CleanAir HAMILTON

2004-2005 Progress Report

May 2006

Table of Contents

Appendices

Appendix A – *Clean Air Hamilton* Strategic Plan

Appendix B - 2005/2006 *Clean Air Hamilton* Projects

Appendix C – Air Quality Indicators - Trends & Comparisons

Appendix D – Upwind/Downwind 2006 Conference Summary

Appendix E – Health-Impacting Air Pollutants – Mobile Monitoring Study 2006

Executive Summary

- *Clean Air Hamilton* is a community initiative which promotes and supports improvements to air quality in the City of Hamilton. It has a diverse membership with representation from environmental organizations, businesses, academic institutions, and different levels of government. Initiated in 1998, *Clean Air Hamilton* works to improve air quality in Hamilton by:
  - Initiating research on air quality;
  - Providing policy advice to all levels of government;
  - Encouraging emission reductions among companies operating in Hamilton; and
  - Promoting behavioural changes among individuals living and working in Hamilton.

- *Clean Air Hamilton* receives financial support from the City of Hamilton, reports annually to City Council, and provides direct benefits to the citizens of Hamilton. Viewed as a success at the international, federal, provincial and municipal levels, *Clean Air Hamilton*'s achievements are attributed in large part to the efforts of many volunteers and the funding provided by City Council. The City's funding is matched many times over by the in-kind support offered by experts and organizations that volunteer their resources to the *Clean Air Hamilton* process.

- *Clean Air Hamilton* emerged out of the VISION 2020 process and addresses air quality issues identified initially by that process. *Clean Air Hamilton* initiatives aim to achieve the two VISION 2020 goals that are related to air quality and climate change:
  - To ensure that the City of Hamilton has the best air quality of any major urban area in Ontario; and
  - To reduce greenhouse gas emissions (by 20 percent of 1994 levels in municipal operations and by 6 percent of 1994 levels city-wide).

- As a partner with VISION 2020, *Clean Air Hamilton* programs are designed to address the following VISION 2020 theme areas:
  - Natural Areas and Corridors
  - Reducing and Managing Waste
  - Consuming Less Energy
  - Changing Our Modes of Transportation
  - Land Use Issues in Urban Areas
  - Personal Health and Well-being.

- Together with VISION 2020, *Clean Air Hamilton*'s community-based process for local air quality improvement earned the City of Hamilton the prestigious Dubai International Award for Best Practices in Improving the Living Environment in 2000.

- *Clean Air Hamilton* sponsored its fourth biannual *Upwind/Downwind Conference* in February, 2006. As a result of exposure from the conference and the *Clean Air Hamilton* web site, inquiries continue to be received from municipalities throughout southern Ontario, Canada, the U.S. and overseas related to *Clean Air Hamilton*'s initiatives and activities. One measure of the value of the *Clean Air Hamilton* website is the frequency of access. In 2005, the site received on average 5,630 hits per week or approximately 270,000 hits per year.

- While air quality in Hamilton has improved substantially over the last decade, the levels of air pollution remain higher than, or equal to, those in other communities in southern Ontario.

- There is a broadly-held perception that the City's industrial sector is the major contributor to poor air quality within the City. There is much less awareness and understanding of the significant contributions that transportation sources make to air pollution and the resultant negative health impacts due to these sources.

- Transportation emissions contribute higher levels of some important pollutants than the major industries in Hamilton. Reductions in emissions from both the industrial and transportation sectors are needed to make significant improvements to local air quality. Dust from roads, construction sites and open commercial operations, particularly in the industrial areas of the City, have recently been shown to be significant sources of fine particulate material that can have impacts on human health.

- The planning of our transportation systems and land use patterns will have direct relationships on the levels of future emissions associated with the transportation sector. In turn, these decisions have direct consequences on the future air quality in Hamilton and associated human health impacts.

To continue to gain further improvements in air quality, *Clean Air Hamilton* will have to continue to supplement voluntary contributions of members with renewed and ongoing commitments of funding from key stakeholders, including various levels of government, the City of Hamilton, local industries and academic institutions, as well as recruit new members into the organization.

1.0 Introduction

Clean Air Hamilton presents the 2004-2005 Progress Report on Air Quality to Hamilton City Council. This report presents the activities undertaken by *Clean Air Hamilton* in 2004 and 2005 to help improve air quality in the City of Hamilton. This report gives an update on new initiatives and on activities that have continued from previous years. This document consists of a 57-page report and five appendices:

- Appendix A is a Strategic Action Plan that identifies and organizes the recommendations, actions and priorities that will guide the work of *Clean Air Hamilton* over the next few years;
- Appendix B presents the programs that *Clean Air Hamilton* has undertaken and will undertake in 2006 and beyond;
- Appendix C presents updated Air Quality Trends for Hamilton and comparisons of Hamilton's air quality indicators to other cities in Ontario;
- Appendix D is a summary of the fourth biannual conference called *Upwind/Downwind: Cities, Air and Health*, held in February 2006 and hosted by *Clean Air Hamilton,* the McMaster Institute of Environment and Health, and the City of Hamilton.
- Appendix E is the mobile emissions monitoring study of air pollutants in Hamilton that was undertaken for *Clean Air Hamilton* by Rotek Environmental Inc.

1.1 Background

The former Regional Council endorsed the establishment of *Clean Air Hamilton* (then called the Hamilton-Wentworth Air Quality Improvement Committee or HAQIC) in 1998 following the publication of a series of reports by the Hamilton Air Quality Initiative (HAQI) in October 1997.

HAQI began in 1995 as a cooperative initiative between all levels of government, the community at large, non - governmental organizations, and academia to assess the social, environmental, human health, and economic impacts of air pollution in the City. A set of reports were issued by HAQI in the fall of 1997 which concluded with 25 recommendations directed at actions needed to improve air quality, including suggestions and strategies for individuals, corporations and different levels of government.

1.2 Successes Related to Contributions

Clean Air Hamilton has received attention regionally, nationally and internationally for its outstanding leadership and commitment to improving local air quality. Many innovative initiatives have emerged, directly and indirectly, from this program.

The City of Hamilton currently provides an annual budget of $80,000/year in support of *Clean Air Hamilton* and its activities. This money is matched many times over by funding provided by partner institutions and by in-kind support by volunteers in the community. It has been estimated that *Clean Air Hamilton*'s volunteers provide time, energy and air quality expertise that is worth about $400,000 per year.

Members of *Clean Air Hamilton* have engaged City Council and the community in decision-making and issues related to air quality, including transportation (i.e., City of Hamilton Master Trail Plan, Anti-idling Strategies, Green Fleet Strategy, and Smart Commute), planning (GRIDS), tree planting, education initiatives and community air quality awareness sheets.

2.0 *Clean Air Hamilton*

2.1 Vision Statement

"Clean Air Hamilton is an innovative multi-stakeholder agent of change dedicated to improving air quality in our community. We are committed to improving the health and quality of life of citizens through communication and promoting realistic, science-based decision-making and sustainable practices."

2.2 Goals

Clean Air Hamilton has identified the following goals to guide its work over the next 2 to 5 years:

- To raise *Clean Air Hamilton*'s visibility in the community and be recognized as the authoritative voice on air quality issues;
- To provide information and advice that decision-makers value;
- To influence decision-makers to choose sustainable alternatives;
- To improve air quality throughout the City to meet all ambient air quality criteria;
- To galvanize broad-based support for a process and an action plan to improve air quality; and
- To affect behavioural change to improve air quality.

2.3 Structure, Membership and Participation

The structure of *Clean Air Hamilton* includes the Coordination Committee and three subcommittees: Communications Subcommittee, the Emissions Reduction Subcommittee, and the Health Policy & Research Subcommittee.

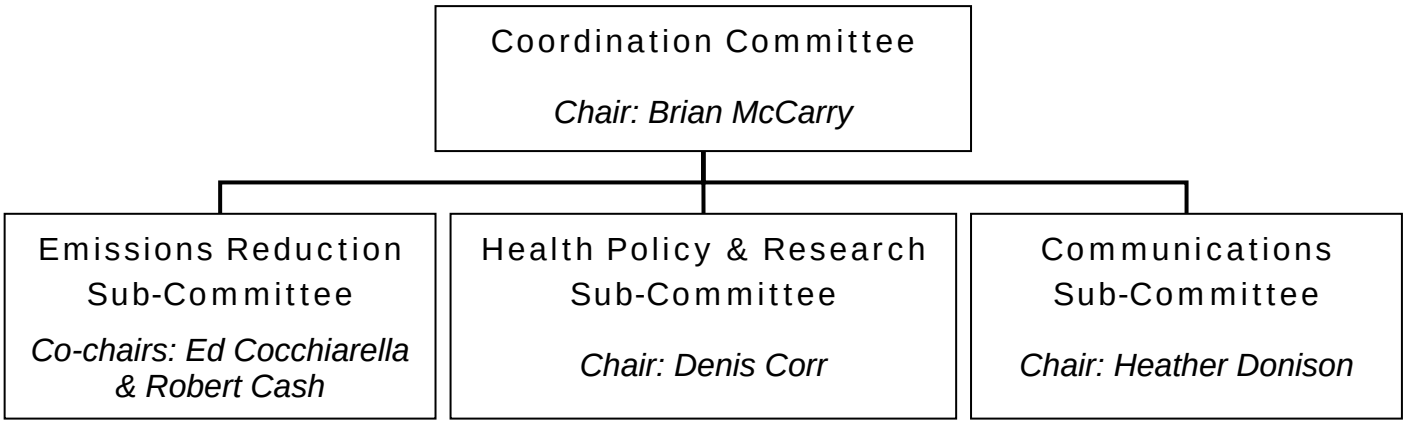


Figure 1: Organizational Structure of *Clean Air Hamilton*

2.4 Co-ordination Committee Membership in 2004 and 2005

Dr. Brian McCarry	McMaster University, Chair
Robert Cash	Archer Daniels Midland
Ed Cocchiarella	Dofasco
Dr. Denis Corr	McMaster University/Rotek Environmental
Heather Donison,	Green Venture
Rob Hall	Public Health Services, City of Hamilton
Linda Harvey	Planning & Economic Development, City of Hamilton
Trevor Horzelenberg	Public Works, City of Hamilton
Phil Jensen	Ontario Ministry of the Environment
Christine McFayden	Stelco
Paul Mason	Planning & Economic Development, City of Hamilton
Sharon Mattiuz	Citizen
Natasha Mihas	Public Health Services, City of Hamilton
Dr. Ted Mitchell	Citizen
Brian Montgomery	Planning & Economic Development, City of Hamilton
Hossein Naghdianei	Environment Canada
Dr. Mark Nazar	Public Health Services, City of Hamilton
Kim Perrotta	Planning & Economic Development, City of Hamilton
Andy Sebestyen	Stelco
Carl Slater	Ontario Ministry of the Environment
Steve Walsh	Public Health Services, City of Hamilton

The Subcommittees develop realistic work plans for their action plans and changes in those work plans are approved by the Coordination Committee.

Clean Air Hamilton is dependent upon the voluntary contributions of its committee members. In order to continue to make gains in air quality improvements in Hamilton, *Clean Air Hamilton* will have to continue to supplement the voluntary contributions of members with a renewed and ongoing commitments of funding from key stakeholders, including various levels of government, the City of Hamilton, local industries and academic institutions, as well as recruit new members into the organization.

Clean Air Hamilton is committed to recruiting new members who have the time, expertise and interest in air quality issues to work in a committee-based format to find ways to improve air quality in this city *Clean Air Hamilton* is particularly interested in engaging with committed individuals who want to work to improve air quality in Hamilton. *Clean Air Hamilton* is interested in working with individuals and with representatives from schools and school boards, community groups and others who partner on one or more actions identified by a *Clean Air Hamilton* subcommittee. Retirees have valuable work experience and expertise they can bring to the table to assist members of the committee and members of the media.

3.0 Hamilton Air Quality

3.1 Air Pollution Health Impacts – Hamilton and Ontario

In 2005, the Ontario Medical Association (OMA) updated their estimated cost of illness associated with air pollution. This update of their 2000 report reflects the improved understanding of the health effects, including new studies on the chronic effects of exposure to air pollution.

The report shows the estimated cost of illness as both a dollar figure, as well as the projected health outcomes including premature death, hospital admissions, emergency room visits, and minor illnesses. In 2005, air pollution caused an estimated 5,800 premature deaths, almost 17,000 hospital admissions and almost 60,000 Ontarians to visit hospital emergency rooms. The adverse health impacts in Ontario each year from trans-boundary air pollution include more than 2,700 premature deaths, almost 12,000 hospital admissions, and almost 14,000 emergency room visits.

The OMA report estimates the cost of air pollution to the economy of Ontario at $16 B per year! This figure is an extraordinary cost which includes health costs, lost time from work, lost productivity in the workforce, etc. While the OMA did not provide a breakdown of these costs for Hamilton, the local figure would be around $1 B, based on the proportion of the local population (~600,000) to the population of the Province of Ontario (~12,500,000). The estimated health impacts on the health of Hamiltonians as a result of smog can be found in **Table 1**.

Table 1: 2005 Illness Cost of Air Pollution – Regional Data for Hamilton-Wentworth Regional Municipality (Source: Ontario Medical Association)

	Number of Individuals in 2005	Number of Individuals in 2026 (Projected)
Premature Deaths	290	500
Hospital Admissions	810	1,200
Emergency Visits	2,840	4,250

The Ontario Medical Association estimated that the economic impact of smog in Hamilton on individual health in 2005 was $2.13 M in Health Care and $1.73 M in lost productivity.

The 2005 OMA report is supported by the 2003 air pollution health assessment report prepared by Michael Jerrett and Talar Sahsuvaroglu of the McMaster Institute of Environment and Health for the City of Hamilton. The Jerrett report estimates that of the five key air pollutants – nitrogen dioxide (NO_2), ground-level ozone (O_3), inhalable particulate matter (PM_{10}), sulphur dioxide (SO_2) and carbon monoxide (CO) – two pollutants (NO_2 and O_3) account for over two-thirds of the adverse health outcomes **(see Figures 2 and 3 and Table 2).** These estimates, which were based on the current health studies and Hamilton's air quality and health statistics, allowed identification of air pollutants that contribute most to adverse human health impacts.

Table 2: Summary of Premature Deaths, Respiratory and Cardiovascular Hospital Admissions Associated with Air Pollutants, Hamilton, 1997

Pollutant	Premature Deaths	Respiratory Hospital Admissions	Cardiovascular Hospital Admissions	Totals
O_3	36	44	191	271
NO_2	27	48	176	251
PM_{10}	14	27	49	90
SO_2	16	20	26	62
CO	3	NA	38	41
Totals	96	139	479	714

Figure 2: Air Pollution Health Impacts in Hamilton

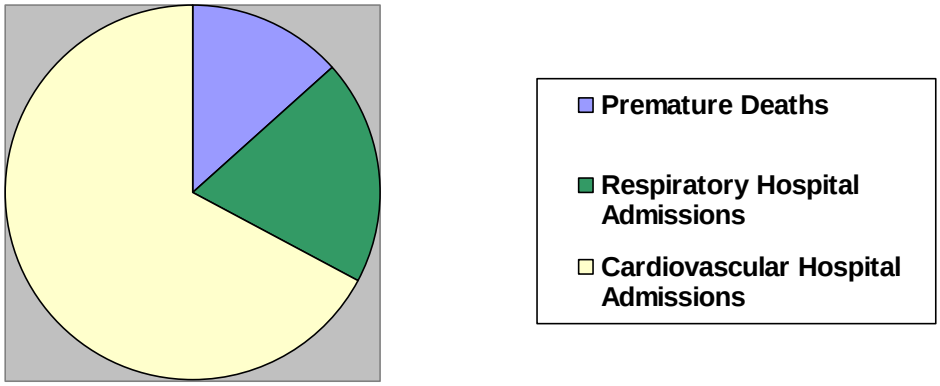
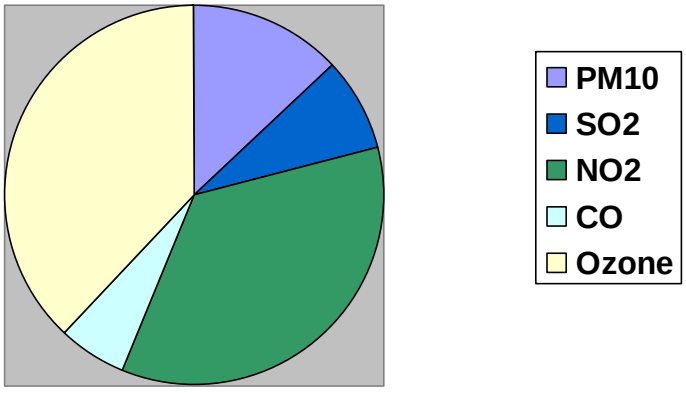


Figure 3: Contribution of Air Pollutants to Air Pollutant Health Impacts, Hamilton (%)



3.2 Hamilton Air Quality – Trends and Comparisons

When we examine trends in ambient air quality in Hamilton over the last decade, it is apparent that there have been significant reductions in the air levels of some pollutants such as benzene, total reduced sulphur, benzo[a]pyrene and SO_2 **(see Appendix C for details)**. Many of these reductions have resulted from actions taken to reduce emissions from the industrial sector and, to a lesser extent, the transportation sector.

Unfortunately, less progress has been made on other fronts: air levels of PM_{10} and NO_2 have remained essentially constant for over a decade; air levels of ground level ozone, which vary substantially from year to year due to weather conditions, have been increasing over the past decade **(see Appendix C)**.

When we compare levels of pollutants in Hamilton to levels of the same pollutants in other southern Ontario communities, it appears that:

- The levels of nitrogen oxides (NO_x) in Hamilton are similar to or slightly higher than other cities in southern Ontario, with the exception of Toronto which has the highest levels in Ontario;
- The levels of ground-level ozone in southern Ontario during the summer months have increased over the past decade; ozone levels in Hamilton are usually equal to or lower than in other Southern Ontario cities;
- The levels of sulphur dioxide (SO_2) in Hamilton tend to be somewhat higher than in other southern Ontario communities due to local industrial activities; however as noted above, SO_2 levels in Hamilton have decreased in recent years **(see Appendix C)**.

Air Quality in Hamilton is impacted by a number of factors that do not occur together in most communities in southern Ontario:

- Hamilton is affected by trans-boundary air pollution (primarily ground-level ozone and air particulate from sources in the mid-western United States) in a manner similar to the pollution experienced in other communities in southwestern Ontario;
- On the occasions when the winds come from the south, Hamilton is impacted by emissions from the Nanticoke coal-fired generating station;
- The roads in and around Hamilton are heavily used by both commuters (gasoline-powered vehicles and transport trucks (diesel-powered vehicles);
- Hamilton is home to a number of large industries; and
- Hamilton's location at the west end of Lake Ontario, the local topography and prevailing weather conditions contribute to situations wherein air pollutants levels in the downtown core are often higher than on the escarpment.

3.3 Emission Sources within Hamilton

The information needed to produce a comprehensive and current inventory of emission sources within the City of Hamilton is not available. **Table 3**, derived from Environment Canada's 2001 Criteria Air Contaminant emissions database, lists total emissions by source type. **Table 4,** derived from the National Pollutant Release Inventory (NPRI), provides the totals of all reported sources of key air pollutants as reported by a selection of local industries. As illustrated in **Figures 4 to 8**, these data suggest that:

- The transportation sector is the leading source of NO_X emissions within the City of Hamilton, followed closely by the industrial sector; surprisingly, off-road sources represent about 65% of all emissions from the transportation sector **(Figure 4)**;
- The industrial sector is the leading source of directly-emitted $PM_{2.5}$, followed by road dust and area sources such as fireplaces, home heating and businesses **(Figure 6)**;
- Road dust, construction activities and area sources such as fireplaces and home heating are the leading sources of PM_{10} , followed by industry sources **(Figure 9)**;
- The industrial sector is the leading source of SO_2 **(Figure 7)**; and
- The industrial sector is the leading source of volatile organic compounds (VOCs), followed by releases due to general solvent use by companies and individuals and emissions from the transportation sector **(Figure 5)**.

Table 3: Estimated Emissions by Source, Hamilton, 2001 (Tonnes/year)

Source	PM_{10}	$PM_{2.5}$	SO_2	NO_X	VOCs	CO
Industrial	10,167	2,764	25,771	10,903	28,540	501,768
Area Sources*	4,212	1,571	427	1469	6,908	8,566
Transportation	879	810	1,638	14,217	10,282	107,808
(Off-Road)* *	(523)	(482)	(464)	(7271)	(5514)	(68572)
(On-Road)	(256)	(241)	(191)	(6320)	(4105)	(41330)
Road Dust***	6,992	1,366	NA	NA	NA	NA
Total	22,250	5,145	27,836	26,589	45,244	618,142

Ref: RWDI Inc. (2004). Transportation Master Plan - Air Quality Policy Paper (May 2004 Draft). Prepared by the IBI Group for the City of Hamilton.

* Includes fireplaces & furnaces in homes & businesses & general solvent use.
** Excludes marine, railroad and aircraft emissions; includes vehicles and equipment used for construction, farming, and lawn and garden maintenance.
*** Road dust includes fine particulate matter from vehicle exhaust, tire wear, construction sites and industrial sites that can become airborne when disturbed.

Sulphur dioxide (SO_2) and nitrogen dioxide (NO_2) are air pollutants that can harm human health directly; these compounds are transformed in the atmosphere to sulphate and nitrate particulate material; these particles are in the size range that is classed as $PM_{2.5}$. Nitrogen oxides (NO_x, mainly NO and NO_2) can also react with volatile organic compounds (VOCs) in the atmosphere to produce ground level ozone.

Figure 4: Emission Sources by Sector, Nitrogen Oxides, Hamilton, 2001 (%)

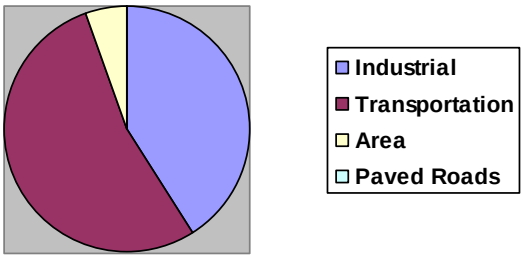


Figure 5: Emission Sources by Sector, Volatile Organic Compounds, Hamilton, 2001 (%)

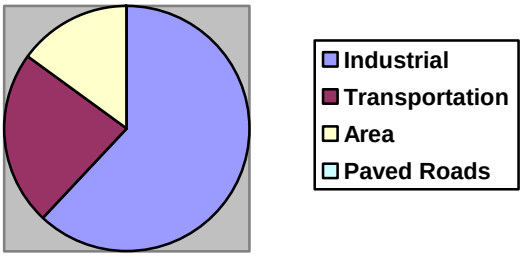


Figure 6: Emission Sources by Sector, Particulate Matter ($PM_{2.5}$), Hamilton, 2001 (%)

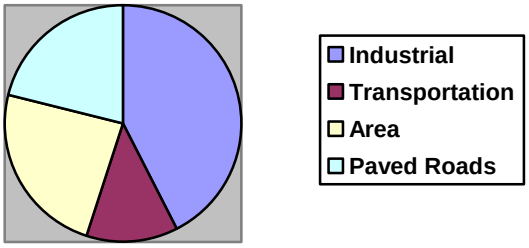


Figure 7: Emission Sources by Sector, Sulphur Dioxide, Hamilton, 2001 (%)

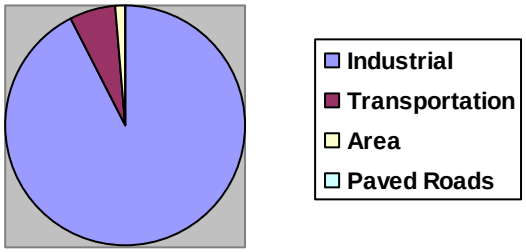


Figure 8: Emission Sources by Sector, Carbon Monoxide, Hamilton, 2001 (%)

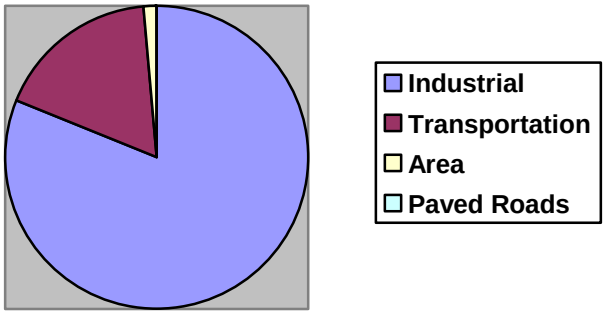


Table 4 - NPRI Total Emissions by Source Category for Hamilton (2004)

Source Category	*CO*	*SO_X*	*NO_X*	*PM_{10}*
Industrial	16,443	11,088	8,414	5,430
Fuel Combustion	9,428	421	1,659	1,707
Transportation	58,490	871	12,766	1,037
Incineration	377	40	173	2
Miscellaneous	197	0	0	118
Open Sources	0	0	0	21,669
Total Tonnes	**84,934**	**12,421**	**23,012**	**29,963**

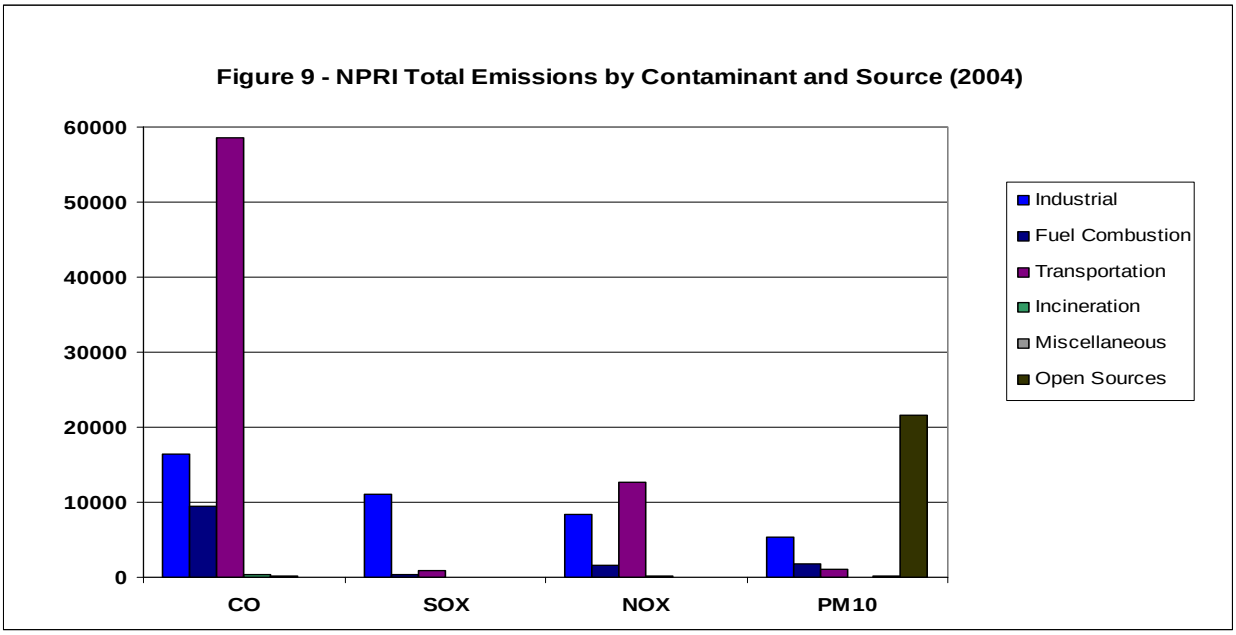


Table 4 shows the total emissions data from the National Pollutant Release Inventory (NPRI), broken down by source category show CO as the air pollutant with the largest emissions. Transportation is the largest source of CO with three times greater emissions than point source industrial emissions. Open sources (including road dust) are the largest contributor to PM_{10}.

Transportation is also the largest source of NO_x, 12,766 tonnes, although industrial sources are of a similar magnitude, 8,414 tonnes. The top three transportation sources for NO_X are Air Transportation, at 1,219 tonnes, Marine Transportation at 558 tonnes and Heavy Duty Diesel Vehicles at 440 tonnes. Thus, the NPRI data show industrial NO_X sources exceeding heavy duty diesel emissions by a factor of 20.

Overall the NPRI data for Hamilton shows 56 point sources of PM_{10}, 14 sources of CO, 13 sources of NO_X and 9 sources of SO_2. In light of these data, we would expect the following percentage contributions by source class in Hamilton, with local variations:

- **Carbon Monoxide**
  69% Transportation, 19% Industry
- **Sulphur Dioxide**
  89% Industry, 7% Transportation
- **Nitrogen Oxides**
  56% Transportation, 37% Industry
- **PM_{10}**
  73% Open Sources/Road Dust,
  18% Industry

3.4 Urban Planning – Linkage to Air Quality and Public Health

Within Hamilton there is a broadly-held perception that the City's industrial sector is the primary contributor to poor air quality in Hamilton. There is much less awareness and understanding of the contributions that urban design and transportation sources make to air pollution. It is not widely recognized by the public that the levels of transportation-based emissions are directly related to urban planning, access to public transit and proximity to mobile transportation corridors.

The planning and implementation of transportation systems and land use patterns will have direct results in the future on local air quality and its attendant impacts on human health.

Increasingly, research in the areas of city design, urban planning and public health is revealing the direct relationships between urban design and public health. According to the *Ontario College of Family Physicians* report (2005), people who live in low-density, car-dependant neighbourhoods are likely to walk less, to weigh more, and to suffer from obesity, high blood pressure, diabetes, cardio-vascular and other diseases, compared to people who live in higher density, multi-use communities.

The Ontario Provincial Policy Statement (2005) states that "Land use patterns within settlement areas shall be based on densities and a mix of land uses which minimize negative impacts to air quality and climate change, and promote energy efficiency".

Urban design strategies in Hamilton can provide choices for transportation modes and encourage the use of public transit through transit–orientated development, focusing community design towards people, not vehicles, and promoting walking and bicycling by creating communities that have facilities and services within walking and biking distance of homes as well as creating a safe and extensive network of bicycle routes.

3.5 Transportation Sector – Linkages between Air Quality and Public Health

Due to recent advances in health-based research, a better understanding of the contributions of oxides of nitrogen and ozone to the health impacts associated with air pollution has developed. This knowledge has shifted the attention of health professionals towards the transportation sector, which is recognized as the leading source of nitrogen oxides in almost every community and a significant contributor to the formation of ground-level ozone.

In recent years, a number of studies have examined the health impacts associated with living near major traffic corridors, such as major highways (e.g., the 400-series highways and the Queen Elizabeth Way) and four-lane roads in urban areas (e.g., Main Street, King Street, Centennial Parkway, etc.). These studies have shown consistently that levels of air pollutants measured near and along these major roadways are significantly higher than levels at locations well away from these sites. Furthermore, pollution-related health impacts are greater among people who live or work near busy roadways.

In 2005 a mobile monitoring study of Hamilton was conducted for the City and *Clean Air Hamilton* to examine a range of issues related to the levels of ambient pollutants near roadways. This study **(see Appendix E)** showed clearly that the highest pollutant exposures (on average) occur due to transportation emissions. Arterial roads and highways contribute substantial amounts of air contaminants to areas directly downwind of these roadways.

Pollutant concentrations were found to decrease quite quickly with increasing distance from roadways; however, concentrations of pollutants on or near roads and the resultant exposures while driving can be very high, due to the close proximity to direct emissions from diesel and gasoline vehicles. Routinely on busy roads, levels of 300 $\mu g/m^3$ of PM_{10} and 150 ppb (parts per billion) of NO were measured, while ambient levels in residential areas were found to be between 20-40 $\mu g/m^3$ of PM_{10} and 4-20 ppb NO. Thus, peak roadway concentrations of these pollutants exceed levels in residential areas by factors of 20-50 times.

These pollutant levels are cause for concern because of the health impacts for drivers, vehicle occupants, cyclists, joggers and pedestrians. Persons who are most susceptible to these pollutants, i.e., the very young, the very old and those with compromised respiratory or cardiovascular systems, should be especially careful to limit their exposures.

Figure 10 **Mobile Monitoring Study - Levels of Certain Air Contaminants near Major Roads vs. Streets in Residential Areas in Hamilton**

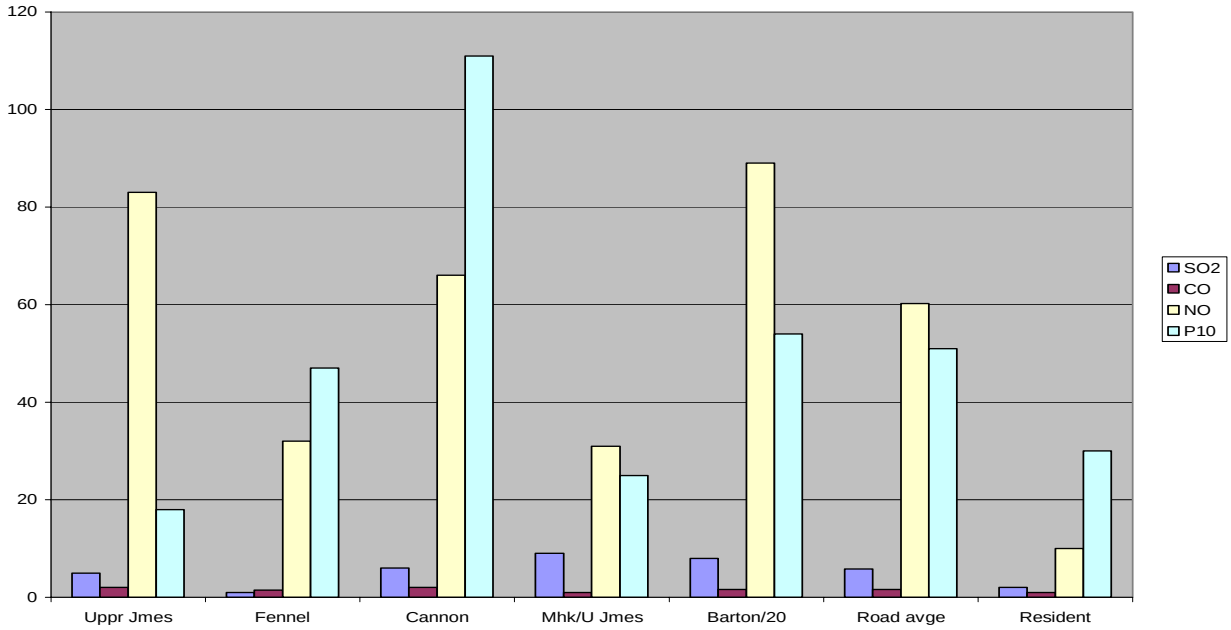
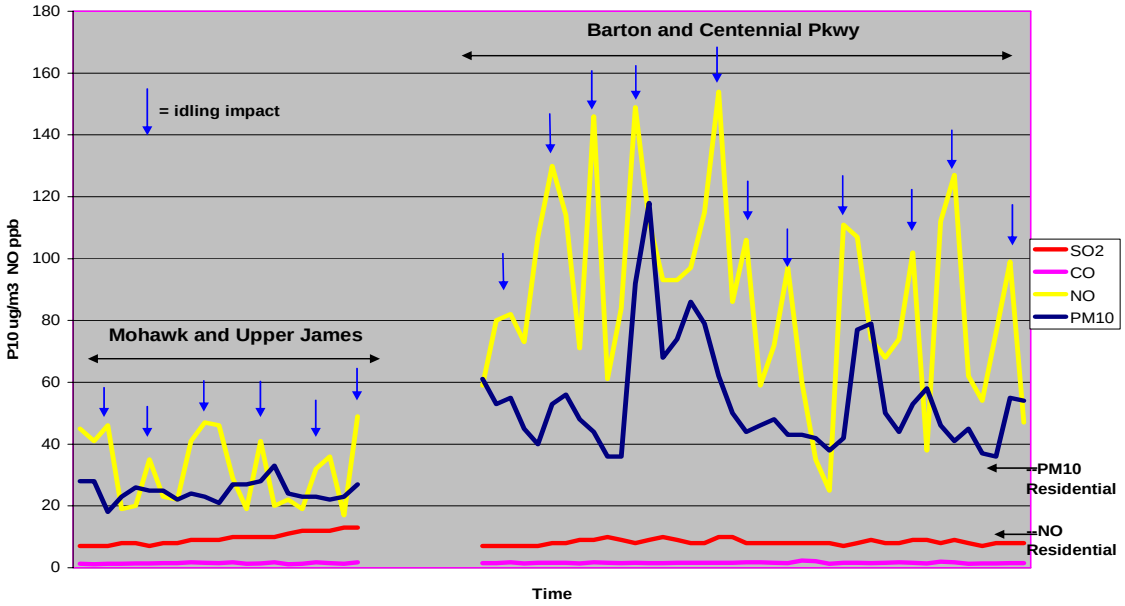


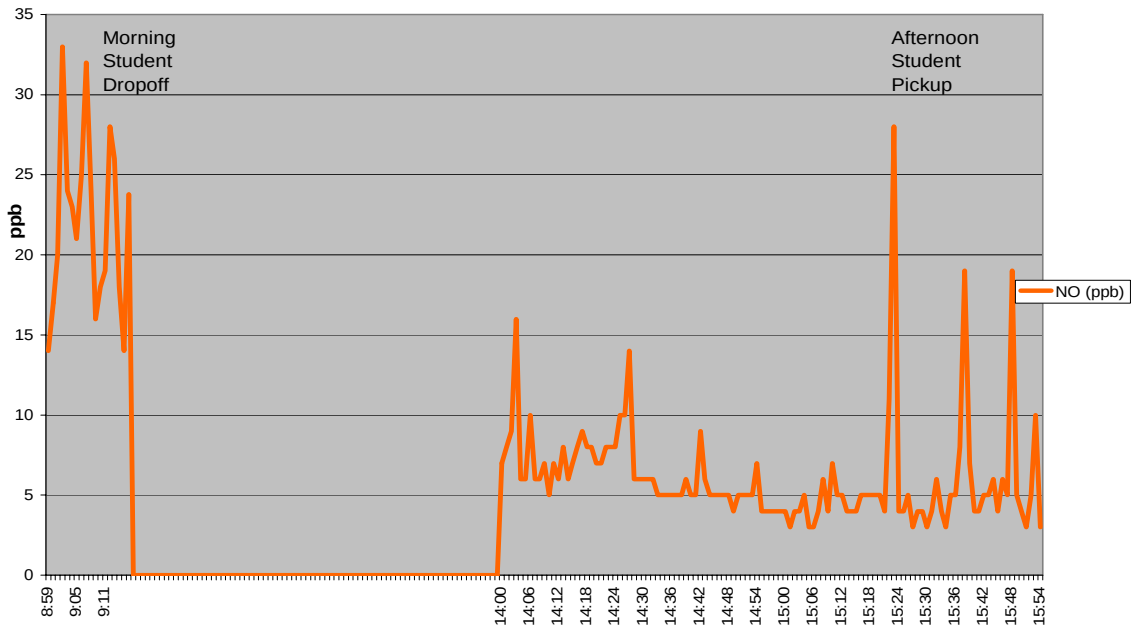
Figure 11 **Ambient Measurements of PM_{10}, NO, CO and SO_2 during Idling at Stop Signs and Traffic Lights at two intersections in Hamilton.**



Idling vehicles, whether at traffic lights or elsewhere, not only waste fuel but also contribute significantly to elevated levels of pollutants. Dramatic rises in pollutant concentrations were measured downwind of intersections while vehicles were stopped at traffic lights. Motorists stopped at red lights on busy roads can be exposed to peak values of air pollution 50 times higher than they would on a quiet street.

Even levels of nitrogen oxides (NO) outside schools can reach very high levels because of cars idling at the curb **(see Figure 11)**. The mobile sampling data showed an average of 24 ppb NO in the morning with idling, but in the afternoon, when vehicle owners were aware of the sampling vehicle and turned their vehicles off, the NO levels remained at 4-5 ppb with the exception a few brief spikes in NO levels.

Figure 12 Nitrogen Oxide Levels Measured Outside a Hamilton School



Resuspended road dust is a very significant source of inhalable particulate, PM_{10}, and respirable particulate, $PM_{2.5}$. Historically, these dusts have been regarded as nuisance dusts and considered mainly as an esthetic problem rather than an “emission” or a concern for human health. The mobile monitoring study data showed ambient levels of over 2000 µg/m^3 PM_{10} and 300 µg/m^3 $PM_{2.5}$ in dust clouds on industrial roads. Severe, local road dust impacts occur routinely in industrial road areas during business hours, when the truck traffic is heaviest. The combination of dirt track-out onto roads and heavy truck traffic along these roads causes large quantities of dust to be resuspended. The chemical composition of these dusts is also problematic, given the nature of the emissions from nearby industries and the deposition of these materials on roadways.

Mobile monitoring studies such as the present study provide a very different “picture” of the sources and impacts of air pollution compared to the view derived solely from data obtained at fixed monitoring stations. The mobile monitoring data emphasizes the need to continue these sorts of studies and the need to reduce air pollution associated directly and indirectly with the transportation sector, i.e., both direct vehicular emissions and road dust re-entrainment.

4.0 *Clean Air Hamilton* and City of Hamilton Air Quality Programs

4.1 Current Programs

Clean Air Hamilton received $80,000 a year in funding from the City of Hamilton in 2004 and in 2005. Funding from the City of Hamilton for *Clean Air Hamilton* was committed primarily to the following programs and activities:

- Upwind/Downwind 2006 Conference
- Mobile Monitoring Study
- Residential Energy Efficiency Project/Wise Energy Use *
- Commuter Challenge*
- Youth Commuter Challenge*
- Anti-idling Campaign & Smog Plan Materials
- Homeowner Tree Subsidy*
- Heritage Tree Project

* Implemented in partnership with Hamilton-Wentworth Green Venture Inc.

4.2 Hamilton Air Monitoring Network

On May 1, 2003, the Hamilton Air Monitoring Network (HAMN) officially took over operation of all 19 air quality monitoring stations in Hamilton, except for the three Air Quality Index (AQI) stations which are still managed by the Ontario Ministry of the Environment. The HAMN network is operated by a consortium of 22 companies in Hamilton. The West Central Region District Office of the Ontario Ministry of the Environment (MOE) has given HAMN the responsibility to operate, maintain and upgrade all the industrial air monitoring equipment previously operated by the MOE in Hamilton. The cost of operating and upgrading the network is borne by the members of the network.

HAMN supplies air quality monitoring reports to the MOE on a regular basis and all reports are audited by MOE staff to ensure a consistent and high quality of data. Since HAMN took over the monitoring network, the percentage of all data which has been validated subsequently exceeds 97%; this is an exceptionally high valid data percentage. The MOE will continue to operate the three AQI sites in Hamilton and has agreed to make this data available to HAMN and the industrial partners in this consortium. This monitoring network is a rather unique partnership in Ontario because of the diversity of the member companies and the broad range of contaminants monitored and reported.

4.3 The Greater Toronto Area Clean Air Council

The City of Hamilton and *Clean Air Hamilton* joined the Greater Toronto Area Clean Air Council in 2005 to provide Hamilton with an opportunity to participate in a dialogue on air quality with other municipalities in southern Ontario. The Greater Toronto Area Clean Air Council is an intergovernmental working group that promotes the reduction of air pollution emissions and increased awareness of regional air quality issues in the Greater Toronto Area through the collective efforts of all levels of government. More information can be found at www.cleanairpartnership.org/gtacac.

4.4 Transportation Demand Management

Travel (or transportation) demand management (TDM) helps us get the most from our transportation systems. It encourages people to:

- Get around by using alternative travel modes (e.g., walking, cycling, taking public transit or carpooling) that consume fewer resources and create fewer undesirable impacts.
- Travel outside peak hours to avoid congestion.
- Travel less by choosing closer destinations or combining several trips into one trip.
- Use telework or other travel options where practical.

TDM can help reduce traffic congestion, defer or eliminate the need for new infrastructure, and improve air quality. It is recognized around the world as a solid investment, particularly when the alternatives are expensive new infrastructure or increased congestion and delay. The City of Hamilton has been active in the creation of the Smart Commute Association that will implement a number of regional and local TDM measures.

The Smart Commute Association (SCA) is a new partnership between cities and regions of the Greater Toronto Area and Hamilton (GTAH) to reduce traffic congestion and to take action on climate change through transportation efficiency. Along with the participating municipalities, Transport Canada is funding the project, and private sector involvement is highly encouraged. The Smart Commute Association oversees regional activities and develops common programs. As part of this initiative, a series of Transportation Management Associations (TMAs), including one in Hamilton, are currently being developed in order to customize and deliver those programs. Smart Commute helps local employers and commuters to explore different commuter choices like carpooling, tele-working, transit, cycling, walking and flexible work hours. Further information can be found at www.smartcommute.ca.

The Hamilton TMA, to be called Smart Commute Hamilton, will involve a majority of the major employers, including the City of Hamilton, Hamilton Health Sciences and other groups, such as McMaster University, Chamber of Commerce and Green Venture. The Hamilton TMA is currently being developed through the networking and assistance measures of City staff, in order to help foster individual employer trip reduction programs. Currently, workshops and stakeholder meetings are being conducted in order to determine the feasibility of a Hamilton TMA and to establish a work plan for the local TMA.

4.5 Corporate Smog Response Plan

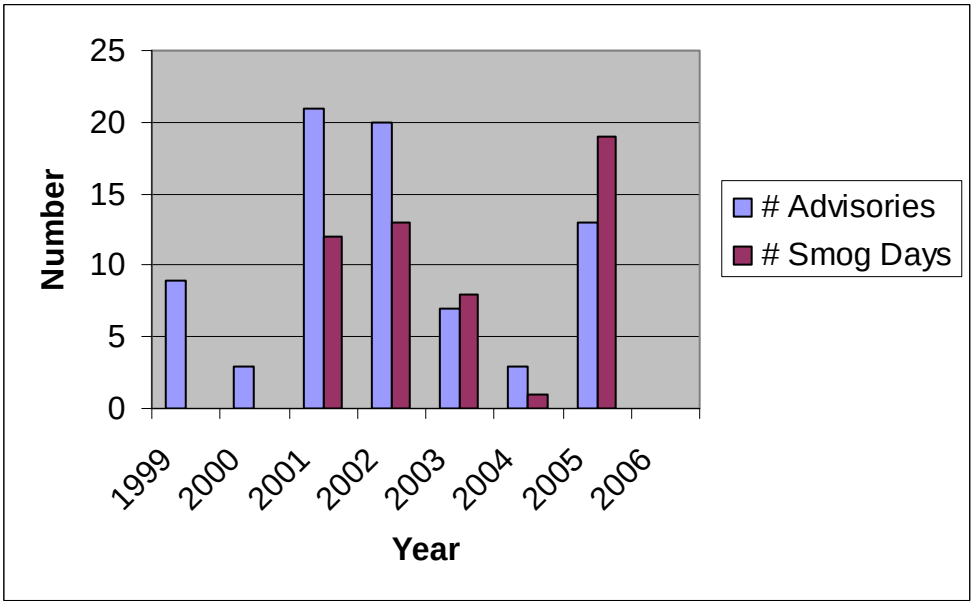
Whenever the Ontario Ministry of the Environment issues a smog advisory for the City of Hamilton, the City implements its Corporate Smog Response Plan (www.cleanair.hamilton.ca/smog/smog-plan.asp). In so doing, the City modifies its activities and thereby reduces emissions of smog-forming pollutants, which would otherwise contribute to the problem. Departmental leads train employees on departmental policies that come into effect on smog days.

What is a Smog Advisory?

The Ontario Ministry of Environment monitors the air and provides a rating of the air quality for that particular day, called the Air Quality Index (AQI). If the Ministry predicts that the AQI will rise to 50 or above within the next 24 hours, it issues a Smog Advisory.

For further information check out the Ontario Ministry of Environment's Air Quality site: www.airqualityontario.com

Figure 13 Number of Smog Advisories in Hamilton – 1999 - 2005



In 2005, there was an increase in the number of smog advisories and smog days declared in Hamilton, with 13 smog advisories from the Ministry of Environment, and a total of 19 smog days. This number was up from 2004 when Hamilton received 3 smog advisories from the Ministry of Environment, and only 1 smog day occurred.

On hot and sunny days, stagnant air can trap pollutants. These pollutants can react in the presence of sunlight to afford a complex mixture of products, including ground-level ozone. This ozone mixes with respirable particulate matter and other pollutants in the air and creates smog.

Sometimes pollution can be trapped close to the earth's surface rather than rising higher up into the atmosphere as is usually the case. Temperature inversions can occur if the ground has cooled very rapidly (usually on a calm, clear night). A cold layer of air forms at ground level and is trapped by warmer air above it. As peak hour arrives in the morning, pollution produced remains trapped in the lower, cooler layer of air, causing concentrations at ground level to become quite high.

In contrast to ozone, respirable particulate matter sometimes reaches high concentrations in the air in winter, potentially leading to winter smog alerts. In short, concentrations of some pollutants can be high all year long, and can trigger smog alerts even in the wintertime. These cold-weather smog alerts highlight the need to improve air quality throughout the year.

4.6 Upwind/Downwind 2006 Conference

The **2006 Upwind Downwind Air Quality Conference: Cities, Air and Health** was the fourth biennial conference focusing on practical solutions to the air quality problems facing urban regions. The 2-day conference aims to provide a forum to enable an improved understanding of air quality issues and human health impacts related to urban sprawl. Secondly, the conference highlighted the roles that industry, community groups and government can play in achieving air quality improvements.

Approximately 132 individuals attended the conference held at the Hamilton Convention Centre on February 27th and 28th, 2006 and hosted by *Clean Air Hamilton*, the McMaster Institute of Health and the Environment, and the City of Hamilton.

4.7 Mobile Monitoring Study

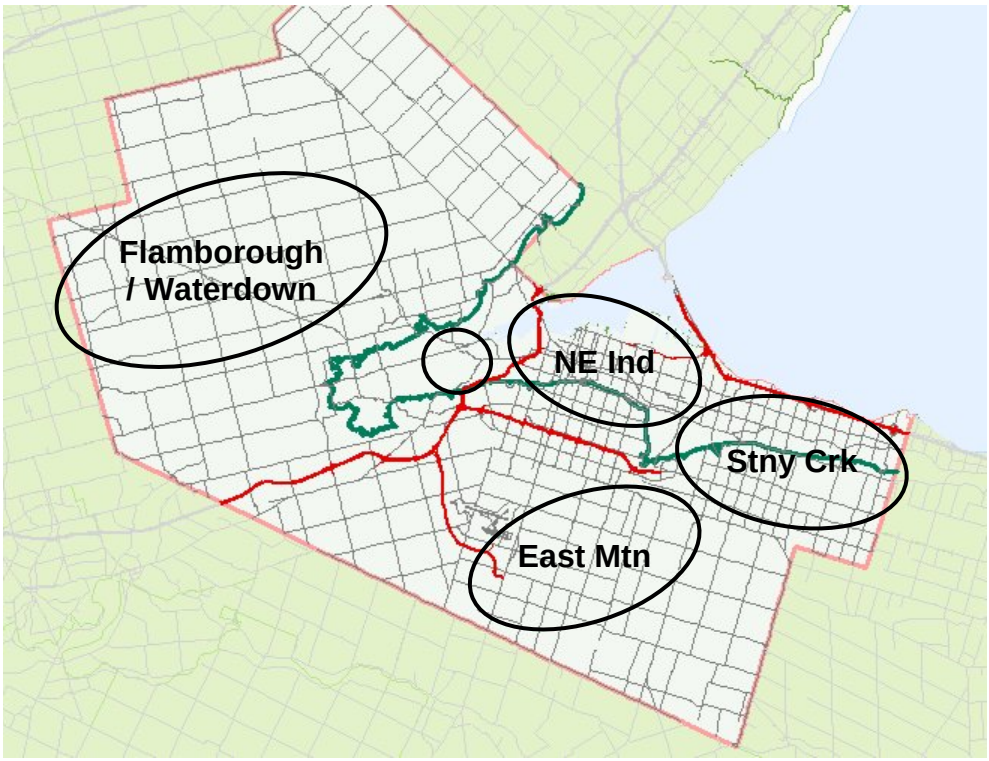
A pilot study to identify PM_{10} sources was undertaken in late 2004 by Rotek Environmental Inc. in order to determine the feasibility of using mobile monitoring to identify and isolate the impact of previously unexamined sources. The pilot study was successful in identifying a major source of Particulate Matter (PM 10) as well as specific roads and intersections that require intensive cleaning (**see Appendix E**).

In 2005, the scope of the study was increased to identify and rank sources of NO_x, SO_2, airborne particulate and CO, including transportation sources, using mobile monitoring techniques.

Historical fixed-site air monitoring data and National Pollutant Release Inventory data for Hamilton were used to develop a target list of sources of health- impacting air pollutants to be monitored in the study. Five separate industrial areas were identified **(see Figure 14)**. These areas are Flamborough / Waterdown (aggregates), East Mountain (aggregates), West Hamilton/Frid Street (mixed industrial and university), Northeast Industrial area (heavy and mixed industrial), and Stoney Creek (mixed industrial, aggregates).

The purpose of undertaking the mobile monitoring study was to obtain ambient air quality data that reflects the variability of sources emissions and exposures that citizens of Hamilton experience in their day-to-day lives. Fixed air monitoring stations tend to be placed in locations which provide an average of the fluctuating air quality in a city; the locations of fixed monitoring sites are selected to provide averaged data that is representative of an area. Recent studies from around the world have shown that short-term, peak exposures can have serious detrimental health effects in some individuals. The mobile study sought to get data on these peak levels of pollutants and thus peak exposures.

Figure 14 Emission Sources by Regions in the Hamilton Area



A mobile command vehicle was fitted with a Global Positioning Satellite (GPS) detector and modified to support a data acquisition and data storage system, along with instruments to measure NO_x (oxides of nitrogen), SO_2 (sulphur dioxide), PM (airborne particulate matter) and CO (carbon monoxide).

Figure 15 Mobile Air Monitoring Unit

Mobile scans for the above pollutants were performed while driving the monitoring unit slowly across in traverses across the city; at selected industrial areas, at selected traffic intersections and at a school during student pickup and drop-off times, the monitoring unit was parked and data was collected for a few to tens of minutes.

Although it might be expected that industrial sources would be responsible for the highest concentrations of pollutants, overall, the highest concentrations were observed near major road intersections and along heavily used roads, particularly those roads affected by dirt track-out in the industrial sectors of the city. It should be noted, however, that industrial point sources still made significant contributions for some pollutants such as SO_2.

Along some roads in the industrial area of Hamilton re-suspended road dust resulted in very high concentrations of inhalable particulate material (PM_{10}, up to 2000 µg/m^3), respirable particulate ($PM_{2.5}$, up to 300 µg/m^3) and very small particles (PM_1, up to 125 µg/m^3). The correlation between particles of different sizes was very strong **(Figure 17)**.

Figure 16 Concentrations of NO measured during a mobile monitoring survey on December 8, 2005 superimposed on a City Map. (Red circles on map show selected residential areas where sampling was done.)

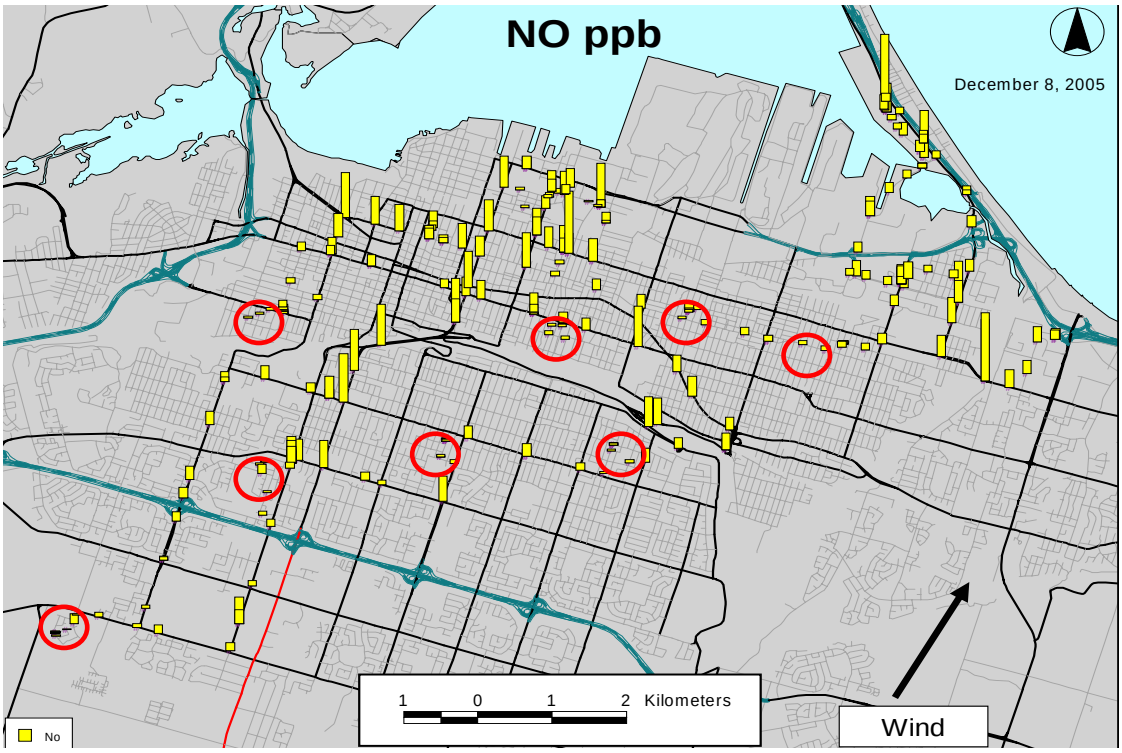


Figure 17 Re-suspended Road Dust: Covariance of PM_{10}, $PM_{2.5}$ and PM_1

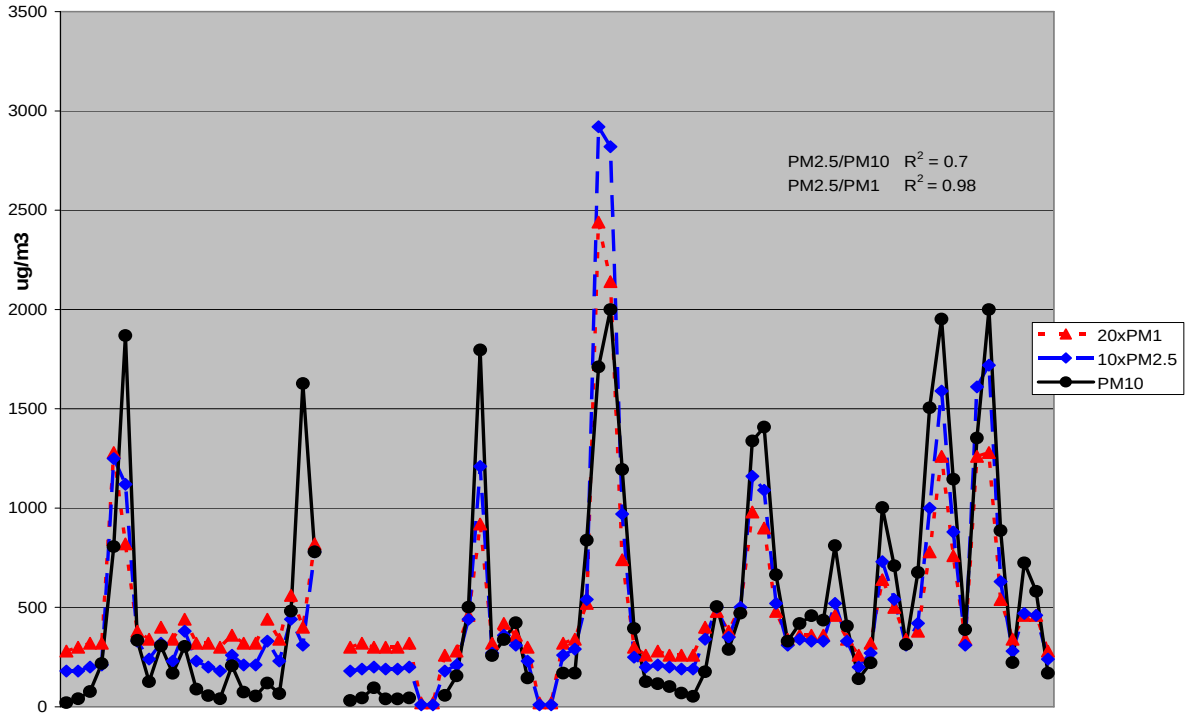


Figure 18 PM_{10} Road Dust Track-out, 18 Locations, 14 Sources Monitored

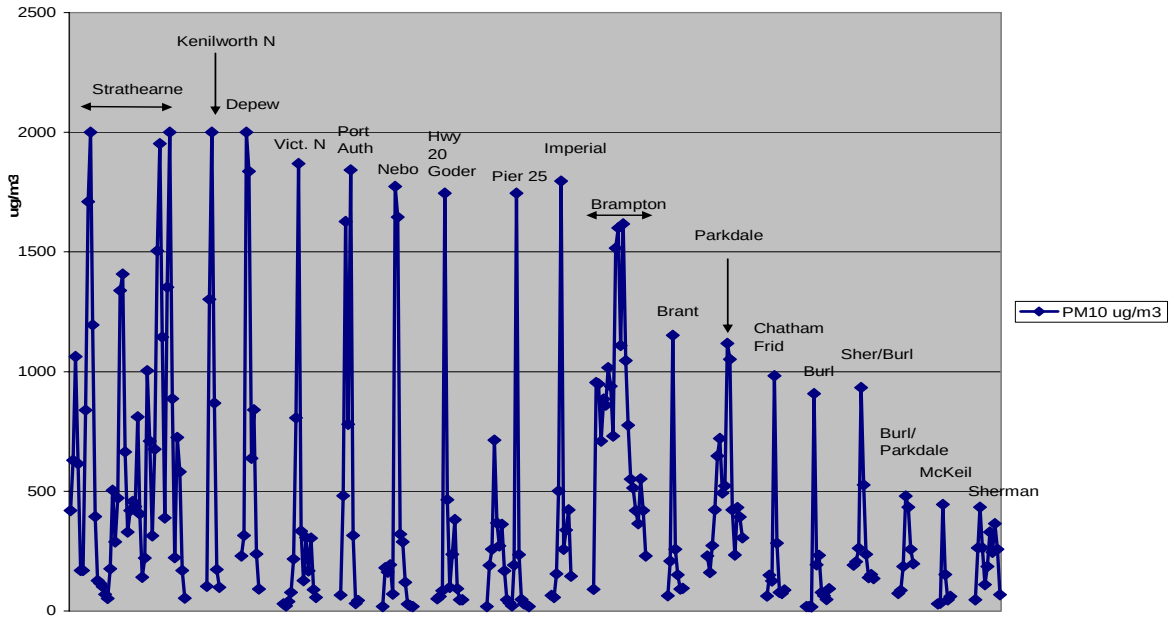


Figure 18 shows a composite of PM_{10} data from 18 different locations in the City where visible clouds of road dust were observed. The peak concentration data from these locations were combined onto a single plot for comparison purposes. Fourteen of these 18 locations were associated with track-out of dirt from specific facilities. These track-out locations in the industrial area of Hamilton were identified as being in need of clean-up and street sweeping to reduce airborne particulate loadings due to road dust resuspension.

Fifteen point sources were ranked in order of peak ambient impacts of CO, NO_x and particulate material. These point source impacts did not correspond, in all cases, with the data in the NPRI emissions database. Some major emissions sources identified in this study are not listed as sources in the NPRI database.

Relatively simple GIS techniques proved very useful in this study for correlating ambient levels with locations within the city; more sophisticated GIS analyses of the data should be incorporated into future mobile monitoring studies.

Analysis and interpretation of the data obtained in this mobile monitoring study has led to a number of specific recommendations that are documented in the full Rotek report **(see Appendix E)**.

4.8 Idling Control

4.8.1 Corporate Policy

In 2005, the City of Hamilton implemented a corporate policy with regards to idling of internal fleets.

4.8.2 Repair Our Air Fleet Challenge

The Repair Our Air Fleet Challenge is a program funded by Natural Resources Canada for the purpose of reducing greenhouse gas emissions through the promotion of efficient fuel management practices and the reduction of vehicle idling. The fleet challenge ran over a 3 month period with 25 fleet participants undertaking the challenge in 2005. Several fleets participating in the Challenge reduced their idling to 5%-10% of operating time in industries where 30% to 40% idling is common.

The City of Hamilton received an award for its leadership in organizing and hosting the launch and wrap-up events that helped make the 2005 Repair Our Air Fleet Challenge a success.

For more information please visit www.repairourair.org

4.8.3 Control By-Law

The City of Hamilton does not have a city-wide anti-idling by-law in place. However, the corporation of the City of Hamilton has implemented a policy with regards to the idling of internal fleets.

4.8.4 Awareness Campaign

Clean Air Hamilton, Green Venture and city staff have developed an idling awareness campaign to be directed at the broader community. The campaign has the dual objectives of reducing greenhouse gas emissions that contribute to climate change and reducing emissions that produce air quality concerns in localized areas. A component of the campaign will be the encouragement of parents waiting to pick up or drop off children at elementary schools to reduce their idling behaviour with the assistance of school administrators, parents and Public Health. The campaign will aim to encourage behavioural change among those who live and work in Hamilton through education and awareness.

4.9 Commuter Challenge

The Commuter Challenge is a week-long, friendly competition where Canadian cities compete to reduce air pollution by using active and sustainable modes of transportation. Participants make a commitment to walk, jog, cycle, rollerblade, take public transit, carpool or telecommute during a pre-established week, called *National Environment Week*.

4.9.1 Youth Commuter Challenge

In 2005, a pilot program was initiated to target youth involvement in the establishment of an on-going trip reduction program in Hamilton's secondary schools. Through the pilot program a number of challenges in engaging youth and school administration in commuting programs were identified.

4.9.2 Corporate Commuter Challenge

The Commuter Challenge promotes sustainable and active commuting and the personal, social and environmental cost/benefits of alternatives to the single occupied vehicle (SOV). This nationwide event takes place annually during Environment Week (first week in June) and engages Canadians in a friendly competition between cities to reduce the number of single occupancy vehicles traveling on our roads. It raises awareness on transportation, air quality and climate change to help reduce green house gases (GHG) that are related to our traveling choices. The Commuter Challenge aims to improve air quality through sustainable commuting habits.

Hamilton has recently celebrated six years of Commuter Challenge success. The City of Hamilton's Commuter Challenge began in the year 2000 when 41 companies and over 700 individuals made the commitment to eco-commute. In 2004, 38 organizations registered for the challenge and participation included nearly 1,900 Hamiltonians. This year the 2005 Hamilton Commuter Challenge had participation from 28 local organizations with a total of 1915 individuals committed to change their commutes during Environment Week, June 5th - June 11th 2005, greater participation than many of Canada's larger cities, including Toronto and Montreal. These exceptional Hamiltonians traveled by active and sustainable transportation reducing single-occupancy car trips by over 162,000 km.

In 2005, the Corporation's participation rate was 143 staff members (or 1.53% of the Corporation). The City was ranked 18th of all the participants within the City of Hamilton this year. In total, staff logged 16,717.90 kilometres and prevented 19924.20 kilograms of pollution from entering the atmosphere.

Hamilton placed fourth in 2005, moving up from its 2004 fifth place position for its category (population under 499,999). Waterloo Region beat Hamilton by less than 0.03%. 1,915 participants from Hamilton joined the Commuter Challenge this year, reducing single-occupancy car trips by over 162,000 km, a number higher than many of Canada's larger cities, including Toronto and Montreal.

4.10 Residential Energy Efficiency

4.10.1 EnerGuide for Houses

EnerGuide for Houses was developed by Natural Resources Canada in 1998 to help homeowners make retrofit choices that improve the comfort and energy efficiency of their homes. The EnerGuide for Houses aim is to identify for homeowners potential home energy savings and to offer a grant incentive for home retrofits.

Certified inspectors visit homes and provide customized plans to improve home energy efficiency and provide homeowners with detailed, easy-to-understand information as well as an energy rating for their home.

In 2003, Natural Resources Canada launched a program providing grants for homeowners who complete energy efficiency retrofits based on the EnerGuide for Houses rating of their home. In 2005, the program was extended to include owners of rental properties and the amount of grant money available to be awarded was increased.

To date approximately 1500 houses in Hamilton and area have had an EnerGuide for Houses energy audit and approximately 40% of these homeowners have completed renovations saving them an average of 33% of their heating costs.

In 2005, the local program contributed to a reduction of 717 tonnes of CO2 emissions, average of 2.26 per household by recommending and encouraging home retrofits. This represents a 75% increase over the 2004 program results. The program also helped Hamiltonian homeowners receive $88,000 in grants for energy efficiency in 2005. In late 2005 the federal government announced an extension of the program to help low income earners participate in the program and reduce their home energy consumption.

Green Venture delivers this program in Hamilton and area through partnerships with Natural Resources Canada, Green Communities Canada and *Clean Air Hamilton*.

4.11 Tree Planting Programs

4.11.1 Homeowner Tree Planting Program

There are many reasons to encourage tree planting within a community: trees act as carbon sinks that can off-set the release of greenhouse gases; they provide shade that can mitigate the “urban heat island effect”; they offer shade that can protect people from the damaging effects of the sun’s ultra-violet light; they can provide cool retreats for people during heat waves; and they may remove many pollutants from the atmosphere.

The City, in partnership with *Clean Air Hamilton* and Green Venture, offers homeowners in Hamilton subsidies of $29.99 per tree for up to two native trees to be planted on their properties. A comprehensive web site, launched in 2002, provides detailed information on the Tree Planting Program (www.greenventure.on.ca/tp.asp).

The 2005 Homeowner Tree Planting Program was able to provide 250 trees to homes in Hamilton. Demand outstripped supply in 2005 in this popular program.

Since 1998, the Tree Planting Program has enabled Hamilton citizens to plant a total of over 2400 native species trees in an effort to improve our local air quality. Assuming these trees live for an average of 50 years each, they will remove over 65,000 tonnes of air pollution from our atmosphere.

4.11.2 Heritage Tree Planting Program

The City has partnered with *Clean Air Hamilton*, the Hamilton Industrial Environmental Association (HIEA), the Royal Botanical Gardens, the Bay Area Restoration Council (BARC), the Hamilton Waterfront Trust, Halton Conservation and the City of Burlington to reintroduce tree species that were once native to this area. The project involves collecting seeds from surviving trees, propagating them in a greenhouse, and then planting the seedlings in and around the Hamilton Harbour.

One of the first plantings of heritage oaks occurred on May 5, 2005, along the Bayfront Park Trail as an activity of the Provincial Envirothon competition. Approximately 35 students, teachers and staff from the City of Hamilton and the Bay Area Restoration Council planted 100 heritage oak whips along the trail. In 2006, over 300 trees will be planted, and seeds will be collected and propagated from White Pine, another heritage tree species.

4.12 Environmental Awards

4.12.1 Vision 2020 Waterfront Trail Project

In November 2000 Hamilton was the recipient of the Dubai International Award for best Practices to Improve the Living Environment in recognition of the Vision 2020 Sustainable Community Initiative and *Clean Air Hamilton* partnership.

After community consultation, the decision was made to use the prize towards placing an interpretive panel and bronze plaques along the Waterfront Trail, and inscribe the names of the Vision 2020 Sustainable Community Award winners – individuals who have worked towards the goals of sustainable community since 1997 including actions to improve air quality. In this way there is a permanent and on-going public record of how citizens, business, organizations, and government have continued to work together over the years.

5.0 Conclusions and Recommendations

Air quality in Hamilton is impacted by a number of factors which include:

- **Trans-boundary Air Pollution.** Originating from sources in the mid-western United States, pollutants are brought to Ontario by prevailing winds; Hamilton is impacted in a manner similar to many other communities in southwestern Ontario;
- **Transportation Sources.** The roads in and around Hamilton are heavily used by automobiles and diesel trucks; the increased numbers of miles driven by commuters and the increased truck traffic has been offset by the improved efficiencies of vehicles;
- **Industrial Sources.** Hamilton is home to a large number of industries from the large, integrated steel mills to medium-size and small industries; and
- **Hamilton's Location and Topography.** The escarpment and the city's location at the west end of Lake Ontario, together with weather local conditions (e.g., thermal inversions) can result in higher levels of air pollutants in the downtown area.

When we examine trends in ambient air quality in Hamilton over the last decade, it is apparent that there have been significant reductions in the ambient levels of some pollutants, primarily from actions taken to reduce emissions from the industrial sector. Continued reductions from industrial sources may follow with the introduction of Ontario Regulation 419/05, concerning local air quality, and Ontario Regulation 194/05, which sets even lower NO_2 and SO_2 limits for specific industrial sectors.

Greater awareness and education is needed to counter the broadly-held perception that the City's industrial sector is the primary contributor to poor air quality in Hamilton. The largest gains in improving local air quality can be achieved addressing measures to reduce transportation-based emissions, including road dust. Transportation-based emissions are directly linked to decisions made related to urban design, urban planning and investments in public transit.

Transportation is identified as the largest source for NO_x, a key pollutant which alone accounts for approximately one third of all deleterious health impacts in humans. NO_x is also a significant precursor to Ground Level Ozone (O_3) which too is responsible for over one third of the adverse health outcomes in Hamiltonians. The third most significant pollutant in terms of health outcomes is inhalable particulate (PM_{10}); transportation sources are a major source particulate through exhaust emissions and the re-suspension of road dust.

The 2005 Rotek Mobile Air Monitoring Study clearly demonstrated that proximity to arterial roads and highways can result in substantial exposures to the air pollutants produced by transportation sources; mobile monitoring data provides a very different picture of the contributions that mobile sources have on the overall air quality in Hamilton. The road dust created by traffic on dirty roads in the industrial area can reach truly extraordinary levels.

When truck traffic is heaviest, the levels of road dust can cause severe local impacts, particularly in industrial areas during business hours. The combination of dirt track-out onto roads and heavy truck traffic causes large quantities of dust to be re-suspended. Significant reductions in the levels of PM_{10} from the transportation sector will require targeted actions on reducing direct emissions from diesel engines as well as policy changes to deal with dirt track-out from industrial sites and increased street sweeping to reduce road dust re-suspension.

Actions to mitigate transportation-based emissions can include initiatives that:

- Encourage the routine maintenance of vehicles, and the use of more fuel-efficient vehicles.
- Increase the use of public transit.
- Reduce the number of automobile and truck trips.
- Clean roads in heavily used traffic corridors.
- Change the behaviour of Hamiltonians with respect to idling vehicles. In particular, anti-idling practices should be promoted near schools as children are more easily affected by air pollution.
- Increase the number of commuter bike routes on non-arterial routes. Innovative signage could be developed to assist cyclists along designated bike routes.
- Sample emissions from diesel trucks at “gateways” to Hamilton on major arterial roads.
- Enhance the capacity of HAMN to monitor NO_x at more sites so as to expand the area of coverage.
- Encourage industrial sites to develop procedures and protocols to reduce track-out from industrial properties.

Re-suspended road dust could be reduced through an integrated approach by reducing track-out (through wheel washing, paving, vegetation planting), increasing road cleaning and using feedback air monitoring (internet-based) for continuous improvement.

In 2006, *Clean Air Hamilton* will continue its recognized work in addressing air quality issues and their relationships to public health outcomes. *Clean Air Hamilton* will continue to develop relationships with City staff to ensure that air quality goals are integrated into the decision-making processes across divisions within the City. *Clean Air Hamilton* will work to expand its membership and to cultivate partnerships with organizations that have goals that are consistent with those of *Clean Air Hamilton* and the City.

Appendix A: *Clean Air Hamilton* Strategic Action Plan – 2004

CAH Groups:
CC – Coordinating Committee
Comm-Communications Sub-committee
Policy – Research & Health Policy Sub-committee
AQC- Air Quality Coordinator
Emiss – Emissions Reduction Sub-committee

Goal	Recommendations	CAH Group	Actions	Resources, Pressures & / or Opportunities	Potential Partners
CAH Effectiveness Build authority/ Visibility of CAH. Galvanize broad-based support for CAH process & plans	• Inform & educate decision makers • Establish support networks	Comm & CC	• Distribute reports to decision makers. • Do presentations(e.g. new MOE Director, MOE Minister, Reg. Dir. Gen of Env Can) • Meet with decision-makers. • Engage Councillors. • Use press to educate broader public. • Engage neighbourhood associations.		
Education & Social Marketing Inform Community Affect Behavioural Change. Educate children	• Public Awareness Campaign. • Reduce Energy use at Home & Work. • Promote car-pooling. • Promote transit. • Reduce # of Single-Occupancy Trips. • Reduce idling. • Encourage alternative modes. • Educate re: Vehicle & Fuel Choices. • Educate re: wood stoves. • Encourage tree planting. • Educate children	Comm	• Develop a Communications Plan. • Link website to other sites. • Distribute pamphlets. • Develop champions. • Identify audiences for various products. • Identify partners & programs. • Work with HSR & downtown merchants re: promoting bus use (e.g. Discount if show bus pass). • Create information for science grades 5/6 curriculum. • Encourage student journals.	• Clean Air On-Line (CAOL) (GTA CAC) • 2020 Social Marketing Campaign (Reduce vehicle & energy use by 20%). • NRCan anti-idling program • Env Can Smart Burn program • Ecoschools curriculum for public/high school. • Waterloo Region curriculum for science	• Public Health • GTA- CAC • Smart Commute Association . • HSR • ACT • School Boards • Parent Groups • The Spectator

				students.	
Reduce Emissions from Transportation Sector – Urban Planning	• Improve efficient flow of traffic. • Encourage mixed land use & compact urban form. • Encourage alternative modes of transportation (walking, biking etc.) • Influence decision-makers re: urban development & air quality.	Policy CC & AQC	• Provide input on Transportation Master Plan. • Develop "lure card" to help make linkages for plans, policies, programs to guide buses, urban design, cycling, and parking and to target industries and institutions. • Participate in GRIDS: Transportation Master Planning. • Present. Re: Upwind Conf for decision-makers in City. • Present. From Ewing to OPPI/CIP Conference	• Provincial Land Use Policies re: Urban Sprawl & Green Belts. • Provincial Transportation Growth Strategy	• Public Health • Bike advocates • HSR • Smart Commute Association • ACT • NGOs • Business Assoc.
Reduce Emissions from Transportation Sector - Greening Fleets	• Advocate for better fuel/ vehicle standards. • Monitor & report on Drive Clean. • Encourage use of alternative fuels/ technologies in City Fleets. • Encourage alternative fuels/technologies in Other Large Fleets in City.	Policy AQC CC Emiss	• Advocate for fuel/vehicle/engine standards – prov & fed. • Annual update • Develop Model Fleet Management Policy for City • Replace old equipment. • Encourage alternative fuels & new technologies. • Encourage rail/marine instead of trucks. • Encourage off-peak shipments.	• Env Can Technical • Diesel Emission Evaluation Project (DEEP)	• City Fleets • Fleet Managers of Large Companies. • Operators of off-road equipment. • OPHA Env Health Program
Reduce Emissions from Energy Use – Green Energy	• Develop & Implement: • Municipal Energy Reduction Programs • Alternative energy pilots • Industrial Energy Reduction Programs • Energy Audit Subsidies • District Heating & Co-generation.	Policy	• Identify Programs • Identify local partners • Advocate linkages to reduction in emissions.	• Climate Change Retrofit/ Project Funds.	• Hamilton Hydro • Hamilton Community Energy • Positive Power (NGO) • Green Venture
Reduce Emissions from Large Point Sources Improve Air Quality – Meet all AQ Criteria	• Advocate for Code of Best Practices • Advocate for BACT EA & practices for major sources	CC Emiss	• Review & report to CC • Compile Emiss Inventory. • Identify Pollution Prevention measures. • Develop action plan for major sources. • Identify targets • Approach Industries. • Compile database of		MOE Air Policy & Climate Change Branch

			improvements. • Contact HEIA		
	• Monitor the imp. of SOP for Iron & Steel Sector	CC	• Status report • Presentation to CC		
Research to Guide & Drive Policy	• Advocate for comprehensive emissions inventory & atmospheric modeling.	MOE	• Assess prov & fed emiss inventories. • Geo reference data • Obtain funds ($20,000) to assemble data. • Add complementary data to provincial template.		
	• Expand monitoring capability re: Ozone, NOx, and PM2.5, & expand mobile monitoring capabilities.	CC Chair	• Identify priorities for monitoring & advocate for MOE support. • Provide real-time web-based geo-referenced air data.		
	• Promote & advocate for research re: health impacts & characteristics of gaseous & particulate pollutants.	Policy (Public Health)	• Keep current on health research. • Monitor CCME air standards. • Recruit someone with expertise to assist.		
	• Advocate for health-based AQI system & asthma index.	Policy AQC	• Identify contact in Health Sciences re: asthma index/ • Update re: Fed/Prov AQI process		
	• Analyse & model transportation emissions	Policy & Chair	• Facilitate the development of Work Plan between City & McMaster (Pavlos Kanoraglou).		
	• Promote research for environmental impacts.	Policy (Env Can & MOE)	• Follow-up re: lichen study. • Develop template for lichen study. • MOE to provide phyto-toxic presentation for Hamilton.		
Reduce Trans-boundary Air Pollution	• Advocate for reduced transboundary air pollution.	CC AQC	• Organize bi-annual Upwind/Downwind Conference		
Tree Projects	• Develop and/or enhance Community Tree Projects.	HEIA Comm	• Green Venture program. • Advertise for volunteers		

Appendix B: 2005/2006 *Clean Air Hamilton* Projects

Table 1: Status of Community-Based Projects, *Clean Air Hamilton*, 2005

Project	Activity	Source Targeted	Audience Targeted	Purpose, Opportunities, Pressures	Possible Partners	Status
Encourage Car-pooling, Public Transit & Telecommuting with Corporate Policies	Promoting Policy Shift	Transport CAC & GHG	Businesses & Institutions	Client base developed from Commuter Challenge; Council Expectations; GV experience.	GV HEIA	Completed (On-going)
Encourage Alternate Modes of Transportation	Promoting Behavioural Shift	Transport CAC & GHG	Individuals – High School Students	Reach audience at age of influence; Extend commuter challenge to new audience.	GV PH	Completed
Discourage Idling	Promoting Behavioural Shift	Transport CAC & GHG	Individuals – Public School students & parents	Council expectations; Community demand; CAH priority	GV PH Works	Initiated (On-going)
Educate kids re: AQ/CC & Energy Use in Transportation & Residential Sectors	Promoting Behavioural Shift	Transport & Area CAC & GHG	Individuals – Public School children & parents	Meet demand by teachers for teaching aids; Educate kids at influential age; Reach adults through kids	GV GTA CAC 20/20 Eco-schools	2006
Promoting Energy Efficiency among home owners.	Promoting Behavioural Shift	Area CAC & GHG	Individuals - home owners	Encourage increased energy efficiency among residents; Drive action	GV	Completed (On-going)
Clean Air Day Media Event to Highlight Positive Actions	Promoting Awareness	All Sectors	Community	Fill the media void created if move away from Commuter Challenge; Increase public awareness	GV City CAH	2006
Establish a Tree Foundation to Support Tree Programs in the City	Adaptation Incentive Program	Area CC Adapt	Individuals – home owners	Supported by Council and the community; Build "Carbon Sink"	GV	2006

Key: GV=Green Venture PH=Public Health HC=Health Canada EC=Environment Canada
CAC=Criteria Air Contaminants GHG=Greenhouse Gases

Note: Program funding and choices will depend upon funds available from other sources/partners.

Table 2: Status of Research and Policy Projects, *Clean Air Hamilton*, 2005

Project	Activity	Source Targeted	Audience Targeted	Purpose, Opportunities, Pressures	Possible Partners	Status
Mobile monitoring of PM on traffic corridors	Monitoring	Fugitive Industrial & Road Dust	Decision-makers	Identify where increased street cleaning may be needed; identify sources of "road dust" for abatement.	Env Can MOE HAMN	Initiated
Monitoring PM/ **NO_2** on Traffic Corridors	Monitoring	Transport CAC	Decision-makers	Support street cleaning purchase; Provide air data that can be correlated with traffic corridor health study.	MOE EC HC PH	Initiated
Correlate Air Data for Traffic Corridors to Health Data	Health Assessment	Transport CAC	Decision-makers	Clarify the source of health risks associated with traffic corridor; Drive policy	McMaster HC	2006
Monitoring VOCs in Industrial Area	Monitoring	Point Toxics & CAC	Business	Assess health risk; Address local concerns; Drive action if needed.	McMaster MOE EC PH	Completed
Re-introduce Air Pollutant Index as Tool to Trigger Industrial Action	Develop Monitoring Tool	Point Toxics & CAC	Business	Develop tool that can trigger immediate action by industry in poor air quality situations; Drive action when needed; Protect health.	McMaster MOE EC PH	2007
Estimate GHG & CAC with Municipal Operations & Reduction Options	Emission Analysis	Point, Area & Transport GHG & CAC	Municipal Government	Support review of City's Corporate Clean Air & Climate Change Plans; Meet Council Demands; Leverage funding and in-kind worth about $30,000 from GTA CAC	GTA CAC MOE EC City Depts	Initiated (2006)
Collect community data for CALPUFF Modeling	Data Collection & Modeling	All Sectors CAC	Policy Makers	Support development of a municipal Clean Air Plan; Determine priorities; Leverage funding worth about $40,000 from GTA CAC.	GTA CAC City Depts MOE EC	Initiated (2006)
Collect community data according to GIS for modeling	Data Collection	All sectors CAC	Policy Makers	Support development of a municipal Clean Air Plan; Meet Council demands; Determine priorities.	McMaster MOE EC City Depts	Under consideration
Develop Asthma Index	Health Warning Tool	All sectors CAC	Community	Develop tool to warn vulnerable populations; Drive policy	McMaster	Under discussion
Link Real-Time Air Quality Data from HAMN to CAH Website	Information Tool	All Sectors	Community	Provide data for the public, Clean Air Hamilton, City.	HAMN	Under discussion

Appendix C: Hamilton's Air Quality - Trends & Comparisons

Air Quality Trends in Hamilton

The graphs in this Appendix illustrate trends in key air quality parameters in Hamilton over the past 10 years. Longer term trends from about 1970 to the mid-1990's can be found in the 1997 HAQI reports. Dramatic reductions in all parameters were observed between 1970 and the mid-1990's because many major industrial sources were outfitted with pollution abatement equipment.

Since 1990, improvements have been less dramatic than in the previous two decades. Pollution abatement technologies and strategies continue to be implemented by companies within the industrial sector and these process upgrades are resulting in measurable improvements to Hamilton's air quality. *Clean Air Hamilton* strongly recommends that all stakeholders evaluate their air pollution control equipment on a regular basis and make every effort to install the most efficient and non-polluting technologies when upgrading their pollution control equipment. Stakeholders are encouraged to identify and install the best available pollution abatement technologies when constructing new facilities or when retrofitting existing facilities.

Clean Air Hamilton recommends that all citizens critically evaluate the fuel and energy efficiencies of any energy-consuming appliances, passenger vehicles and trucks that they may be considering purchasing over the next few months.

In most of the graphs below, one line represents the average ambient air levels in residential areas, based on data from two or more air monitoring stations located at City Sites, while the other line represents the average ambient air levels near industrial sites, based on data from two or more air monitoring stations located near Industry Sites.

The air quality in Hamilton is affected by emissions and activities from both the inside and outside our region. The 1997 Hamilton Air Quality Initiative (HAQI) reports stated that about 50% of the pollutants in Hamilton's airshed were due to sources outside the Hamilton region; indeed, the primary, non-local source was long-range, trans-boundary loadings of pollutants across southwestern Ontario from sources in the mid-west region of the United States.

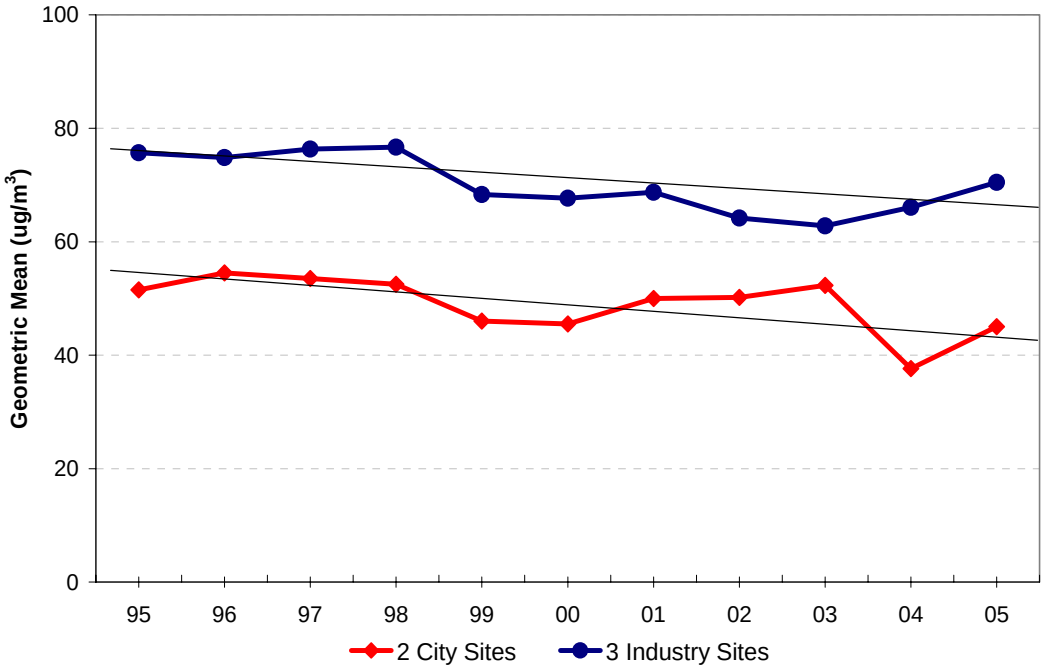
A recent report from the Ontario MOE (June 2005) showed the results of modeling estimates of the impacts of US sources on Canada. These estimates were based on the analysis of large-scale weather patterns and detailed estimates of emissions from sources in Midwestern US states. These results clearly demonstrated that about 50% of all contaminants in the air in Ontario (and in Hamilton) were the result of long-range transport from sources in the US. These sophisticated modeling studies were consistent with the estimates provided in the original HAQI Study reports.

Particulate Material: Total Suspended Particulate

Total suspended particulate (or TSP) includes all particulate material with diameters less than about 45 micrometers (µm). The largest portion of TSP with a diameter of 45 µm is similar to the diameter to a human hair and is just visible to the eye. Air levels of (TSP) in Hamilton have decreased about 15% since 1995. A substantial portion of TSP is composed of road dust, soil particles and emissions from industrial activities and transportation sources.

Included in the TSP category are Inhalable Particulates (PM_{10}) and Respirable Particulate ($PM_{2.5}$). By subtracting the PM10 or the PM2.5 value from the TSP value it is possible to determine the net amount of material in the air with sizes between about 45 µm and either 10 µm or 2.5 µm. The material in the air with diameters between 10 and 45 µm is due almost exclusively to fugitive industrial emissions and re-entrained road dust.

Total Suspended Particulate (TSP) Trend: 1995 - 2005

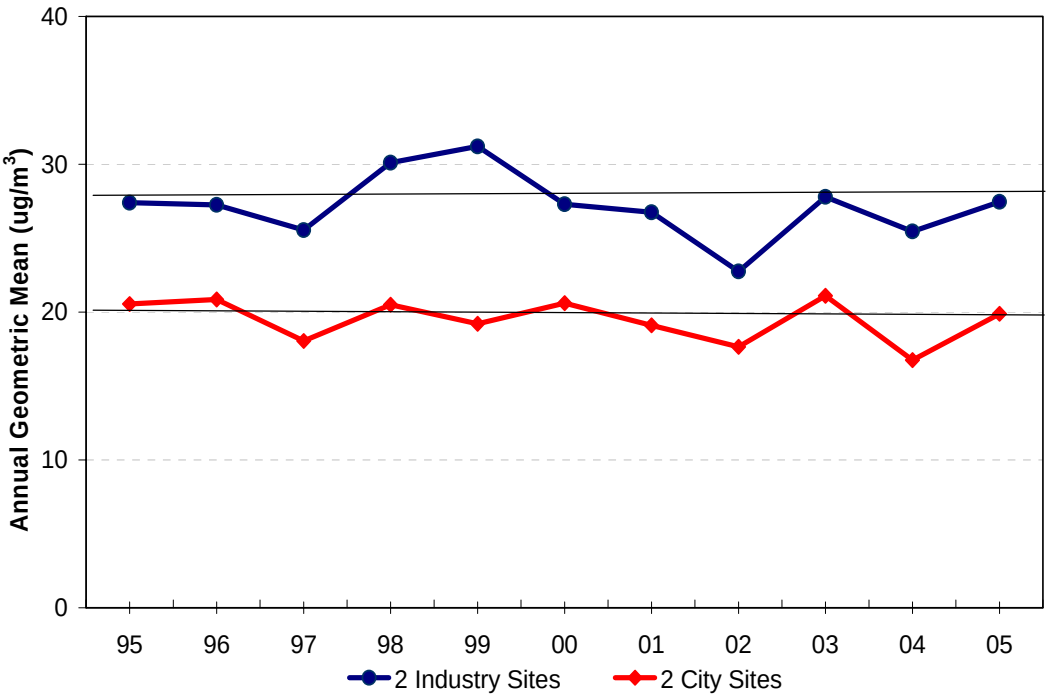


Particulate Material: Inhalable Particulate Matter (PM_{10})

Inhalable particulate matter (PM_{10}), the airborne particles that have diameters of 10 µm or less, is a subset of TSP. PM_{10}, which often makes up about 40% of TSP, has been clearly and consistently linked to respiratory and cardiovascular health impacts in humans. The ambient levels of PM_{10} in Hamilton have remained relatively constant for the past decade. It has been estimated that: between 40 and 70% of the PM_{10} in Hamilton's air originates from outside the community; between 15 and 30% originates from urban sources such as vehicles and wood-burning fireplaces; and between 10 and 45% originate from industries that operate in the City. In areas of the city near the industrial sectors the contributions of industrially generated PM_{10} is greater.

The modest decrease in TSP levels over the past 10 years while laudable has not been reflected in a parallel decrease in the PM_{10} data. The reason for this difference in trends lies in the sources of TSP and PM_{10}. TSP is derived primarily from industrial activities and road dust re-entrainment by vehicles; efforts to control fugitive emissions by industries and increased attention to street sweeping to reduce road dust have led to much of the reduction in TSP over the past decade. On the other hand, the PM_{10} fraction is derived primarily from vehicle exhaust emissions and the finer fraction of road dust. Car and truck traffic numbers have remained constant in Hamilton over recent years and this is reflected in the unchanging trend in PM_{10} over the past decade both in the industrial areas and the city areas.

Inhalable Particulate (PM_{10}) Trend: 1995 - 2005

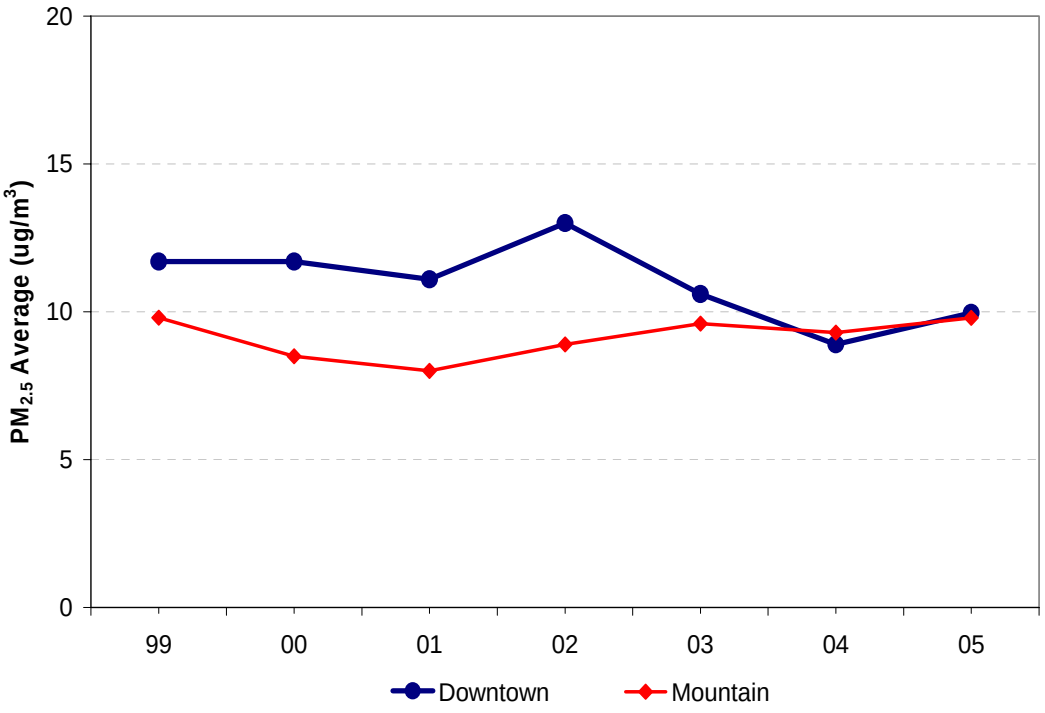


Particulate Matter: Respirable Particulate Matter ($PM_{2.5}$)

The Province of Ontario has recently begun to monitor respirable particulate matter ($PM_{2.5}$), airborne particles with a diameter of 2.5 µm or less. $PM_{2.5}$, which makes up about 60% of the PM_{10} in the air, has been more strongly linked to health impacts than PM_{10}.

Respirable particulate matter ($PM_{2.5}$) is the fraction of air particulate which is responsible for essentially all of the deleterious health effects associated with air particles. Most of the particles associated with automobile exhaust and diesel exhaust have sizes in the 0.1 to 0.3 µm range; these combustion sources constitute about 30-50% of the mass of $PM_{2.5}$. It is this fraction of particles which bears over 95% of all small organic compounds. There has been a scientific debate over just what causes these health impacts on humans. It is not been established conclusively whether it is the $PM_{2.5}$ particles alone, the organic compounds associated with these particles or some combination of the particles themselves and the organic substances that is responsible for the respiratory and cardiovascular health impacts attributed to particulate material.

Respirable Particulate ($PM_{2.5}$) Trend: 1999 - 2005



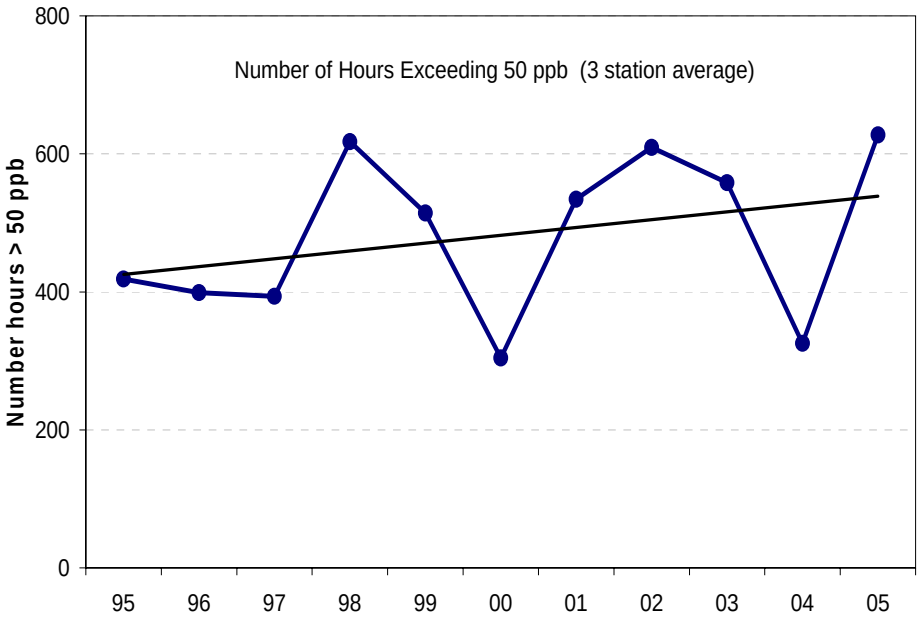
Ground Level Ozone

Ground level ozone is formed in the atmosphere when air pollutants such as nitrogen oxides (NO_X) and volatile organic compounds (VOC) react in the presence of sunlight. Consequently, air levels of ozone are higher in warmer seasons than in colder seasons. Air levels of ozone, which have varied substantially from one year to the next in response to varying weather conditions, appear to be increasing over time.

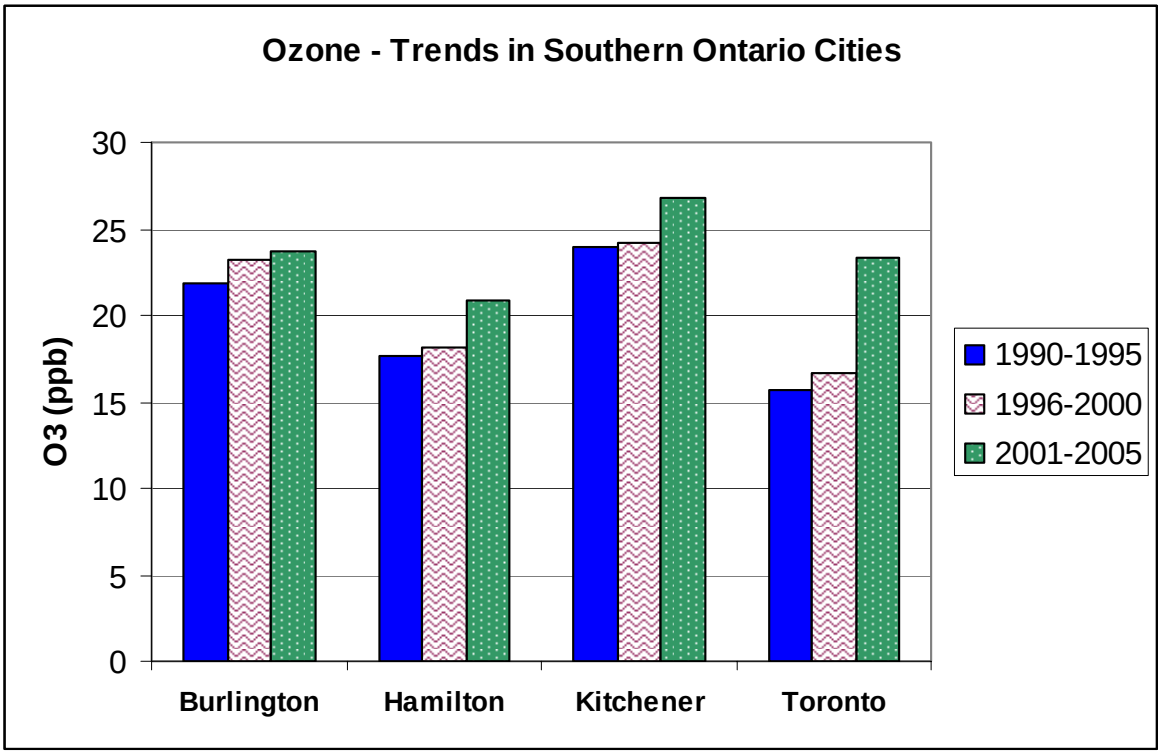
The formation of ground level ozone takes several hours once the pollutants reach the atmosphere. As a result emissions from sources within Hamilton cause the formation of ground level ozone in areas downwind of Hamilton. A substantial portion of the ozone that affects southern Ontario during smog episodes in the summer months originates from distant, upwind sources in the United States.

Ground level ozone should not be confused with stratospheric ozone in the so-called "ozone layer". The ozone called "stratospheric ozone" is produced and destroyed in the stratosphere at an altitude of 30-60 km above the earth. The term "ozone depletion" refers to a decrease in the levels of stratospheric ozone due to man-made emissions, particularly halogenated refrigerants which have now been banned. Stratospheric ozone and changes in the "ozone layer" have not yet been linked to impacts of combustion emissions.

Ground Level Ozone Trend: 1995 - 2005



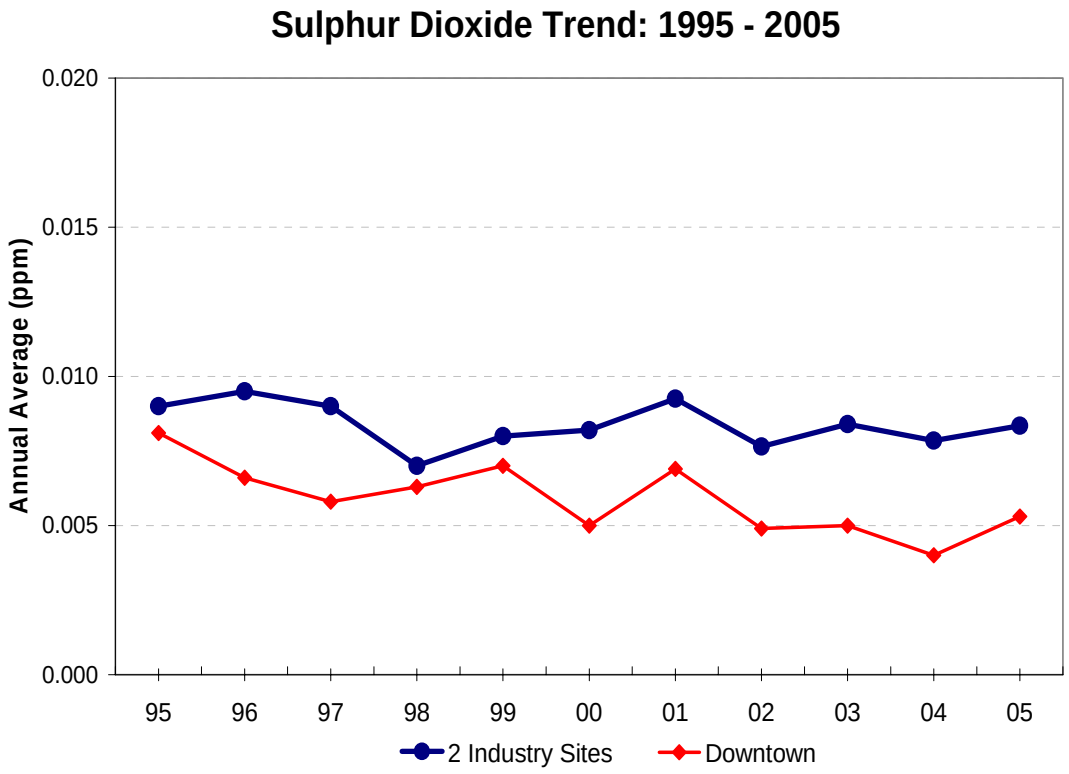
Over the past 15 years the concentrations of ground level ozone across southern Ontario have increased. The increases seen in Hamilton during this period are similar to the trends observed in Burlington, Kitchener and Toronto. The percentage increase in Toronto was the greatest of these four cities.



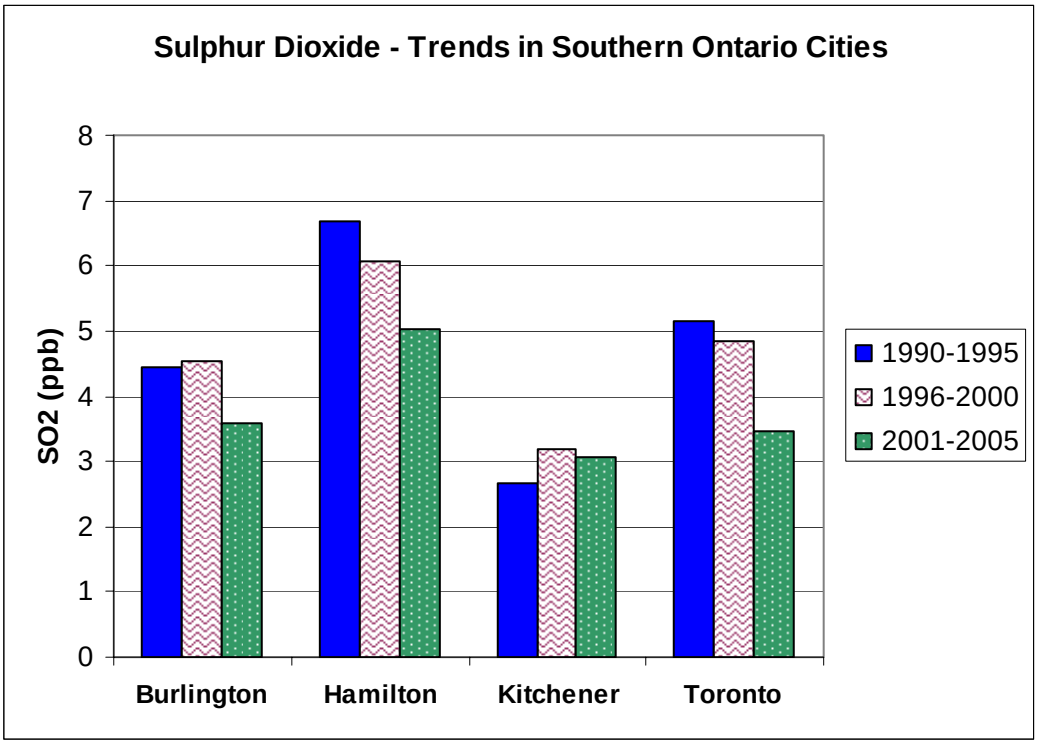
Sulphur Dioxide

The principal sources of sulphur dioxide (SO_2) in Hamilton are industrial processes within the city. Significant improvements in air levels of sulphur dioxide were made in the 1970s and 1980s. Since 1995, there has been a gradual and continuous decline in air levels of SO_2. These reductions reflect actions taken to reduce SO_2 emissions from the steel industry. Combustion of fossil fuels containing sulphur is another major source of SO_2. The new federal regulations to limit the sulphur content in diesel fuel to 15 parts per million by 2007 should have an impact on ambient SO_2 levels once these measures take full effect in 2007.

Sulphur dioxide is not only a respiratory irritant but this oxide is readily converted in the atmosphere to form sulphate particles. These particles average about 2 µm in diameter and constitute part of the respirable particulate fraction in the air. These particles tend to be acidic and also cause lung irritation when inhaled. Thus, the health concerns associated with sulphur dioxide exposures are linked to the gas itself as well as to the particulate material derived from it.



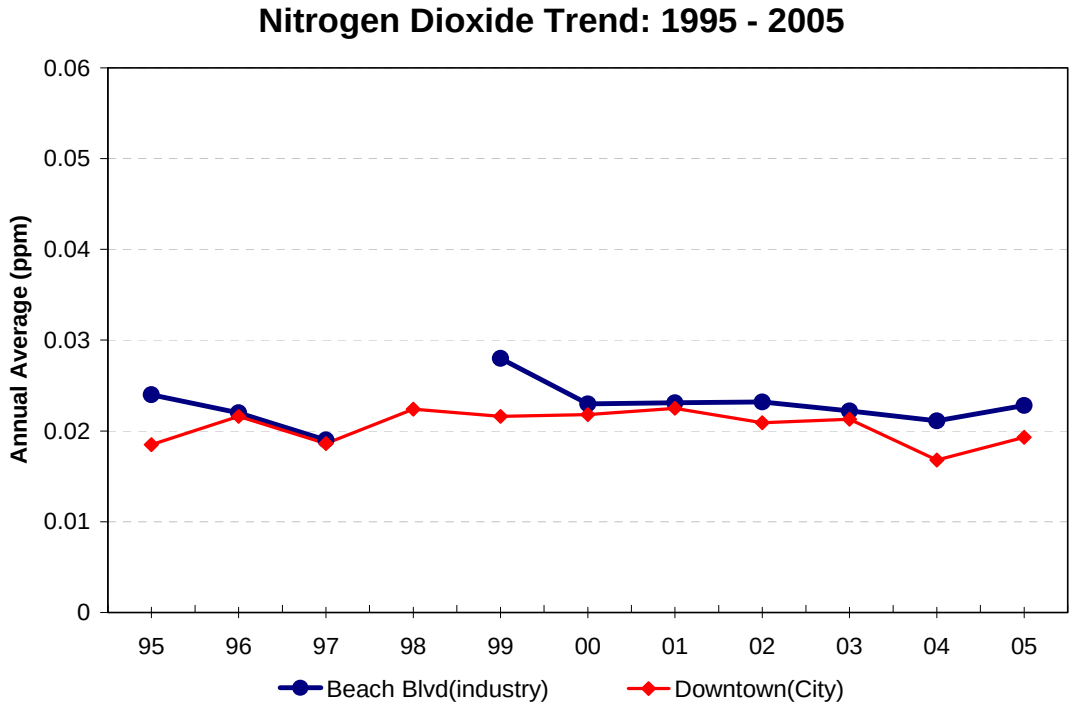
The graph below shows a comparison of the five-year averages of sulphur dioxide levels in four southern Ontario cities. The levels in Hamilton are higher than the other cities due primarily to the industrial emissions that are unique to Hamilton. The sulphur dioxide levels in Burlington and Toronto are very similar, reflecting similar compositions of local sources, primarily transportation sources. The net contribution from industrial sources in Hamilton has decreased faster that the overall decreases seen in the other cities.



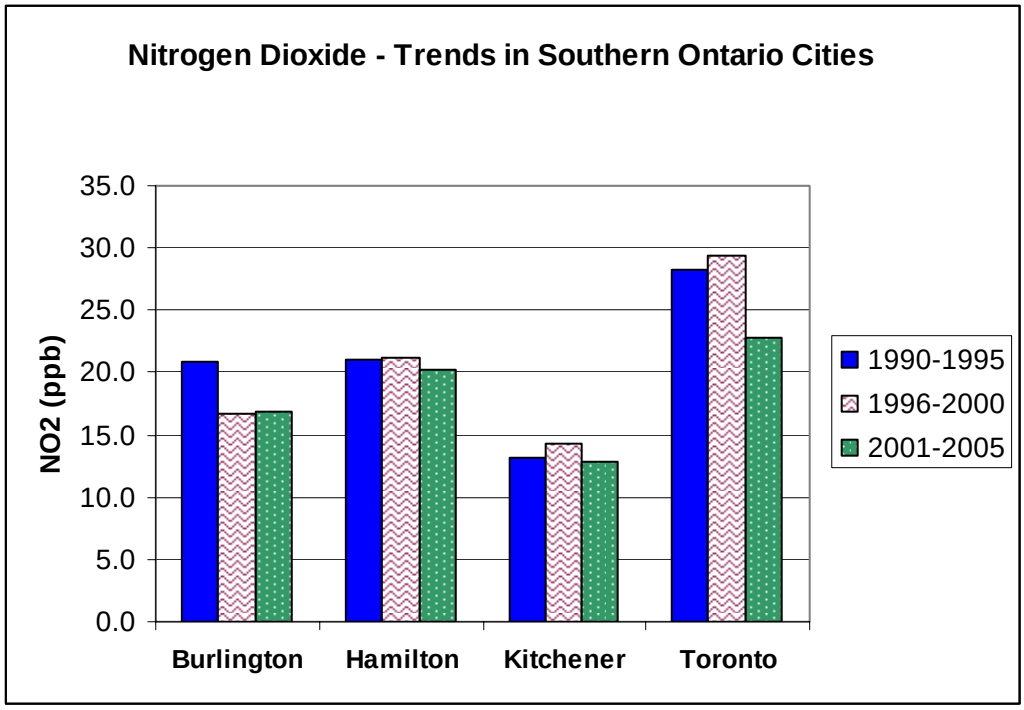
Nitrogen Dioxide

Nitrogen dioxide (NO_2) is responsible for a significant share of the air pollution-related health impacts in Hamilton. Little progress has been made to reduce air levels of NO_2 over the last decade. NO_2 is formed in the atmosphere from nitric oxide (NO) which is formed during the combustion of fuels such as gasoline, diesel, coal, wood, oil and natural gas. The leading sources of NO_2 in Hamilton are the transportation sector followed by the industrial sector.

Unfortunately, there has been no change in the average levels of nitrogen dioxide in Hamilton over the past decade. The level of vehicle use has increased during this time; the overall improvements in vehicle emissions performance have been offset by the increased vehicle usage in and around Hamilton.



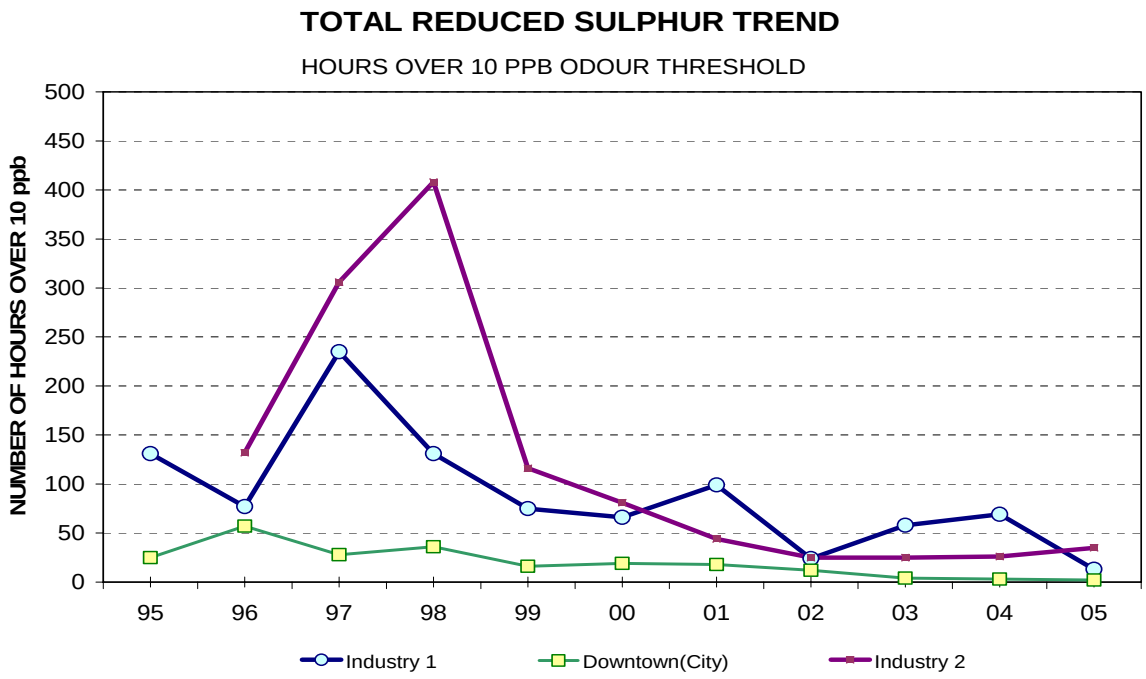
When we compare the 15-year trends in air levels of NO_2 in Hamilton to levels in other Ontario cities which have no significant industrial contributors (only vehicular emissions), the levels in Hamilton have remained steady whereas they have decreased in Burlington and in Toronto during this period. While average levels in Toronto have decreased significantly, the average level is about 10% higher than in Hamilton.



Total Reduced Sulphur

Total Reduced Sulphur (TRS) is a measure of the sulphur-containing compounds that are the basis of many of the odour complaints related to steel mill operations, particularly coke oven emissions, blast furnace emissions and slag quenching operations. At 10 parts per billion (ppb), many people can detect TRS as an odour similar to rotten eggs.

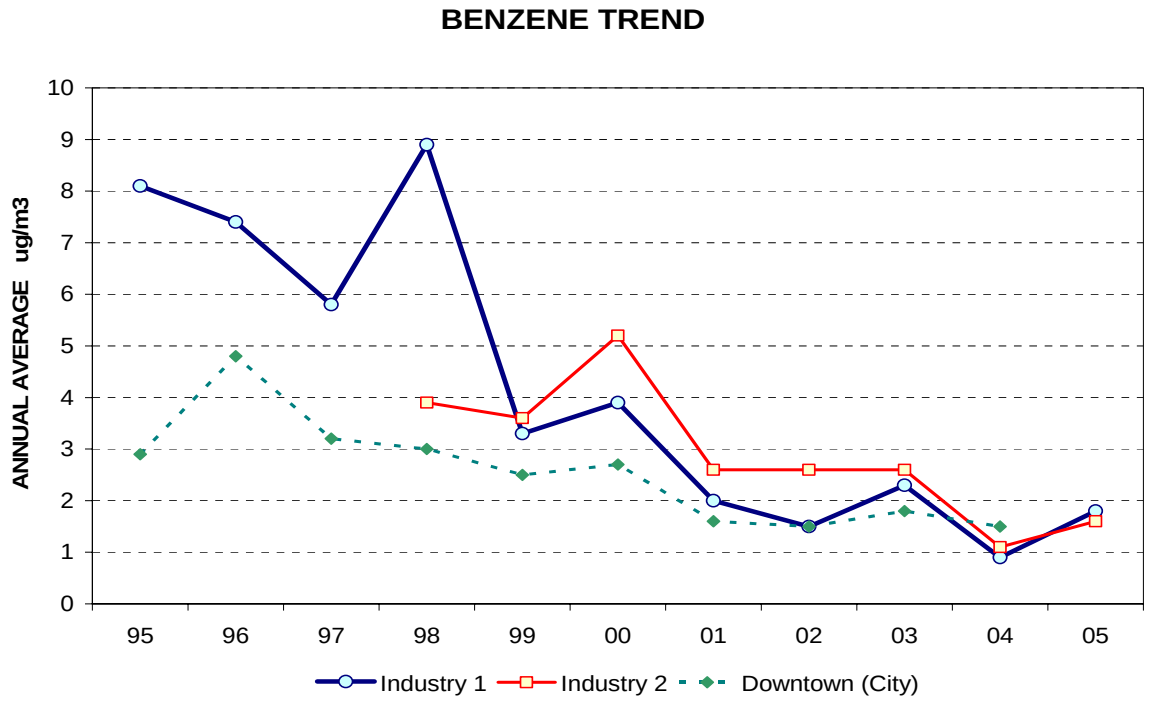
Hourly exceedances of the 10 ppb odour threshold have been reduced by between 70-90% since the mid-1990s due to significant changes in the management and operation of the coke ovens and blast furnaces. In particular, changes to slag quenching procedures have had the greatest effect on reducing odour-causing emissions from those operations.



Benzene

Benzene is a volatile pollutant that is capable of producing cancer in humans. Benzene is emitted from operations within the steel industry, specifically releases from the coking ovens and from coke oven by-product plant operations. Air levels of benzene have been reduced dramatically since the late 1990s due to significant upgrading of the coking plant operations, improved procedures and controls applied to the operations of the by-products plants run by both steel companies.

Benzene is a component of gasoline and is found wherever gasoline is used and distributed. Thus, all cities in Canada have low but measurable levels of benzene in the air. The levels of benzene in Hamilton have now dropped to levels comparable to levels in other Canadian and Ontario cities of comparable size.

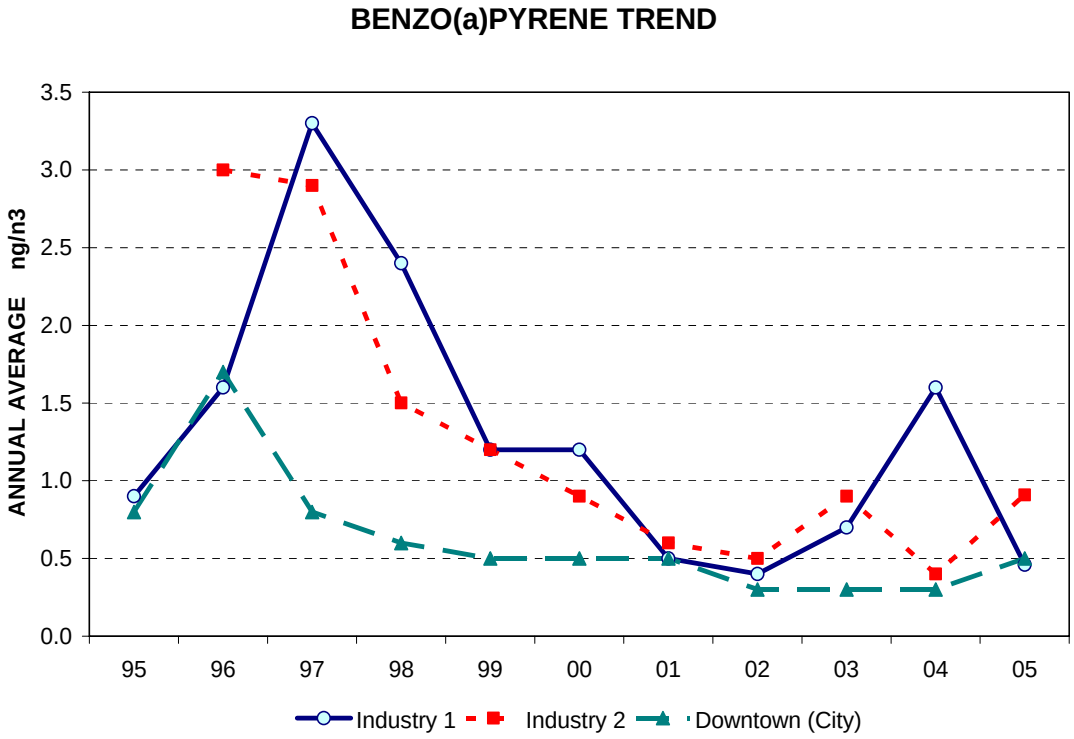


Benzo[a]pyrene

Benzo[a]pyrene (BaP) is a pollutant capable of causing cancer in animals and humans. BaP is one member of a large class of chemical compounds called polycyclic aromatic hydrocarbons (or PAH). PAH are emitted when carbon-based fuels such as coke, oil, wood, coal and diesel fuel are burned. The principal sources of BaP in Hamilton are releases from coke oven operations within the steel industry. The significant decreases in ambient benzo[a]pyrene levels since the late 1990's are the result of improvements to the infrastructure of coke ovens themselves and increased attention to the operation and maintenance procedures for proper operation of the coke ovens.

While benzo[a]pyrene is only one of may PAH released from coking operations, BaP is undoubtedly the most potent and most studied of all PAH carcinogens (cancer-causing agents) in the scientific literature. As a result of the extensive amount of chemical and toxicological research work and occupational exposure work done with this compound, BaP has become the primary PAH carcinogen by which to compare exposures to many PAH-containing mixtures, such as vehicular emissions, coke oven emissions, barbecued foods, coal tar exposures, etc.,

The downtown (city) sampling site has BaP levels that are typical of many other Ontario cities. This result shows that transportation sources are now the number one cause of PAH emissions to the atmosphere.



Appendix D: Upwind/Downwind Conference 2006 – Summary Report

Executive Summary

The 2006 Upwind/Downwind Conference: Cities, Air and Health was held at the Hamilton Convention Centre, Hamilton, Ontario on February 27th and 28th, 2006. The Upwind/Downwind conference is hosted every two years by the City of Hamilton and *Clean Air Hamilton* to provide a venue for a broad range of stakeholders interested in improving their local air quality to present and discuss their initiatives, ideas and practical solutions to air quality problems. The conference has also functioned to bring community groups together to discuss air quality issues. Over 130 planners, health promoters, academics, industry representatives, students, environmental consultants, citizens and international registrants participated in the 2006 event. In 2006, the McMaster Institute of Environment and Health partnered with *Clean Air Hamilton* and played a major role in organizing the conference.

Introduction

The 2006 Upwind/Downwind Conference was the fourth biennial conference held in Hamilton that focused on practical solutions to the air quality problems facing urban regions. This 2-day conference aims to provide participants with a forum to develop an improved understanding of air quality issues and the associated human health impacts of exposure to poor air quality. The conference also provides an opportunity for collaborative networking amongst attendees and highlights the roles that industry, community groups and government can play through partnerships in achieving improvements to local air quality and public health.

Conference Background

The conference is an important activity in *Clean Air Hamilton*'s overall strategy to bring the best science in the air quality field to the attention of planning practioners, decision-makers and politicians; the conference is designed to develop continued awareness of air quality issues and to address new matters that relate to trans-boundary air pollution. The first Upwind Downwind conference was hosted in September 1999 by the former Region of Hamilton–Wentworth.

Conference Goals

The goal of the biennial conferences is to provide a diverse range of attendees with the latest air quality information so that they are enabled to develop policy and actions that will lead to improvements in their local air quality. Each conference builds on the momentum and strong networks that had been developed at previous Upwind/Downwind conferences in order to facilitate continued discussion and partnerships for improvements on air quality issues. The conference provides a forum for discussing and understanding a broad spectrum of air quality issues and the human health impacts related to emissions from combustion sources. Recently, urban sprawl and the air quality improvements that could result from smart growth initiatives and successful airshed management practices have been highlighted. The conference also provides an opportunity for collaborative networking amongst attendees and highlights the roles that industry, community groups and government play through partnerships in achieving improvements in air quality and health.

The four themes of the 2006 conference that occupied one half-day each were: “Air Quality, Public Health and Planning,” “Science for Decision-Making,” “Airshed Agreements and Regulations,” and “Partnerships”.

In the “Air Quality, Public Health and Planning” session, speakers focused on the emerging partnership between public health and planning with respect to improving air quality in urban environments. In the “Science for Decision-Making” session, the presentations illustrated the use of scientific results to aid decision-making and the development of new projects, policies and regulations. Presentations within the “Airshed Agreements and Regulations” session provided examples of airshed agreements in North America and highlighted recent changes and additions to Ontario’s air quality regulations. Lastly, in the “Partnerships” session presentations focused on concrete examples of how various groups, academic, government, citizens and industry, had partnered successfully and improved their local air quality.

The speaker’s list included representatives from Environment Canada, Health Canada, Ontario Ministry of Environment, Ford Motor Company, Stelco, University of British Columbia, University of Toronto, McMaster University, Environment Hamilton, G. O'Connor Consultants Inc., Willms and Shier, and Rotek Environmental, Inc.

Conference Planning and Coordination

In the summer of 2005, planning for the 2006 event began with a team of 14 volunteers from *Clean Air Hamilton*, Environment Canada, Ontario Ministry of the Environment, City of Hamilton, McMaster Institute of Environment and Health, Rotek Environmental Inc, McKibbon Wakefield Inc., Dofasco and Stelco (see Table 1 for a list of participants). The planning activities were executed by both the McMaster Institute of Environment and Health and the City of Hamilton’s Planning and Development Department’s staff.

Table 1: 2006 Upwind Downwind Conference Planning Committee

Organization	Representative	Job Title
McMaster University and Clean Air Hamilton	Brian McCarry	Conference Chair and Professor
McMaster Institute of Environment and Health	Anita Toth	Project Development Officer
	Bruce Newbold	Director
City of Hamilton	Brian Montgomery	Clean Air Hamilton Coordinator
	Linda Harvey	Vision 2020 Coordinator
	Stan Yung	Public Health Services
	Steve Walsh	Public Health Services
	Natasha Mihas	Public Health Services
Environment Canada	Hossein Naghdianei	Environmental Protection Services
Ministry of the Environment	Carl Slater	Manager, - Technical Support Section, Hamilton Regional Office Operations Division
Rotek Environmental Inc.	Denis Corr	Consultant
McKibbon Wakefield Inc.	George McKibbon	Consultant
Dofasco	Ed Cocchiarella	Manager, Environmental Management System
Stelco	Andrew Sebestyen	Environment Manager

Conference Funding

The total cost of putting on the 2006 Upwind/Downwind Conference was $27,588.79. The total revenues from the conference were $44,079.70 which included $14,029.70 from registration fees, a $50 exhibit booth fee, and $30,000 from sponsorship donations. In addition, there was $12,500 of in-kind sponsorship (see Table 2). Overall, the conference netted $16,520.91; these funds will be used as seed money for early expenses for the next Upwind/Downwind Conference or for similar outreach and educational activities of *Clean Air Hamilton*. This favourable bottom line is due primarily to the unpredicted level of sponsorship donations received in support of this conference. It is probable that the aggressive sponsorship campaign developed by this year's conference planning committee is responsible in part for the increased donations in 2006.

The McMaster Institute of Environment and Health and the City of Hamilton provided staff resources to procure sponsorship, coordinate logistics, facilitate meetings, process registration and promote the conference. Planning Committee members helped to identify and confirm speakers and facilitate the conference sessions. Volunteers helped with registration during the conference.

Table 2: 2006 Upwind Downwind Conference Sponsors

Organizations	**Donation**
Environment Canada	$10,000
Ontario Ministry of the Environment	$5,000
Hamilton Industrial Environmental Association	$2,500
Liberty Energy	$2,500
Rotek Environmental	$1,000
Dofasco Inc.	$1,000
Honeywell Limited	$1,000
Health Canada	$1,000
Golder Associates Inc.	$1,000
City of Burlington	$1,000
Region of Halton	$1,000
Hamilton Air Monitoring Network	$1,000
Stephen A. Jarislowsky Chair in Environment and Health, McMaster University	$1,000
Mohawk College	$500
McKibbon Wakefield Inc.	$500
Total Cash Sponsorship Funding	**$30,000**
Organizations	**In Kind Donation**
McMaster Institute of Environment and Health	$10,000
Ontario Provincial Planners Institute	$2,500
Total In-Kind Sponsorship Funding	**$12,500**

Advertising and Promotions

The objectives of promoting the 2006 Upwind Downwind Air Quality in Hamilton were to raise awareness of the event as an opportunity to share best practices, to network, to learn from others and to increase international presence. One method used to attract the attention of delegates was to brand the conference and create a new conference logo. The new logo was put on all conference materials in order to advertise the conference long after the event was over.

Promotion materials for the conference are estimated to have reached about 10,000 people through an advertising strategy that targeted potential interested parties. E-mail flyers were sent to colleges, universities, non-government organizations, industry and government in southern Ontario as well as to the e-mail distribution lists of McMaster University, Ministry of the Environment and the City of Hamilton; flyers were distributed to members of the Ontario Provincial Planners Association in their December 2005 mailings; the Upwind/Downwind conference was listed on a number of websites that announce upcoming conferences; 1000 paper flyers were included in Conference kits. The radio stations 820 CHAM AM, Oldies 1150 AM, and 102.9 K-Lite FM mentioned the conference on air. Three separate articles related to topics discussed and covered in the conference appeared in The Hamilton Spectator during the week of February 25th to 29th, 2006.

Responses from Conference Attendees

Overall, the 2006 Upwind/Downwind Conference received very positive feedback from attendees. Evaluations were submitted by 36% or 48 attendees of the 2006 conference.

When asked to rate their overall satisfaction with the conference, 24 individuals chose ‘very satisfied” while 21 picked “satisfied,” corresponding to a positive response rating from 94% of the respondents. For 41 respondents, the conference “met their expectations” while only 2 conference delegates did not feel that the conference had met their expectations. Two individuals created their own category by stating that the conference “exceeded” their expectations; 90% of respondents felt that the conference met or exceeded their expectations.

The most common complaints were concerned with the extended length of a couple of presentations which caused subsequent presentations to start later than they were scheduled. This is the first conference where there were such timing issues.

Appendix E: Health Impacting Air Pollutants – Mobile Monitoring Study 2006

A mobile air quality monitoring study was undertaken to identify the transient levels of air pollutants in Hamilton, Ontario. The objectives of the mobile monitoring study were to identify and rank sources, including transportation sources, of NO_x, SO_2, airborne particles and CO, using mobile monitoring techniques, to investigate the effect of idling vehicles at a designated school during student drop off and pickup times, and to investigate track-out/road dust issues in the industrial area of Hamilton.

Although it might be expected that industrial sources would be responsible for the highest concentrations of air pollutants, overall, the study showed that the highest concentrations were observed near major road intersections and along heavily used roads affected by dirt track-out in the industrial sectors of the city. These high levels of pollutants are attributed to the impacts of city traffic emissions and the industrial transportation sector, respectively. Industrial point sources still make significant contributions to pollutant concentrations, particularly for SO_2.

The mobile monitoring study shows a cumulative effect of city emissions, high ambient levels of combustion emissions from vehicles idling at intersections and from large diesel trucks, as well as very high levels of particulate from dirt track-out onto roads and re-suspension of road dust by large trucks.

The full study report and recommendations are available to view at:
http://www.cleanair.hamilton.ca/reports/reports-news-presentations-fact-sheets.asp

Clean Air Hamilton, May 2006

Production: Planning and Development Department
City of Hamilton

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