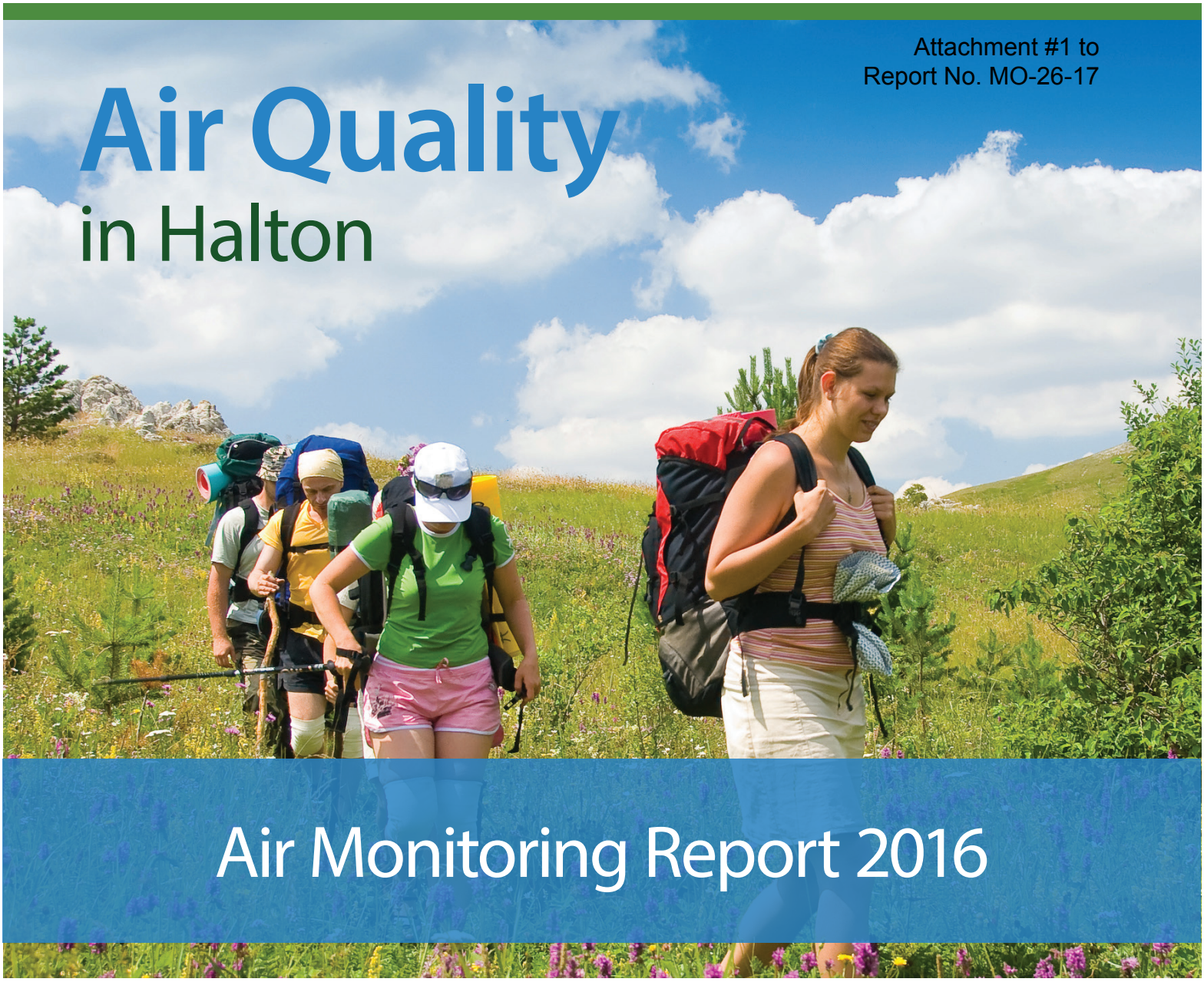
Attachment #1 to
Report No. MO-26-17

Air Quality in Halton



Air Monitoring Report 2016

September 2017

Halton REGION

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Reference:

Halton Region Health Department, *Air Quality in Halton: Air Monitoring Report 2016*. Oakville, Ontario, September 2017.

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Acknowledgements:

Thank you to staff at the Ontario Ministry of Environment and Climate Change for helpful comments on a draft of this report and for providing some of the Canadian Ambient Air Quality Standards calculations. Thanks also to Neil Buonocore, CleanAir Environmental Inc. and to Rotek Environmental Inc. for supporting all aspects of operating the Milton air quality monitoring site.

Executive Summary

The Health Department operates an air quality monitoring station in Milton to measure the level of five common pollutants in the surrounding outdoor air. The five common air pollutants are ozone (O_3), fine particulate matter ($PM_{2.5}$), nitrogen dioxide (NO_2), carbon monoxide (CO), and sulphur dioxide (SO_2). Nitrogen dioxide, CO, SO_2 and $PM_{2.5}$ are released directly into the air mainly from vehicles and industry. Ozone is not released directly into the environment but forms indirectly in the atmosphere through complex chemical reactions. $PM_{2.5}$ is released directly from places such as construction sites, unpaved roads and fires but can also form indirectly in the atmosphere from chemical reaction of gases such as sulphur dioxide and nitrogen oxides. Poor air quality created by the presence of air pollutants, especially ground level O_3 and $PM_{2.5}$ can have harmful effects on human health.

The levels for three of the air pollutants (O_3, $PM_{2.5}$ and NO_2) measured at the Milton station are compared to results from two air quality monitoring stations that are operated by the Ontario Ministry of the Environment and Climate Change (MOECC) in Burlington and Oakville. Carbon monoxide (CO) and sulphur dioxide (SO_2) are measured in Milton but not in Burlington and Oakville, therefore; comparisons are made to the next closest monitoring locations which are Toronto West and Hamilton Downtown.

In 2016, air monitoring results from Burlington, Oakville and Milton met, or were lower than, all applicable criteria or standards (Ambient Air Quality Criteria/Canadian Ambient Air Quality Standards) with the exception of the Canadian Ambient Air Quality Standard for ozone. The standard for ozone was exceeded by all but one site in the surrounding community. The Ambient Air Quality Criteria are set by MOECC and the Canadian Ambient Air Quality Standards are set by Health Canada and Environment Canada; these are targets levels below which harmful effects on human health and/or the environment are not expected to occur.

A review of the Air Quality Health Index (AQHI) data is also presented in this report. The AQHI shows a health-based scale that indicates the level of health risk associated with local air pollution levels. The AQHI is calculated using levels of ground level ozone, particulate matter and nitrogen dioxide. In 2016, the Air Quality Health Index (AQHI) in Milton was in the low health risk category 89 per cent of the time and in the moderate health risk category 10 per cent of the time (one per cent of the readings were invalid). In Burlington, the AQHI was in the low health risk category 89 per cent of the time and in the moderate health risk category for 11 per cent of the time with no invalid readings. In Oakville, the AQHI was in the low risk category 92 per cent of the time, in the moderate risk category for seven per cent of the time and had one per cent invalid readings.

Introduction

Air quality in Halton Region is affected by pollution that is released locally as well as by pollution that is carried in the upper atmosphere to the region from other areas. Sources of air pollution include transportation sector, industry, heating produced from burning firewood, electrical energy generation and agricultural activities such as the use of fertilizers and the raising of livestock. Air pollution also comes from natural sources such as trees and vegetation that emit pollen and chemicals that are important in the formation of ozone. Other natural sources include wind erosion as well as forest and grassland fires. Local surroundings such as the presence of tall buildings that create a canyon-like effect can slow down the movement of pollution in an area. Wind speed and wind direction as well as sunlight intensity and the amount of rainfall are other factors that affect the level of air pollution.

This report focuses on five common air pollutants: ozone (O_3), fine particulate matter ($PM_{2.5}$ – particles equal to or less than two and a half microns in diameter), nitrogen dioxide (NO_2), carbon monoxide (CO), and sulphur dioxide (SO_2) and also reports on the AQHI levels in Burlington, Milton and Oakville. The AQHI is updated hourly and lets the public know the health risk associated with local air pollution levels. The AQHI information allows the general population and at-risk groups to plan when to safely enjoy outdoor activities.

The 2016 air quality data collected from Milton is compared to air quality data from Burlington and Oakville (http://www.airqualityontario.com/). Levels of the five common air pollutants are compared to determine if the levels of the pollutants measured in Halton are similar within Halton and similar to levels in surrounding communities. Sulphur dioxide (SO_2) and carbon monoxide (CO) are monitored in Milton but not monitored in

Burlington or Oakville; therefore SO_2 and CO levels from Milton are compared to results from the Toronto West and Hamilton Downtown stations.

The air quality data for four of the common air pollutants (O_3, NO_2, CO and SO_2) measured at the Halton sites are compared to the Ambient Air Quality Criteria (AAQC). The AAQC are provincial criteria set by MOECC to protect human health and the environment. The levels of these four air pollutants are compared to the AAQC to determine if the levels measured in Halton are above or below the AAQC. There are no AAQC for $PM_{2.5}$.

The 2016 O_3 and $PM_{2.5}$ air quality results from Milton, Burlington and Oakville are compared to the Canadian Ambient Air Quality Standards (CAAQS) to determine if the levels of these pollutants are above or below the federal standards. The CAAQS are set by Environment Canada and Health Canada to protect human health and the environment. Health Canada and Environment Canada have only set CAAQS for O_3 and $PM_{2.5}$. Both the AAQC and the CAAQS are set at levels of a pollutant where harmful human health effects or harm to the environment are not expected.

Ambient Air Monitoring in Halton Region

Air quality is monitored by the Ontario Ministry of the Environment and Climate Change (MOECC) at two stations in Halton Region. These stations are a part of a network of 39 air quality monitoring stations throughout Ontario. One monitoring station is located in Burlington, at Highway 2 and North Shore Boulevard East and one station is located in Oakville, at Eighth Line and Glenashton Drive. In 2008, Halton Region established an air quality monitoring station in Milton. This monitoring station is located on the property of Bishop Reding School at 1120 Main Street East.

Air quality data from the Milton station is of similar quality to data from the two MOECC stations in Halton. The Milton station has air monitoring equipment that is the same as equipment used by the provincial air quality monitoring network. Also, the Milton station is periodically audited by the MOECC and the Milton monitoring equipment are operated using MOECC rules.

Presentation of results

The results for the five common air pollutants are described in different sections of the report. A section on the Air Quality Health Index (AQHI) is also included. The air quality data for Milton is calculated and compared to the Ambient Air Quality Criteria (AAQC) and the Canadian Ambient Air Quality Standards (CAAQS). There are AAQC for four of the five pollutants: O_3, NO_2, CO and SO_2. The CAAQS only has standards for O_3 and $PM_{2.5}$. Data collected in Milton are used to provide the Air Quality Health Index (AQHI) for residents in Milton and Halton Hills. Air quality data are available from the Region's air quality web page: www.halton.ca/airquality.

Ambient Air Quality Criteria

Ambient Air Quality Criteria for air pollutants are developed by the Ontario Ministry of the Environment and Climate Change for different averaging times (e.g.1-hour, 24-hour and annual) depending upon the effect of interest. The AAQC represent a level below which harmful effects on human health and/or the environment are not expected to occur. However, studies have shown that some of the common air pollutants do not have a level below which there are no expected health effects. Also, harmful health effects can be found at air pollution levels below current air quality standards. Ambient Air Quality Criteria are shown in Table 1 for four of the common air pollutants.

Table 1: Ambient Air Quality Criteria for ozone, nitrogen dioxide, carbon monoxide, and sulphur dioxide.

Pollutant	Averaging Time	Standard
O_3 (ppb)	1-hour	80
NO_2 (ppb)	1-hour	200
	24-hour	100
CO (ppm)	1-hour	30
	8-hour	13
SO_2 (ppb)	1-hour	250
	24-hour	100
	Annual	20

Canadian Ambient Air Quality Standards

The Canadian Ambient Air Quality Standards replace the Canada-wide Standards for ground-level O_3 and $PM_{2.5}$ in outdoor air. O_3 and $PM_{2.5}$ are a concern for human health and are the major components of smog. The CAAQS are voluntary standards which set objectives for provinces and territories to work towards achieving by 2015 and 2020 (three years of data are required to calculate CAAQS). In 2020, a new CAAQS for SO_2 will come into effect and the existing CAAQS for O_3 and $PM_{2.5}$ will be lowered to better protect human health. A CAAQS for NO_2 is also being developed. The CAAQS for O_3 and $PM_{2.5}$ are shown in Table 2.

The level of O_3 and $PM_{2.5}$ detected locally may be influenced by movement of air pollution across international boundaries (transboundary flows (TF), for example ozone moving into Ontario from the United States). Exceptional events (EE) such as fine particulate matter from forest fires in northern Ontario or even outside the province may be taken into consideration when accounting for achievement of the CAAQS for $PM_{2.5}$. Assessing TF and EE is important for air quality management purposes but is not important from a human exposure perspective. Local actions can impact the amount of pollution produced locally, however residents are exposed to locally produced pollution as well as pollution carried into an area. Transboundary flow and exceptional events were not assessed for this report.

Table 2: Canadian Ambient Air Quality Standards for 2015 for O_3 and $PM_{2.5}$.

Pollutant	Averaging Time	Standard	Metric
O_3 (ppb)	8-hour	63	The 3-year average of the annual 4th-highest daily maximum 8-hour average concentrations.
$PM_{2.5}$ (µg/m^3)	24-hour	28	The 3-year average of the annual 98th percentile of the daily 24-hour average concentrations.
$PM_{2.5}$ (µg/m^3)	annual	10.0	The 3-year average of the annual average concentrations.

Ground Level Ozone (O_3)

Ground level ozone is not released directly to the atmosphere but forms and builds up during sunny days. It is a colourless and irritating gas that forms when nitrogen oxides (nitrogen dioxide (NO_2) and nitric oxide (NO) and volatile organic compounds react in the presence of oxygen and sunlight. The highest levels of ground level ozone tend to occur in the summer months (May to September) when sunlight is most intense.

Short-term exposure (lasting minutes, hours, or, at most, a few days) to ozone can irritate the eyes and respiratory tract and can cause coughing, chest tightness and wheezing. Short-term and long-term exposure (months to years) have also been linked to cardiovascular effects and death. Those most at risk from ozone exposure are children, people who already have respiratory or heart and lung conditions, and those who are active outside during the summer months. When high ozone levels are predicted, steps can be taken to reduce the release of pollutants needed for the formation of ground level ozone. Individuals can choose a cleaner commute such as public transit, biking, car-pooling or walking where possible. Other measures to reduce the

formation of ozone include conserving energy wherever possible, avoiding excessive idling of automobiles and refueling cars in the evening when it's cooler outside.

The summarized air quality monitoring results for O_3 in 2016 are presented in Table 3. The table shows the annual average concentration, maximum 24-hour (daily) concentration, maximum 1-hour concentration, and the number of hours recorded above the 1-hour Ambient Air Quality Criterion of 80 ppb. Annual average and daily maximum O_3 concentrations do not vary much between municipalities, while the 1-hour maximum values show some slight differences.

Table 3: Summary statistics for O_3 (ppb), Halton region, 2016.

Concentration units are: parts per billion (ppb)	Milton	Oakville	Burlington
Annual average	27	27	28
24-hour maximum	56	55	56
1-hour maximum	79	74	80
# of hours over the AAQC of 80 ppb	0	0	0

Ozone Canadian Ambient Air Quality Standard

Figure 1 shows the CAAQS for ozone for monitoring sites in Halton Region (green bars) compared to other MOECC monitoring sites (blue bars) in the surrounding area. Of the comparison locations shown here, only Toronto West met the CAAQS for O_3 in 2016. However, the MOECC 2015 *Air Quality in Ontario Report* shows that all designated monitoring sites in the province would have met the ozone CAAQS of 63 ppb if days of transboundary ozone flow are removed from the calculation.

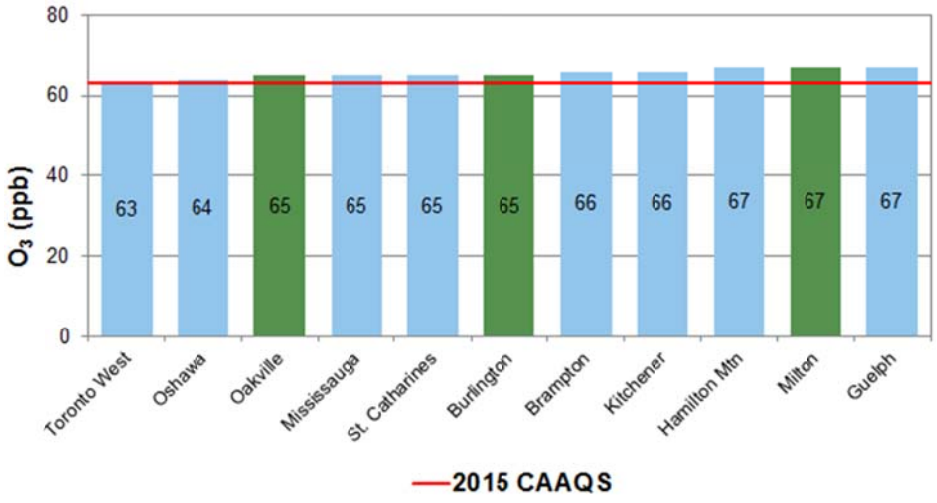

Figure 1: CAAQS for O_3 (ppb), Halton Region (green bars) and surrounding area (blue bars), based on data collected in 2014, 2015, and 2016.

The annual average of O_3 concentrations measured at monitoring sites in Halton Region and surrounding area are presented in Figure 2. The green circles represent Halton sites and the blue circles represent surrounding area sites. Comparisons of the O_3 results help demonstrate that the annual average ozone concentrations over a wider area are not very different around the western end of Lake Ontario. Toronto West is a roadside monitoring site where higher concentrations of vehicle emissions may react with ozone in the atmosphere to lower ozone concentrations.

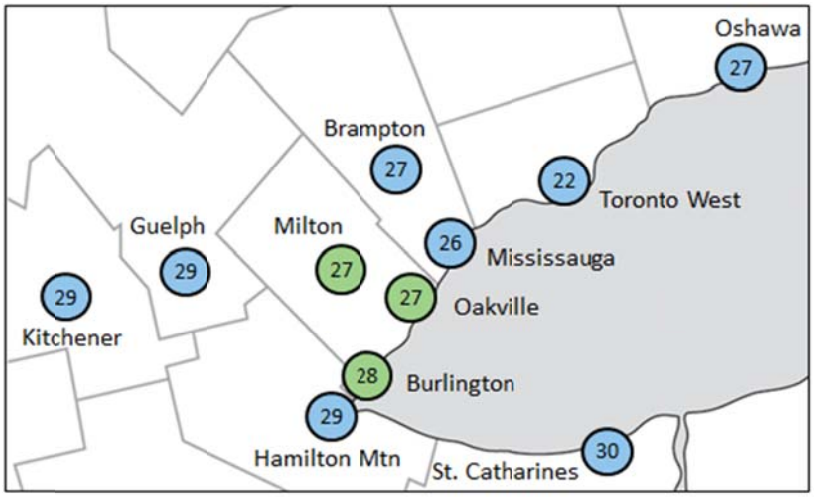

Figure 2: Annual mean ozone concentrations (ppb) in Halton region (green circles) and surrounding area (blue circles), 2016.

Fine Particulate Matter ($PM_{2.5}$)

Particulate matter is a mixture of both solid particles and liquid droplets suspended in air. Particulate matter is classified by its size, which is important because smaller particles are inhaled deeper into the respiratory system. Fine particulate matter ($PM_{2.5}$) refers to particles that are less than or equal to 2.5 microns in diameter (a micron is one-millionth of a metre). Particulate matter comes from a number of sources including fuel combustion (for transportation, industry, heating, and power generation), paved and unpaved roads, construction activity, agricultural burning and forest fires. Particulate matter may be 'primary' (emitted directly from a source) or 'secondary' (formed in the atmosphere from other emissions).

Fine particulate matter affects the respiratory and cardiovascular systems. Short-term exposure to elevated levels of $PM_{2.5}$ can cause eye, nose, and throat irritation, and can worsen symptoms of pre-existing respiratory conditions such as asthma and chronic bronchitis. Both short-term and long-term exposures to $PM_{2.5}$ have been linked to illness and premature death.

Results for $PM_{2.5}$ in 2016 are summarized in table 4. The table shows the annual average, the 24-hour (daily) maximum, the 1-hour maximum, and the number of days that the 24-hour concentration exceeded 28 µg/m^3. The number of days that the 24-hour concentration of $PM_{2.5}$ is over 28 µg/m^3 can be used as an indication of worsening air quality.

The 1-hour and 24-hour maximum values are similar at all three Halton sites. However, in Burlington the annual average for $PM_{2.5}$ is slightly higher than the other two sites. This may be due to the location of the monitor near the Burlington Skyway, and construction that occurred at the nearby hospital and wastewater treatment plant.

Table 4: Summary statistics for $PM_{2.5}$ (µg/m^3), Halton region, 2016.

Concentration units are: micrograms per cubic metre (µg/m^3)	Milton	Oakville	Burlington
Annual average	7.1	7.0	7.6
24-hour maximum	24	24	27
1-hour maximum	43	42	45
# of days over 28 µg/m^3	0	0	0

$PM_{2.5}$ Canadian Ambient Air Quality Standard

There are two Canadian Ambient Air Quality Standards for $PM_{2.5}$. One is 28 µg/m^3 based on a 24-hour averaging time, and the other is 10 µg/m^3 based on an annual average. Figure 3 presents the results for the 24-hour $PM_{2.5}$ CAAQS in Halton Region represented by the green bars. These results are compared to surrounding area monitoring sites represented by the blue bars. The 2016 results for all of the air monitoring locations show that they were all below the 24-hour CAAQS of 28 µg/m³.

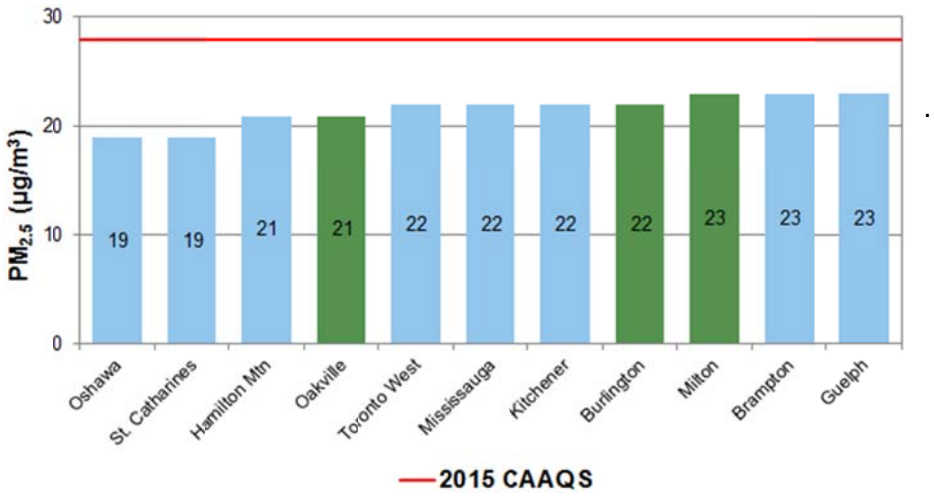

Figure 3: 24-hour averaging time CAAQS for $PM_{2.5}$ (µg/m³), Halton region (green bars) and surrounding area (blue bars), based on data collected in 2014, 2015, and 2016.

Figure 4 shows the annual average CAAQS results for $PM_{2.5}$ for Halton Region in 2016 (represented by the green bars) compared to surrounding area monitoring sites (represented by the blue bars). For 2016, all of the monitoring locations compared were below the annual CAAQS of 10µg/m^3.

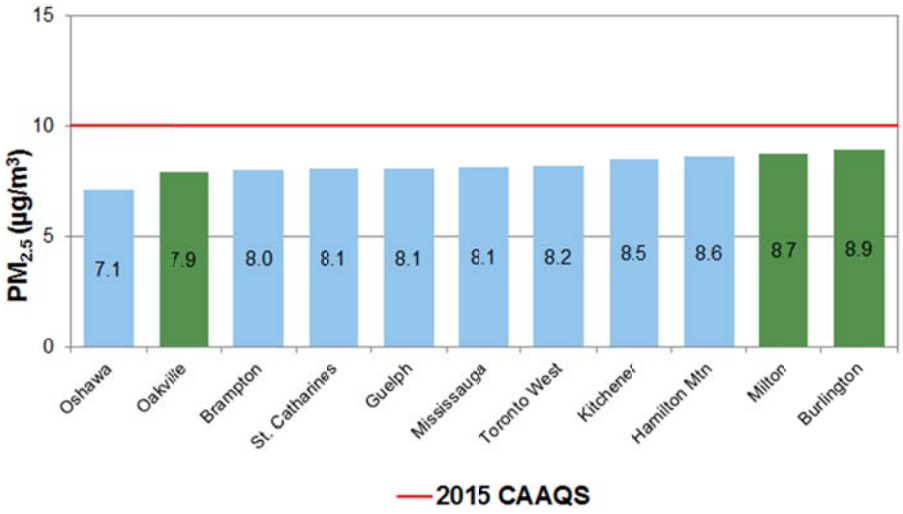

Figure 4: Annual CAAQS for $PM_{2.5}$ (µg/m^3), Halton region (green bars) and surrounding area (blue bars), based on data collected in 2014, 2015, and 2016.

The annual average for $PM_{2.5}$ concentrations measured at monitoring sites in Halton Region (green circles) are compared to results from several other locations (blue circles) in the surrounding area (Figure 5). This comparison helps to demonstrate that there is not much variation of the annual average concentrations for fine particulate matter over a wider area among the comparison sites. The slightly higher annual average measured in Burlington may be due to the monitor location near the Burlington Skyway and construction activity at the nearby hospital and wastewater treatment plant.

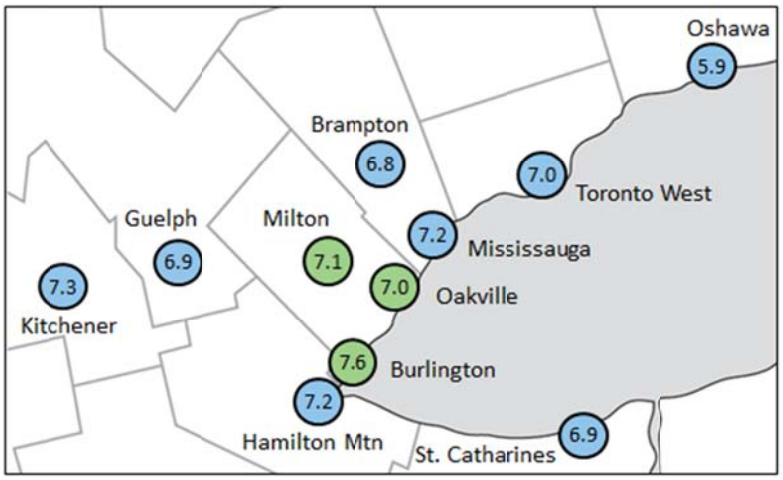

Figure 5: Mean annual $PM_{2.5}$ concentrations (µg/m³) in Halton region (green circles) and surrounding area (blue circles), 2016.

Nitrogen Dioxide (NO_2)

Most nitrogen dioxide in the atmosphere is not directly emitted but forms from nitric oxide (NO) which is formed during burning of fossil fuel. Together, NO_2 and NO make up nitrogen oxides (NO_x). Nitrogen oxides are directly released from all combustion processes, mostly as nitric oxide and with about 5-10 per cent emitted as nitrogen dioxide.

Exposure to NO_2 affects mainly the respiratory system by increasing proneness to respiratory infections and making pre-existing respiratory conditions worse. For example, people with asthma or chronic bronchitis have an increased sensitivity to NO_2. Childhood exposure to NO_2 has been linked to reduced lung function in later life.

The summarized results for NO_2 in 2016 including the annual average, the 24-hour (daily) maximum, the 1-hour maximum, the number of days over the 24-hour AAQC of 100 ppb and the number of hours over the 1-hour AAQC of 200 ppb are shown in table 5. For Milton, Oakville, and Burlington the maximum 1-hour and 24-hour measurements are all well below their respective AAQC values. The slightly higher 1-hour maximum concentration in Burlington may be influenced by the monitor location as mentioned above.

Table 5: Summary statistics for NO_2 (ppb), Halton region, 2016.

Concentration units are: parts per billion (ppb)	Milton	Oakville	Burlington
Annual average	9	8	10
24-hour maximum	29	28	33
1-hour maximum	53	50	62
# of days over the 24-hour AAQC of 100 ppb	0	0	0
# of hours over the 1-hour AAQC of 200 ppb	0	0	0

Carbon Monoxide (CO)

Carbon monoxide is a colourless, odourless and tasteless gas which is emitted primarily from incomplete combustion of fossil fuels. Vehicle emission is the single largest source of CO to the atmosphere in Ontario. The second largest sector emitting CO to the atmosphere is the commercial/residential/institutional sector, due largely to firewood burning in homes.

Short periods of exposure to CO levels from 70-800 ppm can cause headache, dizziness and disorientation. Carbon monoxide levels greater than 800 ppm may lead to unconsciousness and respiratory failure and levels above 1900-2000 ppm are fatal within a short period of time. Due to its cumulative effects of CO in the bloodstream, even exposure to low concentrations of CO can lead to adverse outcomes if exposure is prolonged. Outdoor levels of CO detected in Halton Region are not considered a health risk.

Carbon monoxide is not measured at the Oakville or the Burlington monitoring locations therefore readings from the Milton site were compared with Toronto West and Hamilton Downtown. Toronto West is located next to Highway 401 and Weston Road, and Hamilton Downtown is located at Elgin Street and Kelly Street, two of only four sites in Ontario where CO measurements are made (excluding Milton). Summary results for CO are shown in Table 6 including the annual average, the 8-hour maximum, and the 1-hour maximum. The number of occurrences over the 8-hour AAQC of 13 ppm, and the number of hours over the 1-hour AAQC of 30 ppm are also presented. For Milton, Toronto West and Hamilton Downtown, the maximum 1-hour and 8-hour measurements are well below their respective AAQC values. When comparing CO results it is important to keep in mind that the lower limit of detection for the CO monitor is around 0.08 parts per million and any values around this lower limit are unreliable and may be due to the “noise” of the monitor, rather than actual CO.

Table 6: Summary statistics for CO (ppm), Milton, Toronto West and Hamilton Downtown, 2016.

Concentration units are: parts per million (ppm)	Milton	Toronto West	Hamilton Downtown
Annual average	0.17	0.25	0.24
8-hour maximum	0.7	1.2	1.1
1-hour maximum	1.0	1.7	1.4
# of occurrences over the 8-hour AAQC of 13 ppm	0	0	0
# of hours over the 1-hour AAQC of 30 ppm	0	0	0

Sulphur Dioxide (SO_2)

Sulphur dioxide is a colourless gas with an odour similar to burnt matches. It is formed mainly from the combustion of fuels containing sulphur and smelters are the main source of SO_2 in Ontario. Other smaller, but important, sources include petroleum refining, cement and concrete manufacturing, as well as iron and steel industries.

Sulphur dioxide aggravates asthma and can reduce lung function and worsen symptoms of respiratory and cardiovascular conditions. People with asthma or chronic heart and lung conditions are most susceptible to SO_2.

Sulphur dioxide is also only measured in a few locations across Ontario; the SO_2 results from Milton were compared with Toronto West and Hamilton Downtown. Summary results are presented in Table 7 which includes the annual average, the 24-hour maximum, the 1-hour maximum, and the number of times any of the SO_2 Ambient Air Quality Criteria were exceeded. For all three monitoring stations, the maximum 1-hour, 24-hour, and annual average measurements are all well below their respective AAQC values. The higher results for Hamilton Downtown may be due to times when winds from the industrial area of Hamilton impact the site. It is important to keep in mind when comparing the annual averages that the lower limit of detection for the SO_2 monitor is around 1 ppb, and any values around this lower limit are unreliable and may be due to the “noise” of the monitor, rather than actual SO_2.

Table 7: Summary statistics for SO_2 (ppb), Milton, Toronto West and Hamilton Downtown, 2016.

Concentration units are: parts per billion (ppb)	Milton	Toronto West	Hamilton Downtown
Annual average	0.9	0.6	3.2
24-hour maximum	5	3	20
1-hour maximum	20	10	80
# of occurrences over the annual AAQC of 20 ppb	0	0	0
# of days over the 24-hour AAQC of 100 ppb	0	0	0
# of hours over the 1-hour AAQC of 250 ppb	0	0	0

Air Quality Health Index (AQHI)

The Air Quality Health Index (AQHI) was developed by the Federal and Provincial governments in consultation with health professionals. The AQHI shows a health-based scale that indicates the level of health risk associated with local air pollution levels. The scale ranges from 1 to 10+ (see Table 8).

The AQHI is a communication tool which indicates:

- An air quality reading that ranges from 1 to 10+. A higher number indicates greater health risk.
- The category that describes the level of health risk associated with the index reading—low, moderate, high or very high health risk.
- Health messages tailored to an "at-risk" population and the general population.
- Current hourly AQHI readings and maximum forecast values for today, tonight and tomorrow.

Table 8: Air Quality Health Index health messages (Source: Environment Canada).

Health Risk	Air Quality Health Index	Health Messages	
		At Risk Population[1]	General Population
Low	1 - 3	Enjoy usual outdoor activities.	Ideal air quality for outdoor activities.
Moderate	4 - 6	Consider reducing or rescheduling strenuous activities outdoors if you are experiencing symptoms.	No need to modify your usual outdoor activities unless you experience symptoms such as coughing and throat irritation.
High	7 - 10	Reduce or reschedule strenuous activities outdoors. Children and the elderly should also take it easy.	Consider reducing or rescheduling strenuous activities outdoors if you experience symptoms such as coughing and throat irritation.
Very High	>10	Avoid strenuous activities outdoors. Children and the elderly should also avoid outdoor physical exertion.	Reduce or reschedule strenuous activities outdoors, especially if you experience symptoms such as coughing and throat irritation.

[1] The at-risk population includes children, elderly people, and people of all ages with pre-existing heart & lung conditions.

Special Air Quality Statements (SAQS) are issued by the Ministry of the Environment and Climate Change and Health Canada when forecast AQHI levels are predicted to reach high risk levels and to last for one to two hours. If a high risk AQHI level is forecast for a length of time of at least three hours, then a Smog and Air Health Advisory (SAHA) is issued. In Ontario, only one SAHA was issued in 2016. The SAHA was issued for the City of Toronto on June 18th and it lasted from 4:45 pm to 8:02 pm with an AQHI over 6 for one hour.

In 2016, three SAQS were issued for Halton-Peel (on June 19th, on August 10th and on August 11th) however the AQHI readings did not reach the high risk category at any time. Table 9 shows the AQHI readings from Milton and the percentage of readings in the different health risk categories over an eight year period. In 2009, 2010, 2013 and 2016 there were no readings in the high risk category (>6). However, there were AQHI

readings of 7 in 2011 (3 hours), in 2012 (1 hour), in 2014 (3 hours) and 2015 (2 hours). Invalid readings are reported for hours when an AQHI reading is not available.

The AQHI for Milton can be viewed here: Air Quality Health Index for Milton

In Burlington, the 2016 AQHI was in the low health risk category 89 per cent of the time and in the moderate health risk category for 11 per cent of the time. There were no invalid readings. For Milton, the AQHI was in the low health risk category 89 per cent of the time and in the moderate health risk category 10 per cent of the time. One per cent of the readings were invalid. In Oakville, the AQHI was in the low risk category 92 per cent of the time, in the moderate risk category for seven per cent of the time and had one per cent invalid readings. There were no high or very high health risk readings in either Burlington or Oakville in 2016.

Table 9: AQHI readings from Milton for eight years (per cent of hourly readings in low, moderate, high and very high risk categories*).

	Low Risk	Moderate Risk	High Risk	Very High Risk	Invalid Readings
2009	84%	14%	0.00%	0.00%	2%
2010	83%	14%	0.00%	0.00%	3%
2011	85%	13%	0.03%	0.00%	2%
2012	85%	12%	0.01%	0.00%	2%
2013	86%	9%	0.00%	0.00%	5%
2014	84%	11%	0.03%	0.00%	5%
2015	86%	14%	0.02%	0.00%	1%
2016	89%	10%	0.00%	0.00%	1%

* Totals may not sum to 100% due to rounding.

Summary

Air quality data in Milton from 2016 was compared to 2016 data available for Oakville and Burlington and some locations surrounding Halton Region. Results of the analysis showed that the annual average concentrations of O_3 and $PM_{2.5}$ are relatively consistent among the Milton, Oakville, and Burlington monitoring stations. The Halton results for O_3 and $PM_{2.5}$ were also similar to results from monitoring stations in surrounding municipalities. For NO_2, the annual average and the 24-hour maximum concentrations are similar for all three sites. However, for the 1-hour maximum concentration, Burlington is about 20% higher than Oakville or Milton, possibly influenced by known sources of NO_2 near the monitoring station.

Carbon monoxide and sulphur dioxide are not measured in Oakville or Burlington and Milton results were compared to Toronto West and Hamilton Downtown. For CO, the Milton monitoring station results were slightly lower than those from Toronto West and Hamilton Downtown. For SO_2 the annual average, 1-hour maximum and 24-hour maximum concentrations were all higher in Milton compared with Toronto West but lower than Hamilton Downtown. Sulphur dioxide results at the three locations did not exceed the Ambient Air Quality Criteria. The other common air pollutants measured also did not exceed any AAQC.

The Canadian Ambient Air Quality Standard for ozone was not achieved at any of the monitoring stations in Halton region, nor in any of the surrounding comparison locations with the exception of Toronto West. Both the 24-hour and the annual CAAQS for fine particulate matter were achieved in Halton region and the surrounding comparison locations. Due to an improvement in monitoring technology $PM_{2.5}$ measurements from 2013 onwards should not be compared to previous years.

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