4	48	0	13	99.86	0.14	0	0
Jun	99.03	677	2.4	25	0	5	100	0	0	0
Jul	99.73	707	2.3	15	0	5	100	0	0	0
Aug	95.43	671	3.2	18	0	9	100	0	0	0
Sep	93.06	631	3.0	27	0	7	100	0	0	0
Oct	98.92	700	4.6	22	0	12	100	0	0	0
Nov	99.86	683	7.4	28	0	17	100	0	0	0
Dec	100	707	13.3	36	0	24	100	0	0	0
Annual	98.62	8220	6.7	48	0	24	99.99	0.01	0	0



Wood Buffalo Environmental Association - Patricia McInnes (AMS 6)
Annual Summary for the Year 2016
Nitrogen Dioxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value	% of Data in Each Concentration Range			
							0 - 40	41 - 80	81 - 159	>159
Jan	99.46	704	10.9	41	0	22	99.72	0.28	0	0
Feb	100	656	9.9	36	0	15	100	0	0	0
Mar	100	708	8.1	40	0	18	100	0	0	0
Apr	99.72	683	4.0	27	0	8	100	0	0	0
May	100	704	3.6	64	0	13	99.29	0.71	0	0
Jun	96.39	661	1.8	20	0	5	100	0	0	0
Jul	100	708	2.9	12	0	6	100	0	0	0
Aug	99.6	704	2.7	17	0	6	100	0	0	0
Sep	99.86	678	2.7	26	0	9	100	0	0	0
Oct	99.87	706	5.2	26	0	15	100	0	0	0
Nov	100	685	6.1	30	0	14	100	0	0	0
Dec	100	708	9.0	34	0	20	100	0	0	0
Annual	99.58	8305	5.6	64	0	22	99.92	0.08	0	0



Wood Buffalo Environmental Association - Athabasca Valley (AMS 7)
Annual Summary for the Year 2016
Nitrogen Dioxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value	% of Data in Each Concentration Range			
							0 - 40	41 - 80	81 - 159	>159
Jan	99.87	706	12.5	35	0	19	100	0	0	0
Feb	99.57	658	13.6	48	0	22	99.54	0.46	0	0
Mar	98.92	700	9.1	40	0	17	100	0	0	0
Apr	99.03	678	4.9	28	0	8	100	0	0	0
May	99.87	710	5.4	59	0	17	98.73	1.27	0	0
Jun	99.86	684	2.9	13	0	6	100	0	0	0
Jul	98.52	688	4.0	20	0	6	100	0	0	0
Aug	96.91	686	3.9	16	0	7	100	0	0	0
Sep	99.31	669	4.8	25	0	12	100	0	0	0
Oct	99.6	706	6.0	21	0	14	100	0	0	0
Nov	99.86	684	9.4	32	0	18	100	0	0	0
Dec	100	708	13.3	42	0	27	99.86	0.14	0	0
Annual	99.27	8277	7.5	59	0	27	99.84	0.16	0	0



Wood Buffalo Environmental Association - Fort Chipewyan (AMS 8)
Annual Summary for the Year 2016
Nitrogen Dioxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value	% of Data in Each Concentration Range			
							0 - 40	41 - 80	81 - 159	>159
Jan	99.6	704	2.5	21	0	8	100	0	0	0
Feb	100	658	1.1	10	0	4	100	0	0	0
Mar	99.73	706	0.7	9	0	2	100	0	0	0
Apr	99.17	678	0.8	8	0	3	100	0	0	0
May	99.73	705	0.7	14	0	3	100	0	0	0
Jun	99.58	678	0.4	8	0	2	100	0	0	0
Jul	99.6	703	0.4	5	0	1	100	0	0	0
Aug	100	708	0.3	5	0	2	100	0	0	0
Sep	100	684	0.6	6	0	3	100	0	0	0
Oct	99.87	707	0.6	9	0	5	100	0	0	0
Nov	100	685	1.8	20	0	12	100	0	0	0
Dec	100	708	2.6	30	0	14	100	0	0	0
Annual	99.77	8324	1.1	30	0	14	100	0	0	0



Wood Buffalo Environmental Association - Fort McKay South (AMS 13)
Annual Summary for the Year 2016
Nitrogen Dioxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value	% of Data in Each Concentration Range			
							0 - 40	41 - 80	81 - 159	>159
Jan	100	708	11.7	34	0	21	100	0	0	0
Feb	99.43	657	11.9	36	0	18	100	0	0	0
Mar	99.6	706	8.7	36	0	20	100	0	0	0
Apr	99.72	677	5.8	30	0	12	100	0	0	0
May	99.87	708	2.1	44	0	10	99.72	0.28	0	0
Jun	99.17	678	2.2	20	0	5	100	0	0	0
Jul	99.87	707	2.4	24	0	5	100	0	0	0
Aug	99.87	707	2.9	19	0	8	100	0	0	0
Sep	100	682	2.7	22	0	7	100	0	0	0
Oct	99.73	707	4.0	17	0	8	100	0	0	0
Nov	100	686	5.6	23	0	13	100	0	0	0
Dec	96.51	684	11.0	35	0	22	100	0	0	0
Annual	99.48	8307	5.9	44	0	22	99.98	0.02	0	0



Wood Buffalo Environmental Association - Anzac (AMS 14)
Annual Summary for the Year 2016
Nitrogen Dioxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value	% of Data in Each Concentration Range			
							0 - 40	41 - 80	81 - 159	>159
Jan	99.46	704	4.7	25	0	10	100	0	0	0
Feb	99.86	660	3.9	27	0	10	100	0	0	0
Mar	99.46	703	2.6	22	0	8	100	0	0	0
Apr	99.72	683	1.2	13	0	3	100	0	0	0
May	72.58	512	2.4	291	1	19	99.61	0.2	0	0.2
Jun	90.14	609	1.0	7	0	2	100	0	0	0
Jul	99.19	702	1.2	12	0	3	100	0	0	0
Aug	98.52	696	0.9	7	0	2	100	0	0	0
Sep	99.72	680	1.2	8	0	3	100	0	0	0
Oct	100	708	1.5	18	0	10	100	0	0	0
Nov	100	685	2.3	19	0	6	100	0	0	0
Dec	99.6	704	4.3	25	0	11	100	0	0	0
Annual	96.49	8046	2.3	291	1	19	99.97	0.01	0	0.01



Wood Buffalo Environmental Association - CNRL Horizon (AMS 15)
Annual Summary for the Year 2016
Nitrogen Dioxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value	% of Data in Each Concentration Range			
							0 - 40	41 - 80	81 - 159	>159
Jan	99.06	701	9.0	30	0	19	100	0	0	0
Feb	100	660	10.7	45	0	25	99.09	0.91	0	0
Mar	100	708	10.6	43	0	19	99.72	0.28	0	0
Apr	99.58	680	4.5	37	0	9	100	0	0	0
May	98.39	697	2.9	36	0	7	100	0	0	0
Jun	99.86	682	2.8	28	0	7	100	0	0	0
Jul	99.73	704	2.6	20	0	6	100	0	0	0
Aug	99.73	706	3.5	23	0	6	100	0	0	0
Sep	100	682	3.0	22	0	8	100	0	0	0
Oct	100	708	3.9	28	0	8	100	0	0	0
Nov	99.86	684	4.4	26	0	10	100	0	0	0
Dec	99.33	703	8.7	42	0	20	99.86	0.14	0	0
Annual	99.62	8315	5.5	45	0	25	99.89	0.11	0	0



Wood Buffalo Environmental Association - Shell Muskeg River (AMS 16)
Annual Summary for the Year 2016
Nitrogen Dioxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value	% of Data in Each Concentration Range			
							0 - 40	41 - 80	81 - 159	>159
Jan	100	707	13.7	42	0	27	99.86	0.14	0	0
Feb	100	661	13.9	66	0	33	97.58	2.42	0	0
Mar	99.19	701	13.4	43	0	30	99.29	0.71	0	0
Apr	100	683	8.3	40	0	17	100	0	0	0
May	100	709	6.3	50	0	16	99.58	0.42	0	0
Jun	99.86	683	4.8	41	0	12	99.85	0.15	0	0
Jul	97.58	693	5.9	29	0	13	100	0	0	0
Aug	100	708	5.0	24	0	10	100	0	0	0
Sep	100	680	6.2	32	0	15	100	0	0	0
Oct	100	707	7.0	35	0	18	100	0	0	0
Nov	100	685	8.7	28	0	19	100	0	0	0
Dec	99.73	704	16.1	47	0	32	99.72	0.28	0	0
Annual	99.69	8321	9.1	66	0	33	99.66	0.34	0	0



Wood Buffalo Environmental Association - Wapasu (AMS 17)
Annual Summary for the Year 2016
Nitrogen Dioxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value	% of Data in Each Concentration Range			
							0 - 40	41 - 80	81 - 159	>159
Jan	100	707	4.9	30	0	10	100	0	0	0
Feb	100	662	3.7	25	0	11	100	0	0	0
Mar	100	707	2.4	25	0	8	100	0	0	0
Apr	100	685	1.2	16	0	3	100	0	0	0
May	99.6	705	1.5	23	0	7	100	0	0	0
Jun	96.53	661	0.9	9	0	2	100	0	0	0
Jul	99.6	704	1.1	14	0	3	100	0	0	0
Aug	99.33	703	1.1	20	0	4	100	0	0	0
Sep	100	680	1.5	15	0	5	100	0	0	0
Oct	100	709	1.6	16	0	5	100	0	0	0
Nov	100	685	2.9	17	0	8	100	0	0	0
Dec	100	708	4.3	35	0	13	100	0	0	0
Annual	99.59	8316	2.3	35	0	13	100	0	0	0



Wood Buffalo Environmental Association - Stony Mountain (AMS 18)
Annual Summary for the Year 2016
Nitrogen Dioxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value	% of Data in Each Concentration Range			
							0 - 40	41 - 80	81 - 159	>159
Jan	99.73	707	2.8	19	0	7	100	0	0	0
Feb	100	662	2.2	9	0	7	100	0	0	0
Mar	100	708	2.2	12	0	6	100	0	0	0
Apr	100	686	0.9	3	0	1	100	0	0	0
May	100	709	1.2	11	0	4	100	0	0	0
Jun	99.17	678	0.6	5	0	1	100	0	0	0
Jul	99.87	707	0.7	5	0	1	100	0	0	0
Aug	100	708	0.6	3	0	1	100	0	0	0
Sep	92.22	626	0.7	8	0	2	100	0	0	0
Oct	100	707	1.0	6	0	3	100	0	0	0
Nov	99.31	681	1.6	6	0	3	100	0	0	0
Dec	100	707	2.0	18	0	8	100	0	0	0
Annual	99.2	8286	1.4	19	0	8	100	0	0	0



Wood Buffalo Environmental Association - Firebag (AMS 19)
Annual Summary for the Year 2016
Nitrogen Dioxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value	% of Data in Each Concentration Range			
							0 - 40	41 - 80	81 - 159	>159
Jan	95.3	674	5.5	35	0	15	100	0	0	0
Feb	100	662	5.1	38	0	13	100	0	0	0
Mar	100	708	2.8	19	0	6	100	0	0	0
Apr	100	686	1.9	34	0	6	100	0	0	0
May	100	707	2.3	30	0	10	100	0	0	0
Jun	99.44	681	1.2	14	0	3	100	0	0	0
Jul	99.73	705	1.3	13	0	3	100	0	0	0
Aug	100	708	1.6	16	0	3	100	0	0	0
Sep	99.86	677	2.0	15	0	4	100	0	0	0
Oct	99.73	705	2.2	22	0	6	100	0	0	0
Nov	99.72	683	3.3	18	0	8	100	0	0	0
Dec	100	708	4.4	29	0	9	100	0	0	0
Annual	99.48	8304	2.8	38	0	15	100	0	0	0



Wood Buffalo Environmental Association - Brion MacKay River (AMS 20)
Annual Summary for the Year 2016
Nitrogen Dioxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value	% of Data in Each Concentration Range			
							0 - 40	41 - 80	81 - 159	>159
Jan	99.84	581	6.7	46	0	25	99.83	0.17	0	0
Feb	100	662	5.7	35	0	20	100	0	0	0
Mar	100	708	4.7	36	0	18	100	0	0	0
Apr	99.86	685	2.2	26	0	6	100	0	0	0
May	99.73	706	0.9	11	0	2	100	0	0	0
Jun	99.86	683	0.7	7	0	2	100	0	0	0
Jul	99.46	705	1.0	16	0	4	100	0	0	0
Aug	99.87	707	0.9	12	0	5	100	0	0	0
Sep	100	681	0.7	15	0	4	100	0	0	0
Oct	100	707	1.9	19	0	6	100	0	0	0
Nov	100	685	1.7	24	0	12	100	0	0	0
Dec	100	708	3.8	30	0	15	100	0	0	0
Annual	99.88	8218	2.5	46	0	25	99.99	0.01	0	0



Wood Buffalo Environmental Association - Conklin Community (AMS 21)
Annual Summary for the Year 2016
Nitrogen Dioxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value	% of Data in Each Concentration Range			
							0 - 40	41 - 80	81 - 159	>159
Apr	99.72	684	1.3	19	0	2	100	0	0	0
May	99.33	703	1.3	14	0	3	100	0	0	0
Jun	99.44	679	0.8	6	0	2	100	0	0	0
Jul	99.73	705	0.8	8	0	1	100	0	0	0
Aug	99.73	707	0.7	4	0	1	100	0	0	0
Sep	99.44	677	0.9	14	0	2	100	0	0	0
Oct	99.87	707	1.3	10	0	4	100	0	0	0
Nov	99.44	681	2.5	14	0	5	100	0	0	0
Dec	100	709	3.2	19	0	10	100	0	0	0
Annual	99.63	6252	1.4	19	0	10	100	0	0	0



Wood Buffalo Environmental Association - Cenovus - Christina Lake (AMS500)
Annual Summary for the Year 2016
Nitrogen Dioxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value	% of Data in Each Concentration Range			
							0 - 40	41 - 80	81 - 159	>159
Jan	95.3	673	6.6	36	0	16	100	0	0	0
Feb	99.71	659	4.4	38	0	9	100	0	0	0
Mar	99.87	707	2.5	15	0	7	100	0	0	0
Apr	92.92	626	1.9	18	0	5	100	0	0	0
May	100	708	2.0	19	0	5	100	0	0	0
Jun	100	684	1.8	14	0	5	100	0	0	0
Jul	99.19	701	1.2	11	0	3	100	0	0	0
Aug	99.87	708	1.7	16	0	7	100	0	0	0
Sep	99.86	680	2.1	15	0	4	100	0	0	0
Oct	99.87	707	2.1	12	0	5	100	0	0	0
Nov	100	685	2.9	18	0	8	100	0	0	0
Dec	100	708	6.0	32	0	14	100	0	0	0
Annual	98.88	8246	2.9	38	0	16	100	0	0	0



Wood Buffalo Environmental Association - Statoil - Leismer (AMS501)
Annual Summary for the Year 2016
Nitrogen Dioxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value	% of Data in Each Concentration Range			
							0 - 40	41 - 80	81 - 159	>159
Jan	100	709	2.9	15	0	7	100	0	0	0
Feb	99.71	658	2.1	11	0	5	100	0	0	0
Mar	100	709	1.8	12	0	4	100	0	0	0
Annual	99.90	2076	2.3	15	0	7	100	0	0	0



Wood Buffalo Environmental Association - ConocoPhillips - Surmont (AMS502)
Annual Summary for the Year 2016
Nitrogen Dioxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value	% of Data in Each Concentration Range			
							0 - 40	41 - 80	81 - 159	>159
Jan	100	707	5.6	29	0	10	100	0	0	0
Feb	100	663	4.1	27	0	12	100	0	0	0
Mar	100	708	3.0	20	0	6	100	0	0	0
Apr	96.81	661	1.9	13	0	5	100	0	0	0
May	28.09	196	1.3	9	0	3	100	0	0	0
Jun	98.61	674	1.5	9	0	4	100	0	0	0
Jul	99.73	706	1.4	10	0	4	100	0	0	0
Aug	100	709	1.2	8	0	3	100	0	0	0
Sep	100	681	1.3	8	0	3	100	0	0	0
Oct	100	707	1.5	15	0	6	100	0	0	0
Nov	100	685	2.3	12	0	6	100	0	0	0
Dec	100	708	4.0	18	0	10	100	0	0	0
Annual	93.51	7805	2.5	29	0	12	100	0	0	0



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
ANNUAL REPORT

OXIDES OF NITROGEN ANNUAL 2016

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

March 2017



Wood Buffalo Environmental Association - Fort McKay - Bertha Ganter (AMS 1)
Annual Summary for the Year 2016
Oxides of Nitrogen (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum	Maximum	% of Data in Each Concentration Range			
				1-Hour Value	24-Hour Value	0 - 40	41 - 80	81 - 159	>159
Jan	99.73	706	20.4	113	53	86.4	11.76	1.84	0
Feb	99.14	650	19.5	103	59	90.92	7.38	1.69	0
Mar	99.19	701	11.5	71	27	98.29	1.71	0	0
Apr	99.72	682	7.7	53	15	99.71	0.29	0	0
May	99.6	705	2.8	52	14	99.72	0.28	0	0
Jun	99.03	677	2.9	51	7	99.85	0.15	0	0
Jul	99.73	707	3.0	33	8	100	0	0	0
Aug	95.43	671	4.4	44	12	99.55	0.45	0	0
Sep	93.06	631	4.4	58	13	99.37	0.63	0	0
Oct	98.92	700	6.7	73	34	98.86	1.14	0	0
Nov	99.86	683	11.2	92	42	95.75	3.66	0.59	0
Dec	100	707	20.0	126	48	86.85	11.46	1.7	0
Annual	98.62	8220	9.6	126	59	96.24	3.27	0.49	0



Wood Buffalo Environmental Association - Patricia McInnes (AMS 6)
Annual Summary for the Year 2016
Oxides of Nitrogen (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum	Maximum	% of Data in Each Concentration Range			
				1-Hour Value	24-Hour Value	0 - 40	41 - 80	81 - 159	>159
Jan	99.46	704	16.2	108	48	93.32	5.82	0.85	0
Feb	100	656	13.1	96	23	97.56	2.29	0.15	0
Mar	100	708	10.5	64	21	98.45	1.55	0	0
Apr	99.72	683	5.1	57	10	99.85	0.15	0	0
May	100	704	4.3	66	15	99.01	0.99	0	0
Jun	96.39	661	2.3	21	6	100	0	0	0
Jul	100	708	3.6	22	8	100	0	0	0
Aug	99.6	704	3.5	33	8	100	0	0	0
Sep	99.86	678	3.9	58	13	99.71	0.29	0	0
Oct	99.87	706	7.6	75	25	98.44	1.56	0	0
Nov	100	685	9.1	78	26	96.35	3.65	0	0
Dec	100	708	12.9	86	33	94.07	5.65	0.28	0
Annual	99.58	8305	7.7	108	48	98.05	1.85	0.11	0



Wood Buffalo Environmental Association - Athabasca Valley (AMS 7)
Annual Summary for the Year 2016
Oxides of Nitrogen (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum	Maximum	% of Data in Each Concentration Range			
				1-Hour Value	24-Hour Value	0 - 40	41 - 80	81 - 159	>159
Jan	99.87	706	19.3	101	42	92.78	6.66	0.57	0
Feb	99.57	658	19.3	91	41	89.97	9.57	0.46	0
Mar	98.92	700	11.8	77	26	97.43	2.57	0	0
Apr	99.03	678	5.8	34	10	100	0	0	0
May	99.87	710	7.3	112	20	97.46	2.39	0.14	0
Jun	99.86	684	4.1	16	8	100	0	0	0
Jul	98.52	688	5.1	31	9	100	0	0	0
Aug	96.91	686	5.1	28	9	100	0	0	0
Sep	99.31	669	7.1	56	17	99.55	0.45	0	0
Oct	99.6	706	9.1	55	25	99.15	0.85	0	0
Nov	99.86	684	16.8	102	37	92.4	7.16	0.44	0
Dec	100	708	20.3	145	63	86.72	12.15	1.13	0
Annual	99.27	8277	10.9	145	63	96.29	3.48	0.23	0



Wood Buffalo Environmental Association - Fort Chipewyan (AMS 8)
Annual Summary for the Year 2016
Oxides of Nitrogen (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum	Maximum	% of Data in Each Concentration Range			
				1-Hour Value	24-Hour Value	0 - 40	41 - 80	81 - 159	>159
Jan	99.6	704	2.8	21	10	100	0	0	0
Feb	100	658	1.3	11	4	100	0	0	0
Mar	99.73	706	0.8	14	3	100	0	0	0
Apr	99.17	678	0.9	8	3	100	0	0	0
May	99.73	705	0.8	15	3	100	0	0	0
Jun	99.58	678	0.4	8	2	100	0	0	0
Jul	99.6	703	0.4	9	2	100	0	0	0
Aug	100	708	0.3	7	2	100	0	0	0
Sep	100	684	0.7	12	4	100	0	0	0
Oct	99.87	707	0.7	9	5	100	0	0	0
Nov	100	685	2.0	25	13	100	0	0	0
Dec	100	708	3.0	41	16	99.86	0.14	0	0
Annual	99.77	8324	1.2	41	16	99.99	0.01	0	0



Wood Buffalo Environmental Association - Fort McKay South (AMS 13)
Annual Summary for the Year 2016
Oxides of Nitrogen (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum	Maximum	% of Data in Each Concentration Range			
				1-Hour Value	24-Hour Value	0 - 40	41 - 80	81 - 159	>159
Jan	100	708	21.5	128	64	82.77	14.83	2.4	0
Feb	99.43	657	18.0	102	50	90.41	8.98	0.61	0
Mar	99.6	706	11.1	71	26	97.03	2.97	0	0
Apr	99.72	677	7.0	52	14	99.85	0.15	0	0
May	99.87	708	2.3	48	12	99.58	0.42	0	0
Jun	99.17	678	2.6	32	6	100	0	0	0
Jul	99.87	707	3.1	34	8	100	0	0	0
Aug	99.87	707	4.2	71	11	99.58	0.42	0	0
Sep	100	682	4.6	71	14	99.41	0.59	0	0
Oct	99.73	707	6.6	74	31	98.3	1.7	0	0
Nov	100	686	9.7	85	43	95.92	3.94	0.15	0
Dec	96.51	684	18.1	135	45	88.16	10.23	1.61	0
Annual	99.48	8307	9.0	135	64	96	3.63	0.38	0



Wood Buffalo Environmental Association - Anzac (AMS 14)
Annual Summary for the Year 2016
Oxides of Nitrogen (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum	Maximum	% of Data in Each Concentration Range			
				1-Hour Value	24-Hour Value	0 - 40	41 - 80	81 - 159	>159
Jan	99.46	704	5.4	31	12	100	0	0	0
Feb	99.86	660	4.5	47	12	99.55	0.45	0	0
Mar	99.46	703	3.0	22	9	100	0	0	0
Apr	99.72	683	1.3	17	3	100	0	0	0
May	72.58	512	3.8	539	31	99.41	0.39	0	0.2
Jun	90.14	609	1.4	18	3	100	0	0	0
Jul	99.19	702	1.5	18	3	100	0	0	0
Aug	98.52	696	1.1	13	2	100	0	0	0
Sep	99.72	680	1.5	19	3	100	0	0	0
Oct	100	708	1.9	26	12	100	0	0	0
Nov	100	685	2.7	39	9	100	0	0	0
Dec	99.6	704	5.1	42	15	99.72	0.28	0	0
Annual	96.49	8046	2.8	539	31	99.9	0.09	0	0.01



Wood Buffalo Environmental Association - CNRL Horizon (AMS 15)
Annual Summary for the Year 2016
Oxides of Nitrogen (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum	Maximum	% of Data in Each Concentration Range			
				1-Hour Value	24-Hour Value	0 - 40	41 - 80	81 - 159	>159
Jan	99.06	701	12.1	98	34	94.86	4.71	0.43	0
Feb	100	660	17.9	199	77	88.03	8.33	3.03	0.61
Mar	100	708	14.9	129	33	93.5	5.79	0.71	0
Apr	99.58	680	5.8	86	15	99.26	0.59	0.15	0
May	98.39	697	3.7	74	9	98.85	1.15	0	0
Jun	99.86	682	3.6	67	10	99.12	0.88	0	0
Jul	99.73	704	3.3	37	8	100	0	0	0
Aug	99.73	706	4.8	42	10	99.72	0.28	0	0
Sep	100	682	4.2	44	13	99.71	0.29	0	0
Oct	100	708	5.7	79	17	99.44	0.56	0	0
Nov	99.86	684	6.5	147	19	97.51	1.75	0.73	0
Dec	99.33	703	12.4	133	42	92.18	7.25	0.57	0
Annual	99.62	8315	7.9	199	77	96.94	2.57	0.44	0.05



Wood Buffalo Environmental Association - Shell Muskeg River (AMS 16)
Annual Summary for the Year 2016
Oxides of Nitrogen (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum	Maximum	% of Data in Each Concentration Range			
				1-Hour Value	24-Hour Value	0 - 40	41 - 80	81 - 159	>159
Jan	100	707	25.1	187	88	80.76	15.13	3.54	0.57
Feb	100	661	31.2	417	147	80.64	11.5	5.14	2.72
Mar	99.19	701	23.3	175	54	83.74	12.98	3.14	0.14
Apr	100	683	13.3	140	33	96.34	2.34	1.32	0
May	100	709	12.0	104	51	92.95	6.91	0.14	0
Jun	99.86	683	7.9	125	22	97.66	2.2	0.15	0
Jul	97.58	693	11.6	106	30	94.81	4.62	0.58	0
Aug	100	708	9.4	84	24	98.45	1.41	0.14	0
Sep	100	680	11.3	207	35	95.29	4.41	0.15	0.15
Oct	100	707	13.7	200	46	94.2	5.09	0.57	0.14
Nov	100	685	13.1	104	32	96.06	3.8	0.15	0
Dec	99.73	704	25.6	174	55	81.11	16.48	2.13	0.28
Annual	99.69	8321	16.4	417	147	91.02	7.24	1.42	0.32



Wood Buffalo Environmental Association - Wapasu (AMS 17)
Annual Summary for the Year 2016
Oxides of Nitrogen (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum	Maximum	% of Data in Each Concentration Range			
				1-Hour Value	24-Hour Value	0 - 40	41 - 80	81 - 159	>159
Jan	100	707	5.6	56	11	99.86	0.14	0	0
Feb	100	662	4.5	58	14	99.55	0.45	0	0
Mar	100	707	2.9	40	11	100	0	0	0
Apr	100	685	1.5	16	3	100	0	0	0
May	99.6	705	1.9	23	8	100	0	0	0
Jun	96.53	661	1.2	13	3	100	0	0	0
Jul	99.6	704	1.6	21	4	100	0	0	0
Aug	99.33	703	1.7	43	6	99.86	0.14	0	0
Sep	100	680	2.2	38	6	100	0	0	0
Oct	100	709	2.5	39	10	100	0	0	0
Nov	100	685	3.4	22	9	100	0	0	0
Dec	100	708	5.0	53	16	99.72	0.28	0	0
Annual	99.59	8316	2.8	58	16	99.92	0.08	0	0



Wood Buffalo Environmental Association - Stony Mountain (AMS 18)
Annual Summary for the Year 2016
Oxides of Nitrogen (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum	Maximum	% of Data in Each Concentration Range			
				1-Hour Value	24-Hour Value	0 - 40	41 - 80	81 - 159	>159
Jan	99.73	707	2.9	19	7	100	0	0	0
Feb	100	662	2.4	11	7	100	0	0	0
Mar	100	708	2.5	12	7	100	0	0	0
Apr	100	686	1.0	4	1	100	0	0	0
May	100	709	1.3	11	4	100	0	0	0
Jun	99.17	678	0.7	6	1	100	0	0	0
Jul	99.87	707	0.8	9	2	100	0	0	0
Aug	100	708	0.6	4	1	100	0	0	0
Sep	92.22	626	0.7	8	2	100	0	0	0
Oct	100	707	1.1	7	4	100	0	0	0
Nov	99.31	681	1.6	6	4	100	0	0	0
Dec	100	707	2.1	18	8	100	0	0	0
Annual	99.2	8286	1.5	19	8	100	0	0	0



Wood Buffalo Environmental Association - Firebag (AMS 19)
Annual Summary for the Year 2016
Oxides of Nitrogen (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum	Maximum	% of Data in Each Concentration Range			
				1-Hour Value	24-Hour Value	0 - 40	41 - 80	81 - 159	>159
Jan	95.3	674	6.6	68	19	99.41	0.59	0	0
Feb	100	662	6.7	77	20	99.09	0.91	0	0
Mar	100	708	3.4	22	8	100	0	0	0
Apr	100	686	2.3	49	7	99.85	0.15	0	0
May	100	707	2.6	32	11	100	0	0	0
Jun	99.44	681	1.6	19	4	100	0	0	0
Jul	99.73	705	1.7	24	5	100	0	0	0
Aug	100	708	2.1	25	4	100	0	0	0
Sep	99.86	677	2.4	21	7	100	0	0	0
Oct	99.73	705	3.0	42	9	99.72	0.28	0	0
Nov	99.72	683	3.8	22	8	100	0	0	0
Dec	100	708	5.0	38	11	100	0	0	0
Annual	99.48	8304	3.4	77	20	99.89	0.11	0	0



Wood Buffalo Environmental Association - Brion MacKay River (AMS 20)
Annual Summary for the Year 2016
Oxides of Nitrogen (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum	Maximum	% of Data in Each Concentration Range			
				1-Hour Value	24-Hour Value	0 - 40	41 - 80	81 - 159	>159
Jan	99.84	581	10.6	209	67	94.66	3.61	1.38	0.34
Feb	100	662	6.6	58	23	99.24	0.76	0	0
Mar	100	708	5.4	44	23	99.29	0.71	0	0
Apr	99.86	685	2.4	26	7	100	0	0	0
May	99.73	706	1.0	11	2	100	0	0	0
Jun	99.86	683	0.8	7	2	100	0	0	0
Jul	99.46	705	1.2	29	5	100	0	0	0
Aug	99.87	707	1.0	12	6	100	0	0	0
Sep	100	681	0.8	15	5	100	0	0	0
Oct	100	707	2.1	28	6	100	0	0	0
Nov	100	685	2.0	54	19	99.56	0.44	0	0
Dec	100	708	4.4	65	19	99.29	0.71	0	0
Annual	99.88	8218	3.1	209	67	99.42	0.46	0.1	0.02



Wood Buffalo Environmental Association - Conklin Community (AMS 21)
Annual Summary for the Year 2016
Oxides of Nitrogen (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum	Maximum	% of Data in Each Concentration Range			
				1-Hour Value	24-Hour Value	0 - 40	41 - 80	81 - 159	>159
Apr	99.72	684	1.5	32	3	100	0	0	0
May	99.33	703	1.4	15	3	100	0	0	0
Jun	99.44	679	1.0	11	2	100	0	0	0
Jul	99.73	705	1.0	22	2	100	0	0	0
Aug	99.73	707	0.9	10	2	100	0	0	0
Sep	99.44	677	1.3	34	4	100	0	0	0
Oct	99.87	707	2.0	48	11	99.72	0.28	0	0
Nov	99.44	681	3.2	32	7	100	0	0	0
Dec	100	709	3.7	26	11	100	0	0	0
Annual	99.63	6252	1.8	48	11	99.97	0.03	0	0



Wood Buffalo Environmental Association - Cenovus - Christina Lake (AMS500)
Annual Summary for the Year 2016
Oxides of Nitrogen (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum	Maximum	% of Data in Each Concentration Range			
				1-Hour Value	24-Hour Value	0 - 40	41 - 80	81 - 159	>159
Jan	95.3	673	9.6	97	30	97.47	2.38	0.15	0
Feb	99.71	659	6.4	145	22	98.79	0.76	0.46	0
Mar	99.87	707	3.6	38	12	100	0	0	0
Apr	92.92	626	2.7	25	7	100	0	0	0
May	100	708	2.8	30	9	100	0	0	0
Jun	100	684	2.7	20	7	100	0	0	0
Jul	99.19	701	1.9	18	5	100	0	0	0
Aug	99.87	708	3.1	41	17	99.86	0.14	0	0
Sep	99.86	680	3.6	29	8	100	0	0	0
Oct	99.87	707	3.1	23	8	100	0	0	0
Nov	100	685	3.8	25	9	100	0	0	0
Dec	100	708	8.0	54	19	99.58	0.42	0	0
Annual	98.88	8246	4.3	145	30	99.65	0.31	0.05	0



Wood Buffalo Environmental Association - Statoil - Leismer (AMS501)
Annual Summary for the Year 2016
Oxides of Nitrogen (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum	Maximum	% of Data in Each Concentration Range			
				1-Hour Value	24-Hour Value	0 - 40	41 - 80	81 - 159	>159
Jan	100	709	3.4	26	7	100	0	0	0
Feb	99.71	658	2.8	29	8	100	0	0	0
Mar	100	709	2.3	27	7	100	0	0	0
Annual	99.90	2076	2.8	29	8	100	0	0	0



Wood Buffalo Environmental Association - ConocoPhillips - Surmont (AMS502)
Annual Summary for the Year 2016
Oxides of Nitrogen (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum	Maximum	% of Data in Each Concentration Range			
				1-Hour Value	24-Hour Value	0 - 40	41 - 80	81 - 159	>159
Jan	100	707	8.1	44	16	99.72	0.28	0	0
Feb	100	663	6.1	46	16	99.7	0.3	0	0
Mar	100	708	4.3	32	11	100	0	0	0
Apr	96.81	661	3.0	39	11	100	0	0	0
May	28.09	196	2.3	20	6	100	0	0	0
Jun	98.61	674	2.7	21	8	100	0	0	0
Jul	99.73	706	2.4	20	8	100	0	0	0
Aug	100	709	2.4	19	7	100	0	0	0
Sep	100	681	2.6	30	9	100	0	0	0
Oct	100	707	2.3	18	8	100	0	0	0
Nov	100	685	3.2	15	7	100	0	0	0
Dec	100	708	6.5	69	12	99.72	0.28	0	0
Annual	93.51	7805	3.9	69	16	99.92	0.08	0	0



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
ANNUAL REPORT

NITROGEN OXIDE ANNUAL 2016

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

March 2017



Wood Buffalo Environmental Association - Fort McKay - Bertha Ganter (AMS 1)
Annual Summary for the Year 2016
Nitrogen Oxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum		% of Data in Each Concentration Range			
				1-Hour Value	24-Hour Value	0 - 40	41 - 80	81 - 159	>159
Jan	99.73	706	7.1	84	34	97.03	2.69	0.28	0
Feb	99.14	650	6.5	82	43	96.31	3.54	0.15	0
Mar	99.19	701	2.3	49	9	99.71	0.29	0	0
Apr	99.72	682	1.2	14	3	100	0	0	0
May	99.6	705	0.4	37	2	100	0	0	0
Jun	99.03	677	0.5	26	2	100	0	0	0
Jul	99.73	707	0.7	20	3	100	0	0	0
Aug	95.43	671	1.3	28	3	100	0	0	0
Sep	93.06	631	1.4	44	6	99.84	0.16	0	0
Oct	98.92	700	2.1	63	22	99.29	0.71	0	0
Nov	99.86	683	3.8	75	25	97.95	2.05	0	0
Dec	100	707	6.7	91	24	97.45	2.26	0.28	0
Annual	98.62	8220	2.8	91	43	98.97	0.97	0.06	0



Wood Buffalo Environmental Association - Patricia McInnes (AMS 6)
Annual Summary for the Year 2016
Nitrogen Oxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum		% of Data in Each Concentration Range			
				1-Hour Value	24-Hour Value	0 - 40	41 - 80	81 - 159	>159
Jan	99.46	704	5.3	74	26	98.15	1.85	0	0
Feb	100	656	3.2	59	8	99.54	0.46	0	0
Mar	100	708	2.4	40	6	100	0	0	0
Apr	99.72	683	1.0	33	3	100	0	0	0
May	100	704	0.7	14	2	100	0	0	0
Jun	96.39	661	0.5	11	2	100	0	0	0
Jul	100	708	0.7	11	2	100	0	0	0
Aug	99.6	704	0.8	16	2	100	0	0	0
Sep	99.86	678	1.2	41	5	99.85	0.15	0	0
Oct	99.87	706	2.5	58	13	99.58	0.42	0	0
Nov	100	685	2.9	54	14	99.42	0.58	0	0
Dec	100	708	3.9	56	13	99.58	0.42	0	0
Annual	99.58	8305	2.1	74	26	99.67	0.33	0	0



Wood Buffalo Environmental Association - Athabasca Valley (AMS 7)
Annual Summary for the Year 2016
Nitrogen Oxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum	Maximum	% of Data in Each Concentration Range			
				1-Hour Value	24-Hour Value	0 - 40	41 - 80	81 - 159	>159
Jan	99.87	706	6.8	72	24	98.16	1.84	0	0
Feb	99.57	658	5.7	60	20	98.94	1.06	0	0
Mar	98.92	700	2.6	42	9	99.86	0.14	0	0
Apr	99.03	678	0.9	14	2	100	0	0	0
May	99.87	710	1.9	106	5	99.86	0	0.14	0
Jun	99.86	684	1.2	11	2	100	0	0	0
Jul	98.52	688	1.1	23	4	100	0	0	0
Aug	96.91	686	1.2	17	4	100	0	0	0
Sep	99.31	669	2.3	31	7	100	0	0	0
Oct	99.6	706	3.1	42	14	99.86	0.14	0	0
Nov	99.86	684	7.4	76	19	97.95	2.05	0	0
Dec	100	708	7.1	103	36	97.74	2.12	0.14	0
Annual	99.27	8277	3.5	106	36	99.36	0.62	0.02	0



Wood Buffalo Environmental Association - Fort Chipewyan (AMS 8)
Annual Summary for the Year 2016
Nitrogen Oxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum	Maximum	% of Data in Each Concentration Range			
				1-Hour Value	24-Hour Value	0 - 40	41 - 80	81 - 159	>159
Jan	99.6	704	0.3	8	2	100	0	0	0
Feb	100	658	0.1	2	0	100	0	0	0
Mar	99.73	706	0.1	6	1	100	0	0	0
Apr	99.17	678	0.1	2	1	100	0	0	0
May	99.73	705	0.1	2	0	100	0	0	0
Jun	99.58	678	0.1	1	0	100	0	0	0
Jul	99.6	703	0.1	4	1	100	0	0	0
Aug	100	708	0.0	2	0	100	0	0	0
Sep	100	684	0.1	8	1	100	0	0	0
Oct	99.87	707	0.1	5	1	100	0	0	0
Nov	100	685	0.1	5	1	100	0	0	0
Dec	100	708	0.3	11	3	100	0	0	0
Annual	99.77	8324	0.1	11	3	100	0	0	0



Wood Buffalo Environmental Association - Fort McKay South (AMS 13)
Annual Summary for the Year 2016
Nitrogen Oxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum	Maximum	% of Data in Each Concentration Range			
				1-Hour Value	24-Hour Value	0 - 40	41 - 80	81 - 159	>159
Jan	100	708	9.8	103	42	93.64	5.51	0.85	0
Feb	99.43	657	6.1	67	36	95.89	4.11	0	0
Mar	99.6	706	2.4	50	9	99.72	0.28	0	0
Apr	99.72	677	1.2	25	4	100	0	0	0
May	99.87	708	0.3	13	2	100	0	0	0
Jun	99.17	678	0.4	12	1	100	0	0	0
Jul	99.87	707	0.7	21	3	100	0	0	0
Aug	99.87	707	1.3	57	6	99.86	0.14	0	0
Sep	100	682	1.9	65	8	99.71	0.29	0	0
Oct	99.73	707	2.6	72	23	99.01	0.99	0	0
Nov	100	686	4.1	76	33	97.81	2.19	0	0
Dec	96.51	684	7.1	100	27	96.05	3.65	0.29	0
Annual	99.48	8307	3.1	103	42	98.5	1.41	0.09	0



Wood Buffalo Environmental Association - Anzac (AMS 14)
Annual Summary for the Year 2016
Nitrogen Oxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum	Maximum	% of Data in Each Concentration Range			
				1-Hour Value	24-Hour Value	0 - 40	41 - 80	81 - 159	>159
Jan	99.46	704	0.7	13	2	100	0	0	0
Feb	99.86	660	0.7	24	3	100	0	0	0
Mar	99.46	703	0.4	6	1	100	0	0	0
Apr	99.72	683	0.2	6	1	100	0	0	0
May	72.58	512	1.4	248	12	99.61	0.2	0	0.2
Jun	90.14	609	0.4	12	1	100	0	0	0
Jul	99.19	702	0.3	7	1	100	0	0	0
Aug	98.52	696	0.2	6	1	100	0	0	0
Sep	99.72	680	0.3	11	1	100	0	0	0
Oct	100	708	0.4	14	2	100	0	0	0
Nov	100	685	0.4	20	3	100	0	0	0
Dec	99.6	704	0.8	28	4	100	0	0	0
Annual	96.49	8046	0.5	248	12	99.97	0.01	0	0.01



Wood Buffalo Environmental Association - CNRL Horizon (AMS 15)
Annual Summary for the Year 2016
Nitrogen Oxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum		% of Data in Each Concentration Range			
				1-Hour Value	24-Hour Value	0 - 40	41 - 80	81 - 159	>159
Jan	99.06	701	3.2	72	16	99	1	0	0
Feb	100	660	7.2	159	55	95.76	2.58	1.67	0
Mar	100	708	4.3	88	18	99.01	0.71	0.28	0
Apr	99.58	680	1.3	66	6	99.56	0.44	0	0
May	98.39	697	0.8	48	4	99.57	0.43	0	0
Jun	99.86	682	0.8	53	5	99.85	0.15	0	0
Jul	99.73	704	0.7	19	2	100	0	0	0
Aug	99.73	706	1.3	33	4	100	0	0	0
Sep	100	682	1.2	24	6	100	0	0	0
Oct	100	708	1.7	60	9	99.86	0.14	0	0
Nov	99.86	684	2.1	123	14	98.68	0.88	0.44	0
Dec	99.33	703	3.7	114	22	99	0.71	0.28	0
Annual	99.62	8315	2.4	159	55	99.25	0.54	0.22	0



Wood Buffalo Environmental Association - Shell Muskeg River (AMS 16)
Annual Summary for the Year 2016
Nitrogen Oxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum	Maximum	% of Data in Each Concentration Range			
				1-Hour Value	24-Hour Value	0 - 40	41 - 80	81 - 159	>159
Jan	100	707	11.4	150	61	92.93	5.37	1.7	0
Feb	100	661	17.3	351	114	90.17	4.24	3.93	1.66
Mar	99.19	701	9.9	132	28	94.86	4.14	1	0
Apr	100	683	5.0	101	16	97.95	1.17	0.88	0
May	100	709	5.7	73	34	98.45	1.55	0	0
Jun	99.86	683	3.1	83	10	99.41	0.44	0.15	0
Jul	97.58	693	5.7	83	20	97.55	2.31	0.14	0
Aug	100	708	4.4	65	15	99.58	0.42	0	0
Sep	100	680	5.1	190	19	99.26	0.44	0.15	0.15
Oct	100	707	6.7	166	31	97.88	1.56	0.42	0.14
Nov	100	685	4.4	76	16	99.71	0.29	0	0
Dec	99.73	704	9.5	134	30	97.02	2.41	0.57	0
Annual	99.69	8321	7.3	351	114	97.09	2.02	0.73	0.16



Wood Buffalo Environmental Association - Wapasu (AMS 17)
Annual Summary for the Year 2016
Nitrogen Oxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum		% of Data in Each Concentration Range			
				1-Hour Value	24-Hour Value	0 - 40	41 - 80	81 - 159	>159
Jan	100	707	0.7	26	2	100	0	0	0
Feb	100	662	0.8	33	5	100	0	0	0
Mar	100	707	0.5	19	3	100	0	0	0
Apr	100	685	0.3	3	1	100	0	0	0
May	99.6	705	0.4	12	2	100	0	0	0
Jun	96.53	661	0.4	5	1	100	0	0	0
Jul	99.6	704	0.5	11	1	100	0	0	0
Aug	99.33	703	0.6	23	2	100	0	0	0
Sep	100	680	0.7	23	2	100	0	0	0
Oct	100	709	0.8	24	5	100	0	0	0
Nov	100	685	0.5	7	1	100	0	0	0
Dec	100	708	0.7	18	5	100	0	0	0
Annual	99.59	8316	0.6	33	5	100	0	0	0



Wood Buffalo Environmental Association - Stony Mountain (AMS 18)
Annual Summary for the Year 2016
Nitrogen Oxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum		% of Data in Each Concentration Range			
				1-Hour Value	24-Hour Value	0 - 40	41 - 80	81 - 159	>159
Jan	99.73	707	0.2	3	1	100	0	0	0
Feb	100	662	0.2	3	0	100	0	0	0
Mar	100	708	0.3	2	1	100	0	0	0
Apr	100	686	0.1	1	0	100	0	0	0
May	100	709	0.1	2	0	100	0	0	0
Jun	99.17	678	0.0	1	0	100	0	0	0
Jul	99.87	707	0.0	4	0	100	0	0	0
Aug	100	708	0.0	1	0	100	0	0	0
Sep	92.22	626	0.1	1	0	100	0	0	0
Oct	100	707	0.1	2	0	100	0	0	0
Nov	99.31	681	0.1	1	0	100	0	0	0
Dec	100	707	0.1	2	0	100	0	0	0
Annual	99.2	8286	0.1	4	1	100	0	0	0



Wood Buffalo Environmental Association - Firebag (AMS 19)
Annual Summary for the Year 2016
Nitrogen Oxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum		% of Data in Each Concentration Range			
				1-Hour Value	24-Hour Value	0 - 40	41 - 80	81 - 159	>159
Jan	95.3	674	1.1	34	4	100	0	0	0
Feb	100	662	1.6	38	7	100	0	0	0
Mar	100	708	0.6	9	2	100	0	0	0
Apr	100	686	0.4	14	2	100	0	0	0
May	100	707	0.3	7	1	100	0	0	0
Jun	99.44	681	0.3	8	1	100	0	0	0
Jul	99.73	705	0.4	11	1	100	0	0	0
Aug	100	708	0.5	9	1	100	0	0	0
Sep	99.86	677	0.5	10	3	100	0	0	0
Oct	99.73	705	0.7	33	4	100	0	0	0
Nov	99.72	683	0.5	6	2	100	0	0	0
Dec	100	708	0.7	18	3	100	0	0	0
Annual	99.48	8304	0.6	38	7	100	0	0	0



Wood Buffalo Environmental Association - Brion MacKay River (AMS 20)
Annual Summary for the Year 2016
Nitrogen Oxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum		% of Data in Each Concentration Range			
				1-Hour Value	24-Hour Value	0 - 40	41 - 80	81 - 159	>159
Jan	99.84	581	3.9	185	42	97.42	1.89	0.52	0.17
Feb	100	662	0.9	31	4	100	0	0	0
Mar	100	708	0.7	25	5	100	0	0	0
Apr	99.86	685	0.2	8	1	100	0	0	0
May	99.73	706	0.1	3	0	100	0	0	0
Jun	99.86	683	0.1	3	0	100	0	0	0
Jul	99.46	705	0.2	13	2	100	0	0	0
Aug	99.87	707	0.1	3	1	100	0	0	0
Sep	100	681	0.1	5	1	100	0	0	0
Oct	100	707	0.2	9	1	100	0	0	0
Nov	100	685	0.3	30	6	100	0	0	0
Dec	100	708	0.6	36	7	100	0	0	0
Annual	99.88	8218	0.6	185	42	99.82	0.14	0.04	0.01



Wood Buffalo Environmental Association - Conklin Community (AMS 21)
Annual Summary for the Year 2016
Nitrogen Oxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum		% of Data in Each Concentration Range			
				1-Hour Value	24-Hour Value	0 - 40	41 - 80	81 - 159	>159
Apr	99.72	684	0.3	13	1	100	0	0	0
May	99.33	703	0.2	6	1	100	0	0	0
Jun	99.44	679	0.1	5	0	100	0	0	0
Jul	99.73	705	0.2	15	1	100	0	0	0
Aug	99.73	707	0.3	8	1	100	0	0	0
Sep	99.44	677	0.4	21	2	100	0	0	0
Oct	99.87	707	0.7	38	7	100	0	0	0
Nov	99.44	681	0.7	18	2	100	0	0	0
Dec	100	709	0.5	13	2	100	0	0	0
Annual	99.63	6252	0.4	38	7	100	0	0	0



Wood Buffalo Environmental Association - Cenovus - Christina Lake (AMS500)
Annual Summary for the Year 2016
Nitrogen Oxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum		% of Data in Each Concentration Range			
				1-Hour Value	24-Hour Value	0 - 40	41 - 80	81 - 159	>159
Jan	95.3	673	3.0	69	14	99.26	0.74	0	0
Feb	99.71	659	2.1	108	13	99.39	0.46	0.15	0
Mar	99.87	707	1.1	23	5	100	0	0	0
Apr	92.92	626	0.8	14	4	100	0	0	0
May	100	708	0.8	13	4	100	0	0	0
Jun	100	684	0.9	11	3	100	0	0	0
Jul	99.19	701	0.7	8	2	100	0	0	0
Aug	99.87	708	1.4	26	10	100	0	0	0
Sep	99.86	680	1.5	18	5	100	0	0	0
Oct	99.87	707	1.0	17	3	100	0	0	0
Nov	100	685	0.9	13	3	100	0	0	0
Dec	100	708	2.1	22	7	100	0	0	0
Annual	98.88	8246	1.3	108	14	99.89	0.1	0.01	0



Wood Buffalo Environmental Association - Statoil - Leismer (AMS501)
Annual Summary for the Year 2016
Nitrogen Oxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum	Maximum	% of Data in Each Concentration Range			
				1-Hour Value	24-Hour Value	0 - 40	41 - 80	81 - 159	>159
Jan	100	709	0.4	17	2	100	0	0	0
Feb	99.71	658	0.7	25	3	100	0	0	0
Mar	100	709	0.5	18	3	100	0	0	0
Annual	99.90	2076	0.6	25	3	100	0	0	0



Wood Buffalo Environmental Association - ConocoPhillips - Surmont (AMS502)
Annual Summary for the Year 2016
Nitrogen Oxide (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum		% of Data in Each Concentration Range			
				1-Hour Value	24-Hour Value	0 - 40	41 - 80	81 - 159	>159
Jan	100	707	2.5	24	7	100	0	0	0
Feb	100	663	2.0	28	8	100	0	0	0
Mar	100	708	1.3	17	5	100	0	0	0
Apr	96.81	661	1.2	27	7	100	0	0	0
May	28.09	196	1.0	11	3	100	0	0	0
Jun	98.61	674	1.2	14	5	100	0	0	0
Jul	99.73	706	1.0	15	4	100	0	0	0
Aug	100	709	1.2	14	5	100	0	0	0
Sep	100	681	1.3	24	7	100	0	0	0
Oct	100	707	0.9	10	4	100	0	0	0
Nov	100	685	0.9	7	2	100	0	0	0
Dec	100	708	2.4	54	7	99.72	0.28	0	0
Annual	93.51	7805	1.4	54	8	99.97	0.03	0	0



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM ANNUAL REPORT

OZONE ANNUAL 2016

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

March 2017



Wood Buffalo Environmental Association - Fort McKay - Bertha Ganter (AMS 1)
Annual Summary for the Year 2016
Ozone (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value
Jan	100	709	15.04	39.5	0	32.8
Feb	99.28	658	17.86	39.8	0	31.8
Mar	99.46	701	28.27	50.7	0	40.4
Apr	99.44	671	31.07	61.8	0	49.2
May	96.24	686	30.04	71.9	0	42.8
Jun	98.89	674	27.78	68.0	0	42.6
Jul	96.91	688	21.79	54.1	0	31.9
Aug	99.46	706	19.43	63.2	0	31.8
Sep	99.58	681	18.34	43.4	0	27.8
Oct	100	709	16.18	36.5	0	27.9
Nov	99.86	685	15.67	37.0	0	31.5
Dec	100	709	15.40	39.2	0	34.1
Annual	99.09	8277	21.35	71.9	0	49.2



Wood Buffalo Environmental Association - Patricia McInnes (AMS 6)
Annual Summary for the Year 2016
Ozone (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value
Jan	99.46	705	19.44	42.9	0	38.4
Feb	100	659	22.80	42.7	0	37.5
Mar	96.24	682	31.18	53.6	0	46.3
Apr	99.58	682	37.71	75.3	0	59.0
May	99.33	706	36.84	291.5	15	84.3
Jun	99.72	684	34.70	68.4	0	47.7
Jul	100	707	28.20	53.5	0	38.2
Aug	98.39	693	24.77	63.2	0	31.5
Sep	99.86	683	22.78	43.1	0	32.3
Oct	100	710	17.65	35.2	0	31.6
Nov	100	684	21.39	39.7	0	34.9
Dec	100	709	22.86	43.6	0	37.9
Annual	99.37	8304	26.67	291.5	15	84.3



Wood Buffalo Environmental Association - Athabasca Valley (AMS 7)
Annual Summary for the Year 2016
Ozone (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value
Jan	100	709	13.38	37.0	0	30.8
Feb	99.28	659	16.54	39.3	0	27.9
Mar	98.92	702	24.45	45.2	0	37.5
Apr	99.17	680	30.07	66.0	0	47.8
May	99.87	710	35.12	355.1	32	94.1
Jun	99.86	686	32.34	63.9	0	45.6
Jul	98.39	698	24.51	58.3	0	34.7
Aug	99.87	707	23.59	62.8	0	33.3
Sep	99.58	682	20.63	41.3	0	31.2
Oct	99.6	707	18.51	37.0	0	31.5
Nov	99.86	684	17.22	39.1	0	34.8
Dec	100	709	17.61	42.2	0	35.7
Annual	99.53	8333	22.84	355.1	32	94.1



Wood Buffalo Environmental Association - Fort Chipewyan (AMS 8)
Annual Summary for the Year 2016
Ozone (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value
Jan	99.46	706	26.50	39.6	0	35.8
Feb	96.7	639	33.47	42.6	0	39.4
Mar	100	710	39.74	51.1	0	46.5
Apr	99.86	685	40.58	57.4	0	50.1
May	99.46	706	32.95	62.6	0	51.7
Jun	98.75	671	30.84	53.2	0	43.6
Jul	98.66	701	25.48	50.3	0	40.8
Aug	100	709	22.55	37.6	0	29.9
Sep	99.58	684	20.29	39.2	0	29.9
Oct	56.85	400	25.07	36.2	0	33.4
Nov	94.03	642	25.97	40.4	0	37.2
Dec	99.87	706	27.83	40.1	0	38.2
Annual	95.23	7959	29.42	62.6	0	51.7



Wood Buffalo Environmental Association - Fort McKay South (AMS 13)
Annual Summary for the Year 2016
Ozone (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value
Jan	100	709	12.02	38.9	0	32.0
Feb	99.43	660	15.38	42.8	0	30.4
Mar	99.6	707	24.76	49.4	0	35.7
Apr	99.44	684	28.48	62.4	0	47.2
May	99.87	706	27.92	67.5	0	40.6
Jun	94.44	648	27.57	66.4	0	40.0
Jul	99.73	708	20.50	51.5	0	29.5
Aug	100	707	16.65	61.7	0	28.4
Sep	99.86	684	15.20	40.5	0	26.6
Oct	99.19	705	14.40	34.9	0	25.6
Nov	99.86	686	14.47	37.5	0	31.4
Dec	100	710	13.40	37.7	0	33.7
Annual	99.29	8314	19.18	67.5	0	47.2



Wood Buffalo Environmental Association - Anzac (AMS 14)
Annual Summary for the Year 2016
Ozone (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value
Jan	99.6	708	25.12	44.0	0	42.1
Feb	99.57	660	29.49	47.2	0	43.4
Mar	99.33	705	35.61	51.4	0	45.8
Apr	99.86	686	37.80	64.5	0	54.5
May	72.31	513	34.63	1611.9	2	122.1
Jun	96.53	664	31.47	65.2	0	45.9
Jul	99.6	706	24.21	50.1	0	36.1
Aug	100	709	20.39	51.0	0	26.4
Sep	99.86	684	20.66	39.2	0	30.5
Oct	100	709	19.47	34.4	0	29.3
Nov	100	687	24.39	40.2	0	35.7
Dec	91.67	650	27.25	42.3	0	40.0
Annual	96.48	8081	27.34	1611.9	2	122.1



Wood Buffalo Environmental Association - Stony Mountain (AMS 18)
Annual Summary for the Year 2016
Ozone (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value
Jan	99.6	708	32.12	48.5	0	43.9
Feb	100	664	36.95	50.3	0	48.0
Mar	100	711	40.46	54.7	0	51.6
Apr	100	687	42.90	63.3	0	56.3
May	100	710	41.69	66.4	0	57.4
Jun	98.89	681	38.74	72.9	0	56.6
Jul	99.87	709	32.25	53.9	0	44.3
Aug	100	709	27.49	46.6	0	33.7
Sep	92.36	629	27.56	46.4	0	38.7
Oct	100	710	25.27	39.4	0	35.1
Nov	99.86	685	29.38	45.5	0	42.5
Dec	100	709	33.00	44.9	0	42.3
Annual	99.23	8312	34.00	72.9	0	57.4



Wood Buffalo Environmental Association - Conklin Community (AMS 21)
Annual Summary for the Year 2016
Ozone (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values Exceeding 1-Hour Guideline	Maximum 24-Hour Value
Apr	100	685	36.57	61.8	0	50.7
May	99.33	706	31.96	63.5	0	49.5
Jun	99.86	685	32.66	69.4	0	47.3
Jul	99.73	707	26.26	53.5	0	35.8
Aug	99.6	707	20.67	46.9	0	27.2
Sep	100	685	22.87	43.5	0	34.2
Oct	100	710	22.47	39.6	0	32.6
Nov	100	687	25.14	43.1	0	36.1
Dec	100	710	29.03	44.2	0	40.4
Annual	99.84	6282	27.51	69.4	0	50.7



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
ANNUAL REPORT

TOTAL HYDROCARBON ANNUAL 2016

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

March 2017



Wood Buffalo Environmental Association - Fort McKay - Bertha Ganter (AMS 1)
Annual Summary for the Year 2016
Total Hydrocarbons (ppm) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value
Jan	100	709	2.2	3.4	2.7
Feb	96.12	637	2.1	3.5	2.7
Mar	99.06	702	2.0	3.0	2.2
Apr	99.72	684	2.0	2.9	2.2
May	99.33	705	2.0	4.6	3.1
Jun	96.94	663	2.0	5.0	2.5
Jul	99.6	706	2.1	3.2	2.2
Aug	99.46	705	2.1	3.5	2.4
Sep	99.58	679	2.0	3.1	2.3
Oct	100	709	2.1	3.5	2.7
Nov	99.58	682	2.2	4.0	2.9
Dec	98.92	700	2.2	3.9	2.7
Annual	99.04	8281	2.1	5.0	3.1



Wood Buffalo Environmental Association - Mildred Lake (AMS 2)
Annual Summary for the Year 2016
Total Hydrocarbons (ppm) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value
Jan	100	709	2.6	5.8	3.4
Feb	99.28	657	2.5	5.2	3.0
Mar	99.33	705	2.5	5.6	3.2
Apr	99.31	682	2.3	5.0	2.7
May	96.51	687	2.4	8.4	4.4
Jun	100	685	2.7	111.5	16.6
Jul	100	709	2.3	4.9	2.6
Aug	99.73	707	2.4	5.4	2.8
Sep	95	647	2.3	4.0	2.7
Oct	100	709	2.2	7.2	3.2
Nov	98.61	675	2.5	7.9	3.3
Dec	96.64	684	2.6	5.2	3.2
Annual	98.7	8256	2.4	111.5	16.6



Wood Buffalo Environmental Association - Buffalo Viewpoint (AMS 4)
Annual Summary for the Year 2016
Total Hydrocarbons (ppm) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value
Jan	100	709	2.4	4.1	2.9
Feb	100	662	2.4	5.3	3.2
Mar	100	710	2.4	5.3	3.1
Apr	100	687	2.3	9.1	2.8
May	100	710	2.4	6.6	3.7
Jun	100	684	2.3	5.8	2.7
Jul	99.06	704	2.3	3.5	2.6
Aug	100	708	2.4	3.9	2.7
Sep	100	685	2.3	4.7	2.7
Oct	100	711	2.3	3.8	2.7
Nov	100	686	2.3	4.4	2.6
Dec	80.78	572	2.5	4.8	3.2
Annual	98.29	8228	2.3	9.1	3.7



Wood Buffalo Environmental Association - Mannix (AMS 5)
Annual Summary for the Year 2016
Total Hydrocarbons (ppm) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value
Jan	100	707	2.5	4.4	3.1
Feb	100	664	2.5	9.8	3.7
Mar	99.6	706	2.5	5.3	3.0
Apr	100	687	2.3	8.8	2.9
May	99.87	708	2.5	12.0	4.3
Jun	99.86	685	2.2	5.1	2.6
Jul	99.06	703	2.3	6.2	2.7
Aug	99.46	706	2.3	3.8	2.6
Sep	100	684	2.3	4.2	2.5
Oct	100	709	2.3	5.6	2.7
Nov	100	688	2.3	4.1	2.7
Dec	99.6	707	2.3	5.7	3.1
Annual	99.78	8354	2.4	12.0	4.3



Wood Buffalo Environmental Association - Patricia McInnes (AMS 6)
Annual Summary for the Year 2016
Total Hydrocarbons (ppm) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value
Jan	99.73	706	2.1	3.3	2.6
Feb	100	664	2.0	2.9	2.1
Mar	99.6	706	2.1	2.5	2.2
Apr	100	687	2.0	2.3	2.1
May	100	706	2.2	8.6	3.6
Jun	95.69	656	2.0	2.8	2.2
Jul	99.87	708	2.1	3.1	2.2
Aug	99.6	703	2.0	3.1	2.2
Sep	99.86	683	2.0	2.8	2.1
Oct	95.56	678	2.0	3.0	2.3
Nov	100	686	2.0	2.4	2.2
Dec	99.73	708	2.0	3.1	2.5
Annual	99.13	8291	2.1	8.6	3.6



Wood Buffalo Environmental Association - Athabasca Valley (AMS 7)
Annual Summary for the Year 2016
Total Hydrocarbons (ppm) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value
Jan	99.87	706	2.0	3.1	2.4
Feb	99.57	658	2.0	3.0	2.3
Mar	98.25	695	2.0	2.6	2.1
Apr	99.17	679	1.9	2.3	2.0
May	99.87	711	2.2	6.6	3.4
Jun	99.86	684	1.9	2.5	2.1
Jul	97.45	684	1.9	2.5	2.0
Aug	99.87	707	2.0	3.0	2.1
Sep	100	681	1.9	3.2	2.1
Oct	87.23	612	1.9	2.6	2.1
Nov	99.86	679	2.0	2.9	2.3
Dec	99.46	704	2.2	3.7	2.7
Annual	98.35	8200	2.0	6.6	3.4



Wood Buffalo Environmental Association - Barge Landing (AMS 9)
Annual Summary for the Year 2016
Total Hydrocarbons (ppm) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value
Jan	99.73	708	2.6	4.2	3.3
Feb	99.43	659	2.5	5.1	3.2
Mar	98.52	700	2.4	4.0	2.8
Apr	99.03	679	2.3	4.7	2.5
May	100	710	2.3	5.8	3.5
Jun	98.33	675	2.2	5.3	2.6
Jul	99.73	706	2.2	3.4	2.4
Aug	100	709	2.3	5.0	2.6
Sep	100	683	2.2	3.1	2.4
Oct	100	709	2.3	3.6	2.9
Nov	100	684	2.3	3.7	3.0
Dec	100	710	2.5	4.7	3.1
Annual	99.57	8332	2.3	5.8	3.5



Wood Buffalo Environmental Association - Lower Camp (AMS 11)
Annual Summary for the Year 2016
Total Hydrocarbons (ppm) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value
Jan	100	703	2.5	4.7	3.1
Feb	100	663	2.5	3.8	3.0
Mar	99.87	700	2.4	4.5	2.8
Apr	99.03	679	2.3	4.3	2.6
May	100	711	2.4	6.5	3.9
Jun	100	685	2.3	14.1	3.8
Jul	99.46	704	2.3	5.6	2.7
Aug	100	709	2.3	3.8	2.8
Sep	100	684	2.3	9.7	2.7
Oct	92.74	657	2.3	4.6	2.8
Nov	100	687	2.4	5.1	2.8
Dec	100	709	2.5	5.0	3.3
Annual	99.25	8291	2.4	14.1	3.9



Wood Buffalo Environmental Association - Fort McKay South (AMS 13)
Annual Summary for the Year 2016
Total Hydrocarbons (ppm) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value
Jan	100	708	2.6	4.8	3.1
Feb	99.43	658	2.5	4.0	3.0
Mar	99.6	706	2.4	4.0	2.6
Apr	99.58	674	2.3	5.2	2.9
May	70.7	498	2.3	7.3	3.6
Jun	99.86	683	2.3	14.3	3.9
Jul	99.87	707	2.3	3.9	2.6
Aug	99.87	707	2.2	3.4	2.5
Sep	100	684	2.2	3.5	2.6
Oct	99.73	707	2.3	3.8	3.1
Nov	100	685	2.4	5.8	3.5
Dec	100	710	2.5	4.0	3.0
Annual	97.35	8127	2.4	14.3	3.9



Wood Buffalo Environmental Association - Anzac (AMS 14)
Annual Summary for the Year 2016
Total Hydrocarbons (ppm) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value
Jan	96.51	676	2.0	3.1	2.3
Feb	99.86	660	2.0	2.8	2.1
Mar	99.19	701	2.0	2.6	2.1
Apr	95.83	651	2.0	2.2	2.0
May	72.45	513	2.2	32.2	3.6
Jun	93.47	638	2.0	2.6	2.1
Jul	99.33	703	2.0	2.5	2.1
Aug	99.6	703	1.9	2.6	2.0
Sep	95.97	657	1.9	2.5	2.0
Oct	93.82	661	1.9	2.4	2.2
Nov	98.19	672	2.0	2.3	2.1
Dec	93.55	664	2.0	3.2	2.4
Annual	94.77	7899	2.0	32.2	3.6



Wood Buffalo Environmental Association - CNRL Horizon (AMS 15)
Annual Summary for the Year 2016
Total Hydrocarbons (ppm) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value
Jan	98.92	702	2.3	5.5	3.1
Feb	100	660	2.4	6.5	3.3
Mar	100	708	2.3	7.4	3.2
Apr	99.31	681	2.2	5.0	2.6
May	97.45	691	2.2	4.8	2.8
Jun	99.86	682	2.2	5.4	2.6
Jul	99.73	704	2.1	3.3	2.4
Aug	99.73	706	2.2	3.8	2.5
Sep	100	682	2.2	3.8	2.4
Oct	100	708	2.2	4.9	2.5
Nov	99.86	684	2.2	5.5	2.5
Dec	99.33	703	2.4	4.6	3.0
Annual	99.51	8311	2.2	7.4	3.3



Wood Buffalo Environmental Association - Shell Muskeg River (AMS 16)
Annual Summary for the Year 2016
Total Hydrocarbons (ppm) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value
Jan	99.73	705	2.6	5.8	3.7
Feb	100	663	2.6	6.9	4.0
Mar	96.77	683	2.7	11.8	3.9
Apr	100	680	2.4	4.5	2.8
May	100	709	2.5	4.8	3.4
Jun	99.86	683	2.4	4.7	2.9
Jul	97.45	693	2.5	13.2	3.1
Aug	100	708	2.5	5.0	3.2
Sep	99.44	677	2.4	8.4	2.9
Oct	99.33	702	2.4	6.4	3.2
Nov	98.47	674	2.4	4.2	2.8
Dec	99.73	704	2.6	12.3	3.4
Annual	99.23	8281	2.5	13.2	4.0



Wood Buffalo Environmental Association - Wapasu (AMS 17)
Annual Summary for the Year 2016
Total Hydrocarbons (ppm) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value
Jan	100	708	2.3	3.7	2.5
Feb	99.71	660	2.2	3.0	2.4
Mar	100	709	2.2	2.5	2.3
Apr	100	685	2.2	2.4	2.2
May	100	708	2.2	4.6	2.8
Jun	99.58	683	2.1	2.9	2.3
Jul	98.39	697	2.2	3.4	2.3
Aug	100	708	2.2	3.0	2.2
Sep	100	682	2.2	2.7	2.3
Oct	100	709	2.2	2.7	2.4
Nov	100	685	2.2	2.7	2.3
Dec	100	708	2.3	3.5	2.5
Annual	99.81	8342	2.2	4.6	2.8



Wood Buffalo Environmental Association - Stony Mountain (AMS 18)
Annual Summary for the Year 2016
Total Hydrocarbons (ppm) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value
Jan	100	709	2.1	2.6	2.4
Feb	100	662	2.0	2.4	2.3
Mar	100	708	2.0	2.2	2.1
Apr	98.47	670	2.0	2.2	2.1
May	99.73	707	2.0	2.5	2.2
Jun	99.31	679	2.0	2.3	2.1
Jul	99.73	706	2.0	2.2	2.1
Aug	99.73	706	2.0	2.2	2.1
Sep	91.94	625	2.0	2.2	2.1
Oct	100	707	2.0	2.3	2.1
Nov	99.31	681	1.9	2.3	2.1
Dec	99.73	705	2.0	2.4	2.1
Annual	99.01	8265	2.0	2.6	2.4



Wood Buffalo Environmental Association - Firebag (AMS 19)
Annual Summary for the Year 2016
Total Hydrocarbons (ppm) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value
Jan	100	708	2.2	2.7	2.5
Feb	100	664	2.2	2.9	2.4
Mar	100	708	2.2	2.4	2.3
Apr	100	686	2.2	2.4	2.2
May	100	707	2.3	4.7	3.0
Jun	99.44	682	2.2	2.8	2.3
Jul	96.91	684	2.2	3.4	2.4
Aug	98.52	698	2.3	3.4	2.4
Sep	81.11	547	2.2	2.8	2.3
Oct	99.73	708	2.2	2.7	2.5
Nov	99.72	683	2.3	2.9	2.4
Dec	100	708	2.3	2.7	2.4
Annual	97.97	8183	2.2	4.7	3.0



Wood Buffalo Environmental Association - Brion MacKay River (AMS 20)
Annual Summary for the Year 2016
Total Hydrocarbons (ppm) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value
Jan	100	579	2.3	3.0	2.8
Feb	100	662	2.3	3.2	2.4
Mar	100	708	2.2	2.9	2.5
Apr	99.86	684	2.2	2.6	2.3
May	99.73	706	2.1	3.6	2.3
Jun	99.86	683	2.1	2.6	2.2
Jul	99.33	704	2.1	2.6	2.2
Aug	99.73	706	2.1	3.0	2.3
Sep	100	683	2.1	2.5	2.3
Oct	100	707	2.2	2.9	2.3
Nov	100	685	2.2	2.9	2.5
Dec	100	708	2.3	4.0	2.6
Annual	99.87	8215	2.2	4.0	2.8



Wood Buffalo Environmental Association - Conklin Community (AMS 21)
Annual Summary for the Year 2016
Total Hydrocarbons (ppm) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value
Apr	100	686	1.9	2.2	2.0
May	99.06	702	1.9	2.3	2.0
Jun	99.03	677	1.9	2.6	2.0
Jul	99.46	703	2.0	3.0	2.1
Aug	99.73	707	2.1	4.0	2.3
Sep	99.72	680	2.0	3.1	2.2
Oct	99.87	707	1.9	2.4	2.1
Nov	99.58	682	2.0	2.2	2.1
Dec	100	709	2.0	2.3	2.1
Annual	99.61	6253	2.0	4.0	2.3



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
ANNUAL REPORT

NON-METHANE HYDROCARBON ANNUAL 2016

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

March 2017



Wood Buffalo Environmental Association - Fort McKay - Bertha Ganter (AMS 1)
Annual Summary for the Year 2016
Non-Methane Hydrocarbons (ppm) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value
Jan	100	709	0.0715	0.5287	0.2333
Feb	96.12	637	0.0652	0.5693	0.2226
Mar	99.06	702	0.0230	0.4448	0.1009
Apr	99.72	684	0.0241	0.4609	0.1000
May	99.33	705	0.0563	1.7438	0.7376
Jun	96.94	663	0.0740	3.0128	0.5089
Jul	99.6	706	0.0672	0.7363	0.1966
Aug	99.46	705	0.0742	1.2146	0.2090
Sep	99.58	679	0.0238	0.5117	0.0871
Oct	100	709	0.0283	0.6253	0.2656
Nov	99.58	682	0.0484	0.7117	0.2711
Dec	98.92	700	0.0536	0.5343	0.1720
Annual	99.04	8281	0.0507	3.0128	0.7376



Wood Buffalo Environmental Association - Patricia McInnes (AMS 6)
Annual Summary for the Year 2016
Non-Methane Hydrocarbons (ppm) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value
Jan	99.73	706	0.0057	0.3073	0.1023
Feb	100	664	0.0016	0.2245	0.0172
Mar	99.6	706	0.0003	0.0355	0.0029
Apr	100	687	0.0011	0.3171	0.0138
May	100	706	0.1390	3.8281	0.9230
Jun	95.69	656	0.0066	0.5893	0.1034
Jul	99.87	708	0.0013	0.1405	0.0112
Aug	99.6	703	0.0007	0.1259	0.0088
Sep	99.86	683	0.0004	0.1093	0.0070
Oct	95.56	678	0.0011	0.3126	0.0155
Nov	100	686	0.0007	0.0492	0.0043
Dec	99.73	708	0.0042	0.2252	0.0557
Annual	99.13	8291	0.0138	3.8281	0.9230



Wood Buffalo Environmental Association - Athabasca Valley (AMS 7)
Annual Summary for the Year 2016
Non-Methane Hydrocarbons (ppm) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value
Jan	99.87	706	0.0124	0.4143	0.1536
Feb	99.57	658	0.0153	0.4950	0.0984
Mar	98.25	695	0.0162	0.3014	0.1060
Apr	99.17	679	0.0051	0.2151	0.0422
May	99.87	711	0.2380	3.0156	0.9915
Jun	99.86	684	0.0131	0.4646	0.1085
Jul	97.45	684	0.0221	0.4130	0.0719
Aug	99.87	707	0.0153	0.4783	0.0815
Sep	100	681	0.0073	0.5140	0.0503
Oct	87.23	612	0.0070	0.3331	0.0162
Nov	99.86	679	0.0056	0.5162	0.0339
Dec	99.46	704	0.0421	0.6103	0.2443
Annual	98.35	8200	0.0342	3.0156	0.9915



Wood Buffalo Environmental Association - Anzac (AMS 14)
Annual Summary for the Year 2016
Non-Methane Hydrocarbons (ppm) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value
Jan	96.51	676	0.0046	0.2308	0.0663
Feb	99.86	660	0.0081	0.1986	0.0452
Mar	99.19	701	0.0033	0.1508	0.0147
Apr	95.83	651	0.0001	0.0138	0.0006
May	72.45	513	0.1048	17.0850	0.9436
Jun	93.47	638	0.0116	0.5511	0.0458
Jul	99.33	703	0.0037	0.1268	0.0136
Aug	99.6	703	0.0138	0.2550	0.0667
Sep	95.97	657	0.0018	0.1730	0.0083
Oct	93.82	661	0.0079	0.3558	0.0963
Nov	98.19	672	0.0064	0.1410	0.0416
Dec	93.55	664	0.0062	0.2735	0.0685
Annual	94.77	7899	0.0125	17.0850	0.9436



Wood Buffalo Environmental Association - Stony Mountain (AMS 18)
Annual Summary for the Year 2016
Non-Methane Hydrocarbons (ppm) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value
Jan	100	709	0.0132	0.1026	0.0817
Feb	100	662	0.0032	0.0728	0.0475
Mar	100	708	0.0017	0.0608	0.0087
Apr	98.47	670	0.0012	0.0468	0.0114
May	99.73	707	0.0424	0.4257	0.1879
Jun	99.31	679	0.0534	0.1615	0.1119
Jul	99.73	706	0.0954	0.1875	0.1341
Aug	99.73	706	0.0672	0.1764	0.1060
Sep	91.94	625	0.0142	0.1532	0.0992
Oct	100	707	0.0061	0.0951	0.0422
Nov	99.31	681	0.0054	0.1038	0.0286
Dec	99.73	705	0.0041	0.0956	0.0456
Annual	99.01	8265	0.0259	0.4257	0.1879



Wood Buffalo Environmental Association - Conklin Community (AMS 21)
Annual Summary for the Year 2016
Non-Methane Hydrocarbons (ppm) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value
Apr	100	686	0.0010	0.3018	0.0165
May	99.06	702	0.0016	0.2254	0.0346
Jun	99.03	677	0.0022	0.0988	0.0144
Jul	99.46	703	0.0028	0.1300	0.0165
Aug	99.73	707	0.0031	0.2913	0.0186
Sep	99.72	680	0.0005	0.1279	0.0056
Oct	99.87	707	0.0011	0.2916	0.0190
Nov	99.58	682	0.0002	0.0167	0.0013
Dec	100	709	0.0004	0.1633	0.0071
Annual	99.61	6253	0.0014	0.3018	0.0346



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM ANNUAL REPORT

METHANE ANNUAL 2016

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

March 2017



Wood Buffalo Environmental Association - Fort McKay - Bertha Ganter (AMS 1)
Annual Summary for the Year 2016
Methane (ppm) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value
Jan	100	709	2.11	3.06	2.49
Feb	96.12	637	2.08	3.06	2.44
Mar	99.06	702	2.00	2.66	2.13
Apr	99.72	684	1.98	2.51	2.09
May	99.33	705	1.97	3.01	2.38
Jun	96.94	663	1.97	2.54	2.06
Jul	99.6	706	2.00	2.56	2.08
Aug	99.46	705	2.06	2.65	2.18
Sep	99.58	679	2.01	2.80	2.21
Oct	100	709	2.02	2.84	2.46
Nov	99.58	682	2.11	3.30	2.64
Dec	98.92	700	2.18	3.57	2.57
Annual	99.04	8281	2.04	3.57	2.64



Wood Buffalo Environmental Association - Patricia McInnes (AMS 6)
Annual Summary for the Year 2016
Methane (ppm) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value
Jan	99.73	706	2.10	3.00	2.48
Feb	100	664	2.03	2.78	2.14
Mar	99.6	706	2.08	2.52	2.19
Apr	100	687	2.02	2.29	2.06
May	100	706	2.09	4.78	2.64
Jun	95.69	656	2.01	2.39	2.12
Jul	99.87	708	2.06	3.06	2.18
Aug	99.6	703	2.02	3.06	2.22
Sep	99.86	683	1.97	2.80	2.13
Oct	95.56	678	2.03	2.73	2.29
Nov	100	686	2.00	2.39	2.19
Dec	99.73	708	2.04	2.95	2.40
Annual	99.13	8291	2.04	4.78	2.64



Wood Buffalo Environmental Association - Athabasca Valley (AMS 7)
Annual Summary for the Year 2016
Methane (ppm) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value
Jan	99.87	706	2.02	2.68	2.33
Feb	99.57	658	1.97	2.52	2.16
Mar	98.25	695	1.95	2.37	2.03
Apr	99.17	679	1.89	2.28	1.92
May	99.87	711	2.01	3.73	2.49
Jun	99.86	684	1.88	2.25	1.96
Jul	97.45	684	1.91	2.37	1.99
Aug	99.87	707	1.94	2.99	2.07
Sep	100	681	1.93	3.05	2.03
Oct	87.23	612	1.94	2.27	2.05
Nov	99.86	679	2.04	2.92	2.32
Dec	99.46	704	2.11	3.07	2.47
Annual	98.35	8200	1.97	3.73	2.49



Wood Buffalo Environmental Association - Anzac (AMS 14)
Annual Summary for the Year 2016
Methane (ppm) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value
Jan	96.51	676	2.01	2.95	2.27
Feb	99.86	660	2.00	2.65	2.07
Mar	99.19	701	2.00	2.54	2.08
Apr	95.83	651	1.95	2.17	1.99
May	72.45	513	2.06	15.15	2.67
Jun	93.47	638	1.99	2.31	2.03
Jul	99.33	703	1.98	2.48	2.09
Aug	99.6	703	1.87	2.43	1.99
Sep	95.97	657	1.87	2.52	1.97
Oct	93.82	661	1.93	2.27	2.10
Nov	98.19	672	1.98	2.28	2.09
Dec	93.55	664	2.03	2.92	2.36
Annual	94.77	7899	1.97	15.15	2.67



Wood Buffalo Environmental Association - Stony Mountain (AMS 18)
Annual Summary for the Year 2016
Methane (ppm) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value
Jan	100	709	2.06	2.53	2.35
Feb	100	662	2.03	2.36	2.22
Mar	100	708	1.96	2.15	2.08
Apr	98.47	670	1.97	2.18	2.13
May	99.73	707	1.95	2.12	2.05
Jun	99.31	679	1.96	2.21	2.03
Jul	99.73	706	1.91	2.09	1.99
Aug	99.73	706	1.91	2.11	2.02
Sep	91.94	625	1.94	2.12	2.01
Oct	100	707	1.96	2.23	2.12
Nov	99.31	681	1.94	2.23	2.07
Dec	99.73	705	1.96	2.32	2.10
Annual	99.01	8265	1.96	2.53	2.35



Wood Buffalo Environmental Association - Conklin Community (AMS 21)
Annual Summary for the Year 2016
Methane (ppm) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value
Apr	100	686	1.91	2.14	1.98
May	99.06	702	1.88	2.32	1.93
Jun	99.03	677	1.90	2.57	2.04
Jul	99.46	703	1.98	2.89	2.08
Aug	99.73	707	2.10	3.94	2.33
Sep	99.72	680	1.99	3.09	2.16
Oct	99.87	707	1.94	2.38	2.09
Nov	99.58	682	1.95	2.22	2.06
Dec	100	709	1.97	2.29	2.12
Annual	99.61	6253	1.96	3.94	2.33



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
ANNUAL REPORT

CARBON MONOXIDE ANNUAL 2016

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

March 2017



Wood Buffalo Environmental Association - Athabasca Valley (AMS 7)
Annual Summary for the Year 2016
Carbon Monoxide (ppm) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value
Jan	99.87	709	0.12	0.71	0.26
Feb	99.43	660	0.12	0.61	0.26
Mar	99.33	705	0.09	0.36	0.14
Apr	99.03	682	0.07	0.25	0.10
May	99.87	713	1.56	17.00	6.43
Jun	99.72	684	0.12	0.63	0.24
Jul	96.24	685	0.11	0.38	0.19
Aug	99.87	708	0.11	0.37	0.15
Sep	99.58	680	0.09	0.53	0.13
Oct	99.6	708	0.11	0.34	0.20
Nov	99.86	686	0.16	0.66	0.27
Dec	100	710	0.16	0.93	0.38
Annual	99.36	8330	0.24	17.00	6.43



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM ANNUAL REPORT

AMMONIA ANNUAL 2016

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

March 2017



Wood Buffalo Environmental Association - Fort McKay - Bertha Ganter (AMS 1)
Annual Summary for the Year 2016
Ammonia (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values		% of Data in Each Concentration Range		
					Exceeding 1-Hour Guideline	Maximum 24-Hour Value	0 - 1000	1001 - 2000	> 2000
Jan	92.47	646	0.0	0	0	0	100	0	0
Feb	92.82	603	0.0	0	0	0	100	0	0
Mar	93.01	650	0.0	0	0	0	100	0	0
Apr	92.64	625	0.0	0	0	0	100	0	0
May	91.67	642	6.1	233	0	94	100	0	0
Jun	90.14	604	0.0	0	0	0	100	0	0
Jul	88.71	612	0.0	0	0	0	100	0	0
Aug	87.63	608	0.0	10	0	0	100	0	0
Sep	91.53	604	0.0	28	0	1	100	0	0
Oct	93.15	649	0.0	0	0	0	100	0	0
Nov	93.19	621	0.0	0	0	0	100	0	0
Dec	95.83	670	0.0	0	0	0	100	0	0
Annual	91.89	7534	0.5	233	0	94	100	0	0



Wood Buffalo Environmental Association - Patricia McInnes (AMS 6)
Annual Summary for the Year 2016
Ammonia (ppb) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Number of Values		% of Data in Each Concentration Range		
					Exceeding 1-Hour Guideline	Maximum 24-Hour Value	0 - 1000	1001 - 2000	> 2000
Jan	95.3	668	0.0	11	0	0	100	0	0
Feb	95.83	626	0.0	0	0	0	100	0	0
Mar	95.7	672	0.0	13	0	1	100	0	0
Apr	94.31	637	0.0	0	0	0	100	0	0
May	95.56	668	79.0	1588	0	458	99.4	0.6	0
Jun	92.5	622	1.2	72	0	10	100	0	0
Jul	90.46	631	0.1	19	0	2	100	0	0
Aug	91.53	636	0.3	22	0	10	100	0	0
Sep	95.14	636	0.0	0	0	0	100	0	0
Oct	95.7	667	0.0	0	0	0	100	0	0
Nov	95	645	0.0	10	0	0	100	0	0
Dec	95.43	670	0.0	0	0	0	100	0	0
Annual	94.36	7778	6.9	1588	0	458	99.95	0.05	0



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
ANNUAL REPORT

**PARTICULATE MATTER <2.5 μ M
ANNUAL 2016**

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

March 2017



Wood Buffalo Environmental Association - Fort McKay - Bertha Ganter (AMS 1)
Annual Summary for the Year 2016
Particulate Matter 2.5 ($\mu\text{g}/\text{m}^3$) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value	Number of Values Exceeding 24-Hour Guidance	% of Data in Each Concentration Range				
							0 - 5	6 - 10	11 - 20	21 - 30	>30
Jan	99.19	736	6.5	44.3	15.2	0	54.89	26.77	16.3	1.49	0.54
Feb	99.14	688	6.1	69.8	12.1	0	59.59	26.02	12.21	1.89	0.29
Mar	98.25	728	4.2	31.4	12.8	0	74.31	19.23	5.22	1.1	0.14
Apr	99.31	711	5.5	47.1	11.3	0	63.99	25.32	9.56	0.98	0.14
May	99.19	736	62.6	3151.6	1158.5	7	60.73	11.96	6.93	2.85	16.03
Jun	99.58	713	7.8	80.9	16.8	0	48.67	26.51	19.21	4.91	0.7
Jul	99.73	740	9.1	63.6	27.4	0	33.51	37.43	21.62	5.81	1.62
Aug	99.6	738	6.5	38.7	18.0	0	50.54	37.4	9.21	2.57	0.27
Sep	99.72	714	4.3	20.9	10.1	0	72.13	22.55	5.18	0.14	0
Oct	100	741	3.3	18.1	10.6	0	83.94	12.42	3.64	0	0
Nov	99.44	714	5.6	39.6	12.7	0	60.08	29.83	7.56	2.1	0.42
Dec	100	740	6.6	48.6	16.1	0	55.41	27.16	15.27	1.76	0.41
Annual	99.43	8699	10.8	3151.6	1158.5	7	59.76	25.23	11.01	2.14	1.74



Wood Buffalo Environmental Association - Patricia McInnes (AMS 6)
Annual Summary for the Year 2016
Particulate Matter 2.5 ($\mu\text{g}/\text{m}^3$) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value	Number of Values Exceeding 24-Hour Guidance	% of Data in Each Concentration Range				
							0 - 5	6 - 10	11 - 20	21 - 30	>30
Jan	100	742	5.7	81.1	15.7	0	63.07	21.56	13.48	1.62	0.27
Feb	100	694	4.6	44.4	10.4	0	76.22	15.56	7.64	0.29	0.29
Mar	98.79	732	4.3	26.3	9.8	0	74.04	18.72	6.56	0.68	0
Apr	100	718	4.2	30.5	7.5	0	77.72	19.22	2.65	0.28	0.14
May	99.73	740	162.1	5197.9	1131.0	17	32.79	9.62	11.79	7.72	34.28
Jun	98.75	704	6.5	181.7	27.6	0	66.05	23.15	6.11	1.14	3.55
Jul	100	742	7.3	55.5	22.1	0	50.4	30.05	14.69	3.1	1.75
Aug	100	743	4.8	21.0	9.4	0	69.58	23.42	6.73	0.27	0
Sep	100	716	3.1	22.7	6.7	0	85.47	11.45	2.79	0.28	0
Oct	97.72	726	3.4	29.6	15.5	0	84.71	10.61	3.72	0.96	0
Nov	99.58	715	4.6	63.7	9.7	0	72.17	19.72	7.13	0.84	0.14
Dec	98.25	731	5.0	21.2	14.7	0	65.12	24.08	10.67	0.14	0
Annual	99.4	8703	18.2	5197.9	1131.0	17	67.99	18.92	7.88	1.46	3.42



Wood Buffalo Environmental Association - Athabasca Valley (AMS 7)
Annual Summary for the Year 2016
Particulate Matter 2.5 ($\mu\text{g}/\text{m}^3$) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value	Number of Values Exceeding 24-Hour Guidance	% of Data in Each Concentration Range				
							0 - 5	6 - 10	11 - 20	21 - 30	>30
Jan	99.06	736	6.4	148.1	23.8	0	57.07	30.98	9.38	1.9	0.68
Feb	99.71	693	4.7	33.6	11.7	0	73.16	20.63	5.48	0.58	0.14
Mar	98.25	730	4.2	22.6	10.9	0	72.47	21.51	5.89	0.14	0
Apr	98.06	703	4.4	25.1	6.8	0	80.23	18.07	1.42	0.28	0
May	96.24	715	152.2	3261.4	1034.9	18	22.94	18.6	13.43	5.31	35.8
Jun	98.19	704	7.1	101.1	29.2	0	53.13	30.26	13.49	1.99	1.14
Jul	93.01	689	8.5	52.4	20.6	0	38.75	34.54	20.75	3.92	2.03
Aug	97.72	726	6.1	26.8	11.2	0	50.41	42.84	6.34	0.41	0
Sep	99.03	710	5.1	40.1	9.2	0	64.08	29.3	6.2	0.28	0.14
Oct	99.06	736	5.6	28.2	15.7	0	64.67	26.09	8.15	1.09	0
Nov	96.94	696	6.4	27.5	11.0	0	49.57	37.64	11.93	0.86	0
Dec	98.92	734	6.8	23.6	16.6	0	45.64	40.87	12.26	1.23	0
Annual	97.84	8572	18.1	3261.4	1034.9	18	56.01	29.31	9.54	1.48	3.33



Wood Buffalo Environmental Association - Fort Chipewyan (AMS 8)
Annual Summary for the Year 2016
Particulate Matter 2.5 ($\mu\text{g}/\text{m}^3$) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value	Number of Values Exceeding 24-Hour Guidance	% of Data in Each Concentration Range				
							0 - 5	6 - 10	11 - 20	21 - 30	>30
Jan	99.87	741	3.7	15.9	7.6	0	81.51	16.19	2.29	0	0
Feb	100	694	2.2	15.9	3.9	0	97.12	2.45	0.43	0	0
Mar	99.19	736	2.4	17.0	4.8	0	95.52	3.94	0.54	0	0
Apr	96.53	687	3.9	24.9	5.9	0	86.9	12.37	0.58	0.15	0
May	100	744	16.4	623.5	114.4	5	74.87	10.22	3.63	2.69	8.6
Jun	90.14	644	4.2	43.5	11.7	0	79.97	14.29	5.43	0	0.31
Jul	88.58	657	7.4	117.9	27.3	0	64.99	18.42	10.81	2.13	3.65
Aug	87.23	647	3.3	94.7	13.5	0	86.71	11.13	1.08	0.46	0.62
Sep	98.33	705	1.8	8.2	4.7	0	96.45	3.55	0	0	0
Oct	99.87	742	2.0	14.3	7.8	0	94.88	4.45	0.67	0	0
Nov	100	717	3.7	21.9	10.5	0	81.03	15.48	3.21	0.28	0
Dec	100	743	3.5	16.4	8.4	0	83.45	13.59	2.96	0	0
Annual	96.63	8457	4.6	623.5	114.4	5	85.17	10.59	2.63	0.48	1.13



Wood Buffalo Environmental Association - Fort McKay South (AMS 13)
Annual Summary for the Year 2016
Particulate Matter 2.5 ($\mu\text{g}/\text{m}^3$) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value	Number of Values Exceeding 24-Hour Guidance	% of Data in Each Concentration Range				
							0 - 5	6 - 10	11 - 20	21 - 30	>30
Jan	100	743	5.1	20.0	12.7	0	65.14	25.17	9.69	0	0
Feb	99.43	691	4.4	24.6	10.0	0	71.49	22.87	5.07	0.58	0
Mar	99.73	740	4.5	51.1	14.6	0	72.84	21.76	4.32	0.54	0.54
Apr	98.06	704	4.9	18.6	8.8	0	67.05	28.55	4.4	0	0
May	99.87	741	62.0	3866.6	1140.6	8	65.72	10.26	6.07	2.02	14.44
Jun	99.31	711	5.3	24.5	11.8	0	60.9	29.82	8.58	0.7	0
Jul	99.87	741	6.4	53.6	23.6	0	55.87	29.55	12.28	1.62	0.67
Aug	100	743	4.6	25.6	13.0	0	73.35	20.46	5.52	0.67	0
Sep	99.17	711	3.8	20.6	8.8	0	78.34	18.14	3.38	0.14	0
Oct	97.45	723	3.3	15.1	9.0	0	85.89	12.86	1.24	0	0
Nov	98.33	707	4.5	24.6	10.9	0	69.17	26.59	3.68	0.57	0
Dec	100	742	4.4	17.9	13.8	0	76.55	15.63	7.82	0	0
Annual	99.27	8697	9.5	3866.6	1140.6	8	70.1	21.83	6.02	0.58	1.34



Wood Buffalo Environmental Association - Anzac (AMS 14)
Annual Summary for the Year 2016
Particulate Matter 2.5 ($\mu\text{g}/\text{m}^3$) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value	Number of Values Exceeding 24-Hour Guidance	% of Data in Each Concentration Range				
							0 - 5	6 - 10	11 - 20	21 - 30	>30
Jan	98.66	731	4.9	44.3	18.7	0	73.73	14.23	9.44	1.64	0.96
Feb	100	694	3.5	56.4	7.8	0	84.73	9.51	5.19	0.43	0.14
Mar	99.73	737	2.9	26.8	7.5	0	90.77	7.87	1.22	0.14	0
Apr	100	719	3.2	14.7	5.3	0	90.4	9.04	0.56	0	0
May	74.33	551	60.3	3182.4	267.3	12	28.13	17.24	15.06	6.17	33.03
Jun	97.36	699	5.8	92.8	31.2	1	66.95	17.31	12.02	2.58	1.14
Jul	99.6	740	6.0	38.8	15.7	0	58.24	27.84	11.76	1.89	0.27
Aug	100	743	4.4	44.0	8.4	0	71.87	23.42	4.17	0.4	0.13
Sep	94.31	676	2.9	13.4	5.0	0	92.16	7.25	0.59	0	0
Oct	99.6	740	2.3	13.9	8.6	0	93.38	4.59	2.03	0	0
Nov	99.86	718	3.0	32.7	8.1	0	85.93	11.98	1.81	0.14	0.14
Dec	100	743	5.1	49.9	24.0	0	78.73	11.04	5.79	2.83	1.62
Annual	96.93	8491	7.7	3182.4	267.3	13	77.11	13.43	5.64	1.26	2.53



Wood Buffalo Environmental Association - CNRL Horizon (AMS 15)
Annual Summary for the Year 2016
Particulate Matter 2.5 ($\mu\text{g}/\text{m}^3$) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value	Number of Values Exceeding 24-Hour Guidance	% of Data in Each Concentration Range				
							0 - 5	6 - 10	11 - 20	21 - 30	>30
Jan	99.06	735	4.7	59.7	18.0	0	71.43	19.59	7.62	0.54	0.82
Feb	100	694	4.8	35.6	10.1	0	69.31	22.48	7.64	0.43	0.14
Mar	100	742	4.2	28.3	11.4	0	75.47	19.27	4.85	0.4	0
Apr	100	719	4.6	20.0	8.0	0	72.74	22.81	4.45	0	0
May	94.22	701	31.5	2027.8	438.7	6	62.62	12.41	8.7	3.28	12.41
Jun	68.89	492	4.8	46.7	11.7	0	73.37	20.33	5.28	0.41	0.61
Jul	0	0	--	--	--	0	--	--	--	--	--
Aug	0	0	--	--	--	0	--	--	--	--	--
Sep	24.86	178	6.2	36.2	10.0	0	58.43	27.53	9.55	3.37	1.12
Oct	99.46	736	2.7	16.3	9.4	0	89.27	8.83	1.9	0	0
Nov	97.78	702	4.5	29.5	10.7	0	69.23	23.65	6.84	0.28	0
Dec	95.56	709	5.5	22.9	15.4	0	65.3	22.99	10.44	1.27	0
Annual	73.18	6408	7.5	2027.8	438.7	6	71.79	19.32	6.44	0.83	1.57



Wood Buffalo Environmental Association - Shell Muskeg River (AMS 16)
Annual Summary for the Year 2016
Particulate Matter 2.5 ($\mu\text{g}/\text{m}^3$) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value	Number of Values Exceeding 24-Hour Guidance	% of Data in Each Concentration Range				
							0 - 5	6 - 10	11 - 20	21 - 30	>30
Jan	100	742	9.2	150.7	34.6	1	47.04	21.83	24.8	3.23	3.1
Feb	100	695	5.2	35.4	15.9	0	66.76	23.31	8.06	1.58	0.29
Mar	99.87	741	5.1	34.5	18.3	0	69.91	19.7	8.77	1.21	0.4
Apr	100	717	6.1	44.1	16.3	0	57.18	32.64	7.53	1.81	0.84
May	100	741	82.9	6070.2	1444.5	8	46.34	18.97	11.11	4.07	18.16
Jun	100	716	7.8	71.4	16.9	0	43.72	34.36	17.46	3.49	0.98
Jul	97.04	721	8.9	61.7	27.7	0	37.73	33.7	21.5	5.41	1.66
Aug	100	742	7.8	154.0	35.8	1	52.02	30.19	13.21	2.83	1.75
Sep	100	716	5.0	32.8	12.0	0	67.32	25.14	6.42	0.98	0.14
Oct	100	742	3.5	19.5	10.1	0	86.39	9.84	3.77	0	0
Nov	100	718	5.1	25.3	13.0	0	65.6	25.21	8.36	0.84	0
Dec	99.73	741	6.2	31.0	12.7	0	50.47	37.92	11.34	0.13	0.13
Annual	99.72	8732	12.9	6070.2	1444.5	10	57.54	26.02	11.88	2.13	2.32



Wood Buffalo Environmental Association - Wapasu (AMS 17)
Annual Summary for the Year 2016
Particulate Matter 2.5 ($\mu\text{g}/\text{m}^3$) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value	Number of Values Exceeding 24-Hour Guidance	% of Data in Each Concentration Range				
							0 - 5	6 - 10	11 - 20	21 - 30	>30
Jan	99.6	739	4.1	18.4	10.2	0	76.32	14.34	9.34	0	0
Feb	100	694	2.9	21.2	6.4	0	89.19	8.36	2.31	0.14	0
Mar	99.33	737	2.6	12.9	6.1	0	91.04	8.41	0.54	0	0
Apr	100	719	3.3	19.7	6.9	0	90.54	8.48	0.97	0	0
May	100	742	50.6	1238.2	350.3	9	61.99	11.05	4.85	2.43	19.41
Jun	96.53	692	4.8	70.6	13.1	0	74.42	19.94	4.91	0.29	0.43
Jul	99.46	738	6.7	45.8	17.2	0	54.61	28.18	13.69	2.98	0.54
Aug	92.74	683	4.2	19.2	9.2	0	71.74	21.67	6.59	0	0
Sep	93.33	670	3.5	20.8	6.8	0	81.34	15.67	2.84	0.15	0
Oct	97.18	721	2.3	27.6	7.4	0	90.43	8.04	1.39	0.14	0
Nov	98.61	708	4.0	25.5	10.0	0	78.25	16.53	4.66	0.56	0
Dec	98.92	733	4.2	19.6	11.1	0	76.26	17.05	6.68	0	0
Annual	97.97	8576	7.9	1238.2	350.3	9	77.89	14.81	4.93	0.57	1.77



Wood Buffalo Environmental Association - Stony Mountain (AMS 18)
Annual Summary for the Year 2016
Particulate Matter 2.5 ($\mu\text{g}/\text{m}^3$) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value	Number of Values Exceeding 24-Hour Guidance	% of Data in Each Concentration Range				
							0 - 5	6 - 10	11 - 20	21 - 30	>30
Jan	100	742	4.2	23.2	9.3	0	72.24	19.81	7.82	0.13	0
Feb	100	695	2.9	20.4	9.1	0	88.78	8.49	2.73	0	0
Mar	93.01	690	2.5	13.5	6.4	0	90.14	8.12	1.74	0	0
Apr	99.86	718	2.9	46.1	7.6	0	89.83	9.33	0.7	0	0.14
May	100	742	21.8	389.4	152.6	8	54.99	15.9	8.89	4.58	15.63
Jun	99.44	713	4.6	36.3	15.6	0	78.12	17.53	2.38	1.26	0.7
Jul	99.6	740	5.4	38.0	12.6	0	60	32.7	5.95	1.08	0.27
Aug	98.92	734	3.6	14.5	5.8	0	87.6	11.44	0.95	0	0
Sep	100	719	2.7	16.0	5.7	0	94.85	4.45	0.7	0	0
Oct	98.52	732	2.3	13.4	7.1	0	92.76	6.69	0.55	0	0
Nov	95.97	690	3.2	16.9	7.3	0	85.94	11.01	3.04	0	0
Dec	98.66	732	4.5	29.6	16.5	0	78.96	12.02	6.83	2.19	0
Annual	98.66	8647	5.1	389.4	152.6	8	80.55	13.52	3.65	0.81	1.47



Wood Buffalo Environmental Association - Conklin Community (AMS 21)
Annual Summary for the Year 2016
Particulate Matter 2.5 ($\mu\text{g}/\text{m}^3$) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value	Number of Values Exceeding 24-Hour Guidance	% of Data in Each Concentration Range				
							0 - 5	6 - 10	11 - 20	21 - 30	>30
Apr	100	718	3.8	57.0	7.7	0	87.05	10.17	2.23	0.28	0.28
May	80.38	597	23.9	353.7	137.0	7	43.38	18.59	14.41	5.19	18.43
Jun	93.47	668	6.3	221.6	74.3	1	81.89	10.78	2.69	2.4	2.25
Jul	100	743	4.2	44.3	9.1	0	79	16.15	3.63	0.94	0.27
Aug	99.73	740	2.6	39.7	6.3	0	94.19	4.59	0.81	0.14	0.27
Sep	100	719	2.3	37.1	7.0	0	93.88	4.03	1.11	0.7	0.28
Oct	98.25	726	2.3	72.4	7.6	0	92.01	5.51	1.93	0.41	0.14
Nov	98.61	707	3.5	37.9	6.5	0	83.88	12.02	3.96	0	0.14
Dec	96.64	715	4.6	59.8	16.3	0	77.34	12.59	6.71	3.08	0.28
Annual	96.34	6333	5.6	353.7	137.0	8	82.21	10.37	3.89	1.36	2.17



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
ANNUAL REPORT

AMBIENT TEMPERATURE ANNUAL 2016

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

March 2017



Wood Buffalo Environmental Association - Fort McKay - Bertha Ganter (AMS 1)
Annual Summary for the Year 2016
Ambient Temperature 10m (°C) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	-34.2	6.9	-30.3	3.3	-13.0
February	100	696	-34.9	10.1	-21.7	2.6	-11.3
March	100	744	-18.5	13.3	-8.8	6.1	-3.6
April	100	720	-13.6	28.0	-7.3	16.8	4.0
May	100	744	-0.1	33.0	5.5	23.3	13.4
June	100	720	5.3	29.3	13.0	22.3	17.4
July	99.73	742	4.6	30.0	14.3	22.8	19.0
August	99.6	741	5.2	28.9	10.7	21.5	17.2
September	99.72	718	1.0	24.2	7.5	15.4	11.5
October	100	744	-3.9	9.8	-2.1	4.8	1.1
November	100	720	-11.8	12.4	-10.6	6.8	-1.1
December	100	744	-37.3	0.7	-33.4	-1.3	-17.5
Annual	99.92	8777	-37.3	33.0	-33.4	23.3	3.1



Wood Buffalo Environmental Association - Fort McKay - Bertha Ganter (AMS 1)
Annual Summary for the Year 2016
Ambient Temperature 2m (°C) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	-35.7	6.9	-31.4	2.1	-13.5
February	100	696	-36.6	10.4	-22.3	1.4	-11.8
March	100	744	-21.4	14.1	-10.5	5.1	-4.0
April	100	720	-15.8	28.4	-7.4	16.3	3.7
May	100	744	-2.7	33.8	5.5	22.2	13.1
June	100	720	3.5	30.2	12.4	21.5	17.1
July	99.73	742	3.1	31.1	14.4	22.3	18.8
August	99.6	741	3.7	30.2	10.2	21.2	16.8
September	99.72	718	-0.2	25.0	7.0	14.7	11.1
October	100	744	-4.6	10.6	-2.2	4.8	1.0
November	100	720	-11.9	12.3	-10.6	6.2	-1.7
December	100	744	-38.3	0.5	-34.0	-1.5	-18.1
Annual	99.92	8777	-38.3	33.8	-34.0	22.3	2.7



Wood Buffalo Environmental Association - Mildred Lake (AMS 2)
Annual Summary for the Year 2016
Ambient Temperature (°C) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	-32.2	5.7	-29.2	3.1	-12.9
February	100	696	-31.8	8.6	-21.2	2.3	-10.9
March	100	744	-15.8	12.9	-9.1	5.4	-3.6
April	100	720	-12.3	27.0	-7.1	16.5	3.9
May	100	744	-0.5	33.4	5.5	23.3	13.4
June	100	720	5.5	29.9	12.1	22.7	17.7
July	100	744	6.1	30.8	14.2	23.6	19.1
August	99.73	742	4.8	29.3	10.3	21.9	17.2
September	100	720	3.5	24.1	7.1	15.5	11.7
October	100	744	-4.2	9.6	-2.7	4.7	0.9
November	100	720	-11.9	11.2	-10.2	6.8	-0.9
December	100	744	-35.1	2.4	-32.1	-1.6	-17.1
Annual	99.98	8782	-35.1	33.4	-32.1	23.6	3.2



Wood Buffalo Environmental Association - Lower Camp Met Tower (AMS 3)
Annual Summary for the Year 2016
Ambient Temperature 20m (°C) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	-33.0	6.7	-29.9	3.6	-13.0
February	100	696	-34.2	7.9	-21.0	1.9	-10.9
March	100	744	-18.9	14.1	-9.0	6.0	-3.3
April	100	720	-12.1	27.2	-6.3	16.8	4.3
May	100	744	0.5	32.6	6.3	23.7	13.8
June	100	720	6.2	29.4	12.6	23.2	18.0
July	100	744	8.4	30.1	14.6	23.9	19.4
August	100	744	5.5	28.8	10.7	22.0	17.5
September	99.86	719	2.9	24.1	7.2	16.0	12.1
October	100	744	-3.4	10.2	-2.0	5.2	1.5
November	100	720	-11.5	12.1	-9.9	7.3	-0.7
December	100	744	-35.8	1.6	-32.9	-0.9	-17.5
Annual	99.99	8783	-35.8	32.6	-32.9	23.9	3.4



Wood Buffalo Environmental Association - Lower Camp Met Tower (AMS 3)
Annual Summary for the Year 2016
Ambient Temperature 45m (°C) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	-32.0	6.4	-29.3	3.7	-12.8
February	100	696	-32.4	7.7	-21.0	2.3	-10.8
March	100	744	-18.5	13.4	-8.9	6.2	-3.3
April	99.72	718	-11.6	27.3	-6.6	17.1	4.3
May	100	744	0.9	32.3	6.2	23.8	13.7
June	100	720	6.5	29.4	12.8	23.1	17.9
July	100	744	8.6	29.6	14.5	23.8	19.3
August	28.09	209	11.8	25.3	17.3	19.9	18.8
September	31.67	228	3.0	24.1	7.2	14.4	11.9
October	100	744	-3.5	10.0	-2.1	5.2	1.4
November	100	720	-11.5	12.3	-10.0	7.6	-0.6
December	100	744	-35.5	2.1	-32.9	-0.9	-17.2
Annual	88.29	7755	-35.5	32.3	-32.9	23.8	2.0



Wood Buffalo Environmental Association - Lower Camp Met Tower (AMS 3)
Annual Summary for the Year 2016
Ambient Temperature 100m (°C) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	-31.1	6.1	-27.8	3.9	-12.2
February	100	696	-29.0	9.3	-21.3	3.2	-10.4
March	100	744	-15.9	12.7	-9.2	6.7	-3.3
April	100	720	-10.6	26.8	-7.3	18.0	4.1
May	100	744	0.8	31.7	5.6	23.8	13.6
June	100	720	8.5	28.9	12.5	23.1	17.8
July	100	744	8.2	28.7	13.9	23.7	19.0
August	100	744	6.6	27.6	10.4	22.1	17.5
September	99.86	719	3.7	23.6	7.1	16.9	12.1
October	100	744	-4.1	9.5	-2.7	4.8	1.0
November	100	720	-11.9	12.9	-10.4	9.0	-0.2
December	100	744	-35.2	3.1	-31.8	-0.9	-16.5
Annual	99.99	8783	-35.2	31.7	-31.8	23.8	3.6



Wood Buffalo Environmental Association - Lower Camp Met Tower (AMS 3)
Annual Summary for the Year 2016
Ambient Temperature 167m (°C) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	-28.8	6.0	-26.0	3.7	-11.8
February	100	696	-26.6	9.1	-21.5	3.3	-10.3
March	100	744	-14.3	13.1	-9.4	7.0	-3.4
April	100	720	-10.6	26.1	-7.4	18.5	4.0
May	100	744	1.3	31.1	4.9	23.5	13.4
June	100	720	8.2	28.2	12.3	23.0	17.7
July	100	744	7.9	28.0	13.6	23.3	18.8
August	100	744	6.6	27.0	9.9	21.9	17.4
September	99.86	719	3.6	23.0	6.7	17.1	11.9
October	100	744	-4.7	9.0	-3.2	4.2	0.6
November	100	720	-12.3	13.3	-10.9	9.6	-0.2
December	100	744	-32.7	2.8	-30.1	-1.2	-16.3
Annual	99.99	8783	-32.7	31.1	-30.1	23.5	3.5



Wood Buffalo Environmental Association - Buffalo Viewpoint (AMS 4)
Annual Summary for the Year 2016
Ambient Temperature (°C) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	-35.0	5.8	-31.2	3.0	-13.1
February	100	696	-35.2	8.8	-21.6	2.7	-10.8
March	100	744	-17.2	14.0	-9.0	6.3	-3.7
April	100	720	-14.2	27.7	-6.5	17.1	4.0
May	100	744	-0.9	32.8	5.5	23.3	13.5
June	100	720	6.4	30.3	12.1	23.0	17.7
July	100	744	5.6	30.3	14.5	22.9	19.1
August	100	744	5.6	29.0	10.4	21.2	17.3
September	100	720	1.6	24.3	6.9	15.0	11.4
October	100	744	-5.5	11.2	-2.9	4.5	0.8
November	100	720	-11.6	12.3	-10.4	6.5	-1.0
December	100	744	-38.8	2.7	-34.1	-1.7	-17.3
Annual	100	8784	-38.8	32.8	-34.1	23.3	3.2



Wood Buffalo Environmental Association - Mannix (AMS 5)
Annual Summary for the Year 2016
Ambient Temperature 2m (°C) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	-32.5	5.2	-29.6	2.4	-13.0
February	100	696	-30.0	8.0	-21.0	2.1	-10.6
March	100	744	-15.4	12.6	-8.6	5.5	-3.3
April	100	720	-10.7	28.5	-6.2	17.6	4.3
May	100	744	-0.2	34.1	5.9	23.4	13.5
June	100	720	6.2	29.4	12.4	22.6	17.6
July	100	744	5.2	30.3	14.1	22.7	18.8
August	99.6	741	5.8	28.2	10.3	20.6	17.1
September	99.58	717	1.4	23.6	7.2	15.3	11.3
October	100	744	-5.4	9.5	-2.4	4.7	0.9
November	100	720	-11.3	11.2	-10.4	6.1	-1.2
December	100	744	-36.1	2.2	-32.9	-2.0	-17.2
Annual	99.93	8778	-36.1	34.1	-32.9	23.4	3.2



Wood Buffalo Environmental Association - Mannix (AMS 5)
Annual Summary for the Year 2016
Ambient Temperature 20m (°C) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	-32.0	5.9	-28.2	3.1	-12.5
February	100	696	-29.0	8.8	-21.1	3.0	-10.3
March	100	744	-14.9	12.7	-9.0	6.5	-3.3
April	100	720	-10.1	26.8	-6.8	17.6	4.2
May	100	744	1.5	31.9	5.7	23.5	13.5
June	100	720	8.0	28.7	12.6	22.9	17.8
July	100	744	6.6	29.1	14.0	23.4	19.0
August	99.6	741	6.2	27.8	10.4	21.5	17.4
September	99.58	717	3.3	23.5	7.3	16.1	11.7
October	100	744	-4.7	9.1	-2.6	4.5	0.9
November	100	720	-11.6	11.7	-10.7	7.7	-0.7
December	92.2	686	-30.7	2.8	-27.8	-1.7	-15.6
Annual	99.27	8720	-32.0	31.9	-28.2	23.5	3.7



Wood Buffalo Environmental Association - Mannix (AMS 5)
Annual Summary for the Year 2016
Ambient Temperature 45m (°C) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	-30.7	6.0	-26.9	3.3	-12.2
February	100	696	-28.1	9.0	-21.2	3.2	-10.2
March	100	744	-15.2	12.3	-9.2	6.8	-3.4
April	100	720	-10.5	26.3	-7.1	17.8	4.1
May	100	744	1.3	31.4	5.4	23.4	13.4
June	100	720	7.8	28.5	12.4	22.9	17.7
July	100	744	6.6	28.6	13.8	23.2	18.8
August	99.6	741	6.4	27.4	10.2	21.7	17.4
September	99.58	717	3.8	23.1	7.0	16.4	11.7
October	100	744	-4.7	8.7	-2.9	4.4	0.7
November	100	720	-11.9	12.1	-10.9	8.5	-0.5
December	100	744	-35.1	2.7	-31.5	-1.7	-16.6
Annual	99.93	8778	-35.1	31.4	-31.5	23.4	3.4



Wood Buffalo Environmental Association - Mannix (AMS 5)
Annual Summary for the Year 2016
Ambient Temperature 75m (°C) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	-29.6	6.0	-26.1	3.2	-11.8
February	100	696	-26.9	8.8	-21.4	3.2	-10.2
March	100	744	-15.1	12.0	-9.3	6.9	-3.5
April	100	720	-10.8	26.0	-7.3	18.2	4.0
May	100	744	1.3	31.0	5.1	23.3	13.3
June	100	720	7.6	28.2	12.2	22.7	17.6
July	100	744	6.8	28.2	13.5	23.1	18.7
August	99.6	741	6.5	27.0	10.0	21.7	17.3
September	99.58	717	3.5	22.9	6.7	16.9	11.7
October	100	744	-4.8	8.4	-3.2	4.4	0.5
November	100	720	-12.3	12.8	-11.2	9.2	-0.4
December	100	744	-33.8	2.6	-30.2	-1.3	-16.4
Annual	99.93	8778	-33.8	31.0	-30.2	23.3	3.4



Wood Buffalo Environmental Association - Mannix (AMS 5)
Annual Summary for the Year 2016
Ambient Temperature 90m (°C) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	-29.1	5.9	-25.8	3.2	-11.7
February	100	696	-26.5	8.7	-21.4	3.1	-10.1
March	100	744	-14.3	11.9	-9.3	6.9	-3.5
April	100	720	-11.0	25.8	-7.4	18.4	3.9
May	100	744	1.4	30.9	4.9	23.3	13.3
June	100	720	7.6	28.0	12.1	22.7	17.5
July	100	744	6.9	28.0	13.4	23.1	18.6
August	99.6	741	6.5	26.9	9.9	21.7	17.2
September	99.58	717	3.4	22.8	6.6	17.0	11.6
October	100	744	-4.8	8.3	-3.3	4.4	0.4
November	100	720	-12.3	13.5	-11.3	9.4	-0.4
December	100	744	-33.1	2.5	-29.8	-1.3	-16.3
Annual	99.93	8778	-33.1	30.9	-29.8	23.3	3.4



Wood Buffalo Environmental Association - Patricia McInnes (AMS 6)
Annual Summary for the Year 2016
Ambient Temperature (°C) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	-34.2	6.3	-30.5	3.3	-12.7
February	100	696	-33.2	9.5	-20.4	2.9	-10.0
March	100	744	-15.6	13.0	-8.6	6.5	-3.2
April	100	720	-12.3	26.9	-6.0	16.7	4.3
May	100	744	-1.1	31.7	6.0	23.4	13.3
June	100	720	5.1	29.5	12.4	23.1	17.6
July	100	744	6.5	29.8	14.3	23.0	18.7
August	100	744	4.9	28.1	10.0	20.9	17.1
September	100	720	1.5	23.7	6.9	15.5	11.3
October	100	744	-7.8	10.0	-3.4	4.8	0.7
November	100	720	-13.9	12.9	-11.4	6.4	-1.0
December	100	744	-36.5	3.3	-32.9	-1.7	-16.8
Annual	100	8784	-36.5	31.7	-32.9	23.4	3.3



Wood Buffalo Environmental Association - Athabasca Valley (AMS 7)
Annual Summary for the Year 2016
Ambient Temperature (°C) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	-33.9	6.7	-30.9	3.7	-13.4
February	100	696	-31.3	9.7	-20.2	1.1	-10.6
March	100	744	-18.0	13.5	-8.9	4.8	-3.0
April	100	720	-10.0	27.8	-5.1	16.7	4.7
May	100	744	0.8	31.2	7.3	23.1	14.0
June	100	720	7.1	30.5	13.5	23.8	18.4
July	99.6	741	5.7	30.5	15.2	24.1	19.5
August	100	744	6.9	28.7	11.3	21.6	17.9
September	100	720	2.3	24.9	7.4	15.6	12.0
October	100	744	-5.8	10.6	-2.2	6.0	1.6
November	100	720	-12.0	12.1	-10.2	5.5	-1.1
December	100	744	-36.9	4.0	-33.7	-2.0	-17.6
Annual	99.97	8781	-36.9	31.2	-33.7	24.1	3.6



Wood Buffalo Environmental Association - Fort Chipewyan (AMS 8)
Annual Summary for the Year 2016
Ambient Temperature 2m (°C) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	-32.1	0.1	-28.8	-2.4	-14.7
February	100	696	-31.6	2.6	-26.5	-3.5	-17.1
March	100	744	-23.9	9.5	-18.0	3.7	-8.5
April	100	720	-17.6	19.1	-15.5	12.4	-1.8
May	100	744	0.8	26.8	4.2	18.7	10.3
June	100	720	5.1	30.8	10.8	24.0	16.8
July	99.73	742	7.5	28.8	13.2	23.8	18.5
August	100	744	5.2	27.5	9.3	21.8	16.8
September	100	720	0.8	20.8	5.8	15.0	10.8
October	99.87	743	-7.6	8.0	-2.9	3.7	0.7
November	100	720	-15.1	12.2	-13.4	6.3	-2.3
December	100	744	-33.6	-0.9	-30.4	-2.0	-19.5
Annual	99.97	8781	-33.6	30.8	-30.4	24.0	0.9



Wood Buffalo Environmental Association - Barge Landing (AMS 9)
Annual Summary for the Year 2016
Ambient Temperature (°C) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	-34.0	6.3	-30.2	2.7	-13.2
February	100	696	-34.8	9.5	-21.8	2.3	-11.5
March	100	744	-19.0	13.0	-9.8	5.8	-3.9
April	100	720	-13.8	28.7	-7.4	17.3	3.9
May	100	744	-1.1	33.6	5.5	23.7	13.5
June	100	720	4.5	30.6	12.7	22.5	17.5
July	99.87	743	4.3	31.3	14.4	23.2	19.0
August	100	744	4.2	29.9	10.5	21.6	17.1
September	100	720	0.5	24.7	7.3	15.1	11.4
October	100	744	-4.0	9.5	-2.2	4.7	1.0
November	100	720	-11.9	12.1	-10.7	6.3	-1.4
December	100	744	-36.6	0.1	-33.2	-1.5	-17.9
Annual	99.99	8783	-36.6	33.6	-33.2	23.7	3.0



Wood Buffalo Environmental Association - Lower Camp (AMS 11)
Annual Summary for the Year 2016
Ambient Temperature (°C) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	-34.5	6.1	-30.8	3.2	-13.3
February	100	696	-34.0	8.0	-21.5	1.4	-11.4
March	100	744	-21.2	13.4	-10.7	4.8	-3.6
April	100	720	-12.1	29.2	-6.3	16.7	4.1
May	100	744	-0.2	33.9	6.5	23.0	13.7
June	100	720	5.7	30.5	13.2	22.9	17.9
July	99.73	742	7.2	31.2	14.8	24.0	19.4
August	100	744	5.3	29.6	11.0	22.1	17.4
September	100	720	2.7	24.9	7.2	15.5	12.0
October	100	744	-3.2	9.9	-1.8	5.3	1.5
November	100	720	-10.9	11.9	-9.6	6.4	-1.0
December	100	744	-36.9	1.1	-33.2	-1.1	-18.0
Annual	99.98	8782	-36.9	33.9	-33.2	24.0	3.2



Wood Buffalo Environmental Association - Fort McKay South (AMS 13)
Annual Summary for the Year 2016
Ambient Temperature (°C) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	-36.7	6.6	-32.8	1.9	-14.4
February	100	696	-37.0	9.9	-22.5	0.3	-12.2
March	100	744	-23.4	14.0	-12.1	5.2	-4.3
April	100	720	-17.2	29.1	-7.6	15.2	3.1
May	100	744	-4.3	34.7	5.0	21.0	12.4
June	100	720	2.3	30.9	12.7	21.5	16.9
July	99.87	743	2.1	30.5	14.2	22.2	18.5
August	100	744	2.1	29.4	10.5	20.9	16.5
September	100	720	-2.3	24.3	6.4	14.8	10.7
October	96.77	720	-5.5	10.6	-2.2	4.7	0.8
November	100	720	-14.8	11.6	-10.9	5.4	-2.2
December	100	744	-39.8	0.7	-35.1	-1.5	-18.6
Annual	99.72	8759	-39.8	34.7	-35.1	22.2	2.3



Wood Buffalo Environmental Association - Anzac (AMS 14)
Annual Summary for the Year 2016
Ambient Temperature 2m (°C) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	-32.9	6.0	-28.7	2.1	-12.2
February	100	696	-29.3	8.8	-19.6	2.8	-8.5
March	100	744	-19.5	12.2	-8.9	5.0	-3.1
April	100	720	-11.2	25.7	-5.4	16.7	3.9
May	75.4	561	-0.5	30.8	8.3	22.1	14.2
June	100	720	4.5	28.6	11.6	22.6	16.9
July	99.87	743	5.3	29.4	13.5	22.2	18.0
August	100	744	4.6	26.9	8.9	20.7	16.2
September	100	720	0.9	23.1	5.7	15.7	10.8
October	100	744	-9.8	10.1	-4.8	5.6	0.0
November	100	720	-13.2	16.6	-11.7	9.0	-0.7
December	100	744	-36.8	3.2	-31.3	0.0	-16.0
Annual	97.91	8600	-36.8	30.8	-31.3	22.6	3.1



Wood Buffalo Environmental Association - CNRL Horizon (AMS 15)
Annual Summary for the Year 2016
Ambient Temperature (°C) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	-34.9	5.5	-31.0	2.7	-13.4
February	100	696	-37.5	9.5	-22.5	1.9	-11.9
March	100	744	-16.8	12.1	-9.5	5.8	-4.4
April	100	720	-16.3	28.5	-8.0	16.5	3.3
May	99.87	743	-2.5	33.3	4.8	22.7	12.7
June	100	720	3.1	30.6	12.8	21.9	17.2
July	99.73	742	2.6	31.7	14.0	22.5	18.6
August	100	744	2.9	29.8	10.5	21.1	16.7
September	100	720	-1.1	24.4	7.1	14.6	10.8
October	100	744	-5.5	10.2	-2.8	4.5	0.6
November	100	720	-13.4	11.7	-11.6	5.2	-2.1
December	100	744	-38.7	-0.9	-33.9	-2.5	-18.5
Annual	99.97	8781	-38.7	33.3	-33.9	22.7	2.5



Wood Buffalo Environmental Association - Shell Muskeg River (AMS 16)
Annual Summary for the Year 2016
Ambient Temperature (°C) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	-33.9	5.8	-30.6	2.0	-13.7
February	100	696	-37.2	8.7	-22.2	0.6	-12.2
March	99.73	742	-20.9	11.5	-10.6	4.4	-4.2
April	100	720	-14.8	27.9	-7.9	16.9	3.3
May	100	744	-2.1	33.5	5.8	22.5	13.0
June	100	720	3.6	30.1	13.0	22.2	17.0
July	100	744	3.5	30.1	14.1	22.6	18.6
August	100	744	2.9	28.6	10.3	20.3	16.5
September	100	720	0.1	23.6	7.0	14.8	10.7
October	100	744	-4.8	9.4	-2.3	4.6	0.7
November	100	720	-13.6	12.1	-10.6	5.1	-2.1
December	99.73	742	-39.2	-0.6	-34.1	-1.9	-18.4
Annual	99.95	8780	-39.2	33.5	-34.1	22.6	2.5



Wood Buffalo Environmental Association - Wapasu (AMS 17)
Annual Summary for the Year 2016
Ambient Temperature (°C) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	-34.6	3.4	-30.1	0.6	-13.1
February	100	696	-31.2	7.0	-23.4	-0.3	-11.9
March	100	744	-22.0	10.6	-10.2	4.3	-4.3
April	100	720	-15.4	25.0	-8.6	17.3	2.5
May	100	744	-4.4	31.0	3.9	22.6	11.9
June	100	720	-0.6	27.9	10.9	22.4	16.0
July	99.87	743	2.0	28.2	11.8	22.0	17.2
August	100	744	0.0	26.7	7.8	19.6	15.3
September	100	720	-1.2	21.7	5.4	14.6	9.9
October	100	744	-7.1	8.0	-3.8	4.2	-0.4
November	100	720	-15.6	13.6	-13.0	8.4	-2.0
December	100	744	-36.8	-0.7	-31.8	-2.9	-17.7
Annual	99.99	8783	-36.8	31.0	-31.8	22.6	2.0



Wood Buffalo Environmental Association - Stony Mountain (AMS 18)
Annual Summary for the Year 2016
Ambient Temperature (°C) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	-28.4	4.9	-24.5	2.2	-10.6
February	100	696	-26.8	9.9	-18.5	4.6	-6.8
March	100	744	-13.1	11.2	-8.3	6.3	-2.2
April	100	720	-8.2	23.2	-4.5	17.1	4.5
May	100	744	-2.2	29.1	3.7	22.9	12.5
June	100	720	6.1	27.8	10.6	22.3	15.8
July	99.87	743	6.5	28.1	13.6	21.7	17.1
August	100	744	3.8	25.7	8.2	19.7	14.9
September	100	720	1.8	22.4	5.5	16.2	10.2
October	100	744	-6.7	11.4	-4.5	6.2	-0.3
November	100	720	-14.7	15.2	-12.3	9.4	-0.7
December	100	744	-30.6	0.9	-27.5	-2.2	-15.0
Annual	99.99	8783	-30.6	29.1	-27.5	22.9	3.3



Wood Buffalo Environmental Association - Firebag (AMS 19)
Annual Summary for the Year 2016
Ambient Temperature (°C) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	-32.6	2.6	-27.5	0.0	-13.1
February	100	696	-27.6	6.1	-23.8	0.0	-11.9
March	100	744	-16.5	9.2	-10.9	4.1	-5.0
April	100	720	-15.3	22.9	-9.0	15.7	1.7
May	100	744	-2.3	29.2	3.4	21.8	11.7
June	100	720	4.6	26.9	10.3	22.0	15.7
July	99.73	742	5.1	27.0	11.4	21.5	16.9
August	100	744	3.0	25.4	7.2	19.8	15.2
September	99.86	719	0.6	20.9	4.9	14.0	9.6
October	100	744	-7.9	7.1	-4.5	3.9	-1.0
November	99.86	719	-15.9	11.4	-13.4	7.7	-2.4
December	100	744	-35.7	-1.8	-30.6	-3.7	-18.1
Annual	99.95	8780	-35.7	29.2	-30.6	22.0	1.6



Wood Buffalo Environmental Association - Brion MacKay River (AMS 20)
Annual Summary for the Year 2016
Ambient Temperature (°C) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	419	-36.0	5.6	-31.2	2.0	-11.7
February	100	696	-32.0	9.0	-21.2	1.8	-9.6
March	100	744	-19.7	12.1	-10.3	4.7	-4.0
April	100	720	-13.7	26.3	-5.9	16.2	3.5
May	100	744	-4.8	31.1	3.9	21.1	11.6
June	99.86	719	-0.2	28.2	11.1	21.2	16.0
July	100	744	4.9	29.2	13.3	20.3	17.2
August	99.87	743	0.6	27.4	8.6	18.9	15.3
September	100	720	-2.3	22.8	5.7	14.1	9.7
October	100	744	-13.8	9.0	-6.6	3.0	-0.7
November	100	720	-18.0	12.7	-13.8	6.6	-1.9
December	100	744	-39.3	1.7	-32.7	-2.2	-17.3
Annual	99.98	8457	-39.3	31.1	-32.7	21.2	2.9



Wood Buffalo Environmental Association - Conklin Community (AMS 21)
Annual Summary for the Year 2016
Ambient Temperature (°C) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
April	100	720	-10.6	24.2	-4.5	15.6	4.2
May	100	744	-6.2	29.8	2.4	20.6	11.6
June	100	720	0.5	27.7	10.8	22.2	15.7
July	100	744	5.9	27.7	13.9	20.9	17.0
August	100	744	1.1	25.9	8.9	19.4	14.7
September	100	720	-3.1	23.4	5.6	15.0	9.7
October	100	744	-7.6	11.0	-3.9	6.0	0.0
November	100	720	-16.2	16.0	-13.0	9.1	-1.1
December	100	744	-39.0	1.2	-31.8	-2.1	-15.6
Annual	100	6600	-39.0	29.8	-31.8	22.2	6.2



Wood Buffalo Environmental Association - Cenovus Christina Lake (AMS 500)
Annual Summary for the Year 2016
Ambient Temperature (°C) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	-32.7	5.7	-25.6	2.8	-11.0
February	100	696	-31.9	9.9	-19.6	4.9	-6.5
March	100	744	-17.8	11.3	-7.6	6.1	-2.0
April	100	720	-7.5	23.6	-4.3	16.8	4.7
May	100	744	-4.5	29.5	3.7	21.7	12.5
June	100	720	3.0	27.8	11.6	22.8	16.4
July	100	744	6.4	28.2	14.3	21.8	17.8
August	100	744	2.8	25.8	9.5	19.6	15.3
September	100	720	-0.6	23.5	6.5	16.6	10.5
October	99.87	743	-6.6	11.1	-3.7	6.3	0.3
November	100	720	-14.2	17.4	-11.5	10.5	-0.1
December	100	744	-35.5	2.1	-28.8	-1.3	-14.5
Annual	99.99	8783	-35.5	29.5	-28.8	22.8	3.6



Wood Buffalo Environmental Association - Statoil Leismer (AMS 501)
Annual Summary for the Year 2016
Ambient Temperature (°C) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	-31.0	4.5	-26.5	1.3	-11.5
February	100	696	-27.1	7.7	-18.5	3.2	-7.5
March	100	744	-15.8	10.2	-8.4	4.5	-2.7
Annual	100	2184	-31.0	10.2	-26.5	4.5	-7.2



Wood Buffalo Environmental Association - ConocoPhillips Surmont (AMS 502)
Annual Summary for the Year 2016
Ambient Temperature (°C) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	-26.6	6.2	-23.4	2.8	-10.6
February	100	696	-25.2	8.0	-18.6	3.1	-7.8
March	100	744	-13.1	10.6	-8.4	6.1	-2.8
April	100	720	-9.5	24.0	-5.8	18.6	4.0
May	41.53	309	6.1	29.4	11.2	23.8	15.4
June	100	720	7.7	26.3	10.6	22.1	16.3
July	99.73	742	5.5	27.0	13.6	21.8	17.7
August	100	744	5.5	25.5	8.6	20.1	15.7
September	100	720	3.1	22.1	6.0	16.4	10.7
October	100	744	-6.9	8.8	-5.2	5.0	-0.4
November	100	720	-15.3	15.4	-13.0	10.7	-0.5
December	100	744	-29.6	1.8	-27.7	-1.4	-15.0
Annual	95.03	8347	-29.6	29.4	-27.7	23.8	3.0



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
ANNUAL REPORT

RELATIVE HUMIDITY ANNUAL 2016

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

March 2017



Wood Buffalo Environmental Association - Fort McKay - Bertha Ganter (AMS 1)
Annual Summary for the Year 2016
Relative Humidity (%) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	50.3	97.2	67.5	91.9	79.5
February	100	696	32.1	95.6	56.3	89.9	76.7
March	100	744	13.6	94.5	40.3	87.7	70.0
April	100	720	12.2	98.6	26.0	90.7	57.0
May	100	744	11.5	98.7	33.6	87.8	57.0
June	100	720	21.3	99.1	47.2	94.2	66.0
July	99.73	742	24.5	99.1	51.9	95.3	69.3
August	99.6	741	27.8	99.1	55.5	96.1	70.3
September	99.72	718	26.3	99.1	51.7	93.4	72.1
October	100	744	46.7	98.5	65.7	97.6	85.1
November	100	720	42.1	97.2	63.1	93.8	80.4
December	100	744	58.9	94.8	67.6	88.7	77.1
Annual	99.92	8777	11.5	99.1	26.0	97.6	71.7



Wood Buffalo Environmental Association - Mildred Lake (AMS 2)
Annual Summary for the Year 2016
Relative Humidity (%) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	54.1	97.6	68.9	91.9	82.4
February	100	696	39.6	97.1	55.4	94.1	79.7
March	100	744	21.2	97.8	37.4	90.3	71.6
April	100	720	13.5	99.9	24.3	93.3	57.6
May	100	744	14.0	98.5	32.5	86.1	55.1
June	100	720	17.8	100.0	37.1	96.2	60.9
July	100	744	22.7	99.9	44.4	94.7	67.6
August	99.73	742	29.2	99.6	53.1	90.1	67.7
September	100	720	28.2	99.9	51.8	91.4	69.7
October	100	744	50.8	100.0	65.9	98.6	85.7
November	100	720	45.8	98.2	60.8	97.2	78.9
December	100	744	62.9	96.6	71.7	89.8	79.7
Annual	99.98	8782	13.5	100.0	24.3	98.6	71.4



Wood Buffalo Environmental Association - Lower Camp Met Tower (AMS 3)
Annual Summary for the Year 2016
Relative Humidity 20m (%) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	48.4	94.7	68.7	89.2	80.1
February	100	696	41.1	94.9	55.0	90.6	77.1
March	100	744	18.1	96.7	41.5	87.5	69.3
April	100	720	12.6	99.1	22.6	90.5	56.2
May	100	744	13.6	98.1	31.6	83.7	55.0
June	100	720	14.8	99.4	37.2	94.0	61.1
July	100	744	22.0	99.5	43.1	92.3	67.3
August	100	744	30.1	99.3	54.5	86.6	68.5
September	99.86	719	27.2	99.4	50.8	89.9	68.9
October	100	744	49.5	99.6	65.0	96.0	82.9
November	100	720	47.0	96.1	62.3	93.0	77.5
December	100	744	60.1	95.2	69.4	86.9	78.5
Annual	99.99	8783	12.6	99.6	22.6	96.0	70.2



Wood Buffalo Environmental Association - Lower Camp Met Tower (AMS 3)
Annual Summary for the Year 2016
Relative Humidity 45m (%) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	48.0	93.6	65.5	88.9	78.8
February	100	696	38.5	94.2	52.4	90.0	75.9
March	100	744	17.6	95.9	38.8	87.1	68.3
April	99.72	718	12.2	98.2	21.8	89.3	55.0
May	100	744	13.2	97.2	30.5	83.1	53.7
June	100	720	14.1	98.6	34.6	91.1	59.2
July	100	744	21.3	98.7	41.6	90.3	66.1
August	28.09	209	34.9	97.6	58.5	76.0	66.0
September	31.67	228	26.4	91.0	49.6	67.3	56.6
October	100	744	48.9	98.7	63.5	95.5	82.0
November	100	720	45.6	95.4	60.0	92.5	75.8
December	100	744	57.9	94.5	67.4	85.5	76.9
Annual	88.29	7755	12.2	98.7	21.8	95.5	68.7



Wood Buffalo Environmental Association - Lower Camp Met Tower (AMS 3)
Annual Summary for the Year 2016
Relative Humidity 100m (%) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	46.9	94.4	61.1	89.7	79.1
February	100	696	32.0	94.1	47.8	91.6	76.8
March	100	744	16.7	96.2	32.1	89.9	68.5
April	100	720	11.8	98.3	21.1	90.5	54.1
May	100	744	13.1	97.0	27.1	85.0	51.9
June	100	720	13.7	98.7	29.5	91.3	56.1
July	100	744	20.2	98.6	39.1	88.8	64.7
August	100	744	28.8	97.9	49.2	83.1	63.7
September	99.86	719	26.8	98.8	45.7	88.2	65.3
October	100	744	47.1	98.9	63.0	97.7	82.9
November	100	720	42.2	96.0	54.1	95.3	74.3
December	100	744	55.5	96.2	67.6	87.1	76.9
Annual	99.99	8783	11.8	98.9	21.1	97.7	67.9



Wood Buffalo Environmental Association - Lower Camp Met Tower (AMS 3)
Annual Summary for the Year 2016
Relative Humidity 167m (%) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	36.8	95.9	56.5	89.2	78.6
February	100	696	31.9	95.3	46.5	91.5	77.3
March	100	744	16.2	95.8	29.7	91.3	68.9
April	100	720	11.7	97.3	20.9	91.7	53.7
May	100	744	13.5	98.4	25.9	86.5	50.9
June	100	720	14.2	98.5	26.3	88.4	54.4
July	100	744	20.5	97.2	38.3	87.7	63.6
August	100	744	28.3	97.8	45.2	82.3	62.0
September	99.86	719	27.8	98.4	44.3	87.7	64.5
October	100	744	47.3	98.6	63.1	97.9	83.3
November	100	720	41.4	95.9	50.2	95.0	73.3
December	100	744	50.9	96.8	65.4	88.4	76.9
Annual	99.99	8783	11.7	98.6	20.9	97.9	67.3



Wood Buffalo Environmental Association - Buffalo Viewpoint (AMS 4)
Annual Summary for the Year 2016
Relative Humidity (%) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	52.9	97.0	61.9	90.1	81.0
February	100	696	36.5	97.4	50.9	92.6	78.8
March	100	744	21.6	97.3	39.9	89.7	72.1
April	100	720	14.0	99.1	23.4	94.5	58.0
May	100	744	13.6	98.9	32.2	86.1	55.6
June	100	720	18.7	99.0	38.4	95.5	61.9
July	100	744	21.9	99.0	46.1	93.7	68.0
August	100	744	27.5	98.1	55.5	90.8	68.6
September	100	720	29.0	99.0	52.1	92.2	70.8
October	100	744	51.2	99.3	67.1	97.8	86.1
November	100	720	45.0	96.9	61.6	95.4	77.6
December	100	744	59.4	96.5	70.8	90.9	78.9
Annual	100	8784	13.6	99.3	23.4	97.8	71.5



Wood Buffalo Environmental Association - Mannix (AMS 5)
Annual Summary for the Year 2016
Relative Humidity 2m (%) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	55.1	95.7	71.8	89.7	80.7
February	100	696	37.8	95.3	53.5	91.8	77.8
March	100	744	23.8	96.0	39.1	88.5	69.9
April	100	720	11.7	98.1	22.1	91.6	54.8
May	100	744	12.0	97.2	30.2	83.9	53.1
June	100	720	16.6	97.8	36.3	91.7	60.2
July	100	744	22.6	97.6	45.6	94.1	68.8
August	99.6	741	31.1	96.9	57.0	87.0	68.3
September	99.58	717	27.1	98.5	50.4	90.0	70.5
October	100	744	51.4	98.3	66.8	96.3	84.6
November	100	720	43.7	95.9	62.3	94.0	78.5
December	100	744	63.0	95.3	71.6	88.5	78.6
Annual	99.93	8778	11.7	98.5	22.1	96.3	70.5



Wood Buffalo Environmental Association - Mannix (AMS 5)
Annual Summary for the Year 2016
Relative Humidity 20m (%) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	50.4	94.9	64.2	89.3	79.3
February	100	696	33.9	95.1	48.1	91.6	76.7
March	100	744	19.7	95.9	35.9	88.7	68.9
April	100	720	11.8	97.6	21.0	90.5	53.8
May	100	744	12.8	97.2	27.4	83.8	51.3
June	100	720	14.0	98.0	28.9	89.1	55.7
July	100	744	19.4	97.0	39.2	90.5	64.7
August	99.6	741	28.7	95.6	51.0	83.6	64.0
September	99.58	717	26.4	98.4	45.6	87.3	66.1
October	100	744	47.5	98.5	64.2	96.9	83.3
November	100	720	41.6	95.7	57.5	95.0	75.1
December	92.2	686	60.7	95.8	69.8	87.9	77.6
Annual	99.27	8720	11.8	98.5	21.0	96.9	68.0



Wood Buffalo Environmental Association - Mannix (AMS 5)
Annual Summary for the Year 2016
Relative Humidity 45m (%) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	44.6	96.1	59.9	89.5	78.9
February	100	696	33.2	96.1	46.5	91.7	76.8
March	100	744	17.0	96.2	34.3	89.4	69.0
April	100	720	11.7	97.9	20.5	91.1	53.7
May	100	744	12.9	98.2	26.3	85.0	51.0
June	100	720	13.8	98.4	27.7	89.4	54.8
July	100	744	19.3	98.2	38.5	90.2	64.2
August	99.6	741	28.6	95.8	49.3	83.3	63.1
September	99.58	717	26.4	98.8	44.7	87.9	65.4
October	100	744	47.5	98.8	63.7	97.6	83.5
November	100	720	41.6	95.9	53.5	95.2	74.1
December	100	744	60.0	96.5	68.7	88.7	77.2
Annual	99.93	8778	11.7	98.8	20.5	97.6	67.7



Wood Buffalo Environmental Association - Mannix (AMS 5)
Annual Summary for the Year 2016
Relative Humidity 75m (%) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	38.8	94.9	52.9	89.4	78.3
February	100	696	33.1	96.2	46.3	91.7	77.3
March	100	744	14.6	96.2	33.7	89.9	69.3
April	100	720	11.7	97.6	20.5	91.4	53.6
May	100	744	13.1	98.7	25.9	86.2	50.7
June	100	720	14.0	97.6	26.6	89.2	54.2
July	100	744	19.5	98.5	38.1	89.6	63.7
August	99.6	741	28.9	96.3	48.0	83.3	62.3
September	99.58	717	26.7	98.3	43.6	88.3	64.7
October	100	744	47.6	98.7	63.1	97.8	83.7
November	100	720	41.1	95.7	50.2	94.9	73.4
December	100	744	58.6	96.9	67.0	88.8	77.4
Annual	99.93	8778	11.7	98.7	20.5	97.8	67.4



Wood Buffalo Environmental Association - Mannix (AMS 5)
Annual Summary for the Year 2016
Relative Humidity 90m (%) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	38.3	95.1	50.7	89.4	78.4
February	100	696	33.0	96.1	46.3	91.9	77.5
March	100	744	14.7	96.3	33.6	90.0	69.5
April	100	720	11.7	97.7	20.5	91.5	53.7
May	100	744	13.2	98.9	25.4	86.8	50.6
June	100	720	14.1	97.3	25.9	89.4	54.1
July	100	744	19.6	98.7	38.0	89.6	63.6
August	99.6	741	29.2	96.6	47.8	83.4	62.3
September	99.58	717	26.9	98.4	43.3	88.7	64.6
October	100	744	47.8	98.9	62.9	98.0	83.9
November	100	720	38.3	95.7	48.7	94.9	73.2
December	100	744	57.5	97.1	66.9	88.6	77.5
Annual	99.93	8778	11.7	98.9	20.5	98.0	67.4



Wood Buffalo Environmental Association - Patricia McInnes (AMS 6)
Annual Summary for the Year 2016
Relative Humidity (%) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	45.8	93.3	64.3	87.2	78.2
February	100	696	33.6	95.4	49.4	92.1	76.3
March	100	744	26.4	96.9	41.5	87.3	70.4
April	100	720	9.5	98.1	19.5	88.0	55.5
May	100	744	14.3	96.5	28.8	83.9	52.9
June	100	720	15.1	98.3	32.0	90.5	57.4
July	100	744	18.7	97.7	41.1	89.5	66.3
August	100	744	30.5	98.0	53.6	83.9	66.5
September	100	720	29.0	98.7	51.4	89.4	68.8
October	100	744	50.1	98.8	64.8	95.4	84.9
November	100	720	41.8	96.2	61.1	92.9	77.3
December	100	744	52.4	95.5	67.1	88.1	76.3
Annual	100	8784	9.5	98.8	19.5	95.4	69.3



Wood Buffalo Environmental Association - Athabasca Valley (AMS 7)
Annual Summary for the Year 2016
Relative Humidity (%) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	48.3	94.8	67.8	88.8	79.0
February	100	696	33.7	94.8	56.3	90.4	76.9
March	100	744	26.9	96.7	51.3	87.5	70.8
April	100	720	10.6	99.2	20.3	88.7	56.0
May	100	744	14.8	95.3	32.2	82.1	53.1
June	100	720	15.8	98.7	35.1	86.5	57.9
July	99.6	741	17.5	97.3	40.4	87.6	66.4
August	100	744	32.0	95.8	55.2	82.3	67.1
September	100	720	28.2	98.9	52.7	86.8	69.1
October	100	744	48.8	98.3	63.1	93.8	82.8
November	100	720	41.4	97.5	65.2	93.7	78.6
December	100	744	55.6	95.5	67.8	85.5	76.9
Annual	99.97	8781	10.6	99.2	20.3	93.8	69.6



Wood Buffalo Environmental Association - Fort Chipewyan (AMS 8)
Annual Summary for the Year 2016
Relative Humidity (%) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	60.8	99.2	72.3	96.3	83.5
February	100	696	53.1	93.1	65.1	86.6	78.6
March	100	744	27.7	98.4	46.3	92.4	72.5
April	100	720	24.5	99.9	38.9	93.3	67.3
May	100	744	18.1	99.0	39.2	94.4	65.8
June	100	720	17.0	99.1	42.4	88.5	66.6
July	99.73	742	26.3	100.0	47.8	88.4	71.0
August	100	744	32.5	99.5	55.6	93.8	71.3
September	100	720	27.6	100.0	53.0	98.9	76.4
October	99.87	743	50.7	100.0	70.1	99.4	87.2
November	100	720	47.3	99.7	66.9	96.1	83.6
December	100	744	69.9	97.7	74.7	93.5	80.3
Annual	99.97	8781	17.0	100.0	38.9	99.4	75.3



Wood Buffalo Environmental Association - Barge Landing (AMS 9)
Annual Summary for the Year 2016
Relative Humidity (%) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	51.1	98.0	72.3	93.4	82.3
February	100	696	34.2	96.8	53.6	91.7	78.8
March	100	744	19.1	96.4	42.8	88.4	71.2
April	100	720	12.7	99.2	24.0	91.6	57.4
May	100	744	12.6	97.9	31.8	85.9	55.8
June	100	720	18.7	99.0	39.7	91.4	63.5
July	99.87	743	21.9	98.8	45.4	94.3	68.3
August	100	744	28.9	98.8	53.1	94.6	69.4
September	100	720	27.5	99.0	51.9	91.7	71.1
October	100	744	48.0	99.3	65.8	99.0	85.9
November	100	720	43.9	97.9	63.4	95.7	80.8
December	100	744	66.0	96.3	72.4	91.0	80.4
Annual	99.99	8783	12.6	99.3	24.0	99.0	72.1



Wood Buffalo Environmental Association - Lower Camp (AMS 11)
Annual Summary for the Year 2016
Relative Humidity (%) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	52.7	96.4	71.2	89.7	80.3
February	100	696	41.2	95.4	58.7	90.2	77.9
March	100	744	22.6	96.4	52.5	87.4	72.2
April	100	720	13.9	99.2	25.5	90.6	59.6
May	100	744	13.0	98.5	34.9	83.1	57.9
June	100	720	19.6	99.3	43.9	91.1	64.2
July	99.73	742	24.5	99.3	47.4	92.8	69.5
August	100	744	31.3	99.3	56.0	88.8	71.2
September	100	720	27.6	99.4	53.1	92.0	71.8
October	100	744	51.9	98.8	67.7	95.8	83.8
November	100	720	47.8	98.0	63.2	92.5	79.3
December	100	744	59.2	94.2	67.9	86.8	77.8
Annual	99.98	8782	13.0	99.4	25.5	95.8	72.1



Wood Buffalo Environmental Association - Fort McKay South (AMS 13)
Annual Summary for the Year 2016
Relative Humidity (%) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	52.4	97.9	70.3	92.9	82.1
February	100	696	33.8	96.4	63.3	91.5	79.6
March	100	744	15.6	94.8	46.1	89.2	72.5
April	100	720	12.8	98.4	29.8	92.8	60.3
May	100	744	13.3	98.1	35.4	87.4	59.1
June	100	720	17.1	98.5	45.7	90.9	64.6
July	99.87	743	20.4	98.4	49.5	93.9	68.8
August	100	744	28.7	98.7	57.2	94.2	69.7
September	100	720	27.0	98.5	53.2	92.4	72.5
October	96.77	720	48.8	98.9	67.8	97.9	85.6
November	100	720	43.7	98.2	62.4	95.1	82.0
December	100	744	65.1	96.2	70.0	90.4	79.4
Annual	99.72	8759	12.8	98.9	29.8	97.9	73.0



Wood Buffalo Environmental Association - Anzac (AMS 14)
Annual Summary for the Year 2016
Relative Humidity (%) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	36.2	97.4	56.2	90.4	79.8
February	100	696	35.4	97.6	50.2	93.9	78.8
March	100	744	28.4	97.8	50.8	90.5	74.5
April	100	720	11.9	98.7	22.6	92.9	57.1
May	75.4	561	12.7	96.0	27.6	84.8	55.5
June	100	720	15.2	98.5	31.1	91.3	59.2
July	99.87	743	20.2	97.5	42.8	91.0	68.0
August	100	744	35.0	97.5	56.4	88.8	70.8
September	100	720	28.2	98.5	51.7	95.5	71.2
October	100	744	50.3	99.4	73.0	98.7	87.6
November	100	720	29.3	97.6	50.6	94.8	76.8
December	100	744	54.0	94.6	61.9	89.4	78.6
Annual	97.91	8600	11.9	99.4	22.6	98.7	71.8



Wood Buffalo Environmental Association - CNRL Horizon (AMS 15)
Annual Summary for the Year 2016
Relative Humidity (%) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	53.6	97.8	70.8	93.7	81.3
February	100	696	33.2	96.6	54.2	92.3	78.3
March	100	744	14.6	97.2	36.9	91.0	71.1
April	100	720	13.7	98.6	27.5	88.4	57.4
May	99.87	743	13.0	98.5	34.2	88.2	56.7
June	100	720	18.5	99.3	42.4	89.8	62.5
July	99.73	742	21.8	99.0	48.4	92.3	67.6
August	100	744	27.4	99.0	50.8	95.4	67.5
September	100	720	25.7	98.7	52.2	90.7	70.7
October	100	744	48.9	99.5	65.0	98.1	86.1
November	100	720	42.0	98.2	64.7	95.9	82.1
December	100	744	56.9	95.2	67.3	91.7	78.0
Annual	99.97	8781	13.0	99.5	27.5	98.1	71.6



Wood Buffalo Environmental Association - Shell Muskeg River (AMS 16)
Annual Summary for the Year 2016
Relative Humidity (%) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	54.1	98.4	74.2	94.6	83.5
February	100	696	38.0	97.4	60.1	91.6	79.8
March	99.73	742	23.1	97.2	45.3	88.8	72.3
April	100	720	14.2	99.8	27.5	90.2	58.8
May	100	744	13.2	98.5	34.3	85.0	56.6
June	100	720	19.5	99.5	40.3	86.9	64.1
July	100	744	21.1	98.8	46.5	94.0	69.1
August	100	744	31.5	98.6	56.0	93.0	70.2
September	100	720	28.0	99.6	54.5	89.6	73.0
October	100	744	49.0	100.0	66.2	96.7	85.9
November	100	720	46.5	99.1	68.4	95.7	82.8
December	99.73	742	61.7	96.5	72.2	91.6	80.1
Annual	99.95	8780	13.2	100.0	27.5	96.7	73.0



Wood Buffalo Environmental Association - Wapasu (AMS 17)
Annual Summary for the Year 2016
Relative Humidity (%) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	54.1	98.4	74.2	94.6	83.5
February	100	696	38.0	97.4	60.1	91.6	79.8
March	99.73	742	23.1	97.2	45.3	88.8	72.3
April	100	720	14.2	99.8	27.5	90.2	58.8
May	100	744	13.2	98.5	34.3	85.0	56.6
June	100	720	19.5	99.5	40.3	86.9	64.1
July	100	744	21.1	98.8	46.5	94.0	69.1
August	100	744	31.5	98.6	56.0	93.0	70.2
September	100	720	28.0	99.6	54.5	89.6	73.0
October	100	744	49.0	100.0	66.2	96.7	85.9
November	100	720	46.5	99.1	68.4	95.7	82.8
December	99.73	742	61.7	96.5	72.2	91.6	80.1
Annual	99.95	8780	13.2	100.0	27.5	96.7	73.0



Wood Buffalo Environmental Association - Stony Mountain (AMS 18)
Annual Summary for the Year 2016
Relative Humidity (%) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	31.7	95.8	48.2	91.2	78.1
February	100	696	35.2	98.1	53.7	94.4	75.4
March	100	744	29.5	98.3	45.0	92.9	74.1
April	100	720	10.6	98.6	21.6	95.2	56.7
May	100	744	14.1	99.7	26.1	99.2	56.7
June	100	720	20.4	99.3	37.4	98.7	63.3
July	99.87	743	29.6	98.5	52.7	92.2	72.0
August	100	744	37.5	99.2	64.0	97.8	78.9
September	100	720	28.5	99.1	49.1	95.7	73.1
October	100	744	41.4	99.8	64.2	99.5	88.9
November	100	720	28.9	99.4	48.9	96.7	79.0
December	100	744	52.6	96.7	65.4	94.9	80.7
Annual	99.99	8783	10.6	99.8	21.6	99.5	73.1



Wood Buffalo Environmental Association - Firebag (AMS 19)
Annual Summary for the Year 2016
Relative Humidity (%) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	39.3	99.2	54.6	94.5	83.1
February	100	696	35.7	98.1	56.0	93.5	81.5
March	100	744	19.6	98.2	34.1	95.1	74.2
April	100	720	16.3	99.8	28.9	92.7	59.7
May	100	744	16.9	100.0	29.5	92.2	56.7
June	100	720	15.0	100.0	27.4	95.0	61.6
July	99.73	742	20.4	100.0	39.7	95.5	69.7
August	100	744	31.6	99.5	47.4	92.2	69.3
September	99.86	719	31.7	100.0	52.5	99.1	74.4
October	100	744	55.2	100.0	65.0	100.0	90.7
November	99.86	719	47.0	98.1	51.0	96.1	82.7
December	100	744	69.9	96.8	74.2	95.1	83.4
Annual	99.95	8780	15.0	100.0	27.4	100.0	73.9



Wood Buffalo Environmental Association - Cenovus Christina Lake (AMS 500)
Annual Summary for the Year 2016
Relative Humidity (%) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	35.9	92.6	53.3	89.2	77.1
February	100	696	35.3	96.6	53.4	91.8	73.6
March	100	744	31.4	98.3	49.6	91.3	73.0
April	100	720	11.7	98.4	22.5	93.8	58.0
May	100	744	14.3	97.5	29.8	96.1	57.8
June	100	720	15.9	98.0	38.3	95.8	59.9
July	100	744	27.8	97.6	53.7	85.9	68.2
August	100	744	35.2	98.1	63.8	93.0	75.8
September	100	720	29.8	98.6	54.4	91.3	72.6
October	99.87	743	43.5	98.9	71.5	97.5	87.2
November	100	720	28.4	97.4	50.3	94.2	76.8
December	100	744	49.6	95.2	60.3	90.1	76.8
Annual	99.99	8783	11.7	98.9	22.5	97.5	71.4



Wood Buffalo Environmental Association - Statoil Leismer (AMS 501)
Annual Summary for the Year 2016
Relative Humidity (%) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	40.7	96.7	55.5	92.1	80.1
February	100	696	37.5	98.3	58.5	94.8	77.5
March	100	744	33.2	98.1	51.9	93.0	75.0
Annual	25.32	2184	33.2	98.3	51.9	94.8	77.5



Wood Buffalo Environmental Association - ConocoPhillips Surmont (AMS 502)
Annual Summary for the Year 2016
Relative Humidity (%) Average

Month	Operational Time (%)	Number of Data	1-hour Min	1-hour Max	24-hour Min	24-hour Max	Average
January	100	744	19.9	94.1	33.5	90.9	77.4
February	100	696	37.5	98.2	53.3	94.8	78.5
March	100	744	33.2	98.2	45.3	92.7	75.2
April	100	720	11.6	99.8	22.2	93.1	57.2
May	41.53	309	13.7	99.9	25.0	92.0	52.9
June	100	720	18.1	99.9	29.9	97.5	60.1
July	99.73	742	26.7	98.4	46.0	90.1	67.6
August	100	744	33.3	99.3	57.1	94.7	72.3
September	100	720	29.8	99.1	46.4	93.9	70.4
October	100	744	51.6	100.0	73.3	100.0	89.3
November	100	720	28.9	98.5	40.6	97.6	77.2
December	100	744	59.7	97.2	67.7	93.8	81.3
Annual	95.03	8347	11.6	100.0	22.2	100.0	72.6



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
ANNUAL REPORT

BAROMETRIC PRESSURE ANNUAL 2016

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

March 2017



Wood Buffalo Environmental Association - Athabasca Valley (AMS 7)
Annual Summary for the Year 2016
Barometric Pressure (inHg) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value
Jan	100	744	29.0	29.5	29.5
Feb	100	696	29.0	29.6	29.5
Mar	100	744	28.9	29.4	29.4
Apr	100	720	29.0	29.4	29.3
May	100	744	28.9	29.5	29.4
Jun	100	720	28.8	29.2	29.2
Jul	99.6	741	28.9	29.2	29.2
Aug	100	744	29.0	29.4	29.3
Sep	100	720	28.9	29.3	29.3
Oct	100	744	29.0	29.4	29.4
Nov	100	720	28.9	29.5	29.5
Dec	100	744	29.0	29.9	29.9
Annual	99.97	8781	29.0	29.9	29.9



Wood Buffalo Environmental Association - Shell Muskeg River (AMS 16)
Annual Summary for the Year 2016
Barometric Pressure (inHg) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value
Jan	100	744	28.9	29.4	29.3
Feb	100	696	28.9	29.5	29.4
Mar	99.87	743	28.8	29.3	29.3
Apr	100	720	29.0	29.3	29.2
May	100	744	28.9	29.4	29.3
Jun	100	720	28.8	29.1	29.1
Jul	100	744	28.8	29.1	29.1
Aug	100	744	28.9	29.3	29.2
Sep	100	720	28.8	29.3	29.2
Oct	100	744	28.9	29.3	29.3
Nov	100	720	28.8	29.4	29.4
Dec	99.6	741	28.9	29.8	29.8
Annual	99.95	8780	28.9	29.8	29.8



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
ANNUAL REPORT

SOLAR RADIATION ANNUAL 2016

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

March 2017



Wood Buffalo Environmental Association - Fort McKay - Bertha Ganter (AMS 1)
Annual Summary for the Year 2016
Solar Radiation (W/m²) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value
Jan	100	744	15.7	236.3	43.7
Feb	100	696	48.1	454.5	116.3
Mar	100	744	101.8	631.8	199.8
Apr	100	720	173.6	776.7	266.5
May	100	744	223.3	958.4	333.7
Jun	100	720	240.9	907.7	351.1
Jul	99.73	742	226.2	876.0	341.2
Aug	99.6	741	190.4	777.4	279.9
Sep	99.72	718	122.9	640.9	195.6
Oct	100	744	43.8	466.5	126.1
Nov	100	720	23.3	299.7	53.7
Dec	100	744	17.7	206.4	34.0
Annual	99.92	8777	119.1	958.4	351.1



Wood Buffalo Environmental Association - Fort Chipewyan (AMS 8)
Annual Summary for the Year 2016
Solar Radiation (W/m²) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value
Jan	100	744	20.4	284.2	49.2
Feb	100	696	58.8	503.5	129.8
Mar	100	744	130.0	691.4	215.8
Apr	100	720	203.6	824.8	304.0
May	12.23	91	309.3	824.8	330.8
Jun	82.22	592	290.4	954.5	382.8
Jul	99.73	742	259.3	922.9	367.2
Aug	100	744	220.4	871.2	332.0
Sep	100	720	123.2	684.0	213.4
Oct	99.87	743	41.8	388.8	86.0
Nov	100	720	25.0	279.8	53.7
Dec	100	744	18.6	190.3	32.2
Annual	91.07	8000	125.9	954.5	382.8



Wood Buffalo Environmental Association - CNRL Horizon (AMS 15)
Annual Summary for the Year 2016
Solar Radiation (W/m²) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value
Jan	100	744	20.0	245.1	45.1
Feb	100	696	50.2	490.0	133.0
Mar	100	744	112.6	658.2	210.7
Apr	100	720	181.5	787.5	276.2
May	99.87	743	230.8	894.9	354.7
Jun	100	720	262.2	919.3	369.1
Jul	99.73	742	244.2	914.8	348.1
Aug	100	744	195.5	804.1	303.1
Sep	100	720	123.9	673.7	202.5
Oct	100	744	45.4	484.2	126.7
Nov	100	720	22.3	270.9	51.7
Dec	100	744	11.3	199.6	31.2
Annual	99.97	8781	125.1	919.3	369.1



Wood Buffalo Environmental Association - Stony Mountain (AMS 18)
Annual Summary for the Year 2016
Solar Radiation (W/m²) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum 1-Hour Value	Maximum 24-Hour Value
Jan	100	744	22.5	342.1	65.5
Feb	100	696	67.0	565.5	142.7
Mar	100	744	112.3	796.2	217.0
Apr	100	720	188.0	876.5	299.2
May	100	744	228.1	944.3	325.6
Jun	100	720	256.6	1020.1	364.7
Jul	99.73	742	243.5	970.6	341.8
Aug	100	744	177.6	880.8	270.0
Sep	100	720	132.2	797.0	209.3
Oct	100	744	36.7	576.5	152.4
Nov	100	720	31.3	359.9	75.3
Dec	100	744	18.0	245.3	36.9
Annual	99.98	8782	126.2	1020.1	364.7



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
ANNUAL REPORT

PRECIPITATION ANNUAL 2016

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

March 2017



Wood Buffalo Environmental Association - Fort McKay - Bertha Ganter (AMS 1)
Annual Summary for the Year 2016
Precipitation Collector (mm) Total

Month	Operational Time (%)	Number of Data	Total Value	Maximum 1-Hour Value	Maximum 24-Hour Value
Jan	100	744	15	2	4
Feb	100	696	28	2	11
Mar	100	744	24	1	9
Apr	100	720	15	1	4
May	100	744	36	6	12
Jun	100	720	96	8	31
Jul	99.6	741	48	8	19
Aug	99.6	741	45	5	29
Sep	99.72	718	47	5	35
Oct	100	744	50	3	11
Nov	99.86	719	8	1	3
Dec	100	744	17	1	6
Annual	99.9	8775	428	8	35



Wood Buffalo Environmental Association - Fort Chipewyan (AMS 8)
Annual Summary for the Year 2016
Precipitation Collector (mm) Total

Month	Operational Time (%)	Number of Data	Total Value	Maximum 1-Hour Value	Maximum 24-Hour Value
Jan	100	744	9	2	7
Feb	100	696	3	1	1
Mar	100	744	7	1	4
Apr	100	720	5	1	5
May	100	744	36	3	12
Jun	100	720	50	16	17
Jul	99.73	742	45	6	9
Aug	100	744	61	7	27
Sep	100	720	72	12	29
Oct	99.87	743	34	3	10
Nov	91.81	661	2	1	1
Dec	0	0	--	--	--
Annual	90.82	7978	324	16	29



Wood Buffalo Environmental Association - Anzac (AMS 14)
Annual Summary for the Year 2016
Precipitation Collector (mm) Total

Month	Operational Time (%)	Number of Data	Total Value	Maximum	Maximum
				1-Hour Value	24-Hour Value
Jan	99.87	743	5	2	3
Feb	100	696	3	1	1
Mar	100	744	11	1	6
Apr	100	720	4	1	2
May	75.4	561	14	6	13
Jun	100	720	81	18	44
Jul	99.87	743	75	11	24
Aug	100	744	70	24	28
Sep	100	720	50	8	32
Oct	100	744	29	3	12
Nov	100	720	2	1	2
Dec	100	744	6	1	3
Annual	97.89	8599	350	24	44



Wood Buffalo Environmental Association - CNRL Horizon (AMS 15)
Annual Summary for the Year 2016
Precipitation Collector (mm) Total

Month	Operational Time (%)	Number of Data	Total Value	Maximum	Maximum
				1-Hour Value	24-Hour Value
Jan	100	744	8	2	5
Feb	100	696	14	2	6
Mar	100	744	20	2	5
Apr	100	720	12	2	3
May	99.87	743	45	11	16
Jun	100	720	90	12	30
Jul	99.73	742	42	6	12
Aug	100	744	40	6	26
Sep	100	720	45	5	30
Oct	100	744	50	3	11
Nov	44.44	320	1	1	1
Dec	56.59	421	3	1	2
Annual	91.73	8058	370	12	30



Wood Buffalo Environmental Association - Wapasu (AMS 17)
Annual Summary for the Year 2016
Precipitation Collector (mm) Total

Month	Operational Time (%)	Number of Data	Total Value	Maximum 1-Hour Value	Maximum 24-Hour Value
Jan	100	744	18	1	5
Feb	100	696	26	1	10
Mar	100	744	35	1	9
Apr	100	720	39	2	10
May	100	744	14	4	5
Jun	99.86	719	100	7	41
Jul	98.25	731	72	10	25
Aug	100	744	42	3	17
Sep	98.61	710	96	11	51
Oct	97.31	724	55	7	12
Nov	48.75	351	4	2	2
Dec	75.94	565	12	1	6
Annual	93.26	8192	513	11	51



Wood Buffalo Environmental Association - Stony Mountain (AMS 18)
Annual Summary for the Year 2016
Precipitation Collector (mm) Total

Month	Operational Time (%)	Number of Data	Total Value	Maximum	Maximum
				1-Hour Value	24-Hour Value
Jan	100	744	16	1	6
Feb	100	696	13	1	6
Mar	100	744	36	3	12
Apr	100	720	17	2	7
May	100	744	94	5	34
Jun	99.86	719	131	8	61
Jul	43.55	324	42	15	25
Aug	86.16	641	127	19	34
Sep	100	720	51	4	17
Oct	100	744	151	15	35
Nov	100	720	6	1	3
Dec	100	744	19	1	5
Annual	94.03	8260	701	19	61



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
ANNUAL REPORT

SURFACE WETNESS ANNUAL 2016

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

March 2017



Wood Buffalo Environmental Association - Fort McKay - Bertha Ganter (AMS 1)
Annual Summary for the Year 2016
Surface Wetness (% of range) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum	Maximum
				1-Hour Value	24-Hour Value
Jan	100	744	1.4	60.5	12.7
Feb	100	696	3.1	46.8	15.1
Mar	100	744	0.2	11.6	2.5
Apr	100	720	1.0	61.4	13.3
May	100	744	1.0	42.7	10.0
Jun	100	720	4.2	50.5	26.1
Jul	99.73	742	3.3	48.8	20.1
Aug	99.6	741	3.2	46.6	26.7
Sep	99.72	718	4.0	47.1	22.7
Oct	100	744	3.6	56.9	16.4
Nov	100	720	1.2	49.5	6.5
Dec	100	744	0.9	3.3	2.1
Annual	99.92	8777	2.3	61.4	26.7



Wood Buffalo Environmental Association - Fort Chipewyan (AMS 8)
Annual Summary for the Year 2016
Surface Wetness (% of range) Average

Month	Operational Time (%)	Number of Data	Mean Value	Maximum	Maximum
				1-Hour Value	24-Hour Value
Jan	100	744	3.1	87.0	17.2
Feb	100	696	8.0	17.7	10.4
Mar	99.73	742	1.7	77.0	33.1
Apr	100	720	1.9	58.3	36.9
May	12.23	91	1.5	49.4	7.5
Jun	78.61	566	2.9	47.8	9.7
Jul	99.73	742	1.3	40.3	9.0
Aug	100	744	1.2	26.2	17.7
Sep	100	720	2.7	38.2	15.0
Oct	99.87	743	4.0	62.7	22.3
Nov	100	720	0.9	38.0	5.0
Dec	100	744	1.0	3.1	2.1
Annual	90.76	7972	2.6	87.0	36.9



Wood Buffalo Environmental Association - Anzac (AMS 14)
Annual Summary for the Year 2016
Surface Wetness (% of range) Average

Month	Operational Time (%)	Number of Data	Maximum		
			Mean Value	1-Hour Value	24-Hour Value
Jan	100	744	2.0	73.7	9.7
Feb	100	696	2.2	46.6	9.5
Mar	100	744	2.1	61.8	9.4
Apr	99.86	719	1.9	67.3	20.1
May	75.4	561	1.0	32.1	8.8
Jun	100	720	2.8	42.5	19.7
Jul	99.87	743	3.9	56.2	14.0
Aug	54.7	407	6.1	51.9	17.3
Sep	100	720	4.4	56.7	22.9
Oct	100	744	5.2	71.5	18.2
Nov	100	720	1.2	21.0	3.5
Dec	100	744	1.8	36.2	5.0
Annual	94.06	8262	2.8	73.7	22.9



Wood Buffalo Environmental Association - Stony Mountain (AMS 18)
Annual Summary for the Year 2016
Surface Wetness (% of range) Average

Month	Operational Time (%)	Number of Data	Maximum		
			Mean Value	1-Hour Value	24-Hour Value
Jan	99.6	741	3.2	74.5	13.8
Feb	100	696	2.7	58.3	10.7
Mar	100	744	3.3	70.6	11.1
Apr	100	720	5.0	92.3	28.2
May	100	744	5.9	51.5	28.8
Jun	100	720	4.6	64.9	26.0
Jul	99.73	742	4.6	59.3	13.1
Aug	100	744	7.8	79.3	24.3
Sep	100	720	5.7	61.5	22.7
Oct	100	744	6.4	72.7	21.6
Nov	100	720	2.5	18.0	6.0
Dec	100	744	2.8	4.5	4.2
Annual	99.94	8779	4.6	92.3	28.8



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
ANNUAL REPORT

VERTICAL WIND SPEED ANNUAL 2016

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

March 2017



Wood Buffalo Environmental Association - Lower Camp Met Tower (AMS 3)
Annual Summary for the Year 2016
Vertical Wind Speed 20m (km/h) Average

Wind Speed(km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.3	5.42	3.12	1.05	0.58	0.99	1.57	12.16	30.35	8.6	4.2	3.56	2.45	1.98	1.55	2.89	10.15	90.61
0.4 - 0.5	0	0.06	0	0	0	0	0.73	3.18	1.87	0.5	0.09	0.06	0.06	0.03	0	0.03	6.59
0.6 - 0.7	0	0	0	0	0	0	0.29	0.82	0.96	0.03	0	0	0	0	0	0	2.1
0.8 - 1.4	0	0.06	0	0	0	0	0.12	0.09	0.44	0	0	0	0	0	0	0	0.7
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	5.42	3.24	1.05	0.58	0.99	1.57	13.29	34.43	11.87	4.72	3.64	2.51	2.04	1.57	2.89	10.17	100

Total Number of Valid Hours 3430
 Total Number of Hours 8760

Wood Buffalo Environmental Association - Lower Camp Met Tower (AMS 3)
Annual Summary for the Year 2016
Vertical Wind Speed 45m (km/h) Average

Wind Speed(km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.3	3.06	3.74	2.12	1.03	1.9	2.58	5.7	8.19	5.18	2.55	2.41	2.93	1.36	1	1.25	3.42	48.41
0.4 - 0.5	0.14	0.22	0.03	0.05	0.22	0.81	4.37	8.84	2.2	0.41	0.22	0.14	0.11	0.05	0	0.05	17.85
0.6 - 0.7	0	0	0	0	0.03	0.33	4.1	9.28	1.25	0.03	0.05	0	0.05	0	0	0	15.11
0.8 - 1.4	0	0.05	0	0	0	0	3.93	12.94	0.79	0	0	0	0	0	0	0	17.71
1.5 - 10	0	0	0	0	0	0	0.27	0.41	0	0	0	0	0	0	0	0	0.68
> 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	3.2	4.01	2.14	1.08	2.14	3.72	18.36	39.65	9.41	2.98	2.69	3.06	1.52	1.06	1.25	3.47	99.76

Total Number of Valid Hours 3687
 Total Number of Hours 8760



Wood Buffalo Environmental Association - Lower Camp Met Tower (AMS 3)
Annual Summary for the Year 2016
Vertical Wind Speed 100m (km/h) Average

Wind Speed(km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.3	10.38	3.98	1.37	0.69	0.64	1.16	3.82	8.37	2.4	1.3	0.96	1.9	2.84	1.3	1.9	6.75	49.77
0.4 - 0.5	1.58	1.12	0.25	0.16	0.36	0.43	1.9	3.71	0.82	0.5	0.66	1	0.91	0.25	0.36	1	14.98
0.6 - 0.7	0.69	0.52	0.07	0.14	0.34	0.39	1.44	2.93	1	0.32	0.52	1.21	0.68	0.11	0.18	0.37	10.9
0.8 - 1.4	0.39	0.5	0.09	0.07	0.25	0.55	3.27	6.19	1.03	0.43	0.87	0.91	0.66	0.32	0.09	0.32	15.93
1.5 - 10	0.04	0.02	0	0.02	0	0.09	1.74	4.6	0.5	0.11	0.16	0.12	0.23	0.12	0.05	0	7.8
> 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	13.08	6.13	1.78	1.08	1.58	2.61	12.18	25.81	5.74	2.65	3.16	5.14	5.31	2.1	2.58	8.44	99.38

Total Number of Valid Hours 5626
 Total Number of Hours 8760

Wood Buffalo Environmental Association - Lower Camp Met Tower (AMS 3)
Annual Summary for the Year 2016
Vertical Wind Speed 167m (km/h) Average

Wind Speed(km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.3	8.4	2.44	1.05	0.36	0.33	0.72	2.35	4.96	1.4	0.4	0.4	0.88	1.64	1.42	2.6	7.74	37.08
0.4 - 0.5	2.51	1.31	0.4	0.22	0.24	0.37	1.57	3.6	0.7	0.33	0.18	0.58	0.88	0.39	0.52	1.63	15.45
0.6 - 0.7	1.28	0.61	0.16	0.16	0.22	0.22	1.21	3.09	0.61	0.22	0.24	0.55	0.72	0.33	0.25	0.82	10.73
0.8 - 1.4	1.37	1.02	0.31	0.24	0.46	0.81	3.35	5.95	1.49	1.11	0.94	1.7	2.06	0.51	0.45	1.06	22.83
1.5 - 10	0.13	0.1	0.04	0.09	0.16	0.25	2.42	4.45	1.22	0.7	0.99	0.84	0.6	0.34	0.16	0.28	12.8
> 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	13.7	5.48	1.97	1.08	1.42	2.38	10.89	22.05	5.44	2.76	2.75	4.56	5.9	2.99	3.99	11.53	98.88

Total Number of Valid Hours 6694
 Total Number of Hours 8760



Wood Buffalo Environmental Association - Mannix (AMS 5)
Annual Summary for the Year 2016
Vertical Wind Speed 20m (km/h) Average

Wind Speed(km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.3	5.19	9.18	1.62	0.82	0.74	1.19	5.72	11.28	5.17	1.02	0.9	1.21	2.56	1.6	1.58	2.81	52.6
0.4 - 0.5	0.23	1.6	1.46	0.64	1.07	1.44	9.47	8.28	0.35	0.04	0.02	0.02	0.02	0.04	0.08	0.16	24.93
0.6 - 0.7	0.06	0.45	0.86	0.72	0.84	1.37	5.37	4.67	0	0.02	0	0	0	0	0.02	0.04	14.41
0.8 - 1.4	0.04	0.04	0.45	1	1.09	1.82	2.23	1.33	0	0	0	0	0	0	0	0	7.99
1.5 - 10	0	0	0	0.02	0.02	0.02	0	0	0	0	0	0	0	0	0	0	0.06
> 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	5.53	11.27	4.39	3.2	3.77	5.84	22.78	25.56	5.53	1.07	0.92	1.23	2.58	1.64	1.68	3.01	99.98

Total Number of Valid Hours 5122
 Total Number of Hours 8760

Wood Buffalo Environmental Association - Mannix (AMS 5)
Annual Summary for the Year 2016
Vertical Wind Speed 45m (km/h) Average

Wind Speed(km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.3	0.86	2.71	3.15	1.13	1.26	0.9	1.94	3.49	3.42	2.8	2.23	2.1	1.79	1.04	1.01	0.86	30.69
0.4 - 0.5	0.11	0.2	0.77	0.99	1.3	1.26	3.07	3.15	2.1	0.82	0.46	0.26	0.04	0.15	0.15	0.11	14.96
0.6 - 0.7	0.07	0.13	0.13	0.62	0.97	1.3	4.54	4.52	1.24	0.31	0.04	0.04	0.02	0.04	0.09	0.11	14.18
0.8 - 1.4	0.09	0	0.02	0.53	0.51	2.78	14.36	14.12	1.76	0.11	0	0.02	0.02	0	0	0.02	34.35
1.5 - 10	0	0	0	0	0.04	0.26	1.13	2.98	0.26	0	0	0	0	0	0	0	4.68
> 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	1.13	3.04	4.08	3.26	4.08	6.51	25.04	28.26	8.78	4.04	2.74	2.43	1.88	1.24	1.26	1.1	98.85

Total Number of Valid Hours 4533
 Total Number of Hours 8760



Wood Buffalo Environmental Association - Mannix (AMS 5)
Annual Summary for the Year 2015
Vertical Wind Speed 75m (km/h) Average

Wind Speed(km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.3	3.73	4.01	2.45	1.28	1.49	1.71	7.83	6.97	3.82	2.4	3.28	5.7	6.14	4.22	2.85	2.82	60.7
0.4 - 0.5	0.54	0.59	0.54	0.59	0.66	1.12	2.42	4.13	1.28	0.28	0.36	0.64	2.13	1.68	0.66	0.28	17.87
0.6 - 0.7	0.26	0.16	0.17	0.41	0.17	0.69	1.61	3.78	0.64	0.17	0.17	0.33	0.66	0.67	0.33	0.19	10.42
0.8 - 1.4	0.26	0.14	0.05	0.16	0.12	0.97	1.33	5.41	0.6	0.07	0	0.14	0.54	0.33	0.22	0.22	10.56
1.5 - 10	0.05	0	0	0	0.03	0.03	0.03	0.19	0.03	0	0	0	0	0.02	0	0.02	0.41
> 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	4.84	4.89	3.21	2.44	2.47	4.53	13.22	20.48	6.38	2.92	3.82	6.81	9.45	6.91	4.06	3.53	99.97

Total Number of Valid Hours 5786
 Total Number of Hours 8760

Wood Buffalo Environmental Association - Mannix (AMS 5)
Annual Summary for the Year 2016
Vertical Wind Speed 90m (km/h) Average

Wind Speed(km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.3	0.85	0.98	1.41	1.18	1.41	1.89	5.2	2.62	3.07	2.16	2.82	1.18	0.34	0.21	0.24	0.32	25.86
0.4 - 0.5	0.99	1.45	0.95	0.78	0.2	0.34	1.77	2.94	1.55	0.34	0.85	1.59	0.17	0.22	0.24	0.46	14.85
0.6 - 0.7	1.36	1.4	0.5	0.32	0.09	0.21	0.97	3.15	1.14	0.12	0.3	1.38	0.54	0.29	0.42	0.62	12.81
0.8 - 1.4	5.92	3.54	0.42	0.12	0.07	0.07	0.4	3.85	0.75	0.04	0.2	2.49	2.47	1.32	1.56	3.05	26.27
1.5 - 10	4.06	0.48	0.01	0	0	0	0	0.16	0.03	0	0	0.69	3.69	4.22	2.51	3.01	18.85
> 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	13.18	7.85	3.31	2.39	1.77	2.51	8.33	12.71	6.53	2.66	4.17	7.31	7.22	6.27	4.97	7.47	98.65

Total Number of Valid Hours 7563
 Total Number of Hours 8760



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
ANNUAL REPORT

WIND SPEED AND DIRECTION ANNUAL 2016

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

March 2017



Wood Buffalo Environmental Association - Fort McKay - Bertha Ganter (AMS 1)
Annual Summary for the Year 2016
Wind Speed and Wind Direction

Wind Speed(km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	4.67	2.26	1.49	1.13	0.91	0.87	1.25	2.83	5.68	4.94	3.56	3.06	2.78	4.28	3.48	3.87	47.04
6 - 11	8.62	2.93	1.13	0.72	0.72	0.36	1.21	4.75	7.34	2.13	1.07	1.13	1.35	2.92	2.08	2.65	41.1
12 - 19	3.4	0.86	0	0.01	0.01	0.02	0.17	1.64	1.31	0.25	0.08	0.1	0.09	0.81	1.13	0.96	10.84
20 - 28	0.4	0.01	0	0	0	0	0.01	0.02	0.13	0.02	0	0	0	0.02	0.21	0.14	0.96
29 - 38	0	0	0	0	0	0	0	0.02	0.02	0	0	0	0	0	0.01	0	0.06
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	17.09	6.05	2.62	1.86	1.64	1.25	2.65	9.27	14.48	7.34	4.71	4.29	4.22	8.03	6.9	7.6	100

Total Number of Valid Hours 8771
 Total Number of Hours 8784



Wood Buffalo Environmental Association - Mildred Lake (AMS 2)
Annual Summary for the Year 2016
Wind Speed and Wind Direction

Wind Speed(km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	2.55	2.24	1.61	1.13	1.05	1.05	1.14	1.61	2.81	3.29	1.95	1.14	0.96	0.71	0.66	1.18	25.08
6 - 11	7.18	7.23	2.18	0.62	0.69	1.04	1.89	5.09	5.79	4.24	2.74	2.02	1.53	2.19	1.78	2.44	48.66
12 - 19	3.25	4.82	0.9	0.06	0.06	0.44	0.67	4.15	1.67	0.59	0.25	1.05	0.67	1.96	1.86	1.43	23.82
20 - 28	0.43	0.4	0	0	0	0	0.08	0.33	0.07	0.17	0	0.03	0.13	0.18	0.21	0.3	2.34
29 - 38	0	0	0	0	0	0	0	0	0.05	0.03	0	0	0	0	0	0.01	0.09
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	13.41	14.69	4.69	1.81	1.8	2.53	3.78	11.19	10.39	8.33	4.95	4.24	3.29	5.05	4.5	5.36	100

Total Number of Valid Hours 8672
 Total Number of Hours 8784



Wood Buffalo Environmental Association - Lower Camp Met Tower (AMS 3)
Annual Summary for the Year 2016
Wind Speed and Wind Direction 20m

Wind Speed(km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	6.68	2.24	1.39	0.88	1.06	1.47	3.41	4.34	1.8	1.16	1.2	1.31	1.33	1.61	3.68	10.13	43.69
6 - 11	7.37	2.87	0.53	0.15	0.22	0.57	4.03	9.48	1.54	0.95	0.92	1.6	1.81	1.06	1.38	3.29	37.76
12 - 19	1.85	0.87	0.02	0	0	0.01	1.7	4.54	1.6	0.3	0.29	1.11	2.04	1.16	1.25	0.52	17.26
20 - 28	0	0	0	0	0	0	0.06	0.37	0.15	0.08	0.02	0.15	0.25	0.09	0.06	0	1.23
29 - 38	0	0	0	0	0	0	0	0	0.07	0	0	0	0	0	0	0	0.07
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	15.89	5.98	1.94	1.03	1.27	2.05	9.19	18.73	5.15	2.49	2.43	4.17	5.44	3.91	6.37	13.94	100

Total Number of Valid Hours 8714
 Total Number of Hours 8784

Wood Buffalo Environmental Association - Lower Camp Met Tower (AMS 3)
Annual Summary for the Year 2016
Wind Speed and Wind Direction 45m

Wind Speed(km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	3.2	1.15	0.73	0.61	0.89	1.18	3.35	2.25	1	1.02	0.85	0.95	0.96	1.27	3.12	6.3	28.83
6 - 11	6.39	1.83	0.44	0.35	0.48	0.92	8.12	2.9	0.98	0.73	0.88	1.3	1.18	0.69	1.54	7.6	36.32
12 - 19	4.78	1.74	0.17	0	0.06	0.75	7.76	2.95	1.36	0.36	0.66	1.85	1.33	1.1	0.98	1.68	27.55
20 - 28	0.58	0.3	0	0	0	0.01	1.46	0.98	0.22	0.1	0.06	1	0.91	0.82	0.21	0.14	6.8
29 - 38	0	0	0	0	0	0	0.04	0.03	0.05	0	0	0.19	0.14	0.01	0.01	0	0.48
> 38	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0	0.01
Totals	14.95	5.01	1.33	0.96	1.44	2.86	20.74	9.13	3.61	2.22	2.46	5.28	4.52	3.89	5.87	15.73	100

Total Number of Valid Hours 7720
 Total Number of Hours 8784



Wood Buffalo Environmental Association - Lower Camp Met Tower (AMS 3)
Annual Summary for the Year 2016
Wind Speed and Wind Direction 100m

Wind Speed(km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	1.24	0.88	0.68	0.53	0.65	0.86	1.36	1.53	1.3	1.04	0.68	0.73	0.65	0.66	0.8	1.39	14.97
6 - 11	5.33	2.16	0.83	0.67	0.76	0.75	3.05	4.29	1.78	1.41	1.43	1.47	1.05	0.72	0.89	3.61	30.23
12 - 19	5.59	2.5	0.58	0.22	0.29	0.64	4.21	5.26	1.74	0.67	1.12	2.06	1.11	0.91	1.25	3.05	31.2
20 - 28	2.74	1.56	0.13	0.05	0.06	0.25	3.04	2.3	0.56	0.21	0.54	1.95	1.09	1.3	0.82	0.98	17.58
29 - 38	0.46	0.37	0	0	0.01	0	1.24	0.53	0.06	0.01	0.07	0.87	0.64	0.76	0.28	0.21	5.51
> 38	0	0	0	0	0	0	0.09	0.03	0.03	0	0	0.12	0.19	0.05	0.01	0	0.52
Totals	15.36	7.47	2.22	1.47	1.77	2.5	13	13.95	5.46	3.34	3.85	7.19	4.72	4.4	4.05	9.24	100

Total Number of Valid Hours 8645
 Total Number of Hours 8784

Wood Buffalo Environmental Association - Lower Camp Met Tower (AMS 3)
Annual Summary for the Year 2016
Wind Speed and Wind Direction 167m

Wind Speed(km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	0.68	0.82	0.47	0.43	0.4	0.48	0.62	0.8	0.79	0.84	0.56	0.52	0.45	0.63	0.68	0.57	9.74
6 - 11	2.81	2.54	1.16	0.72	0.6	0.81	1.62	2.25	2.53	1.98	1.42	1.21	1.36	0.69	0.72	1.37	23.78
12 - 19	4.34	4.33	1.24	0.61	0.68	0.75	2	4.01	3.31	1.7	1.7	2.03	1.3	1	0.97	1.86	31.83
20 - 28	2.95	2.67	0.53	0.18	0.13	0.23	2.5	2.92	1.85	0.67	0.83	1.96	1.34	1.2	1.16	1.16	22.27
29 - 38	0.62	0.84	0.12	0.06	0.02	0.04	1.28	1.2	0.63	0.23	0.22	1.13	1.37	1.34	0.8	0.38	10.27
> 38	0.11	0.02	0.01	0	0	0.01	0.2	0.06	0.12	0.04	0.01	0.34	0.67	0.32	0.16	0.05	2.11
Totals	11.51	11.23	3.53	1.99	1.83	2.32	8.22	11.23	9.23	5.46	4.75	7.17	6.48	5.17	4.49	5.39	100

Total Number of Valid Hours 8531
 Total Number of Hours 8784



**Wood Buffalo Environmental Association - Buffalo Viewpoint (AMS 4)
Annual Summary for the Year 2016
Wind Speed and Wind Direction**

Wind Speed(km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	1.68	1.25	0.99	0.5	0.54	0.85	1.64	3.07	1.84	1.17	1.14	0.91	0.7	0.85	0.98	1.06	19.17
6 - 11	5.75	4.04	1.35	0.45	0.75	2.28	7.47	11.45	2.58	1.71	1.84	2.06	2.14	2.06	1.47	1.83	49.22
12 - 19	5.95	2.46	0.08	0.03	0.09	0.66	1.66	2.33	0.38	0.31	0.71	2.46	1.47	1.8	1.82	1.41	23.61
20 - 28	3.05	0.58	0	0	0	0.03	0.02	0.1	0.18	0	0.06	0.7	0.23	0.87	0.64	0.53	6.99
29 - 38	0.56	0.06	0	0	0	0	0	0.03	0	0	0	0.06	0.02	0.01	0.13	0.08	0.95
> 38	0.05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0.06
Totals	17.03	8.38	2.42	0.98	1.38	3.83	10.8	16.99	4.98	3.19	3.75	6.18	4.56	5.59	5.04	4.91	100

Total Number of Valid Hours 8754
Total Number of Hours 8784



**Wood Buffalo Environmental Association - Mannix (AMS 5)
Annual Summary for the Year 2016
Wind Speed and Wind Direction 20m**

Wind Speed(km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	1.35	0.97	0.78	0.71	0.54	1.06	1.53	2.07	1.85	1.07	1.29	1.24	1.09	1.01	1.2	1.4	19.16
6 - 11	4.05	3.27	1.36	0.86	1.09	1.5	7.15	8.79	2.32	1.43	1.83	2.79	2.12	1.96	1.82	3.42	45.74
12 - 19	3.54	3.07	0.41	0.33	0.59	0.9	4.44	4.15	0.63	0.31	0.78	2.04	2.43	1.54	1.13	2.13	28.42
20 - 28	1.08	0.49	0.03	0.01	0	0	0.32	0.22	0.14	0.02	0.12	0.7	1.5	0.81	0.26	0.46	6.16
29 - 38	0.05	0.01	0	0	0	0.01	0	0.06	0.02	0	0	0.07	0.21	0.06	0.02	0	0.51
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0.01
Totals	10.06	7.81	2.59	1.92	2.22	3.46	13.44	15.28	4.97	2.83	4.01	6.84	7.35	5.37	4.43	7.41	100

Total Number of Valid Hours 8695
Total Number of Hours 8784

**Wood Buffalo Environmental Association - Mannix (AMS 5)
Annual Summary for the Year 2016
Wind Speed and Wind Direction 45m**

Wind Speed(km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	0.59	0.49	0.62	0.54	0.46	0.83	0.78	0.67	0.57	0.56	0.63	0.6	0.67	0.55	0.68	0.92	10.15
6 - 11	2.8	1.76	1.23	0.65	0.96	1.65	3.7	3.22	1.81	1.1	1.24	1.56	1.44	1.4	1.69	2.34	28.56
12 - 19	4.58	2.51	0.52	0.55	1.02	2.5	7.28	6.01	1.63	1.16	1.72	2.45	2.17	1.45	1.75	3.03	40.33
20 - 28	2.96	0.49	0.14	0.03	0.01	0.4	2.47	2.24	0.46	0.31	0.69	1.78	1.86	1.15	0.68	1.62	17.29
29 - 38	0.83	0.03	0	0	0	0.01	0	0.22	0.13	0.02	0.15	0.48	0.59	0.44	0.17	0.24	3.31
> 38	0.03	0	0	0	0	0	0	0.09	0	0	0	0.05	0.03	0.09	0.01	0.05	0.36
Totals	11.79	5.29	2.5	1.78	2.46	5.4	14.23	12.44	4.6	3.16	4.43	6.91	6.75	5.08	4.97	8.2	100

Total Number of Valid Hours 8708
Total Number of Hours 8784



Wood Buffalo Environmental Association - Mannix (AMS 5)
Annual Summary for the Year 2016
Wind Speed and Wind Direction 75m

Wind Speed(km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	0.52	0.55	0.56	0.53	0.59	0.8	0.7	0.48	0.68	0.41	0.34	0.3	0.46	0.42	0.49	0.63	8.46
6 - 11	2.05	1.49	1.14	0.98	1.16	2.61	3	1.95	1.31	1.18	1.03	1.25	1.04	1.18	1.25	1.83	24.47
12 - 19	3.68	3.07	0.96	0.82	0.63	1.45	5.78	3.87	1.75	1.3	1.64	2.18	1.77	1.27	1.52	2.34	34.03
20 - 28	3.33	1.55	0.23	0.08	0.01	0.13	3.93	3.81	1.02	0.67	1.07	2.24	2.18	1.29	0.82	1.98	24.33
29 - 38	1.68	0.18	0.04	0	0	0.01	0.6	0.94	0.35	0.12	0.28	0.8	0.86	1.05	0.32	0.56	7.77
> 38	0.22	0.01	0	0	0	0	0	0.16	0.04	0	0.01	0.18	0.06	0.12	0.06	0.08	0.94
Totals	11.47	6.84	2.93	2.41	2.39	5	14	11.2	5.14	3.68	4.37	6.95	6.36	5.33	4.47	7.43	100

Total Number of Valid Hours 8533
 Total Number of Hours 8784

Wood Buffalo Environmental Association - Mannix (AMS 5)
Annual Summary for the Year 2016
Wind Speed and Wind Direction 90m

Wind Speed(km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	0.44	0.41	0.51	0.46	0.4	0.51	0.53	0.47	0.6	0.41	0.36	0.32	0.4	0.41	0.58	0.55	7.38
6 - 11	2.28	1.37	1.11	0.82	0.89	1.27	2.25	1.59	1.35	1.15	0.96	1.19	1.06	1.21	1.11	1.64	21.23
12 - 19	3.71	2.84	1.01	0.86	1	2.51	4.26	3.48	1.84	1.41	1.58	2.12	1.78	1.23	1.38	2.11	33.14
20 - 28	3.32	1.97	0.35	0.14	0.17	1.04	3.75	3.94	1.52	0.84	1.11	2.1	2.11	1.46	0.92	1.72	26.45
29 - 38	1.96	0.37	0.07	0	0	0.06	1.19	1.69	0.6	0.2	0.25	0.85	1.13	1.21	0.31	0.68	10.57
> 38	0.3	0.02	0	0	0	0.01	0.01	0.2	0.09	0.01	0.02	0.17	0.1	0.09	0.14	0.06	1.23
Totals	12.01	6.98	3.04	2.28	2.47	5.39	11.99	11.38	6.01	4.02	4.28	6.75	6.58	5.62	4.44	6.75	100

Total Number of Valid Hours 8676
 Total Number of Hours 8784



Wood Buffalo Environmental Association - Patricia McInnes (AMS 6)
Annual Summary for the Year 2016
Wind Speed and Wind Direction

Wind Speed(km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	1.17	0.96	0.63	0.73	1.13	1.21	1.96	2.41	2.62	2.11	1.85	1.13	1.2	1.48	1.56	1.4	23.54
6 - 11	4.49	2.21	1.24	0.96	1.4	2.63	4.66	3.15	3.25	3.15	3.93	2.38	1.31	1.86	1.77	4.57	42.97
12 - 19	5.16	1.55	0.36	0.33	0.46	2.47	1.9	0.75	0.79	1	1.79	2.5	1.64	2.02	1.63	3.41	27.77
20 - 28	1.29	0.16	0.01	0.01	0	0.1	0.13	0.06	0.21	0.1	0.21	0.63	0.54	0.84	0.44	0.63	5.35
29 - 38	0.03	0.01	0	0	0	0.01	0	0.03	0.05	0	0	0	0.1	0.05	0.07	0.01	0.36
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	12.15	4.89	2.25	2.03	2.99	6.43	8.65	6.4	6.91	6.36	7.78	6.64	4.79	6.25	5.47	10.02	100

Total Number of Valid Hours 8771
 Total Number of Hours 8784



Wood Buffalo Environmental Association - Athabasca Valley (AMS 7)
Annual Summary for the Year 2016
Wind Speed and Wind Direction

Wind Speed(km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	2.42	1.25	0.94	1.49	1.99	2.52	4.11	3.37	2.2	2.2	2.53	1.8	1.43	1.38	1.85	2.09	33.57
6 - 11	4.73	0.76	0.43	0.55	1.19	1.78	10.7	3.29	0.95	1.1	2.48	1.6	0.66	0.52	1.31	6.73	38.78
12 - 19	2.92	0.37	0.11	0.19	0.31	0.51	4.39	0.96	0.38	0.24	0.96	1.8	1.02	1.13	1.04	6.64	22.97
20 - 28	0.26	0	0	0	0.02	0.01	0.13	0.05	0.05	0.02	0.11	0.32	0.64	0.95	0.59	1.05	4.2
29 - 38	0	0	0	0	0	0	0	0.01	0.01	0	0	0	0.07	0.1	0.18	0.09	0.47
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0.02	0	0	0	0.02
Totals	10.34	2.38	1.48	2.24	3.5	4.83	19.33	7.67	3.58	3.56	6.08	5.52	3.83	4.08	4.97	16.6	100

Total Number of Valid Hours 8765
 Total Number of Hours 8784



Wood Buffalo Environmental Association - Fort Chipewyan (AMS 8)
Annual Summary for the Year 2016
Wind Speed and Wind Direction

Wind Speed(km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	0.81	0.45	0.48	0.67	1.01	0.68	0.32	0.32	0.46	0.34	0.77	0.85	0.8	0.87	0.8	0.75	10.4
6 - 11	2.47	1.32	1.36	2.04	4.79	2.6	1.17	0.88	0.8	0.88	1.28	1.44	2.61	4.03	3.24	3.25	34.17
12 - 19	1.06	0.65	1.33	3.56	7.89	2.53	1.07	1.25	1.18	0.71	0.68	1.36	3.02	3.06	3.39	2.05	34.81
20 - 28	0.08	0	0.85	3.26	6.4	0.93	0.38	1.04	1.13	0.23	0.05	0.16	0.71	0.49	0.77	0.37	16.84
29 - 38	0	0	0.06	1.46	1.28	0.19	0.05	0.05	0.23	0.02	0	0.02	0.14	0.01	0.08	0	3.59
> 38	0	0	0	0	0.07	0.03	0.01	0.01	0.06	0	0	0	0.01	0	0	0	0.2
Totals	4.42	2.43	4.07	11	21.44	6.96	3.01	3.56	3.86	2.18	2.77	3.83	7.29	8.46	8.28	6.43	100

Total Number of Valid Hours 8616
 Total Number of Hours 8784



Wood Buffalo Environmental Association - Barge Landing (AMS 9)
Annual Summary for the Year 2016
Wind Speed and Wind Direction

Wind Speed(km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	5.96	2.76	2.23	2.05	1.84	1.93	3.22	4.34	4.81	4.37	3.85	3.37	2.62	2.08	3.12	6.89	55.43
6 - 11	4.31	6.24	2.85	0.87	0.21	0.51	2.04	3.32	5.75	3.05	1.84	2.42	1.15	1.18	1.32	2.19	39.25
12 - 19	0.62	1.12	0.17	0	0	0	0.25	0.43	0.35	0.18	0.21	0.81	0.37	0.22	0.28	0.23	5.22
20 - 28	0	0	0	0	0	0	0	0.02	0.03	0	0	0	0.03	0	0	0	0.09
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	10.89	10.12	5.26	2.92	2.05	2.44	5.51	8.11	10.94	7.6	5.9	6.59	4.17	3.48	4.72	9.3	100

Total Number of Valid Hours 8695
 Total Number of Hours 8784



Wood Buffalo Environmental Association - Lower Camp (AMS 11)
Annual Summary for the Year 2016
Wind Speed and Wind Direction

Wind Speed(km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	2.05	1.46	1.3	1.32	1.92	2.42	3.59	1.59	0.87	0.51	0.5	0.6	2.15	4.9	5.61	3.21	34.01
6 - 11	3.86	1.21	0.43	0.31	0.66	1.91	11.02	2.9	1.15	0.63	0.74	1.43	1.79	1.54	3.94	5.33	38.85
12 - 19	3.65	1.34	0.26	0.06	0.16	2.01	5.74	0.56	0.14	0.11	0.32	2.34	1.71	1.71	1.03	1.72	22.86
20 - 28	0.56	0.31	0	0	0	0.24	0.55	0.05	0.01	0	0.01	0.56	0.79	0.75	0.19	0.14	4.15
29 - 38	0	0	0	0	0	0.02	0.05	0	0	0	0	0.01	0.02	0.03	0	0	0.14
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	10.12	4.31	2	1.69	2.74	6.6	20.95	5.09	2.17	1.26	1.57	4.94	6.46	8.94	10.77	10.4	100

Total Number of Valid Hours 8763
 Total Number of Hours 8784



Wood Buffalo Environmental Association - Fort McKay South (AMS 13)
Annual Summary for the Year 2016
Wind Speed and Wind Direction

Wind Speed(km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	4.56	3.11	1.73	0.88	0.73	1.13	1.65	2.9	5.95	6.08	5.52	5.36	3.07	2.61	3.25	3.52	52.04
6 - 11	6.43	5.15	1.15	0.14	0.15	0.61	1.65	2.73	3.95	2.06	1.6	2.51	2.44	1.84	1.31	2.49	36.21
12 - 19	2.66	2.66	0.09	0	0	0	0.21	1.16	1.2	0.53	0.44	0.59	0.28	0.16	0.35	0.52	10.84
20 - 28	0.4	0.13	0	0	0	0	0.01	0.14	0.06	0	0	0	0	0	0	0.09	0.83
29 - 38	0	0	0	0	0	0	0	0.02	0.06	0	0	0	0	0	0	0	0.08
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	14.05	11.04	2.97	1.01	0.88	1.74	3.51	6.96	11.22	8.67	7.55	8.45	5.79	4.62	4.91	6.62	100

Total Number of Valid Hours 8683
 Total Number of Hours 8784



Wood Buffalo Environmental Association - Anzac (AMS 14)
Annual Summary for the Year 2016
Wind Speed and Wind Direction

Wind Speed(km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	1.81	1.15	1.03	1.06	1.28	1.54	1.71	1.95	2.72	2.05	1.81	1.54	1.81	2.01	2	2.18	27.65
6 - 11	2.78	1.49	1.27	1.34	1.46	2.31	5.11	6.16	3.63	1.56	1.78	1.85	2.43	7.63	5.4	4.92	51.13
12 - 19	1.33	0.4	0.22	0.36	0.36	0.62	1.82	2.41	0.96	0.36	0.87	0.52	1.48	4.12	2.75	1.66	20.24
20 - 28	0.04	0	0.01	0	0	0.01	0.06	0.13	0.09	0.08	0.11	0.02	0.2	0.13	0.04	0.05	0.96
29 - 38	0	0	0	0	0	0	0	0	0	0.01	0.01	0	0	0	0	0	0.02
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	5.95	3.04	2.54	2.76	3.1	4.48	8.7	10.65	7.41	4.07	4.58	3.93	5.92	13.89	10.18	8.8	100

Total Number of Valid Hours 8518
 Total Number of Hours 8784



Wood Buffalo Environmental Association - CNRL Horizon (AMS 15)
Annual Summary for the Year 2016
Wind Speed and Wind Direction

Wind Speed(km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	2.46	2.8	1.87	1.22	0.82	0.77	1.1	1.88	3.03	3.57	2.25	1.45	1.23	1.08	1.19	1.82	28.55
6 - 11	5.81	8	2.69	0.98	0.67	0.78	1.18	2.57	7.57	8.52	4.52	1.79	1.52	1.35	1.06	1.03	50.03
12 - 19	1.99	4.78	0.66	0.01	0.01	0.07	0.08	0.73	1.59	1.83	2.02	0.91	0.76	1.67	0.99	0.63	18.75
20 - 28	0.43	0.51	0	0	0	0	0	0.06	0.15	0.05	0.05	0.03	0.23	0.33	0.42	0.27	2.51
29 - 38	0	0	0	0	0	0	0	0	0.01	0	0	0	0.01	0.03	0.1	0	0.16
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	10.69	16.09	5.21	2.21	1.5	1.63	2.35	5.23	12.36	13.97	8.83	4.18	3.76	4.47	3.76	3.75	100

Total Number of Valid Hours 8674
 Total Number of Hours 8784



Wood Buffalo Environmental Association - Shell Muskeg River (AMS 16)
Annual Summary for the Year 2016
Wind Speed and Wind Direction

Wind Speed(km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	0.47	0.56	0.8	1.21	1.44	1.22	1.38	2.28	4.08	3.95	1.87	0.97	0.81	0.81	0.7	0.7	23.23
6 - 11	1.09	1.55	3.18	2.78	0.85	0.74	1.28	2.72	9.68	7.84	2.81	1.38	1.46	1.13	1.69	1.88	42.06
12 - 19	3.03	4.91	5.88	0.73	0.02	0.01	0.38	1.56	1.99	1.2	1.45	1.38	1.22	1.06	0.75	1.17	26.75
20 - 28	1.34	2.71	1.15	0	0	0	0.03	0.19	0.21	0.06	0.25	0.57	0.18	0.34	0.25	0.14	7.43
29 - 38	0.08	0.16	0.07	0	0	0	0	0.02	0.03	0	0.03	0.05	0.03	0.03	0.01	0	0.52
> 38	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0	0.01
Totals	6.02	9.89	11.08	4.72	2.31	1.97	3.07	6.79	15.99	13.05	6.42	4.34	3.7	3.37	3.4	3.89	100

Total Number of Valid Hours 8775
 Total Number of Hours 8784



Wood Buffalo Environmental Association - Wapasu (AMS 17)
Annual Summary for the Year 2016
Wind Speed and Wind Direction

Wind Speed(km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	2.21	2.19	2.07	1.75	1.73	2.28	2.99	3.77	2.39	1.26	0.89	0.99	1.02	1.07	1.28	1.82	29.72
6 - 11	4.16	3.04	1.68	0.79	1.42	2.78	5.62	7.8	5.8	2.98	3.22	2.06	1.52	1.74	2.21	4.59	51.43
12 - 19	1.13	0.65	0.22	0.3	0.21	1.29	2.82	2.72	1.37	0.58	1.78	0.77	0.37	0.29	0.68	2.69	17.86
20 - 28	0.06	0	0.01	0	0	0.02	0.31	0.11	0.05	0.01	0.05	0.03	0.01	0.01	0.07	0.23	0.97
29 - 38	0	0	0	0	0	0	0.01	0.01	0	0	0	0	0	0	0	0	0.02
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	7.56	5.88	3.99	2.84	3.36	6.38	11.75	14.41	9.61	4.83	5.93	3.85	2.92	3.1	4.24	9.34	100

Total Number of Valid Hours 8729
 Total Number of Hours 8784



Wood Buffalo Environmental Association - Stony Mountain (AMS 18)
Annual Summary for the Year 2016
Wind Speed and Wind Direction

Wind Speed(km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	2	2.1	1.98	1.62	1.37	1.31	1.55	1.38	1.49	1.93	1.87	1.21	1.81	2.59	2.98	3.03	30.22
6 - 11	1.03	2.18	3	1.73	1.65	1.63	1.54	2.57	3.31	5.96	6.13	3.07	4.34	6.02	4.75	1.73	50.64
12 - 19	0.02	0.41	0.86	0.53	0.27	0.08	0.32	0.61	0.89	3.13	2.92	1.35	2.68	3.01	1.16	0.15	18.38
20 - 28	0	0	0	0	0	0	0	0	0.01	0.33	0.04	0	0.14	0.22	0.02	0	0.76
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	3.05	4.69	5.85	3.87	3.28	3.02	3.41	4.55	5.71	11.34	10.95	5.64	8.98	11.85	8.91	4.91	100

Total Number of Valid Hours 8568
 Total Number of Hours 8784



Wood Buffalo Environmental Association - Firebag (AMS 19)
Annual Summary for the Year 2016
Wind Speed and Wind Direction

Wind Speed(km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	0.95	0.95	0.81	0.73	0.4	0.61	0.78	1.02	1.64	1.2	0.96	0.82	0.78	0.63	0.79	0.95	14.01
6 - 11	3.31	2.94	2.03	1.47	0.93	1.5	1.98	2.14	3.31	2.85	3.22	2.55	1.71	1.84	1.64	2.1	35.53
12 - 19	3.82	2.89	1.19	0.78	0.75	2.11	2.56	3.18	4.21	3.56	2.63	2.06	1.16	1.52	1.56	2.53	36.53
20 - 28	1.18	1	0.06	0.26	0.13	0.46	0.68	1.52	1.65	1.18	0.7	0.78	0.42	0.37	0.36	1.52	12.27
29 - 38	0.14	0.08	0.03	0.06	0	0	0.14	0.24	0.22	0.05	0	0.04	0.05	0.04	0.01	0.46	1.56
> 38	0	0	0	0	0	0	0.01	0	0.06	0.03	0	0	0	0	0	0	0.1
Totals	9.4	7.85	4.12	3.3	2.21	4.68	6.15	8.11	11.09	8.86	7.52	6.24	4.13	4.4	4.36	7.56	100

Total Number of Valid Hours 7818
 Total Number of Hours 8784



Wood Buffalo Environmental Association - Brion MacKay River (AMS 20)
Annual Summary for the Year 2016
Wind Speed and Wind Direction

Wind Speed(km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	1.95	2.55	2.82	1.45	1.36	1.8	4.22	5.95	3.68	2.91	2.74	3.34	3.07	2.29	1.55	1.71	43.39
6 - 11	2	4.57	3.83	0.88	0.91	2.81	3.07	2.93	5.26	3.69	2.4	3.11	3.41	3.85	2.75	1.77	47.24
12 - 19	0.2	1.69	0.74	0.04	0.04	0.4	0.12	0.37	0.84	0.65	0.14	0.42	0.44	0.96	1.36	0.81	9.21
20 - 28	0	0.04	0	0	0	0	0	0.02	0.05	0.01	0	0	0	0.01	0.04	0	0.16
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	4.15	8.85	7.39	2.36	2.3	5	7.41	9.28	9.83	7.27	5.27	6.87	6.93	7.11	5.69	4.28	100

Total Number of Valid Hours 8555
 Total Number of Hours 8784



Wood Buffalo Environmental Association - Conklin Community (AMS 21)
Annual Summary for the Year 2016
Wind Speed and Wind Direction

Wind Speed(km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	2.93	1.65	1.22	1.05	1.29	1.71	2.36	3.71	5.31	3.94	2.25	1.26	1.89	2.48	5.35	6.18	44.58
6 - 11	2.99	2.02	1.09	0.91	0.79	2.31	2.02	2.13	2.76	4.73	3.7	1.83	2.43	3.43	5.82	2.8	41.76
12 - 19	0.83	0.71	0.08	0	0.02	0.22	0.59	1.26	0.79	1.31	1.65	1.02	1.09	0.54	1.66	1.46	13.22
20 - 28	0	0	0	0	0	0	0.02	0.05	0.2	0.05	0	0	0.03	0	0	0.11	0.45
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	6.75	4.37	2.39	1.96	2.09	4.24	4.98	7.15	9.06	10.03	7.59	4.11	5.45	6.45	12.83	10.55	100

Total Number of Valid Hours 6492
 Total Number of Hours 6600



Wood Buffalo Environmental Association - Cenovus Christina Lake (AMS 500)
Annual Summary for the Year 2016
Wind Speed and Wind Direction

Wind Speed(km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	0.67	1.04	1.23	1.43	1.96	2.1	2.27	3.43	3.8	2.16	1.01	0.79	0.59	0.38	0.56	0.49	23.92
6 - 11	2.01	2.79	2.12	1.85	1.53	1.74	2.54	3	5.24	4.6	5.22	5.15	1.12	1.38	2.25	1.46	44
12 - 19	1.62	2.26	0.92	0.67	0.55	0.55	1.45	1.85	1.88	1.02	1.94	3.08	2.39	1.99	3.98	1.27	27.4
20 - 28	0.09	0.32	0.17	0	0.01	0	0.1	0.21	0.28	0.07	0.01	0.24	0.78	0.85	1.12	0.29	4.54
29 - 38	0	0	0	0	0	0	0	0	0.02	0	0	0	0.03	0.03	0.05	0	0.14
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	4.38	6.41	4.44	3.95	4.05	4.4	6.36	8.48	11.22	7.85	8.18	9.26	4.91	4.62	7.96	3.51	100

Total Number of Valid Hours 8714
 Total Number of Hours 8784



Wood Buffalo Environmental Association - Statoil - Leismer (AMSS01)
Annual Summary for the Year 2016
Wind Speed and Wind Direction

Wind Speed(km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	1.7	1.38	1.33	1.56	1.93	1.7	1.88	3.12	3.49	5.09	3.17	1.24	2.8	1.01	1.01	1.15	33.55
6 - 11	3.4	1.61	0.64	1.56	2.48	5.09	3.17	3.72	1.65	3.85	1.79	0.28	3.44	2.89	1.15	2.52	39.24
12 - 19	2.48	0.37	0.05	0.23	1.51	1.28	1.06	1.7	0.28	0.14	0.05	0	1.15	4.36	2.11	4.86	21.62
20 - 28	0.37	0	0	0	0	0	0.05	0	0	0	0	0	0.55	1.61	0.78	1.15	4.5
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0.05	0.64	0.37	0.05	1.1
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	7.94	3.35	2.02	3.35	5.92	8.08	6.15	8.54	5.42	9.09	5	1.51	7.99	10.51	5.42	9.73	100

Total Number of Valid Hours 2179
 Total Number of Hours 2184



Wood Buffalo Environmental Association - ConocoPhillips - Surmont (AMSS02)
Annual Summary for the Year 2016
Wind Speed and Wind Direction

Wind Speed(km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	0.76	0.86	0.72	0.73	0.92	0.71	0.87	0.62	0.75	0.86	0.94	0.93	0.86	0.78	0.37	0.43	12.08
6 - 11	2.76	1.38	0.89	1.12	1.34	2.54	3.07	1.44	2.8	3.38	3.73	3.36	2.65	2.05	1.6	2.43	36.55
12 - 19	2.39	0.64	0.33	0.43	0.6	0.89	3.16	1.55	3.73	1.56	1.56	3.78	3.82	5.23	2.09	4.35	36.11
20 - 28	0.21	0.1	0.02	0	0	0.06	0.46	0.34	0.39	0.12	0.22	2.25	3.08	2.81	0.97	1.93	12.96
29 - 38	0	0	0	0	0	0	0	0.01	0.07	0.01	0	0.26	0.89	0.82	0.05	0.1	2.21
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0.05	0.02	0	0	0.07
Totals	6.12	2.97	1.97	2.28	2.86	4.2	7.56	3.97	7.73	5.94	6.45	10.57	11.35	11.72	5.07	9.24	100

Total Number of Valid Hours 8185
 Total Number of Hours 8784



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM ANNUAL REPORT

WIND ROSES ANNUAL 2016

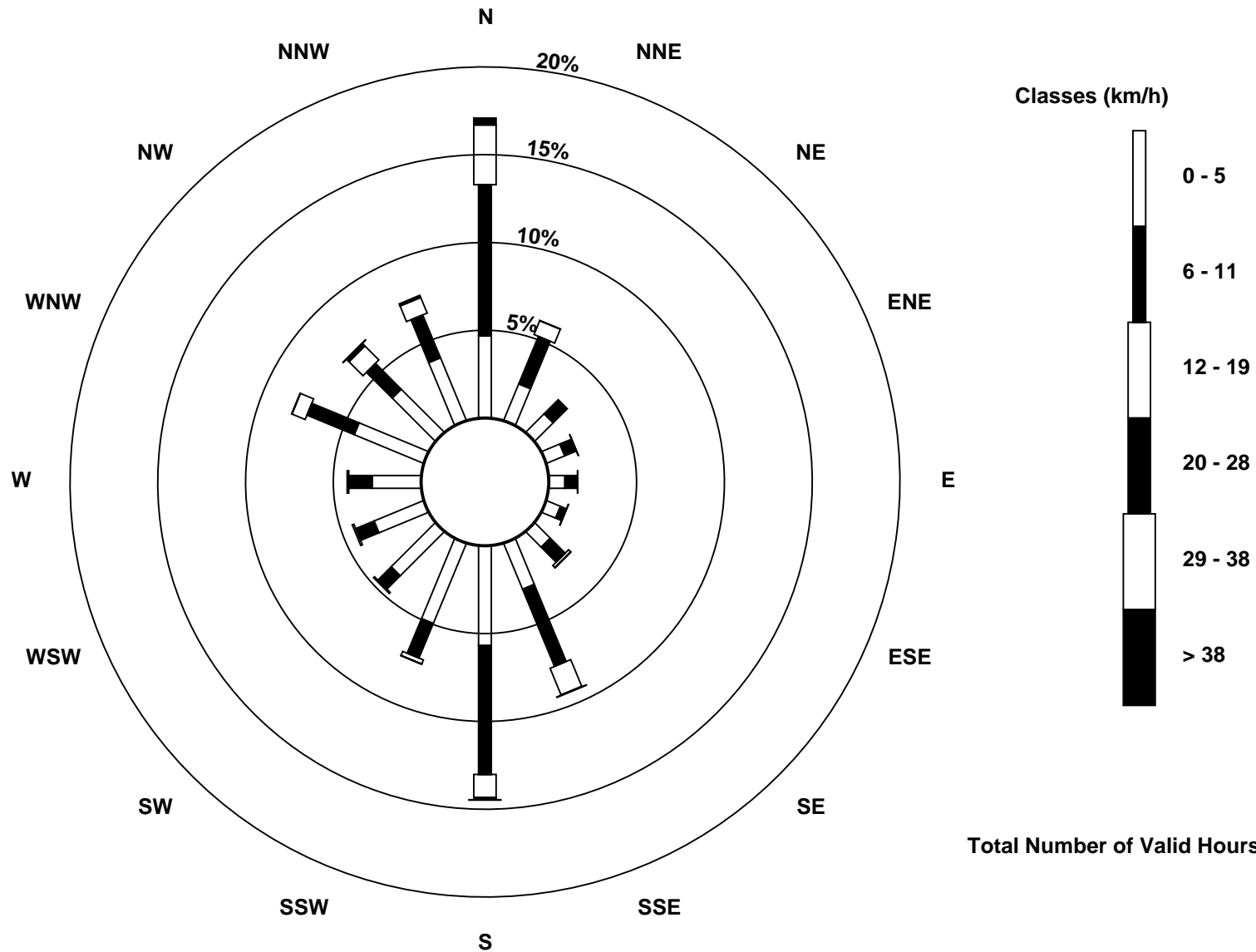
Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

March 2017



Wood Buffalo Environmental Association
Wind Rose 2016

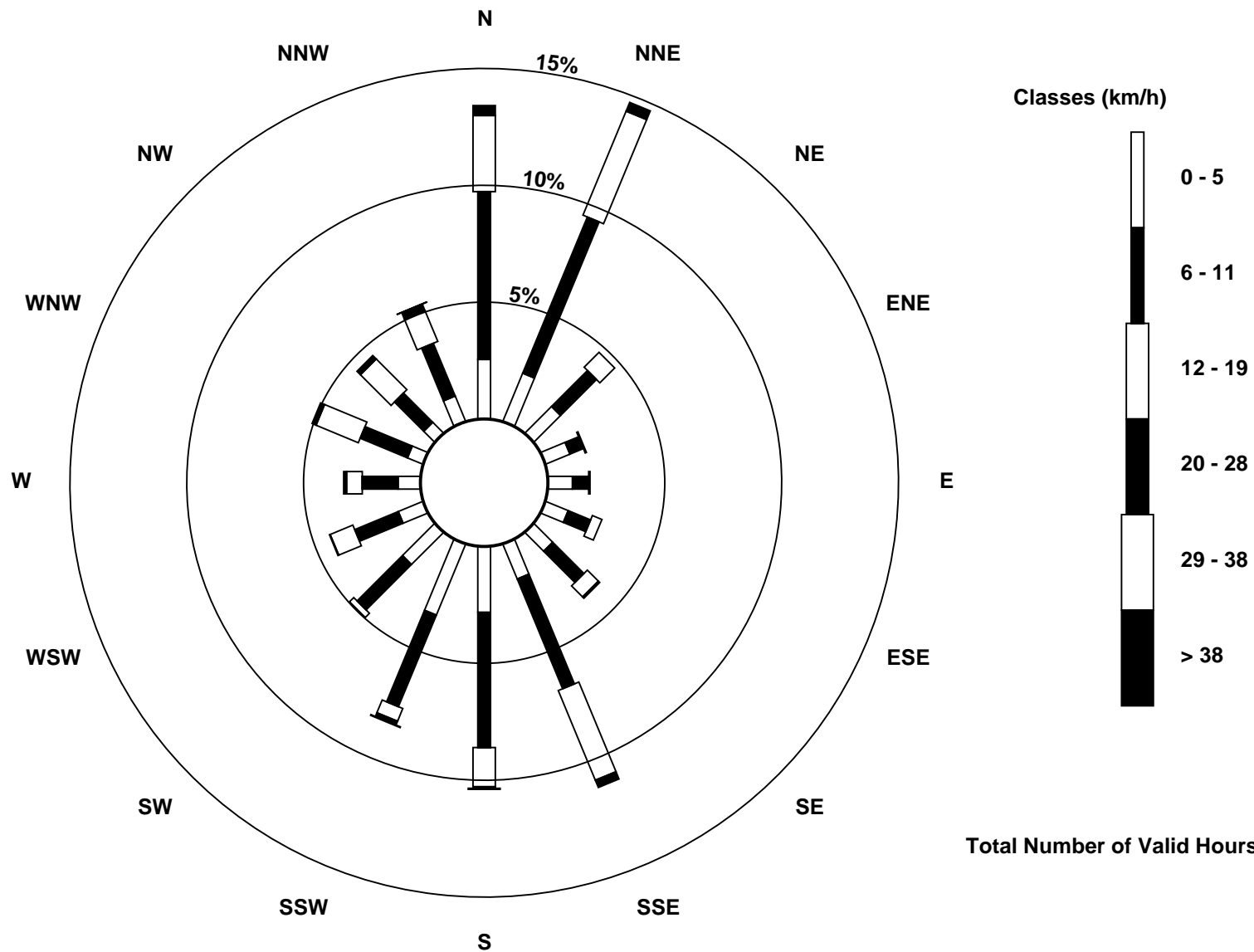
Wind Speed (WS) - km/h
Fort McKay - Bertha Ganter (AMS 1)





Wood Buffalo Environmental Association
Wind Rose 2016

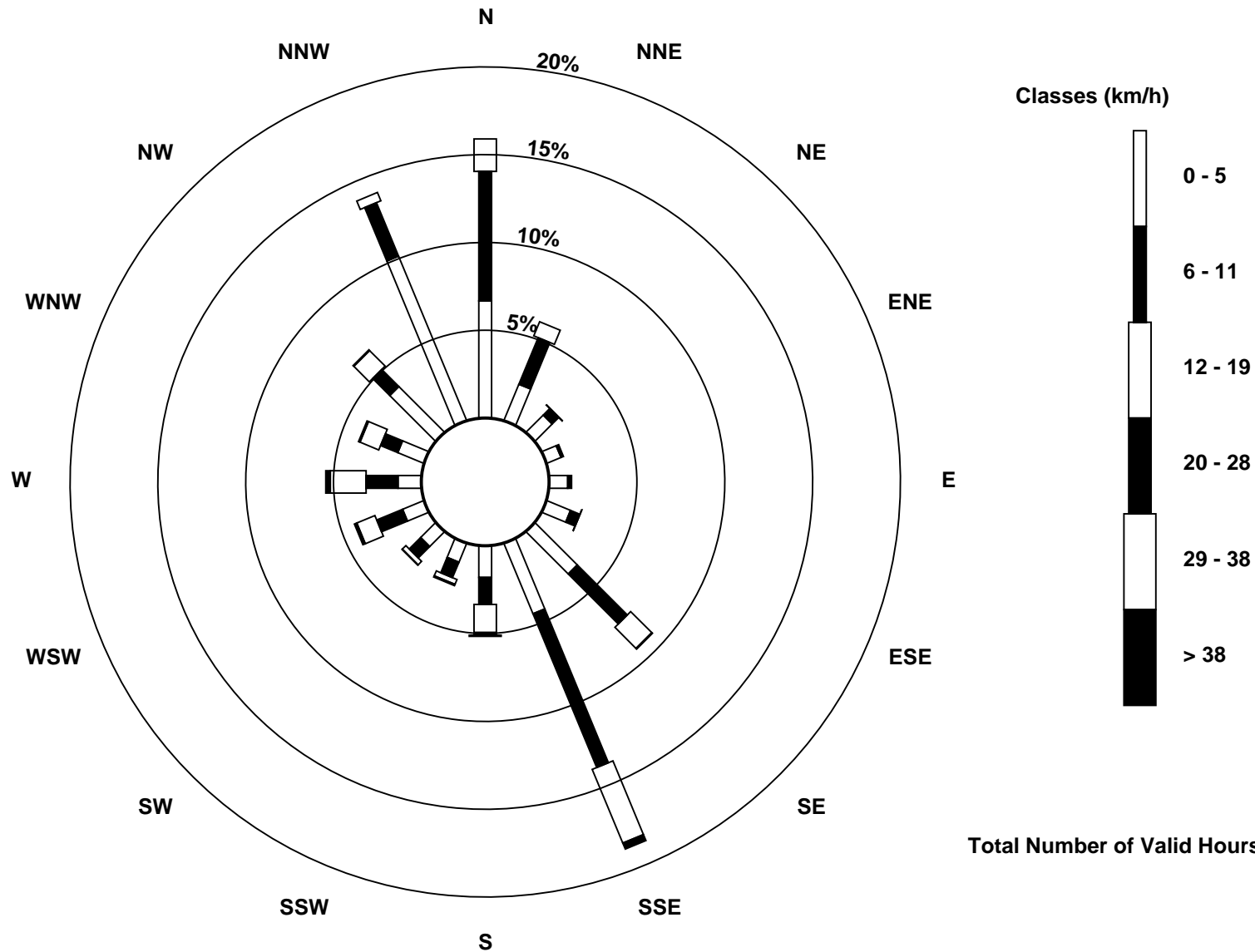
Wind Speed (WS) - km/h
Mildred Lake (AMS 2)





Wood Buffalo Environmental Association
Wind Rose 2016

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

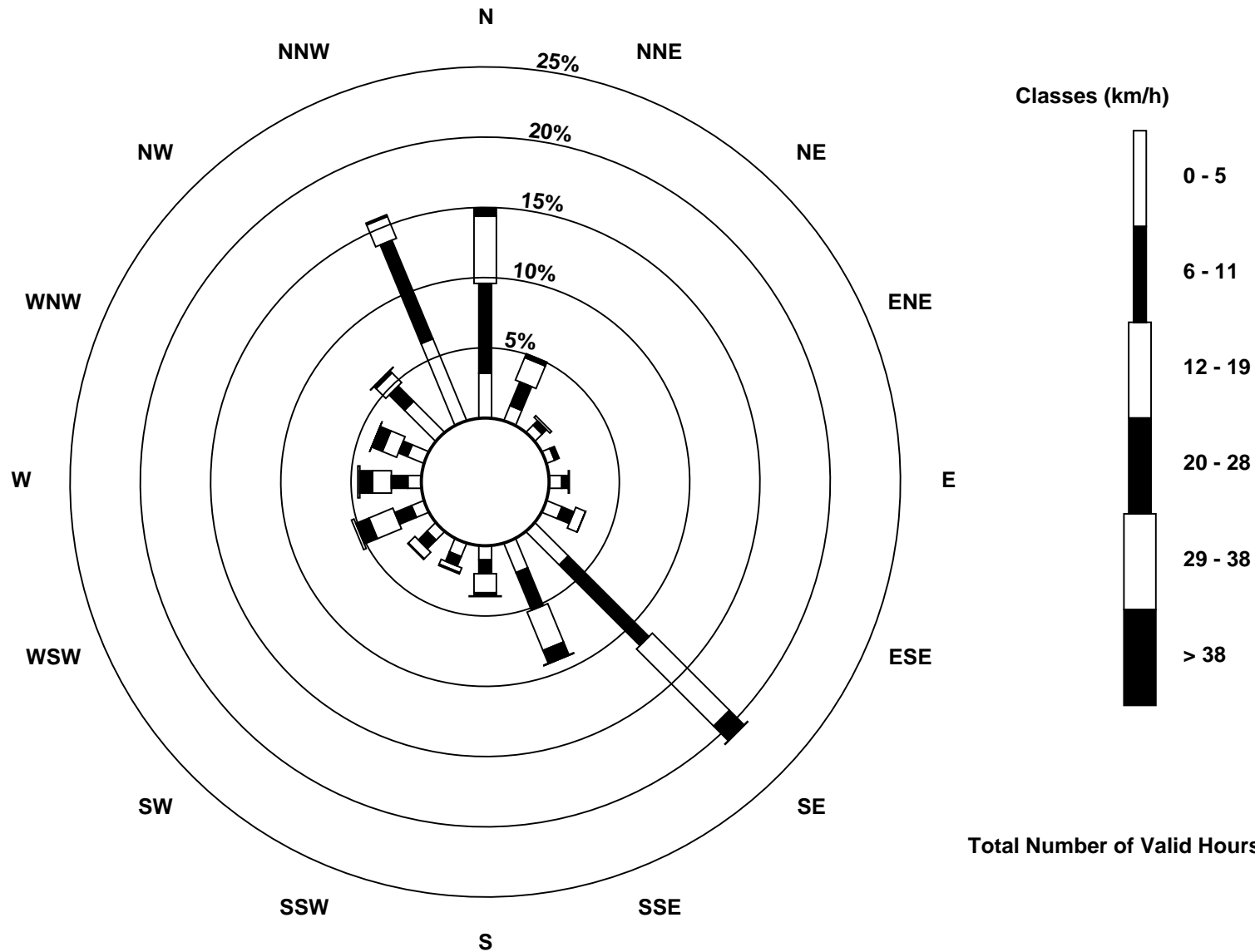


Total Number of Valid Hours: 8714



Wood Buffalo Environmental Association
Wind Rose 2016

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

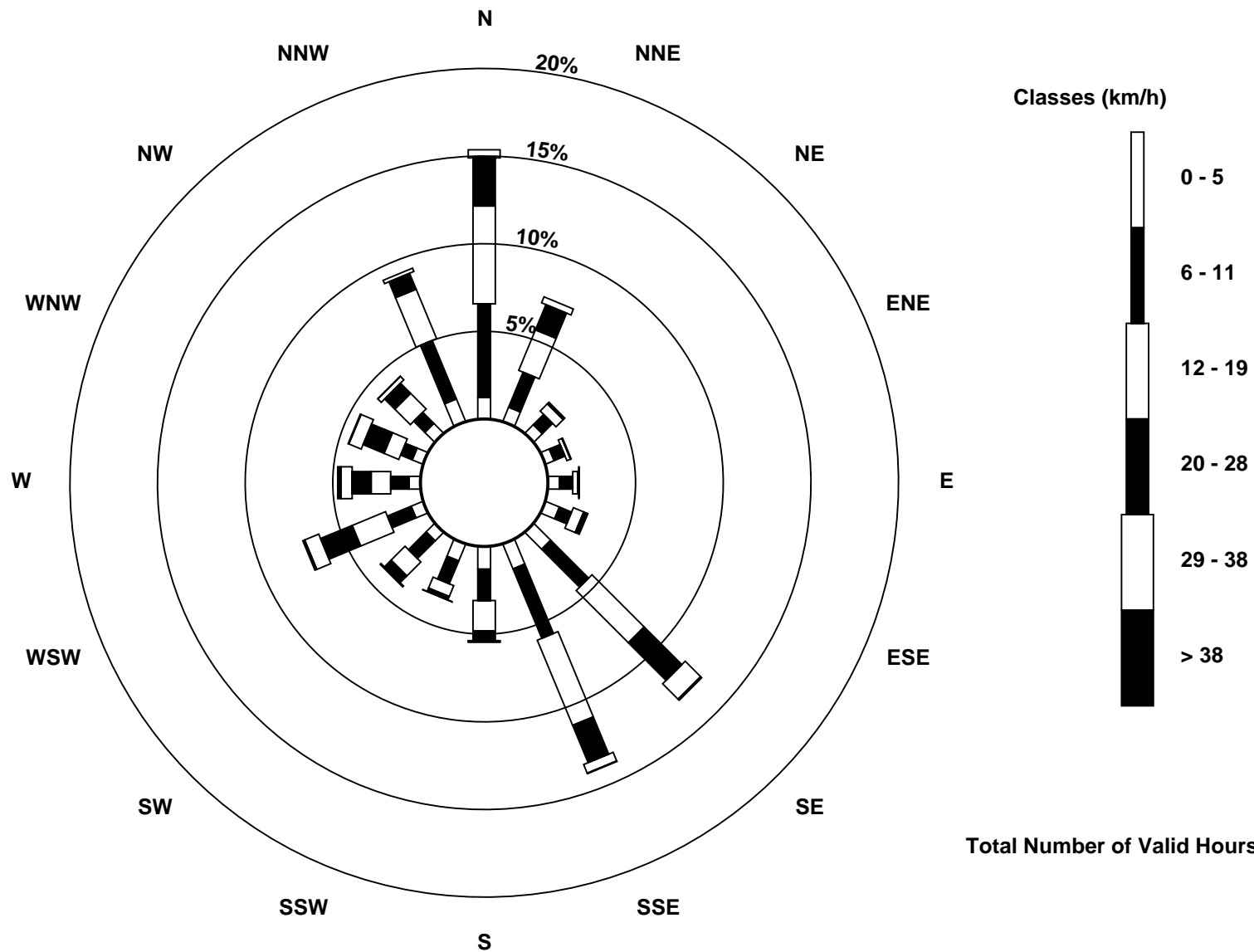


Total Number of Valid Hours: 7720



Wood Buffalo Environmental Association
Wind Rose 2016

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

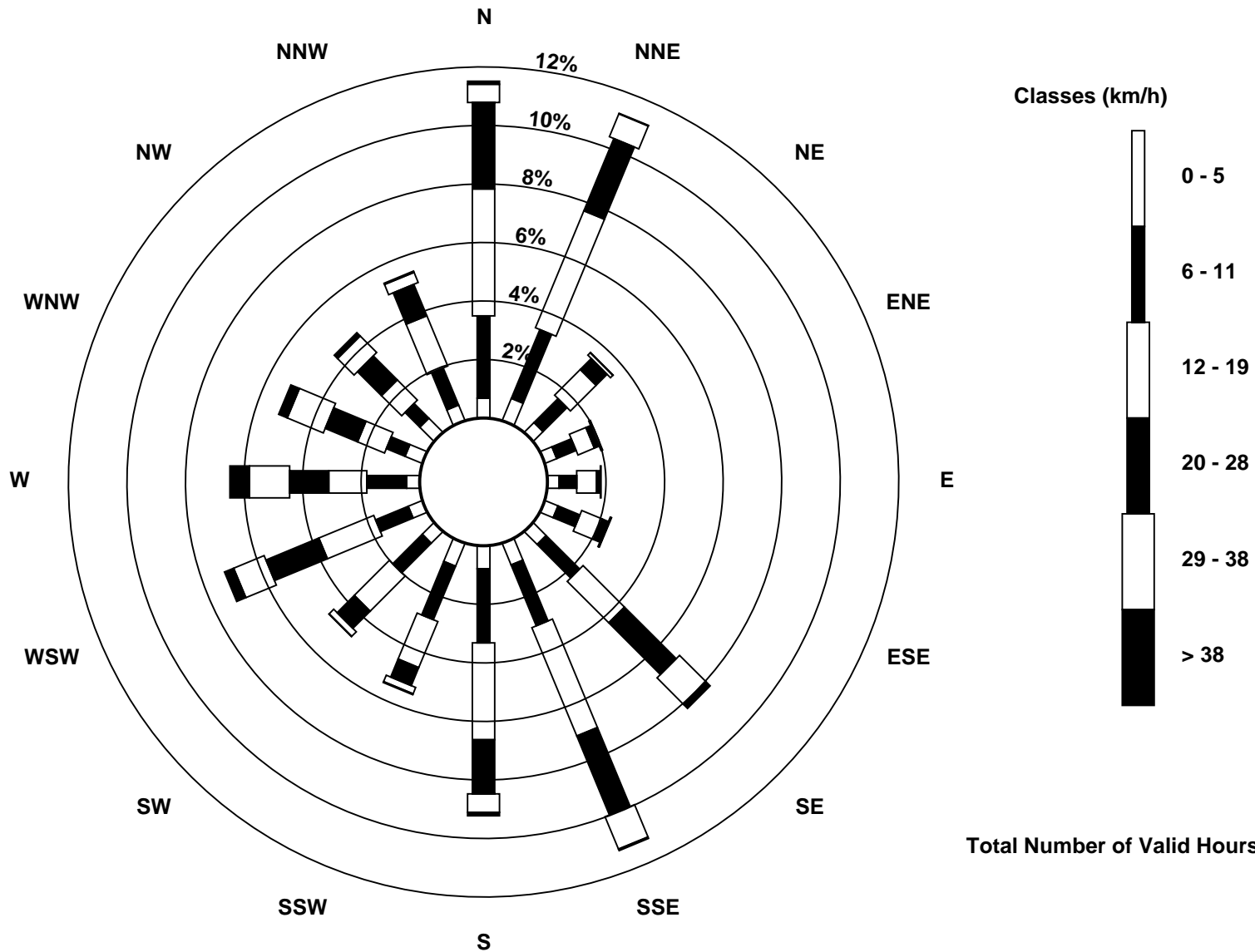


Total Number of Valid Hours: 8645



Wood Buffalo Environmental Association
Wind Rose 2016

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

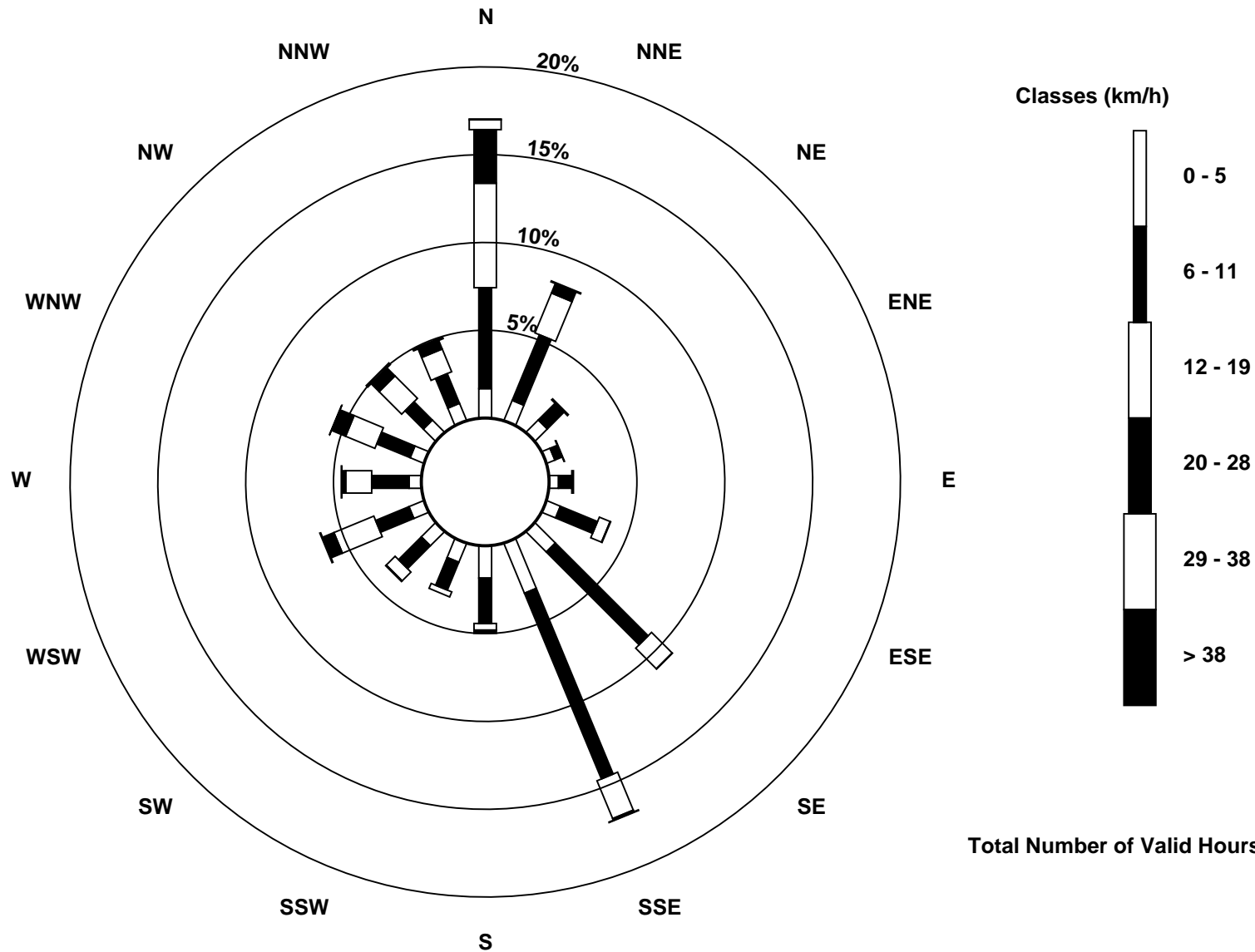


Total Number of Valid Hours: 8531



Wood Buffalo Environmental Association
Wind Rose 2016

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

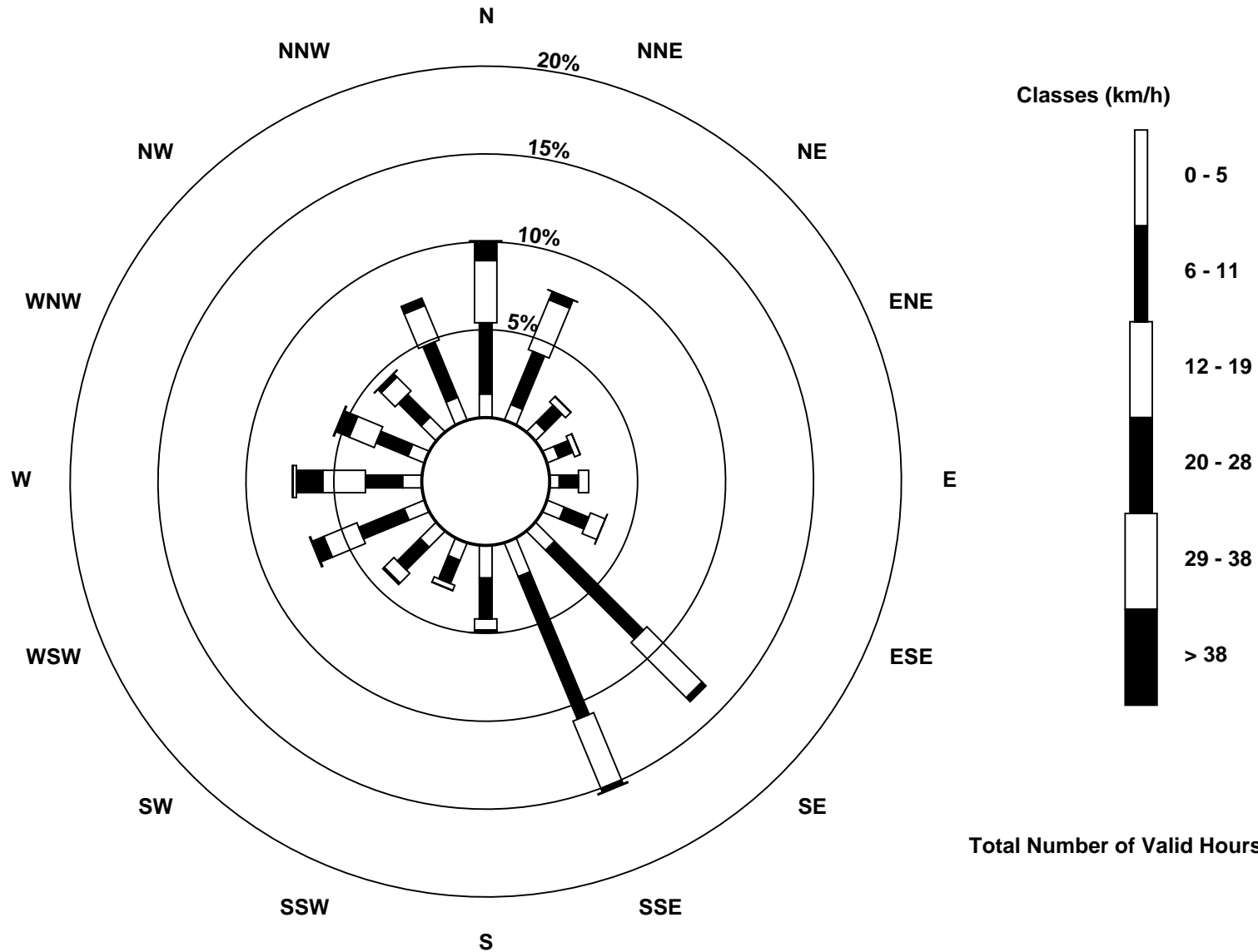


Total Number of Valid Hours: 8754



Wood Buffalo Environmental Association
Wind Rose 2016

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

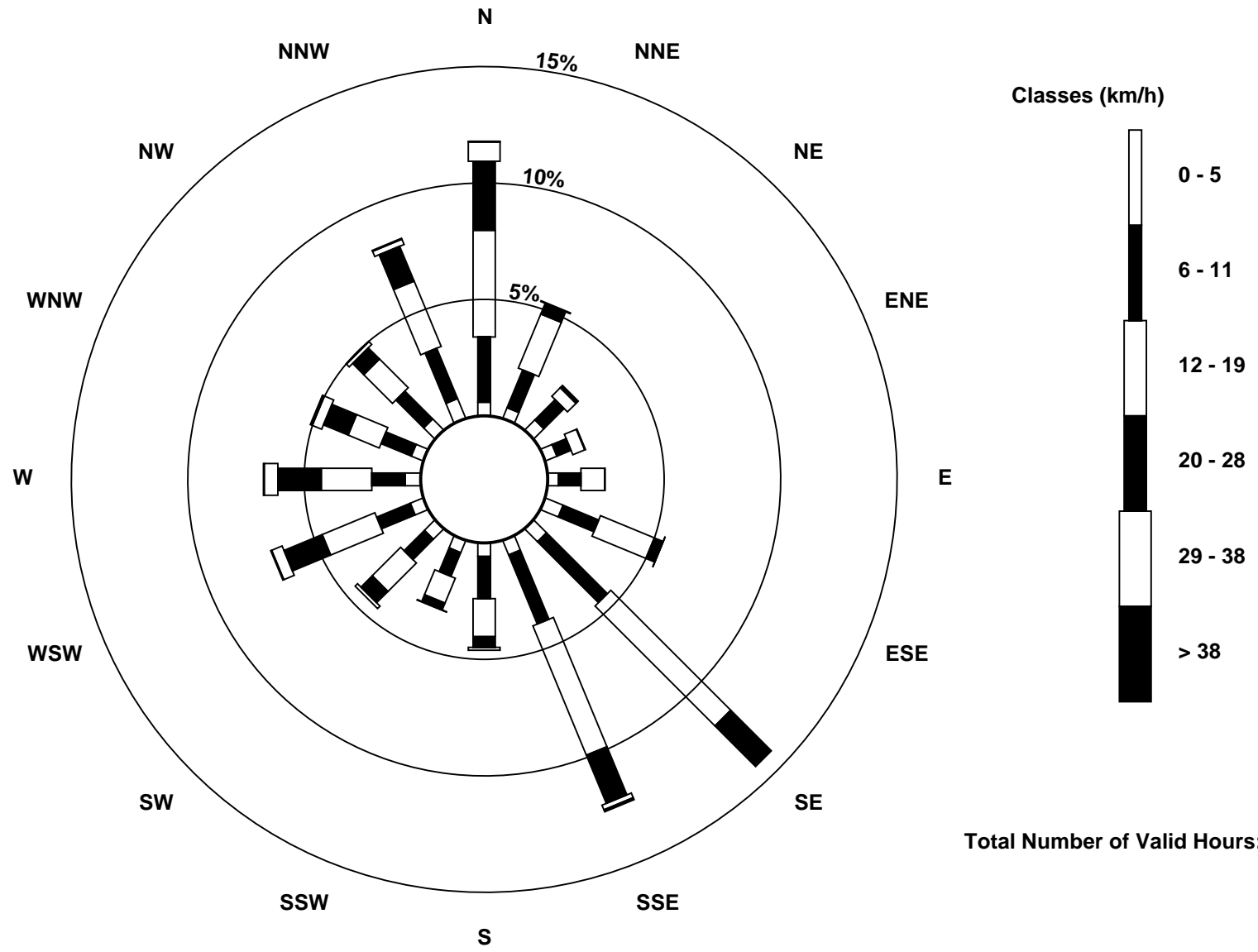


Total Number of Valid Hours: 8695



Wood Buffalo Environmental Association
Wind Rose 2016

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

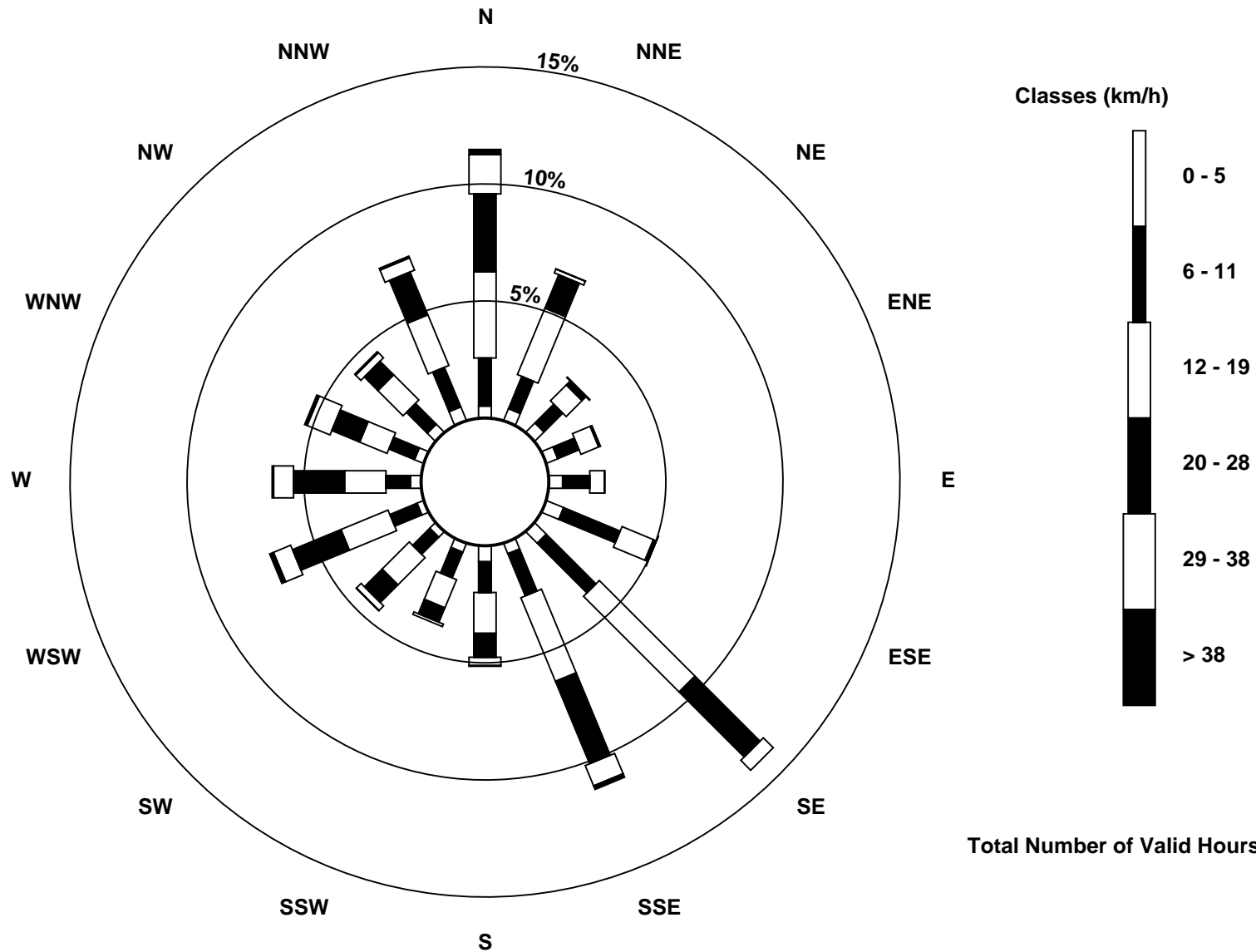


Total Number of Valid Hours: 8708



Wood Buffalo Environmental Association
Wind Rose 2016

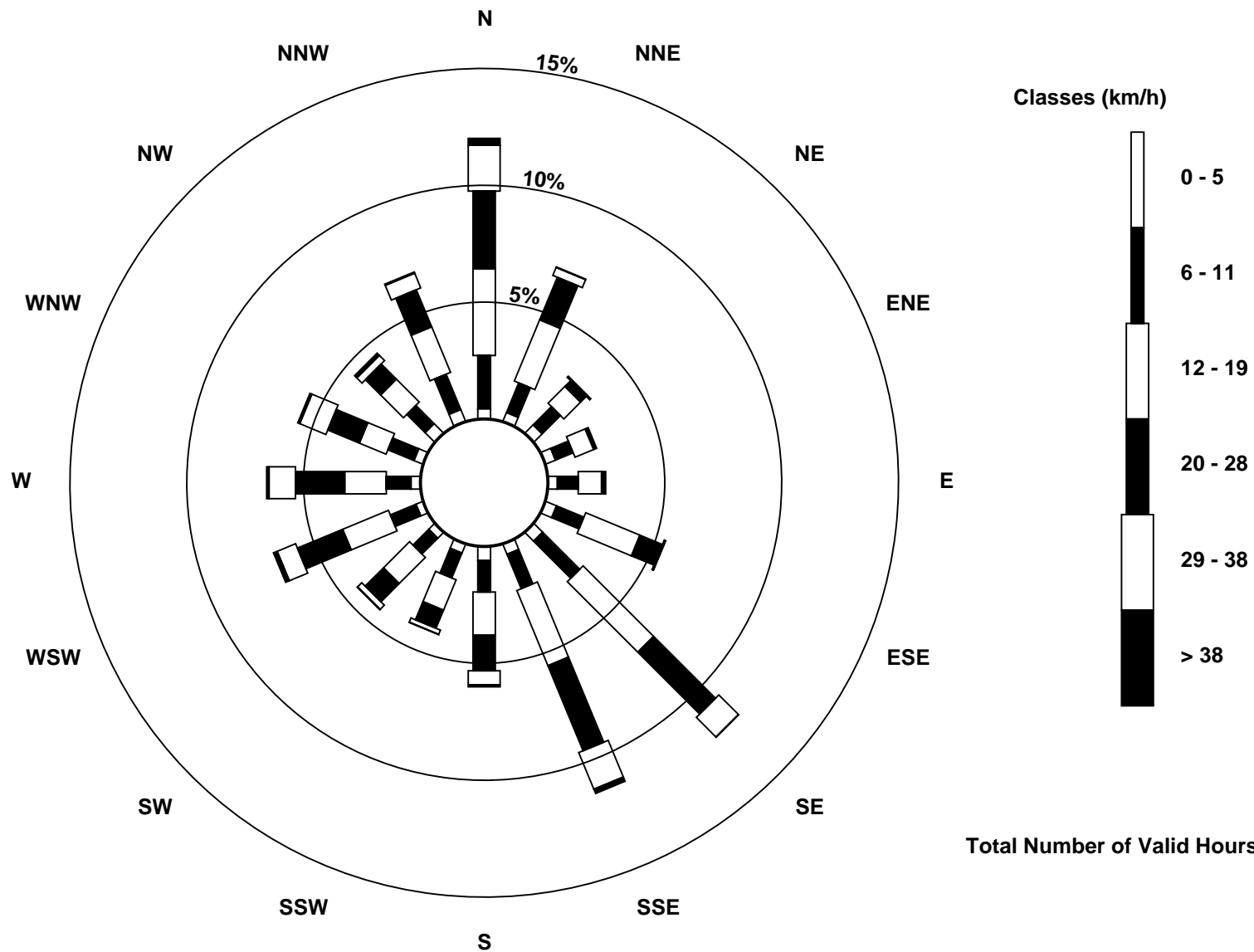
Wind Speed 75 m (WS75m) - km/h
Mannix (AMS 5)





Wood Buffalo Environmental Association
Wind Rose 2016

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

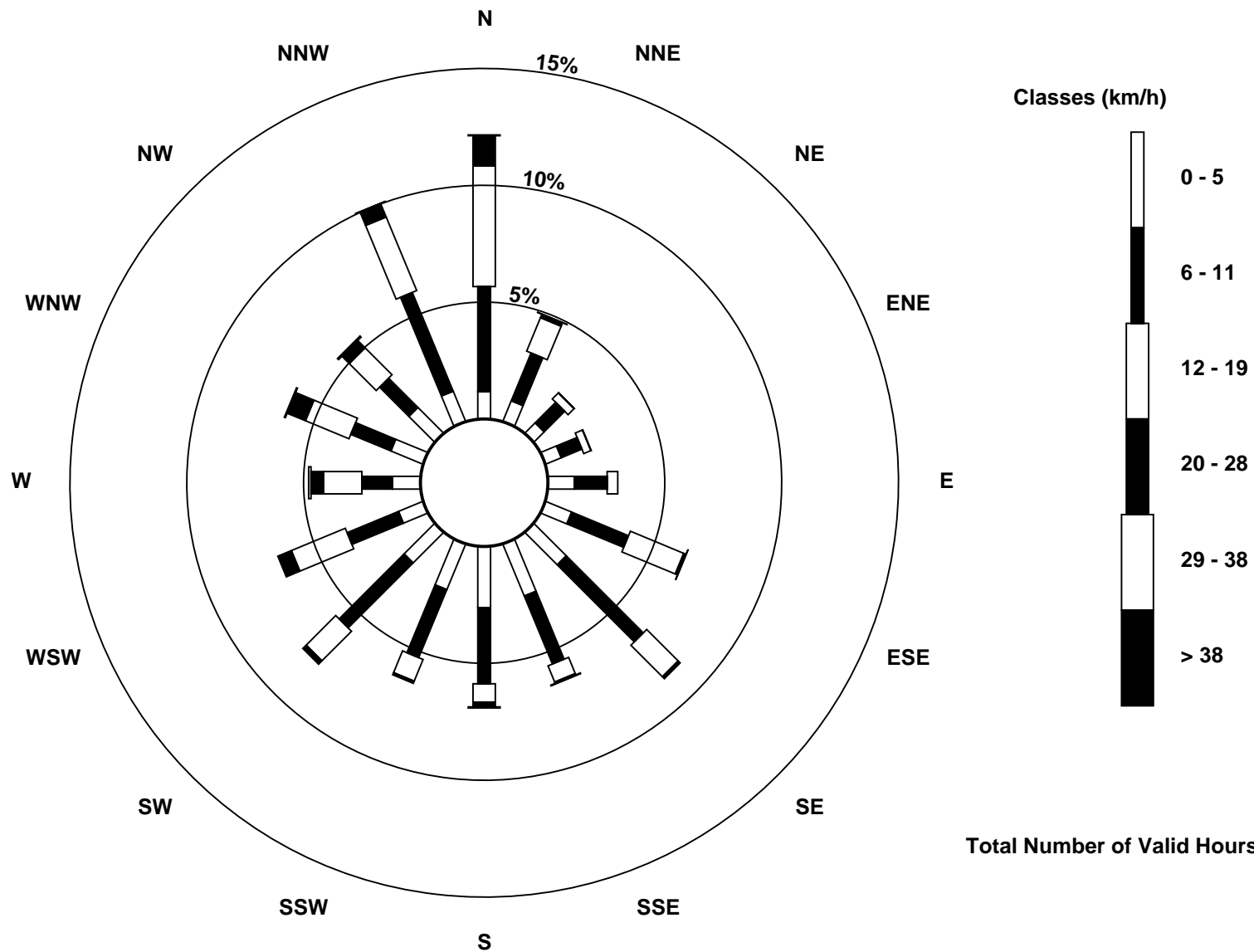


Total Number of Valid Hours: 8676



Wood Buffalo Environmental Association
Wind Rose 2016

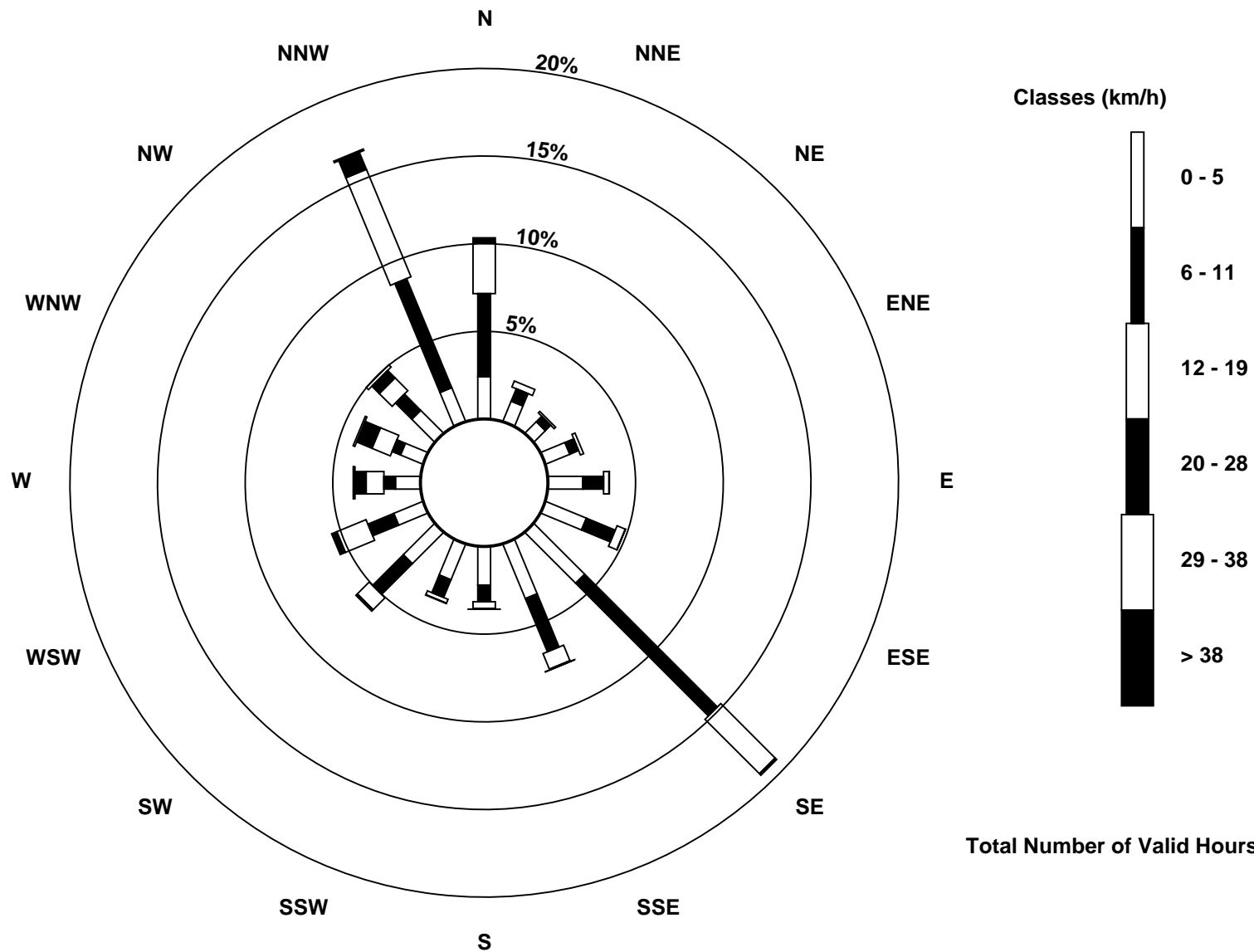
Wind Speed (WS) - km/h
Patricia McInnes (AMS 6)





Wood Buffalo Environmental Association
Wind Rose 2016

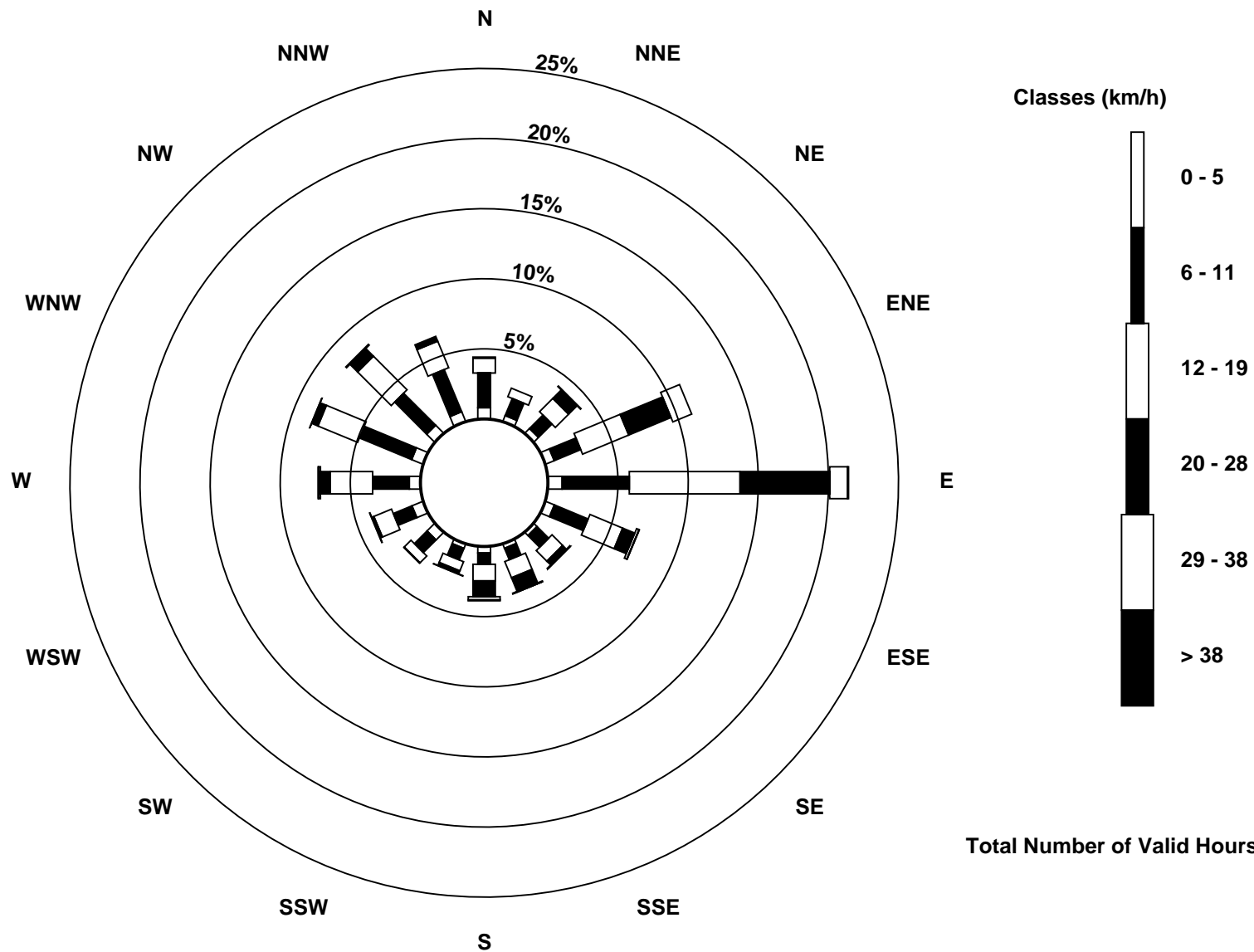
Wind Speed (WS) - km/h
Athabasca Valley (AMS 7)





Wood Buffalo Environmental Association
Wind Rose 2016

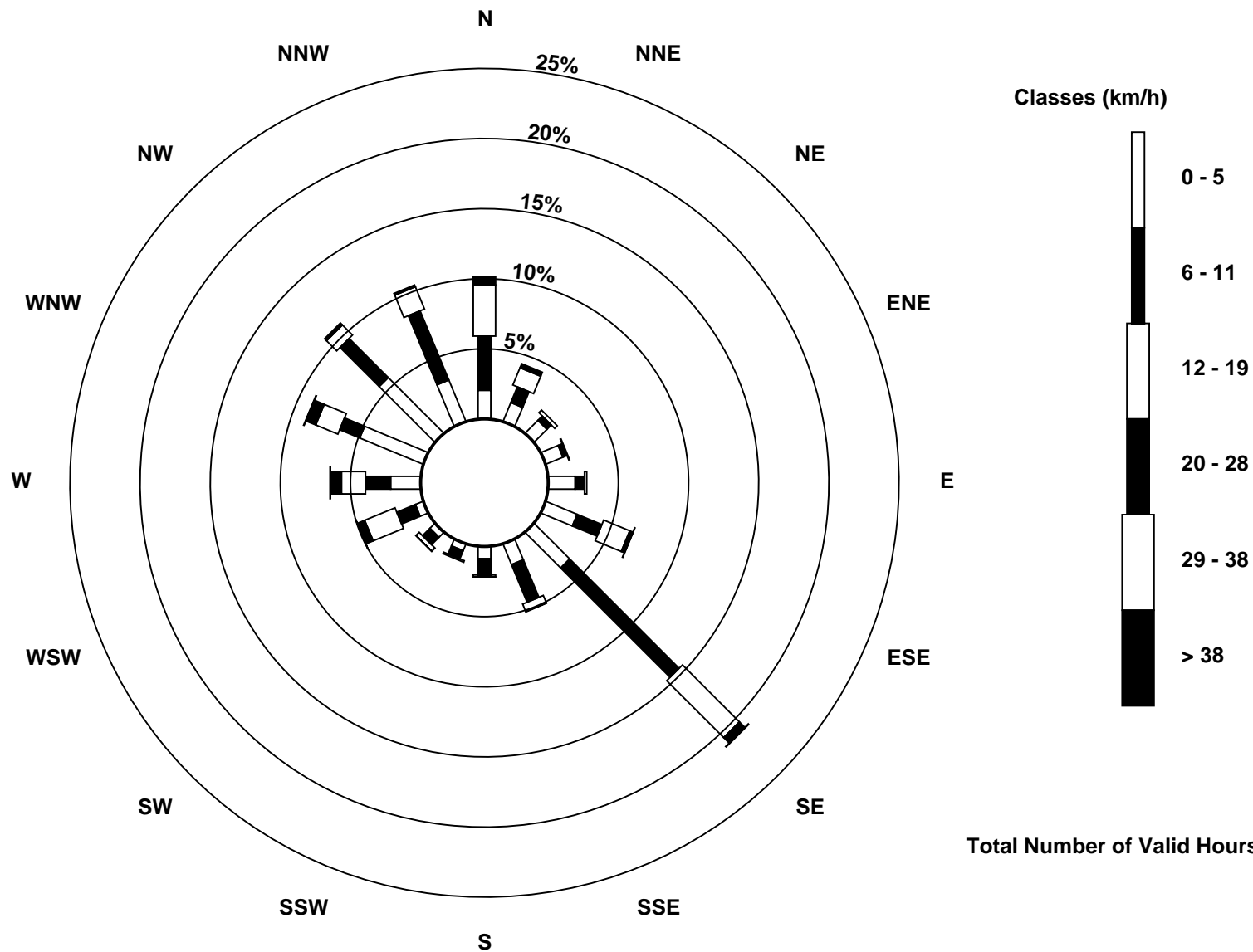
Wind Speed (WS) - km/h
Fort Chipewyan (AMS 8)





Wood Buffalo Environmental Association
Wind Rose 2016

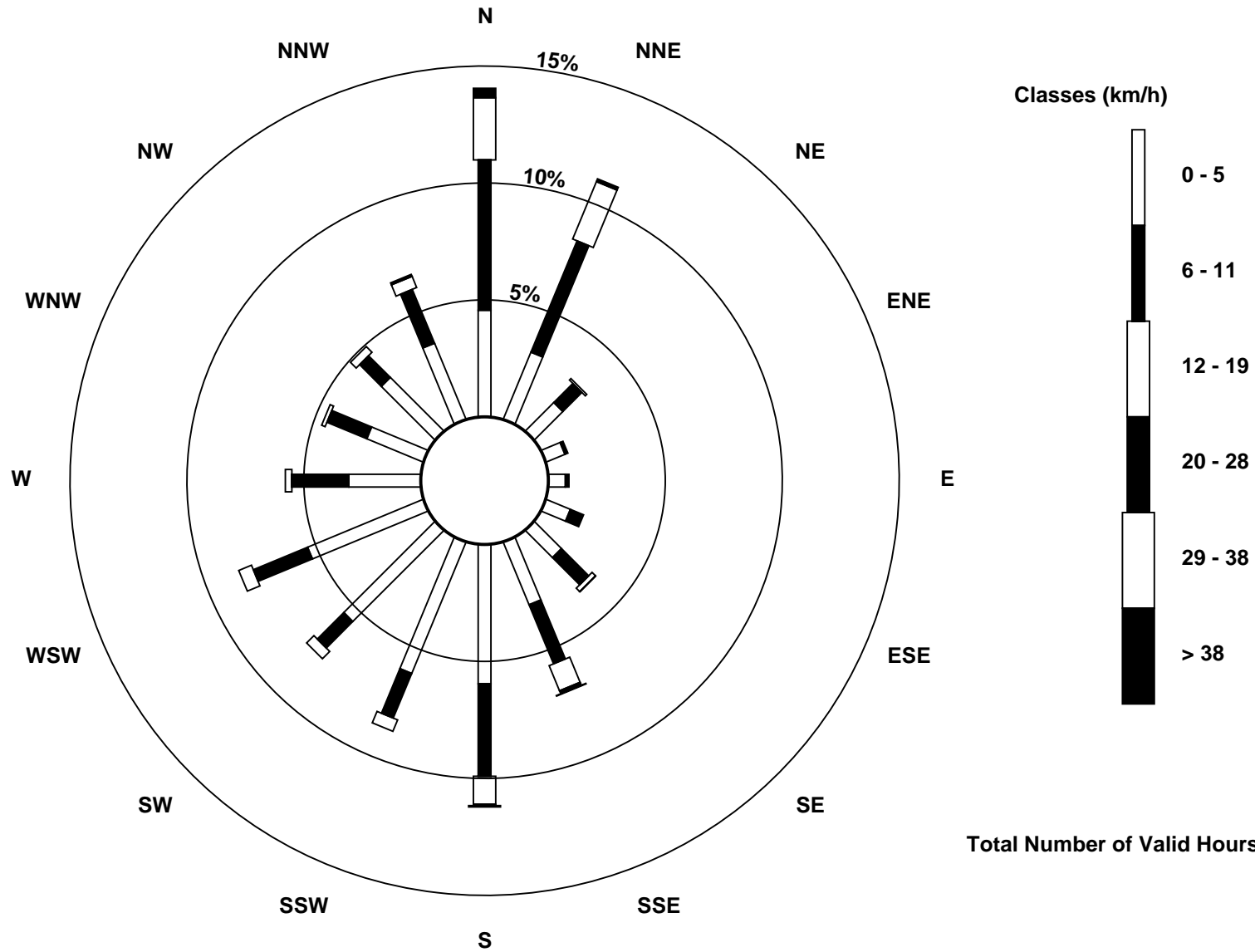
Wind Speed (WS) - km/h
Lower Camp (AMS 11)





Wood Buffalo Environmental Association
Wind Rose 2016

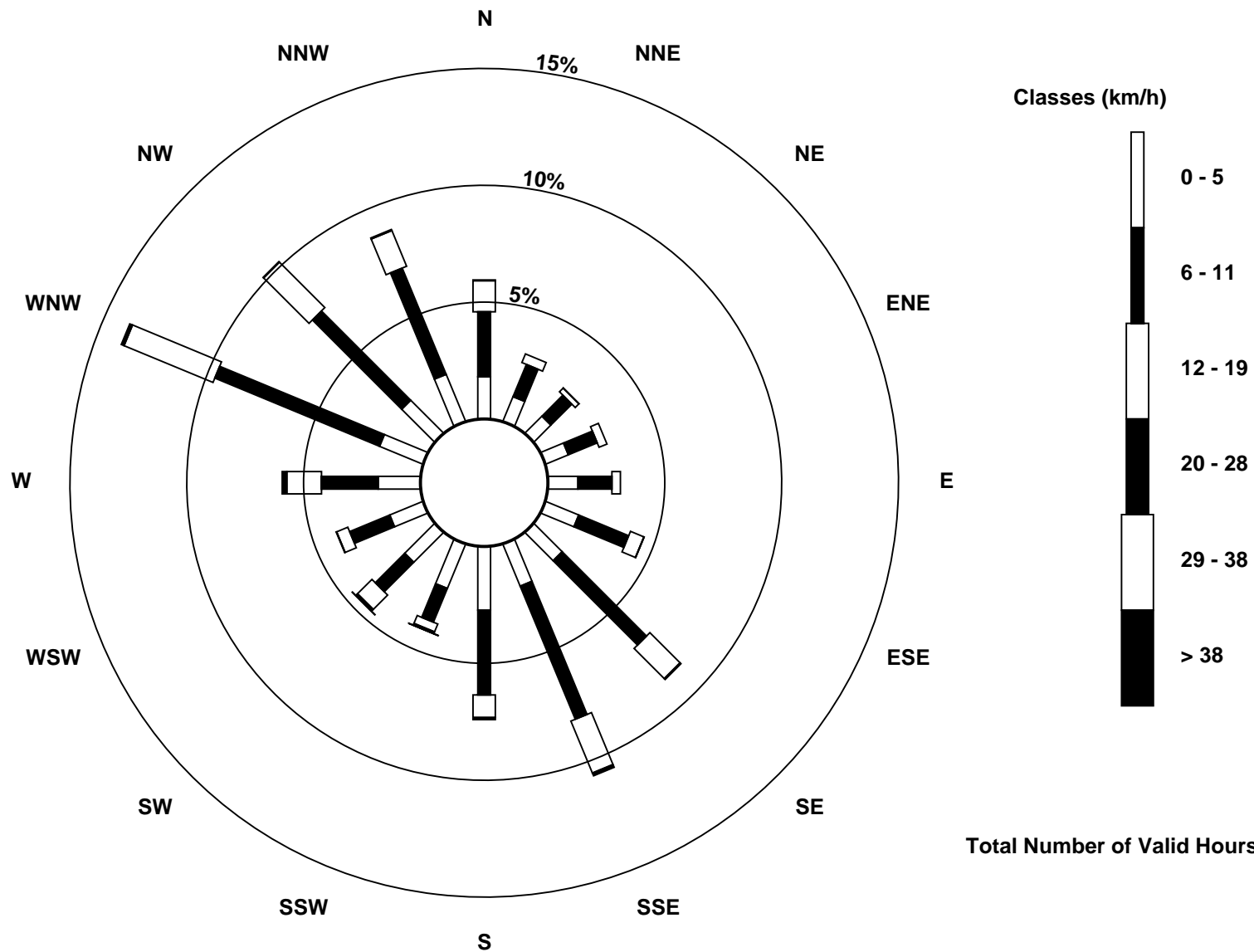
Wind Speed (WS) - km/h
Fort McKay South (AMS 13)





Wood Buffalo Environmental Association
Wind Rose 2016

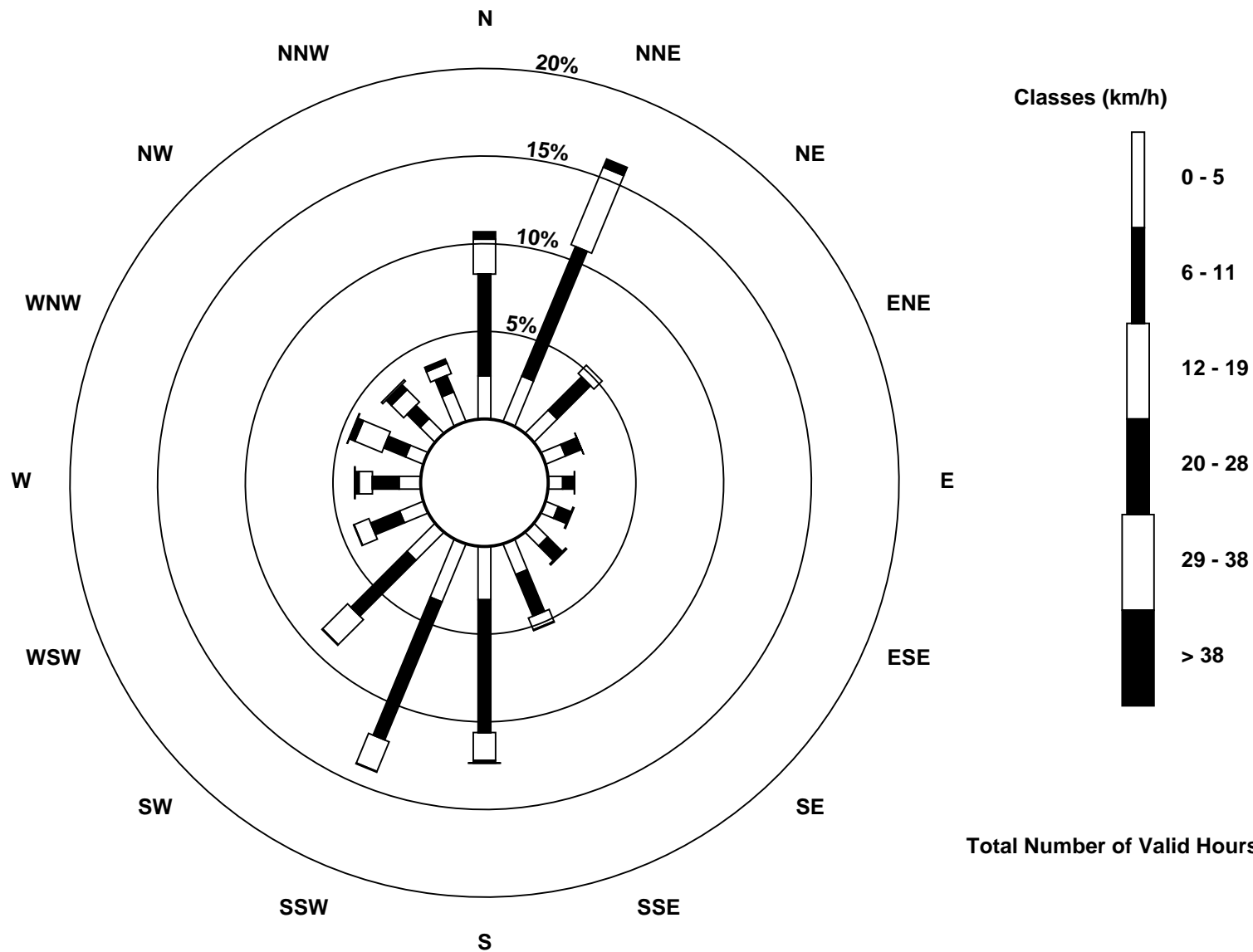
Wind Speed (WS) - km/h
Anzac (AMS 14)





Wood Buffalo Environmental Association
Wind Rose 2016

Wind Speed (WS) - km/h
CNRL Horizon (AMS 15)

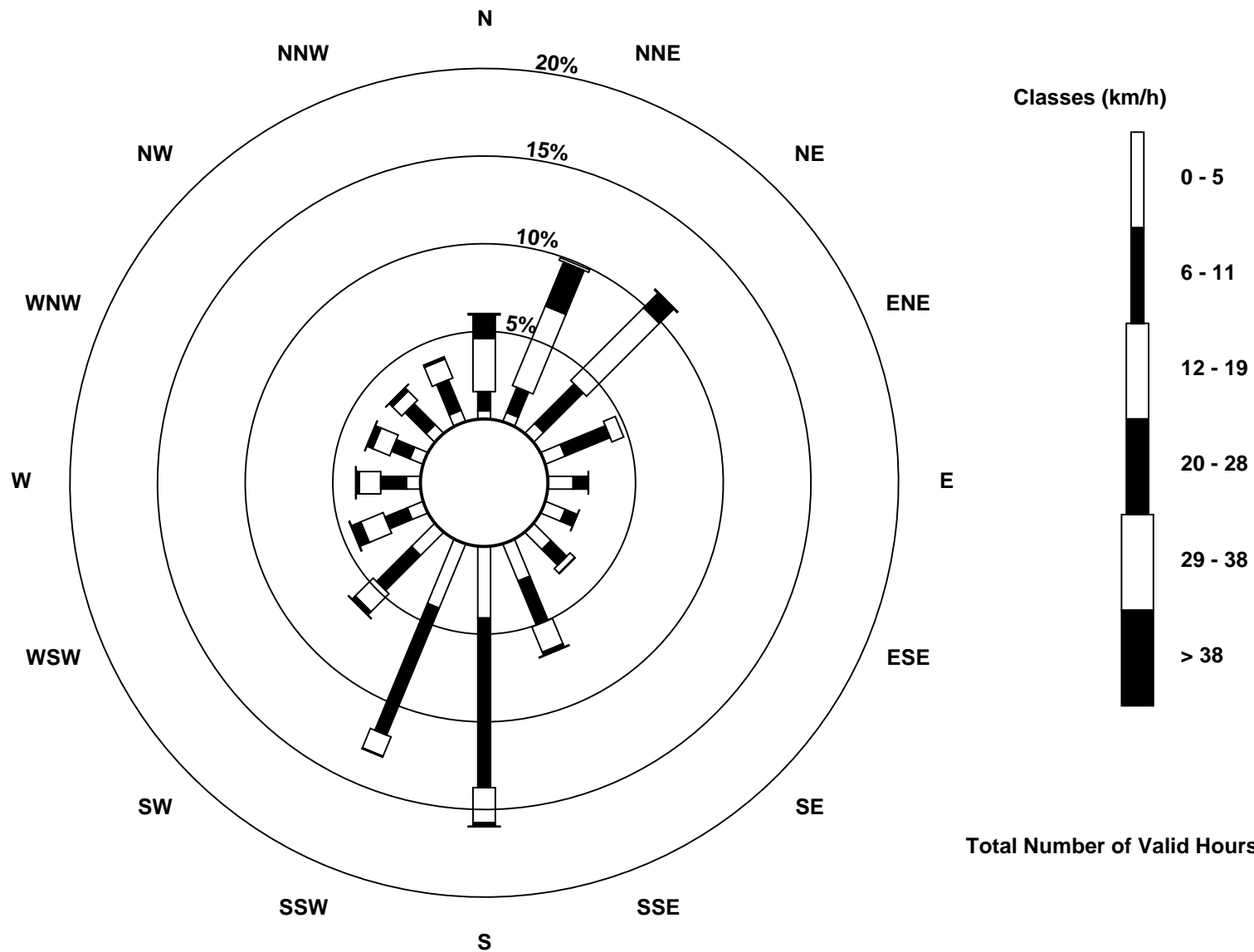


Total Number of Valid Hours: 8674



Wood Buffalo Environmental Association
Wind Rose 2016

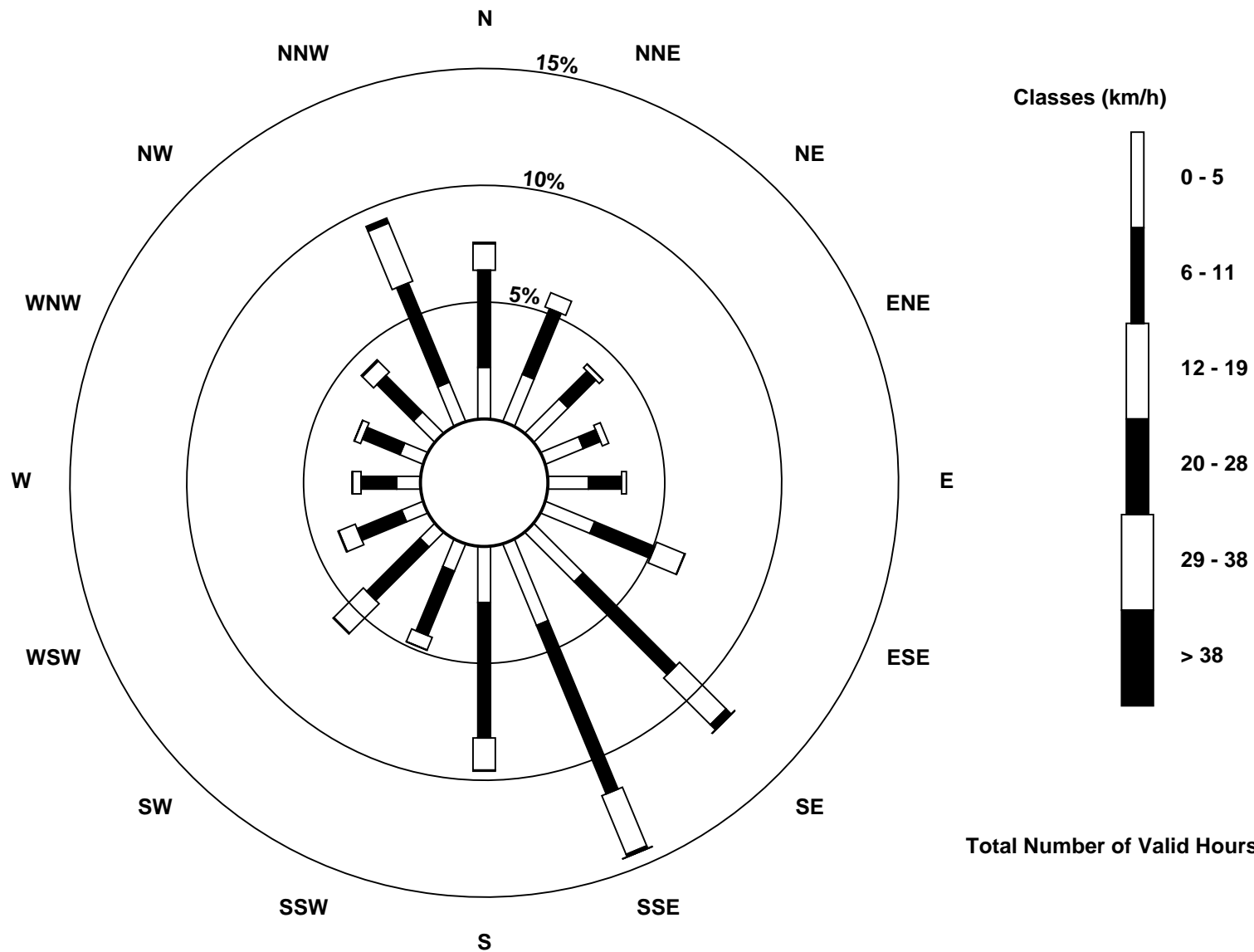
Wind Speed (WS) - km/h
Shell Muskeg River (AMS 16)





Wood Buffalo Environmental Association
Wind Rose 2016

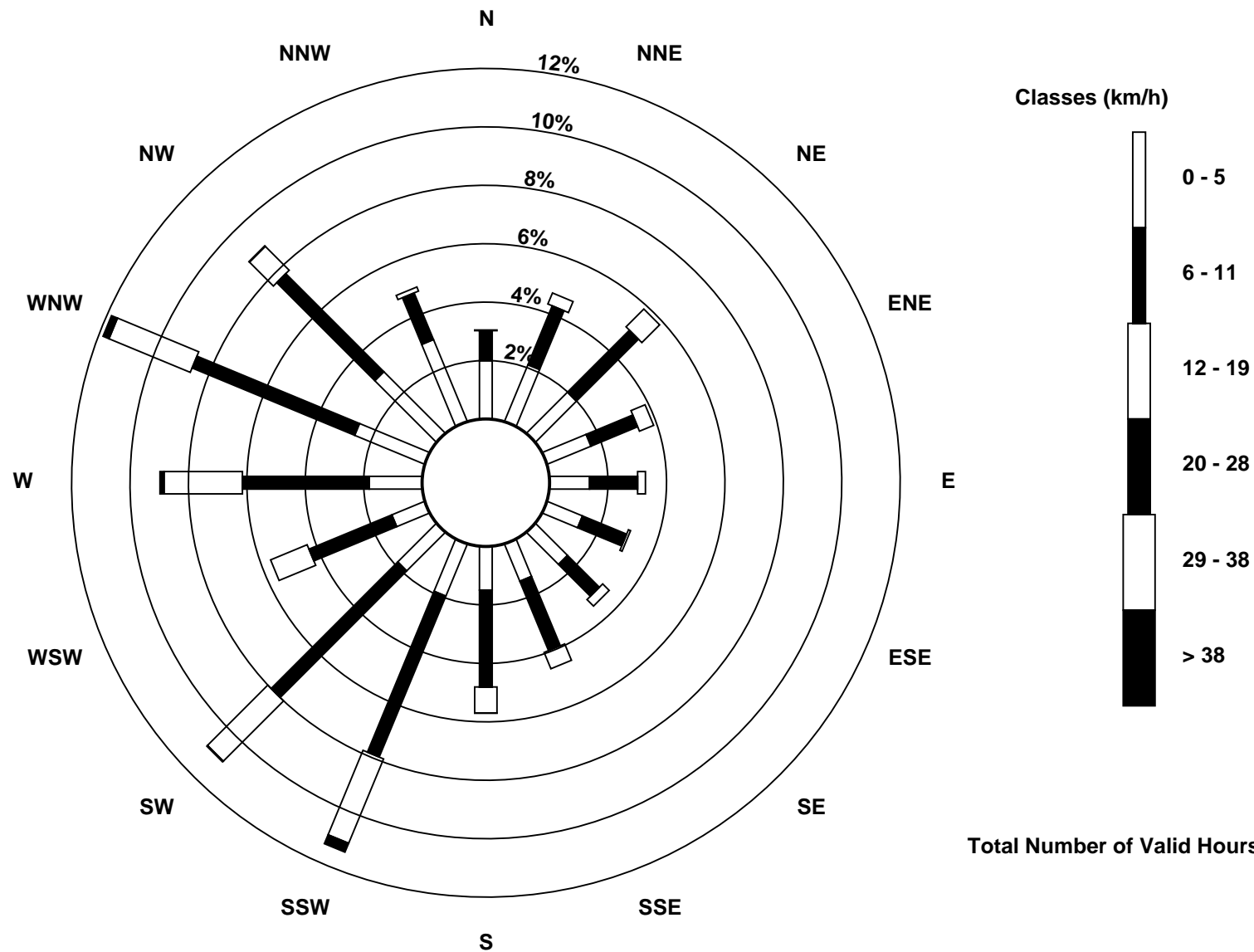
Wind Speed (WS) - km/h
Wapasu (AMS 17)





Wood Buffalo Environmental Association
Wind Rose 2016

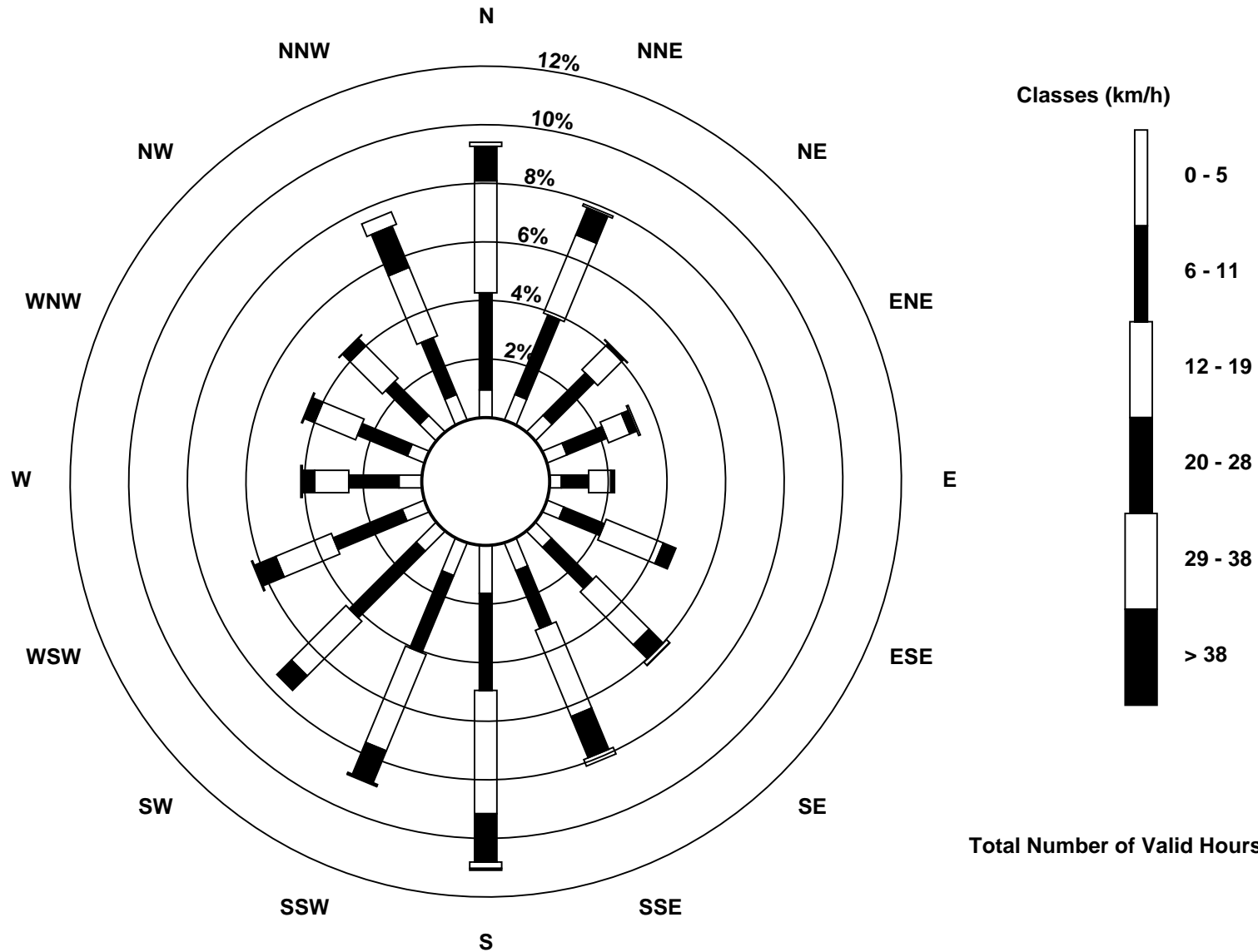
Wind Speed (WS) - km/h
Stony Mountain (AMS 18)





Wood Buffalo Environmental Association
Wind Rose 2016

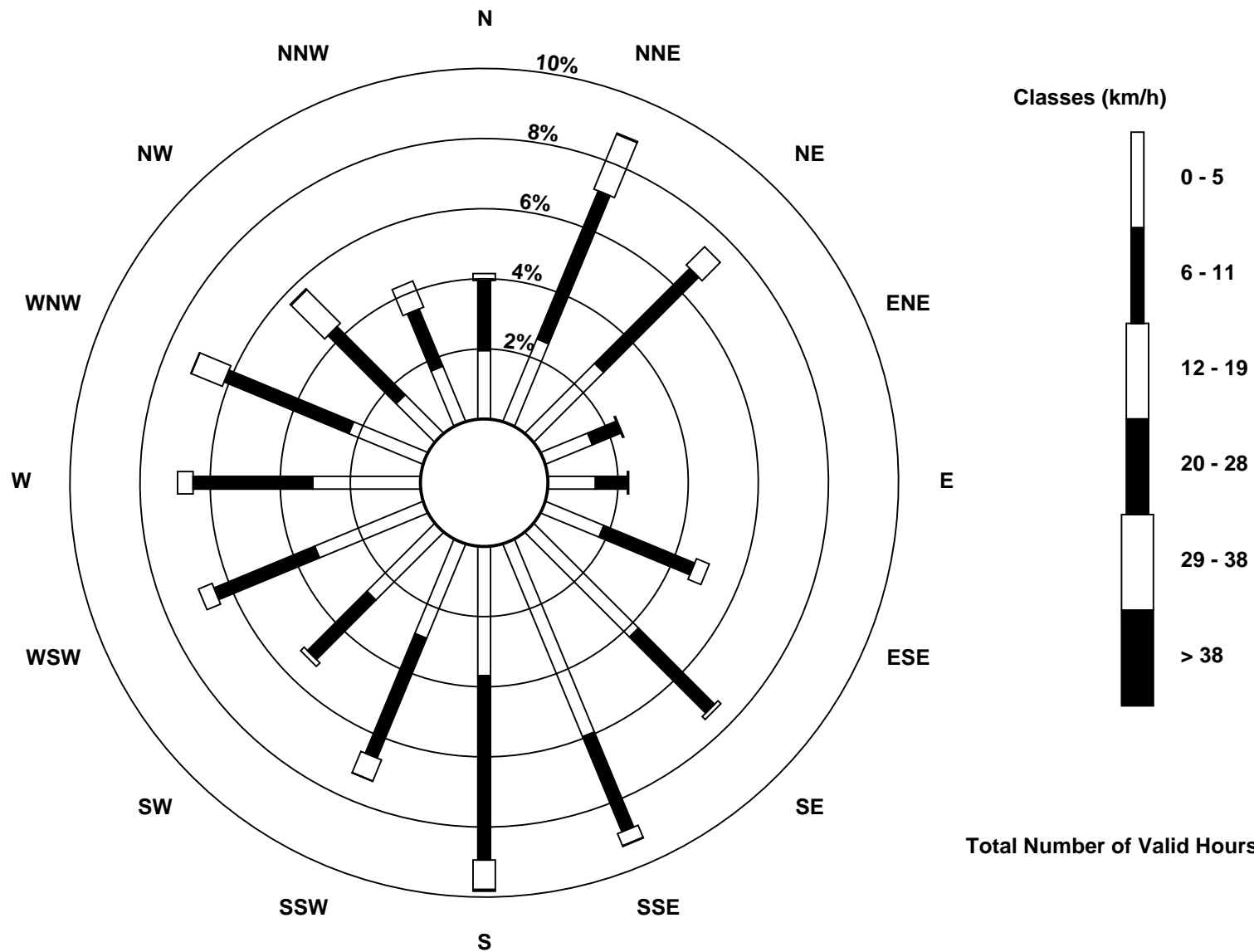
Wind Speed (WS) - km/h
Firebag (AMS 19)





Wood Buffalo Environmental Association
Wind Rose 2016

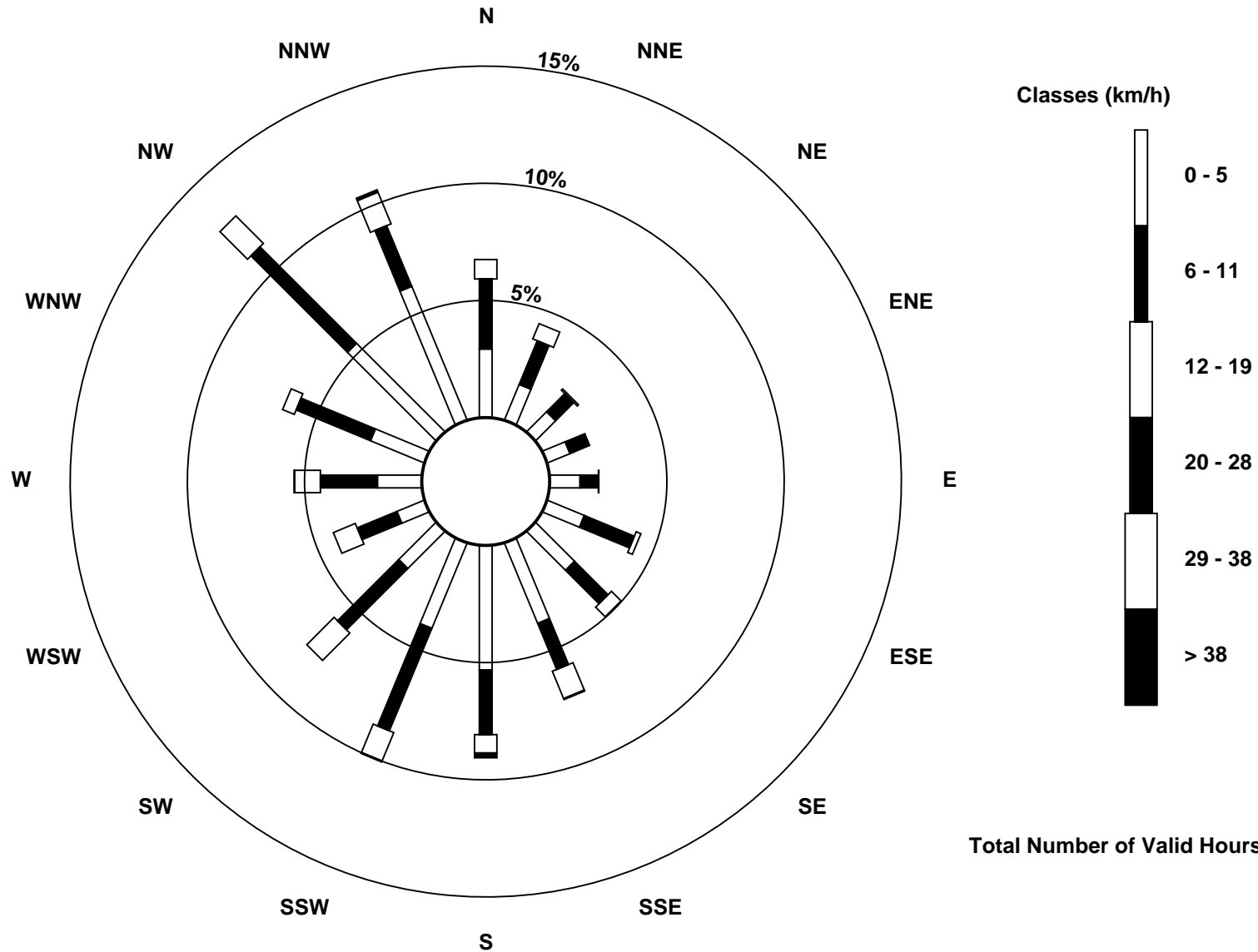
Wind Speed (WS) - km/h
Brion MacKay River (AMS 20)





Wood Buffalo Environmental Association
Wind Rose 2016

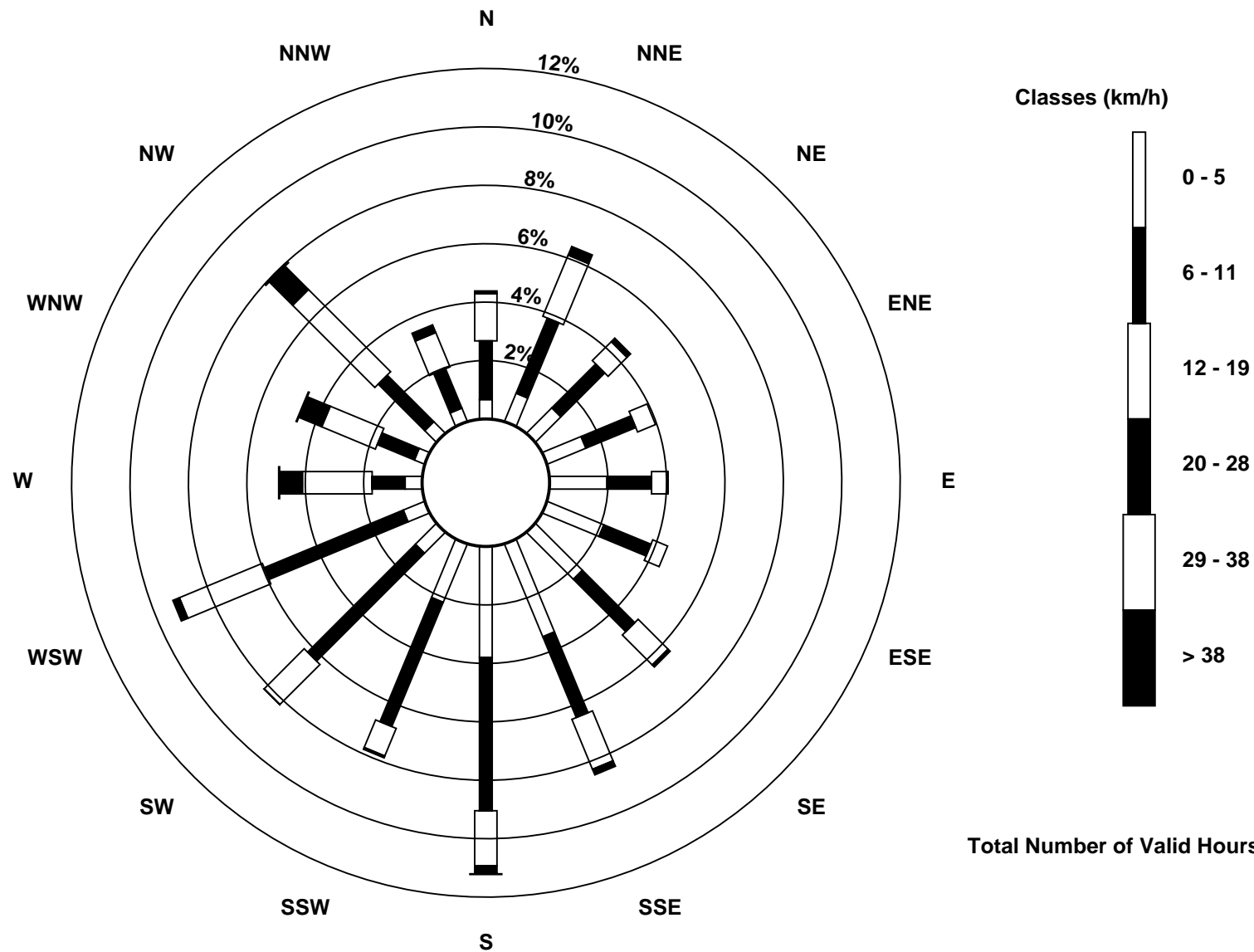
Wind Speed (WS) - km/h
Conklin Community (AMS 21)





Wood Buffalo Environmental Association
Wind Rose 2016

Wind Speed (WS) - km/h
Cenovus - Christina Lake (AMS500)

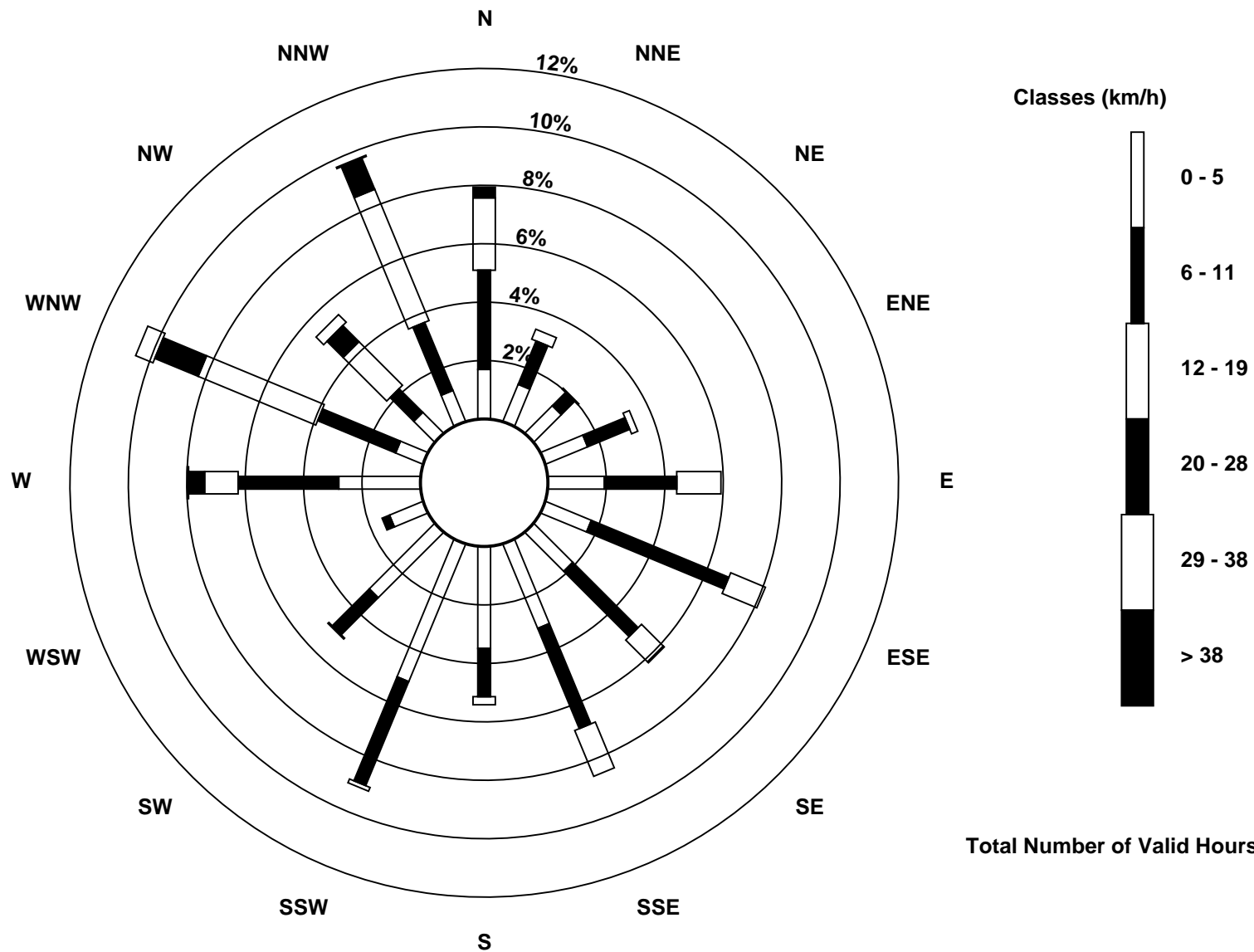


Total Number of Valid Hours: 8714



Wood Buffalo Environmental Association
Wind Rose 2016

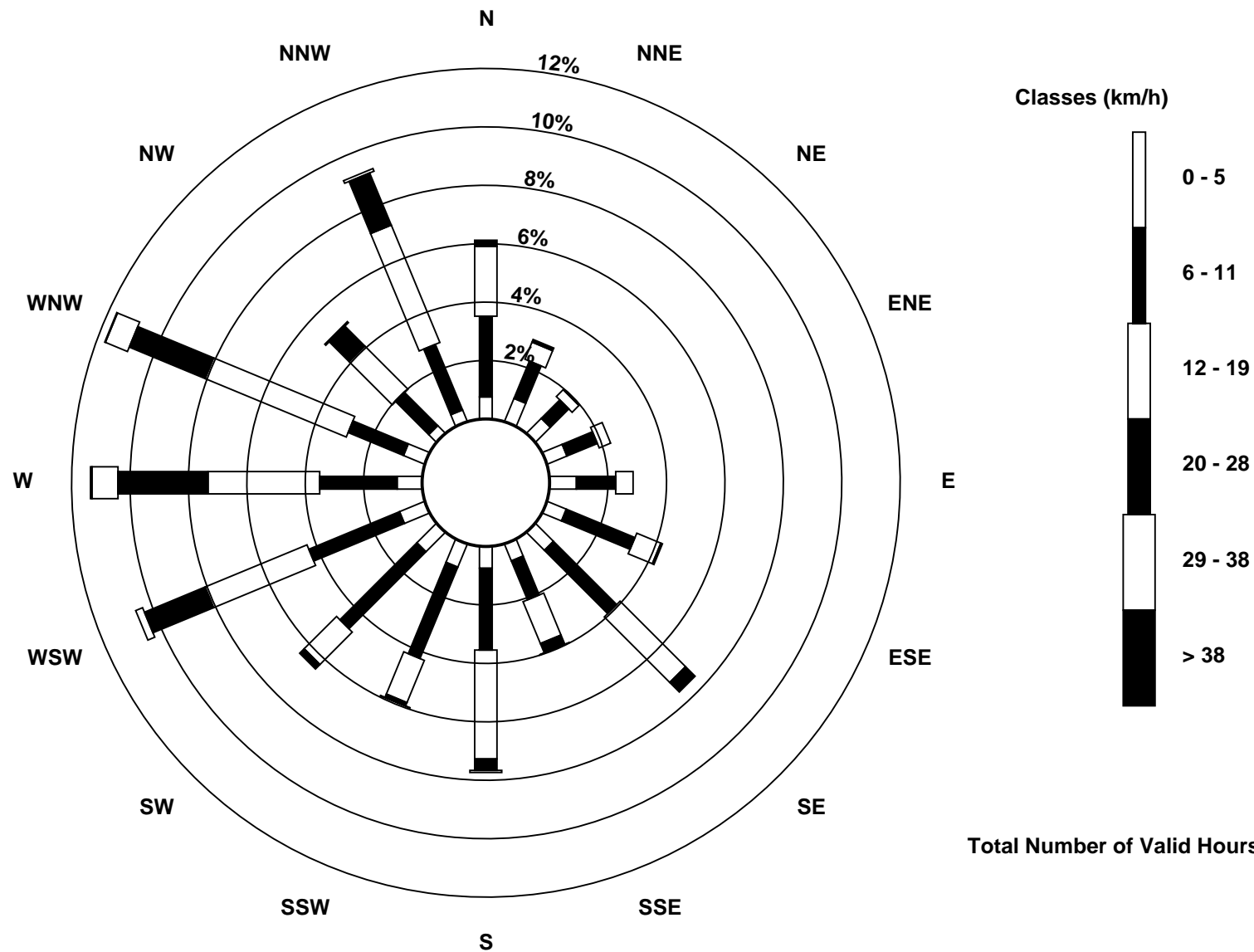
Wind Speed (WS) - km/h
Statoil - Leismer (AMS501)





Wood Buffalo Environmental Association
Wind Rose 2016

Wind Speed (WS) - km/h
ConocoPhillips - Surmont (AMS502)



Total Number of Valid Hours: 8185



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM ANNUAL REPORT

APPENDIX I: AAAQO EXCEEDANCES 2016

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

March 2017



Site	Parameter	Date/Time	Reference	Period	Reported	Final	Status
AMS 2 Mildred Lake	H ₂ S	26Jan16:24:00	307675	24-hour	4	3.3	nae
AMS 11 Lower Camp	H ₂ S	24Jan16:13:00	307599	1-hour	11	11	exc
AMS 14 Anzac	TRS	08Jan16:04:00	307152	1-hour	10	-	ret
AMS 16 Shell Muskeg River	PM _{2.5}	16Jan16:24:00	307379	24-hour	35	34.6	exc
AMS 2 Mildred Lake	H ₂ S	26Feb16:08:00	308687	1-hour	10	10	nae
AMS 5 Mannix	H ₂ S	11Feb16:24:00	308232	24-hour	3	-	ret
AMS 5 Mannix	H ₂ S	22Feb16:02:00	308506	1-hour	16	-	ret
AMS 5 Mannix	H ₂ S	22Feb16:05:00	308506	1-hour	10	-	ret
AMS 5 Mannix	H ₂ S	22Feb16:06:00	308506	1-hour	17	-	ret
AMS 5 Mannix	H ₂ S	22Feb16:24:00	308506	24-hour	3	-	ret
AMS 11 Lower Camp	H ₂ S	08Feb16:15:00	308091	1-hour	15	15	exc
AMS 11 Lower Camp	H ₂ S	08Feb16:16:00	308091	1-hour	13	13	exc
AMS 1 Fort McKay	PM _{2.5}	6May 16, 24:00	311135	24-hour	119	120	exc
AMS 1 Fort McKay	PM _{2.5}	7May 16, 24:00	311142	24-hour	1158	1158	exc
AMS 1 Fort McKay	PM _{2.5}	15May 16, 24:00	311437	24-hour	89	89	exc
AMS 1 Fort McKay	PM _{2.5}	16May 16, 24:00	311487	24-hour	171	171	exc
AMS 1 Fort McKay	PM _{2.5}	17May 16, 24:00	311547	24-hour	90	90	exc
AMS 1 Fort McKay	PM _{2.5}	24May 16, 24:00	311821	24-hour	38	38	exc
AMS 1 Fort McKay	PM _{2.5}	25May 16, 24:00	311872	24-hour	94	94	exc
AMS 1 Fort McKay	TRS	7May 16, 24:00	311159	24-hour	3	3	nae
AMS 2 Mildred Lake	H ₂ S	7May 16, 24:00	311160	24-hour	3	3	nae
AMS 5 Mannix	H ₂ S	5May 16, 19:00	311071	1-hour	11	-	ret
AMS 5 Mannix	H ₂ S	5May 16, 20:00	311071	1-hour	12	-	ret
AMS 5 Mannix	H ₂ S	6May 16, 8:00	311087	1-hour	10	-	ret
AMS 5 Mannix	H ₂ S	7May 16, 24:00	311161	24-hour	3	-	ret
AMS 6 Patricia McInnes	PM _{2.5}	2May 16, 24:00	310923	24-hour	42.5	43	exc
AMS 6 Patricia McInnes	PM _{2.5}	3May 16, 24:00	310974	24-hour	282	282	exc
AMS 6 Patricia McInnes	PM _{2.5}	4May 16, 24:00	311028	24-hour	1131	1131	exc
AMS 6 Patricia McInnes	PM _{2.5}	5May 16, 24:00	311653	24-hour	64	64	exc
AMS 6 Patricia McInnes	PM _{2.5}	6May 16, 24:00	311132	24-hour	568	568	exc
AMS 6 Patricia McInnes	PM _{2.5}	7May 16, 24:00	311141	24-hour	1079	1080	exc
AMS 6 Patricia McInnes	PM _{2.5}	8May 16, 24:00	311183	24-hour	122	121	exc
AMS 6 Patricia McInnes	PM _{2.5}	13May 16, 24:00	311391	24-hour	72	73	exc
AMS 6 Patricia McInnes	PM _{2.5}	14May 16, 24:00	311318	24-hour	159	159	exc
AMS 6 Patricia McInnes	PM _{2.5}	15May 16, 24:00	311438	24-hour	425	425	exc
AMS 6 Patricia McInnes	PM _{2.5}	16May 16, 24:00	311488	24-hour	151	151	exc
AMS 6 Patricia McInnes	PM _{2.5}	17May 16, 24:00	311548	24-hour	213	213	exc
AMS 6 Patricia McInnes	PM _{2.5}	18May 16, 24:00	311606	24-hour	342	342	exc
AMS 6 Patricia McInnes	PM _{2.5}	19May 16, 24:00	311679	24-hour	49	49	exc
AMS 6 Patricia McInnes	PM _{2.5}	20May 16, 24:00	311729	24-hour	52	51	exc
AMS 6 Patricia McInnes	PM _{2.5}	23May 16, 24:00	311780	24-hour	33	33	exc
AMS 6 Patricia McInnes	PM _{2.5}	25May 16, 24:00	311873	24-hour	56	55	exc
AMS 6 Patricia McInnes	TRS	3May 16, 24:00	310974	1-hour	10	9	nae
AMS 6 Patricia McInnes	TRS	4May 16, 1:00	310974	1-hour	17	17	exc
AMS 6 Patricia McInnes	TRS	4May 16, 2:00	310974	1-hour	17	16	exc
AMS 6 Patricia McInnes	TRS	4May 16, 3:00	310974	1-hour	12	12	exc
AMS 6 Patricia McInnes	TRS	4May 16, 4:00	310974	1-hour	10	10	nae
AMS 6 Patricia McInnes	TRS	4May 16, 5:00	310974	1-hour	11	11	exc
AMS 6 Patricia McInnes	TRS	4May 16, 6:00	310974	1-hour	10	9	nae
AMS 6 Patricia McInnes	TRS	4May 16, 24:00	311028	24-hour	5	4.5	exc
AMS 6 Patricia McInnes	TRS	7May 16, 24:00	311141	24-hour	4	4.1	exc
AMS 6 Patricia McInnes	TRS	7May 16, 4:00	311141	1-hour	10	9	nae
AMS 6 Patricia McInnes	TRS	7May 16, 6:00	311141	1-hour	11	11	exc
AMS 6 Patricia McInnes	TRS	7May 16, 7:00	311141	1-hour	10	10	nae
AMS 6 Patricia McInnes	TRS	7May 16, 8:00	311141	1-hour	10	10	nae
AMS 6 Patricia McInnes	O ₃	3May 16, 19:00	310974	1-hour	89	91	exc
AMS 6 Patricia McInnes	O ₃	3May 16, 20:00	310974	1-hour	106	108	exc
AMS 6 Patricia McInnes	O ₃	3May 16, 21:00	310974	1-hour	94	96	exc
AMS 6 Patricia McInnes	O ₃	3May 16, 22:00	310974	1-hour	104	106	exc
AMS 6 Patricia McInnes	O ₃	3May 16, 23:00	310974	1-hour	132	140	exc



Site	Parameter	Date/Time	Reference	Period	Reported	Final	Status
AMS 6 Patricia McInnes	O3	3May 16, 24:00	310974	1-hour	190	192	exc
AMS 6 Patricia McInnes	O3	4May 16, 1:00	310974	1-hour	289	291	exc
AMS 6 Patricia McInnes	O3	4May 16, 2:00	310974	1-hour	236	239	exc
AMS 6 Patricia McInnes	O3	4May 16, 3:00	310974	1-hour	171	173	exc
AMS 6 Patricia McInnes	O3	4May 16, 4:00	310974	1-hour	125	128	exc
AMS 6 Patricia McInnes	O3	4May 16, 5:00	310974	1-hour	147	149	exc
AMS 6 Patricia McInnes	O3	4May 16, 6:00	310974	1-hour	106	109	exc
AMS 6 Patricia McInnes	O3	6May 16, 21:00	311132	1-hour	97	99	exc
AMS 6 Patricia McInnes	O3	6May 16, 22:00	311132	1-hour	121	123	exc
AMS 6 Patricia McInnes	O3	6May 16, 23:00	311132	1-hour	86	88	exc
AMS 7 Athabasca Valley	PM _{2.5}	2May 16, 24:00	310923	24-hour	64	64	exc
AMS 7 Athabasca Valley	PM _{2.5}	3May 16, 24:00	310975	24-hour	298	105	exc
AMS 7 Athabasca Valley	PM _{2.5}	4May 16, 24:00	311029	24-hour	550	293	exc
AMS 7 Athabasca Valley	PM _{2.5}	5May 16, 24:00	311654	24-hour	103	103	exc
AMS 7 Athabasca Valley	PM _{2.5}	6May 16, 24:00	311083	24-hour	521	385	exc
AMS 7 Athabasca Valley	PM _{2.5}	7May 16, 24:00	311140	24-hour	1141	1035	exc
AMS 7 Athabasca Valley	PM _{2.5}	8May 16, 24:00	311184	24-hour	130	101	exc
AMS 7 Athabasca Valley	PM _{2.5}	10May 16, 24:00	311261	24-hour	52	52	exc
AMS 7 Athabasca Valley	PM _{2.5}	13May 16, 24:00	311392	24-hour	342	342	exc
AMS 7 Athabasca Valley	PM _{2.5}	14May 16, 24:00	311417	24-hour	561	561	exc
AMS 7 Athabasca Valley	PM _{2.5}	15May 16, 24:00	311439	24-hour	725	725	exc
AMS 7 Athabasca Valley	PM _{2.5}	16May 16, 24:00	311489	24-hour	376	358	exc
AMS 7 Athabasca Valley	PM _{2.5}	17May 16, 24:00	311549	24-hour	258	258	exc
AMS 7 Athabasca Valley	PM _{2.5}	18May 16, 24:00	311607	24-hour	196	196	exc
AMS 7 Athabasca Valley	PM _{2.5}	20May 16, 24:00	311730	24-hour	83	83	exc
AMS 7 Athabasca Valley	PM _{2.5}	23May 16, 24:00	311781	24-hour	49	49	exc
AMS 7 Athabasca Valley	PM _{2.5}	24May 16, 24:00	311822	24-hour	66	66	exc
AMS 7 Athabasca Valley	PM _{2.5}	25May 16, 24:00	311874	24-hour	80	80	exc
AMS 7 Athabasca Valley	TRS	4May 16, 24:00	311029	24-hour	4	3.4	nae
AMS 7 Athabasca Valley	TRS	6May 16, 24:00	311083	24-hour	4	3.5	exc
AMS 7 Athabasca Valley	TRS	7May 16, 24:00	311140	24-hour	4	4.2	exc
AMS 7 Athabasca Valley	TRS	7May 16, 1:00	311140	1-hour	10	9	nae
AMS 7 Athabasca Valley	TRS	7May 16, 2:00	311140	1-hour	10	10	nae
AMS 7 Athabasca Valley	TRS	7May 16, 3:00	311140	1-hour	10	10	nae
AMS 7 Athabasca Valley	TRS	14May 16, 24:00	311397	24-hour	4	3.3	nae
AMS 7 Athabasca Valley	TRS	14May 16, 6:00	311397	1-hour	12	12	exc
AMS 7 Athabasca Valley	TRS	14May 16, 7:00	311397	1-hour	10	9	nae
AMS 7 Athabasca Valley	TRS	15May 16, 24:00	311423	24-hour	4	4.9	exc
AMS 7 Athabasca Valley	TRS	15May 16, 5:00	311423	1-hour	13	13	exc
AMS 7 Athabasca Valley	TRS	15May 16, 6:00	311423	1-hour	10	10	nae
AMS 7 Athabasca Valley	TRS	15May 16, 10:00	311423	1-hour	10	10	nae
AMS 7 Athabasca Valley	TRS	16May 16, 24:00	311489	24-hour	3	3.1	nae
AMS 7 Athabasca Valley	O3	3May 16, 19:00	310975	1-hour	151	152	exc
AMS 7 Athabasca Valley	O3	3May 16, 20:00	310975	1-hour	165.5	167	exc
AMS 7 Athabasca Valley	O3	3May 16, 21:00	310975	1-hour	319	320	exc
AMS 7 Athabasca Valley	O3	3May 16, 22:00	310975	1-hour	354	355	exc
AMS 7 Athabasca Valley	O3	3May 16, 23:00	310975	1-hour	228	229	exc
AMS 7 Athabasca Valley	O3	3May 16, 24:00	310975	1-hour	212	213	exc
AMS 7 Athabasca Valley	O3	4May 16, 1:00	310975	1-hour	205	206	exc
AMS 7 Athabasca Valley	O3	4May 16, 2:00	310975	1-hour	203	205	exc
AMS 7 Athabasca Valley	O3	4May 16, 3:00	310975	1-hour	154	155	exc
AMS 7 Athabasca Valley	O3	4May 16, 4:00	310975	1-hour	185	186	exc
AMS 7 Athabasca Valley	O3	4May 16, 5:00	310975	1-hour	148	150	exc
AMS 7 Athabasca Valley	O3	4May 16, 6:00	310975	1-hour	110	111	exc
AMS 7 Athabasca Valley	O3	4May 16, 7:00	310975	1-hour	103	105	exc
AMS 7 Athabasca Valley	O3	4May 16, 8:00	310975	1-hour	96	98	exc
AMS 7 Athabasca Valley	O3	4May 16, 9:00	310975	1-hour	119	120	exc
AMS 7 Athabasca Valley	O3	4May 16, 10:00	310975	1-hour	177	179	exc
AMS 7 Athabasca Valley	O3	4May 16, 11:00	310975	1-hour	101	103	exc
AMS 7 Athabasca Valley	O3	5May 16, 22:00	311079	1-hour	84	86	exc
AMS 7 Athabasca Valley	O3	6May 16, 4:00	311083	1-hour	99	101	exc
AMS 7 Athabasca Valley	O3	6May 16, 8:00	311083	1-hour	117	118	exc
AMS 7 Athabasca Valley	O3	6May 16, 9:00	311083	1-hour	128	129	exc



Site	Parameter	Date/Time	Reference	Period	Reported	Final	Status
AMS 7 Athabasca Valley	O3	6May 16, 20:00	311083	1-hour	103	105	exc
AMS 7 Athabasca Valley	O3	6May 16, 21:00	311083	1-hour	154	155	exc
AMS 7 Athabasca Valley	O3	6May 16, 22:00	311083	1-hour	178	179	exc
AMS 7 Athabasca Valley	O3	6May 16, 23:00	311083	1-hour	173	174	exc
AMS 7 Athabasca Valley	O3	6May 16, 00:00	311083	1-hour	157	159	exc
AMS 7 Athabasca Valley	O3	7May 16, 1:00	311140	1-hour	148	148	exc
AMS 7 Athabasca Valley	O3	7May 16, 2:00	311140	1-hour	143	145	exc
AMS 7 Athabasca Valley	O3	7May 16, 3:00	311140	1-hour	138	138	exc
AMS 7 Athabasca Valley	O3	7May 16, 4:00	311140	1-hour	118	119	exc
AMS 7 Athabasca Valley	O3	7May 16, 5:00	311140	1-hour	90	91	exc
AMS 7 Athabasca Valley	O3	7May 16, 8:00	311140	1-hour	84	85	exc
AMS 7 Athabasca Valley	CO	3May 16, 21:00	311640	1-hour	14	14	exc
AMS 7 Athabasca Valley	CO	3May 16, 22:00	311640	1-hour	16	16	exc
AMS 7 Athabasca Valley	CO	4May 16, 2:00	311641	1-hour	15	15	exc
AMS 7 Athabasca Valley	CO	4May 16, 4:00	311641	1-hour	14	13	nae
AMS 7 Athabasca Valley	CO	6May 16, 22:00	311643	1-hour	14	13	nae
AMS 7 Athabasca Valley	CO	6May 16, 23:00	311643	1-hour	15	15	exc
AMS 7 Athabasca Valley	CO	6May 16, 00:00	311643	1-hour	16	15	exc
AMS 7 Athabasca Valley	CO	7May 16, 1:00	311644	1-hour	16	16	exc
AMS 7 Athabasca Valley	CO	7May 16, 2:00	311644	1-hour	17	17	exc
AMS 7 Athabasca Valley	CO	7May 16, 3:00	311644	1-hour	17	17	exc
AMS 7 Athabasca Valley	CO	7May 16, 4:00	311644	1-hour	15	14	exc
AMS 7 Athabasca Valley	CO	14May 16, 6:00	311397	1-hour	13	13	nae
AMS 7 Athabasca Valley	CO	15May 16, 5:00	311423	1-hour	14	14	exc
AMS 8 Fort Chipewyan	PM _{2.5}	7May 16, 24:00	311655	24-hour	74	75	exc
AMS 8 Fort Chipewyan	PM _{2.5}	16May 16, 24:00	311490	24-hour	60	61	exc
AMS 8 Fort Chipewyan	PM _{2.5}	17May 16, 24:00	311550	24-hour	98	99	exc
AMS 8 Fort Chipewyan	PM _{2.5}	24May 16, 24:00	311823	24-hour	114	114	exc
AMS 8 Fort Chipewyan	PM _{2.5}	25May 16, 24:00	311875	24-hour	46	47	exc
AMS 11 Lower Camp	H ₂ S	17May 16, 23:00	311546	1-hour	11	11	exc
AMS 11 Lower Camp	H ₂ S	27May 16, 18:00	311968	1-hour	16	16	exc
AMS 11 Lower Camp	H ₂ S	28May 16, 23:00	311990	1-hour	11	16	exc
AMS 13 Fort McKay South	PM _{2.5}	4May 16, 24:00	311030	24-hour	33	33	exc
AMS 13 Fort McKay South	PM _{2.5}	6May 16, 24:00	311136	24-hour	176	176	exc
AMS 13 Fort McKay South	PM _{2.5}	7May 16, 24:00	311656	24-hour	1138	1141	exc
AMS 13 Fort McKay South	PM _{2.5}	15May 16, 24:00	311440	24-hour	104	104	exc
AMS 13 Fort McKay South	PM _{2.5}	16May 16, 24:00	311491	24-hour	158	156	exc
AMS 13 Fort McKay South	PM _{2.5}	17May 16, 24:00	311551	24-hour	67	67	exc
AMS 13 Fort McKay South	PM _{2.5}	24May 16, 24:00	311824	24-hour	33	33	exc
AMS 13 Fort McKay South	PM _{2.5}	25May 16, 24:00	311876	24-hour	73	73	exc
AMS 14 Anzac	O3	5May 16, 22:00	311081	1-hour	1613	1612	exc
AMS 14 Anzac	O3	5May 16, 23:00	311081	1-hour	139	138	exc
AMS 14 Anzac	O3	5May 16, 24:00	311081	1-hour	119	-	nae
AMS 14 Anzac	PM _{2.5}	5May 16, 24:00	311080	24-hour	656	223	exc
AMS 14 Anzac	PM _{2.5}	14May 16, 24:00	311658	24-hour	267	267	exc
AMS 14 Anzac	PM _{2.5}	15May 16, 24:00	311441	24-hour	267	267	exc
AMS 14 Anzac	PM _{2.5}	16May 16, 24:00	311492	24-hour	42	42	exc
AMS 14 Anzac	PM _{2.5}	17May 16, 24:00	311552	24-hour	50	52	exc
AMS 14 Anzac	PM _{2.5}	18May 16, 24:00	311608	24-hour	62	67	exc
AMS 14 Anzac	PM _{2.5}	19May 16, 24:00	311680	24-hour	50	50	exc
AMS 14 Anzac	PM _{2.5}	20May 16, 24:00	311731	24-hour	40	40	exc
AMS 14 Anzac	PM _{2.5}	21May 16, 24:00	311748	24-hour	46	46	exc
AMS 14 Anzac	PM _{2.5}	24May 16, 24:00	311825	24-hour	60	60	exc
AMS 14 Anzac	PM _{2.5}	25May 16, 24:00	311877	24-hour	73	73	exc
AMS 14 Anzac	PM _{2.5}	26May 16, 24:00	311926	24-hour	84	84	exc
AMS 14 Anzac	TRS	5May 16, 22:00	311080	1-hour	42	42	exc
AMS 14 Anzac	TRS	5May 16, 23:00	311080	1-hour	12	12	exc
AMS 14 Anzac	TRS	14May 16, 2:00	311395	1-hour	11	-	nae
AMS 14 Anzac	TRS	14May 16, 3:00	311395	1-hour	10	-	nae
AMS 14 Anzac	TRS	15May 16, 24:00	311422	24-hour	4	4.1	exc
AMS 14 Anzac	TRS	15May 16, 3:00	311422	1-hour	11	11	exc
AMS 14 Anzac	TRS	15May 16, 4:00	311422	1-hour	12	12	exc



Site	Parameter	Date/Time	Reference	Period	Reported	Final	Status
AMS 14 Anzac	TRS	15May 16, 5:00	311422	1-hour	15	15	exc
AMS 14 Anzac	NO2	6May 16, 22:00	311080	1-hour	291	291	exc
AMS 15 CNRL Horizon	PM _{2.5}	6May 16, 24:00	311137	24-hour	34	34	exc
AMS 15 CNRL Horizon	PM _{2.5}	7May 16, 24:00	311657	24-hour	439	439	exc
AMS 15 CNRL Horizon	PM _{2.5}	15May 16, 24:00	311442	24-hour	48	48	exc
AMS 15 CNRL Horizon	PM _{2.5}	16May 16, 24:00	311493	24-hour	117	117	exc
AMS 15 CNRL Horizon	PM _{2.5}	17May 16, 24:00	311553	24-hour	109	109	exc
AMS 15 CNRL Horizon	PM _{2.5}	24May 16, 24:00	311826	24-hour	32	33	exc
AMS 15 CNRL Horizon	PM _{2.5}	25May 16, 24:00	311878	24-hour	79	-	nae
AMS 15 CNRL Horizon	PM _{2.5}	26May 16, 24:00	311927	24-hour	34	-	nae
AMS 16 Shell Muskeg River	PM _{2.5}	4May 16, 24:00	311031	24-hour	49	49	exc
AMS 16 Shell Muskeg River	PM _{2.5}	6May 16, 24:00	311138	24-hour	349	349	exc
AMS 16 Shell Muskeg River	PM _{2.5}	7May 16, 24:00	311165	24-hour	1444	1445	exc
AMS 16 Shell Muskeg River	PM _{2.5}	15May 16, 24:00	311443	24-hour	81	81	exc
AMS 16 Shell Muskeg River	PM _{2.5}	16May 16, 24:00	311494	24-hour	221	221	exc
AMS 16 Shell Muskeg River	PM _{2.5}	17May 16, 24:00	311554	24-hour	107	107	exc
AMS 16 Shell Muskeg River	PM _{2.5}	18May 16, 24:00	311609	24-hour	30	22	nae
AMS 16 Shell Muskeg River	PM _{2.5}	24May 16, 24:00	311827	24-hour	49	49	exc
AMS 16 Shell Muskeg River	PM _{2.5}	25May 16, 24:00	311879	24-hour	56	56	exc
AMS 17 Wapasu Creek	PM _{2.5}	4May 16, 24:00	311032	24-hour	120	120	exc
AMS 17 Wapasu Creek	PM _{2.5}	6May 16, 24:00	311139	24-hour	74	75	exc
AMS 17 Wapasu Creek	PM _{2.5}	7May 16, 24:00	311166	24-hour	191	190	exc
AMS 17 Wapasu Creek	PM _{2.5}	15May 16, 24:00	311444	24-hour	86	86	exc
AMS 17 Wapasu Creek	PM _{2.5}	16May 16, 24:00	311495	24-hour	233	233	exc
AMS 17 Wapasu Creek	PM _{2.5}	17May 16, 24:00	311555	24-hour	350	350	exc
AMS 17 Wapasu Creek	PM _{2.5}	18May 16, 24:00	311610	24-hour	167	165	exc
AMS 17 Wapasu Creek	PM _{2.5}	24May 16, 24:00	311828	24-hour	136	136	exc
AMS 17 Wapasu Creek	PM _{2.5}	25May 16, 24:00	311880	24-hour	103	103	exc
AMS 18 Stony Mountain	PM _{2.5}	11May 16, 24:00	311349	24-hour	53	53	exc
AMS 18 Stony Mountain	PM _{2.5}	12May 16, 24:00	311349	24-hour	84	84	exc
AMS 18 Stony Mountain	PM _{2.5}	13May 16, 24:00	311393	24-hour	65	65	exc
AMS 18 Stony Mountain	PM _{2.5}	14May 16, 24:00	311419	24-hour	42	42	exc
AMS 18 Stony Mountain	PM _{2.5}	15May 16, 24:00	311445	24-hour	70	70	exc
AMS 18 Stony Mountain	PM _{2.5}	19May 16, 24:00	311682	24-hour	153	153	exc
AMS 18 Stony Mountain	PM _{2.5}	21May 16, 24:00	311746	24-hour	38	38	exc
AMS 18 Stony Mountain	PM _{2.5}	26May 16, 24:00	311928	24-hour	37	37	exc
AMS 21 Conklin Community	PM _{2.5}	12May 16, 24:00	311150	24-hour	80	80	exc
AMS 21 Conklin Community	PM _{2.5}	13May 16, 24:00	311394	24-hour	57	57	exc
AMS 21 Conklin Community	PM _{2.5}	14May 16, 24:00	311420	24-hour	45	45	exc
AMS 21 Conklin Community	PM _{2.5}	15May 16, 24:00	311446	24-hour	62	62	exc
AMS 21 Conklin Community	PM _{2.5}	19May 16, 24:00	311681	24-hour	137	137	exc
AMS 21 Conklin Community	PM _{2.5}	21May 16, 24:00	311747	24-hour	31	31	exc
AMS 21 Conklin Community	PM _{2.5}	26May 16, 24:00	311929	24-hour	32	32	exc
AMS 2 Mildred Lake	H ₂ S	20Jun 16, 04:00	312835	1-hour	14	14	exc
AMS 2 Mildred Lake	H ₂ S	20Jun 16, 05:00	312835	1-hour	13	13	exc
AMS 2 Mildred Lake	H ₂ S	20Jun 16, 06:00	312835	1-hour	22	22	exc
AMS 2 Mildred Lake	H ₂ S	20Jun 16, 07:00	312835	1-hour	29	29	exc
AMS 2 Mildred Lake	H ₂ S	20Jun 16, 08:00	312835	1-hour	15	15	exc
AMS 2 Mildred Lake	H ₂ S	20Jun 16, 24:00	312835	24-hour	5	5.1	exc
AMS 8 Fort Chipewyan	PM _{2.5}	18Jun 16, 24:00	312815	24-hour	1576	-	ret
AMS 14 Anzac	PM _{2.5}	08Jun 16, 24:00	312469	24-hour	31	31.2	exc
AMS 21 Conklin Community	PM _{2.5}	08Jun 16, 24:00	312470	24-hour	75	74.3	exc
AMS 5 Mannix	H ₂ S	25Jul 16, 23:00	314254	1-hour	11	-	ret
AMS 5 Mannix	H ₂ S	28Jul 16, 01:00	314351	1-hour	12	-	ret
AMS 15 CNRL Horizon	TRS	26Jul 16, 01:00	314256	1-hour	13	13	exc
AMS 15 CNRL Horizon	TRS	26Jul 16, 02:00	314256	1-hour	20	20	exc
AMS 15 CNRL Horizon	TRS	26Jul 16, 04:00	314256	1-hour	16	16	exc
AMS 15 CNRL Horizon	TRS	27Jul 16, 21:00	314348	1-hour	14	14	exc
AMS 15 CNRL Horizon	PM _{2.5}	17Jul 16, 24:00	313937	24-hour	40	-	ret



Site	Parameter	Date/Time	Reference	Period	Reported	Final	Status
AMS 5 Mannix	H ₂ S	02Aug 16, 00:00	314547	1-hour	22	-	ret
AMS 5 Mannix	H ₂ S	03Aug 16, 06:00	314547	1-hour	20	-	ret
AMS 5 Mannix	H ₂ S	03Aug 16, 07:00	314553	1-hour	19	-	ret
AMS 5 Mannix	H ₂ S	03Aug 16, 24:00	314610	24-hour	4	-	ret
AMS 5 Mannix	H ₂ S	04Aug 16, 23:00	314659	1-hour	13	-	ret
AMS 5 Mannix	H ₂ S	04Aug 16, 24:00	314660	1-hour	19	-	ret
AMS 5 Mannix	H ₂ S	05Aug 16, 01:00	314660	1-hour	21	-	ret
AMS 5 Mannix	H ₂ S	05Aug 16, 02:00	314660	1-hour	22	-	ret
AMS 5 Mannix	H ₂ S	05Aug 16, 06:00	314660	1-hour	11	-	ret
AMS 5 Mannix	H ₂ S	05Aug 16, 24:00	314660	24-hour	4	-	ret
AMS 5 Mannix	H ₂ S	09Aug 16, 01:00	314818	1-hour	21	-	ret
AMS 5 Mannix	H ₂ S	09Aug 16, 03:00	314818	1-hour	10	-	ret
AMS 5 Mannix	H ₂ S	18Aug 16, 22:00	315235	1-hour	17	-	ret
AMS 5 Mannix	H ₂ S	18Aug 16, 23:00	315235	1-hour	10	-	ret
AMS 5 Mannix	H ₂ S	18Aug 16, 24:00	315235	24-hour	3	-	ret
AMS 5 Mannix	H ₂ S	21Aug 16, 24:00	315322	24-hour	4	-	ret
AMS 5 Mannix	H ₂ S	21Aug 16, 24:00	315336	1-hour	54	-	ret
AMS 5 Mannix	H ₂ S	22Aug 16, 01:00	315321	1-hour	50	-	ret
AMS 5 Mannix	H ₂ S	22Aug 16, 02:00	315321	1-hour	29	-	ret
AMS 5 Mannix	H ₂ S	22Aug 16, 03:00	315321	1-hour	24	-	ret
AMS 5 Mannix	H ₂ S	22Aug 16, 04:00	315321	1-hour	14	-	ret
AMS 5 Mannix	H ₂ S	22Aug 16, 05:00	315321	1-hour	10	-	ret
AMS 5 Mannix	H ₂ S	22Aug 16, 06:00	315321	1-hour	12	-	ret
AMS 5 Mannix	H ₂ S	22Aug 16, 07:00	315321	1-hour	16	-	ret
AMS 5 Mannix	H ₂ S	22Aug 16, 08:00	315321	1-hour	19	-	ret
AMS 5 Mannix	H ₂ S	22Aug 16, 09:00	315321	1-hour	23	-	ret
AMS 5 Mannix	H ₂ S	22Aug 16, 10:00	315321	1-hour	14	-	ret
AMS 5 Mannix	H ₂ S	22Aug 16, 11:00	315321	1-hour	14	-	ret
AMS 5 Mannix	H ₂ S	22Aug 16, 23:00	315321	1-hour	20	-	ret
AMS 5 Mannix	H ₂ S	22Aug 16, 24:00	315321	1-hour	17	-	ret
AMS 5 Mannix	H ₂ S	22Aug 16, 24:00	315321	24-hour	13	-	ret
AMS 5 Mannix	H ₂ S	23Aug 16, 01:00	315378	1-hour	14	-	ret
AMS 5 Mannix	H ₂ S	23Aug 16, 03:00	315378	1-hour	27	-	ret
AMS 5 Mannix	H ₂ S	23Aug 16, 04:00	315378	1-hour	16	-	ret
AMS 5 Mannix	H ₂ S	23Aug 16, 06:00	315378	1-hour	14	-	ret
AMS 5 Mannix	H ₂ S	23Aug 16, 07:00	315378	1-hour	21	-	ret
AMS 5 Mannix	H ₂ S	23Aug 16, 08:00	315378	1-hour	21	-	ret
AMS 5 Mannix	H ₂ S	23Aug 16, 09:00	315378	1-hour	14	-	ret
AMS 5 Mannix	H ₂ S	23Aug 16, 10:00	315378	1-hour	11	-	ret
AMS 5 Mannix	H ₂ S	23Aug 16, 20:00	315378	1-hour	14	-	ret
AMS 5 Mannix	H ₂ S	23Aug 16, 21:00	315378	1-hour	13	-	ret
AMS 5 Mannix	H ₂ S	23Aug 16, 23:00	315378	1-hour	29	-	ret
AMS 5 Mannix	H ₂ S	23Aug 16, 24:00	315378	1-hour	13	-	ret
AMS 5 Mannix	H ₂ S	23Aug 16, 24:00	315378	24-hour	11	-	ret
AMS 5 Mannix	H ₂ S	24Aug 16, 22:00	315472	1-hour	11	-	ret
AMS 5 Mannix	H ₂ S	25Aug 16, 06:00	315475	1-hour	10	-	ret
AMS 5 Mannix	H ₂ S	25Aug 16, 22:00	315475	1-hour	21	-	ret
AMS 5 Mannix	H ₂ S	25Aug 16, 24:00	315475	24-hour	5	-	ret
AMS 5 Mannix	H ₂ S	27Aug 16, 03:00	315555	1-hour	15	-	ret
AMS 5 Mannix	H ₂ S	27Aug 16, 20:00	315555	1-hour	14	-	ret
AMS 11 Lower Camp	H ₂ S	16Aug 16, 05:00	315087	1-hour	11	11	exc
AMS 15 CNRL Horizon	TRS	03Aug 16, 02:00	314549	1-hour	22	22	exc
AMS 15 CNRL Horizon	TRS	03Aug 16, 03:00	314549	1-hour	10	10	nae
AMS 15 CNRL Horizon	TRS	05Aug 16, 02:00	314661	1-hour	12	12	exc
AMS 15 CNRL Horizon	TRS	05Aug 16, 03:00	314661	1-hour	10	11	exc
AMS 15 CNRL Horizon	TRS	06Aug 16, 21:00	314734	1-hour	10	10	nae
AMS 15 CNRL Horizon	TRS	06Aug 16, 24:00	314734	1-hour	22	22	exc
AMS 15 CNRL Horizon	TRS	07Aug 16, 01:00	314736	1-hour	28	28	exc
AMS 15 CNRL Horizon	TRS	07Aug 16, 02:00	314736	1-hour	21	21	exc



Site	Parameter	Date/Time	Reference	Period	Reported	Final	Status
AMS 15 CNRL Horizon	TRS	08Aug 16, 04:00	314758	1-hour	10	10	nae
AMS 15 CNRL Horizon	TRS	08Aug 16, 05:00	314758	1-hour	12	12	exc
AMS 15 CNRL Horizon	TRS	08Aug 16, 06:00	314758	1-hour	15	15	exc
AMS 15 CNRL Horizon	TRS	08Aug 16, 24:00	314758	1-hour	33	33	exc
AMS 15 CNRL Horizon	TRS	08Aug 16, 24:00	314758	24-hour	4	3.8	exc
AMS 15 CNRL Horizon	TRS	09Aug 16, 01:00	314817	1-hour	14	14	exc
AMS 15 CNRL Horizon	TRS	09Aug 16, 02:00	314817	1-hour	24	24	exc
AMS 15 CNRL Horizon	TRS	09Aug 16, 03:00	314817	1-hour	14	14	exc
AMS 15 CNRL Horizon	TRS	10Aug 16, 04:00	314870	1-hour	11	11	exc
AMS 15 CNRL Horizon	TRS	12Aug 16, 23:00	315001	1-hour	13	13	exc
AMS 15 CNRL Horizon	TRS	12Aug 16, 24:00	315001	1-hour	15	15	exc
AMS 15 CNRL Horizon	TRS	13Aug 16, 01:00	314997	1-hour	10	10	nae
AMS 15 CNRL Horizon	TRS	13Aug 16, 23:00	315022	1-hour	10	10	nae
AMS 15 CNRL Horizon	TRS	14Aug 16, 04:00	315027	1-hour	14	14	exc
AMS 15 CNRL Horizon	TRS	14Aug 16, 05:00	315027	1-hour	23	23	exc
AMS 15 CNRL Horizon	TRS	14Aug 16, 06:00	315027	1-hour	13	13	exc
AMS 15 CNRL Horizon	TRS	21Aug 16, 24:00	315320	1-hour	13	13	exc
AMS 15 CNRL Horizon	TRS	22Aug 16, 01:00	315333	1-hour	22	23	exc
AMS 15 CNRL Horizon	TRS	22Aug 16, 02:00	315333	1-hour	15	15	exc
AMS 15 CNRL Horizon	TRS	22Aug 16, 24:00	315333	1-hour	14	14	exc
AMS 16 Shell Muskeg River	PM _{2.5}	23Aug 16, 00:00	315433	24-hour	36	35.8	exc
AMS 5 Mannix	H ₂ S	01Sept16, 06:00	315706	1-hour	12	-	ret
AMS 5 Mannix	H ₂ S	01Sept16, 20:00	315754	1-hour	10	-	ret
AMS 11 Lower Camp	H ₂ S	16Sept16, 23:00	316285	1-hour	11	11	exc
AMS 1 Fort McKay	TRS	20Oct16, 04:00	317406	1-hour	11	11	exc
AMS 1 Fort McKay	TRS	20Oct16, 05:00	317406	1-hour	10	10	nae
AMS 5 Mannix	SO ₂	01Oct16, 08:00	316830	1-hour	185	185	exc
AMS 11 Lower Camp	H ₂ S	03Oct16, 06:00	316857	1-hour	13	13	exc
AMS 11 Lower Camp	H ₂ S	03Oct16, 07:00	316857	1-hour	14	14	exc
AMS 11 Lower Camp	H ₂ S	03Oct16, 08:00	316857	1-hour	12	12	exc
AMS 11 Lower Camp	H ₂ S	10Oct16, 18:00	317088	1-hour	18	18	exc
AMS 11 Lower Camp	H ₂ S	10Oct16, 19:00	317088	1-hour	24	24	exc
AMS 11 Lower Camp	H ₂ S	10Oct16, 20:00	317088	1-hour	10	10	nae
AMS 11 Lower Camp	H ₂ S	31Oct16, 05:00	317753	1-hour	11	11	exc
AMS 13 Fort McKay South	TRS	20Oct16, 05:00	317408	1-hour	12	12	exc
AMS 2 Mildred Lake	H ₂ S	11Nov16, 24:00	318211	1-hour	17	17	exc
AMS 11 Lower Camp	H ₂ S	11Nov16, 16:00	318203	1-hour	11	11	exc
AMS 11 Lower Camp	H ₂ S	24Nov16, 17:00	318601	1-hour	16	16	exc
AMS 11 Lower Camp	H ₂ S	26Nov16, 10:00	318659	1-hour	16	16	exc
AMS 11 Lower Camp	H ₂ S	26Nov16, 17:00	318666	1-hour	16	15	exc
AMS 11 Lower Camp	H ₂ S	26Nov16, 18:00	318667	1-hour	21	21	exc
AMS 11 Lower Camp	H ₂ S	26Nov16, 19:00	318668	1-hour	20	19	exc
AMS 11 Lower Camp	H ₂ S	26Nov16, 20:00	318670	1-hour	11	11	exc
AMS 11 Lower Camp	H ₂ S	26Nov16, 21:00	318671	1-hour	15	15	exc
AMS 11 Lower Camp	H ₂ S	26Nov16, 24:00	318672	24-hour	5	5	exc
AMS 1 Fort McKay	TRS	10Dec16, 06:00	319088	1-hour	11	-	ret
AMS 15 CNRL Horizon	PM _{2.5}	23Dec16, 24:00	319509	24-hour	35	-	ret



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
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APPENDIX II: SUMMARY OF MONTHLY OPERATIONAL TIMES BELOW 90 PERCENT AND NON-COMPLIANCES 2016

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

March 2017

Date Reported	AEP Reference Number	Reporting Period	Location	Brief Description	Issue	Remedial Action
01-Feb-16	307830	January	AMS 08	The wind speed and direction sensors at AMS 8 operated less than 90% of the time in January, 2016.	Freezing temperatures and precipitation resulted in sensor freeze up and a flat line in the output signal. Remote location of this AMS prevented an immediate response to repair the frozen sensors.	Sensors were removed and replaced with backup sensors during monthly station visit.
May-16	311592	May	AMS 502	AMS 502 operated less than 90% of the time in May, 2016. Plant shutdown and power outage due to wildfires.	With fires approaching the ConocoPhillips Surmont facility on May 4, 2016, power to the facility and surrounding area was de-energized. Power to the station (AMS 502 ConocoPhillips Surmont) was interrupted from May 5 to May 26, 2016. After flagging and processing for monthly reports, data for AMS 502 was available for 29% of the month. This incident was reported to Alberta Environment and Parks by facility operators from CPC (reference number 311592).	n/a
01-Jun-16	312136	May	AMS 13	The Total Hydrocarbons (THC) analyzer at AMS 13, Fort McKay South, operated less than 90% of the time in May 2016.	There were two issues associated with the operation of the THC analyzer, resulting in 218 hours of invalid data: From May 16th to May 25th, particulate matter associated with forest fire smoke accumulated on the analyzer inlet filter. Specifically, THC analyzers, which utilize flame ionization detection, are sensitive to changes in sample flow and pressure. This resulted in 218 hours of invalid data.	Sample filters were replaced and a follow up calibration occurred on May 25th. Response time affected by wild fires.
15-Jun-16	312696	May	AMS 14	AMS 14 operated less than 90% of the time in May, 2016. Power outage due to wildfires.	Wildfires passed through the community of Anzac on May 6, 2016. As a result of wildfires, power was interrupted at the Anzac Community air monitoring station (AMS 14) from May 6 to May 13, 2016. After flagging and processing for monthly reports, data for AMS 14 was available for 73% of the month.	n/a
01-Jun-16	312137	May	AMS 15	The Total Reduced Sulphur (TRS) analyzer at AMS 15, CNRL Horizon, operated less than 90% of the time in May 2016.	There were multiple issues associated with the operation of the TRS analyzer, resulting in 193 hours of invalid data: From May 1st to May 2nd, 5 hours of data collection was interrupted due to communications errors. The LAN switch was replaced by the station operator on May 2nd, affecting the regular data collection of the TRS analyzer for an additional 3 hours. Electronic component failure (motherboard) of the TRS analyzer on May 18th resulted in 170 hours of invalid data. Maintenance to replace the analyzer and allow for stabilization on May 25th affected the routine operations of the TRS analyzer for 13 hours. Maintenance and cleaning of the sample manifold on May 26th interrupted the routine operations of the TRS analyzer for 1 hour. Station operator activities at the station on May 26th affected the routine operations of the TRS analyzer for 1 hour.	Analyzer replaced with backup unit. Response time affected by wild fires.
03-Jun-16	312220	May	AMS 21	The Fine Particulate Matter (PM2.5) analyzer at AMS 21, Conklin Community, operated less than 90% of the time in May 2016.	There were two issues associated with the operation of the PM2.5 analyzer, resulting in 146 hours of invalid data: A power interruption at the station on May 5th interrupted the normal operations of all analyzers for 4 hours. From May 5th to May 11th, the sample pump failed to restart following automated filter tape changes, resulting in 142 hours of invalid data.	Pump was reset. Response time affected by wild fires.
22-Jul-16	314163	July	AMS 8	The Fine Particulate Matter (PM2.5) analyzer at AMS 8 in Fort Chipewyan operated less than 90% of the month for July 2016.	The instrument diagnostics indicate instrument failure started on July 2 at 00:00 MST during the daily automated sample tape change. A site visitation on July 5th confirmed broken sample tape as the cause of the instrument malfunction. The sample tape was replaced and a follow-up calibration was performed to confirm instrument operations. Data flow was restored at 11:00 MST on July 5, 2016.	On-site repairs performed. The remote location of this air monitoring station prevented an immediate response to repair the analyzer.
27-Jul-16	314319	June	AMS 14	The sulphur dioxide (SO2) analyzer at AMS 14 – Anzac Community operated less than 90% of the time in June 2016.	The station temperature control at AMS 14 failed to operate properly June 7 to 9 and June 25 to 27, 2016. This resulted in high internal station temperatures during those periods. The PMT cooler on the SO2 analyzer could not maintain stable temperature during these periods resulting in unacceptable drift.	Portable air conditioner installed; HVAC repairs to be scheduled based on availability.
27-Jul-16	314320	June	AMS 21	The Total Reduced Sulphur (TRS) analyzer at AMS 21 – Conklin Community operated less than 90% of the time in June 2016.	From June 7 to 8, TRS data was invalidated due to an unlinear calibration completed on June 7. Maintenance was performed on the calibration rig and the calibration was repeated on June 8, meeting calibration acceptance criteria. The analyzer sensitivity stability failed after the June 10 span point. A number of tests were conducted on the analyzer to determine the cause, but were unsuccessful.	Analyzer replaced with backup unit. Failed analyzer to be investigated and repaired in shop.
26-Aug-16	315539	July	AMS 1	The ammonia (NH3) analyzer at AMS 1 – Fort McKay Bertha Ganter operated less than 90% of the time in July 2016.	The NH3 analyzer required additional time to stabilize to levels below ambient concentrations following the automated daily spans and routine monthly multipoint calibrations. Additional time for stabilization after exposure to high concentrations of NH3 gas is an inherent behavior in the NH3 analyzer operations resulting from the properties of the NH3 gas. Data for 2 to 4 hours following the daily spans have been reported as invalid for a total of 82 hours this month. Maintenance to the data logger and station wiring on July 15 interrupted the routine operation of the NH3 analyzer for 2 hours.	To address the stabilization issue on the NH3 analyzer, a request will be submitted to AEP to lower the effective range of the analyzer. The lower effective range will allow for a shorter stabilization period, minimizing downtime for this analyzer.

Date Reported	AEP Reference Number	Reporting Period	Location	Brief Description	Issue	Remedial Action
26-Aug-16	315540	July	AMS 7	The Total Reduced Sulphur (TRS) analyzer at AMS 7 – Athabasca Valley operated less than 90% of the time in July 2016.	Multiple issues affected the routine operations of the TRS analyzer, resulting in a total of 83 hours of invalid data: Station maintenance activities on July 4 and July 17 resulted in 4 hours of invalid data. Operation outside of AMD criteria for daily span responses on July 20 and 29 resulted in 29 and 20 hours of invalid data, respectively. On-site repairs and recalibrations to the TRS analyzer on July 21 and July 29 resulted in 7 hours of invalid data. Sample pump failure on July 25 followed by replacement and recalibration on July 26 affected the routine operations of the TRS analyzer for 23 hours.	The analyzer was removed from service on July 29 and replaced on July 30 with a backup analyzer. The failed analyzer will be investigated further at the WBEA Field Operations Centre before being re-deployed.
26-Sep-16	316611	August	AMS 1	The ammonia (NH3) analyzer at AMS 1 – Fort McKay Bertha Ganter operated less than 90% of the time in August 2016.	The NH3 analyzer required additional time to stabilize to levels below ambient concentrations following the automated daily spans and routine monthly multipoint calibrations. Additional time for stabilization after exposure to high concentrations of NH3 gas is an inherent behavior in the NH3 analyzer operations resulting from the properties of the NH3 gas. Data for 2 to 4 hours following the daily spans have been reported as invalid for a total of 88 hours this month. Maintenance to clean the sample manifold on August 11 interrupted the routine operation of the NH3 analyzer for 1 hour.	To address the stabilization issue on the NH3 analyzer, a request will be submitted to AEP to lower the effective range of the analyzer. A response has not yet been received. The lower effective range will allow for a shorter stabilization period, minimizing downtime for this analyzer.
26-Sep-16	316612	August	AMS 8	The Fine Particulate Matter (PM2.5) analyzer at AMS 8 in Fort Chipewyan operated less than 90% of the month for July 2016.	Reviews of analyzer operations were conducted during the daily network systems checks. During these checks, data appeared indicative of potential debris in the sampling system. A site visit on September 1 revealed debris and insects on the filter tape and in the sample chamber.	The analyzer was removed for maintenance and replaced with a backup unit.
29-Sep-16	316744	August	AMS 7	The Total Reduced Sulphur (TRS) analyzer at Athabasca Valley (AMS 7) operated less than 90% of the time in August and September 2016.	During the audit by AEP on September 25, results indicated the total reduced sulphur (TRS) analyzer did not meet Air Monitoring Directive (AMD) audit assessment criteria. The post audit failure on-site checklist revealed a leak in the sample/zero-span valve which was immediately repaired. Based on analyzer performance in previous calibrations and documented station operator activities, it has been determined that the leak has been in existence since July 30, 2016 when the analyzer was replaced.	The post audit failure on-site checklist revealed a leak in the sample/zero-span valve which was immediately repaired. Following repairs, the analyzer was re-audited to ensure the source of audit failure had been determined and corrected.
29-Sep-16	316745	September	AMS 7	The Total Reduced Sulphur (TRS) analyzer at Athabasca Valley (AMS 7) operated less than 90% of the time in August and September 2016.	During the audit by AEP on September 25, results indicated the total reduced sulphur (TRS) analyzer did not meet Air Monitoring Directive (AMD) audit assessment criteria. The post audit failure on-site checklist revealed a leak in the sample/zero-span valve which was immediately repaired. Based on analyzer performance in previous calibrations and documented station operator activities, it has been determined that the leak has been in existence since July 30, 2016 when the analyzer was replaced.	The post audit failure on-site checklist revealed a leak in the sample/zero-span valve which was immediately repaired. Following repairs, the analyzer was re-audited to ensure the source of audit failure had been determined and corrected.
19-Oct-16	317372	September	AMS 19	The Total Hydrocarbon (THC) analyzer at Firebag Air Monitoring Station operated less than 90% of the time in September 2016.	Based on a review of analyzer diagnostics, it has been determined that the component failure occurred on September 15 following a routine calibration. Daily system checks indicated that the analyzer performance was within AMD criteria throughout this time period. Failure of the component to the extent of affecting data was intermittent, however, data has been conservatively flagged invalid from the onset of unstable air pressure on September 15 until the time it was stabilized on September 21, 2016.	The control cable to the air pressure regulator was re-seated and air pressure stabilized. A multipoint calibration was performed on September 21 – air pressure remained stable and the analyzer response was as expected with no adjustments required.
19-Oct-16	317373	September	AMS 18	The wind speed and wind direction sensors at Stony Mountain Air Monitoring Station operated less than 90% of the time in September 2016.	Intermittent flat-lines in the output signal of the wind speed and wind direction sensors resulted in less than 90% operational time. The cause of the issue was identified to be faulty wiring and connections to the data logger.	The sensor and wiring was replaced and verified to be operating correctly during multiple investigative and repair attempts. Issue resolved October 16, 2016.
21-Nov-16	318434	October	AMS 18	The wind speed and wind direction sensors at Stony Mountain AMS operated less than 90% of the time in October 2016.	During the month of October there were frequent precipitation events at or near freezing temperatures, which can cause wind speed sensors to ice up and freeze in a stationary position.	WBEA field technicians were deployed on October 16 and 28 to address the frozen sensors.
21-Nov-16	318435	October	AMS 502	The wind speed and wind direction sensor at ConocoPhillips Surmont AMS operated less than 90% of the time in October 2016.	During the month of October there were frequent precipitation events at or near freezing temperatures, which can cause wind speed sensors to ice up and freeze in a stationary position.	WBEA field technicians were deployed on October 17, 27, and 28 to address the frozen sensors.

Date Reported	AEP Reference Number	Reporting Period	Location	Brief Description	Issue	Remedial Action
23-Nov-16	318514	October	AMS 7	The Total Hydrocarbon (THC) analyzer at Athabasca Valley AMS operated less than 90% of the time in October 2016.	The performance of the THC analyzer at Athabasca Valley AMS began degrading after replacing the sample pump on October 11. An investigation and consultation with the analyzer manufacturer determined that extensive in-shop maintenance should be completed. A replacement analyzer was installed on October 12, and required stabilization and gas chromatogram (GC) column conditioning, resulting in additional downtime. A station power failure on October 20 and maintenance to the sample manifold interrupted the normal operation of the THC analyzer for an additional 2 hours.	Moving forward, the WBEA will complete one full week of operation in test mode prior to deployment in the field.
23-Nov-16	318515	October	AMS 8	The ozone (O3) analyzer at Fort Chipewyan Air Monitoring Station operated less than 90% of the time in October 2016.	The O3 analyzer was removed due to excessive signal noise, and replaced with a backup unit on October 19. The backup analyzer had been audited against a primary standard ozone source at the WBEA Field Operations Centre and was within operational criteria. Analyzer response was found to be low, but linear, upon installation at the air monitoring station. The analyzer was not adjusted at the time due to the recent comparison to the primary standard. A field audit calibrator was brought to the station on November 2 and determined that between the initial comparison to the primary standard and the installation calibration, analyzer response had dropped by approximately 30%. Data was invalidated from the time of analyzer install on October 19 to November 2 when the analyzer issues were resolved.	Maintenance to replace the absorption tubes and adjust the lamp intensity returned the analyzer response to expected values on November 2.
19-Dec-16	319325	October and November	AMS 19	The wind speed and wind direction sensors at Firebag AMS operated less than 90% of the time in October and November 2016	Following ice removal from the wind sensors on October 26, 2016, the wind direction sensor was incorrectly oriented with respect to true north. During the data validation process, it was discovered that the wind direction at Firebag AMS did not correlate with nearby air monitoring stations. WBEA field technicians were deployed on November 30, 2016, and found that the wind direction sensor was installed approximately 90 degrees west of true north.	The sensor was oriented properly and returned to normal operation.
04-Jan-17	319668	December	AMS 4	The Total Hydrocarbon (THC) analyzer at Buffalo Viewpoint AMS operated less than 90% of the time in December 2016.	A component failure occurred on December 22 following the daily zero/span sequence. Daily system checks indicated that the analyzer performance was within AMD criteria throughout this time period. On site investigation on December 26 determined that due to a failed solenoid control relay, the analyzer was sampling through the zero/span lines rather than the ambient air sample line.	The solenoid control was repaired and the analyzer was returned to normal operation.
22-Mar-17	322253	February 2015 through September 2016	AMS 5	H2S analyzer response was 32% above the calculated audit gas concentration.	Calibration gas may have become contaminated from the time of cylinder install.	Data has been invalidated for the time the calibration cylinder was used at the station: February 6, 2015 to September 28, 2016.
22-Mar-17	322254	June through September	AMS 15	During the AEP audit of the WBEA network, the PM2.5 analyzer span response was 34% above the target sensitivity factor.	The previous foil calibration, on June 21, was beyond audit criteria.	The analyzer was re-calibrated and data was invalidated from June 21 to September 23, 2016.



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

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APPENDIX III: 2011-2016 WBEA DATA COMPARED TO LARP TRIGGERS AND LIMITS 2016

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

March 2017



Comparison of WBEA 2011 to 2016 Data With LARP Triggers and Limits (all data as ppb)

LARP Index	Year	Air Monitoring Stations									
		AMS 1 Bertha Ganter	AMS 6 Patricia McInnes	AMS 7 Athabasca Valley	AMS 8 Fort Chipewyan	AMS 12* Millennium Mine	AMS 13 Fort McKay South	AMS 14 Anzac	AMS 15 Horizon	AMS 16 Muskeg River	
NO ₂ Annual average	2016	7	6	7	1		6	2	6	9	
	2015	6	5	8	2	11	5	2	5	9	
	2014	8	6	11	1	12	7	3	7	12	
	2013	8	6	10	1	13	7	3	7	12	
	2012	7	6	9	1	13	7	3	6	11	
	2011	7	6	11	1	15	6	3	5	12	
NO ₂ hourly 99th Percentile	2016	28	27	30	11		26	17	30	36	
	2015	30	28	33	13	43	27	14	33	37	
	2014	33	29	48	11	43	31	18	34	40	
	2013	35	31	38	9	43	33	19	39	40	
	2012	34	29	34	11	42	31	15	36	40	
	2011	34	30	39	13	50	32	20	33	41	

LARP Index	Year	Air Monitoring Stations								
		AMS 17 Wapasu	AMS 18 Stony Mountain	AMS 19 Firebag	AMS 20 Brion MacKay River	AMS 21 Conklin	AMS 500 Christina Lake	AMS 501 Leismer	AMS 502 Surmont	
NO ₂ Annual average	2016	2	1	3	3	1	3	2	2	
	2015	3	1	4				2	3	
	2014	3		4			5	2	5	
	2013	6					5	5	5	
	2012								8	
	2011								7	
NO ₂ hourly 99th Percentile	2016	16	8	18	23	8	18	10	13	
	2015	19	8	24				9	18	
	2014	21		23			32	8	22	
	2013	25					17	41	22	
	2012								45	
	2011								36	

Limit	24
Level 3 Trigger	16
Level 2 Trigger	8
Level 4 Trigger	92
Level 3 Trigger	62
Level 2 Trigger	30

* - AMS 12 - Millenium destroyed due to structure fire, Aug 29, 2015

Data Collection less than 12 months



Comparison of WBEA 2011 to 2016 Data With LARP Triggers and Limits (all data as ppb)

LARP Index	Year	Air Monitoring Stations										
		AMS 1 Bertha Ganter	AMS 2 Mildred Lake	AMS 4 Buffalo Viewpoint	AMS 5 Mannix	AMS 6 Patricia McInnes	AMS 7 Athabasca Valley	AMS 8 Fort Chipewyan	AMS11 Lower Camp	AMS 12* Millennium Mine	AMS 13 Fort McKay South	AMS 14 Anzac
SO ₂ Annual average	2016	1	2	1	3	1	1	0	3		1	1
	2015	1	2	1	2	1	1	0	2	1	1	0
	2014	1	2	1	2	1	1	0	1	1	1	1
	2013	1	2	1	2	1	1	0	1	1	1	1
	2012	1	2	1	2	1	0	0	1	1	1	1
	2011	2	3	1	2	1	1	0	2	1	1	1
SO ₂ hourly 99th Percentile	2016	15	29	14	36	12	11	5	43		15	5
	2015	14	26	9	31	10	9	2	27	14	14	5
	2014	15	28	10	32	12	9	3	16	19	17	6
	2013	16	22	16	31	14	10	4	16	14	17	9
	2012	17	32	13	28	11	8	4	21	15	18	9
	2011	17	45	22	29	13	10	4	26	16	17	6

LARP Index	Year	Air Monitoring Stations									
		AMS 15 Horizon	AMS 16 Muskeg River	AMS 17 Wapasu	AMS 18 Stony Mountain	AMS 19 Firebag	AMS 20 Brion MacKay River	AMS 21 Conklin	AMS 500 Christina Lake	AMS 501 Leismer	AMS 502 Surmont
SO ₂ Annual average	2016	1	1	1	0	1	1	0	1	1	1
	2015	1	1	1	0	1			1	1	1
	2014	1	1	1		1			1	1	1
	2013	1	1	2					0	0	1
	2012	1	1								2
	2011	1	1								3
SO ₂ hourly 99th Percentile	2016	12	15	12	2	12	8	1	9	6	11
	2015	10	14	11	2	12				7	7
	2014	15	16	11		13			7	4	9
	2013	15	20	23					3	3	13
	2012	16	20								26
	2011	13	13								36

Limit	8
Level 3 Trigger	5
Level 2 Trigger	3
Level 4 Trigger	36
Level 3 Trigger	24
Level 2 Trigger	12

* - AMS 12 - Millenium destroyed due to structure fire, Aug 29, 2015

Data Collection less than 12 months