



# 2020 Annual Report



Western Yellowhead  
Air Management Zone

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## List of Terms and Definitions

24-hour	A calendar day, average is calculated midnight-to-midnight.
8-hour	8-hour running average for O <sub>3</sub> 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 <sub>2</sub> S	Hydrogen sulphide
NO <sub>2</sub>	Nitrogen dioxide
NO	Nitric oxide
NO <sub>x</sub>	Oxides of nitrogen
O <sub>3</sub>	Ozone
PM <sub>2.5</sub>	Particulate matter with aerodynamic diameter less than 2.5 µm, referred to as fine 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

average	arithmetic average = $\sum X_i / n$
m/s	meter per second, or mps
µg/m <sup>3</sup>	microgram per cubic meter
ppb	part per billion by volume
mm	millimeter of precipitation
°C	degree centigrade
%	percent of relative humidity, instrument uptime, etc.
Degree	angle of wind direction from true north

## MESSAGE FROM THE EXECUTIVE DIRECTOR

2020 was a challenging year for the Western Yellowhead Air Management Zone (WYAMZ) and for air quality monitoring in the western Yellowhead region of Saskatchewan. The Covid pandemic crashed oil and gas prices and caused a world-wide economic slowdown. Even though the turbulence caused by the pandemic was significant we did receive very good financial support. 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 ambient 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>/NO<sub>x</sub>, 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 to 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® was moved from the Cabana Pasture into the City of Meadow Lake in the fall 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 [www.wyamz.ca](http://www.wyamz.ca). 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 past and upcoming communication initiatives:

- The Lloydminster Heavy Oil Show, 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 were unable to maintain a booth at the 2020 Lloydminster Heavy Oil Show as it was cancelled due to the pandemic.
- Saskatchewan Association of Rural Municipalities (SARM) the Councillor Newsletter Article in 2014
- 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, 2018 and 2019 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 when it becomes available.

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 did present Saabir Yousuf and Kevin Liu the Gerry Mooney Environmental Award at the Saskatoon Regional Science Fair, University of Saskatchewan, April 3, 2019. We are committed to providing this Award and funding every year.

All of these initiatives 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 continue to have high-quality air monitoring 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 ambient 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 ambient 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 City, Maidstone, Clavet, and Kerrobert stations. 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 Husky East and West stations in Lloydminster 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>, NO<sub>x</sub>), 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 2020 with the exception of nitrogen oxides (NO, NO<sub>2</sub>, NO<sub>x</sub>) at Clavet, and PM<sub>2.5</sub> at Maidstone. All parameters at Kerrobert were less than 62% operational for the year, the station was not operating from August to December due to the air conditioning unit needed to be sent away for repair.

Table 1 summarizes the annual average concentration data for January to December 2020; the measured air quality was within the Saskatchewan Ambient Air Quality Standards (SAAQS), with the exception of H<sub>2</sub>S and PM<sub>2.5</sub>. There was a total of three exceedance events for 1-hour average H<sub>2</sub>S and two 24-hour average PM<sub>2.5</sub>. The air quality at the WYAMZ air monitoring stations was rated Low Risk or Good for more than 99% of the time according to the Air Quality Health Index and Air Quality Index.

Table 1 Annual average concentrations for continuous parameters for 2020

Pollutant	Conc. Unit	Annual Average Concentration for Continuous Data			
		Clavet	Maidstone	Kerrobert	Meadow Lake
SO <sub>2</sub>	ppb	<i>a</i>	0.4	0.1	<i>a</i>
H <sub>2</sub> S	ppb	<i>a</i>	0.2	0.2	<i>a</i>
NO	ppb	1.5	0.5	<i>a</i>	0.8
NO <sub>2</sub>	ppb	4.8	3.2	<i>a</i>	2.8
NO <sub>x</sub>	ppb	6.3	3.8	<i>a</i>	3.5
O <sub>3</sub>	ppb	26	<i>a</i>	<i>a</i>	26
PM <sub>2.5</sub>	µg/m <sup>3</sup>	8	4	4	5

*a. Parameter was not monitored.*

## 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 ambient 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 seven continuous air monitoring stations in the region. The Meadow Lake City, Maidstone, Clavet and Kerrobert stations are owned and operated by WYAMZ; the Saskatoon station is owned and operated by the Ministry of Environment. The Husky East and West stations in Lloydminster are owned and operated by Husky Energy.

WYAMZ operates four airpointers® at the Meadow Lake City, Maidstone, Clavet 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>, NO<sub>x</sub>), 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® have been operating since December 1, 2013. Publicly available real-time air monitoring data is available on the WYAMZ website at: [www.wyamz.ca](http://www.wyamz.ca).

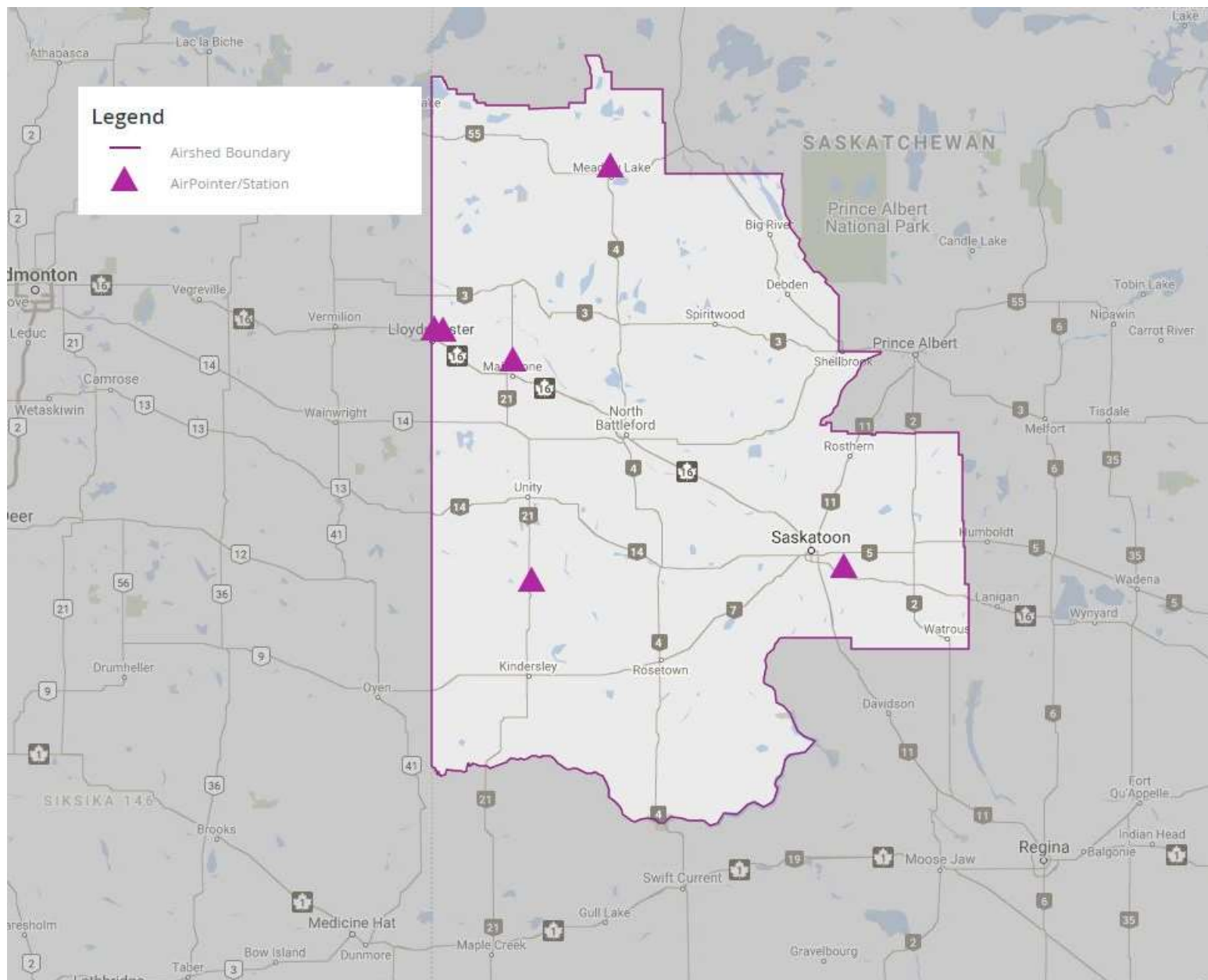


Figure 1. The Western Yellowhead Air Management Zone (WYAMZ)

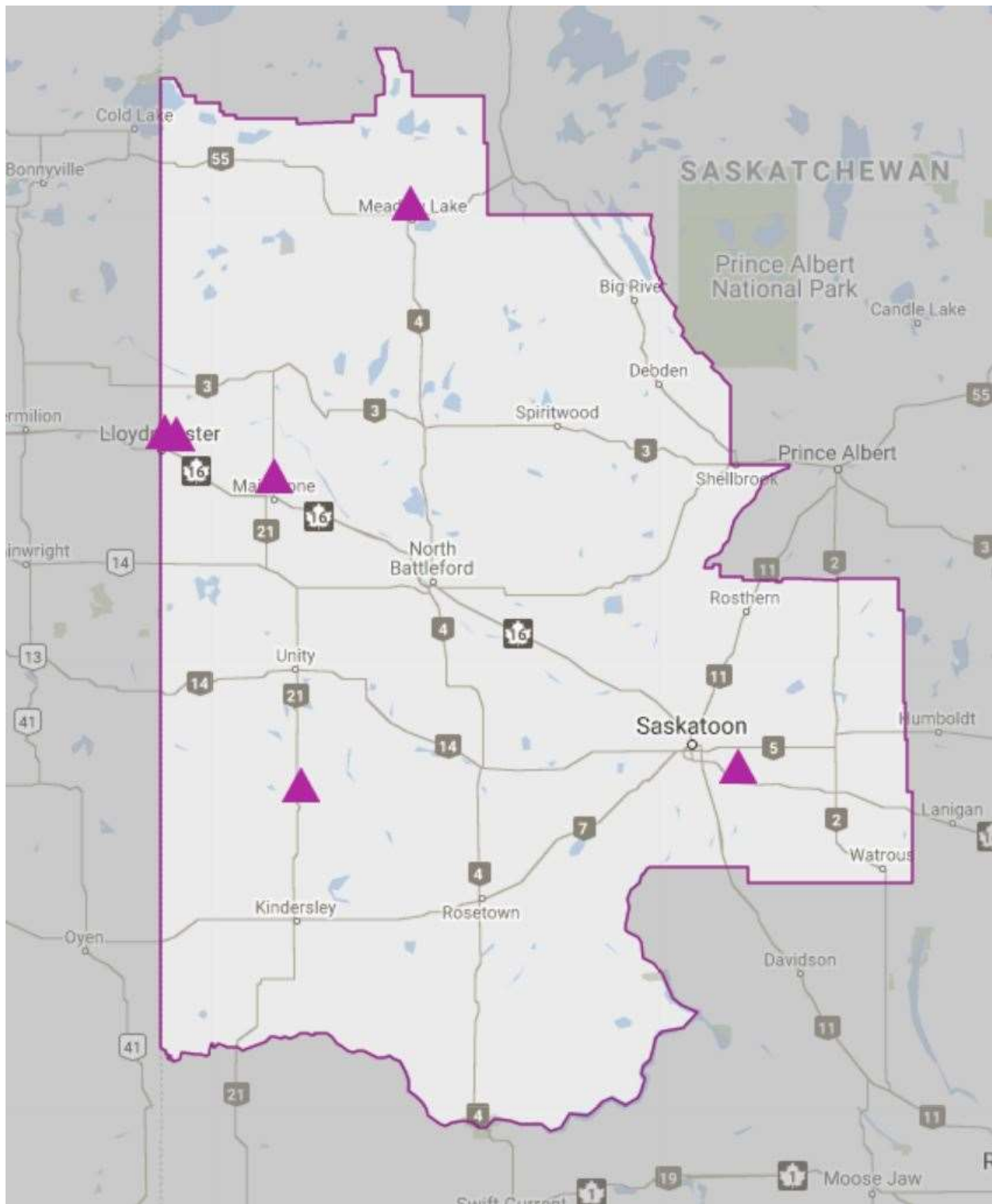


Figure 2 Locations of the continuous air monitoring stations in the WYAMZ zone

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

Monitoring Parameters	Continuous air quality parameters measured in the WYAMZ network			
	Meadow Lake City	Maidstone	Clavet	Kerrobert
SO <sub>2</sub>	<i>a</i>	√	<i>a</i>	√
H <sub>2</sub> S	<i>a</i>	√	<i>a</i>	√
NO	√	√	√	<i>a</i>
NO <sub>2</sub>	√	√	√	<i>a</i>
NO <sub>x</sub>	√	√	√	<i>a</i>
O <sub>3</sub>	√	<i>a</i>	√	<i>a</i>
PM <sub>2.5</sub>	√	√	√	√
Precipitation	√	√	√	√
Ambient Temperature	√	√	√	√
Relative Humidity	√	√	√	√
Wind Speed	√	√	√	√
Wind Direction	√	√	√	√

*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 2020. A total of 3 exceedance events for 1-hour average H<sub>2</sub>S, were recorded for the WYAMZ air monitoring network. There were 2 24-hour PM<sub>2.5</sub> exceedances recorded.

Table 3. Number of exceedance events for 2020

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

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 station was characterized with winds from the west and southeast quadrant. The Clavet station winds were primarily from the southwest and east. The Maidstone station was characterized with a prevalent wind from the northwest and southeast quadrant. Prevalent winds from the northwest and southwest were 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.

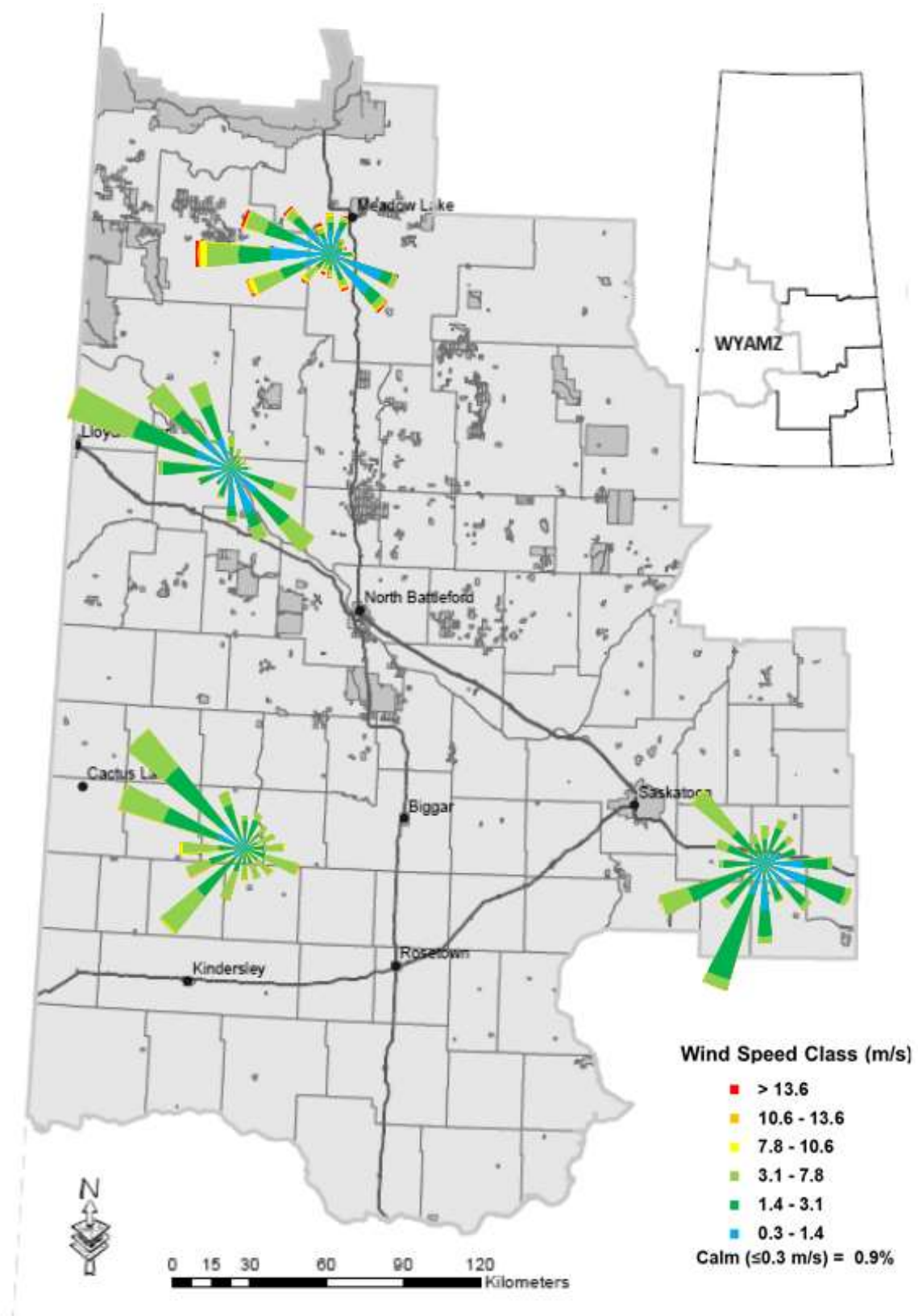


Figure 3. Wind roses for 1-hour average wind data for 2020

## 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 2020 was 0.4 ppb and 0.1 ppb at the Maidstone and Kerrobert stations, respectively. The maximum 1-hour average concentration of 31.1 ppb and the maximum 24-hour average concentration of 4.5 ppb were detected at the Maidstone station. There was no exceedance of the SAAQS 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. Summary statistics for SO<sub>2</sub> measurement results for 2020

Monitoring Station	Annual Average	Instrument Uptime	Maximum SO <sub>2</sub> Conc. and Occurrence Time			
			1-hour Max.		24-hour Max.	
	ppb	%	ppb	Time	ppb	Date
Maidstone	0.4	99.8%	31.1	Oct-25 12:00	4.5	Feb-13
Kerrobert	0.1	60.2%	3.7	Jan-15 04:00	1.9	Jan-15

Table 5. Number of exceedance events for SO<sub>2</sub> for 2020

Monitoring Station	No. of Exceedance of Saskatchewan SO <sub>2</sub> Ambient Air Quality Standard (SAAQS)		
	1-hr SAAQS	24-hr SAAQS	Annual SAAQS
	172 ppb	48 ppb	8 ppb
Maidstone	0	0	0
Kerrobert	0	0	0

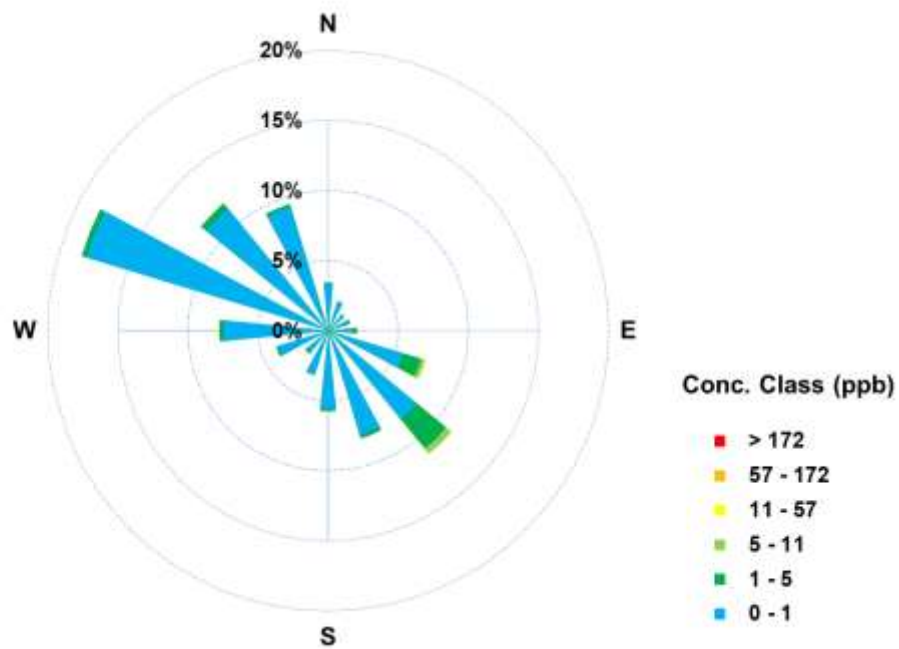


Figure 4. Pollutant rose for 1-hour average SO<sub>2</sub> data at the Maidstone station

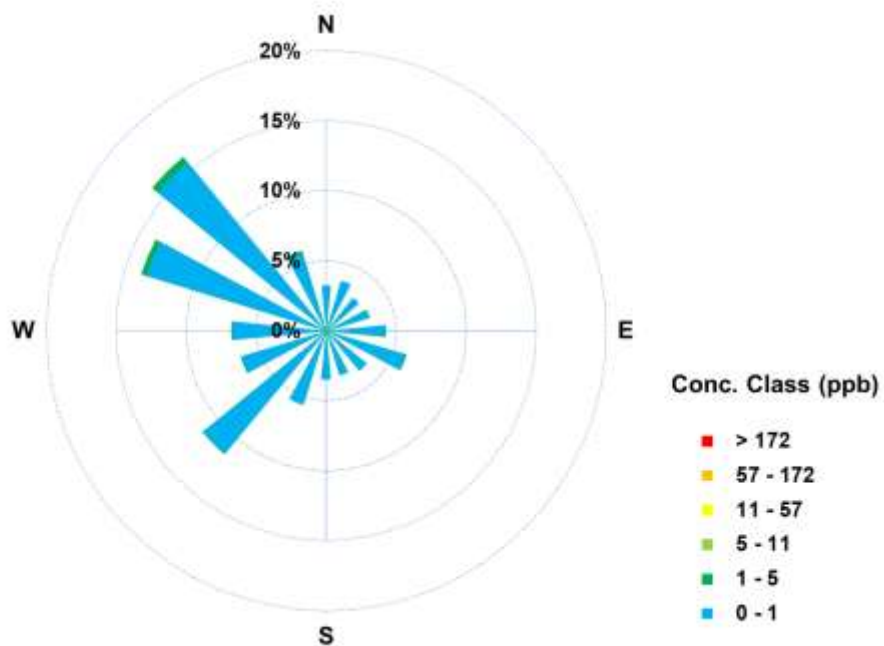


Figure 5. Pollutant rose for 1-hour average SO<sub>2</sub> data at the Kerrobert station

### 2.3.2 Hydrogen Sulphide ( $H_2S$ )

Hydrogen sulphide ( $H_2S$ ) is a colourless gas with a characteristic “rotten egg” odour. It is produced both naturally and through anthropogenic emission sources.  $H_2S$  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  $H_2S$  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 2020 were 0.2 ppb and 0.2 ppb at the Maidstone and Kerrobert stations, respectively. The maximum 1-hour average concentration of 29.5 ppb and the maximum 24-hour average concentration of 2.5 ppb were both measured at the Maidstone station. There were three exceedances of the SAAQS for 1-hour average concentration at the Maidstone station (see Table 7).

Figures 6 and 7 present the pollutant roses for 1-hour average  $H_2S$ . For more than 99% of time,  $H_2S$  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 northwest and southeast directions. The higher concentration events at the Kerrobert station tend to be slightly more frequent when wind was from the northwest quadrant, however the sample size was small.

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 2020

Monitoring Station	Annual Average	Instrument Uptime	Maximum H <sub>2</sub> S Conc. and Occurrence Time			
			1-hour Max.		24-hour Max.	
	ppb	%	ppb	Time	ppb	Date
Maidstone	0.2	99.8%	29.5	Aug 05 06:00	2.2	Aug-5
Kerrobert	0.2	60.1%	7.2	July 24 07:00	1.3	July-24

Table 7. Number of exceedance events for H<sub>2</sub>S for 2020

Monitoring Station	No. of Exceedances of Saskatchewan H <sub>2</sub> S Ambient Air Quality Standard (SAAQS)	
	1-hr SAAQS	24-hr SAAQS
	11 ppb	3.6 ppb
Maidstone	3	0
Kerrobert	0	0



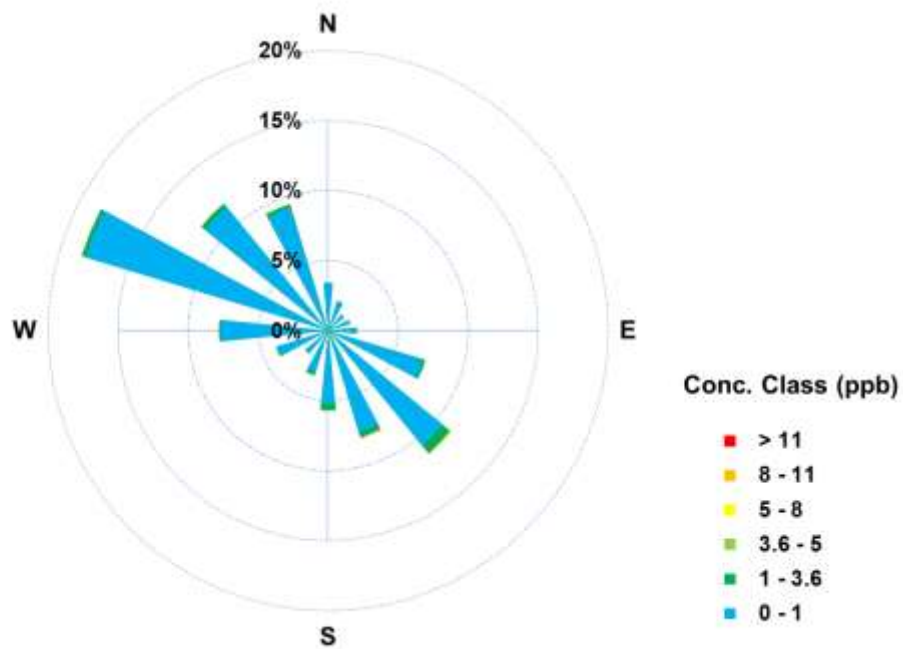


Figure 6. Pollutant rose for 1-hour average  $H_2S$  data at the Maidstone station

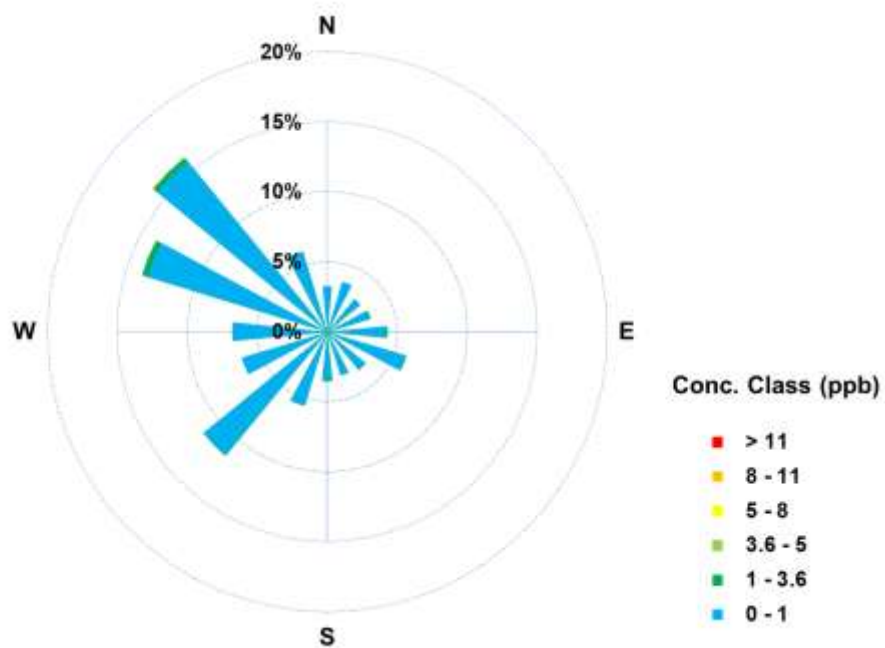


Figure 7. Pollutant rose for 1-hour average  $H_2S$  data at the Kerrobert station

### 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<sub>x</sub> can cause respiratory disease, damage vegetation, and reduce visibility. The primary concern with NO<sub>x</sub> emissions is their contribution to formation of ground-level ozone, smog and acid rain. To a lesser extent, some NO<sub>x</sub> compounds (e.g. N<sub>2</sub>O) contribute to stratospheric ozone layer depletion and global warming.

NO<sub>x</sub> emissions are mainly produced by fossil fuel combustion. High temperature conditions during combustion result in the formation of NO<sub>x</sub> as a by-product. The major anthropogenic emission sources for NO<sub>x</sub> 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<sub>x</sub>, 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<sub>2</sub> measurement results. The Clavet station measured a higher concentration than the other two stations, with an annual average of 4.8 ppb. The average concentration recorded at the Maidstone station was 3.2 ppb and 2.8 ppb at Meadow Lake City station. the maximum 1-hour concentration was detected at the Meadow Lake City 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 City station was the lowest among the three stations; for more than 85% of the time NO<sub>2</sub> concentration was less than 5 ppb. The >5 ppb events tend to be slightly more frequent when wind was from the west and southeast quadrants, however the sample size was too small to conclude the trend. At the Clavet station, 13.4% of the time NO<sub>2</sub> concentration was higher than 5 ppb. The >5 ppb events tend to be more frequent when wind was from the southwest and east directions. The NO<sub>2</sub> concentration was greater than 5 ppb at the Maidstone station 21.1% of the time; these events tend to be more frequent

when wind was from the northwest and southeast 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 NO<sub>x</sub> 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.

Table 8. Summary statistics for NO<sub>2</sub> measurement results for 2020

Monitoring Station	Annual Average	Instrument Uptime	Maximum NO <sub>2</sub> Conc. and Occurrence Time			
			1-hour Max.		24-hour Max.	
	ppb	%	ppb	Time	ppb	Date
Maidstone	3.2	99.9%	26.9	Mar 09 03:00	17.4	Dec-31
Clavet	4.8	87.0%	28.1	Feb 24 08:00	12.7	Feb-24
Meadow Lake City	2.8	100.0%	37.3	Feb 20 09:00	15.4	Nov-13

Table 9. Number of exceedance events for NO<sub>2</sub> for 2020

Monitoring Station	No. of Exceedances to Saskatchewan NO <sub>2</sub> Ambient Air Quality Standard (SAAQS)	
	1-hr SAAQS	Annual SAAQS
	159 ppb	24 ppb
Maidstone	0	0
Clavet	0	0
Meadow Lake City	0	0

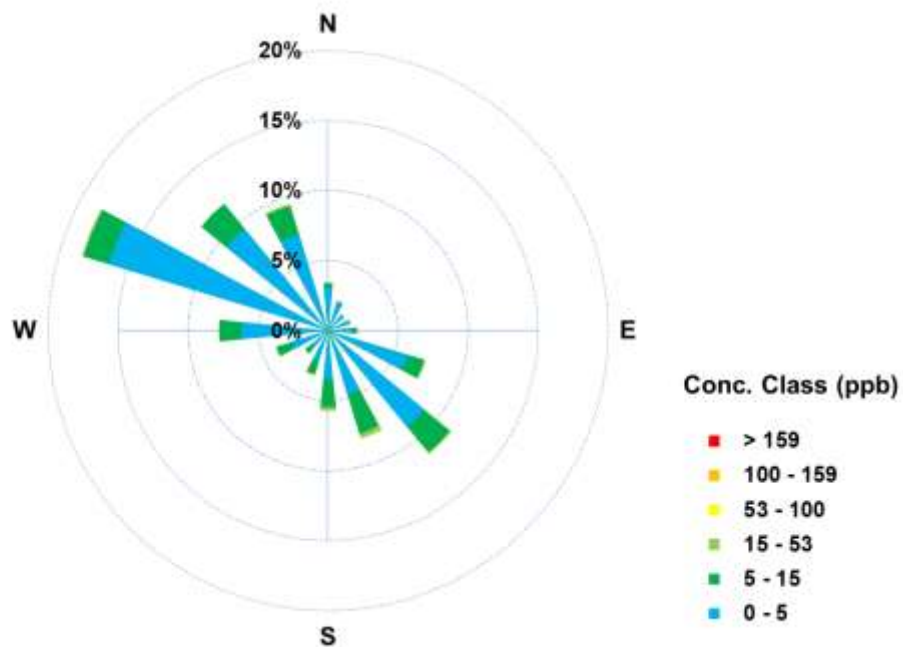


Figure 8. Pollutant rose for 1-hour average NO<sub>2</sub> data at the Maidstone station

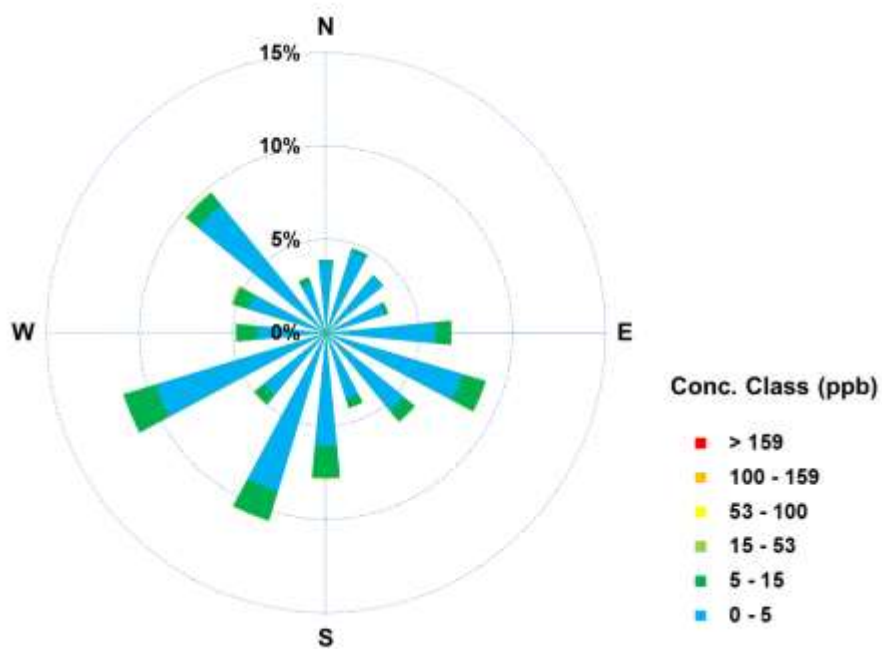


Figure 9. Pollutant rose for 1-hour average NO<sub>2</sub> data at the Clavet station

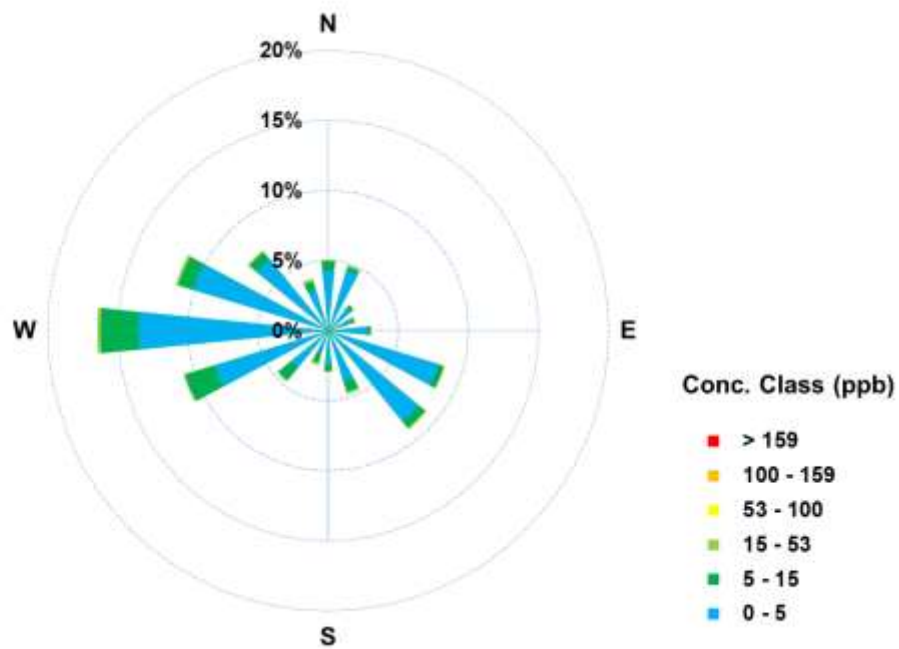


Figure 10 Pollutant rose for 1-hour average NO<sub>2</sub> data at the Meadow Lake City station

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

Ozone (O<sub>3</sub>) 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<sub>3</sub> 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 end-points, 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<sub>3</sub> measurement results. The average concentration in 2020 was 26 ppb for both Clavet and Meadow Lake City stations. The maximum 1-hour concentration of 59 ppb and the 4<sup>th</sup> highest 8-hour running averages of 54 ppb were both detected at the Clavet 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 11 to 12 present the pollutant roses for 1-hour average concentration of O<sub>3</sub>. The measured concentration was within 20 ppb to 40 ppb range for 50-60% of the time at both stations. There was no apparent directional trend for the higher concentration events (>40 ppb). The concentration of O<sub>3</sub> 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.

Table 10. Summary statistics for O<sub>3</sub> measurement results for 2020

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	Time	ppb	Time
Clavet	26	99.4%	59	June 13 17:00	54	June 13 11:00
Meadow Lake City	26	100.0%	54	Mar 21 19:00	50	Mar 21 17:00

Table 11. Number of exceedance events for O<sub>3</sub> for 2020

Monitoring Station	No. of Exceedances of Saskatchewan O <sub>3</sub> Ambient Air Quality Standard (SAAQS)	
	1-hr SAAQS	8-hr CWS
	82 ppb	63 ppb
Clavet	0	0
Meadow Lake City	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.

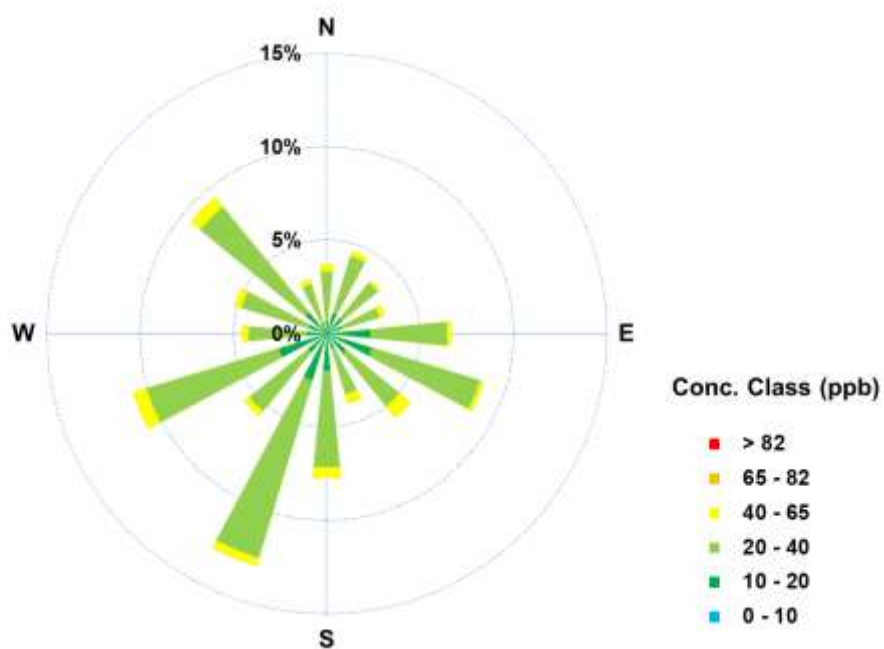


Figure 11. Pollutant rose for 1-hour average O<sub>3</sub> data at the Clavet station

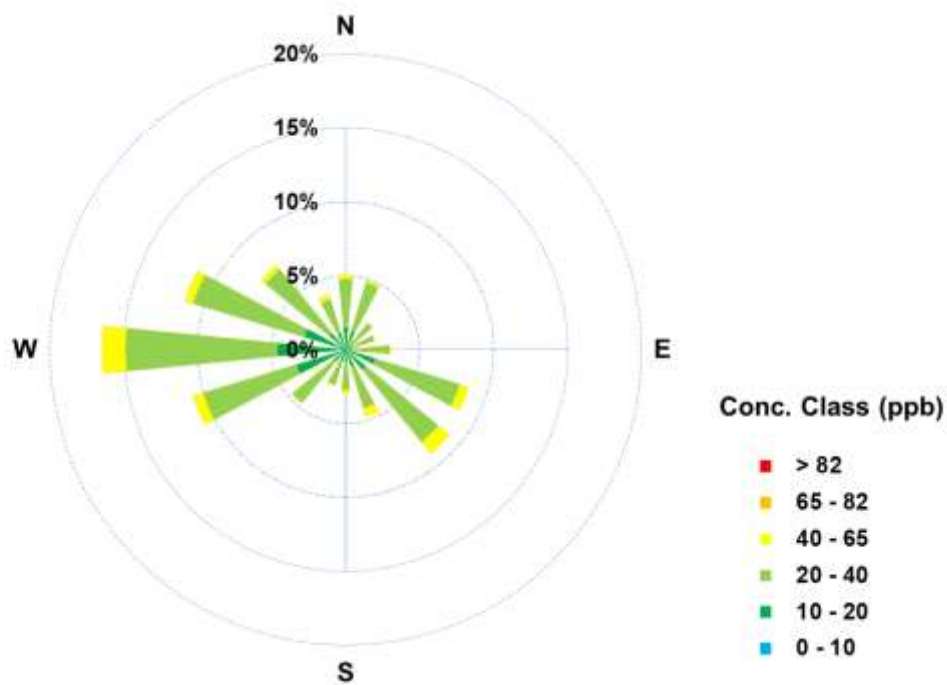


Figure 12. Pollutant rose for 1-hour average O<sub>3</sub> data at the Meadow Lake City station



### 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<sub>10</sub>. PM<sub>10</sub> is defined as particles that have an aerodynamic diameter less than 10 microns (or 0.01 mm). PM<sub>10</sub> 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<sub>2.5</sub>. 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<sub>2.5</sub> measurement results. The average concentration in 2020 ranged between 4 and 8 µg/m<sup>3</sup>. The maximum 1-hour concentration of 288 µg/m<sup>3</sup> and the maximum 24-hour concentration of 39 µg/m<sup>3</sup> were both detected at the Clavet station. There were two exceedances of the CWS 24-hour average standard (see Table 13).

Figures 13 through 16 present the pollutant roses for PM<sub>2.5</sub> measurement results. The measured concentrations were mostly less than 10 µg/m<sup>3</sup> (85.0% to 91.3% of the time for the four stations). There was no apparent directional trend for the higher concentration events (>10 µg/m<sup>3</sup>) for the Clavet station, while a higher occurrence frequency was observed in summer months. Higher concentrations events at Maidstone occur more frequently with northwest and southeast wind and Kerrobert occur more frequently when the wind was from the northwest. Highest concentrations were detected when the wind was from the west at the Meadow Lake City station.

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 PM<sub>2.5</sub> measurement results for 2020

Monitoring Station	Annual Average	Instrument Uptime	Maximum PM <sub>2.5</sub> Conc. and Occurrence Time			
			1-hour Max.		24-hour Max.	
	µg/m <sup>3</sup>	%	µg/m <sup>3</sup>	Time	µg/m <sup>3</sup>	Date
Maidstone	4	71.7%	188	June 29 06:00	25	Sep-20
Kerrobert	4	61.8%	33	Apr 24 20:00	21	Dec-31
Clavet	8	99.6%	288	June 02 21:00	39	June-02
Meadow Lake City	5	100.0%	172	Dec 28 00:00	25	Sep-20

Table 13. Number of exceedance events for PM<sub>2.5</sub> for 2020

Monitoring Station	No. of Exceedance of Canada-Wide PM <sub>2.5</sub> Standards (CWS)	
	24-hr CWS	
	28 µg/m <sup>3</sup>	
Maidstone	0	
Kerrobert	0	
Clavet	2	
Meadow Lake City	0	

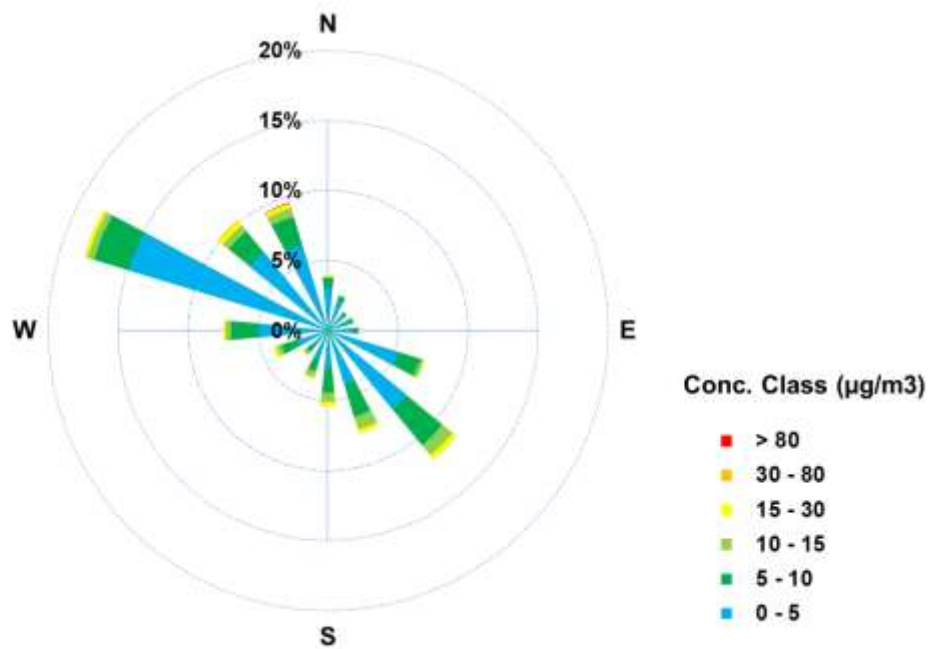


Figure 13. Pollutant rose for 1-hour average  $\text{PM}_{2.5}$  data at the Maidstone station

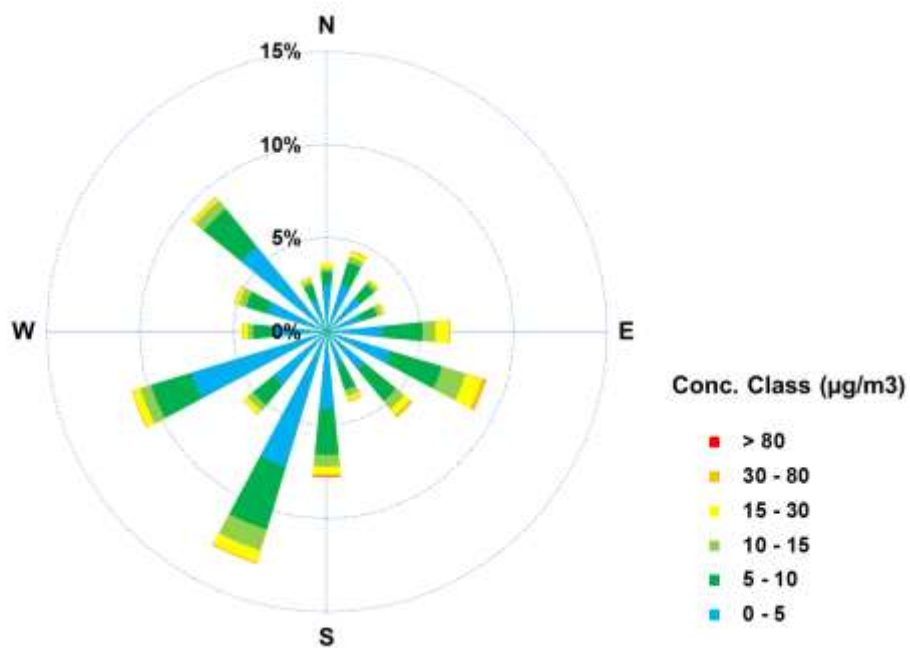


Figure 14. Pollutant rose for 1-hour average  $\text{PM}_{2.5}$  data at the Clavet station

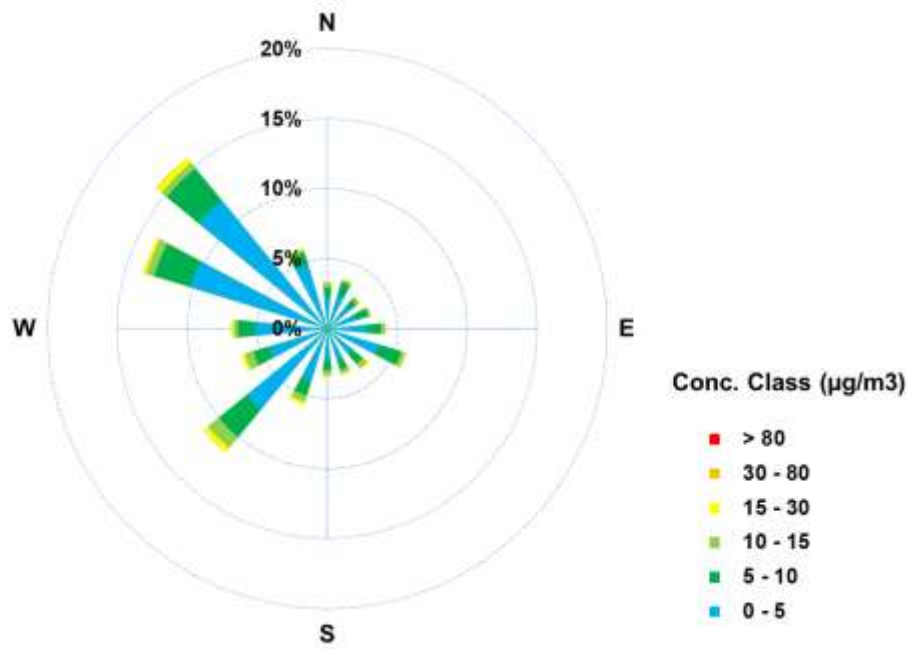


Figure 15. Pollutant rose for 1-hour average  $\text{PM}_{2.5}$  data at the Kerrobert station

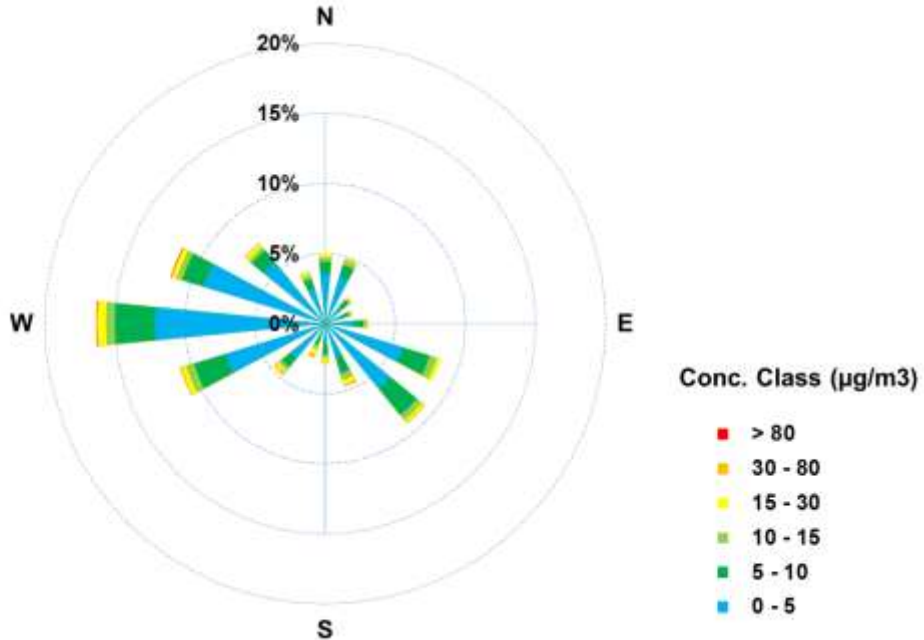


Figure 16. Pollutant rose for 1-hour average  $\text{PM}_{2.5}$  data at the Meadow Lake City station

## 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 City and Clavet are eligible for AQHI reporting.

Figure 17 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 City station had 0.8% of time in the Moderate Risk, 0.0% of time in the High-Risk category and 0.0% in the Very High-Risk category. The Clavet station had 0.8% of time in the Moderate Risk category and 0.0% in the High-Risk category and 0.0% in the Very-High Risk category.



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

Figure 17. 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	Occurrence Hours and Frequency by AQHI Risk Rating			
		Low Risk	Moderate Risk	High Risk	Very High Risk
Meadow Lake City	Occurrence Hours	8671	73	1	0
	Occurrence Frequency	99.2%	0.8%	0.0%	0.0%
Clavet	Occurrence Hours	7622	58	3	0
	Occurrence Frequency	99.2%	0.8%	0.0%	0.0%

## 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 99.7% of the time; and 0.2% was rated Fair. The Fair and Poor air quality was associated with an increased PM<sub>2.5</sub> concentration.

Table 15. AQI rating and effect description

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	<u>Intolerable Range</u> : Continued high readings could pose a risk to public health.

Table 16. Summary of occurrence statistics for AQI rating

Station Name	Occurrence Statistics	Occurrence Hours and Frequency by AQI Rating			
		Good	Fair	Poor	Very Poor
Maidstone	Occurrence Hours	5963	13	2	1
	Occurrence Frequency	99.7%	0.2%	0.0%	0.0%

## APPENDIX A. SASKATCHEWAN AMBIENT AIR QUALITY STANDARDS

Table A-1. Saskatchewan Ambient Air Quality Standards

<b>TABLE 20: SASKATCHEWAN AMBIENT AIR QUALITY STANDARDS (<math>\mu\text{g}/\text{m}^3</math>)</b>				
<b>Air Pollutant</b>	<b>1 Hour</b>	<b>8 Hours</b>	<b>24 Hours</b>	<b>Annual</b>
Particulate Matter ( $\text{PM}_{2.5}$ )			28 <sup>a</sup>	10
Particulate Matter ( $\text{PM}_{10}$ )			50	
Total Suspended Particulates (TSP)			100	60 <sup>b</sup>
Nitrogen Dioxide ( $\text{NO}_2$ )	300 (159 ppb)		200 (106 ppb)	45 <sup>c</sup> (24 ppb)
Sulphur Dioxide ( $\text{SO}_2$ )	450 (172 ppb)		125 (48 ppb)	20 <sup>c</sup> (8 ppb)
Hydrogen Sulphide ( $\text{H}_2\text{S}$ )	15 (11 ppb)		5 (3.6 ppb)	
Ozone ( $\text{O}_3$ )	160 (82 ppb)	124 <sup>d</sup> (63 ppb)		
Carbon Monoxide ( $\text{CO}$ )	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. MAIDSTONE STATION: CONTINUOUS MONITORING DATA

Table B-1 Maidstone Station: Summary statistics for continuous air monitoring results for 2020

Parameter	Unit	Calibration & AIC <sup>a</sup>	Valid Data	Uptime	Summary Statistics for Hourly Average Data		
		(hours)	(hours)	(%)	Average	Minimum	Maximum
SO <sub>2</sub>	ppb	413	8355	99.8%	0.4	< 0.1	31.1
H <sub>2</sub> S	ppb	413	8355	99.8%	0.2	< 0.1	29.5
NO	ppb	413	8359	99.9%	0.5	< 0.1	31.9
NO <sub>2</sub>	ppb	413	8359	99.9%	3.2	< 0.1	26.9
NO <sub>x</sub>	ppb	413	8359	99.9%	3.8	< 0.1	49.2
PM <sub>2.5</sub>	µg/m <sup>3</sup>	9	6261	71.7%	4	< 1	188
Precipitation	mm	0	8777	99.9%	340.9 <sup>b</sup>	< 0.1	17.2
Ambient Temperature	°C	0	8777	99.9%	1.7	-38.5	32.2
Relative Humidity	%	0	8777	99.9%	65	17	90
Wind Speed	m/s	0	8774	99.9%	2.2	Calm	8.7

*a. Automatic Instrument Check*

*b. Total precipitation*

Table B-2. Maidstone Station: Summary of airpointer® SO<sub>2</sub> monitoring results for 2020

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Conc. (ppb)	Maximum 1-Hr Conc. (ppb)	1-Hour Exceedance <sup>a</sup> (no.)	Maximum 24-Hr Conc. (ppb)	24-Hour Exceedance <sup>b</sup> (no.)	Percent of Data in each Concentration Range					
								≤1	1 - 5	5 - 11	11 - 57	57 - 172	>172
January	712	100.0%	0.8	11.0	0	3.8	0	82.0	15.9	2.0	0.1	0.0	0.0
February	666	100.0%	0.9	15.5	0	4.5	0	82.3	14.6	2.4	0.8	0.0	0.0
March	704	100.0%	0.4	5.7	0	1.2	0	90.1	9.7	0.3	0.0	0.0	0.0
April	689	100.0%	0.3	9.2	0	1.0	0	96.4	2.8	0.9	0.0	0.0	0.0
May	712	100.0%	0.3	13.0	0	1.3	0	96.1	3.2	0.6	0.1	0.0	0.0
June	679	99.9%	0.2	5.7	0	1.1	0	95.7	4.0	0.3	0.0	0.0	0.0
July	709	99.4%	0.2	4.6	0	0.7	0	97.3	2.7	0.0	0.0	0.0	0.0
August	712	100.0%	0.4	8.7	0	1.9	0	92.3	6.7	1.0	0.0	0.0	0.0
September	679	100.0%	0.3	6.4	0	1.4	0	95.4	4.0	0.6	0.0	0.0	0.0
October	709	99.6%	0.2	31.1	0	2.8	0	97.6	2.0	0.1	0.3	0.0	0.0
November	689	100.0%	0.3	6.9	0	1.1	0	95.2	4.4	0.4	0.0	0.0	0.0
December	695	98.9%	0.5	9.6	0	2.1	0	88.8	9.8	1.4	0.0	0.0	0.0
Annual <sup>c</sup>	8355	99.8%	0.4	31.1	0	4.5	0	92.4	6.6	0.8	0.1	0.0	0.0

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

Table B-3. Maidstone Station: Summary of airpointer® H2S monitoring results for 2020

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Conc. (ppb)	Maximum 1-Hr Conc. (ppb)	1-Hour Exceedance <sup>a</sup> (no.)	Maximum 24-Hr Conc. (ppb)	24-Hour Exceedance <sup>b</sup> (no.)	Percent of Data in each Concentration Range					
								≤1	1 - 3.6	3.6 - 5	5 - 8	8 - 11	>11
January	712	100.0%	0.1	2.0	0	0.3	0	99.4	0.6	0.0	0.0	0.0	0.0
February	666	100.0%	0.1	1.5	0	0.4	0	99.4	0.6	0.0	0.0	0.0	0.0
March	704	100.0%	0.1	1.4	0	0.4	0	99.7	0.3	0.0	0.0	0.0	0.0
April	689	100.0%	0.2	15.5	1	1.8	0	97.1	1.9	0.7	0.1	0.0	0.1
May	712	100.0%	0.2	1.3	0	0.7	0	99.7	0.3	0.0	0.0	0.0	0.0
June	679	99.9%	0.3	4.1	0	1.3	0	94.8	4.7	0.4	0.0	0.0	0.0
July	709	99.4%	0.4	10.9	0	1.1	0	89.8	9.3	0.7	0.0	0.0	0.1
August	712	100.0%	0.7	29.5	2	2.2	0	84.1	13.5	1.3	0.6	0.3	0.3
September	679	100.0%	0.3	3.7	0	0.8	0	94.3	5.6	0.1	0.0	0.0	0.0
October	709	99.6%	0.2	2.5	0	0.5	0	99.3	0.7	0.0	0.0	0.0	0.0
November	689	100.0%	0.1	1.2	0	0.2	0	99.9	0.1	0.0	0.0	0.0	0.0
December	695	98.9%	0.1	1.0	0	0.4	0	99.9	0.1	0.0	0.0	0.0	0.0
Annual <sup>c</sup>	8355	99.8%	0.2	29.5	3	2.2	0	96.4	3.2	0.3	0.1	0.0	0.0

a. 1-hour Saskatchewan Ambient Air Quality Standard = 11.0 ppb

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

c. No annual Saskatchewan Ambient Air Quality Standard

Table B-4. Maidstone Station: Summary of airpointer® NO monitoring results for 2020

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Conc. (ppb)	Maximum 1-Hr Conc. (ppb)	1-Hour Exceedance <sup>a</sup> (no.)	Maximum 24-Hr Conc. (ppb)	24-Hour Exceedance <sup>b</sup> (no.)	Percent of Data in each Concentration Range					
								≤5	5 - 15	15 - 53	53 - 100	100 - 159	>159
January	712	100.0%	1.0	31.9	-	3.5	-	94.7	4.8	0.6	0.0	0.0	0.0
February	666	100.0%	1.0	13.8	-	2.4	-	96.1	3.9	0.0	0.0	0.0	0.0
March	704	100.0%	0.8	24.6	-	2.6	-	98.0	1.8	0.1	0.0	0.0	0.0
April	689	100.0%	0.4	9.8	-	1.2	-	99.6	0.4	0.0	0.0	0.0	0.0
May	712	100.0%	0.3	7.7	-	0.9	-	99.2	0.8	0.0	0.0	0.0	0.0
June	679	99.9%	0.4	8.2	-	1.4	-	99.1	0.9	0.0	0.0	0.0	0.0
July	705	98.9%	0.3	5.6	-	0.9	-	99.9	0.1	0.0	0.0	0.0	0.0
August	712	100.0%	0.3	4.4	-	0.8	-	100.0	0.0	0.0	0.0	0.0	0.0
September	679	100.0%	0.3	5.6	-	0.8	-	99.9	0.1	0.0	0.0	0.0	0.0
October	709	99.6%	0.2	6.2	-	0.7	-	99.9	0.1	0.0	0.0	0.0	0.0
November	689	100.0%	0.5	11.8	-	1.9	-	99.0	1.0	0.0	0.0	0.0	0.0
December	703	100.0%	0.8	19.6	-	4.8	-	97.3	2.3	0.4	0.0	0.0	0.0
Annual <sup>c</sup>	8359	99.9%	0.5	31.9	-	4.8	-	98.5	1.4	0.1	0.0	0.0	0.0

a. No 1-hour Saskatchewan Ambient Air Quality Standard

b. No 24-hour Saskatchewan Ambient Air Quality Standard

c. No annual Saskatchewan Ambient Air Quality Standard

Table B-5. Maidstone Station: Summary of airpointer® NO2 monitoring results for 2020

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Conc. (ppb)	Maximum 1-Hr Conc. (ppb)	1-Hour Exceedance <sup>a</sup> (no.)	Maximum 24-Hr Conc. (ppb)	24-Hour Exceedance <sup>b</sup> (no.)	Percent of Data in each Concentration Range					
								≤5	5 - 15	15 - 53	53 - 100	100 - 159	>159
January	712	100.0%	5.6	24.8	0	12.6	-	57.0	38.9	4.1	0.0	0.0	0.0
February	666	100.0%	5.9	20.5	0	9.9	-	52.4	44.1	3.5	0.0	0.0	0.0
March	704	100.0%	4.1	26.9	0	12.9	-	71.6	26.1	2.3	0.0	0.0	0.0
April	689	100.0%	2.6	19.0	0	5.6	-	88.4	11.2	0.4	0.0	0.0	0.0
May	712	100.0%	2.1	13.9	0	4.7	-	90.3	9.7	0.0	0.0	0.0	0.0
June	679	99.9%	2.1	13.6	0	5.1	-	89.0	11.0	0.0	0.0	0.0	0.0
July	705	98.9%	1.0	7.1	0	1.8	-	98.6	1.4	0.0	0.0	0.0	0.0
August	712	100.0%	1.0	6.8	0	2.2	-	99.0	1.0	0.0	0.0	0.0	0.0
September	679	100.0%	1.8	8.9	0	3.4	-	95.1	4.9	0.0	0.0	0.0	0.0
October	709	99.6%	2.0	10.7	0	3.7	-	94.1	5.9	0.0	0.0	0.0	0.0
November	689	100.0%	4.1	13.9	0	9.8	-	68.5	31.5	0.0	0.0	0.0	0.0
December	703	100.0%	6.5	25.1	0	17.4	-	40.7	54.6	4.7	0.0	0.0	0.0
Annual <sup>c</sup>	8359	99.9%	3.2	26.9	0	17.4	-	78.8	20.0	1.2	0.0	0.0	0.0

a. 1-hour Saskatchewan Ambient Air Quality Standard = 159 ppb

b. 24-hour Saskatchewan Ambient Air Quality Standard = 106 ppb

c. Annual Saskatchewan Ambient Air Quality Standard = 24 ppb

Table B-6. Maidstone Station: Summary of airpointer® NOx monitoring results for 2020

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Conc. (ppb)	Maximum 1-Hr Conc. (ppb)	1-Hour Exceedance <sup>a</sup> (no.)	Maximum 24-Hr Conc. (ppb)	24-Hour Exceedance <sup>b</sup> (no.)	Percent of Data in each Concentration Range					
								≤5	5 - 15	15 - 53	53 - 100	100 - 212	>212
January	712	100.0%	6.6	49.2	-	14.4	-	51.1	42.0	6.9	0.0	0.0	0.0
February	666	100.0%	6.9	30.2	-	12.1	-	40.4	54.1	5.6	0.0	0.0	0.0
March	704	100.0%	4.9	41.4	-	15.4	-	62.1	35.1	2.8	0.0	0.0	0.0
April	689	100.0%	3.0	19.8	-	6.9	-	85.6	13.5	0.9	0.0	0.0	0.0
May	712	100.0%	2.5	19.2	-	5.7	-	88.2	11.1	0.7	0.0	0.0	0.0
June	679	99.9%	2.5	17.2	-	6.5	-	86.6	12.8	0.6	0.0	0.0	0.0
July	705	98.9%	1.3	9.0	-	2.3	-	97.0	3.0	0.0	0.0	0.0	0.0
August	712	100.0%	1.2	7.5	-	2.5	-	97.2	2.8	0.0	0.0	0.0	0.0
September	679	100.0%	2.1	13.9	-	3.6	-	92.9	7.1	0.0	0.0	0.0	0.0
October	709	99.6%	2.3	16.6	-	4.4	-	92.0	7.9	0.1	0.0	0.0	0.0
November	689	100.0%	4.7	23.4	-	11.7	-	62.3	36.9	0.9	0.0	0.0	0.0
December	703	100.0%	7.4	34.4	-	22.2	-	36.6	56.0	7.4	0.0	0.0	0.0
Annual <sup>c</sup>	8359	99.9%	3.8	49.2	-	22.2	-	74.4	23.4	2.2	0.0	0.0	0.0

a. No 1-hour Saskatchewan Ambient Air Quality Standard

b. No 24-hour Saskatchewan Ambient Air Quality Standard

c. No annual Saskatchewan Ambient Air Quality Standard

Table B-7. Maidstone Station: Summary of airpointer® PM2.5 monitoring results for 2020

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Conc. (µg/m³)	Maximum 1-Hr Conc. (µg/m³)	1-Hour Exceedance <sup>a</sup> (no.)	Maximum 24-Hr Conc. (µg/m³)	24-Hour Exceedance <sup>b</sup> (no.)	Percent of Data in each Concentration Range					
								≤5	5 - 10	10 - 15	15 - 30	30 - 80	>80
January	744	100.0%	4	19	-	10	0	71.4	21.0	7.1	0.5	0.0	0.0
February	696	100.0%	4	18	-	10	0	67.5	23.9	7.0	1.6	0.0	0.0
March	744	100.0%	5	72	-	13	0	69.2	16.9	10.2	2.8	0.8	0.0
April	693	96.3%	4	27	-	8	0	73.9	19.5	5.3	1.3	0.0	0.0
May	744	100.0%	4	22	-	10	0	66.7	28.9	3.8	0.7	0.0	0.0
June	710	99.9%	4	188	-	17	0	78.0	15.8	3.2	1.7	0.8	0.4
July	715	96.1%	5	36	-	10	0	67.6	23.9	5.6	2.7	0.3	0.0
August	744	100.0%	5	26	-	10	0	63.6	26.2	8.1	2.2	0.0	0.0
September	471	68.6%	6	32	-	25	0	58.6	23.8	5.1	11.9	0.6	0.0
October	0	0.0%	-	-	-	-	0	-	-	-	-	-	-
November	0	0.0%	-	-	-	-	0	-	-	-	-	-	-
December	0	0.0%	-	-	-	-	0	-	-	-	-	-	-
Annual <sup>c</sup>	6261	71.7%	4	188	-	25	0	68.8	22.2	6.2	2.4	0.3	0.0

a. No 1-hour Saskatchewan Ambient Air Quality Standard

b. 24-hour Canada-Wide Standard = 28 µg/m³

c. No annual Saskatchewan Ambient Air Quality Standard

Table B-8. Maidstone Station: Summary of airpointer® precipitation monitoring results for 2020

Month	Valid 1-Hr data (no.)	Operational Time (%)	Total Precip. (mm)	Maximum 1-Hr Precip. (mm)	Maximum 24-Hr Precip. (mm)	Percent of Data in each Precipitation Range					
						≤5	5 - 10	10 - 25	25 - 50	50 - 75	>75
January	744	100.0%	0.2	0.1	0.1	100.0	0.0	0.0	0.0	0.0	0.0
February	696	100.0%	3.6	1.3	2.3	100.0	0.0	0.0	0.0	0.0	0.0
March	744	100.0%	0.7	0.4	0.4	100.0	0.0	0.0	0.0	0.0	0.0
April	720	100.0%	6.0	2.6	2.6	100.0	0.0	0.0	0.0	0.0	0.0
May	744	100.0%	27.1	4.6	11.9	100.0	0.0	0.0	0.0	0.0	0.0
June	720	100.0%	68.6	6.9	31.1	99.7	0.3	0.0	0.0	0.0	0.0
July	740	99.5%	168.4	11.3	66.4	98.4	1.2	0.4	0.0	0.0	0.0
August	744	100.0%	57.8	17.2	33.9	99.6	0.3	0.1	0.0	0.0	0.0
September	720	100.0%	4.4	1.1	2.3	100.0	0.0	0.0	0.0	0.0	0.0
October	741	99.6%	4.0	1.5	1.5	100.0	0.0	0.0	0.0	0.0	0.0
November	720	100.0%	0.1	0.1	0.1	100.0	0.0	0.0	0.0	0.0	0.0
December	744	100.0%	< 0.1	< 0.1	< 0.1	100.0	0.0	0.0	0.0	0.0	0.0
Annual	8777	99.9%	340.9	17.2	66.4	99.8	0.1	0.0	0.0	0.0	0.0



Table B-9. Maidstone Station: Summary of airpointer® ambient temperature monitoring results for 2020

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Temp. (°C)	Minimum 1-Hr Temp. (°C)	Maximum 1-Hr Temp. (°C)	Percent of Data in each Temperature Range					
						≤-30	-30 ~ -15	-15 ~ 0	0 ~ 15	15 ~ 30	>30
January	744	100.0%	-15.0	-38.5	3.1	9.5	35.6	50.1	4.7	0.0	0.0
February	696	100.0%	-11.5	-32.8	5.4	3.9	28.0	61.2	6.9	0.0	0.0
March	744	100.0%	-9.0	-25.6	3.8	0.0	21.6	69.2	9.1	0.0	0.0
April	720	100.0%	-0.7	-30.0	24.7	0.3	10.3	38.2	44.2	7.1	0.0
May	744	100.0%	10.5	-3.4	26.0	0.0	0.0	4.0	73.3	22.7	0.0
June	720	100.0%	14.7	4.8	28.4	0.0	0.0	0.0	56.4	43.6	0.0
July	740	99.5%	17.9	7.3	29.4	0.0	0.0	0.0	34.2	65.8	0.0
August	744	100.0%	16.5	3.3	32.2	0.0	0.0	0.0	42.2	56.6	1.2
September	720	100.0%	10.9	-3.2	26.2	0.0	0.0	3.2	74.9	21.9	0.0
October	741	99.6%	1.0	-13.3	20.4	0.0	0.0	51.6	43.0	5.4	0.0
November	720	100.0%	-6.4	-23.3	13.7	0.0	9.2	74.3	16.5	0.0	0.0
December	744	100.0%	-9.1	-28.6	5.8	0.0	21.6	68.8	9.5	0.0	0.0
Annual	8777	99.9%	1.7	-38.5	32.2	1.1	10.5	35.0	34.6	18.7	0.1

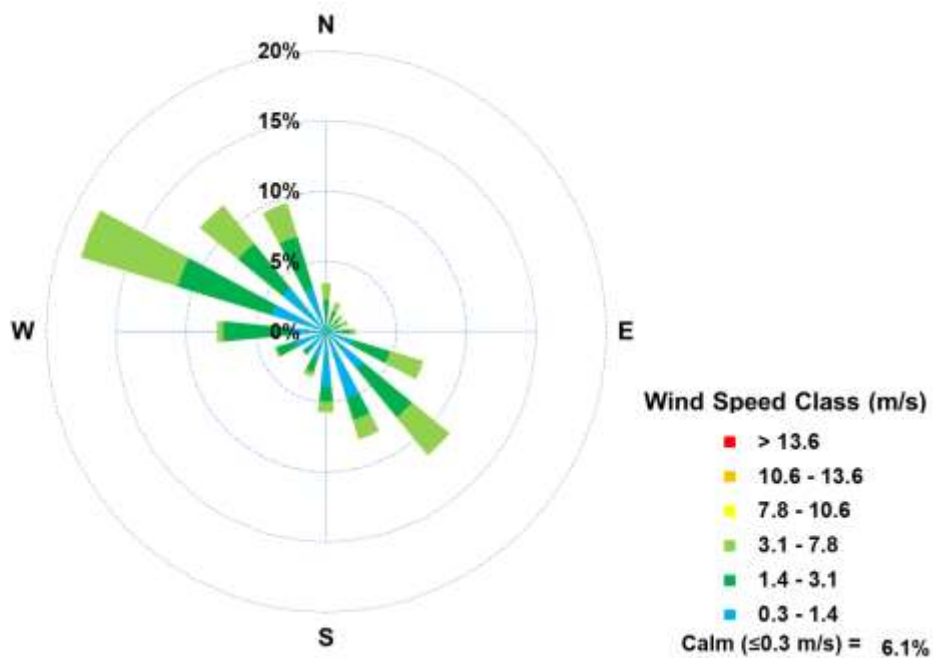
Table B-10. Maidstone Station: Summary of airpointer® relative humidity monitoring results for 2020

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average RH (%)	Minimum 1-Hr RH (%)	Maximum 1-Hr RH (%)	Percent of Data in each Relative Humidity Range					
						≤15	15 - 30	30 - 60	60 - 80	80 - 90	>90
January	744	100.0%	70	47	85	0.0	0.0	14.5	67.5	18.0	0.0
February	696	100.0%	65	44	84	0.0	0.0	24.9	74.1	1.0	0.0
March	744	100.0%	65	41	84	0.0	0.0	31.0	66.9	2.0	0.0
April	720	100.0%	57	17	86	0.0	6.3	46.5	43.1	4.2	0.0
May	744	100.0%	54	18	88	0.0	12.4	45.7	34.5	7.4	0.0
June	720	100.0%	63	21	89	0.0	2.6	38.8	39.3	19.3	0.0
July	740	99.5%	69	17	90	0.0	0.1	29.9	37.6	31.4	1.1
August	744	100.0%	66	27	90	0.0	0.4	38.2	34.4	26.5	0.5
September	720	100.0%	64	24	90	0.0	1.7	37.2	36.9	24.2	0.0
October	741	99.6%	62	28	86	0.0	0.5	44.9	43.5	11.1	0.0
November	720	100.0%	72	40	86	0.0	0.0	6.3	77.4	16.4	0.0
December	744	100.0%	69	53	81	0.0	0.0	6.5	93.1	0.4	0.0
Annual	8777	99.9%	65	17	90	0.0	2.0	30.4	54.0	13.5	0.1

Table B-11. Maidstone Station: Wind frequency table for 2020

Wind Direction Sector	Percent of Data within Wind Speed Range, wind speed unit m/s						Totals
	0.3 - 1.4	1.4 - 3.1	3.1 - 7.8	7.8 - 10.6	10.6 - 13.6	>13.6	
North NorthEast	0.3%	1.1%	0.7%	0.0%	0.0%	0.0%	2.1%
NorthEast	0.3%	0.8%	0.4%	0.0%	0.0%	0.0%	1.5%
East NorthEast	0.3%	0.7%	0.6%	0.0%	0.0%	0.0%	1.5%
East	0.8%	0.9%	0.4%	0.0%	0.0%	0.0%	2.0%
East SouthEast	1.9%	2.7%	2.5%	0.0%	0.0%	0.0%	7.1%
SouthEast	3.1%	4.5%	3.5%	0.0%	0.0%	0.0%	11.1%
South SouthEast	4.6%	1.6%	1.4%	0.0%	0.0%	0.0%	7.5%
South	3.1%	1.1%	0.8%	0.0%	0.0%	0.0%	5.0%
South SouthWest	1.5%	1.0%	0.3%	0.0%	0.0%	0.0%	2.8%
SouthWest	1.3%	0.4%	0.0%	0.0%	0.0%	0.0%	1.7%
West SouthWest	1.7%	1.3%	0.1%	0.0%	0.0%	0.0%	3.1%
West	2.0%	4.7%	0.4%	0.0%	0.0%	0.0%	7.1%
West NorthWest	3.2%	7.0%	7.2%	0.0%	0.0%	0.0%	17.4%
NorthWest	3.6%	4.1%	3.5%	0.0%	0.0%	0.0%	11.3%
North NorthWest	3.0%	3.8%	2.5%	0.0%	0.0%	0.0%	9.2%
North	0.7%	1.4%	1.2%	0.0%	0.0%	0.0%	3.3%
Total	31.5%	37.0%	25.3%	0.0%	0.0%	0.0%	93.9%

Percent Calm ( $\leq 0.3$ m/s)	6.1%
Number of Valid Hourly-Average Data	8774
Total Workable Hours in Time Period	8784



## APPENDIX C. CLAVET STATION: CONTINUOUS MONITORING DATA

Table C-1 Clavet Station: Summary statistics for continuous air monitoring results for 2020

Parameter	Unit	Calibration & AIC <sup>a</sup> (hours)	Valid Data (hours)	Uptime (%)	Summary Statistics for Hourly Average Data		
					Average	Minimum	Maximum
NO	ppb	357	7335	87.0%	1.5	< 0.1	27.2
NO <sub>2</sub>	ppb	357	7335	87.0%	4.8	< 0.1	28.1
NO <sub>x</sub>	ppb	357	7335	87.0%	6.3	< 0.1	47.7
O <sub>3</sub>	ppb	407	8330	99.4%	26	< 1	59
PM <sub>2.5</sub>	µg/m <sup>3</sup>	6	8740	99.6%	8	< 1	288
Precipitation	mm	0	8756	99.7%	212.7 <sup>b</sup>	< 0.1	10.6
Ambient Temperature	°C	0	8756	99.7%	3.1	-36.5	35.1
Relative Humidity	%	0	8756	99.7%	69	< 1	90
Wind Speed	m/s	0	8741	99.7%	2.1	Calm	9.0

*a. Automatic Instrument Check*

*b. Total precipitation*

Table C-2. Clavet Station: Summary of airpointer® NO monitoring results for 2020

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Conc. (ppb)	Maximum 1-Hr Conc. (ppb)	1-Hour Exceedance <sup>a</sup> (no.)	Maximum 24-Hr Conc. (ppb)	24-Hour Exceedance <sup>b</sup> (no.)	Percent of Data in each Concentration Range					
								≤5	5 - 15	15 - 53	53 - 100	100 - 159	>159
January	712	100.0%	1.7	27.2	-	5.0	-	95.2	4.4	0.4	0.0	0.0	0.0
February	666	100.0%	1.5	23.4	-	5.2	-	96.8	2.6	0.6	0.0	0.0	0.0
March	705	100.0%	1.0	13.1	-	3.1	-	98.3	1.7	0.0	0.0	0.0	0.0
April	689	100.0%	0.6	7.8	-	1.7	-	99.4	0.6	0.0	0.0	0.0	0.0
May	711	99.9%	0.5	7.8	-	0.9	-	99.7	0.3	0.0	0.0	0.0	0.0
June	656	96.0%	0.5	15.5	-	1.8	-	99.7	0.2	0.2	0.0	0.0	0.0
July	704	98.9%	0.4	9.7	-	1.0	-	99.7	0.3	0.0	0.0	0.0	0.0
August	712	100.0%	0.5	15.3	-	1.4	-	99.6	0.3	0.1	0.0	0.0	0.0
September	679	100.0%	0.5	6.1	-	1.0	-	99.7	0.3	0.0	0.0	0.0	0.0
October	709	99.6%	1.0	7.2	-	1.9	-	99.2	0.8	0.0	0.0	0.0	0.0
November	392	55.9%	0.8	18.8	-	3.1	-	97.7	2.0	0.3	0.0	0.0	0.0
December	0	0.0%	-	-	-	-	-	-	-	-	-	-	-
Annual <sup>c</sup>	7335	87.0%	1.5	27.2	-	5.2	-	98.7	1.2	0.1	0.0	0.0	0.0

a. No 1-hour Saskatchewan Ambient Air Quality Standard

b. No 24-hour Saskatchewan Ambient Air Quality Standard

c. No annual Saskatchewan Ambient Air Quality Standard

Table C-3. Clavet Station: Summary of airpointer® NO2 monitoring results for 2020

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Conc. (ppb)	Maximum 1-Hr Conc. (ppb)	1-Hour Exceedance <sup>a</sup> (no.)	Maximum 24-Hr Conc. (ppb)	24-Hour Exceedance <sup>b</sup> (no.)	Percent of Data in each Concentration Range					
								≤5	5 - 15	15 - 53	53 - 100	100 - 159	>159
January	712	100.0%	5.3	21.8	0	10.0	-	59.4	38.8	1.8	0.0	0.0	0.0
February	666	100.0%	4.6	28.1	0	12.7	-	68.2	30.2	1.7	0.0	0.0	0.0
March	705	100.0%	3.0	16.3	0	5.7	-	84.5	15.3	0.1	0.0	0.0	0.0
April	689	100.0%	2.3	17.2	0	4.2	-	92.5	7.4	0.1	0.0	0.0	0.0
May	711	99.9%	2.2	16.4	0	5.3	-	92.1	7.7	0.1	0.0	0.0	0.0
June	656	96.0%	2.3	22.0	0	4.1	-	89.3	10.5	0.2	0.0	0.0	0.0
July	704	98.9%	1.5	7.8	0	2.3	-	98.6	1.4	0.0	0.0	0.0	0.0
August	712	100.0%	1.8	9.4	0	3.7	-	95.4	4.6	0.0	0.0	0.0	0.0
September	679	100.0%	1.8	9.9	0	3.2	-	95.6	4.4	0.0	0.0	0.0	0.0
October	709	99.6%	2.6	15.4	0	4.8	-	89.1	10.7	0.1	0.0	0.0	0.0
November	392	55.9%	2.1	24.2	0	4.9	-	87.8	12.0	0.3	0.0	0.0	0.0
December	0	0.0%	-	-	0	-	-	-	-	-	-	-	-
Annual <sup>c</sup>	7335	87.0%	4.8	28.1	0	12.7	-	86.6	13.0	0.4	0.0	0.0	0.0

a. 1-hour Saskatchewan Ambient Air Quality Standard = 159 ppb

b. 24-hour Saskatchewan Ambient Air Quality Standard = 106 ppb

c. Annual Saskatchewan Ambient Air Quality Standard = 24 ppb

Table C-4. Clavet Station: Summary of airpointer® NOx monitoring results for 2020

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Conc. (ppb)	Maximum 1-Hr Conc. (ppb)	1-Hour Exceedance <sup>a</sup> (no.)	Maximum 24-Hr Conc. (ppb)	24-Hour Exceedance <sup>b</sup> (no.)	Percent of Data in each Concentration Range					
								≤5	5 - 15	15 - 53	53 - 100	100 - 159	>159
January	712	100.0%	6.9	46.0	-	13.9	-	42.7	52.7	4.6	0.0	0.0	0.0
February	666	100.0%	6.0	47.7	-	17.9	-	51.7	44.7	3.6	0.0	0.0	0.0
March	705	100.0%	3.9	23.9	-	8.8	-	71.6	27.2	1.1	0.0	0.0	0.0
April	689	100.0%	2.9	22.7	-	5.7	-	88.0	11.8	0.3	0.0	0.0	0.0
May	711	99.9%	2.7	16.9	-	6.0	-	87.8	11.7	0.6	0.0	0.0	0.0
June	656	96.0%	3.0	26.0	-	5.9	-	81.9	17.8	0.3	0.0	0.0	0.0
July	704	98.9%	1.7	10.6	-	2.7	-	96.7	3.3	0.0	0.0	0.0	0.0
August	712	100.0%	2.3	21.0	-	4.7	-	91.6	8.3	0.1	0.0	0.0	0.0
September	679	100.0%	2.3	11.5	-	4.2	-	91.0	9.0	0.0	0.0	0.0	0.0
October	709	99.6%	3.6	20.3	-	6.3	-	80.4	19.3	0.3	0.0	0.0	0.0
November	392	55.9%	2.9	33.8	-	7.5	-	79.8	18.6	1.5	0.0	0.0	0.0
December	0	0.0%	-	-	-	-	-	-	-	-	-	-	-
Annual <sup>c</sup>	7335	87.0%	6.3	47.7	-	17.9	-	78.4	20.4	1.1	0.0	0.0	0.0

a. No 1-hour Saskatchewan Ambient Air Quality Standard

b. No 24-hour Saskatchewan Ambient Air Quality Standard

c. No annual Saskatchewan Ambient Air Quality Standard

Table C-5. Clavet Station: Summary of airpointer® PM2.5 monitoring results for 2020

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Conc. (µg/m³)	Maximum 1-Hr Conc. (µg/m³)	1-Hour Exceedance <sup>a</sup> (no.)	Maximum 24-Hr Conc. (µg/m³)	24-Hour Exceedance <sup>b</sup> (no.)	Percent of Data in each Concentration Range					
								≤5	5 - 10	10 - 15	15 - 30	30 - 80	>80
January	744	100.0%	9	80	-	29	1	38.6	27.6	13.8	15.7	4.2	0.1
February	696	100.0%	5	98	-	16	0	60.2	28.7	7.0	3.3	0.6	0.1
March	744	100.0%	5	38	-	11	0	65.2	23.4	7.3	4.0	0.1	0.0
April	720	100.0%	5	55	-	9	0	67.6	25.7	4.0	2.1	0.6	0.0
May	743	99.9%	7	102	-	28	0	50.1	33.9	7.9	5.5	2.3	0.3
June	688	96.4%	6	288	-	39	1	62.1	22.8	7.4	4.8	2.6	0.3
July	744	100.0%	5	35	-	13	0	63.4	29.3	5.4	1.7	0.1	0.0
August	744	100.0%	6	64	-	15	0	47.6	36.0	11.6	4.0	0.8	0.0
September	720	100.0%	6	71	-	19	0	61.5	20.7	6.4	10.0	1.4	0.0
October	744	100.0%	5	64	-	10	0	65.9	25.4	5.2	3.1	0.4	0.0
November	709	98.5%	7	37	-	16	0	45.1	30.9	14.1	8.7	1.1	0.0
December	744	100.0%	5	23	-	11	0	63.0	26.2	9.4	1.3	0.0	0.0
Annual <sup>c</sup>	8740	99.6%	8	288	-	39	2	57.5	27.6	8.3	5.4	1.2	0.1

a. No 1-hour Saskatchewan Ambient Air Quality Standard

b. 24-hour Canada-Wide Standard = 28 µg/m³

c. No annual Saskatchewan Ambient Air Quality Standard



Table C-6. Clavet Station: Summary of airpointer® precipitation monitoring results for 2020

Month	Valid 1-Hr data (no.)	Operational Time (%)	Total Precip. (mm)	Maximum 1-Hr Precip. (mm)	Maximum 24-Hr Precip. (mm)	Percent of Data in each Precipitation Range					
						≤5	5 - 10	10 - 25	25 - 50	50 - 75	>75
January	744	100.0%	< 0.1	< 0.1	< 0.1	100.0	0.0	0.0	0.0	0.0	0.0
February	696	100.0%	< 0.1	< 0.1	< 0.1	100.0	0.0	0.0	0.0	0.0	0.0
March	744	100.0%	2.0	1.1	2.0	100.0	0.0	0.0	0.0	0.0	0.0
April	720	100.0%	6.5	2.2	4.7	100.0	0.0	0.0	0.0	0.0	0.0
May	743	99.9%	29.8	10.6	24.4	99.7	0.1	0.1	0.0	0.0	0.0
June	694	96.4%	72.5	8.9	23.5	99.6	0.4	0.0	0.0	0.0	0.0
July	744	100.0%	41.0	8.7	8.7	99.9	0.1	0.0	0.0	0.0	0.0
August	744	100.0%	31.7	6.1	12.2	99.7	0.3	0.0	0.0	0.0	0.0
September	720	100.0%	20.7	4.1	9.6	100.0	0.0	0.0	0.0	0.0	0.0
October	744	100.0%	3.1	0.7	0.9	100.0	0.0	0.0	0.0	0.0	0.0
November	719	99.9%	5.4	2.3	2.7	100.0	0.0	0.0	0.0	0.0	0.0
December	744	100.0%	0.1	0.1	0.1	100.0	0.0	0.0	0.0	0.0	0.0
Annual	8756	99.7%	212.7	10.6	24.4	99.9	0.1	0.0	0.0	0.0	0.0

Table C-7. Clavet Station: Summary of airpointer® ambient temperature monitoring results for 2020

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Temp. (°C)	Minimum 1-Hr Temp. (°C)	Maximum 1-Hr Temp. (°C)	Percent of Data in each Temperature Range					
						≤ -30	-30 ~ -15	-15 ~ 0	0 ~ 15	15 ~ 30	>30
January	744	100.0%	-12.9	-36.5	4.6	6.2	32.5	59.1	2.2	0.0	0.0
February	696	100.0%	-10.3	-32.2	6.2	1.0	22.6	69.4	7.0	0.0	0.0
March	744	100.0%	-6.1	-21.3	9.2	0.0	10.9	70.2	19.0	0.0	0.0
April	720	100.0%	0.4	-19.6	27.4	0.0	5.0	42.8	43.9	8.3	0.0
May	743	99.9%	11.6	-4.0	29.4	0.0	0.0	3.9	64.5	31.6	0.0
June	694	96.4%	15.7	4.7	29.8	0.0	0.0	0.0	47.1	52.9	0.0
July	744	100.0%	19.5	9.9	32.3	0.0	0.0	0.0	19.9	77.3	2.8
August	744	100.0%	18.9	5.2	35.1	0.0	0.0	0.0	32.1	62.8	5.1
September	720	100.0%	12.3	-3.9	29.9	0.0	0.0	1.3	71.8	26.9	0.0
October	744	100.0%	2.1	-13.9	23.0	0.0	0.0	47.2	46.5	6.3	0.0
November	719	99.9%	-5.4	-25.3	15.7	0.0	6.3	73.2	20.2	0.4	0.0
December	744	100.0%	-8.9	-29.8	4.0	0.0	17.7	74.2	8.1	0.0	0.0
Annual	8756	99.7%	3.1	-36.5	35.1	0.6	7.9	36.8	31.8	22.2	0.7

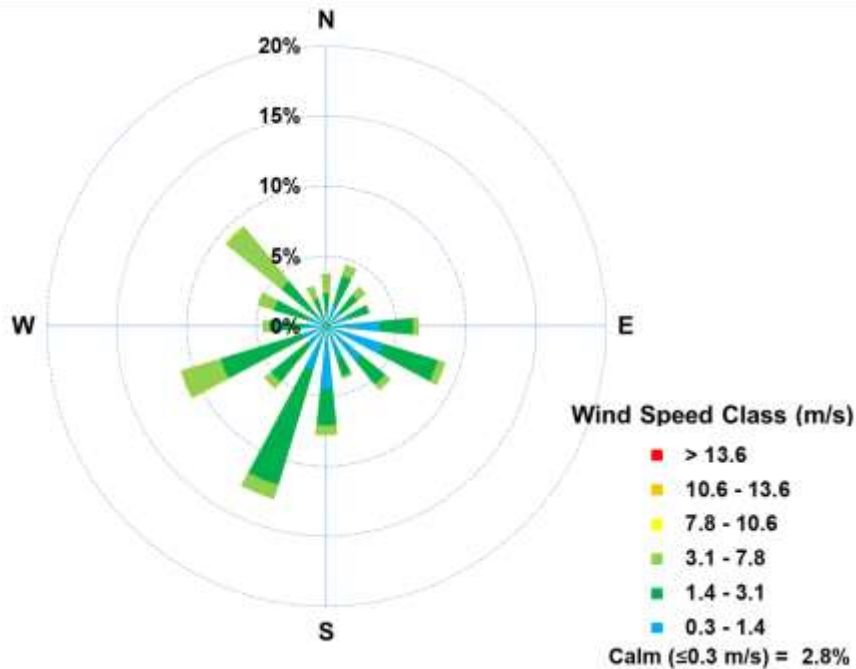
Table C-8. Clavet Station: Summary of airpointer® relative humidity monitoring results for 2020

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average RH (%)	Minimum 1-Hr RH (%)	Maximum 1-Hr RH (%)	Percent of Data in each Relative Humidity Range					
						≤15	15 - 30	30 - 60	60 - 80	80 - 90	>90
January	744	100.0%	70	49	84	0.0	0.0	9.7	75.3	15.1	0.0
February	696	100.0%	66	45	84	0.0	0.0	18.1	81.0	0.9	0.0
March	744	100.0%	66	35	85	0.0	0.0	22.8	74.7	2.4	0.0
April	720	100.0%	58	18	86	0.0	5.6	42.9	48.6	2.9	0.0
May	743	99.9%	51	17	88	0.0	17.4	45.6	29.5	7.5	0.0
June	694	96.4%	61	22	89	0.0	3.6	40.5	38.8	17.1	0.0
July	744	100.0%	63	26	89	0.0	0.9	40.9	39.4	18.8	0.0
August	744	100.0%	54	17	90	0.0	12.2	47.0	31.3	9.4	0.0
September	720	100.0%	58	19	89	0.0	6.0	44.7	37.9	11.4	0.0
October	744	100.0%	58	4	85	0.1	1.7	53.0	38.7	6.5	0.0
November	719	99.9%	70	16	85	0.0	0.1	12.1	78.7	9.0	0.0
December	744	100.0%	70	0	82	0.1	0.1	3.1	96.4	0.3	0.0
Annual	8756	99.7%	69	0	90	0.0	4.0	31.7	55.8	8.4	0.0

Table C-9 Clavet Station: Wind frequency table for 2020

Wind Direction Sector	Percent of Data within Wind Speed Range, wind speed unit m/s						Totals
	0.3 - 1.4	1.4 - 3.1	3.1 - 7.8	7.8 - 10.6	10.6 - 13.6	>13.6	
North NorthEast	1.4%	2.2%	0.8%	0.0%	0.0%	0.0%	4.5%
NorthEast	1.2%	1.5%	0.8%	0.0%	0.0%	0.0%	3.5%
East NorthEast	1.4%	1.5%	0.1%	0.0%	0.0%	0.0%	3.0%
East	3.5%	2.4%	0.4%	0.0%	0.0%	0.0%	6.3%
East SouthEast	3.8%	4.0%	0.5%	0.0%	0.0%	0.0%	8.4%
SouthEast	3.0%	2.2%	0.5%	0.0%	0.0%	0.0%	5.7%
South SouthEast	2.1%	1.3%	0.2%	0.0%	0.0%	0.0%	3.6%
South	4.3%	2.6%	0.7%	0.0%	0.0%	0.0%	7.6%
South SouthWest	3.0%	8.6%	1.1%	0.0%	0.0%	0.0%	12.7%
SouthWest	1.7%	3.4%	0.6%	0.0%	0.0%	0.0%	5.7%
West SouthWest	1.8%	6.1%	3.0%	0.0%	0.0%	0.0%	10.8%
West	1.5%	2.4%	0.5%	0.0%	0.0%	0.0%	4.4%
West NorthWest	1.2%	2.6%	1.2%	0.0%	0.0%	0.0%	5.1%
NorthWest	0.9%	3.2%	5.1%	0.1%	0.0%	0.0%	9.2%
North NorthWest	0.7%	1.3%	1.0%	0.0%	0.0%	0.0%	3.0%
North	0.8%	1.5%	1.4%	0.0%	0.0%	0.0%	3.6%
Total	32.4%	46.8%	17.9%	0.1%	0.0%	0.0%	97.2%

Percent Calm (<0.3 m/s)	2.8%
Number of Valid Hourly-Average Data	8741
Total Workable Hours in Time Period	8769



## APPENDIX D. KERROBERT STATION: CONTINUOUS MONITORING DATA

Table D-1 Kerrobert Station: Summary statistics for continuous air monitoring results for 2020

Parameter	Unit	Calibration & AIC <sup>a</sup> (hours)	Valid Data (hours)	Uptime (%)	Summary Statistics for Hourly Average Data		
					Average	Minimum	Maximum
SO <sub>2</sub>	ppb	230	5082	60.2%	0.1	< 0.1	3.7
H <sub>2</sub> S	ppb	230	5066	60.15	0.2	< 0.1	7.2
PM <sub>2.5</sub>	µg/m <sup>3</sup>	0	5384	61.8%	4	< 1	33
Precipitation	mm	0	5382	61.7%	209.7 <sup>b</sup>	< 0.1	7.5
Ambient Temperature	°C	0	5389	61.8%	1.0	-35.7	30.9
Relative Humidity	%	0	5380	61.7%	65	1	90
Wind Speed	m/s	0	5365	61.7%	3.0	Calm	13.7

*a. Automatic Instrument Check*

*b. Total precipitation*

Table D-2. Kerrobert Station: Summary of airpointer® SO2 monitoring results for 2020

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Conc. (ppb)	Maximum 1-Hr Conc. (ppb)	1-Hour Exceedance <sup>a</sup> (no.)	Maximum 24-Hr Conc. (ppb)	24-Hour Exceedance <sup>b</sup> (no.)	Percent of Data in each Concentration Range					
								≤1	1 - 5	5 - 11	11 - 57	57 - 172	>172
January	710	100.0%	0.3	3.7	0	1.9	0	93.0	7.0	0.0	0.0	0.0	0.0
February	666	100.0%	0.2	1.5	0	0.5	0	98.6	1.4	0.0	0.0	0.0	0.0
March	706	100.0%	0.1	1.7	0	0.6	0	99.3	0.7	0.0	0.0	0.0	0.0
April	689	100.0%	0.1	1.2	0	0.2	0	99.9	0.1	0.0	0.0	0.0	0.0
May	712	100.0%	0.1	0.9	0	0.1	0	100.0	0.0	0.0	0.0	0.0	0.0
June	605	100.0%	< 0.1	0.4	0	0.2	0	100.0	0.0	0.0	0.0	0.0	0.0
July	666	94.1%	0.1	0.4	0	0.2	0	100.0	0.0	0.0	0.0	0.0	0.0
August	-	0.0%	-	-	-	-	-	-	-	-	-	-	-
September	-	0.0%	-	-	-	-	-	-	-	-	-	-	-
October	-	0.0%	-	-	-	-	-	-	-	-	-	-	-
November	-	0.0%	-	-	-	-	-	-	-	-	-	-	-
December	328	45.3%	< 0.1	1.4	0	0.4	0	99.4	0.6	0.0	0.0	0.0	0.0
Annual <sup>c</sup>	5082	60.2%	0.1	3.7	0	1.9	0	98.7	1.3	0.0	0.0	0.0	0.0

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

Table D-3. Kerrobert Station: Summary of airpointer® H2S monitoring results for 2020

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Conc. (ppb)	Maximum 1-Hr Conc. (ppb)	1-Hour Exceedance <sup>a</sup> (no.)	Maximum 24-Hr Conc. (ppb)	24-Hour Exceedance <sup>b</sup> (no.)	Percent of Data in each Concentration Range					
								≤1	1 - 3.6	3.6 - 5	5 - 8	8 – 11.0	>11.0
January	710	100.0%	0.2	2.6	0	0.9	0	97.5	2.5	0.0	0.0	0.0	0.0
February	666	100.0%	0.1	1.8	0	0.7	0	98.9	1.1	0.0	0.0	0.0	0.0
March	706	100.0%	0.1	0.8	0	0.3	0	100.0	0.0	0.0	0.0	0.0	0.0
April	689	100.0%	0.1	1.3	0	0.7	0	98.8	1.2	0.0	0.0	0.0	0.0
May	696	100.0%	0.2	2.1	0	0.4	0	99.1	0.9	0.0	0.0	0.0	0.0
June	605	100.0%	0.2	2.0	0	0.6	0	98.0	2.0	0.0	0.0	0.0	0.0
July	666	94.1%	0.3	7.2	0	1.3	0	96.8	2.7	0.3	0.2	0.0	0.0
August	-	0.0%	-	-	-	-	-	-	-	-	-	-	-
September	-	0.0%	-	-	-	-	-	-	-	-	-	-	-
October	-	0.0%	-	-	-	-	-	-	-	-	-	-	-
November	-	0.0%	-	-	-	-	-	-	-	-	-	-	-
December	328	45.3%	0.1	0.5	0	0.2	0	100.0	0.0	0.0	0.0	0.0	0.0
Annual	5066	60.1%	0.2	7.2	0	1.3	0	98.6	1.4	0.0	0.0	0.0	0.0

a. 1-hour Saskatchewan Ambient Air Quality Standard = 11.0 ppb

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

c. No annual Saskatchewan Ambient Air Quality Standard

Table D-4. Kerrobert Station: Summary of airpointer® PM2.5 monitoring results for 2020

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Conc. (µg/m³)	Maximum 1-Hr Conc. (µg/m³)	1-Hour Exceedance <sup>a</sup> (no.)	Maximum 24-Hr Conc. (µg/m³)	24-Hour Exceedance <sup>b</sup> (no.)	Percent of Data in each Concentration Range					
								≤5	5 - 10	10 - 15	15 - 30	30 - 80	>80
January	741	100.0%	5	22	-	11	0	59.6	31.6	7.0	1.8	0.0	0.0
February	696	100.0%	5	20	-	12	0	64.7	26.6	6.9	1.9	0.0	0.0
March	744	100.0%	4	21	-	12	0	69.0	21.5	7.9	1.6	0.0	0.0
April	720	100.0%	4	33	-	8	0	79.3	17.1	2.8	0.7	0.1	0.0
May	744	100.0%	4	27	-	10	0	78.2	17.1	3.4	1.3	0.0	0.0
June	647	98.3%	4	16	-	6	0	77.6	19.8	2.2	0.5	0.0	0.0
July	732	98.5%	5	19	-	9	0	66.8	16.3	13.1	3.8	0.0	0.0
August	-	0.0%	-	-	-	-	0	-	-	-	-	-	-
September	-	0.0%	-	-	-	-	0	-	-	-	-	-	-
October	-	0.0%	-	-	-	-	0	-	-	-	-	-	-
November	-	0.0%	-	-	-	-	0	-	-	-	-	-	-
December	360	48.4%	6	30	-	21	0	65.8	14.2	8.1	11.7	0.3	0.0
Annual	5384	61.8%	4	33	-	21	0	70.3	20.9	6.4	2.3	0.0	0.0

a. No 1-hour Saskatchewan Ambient Air Quality Standard

b. 24-hour Canada-Wide Standard = 28 µg/m³

c. No annual Saskatchewan Ambient Air Quality Standard



Table D-5. Kerrobert Station: Summary of airpointer® precipitation monitoring results for 2020

Month	Valid 1-Hr data (no.)	Operational Time (%)	Total Precip. (mm)	Maximum 1-Hr Precip. (mm)	Maximum 24-Hr Precip. (mm)	Percent of Data in each Precipitation Range					
						≤5	5 - 10	10 - 25	25 - 50	50 - 75	>75
January	741	100.0%	3.0	1.7	2.9	100.0	0.0	0.0	0.0	0.0	0.0
February	696	100.0%	0.1	0.1	0.1	100.0	0.0	0.0	0.0	0.0	0.0
March	744	100.0%	0.3	0.2	0.2	100.0	0.0	0.0	0.0	0.0	0.0
April	720	100.0%	6.3	2.2	3.4	100.0	0.0	0.0	0.0	0.0	0.0
May	744	100.0%	25.7	4.6	11.1	100.0	0.0	0.0	0.0	0.0	0.0
June	646	98.3%	83.8	7.5	22.3	99.5	0.5	0.0	0.0	0.0	0.0
July	732	98.5%	90.4	7.2	62.4	99.3	0.7	0.0	0.0	0.0	0.0
August	-	0.0%	-	-	-	-	-	-	-	-	-
September	-	0.0%	-	-	-	-	-	-	-	-	-
October	-	0.0%	-	-	-	-	-	-	-	-	-
November	-	0.0%	-	-	-	-	-	-	-	-	-
December	359	48.3%	0.1	0.1	0.1	100.0	0.0	0.0	0.0	0.0	0.0
Annual	5382	61.7%	209.7	7.5	62.4	99.9	0.1	0.0	0.0	0.0	0.0

Table D-6. Kerrobert Station: Summary of airpointer® ambient temperature monitoring results for 2020

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Temp. (°C)	Minimum 1-Hr Temp. (°C)	Maximum 1-Hr Temp. (°C)	Percent of Data in each Temperature Range					
						≤-30	-30 ~ -15	-15 ~ 0	0 ~ 15	15 ~ 30	>30
January	741	100.0%	-13.5	-35.7	3.4	7.4	32.9	56.3	3.4	0.0	0.0
February	696	100.0%	-9.7	-30.3	8.6	0.3	20.4	71.4	7.9	0.0	0.0
March	744	100.0%	-6.6	-20.0	12.6	0.0	12.8	69.9	17.3	0.0	0.0
April	720	100.0%	0.8	-18.7	25.5	0.0	4.0	42.8	45.3	7.9	0.0
May	744	100.0%	10.5	-2.9	28.7	0.0	0.0	4.0	73.0	23.0	0.0
June	653	98.3%	14.6	3.0	28.4	0.0	0.0	0.0	57.0	43.0	0.0
July	732	98.5%	17.3	8.2	30.9	0.0	0.0	0.0	37.3	62.2	0.5
August	-	0.0%	-	-	-	-	-	-	-	-	-
September	-	0.0%	-	-	-	-	-	-	-	-	-
October	-	0.0%	-	-	-	-	-	-	-	-	-
November	-	0.0%	-	-	-	-	-	-	-	-	-
December	359	48.3%	-8.8	-22.1	3.5	0.0	10.0	84.7	5.3	0.0	0.0
Annual	5389	61.8%	1.0	-35.7	30.9	1.1	10.1	38.5	32.3	17.9	0.1

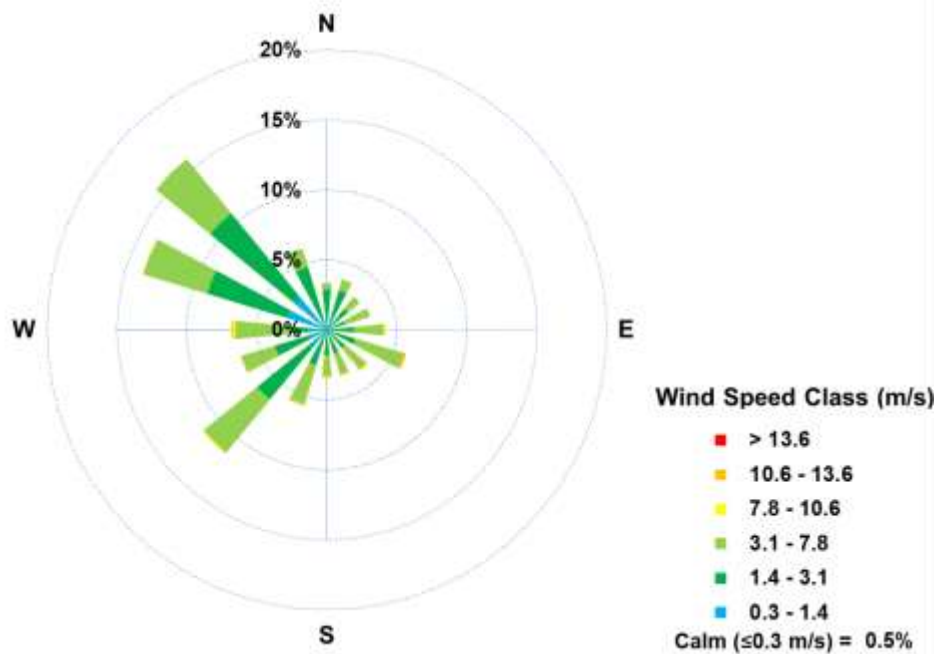
Table D-7. Kerrobert Station: Summary of airpointer® relative humidity monitoring results for 2020

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average RH (%)	Minimum 1-Hr RH (%)	Maximum 1-Hr RH (%)	Percent of Data in each Relative Humidity Range					
						≤15	15 - 30	30 - 60	60 - 80	80 - 90	>90
January	741	100.0%	71	33	87	0.0	0.0	5.9	77.1	17.0	0.0
February	696	100.0%	70	38	83	0.0	0.0	9.8	85.8	4.5	0.0
March	744	100.0%	69	50	85	0.0	0.0	14.7	80.4	5.0	0.0
April	718	100.0%	57	18	85	0.0	8.2	42.1	46.9	2.8	0.0
May	744	100.0%	52	16	89	0.1	16.0	48.0	28.1	7.8	0.0
June	646	98.3%	61	20	90	0.0	5.9	40.9	30.7	22.4	0.2
July	732	98.5%	68	30	90	0.0	0.0	33.9	38.4	27.5	0.3
August	-	0.0%	-	-	-	-	-	-	-	-	-
September	-	0.0%	-	-	-	-	-	-	-	-	-
October	-	0.0%	-	-	-	-	-	-	-	-	-
November	-	0.0%	-	-	-	-	-	-	-	-	-
December	359	48.3%	72	60	83	0.0	0.0	0.3	91.6	8.1	0.0
Annual	5380	61.7%	65	16	90	0.0	4.0	25.9	58.0	12.0	0.1

Table D-8 Kerrobert Station: Wind frequency table for the year 2020

Wind Direction Sector	Percent of Data within Wind Speed Range, wind speed unit m/s						Totals
	0.3 - 1.4	1.4 - 3.1	3.1 - 7.8	7.8 - 10.6	10.6 - 13.6	>13.6	
North NorthEast	0.9%	2.0%	0.8%	0.0%	0.0%	0.0%	3.7%
NorthEast	0.7%	1.3%	1.1%	0.0%	0.0%	0.0%	3.0%
East NorthEast	0.4%	0.9%	1.9%	0.0%	0.0%	0.0%	3.2%
East	0.6%	1.4%	2.1%	0.1%	0.0%	0.0%	4.2%
East SouthEast	0.7%	1.5%	3.6%	0.2%	0.0%	0.0%	5.9%
SouthEast	0.5%	1.2%	2.0%	0.1%	0.0%	0.0%	3.7%
South SouthEast	0.3%	1.4%	1.6%	0.1%	0.0%	0.0%	3.4%
South	0.4%	1.4%	1.5%	0.0%	0.1%	0.0%	3.4%
South SouthWest	0.8%	1.8%	2.9%	0.1%	0.0%	0.0%	5.6%
SouthWest	1.6%	4.8%	4.9%	0.1%	0.0%	0.0%	11.4%
West SouthWest	1.4%	2.4%	2.5%	0.0%	0.0%	0.0%	6.4%
West	0.9%	1.7%	3.8%	0.2%	0.1%	0.0%	6.8%
West NorthWest	2.9%	5.9%	4.8%	0.0%	0.0%	0.0%	13.7%
NorthWest	3.0%	7.7%	5.0%	0.0%	0.0%	0.0%	15.7%
North NorthWest	1.0%	3.7%	1.4%	0.0%	0.0%	0.0%	6.0%
North	1.0%	1.8%	0.5%	0.0%	0.0%	0.0%	3.3%
Total	17.0%	40.9%	40.3%	1.0%	0.2%	0.0%	99.5%

Percent Calm ( $\leq 0.3$ m/s)	0.5%
Number of Valid Hourly-Average Data	5365
Total Workable Hours in Time Period	8700



## APPENDIX E. MEADOW LAKE CITY STATION: CONTINUOUS MONITORING DATA

Table E-1 Meadow Lake City Station: Summary statistics for continuous air monitoring results for 2020

Parameter	Unit	Calibration & AIC <sup>a</sup>	Valid Data	Uptime	Summary Statistics for Hourly Average Data		
		(hours)	(hours)	(%)	Average	Minimum	Maximum
NO	ppb	408	8370	100.0%	0.8	< 0.1	52.8
NO <sub>2</sub>	ppb	408	8370	100.0%	2.8	< 0.1	37.3
NO <sub>x</sub>	ppb	408	8370	100.0%	3.5	< 0.1	81.7
O <sub>3</sub>	ppb	408	8373	100.0%	26	< 1	54
PM <sub>2.5</sub>	µg/m <sup>3</sup>	7	8753	99.7%	5	< 1	172
Precipitation	mm	0	8784	100.0%	361.9 <sup>b</sup>	< 0.1	25.0
Ambient Temperature	°C	0	8784	100.0%	2.5	-35.4	31.9
Relative Humidity	%	0	8784	100.0%	63	< 1	90
Wind Speed	m/s	0	8781	100.0%	1.1	Calm	5.5

*a. Automatic Instrument Check*

*b. Total precipitation*

Table E-2. Meadow Lake City Station: Summary of airpointer® NO monitoring results for 2020

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Conc. (ppb)	Maximum 1-Hr Conc. (ppb)	1-Hour Exceedance <sup>a</sup> (no.)	Maximum 24-Hr Conc. (ppb)	24-Hour Exceedance <sup>b</sup> (no.)	Percent of Data in each Concentration Range					
								≤5	5 - 15	15 - 53	53 - 100	100 - 159	>159
January	712	100.0%	1.2	48.5	-	6.5	-	96.6	2.9	0.4	0.0	0.0	0.0
February	666	100.0%	1.2	35.0	-	2.9	-	96.8	3.0	0.2	0.0	0.0	0.0
March	706	100.0%	0.9	20.8	-	3.1	-	96.6	3.0	0.4	0.0	0.0	0.0
April	687	99.7%	0.4	5.4	-	1.1	-	99.9	0.1	0.0	0.0	0.0	0.0
May	711	99.9%	0.2	6.2	-	0.7	-	99.9	0.1	0.0	0.0	0.0	0.0
June	678	100.0%	0.3	6.1	-	0.6	-	99.6	0.4	0.0	0.0	0.0	0.0
July	712	100.0%	0.3	5.1	-	0.7	-	99.7	0.3	0.0	0.0	0.0	0.0
August	712	100.0%	0.3	5.1	-	0.7	-	99.9	0.1	0.0	0.0	0.0	0.0
September	681	100.0%	0.7	50.9	-	3.3	-	98.7	0.9	0.4	0.0	0.0	0.0
October	712	100.0%	0.7	48.0	-	6.3	-	99.0	0.6	0.4	0.0	0.0	0.0
November	689	100.0%	1.9	52.8	-	9.4	-	92.0	4.5	3.5	0.0	0.0	0.0
December	704	100.0%	1.0	32.5	-	3.9	-	98.2	1.6	0.3	0.0	0.0	0.0
Annual <sup>c</sup>	8370	100.0%	0.8	52.8	-	9.4	-	98.1	1.5	0.5	0.0	0.0	0.0

- a. No 1-hour Saskatchewan Ambient Air Quality Standard  
b. No 24-hour Saskatchewan Ambient Air Quality Standard  
c. No annual Saskatchewan Ambient Air Quality Standard

Table E-3. Meadow Lake City Station: Summary of airpointer® NO2 monitoring results for 2020

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Conc. (ppb)	Maximum 1-Hr Conc. (ppb)	1-Hour Exceedance <sup>a</sup> (no.)	Maximum 24-Hr Conc. (ppb)	24-Hour Exceedance <sup>b</sup> (no.)	Percent of Data in each Concentration Range					
								≤5	5 - 15	15 - 53	53 - 100	100 - 159	>159
January	712	100.0%	4.9	33.2	0	11.6	-	66.9	27.8	5.3	0.0	0.0	0.0
February	666	100.0%	5.3	37.3	0	10.5	-	63.7	30.2	6.2	0.0	0.0	0.0
March	706	100.0%	3.2	26.8	0	9.4	-	80.7	17.6	1.7	0.0	0.0	0.0
April	687	99.7%	2.0	13.7	0	4.5	-	93.7	6.3	0.0	0.0	0.0	0.0
May	711	99.9%	1.3	10.6	0	3.1	-	97.5	2.5	0.0	0.0	0.0	0.0
June	678	100.0%	1.2	7.8	0	2.4	-	99.1	0.9	0.0	0.0	0.0	0.0
July	712	100.0%	1.0	11.4	0	1.6	-	99.2	0.8	0.0	0.0	0.0	0.0
August	712	100.0%	1.1	9.9	0	2.3	-	98.5	1.5	0.0	0.0	0.0	0.0
September	681	100.0%	1.6	10.6	0	3.0	-	96.0	4.0	0.0	0.0	0.0	0.0
October	712	100.0%	2.0	17.7	0	4.6	-	94.5	4.8	0.7	0.0	0.0	0.0
November	689	100.0%	4.8	34.7	0	15.4	-	68.2	25.8	6.0	0.0	0.0	0.0
December	704	100.0%	5.1	29.0	0	12.2	-	62.8	33.5	3.7	0.0	0.0	0.0
Annual <sup>c</sup>	8370	100.0%	2.8	37.3	0	15.4	-	85.1	12.9	1.9	0.0	0.0	0.0

a. 1-hour Saskatchewan Ambient Air Quality Standard = 159 ppb

b. 24-hour Saskatchewan Ambient Air Quality Standard = 106 ppb

c. Annual Saskatchewan Ambient Air Quality Standard = 24 ppb

Table E-4. Meadow Lake City Station: Summary of airpointer® NOx monitoring results for 2020

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Conc. (ppb)	Maximum 1-Hr Conc. (ppb)	1-Hour Exceedance <sup>a</sup> (no.)	Maximum 24-Hr Conc. (ppb)	24-Hour Exceedance <sup>b</sup> (no.)	Percent of Data in each Concentration Range					
								≤5	5 - 15	15 - 53	53 - 100	100 - 159	>159
January	712	100.0%	6.1	81.7	-	17.1	-	59.4	34.1	6.2	0.3	0.0	0.0
February	666	100.0%	6.5	72.3	-	13.0	-	52.7	38.6	8.6	0.2	0.0	0.0
March	706	100.0%	4.1	47.5	-	12.5	-	74.9	22.4	2.7	0.0	0.0	0.0
April	687	99.7%	2.4	14.8	-	5.7	-	88.9	11.1	0.0	0.0	0.0	0.0
May	711	99.9%	1.5	16.2	-	3.7	-	96.2	3.7	0.1	0.0	0.0	0.0
June	678	100.0%	1.5	8.7	-	3.0	-	97.6	2.4	0.0	0.0	0.0	0.0
July	712	100.0%	1.3	16.1	-	2.2	-	98.6	1.3	0.1	0.0	0.0	0.0
August	712	100.0%	1.4	12.3	-	2.6	-	96.6	3.4	0.0	0.0	0.0	0.0
September	681	100.0%	2.3	57.7	-	6.0	-	91.2	8.2	0.4	0.1	0.0	0.0
October	712	100.0%	2.6	65.0	-	10.6	-	91.4	7.7	0.6	0.3	0.0	0.0
November	689	100.0%	6.8	77.4	-	24.8	-	61.4	28.2	9.9	0.6	0.0	0.0
December	704	100.0%	6.1	61.4	-	16.0	-	53.6	39.3	7.0	0.1	0.0	0.0
Annual <sup>c</sup>	8370	100.0%	3.5	81.7	-	24.8	-	80.3	16.6	2.9	0.1	0.0	0.0

a. No 1-hour Saskatchewan Ambient Air Quality Standard

b. No 24-hour Saskatchewan Ambient Air Quality Standard

c. No annual Saskatchewan Ambient Air Quality Standard



Table E-5. Meadow Lake City Station: Summary of airpointer® O3 monitoring results for 2020

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Conc. (ppb)	Maximum 1-Hr Conc. (ppb)	1-Hour Exceedance <sup>a</sup> (no.)	Maximum 8-Hr Conc. (ppb)	8-Hour Conc. Above CWS <sup>b</sup> (no.)	Percent of Data in each Concentration Range					
								≤10	10 - 20	20 - 40	40 - 65	65 - 82	>82
January	712	100.0%	25	40	0	38	0	2.0	19.1	78.9	0.0	0.0	0.0
February	666	100.0%	30	45	0	44	0	2.6	9.5	82.6	5.4	0.0	0.0
March	706	100.0%	32	54	0	51	0	0.6	5.8	78.8	14.9	0.0	0.0
April	687	99.7%	36	53	0	50	0	1.0	4.1	59.7	35.2	0.0	0.0
May	711	99.9%	30	50	0	49	0	0.7	15.6	68.2	15.5	0.0	0.0
June	681	100.0%	24	49	0	45	0	4.7	30.7	58.9	5.7	0.0	0.0
July	712	100.0%	22	47	0	44	0	5.6	39.2	53.2	2.0	0.0	0.0
August	712	100.0%	22	48	0	40	0	8.6	30.9	58.6	2.0	0.0	0.0
September	681	100.0%	19	41	0	37	0	14.7	41.7	43.3	0.3	0.0	0.0
October	712	100.0%	24	39	0	37	0	3.5	20.5	76.0	0.0	0.0	0.0
November	689	100.0%	24	35	0	35	0	7.4	21.9	70.7	0.0	0.0	0.0
December	704	100.0%	26	41	0	40	0	4.7	14.8	79.5	1.0	0.0	0.0
Annual <sup>c</sup>	8373	100.0%	26	54	0	51	0	4.6	21.2	67.4	6.8	0.0	0.0

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

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

*c. No annual Saskatchewan Ambient Air Quality Standard*

Table E-6. Meadow Lake City Station: Summary of airpointer® PM2.5 monitoring results for 2020

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Conc. (µg/m³)	Maximum 1-Hr Conc. (µg/m³)	1-Hour Exceedance <sup>a</sup> (no.)	Maximum 24-Hr Conc. (µg/m³)	24-Hour Exceedance <sup>b</sup> (no.)	Percent of Data in each Concentration Range					
								≤5	5 - 10	10 - 15	15 - 30	30 - 80	>80
January	744	100.0%	5	89	-	10	0	70	22	6	2	1	0
February	696	100.0%	6	77	-	13	0	68	20	6	5	2	0
March	744	100.0%	5	77	-	12	0	72	14	8	5	2	0
April	718	99.7%	6	150	-	15	0	75	14	4	3	2	1
May	743	99.9%	6	48	-	10	0	58	30	6	5	1	0
June	713	100.0%	5	85	-	11	0	71	20	5	4	0	0
July	744	100.0%	5	35	-	11	0	66	25	6	3	0	0
August	744	100.0%	5	43	-	12	0	64	28	6	2	0	0
September	720	100.0%	4	59	-	25	0	77	12	3	7	1	0
October	744	100.0%	4	104	-	9	0	81	13	3	1	1	0
November	720	100.0%	6	63	-	18	0	58	20	13	8	1	0
December	723	97.2%	6	172	-	17	0	65	23	6	6	1	0
Annual <sup>c</sup>	8753	99.7%	5	172	-	25	0	68.7	20.0	5.9	4.1	1.1	0.1

a. No 1-hour Saskatchewan Ambient Air Quality Standard

b. 24-hour Canada-Wide Standard = 28 µg/m³

c. No annual Saskatchewan Ambient Air Quality Standard

Table E-7. Meadow Lake City Station: Summary of airpointer® precipitation monitoring results for 2020

Month	Valid 1-Hr data (no.)	Operational Time (%)	Total Precip. (mm)	Maximum 1-Hr Precip. (mm)	Maximum 24-Hr Precip. (mm)	Percent of Data in each Precipitation Range					
						≤5	5 - 10	10 - 25	25 - 50	50 - 75	>75
January	744	100.0%	1.7	0.8	1.6	100.0	0.0	0.0	0.0	0.0	0.0
February	696	100.0%	< 0.1	< 0.1	< 0.1	100.0	0.0	0.0	0.0	0.0	0.0
March	744	100.0%	0.4	0.4	0.4	100.0	0.0	0.0	0.0	0.0	0.0
April	720	100.0%	3.4	2.6	2.6	100.0	0.0	0.0	0.0	0.0	0.0
May	744	100.0%	20.8	4.6	8.6	100.0	0.0	0.0	0.0	0.0	0.0
June	720	100.0%	76.9	4.8	23.5	100.0	0.0	0.0	0.0	0.0	0.0
July	744	100.0%	182.0	25.0	43.8	98.5	0.9	0.4	0.1	0.0	0.0
August	744	100.0%	51.1	12.4	25.6	99.7	0.1	0.1	0.0	0.0	0.0
September	720	100.0%	19.7	4.5	6.1	100.0	0.0	0.0	0.0	0.0	0.0
October	744	100.0%	2.9	0.7	1.8	100.0	0.0	0.0	0.0	0.0	0.0
November	720	100.0%	2.8	1.1	2.5	100.0	0.0	0.0	0.0	0.0	0.0
December	744	100.0%	0.3	0.2	0.2	100.0	0.0	0.0	0.0	0.0	0.0
Annual	8784	100.0%	361.9	25.0	43.8	99.9	0.1	0.0	0.0	0.0	0.0

Table E-8. Meadow Lake City Station: Summary of airpointer® ambient temperature monitoring results for 2020

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Temp. (°C)	Minimum 1-Hr Temp. (°C)	Maximum 1-Hr Temp. (°C)	Percent of Data in each Temperature Range					
						≤-30	-30 ~ -15	-15 ~ 0	0 ~ 15	15 ~ 30	>30
January	744	100.0%	-13.5	-35.4	4.0	6.9	38.2	49.9	5.1	0.0	0.0
February	696	100.0%	-9.8	-32.4	7.3	2.2	25.0	63.6	9.2	0.0	0.0
March	744	100.0%	-8.4	-25.7	5.0	0.0	18.8	69.8	11.4	0.0	0.0
April	720	100.0%	-0.1	-26.2	20.9	0.0	6.7	39.7	47.6	6.0	0.0
May	744	100.0%	10.6	-2.5	25.8	0.0	0.0	1.7	74.7	23.5	0.0
June	720	100.0%	14.9	5.4	27.3	0.0	0.0	0.0	53.8	46.3	0.0
July	744	100.0%	18.8	9.8	31.4	0.0	0.0	0.0	23.7	75.4	0.9
August	744	100.0%	17.6	7.2	31.9	0.0	0.0	0.0	34.9	63.0	2.0
September	720	100.0%	11.1	-2.3	23.7	0.0	0.0	1.0	78.2	20.8	0.0
October	744	100.0%	1.3	-8.5	21.2	0.0	0.0	52.0	45.3	2.7	0.0
November	720	100.0%	-5.8	-24.5	13.2	0.0	4.4	80.4	15.1	0.0	0.0
December	744	100.0%	-7.1	-25.2	6.7	0.0	17.9	60.2	21.9	0.0	0.0
Annual	8784	100.0%	2.5	-35.4	31.9	0.8	9.2	34.8	35.1	19.9	0.3

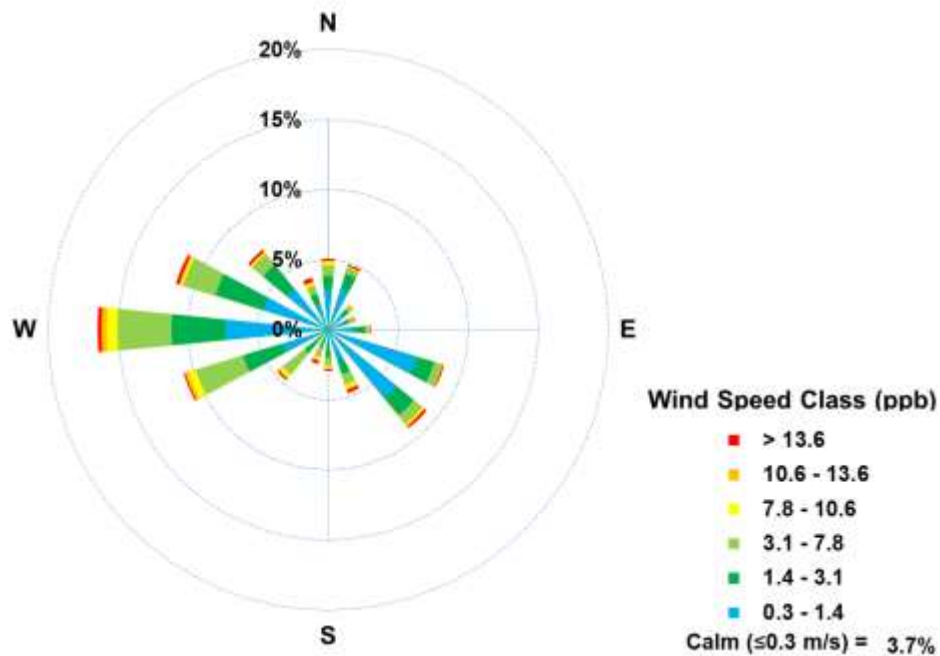
Table E-9. Meadow Lake City Station: Summary of airpointer® relative humidity monitoring results for 2020

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average RH (%)	Minimum 1-Hr RH (%)	Maximum 1-Hr RH (%)	Percent of Data in each Relative Humidity Range					
						≤15	15 - 30	30 - 60	60 - 80	80 - 90	>90
January	744	100.0%	68	45	86	0.0	0.0	16.5	73.9	9.5	0.0
February	696	100.0%	60	35	84	0.0	0.0	46.4	52.6	1.0	0.0
March	744	100.0%	60	29	82	0.0	0.1	49.3	49.9	0.7	0.0
April	720	99.9%	54	11	84	0.3	5.3	58.6	33.1	2.8	0.0
May	744	100.0%	55	21	89	0.0	10.6	51.1	27.8	10.5	0.0
June	720	100.0%	64	23	90	0.0	3.5	36.7	38.3	21.5	0.0
July	744	100.0%	66	28	90	0.0	0.1	32.5	43.8	23.4	0.1
August	744	100.0%	62	27	88	0.0	0.9	41.0	41.7	16.4	0.0
September	720	100.0%	66	21	90	0.0	1.4	31.7	45.1	21.8	0.0
October	744	100.0%	61	27	84	0.0	0.8	46.5	47.6	5.1	0.0
November	720	100.0%	69	39	85	0.0	0.0	12.4	82.8	4.9	0.0
December	744	100.0%	66	40	81	0.0	0.0	21.0	78.4	0.7	0.0
Annual	8784	100.0%	63	11	90	0.0	1.9	36.9	51.3	9.9	0.0

Table E-10 Meadow Lake City Station: Wind frequency table for 2020

Wind Direction Sector	Percent of Data within Wind Speed Range, wind speed unit m/s						Totals
	0.3 - 1.4	1.4 - 3.1	3.1 - 7.8	7.8 - 10.6	10.6 - 13.6	>13.6	
North NorthEast	3.2%	0.8%	0.0%	0.0%	0.0%	0.0%	4.0%
NorthEast	1.5%	0.0%	0.0%	0.0%	0.0%	0.0%	1.5%
East NorthEast	1.1%	0.0%	0.0%	0.0%	0.0%	0.0%	1.1%
East	2.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.0%
East SouthEast	6.1%	1.1%	0.0%	0.0%	0.0%	0.0%	7.3%
SouthEast	4.3%	3.2%	0.6%	0.0%	0.0%	0.0%	8.1%
South SouthEast	2.3%	1.1%	0.1%	0.0%	0.0%	0.0%	3.5%
South	1.6%	0.3%	0.0%	0.0%	0.0%	0.0%	1.9%
South SouthWest	1.1%	0.4%	0.0%	0.0%	0.0%	0.0%	1.5%
SouthWest	2.4%	1.5%	0.0%	0.0%	0.0%	0.0%	4.0%
West SouthWest	8.6%	1.3%	0.0%	0.0%	0.0%	0.0%	9.8%
West	8.8%	5.7%	0.6%	0.0%	0.0%	0.0%	15.2%
West NorthWest	4.0%	5.1%	1.5%	0.0%	0.0%	0.0%	10.6%
NorthWest	2.7%	3.6%	0.4%	0.0%	0.0%	0.0%	6.6%
North NorthWest	2.1%	1.0%	0.0%	0.0%	0.0%	0.0%	3.2%
North	3.1%	1.0%	0.0%	0.0%	0.0%	0.0%	4.1%
Total	55.0%	26.3%	3.3%	0.0%	0.0%	0.0%	84.6%

Percent Calm (<0.3 m/s)	15.4%
Number of Valid Hourly-Average Data	8741
Total Workable Hours in Time Period	8784



## APPENDIX F. WYAMZ EXCEEDANCE SUMMARY

Table F-1 Maidstone Station: Summary of 1-hour exceedances for 2020

1-hour Exceedance Information			Summary of Other Parameters During Exceedance								
Pollutant	Conc.	Exceedance Time mmm-dd hh:mm	WS m/s	WD deg	AQI -	Rain mm	ET C	SO <sub>2</sub> ppb	NO <sub>2</sub> ppb	H <sub>2</sub> S ppb	PM <sub>2.5</sub> µg/m <sup>3</sup>
H <sub>2</sub> S	15.5	Apr-14 05:00	0.1	227	9	0.0	-18.0	0	15	15.5	10.7
H <sub>2</sub> S	14.2	Aug-01 06:00	0.1	167	6	0.0	11.9	0	3	14.2	7.5
H <sub>2</sub> S	29.5	Aug-05 06:00	0.3	126	6	0.0	10.7	0	5	29.5	7.0

\* No recorded 24- hour exceedances

Table F-2 Clavet Station: Summary of exceedances for 2020

24-hour Exceedance Information			Summary of Other Parameters During Exceedance								
Pollutant	Conc.	Exceedance Time mmm-dd	WS m/s	WD deg	AQI -	Rain mm	NO C	NO <sub>2</sub> ppb	NO <sub>x</sub> ppb	O <sub>3</sub> ppb	PM <sub>2.5</sub> µg/m <sup>3</sup>
PM <sub>2.5</sub>	29	Jan-15	1.5	229	3	0.0	5.0	8.9	13.9	18	29
PM <sub>2.5</sub>	39	Jun-2	2.0	246	4	0.0	0.9	3.8	4.8	33	39

Table F-3 Kerrobert Station: Summary of exceedances for 2020

Exceedance Information			Summary of Other Parameters During Exceedance						
Pollutant	Conc.	Exceedance Date mmm-dd	WS	WD	Rain	ET	SO <sub>2</sub>	H <sub>2</sub> S	PM <sub>2.5</sub>
			m/s	deg	mm	C	ppb	ppb	µg/m³
No recorded exceedances									

Table F-4 Meadow Lake City Station: Summary of exceedances for 2020

Exceedance Information			Summary of Other Parameters During Exceedance						
Pollutant	Conc.	Exceedance Date mmm-dd	WS m/s	WD deg	Rain mm	ET C	SO <sub>2</sub> ppb	H <sub>2</sub> S ppb	PM <sub>2.5</sub> µg/m³
No recorded exceedances									

## APPENDIX G. 2020 FINANCIAL STATEMENTS



## APPENDIX H. WYAMZ BOARD OF DIRECTORS

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**Curtis Ferguson** Board Chair (Nutrien Allan)



Curtis Ferguson, grew up in rural Saskatchewan and moved to Saskatoon and attended the University of Saskatchewan, attaining a BSc in Agriculture and Bioresource Engineering. In pursuit of a career in the environmental sector, Curtis relocated to Alberta and spent the next seven years in the oil and gas industry, providing environmental consulting support and also focusing on a water management strategy for Hydraulic Fracturing. Since relocating back to Saskatoon, Curtis has been employed with the Ministry of Environment, Mosaic Colonsay, and Nutrien Allan Potash Operations. His current role is Lead Environmental Engineer at Nutrien Allan which duties include the responsibility to maintain the facility license to operate and undertake environmental improvements related to water, air, energy, and waste management.

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**David Henry** Vice Chair (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.

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**Trippet McKnight** Treasurer (Cenovus Energy Upstream)



Trippet obtained his bachelor of applied science from Lakeland College in Vermilion, Alberta. He started working in the oilfield as an equipment operator before accepting a position with an environmental consulting company in Edmonton, AB. Trippet has since transitioned from consulting to a Senior Environmental Advisor for Cenovus Energy based out of Lloydminster, SK. In this role, he provides environmental support for Lloydminster Upstream Operations.

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**Brad Sigurdson** Member (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".



**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.

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**Lovyl Zweifel**

Member

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**Jocelan Lundquist**

Member (Husky Energy Downstream)

Jocelan holds a BSc in Environmental Science from the University of Alberta, is a Professional Agrologist and has worked in an environmental role within the Western Canadian Oil and Gas Industry for over 17 years. She currently resides in Lloydminster, Alberta and works for Husky Energy Downstream. Jocelan began her career working on soil/groundwater remediation and reclamation as part of company asset retirement and liability management programs. She now provides technical and regulatory support for operational activities related to air quality, water quality, waste management, spill response, soil remediation and vegetation management.



**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 35 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 I

### 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
- Viterro
- Zelmar Energy

## CONTRIBUTING MEMBERS THIS YEAR

For information on how to become a member, please contact Terry Gibson, Executive Director at (306) 371 2478

- Nutrien Inc.
- Akzo Nobel
- Atco Cory
- Bayhurst Sask Energy
- 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
- TransGas Sask Energy
- Viterra Inc.
- WestLake Energy
- Zelmar Energy Ltd.

*End of the Report*