



Southeast Saskatchewan  
Airshed Association

## 2006 ANNUAL REPORT



SOUTHEAST SASKATCHEWAN  
AIRSHED ASSOCIATION

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## MESSAGE FROM THE CHAIRPERSON



Southeast Saskatchewan is a vibrant region of Saskatchewan. The region has a large agriculture industry, an extensive oil and gas industry, potash mines, coal mining, electrical generation and supports a major transportation route to the United States.

For a number of years, people in the region have expressed concerns about air quality. These concerns include seemingly higher asthma and cancer rates. It has long been evident that in order to understand how air quality might affect the health of the population we need to implement an effective air quality monitoring program.

The Airshed approach was determined to be the best way to implement and manage a credible regional program. Saskatchewan Ministry of Environment supported by Saskatchewan Ministries of Energy & Resources, Health, and Agriculture have spearheaded the development of the first Airshed in Saskatchewan. The program is voluntary and to date has been supported by industry from all sectors.

We are pleased to be the first Airshed established in Saskatchewan and look forward to providing air quality information as a basic tool in managing our air quality.

**MARIAN WILSON**

## EXECUTIVE SUMMARY

The Southeast Saskatchewan Airshed Association (SESAA), established in October 2005, is Saskatchewan's first airshed association with a mandate to monitor ambient air quality in southeast region of the Province. SESAA is a collaborative group of industry, government, non-government organizations, and private citizens. The airshed covers an area of 36,800 square kilometres and includes 45 municipalities. Major economic activities in the region are agriculture, oil & gas, mining, power generation, and transportation.

This 2006 Annual Report is the SESAA's first annual report. Monthly passive monitoring data was collected at 28 locations from June to December 2006. Nitrogen dioxide (NO<sub>2</sub>) and sulphur dioxide (SO<sub>2</sub>) were monitored at all 28 sites, while ozone (O<sub>3</sub>) was monitored at 12 selected sites. Data capture rate for the entire passive network was 99.2%, whereas the individual capture rates for SO<sub>2</sub>, NO<sub>2</sub>, and O<sub>3</sub> were 99.0%, 99.5%, and 98.8%, respectively.

Average concentrations of SO<sub>2</sub>, NO<sub>2</sub>, and O<sub>3</sub> for the entire network were 1.5, 1.1, and 30 ppb, respectively. Similarly, maximum concentrations of SO<sub>2</sub>, NO<sub>2</sub>, and O<sub>3</sub> for the entire network were 5.6, 2.2, and 46 ppb, respectively. All measured SO<sub>2</sub> and NO<sub>2</sub> concentrations were well below the Saskatchewan annual ambient air quality standards, and O<sub>3</sub> concentrations were within the normal range. In overall, there were no air quality issues with the passive monitoring program in 2006. The SESAA plans to initiate a continuous air monitoring program in 2008 to complement the existing passive monitoring program.

## INTRODUCTION

The Southeast Saskatchewan Airshed Association (SESAA) was established in October 2005 to manage ambient air quality in southeast Saskatchewan. The SESAA is a consortium of government, industry, non-government organizations, and private citizen stakeholders. The SESAA goal is to collect credible, scientifically defensible air quality data for the southeast region of Saskatchewan, and to make this data freely available to all stakeholders. The SESAA objective is to bring together stakeholders from all backgrounds to identify local air quality issues and to develop innovative solutions for managing these issues.

The southeast Saskatchewan airshed is Saskatchewan's first airshed. It covers an area of 36,800 square kilometers, including 45 municipalities. The airshed boundaries were established based on common history, meteorology, and funding considerations. Major economic activities in the region include agriculture, oil and gas, mining, power generation, and transportation. Development of other airsheds in the province is being planned.

Membership in the SESAA is currently voluntary. Current membership includes members of the agriculture, oil & gas, mining and power generation sectors, as well as the public. The Government of Saskatchewan's Ministries Environment, Energy & Resources, and Health also participate as members of the board of directors. The SESAA's operating budget consists of membership fees and emissions-based fees assessed to facilities operating within the airshed boundaries (Figure 1).

## AIR QUALITY MONITORING

One of the SESAA's mandates is to collect scientifically credible regional air quality data, and to convey this information in a meaningful way to the public and stakeholders. To fulfill the first part of this mandate, SESAA has developed a comprehensive air quality monitoring program. The first phase of the program was initiated in June 2006 with passive monitoring, and will be followed with a continuous monitoring program in 2008.

The passive monitoring program consists of monthly passive monitoring at 28 locations in southeast Saskatchewan. The Maxxam Analytics PASS samplers were deployed to monthly collect sulphur dioxide (SO<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>) and ozone (O<sub>3</sub>) samples at selected stations. Locations of passive monitoring sites are shown in Figure 2. Symbols with pink, blue, and yellow circles (●) indicate sites where SO<sub>2</sub>, NO<sub>2</sub>, and O<sub>3</sub> were monitored. Symbols with blue and yellow circles only (●) indicate sites where SO<sub>2</sub> and NO<sub>2</sub> were monitored. SO<sub>2</sub> and NO<sub>2</sub> were monitored at all 28 sites, while O<sub>3</sub> was monitored at 12 sites.

In addition to the monthly samples, a field blank and one replicate for each of the monitored substances was collected each month. The field blank detects filter contamination introduced during sample collection/deployment and laboratory processes. Replicate samples are used to quantify variability in sampling and analytical procedures.

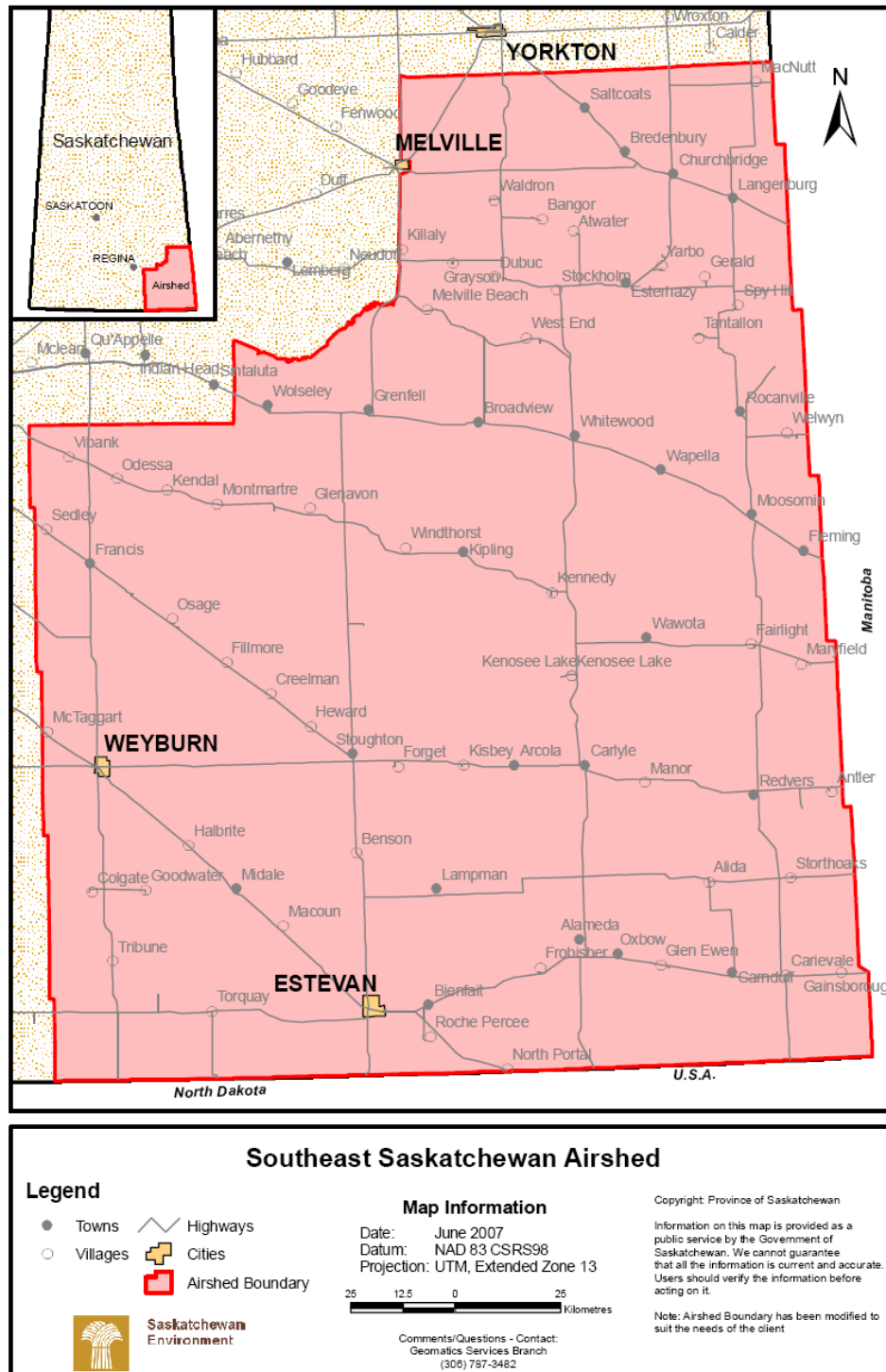


Figure 1: Boundary of Southeast Saskatchewan Airshed



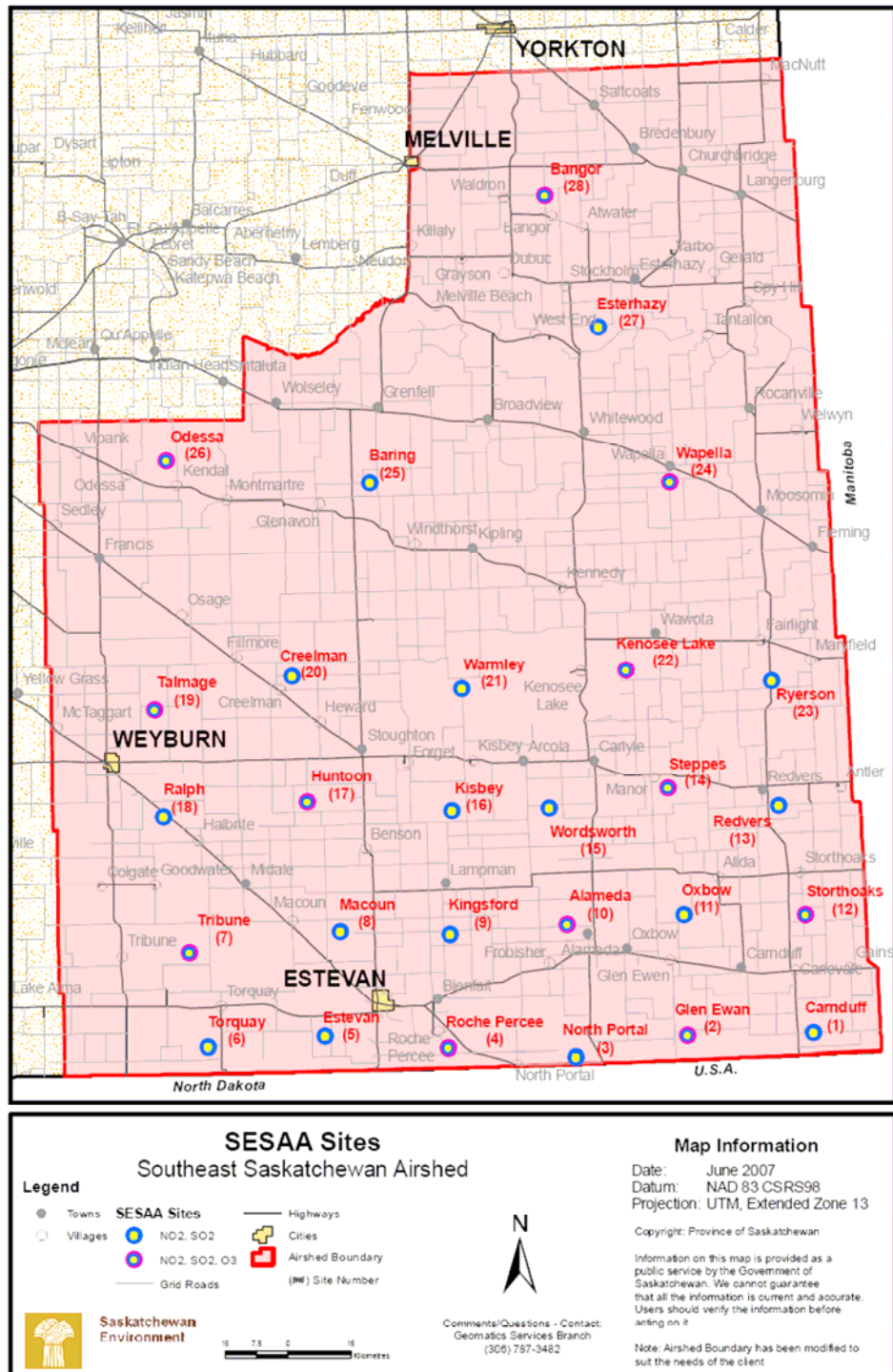


Figure 2: Passive monitoring network of Southeast Saskatchewan Airshed



## Sulphur Dioxide

Sulphur dioxide (SO<sub>2</sub>) is a colourless gas with a strong suffocating odour. It smells like burnt matches. At concentrations above 300 ppb, it can be detected by taste and odour.

Health effects caused by exposure to high levels of SO<sub>2</sub> include breathing problems, respiratory illness, changes in the lung's defences, and worsening respiratory and cardiovascular disease. People with asthma or chronic lung or heart disease are the most sensitive to SO<sub>2</sub>. It also damages trees and crops. SO<sub>2</sub>, along with nitrogen oxides, are the main precursors of acid rain. This contributes to the acidification of lakes and streams, accelerated corrosion of buildings, and reduced visibility. SO<sub>2</sub> also causes formation of microscopic acid aerosols, which have serious health implications as well as contributing to climate change.

SO<sub>2</sub> emissions come from the burning of sulphur containing fuels (e.g. gasoline, natural gas and coal) and the processing of sulphur containing ores. SO<sub>2</sub> atmospheric contributions come from industrial sources such as power plants, petroleum refineries, iron and steel mills, fertilizer plants, pulp and paper mills, and smelters. Other sources include smaller oil and gas plants, battery and well flares. Moreover, small sources include residential, commercial and industrial space heating.

Saskatchewan ambient air quality standards for sulphur dioxide are:

- 0.17 ppm (172 ppb) averaged over a 1-hour period;
- 0.06 ppm (57 ppb) averaged over a 24-hour period;
- 0.01 ppm (11 ppb) as an annual arithmetic mean.

In 2006, the passive monitoring data indicates the average and maximum SO<sub>2</sub> concentrations of the entire network were 1.5 and 5.6 ppb, respectively. These concentrations are well below the Saskatchewan annual ambient standard for SO<sub>2</sub> (11 ppb).

Figure 3 shows average and maximum concentrations of SO<sub>2</sub> by town for the June to December 2006 period. Kingsford (Station 9) is the location where maximum SO<sub>2</sub> concentration was observed, measuring 5.6 ppb. Other stations with higher concentrations were Roche Percee (Station 4) and Kenosee Lake (Station 22). In comparison, the lowest average (0.7 ppb) was observed at Bangor (Station 28).

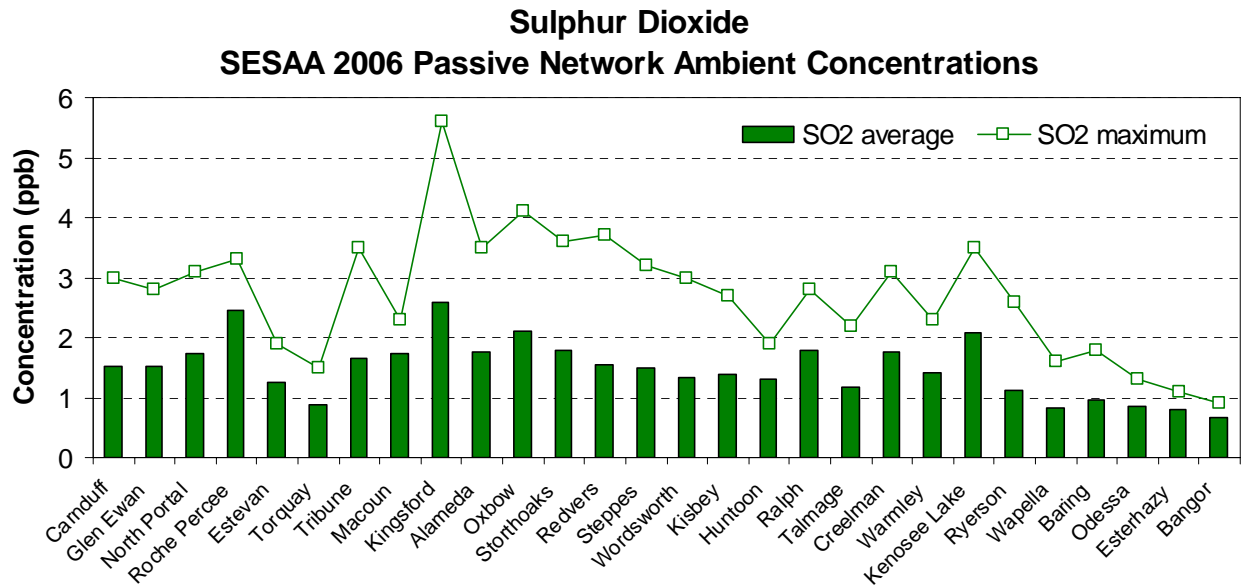


Figure 3: Sulphur dioxide ambient concentrations by town in 2006

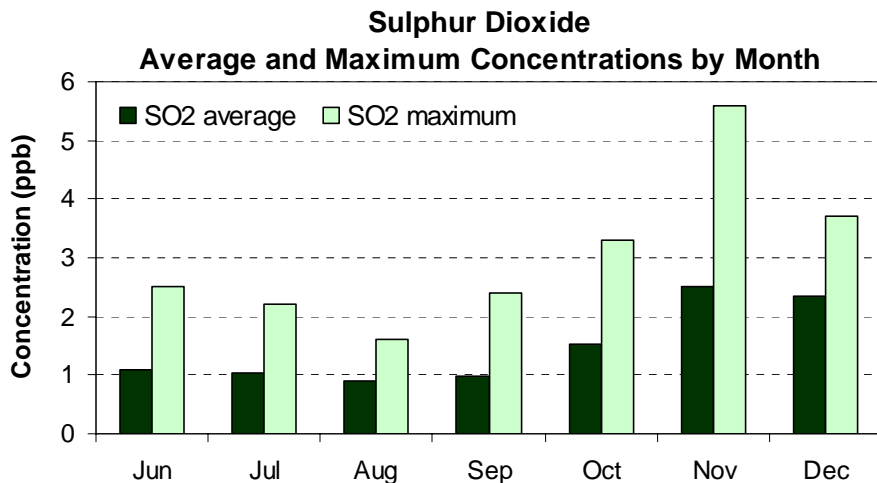


Figure 4: Sulphur dioxide ambient concentrations by month in 2006

Figure 4 shows monthly variations in SO<sub>2</sub> concentrations for the entire network. The average monthly concentrations varied from 0.9 ppb in August to 2.5 ppb in November. The highest maximum concentration was also observed for the month of November (5.6 ppb).

Figure 5 shows spatial distribution of average SO<sub>2</sub> measured for the June to December 2006 period. In general, higher concentrations were found in the southern part of the airshed where more industrial activities exist such as coal-fired power plants and upstream oil & gas industry. In contrast, lower concentrations were observed in the northern part of the airshed where no major sources of SO<sub>2</sub> exist.

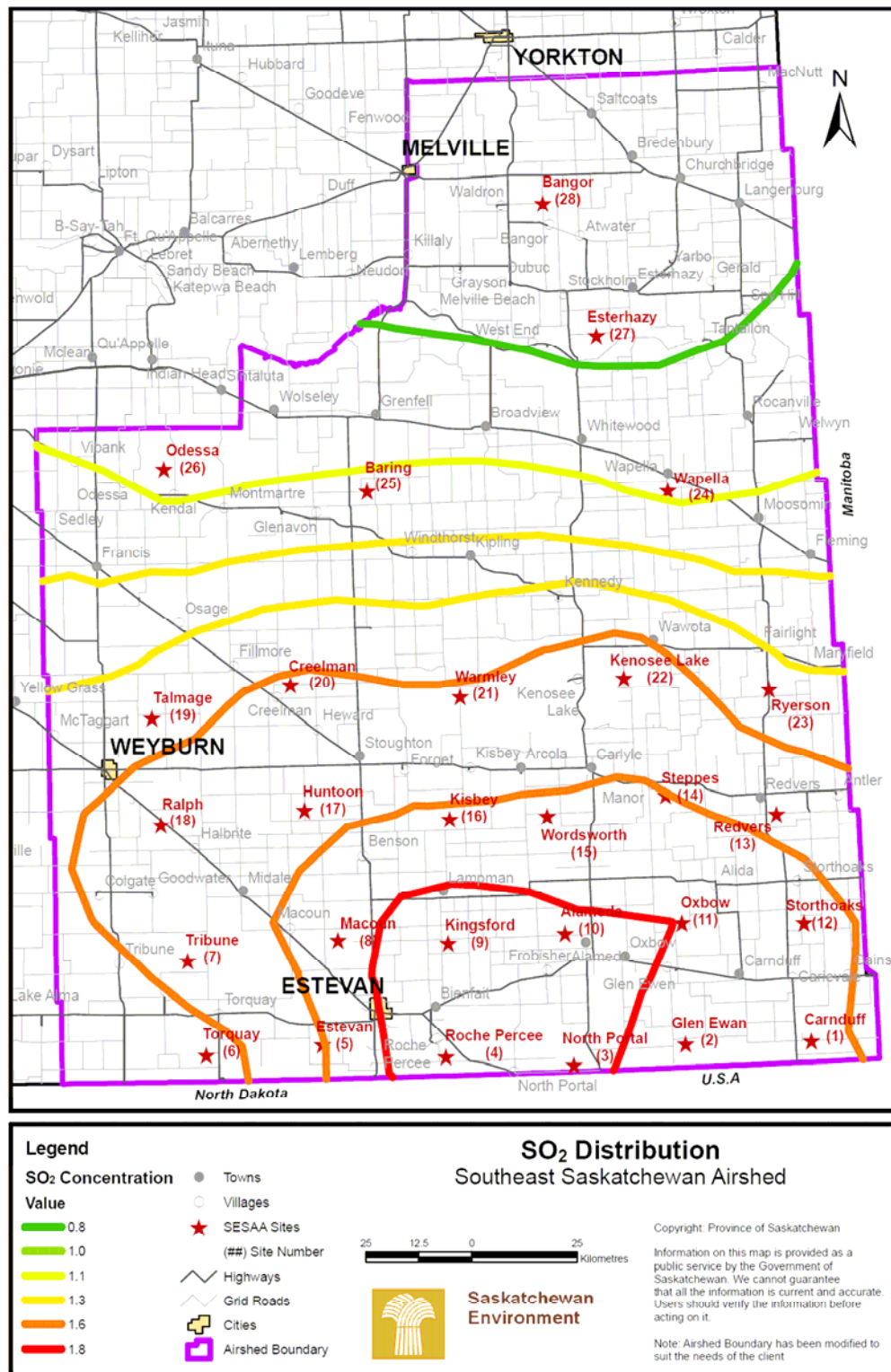


Figure 5: Spatial distribution of sulphur dioxide monthly averages in 2006

## Nitrogen Oxides

Nitrogen oxides, also known as Oxides of Nitrogen ( $\text{NO}_x$ ), is a collective term used to refer to two species of nitrogen: nitric oxide ( $\text{NO}$ ) and nitrogen dioxide ( $\text{NO}_2$ ). 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.  $\text{NO}_2$  is of more interest than  $\text{NO}$  from both a health and acid rain perspective. While  $\text{NO}_2$  is soluble in water, it is less soluble than  $\text{SO}_2$ .  $\text{NO}_2$  can be detected at concentrations as low as 106 ppb.

$\text{NO}_x$  can cause respiratory disease, damage vegetation and reduce visibility. The primary concern with  $\text{NO}_x$  emissions is their contribution to formation of ground-level ozone, smog and acid rain. To lesser extent, some  $\text{NO}_x$  compounds contribute to stratospheric ozone layer depletion and global warming.

$\text{NO}_x$  emissions are produced mainly due to fossil fuel combustion. High temperature conditions during combustion result in the formation of  $\text{NO}_x$  as a byproduct.  $\text{NO}_x$  atmospheric contributions come from both stationary sources, such as power plants, oil & gas industries, incinerators, as well as mobile sources such as automobiles. Other atmospheric contributions come from non-combustion processes, for example, nitric acid manufacture, welding processes and the use of explosives. The largest urban source of  $\text{NO}_x$  is emissions from motor vehicles.

Saskatchewan ambient air quality standards for nitrogen dioxide are:

- 0.2 ppm (212 ppb) averaged over a 1-hour period;
- 0.05 ppm (53 ppb) as an annual arithmetic mean.

In 2006, the average and maximum  $\text{NO}_2$  concentrations of the entire network were 1.1 and 2.2 ppb, respectively, which are well below the Saskatchewan annual ambient standard of  $\text{NO}_2$ .

Figure 6 shows average and maximum concentrations of  $\text{NO}_2$  for the June to December 2006 period. The stations with higher  $\text{NO}_2$  concentrations were Roche Percee (Station 4), Kingsford (Station 9), and Ralph (Station 18). In contrast, the stations with lower  $\text{NO}_2$  were Warmley (Station 21), Esterhazy (Station 27), and Odessa (Station 26).

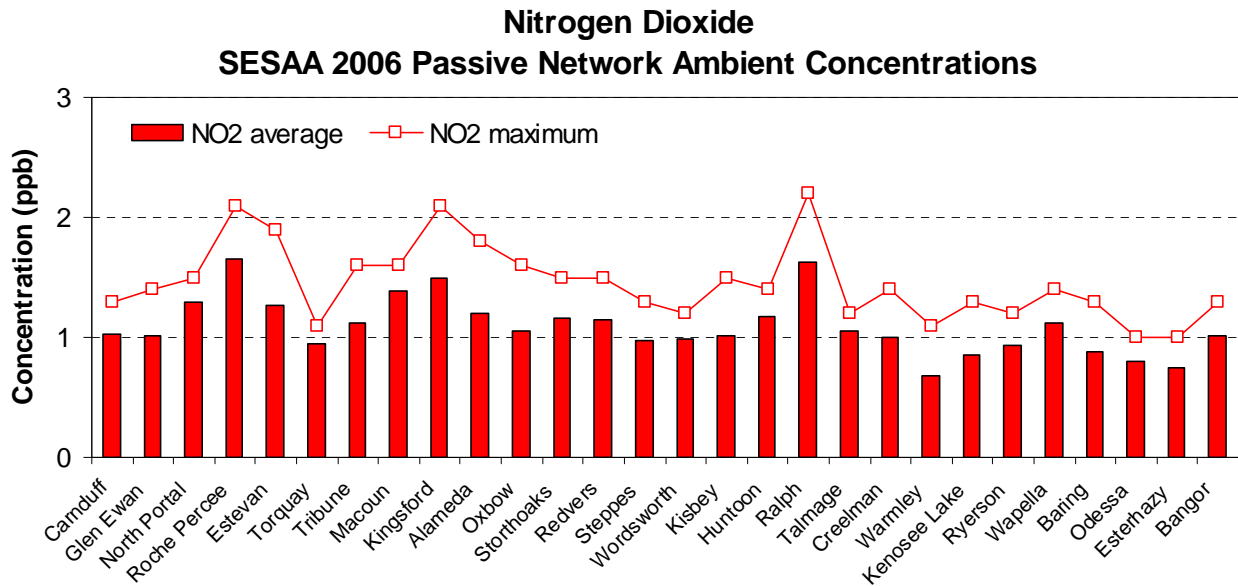


Figure 6: Nitrogen dioxide ambient concentrations by town in 2006

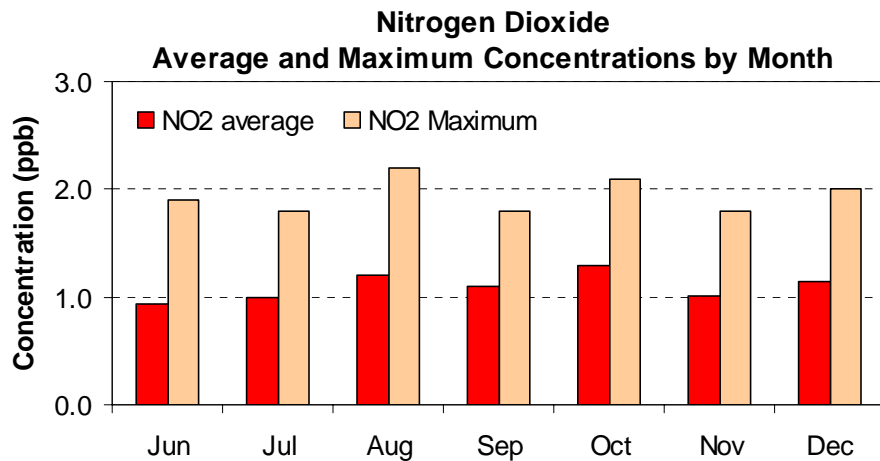


Figure 7: Nitrogen dioxide ambient concentrations by month in 2006

Figure 7 shows monthly variations in  $\text{NO}_2$  concentrations for the entire airshed in 2006. There is no overall increasing or decreasing trend in  $\text{NO}_2$  levels. The average monthly concentrations varied from 0.9 ppb in June to 1.3 ppb in October. The highest maximum monthly concentration of 2.2 ppb was observed in August.

Figure 8 shows spatial distribution of average  $\text{NO}_2$  concentrations measured for the June to December 2006 period. In general, higher concentrations were found in the southern part of the airshed where more industrial activities occur (such as coal-fired power plants and upstream oil & gas industry). Lower concentrations in the northern part of the airshed were observed where no major sources of  $\text{NO}_x$  exist.

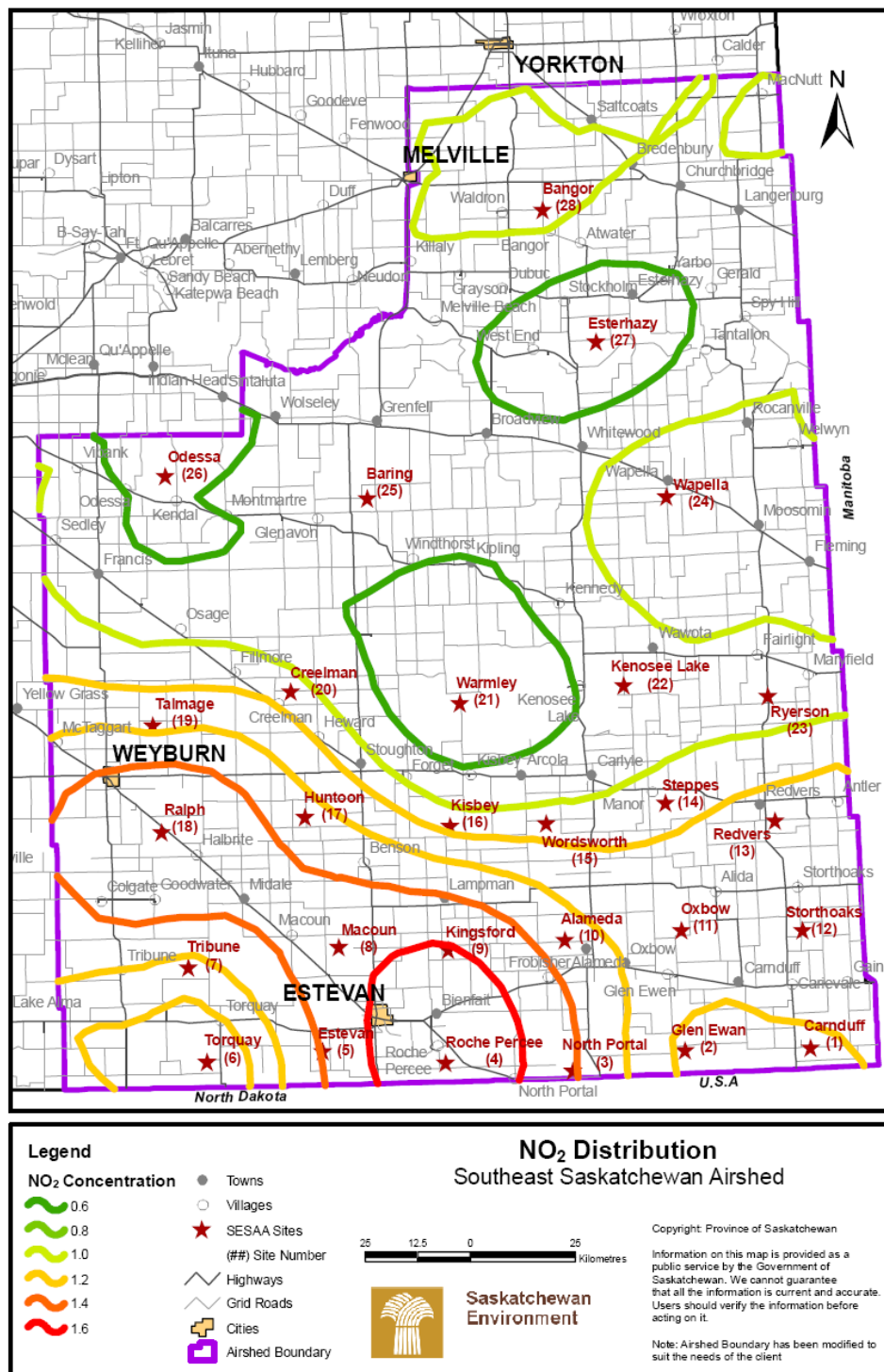


Figure 8: Spatial distribution of nitrogen dioxide monthly averages in 2006

## Ozone

Ground-level Ozone ( $O_3$ ) is a colorless gas that at normal outdoor concentration is odourless. However, ozone does have a distinctive sharp odour when found at higher concentration, such as those associated with electrical discharges from lightning storms or photocopiers.  $O_3$  can be detected at an odour threshold above 10 ppb.

Exposure to high levels of ozone can cause eye irritation, breathing difficulty, decreased visibility, and vegetation damage. People with respiratory and heart problems are at a higher risk.  $O_3$  has been linked to increased hospital admissions and premature death.  $O_3$  is a key ingredient of urban smog.

$O_3$  is not emitted directly into the atmosphere. Instead, it results from photochemical reactions between oxides of nitrogen ( $NO_x$ ) and volatile organic compounds (VOC) in the presence of sunlight. High levels typically occur from May to September, between noon and early evening. Emissions of  $NO_x$  are produced primarily when fossil fuels are burned in motor vehicle engines, power plants, and industrial boilers. The sources of VOC emissions include automobile emissions, gasoline vapors, chemical solvents, and consumer products like paints.

Saskatchewan ambient air quality standard for ozone is:

- 0.08 ppm (82 ppb) averaged over a 1-hour period.

Canada-wide Standard (CWS) for ozone is:

- 65 ppb, 8-hour averaging time, the achievement statistics is based on the fourth highest measurement annually averaged over three consecutive years.

In 2006, the average and maximum  $O_3$  concentrations of the entire network were 30 and 46 ppb respectively. These measured levels are well below the ozone CWS of 65 ppb.

Figure 9 shows concentrations of ozone ( $O_3$ ) for the June to December 2006 period. The station with the highest average  $O_3$  concentration was Roche Percee (Station 4) measuring 32 ppb, and the lowest average concentration was observed at Odessa (Station 26), measuring 27 ppb. The station with highest maximum  $O_3$  concentration was Alameda (Station 10), measuring 46 ppb.



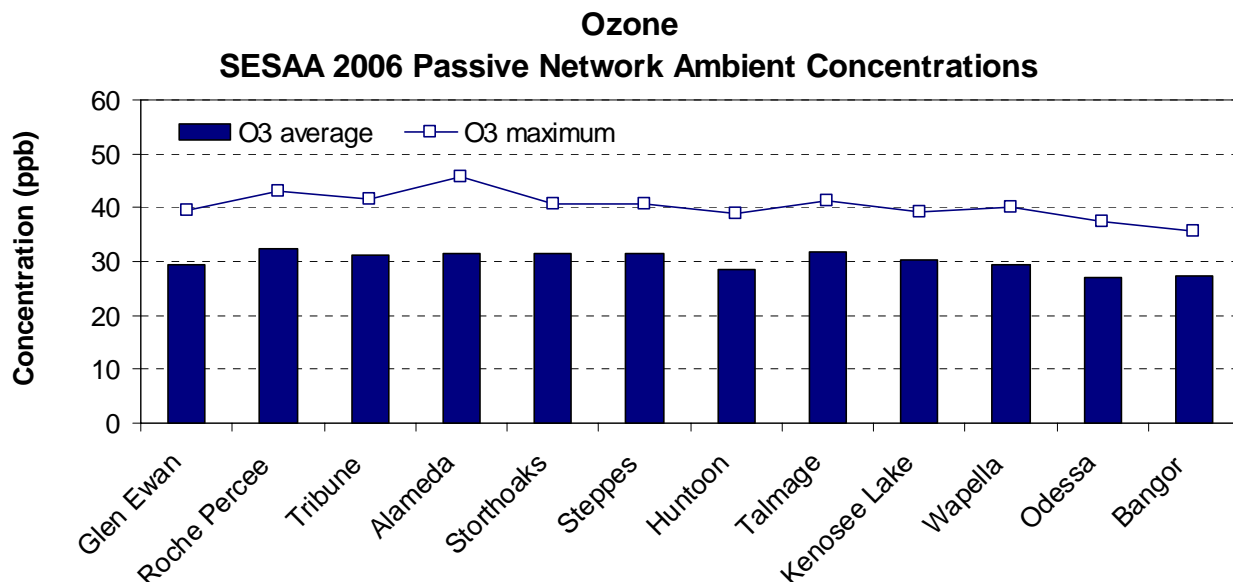


Figure 9: Ozone ambient concentrations by town in 2006

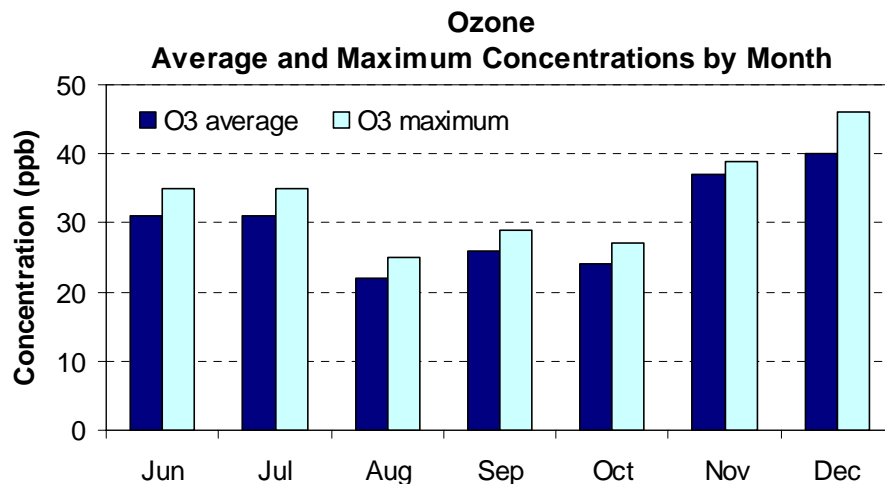


Figure 10: Ozone ambient concentrations by month in 2006

Figure 10 shows monthly variations in O<sub>3</sub> concentrations for the entire airshed in 2006. There is no overall trend in O<sub>3</sub> levels. The average monthly concentrations varied from 22 ppb in August to 40 ppb in December. The highest maximum monthly concentration was observed in December (46 ppb). These higher ozone concentrations may reflect the impact of ozone transport from the stratosphere.

Figure 11 shows spatial distribution of average O<sub>3</sub> concentrations measured for the June to December 2006 period. Generally, O<sub>3</sub> has similar levels on region-wide scale and this is evident from the figure below showing O<sub>3</sub> concentrations that are evenly distributed over the entire airshed.

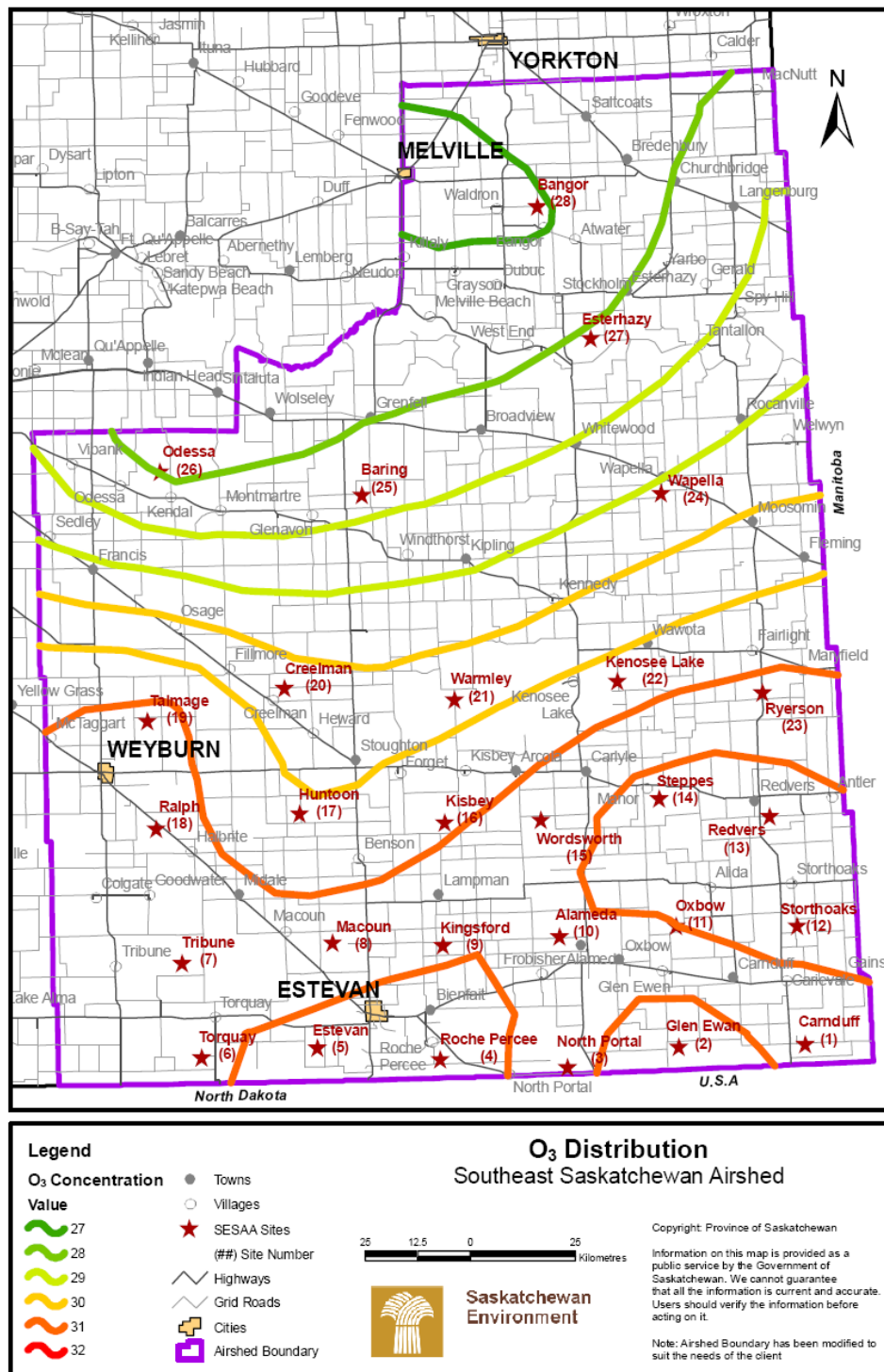


Figure 11: Spatial distribution of ozone monthly averages in 2006

## FINANCIAL REPORT

### Southeast Saskatchewan Airshed Association

#### Balance Sheet

As at December 31, 2006

<b>Assests</b>	
<b>Current</b>	
Cash	24,850
Goods and Services Tax receivable	322
	<b>25,172</b>
<b>Liabilities</b>	
<b>Current</b>	
Account payable and accruals	54,617
<b>Shareholders' Deficit</b>	
<b>Deficit</b>	<b>(29,445)</b>
	<b>25,172</b>

**Southeast Saskatchewan Airshed Association****Statement of Loss**

For the year ended December 31, 2006

<b>Revenue</b>	
Membership fees	64,565
Grant revenue	14,536
	<b>79,101</b>
<b>Expenses</b>	
Advertising and promotion	5,000
Business taxes and licences	10
Custom work	32,434
Interest and bank charges	157
Management fees	66,218
Professional fees	3,000
Repairs and maintenance	1,727
	<b>108,546</b>
<b>Net loss</b>	<b>(29,445)</b>
<b>Retained earning, beginning of year</b>	<b>-</b>
<b>Deficit, end of year</b>	<b>(29,445)</b>

**Southeast Saskatchewan Airshed Association****Statement of Cash Flow**

For the year ended December 31, 2006

<b>Cash provided by (used for) the following activities</b>	
<b>Operating activities</b>	
Cash received from customers	78,779
Cash paid to suppliers	(53,772)
Interest paid	(157)
	<b>24,850</b>
<b>Increase (decrease) in cash resources</b>	<b>24,850</b>
<b>Cash resources, end of year</b>	<b>24,850</b>

## APPENDIX A: AMBIENT AIR MONITORING DATA

### Monthly Average Concentrations

Sample ID	Station Code	Jun-2006			Jul-2006			Aug-2006			Sep-2006			Oct-2006			Nov-2006			Dec-2006		
		NO <sub>2</sub>	SO <sub>2</sub>	O <sub>3</sub>	NO <sub>2</sub>	SO <sub>2</sub>	O <sub>3</sub>	NO <sub>2</sub>	SO <sub>2</sub>	O <sub>3</sub>	NO <sub>2</sub>	SO <sub>2</sub>	O <sub>3</sub>	NO <sub>2</sub>	SO <sub>2</sub>	O <sub>3</sub>	NO <sub>2</sub>	SO <sub>2</sub>	O <sub>3</sub>	NO <sub>2</sub>	SO <sub>2</sub>	O <sub>3</sub>
1	Carnduff	0.7	0.8		0.8	0.7		1.1	0.8		1.1	1.2		1.3	1.3		0.9	2.8		1.3	3.0	
2	Glen Ewan	0.7	0.8	29	0.8	0.8	31	1.1	1.2	23	1.0	1.2	27	1.4	1.6	24	1.0	2.3	33	1.1	2.8	40
3	North Portal	0.9	1.2		1.3	1.0		1.5	1.2		1.5	1.6		1.2	1.6		1.5	2.5		1.2	3.1	
4	Roche Percee	1.4	2.5	33	1.7	1.9	33	2.1	1.5	25	1.8	2.4	28	1.9	3.3	26	0.7	2.3	38	2.0	3.3	43
5	Estevan	1.9	1.3		1.8	1.0		1.4	1.2		0.9	0.8		1.0	1.1		0.8	1.4		1.1	1.9	
6	Torquay	1.0	1.0		1.1	0.7		1.1	0.5		0.9	0.8		1.1	0.6		0.5	1.0		0.9	1.5	
7	Tribune	1.1	1.0	35	1.6	1.1	31	1.2	1.1	21	1.2	1.2	26	1.3	1.4	26	0.6	2.3	39	0.8	3.5	42
8	Macoun	1.1	1.2		1.5	2.2		1.3	1.3		1.3	1.3		1.5	1.7		1.4	2.2		1.6	2.3	
9	Kingsford	1.4	1.2		1.4	1.3		1.3	1.6		1.5	2.0		2.1	2.8		1.8	5.6		1.0	3.7	
10	Alameda	0.7	0.9	35	1.1	0.8	30	1.1	1.0	24	1.4	1.1	25	1.8	1.8	24	1.0	3.5	38	1.3	3.3	46
11	Oxbow	0.7	1.5		1.0	1.2		0.9	1.4		0.8	1.1		1.6	2.2		1.1	4.1		1.3	3.2	
12	Storthoaks	0.7	1.0	33	0.7	1.0	33	1.2	0.9	24	1.2	1.0	27	1.4	1.7	26	1.5	3.6	38	1.4	3.3	41
13	Redvers	0.9	1.0		0.8	0.8		1.1	0.6		1.4	0.8		1.5	1.5		1.2	3.7		1.1	2.4	
14	Steppes	0.7	0.9	32	0.8	0.9	33	0.8	0.7	25	0.9	1.0	26	1.3	1.8	27	1.1	3.2	38	1.2	2.0	41
15	Wordsworth	0.7	0.7		0.7	0.6		1.0	0.5		1.2	0.7		1.0	1.3		1.1	3.0		1.2	2.6	
16	Kisbey	0.7	0.8		0.8	0.8		1.3	1.0		0.8	0.7		1.5	1.4		0.8	2.7		1.2	2.3	
17	Huntoon	1.2	0.9	M	1.2	1.2	29	1.2	0.8	22	1.1	0.9	24	1.2	1.5	21	0.9	1.9	36	1.4	1.9	39
18	Ralph	1.4	1.7		1.5	1.4		2.2	1.2		1.4	1.1		1.6	1.8		1.5	2.5		1.8	2.8	
19	Talmage	0.9	0.7	33	1.1	0.9	34	1.2	0.7	21	1.0	0.8	29	1.1	1.3	26	1.1	2.2	39	1.0	1.6	41
20	Creelman	1.0	0.8		0.8	1.6		1.4	1.2		0.9	1.1		1.1	1.8		1.1	3.1		0.7	2.8	
21	Warmley	0.5	0.9		0.4	M		1.0	0.9		0.7	1.0		1.1	1.5		0.5	2.3		0.6	1.9	
22	Kenosee Lake	0.5	1.7	31	0.5	1.5	35	0.9	1.0	22	0.7	1.2	27	1.3	2.7	23	1.0	3.5	36	1.1	2.9	39
23	Ryerson	0.9	1.0		0.6	0.6		1.0	0.5		0.9	0.5		1.2	1.0		1.0	2.6		0.9	1.7	
24	Wapella	1.2	0.9	29	0.6	0.4	28	1.2	0.4	23	1.2	0.4	25	1.4	0.9	24	0.9	1.6	37	1.3	1.1	40
25	Baring	0.6	0.8		M	M		0.9	0.5		1.3	0.5		0.9	0.8		0.5	1.8		1.1	1.3	
26	Odessa	0.9	1.3	25	0.8	0.9	28	1.0	0.6	20	0.8	0.4	23	0.8	0.9	22	0.8	0.5	38	0.5	1.3	34
27	Esterhazy	0.6	1.1		0.4	0.9		0.8	0.5		1.0	0.3		0.6	0.7		0.8	1.1		1.0	1.0	
28	Bangor	1.0	0.9	26	0.8	0.6	27	1.3	0.4	20	0.9	0.2	23	0.9	0.8	25	1.1	0.9	35	1.1	0.9	36

Note: M = missing data; [empty box] = no data available.

## APPENDIX B: COMPLETENESS OF MONITORING DATA

### Instances of invalid sample collection/missing data for passive monitoring parameters during 2006

Month	Station No.	Parameter	Cause
June	17	O <sub>3</sub>	missing sample
July	21	SO <sub>2</sub>	damaged sample found 7" away from head
July	25	SO <sub>2</sub>	damaged sampling head (struck by farm equipment)
July	25	NO <sub>2</sub>	damaged sampling head (struck by farm equipment)

### Data capture rates for passive monitoring parameters during 2006

Parameter	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total Capture	% Capture
SO <sub>2</sub>	28/28	26/28	28/28	28/28	28/28	28/28	28/28	194/196	99.0 %
NO <sub>2</sub>	28/28	27/28	28/28	28/28	28/28	28/28	28/28	195/196	99.5 %
O <sub>3</sub>	12/12	11/12	12/12	12/12	12/12	12/12	12/12	83/84	98.8 %

Note: Data capture rates expressed as number of valid samples /total number of samples.

## APPENDIX C: METEOROLOGY

### Monthly Meteorology Data for Estevan 2006

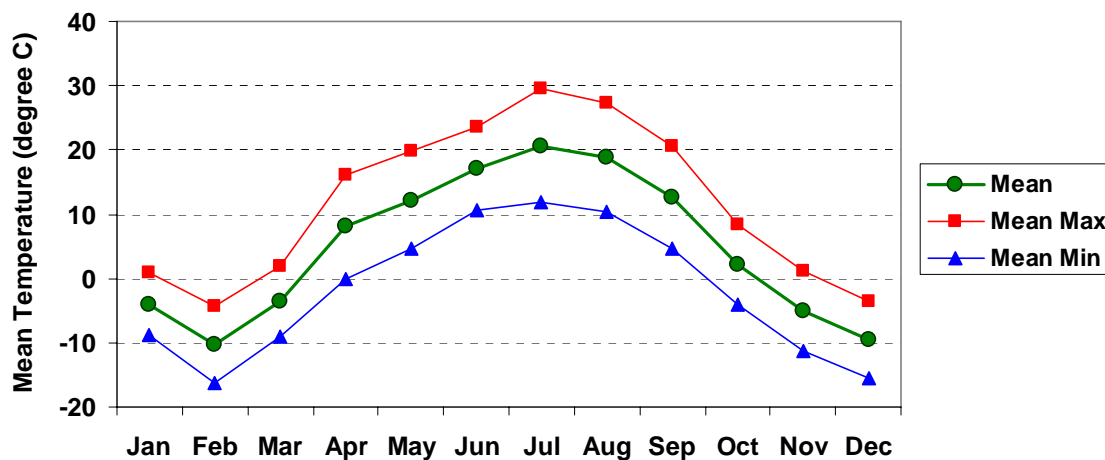
Latitude: 49° 13' N Longitude: 102° 58' W Elevation: 580.60 m

Month	<u>Mean Max</u> <u>Temp</u> °C	<u>Mean</u> <u>Temp</u> °C	<u>Mean Min</u> <u>Temp</u> °C	Total Rain mm	Total Snow cm	Total Precip mm	<u>Dir of Max</u> <u>Gust</u> 10's Deg	<u>Spd of Max</u> <u>Gust</u> km/h
<a href="#">Jan</a>	0.8	-4.0	-8.7	2.6	2.8	4.8		
<a href="#">Feb</a>	-4.2	-10.3	-16.3	T	14.2	11.2	32E	70E
<a href="#">Mar</a>	1.9	-3.6	-9.1	10.6	10.0	20.4	10E	65E
<a href="#">Apr</a>	16.2	8.1	-0.1	66.0	5.4	71.6	35E	69E
<a href="#">May</a>	19.9	12.2	4.6	35.6	T	35.6	25E	59E
<a href="#">Jun</a>	23.6	17.1	10.5	66.2	0.0	66.2		
<a href="#">Jul</a>	29.6	20.7	11.8	7.4	0.0	7.4	32E	61E
<a href="#">Aug</a>	27.4	18.9E	10.3E	30.6	0.0	30.6		
<a href="#">Sep</a>	20.6	12.6	4.6	46.0	0.0	46.0	34E	59E
<a href="#">Oct</a>	8.4	2.2	-4.1	8.8	7.8	16.2	30E	78E
<a href="#">Nov</a>	1.1	-5.1	-11.3	4.0	29.4	27.6	30E	63E
<a href="#">Dec</a>	-3.6	-9.6	-15.6	0.8	18.2	18.0	30E	69E
Sum				278.6	87.8	355.6		
Avg	11.8	4.9	-2.0E					

Note: [empty] = No data available; E = Estimated; T = Trace

Source: Environment Canada, [http://www.climate.weatheroffice.ec.gc.ca/climateData/monthlydata\\_e.html](http://www.climate.weatheroffice.ec.gc.ca/climateData/monthlydata_e.html)

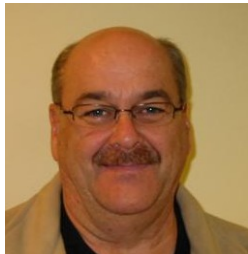
### 2006 Monthly Ambient Temperature For Estevan SK





## APPENDIX D: SESAA BOARD OF DIRECTORS

### Interim Board, 2006



**Bob Scotten – Executive Director (SEACOR Environmental Inc.)**

Mr. Scotten has extensive experience in airshed development and management. He served as the Executive Director of the Wood Buffalo Environmental Association (WBEA) from 1997 to 2000, and is the current Executive Director of the West Central Airshed Society (WCAS) in Alberta. He was instrumental in the design and development of the award-winning WBEA air monitoring network and the first real-time website for public access to air quality data. He has also played key roles in the development of the Peace Airshed Society and Palliser Airshed Society in Alberta.



**J.A. Brian Mathieson – Director (Saskatchewan Industry & Resources)**

Mr. Mathieson has 44 years experience in the upstream oil and gas industry. As Director of the Petroleum Development Branch, his current responsibilities include developing, monitoring, and enforcing environmental protection and public safety regulations, programs, policies, standards, and guidelines as specified under *The Oil and Gas Conservation Regulations* (1985). He believes the information gathered by SESAA will provide, in a cost effective way, the data necessary to institute programs that will maintain a high quality of air for Saskatchewan residents.



**Chuck Bosgoed – Director (Saskatchewan Environment)**

Mr. Bosgoed is an Environmental Engineer who has worked with Saskatchewan Environment for 20 years. He is involved in the airshed because he believes airshed management is an excellent approach to better understand air issues and one more way to resolve air quality problems in a region. Mr. Bosgoed writes, “Being a member of the Board provides me, as an environmental regulator, with a new and effective way of dealing with regional air quality issues.”



**Darlene Sakires – Director (Canadian Natural Resources Limited)**

Ms. Sakires is an Environmental Coordinator who is responsible for CNRL’s Environmental Management Plan and Environmental Operating Guidelines. She manages site decommissioning and remediation projects across the prairies, ensuring compliance with environmental regulatory requirements in all aspects of the company’s operations. She is active on a variety of committees, including the Saskatchewan Petroleum Industry Government Environmental Committee and the Saskatchewan Environmental Managers Association.



**Marian Wilson – Chairperson (Private Business Owner)**

Ms. Wilson is a bookkeeper for a construction business that she and her husband have owned and operated for over 23 years in southeast Saskatchewan. She is active in the Estevan community, raising 5 children, volunteering at the long term care centre and other groups, and sitting on the CPR Advisory Committee. As a local resident who has observed the growth of the transportation industry in Estevan, Ms. Wilson is concerned about the quality of air in the area and is pleased to be a director on the SESAA Board.

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**Robert Stedwill – Director (SaskPower)**

Mr. Stedwill is the Manager of Environmental Programs at SaskPower. His department is responsible for administration of the corporation's environmental policy, conduct of environmental studies, policy and planning, risk and site assessment, and community and external programs. such as the solar panel demonstration projects at the Western Hemisphere Shorebird Reserve, wind turbines in SW Saskatchewan, and utilization of wastes from sawmills, flare stacks, and hog operations. Mr. Stedwill is also active in various community organizations including the Saskatchewan Cycling Association, Regina's Green Ribbon Committee, Toastmasters, and the Regina Adult Learning Centre.

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**Tim Macaulay – Director (Saskatchewan Health)**

Mr. Macaulay is the Manager of Environmental Health, Population Health Branch, at Saskatchewan Health. He has worked with Saskatchewan Health for 25 years, where his current responsibilities include developing provincial regulations and policies that deal with environmental health programs. Regional Health Authorities (RHAs) are responsible for administering and enforcing these regulations and policies within their jurisdictions. The Southeast Saskatchewan Airshed crosses over the boundaries of three different RHAs (Sun Country Health RHA, Regina Qu'Appelle RHA and Sunrise RHA).

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## APPENDIX E: SESAA MEMBERSHIP

- 101072464 Saskatchewan Ltd.
- AltaGas Ltd.
- Apache Canada Ltd.
- Arc (Sask) Energy Trust
- Black Rider Resources Inc.
- Bonavista Petroleum Ltd.
- Burmis Energy Inc.
- Canadian Natural Resources Limited
- Connacher Oil and Gas Limited
- Crescent Point Resources Ltd. Partnership
- Crescent Point Resources Ltd.
- Dawn Energy Inc.
- Daylight Energy Ltd.
- Diaz Resources Ltd.
- Enbridge Pipelines Inc.
- EnCana Corporation
- Enermark Inc.
- Esprit Exploration Ltd.
- Fire Creek Resources Ltd.
- Flagship Energy Inc.
- Geocan Energy Inc.
- GKN Resources Ltd.
- Grand Banks Energy Corporation
- Grimes Energy Ltd.
- Innova Exploration Ltd.
- Jedi Exploration & Development
- Kenwood Resources Ltd.
- Kinwest Corporation
- Landex Petroleum Corp.
- Midale Petroleums Ltd.
- Mission Oil & Gas Inc.
- Nexans Canada Inc.
- NorAmera BioEnergy Corporation
- Northrock Resources Ltd.
- Outback Energy Ltd.
- Penn West Petroleum Ltd.
- Penn West PTF Energy Ltd.
- Petrobank Energy & Resources Ltd.
- Plains Environmental Inc.
- Postell Energy Co. Ltd.
- Prairie Mines & Royalty Ltd.
- Primewest Energy Inc.
- Primrose Drilling Ventures Ltd.
- Provident Energy Ltd.
- Regent Resources Ltd.
- Runcible Oil Corp.
- Saskatchewan Wheat Pool
- SaskPower
- Silver Bay Energy Ltd.
- Silver Bay Oil & Gas Ltd.
- Silver Bay Petroleum Ltd.
- Silver Bay Resources Ltd.
- Strand Resources Ltd.
- Swertz Exploration Ltd.
- Talisman Energy Inc.
- Triwest Energy Inc.
- Valleyview Petroleums Ltd.
- Waveform Energy Ltd.
- Zargon Oil & Gas Ltd



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SOUTHEAST SASKATCHEWAN AIRSHED ASSOCIATION