



2014 Annual Report



Western Yellowhead Air Management Zone

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List of Terms and Definitions

24-hour	A calendar day, average is calculated midnight-to-midnight.
8-hour	8-hour running average for O ₃ 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 ₂ S	Hydrogen sulphide
NH ₃	Ammonia
NO ₂	Nitrogen dioxide
NO	Nitric oxide
NO _x	Oxides of nitrogen
O ₃	Ozone
PM _{2.5}	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 ₂	Sulphur dioxide
WD	Wind direction
WS	Wind speed

Units of Measurement

average	arithmetic average = $\sum X_i / n$
m/s	meter per second, or mps
µg/m ³	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 the north

MESSAGE FROM THE EXECUTIVE DIRECTOR

2014 was an excellent year for Western Yellowhead Air Management Zone (WYAMZ) and for air quality monitoring in the western Yellowhead region of Saskatchewan. WYAMZ is very pleased to inform our members that six (6) continuous air monitoring sites recording criteria air contaminant measurements are now operating in the region and providing real time data. Four of these stations are operated by WYAMZ. We also have the data from the airpointer operated by the Saskatchewan Ministry of Environment at North Battleford and the data from the National Air Pollution Surveillance Program (NAPS) Station in Saskatoon. We are exploring every opportunity to collaborate with other agencies in bringing additional monitoring into the region.

This monitoring initiative is multi-purpose; it: a) collects real-time air quality data throughout the WYAMZ region, b) demonstrates companies are operating in a safe, environmentally sound manner that is enabling sustainable growth, and c) provides companies considering investing in operations in Saskatchewan with data that shows it is a safe place to invest, being that the air quality is well understood and not an impediment to growth. The credibility and strength of the continuous monitoring network is scientifically and financially sound. The continuous data is available live on the internet; it includes hourly concentrations of SO₂, H₂S, NO/NO₂/NO_x, PM_{2.5} and O₃. The data is available on the WYAMZ website: <http://www.wyamz.ca>

We are continuing to communicate the work we do in many ways. When we do a presentation, or place an article or story in a newspaper, we highlight our members wherever possible. We list our members on our website and do as much as we can to inform the public the names of our member companies. This communication work is very important to WYAMZ and to its members.

Here are some of our recent and upcoming communication initiatives:

- CBC Radio, Saskatoon Star Phoenix, Lloydminster Meridian Booster interviews, Jan 2014
- Air Symposium in concert with SEIMA, Saskatoon Jan 2014
- Clean Air Day newspaper Campaign, Leader Post and Star Phoenix, June 4, 2014
- The Lloydminster Heavy Oil Show, Lloydminster September of 2014 and registered for 2016. This will once again provide us with an excellent showcase to inform the public of the work we do and highlight the names of our members and their participation in transparent reporting of air quality.
- Saskatchewan Association of Rural Municipalities (SARM), the Councillor Newsletter Article

All of these showcase the work we do and our members' involvement. It is important that the public is comfortable and welcoming of well-run industry in their municipalities, as public acceptance plays a large role in helping to foster a business-friendly environment that promotes future industrial growth. Future plans include determining the need for additional air monitoring stations, development of additional communication materials, presentations to municipalities, Chambers of Commerce, high school classes, home and school meetings, etc.

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

Real-time air monitoring data can be viewed at www.wyamz.ca. Real time and long-term historical data for use by industry to evaluate future development scenarios can be obtained from WYAMZ by request.

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

EXECUTIVE SUMMARY

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

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

The WYAMZ network monitors sulphur dioxide (SO₂), hydrogen sulphide (H₂S), nitrogen oxides (NO, NO₂, NO_x), ozone (O₃), fine particulate matter (PM_{2.5}), 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 2014, with the exception of 76.6% annual uptime for the Meadow Lake station PM_{2.5} monitor. The PM_{2.5} analyzer was malfunctioning from July 1 to September 24.

Table 1 summarizes the annual average concentration data for 2014; the measured air quality was within the Saskatchewan Ambient Air Quality Standards (SAAQS), with the exception of H₂S and PM_{2.5}. There was a total of 4 exceedance events for 1-hour average H₂S and 12 exceedance events for 24-hour average PM_{2.5}. The air quality at the WYAMZ air monitoring stations was rated Low Risk or Good for more than 97% of the time according to the Air Quality Health Index and Air Quality Index.

Table 1 Annual average concentrations for continuous parameters for 2014

Pollutant	Conc. Unit	Annual Average Concentration for Continuous Data			
		Meadow Lake	Maidstone	Unity	Kindersley
SO ₂	ppb	<i>a</i>	0.3	<i>a</i>	0.2
H ₂ S	ppb	<i>a</i>	0.3	<i>a</i>	0.2
NO	ppb	0.1	1.4	0.6	<i>a</i>
NO ₂	ppb	0.8	4.6	2.5	<i>a</i>
NO _x	ppb	0.9	5.9	3.1	<i>a</i>
O ₃	ppb	30	<i>a</i>	30	<i>a</i>
PM _{2.5}	µg/m ³	4	7	5	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 eight continuous air monitoring stations in the region. The Meadow Lake, Maidstone, Unity, and Kindersley stations are owned and operated by WYAMZ; the North Battleford and Saskatoon stations are owned and operated by the Ministry of Environment. The Lloydminster East and West stations are owned and operated by Husky Energy.

WYAMZ operates four airpointers® at the Meadow Lake, Maidstone, Unity, and Kindersley stations. The network measures continuous data for sulphur dioxide (SO₂), hydrogen sulphide (H₂S), nitrogen oxides (NO, NO₂, NO_x), ozone (O₃), fine particulate matter (PM_{2.5}), 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. Publically available real-time air monitoring data is available on the WYAMZ website at: www.wyamz.ca.

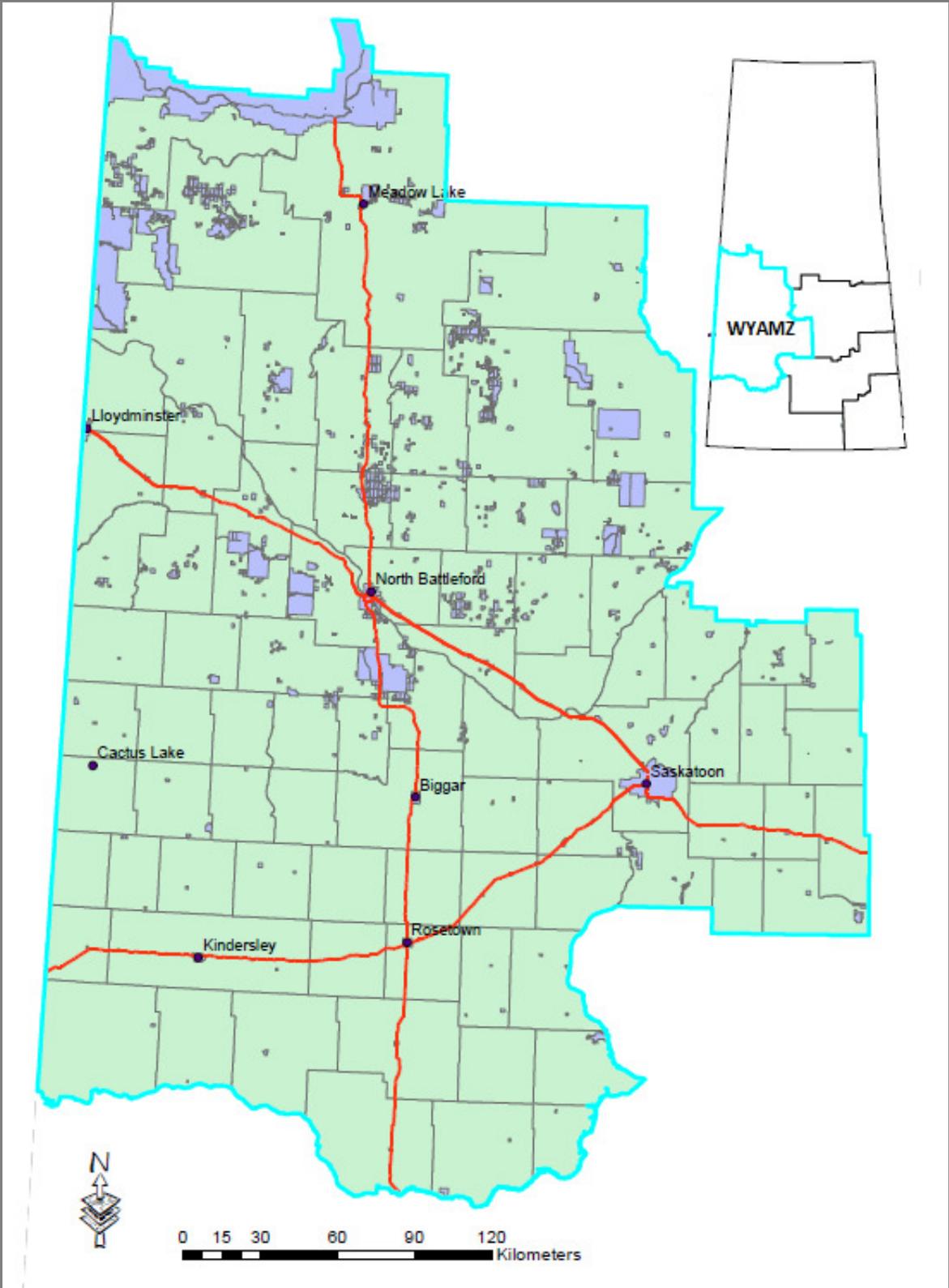


Figure 1. The Western Yellowhead Air Management Zone (WYAMZ)



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

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	Maidstone	Unity	Kindersley
SO ₂	<i>a</i>	✓	<i>a</i>	✓
H ₂ S	<i>a</i>	✓	<i>a</i>	✓
NO	✓	✓	✓	<i>a</i>
NO ₂	✓	✓	✓	<i>a</i>
NO _x	✓	✓	✓	<i>a</i>
O ₃	✓	<i>a</i>	✓	<i>a</i>
PM _{2.5}	✓	✓	✓	✓
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 2014. A total of 4 exceedance events for 1-hour average H₂S and 12 exceedance events for 24-hour average PM_{2.5} were recorded for the WYAMZ air monitoring network. There were 17 8-hour running averages greater than the O₃ Canada-Wide Standard (CWS) of 65 ppb. These events do not constitute an exceedance because CWS is based on the 4th highest concentration, averaged over three consecutive years.

Table 3. Number of exceedance events for 2014

Parameter	No. of Stations	Average Type	SAAQS	No. of Exceedance
SO ₂	2	1-hour	172 ppb	0
		24-hour	57 ppb	0
		Annual	11 ppb	0
H ₂ S	2	1-hour	10.8 ppb	4
		24-hour	3.6 ppb	0
NO ₂	3	1-hour	212 ppb	0
		Annual	53 ppb	0
O ₃	2	1-hour	82 ppb	0
		8-hour	65 ppb CWS	17 ^a
PM _{2.5}	4	24-hour	30 µg/m ³	12

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

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 slow most of time. According to the international wind classification system, prevailing wind primarily consisted of Light Air (0.3 m/s – 1.4 m/s) and Light Breeze (1.4 m/s – 3.1 m/s). Moderate Breeze (3.1 m/s – 7.8 m/s) and fast wind (>7.8 m/s) was primarily recorded at the Kindersley station, for 2.9% of time. The frequency of calm wind (≤ 0.3 m/s) ranged from 1.3% (Kindersley) to 5.3% (Unity and Maidstone).

The prevailing wind direction was not consistent among the four air monitoring stations. The Meadow Lake station was characterized with winds from the southwest quadrant (31.3%) and southeast quadrant (32.4%). The remaining three stations were characterized with a prevalent wind from the northwest quadrant and southeast quadrant. The Unity station also detected a secondary prevalent wind (11.4%) from the east-northeast direction.

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.

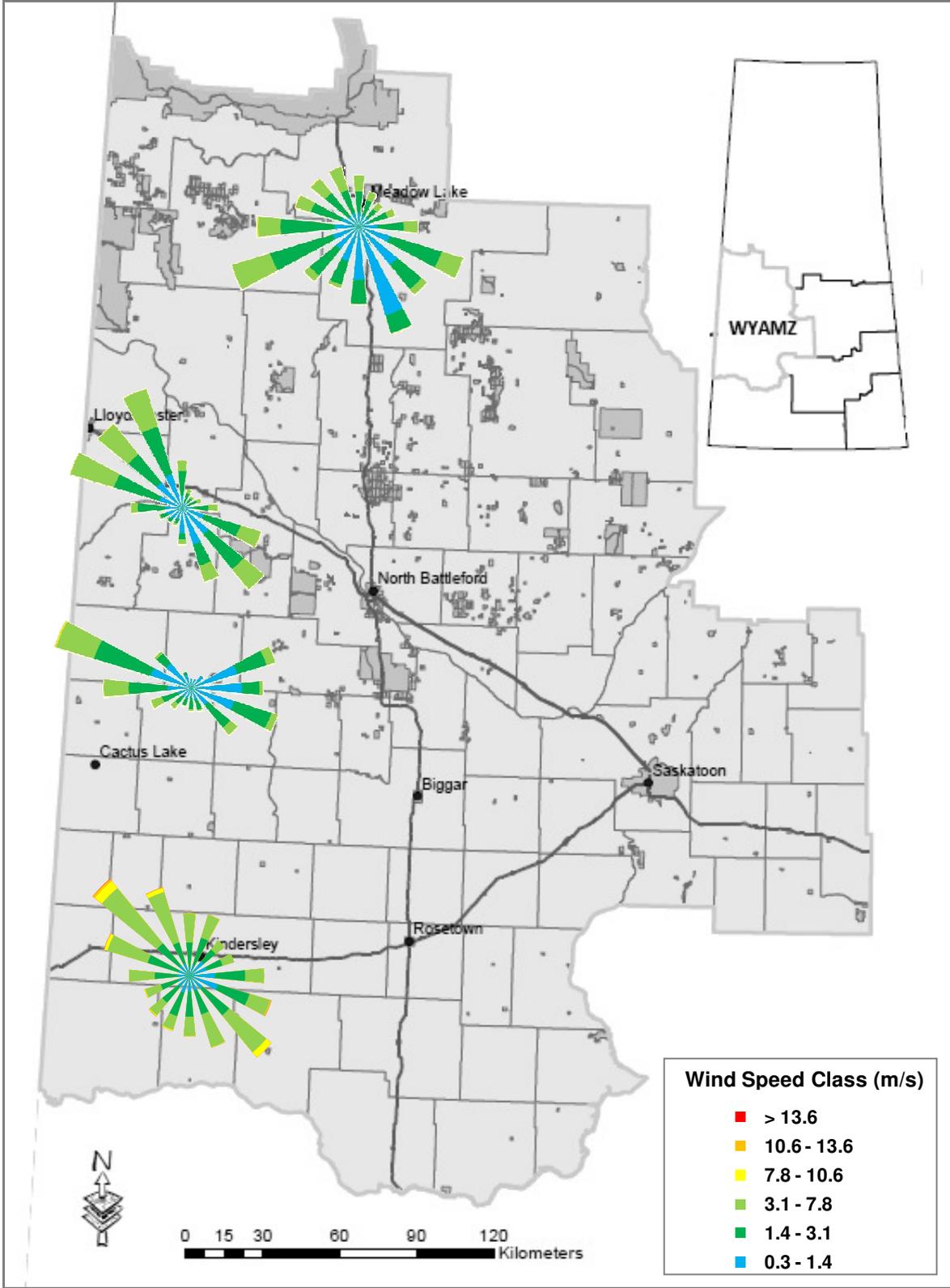


Figure 3. Wind roses for 1-hour average wind data for 2014

2.3 Continuous Air Quality Data

2.3.1 Sulphur Dioxide (SO₂)

Sulphur dioxide (SO₂) 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 SO₂ 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 SO₂. SO₂ also damages trees and crops.

SO₂, 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. SO₂ in the air can form microscopic acid aerosols, which have serious health implications, as well as, contributing to climate change.

Anthropogenic SO₂ 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 SO₂ 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 = 57 ppb
- annual average SAAQS = 11 ppb

Table 4 presents the summary statistics for SO₂ measurement results. The measured concentration was low at both stations. The annual average concentration was 0.3 ppb and 0.2 ppb at the Maidstone and Kindersley stations, respectively. The maximum 1-hour average concentration of 7.6 ppb and the maximum 24-hour average concentration of 2.1 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 SO₂. For more than 95% of the time, SO₂ 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 southwest quadrant for both stations.

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 SO₂ measurement results for 2014

Monitoring Station	Annual Average	Instrument Uptime	Maximum SO ₂ Conc. and Occurrence Time			
			1-hour Max.		24-hour Max.	
	ppb	%	ppb	Time	ppb	Date
Maidstone	0.3	99.7%	7.5	Nov 19 22:00	2.1	Jul-8
Kindersley	0.2	99.4%	6.6	Mar-14 20:00	1.5	Feb-25

Table 5. Number of exceedance events for SO₂ for 2014

Monitoring Station	No. of Exceedance to Saskatchewan SO ₂ Ambient Air Quality Standard (SAAQS)		
	1-hr SAAQS	24-hr SAAQS	Annual SAAQS
	172 ppb	57 ppb	11 ppb
Maidstone	0	0	0
Kindersley	0	0	0

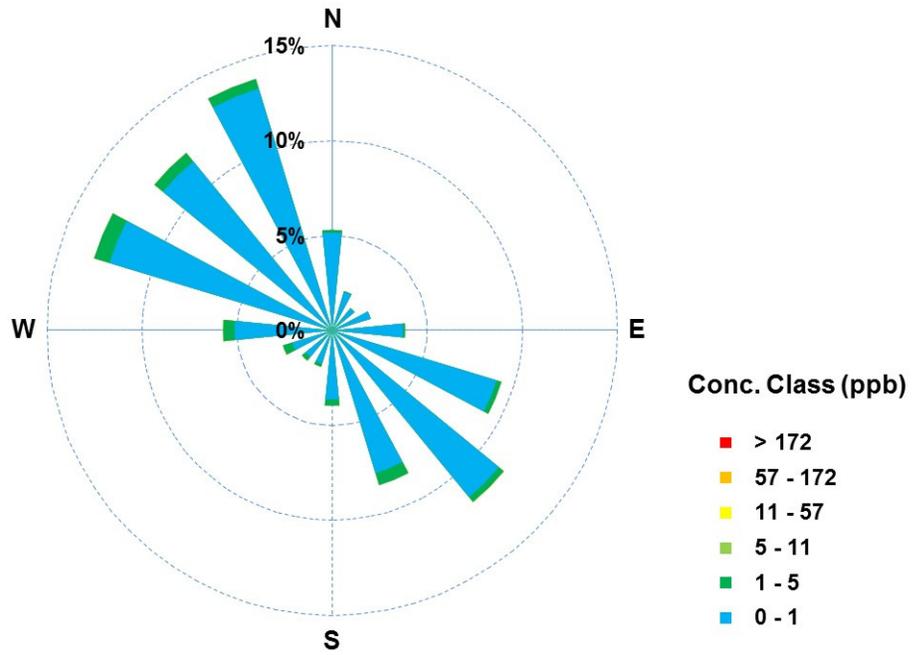


Figure 4. Pollutant rose for 1-hour average SO₂ data at the Maidstone station

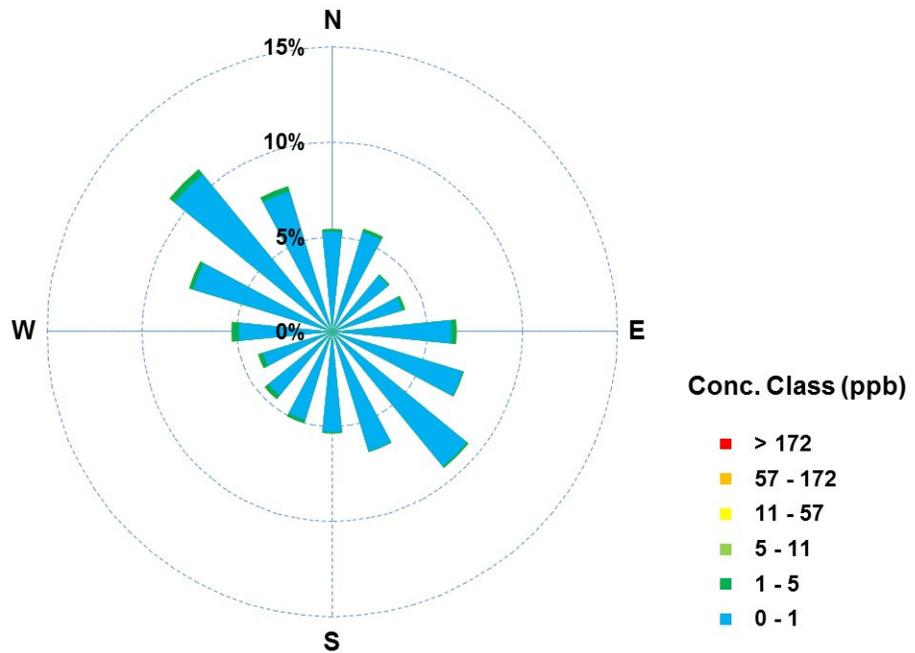


Figure 5. Pollutant rose for 1-hour average SO₂ data at the Kindersley station

2.3.2 Hydrogen Sulphide (H₂S)

Hydrogen sulphide (H₂S) is a colourless gas with a characteristic “rotten egg” odour. It is produced both naturally and through anthropogenic emission sources. H₂S 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 H₂S 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 = 10.8 ppb
- 24-hour average SAAQS = 3.6 ppb

Table 6 presents the summary statistics for H₂S measurement results. The measured concentration was low at both stations; the annual average concentration was 0.3 ppb and 0.2 ppb at the Maidstone and Kindersley stations, respectively. The maximum 1-hour average concentration of 13.5 ppb and the maximum 24-hour average concentration of 2.3 ppb were both measured at the Maidstone station. There were 4 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 H₂S. For more than 99% of time, H₂S concentration was less than or equal to 1 ppb (blue petals) at both stations. The higher concentrations (>1 ppb) at the Maidstone station tend to be slightly more frequent when wind was from the southern directions. The higher concentration events at the Kindersley station tend to be slightly more frequent when wind was from the northeast 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 H₂S measurement results for 2014

Monitoring Station	Annual Average	Instrument Uptime	Maximum H ₂ S Conc. and Occurrence Time			
			1-hour Max.		24-hour Max.	
	ppb	%	ppb	Time	ppb	Date
Maidstone	0.3	99.7%	13.5	Aug 29 07:00	2.3	Jul-9
Kindersley	0.2	99.4%	3.3	Jul 31 09:00	0.9	Aug 16

Table 7. Number of exceedance events for H₂S for 2014

Monitoring Station	No. of Exceedances to Saskatchewan H ₂ S Ambient Air Quality Standard (SAAQS)	
	1-hr SAAQS	24-hr SAAQS
	10.8 ppb	3.6 ppb
Maidstone	4	0
Kindersley	0	0

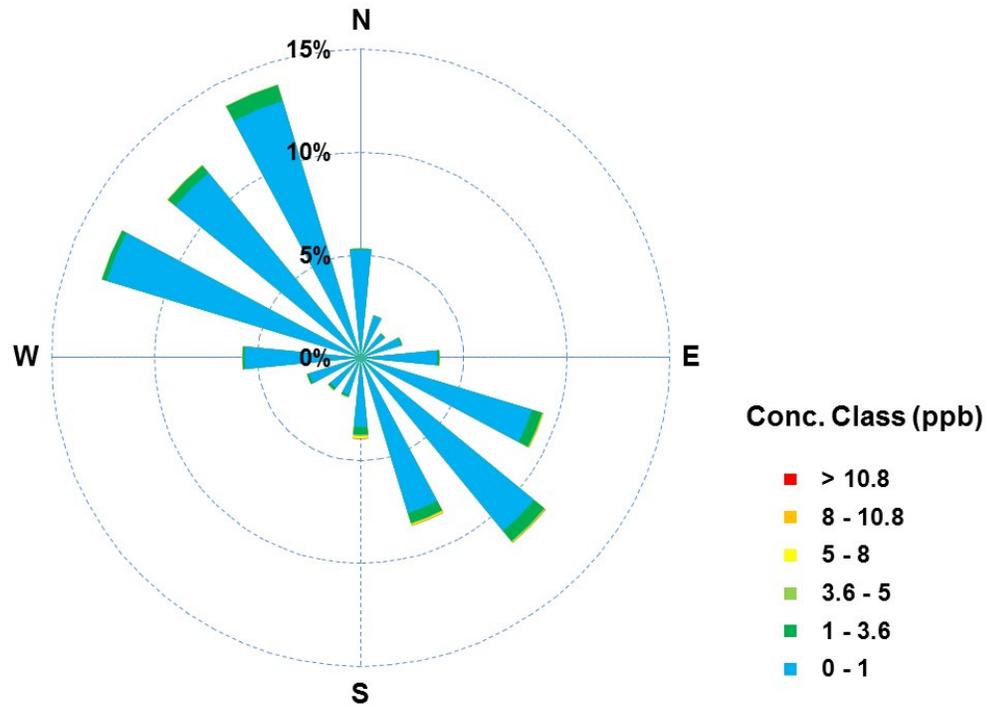


Figure 6. Pollutant rose for 1-hour average H₂S data at the Maidstone station

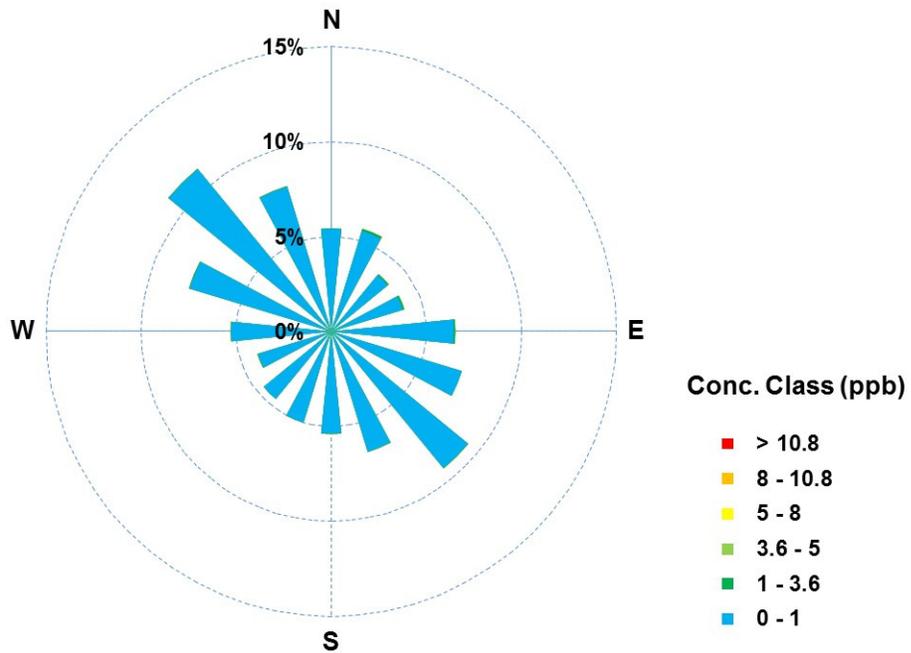


Figure 7. Pollutant rose for 1-hour average H₂S data at the Kindersley station

2.3.3 Nitrogen Dioxide (NO₂)

Nitrogen oxides, also known as oxides of nitrogen (NO_x), is a collective term for nitric oxide (NO) and nitrogen dioxide (NO₂). 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. NO₂ is of more interest than NO from both a health and acid rain perspective.

NO_x can cause respiratory disease, damage vegetation, and reduce visibility. The primary concern with NO_x emissions is their contribution to formation of ground-level ozone, smog and acid rain. To a lesser extent, some NO_x compounds (e.g. N₂O) contribute to stratospheric ozone layer depletion and global warming.

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

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

- 1-hour average SAAQS = 212 ppb
- annual average SAAQS = 53 ppb

Table 8 presents the summary statistics for NO₂ measurement results. The Maidstone station measured a higher concentration than the other two stations, with an annual average of 4.6 ppb. The annual average concentration recorded at the Unity station was 2.5 ppb, and the Meadow Lake station was 0.8 ppb. Both the maximum 1-hour and 24-hour concentrations were detected at the Maidstone station. There was no exceedance of the 1-hour or annual SAAQS (see Table 9).

Figures 8 to 10 present the pollutant roses for 1-hour average concentrations for NO₂. The concentration at the Meadow Lake station was the lowest among the three stations; for more than 99% of the time NO₂ concentration was less than 5 ppb; the concentration never exceeded 10 ppb for the three stations. The >5 ppb events tend to be slightly more frequent when wind was from the southwest quadrant, however the sample size was too small to conclude the trend. At the Unity station, 11.2% of the time NO₂ concentration was higher than 5 ppb. The >5 ppb events tend to be more frequent when wind was from the southern directions, however the sample size was too small to conclude the trend. The concentration at the Maidstone station tends to be the highest among the three stations; 32.9% of the time NO₂ concentration was greater than 5 ppb; these events tend to be more frequent when wind was from the

southwest and northwest quadrants. In addition to the directional trends, a seasonal trend was observed at all stations; NO₂ concentration tends to be higher during the winter months.

The detailed frequency distribution tables for the NO, NO₂ and NO_x 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 NO₂ measurement results for 2014

Monitoring Station	Annual Average	Instrument Uptime	Maximum NO ₂ Conc. and Occurrence Time			
			1-hour Max.		24-hour Max.	
			ppb	%	ppb	Time
Meadow Lake	0.8	99.8%	9.6	Jan 28 23:00	4.4	Jan-28
Maidstone	4.6	99.7%	40.1	Feb 27 04:00	19.6	Jan-10
Unity	2.5	99.0%	31.8	Mar 07 21:00	12.6	Jan-10

Table 9. Number of exceedance events for NO₂ for 2014

Monitoring Station	No. of Exceedances to Saskatchewan NO ₂ Ambient Air Quality Standard (SAAQS)	
	1-hr SAAQS	Annual SAAQS
	212 ppb	53 ppb
Meadow Lake	0	0
Maidstone	0	0
Unity	0	0

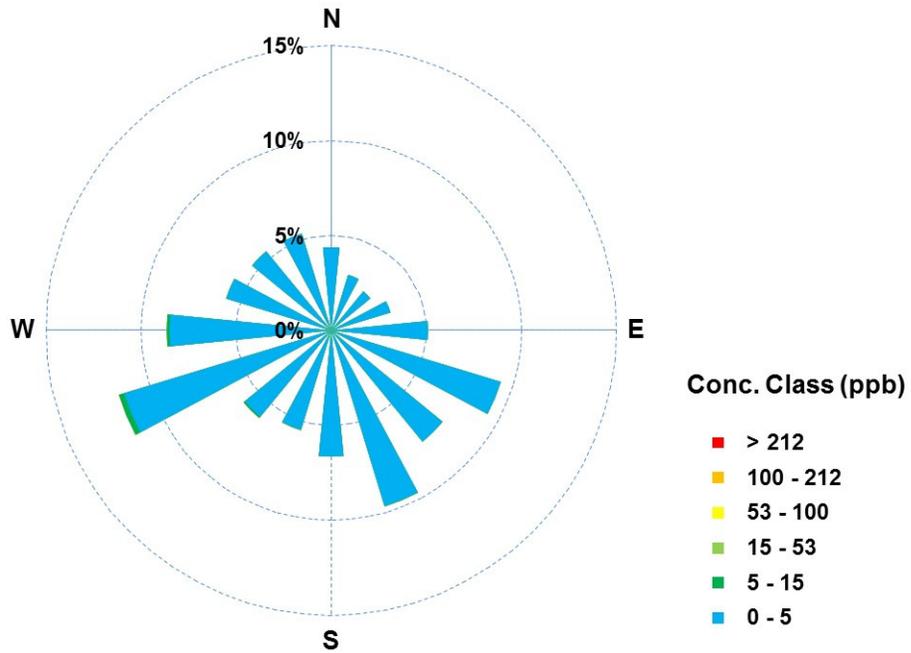


Figure 8. Pollutant rose for 1-hour average NO₂ data at the Meadow Lake station

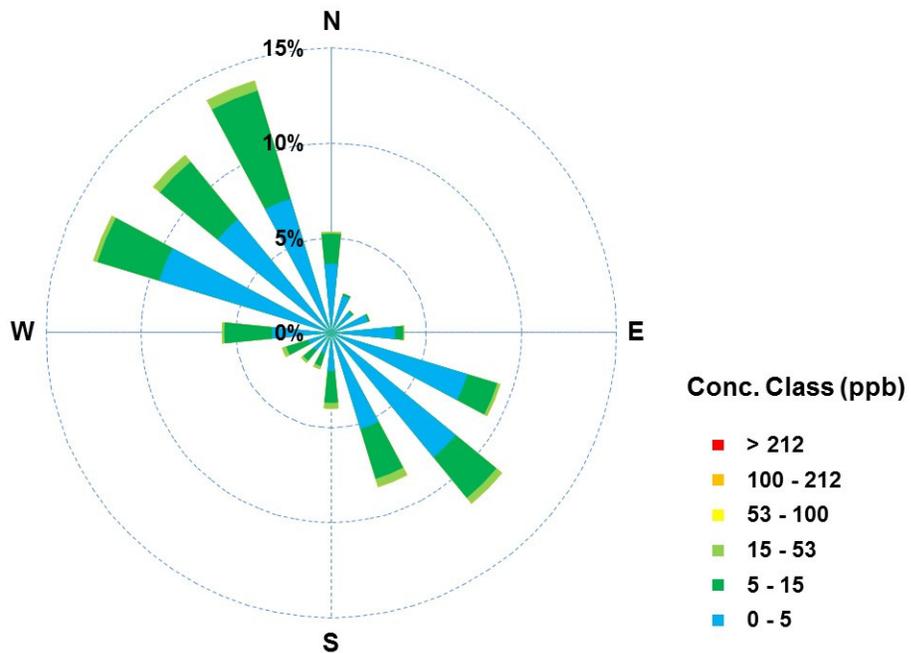


Figure 9. Pollutant rose for 1-hour average NO₂ data at the Maidstone station

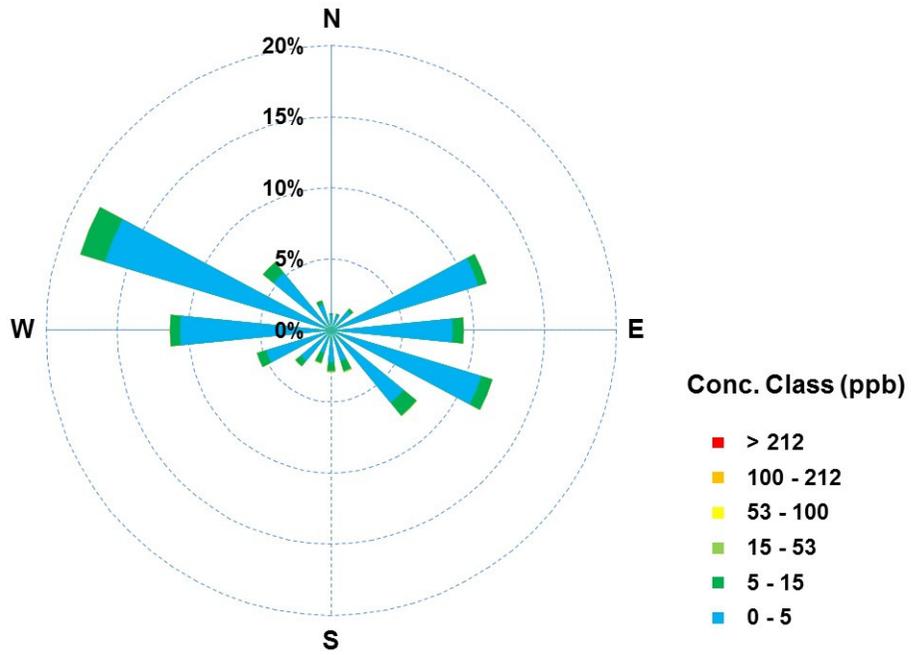


Figure 10. Pollutant rose for 1-hour average NO₂ data at the Unity station

2.3.4 Ozone (O₃)

Ozone (O₃) 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, O₃ 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_x) and volatile organic compounds (VOC) in the presence of sunlight. Some research suggests that ground-level ozone could be from intrusion of ozone from the stratosphere, mixing from the upper troposphere, local photochemistry and the medium and long-range transport. There are split opinions regarding relative importance of these mechanisms. A study in Regina suggested that high ozone events could be due to downward transport from the stratosphere for the reviewed data.

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

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

- 1-hour average SAAQS = 82 ppb

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

- 8-hour average CWS = 65 ppb; achievement evaluation is based on the 4th highest measurement annually, averaged over three consecutive years.

Table 10 presents the summary statistics for O₃ measurement results. The annual average concentration was 30 ppb for both stations. The maximum 1-hour concentration of 71 ppb and the 4th highest 8-hour running averages of 68 ppb were both detected at the Unity station. There were 17 8-hour running averages higher than the CWS standard (see Table 11). These events do not constitute an exceedance because the CWS standard is based on the 4th highest concentration, averaged over three consecutive years. The WYAMZ network has not collected enough data for CWS exceedance assessment.

Figures 11 and 12 present the pollutant roses for 1-hour average concentration of O₃. The measured concentration was within 20 ppb to 40 ppb range for more than 60% of the time at both stations. There was no apparent directional trend for the higher concentration events (>40 ppb). The concentration of O₃ 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 O₃ measurement results for 2014

Monitoring Station	Annual Average	Instrument Uptime	Maximum O ₃ Conc. and Occurrence Time			
			1-hour Max.		8-hour 4 th Highest	
			ppb	%	ppb	Time
Meadow Lake	30	99.8%	61	Mar 09 19:00	58	May 23 13:00
Unity	30	99.1%	71	Apr 22 17:00	68	Jun 13 12:00

Table 11. Number of exceedance events for O₃ for 2014

Monitoring Station	No. of Exceedances to Saskatchewan O ₃ Ambient Air Quality Standard(SAAQS)	
	1-hr SAAQS	8-hr CWS
	82 ppb	65 ppb
Meadow Lake	0	0
Unity	0	17 ^a

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

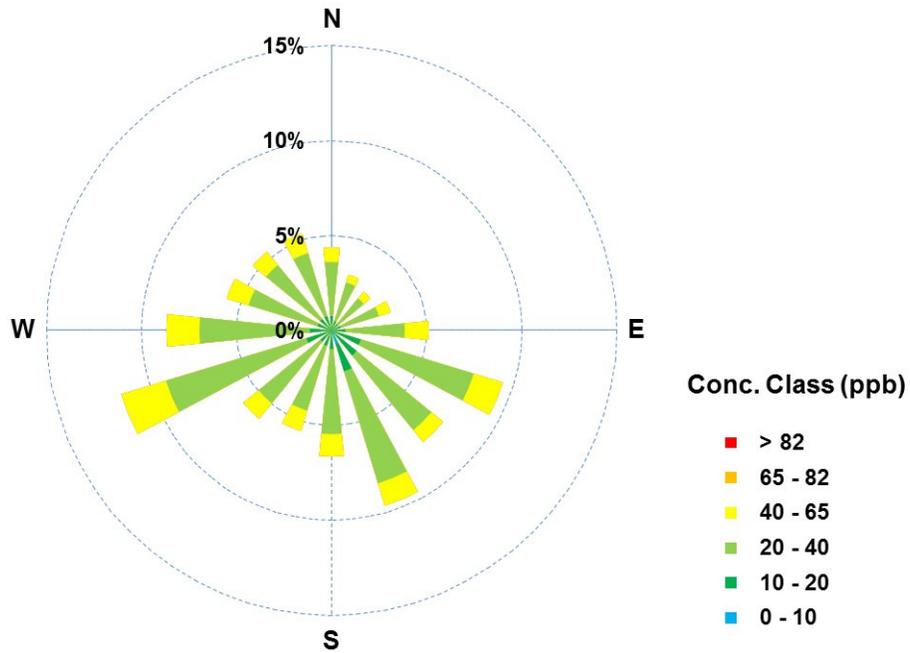


Figure 11. Pollutant rose for 1-hour average O₃ data at the Meadow Lake station

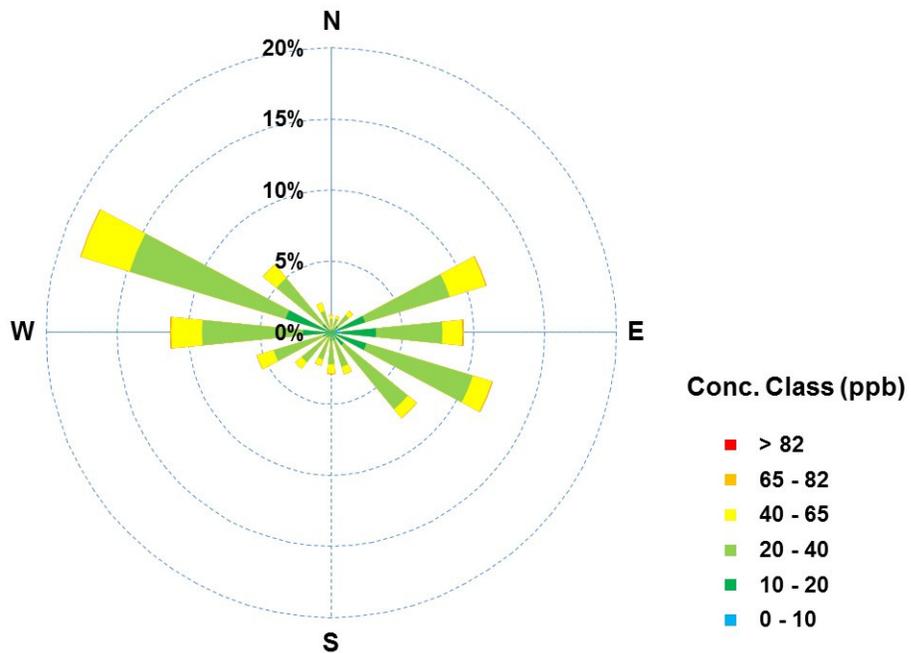


Figure 12. Pollutant rose for 1-hour average O₃ data at the Unity station

2.3.5 Fine Particulate Matter (PM_{2.5})

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 PM₁₀. PM₁₀ is defined as particles that have an aerodynamic diameter less than 10 microns (or 0.01 mm). PM₁₀ can be divided into two groups of particles based on size: fine particles and coarse particles. The fine particles are those particles with an aerodynamic diameter smaller than 2.5 microns (0.0025 mm), and are identified as PM_{2.5}. In contrast, coarse particles are those with aerodynamic diameter greater than 2.5 microns and less than 10 microns.

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

Adverse health effects from breathing air with a high PM_{2.5} 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_{2.5}):

- 30 µg/m³ averaged over a 24-hour period from midnight to midnight; the standard is based on the 98th percentile annually, averaged over three consecutive years.

Table 12 presents the summary statistics for PM_{2.5} measurement results. The annual average concentrations ranged from 4 µg/m³ to 7 µg/m³. The maximum 1-hour concentration of 183 µg/m³ and the maximum 24-hour concentration of 89 µg/m³ were both detected at the Maidstone station. There were 12 exceedances of the CWS 24-hour average standard (see Table 13).

Figures 13 through 16 present the pollutant roses for PM_{2.5} measurement results. The measured concentrations were mostly less than 10 µg/m³ (82.0% to 93.9% of the time for the four stations). There was no apparent directional trend for the higher concentration events (>10 µg/m³), while a higher occurrence frequency was observed in July and August.

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

Table 12. Summary statistics for PM_{2.5} measurement results for 2014

Monitoring Station	Annual Average	Instrument Uptime	Maximum PM _{2.5} Conc. and Occurrence Time			
			1-hour Max.		24-hour Max.	
	µg/m ³	%	µg/m ³	Time	µg/m ³	Date
Meadow Lake ^a	4	76.6%	158	Jun 30 00:00	40	Nov-20
Maidstone	7	98.9%	183	Feb 27 00:00	89	Jul-8
Unity	5	99.4%	90	Jul 09 03:00	45	Jul-8
Kindersley	6	97.1%	137	Jul 11 22:00	40	Aug 16

a. Meadow Lake PM_{2.5} monitor was malfunctioning from July 1 to September 24.

Table 13. Number of exceedance events for PM_{2.5} for 2014

Monitoring Station	No. of Exceedance to Canada-Wide PM _{2.5} Standards (CWS)	
	24-hr CWS	
	30 µg/m ³	
Meadow Lake ^a	2	
Maidstone	3	
Unity	3	
Kindersley	4	

a. Meadow Lake PM_{2.5} monitor was malfunctioning from July 1 to September 24.

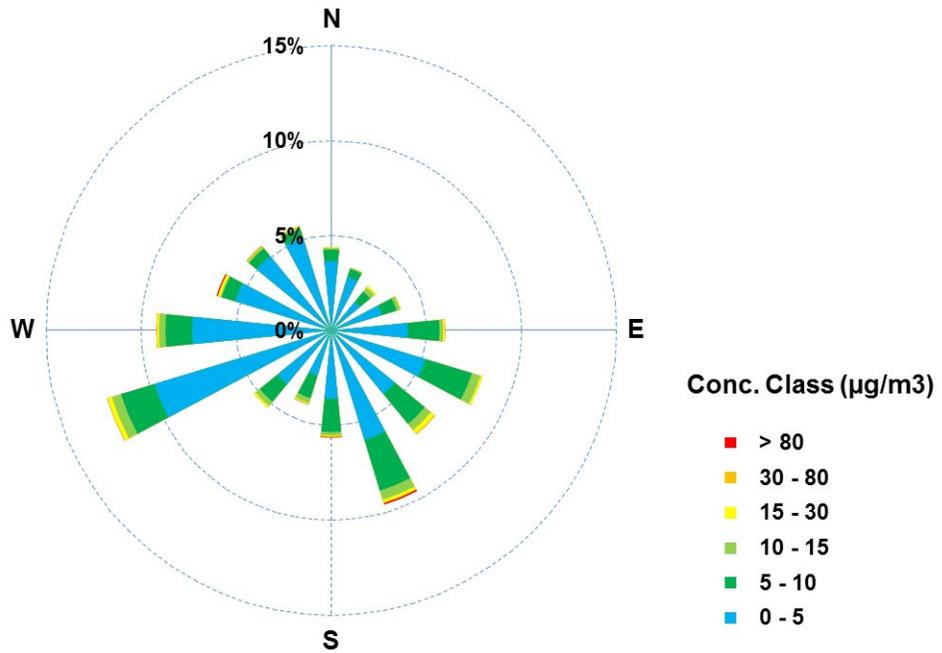


Figure 13. Pollutant rose for 1-hour average $\text{PM}_{2.5}$ data at the Meadow Lake station

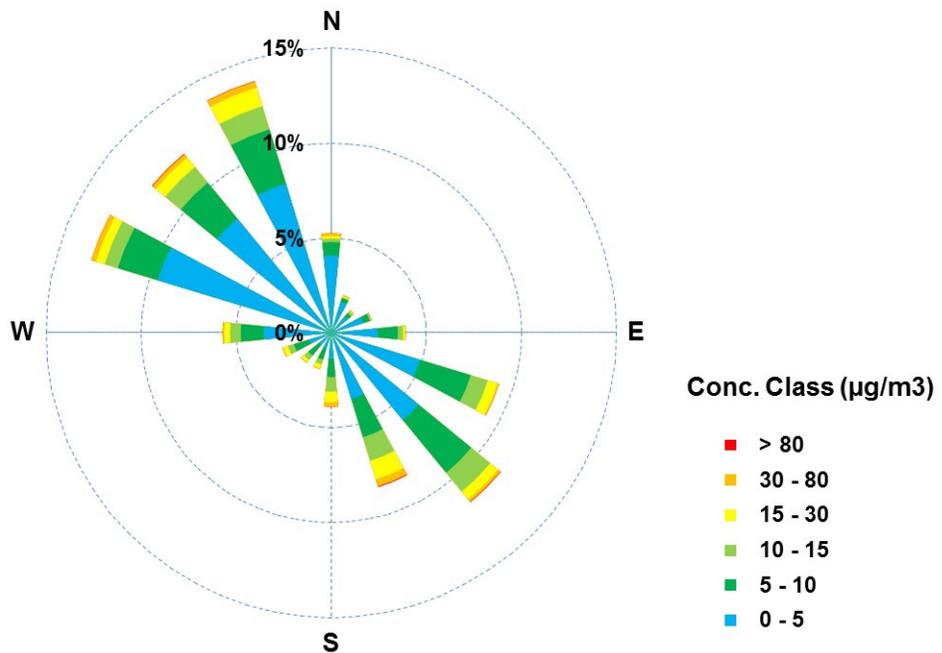


Figure 14. Pollutant rose for 1-hour average $\text{PM}_{2.5}$ data at the Maidstone station

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_{2.5}), nitrogen dioxide (NO₂), and ground-level ozone (O₃). All three pollutants are required to calculate AQHI. Among the WYAMZ air monitoring stations, Meadow Lake and Unity 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 station had 0.6% of time in the Moderate Risk and 0.1% of time in the High Risk categories. The High Risk events were associated with an increased PM_{2.5} concentration, while the Moderate Risk events were primarily associated with an increased concentration of PM_{2.5} or O₃. The High Risk events were recorded on June 30, and the cause was determined to be wildfire smoke; PM_{2.5} exceeded 100 µg/m³. The Unity station had 1.8% of time in the Moderate Risk category, which was primarily associated with an increased concentration of PM_{2.5} or O₃.



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 Hour and Frequency by AQHI Risk Rating			
		Low Risk	Moderate Risk	High Risk	Very High Risk
Meadow Lake	Occurrence Hours	6648	42	4	0
	Occurrence Frequency	99.3%	0.6%	0.1%	0.0%
Unity	Occurrence Hours	8485	154	0	0
	Occurrence Frequency	98.2%	1.8%	0.0%	0.0%

2.5 Air Quality Index (AQI)

The Maidstone station does not meet the reporting requirements for AQHI, the Air Quality Index (AQI) is used as an alternative index. The Kindersley 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: SO₂, NO₂, O₃, PM_{2.5}, 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 97.8% of the time; 2.0% was rated Fair, and 0.2% was rated Poor. The Fair and Poor air quality was associated with an increased PM_{2.5} concentration.

Table 15. AQI rating and effect description

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

Table 16. Summary of occurrence statistics for AQI rating

Station Name	Occurrence Statistics	Occurrence Hours and Frequency by AQI Rating			
		Good	Fair	Poor	Very Poor
Maidstone	Occurrence Hours	7969	167	14	1
	Occurrence Frequency	97.8%	2.0%	0.2%	0.0%

APPENDIX A. SASKATCHEWAN AMBIENT AIR QUALITY STANDARDS

Table A-1. Saskatchewan Ambient Air Quality Standards

Pollutant ⁽¹⁾	Average Concentration For Applicable Time Period				
	1 Hour	8 Hours	24 Hours	30 Days	Annual
Suspended Particulates			120 µg/m ³		*70 µg/m ³
Settleable Particulates				2.0 mg/cm ²	
Soil Index			1.5 COH units		
Sulphur Dioxide	450 (0.17) µg/m ³		150 (0.06) µg/m ³		**30 (0.01) µg/m ³
Sulphation				30 mg of SO ₃ per 100 cm ²	
Carbon Monoxide	15 (13) mg/m ³	6 (5) mg/m ³			
Oxidants (Ozone)	160 (0.08) µg/m ³				
Nitrogen Dioxide	400 (.2) µg/m ³				**100 (0.05) µg/m ³
Hydrogen Sulphide	15 (10.8) µg/m ³		5 (3.6) µg/m ³		

NOTE: Volume units, in parts per million or parts per billion for H₂S, are in brackets

* Geometric Means, **Arithmetic Means

⁽¹⁾ Sampling will be in a manner and location specified by the Minister.

The Canada-wide Standards (CWSs) listed below are in addition to the above air quality standards.

- Particulate Matter
 - A CWS for PM_{2.5} of 30 µg/m³, 24-hour averaging time
 - Achievement to be based on the 98th percentile ambient measurement annually, averaged over three consecutive years
- Ozone
 - A CWS for ozone of 65 ppb, eight-hour averaging time
 - Achievement to be based on the 4th highest measurement annually, averaged over three consecutive years
- Benzene, Mercury, Dioxins & Furans
 - Information on numerical targets or emission limits for specific facilities or sectors is available from the Canadian Council of Ministers of the Environment website at <http://www.ccme.ca/>

APPENDIX B. MEADOW LAKE STATION: CONTINUOUS MONITORING DATA

Table B-1 Meadow Lake Station: Summary statistics for continuous air monitoring results for 2014

Parameter	Unit	Calibration & AIC ^a (hours)	Valid Data (hours)	Uptime (%)	Summary Statistics for Hourly Average Data		
					Average	Minimum	Maximum
NO	ppb	493	8249	99.8%	0.1	< 0.1	5.0
NO ₂	ppb	493	8249	99.8%	0.8	< 0.1	9.6
NO _x	ppb	493	8249	99.8%	0.9	< 0.1	9.7
O ₃	ppb	411	8336	99.8%	30	2	61
PM _{2.5}	µg/m ³	0	6704	76.6%	4	< 1	158
Precipitation	mm	0	8749	99.9%	330.3 ^b	< 0.1	19.8
Ambient Temperature	°C	0	8749	99.9%	1.6	-34.8	29.1
Relative Humidity	%	0	8749	99.9%	68	20	94
Wind Speed	m/s	0	8749	99.9%	2.0	Calm	9.7

a. Automatic Instrument Check

b. Total precipitation

Table B-2. Meadow Lake Station: Summary of airpointer® NO monitoring results for the year 2014

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Conc. (ppb)	Maximum 1-Hr Conc. (ppb)	1-Hour Exceedance ^a (no.)	Maximum 24-Hr Conc. (ppb)	24-Hour Exceedance ^b (no.)	Percent of Data in each Concentration Range					
								<=5	5 ~ 15	15 ~ 53	53 ~ 100	100 ~ 212	>212
January	710	99.7%	0.2	1.8	-	0.4	-	100.0	0.0	0.0	0.0	0.0	0.0
February	643	100.0%	0.2	2.4	-	0.7	-	100.0	0.0	0.0	0.0	0.0	0.0
March	704	100.0%	0.2	4.2	-	0.6	-	100.0	0.0	0.0	0.0	0.0	0.0
April	688	99.9%	0.1	1.0	-	0.2	-	100.0	0.0	0.0	0.0	0.0	0.0
May	702	99.9%	0.1	0.7	-	0.1	-	100.0	0.0	0.0	0.0	0.0	0.0
June	666	100.0%	0.1	1.3	-	0.2	-	100.0	0.0	0.0	0.0	0.0	0.0
July	680	99.9%	0.1	1.0	-	0.2	-	100.0	0.0	0.0	0.0	0.0	0.0
August	686	99.7%	0.1	3.7	-	0.4	-	100.0	0.0	0.0	0.0	0.0	0.0
September	676	99.6%	0.1	1.0	-	0.2	-	100.0	0.0	0.0	0.0	0.0	0.0
October	704	99.0%	0.2	5.0	-	0.6	-	99.9	0.1	0.0	0.0	0.0	0.0
November	689	100.0%	0.1	1.2	-	0.3	-	100.0	0.0	0.0	0.0	0.0	0.0
December	701	99.9%	0.1	1.8	-	0.3	-	100.0	0.0	0.0	0.0	0.0	0.0
Annual ^c	8249	99.8%	0.1	5.0	-	0.7	-	100.0	0.0	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-3. Meadow Lake Station: Summary of airpointer® NO₂ monitoring results for the year 2014

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Conc. (ppb)	Maximum 1-Hr Conc. (ppb)	1-Hour Exceedance ^a (no.)	Maximum 24-Hr Conc. (ppb)	24-Hour Exceedance ^b (no.)	Percent of Data in each Concentration Range					
								<=5	5 ~ 15	15 ~ 53	53 ~ 100	100 ~ 212	>212
January	710	99.7%	1.5	9.6	0	4.4	-	97.5	2.5	0.0	0.0	0.0	0.0
February	643	100.0%	1.5	9.6	0	3.9	-	96.9	3.1	0.0	0.0	0.0	0.0
March	704	100.0%	1.1	5.4	0	3.4	-	99.9	0.1	0.0	0.0	0.0	0.0
April	688	99.9%	0.6	2.1	0	1.4	-	100.0	0.0	0.0	0.0	0.0	0.0
May	702	99.9%	0.4	2.7	0	0.9	-	100.0	0.0	0.0	0.0	0.0	0.0
June	666	100.0%	0.4	1.8	0	0.6	-	100.0	0.0	0.0	0.0	0.0	0.0
July	680	99.9%	0.4	1.7	0	0.7	-	100.0	0.0	0.0	0.0	0.0	0.0
August	686	99.7%	0.4	3.0	0	0.8	-	100.0	0.0	0.0	0.0	0.0	0.0
September	676	99.6%	0.5	2.2	0	1.0	-	100.0	0.0	0.0	0.0	0.0	0.0
October	704	99.0%	0.7	3.7	0	1.6	-	100.0	0.0	0.0	0.0	0.0	0.0
November	689	100.0%	0.9	7.9	0	2.6	-	99.1	0.9	0.0	0.0	0.0	0.0
December	701	99.9%	1.4	9.4	0	3.2	-	99.1	0.9	0.0	0.0	0.0	0.0
Annual ^c	8249	99.8%	0.8	9.6	0	4.4	-	99.4	0.6	0.0	0.0	0.0	0.0

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

b. No 24-hour Saskatchewan Ambient Air Quality Standard

c. Annual Saskatchewan Ambient Air Quality Standard = 53 ppb

Table B-4. Meadow Lake Station: Summary of airpointer® NOx monitoring results for the year 2014

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Conc. (ppb)	Maximum 1-Hr Conc. (ppb)	1-Hour Exceedance ^a (no.)	Maximum 24-Hr Conc. (ppb)	24-Hour Exceedance ^b (no.)	Percent of Data in each Concentration Range					
								<=5	5 ~ 15	15 ~ 53	53 ~ 100	100 ~ 212	>212
January	710	99.7%	1.6	9.7	-	4.8	-	96.6	3.4	0.0	0.0	0.0	0.0
February	643	100.0%	1.6	9.5	-	4.2	-	95.3	4.7	0.0	0.0	0.0	0.0
March	704	100.0%	1.2	7.9	-	3.6	-	99.6	0.4	0.0	0.0	0.0	0.0
April	688	99.9%	0.7	2.6	-	1.5	-	100.0	0.0	0.0	0.0	0.0	0.0
May	702	99.9%	0.5	2.8	-	1.0	-	100.0	0.0	0.0	0.0	0.0	0.0
June	666	100.0%	0.4	3.1	-	0.7	-	100.0	0.0	0.0	0.0	0.0	0.0
July	680	99.9%	0.5	2.1	-	0.8	-	100.0	0.0	0.0	0.0	0.0	0.0
August	686	99.7%	0.6	5.9	-	1.2	-	99.9	0.1	0.0	0.0	0.0	0.0
September	676	99.6%	0.6	3.0	-	1.2	-	100.0	0.0	0.0	0.0	0.0	0.0
October	704	99.0%	0.8	8.6	-	2.0	-	99.4	0.6	0.0	0.0	0.0	0.0
November	689	100.0%	1.0	8.1	-	2.7	-	99.1	0.9	0.0	0.0	0.0	0.0
December	701	99.9%	1.5	9.5	-	3.4	-	98.9	1.1	0.0	0.0	0.0	0.0
Annual ^c	8249	99.8%	0.9	9.7	-	4.8	-	99.1	0.9	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. Meadow Lake Station: Summary of airpointer® O₃ monitoring results for the year 2014

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Conc. (ppb)	Maximum 1-Hr Conc. (ppb)	1-Hour Exceedance ^a (no.)	Maximum 8-Hr Conc. (ppb)	8-Hour Conc. Above CWS ^b (no.)	Percent of Data in each Concentration Range					
								<=10	10 ~ 20	20 ~ 40	40 ~ 65	65 ~ 82	>82
January	711	99.9%	35	49	0	48	0	0.0	1.0	79.0	20.0	0.0	0.0
February	643	100.0%	34	46	0	44	0	0.0	0.9	85.5	13.5	0.0	0.0
March	704	100.0%	40	61	0	57	0	0.0	1.4	43.9	54.7	0.0	0.0
April	689	100.0%	40	55	0	52	0	0.0	1.7	41.2	57.0	0.0	0.0
May	711	99.9%	36	60	0	59	0	0.4	7.3	55.1	37.1	0.0	0.0
June	681	100.0%	30	58	0	53	0	1.0	17.3	66.1	15.6	0.0	0.0
July	712	100.0%	28	55	0	51	0	1.3	18.8	72.5	7.4	0.0	0.0
August	710	99.7%	23	54	0	45	0	10.3	26.3	59.3	4.1	0.0	0.0
September	680	99.9%	23	45	0	42	0	4.9	31.8	60.0	3.4	0.0	0.0
October	705	99.0%	25	43	0	41	0	0.4	29.9	68.5	1.1	0.0	0.0
November	689	100.0%	26	40	0	39	0	7.4	12.2	80.4	0.0	0.0	0.0
December	701	99.9%	26	37	0	36	0	0.3	15.5	84.2	0.0	0.0	0.0
Annual ^c	8336	99.8%	30	61	0	59	0	2.2	13.7	66.2	17.9	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 B-6. Meadow Lake Station: Summary of airpointer® PM_{2.5} monitoring results for the year 2014

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Conc. (µg/m ³)	Maximum 1-Hr Conc. (µg/m ³)	1-Hour Exceedance ^a (no.)	Maximum 24-Hr Conc. (µg/m ³)	24-Hour Exceedance ^b (no.)	Percent of Data in each Concentration Range					
								<=5	5 ~ 10	10 ~ 15	15 ~ 30	30 ~ 80	>80
January	743	99.9%	3	23	-	5	0	89	9	1	1	0	0
February	672	100.0%	4	34	-	8	0	77	18	3	2	0	0
March	743	100.0%	4	29	-	8	0	73	23	4	0	0	0
April	720	100.0%	3	18	-	8	0	78	20	2	0	0	0
May	743	99.9%	4	34	-	10	0	72	22	4	1	0	0
June	720	100.0%	6	158	-	29	0	55	34	8	2	0	1
July	17	2.3%	5	7	-	< 1	0	59	41	0	0	0	0
August	0	0.0%	-	-	-	-	-	-	-	-	-	-	-
September	145	20.4%	4	20	-	7	0	74	16	7	3	0	0
October	738	99.2%	3	21	-	8	0	79	17	4	1	0	0
November	720	100.0%	7	105	-	40	2	67	17	7	6	1	1
December	743	99.9%	4	34	-	7	0	69	27	3	1	0	0
Annual ^c	6704	76.6%	4	158	-	40	2	73.1	20.8	4.1	1.5	0.3	0.2

a. No 1-hour Saskatchewan Ambient Air Quality Standard

b. 24-hour Canada-Wide Standard = 30 µg/m³

c. No annual Saskatchewan Ambient Air Quality Standard

Table B-7. Meadow Lake Station: Summary of airpointer® precipitation monitoring results for the year 2014

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%	1.1	0.5	0.6	100.0	0.0	0.0	0.0	0.0	0.0
February	672	100.0%	0.2	0.1	0.2	100.0	0.0	0.0	0.0	0.0	0.0
March	744	100.0%	0.4	0.2	0.3	100.0	0.0	0.0	0.0	0.0	0.0
April	720	100.0%	14.2	2.5	8.5	100.0	0.0	0.0	0.0	0.0	0.0
May	743	99.9%	30.7	5.6	13.0	99.9	0.1	0.0	0.0	0.0	0.0
June	720	100.0%	114.7	19.8	34.9	99.3	0.3	0.4	0.0	0.0	0.0
July	744	100.0%	75.6	10.7	17.3	99.2	0.7	0.1	0.0	0.0	0.0
August	742	99.7%	76.5	10.6	32.1	99.1	0.8	0.1	0.0	0.0	0.0
September	719	99.9%	6.0	1.6	2.1	100.0	0.0	0.0	0.0	0.0	0.0
October	738	99.2%	5.0	1.2	2.7	100.0	0.0	0.0	0.0	0.0	0.0
November	720	100.0%	5.8	2.0	3.3	100.0	0.0	0.0	0.0	0.0	0.0
December	743	99.9%	< 0.1	< 0.1	< 0.1	100.0	0.0	0.0	0.0	0.0	0.0
Annual	8749	99.9%	330.3	19.8	34.9	99.8	0.2	0.1	0.0	0.0	0.0

Table B-8. Meadow Lake Station: Summary of airpointer® ambient temperature monitoring results for the year 2014

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Temp. (°C)	Minimum 1-Hr Temp. (°C)	Maximum 1-Hr Temp. (°C)	Percent of Data in each Temperature Range					
						<=-30	-30 ~ -15	-15 ~ 0	0 ~ 15	15 ~ 30	>30
January	744	100.0%	-13.4	-34.8	8.6	4.4	41.4	40.3	13.8	0.0	0.0
February	672	100.0%	-18.0	-34.3	0.2	1.8	67.3	30.5	0.4	0.0	0.0
March	744	100.0%	-9.5	-34.2	8.6	1.9	29.2	47.8	21.1	0.0	0.0
April	720	100.0%	1.2	-17.8	18.9	0.0	0.7	39.2	57.4	2.8	0.0
May	743	99.9%	9.1	-4.1	28.2	0.0	0.0	10.2	71.2	18.6	0.0
June	720	100.0%	14.4	2.2	26.1	0.0	0.0	0.0	53.6	46.4	0.0
July	744	100.0%	18.6	6.9	29.0	0.0	0.0	0.0	23.1	76.9	0.0
August	742	99.7%	17.4	1.7	28.5	0.0	0.0	0.0	30.5	69.5	0.0
September	719	99.9%	10.9	-0.1	29.1	0.0	0.0	0.3	76.4	23.4	0.0
October	738	99.2%	6.1	-4.6	20.9	0.0	0.0	11.2	83.9	4.9	0.0
November	720	100.0%	-9.8	-28.6	7.7	0.0	20.8	60.8	18.3	0.0	0.0
December	743	99.9%	-9.7	-32.6	10.4	1.5	22.1	68.0	8.5	0.0	0.0
Annual	8749	99.9%	1.6	-34.8	29.1	0.8	14.8	25.7	38.3	20.4	0.0

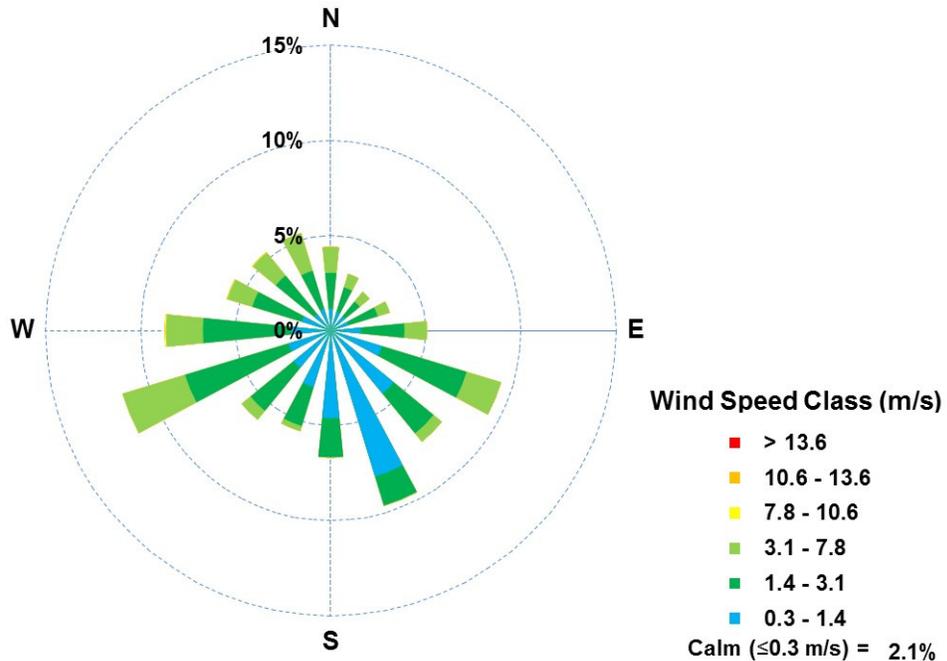
Table B-9. Meadow Lake Station: Summary of airpointer® relative humidity monitoring results for the year 2014

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	42	90	0.0	0.0	14.7	74.3	11.0	0.0
February	672	100.0%	66	27	87	0.0	0.1	23.8	72.8	3.3	0.0
March	744	100.0%	59	24	89	0.0	0.1	51.9	41.7	6.3	0.0
April	720	100.0%	66	20	92	0.0	2.6	36.3	29.6	29.2	2.4
May	743	99.9%	60	23	93	0.0	4.6	43.2	31.2	15.6	5.4
June	720	100.0%	72	29	94	0.0	0.1	26.9	29.4	27.1	16.4
July	744	100.0%	68	31	94	0.0	0.0	32.3	38.0	22.7	7.0
August	742	99.7%	71	35	94	0.0	0.0	25.3	40.2	23.2	11.3
September	719	99.9%	68	27	94	0.0	1.0	32.7	34.9	24.9	6.5
October	738	99.2%	67	28	92	0.0	0.7	35.9	36.4	24.5	2.4
November	720	100.0%	75	39	91	0.0	0.0	4.2	71.4	20.7	3.8
December	743	99.9%	77	47	90	0.0	0.0	5.1	52.6	41.6	0.7
Annual	8749	99.9%	68	20	94	0.0	0.8	27.7	45.9	20.9	4.7

Table B-10 Meadow Lake Station: Wind frequency table for 2014

Wind Direction Sector	Percent of Data within Wind Speed Range, wind speed unit m/s						Totals
	0.3 ~ 1.4	1.4 ~ 3.1	3.1 ~ 7.8	7.8 ~ 10.6	10.6 ~ 13.6	>13.6	
North NorthEast	0.9%	1.3%	0.7%	0.0%	0.0%	0.0%	3.0%
NorthEast	0.9%	1.0%	0.7%	0.0%	0.0%	0.0%	2.6%
East NorthEast	0.9%	1.6%	0.7%	0.0%	0.0%	0.0%	3.1%
East	1.5%	2.3%	1.2%	0.0%	0.0%	0.0%	5.0%
East SouthEast	2.7%	4.7%	1.9%	0.0%	0.0%	0.0%	9.3%
SouthEast	4.1%	2.7%	0.6%	0.0%	0.0%	0.0%	7.4%
South SouthEast	7.6%	1.6%	0.0%	0.0%	0.0%	0.0%	9.3%
South	4.5%	2.0%	0.0%	0.0%	0.0%	0.0%	6.5%
South SouthWest	2.9%	2.1%	0.3%	0.0%	0.0%	0.0%	5.4%
SouthWest	2.4%	2.9%	0.6%	0.0%	0.0%	0.0%	6.0%
West SouthWest	2.2%	5.7%	3.4%	0.0%	0.0%	0.0%	11.4%
West	1.9%	4.7%	1.9%	0.1%	0.0%	0.0%	8.6%
West NorthWest	1.5%	2.7%	1.4%	0.0%	0.0%	0.0%	5.6%
NorthWest	1.1%	2.6%	1.6%	0.0%	0.0%	0.0%	5.3%
North NorthWest	1.1%	2.1%	2.1%	0.0%	0.0%	0.0%	5.3%
North	1.1%	1.9%	1.4%	0.0%	0.0%	0.0%	4.3%
Total	37.3%	42.0%	18.4%	0.1%	0.0%	0.0%	97.9%

Percent Calm (≤ 0.3 m/s)	2.1%
Number of Valid Hourly-Average Data	8749
Total Workable Hours in Time Period	8760



APPENDIX C. MAIDSTONE STATION: CONTINUOUS MONITORING DATA

Table C-1 Maidstone Station: Summary statistics for continuous air monitoring results for 2014

Parameter	Unit	Calibration & AIC ^a (hours)	Valid Data (hours)	Uptime (%)	Summary Statistics for Hourly Average Data		
					Average	Minimum	Maximum
SO ₂	ppb	586	8305	99.7%	0.3	< 0.1	7.5
H ₂ S	ppb	586	8151	99.7%	0.3	< 0.1	13.5
NO	ppb	446	8293	99.7%	1.4	< 0.1	57.5
NO ₂	ppb	446	8293	99.7%	4.6	< 0.1	40.1
NO _x	ppb	446	8293	99.7%	5.9	< 0.1	70.8
PM _{2.5}	µg/m ³	0	8613	98.3%	7	< 1	183
Precipitation	mm	0	8741	99.8%	298.7 ^b	< 0.1	20.7
Ambient Temperature	°C	0	8741	99.8%	1.6	-36.2	28.7
Relative Humidity	%	0	8741	99.8%	70	19	94
Wind Speed	m/s	0	8741	99.8%	2.2	Calm	11.5

a. Automatic Instrument Check

b. Total precipitation

Table C-2. Maidstone Station: Summary of airpointer® SO₂ monitoring results for 2014

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Conc. (ppb)	Maximum 1-Hr Conc. (ppb)	1-Hour Exceedance ^a (no.)	Maximum 24-Hr Conc. (ppb)	24-Hour Exceedance ^b (no.)	Percent of Data in each Concentration Range					
								<=1	1 ~ 5	5 ~ 11	11 ~ 57	57 ~ 172	>172
January	711	99.9%	0.4	3.0	0	1.0	0	93.4	6.6	0.0	0.0	0.0	0.0
February	643	100.0%	0.6	7.4	0	1.7	0	82.7	17.0	0.3	0.0	0.0	0.0
March	699	100.0%	0.4	5.2	0	1.3	0	90.7	9.2	0.1	0.0	0.0	0.0
April	686	100.0%	0.2	2.0	0	0.6	0	98.8	1.2	0.0	0.0	0.0	0.0
May	702	100.0%	0.1	0.7	0	0.3	0	100.0	0.0	0.0	0.0	0.0	0.0
June	674	99.6%	0.2	1.5	0	0.8	0	98.2	1.8	0.0	0.0	0.0	0.0
July	712	100.0%	0.5	2.9	0	2.1	0	90.0	10.0	0.0	0.0	0.0	0.0
August	712	100.0%	0.4	3.5	0	1.0	0	92.3	7.7	0.0	0.0	0.0	0.0
September	680	100.0%	0.2	1.4	0	0.4	0	99.4	0.6	0.0	0.0	0.0	0.0
October	712	100.0%	0.2	1.8	0	0.4	0	99.2	0.8	0.0	0.0	0.0	0.0
November	687	100.0%	0.2	7.5	0	0.6	0	95.3	4.5	0.1	0.0	0.0	0.0
December	687	97.4%	0.3	3.8	0	0.9	0	94.2	5.8	0.0	0.0	0.0	0.0
Annual ^c	8305	99.7%	0.3	7.5	0	2.1	0	94.6	5.4	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 C-3. Maidstone Station: Summary of airpointer® H₂S monitoring results for the year 2014

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Conc. (ppb)	Maximum 1-Hr Conc. (ppb)	1-Hour Exceedance ^a (no.)	Maximum 24-Hr Conc. (ppb)	24-Hour Exceedance ^b (no.)	Percent of Data in each Concentration Range					
								<=1	1 ~ 3.6	3.6 ~ 5	5 ~ 8	8 ~ 10.8	>10.8
January	689	99.9%	0.2	5.9	0	0.9	0	97.7	2.0	0.1	0.1	0.0	0.0
February	621	100.0%	0.2	1.0	0	0.4	0	100.0	0.0	0.0	0.0	0.0	0.0
March	679	100.0%	0.2	1.7	0	0.5	0	99.4	0.6	0.0	0.0	0.0	0.0
April	666	100.0%	0.2	0.9	0	0.6	0	100.0	0.0	0.0	0.0	0.0	0.0
May	683	100.0%	0.1	1.4	0	0.4	0	99.7	0.3	0.0	0.0	0.0	0.0
June	657	99.4%	0.3	2.9	0	0.7	0	97.0	3.0	0.0	0.0	0.0	0.0
July	712	100.0%	0.7	11.5	2	2.3	0	81.6	15.2	1.4	1.0	0.6	0.3
August	708	100.0%	0.8	13.5	2	2.0	0	76.3	21.0	1.8	0.6	0.0	0.3
September	680	100.0%	0.4	5.5	0	1.1	0	92.4	6.9	0.4	0.3	0.0	0.0
October	710	100.0%	0.2	1.2	0	0.4	0	99.6	0.4	0.0	0.0	0.0	0.0
November	677	100.0%	0.1	1.1	0	0.4	0	99.9	0.1	0.0	0.0	0.0	0.0
December	669	97.4%	0.2	1.6	0	0.6	0	99.3	0.7	0.0	0.0	0.0	0.0
Annual ^c	8151	99.7%	0.3	13.5	4	2.3	0	95.1	4.3	0.3	0.2	0.0	0.0

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

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

c. No annual Saskatchewan Ambient Air Quality Standard

Table C-4. Maidstone Station: Summary of airpointer® NO monitoring results for the year 2014

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Conc. (ppb)	Maximum 1-Hr Conc. (ppb)	1-Hour Exceedance ^a (no.)	Maximum 24-Hr Conc. (ppb)	24-Hour Exceedance ^b (no.)	Percent of Data in each Concentration Range					
								<=5	5 ~ 15	15 ~ 53	53 ~ 100	100 ~ 212	>212
January	711	99.9%	1.2	36.9	-	7.4	-	95.2	3.8	1.0	0.0	0.0	0.0
February	643	100.0%	1.8	22.8	-	5.4	-	89.0	10.0	1.1	0.0	0.0	0.0
March	703	100.0%	1.4	18.4	-	3.7	-	92.9	6.8	0.3	0.0	0.0	0.0
April	689	100.0%	0.8	20.0	-	2.9	-	96.8	3.0	0.1	0.0	0.0	0.0
May	712	100.0%	1.4	36.7	-	4.0	-	93.4	5.3	1.3	0.0	0.0	0.0
June	671	99.4%	1.2	35.2	-	3.5	-	93.4	5.8	0.7	0.0	0.0	0.0
July	699	100.0%	1.1	51.2	-	4.6	-	95.6	3.6	0.9	0.0	0.0	0.0
August	695	100.0%	2.2	57.5	-	8.4	-	89.9	6.5	3.5	0.1	0.0	0.0
September	680	100.0%	1.1	19.2	-	5.0	-	95.1	3.8	1.0	0.0	0.0	0.0
October	712	100.0%	1.2	21.0	-	4.1	-	94.2	4.8	1.0	0.0	0.0	0.0
November	689	100.0%	1.8	19.5	-	4.7	-	88.5	10.9	0.6	0.0	0.0	0.0
December	689	97.7%	1.7	29.8	-	6.6	-	89.8	9.0	1.2	0.0	0.0	0.0
Annual ^c	8293	99.7%	1.4	57.5	-	8.4	-	92.9	6.1	1.0	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 C-5. Maidstone Station: Summary of airpointer® NO₂ monitoring results for the year 2014

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Conc. (ppb)	Maximum 1-Hr Conc. (ppb)	1-Hour Exceedance ^a (no.)	Maximum 24-Hr Conc. (ppb)	24-Hour Exceedance ^b (no.)	Percent of Data in each Concentration Range					
								<=5	5 ~ 15	15 ~ 53	53 ~ 100	100 ~ 212	>212
January	711	99.9%	6.9	38.8	0	19.6	-	47.0	44.6	8.4	0.0	0.0	0.0
February	643	100.0%	8.0	40.1	0	14.3	-	39.2	48.8	12.0	0.0	0.0	0.0
March	703	100.0%	6.2	30.1	0	13.8	-	47.9	45.5	6.5	0.0	0.0	0.0
April	689	100.0%	3.1	17.0	0	7.3	-	82.7	16.7	0.6	0.0	0.0	0.0
May	712	100.0%	3.7	25.1	0	7.8	-	75.4	21.9	2.7	0.0	0.0	0.0
June	671	99.4%	3.1	17.2	0	4.9	-	79.9	19.7	0.4	0.0	0.0	0.0
July	699	100.0%	2.6	16.0	0	5.0	-	85.4	14.4	0.1	0.0	0.0	0.0
August	695	100.0%	2.9	13.3	0	6.3	-	82.7	17.3	0.0	0.0	0.0	0.0
September	680	100.0%	3.3	16.4	0	6.8	-	78.5	21.3	0.1	0.0	0.0	0.0
October	712	100.0%	3.6	18.1	0	7.2	-	74.2	25.1	0.7	0.0	0.0	0.0
November	689	100.0%	4.9	29.1	0	12.2	-	64.6	32.4	3.0	0.0	0.0	0.0
December	689	97.7%	6.6	31.3	0	15.7	-	46.3	47.5	6.2	0.0	0.0	0.0
Annual ^c	8293	99.7%	4.6	40.1	0	19.6	-	67.1	29.5	3.4	0.0	0.0	0.0

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

b. No 24-hour Saskatchewan Ambient Air Quality Standard

c. Annual Saskatchewan Ambient Air Quality Standard = 53 ppb

Table C-6. Maidstone Station: Summary of airpointer® NOx monitoring results for the year 2014

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Conc. (ppb)	Maximum 1-Hr Conc. (ppb)	1-Hour Exceedance ^a (no.)	Maximum 24-Hr Conc. (ppb)	24-Hour Exceedance ^b (no.)	Percent of Data in each Concentration Range					
								<=5	5 ~ 15	15 ~ 53	53 ~ 100	100 ~ 212	>212
January	711	99.9%	8.1	63.5	-	27.0	-	39.8	48.8	11.3	0.1	0.0	0.0
February	643	100.0%	9.8	41.4	-	19.7	-	28.1	52.1	19.8	0.0	0.0	0.0
March	703	100.0%	7.6	38.5	-	17.1	-	42.8	45.4	11.8	0.0	0.0	0.0
April	689	100.0%	3.8	31.4	-	8.2	-	77.6	19.6	2.8	0.0	0.0	0.0
May	712	100.0%	5.1	45.7	-	11.5	-	68.5	24.0	7.4	0.0	0.0	0.0
June	671	99.4%	4.3	43.7	-	8.0	-	74.5	20.1	5.4	0.0	0.0	0.0
July	699	100.0%	3.7	59.8	-	8.4	-	78.8	18.2	2.9	0.1	0.0	0.0
August	695	100.0%	5.1	70.8	-	12.1	-	71.4	22.2	6.3	0.1	0.0	0.0
September	680	100.0%	4.4	28.1	-	8.4	-	68.8	27.4	3.8	0.0	0.0	0.0
October	712	100.0%	4.8	31.6	-	9.4	-	68.1	27.0	4.9	0.0	0.0	0.0
November	689	100.0%	6.7	35.9	-	16.8	-	52.4	37.4	10.2	0.0	0.0	0.0
December	689	97.7%	8.3	48.5	-	18.3	-	40.2	46.7	13.1	0.0	0.0	0.0
Annual ^c	8293	99.7%	5.9	70.8	-	27.0	-	59.4	32.3	8.2	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-7. Maidstone Station: Summary of airpointer® PM_{2.5} monitoring results for the year 2014

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Conc. (µg/m ³)	Maximum 1-Hr Conc. (µg/m ³)	1-Hour Exceedance ^a (no.)	Maximum 24-Hr Conc. (µg/m ³)	24-Hour Exceedance ^b (no.)	Percent of Data in each Concentration Range					
								<=5	5 ~ 10	10 ~ 15	15 ~ 30	30 ~ 80	>80
January	743	99.9%	3	62	-	15	0	83.0	9.7	3.9	2.6	0.8	0.0
February	672	100.0%	5	183	-	11	0	65.6	23.5	7.0	2.5	1.2	0.1
March	744	100.0%	6	78	-	14	0	60.2	27.8	6.7	4.0	1.2	0.0
April	720	100.0%	4	35	-	8	0	70.4	23.3	4.3	1.7	0.3	0.0
May	744	100.0%	6	84	-	17	0	60.5	23.1	10.9	4.3	1.1	0.1
June	718	99.7%	6	78	-	24	0	57.1	29.0	9.3	3.9	0.7	0.0
July	710	95.4%	16	177	-	89	2	25.1	21.1	21.5	19.9	10.7	1.7
August	651	87.5%	13	88	-	39	1	20.0	29.0	21.2	23.2	6.3	0.3
September	719	100.0%	5	32	-	13	0	58.0	28.0	10.4	3.5	0.1	0.0
October	744	100.0%	4	37	-	10	0	72.7	18.8	5.1	3.2	0.1	0.0
November	720	100.0%	6	129	-	14	0	68.2	18.9	7.2	3.1	2.5	0.1
December	728	97.8%	5	66	-	14	0	62.5	24.2	8.4	4.0	1.0	0.0
Annual ^c	8613	98.3%	7	183	-	89	3	59.0	23.0	9.5	6.2	2.1	0.2

a. No 1-hour Saskatchewan Ambient Air Quality Standard

b. 24-hour Canada-Wide Standard = 30 µg/m³

c. No annual Saskatchewan Ambient Air Quality Standard

Table C-8. Maidstone Station: Summary of airpointer® precipitation monitoring results for the year 2014

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	743	99.9%	1.0	0.4	0.6	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%	< 0.1	< 0.1	< 0.1	100.0	0.0	0.0	0.0	0.0	0.0
April	720	100.0%	41.8	6.6	30.0	99.7	0.3	0.0	0.0	0.0	0.0
May	744	100.0%	36.9	4.1	9.2	100.0	0.0	0.0	0.0	0.0	0.0
June	718	99.7%	67.6	7.6	16.2	99.6	0.4	0.0	0.0	0.0	0.0
July	744	100.0%	90.4	20.7	38.5	99.2	0.7	0.1	0.0	0.0	0.0
August	744	100.0%	37.6	5.1	13.5	99.9	0.1	0.0	0.0	0.0	0.0
September	720	100.0%	8.3	3.0	3.1	100.0	0.0	0.0	0.0	0.0	0.0
October	744	100.0%	1.3	0.2	0.8	100.0	0.0	0.0	0.0	0.0	0.0
November	720	100.0%	13.5	2.7	12.8	100.0	0.0	0.0	0.0	0.0	0.0
December	728	97.8%	0.2	0.2	0.2	100.0	0.0	0.0	0.0	0.0	0.0
Annual	8741	99.8%	298.7	20.7	38.5	99.9	0.1	0.0	0.0	0.0	0.0

Table C-9. Maidstone Station: Summary of airpointer® ambient temperature monitoring results for the year 2014

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	743	99.9%	-13.1	-35.1	9.0	4.0	42.8	37.4	15.7	0.0	0.0
February	672	100.0%	-18.5	-33.0	-0.8	4.2	64.7	31.1	0.0	0.0	0.0
March	744	100.0%	-9.4	-36.2	6.5	2.8	25.3	53.8	18.1	0.0	0.0
April	720	100.0%	1.7	-15.7	18.8	0.0	0.4	37.6	57.5	4.4	0.0
May	744	100.0%	9.4	-5.0	28.0	0.0	0.0	8.7	73.1	18.1	0.0
June	718	99.7%	14.5	3.1	25.0	0.0	0.0	0.0	55.8	44.2	0.0
July	744	100.0%	18.0	6.3	28.4	0.0	0.0	0.0	31.3	68.7	0.0
August	744	100.0%	17.0	3.8	28.7	0.0	0.0	0.0	33.9	66.1	0.0
September	720	100.0%	11.0	-2.0	28.5	0.0	0.0	1.7	72.8	25.6	0.0
October	744	100.0%	6.0	-4.9	22.2	0.0	0.0	11.6	80.9	7.5	0.0
November	720	100.0%	-9.2	-31.6	9.7	0.4	20.0	59.3	20.3	0.0	0.0
December	728	97.8%	-10.0	-31.6	6.5	0.5	19.6	75.1	4.7	0.0	0.0
Annual	8741	99.8%	1.6	-36.2	28.7	1.0	14.1	26.3	38.9	19.8	0.0

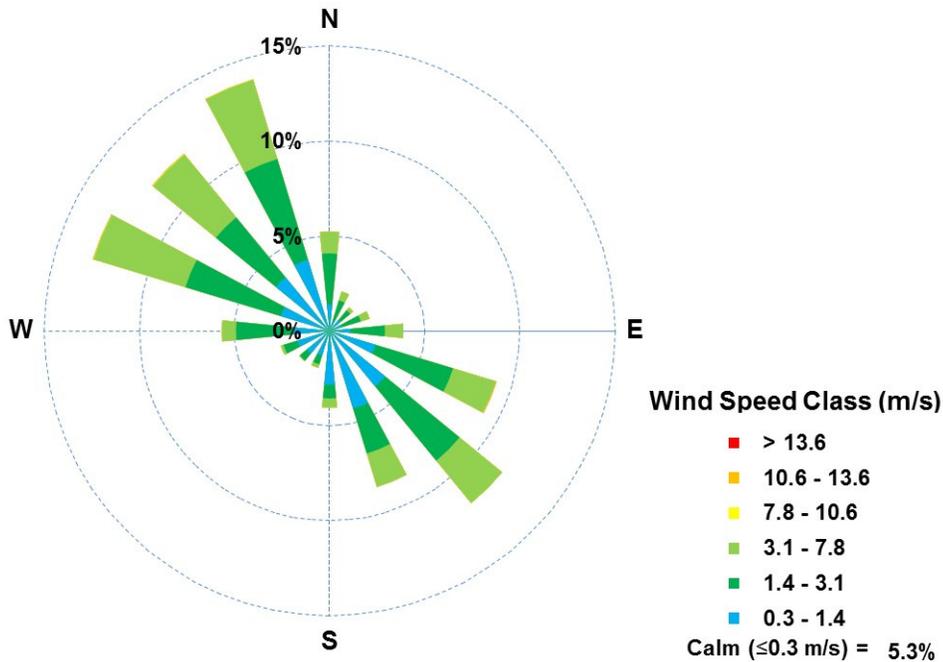
Table C-10. Maidstone Station: Summary of airpointer® relative humidity monitoring results for the year 2014

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	743	99.9%	71	43	89	0.0	0.0	8.3	78.3	13.3	0.0
February	672	100.0%	69	36	86	0.0	0.0	12.4	81.8	5.8	0.0
March	744	100.0%	65	39	90	0.0	0.0	32.3	58.3	9.4	0.0
April	720	100.0%	69	20	91	0.0	3.6	25.3	35.7	30.8	4.6
May	744	100.0%	61	19	93	0.0	8.3	38.2	31.0	17.6	4.8
June	718	99.7%	71	28	93	0.0	0.7	25.8	32.6	27.4	13.5
July	744	100.0%	72	32	94	0.0	0.0	30.5	26.3	25.0	18.1
August	744	100.0%	73	33	94	0.0	0.0	25.8	27.4	25.3	21.5
September	720	100.0%	66	25	93	0.0	3.2	30.6	39.2	21.1	6.0
October	744	100.0%	66	24	91	0.0	2.0	33.2	40.6	22.8	1.3
November	720	100.0%	74	43	90	0.0	0.0	5.1	66.8	28.1	0.0
December	728	97.8%	78	54	90	0.0	0.0	1.4	49.7	48.9	0.0
Annual	8741	99.8%	70	19	94	0.0	1.5	22.5	47.1	23.0	5.9

Table C-11. Maidstone Station: Wind frequency table for the year 2014

Wind Direction Sector	Percent of Data within Wind Speed Range, wind speed unit m/s						Totals
	0.3 ~ 1.4	1.4 ~ 3.1	3.1 ~ 7.8	7.8 ~ 10.6	10.6 ~ 13.6	>13.6	
North NorthEast	0.4%	1.1%	0.5%	0.0%	0.0%	0.0%	2.0%
NorthEast	0.6%	0.7%	0.2%	0.0%	0.0%	0.0%	1.5%
East NorthEast	0.6%	1.0%	0.5%	0.0%	0.0%	0.0%	2.1%
East	1.0%	1.8%	1.0%	0.0%	0.0%	0.0%	3.8%
East SouthEast	2.4%	4.3%	2.3%	0.0%	0.0%	0.0%	9.0%
SouthEast	3.5%	5.1%	2.9%	0.0%	0.0%	0.0%	11.5%
South SouthEast	3.7%	2.5%	1.8%	0.0%	0.0%	0.0%	8.0%
South	2.1%	0.7%	0.5%	0.0%	0.0%	0.0%	3.3%
South SouthWest	0.9%	0.5%	0.2%	0.0%	0.0%	0.0%	1.6%
SouthWest	1.1%	0.5%	0.0%	0.0%	0.0%	0.0%	1.6%
West SouthWest	1.3%	0.8%	0.1%	0.0%	0.0%	0.0%	2.2%
West	1.5%	3.0%	0.7%	0.0%	0.0%	0.0%	5.3%
West NorthWest	2.1%	5.2%	5.1%	0.0%	0.0%	0.0%	12.5%
NorthWest	3.2%	4.1%	4.3%	0.0%	0.0%	0.0%	11.7%
North NorthWest	3.7%	5.5%	4.4%	0.0%	0.0%	0.0%	13.6%
North	1.2%	2.7%	1.1%	0.0%	0.0%	0.0%	5.1%
Total	29.5%	39.4%	25.7%	0.1%	0.0%	0.0%	94.7%

Percent Calm (≤ 0.3 m/s)	5.3%
Number of Valid Hourly-Average Data	8741
Total Workable Hours in Time Period	8760



APPENDIX D. UNITY STATION: CONTINUOUS MONITORING DATA

Table D-1 Unity Station: Summary statistics for continuous air monitoring results for 2014

Parameter	Unit	Calibration & AIC ^a (hours)	Valid Data (hours)	Uptime (%)	Summary Statistics for Hourly Average Data		
					Average	Minimum	Maximum
NO	ppb	414	8266	99.0%	0.6	< 0.1	30.2
NO ₂	ppb	414	8266	99.0%	2.5	< 0.1	31.8
NO _x	ppb	414	8266	99.0%	3.1	0.1	50.9
O ₃	ppb	410	8275	99.1%	30	3	71
PM _{2.5}	µg/m ³	3	8703	99.4%	5	< 1	90
Precipitation	mm	0	8745	99.8%	391.0 ^b	< 0.1	22.4
Ambient Temperature	°C	0	8745	99.8%	1.5	-37.7	28.7
Relative Humidity	%	0	8745	99.8%	71	19	94
Wind Speed	m/s	0	8680	99.1%	1.8	Calm	12.7

a. Automatic Instrument Check

b. Total precipitation

Table D-2. Unity Station: Summary of airpointer® NO monitoring results for the year 2014

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Conc. (ppb)	Maximum 1-Hr Conc. (ppb)	1-Hour Exceedance ^a (no.)	Maximum 24-Hr Conc. (ppb)	24-Hour Exceedance ^b (no.)	Percent of Data in each Concentration Range					
								<=5	5 ~ 15	15 ~ 53	53 ~ 100	100 ~ 212	>212
January	711	100.0%	1.0	30.2	-	6.0	-	96.6	3.0	0.4	0.0	0.0	0.0
February	643	100.0%	1.4	13.7	-	3.7	-	91.4	8.6	0.0	0.0	0.0	0.0
March	705	100.0%	0.8	10.4	-	2.5	-	98.0	2.0	0.0	0.0	0.0	0.0
April	689	100.0%	0.3	4.1	-	0.7	-	100.0	0.0	0.0	0.0	0.0	0.0
May	712	100.0%	0.4	5.1	-	1.0	-	99.9	0.1	0.0	0.0	0.0	0.0
June	681	100.0%	0.5	4.1	-	1.0	-	100.0	0.0	0.0	0.0	0.0	0.0
July	700	98.6%	0.4	3.4	-	0.6	-	100.0	0.0	0.0	0.0	0.0	0.0
August	711	99.9%	0.4	3.6	-	0.8	-	100.0	0.0	0.0	0.0	0.0	0.0
September	681	100.0%	0.4	10.3	-	1.0	-	99.9	0.1	0.0	0.0	0.0	0.0
October	711	100.0%	0.4	4.2	-	0.7	-	100.0	0.0	0.0	0.0	0.0	0.0
November	622	90.4%	0.6	21.8	-	2.2	-	98.7	1.1	0.2	0.0	0.0	0.0
December	700	99.6%	0.8	12.1	-	3.0	-	96.4	3.6	0.0	0.0	0.0	0.0
Annual ^c	8266	99.0%	0.6	30.2	-	6.0	-	98.5	1.5	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 D-3. Unity Station: Summary of airpointer® NO₂ monitoring results for the year 2014

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Conc. (ppb)	Maximum 1-Hr Conc. (ppb)	1-Hour Exceedance ^a (no.)	Maximum 24-Hr Conc. (ppb)	24-Hour Exceedance ^b (no.)	Percent of Data in each Concentration Range					
								<=5	5 ~ 15	15 ~ 53	53 ~ 100	100 ~ 212	>212
January	711	100.0%	4.1	25.6	0	12.6	-	70.9	27.8	1.3	0.0	0.0	0.0
February	643	100.0%	4.4	24.6	0	8.8	-	67.2	32.7	0.2	0.0	0.0	0.0
March	705	100.0%	3.2	31.8	0	9.0	-	82.7	16.7	0.6	0.0	0.0	0.0
April	689	100.0%	1.7	7.6	0	3.2	-	98.7	1.3	0.0	0.0	0.0	0.0
May	712	100.0%	2.1	13.2	0	5.3	-	93.7	6.3	0.0	0.0	0.0	0.0
June	681	100.0%	2.4	16.0	0	5.6	-	89.6	10.1	0.3	0.0	0.0	0.0
July	700	98.6%	1.3	5.0	0	2.4	-	99.9	0.1	0.0	0.0	0.0	0.0
August	711	99.9%	1.1	4.6	0	1.8	-	100.0	0.0	0.0	0.0	0.0	0.0
September	681	100.0%	1.5	9.7	0	2.8	-	96.6	3.4	0.0	0.0	0.0	0.0
October	711	100.0%	1.8	9.5	0	3.7	-	97.6	2.4	0.0	0.0	0.0	0.0
November	622	90.4%	2.4	15.3	0	5.6	-	90.0	9.8	0.2	0.0	0.0	0.0
December	700	99.6%	4.0	21.7	0	10.7	-	75.1	24.0	0.9	0.0	0.0	0.0
Annual ^c	8266	99.0%	2.5	31.8	0	12.6	-	88.6	11.1	0.3	0.0	0.0	0.0

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

b. No 24-hour Saskatchewan Ambient Air Quality Standard

c. Annual Saskatchewan Ambient Air Quality Standard = 53 ppb

Table D-4. Unity Station: Summary of airpointer® NOx monitoring results for the year 2014

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Conc. (ppb)	Maximum 1-Hr Conc. (ppb)	1-Hour Exceedance ^a (no.)	Maximum 24-Hr Conc. (ppb)	24-Hour Exceedance ^b (no.)	Percent of Data in each Concentration Range					
								<=5	5 ~ 15	15 ~ 53	53 ~ 100	100 ~ 212	>212
January	711	100.0%	5.1	50.9	-	18.6	-	63.0	34.9	2.1	0.0	0.0	0.0
February	643	100.0%	5.7	30.0	-	11.3	-	51.8	45.1	3.1	0.0	0.0	0.0
March	705	100.0%	4.0	34.0	-	10.0	-	73.3	25.5	1.1	0.0	0.0	0.0
April	689	100.0%	2.0	8.9	-	3.9	-	96.8	3.2	0.0	0.0	0.0	0.0
May	712	100.0%	2.5	15.5	-	6.2	-	91.9	7.9	0.3	0.0	0.0	0.0
June	681	100.0%	3.0	16.7	-	6.6	-	85.9	13.7	0.4	0.0	0.0	0.0
July	700	98.6%	1.7	5.6	-	2.9	-	99.4	0.6	0.0	0.0	0.0	0.0
August	711	99.9%	1.6	5.8	-	2.5	-	99.3	0.7	0.0	0.0	0.0	0.0
September	681	100.0%	2.0	13.9	-	3.3	-	95.3	4.7	0.0	0.0	0.0	0.0
October	711	100.0%	2.2	9.7	-	4.1	-	96.2	3.8	0.0	0.0	0.0	0.0
November	622	90.4%	3.0	31.3	-	6.8	-	86.0	12.9	1.1	0.0	0.0	0.0
December	700	99.6%	4.8	28.4	-	13.5	-	66.7	30.0	3.3	0.0	0.0	0.0
Annual ^c	8266	99.0%	3.1	50.9	-	18.6	-	84.0	15.1	0.9	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 D-5. Unity Station: Summary of airpointer® O₃ monitoring results for the year 2014

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Conc. (ppb)	Maximum 1-Hr Conc. (ppb)	1-Hour Exceedance ^a (no.)	Maximum 8-Hr Conc. (ppb)	8-Hour Conc. Above CWS ^b (no.)	Percent of Data in each Concentration Range					
								<=10	10 ~ 20	20 ~ 40	40 ~ 65	65 ~ 82	>82
January	712	100.0%	33	49	0	47	0	0.4	2.7	81.7	15.2	0.0	0.0
February	643	100.0%	29	41	0	40	0	0.0	7.6	91.4	0.9	0.0	0.0
March	705	100.0%	36	56	0	52	0	0.0	3.0	65.0	32.1	0.0	0.0
April	689	100.0%	42	71	0	66	3	0.0	0.7	45.3	53.0	1.0	0.0
May	712	100.0%	42	71	0	66	6	0.0	2.9	42.7	51.1	3.2	0.0
June	681	100.0%	35	71	0	68	8	0.3	11.9	53.7	31.9	2.2	0.0
July	703	98.7%	23	45	0	40	0	4.4	36.3	57.5	1.8	0.0	0.0
August	712	100.0%	20	51	0	43	0	17.4	36.5	44.2	1.8	0.0	0.0
September	681	100.0%	22	55	0	52	0	9.8	38.6	46.1	5.4	0.0	0.0
October	712	100.0%	28	55	0	47	0	0.4	22.1	63.6	13.9	0.0	0.0
November	624	90.7%	27	46	0	44	0	2.4	15.1	77.6	5.0	0.0	0.0
December	701	99.7%	25	39	0	38	0	0.6	18.8	80.6	0.0	0.0	0.0
Annual ^c	8275	99.1%	30	71	0	68	17	3.0	16.4	62.2	17.9	0.5	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 D-6. Unity Station: Summary of airpointer® PM_{2.5} monitoring results for the year 2014

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Conc. (µg/m ³)	Maximum 1-Hr Conc. (µg/m ³)	1-Hour Exceedance ^a (no.)	Maximum 24-Hr Conc. (µg/m ³)	24-Hour Exceedance ^b (no.)	Percent of Data in each Concentration Range					
								<=5	5 ~ 10	10 ~ 15	15 ~ 30	30 ~ 80	>80
January	744	100.0%	3	32	-	10	0	84.4	11.0	3.6	0.7	0.3	0.0
February	672	100.0%	4	17	-	8	0	64.7	31.4	3.6	0.3	0.0	0.0
March	744	100.0%	5	22	-	11	0	63.4	28.4	6.6	1.6	0.0	0.0
April	720	100.0%	3	22	-	9	0	73.5	24.0	1.8	0.7	0.0	0.0
May	744	100.0%	5	24	-	10	0	64.2	22.8	9.3	3.6	0.0	0.0
June	720	100.0%	5	59	-	20	0	67.5	22.9	5.6	3.1	1.0	0.0
July	735	98.8%	13	90	-	45	2	29.3	22.7	19.9	18.8	8.7	0.7
August	744	100.0%	11	84	-	38	1	30.1	32.5	14.2	19.1	3.8	0.3
September	718	99.7%	5	24	-	15	0	63.9	22.7	9.6	3.8	0.0	0.0
October	728	98.0%	2	52	-	6	0	90.4	8.5	0.4	0.4	0.3	0.0
November	692	96.4%	3	18	-	10	0	79.9	12.3	6.8	1.0	0.0	0.0
December	742	99.7%	5	39	-	20	0	66.2	22.9	6.5	4.0	0.4	0.0
Annual ^c	8703	99.4%	5	90	-	45	3	64.7	21.8	7.4	4.8	1.2	0.1

a. No 1-hour Saskatchewan Ambient Air Quality Standard

b. 24-hour Canada-Wide Standard = 30 µg/m³

c. No annual Saskatchewan Ambient Air Quality Standard

Table D-7. Unity Station: Summary of airpointer® precipitation monitoring results for the year 2014

Month	Valid 1-Hr data (no.)	Operational Time (%)	Total Precip. (mm)	Maximum 1-Hr Precip. (mm)	Maximum 24-Hr Precip. (mm)	Percent of Data in each Precipitation Range					
						<=5	5 ~ 10	10 ~ 25	25 ~ 50	50 ~ 75	>75
January	744	100.0%	0.8	0.3	0.4	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%	< 0.1	< 0.1	< 0.1	100.0	0.0	0.0	0.0	0.0	0.0
April	720	100.0%	47.8	7.8	20.6	99.7	0.3	0.0	0.0	0.0	0.0
May	744	100.0%	37.2	13.8	18.3	99.9	0.0	0.1	0.0	0.0	0.0
June	720	100.0%	146.2	22.4	37.5	99.3	0.3	0.4	0.0	0.0	0.0
July	735	98.8%	61.9	7.5	19.0	99.9	0.1	0.0	0.0	0.0	0.0
August	744	100.0%	48.3	8.7	18.1	99.7	0.3	0.0	0.0	0.0	0.0
September	720	100.0%	20.3	4.8	8.1	100.0	0.0	0.0	0.0	0.0	0.0
October	744	100.0%	3.7	0.9	1.6	100.0	0.0	0.0	0.0	0.0	0.0
November	716	99.4%	21.2	2.9	12.1	100.0	0.0	0.0	0.0	0.0	0.0
December	742	99.7%	3.4	1.9	3.4	100.0	0.0	0.0	0.0	0.0	0.0
Annual	8745	99.8%	391.0	22.4	37.5	99.9	0.1	0.0	0.0	0.0	0.0

Table D-8. Unity Station: Summary of airpointer® ambient temperature monitoring results for the year 2014

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Temp. (°C)	Minimum 1-Hr Temp. (°C)	Maximum 1-Hr Temp. (°C)	Percent of Data in each Temperature Range					
						<=-30	-30 ~ -15	-15 ~ 0	0 ~ 15	15 ~ 30	>30
January	744	100.0%	-12.6	-34.1	6.8	3.9	37.0	46.2	12.9	0.0	0.0
February	672	100.0%	-18.8	-32.5	-2.2	3.6	65.8	30.7	0.0	0.0	0.0
March	744	100.0%	-9.9	-37.7	4.3	3.6	24.9	57.1	14.4	0.0	0.0
April	720	100.0%	1.6	-13.7	20.5	0.0	0.0	40.0	55.4	4.6	0.0
May	744	100.0%	9.6	-7.1	28.0	0.0	0.0	10.5	67.6	21.9	0.0
June	720	100.0%	13.8	2.2	24.1	0.0	0.0	0.0	63.1	36.9	0.0
July	735	98.8%	17.5	6.8	27.5	0.0	0.0	0.0	36.1	63.9	0.0
August	744	100.0%	16.4	3.6	28.7	0.0	0.0	0.0	41.3	58.7	0.0
September	720	100.0%	10.6	-2.0	27.9	0.0	0.0	1.1	74.2	24.7	0.0
October	744	100.0%	6.0	-7.3	22.5	0.0	0.0	11.4	80.4	8.2	0.0
November	716	99.4%	-8.5	-28.2	10.3	0.0	15.4	64.4	20.3	0.0	0.0
December	742	99.7%	-9.2	-28.6	6.0	0.0	16.6	74.4	9.0	0.0	0.0
Annual	8745	99.8%	1.5	-37.7	28.7	0.9	13.0	28.0	39.7	18.4	0.0

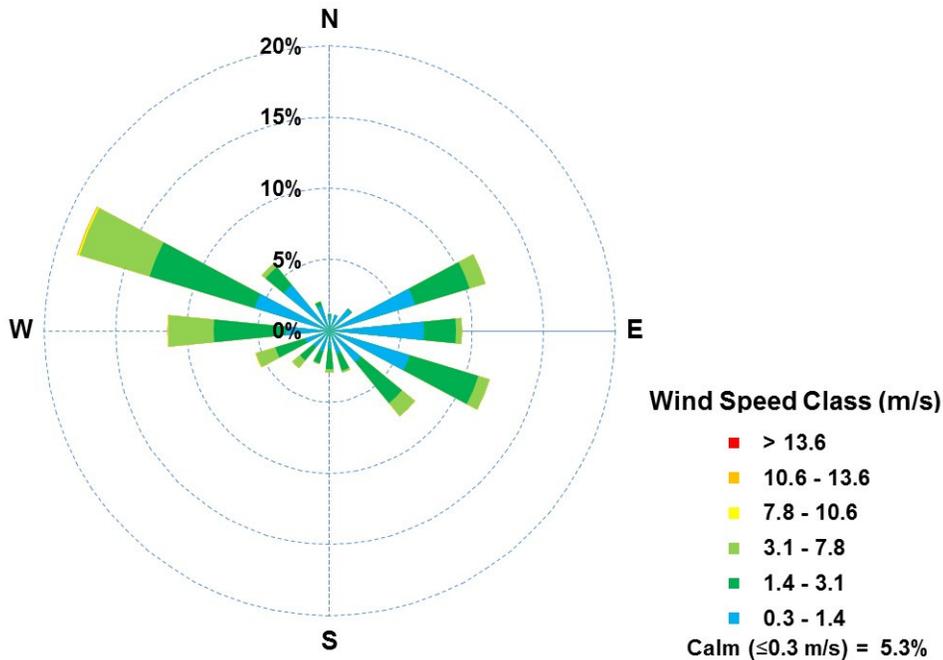
Table D-9. Unity Station: Summary of airpointer® relative humidity monitoring results for the year 2014

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%	74	50	88	0.0	0.0	1.6	77.8	20.6	0.0
February	672	100.0%	70	46	85	0.0	0.0	6.3	87.6	6.1	0.0
March	744	100.0%	69	40	88	0.0	0.0	15.1	74.2	10.8	0.0
April	720	100.0%	71	20	93	0.0	4.0	17.8	38.9	32.4	6.9
May	744	100.0%	59	19	94	0.0	11.4	39.1	28.0	15.9	5.6
June	720	100.0%	72	26	94	0.0	0.7	26.4	28.9	28.9	15.1
July	735	98.8%	75	39	94	0.0	0.0	21.9	31.4	30.6	16.1
August	744	100.0%	77	39	94	0.0	0.0	17.6	28.0	32.1	22.3
September	720	100.0%	69	30	93	0.0	0.1	31.3	30.4	30.6	7.6
October	744	100.0%	66	25	90	0.0	1.3	32.9	40.6	25.0	0.1
November	716	99.4%	76	52	90	0.0	0.0	2.5	65.9	30.9	0.7
December	742	99.7%	77	52	88	0.0	0.0	1.6	61.5	36.9	0.0
Annual	8745	99.8%	71	19	94	0.0	1.5	17.9	49.2	25.1	6.2

Table D-10 Unity Station: Wind frequency table for 2014

Wind Direction Sector	Percent of Data within Wind Speed Range, wind speed unit m/s						Totals
	0.3 ~ 1.4	1.4 ~ 3.1	3.1 ~ 7.8	7.8 ~ 10.6	10.6 ~ 13.6	>13.6	
North NorthEast	0.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.8%
NorthEast	1.6%	0.1%	0.0%	0.0%	0.0%	0.0%	1.6%
East NorthEast	5.6%	4.0%	1.2%	0.0%	0.0%	0.0%	10.8%
East	5.8%	2.2%	0.4%	0.0%	0.0%	0.0%	8.5%
East SouthEast	5.5%	5.0%	0.8%	0.0%	0.0%	0.0%	11.4%
SouthEast	2.5%	3.7%	1.2%	0.0%	0.0%	0.0%	7.5%
South SouthEast	1.5%	1.3%	0.1%	0.0%	0.0%	0.0%	2.8%
South	1.0%	1.5%	0.2%	0.0%	0.0%	0.0%	2.8%
South SouthWest	1.3%	0.9%	0.1%	0.0%	0.0%	0.0%	2.3%
SouthWest	1.3%	1.2%	0.7%	0.0%	0.0%	0.0%	3.2%
West SouthWest	1.7%	2.2%	1.4%	0.0%	0.0%	0.0%	5.3%
West	2.8%	5.0%	3.2%	0.0%	0.0%	0.0%	11.0%
West NorthWest	5.1%	7.7%	5.1%	0.1%	0.0%	0.0%	18.1%
NorthWest	3.8%	1.6%	0.3%	0.0%	0.0%	0.0%	5.8%
North NorthWest	1.6%	0.3%	0.0%	0.0%	0.0%	0.0%	1.9%
North	0.7%	0.1%	0.0%	0.0%	0.0%	0.0%	0.8%
Total	42.8%	36.8%	14.8%	0.2%	0.1%	0.0%	94.7%

Percent Calm (<0.3 m/s)	5.3%
Number of Valid Hourly-Average Data	8680
Total Workable Hours in Time Period	8760



APPENDIX E. KINDERSLEY STATION: CONTINUOUS MONITORING DATA

Table E-1 Kindersley Station: Summary statistics for continuous air monitoring results for 2014

Parameter	Unit	Calibration & AIC ^a (hours)	Valid Data (hours)	Uptime (%)	Summary Statistics for Hourly Average Data		
					Average	Minimum	Maximum
SO ₂	ppb	486	8220	99.4%	0.2	< 0.1	3.3
H ₂ S	ppb	486	8220	99.4%	0.2	< 0.1	3.3
PM _{2.5}	µg/m ³	1	8502	97.1%	6	< 1	137
Precipitation	mm	0	8724	99.6%	381.9 ^b	< 0.1	17.7
Ambient Temperature	°C	0	8724	99.6%	2.2	-37.8	31.1
Relative Humidity	%	0	8724	99.6%	70	17	94
Wind Speed	m/s	0	8705	99.4%	3.1	Calm	13.7

a. Automatic Instrument Check

b. Total precipitation

Table E-2. Kindersley Station: Summary of airpointer® SO₂ monitoring results for 2014

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Conc. (ppb)	Maximum 1-Hr Conc. (ppb)	1-Hour Exceedance ^a (no.)	Maximum 24-Hr Conc. (ppb)	24-Hour Exceedance ^b (no.)	Percent of Data in each Concentration Range						
								<=1	1 ~ 5	5 ~ 11	11 ~ 57	57 ~ 172	>172	
January	707	100.0%	0.2	0.7	0	0.4	0	100.0	0.0	0.0	0.0	0.0	0.0	0.0
February	617	100.0%	0.2	0.9	0	0.3	0	100.0	0.0	0.0	0.0	0.0	0.0	0.0
March	699	100.0%	0.1	0.6	0	0.3	0	100.0	0.0	0.0	0.0	0.0	0.0	0.0
April	675	99.4%	0.1	0.8	0	0.3	0	100.0	0.0	0.0	0.0	0.0	0.0	0.0
May	688	99.9%	0.2	2.9	0	0.5	0	99.0	1.0	0.0	0.0	0.0	0.0	0.0
June	654	97.8%	0.2	1.1	0	0.3	0	99.8	0.2	0.0	0.0	0.0	0.0	0.0
July	691	97.3%	0.3	3.3	0	0.7	0	99.0	1.0	0.0	0.0	0.0	0.0	0.0
August	712	100.0%	0.4	2.2	0	0.9	0	96.1	3.9	0.0	0.0	0.0	0.0	0.0
September	679	99.4%	0.2	1.6	0	0.5	0	98.8	1.2	0.0	0.0	0.0	0.0	0.0
October	712	100.0%	0.1	0.7	0	0.3	0	100.0	0.0	0.0	0.0	0.0	0.0	0.0
November	687	99.7%	0.1	2.6	0	0.4	0	99.7	0.3	0.0	0.0	0.0	0.0	0.0
December	699	98.9%	0.1	0.7	0	0.3	0	100.0	0.0	0.0	0.0	0.0	0.0	0.0
Annual ^c	8220	99.4%	0.2	3.3	0	0.9	0	99.4	0.6	0.0	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 E-3. Kindersley Station: Summary of airpointer® H₂S monitoring results for the year 2014

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Conc. (ppb)	Maximum 1-Hr Conc. (ppb)	1-Hour Exceedance ^a (no.)	Maximum 24-Hr Conc. (ppb)	24-Hour Exceedance ^b (no.)	Percent of Data in each Concentration Range					
								<=1	1 ~ 3.6	3.6 ~ 5	5 ~ 8	8 ~ 10.8	>10.8
January	707	100.0%	0.2	0.7	0	0.4	0	100.0	0.0	0.0	0.0	0.0	0.0
February	617	100.0%	0.2	0.9	0	0.3	0	100.0	0.0	0.0	0.0	0.0	0.0
March	699	100.0%	0.1	0.6	0	0.3	0	100.0	0.0	0.0	0.0	0.0	0.0
April	675	99.4%	0.1	0.8	0	0.3	0	100.0	0.0	0.0	0.0	0.0	0.0
May	688	99.9%	0.2	2.9	0	0.5	0	99.0	1.0	0.0	0.0	0.0	0.0
June	654	97.8%	0.2	1.1	0	0.3	0	99.8	0.2	0.0	0.0	0.0	0.0
July	691	97.3%	0.3	3.3	0	0.7	0	99.0	1.0	0.0	0.0	0.0	0.0
August	712	100.0%	0.4	2.2	0	0.9	0	96.1	3.9	0.0	0.0	0.0	0.0
September	679	99.4%	0.2	1.6	0	0.5	0	98.8	1.2	0.0	0.0	0.0	0.0
October	712	100.0%	0.1	0.7	0	0.3	0	100.0	0.0	0.0	0.0	0.0	0.0
November	687	99.7%	0.1	2.6	0	0.4	0	99.7	0.3	0.0	0.0	0.0	0.0
December	699	98.9%	0.1	0.7	0	0.3	0	100.0	0.0	0.0	0.0	0.0	0.0
Annual ^c	8220	99.4%	0.2	3.3	0	0.9	0	99.4	0.6	0.0	0.0	0.0	0.0

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

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

c. No annual Saskatchewan Ambient Air Quality Standard

Table E-4. Kindersley Station: Summary of airpointer® PM_{2.5} monitoring results for the year 2014

Month	Valid 1-Hr data (no.)	Operational Time (%)	Average Conc. (µg/m ³)	Maximum 1-Hr Conc. (µg/m ³)	1-Hour Exceedance ^a (no.)	Maximum 24-Hr Conc. (µg/m ³)	24-Hour Exceedance ^b (no.)	Percent of Data in each Concentration Range					
								<=5	5 ~ 10	10 ~ 15	15 ~ 30	30 ~ 80	>80
January	744	100.0%	4	16	-	11	0	75.9	19.9	3.8	0.4	0.0	0.0
February	672	100.0%	5	30	-	14	0	62.5	32.4	4.0	0.9	0.1	0.0
March	744	100.0%	5	89	-	17	0	66.7	28.4	3.4	0.9	0.4	0.3
April	719	99.9%	4	22	-	9	0	72.0	20.4	6.1	1.4	0.0	0.0
May	744	100.0%	6	44	-	11	0	56.3	30.5	8.3	3.9	0.9	0.0
June	664	92.2%	5	43	-	18	0	63.6	24.7	7.4	3.3	1.1	0.0
July	660	88.7%	12	137	-	34	2	30.0	22.3	18.2	22.6	6.8	0.2
August	744	100.0%	11	123	-	40	2	37.4	25.9	18.3	12.4	5.2	0.8
September	714	99.7%	6	60	-	15	0	54.6	27.3	12.5	5.0	0.6	0.0
October	639	86.0%	5	70	-	12	0	67.6	23.0	5.8	3.1	0.5	0.0
November	718	99.7%	5	36	-	13	0	58.5	29.2	8.4	3.6	0.3	0.0
December	740	99.5%	5	20	-	12	0	63.0	28.1	5.4	3.5	0.0	0.0
Annual ^c	8502	97.1%	6	137	-	40	4	59.1	26.1	8.4	5.0	1.3	0.1

a. No 1-hour Saskatchewan Ambient Air Quality Standard

b. 24-hour Canada-Wide Standard = 30 µg/m³

c. No annual Saskatchewan Ambient Air Quality Standard

Table E-5. Kindersley Station: Summary of airpointer® precipitation monitoring results for the year 2014

Month	Valid 1-Hr data (no.)	Operational Time (%)	Total Precip. (mm)	Maximum 1-Hr Precip. (mm)	Maximum 24-Hr Precip. (mm)	Percent of Data in each Precipitation Range					
						<=5	5 ~ 10	10 ~ 25	25 ~ 50	50 ~ 75	>75
January	744	100.0%	0.1	< 0.1	0.1	100.0	0.0	0.0	0.0	0.0	0.0
February	672	100.0%	1.0	0.7	0.8	100.0	0.0	0.0	0.0	0.0	0.0
March	744	100.0%	< 0.1	< 0.1	< 0.1	100.0	0.0	0.0	0.0	0.0	0.0
April	719	99.9%	30.1	6.7	12.3	99.9	0.1	0.0	0.0	0.0	0.0
May	744	100.0%	19.1	4.0	11.3	100.0	0.0	0.0	0.0	0.0	0.0
June	710	98.6%	141.3	16.2	36.1	98.7	0.7	0.6	0.0	0.0	0.0
July	726	97.6%	70.3	15.2	25.7	99.2	0.7	0.1	0.0	0.0	0.0
August	744	100.0%	75.3	17.7	32.0	99.6	0.3	0.1	0.0	0.0	0.0
September	718	99.7%	24.5	4.7	14.3	100.0	0.0	0.0	0.0	0.0	0.0
October	744	100.0%	12.1	5.6	5.8	99.9	0.1	0.0	0.0	0.0	0.0
November	719	99.9%	8.2	1.5	4.9	100.0	0.0	0.0	0.0	0.0	0.0
December	740	99.5%	< 0.1	< 0.1	< 0.1	100.0	0.0	0.0	0.0	0.0	0.0
Annual	8724	99.6%	381.9	17.7	36.1	99.8	0.2	0.1	0.0	0.0	0.0

Table E-6. Kindersley Station: Summary of airpointer® ambient temperature monitoring results for the year 2014

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%	-11.9	-33.8	4.5	3.5	35.6	48.8	12.1	0.0	0.0
February	672	100.0%	-18.2	-34.3	2.9	3.9	63.8	30.4	1.9	0.0	0.0
March	744	100.0%	-8.9	-37.8	5.8	3.8	21.1	55.2	19.9	0.0	0.0
April	719	99.9%	2.9	-11.3	21.9	0.0	0.0	33.0	63.0	4.0	0.0
May	744	100.0%	10.6	-6.5	29.2	0.0	0.0	5.8	66.3	28.0	0.0
June	710	98.6%	13.9	2.4	24.2	0.0	0.0	0.0	62.1	37.9	0.0
July	726	97.6%	18.2	7.7	29.4	0.0	0.0	0.0	30.7	69.3	0.0
August	744	100.0%	17.1	4.3	28.8	0.0	0.0	0.0	35.1	64.9	0.0
September	718	99.7%	11.6	-2.0	31.1	0.0	0.0	1.8	69.6	28.1	0.4
October	744	100.0%	7.0	-6.1	23.1	0.0	0.0	9.5	79.8	10.6	0.0
November	719	99.9%	-8.0	-27.3	9.1	0.0	13.1	69.1	17.8	0.0	0.0
December	740	99.5%	-8.2	-27.8	7.6	0.0	14.3	73.8	11.9	0.0	0.0
Annual	8724	99.6%	2.2	-37.8	31.1	0.9	12.0	27.3	39.3	20.3	0.0

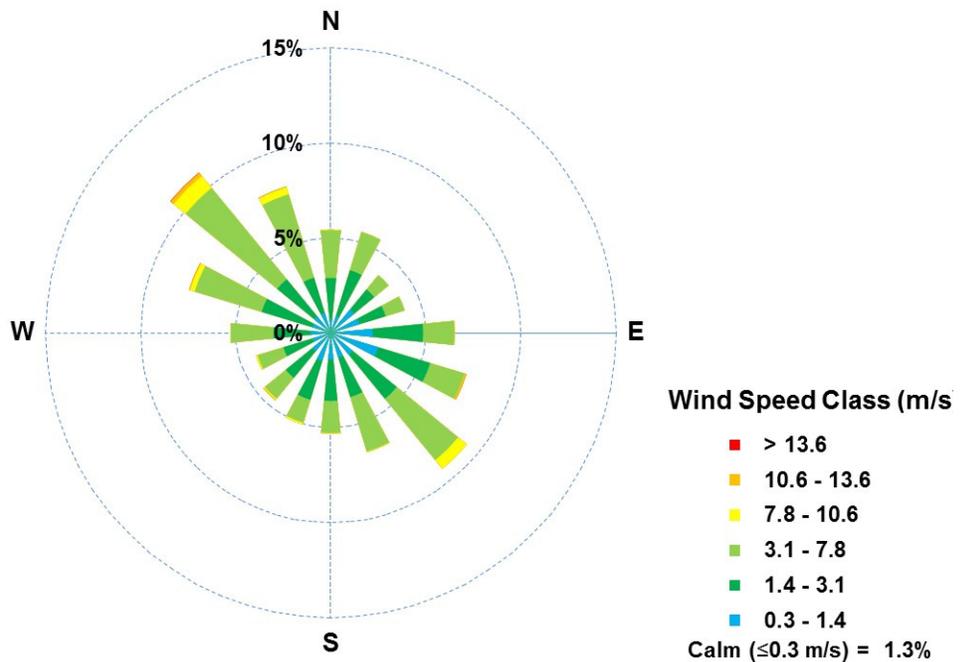
Table E-7. Kindersley Station: Summary of airpointer® relative humidity monitoring results for the year 2014

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%	75	54	88	0.0	0.0	2.6	78.4	19.1	0.0
February	672	100.0%	74	60	88	0.0	0.0	0.1	86.8	13.1	0.0
March	744	100.0%	73	46	90	0.0	0.0	7.5	75.7	16.7	0.1
April	719	99.9%	69	17	92	0.0	4.5	19.3	42.4	27.7	6.1
May	744	100.0%	54	18	94	0.0	16.5	43.4	22.8	14.4	2.8
June	710	98.6%	68	21	94	0.0	2.3	31.7	28.2	29.7	8.2
July	726	97.6%	71	28	94	0.0	0.4	26.7	36.2	28.4	8.3
August	744	100.0%	74	31	94	0.0	0.0	23.8	29.4	31.2	15.6
September	718	99.7%	65	22	93	0.0	4.2	32.5	33.6	25.5	4.3
October	744	100.0%	64	22	90	0.0	2.6	34.9	44.4	17.7	0.4
November	719	99.9%	76	56	91	0.0	0.0	1.7	66.1	31.7	0.6
December	740	99.5%	78	63	90	0.0	0.0	0.0	52.8	47.0	0.1
Annual	8724	99.6%	70	17	94	0.0	2.6	18.8	49.6	25.2	3.9

Table E-8 Kindersley Station: Wind frequency table for the year 2014

Wind Direction Sector	Percent of Data within Wind Speed Range, wind speed unit m/s						Totals
	0.3 ~ 1.4	1.4 ~ 3.1	3.1 ~ 7.8	7.8 ~ 10.6	10.6 ~ 13.6	>13.6	
North NorthEast	0.9%	2.5%	2.1%	0.0%	0.0%	0.0%	5.5%
NorthEast	1.5%	1.4%	1.0%	0.0%	0.0%	0.0%	3.8%
East NorthEast	1.4%	1.4%	1.0%	0.0%	0.0%	0.0%	3.9%
East	2.1%	2.7%	1.7%	0.0%	0.0%	0.0%	6.4%
East SouthEast	2.5%	2.9%	1.9%	0.1%	0.0%	0.0%	7.4%
SouthEast	1.4%	3.0%	4.2%	0.6%	0.0%	0.0%	9.2%
South SouthEast	1.3%	2.2%	3.0%	0.0%	0.0%	0.0%	6.5%
South	1.3%	2.2%	1.7%	0.0%	0.0%	0.0%	5.2%
South SouthWest	1.5%	2.1%	1.3%	0.1%	0.0%	0.0%	5.0%
SouthWest	1.2%	1.8%	1.4%	0.1%	0.0%	0.0%	4.5%
West SouthWest	0.9%	1.6%	1.4%	0.1%	0.0%	0.0%	4.0%
West	1.0%	2.0%	2.3%	0.0%	0.0%	0.0%	5.2%
West NorthWest	1.0%	2.8%	3.7%	0.3%	0.1%	0.0%	7.8%
NorthWest	1.0%	2.5%	6.2%	0.8%	0.2%	0.0%	10.8%
North NorthWest	1.0%	1.9%	4.6%	0.4%	0.0%	0.0%	8.0%
North	0.7%	2.1%	2.5%	0.0%	0.0%	0.0%	5.4%
Total	20.7%	35.2%	40.0%	2.5%	0.4%	0.0%	98.7%

Percent Calm (≤ 0.3 m/s)	1.3%
Number of Valid Hourly-Average Data	8705
Total Workable Hours in Time Period	8760



APPENDIX F. WYAMZ EXCEEDANCE SUMMARY

Table F-1 Meadow Lake Station: Summary of 24-hour exceedences for the year 2014

24-hour Exceedance Information			Summary of Other Parameters During Exceedance								
Pollutant	Conc.	Exceedance Date mmm-dd	WS m/s	WD deg	AQHI -	Rain mm	NO ppb	NO ₂ ppb	NO _x ppb	O ₃ ppb	PM _{2.5} µg/m ³
PM _{2.5}	40	Nov-20	1.5	154	3	<0.1	0.1	1.4	1.6	28	40
PM _{2.5}	39	Nov-21	2.2	201	3	<0.1	0.2	2.6	2.7	19	39

Table F-2 Maidstone Station: Summary of 1-hour exceedences for the year 2014

1-hour Exceedance Information			Summary of Other Parameters During Exceedance								
Pollutant	Conc.	Exceedance Time mmm-dd hh:mm	WS m/s	WD deg	AQI -	Rain mm	ET C	SO ₂ ppb	NO ₂ ppb	H ₂ S ppb	PM _{2.5} µg/m ³
H ₂ S	11.5	Jul-09 05:00	0.7	165	30	<0.1	12	0.8	6.5	11.5	39
H ₂ S	11.0	Jul-09 04:00	0.5	184	28	<0.1	13	0.7	7.6	11.0	36
H ₂ S	13.5	Aug-29 07:00	0.4	187	5	<0.1	4	0.1	4.7	13.5	6
H ₂ S	11.7	Aug-29 08:00	0.8	138	4	<0.1	5	0.0	4.7	11.7	5

Table F-3 Maidstone Station: Summary of 24-hour exceedences for the year 2014

24-hour Exceedance Information			Summary of Other Parameters During Exceedance								
Pollutant	Conc.	Exceedance Date mmm-dd	WS m/s	WD deg	AQI -	Rain mm	ET C	SO ₂ ppb	NO ₂ ppb	H ₂ S ppb	PM _{2.5} µg/m ³
PM _{2.5}	89	Jul-8	0.9	223	51	<0.1	18.7	2.1	3.3	0.6	89
PM _{2.5}	35	Jul-12	2.3	278	27	<0.1	17.3	1.0	2.8	0.2	35
PM _{2.5}	39	Aug-16	1.2	152	29	<0.1	18.2	1.0	2.5	2.0	39

Table F-4 Unity Station: Summary of 24-hour exceedences for the year 2014

24-hour Exceedance Information			Summary of Other Parameters During Exceedance								
Pollutant	Conc.	Exceedance Date mmm-dd	WS m/s	WD deg	AQHI -	Rain mm	NO ppb	NO ₂ ppb	NO _x ppb	O ₃ ppb	PM _{2.5} µg/m ³
PM _{2.5}	45	Jul-8	1.0	225	3	<0.1	0.5	1.7	2.2	22	45
PM _{2.5}	40	Jul-9	1.5	130	3	<0.1	0.4	1.6	2.0	26	40
PM _{2.5}	38	Aug-16	1.1	82	3	<0.1	0.2	0.9	1.1	14	38

Table F-5 Kindersley Station: Summary of 24-hour exceedences for the year 2014

24-hour Exceedance Information			Summary of Other Parameters During Exceedance								
Pollutant	Conc.	Exceedance Date mmm-dd	WS m/s	WD deg	Rain mm	ET C	SO ₂ ppb	H ₂ S ppb	PM _{2.5} µg/m ³		
PM _{2.5}	34	Jul-12	2.7	252	<0.1	17.7	0.3	0.4	34		
PM _{2.5}	34	Jul-11	2.7	283	<0.1	15.8	0.2	0.4	34		
PM _{2.5}	40	Aug-16	1.5	90	0.3	18.0	0.2	0.9	40		
PM _{2.5}	39	Aug-15	1.1	112	<0.1	20.3	0.1	0.6	39		

APPENDIX G. 2014 FINANCIAL STATEMENTS



**Western Yellowhead Air Management Zone Inc.
Financial Statements**
December 31, 2014



ACCOUNTING › CONSULTING › TAX
800, 119 - 4TH AVENUE S; SASKATOON SK; S7K 5X2
1-877-500-0778 P: 306-665-6766 F: 306-665-9910 www.MNP.ca

Western Yellowhead Air Management Zone Inc.

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Independent Auditors' Report

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

We have audited the accompanying financial statements of Western Yellowhead Air Management Zone Inc. which comprise the statement of financial position as at December 31, 2014 and the statements of operations and changes in net assets and cash flows for the year then ended, and a summary of significant accounting policies and other explanatory information.

Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these 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.

Auditors' Responsibility

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with Canadian generally accepted auditing standards. Those standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditors' judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements 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 entity's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained in our audit is sufficient and appropriate to provide a basis for our audit opinion.

Opinion

In our opinion, the financial statements present fairly, in all material respects, the financial position of Western Yellowhead Air Management Zone Inc. as at December 31, 2014 and the results of its operations and cash flows for the year then ended in accordance with Canadian accounting standards for not-for-profit organizations.

Saskatoon, Saskatchewan

April 16, 2015

MNP LLP
Chartered Accountants

Western Yellowhead Air Management Zone Inc.
Statement of Financial Position
As at December 31, 2014

	2014	2013
Assets		
Current		
Cash resources	135,610	9,673
Grants receivable	-	27,000
Prepaid expenses	6,638	7,008
Goods and Services Tax receivable	-	15,118
	142,248	58,799
Capital assets (Note 3)	306,713	372,366
	448,961	431,165
Liabilities		
Current		
Accounts payable and accruals	11,700	81,119
Goods and service tax payable	4,111	-
Current portion of deferred contributions (Note 4)	40,000	40,000
	55,811	121,119
Deferred contributions (Note 4)	100,000	140,000
	155,811	261,119
Net Assets		
Unrestricted net assets	293,150	170,046
	448,961	431,165

Approved on behalf of the Board


 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, 2014

	2014	2013
Revenue		
Membership fees	227,679	179,280
Grant revenue	81,000	108,000
Amortization of deferred contributions (Note 4)	40,000	20,000
	348,679	307,280
Expenses		
Amortization	75,453	41,374
Insurance	10,337	1,999
Management fees	38,375	50,600
Meetings	860	524
Monitoring	83,624	45,945
Office supplies	1,854	1,644
Repairs and maintenance	2,576	-
Professional fees	5,150	4,500
Promotion	5,008	-
Telephone	1,772	1,945
Travel	566	1,293
	225,575	149,824
Excess of revenue over expenses	123,104	157,456
Net assets, beginning of year	170,046	12,590
Net assets, end of year	293,150	170,046

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, 2014

	2014	2013
Cash provided by (used for) the following activities		
Operating		
Excess of revenue over expenses	123,104	157,456
Amortization	75,453	41,374
Amortization of deferred contributions	(40,000)	(20,000)
	158,557	178,830
Changes in working capital accounts		
Grants receivable	27,000	(27,000)
Goods and services tax receivable	19,229	(15,118)
Prepaid expenses	370	(7,008)
Accounts payable and accruals	(69,419)	72,425
	135,737	202,129
Investing		
Contributions received for the purchase of capital assets	-	200,000
Purchase of capital assets	(9,800)	(413,740)
	(9,800)	(213,740)
Increase (decrease) in cash resources	125,937	(11,611)
Cash resources, beginning of year	9,673	21,284
Cash resources, end of year	135,610	9,673

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, 2014

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 this data available to all members.

2. Significant accounting policies

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

Revenue recognition

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

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 amortized cost.

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

Financial asset impairment

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

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

Western Yellowhead Air Management Zone Inc.
Notes to the Financial Statements
For the year ended December 31, 2014

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

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.

Accounts receivable are stated after evaluation as to their collectability and an appropriate allowance for doubtful accounts is provided where considered necessary. Amortization is based on the estimated useful lives of capital assets.

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

Capital assets

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

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

	Rate
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 capital assets

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

3. **Capital assets**

	<i>Cost</i>	<i>Accumulated amortization</i>	<i>2014 Net book value</i>	<i>2013 Net book value</i>
Equipment	423,540	116,827	306,713	372,366

Western Yellowhead Air Management Zone Inc.
Notes to the Financial Statements
For the year ended December 31, 2014

4. Deferred contributions

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

	2014	2013
Balance, beginning of year	180,000	-
Amount received during the year	-	200,000
Less: Amount recognized as revenue	<u>(40,000)</u>	<u>(20,000)</u>
	140,000	180,000
Less: current portion	<u>40,000</u>	<u>40,000</u>
Balance, end of year	<u>100,000</u>	<u>140,000</u>

5. Related party transactions

The Organization has entered into a contract agreement for management services, expiring May 2017. The contract is based on hours required, to a maximum of 1,000 hours, or \$50,000. Any overage is required to be approved by the Board of Directors. Included in expenses for the current year are \$38,375 (2013 - \$50,600) 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. At December 31, 2014, accounts payable and accruals includes \$nil (2013 - \$62,975) due to this related party.

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.

Liquidity risk

Liquidity risk is the risk that the Organization will encounter difficulty in meeting obligations associated with financial liabilities. The Organization's exposure to liquidity risk is dependent on the collection of membership fee revenue and obligations to sustain operations.

7. Commitments

The Organization has entered into a contract agreement for the operation and maintenance of airporter monitoring stations, expiring June 30, 2015. Payments remaining on the contract total \$40,000.

APPENDIX H. WYAMZ BOARD OF DIRECTORS

Brad Sigurdson Board Chair (Saskatchewan Mining Association)



Mr. Sigurdson is the Manager, Environment and Safety for the 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".

Gerry Mooney Vice Chair (Akzo Nobel Chemicals Ltd.)



Gerry Mooney brings 35 years of chemical manufacturing experience, with a focus on Environmental Management and Community Engagement. He is a strong supporter of the collaborative approach to air quality management. He indicated that he is enthused to be part of a consensus based team which facilitates dialogue among regulators, public interest groups and industry while ensuring the availability of robust air quality data. As a member of the Chemistry Industry Association of Canada (CIAC), AkzoNobel is committed to Responsible Care® – CIAC's internationally recognized sustainability initiative.

Murray Hilderman Secretary Treasurer (Ministry of Environment)



Mr. Hilderman is a Senior Project Manager with the Ministry of Environment, Technical Resources Branch. He has 25 years of experience in environmental work related to air and water, working with industry, municipalities and other stakeholders on projects ranging from local to international. He is involved in the air management zone because he believes this is an excellent approach to engage all parties to better understand air issues in a region.

Phil Burry Member (Husky Energy Upstream)



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

Brenda Wallace Member (City of Saskatoon)



Brenda is the Director of Environmental & Corporate Initiatives with the City of Saskatoon where she leads a team of environmental professionals, engineers, and project managers to improve environmental performance and plan major city-building projects that enhance quality of life. Ms. Wallace has a background in urban planning and has worked in the economic development sector on affordable housing projects, and has spent 3 years as Resource Planning Manager with the Meewasin Valley Authority.

David Henry Member (Saskatchewan Environmental Society)



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

Gary Ericson Member (Saskatchewan Ministry of the Economy)



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

Shelley Kirychuk Member (University of Saskatchewan)



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

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



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

Dan Gauthier Member (Mosaic Potash Colonsay)



Mr. Gauthier joined Mosaic in 2008 and is a Professional Engineer registered in Saskatchewan. He has held various positions at the Mosaic Potash Colonsay mine including maintenance engineer, ISO 14001 and OHSAS 18001 Coordinator and most recently as the Senior Environmental Engineer. He is currently responsible for maintaining environmental compliance and improving environmental performance at the Mosaic Potash Colonsay mine.

He has experience leading large projects which include a tailings area expansion and the Mosaic Colonsay site ISO 14001 and OHSAS 18001 management system certification.

Aaron Studer Member (Husky Energy Downstream)

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

Don Corrigan Member (Prairie North Regional Health Authority)



Don Corrigan worked throughout the BC Public Health system from 1976 until retirement in 2011, as a field Public Health Inspector in northern BC (Vanderhoof) and the Okanagan Valley (Kelowna); as a Chief Public Health Inspector for the East Kootenay region in Cranbrook; as the Manager of Health Protection for the Kootenay/Boundary region of BC and as an Assistant Director of Health Protection with Interior Health, with a broad program portfolio including Water

Quality, Healthy Built Environments, Emergency Response Planning & Operations, Community Care Facilities Licensing, Public Health Engineering, Tobacco Reduction, and Air Quality. In 2013, took the of Manager of Environmental Protection Services position with Prairie North Health Authority.

Terry Gibson

Executive Director



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

APPENDIX I. WYAMZ MEMBER COMPANIES

The Western Yellowhead Air Management Zone would like to express our gratitude to our members in good standing 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.

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

- Agrium Inc.
- Akzo Nobel
- Alta Gas
- Bayhurst Gas
- Baytex Energy Ltd.
- Beaumont Energy
- Black Pearl Resources
- Buzzard Resources
- Caltex Resources
- Canadian Natural Resources Limited
- Can-Expo
- Carrier Forest
- Cenovus Energy
- City of Saskatoon
- Conoco Phillips
- Cory Operations
- Crescent Point
- Crocotta Energy
- Crocus Oil
- Devon Canada Corporation
- Enerplus Corporation
- Gear Energy
- Halo Exploration
- Husky Oil Operations Limited
- Hyzer Energy
- Ish Energy
- Longhorn Oil and Gas
- Longview Oil
- Modexco Petroleum
- Meridian Cogeneration Power
- Mosaic
- NAL Resources Limited
- North West Bio Energy
- Northern Blizzard
- Novus Energy Inc.
- P&H Milling
- Palliser Oil and Gas
- Pengrowth Energy Corporation
- Penn West Petroleum
- Plasti-Fab
- Potash Corp
- Prosper Energy
- Raven Resources
- Renegade Petroleum
- Rife Resources
- Saputo Products
- SaskEnergy Incorporated/ TransGas Limited
- Sask Power
- Secure Energy
- Smitty's Farms
- Sojourn Energy
- Spartan Energy
- Sphere Energy
- Spur Resources
- SSSS Oil Partnership
- Tamarack Acquisitions
- Tuscany Energy
- Viterra
- Zelmar Energy

End of the Report