



## 2021 Annual Report



Western Yellowhead  
Air Management Zone

Prepared by:  
Wood  
Environment & Infrastructure Solutions  
5681 - 70 Street  
Edmonton, Alberta  
T6B 3P6

For more information, please contact:  
Glen White  
Executive Director  
Western Yellowhead Air Management Zone  
Phone: (306) 227-8548  
E-mail: [wyamz@sasktel.net](mailto:wyamz@sasktel.net)

# TABLE OF CONTENTS

	Page
<b>List of Tables .....</b>	<b>i</b>
<b>List of Figures .....</b>	<b>ii</b>
<b>List of Appendices .....</b>	<b>ii</b>
<b>List of Terms and Definitions.....</b>	<b>iv</b>
<b>Units of Measurement.....</b>	<b>iv</b>
 <b>MESSAGE FROM THE EXECUTIVE DIRECTOR .....</b>	 <b>V</b>
<b>EXECUTIVE SUMMARY .....</b>	<b>VI</b>
<b>1.0 INTRODUCTION .....</b>	<b>1</b>
1.1 WYAMZ MISSION .....	2
1.2 WYAMZ AIR MONITORING NETWORK.....	2
<b>2.0 AIR QUALITY MONITORING .....</b>	<b>6</b>
2.1 SUMMARY OF EXCEEDANCES ABOVE THE SAAQS .....	6
2.2 WIND.....	7
2.3 CONTINUOUS AIR QUALITY DATA.....	9
2.3.1 Sulphur Dioxide (SO <sub>2</sub> ) .....	9
2.3.2 Hydrogen Sulphide (H <sub>2</sub> S) .....	12
2.3.3 Oxides of Nitrogen (NO <sub>x</sub> ) .....	15
2.3.4 Ozone (O <sub>3</sub> ) .....	19
2.3.5 Fine Particulate Matter (PM <sub>2.5</sub> ) .....	22
2.4 AIR QUALITY HEALTH INDEX (AQHI).....	26
2.5 AIR QUALITY INDEX (AQI).....	27

## TABLE OF CONTENTS

### LIST OF TABLES

	<b>Page</b>
Table 1	Annual average concentrations for continuous parameters for 2021 .....vii
Table 2	WYAMZ ambient air continuous monitoring stations and the measurement parameters.....5
Table 3.	Number of exceedance events for 2021 .....6
Table 4.	Summary statistics for SO <sub>2</sub> measurement results for 2021 ..... 10
Table 5.	Number of exceedance events for SO <sub>2</sub> for 2021..... 10
Table 6.	Summary statistics for H <sub>2</sub> S measurement results for 2021 ..... 13
Table 7.	Number of exceedance events for H <sub>2</sub> S for 2021 ..... 13
Table 8.	Summary statistics for NO <sub>2</sub> measurement results for 2021 ..... 16
Table 9.	Number of exceedance events for NO <sub>2</sub> for 2021..... 16
Table 10.	Summary statistics for O <sub>3</sub> measurement results for 2021 ..... 20
Table 11.	Number of exceedance events for O <sub>3</sub> for 2021..... 20
Table 12.	Summary statistics for PM <sub>2.5</sub> measurement results for 2021 ..... 23
Table 13.	Number of exceedance events for PM <sub>2.5</sub> for 2021 ..... 23
Table 14.	Summary of occurrence statistics for AQHI rating ..... 27
Table 15.	AQI rating and effect description..... 28
Table 16.	Summary of occurrence statistics for AQI rating..... 28

## TABLE OF CONTENTS

### LIST OF FIGURES

	<b>Page</b>
Figure 1. The Western Yellowhead Air Management Zone (WYAMZ) .....	3
Figure 2. Locations of the continuous air monitoring stations in the WYAMZ zone .....	4
Figure 3. Wind roses for 1-hour average wind data for 2021 .....	8
Figure 4. Pollutant rose for 1-hour average SO <sub>2</sub> data at the Maidstone station .....	11
Figure 5. Pollutant rose for 1-hour average SO <sub>2</sub> data at the Kerrobert station.....	11
Figure 6. Pollutant rose for 1-hour average H <sub>2</sub> S data at the Maidstone station .....	14
Figure 7. Pollutant rose for 1-hour average H <sub>2</sub> S data at the Kerrobert station.....	14
Figure 8. Pollutant rose for 1-hour average NO <sub>2</sub> data at the Maidstone station .....	17
Figure 9. Pollutant rose for 1-hour average NO <sub>2</sub> data at the Clavet station .....	17
Figure 10. Pollutant rose for 1-hour average NO <sub>2</sub> data at the Meadow Lake City station.....	18
Figure 11. Pollutant rose for 1-hour average O <sub>3</sub> data at the Clavet station.....	21
Figure 12. Pollutant rose for 1-hour average O <sub>3</sub> data at the Meadow Lake City station .....	21
Figure 13. Pollutant rose for 1-hour average PM <sub>2.5</sub> data at the Maidstone station .....	24
Figure 14. Pollutant rose for 1-hour average PM <sub>2.5</sub> data at the Clavet station .....	24
Figure 15. Pollutant rose for 1-hour average PM <sub>2.5</sub> data at the Kerrobert station.....	25
Figure 16. Pollutant rose for 1-hour average PM <sub>2.5</sub> data at the Meadow Lake City station.....	25
Figure 17. Health risk classification and health messages for Air Quality Health Index (Environment Canada) .....	26

### LIST OF APPENDICES

APPENDIX A. Saskatchewan Ambient Air Quality Standards
APPENDIX B. Maidstone Station: Continuous Monitoring Data
APPENDIX C. Clavet Station: Continuous Monitoring Data
APPENDIX D. Kerrobert Station: Continuous Monitoring Data
APPENDIX E. Meadow Lake City: Continuous Monitoring Data
APPENDIX F. WYAMZ Exceedance Summary
APPENDIX G. 2021 Financial Statements
APPENDIX H. WYAMZ Board of Directors
APPENDIX I. WYAMZ Member Companies

## List of Terms and Definitions

24-hour	A calendar day, average is calculated midnight-to-midnight.
8-hour	8-hour running average for 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 = $\sum X_i / n$
kph	kilometre per hour
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

On behalf of the Western Yellowhead Air Management Zone (WYAMZ) Board of Directors, I would like to thank the association members for their commitment to air quality improvement and for the ongoing financial support that keeps our association viable and able to respond to the needs of WYAMZ members. 2021 members and a summary of membership benefits is included in Appendix I.

WYAMZ is an independent, collaborative non-profit organization of industry, government, and other representatives formed for the purpose of collecting high quality continuous air quality data. Through diverse stakeholder representation, the association strives to recognize concerns specific to the air zone and encourage solutions to address these needs.

WYAMZ operates, maintains and reports on 4 ambient air quality monitoring stations called Airpointers. These Airpointers work in combination with 2 Airpointer stations operated by Cenovus in the Lloydminster area and the National Air Pollution Surveillance Program (NAPS) station in Saskatoon. This equipment collectively provides an extensive ambient air quality monitoring and data collection network across the air zone. Data for both the WYAMZ and Cenovus stations is available in real time @ [www.wyamz.ca](http://www.wyamz.ca). The WYAMZ data for 2021 is summarized in this annual report and freely available, on the WYAMZ website for use by member organizations, government agencies, and the general public.

WYAMZ is currently evaluating the use of Purple Air Monitoring (PAM) devices as a cost-effective way to extend ambient air monitoring to more WYAMZ communities. Our intention is to make use of government environmental and Indigenous air quality monitoring initiatives to keep costs to a minimum. A link to the real time worldwide Purple Air monitoring network is also provided on the WYAMZ website.

WYAMZ is now participating in a Saskatchewan MOE led 2021 initiative to include air zone associations in the development of Air zone Management Plans (AMP)s. Our initial recommendation is to have MOE use the WYAMZ and Cenovus data to better characterize our air zone the beyond that currently achieved using the NAPS station data alone. Future efforts could consider alternative deployments of our Airpointers to further improve our understanding of where AMPs should be focused.

We intend to resume the WYAMZ industry and public outreach programs in 2022. We will have a booth at the Lloydminster Heavy Oil Show in September. This will be an excellent opportunity to highlight the names of our members and showcase our efforts to ensure good ambient air quality and cost-effective, well managed air quality management programs in our air zone. WYAMZ will also look for other opportunities to showcase our efforts to other potential industrial members. Our public outreach programs in 2022 will include sponsoring school science fairs events and awards, as well as making presentations to interested school and community organizations within the air zone.

I look forward to reporting back on the success of these initiatives in next year's report.

## 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® 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 Cenovus East and West stations in Lloydminster are owned and operated by Cenovus.

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 2021 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.

Table 1 summarizes the annual average concentration data for January to December 2021; 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 five exceedance events for 1-hour average H<sub>2</sub>S and 13 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 96% of the time according to the Air Quality Health Index and Air Quality Index.



**Table 1 Annual average concentrations for continuous parameters for 2021**

<b>Pollutant</b>	<b>Conc. Unit</b>	<b>Annual Average Concentration for Continuous Data</b>			
		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>	0.3	0.2	<i>a</i>
NO	ppb	2.5	0.5	<i>a</i>	0.8
NO <sub>2</sub>	ppb	5.2	3.4	<i>a</i>	2.9
NO <sub>x</sub>	ppb	7.7	3.9	<i>a</i>	3.7
O <sub>3</sub>	ppb	29	<i>a</i>	<i>a</i>	27
PM <sub>2.5</sub>	µg/m <sup>3</sup>	4	8	7	6

*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 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.

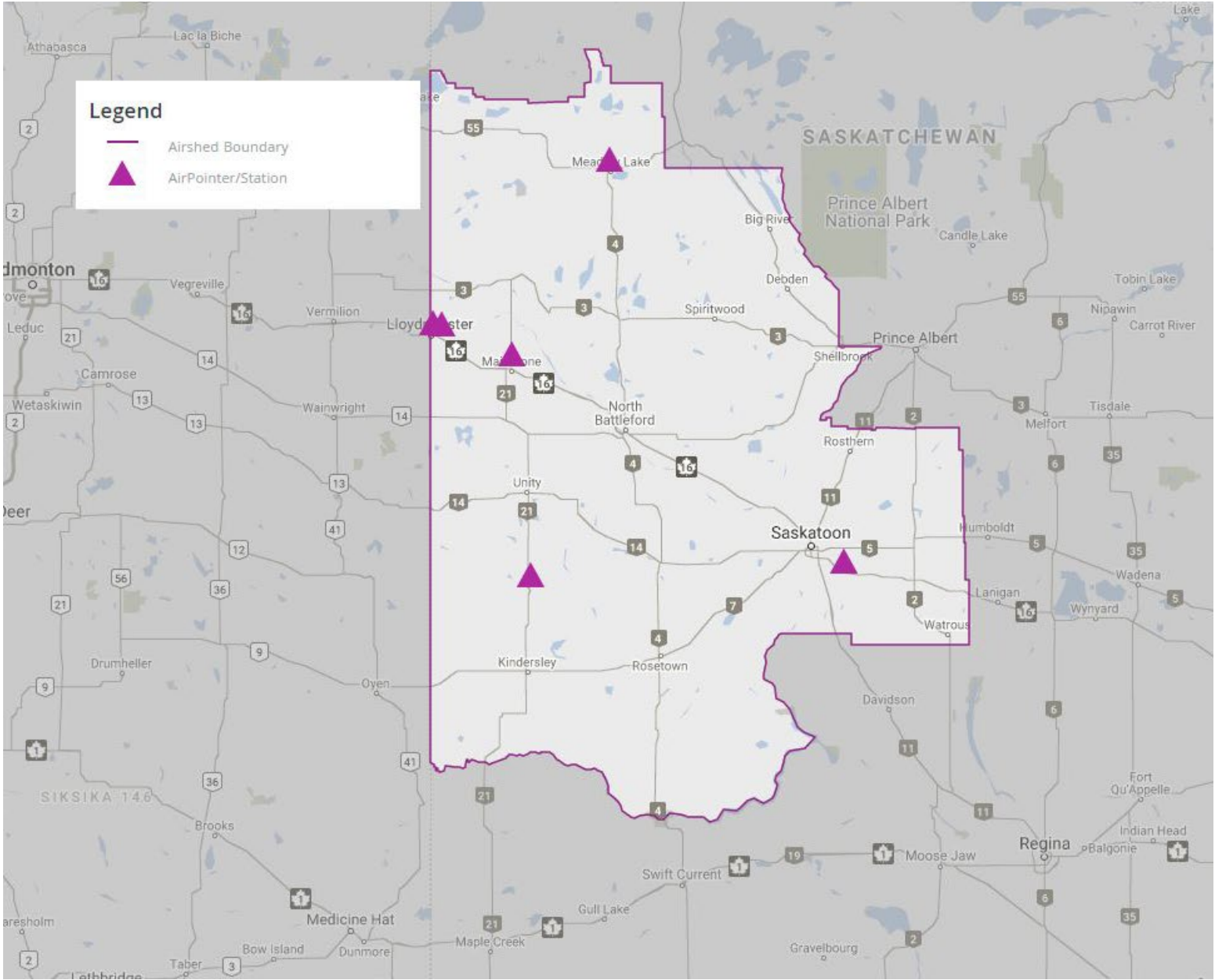
## **1.1 WYAMZ Mission**

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.

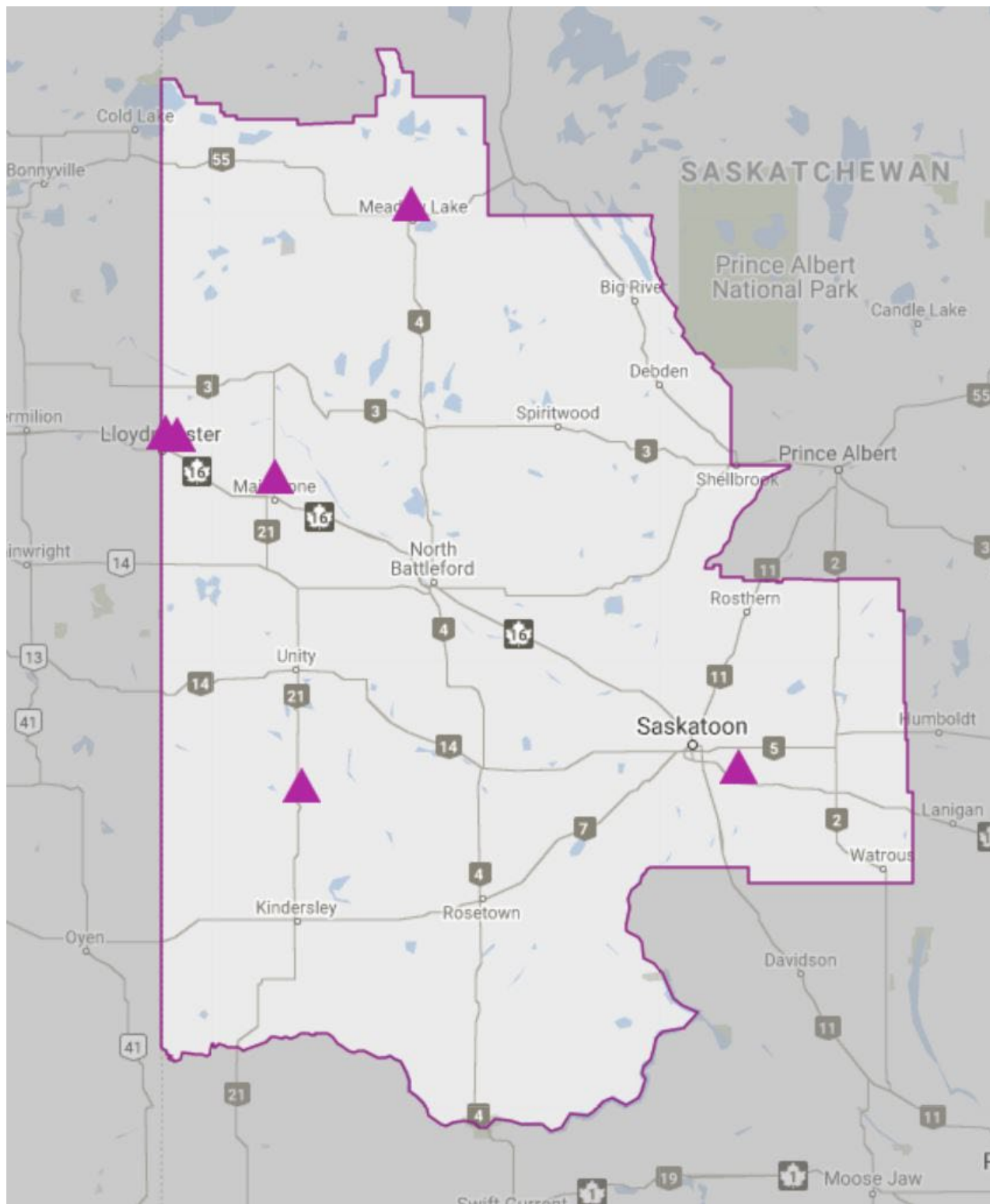
## **1.2 WYAMZ Air Monitoring Network**

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 NAPS station is owned and operated by the Ministry of Environment. The Cenovus East and West stations in Lloydminster are owned and operated by Cenovus.

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 2021. A total of 5 exceedance events for 1-hour average H<sub>2</sub>S, were recorded for the WYAMZ air monitoring network. There were 16 24-hour PM<sub>2.5</sub> exceedances recorded.

**Table 3. Number of exceedance events for 2021**

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	5
		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>	16

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 kph – 1.4 kph) and Light Breeze (1.4 kph – 3.1 kph), Moderate Breeze (3.1 kph – 7.8 kph) and fast wind (>7.8 kph). 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.



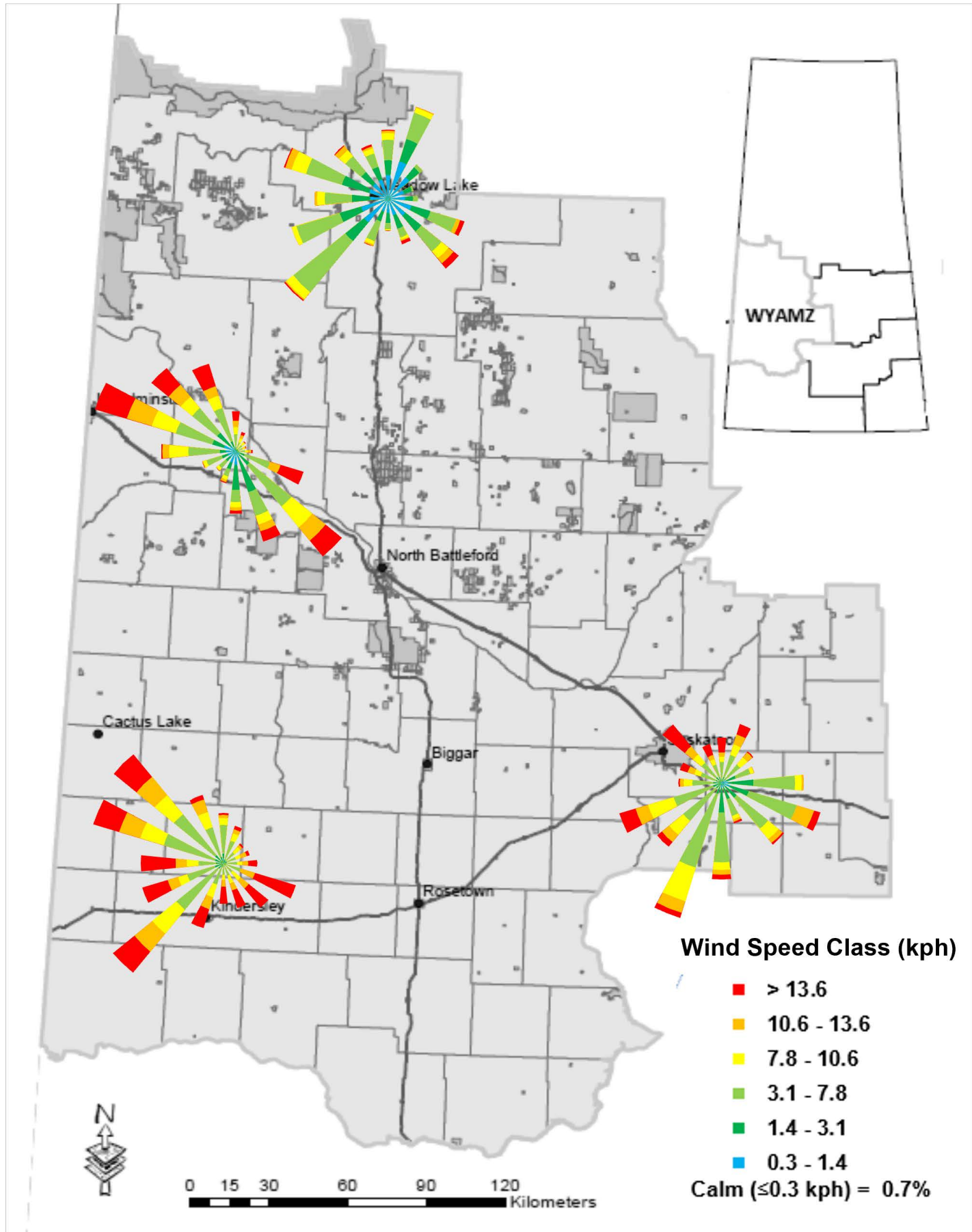


Figure 3. Wind roses for 1-hour average wind data for 2021

## 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 for 2021 was 0.4 ppb and 0.1 ppb at the Maidstone and Kerrobert stations, respectively. The maximum 1-hour average concentration of 13.5 ppb and the maximum 24-hour average concentration of 9.4 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.

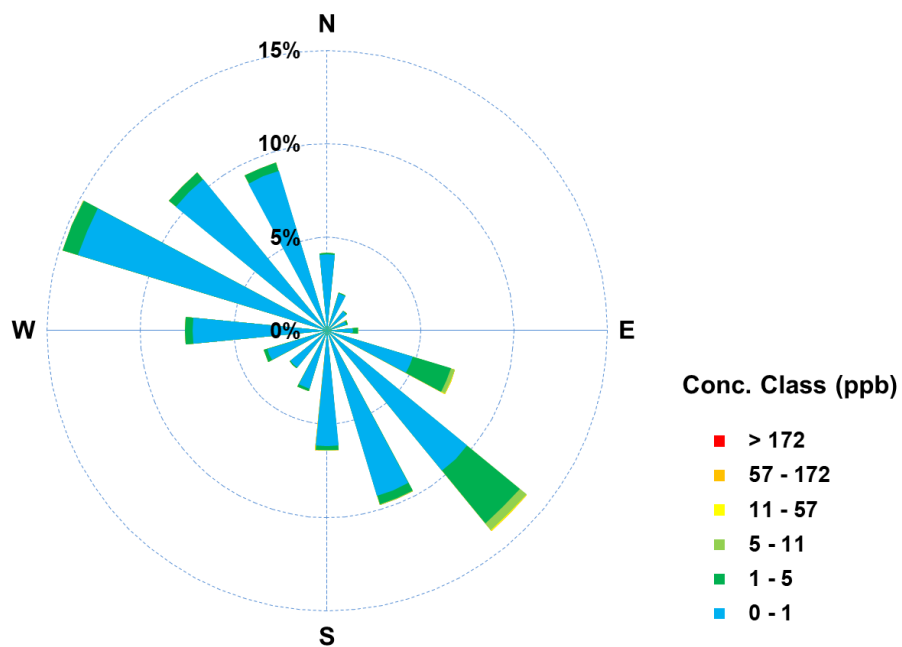
The detailed frequency distribution tables for the pollutant roses are presented in the Appendices: Table C-2 and Table E-2.

**Table 4. Summary statistics for SO<sub>2</sub> measurement results for 2021**

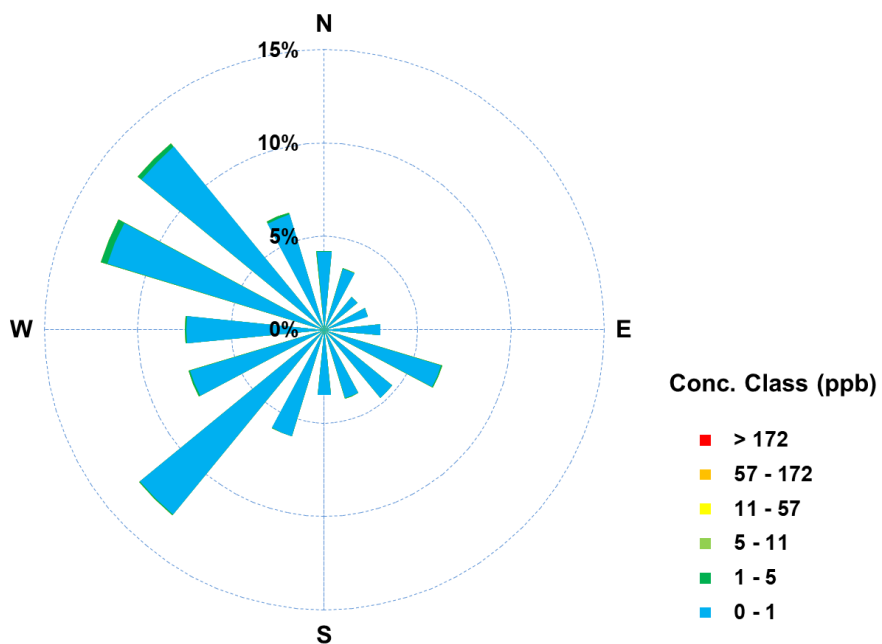
Monitoring Station	Annual Average	Instrument Uptime	Maximum SO <sub>2</sub> Conc. and Occurrence Time			
			1-hour Max.		24-hour Max.	
			ppb	Time	ppb	Date
Maidstone	0.4	100.0	13.5	Aug-01 09:00	3.6	Feb 19
Kerrobert	0.1	95.3	9.4	Jul-30 12:00	1.3	Dec 31

**Table 5. Number of exceedance events for SO<sub>2</sub> for 2021**

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<sub>2</sub>S)**

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

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

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

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

Table 6 presents the summary statistics for H<sub>2</sub>S measurement results. The measured concentration was low at both stations; the average concentration from 2021 were 0.3 ppb and 0.2 ppb at the Maidstone and Kerrobert stations, respectively. The maximum 1-hour average concentration of 20.8 ppb and the maximum 24-hour average concentration of 3.4 ppb were both measured at the Maidstone station. There were five 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<sub>2</sub>S. For more than 99% of time, H<sub>2</sub>S concentration was less than or equal to 1 ppb (blue petals) at both stations. The higher concentrations (> 1 ppb) at the Maidstone station tend to be slightly more frequent when wind was from the 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.

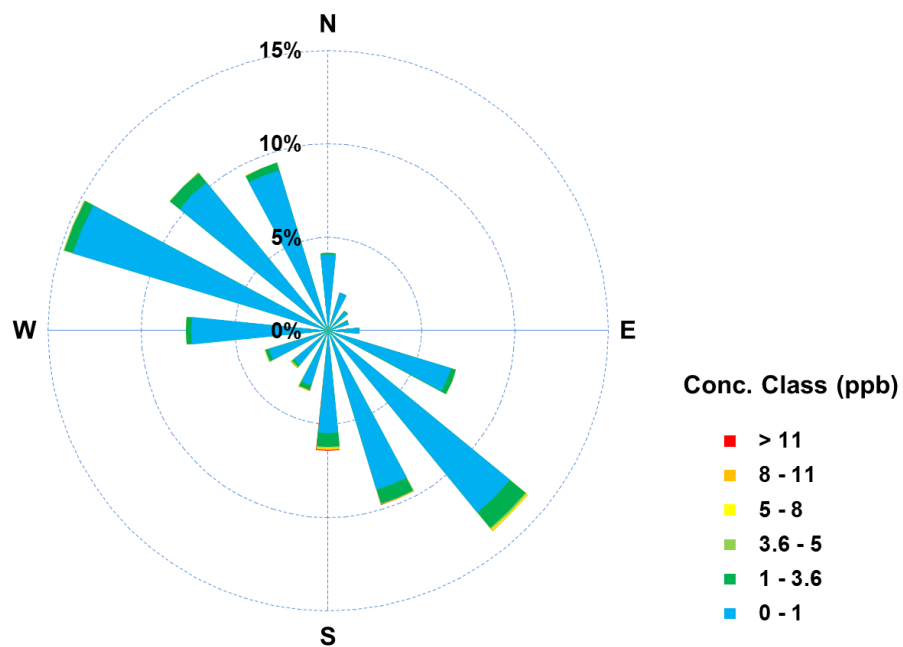
The detailed frequency distribution tables for the pollutant roses are presented in the Appendices: Table C-3 and Table E-3.

**Table 6. Summary statistics for H<sub>2</sub>S measurement results for 2021**

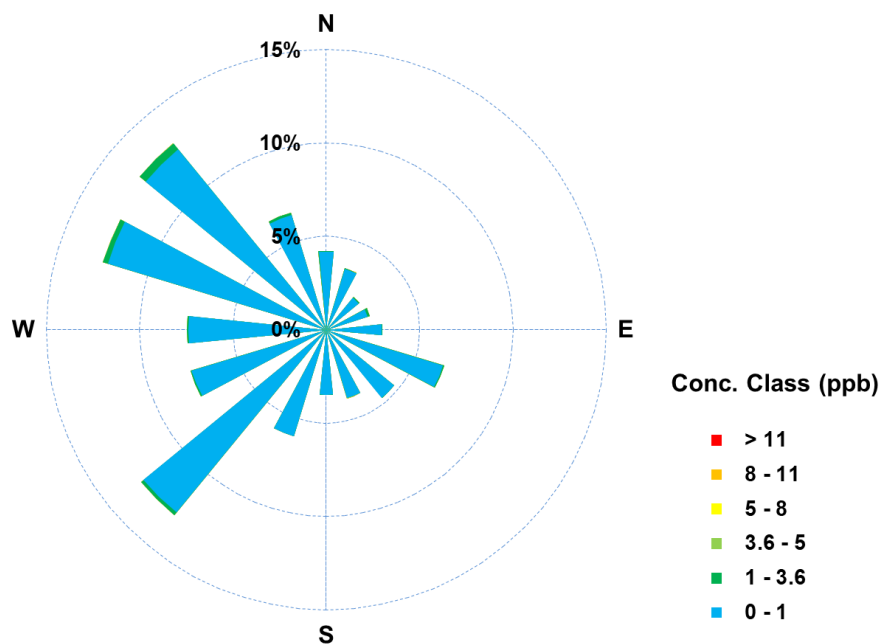
Monitoring Station	Annual Average	Instrument Uptime	Maximum H <sub>2</sub> S Conc. and Occurrence Time			
			1-hour Max.		24-hour Max.	
			ppb	Time	ppb	Date
Maidstone	0.3	100.0	20.8	July 10 06:00	3.4	June 28
Kerrobert	0.2	95.3	5.1	July 30 12:00	1.2	May 31

**Table 7. Number of exceedance events for H<sub>2</sub>S for 2021**

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	5	0
Kerrobert	0	0



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



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

### **2.3.3 Oxides of Nitrogen (NO<sub>x</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 5.2 ppb. The average concentration recorded at the Maidstone station was 3.4 ppb and 2.9 ppb at Meadow Lake City station. Both the maximum 1-hour concentration and maximum 24-hour concentration were detected at the at the Meadow Lake City 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 83% 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, 14.0% 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 21.4% 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 2021**

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	3.4	100.0	24.1	Feb 14 04:00	13.7	Jan 7
Clavet	5.2	88.3	27.4	June 4 21:00	10.4	June 8
Meadow Lake City	2.9	100.0	36.6	Feb 18 07:00	15.0	Mar 3

**Table 9. Number of exceedance events for NO<sub>2</sub> for 2021**

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

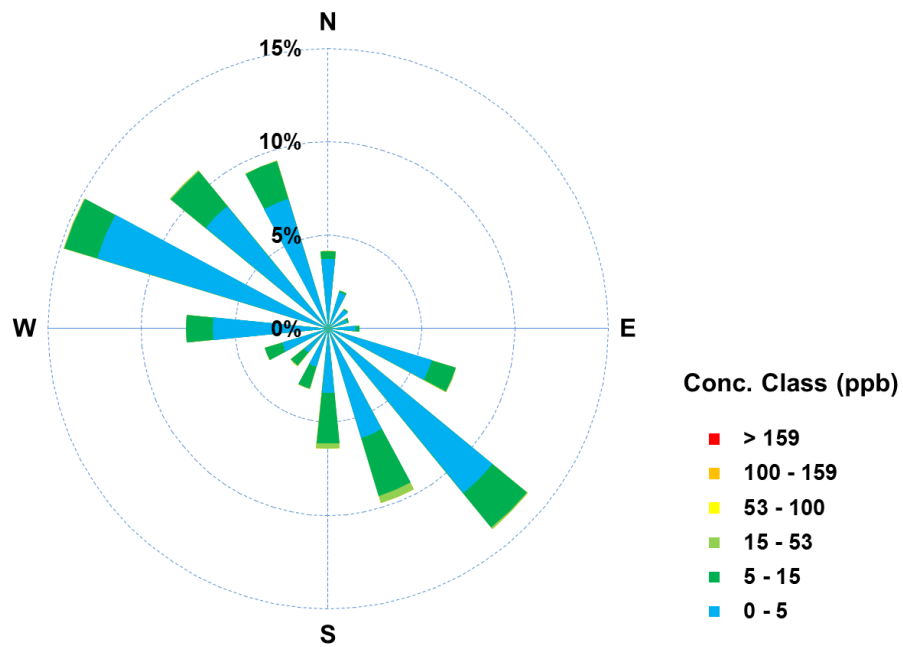


Figure 8. Pollutant rose for 1-hour average NO<sub>2</sub> data at the Maidstone station

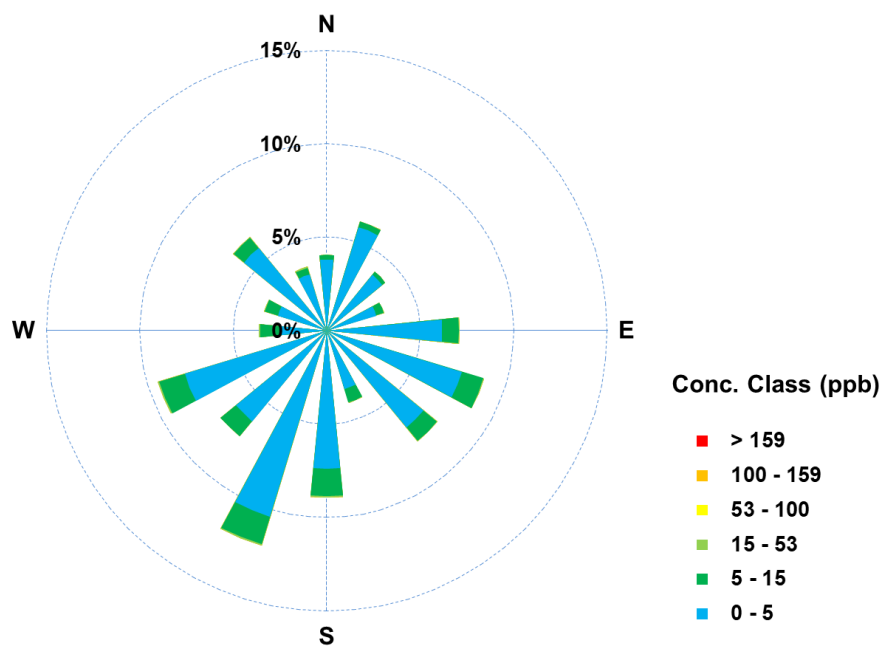
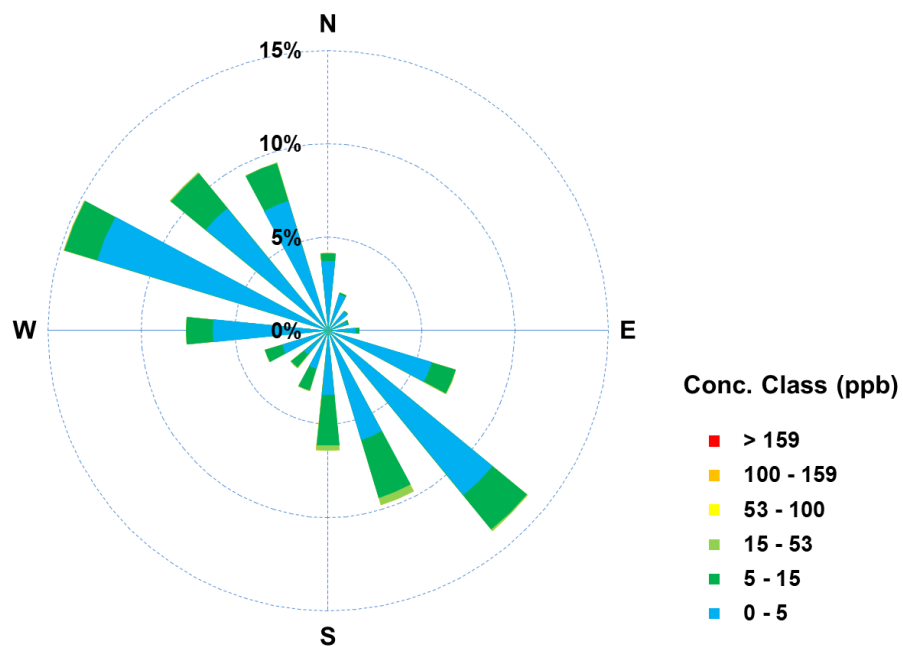


Figure 9. Pollutant rose for 1-hour average NO<sub>2</sub> data at the Clavet station



**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 2021 was 29 ppb and 27 ppb respectively for Clavet and Meadow Lake City stations. The maximum 1-hour concentration of 68 ppb and the 4<sup>th</sup> highest 8-hour running averages of 64 ppb were both detected at the Clavet station. There was one 8-hour running averages higher than the CWS standard (see Table 11) recorded at Clavet. 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.

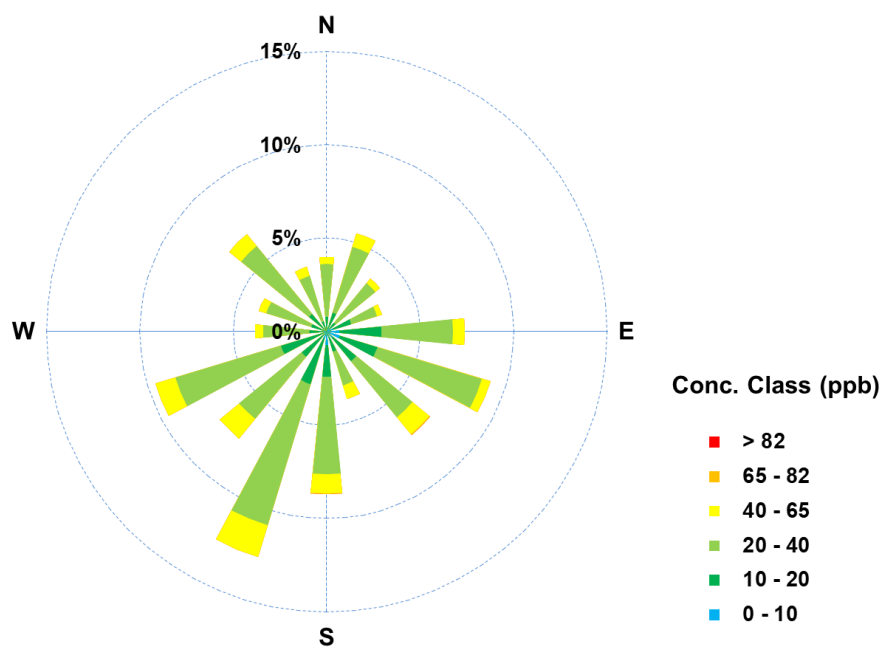
**Table 10. Summary statistics for O<sub>3</sub> measurement results for 2021**

Monitoring Station	Annual Average	Instrument Uptime	Maximum O <sub>3</sub> Conc. and Occurrence Time			
			1-hour Max.		8-hour 4 <sup>th</sup> Highest	
	ppb	%	ppb	Time	ppb	Time
Clavet	29	100.0	68	June 15 18:00	64	June 15 14:00
Meadow Lake City	27	100.0	65	June 15 19:00	59	June 15 10:00

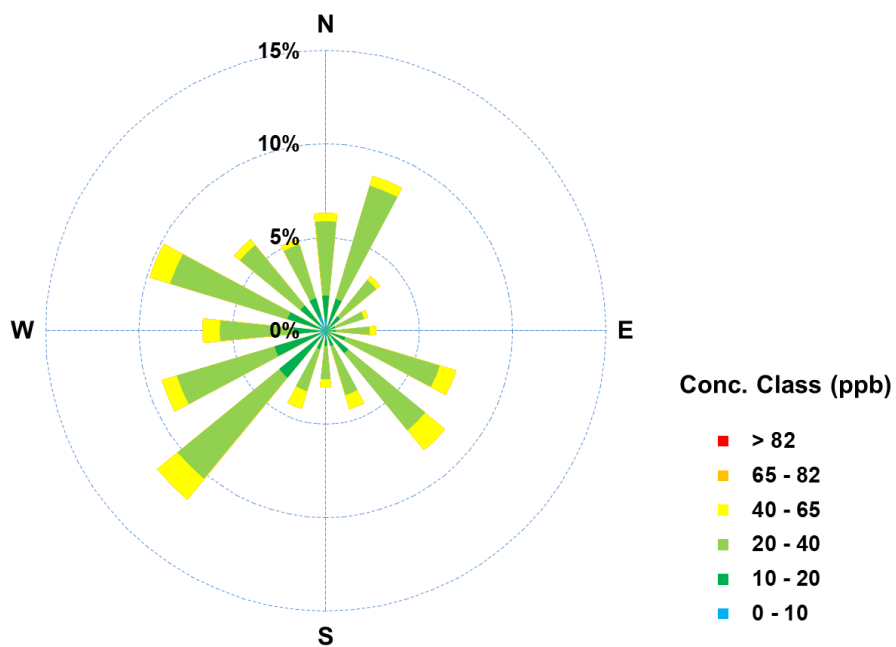
**Table 11. Number of exceedance events for O<sub>3</sub> for 2021**

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	1
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 2021 ranged between 4 and 8 µg/m<sup>3</sup>. The maximum 1-hour concentration of 562 µg/m<sup>3</sup> and the maximum 24-hour concentration of 154 µg/m<sup>3</sup> were both detected at the Clavet station. There were 13 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> (82% to 87% of the time for the four stations). Winds from the northwest were more prevalent with 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 and southwest. Highest concentrations were detected when the wind was from the southwest 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.

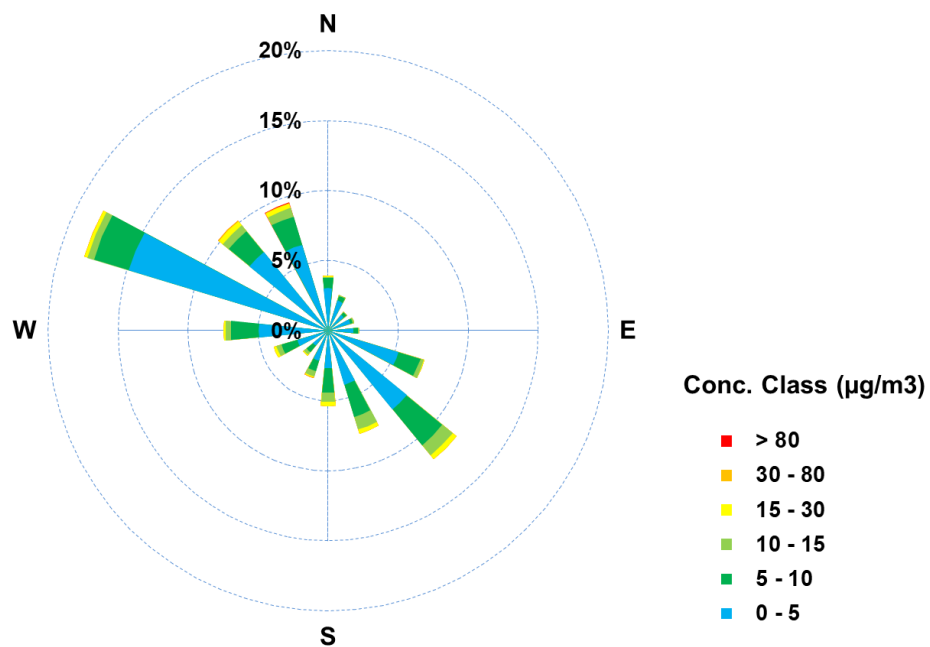
**Table 12. Summary statistics for PM<sub>2.5</sub> measurement results for 2021**

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>	Time	µg/m <sup>3</sup>	Date
Maidstone	8	76.5	337	July 17 07:00	137	July 17
Kerrobert	7	98.3	158	July 18 17:00	121	July 18
Clavet	4	100.0	562	Oct 04 14:00	154	Oct 04
Meadow Lake City	6	79.6	126	Oct 06 01:00	46	Oct 06

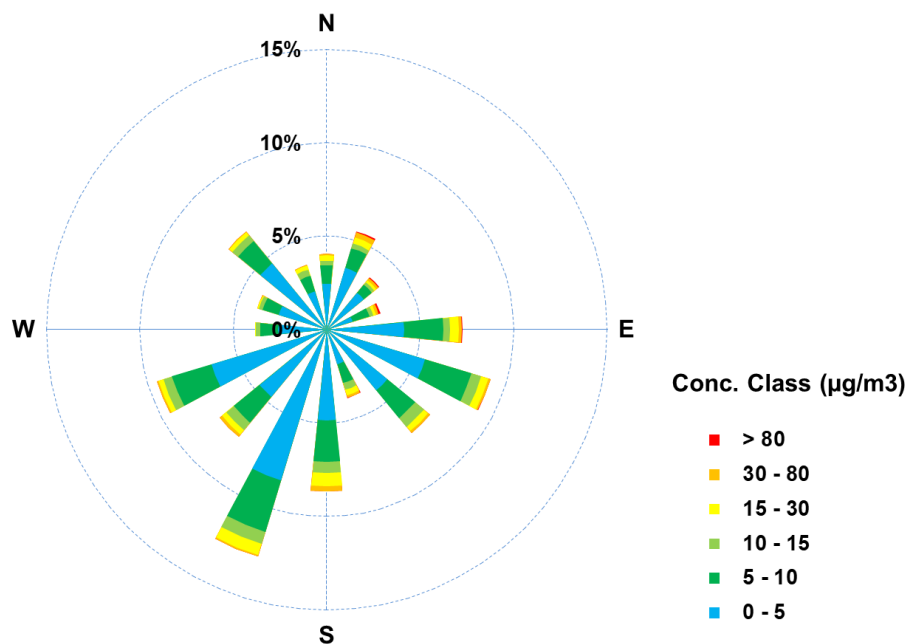
**Table 13. Number of exceedance events for PM<sub>2.5</sub> for 2021**

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	6	
Kerrobert	0	
Clavet	6	
Meadow Lake City	1	

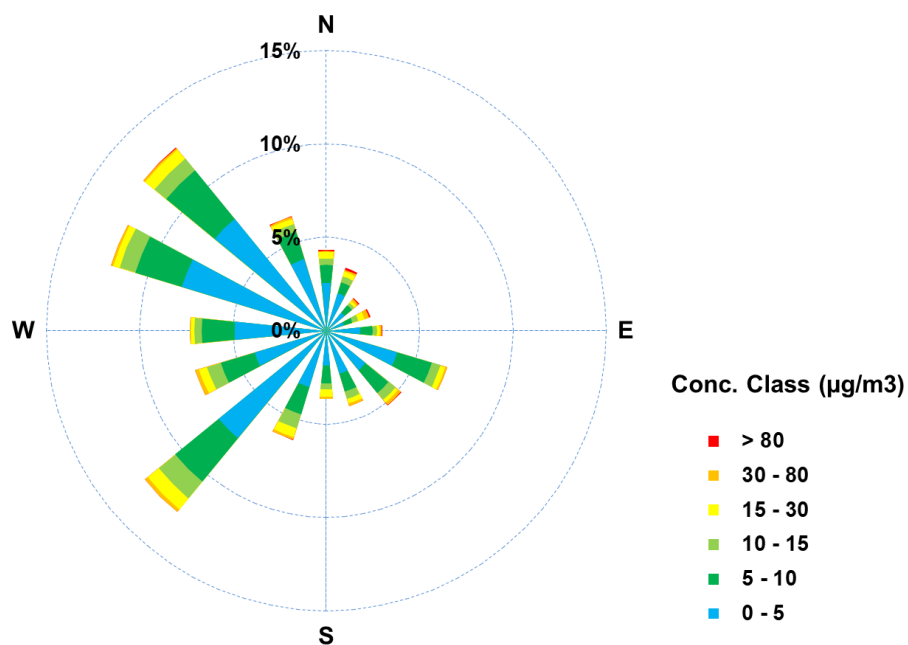




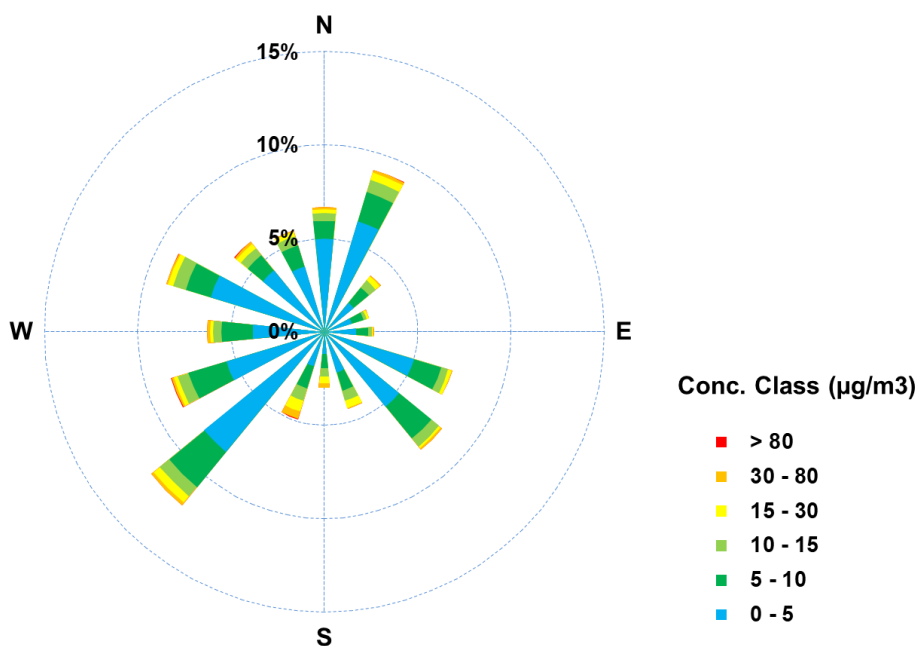
**Figure 13. Pollutant rose for 1-hour average  $PM_{2.5}$  data at the Maidstone station**



**Figure 14. Pollutant rose for 1-hour average  $PM_{2.5}$  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 1.3% 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 3.3% of time in the Moderate Risk category and 0.1% in the High-Risk category and 0.2% 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	98.7%	1.3%	0.0%	0.0%
Clavet	Occurrence Hours	7430	257	11	13
	Occurrence Frequency	96.4%	3.3%	0.1%	0.2%

## 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 97.0% of the time; and 2.0% was rated Fair, 0.9% of time in the High-Risk category and 0.1% in the Very High-Risk category. The Fair and Poor air quality was associated with an increased PM<sub>2.5</sub> concentration.

**Table 15. AQI rating and effect description**

<b>AQI</b>	<b>Air Quality Rating</b>	<b>Effect Description</b>
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**

<b>Station Name</b>	<b>Occurrence Statistics</b>	<b>Occurrence Hours and Frequency by AQI Rating</b>			
		Good	Fair	Poor	Very Poor
Maidstone	Occurrence Hours	6213	129	60	5
	Occurrence Frequency	97.0%	2.0%	0.9%	0.1%

## APPENDIX A. SASKATCHEWAN AMBIENT AIR QUALITY STANDARDS

TABLE 20: SASKATCHEWAN AMBIENT AIR QUALITY STANDARDS ( $\mu\text{g}/\text{m}^3$ )				
Air Pollutant	1 Hour	8 Hours	24 Hours	Annual
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.

**Table A-1. Saskatchewan Ambient Air Quality Standards**

## APPENDIX B. MAIDSTONE STATION: CONTINUOUS MONITORING DATA

**Table B-1 Maidstone Station: Summary statistics for continuous air monitoring results for 2021**

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	414	8346	100.0	0.4	< 0.1	13.5
H <sub>2</sub> S	ppb	414	8346	100.0	0.3	< 0.1	20.8
NO	ppb	414	8346	100.0	0.5	< 0.1	19.8
NO <sub>2</sub>	ppb	414	8346	100.0	3.4	< 0.1	24.1
NO <sub>x</sub>	ppb	414	8346	100.0	3.9	< 0.1	33.0
PM <sub>2.5</sub>	µg/m <sup>3</sup>	0	6706	76.8	8	< 1	337
Precipitation	mm	0	8760	100.0	249.8 <sup>b</sup>	< 0.1	12.5
Ambient Temperature	°C	0	8760	100.0	2.7	-39.8	35.3
Relative Humidity	%	0	8760	100.0	60	< 1	90
Wind Speed	kph	0	8758	100.0	4.7	Calm	29.3

*a. Automatic Instrument Check*

*b. Total precipitation*

**Table B-2. Maidstone Station: Summary of airpointer® SO<sub>2</sub> monitoring results for 2021**

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%	0.7	11.0	0	2.5	0	81.1	17.3	1.5	0.1	0.0	0.0
February	643	100.0%	0.8	10.6	0	3.6	0	79.3	17.7	3.0	0.0	0.0	0.0
March	703	100.0%	0.6	13.0	0	2.4	0	87.6	11.0	1.1	0.3	0.0	0.0
April	689	100.0%	0.2	3.7	0	0.8	0	95.9	4.1	0.0	0.0	0.0	0.0
May	712	100.0%	0.3	10.0	0	1.4	0	94.7	4.8	0.6	0.0	0.0	0.0
June	680	100.0%	0.3	10.7	0	1.5	0	94.0	5.6	0.4	0.0	0.0	0.0
July	712	100.0%	0.3	8.1	0	1.4	0	93.7	5.8	0.6	0.0	0.0	0.0
August	712	100.0%	0.4	13.5	0	1.7	0	92.3	6.9	0.7	0.1	0.0	0.0
September	680	100.0%	0.3	8.4	0	0.8	0	95.7	3.8	0.4	0.0	0.0	0.0
October	712	100.0%	0.4	4.6	0	1.3	0	90.3	9.7	0.0	0.0	0.0	0.0
November	689	100.0%	0.5	11.4	0	3.0	0	89.3	9.0	1.6	0.1	0.0	0.0
December	702	100.0%	0.6	11.7	0	2.1	0	81.1	18.7	0.1	0.1	0.0	0.0
Annual <sup>c</sup>	8346	100.0%	0.4	13.5	0	3.6	0	89.6	9.5	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® H<sub>2</sub>S monitoring results for 2021**

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	1.3	0	0.3	0	99.9	0.1	0.0	0.0	0.0	0.0
February	643	100.0%	0.1	1.5	0	0.3	0	99.5	0.5	0.0	0.0	0.0	0.0
March	703	100.0%	0.1	1.8	0	0.4	0	99.4	0.6	0.0	0.0	0.0	0.0
April	689	100.0%	0.1	0.9	0	0.2	0	100.0	0.0	0.0	0.0	0.0	0.0
May	712	100.0%	0.2	3.1	0	0.7	0	96.9	3.1	0.0	0.0	0.0	0.0
June	680	100.0%	0.7	19.0	3	3.4	0	81.0	16.0	1.2	0.4	0.9	0.4
July	712	100.0%	0.8	20.8	2	2.8	0	76.4	20.5	1.7	0.8	0.1	0.4
August	712	100.0%	0.6	9.5	0	1.7	0	85.3	12.9	0.7	0.6	0.6	0.0
September	680	100.0%	0.4	3.9	0	0.8	0	93.4	6.3	0.3	0.0	0.0	0.0
October	712	100.0%	0.3	2.1	0	1.1	0	95.5	4.5	0.0	0.0	0.0	0.0
November	689	100.0%	0.1	0.9	0	0.3	0	100.0	0.0	0.0	0.0	0.0	0.0
December	702	100.0%	0.1	1.7	0	0.3	0	99.1	0.9	0.0	0.0	0.0	0.0
Annual <sup>c</sup>	8346	100.0%	0.3	20.8	5	3.4	0	93.8	5.5	0.3	0.2	0.1	0.1

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 2021**

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%	0.7	15.8	-	3.0	-	97.4	2.4	0.1	0.0	0.0	0.0
February	643	100.0%	0.8	11.8	-	2.5	-	96.7	3.3	0.0	0.0	0.0	0.0
March	703	100.0%	0.5	7.9	-	1.4	-	99.4	0.6	0.0	0.0	0.0	0.0
April	689	100.0%	0.3	9.2	-	0.8	-	99.6	0.4	0.0	0.0	0.0	0.0
May	712	100.0%	0.3	5.1	-	0.8	-	99.9	0.1	0.0	0.0	0.0	0.0
June	680	100.0%	0.5	19.8	-	3.4	-	99.0	0.7	0.3	0.0	0.0	0.0
July	712	100.0%	0.4	6.0	-	1.0	-	99.6	0.4	0.0	0.0	0.0	0.0
August	712	100.0%	0.5	10.7	-	1.5	-	99.6	0.4	0.0	0.0	0.0	0.0
September	680	100.0%	0.4	16.6	-	1.9	-	99.3	0.6	0.1	0.0	0.0	0.0
October	712	100.0%	0.5	10.8	-	2.9	-	98.7	1.3	0.0	0.0	0.0	0.0
November	689	100.0%	0.7	11.4	-	1.8	-	98.3	1.7	0.0	0.0	0.0	0.0
December	702	100.0%	0.7	12.2	-	3.6	-	97.4	2.6	0.0	0.0	0.0	0.0
Annual <sup>c</sup>	8346	100.0%	0.5	19.8	-	3.6	-	98.7	1.2	0.0	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® NO<sub>2</sub> monitoring results for 2021**

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%	5.7	21.1	0	13.7	-	56.5	38.3	5.2	0.0	0.0	0.0
February	643	100.0%	4.5	24.1	0	11.9	-	68.1	30.3	1.6	0.0	0.0	0.0
March	703	100.0%	3.4	14.1	0	7.1	-	78.0	22.0	0.0	0.0	0.0	0.0
April	689	100.0%	2.7	12.2	0	4.9	-	82.7	17.3	0.0	0.0	0.0	0.0
May	712	100.0%	2.4	12.9	0	4.5	-	86.9	13.1	0.0	0.0	0.0	0.0
June	680	100.0%	2.9	15.0	0	5.6	-	80.9	19.1	0.0	0.0	0.0	0.0
July	712	100.0%	1.5	13.1	0	3.8	-	94.0	6.0	0.0	0.0	0.0	0.0
August	712	100.0%	2.1	10.4	0	3.6	-	91.0	9.0	0.0	0.0	0.0	0.0
September	680	100.0%	2.3	12.4	0	4.0	-	90.6	9.4	0.0	0.0	0.0	0.0
October	712	100.0%	3.1	20.0	0	7.3	-	85.7	13.8	0.6	0.0	0.0	0.0
November	689	100.0%	4.8	20.3	0	8.8	-	59.9	39.5	0.6	0.0	0.0	0.0
December	702	100.0%	5.3	20.8	0	13.3	-	57.5	38.9	3.6	0.0	0.0	0.0
Annual <sup>c</sup>	8346	100.0%	3.4	24.1	0	13.7	-	77.7	21.4	1.0	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 2021**

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%	6.4	28.8	-	16.4	-	50.7	41.3	8.0	0.0	0.0	0.0
February	643	100.0%	5.4	27.1	-	14.1	-	56.9	39.7	3.4	0.0	0.0	0.0
March	703	100.0%	3.9	17.3	-	7.4	-	71.4	28.2	0.4	0.0	0.0	0.0
April	689	100.0%	3.0	18.1	-	5.7	-	79.8	19.6	0.6	0.0	0.0	0.0
May	712	100.0%	2.7	14.6	-	5.1	-	84.4	15.6	0.0	0.0	0.0	0.0
June	680	100.0%	3.4	33.0	-	8.9	-	77.6	20.9	1.5	0.0	0.0	0.0
July	712	100.0%	1.9	13.8	-	4.2	-	91.0	9.0	0.0	0.0	0.0	0.0
August	712	100.0%	2.5	17.2	-	4.9	-	85.7	14.0	0.3	0.0	0.0	0.0
September	680	100.0%	2.7	21.9	-	5.1	-	88.5	11.2	0.3	0.0	0.0	0.0
October	712	100.0%	3.6	21.7	-	8.2	-	80.5	18.1	1.4	0.0	0.0	0.0
November	689	100.0%	5.5	23.6	-	10.2	-	51.2	46.3	2.5	0.0	0.0	0.0
December	702	100.0%	6.0	23.2	-	16.9	-	50.4	43.7	5.8	0.0	0.0	0.0
Annual <sup>c</sup>	8346	100.0%	3.9	33.0	-	16.9	-	72.4	25.6	2.0	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® PM<sub>2.5</sub> monitoring results for 2021**

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Conc. (µg/m <sup>3</sup> )	Maximum 1-Hr Conc. (µg/m <sup>3</sup> )	1-Hour Exceedance <sup>a</sup> (no.)	Maximum 24-Hr Conc. (µg/m <sup>3</sup> )	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	0	0.0%	< 1	< 1	-	< 1	0	-	-	-	-	-	-
February	0	0.0%	-	< 1	-	< 1	0	-	-	-	-	-	-
March	130	17.5%	3	14	-	6	0	73.8	22.3	3.8	0.0	0.0	0.0
April	720	100.0%	5	70	-	10	0	69.9	19.6	6.7	2.9	1.0	0.0
May	744	100.0%	5	44	-	10	0	68.1	21.2	5.9	4.3	0.4	0.0
June	720	100.0%	5	46	-	12	0	66.7	19.6	10.6	2.8	0.4	0.0
July	744	100.0%	20	337	-	137	5	29.8	25.0	13.4	16.4	9.3	6.0
August	744	100.0%	10	115	-	32	1	39.9	29.8	9.8	16.8	3.4	0.3
September	720	100.0%	4	33	-	9	0	74.0	20.3	3.3	2.2	0.1	0.0
October	744	100.0%	9	157	-	82	2	58.6	29.8	3.9	2.0	3.4	2.3
November	720	100.0%	6	30	-	16	0	51.4	34.0	9.9	4.4	0.3	0.0
December	744	100.0%	7	115	-	48	1	57.4	28.8	6.2	4.8	2.2	0.7
Annual <sup>c</sup>	6706	76.8%	8	337	-	137	9	57.5	25.3	7.7	6.2	2.2	1.0

*a. No 1-hour Saskatchewan Ambient Air Quality Standard*

*b. 24-hour Canada-Wide Standard = 28 µg/m<sup>3</sup>*

*c. No annual Saskatchewan Ambient Air Quality Standard*

**Table B-8. Maidstone Station: Summary of airpointer® precipitation monitoring results for 2021**

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%	2.4	1.9	2.4	100.0	0.0	0.0	0.0	0.0	0.0
February	672	100.0%	< 0.1	< 0.1	< 0.1	100.0	0.0	0.0	0.0	0.0	0.0
March	744	100.0%	0.4	0.3	0.3	100.0	0.0	0.0	0.0	0.0	0.0
April	720	100.0%	0.1	0.1	0.1	100.0	0.0	0.0	0.0	0.0	0.0
May	744	100.0%	55.3	8.6	52.9	99.6	0.4	0.0	0.0	0.0	0.0
June	720	100.0%	72.0	12.5	21.7	99.4	0.3	0.3	0.0	0.0	0.0
July	744	100.0%	35.4	11.7	12.0	99.6	0.3	0.1	0.0	0.0	0.0
August	744	100.0%	33.8	9.1	11.2	99.9	0.1	0.0	0.0	0.0	0.0
September	720	100.0%	6.0	2.2	2.6	100.0	0.0	0.0	0.0	0.0	0.0
October	744	100.0%	25.7	4.4	18.4	100.0	0.0	0.0	0.0	0.0	0.0
November	720	100.0%	17.9	4.4	8.7	100.0	0.0	0.0	0.0	0.0	0.0
December	744	100.0%	0.8	0.4	0.8	100.0	0.0	0.0	0.0	0.0	0.0
Annual	8760	100.0%	249.8	12.5	52.9	99.9	0.1	0.0	0.0	0.0	0.0

**Table B-9. Maidstone Station: Summary of airpointer® ambient temperature monitoring results for 2021**

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%	-10.9	-36.5	3.5	3.0	20.4	71.1	5.5	0.0	0.0
February	672	100.0%	-18.3	-39.8	4.9	14.1	49.9	30.1	6.0	0.0	0.0
March	744	100.0%	-2.4	-18.7	16.0	0.0	0.7	67.2	31.6	0.5	0.0
April	720	100.0%	3.8	-9.4	22.2	0.0	0.0	33.5	59.4	7.1	0.0
May	744	100.0%	10.4	-8.2	29.4	0.0	0.0	6.6	67.1	26.3	0.0
June	720	100.0%	18.2	3.2	34.2	0.0	0.0	0.0	38.1	56.3	5.7
July	744	100.0%	19.6	6.2	34.4	0.0	0.0	0.0	25.9	68.4	5.6
August	744	100.0%	17.2	4.0	35.3	0.0	0.0	0.0	40.1	56.0	3.9
September	720	100.0%	12.6	-2.7	26.8	0.0	0.0	1.1	64.2	34.7	0.0
October	744	100.0%	4.2	-8.8	21.9	0.0	0.0	24.6	69.0	6.5	0.0
November	720	100.0%	-5.0	-19.7	10.4	0.0	4.7	76.1	19.2	0.0	0.0
December	744	100.0%	-17.8	-38.0	7.8	11.0	47.3	38.3	3.4	0.0	0.0
Annual	8760	100.0%	2.7	-39.8	35.3	2.3	10.1	29.2	35.8	21.4	1.3

**Table B-10. Maidstone Station: Summary of airpointer® relative humidity monitoring results for 2021**

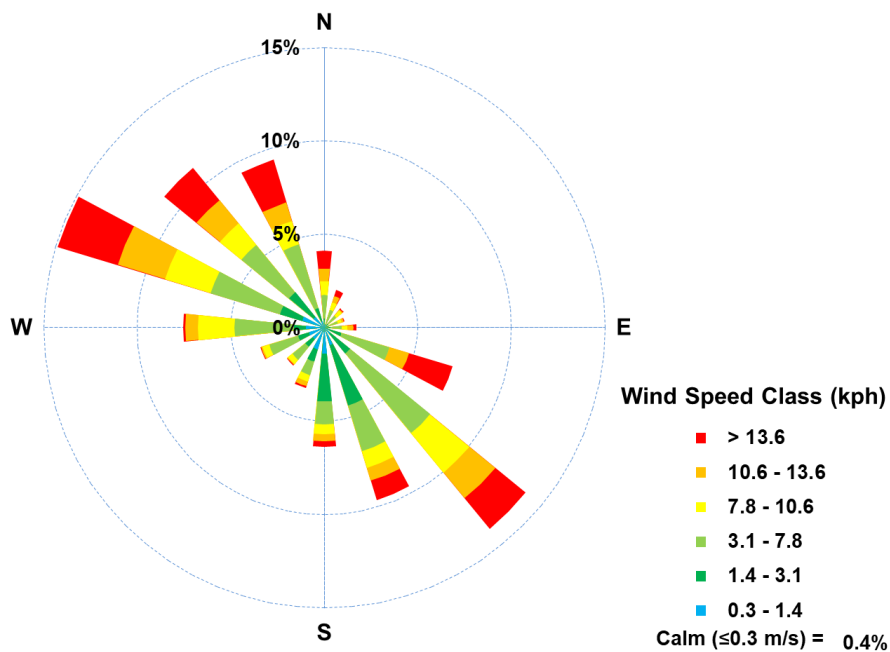
Month	Valid 1-Hr data (no.)	Operational Time (%)	Average RH (%)	Minimum 1-Hr RH (%)	Maximum 1-Hr RH (%)	Percent of Data in each Relative Humidity Range					
						≤15	15 - 30	30 - 60	60 - 80	80 - 90	>90
January	768	100.0%	67	52	85	3.1	0.0	12.2	82.9	1.7	0.0
February	672	100.0%	63	46	80	0.0	0.0	35.7	64.1	0.1	0.0
March	744	100.0%	64	24	86	0.0	0.9	32.9	58.6	7.5	0.0
April	720	100.0%	46	15	80	0.0	23.8	53.3	22.9	0.0	0.0
May	744	100.0%	47	14	89	0.8	23.8	47.4	23.7	4.3	0.0
June	720	100.0%	58	10	89	0.1	9.4	42.9	28.2	19.3	0.0
July	744	100.0%	60	23	90	0.0	7.4	38.8	34.7	19.0	0.1
August	744	100.0%	61	20	89	0.0	4.8	41.0	31.6	22.6	0.0
September	720	100.0%	57	0	89	0.3	9.0	43.6	29.9	17.2	0.0
October	744	100.0%	59	14	87	0.3	6.6	40.5	45.0	7.7	0.0
November	720	100.0%	70	41	87	0.0	0.0	15.3	73.3	11.4	0.0
December	744	100.0%	66	47	85	0.0	0.0	16.8	80.5	2.7	0.0
Annual	8784	100.0%	60	0	90	0.4	7.1	34.9	48.0	9.5	0.0



**Table B-11. Maidstone Station: Wind frequency table for 2021**

Wind Direction Sector	Percent of Data within Wind Speed Range, wind speed unit kph						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%	0.7%	0.9%	0.2%	0.0%	0.0%	2.1%
NorthEast	0.2%	0.4%	0.4%	0.2%	0.0%	0.0%	1.2%
East NorthEast	0.2%	0.3%	0.4%	0.1%	0.1%	0.0%	1.1%
East	0.4%	0.3%	0.4%	0.3%	0.3%	0.1%	1.7%
East SouthEast	1.2%	1.7%	2.7%	0.5%	0.4%	0.6%	7.1%
SouthEast	1.8%	3.5%	5.2%	1.4%	0.5%	1.4%	13.7%
South SouthEast	2.8%	2.9%	2.4%	0.6%	0.3%	0.3%	9.3%
South	2.3%	2.3%	0.9%	0.2%	0.1%	0.1%	5.9%
South SouthWest	1.3%	0.8%	0.7%	0.1%	0.1%	0.0%	3.0%
SouthWest	1.2%	0.6%	0.5%	0.1%	0.0%	0.0%	2.4%
West SouthWest	1.2%	0.9%	0.9%	0.1%	0.0%	0.0%	3.2%
West	1.3%	2.0%	2.3%	1.2%	0.3%	0.0%	7.1%
West NorthWest	1.9%	3.3%	5.1%	1.4%	1.4%	1.3%	14.4%
NorthWest	2.1%	2.4%	3.5%	0.9%	0.9%	1.1%	10.9%
North NorthWest	1.2%	2.4%	3.6%	0.8%	0.5%	0.7%	9.2%
North	0.5%	1.0%	2.0%	0.3%	0.1%	0.1%	4.1%
Total	19.8%	25.5%	31.7%	8.5%	5.1%	5.9%	96.5%

Percent Calm ( $\leq 0.3$ kph)	3.5%
Number of Valid Hourly-Average Data	8758
Total Workable Hours in Time Period	8760



## APPENDIX C. CLAVET STATION: CONTINUOUS MONITORING DATA

**Table C-1 Clavet Station: Summary statistics for continuous air monitoring results for 2021**

Parameter	Unit	Calibration & AIC <sup>a</sup>	Valid Data	Uptime	Summary Statistics for Hourly Average Data		
		(hours)	(hours)	(%)	Average	Minimum	Maximum
NO	ppb	366	7381	88.3	2.5	< 0.1	32.9
NO <sub>2</sub>	ppb	366	7381	88.3	5.2	< 0.1	27.4
NO <sub>x</sub>	ppb	366	7381	88.3	7.7	< 0.1	44.8
O <sub>3</sub>	ppb	408	8295	100.0	29	< 1	68
PM <sub>2.5</sub>	µg/m <sup>3</sup>	6	8758	100.0	4	< 1	562
Precipitation	mm	0	8760	100.0	187.9 <sup>b</sup>	< 0.1	17.4
Ambient Temperature	°C	0	8760	100.0	4.0	-37.7	38.0
Relative Humidity	%	0	8760	100.0	67	< 1	89
Wind Speed	kph	0	8760	100.0	4.8	Calm	34.5

*a. Automatic Instrument Check*

*b. Total precipitation*

**Table C-2. Clavet Station: Summary of airpointer® NO monitoring results for 2021**

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	0	0.0%	< 0.1	< 0.1	-	< 0.1	-	100.0	0.0	0.0	0.0	0.0	0.0
February	418	64.3%	1.7	16.2	-	5.3	-	94.5	5.3	0.2	0.0	0.0	0.0
March	703	100.0%	0.7	5.2	-	1.3	-	99.9	0.1	0.0	0.0	0.0	0.0
April	687	100.0%	0.5	13.1	-	1.1	-	99.6	0.4	0.0	0.0	0.0	0.0
May	712	100.0%	0.4	9.7	-	1.3	-	99.6	0.4	0.0	0.0	0.0	0.0
June	682	100.0%	1.0	27.8	-	5.2	-	96.3	2.8	0.9	0.0	0.0	0.0
July	707	100.0%	0.3	5.0	-	0.8	-	100.0	0.0	0.0	0.0	0.0	0.0
August	662	100.0%	0.4	6.5	-	1.3	-	99.5	0.5	0.0	0.0	0.0	0.0
September	680	100.0%	0.7	10.2	-	1.9	-	99.1	0.9	0.0	0.0	0.0	0.0
October	711	100.0%	0.8	8.3	-	1.7	-	99.2	0.8	0.0	0.0	0.0	0.0
November	689	100.0%	1.2	16.8	-	2.5	-	98.4	1.5	0.1	0.0	0.0	0.0
December	704	100.0%	1.8	32.9	-	7.4	-	94.7	4.1	1.1	0.0	0.0	0.0
Annual <sup>c</sup>	7379	88.3%	2.5	32.9	-	7.4	-	98.4	1.4	0.2	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 C-3. Clavet Station: Summary of airpointer® NO2 monitoring results for 2021**

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	0	0.0%	< 0.1	< 0.1	0	< 0.1	-	100.0	0.0	0.0	0.0	0.0	0.0
February	420	64.3%	4.0	20.6	0	9.8	-	73.6	25.0	1.4	0.0	0.0	0.0
March	703	100.0%	2.6	10.1	0	5.2	-	89.8	10.2	0.0	0.0	0.0	0.0
April	687	100.0%	1.9	11.9	0	4.0	-	94.2	5.8	0.0	0.0	0.0	0.0
May	712	100.0%	2.2	14.5	0	4.1	-	91.4	8.6	0.0	0.0	0.0	0.0
June	682	100.0%	4.3	27.4	0	10.4	-	72.1	23.6	4.3	0.0	0.0	0.0
July	707	100.0%	2.3	9.3	0	3.7	-	90.7	9.3	0.0	0.0	0.0	0.0
August	662	100.0%	2.3	12.1	0	4.6	-	91.8	8.2	0.0	0.0	0.0	0.0
September	680	100.0%	2.4	13.8	0	4.2	-	90.1	9.9	0.0	0.0	0.0	0.0
October	711	100.0%	2.2	13.7	0	4.0	-	92.7	7.3	0.0	0.0	0.0	0.0
November	689	100.0%	3.1	18.2	0	6.4	-	83.5	16.4	0.1	0.0	0.0	0.0
December	704	100.0%	4.4	18.8	0	9.3	-	70.7	28.4	0.9	0.0	0.0	0.0
Annual <sup>c</sup>	7381	88.3%	5.2	27.4	0	10.4	-	86.0	13.4	0.6	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 2021**

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	0	0.0%	< 0.1	< 0.1	-	< 0.1	-	100.0	0.0	0.0	0.0	0.0	0.0
February	420	64.3%	5.7	27.0	-	15.1	-	57.6	37.1	5.2	0.0	0.0	0.0
March	703	100.0%	3.3	13.8	-	6.5	-	79.7	20.3	0.0	0.0	0.0	0.0
April	687	100.0%	2.4	25.0	-	4.7	-	90.7	9.0	0.3	0.0	0.0	0.0
May	712	100.0%	2.6	23.7	-	5.3	-	89.2	10.3	0.6	0.0	0.0	0.0
June	682	100.0%	5.3	44.2	-	14.7	-	65.7	27.6	6.7	0.0	0.0	0.0
July	707	100.0%	2.5	11.1	-	4.1	-	88.0	12.0	0.0	0.0	0.0	0.0
August	662	100.0%	2.6	14.3	-	4.9	-	89.3	10.7	0.0	0.0	0.0	0.0
September	680	100.0%	3.1	19.9	-	6.0	-	83.8	15.7	0.4	0.0	0.0	0.0
October	711	100.0%	3.0	19.1	-	5.7	-	83.7	15.9	0.4	0.0	0.0	0.0
November	689	100.0%	4.3	25.5	-	8.7	-	70.1	28.2	1.7	0.0	0.0	0.0
December	704	100.0%	6.2	44.8	-	14.3	-	50.1	45.3	4.5	0.0	0.0	0.0
Annual <sup>c</sup>	7381	88.3%	7.7	44.8	-	15.1	-	77.8	20.5	1.7	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® O<sub>3</sub> monitoring results for 2021**

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%	30	41	0	40	0	3.9	5.0	90.2	0.8	0.0	0.0
February	643	100.0%	30	48	0	46	0	0.9	9.0	80.1	10.0	0.0	0.0
March	703	100.0%	33	51	0	48	0	0.1	3.8	82.6	13.4	0.0	0.0
April	688	100.0%	33	54	0	52	0	0.7	4.5	73.7	21.1	0.0	0.0
May	712	100.0%	31	52	0	50	0	2.9	13.9	55.8	27.4	0.0	0.0
June	682	100.0%	29	68	0	66	1	10.4	19.9	43.4	25.4	0.9	0.0
July	710	100.0%	32	67	0	60	0	3.8	21.1	45.9	29.0	0.1	0.0
August	662	100.0%	25	57	0	52	0	9.7	28.2	49.4	12.7	0.0	0.0
September	680	100.0%	24	54	0	49	0	7.1	30.4	57.9	4.6	0.0	0.0
October	710	100.0%	19	56	0	51	0	12.4	49.2	36.5	2.0	0.0	0.0
November	689	100.0%	19	34	0	32	0	11.8	42.5	45.7	0.0	0.0	0.0
December	704	100.0%	24	35	0	33	0	1.0	22.3	76.7	0.0	0.0	0.0
Annual <sup>c</sup>	8295	100.0%	29	68	0	66	1	5.4	20.8	61.6	12.2	0.1	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 C-6. Clavet Station: Summary of airpointer® PM<sub>2.5</sub> monitoring results for 2021**

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Conc. (µg/m <sup>3</sup> )	Maximum 1-Hr Conc. (µg/m <sup>3</sup> )	1-Hour Exceedance <sup>a</sup> (no.)	Maximum 24-Hr Conc. (µg/m <sup>3</sup> )	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%	3	16	-	10	0	85.2	12.4	2.3	0.1	0.0	0.0
February	672	100.0%	4	13	-	9	0	76.8	21.7	1.5	0.0	0.0	0.0
March	744	100.0%	4	22	-	8	0	73.1	25.1	1.5	0.3	0.0	0.0
April	720	100.0%	5	27	-	9	0	61.0	32.4	5.3	1.4	0.0	0.0
May	744	100.0%	4	35	-	12	0	71.1	24.6	2.7	1.3	0.3	0.0
June	718	100.0%	5	31	-	15	0	61.7	30.6	5.2	2.4	0.1	0.0
July	744	100.0%	15	267	-	76	2	26.5	25.3	18.7	22.4	5.2	1.9
August	744	100.0%	10	54	-	27	1	43.8	23.3	7.9	17.2	7.8	0.0
September	720	100.0%	6	55	-	18	0	55.3	31.1	8.3	3.1	2.2	0.0
October	744	100.0%	14	562	-	154	3	50.8	23.8	10.5	7.1	6.0	1.7
November	720	100.0%	5	18	-	10	0	69.0	23.3	6.4	1.3	0.0	0.0
December	744	100.0%	4	25	-	8	0	73.3	22.2	3.4	1.2	0.0	0.0
Annual <sup>c</sup>	8758	100.0%	4	562	-	154	6	62.2	24.6	6.2	4.9	1.8	0.3

a. No 1-hour Saskatchewan Ambient Air Quality Standard

b. 24-hour Canada-Wide Standard = 28 µg/m<sup>3</sup>

c. No annual Saskatchewan Ambient Air Quality Standard

**Table C-7. Clavet Station: Summary of airpointer® precipitation monitoring results for 2021**

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%	13.0	9.4	11.7	99.9	0.1	0.0	0.0	0.0	0.0
February	672	100.0%	< 0.1	< 0.1	< 0.1	100.0	0.0	0.0	0.0	0.0	0.0
March	744	100.0%	0.8	0.6	0.8	100.0	0.0	0.0	0.0	0.0	0.0
April	720	100.0%	0.2	0.1	0.1	100.0	0.0	0.0	0.0	0.0	0.0
May	744	100.0%	27.1	3.5	21.0	100.0	0.0	0.0	0.0	0.0	0.0
June	720	100.0%	44.1	17.4	33.1	99.7	0.1	0.1	0.0	0.0	0.0
July	744	100.0%	21.8	9.0	11.1	99.7	0.3	0.0	0.0	0.0	0.0
August	744	100.0%	51.2	8.8	19.1	99.5	0.5	0.0	0.0	0.0	0.0
September	720	100.0%	21.3	11.7	16.2	99.9	0.0	0.1	0.0	0.0	0.0
October	744	100.0%	3.7	1.1	1.2	100.0	0.0	0.0	0.0	0.0	0.0
November	720	100.0%	4.6	1.1	1.5	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	8760	100.0%	187.9	17.4	33.1	99.9	0.1	0.0	0.0	0.0	0.0



**Table C-8. Clavet Station: Summary of airpointer® ambient temperature monitoring results for 2021**

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%	-9.7	-33.4	5.4	3.1	14.6	74.9	7.4	0.0	0.0
February	672	100.0%	-18.3	-37.7	4.2	15.6	48.2	31.5	4.6	0.0	0.0
March	744	100.0%	-1.1	-19.7	17.2	0.0	1.3	54.0	43.4	1.2	0.0
April	720	100.0%	5.0	-10.0	24.5	0.0	0.0	22.8	70.3	6.9	0.0
May	744	100.0%	11.1	-5.4	31.4	0.0	0.0	5.8	63.8	29.4	0.9
June	720	100.0%	19.5	3.5	34.8	0.0	0.0	0.0	26.4	66.9	6.7
July	744	100.0%	22.0	5.8	38.0	0.0	0.0	0.0	13.0	75.8	11.2
August	744	100.0%	18.0	4.7	36.0	0.0	0.0	0.0	37.8	57.5	4.7
September	720	100.0%	14.2	0.5	31.9	0.0	0.0	0.0	59.6	39.4	1.0
October	744	100.0%	5.7	-7.7	25.0	0.0	0.0	18.0	71.2	10.8	0.0
November	720	100.0%	-3.0	-17.5	12.8	0.0	1.7	68.6	29.7	0.0	0.0
December	744	100.0%	-15.8	-37.1	6.1	10.1	41.4	43.5	5.0	0.0	0.0
Annual	8760	100.0%	4.0	-37.7	38.0	2.3	8.7	26.7	36.1	24.1	2.0

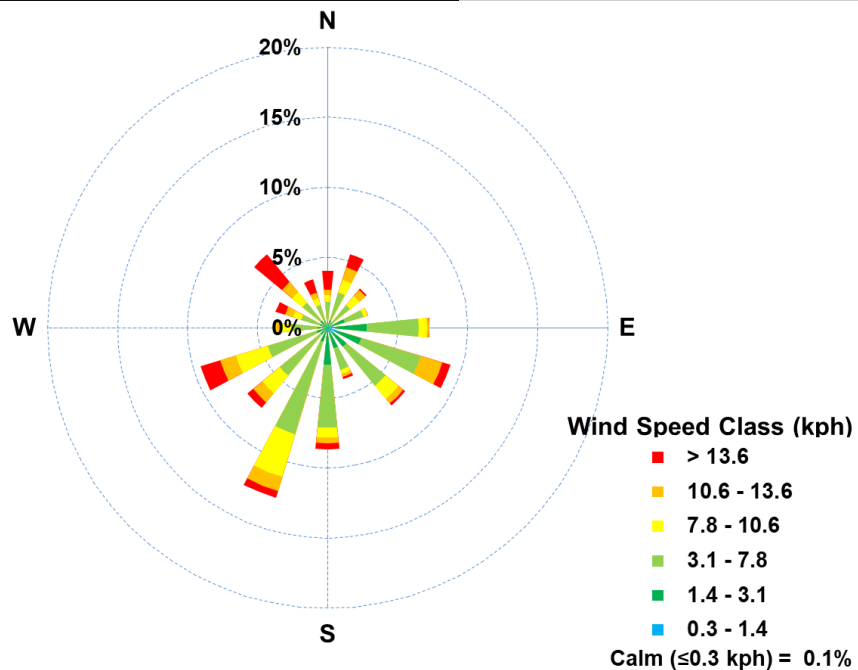
**Table C-9. Clavet Station: Summary of airpointer® relative humidity monitoring results for 2021**

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%	67	56	85	3.1	0.0	3.5	92.6	0.8	0.0
February	672	100.0%	64	15	80	0.0	0.1	21.4	78.4	0.0	0.0
March	744	100.0%	63	25	82	0.0	1.1	37.8	59.0	2.2	0.0
April	720	100.0%	44	12	84	0.7	25.8	54.3	17.9	1.3	0.0
May	744	100.0%	44	13	88	3.0	27.6	46.8	16.8	5.9	0.0
June	720	100.0%	52	18	88	0.0	18.6	42.9	30.3	8.2	0.0
July	744	100.0%	52	14	88	0.3	15.2	46.6	29.6	8.3	0.0
August	744	100.0%	58	16	89	0.0	8.7	45.4	27.6	18.3	0.0
September	720	100.0%	52	13	89	0.7	12.2	50.3	29.7	7.1	0.0
October	744	100.0%	58	19	86	0.0	7.4	39.7	43.8	9.1	0.0
November	720	100.0%	68	31	86	0.0	0.0	17.2	73.9	8.9	0.0
December	744	100.0%	67	49	83	0.0	0.0	11.4	87.4	1.2	0.0
Annual	8760	100.0%	67	12	89	0.7	9.7	34.7	48.9	6.0	0.0

**Table C-10 Clavet Station: Wind frequency table for 2021**

Wind Direction Sector	Percent of Data within Wind Speed Range, wind speed unit kph						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	0.6%	1.1%	2.6%	0.5%	0.5%	0.2%	5.5%
NorthEast	0.6%	1.4%	1.2%	0.3%	0.1%	0.0%	3.6%
East NorthEast	1.1%	0.9%	0.8%	0.2%	0.0%	0.0%	2.9%
East	2.4%	2.6%	1.8%	0.3%	0.1%	0.0%	7.2%
East SouthEast	2.1%	3.0%	2.6%	0.9%	0.3%	0.0%	9.0%
SouthEast	1.6%	1.8%	2.3%	0.9%	0.4%	0.2%	7.1%
South SouthEast	0.9%	1.2%	1.3%	0.2%	0.1%	0.0%	3.7%
South	2.3%	2.8%	2.9%	0.4%	0.2%	0.1%	8.6%
South SouthWest	1.3%	4.4%	5.2%	1.4%	0.2%	0.1%	12.6%
SouthWest	0.9%	1.8%	2.8%	1.1%	0.4%	0.3%	7.4%
West SouthWest	1.0%	1.6%	3.4%	1.7%	0.8%	1.0%	9.4%
West	0.6%	1.2%	1.2%	0.5%	0.3%	0.1%	3.8%
West NorthWest	0.4%	0.8%	1.5%	0.4%	0.4%	0.3%	3.8%
NorthWest	0.5%	1.1%	2.2%	0.7%	0.7%	1.6%	6.8%
North NorthWest	0.4%	0.7%	1.4%	0.4%	0.3%	0.3%	3.6%
North	0.4%	0.6%	2.1%	0.3%	0.1%	0.4%	4.0%
Total	17.0%	27.1%	35.3%	10.3%	4.7%	4.6%	99.3%

Percent Calm (<0.3 kph)	0.7%
Number of Valid Hourly-Average Data	8736
Total Workable Hours in Time Period	8736



## APPENDIX D. KERROBERT STATION: CONTINUOUS MONITORING DATA

**Table D-1 Kerrobert Station: Summary statistics for continuous air monitoring results for 2021**

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	384	7977	95.3	0.1	< 0.1	9.4
H <sub>2</sub> S	ppb	384	7977	95.3	0.2	< 0.1	5.1
PM <sub>2.5</sub>	µg/m <sup>3</sup>	0	8615	98.3	7	< 1	158
Precipitation	mm	0	8678	99.1	180.0 <sup>b</sup>	< 0.1	11.0
Ambient Temperature	°C	0	8678	99.1	3.4	-36.5	37.1
Relative Humidity	%	0	8678	99.1	58	< 1	91
Wind Speed	kph	0	8760	99.0	6.9	Calm	34.2

*a. Automatic Instrument Check*

*b. Total precipitation*

**Table D-2. Kerrobert Station: Summary of airpointer® SO<sub>2</sub> monitoring results for 2021**

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	99.7%	0.1	2.8	0	0.4	0	99.3	0.7	0.0	0.0	0.0	0.0
February	643	100.0%	0.3	2.0	0	0.9	0	95.0	5.0	0.0	0.0	0.0	0.0
March	687	97.3%	0.1	3.1	0	0.4	0	99.0	1.0	0.0	0.0	0.0	0.0
April	690	100.0%	0.1	1.6	0	0.2	0	99.7	0.3	0.0	0.0	0.0	0.0
May	712	99.9%	< 0.1	0.4	0	0.1	0	100.0	0.0	0.0	0.0	0.0	0.0
June	621	90.5%	< 0.1	2.9	0	0.2	0	99.5	0.5	0.0	0.0	0.0	0.0
July	535	74.5%	0.1	9.4	0	0.2	0	97.9	1.9	0.2	0.0	0.0	0.0
August	644	90.2%	0.1	0.9	0	0.2	0	100.0	0.0	0.0	0.0	0.0	0.0
September	625	91.4%	0.1	1.1	0	0.2	0	99.8	0.2	0.0	0.0	0.0	0.0
October	712	100.0%	0.1	0.8	0	0.2	0	100.0	0.0	0.0	0.0	0.0	0.0
November	689	100.0%	< 0.1	0.8	0	0.2	0	100.0	0.0	0.0	0.0	0.0	0.0
December	707	100.0%	0.2	2.6	0	1.3	0	95.5	4.5	0.0	0.0	0.0	0.0
Annual <sup>c</sup>	7977	95.3%	0.1	9.4	0	1.3	0	98.8	1.1	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® H<sub>2</sub>S monitoring results for 2021**

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	712	99.7%	0.1	0.5	0	0.2	0	100.0	0.0	0.0	0.0	0.0	0.0
February	643	100.0%	0.1	0.5	0	0.2	0	100.0	0.0	0.0	0.0	0.0	0.0
March	687	97.3%	0.1	4.0	0	0.7	0	98.5	1.3	0.1	0.0	0.0	0.0
April	690	100.0%	0.1	1.0	0	0.2	0	99.9	0.1	0.0	0.0	0.0	0.0
May	712	99.9%	0.2	4.9	0	1.2	0	95.4	4.5	0.1	0.0	0.0	0.0
June	621	90.5%	0.3	2.0	0	0.6	0	94.4	5.6	0.0	0.0	0.0	0.0
July	535	74.5%	0.4	5.1	0	0.8	0	95.5	4.3	0.0	0.2	0.0	0.0
August	644	90.2%	0.3	4.2	0	0.5	0	96.9	3.0	0.2	0.0	0.0	0.0
September	625	91.4%	0.2	0.8	0	0.3	0	100.0	0.0	0.0	0.0	0.0	0.0
October	712	100.0%	0.1	0.7	0	0.6	0	100.0	0.0	0.0	0.0	0.0	0.0
November	689	100.0%	0.1	1.1	0	0.3	0	99.7	0.3	0.0	0.0	0.0	0.0
December	707	100.0%	0.1	0.5	0	0.2	0	100.0	0.0	0.0	0.0	0.0	0.0
Annual	7977	95.3%	0.2	5.1	0	1.2	0	98.4	1.5	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® PM<sub>2.5</sub> monitoring results for 2021**

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Conc. (µg/m <sup>3</sup> )	Maximum 1-Hr Conc. (µg/m <sup>3</sup> )	1-Hour Exceedance <sup>a</sup> (no.)	Maximum 24-Hr Conc. (µg/m <sup>3</sup> )	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	687	92.6%	5	107	-	19	0	70.7	16.2	8.3	2.8	1.5	0.4
February	672	100.0%	5	26	-	14	0	65.2	24.9	6.8	3.1	0.0	0.0
March	725	97.4%	5	30	-	13	0	71.7	19.0	6.8	2.5	0.0	0.0
April	720	100.0%	4	32	-	6	0	79.6	19.3	1.0	0.0	0.1	0.0
May	744	100.0%	5	52	-	11	0	60.8	35.6	2.7	0.7	0.3	0.0
June	714	99.2%	5	38	-	15	0	62.0	26.6	7.0	3.4	1.0	0.0
July	740	99.5%	18	158	-	121	3	28.6	13.6	20.8	23.9	8.8	4.2
August	744	100.0%	11	70	-	27	0	33.9	30.9	11.8	16.0	7.4	0.0
September	661	91.8%	6	48	-	15	0	56.7	33.0	5.6	4.5	0.2	0.0
October	744	100.0%	9	114	-	58	3	57.3	21.5	9.5	5.8	4.4	1.5
November	720	100.0%	4	25	-	13	0	70.0	19.4	8.2	2.4	0.0	0.0
December	744	100.0%	5	20	-	14	0	55.5	31.6	10.9	2.0	0.0	0.0
Annual	8615	98.3%	7	158	-	121	6	59.2	24.3	8.3	5.7	2.0	0.5

a. No 1-hour Saskatchewan Ambient Air Quality Standard

b. 24-hour Canada-Wide Standard = 28 µg/m<sup>3</sup>

c. No annual Saskatchewan Ambient Air Quality Standard

**Table D-5. Kerrobert Station: Summary of airpointer® precipitation monitoring results for 2021**

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%	1.8	0.3	1.4	100.0	0.0	0.0	0.0	0.0	0.0
February	672	100.0%	0.1	0.1	0.1	100.0	0.0	0.0	0.0	0.0	0.0
March	725	97.4%	0.8	0.5	0.6	100.0	0.0	0.0	0.0	0.0	0.0
April	720	100.0%	1.4	0.4	1.3	100.0	0.0	0.0	0.0	0.0	0.0
May	744	100.0%	34.8	8.0	32.6	99.9	0.1	0.0	0.0	0.0	0.0
June	720	100.0%	63.9	11.0	22.1	99.4	0.4	0.1	0.0	0.0	0.0
July	740	99.5%	32.9	8.6	12.9	99.9	0.1	0.0	0.0	0.0	0.0
August	744	100.0%	24.7	3.1	8.1	100.0	0.0	0.0	0.0	0.0	0.0
September	661	91.8%	9.6	3.8	7.0	100.0	0.0	0.0	0.0	0.0	0.0
October	744	100.0%	4.9	2.5	4.6	100.0	0.0	0.0	0.0	0.0	0.0
November	720	100.0%	5.0	2.4	2.8	100.0	0.0	0.0	0.0	0.0	0.0
December	744	100.0%	0.3	0.1	0.1	100.0	0.0	0.0	0.0	0.0	0.0
Annual	8678	99.1%	180.0	11.0	32.6	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 2021**

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%	-9.4	-30.1	3.8	0.1	23.2	70.7	6.0	0.0	0.0
February	672	100.0%	-18.1	-36.5	4.3	13.5	47.8	34.7	4.0	0.0	0.0
March	725	97.4%	-1.8	-18.2	15.9	0.0	1.4	59.9	38.2	0.6	0.0
April	720	100.0%	4.5	-9.8	24.7	0.0	0.0	27.1	66.7	6.3	0.0
May	744	100.0%	10.2	-4.5	29.4	0.0	0.0	7.0	69.5	23.5	0.0
June	720	100.0%	18.6	4.8	36.6	0.0	0.0	0.0	33.8	59.6	6.7
July	740	99.5%	20.5	7.1	36.4	0.0	0.0	0.0	18.9	76.1	5.0
August	744	100.0%	17.6	3.6	37.1	0.0	0.0	0.0	39.0	55.8	5.2
September	661	91.8%	13.5	-2.0	28.6	0.0	0.0	1.8	59.5	38.7	0.0
October	744	100.0%	4.9	-8.1	24.0	0.0	0.0	22.2	70.0	7.8	0.0
November	720	100.0%	-2.9	-20.6	12.4	0.0	2.2	65.6	32.2	0.0	0.0
December	744	100.0%	-16.5	-34.1	6.5	10.3	42.7	41.3	5.6	0.0	0.0
Annual	8678	99.1%	3.4	-36.5	37.1	1.9	9.7	27.7	36.9	22.4	1.4

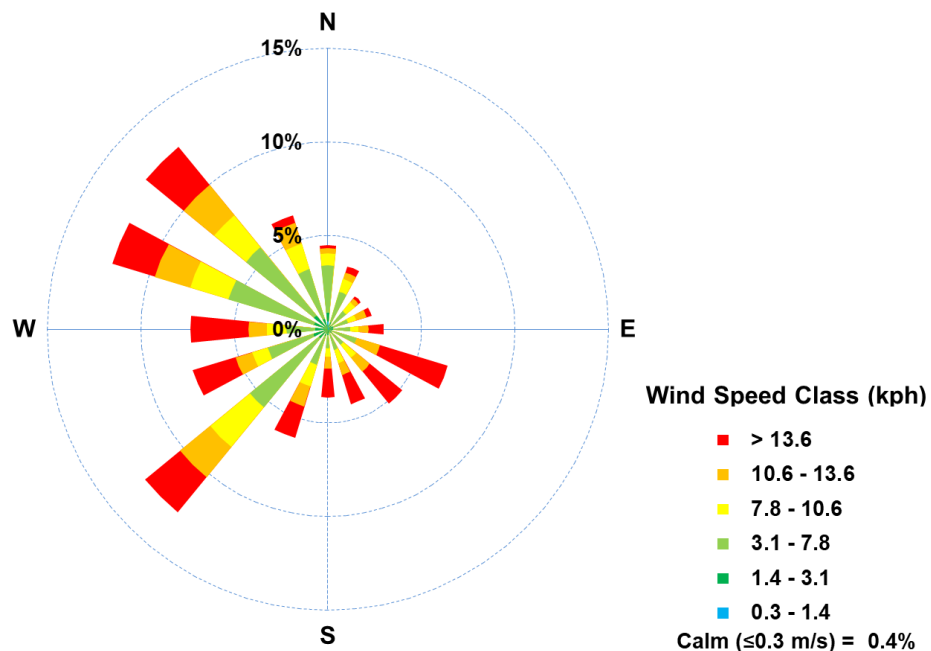
**Table D-7. Kerrobert Station: Summary of airpointer® relative humidity monitoring results for 2021**

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%	69	0	86	3.3	0.0	2.7	90.8	3.3	0.0
February	672	100.0%	68	51	82	0.0	0.0	5.8	92.4	1.8	0.0
March	725	97.4%	68	0	86	1.1	0.1	14.5	72.3	12.0	0.0
April	720	100.0%	45	16	81	0.0	24.6	51.1	23.8	0.6	0.0
May	744	100.0%	48	13	89	0.5	21.9	45.2	26.3	6.0	0.0
June	720	100.0%	52	15	90	0.0	16.1	45.4	29.0	9.4	0.0
July	740	99.5%	55	16	91	0.0	14.9	42.8	28.8	12.7	0.8
August	744	100.0%	56	12	89	1.1	11.8	42.7	24.3	20.0	0.0
September	661	91.8%	50	0	89	0.8	18.3	49.6	24.2	7.1	0.0
October	744	100.0%	54	15	85	0.0	11.3	47.4	35.8	5.5	0.0
November	720	100.0%	66	0	88	0.4	0.6	23.1	67.1	8.9	0.0
December	744	100.0%	69	40	85	0.0	0.0	6.2	88.3	5.5	0.0
Annual	8678	99.1%	58	0	91	0.6	9.9	31.3	50.3	7.8	0.1

**Table D-8 Kerrobert Station: Wind frequency table for the year 2021**

Wind Direction Sector	Percent of Data within Wind Speed Range, wind speed unit kph						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%	1.2%	1.6%	0.3%	0.1%	0.0%	3.5%
NorthEast	0.3%	0.6%	0.9%	0.4%	0.1%	0.1%	2.3%
East NorthEast	0.3%	0.5%	0.8%	0.2%	0.4%	0.1%	2.4%
East	0.3%	0.5%	1.1%	0.3%	0.4%	0.4%	3.0%
East SouthEast	0.3%	1.0%	2.6%	0.9%	0.7%	1.2%	6.7%
SouthEast	0.2%	0.7%	1.2%	0.6%	0.6%	1.8%	5.1%
South SouthEast	0.2%	0.7%	1.5%	0.5%	0.4%	0.9%	4.2%
South	0.2%	0.6%	1.4%	0.4%	0.4%	0.7%	3.6%
South SouthWest	0.4%	1.2%	2.4%	0.7%	0.7%	0.6%	6.0%
SouthWest	0.9%	3.0%	5.8%	1.4%	0.8%	0.7%	12.6%
West SouthWest	0.6%	1.3%	3.2%	0.6%	0.6%	1.2%	7.5%
West	0.4%	1.0%	2.4%	0.9%	0.8%	1.9%	7.3%
West NorthWest	0.8%	2.1%	5.1%	1.6%	1.2%	1.3%	12.0%
NorthWest	1.2%	2.7%	4.1%	1.5%	1.5%	1.6%	12.5%
North NorthWest	0.6%	2.0%	2.5%	0.7%	0.4%	0.1%	6.4%
North	0.6%	1.4%	1.9%	0.2%	0.0%	0.0%	4.1%
Total	7.7%	20.4%	38.4%	11.1%	9.1%	12.5%	99.2%

Percent Calm ( $\leq 0.3$ kph)	0.8%
Number of Valid Hourly-Average Data	8760
Total Workable Hours in Time Period	8760



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

**Table E-1 Meadow Lake City Station: Summary statistics for continuous air monitoring results for 2021**

Parameter	Unit	Calibration & AIC <sup>a</sup> (hours)	Valid Data (hours)	Uptime (%)	Summary Statistics for Hourly Average Data		
					Average	Minimum	Maximum
NO	ppb	409	8215	100.0	0.8	< 0.1	42.7
NO <sub>2</sub>	ppb	409	8215	100.0	2.9	< 0.1	36.6
NO <sub>x</sub>	ppb	409	8215	100.0	3.7	< 0.1	61.7
O <sub>3</sub>	ppb	409	8221	100.0	27	< 1	65
PM <sub>2.5</sub>	µg/m <sup>3</sup>	0	6972	79.6	6	< 1	126
Precipitation	mm	0	8752	99.9	259.9 <sup>b</sup>	< 0.1	14.9
Ambient Temperature	°C	0	8752	99.9	3.5	-38.2	35.3
Relative Humidity	%	0	8752	99.9	58	< 1	89
Wind Speed	kph	0	8752	99.9	2.0	Calm	19.4

*a. Automatic Instrument Check*

*b. Total precipitation*

**Table E-2. Meadow Lake City Station: Summary of airpointer® NO monitoring results for 2021**

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%	1.4	28.4	-	5.4	-	93.9	4.9	1.2	0.0	0.0	0.0
February	643	100.0%	1.4	22.5	-	4.0	-	96.6	2.6	0.8	0.0	0.0	0.0
March	705	100.0%	0.9	29.7	-	4.3	-	97.7	1.6	0.7	0.0	0.0	0.0
April	688	99.9%	0.4	6.8	-	0.8	-	99.9	0.1	0.0	0.0	0.0	0.0
May	710	99.7%	0.3	12.2	-	2.2	-	99.6	0.4	0.0	0.0	0.0	0.0
June	667	99.1%	0.3	2.4	-	0.7	-	100.0	0.0	0.0	0.0	0.0	0.0
July	712	100.0%	0.3	3.7	-	0.6	-	100.0	0.0	0.0	0.0	0.0	0.0
August	712	100.0%	0.3	13.1	-	1.0	-	99.6	0.4	0.0	0.0	0.0	0.0
September	682	100.0%	0.5	14.2	-	1.7	-	98.5	1.5	0.0	0.0	0.0	0.0
October	712	100.0%	0.7	29.0	-	3.4	-	98.2	1.3	0.6	0.0	0.0	0.0
November	686	99.6%	1.7	42.7	-	6.8	-	92.1	6.6	1.3	0.0	0.0	0.0
December	586	82.5%	1.7	29.7	-	4.3	-	94.5	4.8	0.7	0.0	0.0	0.0
Annual <sup>c</sup>	8215	98.4%	0.8	42.7	-	6.8	-	97.6	2.0	0.4	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® NO<sub>2</sub> monitoring results for 2021**

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%	5.4	31.4	0	14.7	-	64.0	28.4	7.6	0.0	0.0	0.0
February	643	100.0%	4.8	36.6	0	11.6	-	69.2	26.1	4.7	0.0	0.0	0.0
March	705	100.0%	3.6	33.9	0	15.0	-	81.3	14.9	3.8	0.0	0.0	0.0
April	688	99.9%	2.1	20.0	0	3.8	-	90.8	8.9	0.3	0.0	0.0	0.0
May	710	99.7%	1.4	11.8	0	3.5	-	95.5	4.5	0.0	0.0	0.0	0.0
June	667	99.1%	1.4	7.2	0	2.3	-	99.1	0.9	0.0	0.0	0.0	0.0
July	712	100.0%	1.3	11.3	0	2.6	-	98.2	1.8	0.0	0.0	0.0	0.0
August	712	100.0%	1.2	11.0	0	2.5	-	98.9	1.1	0.0	0.0	0.0	0.0
September	682	100.0%	1.6	14.3	0	3.7	-	95.6	4.4	0.0	0.0	0.0	0.0
October	712	100.0%	2.4	16.9	0	4.7	-	89.0	10.7	0.3	0.0	0.0	0.0
November	686	99.6%	4.8	31.8	0	11.5	-	65.9	28.9	5.2	0.0	0.0	0.0
December	586	82.5%	5.4	32.0	0	10.4	-	53.6	43.0	3.4	0.0	0.0	0.0
Annual <sup>c</sup>	8215	98.4%	2.9	36.6	0	15.0	-	83.8	14.1	2.1	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® NO<sub>x</sub> monitoring results for 2021**

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%	6.8	55.2	-	19.9	-	58.8	30.7	10.2	0.3	0.0	0.0
February	643	100.0%	6.2	56.6	-	14.5	-	58.6	35.0	6.2	0.2	0.0	0.0
March	705	100.0%	4.5	59.7	-	19.2	-	78.0	16.7	5.0	0.3	0.0	0.0
April	688	99.9%	2.4	21.9	-	4.4	-	87.8	11.3	0.9	0.0	0.0	0.0
May	710	99.7%	1.7	21.1	-	5.7	-	94.4	5.1	0.6	0.0	0.0	0.0
June	667	99.1%	1.7	7.6	-	2.9	-	98.1	1.9	0.0	0.0	0.0	0.0
July	712	100.0%	1.5	13.2	-	3.2	-	96.2	3.8	0.0	0.0	0.0	0.0
August	712	100.0%	1.5	19.7	-	3.2	-	97.3	2.4	0.3	0.0	0.0	0.0
September	682	100.0%	2.1	28.5	-	4.7	-	94.0	5.1	0.9	0.0	0.0	0.0
October	712	100.0%	3.0	41.9	-	8.1	-	86.0	11.9	2.1	0.0	0.0	0.0
November	686	99.6%	6.4	60.5	-	17.6	-	58.5	31.3	9.9	0.3	0.0	0.0
December	586	82.5%	7.1	61.7	-	14.7	-	43.0	50.0	6.8	0.2	0.0	0.0
Annual <sup>c</sup>	8215	98.4%	3.7	61.7	-	19.9	-	79.8	16.6	3.5	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® O<sub>3</sub> monitoring results for 2021**

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	736	100.0%	27	44	0	41	0	10.1	12.2	75.8	1.9	0.0	0.0
February	643	100.0%	31	46	0	45	0	2.3	9.2	73.7	14.8	0.0	0.0
March	705	100.0%	35	54	0	51	0	4.5	3.8	62.3	29.4	0.0	0.0
April	688	99.9%	33	55	0	53	0	1.3	7.7	69.3	21.7	0.0	0.0
May	710	99.7%	32	53	0	52	0	1.3	8.9	69.2	20.7	0.0	0.0
June	673	100.0%	30	65	0	62	0	4.6	15.2	61.8	18.4	0.0	0.0
July	712	100.0%	29	64	0	59	0	3.8	21.6	55.5	19.1	0.0	0.0
August	712	100.0%	24	52	0	47	0	8.1	27.1	58.4	6.3	0.0	0.0
September	682	100.0%	22	44	0	39	0	6.9	33.9	58.2	1.0	0.0	0.0
October	712	100.0%	22	43	0	40	0	8.0	29.4	61.1	1.5	0.0	0.0
November	686	99.6%	19	38	0	37	0	13.3	35.9	50.9	0.0	0.0	0.0
December	586	82.5%	22	37	0	36	0	4.3	26.3	69.5	0.0	0.0	0.0
Annual <sup>c</sup>	8221	98.4%	27	65	0	62	0	5.8	19.2	63.7	11.3	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® PM<sub>2.5</sub> monitoring results for 2021**

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Conc. (µg/m <sup>3</sup> )	Maximum 1-Hr Conc. (µg/m <sup>3</sup> )	1-Hour Exceedance <sup>a</sup> (no.)	Maximum 24-Hr Conc. (µg/m <sup>3</sup> )	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	728	97.9%	6	63	-	16	0	65	14	11	8	2	0
February	672	100.0%	5	47	-	12	0	68	19	5	7	1	0
March	744	100.0%	5	49	-	10	0	67	20	8	4	1	0
April	719	99.9%	6	121	-	13	0	70	18	4	4	4	0
May	742	99.7%	4	17	-	7	0	78	19	3	0	0	0
June	718	99.7%	6	114	-	22	0	61	31	4	3	1	0
July	289	38.8%	11	41	-	15	0	3	42	49	6	1	0
August	0	0.0%	-	< 1	-	< 1	0	-	-	-	-	-	-
September	155	21.5%	5	28	-	10	0	63	24	8	5	0	0
October	744	100.0%	7	126	-	46	1	61	22	6	6	5	0
November	717	99.6%	7	88	-	18	0	59	22	9	6	4	0
December	744	100.0%	5	83	-	10	0	71	21	4	3	1	0
Annual <sup>c</sup>	6972	79.6%	6	126	-	46	1	64.0	21.6	7.8	4.5	1.9	0.1

*a. No 1-hour Saskatchewan Ambient Air Quality Standard*

*b. 24-hour Canada-Wide Standard = 28 µg/m<sup>3</sup>*

*c. No annual Saskatchewan Ambient Air Quality Standard*

**Table E-7. Meadow Lake City Station: Summary of airpointer® precipitation monitoring results for 2021**

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%	9.5	5.4	9.5	99.9	0.1	0.0	0.0	0.0	0.0
February	672	100.0%	0.1	0.1	0.1	100.0	0.0	0.0	0.0	0.0	0.0
March	744	100.0%	8.2	5.1	6.9	99.9	0.1	0.0	0.0	0.0	0.0
April	719	99.9%	0.6	0.4	0.4	100.0	0.0	0.0	0.0	0.0	0.0
May	742	99.7%	36.5	5.3	26.5	99.9	0.1	0.0	0.0	0.0	0.0
June	718	99.7%	53.9	8.0	23.9	99.6	0.4	0.0	0.0	0.0	0.0
July	744	100.0%	27.0	7.3	10.2	99.9	0.1	0.0	0.0	0.0	0.0
August	744	100.0%	45.4	11.0	14.1	99.9	0.0	0.1	0.0	0.0	0.0
September	720	100.0%	45.5	14.9	18.9	99.7	0.1	0.1	0.0	0.0	0.0
October	744	100.0%	26.4	4.2	24.7	100.0	0.0	0.0	0.0	0.0	0.0
November	717	99.6%	6.5	1.7	5.9	100.0	0.0	0.0	0.0	0.0	0.0
December	744	100.0%	0.4	0.3	0.3	100.0	0.0	0.0	0.0	0.0	0.0
Annual	8752	99.9%	259.9	14.9	26.5	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 2021**

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%	-9.6	-35.8	4.7	2.7	20.4	67.2	9.6	0.0	0.0
February	672	100.0%	-17.2	-38.2	6.1	11.2	50.0	32.4	6.4	0.0	0.0
March	744	100.0%	-1.6	-14.7	13.5	0.0	0.0	59.7	40.3	0.0	0.0
April	719	99.9%	3.7	-7.5	21.6	0.0	0.0	29.2	66.3	4.5	0.0
May	742	99.7%	10.5	-6.5	28.3	0.0	0.0	7.0	66.6	26.4	0.0
June	718	99.7%	19.0	5.4	35.3	0.0	0.0	0.0	29.5	64.2	6.3
July	744	100.0%	20.5	10.6	35.0	0.0	0.0	0.0	19.0	74.7	6.3
August	744	100.0%	17.7	5.1	33.3	0.0	0.0	0.0	33.6	62.9	3.5
September	720	100.0%	13.0	1.0	25.4	0.0	0.0	0.0	66.1	33.9	0.0
October	744	100.0%	5.2	-5.2	19.7	0.0	0.0	11.4	82.7	5.9	0.0
November	717	99.6%	-3.7	-18.7	10.6	0.0	3.3	74.2	22.5	0.0	0.0
December	744	100.0%	-16.9	-33.8	5.4	7.8	48.3	42.2	1.7	0.0	0.0
Annual	8784	99.9%	3.5	-38.2	35.3	1.8	10.0	27.0	37.1	22.8	1.3

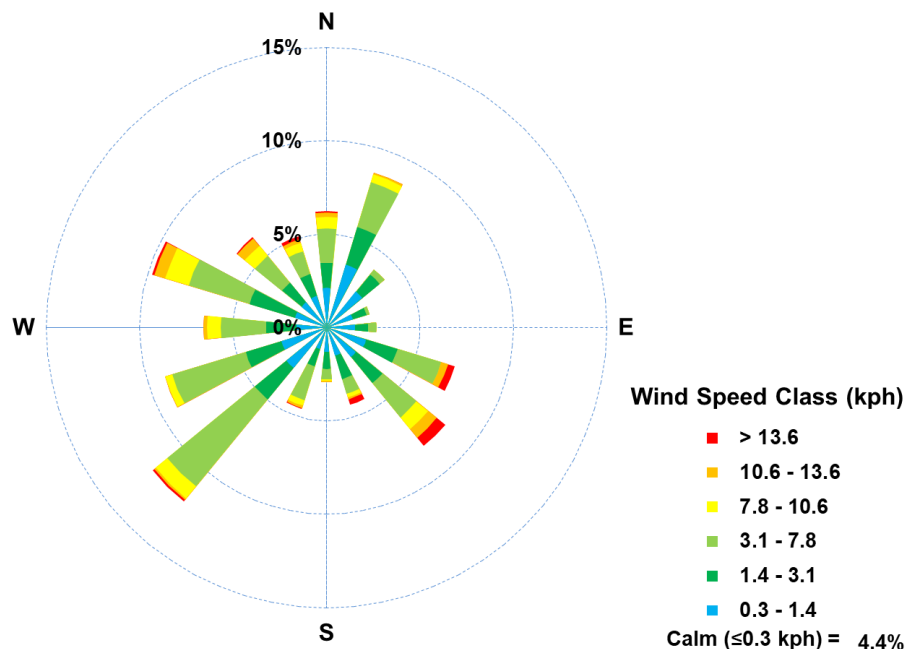
**Table E-9. Meadow Lake City Station: Summary of airpointer® relative humidity monitoring results for 2021**

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%	63	40	86	3.1	0.0	22.9	72.5	1.4	0.0
February	672	100.0%	59	34	81	0.0	0.0	51.9	47.8	0.3	0.0
March	744	100.0%	57	28	84	0.0	0.7	57.9	38.7	2.7	0.0
April	719	99.9%	48	15	80	0.0	17.4	54.9	27.3	0.4	0.0
May	742	99.7%	48	14	86	0.1	19.9	50.5	24.3	5.1	0.0
June	718	99.7%	54	13	88	0.3	8.9	51.0	31.6	8.2	0.0
July	744	100.0%	56	22	88	0.0	8.5	47.4	37.2	6.9	0.0
August	744	100.0%	60	23	89	0.0	5.0	44.6	34.3	16.1	0.0
September	720	100.0%	60	26	88	0.0	2.4	47.4	33.8	16.5	0.0
October	744	100.0%	58	15	86	0.0	5.9	44.0	42.9	7.3	0.0
November	717	99.6%	68	27	85	0.0	0.3	16.5	74.8	8.5	0.0
December	744	100.0%	64	40	80	0.0	0.0	22.3	77.6	0.1	0.0
Annual	8752	99.9%	58	13	89	0.3	5.8	42.5	45.3	6.1	0.0

**Table E-10 Meadow Lake City Station: Wind frequency table for 2021**

Wind Direction Sector	Percent of Data within Wind Speed Range, wind speed unit kph						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	4.9%	1.8%	0.4%	0.0%	0.0%	0.0%	7.1%
NorthEast	2.3%	0.4%	0.2%	0.0%	0.0%	0.0%	2.9%
East NorthEast	1.4%	0.3%	0.1%	0.0%	0.0%	0.0%	1.8%
East	1.7%	0.3%	0.1%	0.0%	0.0%	0.0%	2.1%
East SouthEast	3.6%	1.5%	1.1%	0.2%	0.2%	0.1%	6.7%
SouthEast	3.1%	2.7%	1.1%	0.2%	0.2%	0.4%	7.7%
South SouthEast	1.7%	1.5%	0.6%	0.0%	0.0%	0.0%	3.7%
South	1.5%	0.7%	0.2%	0.0%	0.0%	0.0%	2.4%
South SouthWest	1.8%	1.7%	0.6%	0.0%	0.0%	0.0%	4.1%
SouthWest	4.6%	3.2%	3.4%	0.3%	0.0%	0.0%	11.5%
West SouthWest	4.2%	2.3%	1.9%	0.2%	0.0%	0.0%	8.5%
West	2.4%	2.6%	1.1%	0.1%	0.0%	0.0%	6.2%
West NorthWest	2.2%	4.6%	1.9%	0.3%	0.1%	0.0%	9.1%
NorthWest	2.2%	2.1%	0.9%	0.3%	0.2%	0.0%	5.7%
North NorthWest	2.3%	1.3%	0.6%	0.1%	0.0%	0.0%	4.3%
North	3.0%	1.9%	0.5%	0.0%	0.1%	0.0%	5.5%
Total	42.6%	28.9%	14.5%	1.8%	0.8%	0.7%	89.3%

Percent Calm (<0.3 kph)	10.7%
Number of Valid Hourly-Average Data	8752
Total Workable Hours in Time Period	8760



## APPENDIX F. WYAMZ EXCEEDANCE SUMMARY

**Table F-1 Maidstone Station: Summary of 24-hour exceedances for 2021**

1-hour Exceedance Information			Summary of Other Parameters During Exceedance								
Pollutant	Conc.	Exceedance Time mmm-dd hh:mm	WS kph	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	19.0	Jun-28 04:00	0.7	181	10	0.0	12.7	0	7	19.0	12.3
H <sub>2</sub> S	12.9	Jun-28 01:00	0.5	185	16	0.0	14.8	0	14	12.9	19.5
H <sub>2</sub> S	12.0	Jun-28 05:00	0.6	172	10	0.0	12.3	0	6	12.0	12.2
H <sub>2</sub> S	20.8	Jul-10 06:00	1.8	155	7	0.0	15.3	0	8	20.8	8.9
H <sub>2</sub> S	16.0	Jul-10 04:00	1.2	185	12	0.0	14.0	0	10	16.0	14.4

\* No recorded 24- hour exceedances

24-hour Exceedance Information			Summary of Other Parameters During Exceedance								
Pollutant	Conc.	Exceedance Time mmm-dd	WS kph	WD deg	AQI -	Rain mm	NO ppb	NO <sub>2</sub> ppb	NO <sub>x</sub> ppb	H <sub>2</sub> S ppb	PM <sub>2.5</sub> µg/m <sup>3</sup>
PM <sub>2.5</sub>	137	Jul-17	12	125	80	0.0	19.0	0.5	1.9	0.7	137
PM <sub>2.5</sub>	98	Jul-18	8	118	58	0.0	14.4	-	1.3	0.2	98
PM <sub>2.5</sub>	43	Jul-16	8	108	31	0.0	19.1	0.2	1.4	0.5	43
PM <sub>2.5</sub>	41	Jul-19	6	96	29	0.0	15.1	0.1	0.4	0.4	41
PM <sub>2.5</sub>	37	Jul-13	4	151	25	0.0	19.3	-	2.1	-	37
PM <sub>2.5</sub>	32	Aug-2	4	167	26	0.0	23.7	0.7	3.3	1.5	32
PM <sub>2.5</sub>	82	Oct-6	6	236	51	0.0	7.7	0.4	4.0	0.7	82
PM <sub>2.5</sub>	73	Oct-5	9	102	45	0.0	10.9	0.7	2.0	0.5	73
PM <sub>2.5</sub>	48	Dec-7	4	138	34	0.0	20.4	0.2	13.3	0.2	48

**Table F-2 Clavet Station: Summary of exceedances for 2021**

24-hour Exceedance Information			Summary of Other Parameters During Exceedance								
Pollutant	Conc.	Exceedance Time mmm-dd	WS kph	WD deg	AQI -	Rain mm	NO ppb	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>	154	Oct-4	6.9	50	10	0.0	0	2	3	37	154
PM <sub>2.5</sub>	49	Oct-5	4.6	104	4	0.0	1	2	3	21	49
PM <sub>2.5</sub>	29	Oct-6	4.8	143	3	0.0	0	3	3	21	29
PM <sub>2.5</sub>	31	Aug-5	3.7	188	3	0.0	0.5	2.5	3.0	33	31
PM <sub>2.5</sub>	76	Jul-16	8.8	32	6	0.0	0.4	2.5	2.9	37	76
PM <sub>2.5</sub>	74	Jul-17	7.6	119	6	0.0	-	1.6	1.7	43.3	74

**Table F-3 Kerrobert Station: Summary of exceedances for 2021**

24-hour Exceedance Information			Summary of Other Parameters During Exceedance						
Pollutant	Conc.	Exceedance Time mmm-dd	WS kph	WD deg	Rain mm	ET °C	SO2 ppb	H2S ppb	PM <sub>2.5</sub> µg/m <sup>3</sup>
PM <sub>2.5</sub>	121	Jul-18	7	92	0.0	16	0.1	0.6	121
PM <sub>2.5</sub>	68	Jul-17	13	180	0.0	23	-	-	68
PM <sub>2.5</sub>	41	Jul-16	12	70	0.1	22	-	0.4	41
PM <sub>2.5</sub>	58	Oct-5	10.8	104	0.0	11.9	0.1	0.6	58
PM <sub>2.5</sub>	35	Oct-4	10.0	72	0.0	8.4	0.1	-	35
PM <sub>2.5</sub>	33	Oct-6	6.6	232	0.0	11	0	0	33

**Table F-4 Meadow Lake City Station: Summary of exceedances for 2021**

24-hour Exceedance Information			Summary of Other Parameters During Exceedance								
Pollutant	Conc.	Exceedance Time mmm-dd	WS kph	WD deg	AQI -	Rain mm	NO ppb	NO <sub>2</sub> ppb	NOx ppb	O <sub>3</sub> ppb	PM <sub>2.5</sub> µg/m <sup>3</sup>
PM <sub>2.5</sub>	46	Oct-6	3.1	198	3	0.0	0	2	3	17	46

## **APPENDIX G. 2021 FINANCIAL STATEMENTS**



**Western Yellowhead Air Management Zone Inc.**  
**Financial Statements**  
*December 31, 2021*

# Western Yellowhead Air Management Zone Inc.

## Contents

*For the year ended December 31, 2021*

---

	<i>Page</i>
<b>Management's Responsibility</b>	
<b>Independent Auditor's Report</b>	
<b>Financial Statements</b>	
Statement of Financial Position.....	1
Statement of Operations and Changes in Net Assets.....	2
Statement of Cash Flows.....	3
<b>Notes to the Financial Statements</b> .....	4

---

## **Management's Responsibility**

---

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

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

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

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

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

March 18, 2022



---

Executive Director

## Independent Auditor's Report

---

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

### Opinion

We have audited the financial statements of Western Yellowhead Air Management Zone Inc. (the "Organization"), which comprise the statement of financial position as at December 31, 2021, and the statements of operations, changes in net assets and cash flows for the year then ended, and notes to the financial statements, including a summary of significant accounting policies.

In our opinion, the accompanying financial statements present fairly, in all material respects, the financial position of the Organization as at December 31, 2021, and the results of its operations and its cash flows for the year then ended in accordance with Canadian accounting standards for not-for-profit organizations.

### Basis for Opinion

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

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

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

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

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

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

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

## Independent Auditor's Report *(continued from previous page)*

---

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

- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Organization's internal control.
- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by management.
- Conclude on the appropriateness of management's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Organization's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the Organization to cease to continue as a going concern.
- Evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

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

Saskatoon, Saskatchewan

March 18, 2022

*MNP* LLP

Chartered Professional Accountants

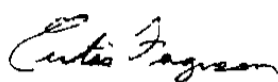
# Western Yellowhead Air Management Zone Inc.

## Statement of Financial Position

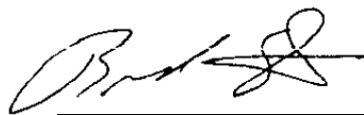
*As at December 31, 2021*

	2021	2020
<b>Assets</b>		
<b>Current</b>		
Cash resources	198,122	159,511
Short-term investment (Note 3)	106,559	105,977
Prepaid expenses	6,406	6,245
	311,087	271,733
<b>Tangible capital assets (Note 4)</b>	83,059	104,104
	394,146	375,837
<b>Liabilities</b>		
<b>Current</b>		
Accounts payable and accruals	10,599	5,875
Goods and Services Tax payable	1,915	1,079
	12,514	6,954
<b>Commitment (Note 7)</b>		
<b>Net Assets</b>		
Unrestricted net assets	381,632	368,883
	394,146	375,837

Approved on behalf of the Board of Directors



Director



Director

*The accompanying notes are an integral part of these financial statements*

# Western Yellowhead Air Management Zone Inc.

## Statement of Operations and Changes in Net Assets

*For the year ended December 31, 2021*

	<b>2021</b>	<b>2020</b>
<b>Revenue</b>		
Membership fees	<b>164,799</b>	135,675
Investments	<b>737</b>	2,572
	<b>165,536</b>	138,247
<b>Expenses</b>		
Amortization	<b>21,044</b>	25,568
Insurance	<b>6,676</b>	5,178
Management fees (Note 5)	<b>49,850</b>	36,960
Meetings	<b>-</b>	175
Monitoring	<b>48,961</b>	43,645
Office supplies	<b>533</b>	472
Professional fees	<b>6,929</b>	6,662
Repairs and maintenance	<b>16,298</b>	18,121
Telephone	<b>2,496</b>	2,235
	<b>152,787</b>	139,016
<b>Excess (deficiency) of revenue over expenses</b>	<b>12,749</b>	(769)
<b>Net assets, beginning of year</b>	<b>368,883</b>	369,652
<b>Net assets, end of year</b>	<b>381,632</b>	368,883

*The accompanying notes are an integral part of these financial statements*

# Western Yellowhead Air Management Zone Inc.

## Statement of Cash Flows

For the year ended December 31, 2021

	2021	2020
<b>Cash provided by (used for) the following activities</b>		
<b>Operating</b>		
Excess (deficiency) of revenue over expenses	12,749	(769)
Amortization	21,044	25,568
	33,793	24,799
Changes in working capital accounts		
Prepaid expenses	(161)	(683)
Accounts payable and accruals	4,724	(6,483)
Goods and Services Tax payable	837	(542)
	39,193	17,091
<b>Investing</b>		
Purchase of short-term investment	(106,559)	(105,977)
Proceeds on disposal of short-term investment	105,977	103,797
Purchase of capital assets	-	(8,139)
	(582)	(10,319)
<b>Increase in cash resources</b>	38,611	6,772
<b>Cash resources, beginning of year</b>	159,511	152,739
<b>Cash resources, end of year</b>	198,122	159,511

The accompanying notes are an integral part of these financial statements



# Western Yellowhead Air Management Zone Inc.

## Notes to the Financial Statements

For the year ended December 31, 2021

---

### 1. Incorporation and nature of the organization

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

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

#### ***Impact on operations of COVID-19 (coronavirus)***

In early March 2020 the global outbreak of COVID-19 (coronavirus) began to have a significant impact on businesses through the restrictions put in place by the Canadian, provincial and municipal governments regarding travel, business operations and isolation/quarantine orders. The Organization's operations were not directly impacted by COVID-19. The Organization was indirectly affected by COVID-19 as members who pay membership fees may have been directly affected by the pandemic.

### 2. Significant accounting policies

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

#### ***Cash resources***

Cash and cash equivalents include cash, term deposits, and marketable securities with maturities of three months or less. Cash subject to restrictions that prevent its use for current purposes is included in restricted cash.

#### ***Revenue recognition***

The Organization follows the deferral method of accounting for contributions. Restricted contributions are recognized as revenue in the year in which the related expenses are incurred. Unrestricted contributions are recognized as revenue when received. Membership fees are recognized when received.

#### ***Financial instruments***

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

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

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

#### ***Financial asset impairment***

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

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

# Western Yellowhead Air Management Zone Inc.

## Notes to the Financial Statements

*For the year ended December 31, 2021*

---

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

#### ***Tangible capital assets***

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

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

	<b>Rate</b>
Website	50 %
Equipment	20 %

#### ***Long-lived assets***

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

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

#### ***Deferred contributions related to tangible capital assets***

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

#### ***Measurement uncertainty***

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

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

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

### 3. Short-term investment

Balance consists of a \$106,559 (2020 - \$105,977) Guaranteed Investment Certificate with an interest rate of 0.75% (2020 - 0.55%) maturing on December 20, 2022 (2020 - December 20, 2021).

### 4. Tangible capital assets

	<b>Cost</b>	<b>Accumulated amortization</b>	<b>2021 Net book value</b>	<b>2020 Net book value</b>
Website	7,956	7,583	373	746
Equipment	462,174	379,488	82,686	103,358
	<b>470,130</b>	<b>387,071</b>	<b>83,059</b>	<b>104,104</b>

**Western Yellowhead Air Management Zone Inc.**  
**Notes to the Financial Statements**  
*For the year ended December 31, 2021*

---

**5. Related party transactions**

The Organization has entered into a contract agreement for management services, expiring December 2021. The contract is based on hours required, to a maximum of \$50,000. Any overage is required to be approved by the Board of Directors. Included in expenses for the current year are \$49,850 (2020 - \$36,960) of management fees. The expenses were incurred in the normal course of operations and measured at the exchange amount, which is the amount of consideration established and agreed to by the related parties.

**6. Financial instruments**




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

**7. Commitment**

The Organization has entered into a contract for the operation and maintenance of airpointer monitoring stations expiring July 31, 2024 with minimum annual payments as follows:

2022	49,020
2023	49,020
2024	28,595
	<hr/>
	126,635
	<hr/>

## APPENDIX H. WYAMZ BOARD OF DIRECTORS

	<p><b>Curtis Ferguson</b> Board Chair (Nutrien Allan)</p> <p>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 in 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.</p>
	<p><b>David Henry</b> Vice Chair (Saskatchewan Environmental Society)</p> <p>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.</p>
	<p><b>Trippet McKnight</b> Treasurer (Cenovus Energy Upstream)</p> <p>Trippett 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. Trippett 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.</p>



**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.



**Jocelan Lundquist** Member (Cenovus Energy Inc)

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.



**Matthew Reiger** Member


Matthew is an Environmental Coordinator with the City of Saskatoon's Sustainability Department. He has undergraduate degrees in Physical Education and Land Use & Environmental Studies from the University of Saskatchewan, and has been employed with the City of Saskatoon since 2008. His current portfolio includes tracking and reporting progress towards the City's Climate Action Plan, as well as various other reporting requirements related to the overall environmental performance of the City and community.

**Megan Tilly** Member



**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

	<p>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.</p> <p>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.</p>
	<p><b>Glen White</b>      Executive Director</p> <p>Mr. White brings more than 30 years of environmental management experience in the Saskatchewan mining and clean energy industries. His roles have included management of mine site environmental programs, conducting major project federal- provincial environmental assessments for new mining projects, and completing prefeasibility studies for utility scale renewable energy projects. Glen is committed to working with industry, regulatory agencies and other stakeholders to build efficient and effective air management programs based upon consistent, high quality air quality data collected within the WYAMZ.</p>

## **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
- Beaumont Energy
- Black Pearl Resources
- Bruin Oil and Gas
- Buzzard Resources
- Caltex Resources
- Canadian Natural Resources Limited
- 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
- Cenovus Energy Inc
- Hyzer Energy
- Ish Energy
- Kaisen Energy
- Leeco Resources
- Longhorn Oil and Gas
- Longview Oil
- Modexco Petroleum
- Meridian Cogeneration Power
- 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
- Smitty's Farms
- Sojourn Energy
- Spartan Energy
- Sphere Energy
- SSSS Oil Partnership
- Tamarack Valley
- Talisman Energy
- Tuscany Energy
- Twin Butte Energy
- Viterra



## CONTRIBUTING MEMBERS THIS YEAR

For information on how to become a member, please contact Glen White, Executive Director at (306) 227-8548.

- 102031850 Sask
- Baytex Energy Ltd.
- Canadian Natural Resources
- Can Expo Energy
- Cargill
- City of Saskatoon
- CNH Industrial
- Crescent Point Energy
- Cenovus Downstream
- Cenovus Upstream
- Erco Worldwide
- IPC Canada
- Kaisen Energy Corp
- Meadow Lake Mechanical Pulp
- Meridian Cogen Plant
- Mosaic Potash
- North Battleford Power
- Northwest Pure Alcohol and Spirits
- Pele Energy
- Nutrien- Agrium
- Nutrien – PCS
- SaskPower
- Secure Energy
- Serafina Energy Ltd
- Sifto Canada (Compass)
- Smitty's Farms
- Spur Petroleum
- Steel Reef Infrastructure
- Surge Energy Inc

\* A listing and website link to current WYAMZ members can also be found at <http://wyamz.ca/member-companies/>

## **Member Benefits**

Supporting WYAMZ through membership fees provides several member benefits, including:

- Membership in an association helping to foster a business-friendly environment that promotes future industrial growth.
- A collective voice for members to provide additional input to government mandated air zone management plans.
- Access to Federal Reference Method (FRM) quality regional air quality data.
- Shared monitoring equipment and air quality program operating costs amongst emitters. These efforts also potentially avoid less cost effective and more bureaucratic government mandated operation-based monitoring programs.
- An opportunity to build productive working relationships among industry, government, and public stakeholder groups.
- An effective forum for open discussion at WYAMZ Board meetings and the annual AGM.
- A contribution to building public trust through participation in open association processes and direct public involvement in the Association.
- An opportunity to use the information collected for public relations and education purposes.

*End of the Report*