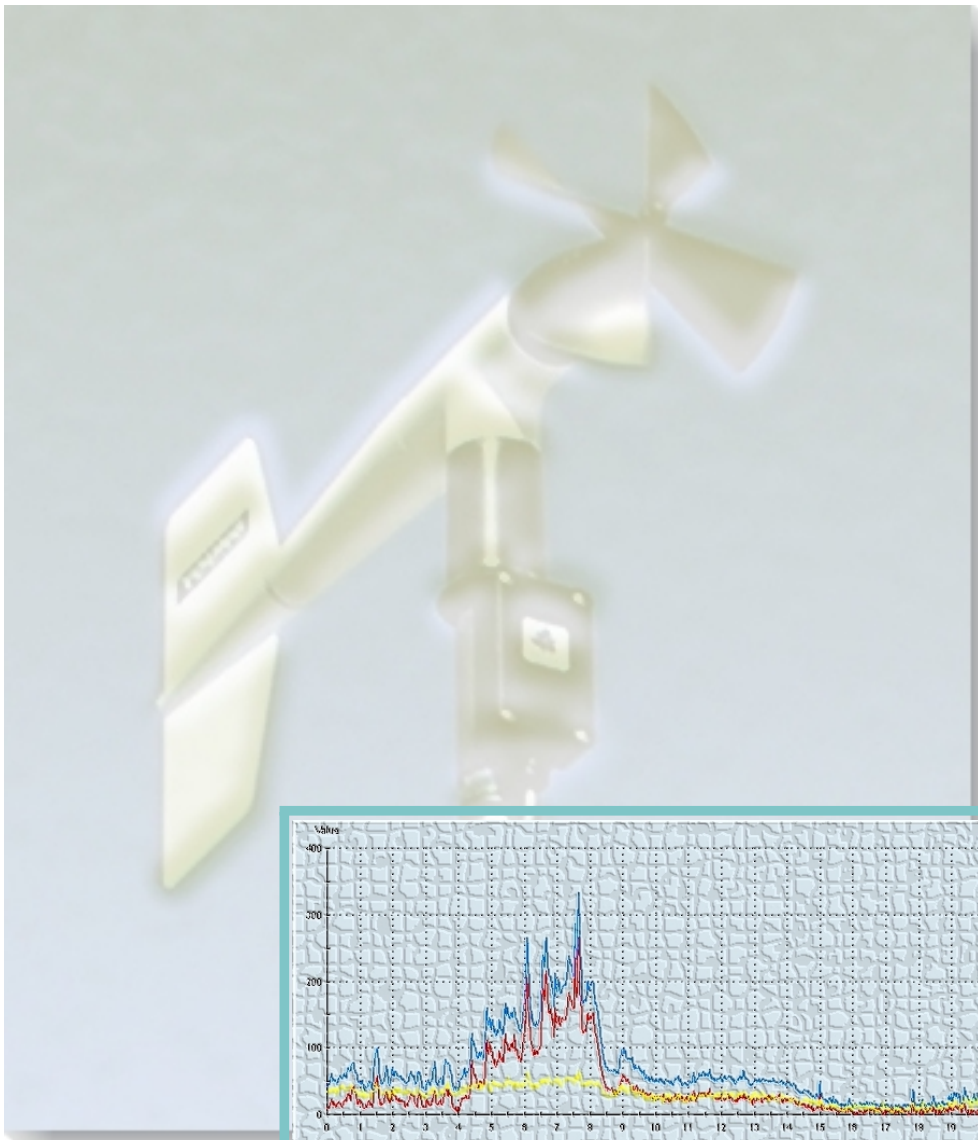

Annual Air Quality Report 2008

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Figures and Tables

Executive Summary

Since May 1st, 2003, the industrial air shed monitoring network in the City of Hamilton has been operated, serviced and maintained by Hamilton Air Monitoring Network (HAMN). HAMN is a group of industries that are committed to ongoing measurement of local air quality as part of the Ministry of the Environment (MOE) industrial Source Emissions Monitoring (SEM) program.

Companies participating in the MOE SEM program are required to submit an annual summary report of their air quality monitoring results obtained in the previous calendar year.

This report contains an overview of the HAMN network, historical trends for major air pollutants and an explanation of the roles and responsibilities of HAMN and MOE in the SEM program. The complete 2008 monitoring results are provided in a separate appendix to this report.

Some of the highlights of this report are:

- Sulphur dioxide levels continue to decline and remain well below the MOE's annual criteria. The sulphur dioxide 2008 annual average was the lowest in 10 years.
- Total Reduced Sulphur (TRS) annual trends for 2008 were the lowest in ten years. We have seen a decrease in the number of hours over the 10 ppb odour threshold level. There was a 50%decrease from the previous year.
- Nitrogen dioxide (NO_2) levels continue to decline in 2008. This year was the lowest in ten years.
- Inhalable Particulate (PM10) levels continue to exceed the 24-hour interim AAQC. Although annual trends seen at the three industrial sites monitoring Total Suspended Particulate (TSP) remain the same over the last 6 years, levels at specific point source stations continue to exceed the 24-hour TSP objective. Based on the location of the ambient air monitoring stations and their proximity to local sources it is evident that road dust, fugitive emissions and industrial emissions continue show elevated TSP levels.
- Benzene levels remain constant over the last five years.
- Benzo[a]Pyrene (B[a]P) levels increased slightly in 2008. All three sites continue to record periodic exceedances of the 24-hour Ambient Air Quality Criteria (AAQC).

HAMN has surpassed the MOE yearly valid data collection requirement criteria of 95% for six consecutive years. HAMN has averaged 97% over each of the first five years of operation, with minimal down time.

The MOE performs regular audits of activities and processes related to the collection of air quality data under the MOE Source emission monitoring (SEM) program. The audits provide an indication of the effectiveness of quality control activities used by station operators and data management staff. HAMN meets or exceeds all of the requirements under the MOE SEM program.

HAMN continues to provide resources for network enhancement; 2008 projects include:

- A new air monitoring station was commissioned in late 2008 for St Christopher Park.
- Two new real-time particulate samplers we purchased in 2008. These additional samplers will enhance the HAMN particulate monitoring program
- Continuing to participate in joint monitoring programs with the MOE such as fugitive emissions.
- A new oxides of nitrogen (NOX) analyzer was added to the HAMN network in 2008.
- All upgrades to the HAMN real-time telemetry and data acquisition system were completed in 2008. Completion of this project was required to move ahead with the HAMN website scheduled for release for June, 2009.

Introduction

Hamilton Air Monitoring Network (HAMN)

Since May 1st, 2003, the point source air-monitoring network in the City of Hamilton has been operated, serviced and maintained by the Hamilton Air Monitoring Network (HAMN).

The Hamilton industrial area is made up of various industrial sectors including integrated iron and steel plants, chemical producers, manufacturing facilities and several recycling facilities. With the close proximity of these facilities to each other, and the complexity of meteorological conditions in Hamilton, assessing sources of industrial emissions has always been a difficult task.

HAMN represents participating industries that are committed to carrying out their own air quality monitoring as part of the MOE's SEM program, which is designed to identify, monitor and report the levels of target pollutants near industrial plants.

HAMN Participating Industries – Table 1

Bartek Ingredients	MultiServ - ArcelorMittal Dofasco Inc.	Liberty Energy Inc.
Baycoat Ltd.	MultiServ - U.S Steel Canada	U.S Steel Canada
Bunge Canada	Lafarge Canada – Jones Road	ArcelorMittal Hamilton East
City of Hamilton	Lafarge Canada - Victoria	Rurtgers Canada
Shell Canada	Lafarge Hamilton Slag	Vopak Terminals of Canada Inc.
ArcelorMittal Dofasco Inc.	Triple M Metal LP	Columbian Chemicals Canada ULC
Federal Marine Terminals		

Annual Report Overview

Companies participating in the MOE's SEM program are required to submit an annual summary report of their air quality monitoring results obtained in the previous calendar year. This report is HAMN's annual submission which summarizes HAMN's 2008 air quality data as per the MOE's reporting requirements.

This report contains an overview of the HAMN network, historical trends and annual data for major air pollutants and an explanation of the roles and responsibilities of HAMN and MOE in the SEM program. The complete 2008 monitoring results are provided in a separate appendix to this report.

Network Enhancements

The total capital value of HAMN assets now exceeds $500,000. The HAMN members support the network's annual operating costs of approximately $400,000 through user fees. These fees fund the service, repair and maintenance of the monitoring equipment in the HAMN network, as well as the costs of meeting all QA/QC requirements required by the MOE and paying for all laboratory analyses. Approximately 10% of the budget is committed toward the purchase of new equipment or the conducting of special air monitoring surveys.

Public - Web Based Data Access

The HAMN steering committee is committed to securing funding needed to make the real-time data collected by HAMN available to the public via a web-based data portal. The funding needed to host and maintain this web site may be identified in the near future so that HAMN members and the general public will have access to this unique data resource. Funding for this project was approved by HAMN in late 2007 and 2008. Installation of hardware and system software is expected for early spring of 2008. Development of a website will be carried out throughout most of the summer with an expected release of June 2009.

Air Quality Summary Data - Pollutant Trends

An important tool used for air pollution data analysis is the evaluation of pollutant trends. Data collected from the HAMN air monitoring sites is summarized and illustrated in the following 'historical trend' graphs. Trend analysis is a good approach to learn more about how a pollutant behaves over time and space. Some data trend categories include the following:

- **Hourly data** - How does a given pollutant tend to 'behave' during an average day.
- **Annual data** - How a given pollutant 'behaves' during the course of the year.
- **Seasonal data** - How inversions affect the dispersion of pollutants in the local air shed.
- **Historical data** - This is the trend over several years.

These analyses help in assessing the impacts of emission reductions initiatives, deciding where to deploy monitors and gauging the effectiveness of Provincial pollution abatement and control legislation.

The following graphs and bar charts provide annual trends for the pollutants monitored at selected monitoring locations. Figure 15 in Appendix 4 provides the locations of the individual monitoring stations in the Hamilton Area.

A summary table for each pollutant is also provided indicating the Maximum 1-Hr Average Value, the Maximum 24-Hr Average Value, the Number of Hours over the 1-Hr Ambient Air Quality Criteria (AAQC) the Number of Days over the 24-Hr AAQC, Annual Mean and Percent Valid Data. All 2008 data is available in the "Summary Statistics and Data Set 2008"

Air Quality Monitoring – Sulphur Dioxide

Characteristics

Sulphur Dioxide (SO_2) belongs to the family of sulphur oxide gases (SOx). These gases dissolve easily in water. Sulphur is prevalent in many raw materials, including crude oil, coal, and ores that contain common metals like aluminum, copper, zinc, lead, and iron. SOx gases are formed when fuels containing sulphur, such as coal or oil, are burned, and when gasoline is extracted from oil, or metals are extracted from ore. SO_2 dissolves in water vapour to form an acid which interacts with other gases and particles in the air to form sulphate particulates and other products that can be harmful to people and their environment.

Over 65% of SO_2 released to the air comes from electric power utilities, especially those that burn coal. Other sources of SO_2 are industrial facilities that derive their products from raw materials like coal and crude oil, or that burn coal or oil to produce process heat. Examples are the steel industry, petroleum refineries, cement manufacturing, and metal processing facilities.

Ontario AAQC's for SO_2 are:

1 hour average	0.25 ppm
24 hour average	0.10 ppm
Annual average	0.02 ppm

SO_2 levels in Hamilton remain well below the MOE's annual objective. In 2008 the annual mean for Station 29102, Beach Blvd, was 0.009 ppm compared to Station 29567, Niagara/Land, at 0.005 ppm. The highest 1 hour average for Station 29102 was 0.183 ppm and 0.167 ppm for Station 29567.

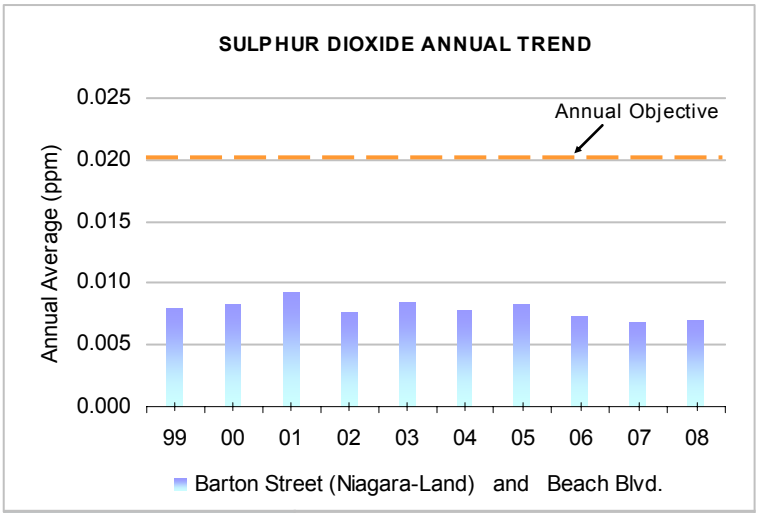

Figure 1 Annual average SO_2 trend. Barton Street terminated in 07. The 08 average is based on Niagara/Land and Beach stations.

Figure 2 Monthly SO_2 trends for 2008. Monthly average concentrations ranged from 0.002 to 0.013 ppm.

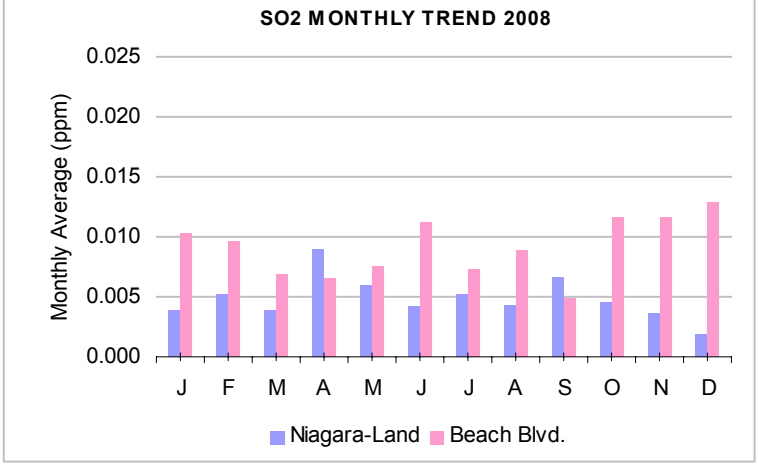

Table 2 Sulphur Dioxide Statistics for 2008

Station	Maximum 1Hr Average	Maximum 24 Hr Average	No. of Hrs > 1 Hr AAQC	No. of Days > 24 Hr AAQC	Annual Mean	Percent Valid Data
	ppm	ppm			ppm	
29567 Land	0.167	0.031	0	0	0.005	98.7
29102 Beach	0.183	0.044	0	0	0.009	98.7

Air Quality Monitoring – Total Reduced Sulphur (TRS)

Characteristics

Total Reduced Sulphur (TRS) is a term used for a class of compounds that have offensive odours similar to rotten eggs; these compounds are a common basis for odour complaints. Common sources of TRS compounds are the steel industry (coke ovens and blast furnace releases), and pulp and paper mills. TRS compounds are not normally considered a health hazard except at very high concentrations.

The odour threshold for TRS is low and is approximately 10 parts per billion (ppb).

Ontario AAQC's for TRS are:

1 hour average	27 ppb
1 hour odour threshold	10 ppb

In recent years there has been a decrease of between 70% to 90% in the number of hours that TRS levels have exceeded 10 ppb. Significant improvements in the management and operations of the coke ovens, the blast furnaces and slag quenching operations have resulted in these substantial improvements.

Improvement in the long term trend line continues for 2008.

Woodward Station (STN29163) was commissioned in 2005.

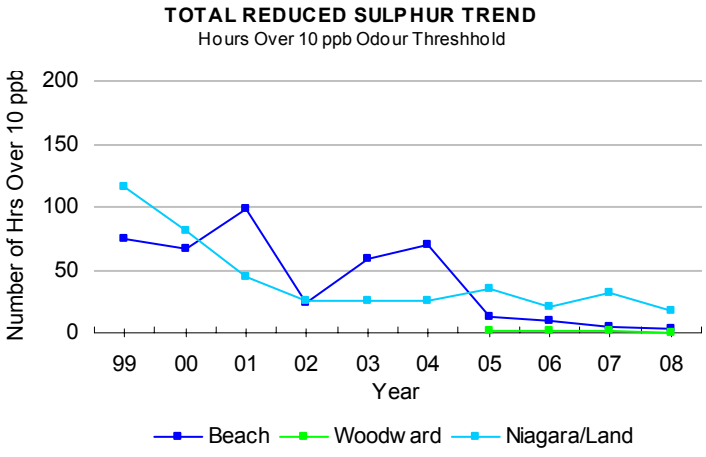

Figure 3 Historical annual TRS trends for the number of hours over the odour threshold of 10 ppb for the past 10 years.

Figure 4 Annual TRS trends for the number of hours over the odour threshold of 10 ppb for the past 3 years.

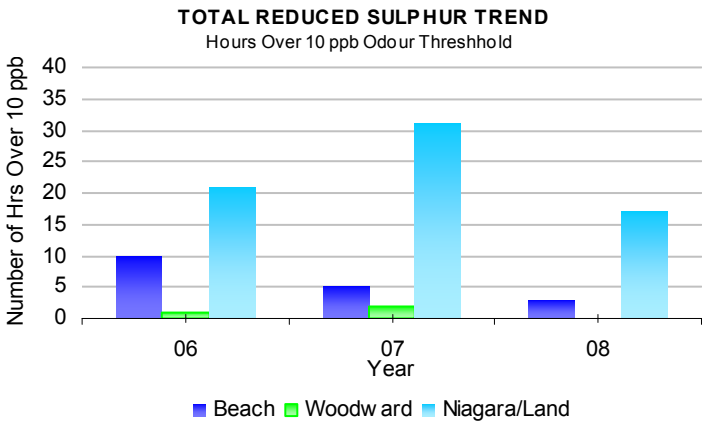

Table 3 Total Reduced Sulphur Statistics for 2008

Station	Maximum 1 Hr Average	Maximum 24 Hr Average	No. of Hrs > 1 Hr AAQC	No. of Hrs > 1 Hr Threshold	Annual Mean	Percent Valid Data
	ppb	ppb			ppb	
29567 Land	25	4	0	17	0.4	98.6
29163 Woodward	6	2	0	0	0.1	99.5
29102 Beach	13	4	0	3	0.5	99.5

Air Quality Monitoring – Nitrogen Oxides (NOx)

Characteristics

Oxides of Nitrogen (NOx) is the generic terms used for a group of highly reactive gases, all of which contain nitrogen and oxygen in varying amounts. The MOE lists criteria for NO_X as Nitrogen Oxides which is defined as the sum of nitrogen dioxide and nitric oxide (NO_2 + NO). Nitric Oxide (NO) is colorless and odourless and is emitted from combustion sources. Nitrogen Dioxide (NO_2) is a reddish-brown gas that causes the brown layer commonly seen over many urban areas.

Oxides of Nitrogen form when air is heated to over 675°C during combustion processes. The primary manmade sources of NOx are motor vehicles, electric power utilities and other industrial, commercial, and residential sources that burn fuels. NOx can also be formed naturally by lightning. Emissions of NO_X consist mainly of NO and to a lesser extent NO_2. in atmosphere NO will convert to NO_2. The adverse health effects of NO_2 occur at much lower concentrations and so although the AAQC standard is for NO_X, it is based on the health effects of nitrogen dioxide (NO_2). NO_X causes a wide variety of health impacts in humans as well as other environmental impacts.

Ontario AAQC's for NO_X (as NO_2) are:

1 hour average	0.20 ppm
24 hour average	0.10 ppm

Nitrogen Dioxide levels have remained almost constant over the past decade. There is a direct link between the number of vehicles, the number of miles the vehicles are driven and the Nitrogen Dioxide levels. These data show that there has been no improvement in the overall impacts of car and truck traffic emissions over the past decade. A number of other major urban centres have seen increases in the Nitrogen Dioxide levels in those cities over the same period.

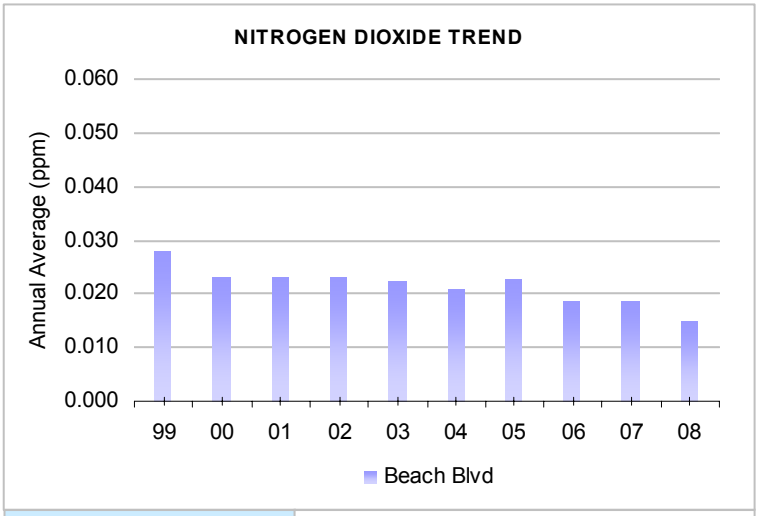

Figure 5 Annual average NO_2 trend over the past 10 years for STN29102, Beach Blvd.

Figure 6 Monthly NO_2 trends for 2008. Monthly average concentrations range from 0.011 ppm to 0.020 ppm

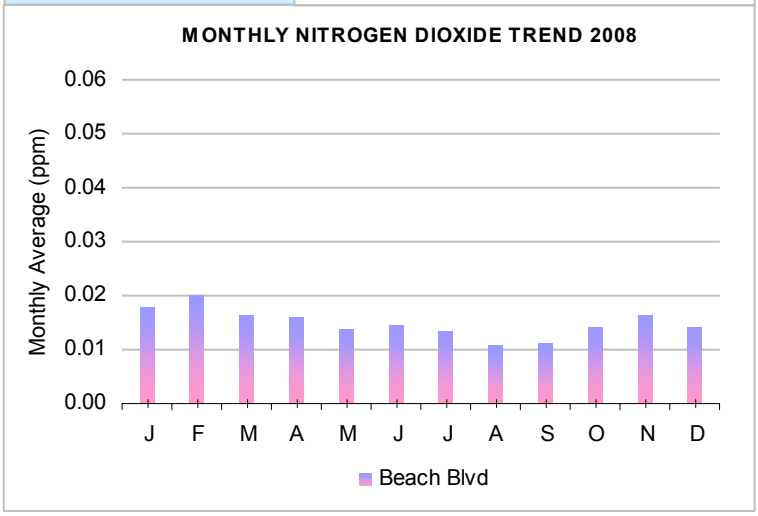

Table 4 Nitrogen Dioxide Statistics for 2008

Station	Maximum 1 Hr Average	Maximum 24 Hr Average	No. of Hrs > 1 Hr AAQC	No. of Days > 24 Hr AAQC	Annual Mean	Percent Valid Data
	ppm	ppm			ppm	
29102 Beach	0.079	0.042	0	0	0.015	99.5

Air Quality Monitoring – Total Suspended Particulate (TSP)

Characteristics

Particle pollution (also called total suspended particulate or TSP) is the term for a mixture of solid particles and liquid droplets found in the air. Some particles, such as dust, dirt, soot, or smoke, are large or dark enough to be seen with the naked eye. TSP includes all particulate material smaller than 44 µm (44 micrometres or 44 microns) in diameter. The largest TSP particles have diameters similar to the diameter of a human hair (about 50 µm) while others are so small they can only be detected using an electron microscope.

Ontario AAQC's for TSP are:

24 hour average 120 µg/m^3
Annual mean 60 µg/m^3

A substantial portion of TSP is related to industrial activities, road dusts, agricultural dusts and other sources of airborne soils. The TSP values in Figure 7 are the geometric means of TSP data from 3 industrial monitoring sites and is representative of the impacts experienced by those communities bordering on the industrial area.

Table 5 summarizes the 2008 statistics for 7 TSP monitoring sites. Station 29161, Strathearne, was re-established in June of 2008. There was insufficient data to calculate an annual mean.

STN29166, Jones Road, TSP samples are not analyzed for metals.

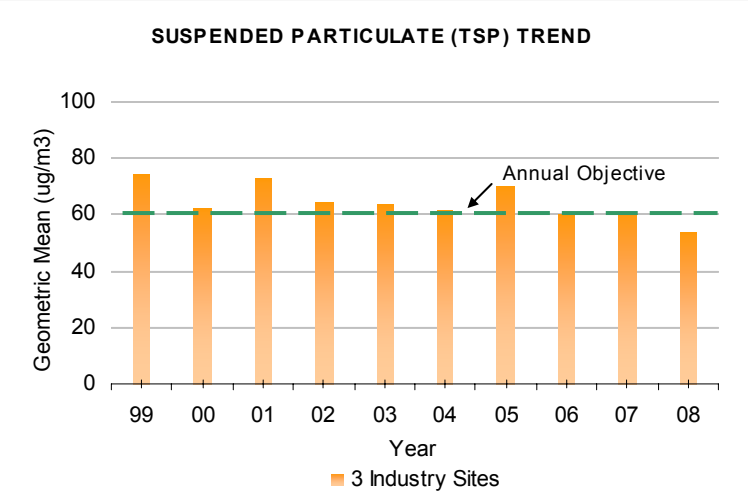

Figure 7

Annual average TSP trend over the past 10 years. Years 99 through 07 based on the combined averages of Station 29025, Barton St, Station 29113, Gertrude and Station 29102, Beach. Station 29025 was terminated in 07. Station 29567, Niagara/Land, used for the 08 average calculation.

Table 5 **Total Suspended Particulates (TSP) Statistics for 2008**

Station	Number of 24 Hr Samples	Maximum 24 Hr µg/m3	No. of Days > 24 Hr TSP AAQC	No. of Days > 24 Hr Metals AAQC	Annual Mean µg/m3	Percent Valid Data
29102 Beach Blvd	61	222	10	0	58	100.0
29113 Gertrude	57	231	7	0	50	93.4
29160 Wilfred St	59	322	7	5 (Mn)	65	96.7
29161 Strathearne	35	239	16	1 (Fe)	---	100.0
29164 Eastport Dr	59	226	4	0	66	96.7
29567 Land	60	253	6	0	53	98.4
29166 Jones Rd	58	183	2	---	42	95.1

Air Quality Monitoring – Inhalable Particulate Matter (PM_{10})

Characteristics

Particulate Matter (PM) is a complex mixture of extremely small particles and liquid droplets. PM is made up of a number of components, including acids (such as nitrates and sulphates), organic chemicals, metals, and soil or dust particles.

The size of particles is directly linked to their potential for causing health problems. There is concern about particles that are 10 micrometers in diameter or smaller (PM_{10}) because those are the particles that generally pass through the throat and nose and enter the lungs. Once inhaled, these particles can affect the heart and lungs and cause serious health effects.

Some particles, known as primary particles are emitted directly from a source, such as construction sites, unpaved roads, fields, smokestacks or fires. Other particles are formed in complex reactions in the atmosphere from gases such as SO_2 and NOx that are emitted from power plants, industries and automobiles. These particles, known as secondary particles, make up most of the fine particulate pollution in the country.

Ontario Interim AAQC for PM_{10} is:

24 hour average 50 µg/m^3

A continuous PM_{10} monitor was added to the network at Station 29102, Beach, for 2006. Levels of PM_{10} have decreased by about 20% in most areas of the City since the early 1990's. There was little change in the trend line for 2008. HAMN will continue to attempt to identify sources of PM_{10} throughout 2009.

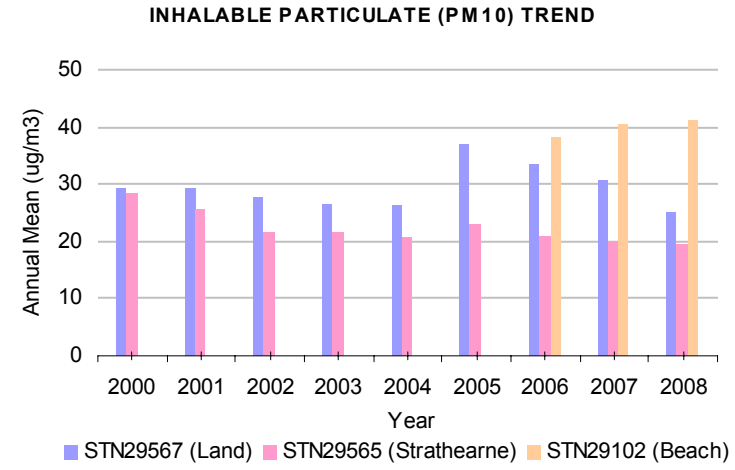

Figure 8 Annual average PM_{10} trend over the past 9 years for 29557, Niagara/Land, and STN29565, Strathearne (29102 new for 06).

Figure 9 Monthly PM_{10} exceedance trends for 2008. Monthly average concentrations range from 12 µg/m^3 to 66 µg/m^3.

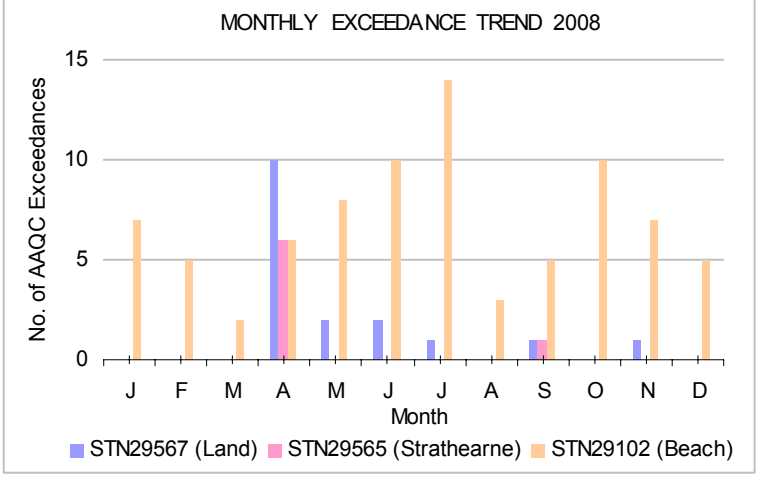

Table 6 **Inhalable Particulate Matter (PM_{10}) Statistics for 2008**

Station	Maximum 1 Hr Average µg/m^3	Maximum 24 Hr Average µg/m^3	No. of Days > 24 Hr AAQC	Annual Mean µg/m^3	Percent Valid Data
29567 Land	270	118	17	25.1	98.0
29565 Strathearne	188	73	7	19.7	94.8
29102 Beach	>1000	338	83	41.1	98.1

Air Quality Monitoring – Polycyclic Aromatic Hydrocarbons (PAH)

Characteristics

Benzo[a]Pyrene (BaP) is a compound representative of a class of chemicals called Polycyclic Aromatic Hydrocarbons (PAH). BaP is a known carcinogen and is produced by the combustion of carbonaceous fuels (gasoline, diesel fuel, wood, coal, etc.) and tobacco. PAH is present in the atmosphere predominantly in particulate form. A less significant formation mechanism is the volatilization of lightweight polycyclic organic matter, which occurs in the production and use of naphthalene.

Ontario AAQC's for Benzo[a]Pyrene:

24 Hour Average	1.10 ng/m^3
Annual Mean	0.22 ng/m^3

The principal sources of BaP in Hamilton are vehicle and coke oven emissions. Improvements made to the coke oven operations have led to dramatic reductions (65-85% since the mid-1990's) in the ambient BaP levels near and away from the industries.

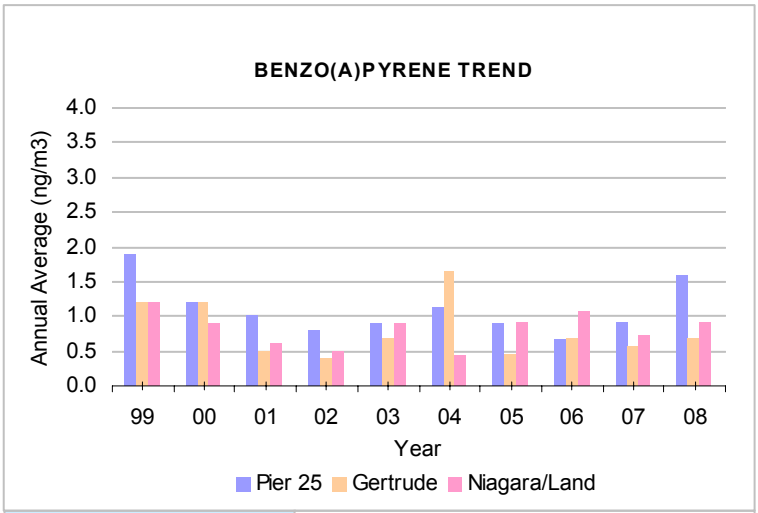

Figure 10 Annual average BaP trend over the past 10 years for Station 29547, Pier 25, Station 29113, Gertrude and Station 29567, Land.

Figure 11 Annual BaP trends for the number of days which exceeded the AAQC threshold for the past year.

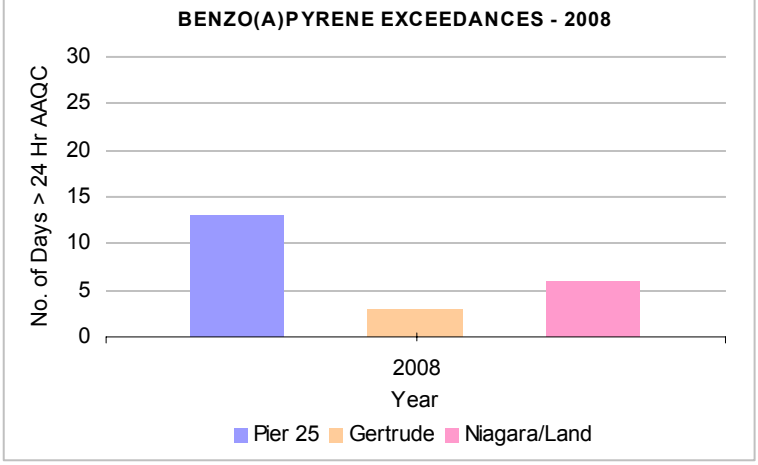

Table 7 Benzo[a]Pyrene (BaP) Statistics for 2008

Station	Number of 24 Hr Samples	Maximum 24 Hr ng/m^3	No. of Days > 24 Hr AAQC	Annual Mean ng/m^3	Percent Valid Data
29567 Land	28	8.0	6	0.93	90.3
29113 Gertrude	30	6.2	3	0.70	96.8
29547 Pier 25	29	5.4	13	1.57	93.6

Air Quality Monitoring – Volatile Organic Compounds (VOC)

Characteristics

Benzene is a volatile organic compound that has been classified as a human carcinogen. It is a non-threshold toxicant, a substance for which there is considered to be some probability of harm for critical effects at any level of exposure. The main sources of benzene are wood combustion (including forest fires and residential wood combustion), transportation, natural gas dehydrators, steel industry and petroleum distribution and refining.

Industrial Benzene emissions arise primarily from the coke ovens and the associated by-products plants in the steel industry. Improvements in the control of benzene vapours at the by-products plants have resulted in large reductions (60-80%) at a monitoring site near the steel mills over the past several years. Background benzene levels measured by Environment Canada have dropped below 2 µg/m^3.

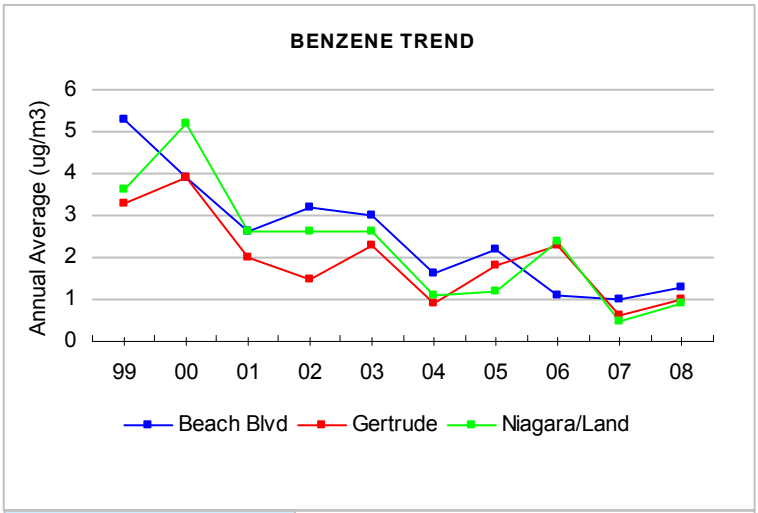

Figure 12 Annual average Benzene trends over the past 10 years for Stations 29102, Beach Blvd, 29113, Gertrude and 29567, Land.

Figure 13 Annual Benzene means (2008) for Station 29102, Beach Blvd, Station 29113, Gertrude and Station 29567, Land.

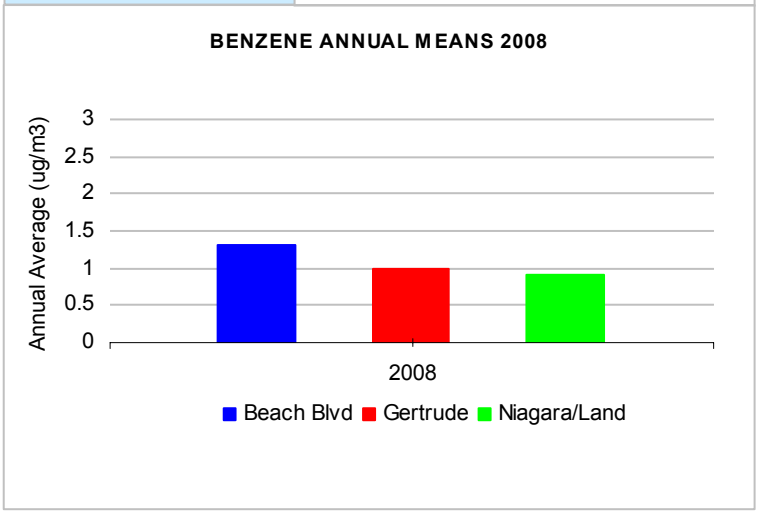

Table 8 Volatile Organic Compounds - Benzene Statistics for 2008

Station	Number of 24 Hr Samples	Minimum 24 Hr µg/m^3	Maximum 24 Hr µg/m^3	Annual Mean µg/m^3	Percent Valid Data
29102 Beach Blvd	17	0.1	3.3	1.3	100.0
29113 Gertrude	17	0.1	3.2	1.0	100.0
29567 Land	29	0.1	6.0	0.9	96.7

Appendix 1

Wind Frequency Distribution – Wind Roses, 2008

To show the information about the distributions of wind directions and wind speeds, one may draw a radial plot of the data as a so-called “wind rose,” based on meteorological observations of wind speeds and wind directions. Wind roses are a form of meteorological fingerprint. It is important to be able to “read” the wind rose correctly. The “arms” of a wind rose point to where the wind was **coming from**, not the direction the wind was blowing.

Wind roses summarize the relative occurrence (or frequency) of winds blowing from different directions as narrow wedges or spokes about a central point; the longer the wedge or spoke , the more frequent the winds blew in from that direction, with North at the top of the diagram. Each wedge is divided into segments of different colours, representing wind speed ranges.

Examination of a wind rose is extremely useful for siting air monitoring stations. If a large share of the energy in the wind comes from a particular direction, then you will want to site an air monitoring location in that predominant downwind vector. Examples of wind rose graphics from two of the network Meteorological Stations are provided below. For example, the longest spokes in the wind rose for STN29026 point toward the southwest, which means these spokes represent data for winds which were blowing from the southwest about 225 degrees on the compass. In other words the predominant winds for 2008 at STN29026 were from the southwest. Conversely, the predominant winds at STN29567 came from a direction that is about 270 degrees on the compass. This difference in wind directions highlights the fact that winds in Hamilton are affected a great deal by the both the harbour and the escarpment.

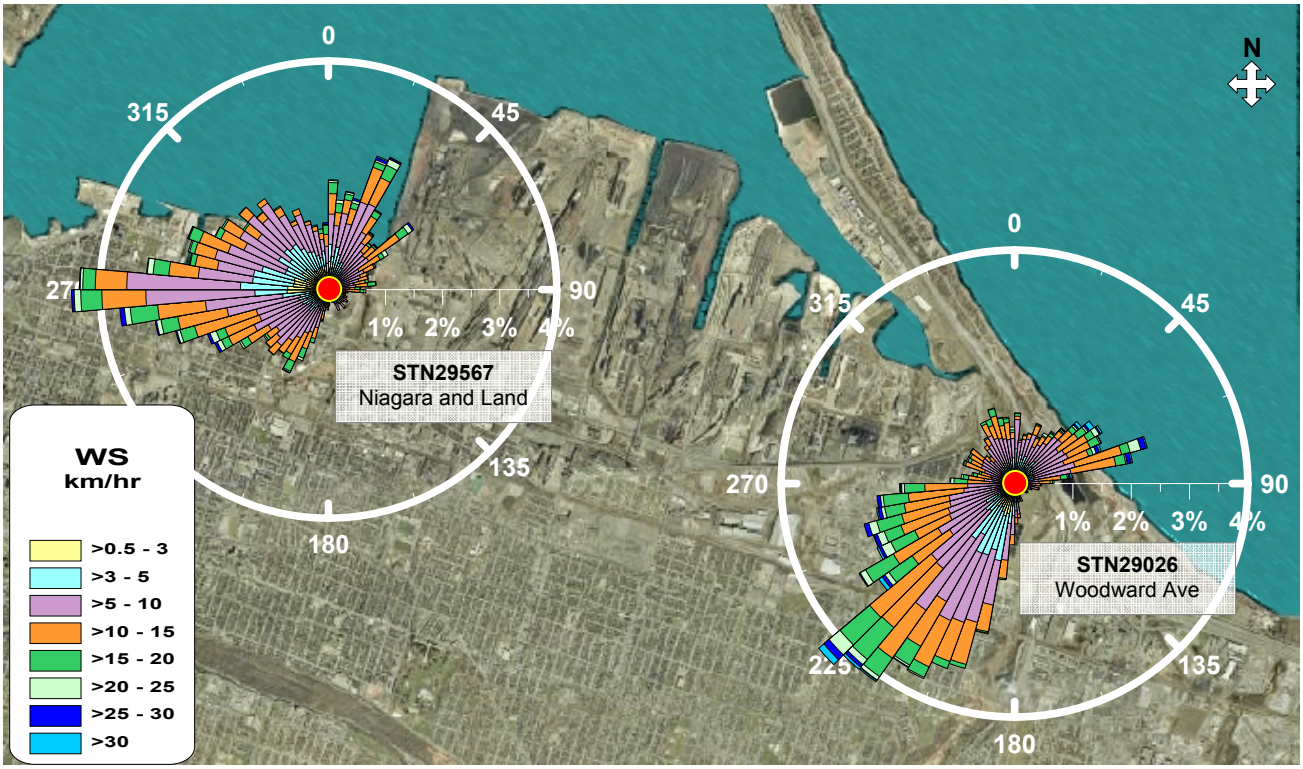

Figure 14

Appendix 2

Activities and Progress

New Air Monitoring Station - St. Christopher Park (STN29168)

St Christopher Park air monitoring station was commissioned at the end of 2008. The following parameters will be measured continuously; Particulate Matter (PM_{10}), Total Reduced Sulphur (TRS), Wind Speed and Wind Direction. Data will be available through the HAMN public website.

Location - Aerial Overview

HAMN Website

All the required hardware / software has been purchased, installed and integrated with the current HAMN data acquisition network. This will provide a platform for the new public web-based air quality data access portal. The public web-site is scheduled for release in 2009.

Appendix 3

Legend

QA/QC	-	Quality Assurance/Quality Control
SEM	-	Source Emissions Monitoring
HAMN	-	Hamilton Air Monitoring Network
AAQC	-	Ambient Air Quality Criteria (Ontario)
EST	-	Eastern Standard Time
MOE	-	Ministry of the Environment
NO	-	Nitric Oxide
NO_2	-	Nitrogen Dioxide
NO_x	-	Oxides of Nitrogen
PM_{10}	-	Inhalable Particulates less than 10 microns in diameter
SO_2	-	Sulphur Dioxide
TSP	-	Total Suspended Particles
TRS	-	Total Reduced Sulphur
VOC	-	Volatile Organic Compounds
PAH	-	Polycyclic Aromatic Hydrocarbons
B[a]P	-	Benzo[a]Pyrene
MDL	-	Minimum Detection Limit
ng/m^3	-	Nanograms (of contaminant) Per Cubic Metre (of air)
$\mu g/m^3$	-	Micrograms (of contaminant) Per Cubic Metre (of air)
ppb	-	Parts (of contaminant) Per Billion (parts of air)
ppm	-	Parts (of contaminant) Per Million (parts of air)
TEOM	-	Tapered Element Oscillating Microbalance
SSI	-	Size Selective Inlet (Manual)
Mn	-	Manganese
Fe	-	Iron
Continuous	-	Continuous ‘Real Time’ Monitoring
Non Continuous	-	24 Hr Samples – 6 or 12 Day Rotating Schedule

Appendix 4

Where Do We Measure Air Quality in Hamilton?

For many years the MOE and Environment Canada (EC) carried out routine ambient monitoring in the Hamilton area. Since May, 2003 HAMN's industrial air quality monitoring program has been responsible for collecting and reporting accurate, real-time continuous measurements of ambient pollutants at five sites located around the industrial area (Figure 15). These pollutants include Sulphur Dioxide (SO_2), Total Reduced Sulphur (TRS), Oxides of Nitrogen (NO_x), and Inhalable Particulate Matter (PM_{10}). As well, there are 13 non-continuous air monitoring samplers in the HAMN network that collect data every sixth or twelfth day in a rotating schedule.

Hamilton Air Monitoring Network Map

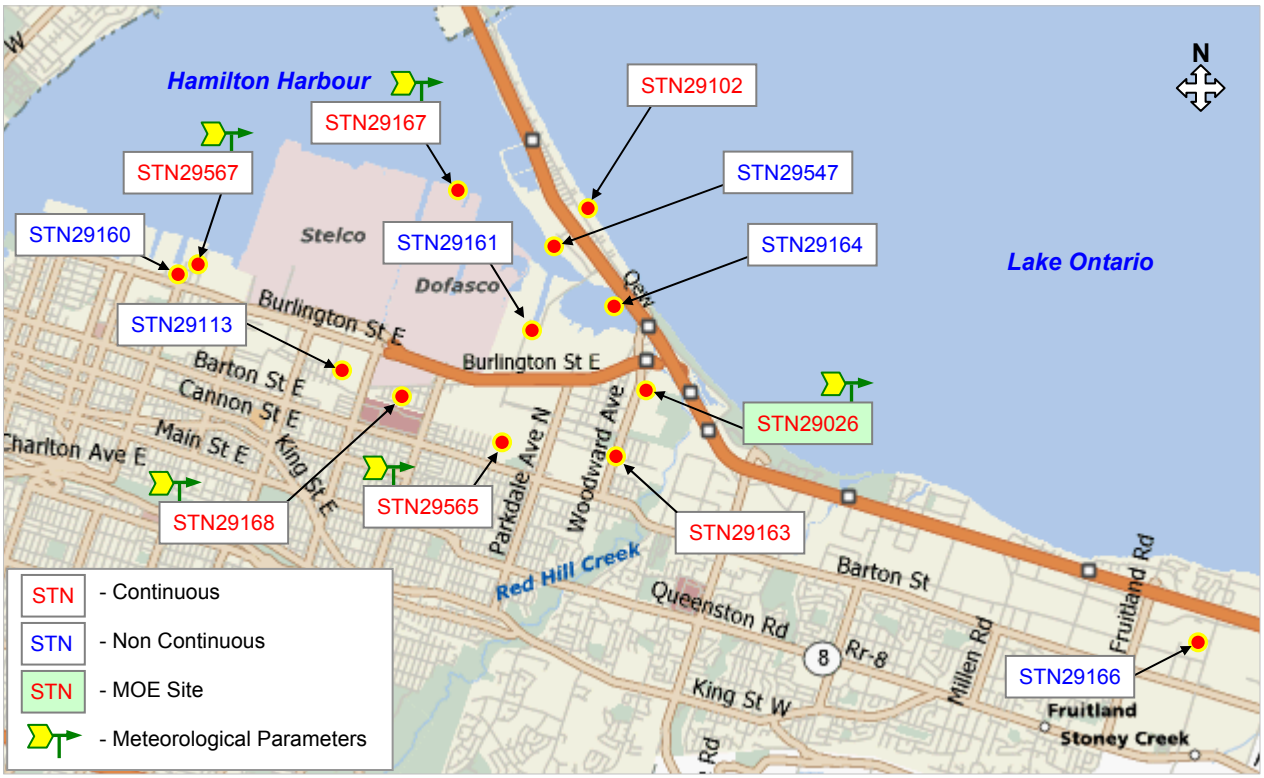

Figure 15

These samplers monitor such pollutants as Total Suspended Particulates (TSP), Volatile Organic Compounds (VOC's), Polycyclic Aromatic Hydrocarbons (PAH) and Metals (Table 9).

The data generated are used to monitor air quality in and around the industrial area, determine which areas meet and/or exceed Ontario Ambient Air Quality Criteria (AAQC) and develop pollution trends. The HAMN program encompasses operation of the sampling and monitoring

network, laboratory analysis of air samples, and quality assurance activities to ensure the quality of the data collected.

HAMN provides the MOE with real-time access to continuous air monitoring data and submits quarterly and annual data summary reports of all continuous and non-continuous air monitoring data. Also, HAMN provides immediate notification of all exceedances of the AAQC. The MOE has real-time data access to the air quality information to assist them with abatement programs and complaint investigations.

HAMN Network Configuration

Network Configuration

Parameter / Station	SO2	TRS	NOX	PM10 Real Time	PM10 SSI	TSP Metals	VOC	PAH	MET
STN29102	◆	◆	◆	◆		o	o		
STN29547								o	
STN29565				◆					◆
STN29567	◆	◆	◆	◆		o	o	o	◆
STN29113						o	o	o	
STN29160						o			
STN29161						o			
STN29163		◆							
STN29164						o			
STN29166						o			
STN29167									◆
STN29168		◆		◆					◆
STN29026									◆

◆ Continuous o Non-Continuous

Table 9

How Do We Measure Air Quality?

The network data is used to provide HAMN members and the MOE with accurate air quality information. The continuous monitoring sites in the network include instruments that measure ambient levels of gaseous and particulate air pollutants, and in some cases, meteorological parameters. The data signals from these analyzers and sensors must be averaged, digitized and processed according to detailed MOE guidelines for collecting air quality monitoring data. Figure 16 illustrates the real-time movement of data to both industry members and MOE servers.

Telemetry System

Data that is received by the HAMN operated servers is utilized for troubleshooting and rectifying network anomalies, generating reports, implementing QA/QC protocols and notifying MOE and industry personnel of AAQC exceedances and/or unusual air quality events. The MOE database provides for real-time oversight of network operations to ensure compliance with defined protocols and provides immediate access to daily pollutant trends for tracking of abatement program initiatives (Figure 16).

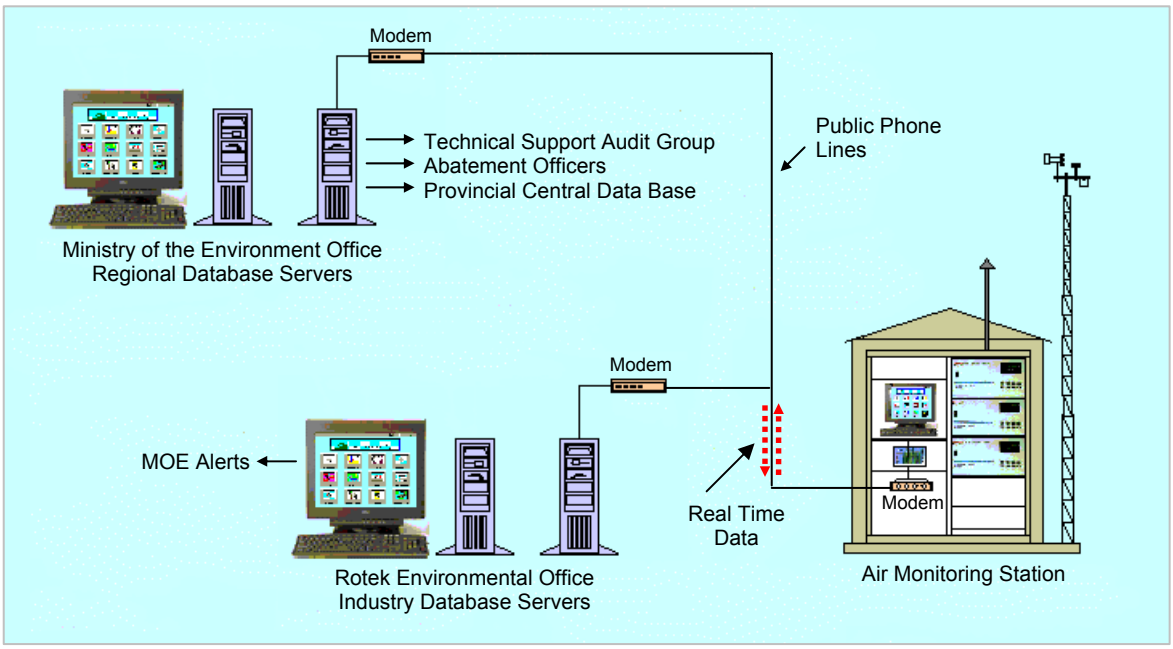
Modem
Technical Support Audit Group
Abatement Officers
Provincial Central Data Base
Public Phone Lines
Ministry of the Environment Office
Regional Database Servers
Modem
MOE Alerts
Real Time Data
Modem
Rotek Environmental Office
Industry Database Servers
Air Monitoring Station

Figure 16

Appendix 5

Ministry of the Environment (MOE) Role in HAMN

In April of 2003 the MOE launched a new initiative called Industrial Source Emissions Monitoring (SEM). This program requires that companies in Ontario assume the responsibility for monitoring air quality near their facilities.

The objectives of the air quality monitoring program near industrial point sources include the following:

- To assist in the prevention of possible adverse effects due to air emissions from an industrial facility.
- To demonstrate compliance with provincial regulatory air quality limits as set out in Regulation 419, Regulation 337 or in other regulatory instruments such as Orders and Certificates of Approval.
- To demonstrate conformance with Schedule 1, 2 and/or 3 standards set out in Regulation 419 and listed in the document “SUMMARY of STANDARDS and GUIDELINES to support Ontario Regulation 419: Air Pollution – Local Air Quality”, and Ambient Air Quality Criteria listed in the document “ONTARIO’S AMBIENT AIR QUALITY CRITERIA” which are developed by the MOE as a component of the MOE standard setting process. These lists are updated periodically.
- To provide accurate and reliable data in support of air quality modeling calculations.
- To determine the impact of industrial air emissions on local air quality in adjacent communities and in the regional air shed.
- To provide accurate and reliable data as part of an integrated air quality management-control system.
- To determine air quality improvements and trends in conjunction with industrial air emissions abatement programs.
- To provide data to assess local population and ecosystem exposure to air pollutants.

Linkages to the Ministry of the Environment (MOE)

The HAMN air-monitoring network is solely funded and operated by 21 industrial members. HAMN has hired two consultants 1) Administrator - to oversee the network operations as per MOE requirements, and a second 2) Service Contractor - to provide the service, repair and maintenance of the monitoring network. Although the network is owned and operated by industry the MOE has made several request of HAMN to ensure credibility of Hamilton air quality data.

The following is a list of requirements specified by the MOE:

A) **Data Access**

- The MOE has full access to all continuous monitoring stations via HAMN telemetry and data acquisition system.
  MOE can review and assess all raw air quality data collected by HAMN. Data corrections and/or edits are electronically logged and made available to the MOE for review. Data is reviewed by the MOE Air Quality Analyst and forwarded to District abatement staff should further investigation be required.
- The MOE has full access to all analyser’s daily calibration records.
  MOE can review and verify instrument performance through daily calibration records. MOE will notify HAMN staff of any anomalies.

B) **Notification**

- HAMN to notify the MOE immediately of any exceedances of the air quality guideline or standards.

C) **Reporting**

- HAMN to provide monthly exceedances summary report.
  HAMN prepares and submits to the MOE a monthly summary report of all exceedances that occur within the network.
- HAMN to prepare and provide to the MOE a quarterly summary of all collected and reviewed data.
- HAMN to prepare and provide to the MOE an annual data summary report.

D) **Auditing**

- MOE staff will carry out routine auditing of all HAMN air monitoring samplers.
  MOE audits carried out on continuous analysers are performed with certified calibration test gases.
  MOE carried out system audits on all non-continuous samplers. A system audit is a performance check of the instrument performance.
  Duplicate monitoring of MOE/HAMN samplers is carried out to verify system audits and laboratory analysis.

E) **Communication**

- Two HAMN committees have been established to provide communication between all HAMN members and the MOE.

  i. HAMN steering Committee
  The HAMN steering committee members include 10 HAMN members, HAMN Administrator, MOE District abatement staff, and MOE Technical support staff.

  ii. HAMN Technical sub-working group.
  This working group deals with day-to-day operation of the network. MOE technical support staff, service contractor and HAMN administrator meet bi-monthly. On occasion MOE district abatement staff may be called in to discuss specific abatement issues.

F) **Service Contractor Performance Audit Review**

- HAMN carries out a yearly review of the service contractor's performance.
  Performance assessment criteria are determined by the MOE 'Operations Manual for Air Quality Monitoring in Ontario' (March 2008). A copy has been provided to all HAMN members.

Ministry of the Environment (MOE) – Audit Program / HAMN Performance

The MOE performs regular audits of activities and processes related to the collection of air quality data under the SEM program. The audit program provides an indication of the effectiveness of quality control activities used by station operators and data management staff. Performance audits are independent evaluations of data quality produced by the analyzers, and are performed in addition to the normal quality control activities. In addition to auditing analyzer and sampler performance, quality control activities of the operator, siting criteria, assessment of the complete sampling system, and completeness and quality of the site logging information is also verified by MOE staff and is incorporated in their audit reports.

The MOE uses a conformance/non-conformance limit of ±10% of the test gas value or sampler air flow rate standard. Non-conformance with this criterion requires immediate and/or quick corrective action by station operators and data management individuals if data correction/editing are required. In such instances, a follow-up audit by MOE staff is required to ensure that appropriate corrective actions have been taken in a timely manner. For continuously monitored parameters (such as SO_2 or TRS) acquired with a telemetry system, a systems audit starting from the analyzer through to the operator's central computer is undertaken periodically. For non-continuously measured parameters (such as TSP and PM_{10}), in addition to auditing sampler performance, MOE staff audit sample handling and submission protocols and procedures. The MOE's Laboratory Services Branch also participates in these audit activities with respect to the use and performance of private laboratories.

As described above the Ministry of the Environment carries out a QA/QC function in ensuring quality of data. The QA/QC program is made-up of two parts:

1) Auditing field samplers to ensure sampling equipment is being maintained and operated as per MOE 'Operations Manual for Air Quality Monitoring in Ontario', March 2008.

2) Auditing contract laboratories to ensure analyses are carried out as per MOE Standard Operating Procedures.

Ministry of the Environment Provincial Audit Record

In 2008 there were a total of 105 individual Provincial audits of SEM continuous and non-continuous air monitoring equipment controlled, serviced and maintained by Rotek Environmental Inc. Of the 105 audits, 100 were certified by the MOE as being acceptable, a 95.2% audit success rate.

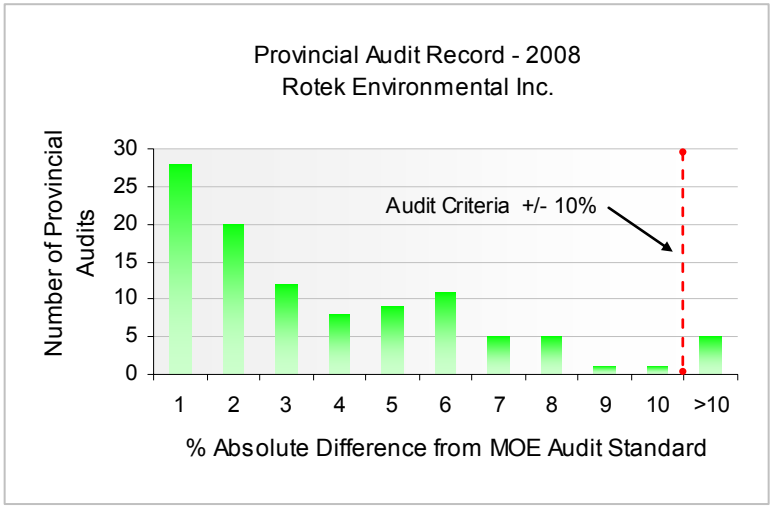

Figure 17

Appendix 6

HAMN Structure

Working Committees:

1) **HAMN Steering Committee -** a management group comprising of 10 industry members, the Clean Air Hamilton Chair and a representative from the MOE of the Environment. The mandate of this committee is to ensure that both the Ministry and the industrial partners' needs are met with regards to their SEM responsibilities.

2) **HAMN Technical Working Group** - a technical working group to deal with day-to-day issues related to the operation of the air-monitoring network.

These committees will provide a continuous line of communication among the Industrial partners, air monitoring network contractor, Clean Air Hamilton, and the MOE. In February, 2003, HAMN acquired the services of an administrator to oversee the SEM project and ensure compliance with MOE requirements and protocols.

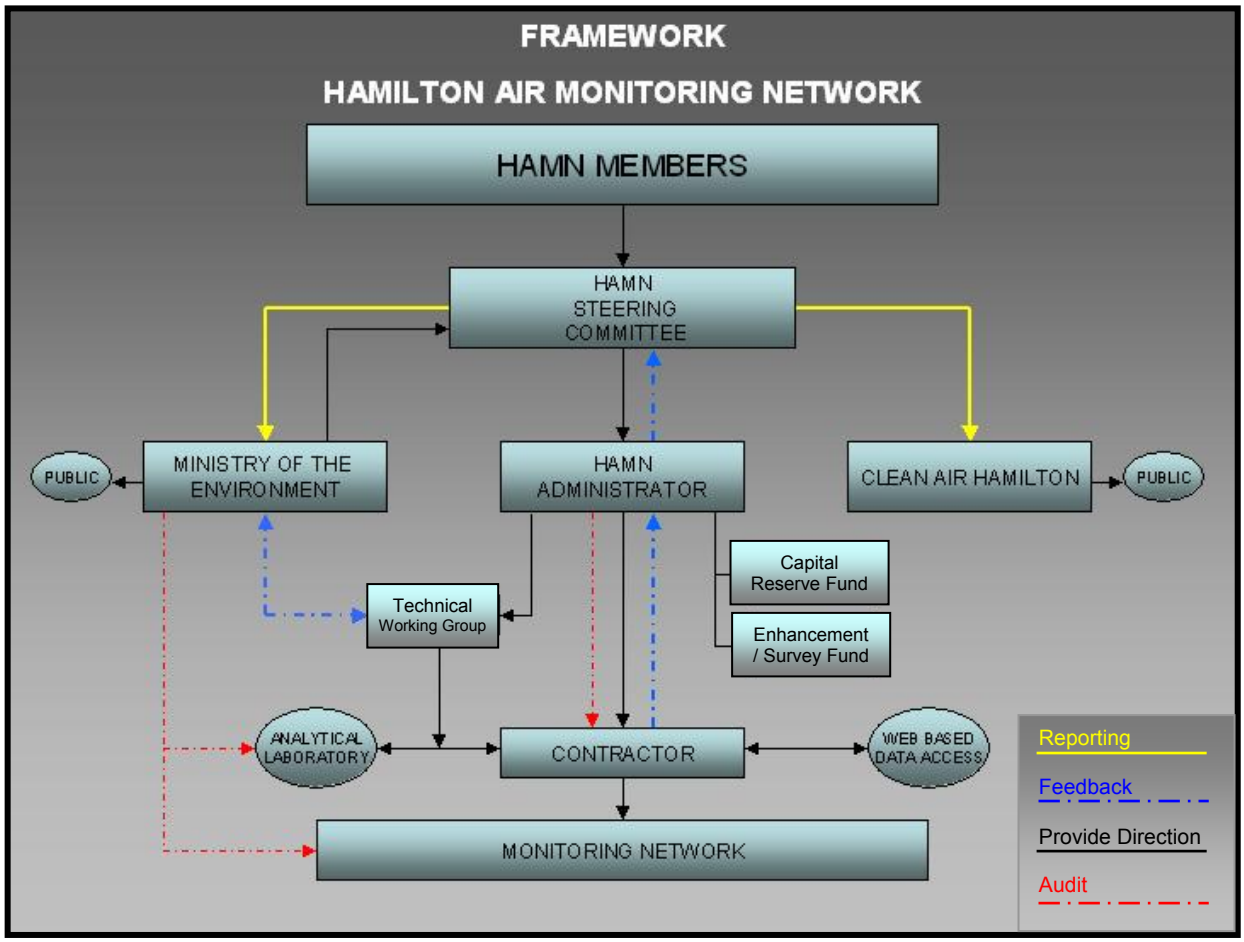

Figure 18

Contacts

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Dr. Brian McCarry, McMaster University, is the Chair of the HAMN Steering Committee. Dr. McCarry is also the Chair of Clean Air Hamilton.

Clean Air Hamilton was formed in October, 1998, to promote and support improvements to air quality in the City of Hamilton by reducing emissions that affect human and environmental health.

HAMN will continue to provide data in support of Clean Air Hamilton.

Network Monitoring and Service Contractor

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