

# 2018 Annual Report



# Western Yellowhead Air Management Zone

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			Page
List of	Tables.		2
List of	Figures.		3
List of <i>i</i>	Append	ices	4
List of <sup>·</sup>	Terms a	nd Definitions	5
Units o	of Meas	urement	5
NIECCA			c
			0
EXECU	IIVE SU		
1.0	INTRO	DUCTION	
1.1	WYAN	IZ MISSION	11
1.2	WYAN	Z AIR MONITORING NETWORK	11
2.0	AIR QI	JALITY MONITORING	15
2.1	SUMMA	NRY OF EXCEEDANCES ABOVE THE SAAQS	15
2.2	WIND.		16
2.3	CONTIN	UOUS AIR QUALITY DATA	
	2.3.1	Sulphur Dioxide (SO <sub>2</sub> )	18
	2.3.2	Hydrogen Sulphide (H₂S)	21
	2.3.3	Nitrogen Dioxide (NO2)	24
	2.3.4	Ozone (O₃)	28
	2.3.5	Fine Particulate Matter (PM <sub>2.5</sub> )	32
2.4	Air Qu	ality Health Index (AQHI)	
2.5	Air Qu	ality Index (AQI)	

### LIST OF TABLES

### Page

Table 1	Annual average concentrations for continuous parameters for 2018	9
Table 2.	WYAMZ ambient air continuous monitoring stations and the measurement parameters	.14
Table 3.	Number of exceedance events for 2018	. 15
Table 4.	Summary statistics for SO <sub>2</sub> measurement results for 2018	. 19
Table 5.	Number of exceedance events for SO <sub>2</sub> for 2018	. 19
Table 6.	Summary statistics for H <sub>2</sub> S measurement results for 2018	. 22
Table 7.	Number of exceedance events for H <sub>2</sub> S for 2018	. 22
Table 8.	Summary statistics for NO <sub>2</sub> measurement results for 2018	. 25
Table 9.	Number of exceedance events for NO <sub>2</sub> for 2018	.25
Table 10.	Summary statistics for O <sub>3</sub> measurement results for 2018	. 29
Table 11.	Number of exceedance events for O <sub>3</sub> for 2018	. 29
Table 12.	Summary statistics for PM <sub>2.5</sub> measurement results for 2018	. 33
Table 13.	Number of exceedance events for PM <sub>2.5</sub> for 2018	.33
Table 14.	Summary of occurrence statistics for AQHI rating	. 38
Table 15.	AQI rating and effect description	. 39
Table 16.	Summary of occurrence statistics for AQI rating	. 39

### LIST OF FIGURES

### Page

The Western Yellowhead Air Management Zone (WYAMZ)	. 12
Locations of the air monitoring stations in the WYAMZ zone	. 13
Wind roses for 1-hour average wind data for 2018	.17
Pollutant rose for 1-hour average SO <sub>2</sub> data at the Maidstone station	. 20
Pollutant rose for 1-hour average SO <sub>2</sub> data at the Kerrobert station	. 20
Pollutant rose for 1-hour average H <sub>2</sub> S data at the Maidstone station	23
Pollutant rose for 1-hour average H <sub>2</sub> S data at the Kerrobert station	23
Pollutant rose for 1-hour average NO <sub>2</sub> data at the Meadow Lake station	.26
Pollutant rose for 1-hour average NO <sub>2</sub> data at the Maidstone station	. 26
Pollutant rose for 1-hour average NO <sub>2</sub> data at the Unity station	27
Pollutant rose for 1-hour average NO <sub>2</sub> data at the Clavet station	. 30
Pollutant rose for 1-hour average $O_3$ data at the Meadow Lake station	. 30
Pollutant rose for 1-hour average O <sub>3</sub> data at the Unity station	. 30
Pollutant rose for 1-hour average O <sub>3</sub> data at the Clavet station	. 30
Pollutant rose for 1-hour average PM <sub>2.5</sub> data at the Meadow Lake station	. 34
Pollutant rose for 1-hour average PM <sub>2.5</sub> data at the Maidstone station	.34
Pollutant rose for 1-hour average PM <sub>2.5</sub> data at the Unity station	. 35
Pollutant rose for 1-hour average PM <sub>2.5</sub> data at the Kerrobert station	.35
Pollutant rose for 1-hour average PM <sub>2.5</sub> data at the Clavet station	. 35
Health risk classification and health messages for Air Quality Health Index (Environment	
Canada)	. 38
	The Western Yellowhead Air Management Zone (WYAMZ) Locations of the air monitoring stations in the WYAMZ zone Wind roses for 1-hour average wind data for 2018 Pollutant rose for 1-hour average SO <sub>2</sub> data at the Maidstone station Pollutant rose for 1-hour average SO <sub>2</sub> data at the Kerrobert station Pollutant rose for 1-hour average H <sub>2</sub> S data at the Kerrobert station Pollutant rose for 1-hour average H <sub>2</sub> S data at the Kerrobert station Pollutant rose for 1-hour average NO <sub>2</sub> data at the Kerrobert station Pollutant rose for 1-hour average NO <sub>2</sub> data at the Maidstone station Pollutant rose for 1-hour average NO <sub>2</sub> data at the Maidstone station Pollutant rose for 1-hour average NO <sub>2</sub> data at the Unity station Pollutant rose for 1-hour average NO <sub>2</sub> data at the Clavet station Pollutant rose for 1-hour average NO <sub>2</sub> data at the Meadow Lake station Pollutant rose for 1-hour average O <sub>3</sub> data at the Meadow Lake station Pollutant rose for 1-hour average O <sub>3</sub> data at the Meadow Lake station Pollutant rose for 1-hour average O <sub>3</sub> data at the Clavet station Pollutant rose for 1-hour average PM <sub>2.5</sub> data at the Meadow Lake station Pollutant rose for 1-hour average PM <sub>2.5</sub> data at the Maidstone station Pollutant rose for 1-hour average PM <sub>2.5</sub> data at the Unity station Pollutant rose for 1-hour average PM <sub>2.5</sub> data at the Unity station Pollutant rose for 1-hour average PM <sub>2.5</sub> data at the Unity station Pollutant rose for 1-hour average PM <sub>2.5</sub> data at the Clavet station Pollutant rose for 1-hour average PM <sub>2.5</sub> data at the Clavet station Pollutant rose for 1-hour average PM <sub>2.5</sub> data at the Clavet station Pollutant rose for 1-hour average PM <sub>2.5</sub> data at the Clavet station Pollutant rose for 1-hour average PM <sub>2.5</sub> data at the Clavet station Pollutant rose for 1-hour average PM <sub>2.5</sub> data at the Clavet station Pollutant rose for 1-hour average PM <sub>2.5</sub> data at the Clavet station Pollutant ro

### LIST OF APPENDICES

- APPENDIX A. Saskatchewan Ambient Air Quality Standards
- APPENDIX B. Meadow Lake Station: Continuous Monitoring Data
- APPENDIX C. Maidstone Station: Continuous Monitoring Data
- APPENDIX D. Unity Station: Continuous Monitoring Data
- APPENDIX E. Kerrobert Station: Continuous Monitoring Data
- APPENDIX F. Clavet Station: Continuous Monitoring Data
- APPENDIX G. WYAMZ Exceedance Summary
- APPENDIX H. 2018 Financial Statements
- APPENDIX I. WYAMZ Board of Directors
- APPENDIX J. WYAMZ Member Companies

# List of Terms and Definitions

24-hour	A calendar day, average is calculated midnight-to-midnight.
8-hour	8-hour running average for O₃ Canada-Wide Standards.
SAAQS	Saskatchewan Ambient Air Quality Standard
AIC	Automatic Instrument Check (instrument self-verification process)
AMG	Air Monitoring Guidelines for Saskatchewan, March 2012
Calm	1-hour average wind speed lower than 1 km/hour
CWS	Canada-Wide-Standards
ET	Ambient temperature
$H_2S$	Hydrogen sulphide
$NH_3$	Ammonia
NO <sub>2</sub>	Nitrogen dioxide
NO	Nitric oxide
NOx	Oxides of nitrogen
O <sub>3</sub>	Ozone
PM <sub>2.5</sub>	Particulate matter with aerodynamic diameter less than 2.5 $\mu$ m, referred to as fine
01/00	or respirable particles
QA/QC	Quality Assurance / Quality Control
RH	Relative humidity
SO <sub>2</sub>	Sulphur dioxide
WD	Wind direction
WS	Wind speed

# Units of Measurement

arithmetic average = n Xi / n
meter per second, or mps
microgram per cubic meter
part per billion by volume
millimeter of precipitation
degree centigrade
percent of relative humidity, instrument uptime, etc.
angle of wind direction from the north

# MESSAGE FROM THE EXECUTIVE DIRECTOR

2018 was an excellent year for Western Yellowhead Air Management Zone (WYAMZ) and for air quality monitoring in the western Yellowhead region of Saskatchewan. WYAMZ is very pleased to inform our members that seven (7) continuous air monitoring sites recording criteria air contaminant measurements are now operating in the region and providing real time data. Four of these stations are operated by WYAMZ. We also have the data from the two air monitoring stations operated and independently calibrated by Husky and the data from the National Air Pollution Surveillance Program (NAPS) Station in Saskatoon. We are exploring every opportunity to collaborate with other agencies in bringing additional monitoring into the region.

This monitoring initiative is multi-purpose it: a) collects real time air quality data throughout the WYAMZ region, b) demonstrates companies are operating in a safe, environmentally sound manner that is enabling sustainable growth, and c) provides companies considering to invest in operations in Saskatchewan with data that shows it is a safe place to invest being that the air quality is well understood and not an impediment to growth. The credibility and strength of the continuous monitoring network is scientifically and financially sound. The continuous data is available live on the internet; it includes hourly concentrations of SO<sub>2</sub>, H<sub>2</sub>S, NO/NO<sub>2</sub>/NOx, PM<sub>2.5</sub> and O<sub>3</sub> as well as meteorological data at about two metres above the ground. The data is available on the WYAMZ website: http://www.wyamz.ca

After reviewing the past three to five years of meteorological and ambient air quality data, the WYAMZ Science Committee has made a decision that some of the existing monitoring stations have provided enough relevant data for those areas and can provide additional useful data if they were relocated in other WYAMZ communities. The Kindersley airpointer was moved to the Town of Kerrobert on November 20, 2017. The Unity airpointer was moved in the fall of 2018 to Clavet, a village about 20 kilometers east of Saskatoon. The Meadow Lake airpointer will be moved from the Cabana Pasture into the City of Meadow Lake in the spring of 2019.

After an extensive review of our communication strategy our Communication Committee has worked with YasTech Developments Inc. to redesign our website (wyamz.ca). It has a new look and easy to access Dashboard reports. Also, monthly quality assured data for each station since July of 2015 is available. There is also a search function that allows visitors to access raw data for the past 120 days at any of the airpointers. The new website is connected to Facebook to allow for better communication opportunities for our members and the public. Real-time air monitoring data can be seen at <u>www.wyamz.ca</u>. Real time and long-term historical data that can be used to evaluate future development scenarios can be obtained from WYAMZ by request.

We have and are continuing to communicate the work we do in many ways. When we do a presentation or place an article or a story in a newspaper we highlight our members wherever possible. We list our members on our website and do as much as we can to inform the public

the names of our member companies. This communication work is very important to WYAMZ and to its members.

Here are some of our recent and upcoming communication initiatives:

- The Lloydminster Heavy Oil Show, Lloydminster September of 2014, 2016 and 2018. This once again provided us with an excellent showcase to inform the public of the work we do and highlight the names of our members and their participation in transparent reporting of air quality. We will maintain our booth at the 2020 Lloydminster Heavy Oil Show.
- Saskatchewan Association of Rural Municipalities (SARM) the Councillor Newsletter Article
- In 2016 the WYAMZ Communications Committee and Board of Directors worked with a communications consultant to review our communications strategy, review our website and has begun to utilize social media such as Facebook in 2017.
- WYAMZ had a booth in April of 2017 and 2018 at the Saskatchewan Environmental Society's "Living Green Expo" held at Prairie Land Park in Saskatoon. It was an excellent opportunity to showcase the work we do. We will attend again in 2019.
- The WYAMZ Board is working with the Science Fairs in our area. We will be providing the winner of the science Fair with the Gerry Mooney Environmental Award to honour our former Board Director Mr. Gerry Mooney. We will present the award in 2019 and every year after.

All of these showcase the work we do and our members' involvement. Future plans include determining the need for additional air monitoring stations, development of more communication materials, presentations to municipalities, Chambers of Commerce, high school classes, School Community Council meetings, etc.

WYAMZ is pleased with the excellent response we received from our members. We have had a very good year financially and with our data monitoring capabilities. This is excellent news for the people of the western Yellowhead area of Saskatchewan and for all of our valued members. We now have data to help inform our decision-making process. The Science committee will review all of this data and bring recommendations to the Board as to how we should proceed with managing our monitoring capabilities. The data will direct our decisions as to how to improve our monitoring network.

Our objective is to collaboratively identify local air quality issues, and to develop and operate appropriate monitoring programs. Through diverse stakeholder representation WYAMZ recognizes concerns specific to the region, and encourages solutions that are tailored to address the needs of its members. Our goal is to collect credible and defensible air quality data and provide excellent service to our members. WYAMZ thanks all of our members for their participation.

# **EXECUTIVE SUMMARY**

The Western Yellowhead Air Management Zone (WYAMZ), established in 2012, is the second air management association in Saskatchewan. WYAMZ is a collaborative group of industry, government, non-government organizations, and private citizens. The air management zone covers an area that stretches from east of Saskatoon to the Alberta border, and from north of Meadow Lake to south of Rosetown, as shown in Figure 1 of the main report. Major economic activities in the region include agriculture, oil and gas, mining, power generation, and transportation.

WYAMZ manages a continuous air monitoring network. Figure 2 of the main report illustrates spatial distribution of the air monitoring stations in the WYAMZ region. The continuous air monitoring network consists of four airpointers<sup>®</sup> at the Meadow Lake, Maidstone, Clavet (formerly the Unity station), and Kerrobert stations. The North Battleford station is operated by the Ministry of Environment. Three additional continuous monitoring stations also operate within the WYAMZ region. A continuous air monitoring NAPS (National Air Pollution Surveillance Program) station is operated by the Ministry of Environment in Saskatoon, and the Lloydminster East and West stations are owned and operated by Husky Energy.

The WYAMZ network monitors sulphur dioxide (SO<sub>2</sub>), hydrogen sulphide (H<sub>2</sub>S), nitrogen oxides (NO, NO<sub>2</sub>, NOx), ozone (O<sub>3</sub>), fine particulate matter (PM<sub>2.5</sub>), ambient temperature (ET), relative humidity (RH), precipitation, wind speed (WS) and wind direction (WD). Both the annual and monthly uptime for all analyzers was greater than 90% in 2018, with the exception of 79.6% monthly uptime for the Kerrobert station in August. Unity had 41.3% annual operational uptime for ozone and PM2.5 at the Maidstone station was <90% for July (81.5%) and August (78.1%).

Table 1 summarizes the annual average concentration data for January to December 2018; the measured air quality was within the Saskatchewan Ambient Air Quality Standards (SAAQS), with the exception of  $H_2S$  and  $PM_{2.5}$ . There was a total of 12 exceedance events for 1-hour average  $H_2S$  and 1 24-hour average exceedance  $H_2S$ . 39 exceedance events for 24-hour average  $PM_{2.5}$  were recorded. The air quality at the WYAMZ air monitoring stations was rated Low Risk or Good for more than 97% of the time according to the Air Quality Health Index and Air Quality Index.

Data from January 1 to June 2018 calibrated and verified by SRC. Data from July 1 to Dec 31, 2018 calibrated and verified by Wood Environment and Infrastructure Solutions.

Dollutont	Conc. Unit –	Annual Averag				
Ponutant		Meadow Lake	Maidstone	Unity <sup>b</sup>	Clavet <sup>c</sup>	Kerrobert
SO <sub>2</sub>	ppb	а	0.4	а	а	0.2
$H_2S$	ppb	а	0.3	а	а	0.2
NO	ppb	0.2	0.7	0.6	1.3	а
NO <sub>2</sub>	ppb	0.9	4.2	2.9	4.3	а
NOx	ppb	0.11	4.9	3.4	5.6	а
O <sub>3</sub>	ppb	30	а	22	23	а
PM <sub>2.5</sub>	µg/m³	7	7	9	8	7

### Table 1 Annual average concentrations for continuous parameters for 2018

a. Parameter was not monitored.

b. Station was operational until November 8, 2018

c. Station operational starting November 13, 2018

# 1.0 Introduction

The Western Yellowhead Air Management Zone (WYAMZ), established in 2012, is the second air management association in Saskatchewan. WYAMZ is a collaborative group of industry, government, non-government organizations, and private citizens. The WYAMZ design is in-line with the directive from the Canadian Council of Ministers of the Environment under the Canada-wide Air Quality Management System. The association is designed to collect credible, continuous real-time air quality information through collaborative efforts.

Figure 1 illustrates the WYAMZ zone which covers the west central region of the province. The air management zone encompasses an area from east of Saskatoon to the Alberta border, and from north of Meadow Lake to south of Rosetown. Major economic activities in the region include agriculture, oil and gas, mining, power generation, and transportation.

Membership in the WYAMZ is currently voluntary. The current membership includes members of the agriculture, chemistry, oil and gas, mining and power generation sectors, as well as the public. The Government of Saskatchewan Ministry of Environment, Ministry of Economy, as well as representatives of the City of Saskatoon, University of Saskatchewan, Prairie North Regional Health Authority and the Saskatchewan Environmental Society also participate as members of the Board of Directors. WYAMZ's budget consists of membership fees, environmental footprint, and emissions-based fees assessed to facilities operating within the air management zone.

### 1.1 WYAMZ Mission

The WYAMZ mission is to collect credible, scientifically defensible air quality data for west central Saskatchewan, and to make this data freely available to all stakeholders. The objective is to bring together stakeholders from all backgrounds to identify local air quality issues and to develop innovative solutions for managing these issues

### **1.2 WYAMZ Air Monitoring Network**

Figure 2 illustrates a map of the air monitoring stations in the WYAMZ region. Real-time data for these stations is available through the WYAMZ website or the Saskatchewan Ministry of Environment. There are eight continuous air monitoring stations in the region. The Meadow Lake, Maidstone, Clavet (formerly Unity), and Kerrobert stations are owned and operated by WYAMZ; the North Battleford and Saskatoon stations are owned and operated by the Ministry of Environment. The Lloydminster East and West stations are owned and operated by Husky Energy.

WYAMZ operates four airpointers<sup>®</sup> at the Meadow Lake, Maidstone, Clavet (formerly Unity), and Kerrobert stations. The network measures continuous data for sulphur dioxide (SO<sub>2</sub>), hydrogen sulphide (H<sub>2</sub>S), nitrogen oxides (NO, NO<sub>2</sub>, NOx), ozone (O<sub>3</sub>), fine particulate matter (PM<sub>2.5</sub>), ambient temperature (ET), relative humidity (RH), precipitation, wind speed (WS) and wind direction (WD). Table 2 presents a combination matrix of the monitoring stations and the measured parameters. The airpointers<sup>®</sup> have been operating since December 1, 2013. Publicly available real-time air monitoring data is available on the WYAMZ website at: www.wyamz.ca.



Figure 1. The Western Yellowhead Air Management Zone (WYAMZ)



Figure 2. Locations of the continuous air monitoring stations in the WYAMZ zone

Monitoring	Continuous air quality parameters measured in the WYAMZ network					
Parameters	Meadow Lake	Maidstone	Unity / Clavet	Kerrobert		
SO <sub>2</sub>	а	٧	а	V		
H <sub>2</sub> S	а	v	а	v		
NO	v	٧	v	а		
NO <sub>2</sub>	v	٧	v	а		
NOx	v	v	v	а		
O <sub>3</sub>	v	а	v	а		
PM <sub>2.5</sub>	v	٧	v	v		
Precipitation	v	٧	v	v		
Ambient Temperature	v	٧	v	v		
Relative Humidity	v	٧	v	v		
Wind Speed	v	٧	v	v		
Wind Direction	v	v	v	٧		

### Table 2. WYAMZ ambient air continuous monitoring stations and the measurement parameters

a. Parameter was not monitored.

# 2.0 Air Quality Monitoring

### 2.1 Summary of Exceedances above the SAAQS

The WYAMZ ambient air monitoring network measures air pollutant concentrations to indicate the general quality of air in the management zone. Comparing measured air quality data with the Saskatchewan Ambient Air Quality Standards and Federal guidelines ensures public and environmental health is not impaired. Air quality data is used to evaluate the trends in air quality resulting from emissions of anthropogenic sources (industry, motor vehicles, etc) and natural processes (such as forest fires, decomposition of organic matter, etc).

Table 3 summarizes the Saskatchewan Ambient Air Quality Standards (SAAQS) and the number of exceedances recorded in 2018. A total of 12 exceedance events for 1-hour average H<sub>2</sub>S, one 24-hour average and 39 exceedance events for 24-hour average  $PM_{2.5}$  were recorded for the WYAMZ air monitoring network. There were no 8-hour running averages greater than the O<sub>3</sub> Canada-Wide Standard (CWS) of 65 ppb.

Parameter	No. of Stations	Average Type	SAAQS	No. of Exceedance
		1-hour	172 ppb	0
SO <sub>2</sub>	2	24-hour	48 ppb	0
		Annual	8 ppb	0
	2	1-hour	11 ppb	12
П25		24-hour	3.6 ppb	1
NO	3	1-hour	159 ppb	0
NO <sub>2</sub>		Annual	24 ppb	0
0-	2	1-hour	82 ppb	0
03	2 -	8-hour	63 ppb CWS <sup>a</sup>	0
PM <sub>2.5</sub>	4	24-hour	28 μg/m <sup>3</sup>	39

### Table 3.Number of exceedance events for 2018

a. The 3-year average of the annual 4<sup>th</sup>-highest daily maximum 8-hour average concentrations

## 2.2 Wind

Wind speed and wind direction, as well as other meteorological parameters, are important factors that influence regional air quality. The diffusion and dispersion of air pollutant emissions are greatly impacted by variations in wind speed and corresponding air turbulence. Different degrees of turbulence are created by variable mixing conditions due to the vertical gradient of ambient temperatures and terrain roughness unique to each station.

Figure 3 presents the wind roses at the WYAMZ continuous monitoring stations. Generally, the prevailing wind speed was calm most of time. According to the international wind classification system, prevailing wind primarily consisted of Light Air (0.3 m/s - 1.4 m/s) and Light Breeze (1.4 m/s - 3.1 m/s), Moderate Breeze (3.1 m/s - 7.8 m/s) and fast wind (>7.8 m/s). All stations wind speed ranges were Light Air, Light Breeze or Moderate Breeze most of the time.

The prevailing wind direction was not consistent among the four air monitoring stations. The Meadow Lake and Clavet stations were characterized with winds from the southwest quadrant and southeast quadrant. The Maidstone station was characterized with a prevalent wind from the southwest quadrant. Prevalent winds from the northwest was seen at the Kerrobert station.

The detailed frequency distribution table and wind rose are presented in the Appendices: Table B-10, Table C-11, Table D-10, and Table E-8.



Figure 3. Wind roses for 1-hour average wind data for 2018

## 2.3 Continuous Air Quality Data

### 2.3.1 Sulphur Dioxide (SO<sub>2</sub>)

Sulphur dioxide (SO<sub>2</sub>) is a colourless gas with a strong suffocating odour. It smells like burnt matches. At concentrations above 300 ppb, it can be detected by taste and odour. The health effects caused by exposure to high levels of SO<sub>2</sub> include breathing problems, respiratory illness, changes in lung function, and worsening respiratory and cardiovascular disease. People with asthma or chronic lung or heart disease are the most susceptible to SO<sub>2</sub>. SO<sub>2</sub> also damages trees and crops.

SO<sub>2</sub>, along with nitrogen oxides, are the main precursors of photochemical smog and acid rain, which contributes to the acidification of lakes and streams, accelerated corrosion of buildings, and reduced visibility. SO<sub>2</sub> in the air can form microscopic acid aerosols, which have serious health implications, as well as, contributing to climate change.

Anthropogenic SO<sub>2</sub> emission sources are primarily from combustion of sulphur containing fuels (e.g. gasoline, natural gas and coal) and processing of sulphur containing ores. The major emission sources for SO<sub>2</sub> include large industrial sources such as power plants, petroleum refineries, iron and steel mills, fertilizer plants, pulp and paper mills, and smelters, as well as small industries, such as small oil and gas plants, battery and well flares.

The Saskatchewan Ambient Air Quality Standards (SAAQS) for sulphur dioxide are:

- 1-hour average SAAQS = 172 ppb
- 24-hour average SAAQS = 48 ppb
- annual average SAAQS = 8 ppb

Table 4 presents the summary statistics for SO<sub>2</sub> measurement results. The measured concentration was low at both stations. The concentration from 2018 was 0.4 ppb and 0.2 ppb at the Maidstone and Kerrobert stations, respectively. The maximum 1-hour average concentration of 17.5 ppb and the maximum 24-hour average concentration of 2.2 ppb were detected at the Maidstone station. There was no exceedance of the SAAAQS for 1-hour, 24-hour, and annual average concentrations (see Table 5).

Figures 4 and 5 present the pollutant roses for 1-hour average concentration for SO<sub>2</sub>. For more than 95% of the time, SO<sub>2</sub> concentration was less than or equal to 1 ppb (blue petals); the concentration seldom exceeded 5 ppb (green petals). The higher concentration events (>1 ppb) tend to be detected more frequently when wind was from the southeast quadrant for Maidstone.

The detailed frequency distribution tables for the pollutant roses are presented in the Appendices: Table C-2 and Table E-2.

Table 4.	Summarv	statistics f	or SO <sub>2</sub>	measurement	results fo	r 2018

Monitoring	Annual	Instrument	Maxi	mum SO <sub>2</sub> Conc. an	d Occurrence Time		
Station	Average	Uptime	1	1-hour Max.		24-hour Max.	
	ppb	%	ppb	Time	ppb	Date	
Maidstone	0.4	99.9%	17.5	Feb-25 15:00	2.2	Jan-12	
Kerrobert	0.2	97.9%	3.7	July-30 13:00	1.4	Mar-06	

### Table 5.Number of exceedance events for SO2 for 2018

Monitoring	No. of Exceedance to Sasl	katchewan SO₂ Ambient Air	Quality Standard (SAAQS)
Station	1-hr SAAQS 24-hr SAAQS		Annual SAAQS
	172 ppb	48 ppb	8 ppb
Maidstone	0	0	0
Kerrobert	0	0	0



Figure 4. Pollutant rose for 1-hour average SO<sub>2</sub> data at the Maidstone station



Figure 5. Pollutant rose for 1-hour average SO<sub>2</sub> data at the Kerrobert station

### 2.3.2 Hydrogen Sulphide (H<sub>2</sub>S)

Hydrogen sulphide (H<sub>2</sub>S) is a colourless gas with a characteristic "rotten egg" odour. It is produced both naturally and through anthropogenic emission sources. H<sub>2</sub>S occurs naturally in coal, crude oil, natural gas, oil, sulphur hot springs, volcanic gases, sloughs, swamps and lakes. The major anthropogenic emission sources include natural gas and petroleum production, wastewater treatment, pulp and paper mills, rayon textile manufacturing, and tar and asphalt manufacturing. Decomposition of organic matter by bacteria under anaerobic conditions releases H<sub>2</sub>S as well, forming the characteristic odour commonly associated with sewers, sewage lagoons, and swamps.

Hydrogen sulfide is a highly toxic and flammable gas. It is heavier than air and tends to accumulate at the bottom of poorly ventilated spaces. Although very pungent at first, it quickly deadens the sense of smell. Potential victims may be unaware of its presence until it is too late.

The Saskatchewan Ambient Air Quality Standards (SAAQS) for hydrogen sulphide are:

- 1-hour average SAAQS = 11 ppb
- 24-hour average SAAQS = 3.6 ppb

Table 6 presents the summary statistics for  $H_2S$  measurement results. The measured concentration was low at both stations; the average concentration from 2018 was 0.4 ppb and 0.2 ppb at the Maidstone and Kerrobert stations, respectively. The maximum 1-hour average concentration of 21.4 ppb and the maximum 24-hour average concentration of 3.8 ppb were both measured at the Maidstone station. There were 12 exceedances of the SAAAQS for 1-hour average concentration at the Maidstone station and 1 for the 24-hour average (see Table 7).

Figures 6 and 7 present the pollutant roses for 1-hour average H<sub>2</sub>S. For more than 99% of time, H<sub>2</sub>S concentration was less than or equal to 1 ppb (blue petals) at both stations. The higher concentrations (>1 ppb) at the Maidstone station tend to be slightly more frequent when wind was from the southern directions. The higher concentration events at the Kerrobert station tend to be slightly more frequent when wind was from the solution frequent when wind was from the solution.

The detailed frequency distribution tables for the pollutant roses are presented in the Appendices: Table C-3 and Table E-3.

Table 6.	Summary statistics for H <sub>2</sub> S measurement results for 2018
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Monitoring Station	Annual Instrument Average Uptime	Instrument	Maximum $H_2S$ Conc. and Occurrence Time			
		Uptime	1	-hour Max.	24-h	our Max.
	ppb	%	ppb	Time	ppb	Date
Maidstone	0.3	99.8%	21.4	Aug 09 08:00	3.8	Aug-9
Kerrobert	0.2	99.6%	3.5	Aug 10 06:00	0.8	July-1

### Table 7. Number of exceedance events for H<sub>2</sub>S for 2018

Monitoring	No. of Exceedances to Saskatchewan H <sub>2</sub> S Ambient Air Quality Standard (SAAQS)			
Station	1-hr SAAQS	24-hr SAAQS		
	11 ppb	3.6 ppb		
Maidstone	12	1		
Kerrobert	0	0		



Figure 6. Pollutant rose for 1-hour average H<sub>2</sub>S data at the Maidstone station



Figure 7. Pollutant rose for 1-hour average H<sub>2</sub>S data at the Kerrobert station

### 2.3.3 Nitrogen Dioxide (NO<sub>2</sub>)

Nitrogen oxides, also known as oxides of nitrogen (NO<sub>X</sub>), is a collective term for nitric oxide (NO) and nitrogen dioxide (NO<sub>2</sub>). Nitric oxide is a colorless, flammable gas with a slight odour. Nitrogen dioxide is a reddish brown, non-flammable gas with a pungent irritating odour. NO<sub>2</sub> is of more interest than NO from both a health and acid rain perspective.

 $NO_X$  can cause respiratory disease, damage vegetation, and reduce visibility. The primary concern with  $NO_X$  emissions is their contribution to formation of ground-level ozone, smog and acid rain. To a lesser extent, some  $NO_X$  compounds (e.g.  $N_2O$ ) contribute to stratospheric ozone layer depletion and global warming.

 $NO_X$  emissions are mainly produced by fossil fuel combustion. High temperature conditions during combustion result in the formation of  $NO_X$  as a by-product. The major anthropogenic emission sources for  $NO_X$  are associated with fuel combustion, including both stationary sources, such as power plants, oil and gas industries, incinerators, as well as mobile sources such as automobiles. Non-combustion sources, for example nitric acid manufacture, welding processes and the use of explosives, comprise the smaller emission sources. In large cities, motor vehicle emissions are the major source of  $NO_X$ , as well as space heating emissions in the winter.

The Saskatchewan Ministry of Environment regulates ambient air concentration for nitrogen dioxide. The Saskatchewan Ambient Air Quality Standards (SAAQS) for nitrogen dioxide are:

- 1-hour average SAAQS = 159 ppb
- annual average SAAQS = 24 ppb

Table 8 presents the summary statistics for  $NO_2$  measurement results. The Maidstone station measured a higher concentration than the other two stations, with an annual average of 4.2 ppb. The average concentration from Jan – November 2018 recorded at the Unity station was 2.9 ppb, and the Meadow Lake station was 4.3 ppb. The maximum 1-hour concentration was detected at the Unity station and maximum 24-hour concentration was detected at the Maidstone station. There was no exceedance of the 1-hour or annual SAAQS (see Table 9).

Figures 8 to 11 present the pollutant roses for 1-hour average concentrations for NO<sub>2</sub>. The concentration at the Meadow Lake station was the lowest among the three stations; for more than 99% of the time NO<sub>2</sub> concentration was less than 5 ppb; the concentration never exceeded 10 ppb for the three stations. The >5 ppb events tend to be slightly more frequent when wind was from the southwest quadrant, however the sample size was too small to conclude the trend. At the Unity station, 14.4% of the time NO<sub>2</sub> concentration was from the northern directions, however the sample size was too small to be more frequent when wind was from the northern directions, however the sample size was too small to conclude the trend. The concentration at the Maidstone station tends to be the highest among the three stations; 22.2% of the time NO<sub>2</sub> concentration was from the

southwest and northwest quadrants. In addition to the directional trends, a seasonal trend was observed at all stations; NO<sub>2</sub> concentration tends to be higher during the winter months.

The detailed frequency distribution tables for the NO, NO<sub>2</sub> and NOx pollutant roses are presented in the Appendices: Tables B-2 to B-4, Tables C-4 to C-6, and Tables D-2 to D-4.

	Annual Average	Instrument Uptime	Maximum NO <sub>2</sub> Conc. and Occurrence Time			
Monitoring Station			1-	hour Max.	24-h	our Max.
	ppb	%	ppb	Time	ppb	Date
Meadow Lake	0.9	93.4%	10.0	Jan 11 20:00	4.3	Jan-13
Maidstone	4.2	99.9%	28.0	Mar 08 03:00	20.9	Dec-08
Unity <sup>a</sup>	2.9	99.8%	23.4	Jun-19 05:00	10.2	Jun-18
Clavet <sup>b</sup>	4.4	96.1%	23.1	Dec 08 09:00	10.2	Nov-15

#### Table 8.Summary statistics for NO2 measurement results for 2018

a. Parameter was monitored until November 8.

b. Parameter was operational starting November 13.

### Table 9.Number of exceedance events for NO2 for 2018

Monitoring	No. of Exceedances to Saskatchewan NO₂ Ambient Air Quality Standard (SAAQS)				
Station	1-hr SAAQS	Annual SAAQS			
	159 ppb	24 ppb			
Meadow Lake	0	0			
Maidstone	0	0			
Unity <sup>a</sup>	0	0			
Clavet <sup>b</sup>	0	0			

a. Parameter was monitored until November 8.

b. Parameter was operational starting November 13.



Figure 8. Pollutant rose for 1-hour average NO<sub>2</sub> data at the Meadow Lake station



Figure 9. Pollutant rose for 1-hour average NO<sub>2</sub> data at the Maidstone station



Figure 10. Pollutant rose for 1-hour average NO<sub>2</sub> data at the Unity station



Figure 11. Pollutant rose for 1-hour average NO<sub>2</sub> data at the Clavet station

### 2.3.4 Ozone (O<sub>3</sub>)

Ozone  $(O_3)$  is a pale blue gas, slightly soluble in water. Most people can detect a sharp odour resembling chlorine bleach at about 10 ppb concentration. Ozone can be formed by electrical discharges and high energy electromagnetic radiation. In the indoor environments, ozone can be present as a result of electronic equipment such as ionic air purifiers, laser printers, photocopiers, and arc welders.

In the ambient air,  $O_3$  is a "secondary" pollutant, meaning it is not directly emitted from a source. Instead, ozone is produced from photochemical reactions between oxides of nitrogen (NO<sub>X</sub>) and volatile organic compounds (VOC) in the presence of sunlight. Some research suggests that ground-level ozone could be from intrusion of ozone from the stratosphere, mixing from the upper troposphere, local photochemistry and the medium and long-range transport. There are split opinions regarding relative importance of these mechanisms. A study in Regina suggested that high ozone events could be due to downward transport from the stratosphere for the reviewed data.

Exposure to ozone has been linked to premature mortality and a range of morbidity health endpoints, such as hospital admissions and asthma symptoms. Acute exposure to high concentrations of ozone can cause eye irritation and breathing difficulty. Ozone can significantly impact vegetation and decrease the productivity of some crops. It damages cotton, acetate, nylon, polyester and other textile materials. Ozone can also damage other synthetic materials, cause cracks in rubber, accelerate fading of dyes, and speed deterioration of some paints and coatings.

The Saskatchewan Ambient Air Quality Standard (SAAQS) for ozone is:

• 1-hour average SAAQS = 82 ppb

The Canada-Wide Standard (CWS) for ozone is:

• 8-hour average CWS = 63 ppb; achievement evaluation is based on the 4<sup>th</sup> highest measurement annually, averaged over three consecutive years.

Table 10 presents the summary statistics for  $O_3$  measurement results. The average concentration in 2018 was 24 ppb for Meadow Lake, with 22 ppb at Unity and 23 ppb at Clavet. The maximum 1-hour concentration of 72 ppb and the 4<sup>th</sup> highest 8-hour running averages of 63 ppb were both detected at the Unity station. There were no 8-hour running averages higher than the CWS standard (see Table 11). The WYAMZ network has not collected enough data for CWS exceedance assessment.

Figures 12 to 14 present the pollutant roses for 1-hour average concentration of  $O_3$ . The measured concentration was within 20 ppb to 40 ppb range for more than 60% of the time at both stations. There was no apparent directional trend for the higher concentration events (>40 ppb). The concentration of  $O_3$  tends to be higher in the spring months.

The detailed frequency distribution table for the pollutant roses are presented in the Appendices: Table B-5 and Table D-5.

Monitoring Station	Annual Average	Instrument Uptime	Maximum O <sub>3</sub> Conc. and Occurrence Time			
			1-hour Max.		8-hour 4 <sup>th</sup> Highest	
	ppb	%	ppb	Time	ppb	Time
Meadow Lake	30	98.5%	69	Mar 13 16:00	63	June 20 14:00
Unity <sup>a</sup>	22	41.3% <sup>b</sup>	69	July 1 07:00	63	July 30 12:00
Clavet <sup>c</sup>	23	97.1%	37	Dec 15 17:00	34	Nov 16 07:00

#### Table 10. Summary statistics for O<sub>3</sub> measurement results for 2018

a. Parameter was monitored until November 8.

b. Operational issues, analyzer not fully operational until June 28.

c. Parameter was operational starting November 13.

#### Table 11. Number of exceedance events for O<sub>3</sub> for 2018

Monitoring	No. of Exceedances to Saskatchewan $O_3$ Ambient Air Quality Standard (SAAQS)					
Station	1-hr SAAQS	8-hr CWS				
	82 ppb	63 ppb				
Meadow Lake	0	0				
Unity <sup>a</sup>	0	0 <sup><i>a</i></sup>				
Clavet <sup>b</sup>	0	0				

a. These events do not constitute an exceedance because the CWS standard is based on the 4<sup>th</sup> highest measurement annually, averaged over three consecutive years.

b. Parameter was monitored until November 8.

c. Parameter was operational starting November 13.



Figure 112. Pollutant rose for 1-hour average O<sub>3</sub> data at the Meadow Lake station



Figure 13. Pollutant rose for 1-hour average O<sub>3</sub> data at the Unity station



Figure 14. Pollutant rose for 1-hour average  $O_3$  data at the Clavet station

### **2.3.5** Fine Particulate Matter (PM<sub>2.5</sub>)

Particulate matter is unique among air pollutants, as it is identified by its size rather than by its composition. The major concern for particulate matter deals with small particles referred to as inhalable particulate, or  $PM_{10}$ .  $PM_{10}$  is defined as particles that have an aerodynamic diameter less than 10 microns (or 0.01 mm).  $PM_{10}$  can be divided into two groups of particles based on size: fine particles and coarse particles. The fine particles are those particles with an aerodynamic diameter smaller than 2.5 microns (0.0025 mm) and are identified as  $PM_{2.5}$ . In contrast, coarse particles are those with aerodynamic diameter greater than 2.5 microns and less than 10 microns.

Fine particles are generally emitted from activities such as industrial and residential combustion, and from vehicle exhaust. Fine particles are also formed in the atmosphere when gases such as sulphur dioxide, nitrogen oxides, and volatile organic compounds, emitted by combustion activities, are transformed by chemical reactions in the air.

Adverse health effects from breathing air with a high PM<sub>2.5</sub> concentration include: premature death, increased respiratory symptoms and disease, chronic bronchitis, and decreased lung function particularly for individuals with asthma. Particulate matter can clog stomatal openings of plants and interfere with photosynthesis functions, leading to growth stunting or mortality in some plant species.

Saskatchewan endorses the Canada-Wide Standards (CWS) for fine particulate matter (PM<sub>2.5</sub>):

 28 μg/m<sup>3</sup> averaged over a 24-hour period from midnight to midnight; the standard is based on the 98<sup>th</sup> percentile annually, averaged over three consecutive years.

Table 12 presents the summary statistics for  $PM_{2.5}$  measurement results. The average concentration in 2018 ranged from 7 µg/m<sup>3</sup> to 12 µg/m<sup>3</sup>. The maximum 1-hour concentration of 214 µg/m<sup>3</sup> and the maximum 24-hour concentration of 105 µg/m<sup>3</sup> were both detected at the Meadow Lake station. There were 39 exceedances of the CWS 24-hour average standard (see Table 13) attributed to wildfire smoke in the area.

Figures 15 through 19 present the pollutant roses for  $PM_{2.5}$  measurement results. The measured concentrations were mostly less than 10 µg/m<sup>3</sup> (72.5.0% to 83.0% of the time for the four stations). There was no apparent directional trend for the higher concentration events (>10 µg/m<sup>3</sup>), while a higher occurrence frequency was observed in July and August.

The detailed frequency distribution tables for the pollutant roses are presented in the Appendices: Table B-6, Table C-7, Table D-6, and Table E-4.

#### Table 12. Summary statistics for PM2.5 measurement results for 2018

	Annual Average	Instrument Uptime	Maximum PM <sub>2.5</sub> Conc. and Occurrence Time			
<b>Monitoring Station</b>			1-	hour Max.	24-hc	our Max.
	μg/m³	%	µg/m³	Time	µg/m³	Date
Meadow Lake	7	97.5%	214	Aug 18 06:00	105	Aug-18
Maidstone <sup>a</sup>	7	96.1%	171	Aug 22 23:00	95	Aug-15
Unity <sup>b</sup>	12	98.5%	157	Aug 18 11:00	87	Aug-23
Kerrobert	7	98.0%	160	Aug 18 10:00	77	Aug-28
Clavet <sup>c</sup>	8	96.9%	41	Dec 30 01:00	20	Nov-20

a. Maidstone PM<sub>2.5</sub> monitor was malfunctioning intermittently throughout August.

b. Parameter was monitored until November 8.

c. Parameter was operation starting November 13.

#### Table 13. Number of exceedance events for PM<sub>2.5</sub> for 2018

Monitoring	No. of Exceedance to Canada-Wide PM <sub>2.5</sub> Standards (CWS)					
Station	24-hr CWS					
	28 μg/m3					
Meadow Lake	9					
Maidstone <sup>a</sup>	7					
Unity <sup>b</sup>	15					
Kerrobert	8					
Clavet <sup>c</sup>	0					

a. Maidstone PM<sub>2.5</sub> monitor was malfunctioning intermittently throughout August.

b. Parameter was monitored until November 8.

c. Parameter was operation starting November 13.



Figure 15. Pollutant rose for 1-hour average PM<sub>2.5</sub> data at the Meadow Lake station



Figure 16. Pollutant rose for 1-hour average PM<sub>2.5</sub> data at the Maidstone station


Figure 17. Pollutant rose for 1-hour average PM<sub>2.5</sub> data at the Unity station



Figure 18. Pollutant rose for 1-hour average PM<sub>2.5</sub> data at the Kerrobert station



Figure 19. Pollutant rose for 1-hour average PM<sub>2.5</sub> data at the Clavet station

# 2.4 Air Quality Health Index (AQHI)

The Air Quality Health Index (AQHI) is a health protection tool that is designed to help the public make decisions to protect their health by limiting short-term exposure to air pollution and adjusting their activity levels during increased levels of air pollution. The AQHI uses readings from three air pollutants to calculate a single numerical value to evaluate the health risk associated with air pollution. The three pollutants are fine particulate matter (PM<sub>2.5</sub>), nitrogen dioxide (NO<sub>2</sub>), and ground-level ozone (O<sub>3</sub>). All three pollutants are required to calculate AQHI. Among the WYAMZ air monitoring stations, Meadow Lake and Unity/Clavet are eligible for AQHI reporting.

Figure 20 illustrates the risk categories and the health messages for the AQHI system. The health risk is classified in four categories: Low Risk (1 to 3), Moderate Risk (4 to 6), High Risk (7 to 10), and Very High Risk (higher than 10).

Table 14 summarizes the summary statistics for AQHI rating. The air quality at both stations was rated Low Risk most of the time. The Meadow Lake station had 2.1% of time in the Moderate Risk, 0.4% of time in the High-Risk category and 0.1% in the Very High Risk category. The High Risk and Very High-Risk events were associated with an increased PM<sub>2.5</sub> concentration, while the Moderate Risk events were primarily associated with an increased concentration of PM<sub>2.5</sub> or O<sub>3</sub>. The High-Risk events were recorded throughout July and August, and the cause was determined to be wildfire smoke; PM<sub>2.5</sub> exceeded 100  $\mu$ g/m<sup>3</sup>. The Unity station had 5.9% of time in the Moderate Risk category and 0.7% in the High-Risk category which was primarily associated with an increased concentration of PM<sub>2.5</sub> or O<sub>3</sub>.

1	2	3	4	5	6	7	8	9	10	+
<u> </u>	*			*			*			V
Low R	isk 1-3	Mo	derate	Risk 4	-6	High R	isk 7-1	0 V	ery High	Risk 10+

Air Quality **Health Messages Health Risk Health Index** At Risk Population **General Population** Low Risk 1 - 3Ideal air quality for Enjoy your usual outdoor activities. outdoor activities. Moderate Risk 4-6 Consider reducing or No need to modify your rescheduling strenuous usual outdoor activities activities outdoors if you unless you experience are experiencing symptoms such as coughing and throat irritation. symptoms. High Risk 7 - 10**Reduce or reschedule** Consider reducing or strenuous activities rescheduling strenuous outdoors. Children and activities outdoors if you the elderly should also experience symptoms such as take it easy. coughing and throat irritation. Very High Risk Avoid strenuous activities **Reduce or reschedule** outdoors. Children and the strenuous activities outdoors, elderly should also avoid especially if you experience outdoor physical exertion. symptoms such as coughing and throat irritation.

# Figure 20. Health risk classification and health messages for Air Quality Health Index (Environment Canada)

#### Table 14. Summary of occurrence statistics for AQHI rating

Station Name	Occurrence Statistics	Occurre	Occurrence Hour and Frequency by AQHI Risk Rating								
Name	Occurrence statistics	Low Risk	Moderate Risk	High Risk	Very High Risk						
Meadow	Occurrence Hours	7734	168	30	6						
Lake	Occurrence Frequency	97.4%	2.1%	0.4%	0.1%						
	Occurrence Hours	2883	183	22	0						
Unity	Occurrence Frequency	93.4%	5.9%	0.7%	0.0%						
Clavet <sup>b</sup>	Occurrence Hours	1100	0	0	0						
	Occurrence Frequency	100.%	0.0%	0.0%	0.0%						

a. Station was monitored until November 8.

b. Station was operational starting November 13.

# 2.5 Air Quality Index (AQI)

The Maidstone station does not meet the reporting requirements for AQHI, the Air Quality Index (AQI) is used as an alternative index. The Kerrobert station is excluded from index analysis because this station does not meet the reporting requirements of either index system.

The Air Quality Index (AQI) is a system developed to provide the public with a meaningful and comparable measure of air quality. The AQI uses readings from five major air pollutants: SO<sub>2</sub>, NO<sub>2</sub>, O<sub>3</sub>, PM<sub>2.5</sub>, and carbon monoxide (CO), to calculate the AQI. A minimum of three pollutants is required. The AQI is rated in four categories: Good (0 to 25), Fair (26 to 50), Poor (51 to 100), and Very Poor (>100). Table 15 summarizes the effects associated with the AQI ratings.

Table 16 summarizes the occurrence statistics for AQI rating. The air quality at the Maidstone station was rated Good for 98.2% of the time; 1.3% was rated Fair, and 0.5% was rated Poor. The Fair and Poor air quality was associated with an increased PM<sub>2.5</sub> concentration.

AQI	Air Quality Rating	Effect Description
0 – 25	Good	<u>Desirable Range</u> : No known harmful effects to soil, water, vegetation, animals, materials, visibility or human health. The long-term goal is for air quality to be in this range all of the time in Canada.
26 – 50	Fair	<u>Acceptable Range</u> : Adequate protection against harmful effects to soil, water, vegetation, animals, materials, visibility and human health.
51 – 100	Poor	<u>Tolerable Range</u> : Not all aspects of human health or the environment are adequately protected from possible adverse effects. Long-term control action may be necessary, depending on the frequency, duration and circumstances of the readings.
>100	Very Poor	Intolerable Range: Continued high readings could pose a risk to public health.

## Table 15. AQI rating and effect description

#### Table 16. Summary of occurrence statistics for AQI rating

Station	Occurrence Statistics	Occurrence Hours and Frequency by AQI Rating								
Name	Occurrence statistics	Good	Fair	Poor	Very Poor					
Maidatana	Occurrence Hours	7688	102	39	0					
Maldstone	Occurrence Frequency	98.2%	1.3%	0.5%	0.0%					

## APPENDIX A. SASKATCHEWAN AMBIENT AIR QUALITY STANDARDS

Table A-1. Saskatchewan Ambient Air Quality Standards

TABLE 20: SASKA	ATCHEWAN AMBIE	NT AIR QUALITY	STANDARDS (µg/	m <sup>3</sup> )
Air Pollutant	1 Hour	8 Hours	24 Hours	Annual
Particulate Matter (PM <sub>2.5</sub> )			28°	10
Particulate Matter (PM <sub>10</sub> )			50	
Total Suspended Particulates (TSP)			100	60°
Nitrogen Dioxide (NO2)	300 (159 ppb)		200 (106 ppb)	45° (24 ppb)
Sulphur Dioxide (SO <sub>2</sub> )	450 (172 ppb)		125 (48 ppb)	20° (8 ppb)
Hydrogen Sulphide (H₂S)	15 (11 ppb)		5 (3.6 ppb)	
Ozone (O3)	160 (82 ppb)	124 <sup>d</sup> (63 ppb)		
Carbon Monoxide (CO)	15,000 (13,000 ppb)	6,000 (5,000 ppb)		

Footnotes

(a) The 3-year average of the annual 98th percentile of the daily 24-hour average concentrations.

(b) Geometric means

(c) Arithmetic means

(d) The 3-year average of the annual 4th-highest daily maximum 8-hour average concentrations.

## APPENDIX B. MEADOW LAKE STATION: CONTINUOUS MONITORING DATA

Parameter	Unit	Calibration & AIC <sup>a</sup>	Valid Data	Uptime	Summary Statistics for Hourly Average Data				
Faranietei	Onit	(hours)	(hours)	(%)	Average	Minimum	Maximum		
NO	ppb	402	7808	93.4%	0.2	< 0.1	5.0		
NO <sub>2</sub>	ppb	402	7809	93.4%	0.9	< 0.1	10.0		
NO <sub>x</sub>	ppb	402	7809	93.4%	1.1	< 0.1	12.7		
O <sub>3</sub>	ppb	424	8214	98.5%	30	2	69		
PM <sub>2.5</sub>	µg/m³	0	8545	97.5%	7	< 1	214		
Precipitation	mm	0	8737	99.7%	359.5 <sup>b</sup>	< 0.1	32.0		
Ambient Temperature	°C	0	8739	99.7%	1.9	-33.1	33.7		
Relative Humidity	%	0	8730	99.7%	64	13	91		
Wind Speed	m/s	0	8743	99.8%	2.0	Calm	8.3		

 Table B-1
 Meadow Lake Station: Summary statistics for continuous air monitoring results for 2018

a. Automatic Instrument Check

b. Total precipitation

	Valid	Operational	Average	Maximum	1-Hour	Maximum	24-Hour	Percent of Data in each Concentration Range					e
Month	1-Hr data	Time	Conc.	1-Hr Conc.	Exceedance <sup>a</sup>	24-Hr Conc.	Exceedance <sup><i>b</i></sup>						
	(no.)	(%)	(ppb)	(ppb)	(no.)	(ppb)	(no.)	≤5	5 - 15	15 - 53	53 - 100	100 - 212	>212
January	710	99.7%	0.3	5.0	-	1.2	-	100.0	0.0	0.0	0.0	0.0	0.0
February	636	100.0%	0.2	3.4	-	0.6	-	100.0	0.0	0.0	0.0	0.0	0.0
March	711	100.0%	0.1	1.8	-	0.3	-	100.0	0.0	0.0	0.0	0.0	0.0
April	686	99.7%	0.1	1.5	-	0.2	-	100.0	0.0	0.0	0.0	0.0	0.0
May	193	26.5%	0.1	0.7	-	0.1	-	100.0	0.0	0.0	0.0	0.0	0.0
June	678	98.8%	0.2	1.4	-	0.3	-	100.0	0.0	0.0	0.0	0.0	0.0
July	710	99.6%	0.1	0.9	-	0.4	-	100.0	0.0	0.0	0.0	0.0	0.0
August	711	100.0%	0.1	1.4	-	0.3	-	100.0	0.0	0.0	0.0	0.0	0.0
September	675	100.0%	0.3	4.4	-	3.3	-	100.0	0.0	0.0	0.0	0.0	0.0
October	712	100.0%	0.2	3.9	-	0.5	-	100.0	0.0	0.0	0.0	0.0	0.0
November	688	100.0%	0.1	2.3	-	0.5	-	100.0	0.0	0.0	0.0	0.0	0.0
December	698	99.9%	0.2	4.4	-	0.5	-	100.0	0.0	0.0	0.0	0.0	0.0
Annual <sup>c</sup>	7808	93.4%	0.2	5.0	-	3.3	-	100.0	0.0	0.0	0.0	0.0	0.0
a No.1	hour Cackat	chawan Ambia	nt Air Quali	tu Standard									

## Table B-2. Meadow Lake Station: Summary of airpointer® NO monitoring results for 2018

a. No 1-hour Saskatchewan Ambient Air Quality Standard

b. No 24-hour Saskatchewan Ambient Air Quality Standard

	Valid	Operational	Average	Maximum	1-Hour	Maximum	24-Hour	Percent of Data in each Concentration Range					10
Month	1-Hr data	Time	Conc.	1-Hr Conc.	Exceedance <sup>a</sup>	24-Hr Conc.	Exceedance <sup>b</sup>	r (		Data ili ea	ch concent		,e
	(no.)	(%)	(ppb)	(ppb)	(no.)	(ppb)	(no.)	≤5	5 - 15	15 - 53	53 - 100	100 - 212	>212
January	710	99.7%	1.8	10.0	0	4.3	-	94.9	5.1	0.0	0.0	0.0	0.0
February	636	100.0%	1.3	4.7	0	2.3	-	100.0	0.0	0.0	0.0	0.0	0.0
March	711	100.0%	1.0	4.5	0	2.2	-	100.0	0.0	0.0	0.0	0.0	0.0
April	687	99.9%	0.6	2.6	0	1.3	-	100.0	0.0	0.0	0.0	0.0	0.0
May	194	26.6%	0.6	2.4	0	0.6	-	100.0	0.0	0.0	0.0	0.0	0.0
June	678	98.8%	0.6	3.9	0	1.4	-	100.0	0.0	0.0	0.0	0.0	0.0
July	710	99.6%	0.2	2.5	0	0.6	-	100.0	0.0	0.0	0.0	0.0	0.0
August	711	100.0%	0.6	2.2	0	1.4	-	100.0	0.0	0.0	0.0	0.0	0.0
September	675	100.0%	0.3	2.1	0	0.8	-	100.0	0.0	0.0	0.0	0.0	0.0
October	712	100.0%	0.8	3.6	0	1.8	-	100.0	0.0	0.0	0.0	0.0	0.0
November	688	100.0%	1.2	5.1	0	3.4	-	99.9	0.1	0.0	0.0	0.0	0.0
December	697	99.7%	1.5	7.5	0	4.2	-	98.3	1.7	0.0	0.0	0.0	0.0
				•									
Annual <sup>c</sup>	7809	93.4%	0.9	10.0	0	4.3	-	99.4	0.6	0.0	0.0	0.0	0.0
a 1-ho	ur Sackatcha	wan Amhient /	Nir Quality S	tandard - 212	2 nnh								

## Table B-3. Meadow Lake Station: Summary of airpointer® NO<sub>2</sub> monitoring results for 2018

a. 1-hour Saskatchewan Ambient Air Quality Standard = 212 ppb

b. No 24-hour Saskatchewan Ambient Air Quality Standard

c. Annual Saskatchewan Ambient Air Quality Standard = 53 ppb

	Valid	Operational	Average	Maximum	1-Hour	Maximum	24-Hour	Percent of Data in each Concentration Range					
Month	1-Hr data	Time	Conc.	1-Hr Conc.	Exceedance <sup>a</sup>	24-Hr Conc.	Exceedance <sup>b</sup>						
	(no.)	(%)	(ppb)	(ppb)	(no.)	(ppb)	(no.)	≤5	5 - 15	15 - 53	53 - 100	100 - 212	>212
January	710	99.7%	2.1	12.7	-	5.5	-	92.5	7.5	0.0	0.0	0.0	0.0
February	636	100.0%	1.4	7.8	-	2.7	-	99.4	0.6	0.0	0.0	0.0	0.0
March	711	100.0%	1.1	6.3	-	2.3	-	99.9	0.1	0.0	0.0	0.0	0.0
April	686	99.7%	0.7	3.5	-	1.3	-	100.0	0.0	0.0	0.0	0.0	0.0
May	194	26.6%	0.6	2.4	-	0.7	-	100.0	0.0	0.0	0.0	0.0	0.0
June	678	98.8%	0.7	5.1	-	1.5	-	99.9	0.1	0.0	0.0	0.0	0.0
July	710	99.6%	0.5	3.3	-	0.8	-	100.0	0.0	0.0	0.0	0.0	0.0
August	711	100.0%	0.7	3.0	-	1.6	-	100.0	0.0	0.0	0.0	0.0	0.0
September	675	100.0%	0.7	5.4	-	4.1	-	99.1	0.9	0.0	0.0	0.0	0.0
October	712	100.0%	1.0	5.6	-	2.2	-	99.7	0.3	0.0	0.0	0.0	0.0
November	688	100.0%	1.3	6.3	-	3.9	-	99.0	1.0	0.0	0.0	0.0	0.0
December	698	99.9%	1.6	7.6	-	4.6	-	96.8	3.2	0.0	0.0	0.0	0.0
Annual <sup>c</sup>	7809	93.4%	1.1	12.7	-	5.5	-	98.8	1.2	0.0	0.0	0.0	0.0
a No 1	hour Cackat	chawan Ambia	nt Air Quali	ty Standard									

## Table B-4. Meadow Lake Station: Summary of airpointer® NOx monitoring results for 2018

a. No 1-hour Saskatchewan Ambient Air Quality Standard

b. No 24-hour Saskatchewan Ambient Air Quality Standard

Month	Valid 1-Hr data	Operational Time	Average Conc.	Maximum 1-Hr Conc.	1-Hour Exceedance <sup>a</sup>	Maximum 8-Hr Conc.	8-Hour Conc. Above CWS <sup>b</sup>	Percent of Data in each Concentration Range					
	(no.)	(%)	(ppb)	(ppb)	(no.)	(ppb)	(no.)	≤10	10 - 20	20 - 40	40 - 65	65 - 82	>82
January	651	91.0%	29	39	0	38	0	0.0	2.8	97.2	0.0	0.0	0.0
February	637	100.0%	37	46	0	45	0	0.0	0.0	84.9	15.1	0.0	0.0
March	711	100.0%	42	69	0	63	0	0.0	0.0	44.9	54.7	0.4	0.0
April	688	100.0%	43	58	0	56	0	0.0	0.0	31.4	68.6	0.0	0.0
May	659	93.6%	38	56	0	54	0	0.2	3.8	51.6	44.5	0.0	0.0
June	680	99.3%	34	68	0	64	0	0.4	10.0	62.9	25.9	0.7	0.0
July	710	99.7%	25	55	0	50	0	5.5	25.1	65.2	4.2	0.0	0.0
August	709	99.7%	23	59	0	54	0	6.9	34.0	54.2	4.9	0.0	0.0
September	673	99.7%	20	36	0	35	0	6.1	45.3	48.6	0.0	0.0	0.0
October	712	100.0%	25	50	0	48	0	3.2	19.4	76.4	1.0	0.0	0.0
November	688	100.0%	22	36	0	36	0	3.3	30.2	66.4	0.0	0.0	0.0
December	696	99.6%	26	39	0	37	0	0.1	18.4	81.5	0.0	0.0	0.0
Annual <sup>c</sup>	8214	98.5%	30	69	0	54	0	2.2	15.9	63.5	18.2	0.1	0.0
a	1-hour Saska	itchewan Amhi	ent Air Qua	lity Standard -	- 82 nnh								

## Table B-5. Meadow Lake Station: Summary of airpointer® O<sub>3</sub> monitoring results for the year 2018

a. 1-hour Saskatchewan Ambient Air Quality Standard = 82 ppb

b. 8-hour Canada-Wide Standard = 65 ppb

Month	Valid 1-Hr data	Operational Time	Average Conc.	Maximum 1-Hr Conc.	1-Hour Exceedance <sup>a</sup>	Maximum 24-Hr Conc.	24-Hour Exceedance <sup>b</sup>	Ре	rcent of Dat	ta in each	Concentr	ation Ran	ge
	(no.)	(%)	(µg/m³)	(µg/m³)	(no.)	(µg/m³)	(no.)	≤5	5 - 10	10 - 15	15 - 30	30 - 80	>80
January	744	99.9%	5	81	-	16	0	65	28	4	3	0	0
February	672	100.0%	3	24	-	8	0	87	10	2	1	0	0
March	744	100.0%	5	24	-	12	0	60	28	10	2	0	0
April	720	100.0%	4	15	-	8	0	67	27	6	0	0	0
May	736	98.9%	10	194	-	38	2	46	26	11	13	4	1
June	714	99.2%	5	96	-	16	0	61	26	8	4	0	0
July	642	86.3%	6	35	-	19	0	58	27	9	5	1	0
August	729	98.0%	24	214	-	105	7	31	18	11	17	14	8
September	719	99.9%	3	28	-	12	0	84	11	3	2	0	0
October	744	100.0%	5	41	-	22	0	70	18	6	5	1	0
November	638	88.6%	6	33	-	16	0	54	34	8	4	0	0
December	743	99.9%	4	28	-	11	0	71	22	6	0	0	0
Annual <sup>c</sup>	8545	97.5%	7	214	-	105	9	62.8	22.8	7.1	4.7	1.7	0.9

## Table B-6.Meadow Lake Station: Summary of airpointer® PM2.5 monitoring results for 2018

a. No 1-hour Saskatchewan Ambient Air Quality Standard

b. 24-hour Canada-Wide Standard =  $30 \mu g/m^3$ 

Month	Valid 1-Hr data	Operational Time	Total Precip.	Maximum 1-Hr Precip.	Maximum 24-Hr Precip.	Percent of Data in each Precipitation Range					
	(no.)	(%)	(mm)	(mm)	(mm)	≤5	5 - 10	10 - 25	25 - 50	50 - 75	>75
January	742	99.6%	14.8	7.5	14.2	99.9	0.1	0.0	0.0	0.0	0.0
February	672	100.0%	0.1	< 0.1	0.1	100.0	0.0	0.0	0.0	0.0	0.0
March	744	100.0%	< 0.1	< 0.1	< 0.1	100.0	0.0	0.0	0.0	0.0	0.0
April	720	100.0%	6.5	1.6	2.4	100.0	0.0	0.0	0.0	0.0	0.0
May	735	98.8%	15.1	3.6	5.4	100.0	0.0	0.0	0.0	0.0	0.0
June	714	99.2%	75.4	17.2	24.1	99.4	0.3	0.3	0.0	0.0	0.0
July	741	99.6%	138.9	32.0	43.6	99.2	0.4	0.3	0.1	0.0	0.0
August	741	99.6%	56.0	11.9	17.0	99.7	0.1	0.1	0.0	0.0	0.0
September	720	100.0%	47.2	5.2	12.7	99.9	0.1	0.0	0.0	0.0	0.0
October	744	100.0%	4.3	1.8	3.8	100.0	0.0	0.0	0.0	0.0	0.0
November	720	100.0%	0.9	0.5	0.6	100.0	0.0	0.0	0.0	0.0	0.0
December	744	100.0%	0.5	0.4	0.5	100.0	0.0	0.0	0.0	0.0	0.0
Annual	8737	99.7%	359.5	32.0	43.6	99.8	0.1	0.1	0.0	0.0	0.0

## Table B-7. Meadow Lake Station: Summary of airpointer<sup>®</sup> precipitation monitoring results for 2018

Month	Valid 1-Hr data	Operational Time	Average Temp.	Minimum 1-Hr Temp.	Maximum 1-Hr Temp.	Percent of Data in each Temperature Range						
	(no.)	(%)	(°C)	(°C)	(°C)	≤-30	-30 ~ -15	-15 ~ 0	0~15	15 ~ 30	>30	
January	742	99.6%	-13.4	-31.1	5.0	0.3	40.2	53.5	6.1	0.0	0.0	
February	672	100.0%	-15.3	-33.1	2.5	1.6	50.6	44.6	3.1	0.0	0.0	
March	744	100.0%	-6.0	-24.6	6.1	0.0	10.9	74.5	14.7	0.0	0.0	
April	720	100.0%	0.6	-19.9	26.1	0.0	6.0	39.3	48.5	6.3	0.0	
May	735	98.8%	14.4	-1.1	30.5	0.0	0.0	1.1	53.2	45.4	0.3	
June	714	99.2%	16.4	5.0	29.7	0.0	0.0	0.0	41.3	58.7	0.0	
July	743	99.9%	17.6	8.6	31.3	0.0	0.0	0.0	34.1	65.3	0.7	
August	742	99.7%	15.7	2.6	33.7	0.0	0.0	0.0	47.0	52.2	0.8	
September	720	100.0%	5.7	-5.1	20.6	0.0	0.0	9.7	84.9	5.4	0.0	
October	744	100.0%	2.4	-11.7	19.8	0.0	0.0	32.3	65.3	2.4	0.0	
November	720	100.0%	-7.4	-19.4	8.2	0.0	6.9	85.4	7.6	0.0	0.0	
December	743	99.9%	-8.9	-31.3	5.4	0.4	17.1	72.3	10.2	0.0	0.0	
Annual	8739	99.7%	1.9	-33.1	33.7	0.2	10.7	34.4	34.8	19.8	0.1	

## Table B-8. Meadow Lake Station: Summary of airpointer<sup>®</sup> ambient temperature monitoring results for 2018

Month	Valid 1-Hr data	Operational Time	Average RH	Minimum 1-Hr RH	Maximum 1-Hr RH	Percent of Data in each Relative Humidity Range						
	(no.)	(%)	(%)	(%)	(%)	≤15	15 - 30	30 - 60	60 - 80	80 - 90	>90	
January	742	99.6%	70	41	86	0.0	0.0	15.0	73.6	11.5	0.0	
February	672	100.0%	61	32	86	0.0	0.0	42.1	57.0	0.9	0.0	
March	744	100.0%	62	28	82	0.0	0.4	41.3	55.0	3.4	0.0	
April	720	100.0%	50	13	87	0.1	11.9	56.8	26.0	5.1	0.0	
May	735	98.8%	47	18	91	0.0	25.7	47.9	17.7	7.8	1.0	
June	714	99.3%	62	25	91	0.0	4.5	39.4	37.1	17.6	1.4	
July	740	99.5%	68	35	91	0.0	0.0	30.5	40.0	26.6	2.8	
August	739	99.3%	69	29	91	0.0	0.1	26.8	43.0	29.8	0.3	
September	717	99.6%	71	34	90	0.0	0.0	25.4	38.2	36.0	0.4	
October	744	100.0%	60	20	87	0.0	3.6	43.1	42.1	11.2	0.0	
November	720	100.0%	74	48	88	0.0	0.0	1.9	79.4	18.6	0.0	
December	743	99.9%	69	42	84	0.0	0.0	18.2	73.4	8.5	0.0	
Annual	8730	99.7%	64	13	91	0.0	3.9	32.3	48.5	14.8	0.5	

## Table B-9. Meadow Lake Station: Summary of airpointer<sup>®</sup> relative humidity monitoring results for 2018

Wind Direction	F	Percent of D	ata within W	Vind Speed Rang	ge, wind speed	d unit m/s	
Sector	0.3 - 1.4	1.4 - 3.1	3.1 - 7.8	7.8 - 10.6	10.6 - 13.6	>13.6	Totals
North NorthEast	0.7%	1.3%	1.6%	0.0%	0.0%	0.0%	3.6%
NorthEast	0.8%	1.3%	1.4%	0.0%	0.0%	0.0%	3.5%
East NorthEast	1.0%	1.4%	0.3%	0.0%	0.0%	0.0%	2.7%
East	1.3%	1.6%	0.3%	0.0%	0.0%	0.0%	3.1%
East SouthEast	1.7%	4.1%	2.5%	0.0%	0.0%	0.0%	8.3%
SouthEast	3.5%	3.5%	1.0%	0.0%	0.0%	0.0%	8.0%
South SouthEast	5.2%	1.6%	0.0%	0.0%	0.0%	0.0%	6.9%
South	7.0%	1.0%	0.0%	0.0%	0.0%	0.0%	8.0%
South SouthWest	5.1%	3.9%	0.4%	0.0%	0.0%	0.0%	9.4%
SouthWest	2.5%	2.9%	0.6%	0.0%	0.0%	0.0%	6.1%
West SouthWest	2.3%	5.2%	1.8%	0.0%	0.0%	0.0%	9.3%
West	1.8%	5.3%	2.4%	0.0%	0.0%	0.0%	9.5%
West NorthWest	1.7%	3.6%	1.1%	0.0%	0.0%	0.0%	6.4%
NorthWest	1.1%	1.9%	1.3%	0.0%	0.0%	0.0%	4.4%
North NorthWest	0.8%	1.9%	1.2%	0.0%	0.0%	0.0%	3.9%
North	0.9%	1.8%	1.6%	0.0%	0.0%	0.0%	4.4%
Total	37.3%	42.5%	17.7%	0.0%	0.0%	0.0%	97.5%

Table B-10	Meadow Lake Station: Wind frequency table for 2018
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Percent Calm (≤0.3 m/s)	2.5%
Number of Valid Hourly-Average Data	8743
Total Workable Hours in Time Period	8761



## APPENDIX C. MAIDSTONE STATION: CONTINUOUS MONITORING DATA

Darameter	Unit	Calibration & AIC <sup>a</sup>	Valid Data	Uptime	Summary Sta	tistics for Hourly	Average Data
Falameter	Onit	(hours)	(hours)	(%)	Average	Minimum	Maximum
SO <sub>2</sub>	ppb	417	8357	99.9%	0.4	< 0.1	17.5
H <sub>2</sub> S	ppb	417	8347	99.8%	0.3	< 0.1	21.4
NO	ppb	440	8360	99.9%	0.7	< 0.1	25.5
NO <sub>2</sub>	ppb	440	8332	99.9%	4.2	< 0.1	28.0
NO <sub>x</sub>	ppb	440	8330	99.9%	4.9	< 0.1	38.7
PM <sub>2.5</sub>	µg/m³	165	8287	96.1%	7	< 1	171
Precipitation	mm	8	8768	99.9%	358.0 <sup>b</sup>	< 0.1	27.4
Ambient Temperature	°C	8	8763	99.9%	1.2	-36.0	33.5
Relative Humidity	%	8	8766	99.9%	66	< 1	91
Wind Speed	m/s	0	8763	99.9%	2.1	Calm	9.1

 Table C-1
 Maidstone Station: Summary statistics for continuous air monitoring results for 2018

a. Automatic Instrument Check

b. Total precipitation

Month	Valid 1-Hr data	Operational Time	Average Conc.	Maximum	1-Hour Exceedance <sup>a</sup>	Maximum 24-Hr Conc	24-Hour Exceedance <sup>b</sup>	Perc	Percent of Data in each Concentration Range				
month	(no.)	(%)	(ppb)	(ppb)	(no.)	(ppb)	(no.)	≤1	1 -5	5 - 11	11 - 57	57 - 172	>172
January	729	99.6%	0.5	15.5	0	2.2	0	90.3	9.1	0.5	0.1	0.0	0.0
February	631	99.4%	0.6	17.5	0	1.6	0	85.4	14.1	0.3	0.2	0.0	0.0
March	712	100.0%	0.6	10.3	0	2.2	0	87.1	11.2	1.7	0.0	0.0	0.0
April	686	99.7%	0.4	7.4	0	0.9	0	90.2	9.6	0.1	0.0	0.0	0.0
May	703	100.0%	0.3	6.9	0	1.0	0	96.6	3.3	0.1	0.0	0.0	0.0
June	687	99.9%	0.3	5.5	0	1.1	0	95.8	4.1	0.1	0.0	0.0	0.0
July	710	99.7%	0.3	2.9	0	0.6	0	97.6	2.4	0.0	0.0	0.0	0.0
August	712	100.0%	0.4	15.5	0	2.2	0	95.9	3.4	0.4	0.3	0.0	0.0
September	683	100.0%	0.1	1.4	0	0.3	0	99.1	0.9	0.0	0.0	0.0	0.0
October	712	100.0%	0.2	8.3	0	1.0	0	95.5	4.2	0.3	0.0	0.0	0.0
November	688	100.0%	0.2	10.0	0	1.3	0	96.7	3.1	0.3	0.0	0.0	0.0
December	704	100.0%	0.5	6.9	0	1.7	0	85.4	13.9	0.7	0.0	0.0	0.0
Annual <sup>c</sup>	8357	99.9%	0.4	17.5	0	2.2	0	93.0	6.6	0.4	0.0	0.0	0.0

## Table C-2. Maidstone Station: Summary of airpointer® SO<sub>2</sub> monitoring results for 2018

a. 1-hour Saskatchewan Ambient Air Quality Standard = 172 ppb

b. 24-hour Saskatchewan Ambient Air Quality Standard = 57 ppb

c. Annual Saskatchewan Ambient Air Quality Standard = 11 ppb

	Valid	Operational	Average	Maximum	1-Hour	Maximum	24-Hour	Percent of Data in each Concentration Range					ange
Month	1-Hr data	Time	Conc.	1-Hr Conc.	Exceedance <sup>a</sup>	24-Hr Conc.	Exceedance <sup>b</sup>						0-
	(no.)	(%)	(ppb)	(ppb)	(no.)	(ppb)	(no.)	≤1	1 - 3.6	3.6 - 5	5 - 8	8 - 10.8	>10.8
January	729	99.3%	0.1	1.3	0	0.3	0	99.9	0.1	0.0	0.0	0.0	0.0
February	631	99.7%	0.1	1.0	0	0.3	0	100.0	0.0	0.0	0.0	0.0	0.0
March	712	100.0%	0.2	0.9	0	0.4	0	100.0	0.0	0.0	0.0	0.0	0.0
April	686	99.9%	0.2	1.6	0	0.7	0	99.4	0.6	0.0	0.0	0.0	0.0
May	702	100.0%	0.3	3.3	0	1.0	0	93.9	6.1	0.0	0.0	0.0	0.0
June	687	99.9%	0.5	13.8	1	1.5	0	87.9	10.3	0.9	0.4	0.3	0.1
July	708	99.4%	0.7	20.1	4	2.3	0	79.8	16.8	1.1	1.3	0.4	0.6
August	705	99.0%	1.1	21.4	8	3.8	1	74.8	18.4	2.8	1.8	1.0	1.1
September	683	100.0%	0.3	4.2	0	1.2	0	96.3	3.4	0.3	0.0	0.0	0.0
October	712	100.0%	0.1	0.8	0	0.4	0	100.0	0.0	0.0	0.0	0.0	0.0
November	688	100.0%	0.1	1.0	0	0.3	0	100.0	0.0	0.0	0.0	0.0	0.0
December	704	100.0%	0.1	1.2	0	0.4	0	99.7	0.3	0.0	0.0	0.0	0.0
Annual <sup>c</sup>	8347	99.8%	0.3	21.4	13	3.8	1	94.3	4.7	0.4	0.3	0.1	0.2
~ 1 h	our Cackatab	awan Ambiant	Air Quality	Ctandard - 1(	0 nnh				•		•		

## Table C-3. Maidstone Station: Summary of airpointer® H<sub>2</sub>S monitoring results for 2018

a. 1-hour Saskatchewan Ambient Air Quality Standard = 10.8 ppb

b. 24-hour Saskatchewan Ambient Air Quality Standard = 3.6 ppb

	Valid	Operational	Average	Maximum	1-Hour	Maximum	24-Hour	Percent of Data in each Concentration Range					Ō
Month	1-Hr data	Time	Conc.	1-Hr Conc.	Exceedance <sup><i>a</i></sup>	24-Hr Conc.	Exceedance <sup>b</sup>	Percent of Data in each Concentration Range					
	(no.)	(%)	(ppb)	(ppb)	(no.)	(ppb)	(no.)	≤5	5 - 15	15 - 53	53 - 100	100 - 212	>212
January	731	99.7%	0.8	19.5	-	3.9	-	97.7	1.9	0.4	0.0	0.0	0.0
February	636	100.0%	0.8	14.6	-	3.6	-	98.1	1.9	0.0	0.0	0.0	0.0
March	712	100.0%	0.8	13.4	-	4.3	-	96.1	3.9	0.0	0.0	0.0	0.0
April	686	99.7%	0.6	10.5	-	1.7	-	99.0	1.0	0.0	0.0	0.0	0.0
May	704	100.0%	0.5	14.1	-	1.6	-	99.3	0.7	0.0	0.0	0.0	0.0
June	687	99.7%	0.7	25.5	-	2.4	-	97.8	2.0	0.1	0.0	0.0	0.0
July	710	99.7%	0.8	25.4	-	2.5	-	96.9	2.4	0.7	0.0	0.0	0.0
August	707	99.3%	0.8	12.0	-	1.9	-	96.9	3.1	0.0	0.0	0.0	0.0
September	683	100.0%	0.5	7.5	-	1.4	-	99.0	1.0	0.0	0.0	0.0	0.0
October	712	100.0%	0.6	11.4	-	1.8	-	98.6	1.4	0.0	0.0	0.0	0.0
November	688	100.0%	0.8	20.0	-	4.5	-	97.4	2.0	0.6	0.0	0.0	0.0
December	704	100.0%	1.1	21.0	-	6.6	-	94.2	4.7	1.1	0.0	0.0	0.0
Annual <sup>c</sup>	8360	99.9%	0.7	25.5	-	6.6	-	97.6	2.2	0.3	0.0	0.0	0.0
	1 hour Cad	katahawan Am	hight Air Ou	ality Ctandard	J								

## Table C-4. Maidstone Station: Summary of airpointer® NO monitoring results for 2018

a. No 1-hour Saskatchewan Ambient Air Quality Standard

b. No 24-hour Saskatchewan Ambient Air Quality Standard

	Valid	Operational	Average	Maximum	1-Hour	Maximum	24-Hour	Percent of Data in each Concentration Range					0
Month	1-Hr data	Time	Conc.	1-Hr Conc.	Exceedance <sup>a</sup>	24-Hr Conc.	Exceedance <sup>b</sup>	Percent of Data in each Concentration Range					
	(no.)	(%)	(ppb)	(ppb)	(no.)	(ppb)	(no.)	≤5	5 - 15	15 - 53	53 - 100	100 - 212	>212
January	733	99.9%	5.6	24.9	0	11.7	-	54.6	43.1	2.3	0.0	0.0	0.0
February	636	100.0%	5.6	22.0	0	11.5	-	52.7	45.1	2.2	0.0	0.0	0.0
March	712	100.0%	5.5	28.0	0	14.0	-	57.0	38.5	4.5	0.0	0.0	0.0
April	686	99.7%	3.9	20.4	0	8.3	-	74.5	24.5	1.0	0.0	0.0	0.0
May	704	100.0%	3.6	21.9	0	6.2	-	72.6	27.0	0.4	0.0	0.0	0.0
June	657	99.7%	3.1	15.8	0	6.9	-	78.8	20.7	0.5	0.0	0.0	0.0
July	710	99.7%	2.2	11.9	0	3.7	-	89.6	10.4	0.0	0.0	0.0	0.0
August	707	99.3%	2.5	12.9	0	4.3	-	90.0	10.0	0.0	0.0	0.0	0.0
September	683	100.0%	2.1	14.4	0	4.4	-	91.9	8.1	0.0	0.0	0.0	0.0
October	712	100.0%	4.0	15.5	0	8.3	-	70.1	29.8	0.1	0.0	0.0	0.0
November	688	100.0%	4.5	18.1	0	12.8	-	68.3	29.8	1.9	0.0	0.0	0.0
December	704	100.0%	7.1	24.9	0	20.9	-	45.9	42.0	12.1	0.0	0.0	0.0
Annual <sup>c</sup>	8332	99.9%	4.2	28.0	0	20.9	-	70.5	27.4	2.1	0.0	0.0	0.0
	1 have Caralia	tabaura Ambi	ant Air Our	the Characteria	212								

## Table C-5. Maidstone Station: Summary of airpointer® NO<sub>2</sub> monitoring results for 2018

a. 1-hour Saskatchewan Ambient Air Quality Standard = 212 ppb

b. No 24-hour Saskatchewan Ambient Air Quality Standard

c. Annual Saskatchewan Ambient Air Quality Standard = 53 ppb

	Valid	Operational	Average	Maximum	1-Hour	Maximum	24-Hour	Percent of Data in each Concentration Range					D
Month	1-Hr data	Time	Conc.	1-Hr Conc.	Exceedance <sup>a</sup>	24-Hr Conc.	Exceedance <sup>b</sup>	Percent of Data in each Concentration Range					e
	(no.)	(%)	(ppb)	(ppb)	(no.)	(ppb)	(no.)	≤5	5 - 15	15 - 53	53 - 100	100 - 212	>212
January	731	100.0%	6.4	31.6	-	15.6	-	47.5	47.3	5.2	0.0	0.0	0.0
February	636	100.0%	6.4	31.5	-	15.1	-	42.6	53.5	3.9	0.0	0.0	0.0
March	712	100.0%	6.3	32.2	-	18.3	-	52.7	38.9	8.4	0.0	0.0	0.0
April	686	100.0%	4.5	24.5	-	9.6	-	70.1	27.7	2.2	0.0	0.0	0.0
May	704	100.0%	4.1	27.3	-	6.6	-	67.8	30.4	1.8	0.0	0.0	0.0
June	657	100.0%	3.8	37.3	-	8.3	-	75.0	22.8	2.1	0.0	0.0	0.0
July	710	99.7%	3.1	32.2	-	5.9	-	83.9	14.4	1.7	0.0	0.0	0.0
August	707	99.3%	3.3	17.5	-	5.6	-	80.2	19.1	0.7	0.0	0.0	0.0
September	683	100.0%	2.6	14.7	-	5.2	-	87.6	12.4	0.0	0.0	0.0	0.0
October	712	100.0%	4.6	22.1	-	9.8	-	65.7	33.7	0.6	0.0	0.0	0.0
November	688	100.0%	5.3	35.3	-	17.3	-	64.2	30.1	5.7	0.0	0.0	0.0
December	704	100.0%	8.1	38.7	-	24.8	-	43.0	40.2	16.8	0.0	0.0	0.0
Annual <sup>c</sup>	8330	99.9%	4.9	38.7	-	24.8	-	65.0	30.8	4.1	0.0	0.0	0.0
0	No 1 hour So	skatchowan Ar	nhiont Air (	Juglity Standa	rd								

## Table C-6. Maidstone Station: Summary of airpointer® NOx monitoring results for 2018

a. No 1-hour Saskatchewan Ambient Air Quality Standard

b. No 24-hour Saskatchewan Ambient Air Quality Standard

Month	Valid 1-Hr data	Operational Time	Average Conc.	Maximum 1-Hr Conc.	1-Hour Exceedance <sup>a</sup>	Maximum 24-Hr Conc.	24-Hour Exceedance <sup>b</sup>	Pe	rcent of Da	ta in each	Concentr	ation Ran	ge
	(no.)	(%)	(µg/m³)	(µg/m³)	(no.)	(µg/m³)	(no.)	≤5	5 - 10	10 - 15	15 - 30	30 - 80	>80
January	768	100.0%	5	79	-	13	0	63.9	23.6	7.3	4.7	0.5	0.0
February	672	100.0%	4	50	-	7	0	79.5	13.7	3.9	2.5	0.4	0.0
March	744	100.0%	7	90	-	19	0	53.5	22.3	12.2	9.4	2.4	0.1
April	720	100.0%	5	27	-	13	0	62.1	26.5	8.1	3.3	0.0	0.0
May	587	100.0%	7	49	-	21	0	54.9	26.6	8.9	8.3	1.4	0.0
June	719	99.9%	5	30	-	12	0	66.9	16.3	8.3	8.5	0.0	0.0
July	606	81.5%	4	27	-	15	0	68.0	20.0	6.9	5.1	0.0	0.0
August	581	78.1%	23	171	-	95	7	28.6	14.8	12.6	25.0	12.2	6.9
September	715	99.3%	4	60	-	19	0	82.9	12.2	2.0	2.2	0.7	0.0
October	719	96.6%	4	26	-	16	0	68.2	22.3	5.7	3.9	0.0	0.0
November	720	100.0%	7	28	-	15	0	41.0	33.2	18.3	7.5	0.0	0.0
December	736	100.0%	7	39	-	22	0	51.9	26.0	9.2	12.6	0.3	0.0
Annual <sup>c</sup>	8287	96.1%	7	171	-	95	7	60.5	21.6	8.6	7.5	1.3	0.5
			a hi an h Ain C	Chandle Chandle									

## Table C-7. Maidstone Station: Summary of airpointer® PM<sub>2.5</sub> monitoring results for 2018

a. No 1-hour Saskatchewan Ambient Air Quality Standard

b. 24-hour Canada-Wide Standard =  $30 \mu g/m^3$ 

Month	Valid 1-Hr data	Operational Time	Total Precip.	Maximum 1-Hr Precip.	Maximum 24-Hr Precip.	F	Percent of	Data in eacl	h Precipitat	ion Range	2
	(no.)	(%)	(mm)	(mm)	(mm)	≤5	5 - 10	10 - 25	25 - 50	50 - 75	>75
January	768	100.0%	13.2	7.3	12.6	99.9	0.1	0.0	0.0	0.0	0.0
February	672	100.0%	< 0.1	< 0.1	< 0.1	100.0	0.0	0.0	0.0	0.0	0.0
March	744	100.0%	0.2	0.1	0.2	100.0	0.0	0.0	0.0	0.0	0.0
April	718	99.7%	3.5	1.4	1.8	100.0	0.0	0.0	0.0	0.0	0.0
May	744	100.0%	21.0	5.3	8.4	99.9	0.1	0.0	0.0	0.0	0.0
June	718	99.7%	127.0	27.4	34.7	99.3	0.1	0.4	0.1	0.0	0.0
July	742	99.7%	115.6	12.3	29.3	99.2	0.7	0.1	0.0	0.0	0.0
August	742	99.7%	31.8	5.3	13.8	99.7	0.3	0.0	0.0	0.0	0.0
September	720	100.0%	40.0	4.1	12.2	100.0	0.0	0.0	0.0	0.0	0.0
October	744	100.0%	2.5	0.8	2.3	100.0	0.0	0.0	0.0	0.0	0.0
November	720	100.0%	3.3	1.3	2.4	100.0	0.0	0.0	0.0	0.0	0.0
December	736	100.0%	< 0.1	< 0.1	< 0.1	100.0	0.0	0.0	0.0	0.0	0.0
Annual	8768	99.9%	358.0	27.4	34.7	99.8	0.1	0.0	0.0	0.0	0.0

 Table C-8.
 Maidstone Station: Summary of airpointer® precipitation monitoring results for 2018

Month	Valid	Operational	Average	Minimum	Maximum	F	Percent of D	ata in eacl	n Tempera	ture Range	9
wonth		(%)	(°C)	1-ni remp.	1-пі тепір. (°С)	<-30	-30~-15	-15 ~ 0	0~15	15 ~ 30	>30
January	768	100.0%	-13.7	-36.0	5.0	5.9	32.8	57.8	3.5	0.0	0.0
February	672	100.0%	-17.0	-34.2	2.3	4.2	59.1	34.1	2.7	0.0	0.0
March	744	100.0%	-8.2	-25.4	3.3	0.0	15.7	78.6	5.6	0.0	0.0
April	718	99.7%	-0.9	-25.0	26.4	0.0	10.3	42.1	42.1	5.6	0.0
May	744	100.0%	14.3	-2.5	31.4	0.0	0.0	0.8	54.4	44.1	0.7
June	718	99.7%	16.3	5.5	29.0	0.0	0.0	0.0	43.3	56.7	0.0
July	742	99.7%	17.5	8.5	31.2	0.0	0.0	0.0	35.8	63.5	0.7
August	742	99.7%	15.5	0.7	33.5	0.0	0.0	0.0	49.1	49.3	1.6
September	715	99.3%	6.3	-7.9	23.3	0.0	0.0	9.0	84.6	6.4	0.0
October	744	100.0%	1.8	-11.3	21.6	0.0	0.0	38.2	60.3	1.5	0.0
November	720	100.0%	-7.2	-22.2	5.8	0.0	5.7	86.8	7.5	0.0	0.0
December	736	100.0%	-10.9	-35.5	5.4	0.5	24.7	70.8	3.9	0.0	0.0
Annual	8763	99.9%	1.2	-36.0	33.5	0.9	12.1	34.9	32.8	19.0	0.3

 Table C-9.
 Maidstone Station: Summary of airpointer<sup>®</sup> ambient temperature monitoring results for 2018

Month	Valid 1-Hr data	Operational Time	Average RH	Minimum 1-Hr RH	Maximum 1-Hr RH	Pe	rcent of Data	a in each Re	lative Hun	nidity Ran	ge
	(no.)	(%)	(%)	(%)	(%)	≤15	15 - 30	30 - 60	60 - 80	80 - 90	>90
January	768	100.0%	71	0	85	0.1	0.0	10.2	76.3	13.4	0.0
February	672	100.0%	64	46	80	0.0	0.0	26.9	73.1	0.0	0.0
March	744	100.0%	69	35	86	0.0	0.0	21.6	64.4	14.0	0.0
April	718	99.7%	59	18	86	0.0	8.5	41.5	41.8	8.2	0.0
May	744	100.0%	50	15	90	0.5	26.7	36.7	25.8	10.1	0.1
June	718	99.7%	62	25	91	0.0	6.1	37.5	30.4	24.9	1.1
July	742	99.7%	69	35	91	0.0	0.0	33.3	33.6	30.3	2.8
August	742	99.7%	70	25	91	0.0	1.1	27.9	33.8	34.2	3.0
September	720	100.0%	71	28	89	0.0	0.8	23.3	37.8	38.1	0.0
October	744	100.0%	64	19	86	0.0	1.1	32.1	54.8	12.0	0.0
November	719	99.9%	76	54	86	0.0	0.0	1.9	68.4	29.6	0.0
December	735	99.9%	71	48	83	0.0	0.0	8.2	82.7	9.1	0.0
Annual	8766	99.9%	66	0	91	0.1	3.7	25.0	51.9	18.7	0.6

Table C-10. Maidstone Station: Summary of airpointer<sup>®</sup> relative humidity monitoring results for 2018

Percent of Data within Wind Speed Range, wind speed unit m/s           0.3 - 1.4         1.4 - 3.1         3.1 - 7.8         7.8 - 10.6         10.6 - 13.6         >13.6         Total											
0.3 - 1.4	1.4 - 3.1	3.1 - 7.8	7.8 - 10.6	10.6 - 13.6	>13.6	Totals					
0.5%	1.4%	0.3%	0.0%	0.0%	0.0%	2.2%					
0.3%	1.0%	0.2%	0.0%	0.0%	0.0%	1.5%					
0.7%	1.1%	0.6%	0.0%	0.0%	0.0%	2.5%					
1.0%	1.5%	0.7%	0.0%	0.0%	0.0%	3.3%					
2.2%	4.0%	3.1%	0.0%	0.0%	0.0%	9.4%					
3.9%	5.3%	2.2%	0.0%	0.0%	0.0%	11.3%					
4.4%	1.7%	1.3%	0.0%	0.0%	0.0%	7.4%					
3.3%	0.9%	0.8%	0.0%	0.0%	0.0%	5.1%					
1.7%	0.9%	0.5%	0.0%	0.0%	0.0%	3.1%					
1.5%	0.7%	0.1%	0.0%	0.0%	0.0%	2.3%					
1.8%	1.8%	0.2%	0.0%	0.0%	0.0%	3.9%					
2.0%	3.6%	0.4%	0.0%	0.0%	0.0%	6.0%					
3.3%	6.2%	4.3%	0.0%	0.0%	0.0%	13.8%					
3.8%	3.8%	2.8%	0.0%	0.0%	0.0%	10.3%					
2.9%	4.4%	2.6%	0.0%	0.0%	0.0%	9.9%					
0.9%	1.9%	1.0%	0.0%	0.0%	0.0%	3.9%					
34.3%	40.1%	21.4%	0.0%	0.0%	0.0%	95.9%					
	0.3 - 1.4 0.5% 0.3% 0.7% 1.0% 2.2% 3.9% 4.4% 3.3% 1.7% 1.5% 1.5% 1.8% 2.0% 3.3% 3.8% 2.9% 0.9% 34.3%	0.3 - 1.4         1.4 - 3.1           0.5%         1.4%           0.3%         1.0%           0.7%         1.1%           1.0%         1.5%           2.2%         4.0%           3.9%         5.3%           4.4%         1.7%           3.3%         0.9%           1.5%         0.7%           1.5%         0.7%           1.5%         0.7%           1.5%         0.7%           1.5%         0.7%           3.3%         6.2%           3.8%         3.8%           2.9%         4.4%           0.9%         1.9%           3.4.3%         40.1%	0.3 - 1.4 $1.4 - 3.1$ $3.1 - 7.8$ $0.5%$ $1.4%$ $0.3%$ $0.3%$ $1.0%$ $0.2%$ $0.7%$ $1.1%$ $0.6%$ $1.0%$ $1.5%$ $0.7%$ $2.2%$ $4.0%$ $3.1%$ $3.9%$ $5.3%$ $2.2%$ $4.4%$ $1.7%$ $1.3%$ $3.9%$ $0.9%$ $0.8%$ $1.7%$ $0.9%$ $0.5%$ $1.5%$ $0.7%$ $0.1%$ $1.8%$ $1.8%$ $0.2%$ $2.0%$ $3.6%$ $0.4%$ $3.3%$ $6.2%$ $4.3%$ $3.8%$ $3.8%$ $2.8%$ $2.9%$ $4.4%$ $2.6%$ $0.9%$ $1.9%$ $1.0%$	0.3 - 1.4         1.4 - 3.1         3.1 - 7.8         7.8 - 10.6           0.5%         1.4%         0.3%         0.0%           0.3%         1.0%         0.2%         0.0%           0.7%         1.1%         0.6%         0.0%           1.0%         1.5%         0.7%         0.0%           1.0%         1.5%         0.7%         0.0%           2.2%         4.0%         3.1%         0.0%           3.9%         5.3%         2.2%         0.0%           3.9%         5.3%         2.2%         0.0%           3.9%         5.3%         2.2%         0.0%           3.9%         5.3%         2.2%         0.0%           3.9%         5.3%         0.2%         0.0%           3.3%         0.9%         0.8%         0.0%           1.7%         0.9%         0.5%         0.0%           1.8%         1.8%         0.2%         0.0%           3.3%         6.2%         4.3%         0.0%           3.8%         3.8%         2.8%         0.0%           2.9%         4.4%         2.6%         0.0%           0.9%         1.9%         1.0%         0.0%	0.3 - 1.4         1.4 - 3.1         3.1 - 7.8         7.8 - 10.6         10.6 - 13.6           0.5%         1.4%         0.3%         0.0%         0.0%           0.3%         1.0%         0.2%         0.0%         0.0%           0.7%         1.1%         0.6%         0.0%         0.0%           1.0%         1.5%         0.7%         0.0%         0.0%           1.0%         1.5%         0.7%         0.0%         0.0%           2.2%         4.0%         3.1%         0.0%         0.0%           3.9%         5.3%         2.2%         0.0%         0.0%           4.4%         1.7%         1.3%         0.0%         0.0%           3.3%         0.9%         0.8%         0.0%         0.0%           1.7%         0.9%         0.5%         0.0%         0.0%           1.5%         0.7%         0.1%         0.0%         0.0%           1.8%         1.8%         0.2%         0.0%         0.0%           3.3%         6.2%         4.3%         0.0%         0.0%           3.8%         3.8%         2.8%         0.0%         0.0%           2.9%         4.4%         2.6%	0.3 - 1.4 $1.4 - 3.1$ $3.1 - 7.8$ $7.8 - 10.6$ $10.6 - 13.6$ > $13.6$ $0.5%$ $1.4%$ $0.3%$ $0.0%$ $0.0%$ $0.0%$ $0.3%$ $1.0%$ $0.2%$ $0.0%$ $0.0%$ $0.0%$ $0.7%$ $1.1%$ $0.6%$ $0.0%$ $0.0%$ $0.0%$ $0.7%$ $1.1%$ $0.6%$ $0.0%$ $0.0%$ $0.0%$ $1.0%$ $1.5%$ $0.7%$ $0.0%$ $0.0%$ $0.0%$ $1.0%$ $1.5%$ $0.7%$ $0.0%$ $0.0%$ $0.0%$ $2.2%$ $4.0%$ $3.1%$ $0.0%$ $0.0%$ $0.0%$ $3.9%$ $5.3%$ $2.2%$ $0.0%$ $0.0%$ $0.0%$ $3.3%$ $0.9%$ $0.8%$ $0.0%$ $0.0%$ $0.0%$ $3.3%$ $0.9%$ $0.5%$ $0.0%$ $0.0%$ $0.0%$ $1.5%$ $0.7%$ $0.1%$ $0.0%$ $0.0%$ $0.0%$ $1.5%$ $0.7%$					

Table C-11.	Maidstone	Station:	Wind	frequency	table for	<sup>-</sup> 2018
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Percent Calm (≤0.3 m/s)	4.1%
Number of Valid Hourly-Average Data	8763
Total Workable Hours in Time Period	8776



## APPENDIX D. UNITY STATION: CONTINUOUS MONITORING DATA

Parameter	Unit	Calibration & AIC <sup>a</sup>	Valid Data	Uptime	Summary St	atistics for Hourly A	verage Data
Farameter	Onit	(hours)	(hours)	(%)	Average	Minimum	Maximum
NO	ppb	334	7088	99.8%	0.6	< 0.1	44.2
NO <sub>2</sub>	ppb	362	7061	99.8%	2.9	< 0.1	23.4
NO <sub>x</sub>	ppb	370	7061	99.8%	3.4	< 0.1	51.5
O <sub>3</sub>	ppb	138	3022	41.3%	22	1	69
PM <sub>2.5</sub>	µg/m³	5	6744	90.8%	9	< 1	157
Precipitation	mm	0	7456	99.9%	242.2 <sup>b</sup>	< 0.1	8.5
Ambient Temperature	°C	5	7448	99.9%	3.1	-33.8	35.2
Relative Humidity	%	0	7447	99.9%	65	< 1	91
Wind Speed	m/s	0	6960	93.3%	1.9	Calm	10.1

 Table D-1
 Unity Station: Summary statistics for continuous air monitoring results for January 1 to November 8, 2018

a. Automatic Instrument Check

b. Total precipitation

	Valid	Operational	Average	Maximum	1-Hour	Maximum	24-Hour	Percent of Data in each Concentration Range					
Month	1-Hr data	Time	Conc.	1-Hr Conc.	Exceedance <sup>a</sup>	24-Hr Conc.	Exceedance <sup>b</sup>	Percent of Data in each Concentration Range					,e
	(no.)	(%)	(ppb)	(ppb)	(no.)	(ppb)	(no.)	≤5	5 - 15	15 - 53	53 - 100	100 - 212	>212
January	711	100.0%	0.7	12.0	-	2.5	-	98.3	1.7	0.0	0.0	0.0	0.0
February	634	100.0%	0.8	5.4	-	1.3	-	99.8	0.2	0.0	0.0	0.0	0.0
March	710	99.7%	0.5	7.7	-	2.1	-	99.4	0.6	0.0	0.0	0.0	0.0
April	688	100.0%	0.4	4.6	-	1.3	-	100.0	0.0	0.0	0.0	0.0	0.0
May	703	98.7%	0.6	10.5	-	1.5	-	99.4	0.6	0.0	0.0	0.0	0.0
June	675	99.3%	0.8	22.2	-	3.3	-	96.9	2.8	0.3	0.0	0.0	0.0
July	711	100.0%	0.4	3.4	-	1.1	-	100.0	0.0	0.0	0.0	0.0	0.0
August	700	100.0%	0.4	18.0	-	1.5	-	99.9	0.0	0.1	0.0	0.0	0.0
September	672	100.0%	0.5	9.6	-	1.1	-	99.9	0.1	0.0	0.0	0.0	0.0
October	709	100.0%	0.5	5.8	-	1.6	-	99.9	0.1	0.0	0.0	0.0	0.0
November	175	100.0%	1.0	44.2	-	3.5	-	96.6	1.7	1.7	0.0	0.0	0.0
December	0	-	-	-	-	-	-	-	-	-	-	-	-
Annual <sup>c</sup>	7088	99.8%	0.6	44.2	-	3.5	-	99.3	0.6	0.1	0.0	0.0	0.0
~ \/o	1 hour Cacka	tahawan Amhi	ant Air Qual	ity Ctandard									

Table D-2. Unity Station: Summary of airpointer<sup>®</sup> NO monitoring results for January 1 to November 8, 2018

a. No 1-hour Saskatchewan Ambient Air Quality Standard

b. No 24-hour Saskatchewan Ambient Air Quality Standard

Valid	Operational	Average	Maximum	1-Hour	Maximum	24-Hour	Percent of Data in each Concentration Range					
1-Hr data	Time	Conc.	1-Hr Conc.	Exceedance <sup>a</sup>	24-Hr Conc.	Exceedance <sup>b</sup>	Percent of Data in each Concentration Range					,e
(no.)	(%)	(ppb)	(ppb)	(no.)	(ppb)	(no.)	≤5	5 - 15	15 - 53	53 - 100	100 - 212	>212
711	100.0%	4.2	21.2	0	9.6	-	73.3	26.3	0.4	0.0	0.0	0.0
634	100.0%	3.9	18.2	0	6.0	-	73.7	26.2	0.2	0.0	0.0	0.0
710	99.7%	3.5	14.0	0	7.8	-	75.6	24.4	0.0	0.0	0.0	0.0
688	100.0%	2.5	10.6	0	6.3	-	91.7	8.3	0.0	0.0	0.0	0.0
703	98.7%	3.7	21.8	0	7.5	-	79.7	18.1	2.3	0.0	0.0	0.0
648	99.2%	4.3	23.4	0	10.2	-	70.5	25.5	4.0	0.0	0.0	0.0
711	100.0%	2.1	10.6	0	3.9	-	95.5	4.5	0.0	0.0	0.0	0.0
700	100.0%	1.7	12.7	0	3.7	-	97.4	2.6	0.0	0.0	0.0	0.0
672	100.0%	1.1	5.4	0	2.1	-	99.7	0.3	0.0	0.0	0.0	0.0
709	100.0%	2.1	10.4	0	5.3	-	94.6	5.4	0.0	0.0	0.0	0.0
175	100.0%	1.4	9.3	0	1.8	-	97.7	2.3	0.0	0.0	0.0	0.0
0	-	-	-	-	-	-	-	-	-	-	-	-
7061	99.8%	2.9	23.4	0	10.2	-	85.6	13.7	0.7	0.0	0.0	0.0
	Valid L-Hr data (no.) 711 634 710 688 703 648 703 648 711 700 672 709 175 0 7061	Valid         Operational           L-Hr data         Time           (no.)         (%)           711         100.0%           634         100.0%           634         100.0%           710         99.7%           688         100.0%           703         98.7%           648         99.2%           711         100.0%           700         100.0%           672         100.0%           709         100.0%           0         -           7061         99.8%	Valid         Operational Time         Average Conc.           (no.)         (%)         (ppb)           711         100.0%         4.2           634         100.0%         3.9           710         99.7%         3.5           688         100.0%         2.5           703         98.7%         3.7           648         99.2%         4.3           711         100.0%         2.1           700         100.0%         1.7           672         100.0%         1.1           709         100.0%         1.4           0         -         -           7061         99.8%         2.9	Valid         Operational Time         Average Conc.         Maximum 1-Hr Conc.           (no.)         (%)         (ppb)         (ppb)           711         100.0%         4.2         21.2           634         100.0%         3.9         18.2           710         99.7%         3.5         14.0           688         100.0%         2.5         10.6           703         98.7%         3.7         21.8           648         99.2%         4.3         23.4           711         100.0%         2.1         10.6           700         100.0%         1.7         12.7           672         100.0%         1.1         5.4           709         100.0%         2.1         10.4           175         100.0%         1.4         9.3           0         -         -         -           7061         99.8%         2.9         23.4	Valid         Operational         Average         Maximum         1-Hour           L-Hr data         Time         Conc.         1-Hr Conc.         Exceedance a           (no.)         (%)         (ppb)         (ppb)         (no.)           711         100.0%         4.2         21.2         0           634         100.0%         3.9         18.2         0           710         99.7%         3.5         14.0         0           688         100.0%         2.5         10.6         0           703         98.7%         3.7         21.8         0           648         99.2%         4.3         23.4         0           711         100.0%         1.7         12.7         0           672         100.0%         1.1         5.4         0           709         100.0%         2.1         10.4         0           175         100.0%         1.4         9.3         0           0         -         -         -         -	Valid         Operational         Average         Maximum         1-Hour         Maximum           L-Hr data         Time         Conc.         1-Hr Conc.         Exceedance a         24-Hr Conc.           (no.)         (%)         (ppb)         (ppb)         (no.)         (ppb)           711         100.0%         4.2         21.2         0         9.6           634         100.0%         3.9         18.2         0         6.0           710         99.7%         3.5         14.0         0         7.8           688         100.0%         2.5         10.6         0         6.3           703         98.7%         3.7         21.8         0         7.5           648         99.2%         4.3         23.4         0         10.2           711         100.0%         2.1         10.6         0         3.9           700         100.0%         1.7         12.7         0         3.7           672         100.0%         1.1         5.4         0         2.1           709         100.0%         1.4         9.3         0         1.8           0         -         -         <	Valid         Operational         Average         Maximum         1-Hour         Maximum         24-Hour           L-Hr data         Time         Conc.         1-Hr Conc.         Exceedance a         24-Hr Conc.         Exceedance b           (no.)         (%)         (ppb)         (ppb)         (no.)         (ppb)         (no.)         Exceedance b         (no.)           711         100.0%         4.2         21.2         0         9.6         -           634         100.0%         3.9         18.2         0         6.0         -           710         99.7%         3.5         14.0         0         7.8         -           688         100.0%         2.5         10.6         0         6.3         -           703         98.7%         3.7         21.8         0         7.5         -           648         99.2%         4.3         23.4         0         10.2         -           700         100.0%         1.1         5.4         0         2.1         -           709         100.0%         2.1         10.4         0         5.3         -           175         100.0%         1.4 <t< td=""><td>Valid I-Hr dataOperational Time (no.)Average Conc.Maximum I-Hr Conc.I-Hour Exceedance aMaximum 24-Hr Conc.<math>24</math>-Hour Exceedance b (ppb)<math>exceedance b</math> (no.)<math>exceedance b</math></td><td>Valid         Operational Time         Average Conc.         Maximum 1-Hr Conc.         1-Hour Exceedance and a stress of the strestress of the stress of the strestres of the stress of the stress</td><td>Valid L-Hr dataOperational TimeAverage Conc.Maximum L-Hr Conc.1-Hour Exceedance aMaximum 24-Hr Conc.24-Hour Exceedance bPercent of Data in each <math>(no.)</math>(no.)(%)(ppb)(ppb)(no.)(ppb)(no.)<math>\leq 5</math><math>5 - 15</math><math>15 - 53</math>711100.0%4.221.209.6-<math>73.3</math><math>26.3</math>0.4634100.0%3.918.206.0-<math>73.7</math><math>26.2</math>0.271099.7%3.514.007.8-<math>75.6</math><math>24.4</math>0.0688100.0%2.510.606.3-<math>91.7</math><math>8.3</math>0.070398.7%3.721.80<math>7.5</math>-<math>79.7</math><math>18.1</math><math>2.3</math>64899.2%4.323.40<math>10.2</math>-<math>70.5</math><math>25.5</math><math>4.0</math>711100.0%2.110.60<math>3.9</math>-<math>95.5</math><math>4.5</math><math>0.0</math>700100.0%1.712.70<math>3.7</math>-<math>97.4</math><math>2.6</math><math>0.0</math>672100.0%1.1<math>5.4</math>0<math>2.1</math>-<math>99.7</math><math>0.3</math><math>0.0</math>709100.0%1.4<math>9.3</math>0<math>1.8</math>-<math>97.7</math><math>2.3</math><math>0.0</math>709100.0%1.4<math>9.3</math>0<math>1.8</math>-<math>97.7</math><math>2.3</math><math>0.0</math>70199.8%<math>2.9</math><math>23.4</math>0<math>10.2</math>-<math>-</math></td><td>Valid L-Hr dataOperational TimeAverage Conc.Maximum L-Hr Conc.1-Hour Exceedance <math>°</math>Maximum 24-Hr Conc.24-Hour Exceedance <math>h</math>Percent of Data in each Concent <math>(no.)</math>(no.)(%)(ppb)(ppb)(no.)(ppb)(no.)<math>\leq 5</math><math>5 \cdot 15</math><math>15 \cdot 53</math><math>53 \cdot 100</math>711100.0%4.221.209.6-<math>73.3</math><math>26.3</math>0.40.0634100.0%3.918.206.0-<math>73.7</math><math>26.2</math>0.20.071099.7%3.514.007.8-<math>75.6</math><math>24.4</math>0.00.0688100.0%2.510.606.3-<math>91.7</math><math>8.3</math>0.00.070398.7%3.721.80<math>7.5</math>-<math>79.7</math><math>18.1</math><math>2.3</math>0.064899.2%4.323.4010.2-<math>70.5</math><math>25.5</math><math>4.0</math>0.0701100.0%1.1<math>5.4</math>0<math>2.1</math>-<math>99.7</math><math>0.3</math><math>0.0</math><math>0.0</math>700100.0%1.1<math>5.4</math>0<math>2.1</math>-<math>99.7</math><math>0.3</math><math>0.0</math><math>0.0</math>709100.0%1.4<math>9.3</math>0<math>1.8</math>-<math>97.7</math><math>2.3</math><math>0.0</math><math>0.0</math>701100.0%1.4<math>9.3</math>0<math>1.8</math>-<math>97.7</math><math>2.3</math><math>0.0</math><math>0.0</math>701100.0%<math>1.4</math><math>9.3</math>0<math>1.8</math>-</td></t<> <td>Valid L-H dataOperational TimeAverage Conc.Maximum 1-Hr Conc.1-Hour Exceedance aMaximum 24-Hr Conc.24-Hour Exceedance bPercent of Data in each Concentration Range<math>(no.)</math><math>(\%)</math><math>(ppb)</math><math>(ppb)</math><math>(no.)</math><math>(ppb)</math><math>(no.)</math><math>\leq 5</math><math>5 - 15</math><math>15 - 53</math><math>53 - 100</math><math>100 - 212</math><math>711</math><math>100.0\%</math><math>4.2</math><math>21.2</math><math>0</math><math>9.6</math><math> 73.3</math><math>26.3</math><math>0.4</math><math>0.0</math><math>0.0</math><math>634</math><math>100.0\%</math><math>3.9</math><math>18.2</math><math>0</math><math>6.0</math><math> 73.7</math><math>26.2</math><math>0.2</math><math>0.0</math><math>0.0</math><math>710</math><math>99.7\%</math><math>3.5</math><math>14.0</math><math>0</math><math>7.8</math><math> 75.6</math><math>24.4</math><math>0.0</math><math>0.0</math><math>688</math><math>100.0\%</math><math>2.5</math><math>10.6</math><math>0</math><math>6.3</math><math> 91.7</math><math>8.3</math><math>0.0</math><math>0.0</math><math>648</math><math>99.2\%</math><math>4.3</math><math>23.4</math><math>0</math><math>10.2</math><math> 70.5</math><math>25.5</math><math>4.0</math><math>0.0</math><math>0.0</math><math>701</math><math>100.0\%</math><math>2.1</math><math>10.6</math><math>0</math><math>3.9</math><math> 95.5</math><math>4.5</math><math>0.0</math><math>0.0</math><math>0.0</math><math>711</math><math>100.0\%</math><math>2.1</math><math>10.4</math><math>0</math><math>2.1</math><math> 97.4</math><math>2.6</math><math>0.0</math><math>0.0</math><math>0.0</math><math>702</math><math>100.0\%</math><math>1.1</math><math>5.4</math><math>0</math><math>2.1</math><math> 97.7</math><math>2.3</math><math>0.0</math><math>0.0</math><math>0.0</math><math>700</math><math>100.0\%</math><math>1.4</math><math>9.3</math><math>0</math><math>1.8</math><math> 97.7</math><math>2.3</math><math>0.0</math><math>0.0</math><td< td=""></td<></td>	Valid I-Hr dataOperational Time (no.)Average Conc.Maximum I-Hr Conc.I-Hour Exceedance aMaximum 24-Hr Conc. $24$ -Hour Exceedance b (ppb) $exceedance b$ (no.) $exceedance b$	Valid         Operational Time         Average Conc.         Maximum 1-Hr Conc.         1-Hour Exceedance and a stress of the strestress of the stress of the strestres of the stress of the stress	Valid L-Hr dataOperational TimeAverage Conc.Maximum L-Hr Conc.1-Hour Exceedance aMaximum 24-Hr Conc.24-Hour Exceedance bPercent of Data in each $(no.)$ (no.)(%)(ppb)(ppb)(no.)(ppb)(no.) $\leq 5$ $5 - 15$ $15 - 53$ 711100.0%4.221.209.6- $73.3$ $26.3$ 0.4634100.0%3.918.206.0- $73.7$ $26.2$ 0.271099.7%3.514.007.8- $75.6$ $24.4$ 0.0688100.0%2.510.606.3- $91.7$ $8.3$ 0.070398.7%3.721.80 $7.5$ - $79.7$ $18.1$ $2.3$ 64899.2%4.323.40 $10.2$ - $70.5$ $25.5$ $4.0$ 711100.0%2.110.60 $3.9$ - $95.5$ $4.5$ $0.0$ 700100.0%1.712.70 $3.7$ - $97.4$ $2.6$ $0.0$ 672100.0%1.1 $5.4$ 0 $2.1$ - $99.7$ $0.3$ $0.0$ 709100.0%1.4 $9.3$ 0 $1.8$ - $97.7$ $2.3$ $0.0$ 709100.0%1.4 $9.3$ 0 $1.8$ - $97.7$ $2.3$ $0.0$ 70199.8% $2.9$ $23.4$ 0 $10.2$ - $-$	Valid L-Hr dataOperational TimeAverage Conc.Maximum L-Hr Conc.1-Hour Exceedance $°$ Maximum 24-Hr Conc.24-Hour Exceedance $h$ Percent of Data in each Concent $(no.)$ (no.)(%)(ppb)(ppb)(no.)(ppb)(no.) $\leq 5$ $5 \cdot 15$ $15 \cdot 53$ $53 \cdot 100$ 711100.0%4.221.209.6- $73.3$ $26.3$ 0.40.0634100.0%3.918.206.0- $73.7$ $26.2$ 0.20.071099.7%3.514.007.8- $75.6$ $24.4$ 0.00.0688100.0%2.510.606.3- $91.7$ $8.3$ 0.00.070398.7%3.721.80 $7.5$ - $79.7$ $18.1$ $2.3$ 0.064899.2%4.323.4010.2- $70.5$ $25.5$ $4.0$ 0.0701100.0%1.1 $5.4$ 0 $2.1$ - $99.7$ $0.3$ $0.0$ $0.0$ 700100.0%1.1 $5.4$ 0 $2.1$ - $99.7$ $0.3$ $0.0$ $0.0$ 709100.0%1.4 $9.3$ 0 $1.8$ - $97.7$ $2.3$ $0.0$ $0.0$ 701100.0%1.4 $9.3$ 0 $1.8$ - $97.7$ $2.3$ $0.0$ $0.0$ 701100.0% $1.4$ $9.3$ 0 $1.8$ -	Valid L-H dataOperational TimeAverage Conc.Maximum 1-Hr Conc.1-Hour Exceedance aMaximum 24-Hr Conc.24-Hour Exceedance bPercent of Data in each Concentration Range $(no.)$ $(\%)$ $(ppb)$ $(ppb)$ $(no.)$ $(ppb)$ $(no.)$ $\leq 5$ $5 - 15$ $15 - 53$ $53 - 100$ $100 - 212$ $711$ $100.0\%$ $4.2$ $21.2$ $0$ $9.6$ $ 73.3$ $26.3$ $0.4$ $0.0$ $0.0$ $634$ $100.0\%$ $3.9$ $18.2$ $0$ $6.0$ $ 73.7$ $26.2$ $0.2$ $0.0$ $0.0$ $710$ $99.7\%$ $3.5$ $14.0$ $0$ $7.8$ $ 75.6$ $24.4$ $0.0$ $0.0$ $688$ $100.0\%$ $2.5$ $10.6$ $0$ $6.3$ $ 91.7$ $8.3$ $0.0$ $0.0$ $648$ $99.2\%$ $4.3$ $23.4$ $0$ $10.2$ $ 70.5$ $25.5$ $4.0$ $0.0$ $0.0$ $701$ $100.0\%$ $2.1$ $10.6$ $0$ $3.9$ $ 95.5$ $4.5$ $0.0$ $0.0$ $0.0$ $711$ $100.0\%$ $2.1$ $10.4$ $0$ $2.1$ $ 97.4$ $2.6$ $0.0$ $0.0$ $0.0$ $702$ $100.0\%$ $1.1$ $5.4$ $0$ $2.1$ $ 97.7$ $2.3$ $0.0$ $0.0$ $0.0$ $700$ $100.0\%$ $1.4$ $9.3$ $0$ $1.8$ $ 97.7$ $2.3$ $0.0$ $0.0$ <td< td=""></td<>

Table D-3. Unity Station: Summary of airpointer<sup>®</sup> NO<sub>2</sub> monitoring results for January 1 to November 8, 2018

a. 1-hour Saskatchewan Ambient Air Quality Standard = 212 ppb

b. No 24-hour Saskatchewan Ambient Air Quality Standard

c. Annual Saskatchewan Ambient Air Quality Standard = 53 ppb

	Valid	Operational	Average	Maximum	1-Hour	Maximum	24-Hour	Percent of Data in each Concentration Range					
Month	1-Hr data	Time	Conc.	1-Hr Conc.	Exceedance <sup>a</sup>	24-Hr Conc.	Exceedance <sup>b</sup>	Percent of Data in each Concentration Range					
	(no.)	(%)	(ppb)	(ppb)	(no.)	(ppb)	(no.)	≤5	5 - 15	15 - 53	53 - 100	100 - 212	>212
January	711	100.0%	4.9	22.5	-	11.5	-	66.1	32.5	1.4	0.0	0.0	0.0
February	634	100.0%	4.7	20.2	-	7.2	-	58.2	41.6	0.2	0.0	0.0	0.0
March	710	99.7%	4.0	20.8	-	9.3	-	69.2	30.7	0.1	0.0	0.0	0.0
April	688	100.0%	2.9	12.3	-	6.8	-	86.6	13.4	0.0	0.0	0.0	0.0
May	703	98.7%	4.2	27.8	-	8.3	-	75.8	20.6	3.6	0.0	0.0	0.0
June	648	99.2%	5.1	42.1	-	13.6	-	66.8	27.3	5.9	0.0	0.0	0.0
July	711	100.0%	2.4	9.9	-	4.9	-	93.7	6.3	0.0	0.0	0.0	0.0
August	700	100.0%	2.1	23.0	-	4.3	-	97.0	2.9	0.1	0.0	0.0	0.0
September	672	100.0%	1.6	13.8	-	3.1	-	98.5	1.5	0.0	0.0	0.0	0.0
October	709	100.0%	2.6	12.5	-	6.9	-	89.6	10.4	0.0	0.0	0.0	0.0
November	175	100.0%	2.5	51.5	-	5.2	-	96.0	1.7	2.3	0.0	0.0	0.0
December	0	-	-	-	-	-	-	-	-	-	-	-	-
Annual <sup>c</sup>	7061	99.8%	3.4	51.5	-	13.6	-	80.8	18.1	1.1	0.0	0.0	0.0
~ No.1	hour Cacket	chourse Ambio	nt Air Ouali	ty Ctandard									

Table D-4. Unity Station: Summary of airpointer® NOx monitoring results for January 1 to November 8, 2018

a. No 1-hour Saskatchewan Ambient Air Quality Standard

b. No 24-hour Saskatchewan Ambient Air Quality Standard

Month	Valid 1-Hr data	Operational Time	Average Conc.	Maximum 1-Hr Conc.	1-Hour Exceedance <sup>a</sup>	Maximum 8-Hr Conc.	8-Hour Conc. Above CWS <sup>b</sup>	Percent of Data in each Concentration Range					ze
	(no.)	(%)	(ppb)	(ppb)	(no.)	(ppb)	(no.)	≤10	10 - 20	20 - 40	40 - 65	65 - 82	>82
January	0	0.0%	-	< 1	0	0	0	-	-	-	-	-	-
February	0	0.0%	-	< 1	0	0	0	-	-	-	-	-	-
March	0	0.0%	-	< 1	0	0	0	-	-	-	-	-	-
April	0	0.0%	-	< 1	0	0	0	-	-	-	-	-	-
May	0	0.0%	-	< 1	0	0	0	-	-	-	-	-	-
June	53	7.4%	26	49	0	45	0	11.3	28.3	41.5	18.9	0.0	0.0
July	711	100.0%	25	69	0	63	0	8.4	26.0	56.8	8.3	0.4	0.0
August	695	100.0%	24	65	0	58	0	10.4	33.7	46.0	9.8	0.1	0.0
September	679	100.0%	19	48	0	39	0	11.6	47.3	40.4	0.7	0.0	0.0
October	709	100.0%	21	43	0	39	0	6.2	36.0	57.1	0.7	0.0	0.0
November	175	100.0%	21	30	0	29	0	4.0	45.7	50.3	0.0	0.0	0.0
December	0	-	-	-	-	-	-	-	-	-	-	-	-
Annual <sup>c</sup>	2965	99.0%	22	72	0	61	0	8.9	36.3	50.1	4.5	0.2	0.0
a 1 ho	ur Sackatcha	wan Ambiant	Nir Quality S	tandard - 92	nnh								

## Table D-5. Unity Station: Summary of airpointer<sup>®</sup> O<sub>3</sub> monitoring results for January 1 to November 8, 2018

a. 1-hour Saskatchewan Ambient Air Quality Standard = 82 ppb

b. 8-hour Canada-Wide Standard = 65 ppb

Month	Valid 1-Hr data	Operational Time	Average Conc.	Maximum 1-Hr Conc.	1-Hour Exceedance <sup>a</sup>	Maximum 24-Hr Conc.	24-Hour Exceedance <sup>b</sup>	Percent of Data in each Concentration Range					ge
	(no.)	(%)	(µg/m³)	(µg/m³)	(no.)	(µg/m³)	(no.)	≤5	5 - 10	10 - 15	15 - 30	30 - 80	>80
January	744	100.0%	5	34	-	16	0	63.7	23.3	9.3	3.6	0.1	0.0
February	409	60.9%	4	20	-	8	0	68.2	27.4	3.9	0.5	0.0	0.0
March	744	100.0%	8	34	-	19	0	37.0	30.6	18.3	13.8	0.3	0.0
April	720	100.0%	6	23	-	18	0	45.3	40.1	10.7	3.9	0.0	0.0
May	743	99.9%	6	36	-	16	0	45.0	40.5	10.8	3.5	0.3	0.0
June	304	42.2%	5	19	-	8	0	63.8	27.6	7.9	0.7	0.0	0.0
July	743	100.0%	5	30	-	12	0	54.1	39.2	5.2	1.5	0.0	0.0
August	702	100.0%	34	157	-	91	15	4.6	17.9	3.4	27.1	39.9	7.1
September	709	100.0%	5	142	-	24	0	74.0	16.4	4.4	3.5	1.0	0.7
October	741	100.0%	6	101	-	21	0	59.5	26.0	8.5	4.0	1.8	0.1
November	185	100.0%	4	42	-	8	0	80.5	16.8	1.6	0.5	0.5	0.0
December	0	-	-	-	-	-	-	-	-	-	-	-	-
Annual <sup>c</sup>	6744	90.8%	9	157	-	91	15	50.9	28.8	8.3	6.6	4.5	0.8

## Table D-6. Unity Station: Summary of airpointer® PM2.5 monitoring results for January 1 to November 8, 2018

a. No 1-hour Saskatchewan Ambient Air Quality Standard

b. 24-hour Canada-Wide Standard =  $30 \mu g/m^3$ 

Month	Valid 1-Hr data	Operational Time	Total Precip.	Maximum 1-Hr Precip.	Maximum 24-Hr Precip.	Percent of Data in each Precipitation Range					
	(no.)	(%)	(mm)	(mm)	(mm)	≤5	5 - 10	10 - 25	25 - 50	50 - 75	>75
January	744	100.0%	3.6	1.8	1.8	100.0	0.0	0.0	0.0	0.0	0.0
February	672	100.0%	< 0.1	< 0.1	< 0.1	100.0	0.0	0.0	0.0	0.0	0.0
March	743	100.0%	0.1	< 0.1	0.1	100.0	0.0	0.0	0.0	0.0	0.0
April	720	100.0%	7.3	2.7	6.2	100.0	0.0	0.0	0.0	0.0	0.0
May	744	100.0%	47.9	8.5	16.0	99.9	0.1	0.0	0.0	0.0	0.0
June	714	99.2%	58.8	8.0	14.3	99.6	0.4	0.0	0.0	0.0	0.0
July	741	100.0%	69.8	8.0	27.9	99.6	0.4	0.0	0.0	0.0	0.0
August	737	100.0%	11.1	2.8	4.9	100.0	0.0	0.0	0.0	0.0	0.0
September	714	100.0%	37.7	5.1	12.0	99.9	0.1	0.0	0.0	0.0	0.0
October	742	100.0%	5.4	1.4	5.0	100.0	0.0	0.0	0.0	0.0	0.0
November	185	100.0%	0.5	0.3	0.5	100.0	0.0	0.0	0.0	0.0	0.0
December	0	-	-	-	-	-	-	-	-	-	-
Annual	3116	99.9%	242.2	8.5	-	27.9	-	99.9	0.1	0.0	0.0

 Table D-7.
 Unity Station: Summary of airpointer<sup>®</sup> precipitation monitoring results for January 1 to November 8, 2018

Month	Valid 1-Hr data	Operational Time	Average Temp.	Minimum 1-Hr Temp.	Maximum 1-Hr Temp.	Percent of Data in each Temperature Range					
	(no.)	(%)	(°C)	(°C)	(°C)	≤-30	-30 ~ -15	-15 ~ 0	0~15	15~30	>30
January	744	100.0%	-13.4	-33.7	3.5	3.9	30.8	61.4	3.9	0.0	0.0
February	672	100.0%	-17.3	-33.8	2.8	1.9	63.7	31.7	2.7	0.0	0.0
March	743	100.0%	-8.4	-23.9	3.3	0.0	11.6	85.6	2.8	0.0	0.0
April	720	100.0%	-1.2	-23.7	26.9	0.0	10.8	39.9	43.8	5.6	0.0
May	744	100.0%	14.2	-1.1	30.3	0.0	0.0	0.5	57.7	41.4	0.4
June	714	99.2%	16.3	5.4	29.3	0.0	0.0	0.0	44.3	55.7	0.0
July	741	100.0%	17.3	6.4	31.2	0.0	0.0	0.0	39.0	60.2	0.8
August	734	100.0%	15.8	0.0	35.2	0.0	0.0	0.1	49.9	47.5	2.5
September	709	100.0%	6.3	-6.8	25.5	0.0	0.0	11.4	81.5	7.1	0.0
October	742	100.0%	1.9	-9.5	21.6	0.0	0.0	38.8	59.4	1.8	0.0
November	185	100.0%	-5.3	-15.4	2.7	0.0	0.5	77.3	22.2	0.0	0.0
December	0	-	-	-	-	-	-	-	-	-	-
Annual	7448	99.9%	3.1	-33.8	35.2	0.6	11.0	28.3	38.2	21.5	0.4

 Table D-8.
 Unity Station: Summary of airpointer<sup>®</sup> ambient temperature monitoring results for January 1 to November 8, 2018

Month	Valid 1-Hr data	Operational Time	Average RH	Minimum 1-Hr RH	Maximum 1-Hr RH	Percent of Data in each Relative Humidity Range					
	(no.)	(%)	(%)	(%)	(%)	≤15	15 - 30	30 - 60	60 - 80	80 - 90	>90
January	744	100.0%	71	0	83	0.1	0.0	5.5	85.5	8.9	0.0
February	672	100.0%	66	42	79	0.0	0.0	11.8	88.2	0.0	0.0
March	743	100.0%	72	39	85	0.0	0.0	8.5	73.9	17.6	0.0
April	720	100.0%	63	18	86	0.0	5.8	26.8	56.1	11.3	0.0
May	744	100.0%	51	17	89	0.0	23.5	39.5	24.5	12.5	0.0
June	714	99.2%	61	24	90	0.0	5.7	43.1	29.7	21.4	0.0
July	741	100.0%	68	25	91	0.0	0.8	35.9	26.7	34.0	2.6
August	729	100.0%	63	16	91	0.0	6.4	33.7	33.3	24.7	1.8
September	714	100.0%	70	26	89	0.0	1.4	23.0	36.3	39.4	0.0
October	741	100.0%	65	21	87	0.0	1.8	29.1	54.5	14.6	0.0
November	185	100.0%	74	51	86	0.0	0.0	3.8	60.5	35.7	0.0
December	0	-	-	-	-	-	-	-	-	-	-
Annual	7447	99.9%	65	0	91	0.0	4.5	25.2	50.9	18.9	0.4

 Table D-9.
 Unity Station: Summary of airpointer<sup>®</sup> relative humidity monitoring results for January 1 to November 8, 2018
Wind Direction	Percent of Data within Wind Speed Range, wind speed unit m/s											
Sector	0.3 - 1.4	1.4 - 3.1	3.1 - 7.8	7.8 - 10.6	10.6 - 13.6	>13.6	Totals					
North NorthEast	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.4%					
NorthEast	1.3%	0.0%	0.0%	0.0%	0.0%	0.0%	1.3%					
East NorthEast	5.6%	4.3%	1.3%	0.0%	0.0%	0.0%	11.1%					
East	5.4%	2.5%	0.9%	0.0%	0.0%	0.0%	8.9%					
East SouthEast	5.0%	5.1%	2.2%	0.0%	0.0%	0.0%	12.3%					
SouthEast	3.0%	3.8%	1.3%	0.0%	0.0%	0.0%	8.2%					
South SouthEast	1.3%	1.0%	0.3%	0.0%	0.0%	0.0%	2.6%					
South	1.1%	1.7%	0.6%	0.0%	0.0%	0.0%	3.5%					
South SouthWest	1.3%	1.0%	0.3%	0.0%	0.0%	0.0%	2.5%					
SouthWest	1.2%	1.2%	0.8%	0.0%	0.0%	0.0%	3.2%					
West SouthWest	1.5%	1.9%	1.8%	0.0%	0.0%	0.0%	5.1%					
West	3.0%	5.5%	3.0%	0.2%	0.0%	0.0%	11.7%					
West NorthWest	4.8%	6.4%	5.1%	0.2%	0.0%	0.0%	16.5%					
NorthWest	3.9%	1.7%	0.4%	0.0%	0.0%	0.0%	5.9%					
North NorthWest	0.9%	0.1%	0.0%	0.0%	0.0%	0.0%	1.0%					
North	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.5%					
Total	40.3%	36.2%	17.9%	0.4%	0.0%	0.0%	94.8%					

Table D-10Unity Station: Wind frequency table for January 1 to November 8, 2018

Percent Calm (<0.3 m/s)	5.2%
Number of Valid Hourly-Average Data	6960
Total Workable Hours in Time Period	7456



# APPENDIX E. KERROBERT STATION: CONTINUOUS MONITORING DATA

Parameter	Unit	Calibration & AIC <sup>a</sup>	Valid Data	Uptime	Summary Sta	tistics for Hourly	Average Data
Farameter	Onit	(hours)	(hours)	(%)	Average	Minimum	Maximum
SO <sub>2</sub>	ppb	404	8175	97.9%	0.2	< 0.1	3.7
H <sub>2</sub> S	ppb	404	8037	99.6%	0.2	< 0.1	3.5
PM <sub>2.5</sub>	µg/m³	15	8565	98.0%	7	< 1	160
Precipitation	mm	0	8578	99.9%	295.8 <sup>b</sup>	< 0.1	26.1
Ambient Temperature	°C	0	8578	98.0%	2.0	-31.5	35.1
Relative Humidity	%	0	8578	99.9%	66	< 1	91
Wind Speed	m/s	0	8562	100.0%	2.8	Calm	12.1

 Table E-1
 Kerrobert Station: Summary statistics for continuous air monitoring results for 2018

a. Automatic Instrument Check

b. Total precipitation

Month	Valid 1-Hr data	Operational Time	Average Conc.	Maximum 1-Hr Conc.	1-Hour Exceedance <sup>a</sup>	Maximum 24-Hr Conc.	24-Hour Exceedance <sup>b</sup>	Percent of Data in each Concentration Range				nge	
	(no.)	(%)	(ppb)	(ppb)	(no.)	(ppb)	(no.)	≤1	1 -5	5 - 11	11 - 57	57 - 172	>172
January	703	99.4%	0.2	1.8	0	0.4	0	99.3	0.7	0.0	0.0	0.0	0.0
February	635	99.7%	0.4	2.5	0	0.9	0	95.0	5.0	0.0	0.0	0.0	0.0
March	714	100.0%	0.2	3.1	0	1.4	0	96.8	3.2	0.0	0.0	0.0	0.0
April	686	99.7%	0.1	1.0	0	0.4	0	100.0	0.0	0.0	0.0	0.0	0.0
May	698	100.0%	0.1	0.8	0	0.3	0	100.0	0.0	0.0	0.0	0.0	0.0
June	686	99.9%	0.1	1.0	0	0.2	0	100.0	0.0	0.0	0.0	0.0	0.0
July	704	98.7%	0.1	3.7	0	0.8	0	99.0	1.0	0.0	0.0	0.0	0.0
August	565	78.8%	0.4	1.2	0	0.7	0	98.1	1.9	0.0	0.0	0.0	0.0
September	682	99.7%	0.1	1.4	0	0.2	0	99.7	0.3	0.0	0.0	0.0	0.0
October	712	100.0%	0.1	2.4	0	0.3	0	99.6	0.4	0.0	0.0	0.0	0.0
November	685	99.6%	< 0.1	0.5	0	0.1	0	100.0	0.0	0.0	0.0	0.0	0.0
December	705	99.7%	0.1	1.5	0	0.5	0	99.9	0.1	0.0	0.0	0.0	0.0
Annual <sup>c</sup>	8175	97.9%	0.2	3.7	0	1.4	0	99.0	1.0	0.0	0.0	0.0	0.0

Table E-2. Kerrobert Station: Summary of airpointer® SO<sub>2</sub> monitoring results for 2018

a. 1-hour Saskatchewan Ambient Air Quality Standard = 172 ppb

b. 24-hour Saskatchewan Ambient Air Quality Standard = 57 ppb

c. Annual Saskatchewan Ambient Air Quality Standard = 11 ppb

	Valid	Operational	Average	Maximum	1-Hour	Maximum	24-Hour	Percent of Data in each Concentration Range				ange	
Month	1-Hr data	Time	Conc.	1-Hr Conc.	Exceedance <sup><i>a</i></sup>	24-Hr Conc.	Exceedance <sup>b</sup>					ange	
	(no.)	(%)	(ppb)	(ppb)	(no.)	(ppb)	(no.)	≤1	1 - 3.6	3.6 - 5	5 - 8	8 - 10.8	>10.8
January	682	97.0%	0.1	0.9	0	0.4	0	100.0	0.0	0.0	0.0	0.0	0.0
February	533	99.1%	0.1	0.5	0	0.2	0	100.0	0.0	0.0	0.0	0.0	0.0
March	713	100.0%	0.1	0.7	0	0.2	0	100.0	0.0	0.0	0.0	0.0	0.0
April	685	99.7%	0.2	2.7	0	0.5	0	99.3	0.7	0.0	0.0	0.0	0.0
May	697	100.0%	0.2	2.0	0	0.4	0	99.6	0.4	0.0	0.0	0.0	0.0
June	686	99.9%	0.3	2.0	0	0.6	0	96.8	3.2	0.0	0.0	0.0	0.0
July	704	100.0%	0.3	1.9	0	0.8	0	95.2	4.8	0.0	0.0	0.0	0.0
August	566	100.0%	0.3	3.5	0	0.8	0	95.4	4.6	0.0	0.0	0.0	0.0
September	683	100.0%	0.1	0.7	0	0.5	0	100.0	0.0	0.0	0.0	0.0	0.0
October	712	100.0%	0.1	1.0	0	0.2	0	100.0	0.0	0.0	0.0	0.0	0.0
November	671	100.0%	0.1	0.7	0	0.3	0	100.0	0.0	0.0	0.0	0.0	0.0
December	705	100.0%	0.1	1.3	0	0.6	0	99.4	0.6	0.0	0.0	0.0	0.0
Annual	8037	99.6%	0.2	3.5	0	0.8	0	98.8	1.2	0.0	0.0	0.0	0.0
~ 1 ho	a 1 have Cashetahaven Ambiant Air Ovelity Standard 100 anh												

# Table E-3. Kerrobert Station: Summary of airpointer® H<sub>2</sub>S monitoring results for 2018

a. 1-hour Saskatchewan Ambient Air Quality Standard = 10.8 ppb

b. 24-hour Saskatchewan Ambient Air Quality Standard = 3.6 ppb

Month	Valid 1-Hr data	Operational Time	Average Conc.	Maximum 1-Hr Conc.	1-Hour Exceedance <sup>a</sup>	Maximum 24-Hr Conc.	24-Hour Exceedance <sup>b</sup>	Percent of Data in each Concentration Range					ge
	(no.)	(%)	(µg/m³)	(µg/m³)	(no.)	(µg/m³)	(no.)	≤5	5 - 10	10 - 15	15 - 30	30 - 80	>80
January	735	99.5%	5	25	-	15	0	58.2	28.2	8.2	5.4	0.0	0.0
February	670	99.7%	3	13	-	7	0	81.3	16.6	2.1	0.0	0.0	0.0
March	744	100.0%	7	26	-	14	0	42.7	36.7	13.6	7.0	0.0	0.0
April	716	99.7%	5	29	-	20	0	64.5	25.3	5.7	4.5	0.0	0.0
May	740	100.0%	6	41	-	18	0	53.4	31.2	8.2	6.1	1.1	0.0
June	718	100.0%	6	42	-	13	0	52.6	29.5	12.0	5.2	0.7	0.0
July	735	98.8%	6	52	-	14	0	52.2	33.7	9.5	4.2	0.3	0.0
August	592	79.6%	28	160	-	77	8	16.4	16.7	14.9	21.5	24.0	6.6
September	718	99.9%	5	82	-	17	0	71.3	22.0	3.3	2.1	1.1	0.1
October	744	100.0%	4	20	-	9	0	67.7	28.9	2.6	0.8	0.0	0.0
November	717	99.6%	6	25	-	13	0	55.6	27.3	12.7	4.3	0.0	0.0
December	736	99.7%	5	25	-	12	0	62.2	23.4	9.9	4.5	0.0	0.0
Annual	8565	98.0%	7	160	-	77	8	57.0	26.9	8.5	5.2	1.9	0.5

# Table E-4. Kerrobert Station: Summary of airpointer<sup>®</sup> PM<sub>2.5</sub> monitoring results for 2018

a. No 1-hour Saskatchewan Ambient Air Quality Standard

b. 24-hour Canada-Wide Standard =  $30 \mu g/m^3$ 

Month	Valid 1-Hr data	Operational Time	Total Precip.	Maximum 1-Hr Precip.	Maximum 24-Hr Precip.	Percent of Data in each Precipitation Range					9
	(no.)	(%)	(mm)	(mm)	(mm)	≤5	5 - 10	10 - 25	25 - 50	50 - 75	>75
January	737	99.6%	9.2	7.4	7.9	99.9	0.1	0.0	0.0	0.0	0.0
February	670	99.7%	< 0.1	< 0.1	< 0.1	100.0	0.0	0.0	0.0	0.0	0.0
March	744	100.0%	0.4	0.1	0.3	100.0	0.0	0.0	0.0	0.0	0.0
April	719	99.9%	2.0	0.5	1.0	100.0	0.0	0.0	0.0	0.0	0.0
May	744	100.0%	37.3	6.1	15.2	99.9	0.1	0.0	0.0	0.0	0.0
June	718	99.7%	91.6	26.1	28.2	99.7	0.0	0.1	0.1	0.0	0.0
July	732	100.0%	70.1	10.4	27.4	99.3	0.5	0.1	0.0	0.0	0.0
August	593	100.0%	44.5	19.7	23.8	99.7	0.2	0.2	0.0	0.0	0.0
September	720	100.0%	29.3	5.1	15.5	99.7	0.3	0.0	0.0	0.0	0.0
October	744	100.0%	10.6	2.5	9.2	100.0	0.0	0.0	0.0	0.0	0.0
November	716	100.0%	0.8	0.4	0.4	100.0	0.0	0.0	0.0	0.0	0.0
December	741	100.0%	< 0.1	< 0.1	< 0.1	100.0	0.0	0.0	0.0	0.0	0.0
Annual	8578	99.9%	295.8	26.1	28.2	99.8	0.1	0.0	0.0	0.0	0.0

# Table E-5. Kerrobert Station: Summary of airpointer<sup>®</sup> precipitation monitoring results for 2018

Month	Valid 1-Hr data	Operational Time	Average Temp.	Minimum 1-Hr Temp.	Maximum 1-Hr Temp.	Percent of Data in each Temperature Range					9
	(no.)	(%)	(°C)	(°C)	(°C)	≤-30	-30 ~ -15	-15 ~ 0	0~15	15 ~ 30	>30
January	737	99.6%	-12.1	-31.5	4.0	0.9	31.5	63.6	3.9	0.0	0.0
February	670	99.7%	-16.6	-31.1	3.4	0.9	61.5	36.7	0.9	0.0	0.0
March	744	100.0%	-8.2	-23.6	3.9	0.0	11.8	85.5	2.7	0.0	0.0
April	719	99.9%	-0.2	-21.8	26.9	0.0	9.6	37.6	47.1	5.7	0.0
May	744	100.0%	14.6	-0.9	30.0	0.0	0.0	0.4	54.7	44.9	0.0
June	718	99.7%	17.0	5.9	31.4	0.0	0.0	0.0	38.2	61.3	0.6
July	734	98.7%	18.1	8.1	32.2	0.0	0.0	0.0	32.0	66.1	1.9
August	593	79.7%	17.9	5.1	35.1	0.0	0.0	0.0	36.4	61.4	2.2
September	718	99.7%	7.2	-4.5	28.3	0.0	0.0	8.8	80.9	10.3	0.0
October	744	100.0%	2.5	-9.2	22.0	0.0	0.0	35.8	62.2	2.0	0.0
November	716	99.4%	-5.7	-20.1	7.0	0.0	5.4	79.1	15.5	0.0	0.0
December	741	99.6%	-8.2	-27.1	4.4	0.0	13.0	76.8	10.3	0.0	0.0
Annual	8578	98.0%	2.0	-31.5	35.1	0.2	10.9	36.0	32.1	20.4	0.4

# Table E-6. Kerrobert Station: Summary of airpointer<sup>®</sup> ambient temperature monitoring results for 2018

Month	Valid 1-Hr data	Operational Time	Average RH	Minimum 1-Hr RH	Maximum 1-Hr RH	Percent of Data in each Relative Humidity Range					e
	(no.)	(%)	(%)	(%)	(%)	≤15	15 - 30	30 - 60	60 - 80	80 - 90	>90
January	737	99.6%	72	0	85	0.1	0.0	5.0	79.0	15.9	0.1
February	670	99.7%	67	49	84	0.0	0.0	9.3	89.0	1.8	0.0
March	744	100.0%	76	45	87	0.0	0.0	3.8	60.3	35.9	0.0
April	719	99.9%	63	18	87	0.0	6.8	27.0	51.9	14.3	0.0
May	744	100.0%	50	15	89	0.0	23.5	44.1	22.3	10.1	0.0
June	718	99.7%	57	19	91	0.0	9.1	43.6	32.3	14.1	0.0
July	732	100.0%	63	20	90	0.0	2.6	41.1	32.8	23.5	0.0
August	593	100.0%	57	20	90	0.0	8.6	45.2	31.4	14.7	0.0
September	720	100.0%	68	23	90	0.0	2.8	31.0	32.8	33.5	0.0
October	744	100.0%	64	17	87	0.0	1.5	31.5	52.7	14.4	0.0
November	716	100.0%	76	51	87	0.0	0.0	2.2	58.5	39.2	0.0
December	741	100.0%	74	53	84	0.0	0.0	2.8	84.2	13.0	0.0
Annual	8578	99.9%	66	0	91	0.0	4.5	23.6	52.4	19.3	0.0

# Table E-7. Kerrobert Station: Summary of airpointer<sup>®</sup> relative humidity monitoring results for 2018

Wind Direction	P	ercent of Da	ta within W	ind Speed Ra	nge, wind spe	ed unit m/	s
Sector	0.3 - 1.4	1.4 - 3.1	3.1 - 7.8	7.8 - 10.6	10.6 - 13.6	>13.6	Totals
North NorthEast	0.9%	1.6%	0.3%	0.0%	0.0%	0.0%	2.7%
NorthEast	0.8%	1.7%	1.2%	0.0%	0.0%	0.0%	3.7%
East NorthEast	0.6%	1.7%	2.1%	0.1%	0.0%	0.0%	4.5%
East	0.8%	2.2%	3.5%	0.4%	0.0%	0.0%	6.9%
East SouthEast	0.5%	2.3%	2.6%	0.1%	0.1%	0.0%	5.7%
SouthEast	0.5%	1.8%	2.1%	0.1%	0.0%	0.0%	4.5%
South SouthEast	0.5%	1.5%	1.7%	0.0%	0.0%	0.0%	3.7%
South	0.9%	1.1%	1.6%	0.0%	0.0%	0.0%	3.6%
South SouthWest	1.3%	3.2%	3.4%	0.1%	0.0%	0.0%	8.0%
SouthWest	2.3%	4.7%	3.3%	0.0%	0.0%	0.0%	10.3%
West SouthWest	1.5%	1.9%	3.1%	0.0%	0.0%	0.0%	6.5%
West	1.5%	3.0%	3.2%	0.0%	0.0%	0.0%	7.7%
West NorthWest	3.0%	5.4%	2.5%	0.0%	0.0%	0.0%	11.0%
NorthWest	2.8%	5.7%	3.0%	0.0%	0.0%	0.0%	11.4%
North NorthWest	1.6%	3.1%	0.3%	0.0%	0.0%	0.0%	5.0%
North	1.4%	2.0%	0.5%	0.0%	0.0%	0.0%	3.8%
Total	20.7%	42.8%	34.4%	1.0%	0.2%	0.0%	99.1%

Table E-8	Kerrobert Station: Wind frequency table for the year 2018
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Percent Calm (≤0.3 m/s)	0.9%
Number of Valid Hourly-Average Data	8562
Total Workable Hours in Time Period	8566



# APPENDIX F. CLAVET STATION: CONTINUOUS MONITORING DATA

Parameter	Unit	Calibration & AIC <sup>a</sup>	Valid Data	Uptime	Summary Statistics for Hourly Average Data				
Falameter	Onit	(hours)	(hours)	(%)	Average	Minimum	Maximum		
NO	ppb	14	64	1058	96.1%	1.3	< 0.1		
NO <sub>2</sub>	ppb	14	64	1058	96.1%	4.4	< 0.1		
NO <sub>x</sub>	ppb	14	64	1060	96.1%	5.7	< 0.1		
O <sub>3</sub>	ppb	14	65	1070	97.1%	23	< 1		
PM <sub>2.5</sub>	µg/m³	7	1123	96.9%	8	< 1	41		
Precipitation	mm	1	1128	96.9%	0.3 <sup>b</sup>	< 0.1	0.1		
Ambient Temperature	°C	7	1123	96.8%	-7.8	-28.4	4.9		
Relative Humidity	%	7	1123	96.8%	72	< 1	85		
Wind Speed	m/s	0	1123	96.5%	0.2	Calm	6.1		

 Table F-1
 Clavet Station: Summary statistics for continuous air monitoring results for November 13 to December 2018

a. Automatic Instrument Check

b. Total precipitation

Valid	Operational	Average	Maximum	1-Hour	Maximum	24-Hour	D	arcent of	Data in oa	ch Concent	tration Pana	0
1-Hr data	Time	Conc.	1-Hr Conc.	Exceedance <sup>a</sup>	24-Hr Conc.	Exceedance <sup>b</sup>	Ē		Data ili ea	ch concent		e
(no.)	(%)	(ppb)	(ppb)	(no.)	(ppb)	(no.)	≤5	5 - 15	15 - 53	53 - 100	100 - 212	>212
396	100.0%	1.3	15.7	-	4.1	-	94.9	4.8	0.3	0.0	0.0	0.0
662	93.9%	1.3	14.8	-	2.6	-	97.7	2.3	0.0	0.0	0.0	0.0
1058	96.1%	1.3	15.7	-	4.1	-	96.7	3.2	0.1	0.0	0.0	0.0
	Valid 1-Hr data (no.) 396 662 1058	Valid         Operational           1-Hr data         Time           (no.)         (%)           396         100.0%           662         93.9%           1058         96.1%	Valid         Operational         Average           1-Hr data         Time         Conc.           (no.)         (%)         (ppb)           396         100.0%         1.3           662         93.9%         1.3           1058         96.1%         1.3	Valid         Operational         Average         Maximum           1-Hr data         Time         Conc.         1-Hr Conc.           (no.)         (%)         (ppb)         (ppb)           396         100.0%         1.3         15.7           662         93.9%         1.3         14.8	Valid         Operational         Average         Maximum         1-Hour           1-Hr data         Time         Conc.         1-Hr Conc.         Exceedance <sup>a</sup> (no.)         (%)         (ppb)         (ppb)         (no.)           396         100.0%         1.3         15.7         -           662         93.9%         1.3         14.8         -           1058         96.1%         1.3         15.7         -	Valid         Operational         Average         Maximum         1-Hour         Maximum           1-Hr data         Time         Conc.         1-Hr Conc.         Exceedance a         24-Hr Conc.           (no.)         (%)         (ppb)         (ppb)         (no.)         (ppb)           396         100.0%         1.3         15.7         -         4.1           662         93.9%         1.3         14.8         -         2.6           1058         96.1%         1.3         15.7         -         4.1	Valid         Operational         Average         Maximum         1-Hour         Maximum         24-Hour           1-Hr data         Time         Conc.         1-Hr Conc.         Exceedance <sup>a</sup> 24-Hr Conc.         Exceedance <sup>b</sup> (no.)         (%)         (ppb)         (ppb)         (no.)         (ppb)         (no.)           396         100.0%         1.3         15.7         -         4.1         -           662         93.9%         1.3         14.8         -         2.6         -           1058         96.1%         1.3         15.7         -         4.1         -	Valid         Operational         Average         Maximum         1-Hour         Maximum         24-Hour         Parage           1-Hr data         Time         Conc.         1-Hr Conc.         Exceedance <sup>a</sup> 24-Hr Conc.         Exceedance <sup>b</sup> 1           (no.)         (%)         (ppb)         (ppb)         (no.)         (ppb)         (no.)         ≤5           396         100.0%         1.3         15.7         -         4.1         -         94.9           662         93.9%         1.3         14.8         -         2.6         -         97.7           1058         96.1%         1.3         15.7         -         4.1         -         96.7	Valid 1-Hr dataOperational TimeAverage Conc.Maximum 1-Hr Conc.Maximum Exceedance"24-Hour 24-Hr Conc. $24-HourExceedance-1+Hr Conc.-1+Hr Conc.MaximumExceedance-1+Hr Conc.-1+Hr Conc.-1+Hr$	Valid         Operational         Average         Maximum         1-Hour         Maximum         24-Hour         Exceedance*         Exceedance*	Valid 1-Hr dataOperational TimeAverage Conc.Maximum 1-Hr Conc.Maximum Exceedance"24-Hour Exceedance $24-Hour$ Exceedance $24-$	Valid 1-Hr dataAverage TimeMaximum Conc.1-Hr Conc.1-Hr Conc.Maximum Exceedance*24-Ho Conc. $Exceedance horeExceedance horeExceedanc$

# Table F-2. Clavet Station: Summary of airpointer<sup>®</sup> NO monitoring results for November 13 to December 2018

a. 1-hour Saskatchewan Ambient Air Quality Standard = 82 ppb

b. 8-hour Canada-Wide Standard = 65 ppb

Month	Valid 1-Hr data	Operational Time	Average Conc.	Maximum 1-Hr Conc.	1-Hour Exceedance <sup>a</sup>	Maximum 24-Hr Conc.	24-Hour Exceedance <sup>b</sup>	Percent of Data in each Concentration Range				e	
	(no.)	(%)	(ppb)	(ppb)	(no.)	(ppb)	(no.)	≤5	5 - 15	15 - 53	53 - 100	100 - 212	>212
November	396	100.0%	4.6	19.3	0	10.2	-	74.2	22.2	3.5	0.0	0.0	0.0
December	662	93.9%	4.3	23.1	0	10.0	-	66.9	32.2	0.9	0.0	0.0	0.0
				•									
Annual <sup>c</sup>	1058	96.1%	4.4	23.1	0	10.2	-	69.7	28.4	1.9	0.0	0.0	0.0

# Table F-3. Clavet Station: Summary of airpointer<sup>®</sup> NO<sub>2</sub> monitoring results for November 13 to December 2018

a. 1-hour Saskatchewan Ambient Air Quality Standard = 82 ppb

b. 8-hour Canada-Wide Standard = 65 ppb

	Valid	Operational	Average	Maximum	1-Hour	Maximum	24-Hour	Р	ercent of	Data in ea	ch Concen	tration Rang	ē
Month	1-Hr data	Time	Conc.	1-Hr Conc.	Exceedance <sup>a</sup>	24-Hr Conc.	Exceedance <sup>b</sup>			Butu in cu	en concent		C
	(no.)	(%)	(ppb)	(ppb)	(no.)	(ppb)	(no.)	≤5	5 - 15	15 - 53	53 - 100	100 - 212	>212
November	396	100.0%	5.9	31.1	-	13.4	-	64.4	27.0	8.6	0.0	0.0	0.0
December	662	93.9%	5.6	27.8	-	12.6	-	51.2	46.2	2.6	0.0	0.0	0.0
Annual <sup>c</sup>	1060	96.1%	5.7	31.1	-	13.4	-	56.0	39.2	4.8	0.0	0.0	0.0

# Table F-4. Clavet Station: Summary of airpointer<sup>®</sup> NOx monitoring results for November 13 to December 2018

a. 1-hour Saskatchewan Ambient Air Quality Standard = 82 ppb

b. 8-hour Canada-Wide Standard = 65 ppb

Month	Valid 1-Hr data	Operational Time	Average Conc.	Maximum 1-Hr Conc.	1-Hour Exceedance <sup>a</sup>	Maximum 8-Hr Conc.	8-Hour Conc. Above CWS <sup>b</sup>	Pe	ercent of Da	ita in each	Concentr	ation Ran	ge
	(no.)	(%)	(ppb)	(ppb)	(no.)	(dqq)	(no.)	≤10	10 - 20	20 - 40	40 - 65	65 - 82	

0

0

0

34

34

34

# Table F-5. Clavet Station: Summary of airpointer<sup>®</sup> O<sub>3</sub> monitoring results for November 13 to December 2018

35

37

37

20

24

23

a. 1-hour Saskatchewan Ambient Air Quality Standard = 82 ppb

b. 8-hour Canada-Wide Standard = 65 ppb

396

672

1070

November

December

Annual <sup>c</sup>

c. No annual Saskatchewan Ambient Air Quality Standard

100.0%

95.5%

97.1%

0.0

0.0

0.0

9.6

2.2

5.0

0

0

0

35.1

19.5

25.2

55.3

78.3

69.8

0.0

0.0

0.0

>82

0.0

0.0

0.0

Table F-6. Clavet Station: Sum	mary of airpointer <sup>®</sup> PM <sub>2</sub>	.₅ monitoring results for	November 13 to December 2018
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Month	Valid 1-Hr data	Operational Time	Average Conc.	Maximum 1-Hr Conc.	1-Hour Exceedance <sup>a</sup>	Maximum 24-Hr Conc.	24-Hour Exceedance <sup>b</sup>	Percent of Data in each Concentration Range					ge
	(no.)	(%)	(µg/m³)	(µg/m³)	(no.)	(µg/m³)	(no.)	≤5	5 - 10	10 - 15	15 - 30	30 - 80	>80
November	414	100.0%	10	40	-	20	0	26.3	33.8	18.4	20.0	1.4	0.0
December	708	95.2%	7	41	-	16	0	53.1	25.7	11.7	8.8	0.7	0.0
Annual <sup>c</sup>	414	100.0%	10	40	-	20	0	26.3	33.8	18.4	20.0	1.4	0.0
a 1 hour	Cackatchou	an Ambiant Air	Cuality Sta	indard - 02 n	ah								

a. 1-hour Saskatchewan Ambient Air Quality Standard = 82 ppb

b. 8-hour Canada-Wide Standard = 65 ppb

Month	Valid 1-Hr data	Operational Time	Total Precip.	Maximum 1-Hr Precip.	Maximum 24-Hr Precip.	I	Percent of	Data in eacl	h Precipitat	ion Range	!
	(no.)	(%)	(mm)	(mm)	(mm)	≤5	5 - 10	10 - 25	25 - 50	50 - 75	>75
November	420	100.0%	0.2	0.1	0.1	100.0	0.0	0.0	0.0	0.0	0.0
December	708	95.2%	0.1	0.1	0.1	100.0	0.0	0.0	0.0	0.0	0.0
Annual	1128	96.9%	0.3	0.1	0.1	100.0	0.0	0.0	0.0	0.0	0.0

 Table F-7.
 Clavet Station: Summary of airpointer<sup>®</sup> precipitation monitoring results for November 13 to December 2018

Month	Valid 1-Hr data	Operational Time	Average Temp.	Minimum 1-Hr Temp.	Maximum 1-Hr Temp.	I	Percent of D	ata in eacl	n Tempera	ture Range	9
	(no.)	(%)	(°C)	(°C)	(°C)	≤-30	-30 ~ -15	-15 ~ 0	0~15	15~30	>30
November	420	100.0%	-6.2	-20.4	4.7	0.0	7.2	85.5	7.2	0.0	0.0
December	708	95.2%	-8.7	-28.4	4.9	0.0	16.1	73.9	10.0	0.0	0.0
Annual	1128	96.9%	-7.8	-28.4	4.9	0.0	12.8	78.2	9.0	0.0	0.0

 Table F-8.
 Clavet Station: Summary of airpointer<sup>®</sup> ambient temperature monitoring results for November 13 to December 2018

Month	Valid 1-Hr data	Operational Time	Average RH	Minimum 1-Hr RH	Maximum 1-Hr RH	Percent of Data in each Relative Humidity Range					
	(no.)	(%)	(%)	(%)	(%)	≤15	15 - 30	30 - 60	60 - 80	80 - 90	>90
November	414	100.0%	76	60	85	0.0	0.0	0.2	76.6	23.2	0.0
December	707	95.0%	70	41	83	0.0	0.0	5.8	88.4	5.8	0.0
Annual	1123	96.8%	72	0	85	0.0	0.0	3.7	84.1	12.2	0.0

 Table F-9.
 Clavet Station: Summary of airpointer<sup>®</sup> relative humidity monitoring results for November 13 to December 2018

Wind Direction	Percent of Data within Wind Speed Range, wind speed unit m/s										
Sector	0.3 - 1.4	1.4 - 3.1	3.1 - 7.8	7.8 - 10.6	10.6 - 13.6	>13.6	Totals				
North NorthEast	1.8%	4.6%	0.7%	0.0%	0.0%	0.0%	7.1%				
NorthEast	1.6%	2.6%	0.4%	0.0%	0.0%	0.0%	4.6%				
East NorthEast	2.0%	3.0%	0.1%	0.0%	0.0%	0.0%	5.2%				
East	2.8%	4.9%	0.1%	0.0%	0.0%	0.0%	7.8%				
East SouthEast	5.0%	3.7%	0.4%	0.0%	0.0%	0.0%	9.1%				
SouthEast	4.5%	3.6%	0.0%	0.0%	0.0%	0.0%	8.1%				
South SouthEast	2.4%	1.6%	0.0%	0.0%	0.0%	0.0%	4.0%				
South	4.5%	3.3%	0.3%	0.0%	0.0%	0.0%	8.0%				
South SouthWest	4.0%	8.4%	0.3%	0.0%	0.0%	0.0%	12.6%				
SouthWest	2.7%	9.6%	0.3%	0.0%	0.0%	0.0%	12.6%				
West SouthWest	2.4%	4.1%	1.1%	0.0%	0.0%	0.0%	7.6%				
West	1.7%	1.3%	0.3%	0.0%	0.0%	0.0%	3.3%				
West NorthWest	1.1%	0.6%	0.3%	0.0%	0.0%	0.0%	2.0%				
NorthWest	0.6%	1.1%	1.8%	0.0%	0.0%	0.0%	3.5%				
North NorthWest	0.4%	0.3%	0.4%	0.0%	0.0%	0.0%	1.2%				
North	0.9%	0.5%	0.0%	0.0%	0.0%	0.0%	1.4%				
Total	38.5%	53.2%	6.4%	0.0%	0.0%	0.0%	98.0%				

Table F-10Clavet Station: Wind frequency table for November 13 to December 2018

Percent Calm (<0.3 m/s)	2.0%
Number of Valid Hourly-Average Data	1123
Total Workable Hours in Time Period	1164



# **APPENDIX G. WYAMZ EXCEEDANCE SUMMARY**

24-hour	24-hour Exceedance Information			Summa	ary of Ot	her Para	ameters	s During	g Excee	dance	
Pollutant	Conc	Exceedance Date	WS	WD	AQHI	Rain	NO	NO <sub>2</sub>	NOx	O3	PM <sub>2.5</sub>
Foliatant	mmm-dd	m/s	deg	-	mm	ppb	ppb	ppb	ppb	µg/m³	
PM <sub>2.5</sub>	38.0	May-22	1.3	175	-	0.0	0	0	0	42.4	38.0
PM <sub>2.5</sub>	33.3	May-23	1.2	134	-	0.0	0	0	0	45.2	33.3
PM <sub>2.5</sub>	100	Aug-18	2.3	257	7	0.0	0	1	1	28	100
PM <sub>2.5</sub>	63.0	Aug-22	1.3	212	-	0.0	-	1	1	39	63.4
PM <sub>2.5</sub>	57.0	Aug-11	1.2	247	4	0.0	0	1	1	18	57.0
PM <sub>2.5</sub>	48.0	Aug-9	0.8	202	4	0.0	-	1	1	31	48.4
PM <sub>2.5</sub>	43.0	Aug-17	0.8	222	3	0.0	0	1	1	18	43.4
PM <sub>2.5</sub>	43.0	Aug-8	1.4	241	3	0.0	0	1	1	28	42.6
PM <sub>2.5</sub>	30.0	Aug-21	1.3	211	-	0.0	0	1	1	36	29.6

# Table G-1 Meadow Lake Station: Summary of 24-hour exceedances for 2018

# Table G-2Maidstone Station: Summary of 1-hour exceedances for 2018

1-hour	1-hour Exceedance Information			Sum	mary o	f Other	Paramet	ters Dur	ing Exce	edance	
Pollutant	Conc	Exceedance Time	WS	WD	AQI	Rain	ET	$SO_2$	$NO_2$	$H_2S$	PM <sub>2.5</sub>
Tonatarit	conc.	mmm-dd hh:mm	m/s	deg	-	mm	С	ppb	ppb	ppb	µg/m³
H <sub>2</sub> S	20.1	Jul-05 05:00	0.2	167	5	0.0	8.6	0	8	20.1	5.4
H <sub>2</sub> S	14.0	Jul-30 07:00	0.3	166	16	0.0	16.0	0	5	14.0	19.7
H <sub>2</sub> S	12.5	Jul-09 04:00	0.2	243	9	0.0	9.8	0	10	12.5	10.4
H <sub>2</sub> S	11.7	Jul-09 05:00	0.4	306	8	0.0	9.9	0	7	11.7	9.3
H <sub>2</sub> S	21.4	Aug-09 07:00	0.4	135	26	0.0	13.5	0	4	21.4	32
H <sub>2</sub> S	14.1	Aug-21 05:00	0.2	206	15	0.0	5.5	0	7	14.1	18
H <sub>2</sub> S	13.9	Aug-06 05:00	0.4	185	12	0.0	12.1	0	3	13.9	14.6
H <sub>2</sub> S	13.7	Aug-06 06:00	0.3	159	9	0.0	12.0	0	3	13.7	10.6
H <sub>2</sub> S	13.5	Aug-22 07:00	0.8	134	19	0.0	9.6	0	7	13.5	23.3
H <sub>2</sub> S	13.2	Aug-09 08:00	0.8	137	26	0.0	16.7	0	5	13.2	31.9
$H_2S$	11.3	Aug-09 02:00	0.2	209	34	0.0	13.3	0	10	11.3	47.8
$H_2S$	11.3	Aug-14 06:00	1.1	146	3	0.0	6.9	0	2	11.3	3.0

# Table G-3Maidstone Station: Summary of 24-hour exceedances for 2018

24-houi	24-hour Exceedance Information			Summar	y of Otl	ner Para	meters	During	Exceed	lance	
Dollutant	Conc	Exceedance Date	WS	WD	AQI	Rain	ET	SO <sub>2</sub>	NO <sub>2</sub>	$H_2S$	PM <sub>2.5</sub>
Pollutarit	Conc.	mmm-dd	m/s	deg	-	mm	С	ppb	ppb	ppb	µg/m³
$H_2S$	3.7	Aug-9	0.9	216.0	27.5	0.0	21.3	-	4.5	3.7	35.7
PM <sub>2.5</sub>	94.0	Aug-15	0.9	279.3	56.7	0.0	15.3	0.5	4.3	0.7	94.5
PM <sub>2.5</sub>	63.0	Aug-23	1.8	149.0	36.0	0.0	12.5	0.3	2.8	1.0	62.8
PM <sub>2.5</sub>	56.0	Aug-22	1.4	230.4	36.2	0.0	17.9	0.4	3.9	1.1	55.8
PM <sub>2.5</sub>	50.0	Aug-11	2.2	170.2	33.5	0.0	18.6	0.4	2.4	0.5	49.5
PM <sub>2.5</sub>	38.0	Aug-10	1.1	182.7	28.3	0.0	22.5	0.3	3.2	3.0	37.5
PM <sub>2.5</sub>	36.0	Aug-9	0.9	216.0	27.5	0.0	21.3	-	4.5	3.7	35.7
PM <sub>2.5</sub>	35.0	Aug-17	0.6	212.6	26.1	0.0	17.5	0.6	2.8	1.6	34.6

24-hou	24-hour Exceedance Information			Summa	ary of Ot	her Para	ameters	5 During	g Exceed	dance	
Pollutant	Conc	Exceedance Date	WS	WD	AQHI	Rain	NO	NO <sub>2</sub>	NOx	O3	PM <sub>2.5</sub>
1 onutant	conc.	mmm-dd	m/s	deg	-	mm	ppb	ppb	ppb	ppb	µg/m³
PM2.5	87.0	Aug-23	1.7	86	6	0.0	0	2	2	27	87.0
PM2.5	82.0	Aug-18	1.4	281	5	0.0	0	2	2	25	82.0
PM2.5	80.0	Aug-15	0.9	215	5	0.0	1	4	4	14	79.8
PM2.5	72.0	Aug-16	1.0	111	4	0.0	0	2	2	14	72.0
PM2.5	59.0	Aug-11	1.0	102	4	0.0	0	1	1	26	59.5
PM2.5	47.0	Aug-8	1.6	234	4	0.0	0	2	2	28	47.2
PM2.5	46.0	Aug-17	1.1	187	4	0.0	0	2	3	25	45.6
PM2.5	40.0	Aug-10	1.4	129	4	0.0	0	2	3	39	40.1
PM2.5	37.0	Aug-9	1.2	126	4	0.0	1	3	3	33	37.1
PM2.5	36.0	Aug-22	2.1	197	4	0.0	0	3	3	42	36.5
PM2.5	33.0	Aug-26	1.0	121	3	0.0	-	2	2	24	33.5
PM2.5	33.0	Aug-30	3.4	267	3	0.0	0	2	2	20	33.3
PM2.5	31.0	Aug-27	0.4	248	2	0.0	0	1	1	13	30.7
PM2.5	30.0	Aug-25	1.9	228	3	0.0	0	1	1	19	29.8
PM2.5	30.0	Aug-28	1.4	184	3	0.0	1	2	2	22	29.8

Table G-4Unity Station: Summary of 24-hour exceedances for July 1 to November 8, 2018

# Table G-5Kerrobert Station: Summary of 24-hour exceedances for 2018

24-hour Exceedance Information				Summary	of Other I	Parameters	s During Ex	ceedance	
Pollutant	Conc.	Exceedance Date mmm-dd	WS m/s	WD deg	Rain mm	ET C	SO₂ ppb	H₂S ppb	PM <sub>2.5</sub> μg/m³
PM <sub>2.5</sub>	76.0	Aug-11	3.2	85.8	0.0	22.0	0.7	0.6	75.9
PM <sub>2.5</sub>	72.0	Aug-16	1.9	63.0	0.0	17.8	0.7	0.6	71.7
PM <sub>2.5</sub>	71.0	Aug-15	1.3	188.2	0.0	18.8	0.7	0.3	70.8
PM <sub>2.5</sub>	67.0	Aug-18	1.8	322.2	0.0	16.1	0.7	0.4	66.6
PM <sub>2.5</sub>	49.0	Aug-17	1.4	192.8	0.0	19.8	0.8	0.5	49.1
PM <sub>2.5</sub>	48.0	Aug-8	1.6	247.5	0.0	20.7	0.5	0.5	48.4
PM <sub>2.5</sub>	48.0	Aug-10	2.1	217.6	0.0	24.7	0.7	0.8	48.3
PM <sub>2.5</sub>	39.0	Aug-9	2.1	214.2	0.0	22.8	0.7	0.4	39.4

24-hour Exceedance Information			Summary of Other Parameters During Exceedance							
Pollutant	Conc	Exceedance Date	WS	WD	Rain	ET	SO <sub>2</sub>	$H_2S$	PM <sub>2.5</sub>	
ronatant	Fondtant Conc.	mmm-dd	m/s	deg	mm	С	ppb	ppb	µg/m³	
		No recorded e	exceedances	5						

# APPENDIX H. 2018 FINANCIAL STATEMENTS

Western Yellowhead Air Management Zone Inc. Financial Statements December 31, 2018

# Western Yellowhead Air Management Zone Inc. Contents

For the year ended December 31, 2018

# Management's Responsibility Independent Auditors' Report Financial Statements Statement of Financial Position 1 Statement of Operations and Changes in Net Assets 2 Statement of Cash Flows 3 Notes to the Financial Statements 4

Page

To the Members of Western Yellowhead Air Management Zone Inc.:

Management is responsible for the preparation and presentation of the accompanying financial statements, including responsibility for significant accounting judgments and estimates in accordance with Canadian accounting standards for not-for-profit organizations and ensuring that all information in the annual report is consistent with the statements. This responsibility includes selecting appropriate accounting principles and methods, and making decisions affecting the measurement of transactions in which objective judgment is required.

In discharging its responsibilities for the integrity and fairness of the financial statements, management designs and maintains the necessary accounting systems and related internal controls to provide reasonable assurance that transactions are authorized, assets are safeguarded and financial records are properly maintained to provide reliable information for the preparation of financial statements.

The Board of Directors is composed primarily of Directors who are neither management nor employees of the Organization. The Board is responsible for overseeing management in the performance of its financial reporting responsibilities, and for approving the financial information included in the annual report. The Board fulfils these responsibilities by reviewing the financial information prepared by management and discussing relevant matters with management and external auditors. The Board is also responsible for recommending the appointment of the Organization's external auditors.

MNP LLP is appointed by the members to audit the financial statements and report directly to them; their report follows. The external auditors have full and free access to, and meet periodically and separately with, both the Board and management to discuss their audit findings.

April 5, 2019

Leten

Executive Director

To the Members of Western Yellowhead Air Management Zone Inc.:

#### Opinion

We have audited the financial statements of Western Yellowhead Air Management Zone Inc. (the "Organization"), which comprise the statement of financial position as at December 31, 2018, and the statements of operations and changes in net assets and cash flows for the year then ended, and notes to the financial statements, including a summary of significant accounting policies.

In our opinion, the accompanying financial statements present fairly, in all material respects, the financial position of the Organization as at December 31, 2018, and the results of its operations and its cash flows for the year then ended in accordance with Canadian accounting standards for not-for-profit organizations.

#### **Basis for Opinion**

We conducted our audit in accordance with Canadian generally accepted auditing standards. Our responsibilities under those standards are further described in the Auditor's Responsibilities for the Audit of the Financial Statements section of our report. We are independent of the Organization in accordance with the ethical requirements that are relevant to our audit of the financial statements in Canada, and we have fulfilled our other ethical responsibilities in accordance with these requirements. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

#### Responsibilities of Management and Those Charged with Governance for the Financial Statements

Management is responsible for the preparation and fair presentation of the financial statements in accordance with Canadian accounting standards for not-for-profit organizations, and for such internal control as management determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, management is responsible for assessing the Organization's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless management either intends to liquidate the Organization or to cease operations, or has no realistic alternative but to do so.

Those charged with governance are responsible for overseeing the Organization's financial reporting process.

#### Auditor's Responsibilities for the Audit of the Financial Statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with Canadian generally accepted auditing standards will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

As part of an audit in accordance with Canadian generally accepted auditing standards, we exercise professional judgment and maintain professional skepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, design and
  perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a
  basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting
  from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal
  control.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Organization's internal control.
- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by management.



- Conclude on the appropriateness of management's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Organization's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the Organization to cease to continue as a going concern.
   Evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and whether
- Evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and whethe the financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

We communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

Saskatoon, Saskatchewan

April 5, 2019

MNPLLP

**Chartered Professional Accountants** 



Western	Yellowhead Air Management Zone Inc.
	Statement of Financial Position
	As at December 31, 2018

139.589	133,480
102,364	101,150
3,806	3,806
245,759	238,436
145,610	177,368
391,369	415,804
14,405	17,854
1,474	1,744
	20,000
15,879	39,598
375,490	376,206
391,369	415,804
	102,364 3,806 245,759 145,610 391,369 14,405 1,474 - 15,879 375,490 391,369

1

Director

Director  $\geq$ 

The accompanying notes are an integral part of these financial statements

# Western Yellowhead Air Management Zone Inc. Statement of Operations and Changes in Net Assets For the year ended December 31, 2018

	2018	2017
Revenue		
Membership fees	153,371	159,991
Amortization of deferred contributions (Note 5)	20,000	40,000
Investments	1,856	1,600
	175,227	201,591
Expenses		1
Amortization	37.875	43,248
Insurance	7.011	5,930
Management fees (Note 6)	45.840	49,980
Meetings	751	1,343
Monitoring	59,415	50,430
Office supplies	476	489
Professional fees	6,175	6,138
Promotion	3,010	75
Repairs and maintenance	13,064	10,493
Telephone	1,800	1,835
Travel	526	207
	175,943	170,168
Excess (deficiency) of revenue over expenses	(716)	31,423
Net assets beginning of year	376,206	344,783
Net assets, end of year	375,490	376,206

The accompanying notes are an integral part of these financial statements

# Western Yellowhead Air Management Zone Inc. Statement of Cash Flows

	For the year ended Decem	iber 31, 2018
	2018	2017
Cash provided by (used for) the following activities Operating		
Excess (deficiency) of revenue over expenses	(716)	31,423
Amortization	37,875	43,248
Amortization of deferred contributions	(20,000)	(40,000)
	17,159	34,671
Changes in working capital accounts Accounts payable and accruals Goods and Services Tax payable	(3,449) (270)	98 (1,306)
· · ·	13,440	33,463
Investing		
Purchase of short-term investment	(102,364)	(101,150)
Proceeds on disposal of short-term investment	101,150	100.000
Purchase of capital assets	(6,117)	(20,684)
	(7,331)	(21,834)
Increase in cash resources	6,109	11,629
Cash resources, beginning of year	133,480	121,851
Cash resources, end of year	139,589	133,480

The accompanying notes are an integral part of these financial statements

#### 1. Incorporation and nature of the organization

Western Yellowhead Air Management Zone Inc. (the "Organization") was incorporated under The Non-Profit Corporations Act of Saskatchewan on February 14, 2012.

The Organization collects and monitors ambient air quality data in Northwest Saskatchewan and makes the data available to all members.

#### 2. Significant accounting policies

The financial statements have been prepared in accordance with Canadian accounting standards for not-for-profit organizations using the following significant accounting policies:

#### **Revenue recognition**

The Organization follows the deferral method of accounting for contributions. Restricted contributions are recognized as revenue in the year in which the related expenses are incurred. Unrestricted contributions are recognized as revenue when received. Membership fees are recognized when received. Grants are recognized as revenue when the amount to be received can be reasonably estimated and ultimate collection is reasonably assured.

#### **Financial instruments**

The Organization recognizes its financial instruments when the Organization becomes party to the contractual provisions of the financial instrument. All financial instruments are initially recorded at their fair value, including financial assets and liabilities originated and issued in related party transactions with management.

At initial recognition, the Organization may irrevocably elect to subsequently measure any financial instrument at fair value. The Organization has not made such an election during the year. All financial assets and liabilities are subsequently measured at cost or amortized cost.

Transaction costs and financing fees are added to the carrying amount for those financial instruments subsequently measured at amortized cost or cost.

#### Financial asset impairment

The Organization assesses impairment of all of its financial assets measured at cost or amortized cost. The Organization groups assets for impairment testing when available information is not sufficient to permit identification of each individually impaired financial asset in the group. Management considers whether there has been a breach in contract, such as a default or delinquency in interest or principal payments in determining whether objective evidence of impairment exists. When there is an indication of impairment, the Organization determines whether it has resulted in a significant adverse change in the expected timing or amount of future cash flows during the year. If so, the Organization reduces the carrying amount of any impaired financial assets to the highest of: the present value of cash flows expected to be generated by holding the assets; the amount that could be realized by selling the assets; and the amount expected to be realized by exercising any rights to collateral held against those assets. Any impairment, which is not considered temporary, is included in current year excess of revenues over expenses.

The Organization reverses impairment losses on financial assets when there is a decrease in impairment and the decrease can be objectively related to an event occurring after the impairment loss was recognized. The amount of the reversal is recognized in the excess of revenues over expenses in the year the reversal occurs.

#### Capital assets

Purchased capital assets are recorded at cost. Contributed capital assets are recorded at fair value at the date of contribution if fair value can be reasonably determined.

Amortization is provided using the declining balance method at rates intended to amortize the cost of assets over their estimated useful lives.

	nate
Website	50 %
Equipment	20 %

#### 2. Significant accounting policies (Continued from previous page)

#### Long-lived assets

Long-lived assets consist of capital assets. Long-lived assets held for use are measured and amortized as described in the applicable accounting policies.

When the Organization determines that a long-lived asset no longer has any long-term service potential to the Organization, the excess of its net carrying amount over any residual value is recognized as an expense in the statement of operations. Write-downs are not reversed.

#### Deferred contributions related to capital assets

Deferred contributions related to capital assets represent the unamortized portion of contributed capital assets and restricted contributions that were used to purchase the Organization's equipment. Recognition of these amounts as revenue is deferred to periods when the related capital assets are amortized.

#### Measurement uncertainty

The preparation of financial statements in conformity with Canadian accounting standards for not-for-profit organizations requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements, and the reported amounts of revenues and expenses during the reporting period.

Amortization is based on the estimated useful lives of capital assets.

These estimates and assumptions are reviewed periodically and, as adjustments become necessary they are reported in excess of revenues and expenses in the periods in which they become known.

#### 3. Short-term investment

Balance consists of a \$102,364 (2017 - \$101,150) Guaranteed Investment Certificate with an interest rate of 1.40% (2017 - 1.20%) maturing on December 20, 2019 (2017 - December 20, 2018).

#### 4. Capital assets

	Cost	Accumulated amortization	2018 Net book value	2017 Net book value
Website	7,956	4,972	2,984	5,967
Equipment	447,435	304,809	142,626	171,401
	455,391	309,781	145,610	177,368

#### 5. Deferred contributions

Deferred contributions consist of externally restricted grants for the reimbursement of the purchase of four airpointers. Recognition of these amounts as revenue is amortized over the useful life of the related assets. Changes in the deferred contribution balance are as follows:

	2018	2017
Balance, beginning of year	20,000	60,000
Less: Amount recognized as revenue	(20,000)	(40,000)
	-	20,000
Less: current portion	-	20,000
Balance, end of year	-	-

#### 6. Related party transactions

The Organization has entered into a contract agreement for management services, expiring December 2019. The contract is based on hours required, to a maximum of \$50,000. Any overage is required to be approved by the Board of Directors. Included in expenses for the current year are \$45,840 (2017 - \$49,980) of management fees. The expenses were incurred in the normal course of operations and measured at the exchange amount, which is the amount of consideration established and agreed to by the related parties.

#### 7. Financial instruments

The Organization, as part of its operations, carries a number of financial instruments. It is management's opinion that the Organization is not exposed to significant interest, currency, credit, liquidity or other price risks arising from these financial instruments except as otherwise disclosed.

#### 8. Commitment

The Organization has entered into a contract for the operation and maintenance of airpointer monitoring stations, expiring June 30, 2021, with minimum annual payments as follows:

2019	42,000
2020	42,000
2021	21,000

# **APPENDIX I. WYAMZ BOARD OF DIRECTORS**

# **Cory Laferriere**

Board Chair (Agrium Potash)



Cory Laferriere, grew up in northeast rural Saskatchewan and moved to Saskatoon and attended the University of Saskatchewan, attaining a BSc in Geographical Sciences. In pursuit of a career in the environmental sector, Cory relocated to Alberta and spent the next fifteen years in the oil in gas industry, providing environmental support as an Environmental Field Technician. Cory has taken employment with Agrium as an Environmental Coordinator with the Vanscoy Potash Operation which

duties include the responsibility to maintain the facility license to operate and manage the continual site environmental improvement plans.

# Brad Sigurdson Vice Chair (Saskatchewan Mining Association)



Mr. Sigurdson is the Vice President – Environment, Safety and Regulatory Affairs Saskatchewan Mining Association (SMA) and he brings nearly 25 years of mining, industrial and government experience to this role; including working in both Canadian and U.S. mining operations as well as previously with the Ministry of Environment as Manager of the Potash and Central Operations Section. During his time with the

Ministry of Environment he acted as the advisor to the Industrial Content Committee during the development of the Saskatchewan Environmental Code. Mr. Sigurdson has indicated that "It is a privilege to be a member of the WYAMZ Board and I really enjoy working with a group of individuals that are committed to working in a collaborative and cooperative manner with a common goal of ensuring excellent air quality in our Air Management Zone".

### **Phil Burry**

# Secretary Treasurer (Husky Energy Upstream)



Mr. Burry is the Team Lead, Upstream Environmental Operations for Husky Energy, based in Lloydminster, Saskatchewan. Phil is a Professional Agrologist with approximately 15 years environmental management experience. He provides technical/regulatory support regarding air, water, waste, biophysical, spill and site remediation projects. Actively engaging key stakeholders is another key responsibility of his current position with Husky. He is very interested in furthering his understanding

of regional air quality issues.

# **David Henry** Member (Saskatchewan Environmental Society)



David Henry has been an active member of the Saskatchewan Environmental Society since 2008. In 2007, he retired from his position as conservation ecologist for Parks Canada in the Yukon Territory. In that work, he developed an ecological monitoring program for each national park in the Yukon. He is presently an Adjunct Professor, Faculty of Environmental Design, University of Calgary. In the past working with others, he coordinated the public campaigns that were instrumental in the establishment Grasslands National Park and the revision of Canada's National Parks Act.

# **Gary Ericson**

Member (Saskatchewan Ministry of the Economy)



Mr. Ericson is the Regional Manager of the Lloydminster Office of The Ministry of Economy and holds an AScT. Designation with the Saskatchewan Applied Science Technologists and Technicians. He graduated from Kelsey Institute of Applied Arts and Sciences in Saskatoon with a Diploma in Mechanical Engineering Technology in 1979. He has over 34 years of oil and gas development experience and considered to be one of our Ministry's foremost heavy oil well development and production expert. Mr. Ericson has extensive experience in the upstream Petroleum and Natural Gas Industry

relating to drilling, servicing, and production issues gained through his years as a field technician and a manager

# Shelley Kirychuk Member (University of Saskatchewan)



Dr. Shelley Kirychuk is a nurse and holds Masters and PhD Degrees in Preventative Medicine and occupational hygiene. She is an Associate Professor at the University of Saskatchewan's Department of Medicine in the division of the Canadian Centre for Health and Safety in Agriculture. Her research and extension activities focus on environmental epidemiology and more specifically respiratory exposures and respiratory health of occupational, rural and agricultural populations.



**Darren Letkeman** Member (Environmental Protection Branch – Ministry of Environment)

Mr. Letkeman is an Environmental Protection Officer with the Industrial Branch of the Ministry of Environment and has been with the ministry since 1998. He has extensive regulatory experience in Northwestern Saskatchewan, and has worked with municipal, commercial, and industrial operations. Prior to working for the ministry, Darren worked 6 years as an Environmental Co-ordinator for an industrial

wood processing facility.

# Aaron Studer



Member (Husky Energy Downstream)

Aaron Studer joined Husky in 2004 and is currently leading a team of 5 environmental specialists tasked with maintaining environmental compliance at Husky's Downstream Assets in the Lloydminster area. He has worked extensively in the environmental field for 6 years and was previously working for an international environmental consulting firm. His areas of experience include project and office management; all aspects of groundwater well installation, monitoring, sampling, and reporting; Phase I and II assessments; contaminated site remediation; and licensing,

construction and commissioning of new facilities. He has technical experience in reclamation assessments, lease construction, drilling, service, and operations.

# Kirk Hogarth Alternate (Saskatchewan Ministry of the Economy)

# **Dr. Simon Kapaj** Member (Saskatchewan Health Authority)



Dr. Simon Kapaj has worked as a Medical Health Officer in Saskatoon since 2014. He obtained his degree in medicine at the University of Tirana in Albania in 1993 and practiced family medicine before coming to Canada. He completed his Masters of Public Health and the residency training in Public Health and Preventive Medicine at the University of Saskatchewan. His interests and contributions to improving the health of residents of Saskatchewan include work across broad spectrum of public health services. He has been active in Immunizations, Occupation Health and Safety,

Environmental Health, Prevention and Protection including infectious diseases and outbreaks, Disaster and Emergency Planning, and fostering partnerships with community groups. He serves as Medical Director for Environmental Public Health/Health Protection for the Saskatchewan Health Authority.

Dr. Kapaj is a Fellow in Public Health and Preventive Medicine of the Royal College of Physicians of Canada and a Diplomate of American Board of Preventive Medicine. He also is an Assistant Professor at the University of Saskatchewan, where he continues to supervise medical students and residents in Public Health and Preventive Medicine.

# Terry Gibson Executive Director



Mr. Gibson brings more than 30 years of Public Health/Environmental Health experience to the position. He has held the positions of President of the Saskatchewan Public Health Association and Vice-Chair of the Saskatchewan Epidemiology Association. He teaches Public Health Protection at the University of Saskatchewan Master of Public Health Program and has served on many provincial and national boards and committees. Terry is committed to working with industry and regulators in a consensus decision making process to ensure that the health of the environment of

south east Saskatchewan is always protected.

# **APPENDIX J.**

# WYAMZ HISTORICAL MEMBER COMPANIES

The Western Yellowhead Air Management Zone would like to express our gratitude to our members over the years for their support of WYAMZ, for their very strong support regarding quality air data collection, and for their commitment to the citizens and environment of Saskatchewan.

- 5 Star Resources
  - Agrium Inc.
  - Akzo Nobel
    - Alta Gas
  - Bayhurst Gas
- Baytex Energy Ltd.
- Beaumont Energy
- Black Pearl Resources
  - Bruin Oil and Gas
  - Buzzard Resources
  - Caltex Resources
  - Canadian Natural Resources Limited
    - Can-Expo
    - Carrier Forest
  - Cenovus Energy
  - City of Saskatoon
  - Compass Minerals
  - Conoco Phillips
- Cory Atco Operations
  - Crescent Point
  - Crocotta Energy
    - Crocus Oil
  - Devon Canada Corporation
- Enerplus Corporation
  - ERCO Worldwide
    - Gear Energy
  - Halo Exploration

- Husky Oil Operations
   Limited
  - Hyzer Energy
  - Ish Energy
  - Kaisen Energy
  - Leeco Resources
  - Longhorn Oil and Gas
    - Longview Oil
- Modexco Petroleum
  - Meridian
  - **Cogeneration Power** 
    - Mosaic
  - NAL Resources Limited
  - Niven Fisher
  - North Battleford Power L.P.
  - North West Bio Energy
  - Northern Blizzard
  - Novus Energy Inc.
    - P&H Milling
- Palliser Oil and Gas
- Pengrowth Energy Corporation
  - Plasti-Fab
  - Potash Corp
- Prosper Energy
- Raven Resources
- Renegade Petroleum

- Repsol Canada
- Rife Resources
- Saputo Products
  - SaskEnergy Incorporated/ TransGas Limited
  - Sask Power
- Secure Energy
- Smitty's Farms
- Sojourn Energy
- Spartan Energy
- Sphere Energy
- Spur Resources
- SSSS Oil Partnership
- Tamarack Valley
- Talisman Energy
- Tuscany Energy
- Twin Butte Energy
  - Viterra
- Zelmar Energy
## CONTRIBUTING MEMBERS THIS YEAR

For information on how to become a member, please contact Terry Gibson, Executive Director at (306) 491-9198.

- Agrium Inc.
- Akzo Nobel
- Atco Cory
- Bayhurst Sask Engery
  - Baytex
- Black Pearl Resources
  - Canadian Natural Resources Limited
  - Can-Expo Energy
    - Cargill
  - City of Saskatoon
  - Compass Minerals
    - Crescent Point Resources Partnership
  - ERCO Worldwide
- Freehold Royalties

- Husky Group of Companies
- Husky Meridian
  Cogeneration
- Kaisen Energy
- Leeco Resources Ltd.
- Lehmkuhl Farms Ltd.
- Longhorn Oil and Gas
  - Mosaic Potash
  - NAL Resources Management Ltd
  - North Battleford Power L.P.
  - North West Bio Energy
- P&H Milling Group
  - Pele Energy

- Petro One Energy Group
- Prosper Petroleum
- Repsol Canada
  Energy Partnership
- Serafina Energy Ltd.
  - Smitty's Farms
  - Spartan Energy Group
  - Surge Energy
  - Trasn Gas Sask Energy
    - Viterra Inc.
  - WestLake Energy
- Zelmar Energy Ltd.

End of the Report