

10.0 HEALTH AND THE ENVIRONMENT

The City of Hamilton's Roadmap to Sustainability highlights the need to preserve the environment and basic health of our citizens. Two priorities that have been identified through this initiative include: to reduce environmental impacts to air, land and water, and to protect and enhance ecosystems. This section of the report assesses Safe Water Mandatory Program and Air Quality in the City of Hamilton, two components of the natural environment that greatly impact on the health of the population in the City of Hamilton.

The term Environmental Health is used to refer to environmental factors that can impact human health. While the scope of these factors is broad (ranging from Food Safety to Insect/Animal Vector Control), this chapter specifically focuses on indicators related to Air and Water Quality.

In other sections of this report, the authors have compared the City of Hamilton with Middlesex-London, the City of Ottawa, and Windsor-Essex. These comparison health regions were chosen because they are socioeconomically similar to the City of Hamilton and, as such, serve as a means for controlling for socioeconomic characteristics related to health outcomes. Socioeconomic characteristics, however, have little relevance when evaluating environmental health outcomes because these outcomes are more directly impacted by factors related to the geography of the area. Air and Water Quality indicators for the City of Hamilton are, therefore, examined over time.

Water Quality

The consequences of exposure to microbial contaminants in water related to adverse health outcomes are likewise well-documented and reasonably understood. The most prominent recent example of such an exposure is the outbreak of *E. coli* O157:H7 infection associated with the drinking water supply in Walkerton, Ontario in 2000. However, adverse exposures can also be linked to water supplies other than those used for drinking and can involve chemical as well as biological contaminants.

Two indicators of adverse water quality are discussed in this chapter: the number of Boil Water Advisories (BWA) and Drinking Water advisories (DWA) issued in the City of Hamilton, and the number of days "Beaches are Open" recorded for local recreational water areas. BWA and DWA data represent the number of situations where the Medical Officer of Health was of the opinion that the potential existed for possible exposure to unsafe drinking water conditions, in the form of chemical or biological contaminants. Beach closure data considers potential exposure to micro organisms in recreational water. When information displayed in this indicator is considered from a broader Determinants of Health perspective, it also speaks to public access to recreational facilities, which has implications for tourism and recreational activities along Hamilton Harbour.

Air Quality

Adverse health impacts associated with exposure to contaminants in air are diverse and well known. These include correlations in observed hospital admission rates for respiratory illnesses with levels of specific outdoor air pollutants, and increased rates of lung cancer among non-smokers exposed to indoor environmental tobacco smoke.

This chapter focuses on three indicators of outdoor air quality: the average annual level of respirable particulate matter (PM_{2.5}), number of hours that air levels of ozone exceed 50 parts per billion (ppb) each year and the average annual level of nitrogen dioxide. These indicators (described in more detail below) were selected because their relationship to adverse health effects has been well-documented and they are monitored locally by the Ontario Ministry of Environment.



DRINKING WATER AND BOIL WATER ADVISORIES

- Description:**
- The number of Drinking Water Advisories (DWAs) and Boil Water Advisories (BWAs) issued by the Medical Officer of Health to owners/operators of drinking water systems that are regulated under the Safe Drinking Water Act.
 - Depending on the contaminant present, BWAs are issued for bacterial presence while DWAs are issued for chemical presence in drinking water supplies.

- Key Message:**
- In 2004, a total of 30 Drinking Water and Boil Water Advisories were issued by the Medical Officer of Health to various community waterworks owners/operators throughout the City of Hamilton.
 - In 2004, 29 BWAs and one DWA were issued. Of the boil water advisories issued, 11 were issued to municipally owned/operated non-residential drinking water systems. One DWA was issued to a municipal residential water supply.

Number of Drinking Water and Boil Water Advisories, City of Hamilton to Ontario, 2004

Type of Water System	Number of BWAs	Number of DWAs	
Municipal Residential	2	1	
Municipal Non-Residential	11	0	
Non-Municipal Residential	10	0	
Non-Municipal Non-Residential	6	0	
Total	29	1	30

Source: Health Protection Branch, PHCS, City of Hamilton, 2004.



DAYS BEACHES ARE OPEN

- Description:**
- Total number of days of beach openings during the sampling period in 2004.
 - It is important to track “Beaches Open” days because this provides information on the quality of life in our community as well as the health of our local environment.
 - Lake Ontario beaches are reported separately from the Hamilton Harbour beaches.

- Key Message:**
- In 2004, the percentage of Lake Ontario beaches in the City of Hamilton that were open during the sampling season ranged from 87% to 93%.
 - Alternatively, in 2004, the percentage of Hamilton Harbour beaches in the City of Hamilton that were open during the sampling season ranged from 7% to 20%.

Days the Beaches are Open, City of Hamilton, 2004

	Sampling Period (Days)	No. of Days Open	% of Days Open
3 Lake Ontario Beaches			
Beach Boulevard	105	91	87
Van Wagner's	105	98	93
Confederation	105	91	87
2 Harbour Beaches			
Bayfront	105	7	7
Pier 4	105	21	20

Source: Health Protection Branch, PHCS, City of Hamilton, 2005

- Limitations:**
- This indicator discusses two beach areas that are distinctly different. The beaches are not comparable due to environment, location, and physical differences.



ANNUAL AVERAGE NITROGEN DIOXIDE NO₂

Description:

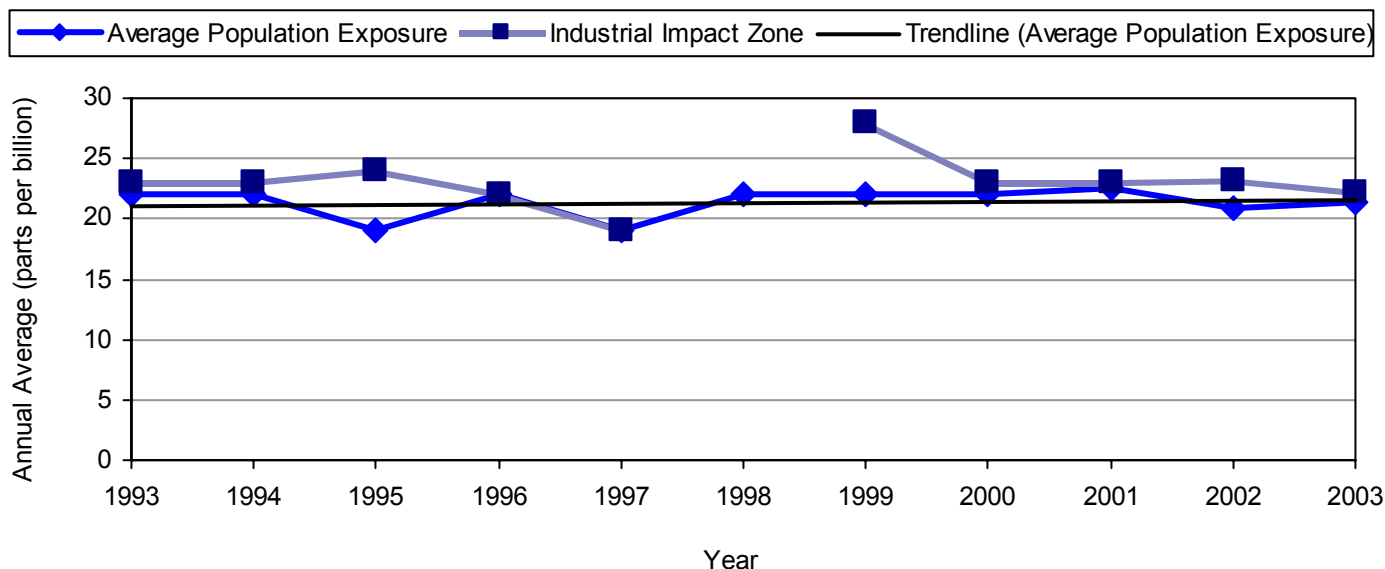
- Annual average nitrogen dioxide (NO₂) exposure is a measure of the yearly average air level of NO₂ measured in the City of Hamilton's air in parts per billion (ppb).
- It is important to monitor air levels of NO₂ because it is responsible for a significant burden of illness in the City of Hamilton. Air pollution, including NO₂ and other air pollutants, will result in approximately 290 premature deaths and 2840 emergency room visits this year.

Source: Ontario Medical Association (OMA) 2005. The Illness Costs of Air Pollution: 2005-2026 Health and Economic Damage Estimates. Toronto: OMA.

Key Message:

- In 2003, the average population exposure to NO₂ in the City of Hamilton was 21.3 ppb, compared to 22.2 ppb in the Industrial Impact Zone.
- The average population exposure of NO₂ in the City of Hamilton has remained relatively stable over the past decade.
- The air levels of NO₂ in the City of Hamilton's Industrial Impact Zone have remained relatively stable over the past four years.
- In 1999, the Industrial Impact Zone had higher air levels of NO₂ than the average population exposure. Since 2000, however, air levels of NO₂ in the Industrial Impact Zone have been comparable with the average population exposure.
- This suggests that NO₂ continues to be a contributing factor to premature death and respiratory illness in the City of Hamilton.

Annual Average Nitrogen Dioxide (NO₂) Trend, City of Hamilton, 1993-2003



Source: Annual Sustainability Indicators Report, City of Hamilton, 2004

Limitations:

- Average NO₂ level for the Industrial Impact Zone in 1998 is not available.
- There is limited information available on the transformation and transport of air pollutants across different communities, which can make it difficult to identify priority actions to address NO₂ emissions.



ANNUAL AVERAGE RESPIRABLE PARTICULATE MATTER (PM_{2.5})

Description:

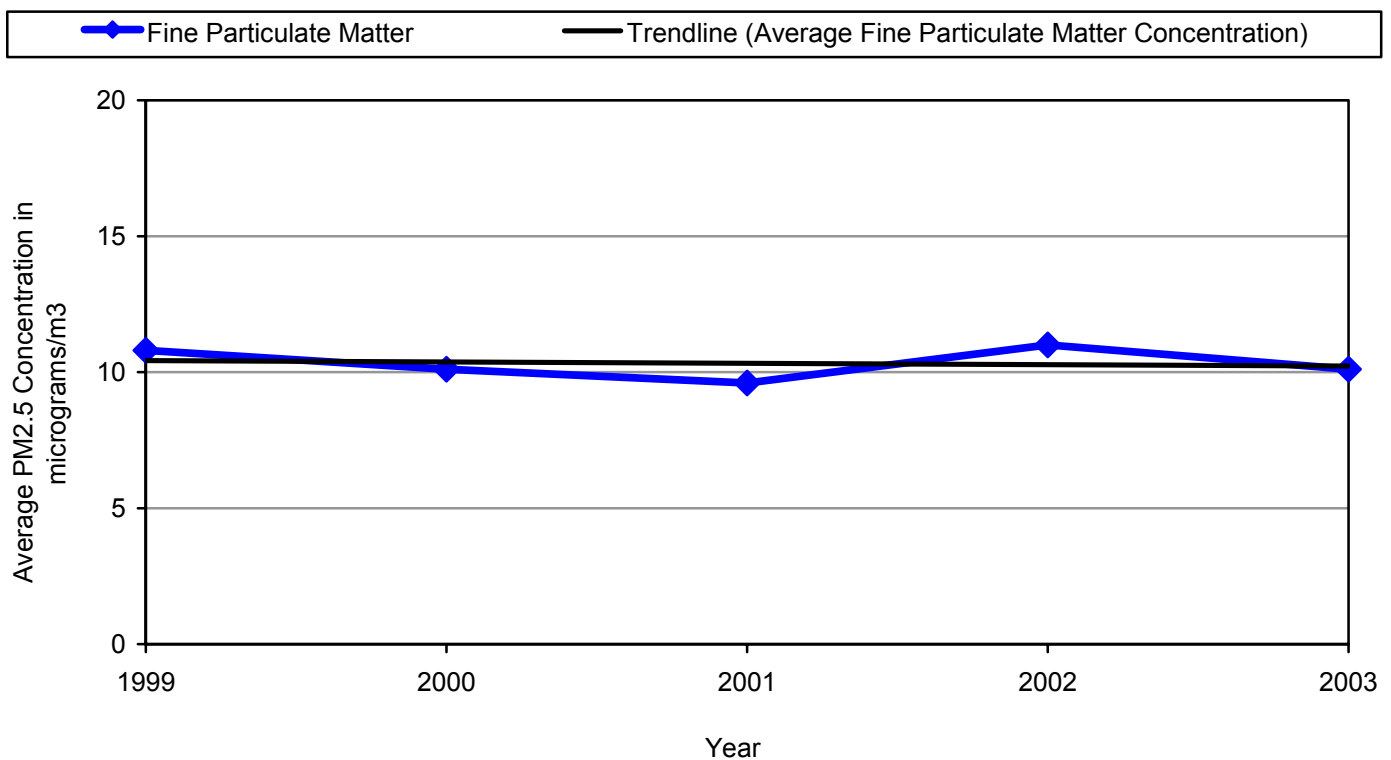
- Annual average respirable particulate matter concentration (PM_{2.5}) is a measure of the yearly average air level of particulate matter that is 2.5 micrometers or less in diameter measured in the air.
- Particulate matter refers to solid and liquid particles that are airborne. PM_{2.5} can penetrate deep into the lungs and has been strongly linked to negative health impacts.
- Air pollution, including PM_{2.5} and other air pollutants, will result in approximately 290 premature deaths and 2840 emergency room visits this year.

Source: Ontario Medical Association (OMA) 2005. The Illness Costs of Air Pollution: 2005-2026 Health and Economic Damage Estimates. Toronto: OMA.

Key Message:

- In 2003, the average PM_{2.5} concentration in the City of Hamilton was 10.1 micrograms/m³.
- Since 1999, air levels of PM_{2.5} have remained relatively stable.
- This means that PM_{2.5} continues to contribute to premature death and hospitalization in the City of Hamilton.

Average Fine Particulate Matter (PM_{2.5}) Concentration, City of Hamilton, 1999-2003



Source: Annual Sustainability Indicators Report, City of Hamilton, 2004

Limitations:

- There is limited information available on the transformation and transport of air pollutants across different communities, which can make it difficult to identify the actions that should be prioritized for action.



GROUND LEVEL OZONE (O₃) – HOURS EXCEEDING 50PPB

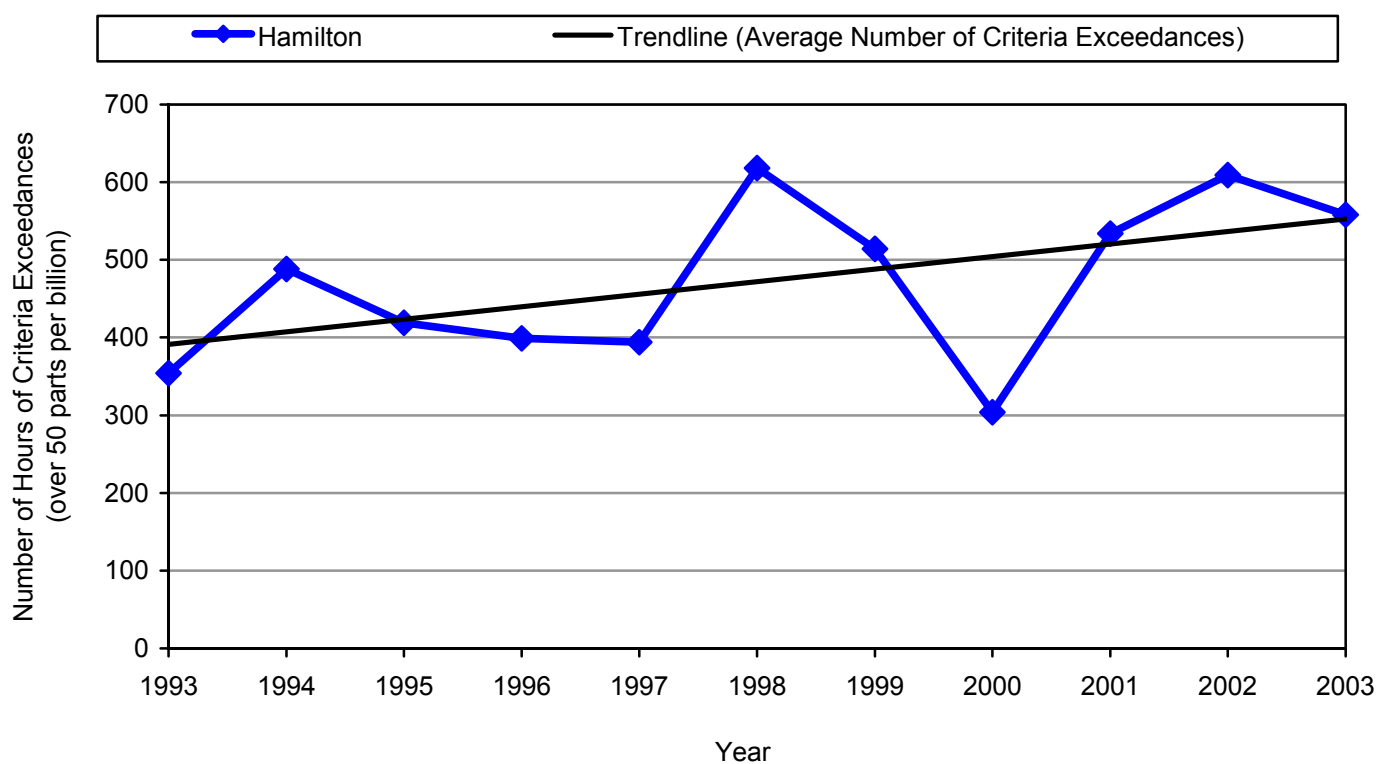
Description:

- The number of hours that air levels of ozone exceed 50 parts per billion (ppb) each year.
- The 50 ppb air level is used by the Ontario Ministry of the Environment to classify air quality as “moderate” under the Air Quality Index.
- Ground level ozone is an important indicator to track because it is a major component of smog that is harmful to human health. Air pollution, including ozone and other air pollutants, will result in approximately 290 premature deaths and 2840 emergency room visits this year. *Source: Ontario Medical Association (OMA) 2005. The Illness Costs of Air Pollution: 2005-2026 Health and Economic Damage Estimates. Toronto: OMA.*

Key Message:

- Over the last decade, ozone levels in the City of Hamilton varied considerably from one year to the next.
- Overall, ozone levels in the City of Hamilton tend to be increasing.
- This suggests that, in the future, the very young, the very old, and those with respiratory conditions who are particularly vulnerable to ozone will be at increased risk for respiratory problems due to exposure to ozone.

Number of Ground Level Ozone (O₃) Criteria Exceedances, City of Hamilton, 1993-2003



Source: Annual Sustainability Indicators Report, City of Hamilton, 2004

Limitations:

- There is limited information available on the transformation and transport of air pollutants across different communities, which can make it difficult to identify priority actions to address ozone emissions.

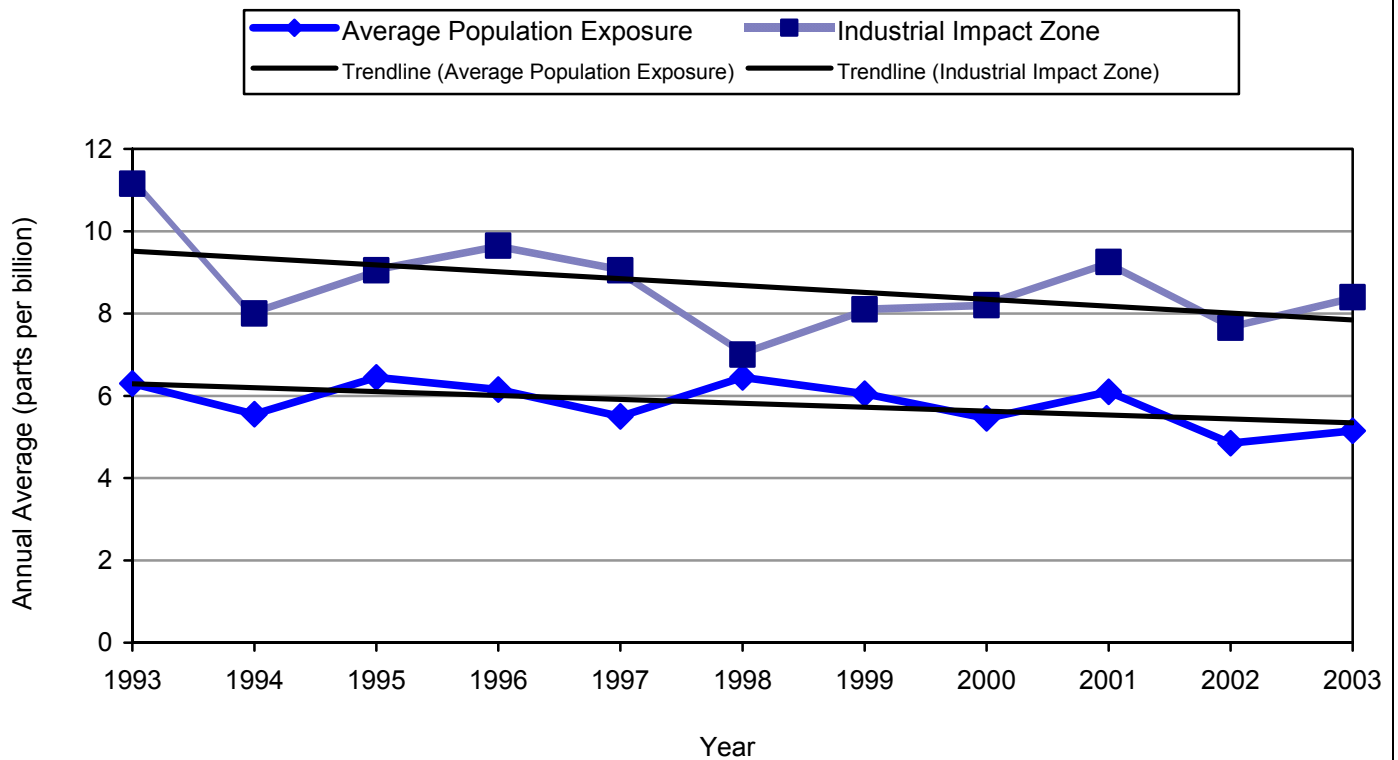


ANNUAL AVERAGE SULPHUR DIOXIDE (SO₂) CONCENTRATION

- Description:**
- Annual average sulphur dioxide (SO₂) exposure is a measure of the average ambient air concentrations of SO₂ measured at monitoring stations throughout the City in parts per billion (ppb).
 - It is important to monitor air levels of SO₂ because it is linked to an increase in daily respiratory hospital admissions and an increase in cardiac and respiratory mortality.

- Key Message:**
- In 2003, the average population exposure to SO₂ in the City of Hamilton was 5.15 parts per billion, compared to 8.4 ppb in the Industrial Impact Zone.
 - The average population exposure of SO₂ in the City of Hamilton has decreased over the past decade.
 - Sulphur dioxide levels in the City of Hamilton's Industrial Impact Zone have fluctuated over the past decade, but overall have decreased.
 - This suggests a reduction in the number of premature deaths and respiratory and cardiovascular hospitalizations in the City of Hamilton where SO₂ is a contributing factor.

Annual Average Sulphur Dioxide (SO₂) Trend, City of Hamilton, 1993-2003



Source: Annual Sustainability Indicators Report, City of Hamilton, 2004

- Limitations:**
- There is limited information available on the transformation and transport of air pollutants across different communities, which can make it difficult to identify priority actions to address SO₂ emissions.

