Air Quality in Ontario
2004 Report

Protecting our environment.

Ontario

ACKNOWLEDGEMENTS

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2004 Report Findings

- The 2004 air quality report marks 34 years of reporting on the state of air quality in Ontario. This report summarizes province-wide monitoring of ambient air quality.

- Overall, Ontario experienced relatively good air quality during 2004 when compared to the previous year. Sulphur dioxide, nitrogen dioxide and carbon monoxide were measured at acceptable levels. The main components of smog, ozone and fine particulate matter, continue to be a concern. However, ozone levels did show a marked improvement over 2003 due to favourable weather conditions.

- The provincial ambient air quality criteria (AAQC) for nitrogen dioxide, carbon monoxide and sulphur dioxide were not exceeded at any of the ambient monitoring sites in 2004.

- In 2004, Ontario's AAQC for ozone was exceeded at 28 of the 37 Air Quality Index (AQI) stations on at least one occasion, whereas in 2003, ozone was exceeded at 36 of the 37 AQI stations.

- The annual one-hour ozone maximum concentrations decreased from 1980 to a record low in 2004. However, there was an increasing trend in ozone mean concentrations during the same 25-year period.

- In 2004, 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 all AQI sites across Ontario with the exception of Thunder Bay.

- There were eight smog advisories covering 20 days (due to ozone and/or $PM_{2.5}$) issued in 2004. Seven 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 26 to 27, 2004.

- Atypical seasonal weather conditions which prevailed over much of southern Ontario during the 2004 summer smog season resulted in nine of the 20 smog advisory days being issued in September.

- 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 14 cities world-wide was conducted for 2004. Overall, the air quality of the Ontario cities, Toronto and Ottawa, was generally better than the other cities used in this analysis for the parameters measured.

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

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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 34 years, smog remains a significant issue, 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.

This report focuses on air concentrations based on measurements of key criteria pollutants in 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 37 Air Quality Index (AQI) 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 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.

Table 1.1: Linkages between Air Pollutants and Air Issues

Pollutant	Smog	Acid Deposition	Odour	Visibility/ Soiling
Ozone	Yes	Yes	No	No
Sulphur Dioxide	Yes	Yes	No	Yes
Carbon Monoxide	Yes	No	No	No
Nitrogen Oxides	Yes	Yes	No	Yes
Volatile Organic Compounds	Yes	No	Yes	No
Particulate Matter	Yes	Yes	Yes	Yes
Total Reduced Sulphur Compounds	No	No	Yes	No

This report, the 34th in a series, summarizes the state of ambient air quality in Ontario during 2004 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. City populations ranged from approximately 185,000 (Geneva) 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 2004. Results for a select number of volatile organic compounds (VOCs) are also presented.

The main focus of the 2004 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, one can make informed decisions about what needs to be done to protect and improve the quality of air for Ontarians.

Chapter 2

Ground-Level Ozone

Ground-level ozone (O_3) is a gas formed when nitrogen oxides (NO_x) 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

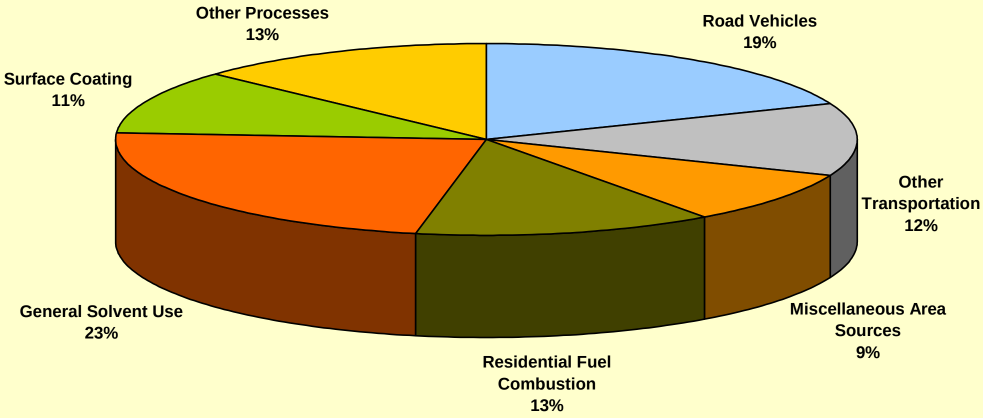
Ozone is a colourless, odourless gas at ambient concentrations, and is a major component of smog. Ground-level ozone is not emitted directly into the atmosphere. Ozone is formed as a result from chemical reactions between VOCs and NO_x in the presence of sunlight.

Figure 2.1 shows typical estimates of Ontario's VOC emissions from human activity by sector. Transportation sectors accounted for approximately 31 per cent of VOC emissions. The use of general solvents was the second largest source of VOC emissions, accounting for approximately 23 per cent.

Figure 2.2 shows estimates of Ontario's NO_x emissions from human activity by sector. Transportation sectors accounted for 64 per cent of NO_x emissions. Utilities were the second largest source of NO_x emissions, accounting for approximately 15 per cent.

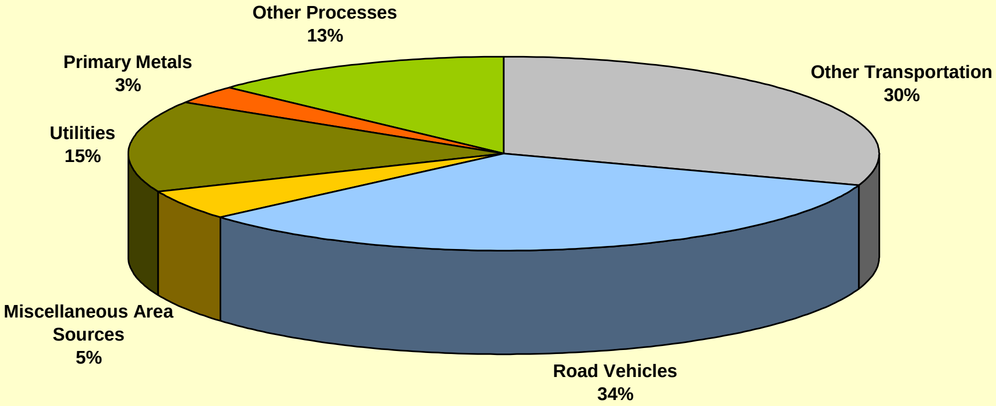
Ozone irritates the respiratory tract and eyes. Exposure to ozone in sensitive people can result in chest tightness, coughing and wheezing. Children who are active outdoors during the summer, when ozone levels are highest, are particularly at risk. Other groups at risk include individuals with pre-existing respiratory disorders, such as asthma and chronic obstructive pulmonary disease (COPD). 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. The loss of agricultural and forest productivity due to air pollution account for approximately $280 million in damages.

Figure 2.1
Ontario Volatile Organic Compounds Emissions by Sector
(Emissions from Human Activities, 2001 Estimates)



Note: Emissions data are a combination of reported and projected emission estimates that may be revised with updated source/sector information or emission estimation methodologies as they become available.

Figure 2.2
Ontario Nitrogen Oxides Emissions by Sector
(Emissions from Human Activities, 2001 Estimates)



Note: Emissions data are a combination of reported and projected emission estimates that may be revised with updated source/sector information or emission estimation methodologies as they become available.

Monitoring results for 2004

During 2004, ground-level ozone was monitored at all 37 Ontario Ministry of the Environment Air Quality Index (AQI) monitoring stations. The highest annual mean was 32.2 parts per billion (ppb), measured at Port Stanley, a rural site on the northern shore of Lake Erie, while the lowest annual mean, 17.6 ppb, was measured at Toronto West, a site impacted by vehicle pollution. Generally, ozone is lower in urban areas because it is removed by reaction with nitric oxide emitted locally by vehicles and other combustion sources.

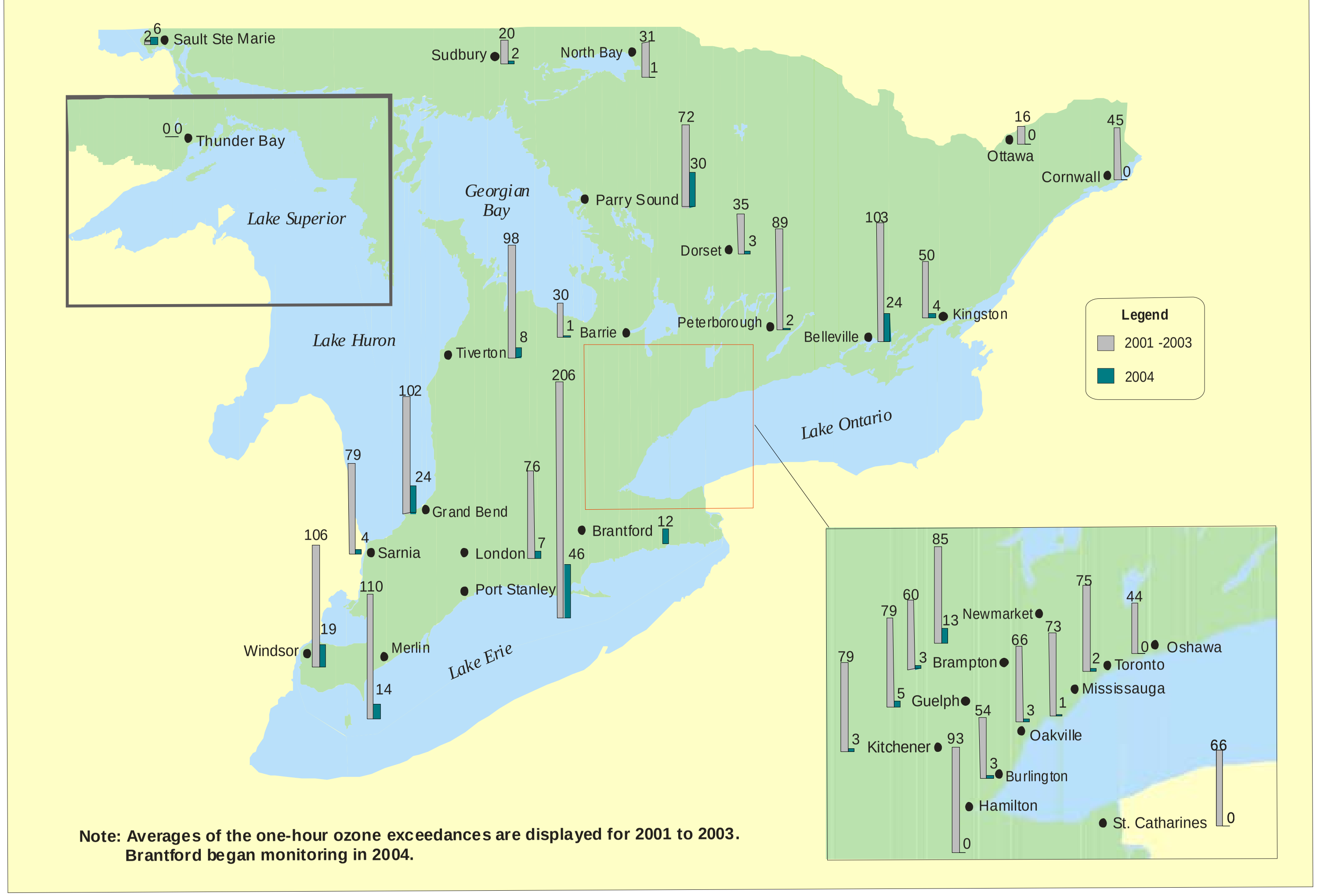
Among urban sites in 2004, the highest one-hour ozone concentration (96 ppb) was recorded at both Newmarket and Sault Ste. Marie, whereas Belleville recorded the greatest number of instances (24) when ozone was above Ontario's one-hour Ambient Air Quality Criteria (AAQC) of 80 ppb. Newmarket and Belleville also recorded the highest annual urban means (28.3 ppb and 28.1 ppb, respectively).

At rural sites, Grand Bend measured the highest one-hour concentration (105 ppb), while Port Stanley had the most instances (46) above Ontario's one-hour AAQC, followed by Parry Sound where the AAQC was exceeded 30 times.

Ground-level ozone continued to exceed the provincial AAQC across parts of the province. In 2004, Ontario's one-hour AAQC for ozone was exceeded at 28 of the 37 AQI stations on at least one occasion.

The geographical distribution of the number of ozone exceedances across Ontario is shown in Figure 2.3. Higher numbers of one-hour ozone exceedances were recorded on the northern shores of Lake Erie and Lake Ontario and the eastern shores of Lake Huron and Georgian Bay. As stated in the *Transboundary Air Pollution in Ontario* report, elevated ozone levels in these areas are generally attributed to the long-range transport of pollutants into Ontario from the United States (U.S.). The influence of transboundary air pollution was more evident in the average number of ozone exceedances from 2001 to 2003 (summers of near normal temperatures and precipitation and/or hot and dry summers), which were significantly higher than those reported in 2004. The lower number of ozone exceedances in 2004 are coupled with the lack of weather conditions conducive to the formation of ground-level ozone for most of the 2004 summer; for example, the cool and wet conditions from May to August 2004.

Figure 2.3
Geographical Distribution of Number of One-Hour Ozone Exceedances Across Ontario (2001 - 2003 vs. 2004)

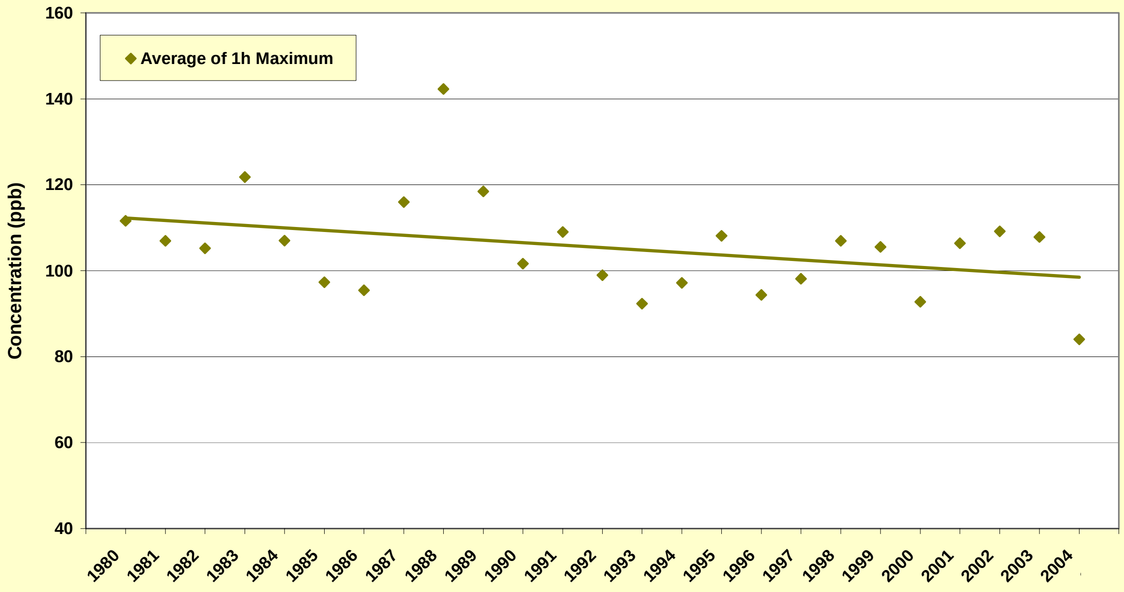


Note: Averages of the one-hour ozone exceedances are displayed for 2001 to 2003.
Brantford began monitoring in 2004.

Trends

The annual composite means of the one-hour maximum concentrations of ozone for 23 sites are shown for the 25-year period of 1980 to 2004 in Figure 2.4. For this period, the annual one-hour maximum concentrations range from 84 ppb, recorded in 2004, to 142 ppb, recorded in 1988. The data show random fluctuations but an overall decreasing trend (approximately 13 per cent) in annual one-hour maximum ozone concentrations from 1980 to 2004 is evident. The year 2004 recorded the lowest composite one-hour ozone maximum (84 ppb) over the 25-year period examined here. Over the past 10 years (1995 to 2004), the annual composite means of the one-hour maximum concentrations of ozone have decreased by approximately 4 per cent.

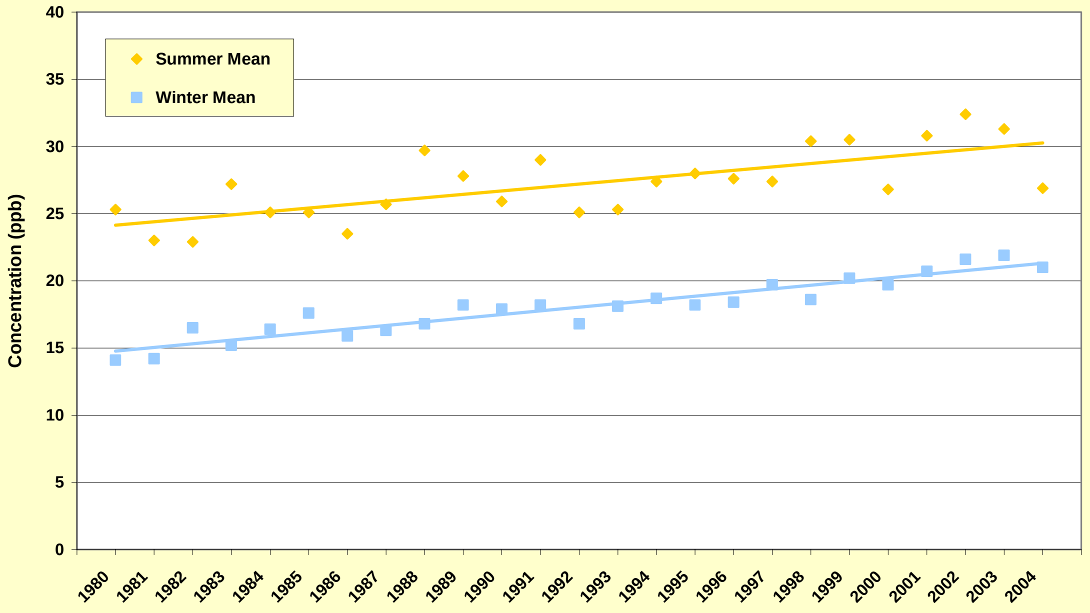
Figure 2.4
Trend of Ozone One-Hour Maximum Concentrations in Ontario
(1980 - 2004)



Note: Based on data from 23 ambient ozone sites operated over 25 years.
Ontario 1h AAQC = 80 ppb.

The trend of the ozone seasonal composite means (summer and winter) for 22 long-term ozone sites for the period 1980 to 2004 is shown in Figure 2.5. It shows that there has been an increasing trend in the ozone seasonal means during the 25-year period. The ozone summer means have increased by approximately 25 per cent and the winter means by approximately 44 per cent over the 25-year period. From 1995 to 2004, summer composite means increased by approximately 8 per cent and winter composite means increased by approximately 20 per cent. The increases in summer and winter ozone means appear to be largely related to rising global background concentrations of ozone throughout Ontario. This increase in background concentrations of ozone observed throughout Ontario is similarly found in other areas of Canada and across North America. Potential contributions to the increases in the summer composite means may be related to meteorological factors and long-range transport of ozone and its precursors from the U.S.

Figure 2.5
Trend of Ozone Seasonal Means at Sites Across Ontario
(1980 - 2004)



Note: Based on data from 22 ozone sites operated over 25 years.
Seasonal definitions - Summer (May to September); Winter (January to April, October to December).

In Figure 2.6, the averaged ozone monthly means are compared between two locations from 1990 to 2004. This figure shows the typical behaviour of ozone concentrations throughout the year in northern and southern Ontario as represented by North Bay and London, respectively. The ozone monthly mean concentrations are higher in North Bay during the cooler months of the year. For the month of January, the ozone mean concentration in North Bay is almost 9 ppb (63 per cent) greater than that observed in London. Among the possible scientific explanations, local emissions of nitric oxide are generally 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 of June and July, the ozone mean concentrations in London are approximately 5 ppb (between 15-20 per cent) greater than those reported in North Bay. It is common for ozone and its precursors to be transported into southern Ontario from the mid-western U.S. causing ozone concentrations to increase in southern Ontario over the summer months.

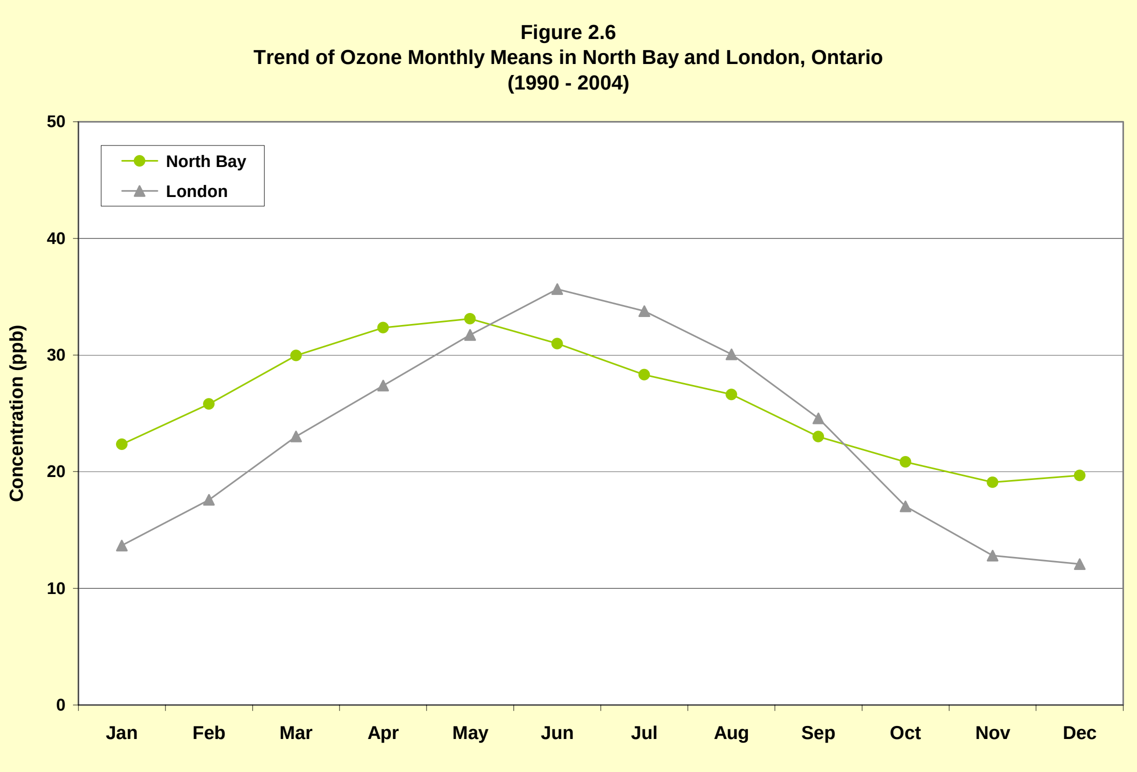
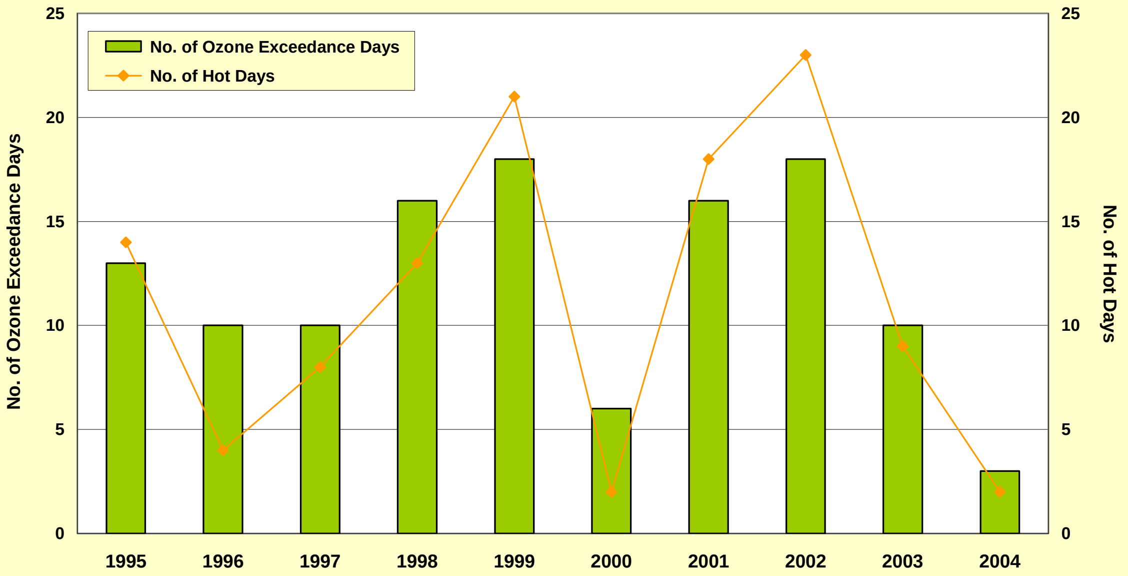


Figure 2.7a examines ozone smog episode trend in Ontario. It shows the distribution of the province-wide ozone exceedance days (at least one hour greater than 80 ppb) and the number of hot days (days with maximum air temperatures greater than 30°C). The high number of ozone exceedance days in 1998, 1999, 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 number of exceedance days in 2000 and 2004 reflect conditions less conducive to the production of ground-level ozone.

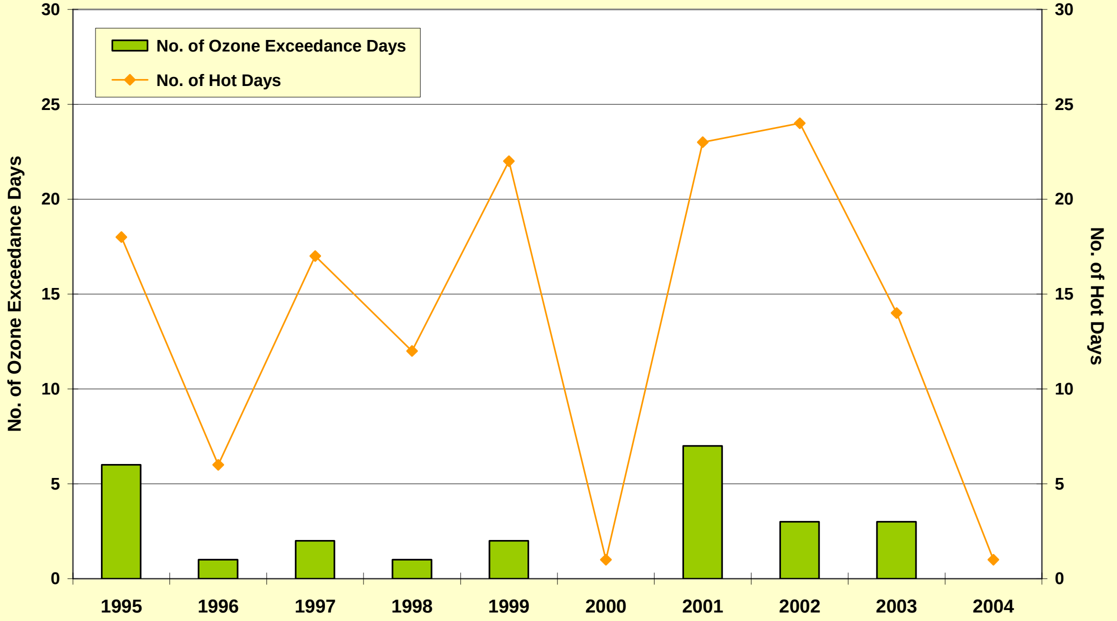
Generally, the number of ozone exceedance days and the number of hot days recorded for each year are highly correlated and suggest a strong relationship between ozone and temperature. However, this is not the case for all cities in Ontario, Ottawa, shown in Figure 2.7b for example, reveals a weak correlation as the number of hot days is significantly higher than the number of ozone exceedance days. This is likely due to the fact that Ottawa is less impacted by transboundary air pollution from the southwest.

Figure 2.7a
Trend of Ozone Exceedance Days and Hot Days in Ontario
(1995 - 2004)



Note: Based on 21 ozone sites operated over 10 years.
"Hot" days are based on eight meteorological sites operated over 10 years.
An ozone exceedance day has at least one hour > 80 ppb.
A hot day is a day where the maximum temperature is greater than 30 degrees C.

Figure 2.7b
Trend of Ozone Exceedance Days and Hot Days in Ottawa
(1995 - 2004)



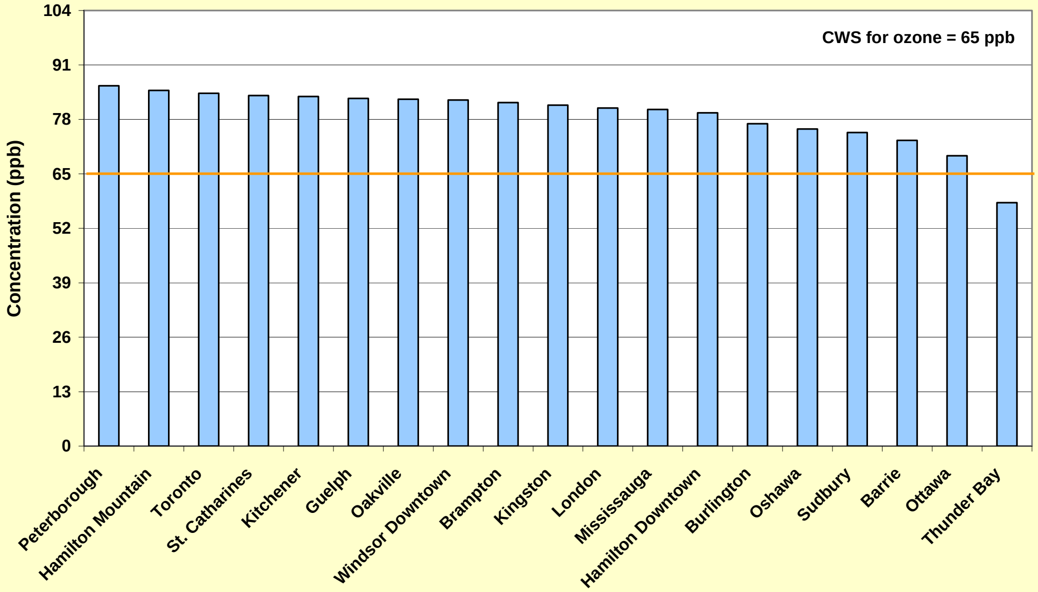
Note: An ozone exceedance day has at least one hour > 80 ppb.
A hot day is a day where the maximum temperature is greater than 30 degrees C.
Ottawa did not record any ozone exceedance days in 2000 and in 2004.

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, eight-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 focus on the examination of the 4th highest annual ambient ozone measurements across Ontario over various periods of time.

Figure 2.8 displays the 2004 CWS for ozone – based on the 4th highest ozone eight-hour daily maximum – for selected sites across Ontario. (The 2004 CWS consists of an average over a three-year period, 2002 to 2004). All of the sites exceeded the CWS of 65 ppb for ozone, with the exception of Thunder Bay where the three-year average of the 4th highest ozone eight-hour daily maximum was 58 ppb.

Figure 2.8
Ozone Levels at Selected Sites Across Ontario
Based on the Canada-wide Standard for Ozone
(2002 - 2004)



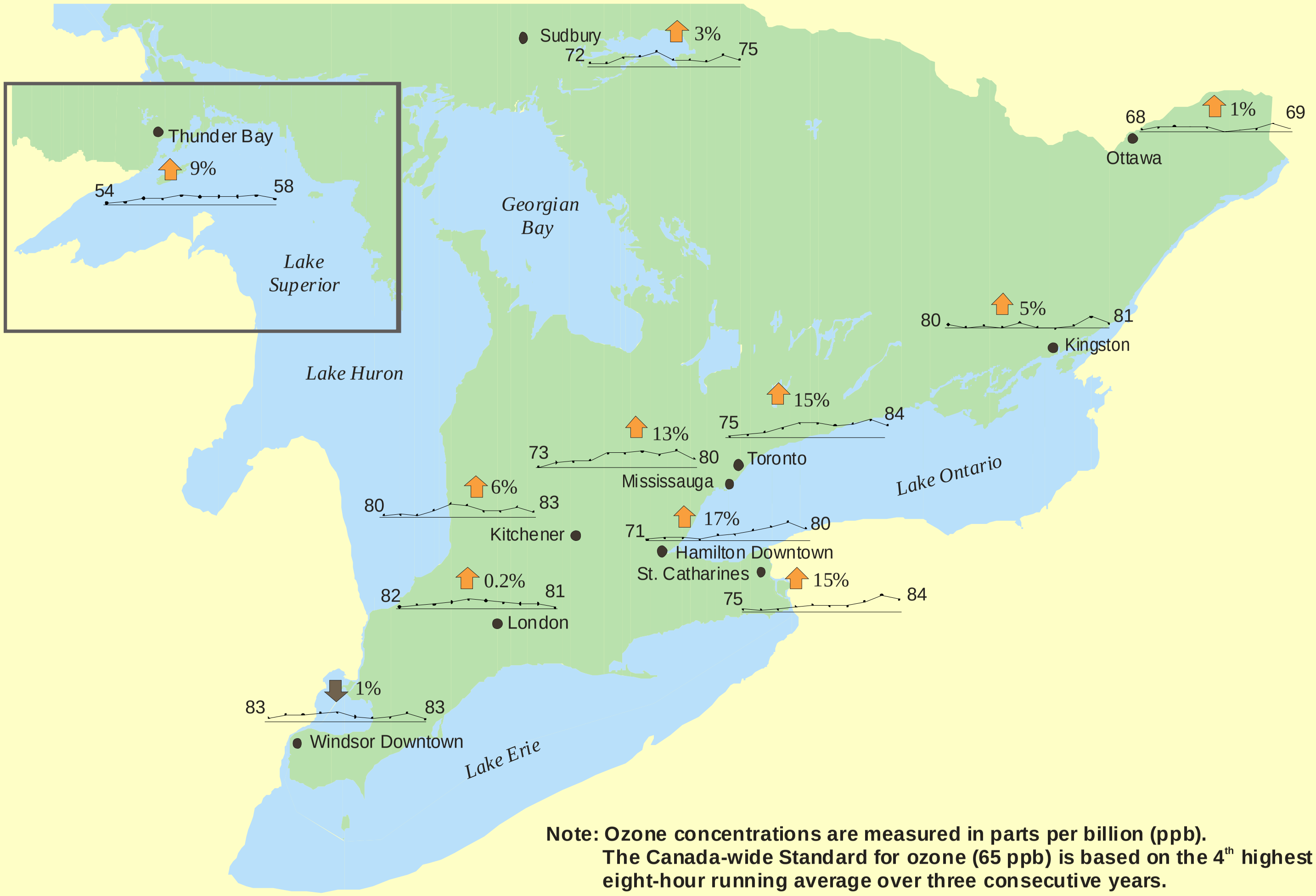
Note: Displayed sites are selected based on future requirements for Canada-wide Standard (CWS) reporting.
Toronto reporting is based on Toronto Downtown, Toronto North, Toronto East and Toronto West sites.
The CWS for ozone (65 ppb) is based on the 4th highest 8-hour running average over 3 consecutive years (2002 - 2004).

Figure 2.9

Trend of Eight-Hour Ozone Levels at Selected Sites in Ontario

Based on the Canada-wide Standard for Ozone

(1995 - 2004)



Note: Ozone concentrations are measured in parts per billion (ppb).
The Canada-wide Standard for ozone (65 ppb) is based on the 4th highest eight-hour running average over three consecutive years.

The trends in Figure 2.9 are based on the CWS for ozone - the 4th highest ozone eight-hour daily maximum averaged over three consecutive years – over a 10-year period, 1995 to 2004, for 11 selected sites across the province. This figure shows an increasing trend of the 4th highest, eight-hour daily maximums for 10 of the sites examined ranging from 0.2 per cent increase in London to 17 per cent increase in Hamilton over the 10-year period. Windsor was the only site, of the 11 sites displayed that showed a decreasing trend (1 per cent) from 1995 to 2004. The small percentage changes noted in Windsor, London and Ottawa are not statistically significant. For most of the sites, the increasing trend is comparable with the ozone means increasing over the last two decades. The highest per cent increases of the eight-hour ozone levels occurred in the urbanized areas near the shores of Lake Ontario, such as St. Catharines, Hamilton, Mississauga and Toronto.

Elevated levels of ozone are typically associated with weather patterns that affect the lower Great Lakes region. Such weather patterns are invariably associated with slow moving high pressure cells across the region that result in the long-range transport of smog pollutants into Ontario from neighbouring U.S. industrial and urbanized states including the American Mid-West and Ohio River Valley regions, during warm south to southwesterly air flow conditions. The occurrence of elevated ozone levels varies from year to year in response to changes in the synoptic, large-scale, weather patterns.

The ozone CWS – based on the 4th highest ozone eight-hour daily maximum average – is illustrated in Figure 2.10 from 2001 to 2003 for the Great Lakes Region and surrounding area. The 4th highest eight-hour daily maximum average exceeded the ozone CWS in the majority of areas in northeastern North America. Figure 2.11 depicts the northern extent of the number of days the ozone CWS was exceeded in eastern North America. During the study period, both figures show that Ontario continued to exceed the ozone CWS, especially in southwestern Ontario which is clearly influenced by the long-range transport of pollutants from the U.S. in addition to favourable weather conditions conducive to ground-level ozone formation.

Figure 2.10
4th Highest Daily Maximum Eight-Hour Ozone Concentration
Based on the Canada-Wide Standard for Ozone
(2001 – 2003)

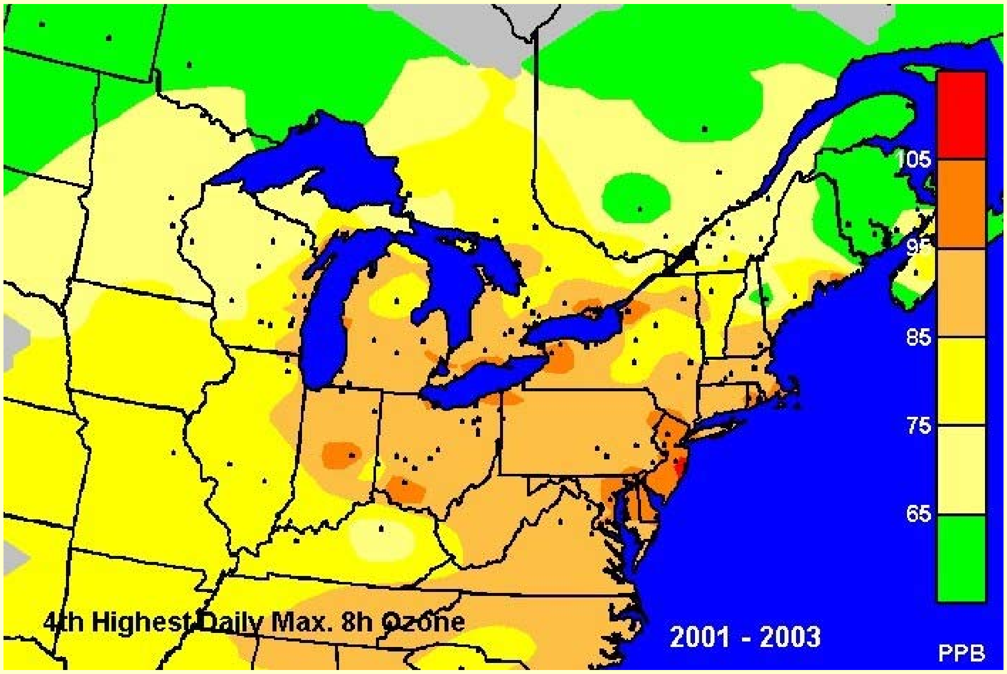


Figure courtesy of Environment Canada.

Figure 2.11
Number of Exceedance Days
Based on the Canada-wide Standard for Ozone
(2001 – 2003)

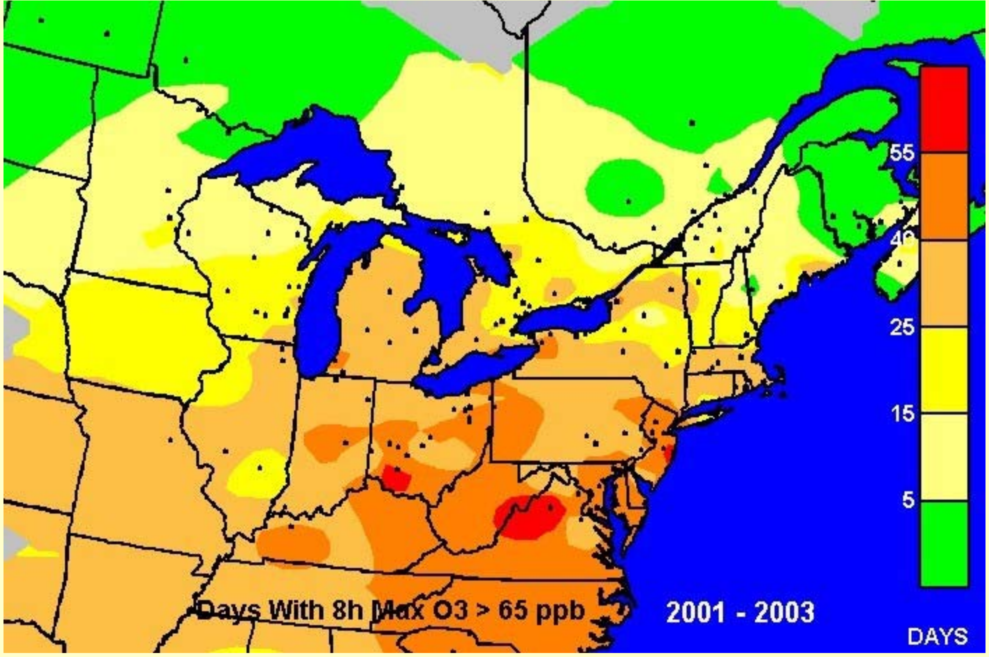


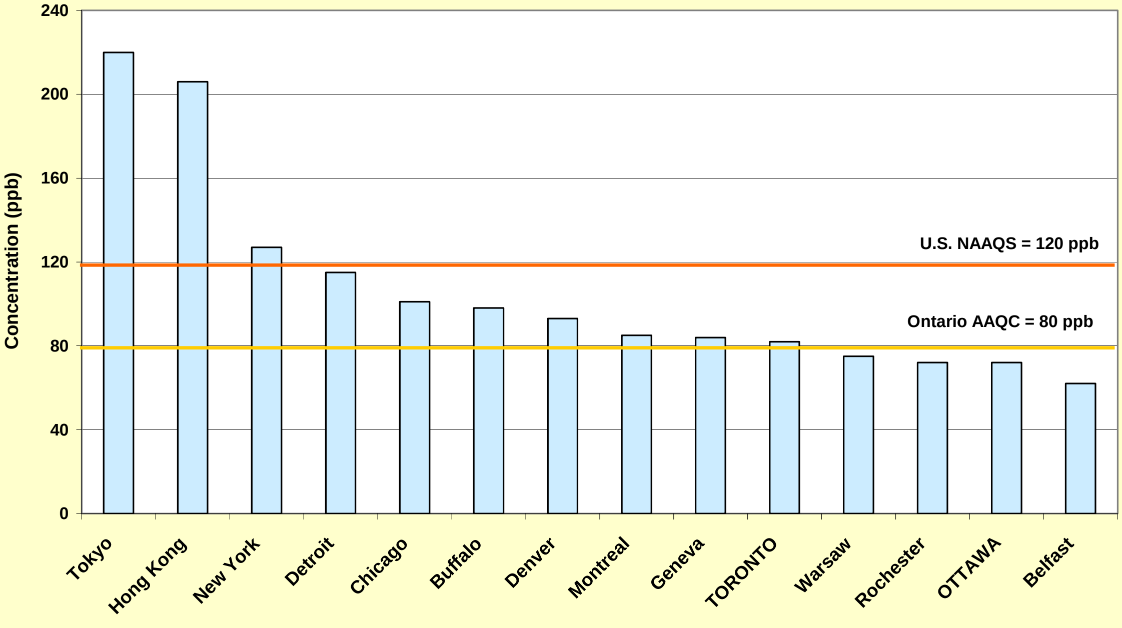
Figure courtesy of Environment Canada.

Note: The Canada-wide Standard for ozone (65 ppb) is based on the 4th highest 8-hour running average over 3 consecutive years i.e. 2001 – 2003.

International Perspective

Figure 2.12 displays the ozone one-hour maximum concentrations in 2004 for 14 cities around the world. Tokyo recorded the highest ozone one-hour maximum reaching 220 ppb, followed closely by Hong Kong at 206 ppb. Belfast reported the lowest ozone one-hour maximum at 62 ppb. Three cities, Tokyo, Hong Kong and New York City, of the 14 examined, 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 10 cities, including Toronto.

Figure 2.12
Ozone One-Hour Maximum Concentrations for Selected Cities World-wide (2004)



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 classified according to its aerodynamic size – mainly due to the different health effects associated with particles of different diameters. Fine particulate matter (or respirable particles) refers 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, smelters, power plants, 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 elevated concentrations of $PM_{2.5}$ in Ontario, it is estimated that there are significant contributions from the U.S., specifically in border communities on the northern shores of Lake Erie, including Windsor and Port Stanley, Grand Bend and Tiverton on the east shore of Lake Huron, and Parry Sound in the Georgian Bay area.

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 2004

In 2004, continuous monitoring for $PM_{2.5}$ was conducted at all 37 Ontario Ministry of the Environment AQI monitoring locations. 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 4.2 micrograms per cubic metre ($\mu g/m^3$) in Thunder Bay to a maximum of 12.2 $\mu g/m^3$ in Sarnia. The highest 24-hour average of 48 $\mu g/m^3$ was also recorded in Sarnia. The $PM_{2.5}$ reference level of 30 $\mu g/m^3$ for a 24-hour period (based on the CWS) was exceeded at least once at all sites with the exception of Thunder Bay. Sudbury also did not record a 24-hour $PM_{2.5}$ concentration over 30 $\mu g/m^3$; however, Sudbury did not have a complete annual data set. Ambient sites located in southwestern Ontario exceeded 30 $\mu g/m^3$ more frequently than in eastern and northern Ontario. The provincial ambient average for $PM_{2.5}$ during 2004 was 7.4 $\mu g/m^3$.

The annual statistics for 24-hour $PM_{2.5}$ for selected urban and rural sites across Ontario are shown in Figure 3.1a and Figure 3.1b, respectively. (Refer to Table 3 of the Appendix for annual $PM_{2.5}$ statistics for all 37 monitoring sites). The 24-hour $PM_{2.5}$ maximum concentrations recorded in urban sites ranged from 22 $\mu g/m^3$ in Thunder Bay to 48 $\mu g/m^3$ in Sarnia. As displayed in Figure 3.1b, the 24-hour $PM_{2.5}$ maximum concentrations measured at rural sites ranged from 32 $\mu g/m^3$ in Parry Sound to 45 $\mu g/m^3$ in Grand Bend. Annual means among the rural sites ranged from 4.6 $\mu g/m^3$ in Dorset to 7.8 $\mu g/m^3$ in Merlin.

Figure 3.2 shows the geographical distribution of the number of days $PM_{2.5}$ 24-hour concentrations greater than 30 $\mu g/m^3$ across Ontario. In 2004, Sarnia recorded the highest number of days (18) in Ontario where 24-hour $PM_{2.5}$ concentrations were greater than 30 $\mu g/m^3$. Most parts of southwestern Ontario, from Windsor to Oshawa and north to Barrie, exceeded the 24-hour $PM_{2.5}$ concentration of 30 $\mu g/m^3$ any where between 6 and 15 days.

The seasonal variability of $PM_{2.5}$ is more distinct when comparing monthly quarters of the year for nine selected sites across Ontario as shown in Figure 3.3. In 2004, the means for the warmer months, April to June and July to September, were greater than the means in the cooler months, January to March and October to December. The highest mean over the warmer months was 13 $\mu g/m^3$ recorded at Windsor. Thunder Bay reported the lowest mean throughout the quarters of the year ranging from 3.1 $\mu g/m^3$ to 5.1 $\mu g/m^3$. Again, the higher means were recorded in the more southwestern area of the province as concentrations decreased moving eastward and northward.

Figure 3.1a

Annual Statistics for 24-Hour PM $_{2.5}$ at Selected Urban Sites Across Ontario (2004)

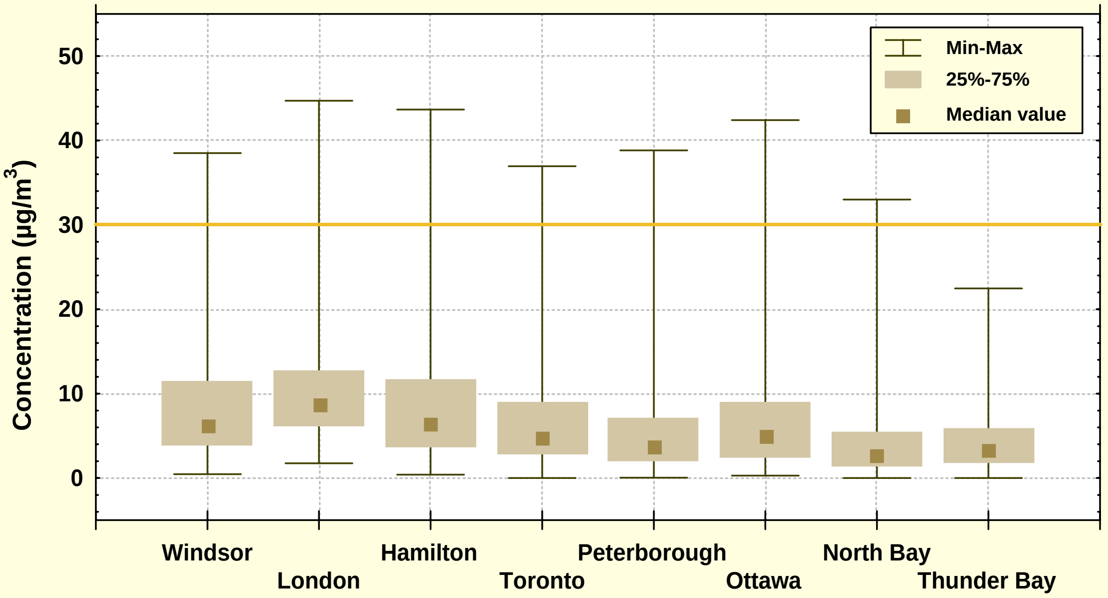


Figure 3.1b

Annual Statistics for 24-Hour PM$_{2.5}$ at Selected Rural Sites Across Ontario (2004)

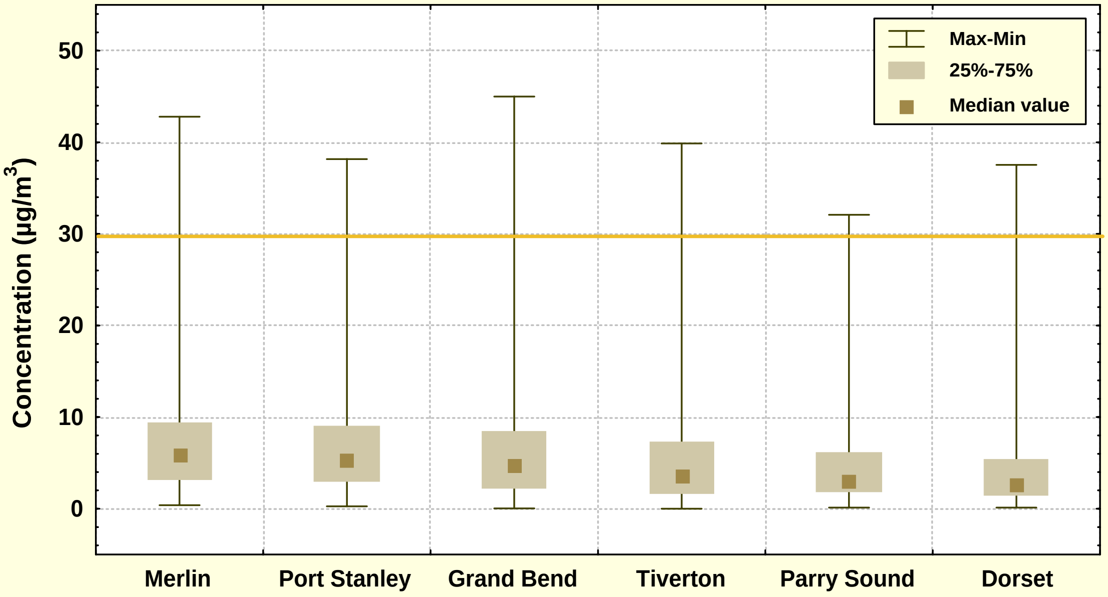
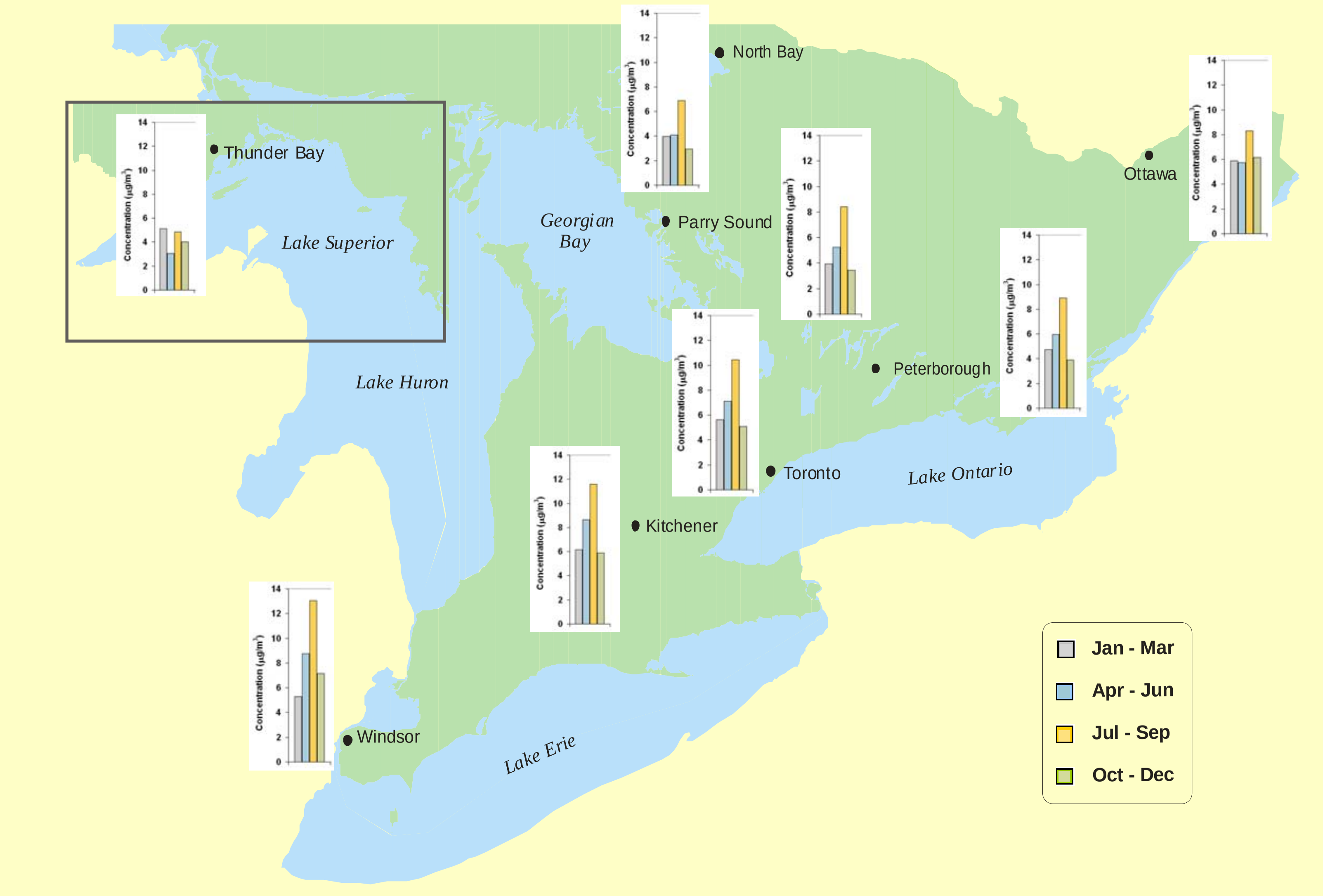


Figure 3.2
Geographical Distribution of
Number of Days $PM_{2.5}$ 24-Hour Concentrations > 30 $\mu g/m^3$ Across Ontario
(2004)

Figure 3.3
Seasonal Averages of $PM_{2.5}$ Concentrations Across Ontario (2004)

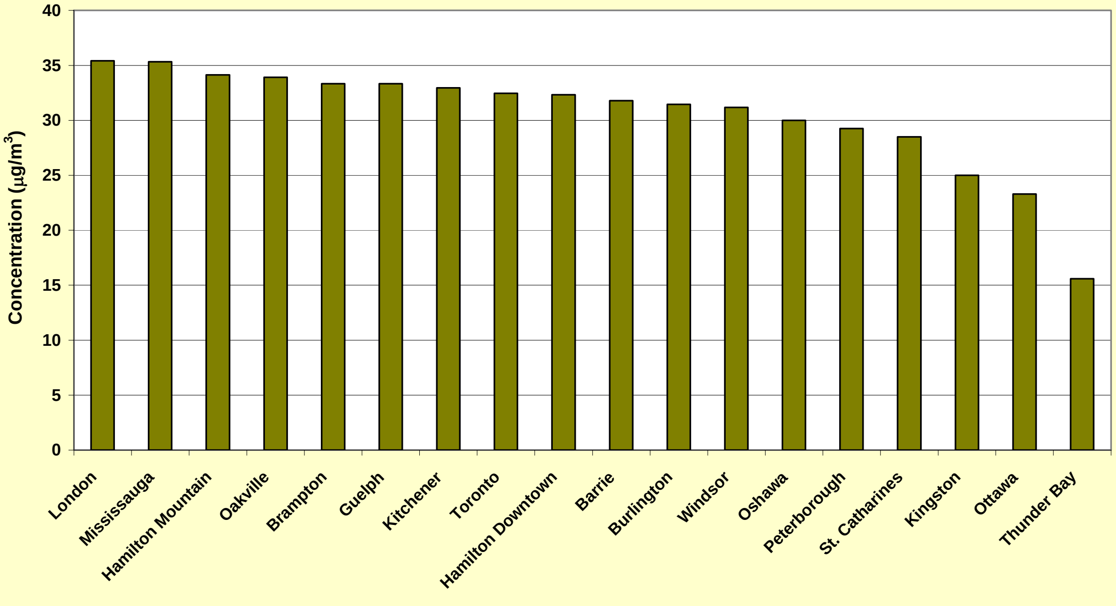


PM2.5 and the Canada-wide Standard (CWS)

In 2000, the Canadian Council of Ministers of the Environment (CCME) developed a CWS for PM2.5 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 PM2.5 is 30 µg/m³, 24-hour averaging time, based on the 98th percentile annual ambient measurement averaged over three consecutive years. Jurisdictions are required to meet the CWS by 2010 and commence reporting by year 2011. As a result, comprehensive reporting on progress towards meeting the CWS for PM2.5 will commence in 2006, hence the following discussion and analysis focus mainly on the examination of PM2.5 98th percentiles across Ontario in 2004.

Figure 3.4 displays the 98th percentile PM2.5 daily average for selected sites across Ontario in 2004. The 98th percentiles ranged from 15.6 µg/m³ in Thunder Bay to 35.4 µg/m³ in London. Thirteen of the 18 selected sites exceeded 30 µg/m³.

Figure 3.4
$PM_{2.5}$ Levels at Selected Sites Across Ontario
98th Percentile $PM_{2.5}$ Daily Average
(2004)



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.

Figure 3.5
98th Percentile $PM_{2.5}$ Daily Average Concentrations
(2003)

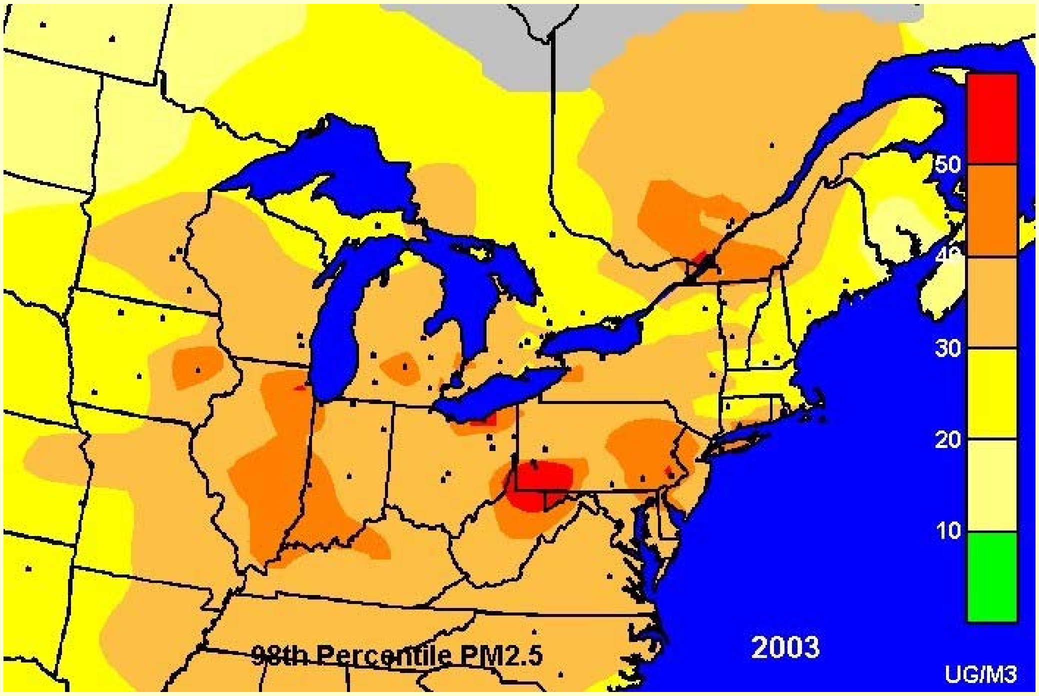


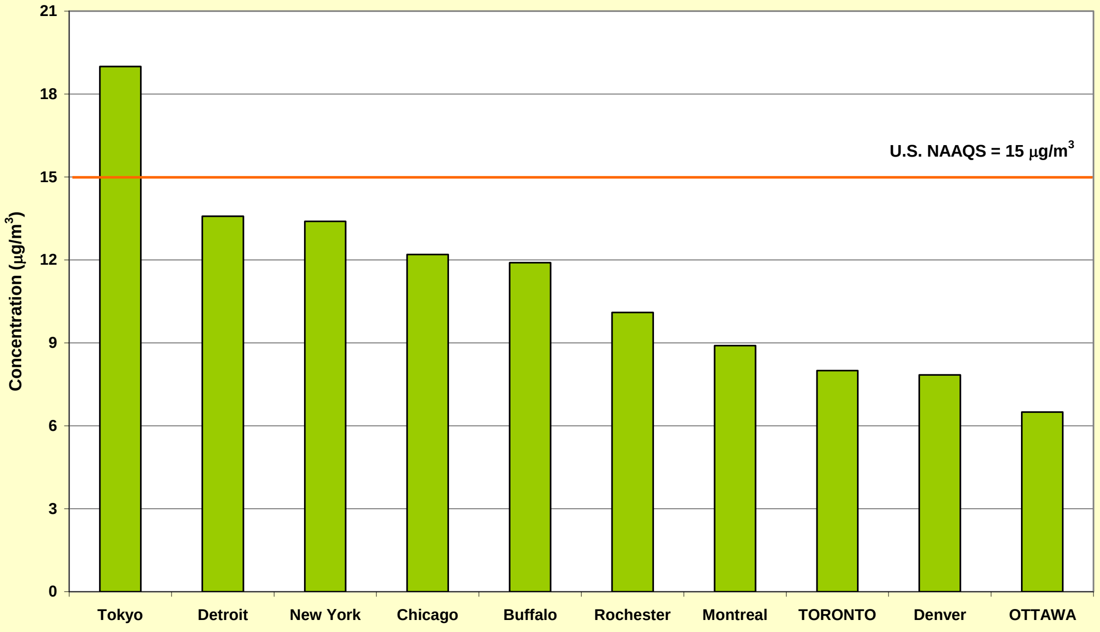
Figure courtesy of Environment Canada.

The 98th percentile $PM_{2.5}$ daily average in the Great Lakes Region and surrounding area is illustrated for 2003 in Figure 3.5. Although this figure shows parts of southwestern Ontario exceeding 30 µg/m^3 in 2003, it also illustrates the northern extent of a larger regional scale of smog conditions that prevailed over much of northeastern North America. Southern Ontario is also influenced by the long-range transport of pollutants from the U.S. during southerly and southwesterly air flow conditions.

International Perspective

Figure 3.6 displays $PM_{2.5}$ annual means in 2004 for 10 cities from around the world. Tokyo reported the highest annual mean $PM_{2.5}$ concentration (19 µg/m^3) for 2004 and was the only city examined to exceed the annual U.S. NAAQS of 15 µg/m^3. Ottawa recorded the lowest annual mean $PM_{2.5}$ concentration of 6.5 µg/m^3.

Figure 3.6
$PM_{2.5}$ Annual Means for Selected Cities World-wide
(2004)



Note: Ontario sites are displayed in UPPERCASE font.

Chapter 4

Other Criteria Contaminants

Characteristics, sources and effects of nitrogen dioxide (NO_2), carbon monoxide (CO) and sulphur dioxide (SO_2) are discussed in this chapter, as well as their concentrations during 2004 and trends over time. A comparison of pollutant concentrations from an international perspective is also presented.

NITROGEN DIOXIDE

Characteristics, sources and effects

Nitrogen dioxide is a reddish-brown gas with a pungent 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 reacts in the air to form organic nitrates, which contribute to the formation 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. (Ontario's nitrogen oxides emission estimates are displayed by sector in Figure 2.2 of Chapter 2).

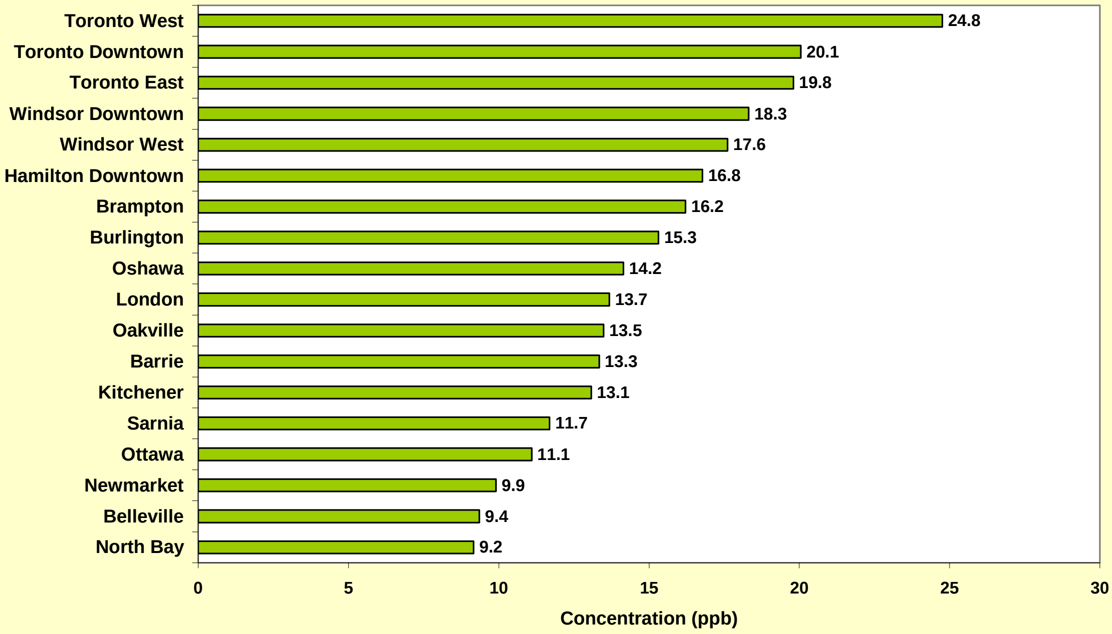
Nitrogen dioxide can irritate the lungs lowering the resistance to respiratory infection. People with asthma and bronchitis have increased sensitivity to NO_2. Nitrogen dioxide chemically transforms into nitric acid in the atmosphere and, when deposited, contributes to the acidification of lakes and soils in Ontario. Nitric acid can also corrode metals, fade fabrics, degrade rubber, and damage trees and crops.

Monitoring results for 2004

Monitoring for NO_2 was conducted at 20 AQI sites in 2004; 18 sites provided sufficient data for an annual mean. Nitrogen dioxide annual means across Ontario are displayed in Figure 4.1. The Toronto West site, located in an area of Toronto influenced by heavy vehicle traffic, recorded the highest annual mean (24.8 ppb) for NO_2 during 2004. 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 (54 ppb) and the Windsor Downtown site recorded the highest one-hour concentration (97 ppb) in 2004. 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 2004.

Figure 4.1
Nitrogen Dioxide Annual Means Across Ontario
(2004)



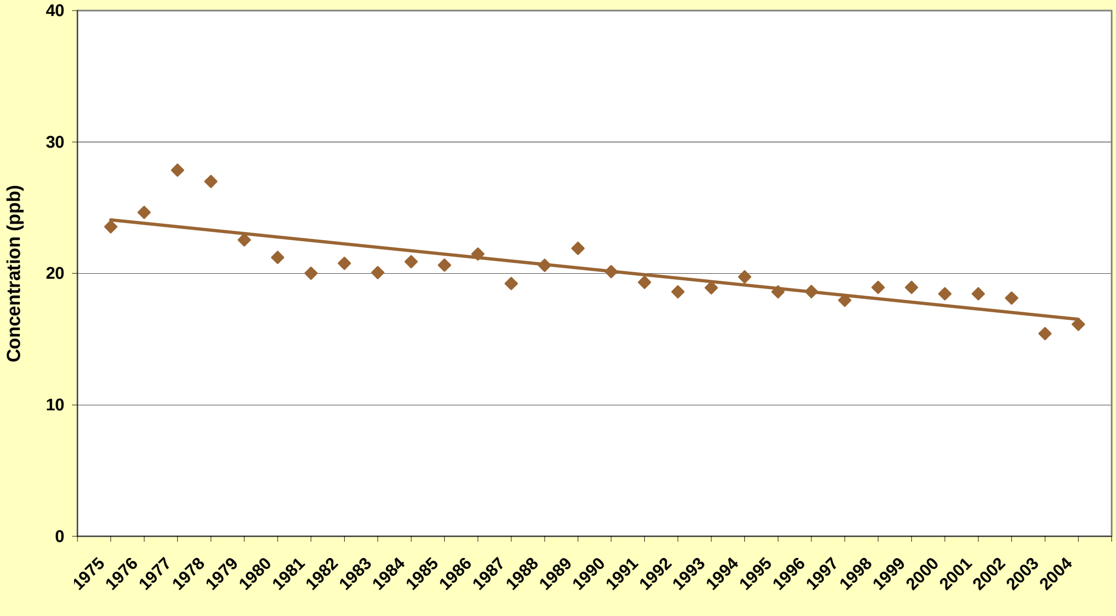
Trends

Provincial average ambient NO_2 concentrations show a decreasing trend from 1975 to 2004 as displayed in Figure 4.2. Average concentrations decreased by 31 per cent over the 30-year period. There was a 13 per cent decrease in average NO_2 concentrations over the last decade, 1995 to 2004.

International perspective

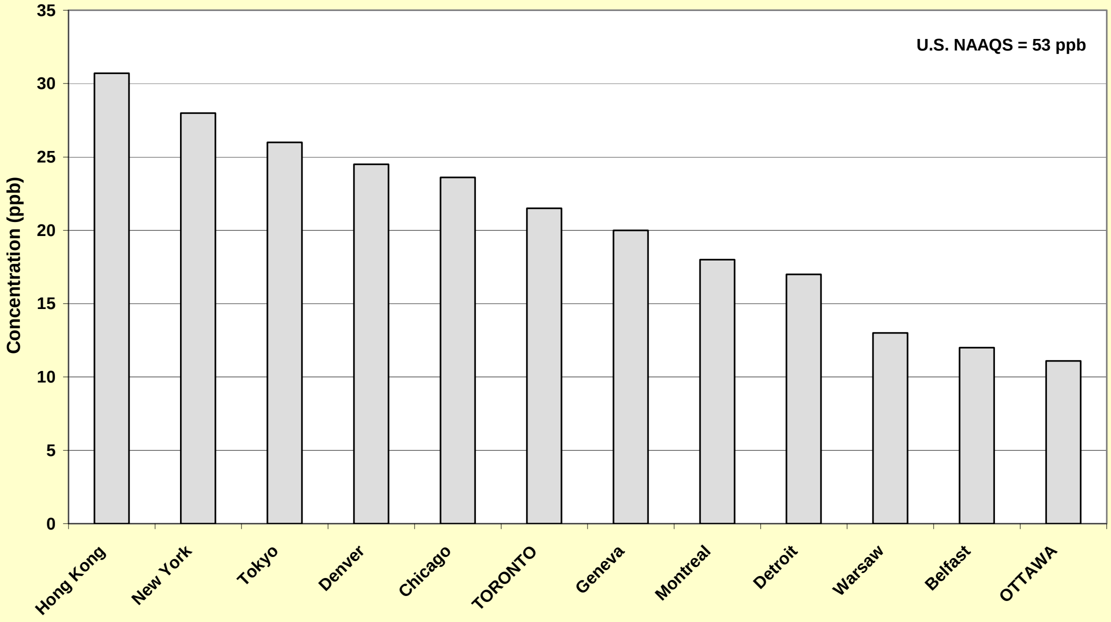
Figure 4.3 displays the NO_2 annual mean concentrations in 2004 for 12 cities world-wide. Hong Kong reported the highest NO_2 annual mean of 30.7 ppb. Ottawa recorded the lowest NO_2 annual mean of 11.1 ppb. The annual U.S. NAAQS of 53 ppb was not exceeded at any of the cities examined in 2004. Large urban centres typically experience higher NO_2 levels due to increased energy use and motor vehicle emissions.

Figure 4.2
Trend of Nitrogen Dioxide Annual Means in Ontario
(1975 - 2004)



Note: Annual composite mean based on 16 ambient sites operated over 30 years.

Figure 4.3
Nitrogen Dioxide Annual Means for Selected Cities World-wide
(2004)



Note: Ontario cities are displayed in UPPERCASE font.

CARBON MONOXIDE

Characteristics, sources and effects

Carbon monoxide 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.

Monitoring results for 2004

Monitoring for CO was conducted at 15 ambient AQI sites in 2004; 9 sites provided sufficient data for an annual mean. In 2004, the highest annual mean was 0.51 parts per million (ppm) recorded at both Brampton and Sault Ste. Marie. The highest one-hour maximum CO value (4.0 ppm) was measured in Hamilton as shown in Figure 4.4. Brampton recorded the highest eight-hour maximum value (2.1 ppm). Typically, the higher CO concentrations are recorded in 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 from 1971 to 2004 are shown in Figure 4.5. Ambient CO concentrations, as measured by the composite average of the one-hour and eight-hour maximums, decreased by 82 per cent and 87 per cent, respectively, over this 34-year period. The CO composite annual mean in 2004 was 88 per cent lower than the corresponding 1971 composite mean; however, there was a 16 per cent decrease in average CO concentrations over the last decade, 1995 to 2004.

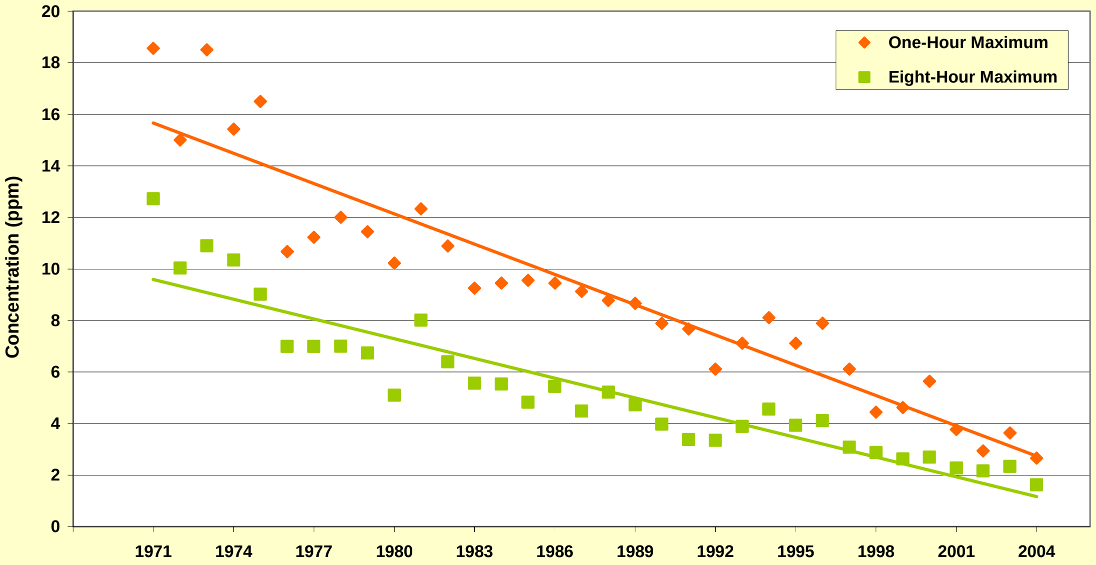
International perspective

Figure 4.6 displays the CO one-hour maximum concentrations in 2004 for 14 cities world-wide. Denver and Warsaw reported the highest CO one-hour maxima almost reaching 9 ppm. Toronto and Ottawa recorded the lowest CO maximums of less than 3 ppm. There were no exceedances of the one-hour Ontario AAQC of 30 ppm or the U.S. NAAQS of 35 ppm by any of the cities examined in 2004.

Figure 4.4
Geographical Distribution of Carbon Monoxide One-Hour Maximum Concentrations Across Ontario (2004)

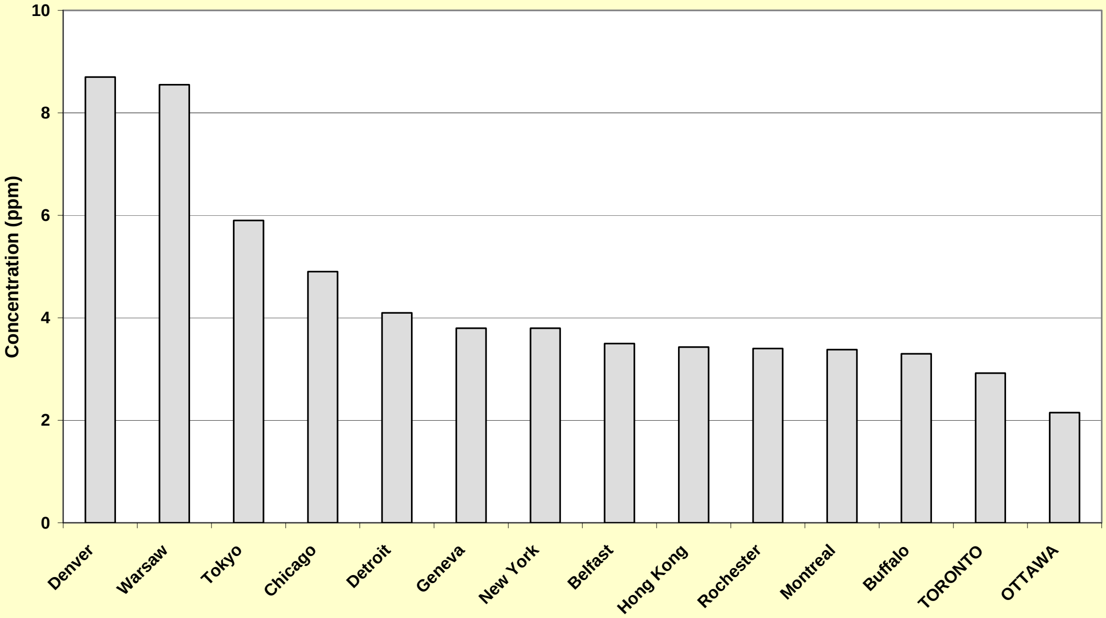
Note: One-hour AAQC = 30 ppm;
Carbon monoxide concentrations are reported in parts per million (ppm).

Figure 4.5
Trends of Carbon Monoxide One-Hour and Eight-Hour Maximums in Ontario
(1971 - 2004)



Note: Data are based on nine ambient CO sites operated over 34 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
(2004)



Note: Ontario cities are displayed in UPPERCASE font.

SULPHUR DIOXIDE

Characteristics, sources and effects

Sulphur dioxide 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.

Approximately 71 per cent of the SO_2 emitted in Ontario comes from smelters and utilities as shown in Figure 4.7. Other industrial sources include petroleum refineries, iron and steel mills, and pulp and paper mills. Lesser sources of SO_2 include transportation, residential, commercial and industrial heating.

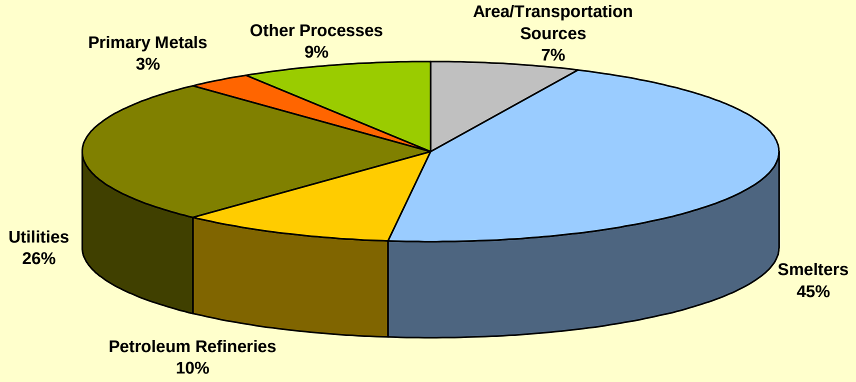
Health effects caused by exposure to high levels of SO_2 include breathing problems, respiratory illness, and the worsening of respiratory and cardiovascular disease. People with asthma, chronic lung disease or heart disease are the most sensitive to SO_2. Sulphur dioxide also damages trees and crops. Sulphur dioxide, like NO_2, is also a precursor of acid rain, which contributes to the acidification of soils, 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 2004

Sulphur dioxide was monitored at 17 AQI sites in 2004; 14 sites provided sufficient data for an annual mean. Sarnia recorded the highest annual mean (8.2 ppb) and 24-hour maximum concentration (75 ppb) during 2004. Sudbury recorded the highest one-hour concentration (224 ppb). The highest peak concentrations of SO_2 historically have been recorded in the vicinity of large industrial facilities such as smelters and utilities. The provincial one-hour criterion (250 ppb) and 24-hour criterion (100 ppb) for SO_2 were not exceeded at any of the ambient air monitoring sites in 2004.

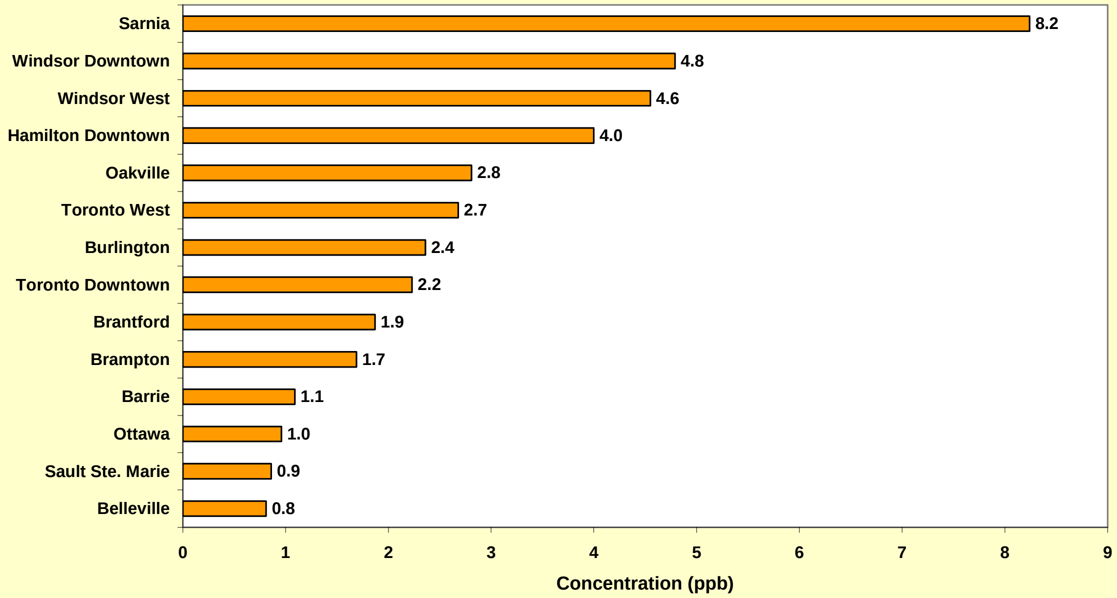
The SO_2 annual means at ambient AQI sites across Ontario are displayed in Figure 4.8. As mentioned previously, Sarnia recorded the highest annual mean in 2004. The annual levels across the province ranged from a low of 0.8 ppb in Belleville to a high of 8.2 in Sarnia. The annual criterion of 20 ppb for SO_2 was not exceeded at any site in Ontario during 2004.

Figure 4.7
Ontario Sulphur Dioxide Emissions by Sector
(Emissions from Human Activities, 2001 Estimates)



Note: Emissions data are a combination of reported and projected emission estimates that may be revised with updated source/sector information or emission estimation methodologies as they become available.

Figure 4.8
Sulphur Dioxide Annual Means Across Ontario
(2004)

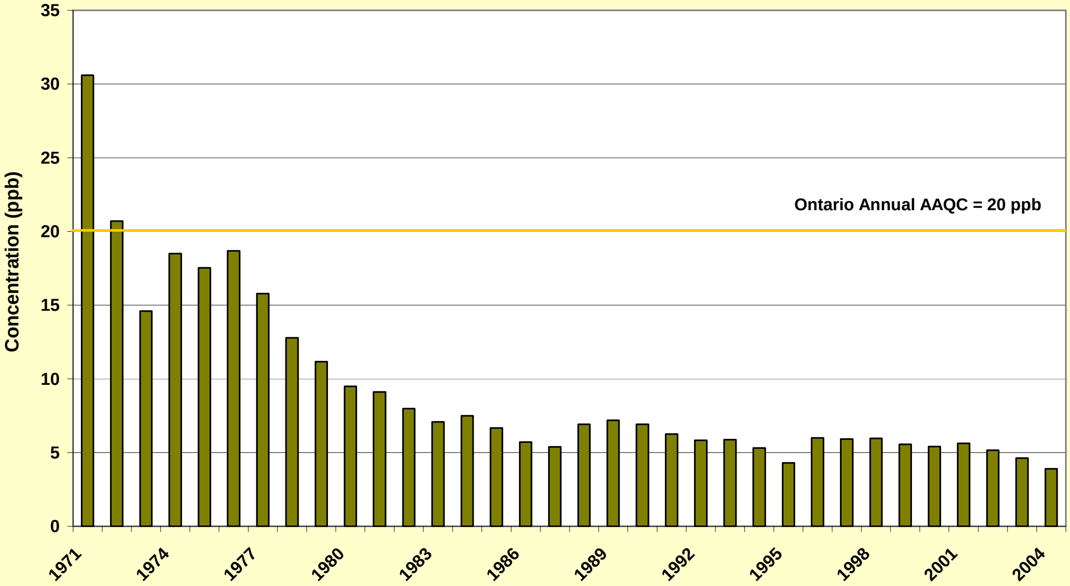


Note: Data collected from ambient sites.
Ontario's annual AAQC = 20 ppb

Trends

Provincial average ambient SO_2 concentrations show a decreasing trend for the period 1971 to 2004, as shown in Figure 4.9. Average concentrations decreased by 86 per cent from 1971 to 2004. Control orders on smelting operations, and the Countdown Acid Rain program resulted in significant decreases of SO_2 emissions prior to the early 1990s. There has been a 17 per cent decreasing trend of SO_2 concentrations over the last 10 years.

Figure 4.9
34-Year Trend of Sulphur Dioxide Concentrations in Ontario
(1971 - 2004)

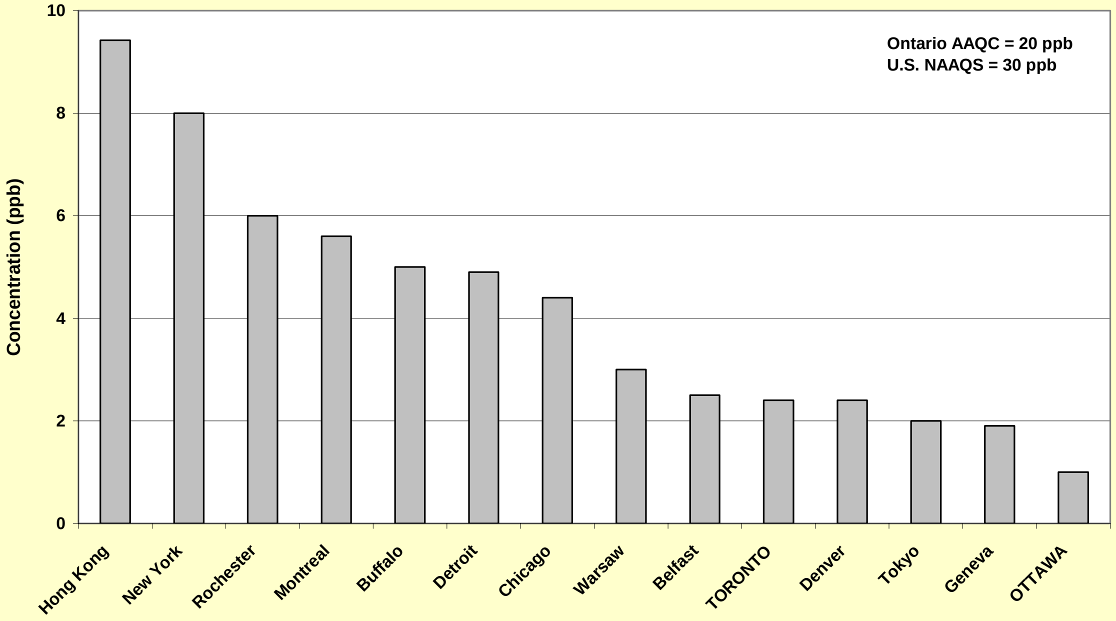


Note: Annual composite mean based on 11 ambient SO_2 sites operated over 34 years.

International perspective

Figure 4.10 displays the SO_2 annual mean concentrations in 2004 for 14 cities world-wide. Hong Kong reported the highest annual mean (9.4 ppb) whereas Ottawa recorded the lowest SO_2 annual mean (1.0 ppb) in 2004. All cities examined here were below the Ontario annual AAQC of 20 ppb and the U.S. annual NAAQS of 30 ppb.

Figure 4.10
Sulphur Dioxide Annual Means for Selected Cities World-wide
(2004)



Note: Ontario cities are displayed in UPPERCASE font.

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 2004, 37 of these sites, in 24 urban centres and six rural areas, formed the basis of the Air Quality Index (AQI) network. The Air Quality Office of the Environmental Monitoring and Reporting Branch continuously 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 each site is converted into a number ranging from zero upwards using a common scale or index. The calculated number for each pollutant is referred to as a sub-index.

At a given site, the highest sub-index for any given hour becomes the AQI reading for that location. 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 (AQI) Monitoring Sites in Ontario (2004)

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
0-15	Very good	No health effects are expected in healthy people	Sensitive populations may want to exercise caution	No health effects are expected in healthy people	No health effects are expected in healthy people	No health effects are expected in healthy people	No health effects are expected in healthy people
16-31	Good	No health effects are expected in healthy people	Sensitive populations may want to exercise caution	Slight odour	No health effects are expected in healthy people	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 asthmatics	Increased symptoms in smokers with heart disease	Odour; 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 asthmatics and people with bronchitis	Increasing symptoms in non-smokers with heart diseases; blurred vision; some clumsiness	Increasing sensitivity for asthmatics and people with bronchitis	Severe odour; some people may experience nausea and headaches

* Please note that the information in this table is subject to change.

Computed 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 readings for the 37 monitoring sites by the AQI descriptive category and the number of days at least one hour the AQI was greater than 49. On average, the AQI sites in 2004 reported air quality in the very good and good categories approximately 92 per cent of the time and moderate to poor categories about 8 per cent of the time.

Air quality in the very good and good categories at individual sites ranged from approximately 85 per cent at Sarnia to 99 per cent at Thunder Bay. Of the 0.4 per cent of poor air quality in Ontario during 2004, 78.6 per cent was due to fine particulate matter and 21.4 per cent due to ozone. This was the first year since 2002, the year $PM_{2.5}$ was included into the AQI, that ozone was not the dominant pollutant that caused the index to be in the poor category. In fact, a number of cities, including Hamilton and Ottawa, did not report poor air quality due to ozone during 2004. Sarnia recorded the highest number of days (18) with poor air quality; 17 of these days occurred when the maximum AQI was due to $PM_{2.5}$. In 2004, the Hamilton Downtown AQI site was the first site to officially report a very poor AQI reading (103), due to $PM_{2.5}$. This occurred on October 26, 2004 and resulted from local emissions compounded by prevailing meteorological conditions conducive to the build-up of pollutants, which included a frontal inversion created by a cold front across the city.

Table 5.2: Air Quality Index Summary (2004)

City/Town	Valid Hours	Percentage of Valid Hours AQI in Range					No. of Days At Least 1 Hour > 49
		Very Good 0-15	Good 16-31	Moderate 32-49	Poor 50-99	Very Poor 100+	
Windsor Downtown	8759	47.4	42.7	9.7	0.2	0	7
Windsor West	8775	42.3	46.0	11.3	0.4	0	9
Merlin	8771	33.2	56.2	10.2	0.4	0	11
Sarnia	8706	29.2	56.0	13.5	1.3	0	18
Grand Bend	8596	36.4	55.1	8.0	0.5	0	11
London	8629	35.0	53.7	10.7	0.6	0	13
Port Stanley	8633	25.7	61.8	11.8	0.7	0	14
Tiverton	8014	34.7	58.3	6.9	0.1	0	5
Brantford	8707	35.8	54.3	9.5	0.5	0	10
Kitchener	8775	38.8	51.2	9.6	0.4	0	9
St. Catharines	8777	43.0	47.7	9.2	0.1	0	1
Guelph	8755	36.4	53.9	9.3	0.4	0	9
Hamilton Downtown	8753	49.3	40.8	9.3	0.6	>0.1	12
Hamilton Mountain	8776	37.6	51.0	10.8	0.6	0	12
Hamilton West	8728	50.4	41.4	7.7	0.5	0	12
Toronto Downtown	8770	47.9	44.2	7.6	0.3	0	6
Toronto East	8730	53.3	39.3	7.1	0.4	0	8
Toronto North	8774	42.7	49.0	7.7	0.6	0	10
Toronto West	8771	54.6	36.5	8.4	0.6	0	10
Burlington	8738	48.7	43.5	7.3	0.4	0	6
Oakville	8763	39.6	51.1	8.8	0.5	0	8
Oshawa	8732	38.5	54.2	6.9	0.4	0	9
Brampton	8721	36.7	53.9	9.1	0.4	0	7
Mississauga	8761	48.8	43.0	7.8	0.5	0	8
Barrie	8767	39.6	52.3	7.8	0.2	0	8
Newmarket	8775	31.6	59.5	8.6	0.3	0	6
Parry Sound	8774	25.0	66.0	8.6	0.3	0	6
Dorset	8665	31.0	63.5	5.4	0.1	0	4
Ottawa	8638	47.8	47.8	4.3	0.1	0	1
Kingston	8741	42.9	50.4	6.3	0.3	0	8
Bellville	8760	37.8	53.0	8.9	0.4	0	8
Cornwall	8759	39.3	55.0	5.7	0.1	0	3
Peterborough	8760	35.5	57.8	6.5	0.2	0	5
Thunder Bay	8483	46.6	52.0	1.5	0.0	0	0
Sault Ste. Marie	8760	34.9	60.9	3.9	0.2	0	4
North Bay	8756	39.8	54.9	5.2	0.0	0	1
Sudbury	8677	34.7	61.3	3.9	0.0	0	1

Figures 5.2a-c display the daily maximum AQI values in downtown Windsor, Hamilton and Toronto, respectively, for 2004. As shown in Figure 5.2a, ozone accounted for 66 per cent of the daily maximum AQI values reported in downtown Windsor. It is evident that ozone dominated the summer months, whereas, most of the daily maximum AQI values from October through to December were due to $PM_{2.5}$. The 2004 daily maximum AQI readings for Hamilton Downtown are displayed in Figure 5.2b. Here, 60 per cent of the reported daily maximum AQI readings were due to ozone and 40 per cent due to $PM_{2.5}$. There were 12 poor days in Hamilton in 2004 and they were all due to fine particulate matter. (A poor day is defined as a day with at least one hour in the poor AQI category). At the Hamilton Downtown site, there were 72 days where the maximum AQI values greater than 31 were due to $PM_{2.5}$, and 28 such days due to ozone. In Figure 5.2c, the 2004 daily maximum AQI values for Toronto Downtown are presented. Clearly, ozone was the cause for the majority of maximum AQI readings recorded; however, five of the six poor days were due to fine particulate matter.

Figure 5.2a
Daily Maximum AQI Values in Windsor Downtown
(2004)

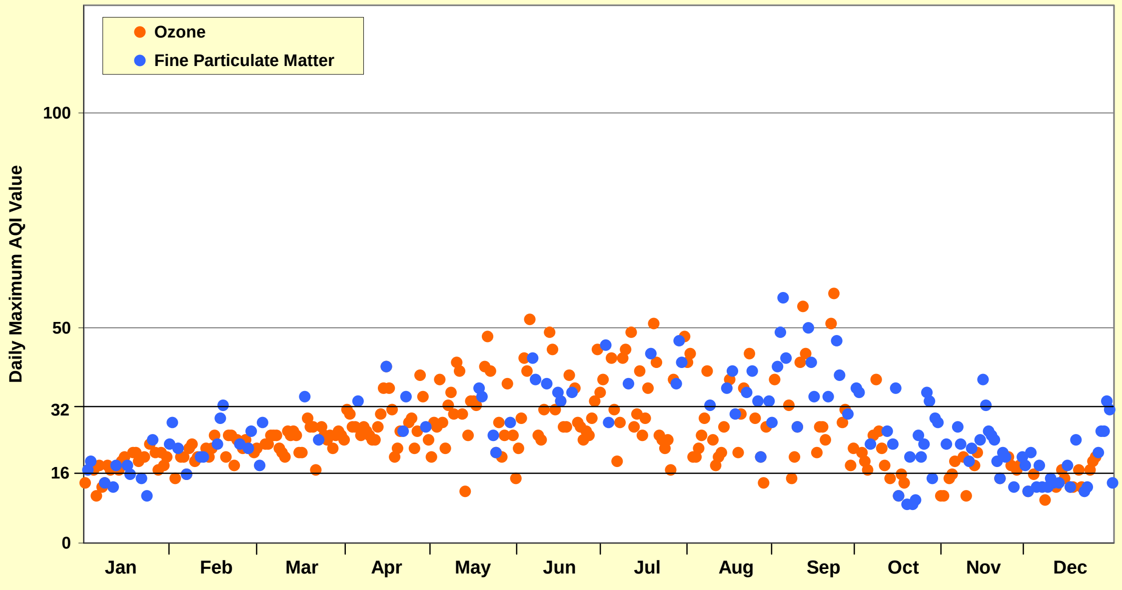


Figure 5.2b
Daily Maximum AQI Values in Hamilton Downtown
(2004)

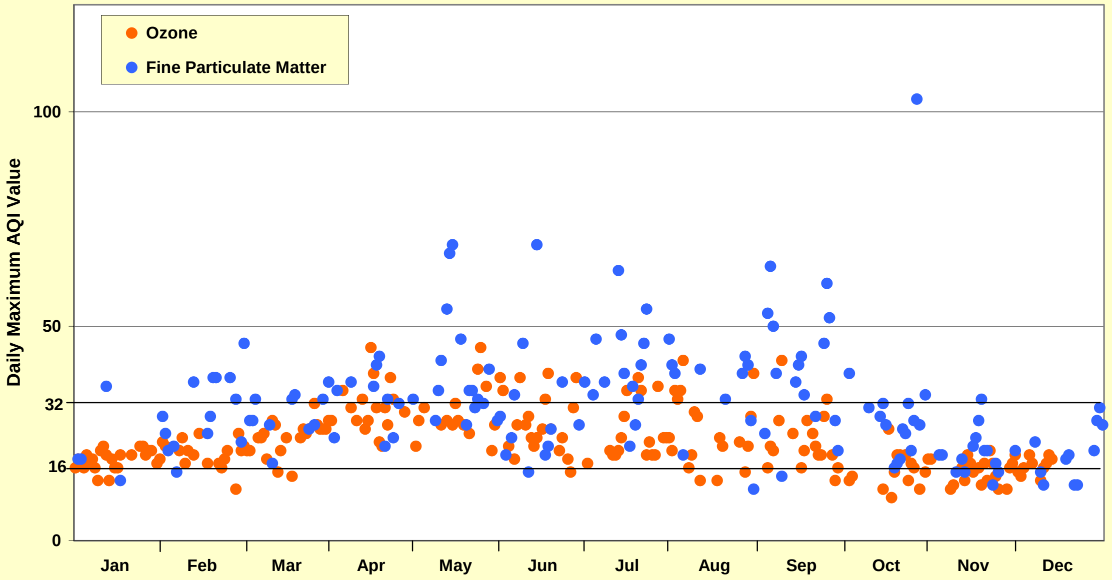


Figure 5.2c
Daily Maximum AQI Values in Toronto Downtown
(2004)

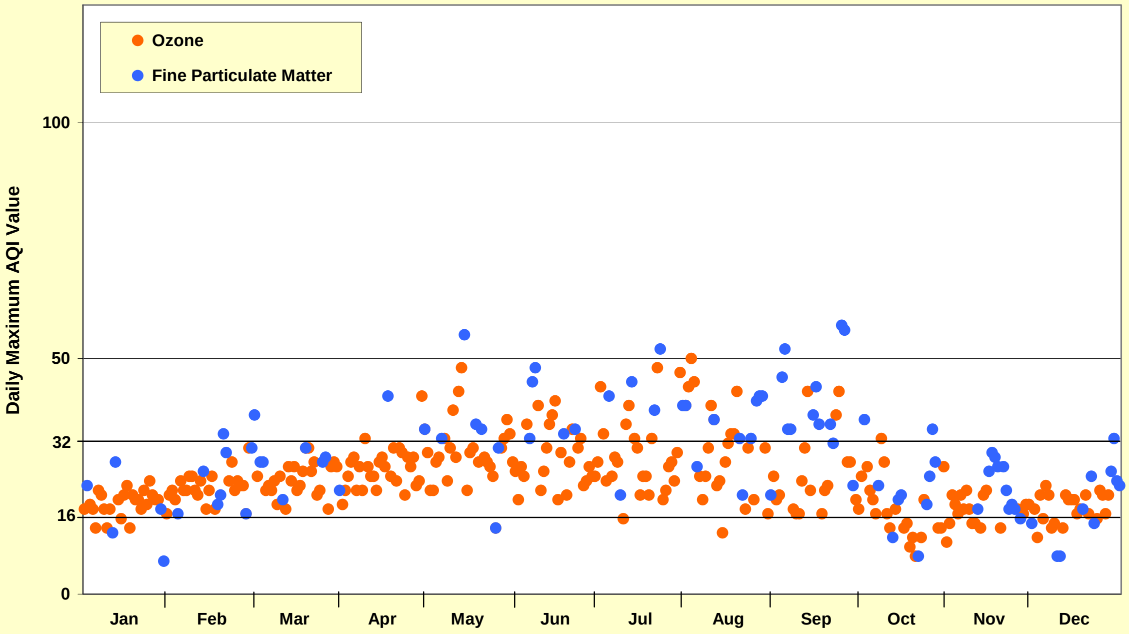
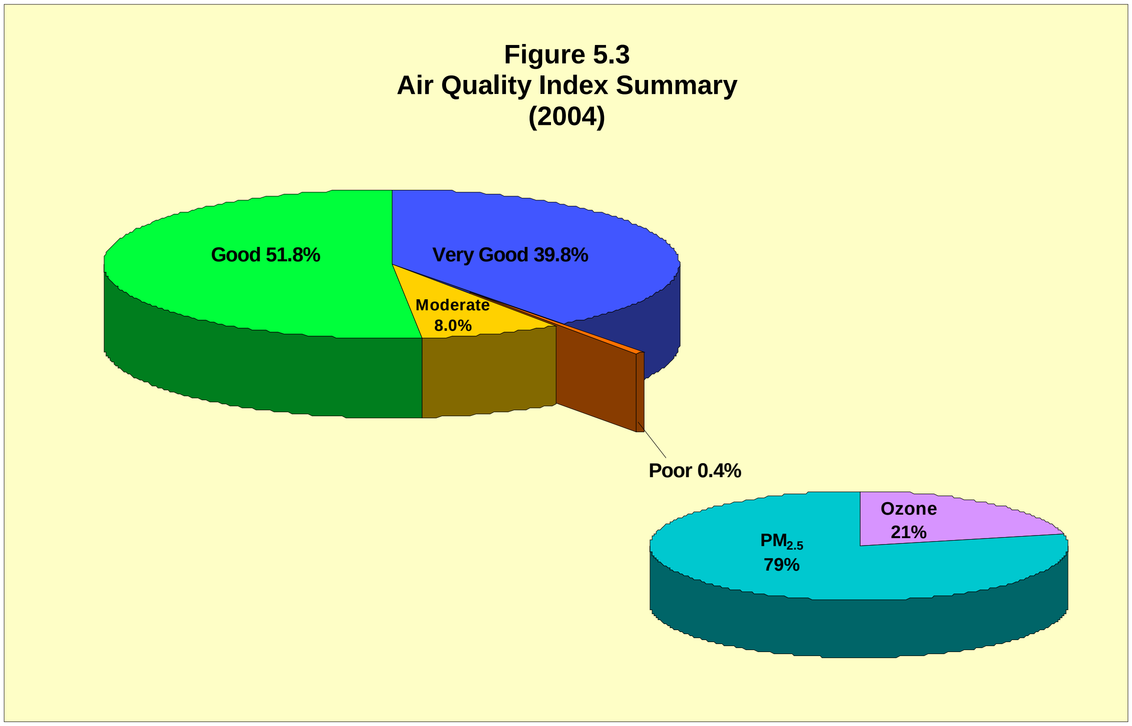


Figure 5.3 shows the composite pie diagrams of the percentages of very good, good, moderate and poor air quality recorded at sites across the province. The pie diagram on the top left shows category percentages. The pie diagram on the bottom right breaks down the poor air quality into percentages of pollutants associated with the AQI above 49. Seventy-nine per cent of the poor AQI values were due to fine particulate matter.



Smog alert program

The ministry began issuing smog advisories in 1993 under the Air Quality Advisory program, 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 µg/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 elevated smog levels are forecast within the next three days;
- ❑ A Smog Advisory is called when there is a strong likelihood that elevated 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;
- ❑ A public website, www.airqualityontario.com, where current AQI readings, smog forecasts and other air quality information are available;
- ❑ Direct e-mails of smog alerts to everyone who subscribes to the ministry's Smog Alert network at the above website;
- ❑ Toll-free numbers by which anyone at anytime can get updated information on 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. This arrangement has been expanded in 2004 to also include year round discussions under LADCO (Lake Michigan Air Director's Consortium) on the issuance and harmonizing of smog alerts and ozone action days during the summer, as well as $PM_{2.5}$ forecasting for the Great Lakes transboundary area.

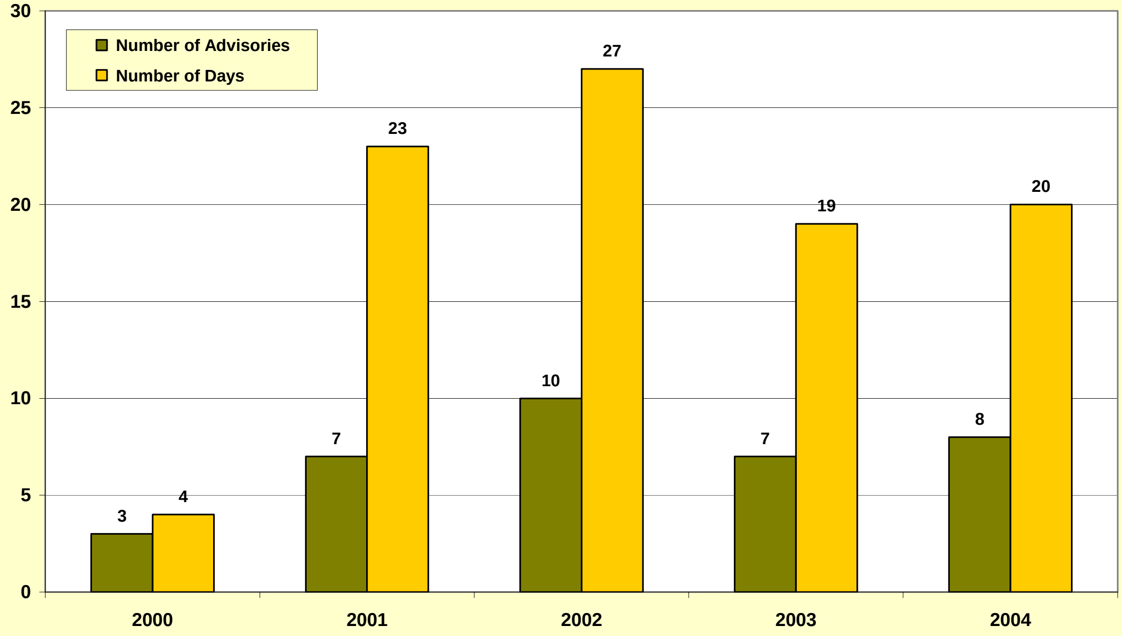
The issuances of smog advisories in Ontario under the Smog Alert program and in Quebec under their Info-Smog program during the smog season are also harmonized through discussions when required between Ontario meteorologists and the Meteorological Services of Canada, Quebec Region meteorologists for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

2004 smog advisories

For the 2004 traditional smog season (May 1 to September 30 inclusive), Ontarians experienced 7 smog advisories covering 18 days. Over the entire calendar year, 8 smog advisories, covering 20 days, were issued. Outside of the traditional smog season, a two-day smog advisory due to fine particulate matter was issued on October 26 and 27, 2004, and was confined only to the Hamilton area. Of the smog advisories issued in 2004, the first one was a 2-day event, covering May 13-14, 2004. This was followed by one 3-day advisory (June 7-9), two 2-day advisories (July 21-22 and August 26-27), three 3-day advisories (September 4-6, September 14-16 and September 23-25) and one 2-day advisory (October 26-27).

The number of smog advisory days in 2004 was comparable to that of 2003. For the province as a whole, there were 20 smog advisory days in 2004 and 19 such days in 2003. Weather conditions, however, were different between the two years. In contrast to the seasonal weather conditions that prevailed over southern Ontario during 2003, the months of May to August inclusive in 2004 were generally cool and wet while September was unseasonably warm and dry. As a result, almost half of the smog advisory days in 2004 occurred in September. A history of smog advisories and smog advisory days since 2000 is shown in Figure 5.4.

Figure 5.4
Summary of Smog Advisories Issued
(2000 - 2004)



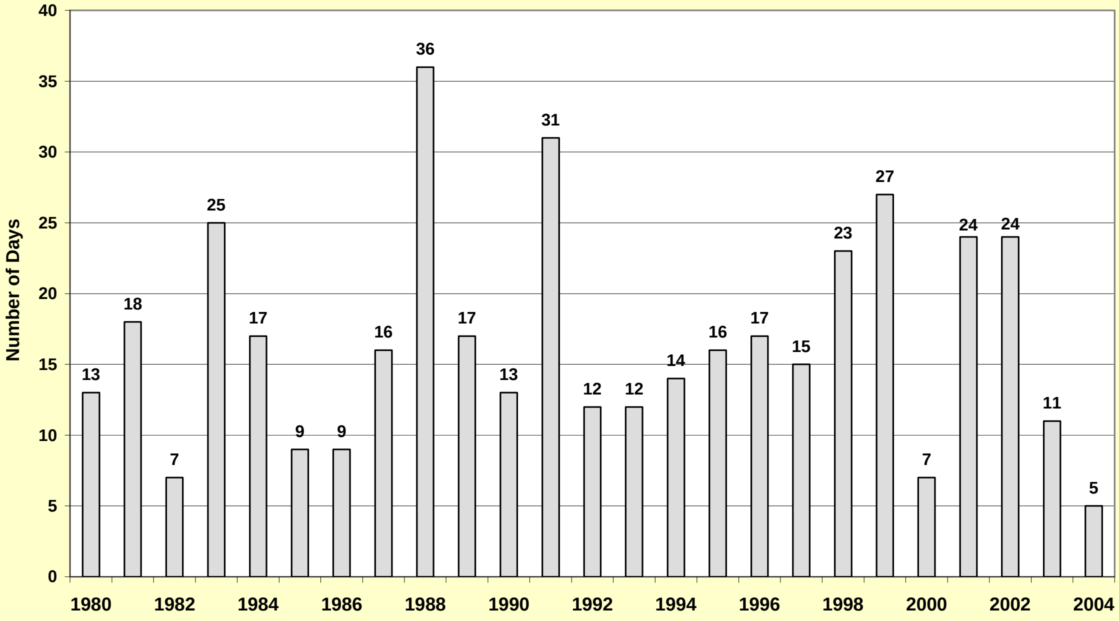
2004 smog episodes

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.

Unlike previous years, summer smog episodes in 2004 were typically of one or two day duration during the period May to August inclusive. To a large extent, this reflects the relatively cool and wet conditions that prevailed during these months. September, however, proved to be unseasonably warm and as a result, there were about 50 per cent of the summer smog episodes during this month including two three day smog episodes.

Elevated ozone and fine particulate matter smog levels are highly dependent upon weather conditions which vary from year to year. To depict the trend in Ontario, the number of ozone "episode days", characterized by days with widespread one-hour average ozone levels greater 80 ppb, for the period 1980 to 2004 is depicted in Figure 5.5. This shows that ozone "episode days", a total of five, in 2004 were the lowest on record since 1980. In total, there were 15 summer smog "episode days" in 2004, as shown in Figure 5.6a, five of which had widespread elevated ozone levels and 13 of which had widespread elevated fine particulate matter levels greater than 45 μg/m^3 three-hour average – three of which occurred when ozone levels were also elevated. In contrast, there were 12 summer smog "episode days" in 2003, as shown in Figure 5.6b. Here, 11 smog "episode days" had widespread elevated ozone levels and seven had widespread elevated PM$_{2.5}$.

Figure 5.5
Number of Ozone Episode Days in Ontario
(1980 - 2004)



Note: *Ozone episode days* are days with widespread ozone levels > 80 ppb.

Figure 5.6a
Smog Episode Days in Ontario
(2004)

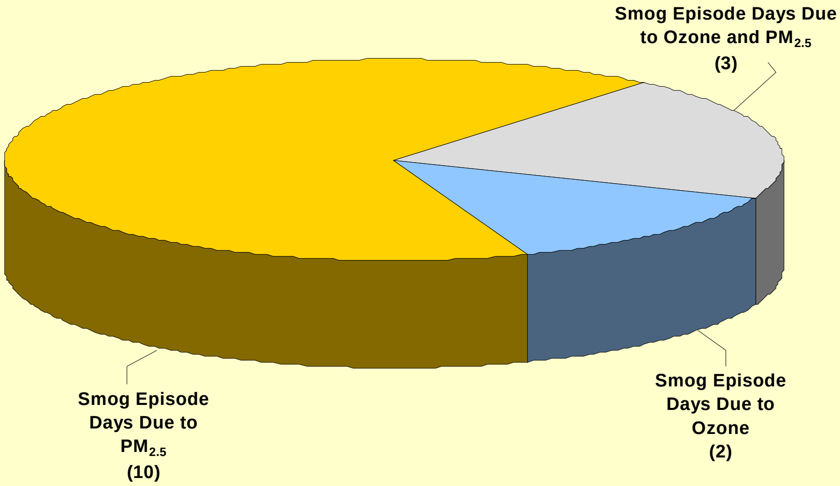
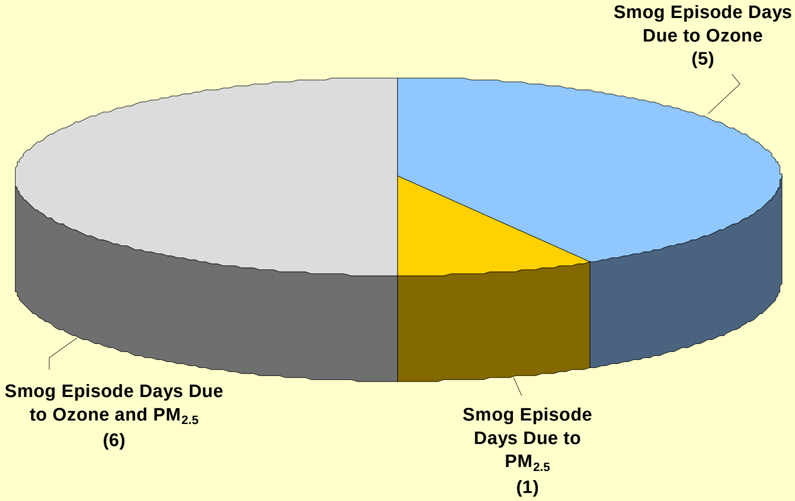


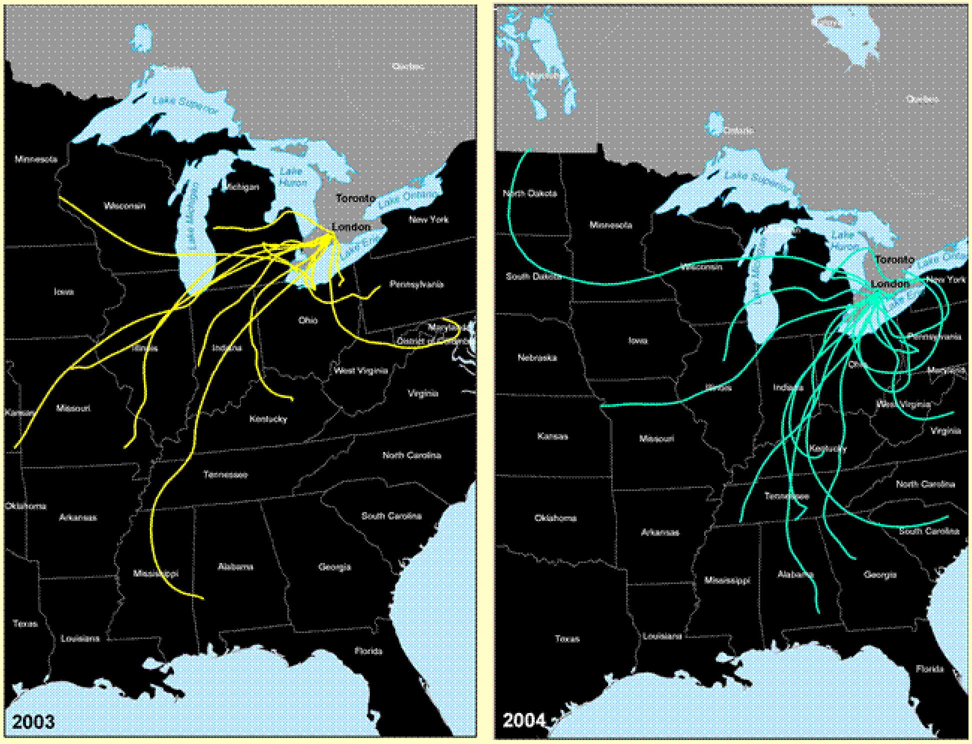
Figure 5.6b
Smog Episode Days in Ontario
(2003)



The air flow into Ontario on the 15 smog episode days during 2004 is depicted in Figure 5.7. This qualitatively confirms the fact that summer ozone and fine particulate matter episode days in Ontario are associated with flows from the heavily industrialized and urbanized regions upwind of southern Ontario. A comparison of air flow conditions on smog "episode days" in 2003 and 2004 reveals more southerly trajectories in 2004 when compared to 2003. The more southerly flows in 2004 probably reflect more impacts of warm, moist flow from the Gulf of

Mexico region, and in addition, indirectly the influence of above-normal activity of the 2004 Atlantic hurricane season on air flow conditions over southern Ontario, especially in September. Cloudy conditions would have likely suppressed ozone formation whereas fine particulate matter would tend to accumulate and dominate under near stationary flow conditions.

Figure 5.7
48-Hour Back Trajectories at 500m Arriving at London, Ontario at 1300 EDT on Smog Episode Days in 2003 and 2004



Approximately half of the smog episode days in 2004 occurred in September. This unusually high frequency appears to be related to the blocking air flow patterns over southern Ontario during periods of tropical storm activities over and approaching the southeastern U.S. In this regard, the three day smog episode, September 3-5, occurred when Hurricane Frances was active in the south. Similarly, the three day episode, September 23-25 occurred when the major Hurricane Jeanne was active over the southeastern U.S. The first three day episode, September 3-5, was dominated by widespread elevated fine particulate levels across southern Ontario on all three days. There were 14 sites with $PM_{2.5}$ concentrations greater than the 45 $\mu g/m^3$ three-hour average on September 3, 24 sites above on September 4 and 14 sites above on September 5. In contrast, only three sites reported elevated ozone levels on September 3, six sites on September 4 and none on September 5. The next major event occurred over the period September 22-25. Elevated ozone levels were reported across southwest Ontario at six sites on September 22 and across most of southern and northern Ontario on September 23 (19 sites). This was followed by 10 sites on September 24 and none on September 25. For fine particulate matter, there was a phase shift with one site reporting elevated fine particulate matter level on September 23, 20 sites on September 24 and 18 such sites on September 25.

The only fine particulate smog event outside of the traditional smog season occurred on October 26-27, 2004, and was confined to the Hamilton area. An AQI reading of 103 was registered in Hamilton on October 26, due to fine particulate matter. This event marks the first time that an AQI value in the *very poor* air quality category (AQI equal or greater than 100) has been officially reported by the ministry. The value was reported at 2:00 p.m. EDT and was determined to be caused by local emissions and compounded by prevailing meteorological conditions conducive to the build-up of pollutants. A smog advisory was in effect on October 26 and 27 due to the persistent impact of the incident. Weather conditions associated with frontal trapping, created by a cold front lying across the city on the morning of October 26, compounded the effects of local pollution by creating a strong inversion layer which trapped pollutants close to the surface. The event was confined only to the Hamilton area, suggesting local impacts were the main contributors to the observed poor air quality.

Transboundary versus Ontario contributions

Detailed understanding of the role and quantification of transboundary contributions to air quality levels in Ontario is provided by mathematical models of atmospheric transport and transformation. Under episodic conditions for the May to September period, the contribution from Ontario sources, as confirmed by modelling, is limited whereas transboundary contribution dominates.

A recent modelling study to assess the transboundary versus Ontario contributions on high ozone concentration days (days when 8-hour running average ozone concentrations were above the CWS threshold of 65 ppb) and high fine particulate matter days (days when the daily average $PM_{2.5}$ concentration exceeded 30 $\mu g/m^3$) indicates that Ontario sources contributed up to 16 per cent to the observed ozone levels and approximately 50 per cent to the fine particulate matter levels. Ontario sources contributed about 1 per cent to the ozone concentrations in Windsor, 9 per cent in the Greater Toronto Area, 16 per cent in Oshawa (downwind of Toronto) and 7 per cent in Kingston. Moreover, Ontario's contribution to upper New York state and Vermont/New Hampshire is very small, approximately 4 per cent and 3 per cent, respectively. For fine particulate matter on high concentration days in the warm season, transboundary contributions are also very significant across Ontario except in the GTA where modelling studies suggest about half of the contribution originates from Ontario's emissions. For other areas, the contributions of Ontario emissions are much smaller, about 6 per cent in Windsor and 14 per cent in Kingston. The large contribution from U.S. emissions and background ozone presents a significant challenge, and reductions in precursor emissions in the U.S. and Ontario would be needed to significantly affect ozone levels in southern Ontario and northeast U.S. states on these high ozone days.

Chapter 6

Selected Volatile Organic Compounds

Characteristics, sources and effects

Volatile organic compounds (VOCs) 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 VOCs warrant special concern because they play an important role in the formation of ground-level ozone and $PM_{2.5}$, two key components of smog. 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 residence time 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 1995 to 2004 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. In addition to compounds that are very reactive in forming tropospheric ozone, such as benzene, toluene and xylenes, this chapter also examines trichlorofluoromethane, dichlorodifluoromethane and chlorodifluoromethane – compounds that deplete stratospheric ozone.

Figure 6.1
Locations of Ambient VOC Monitoring Sites Across Ontario
(2004)

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

Benzene, toluene and xylene (BTX)

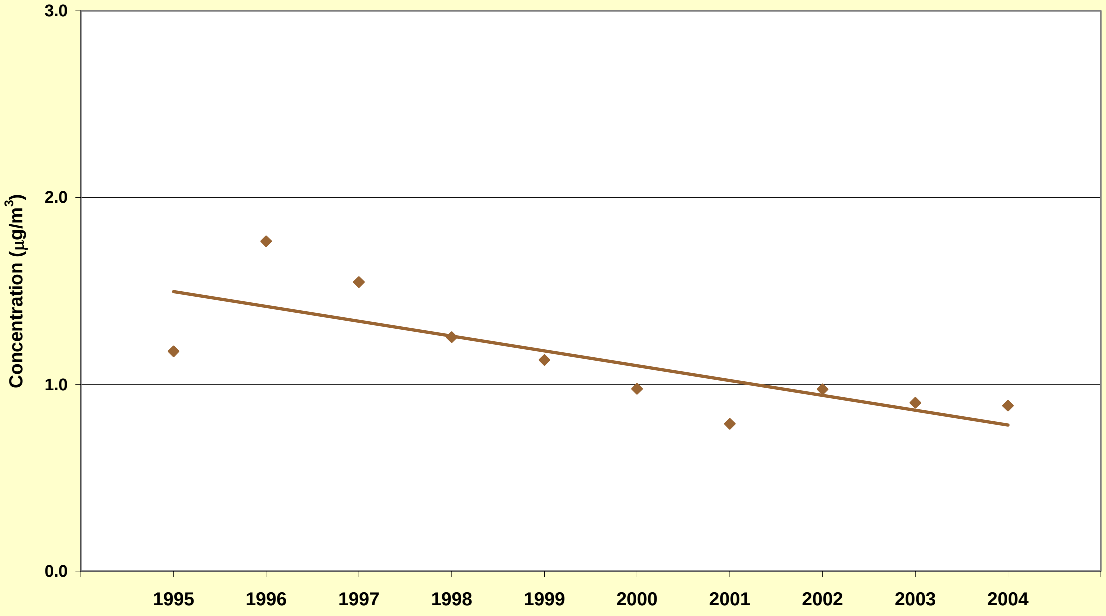
Benzene, a volatile aromatic hydrocarbon which has a strong, often pleasant scent, is primarily used in the production of plastics and other chemical products. Large quantities of benzene are obtained from petroleum, either by direct extraction from certain types of crude oils or by chemical treatment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

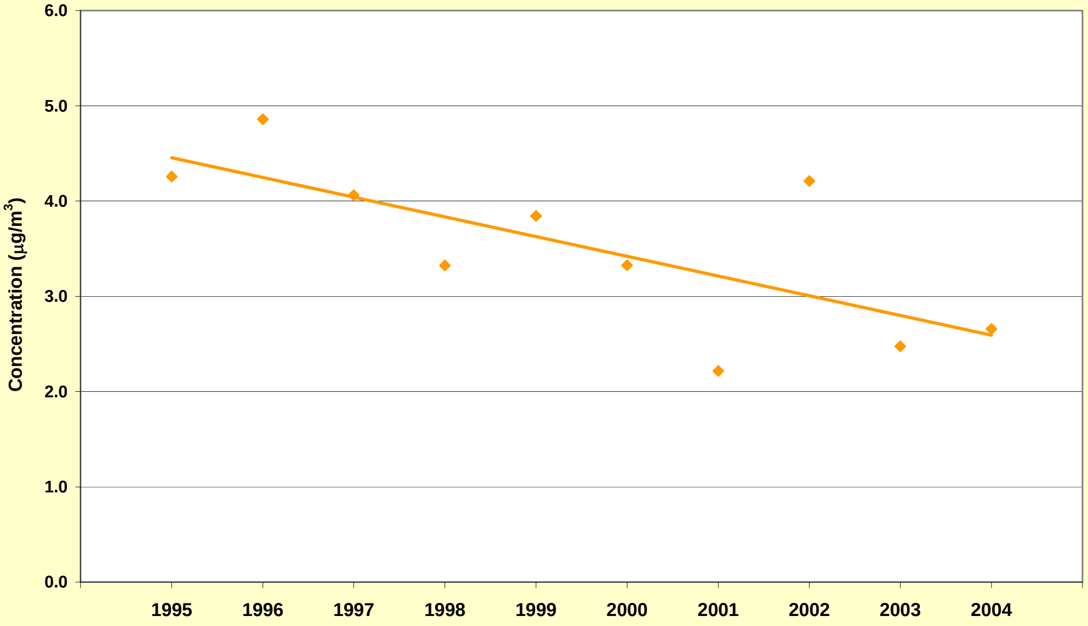
Motor vehicle exhaust is the major source of BTX in Ontario. These compounds are very reactive in forming ground-level ozone and $PM_{2.5}$. In 2004, the annual mean concentrations for benzene, toluene and xylenes were 0.89 $\mu g/m^3$, 2.66 $\mu g/m^3$ and 1.32 $\mu g/m^3$, respectively. Figures 6.2a-c show trends of benzene, toluene, and xylenes for the period from 1995 to 2004. 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 50 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 6.2a
Trend of Benzene Concentrations in Ontario
(1995 - 2004)



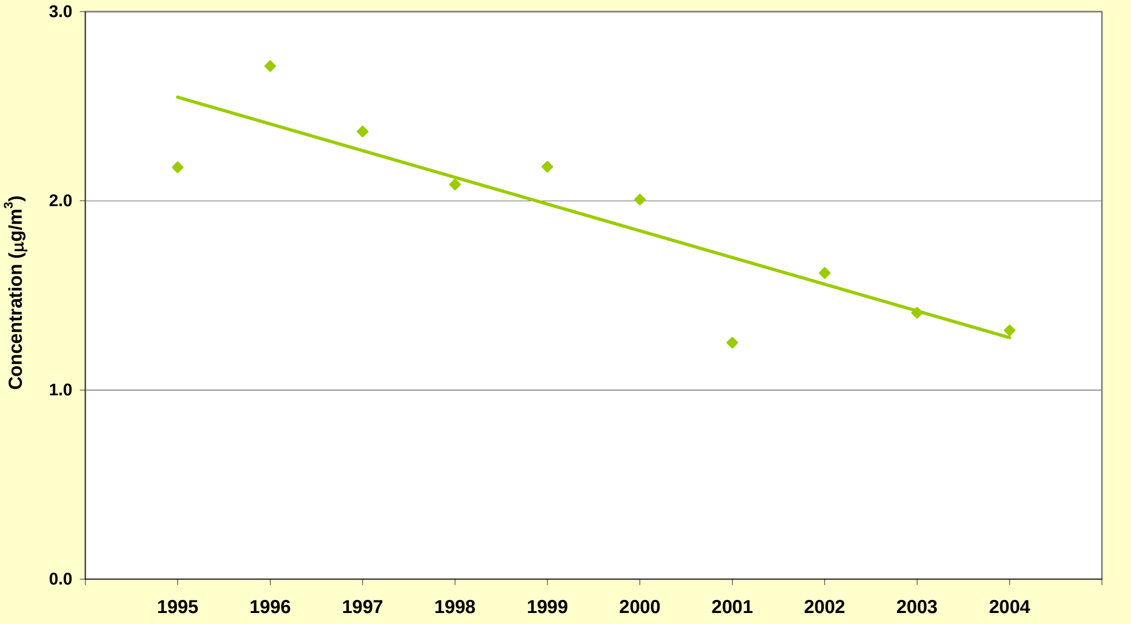
Note: Annual composite mean based on eight sites over ten years;
Data from these sites are provided by Environment Canada as part of the NAPS program.

Figure 6.2b
Trend in Toluene Concentrations in Ontario
(1994 - 2004)



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.

Figure 6.2c
Trend of Xylene Concentrations in Ontario
(1995 - 2004)



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.

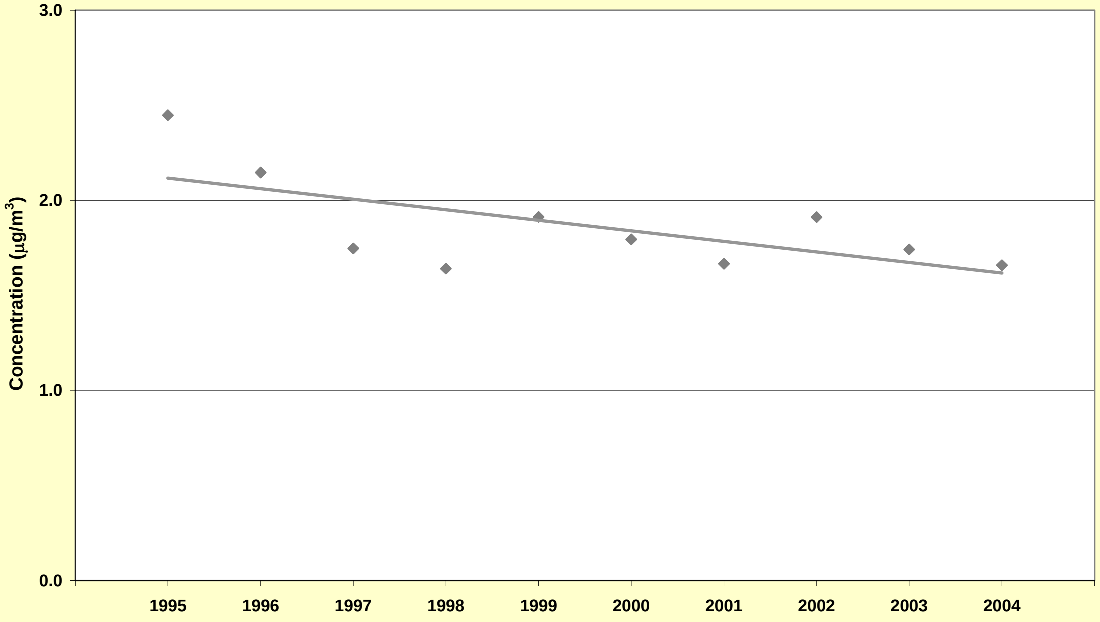
Trichlorofluoromethane, dichlorodifluoromethane and chlorodifluoromethane

Trichlorofluoromethane, dichlorodifluoromethane and chlorodifluoromethane, also referred to as CFC 11, CFC 12 and CFC 22 respectively, are chlorofluorocarbons (CFCs) comprised of chlorinated and fluorinated organic compounds. CFCs do not decompose in the lower atmosphere. Instead, their chemical stability allows them to reach the stratosphere where the absorption of intense ultraviolet radiation subsequently causes them to break apart and release chlorine. The chlorine reacts with oxygen, nitrogen and hydrogen oxides in the stratosphere which results in the depletion of the ozone layer. Some CFCs are more harmful to stratospheric ozone than others. For example, CFC 11 and CFC 12 have a life span in the stratosphere of 45 and 100 years respectively, inflicting damage to the ozone layer for decades. Chemical structures with hydrogen, such as CFC 22, degrade more quickly than those CFCs without hydrogen.

Trichlorofluoromethane, dichlorodifluoromethane and chlorodifluoromethane are more commonly known as Freon 11, Freon 12 and Freon 22. (The term Freons collectively here, refers to Freons 11, 12, and 22). Freons are clear, colourless liquid or gas. Freons are non-toxic but they contribute to the *greenhouse effect* and are the primary cause for depleting the stratospheric ozone layer. Generally, Freons are aerosol propellants and are used as a refrigerant and fire extinguishing agents.

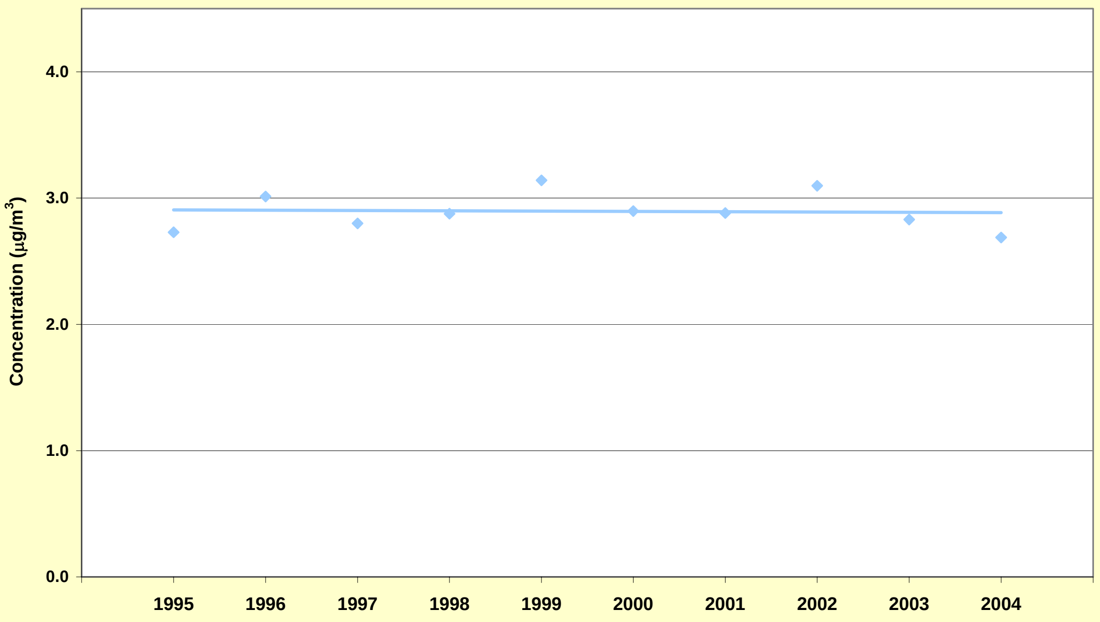
Figures 6.3a-c show trends for trichlorofluoromethane, dichlorodifluoromethane and chlorodifluoromethane for the period 1995 to 2004. Trichlorofluoromethane concentrations decreased by 23 per cent over the past decade. The trend for dichlorodifluoromethane concentrations remained fairly constant, however annual concentrations for chlorodifluoromethane increased by 52 per cent over the 10-year period. This increase is most likely due to the continued use of hydrochlorofluorocarbons (HCFCs), such as chlorodifluoromethane (CFC 22), as interim ozone-depleting substance (ODS) replacements for CFC 11 and CFC 12, for the reason that CFC 22 is less reactive with ozone. (The production and import of CFCs, including CFC 11 and CFC 12, were banned in Canada in 1994-96 under the Ozone-Depleting Substances Regulations; CFC 22 will be phased out by January 2020).

Figure 6.3a
Trend of Trichlorofluoromethane Concentrations in Ontario
(1995 - 2004)



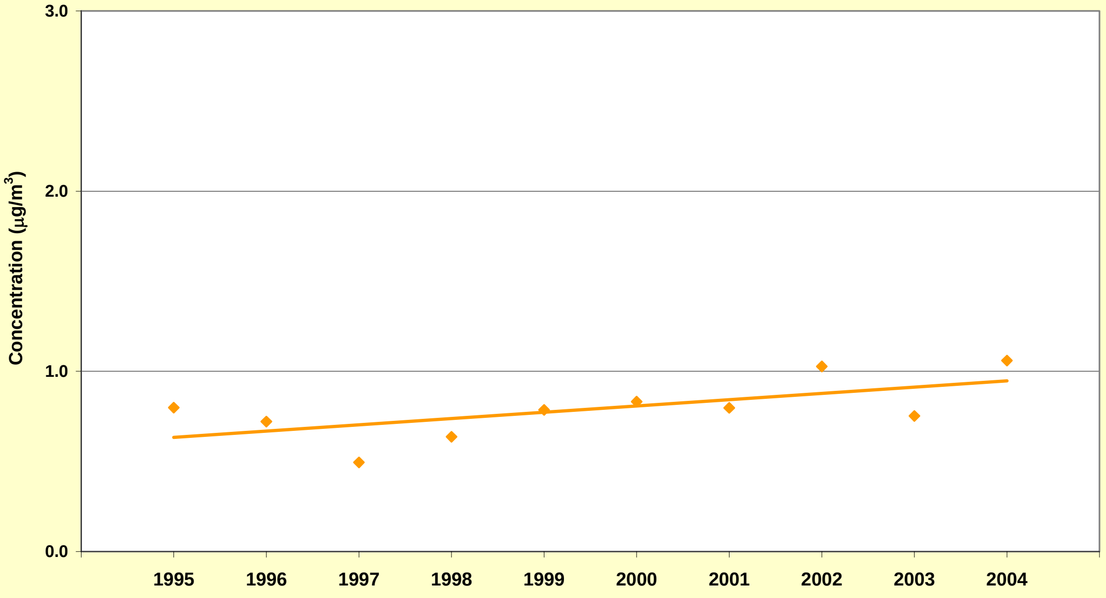
Note: Annual composite mean based on eight sites over ten years;
Data from these sites are provided by Environment Canada as part of the NAPS program.

Figure 6.3b
Trend of Dichlorodifluoromethane Concentrations in Ontario
(1995 - 2004)



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.

Figure 6.3c
Trend of Chlorodifluoromethane Concentrations in Ontario
(1995 - 2004)



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.

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.

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 - pollutants for which a continuous measurement 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 pollutant concentrations are measured on a real-time continuous basis and data determined hourly (for example ozone, sulphur dioxide).

Criterion - maximum concentration or level (based on potential effects) of pollutant 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.
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.

Glossary continued...

Primary pollutant	-	pollutant emitted directly to the atmosphere.
Secondary pollutant	-	pollutant formed from other pollutants in the atmosphere.
Smog	-	a contraction of smoke and fog; colloquial term used for photochemical smog, which includes ozone, particulate matter 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 water, 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.

ACRONYMS

AAQC - Ambient Air Quality Criteria (Ontario)

AQI - Air Quality Index

BTX - benzene, toluene, xylenes

CCME - Canadian Council of Ministers of the Environment

CFCs - chlorofluorocarbons

CO - carbon monoxide

CWS - Canada-wide Standard

DL - detection limit

GTA - Greater Toronto Area

IVR - Integrated Voice Response

MOE - Ministry of the Environment

NAAQS - National Ambient Air Quality Standard (U.S.)

NAPS - National Air Pollution Surveillance (Canada)

NO - nitric oxide

NO_2 - nitrogen dioxide

NO_x - nitrogen oxides

O_3 - ozone

ODS - ozone depleting substances

$PM_{2.5}$ - fine particulate matter

SES (TEOM) - Sample Equilibration System

SO_2 - sulphur dioxide

TEOM - Tapered Element Oscillating Microbalance

TRS - total reduced sulphur

VOCs - volatile organic compounds

µg/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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2004 REPORT
APPENDIX

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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 and air toxics data.

APPENDIX
TABLE OF CONTENTS

INTRODUCTION

This appendix is intended for use in conjunction with the 2004 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, maximums, percentile values and the number of exceedances of the Ontario ambient air quality criteria (AAQC) for each pollutant.

MONITORING NETWORK OPERATIONS

Network Description

In 2004, the ambient network comprised of 148 continuous monitoring instruments at 43 sites, which included 41 real-time $PM_{2.5}$ monitors. During 2004, 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 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. As a result, the 2004 ambient air quality monitoring network had 96 per cent valid data from over 3 million data points.

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 over the 10-year period from 1995-2004.

NETWORK DESCRIPTIVE TABLES AND ANNUAL STATISTICS

The ambient 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 2004 statistical data and 10-year trends for various continuous pollutants are provided in Tables 2-15. The 2004 statistical data for selected VOCs (see Table 16 for list) are presented in Tables 17-24.

Table 1: 2004 Ontario Continuous Ambient Air Monitoring Network

ID	CITY/TOWN	STATION LOCATION	YEAR	LATITUDE	LONGITUDE	AIR INTAKE	TYPE	AQI	O_3	$PM_{2.5}$	NO_2	CO	SO_2	TRS
12008	WINDSOR DOWNTOWN	467 UNIVERSITY AVE.	1969	42°18`59``	83°02`40``	8	A	Y	T	T	T	T	T	.
12016	WINDSOR WEST	COLLEGE/SOUTH ST.	1975	42°17`34``	83°04`24``	4	A	Y	T	T	T	.	T	T
12059	ESSEX	360 FAIRVIEW DR. W.	2004	42°09`36``	82°50`00``	5	R	.	T	T	T	T	T	.
13021	MERLIN	MIDDLE RD./ MOE WATER PUMP STN.	1977	42°14`58``	82°13`05``	3	A	S	T	T	.	.	.	.
14064	SARNIA	FRONT ST./CN TRACKS/ CENTENNIAL PARK	1976	42°59`01``	82°24`16``	3	A	Y	T	T	T	.	T	T
15020	GRAND BEND	WATER TREATMENT PLANT	1991	43°20`02``	81°44`20``	10	A	S	T	T	.	.	.	.
15025	LONDON	900 HIGHBURY AVE.	1995	43°00`32``	81°12`34``	4	A	Y	T	T	T	T	T	.
16015	PORT STANLEY	43665 DEXTER LINE/ ELGIN WATER T. PLANT	2002	42°39`36``	81°13`08``	5	A	S	T	T	.	.	.	.
18007	TIVERTON	CONCESSION RD. 2/ LOT A	1979	44°18`50``	81°33`08``	4	A	S	T	T	.	.	.	.
21005	BRANTFORD	324 GRAND RIVER AVE.	2004	43°08`25``	80°17`46``	5	A	.	T	T	T	T	T	.
22071	SIMCOE	HWY 3/BLUE LINE RD./ EXPERIMENTAL FARM	1975	42°51`08``	80°15`50``	4	R	.	T	T	.	.	.	.
26060	KITCHENER	WEST AVE./HOMEWOOD	1990	43°26`34``	80°30`14``	5	A	Y	T	T	T	.	.	.
27067	ST. CATHARINES	ARGYLE CRES./ PUMP STN.	1987	43°09`38``	79°14`02``	4	A	Y	T	T	.	.	.	.
28028	GUELPH	EXHIBITION ST./CLARK ST.	2000	43°33`09``	80°15`59``	4	A	Y	T	T	.	.	.	.
29000	HAMILTON DOWNTOWN	ELGIN/KELLY	1987	43°15`30``	79°51`41``	4	A	Y	T	T	T	T	T	T
29114	HAMILTON MOUNTAIN	VICKERS RD./E. 18TH ST.	1985	43°13`47``	79°51`43``	3	A	Y	T	T	.	.	.	.
29118	HAMILTON WEST	MAIN ST. W./ HWY 403	1985	43°15`31``	79°54`09``	3	A	Y	T	T	.	.	.	.
31103	TORONTO DOWNTOWN	BAY/WELLESLEY ST.	2000	43°39`51``	79°23`14``	10	A	Y	T	T	T	T	T	.
31190	TORONTO	CN TOWER/ 301 FRONT ST. W.	1989	43°38`26``	79°23`13``	444	R	.	T	.	T	.	.	.
33003	TORONTO EAST	KENNEDY/LAWRENCE	1970	43°44`57``	79°16`30``	4	A	Y	T	T	T	.	.	.
34020	TORONTO NORTH	HENDON/YONGE ST.	1988	43°46`47``	79°24`56``	5	A	Y	T	T	T	.	.	.
35003	ETOBICOKE WEST	ELMCREST RD./CENTENNIAL PARK	1969	43°38`58``	79°35`18``	5	R	.	T	T	T	.	.	.
35033	ETOBICOKE SOUTH	185 JUDSON ST.	1967	43°36`49``	79°30`28``	5	R	.	T	T	T	.	.	.
35125	TORONTO WEST	125 RESOURCES RD.	2003	43°42`40``	79°32`33``	8	A	Y	T	T	T	T	T	.
44008	BURLINGTON	HWY 2/NORTH SHORE BLVD. E.	1979	43°19`08``	79°48`06``	5	A	Y	T	T	T	T	T	.
44017	OAKVILLE	8TH LINE/GLENASHTON DR./ HALTON RESERV.	2003	43°29`09``	79°42`08``	12	A	Y	T	T	T	T	T	.
45025	OSHAWA	RITSON RD. PUBLIC SCHOOL	1979	43°53`31``	78°51`03``	5	A	Y	T	T	T	.	.	.
46089	BRAMPTON	525 MAIN ST. N./ PEEL MANOR	2000	43°41`59``	79°46`41``	5	A	Y	T	T	T	T	T	.
46109	MISSISSAUGA	FRANK McKECHNIE COMM. CTR	2004	43°36`57``	79°39`09``	10	A	Y	T	T	.	T	T	.

Table 1: 2004 Ontario Continuous Ambient Air Monitoring Network

ID	CITY/TOWN	STATION LOCATION	YEAR	LATITUDE	LONGITUDE	AIR INTAKE	TYPE	AQI	O_3	$PM_{2.5}$	NO_2	CO	SO_2	TRS
47045	BARRIE	83 PERRY ST.	2001	44°22`55``	79°42`15``	5	A	Y	T	T	T	T	T	.
48002	STOUFFVILLE	HWY 47/ E. OF HWY 48	1980	43°57`52``	79°15`58``	5	R	.	T	.	.	.	.	.
48006	NEWMARKET	EAGLE ST./McCAFFREY RD.	2001	44°02`38``	79°28`55``	5	A	Y	T	T	T	T	.	.
49005	PARRY SOUND	7 BAY ST.	2001	45°20`21``	80°02`15``	5	A	S	T	T	.	.	.	.
49010	DORSET	HWY 117 / PAINT LAKE RD.	1981	45°13`35``	78°55`08``	3	A	S	T	T	.	.	.	.
51001	OTTAWA	RIDEAU/WURTEMBURG ST.	1971	45°26`00``	75°40`30``	4	A	Y	T	T	T	T	T	.
52020	KINGSTON	133 DALTON ST.	1988	44°15`57``	76°30`06``	5	A	Y	T	T	.	.	.	.
54012	BELLEVILLE	2 SIDNEY ST./ WATER TREATMENT PLANT	2002	44°09`07``	77°23`41``	10	A	Y	T	T	T	T	T	.
56051	CORNWALL	BEDFORD/THIRD ST.	1970	45°01`05``	74°44`09``	4	A	Y	T	T	.	.	.	.
59006	PETERBOROUGH	10 HOSPITAL DR.	1998	44°18`05``	78°20`51``	10	A	Y	T	T	.	.	.	.
63203	THUNDER BAY	421 JAMES ST. N.	2004	48°22`46``	89°17`25``	15	A	Y	T	T	.	.	.	.
71078	SAULT STE MARIE	SAULT COLLEGE	2004	46°31`59``	84°18`34``	8	A	Y	T	T	.	T	T	T
75010	NORTH BAY	CHIPPAWA ST./ DEPT. NATIONAL DEFENCE	1979	46°18`58``	79°27`01``	4	A	Y	T	T	T	.	.	.
77219	SUDBURY	RAMSEY LAKE RD.	2004	46°28`32``	80°57`47``	3	A	Y	T	T	T	T	T	.

Note, in 2004

- *station 46109 replaced station 46110 as the Mississauga site.*
- *station 63203 replaced station 63200 as the Thunder Bay site.*
- *station 71078 replaced station 71068 as the Sault Ste. Marie site.*
- *station 77219 replaced station 77203 as the Sudbury site.*

ID - station identfication number
Year - year station began monitoring
Air intake - height of air intake above ground (m)
Type - type of monitoring site: A = ambient, R = reasearch
AQI - Air Quality Index site: Y = year-round AQI site (January to December), S = seasonal AQI site (May 1 to September 30)
T - telemetry
O_3 - ground-level ozone
$PM_{2.5}$ - fine particulate matter
NO_2 - nitrogen dioxide
CO - carbon monoxide
SO_2 - sulphur dioxide
TRS - total reduced sulphur

Table 2: 2004 Ozone (O_3) Statistics

Unit: parts per billion (ppb)
O_3 1-hour AAQC is 80 ppb

				PERCENTILES							Maximum		No. of Times Above Criterion
ID	City	Location	Valid h	10%	30%	50%	70%	90%	99%	Mean	1h	24h	1h
12008	Windsor Downtown	467 University Ave.	8745	1	10	18	27	40	67	20.2	92	48	10
12016	Windsor West	College/South St.	8765	3	12	21	29	44	69	22.6	92	56	19
12059	Essex	360 Fairview Dr. W.	8605	4	14	21	29	40	59	22.3	82	49	1
13021	Merlin	Middle Rd., Moe Water Pump Stn.	8765	10	20	28	35	47	69	28.4	90	58	14
14064	Sarnia	Front St./Cn Tracks, Centennial Park	8671	4	16	24	31	41	60	23.8	93	51	4
15020	Grand Bend	Water Treatment Plant	8593	10	19	25	31	40	67	25.8	105	54	24
15025	London	900 Highbury Ave.	8592	5	16	23	30	41	63	23.6	85	53	7
16015	Port Stanley	43665 Dexter Line, Elgin Water T. Plt	8618	14	24	31	39	50	76	32.2	92	68	46
18007	Tiverton	Concession Rd. 2, Lot A	7668	13	22	27	33	43	62	28.1	97	60	8
21005	Brantford	324 Grand River Ave.	8696	6	17	26	34	46	66	26.2	92	60	12
22071	Simcoe	Hwy 3/Blue Line Rd., Experimental Farm	8611	13	23	30	37	48	70	30.5	93	64	15
26060	Kitchener	West Ave./Homewood	8748	5	17	25	31	43	64	24.8	82	57	3
27067	St. Catharines	Argyle Cres., Pump Stn.	8769	3	15	23	31	42	64	23.6	79	61	0
28028	Guelph	Exhibition St./Clark St.	8752	6	18	26	33	44	65	25.9	87	55	5
29000	Hamilton Downtown	Elgin/Kelly	8735	2	11	19	26	39	60	20.1	78	55	0
29114	Hamilton Mountain	Vickers Rd./E. 18th St.	8773	6	16	24	31	43	65	24.6	80	58	0
29118	Hamilton West	Main St. W./ Hwy 403	8653	1	10	18	26	37	57	19.2	80	50	0
31103	Toronto Downtown	Bay/Wellesley St.	8655	4	14	21	30	42	65	22.8	82	55	2
31190	Toronto	Cn Tower, 301 Front St. W.	8484	18	28	34	42	57	79	36.0	102	80	72
33003	Toronto East	Kennedy/Lawrence	8720	2	11	18	26	39	62	19.9	82	50	2
34020	Toronto North	Hendon/Yonge St.	8742	4	13	22	30	40	59	22.5	81	47	1
35003	Etobicoke West	Elmcrest Rd., Centennial Park	8754	2	10	19	28	40	62	20.4	77	51	0
35033	Etobicoke South	185 Judson St.	8696	3	10	17	25	37	56	18.9	87	47	4
35125	Toronto West	125 Resources Rd.	8761	3	7	15	23	36	60	17.6	78	47	0
44008	Burlington	Hwy 2/North Shore Blvd. E.	8722	3	12	20	28	40	60	21.0	89	55	3
44017	Oakville	8th Line/Glenashton Dr., Halton Reserv.	8757	5	16	24	32	43	65	24.6	86	58	3
45025	Oshawa	Ritson Rd. Public School	8729	5	16	23	30	39	57	23.3	76	51	0
46089	Brampton	525 Main St. N., Peel Manor	8716	6	17	25	33	43	65	25.1	84	58	3

Table 2: 2004 Ozone (O_3) Statistics

Unit: parts per billion (ppb)
O_3 1-hour AAQC is 80 ppb

				PERCENTILES							Maximum		No. of Times Above Criterion
ID	City	Location	Valid h	10%	30%	50%	70%	90%	99%	Mean	1h	24h	1h
46109	Mississauga	Frank Mckechnie Comm. Ctr	8575	2	11	19	28	39	62	20.7	82	58	1
47045	Barrie	83 Perry St.	8637	4	17	25	32	43	60	24.8	81	52	1
48002	Stouffville	Hwy 47/ E. Of Hwy 48	8738	10	20	27	34	43	64	27.3	86	62	8
48006	Newmarket	Eagle St./Mccaffrey Rd.	8763	8	21	28	35	46	67	28.3	96	66	13
49005	Parry Sound	7 Bay St.	8748	13	25	31	37	48	69	31.1	99	67	30
49010	Dorset	Hwy 117 / Paint Lake Rd.	8663	12	23	29	35	44	63	28.8	89	53	3
51001	Ottawa	Rideau/Wurtemburg St.	8558	5	15	21	28	37	54	21.7	72	49	0
52020	Kingston	133 Dalton St.	8737	2	14	23	30	41	62	22.5	85	56	4
54012	Belleville	2 Sidney St., Water Treatment Plant	8751	8	19	27	36	48	71	28.1	90	71	24
56051	Cornwall	Bedford/Third St.	8752	5	17	24	30	40	57	23.8	77	61	0
59006	Peterborough	10 Hospital Dr.	8759	9	20	27	34	43	65	27.1	82	57	2
63203	Thunder Bay	421 James St. N.	8483	4	14	23	30	38	48	22.0	64	43	0
71078	Sault Ste Marie	Sault College	8757	11	21	27	33	42	58	27.0	96	51	6
75010	North Bay	Chippawa St., Dept. National Defence	8750	6	19	26	32	41	61	25.2	83	62	1
77219	Sudbury	Ramsey Lake Rd.	8677	13	22	28	34	42	59	27.7	82	60	2

Notes:

The annual mean for sites that do not meet the requirement of 75% valid data per quarter are INS (insufficient data to calculate a valid annual mean).

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

Table 3: 2004 Fine Particulate Matter ($PM_{2.5}$) Statistics

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

				PERCENTILES							Maximum		No. of Times Above Reference Level
ID	City	Location	Valid h	10%	30%	50%	70%	90%	99%	Mean	1h	24h	24h
12008	Windsor Downtown	467 University Ave.	8597	0	3	6	11	19	37	8.6	54	39	8
12016	Windsor West	College/South St.	8757	1	4	7	12	21	39	9.5	56	38	9
12059	Essex	360 Fairview Dr. W.	8161	0	3	6	10	18	35	8.1	60	41	3
13021	Merlin	Middle Rd., Moe Water Pump Stn.	8505	1	3	5	9	18	38	7.8	66	43	8
14064	Sarnia	Front St./Cn Tracks, Centennial Park	8596	4	6	8	14	27	47	12.2	70	48	18
15020	Grand Bend	Water Treatment Plant	8369	0	2	4	8	18	38	7.0	64	45	8
15025	London	900 Highbury Ave.	8617	4	6	8	12	22	42	10.9	66	45	12
16015	Port Stanley	43665 Dexter Line, Elgin Water T. Plt	8619	1	3	5	8	17	38	7.5	55	38	10
18007	Tiverton	Concession Rd. 2, Lot A	8010	0	1	3	6	16	36	5.8	50	40	4
21005	Brantford	324 Grand River Ave.	8703	1	3	5	9	17	39	7.5	65	45	9
22071	Simcoe	Hwy 3/Blue Line Rd., Experimental Farm	8285	1	3	6	9	18	39	8.0	59	45	9
26060	Kitchener	West Ave./Homewood	8654	1	3	5	9	19	41	8.1	64	41	11
27067	St. Catharines	Argyle Cres., Pump Stn.	8762	0	2	5	9	17	36	7.3	54	42	6
28028	Guelph	Exhibition St./Clark St.	8623	1	3	5	9	18	40	7.8	58	40	9
29000	Hamilton Downtown	Elgin/Kelly	8729	1	3	6	10	21	43	8.9	108	44	11
29114	Hamilton Mountain	Vickers Rd./E. 18th St.	8643	1	4	6	11	22	43	9.3	68	45	10
29118	Hamilton West	Main St. W./ Hwy 403	8707	1	3	6	10	19	40	8.4	82	42	8
31103	Toronto Downtown	Bay/Wellesley St.	8752	0	2	4	8	17	38	7.1	56	37	8
33003	Toronto East	Kennedy/Lawrence	8702	1	3	5	8	18	39	7.4	55	37	8
34020	Toronto North	Hendon/Yonge St.	8695	0	2	5	9	19	43	7.7	69	43	12
35003	Etobicoke West	Elmcrest Rd., Centennial Park	8619	1	3	5	9	18	40	8.0	66	43	10
35033	Etobicoke South	185 Judson St.	7294	2	4	7	11	22	46	9.9	62	45	11
35125	Toronto West	125 Resources Rd.	8329	2	5	7	11	21	43	9.8	63	41	12
44008	Burlington	Hwy 2/North Shore Blvd. E.	8727	1	3	5	9	18	41	7.9	59	45	8
44017	Oakville	8th Line/Glenashton Dr., Halton Reserv.	8758	1	3	5	9	18	42	8.1	69	41	10
45025	Oshawa	Ritson Rd. Public School	8589	1	3	5	9	18	41	7.9	63	43	7
46089	Brampton	525 Main St. N., Peel Manor	8717	1	3	5	9	18	41	7.7	65	39	10
46109	Mississauga	Frank Mckechnie Comm. Ctr	8517	1	3	5	9	18	42	8.0	67	40	10

Table 3: 2004 Fine Particulate Matter ($PM_{2.5}$) Statistics

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

				PERCENTILES							Maximum		No. of Times Above Reference Level
ID	City	Location	Valid h	10%	30%	50%	70%	90%	99%	Mean	1h	24h	24h
47045	Barrie	83 Perry St.	8753	1	2	4	7	17	40	6.9	55	41	8
48006	Newmarket	Eagle St./Mccaffrey Rd.	8767	0	2	4	7	16	40	6.4	59	39	11
49005	Parry Sound	7 Bay St.	8773	0	1	3	5	14	32	5.3	45	32	4
49010	Dorset	Hwy 117 / Paint Lake Rd.	8492	0	1	2	4	12	35	4.7	53	38	2
51001	Ottawa	Rideau/Wurtemburg St.	8110	1	2	4	8	15	33	6.5	54	42	3
52020	Kingston	133 Dalton St.	8712	1	3	5	9	18	37	7.6	58	42	4
54012	Belleville	2 Sidney St., Water Treatment Plant	8739	1	2	4	7	15	37	6.4	54	37	4
56051	Cornwall	Bedford/Third St.	8727	0	2	5	8	16	34	6.8	60	37	1
59006	Peterborough	10 Hospital Dr.	8695	0	2	3	6	15	40	5.9	55	39	4
63203	Thunder Bay	421 James St. N.	8097	0	1	3	5	10	24	4.2	56	22	0
71078	Sault Ste Marie	Sault College	8719	0	1	2	5	12	29	4.5	131	34	1
75010	North Bay	Chippawa St., Dept. National Defence	8653	0	1	2	5	12	29	4.5	40	33	1
77219	Sudbury	Ramsey Lake Rd.	4455	0	1	2	4	13	26	INS	44	25	0

Notes:

The annual mean for sites that do not meet the requirement of 75% valid data per quarter are INS (insufficient data to calculate a valid annual mean).

Measurements taken by Tapered Element Oscillating Microbalance (TEOM) sampler operated at 30 degrees Celsius with a Sample Equilibration System (SES).

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

Table 4: 2004 Nitric Oxide (NO) Statistics

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.	8563	0	2	4	8	25	116	10.5	403	122
12016	Windsor West	College/South St.	8766	0	1	3	7	25	160	11.3	439	112
12059	Essex	360 Fairview Dr. W.	8607	1	1	1	2	6	30	3.0	148	30
14064	Sarnia	Front St./Cn Tracks, Centennial Park	8366	0	1	1	2	8	48	3.7	197	34
15025	London	900 Highbury Ave.	8597	1	2	3	4	12	66	6.0	224	60
21005	Brantford	324 Grand River Ave.	8001	0	1	1	2	6	35	INS	99	22
26060	Kitchener	West Ave./Homewood	8473	1	1	2	3	9	61	4.9	249	50
29000	Hamilton Downtown	Elgin/Kelly	8637	1	2	3	7	22	100	9.6	320	124
31103	Toronto Downtown	Bay/Wellesley St.	8694	1	1	3	6	19	72	7.6	214	67
31190	Toronto	Cn Tower, 301 Front St. W.	8535	0	0	1	1	4	23	2.0	136	15
33003	Toronto East	Kennedy/Lawrence	8611	2	3	7	14	37	137	16.0	354	95
34020	Toronto North	Hendon/Yonge St.	8076	0	1	3	9	30	98	INS	271	90
35003	Etobicoke West	Elmcrest Rd., Centennial Park	8684	0	0	2	6	28	129	10.9	328	114
35033	Etobicoke South	185 Judson St.	8745	2	6	11	23	66	166	24.5	407	138
35125	Toronto West	125 Resources Rd.	8754	1	5	13	27	66	206	26.6	467	158
44008	Burlington	Hwy 2/North Shore Blvd. E.	8514	0	2	3	8	27	122	11.1	323	87
44017	Oakville	8th Line/Glenashton Dr., Halton Reserv.	8753	1	1	2	3	11	62	5.3	265	62
45025	Oshawa	Ritson Rd. Public School	8584	0	1	2	6	20	97	8.2	224	89
46089	Brampton	525 Main St. N., Peel Manor	8713	0	1	2	5	21	105	8.7	366	99
47045	Barrie	83 Perry St.	8684	0	1	2	4	14	110	7.3	402	64
48006	Newmarket	Eagle St./Mccaffrey Rd.	8739	0	0	0	1	7	50	3.1	206	42
51001	Ottawa	Rideau/Wurtemburg St.	8136	0	0	0	1	7	46	3.2	175	34
54012	Belleville	2 Sidney St., Water Treatment Plant	8521	2	2	2	4	9	69	5.6	219	52
75010	North Bay	Chippawa St., Dept. National Defence	8683	0	1	2	6	26	82	8.8	192	100

Notes:

The annual mean for sites that do not meet the requirement of 75% valid data per quarter are INS (insufficient data to calculate a valid annual mean).

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

Table 5: 2004 Nitrogen Dioxide (NO_2) Statistics

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

				PERCENTILES							Maximum		No. of Times Above Criteria	
ID	City	Location	Valid h	10%	30%	50%	70%	90%	99%	Mean	1h	24h	1h	24h
12008	Windsor Downtown	467 University Ave.	8563	5	10	16	23	36	52	18.3	97	48	0	0
12016	Windsor West	College/South St.	8766	5	10	15	22	33	49	17.6	94	42	0	0
12059	Essex	360 Fairview Dr. W.	8607	1	3	5	9	16	28	7.0	39	25	0	0
14064	Sarnia	Front St./Cn Tracks, Centennial Park	8366	4	6	10	14	23	36	11.7	50	33	0	0
15025	London	900 Highbury Ave.	8597	5	8	11	16	26	42	13.7	73	36	0	0
21005	Brantford	324 Grand River Ave.	8001	2	4	7	10	18	34	INS	47	29	0	0
26060	Kitchener	West Ave./Homewood	8473	4	7	10	15	26	50	13.1	71	47	0	0
29000	Hamilton Downtown	Elgin/Kelly	8637	5	10	15	21	31	49	16.8	80	48	0	0
31103	Toronto Downtown	Bay/Wellesley St.	8694	8	13	18	24	36	53	20.1	79	51	0	0
31190	Toronto	Cn Tower, 301 Front St. W.	8535	2	4	6	10	17	33	8.3	58	25	0	0
33003	Toronto East	Kennedy/Lawrence	8611	7	12	18	24	36	55	19.8	74	51	0	0
34020	Toronto North	Hendon/Yonge St.	8076	3	9	15	23	34	51	INS	80	49	0	0
35003	Etobicoke West	Elmcrest Rd., Centennial Park	8684	6	11	16	23	34	55	18.7	88	53	0	0
35033	Etobicoke South	185 Judson St.	8745	10	17	23	32	46	67	26.1	119	77	0	0
35125	Toronto West	125 Resources Rd.	8754	11	17	24	30	40	59	24.8	83	54	0	0
44008	Burlington	Hwy 2/North Shore Blvd. E.	8514	4	8	13	19	30	48	15.3	84	42	0	0
44017	Oakville	8th Line/Glenashton Dr., Halton Reserv.	8753	4	7	11	16	27	42	13.5	66	40	0	0
45025	Oshawa	Ritson Rd. Public School	8584	3	6	12	18	29	45	14.2	81	38	0	0
46089	Brampton	525 Main St. N., Peel Manor	8713	4	7	12	20	34	53	16.2	87	53	0	0
47045	Barrie	83 Perry St.	8684	4	7	10	15	28	48	13.3	79	40	0	0
48006	Newmarket	Eagle St./Mccaffrey Rd.	8739	2	4	7	12	23	40	9.9	53	35	0	0
51001	Ottawa	Rideau/Wurtemburg St.	8136	2	5	8	14	25	42	11.1	68	42	0	0
54012	Belleville	2 Sidney St., Water Treatment Plant	8521	3	4	7	10	20	40	9.4	60	31	0	0
75010	North Bay	Chippawa St., Dept. National Defence	8683	0	2	5	11	24	44	9.2	60	38	0	0

Notes:

The annual mean for sites that do not meet the requirement of 75% valid data per quarter are INS (insufficient data to calculate a valid annual mean).

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

Table 6: 2004 Nitrogen Oxides (NO_x) Statistics

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.	8563	7	13	20	32	58	162	29.3	477	170
12016	Windsor West	College/South St.	8766	7	13	20	29	56	198	29.1	493	145
12059	Essex	360 Fairview Dr. W.	8607	3	5	8	12	23	57	11.5	170	58
14064	Sarnia	Front St./Cn Tracks, Centennial Park	8366	5	8	11	17	30	80	15.7	247	67
15025	London	900 Highbury Ave.	8597	6	10	14	20	37	103	19.4	266	86
21005	Brantford	324 Grand River Ave.	8001	3	5	8	12	25	60	INS	120	48
26060	Kitchener	West Ave./Homewood	8473	6	9	12	19	35	101	18.2	315	88
29000	Hamilton Downtown	Elgin/Kelly	8637	8	14	20	29	54	136	27.7	370	156
31103	Toronto Downtown	Bay/Wellesley St.	8694	10	15	21	30	55	114	28.1	281	101
31190	Toronto	Cn Tower, 301 Front St. W.	8535	2	4	7	11	21	51	10.0	152	38
33003	Toronto East	Kennedy/Lawrence	8611	9	18	27	39	73	182	36.3	425	139
34020	Toronto North	Hendon/Yonge St.	8076	4	11	20	33	61	139	INS	341	138
35003	Etobicoke West	Elmcrest Rd., Centennial Park	8684	7	13	20	30	61	179	29.8	417	167
35033	Etobicoke South	185 Judson St.	8745	13	22	34	54	109	224	49.4	469	201
35125	Toronto West	125 Resources Rd.	8754	13	25	38	57	103	250	51.2	544	202
44008	Burlington	Hwy 2/North Shore Blvd. E.	8514	4	9	17	27	56	159	26.1	377	117
44017	Oakville	8th Line/Glenashton Dr., Halton Reserv.	8753	5	8	13	19	37	94	18.3	294	88
45025	Oshawa	Ritson Rd. Public School	8584	4	8	15	25	47	131	22.5	272	123
46089	Brampton	525 Main St. N., Peel Manor	8713	5	9	15	26	55	150	25.0	440	152
47045	Barrie	83 Perry St.	8684	5	8	12	19	43	148	20.8	450	101
48006	Newmarket	Eagle St./Mccaffrey Rd.	8739	2	4	7	13	30	85	13.0	260	66
51001	Ottawa	Rideau/Wurtemburg St.	8136	2	6	9	16	33	79	14.7	218	78
54012	Belleville	2 Sidney St., Water Treatment Plant	8521	4	6	9	13	28	97	14.4	266	79
75010	North Bay	Chippawa St., Dept. National Defence	8683	2	5	9	20	50	123	19.0	233	139

Notes:

The annual mean for sites that do not meet the requirement of 75% valid data per quarter are INS (insufficient data to calculate a valid annual mean).

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

Table 7: 2004 Carbon Monoxide (CO) Statistics

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

				PERCENTILES							Maximum		No. 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.	8573	0.26	0.37	0.45	0.54	0.72	1.28	0.48	2.33	1.75	0	0
12059	Essex	360 Fairview Dr. W.	7115	0.21	0.33	0.43	0.49	0.58	0.86	0.42	2.13	1.61	0	0
15025	London	900 Highbury Ave.	8560	0.25	0.36	0.44	0.52	0.67	0.98	0.45	2.3	1.45	0	0
21005	Brantford	324 Grand River Ave.	6780	0.15	0.25	0.34	0.43	0.53	0.72	INS	1.11	0.78	0	0
29000	Hamilton Downtown	Elgin/Kelly	8137	0.16	0.31	0.42	0.53	0.71	1.18	0.44	3.98	1.70	0	0
31103	Toronto Downtown	Bay/Wellesley St.	7000	0.18	0.25	0.32	0.39	0.53	0.85	INS	1.9	1.25	0	0
35125	Toronto West	125 Resources Rd.	8735	0.23	0.33	0.41	0.5	0.67	1.29	0.44	2.92	1.90	0	0
44008	Burlington	Hwy 2/North Shore Blvd. E.	7568	0.18	0.28	0.37	0.45	0.58	0.89	INS	1.85	1.16	0	0
44017	Oakville	8th Line/Glenashton Dr., Halton Reserv.	8756	0.31	0.38	0.45	0.52	0.63	0.91	0.46	1.61	1.06	0	0
46089	Brampton	525 Main St. N., Peel Manor	8140	0.17	0.32	0.46	0.6	0.91	1.52	0.51	3.43	2.13	0	0
46109	Mississauga	Frank Mckechnie Comm. Ctr	2045	0.14	0.26	0.37	0.47	0.66	1.13	INS	1.87	1.19	0	0
47045	Barrie	83 Perry St.	6103	0.09	0.17	0.24	0.36	0.6	1.15	INS	2.6	1.32	0	0
48006	Newmarket	Eagle St./Mccaffrey Rd.	8765	0.16	0.31	0.41	0.49	0.63	1.01	0.41	3.61	1.59	0	0
51001	Ottawa	Rideau/Wurtemburg St.	8338	0.25	0.36	0.44	0.54	0.74	1.17	0.48	2.15	1.52	0	0
54012	Belleville	2 Sidney St., Water Treatment Plant	8037	0.16	0.26	0.35	0.41	0.5	0.69	INS	1.52	0.86	0	0
71078	Sault Ste Marie	Sault College	8715	0.32	0.43	0.5	0.56	0.69	1.05	0.51	2.46	1.47	0	0

Notes:

The annual mean for sites that do not meet the requirement of 75% valid data per quarter are INS (insufficient data to calculate a valid annual mean).

Table 8: 2004 Sulphur Dioxide (SO_2) Statistics

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		No. 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.	8750	0	1	2	4	13	38	4.8	86	20	0	0	0
12016	Windsor West	College/South St.	8766	0	1	2	4	12	32	4.6	72	20	0	0	0
12059	Essex	360 Fairview Dr. W.	8621	0	0	1	2	5	16	2.0	48	13	0	0	0
14064	Sarnia	Front St./Cn Tracks, Centennial Park	8672	0	0	1	4	21	104	8.2	216	75	0	0	0
15025	London	900 Highbury Ave.	7741	1	1	1	2	4	12	INS	33	15	0	0	0
21005	Brantford	324 Grand River Ave.	8699	0	0	1	2	5	13	1.9	41	10	0	0	0
29000	Hamilton Downtown	Elgin/Kelly	8734	0	1	2	3	11	36	4.0	98	24	0	0	0
31103	Toronto Downtown	Bay/Wellesley St.	8696	0	1	1	2	6	16	2.2	55	17	0	0	0
35125	Toronto West	125 Resources Rd.	8586	1	1	1	2	6	19	2.7	82	14	0	0	0
44008	Burlington	Hwy 2/North Shore Blvd. E.	8731	0	1	1	2	6	16	2.4	42	14	0	0	0
44017	Oakville	8th Line/Glenashton Dr., Halton Reserv.	8758	0	1	1	3	7	19	2.8	53	14	0	0	0
46089	Brampton	525 Main St. N., Peel Manor	8689	0	0	1	2	4	12	1.7	40	14	0	0	0
46109	Mississauga	Frank Mckechnie Comm. Ctr	4975	0	0	1	1	4	15	INS	95	16	0	0	0
47045	Barrie	83 Perry St.	8759	0	0	1	1	3	8	1.1	17	8	0	0	0
51001	Ottawa	Rideau/Wurtemburg St.	8520	0	0	0	1	3	11	1.0	42	13	0	0	0
54012	Belleville	2 Sidney St., Water Treatment Plant	8741	0	0	0	1	2	8	0.8	18	7	0	0	0
71078	Sault Ste Marie	Sault College	8755	0	0	0	0	2	16	0.9	65	12	0	0	0
77219	Sudbury	Ramsey Lake Rd.	4478	0	0	1	1	4	52	INS	224	21	0	0	0

Notes:

The annual mean for sites that do not meet the requirement of 75% valid data per quarter are INS (insufficient data to calculate a valid annual mean).

Table 9: 2004 Total Reduced Sulphur (TRS) Compounds Statistics

Unit: parts per billion (ppb)
TRS 1-hour AAQC is 27 ppb

				PERCENTILES							Maximum		No. of Times Above Criteria
ID	City	Location	Valid h	10%	30%	50%	70%	90%	99%	Mean	1h	24h	1h
12016	Windsor West	College/South St.	8583	0	0	0	0	1	3	0.4	16	2	0
14064	Sarnia	Front St./Cn Tracks, Centennial Park	8445	0	0	0	0	0	1	0.1	11	1	0
29000	Hamilton Downtown	Elgin/Kelly	8737	0	0	0	0	1	4	0.3	15	3	0
71078	Sault Ste Marie	Sault College	4946	0	0	1	1	1	2	INS	7	2	0

Notes:

The annual mean for sites that do not meet the requirement of 75% valid data per quarter are INS (insufficient data to calculate a valid annual mean).

Table 10: 10-Year Trend for O_3

Annual Mean (ppb)

ID	City	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
12008	Windsor Downtown	18.3	20.3	20.7	21.4	21.7	18.6	20.5	21.9	22.9	20.2
12016	Windsor West	19.3	20.8	17.9	18.7	18.9	17.0	19.0	20.2	22.8	22.6
13021	Merlin	28.0	28.5	27.0	28.4	27.2	24.6	27.4	26.0	29.0	28.4
14064	Sarnia	22.2	25.2	24.5	26.1	26.5	24.3	25.6	26.5	24.7	23.8
15020	Grand Bend	31.3	31.9	31.2	31.2	32.5	32.6	31.6	29.8	30.7	25.8
15025	London	INS	23.1	22.8	25.1	25.8	21.1	24.2	25.3	26.9	23.6
18007	Tiverton	31.6	32.0	32.5	32.2	INS	32.3	34.7	34.7	33.2	28.1
22071	Simcoe	30.7	29.9	28.6	31.1	31.3	n/a	31.0	33.5	33.9	30.5
26060	Kitchener	25.1	23.8	23.4	25.4	25.2	23.0	25.7	27.3	28.1	24.8
27067	St. Catharines	20.5	20.3	20.9	20.8	21.7	18.9	21.2	24.1	25.3	23.6
29000	Hamilton Downtown	18.0	17.3	18.1	19.1	19.5	17.0	18.8	20.4	21.7	20.1
29114	Hamilton Mountain	20.4	20.8	22.2	24.1	24.1	22.6	24.2	27.7	28.4	24.6
29118	Hamilton West	18.1	17.3	18.6	19.3	20.0	16.9	18.6	20.5	22.0	19.2
31103	Toronto Downtown	18.1	12.2	INS	17.8	20.2	19.7	22.0	24.0	23.6	22.8
31190	Toronto	32.1	n/a	37.3	INS	40.3	34.2	37.2	37.4	36.9	36.0
33003	Toronto East	19.3	18.9	18.0	20.6	21.5	19.6	21.7	21.0	21.8	19.9
34020	Toronto North	18.6	16.4	21.6	22.0	22.8	20.6	23.4	25.1	23.6	22.5
35033	Etobicoke South	16.5	17.0	17.2	18.4	21.5	17.4	19.9	20.2	19.2	18.9
44008	Burlington	21.8	22.4	21.7	22.5	26.2	23.4	24.6	26.3	22.8	21.0
44017	Oakville	20.4	21.1	20.8	21.8	22.4	21.0	22.9	25.1	INS	24.6
45025	Oshawa	22.7	21.9	23.2	23.1	25.0	21.2	23.4	23.2	24.1	23.3
46109	Mississauga	INS	19.3	20.0	20.8	22.2	19.9	22.4	23.1	24.8	20.7
48002	Stouffville	24.4	26.4	30.1	31.4	31.2	27.5	30.5	30.6	29.4	27.3
49010	Dorset	30.9	28.6	30.9	30.6	31.0	29.3	31.0	32.4	30.1	28.8
51001	Ottawa	20.9	18.9	20.5	19.1	21.2	19.9	25.0	24.9	24.7	21.7
52020	Kingston	21.0	21.0	20.1	21.5	21.5	19.1	20.7	23.0	24.0	22.5
56051	Cornwall	23.5	20.9	22.8	24.2	25.8	24.0	29.0	24.8	25.9	23.8
59006	Peterborough	INS	26.0	INS	INS	31.4	28.1	30.7	30.5	29.7	27.1
63203	Thunder Bay	20.8	21.0	23.9	21.5	22.5	22.6	24.4	23.4	26.1	22.0
71078	Sault Ste. Marie	23.9	22.8	24.9	22.3	24.1	24.8	25.2	24.2	26.8	27.0
75010	North Bay	27.1	25.4	26.6	27.4	29.1	22.1	26.6	26.8	27.0	25.2
77219	Sudbury	29.7	28.1	28.0	29.1	30.7	26.1	29.1	29.2	28.5	27.7

Notes:

n/a indicates pollutant not monitored.

The annual mean for sites that do not meet the requirement of 75% valid data per quarter are INS (insufficient data to calculate a valid annual mean).

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

Station 31103 was relocated in 1996 and represented by station 31303.

Station 35033 was relocated in 2001.

Station 44017 replaced station 44015 as the Oakville site in 2003.

Station 46109 replaced station 46110 as the Mississauga site in 2004.

Station 63203 replaced station 63200 as the Thunder Bay site in 2004.

Station 71078 replaced station 71068 as the Sault Ste. Marie site in 2004.

Station 77219 replaced station 77203 as the Sudbury site in 2004.

Table 11: 10-Year Trend for NO

Annual mean (ppb)

ID	City	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
12008	Windsor Downtown	15.1	15.7	15.9	16.3	13.3	13.9	11.0	10.9	INS	10.5
14064	Sarnia	5.6	6.6	7.0	6.9	7.1	8.9	6.7	7.1	5.0	3.7
26060	Kitchener	7.4	7.4	5.5	6.9	6.6	7.4	5.7	3.8	INS	4.9
29000	Hamilton Downtown	15.7	15.4	10.8	12.6	12.0	14.7	11.5	10.4	11.7	9.6
29118	Hamilton West	25.2	25.1	22.1	28.3	23.4	22.6	18.5	16.0	17.2	n/a
31103	Toronto Downtown	20.1	41.9	INS	24.3	15.8	14.4	10.0	8.2	8.7	7.6
33003	Toronto East	24.5	23.2	24.9	23.2	20.7	23.0	17.9	16.1	17.0	16.0
34020	Toronto North	18.5	17.4	16.3	16.5	16.5	16.8	14.3	12.4	12.4	INS
35033	Etobicoke South	36.3	39.4	33.8	29.8	27.1	34.6	25.0	23.3	26.7	24.5
44008	Burlington	20.7	11.7	12.2	14.1	22.6	21.8	13.2	11.8	15.5	11.1
45025	Oshawa	18.0	15.2	16.4	15.6	15.1	14.2	13.7	10.0	9.3	8.2

Notes:

n/a indicates pollutant not monitored.

The annual mean for sites that do not meet the requirement of 75% valid data per quarter are INS (insufficient data to calculate a valid annual mean)

Station 31103 was relocated in 1996 and represented by station 31303.

Station 35033 was relocated in 2001.

Table 12: 10-Year Trend for NO_2

Annual Mean (ppb)

ID	City	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
12008	Windsor Downtown	24.6	25.5	23.8	23.8	22.9	21.6	19.4	19.1	INS	18.3
14064	Sarnia	16.8	16.4	16.9	18.0	16.7	16.3	16.8	17.5	13.0	11.7
26060	Kitchener	11.1	12.9	13.7	16.5	14.0	14.7	14.1	11.9	INS	13.1
29000	Hamilton Downtown	18.5	21.6	18.6	22.4	21.6	21.8	22.5	20.9	21.3	16.8
29118	Hamilton West	19.3	19.7	19.5	23.4	21.8	21.0	19.5	19.0	18.0	n/a
31103	Toronto Downtown	30.0	33.9	INS	27.7	26.9	26.8	27.1	23.3	23.1	20.1
33003	Toronto East	24.6	22.9	23.4	25.5	24.6	23.7	22.9	22.0	21.3	19.8
34020	Toronto North	17.6	21.9	20.2	23.4	24.3	22.7	22.0	21.0	20.3	17.3
35033	Etobicoke South	29.6	31.6	29.2	29.7	28.4	28.2	26.1	26.1	26.6	26.1
44008	Burlington	20.2	10.6	13.2	16.6	22.9	20.3	16.5	17.9	17.3	15.3
45025	Oshawa	20.3	19.3	18.6	20.0	21.5	19.7	19.0	17.2	16.2	14.2

Notes:

n/a indicates pollutant not monitored.

The annual mean for sites that do not meet the requirement of 75% valid data per quarter are INS (insufficient data to calculate a valid annual mean)

Station 31103 was relocated in 1996 and represented by station 31303.

Station 35033 was relocated in 2001.

Table 13: 10-Year Trend for NO_x

Annual Mean (ppb)

ID	City	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
12008	Windsor Downtown	38.3	39.1	39.3	38.5	37.0	36.0	30.5	29.2	INS	29.3
14064	Sarnia	INS	23.5	24.9	25.1	23.5	25.0	23.6	24.6	18.1	15.7
26060	Kitchener	24.9	28.5	19.2	23.9	20.5	21.9	19.5	15.5	INS	18.2
29000	Hamilton Downtown	22.8	25.5	29.5	34.7	34.0	37.0	34.4	31.4	33.3	27.7
29118	Hamilton West	50.8	44.0	42.1	52.1	45.1	43.5	38.4	35.3	35.3	n/a
31103	Toronto Downtown	50.8	45.4	INS	51.6	41.9	40.4	36.6	31.5	32.1	28.1
33003	Toronto East	36.4	38.9	47.5	48.3	44.9	46.3	40.3	37.7	37.9	36.3
34020	Toronto North	45.5	47.2	36.7	39.9	40.7	39.3	36.2	33.4	33.0	28.3
35033	Etobicoke South	64.8	47.4	62.1	59.9	56.6	63.1	51.0	49.3	53.1	49.4
44008	Burlington	31.6	33.2	25.6	30.7	45.4	42.2	29.0	28.4	32.5	26.1
45025	Oshawa	36.1	34.5	34.9	35.1	35.8	33.6	32.6	27.2	25.5	22.5

Notes:

n/a indicates pollutant not monitored.

The annual mean for sites that do not meet the requirement of 75% valid data per quarter are INS (insufficient data to calculate a valid annual mean)

Station 31103 was relocated in 1996 and represented by station 31303.

Station 35033 was relocated in 2001.

Table 14: 10-Year Trend for CO

Annual Mean (ppm)

ID	City	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
12008	Windsor Downtown	0.9	0.8	0.6	0.7	0.6	0.3	0.3	0.5	INS	0.5
26060	Kitchener	0.3	0.4	0.2	0.3	0.4	0.4	0.4	0.3	0.6	n/a
29000	Hamilton Downtown	0.6	1.0	0.7	1.1	0.8	0.8	0.7	INS	INS	0.4
29118	Hamilton West	0.6	0.8	0.6	0.6	0.6	0.5	0.4	0.5	0.6	n/a
35033	Etobicoke South	0.9	1.1	1.1	0.9	1.3	1.7	0.9	0.9	0.6	n/a
44008	Burlington	0.7	0.5	0.4	0.3	0.7	1.4	0.5	0.8	0.4	0.4
44017	Oakville	0.5	0.7	0.3	0.2	0.2	0.4	0.4	0.6	INS	0.5
51001	Ottawa	0.6	0.7	0.4	1.1	0.8	0.7	0.6	0.7	0.6	0.5
63203	Thunder Bay	0.1	0.2	0.3	0.1	0.5	0.8	0.7	0.5	0.5	INS

Notes:

n/a indicates pollutant not monitored.

The annual mean for sites that do not meet the requirement of 75% valid data per quarter are INS (insufficient data to calculate a valid annual mean)

Station 35033 was relocated in 2001.

Station 44017 replaced station 44015 as the Oakville site in 2003.

Station 63203 replaced station 63200 as the Thunder Bay site in 2004.

Table 15: 10-Year Trend for SO_2

Annual Mean (ppb)
SO_2 1-year AAQC is 20 ppb

ID	City	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
12008	Windsor Downtown	4.6	9.8	6.7	7.4	6.7	6.2	6.1	5.7	5.9	4.8
12016	Windsor West	6.4	9.1	12.5	12.0	9.6	8.8	9.3	7.9	6.3	4.6
14064	Sarnia	6.1	7.4	8.7	10.3	11.8	10.4	12.5	10.4	7.1	8.2
15025	London	INS	2.7	2.5	3.2	4.9	3.5	3.5	2.2	INS	2.2
22071	Simcoe	1.5	2.8	3.2	3.8	3.7	4.3	5.0	3.4	n/a	n/a
26060	Kitchener	2.2	3.3	3.1	3.0	3.4	3.2	3.4	2.8	3.0	n/a
29000	Hamilton Downtown	8.1	6.6	5.8	6.3	6.6	5.1	6.0	4.9	5.0	4.0
29114	Hamilton Mountain	4.8	5.7	5.2	6.6	5.5	5.8	5.3	4.8	5.3	n/a
29118	Hamilton West	3.2	5.1	4.9	3.8	4.5	4.0	4.0	2.6	4.0	n/a
44008	Burlington	2.4	4.3	5.1	3.2	4.9	5.2	4.9	5.9	2.5	2.4
44017	Oakville	2.1	5.1	4.8	5.1	4.0	4.8	3.7	4.3	INS	2.8
51001	Ottawa	1.0	4.8	6.3	3.4	4.2	4.1	2.3	2.9	INS	1.0
63203	Thunder Bay	0.3	0.3	0.4	0.4	0.4	0.3	0.7	0.5	0.6	INS
71078	Sault Ste. Marie	1.7	2.2	2.1	1.9	1.9	2.0	2.0	1.7	2.0	0.9
77219	Sudbury	3.6	4.6	3.5	5.2	3.0	4.2	2.6	3.1	2.0	INS

Notes:

n/a indicates pollutant not monitored.

The annual mean for sites that do not meet the requirement of 75% valid data per quarter are INS (insufficient data to calculate a valid annual mean)

Station 44017 replaced station 44015 as the Oakville site in 2003.

Station 63203 replaced station 63200 as the Thunder Bay site in 2004.

Station 71078 replaced station 71068 as the Sault Ste. Marie site in 2004.

Station 77219 replaced station 77203 as the Sudbury site in 2004.

Table 16: 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	Vinylchloride
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 17: 2004 VOC Annual Statistics at Egbert

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

Compounds	No. of Samples	No. < DL	PERCENTILES					Max	Min	Mean	Std. Dev.
			5%	25%	50%	75%	90%				
1,1,1-Trichloroethane	119	0	0.904	1.265	1.928	2.464	3.394	6.221	0.501	2.039	1.049
1,1,2-Trichloroethane	119	119	0.118	0.168	0.288	0.505	0.774	2.010	0.100	0.385	0.313
1,2,3-Trimethylbenzene	119	116	0.097	0.223	0.366	0.523	0.693	1.373	0.082	0.398	0.236
1,2,4-Trimethylbenzene	119	97	0.050	0.054	0.070	0.109	0.164	0.513	0.050	0.094	0.066
1,2-Dichloroethane	119	119	0.199	0.524	1.126	1.713	2.405	4.691	0.149	1.254	0.888
1,3,5-Trimethylbenzene	119	116	0.050	0.050	0.050	0.050	0.050	0.062	0.050	0.050	0.001
1,3-Butadiene	119	118	0.050	0.103	0.256	0.463	0.720	1.783	0.050	0.325	0.294
1,3-Diethylbenzene	119	119	0.050	0.050	0.063	0.083	0.112	0.271	0.050	0.074	0.033
1,4-Dichlorobenzene	119	118	0.050	0.050	0.050	0.050	0.050	0.065	0.050	0.050	0.001
1,4-Diethylbenzene	119	116	0.094	0.265	0.677	1.177	1.859	5.148	0.054	0.854	0.783
1-Butene/Isobutene	119	30	0.050	0.050	0.050	0.050	0.050	0.080	0.050	0.050	0.003
1-Butyne	119	119									
1-Hexene	119	118									
1-Pentene	119	118	0.050	0.050	0.050	0.050	0.050	0.062	0.050	0.050	0.001
1-Propyne	119	117	0.050	0.050	0.050	0.050	0.050	0.071	0.050	0.050	0.002
2,2,4-Trimethylpentane	119	66	0.071	0.140	0.322	0.634	0.834	2.064	0.050	0.426	0.380
2,2,5-Trimethylhexane	119	119	0.050	0.050	0.050	0.050	0.050	0.055	0.050	0.050	0.000
2,2-Dimethylbutane	119	114	0.050	0.093	0.162	0.332	0.516	1.190	0.050	0.243	0.212
2,2-Dimethylhexane	119	119	0.050	0.050	0.050	0.113	0.329	0.676	0.050	0.115	0.131
2,2-Dimethylpentane	119	119	0.050	0.050	0.050	0.050	0.050	0.109	0.050	0.051	0.006
2,2-Dimethylpropane	119	119	0.050	0.050	0.050	0.050	0.050	0.056	0.050	0.050	0.001
2,3,4-Trimethylpentane	119	116	0.050	0.050	0.050	0.050	0.050	0.127	0.050	0.051	0.007
2,3-Dimethylbutane	119	109	0.050	0.050	0.050	0.050	0.050	0.086	0.050	0.051	0.005
2,3-Dimethylpentane	119	99									
2,4-Dimethylhexane	119	116	0.050	0.050	0.050	0.050	0.052	0.152	0.050	0.054	0.016
2,4-Dimethylpentane	119	116	0.050	0.050	0.050	0.050	0.050	0.145	0.050	0.053	0.014
2,5-Dimethylhexane	119	117	0.050	0.050	0.067	0.144	0.227	0.738	0.050	0.116	0.116
2-Ethyltoluene	119	116	0.050	0.050	0.052	0.130	0.176	0.486	0.050	0.098	0.082
2-methyl-1-butene	119	117	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.000
2-Methyl-2-butene	119	117	0.050	0.050	0.074	0.173	0.265	9.671	0.050	0.223	0.899
2-Methylheptane	119	112									
2-Methylhexane	119	70									

Table 17: 2004 VOC Annual Statistics at Egbert

Unit: micrograms per cubic metre ($\mu g/m^3$)

	No. of		PERCENTILES								
Compounds	**Samples**	**No. < DL**	**5%**	**25%**	**50%**	**75%**	**90%**	**Max**	**Min**	**Mean**	**Std. Dev.**
2-Methylpentane	119	50									
3-Ethyltoluene	119	102									
3-Methyl-1-pentene	119	119	0.050	0.050	0.050	0.061	0.096	0.876	0.050	0.074	0.089
3-Methylheptane	119	115	0.050	0.050	0.050	0.050	0.050	0.077	0.050	0.051	0.004
3-Methylhexane	119	67	0.095	0.184	0.292	0.411	0.575	1.305	0.061	0.327	0.206
3-Methylpentane	119	57	0.050	0.050	0.050	0.050	0.058	0.125	0.050	0.053	0.011
4-Ethyltoluene	119	113	0.050	0.050	0.050	0.080	0.115	0.294	0.050	0.072	0.044
4-Methyl-1-pentene	119	119	0.050	0.050	0.050	0.050	0.063	0.128	0.050	0.054	0.014
4-Methylheptane	119	119	0.050	0.050	0.050	0.087	0.144	0.344	0.050	0.078	0.053
Acetaldehyde	57	0	0.050	0.050	0.050	0.050	0.050	0.054	0.050	0.050	0.000
Acetone	57	0	0.050	0.050	0.050	0.086	0.142	0.424	0.050	0.077	0.056
Acetylene	119	0	0.050	0.050	0.050	0.066	0.119	0.279	0.050	0.068	0.043
a-Pinene	119	77	0.050	0.050	0.050	0.050	0.053	0.160	0.050	0.053	0.013
Benzene	119	0	0.050	0.050	0.050	0.050	0.050	0.051	0.050	0.050	0.000
b-Pinene	119	94	0.050	0.050	0.050	0.050	0.050	0.059	0.050	0.050	0.001
Bromoform	119	119	0.050	0.050	0.050	0.050	0.050	0.105	0.050	0.051	0.007
Bromomethane	119	10	0.067	0.131	0.233	0.581	1.052	3.869	0.050	0.472	0.626
Butane	119	0	0.050	0.050	0.050	0.050	0.050	0.101	0.050	0.051	0.007
Camphene	119	113									
Carbontetrachloride	119	0	0.050	0.050	0.050	0.050	0.050	0.099	0.050	0.051	0.006
Chlorobenzene	119	119									
Chloroethane	119	118	0.050	0.050	0.050	0.050	0.050	0.139	0.050	0.052	0.012
Chloroform	119	1	0.050	0.050	0.050	0.132	0.230	0.631	0.050	0.108	0.107
Chloromethane	119	0	0.050	0.050	0.063	0.240	0.483	1.803	0.050	0.199	0.286
cis-1,2-Dimethylcyclohexane	119	119	0.050	0.050	0.050	0.050	0.050	2.367	0.050	0.077	0.219
cis-1,3-Dimethylcyclohexane	119	118	0.050	0.050	0.050	0.098	0.173	0.571	0.050	0.087	0.085
cis-1,4/t-1,3-Dimethylcyclohexane	119	119	0.050	0.050	0.050	0.050	0.050	0.135	0.050	0.052	0.011
cis-2-Butene	119	117	0.050	0.050	0.050	0.050	0.050	0.112	0.050	0.051	0.006
cis-2-Hexene	119	119	0.050	0.050	0.050	0.050	0.050	0.132	0.050	0.051	0.009
cis-2-Pentene	119	118	0.050	0.050	0.050	0.050	0.062	0.318	0.050	0.058	0.034
cis-3-Methyl-2-pentene	119	119	0.050	0.050	0.050	0.050	0.050	0.172	0.050	0.052	0.014
cis-4-Methyl-2-pentene	119	119	0.050	0.050	0.050	0.050	0.050	0.154	0.050	0.051	0.010

Table 17: 2004 VOC Annual Statistics at Egbert

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

	No. of		PERCENTILES								
Compounds	Samples	No. < DL	5%	25%	50%	75%	90%	Max	Min	Mean	Std. Dev.
Cyclohexane	119	103	0.050	0.050	0.050	0.050	0.050	0.125	0.050	0.051	0.009
Cyclopentane	119	106	0.050	0.050	0.050	0.050	0.076	0.611	0.050	0.065	0.062
Cyclopentene	119	119	0.050	0.050	0.050	0.050	0.050	0.212	0.050	0.055	0.023
Decane	119	108									
Dichloromethane	119	0									
d-Limonene	119	116									
Dodecane	118	107	0.050	0.050	0.050	0.050	0.050	0.129	0.050	0.051	0.008
Ethane	119	0	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.000
Ethylbenzene	119	61									
Ethylene	119	0	0.050	0.050	0.050	0.050	0.050	0.098	0.050	0.051	0.005
Formaldehyde	57	0									
Freon11	119	0	0.050	0.050	0.050	0.050	0.060	0.231	0.050	0.056	0.023
Freon113	119	0	0.050	0.050	0.050	0.050	0.050	0.139	0.050	0.053	0.012
Freon114	119	0									
Freon12	119	0									
Freon22	119	0									
Heptane	119	80									
Hexane	119	45									
Indane	119	118									
Isobutane	119	14									
iso-Butylbenzene	119	119									
Isopentane	119	2									
Isoprene	119	77	0.050	0.050	0.050	0.050	0.050	0.159	0.050	0.052	0.012
iso-Propylbenzene	119	118	0.498	0.525	0.562	0.612	0.716	1.593	0.478	0.589	0.123
m and p-Xylene	119	54	2.508	2.580	2.675	2.797	2.925	5.559	2.441	2.731	0.314
MEK	57	1	0.103	0.107	0.111	0.116	0.122	0.140	0.099	0.112	0.007
Methylcyclohexane	119	105									
Methylcyclopentane	119	81	1.516	1.580	1.656	1.746	1.855	2.064	1.477	1.674	0.124
Naphthalene	119	108	0.123	0.142	0.163	0.233	0.361	1.219	0.119	0.226	0.166
n-Butylbenzene	119	119	0.056	0.062	0.067	0.072	0.078	0.106	0.050	0.068	0.009
Nonane	119	107									
n-Propylbenzene	119	116	0.119	0.125	0.133	0.147	0.151	0.321	0.112	0.137	0.020

Table 17: 2004 VOC Annual Statistics at Egbert

Unit: micrograms per cubic metre ($\mu g/m^3$)

			PERCENTILES								
Compounds	**No. of Samples**	**No. < DL**	**5%**	**25%**	**50%**	**75%**	**90%**	**Max**	**Min**	**Mean**	**Std. Dev.**
Octane	119	111	0.560	0.579	0.612	0.643	0.691	0.899	0.545	0.625	0.067
o-Xylene	119	73	0.050	0.050	0.050	0.050	0.074	0.349	0.050	0.063	0.047
p-Cymene	119	119									
Pentane	119	10	0.050	0.050	0.050	0.085	0.124	0.451	0.050	0.075	0.053
Propane	119	0									
Propionaldehyde	57	1									
Propylene	119	20	0.050	0.050	0.050	0.050	0.050	0.113	0.050	0.051	0.006
sec-Butylbenzene	119	119	0.953	1.044	1.112	1.172	1.207	1.282	0.942	1.105	0.085
Styrene	119	113	0.050	0.053	0.057	0.062	0.067	0.089	0.050	0.058	0.007
Tetrachloroethylene	119	70	0.050	0.050	0.050	0.050	0.050	0.199	0.050	0.051	0.014
Toluene	119	2	0.644	1.116	1.958	3.024	4.088	5.608	0.427	2.109	1.264
trans-1,2-Dimethylcyclohexane	119	119	0.365	0.550	0.877	1.106	1.611	2.050	0.278	0.895	0.449
trans-1,4-Dimethylcyclohexane	119	119	4.584	8.503	10.702	14.593	23.104	38.302	2.499	12.747	7.301
trans-2-Butene	119	117	0.078	0.129	0.177	0.262	0.374	0.538	0.050	0.212	0.115
trans-2-Hexene	119	119	0.150	1.817	2.963	4.450	8.795	14.684	0.050	3.711	3.131
trans-2-Pentene	119	117	0.050	0.050	0.050	0.088	0.215	0.519	0.050	0.095	0.097
trans-3-Methyl-2-pentene	119	119	0.050	0.050	0.050	0.050	0.106	0.233	0.050	0.064	0.038
Trichloroethylene	119	100	0.050	0.050	0.050	0.050	0.050	0.076	0.050	0.050	0.002
Undecane	119	105	0.050	0.050	0.050	0.050	0.050	0.153	0.050	0.051	0.010
Vinylchloride	119	119	0.584	0.611	0.635	0.666	0.693	0.764	0.558	0.640	0.039

Table 18: 2004 VOC Annual Statistics at Hamilton

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

			PERCENTILES								
Compounds	**No. of Samples**	**No. < DL**	**5%**	**25%**	**50%**	**75%**	**90%**	**Max**	**Min**	**Mean**	**Std. Dev.**
1,1,1-Trichloroethane	52	0	0.102	0.123	0.142	0.150	0.158	0.450	0.097	0.142	0.047
1,1,2,2-Tetrachloroethane	52	52									
1,1,2-Trichloroethane	52	52									
1,1-Dichloroethane	52	52									
1,1-Dichloroethylene	52	52									
1,2,3-Trimethylbenzene	52	11	0.050	0.053	0.084	0.149	0.299	0.505	0.050	0.129	0.107
1,2,4-Trichlorobenzene	52	52									
1,2,4-Trimethylbenzene	52	0	0.155	0.224	0.361	0.595	1.156	1.980	0.114	0.515	0.423
1,2-Dichlorobenzene	52	52									
1,2-Dichloroethane	52	50	0.050	0.050	0.050	0.050	0.050	0.054	0.050	0.050	0.001
1,2-Dichloropropane	52	52									
1,2-Diethylbenzene	52	52									
1,3,5-Trimethylbenzene	52	5	0.050	0.064	0.101	0.172	0.309	0.551	0.050	0.145	0.119
1,3-Butadiene	52	8	0.050	0.056	0.075	0.119	0.158	0.320	0.050	0.095	0.057
1,3-Dichlorobenzene	52	52									
1,3-Diethylbenzene	52	43	0.050	0.050	0.050	0.050	0.067	0.114	0.050	0.055	0.013
1,4-Dichlorobenzene	52	6	0.050	0.062	0.088	0.138	0.190	0.484	0.050	0.111	0.077
1,4-Dichlorobutane	52	52									
1,4-Diethylbenzene	52	19	0.050	0.050	0.060	0.098	0.181	0.362	0.050	0.088	0.064
1-Butene/Isobutene	52	0	0.180	0.247	0.319	0.567	0.822	1.564	0.154	0.424	0.289
1-Butyne	52	52									
1-Decene	52	52									
1-Heptene	52	52									
1-Hexene	52	30	0.050	0.050	0.050	0.069	0.122	0.171	0.050	0.067	0.032
1-Methylcyclohexene	52	52									
1-Methylcyclopentene	52	47	0.050	0.050	0.050	0.050	0.050	0.103	0.050	0.053	0.010
1-Nonene	52	52									
1-Octene	52	52									
1-Pentene	52	18	0.050	0.050	0.059	0.088	0.159	0.242	0.050	0.083	0.049
1-Propyne	52	25	0.050	0.050	0.053	0.083	0.104	0.188	0.050	0.068	0.029
1-Undecene	52	52									
2,2,3-Trimethylbutane	52	52									

Table 18: 2004 VOC Annual Statistics at Hamilton

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

	No. of		PERCENTILES								
Compounds	Samples	No. < DL	5%	25%	50%	75%	90%	Max	Min	Mean	Std. Dev.
2,2,4-Trimethylpentane	52	0	0.158	0.233	0.333	0.557	0.773	1.285	0.115	0.409	0.265
2,2,5-Trimethylhexane	52	43	0.050	0.050	0.050	0.050	0.051	0.103	0.050	0.052	0.009
2,2-Dimethylbutane	52	6	0.050	0.060	0.088	0.163	0.247	0.469	0.050	0.123	0.087
2,2-Dimethylhexane	52	45	0.050	0.050	0.050	0.050	0.062	0.134	0.050	0.055	0.017
2,2-Dimethylpentane	52	38	0.050	0.050	0.050	0.060	0.105	0.155	0.050	0.062	0.025
2,2-Dimethylpropane	52	44	0.050	0.050	0.050	0.050	0.070	0.090	0.050	0.054	0.010
2,3,4-Trimethylpentane	52	1	0.057	0.073	0.109	0.188	0.253	0.468	0.050	0.138	0.094
2,3-Dimethylbutane	52	0	0.073	0.134	0.191	0.317	0.600	0.894	0.059	0.277	0.226
2,3-Dimethylpentane	52	0	0.082	0.113	0.182	0.301	0.410	0.576	0.076	0.211	0.127
2,4-Dimethylhexane	52	25	0.050	0.050	0.052	0.105	0.133	0.243	0.050	0.078	0.046
2,4-Dimethylpentane	52	6	0.050	0.061	0.087	0.151	0.239	0.370	0.050	0.119	0.081
2,5-Dimethylhexane	52	32	0.050	0.050	0.050	0.081	0.104	0.184	0.050	0.066	0.031
2-Ethyl-1-butene	52	51	0.050	0.050	0.050	0.050	0.050	0.062	0.050	0.050	0.002
2-Ethyltoluene	52	7	0.050	0.059	0.088	0.151	0.262	0.497	0.050	0.126	0.100
2-methyl-1-butene	52	11	0.050	0.054	0.080	0.161	0.287	0.410	0.050	0.125	0.099
2-Methyl-2-butene	52	3	0.050	0.077	0.104	0.251	0.458	0.765	0.050	0.186	0.178
2-Methylheptane	52	4	0.050	0.069	0.093	0.173	0.220	0.383	0.050	0.122	0.078
2-Methylhexane	52	0	0.145	0.197	0.312	0.556	0.808	1.077	0.128	0.402	0.262
2-Methylpentane	52	0	0.299	0.570	0.871	1.691	2.570	5.263	0.252	1.323	1.210
3,6-Dimethyloctane	52	52									
3-Ethyltoluene	52	0	0.096	0.139	0.202	0.373	0.624	1.119	0.069	0.296	0.238
3-Methyl-1-Butene	52	40	0.050	0.050	0.050	0.050	0.071	0.119	0.050	0.056	0.014
3-Methyl-1-pentene	52	51	0.050	0.050	0.050	0.050	0.050	0.051	0.050	0.050	0.000
3-Methylheptane	52	7	0.050	0.060	0.082	0.160	0.212	0.394	0.050	0.112	0.077
3-Methylhexane	52	0	0.156	0.220	0.363	0.669	0.983	1.244	0.137	0.460	0.305
3-Methylpentane	52	0	0.288	0.431	0.687	1.716	2.625	6.541	0.218	1.258	1.427
4-Ethyltoluene	52	4	0.050	0.069	0.103	0.180	0.319	0.557	0.050	0.149	0.120
4-Methyl-1-pentene	52	51	0.050	0.050	0.050	0.050	0.050	0.133	0.050	0.052	0.012
4-Methylheptane	52	36	0.050	0.050	0.050	0.063	0.090	0.153	0.050	0.061	0.023
Acetylene	52	0	0.356	0.512	0.741	1.213	1.417	2.841	0.149	0.895	0.542
a-Pinene	52	15	0.050	0.050	0.118	0.207	0.290	0.595	0.050	0.144	0.107
Benzene	52	0	0.409	0.710	0.983	2.472	3.380	4.562	0.373	1.476	1.125

Table 18: 2004 VOC Annual Statistics at Hamilton

Unit: micrograms per cubic metre ($\mu g/m^3$)

	No. of		PERCENTILES								
Compounds	**Samples**	**No. < DL**	**5%**	**25%**	**50%**	**75%**	**90%**	**Max**	**Min**	**Mean**	**Std. Dev.**
Benzylchloride	49	49									
b-Pinene	52	40	0.050	0.050	0.050	0.050	0.068	0.090	0.050	0.055	0.010
Bromodichloromethane	52	51	0.050	0.050	0.050	0.050	0.050	0.059	0.050	0.050	0.001
Bromoform	52	50	0.050	0.050	0.050	0.050	0.050	0.055	0.050	0.050	0.001
Bromomethane	52	9	0.050	0.052	0.061	0.065	0.071	0.105	0.050	0.060	0.010
Butane	52	0	0.842	2.038	3.328	5.320	10.644	30.596	0.688	5.170	6.064
Camphene	52	52									
Carbontetrachloride	52	0	0.532	0.583	0.623	0.637	0.691	0.739	0.522	0.616	0.053
Chlorobenzene	52	52									
Chloroethane	52	52									
Chloroform	52	0	0.059	0.072	0.088	0.110	0.119	0.181	0.057	0.090	0.025
Chloromethane	52	0	0.970	1.054	1.140	1.243	1.330	1.349	0.941	1.148	0.125
cis-1,2-Dichloroethylene	52	52									
cis-1,2-Dimethylcyclohexane	52	52									
cis-1,3-Dichloropropene	52	46	0.050	0.050	0.050	0.050	0.051	0.199	0.050	0.057	0.026
cis-1,3-Dimethylcyclohexane	52	35	0.050	0.050	0.050	0.063	0.087	0.138	0.050	0.061	0.023
cis-1,4/t-1,3-Dimethylcyclohexane	52	51	0.050	0.050	0.050	0.050	0.050	0.054	0.050	0.050	0.000
cis-2-Butene	52	12	0.050	0.052	0.090	0.164	0.306	0.719	0.050	0.134	0.127
cis-2-Heptene	52	52									
cis-2-Hexene	52	48	0.050	0.050	0.050	0.050	0.050	0.131	0.050	0.053	0.013
cis-2-Pentene	52	28	0.050	0.050	0.050	0.103	0.188	0.263	0.050	0.084	0.060
cis-3-Heptene	4	1	0.050	0.060	0.086	0.142	0.142	0.142	0.050	0.084	0.041
cis-3-Methyl-2-pentene	52	42	0.050	0.050	0.050	0.050	0.082	0.146	0.050	0.058	0.021
cis-4-Methyl-2-pentene	52	47	0.050	0.050	0.050	0.050	0.050	0.074	0.050	0.051	0.004
Cyclohexane	52	5	0.050	0.072	0.105	0.192	0.247	0.375	0.050	0.131	0.081
Cyclohexene	52	52									
Cyclopentane	52	1	0.060	0.096	0.142	0.223	0.438	0.705	0.050	0.194	0.149
Cyclopentene	52	46	0.050	0.050	0.050	0.050	0.053	0.086	0.050	0.053	0.008
Decane	52	0	0.063	0.100	0.170	0.280	0.483	1.029	0.058	0.237	0.217
Dibromochloromethane	52	52									
Dibromomethane	52	52									
Dichloromethane	52	0	0.209	0.248	0.316	0.510	0.876	3.213	0.179	0.484	0.463

Table 18: 2004 VOC Annual Statistics at Hamilton

Unit: micrograms per cubic metre ($\mu g/m^3$)

	No. of		PERCENTILES								
Compounds	Samples	No. < DL	5%	25%	50%	75%	90%	Max	Min	Mean	Std. Dev.
d-Limonene	52	16	0.050	0.050	0.073	0.110	0.257	0.378	0.050	0.112	0.093
Dodecane	51	2	0.050	0.083	0.128	0.237	0.333	0.612	0.050	0.173	0.129
EDB	52	52									
Ethane	52	0	1.370	2.278	2.962	4.390	6.219	7.415	1.330	3.445	1.640
Ethylbenzene	52	0	0.188	0.275	0.424	0.746	1.265	2.093	0.150	0.598	0.472
Ethylbromide	52	52									
Ethylene	52	0	0.718	1.120	1.635	2.394	3.216	5.268	0.470	1.869	1.055
Freon11	52	0	1.339	1.539	1.716	1.911	2.055	2.375	1.307	1.720	0.253
Freon113	52	0	0.422	0.544	0.602	0.645	0.698	0.782	0.413	0.589	0.093
Freon114	52	0	0.085	0.102	0.110	0.116	0.125	0.148	0.084	0.109	0.013
Freon12	52	0	2.079	2.412	2.688	2.890	3.101	3.289	2.037	2.654	0.335
Freon22	52	0	0.546	0.634	0.800	1.110	1.935	40.058	0.535	1.893	5.568
Heptane	52	0	0.095	0.179	0.241	0.500	0.780	1.005	0.085	0.344	0.246
Hexachlorobutadiene	52	52									
Hexane	52	0	0.285	0.639	1.261	3.411	5.894	10.348	0.220	2.330	2.509
Hexylbenzene	45	45									
Indane	52	26	0.050	0.050	0.050	0.095	0.175	0.316	0.050	0.086	0.066
Isobutane	52	0	0.411	0.820	1.281	2.126	3.968	10.374	0.364	1.982	2.127
iso-Butylbenzene	52	52									
Isopentane	52	0	0.973	1.472	2.239	4.289	8.471	11.713	0.851	3.373	2.714
Isoprene	52	16	0.050	0.050	0.098	0.199	0.234	0.348	0.050	0.121	0.080
iso-Propylbenzene	52	43	0.050	0.050	0.050	0.050	0.071	0.121	0.050	0.055	0.014
m and p-Xylene	52	0	0.497	0.778	1.137	2.140	3.989	6.082	0.395	1.704	1.398
Methylcyclohexane	52	5	0.050	0.066	0.102	0.190	0.276	0.405	0.050	0.137	0.098
Methylcyclopentane	52	0	0.147	0.263	0.423	1.043	1.674	4.345	0.095	0.757	0.801
MTBE	52	50	0.050	0.050	0.050	0.050	0.050	0.149	0.050	0.052	0.014
Naphthalene	51	0	0.072	0.108	0.223	0.571	1.287	2.269	0.069	0.467	0.527
n-Butylbenzene	52	43	0.050	0.050	0.050	0.050	0.068	0.111	0.050	0.054	0.012
Nonane	52	6	0.050	0.074	0.114	0.223	0.334	0.708	0.050	0.168	0.146
n-Propylbenzene	52	11	0.050	0.054	0.076	0.133	0.222	0.410	0.050	0.110	0.081
Octane	52	5	0.050	0.070	0.103	0.183	0.268	0.479	0.050	0.142	0.102
o-Xylene	52	0	0.176	0.254	0.374	0.584	1.278	1.902	0.145	0.536	0.432

Table 18: 2004 VOC Annual Statistics at Hamilton

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

	No. of		PERCENTILES								
Compounds	**Samples**	**No. < DL**	**5%**	**25%**	**50%**	**75%**	**90%**	**Max**	**Min**	**Mean**	**Std. Dev.**
p-Cymene	52	40	0.050	0.050	0.050	0.050	0.062	0.108	0.050	0.054	0.010
Pentane	52	0	0.557	0.858	1.163	2.249	4.031	5.808	0.356	1.780	1.343
Propane	52	0	0.937	1.594	2.271	3.525	5.351	6.137	0.923	2.703	1.498
Propylene	52	0	0.257	0.370	0.534	0.807	1.037	2.019	0.188	0.641	0.383
sec-Butylbenzene	52	51	0.050	0.050	0.050	0.050	0.050	0.054	0.050	0.050	0.000
Styrene	52	15	0.050	0.050	0.078	0.162	0.283	0.388	0.050	0.123	0.099
tert-Butylbenzene	52	52									
Tetrachloroethylene	52	0	0.064	0.098	0.167	0.302	0.685	1.919	0.052	0.282	0.330
Toluene	52	0	1.177	1.748	3.300	4.731	9.215	14.015	0.911	3.934	3.094
trans-1,2-Dichloroethylene	52	52									
trans-1,2-Dimethylcyclohexane	52	52									
trans-1,3-Dichloropropene	52	47	0.050	0.050	0.050	0.050	0.050	0.116	0.050	0.053	0.012
trans-1,4-Dimethylcyclohexane	52	48	0.050	0.050	0.050	0.050	0.050	0.053	0.050	0.050	0.000
trans-2-Butene	52	7	0.050	0.064	0.109	0.221	0.446	1.010	0.050	0.171	0.179
trans-2-Heptene	52	52									
trans-2-Hexene	52	45	0.050	0.050	0.050	0.050	0.070	0.098	0.050	0.054	0.010
trans-2-Octene	52	39	0.050	0.050	0.050	0.052	0.071	0.117	0.050	0.057	0.016
trans-2-Pentene	52	9	0.050	0.062	0.095	0.207	0.398	0.564	0.050	0.152	0.136
trans-3-Heptene	52	52									
trans-3-Methyl-2-pentene	52	51	0.050	0.050	0.050	0.050	0.050	0.057	0.050	0.050	0.001
trans-4-Methyl-2-pentene	52	52									
Trichloroethylene	52	22	0.050	0.050	0.056	0.087	0.158	0.394	0.050	0.082	0.059
Undecane	52	0	0.067	0.113	0.198	0.337	0.509	0.996	0.055	0.257	0.218
Vinylchloride	52	52									

Table 19: 2004 VOC Annual Statistics at Longwoods

Unit: micrograms per cubic metre ($\mu g/m^3$)

	No. of		PERCENTILES								
Compounds	**Samples**	**No. < DL**	**5%**	**25%**	**50%**	**75%**	**90%**	**Max**	**Min**	**Mean**	**Std. Dev.**
1,1,1-Trichloroethane	91	0	1.148	1.870	2.387	3.056	4.692	7.856	0.889	2.710	1.331
1,1,2-Trichloroethane	91	91	0.216	0.319	0.497	0.752	1.432	2.191	0.156	0.665	0.483
1,2,3-Trimethylbenzene	91	87	0.183	0.400	0.489	0.606	0.868	1.548	0.123	0.538	0.262
1,2,4-Trimethylbenzene	91	63	0.060	0.084	0.112	0.180	0.360	0.661	0.050	0.160	0.115
1,2-Dichloroethane	91	91	0.605	1.335	1.851	2.389	3.803	5.800	0.383	2.119	1.240
1,3,5-Trimethylbenzene	91	85									
1,3-Butadiene	91	86	0.142	0.311	0.426	0.635	1.053	1.460	0.090	0.527	0.325
1,3-Diethylbenzene	91	91	0.055	0.074	0.095	0.120	0.195	0.890	0.050	0.117	0.095
1,4-Dichlorobenzene	91	91	0.050	0.050	0.050	0.050	0.050	0.075	0.050	0.051	0.004
1,4-Diethylbenzene	91	90	0.396	0.771	1.151	1.655	2.506	4.110	0.204	1.353	0.838
1-Butene/Isobutene	91	1	0.050	0.050	0.050	0.050	0.050	0.054	0.050	0.050	0.000
1-Butyne	91	91									
1-Hexene	91	90									
1-Pentene	91	88									
1-Propyne	91	91									
2,2,4-Trimethylpentane	91	46	0.232	0.389	0.478	0.713	1.213	2.184	0.196	0.652	0.420
2,2,5-Trimethylhexane	91	91	0.050	0.050	0.050	0.050	0.050	0.098	0.050	0.051	0.007
2,2-Dimethylbutane	91	82	0.163	0.213	0.306	0.452	0.679	5.292	0.128	0.412	0.558
2,2-Dimethylhexane	91	91	0.050	0.050	0.050	0.050	0.304	1.959	0.050	0.150	0.321
2,2-Dimethylpentane	91	91									
2,2-Dimethylpropane	91	91									
2,3,4-Trimethylpentane	91	82									
2,3-Dimethylbutane	91	80	0.050	0.050	0.050	0.050	0.050	0.065	0.050	0.051	0.003
2,3-Dimethylpentane	91	73									
2,4-Dimethylhexane	91	91	0.050	0.050	0.050	0.050	0.060	0.085	0.050	0.052	0.007
2,4-Dimethylpentane	91	89	0.050	0.050	0.050	0.050	0.069	0.087	0.050	0.053	0.009
2,5-Dimethylhexane	91	91	0.050	0.075	0.102	0.165	0.323	0.451	0.050	0.135	0.100
2-Ethyltoluene	91	83	0.050	0.061	0.087	0.135	0.259	0.334	0.050	0.114	0.078
2-methyl-1-butene	91	91	0.050	0.050	0.050	0.050	0.050	0.092	0.050	0.050	0.004
2-Methyl-2-butene	91	91	0.051	0.072	0.109	0.169	0.321	0.452	0.050	0.143	0.102
2-Methylheptane	91	80									
2-Methylhexane	91	33									

Table 19: 2004 VOC Annual Statistics at Longwoods

Unit: micrograms per cubic metre ($\mu g/m^3$)

	No. of		PERCENTILES								
Compounds	**Samples**	**No. < DL**	**5%**	**25%**	**50%**	**75%**	**90%**	**Max**	**Min**	**Mean**	**Std. Dev.**
2-Methylpentane	91	11									
3-Ethyltoluene	91	70									
3-Methyl-1-pentene	91	91	0.050	0.050	0.050	0.069	0.142	0.170	0.050	0.067	0.034
3-Methylheptane	91	86	0.050	0.050	0.050	0.050	0.050	0.052	0.050	0.050	0.000
3-Methylhexane	91	28	0.173	0.303	0.395	0.554	0.867	1.070	0.095	0.449	0.224
3-Methylpentane	91	15	0.050	0.050	0.050	0.050	0.128	0.329	0.050	0.068	0.052
4-Ethyltoluene	91	83	0.050	0.050	0.063	0.095	0.141	0.268	0.050	0.083	0.051
4-Methyl-1-pentene	91	91	0.050	0.050	0.050	0.050	0.081	0.122	0.050	0.056	0.016
4-Methylheptane	91	91	0.050	0.050	0.065	0.104	0.167	0.304	0.050	0.091	0.060
Acetylene	91	0									
a-Pinene	91	47	0.050	0.050	0.050	0.085	0.153	0.199	0.050	0.077	0.044
Benzene	91	0	0.050	0.050	0.053	0.080	0.142	0.262	0.050	0.077	0.047
b-Pinene	91	81	0.050	0.050	0.050	0.050	0.068	0.117	0.050	0.054	0.013
Bromoform	91	91									
Bromomethane	91	9									
Butane	91	0	0.050	0.050	0.050	0.050	0.050	0.077	0.050	0.051	0.004
Camphene	91	60	0.180	0.254	0.403	0.764	1.287	2.119	0.121	0.590	0.474
Carbontetrachloride	91	0	0.050	0.050	0.050	0.050	0.054	0.070	0.050	0.051	0.004
Chlorobenzene	91	91									
Chloroethane	91	90	0.050	0.050	0.050	0.050	0.050	0.067	0.050	0.051	0.003
Chloroform	91	1									
Chloromethane	91	0	0.050	0.050	0.050	0.050	0.059	0.085	0.050	0.053	0.008
cis-1,2-Dimethylcyclohexane	91	91	0.050	0.050	0.075	0.108	0.219	0.345	0.050	0.102	0.071
cis-1,3-Dimethylcyclohexane	91	91	0.050	0.062	0.120	0.250	0.441	0.939	0.050	0.188	0.183
cis-1,4/t-1,3-Dimethylcyclohexane	91	91	0.050	0.050	0.050	0.050	0.058	0.256	0.050	0.056	0.026
cis-2-Butene	91	91	0.050	0.050	0.050	0.097	0.148	0.268	0.050	0.081	0.055
cis-2-Hexene	91	91	0.050	0.050	0.050	0.050	0.053	0.097	0.050	0.052	0.007
cis-2-Pentene	91	91									
cis-3-Methyl-2-pentene	91	91	0.050	0.050	0.050	0.050	0.050	0.075	0.050	0.051	0.003
cis-4-Methyl-2-pentene	91	89	0.050	0.050	0.050	0.050	0.096	0.206	0.050	0.060	0.028
Cyclohexane	91	72	0.050	0.050	0.050	0.050	0.050	0.109	0.050	0.052	0.008
Cyclopentane	91	80	0.050	0.050	0.050	0.050	0.050	0.094	0.050	0.051	0.005

Table 19: 2004 VOC Annual Statistics at Longwoods

Unit: micrograms per cubic metre ($\mu g/m^3$)

	No. of		PERCENTILES								
Compounds	**Samples**	**No. < DL**	**5%**	**25%**	**50%**	**75%**	**90%**	**Max**	**Min**	**Mean**	**Std. Dev.**
Cyclopentene	91	91	0.050	0.050	0.050	0.050	0.050	0.087	0.050	0.051	0.005
Decane	91	71	0.050	0.050	0.050	0.060	0.112	0.291	0.050	0.068	0.046
Dichloromethane	91	0	0.050	0.050	0.050	0.050	0.076	0.126	0.050	0.057	0.016
d-Limonene	91	67									
Dodecane	91	42									
Ethane	91	0	0.050	0.050	0.050	0.050	0.050	0.068	0.050	0.051	0.003
Ethylbenzene	91	27	0.050	0.050	0.050	0.050	0.050	0.060	0.050	0.050	0.001
Ethylene	91	0									
Freon11	91	0									
Freon113	91	0	0.050	0.050	0.050	0.050	0.050	0.054	0.050	0.050	0.000
Freon114	91	0									
Freon12	91	0	0.050	0.050	0.063	0.095	0.151	0.260	0.050	0.081	0.046
Freon22	91	0	0.050	0.050	0.057	0.094	0.122	0.290	0.050	0.078	0.042
Heptane	91	44									
Hexane	91	4									
Indane	91	91	0.050	0.050	0.050	0.050	0.050	0.052	0.050	0.050	0.000
Isobutane	91	0									
iso-Butylbenzene	91	91									
Isopentane	91	0									
Isoprene	91	71									
iso-Propylbenzene	91	91									
m and p-Xylene	91	10									
Methylcyclohexane	91	78	0.050	0.050	0.050	0.050	0.079	0.161	0.050	0.058	0.023
Methylcyclopentane	91	59	0.500	0.516	0.549	0.568	0.623	0.695	0.392	0.552	0.049
Naphthalene	91	72	2.497	2.561	2.685	2.786	2.939	3.503	2.008	2.700	0.199
n-Butylbenzene	91	91	0.105	0.109	0.111	0.115	0.119	0.133	0.083	0.112	0.006
Nonane	91	77									
n-Propylbenzene	91	85	1.623	1.678	1.713	1.823	1.888	2.484	1.239	1.749	0.137
Octane	91	78	0.136	0.153	0.170	0.220	0.273	0.600	0.100	0.193	0.066
o-Xylene	91	48	0.060	0.064	0.067	0.071	0.076	0.130	0.050	0.070	0.012
p-Cymene	91	87									
Pentane	91	0	0.111	0.136	0.144	0.151	0.153	0.373	0.082	0.142	0.029

Table 19: 2004 VOC Annual Statistics at Longwoods

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

	No. of		PERCENTILES								
Compounds	**Samples**	**No. < DL**	**5%**	**25%**	**50%**	**75%**	**90%**	**Max**	**Min**	**Mean**	**Std. Dev.**
Propane	91	0	0.510	0.589	0.608	0.639	0.653	0.683	0.401	0.604	0.051
Propylene	91	2	0.050	0.050	0.050	0.050	0.078	0.372	0.050	0.062	0.043
sec-Butylbenzene	91	91									
Styrene	91	81	0.050	0.050	0.063	0.099	0.161	0.346	0.050	0.086	0.056
Tetrachloroethylene	91	32									
Toluene	91	0									
trans-1,2-Dimethylcyclohexane	91	91									
trans-1,4-Dimethylcyclohexane	91	91	0.997	1.053	1.102	1.158	1.228	1.387	0.787	1.109	0.087
trans-2-Butene	91	90	0.050	0.051	0.055	0.057	0.061	0.083	0.050	0.055	0.006
trans-2-Hexene	91	91	0.050	0.050	0.050	0.050	0.050	0.051	0.050	0.050	0.000
trans-2-Pentene	91	91	0.050	0.050	0.050	0.201	0.686	1.459	0.050	0.218	0.316
trans-3-Methyl-2-pentene	91	91	0.050	0.050	0.050	0.050	0.061	0.142	0.050	0.054	0.014
Trichloroethylene	91	74	0.050	0.050	0.050	0.057	0.082	0.192	0.050	0.060	0.024
Undecane	91	37	0.050	0.050	0.050	0.063	0.096	0.321	0.050	0.065	0.036
Vinylchloride	91	91	0.588	0.608	0.625	0.653	0.664	0.696	0.475	0.629	0.032

Table 20: 2004 VOC Annual Statistics at Ottawa

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

Compounds	No. of Samples	No. < DL	PERCENTILES					Max	Min	Mean	Std. Dev.
			5%	25%	50%	75%	90%				
1,1,1-Trichloroethane	58	0	0.104	0.125	0.132	0.139	0.160	0.656	0.102	0.142	0.071
1,1,2,2-Tetrachloroethane	58	58									
1,1,2-Trichloroethane	58	58									
1,1-Dichloroethane	58	58									
1,1-Dichloroethylene	58	58									
1,2,3-Trimethylbenzene	58	17	0.050	0.050	0.067	0.097	0.140	0.274	0.050	0.086	0.049
1,2,4-Trichlorobenzene	58	58									
1,2,4-Trimethylbenzene	58	1	0.097	0.203	0.292	0.436	0.649	1.069	0.050	0.354	0.221
1,2-Dichlorobenzene	58	58									
1,2-Dichloroethane	58	57	0.050	0.050	0.050	0.050	0.050	0.052	0.050	0.050	0.000
1,2-Dichloropropane	58	58									
1,2-Diethylbenzene	58	58									
1,3,5-Trimethylbenzene	58	9	0.050	0.055	0.086	0.122	0.179	0.315	0.050	0.104	0.061
1,3-Butadiene	58	17	0.050	0.050	0.062	0.109	0.165	0.269	0.050	0.086	0.047
1,3-Dichlorobenzene	58	58									
1,3-Diethylbenzene	58	55	0.050	0.050	0.050	0.050	0.050	0.066	0.050	0.050	0.002
1,4-Dichlorobenzene	58	18	0.050	0.050	0.072	0.105	0.166	0.466	0.050	0.092	0.065
1,4-Dichlorobutane	58	58									
1,4-Diethylbenzene	58	27	0.050	0.050	0.052	0.076	0.108	0.211	0.050	0.070	0.034
1-Butene/Isobutene	58	0	0.124	0.214	0.277	0.471	0.771	1.282	0.115	0.386	0.271
1-Butyne	58	58									
1-Decene	58	58									
1-Heptene	58	58									
1-Hexene	58	38	0.050	0.050	0.050	0.059	0.082	0.149	0.050	0.060	0.020
1-Methylcyclohexene	58	58									
1-Methylcyclopentene	58	55	0.050	0.050	0.050	0.050	0.050	0.085	0.050	0.051	0.005
1-Nonene	58	58									
1-Octene	58	58									
1-Pentene	58	28	0.050	0.050	0.051	0.075	0.103	0.192	0.050	0.066	0.028
1-Propyne	58	33	0.050	0.050	0.050	0.073	0.111	0.162	0.050	0.065	0.026
1-Undecene	58	58									
2,2,3-Trimethylbutane	58	58									

Table 20: 2004 VOC Annual Statistics at Ottawa

Unit: micrograms per cubic metre ($\mu g/m^3$)

	No. of		PERCENTILES								
Compounds	Samples	No. < DL	5%	25%	50%	75%	90%	Max	Min	Mean	Std. Dev.
2,2,4-Trimethylpentane	58	2	0.051	0.112	0.156	0.246	0.314	0.507	0.050	0.187	0.109
2,2,5-Trimethylhexane	58	58									
2,2-Dimethylbutane	58	2	0.051	0.081	0.128	0.201	0.343	0.663	0.050	0.169	0.131
2,2-Dimethylhexane	58	58									
2,2-Dimethylpentane	58	57	0.050	0.050	0.050	0.050	0.050	0.090	0.050	0.051	0.005
2,2-Dimethylpropane	58	58									
2,3,4-Trimethylpentane	58	27	0.050	0.050	0.051	0.088	0.104	0.182	0.050	0.071	0.032
2,3-Dimethylbutane	58	3	0.050	0.089	0.138	0.230	0.292	0.490	0.050	0.166	0.104
2,3-Dimethylpentane	58	9	0.050	0.061	0.084	0.144	0.192	0.332	0.050	0.107	0.060
2,4-Dimethylhexane	58	40	0.050	0.050	0.050	0.052	0.076	0.121	0.050	0.057	0.016
2,4-Dimethylpentane	58	30	0.050	0.050	0.050	0.090	0.102	0.187	0.050	0.069	0.030
2,5-Dimethylhexane	58	49	0.050	0.050	0.050	0.050	0.059	0.095	0.050	0.053	0.009
2-Ethyl-1-butene	58	58									
2-Ethyltoluene	58	15	0.050	0.050	0.071	0.106	0.162	0.268	0.050	0.091	0.051
2-methyl-1-butene	58	17	0.050	0.050	0.075	0.119	0.178	0.384	0.050	0.097	0.062
2-Methyl-2-butene	58	8	0.050	0.059	0.110	0.158	0.260	0.621	0.050	0.134	0.106
2-Methylheptane	58	14	0.050	0.051	0.074	0.112	0.169	0.244	0.050	0.088	0.047
2-Methylhexane	58	0	0.083	0.147	0.202	0.311	0.466	0.699	0.054	0.250	0.144
2-Methylpentane	58	0	0.214	0.384	0.604	0.964	1.318	1.978	0.136	0.698	0.417
3,6-Dimethyloctane	58	58									
3-Ethyltoluene	58	1	0.064	0.112	0.168	0.257	0.379	0.618	0.050	0.208	0.129
3-Methyl-1-Butene	58	53	0.050	0.050	0.050	0.050	0.050	0.095	0.050	0.051	0.006
3-Methyl-1-pentene	58	58									
3-Methylheptane	58	21	0.050	0.050	0.070	0.106	0.163	0.259	0.050	0.085	0.047
3-Methylhexane	58	0	0.085	0.163	0.222	0.365	0.522	0.812	0.057	0.276	0.162
3-Methylpentane	58	0	0.194	0.294	0.410	0.632	0.863	1.294	0.130	0.481	0.263
4-Ethyltoluene	58	9	0.050	0.059	0.083	0.133	0.199	0.312	0.050	0.108	0.063
4-Methyl-1-pentene	58	58									
4-Methylheptane	58	49	0.050	0.050	0.050	0.050	0.063	0.092	0.050	0.053	0.008
Acetylene	58	0	0.250	0.441	0.642	0.921	1.341	1.994	0.199	0.743	0.401
a-Pinene	58	5	0.050	0.073	0.162	0.281	0.749	1.458	0.050	0.264	0.300
Benzene	58	0	0.275	0.474	0.670	0.918	1.508	2.354	0.170	0.798	0.448

Table 20: 2004 VOC Annual Statistics at Ottawa

Unit: micrograms per cubic metre ($\mu g/m^3$)

	No. of		PERCENTILES								
Compounds	**Samples**	**No. < DL**	**5%**	**25%**	**50%**	**75%**	**90%**	**Max**	**Min**	**Mean**	**Std. Dev.**
Benzylchloride	54	54									
b-Pinene	58	28	0.050	0.050	0.055	0.141	0.268	0.531	0.050	0.111	0.105
Bromodichloromethane	58	58									
Bromoform	58	57	0.050	0.050	0.050	0.050	0.050	0.051	0.050	0.050	0.000
Bromomethane	58	10	0.050	0.052	0.055	0.061	0.070	0.167	0.050	0.059	0.016
Butane	58	0	0.430	0.890	1.742	3.646	5.250	9.231	0.320	2.353	1.880
Camphene	58	30	0.050	0.050	0.050	0.077	0.126	0.261	0.050	0.072	0.041
Carbontetrachloride	58	0	0.533	0.582	0.608	0.626	0.655	0.737	0.527	0.609	0.045
Chlorobenzene	58	58									
Chloroethane	58	58									
Chloroform	58	0	0.074	0.091	0.127	0.154	0.202	0.427	0.071	0.134	0.058
Chloromethane	58	0	0.915	1.045	1.116	1.211	1.299	1.366	0.886	1.127	0.129
cis-1,2-Dichloroethylene	58	58									
cis-1,2-Dimethylcyclohexane	58	58									
cis-1,3-Dichloropropene	58	58									
cis-1,3-Dimethylcyclohexane	58	48	0.050	0.050	0.050	0.050	0.059	0.104	0.050	0.053	0.010
cis-1,4/t-1,3-Dimethylcyclohexane	58	58									
cis-2-Butene	58	17	0.050	0.050	0.073	0.133	0.259	0.356	0.050	0.106	0.083
cis-2-Heptene	58	58									
cis-2-Hexene	58	55	0.050	0.050	0.050	0.050	0.050	0.079	0.050	0.051	0.004
cis-2-Pentene	58	31	0.050	0.050	0.050	0.065	0.106	0.254	0.050	0.067	0.037
cis-3-Heptene	4	2	0.050	0.050	0.052	0.057	0.057	0.057	0.050	0.052	0.003
cis-3-Methyl-2-pentene	58	54	0.050	0.050	0.050	0.050	0.050	0.114	0.050	0.053	0.010
cis-4-Methyl-2-pentene	58	57	0.050	0.050	0.050	0.050	0.050	0.065	0.050	0.050	0.002
Cyclohexane	58	13	0.050	0.053	0.083	0.135	0.223	0.271	0.050	0.106	0.065
Cyclohexene	58	58									
Cyclopentane	58	4	0.050	0.067	0.105	0.180	0.247	0.360	0.050	0.129	0.077
Cyclopentene	58	55	0.050	0.050	0.050	0.050	0.050	0.078	0.050	0.051	0.005
Decane	58	5	0.050	0.114	0.193	0.277	0.471	0.679	0.050	0.219	0.149
Dibromochloromethane	58	58									
Dibromomethane	58	58									
Dichloromethane	58	0	0.193	0.268	0.343	0.483	0.740	1.836	0.170	0.424	0.257

Table 20: 2004 VOC Annual Statistics at Ottawa

Unit: micrograms per cubic metre ($\mu g/m^3$)

	No. of		PERCENTILES								
Compounds	**Samples**	**No. < DL**	**5%**	**25%**	**50%**	**75%**	**90%**	**Max**	**Min**	**Mean**	**Std. Dev.**
d-Limonene	58	28	0.050	0.050	0.054	0.085	0.143	0.560	0.050	0.089	0.085
Dodecane	58	10	0.050	0.074	0.134	0.174	0.269	0.399	0.050	0.144	0.089
EDB	58	58									
Ethane	58	0	1.071	1.652	2.185	2.874	3.866	5.397	1.040	2.407	1.016
Ethylbenzene	58	0	0.120	0.219	0.302	0.498	0.763	1.247	0.083	0.385	0.250
Ethylbromide	58	58									
Ethylene	58	0	0.410	0.831	1.159	1.764	2.672	4.510	0.364	1.420	0.898
Freon11	58	0	1.379	1.520	1.614	1.714	1.840	2.071	1.330	1.631	0.167
Freon113	58	0	0.442	0.575	0.608	0.648	0.682	1.056	0.422	0.601	0.094
Freon114	58	0	0.090	0.105	0.109	0.112	0.118	0.121	0.088	0.107	0.008
Freon12	58	0	2.185	2.477	2.672	2.753	3.016	3.191	2.125	2.632	0.244
Freon22	58	0	0.543	0.611	0.692	0.761	0.851	1.228	0.509	0.703	0.125
Heptane	58	3	0.050	0.102	0.165	0.252	0.384	0.684	0.050	0.196	0.129
Hexachlorobutadiene	58	58									
Hexane	58	0	0.201	0.287	0.438	0.639	0.920	1.298	0.159	0.497	0.267
Hexylbenzene	47	47									
Indane	58	40	0.050	0.050	0.050	0.053	0.078	0.139	0.050	0.058	0.019
Isobutane	58	0	0.318	0.621	1.010	2.160	4.044	7.822	0.179	1.578	1.488
iso-Butylbenzene	58	58									
Isopentane	58	0	0.684	1.146	1.821	3.045	4.611	6.426	0.426	2.295	1.424
Isoprene	58	20	0.050	0.050	0.095	0.279	0.531	0.890	0.050	0.206	0.228
iso-Propylbenzene	58	55	0.050	0.050	0.050	0.050	0.050	0.066	0.050	0.051	0.003
m and p-Xylene	58	0	0.356	0.651	0.920	1.476	2.403	3.574	0.218	1.116	0.746
Methylcyclohexane	58	15	0.050	0.050	0.081	0.120	0.202	0.307	0.050	0.099	0.063
Methylcyclopentane	58	0	0.093	0.144	0.209	0.342	0.494	0.701	0.060	0.262	0.157
MTBE	58	52	0.050	0.050	0.050	0.050	0.050	0.173	0.050	0.054	0.017
Naphthalene	58	9	0.050	0.076	0.120	0.162	0.263	0.482	0.050	0.139	0.089
n-Butylbenzene	58	55	0.050	0.050	0.050	0.050	0.050	0.061	0.050	0.050	0.002
Nonane	58	7	0.050	0.064	0.104	0.155	0.236	0.390	0.050	0.124	0.077
n-Propylbenzene	58	18	0.050	0.050	0.064	0.096	0.145	0.219	0.050	0.081	0.041
Octane	58	19	0.050	0.050	0.069	0.109	0.176	0.271	0.050	0.089	0.053
o-Xylene	58	0	0.130	0.229	0.333	0.517	0.778	1.222	0.085	0.394	0.251

Table 20: 2004 VOC Annual Statistics at Ottawa

Unit: micrograms per cubic metre ($\mu g/m^3$)

	No. of		PERCENTILES								
Compounds	**Samples**	**No. < DL**	**5%**	**25%**	**50%**	**75%**	**90%**	**Max**	**Min**	**Mean**	**Std. Dev.**
p-Cymene	58	53	0.050	0.050	0.050	0.050	0.050	0.121	0.050	0.052	0.010
Pentane	58	0	0.160	0.481	0.772	1.326	1.703	2.462	0.136	0.912	0.549
Propane	58	0	0.557	1.190	1.765	2.551	4.023	5.573	0.423	2.051	1.218
Propylene	58	0	0.153	0.280	0.395	0.605	0.919	1.348	0.134	0.469	0.276
sec-Butylbenzene	58	58									
Styrene	58	35	0.050	0.050	0.050	0.068	0.111	0.211	0.050	0.066	0.032
tert-Butylbenzene	58	58									
Tetrachloroethylene	58	3	0.050	0.082	0.170	0.393	0.688	1.470	0.050	0.280	0.280
Toluene	58	0	0.777	1.371	2.083	2.964	5.251	8.926	0.363	2.485	1.730
trans-1,2-Dichloroethylene	58	58									
trans-1,2-Dimethylcyclohexane	58	58									
trans-1,3-Dichloropropene	58	58									
trans-1,4-Dimethylcyclohexane	58	58									
trans-2-Butene	58	8	0.050	0.060	0.094	0.158	0.345	0.502	0.050	0.132	0.113
trans-2-Heptene	58	58									
trans-2-Hexene	58	53	0.050	0.050	0.050	0.050	0.050	0.101	0.050	0.052	0.008
trans-2-Octene	58	54	0.050	0.050	0.050	0.050	0.050	0.075	0.050	0.051	0.004
trans-2-Pentene	58	12	0.050	0.058	0.102	0.136	0.236	0.494	0.050	0.121	0.086
trans-3-Heptene	58	58									
trans-3-Methyl-2-pentene	58	58									
trans-4-Methyl-2-pentene	58	58									
Trichloroethylene	58	46	0.050	0.050	0.050	0.050	0.076	0.200	0.050	0.059	0.026
Undecane	58	5	0.050	0.115	0.246	0.321	0.497	0.827	0.050	0.257	0.180
Vinylchloride	58	58									

Table 21: 2004 VOC Annual Statistics at Sarnia

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

			PERCENTILES								
Compounds	**No. of Samples**	**No. < DL**	**5%**	**25%**	**50%**	**75%**	**90%**	**Max**	**Min**	**Mean**	**Std. Dev.**
1,1,1-Trichloroethane	30	0	0.101	0.120	0.134	0.144	0.158	0.170	0.099	0.132	0.019
1,1,2,2-Tetrachloroethane	30	30									
1,1,2-Trichloroethane	30	30									
1,1-Dichloroethane	30	30									
1,1-Dichloroethylene	30	30									
1,2,3-Trimethylbenzene	30	6	0.050	0.051	0.092	0.202	0.263	0.473	0.050	0.131	0.098
1,2,4-Trichlorobenzene	30	30									
1,2,4-Trimethylbenzene	30	0	0.110	0.196	0.363	0.839	1.038	1.994	0.098	0.495	0.418
1,2-Dichlorobenzene	30	30									
1,2-Dichloroethane	30	27	0.050	0.050	0.050	0.050	0.051	0.057	0.050	0.050	0.002
1,2-Dichloropropane	30	30									
1,2-Diethylbenzene	30	30									
1,3,5-Trimethylbenzene	30	6	0.050	0.057	0.102	0.243	0.295	0.612	0.050	0.146	0.124
1,3-Butadiene	30	12	0.050	0.050	0.098	0.283	0.978	2.850	0.050	0.343	0.646
1,3-Dichlorobenzene	30	30									
1,3-Diethylbenzene	30	22	0.050	0.050	0.050	0.050	0.078	0.125	0.050	0.055	0.015
1,4-Dichlorobenzene	30	6	0.050	0.056	0.089	0.118	0.155	0.299	0.050	0.100	0.058
1,4-Dichlorobutane	30	30									
1,4-Diethylbenzene	30	14	0.050	0.050	0.063	0.109	0.175	0.197	0.050	0.088	0.050
1-Butene/Isobutene	30	0	0.101	0.168	0.368	1.894	3.405	5.922	0.092	1.065	1.394
1-Butyne	30	30									
1-Decene	30	29	0.050	0.050	0.050	0.050	0.050	0.052	0.050	0.050	0.000
1-Heptene	30	28	0.050	0.050	0.050	0.050	0.050	0.070	0.050	0.051	0.004
1-Hexene	30	13	0.050	0.050	0.057	0.115	0.177	0.274	0.050	0.092	0.063
1-Methylcyclohexene	30	30									
1-Methylcyclopentene	30	29	0.050	0.050	0.050	0.050	0.050	0.117	0.050	0.052	0.012
1-Nonene	30	29	0.050	0.050	0.050	0.050	0.050	0.091	0.050	0.051	0.008
1-Octene	30	24	0.050	0.050	0.050	0.050	0.065	0.095	0.050	0.053	0.009
1-Pentene	30	13	0.050	0.050	0.069	0.104	0.141	0.332	0.050	0.089	0.064
1-Propyne	30	15	0.050	0.050	0.060	0.085	0.110	0.138	0.050	0.069	0.024
1-Undecene	30	30									
2,2,3-Trimethylbutane	30	30									

Table 21: 2004 VOC Annual Statistics at Sarnia

Unit: micrograms per cubic metre ($\mu g/m^3$)

	No. of		PERCENTILES								
Compounds	**Samples**	**No. < DL**	**5%**	**25%**	**50%**	**75%**	**90%**	**Max**	**Min**	**Mean**	**Std. Dev.**
2,2,4-Trimethylpentane	30	1	0.056	0.117	0.323	0.916	1.595	2.549	0.050	0.554	0.632
2,2,5-Trimethylhexane	30	26	0.050	0.050	0.050	0.050	0.075	0.080	0.050	0.053	0.009
2,2-Dimethylbutane	30	8	0.050	0.050	0.108	0.197	0.340	0.793	0.050	0.153	0.161
2,2-Dimethylhexane	30	25	0.050	0.050	0.050	0.050	0.057	0.175	0.050	0.056	0.025
2,2-Dimethylpentane	30	23	0.050	0.050	0.050	0.050	0.097	0.170	0.050	0.062	0.029
2,2-Dimethylpropane	30	26	0.050	0.050	0.050	0.050	0.064	0.109	0.050	0.053	0.011
2,3,4-Trimethylpentane	30	13	0.050	0.050	0.107	0.214	0.526	0.732	0.050	0.174	0.182
2,3-Dimethylbutane	30	3	0.050	0.068	0.220	0.347	0.548	1.177	0.050	0.261	0.269
2,3-Dimethylpentane	30	5	0.050	0.068	0.162	0.249	0.398	0.604	0.050	0.181	0.142
2,4-Dimethylhexane	30	14	0.050	0.050	0.066	0.145	0.348	0.526	0.050	0.126	0.129
2,4-Dimethylpentane	30	14	0.050	0.050	0.100	0.160	0.279	0.403	0.050	0.119	0.093
2,5-Dimethylhexane	30	14	0.050	0.050	0.051	0.107	0.240	0.362	0.050	0.098	0.085
2-Ethyl-1-butene	30	29	0.050	0.050	0.050	0.050	0.050	0.061	0.050	0.050	0.002
2-Ethyltoluene	30	7	0.050	0.053	0.098	0.194	0.295	0.518	0.050	0.133	0.108
2-methyl-1-butene	30	13	0.050	0.050	0.085	0.145	0.233	0.508	0.050	0.120	0.112
2-Methyl-2-butene	30	10	0.050	0.050	0.132	0.215	0.370	0.800	0.050	0.165	0.166
2-Methylheptane	30	6	0.050	0.062	0.127	0.212	0.360	0.796	0.050	0.168	0.159
2-Methylhexane	30	0	0.066	0.119	0.291	0.538	0.838	1.456	0.064	0.377	0.333
2-Methylpentane	30	0	0.217	0.318	1.023	1.826	2.928	5.971	0.171	1.299	1.401
3,6-Dimethyloctane	30	30									
3-Ethyltoluene	30	0	0.064	0.110	0.211	0.430	0.648	1.204	0.059	0.286	0.252
3-Methyl-1-Butene	30	26	0.050	0.050	0.050	0.050	0.066	0.147	0.050	0.056	0.021
3-Methyl-1-pentene	30	30									
3-Methylheptane	30	10	0.050	0.050	0.107	0.166	0.370	0.746	0.050	0.146	0.150
3-Methylhexane	30	2	0.050	0.118	0.328	0.563	0.934	1.611	0.050	0.418	0.374
3-Methylpentane	30	0	0.135	0.213	0.646	1.188	3.573	4.153	0.121	0.991	1.137
4-Ethyltoluene	30	5	0.050	0.056	0.107	0.230	0.346	0.628	0.050	0.151	0.131
4-Methyl-1-pentene	30	30									
4-Methylheptane	30	19	0.050	0.050	0.050	0.071	0.152	0.323	0.050	0.075	0.057
Acetylene	30	0	0.212	0.552	0.803	1.220	1.383	1.570	0.155	0.870	0.410
a-Pinene	30	5	0.050	0.098	0.159	0.269	0.564	0.688	0.050	0.207	0.172
Benzene	30	0	0.400	0.552	0.899	1.957	3.049	3.893	0.308	1.311	0.962

Table 21: 2004 VOC Annual Statistics at Sarnia

Unit: micrograms per cubic metre ($\mu g/m^3$)

	No. of		PERCENTILES								
Compounds	**Samples**	**No. < DL**	**5%**	**25%**	**50%**	**75%**	**90%**	**Max**	**Min**	**Mean**	**Std. Dev.**
Benzylchloride	25	25									
b-Pinene	30	27	0.050	0.050	0.050	0.050	0.058	0.090	0.050	0.052	0.008
Bromodichloromethane	30	29	0.050	0.050	0.050	0.050	0.050	0.056	0.050	0.050	0.001
Bromoform	30	29	0.050	0.050	0.050	0.050	0.050	0.053	0.050	0.050	0.001
Bromomethane	30	4	0.050	0.055	0.066	0.076	0.125	0.177	0.050	0.074	0.031
Butane	30	0	0.591	1.762	4.434	7.677	12.478	16.590	0.287	5.390	4.487
Camphene	30	29	0.050	0.050	0.050	0.050	0.050	0.135	0.050	0.053	0.015
Carbontetrachloride	30	0	0.503	0.578	0.613	0.642	0.692	0.703	0.496	0.607	0.052
Chlorobenzene	30	30									
Chloroethane	30	29	0.050	0.050	0.050	0.050	0.050	0.052	0.050	0.050	0.000
Chloroform	30	0	0.069	0.076	0.093	0.133	0.153	0.419	0.058	0.115	0.068
Chloromethane	30	0	0.980	1.076	1.295	2.552	5.435	8.504	0.939	2.161	1.805
cis-1,2-Dichloroethylene	30	30									
cis-1,2-Dimethylcyclohexane	30	30									
cis-1,3-Dichloropropene	30	30									
cis-1,3-Dimethylcyclohexane	30	17	0.050	0.050	0.050	0.083	0.137	0.377	0.050	0.079	0.064
cis-1,4/t-1,3-Dimethylcyclohexane	30	27	0.050	0.050	0.050	0.050	0.054	0.101	0.050	0.053	0.010
cis-2-Butene	30	12	0.050	0.050	0.068	0.238	0.360	0.925	0.050	0.163	0.191
cis-2-Heptene	30	27	0.050	0.050	0.050	0.050	0.075	0.104	0.050	0.054	0.014
cis-2-Hexene	30	24	0.050	0.050	0.050	0.050	0.067	0.179	0.050	0.057	0.024
cis-2-Pentene	30	16	0.050	0.050	0.050	0.088	0.138	0.306	0.050	0.082	0.063
cis-3-Heptene	5	5									
cis-3-Methyl-2-pentene	30	20	0.050	0.050	0.050	0.055	0.085	0.180	0.050	0.059	0.025
cis-4-Methyl-2-pentene	30	26	0.050	0.050	0.050	0.050	0.063	0.113	0.050	0.054	0.014
Cyclohexane	30	7	0.050	0.050	0.121	0.965	2.853	3.319	0.050	0.647	0.973
Cyclohexene	30	30									
Cyclopentane	30	2	0.050	0.071	0.221	0.477	1.420	2.780	0.050	0.423	0.598
Cyclopentene	30	28	0.050	0.050	0.050	0.050	0.050	0.102	0.050	0.052	0.009
Decane	30	1	0.067	0.113	0.393	0.694	1.022	1.357	0.050	0.463	0.374
Dibromochloromethane	30	30									
Dibromomethane	30	30									
Dichloromethane	30	0	0.156	0.197	0.307	0.468	0.803	1.187	0.154	0.383	0.260

Table 21: 2004 VOC Annual Statistics at Sarnia

Unit: micrograms per cubic metre ($\mu g/m^3$)

	No. of		PERCENTILES								
Compounds	**Samples**	**No. < DL**	**5%**	**25%**	**50%**	**75%**	**90%**	**Max**	**Min**	**Mean**	**Std. Dev.**
d-Limonene	30	22	0.050	0.050	0.050	0.052	0.091	0.308	0.050	0.064	0.048
Dodecane	26	3	0.050	0.079	0.208	0.295	0.454	0.703	0.050	0.225	0.168
EDB	30	30									
Ethane	30	0	1.867	2.644	4.120	6.320	7.667	8.934	1.192	4.433	2.148
Ethylbenzene	30	0	0.117	0.155	0.367	0.767	1.597	2.379	0.114	0.566	0.594
Ethylbromide	30	30									
Ethylene	30	0	0.462	0.782	1.958	5.589	10.416	12.062	0.457	3.500	3.639
Freon11	30	0	1.355	1.520	1.602	1.737	1.870	2.001	1.345	1.620	0.172
Freon113	30	0	0.482	0.576	0.685	1.151	1.743	3.832	0.451	0.948	0.677
Freon114	30	0	0.087	0.099	0.107	0.112	0.120	0.124	0.086	0.105	0.010
Freon12	30	0	2.164	2.417	2.620	2.895	3.154	3.477	2.122	2.668	0.342
Freon22	30	0	0.539	0.578	0.705	1.541	2.893	8.515	0.501	1.430	1.697
Heptane	30	1	0.061	0.113	0.293	0.584	0.761	1.866	0.050	0.385	0.384
Hexachlorobutadiene	30	30									
Hexane	30	0	0.141	0.275	0.752	1.516	5.975	6.950	0.117	1.479	1.945
Hexylbenzene	23	23									
Indane	30	20	0.050	0.050	0.050	0.075	0.115	0.205	0.050	0.067	0.034
Isobutane	30	0	0.278	0.626	1.609	3.872	5.049	7.021	0.116	2.315	1.980
iso-Butylbenzene	30	30									
Isopentane	30	0	0.761	1.035	3.168	5.046	7.140	15.997	0.577	3.577	3.424
Isoprene	30	15	0.050	0.050	0.057	0.178	0.348	0.683	0.050	0.136	0.149
iso-Propylbenzene	30	24	0.050	0.050	0.050	0.050	0.089	0.143	0.050	0.057	0.021
m and p-Xylene	30	0	0.284	0.394	0.780	1.969	2.773	5.161	0.284	1.232	1.167
Methylcyclohexane	30	10	0.050	0.050	0.123	0.330	0.461	1.246	0.050	0.217	0.254
Methylcyclopentane	30	0	0.060	0.119	0.328	0.725	1.642	2.067	0.059	0.512	0.569
MTBE	30	29	0.050	0.050	0.050	0.050	0.050	0.080	0.050	0.051	0.006
Naphthalene	30	4	0.050	0.065	0.153	0.265	0.488	0.591	0.050	0.182	0.152
n-Butylbenzene	30	22	0.050	0.050	0.050	0.060	0.073	0.116	0.050	0.057	0.014
Nonane	30	3	0.050	0.086	0.248	0.305	0.574	0.965	0.050	0.250	0.208
n-Propylbenzene	30	10	0.050	0.050	0.090	0.169	0.271	0.446	0.050	0.118	0.094
Octane	30	5	0.050	0.055	0.137	0.277	0.518	1.295	0.050	0.216	0.254
o-Xylene	30	0	0.120	0.155	0.297	0.607	1.021	1.824	0.106	0.435	0.405

Table 21: 2004 VOC Annual Statistics at Sarnia

Unit: micrograms per cubic metre ($\mu g/m^3$)

	No. of		PERCENTILES								
Compounds	**Samples**	**No. < DL**	**5%**	**25%**	**50%**	**75%**	**90%**	**Max**	**Min**	**Mean**	**Std. Dev.**
p-Cymene	30	29	0.050	0.050	0.050	0.050	0.050	0.056	0.050	0.050	0.001
Pentane	30	0	0.443	0.666	1.821	3.069	4.365	10.254	0.412	2.190	2.232
Propane	30	0	1.395	2.117	4.072	8.366	10.848	86.520	0.564	7.903	15.242
Propylene	30	0	0.148	0.260	0.688	3.288	4.605	5.735	0.145	1.579	1.791
sec-Butylbenzene	30	28	0.050	0.050	0.050	0.050	0.050	0.060	0.050	0.051	0.002
Styrene	30	11	0.050	0.050	0.076	0.187	0.463	0.550	0.050	0.143	0.144
tert-Butylbenzene	30	30									
Tetrachloroethylene	30	3	0.050	0.066	0.157	0.312	0.784	0.966	0.050	0.245	0.254
Toluene	30	0	0.600	0.894	2.177	5.127	11.030	18.187	0.530	3.824	4.358
trans-1,2-Dichloroethylene	30	30									
trans-1,2-Dimethylcyclohexane	30	30									
trans-1,3-Dichloropropene	30	30									
trans-1,4-Dimethylcyclohexane	30	27	0.050	0.050	0.050	0.050	0.064	0.175	0.050	0.056	0.023
trans-2-Butene	30	11	0.050	0.050	0.085	0.281	0.433	1.112	0.050	0.194	0.235
trans-2-Heptene	30	30									
trans-2-Hexene	30	24	0.050	0.050	0.050	0.050	0.071	0.139	0.050	0.056	0.018
trans-2-Octene	30	18	0.050	0.050	0.050	0.066	0.106	0.253	0.050	0.067	0.041
trans-2-Pentene	30	12	0.050	0.050	0.104	0.169	0.318	0.610	0.050	0.141	0.140
trans-3-Heptene	30	30									
trans-3-Methyl-2-pentene	30	29	0.050	0.050	0.050	0.050	0.050	0.067	0.050	0.051	0.003
trans-4-Methyl-2-pentene	30	30									
Trichloroethylene	30	16	0.050	0.050	0.050	0.075	0.096	0.111	0.050	0.062	0.018
Undecane	30	1	0.079	0.127	0.416	0.768	1.001	1.171	0.050	0.459	0.347
Vinylchloride	30	29	0.050	0.050	0.050	0.050	0.050	0.148	0.050	0.053	0.018

Table 22: 2004 VOC Annual Statistics at Simcoe

Unit: micrograms per cubic metre ($\mu g/m^3$)

	No. of		PERCENTILES								
Compounds	Samples	No. < DL	5%	25%	50%	75%	90%	Max	Min	Mean	Std. Dev.
1,1,1-Trichloroethane	48	0	0.100	0.124	0.132	0.142	0.150	0.358	0.098	0.134	0.037
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	43	0.050	0.050	0.050	0.050	0.053	0.082	0.050	0.051	0.005
1,2,4-Trichlorobenzene	48	48									
1,2,4-Trimethylbenzene	48	11	0.050	0.051	0.092	0.132	0.206	0.318	0.050	0.103	0.060
1,2-Dichlorobenzene	48	48									
1,2-Dichloroethane	48	46	0.050	0.050	0.050	0.050	0.050	0.057	0.050	0.050	0.001
1,2-Dichloropropane	48	48									
1,2-Diethylbenzene	48	48									
1,3,5-Trimethylbenzene	48	42	0.050	0.050	0.050	0.050	0.059	0.110	0.050	0.053	0.010
1,3-Butadiene	48	48									
1,3-Dichlorobenzene	48	48									
1,3-Diethylbenzene	48	48									
1,4-Dichlorobenzene	48	48									
1,4-Dichlorobutane	48	48									
1,4-Diethylbenzene	48	47	0.050	0.050	0.050	0.050	0.050	0.051	0.050	0.050	0.000
1-Butene/Isobutene	48	0	0.109	0.157	0.253	0.362	0.501	1.515	0.090	0.293	0.225
1-Butyne	48	48									
1-Decene	48	47	0.050	0.050	0.050	0.050	0.050	0.053	0.050	0.050	0.000
1-Heptene	48	47	0.050	0.050	0.050	0.050	0.050	0.082	0.050	0.051	0.005
1-Hexene	48	46	0.050	0.050	0.050	0.050	0.050	0.096	0.050	0.051	0.007
1-Methylcyclohexene	48	48									
1-Methylcyclopentene	48	48									
1-Nonene	48	47	0.050	0.050	0.050	0.050	0.050	0.079	0.050	0.051	0.004
1-Octene	48	47	0.050	0.050	0.050	0.050	0.050	0.100	0.050	0.051	0.007
1-Pentene	48	45	0.050	0.050	0.050	0.050	0.050	0.119	0.050	0.053	0.012
1-Propyne	48	46	0.050	0.050	0.050	0.050	0.050	0.056	0.050	0.050	0.001
1-Undecene	48	47	0.050	0.050	0.050	0.050	0.050	0.071	0.050	0.050	0.003
2,2,3-Trimethylbutane	48	48									

Table 22: 2004 VOC Annual Statistics at Simcoe

Unit: micrograms per cubic metre ($\mu g/m^3$)

	No. of		PERCENTILES								
Compounds	**Samples**	**No. < DL**	**5%**	**25%**	**50%**	**75%**	**90%**	**Max**	**Min**	**Mean**	**Std. Dev.**
2,2,4-Trimethylpentane	48	5	0.050	0.078	0.117	0.147	0.230	0.299	0.050	0.125	0.064
2,2,5-Trimethylhexane	48	48									
2,2-Dimethylbutane	48	32	0.050	0.050	0.050	0.053	0.075	0.187	0.050	0.057	0.022
2,2-Dimethylhexane	48	48									
2,2-Dimethylpentane	48	48									
2,2-Dimethylpropane	48	48									
2,3,4-Trimethylpentane	48	36	0.050	0.050	0.050	0.052	0.075	0.101	0.050	0.056	0.013
2,3-Dimethylbutane	48	22	0.050	0.050	0.057	0.092	0.110	0.208	0.050	0.072	0.031
2,3-Dimethylpentane	48	23	0.050	0.050	0.051	0.073	0.105	0.269	0.050	0.067	0.036
2,4-Dimethylhexane	48	48									
2,4-Dimethylpentane	48	42	0.050	0.050	0.050	0.050	0.059	0.086	0.050	0.052	0.006
2,5-Dimethylbenzaldehyde	14	14									
2,5-Dimethylhexane	48	48									
2-Ethyl-1-butene	48	48									
2-Ethyltoluene	48	41	0.050	0.050	0.050	0.050	0.061	0.097	0.050	0.052	0.008
2-methyl-1-butene	48	45	0.050	0.050	0.050	0.050	0.050	0.143	0.050	0.053	0.014
2-Methyl-2-butene	48	48									
2-Methylheptane	48	33	0.050	0.050	0.050	0.058	0.072	0.145	0.050	0.056	0.016
2-Methylhexane	48	7	0.050	0.061	0.096	0.141	0.182	0.697	0.050	0.116	0.100
2-Methylpentane	48	1	0.099	0.169	0.255	0.343	0.432	0.719	0.050	0.265	0.139
2-Pentanone/Isovaleraldehyde	14	4	0.050	0.050	0.082	0.092	0.104	0.105	0.050	0.074	0.022
3,6-Dimethyloctane	48	48									
3-Ethyltoluene	48	21	0.050	0.050	0.060	0.090	0.130	0.222	0.050	0.076	0.037
3-Methyl-1-Butene	48	47	0.050	0.050	0.050	0.050	0.050	0.064	0.050	0.050	0.002
3-Methyl-1-pentene	48	48									
3-Methylheptane	48	44	0.050	0.050	0.050	0.050	0.050	0.062	0.050	0.050	0.002
3-Methylhexane	48	9	0.050	0.059	0.101	0.158	0.234	0.759	0.050	0.125	0.112
3-Methylpentane	48	0	0.074	0.121	0.182	0.260	0.351	1.337	0.054	0.222	0.200
4-Ethyltoluene	48	39	0.050	0.050	0.050	0.050	0.071	0.122	0.050	0.054	0.013
4-Methyl-1-pentene	48	48									
4-Methylheptane	48	48									
Acetaldehyde	14	1	0.050	0.404	0.567	1.002	1.146	1.468	0.050	0.649	0.393

Table 22: 2004 VOC Annual Statistics at Simcoe

Unit: micrograms per cubic metre ($\mu g/m^3$)

	No. of		PERCENTILES								
Compounds	**Samples**	**No. < DL**	**5%**	**25%**	**50%**	**75%**	**90%**	**Max**	**Min**	**Mean**	**Std. Dev.**
Acetone	14	0	0.135	1.569	2.450	2.900	4.165	4.657	0.135	2.335	1.148
Acetylene	48	0	0.168	0.249	0.408	0.644	0.869	1.342	0.149	0.477	0.274
Acrolein	14	14									
a-Pinene	48	20	0.050	0.050	0.066	0.152	0.210	1.619	0.050	0.155	0.294
Benzaldehyde	14	7	0.050	0.050	0.056	0.101	0.110	0.151	0.050	0.074	0.032
Benzene	48	0	0.199	0.330	0.455	0.663	0.785	1.078	0.151	0.478	0.222
Benzylchloride	47	47									
b-Pinene	48	36	0.050	0.050	0.050	0.050	0.090	0.122	0.050	0.057	0.017
Bromodichloromethane	48	48									
Bromoform	48	48									
Bromomethane	48	15	0.050	0.050	0.058	0.062	0.069	0.188	0.050	0.061	0.022
Butane	48	0	0.341	0.863	1.205	1.969	2.965	5.252	0.227	1.444	0.995
Camphene	48	46	0.050	0.050	0.050	0.050	0.050	0.073	0.050	0.051	0.003
Carbontetrachloride	48	0	0.561	0.583	0.616	0.639	0.693	0.723	0.544	0.617	0.043
Chlorobenzene	48	48									
Chloroethane	48	48									
Chloroform	48	0	0.056	0.066	0.074	0.080	0.092	0.106	0.053	0.074	0.013
Chloromethane	48	0	0.938	1.032	1.144	1.225	1.320	1.395	0.896	1.132	0.130
cis-1,2-Dichloroethylene	48	48									
cis-1,2-Dimethylcyclohexane	48	48									
cis-1,3-Dichloropropene	48	39	0.050	0.050	0.050	0.050	0.257	1.998	0.050	0.157	0.349
cis-1,3-Dimethylcyclohexane	48	46	0.050	0.050	0.050	0.050	0.050	0.072	0.050	0.051	0.004
cis-1,4/t-1,3-Dimethylcyclohexane	48	48									
cis-2-Butene	48	45	0.050	0.050	0.050	0.050	0.050	0.097	0.050	0.051	0.007
cis-2-Heptene	48	48									
cis-2-Hexene	48	48									
cis-2-Pentene	48	48									
cis-3-Heptene	2	2									
cis-3-Methyl-2-pentene	48	48									
cis-4-Methyl-2-pentene	48	48									
Crotonaldehyde	14	14									
Cyclohexane	48	29	0.050	0.050	0.050	0.067	0.082	0.157	0.050	0.061	0.021

Table 22: 2004 VOC Annual Statistics at Simcoe

Unit: micrograms per cubic metre ($\mu g/m^3$)

			PERCENTILES								
Compounds	**No. of Samples**	**No. < DL**	**5%**	**25%**	**50%**	**75%**	**90%**	**Max**	**Min**	**Mean**	**Std. Dev.**
Cyclohexene	48	47	0.050	0.050	0.050	0.050	0.050	0.060	0.050	0.050	0.001
Cyclopentane	48	24	0.050	0.050	0.050	0.073	0.087	0.193	0.050	0.064	0.026
Cyclopentene	48	48									
Decane	48	24	0.050	0.050	0.050	0.069	0.089	0.120	0.050	0.062	0.018
Dibromochloromethane	48	48									
Dibromomethane	48	48									
Dichloromethane	48	0	0.145	0.168	0.204	0.265	0.394	0.947	0.131	0.241	0.131
d-Limonene	48	45	0.050	0.050	0.050	0.050	0.050	0.063	0.050	0.050	0.002
Dodecane	47	25	0.050	0.050	0.050	0.068	0.100	0.230	0.050	0.069	0.039
EDB	48	48									
Ethane	48	0	1.210	1.849	2.446	3.576	5.165	6.787	1.018	2.798	1.399
Ethylbenzene	48	2	0.057	0.084	0.124	0.185	0.236	0.370	0.050	0.140	0.072
Ethylbromide	48	48									
Ethylene	48	0	0.294	0.453	0.608	0.809	1.182	1.635	0.242	0.667	0.321
Formaldehyde	14	0	0.286	0.344	0.633	0.918	1.950	2.303	0.286	0.809	0.617
Freon11	48	0	1.362	1.490	1.623	1.760	1.926	2.040	1.294	1.617	0.189
Freon113	48	0	0.429	0.549	0.599	0.640	0.682	0.768	0.414	0.585	0.091
Freon114	48	0	0.087	0.103	0.108	0.115	0.124	0.132	0.085	0.108	0.012
Freon12	48	0	2.100	2.250	2.660	2.745	2.884	3.221	2.051	2.591	0.303
Freon22	48	0	0.520	0.572	0.598	0.649	0.688	1.442	0.481	0.622	0.134
Heptane	48	12	0.050	0.055	0.093	0.122	0.166	0.254	0.050	0.100	0.051
Hexachlorobutadiene	48	48									
Hexanal	14	9	0.050	0.050	0.050	0.062	0.131	0.209	0.050	0.070	0.046
Hexane	48	1	0.081	0.149	0.218	0.347	2.157	41.783	0.050	1.938	7.524
Hexylbenzene	43	43									
Indane	48	48									
Isobutane	48	0	0.146	0.391	0.509	0.795	1.279	1.704	0.130	0.601	0.376
iso-Butylbenzene	48	48									
Isopentane	48	0	0.355	0.572	0.821	1.327	1.713	2.931	0.320	0.986	0.574
Isoprene	48	30	0.050	0.050	0.050	0.108	0.201	0.723	0.050	0.101	0.129
iso-Propylbenzene	48	48									
m and p-Xylene	48	0	0.112	0.182	0.309	0.420	0.532	0.952	0.063	0.319	0.180

Table 22: 2004 VOC Annual Statistics at Simcoe

Unit: micrograms per cubic metre ($\mu g/m^3$)

	No. of		PERCENTILES								
Compounds	**Samples**	**No. < DL**	**5%**	**25%**	**50%**	**75%**	**90%**	**Max**	**Min**	**Mean**	**Std. Dev.**
MEK	14	0	0.402	0.824	1.015	1.593	3.080	3.207	0.402	1.309	0.869
Methylcyclohexane	48	28	0.050	0.050	0.050	0.058	0.077	0.103	0.050	0.056	0.012
Methylcyclopentane	48	10	0.050	0.061	0.090	0.150	0.279	5.568	0.050	0.379	1.114
MIBK	14	11	0.050	0.050	0.050	0.050	0.082	0.118	0.050	0.057	0.019
MTBE	48	47	0.050	0.050	0.050	0.050	0.050	0.079	0.050	0.051	0.004
m-Tolualdehyde	14	14									
Naphthalene	47	21	0.050	0.050	0.051	0.092	0.123	0.185	0.050	0.074	0.036
n-Butylbenzene	48	48									
Nonane	48	32	0.050	0.050	0.050	0.055	0.070	0.107	0.050	0.055	0.012
n-Propylbenzene	48	42	0.050	0.050	0.050	0.050	0.055	0.087	0.050	0.052	0.006
Octane	48	31	0.050	0.050	0.050	0.068	0.076	0.123	0.050	0.059	0.017
o-Tolualdehyde	14	14									
o-Xylene	48	4	0.050	0.072	0.113	0.162	0.195	0.319	0.050	0.117	0.059
p-Cymene	48	48									
Pentane	48	1	0.193	0.362	0.536	0.674	0.857	1.352	0.050	0.537	0.263
Propane	48	0	0.595	1.195	1.946	2.548	3.998	6.057	0.449	2.071	1.195
Propionaldehyde	14	1	0.050	0.083	0.116	0.246	0.264	0.278	0.050	0.144	0.083
Propylene	48	0	0.110	0.149	0.179	0.288	0.331	0.435	0.093	0.210	0.085
p-Tolualdehyde	14	14									
sec-Butylbenzene	48	48									
Styrene	48	43	0.050	0.050	0.050	0.050	0.052	0.067	0.050	0.051	0.004
tert-Butylbenzene	48	48									
Tetrachloroethylene	48	19	0.050	0.050	0.061	0.078	0.130	0.142	0.050	0.071	0.029
Toluene	48	0	0.329	0.475	0.662	1.094	1.570	3.296	0.178	0.823	0.566
trans-1,2-Dichloroethylene	48	48									
trans-1,2-Dimethylcyclohexane	48	48									
trans-1,3-Dichloropropene	48	40	0.050	0.050	0.050	0.050	0.323	1.596	0.050	0.130	0.268
trans-1,4-Dimethylcyclohexane	48	48									
trans-2-Butene	48	46	0.050	0.050	0.050	0.050	0.050	0.107	0.050	0.051	0.008
trans-2-Heptene	48	48									
trans-2-Hexene	48	48									
trans-2-Octene	48	47	0.050	0.050	0.050	0.050	0.050	0.057	0.050	0.050	0.001

Table 22: 2004 VOC Annual Statistics at Simcoe

Unit: micrograms per cubic metre ($\mu g/m^3$)

	No. of		PERCENTILES								
Compounds	Samples	No. < DL	5%	25%	50%	75%	90%	Max	Min	Mean	Std. Dev.
trans-2-Pentene	48	47	0.050	0.050	0.050	0.050	0.050	0.053	0.050	0.050	0.000
trans-3-Heptene	48	48									
trans-3-Methyl-2-pentene	48	48									
trans-4-Methyl-2-pentene	48	48									
Trichloroethylene	48	37	0.050	0.050	0.050	0.050	0.069	0.124	0.050	0.055	0.013
Undecane	48	20	0.050	0.050	0.061	0.080	0.099	0.134	0.050	0.067	0.021
Valeraldehyde	14	12	0.050	0.050	0.050	0.050	0.063	0.082	0.050	0.053	0.009
Vinylchloride	48	48									

Table 23: 2004 VOC Annual Statistics at Stouffville

Unit: micrograms per cubic metre ($\mu g/m^3$)

	No. of		PERCENTILES								
Compounds	Samples	No. < DL	5%	25%	50%	75%	90%	Max	Min	Mean	Std. Dev.
1,1,1-Trichloroethane	44	0	0.112	0.125	0.135	0.147	0.169	0.213	0.103	0.137	0.022
1,1,2,2-Tetrachloroethane	44	44									
1,1,2-Trichloroethane	44	44									
1,1-Dichloroethane	44	44									
1,1-Dichloroethylene	44	44									
1,2,3-Trimethylbenzene	44	29	0.050	0.050	0.050	0.068	0.163	0.268	0.050	0.074	0.052
1,2,4-Trichlorobenzene	44	44									
1,2,4-Trimethylbenzene	44	4	0.050	0.106	0.159	0.277	0.659	1.155	0.050	0.245	0.253
1,2-Dichlorobenzene	44	44									
1,2-Dichloroethane	44	41	0.050	0.050	0.050	0.050	0.050	0.071	0.050	0.051	0.003
1,2-Dichloropropane	44	44									
1,2-Diethylbenzene	44	44									
1,3,5-Trimethylbenzene	44	26	0.050	0.050	0.050	0.080	0.193	0.328	0.050	0.082	0.065
1,3-Butadiene	44	29	0.050	0.050	0.050	0.054	0.100	0.225	0.050	0.065	0.034
1,3-Dichlorobenzene	44	44									
1,3-Diethylbenzene	44	41	0.050	0.050	0.050	0.050	0.050	0.064	0.050	0.050	0.002
1,4-Dichlorobenzene	44	31	0.050	0.050	0.050	0.064	0.091	0.172	0.050	0.063	0.027
1,4-Dichlorobutane	44	44									
1,4-Diethylbenzene	44	34	0.050	0.050	0.050	0.050	0.122	0.231	0.050	0.066	0.040
1-Butene/Isobutene	44	0	0.130	0.190	0.314	0.409	0.777	1.369	0.071	0.366	0.284
1-Butyne	44	44									
1-Decene	44	44									
1-Heptene	44	44									
1-Hexene	44	32	0.050	0.050	0.050	0.051	0.083	0.173	0.050	0.059	0.027
1-Methylcyclohexene	44	44									
1-Methylcyclopentene	44	43	0.050	0.050	0.050	0.050	0.050	0.065	0.050	0.050	0.002
1-Nonene	44	44									
1-Octene	44	44									
1-Pentene	44	25	0.050	0.050	0.050	0.070	0.136	0.430	0.050	0.080	0.074
1-Propyne	44	35	0.050	0.050	0.050	0.050	0.070	0.147	0.050	0.056	0.017
1-Undecene	44	43	0.050	0.050	0.050	0.050	0.050	0.070	0.050	0.050	0.003
2,2,3-Trimethylbutane	44	44									

Table 23: 2004 VOC Annual Statistics at Stouffville

Unit: micrograms per cubic metre ($\mu g/m^3$)

	No. of		PERCENTILES								
Compounds	Samples	No. < DL	5%	25%	50%	75%	90%	Max	Min	Mean	Std. Dev.
2,2,4-Trimethylpentane	44	0	0.074	0.108	0.184	0.363	0.693	1.193	0.064	0.274	0.253
2,2,5-Trimethylhexane	44	43	0.050	0.050	0.050	0.050	0.050	0.095	0.050	0.051	0.007
2,2-Dimethylbutane	44	18	0.050	0.050	0.056	0.082	0.168	0.473	0.050	0.090	0.086
2,2-Dimethylhexane	44	26	0.050	0.050	0.050	0.074	0.092	0.222	0.050	0.065	0.031
2,2-Dimethylpentane	44	41	0.050	0.050	0.050	0.050	0.050	0.146	0.050	0.053	0.015
2,2-Dimethylpropane	44	41	0.050	0.050	0.050	0.050	0.050	0.070	0.050	0.051	0.004
2,3,4-Trimethylpentane	44	17	0.050	0.050	0.058	0.122	0.177	0.421	0.050	0.095	0.075
2,3-Dimethylbutane	44	5	0.050	0.062	0.084	0.153	0.292	0.825	0.050	0.151	0.167
2,3-Dimethylpentane	44	10	0.050	0.055	0.093	0.156	0.264	0.564	0.050	0.131	0.119
2,4-Dimethylhexane	44	31	0.050	0.050	0.050	0.061	0.105	0.196	0.050	0.063	0.029
2,4-Dimethylpentane	44	24	0.050	0.050	0.050	0.080	0.130	0.356	0.050	0.078	0.064
2,5-Dimethylhexane	44	33	0.050	0.050	0.050	0.051	0.083	0.168	0.050	0.058	0.021
2-Ethyl-1-butene	44	43	0.050	0.050	0.050	0.050	0.050	0.053	0.050	0.050	0.000
2-Ethyltoluene	44	27	0.050	0.050	0.050	0.074	0.173	0.296	0.050	0.078	0.058
2-methyl-1-butene	44	22	0.050	0.050	0.052	0.090	0.166	0.766	0.050	0.104	0.132
2-Methyl-2-butene	44	23	0.050	0.050	0.050	0.113	0.292	0.995	0.050	0.127	0.182
2-Methylheptane	44	13	0.050	0.050	0.067	0.106	0.186	0.336	0.050	0.093	0.066
2-Methylhexane	44	0	0.068	0.115	0.195	0.323	0.524	1.349	0.057	0.269	0.264
2-Methylpentane	44	1	0.128	0.265	0.371	0.640	1.144	3.015	0.050	0.599	0.655
3,6-Dimethyloctane	44	44									
3-Ethyltoluene	44	9	0.050	0.063	0.094	0.177	0.412	0.723	0.050	0.152	0.149
3-Methyl-1-Butene	44	40	0.050	0.050	0.050	0.050	0.050	0.226	0.050	0.057	0.030
3-Methyl-1-pentene	44	44									
3-Methylheptane	44	20	0.050	0.050	0.058	0.100	0.155	0.329	0.050	0.085	0.060
3-Methylhexane	44	3	0.050	0.114	0.191	0.398	0.589	1.487	0.050	0.305	0.318
3-Methylpentane	44	0	0.130	0.193	0.272	0.589	0.800	2.173	0.085	0.455	0.450
4-Ethyltoluene	44	24	0.050	0.050	0.050	0.085	0.207	0.343	0.050	0.086	0.070
4-Methyl-1-pentene	44	44									
4-Methylheptane	44	38	0.050	0.050	0.050	0.050	0.066	0.127	0.050	0.055	0.015
Acetylene	44	0	0.206	0.350	0.482	0.840	1.119	1.929	0.166	0.608	0.380
a-Pinene	44	9	0.050	0.064	0.213	0.458	0.667	1.067	0.050	0.292	0.252
Benzene	44	0	0.237	0.358	0.487	0.898	1.218	1.678	0.147	0.633	0.376

Table 23: 2004 VOC Annual Statistics at Stouffville

Unit: micrograms per cubic metre ($\mu g/m^3$)

	No. of		PERCENTILES								
Compounds	**Samples**	**No. < DL**	**5%**	**25%**	**50%**	**75%**	**90%**	**Max**	**Min**	**Mean**	**Std. Dev.**
Benzylchloride	44	44									
b-Pinene	44	22	0.050	0.050	0.052	0.102	0.126	0.239	0.050	0.078	0.043
Bromodichloromethane	44	44									
Bromoform	44	44									
Bromomethane	44	10	0.050	0.051	0.055	0.065	0.068	0.077	0.050	0.058	0.008
Butane	44	0	0.462	0.904	2.054	3.557	7.559	18.484	0.277	2.979	3.429
Camphene	44	39	0.050	0.050	0.050	0.050	0.051	0.064	0.050	0.051	0.002
Carbontetrachloride	44	0	0.536	0.584	0.619	0.653	0.699	0.758	0.530	0.621	0.056
Chlorobenzene	44	44									
Chloroethane	44	44									
Chloroform	44	0	0.062	0.075	0.083	0.098	0.113	0.161	0.056	0.088	0.024
Chloromethane	44	0	0.967	1.037	1.105	1.228	1.301	1.381	0.918	1.125	0.122
cis-1,2-Dichloroethylene	44	44									
cis-1,2-Dimethylcyclohexane	44	44									
cis-1,3-Dichloropropene	44	44									
cis-1,3-Dimethylcyclohexane	44	32	0.050	0.050	0.050	0.057	0.130	0.211	0.050	0.066	0.040
cis-1,4/t-1,3-Dimethylcyclohexane	44	42	0.050	0.050	0.050	0.050	0.050	0.069	0.050	0.051	0.004
cis-2-Butene	44	21	0.050	0.050	0.052	0.109	0.279	0.874	0.050	0.120	0.168
cis-2-Heptene	44	44									
cis-2-Hexene	44	41	0.050	0.050	0.050	0.050	0.050	0.098	0.050	0.052	0.008
cis-2-Pentene	44	34	0.050	0.050	0.050	0.050	0.108	0.452	0.050	0.074	0.075
cis-3-Heptene	10	10									
cis-3-Methyl-2-pentene	44	41	0.050	0.050	0.050	0.050	0.050	0.080	0.050	0.051	0.006
cis-4-Methyl-2-pentene	44	41	0.050	0.050	0.050	0.050	0.050	0.075	0.050	0.051	0.004
Cyclohexane	44	16	0.050	0.050	0.065	0.115	0.158	0.286	0.050	0.092	0.062
Cyclohexene	44	44									
Cyclopentane	44	11	0.050	0.051	0.073	0.119	0.298	0.728	0.050	0.126	0.138
Cyclopentene	44	41	0.050	0.050	0.050	0.050	0.050	0.107	0.050	0.052	0.010
Decane	44	9	0.050	0.063	0.103	0.195	0.424	1.090	0.050	0.176	0.206
Dibromochloromethane	44	44									
Dibromomethane	44	44									
Dichloromethane	44	0	0.147	0.203	0.285	0.448	0.703	1.950	0.141	0.394	0.363

Table 23: 2004 VOC Annual Statistics at Stouffville

Unit: micrograms per cubic metre ($\mu g/m^3$)

	No. of		PERCENTILES								
Compounds	**Samples**	**No. < DL**	**5%**	**25%**	**50%**	**75%**	**90%**	**Max**	**Min**	**Mean**	**Std. Dev.**
d-Limonene	44	30	0.050	0.050	0.050	0.069	0.142	0.432	0.050	0.080	0.072
Dodecane	40	8	0.050	0.061	0.103	0.203	0.580	1.205	0.050	0.187	0.233
EDB	44	44									
Ethane	44	0	1.221	1.849	2.630	3.208	4.388	7.004	1.115	2.680	1.189
Ethylbenzene	44	0	0.076	0.138	0.232	0.393	0.801	1.452	0.067	0.318	0.292
Ethylbromide	44	44									
Ethylene	44	0	0.390	0.719	1.025	1.413	2.080	4.192	0.346	1.197	0.758
Freon11	44	0	1.455	1.537	1.654	1.818	1.964	2.076	1.391	1.680	0.183
Freon113	44	0	0.453	0.569	0.596	0.669	0.693	0.713	0.448	0.596	0.079
Freon114	44	0	0.089	0.103	0.109	0.118	0.122	0.132	0.089	0.109	0.011
Freon12	44	0	2.181	2.481	2.651	2.819	2.980	3.107	2.157	2.634	0.250
Freon22	44	0	0.524	0.599	0.652	0.709	0.815	1.077	0.517	0.671	0.124
Heptane	44	1	0.059	0.131	0.210	0.356	0.608	1.217	0.050	0.286	0.255
Hexachlorobutadiene	44	44									
Hexane	44	0	0.113	0.210	0.316	0.754	1.522	33.843	0.075	1.949	6.593
Hexylbenzene	37	37									
Indane	44	36	0.050	0.050	0.050	0.050	0.077	0.135	0.050	0.056	0.017
Isobutane	44	0	0.189	0.427	0.709	1.303	2.965	5.343	0.121	1.069	1.095
iso-Butylbenzene	44	44									
Isopentane	44	0	0.632	0.858	1.289	1.864	3.997	13.011	0.362	2.052	2.464
Isoprene	44	23	0.050	0.050	0.050	0.171	0.235	0.346	0.050	0.107	0.078
iso-Propylbenzene	44	41	0.050	0.050	0.050	0.050	0.050	0.080	0.050	0.051	0.005
m and p-Xylene	44	0	0.171	0.330	0.601	1.071	2.127	4.134	0.125	0.859	0.846
Methylcyclohexane	44	5	0.050	0.091	0.166	0.294	0.489	0.776	0.050	0.211	0.161
Methylcyclopentane	44	2	0.061	0.085	0.156	0.340	0.847	6.284	0.050	0.454	1.084
MTBE	44	27	0.050	0.050	0.050	0.079	0.103	0.181	0.050	0.066	0.031
Naphthalene	44	17	0.050	0.050	0.063	0.093	0.260	0.394	0.050	0.101	0.087
n-Butylbenzene	44	41	0.050	0.050	0.050	0.050	0.050	0.074	0.050	0.051	0.005
Nonane	44	15	0.050	0.050	0.071	0.136	0.288	0.780	0.050	0.125	0.139
n-Propylbenzene	44	27	0.050	0.050	0.050	0.069	0.149	0.268	0.050	0.073	0.049
Octane	44	19	0.050	0.050	0.065	0.119	0.278	0.559	0.050	0.112	0.114
o-Xylene	44	0	0.067	0.119	0.214	0.375	0.728	1.401	0.053	0.295	0.283

Table 23: 2004 VOC Annual Statistics at Stouffville

Unit: micrograms per cubic metre ($\mu g/m^3$)

	No. of		PERCENTILES								
Compounds	Samples	No. < DL	5%	25%	50%	75%	90%	Max	Min	Mean	Std. Dev.
p-Cymene	44	42	0.050	0.050	0.050	0.050	0.050	0.057	0.050	0.050	0.001
Pentane	44	1	0.303	0.417	0.713	1.110	2.267	6.174	0.050	1.098	1.235
Propane	44	0	0.868	1.681	2.702	3.676	4.967	8.134	0.530	2.912	1.702
Propylene	44	0	0.144	0.224	0.327	0.509	0.810	1.705	0.124	0.405	0.302
sec-Butylbenzene	44	44									
Styrene	44	34	0.050	0.050	0.050	0.050	0.126	0.473	0.050	0.076	0.079
tert-Butylbenzene	44	44									
Tetrachloroethylene	44	7	0.050	0.062	0.105	0.196	0.284	0.503	0.050	0.135	0.100
Toluene	44	0	0.468	0.934	1.465	2.906	4.331	24.434	0.440	2.429	3.739
trans-1,2-Dichloroethylene	44	44									
trans-1,2-Dimethylcyclohexane	44	44									
trans-1,3-Dichloropropene	44	44									
trans-1,4-Dimethylcyclohexane	44	39	0.050	0.050	0.050	0.050	0.056	0.080	0.050	0.052	0.007
trans-2-Butene	44	20	0.050	0.050	0.059	0.124	0.330	0.929	0.050	0.135	0.193
trans-2-Heptene	44	44									
trans-2-Hexene	44	41	0.050	0.050	0.050	0.050	0.050	0.081	0.050	0.051	0.006
trans-2-Octene	44	36	0.050	0.050	0.050	0.050	0.101	0.166	0.050	0.059	0.026
trans-2-Pentene	44	24	0.050	0.050	0.050	0.098	0.218	0.790	0.050	0.110	0.146
trans-3-Heptene	44	44									
trans-3-Methyl-2-pentene	44	44									
trans-4-Methyl-2-pentene	44	44									
Trichloroethylene	44	6	0.050	0.069	0.089	0.139	0.367	0.739	0.050	0.142	0.157
Undecane	44	6	0.050	0.068	0.117	0.319	0.494	1.094	0.050	0.225	0.243
Vinylchloride	44	44									

Table 24: 2004 VOC Annual Statistics at Windsor

Unit: micrograms per cubic metre ($\mu g/m^3$)

	No. of		PERCENTILES								
Compounds	Samples	No. < DL	5%	25%	50%	75%	90%	Max	Min	Mean	Std. Dev.
1,1,1-Trichloroethane	30	0	0.111	0.125	0.131	0.145	0.165	0.186	0.102	0.136	0.018
1,1,2,2-Tetrachloroethane	30	30									
1,1,2-Trichloroethane	30	30									
1,1-Dichloroethane	30	30									
1,1-Dichloroethylene	30	30									
1,2,3-Trimethylbenzene	30	2	0.050	0.071	0.105	0.129	0.258	0.799	0.050	0.139	0.147
1,2,4-Trichlorobenzene	30	30									
1,2,4-Trimethylbenzene	30	0	0.214	0.373	0.468	0.570	1.143	3.421	0.113	0.618	0.630
1,2-Dichlorobenzene	30	30									
1,2-Dichloroethane	30	28	0.050	0.050	0.050	0.050	0.050	0.059	0.050	0.050	0.002
1,2-Dichloropropane	30	30									
1,2-Diethylbenzene	30	30									
1,3,5-Trimethylbenzene	30	1	0.060	0.092	0.123	0.159	0.323	1.036	0.050	0.179	0.190
1,3-Butadiene	30	3	0.050	0.066	0.083	0.122	0.211	0.461	0.050	0.109	0.082
1,3-Dichlorobenzene	30	30									
1,3-Diethylbenzene	30	26	0.050	0.050	0.050	0.050	0.067	0.206	0.050	0.058	0.030
1,4-Dichlorobenzene	30	13	0.050	0.050	0.060	0.084	0.216	0.426	0.050	0.088	0.082
1,4-Dichlorobutane	30	30									
1,4-Diethylbenzene	30	7	0.050	0.053	0.073	0.110	0.198	0.673	0.050	0.112	0.122
1-Butene/Isobutene	30	0	0.205	0.254	0.362	0.481	0.715	1.478	0.109	0.415	0.253
1-Butyne	30	30									
1-Decene	30	28	0.050	0.050	0.050	0.050	0.050	0.055	0.050	0.050	0.001
1-Heptene	30	29	0.050	0.050	0.050	0.050	0.050	0.119	0.050	0.052	0.013
1-Hexene	30	10	0.050	0.050	0.064	0.084	0.128	0.358	0.050	0.081	0.059
1-Methylcyclohexene	30	30									
1-Methylcyclopentene	30	27	0.050	0.050	0.050	0.050	0.060	0.235	0.050	0.057	0.034
1-Nonene	30	27	0.050	0.050	0.050	0.050	0.092	0.114	0.050	0.055	0.015
1-Octene	30	27	0.050	0.050	0.050	0.050	0.105	0.120	0.050	0.056	0.019
1-Pentene	30	5	0.050	0.057	0.083	0.110	0.157	0.400	0.050	0.095	0.067
1-Propyne	30	8	0.050	0.050	0.065	0.078	0.126	0.284	0.050	0.078	0.046
1-Undecene	30	27	0.050	0.050	0.050	0.050	0.066	0.080	0.050	0.052	0.007
2,2,3-Trimethylbutane	30	29	0.050	0.050	0.050	0.050	0.050	0.051	0.050	0.050	0.000

Table 24: 2004 VOC Annual Statistics at Windsor

Unit: micrograms per cubic metre ($\mu g/m^3$)

	No. of		PERCENTILES								
Compounds	**Samples**	**No. < DL**	**5%**	**25%**	**50%**	**75%**	**90%**	**Max**	**Min**	**Mean**	**Std. Dev.**
2,2,4-Trimethylpentane	30	0	0.123	0.225	0.351	0.503	0.863	1.976	0.120	0.423	0.353
2,2,5-Trimethylhexane	30	26	0.050	0.050	0.050	0.050	0.083	0.197	0.050	0.058	0.028
2,2-Dimethylbutane	30	0	0.056	0.081	0.110	0.157	0.277	0.724	0.055	0.144	0.125
2,2-Dimethylhexane	30	27	0.050	0.050	0.050	0.050	0.073	0.169	0.050	0.057	0.025
2,2-Dimethylpentane	30	27	0.050	0.050	0.050	0.050	0.057	0.153	0.050	0.054	0.019
2,2-Dimethylpropane	30	29	0.050	0.050	0.050	0.050	0.050	0.074	0.050	0.051	0.004
2,3,4-Trimethylpentane	30	3	0.050	0.081	0.127	0.166	0.310	0.744	0.050	0.152	0.132
2,3-Dimethylbutane	30	0	0.093	0.150	0.198	0.272	0.503	1.290	0.068	0.253	0.226
2,3-Dimethylpentane	30	1	0.080	0.105	0.173	0.244	0.410	0.929	0.050	0.205	0.163
2,4-Dimethylhexane	30	10	0.050	0.050	0.069	0.087	0.159	0.432	0.050	0.087	0.073
2,4-Dimethylpentane	30	4	0.050	0.064	0.103	0.138	0.254	0.618	0.050	0.124	0.107
2,5-Dimethylbenzaldehyde	14	14									
2,5-Dimethylhexane	30	12	0.050	0.050	0.057	0.075	0.136	0.353	0.050	0.074	0.058
2-Ethyl-1-butene	30	30									
2-Ethyltoluene	30	2	0.050	0.081	0.117	0.152	0.269	0.836	0.050	0.155	0.154
2-methyl-1-butene	30	5	0.050	0.063	0.087	0.136	0.238	0.743	0.050	0.123	0.129
2-Methyl-2-butene	30	4	0.050	0.054	0.106	0.163	0.338	1.286	0.050	0.163	0.231
2-Methylheptane	30	0	0.059	0.089	0.125	0.182	0.280	0.681	0.054	0.163	0.122
2-Methylhexane	30	0	0.157	0.212	0.306	0.426	0.715	1.730	0.100	0.388	0.306
2-Methylpentane	30	0	0.424	0.604	0.943	1.238	2.081	4.924	0.306	1.097	0.866
2-Pentanone/Isovaleraldehyde	14	3	0.050	0.062	0.090	0.119	0.146	0.163	0.050	0.093	0.037
3,6-Dimethyloctane	30	29	0.050	0.050	0.050	0.050	0.050	0.068	0.050	0.051	0.003
3-Ethyltoluene	30	0	0.126	0.208	0.279	0.357	0.682	1.966	0.065	0.368	0.361
3-Methyl-1-Butene	30	26	0.050	0.050	0.050	0.050	0.060	0.186	0.050	0.056	0.025
3-Methyl-1-pentene	30	29	0.050	0.050	0.050	0.050	0.050	0.072	0.050	0.051	0.004
3-Methylheptane	30	1	0.052	0.074	0.113	0.154	0.277	0.712	0.050	0.144	0.126
3-Methylhexane	30	1	0.110	0.215	0.352	0.556	0.817	1.913	0.050	0.429	0.347
3-Methylpentane	30	0	0.291	0.422	0.725	1.001	1.448	3.004	0.179	0.797	0.558
4-Ethyltoluene	30	1	0.066	0.103	0.137	0.179	0.347	0.972	0.050	0.187	0.182
4-Methyl-1-pentene	30	29	0.050	0.050	0.050	0.050	0.050	0.059	0.050	0.050	0.002
4-Methylheptane	30	18	0.050	0.050	0.050	0.062	0.109	0.295	0.050	0.068	0.047
Acetaldehyde	14	0	0.407	0.782	1.054	1.910	2.022	2.298	0.407	1.199	0.609

Table 24: 2004 VOC Annual Statistics at Windsor

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

	No. of		PERCENTILES								
Compounds	**Samples**	**No. < DL**	**5%**	**25%**	**50%**	**75%**	**90%**	**Max**	**Min**	**Mean**	**Std. Dev.**
Acetone	14	0	2.011	2.734	3.194	4.213	6.057	12.245	2.011	3.977	2.627
Acetylene	30	0	0.482	0.770	1.020	1.330	1.822	2.459	0.193	1.065	0.497
Acrolein	14	7	0.050	0.050	0.052	0.076	0.081	0.133	0.050	0.064	0.023
a-Pinene	30	0	0.070	0.097	0.136	0.270	0.608	0.753	0.069	0.223	0.195
Benzaldehyde	14	3	0.050	0.050	0.080	0.273	0.348	0.437	0.050	0.153	0.134
Benzene	30	0	0.767	0.990	1.457	2.070	3.360	6.257	0.426	1.754	1.223
Benzylchloride	27	27									
b-Pinene	30	26	0.050	0.050	0.050	0.050	0.076	0.137	0.050	0.056	0.018
Bromodichloromethane	30	30									
Bromoform	30	30									
Bromomethane	30	1	0.051	0.057	0.062	0.070	0.108	0.119	0.050	0.068	0.018
Butane	30	0	1.222	2.080	2.986	4.418	7.367	13.355	1.045	3.797	2.599
Camphene	30	28	0.050	0.050	0.050	0.050	0.050	0.154	0.050	0.053	0.019
Carbontetrachloride	30	0	0.511	0.553	0.589	0.651	0.682	0.708	0.495	0.599	0.058
Chlorobenzene	30	25	0.050	0.050	0.050	0.050	0.068	0.444	0.050	0.070	0.076
Chloroethane	30	24	0.050	0.050	0.050	0.050	0.060	0.091	0.050	0.053	0.008
Chloroform	30	0	0.068	0.071	0.092	0.110	0.211	0.264	0.064	0.108	0.052
Chloromethane	30	0	0.993	1.041	1.184	1.279	1.310	1.365	0.932	1.154	0.124
cis-1,2-Dichloroethylene	30	30									
cis-1,2-Dimethylcyclohexane	30	29	0.050	0.050	0.050	0.050	0.050	0.064	0.050	0.050	0.003
cis-1,3-Dichloropropene	30	30									
cis-1,3-Dimethylcyclohexane	30	20	0.050	0.050	0.050	0.058	0.107	0.252	0.050	0.065	0.040
cis-1,4/t-1,3-Dimethylcyclohexane	30	29	0.050	0.050	0.050	0.050	0.050	0.103	0.050	0.052	0.010
cis-2-Butene	30	9	0.050	0.050	0.067	0.106	0.170	0.391	0.050	0.094	0.070
cis-2-Heptene	30	29	0.050	0.050	0.050	0.050	0.050	0.140	0.050	0.053	0.016
cis-2-Hexene	30	28	0.050	0.050	0.050	0.050	0.050	0.130	0.050	0.054	0.017
cis-2-Pentene	30	16	0.050	0.050	0.050	0.079	0.149	0.492	0.050	0.081	0.083
cis-3-Heptene	7	7									
cis-3-Methyl-2-pentene	30	24	0.050	0.050	0.050	0.050	0.092	0.284	0.050	0.062	0.044
cis-4-Methyl-2-pentene	30	28	0.050	0.050	0.050	0.050	0.050	0.146	0.050	0.053	0.018
Crotonaldehyde	14	12	0.050	0.050	0.050	0.050	0.059	0.060	0.050	0.051	0.003
Cyclohexane	30	2	0.050	0.082	0.113	0.148	0.238	0.467	0.050	0.134	0.088

Table 24: 2004 VOC Annual Statistics at Windsor

Unit: micrograms per cubic metre ($\mu g/m^3$)

			PERCENTILES								
Compounds	**No. of Samples**	**No. < DL**	**5%**	**25%**	**50%**	**75%**	**90%**	**Max**	**Min**	**Mean**	**Std. Dev.**
Cyclohexene	30	30									
Cyclopentane	30	0	0.078	0.110	0.169	0.216	0.415	1.007	0.062	0.212	0.185
Cyclopentene	30	28	0.050	0.050	0.050	0.050	0.050	0.172	0.050	0.054	0.022
Decane	30	0	0.059	0.108	0.158	0.237	0.536	1.115	0.051	0.226	0.225
Dibromochloromethane	30	30									
Dibromomethane	30	30									
Dichloromethane	30	0	0.180	0.236	0.279	0.434	0.674	1.919	0.171	0.385	0.324
d-Limonene	30	15	0.050	0.050	0.053	0.091	0.234	0.600	0.050	0.098	0.114
Dodecane	26	0	0.069	0.126	0.196	0.252	0.411	0.903	0.067	0.232	0.182
EDB	30	30									
Ethane	30	0	3.273	4.187	6.104	8.013	15.268	18.588	2.985	6.719	3.860
Ethylbenzene	30	0	0.191	0.304	0.457	0.550	1.142	2.565	0.134	0.555	0.482
Ethylbromide	30	30									
Ethylene	30	0	1.173	1.543	2.049	2.526	3.613	6.967	0.576	2.270	1.245
Formaldehyde	14	0	0.901	1.119	2.009	2.759	4.543	4.548	0.901	2.076	1.241
Freon11	30	0	1.410	1.529	1.611	1.749	1.857	2.053	1.359	1.635	0.157
Freon113	30	0	0.483	0.523	0.575	0.614	0.647	0.671	0.425	0.567	0.060
Freon114	30	0	0.091	0.099	0.108	0.111	0.117	0.120	0.087	0.106	0.008
Freon12	30	0	2.209	2.438	2.562	2.712	2.831	2.940	2.112	2.554	0.198
Freon22	30	0	0.556	0.580	0.715	0.754	0.983	1.869	0.536	0.741	0.257
Heptane	30	0	0.132	0.211	0.306	0.442	0.622	1.472	0.116	0.357	0.259
Hexachlorobutadiene	30	30									
Hexanal	14	0	0.065	0.074	0.099	0.450	0.619	0.908	0.065	0.258	0.272
Hexane	30	0	0.337	0.538	0.900	1.471	2.922	3.698	0.227	1.165	0.929
Hexylbenzene	22	22									
Indane	30	13	0.050	0.050	0.057	0.070	0.127	0.391	0.050	0.078	0.067
Isobutane	30	0	0.700	0.981	1.282	2.170	2.882	4.979	0.503	1.621	0.953
iso-Butylbenzene	30	29	0.050	0.050	0.050	0.050	0.050	0.061	0.050	0.050	0.002
Isopentane	30	0	1.107	1.831	2.751	3.595	5.936	13.463	0.900	3.128	2.386
Isoprene	30	12	0.050	0.050	0.085	0.271	0.631	1.023	0.050	0.216	0.255
iso-Propylbenzene	30	26	0.050	0.050	0.050	0.050	0.068	0.179	0.050	0.057	0.025
m and p-Xylene	30	0	0.483	0.815	1.241	1.535	3.496	7.607	0.341	1.554	1.438

Table 24: 2004 VOC Annual Statistics at Windsor

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

	No. of		PERCENTILES								
Compounds	Samples	No. < DL	5%	25%	50%	75%	90%	Max	Min	Mean	Std. Dev.
MEK	14	0	0.834	1.308	1.856	2.104	4.708	12.160	0.834	2.523	2.934
Methylcyclohexane	30	0	0.066	0.107	0.153	0.197	0.303	0.721	0.063	0.170	0.124
Methylcyclopentane	30	0	0.156	0.254	0.391	0.657	1.059	1.812	0.101	0.481	0.362
MIBK	14	2	0.050	0.066	0.148	0.217	0.443	0.713	0.050	0.188	0.183
MTBE	30	29	0.050	0.050	0.050	0.050	0.050	0.100	0.050	0.052	0.009
m-Tolualdehyde	14	14									
Naphthalene	29	0	0.098	0.191	0.299	0.653	0.835	2.006	0.082	0.452	0.396
n-Butylbenzene	30	26	0.050	0.050	0.050	0.050	0.073	0.187	0.050	0.057	0.026
Nonane	30	2	0.050	0.088	0.114	0.169	0.369	0.793	0.050	0.159	0.146
n-Propylbenzene	30	2	0.050	0.078	0.111	0.136	0.239	0.672	0.050	0.135	0.123
Octane	30	0	0.057	0.101	0.133	0.188	0.308	0.754	0.053	0.165	0.133
o-Tolualdehyde	14	14									
o-Xylene	30	0	0.180	0.287	0.410	0.532	1.076	2.593	0.128	0.526	0.481
p-Cymene	30	23	0.050	0.050	0.050	0.050	0.067	0.097	0.050	0.054	0.012
Pentane	30	0	0.685	0.992	1.368	1.884	3.456	6.725	0.567	1.711	1.212
Propane	30	0	2.077	2.699	4.720	9.908	14.951	19.716	1.703	6.391	4.841
Propionaldehyde	14	0	0.103	0.151	0.226	0.360	0.382	0.461	0.103	0.246	0.111
Propylene	30	0	0.323	0.453	0.692	0.928	1.520	2.906	0.235	0.824	0.577
p-Tolualdehyde	14	14									
sec-Butylbenzene	30	29	0.050	0.050	0.050	0.050	0.050	0.082	0.050	0.051	0.006
Styrene	30	8	0.050	0.050	0.069	0.108	0.193	0.448	0.050	0.097	0.080
tert-Butylbenzene	30	30									
Tetrachloroethylene	30	0	0.070	0.121	0.143	0.224	0.372	0.937	0.066	0.194	0.162
Toluene	30	0	0.986	1.790	2.503	3.735	9.021	19.193	0.711	3.673	3.881
trans-1,2-Dichloroethylene	30	30									
trans-1,2-Dimethylcyclohexane	30	30									
trans-1,3-Dichloropropene	30	30									
trans-1,4-Dimethylcyclohexane	30	28	0.050	0.050	0.050	0.050	0.050	0.106	0.050	0.052	0.010
trans-2-Butene	30	7	0.050	0.051	0.076	0.118	0.201	0.455	0.050	0.106	0.085
trans-2-Heptene	30	30									
trans-2-Hexene	30	26	0.050	0.050	0.050	0.050	0.072	0.240	0.050	0.058	0.035
trans-2-Octene	30	24	0.050	0.050	0.050	0.050	0.089	0.200	0.050	0.059	0.029

Table 24: 2004 VOC Annual Statistics at Windsor

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

Compounds	No. of Samples	No. < DL	PERCENTILES					Max	Min	Mean	Std. Dev.
			5%	25%	50%	75%	90%				
trans-2-Pentene	30	5	0.050	0.064	0.096	0.147	0.307	0.929	0.050	0.140	0.165
trans-3-Heptene	30	29	0.050	0.050	0.050	0.050	0.050	0.065	0.050	0.050	0.003
trans-3-Methyl-2-pentene	30	29	0.050	0.050	0.050	0.050	0.050	0.123	0.050	0.052	0.013
trans-4-Methyl-2-pentene	30	30									
Trichloroethylene	30	9	0.050	0.050	0.083	0.106	0.131	0.268	0.050	0.088	0.046
Undecane	30	0	0.094	0.133	0.188	0.348	0.630	1.437	0.064	0.293	0.272
Valeraldehyde	14	4	0.050	0.050	0.083	0.225	0.310	0.525	0.050	0.146	0.139
Vinylchloride	30	30									

Map 1: Locations of Ambient Air Monitoring Stations in Ontario
(2004)