



Clean Air Hamilton

2017 Air Quality Progress Report

December 2018



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Top Row (left to right): George McKibbon, Brian Jantzi, Susan Chapman, Dr. Fran Scott, Trevor Imhoff (coordinator), Christine Borselli, Ed Cocchiarella, Robert Clacket

Bottom Row (left to right): Dr. Lynda Lukasik, Elise Desjardins, Shelley Rogers, Dr. Bruce Newbold (Chair) Peter Chernets, John Lundrigan,

Missing: Karen Logan, Rachel Johnson, Dr. Matthew Adams, Dan Dobrin, Adriano Mena, Ted Mitchell, Dr. Sally Radisic, Andrew Sebestyn, Dr. Denis Corr (Outgoing Chair), Sean Angel, Michael Gemmell,



Dr. Denis Corr was the outgoing Chair for Clean Air Hamilton in 2017. He served as Chair from 2013—2017, and remains a member of Clean Air Hamilton. Dr. Corr continues to contribute to the community through research and providing education, including the Enhanced Fresh Air For Kids Program in partnership with Green Venture.

Message from the Chair

I am pleased to provide the Clean Air Hamilton 2017 report which provides annual air quality trends and our on-going work to improve air quality in Hamilton. The following is our Clean Air Hamilton 2017 report. For previous years' activities go to: <http://www.cleanairhamilton.ca>.

Over the past year, we continued to learn more about the local air quality and to make improvements to Hamilton's air quality. Clean Air Hamilton worked closely with Golder Associates on the Hamilton Airshed Modelling System (HAMS), with the model to be released in 2018. The model will help us better understand questions such as: Where is our air pollution coming from? How important are sources external to the city? How much does air pollution vary across the city? Answering these questions will provide us new insights into our local air quality, and ultimately new directions to address air quality in the City of Hamilton.

The Provincial government has also continued to recognize the need to improve air quality through legislation, with the province proposing new regulations that would recognize the combined effects of pollution sources such as benzene in 2017. Members from Clean Air Hamilton along with other stakeholders were involved in the consultations around this legislation, and we look forward to bringing these changes to our City.

Our mandate includes involving and informing our citizens of all these issues and giving sound, science based advice and recommendations. Over

the past year, we started to plan for the 2018 Upwind-Downwind conference – our 10th Upwind-Downwind conference. We also worked closely with local partner groups including Environment Hamilton, Green Venture and the Active Sustainable School Transportation committee on projects that have raised awareness amongst local citizens about air quality issues, as well as working to improve local air quality. Together, Clean Air Hamilton and its various partners are working to reduce emissions as well as our personal exposures and live healthier lives. Clean Air Hamilton's special projects and this report help us to do that.

We thank Healthy and Safe Communities and City Council for their ongoing support of Clean Air Hamilton and its special projects. Special thanks go to Trevor Imhoff and the committee for their hard work in making our report a reality. Finally, as the new Chair of Clean Air Hamilton, I would like to thank Dr. Denis Corr for his long-term leadership and commitment to Clean Air Hamilton. Much of Clean Air Hamilton's success is due to his work, and I look forward to continuing this in the coming years.



A handwritten signature in black ink, appearing to read 'K. B. Newbold', written in a cursive style.

*Bruce Newbold, Ph.D.
Chair, Clean Air Hamilton*

Strategic Activities

Clean Air Hamilton is dedicated to improving air quality across the City of Hamilton. This will be accomplished through sound science based decision making, using the most up-to-date information and tools available, such as the Hamilton Airshed Model. Clean Air Hamilton has identified these issues for research, communication and program activities in collaboration with our partners:

Governance & Structure:

To remain a multi-stakeholder group dedicated to improving air quality by increasing public perception and expanding Clean Air Hamilton membership while providing communication and promotion of realistic, science based decision making and sustainable practices

Air Zone Management:

Comply with the Ministry of the Environment , Conservation and Parks (MECP) (formally the Ministry of the Environment and Climate Change) and Canadian Ambient Air Quality Standards. This will be done through implementation of a systems level approach and support towards an industrial mandatory monitoring regulation.

Transportation:

To encourage and facilitate more use of public and active transportation through commentary on transportation related matters, supporting educational programs and localized monitoring leading to detailed information to encourage changes in behaviour.

Air Monitoring:

To improve air monitoring activities across the City of Hamilton by providing support for additional portable air monitors and fixed air monitors that provide real-time monitoring for contaminants of concern in Hamilton.

Dust & PM_{2.5} Mitigation:

Lower concentrations of PM_{2.5} across the City of Hamilton below Canadian Ambient Air Quality Standards by effectively utilizing the airshed model to create partnerships and pollution inventory specific to street sweeper and dust mitigation programs.

Clean Air Hamilton Meetings

Clean Air Hamilton meetings are held usually on the second Monday of each month located at 71 Main Street West, City Hall, Room 192/93

2017 Meetings

January 9, 2017
February 13, 2017
March 13, 2017
April 10, 2017
May 8, 2017
June 12, 2017
July 10, 2017
August 14, 2017
September 11, 2017
October 2, 2017
November 13, 2017
December 11, 2017

2018 Meetings

January 8, 2018
February 12, 2018
April 9, 2018
May 14, 2018
June 11, 2018
July 9, 2018
August 13, 2018
September 8, 2018
October 15, 2018
November 12, 2018
December 10, 2018



Photo courtesy of Tourism and Culture Division, City of Hamilton

Clean Air Hamilton (CAH) - 2017 Funded Projects

Clean Air Hamilton is an innovative, multi-stakeholder agent of change dedicated to improving air quality in our community. In 2017, Hamilton Public Health Services provided \$27,150 to fund projects resulting in air quality

improvement and awareness. These projects reach thousands of school aged children and contribute to improving Hamilton's air quality through monitoring and promotion. Clean Air Hamilton is proud to support the 2017 funded projects.

Enhanced Fresh Air for Kids



In 2017, Green Venture and Corr Research teamed up to provide the Enhanced Fresh Air for Kids program to five Hamilton elementary schools. The focus of the project is to educate students, teachers and the public about air quality around schools and the impact of engine idling. The

program was delivered to St. Martin of Tours, Lawfield, Cathy Wever, Hillcrest and Adelaide Hoodless elementary schools, with classroom work, in-the-field air monitoring and at-school anti-idling awareness campaigns.

Students were educated on the importance of air quality, the Air Quality Health Index and gained an awareness of how their actions can impact and improve the air in their neighbourhoods. Students measured PM2.5 and PM10 in their neighbourhoods. The MECP Mobile Air Monitoring van was also used to monitor air quality in the vicinity of the schools. These data were developed into air quality maps (see below) which students used to decide on their best ways to travel to and from their school.

St. Martin of Tours School, Mobile Air Monitoring



Clean Air Hamilton 2017 Funded Projects Cont'd...

Enhanced Fresh Air for Kids Cont'd...

The 2017 Enhanced Fresh Air for Kids program featured an enhanced anti-idling campaign. The program included anti-idling education where Green Venture led classrooms in the development of banners, pamphlets, key chains and other advertising material. Blitzes were included to set a measureable baseline for the success of the program. The initial blitzes took place at the beginning of the program in the Fall and follow-up blitzes the following Spring after the campaign was complete. Four of the five schools completed the secondary blitzes and the collected data was used to form the conclusion of the success of the project. The schools found a 25% decrease in the number of cars idling between the blitzes, Cathy Wever showing the largest decrease of 54%.

The number of cars during between the Fall and Spring blitzes increased, however the number of cars idling dropped.

The estimated reduction of greenhouse gas emissions equates to 7858 kg CO₂ annually.



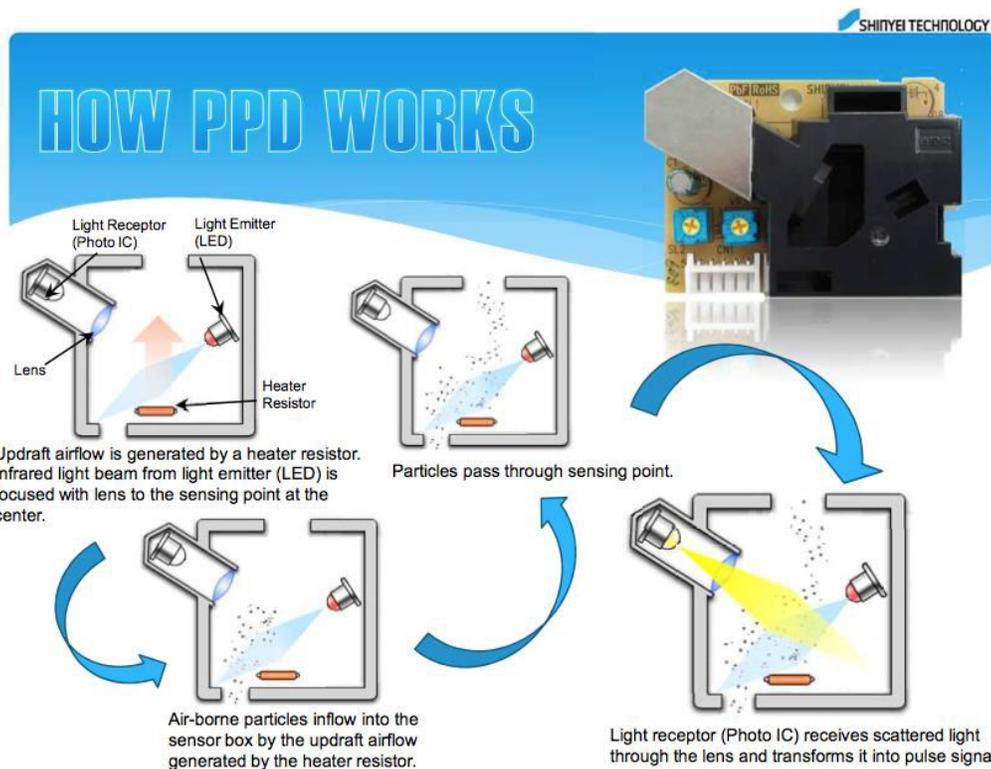
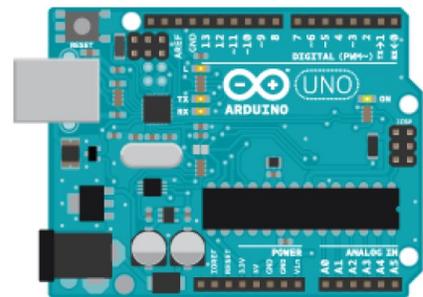
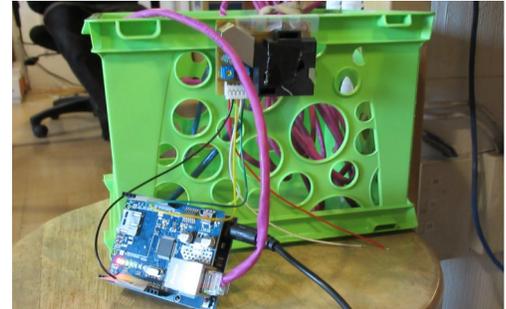
The City of Hamilton [Anti-Idling By-law No. 07-160](#) can be found on the City's Bylaw website at:

<https://www.hamilton.ca/government-information/by-laws-and-enforcement/city-hamilton-by-laws>

Building Community Awareness & Action Regarding Respirable Particulate Pollution in Hamilton

Environment Hamilton is a Hamilton based not-for-profit organization that promotes environmental protection. In 2017, Clean Air Hamilton provided funding to Environment Hamilton to initiate their Building Community Awareness & Action Regarding Respirable Particulate Pollution in Hamilton plan. The goal of the plan was to assemble a group of volunteers to assist in building low cost particulate matter sensors to be deployed in stationary locations across the lower city. The information collected can be viewed on Environment Hamilton's online air mapping system, which can be found at www.inhalemap.com.

Environment Hamilton used Arduino sensors to collect data. The sensors use infrared light and heat resistors to measure the amount of PM in the air. Arduino is an open-source electronics platform that can be modified to perform interactive projects.



Hamilton Air Quality Health Index Mapping



Prof. Matthew Adams with Ryerson University/University of Toronto, performed an extensive update on the Hamilton AQHI website in 2016. Mobile air pollution data was uploaded that was collected during the most recent round of neighbourhood air quality monitoring by [Corr Research Inc.](#)

Corr Research

Now citizens can access hourly conditions during the past five years, as well as selected events (e.g. highest concentrations). This feature is best demonstrated when a person notes some personal effect, such as an odour or news about elevated concentrations.

www.hamiltonaqhi.com

Citizens can go on the website and look up the AQHI for the time they were affected. This interaction should lead to more interest in additional resources such as:

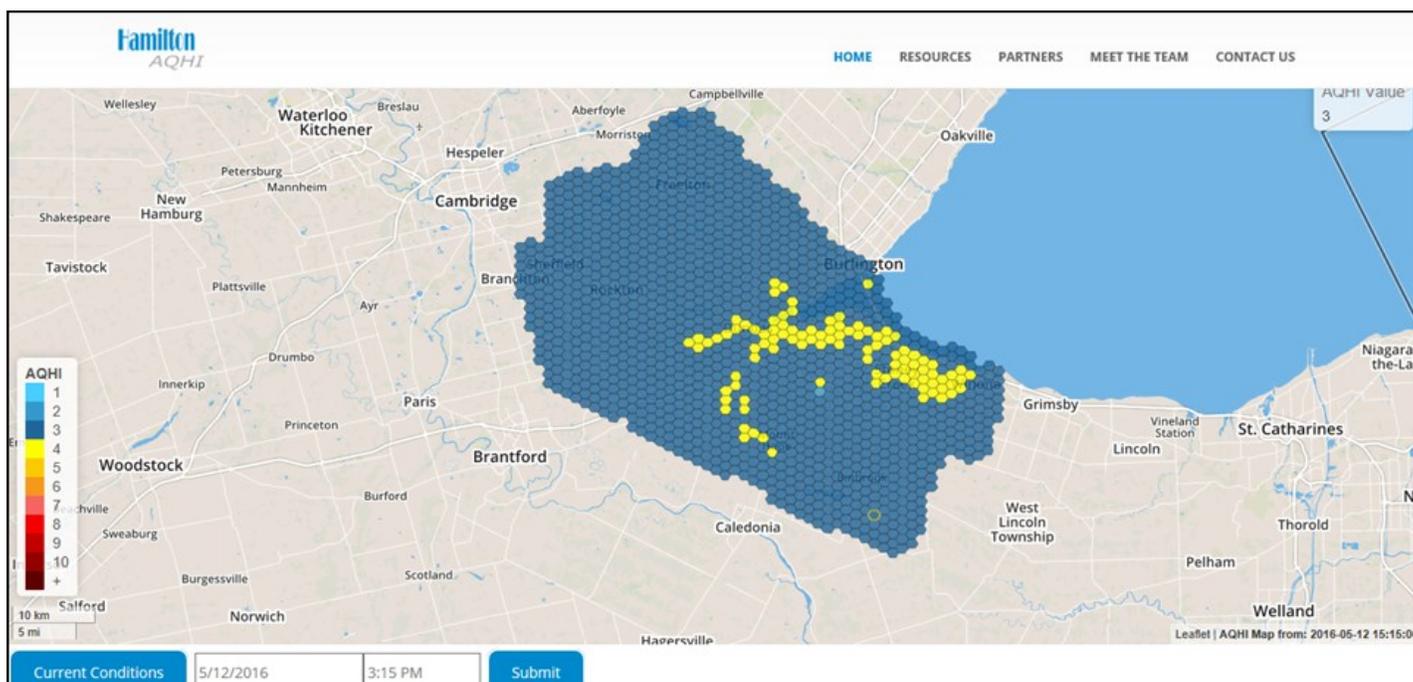
[Environment and Climate Change Canada Air Quality Health Index](#); or

[Air Quality Ontario](#)

Reduction of air pollution exposure is a key component of improving overall public health. The importance of reducing exposure will increase due to our ageing population and incidences of compromised respiratory and cardiac function.

Current AQHI systems utilized by government agencies can be limited in geographical context. This website presents community air quality information to residents of the City of Hamilton that will help behavioural change to reduce air pollutant exposure.

Hamilton AQHI May 12, 2016



Delineation of Ontario Air Zones

Ontario is implementing the Air Quality Management System (AQMS), a flexible cross-Canada framework developed through the Canadian Council of Ministers of the Environment. The AQMS is a comprehensive approach consisting of an interconnected set of drivers and mechanisms to achieve continuous improvements to overall air quality using an all sources approach¹.

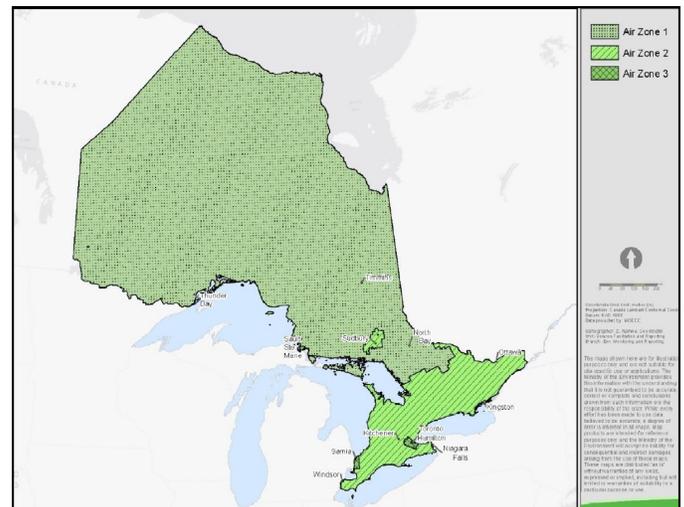
Ontario has finalized its decision to delineate its air zones into three zones:

Air Zone 1—Areas with limited pollution from either point or non-point sources or transboundary influence; where air quality management activities are focused on maintaining good air quality.

Air Zone 2—Areas under pressure from multiple sources including some or all of the following: non-point sources, smaller point sources, individual large industrial point sources, transboundary influences; where air quality management activities are focused on multiple broad-based initiatives targeting many sources.

Air Zone 3—Areas with a concentration of large industrial sources; where air quality management activities are focused on the abatement of local industrial emissions as well as non-industrial sources¹.

Hamilton is classified as Air Zone 3, Clean Air Hamilton continues to work with Ministry of the Environment Conservation and Parks staff on the new Air Quality Management System approach to improve the overall air quality across Hamilton.



¹Government of Ontario.(2016). Environmental Registry. Retrieved from: <https://www.ebr.gov.on.ca/ERS-WEB-External/displaynoticecontent.do?noticeId=MTI1MjE2&statusId=MTkzMDMw>

Clean Air Hamilton Member Good News Stories

Friendly Streets

Friendly Streets Hamilton, an initiative of Environment Hamilton and Cycle Hamilton, has been working to support and engage community stakeholders in securing safer cycling and walking conditions in urban Hamilton which in turn improves local air quality. The work in this project encourages and supports Hamiltonians in critically reflecting on how they move around the city and whether personal choices can be made that will contribute to improving urban air quality.

The 2017 pilot phase focused on areas around Hamilton General Hospital on Barton Street. Over the course of 2017, the pilot phase focused on the area around the Hamilton General Hospital (HGH) on Barton Street and radiated out to the Beasley, Keith, and Gibson-Landsdale neighbourhoods. This location was chosen because community members who live, work, and play in the neighbourhoods have raised concerns about the need for street-level changes that encourage more active mobility. .



Street audit conducted through International Village BIA with residents from First Place in September 2017.

Clean Air Hamilton Member Good News Stories Cont...

Stelco Canada Grant

In 2017, the Ontario Centres of Excellence and Walkers Environmental awarded Stelco Canada \$5 million and \$5.5 million respectively to switch to using bio-carbon for coke production in steel making. This process replaces up to three per cent of coal use by diverting disposed railway ties from landfills or incineration to be used in the steel making process. The ties are ground up and used as a bio-carbon fuel. This process reduces Stelco's GHG emissions by 64,000 tonnes using this biomass substitute for coal. Another environmental benefit of the project is that the creosote preservative on the railway ties is recycled back into tar through the by-product plant.

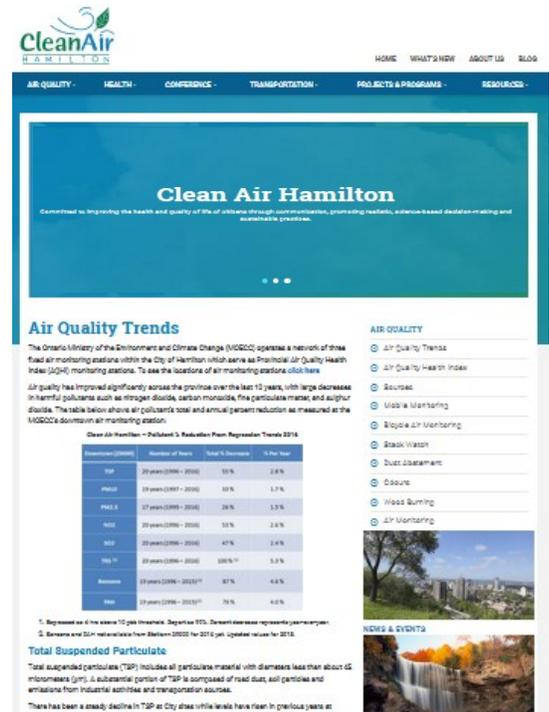


Clean Air Hamilton Website

In 2017, The City of Hamilton enlisted the services of 2Gen Interactive to create a new Clean Air Hamilton Website. City staff are responsible for maintenance and upkeep of Clean Air Hamilton's website.

The services of 2Gen Interactive were recruited to create an updated, informative, easy to use website. The Website contains Hamilton specific air quality information, health information, projects and programs of Clean Air Hamilton, resources, meeting minutes and current events within Hamilton related to air quality.

To visit the new website, go to: www.cleanairhamilton.ca.



Message from the Ministry of the Environment Conservation and Parks (Formally the Ministry of the Environment and Climate Change)

Today, the people of Hamilton are breathing cleaner air than a decade ago.

Air quality in Hamilton continues to improve significantly with large reductions in the levels of many harmful pollutants.

In fact, no smog days or Air Health Advisories were issued for Hamilton in 2017.

Delivering on clean air and reducing air pollution is a commitment of the Ontario government.

We are working to ensure industry continues to improve its environmental performance and invest in new technology.

Additionally, the ministry is expanding our air monitoring capabilities in Hamilton with more sophisticated equipment to understand priority areas and better target our efforts.

The City of Hamilton is a leader in developing collaborative approaches to improving air quality, monitoring, research and sharing information with the broader community.

We look forward to our continued work with Clean Air Hamilton, and ensuring cleaner air for the people of Hamilton.

Ambient Air Quality Trends and Comparisons

Pollutant Percent Reduction From Regression Trends 2017

- Total suspended particulate (TSP) – 57% total reduction over 20 years
- Inhalable particulate matter (PM₁₀) – 37% total reduction over 20 years
- Respirable particulate matter (PM_{2.5}) – 26% total reduction over 18 years
- Nitrogen dioxide (NO₂) – 54% total reduction over 20 years
- Sulphur dioxide (SO₂) – 46% total reduction over 20 years
- Total reduced sulphur odours – 98% total reduction over 20 years*
- Benzene – 89% total reduction over 20 years**
- Polycyclic aromatic hydrocarbons (PAH) measured as benzo[a]pyrene – 78% total reduction over 20 years.**

Ministry of the Environment, Conservation and Parks, Hamilton Downtown Station (Station 29000)

*Expressed as number of hours above 10 ppb threshold

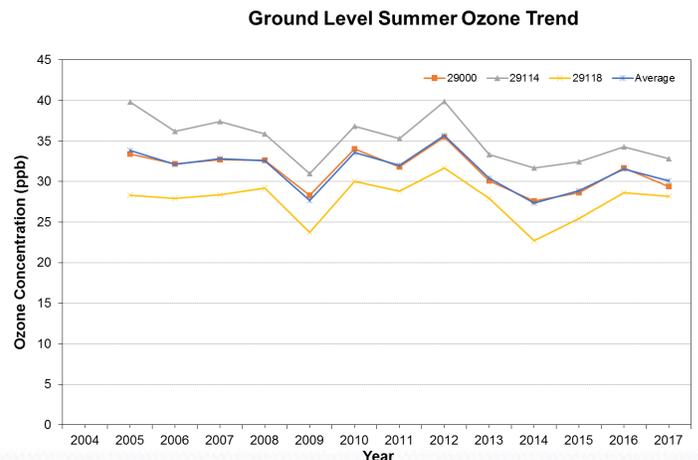
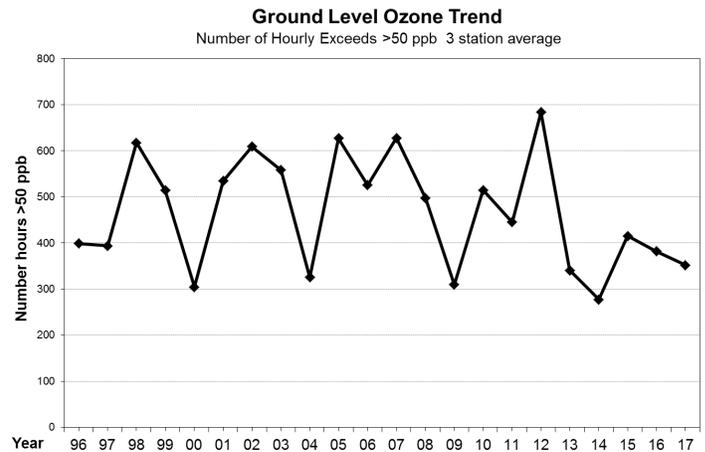
**Benzene and PAH not available from Station 29000 for 2017 yet

Ground Level Ozone (O₃)

Ground level ozone (O₃ or tropospheric ozone) is formed when pollutants are emitted and react with the presence of sunlight. This is why O₃ concentrations are higher during summer months. Sources include: coal-fired power plants, vehicles and urban activities.

The trend in O₃ shows that concentrations have been highly variable in the past 20 years. O₃ is a main contributor for Hamilton's Special Air Health Advisories (SAHA) and Special Air Quality Statements (SAQS) and unlike other pollutants the majority of O₃ comes from sources upwind of Hamilton and are expected to originate in the Midwest Ohio Valley region. Sources from Hamilton contributing to O₃ pollution will affect areas downwind of Hamilton which makes lowering O₃ emissions very important.

The Government of Ontario has been dedicated to lowering O₃ precursor emissions by eliminating all coal-fired power plants in Ontario.



Ambient Air Quality Trends and Comparisons

Total Reduced Sulphur (TRS)

Total Reduced Sulphur (TRS) is a measure of the volatile, sulphur-containing compounds that are the basis of many of the odour complaints related to steel mill operations. An odour threshold has been set at 10 parts per billion (ppb) TRS because at this level about one-half of any group of people can detect an odour similar to the smell of rotten eggs.

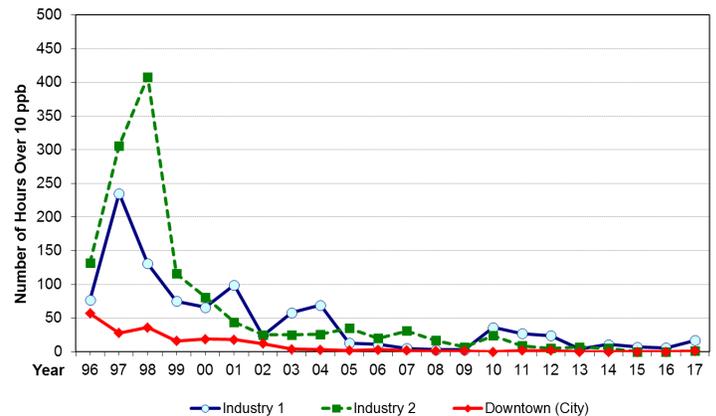
The number of hours per year in which measurements exceed 10 ppb have been reduced by over 90% since the mid-1990s. This is due to significant changes in the management and operation of the coke ovens, blast furnaces and slag quenching operations associated with steel mill operations.

Sulphur Dioxide (SO₂)

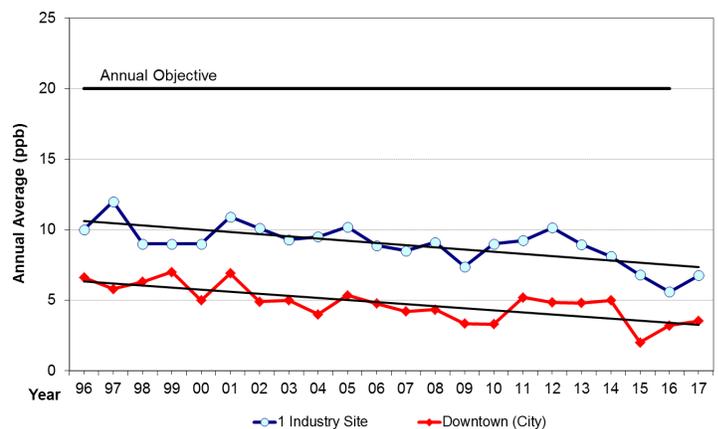
Sulphur Dioxide is the product of industrial activity with over 90% generated within the City. SO₂ is not only a respiratory irritant but is converted in the atmosphere over several hours to sulphuric acid (H₂SO₄), which is then converted to sulphate particles. These particles tend to be acidic in nature and cause lung irritation.

Significant reductions in air levels of SO₂ were made in the 1970s and 1980s. Since 1998, there has been a gradual and continuous decline in air levels of SO₂ besides the recent increase in 2016 and 2017.

Total Reduced Sulphur Trend



Sulphur Dioxide Trend



Public Health Services Airpointer located at Sam Manson Park

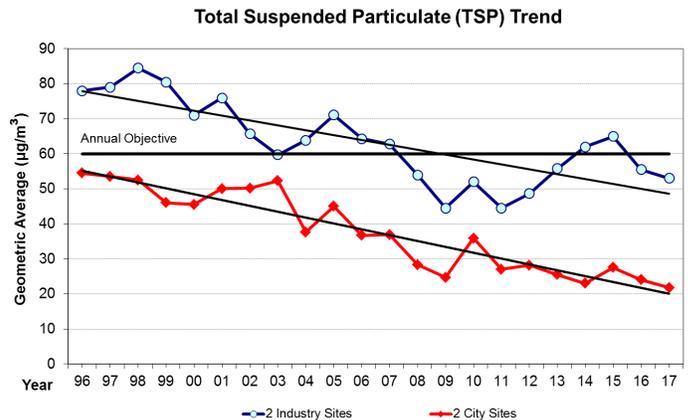


Particulate Material: Total Suspended Particulate (TSP)

Total suspended particulate (TSP) includes all particulate material with diameters less than about 45 micrometers (μm). A substantial portion of TSP is composed of road dust, soil particles and emissions from industrial activities and transportation sources.

There has been a steady decline in TSP at City sites while levels have risen in previous years at industry sites. There was a decline in 2016 lowering emissions at industry sites below the annual objective.

Included in the TSP category are inhalable particulates (PM_{10}) and respirable particulates ($\text{PM}_{2.5}$). It is possible to determine the net amount of particulate material in the air with sizes between about $45 \mu\text{m}$ and $10 \mu\text{m}$, by subtracting PM_{10} from the TSP value.

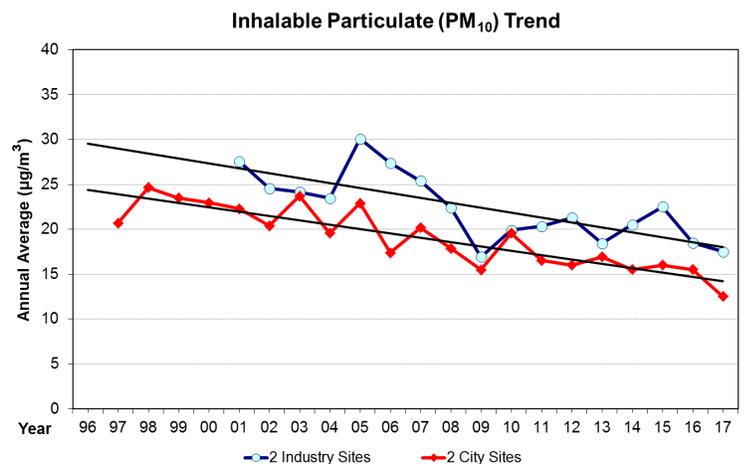


Particulate Material: Inhalable Particulate Matter (PM_{10})

Inhalable particulate matter (PM_{10}) has a diameter of $10 \mu\text{m}$ or less. PM_{10} makes up 40-50% of TSP in Hamilton and has been linked to respiratory, cardiovascular and other health impacts in humans.¹

PM_{10} is primarily derived from vehicle exhaust emissions, industrial fugitive dusts, and the finer fraction of re-entrained road dust.

PM_{10} at City sites has decreased by about 21% over the past decade. This is likely a combination of better performance of vehicle fleets, better management of dust track-out by industries, and the use of better street sweepers and street sweeping practices by the City.



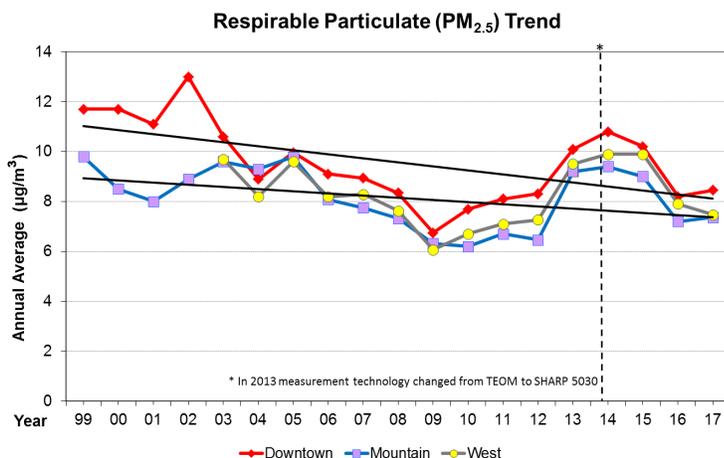
Ambient Air Quality Trends and Comparisons Cont'd..

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

The Ontario government started measuring PM_{2.5} across Ontario in 1999. PM_{2.5} makes up about 60% of PM₁₀ and is mostly derived in cities from vehicle emissions.

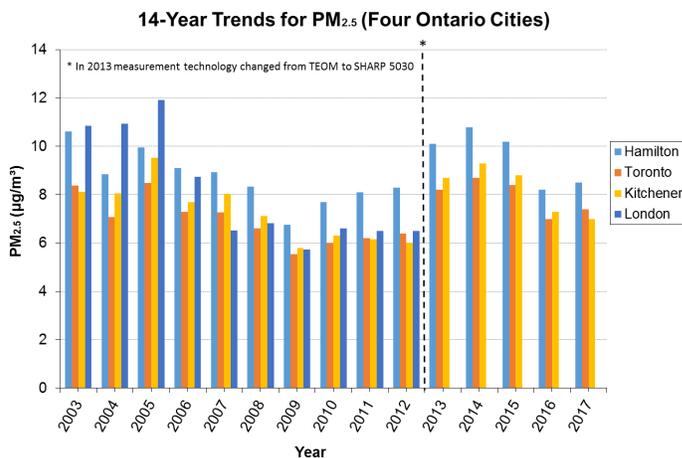
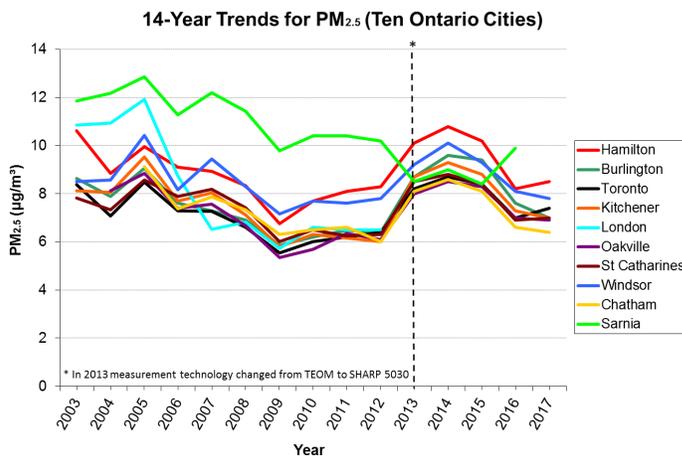
Scientists now agree that exposure to the small particles and the organic substances is the likely cause of the observed respiratory and cardiovascular health impacts attributed to particulate material exposure.¹

The trend in PM_{2.5} showed a 3.5% decrease per year since 1999 until 2009 at the downtown and mountain AQHI sites. The apparent increase in 2013 is not reflective of a change in air quality but is a result of change in monitoring to a more sophisticated and sensitive PM_{2.5} monitoring technology. There has been a decline in PM_{2.5} concentrations across Hamilton with a slight peak on the Mountain and Downtown in 2017. The Mountain and West end remain below the Canadian Ambient Air Quality Standards (CAAQS). CAAQS are becoming more stringent in 2020 and therefore more work will be needed to meet the future standards.



Public Health Services Airpointer

For more information contact Public Health Services (905) 546-2424 ext. 5288

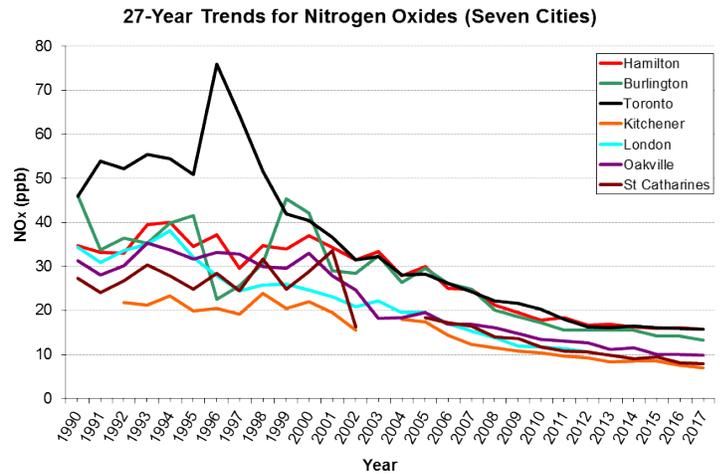


¹ SENES Consulting Ltd. (2011). *Health Impacts Exposure to Outdoor Air Pollution in Hamilton, Ontario*. Retrieved from www.cleanair.hamilton.ca/health-impact (i.e. Inhalable particulate matter (PM₁₀) is the airborne particles that have diameters of 10 µm or less. PM₁₀ makes up 40-50% of TSP in Hamilton and has been linked to respiratory, cardiovascular and other health impacts in humans.)

Nitrogen Oxides (NO_x)

This chart displays the steadily decreasing trend of Nitrogen Oxides (NO_x) in seven cities in Ontario, including Hamilton. Since the 1990's both Toronto and London have seen reductions in NO_x levels of approximately 60%. Hamilton's NO_x levels have decreased by approximately 46% since 1990.

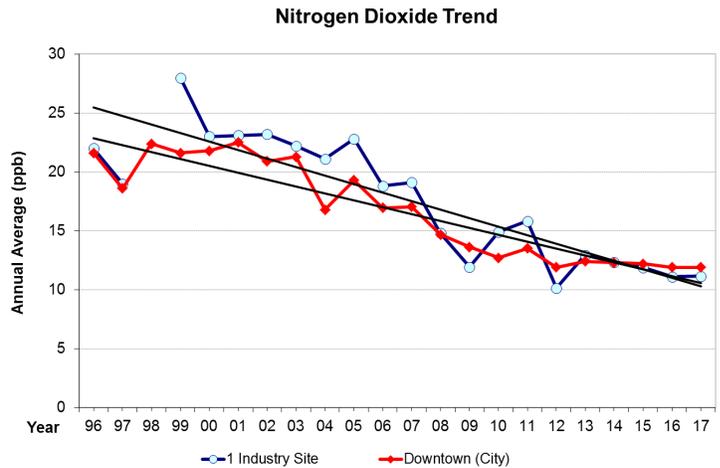
The slower decrease of NO_x levels in Hamilton is presumably due to the fact that Toronto and London do not have other sources (ex. industrial emissions) that contribute to overall NO_x levels that Hamilton has. The decrease in NO_x levels is a reflection of improvements in emission performance of the vehicle fleets in Ontario over the past decade.



Nitrogen Dioxide (NO₂)

Nitrogen Dioxide (NO₂) is formed in the atmosphere from nitric oxide (NO) which is produced during combustion of fuels (i.e gasoline, diesel, coal, wood, oil and natural gas) and is responsible for a significant share of the air pollution-related health impacts in Hamilton. The leading sectors producing these emissions are the transportation and industrial sectors. The level of vehicle use across Hamilton has increased slightly during the past decade, however overall NO levels have decreased most likely due to improved engine technologies.

Both NO and NO₂ are routinely measured and their sum is reported as Nitrogen Oxides (NO_x) to reflect the presence of both species in urban areas. Ultimately all of the NO is converted to NO₂ which reacts with water in the atmosphere to produce nitric and nitrous acids (HNO₃ and HNO₂, respectively); these acids are converted into nitrate salts that constitute about 25% of the mass of fine particulate matter or PM_{2.5}.



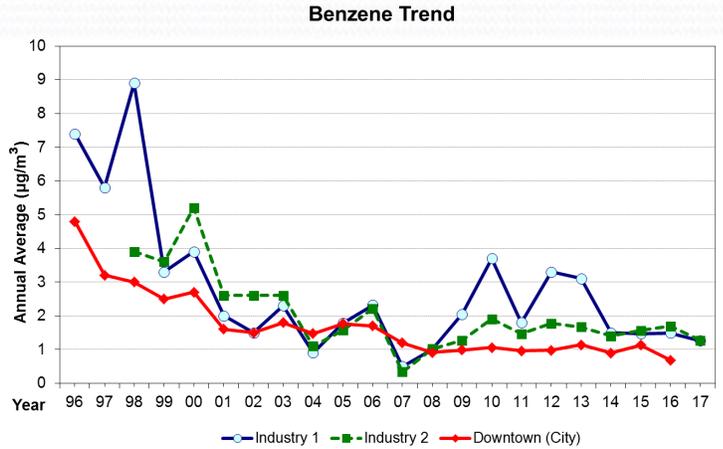
Hamilton Air Monitoring Network Beach Strip Station 29102



Benzene

Benzene is a carcinogenic (cancer causing agent) volatile organic compound (VOC) that is emitted from some operations within the steel industry, specifically coke ovens and coke oven by-product plant operations. Benzene is also a significant component of gasoline which can be up to 5% benzene. Vapours containing benzene are released during pumping at gasoline stations.

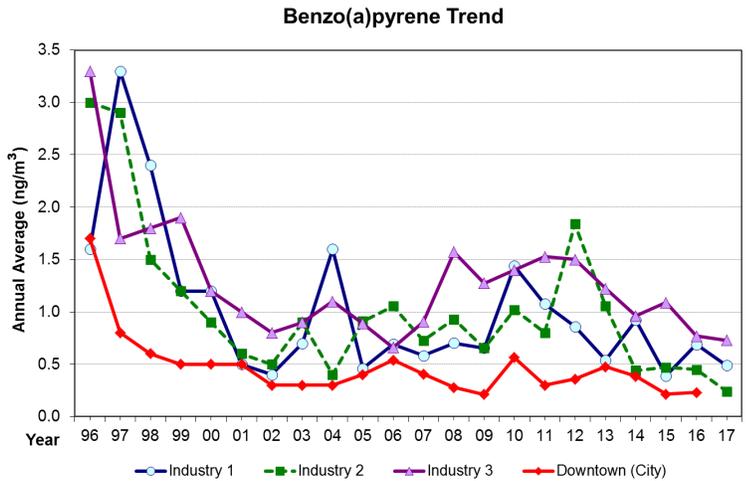
Air levels of benzene have been reduced dramatically since 1990's, due to significant upgrading of the coking plant operations, improved operating procedures and improved control of release of benzene vapours from the coke by-products. More work remains to be done to reduce low concentration exposures of benzene. Benzene concentrations for downtown for 2017 were not



Benzo[a]pyrene

Benzo[a]pyrene (BaP) is also a carcinogen and capable of causing cancer in both animals and humans. BaP is a member of a larger class of chemical compounds called polycyclic aromatic hydrocarbons (PAHs) which 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 released from coke oven operations within the steel industry. There have been significant decreases in BaP levels since the late 1990s. BaP concentrations for downtown for 2017 were not available.



Conclusions

In 2017, the City of Hamilton provided a contribution of \$56,000/year in support of Clean Air Hamilton and its activities. Descriptions of some of the programs supported by Clean Air Hamilton can be found on pages 5 - 7 in this report.

This annual funding is leveraged significantly in two ways: first, Clean Air Hamilton uses these funds in partnership with funds provided by other agencies and institutions to develop programs related to air

quality; second, since all of the members of Clean Air Hamilton donate their time and expertise, there is a significant amount of in-kind support provided. It is estimated that Clean Air Hamilton's partners provide well over \$200,000 in in-kind support.

Bruce Newbold, Ph.D.
Chair, Clean Air Hamilton

Air Quality - Additional Resources

To learn more about Clean Air Hamilton and our work visit www.cleanairhamilton.ca .

Air Quality and Health

To learn about how to protect your health visit: www.airhealth.ca

To learn about Hamilton Public Health Services and actions on air quality visit:

<http://preview.hamilton.ca/public-health/health-topics/air-quality-pollution-smog>

Government Actions on Air Quality

To learn about the Province of Ontario's actions on air quality visit: www.airqualityontario.com/

To learn about the Government of Canada's actions on air quality visit: <http://www.ec.gc.ca/Air/default.asp?lang=En&n=14F71451-1>

Air Quality Monitoring

For a detailed model of hourly concentrations for a variety of pollutants across Hamilton visit:

<http://www.hamiltonaqhi.com>

To check our air pollution levels in Hamilton and Ministry run air monitors visit:

<http://www.airqualityontario.com/>

To check out the Hamilton Air Monitoring Network visit: <http://www.hamnair.ca/>

To check out Hamilton Air Quality Health Index website visit: <http://www.hamiltonaqhi.com>



Who we are...

"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."

2017 MEMBERS

Bruce Newbold, *Chair (Incoming)* -McMaster University

Denis Corr, *Chair (Outgoing)* - Corr Research

Trevor Imhoff - *Air Quality Coordinator* - Clean Air Hamilton

ArcelorMittal Dofasco

Citizens

City of Hamilton - *Community Initiatives**

City of Hamilton Planning - *Community Planning*

City of Hamilton Public Works - *Office of Energy Initiatives*

City of Hamilton Public Works - *Transportation Demand Management**

Environment Canada*

Environment Hamilton

Green Venture

Hamilton Conservation Authority

Hamilton Industrial Environmental Association

Hamilton Public Health Services

Health Canada*

The Lung Association

McKibbon Wakefield Inc.

McMaster Institute for Healthier Environments

Ministry of Environment Conservation and Parks (MECP)
- *Hamilton Regional Office*

Mohawk College*

Ontario Environmental Assessment Corporation (OEAC)

Stelco

* indicates "observing member"



This report and the work of our members is dedicated to the memory of
Dr. Brian McCarry (1946—2013)
Chair of Clean Air Hamilton from
1997—2013

Clean Air Hamilton, November 2017

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