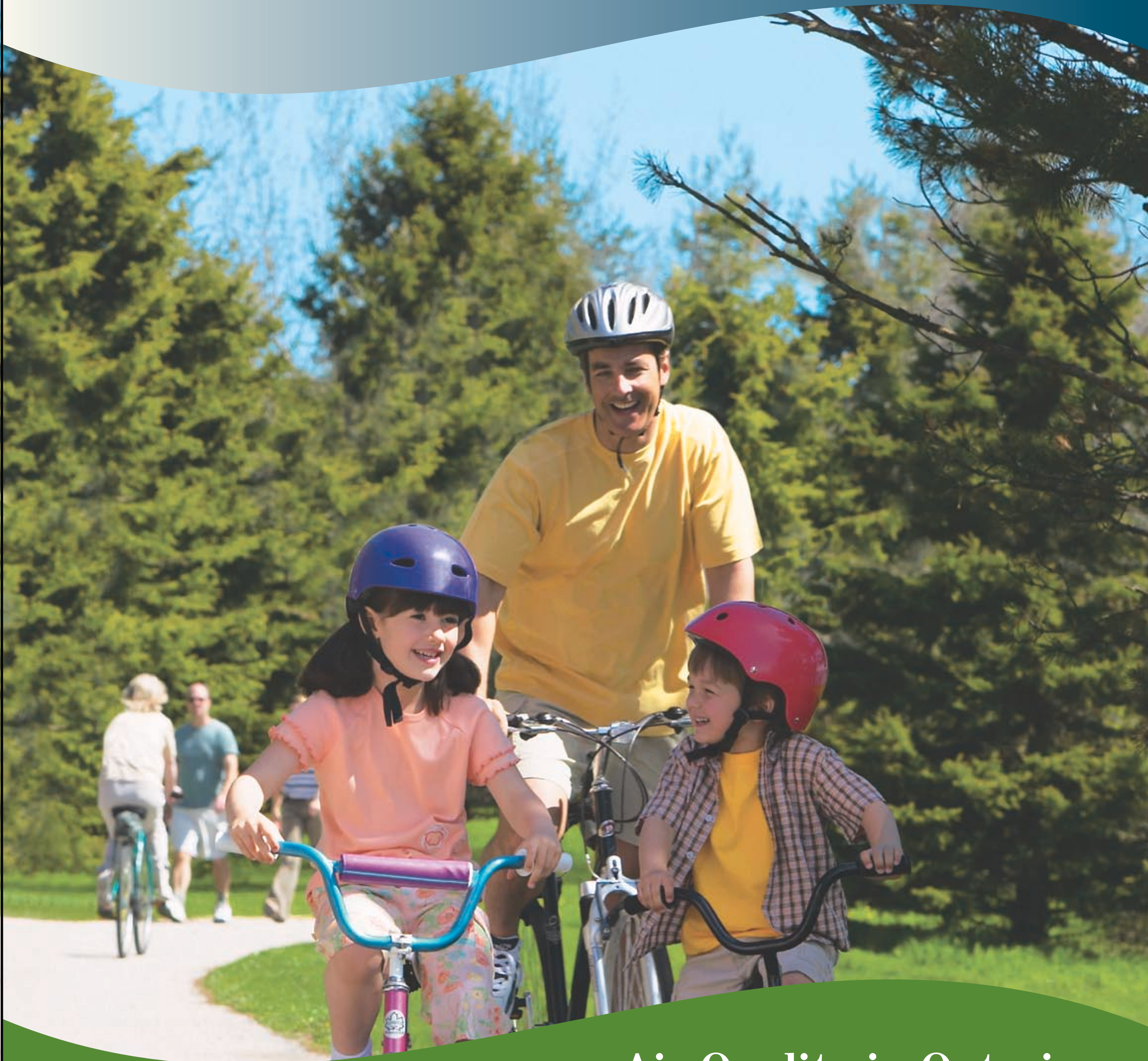


Air Quality in Ontario 2003 Report

Protecting our environment.

Ontario

Air Quality in Ontario
2003 Report

PIBs 4949e

ACKNOWLEDGEMENTS

This report has been prepared by the staff of the Environmental Monitoring and Reporting Branch of the Ontario Ministry of the Environment. Canada's National Air Pollution Surveillance program is also acknowledged for providing air monitoring instrumentation, air toxics data and additional quality assurance/quality control of criteria pollutants.

Foreword

During the 33 years following the first edition of this report in 1971, there has been consistent improvement in the majority of the air pollutants' concentrations measured in Ontario despite significant increases in population, economic activity and vehicle-kilometres travelled.

Encouraging as this is, a great deal of work remains to be done. The Ontario government is directing increased emphasis on two key components of smog, ozone and fine particulate matter ($PM_{2.5}$), which recent scientific evidence suggests have significant adverse health effects.

Data analysis strongly indicates that neighbouring U.S. states – namely Ohio, Illinois and Michigan – are significant contributors to elevated levels of ozone and $PM_{2.5}$ in southern Ontario. The contributions from long-range transport and transboundary movement of these pollutants need further assessment. Continued monitoring is required to evaluate air quality trends to determine the effectiveness of emissions reduction and abatement strategies.

Ontario has continued to review and enhance its existing air monitoring network stations by deploying real-time monitors, namely the Tapered Element Oscillating Microbalances (TEOMs), for the measurement of $PM_{2.5}$. In 1996, only one $PM_{2.5}$ monitor existed in the network. In 2003, there were a total of 37 TEOMs measuring $PM_{2.5}$ in real-time across the province. The continued collection and assessment of such data will allow for improvements in the reporting of important air quality information to all Ontarians.

2003 Report Findings

- The 2003 air quality report marks 33 years of reporting on the state of air quality in Ontario. This report summarizes province-wide monitoring of ambient air quality.

- The provincial ambient air quality criteria (AAQC) for nitrogen dioxide (NO_2), carbon monoxide (CO) and sulphur dioxide (SO_2) were not exceeded at any of the ambient monitoring sites in 2003.

- As in previous years, ozone and fine particulate matter ($PM_{2.5}$), the main components of smog, continued to exceed ambient criteria levels and reference levels.

- In 2003, Ontario's Ambient Air Quality Criteria (AAQC) for ozone was exceeded at 38 of 39 ambient air monitoring stations on at least one occasion. Thunder Bay was the only site that did not record any hours of ozone above the one-hour AAQC of 80 parts per billion (ppb) in 2003.

- The annual one-hour maximum concentration of ozone has decreased from 1980 to 2003. However, there was an increasing trend in ozone mean concentrations during the same 24-year period.

- In 2003, the $PM_{2.5}$ reference level of 30 micrograms per cubic metre ($\mu g/m^3$) for a 24-hour period (based on Canada-wide Standards), was exceeded at 27 sites across Ontario.

- Near seasonal weather conditions prevailed over much of southern Ontario during the 2003 summer season and the 19 smog advisory days issued for the province in 2003 were reflective of this.

- There was a total of seven smog advisories (due to ozone and/or $PM_{2.5}$) in 2003. Six of these advisories occurred during the traditional summer smog season, May to September. The other smog advisory (due to $PM_{2.5}$) occurred on October 10 to 11, 2003.

- Data analysis strongly indicates that neighbouring U.S. states –namely Ohio, Illinois and Michigan – continue to be significant contributors to elevated ozone and $PM_{2.5}$ in southern Ontario during the smog season.

- A comparison of air quality in 34 cities world-wide was conducted for year 2003. Overall, the air quality of Ontario cities, Toronto and Ottawa, was generally better than the other cities used in this analysis for the parameters measured.

- Levels of selected volatile organic compounds (VOCs) continued to show a decreasing trend over the last decade.

Table of Contents

List of Figures

List of Figures continued…

List of Figures continued…

List of Tables

Chapter 1

Overview

Air pollution is of concern to many people who live in Ontario. Although the average air quality concentrations for the majority of the air pollutants in Ontario have decreased over the past 33 years, smog remains a concern, especially in southern Ontario. Air pollution comes from various sources including stationary sources such as factories, power plants and smelters; mobile sources such as cars, buses, trucks, planes, marine vessels and trains; and finally, natural sources such as forest fires, windblown dust and biogenic emissions from vegetation.

Many pollutants, including those that are associated with smog (ozone and fine particulate matter) remain in the atmosphere for long periods of time. These air pollutants and/or their precursors are generated both locally and regionally, and, with winds, can travel hundreds of kilometres from province to province and country to country, affecting areas far removed from the source of the pollution.

This report focuses on air concentrations based on measurements of key criteria pollutants in

Table 1.1: Linkages between Air Pollutants and Air Issues

Pollutant	**Smog**	**Acid Deposition**	**Odour**	**Visibility/ Soiling**	**Local vs. Regional**
Ozone	Yes	Yes	No	No	Regional
Sulphur Dioxide	Yes	Yes	No	Yes	Local & Regional
Carbon Monoxide	Yes	No	No	No	Local
Nitrogen Oxides	Yes	Yes	No	Yes	Local & Regional
Volatile Organic Compounds	Yes	No	Yes	No	Local & Regional
Particles	Yes	Yes	Yes	Yes	Local & Regional
Total Reduced Sulphur Compounds	No	No	Yes	No	Local

the ambient outdoor air to assess the state of air quality in the province of Ontario over time.

The Ontario Ministry of the Environment collects continuous ambient air quality data at more than 40 monitoring sites across the province. These data are used to determine the state of air quality in Ontario and help develop abatement programs to reduce the burden of air pollutants, address key air issues and assess the efficacy of policies and programs. Ambient air monitoring in Ontario provides information on the actual concentrations of selected pollutants in communities across Ontario. Table 1.1 shows the relationship between monitored air pollutants and current air issues.

The data collected by the province's state-of-the-art air monitoring network has contributed to several air quality initiatives and regulations. The Ministry of the Environment continues to monitor air quality across Ontario and uses this information to:

- inform the public about outdoor ambient air quality;
- assess Ontario's air quality and evaluate long-term trends;
- identify areas where criteria are exceeded and identify the origins of pollutants;
- provide the basis for air policy/program development;
- provide quantitative measurements to enable abatement of specific sources;
- determine the significance of pollutants from U.S. sources and their effects on Ontario;
- provide air quality researchers with data to link environmental and human health effects to air quality; and
- since 1993, provide smog advisories for public health protection and public outreach.

This report, the 33rd in a series, summarizes the state of ambient air quality in Ontario during 2003 and examines trends over time. It covers the measured levels of six contaminants: ozone (O_3), fine particulate matter ($PM_{2.5}$), nitrogen dioxide (NO_2), carbon monoxide (CO), sulphur dioxide (SO_2) and total reduced sulphur (TRS) compounds in Ontario. Where appropriate, air pollutant concentrations from selected Ontario cities have been compared to the information available in other cities world-wide (see Figure 1.1). City populations ranged from approximately 335,000 (Pittsburgh) to 12,000,000 (Tokyo). Monitoring methods and siting procedures may vary from country to country; therefore, comparisons among nations are not intended to be used as a comprehensive ranking. Air quality standards for the chosen criteria pollutants in this study may vary from country to country as well, however, the inter-city comparisons represented here are referenced to Ontario's ambient air quality criteria (AAQC) and the national ambient air quality standards (NAAQS) for the United States.

The report also summarizes the results from the Air Quality Index (AQI) and Smog Alert programs and briefly examines smog episodes in 2003. Results for a select number of volatile organic compounds (VOCs) are also reviewed.

The main focus of the 2003 publication is to report on the state of Ontario's ambient air quality. The annual statistics and 10-year trends of ambient data are presented in the attached appendix. Ontario continues to benefit from one of the most comprehensive air monitoring systems in North America. The network is designed to measure continuous air quality at more than 40 ambient monitoring sites across the province and undergoes regular maintenance to ensure a high standard of quality. With these data, we can make informed decisions about what needs to be done to protect and improve the quality of air for Ontarians.

Figure 1.1
Selected Cities Around the World Used for International Comparison of Air Quality

1. Adelaide; 2. Amsterdam; 3. Berlin; 4. Buffalo; 5. Cape Town; 6. Chicago; 7. Copenhagen; 8. Denver; 9. Detroit; 10. Frankfurt; 11. Gdansk; 12. Hong Kong; 13. Houston; 14. Jacksonville; 15. Krakow; 16. Los Angeles; 17. Miami; 18. Milwaukee; 19. Montreal; 20. New York; 21. Ottawa; 22. Pittsburgh; 23.Prague; 24. Rochester; 25. San Diego; 26. San José; 27. Sao Paulo; 28. Seattle; 29. Singapore; 30. Tokyo; 31. Toronto; 32. Vancouver; 33. Vienna; 34. Warsaw

Chapter 2

Ground-Level Ozone

Ground-level ozone (O_3) is a gas formed when nitrogen oxides (NOx) and volatile organic compounds (VOCs) react in the presence of sunlight. While ozone at ground-level is a major environmental and health concern, the naturally occurring ozone in the stratosphere shields the earth from harmful ultraviolet radiation.

The formation and transport of ground-level ozone are strongly dependent on meteorological conditions. Changing weather patterns contribute to short-term and year-to-year differences in ozone concentrations. In Ontario, elevated concentrations of ground-level ozone are generally recorded on hot, sunny days from May to September, between noon and early evening.

Characteristics, sources and effects

Ozone is a colourless, odourless gas at ambient concentrations, and is a major component of smog. Ground-level ozone is not emitted directly into the atmosphere. Ozone is formed from chemical reactions between VOCs and NO_x in the presence of sunlight.

Sources of Ontario's VOC emissions mainly include transportation, such as road vehicles, and the use of general solvents. Sources of NO_x mainly include transportation, power plants, primary metal production and incineration.

Ozone irritates the respiratory tract and eyes. Exposure to ozone in sensitive people can result in chest tightness, coughing and wheezing. Children who are active outdoors during the summer, when ozone levels are highest, are particularly at risk. Other groups at risk include individuals with pre-existing respiratory disorders, such as asthma and chronic obstructive lung disease. Ground-level ozone is linked to increased hospital admissions and premature deaths. Ozone also causes agricultural crop loss each year in Ontario, and visible leaf damage in many crops, garden plants and trees.

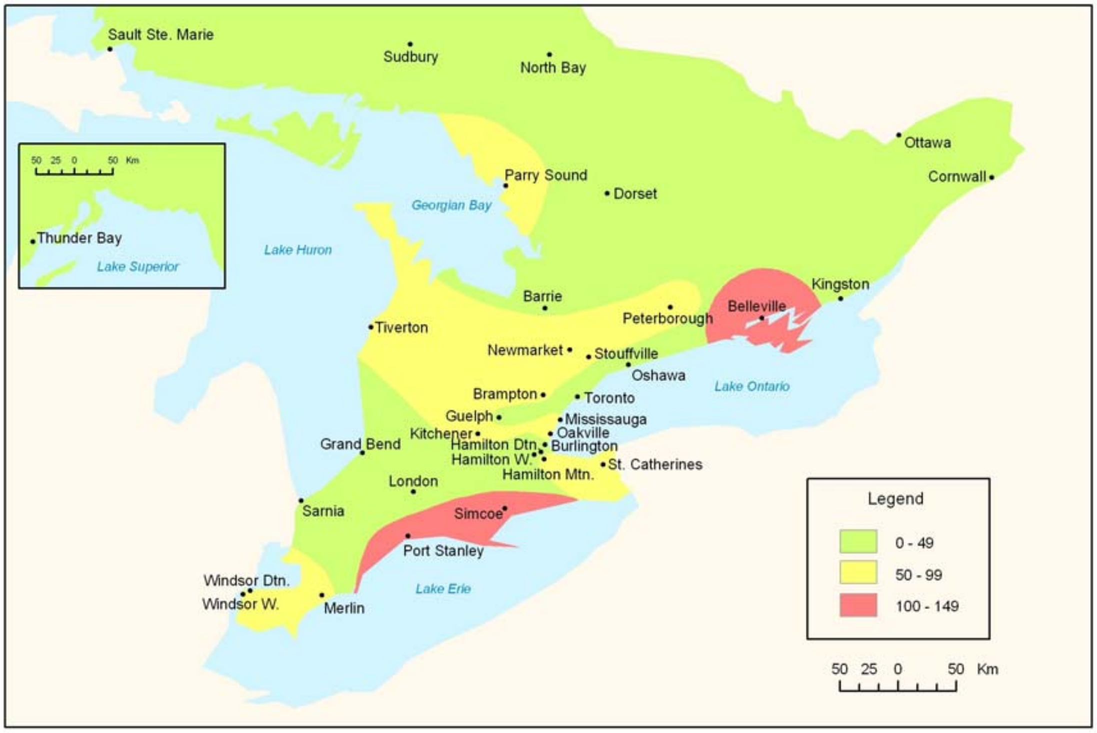
Monitoring results for 2003

During 2003, ground-level ozone was monitored at 41 locations in 2003; 39 sites were used for the analysis presented here. The highest annual mean was 34.9 parts per billion (ppb), measured at Port Stanley, a rural site on the northern shore of Lake Erie, while the lowest annual mean was 18.7 ppb measured at the Toronto West site. Generally, ozone is lower in urban areas because it is removed by reaction with nitric oxide emitted locally by vehicles and other combustion sources.

Among urban sites in 2003, Belleville recorded the highest one-hour concentration (149 ppb), and the greatest number of instances (103 hours) when ozone was above Ontario's one-hour ambient air quality criterion (AAQC) of 80 ppb. Belleville also recorded the highest annual urban mean (30.9 ppb).

At rural sites, Tiverton measured the highest one-hour concentration (135 ppb), while Port Stanley had the most number of instances (138 hours) above the provincial one-hour AAQC, followed by Simcoe (118 hours).

Figure 2.1
Geographical Distribution of Number of One-Hour Ozone Exceedances across Ontario (2003)

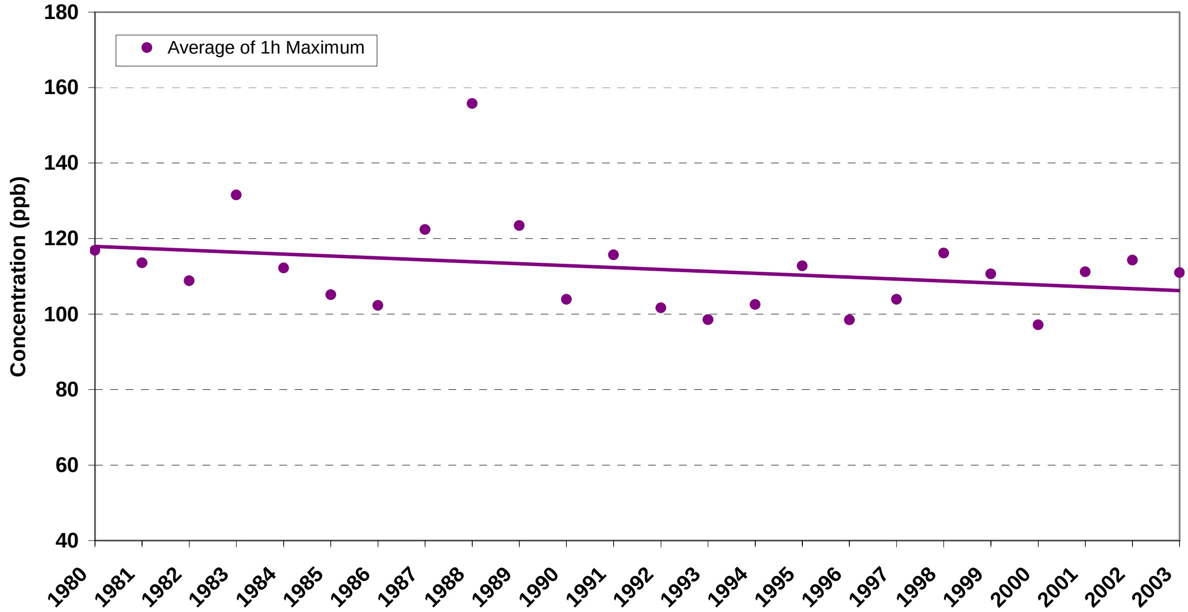


Ground-level ozone continues to exceed its provincial criterion across the province. In 2003, Ontario's one-hour AAQC for ozone was exceeded at 38 ambient air monitoring stations on at least one occasion. Thunder Bay was the only site that did not record any hours of ozone above 80 ppb in 2003.

Figure 2.1 shows the geographical distribution of the number of hours of elevated ozone concentrations across Ontario. The significance of transboundary flow is reflected in the relatively higher levels found at rural sites in the southwestern part of the province along the northern shore of Lake Erie. An area of elevated ozone levels to the east of Toronto in the Belleville area is also evident and is attributed to the long-range transport of pollutants into Ontario from the U.S. and potential impacts from the urbanized area of the Golden Horseshoe, including that of the Greater Toronto Area (GTA).

In general, ozone levels in southern Ontario decrease from southwest to northeast. More than 50 per cent of provincial ozone levels during widespread smog episodes are due to long-range transport of ozone and its precursors from neighbouring U.S. states. This U.S. contribution is expected to be much higher (as much as 90 per cent) in Ontario cities and towns on the northern shores of Lake Erie, the eastern shores of Lake Huron and in the extreme southwest near the U.S. border.

Figure 2.2
Trend of Ozone One-Hour Maximum Concentrations in Ontario (1980 - 2003)



Note: Based on data from 17 ozone sites operated over 24 years.
Ontario 1h AAQC = 80 ppb.

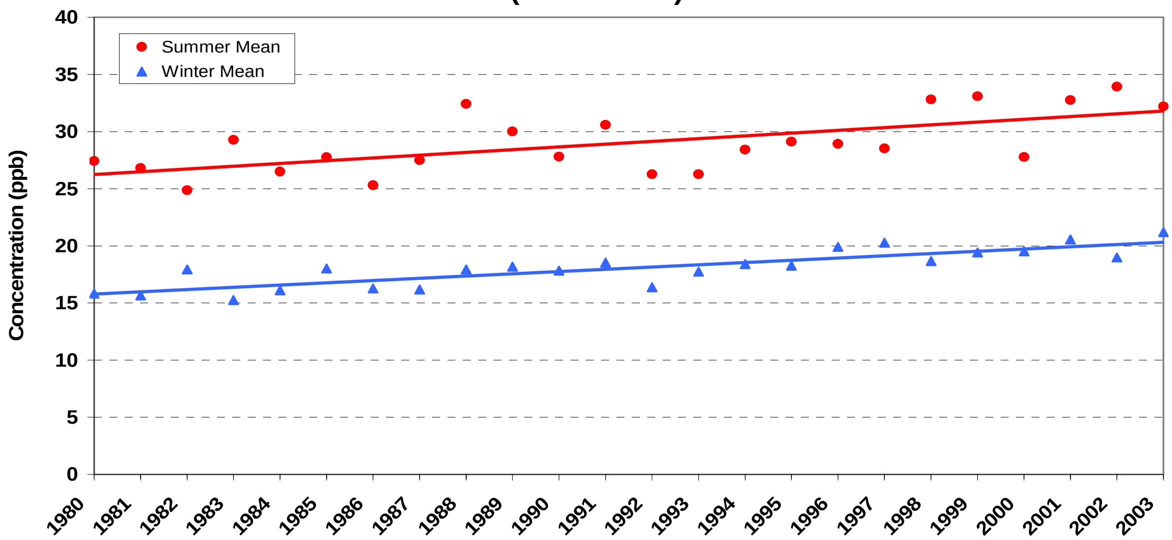
Trends

The annual one-hour maximum concentration of ozone is shown from 1980 to 2003 in Figure 2.2. For the 24-year period, the annual one-hour maximum concentrations range from 97 to 156 ppb, with the highest recorded in 1988. Overall, the data show random fluctuations but an overall decreasing trend in annual one-hour maximum concentrations of ozone from 1980 to 2003 is evident.

The trend of the ozone seasonal means (summer and winter) for the 17 (12 urban and five rural) long-term ozone sites for the period 1980 to 2003 is shown in Figure 2.3. It shows that there has been an increasing trend in the ozone seasonal means during the 24-year period. The ozone summer means have increased by approximately 21 per cent and the winter means by approximately 29 per cent over the 24-year period. The increase of the summer mean is significantly dependent on meteorological factors and the long-range transport of ozone and its precursors from the U.S., in addition to increase in background concentrations, whereas the increase of the winter mean indicates primarily an increase in background concentrations of ozone throughout Ontario. This increase in background ozone is similarly found in other areas across North America.

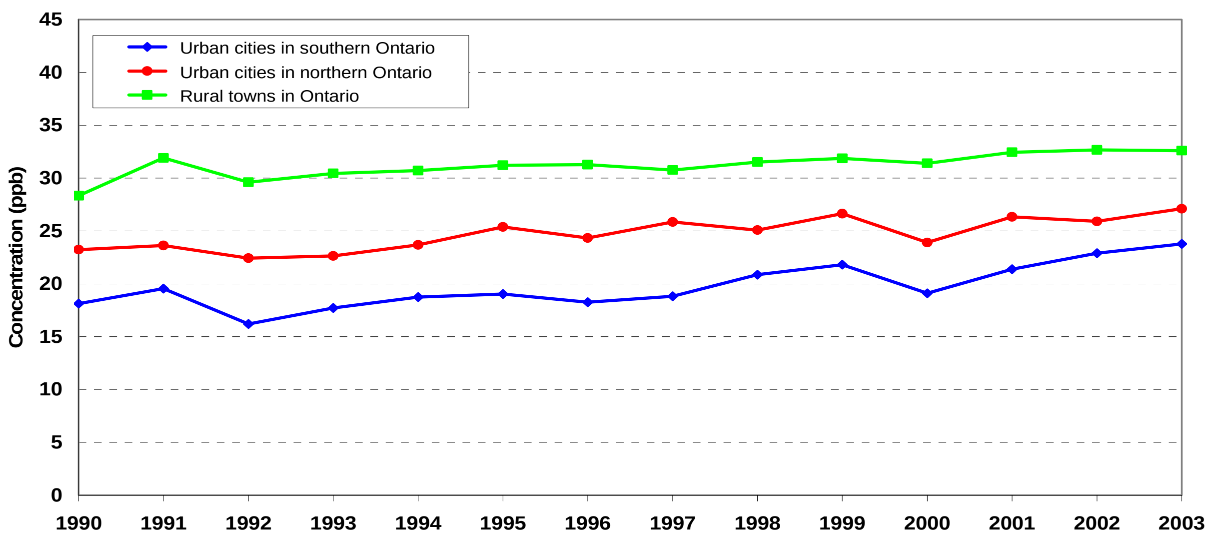
The trend of ozone annual means for urban and rural sites in Ontario for 1990 to 2003 is shown in Figure 2.4. It shows that the ozone annual mean concentrations for urban cities in southern Ontario are consistently about 5 ppb less than those of urban cities in northern Ontario and about 11 ppb less than those in rural Ontario. The destruction of ozone by nitric oxide, substantially present in urban areas, is the reason for the lower ozone concentrations in southern Ontario.

Figure 2.3
Trend of Ozone Seasonal Means at Sites Across Ontario
(1980 - 2003)



Note: Based on data from 17 ozone sites operated over 24 years;
Seasonal definitions - Summer (May to September); Winter (January to April, October to December).

Figure 2.4
Trend of Ozone Annual Means for Urban and Rural Ontario
(1990 - 2003)

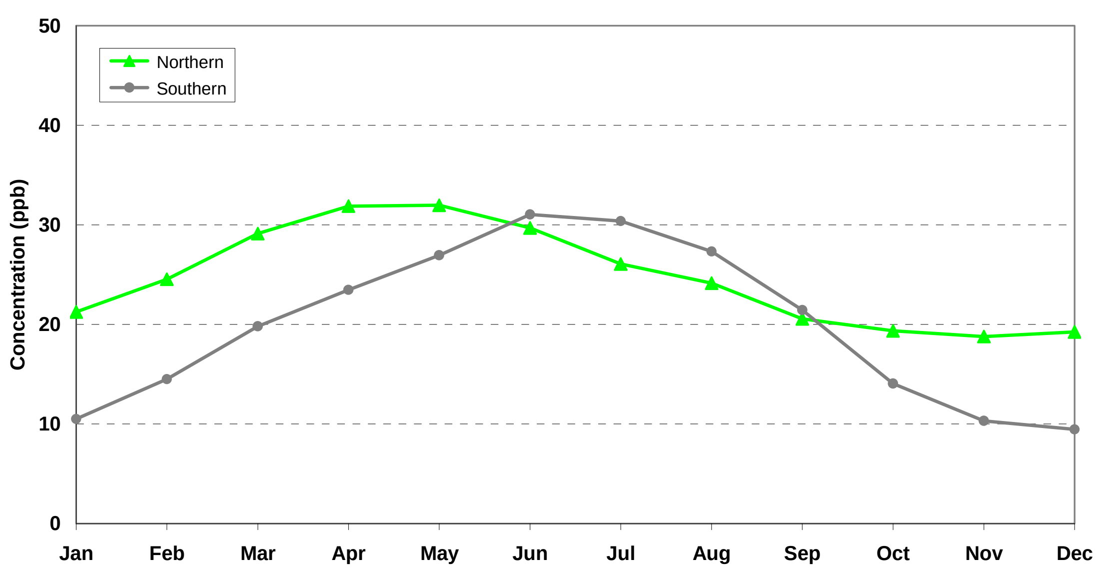


Note: Urban cities in southern Ontario - Windsor, London, Hamilton, Toronto;
Urban cities in northern Ontario - Thunder Bay, Sault Ste. Marie, Sudbury, North Bay;
Rural towns in Ontario - Grand Bend, Simcoe, Tiverton.

In Figure 2.5, the ozone monthly means are compared in southern and northern Ontario from 1990 to 2003. The ozone monthly mean concentrations are higher in northern Ontario during the cooler months of the year. For the month of January, ozone mean concentrations in the north are almost 11 ppb greater than those observed in the south. Among the possible scientific explanations, local emissions of nitric oxide are lower in the north, so there is less removal of ozone than in southern urban areas. Also, during late winter and early spring, there is greater potential for stratospheric ozone to be mixed into the troposphere in northern Ontario. During the summer months, ozone and its precursors are transported into southern Ontario from the mid-western U.S. causing ozone levels to rise in southern Ontario.

The trend in eight-hour average ozone levels is displayed in Figure 2.6 for eight locations over a 10-year period (1994 to 2003). This figure illustrates an increasing trend of the eight-hour ozone levels for the eight sites examined ranging from < 1 per cent increase in Windsor to 20 per cent increase in downtown Hamilton over the 10-year period. A low per cent change does not necessarily imply that levels are low, but as in the case of Windsor, the levels have been consistent over time. This observation is comparable with the ozone means increasing over the last two decades. The highest per cent increase of the eight-hour ozone levels occurred in Hamilton and Toronto.

Figure 2.5
Trend of Ozone Monthly Means in Southern and Northern Ontario (1990 - 2003)



Note: Northern - Thunder Bay, Sault Ste. Marie, Sudbury, North Bay; Southern - Windsor, London, Hamilton, Toronto.

Figure 2.6
Trend of 8-Hour Ozone Levels at Selected Sites in Ontario
Based on Annual 4th Highest 8-Hour Average
(1994 - 2003)

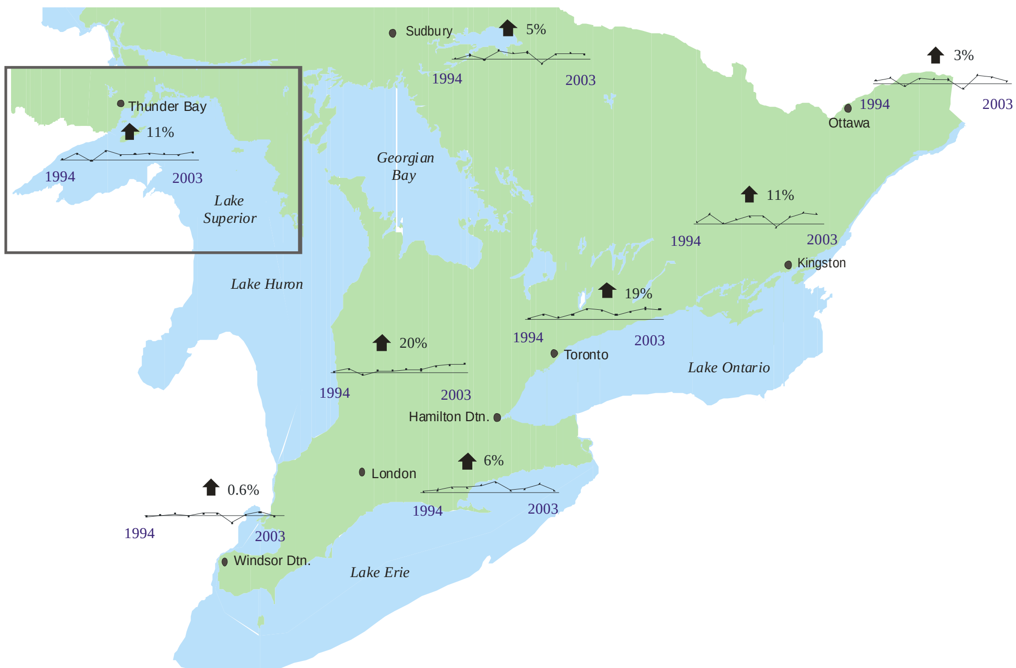
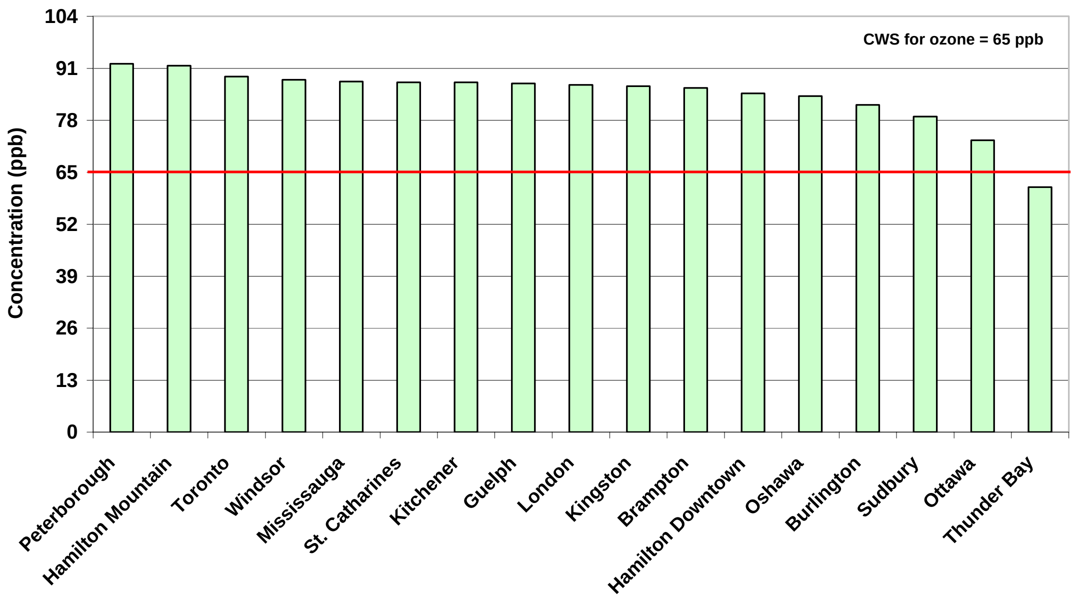


Figure 2.7
Ozone Levels at Selected Sites Across Ontario
4th Highest Ozone 8-Hour Daily Maximum
(2001 - 2003)



Note: Displayed sites are selected based on future requirements for Canada-wide Standard (CWS) reporting.
Toronto reporting is based on Toronto Downtown, Toronto North, Toronto East and Toronto West sites.

Ozone and the Canada-wide Standard (CWS)

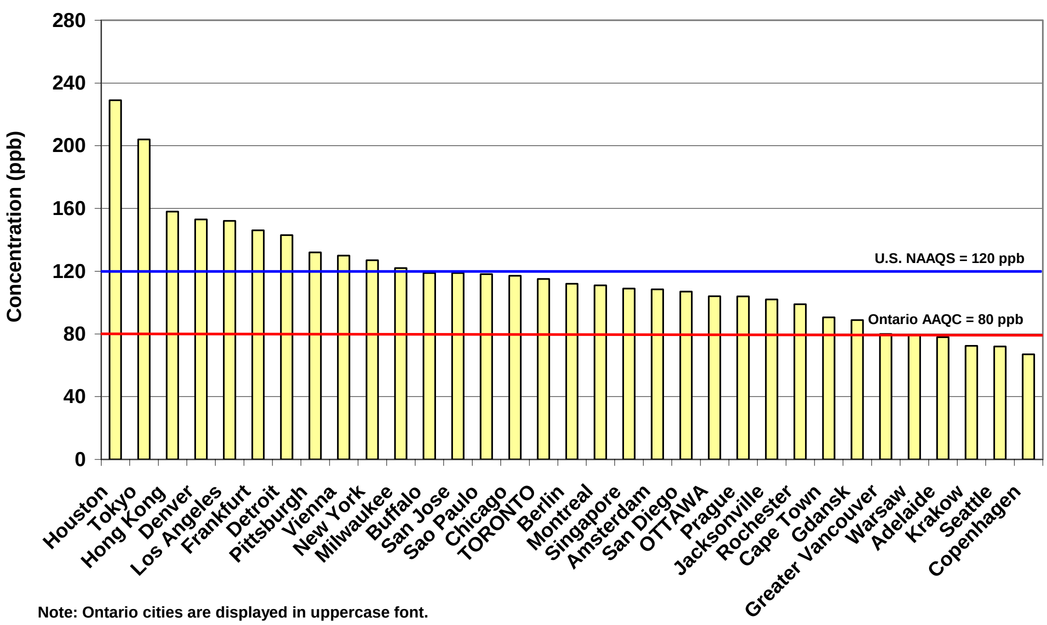
In 2000, the Canadian Council of Ministers of the Environment (CCME) developed a Canada-wide Standard (CWS) for ozone as a result of the pollutant's adverse effects on human health and the environment. As referenced in the *Guidance Document on Achievement Determination*, the CWS for ozone is 65 ppb, 8-hour running average time, based on the 4th highest annual ambient measurement averaged over three consecutive years. Jurisdictions are required to meet the CWS by 2010 and commence reporting on the achievement of the CWS for ozone by 2011. However, comprehensive reporting on progress toward meeting the CWS for ozone commences in 2006, therefore the following discussion and analysis focuses on the examination of the 4th highest annual ambient ozone measurements across Ontario from 2001 to 2003.

Figure 2.7 displays the 4th highest ozone 8-hour daily maximum for selected sites across Ontario averaged over a three-year period, 2001 to 2003. All of the sites exceeded 65 ppb, with the exception of Thunder Bay where the three-year average of the 4th highest ozone 8-hour daily maximum was 61 ppb.

International perspective

Figure 2.8 displays the ozone one-hour maximum concentration in 2003 for 33 cities world-wide. Houston recorded the highest ozone one-hour maximum reaching 229 ppb, while Copenhagen reported the lowest ozone one-hour maximum at 67 ppb. Eleven of the 33 cities examined in 2003 exceeded the U.S. National Ambient Air Quality Standard (NAAQS) ozone one-hour maximum concentration of 120 ppb on at least one occasion. The Ontario AAQC of 80 ppb was exceeded at the majority of cities examined.

Figure 2.8
Ozone One-Hour Maximum Concentrations for Selected Cities World-wide (2003)



Note: Ontario cities are displayed in uppercase font.

Chapter 3

Fine Particulate Matter

Airborne particulate matter is the general term used to describe a mixture of microscopic solid particles suspended in air. Particulate matter is characterized according to an aerodynamic size – mainly because of the different health effects associated with particles of different diameters. Fine particulate matter (or respirable particles) refer to particles that are 2.5 microns in diameter and less that may penetrate deep into the respiratory system.

Particles originate from many different industrial and transportation sources, as well as from natural sources. They may be emitted directly from a source or formed in the atmosphere by the transformation of gaseous emissions. This chapter discusses the ambient monitoring results from Ontario's fine particulate matter ($PM_{2.5}$) monitoring network.

Characteristics, sources and effects

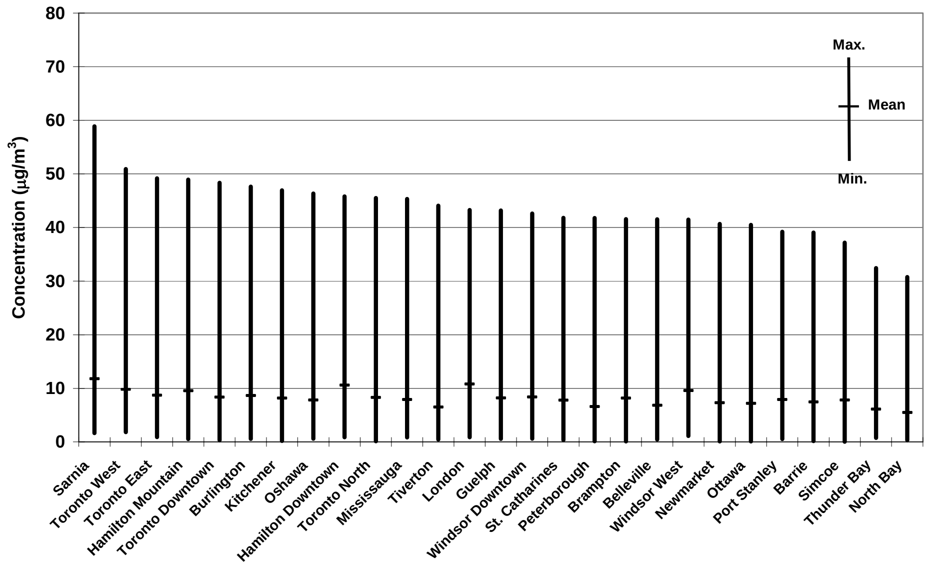
Particulate matter includes aerosols, smoke, fumes, dust, fly ash and pollen. Its composition varies with origin, residence time in the atmosphere, time of year and environmental conditions. Fine particulate matter may also be formed indirectly through a series of complex chemical reactions in the atmosphere and directly through fuel combustion (e.g. motor vehicles, power generation, industrial facilities, residential fireplaces and wood stoves, agricultural burning and forest fires). Significant amounts of $PM_{2.5}$ measured in southern Ontario are of transboundary origin. During periods of widespread elevated levels of $PM_{2.5}$, it is estimated that more than 50 per cent of fine particulate matter in Ontario comes from the U.S. The U.S. contribution to $PM_{2.5}$ concentrations in border cities is estimated to be as high as 90 per cent.

Exposure to $PM_{2.5}$ is associated with hospital admissions and several serious health effects, including premature death. People with asthma, cardiovascular or lung disease, as well as children and elderly people, are considered to be the most sensitive to the effects of $PM_{2.5}$. Adverse health effects have been associated with exposure to $PM_{2.5}$ during both short periods such as a single day, and longer periods of a year or more. Fine particulate matter may also be responsible for environmental impacts such as corrosion, soiling, damage to vegetation and reduced visibility.

Monitoring results in 2003

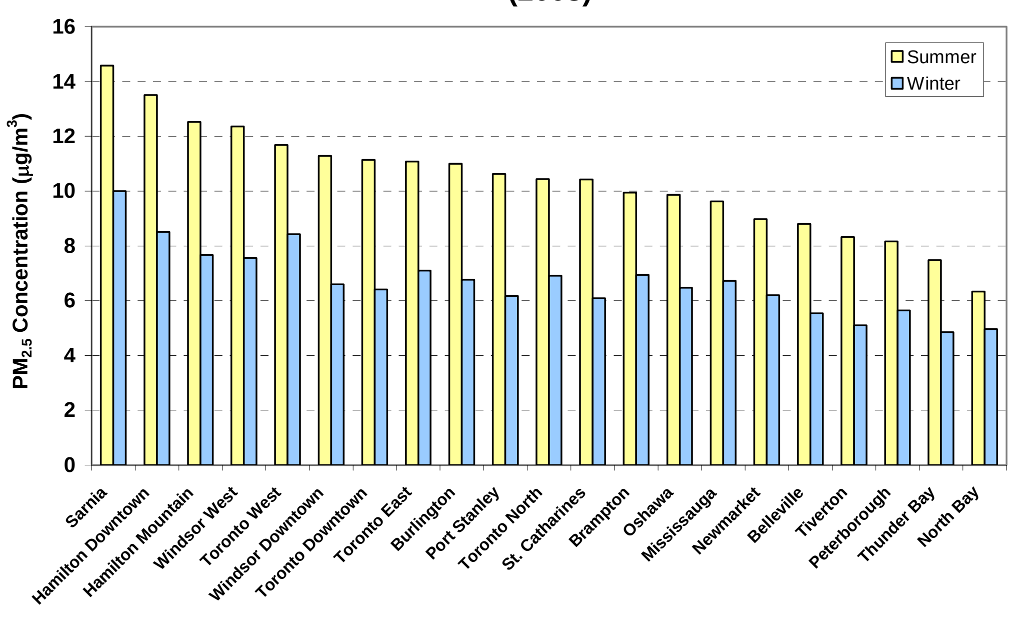
In 2003, continuous monitoring for $PM_{2.5}$ was conducted at 37 ambient monitoring locations; 27 sites provided sufficient data used for the analysis presented here. All of these monitoring sites operated a Tapered Element Oscillating Microbalance (TEOM) at 30°C with a Sample Equilibration System (SES) to measure the $PM_{2.5}$ concentrations on an hourly basis. The annual mean concentrations ranged from 5.5 $\mu g/m^3$ in North Bay to a maximum of 11.9 $\mu g/m^3$ in Sarnia. Sarnia also recorded the highest 24-hour average of 58.9 $\mu g/m^3$. The $PM_{2.5}$ reference level of 30 $\mu g/m^3$ for a 24-hour period (based on the Canada-wide Standard (CWS)) was exceeded at least once at all of the locations displayed in Figure 3.1. The provincial ambient average for $PM_{2.5}$ during 2003 was 8.2 $\mu g/m^3$.

Figure 3.1
Annual Statistics for 24-Hour $PM_{2.5}$
(2003)



Notes: $PM_{2.5}$ concentrations are measured by TEOM (Tapered Element Oscillating Microbalance).

Figure 3.2
Seasonal Distribution of $PM_{2.5}$ at Sites Across Ontario
(2003)



Note: $PM_{2.5}$ concentrations are measured by TEOM (Tapered Element Oscillating Microbalance);
Seasonal distribution based on an average of monthly means.
Seasonal definitions - Summer (May to September); Winter (January to April, October to December).

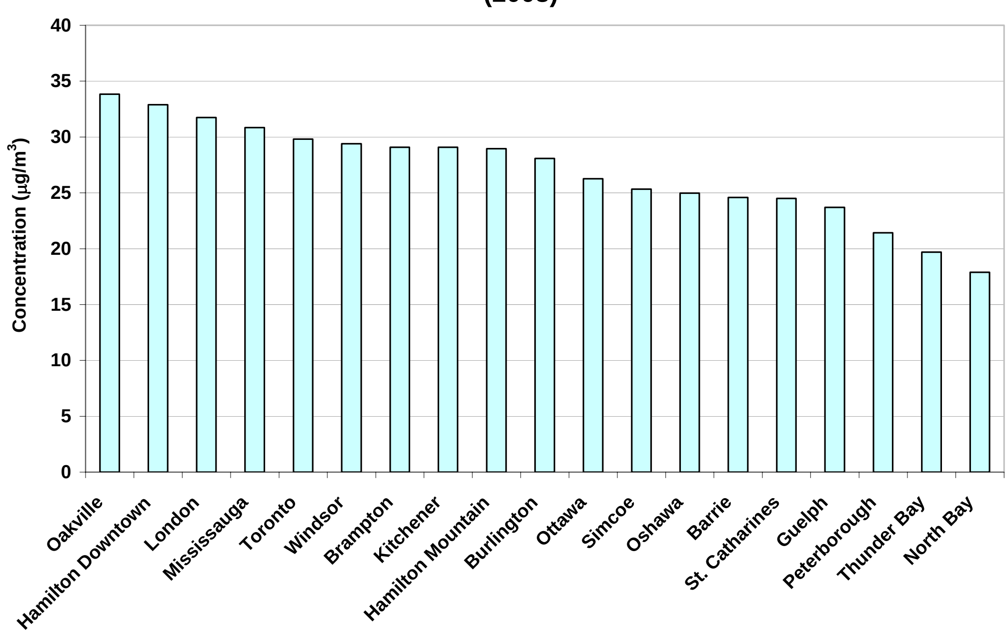
The seasonal variability of $PM_{2.5}$ is more distinct when comparing the summer and winter means for the 21 ambient sites that reported a full year of data during 2003 (Figure 3.2). The means in the summer months are much greater than the means of the winter months. The air monitoring site in Sarnia recorded the highest means during summer and winter seasons, 14.6 $\mu g/m^3$ and 10.0 $\mu g/m^3$, respectively. The lowest means were recorded at North Bay (6.3 $\mu g/m^3$) during the summer and Thunder Bay (4.9 $\mu g/m^3$) during the winter.

$PM_{2.5}$ and the Canada-wide Standard (CWS)

In 2000, the Canadian Council of Ministers of the Environment (CCME) developed a Canada-wide Standard (CWS) for $PM_{2.5}$ as a result of the pollutant's adverse effects on human health and the environment. As referenced in the *Guidance Document on Achievement Determination*, the CWS for $PM_{2.5}$ is 30 micrograms per cubic metre ($\mu g/m^3$), 24-hour averaging time, based on the 98^{th} percentile annual ambient measurement averaged over three consecutive years. Jurisdictions are required to meet the CWS by 2010 and commence reporting on the achievement of the CWS for $PM_{2.5}$ by year 2011. However, comprehensive reporting on progress toward meeting the CWS for $PM_{2.5}$ commences in 2006, hence, the following discussion and analysis mainly focus on the examination of $PM_{2.5}$ 98^{th} percentiles across Ontario in 2003.

Figure 3.3 displays the 98^{th} percentile $PM_{2.5}$ daily average for selected sites across Ontario in 2003. The 98^{th} percentiles ranged from 17.9 $\mu g/m^3$ in Thunder Bay to 33.8 $\mu g/m^3$ in Oakville. Four of the 19 ambient sites exceeded 30 $\mu g/m^3$.

Figure 3.3
$PM_{2.5}$ Levels in Selected Cities Across Ontario
98^{th} Percentile $PM_{2.5}$ Daily Average
(2003)

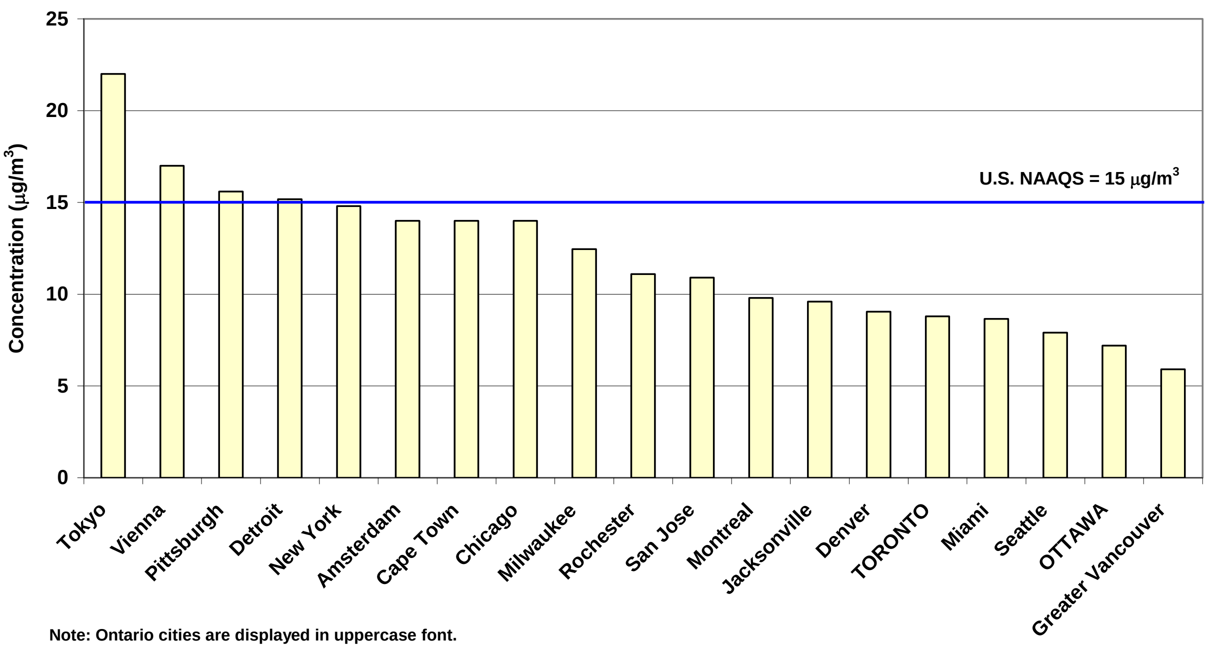


Note: $PM_{2.5}$ concentrations are measured by TEOM (Tapered Element Oscillating Microbalance);
Displayed sites are selected based on future requirements for Canada-wide Standard (CWS) reporting.

International perspective

Figure 3.4 displays $PM_{2.5}$ annual means in 2003 for 19 selected cities world-wide. Tokyo reported the highest annual mean $PM_{2.5}$ concentration (22.0 μg/m^3) for 2003. The annual U.S. NAAQS of 15 μg/m^3 was exceeded in four cities, Tokyo, Vienna, Pittsburgh and Detroit. The Greater Vancouver area recorded the lowest annual mean $PM_{2.5}$ concentration of 5.9 μg/m^3.

Figure 3.4
$PM_{2.5}$ Annual Means for Selected Cities World-wide (2003)



Note: Ontario cities are displayed in uppercase font.

Chapter 4

Other Criteria Contaminants

Characteristics, sources and effects of nitrogen dioxide (NO_2), carbon monoxide (CO), sulphur dioxide (SO_2), and total reduced sulphur (TRS) compounds are discussed in this chapter, as well as their ambient concentrations during 2003 and trends over time. A comparison of pollutant concentrations from an international perspective (where applicable) is also drawn and examined.

NITROGEN DIOXIDE

Characteristics, sources and effects

Nitrogen dioxide (NO_2) is a reddish-brown gas with a pungent and irritating odour, which transforms in the air to form gaseous nitric acid and nitrates. It also plays a major role in atmospheric reactions that produce ground-level ozone, a major component of smog. Nitrogen dioxide is also a precursor to nitrates, which contribute to levels of fine particulate matter in the atmosphere.

All combustion in air produces nitrogen oxides (NO_x), of which NO_2 is a significant component. Major sources of NO_x emissions include the transportation sector, fossil fuel power generation, primary metal production and incineration.

Nitrogen dioxide can irritate the lungs lowering the resistance to respiratory infection. People with asthma and bronchitis have increased sensitivity. Nitrogen dioxide chemically transforms into nitric acid in the atmosphere and, when deposited, contributes to lake acidification. Nitric acid can also corrode metals, fade fabrics, degrade rubber, and damage trees and crops.

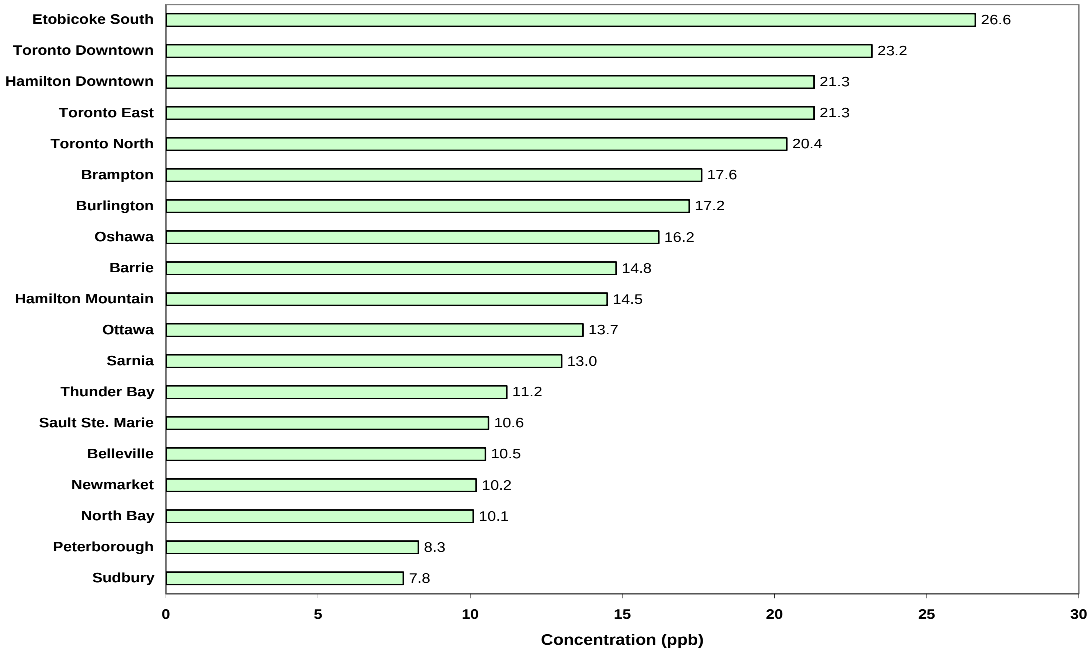
Monitoring results for 2003

Monitoring for NO_2 was conducted at 29 ambient locations in 2003; 19 sites provided sufficient data for an annual mean. Nitrogen dioxide annual means across Ontario are displayed in Figure 4.1. The Etobicoke South site, located in a heavily industrialized and vehicular traffic-influenced area of Toronto, recorded the highest annual mean (26.6 ppb) during 2003. Typically, the highest NO_2 means are recorded in large urbanized areas, such as the Golden Horseshoe area of southern Ontario including the Greater Toronto Area (GTA). The Toronto West air monitoring station recorded the highest 24-hour concentration (71 ppb) and the highest one-hour concentration (119 ppb) in 2003. The provincial 24-hour criterion of 100 ppb and one-hour criterion of 200 ppb for NO_2 were not exceeded at any of the monitoring locations in Ontario during 2003.

Trends

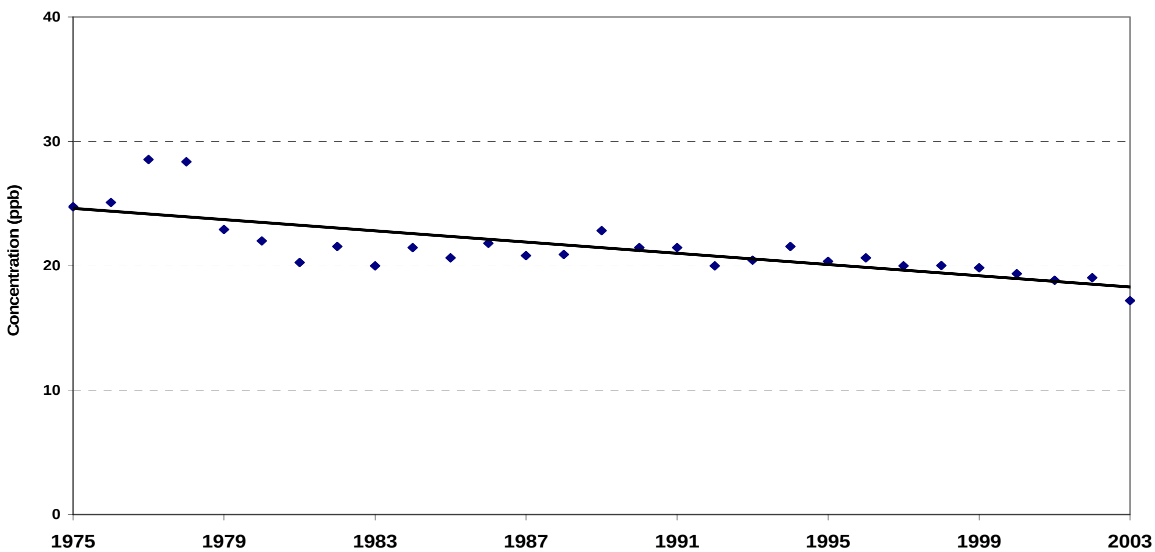
Provincial average ambient NO_2 concentrations show a decreasing trend for the period 1975 to 2003 (Figure 4.2). Average concentrations decreased by 26 per cent from 1975 to 2003.

Figure 4.1
Nitrogen Dioxide Annual Means Across Ontario
(2003)



Note: Data collected from ambient sites.

Figure 4.2
Trend of Nitrogen Dioxide Annual Means in Ontario
(1975 - 2003)



Note: Annual composite mean based on 11 ambient sites operated over 29 years.

International perspective

Figure 4.3 displays the NO_2 annual mean concentrations in 2003 for 32 cities world-wide. Los Angeles, Sao Paulo and New York reported the highest NO_2 annual means of 33.0 ppb, 31.1 ppb and 30.0 ppb, respectively. Adelaide recorded the lowest NO_2 annual mean of 5.0 ppb. The annual U.S. NAAQS of 53 ppb was not exceeded at any of the cities examined in 2003. Large urban centres such as Los Angeles, Sao Paulo and New York typically experience higher NO_2 levels due to population density and increased motor vehicle emissions.

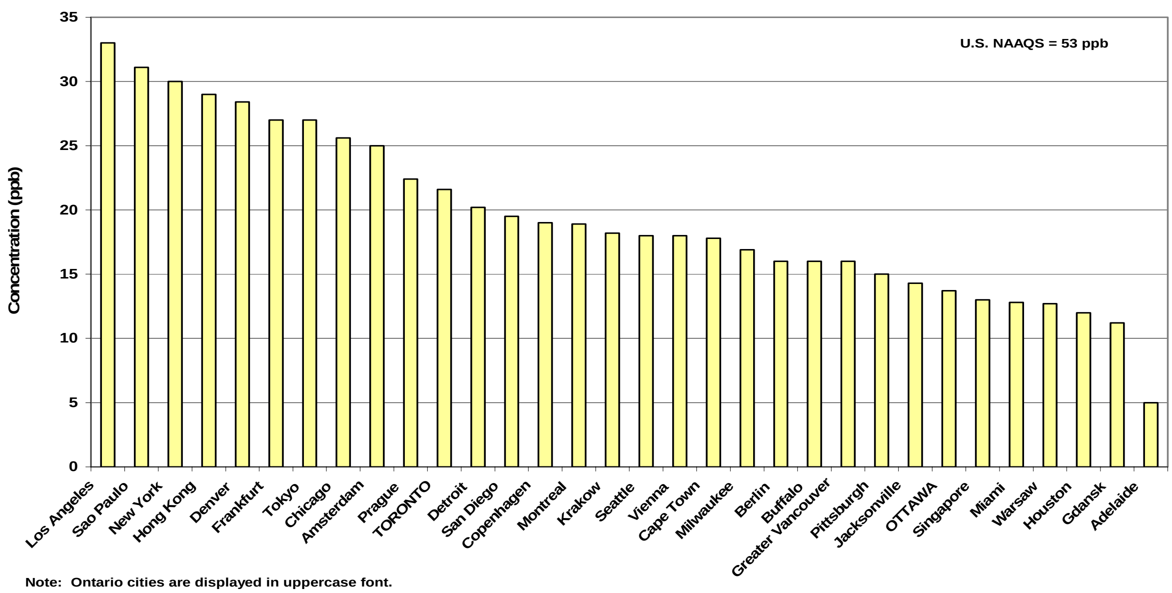
CARBON MONOXIDE

Characteristics, sources and effects

Carbon monoxide (CO) is a colourless, odourless, tasteless and, at high concentrations, a poisonous gas. This gas can enter the bloodstream and reduce oxygen delivery to the organs and tissues. People with heart disease are particularly sensitive. Exposure to high CO levels is linked with the impairment of vision, work capacity, learning ability and performance of complex tasks.

Carbon monoxide is produced primarily by the incomplete combustion of fossil fuels. The transportation sector is the main source of CO emissions.

Figure 4.3
Nitrogen Dioxide Annual Means for Selected Cities World-wide (2003)



Note: Ontario cities are displayed in uppercase font.

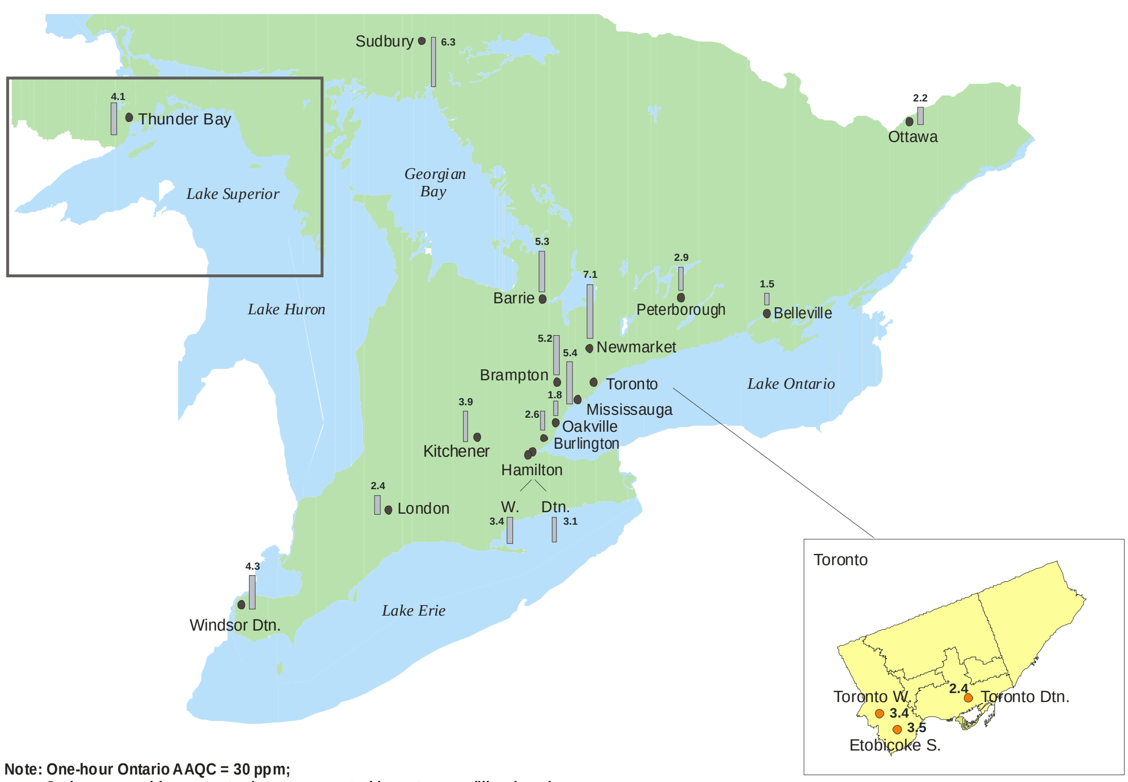
Monitoring results for 2003

Monitoring for CO was conducted at 19 ambient locations in 2003; 13 sites provided sufficient data for an annual mean. In 2003, the highest annual mean was 0.68 parts per million (ppm), recorded at the Brampton site. The highest one-hour maximum CO value (7.1 ppm) was measured at the Newmarket site (Figure 4.4). Mississauga recorded the highest eight-hour maximum value (3.3 ppm). Typically, the highest CO concentrations are recorded in large urban centres as a result of vehicle emissions. Ontario's one-hour (30 ppm) and eight-hour (13 ppm) ambient air quality criteria for CO have not been exceeded at any of the monitoring sites in Ontario since 1991.

Trends

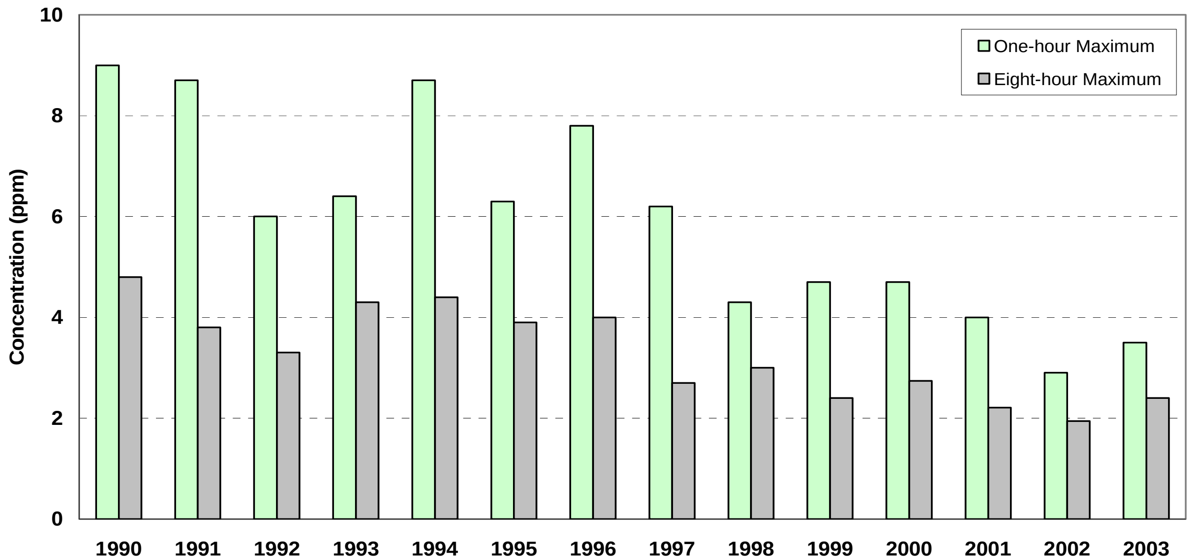
The trends in provincial averaged one-hour and eight-hour maximum CO concentrations for 1990 to 2003 are shown in Figure 4.5. Ambient CO concentrations, as measured by the composite average of the one and eight-hour maximums, decreased by 63 per cent and 55 per cent, respectively, over this 14-year period. The CO composite annual mean in 2003 was 26 per cent less than the corresponding 1994 composite mean.

Figure 4.4
Geographical Distribution of Carbon Monoxide One-Hour Maximum Concentrations Across Ontario (2003)



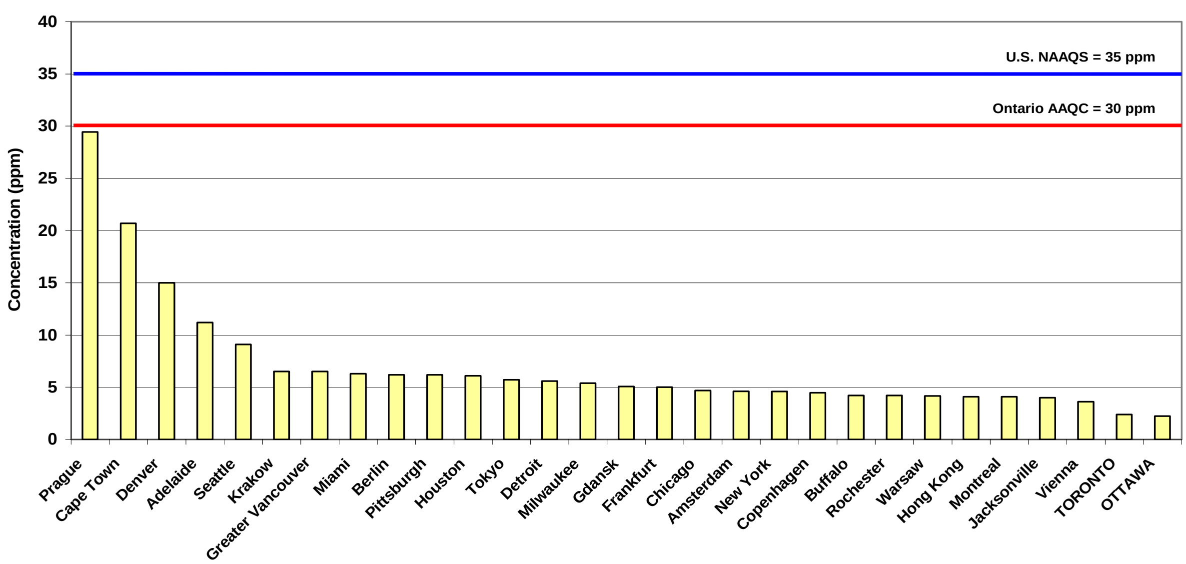
Note: One-hour Ontario AAQC = 30 ppm;
Carbon monoxide concentrations are reported in parts per million (ppm).

Figure 4.5
Trends of Carbon Monoxide
One-Hour and Eight-Hour Maximums in Ontario
(1990 - 2003)



Note: Data is based on 9 ambient CO sites operated over 14 years;
Ontario's one-hour AAQC = 30 ppm;
Ontario's eight-hour AAQC = 13 ppm.

Figure 4.6
Carbon Monoxide One-Hour Maximum Concentrations for Selected Cities World-wide
(2003)



Note: Ontario cities are displayed in uppercase font.

International perspective

Figure 4.6 displays the CO one-hour maximum concentrations in 2003 for 29 cities world-wide. Prague reported the highest CO one-hour maximum reaching 29 ppm. Toronto and Ottawa recorded the lowest CO maximums of less than 3 ppm. There were no exceedances of the Ontario AAQC of 30 ppm or the U.S. NAAQS of 35 ppm by any of the cities examined in 2003.

SULPHUR DIOXIDE

Characteristics, sources and effects

Sulphur dioxide (SO_2) is a colourless gas that smells like burnt matches. Sulphur dioxide can also be oxidized to form sulphuric acid aerosols. In addition, sulphur dioxide is a precursor to sulphates, which are one of the main components of airborne fine particulate matter.

Sulphur dioxide is emitted into the atmosphere from sources such as smelters, utilities, iron and steel mills, petroleum refineries, and pulp and paper mills. Lesser sources include transportation, residential, commercial and industrial space heating. The highest peak concentrations of SO_2 historically have been recorded in the vicinity of large, industrial facilities.

Health effects caused by exposure to high levels of SO_2 include breathing problems, respiratory illness, changes in the lung's defences, and worsening respiratory and cardiovascular disease. People with asthma, chronic lung disease or heart disease are the most sensitive to SO_2. Sulphur dioxide also damages trees and crops. Sulphur dioxide and NO_2 are the main precursors of acid rain, which contributes to the acidification of lakes and streams, accelerated corrosion of buildings, and reduced visibility. Sulphur dioxide also causes the formation of microscopic acid aerosols, which have serious health implications and contribute to climate change.

Monitoring results for 2003

Sulphur dioxide was monitored at 24 ambient locations in 2003; 18 sites provided sufficient data for the analysis presented here. Sarnia recorded the highest annual mean (7.1 ppb) and 24-hour maximum concentration (63 ppb) during 2003. The Sudbury site located at Science North, recorded the highest one-hour concentration (226 ppb). The provincial one-hour criterion (250 ppb) and 24-hour criterion (100 ppb) for SO_2 were not exceeded at any ambient sites in 2003.

Figure 4.7 shows the SO_2 annual means at ambient sites across Ontario. Sarnia recorded the highest annual mean in 2003. The annual levels across the province ranged from a low of 0.6 ppb in Thunder Bay to a high of 7.1 ppb in Sarnia. The annual criterion of 20 ppb for SO_2 was not exceeded at any site in Ontario during 2003.

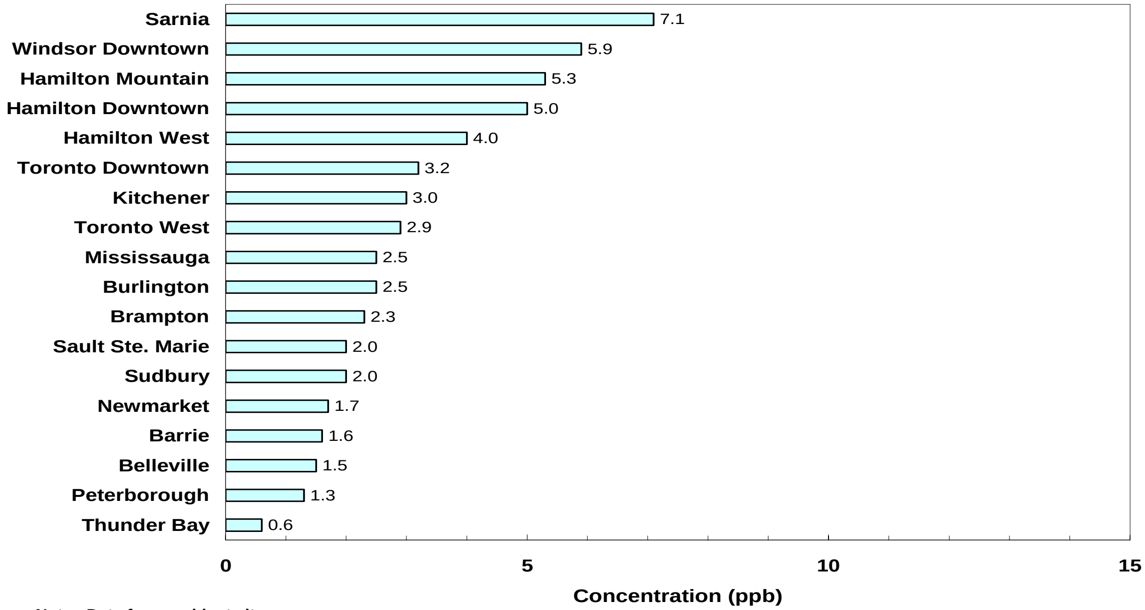
Trends

In 2003, average ambient SO_2 concentrations in the province were approximately 86 per cent lower than levels reported in 1971 (Figure 4.8). Ccontrol orders on smelting operations, and the Countdown Acid Rain program resulted in significant decreases of SO_2 emissions prior to the early 1990s.

International perspective

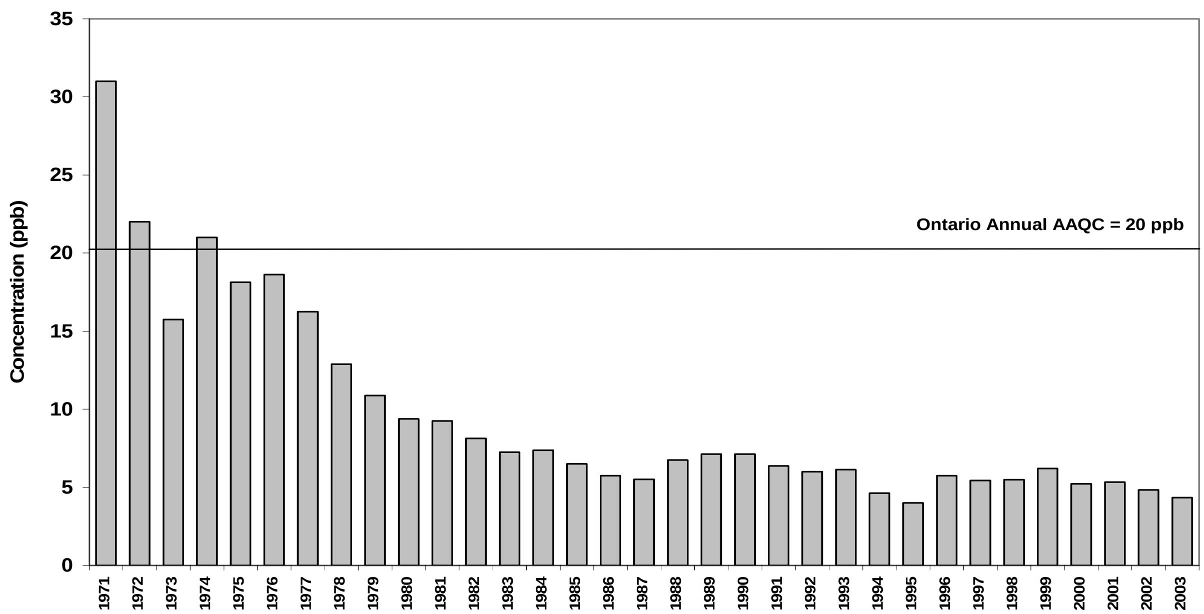
Figure 4.9 displays the SO_2 annual mean concentrations in 2003 for 32 cities world-wide. New York reported the highest annual mean (10 ppb). Adelaide recorded the lowest SO_2 annual mean of 1 ppb in 2003. All cities examined here were below the Ontario annual AAQC of 20 ppb and the U.S. annual NAAQS of 30 ppb.

Figure 4.7
Sulphur Dioxide Annual Means Across Ontario
(2003)



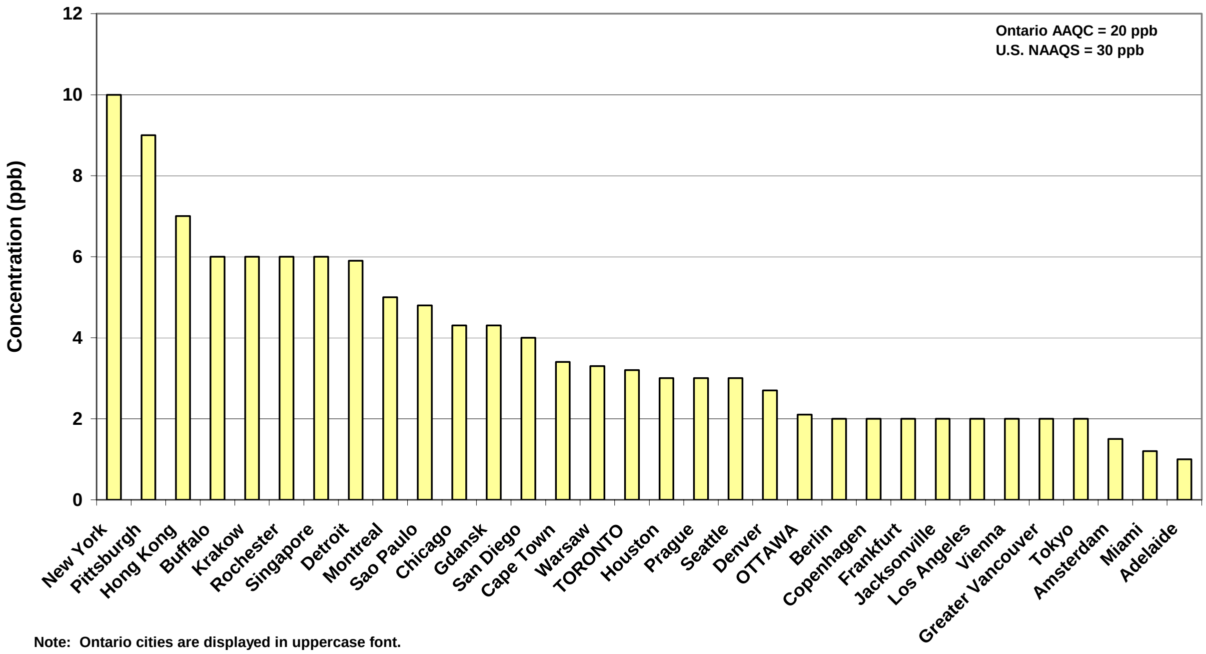
Note: Data from ambient sites;
Ontario annual AAQC for sulphur dioxide is 20 ppb.

Figure 4.8
33-Year Trend of Sulphur Dioxide Concentrations in Ontario
(1971 - 2003)



Note: Annual composite mean based on 8 ambient SO_2 sites operated over 33 years.

Figure 4.9
Sulphur Dioxide Annual Means for Selected Cities World-wide (2003)



Note: Ontario cities are displayed in uppercase font.

TOTAL REDUCED SULPHUR COMPOUNDS

Characteristics, sources and effects

Total reduced sulphur (TRS) compounds produce an offensive odour similar to rotten eggs or decomposed cabbage. Industrial sources of TRS compounds include the steel industry, pulp and paper mills, crude oil refineries and sewage treatment facilities. Natural sources include swamps, bogs and marshes.

Total reduced sulphur compounds are not normally considered a health hazard. They are, however, a primary cause of nuisance odours at some locations in the province.

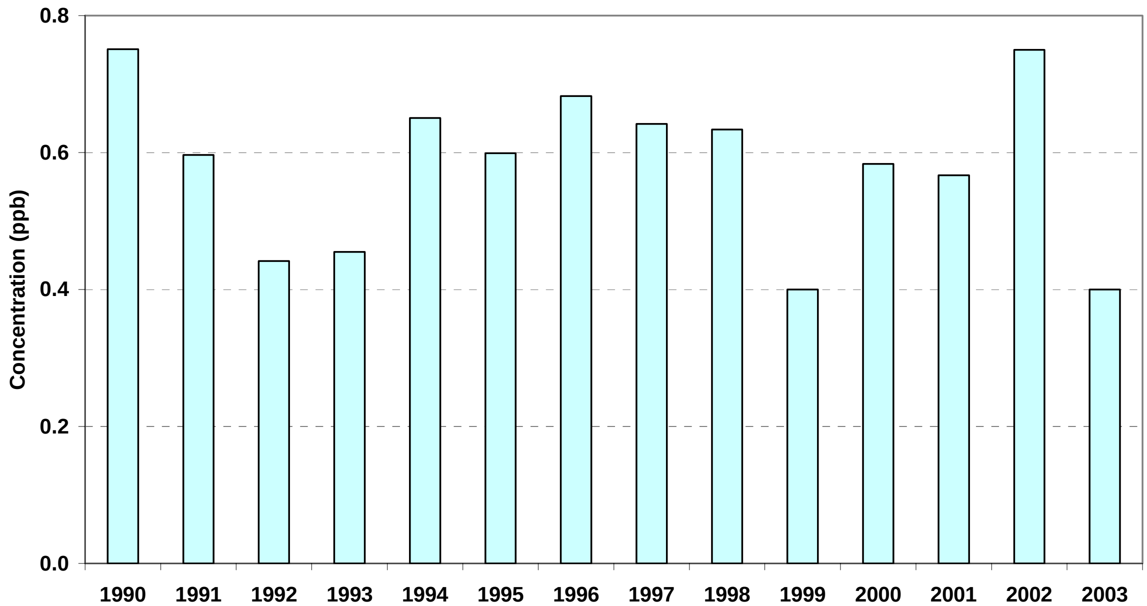
Monitoring results for 2003

Monitoring for TRS compounds was conducted at eight ambient locations in 2003; four sites provided sufficient data for an annual mean. The highest TRS annual mean (0.7 ppb) was recorded at the Sarnia air monitoring site. Of the eight TRS monitoring sites, Oakville had the greatest number of hours (3) above the AAQC of 27 ppb and the maximum one-hour TRS concentration (74 ppb) in 2003.

Trends

Provincial TRS annual mean concentrations at ambient monitoring sites from 1990 to 2003 are displayed in Figure 4.10. No trend was noted in the provincial means of ambient TRS levels shown over the last 14 years.

Figure 4.10
Total Reduced Sulphur Compounds Annual Means in Ontario
(1990 - 2003)



Note: Annual composite mean based on six ambient total reduced sulphur sites operated over 14 years.

Chapter 5

Air Quality Indices, Smog Alert Program and Smog Episodes

Air Quality Indices

The Ministry of the Environment operates an extensive network of air quality monitoring sites across the province. In 2003, 37 of these sites in 24 urban centres and seven rural areas formed the basis of the Air Quality Index (AQI) network. This includes Belleville which was added to the AQI network in 2003. The Air Quality Office of the Environmental Monitoring and Reporting Branch continually obtains data for several criteria pollutants from these 37 sites.

The AQI network, shown in Figure 5.1, provides the public with air quality information, in near real-time, from across the province. The AQI is based on pollutants that have adverse effects on human health and the environment. The pollutants are ozone (O_3), fine particulate matter ($PM_{2.5}$), nitrogen dioxide (NO_2), carbon monoxide (CO), sulphur dioxide (SO_2), and total reduced sulphur (TRS) compounds. At the end of each hour, the concentration of each pollutant measured at a particular site is converted into a number ranging from 1 upwards using a common scale or index. The calculated number for each pollutant is called a sub-index.

At a given site, the highest sub-index for any given hour becomes the AQI reading. The index is a relative scale, in that, the lower the index, the better the air quality. The index values, corresponding categories and potential health and environmental effects, are shown in Table 5.1.

If the AQI value is below 32, the air quality is categorized as good. For AQI values in the 32-49 range (moderate category), there may be some adverse effects on very sensitive people. For index values in the 50-99 range (poor category), the air quality may have adverse effects on sensitive members of human and animal populations, and may cause significant damage to vegetation and property. With an AQI value of 100 or more (very poor category), the air quality may have adverse effects for a large proportion of those exposed.

Figure 5.1
Air Quality Index Monitoring Sites in Ontario
(2003)

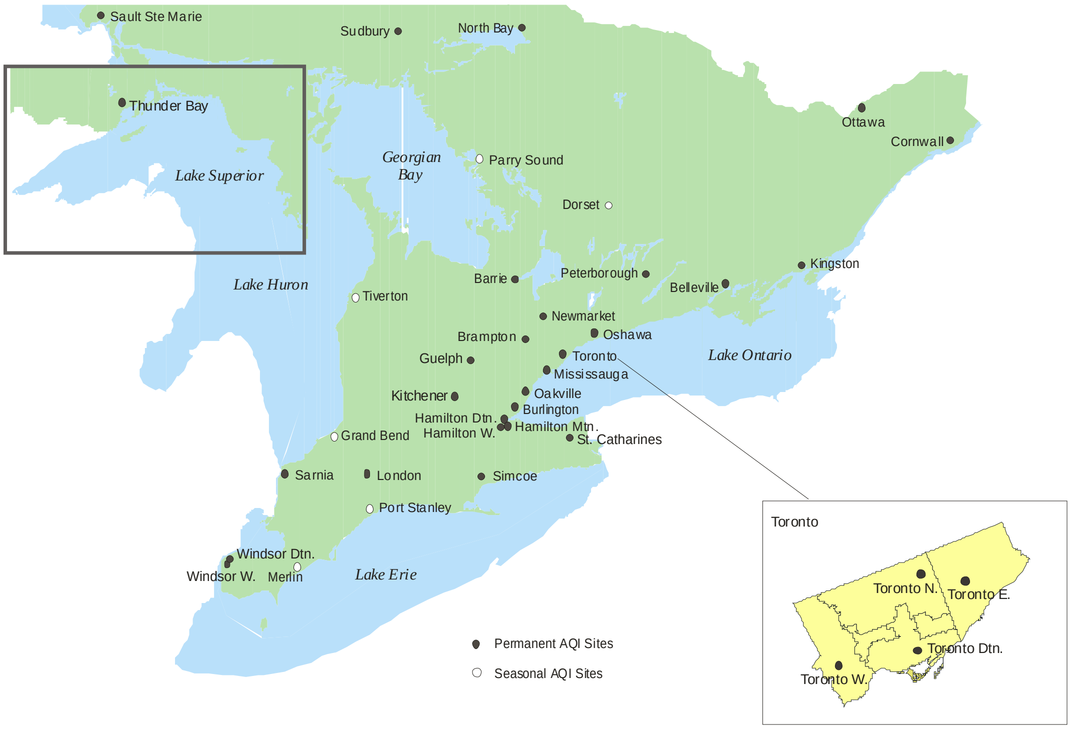


Table 5.1: Air Quality Index Pollutants and Their Impacts

Index	Category	Ozone (O_3)	Fine Particulate Matter ($PM_{2.5}$)	Nitrogen Dioxide (NO_2)	Carbon Monoxide (CO)	Sulphur Dioxide (SO_2)	Total Reduced Sulphur (TRS) Compounds
1-15	Very good	No known harmful effects	Sensitive populations may want to exercise caution	No known harmful effects	No known harmful effects	No known harmful effects	No known harmful effects
16-31	Good	No known harmful effects	Sensitive populations may want to exercise caution	Slight odour	No known harmful effects	Damages some vegetation in combination with ozone	Slight odour
32-49	Moderate	Respiratory irritation in sensitive people during vigorous exercise; people with heart/lung disorders at some risk; damages very sensitive plants	People with respiratory disease at some risk	Odour	Blood chemistry changes, but no noticeable impairment	Damages some vegetation	Odour
50-99	Poor	Sensitive people may experience irritation when breathing and possible lung damage when physically active; people with heart/lung disorders at greater risk; damages some plants	People with respiratory disease should limit prolonged exertion; general population at some risk	Air smells and looks brown. Some increase in bronchial reactivity in people with asthma	Increased symptoms in smokers with heart disease	Odourous; increasing vegetation damage	Strong odour
100-over	Very poor	Serious respiratory effects, even during light physical activity; people with heart/lung disorders at high risk; more vegetation damage	Serious respiratory effects even during light physical activity; people with heart disease, the elderly and children at high risk; increased risk for general population	Increasing sensitivity for people with asthma and bronchitis	Increasing symptoms in non-smokers with heart diseases; blurred vision; some clumsiness	Increasing sensitivity for people with asthma and bronchitis	Severe odour; some people may experience nausea and headaches

Computed air quality indices, or AQI values, and air quality forecasts are released to the public and news media at set times each day. The public can access the index values by calling the ministry's air quality information Integrated Voice Response (IVR), English recording: 1-800-387-7768, or in Toronto, 416-246-0411, and French recording: 1-800-221-8852. The AQI values can also be obtained from the ministry's Web site: www.airqualityontario.com. Air quality forecasts, based on regional meteorological conditions and current pollution levels in Ontario and bordering U.S. states, are also provided daily on this Web site.

Table 5.2 shows the percentage distribution of hourly AQI values for the 37 monitoring sites by the AQI descriptive category and the pollutant responsible for the AQI above 49. On average, the AQI sites in 2003 reported air quality in the good and very good categories approximately 90 per cent of the time and moderate to poor air quality about 10 percent of the time. However, air quality in the very good to good categories recorded at individual sites ranged from approximately 83 percent at Port Stanley, a rural site on the northern shore of Lake Erie, to 96 per cent at Thunder Bay. There were no hours of very poor air quality recorded at air quality index sites in Ontario during 2003.

Table 5.2: Air Quality Index Summary (2003)

Station ID	City/Town	Percentage of Valid Hours AQI in Range					Valid Hours	Percentage of Valid Hours Pollutant Responsible for AQI > 49						No. of Days At Least 1h AQI > 49
		Very Good	Good	Moderate	Poor	Very Poor								
		0-15	16-31	32-49	50-99	100+		O_3	$PM_{2.5}$	NO_2	CO	SO_2	TRS	
12008	WINDSOR DOWNTOWN	45.0	43.7	10.1	1.2	0.0	8575	< 1	< 1	0	0	0	X	17
12016	WINDSOR WEST	44.0	43.0	11.6	1.4	0.0	8728	1.0	< 1	0	X	0	0	18
13021	MERLIN	33.2	52.8	12.6	1.4	0.0	7118	1.2	< 1	X	X	X	X	20
14064	SARNIA	27.3	59.3	11.8	1.5	0.0	8469	< 1	1.2	0	X	0	0	20
15020	GRAND BEND	28.1	62.8	8.3	0.8	0.0	8585	< 1	< 1	X	X	X	X	12
15025	LONDON	34.1	53.2	11.7	1.0	0.0	8671	< 1	< 1	0	0	0	X	17
16015	PORT STANLEY	20.0	63.4	14.8	1.8	0.0	8539	1.5	< 1	X	X	X	X	23
18007	TIVERTON	21.0	67.6	10.4	1.0	0.0	8453	< 1	< 1	X	X	X	X	13
22071	SIMCOE	22.1	62.7	13.7	1.5	0.0	8474	1.4	< 1	0	X	X	X	18
26060	KITCHENER	31.6	56.1	11.2	1.1	0.0	8693	< 1	< 1	0	0	0	X	15
27067	ST. CATHARINES	40.2	49.5	9.4	0.9	0.0	8725	< 1	< 1	0	0	0	X	9
28028	GUELPH	42.2	51.0	6.1	0.7	0.0	8516	< 1	< 1	0	X	X	X	8
29000	HAMILTON DOWNTOWN	41.2	45.6	12.0	1.1	0.0	8704	< 1	< 1	0	0	0	0	22
29114	HAMILTON MOUNTAIN	28.9	56.5	13.0	1.6	0.0	8604	< 1	< 1	0	X	0	0	19
29118	HAMILTON WEST	45.5	45.1	8.5	1.0	0.0	8714	< 1	< 1	0	0	0	0	17
31103	TORONTO DOWNTOWN	45.0	45.3	8.4	1.1	0.0	8682	< 1	< 1	0	0	0	X	12
33003	TORONTO EAST	45.8	45.3	8.0	0.9	0.0	8650	< 1	< 1	0	0	0	X	12
34020	TORONTO NORTH	39.2	51.9	7.8	0.9	0.0	8607	< 1	< 1	0	X	X	X	11
35125	TORONTO WEST	50.6	40.3	8.4	0.8	0.0	8700	< 1	< 1	0	0	0	X	15
44008	BURLINGTON	42.5	48.5	8.1	0.8	0.0	8668	< 1	< 1	0	0	0	X	11
44017	OAKVILLE	37.4	51.0	10.1	1.5	0.0	8725	< 1	< 1	0	0	0	< 1	22
45025	OSHAWA	38.2	55.3	5.7	0.8	0.0	8710	< 1	< 1	0	X	X	X	10
46089	BRAMPTON	35.6	54.2	9.2	1.0	0.0	8716	< 1	< 1	0	0	0	X	13
46110	MISSISSAUGA	42.7	48.0	8.4	0.9	0.0	8667	< 1	< 1	0	0	0	X	13
47045	BARRIE	42.2	50.3	7.0	0.5	0.0	8688	< 1	< 1	0	0	0	X	5
48006	NEWMARKET	27.5	62.5	9.2	0.8	0.0	8706	< 1	< 1	0	0	0	X	10
49005	PARRY SOUND	31.9	57.0	10.2	1.0	0.0	6503	< 1	< 1	X	X	X	X	10
49010	DORSET	30.4	62.2	7.3	0.2	0.0	8414	< 1	< 1	X	X	X	X	5
51001	OTTAWA	40.0	52.4	7.3	0.3	0.0	8317	< 1	< 1	0	0	0	X	5
52020	KINGSTON	40.4	50.9	7.9	0.7	0.0	8703	< 1	< 1	X	X	X	X	11
54012	BELLEVILLE	31.7	56.6	10.4	1.2	0.0	8683	1.2	< 1	0	0	0	X	15
56051	CORNWALL	37.4	54.3	7.6	0.7	0.0	8620	< 1	< 1	X	X	X	X	8
59006	PETERBOROUGH	29.4	61.4	8.3	0.8	0.0	8720	< 1	< 1	0	0	0	X	11
63200	THUNDER BAY	39.6	56.3	4.1	0.0	0.0	8732	0	< 1	0	0	0	0	1
71068	SAULT STE. MARIE	45.3	47.6	7.1	0.1	0.0	8713	< 1	< 1	0	X	0	0	4
75010	NORTH BAY	37.2	56.9	5.7	0.3	0.0	8597	< 1	< 1	0	X	X	X	7
77203	SUDBURY	36.0	58.8	4.9	0.3	0.0	8674	< 1	X	0	0	0	X	5

Figure 5.2 shows the composite pie diagrams of the percentages of very good, good, moderate and poor air quality recorded at sites across the province. The pie diagram on the left shows category percentages. The diagram on the right breaks down the poor air quality slice into percentages of pollutants associated with the AQI above 49. Ozone accounted for 63.1 per cent of the number of poor air quality hours recorded during 2003 at the AQI sites and $PM_{2.5}$ accounted for 36.8 per cent. Total reduced sulphur compounds accounted for less than 1 per cent of the poor air quality values.

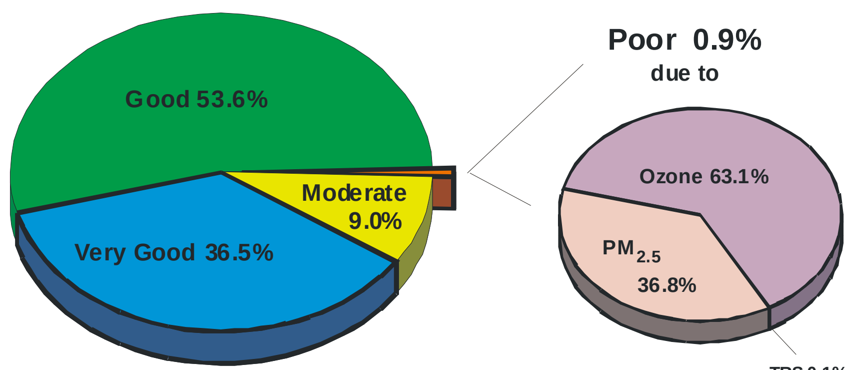
Smog alert program

The ministry began issuing smog advisories in 1993 under the Air Quality Advisory program. The program was revised in 1995, and then expanded to the Smog Alert program in 2000. The program is a joint effort between the Ontario Ministry of the Environment and Environment Canada. Smog advisories are issued to the public when widespread, elevated and persistent smog levels are forecast to occur within the next 24 hours, *or* if elevated smog conditions occur without warning and weather conditions conducive to elevated smog levels are forecast to continue for several hours. The smog advisory program covers southern, eastern and central Ontario where ozone levels are most likely to exceed the one-hour AAQC of 80 ppb and $PM_{2.5}$ levels of 45 $\mu g/m^3$ three-hour running average.

The Smog Alert program provides Ontarians with improved reporting through comprehensive and timely air quality readings and forecasts, and includes the following:

- A two-level air quality forecast that provides a three-day outlook known as a smog watch, in addition to the current 24-hour smog advisory;
- A Smog Watch is called when there is a 50 per cent chance that widespread, elevated and persistent smog levels are forecast within the next three days;
- A Smog Advisory is called when there is a strong likelihood that widespread elevated and persistent smog levels are forecast within the next 24 hours;
- If widespread, elevated smog levels occur without warning and weather conditions conducive to the persistence of such levels are forecast to continue for several hours, then a smog advisory is issued immediately;

Figure 5.2
Air Quality Index Summary
(2003)



- A public Web site www.airqualityontario.com, where current AQI readings, smog forecasts and other air quality information are available;
- Direct e-mails of smog alerts to subscribers of the ministry's Smog Alert network at the above Web site;
- Reporting of AQI at rural sites impacted by transboundary smog; and
- Toll-free numbers by which anyone at anytime can get updated information on the air quality (1-800-387-7768 in English and 1-800-221-8852 in French).

Co-operative activities with Michigan and Quebec

Since May 2000, during the traditional smog season from May to September, air quality and meteorological discussions between Michigan and Ontario meteorologists are held twice per week or more frequently if there is potential for a smog advisory in Ontario or an ozone action day in Michigan. Although ozone action days in Michigan and smog advisories in Ontario are not linked to the same air quality standards, the weather conditions conducive to high levels of smog are often common to both airsheds, particularly in the Detroit-Windsor area.

The issuances of smog advisories in Ontario and in Quebec under their Info-Smog program during the smog season are also harmonized through discussions when required between Ontario meteorologists and the Meteorological Services of Canada, Quebec Region meteorologists for border regions such as Ottawa, Ontario and Gatineau, Quebec.

2003 smog advisories

For the 2003 traditional smog season (May 1 to September 30 inclusive), Ontarians experienced 6 smog advisories covering 17 days, and for the entire year, 7 smog advisories covering 19 days. Outside of the traditional smog season, a two-day smog advisory due to fine particulate matter was issued for the first time. This occurred on October 10 and 11, 2003, and was confined only to the Hamilton area. Of the smog advisories issued in 2003, the first one was a five-day event, covering June 22-26, 2003. This was followed by a four-day episode, July 1 to July 4 inclusive, and five two-day events (July 25-26, July 31-August 1, August 14-15, August 20-21 and October 10-11).

The number of smog advisory days in 2003 was lower than that of the previous two years which had summers that were relatively hot and dry. For the province as a whole, there were 23 smog advisory days in 2001 and 27 such days in 2002. Near seasonal weather conditions prevailed over much of southern Ontario during summer 2003 and this was reflected in the number of days that smog advisories were issued. In contrast, the cool and wet summer of 2000 had only 4 smog advisory days for the entire province. A history of smog advisories and smog advisory days since 2000 is shown in Figure 5.3.

2003 smog episodes

Summer smog episodes in Ontario are often a part of a regional weather condition that prevails over much of northeastern North America. Elevated levels of ozone and $PM_{2.5}$ are typically due to weather patterns that affect the lower Great Lakes region. Such weather patterns are invariably associated with slow moving high pressure cells across the region and result in the long-range transport of smog pollutants from neighbouring U.S. industrial and urbanized states during warm south to southwesterly air flow conditions.

The first smog episode of 2003 occurred somewhat later in the season, during the period June 22 and 26, 2003. It was one of the most persistent and widespread smog events in recent years. Hot, sunny conditions with light southerly winds blowing air pollution from the U.S. into the province began to impact the extreme south-western regions on June 22, and this resulted in elevated smog levels in areas as far north as Sault Ste. Marie. On June 23, the hot, muggy and polluted air expanded into the Greater

Toronto Area and as far north as North Bay and Sudbury. This continued over the next three days, June 24, 25 and 26, with elevated smog levels over most of southern, eastern and northern regions. Relief came on the night of June 26 as a cold front moved across the impacted areas, bringing clouds, showers and thunderstorms, and resulted in cleaner air on June 27. The maximum one-hour ozone level on June 22 was 90 ppb, and this occurred in Windsor. On June 23, the maximum one-hour ozone level was 129 ppb at Port Stanley on the northern shore of Lake Erie. On June 24 and June 25, the maximum one-hour ozone levels of 146 ppb and 149 ppb respectively occurred at Belleville on the north shore of Lake Ontario. On June 26, the maximum one-hour ozone level was 118 ppb and this occurred at Peterborough.

In this episode, three AQI sites reported poor air quality, all due to ozone, on June 22. A total of 21 AQI sites reported poor air quality on June 23 (19 had elevated ozone levels and 2 had elevated fine particulate matter). On June 24 and 25, 35 of the 37 AQI sites in the province reported poor air quality (34 had elevated ozone levels and one fine particulate matter on June 24, and 35 had elevated ozone levels and 16 fine particulate matter on June 25). On the last day of the episode, 32 AQI sites reported poor air quality (31 with elevated ozone and 29 with elevated fine particulate matter). Figure 5.4 illustrates the time history of ozone and fine particulate matter during this multi-day episode for Windsor. The one hour ozone criterion of 80 ppb was exceeded on the first four days of the episode, June 22 to June 25 inclusive. As the air mass aged, fine particulate matter levels gradually increased each day during the episode and exceeded the $PM_{2.5}$ reference level of 30 $\mu g/m^3$ for a 24-hour period (based on CWS) on June 24 and 25.

The North American electrical blackout during August 14 and 15, 2003 was also noteworthy here in Ontario as it occurred during a period of anticipated elevated smog conditions. The electrical blackout which began on the afternoon of August 14, 2003 a strong high pressure over the Great Lakes region provided quasi-stationary conditions and the build-up of pollutants over areas of south-western Ontario. Accordingly, a smog advisory was issued early that afternoon for the Windsor-Essex-Chatham-Kent area just prior to the electrical blackout. Ozone levels that afternoon in Windsor reached a peak value of 86 ppb. On the following day, August 15, elevated levels of ozone were recorded at a number of sites

Figure 5.3
Summary of Smog Advisories Issued
(2000 - 2003)

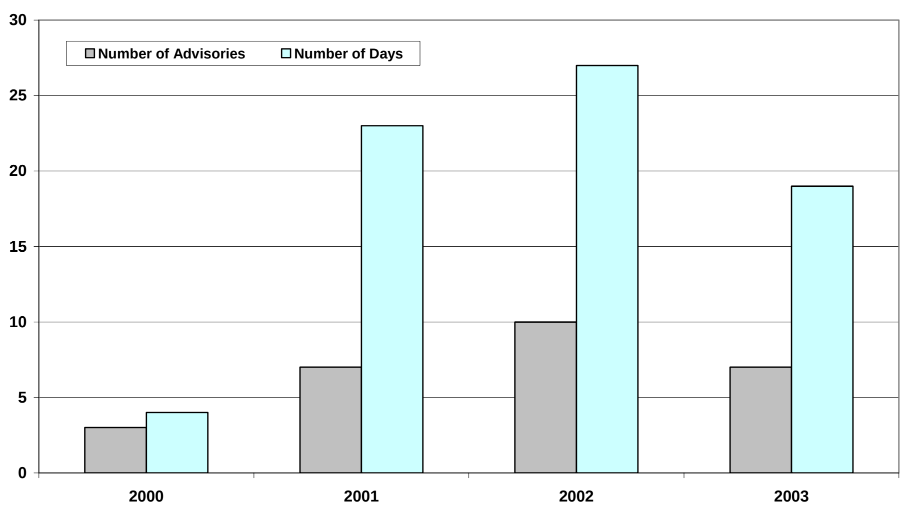
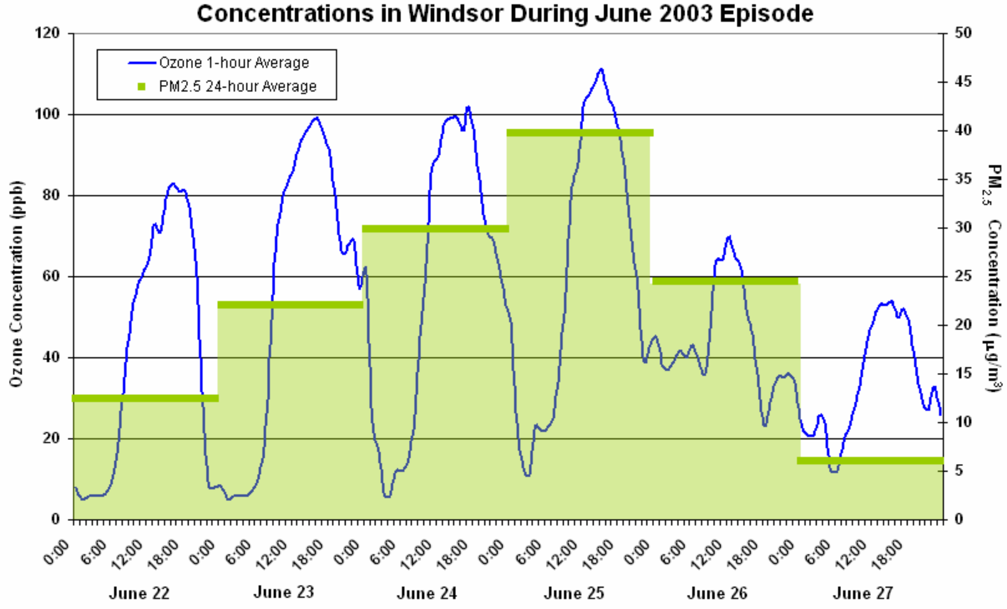


Figure 5.4
One-Hour Average Ozone Concentrations and 24-Hour Average $PM_{2.5}$ Concentrations in Windsor During June 2003 Episode



across Ontario – maximum hourly values of 81 ppb at Simcoe, 84 ppb at Oakville, 113 ppb at Belleville and 82 ppb at Kingston. Increased cloudiness along with unstable and unsettled weather conditions prevailed by August 16 and resulted in cleaner air, and a termination of the smog advisory. The fact that widespread poor air quality was observed over southern Ontario in both urban and rural locations on August 15 despite the electrical blackout, reduction of industrial activities and air emissions in Ontario suggests that trans-boundary pollution may still have been significant on that day. Under normal conditions (i.e. no blackout), air quality levels in Ontario would have likely been worse on August 15.

The fine particulate smog episode outside of the traditional smog season occurred on October 9, 10 and 11, and was confined to the Hamilton area. A high pressure ridge over southern Ontario resulted in very light winds and stagnant weather conditions, and allowed the local build-up of pollutants in Hamilton both below and above the escarpment. Figure 5.5 shows the build-up of fine particulate matter on October 9, 10 and 11 at Hamilton Downtown, Hamilton West and Hamilton Mountain. Relief occurred on the afternoon of October 11 when the high pressure system influencing the weather slowly moved eastward and good mixing of the air brought cleaner conditions to Hamilton. The fine particulate matter levels at the nearby rural site in Simcoe are also shown in Figure 5.5. This provides a measure of background levels in the surrounding area and how much additional burden was provided locally by Hamilton sources during this episode. On October 9, 2003, fine particulate matter levels in Hamilton ranged from 28.3 to 35.8 $\mu g/m^3$ (24 hour average) while Simcoe reported 18.8 $\mu g/m^3$. On October 10, $PM_{2.5}$ levels ranged from 35.7 to 48.9 $\mu g/m^3$ (24 hour average) in Hamilton while Simcoe recorded 27.1 $\mu g/m^3$ and on October 11, $PM_{2.5}$ ranged from 29.1 to 33.4 $\mu g/m^3$ (24 hour average) in Hamilton while Simcoe recorded 18.0 $\mu g/m^3$. These results suggest a local contribution of about 40% to the observed levels in Hamilton during this episode.

Figure 5.5
24-Hour Average $PM_{2.5}$ Concentrations in Hamilton and Simcoe during October 2003 Episode

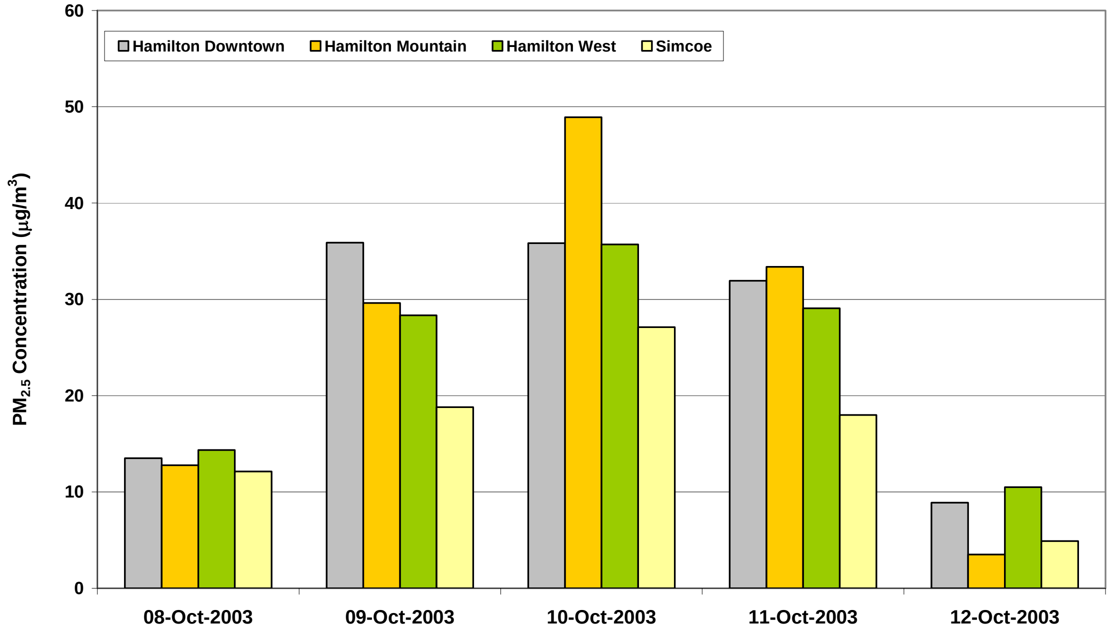
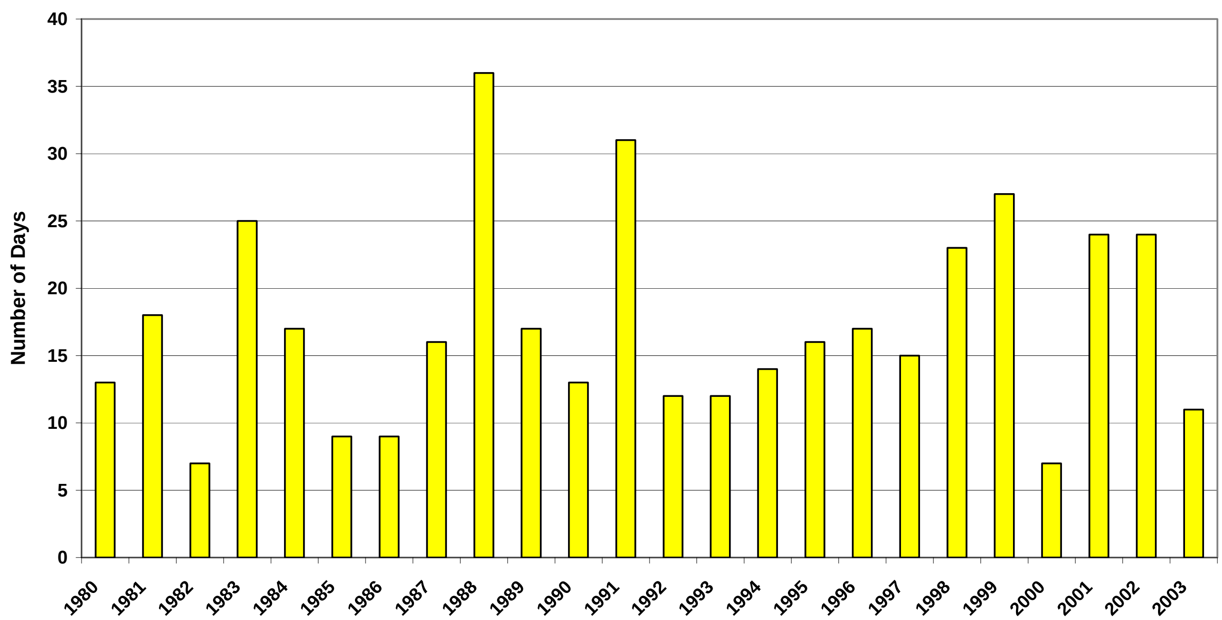


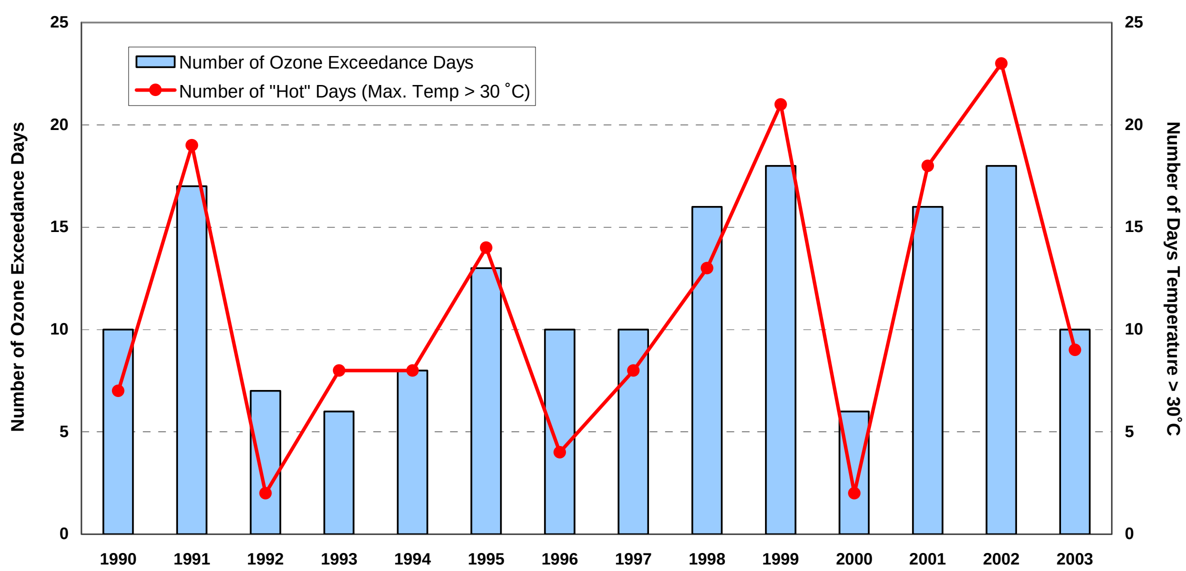
Figure 5.6
Number of Ozone "Episode Days" in Ontario (1980 - 2003)



Trends in ozone smog episodes

Smog episodes are highly dependent upon weather conditions which vary from year to year. To depict the trend in Ontario, the number of ozone "episode days" (i.e. characterized by days with widespread ozone levels greater than 80 ppb) have been assembled for the period 1980 to 2003 (Figure 5.6). Smog episode days were highest in 1988, a summer which was notably hot across eastern North America and lowest in 1982 and 2000, summers which were relatively cool and wet. Other years such as 1983, 1991, 1998, 1999, 2001 and 2002 were also relatively hot and dry summers and resulted in above normal number of smog episode days. Figure 5.7 also provides another way of examining the smog episode trend in Ontario. It shows the distribution of the province-wide ozone exceedance days (at least one hour > 80 ppb) and the number of hot days (those days with maximum air temperatures greater than 30°C) from 1990 to 2003. The high number of ozone exceedance days in 1991, 1998, 1999, 2001 and 2002 can be largely attributed to the relatively high number of "hot" days which are favourable to the formation and transport of ozone, whereas the low numbers of exceedance days in 2000 reflect conditions less conducive to the production of ground-level ozone. From these results, there are no apparent trends in elevated regional smog levels in Ontario.

Figure 5.7
Trend for Ozone Exceedance Days and 'Hot' Days in Ontario (1990 - 2003)



Note: Based on 21 ozone sites operated over 14 years;
"Hot" days based on eight meteorological sites operated over 14 years;
An ozone exceedance day has at least one hour > 80 ppb.

Chapter 6

Air Toxics – Selected VOCs

Sources, characteristics and effects

Volatile organic compounds are emitted into the atmosphere from a variety of anthropogenic and natural sources. Some of the major anthropogenic sources include vehicles, fossil fuel combustion, steel-making, petroleum refining, fuel-refilling, industrial and residential solvent use, paint application, manufacturing of synthetic materials (e.g. plastics, carpets), food processing, agricultural activities and wood processing and wood burning. Vegetation sources are the main contributor of natural VOC emissions.

Certain volatile organic compounds (VOCs) warrant special concern because they play an important role in the formation of ground-level ozone and $PM_{2.5}$. Volatile organic compounds that contribute to the formation of ozone typically have a short life span in the atmosphere. In contrast, VOCs that are least reactive to ozone formation are capable of being transported very long distances as they have a long half-life in the troposphere.

VOC monitoring

Specialized, non-routine monitoring and analytical techniques are required to measure VOCs because they are usually present in the atmosphere at ultra-trace concentrations. Volatile organic compound samples are collected by drawing ambient air into evacuated, specially coated, stainless steel canisters over a 24-hour period (midnight to midnight), following the National Air Pollution Surveillance (NAPS) sampling schedule (every sixth day) for urban sites. Volatile organic compound samples at rural sites are usually collected every three days. Concentrations for 143 pre-selected VOCs are reported for each sample. The list of 143 selected VOCs and their statistics appear in the attached Appendix.

For purposes of this report, data from 1994 to 2003 for eight ambient monitoring stations (Windsor, Sarnia, Longwoods, Hamilton, Simcoe, Egbert, Stouffville and Ottawa) are included in this discussion. The monitoring sites described in this report are displayed in Figure 6.1. Data from these sites are provided by Environment Canada as part of a co-operative federal-provincial program under NAPS.

Benzene, toluene and xylene (BTX)

Benzene, a volatile aromatic hydrocarbon which has a strong, often pleasant scent, is primarily used in the production of plastics and other chemical products. Large quantities of benzene are obtained from petroleum, either by direct extraction from certain types of crude oils or by chemical treatment of gasoline. Benzene is classified as a human carcinogen.

Toluene is an aromatic hydrocarbon that is used to make chemicals, explosives, dyes and many other compounds. It is used as a solvent for inks, paints, lacquers, resins, cleaners, glues and adhesives. Toluene is found in gasoline and aviation fuel. Studies reveal that toluene affects the central nervous system of humans and animals; however, there is little evidence to classify it as a carcinogen.

Like benzene and toluene, xylene is an aromatic hydrocarbon. Xylene is a mixture of three isomers (ortho [o-xylene], meta [m-xylene] and para [p-xylene]). It is also referred to as mixed xylenes. Xylene is produced from petroleum and coal tar and is naturally formed during forest fires. Xylene is used as a solvent and in the printing, rubber, and leather industries, and as a cleaning agent, paint thinner and in paints and varnishes. Xylene is a central nervous system depressant. Xylene has not been classified as a carcinogen.

Motor vehicle exhaust is the major source of BTX in Ontario. These compounds are very reactive in forming ground-level ozone and $PM_{2.5}$. In 2003, the annual mean concentrations for benzene, toluene and xylenes were 1.05 $\mu g/m^3$, 2.55 $\mu g/m^3$ and 1.35 $\mu g/m^3$, respectively. Figure 6.2 shows trends of benzene, toluene, and xylenes for the period from 1994 to 2003. All three VOCs show decreasing trends over the ten-year period. The decline in BTX concentrations can be partially attributed to *The Benzene in Gasoline Regulations*, effective July 1, 1999, which recommends that the benzene in gasoline be reduced through federal regulation to 1 per cent by volume and that aromatics (or equivalent benzene tailpipe emissions) remain at 1994 levels. The most significant decline was in xylenes where the annual composite mean decreased by approximately 57 per cent over the last decade. This decline may be partially attributed to Ontario's Gasoline Volatility regulation (O. Reg. 271/91), passed in 1991, that limits gasoline vapour pressure during the summer.

Figure 6.1
Locations of Ambient VOC Monitoring Sites Across Ontario (2003)

Note: Data from these sites are provided by Environment Canada as part of the NAPS program.

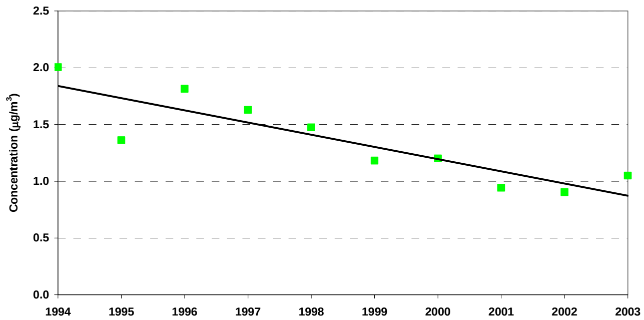
1,1,1-trichloroethane, carbon tetrachloride and tetrachloroethylene

A halogenated VOC compound is one onto which a halogen (e.g. chlorine, bromine, fluorine or iodine) has been attached to the VOC. Typical halogenated VOCs include 1,1,1-trichloroethane, carbon tetrachloride and tetrachloroethylene. 1,1,1-trichloroethane is a colourless liquid with a sweet odour that evaporates quickly into a vapour. It is found in many common products such as glue, paint, industrial degreasers and aerosol sprays. Carbon tetrachloride is also a clear liquid but it is most often found as a colourless gas. It has a strong aromatic odour that can be detected at low levels. Carbon tetrachloride is produced for use in the manufacturing of refrigerants and propellants for aerosols. Tetrachloroethylene is a colourless, non-flammable liquid with a sweet odour. Tetrachloroethylene (also known as perchloroethylene or PERC) is widely used in dry cleaning and textile operations, and metal degreasing. It is also used in the production of other chemicals, in rubber coatings, solvent soaps, printing inks, adhesives and glues, sealants, polishes, lubricants, and pesticides.

Figure 6.3 shows trends in 1,1,1-trichloroethane, carbon tetrachloride and tetrachloroethylene for the period 1994 to 2003. 1,1,1-trichloroethane and carbon tetrachloride show a decreasing trend over the 10-year period. Tetrachloroethylene concentrations increased from 1994 to 1999 and then decreased to 2003. This decrease in the annual mean concentrations for PERC could be attributed to the increase in efficiency in dry cleaning operations including technologically advanced machines with high efficiency solvent recovery, plus a trend towards alternatives such as water-based cleaning.

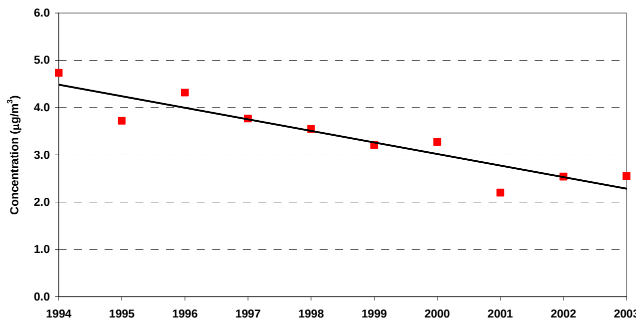
The most significant decline of the halogenated compounds studied was in 1,1,1-trichloroethane where the annual composite mean decreased by approximately 88 per cent over the last decade. 1,1,1-trichloroethane, also known as methyl chloroform (MCF), was added to the list of ozone-depleting substances (ODS) under the Montreal Protocol on Substances that Deplete the Ozone Layer in 1992 to protect the Earth's upper atmosphere. This protocol agrees to phase out the production and consumption of ozone depleting substances on a very specific reduction schedule leading to a complete phase-out of a substance. (Under the Montreal Protocol, consumption refers to the supply [production + import – export] of ODS, and not to the use of ODS'). The protocol proposes MCF be completely phased out by 2005, hence the significant decline in annual concentrations over the last decade.

Figure 6.2
Trends of Benzene, Toluene and Xylenes Concentrations in Ontario (1994 - 2003)



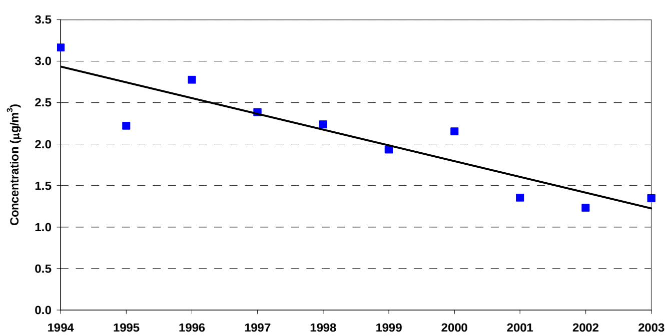
Note: Annual composite mean based on eight sites over ten years; data from these sites are provided by Environment Canada as part of the NAPS program.

a) Benzene



Note: Annual composite mean based on eight sites over ten years; data from these sites are provided by Environment Canada as part of the NAPS program.

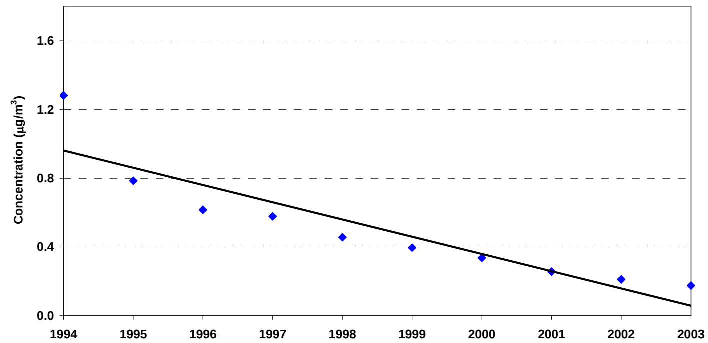
b) Toluene



Note: Annual composite mean based on eight sites over ten years; data from these sites are provided by Environment Canada as part of the NAPS program.

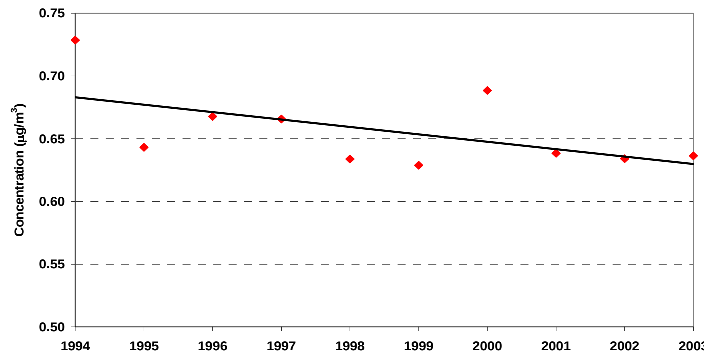
c) Xylene

Figure 6.3
Trends of 1,1,1-Trichloroethane, Carbon Tetrachloride and Tetrachloroethylene Concentrations in Ontario
(1994 - 2003)



Note: Annual composite mean based on eight sites over ten years; data from these sites are provided by Environment Canada as part of the NAPS program.

a) 1,1,1-Trichloroethane



Note: Annual composite mean based on eight sites over ten years; data from these sites are provided by Environment Canada as part of the NAPS program.

b) Carbon Tetrachloride

Note: Annual composite mean based on eight sites over ten years; data from these sites are provided by Environment Canada as part of the NAPS program.

c) Tetrachloroethylene

GLOSSARY

Acidic deposition	-	refers to deposition of a variety of acidic pollutants (acids or acid-forming substances such as sulphates and nitrates) on biota or land or in waters of the Earth's surface.
Air Quality Index	-	real-time information system that provides the public with an indication of air quality in cities, towns and in rural areas across Ontario.
AQI station	-	continuous monitoring station used to inform the public of general ambient air quality levels over an entire region (not a localized area) on a real-time basis; station reports on criteria pollutant levels that are not unduly influenced by a single emission source, but rather are the result of emissions from multiple sources, including those in neighbouring provinces and states.
Airshed	-	a geographical region of influence or spatial extent of the air pollution burden.
Ambient air	-	outdoor or open air.
Aromatic hydrocarbon	-	a compound where the double-bond carbon atoms occur in a ring-type pattern.
Carbon monoxide	-	a colourless, odourless, tasteless and at high concentrations, a poisonous gas.
Carcinogen	-	an agent that incites carcinoma (cancer) or other malignancy.
Continuous pollutant	-	contaminant for which a continuous record exists; effectively, pollutants that have hourly data (maximum 8,760 values per year except leap year – i.e. 2000 where maximum values for the year are 8,784).
Continuous station	-	where pollutants are measured on a real-time basis and data determined hourly (for example ozone, sulphur dioxide).
Criterion	-	maximum concentration or level (based on potential effects) of contaminant that is desirable or considered acceptable in ambient air.
Detection limit	-	minimum concentration of a contaminant that can be determined.

Glossary continued...

Exceedance - violation of the air pollutant concentration levels established by environmental protection criteria or other environmental standards.

Fine Particulate Matter - particles smaller than about 2.5 microns in aerodynamic diameter, which arise mainly from condensation of hot vapours and chemically-driven gas-to-particle conversion processes; also referred to as $PM_{2.5}$. These are fine enough to penetrate deep into the lungs and have the greatest effects on health.

Fossil fuels - natural gas, petroleum, coal and any form of solid, liquid or gaseous fuel derived from such materials for the purpose of generating heat.

Global warming - long-term rise in the average temperature of the earth's atmosphere; principally due to an increase in the build-up of carbon dioxide and other gases.

Ground-level ozone - colourless gas formed from chemical reactions between nitrogen oxides and hydrocarbons in the presence of sunlight near the Earth's surface.

Inhalable particles - represent up to 60 per cent of the total suspended particulate matter; composed of both coarse (diameter 2.6 to 10.0 microns) and fine (diameter $<$ 2.5 microns) particles; also referred to as PM_{10}.

Micron - a millionth of a metre.

Nitrogen dioxide - a reddish-brown gas with a pungent and irritating odour.

Ozone episode day - a day on which widespread (hundreds of kilometres) elevated ozone levels (greater than 80 ppb maximum hourly concentration) occur simultaneously.

Particulate matter - refers to all airborne finely divided solid or liquid material with an aerodynamic diameter smaller than 44 microns.

Percentile value - percentage of the data set that lies below the stated value; if the 70 percentile value is 0.10 ppm, then 70 per cent of the data are equal to or below 0.10 ppm.

Photochemical oxidant - a complex mixture of chemicals produced in the atmosphere; these air pollutants are formed by the action of sunlight on oxides of nitrogen and VOCs.

Photochemical smog - see *smog.*

Photochemical reaction - Chemical reaction influenced or initiated by light, particularly ultraviolet light.

Primary pollutant - contaminant emitted directly to the atmosphere.

Secondary pollutant - Contaminant formed from other pollutants in the atmosphere.

Smog - a contraction of smoke and fog; colloquial term used for photochemical smog, which includes ozone and other contaminants; tends to be a brownish haze.

Smog advisory - smog advisories are issued to the public when there is a strong likelihood that widespread, elevated and persistent smog levels are expected.

Stratosphere - atmosphere 10 to 40 kilometres above the Earth's surface.

Stratospheric ozone - ozone formed in the stratosphere from the conversion of oxygen molecules by solar radiation; ozone found there absorbs much ultraviolet radiation and prevents it from reaching the Earth.

Sulphur dioxide - a colourless gas that smells like burnt matches.

Toxic deposition - deposition of an airborne toxic pollutant at ground, vegetative or surface levels.

Toxic pollutant - substance that can cause cancer, genetic mutations, organ damage, changes to the nervous system, or even physiological harm as a result of prolonged exposure, even to relatively small amounts.

Troposphere - atmospheric layer extending about 10 kilometres above the Earth's surface.

ABBREVIATIONS

AAQC	-	Ambient Air Quality Criteria (Ontario)
AQI	-	Air Quality Index
ASAP	-	Anti-Smog Action Plan
BTX	-	benzene, toluene, xylenes
CCME	-	Canadian Council of Ministers of the Environment
CO	-	carbon monoxide
CWS	-	Canada-wide Standard
DL	-	detection limit
EC	-	Environment Canada
EMRB	-	Environmental Monitoring and Reporting Branch
GTA	-	Greater Toronto Area
IVR	-	Integrated Voice Response
MCF	-	methyl chloroform
MOE	-	Ministry of the Environment
NAAQS	-	National Ambient Air Quality Standard (U.S.)
NAPS	-	National Air Pollution Surveillance (Canada)
NIST	-	National Institute of Standards and Technology (U.S.)
NO	-	nitric oxide
NO_2	-	nitrogen dioxide
NO_X	-	nitrogen oxides
O_3	-	ozone
ODS	-	ozone depleting substances
PERC	-	perchloroethylene
$PM_{2.5}$	-	fine particulate matter
SES (TEOM)	-	Sample Equilibration System
SO_2	-	sulphur dioxide

Abbreviations continued..

TEOM	-	Tapered Element Oscillating Microbalance
TRS	-	total reduced sulphur
VOCs	-	volatile organic compounds
$\mu g/m^3$	-	micrograms (of contaminant) per cubic metre (of air) – by weight
ppb	-	parts (of contaminant) per billion (parts of air) – by volume
ppm	-	parts (of contaminant) per million (parts of air) – by volume

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AIR QUALITY IN ONTARIO
2003 REPORT
APPENDIX

ACKNOWLEDGEMENTS

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APPENDIX
TABLE OF CONTENTS

INTRODUCTION

This appendix is intended for use in conjunction with the 2003 Annual Air Quality in Ontario report. The first section of the Appendix briefly describes the provincial air monitoring network, quality assurance and quality control procedures and the Ministry of the Environment's air quality database. The second part of the Appendix includes a series of tables displaying station locations and a listing of the summary statistics including means, maxima, percentile values and the number of exceedances of the Ontario ambient air quality criteria (AAQC) for each pollutant.

MONITORING NETWORK OPERATIONS

Network Description

In 2003, the network comprised of 163 continuous monitoring instruments at 41 ambient sites, which included 37 real-time $PM_{2.5}$ monitors. During 2003, the Environmental Monitoring and Reporting Branch operated all of the ambient sites. Monitoring site locations for the continuous network are illustrated in Map 1.

Quality Assurance and Quality Control

Day-to-day air monitoring and maintenance of the instruments is administered by staff of the Environmental Monitoring and Reporting Branch. Instrumentation precision is verified by automatic daily zero and span checks to a known concentration of gas. Data analysts and station operators review span control charts to confirm instrument precision using a telemetry system.

The air monitoring station operators routinely inspect and maintain monitoring equipment and stations with mandatory monthly on-site visits where secondary transfer standards are used to calibrate instrumentation.

The Environmental Monitoring and Reporting Branch operate a laboratory with gas reference standards that adhere to those of the U.S. National Institute of Standards and Technology (NIST) and the Pollution Measurement Division of Environment Canada. The secondary transfer standards used by station operators are referenced and certified to EMRB's NIST primary standards on a quarterly basis. Primary weighed filter standards from Rupprecht and Patashnik are used to calibrate the TEOM spring constant twice a year.

The Ontario ambient air quality monitoring network undergoes constant maintenance to ensure a high standard of quality control. Continuous real-time data are consistently reviewed, assessed, and validated by regional staff and staff of the Environmental Monitoring and Reporting Branch. Immediate actions are taken to correct any inconsistencies that may affect the validity of the data. These measures ensure ambient air monitoring data are valid, complete, comparable, representative and accurate.

Data Base

The ambient air quality data used in this report are stored in the ministry's air quality information system (AQUIS). A statistical pattern test is used to identify data anomalies, such as unusual pollutant concentrations. Each pollutant has a predetermined concentration range based on historical data. Values outside this range are flagged for further investigation.

Data, obtained from automated ambient air monitoring instruments that operate continuously, produce an average measurement for every hour for a possible total of 8760 measurements in a given year. Hourly parameters measured include O_3, $PM_{2.5}$, NO/NO_2/ NO_x, CO, SO_2 and TRS compounds. A valid annual mean requires at least 6570 hourly readings. In addition, each quarter of the year should have 75 per cent valid data.

To be included in the 10-year trend analysis, a site must have valid annual means for a minimum of 8 years in the 10-year period from 1994-2003.

NETWORK DESCRIPTIVE TABLES AND ANNUAL STATISTICS

The complete continuous (hourly) network is summarized in Table 1 and Map 1. The table displays the station name, numerical identifier, and pollutants measured. The numerical identifier is the station (ID) number, the first digit of which identifies the geographic region in which the station is located.

The 2003 statistical data and 10-year trends for various continuous pollutants are provided in Tables 2-16. The stations used in the 10-year trends are listed in Table 17. The 2003 statistical data for selected VOCs (see Table 18 for list) are presented in Tables 19-26.

Table 1: Ontario Continuous Ambient Air Monitoring Network (2003)

CITY/TOWN	STATION LOCATION	ID	YR	LAT	LONG	ELEV	SO_2	CO	O_3	NO/NO_2 NO_X	$PM_{2.5}$	TRS	AQI
WINDSOR DOWNTOWN	467 UNIVERSITY AVE. W.	12008	69	42:19	83:03	8	T	T	T	T	T	.	T
WINDSOR WEST	COLLEGE/SOUTH ST.	12016	75	42:18	83:04	4	T	.	T	T	T	T	T
MERLIN	MIDDLE RD., MOE WATER PUMP STN.	13021	77	42:15	82:13	4	.	.	T	.	T	.	*
SARNIA	FRONT ST./CN TRACKS, CENTENNIAL PARK	14064	76	42:59	82:24	3	T	.	T	T	T	T	T
GRAND BEND	HWY 21/COUNTY RD. 83, VISITOR INFO CTR.	15020	91	43:20	81:44	3	.	.	T	.	T	.	*
LONDON	900 HIGHBURY AVE.	15025	95	42:61	81:13	4	T	T	T	T	T	.	T
PORT STANLEY	ELGIN WATER TREATMENT PLANT	16015	02	42:41	81:11	5	.	.	T	.	T	.	*
TIVERTON	LOT C/CONCESSION 5, VISITOR INFO CTR.	18007	79	44:18	81:35	5	.	.	T	.	T	.	*
SIMCOE	HWY 3/BLUE LINE RD.	22071	75	42:51	80:16	4	.	.	T	T	T	.	T
KITCHENER	WEST AVE./HOMEWOOD	26060	90	43:26	80:30	5	T	T	T	T	T	.	T
ST. CATHARINES	ARGYLE CRES., PUMP STATION	27067	87	43:10	79:14	4	T	.	T	.	T	.	T
GUELPH	70 DIVISION STREET, EXHIBITION PARK	28028	00	43:33	80:16	4	.	.	T	T	T	.	T
HAMILTON DOWNTOWN	ELGIN/KELLY	29000	87	43:15	79:52	4	T	T	T	T	T	T	T
HAMILTON MOUNTAIN	VICKERS RD./EAST 18TH ST.	29114	85	43:14	79:52	3	T	.	T	T	T	T	T
HAMILTON WEST	MAIN ST. W./ HWY 403	29118	85	43:15	79:54	3	T	T	T	T	T	T	T
TORONTO DOWNTOWN	BAY/WELLESLEY	31103	00	43:39	79:23	10	T	T	T	T	T	.	T
TORONTO	CN TOWER	31190	89	43:35	79:23	444	.	.	T	T	.	.	.
TORONTO EAST	KENNEDY/LAWRENCE	33003	70	43:45	79:16	5	.	.	T	T	T	.	T
TORONTO NORTH	YONGE ST./FINCH AVE.	34020	88	43:47	79:25	5	.	.	T	T	T	.	T
ETOBICOKE SOUTH	185 JUDSON ST.	35033	67	43:36	79:30	5	T	T	T	T	T	.	.
TORONTO WEST	125 RESOURCES RD.	35125	00	43:42	79:32	8	T	T	T	T	T	.	T
BURLINGTON	HWY 2/NORTH SHORE BLVD E.	44008	79	43:19	79:48	5	T	T	T	T	T	.	T
OAKVILLE	BRONTE RD/WOBURN CRES.	44015	80	43:24	79:44	5	T	T	T	T	.	T	.
OAKVILLE	8TH LINE/GLENASHTON DR., HALTON RSV.	44017	03	43:29	79:42	12	T	T	T	T	T	.	T
OSHAWA	RITSON RD./OLIVE AVE., RITSON RD. P.S.	45025	79	43:53	78:51	5	.	.	T	T	T	.	T
BRAMPTON	525 MAIN ST. N., PEEL MANOR	46089	00	43:42	79:47	5	T	T	T	T	T	.	T
MISSISSAUGA	QUEENSWAY W./HURONTARIO ST.	46110	77	43:34	79:37	5	T	T	T	T	T	.	T
BARRIE	83 PERRY ST.	47045	01	44:22	79:42	5	T	T	T	T	T	.	T
STOUFFVILLE	HWY 47/E. OF HWY 48	48002	74	43:58	79:16	5	.	.	T	.	.	.	.
NEWMARKET	EAGLE ST./McCAFFREY RD.	48006	01	44:02	79:28	5	T	T	T	T	T	.	T

Table 1: Ontario Continuous Ambient Air Monitoring Network (2003)

CITY/TOWN	STATION LOCATION	ID	YR	LAT	LONG	ELEV	SO_2	CO	O_3	NO/NO_2 NO_X	$PM_{2.5}$	TRS	AQI
PARRY SOUND	7 BAY ST.	49005	01	45:20	80:02	5	.	.	T	.	T	.	*
DORSET	HWY 117/PAINT LAKE RD.	49010	81	45:13	78:56	3	.	.	T	.	T	.	*
OTTAWA	RIDEAU/WURTENBURG ST.	51001	71	45:26	75:41	4	T	T	T	T	T	.	T
KINGSTON	133 DALTON AVE.	52020	88	44:14	76:31	5	.	.	T	.	T	.	T
BELLEVILLE	2 SIDNEY ST., WATER TREATMENT PLANT	54012	02	44:09	77:23	10	T	T	T	T	T	.	T
CORNWALL	BEDFORD/THIRD ST., MEMORIAL PARK	56051	70	45:01	74:44	4	.	.	T	.	T	.	T
PETERBOROUGH	10 HOSPITAL DR.	59006	98	44:18	78:21	5	T	T	T	T	T	.	T
THUNDER BAY	JAMES/WALSH ST.	63200	86	48:23	89:17	3	T	T	T	T	T	T	T
SAULT STE. MARIE	PATRICK ST., WM. MERRIFIELD SCHOOL	71068	87	46:32	84:21	3	T	.	T	T	T	T	T
NORTH BAY	CHIPPEWA ST., DEPT. NATIONAL DEFENSE	75010	79	46:19	79:27	4	.	.	T	T	T	.	T
SUDBURY	100 RAMSEY LAKE RD./SCIENCE NORTH	77203	84	46:28	80:59	15	T	T	T	T	.	T	T
Totals:							**25**	**20**	**41**	**31**	**37**	**9**	**37**

LEGEND:

ID	- Station identification number	SO_2	- Sulphur Dioxide	$PM_{2.5}$	- Fine Particulate Matter
YR.	- Year station monitoring began	CO	- Carbon Monoxide	TRS	- Total Reduced Sulphur
LAT.	- Latitude (degrees:minutes)	O_3	- Ozone	AQI	- Air Quality Index
LONG.	- Longitude (degrees:minutes)	NO	- Nitric Oxide	T	- Telemetry
ELEV.	- Air intake height above ground (m)	NO_2	- Nitrogen Dioxide	*	- Seasonal AQI site (May 1 - September 30 only)
		NO_x	- Oxides of Nitrogen		

Table 2: Ozone (O_3) Statistics (2003)

Unit: parts per billion (ppb)

O_3 1-hour AAQC is 80 ppb

ID	City	Location	Valid h	PERCENTILES 10%	30%	50%	70%	90%	99%	Mean	Maximum 1h	24h	# of Times Above Criterion
12008	Windsor Downtown	467 University Ave.	8524	3	11	20	30	46	76	22.9	111	61	60
12016	Windsor West	College/South St.	8618	4	11	19	29	47	81	22.8	123	73	90
13021	Merlin	Middle Rd., Moe Water Pump Stn.	8629	10	20	27	35	50	80	29.0	120	85	86
14064	Sarnia	Front St./Cn Tracks, Centennial Park	8419	6	17	24	31	42	68	24.7	110	63	32
15020	Grand Bend	Water Treatment Plant	8518	14	23	30	37	46	69	30.7	131	75	39
15025	London	900 Highbury Ave.	8349	6	17	25	34	49	75	26.9	109	81	40
16015	Port Stanley	43665 Dexter Line, Elgin Water T. Plt	8538	16	26	33	41	56	88	34.9	129	94	138
18007	Tiverton	Concession Rd. 2, Lot A	8451	17	26	32	39	51	78	33.2	135	88	68
22071	Simcoe	Hwy 3/Blue Line Rd., Experimental Farm	8463	16	25	32	39	55	85	33.9	115	93	118
26060	Kitchener	West Ave./Homewood	8674	5	19	27	36	49	77	28.1	109	83	66
27067	St. Catharines	Argyle Cres., Pump Stn.	8568	4	16	24	32	47	75	25.3	107	81	59
28028	Guelph	Exhibition St./Clark St.	8474	5	16	24	31	42	71	24.4	102	74	38
29000	Hamilton Downtown	Elgin/Kelly	8675	2	12	20	28	42	72	21.7	101	80	39
29114	Hamilton Mountain	Vickers Rd./E. 18th St.	8579	8	19	27	35	49	80	28.4	114	89	79
29118	Hamilton West	Main St. W./ Hwy 403	8688	4	11	21	29	41	70	22.0	110	79	40
31103	Toronto Downtown	Bay/Wellesley St.	8679	4	13	21	30	44	75	23.6	115	70	65
31190	Toronto	CN Tower, 301 Front St. W.	8565	18	28	35	42	59	89	36.9	129	101	153
33003	Toronto East	Kennedy/Lawrence	8642	3	11	20	29	42	70	21.8	112	66	40
34020	Toronto North	Hendon/Yonge St.	8610	4	13	23	31	43	69	23.6	112	73	42
35033	Etobicoke South	185 Judson St.	8296	3	9	17	25	39	61	19.2	93	45	10
35125	Toronto West	125 Resources Rd.	8541	3	7	15	24	40	67	18.7	104	55	40
44008	Burlington	Hwy 2/North Shore Blvd. E.	8648	2	12	21	31	45	71	22.8	104	65	33
44015	Oakville	Bronte Rd./Woburn Cres.	3557*	5	18	27	35	46	63	INS	76	55	0
44017	Oakville	8th Line/Glenashton Dr., Halton Reserv.	5068*	8	18	26	36	53	86	INS	114	85	79
45025	Oshawa	Ritson Rd. Public School	8697	4	15	24	32	41	65	24.1	107	59	37
46089	Brampton	525 Main St. N., Peel Manor	8698	3	15	25	33	44	77	25.1	111	79	68
46110	Mississauga	Mississauga General Hospital	8526	6	14	23	32	45	76	24.8	110	76	61
47045	Barrie	83 Perry St.	8589	2	14	23	31	42	67	23.2	94	63	21
48002	Stouffville	Hwy 47/ E. Of Hwy 48	8649	11	21	29	36	47	74	29.4	107	74	57
48006	Newmarket	Eagle St./Mccaffrey Rd.	8600	8	22	30	37	47	74	29.6	106	79	50
49005	Parry Sound	7 Bay St.	6453*	11	22	29	37	51	77	INS	103	83	54
49010	Dorset	Hwy 117 / Paint Lake Rd.	8234	11	23	31	37	47	67	30.1	95	57	9
51001	Ottawa	Rideau/Wurtemburg St.	8102	5	16	24	31	44	64	24.7	104	65	15
52020	Kingston	133 Dalton St.	8698	2	14	24	32	43	72	24.0	110	75	39
54012	Belleville	2 Sidney St., Water Treatment Plant	8673	10	21	30	38	51	82	30.9	149	94	103
56051	Cornwall	Bedford/Third St.	8601	5	18	26	32	44	72	25.9	109	89	38
59006	Peterborough	10 Hospital Dr.	8632	10	22	29	36	47	75	29.7	120	87	60
63200	Thunder Bay	615 James St. S., Mto	8124	5	18	27	35	43	58	26.1	78	61	0
71068	Sault Ste. Marie	Wm. Merrifield School	7607	7	18	27	35	45	62	26.8	89	62	2
75010	North Bay	Chippewa St., Dept. National Defence	8462	7	19	27	34	45	68	27.0	89	72	22
77203	Sudbury	Science North	8627	13	22	28	34	44	68	28.5	95	78	23

Notes:

** Site does not meet requirement of 75% valid data per quarter; INS represents insufficient data for a valid mean.*

*** CN Tower Site (Station 31190) - measurements taken at 444 m above ground level.*

Table 3: Fine Particulate Matter ($PM_{2.5}$) Statistics (2003)
Unit: micrograms per cubic metre ($\mu g/m^3$)

				PERCENTILES							Maximum		# of Times
ID	**City**	**Location**	**Valid h**	**10%**	**30%**	**50%**	**70%**	**90%**	**99%**	**Mean**	**1 h**	**24 h**	**Above Reference Level****
12008	Windsor Downtown	467 University Ave.	8480	0	3	6	10	19	42	8.5	64	43	5
12016	Windsor West	College/South St.	8605	2	4	7	11	20	41	9.6	64	41	7
13021	Merlin	Middle Rd., Moe Water Pump Stn.	5053*	1	4	7	11	21	41	INS	55	39	4
14064	Sarnia	Front St./Cn Tracks, Centennial Park	8350	3	6	9	14	24	49	11.9	101	59	13
15020	Grand Bend	Water Treatment Plant	5847*	2	4	7	10	19	42	INS	64	46	8
15025	London	900 Highbury Ave.	7730	3	6	9	12	21	43	10.9	61	43	9
16015	Port Stanley	43665 Dexter Line, Elgin Water T. Plt	8332	1	3	6	9	17	39	8.0	62	39	5
18007	Tiverton	Concession Rd. 2, Lot A	8289	1	2	4	7	15	36	6.5	69	44	4
22071	Simcoe	Hwy 3/Blue Line Rd., Experimental Farm	8323	1	3	6	9	17	36	7.8	56	37	4
26060	Kitchener	West Ave./Homewood	7797	1	3	6	9	18	41	8.1	65	47	5
27067	St. Catharines	Argyle Cres., Pump Stn.	8611	1	3	6	9	17	35	7.8	59	42	4
28028	Guelph	Exhibition St./Clark St.	7578	1	3	5	8	15	34	7.3	62	43	2
29000	Hamilton Downtown	Elgin/Kelly	8662	2	5	8	12	23	44	10.6	66	46	12
29114	Hamilton Mountain	Vickers Rd./E. 18th St.	8461	2	4	7	11	21	44	9.6	72	49	6
29118	Hamilton West	Main St. W./ Hwy 403	6512*	1	4	7	11	22	44	INS	87	45	9
31103	Toronto Downtown	Bay/Wellesley St.	8666	1	3	6	10	18	42	8.4	65	48	8
33003	Toronto East	Kennedy/Lawrence	8611	2	4	6	10	19	42	8.8	69	49	7
34020	Toronto North	Hendon/Yonge St.	8565	1	3	6	10	18	41	8.3	67	46	7
35033	Etobicoke South	185 Judson St.	7017*	2	5	8	12	22	47	INS	75	52	12
35125	Toronto West	125 Resources Rd.	8539	3	5	7	11	20	41	9.8	78	51	8
44008	Burlington	Hwy 2/North Shore Blvd. E.	8665	1	4	6	10	18	40	8.6	62	48	6
44017	Oakville	8th Line/Glenashton Dr., Halton Reserv.	5063*	2	5	7	11	22	47	INS	67	50	6
45025	Oshawa	Ritson Rd. Public School	8492	1	3	6	9	17	40	7.8	60	46	6
46089	Brampton	525 Main St. N., Peel Manor	8675	1	3	6	10	18	39	8.2	64	42	7
46110	Mississauga	Mississauga General Hospital	8347	2	4	6	9	17	39	7.9	67	45	7
47045	Barrie	83 Perry St.	8476	1	3	5	9	17	36	7.5	61	39	4
48006	Newmarket	Eagle St./Mccaffrey Rd.	8590	1	3	5	8	16	38	7.3	59	41	4
49005	Parry Sound	7 Bay St.	6494*	0	2	4	7	13	35	INS	56	40	3
49010	Dorset	Hwy 117 / Paint Lake Rd.	7117*	0	2	4	7	13	29	INS	49	33	1
51001	Ottawa	Rideau/Wurtemburg St.	8128	1	3	5	8	17	33	7.2	60	41	4
52020	Kingston	133 Dalton St.	6964*	1	4	6	10	19	43	INS	99	55	5
54012	Belleville	2 Sidney St., Water Treatment Plant	8658	1	3	5	8	15	34	6.9	57	42	3
56051	Cornwall	Bedford/Third St.	6070*	1	3	5	9	19	42	INS	63	49	4
59006	Peterborough	10 Hospital Dr.	8608	1	3	5	8	15	35	6.7	60	42	3
63200	Thunder Bay	615 James St. S., Mto	8208	1	3	4	7	13	28	6.1	55	32	1
71068	Sault Ste. Marie	Wm. Merrifield School	4076*	1	2	5	9	21	39	INS	65	39	4
75010	North Bay	Chippewa St., Dept. National Defence	8458	1	2	4	6	12	26	5.5	51	31	1

Notes:

- Measurements taken by Tapered Element Oscillating Microbalance (TEOM) sampler.

** Site does not meet requirement of 75% valid data per quarter; INS represents insufficient data for a valid mean.*

*** The $PM_{2.5}$ reference level is 30 $\mu g/m^3$ for a 24-hour period (based on CWS).*

Table 4: Nitric Oxide (NO) Statistics (2003)

Unit: parts per billion (ppb)

				PERCENTILES							Maximum	
ID	**City**	**Location**	**Valid h**	**10%**	**30%**	**50%**	**70%**	**90%**	**99%**	**Mean**	**1h**	**24h**
12008	Windsor Downtown	467 University Ave.	3415*	2	5	8	14	35	151	INS	544	114
12016	Windsor West	College/South St.	6218*	1	3	7	14	34	173	INS	572	175
14064	Sarnia	Front St./Cn Tracks, Centennial Park	8347	1	2	2	4	11	41	5.0	341	55
15025	London	900 Highbury Ave.	3803*	1	1	2	5	15	83	INS	227	65
22071	Simcoe	Hwy 3/Blue Line Rd., Experimental Farm	2863*	0	0	0	1	4	13	INS	49	11
26060	Kitchener	West Ave./Homewood	3483*	0	0	1	3	11	98	INS	315	76
28028	Guelph	Exhibition St./Clark St.	2309*	1	2	2	4	15	94	INS	195	51
29000	Hamilton Downtown	Elgin/Kelly	8679	1	2	4	9	27	119	11.7	329	96
29114	Hamilton Mountain	Vickers Rd./E. 18th St.	8221	1	3	3	5	15	72	7.2	163	73
29118	Hamilton West	Main St. W./ Hwy 403	7246*	1	2	5	12	47	167	INS	297	117
31103	Toronto Downtown	Bay/Wellesley St.	8597	1	2	3	7	21	82	8.7	266	73
31190	Toronto	CN Tower, 301 Front St. W.	8662	1	1	1	2	5	23	2.5	121	23
33003	Toronto East	Kennedy/Lawrence	8570	1	3	7	15	40	152	17.0	512	130
34020	Toronto North	Hendon/Yonge St.	8480	0	2	4	11	33	106	12.4	341	109
35033	Etobicoke South	185 Judson St.	8082	2	5	11	23	70	220	26.7	548	155
35125	Toronto West	125 Resources Rd.	7080*	2	5	14	29	74	252	INS	543	184
44008	Burlington	Hwy 2/North Shore Blvd. E.	7036	0	2	5	12	41	159	15.3	413	114
44015	Oakville	Bronte Rd./Woburn Cres.	3521*	2	2	4	7	26	121	INS	276	70
44017	Oakville	8th Line/Glenashton Dr., Halton Reserv.	5085*	0	1	1	3	12	59	INS	220	31
45025	Oshawa	Ritson Rd. Public School	8536	0	1	3	8	24	89	9.3	221	65
46110	Mississauga	Mississauga General Hospital	2075*	1	5	9	16	48	221	INS	385	99
46089	Brampton	525 Main St. N., Peel Manor	8334	0	1	2	6	27	125	10.4	310	99
47045	Barrie	83 Perry St.	8472	0	1	2	4	19	129	9.3	438	123
48006	Newmarket	Eagle St./Mccaffrey Rd.	8545	0	0	1	2	9	63	4.0	203	62
51001	Ottawa	Rideau/Wurtemburg St.	8021	0	0	1	4	14	69	5.8	257	64
54012	Belleville	2 Sidney St., Water Treatment Plant	8664	2	2	3	4	11	65	6.1	192	62
59006	Peterborough	10 Hospital Dr.	8700	1	1	1	2	6	36	3.4	122	28
63200	Thunder Bay	615 James St. S., Mto	7840	2	3	4	6	17	91	9.0	321	96
71068	Sault Ste. Marie	Wm. Merrifield School	7825	1	1	2	4	14	65	6.1	245	70
75010	North Bay	Chippewa St., Dept. National Defence	8573	1	2	2	4	14	71	6.4	255	56
77203	Sudbury	Science North	7512	0	0	1	2	5	37	2.6	119	29

Notes:

** Site does not meet requirement of 75% valid data per quarter; INS represents insufficient data for a valid mean.*

***CN Tower Site (Station 31190) - measurements taken at 444 m above ground level.*

Table 5: Nitrogen Dioxide (NO_2) Statistics (2003)

Unit: parts per billion (ppb)
NO_2 1-hour AAQC is 200 ppb
NO_2 24-hour AAQC is 100 ppb

ID	City	Location	Valid h	PERCENTILES 10%	30%	50%	70%	90%	99%	Mean	Maximum 1h	Maximum 24h	# of Times Above Criteria 1h	# of Times Above Criteria 24h
12008	Windsor Downtown	467 University Ave.	3415*	11	18	23	29	39	56	INS	80	50	0	0
12016	Windsor West	College/South St.	6218*	10	15	20	26	37	55	INS	97	49	0	0
14064	Sarnia	Front St./Cn Tracks, Centennial Park	8347	4	7	11	16	25	42	13.0	70	43	0	0
15025	London	900 Highbury Ave.	3803*	5	9	12	17	27	43	INS	84	34	0	0
22071	Simcoe	Hwy 3/Blue Line Rd., Experimental Farm	2863*	3	5	7	10	17	33	INS	50	29	0	0
26060	Kitchener	West Ave./Homewood	3483*	2	5	9	15	30	58	INS	80	49	0	0
28028	Guelph	Exhibition St./Clark St.	2309*	4	8	13	19	34	52	INS	65	37	0	0
29000	Hamilton Downtown	Elgin/Kelly	8679	9	14	19	26	37	56	21.3	78	57	0	0
29114	Hamilton Mountain	Vickers Rd./E. 18th St.	8221	4	7	11	17	30	51	14.5	66	51	0	0
29118	Hamilton West	Main St. W./ Hwy 403	7246*	4	9	15	22	36	59	INS	84	54	0	0
31103	Toronto Downtown	Bay/Wellesley St.	8597	10	15	21	28	40	63	23.2	87	62	0	0
31190	Toronto	CN Tower, 301 Front St. W.	8662	3	5	7	11	19	35	9.3	65	36	0	0
33003	Toronto East	Kennedy/Lawrence	8570	8	13	19	26	38	61	21.3	97	62	0	0
34020	Toronto North	Hendon/Yonge St.	8480	6	12	18	26	38	58	20.4	79	57	0	0
35033	Etobicoke South	185 Judson St.	8082	11	17	24	32	45	73	26.6	100	63	0	0
35125	Toronto West	125 Resources Rd.	7080*	11	18	24	32	43	67	INS	119	71	0	0
44008	Burlington	Hwy 2/North Shore Blvd. E.	7036	4	10	16	22	32	50	17.2	68	44	0	0
44015	Oakville	Bronte Rd./Woburn Cres.	3521*	4	8	13	21	34	49	INS	80	41	0	0
44017	Oakville	8th Line/Glenashton Dr., Halton Reserv.	5085*	4	7	11	16	26	39	INS	72	39	0	0
45025	Oshawa	Ritson Rd. Public School	8536	4	9	14	20	31	48	16.2	82	48	0	0
46089	Brampton	525 Main St. N., Peel Manor	8334	4	8	14	23	37	59	17.6	82	58	0	0
46110	Mississauga	Mississauga General Hospital	2075*	10	16	22	28	37	51	INS	71	43	0	0
47045	Barrie	83 Perry St.	8472	4	7	11	17	31	58	14.8	110	63	0	0
48006	Newmarket	Eagle St./Mccaffrey Rd.	8545	2	4	7	12	24	48	10.2	61	43	0	0
51001	Ottawa	Rideau/Wurtemburg St.	8021	3	6	10	16	30	53	13.7	83	60	0	0
54012	Belleville	2 Sidney St., Water Treatment Plant	8664	4	5	8	12	22	43	10.5	60	34	0	0
59006	Peterborough	10 Hospital Dr.	8700	2	3	6	9	18	37	8.3	49	29	0	0
63200	Thunder Bay	615 James St. S., Mto	7840	3	5	8	13	25	46	11.2	65	36	0	0
71068	Sault Ste. Marie	Wm. Merrifield School	7825	2	4	7	13	24	41	10.6	58	36	0	0
75010	North Bay	Chippewa St., Dept. National Defence	8573	2	4	6	11	23	47	10.1	64	36	0	0
77203	Sudbury	Science North	7512	1	3	5	9	18	41	7.8	54	32	0	0

Notes:

** Site does not meet requirement of 75% valid data per quarter; INS represents insufficient data for a valid mean.*

*** CN Tower Site (Station 31190) - measurements taken at 444 m above ground level.*

Table 6: Nitrogen Oxides (NO_x) Statistics (2003)

Unit: parts per billion (ppb)

				PERCENTILES							Maximum	
ID	**City**	**Location**	**Valid h**	**10%**	**30%**	**50%**	**70%**	**90%**	**99%**	**Mean**	**1h**	**24h**
12008	Windsor Downtown	467 University Ave.	3415*	15	24	32	43	72	192	INS	613	164
12016	Windsor West	College/South St.	6218*	13	21	29	40	69	219	INS	655	221
14064	Sarnia	Front St./Cn Tracks, Centennial Park	8347	6	9	13	20	36	75	18.1	411	94
15025	London	900 Highbury Ave.	3803*	7	11	16	22	43	113	INS	277	96
22071	Simcoe	Hwy 3/Blue Line Rd., Experimental Farm	2863*	3	5	8	11	20	41	INS	93	38
26060	Kitchener	West Ave./Homewood	3483*	3	6	11	18	39	149	INS	372	124
28028	Guelph	Exhibition St./Clark St.	2309*	5	9	15	23	48	133	INS	237	87
29000	Hamilton Downtown	Elgin/Kelly	8679	11	17	25	35	64	165	33.3	391	143
29114	Hamilton Mountain	Vickers Rd./E. 18th St.	8221	6	10	15	22	43	111	21.2	207	100
29118	Hamilton West	Main St. W./ Hwy 403	7246*	7	13	22	36	80	215	INS	365	167
31103	Toronto Downtown	Bay/Wellesley St.	8597	12	18	25	35	60	134	32.2	351	135
31190	Toronto	CN Tower, 301 Front St. W.	8662	3	6	8	13	23	56	11.7	183	52
33003	Toronto East	Kennedy/Lawrence	8570	9	18	27	41	75	203	37.9	599	178
34020	Toronto North	Hendon/Yonge St.	8597	12	18	25	35	60	134	33.1	395	155
35033	Etobicoke South	185 Judson St.	8082	14	24	36	55	113	276	53.1	635	207
35125	Toronto West	125 Resources Rd.	7080*	15	26	41	61	114	304	INS	626	254
44008	Burlington	Hwy 2/North Shore Blvd. E.	7036	5	12	22	35	69	198	32.2	470	157
44015	Oakville	Bronte Rd./Woburn Cres.	3521*	6	11	17	27	59	165	INS	344	101
44017	Oakville	8th Line/Glenashton Dr., Halton Reserv.	5085*	5	9	13	19	37	94	INS	236	58
45025	Oshawa	Ritson Rd. Public School	8536	5	11	18	29	54	128	25.5	267	106
46089	Brampton	525 Main St. N., Peel Manor	8334	4	9	17	29	65	174	28.1	364	136
46110	Mississauga	Mississauga General Hospital	2075*	12	22	31	44	84	273	INS	456	142
47045	Barrie	83 Perry St.	8472	5	9	14	22	51	179	24.2	547	186
48006	Newmarket	Eagle St./Mccaffrey Rd.	8545	2	4	8	14	32	105	14.1	249	105
51001	Ottawa	Rideau/Wurtemburg St.	8021	4	8	12	21	45	114	20.1	323	119
54012	Belleville	2 Sidney St., Water Treatment Plant	8664	5	7	10	15	31	97	15.8	251	94
59006	Peterborough	10 Hospital Dr.	8700	3	5	8	12	25	66	11.7	169	57
63200	Thunder Bay	615 James St. S., Mto	7840	5	8	12	19	42	134	20.1	358	127
71068	Sault Ste. Marie	Wm. Merrifield School	7825	3	5	9	17	38	98	16.1	301	105
75010	North Bay	Chippewa St., Dept. National Defence	8573	3	6	9	15	37	114	16.4	311	88
77203	Sudbury	Science North	7512	2	4	6	10	22	73	10.3	161	51

Notes:

** Site does not meet requirement of 75% valid data per quarter; INS represents insufficient data for a valid mean.*

*** CN Tower Site (Station 31190) - measurements taken at 444 m above ground level.*

Table 7: Carbon Monoxide (CO) Statistics (2003)

Unit: parts per million (ppm)
CO 1-hour AAQC is 30 ppm
CO 8-hour AAQC is 13 ppm

				PERCENTILES							Maximum		# of Times Above Criteria	
ID	**City**	**Location**	**Valid h**	**10%**	**30%**	**50%**	**70%**	**90%**	**99%**	**Mean**	**1h**	**8h**	**1h**	**8h**
12008	Windsor Downtown	467 University Ave.	5035*	0.51	0.63	0.74	0.89	1.20	1.75	INS	4.34	2.45	0	0
15025	London	900 Highbury Ave.	5759*	0.15	0.33	0.47	0.64	0.84	1.19	INS	2.43	1.50	0	0
26060	Kitchener	West Ave./Homewood	8682	0.21	0.43	0.57	0.67	0.82	1.49	0.56	3.94	2.66	0	0
29000	Hamilton Downtown	Elgin/Kelly	5310*	0.33	0.55	0.69	0.84	1.08	1.58	INS	3.09	1.65	0	0
29118	Hamilton West	Main St. W./ Hwy 403	7801	0.15	0.35	0.54	0.69	1.01	1.53	0.56	3.37	1.91	0	0
31103	Toronto Downtown	Bay/Wellesley St.	8198	0.25	0.38	0.47	0.57	0.75	1.14	0.49	2.40	1.42	0	0
35033	Etobicoke South	185 Judson St.	6596*	0.28	0.52	0.61	0.70	0.90	1.88	INS	3.52	2.54	0	0
35125	Toronto West	125 Resources Rd.	7081*	0.29	0.40	0.48	0.57	0.77	1.45	INS	3.44	2.47	0	0
44008	Burlington	Hwy 2/North Shore Blvd. E.	8483	0.21	0.34	0.43	0.52	0.65	1.13	0.44	2.60	1.71	0	0
44015	Oakville	Bronte Rd./Woburn Cres.	3514*	0.36	0.56	0.67	0.74	0.90	1.32	INS	3.39	1.75	0	0
44017	Oakville	8th Line/Glenashton Dr., Halton Reserv.	5071*	0.55	0.62	0.68	0.76	1.00	1.32	INS	1.81	1.43	0	0
46089	Brampton	525 Main St. N., Peel Manor	7924	0.44	0.56	0.63	0.72	0.94	1.77	0.68	5.17	2.33	0	0
46110	Mississauga	Mississauga General Hospital	8662	0.12	0.31	0.56	0.82	1.43	2.33	0.66	5.36	3.34	0	0
47045	Barrie	83 Perry St.	8256	0.18	0.29	0.37	0.50	0.80	1.62	0.45	5.30	3.12	0	0
48006	Newmarket	Eagle St./Mccaffrey Rd.	8191	0.16	0.31	0.41	0.50	0.71	1.29	0.43	7.05	2.22	0	0
51001	Ottawa	Rideau/Wurtemburg St.	7224	0.34	0.44	0.50	0.60	0.84	1.31	0.55	2.24	1.54	0	0
54012	Belleville	2 Sidney St., Water Treatment Plant	8082	0.13	0.24	0.37	0.52	0.69	0.94	0.40	1.53	1.17	0	0
59006	Peterborough	10 Hospital Dr.	8583	0.09	0.24	0.35	0.50	0.72	1.17	0.39	2.89	1.53	0	0
63200	Thunder Bay	615 James St. S., Mto	8205	0.19	0.35	0.46	0.62	0.81	1.43	0.51	4.07	2.82	0	0
77203	Sudbury	Science North	8358	0.10	0.19	0.25	0.33	0.59	1.14	0.31	6.30	4.48	0	0

Notes:

** Site does not meet requirement of 75% valid data per quarter; INS represents insufficient data for a valid mean.*

Table 8: Sulphur Dioxide (SO_2) Statistics (2003)

Unit: parts per billion (ppb)
SO_2 1-hour AAQC is 250 ppb
SO_2 24-hour AAQC is 100 ppb
SO_2 1-year AAQC is 20 ppb

				PERCENTILES							Maximum		# of Times Above Criteria		
ID	**City**	**Location**	**Valid h**	**10%**	**30%**	**50%**	**70%**	**90%**	**99%**	**Mean**	**1h**	**24h**	**1h**	**24h**	**1y**
12008	Windsor Downtown	467 University Ave.	8564	1	2	3	6	14	38	5.9	98	41	0	0	0
12016	Windsor West	College/South St.	6656*	0	2	4	7	15	41	INS	110	31	0	0	0
14064	Sarnia	Front St./Cn Tracks, Centennial Park	8017	0	1	2	4	15	91	7.1	181	63	0	0	0
15025	London	900 Highbury Ave.	2538*	0	0	2	4	7	17	INS	37	19	0	0	0
26060	Kitchener	West Ave./Homewood	8675	0	1	2	3	6	16	3.0	38	17	0	0	0
27067	St. Catharines	Argyle Cres., Pump Stn.	4411*	1	1	3	4	8	19	INS	61	15	0	0	0
29000	Hamilton Downtown	Elgin/Kelly	8622	0	1	2	5	13	43	5.0	118	30	0	0	0
29114	Hamilton Mountain	Vickers Rd./E. 18th St.	8565	0	1	3	6	13	32	5.3	109	31	0	0	0
29118	Hamilton West	Main St. W./ Hwy 403	7598	0	1	3	5	9	22	4.0	75	15	0	0	0
31103	Toronto Downtown	Bay/Wellesley St.	8694	0	1	2	3	8	21	3.2	54	21	0	0	0
35033	Etobicoke South	185 Judson St.	6655*	0	1	2	3	8	23	INS	63	18	0	0	0
35125	Toronto West	125 Resources Rd.	8683	1	1	2	3	6	19	2.9	107	17	0	0	0
44008	Burlington	Hwy 2/North Shore Blvd. E.	8585	0	1	1	3	6	16	2.5	39	13	0	0	0
44015	Oakville	Bronte Rd./Woburn Cres.	3556*	1	2	3	6	16	43	INS	131	45	0	0	0
44017	Oakville	8th Line/Glenashton Dr., Halton Reserv.	5063*	0	0	1	2	6	18	INS	48	11	0	0	0
46089	Brampton	525 Main St. N., Peel Manor	8703	0	1	1	2	6	16	2.3	82	17	0	0	0
46110	Mississauga	Mississauga General Hospital	8661	0	1	1	2	6	17	2.5	103	16	0	0	0
47045	Barrie	83 Perry St.	8647	0	0	1	2	4	11	1.6	37	18	0	0	0
48006	Newmarket	Eagle St./Mccaffrey Rd.	7821	0	0	1	2	4	13	1.7	82	27	0	0	0
51001	Ottawa	Rideau/Wurtemburg St.	6341*	0	1	1	2	5	13	INS	45	9	0	0	0
54012	Belleville	2 Sidney St., Water Treatment Plant	8674	0	1	1	1	3	8	1.5	17	7	0	0	0
59006	Peterborough	10 Hospital Dr.	7642	0	0	1	1	4	10	1.3	24	9	0	0	0
63200	Thunder Bay	615 James St. S., Mto	8722	0	0	0	0	2	9	0.6	62	12	0	0	0
71068	Sault Ste. Marie	Wm. Merrifield School	8675	0	0	1	1	3	28	2.0	121	26	0	0	0
77203	Sudbury	Science North	8661	0	0	0	1	4	31	2.0	226	24	0	0	0

Notes:

** Site does not meet requirement of 75% valid data per quarter; INS represents insufficient data for a valid mean.*

Table 9: Total Reduced Sulphur (TRS) Statistics (2003)

Unit: parts per billion (ppb)

TRS 1-hour AAQC is 27 ppb

				PERCENTILES							Maximum		# of Times
ID	**City**	**Location**	**Valid h**	**10%**	**30%**	**50%**	**70%**	**90%**	**99%**	**Mean**	**1h**	**24h**	**Above Criterion**
12016	Windsor West	College/South St.	4700	0	0	0	1	1	6	INS	39	7	2
14064	Sarnia	Front St./Cn Tracks, Centennial Park	7489	0	0	1	1	1	2	0.7	4	1	0
29000	Hamilton Downtown	Elgin/Kelly	8664	0	0	0	0	2	5	0.4	20	5	0
29114	Hamilton Mountain	Vickers Rd./E. 18th St.	6882*	0	0	1	1	2	5	0.9	10	6	0
29118	Hamilton West	Main St. W./ Hwy 403	5205*	0	1	1	1	2	4	INS	12	4	0
44015	Oakville	Bronte Rd./Woburn Cres.	3557*	0	0	1	1	1	3	INS	74	6	3
63200	Thunder Bay	615 James St. S., Mto	8407	0	0	0	0	0	2	0.1	10	2	0
71068	Sault Ste. Marie	Wm. Merrifield School	8156	0	0	0	1	1	3	0.4	16	3	0

Notes:

** Site does not meet requirement of 75% valid data per quarter; INS represents insufficient data for a valid mean.*

Table 10: 10-Year Trend For O_3

Annual Mean (ppb)

ID	CITY	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
12008	WINDSOR DOWNTOWN	18.0	18.3	20.4	20.7	21.4	21.7	18.6	20.5	21.9	22.9
13021	MERLIN	24.2	28.0	28.6	27.0	28.4	27.2	24.6	27.4	26.0	29.0
14064	SARNIA	21.4	22.2	25.2	24.5	26.1	26.5	24.3	25.6	26.5	24.7
15020	GRAND BEND	30.2	31.3	31.9	31.2	31.2	32.5	32.6	31.6	29.8	30.7
15025	LONDON #	23.1	21.7	23.1	22.8	25.1	25.8	21.1	24.2	25.3	26.9
18007	TIVERTON	31.7	31.6	32.0	32.5	32.2	n/a	32.3	34.7	34.7	33.2
22071	SIMCOE	30.2	30.7	29.9	28.6	31.1	31.3	29.3	31.0	33.5	33.9
26060	KITCHENER	24.4	25.1	23.8	23.4	25.4	25.2	23.0	25.7	27.3	28.1
27067	ST. CATHARINES	23.6	20.5	20.3	20.9	20.8	21.7	18.9	21.2	24.1	25.3
29000	HAMILTON DOWNTOWN	17.0	18.0	17.3	18.1	19.1	19.5	17.0	18.8	20.4	21.7
31103	TORONTO DOWNTOWN	16.9	16.6	12.2	13.7	17.8	20.2	19.7	22.0	24.0	23.6
33003	TORONTO EAST	18.2	19.3	18.9	18.0	20.6	21.5	19.6	21.7	21.0	21.8
35125	TORONTO WEST^	17.4	16.3	17.1	19.4	20.2	n/a	20.1	21.0	22.0	18.7
44015	OAKVILLE	22.5	20.4	21.1	20.8	21.8	22.4	21.0	22.9	25.1	n/a
45025	OSHAWA	23.8	22.7	21.9	23.2	23.1	25.0	21.2	23.4	24.3	24.1
46110	MISSISSAUGA	19.5	19.2	19.4	20.0	20.8	22.2	19.9	22.4	23.1	24.8
48002	STOUFFVILLE	25.3	24.4	26.4	30.1	31.4	31.2	27.5	30.5	30.6	29.4
51001	OTTAWA	19.7	20.9	18.9	20.6	19.1	21.2	19.9	25.0	24.9	24.8
56051	CORNWALL	21.7	23.5	21.0	22.8	24.2	25.80	24.0	29.0	24.8	25.9
77203	SUDBURY	27.1	29.7	28.1	28.0	29.1	30.7	26.1	29.1	29.2	28.5
COMPOSITE MEAN		**23.9**	**23.4**	**23.4**	**24.1**	**25.1**	**25.1**	**23.0**	**25.4**	**25.9**	**26.2**

Notes:

 # Site change from King/Rectory (15001) to 900 Highbury Ave (15025) in 1995.

^ Site changed from Elmcrest Rd., Centennial Park (35003) to 125 Resources Rd. (35125) in 2003.

n/a - data not available

Table 11: 10-Year Trend For NO

Annual Mean (ppb)

ID	CITY	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
12008	WINDSOR DOWNTOWN	17.0	15.0	16.0	15.9	16.3	13.3	13.9	11.0	10.9	n/a
14064	SARNIA	9.0	6.0	7.0	7.0	6.9	7.1	8.9	6.7	7.1	5.0
15025	LONDON #	18.0	15.0	10.0	7.6	9.1	8.5	8.0	6.6	n/a	n/a
26060	KITCHENER	8.0	7.0	7.0	5.5	6.9	6.6	7.4	5.7	3.8	n/a
27067	ST. CATHARINES	10.0	10.0	13.0	10.3	16.3	11.7	12.4	13.8	n/a	n/a
29000	HAMILTON DOWNTOWN	18.0	16.0	15.0	10.8	12.6	12.0	14.7	11.5	10.4	11.7
31103	TORONTO DOWNTOWN	25.0	23.0	42.0	32.9	24.3	15.8	14.4	10.0	8.2	8.7
33003	TORONTO EAST	26.0	24.0	23.0	24.9	23.2	20.1	23.0	17.9	16.1	17.0
34020	TORONTO NORTH	17.0	18.0	17.0	16.3	16.5	16.5	16.8	14.3	12.4	12.4
35125	TORONTO WEST^	23.0	19.0	22.0	18.6	17.9	20.7	19.3	14.7	11.7	n/a
44015	OAKVILLE	15.0	15.0	16.0	14.9	15.8	13.0	16.2	11.9	n/a	n/a
45025	OSHAWA	19.0	18.0	15.0	16.4	15.6	15.1	14.2	13.7	10.0	9.3
51001	OTTAWA	11.0	7.0	8.0	7.0	7.9	14.8	11.0	7.3	n/a	5.8
77203	SUDBURY	5.0	6.0	6.0	4.9	3.7	5.0	4.5	3.7	3.2	2.6
COMPOSITE MEAN		**15.8**	**14.2**	**15.5**	**13.8**	**13.8**	**12.9**	**13.2**	**10.6**	**9.4**	**9.1**

Notes:

 # Site change location from King/Rectory (15001) to 900 Highbury Ave (15025) in 1995.

^ Site changed from Elmcrest Rd., Centennial Park (35003) to 125 Resources Rd. (35125) in 2003.

n/a - data not available

Table 12: 10-Year Trend For NO_2

Annual Mean (ppb)

ID	CITY	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
12008	WINDSOR DOWNTOWN	28.0	25.0	26.0	23.8	23.8	22.9	21.6	19.4	19.1	n/a
14064	SARNIA	18.0	17.0	16.0	16.9	18.0	16.7	16.3	16.8	17.5	13.0
15025	LONDON #	23.0	20.0	18.0	18.0	17.7	19.4	17.4	17.3	n/a	n/a
26060	KITCHENER	14.0	11.0	13.0	13.7	16.5	14.0	14.7	14.1	11.9	n/a
27067	ST. CATHARINES	17.0	14.0	16.0	13.8	15.7	16.2	16.9	20.0	n/a	n/a
29000	HAMILTON DOWNTOWN	22.0	19.0	22.0	18.6	22.4	21.6	21.8	22.5	20.9	21.3
31103	TORONTO DOWNTOWN	30.0	30.0	34.0	31.7	27.7	26.9	26.8	27.1	23.3	23.2
33003	TORONTO EAST	22.0	25.0	23.0	23.4	25.5	24.6	23.7	22.9	22.0	21.3
34020	TORONTO NORTH	20.0	18.0	22.0	20.2	23.4	24.3	22.7	22.0	21.0	20.4
35125	TORONTO WEST^	27.0	25.0	25.0	26.7	26.2	24.7	23.2	21.2	20.3	n/a
44015	OAKVILLE	17.0	17.0	20.0	20.8	17.1	17.2	17.2	16.2	n/a	n/a
45025	OSHAWA	18.0	20.0	19.0	18.6	20.0	21.5	19.7	19.0	17.2	16.2
51001	OTTAWA	19.0	16.0	13.0	12.5	12.4	12.2	13.8	14.3	n/a	13.7
77203	SUDBURY	11.0	12.0	8.0	7.4	6.0	7.7	8.6	7.5	8.3	7.8
COMPOSITE MEAN		**19.1**	**17.9**	**18.3**	**17.7**	**19.5**	**18.0**	**18.9**	**18.6**	**18.2**	**17.1**

Notes:

 # Site change location from King/Rectory (15001) to 900 Highbury Ave (15025) in 1995.

^ Site changed from Elmcrest Rd., Centennial Park (35003) to 125 Resources Rd. (35125) in 2003.

n/a - data not available

Table 13: 10-Year Trend For NO_X

Annual Mean (ppb)

ID	CITY	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
12008	WINDSOR DOWNTOWN	42.0	38.0	39.0	39.3	38.5	37.0	36.0	30.5	29.2	n/a
14064	SARNIA	28.0	23.0	23.0	24.9	25.1	23.5	25.0	23.6	24.6	18.1
15025	LONDON #	38.0	32.0	28.0	24.4	25.8	25.9	24.7	23.1	n/a	n/a
26060	KITCHENER	23.0	20.0	20.0	19.2	23.9	20.5	21.9	19.5	15.5	n/a
27067	ST. CATHARINES	28.0	25.0	29.0	24.5	31.7	24.8	28.8	33.5	n/a	n/a
29000	HAMILTON	40.0	35.0	37.0	29.5	34.7	34.0	37.0	34.4	31.4	33.3
31103	TORONTO DOWNTOWN	54.0	55.0	76.0	64.3	51.6	41.9	40.4	36.6	31.5	32.2
33003	TORONTO EAST	50.0	49.0	45.0	47.5	48.3	44.9	46.3	40.3	37.7	37.9
34020	TORONTO NORTH	38.0	36.0	39.0	36.7	39.9	40.7	39.3	36.2	33.4	33.1
35125	TORONTO WEST^	49.0	45.0	47.0	45.2	43.7	45.4	42.3	35.9	32.0	n/a
44015	OAKVILLE	34.0	32.0	33.0	32.8	30.0	29.6	33.0	27.8	n/a	n/a
45025	OSHAWA	37.0	36.0	35.0	34.9	35.1	35.8	33.6	32.6	27.2	25.5
51001	OTTAWA	28.0	22.0	25.0	19.6	22.8	27.5	24.2	21.0	n/a	20.1
77203	SUDBURY	17.0	17.0	14.0	12.5	9.4	12.7	12.6	10.8	10.9	10.3
COMPOSITE MEAN		**36.1**	**33.2**	**35.0**	**32.5**	**32.9**	**31.7**	**31.8**	**29.0**	**27.3**	**26.3**

Notes:

 # Site change location from King/Rectory (15001) to 900 Highbury Ave (15025) in 1995.

^ Site changed from Elmcrest Rd., Centennial Park (35003) to 125 Resources Rd. (35125) in 2003.

n/a - data not available

Table 14: 10-Year Trend For CO

Annual Mean (ppm)

ID	CITY	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
12008	WINDSOR DOWNTOWN	1.0	0.9	0.8	0.6	0.7	0.6	0.3	0.3	0.5	n/a
14064	SARNIA	0.2	0.1	0.2	0.2	0.3	0.3	0.4	0.3	n/a	n/a
15025	LONDON #	0.5	0.1	0.0	0.3	0.1	0.3	0.2	0.1	0.1	n/a
26060	KITCHENER	0.3	0.3	0.4	0.2	0.3	0.4	0.4	0.4	0.3	0.6
27067	ST. CATHARINES	0.4	0.2	0.3	0.1	0.4	0.2	0.4	0.3	n/a	n/a
29000	HAMILTON DOWNTOWN	0.8	0.6	1.0	0.7	1.1	0.8	0.8	0.7	n/a	n/a
31103	TORONTO DOWNTOWN	1.0	0.7	1.3	1.2	1.1	n/a	1.3	0.9	0.7	0.5
35125	TORONTO WEST^	0.7	0.8	0.7	1.0	1.0	1.0	1.8	1.0	0.6	n/a
44015	OAKVILLE	0.7	0.5	0.7	0.3	0.2	0.2	0.4	0.4	0.6	n/a
51001	OTTAWA	0.8	0.6	0.7	0.4	1.1	0.8	0.7	0.6	0.7	0.6
77203	SUDBURY	0.1	0.0	0.1	0.0	0.0	0.0	0.2	0.4	0.6	0.3
COMPOSITE MEAN		**0.7**	**0.5**	**0.6**	**0.5**	**0.6**	**0.3**	**0.6**	**0.5**	**0.5**	**0.5**

Notes:

 # Site change location from King/Rectory (15001) to 900 Highbury Ave (15025) in 1995.

^ Site changed from Elmcrest Rd., Centennial Park (35003) to 125 Resources Rd. (35125) in 2003.

n/a - data not available

Table 15: 10-Year Trend For SO_2

Annual Mean (ppb)

SO_2 annual AAQC = 20 ppb

ID	CITY	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
12008	WINDSOR DOWNTOWN	6.0	5.0	10.0	6.7	7.4	6.7	6.2	6.1	5.7	5.9
14064	SARNIA	9.0	6.0	7.0	8.5	10.3	11.8	10.4	12.5	10.4	7.1
15025	LONDON #	4.0	2.0	3.0	2.5	3.2	4.9	3.5	3.5	2.2	n/a
22071	SIMCOE	2.0	2.0	3.0	3.2	3.8	3.7	4.3	5.0	3.4	n/a
26060	KITCHENER	3.0	2.0	3.0	3.1	3.0	3.4	3.2	3.4	2.8	3.0
27067	ST. CATHARINES	3.0	5.0	6.0	5.8	4.0	2.2	3.0	3.3	n/a	n/a
29000	HAMILTON DOWNTOWN	5.0	8.0	9.0	5.8	6.3	6.6	5.1	6.0	4.9	5.0
31103	TORONTO DOWNTOWN	3.0	3.0	5.0	5.3	4.0	n/a	4.7	5.0	4.0	3.2
35125	TORONTO WEST^	4.0	3.0	4.0	4.9	4.1	n/a	3.6	4.0	5.4	2.9
44008	BURLINGTON	4.0	2.0	4.0	5.1	3.2	4.9	5.2	4.9	5.9	2.5
44015	OAKVILLE	4.0	2.0	5.0	4.8	5.1	4.0	4.8	3.7	4.3	n/a
46110	MISSISSAUGA	3.0	2.0	n/a	n/a	5.1	4.7	4.6	4.7	n/a	2.5
51001	OTTAWA	1.0	1.0	5.0	6.3	3.4	4.2	4.1	2.3	2.9	n/a
56051	CORNWALL	12.0	5.0	5.0	3.9	5.5	3.9	3.5	4.3	n/a	n/a
63200	THUNDER BAY	0.0	0.0	0.0	0.4	0.4	0.4	0.3	0.9	0.5	0.6
77203	SUDBURY	3.0	4.0	5.0	3.5	5.2	3.0	4.2	5.8	3.1	2.0
COMPOSITE MEAN		**3.0**	**2.4**	**3.5**	**3.3**	**3.5**	**3.6**	**4.4**	**4.7**	**4.3**	**3.5**

Notes:

 # Site change location from King/Rectory (15001) to 900 Highbury Ave (15025) in 1995.

^ Site changed from Elmcrest Rd., Centennial Park (35003) to 125 Resources Rd. (35125) in 2003.

n/a - data not available

Table 16: 10-Year Trend For TRS

Annual Mean (ppb)

ID	CITY	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
12016	WINDSOR WEST	0.7	0.9	0.8	1.6	1.3	0.5	1.1	1.0	2.1	n/a
14064	SARNIA	0.6	0.3	0.3	0.2	0.3	0.5	0.7	0.7	0.9	0.7
29000	HAMILTON DOWNTOWN	1.1	1.2	1.4	1.0	0.7	0.6	0.7	0.9	0.5	0.4
29114	HAMILTON MOUNTAIN	0.7	0.6	1.1	0.6	1.2	n/a	0.5	0.7	0.4	0.9
29118	HAMILTON WEST	0.7	0.9	1.3	0.8	0.9	0.9	0.6	0.5	0.3	n/a
44015	OAKVILLE	1.3	0.3	1.3	1.3	1.1	1.4	1.2	0.5	1.1	n/a
63200	THUNDER BAY	0.3	0.3	0.1	0.1	0.1	0.2	0.2	0.3	0.2	0.1
71068	SAULT STE. MARIE	0.5	0.4	0.5	0.3	0.2	0.2	0.3	0.8	0.4	0.4
77203	SUDBURY	0.5	0.5	0.3	0.3	0.4	0.2	0.1	0.2	0.5	n/a
COMPOSITE MEAN		**0.72**	**0.59**	**0.77**	**0.69**	**0.69**	**0.56**	**0.60**	**0.62**	**0.71**	**0.50**

Notes:

n/a - data not available

Table 17: Stations Used in Gaseous Trends

City	Station # (Sampling Period)
Burlington	44008 (1994 - 2003)
Cornwall	56051 (1994 - 2003)
Etobicoke South	35033 (1994 - 2003)
Grand Bend	15020 (1994 - 2003)
Hamilton Downtown	29000 (1994 - 2003)
Hamilton Mountain	29114 (1994 - 2003)
Hamilton West	29118 (1994 - 2003)
Kitchener	26060 (1994 - 2003)
London	15001 (1994 - 1995); 15025 (1996 - 2003)
Merlin	13021 (1994 - 2003)
Mississauga	46110 (1994 - 2003)
Oakville	44015 (1994 - 2003)
Oshawa	45025 (1994 - 2003)
Ottawa	51001 (1994 - 2003)
Sarnia	14064 (1994 - 2003)
Sault Ste. Marie	71068 (1994 - 2003)
Simcoe	22071 (1994 - 2003)
St. Catharines	27067 (1994 - 2003)
Stouffville	48002 (1994 - 2003)
Sudbury	77203 (1994 - 2003)
Thunder Bay	63200 (1994 - 2003)
Tiverton	18007 (1994 - 2003)
Toronto Downtown	31103 (1994 - 2003)
Toronto East (Scarborough)	33003 (1994 - 2003)
Toronto North (North York)	34020 (1994 - 2003)
Toronto West (Etobicoke West)	35003 (1994 - 2002); 35125 (2003)
Windsor Downtown	12008 (1994 - 2003)
Windsor West	12016 (1994 - 2003)

Table 18: List of Volatile Organic Compounds (VOCs)

Alkanes	**Alkenes**	**Alkynes**	**Aromatics**	**Halogenated**
Ethane	Ethylene	Acetylene	Benzene	Freon11
Propane	1,3-Butadiene	1-Butyne	Toluene	Dibromomethane
Butane	1-Butene + Isobutene		Styrene	Carbon tetrachloride
Isobutane	trans-2-Butene		Ethylbenzene	Dibromochloromethane
Cyclopentane	cis-2-Butene		Indane	Bromoform
Pentane	Cyclopentene		Iso-Propylbenzene	Bromodichloromethane
Isopentane	Isoprene		n-Propylbenzene	Chloroform
2,2-Dimethylpropane	trans-2-Pentene		sec-Butylbenzene	Chloromethane
Cyclohexane	2-Methyl-1-Butene		tert-Butylbenzene	Dichloromethane
Methylcyclopentane	cis-2-Pentene		iso-Butylbenzene	Freon22
2,2-Dimethylbutane	1-Pentene		Hexylbenzene	Bromomethane
2,3-Dimethylbutane	2-Methyl-2-Butene		*m+p*-Xylene	Bromotrichloromethane
3-Methylpentane	Cyclohexene		*o*-Xylene	cis-1,2-Dichloroethylene
2-Methylpentane	1-Methylcyclopentene		3-Ethyltoluene	Tetrachloroethylene
Hexane	2-Ethyl-1-Butene		4-Ethyltoluene	Chloroethane
Methylcyclohexane	cis-2-Hexene		1,3,5-Trimethylbenzene	Trichloroethylene
2,2,3-Trimethylbutane	1-Hexene		2-Ethyltoluene	trans-1,2-Dichloroethylene
3-Methylheptane	3-Methyl-1-Pentene		1,2,4-Trimethylbenzene	1,2-Dichloroethane
2-Methylheptane	trans-4-Methyl-2-Pentene		1,2,3-Trimethylbenzene	1,1-Dichloroethane
4-Methylheptane	cis-4-Methyl-2-Pentene		1,3-Diethylbenzene	1,1,2-Trichloroethane
Heptane	4-Methyl-1-Pentene		Napthalene	Freon114
3-Methylhexane	trans-3-Methyl-2-Pentene		p-Cymene	Freon12
2,2-Dimethylpentane	trans-2-Hexene		1,4-Diethylbenzene	1,1-Dichloroethylene
2,4-Dimethylpentane	cis-3-Methyl-2-Pentene		n-Buytlbenzene	Vinyl chloride
2,3-Dimethylpentane	1-Methylcyclohexene		1,2-Diethylbenzene	1,1,1-Trichloroethane
2-Methylhexane	cis-2-Heptene			1,1,2,2-Tetrachloroethane
cis-1,4-Dimethylcyclohexane	trans-3-Heptene			Trans-1,3-Dichloropropene
+ trans-1,3-Dimethylcyclohexane	1-Heptene			1,2-Dichloropropane
cis-1,3-Dimethylcyclohexane	cis-3-Heptene			cis-1,3-Dichloropropene
trans-1,4-Dimethylcyclohexane	trans-2-Heptene			Hexachlorobutadiene
trans-1,2-Dimethylcyclohexane	1-Octene			1,4-Dichlorobutane
2,2,4-Trimethylpentane	trans-2-Octene			Chlorobenzene
2,2-Dimethylhexane	1-Nonene			1,3-Dichlorobenzene
Octane	1-Decene			1,4-Dichlorobenzene
2,4-Dimethylhexane	Propylene			1,2,4-Trichlorobenzene
2,5-Dimethylhexane				1,2-Dichlorobenzene
2,3,4-Trimethylpentane				
2,2,5-Trimethylhexane				
Nonane				
3,6-Dimethyloctane				
Decane				
Undecane				
Dodecane				

Alkanes are saturated hydrocarbons in which all carbon atoms form a single bond with other atoms. Alkenes are unsaturated hydrocarbons in which some carbon atoms form a double bond with other carbon atoms. Alkynes are unsaturated hydrocarbons in which some carbon atoms form a triple bond with other carbon atoms. Aromatics are compounds where the double-bond carbon atoms occur in a ring-type pattern. Halogenated compounds are hydrocarbons which add or substitute one or more atoms of chlorine, bromine, fluorine or iodine.

Table 19: VOC Annual Statistics at Egbert (2003)

Unit: micrograms per cubic metre (µg/m^3)

	# of		PERCENTILES								
Compounds	**Samples**	**No. < DL**	**5%**	**25%**	**50%**	**75%**	**90%**	**Max**	**Min**	**Mean**	**Std.Dev.**
1,1,1-Trichloroethane	113	0	0.148	0.153	0.163	0.172	0.178	0.195	0.144	0.163	0.011
1,1,2-Trichloroethane	113	113									
1,2,3-Trimethylbenzene	113	106	0.050	0.050	0.050	0.050	0.050	0.132	0.050	0.052	0.010
1,2,4-Trimethylbenzene	113	91	0.050	0.050	0.050	0.050	0.116	0.568	0.050	0.074	0.078
1,2-Dichloroethane	113	107	0.050	0.050	0.050	0.050	0.050	0.065	0.050	0.050	0.002
1,3,5-Trimethylbenzene	113	105	0.050	0.050	0.050	0.050	0.050	0.181	0.050	0.053	0.017
1,3-Butadiene	113	109	0.050	0.050	0.050	0.050	0.050	0.103	0.050	0.051	0.007
1,3-Diethylbenzene	113	113									
1,4-Dichlorobenzene	113	108	0.050	0.050	0.050	0.050	0.050	0.200	0.050	0.052	0.015
1,4-Diethylbenzene	90	87	0.050	0.050	0.050	0.050	0.050	0.112	0.050	0.051	0.007
1-Butene/Isobutene	113	17	0.050	0.055	0.067	0.089	0.146	0.415	0.050	0.088	0.063
1-Butyne	113	113									
1-Hexene	113	109	0.050	0.050	0.050	0.050	0.050	0.107	0.050	0.051	0.005
1-Pentene	113	106	0.050	0.050	0.050	0.050	0.050	0.131	0.050	0.051	0.009
1-Propyne	113	106	0.050	0.050	0.050	0.050	0.050	0.110	0.050	0.052	0.008
2,2,4-Trimethylpentane	113	54	0.050	0.050	0.053	0.095	0.202	0.766	0.050	0.098	0.104
2,2,5-Trimethylhexane	112	111	0.050	0.050	0.050	0.050	0.050	0.059	0.050	0.050	0.001
2,2-Dimethylbutane	113	100	0.050	0.050	0.050	0.050	0.053	0.142	0.050	0.053	0.012
2,2-Dimethylhexane	113	113									
2,2-Dimethylpentane	113	112	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.000
2,2-Dimethylpropane	113	113									
2,3,4-Trimethylpentane	113	98	0.050	0.050	0.050	0.050	0.064	0.273	0.050	0.058	0.030
2,3-Dimethylbutane	113	93	0.050	0.050	0.050	0.050	0.070	0.277	0.050	0.060	0.033
2,3-Dimethylpentane	113	86	0.050	0.050	0.050	0.050	0.109	0.269	0.050	0.066	0.039
2,4-Dimethylhexane	113	103	0.050	0.050	0.050	0.050	0.050	0.148	0.050	0.052	0.012
2,4-Dimethylpentane	113	104	0.050	0.050	0.050	0.050	0.050	0.164	0.050	0.053	0.014
2,5-Dimethylhexane	113	108	0.050	0.050	0.050	0.050	0.050	0.136	0.050	0.052	0.011
2-Ethyltoluene	113	102	0.050	0.050	0.050	0.050	0.050	0.216	0.050	0.055	0.023
2-methyl-1-butene	113	110	0.050	0.050	0.050	0.050	0.050	0.092	0.050	0.051	0.005
2-Methyl-2-butene	113	112	0.050	0.050	0.050	0.050	0.050	0.088	0.050	0.050	0.004
2-Methylheptane	113	96	0.050	0.050	0.050	0.050	0.062	0.259	0.050	0.058	0.030
2-Methylhexane	113	59	0.050	0.050	0.050	0.082	0.211	0.549	0.050	0.091	0.088
2-Methylpentane	113	26	0.050	0.054	0.086	0.152	0.284	1.141	0.050	0.150	0.177
3-Ethyltoluene	113	93	0.050	0.050	0.050	0.050	0.103	0.554	0.050	0.069	0.067
3-Methyl-1-pentene	113	113									
3-Methylheptane	113	97	0.050	0.050	0.050	0.050	0.062	0.255	0.050	0.058	0.031
3-Methylhexane	113	56	0.050	0.050	0.050	0.085	0.217	0.621	0.050	0.098	0.102

Table 19: VOC Annual Statistics at Egbert (2003)

Unit: micrograms per cubic metre (µg/m^3)

Compounds	# of Samples	No. < DL	PERCENTILES 5%	25%	50%	75%	90%	Max	Min	Mean	Std.Dev.
3-Methylpentane	113	36	0.050	0.050	0.071	0.119	0.284	0.795	0.050	0.120	0.129
4-Ethyltoluene	113	101	0.050	0.050	0.050	0.050	0.050	0.251	0.050	0.056	0.027
4-Methyl-1-pentene	113	113									
4-Methylheptane	113	110	0.050	0.050	0.050	0.050	0.050	0.097	0.050	0.051	0.005
Acetaldehyde	52	0	0.490	0.716	1.060	1.516	2.471	4.491	0.404	1.286	0.860
Acetone	52	0	1.254	3.403	9.300	11.393	13.011	33.768	0.982	8.436	5.932
Acetylene	113	0	0.150	0.226	0.380	0.605	0.934	2.464	0.117	0.500	0.418
a-Pinene	90	62	0.050	0.050	0.050	0.065	0.157	1.496	0.050	0.097	0.170
Benzene	113	0	0.150	0.238	0.348	0.569	0.814	2.133	0.102	0.464	0.346
b-Pinene	90	77	0.050	0.050	0.050	0.050	0.097	0.316	0.050	0.063	0.044
Bromoform	113	113									
Bromomethane	113	15	0.050	0.053	0.057	0.060	0.067	0.106	0.050	0.058	0.008
Butane	113	0	0.191	0.420	0.662	1.187	2.561	9.227	0.129	1.199	1.539
Camphene	113	95	0.050	0.050	0.050	0.050	0.132	0.277	0.050	0.066	0.044
Carbontetrachloride	113	0	0.556	0.594	0.617	0.642	0.677	0.704	0.529	0.618	0.039
Chlorobenzene	113	113									
Chloroethane	113	112	0.050	0.050	0.050	0.050	0.050	0.068	0.050	0.050	0.002
Chloroform	113	0	0.059	0.066	0.072	0.078	0.086	0.118	0.052	0.073	0.011
Chloromethane	113	0	1.025	1.077	1.130	1.177	1.216	1.690	0.949	1.135	0.087
cis-1,2-Dimethylcyclohexane	113	113									
cis-1,3-Dimethylcyclohexane	113	106	0.050	0.050	0.050	0.050	0.050	0.129	0.050	0.052	0.011
cis-1,4/t-1,3-Dimethylcyclohexane	113	113									
cis-2-Butene	113	111	0.050	0.050	0.050	0.050	0.050	0.117	0.050	0.051	0.007
cis-2-Hexene	113	113									
cis-2-Pentene	113	113									
cis-3-Methyl-2-pentene	113	113									
cis-4-Methyl-2-pentene	113	111	0.050	0.050	0.050	0.050	0.050	0.061	0.050	0.050	0.001
Cyclohexane	113	87	0.050	0.050	0.050	0.050	0.090	0.257	0.050	0.062	0.035
Cyclopentane	113	89	0.050	0.050	0.050	0.050	0.090	0.246	0.050	0.061	0.033
Cyclopentene	113	113									
Decane	113	94	0.050	0.050	0.050	0.050	0.075	0.419	0.050	0.065	0.054
Dichloromethane	113	0	0.138	0.162	0.193	0.271	0.506	2.872	0.125	0.294	0.341
d-Limonene	113	99	0.050	0.050	0.050	0.050	0.081	0.210	0.050	0.059	0.029
Dodecane	113	104	0.050	0.050	0.050	0.050	0.050	0.147	0.050	0.053	0.015
Ethane	113	0	1.111	1.465	1.971	2.641	3.966	8.794	0.952	2.365	1.418
Ethylbenzene	113	36	0.050	0.050	0.074	0.150	0.328	1.208	0.050	0.152	0.194
Ethylene	113	0	0.129	0.185	0.317	0.623	1.313	3.415	0.110	0.538	0.596

Table 19: VOC Annual Statistics at Egbert (2003)

Unit: micrograms per cubic metre (µg/m^3)

Compounds	# of Samples	No. < DL	PERCENTILES 5%	25%	50%	75%	90%	Max	Min	Mean	Std.Dev.
Formaldehyde	52	0	0.555	1.125	1.997	3.989	5.180	8.211	0.411	2.590	1.885
Freon11	113	0	1.442	1.495	1.575	1.756	1.833	1.972	1.260	1.618	0.160
Freon113	113	0	0.517	0.576	0.620	0.646	0.658	0.695	0.467	0.606	0.051
Freon114	113	0	0.097	0.104	0.109	0.117	0.123	0.134	0.093	0.110	0.009
Freon12	113	0	2.313	2.457	2.556	2.803	2.964	6.579	2.168	2.658	0.437
Freon22	113	0	0.458	0.500	0.551	0.606	0.675	1.049	0.425	0.567	0.098
Heptane	113	66	0.050	0.050	0.050	0.071	0.153	0.533	0.050	0.083	0.078
Hexane	113	16	0.050	0.060	0.102	0.165	0.291	1.047	0.050	0.161	0.176
Indane	113	111	0.050	0.050	0.050	0.050	0.050	0.066	0.050	0.050	0.002
Isobutane	113	4	0.053	0.134	0.261	0.483	0.864	3.254	0.050	0.430	0.536
iso-Butylbenzene	113	113									
Isopentane	113	0	0.098	0.232	0.410	0.628	1.423	3.585	0.055	0.585	0.638
Isoprene	113	77	0.050	0.050	0.050	0.112	0.628	1.870	0.050	0.201	0.366
iso-Propylbenzene	113	110	0.050	0.050	0.050	0.050	0.050	0.091	0.050	0.051	0.004
m and p-Xylene	113	22	0.050	0.063	0.121	0.284	0.807	3.326	0.050	0.314	0.512
MEK	52	0	0.158	0.625	1.172	3.133	8.264	14.865	0.136	2.758	3.730
Methylcyclohexane	113	91	0.050	0.050	0.050	0.050	0.080	0.280	0.050	0.061	0.035
Methylcyclopentane	113	71	0.050	0.050	0.050	0.063	0.129	0.478	0.050	0.077	0.070
Naphthalene	113	101	0.050	0.050	0.050	0.050	0.051	0.204	0.050	0.056	0.022
n-Butylbenzene	113	113									
Nonane	113	92	0.050	0.050	0.050	0.050	0.074	0.308	0.050	0.061	0.036
n-Propylbenzene	113	101	0.050	0.050	0.050	0.050	0.055	0.263	0.050	0.056	0.026
Octane	113	88	0.050	0.050	0.050	0.050	0.094	0.306	0.050	0.064	0.043
o-Xylene	113	59	0.050	0.050	0.050	0.100	0.253	1.044	0.050	0.116	0.151
p-Cymene	113	113									
Pentane	113	0	0.081	0.147	0.243	0.378	0.714	2.272	0.053	0.354	0.368
Propane	113	0	0.312	0.701	1.202	1.831	3.240	7.679	0.200	1.555	1.390
Propionaldehyde	52	0	0.067	0.152	0.222	0.328	0.447	1.106	0.062	0.260	0.180
Propylene	113	17	0.050	0.057	0.076	0.129	0.275	1.001	0.050	0.127	0.144
sec-Butylbenzene	113	113									
Styrene	113	106	0.050	0.050	0.050	0.050	0.050	0.258	0.050	0.055	0.024
Tetrachloroethylene	113	47	0.050	0.050	0.057	0.093	0.162	0.731	0.050	0.095	0.098
Toluene	113	0	0.104	0.207	0.367	0.634	1.919	6.036	0.057	0.731	1.009
trans-1,2-Dimethylcyclohexane	113	109	0.050	0.050	0.050	0.050	0.050	0.090	0.050	0.051	0.005
trans-1,4-Dimethylcyclohexane	113	111	0.050	0.050	0.050	0.050	0.050	0.055	0.050	0.050	0.001
trans-2-Butene	113	111	0.050	0.050	0.050	0.050	0.050	0.124	0.050	0.051	0.007
trans-2-Hexene	113	113									

Table 19: VOC Annual Statistics at Egbert (2003)

Unit: micrograms per cubic metre (µg/m³)

Compounds	# of Samples	No. < DL	PERCENTILES 5%	25%	50%	75%	90%	Max	Min	Mean	Std.Dev.
trans-2-Pentene	113	112	0.050	0.050	0.050	0.050	0.050	0.090	0.050	0.050	0.004
trans-3-Methyl-2-pentene	113	113									
Trichloroethylene	113	94	0.050	0.050	0.050	0.050	0.100	0.698	0.050	0.076	0.086
Undecane	113	97	0.050	0.050	0.050	0.050	0.061	0.326	0.050	0.060	0.038
Vinylchloride	113	113									

Table 20: VOC Annual Statistics at Hamilton (2003)

Unit: micrograms per cubic metre (μg/m^3)

	# of		PERCENTILES								
Compounds	**Samples**	**No. < DL**	**5%**	**25%**	**50%**	**75%**	**90%**	**Max**	**Min**	**Mean**	**Std.Dev.**
1,1,1-Trichloroethane	48	0	0.151	0.162	0.172	0.185	0.206	0.740	0.149	0.187	0.084
1,1,2,2-Tetrachloroethane	48	48									
1,1,2-Trichloroethane	48	48									
1,1-Dichloroethane	48	48									
1,1-Dichloroethylene	48	48									
1,2,3-Trimethylbenzene	48	12	0.050	0.051	0.093	0.183	0.281	0.395	0.050	0.126	0.086
1,2,4-Trichlorobenzene	48	48									
1,2,4-Trimethylbenzene	48	1	0.136	0.225	0.433	0.779	1.226	1.481	0.050	0.541	0.384
1,2-Dichlorobenzene	48	48									
1,2-Dichloroethane	48	42	0.050	0.050	0.050	0.050	0.057	0.158	0.050	0.054	0.017
1,2-Dichloropropane	48	48									
1,2-Diethylbenzene	48	48									
1,3,5-Trimethylbenzene	48	3	0.050	0.064	0.122	0.220	0.344	0.435	0.050	0.156	0.105
1,3-Butadiene	48	2	0.050	0.069	0.103	0.156	0.243	0.402	0.050	0.124	0.079
1,3-Dichlorobenzene	48	48									
1,3-Diethylbenzene	48	40	0.050	0.050	0.050	0.050	0.061	0.079	0.050	0.053	0.007
1,4-Dichlorobenzene	48	6	0.050	0.062	0.129	0.186	0.284	0.371	0.050	0.143	0.087
1,4-Dichlorobutane	48	48									
1,4-Diethylbenzene	48	16	0.050	0.050	0.081	0.142	0.192	0.258	0.050	0.100	0.060
1-Butene/Isobutene	48	0	0.204	0.256	0.366	0.668	0.819	1.553	0.159	0.487	0.314
1-Butyne	48	48									
1-Decene	48	48									
1-Heptene	48	47	0.050	0.050	0.050	0.050	0.050	0.059	0.050	0.050	0.001
1-Hexene	48	22	0.050	0.050	0.058	0.104	0.146	0.179	0.050	0.077	0.037
1-Methylcyclohexene	48	48									
1-Methylcyclopentene	48	39	0.050	0.050	0.050	0.050	0.074	0.101	0.050	0.054	0.011
1-Nonene	48	47	0.050	0.050	0.050	0.050	0.050	0.077	0.050	0.051	0.004
1-Octene	48	47	0.050	0.050	0.050	0.050	0.050	0.056	0.050	0.050	0.001
1-Pentene	48	9	0.050	0.057	0.074	0.133	0.195	0.249	0.050	0.098	0.054
1-Propyne	48	9	0.050	0.056	0.071	0.093	0.122	0.196	0.050	0.080	0.036
1-Undecene	48	23	0.050	0.050	0.059	0.156	0.380	1.710	0.050	0.161	0.259
2,2,3-Trimethylbutane	48	48									
2,2,4-Trimethylpentane	48	0	0.180	0.287	0.376	0.626	0.845	1.482	0.114	0.465	0.293
2,2,5-Trimethylhexane	48	44	0.050	0.050	0.050	0.050	0.050	0.095	0.050	0.052	0.008
2,2-Dimethylbutane	48	10	0.050	0.061	0.094	0.158	0.252	0.304	0.050	0.121	0.072
2,2-Dimethylhexane	48	42	0.050	0.050	0.050	0.050	0.053	0.108	0.050	0.052	0.010
2,2-Dimethylpentane	48	37	0.050	0.050	0.050	0.050	0.068	0.105	0.050	0.055	0.012

Table 20: VOC Annual Statistics at Hamilton (2003)

Unit: micrograms per cubic metre (µg/m³)

Compounds	# of Samples	No. < DL	5%	25%	50%	75%	90%	Max	Min	Mean	Std.Dev.
			P E R C E N T I L E S								
2,2-Dimethylpropane	48	38	0.050	0.050	0.050	0.050	0.083	0.115	0.050	0.056	0.014
2,3,4-Trimethylpentane	48	2	0.077	0.096	0.130	0.221	0.268	0.517	0.050	0.161	0.097
2,3-Dimethylbutane	48	0	0.098	0.136	0.219	0.449	0.690	1.017	0.071	0.319	0.244
2,3-Dimethylpentane	48	0	0.090	0.137	0.178	0.278	0.405	0.632	0.059	0.223	0.130
2,4-Dimethylhexane	48	16	0.050	0.050	0.075	0.115	0.157	0.251	0.050	0.087	0.049
2,4-Dimethylpentane	48	3	0.050	0.071	0.099	0.170	0.237	0.368	0.050	0.126	0.075
2,5-Dimethylhexane	48	20	0.050	0.050	0.059	0.090	0.120	0.192	0.050	0.074	0.035
2-Ethyl-1-butene	48	48									
2-Ethyltoluene	48	5	0.050	0.061	0.111	0.191	0.268	0.356	0.050	0.136	0.084
2-methyl-1-butene	48	2	0.052	0.081	0.102	0.212	0.325	0.439	0.050	0.149	0.102
2-Methyl-2-butene	48	1	0.051	0.073	0.146	0.318	0.524	0.672	0.050	0.212	0.173
2-Methylheptane	48	5	0.050	0.069	0.126	0.197	0.299	0.412	0.050	0.148	0.095
2-Methylhexane	48	0	0.189	0.240	0.388	0.626	0.834	1.127	0.129	0.463	0.279
2-Methylpentane	48	0	0.335	0.543	0.948	2.241	3.811	7.055	0.289	1.617	1.587
3,6-Dimethyloctane	48	47	0.050	0.050	0.050	0.050	0.050	0.060	0.050	0.050	0.001
3-Ethyltoluene	48	1	0.098	0.139	0.266	0.456	0.666	0.929	0.050	0.323	0.213
3-Methyl-1-Butene	48	34	0.050	0.050	0.050	0.055	0.080	0.118	0.050	0.057	0.015
3-Methyl-1-pentene	48	48									
3-Methylheptane	48	2	0.050	0.075	0.110	0.181	0.291	0.377	0.050	0.142	0.088
3-Methylhexane	48	0	0.157	0.235	0.376	0.628	1.000	1.250	0.131	0.497	0.326
3-Methylpentane	48	0	0.283	0.428	0.677	1.759	3.777	10.604	0.231	1.572	2.088
4-Ethyltoluene	48	4	0.050	0.067	0.136	0.234	0.337	0.472	0.050	0.162	0.108
4-Methyl-1-pentene	48	48									
4-Methylheptane	48	26	0.050	0.050	0.050	0.078	0.125	0.146	0.050	0.068	0.029
Acetylene	48	0	0.561	0.746	1.130	1.425	1.885	4.258	0.514	1.223	0.672
a-Pinene	48	16	0.050	0.050	0.080	0.197	0.291	0.421	0.050	0.127	0.103
Benzene	48	0	0.550	0.819	1.216	2.449	3.816	8.101	0.440	1.795	1.558
Benzylchloride	48	48									
b-Pinene	48	36	0.050	0.050	0.050	0.053	0.078	0.109	0.050	0.056	0.014
Bromodichloromethane	48	43	0.050	0.050	0.050	0.050	0.054	0.068	0.050	0.051	0.004
Bromoform	48	48									
Bromomethane	48	0	0.051	0.058	0.066	0.083	0.096	0.116	0.050	0.071	0.017
Butane	48	0	1.411	2.340	3.910	7.393	14.053	19.891	1.198	5.497	4.799
Camphene	48	47	0.050	0.050	0.050	0.050	0.050	0.051	0.050	0.050	0.000
Carbontetrachloride	48	0	0.584	0.612	0.645	0.676	0.704	0.744	0.575	0.645	0.041
Chlorobenzene	48	48									
Chloroethane	48	44	0.050	0.050	0.050	0.050	0.050	0.060	0.050	0.051	0.002

Table 20: VOC Annual Statistics at Hamilton (2003)

Unit: micrograms per cubic metre (μg/m³)

Compounds	# of Samples	No. < DL	PERCENTILES 5%	25%	50%	75%	90%	Max	Min	Mean	Std.Dev.
Chloroform	48	0	0.074	0.083	0.093	0.117	0.146	0.192	0.073	0.103	0.028
Chloromethane	48	0	1.045	1.105	1.235	1.596	1.803	1.868	1.012	1.327	0.280
cis-1,2-Dichloroethylene	48	48									
cis-1,2-Dimethylcyclohexane	48	48									
cis-1,3-Dichloropropene	48	36	0.050	0.050	0.050	0.059	0.116	0.151	0.050	0.062	0.025
cis-1,3-Dimethylcyclohexane	48	26	0.050	0.050	0.050	0.092	0.135	0.170	0.050	0.072	0.035
cis-1,4/t-1,3-Dimethylcyclohexane	48	45	0.050	0.050	0.050	0.050	0.050	0.063	0.050	0.050	0.002
cis-2-Butene	48	4	0.050	0.065	0.082	0.182	0.299	0.424	0.050	0.132	0.098
cis-2-Heptene	48	47	0.050	0.050	0.050	0.050	0.050	0.054	0.050	0.050	0.001
cis-2-Hexene	48	47	0.050	0.050	0.050	0.050	0.050	0.053	0.050	0.050	0.000
cis-2-Pentene	48	20	0.050	0.050	0.060	0.125	0.206	0.253	0.050	0.092	0.059
cis-3-Heptene	44	30	0.050	0.050	0.050	0.063	0.110	0.200	0.050	0.066	0.033
cis-3-Methyl-2-pentene	48	31	0.050	0.050	0.050	0.070	0.102	0.155	0.050	0.063	0.024
cis-4-Methyl-2-pentene	48	41	0.050	0.050	0.050	0.050	0.056	0.073	0.050	0.052	0.005
Cyclohexane	48	1	0.062	0.112	0.166	0.285	0.390	0.510	0.050	0.198	0.116
Cyclohexene	48	48									
Cyclopentane	48	0	0.070	0.103	0.177	0.326	0.462	0.590	0.064	0.226	0.152
Cyclopentene	48	39	0.050	0.050	0.050	0.050	0.063	0.078	0.050	0.052	0.006
Decane	48	4	0.050	0.080	0.184	0.425	0.745	0.872	0.050	0.288	0.252
Dibromochloromethane	48	48									
Dibromomethane	48	48									
Dichloromethane	48	0	0.222	0.279	0.362	0.577	0.809	1.415	0.180	0.459	0.292
d-Limonene	48	22	0.050	0.050	0.059	0.110	0.190	0.297	0.050	0.092	0.061
Dodecane	48	12	0.050	0.055	0.115	0.254	0.444	0.801	0.050	0.183	0.169
EDB	48	48									
Ethane	48	0	2.249	2.984	3.998	4.601	7.113	11.052	2.048	4.312	2.059
Ethylbenzene	48	0	0.246	0.370	0.610	1.044	1.534	2.651	0.137	0.748	0.525
Ethylbromide	48	48									
Ethylene	48	0	1.019	1.615	2.130	2.920	4.124	5.804	0.974	2.420	1.146
Freon11	48	0	1.670	1.760	1.816	1.930	1.970	2.244	1.628	1.837	0.120
Freon113	48	0	0.568	0.614	0.640	0.675	0.715	0.800	0.557	0.645	0.051
Freon114	48	0	0.110	0.113	0.117	0.123	0.128	0.158	0.109	0.119	0.008
Freon12	48	0	2.584	2.710	2.794	2.935	3.056	3.519	2.567	2.824	0.179
Freon22	48	0	0.570	0.681	0.763	0.931	1.043	1.815	0.556	0.822	0.217
Heptane	48	0	0.108	0.147	0.292	0.535	0.889	1.027	0.083	0.371	0.267
Hexachlorobutadiene	48	48									
Hexane	48	0	0.278	0.598	1.635	3.132	10.339	90.396	0.248	4.982	13.782

Table 20: VOC Annual Statistics at Hamilton (2003)

Unit: micrograms per cubic metre (µg/m^3)

	# of		PERCENTILES								
Compounds	**Samples**	**No. < DL**	**5%**	**25%**	**50%**	**75%**	**90%**	**Max**	**Min**	**Mean**	**Std.Dev.**
Hexylbenzene	48	48									
Indane	48	19	0.050	0.050	0.057	0.105	0.152	0.169	0.050	0.079	0.038
Isobutane	48	0	0.547	0.809	1.242	2.320	4.151	9.019	0.503	1.935	1.812
iso-Butylbenzene	48	48									
Isopentane	48	0	1.349	2.052	2.868	6.306	8.612	10.947	1.103	4.091	2.757
Isoprene	48	10	0.050	0.052	0.113	0.219	0.324	0.527	0.050	0.154	0.124
iso-Propylbenzene	48	33	0.050	0.050	0.050	0.053	0.069	0.092	0.050	0.055	0.010
m and p-Xylene	48	0	0.569	0.982	1.946	3.165	4.373	8.150	0.335	2.242	1.627
Methylcyclohexane	48	4	0.050	0.073	0.143	0.258	0.413	0.533	0.050	0.179	0.133
Methylcyclopentane	48	0	0.135	0.241	0.529	1.151	1.916	16.256	0.116	1.344	3.131
MTBE	48	44	0.050	0.050	0.050	0.050	0.050	0.164	0.050	0.057	0.024
Naphthalene	48	2	0.061	0.130	0.254	0.594	1.306	2.506	0.050	0.505	0.598
n-Butylbenzene	48	38	0.050	0.050	0.050	0.050	0.061	0.079	0.050	0.053	0.007
Nonane	48	3	0.050	0.076	0.129	0.299	0.541	0.876	0.050	0.214	0.188
n-Propylbenzene	48	8	0.050	0.058	0.098	0.168	0.233	0.324	0.050	0.120	0.072
Octane	48	3	0.050	0.082	0.137	0.266	0.367	0.440	0.050	0.173	0.115
o-Xylene	48	0	0.175	0.269	0.516	0.920	1.287	1.911	0.111	0.630	0.435
p-Cymene	48	43	0.050	0.050	0.050	0.050	0.051	0.083	0.050	0.051	0.005
Pentane	48	0	0.841	1.210	1.583	3.381	4.393	5.552	0.617	2.182	1.363
Propane	48	0	1.223	1.884	2.917	3.769	5.197	9.639	0.943	3.137	1.733
Propylene	48	0	0.330	0.491	0.659	1.040	1.355	2.391	0.276	0.811	0.466
sec-Butylbenzene	48	48									
Styrene	48	14	0.050	0.050	0.099	0.146	0.209	0.365	0.050	0.116	0.076
tert-Butylbenzene	48	48									
Tetrachloroethylene	48	0	0.083	0.106	0.272	0.648	0.929	2.143	0.064	0.402	0.416
Toluene	48	0	1.241	2.029	3.605	7.302	11.941	24.014	0.800	5.163	4.554
trans-1,2-Dichloroethylene	48	48									
trans-1,2-Dimethylcyclohexane	48	47	0.050	0.050	0.050	0.050	0.050	0.547	0.050	0.060	0.072
trans-1,3-Dichloropropene	48	39	0.050	0.050	0.050	0.050	0.074	0.111	0.050	0.055	0.013
trans-1,4-Dimethylcyclohexane	48	41	0.050	0.050	0.050	0.050	0.059	0.073	0.050	0.052	0.004
trans-2-Butene	48	1	0.052	0.067	0.094	0.268	0.393	0.578	0.050	0.165	0.135
trans-2-Heptene	48	48									
trans-2-Hexene	48	35	0.050	0.050	0.050	0.054	0.086	0.110	0.050	0.057	0.015
trans-2-Octene	48	31	0.050	0.050	0.050	0.069	0.104	0.140	0.050	0.063	0.024
trans-2-Pentene	48	6	0.050	0.071	0.119	0.245	0.412	0.585	0.050	0.176	0.140
trans-3-Heptene	48	48									
trans-3-Methyl-2-pentene	48	47	0.050	0.050	0.050	0.050	0.050	0.057	0.050	0.050	0.001

Table 20: VOC Annual Statistics at Hamilton (2003)

Unit: micrograms per cubic metre (µg/m³)

Compounds	# of Samples	No. < DL	5%	25%	50%	75%	90%	Max	Min	Mean	Std.Dev.
trans-4-Methyl-2-pentene	48	47	0.050	0.050	0.050	0.050	0.050	0.096	0.050	0.051	0.007
Trichloroethylene	48	22	0.050	0.050	0.055	0.089	0.152	0.279	0.050	0.081	0.054
Undecane	48	4	0.050	0.120	0.210	0.452	0.709	0.903	0.050	0.299	0.246
Vinylchloride	48	48									

Table 21: VOC Annual Statistics at Longwoods (2003)

Unit: micrograms per cubic metre (µg/m^3)

Compounds	# of Samples	No. < DL	PERCENTILES 5%	25%	50%	75%	90%	Max	Min	Mean	Std.Dev.
1,1,1-Trichloroethane	84	0	0.149	0.155	0.158	0.170	0.176	0.189	0.143	0.161	0.010
1,1,2-Trichloroethane	84	84									
1,2,3-Trimethylbenzene	84	82	0.050	0.050	0.050	0.050	0.050	0.079	0.050	0.050	0.003
1,2,4-Trimethylbenzene	84	58	0.050	0.050	0.050	0.060	0.084	0.295	0.050	0.061	0.031
1,2-Dichloroethane	84	84									
1,3,5-Trimethylbenzene	84	84									
1,3-Butadiene	84	83	0.050	0.050	0.050	0.050	0.050	0.065	0.050	0.050	0.002
1,3-Diethylbenzene	84	84									
1,4-Dichlorobenzene	84	83	0.050	0.050	0.050	0.050	0.050	0.069	0.050	0.050	0.002
1,4-Diethylbenzene	65	65									
1-Butene/Isobutene	84	0	0.064	0.087	0.099	0.138	0.173	0.217	0.052	0.113	0.038
1-Butyne	84	84									
1-Hexene	84	80	0.050	0.050	0.050	0.050	0.050	0.111	0.050	0.052	0.009
1-Pentene	84	79	0.050	0.050	0.050	0.050	0.050	0.394	0.050	0.056	0.039
1-Propyne	84	83	0.050	0.050	0.050	0.050	0.050	0.052	0.050	0.050	0.000
2,2,4-Trimethylpentane	84	29	0.050	0.050	0.062	0.092	0.122	0.251	0.050	0.078	0.039
2,2,5-Trimethylhexane	84	84									
2,2-Dimethylbutane	84	77	0.050	0.050	0.050	0.050	0.050	0.086	0.050	0.051	0.005
2,2-Dimethylhexane	84	84									
2,2-Dimethylpentane	84	84									
2,2-Dimethylpropane	84	84									
2,3,4-Trimethylpentane	84	79	0.050	0.050	0.050	0.050	0.050	0.074	0.050	0.051	0.003
2,3-Dimethylbutane	84	73	0.050	0.050	0.050	0.050	0.052	0.090	0.050	0.052	0.008
2,3-Dimethylpentane	84	70	0.050	0.050	0.050	0.050	0.061	0.173	0.050	0.055	0.017
2,4-Dimethylhexane	84	84									
2,4-Dimethylpentane	84	81	0.050	0.050	0.050	0.050	0.050	0.055	0.050	0.050	0.001
2,5-Dimethylhexane	84	84									
2-Ethyltoluene	84	84									
2-methyl-1-butene	84	84									
2-Methyl-2-butene	84	84									
2-Methylheptane	84	80	0.050	0.050	0.050	0.050	0.050	0.070	0.050	0.050	0.002
2-Methylhexane	84	38	0.050	0.050	0.056	0.090	0.113	0.232	0.050	0.072	0.036
2-Methylpentane	84	4	0.052	0.076	0.117	0.175	0.222	0.381	0.050	0.137	0.079
3-Ethyltoluene	84	70	0.050	0.050	0.050	0.050	0.061	0.100	0.050	0.053	0.008
3-Methyl-1-pentene	84	84									
3-Methylheptane	81	78	0.050	0.050	0.050	0.050	0.050	0.087	0.050	0.051	0.005
3-Methylhexane	84	35	0.050	0.050	0.058	0.090	0.123	0.236	0.050	0.074	0.038

Table 21: VOC Annual Statistics at Longwoods (2003)

Unit: micrograms per cubic metre (µg/m^3)

Compounds	# of Samples	No. < DL	5%	25%	50%	75%	90%	Max	Min	Mean	Std.Dev.
			PERCENTILES								
3-Methylpentane	84	11	0.050	0.066	0.097	0.149	0.189	0.338	0.050	0.115	0.065
4-Ethyltoluene	84	84									
4-Methyl-1-pentene	84	84									
4-Methylheptane	84	84									
Acetylene	84	0	0.178	0.269	0.410	0.649	0.864	1.139	0.121	0.471	0.259
a-Pinene	62	19	0.050	0.050	0.103	0.338	0.694	1.889	0.050	0.294	0.406
Benzene	84	0	0.185	0.283	0.357	0.552	0.755	0.946	0.108	0.434	0.207
b-Pinene	56	44	0.050	0.050	0.050	0.050	0.093	0.129	0.050	0.058	0.020
Bromoform	84	84									
Bromomethane	84	11	0.050	0.055	0.060	0.066	0.071	0.094	0.050	0.061	0.009
Butane	84	0	0.341	0.639	0.904	1.565	2.249	5.049	0.200	1.201	0.855
Camphene	84	40	0.050	0.050	0.062	0.193	0.364	0.958	0.050	0.152	0.183
Carbontetrachloride	84	0	0.507	0.564	0.622	0.646	0.688	0.741	0.474	0.612	0.060
Chlorobenzene	84	84									
Chloroethane	84	82	0.050	0.050	0.050	0.050	0.050	0.135	0.050	0.051	0.009
Chloroform	84	0	0.060	0.066	0.072	0.078	0.086	0.105	0.057	0.073	0.009
Chloromethane	84	0	1.064	1.124	1.169	1.262	1.337	1.455	1.021	1.193	0.097
cis-1,2-Dimethylcyclohexane	84	84									
cis-1,3-Dimethylcyclohexane	84	84									
cis-1,4/t-1,3-Dimethylcyclohexane	84	84									
cis-2-Butene	84	84									
cis-2-Hexene	84	84									
cis-2-Pentene	84	84									
cis-3-Methyl-2-pentene	84	84									
cis-4-Methyl-2-pentene	84	84									
Cyclohexane	84	60	0.050	0.050	0.050	0.053	0.091	0.297	0.050	0.062	0.035
Cyclopentane	84	75	0.050	0.050	0.050	0.050	0.052	0.074	0.050	0.052	0.005
Cyclopentene	84	84									
Decane	84	62	0.050	0.050	0.050	0.052	0.081	0.395	0.050	0.062	0.042
Dichloromethane	84	0	0.143	0.164	0.192	0.230	0.282	0.478	0.118	0.205	0.061
d-Limonene	84	37	0.050	0.050	0.068	0.161	0.315	0.839	0.050	0.136	0.157
Dodecane	84	32	0.050	0.050	0.057	0.074	0.107	0.469	0.050	0.076	0.057
Ethane	84	0	1.342	1.748	2.190	3.087	4.424	7.104	1.085	2.627	1.305
Ethylbenzene	84	17	0.050	0.055	0.076	0.111	0.168	0.234	0.050	0.092	0.049
Ethylene	84	0	0.172	0.247	0.446	0.793	1.060	2.069	0.125	0.563	0.404
Freon11	84	0	1.476	1.623	1.752	1.872	2.027	2.331	1.434	1.762	0.208
Freon113	84	0	0.541	0.576	0.637	0.656	0.669	0.691	0.536	0.621	0.047

Table 21: VOC Annual Statistics at Longwoods (2003)

Unit: micrograms per cubic metre (μg/m^3)

	# of		PERCENTILES								
Compounds	**Samples**	**No. < DL**	**5%**	**25%**	**50%**	**75%**	**90%**	**Max**	**Min**	**Mean**	**Std.Dev.**
Freon114	84	0	0.101	0.105	0.116	0.122	0.129	0.141	0.099	0.115	0.010
Freon12	84	0	2.439	2.681	2.950	3.391	4.251	5.056	2.318	3.165	0.655
Freon22	84	0	0.466	0.521	0.568	0.626	0.678	0.785	0.450	0.575	0.076
Heptane	84	41	0.050	0.050	0.051	0.080	0.106	0.201	0.050	0.069	0.030
Hexane	84	3	0.054	0.079	0.121	0.184	0.274	0.425	0.050	0.144	0.087
Indane	84	84									
Isobutane	84	0	0.091	0.212	0.332	0.607	0.861	1.596	0.058	0.449	0.334
iso-Butylbenzene	84	84									
Isopentane	84	0	0.242	0.365	0.520	0.775	1.066	2.244	0.217	0.618	0.381
Isoprene	84	44	0.050	0.050	0.050	0.866	1.708	3.744	0.050	0.530	0.828
iso-Propylbenzene	84	84									
m and p-Xylene	84	8	0.050	0.080	0.115	0.168	0.290	0.481	0.050	0.147	0.100
Methylcyclohexane	84	73	0.050	0.050	0.050	0.050	0.054	0.100	0.050	0.052	0.008
Methylcyclopentane	84	50	0.050	0.050	0.050	0.070	0.098	0.159	0.050	0.064	0.026
Naphthalene	84	57	0.050	0.050	0.050	0.059	0.066	0.119	0.050	0.056	0.012
n-Butylbenzene	84	84									
Nonane	84	75	0.050	0.050	0.050	0.050	0.050	0.166	0.050	0.053	0.014
n-Propylbenzene	84	83	0.050	0.050	0.050	0.050	0.050	0.051	0.050	0.050	0.000
Octane	84	67	0.050	0.050	0.050	0.050	0.062	0.122	0.050	0.054	0.012
o-Xylene	84	44	0.050	0.050	0.050	0.070	0.117	0.160	0.050	0.068	0.030
p-Cymene	84	66	0.050	0.050	0.050	0.050	0.132	0.276	0.050	0.066	0.043
Pentane	84	0	0.170	0.232	0.342	0.452	0.619	1.157	0.143	0.374	0.198
Propane	84	0	0.418	1.013	1.484	2.342	3.320	8.464	0.241	1.877	1.416
Propylene	84	3	0.057	0.085	0.123	0.184	0.295	0.522	0.050	0.148	0.089
sec-Butylbenzene	84	84									
Styrene	84	78	0.050	0.050	0.050	0.050	0.050	0.074	0.050	0.051	0.005
Tetrachloroethylene	84	25	0.050	0.050	0.065	0.097	0.145	0.201	0.050	0.082	0.040
Toluene	84	0	0.212	0.342	0.481	0.684	1.048	1.603	0.143	0.562	0.311
trans-1,2-Dimethylcyclohexane	84	84									
trans-1,4-Dimethylcyclohexane	84	84									
trans-2-Butene	84	84									
trans-2-Hexene	84	84									
trans-2-Pentene	84	84									
trans-3-Methyl-2-pentene	84	84									
Trichloroethylene	84	74	0.050	0.050	0.050	0.050	0.053	0.161	0.050	0.053	0.013
Undecane	84	19	0.050	0.053	0.075	0.113	0.198	1.206	0.050	0.110	0.139
Vinylchloride	84	84									

Table 22: VOC Annual Statistics at Ottawa (2003)

Unit: micrograms per cubic metre (μg/m^3)

Compounds	# of Samples	No. < DL	PERCENTILES 5%	25%	50%	75%	90%	Max	Min	Mean	Std.Dev.
1,1,1-Trichloroethane	49	0	0.150	0.161	0.166	0.180	0.204	0.257	0.146	0.173	0.021
1,1,2,2-Tetrachloroethane	49	49									
1,1,2-Trichloroethane	49	49									
1,1-Dichloroethane	49	49									
1,1-Dichloroethylene	49	49									
1,2,3-Trimethylbenzene	49	6	0.050	0.066	0.101	0.118	0.151	0.191	0.050	0.100	0.038
1,2,4-Trichlorobenzene	49	49									
1,2,4-Trimethylbenzene	49	0	0.106	0.311	0.431	0.558	0.668	1.087	0.062	0.438	0.199
1,2-Dichlorobenzene	49	49									
1,2-Dichloroethane	49	45	0.050	0.050	0.050	0.050	0.050	0.060	0.050	0.050	0.002
1,2-Dichloropropane	49	49									
1,2-Diethylbenzene	49	49									
1,3,5-Trimethylbenzene	49	4	0.050	0.095	0.127	0.167	0.191	0.307	0.050	0.131	0.054
1,3-Butadiene	49	6	0.050	0.075	0.099	0.135	0.219	0.359	0.050	0.116	0.062
1,3-Dichlorobenzene	49	49									
1,3-Diethylbenzene	49	49									
1,4-Dichlorobenzene	49	5	0.050	0.068	0.104	0.133	0.189	0.220	0.050	0.109	0.048
1,4-Dichlorobutane	49	49									
1,4-Diethylbenzene	49	14	0.050	0.050	0.070	0.083	0.105	0.137	0.050	0.073	0.023
1-Butene/Isobutene	49	0	0.196	0.367	0.476	0.657	0.939	2.457	0.153	0.578	0.375
1-Butyne	49	49									
1-Decene	49	49									
1-Heptene	49	48	0.050	0.050	0.050	0.050	0.050	0.076	0.050	0.051	0.004
1-Hexene	49	9	0.050	0.058	0.069	0.087	0.094	0.192	0.050	0.073	0.025
1-Methylcyclohexene	49	49									
1-Methylcyclopentene	49	46	0.050	0.050	0.050	0.050	0.050	0.103	0.050	0.051	0.008
1-Nonene	49	47	0.050	0.050	0.050	0.050	0.050	0.142	0.050	0.052	0.013
1-Octene	49	49									
1-Pentene	49	3	0.050	0.076	0.100	0.113	0.153	0.246	0.050	0.102	0.041
1-Propyne	49	17	0.050	0.050	0.060	0.082	0.138	0.229	0.050	0.075	0.037
1-Undecene	49	29	0.050	0.050	0.050	0.114	0.198	0.717	0.050	0.098	0.108
2,2,3-Trimethylbutane	49	49									
2,2,4-Trimethylpentane	49	0	0.062	0.175	0.236	0.300	0.415	0.827	0.056	0.254	0.132
2,2,5-Trimethylhexane	49	48	0.050	0.050	0.050	0.050	0.050	0.052	0.050	0.050	0.000
2,2-Dimethylbutane	49	2	0.056	0.137	0.169	0.209	0.256	0.599	0.050	0.176	0.087
2,2-Dimethylhexane	49	49									
2,2-Dimethylpentane	49	48	0.050	0.050	0.050	0.050	0.050	0.064	0.050	0.050	0.002

Table 22: VOC Annual Statistics at Ottawa (2003)

Unit: micrograms per cubic metre (µg/m^3)

Compounds	# of Samples	No. < DL	PERCENTILES 5%	25%	50%	75%	90%	Max	Min	Mean	Std.Dev.
2,2-Dimethylpropane	49	49									
2,3,4-Trimethylpentane	49	6	0.050	0.062	0.089	0.113	0.130	0.263	0.050	0.094	0.042
2,3-Dimethylbutane	49	0	0.066	0.151	0.233	0.270	0.320	0.739	0.052	0.225	0.110
2,3-Dimethylpentane	49	2	0.055	0.098	0.135	0.183	0.244	0.382	0.050	0.146	0.066
2,4-Dimethylhexane	49	18	0.050	0.050	0.055	0.069	0.085	0.162	0.050	0.064	0.022
2,4-Dimethylpentane	49	9	0.050	0.062	0.086	0.108	0.132	0.236	0.050	0.089	0.035
2,5-Dimethylhexane	49	27	0.050	0.050	0.050	0.062	0.082	0.129	0.050	0.059	0.016
2-Ethyl-1-butene	49	49									
2-Ethyltoluene	49	6	0.050	0.078	0.106	0.135	0.149	0.234	0.050	0.108	0.041
2-methyl-1-butene	49	3	0.050	0.111	0.144	0.179	0.205	0.440	0.050	0.152	0.075
2-Methyl-2-butene	49	3	0.050	0.126	0.155	0.219	0.305	0.865	0.050	0.186	0.124
2-Methylheptane	49	5	0.050	0.080	0.105	0.141	0.190	0.310	0.050	0.117	0.058
2-Methylhexane	49	0	0.125	0.248	0.347	0.442	0.554	1.002	0.072	0.356	0.168
2-Methylpentane	49	0	0.257	0.626	0.894	1.082	1.370	3.084	0.175	0.907	0.471
3,6-Dimethyloctane	49	47	0.050	0.050	0.050	0.050	0.050	0.087	0.050	0.051	0.006
3-Ethyltoluene	49	1	0.074	0.193	0.248	0.309	0.370	0.639	0.050	0.256	0.114
3-Methyl-1-Butene	49	35	0.050	0.050	0.050	0.050	0.062	0.139	0.050	0.055	0.015
3-Methyl-1-pentene	49	49									
3-Methylheptane	49	5	0.050	0.086	0.105	0.145	0.197	0.306	0.050	0.119	0.056
3-Methylhexane	49	2	0.070	0.262	0.355	0.447	0.623	1.055	0.050	0.365	0.182
3-Methylpentane	49	0	0.224	0.454	0.627	0.807	1.010	2.064	0.138	0.658	0.319
4-Ethyltoluene	49	5	0.050	0.096	0.130	0.160	0.185	0.316	0.050	0.130	0.055
4-Methyl-1-pentene	49	49									
4-Methylheptane	49	32	0.050	0.050	0.050	0.056	0.072	0.126	0.050	0.057	0.014
Acetylene	49	0	0.454	0.588	0.788	1.358	2.240	3.616	0.305	1.039	0.724
a-Pinene	49	3	0.050	0.154	0.312	0.467	0.811	1.110	0.050	0.372	0.279
Benzene	49	0	0.449	0.648	0.906	1.161	1.871	3.655	0.298	1.019	0.582
Benzylchloride	49	49									
b-Pinene	49	19	0.050	0.050	0.079	0.164	0.267	0.504	0.050	0.119	0.096
Bromodichloromethane	49	49									
Bromoform	49	49									
Bromomethane	49	5	0.050	0.056	0.064	0.073	0.086	0.126	0.050	0.067	0.015
Butane	49	0	0.761	1.659	2.439	3.976	6.616	13.588	0.490	3.160	2.365
Camphene	49	19	0.050	0.050	0.057	0.092	0.123	0.175	0.050	0.074	0.034
Carbontetrachloride	49	0	0.553	0.601	0.628	0.685	0.716	0.774	0.525	0.641	0.058
Chlorobenzene	49	49									
Chloroethane	49	48	0.050	0.050	0.050	0.050	0.050	0.055	0.050	0.050	0.001

Table 22: VOC Annual Statistics at Ottawa (2003)

Unit: micrograms per cubic metre (µg/m^3)

Compounds	# of Samples	No. < DL	PERCENTILES 5%	25%	50%	75%	90%	Max	Min	Mean	Std.Dev.
Chloroform	49	0	0.088	0.115	0.148	0.192	0.228	0.321	0.081	0.157	0.054
Chloromethane	49	0	1.011	1.107	1.253	1.479	1.580	1.672	0.946	1.280	0.211
cis-1,2-Dichloroethylene	49	49									
cis-1,2-Dimethylcyclohexane	49	48	0.050	0.050	0.050	0.050	0.050	0.058	0.050	0.050	0.001
cis-1,3-Dichloropropene	49	49									
cis-1,3-Dimethylcyclohexane	49	32	0.050	0.050	0.050	0.055	0.078	0.346	0.050	0.062	0.044
cis-1,4/t-1,3-Dimethylcyclohexane	49	48	0.050	0.050	0.050	0.050	0.050	0.117	0.050	0.051	0.010
cis-2-Butene	49	2	0.051	0.105	0.156	0.209	0.270	0.702	0.050	0.175	0.111
cis-2-Heptene	49	48	0.050	0.050	0.050	0.050	0.050	0.151	0.050	0.052	0.014
cis-2-Hexene	49	48	0.050	0.050	0.050	0.050	0.050	0.055	0.050	0.050	0.001
cis-2-Pentene	49	6	0.050	0.060	0.081	0.103	0.117	0.270	0.050	0.086	0.037
cis-3-Heptene	44	23	0.050	0.050	0.050	0.063	0.085	0.120	0.050	0.061	0.018
cis-3-Methyl-2-pentene	49	34	0.050	0.050	0.050	0.057	0.142	0.175	0.050	0.066	0.034
cis-4-Methyl-2-pentene	49	48	0.050	0.050	0.050	0.050	0.050	0.085	0.050	0.051	0.005
Cyclohexane	49	4	0.050	0.093	0.128	0.169	0.240	0.482	0.050	0.142	0.078
Cyclohexene	49	49									
Cyclopentane	49	2	0.052	0.119	0.174	0.200	0.233	0.509	0.050	0.168	0.076
Cyclopentene	49	48	0.050	0.050	0.050	0.050	0.050	0.082	0.050	0.051	0.005
Decane	49	3	0.050	0.164	0.249	0.327	0.628	0.977	0.050	0.287	0.206
Dibromochloromethane	49	49									
Dibromomethane	49	49									
Dichloromethane	49	0	0.225	0.320	0.401	0.495	0.564	0.752	0.203	0.408	0.120
d-Limonene	49	11	0.050	0.056	0.077	0.097	0.128	0.191	0.050	0.082	0.033
Dodecane	49	8	0.050	0.091	0.131	0.197	0.416	0.614	0.050	0.176	0.139
EDB	49	49									
Ethane	49	0	1.672	1.937	2.421	3.546	5.288	6.678	1.502	2.918	1.360
Ethylbenzene	49	0	0.187	0.387	0.496	0.607	0.688	1.100	0.112	0.490	0.187
Ethylbromide	49	49									
Ethylene	49	0	0.702	1.004	1.403	2.165	3.973	7.327	0.395	1.865	1.369
Freon11	49	0	1.539	1.688	1.746	1.900	2.074	2.692	1.488	1.810	0.214
Freon113	49	0	0.503	0.536	0.617	0.687	0.734	0.751	0.496	0.615	0.079
Freon114	49	0	0.100	0.107	0.113	0.121	0.127	0.138	0.087	0.114	0.011
Freon12	49	0	2.372	2.568	2.729	2.972	3.057	3.265	2.067	2.738	0.265
Freon22	49	0	0.577	0.678	0.752	0.872	1.012	1.356	0.536	0.798	0.172
Heptane	49	0	0.071	0.182	0.226	0.302	0.404	0.652	0.068	0.249	0.121
Hexachlorobutadiene	49	49									
Hexane	49	0	0.217	0.475	0.637	0.823	1.069	1.871	0.150	0.674	0.310

Table 22: VOC Annual Statistics at Ottawa (2003)

Unit: micrograms per cubic metre (µg/m^3)

	# of		PERCENTILES								
Compounds	**Samples**	**No. < DL**	**5%**	**25%**	**50%**	**75%**	**90%**	**Max**	**Min**	**Mean**	**Std.Dev.**
Hexylbenzene	46	46									
Indane	49	28	0.050	0.050	0.050	0.062	0.072	0.119	0.050	0.057	0.014
Isobutane	49	0	0.532	0.961	1.444	2.681	4.138	8.790	0.344	2.057	1.622
iso-Butylbenzene	49	49									
Isopentane	49	0	0.913	1.979	2.845	3.869	4.672	9.757	0.568	3.009	1.586
Isoprene	49	5	0.050	0.081	0.098	0.319	0.751	1.592	0.050	0.272	0.360
iso-Propylbenzene	49	47	0.050	0.050	0.050	0.050	0.050	0.061	0.050	0.050	0.002
m and p-Xylene	49	2	0.253	1.034	1.443	1.727	2.158	2.593	0.050	1.380	0.601
Methylcyclohexane	49	4	0.050	0.100	0.131	0.153	0.218	0.990	0.050	0.148	0.134
Methylcyclopentane	49	0	0.115	0.279	0.346	0.414	0.567	1.181	0.086	0.364	0.180
MTBE	49	29	0.050	0.050	0.050	0.078	0.112	0.249	0.050	0.071	0.045
Naphthalene	49	3	0.050	0.100	0.155	0.194	0.258	0.338	0.050	0.155	0.067
n-Butylbenzene	49	49									
Nonane	49	3	0.050	0.112	0.145	0.194	0.276	0.413	0.050	0.163	0.083
n-Propylbenzene	49	6	0.050	0.069	0.096	0.115	0.131	0.212	0.050	0.096	0.035
Octane	49	6	0.050	0.076	0.115	0.138	0.209	0.287	0.050	0.118	0.055
o-Xylene	49	0	0.169	0.380	0.507	0.587	0.729	1.163	0.092	0.489	0.202
p-Cymene	49	44	0.050	0.050	0.050	0.050	0.051	0.119	0.050	0.052	0.010
Pentane	49	0	0.503	0.818	1.205	1.700	2.180	4.044	0.246	1.328	0.683
Propane	49	0	0.870	1.506	2.097	2.852	4.161	6.457	0.583	2.396	1.328
Propylene	49	0	0.223	0.417	0.497	0.724	1.229	2.317	0.177	0.619	0.389
sec-Butylbenzene	49	49									
Styrene	49	16	0.050	0.050	0.065	0.082	0.127	0.182	0.050	0.072	0.029
tert-Butylbenzene	49	49									
Tetrachloroethylene	49	0	0.093	0.202	0.276	0.470	1.370	4.247	0.076	0.520	0.700
Toluene	49	0	0.770	2.065	2.916	3.837	4.563	12.675	0.635	3.134	1.972
trans-1,2-Dichloroethylene	49	49									
trans-1,2-Dimethylcyclohexane	49	49									
trans-1,3-Dichloropropene	49	49									
trans-1,4-Dimethylcyclohexane	49	47	0.050	0.050	0.050	0.050	0.050	0.160	0.050	0.052	0.016
trans-2-Butene	49	2	0.064	0.112	0.182	0.241	0.371	1.061	0.050	0.213	0.166
trans-2-Heptene	49	49									
trans-2-Hexene	49	37	0.050	0.050	0.050	0.050	0.056	0.127	0.050	0.053	0.013
trans-2-Octene	49	45	0.050	0.050	0.050	0.050	0.050	0.225	0.050	0.055	0.026
trans-2-Pentene	49	3	0.050	0.112	0.155	0.201	0.258	0.646	0.050	0.166	0.093
trans-3-Heptene	49	49									
trans-3-Methyl-2-pentene	49	48	0.050	0.050	0.050	0.050	0.050	0.063	0.050	0.050	0.002

Table 22: VOC Annual Statistics at Ottawa (2003)
Unit: micrograms per cubic metre (µg/m^3)

Compounds	# of Samples	No. < DL	PERCENTILES 5%	25%	50%	75%	90%	Max	Min	Mean	Std.Dev.
trans-4-Methyl-2-pentene	49	49									
Trichloroethylene	49	25	0.050	0.050	0.050	0.066	0.110	0.341	0.050	0.073	0.059
Undecane	49	3	0.050	0.153	0.248	0.373	0.793	1.416	0.050	0.330	0.295
Vinylchloride	49	49									

Table 23: VOC Annual Statistics at Sarnia (2003)

Unit: micrograms per cubic metre (μg/m^3)

	# of		P E R C E N T I L E S								
Compounds	**Samples**	**No. < DL**	**5%**	**25%**	**50%**	**75%**	**90%**	**Max**	**Min**	**Mean**	**Std.Dev.**
1,1,1-Trichloroethane	36	0	0.147	0.158	0.175	0.191	0.213	1.284	0.144	0.206	0.186
1,1,2,2-Tetrachloroethane	36	36									
1,1,2-Trichloroethane	36	36									
1,1-Dichloroethane	36	36									
1,1-Dichloroethylene	36	36									
1,2,3-Trimethylbenzene	36	9	0.050	0.053	0.099	0.202	0.329	1.203	0.050	0.172	0.217
1,2,4-Trichlorobenzene	36	36									
1,2,4-Trimethylbenzene	36	5	0.050	0.246	0.423	0.845	1.302	3.629	0.050	0.615	0.692
1,2-Dichlorobenzene	36	36									
1,2-Dichloroethane	36	28	0.050	0.050	0.050	0.050	0.060	0.100	0.050	0.053	0.009
1,2-Dichloropropane	36	36									
1,2-Diethylbenzene	36	34	0.050	0.050	0.050	0.050	0.050	0.133	0.050	0.053	0.014
1,3,5-Trimethylbenzene	36	7	0.050	0.068	0.114	0.236	0.376	1.012	0.050	0.179	0.188
1,3-Butadiene	36	7	0.050	0.068	0.135	0.363	0.798	3.132	0.050	0.355	0.691
1,3-Dichlorobenzene	36	36									
1,3-Diethylbenzene	36	26	0.050	0.050	0.050	0.051	0.086	0.305	0.050	0.065	0.046
1,4-Dichlorobenzene	36	6	0.050	0.057	0.083	0.128	0.150	0.206	0.050	0.094	0.043
1,4-Dichlorobutane	36	36									
1,4-Diethylbenzene	36	12	0.050	0.050	0.086	0.170	0.293	1.084	0.050	0.153	0.193
1-Butene/Isobutene	36	0	0.103	0.332	0.952	1.826	3.566	6.525	0.095	1.395	1.577
1-Butyne	36	36									
1-Decene	36	35	0.050	0.050	0.050	0.050	0.050	0.054	0.050	0.050	0.001
1-Heptene	36	34	0.050	0.050	0.050	0.050	0.050	1.822	0.050	0.102	0.295
1-Hexene	36	11	0.050	0.050	0.104	0.192	0.275	0.405	0.050	0.129	0.092
1-Methylcyclohexene	36	36									
1-Methylcyclopentene	36	26	0.050	0.050	0.050	0.057	0.080	0.113	0.050	0.058	0.015
1-Nonene	36	36									
1-Octene	36	31	0.050	0.050	0.050	0.050	0.079	0.658	0.050	0.076	0.109
1-Pentene	36	9	0.050	0.056	0.116	0.182	0.225	0.301	0.050	0.128	0.074
1-Propyne	36	13	0.050	0.050	0.069	0.081	0.093	0.172	0.050	0.071	0.027
1-Undecene	36	25	0.050	0.050	0.050	0.108	1.341	2.182	0.050	0.293	0.545
2,2,3-Trimethylbutane	36	36									
2,2,4-Trimethylpentane	36	1	0.059	0.165	0.415	0.713	1.536	4.322	0.050	0.657	0.842
2,2,5-Trimethylhexane	36	34	0.050	0.050	0.050	0.050	0.050	0.064	0.050	0.050	0.002
2,2-Dimethylbutane	36	6	0.050	0.078	0.174	0.252	0.314	0.499	0.050	0.184	0.117
2,2-Dimethylhexane	36	34	0.050	0.050	0.050	0.050	0.050	0.140	0.050	0.053	0.015
2,2-Dimethylpentane	36	22	0.050	0.050	0.050	0.058	0.091	0.191	0.050	0.061	0.027

Table 23: VOC Annual Statistics at Sarnia (2003)
Unit: micrograms per cubic metre (µg/m^3)

	# of		PERCENTILES								
Compounds	**Samples**	**No. < DL**	**5%**	**25%**	**50%**	**75%**	**90%**	**Max**	**Min**	**Mean**	**Std.Dev.**
2,2-Dimethylpropane	36	25	0.050	0.050	0.050	0.052	0.080	0.097	0.050	0.057	0.014
2,3,4-Trimethylpentane	36	7	0.050	0.055	0.105	0.245	0.346	0.958	0.050	0.171	0.180
2,3-Dimethylbutane	36	3	0.050	0.112	0.343	0.471	0.702	1.382	0.050	0.370	0.289
2,3-Dimethylpentane	36	3	0.050	0.113	0.240	0.354	0.437	1.288	0.050	0.256	0.225
2,4-Dimethylhexane	36	13	0.050	0.050	0.099	0.150	0.325	0.524	0.050	0.129	0.115
2,4-Dimethylpentane	36	8	0.050	0.053	0.136	0.179	0.273	0.586	0.050	0.149	0.108
2,5-Dimethylhexane	36	14	0.050	0.050	0.068	0.125	0.230	0.410	0.050	0.103	0.085
2-Ethyl-1-butene	36	36									
2-Ethyltoluene	36	7	0.050	0.063	0.113	0.200	0.367	0.826	0.050	0.159	0.152
2-methyl-1-butene	36	6	0.050	0.070	0.203	0.271	0.375	0.440	0.050	0.192	0.120
2-Methyl-2-butene	36	7	0.050	0.097	0.227	0.486	0.696	1.093	0.050	0.315	0.263
2-Methylheptane	36	7	0.050	0.062	0.168	0.246	0.365	1.930	0.050	0.221	0.320
2-Methylhexane	36	0	0.068	0.197	0.519	0.814	0.979	2.967	0.063	0.564	0.515
2-Methylpentane	36	0	0.147	0.517	1.807	2.593	3.725	7.702	0.103	1.898	1.624
3,6-Dimethyloctane	36	31	0.050	0.050	0.050	0.050	0.061	0.252	0.050	0.059	0.035
3-Ethyltoluene	36	6	0.050	0.141	0.270	0.462	0.863	1.667	0.050	0.340	0.326
3-Methyl-1-Butene	36	22	0.050	0.050	0.050	0.064	0.089	0.109	0.050	0.060	0.017
3-Methyl-1-pentene	36	36									
3-Methylheptane	36	9	0.050	0.056	0.157	0.231	0.319	1.222	0.050	0.186	0.208
3-Methylhexane	36	0	0.074	0.176	0.522	0.847	1.004	3.576	0.053	0.604	0.612
3-Methylpentane	36	0	0.125	0.342	1.256	2.167	3.363	5.140	0.091	1.481	1.321
4-Ethyltoluene	36	8	0.050	0.071	0.135	0.232	0.427	0.919	0.050	0.179	0.171
4-Methyl-1-pentene	36	36									
4-Methylheptane	36	14	0.050	0.050	0.068	0.089	0.124	0.534	0.050	0.087	0.085
Acetylene	36	0	0.515	0.828	0.979	1.384	1.890	2.249	0.493	1.093	0.463
a-Pinene	36	12	0.050	0.050	0.208	0.501	0.839	1.432	0.050	0.345	0.357
Benzene	36	0	0.533	0.837	1.417	2.023	4.168	4.824	0.462	1.674	1.189
Benzylchloride	36	36									
b-Pinene	36	23	0.050	0.050	0.050	0.078	0.111	0.174	0.050	0.068	0.033
Bromodichloromethane	36	30	0.050	0.050	0.050	0.050	0.089	0.390	0.050	0.064	0.058
Bromoform	36	36									
Bromomethane	36	0	0.054	0.070	0.075	0.092	0.146	0.267	0.053	0.089	0.043
Butane	36	0	1.270	3.153	8.238	12.870	17.315	25.144	1.068	8.530	6.333
Camphene	36	36									
Carbontetrachloride	36	0	0.566	0.610	0.643	0.674	0.718	0.745	0.548	0.644	0.048
Chlorobenzene	36	36									
Chloroethane	36	32	0.050	0.050	0.050	0.050	0.059	0.131	0.050	0.054	0.015

Table 23: VOC Annual Statistics at Sarnia (2003)

Unit: micrograms per cubic metre (µg/m^3)

Compounds	# of Samples	No. < DL	5%	25%	50%	75%	90%	Max	Min	Mean	Std.Dev.
Chloroform	36	1	0.069	0.094	0.129	0.172	0.205	0.459	0.050	0.144	0.088
Chloromethane	36	0	1.043	1.201	1.821	3.828	8.325	11.274	1.032	3.182	3.069
cis-1,2-Dichloroethylene	36	36									
cis-1,2-Dimethylcyclohexane	36	33	0.050	0.050	0.050	0.050	0.050	0.113	0.050	0.052	0.010
cis-1,3-Dichloropropene	36	36									
cis-1,3-Dimethylcyclohexane	36	14	0.050	0.050	0.072	0.123	0.175	0.865	0.050	0.108	0.140
cis-1,4/t-1,3-Dimethylcyclohexane	36	33	0.050	0.050	0.050	0.050	0.050	0.189	0.050	0.055	0.024
cis-2-Butene	36	8	0.050	0.055	0.240	0.349	0.510	1.058	0.050	0.249	0.225
cis-2-Heptene	36	34	0.050	0.050	0.050	0.050	0.050	0.090	0.050	0.051	0.007
cis-2-Hexene	36	32	0.050	0.050	0.050	0.050	0.056	0.085	0.050	0.052	0.006
cis-2-Pentene	36	11	0.050	0.050	0.121	0.185	0.242	0.315	0.050	0.125	0.079
cis-3-Heptene	32	21	0.050	0.050	0.050	0.087	0.126	0.230	0.050	0.071	0.041
cis-3-Methyl-2-pentene	36	24	0.050	0.050	0.050	0.084	0.128	0.167	0.050	0.069	0.034
cis-4-Methyl-2-pentene	36	21	0.050	0.050	0.050	0.064	0.095	0.119	0.050	0.061	0.018
Cyclohexane	36	4	0.050	0.129	0.346	1.445	4.083	6.290	0.050	1.164	1.752
Cyclohexene	36	36									
Cyclopentane	36	4	0.050	0.119	0.372	0.502	0.777	4.185	0.050	0.531	0.793
Cyclopentene	36	25	0.050	0.050	0.050	0.053	0.069	0.082	0.050	0.054	0.008
Decane	36	6	0.050	0.092	0.273	0.693	1.763	12.073	0.050	0.938	2.149
Dibromochloromethane	36	36									
Dibromomethane	36	36									
Dichloromethane	36	0	0.191	0.330	0.407	0.490	0.701	1.596	0.186	0.448	0.247
d-Limonene	36	28	0.050	0.050	0.050	0.050	0.082	0.169	0.050	0.060	0.025
Dodecane	36	8	0.050	0.095	0.277	0.577	0.766	2.445	0.050	0.391	0.473
EDB	36	36									
Ethane	36	0	2.529	3.371	4.885	7.654	9.869	16.269	2.000	5.810	3.309
Ethylbenzene	36	2	0.050	0.256	0.523	0.690	1.295	2.884	0.050	0.650	0.628
Ethylbromide	36	36									
Ethylene	36	0	0.788	1.522	3.208	5.945	11.932	20.820	0.675	4.544	4.560
Freon11	36	0	1.591	1.730	1.833	1.915	2.019	3.104	1.555	1.853	0.258
Freon113	36	0	0.673	0.884	1.763	2.941	4.195	6.266	0.660	2.032	1.398
Freon114	36	0	0.109	0.112	0.117	0.123	0.127	0.130	0.108	0.118	0.006
Freon12	36	0	2.673	3.024	3.304	3.970	4.332	4.549	2.618	3.413	0.574
Freon22	36	0	0.542	0.604	0.657	0.724	0.839	2.734	0.538	0.734	0.370
Heptane	36	1	0.050	0.165	0.408	0.696	0.957	5.676	0.050	0.595	0.940
Hexachlorobutadiene	36	36									
Hexane	36	0	0.130	0.445	1.631	2.988	5.859	10.106	0.099	2.218	2.466

Table 23: VOC Annual Statistics at Sarnia (2003)

Unit: micrograms per cubic metre (µg/m^3)

Compounds	# of Samples	No. < DL	PERCENTILES 5%	25%	50%	75%	90%	Max	Min	Mean	Std.Dev.
Hexylbenzene	34	34									
Indane	36	21	0.050	0.050	0.050	0.082	0.139	0.267	0.050	0.073	0.044
Isobutane	36	0	0.437	1.272	3.225	5.361	5.795	13.170	0.414	3.602	3.104
iso-Butylbenzene	36	34	0.050	0.050	0.050	0.050	0.050	0.111	0.050	0.052	0.010
Isopentane	36	0	0.867	2.034	6.125	9.584	12.068	16.565	0.710	6.419	4.366
Isoprene	36	12	0.050	0.050	0.074	0.166	0.305	1.166	0.050	0.149	0.205
iso-Propylbenzene	36	24	0.050	0.050	0.050	0.060	0.095	0.177	0.050	0.063	0.029
m and p-Xylene	36	1	0.052	0.560	1.361	1.794	2.651	5.044	0.050	1.409	1.078
Methylcyclohexane	36	6	0.050	0.091	0.197	0.470	0.625	4.471	0.050	0.392	0.741
Methylcyclopentane	36	1	0.061	0.191	0.669	1.011	1.742	5.175	0.050	0.846	0.979
MTBE	36	33	0.050	0.050	0.050	0.050	0.050	0.145	0.050	0.054	0.016
Naphthalene	36	6	0.050	0.068	0.201	0.275	0.333	0.409	0.050	0.188	0.107
n-Butylbenzene	36	24	0.050	0.050	0.050	0.058	0.107	0.396	0.050	0.072	0.064
Nonane	36	6	0.050	0.088	0.224	0.538	1.226	4.179	0.050	0.453	0.754
n-Propylbenzene	36	7	0.050	0.058	0.109	0.175	0.317	0.610	0.050	0.142	0.118
Octane	36	6	0.050	0.064	0.217	0.390	0.539	2.754	0.050	0.312	0.471
o-Xylene	36	2	0.050	0.196	0.499	0.660	0.883	2.030	0.050	0.517	0.413
p-Cymene	36	32	0.050	0.050	0.050	0.050	0.051	0.255	0.050	0.059	0.036
Pentane	36	0	0.521	1.144	3.561	4.684	6.977	16.169	0.512	3.549	3.004
Propane	36	0	1.972	3.583	6.285	12.322	17.756	28.624	1.914	8.416	6.786
Propylene	36	0	0.207	0.537	1.611	2.950	6.839	14.586	0.198	2.575	3.169
sec-Butylbenzene	36	31	0.050	0.050	0.050	0.050	0.057	0.215	0.050	0.057	0.029
Styrene	36	8	0.050	0.078	0.139	0.214	0.333	0.688	0.050	0.167	0.138
tert-Butylbenzene	36	36									
Tetrachloroethylene	36	0	0.053	0.128	0.196	0.300	0.412	0.890	0.050	0.227	0.169
Toluene	36	0	0.363	1.447	3.477	5.368	7.544	35.982	0.360	4.491	5.939
trans-1,2-Dichloroethylene	36	36									
trans-1,2-Dimethylcyclohexane	36	36									
trans-1,3-Dichloropropene	36	36									
trans-1,4-Dimethylcyclohexane	36	26	0.050	0.050	0.050	0.057	0.069	0.364	0.050	0.064	0.054
trans-2-Butene	36	7	0.050	0.074	0.277	0.425	0.493	1.280	0.050	0.278	0.242
trans-2-Heptene	36	36									
trans-2-Hexene	36	19	0.050	0.050	0.050	0.086	0.107	0.142	0.050	0.068	0.025
trans-2-Octene	36	20	0.050	0.050	0.050	0.098	0.120	0.710	0.050	0.090	0.114
trans-2-Pentene	36	8	0.050	0.082	0.252	0.415	0.523	0.757	0.050	0.257	0.195
trans-3-Heptene	36	35	0.050	0.050	0.050	0.050	0.050	0.051	0.050	0.050	0.000
trans-3-Methyl-2-pentene	36	32	0.050	0.050	0.050	0.050	0.056	0.063	0.050	0.051	0.003

Table 23: VOC Annual Statistics at Sarnia (2003)

Unit: micrograms per cubic metre (µg/m³)

Compounds	# of Samples	No. < DL	PERCENTILES 5%	25%	50%	75%	90%	Max	Min	Mean	Std.Dev.
trans-4-Methyl-2-pentene	36	36									
Trichloroethylene	36	7	0.050	0.053	0.081	0.103	0.123	0.207	0.050	0.082	0.033
Undecane	36	7	0.050	0.141	0.372	0.708	1.909	10.461	0.050	0.900	1.901
Vinylchloride	36	30	0.050	0.050	0.050	0.050	0.082	0.776	0.050	0.078	0.123

Table 24: VOC Annual Statistics at Simcoe (2003)

Unit: micrograms per cubic metre (µg/m^3)

Compounds	# of Samples	No. < DL	PERCENTILES 5%	25%	50%	75%	90%	Max	Min	Mean	Std.Dev.
1,1,1-Trichloroethane	45	0	0.144	0.152	0.157	0.175	0.191	0.210	0.142	0.164	0.018
1,1,2,2-Tetrachloroethane	45	45									
1,1,2-Trichloroethane	45	45									
1,1-Dichloroethane	45	45									
1,1-Dichloroethylene	45	43	0.050	0.050	0.050	0.050	0.050	0.077	0.050	0.051	0.004
1,2,3-Trimethylbenzene	45	38	0.050	0.050	0.050	0.050	0.051	0.080	0.050	0.051	0.005
1,2,4-Trichlorobenzene	45	43	0.050	0.050	0.050	0.050	0.050	0.086	0.050	0.051	0.006
1,2,4-Trimethylbenzene	45	10	0.050	0.053	0.111	0.170	0.205	0.261	0.050	0.117	0.061
1,2-Dichlorobenzene	45	45									
1,2-Dichloroethane	45	42	0.050	0.050	0.050	0.050	0.050	0.090	0.050	0.051	0.006
1,2-Dichloropropane	45	45									
1,2-Diethylbenzene	45	45									
1,3,5-Trimethylbenzene	45	35	0.050	0.050	0.050	0.050	0.073	0.088	0.050	0.054	0.010
1,3-Butadiene	45	43	0.050	0.050	0.050	0.050	0.050	0.127	0.050	0.053	0.013
1,3-Dichlorobenzene	45	44	0.050	0.050	0.050	0.050	0.050	0.056	0.050	0.050	0.001
1,3-Diethylbenzene	45	44	0.050	0.050	0.050	0.050	0.050	0.051	0.050	0.050	0.000
1,4-Dichlorobenzene	45	45									
1,4-Dichlorobutane	45	42	0.050	0.050	0.050	0.050	0.050	0.067	0.050	0.050	0.002
1,4-Diethylbenzene	45	41	0.050	0.050	0.050	0.050	0.050	0.114	0.050	0.052	0.010
1-Butene/Isobutene	45	0	0.080	0.099	0.151	0.170	0.210	0.328	0.061	0.145	0.054
1-Butyne	45	45									
1-Decene	45	45									
1-Heptene	45	44	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.000
1-Hexene	45	43	0.050	0.050	0.050	0.050	0.050	0.219	0.050	0.056	0.028
1-Methylcyclohexene	45	44	0.050	0.050	0.050	0.050	0.050	0.051	0.050	0.050	0.000
1-Methylcyclopentene	45	44	0.050	0.050	0.050	0.050	0.050	0.057	0.050	0.050	0.001
1-Nonene	45	45									
1-Octene	45	45									
1-Pentene	45	35	0.050	0.050	0.050	0.050	0.063	0.138	0.050	0.054	0.014
1-Propyne	45	44	0.050	0.050	0.050	0.050	0.050	0.054	0.050	0.050	0.001
1-Undecene	45	21	0.050	0.050	0.074	0.155	0.426	0.964	0.050	0.160	0.204
2,2,3-Trimethylbutane	45	45									
2,2,4-Trimethylpentane	45	4	0.050	0.102	0.142	0.188	0.221	0.255	0.050	0.145	0.057
2,2,5-Trimethylhexane	45	45									
2,2-Dimethylbutane	45	27	0.050	0.050	0.050	0.060	0.076	0.133	0.050	0.058	0.016
2,2-Dimethylhexane	45	45									
2,2-Dimethylpentane	45	45									

Table 24: VOC Annual Statistics at Simcoe (2003)

Unit: micrograms per cubic metre (µg/m^3)

	# of		PERCENTILES								
Compounds	**Samples**	**No. < DL**	**5%**	**25%**	**50%**	**75%**	**90%**	**Max**	**Min**	**Mean**	**Std.Dev.**
2,2-Dimethylpropane	45	44	0.050	0.050	0.050	0.050	0.050	0.097	0.050	0.051	0.007
2,3,4-Trimethylpentane	45	23	0.050	0.050	0.050	0.061	0.079	0.089	0.050	0.058	0.012
2,3-Dimethylbutane	45	11	0.050	0.055	0.072	0.092	0.117	0.152	0.050	0.079	0.027
2,3-Dimethylpentane	45	14	0.050	0.050	0.058	0.074	0.092	0.113	0.050	0.065	0.018
2,4-Dimethylhexane	45	45									
2,4-Dimethylpentane	45	38	0.050	0.050	0.050	0.050	0.057	0.084	0.050	0.052	0.006
2,5-Dimethylbenzaldehyde	29	29									
2,5-Dimethylhexane	45	45									
2-Ethyl-1-butene	45	45									
2-Ethyltoluene	45	36	0.050	0.050	0.050	0.050	0.067	0.084	0.050	0.053	0.007
2-methyl-1-butene	43	40	0.050	0.050	0.050	0.050	0.050	0.062	0.050	0.051	0.002
2-Methyl-2-butene	45	45									
2-Methylheptane	45	31	0.050	0.050	0.050	0.053	0.060	0.081	0.050	0.053	0.007
2-Methylhexane	45	3	0.050	0.081	0.110	0.131	0.176	0.250	0.050	0.115	0.046
2-Methylpentane	45	0	0.096	0.170	0.281	0.351	0.440	0.594	0.080	0.280	0.131
2-Pentanone/Isovaleraldehyde	29	7	0.050	0.053	0.072	0.104	0.166	0.197	0.050	0.086	0.043
3,6-Dimethyloctane	45	45									
3-Ethyltoluene	45	13	0.050	0.050	0.075	0.111	0.147	0.179	0.050	0.085	0.040
3-Methyl-1-Butene	45	45									
3-Methyl-1-pentene	45	45									
3-Methylheptane	45	42	0.050	0.050	0.050	0.050	0.050	0.107	0.050	0.052	0.009
3-Methylhexane	45	4	0.050	0.082	0.116	0.144	0.189	0.244	0.050	0.117	0.049
3-Methylpentane	45	0	0.081	0.137	0.204	0.251	0.322	0.473	0.059	0.208	0.093
4-Ethyltoluene	45	31	0.050	0.050	0.050	0.059	0.083	0.108	0.050	0.057	0.014
4-Methyl-1-pentene	45	45									
4-Methylheptane	45	45									
Acetaldehyde	29	0	0.396	0.648	0.874	1.123	1.492	3.058	0.294	0.976	0.569
Acetone	29	0	1.100	1.827	2.321	3.534	4.690	6.534	0.986	2.673	1.270
Acetylene	45	0	0.275	0.390	0.513	0.698	0.948	1.353	0.208	0.576	0.257
Acrolein	29	23	0.050	0.050	0.050	0.050	0.077	0.112	0.050	0.055	0.014
a-Pinene	43	14	0.050	0.050	0.297	3.668	7.024	8.992	0.050	2.035	2.846
Benzaldehyde	29	10	0.050	0.050	0.063	0.093	0.129	0.189	0.050	0.077	0.034
Benzene	45	0	0.293	0.421	0.508	0.696	0.890	1.080	0.163	0.566	0.217
Benzylchloride	45	45									
b-Pinene	43	26	0.050	0.050	0.050	0.149	0.309	0.398	0.050	0.115	0.105
Bromodichloromethane	45	44	0.050	0.050	0.050	0.050	0.050	0.051	0.050	0.050	0.000
Bromoform	45	43	0.050	0.050	0.050	0.050	0.050	0.059	0.050	0.050	0.001

Table 24: VOC Annual Statistics at Simcoe (2003)

Unit: micrograms per cubic metre (µg/m^3)

Compounds	# of Samples	No. < DL	5%	25%	50%	75%	90%	Max	Min	Mean	Std.Dev.
			PERCENTILES								
Bromomethane	45	2	0.051	0.056	0.065	0.072	0.101	0.199	0.050	0.071	0.027
Butane	45	0	0.637	1.019	1.519	2.364	3.344	5.422	0.513	1.765	1.017
Camphene	43	29	0.050	0.050	0.050	0.065	0.152	0.252	0.050	0.073	0.048
Carbontetrachloride	45	0	0.577	0.605	0.646	0.671	0.694	0.750	0.552	0.641	0.046
Chlorobenzene	45	45									
Chloroethane	45	42	0.050	0.050	0.050	0.050	0.050	0.109	0.050	0.052	0.010
Chloroform	45	0	0.063	0.073	0.079	0.089	0.098	0.143	0.060	0.084	0.017
Chloromethane	45	0	1.058	1.136	1.268	1.558	1.736	1.853	0.964	1.342	0.252
cis-1,2-Dichloroethylene	45	45									
cis-1,2-Dimethylcyclohexane	45	45									
cis-1,3-Dichloropropene	45	37	0.050	0.050	0.050	0.050	0.148	0.396	0.050	0.074	0.072
cis-1,3-Dimethylcyclohexane	45	45									
cis-1,4/t-1,3-Dimethylcyclohexane	45	45									
cis-2-Butene	45	43	0.050	0.050	0.050	0.050	0.050	0.069	0.050	0.051	0.004
cis-2-Heptene	45	44	0.050	0.050	0.050	0.050	0.050	0.058	0.050	0.050	0.001
cis-2-Hexene	45	45									
cis-2-Pentene	45	45									
cis-3-Heptene	41	41									
cis-3-Methyl-2-pentene	45	45									
cis-4-Methyl-2-pentene	45	45									
Crotonaldehyde	29	27	0.050	0.050	0.050	0.050	0.050	0.058	0.050	0.050	0.002
Cyclohexane	45	20	0.050	0.050	0.052	0.099	0.141	0.153	0.050	0.076	0.035
Cyclohexene	45	45									
Cyclopentane	45	13	0.050	0.050	0.062	0.077	0.101	0.123	0.050	0.068	0.020
Cyclopentene	45	45									
Decane	45	23	0.050	0.050	0.050	0.081	0.097	0.103	0.050	0.063	0.019
Dibromochloromethane	45	44	0.050	0.050	0.050	0.050	0.050	0.059	0.050	0.050	0.001
Dibromomethane	45	43	0.050	0.050	0.050	0.050	0.050	0.105	0.050	0.052	0.010
Dichloromethane	45	0	0.174	0.203	0.220	0.249	0.309	0.796	0.164	0.251	0.123
d-Limonene	43	31	0.050	0.050	0.050	0.052	0.138	0.187	0.050	0.069	0.039
Dodecane	45	28	0.050	0.050	0.050	0.057	0.077	0.114	0.050	0.057	0.013
EDB	45	44	0.050	0.050	0.050	0.050	0.050	0.066	0.050	0.050	0.002
Ethane	45	0	1.921	2.284	3.029	4.011	5.327	10.976	1.490	3.560	1.908
Ethylbenzene	45	2	0.057	0.098	0.144	0.171	0.211	0.311	0.050	0.144	0.062
Ethylbromide	45	45									
Ethylene	45	0	0.396	0.564	0.755	1.063	1.309	1.670	0.344	0.836	0.333
Formaldehyde	29	0	0.341	1.032	1.671	3.234	4.347	8.260	0.338	2.153	1.688

Table 24: VOC Annual Statistics at Simcoe (2003)

Unit: micrograms per cubic metre (µg/m^3)

Compounds	# of Samples	No. < DL	5%	25%	50%	75%	90%	Max	Min	Mean	Std.Dev.
			PERCENTILES								
Freon11	45	0	1.614	1.677	1.743	1.861	1.917	2.081	1.559	1.770	0.124
Freon113	45	0	0.565	0.602	0.647	0.677	0.720	0.810	0.529	0.643	0.057
Freon114	45	0	0.109	0.112	0.116	0.119	0.126	0.219	0.108	0.121	0.020
Freon12	45	0	2.522	2.601	2.708	2.807	2.857	3.252	2.486	2.722	0.161
Freon22	45	0	0.543	0.575	0.607	0.638	0.674	0.795	0.532	0.617	0.057
Heptane	45	8	0.050	0.058	0.083	0.121	0.144	0.207	0.050	0.093	0.040
Hexachlorobutadiene	45	45									
Hexanal	29	13	0.050	0.050	0.067	0.149	0.308	0.382	0.050	0.123	0.104
Hexane	45	0	0.097	0.161	0.240	0.342	0.426	1.395	0.080	0.282	0.206
Hexylbenzene	45	44	0.050	0.050	0.050	0.050	0.050	0.102	0.050	0.051	0.008
Indane	45	44	0.050	0.050	0.050	0.050	0.050	0.060	0.050	0.050	0.001
Isobutane	45	0	0.226	0.397	0.605	0.804	1.117	1.515	0.152	0.652	0.330
iso-Butylbenzene	45	45									
Isopentane	45	0	0.468	0.850	1.102	1.272	1.590	2.215	0.311	1.089	0.436
Isoprene	45	28	0.050	0.050	0.050	0.302	0.628	1.166	0.050	0.203	0.264
iso-Propylbenzene	45	45									
m and p-Xylene	45	2	0.076	0.193	0.292	0.397	0.585	0.832	0.050	0.327	0.185
MEK	29	0	0.140	0.357	0.396	0.577	1.487	3.091	0.133	0.614	0.624
Methylcyclohexane	45	24	0.050	0.050	0.050	0.070	0.087	0.120	0.050	0.061	0.018
Methylcyclopentane	45	5	0.050	0.068	0.111	0.134	0.173	0.695	0.050	0.122	0.099
MIBK	29	20	0.050	0.050	0.050	0.058	0.071	0.088	0.050	0.056	0.011
MTBE	43	43									
m-Tolualdehyde	29	29									
Naphthalene	45	13	0.050	0.050	0.060	0.078	0.149	0.328	0.050	0.081	0.053
n-Butylbenzene	45	45									
Nonane	45	32	0.050	0.050	0.050	0.053	0.063	0.080	0.050	0.054	0.008
n-Propylbenzene	45	36	0.050	0.050	0.050	0.050	0.061	0.076	0.050	0.052	0.006
Octane	45	27	0.050	0.050	0.050	0.059	0.073	0.102	0.050	0.056	0.011
o-Tolualdehyde	29	29									
o-Xylene	45	4	0.050	0.080	0.117	0.152	0.183	0.286	0.050	0.121	0.055
p-Cymene	45	37	0.050	0.050	0.050	0.050	0.075	0.102	0.050	0.055	0.012
Pentane	45	0	0.263	0.527	0.636	0.797	1.020	1.353	0.216	0.651	0.260
Propane	45	0	1.278	1.698	2.363	3.177	4.341	6.783	0.497	2.631	1.373
Propionaldehyde	29	0	0.086	0.141	0.200	0.277	0.364	0.705	0.056	0.222	0.131
Propylene	45	0	0.116	0.197	0.220	0.312	0.383	0.631	0.077	0.252	0.108
p-Tolualdehyde	29	29									
sec-Butylbenzene	45	45									

Table 24: VOC Annual Statistics at Simcoe (2003)

Unit: micrograms per cubic metre (µg/m^3)

Compounds	# of Samples	No. < DL	PERCENTILES 5%	25%	50%	75%	90%	Max	Min	Mean	Std.Dev.
Styrene	45	40	0.050	0.050	0.050	0.050	0.052	0.093	0.050	0.052	0.007
tert-Butylbenzene	45	45									
Tetrachloroethylene	45	7	0.050	0.056	0.073	0.093	0.119	0.198	0.050	0.081	0.030
Toluene	45	0	0.340	0.639	0.821	0.944	1.318	1.817	0.189	0.853	0.354
trans-1,2-Dichloroethylene	45	45									
trans-1,2-Dimethylcyclohexane	45	45									
trans-1,3-Dichloropropene	45	37	0.050	0.050	0.050	0.050	0.154	0.256	0.050	0.067	0.046
trans-1,4-Dimethylcyclohexane	45	45									
trans-2-Butene	45	45									
trans-2-Heptene	45	45									
trans-2-Hexene	45	45									
trans-2-Octene	45	45									
trans-2-Pentene	45	45									
trans-3-Heptene	45	45									
trans-3-Methyl-2-pentene	45	45									
trans-4-Methyl-2-pentene	45	45									
Trichloroethylene	45	33	0.050	0.050	0.050	0.051	0.095	0.142	0.050	0.060	0.023
Undecane	45	16	0.050	0.050	0.055	0.066	0.095	0.120	0.050	0.064	0.019
Valeraldehyde	29	17	0.050	0.050	0.050	0.080	0.096	0.136	0.050	0.066	0.024
Vinylchloride	45	45									

Table 25: VOC Annual Statistics at Stouffville (2003)

Unit: micrograms per cubic metre (µg/m^3)

Compounds	# of Samples	No. < DL	PERCENTILES 5%	25%	50%	75%	90%	Max	Min	Mean	Std.Dev.
1,1,1-Trichloroethane	48	0	0.149	0.157	0.164	0.182	0.208	0.262	0.144	0.172	0.025
1,1,2,2-Tetrachloroethane	48	45	0.050	0.050	0.050	0.050	0.050	0.065	0.050	0.050	0.002
1,1,2-Trichloroethane	48	46	0.050	0.050	0.050	0.050	0.050	0.075	0.050	0.051	0.004
1,1-Dichloroethane	48	48									
1,1-Dichloroethylene	48	45	0.050	0.050	0.050	0.050	0.050	0.093	0.050	0.052	0.008
1,2,3-Trimethylbenzene	48	24	0.050	0.050	0.051	0.071	0.094	0.278	0.050	0.068	0.039
1,2,4-Trichlorobenzene	48	45	0.050	0.050	0.050	0.050	0.050	0.094	0.050	0.052	0.007
1,2,4-Trimethylbenzene	48	4	0.050	0.127	0.232	0.322	0.401	0.986	0.050	0.245	0.183
1,2-Dichlorobenzene	48	46	0.050	0.050	0.050	0.050	0.050	0.064	0.050	0.050	0.002
1,2-Dichloroethane	48	42	0.050	0.050	0.050	0.050	0.053	0.110	0.050	0.054	0.014
1,2-Dichloropropane	48	47	0.050	0.050	0.050	0.050	0.050	0.062	0.050	0.050	0.002
1,2-Diethylbenzene	48	48									
1,3,5-Trimethylbenzene	48	19	0.050	0.050	0.064	0.092	0.115	0.262	0.050	0.078	0.044
1,3-Butadiene	48	31	0.050	0.050	0.050	0.063	0.121	0.177	0.050	0.064	0.029
1,3-Dichlorobenzene	48	46	0.050	0.050	0.050	0.050	0.050	0.066	0.050	0.050	0.002
1,3-Diethylbenzene	48	45	0.050	0.050	0.050	0.050	0.050	0.079	0.050	0.051	0.004
1,4-Dichlorobenzene	48	30	0.050	0.050	0.050	0.070	0.081	0.130	0.050	0.060	0.016
1,4-Dichlorobutane	48	48									
1,4-Diethylbenzene	48	30	0.050	0.050	0.050	0.076	0.111	0.323	0.050	0.068	0.044
1-Butene/Isobutene	48	0	0.083	0.182	0.251	0.347	0.446	2.159	0.060	0.315	0.315
1-Butyne	48	48									
1-Decene	48	45	0.050	0.050	0.050	0.050	0.050	0.100	0.050	0.052	0.010
1-Heptene	48	48									
1-Hexene	48	40	0.050	0.050	0.050	0.050	0.116	0.313	0.050	0.066	0.046
1-Methylcyclohexene	48	48									
1-Methylcyclopentene	48	43	0.050	0.050	0.050	0.050	0.056	0.149	0.050	0.053	0.014
1-Nonene	48	47	0.050	0.050	0.050	0.050	0.050	0.062	0.050	0.050	0.002
1-Octene	48	47	0.050	0.050	0.050	0.050	0.050	0.056	0.050	0.050	0.001
1-Pentene	48	24	0.050	0.050	0.051	0.071	0.115	0.803	0.050	0.083	0.111
1-Propyne	48	39	0.050	0.050	0.050	0.050	0.074	0.116	0.050	0.054	0.012
1-Undecene	48	23	0.050	0.050	0.087	0.525	0.817	1.921	0.050	0.325	0.457
2,2,3-Trimethylbutane	48	48									
2,2,4-Trimethylpentane	48	1	0.073	0.143	0.203	0.349	0.455	0.934	0.050	0.250	0.176
2,2,5-Trimethylhexane	48	46	0.050	0.050	0.050	0.050	0.050	0.061	0.050	0.050	0.002
2,2-Dimethylbutane	48	18	0.050	0.050	0.057	0.086	0.124	0.886	0.050	0.086	0.121
2,2-Dimethylhexane	48	46	0.050	0.050	0.050	0.050	0.050	0.069	0.050	0.051	0.003
2,2-Dimethylpentane	48	46	0.050	0.050	0.050	0.050	0.050	0.098	0.050	0.051	0.007

Table 25: VOC Annual Statistics at Stouffville (2003)

Unit: micrograms per cubic metre (μg/m^3)

Compounds	# of Samples	No. < DL	PERCENTILES 5%	25%	50%	75%	90%	Max	Min	Mean	Std.Dev.
2,2-Dimethylpropane	48	44	0.050	0.050	0.050	0.050	0.050	0.107	0.050	0.052	0.009
2,3,4-Trimethylpentane	48	10	0.050	0.055	0.065	0.112	0.151	0.358	0.050	0.089	0.059
2,3-Dimethylbutane	48	4	0.050	0.092	0.114	0.149	0.220	1.544	0.050	0.156	0.215
2,3-Dimethylpentane	48	4	0.050	0.079	0.105	0.161	0.207	0.467	0.050	0.125	0.078
2,4-Dimethylhexane	48	34	0.050	0.050	0.050	0.060	0.086	0.154	0.050	0.060	0.021
2,4-Dimethylpentane	48	22	0.050	0.050	0.054	0.078	0.103	0.338	0.050	0.070	0.047
2,5-Dimethylhexane	48	36	0.050	0.050	0.050	0.053	0.083	0.134	0.050	0.057	0.016
2-Ethyl-1-butene	48	47	0.050	0.050	0.050	0.050	0.050	0.078	0.050	0.051	0.004
2-Ethyltoluene	48	20	0.050	0.050	0.062	0.087	0.101	0.224	0.050	0.073	0.037
2-methyl-1-butene	47	21	0.050	0.050	0.060	0.089	0.176	1.653	0.050	0.116	0.236
2-Methyl-2-butene	48	20	0.050	0.050	0.056	0.084	0.132	3.139	0.050	0.145	0.448
2-Methylheptane	48	12	0.050	0.051	0.077	0.102	0.176	0.227	0.050	0.089	0.049
2-Methylhexane	48	0	0.092	0.165	0.211	0.291	0.399	1.042	0.066	0.255	0.163
2-Methylpentane	48	0	0.133	0.330	0.456	0.582	0.850	5.926	0.110	0.596	0.839
3,6-Dimethyloctane	48	47	0.050	0.050	0.050	0.050	0.050	0.092	0.050	0.051	0.006
3-Ethyltoluene	48	6	0.050	0.079	0.148	0.198	0.246	0.576	0.050	0.151	0.103
3-Methyl-1-Butene	48	44	0.050	0.050	0.050	0.050	0.050	0.352	0.050	0.058	0.044
3-Methyl-1-pentene	48	47	0.050	0.050	0.050	0.050	0.050	0.074	0.050	0.051	0.003
3-Methylheptane	48	11	0.050	0.052	0.068	0.097	0.173	0.258	0.050	0.087	0.051
3-Methylhexane	48	0	0.081	0.174	0.223	0.319	0.459	1.104	0.063	0.275	0.185
3-Methylpentane	48	0	0.119	0.266	0.338	0.422	0.695	3.424	0.095	0.431	0.482
4-Ethyltoluene	48	19	0.050	0.050	0.070	0.099	0.136	0.278	0.050	0.083	0.047
4-Methyl-1-pentene	48	47	0.050	0.050	0.050	0.050	0.050	0.055	0.050	0.050	0.001
4-Methylheptane	48	40	0.050	0.050	0.050	0.050	0.070	0.092	0.050	0.054	0.010
Acetylene	47	0	0.331	0.501	0.675	1.044	1.402	1.975	0.213	0.823	0.424
a-Pinene	45	10	0.050	0.058	0.133	0.299	0.353	0.726	0.050	0.190	0.168
Benzene	48	0	0.333	0.520	0.685	0.814	1.185	1.778	0.246	0.700	0.303
Benzylchloride	48	48									
b-Pinene	45	25	0.050	0.050	0.050	0.076	0.119	0.261	0.050	0.071	0.042
Bromodichloromethane	48	46	0.050	0.050	0.050	0.050	0.050	0.067	0.050	0.050	0.003
Bromoform	48	46	0.050	0.050	0.050	0.050	0.050	0.076	0.050	0.051	0.004
Bromomethane	48	2	0.051	0.055	0.059	0.071	0.105	0.231	0.050	0.070	0.032
Butane	48	0	0.691	1.321	2.070	4.340	7.347	23.035	0.411	3.582	4.271
Camphene	45	43	0.050	0.050	0.050	0.050	0.050	0.059	0.050	0.050	0.001
Carbontetrachloride	48	0	0.554	0.620	0.644	0.677	0.698	0.762	0.536	0.646	0.048
Chlorobenzene	48	48									
Chloroethane	48	45	0.050	0.050	0.050	0.050	0.050	0.122	0.050	0.052	0.011

Table 25: VOC Annual Statistics at Stouffville (2003)

Unit: micrograms per cubic metre (µg/m^3)

	# of		PERCENTILES								
Compounds	**Samples**	**No. < DL**	**5%**	**25%**	**50%**	**75%**	**90%**	**Max**	**Min**	**Mean**	**Std.Dev.**
Chloroform	48	0	0.070	0.080	0.087	0.113	0.129	0.175	0.058	0.095	0.023
Chloromethane	48	0	0.999	1.073	1.164	1.428	1.554	1.745	0.972	1.232	0.209
cis-1,2-Dichloroethylene	48	48									
cis-1,2-Dimethylcyclohexane	48	48									
cis-1,3-Dichloropropene	48	48									
cis-1,3-Dimethylcyclohexane	48	30	0.050	0.050	0.050	0.062	0.103	0.209	0.050	0.063	0.029
cis-1,4/t-1,3-Dimethylcyclohexane	48	47	0.050	0.050	0.050	0.050	0.050	0.068	0.050	0.050	0.003
cis-2-Butene	48	26	0.050	0.050	0.050	0.080	0.144	1.776	0.050	0.110	0.253
cis-2-Heptene	48	46	0.050	0.050	0.050	0.050	0.050	0.083	0.050	0.051	0.005
cis-2-Hexene	48	47	0.050	0.050	0.050	0.050	0.050	0.116	0.050	0.051	0.010
cis-2-Pentene	48	40	0.050	0.050	0.050	0.050	0.074	1.112	0.050	0.079	0.154
cis-3-Heptene	44	41	0.050	0.050	0.050	0.050	0.050	0.199	0.050	0.055	0.024
cis-3-Methyl-2-pentene	48	42	0.050	0.050	0.050	0.050	0.072	0.289	0.050	0.058	0.035
cis-4-Methyl-2-pentene	48	47	0.050	0.050	0.050	0.050	0.050	0.200	0.050	0.053	0.022
Cyclohexane	48	7	0.050	0.064	0.093	0.121	0.160	0.526	0.050	0.105	0.076
Cyclohexene	48	48									
Cyclopentane	48	5	0.050	0.068	0.098	0.149	0.205	1.447	0.050	0.138	0.202
Cyclopentene	48	46	0.050	0.050	0.050	0.050	0.050	0.221	0.050	0.054	0.025
Decane	48	10	0.050	0.062	0.112	0.170	0.255	1.044	0.050	0.141	0.152
Dibromochloromethane	48	46	0.050	0.050	0.050	0.050	0.050	0.056	0.050	0.050	0.001
Dibromomethane	48	45	0.050	0.050	0.050	0.050	0.050	0.152	0.050	0.055	0.021
Dichloromethane	48	0	0.189	0.261	0.359	0.459	0.625	0.957	0.174	0.379	0.166
d-Limonene	45	31	0.050	0.050	0.050	0.062	0.077	0.201	0.050	0.060	0.025
Dodecane	48	11	0.050	0.057	0.099	0.137	0.211	2.563	0.050	0.157	0.359
EDB	48	45	0.050	0.050	0.050	0.050	0.050	0.080	0.050	0.051	0.006
Ethane	47	0	1.432	2.026	2.703	3.653	5.203	7.378	1.410	3.084	1.496
Ethylbenzene	48	0	0.112	0.211	0.298	0.439	0.583	1.000	0.072	0.330	0.178
Ethylbromide	48	48									
Ethylene	47	0	0.408	0.818	1.159	1.638	1.960	3.159	0.389	1.263	0.580
Freon11	48	0	1.604	1.738	1.781	1.898	1.980	2.077	1.471	1.797	0.133
Freon113	48	0	0.505	0.597	0.643	0.677	0.719	0.817	0.471	0.632	0.075
Freon114	48	0	0.103	0.112	0.115	0.120	0.123	0.262	0.100	0.122	0.033
Freon12	48	0	2.440	2.651	2.722	2.881	3.082	3.185	2.340	2.751	0.201
Freon22	48	0	0.542	0.619	0.687	0.755	0.824	1.492	0.525	0.708	0.164
Heptane	48	1	0.065	0.134	0.173	0.284	0.406	0.768	0.050	0.220	0.143
Hexachlorobutadiene	48	48									
Hexane	48	0	0.128	0.278	0.382	0.527	0.916	3.105	0.094	0.487	0.458

Table 25: VOC Annual Statistics at Stouffville (2003)

Unit: micrograms per cubic metre (µg/m^3)

Compounds	# of Samples	No. < DL	PERCENTILES 5%	25%	50%	75%	90%	Max	Min	Mean	Std.Dev.
Hexylbenzene	48	46	0.050	0.050	0.050	0.050	0.050	0.119	0.050	0.052	0.011
Indane	48	42	0.050	0.050	0.050	0.050	0.066	0.134	0.050	0.054	0.014
Isobutane	48	0	0.264	0.516	0.772	1.260	2.208	7.940	0.203	1.096	1.213
iso-Butylbenzene	48	48									
Isopentane	48	0	0.654	1.236	1.734	2.185	3.233	34.087	0.608	2.527	4.770
Isoprene	48	27	0.050	0.050	0.050	0.188	0.449	0.815	0.050	0.139	0.169
iso-Propylbenzene	48	45	0.050	0.050	0.050	0.050	0.050	0.060	0.050	0.050	0.002
m and p-Xylene	48	0	0.261	0.529	0.846	1.299	1.659	2.794	0.141	0.919	0.539
Methylcyclohexane	48	6	0.050	0.095	0.150	0.244	0.313	1.088	0.050	0.188	0.178
Methylcyclopentane	48	1	0.063	0.134	0.190	0.264	0.386	1.972	0.050	0.241	0.281
MTBE	45	30	0.050	0.050	0.050	0.059	0.111	0.227	0.050	0.066	0.037
Naphthalene	48	10	0.050	0.060	0.097	0.147	0.195	0.621	0.050	0.120	0.097
n-Butylbenzene	48	47	0.050	0.050	0.050	0.050	0.050	0.111	0.050	0.051	0.009
Nonane	48	12	0.050	0.050	0.081	0.116	0.162	0.531	0.050	0.097	0.079
n-Propylbenzene	48	20	0.050	0.050	0.058	0.080	0.100	0.206	0.050	0.070	0.032
Octane	48	11	0.050	0.051	0.086	0.113	0.190	0.325	0.050	0.100	0.065
o-Xylene	48	0	0.092	0.184	0.254	0.406	0.503	0.974	0.051	0.295	0.174
p-Cymene	48	47	0.050	0.050	0.050	0.050	0.050	0.053	0.050	0.050	0.000
Pentane	48	0	0.366	0.746	0.998	1.388	1.900	14.399	0.331	1.375	2.012
Propane	48	0	1.189	1.929	2.532	4.238	5.426	7.136	0.772	2.959	1.489
Propylene	48	0	0.152	0.250	0.375	0.478	0.694	1.491	0.115	0.406	0.233
sec-Butylbenzene	48	47	0.050	0.050	0.050	0.050	0.050	0.053	0.050	0.050	0.000
Styrene	48	31	0.050	0.050	0.050	0.079	0.109	0.174	0.050	0.068	0.031
tert-Butylbenzene	48	48									
Tetrachloroethylene	48	1	0.061	0.083	0.156	0.184	0.244	0.650	0.050	0.157	0.112
Toluene	48	0	0.543	1.294	1.876	3.141	3.639	5.579	0.457	2.158	1.295
trans-1,2-Dichloroethylene	48	48									
trans-1,2-Dimethylcyclohexane	48	48									
trans-1,3-Dichloropropene	48	48									
trans-1,4-Dimethylcyclohexane	48	44	0.050	0.050	0.050	0.050	0.050	0.098	0.050	0.051	0.007
trans-2-Butene	48	24	0.050	0.050	0.052	0.069	0.144	2.297	0.050	0.126	0.328
trans-2-Heptene	48	48									
trans-2-Hexene	48	45	0.050	0.050	0.050	0.050	0.050	0.249	0.050	0.054	0.029
trans-2-Octene	48	39	0.050	0.050	0.050	0.050	0.068	0.124	0.050	0.054	0.014
trans-2-Pentene	48	22	0.050	0.050	0.052	0.078	0.114	2.380	0.050	0.122	0.337
trans-3-Heptene	48	48									
trans-3-Methyl-2-pentene	48	47	0.050	0.050	0.050	0.050	0.050	0.118	0.050	0.051	0.010

Table 25: VOC Annual Statistics at Stouffville (2003)

Unit: micrograms per cubic metre (µg/m^3)

Compounds	# of Samples	No. < DL	PERCENTILES 5%	25%	50%	75%	90%	Max	Min	Mean	Std.Dev.
trans-4-Methyl-2-pentene	48	48									
Trichloroethylene	48	6	0.050	0.070	0.117	0.172	0.222	0.363	0.050	0.128	0.073
Undecane	48	12	0.050	0.067	0.127	0.195	0.272	1.902	0.050	0.175	0.269
Vinylchloride	48	48									

Table 26: VOC Annual Statistics at Windsor (2003)

Unit: micrograms per cubic metre (µg/m^3)

Compounds	# of Samples	No. < DL	PERCENTILES 5%	25%	50%	75%	90%	Max	Min	Mean	Std.Dev.
1,1,1-Trichloroethane	36	0	0.148	0.165	0.174	0.188	0.213	0.232	0.142	0.177	0.021
1,1,2,2-Tetrachloroethane	36	35	0.050	0.050	0.050	0.050	0.050	0.052	0.050	0.050	0.000
1,1,2-Trichloroethane	36	35	0.050	0.050	0.050	0.050	0.050	0.052	0.050	0.050	0.000
1,1-Dichloroethane	36	35	0.050	0.050	0.050	0.050	0.050	0.052	0.050	0.050	0.000
1,1-Dichloroethylene	36	33	0.050	0.050	0.050	0.050	0.050	0.092	0.050	0.053	0.010
1,2,3-Trimethylbenzene	36	13	0.050	0.050	0.087	0.145	0.226	0.507	0.050	0.115	0.098
1,2,4-Trichlorobenzene	36	33	0.050	0.050	0.050	0.050	0.050	0.090	0.050	0.052	0.008
1,2,4-Trimethylbenzene	36	0	0.076	0.184	0.401	0.651	1.095	2.307	0.050	0.501	0.487
1,2-Dichlorobenzene	36	33	0.050	0.050	0.050	0.050	0.050	0.058	0.050	0.050	0.001
1,2-Dichloroethane	36	30	0.050	0.050	0.050	0.050	0.058	0.078	0.050	0.052	0.005
1,2-Dichloropropane	36	35	0.050	0.050	0.050	0.050	0.050	0.075	0.050	0.051	0.004
1,2-Diethylbenzene	36	35	0.050	0.050	0.050	0.050	0.050	0.052	0.050	0.050	0.000
1,3,5-Trimethylbenzene	36	5	0.050	0.057	0.120	0.194	0.323	0.683	0.050	0.151	0.135
1,3-Butadiene	36	7	0.050	0.055	0.087	0.127	0.218	0.459	0.050	0.109	0.085
1,3-Dichlorobenzene	36	33	0.050	0.050	0.050	0.050	0.050	0.063	0.050	0.051	0.002
1,3-Diethylbenzene	36	30	0.050	0.050	0.050	0.050	0.071	0.142	0.050	0.055	0.017
1,4-Dichlorobenzene	36	20	0.050	0.050	0.050	0.080	0.164	0.424	0.050	0.085	0.082
1,4-Dichlorobutane	36	36									
1,4-Diethylbenzene	36	14	0.050	0.050	0.073	0.163	0.206	0.463	0.050	0.110	0.089
1-Butene/Isobutene	36	0	0.146	0.242	0.367	0.556	0.815	1.989	0.108	0.455	0.371
1-Butyne	36	36									
1-Decene	36	34	0.050	0.050	0.050	0.050	0.050	1.236	0.050	0.093	0.206
1-Heptene	36	32	0.050	0.050	0.050	0.050	0.052	1.097	0.050	0.081	0.174
1-Hexene	36	16	0.050	0.050	0.059	0.116	0.254	1.042	0.050	0.118	0.174
1-Methylcyclohexene	36	32	0.050	0.050	0.050	0.050	0.064	0.095	0.050	0.053	0.011
1-Methylcyclopentene	36	28	0.050	0.050	0.050	0.050	0.088	0.237	0.050	0.060	0.033
1-Nonene	36	35	0.050	0.050	0.050	0.050	0.050	1.649	0.050	0.094	0.267
1-Octene	36	34	0.050	0.050	0.050	0.050	0.050	2.241	0.050	0.111	0.365
1-Pentene	36	5	0.050	0.061	0.095	0.158	0.229	1.095	0.050	0.137	0.177
1-Propyne	36	13	0.050	0.050	0.056	0.085	0.137	0.267	0.050	0.077	0.046
1-Undecene	36	21	0.050	0.050	0.050	0.257	1.590	3.036	0.050	0.359	0.678
2,2,3-Trimethylbutane	36	35	0.050	0.050	0.050	0.050	0.050	0.481	0.050	0.062	0.072
2,2,4-Trimethylpentane	36	0	0.080	0.177	0.237	0.340	0.703	1.404	0.079	0.317	0.262
2,2,5-Trimethylhexane	36	31	0.050	0.050	0.050	0.050	0.065	0.154	0.050	0.055	0.019
2,2-Dimethylbutane	36	2	0.050	0.064	0.116	0.177	0.280	0.693	0.050	0.146	0.122
2,2-Dimethylhexane	36	35	0.050	0.050	0.050	0.050	0.050	0.138	0.050	0.052	0.015
2,2-Dimethylpentane	36	31	0.050	0.050	0.050	0.050	0.056	0.154	0.050	0.054	0.018

Table 26: VOC Annual Statistics at Windsor (2003)

Unit: micrograms per cubic metre (µg/m^3)

	# of		PERCENTILES								
Compounds	**Samples**	**No. < DL**	**5%**	**25%**	**50%**	**75%**	**90%**	**Max**	**Min**	**Mean**	**Std.Dev.**
2,2-Dimethylpropane	36	34	0.050	0.050	0.050	0.050	0.050	0.081	0.050	0.051	0.005
2,3,4-Trimethylpentane	36	6	0.050	0.066	0.088	0.124	0.259	0.539	0.050	0.125	0.107
2,3-Dimethylbutane	36	0	0.068	0.113	0.209	0.304	0.474	1.164	0.065	0.243	0.214
2,3-Dimethylpentane	36	1	0.057	0.119	0.152	0.246	0.424	0.842	0.050	0.205	0.159
2,4-Dimethylhexane	36	17	0.050	0.050	0.051	0.073	0.135	0.352	0.050	0.076	0.058
2,4-Dimethylpentane	36	6	0.050	0.056	0.088	0.126	0.213	0.529	0.050	0.112	0.094
2,5-Dimethylbenzaldehyde	30	30									
2,5-Dimethylhexane	36	21	0.050	0.050	0.050	0.070	0.115	0.272	0.050	0.069	0.043
2-Ethyl-1-butene	36	36									
2-Ethyltoluene	36	10	0.050	0.050	0.107	0.155	0.244	0.556	0.050	0.129	0.112
2-methyl-1-butene	33	5	0.050	0.069	0.105	0.175	0.276	0.606	0.050	0.144	0.123
2-Methyl-2-butene	36	6	0.050	0.056	0.096	0.176	0.372	1.106	0.050	0.166	0.201
2-Methylheptane	36	3	0.050	0.071	0.099	0.151	0.247	1.989	0.050	0.181	0.326
2-Methylhexane	36	0	0.113	0.208	0.271	0.499	0.798	1.762	0.096	0.395	0.332
2-Methylpentane	36	0	0.275	0.450	0.957	1.315	1.946	5.160	0.240	1.077	0.962
2-Pentanone/Isovaleraldehyde	30	4	0.050	0.072	0.097	0.135	0.206	0.250	0.050	0.110	0.053
3,6-Dimethyloctane	36	35	0.050	0.050	0.050	0.050	0.050	0.237	0.050	0.055	0.031
3-Ethyltoluene	36	2	0.050	0.124	0.250	0.395	0.631	1.478	0.050	0.307	0.292
3-Methyl-1-Butene	36	25	0.050	0.050	0.050	0.054	0.095	0.147	0.050	0.059	0.021
3-Methyl-1-pentene	36	35	0.050	0.050	0.050	0.050	0.050	0.056	0.050	0.050	0.001
3-Methylheptane	36	4	0.050	0.067	0.089	0.153	0.244	0.665	0.050	0.127	0.117
3-Methylhexane	36	2	0.050	0.207	0.306	0.463	0.776	1.980	0.050	0.405	0.377
3-Methylpentane	36	0	0.282	0.387	0.762	1.120	1.452	3.398	0.214	0.847	0.638
4-Ethyltoluene	36	6	0.050	0.062	0.127	0.202	0.316	0.694	0.050	0.157	0.141
4-Methyl-1-pentene	36	33	0.050	0.050	0.050	0.050	0.050	0.177	0.050	0.054	0.021
4-Methylheptane	36	21	0.050	0.050	0.050	0.056	0.101	0.266	0.050	0.065	0.040
Acetaldehyde	30	0	0.797	0.979	1.681	2.077	2.738	4.569	0.736	1.711	0.854
Acetone	30	0	0.998	2.076	3.534	5.647	6.338	8.945	0.956	3.785	2.155
Acetylene	36	0	0.474	0.793	1.184	1.843	2.572	3.326	0.442	1.356	0.721
Acrolein	30	8	0.050	0.050	0.112	0.183	0.284	0.315	0.050	0.134	0.084
a-Pinene	33	1	0.055	0.122	0.328	0.871	1.233	2.488	0.050	0.582	0.634
Benzaldehyde	30	1	0.058	0.116	0.141	0.283	0.412	0.642	0.050	0.204	0.136
Benzene	36	0	0.590	1.079	1.520	2.347	2.833	6.287	0.576	1.746	1.093
Benzylchloride	36	36									
b-Pinene	33	22	0.050	0.050	0.050	0.062	0.126	0.202	0.050	0.067	0.037
Bromodichloromethane	36	31	0.050	0.050	0.050	0.050	0.068	0.126	0.050	0.055	0.016
Bromoform	36	33	0.050	0.050	0.050	0.050	0.050	0.061	0.050	0.051	0.003

Table 26: VOC Annual Statistics at Windsor (2003)

Unit: micrograms per cubic metre (µg/m^3)

Compounds	# of Samples	No. < DL	PERCENTILES 5%	25%	50%	75%	90%	Max	Min	Mean	Std.Dev.
Bromomethane	36	0	0.057	0.072	0.090	0.103	0.108	0.267	0.053	0.097	0.047
Butane	36	0	2.091	2.742	3.584	4.769	7.564	15.653	1.147	4.394	2.782
Camphene	33	26	0.050	0.050	0.050	0.050	0.081	0.115	0.050	0.056	0.015
Carbontetrachloride	36	0	0.568	0.601	0.647	0.681	0.724	0.761	0.564	0.644	0.053
Chlorobenzene	36	36									
Chloroethane	36	32	0.050	0.050	0.050	0.050	0.093	0.116	0.050	0.056	0.018
Chloroform	36	0	0.072	0.076	0.091	0.125	0.190	0.328	0.064	0.110	0.057
Chloromethane	36	0	1.058	1.136	1.453	1.627	1.751	2.108	1.050	1.388	0.281
cis-1,2-Dichloroethylene	36	35	0.050	0.050	0.050	0.050	0.050	0.080	0.050	0.051	0.005
cis-1,2-Dimethylcyclohexane	36	36									
cis-1,3-Dichloropropene	36	36									
cis-1,3-Dimethylcyclohexane	36	22	0.050	0.050	0.050	0.075	0.101	0.176	0.050	0.066	0.030
cis-1,4/t-1,3-Dimethylcyclohexane	36	33	0.050	0.050	0.050	0.050	0.050	0.084	0.050	0.052	0.007
cis-2-Butene	36	9	0.050	0.050	0.077	0.146	0.202	0.439	0.050	0.107	0.080
cis-2-Heptene	36	33	0.050	0.050	0.050	0.050	0.050	0.071	0.050	0.051	0.004
cis-2-Hexene	36	32	0.050	0.050	0.050	0.050	0.059	0.117	0.050	0.053	0.011
cis-2-Pentene	36	18	0.050	0.050	0.054	0.083	0.139	0.399	0.050	0.084	0.072
cis-3-Heptene	32	25	0.050	0.050	0.050	0.050	0.100	0.382	0.050	0.069	0.062
cis-3-Methyl-2-pentene	36	26	0.050	0.050	0.050	0.051	0.100	0.315	0.050	0.064	0.047
cis-4-Methyl-2-pentene	36	32	0.050	0.050	0.050	0.050	0.054	0.131	0.050	0.054	0.015
Crotonaldehyde	30	24	0.050	0.050	0.050	0.050	0.069	0.083	0.050	0.053	0.008
Cyclohexane	36	2	0.050	0.087	0.117	0.193	0.277	0.451	0.050	0.146	0.095
Cyclohexene	36	35	0.050	0.050	0.050	0.050	0.050	0.167	0.050	0.053	0.019
Cyclopentane	36	0	0.053	0.093	0.136	0.195	0.328	0.973	0.052	0.187	0.174
Cyclopentene	36	30	0.050	0.050	0.050	0.050	0.071	0.152	0.050	0.056	0.018
Decane	36	5	0.050	0.075	0.117	0.196	0.356	0.610	0.050	0.166	0.133
Dibromochloromethane	36	33	0.050	0.050	0.050	0.050	0.050	0.091	0.050	0.052	0.009
Dibromomethane	36	33	0.050	0.050	0.050	0.050	0.050	0.148	0.050	0.058	0.026
Dichloromethane	36	0	0.208	0.249	0.305	0.548	0.662	2.951	0.201	0.469	0.489
d-Limonene	33	20	0.050	0.050	0.050	0.079	0.172	0.461	0.050	0.087	0.083
Dodecane	36	3	0.050	0.083	0.140	0.226	0.312	0.593	0.050	0.173	0.130
EDB	36	34	0.050	0.050	0.050	0.050	0.050	0.096	0.050	0.051	0.008
Ethane	36	0	3.149	4.437	5.990	9.642	14.146	26.421	1.990	7.464	4.840
Ethylbenzene	36	0	0.115	0.261	0.379	0.608	1.047	2.005	0.103	0.501	0.399
Ethylbromide	36	35	0.050	0.050	0.050	0.050	0.050	0.057	0.050	0.050	0.001
Ethylene	36	0	0.871	1.437	2.215	3.519	5.457	17.867	0.811	2.933	2.952
Formaldehyde	30	0	1.450	1.775	2.849	3.941	4.957	11.347	1.446	3.141	2.006

Table 26: VOC Annual Statistics at Windsor (2003)

Unit: micrograms per cubic metre (µg/m^3)

Compounds	# of Samples	No. < DL	5%	25%	50%	75%	90%	Max	Min	Mean	Std.Dev.
			PERCENTILES								
Freon11	36	0	1.615	1.709	1.826	1.867	1.931	2.135	1.580	1.802	0.133
Freon113	36	0	0.533	0.619	0.663	0.707	0.751	0.824	0.526	0.662	0.076
Freon114	36	0	0.105	0.112	0.119	0.128	0.267	0.637	0.098	0.150	0.099
Freon12	36	0	2.454	2.629	2.764	2.911	3.137	3.350	2.361	2.779	0.218
Freon22	36	0	0.581	0.625	0.689	0.840	1.057	2.082	0.554	0.775	0.270
Heptane	36	0	0.069	0.153	0.256	0.350	0.715	1.484	0.060	0.330	0.285
Hexachlorobutadiene	36	36									
Hexanal	30	2	0.050	0.101	0.216	0.409	1.084	3.959	0.050	0.416	0.724
Hexane	36	0	0.322	0.557	1.183	1.736	2.679	3.598	0.272	1.286	0.916
Hexylbenzene	36	35	0.050	0.050	0.050	0.050	0.050	0.136	0.050	0.052	0.014
Indane	36	15	0.050	0.050	0.055	0.104	0.183	0.504	0.050	0.095	0.087
Isobutane	36	0	0.717	0.931	1.297	1.944	2.564	4.874	0.574	1.572	0.915
iso-Butylbenzene	36	36									
Isopentane	36	0	1.193	1.586	2.390	4.307	7.027	12.605	1.039	3.323	2.511
Isoprene	36	19	0.050	0.050	0.050	0.119	0.343	1.381	0.050	0.160	0.279
iso-Propylbenzene	36	27	0.050	0.050	0.050	0.056	0.067	0.127	0.050	0.056	0.015
m and p-Xylene	36	1	0.218	0.633	1.052	1.652	3.339	5.766	0.050	1.380	1.236
MEK	30	0	0.397	0.607	1.237	2.072	4.014	6.110	0.322	1.653	1.430
Methylcyclohexane	36	3	0.050	0.097	0.142	0.188	0.256	0.629	0.050	0.156	0.111
Methylcyclopentane	36	0	0.132	0.207	0.393	0.601	0.797	1.824	0.126	0.458	0.361
MIBK	30	7	0.050	0.053	0.095	0.127	0.169	0.226	0.050	0.098	0.046
MTBE	33	32	0.050	0.050	0.050	0.050	0.050	1.625	0.050	0.098	0.274
m-Tolualdehyde	30	30									
Naphthalene	36	0	0.105	0.186	0.484	1.048	1.919	5.390	0.083	0.809	1.071
n-Butylbenzene	36	28	0.050	0.050	0.050	0.050	0.070	0.136	0.050	0.056	0.018
Nonane	36	4	0.050	0.071	0.111	0.163	0.268	0.587	0.050	0.141	0.113
n-Propylbenzene	36	8	0.050	0.051	0.101	0.137	0.204	0.487	0.050	0.116	0.093
Octane	36	3	0.050	0.082	0.132	0.179	0.347	0.696	0.050	0.166	0.141
o-Tolualdehyde	30	30									
o-Xylene	36	0	0.098	0.220	0.357	0.508	0.994	1.972	0.083	0.453	0.398
p-Cymene	36	28	0.050	0.050	0.050	0.050	0.092	0.202	0.050	0.060	0.028
Pentane	36	0	0.599	1.032	1.357	2.333	3.779	7.156	0.567	1.842	1.370
Propane	36	0	1.426	3.523	4.820	7.144	11.361	31.234	1.400	6.490	5.593
Propionaldehyde	30	0	0.175	0.228	0.330	0.493	0.647	0.928	0.155	0.387	0.187
Propylene	36	0	0.242	0.460	0.610	0.850	1.330	5.029	0.177	0.809	0.831
p-Tolualdehyde	30	30									
sec-Butylbenzene	36	35	0.050	0.050	0.050	0.050	0.050	0.053	0.050	0.050	0.001

Table 26: VOC Annual Statistics at Windsor (2003)

Unit: micrograms per cubic metre (µg/m^3)

	# of		PERCENTILES								
Compounds	**Samples**	**No. < DL**	**5%**	**25%**	**50%**	**75%**	**90%**	**Max**	**Min**	**Mean**	**Std.Dev.**
Styrene	36	11	0.050	0.050	0.082	0.134	0.174	0.254	0.050	0.096	0.052
tert-Butylbenzene	36	36									
Tetrachloroethylene	36	0	0.068	0.111	0.144	0.241	0.320	0.606	0.064	0.185	0.123
Toluene	36	0	0.671	1.552	2.222	4.608	6.281	17.416	0.617	3.343	3.181
trans-1,2-Dichloroethylene	36	34	0.050	0.050	0.050	0.050	0.050	0.055	0.050	0.050	0.001
trans-1,2-Dimethylcyclohexane	36	36									
trans-1,3-Dichloropropene	36	36									
trans-1,4-Dimethylcyclohexane	36	32	0.050	0.050	0.050	0.050	0.054	0.077	0.050	0.051	0.005
trans-2-Butene	36	6	0.050	0.055	0.082	0.148	0.249	0.519	0.050	0.121	0.097
trans-2-Heptene	36	34	0.050	0.050	0.050	0.050	0.050	0.058	0.050	0.050	0.001
trans-2-Hexene	36	29	0.050	0.050	0.050	0.050	0.079	0.216	0.050	0.059	0.031
trans-2-Octene	36	29	0.050	0.050	0.050	0.050	0.087	0.132	0.050	0.057	0.019
trans-2-Pentene	36	7	0.050	0.058	0.094	0.160	0.281	0.762	0.050	0.142	0.149
trans-3-Heptene	36	35	0.050	0.050	0.050	0.050	0.050	0.064	0.050	0.050	0.002
trans-3-Methyl-2-pentene	36	34	0.050	0.050	0.050	0.050	0.050	0.111	0.050	0.052	0.010
trans-4-Methyl-2-pentene	36	36									
Trichloroethylene	36	9	0.050	0.052	0.071	0.115	0.131	0.213	0.050	0.085	0.041
Undecane	36	1	0.050	0.105	0.167	0.285	0.407	0.675	0.050	0.212	0.162
Valeraldehyde	30	8	0.050	0.050	0.101	0.211	0.566	1.250	0.050	0.186	0.245
Vinylchloride	36	36									

Map 1: Locations of Continuous Air Monitoring Stations in Ontario (2003)