2016

Progress Review
& Technical Summary

Sarnia • Lambton Environmental Association

Industries Working Together

2016 Progress Review and Technical Summary

Contents

2016 Member Companies

ARLANXEO Canada Inc.

BioAmber Sarnia

Cabot Canada Ltd.

CF Industries

Clean Harbors Canada, Inc.

Enbridge Pipelines Inc.

H.C. Starck Canada Inc.

Imperial Oil Limited

NOVA Chemicals (Canada) Inc.

Ontario Power Generation

Plains Midstream Canada ULC

Shell Canada Products

Styrolution Canada Limited

Suncor Energy Products Inc.

Suncor Energy Products Inc., St. Clair Ethanol

Terrapure Environmental

TODA Advanced Materials

TransAlta (SC) LP

The Sarnia-Lambton Environmental Association (SLEA) is a voluntary industrial cooperative of 18 operating facilities in Lambton County. Serving for close to 60 years, initially through its predecessors, the St. Clair River Research Committee and the Lambton Industrial Society, the Association's long-standing mission has been to be recognized by its members, regulatory agencies and the community for excellence in promoting and fostering a healthy environment that is consistent with sustainable development. Through third-party environmental specialists, the organization operates an extensive network of ambient air and river water quality monitoring stations. Extending southward from Sarnia to Sombra and eastward from the St. Clair River, the network tracks long-term environmental change in the local area.

Public interest is welcomed. Environmental references are maintained online and at SLEA's office.

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Dean Edwardson

Message from Our General Manager

We are fortunate that exchanges of ideas and information about the environment occur frequently across Sarnia-Lambton. Each year, our Association members take part in a variety of environmental forums and consultations, with participants ranging from students to seniors. Each session helps everyone involved gain a greater appreciation for the many viewpoints about this important subject.

A commitment to sound science continues to underlie SLEA's ongoing environmental research and consultative activities. Our members also recognize that improving the environment must be founded on a well-planned and long-term commitment to continuous improvement. Their multi-faceted approach, including the sharing of best practices, exploring innovative technology and seeking input from others, enables our member companies to further reduce their environmental footprints and respond to the myriad needs of our modern society.

Of the numerous forums in which we have participated during the past year, two forward-looking consultative initiatives, in particular, come to mind. The broad purpose of each has been to encourage further improvements in environmental quality by applying sound science. Both working groups involve representatives from the Ontario Ministry of the Environment and Climate Change, First Nations, environmental interest groups and industry. One group is considering environmental control standards that industrial sites would use to effectively monitor air quality at their property boundaries. Another multi-stakeholder group is providing input into planned changes to provincial regulations, to further improve the environmental performance of petroleum refineries and petrochemical manufacturing facilities. In its early stages, the initiative is looking to the experiences of the Sarnia-Lambton community.

In both cases, working group members have been considering a wide range of issues, from historical emission records and environmental technologies to appropriate reporting protocols. In-field evaluations by third-party specialists will help validate the findings and recommendations of each group.

The working groups are just two examples of the consultative approaches being used to help achieve continuous environmental improvements. Through them, concerned parties cooperatively address related issues, leading to well-reasoned decisions that are based on solid, scientific facts. We look forward to continuing to apply such approaches, in order to take further, measured steps to a better environment.

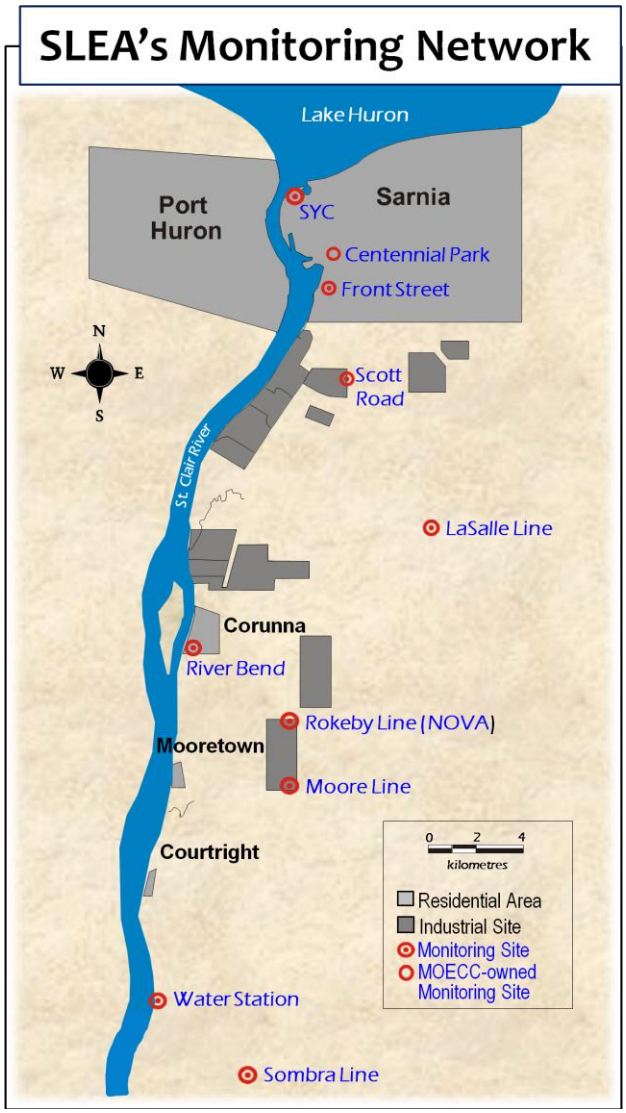
Over the course of each year, our office is involved in a wide range of activities associated with our 18 member companies. A substantial number of those activities typically rest with Joan MacKay (Green), our Office Coordinator, who is a highly capable and trusted, front-line member of our team. After working so dedicatedly with us for so long, Joan has decided to follow a less-hectic pace of life. We will miss her greatly and extend to her our warmest thanks for the many positive contributions that she has made to the success of SLEA, CVECO and CAER.

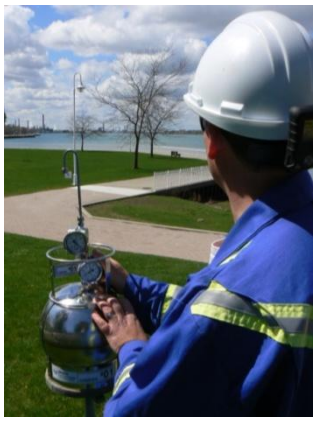
2016 Technical Summary

Ambient Air Quality Monitoring

Ambient air in Sarnia-Lambton is influenced by local emissions, as well as other sources located nearby and a long distance away. Our air quality is affected by local and distant industrial processes, motor vehicles and other transportation-related sources, including re-entrained road particulate matter. Meteorological conditions, the local topography, the alignment of major sources along the St. Clair River

Figure 1





VOC sampler

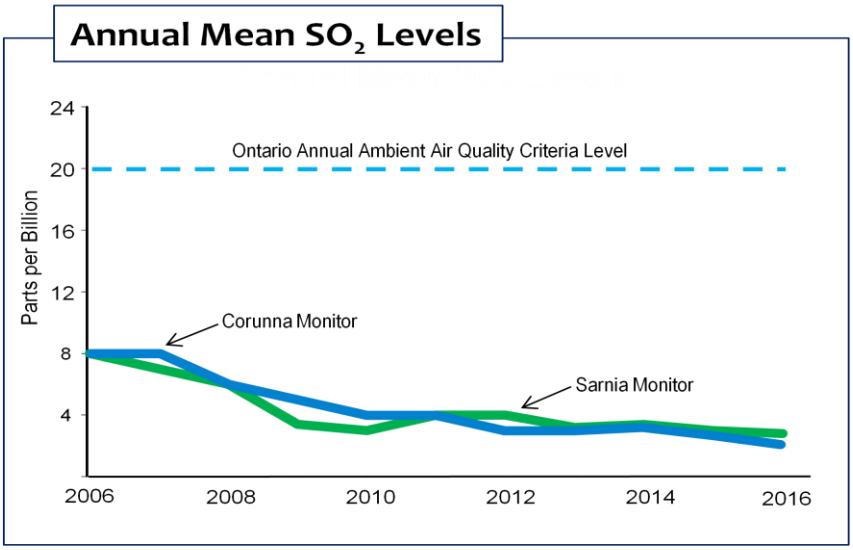
and the prevailing southwesterly winds are also important factors to be considered. In addition, the long-range transport from distant sources of secondary contaminants, such as ozone and fine particulates, can make significant contributions to local air quality.

In support of SLEA's mission, comprehensive air quality testing and assessments continued to be a major element of the environmental studies conducted in 2016. Ongoing activities included the measurement of air contaminants, such as sulphur dioxide, ethylene, ozone, nitrogen oxides, volatile organic compounds and fine particulate matter in ambient air, along with the collection of meteorological data, including wind speed and direction. Monitoring data were collected from a network of 10 stations, located in the SLEA's Sarnia-Lambton study area (Figure 1).

The SLEA survey consists of eight monitoring sites (seven operated by SLEA and one maintained by a member company, NOVA Chemicals). They are distributed over an area extending from Moore Line, in St. Clair Township, north to the Lake Huron shoreline. An additional site in Sarnia is owned by the Ontario Ministry of the Environment and Climate Change (MOECC) and is situated adjacent to the Sarnia Courthouse parking lot. In 2008, a new air monitoring station was established by the MOECC in partnership with Aamjiwnaang First Nation and the Government of Canada near the First Nation's health centre.

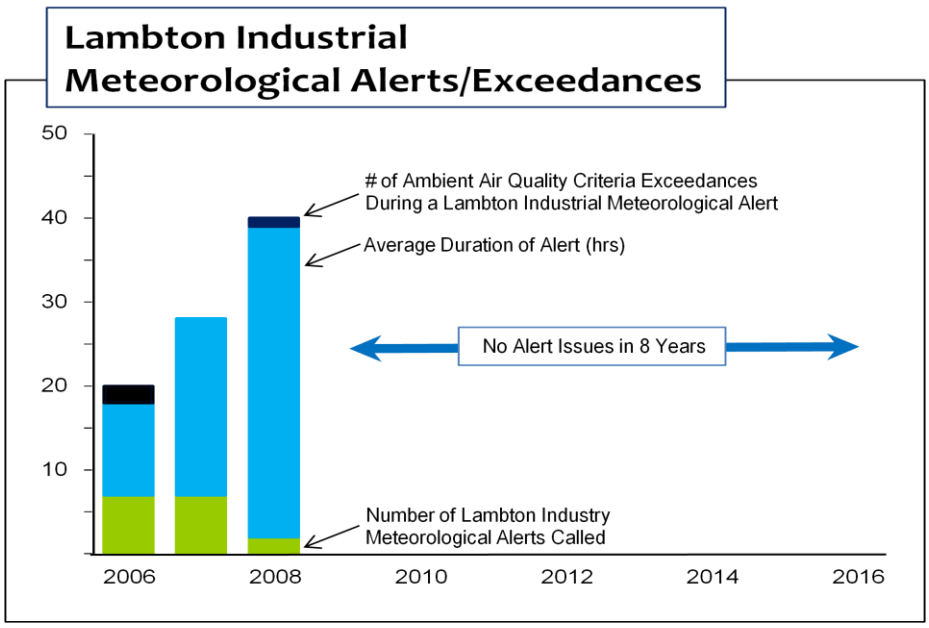
Sulphur Dioxide (SO_2)

Figure 2



SO_2 is emitted from a variety of natural and people activity based sources, with the largest historically being fossil fuel combustion at power plants. Other industrial facilities, such as smelters, pulp and paper mills, and petroleum refineries, make up the second largest source of emissions. Locally, petroleum refineries account for most of the SO_2 emissions. However, sources that impact local air quality are also located far beyond Sarnia-Lambton, including the United States Midwest. SO_2 has the characteristic odour of burned matches. Health effects associated with SO_2 over-exposure include breathing problems and respiratory illness. The most at-risk group for adverse health effects from SO_2 includes individuals with asthma, chronic obstructive pulmonary disease, or cardiovascular diseases. SO_2 can be oxidized to form sulphuric acid aerosols and also may form sulphates that contribute to the formation of fine particulate matter. SO_2 is an acid rain precursor that, over time, may play a role in lake, stream and soil acidification and cause the corrosion of structures. It is measured using scientific monitors, which continuously collect and analyze samples of the ambient air. The compound has been measured continuously by SLEA for over 46 years at strategically located monitoring stations in Sarnia-Lambton.

Figure 3



The Lambton Industry Meteorological Alert (LIMA) Regulation provides for a local response to help diminish SO_2 emissions in the air to levels that protect public health and the environment. The regulation has been in effect for over 30 years. It makes use of real-time SO_2 monitoring data to identify periods of poor atmospheric dispersion, when emission reductions might be required in order to maintain local air quality. Data from three monitoring stations – Front Street, Sarnia MOECC (See separate MOECC station data report) and River Bend – are

SO_2 analyzer

used to determine when emission reductions are needed. Real-time weather data and forecasts, along with SO_2 monitor measures, are subsequently used to cancel a LIMA.

Levels of SO_2 measured locally during 2016 are almost 60 percent less than levels measured 10 years ago. Historical annual average levels measured in Sarnia and Corunna are presented in Figure 2. The measurements are well below Ontario's annual acceptable levels and have exhibited a downward trend since 2005.

In 2016, there was no LIMA event and the Ontario Daily Criterion (100 parts per billion [ppb]) was not exceeded. 2016 marked the eighth consecutive year of no LIMA activation or exceedance. A maximum daily mean measure of 95 ppb was reported in Sarnia at the Front Street station on October 28, under moderate southerly breezes. A long-term summary of LIMA Regulation SO_2 alerts and maximum daily mean exceedances is shown in Figure 3.

Despite the shut-down of Ontario's coal-fired power plants, transboundary SO_2 emissions carried on prevailing winds from coal-burning power plants in the United States continue to have a measurable impact on levels tracked in Sarnia-Lambton.

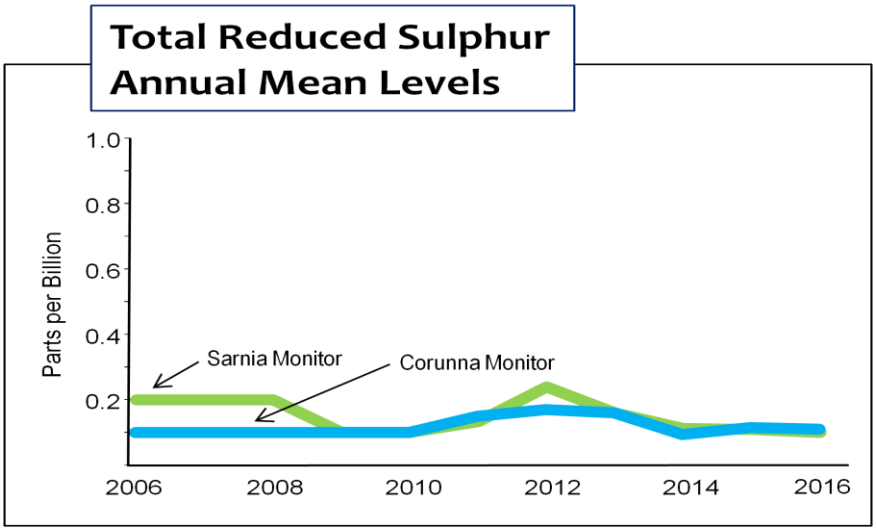
Total Reduced Sulphur (TRS)

The main compounds that make up TRS are hydrogen sulphide, methyl mercaptan, dimethyl sulphide and dimethyl disulphide. The compounds are odourous at low concentrations and produce an offensive, rotten egg- or cooked cabbage-like odour. Although TRS compounds at ambient levels might be noticeable for some people, they are not normally considered to be a health hazard and are monitored to ensure the associated odour does not exceed generally accepted thresholds. Natural sources of TRS include swamps, bogs and marshes. Industrial sources are oil refineries, pulp and paper mills, steel mills and sewage treatment facilities.

Most people can smell TRS compounds at very low levels (concentrations lower than 10 ppb). The challenge facing facility operators is to manage and contain any associated materials they possess on site, so as to avoid the escape of errant odours, which normally occur over relatively short durations.

Ontario does not have a 1-hour Ambient Air Quality

Figure 4



Criterion (AAQC) for TRS. However, for the purposes of comparison, the data has been presented against 10 ppb, the highest criterion value that would receive a "Good" rating under the MOECC's Air Quality Index (AQI) framework.

TRS is continuously tested for in ambient air samples, using analytical technology similar to that used for monitoring SO_2.

Although already very low, TRS levels have demonstrated a slight, further decrease over the past ten years at Sarnia, while remaining relatively unchanged at Corunna. Annual levels of TRS are shown in Figure 4. In comparing the 2016 data against SLEA's self-imposed standard, one hourly value (26 ppb) greater than 10 ppb was measured at Scott Road under north-northeasterly winds.

Figure 5

2016 Ozone | Hours Exceeding 60 ppb*

* Parts per billion

OZONE (O_3)

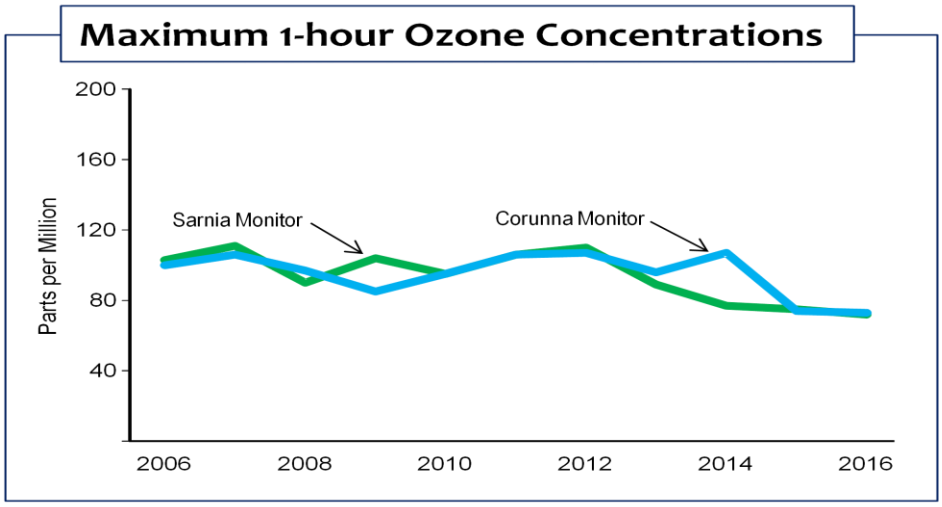
O_3 exists in two regions of the Earth's atmosphere: At ground level (the troposphere), and; in the upper regions (the stratosphere). O_3 in both regions has the same chemical composition, but can affect humans quite differently. While upper atmospheric O_3 protects the earth from the sun's harmful rays, its presence at ground level is one of the main components of smog. Tropospheric O_3 is not emitted directly into the air, but is created by chemical reactions of various precursor compounds, such as oxides of nitrogen (NO_X) and volatile organic compounds (VOCs)

The formation and transport of O_3 are dependent on meteorological factors, such as temperature and hours of bright sunshine, as well as wind speed and direction. Elevated O_3 concentrations are normally detected on hot, sunny days from May to September.

Health effects of O_3 include irritation of the eyes and respiratory tract and have the most effect on children and the elderly, or anyone with respiratory disorders. Agricultural operations can be adversely affected by O_3, particularly impacting the growth and yield of sensitive plants, such as white beans, potatoes and tomatoes. SLEA measures O_3 using continuous analyzers.

O_3 is monitored at two SLEA sites in the Sarnia-Lambton area: At Front Street, which is an urban location in the city's downtown, situated north of the industrial complex, and; At River Bend, a suburban location on the south side of Corunna,

Figure 6



positioned to the south of the industrial area. Both of the SLEA monitoring sites are impacted by long-range transport of ozone and its precursors, related to activities and meteorological conditions in the United States.

More than 50 percent of Ontario's ground level O_3 originates in the United States. Concentrations of O_3 are generally lower in urban areas, the reduction caused by its reaction with nitric oxides (NO), which are emitted by vehicles and local combustion sources.

During 2016, no O_3 measure recorded at either monitoring station exceeded the AAQC (80 ppb). The highest hourly concentration during the year was 73 ppb, measured under southwesterly winds at the River Bend station (Corunna) on June 24. Exceedances of the AAQC and the Canada-wide standard during 2016 and over the past ten years are presented in Table 1.

The 2016 readings were significantly lower than the 10-year average measures at both stations.

Under the old AQI, the MOECC designated 50 ppb as the trigger level, above which air quality was designated as "Poor." Presenting a wind directional plot, Figure 5 illustrates the annual number of hours greater than 50 ppb recorded in 2016. The highest frequency of hours is from southerly directions, supporting the probability of long-range transport of O_3 and its precursors from

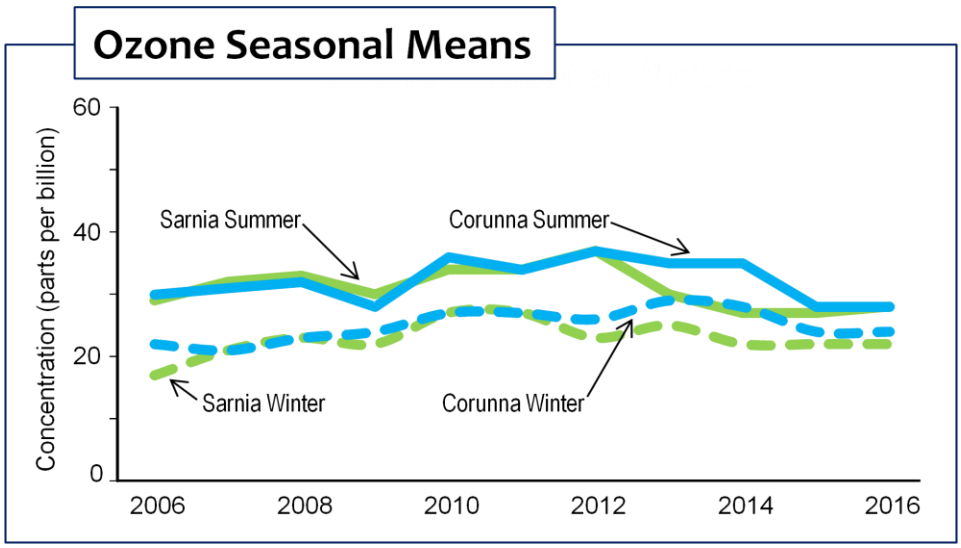
Table 1

Ontario Ambient Air Quality Criteria & Canada-wide Standard Exceedances

	Front Street Monitoring Station*			River Bend Monitoring Station*		
	Ontario Ambient Air Quality Criteria		Canada-wide Standard	Ontario Ambient Air Quality Criteria		Canada-wide Standard
	Air Quality Index 50 ppb	1-hour Criterion 80 ppb	8-hour Standard 63 ppb	Air Quality Index 50 ppb	1-hour Criterion 80 ppb	8-hour Standard 63 ppb
2016	**167**	**0**	**2**	**192**	**0**	**3**
2015	112	0	0	133	0	0
2014	221	0	2	726	31	24
2013	306	4	5	533	21	23
2012	699	68	33	785	67	44
2011	594	24	19	593	36	26
2010	672	25	18	676	37	18
2009	334	7	6	287	6	6
2008	426	7	7	429	4	6
2007	546	58	2	481	43	2
2006	536	24	16	505	33	17
10-yr Avg.	**445**	**22**	**11**	**515**	**28**	**17**

* Measured in parts per billion (ppb)

Figure 7



the United States.

The maximum 1-hour O_3 concentrations over the past decade are illustrated in Figure 6. The graph shows a downward trend over the ten-year period. The resulting decrease in local O_3 formation and transboundary influence is due primarily to the reduction of NOx emissions in Ontario and the United States. Annual summer and winter mean measurements over the past ten years are presented in Figure 7. With very little local O_3 produced during the winter, the upward trend points to an increase in global background levels.

Particulate Matter ($PM_{2.5}$)

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

Airborne particulate matter is classified according to its aerodynamic size. Fine or respirable particulates ($PM_{2.5}$) refer to particles measuring 2.5 microns, or less, in diameter that may penetrate deep into the respiratory system. The Canada-wide Daily Standard for $PM^{2.5}$, which was established to protect public health and the environment, is 28 micrograms per cubic meter ($\mu g/m^3$).

Particulates originate from a wide range of natural, industrial and transportation sources.

Similar to O_3, long-range transport of fine particulates has a major effect on Sarnia-Lambton's particulate levels, as particles can be carried over great distances by prevailing winds.

SLEA has measured $PM_{2.5}$ since 2000 at the Moore Line monitoring station, complementing the data generated by the MOECC at its Sarnia location. A

Figure 8

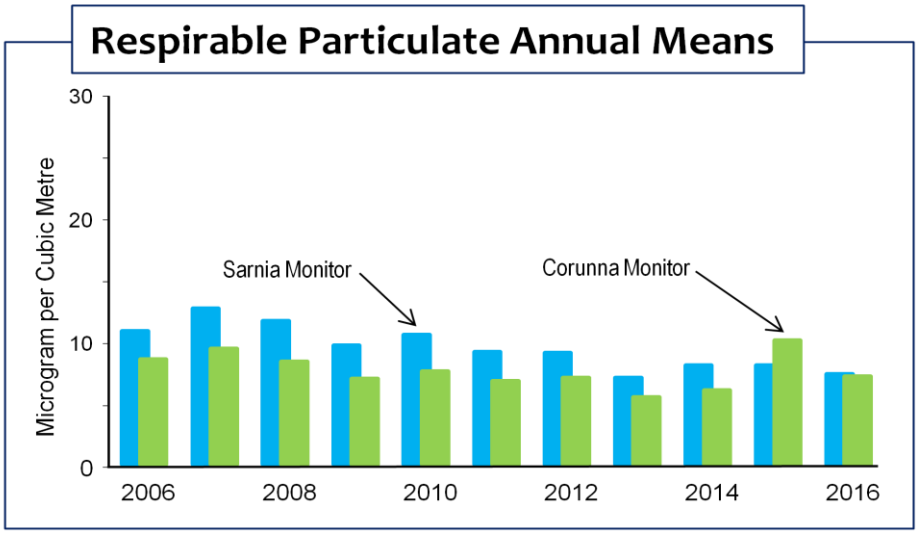


Figure 9

2016 $PM_{2.5}$ Directional Distribution

second monitor was commissioned by SLEA in 2005 at its Sarnia Front Street site. The monitor locations reflect a science-based strategy for data collection from positions situated to the north and to the south of the industrial complex.

In 2016, levels measured at Front Street were only marginally higher than those at the Moore Line site, indicating a general lowering of emissions from local industry. Annual mean respirable particulate levels are shown in Figure 8.

Over the past 10 years, levels measured in Sarnia have been generally higher than those recorded at the Moore Line site, mainly due to local industrial activities. In 2015, levels were higher at Moore Line than in Sarnia, which might have been due to some nearby construction activities occurring to the south of the monitoring site.

The Canada-wide Daily Standard for $PM_{2.5}$ was not exceeded at any time during 2016.

The maximum daily average of 19 $\mu g/m^3$ was measured on April 18 under southerly winds. The Figure 9 wind directional plot presents the annual average concentrations from each of the sixteen points of the compass. The highest concentrations are from southerly directions supporting the probability of long-range transport of $PM_{2.5}$ from USA sources.

Nitrogen Oxides (NO_x)

Nitric oxide (NO) and nitrogen dioxide (NO_2), together known as nitrogen oxides (NO_x), are gases released into the atmosphere from combustion processes. Nitrogen dioxide transforms in air to form gaseous nitric acid and nitrates, which contribute to the formation of fine particulate matter. NO_x play a major role in atmospheric reactions that produce ground-level ozone.

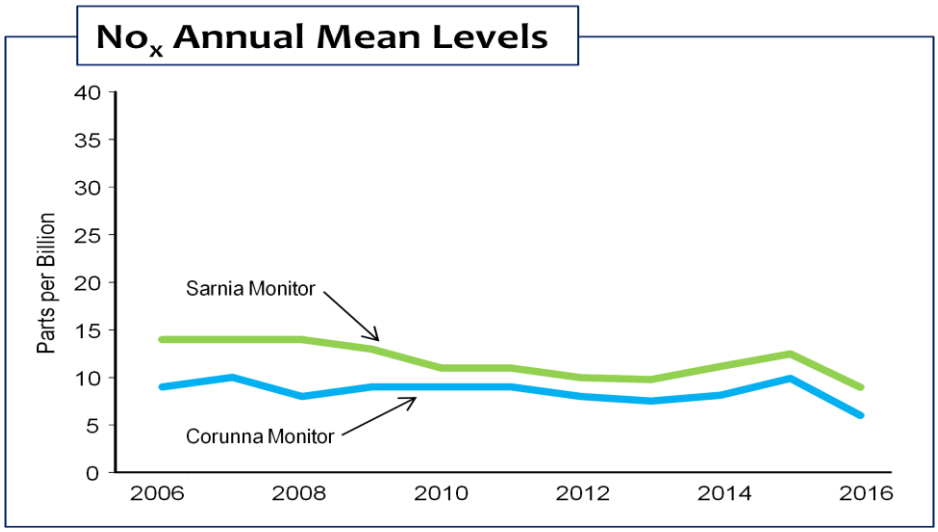
The largest sources of NO_x are motor vehicles, fossil fuel power generation and industrial processes.

Monitoring by SLEA stations in Sarnia and Corunna is conducted on a continuous basis and has been ongoing for more than 30 years.

For the past 10 years, local NO_x levels have shown a continual decline by more than 25 percent, as measured at the Sarnia site. The decline can be attributed to reductions by local industry, as well as from motor vehicles, as a result of more stringent emission control standards.

The Ontario hourly and daily criteria for nitrogen dioxide were not exceeded during 2016. Annual mean levels at both monitoring sites are presented in Figure 10.

Figure 10



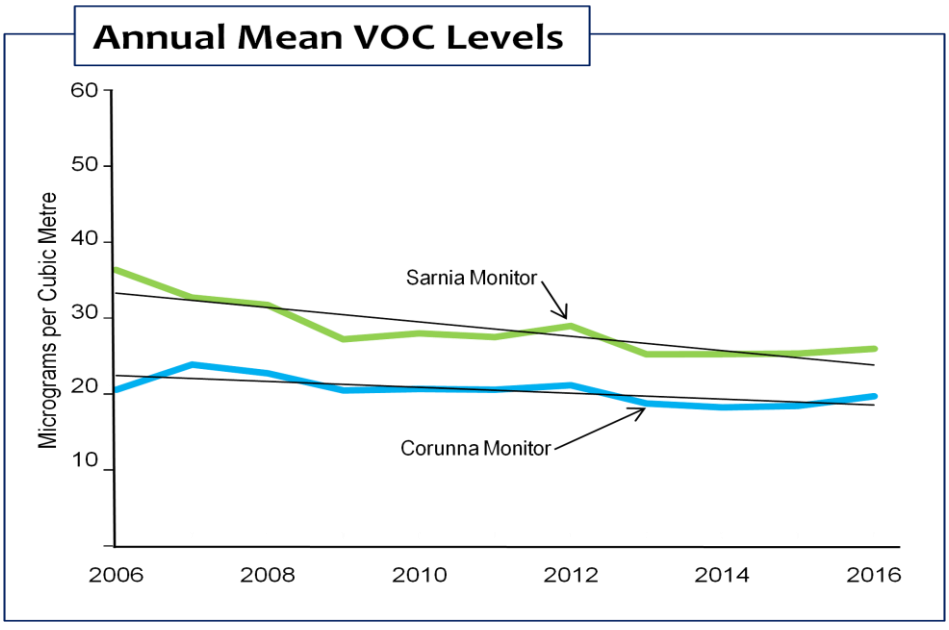
Volatile Organic Compounds (VOCs)

Volatile Organic Compounds (VOCs) are compounds containing carbon that are easily absorbed into the atmosphere at normal temperatures. Additionally, VOCs can convert into vapour or gas forms without undergoing any chemical change. The compounds are highly reactive and contribute to several atmospheric reactions, including the formation of ground-level ozone, as well as particulate matter.

VOCs are of natural origin, although many owe their existence to people activities, such as vehicle emissions, petroleum products, chemicals, and manufacturing industrial processes, in addition to painting, varnishing and coating operations. Many VOCs are toxic air pollutants that can cause adverse health effects on people and the environment.

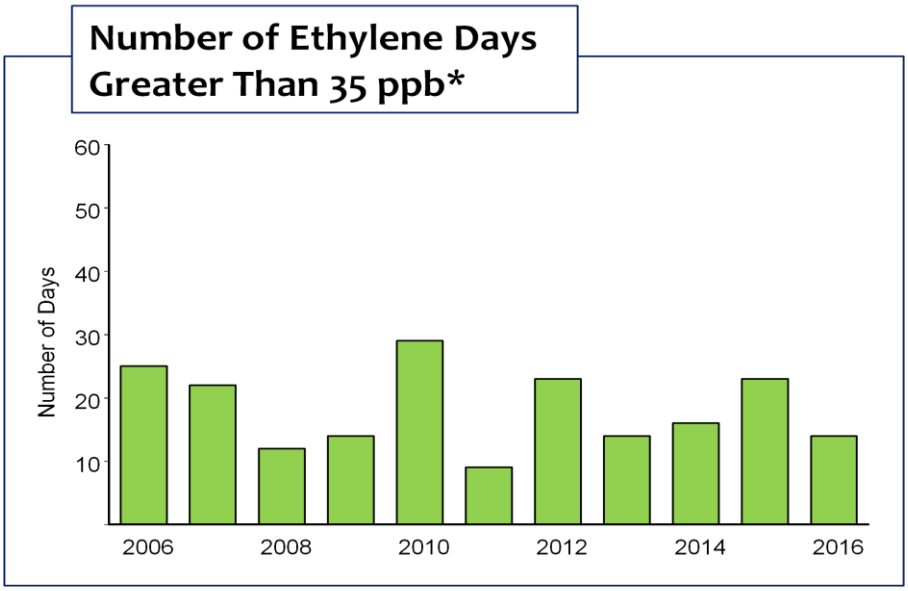
SLEA's VOC monitoring program is truly unique. Its complexity of function and length of operation are unparalleled, compared to other private- and public-sector environmental monitoring programs. The program applies a three-point approach, tracking the following VOC compounds and groups by using network monitors that align with major industrial sites under northerly and southerly prevailing winds:

Figure 11



1. The VOC ethylene has been monitored on a continuous, hourly basis at five sites since 1976. The compound is of particular interest, as it is a major commodity produced, used and stored locally
2. Testing for a group of 46 VOCs is conducted automatically over a 24-hour period, once every 12 days, from the Sarnia and Corunna monitoring sites and then sent to a laboratory for analysis. This element of the

Figure 12



* Parts per billion

monitoring program has been ongoing for 30 years

3. A sub-group of 11 of 46 targeted VOCs referenced in 2. above is tested for hourly by an automated air quality sampler located at the Sarnia site. This unique program component has been in operation for more than 20 years.

In 2016, all concentrations (except for ethylene and benzene) were below any relevant ambient air quality criterion. The annual sum averages of the group of 46 VOCs (excluding ethylene) have continued a downward trend over the past 10 years, as shown in Figure 11. During that time period, total levels have dropped by approximately 30 percent at Sarnia and by 15 percent at Corunna. Annual levels have been leveling off since about 2010.

In 2011, the then Ontario Ministry of the Environment promulgated daily and annual AAQC for benzene of 2.3 and 0.45 µg/m^3, respectively, which are among the most stringent in the world. During 2016, the daily criterion was exceeded on 87 days, while the annual criterion was exceeded routinely at both the Sarnia and Corunna monitoring sites. The practical merits of the existing benzene criteria would seem to be in question, since the levels recorded in Sarnia and Corunna are comparable to those recorded in many other Canadian cities. The daily AAQC for ethylene was exceeded for a total of 14 days at various monitoring locations during 2016, which is consistent with the monitoring results of the past 5 years (See Figure 12).

Continuous Water Quality Monitoring

SLEA's annual water quality program centres on the continuous operation of its St. Clair River monitoring station. The site is strategically situated south of Courtright, just downstream of Sarnia-Lambton's main industrial complex. The primary role of the analyzer is to monitor long-term trends in St. Clair River water quality. At the same time, the real-time data challenge SLEA's member companies to continue to achieve their ultimate objective: no spills to the river.

2016 Water Monitoring by the Numbers

- 8,721 water samples collected
- 17,420 automated analyses conducted
- 14 of 20 VOCs not detected
- 99.17 % results below detection limit
- 99.7 % monitor performance reliability

Table 2

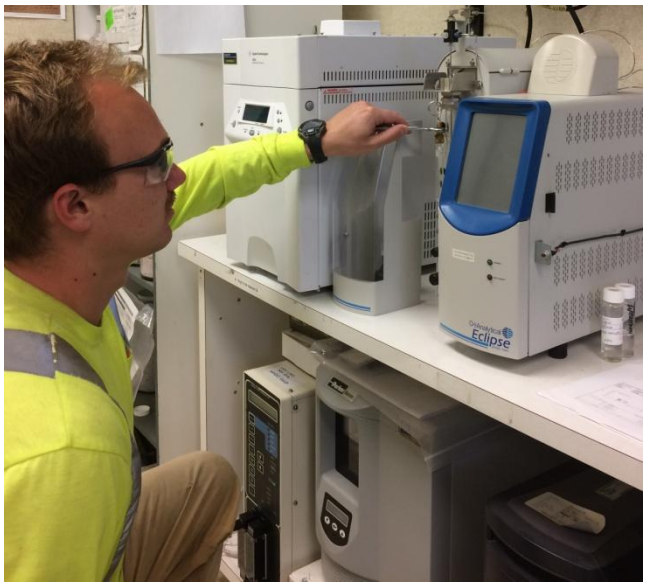
2016 Continuous Monitoring Results for All Detected Compounds

Compound	DetectionLimit (ppb*)	Detection Frequency (%)	Number of Analyses	Average(ppb*)	Minimum (ppb*)	Maximum(ppb*)
Cyclohexane	0.04	0.15	13	<mdl**	<mdl**	0.43
Benzene	0.05	0.3	26	<mdl**	<mdl**	0.06
Toluene	0.08	15.8	1375	<mdl**	<mdl**	0.36
Perchloroethylene	0.08	0.13	11	<mdl**	<mdl**	0.14
m+p-Xylene	0.16	0.19	17	<mdl**	<mdl**	0.18

* Parts per billion ** Minimum detection limit

Since 1987, the station has housed a continuous volatile organic compounds monitor, capable of detecting extremely low levels of any of the targeted chemicals, if present. The analyzer is highly accurate and extremely reliable, lending substantial credibility to SLEA's real-time and historical water quality records.

Should any targeted chemical be detected at any time during the continuous sampling process, a tiered system of alarms is triggered, with warnings of potential water quality concerns automatically relayed simultaneously to SLEA and to the Ontario Ministry of the Environment and Climate Change.



Water Analyzer

Under SLEA's 2016 continuous water quality monitoring program, 8,721 samples were automatically collected from the St. Clair River and analyzed for compounds commonly associated with local industrial activities. During 2016, six of the 20 compounds targeted under the SLEA program were detected (See Table 2). From a total of 174,420 separate findings, only 1,442 results, or fewer than one percent, were greater than or equal to the minimum detection limit (mdl) of the precision analytical instruments used to perform the associated laboratory tests.

In 2016, no episode was recorded where the concentration of any target compound exceeded one ppb. An "episode" is defined as a series of analytical results occurring within a limited timeframe, and of which at least one result is equal to, or greater than, one ppb. The measure is used as a benchmark value, because it provides a useful standard for year-over-year comparisons of the collected water quality data, regardless of changes in detection limit methodology. A 22-year trend, where three or fewer episodes per year of the targeted parameters have been recorded, presents continuing evidence of the excellent overall quality of the St. Clair River flowing past the Courtright site.

For the past 10 years, SLEA and other area organizations and local governments have been working with regional watershed managers and the provincial government to develop a plan to protect critical drinking water sources, such as the Lake Huron source that feeds the Lambton Area Water Supply System (pictured above), from nearby threats. Implementation of the plan started in 2016. *St. Clair Region CA*

Drinking Water Source Protection

Following close to a decade of scientific research, technical evaluation and public consultation, the *Thames-Sydenham and Region Source Protection Plan* was approved by the Ontario Government. The plan became law on December 31, 2015 and is being implemented locally.

The source protection plan is a locally focused, science-based document, designed to protect the water quality of the lakes, rivers and sources of underground water that supply area municipal drinking water systems. The plan sets out proactive measures to eliminate, manage or reduce potential risks to drinking water sources related to area development and resources use. The approved document is being applied by local municipalities.

In 2006, the St. Clair Region, Upper Thames River, and Lower Thames Valley Conservation authorities, along with the Thames-Sydenham and Region Source Protection Committee, began coordinated efforts to develop the plan to proactively protect municipal sources of drinking water throughout the region. The committee is comprised of local citizens, appointed under the Clean Water Act (2006) to represent First Nations, municipalities, agriculture, business, the general public and other stakeholder group interests from across the region.

A concerned community stakeholder, SLEA has had active representation on the local source protection program committee since its inception. As SLEA's representative on the committee, Dean Edwardson, has participated in the entire plan research and development process. In 2017, he was appointed as chair of the Source Protection Committee by the Ontario Minister of the Environment and Climate

Change. The committee remains active in monitoring the progress being made in implementing the plan and in preparing for any updates that will be required.

The source protection plan contains local policies that address a range of drinking water threats. The committee worked hard to create a balance between the important goal of protecting our municipal supplies of drinking water and the burden such an obligation might pose for municipalities and other implementers. In general, for existing activities that represented a significant concern to a water source, the approach was to manage the risk through the use of mitigating management plans and prescribed mechanisms. Such an approach would allow many existing activities to continue, while being conducted in an adjusted manner that no longer represents a significant threat to the associated drinking water source.

Generally, future proposed activities introducing a new, significant risk in vulnerable source areas would be prohibited. To reduce agency duplication whenever possible, other agencies' existing control mechanisms are being used to adequately and effectively overcome a significant threat. The plan also addresses moderate and low water quality risks, through the use of education and outreach measures. The responsibility for risk management services lies at the local level of government, with a number of municipalities in the source protection region contracting conservation authority staff to deliver the service.

Encouraging Environmental Knowledge

Progressing past a level of awareness to a knowledge-based understanding and appreciation

Local students keenly investigate the aquatic life found in a St. Clair River sample, during the SLEA-sponsored *River Bottom Critters Program*.

St. Clair Region CA

of the environment around us is an important step towards real improvements. In fact, using such knowledge to apply proven scientific methods and appropriate technology has long been a key factor in the positive progress that SLEA's annual air and water monitoring programs have documented.

Such an education-focused partnership between SLEA and the St. Clair Region Conservation Authority continues to encourage area young people to develop a healthy, science-based curiosity about the environment. Through SLEA sponsorship in 2016, the Authority introduced more than 5,000 area school students to its *River Bottom Critters* and *Go With the Flow* conservation education programs.

River Bottom Critters offers students a first-hand opportunity to see how the many creatures that live in river sediment can be used as indicators of a watercourse's aquatic health. As part of the program, which is led by an Authority conservation education staff member, the students poke and probe their Petri dish samples of local river sediment. In the process, they discover the wealth of active

aquatic life that thrives at the bottom of the St. Clair River.

Go With the Flow is a program that helps elementary students learn about the fundamentals of groundwater hydrology and the importance of protecting our area groundwater resources.

Community Involvement

Let's All be Prepared

The Chemical Valley Emergency Coordinating Organization (CVECO) and its public education and outreach arm, the Community Awareness and Emergency Response (CAER) committee, work to ensure local residents are protected, prepared and knowledgeable about what to do in the event of a natural, or people-based emergency incident. Emergency responders from local industry and area municipalities maintain a state of readiness for any situation that might threaten the public's safety, particularly given the community's proximity to large petrochemical, chemical and other industrial manufacturers.

Each year, CVECO and CAER proactively address two primary aspects of their emergency preparedness role, as denoted by the CAER acronym: *Community awareness,* and; *Emergency response*.

Increasing Community Awareness

Through communications with a cross-section of the community, CAER representatives keep the community informed and educated about actions families and individuals can take to minimize the negative impact of a natural, or people-based emergency incident. In cooperation with the County of Lambton, CAER produces and distributes the preparedness response handbook, "*Your Home Emergency Preparedness Guide*." A web-based version of the easy-to-follow resource is also available for downloading at CAER.ca

Photos in CAER's online preparedness guide, including the above, showing Sarnia's downtown following a tornado in May 1953, remind residents that emergencies can arise without warning. *Lambton Room Archives*

In addition to the guide, CAER uses a number of tools to inform the community about local measures that are in place in case of out-of-norm incidents. With CAER's financial support, warning sirens have been strategically positioned within the community to warn residents about unusual events, such as severe weather, or industrial occurrences.

The organization continues to investigate further means of ensuring a robust notification system for the community's benefit. A local Community Update Line phone-in service is one of the more recent additions. Available 24 hours a day, residents can call the line's phone number to receive a pre-recorded

Members of Nova Chemicals' emergency response unit answer questions from visiting students and adults, while demonstrating various aerial rescue techniques during CAER's 2017 Emergency Preparedness Day

message about local, non-routine industrial circumstances within Sarnia-Lambton and adjacent St. Clair County, MI. The line can be reach by calling 1-855-4SARNIA, or 1-855-472-7642 and is available to callers in area codes 519, 226 and 810. The update line concept was borrowed from similar services being used successfully in other, similar communities that maintain a substantial industrial sector.

Local industries sponsoring the update line include:

- ARLANXEO Canada Inc.
- CF Industries
- Clean Harbors Canada Inc.
- Plains Midstream Canada ULC
- Shell Canada Products
- Enbridge Pipelines Inc.
- Imperial Oil
- INEOS Styrolution Canada Ltd.
- NOVA Chemicals (Canada) Ltd.
- Suncor Energy Products Inc.
- Terrapure Environmental
- TransAlta (SC) LP

New subscriptions to another CAER- and municipal government-sponsored community notification initiative continue to increase, as awareness of the *My Community Notification Network (My CNN)* service expands. The network proactively contacts its subscribers with timely and relevant information about local natural events, or industrial incidents, through phone, email or text messages, the means pre-set by individual subscribers. Initially, subscribers

in Sarnia, Point Edward and St. Clair Township have been receiving messages about such events as road closures, boil water advisories, tornadoes and other incidents that require the public to shelter in place, or to be evacuated. As the system is expanded, subscribers will be able to also receive a range of other messages, including details about local bus cancellations.

Subscription registration to the network is free, thanks to the financial support of participating municipalities, first responders and area industries. Managed by the firm Everbridge, the service is being used successfully in a variety of other communities across North America and has been receiving positive feedback from local subscribers since its introduction. Further information about *My CNN* operation and how local residents can subscribe is available at CAER.ca

Rapid Response when Needed

Local municipal and industrial emergency responders apply their specialized knowledge and skills to identify potential community health, safety and environmental risks associated with local industrial operations. With the risks defined, emergency responders then develop plans and preparations to efficiently and effectively implement appropriate response measures. Regular training activities ensure they are ready to effectively manage unplanned natural or industrial incidents.

CVECO is a local, mutual aid emergency response organization, formed and maintained by representatives from the private and public sectors. The organization's activities address a variety of facets, including public notification, traffic control and the training and activation of highly skilled and specially equipped first response teams. They are ready to react at any time to any emergency situation potentially affecting the local community.

The Sarnia Area Disaster Simulation (SADS) exercise involves the testing and training of local municipal and industrial emergency responders and has been held annually for well over 20 years. Each annual exercise simulates a real-life incident, such as a plant site emergency, tanker truck and car accident, or railway car incident. The half-day event provides responders with practical planning and response experience, preparing them for actual occurrences. Planning for the annual SADS exercise is conducted months in advance and the community is notified when the simulation will occur. From planning to the evaluation of responder performance after the simulation, a substantial group of representatives is involved – as they would be during a real-time emergency. Each exercise draws on local expertise from fire, EMS, police, industry and other specialists.

Emergency Preparedness Week
Celebrating +20 Years

More than 1,500 students and families took part in CAER's Annual Emergency Preparedness Day event, held on May 6, 2016, in Sarnia. The cost-free event is gaining a reputation as the largest gathering of emergency response professionals and equipment in Canada. Close to 100 informational and educational displays are staffed by emergency response experts. The event includes numerous equipment and procedural demonstrations and interactive programs, conducted by representatives from CVECO members, fire, police and EMS, as well as private service and supply companies.

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