

# City of Saskatoon Air Quality Monitoring Survey

May 10, 2017

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Saskatchewan Ministry of Environment

*saskatchewan.ca*

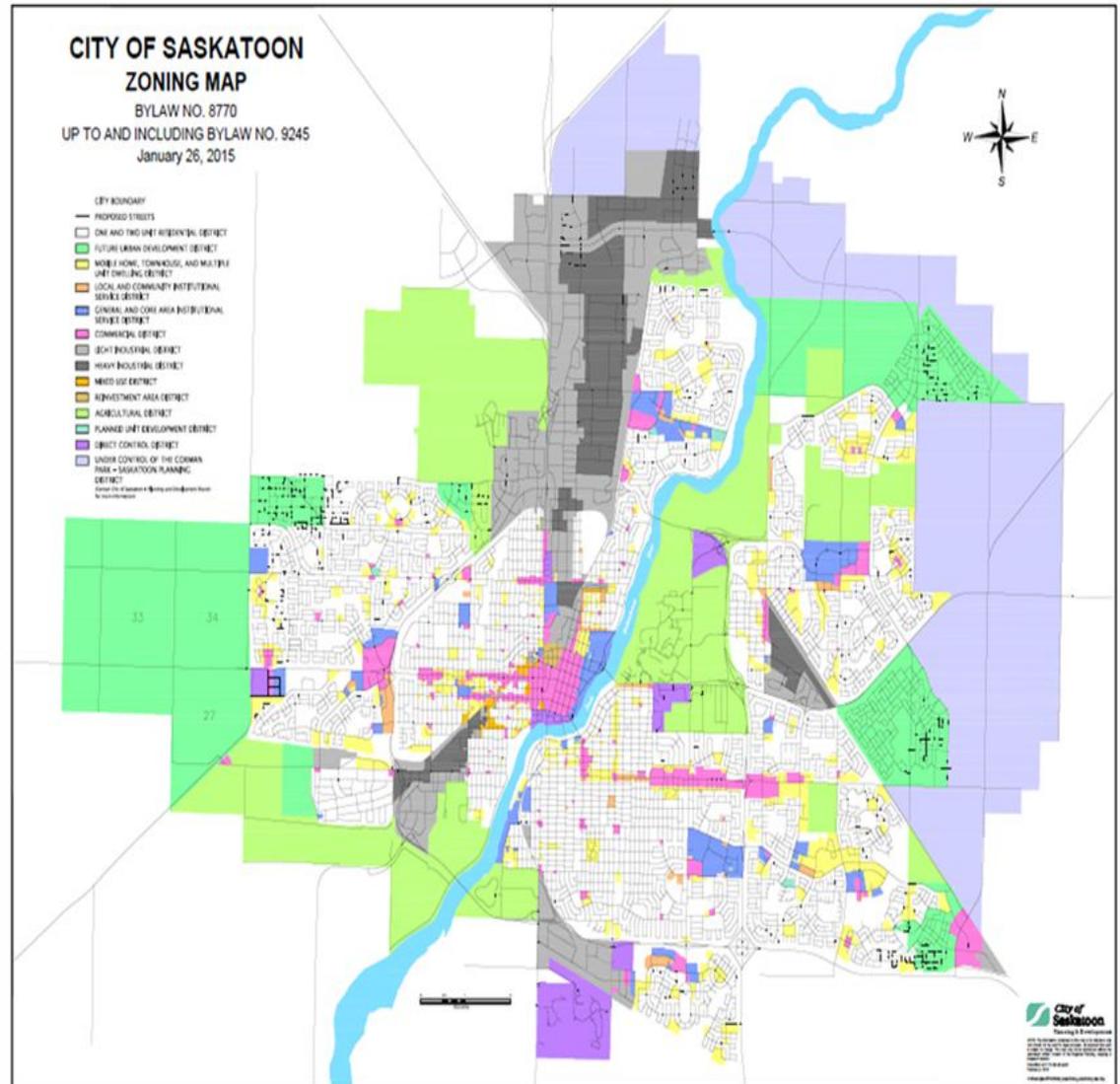


# Background

- Proposal was put forward in May 2014 for Monitoring study in Saskatoon
- Officials met in July 2014 to discuss objectives
- Study Objectives:
  - Obtain information on pollutant levels in a broader range of areas in the city
  - Identify and quantify other air pollutants
  - Establish criterion in which future studies can be compared against
  - Determine if and where additional permanent monitoring stations may be located
- Study was conducted from August 2014 to July 2015

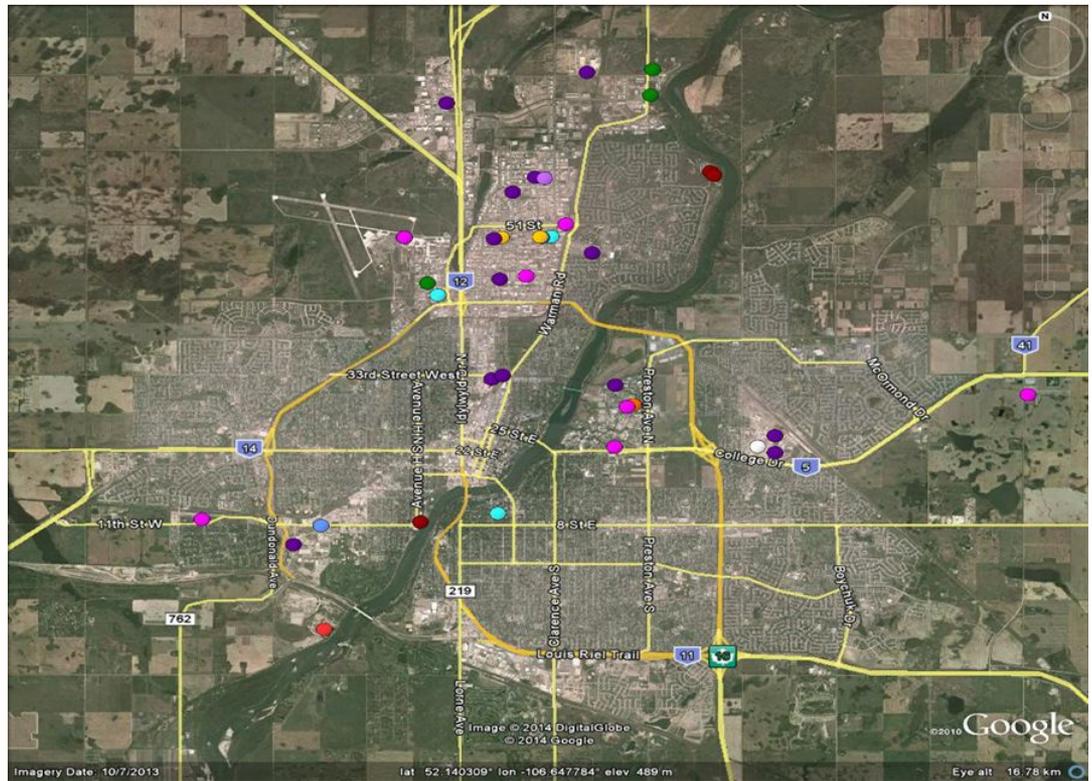
# Site Selection

- Zoning map of city was obtained
- Sampling occurred primarily in residential areas (White)
- Additional sampling occurred near industrial areas (light and dark grey) and agricultural areas (light green)



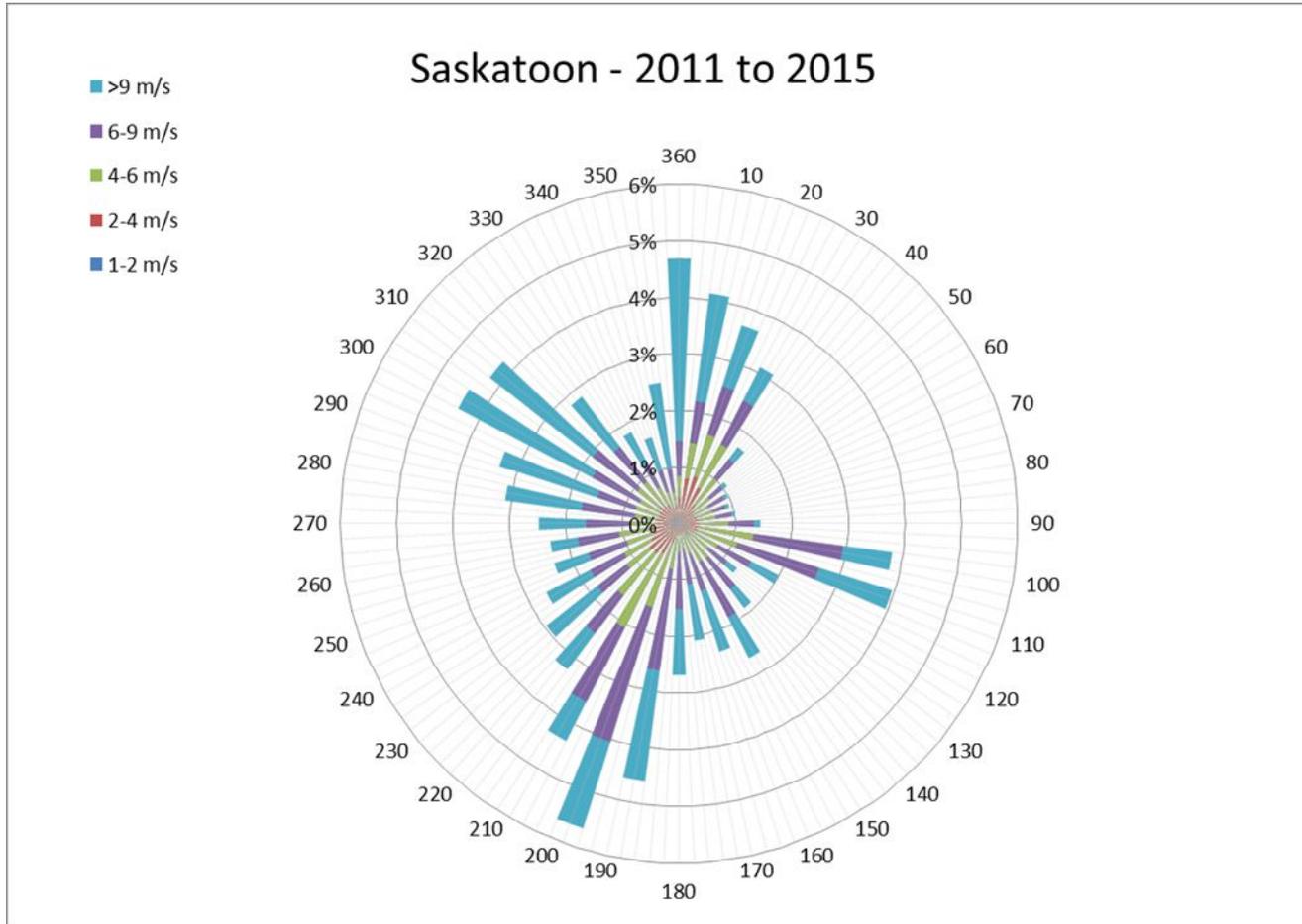
# Site Selection

- NPRI data was obtained
- Appropriate sampling locations based on locations of various industries in proximity to residential areas
- Note: Non-industrial and vehicle emissions are not included in NPRI and account for a major source of SO<sub>2</sub>, NO<sub>2</sub>, VOCs, and PM<sub>2.5</sub>



Colour Code	Sector (as per the National Pollutant Release Inventory)	SO <sub>2</sub> tonnes	NO <sub>2</sub> tonnes	VOC tonnes	PM <sub>2.5</sub> tonnes
●	Chemicals	0.001	20.293	-	4.644
●	Electricity	503	-	-	3
●	Mining	57.3	-	-	54.8
●	Oil & Gas Pipelines & Storage	-	-	358.588	-
●	Other (Except Manufacturing)	-	61.89	-	2.168
●	Other Manufacturing	0.01	-	4.327	7.202
●	Petroleum and Coal Products Refining and Manufacturing	-	-	-	0.646
●	Plastics and Rubber	-	-	-	41.993
○	Transportation Equipment	-	2	21.589	0.144
●	Waste Treatment and Disposal	-	-	-	-
●	Water and Wastewater Treatment	-	567.85	77.853	3.91
	Non-Industrial Emissions*	20099.3	9007.5	655.5	558.0
	Vehicle Emissions*	27.0	10409.3	3476.0	35194.0
	<b>2014-2015 Total for the Saskatoon Region</b>	<b>560.311</b>	<b>652.033</b>	<b>462.357</b>	<b>118.507</b>

# Meteorological Data



# Monitoring Locations

- 5 continuous monitoring locations
  - 1 NAPS
  - 4 SAML
- 20 passive monitoring locations
  - 2 background, north and south of city limits



# Monitoring Method

## Continuous



## Continuous



## Passive



Mobile Lab (SAML)

NAPS

Passive

Hourly Data

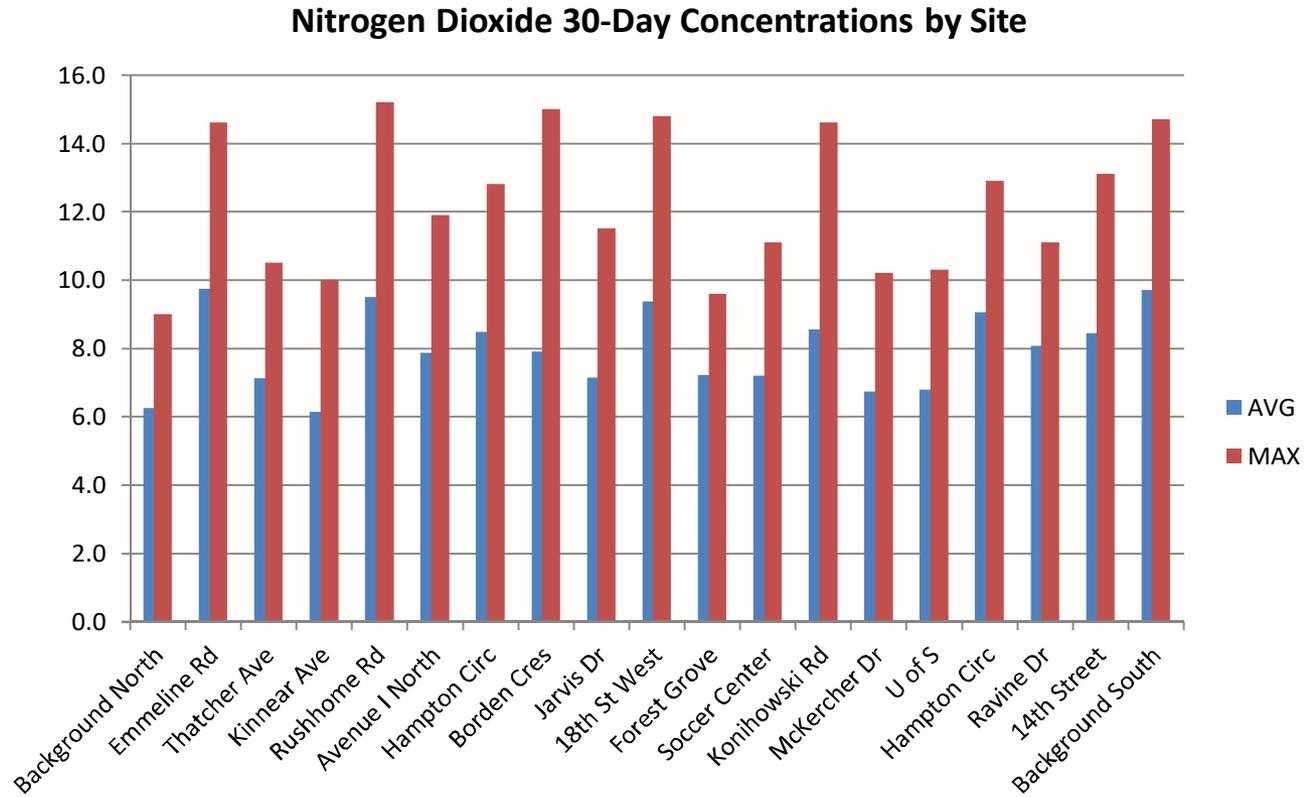
Hourly Data

30-Day Average Data

# Pollutants

Continuous	Continuous	Passive
Sulphur Dioxide (SO <sub>2</sub> )	Sulphur Dioxide (SO <sub>2</sub> )	Sulphur Dioxide (SO <sub>2</sub> )
Nitrogen Oxides (NO <sub>x</sub> )	Nitrogen Oxides (NO <sub>x</sub> )	Nitrogen Dioxide (NO <sub>2</sub> )
Ozone (O <sub>3</sub> )	Ozone (O <sub>3</sub> )	Ozone (O <sub>3</sub> )
Carbon Monoxide (CO)	Carbon Monoxide (CO)	
	Hydrogen Sulphide (H <sub>2</sub> S)	Hydrogen Sulphide (H <sub>2</sub> S)
Particulate Matter (PM <sub>2.5</sub> )	Particulate Matter (PM <sub>2.5</sub> )	
		Volatile Organic Compounds (46 VOCs including BTEX)
<b>NAPS</b>	<b>SAML (4 Sites)</b>	<b>20 sites</b>

# Passive Data



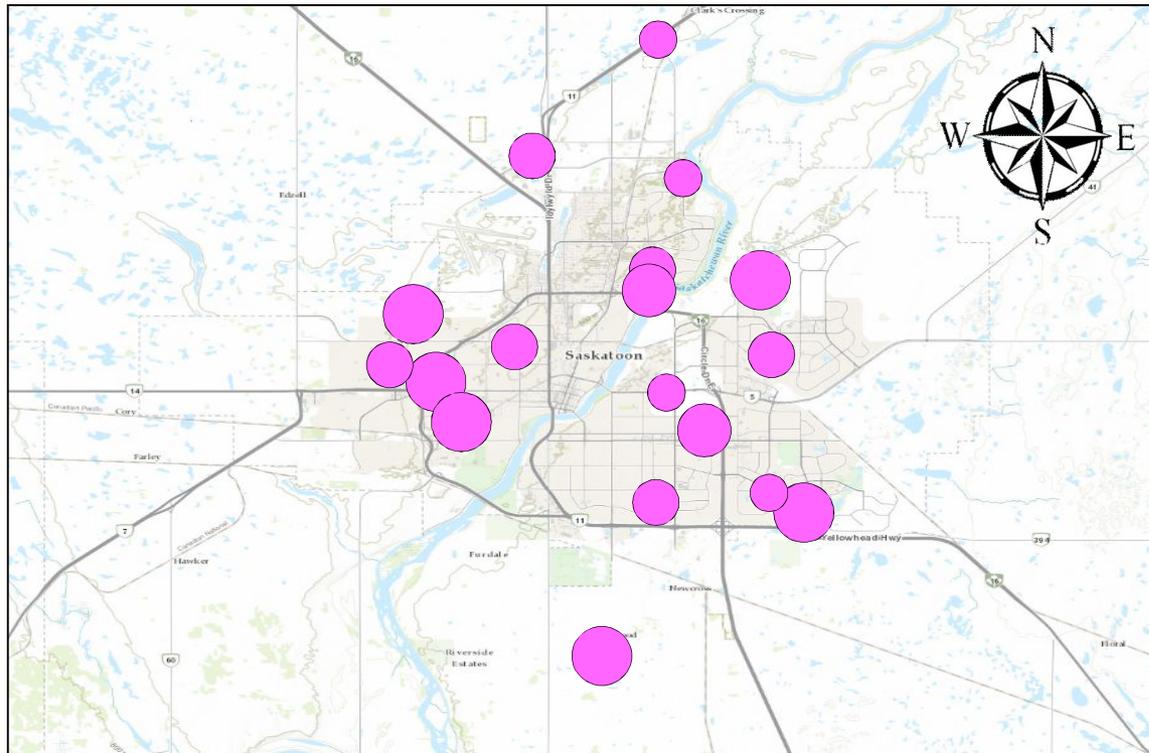
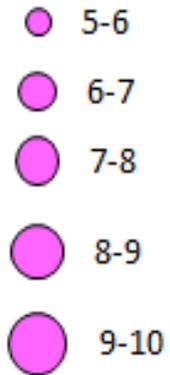
# Passive Data



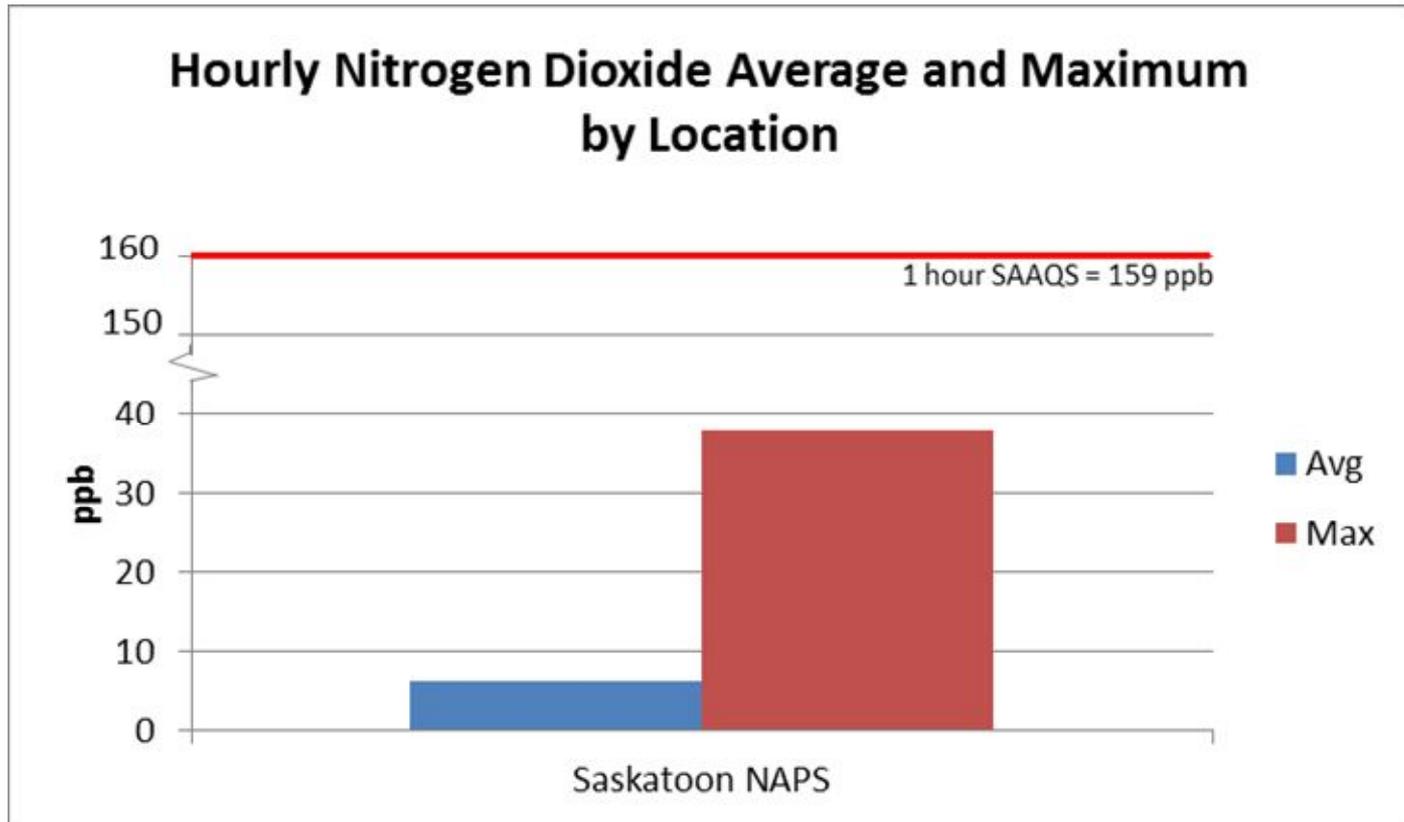
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## Nitrogen Dioxide Monthly Average Concentrations (August 2014 - July 2015)

### Legend NO<sub>2</sub>(ppb)

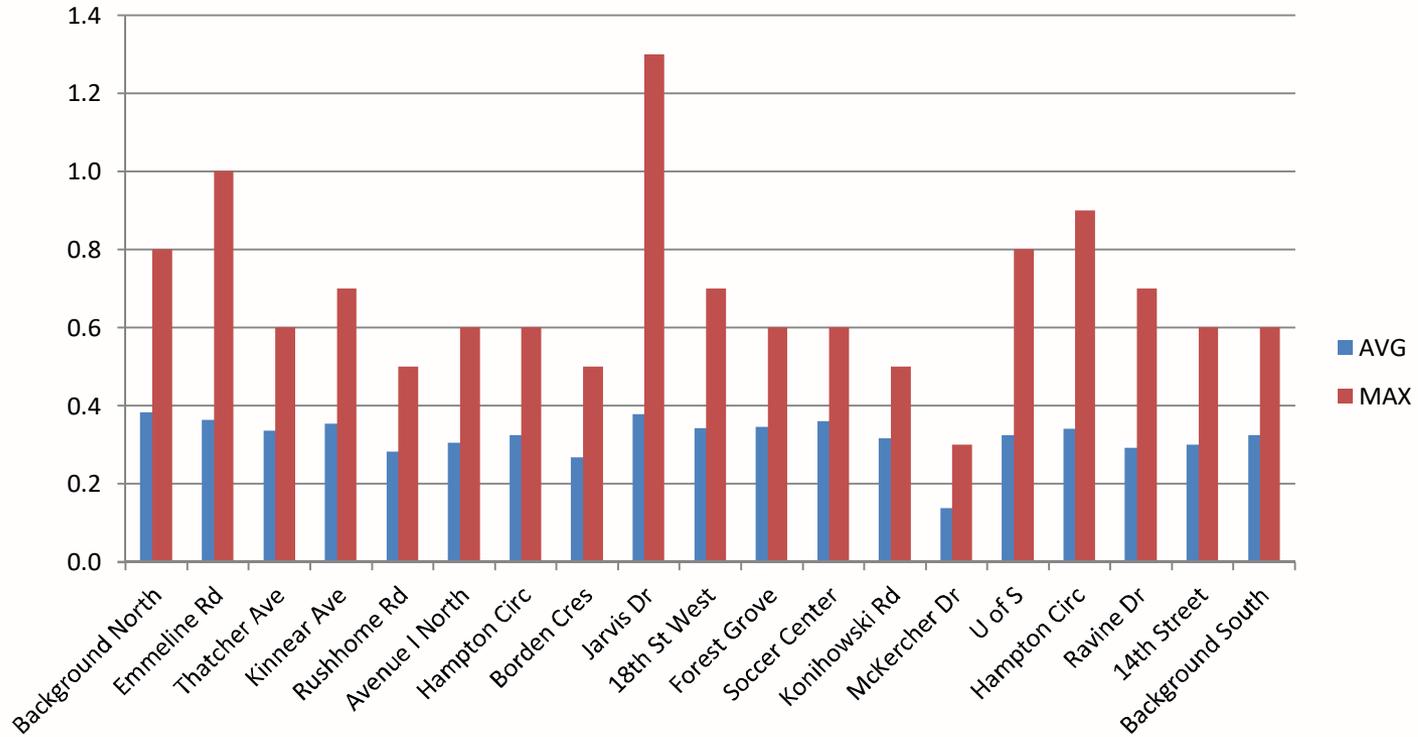


# Continuous Data

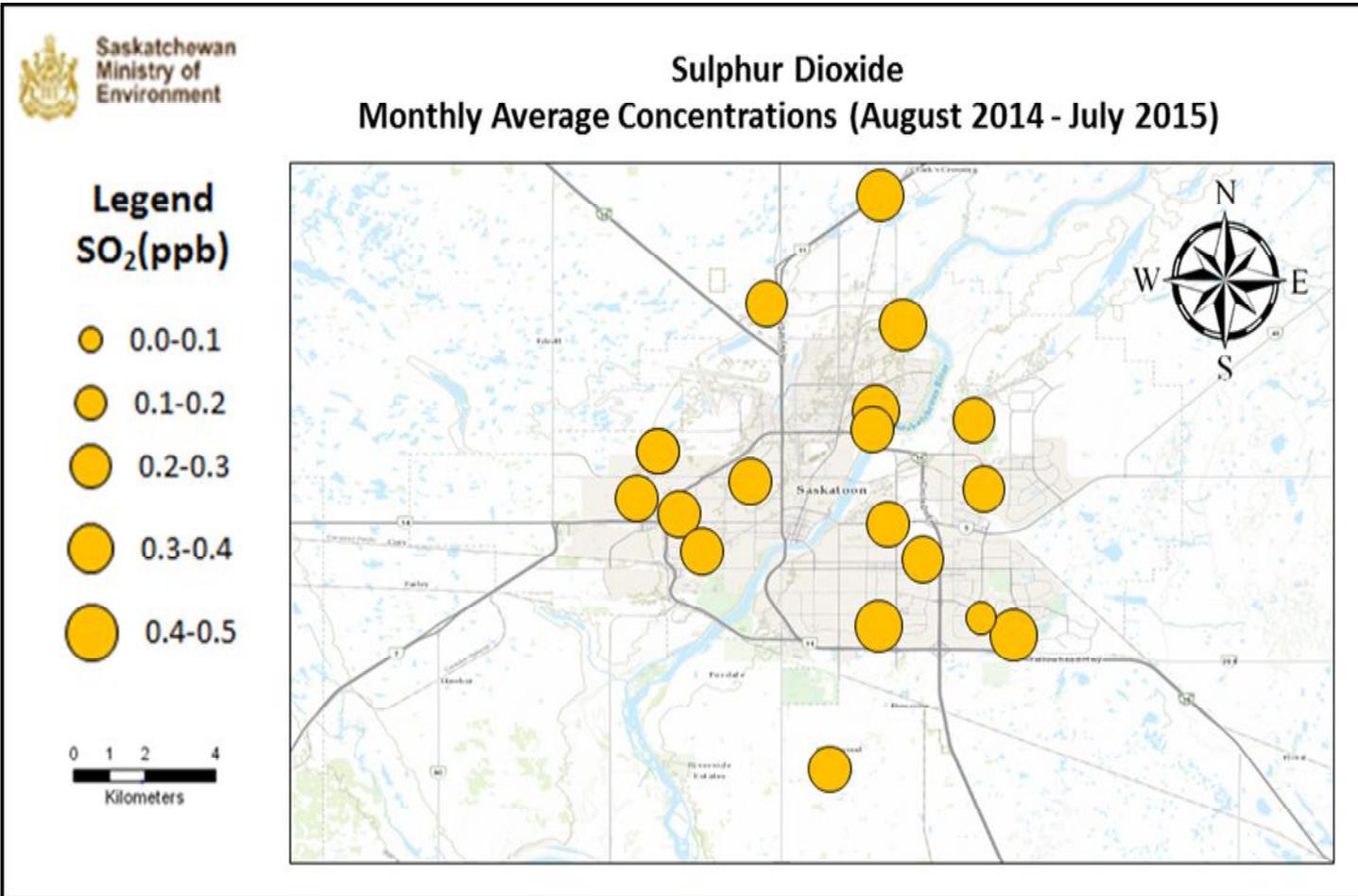


# Passive Data

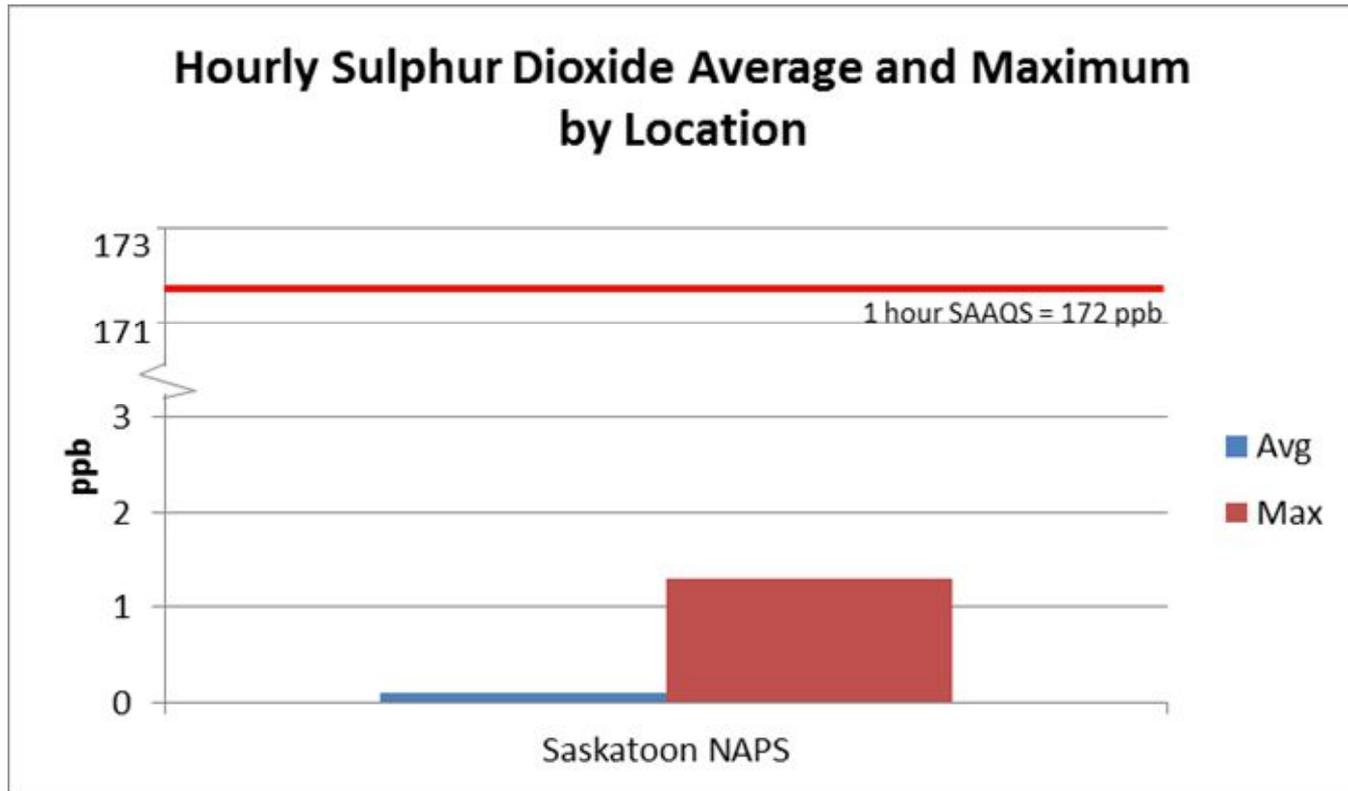
## Sulphur Dioxide 30-Day Concentrations by Site



# Passive Data

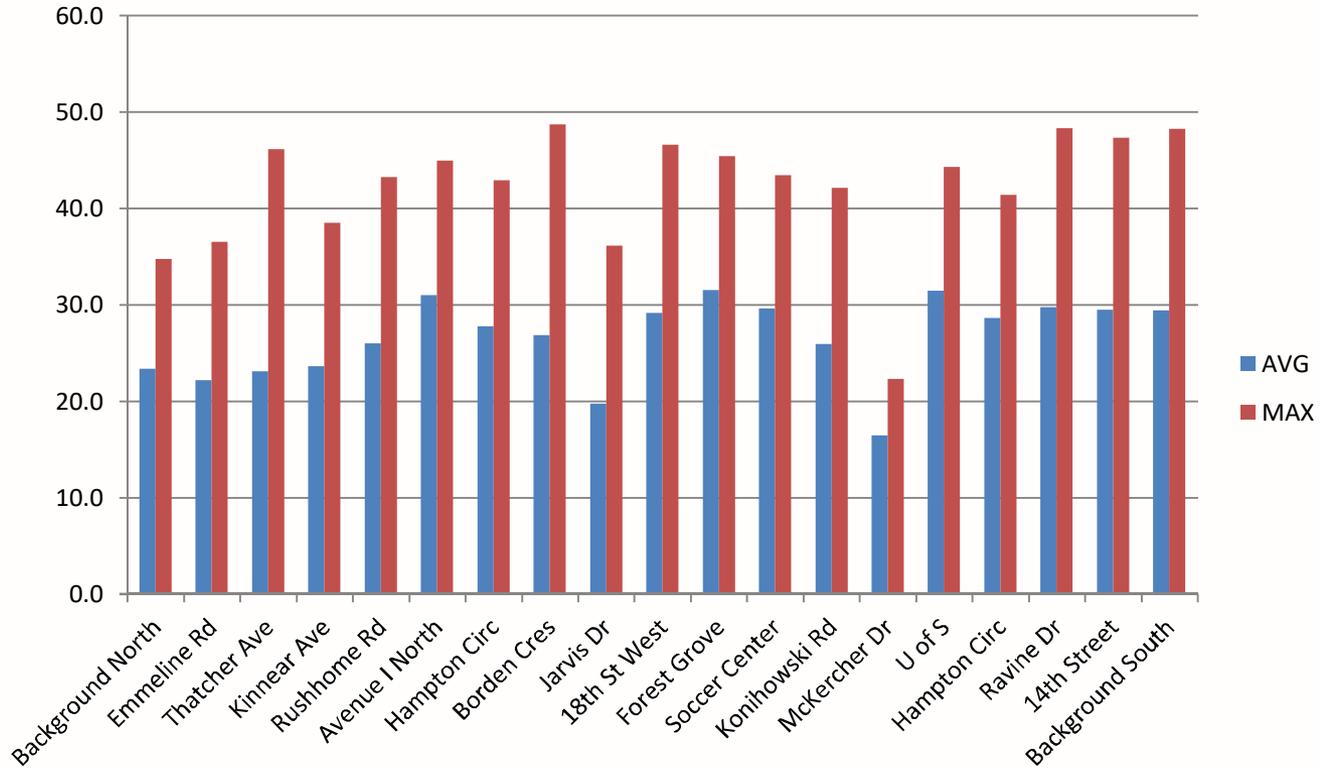


# Continuous Data



# Passive Data

## Ozone 30-Day Concentrations by Site



# Passive Data

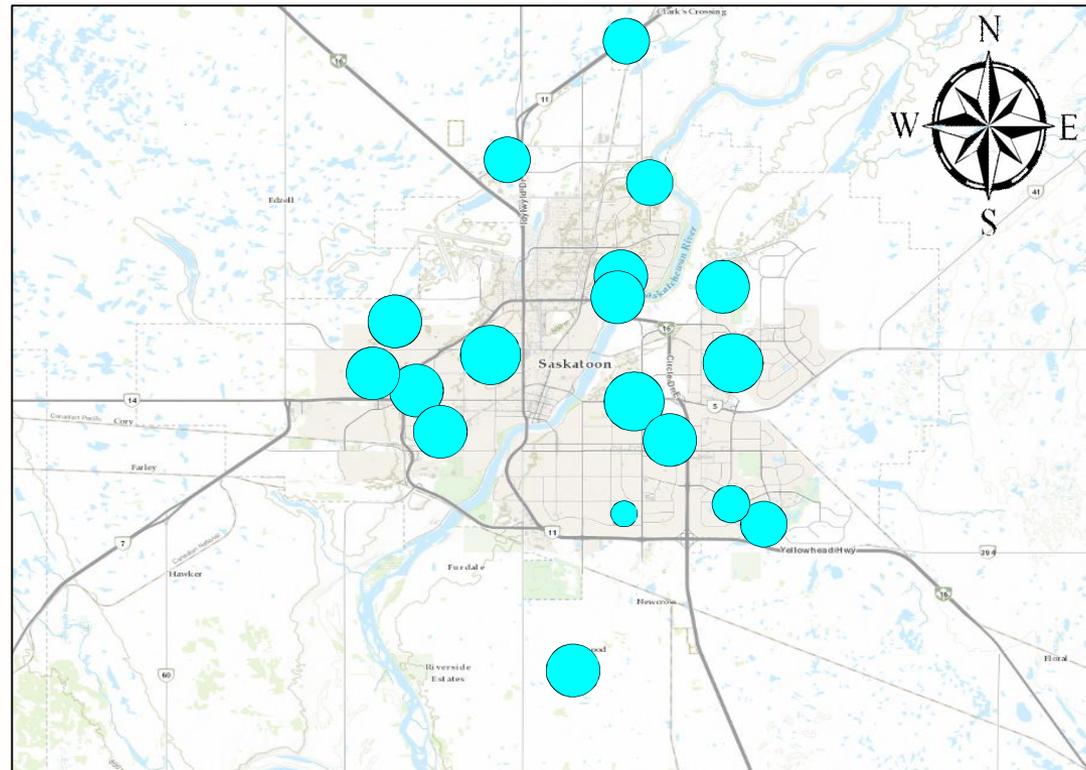
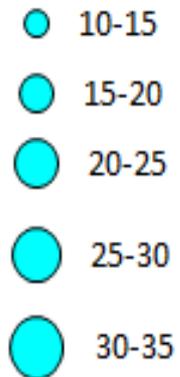


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## Ozone

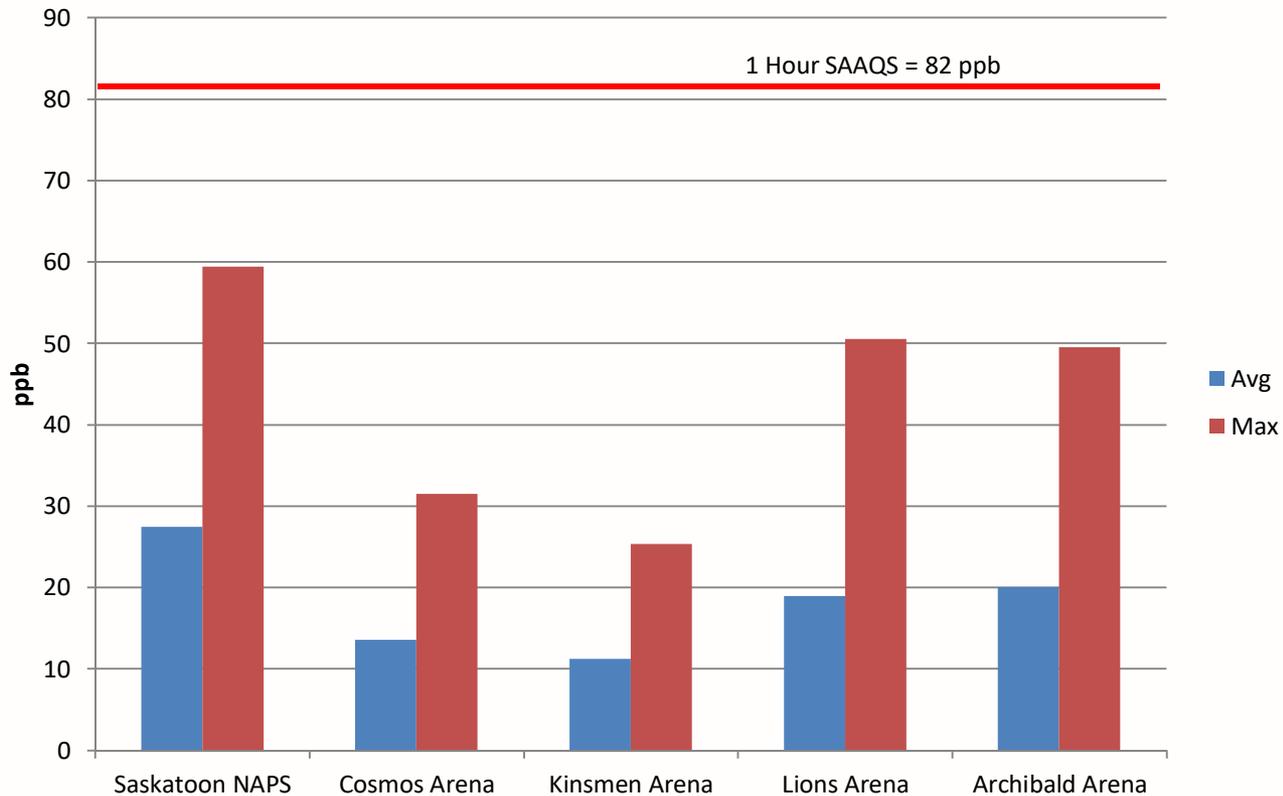
Monthly Average Concentrations (August 2014 - July 2015)

### Legend O<sub>3</sub>(ppb)



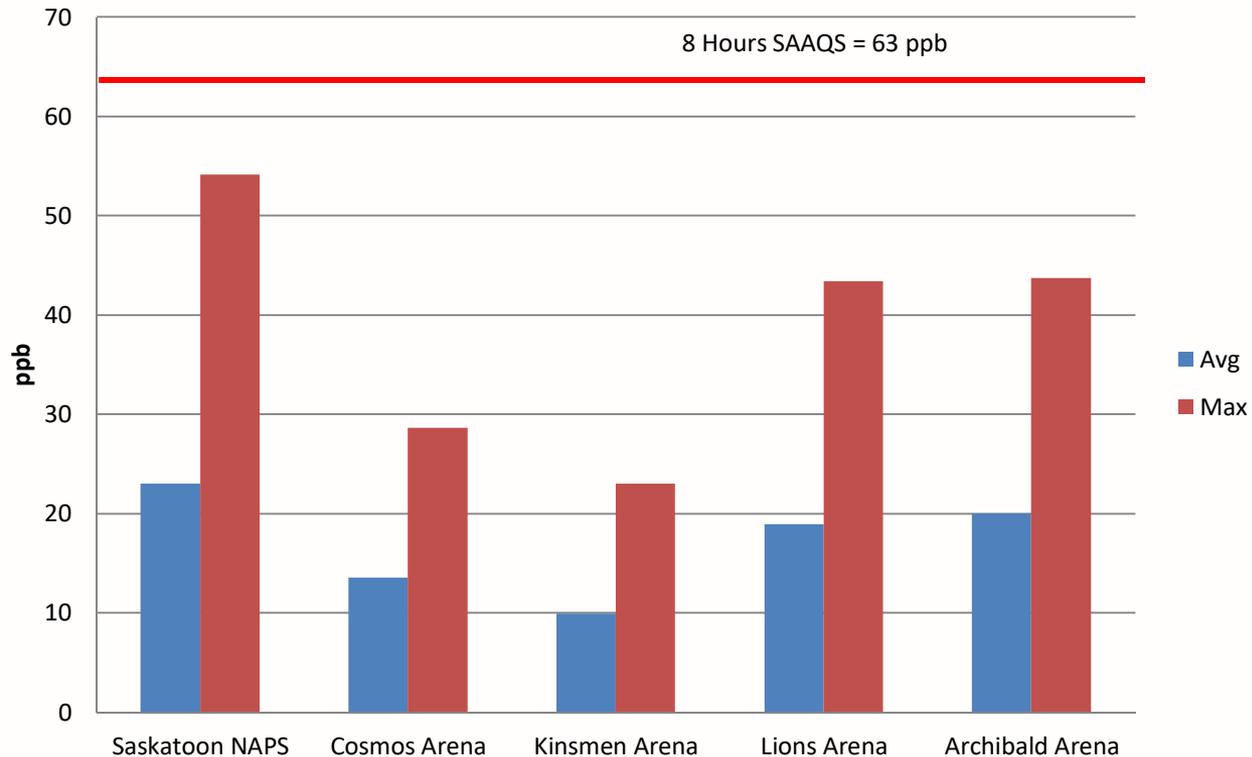
# Continuous Data

## Hourly Ozone Averages and Maximums by Location



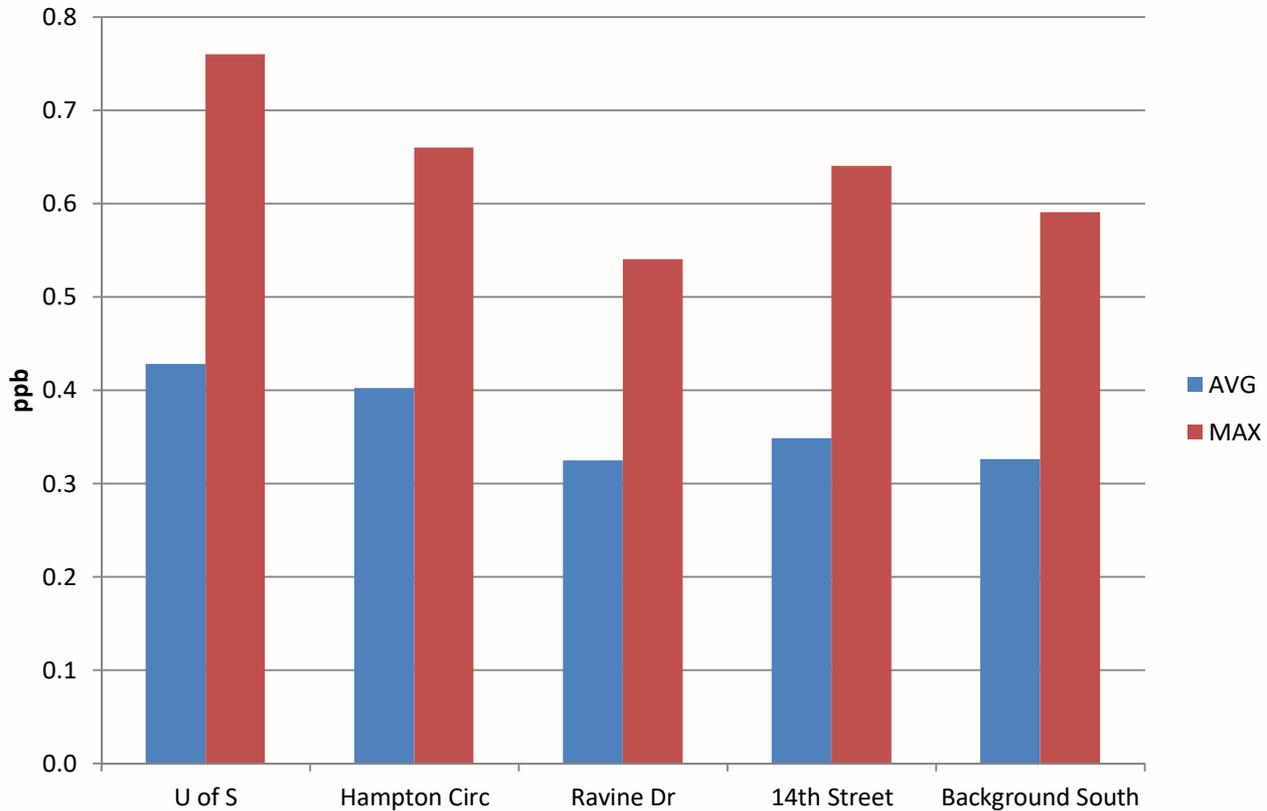
# Continuous Data

## 8 Hour Averages and Maximums by Location

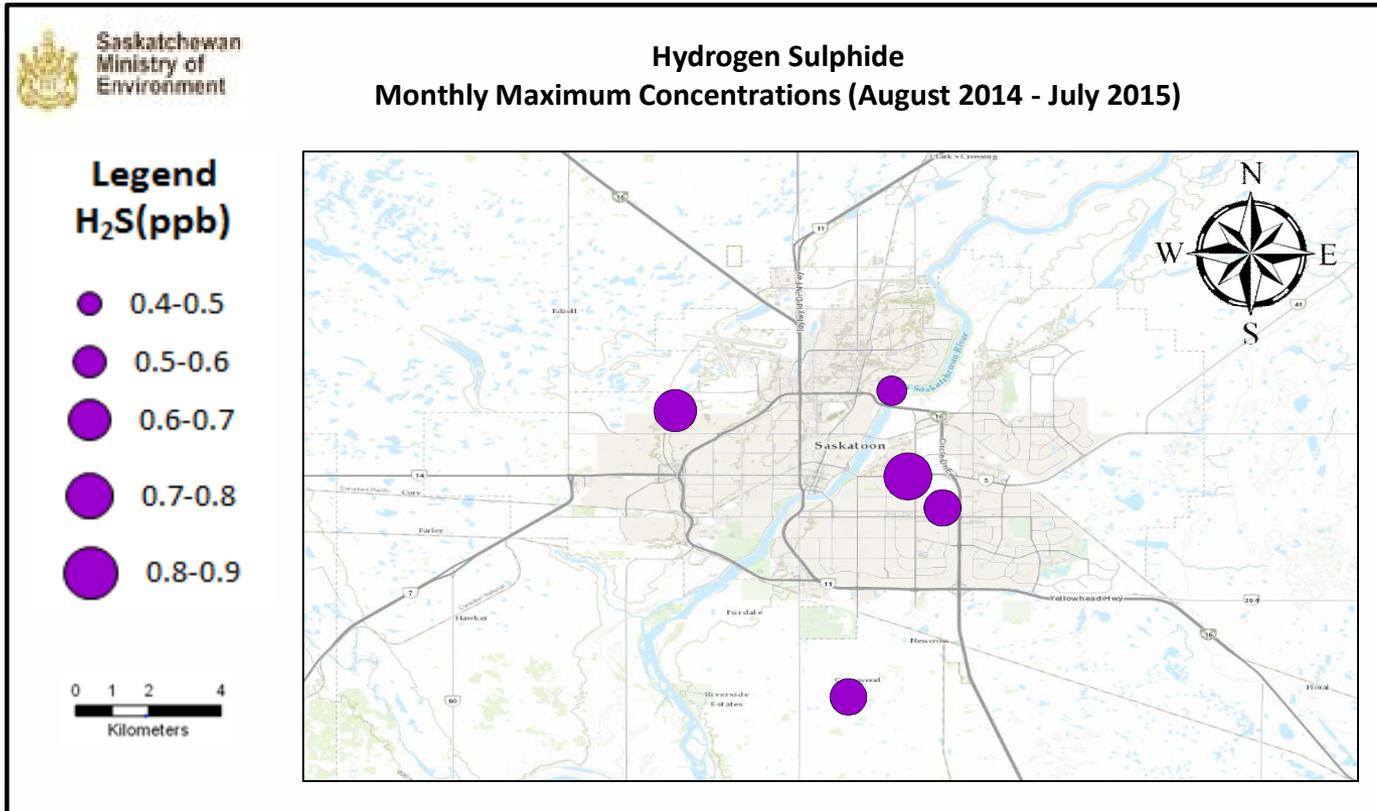


# Passive Data

Hydrogen Sulphide 30-Day Concentrations by Site

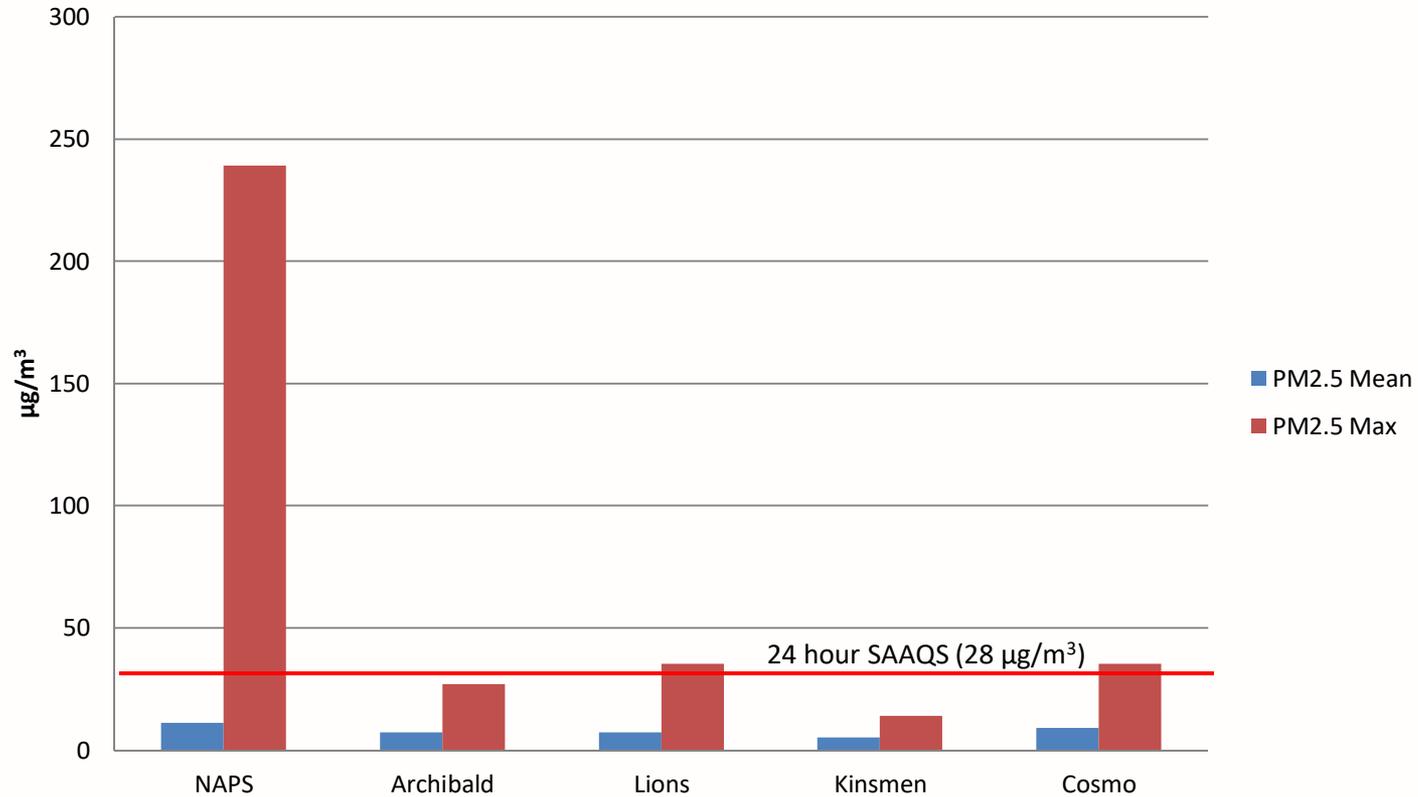


# Passive Data



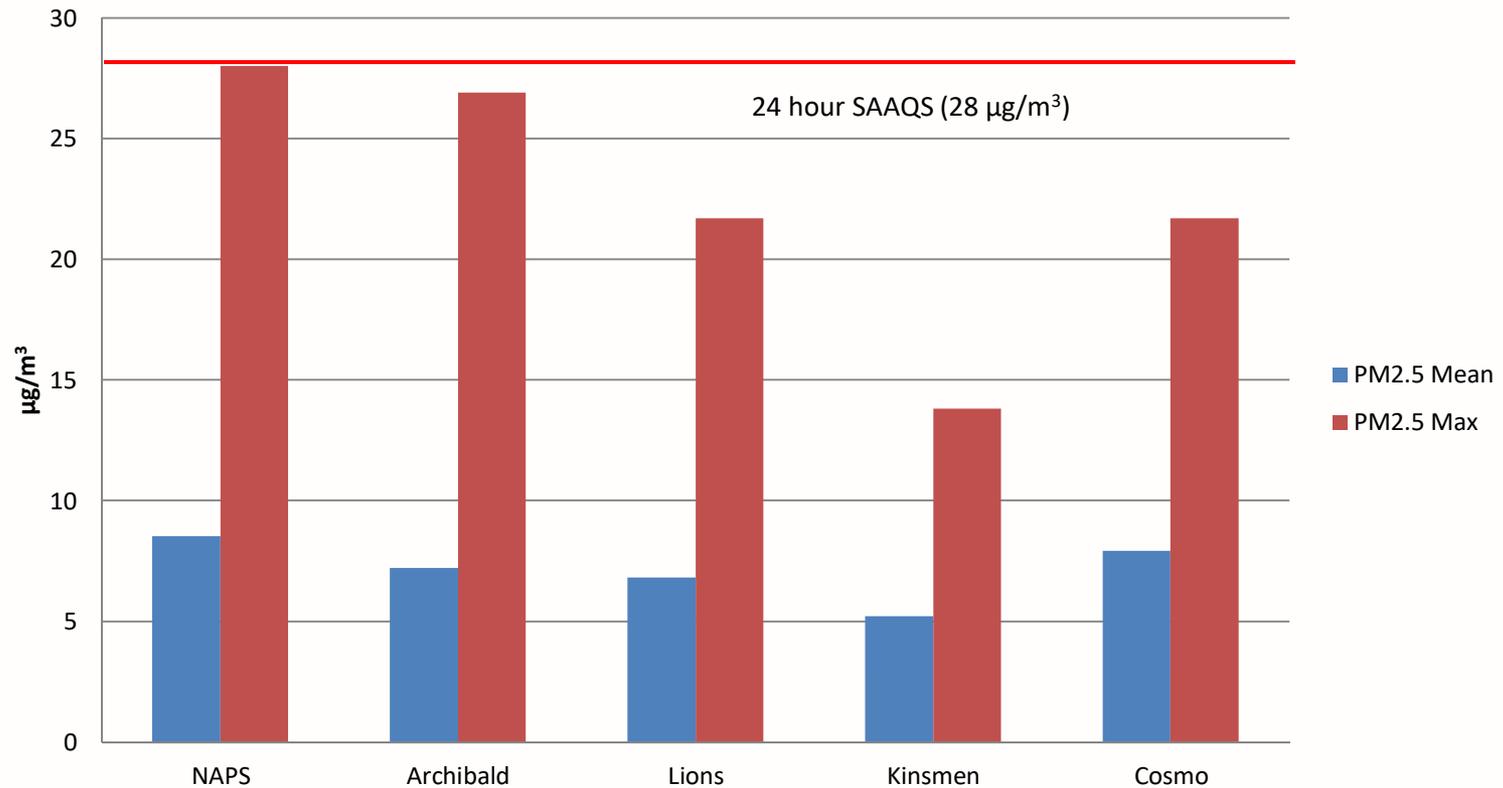
# Continuous Data

## Fine Particulate Matter (PM2.5) Daily Average by Location



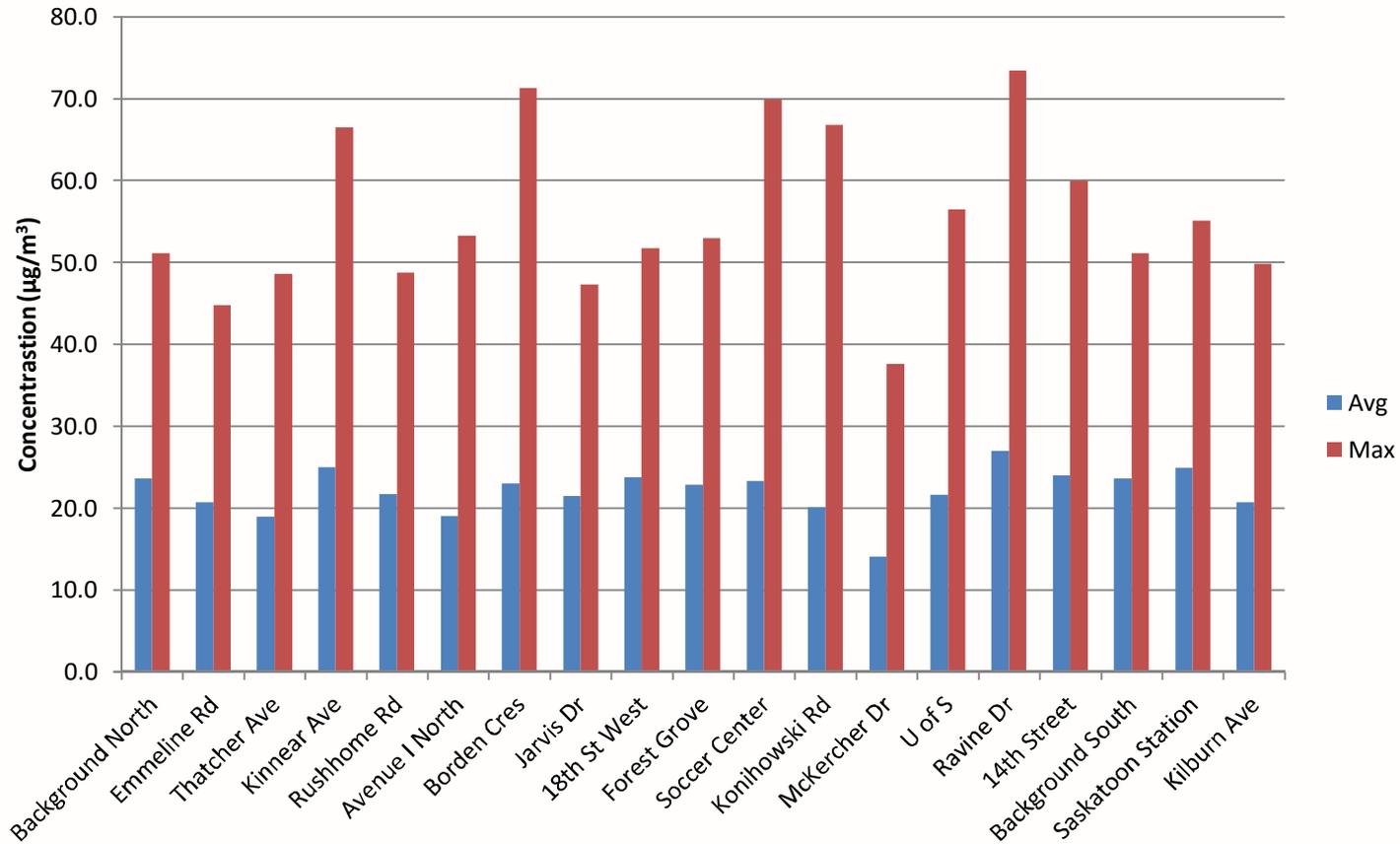
# Continuous Data

Fine Particulate Matter (PM2.5) Daily Averages by Location EE Removed

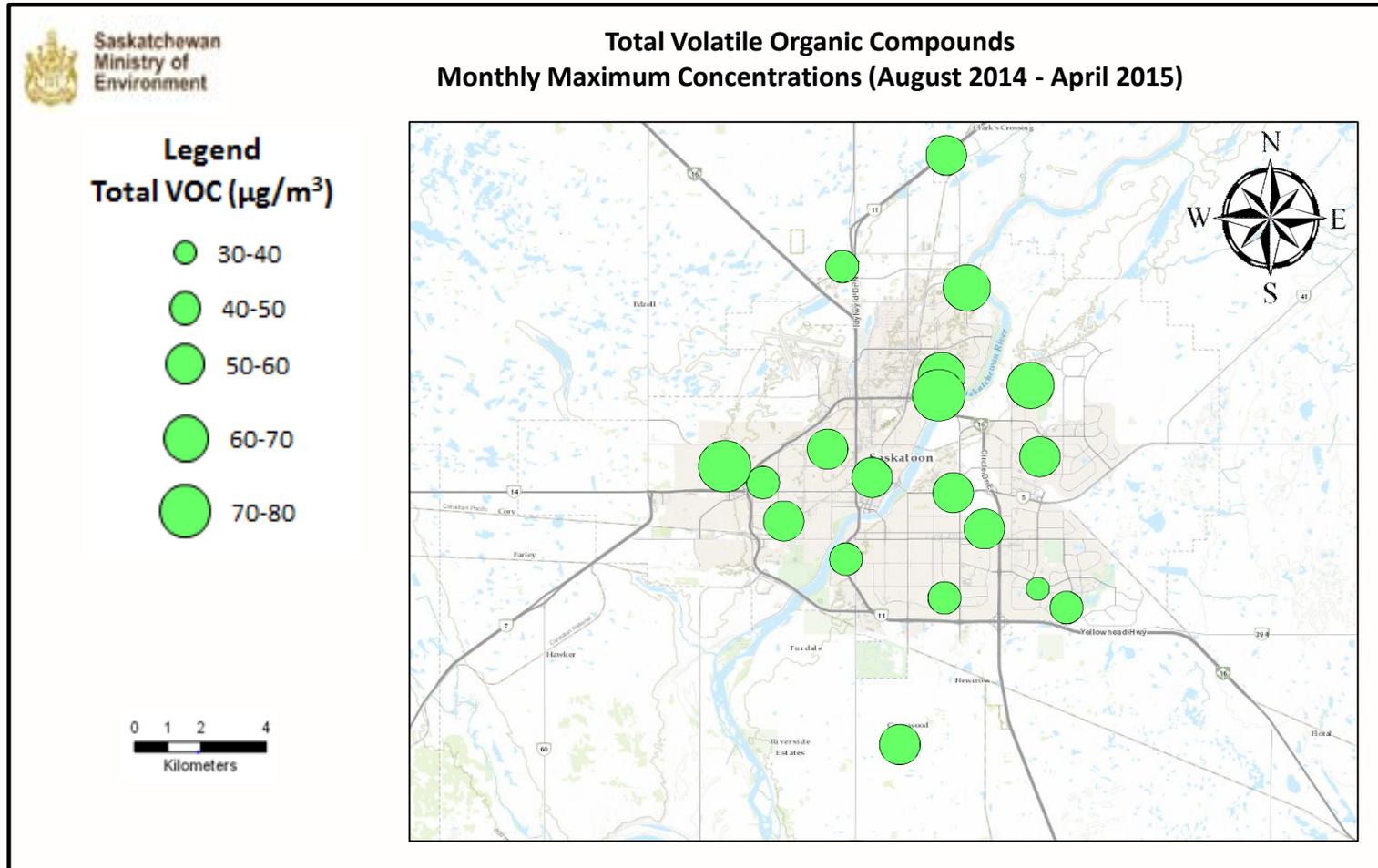


# Passive Data

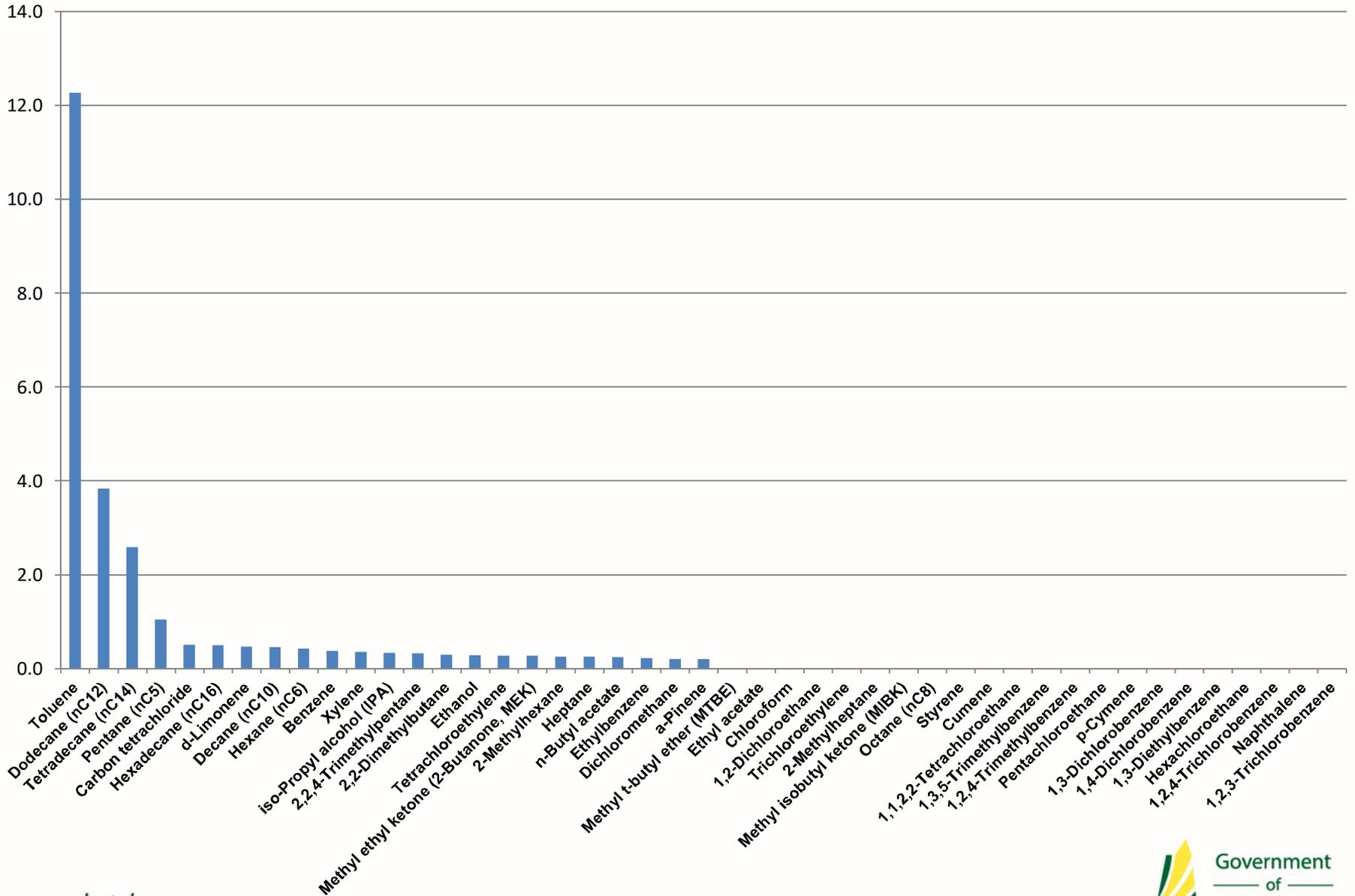
Total VOC 30 Day Concentrations by Site (August 2014 - April 2015)



# Passive Data

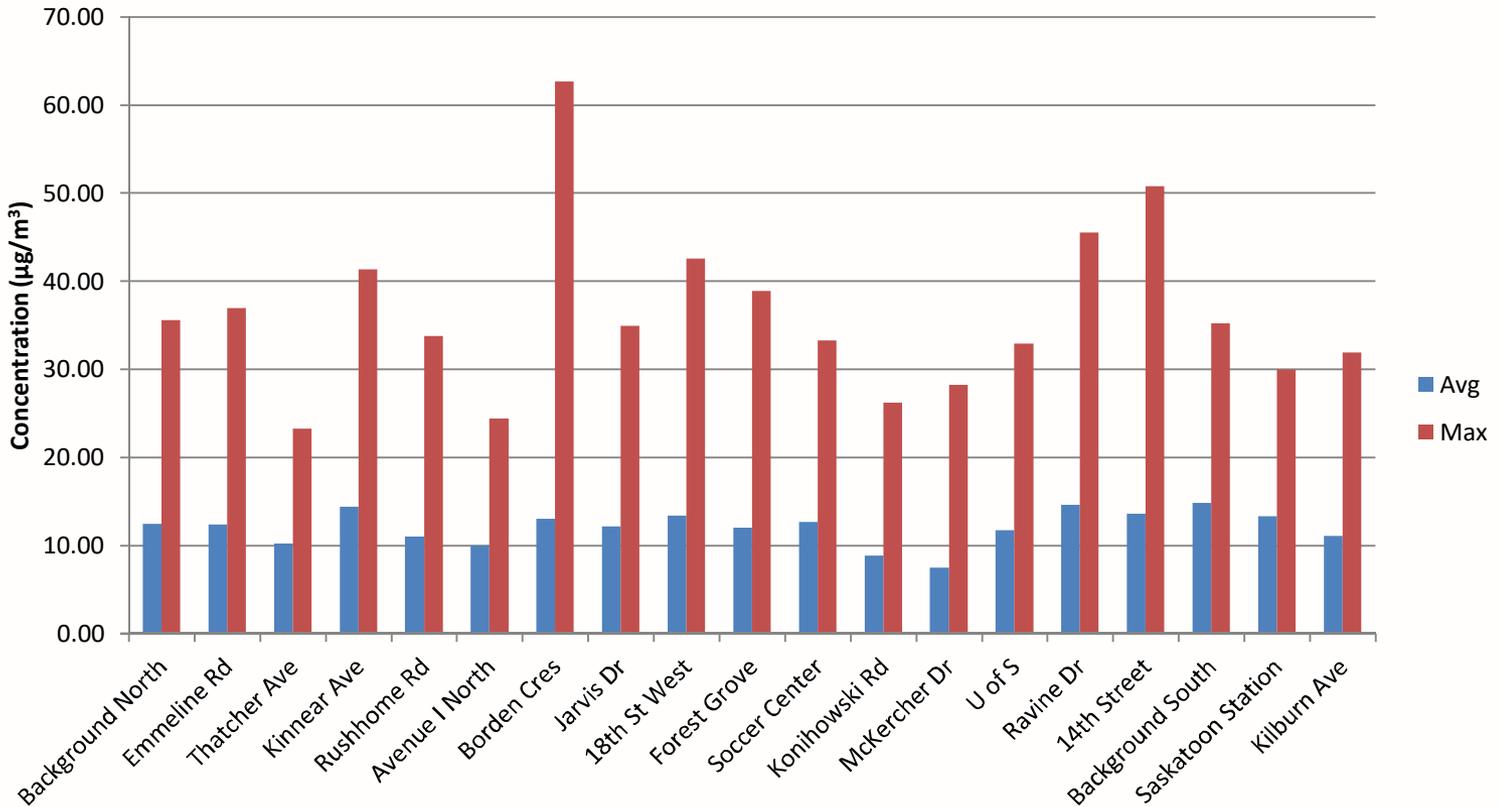


# Breakdown of Total VOCs



# Passive Data

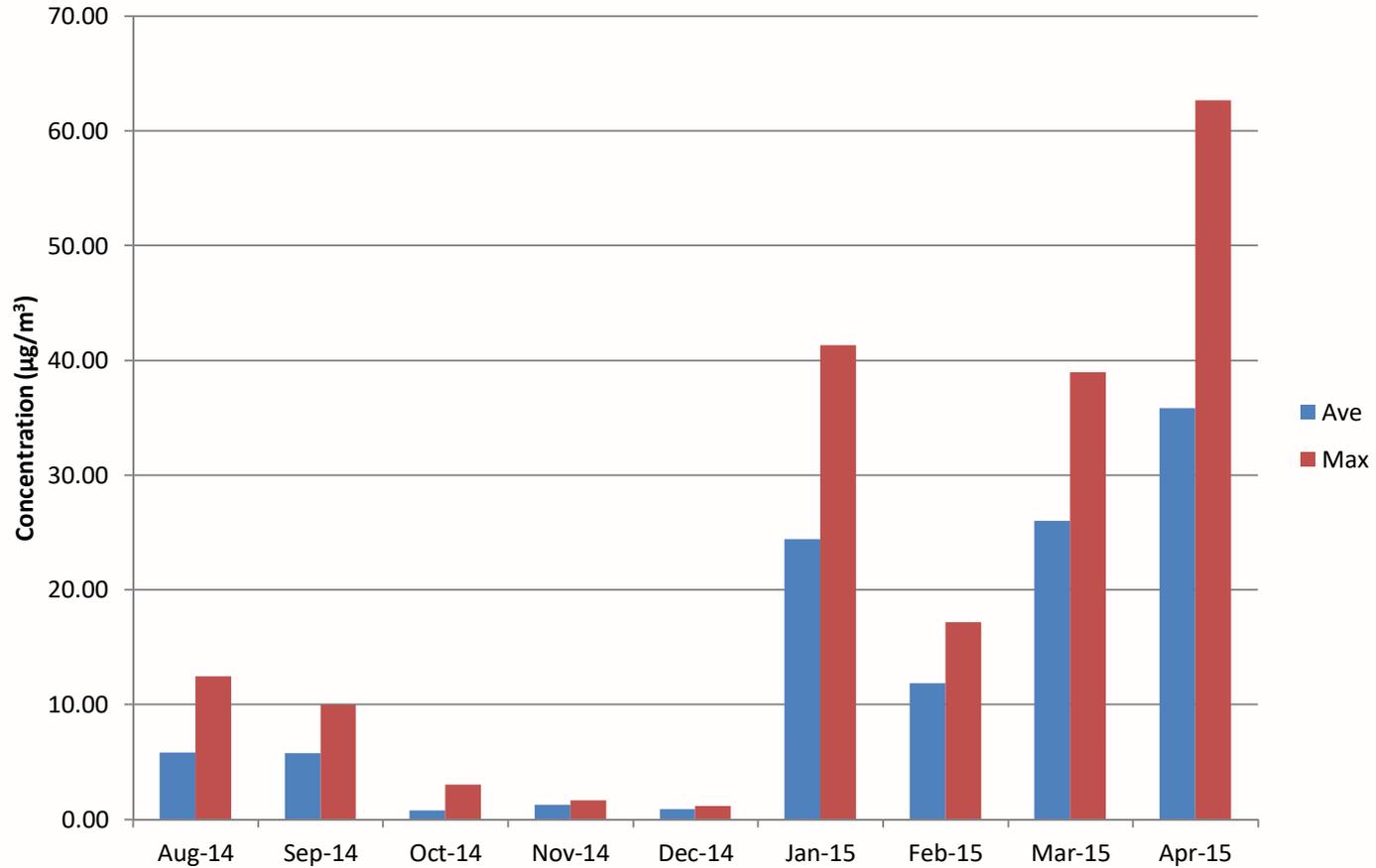
Toluene 30 Day Concentrations by Site (August 2014 - April 2015)





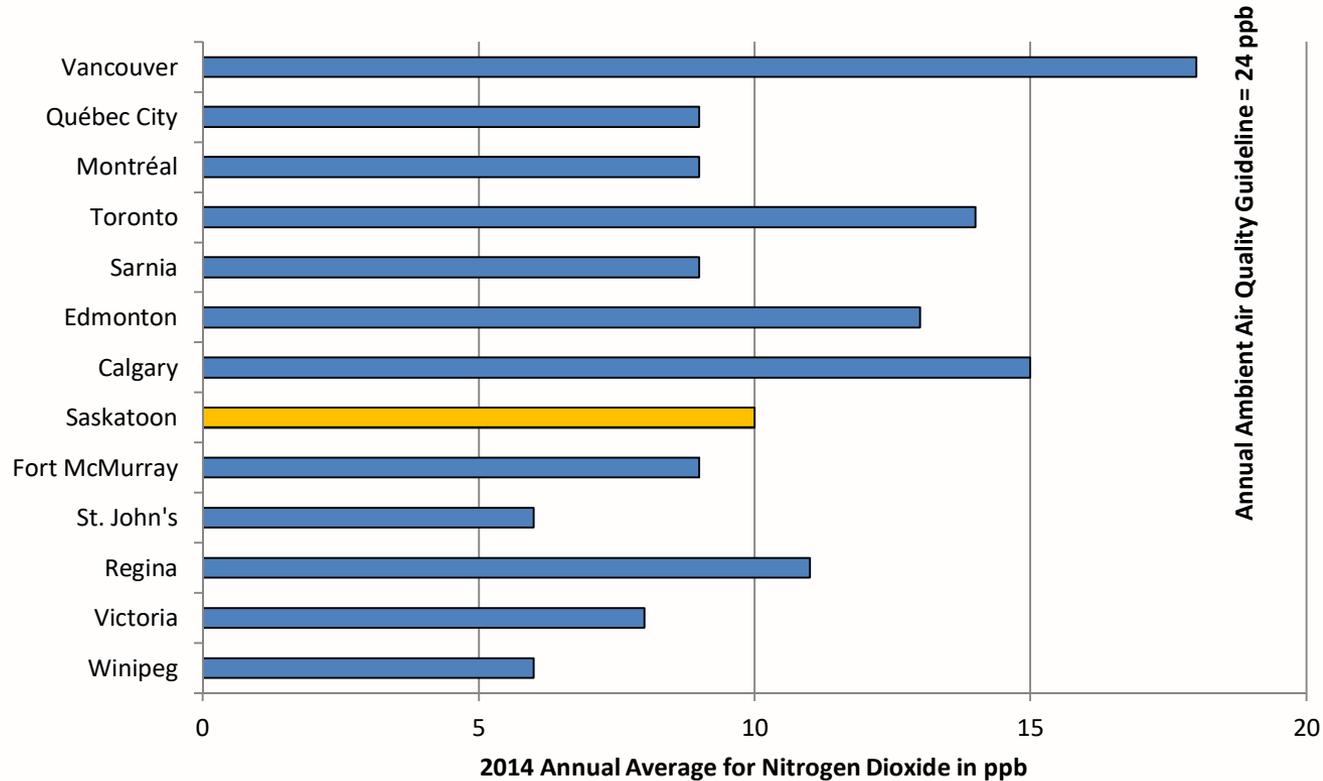
# Toluene

Toluene 30 Day Concentrations

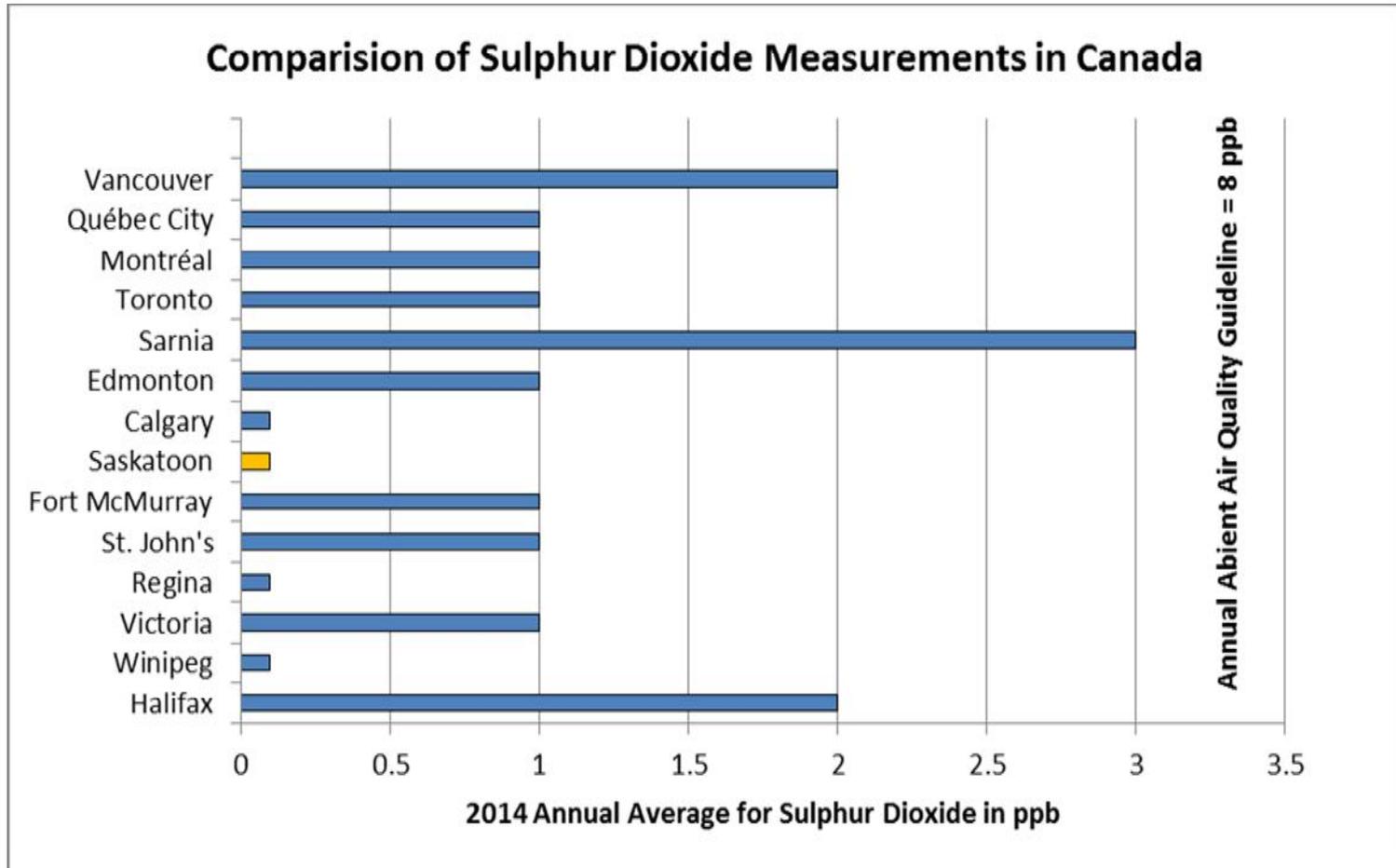


# Comparing Regions

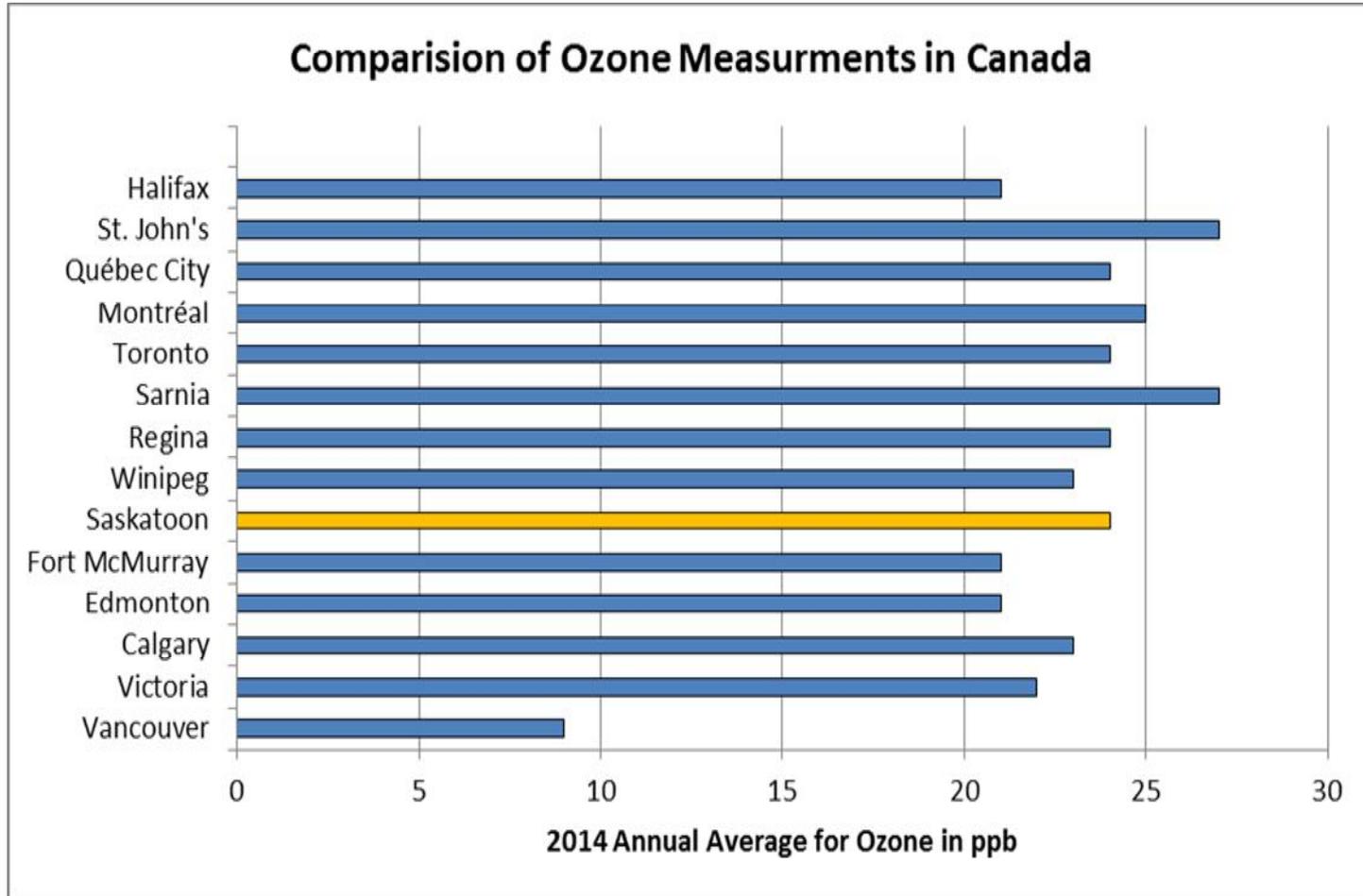
Comparison of Nitrogen Dioxide Measurements in Canada



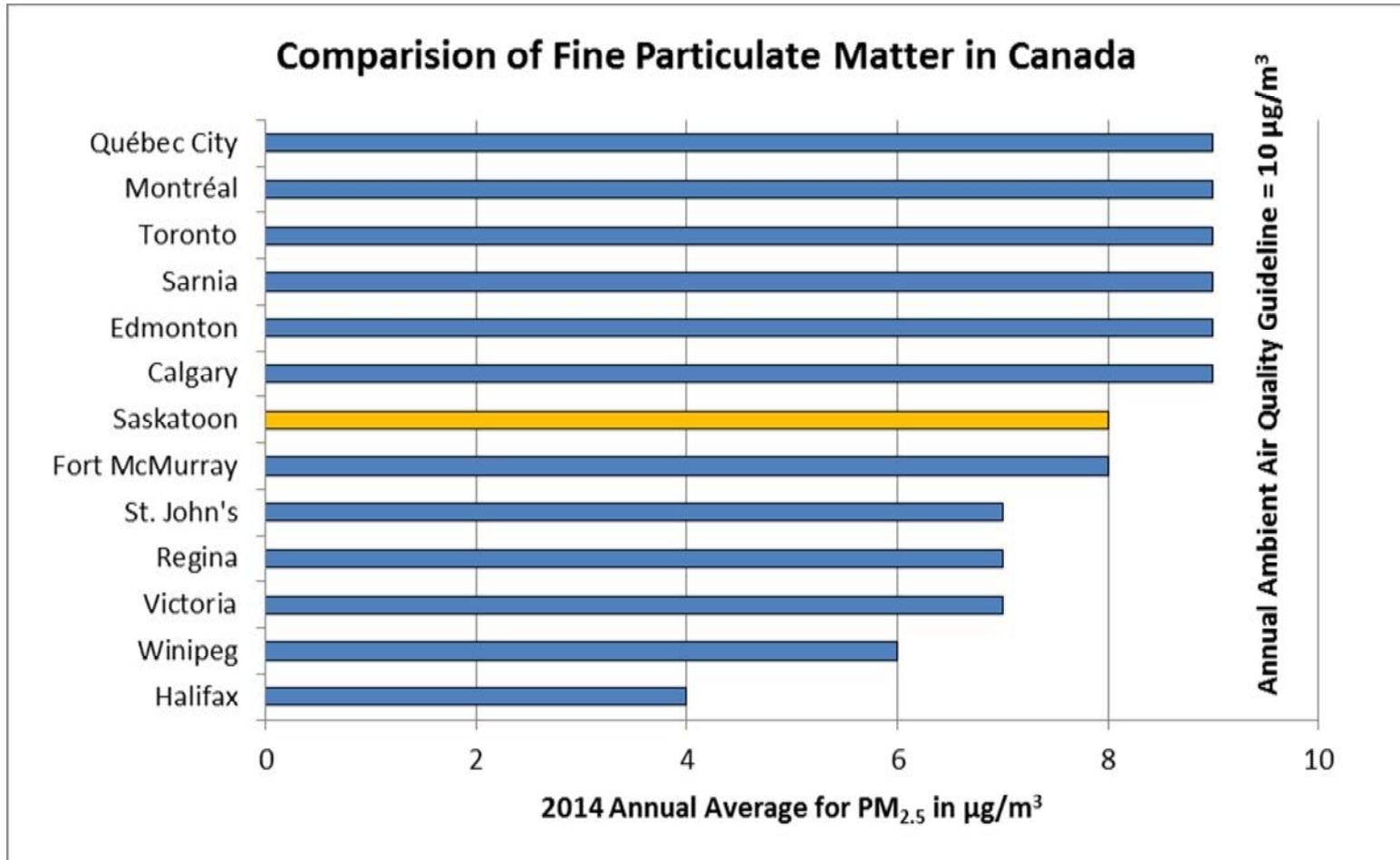
# Comparing Regions



# Comparing Regions



# Comparing Regions



# Summary

- NO<sub>2</sub> and O<sub>3</sub> levels varied slightly between locations, due to the proximity to major roads and industrial/commercial activity. There were no exceedances of the ambient standards.
- SO<sub>2</sub> and H<sub>2</sub>S levels varied slightly between locations, but for the most part were less than 1 ppb.
- PM<sub>2.5</sub> exceeded the SAAQS on a few occasions. These exceedances were due to forest fire smoke and do not reflect typical PM<sub>2.5</sub> levels.
- On average, VOC levels were fairly consistent throughout the city. Toluene was the major constituent of the total VOC concentration.

# Conclusion

- Currently, PM<sub>2.5</sub> and Ozone are below the ambient standards, but by 2020 the CAAQS will decrease. With potential growth of the City and increasing trends of O<sub>3</sub> and PM<sub>2.5</sub>, achievement of the CAAQS may not be possible.
- The results indicate that the downtown NAPS station serves as a good representation of the air quality of the City of Saskatoon.

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