

Sarnia Lambton Environmental Association

**2015 Year End Progress Review  
and Technical Summary**



**Sarnia ♦ Lambton  
Environmental  
Association**

Industries Working Together



# Sarnia Lambton Environmental Association 2015 Year End Progress Review and Technical Summary



It is that time of year when on behalf of our Board of Directors and 19 member companies, I am pleased to share with you the Sarnia-Lambton Environmental Association's (SLEA) 2015 Year End Progress Review and Technical Summary.

During my decade as the General Manager of the SLEA I have witnessed continuous change within our organization, but one thing has remained constant and that is our commitment to fostering a healthy environment that balances the needs of today without compromising the needs of future generations. As I reflect on 2015, I am pleased with the progress that has been made as we continue to meet with stakeholders, government officials and regulators to drive positive change. I truly believe that our undertakings will result in further improvements in 2016. It promises to be another year of challenging work, but more importantly it promises to be a year in which the strength of our organization will be illustrated through what we can collectively accomplish.

To do this we must continue to ground our actions, both present and future, in sound science and with an awareness and appreciation for the importance of our environment.

With that in mind I'm pleased to share with you our 2015 Report.

A handwritten signature in black ink, appearing to read 'D. Edwardson', with a stylized flourish at the end.

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## **2015 - Progress Review and Technical Summary**

Industry learned long ago that improving the local environment takes teamwork. And, it is this fundamental lesson that remains at the core of the Sarnia-Lambton Environmental Association (SLEA). As a voluntary, non-profit industrial co-operative, the present-day 19-member company SLEA is a testament to the importance of evolution, continuous improvement and teamwork.

The modern-day SLEA evolved from two earlier organizations, the St. Clair River Research Committee and the Lambton Industrial Society. As a result, for 60+ years there has been an unwavering focus on environmental and sustainability issues that affect or have the potential to affect the community and surrounding area.

Under the guidance of its General Manager, the SLEA manages and is responsible for a broad network of water and air quality monitoring stations in Sarnia-Lambton which extend from Sarnia southward to Courtright, and eastward from the St. Clair River across bordering lands. The nine monitoring stations that comprise the network are managed by an expert third-party company which ensures records are scrupulously kept to identify, track and document trends should they need to be addressed now or in the future. Any environmental records that the SLEA maintains are available in its office library as well as online at [www.sarniaenvironment.com](http://www.sarniaenvironment.com).

### **Expert Third Party Oversight of Air and Water Monitoring Stations**

The SLEA's network of water and air quality monitoring stations is managed by ORTECH Environmental (ORTECH). For well over 50 years, ORTECH has been a leader in providing technology-based consulting services and expertise in the fields of environmental science and engineering to industrial, manufacturing, municipal, and renewable energy sectors. It provides top-quartile service in technical consulting, problem solving, testing, and evaluation, with emphasis on environmental and advanced computation technologies. ORTECH's considerable expertise was integral in the design, implementation and on-going operation of the SLEA's ambient air and water monitoring networks, and the company continues to provide independent audits and environmental reviews of the local area.

An environmental advisor to the SLEA since the 1970s, ORTECH enjoys a reputation of consistency and reliability within industry and government for its air and water monitoring and laboratory services. It provides independent engineering and consulting services to the SLEA from offices in Sarnia.

In addition to its daily maintenance of the monitoring network, ORTECH also manages the SLEA monitoring data; as an independent, third-party consultant, the data collected by ORTECH and Pollutech EnviroQuatics Limited (Pollutech) is the basis for the SLEA's annual Year End Progress Review and Technical Summary. Pollutech's corporate services include performing routine compliance bioassays as well as developing new and innovative bioassay and biomonitoring techniques. With both public- and private- sector clients across Canada, Pollutech provides zebra mussel control, marine diving and general marine services, ambient effects monitoring, in addition to geo-environmental engineering and assessment services.

### **Sustaining a Healthy Environment Requires Commitment and Collaboration**

The Sarnia-Lambton Environmental Association is committed to fostering a healthy, sustainable environment. The input from and dialogue among its member companies, whether large or small, is a testament to the relationship forged from years of teamwork and collaboration. Through a shared purpose, commitment, and a respect for the views of others, the SLEA is better able to respond to emerging environmental trends and issues that arise.



## 2015 - Progress Review and Technical Summary

### History Drives Future Changes

To understand the genesis of a modern-day environmental association is to reflect on a period when companies worked individually without understanding the inherent benefit that comes from diversity of opinion and experience. Today's multi-company Association began in the 1950s when representatives from Sarnia-area companies began sharing information about innovations and improvements made at their own facilities. Recognizing the power of cross-company dialogue, the 'initial three' formed the St. Clair River Research Committee to initiate studies on air and, in particular, the presence of sulphur dioxide and particulate matter. The Committee later expanded its focus to include the study of surface oil contamination in the St. Clair River. From these initial studies, momentum grew within the broader industrial community, and as environmental progress was made, membership in the Committee grew. By 1967, it had increased from three to 14 companies and the Lambton Industrial Society was formed.

Now in its 65th year, the modern-day SLEA remains a recognized environmental expert and reliable resource for local industry. Its lending library and website allow researchers and visitors to avail themselves of the opportunity to explore decades of local environmental information.

With its Mission 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," the SLEA operates under a rigorous set of goals which guide its behaviour and inform actions that are in step with today's ever-changing world.

### SLEA Goals:

- Members uphold an exemplary awareness of environmental management and risk prevention regulations, technologies and procedures.
- Members will fully understand the impacts of stressors on the local ecosystem.
- The Association will be recognized for its competency and reliability such that regulatory agencies will seek information, expert advice and comment from the Association and its members when developing environmental legislation and regulatory programs.
- The Association will strive to maintain a well-informed community that will actively contribute to sound resolutions of environmental issues.
- The Association will provide opportunities to educate youth about the importance of the environment and a healthy ecosystem.

### On-Going Collaboration...

- The SLEA staff oversees and provides administrative support for the Chemical Valley Emergency Coordinating Organization (CVECO), and the Community Awareness and Emergency Response (CAER) Committee.
- The SLEA is committed to supporting educational programs with the St. Clair Region Conservation Authority.
- Dean Edwardson serves on the Thames-Sydenham and Region Source Protection Committee.

# 2015 - Progress Review and Technical Summary

Located in the Suncor Sustainability Centre – 1489 London Road, Sarnia, Ontario – the SLEA is open to members of the community, inviting them to discover facts about the local environment and the work of member companies to make further improvements. Further information is available at the SLEA office at 519-332-2010 or by email at: [admin@slea.ca](mailto:admin@slea.ca). We can also be found online at [www.sarniaenvironment.com](http://www.sarniaenvironment.com).

## Sarnia Lambton Environmental Association Air & Water Monitoring Network



## 2015 Member Companies

- ARLANXEO Canada Inc.
- BioAmber Sarnia
- Cabot Canada Ltd.
- CF Industries
- Clean Harbors Canada Inc.
- E.I. du Pont Canada Company
- Enbridge Pipelines Inc.
- H.C. Starck Canada Inc.
- Imperial Oil
- INEOS Styrolution Canada Ltd.
- NOVA Chemicals (Canada) Ltd.
- Ontario Power Generation
- Plains Midstream Canada ULC
- Shell Canada Products
- Suncor Energy Products Inc.
- Suncor Energy Products Inc. St. Clair Ethanol Plant
- Terrapure Environmental
- TODA Advanced Materials
- Transalta (SC) LP



# Monitoring Our Air Quality

## 2015 at a Glance

- Sulphur dioxide levels have exhibited a downward trend since 2005 and are well below Ontario's annual acceptable levels. The 2015 levels are over 50 per cent lower than levels measured 10 years ago. In 2015, for the seventh consecutive year, there were no Lambton Industry Meteorological Alert events or exceedances.
- Already very low, annual levels of total reduced sulphur have continued to decrease over the past 10 years. No one-hour values greater than 10 ppb were measured at the Sarnia or Corunna monitoring sites during 2015.
- Maximum one-hour ozone concentrations for the past 10 years show very little change. Most of the major nitrogen oxides emission reductions in Ontario and the United States were made before 2004 and these reductions resulted in decreased ozone production during the summer months. An increasing trend in annual means seen from 2005 to 2013 has reversed in 2014 and 2015. Generally, the increasing trend was attributed to higher background ozone concentrations.
- The Canada Wide Daily Standard for respirable particulate matter – 30 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) – was exceeded once during 2015 at Moore Line.
- Over the past 10 years local nitrogen oxides levels have shown decline with an approximate decrease of 25 per cent at Sarnia. The Ontario nitrogen dioxide hourly and daily criteria were not exceeded during 2015.
- In 2015 all concentrations of volatile organic compounds (except for ethylene and benzene) were below any associated Ontario ambient air quality criteria (AAQC). The Ontario daily ambient air quality criterion for ethylene was exceeded for a total of 23 days during 2015 at the various monitoring locations which is within the range of the last five years. The benzene levels in Sarnia and Corunna are in the range of many other Canadian cities.

Understanding air quality is often complex. Our air is typically odourless and unseen, but even if we can see or smell something, it is not always a cause for concern.

The SLEA uses sound science to measure air quality against specific federal and provincial health risk-related standards, in order to assess local industry emissions and ambient atmospheric conditions. It relies on eight monitoring stations strategically located both up- and downwind of local industrial plants, and has data that spans more than 40 years. The stations automatically collect and analyze air samples and record hourly average measurements of targeted substances. This monitoring network tracks general local weather conditions and smog levels, as well as sulphur dioxide, total reduced sulphur, ozone, nitrogen oxides, a preset series of volatile organic compounds, and respirable particulate matter (all chosen because of their connection to local industrial manufacturing processes). In addition, the SLEA member organizations continually monitor, control and reduce emission levels generated by their operations with the overall goal of reducing their environmental footprint.



# Monitoring Our Air Quality

The following summary sets out the primary findings of the SLEA's 2015 air quality monitoring program.

## Sulphur Dioxide

Sulphur dioxide ( $SO_2$ ) results from a variety of natural and human sources, with the largest source of emissions 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 emitters. In the Sarnia area, petroleum refineries account for most of the local emissions, however, sources extend far beyond Sarnia-Lambton into the United States.

Trans-boundary  $SO_2$  carried from coal-burning power plants in the United States has an influence on Sarnia-Lambton's  $SO_2$  levels, as prevailing winds blow much of this  $SO_2$  into the local air shed, increasing levels.

$SO_2$  has the characteristic odour of burned matches. Health effects associated with  $SO_2$  exposure include breathing problems and respiratory illness. The most at-risk group for adverse health effects from  $SO_2$  are individuals with asthma, chronic obstructive pulmonary disease or cardiovascular diseases.  $SO_2$  is measured in the ambient air via continuous monitors utilizing the principle of fluorescence.

$SO_2$  can be oxidized to form sulphuric acid aerosols and also may form sulphates that contribute to fine particulate matter. Similar to nitrogen dioxide ( $NO_2$ ),  $SO_2$  is an acid rain precursor that may play a role in acidification of lakes, stream and soil, and cause buildings to corrode.

### 2015 Results:

$SO_2$  has been measured continuously by the SLEA for over 45 years at strategically located monitoring stations in the Sarnia-Lambton area.

Figure 1 (Page 8) illustrates historical annual average levels in Sarnia and Corunna. Levels have exhibited a downward trend since 2005 and are well below Ontario's annual acceptable levels. The 2015 levels are approximately 50 per cent lower than levels measured 10 years ago.

The Lambton Industry Meteorological Alert (LIMA) regulation provides a local response to help diminish the local effects of  $SO_2$  emissions to ensure that  $SO_2$  in the air is at levels that protect public health and the environment. This regulation has been in effect for over 30 years and identifies the maximum average daily  $SO_2$  levels that can be reached at the Association's LIMA monitoring stations, before participating area industries are advised to switch to lower sulphur fuels or reduce their production rates to lower emissions.

In 2015 there were no LIMA events and the Ontario Daily Criterion (100 ppb) was not exceeded during the year. This was the seventh consecutive year of no LIMAs or exceedances. A maximum daily mean of 36 ppb was reported in Sarnia at Front Street on December 21 under south-southwesterly winds.

# Monitoring Our Air Quality

A long-term summary of SO<sub>2</sub> alerts (LIMAs) and daily exceedances is shown in Figure 2.

Figure 1

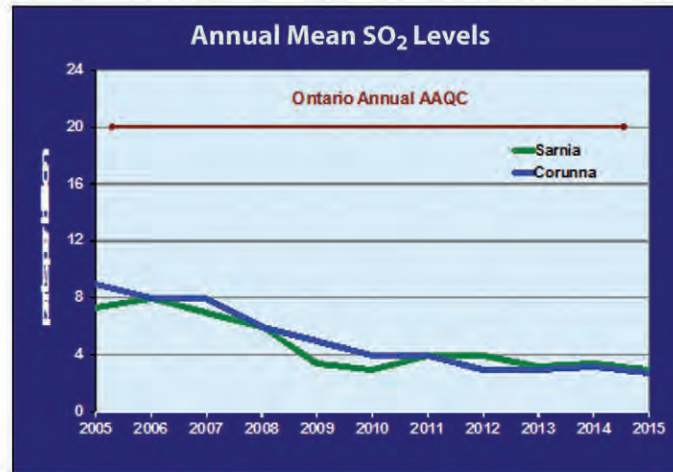
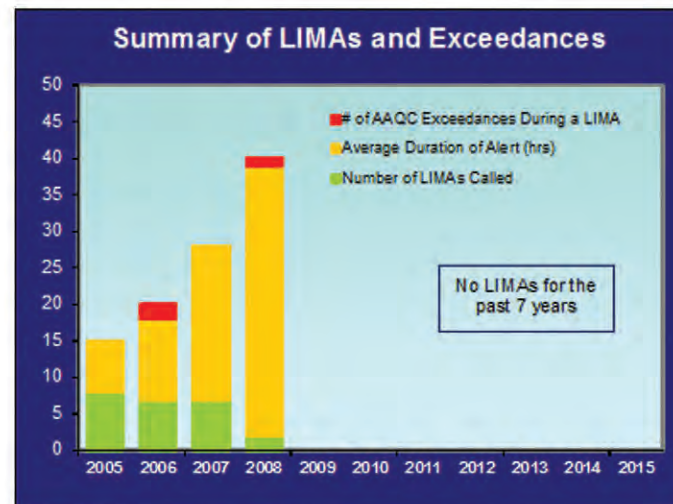


Figure 2



## Total Reduced Sulphur

The main compounds that make up Total Reduced Sulphur (TRS) are hydrogen sulphide, methyl mercaptan, dimethyl sulphide and dimethyl disulphide. Natural sources include swamps, bogs and marshes along with industrial sources such as oil refineries, pulp and paper mills, steel mills and sewage treatment facilities.

TRS compounds are not normally considered a health hazard at ambient levels. Most people can smell the "rotten egg" or cabbage-like odours produced by TRS compounds at very low levels (concentrations lower than 10 ppb); therefore the challenge is to manage these materials to avoid the escape of errant odours, normally of short duration. TRS is measured continuously in ambient air by fluorescent technology similar to that used for sulphur dioxide.



# Monitoring Our Air Quality

## 2015 Results

Annual levels of TRS are shown in Figure 3. Although they are already very low, they have demonstrated a small decrease over the past 10 years at Sarnia and have remained relatively unchanged at Corunna.

TRS does not have a one-hour Ambient Air Quality Criterion so for the purposes of comparison the data has been compared to the highest value that would receive a "good" rating under the Ministry of the Environment and Climate Change (MOECC)'s Air Quality Index framework, 10 ppb. No one-hour values greater than 10 ppb were measured at the Sarnia or Corunna monitoring sites during 2015.

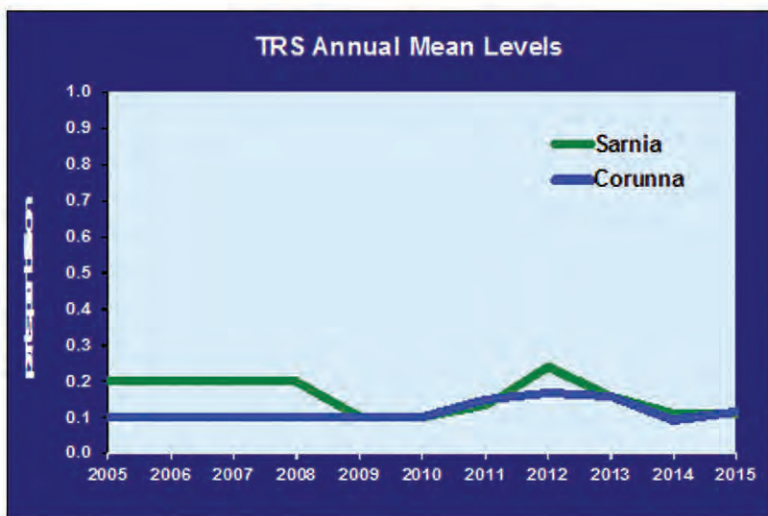


Figure 3

## Ozone

Ozone ( $O_3$ ) exists in two regions of the Earth's atmosphere: at ground level (troposphere) and in the upper regions (stratosphere) of the atmosphere. Both types of  $O_3$  have the same chemical composition but differ greatly in their effect on humans. While upper atmospheric  $O_3$  protects the earth from the sun's harmful rays (ozone layer), ground level  $O_3$  is the main component of smog.

Tropospheric, or ground level  $O_3$ , is not emitted directly into the air, but is created by chemical reactions between various precursor compounds such as oxides of nitrogen ( $NO_x$ ) and volatile organic compounds (VOCs). Formation and transport of  $O_3$  are dependent on meteorological factors such as temperature, hours of bright sunshine, and wind speed and direction. Elevated  $O_3$  concentrations are normally measured on hot, sunny days during the months of May through September.

Health effects of  $O_3$  include irritation of the eyes and respiratory tract and have the most effect on children and people with respiratory disorders. Agricultural effects include the adverse impact of  $O_3$  on growth and yield of sensitive plants such as white beans, potatoes and tomatoes.

The SLEA measures ozone with continuous analyzers that operate on an ultra-violet light absorption principle.



# Monitoring Our Air Quality

## 2015 Results

O<sub>3</sub> is monitored at two SLEA sites in the Sarnia-Lambton area: at Front Street which is an urban location in downtown Sarnia, north of the industrial complex and River Bend, a suburban location on the south side of Corunna, south of the main industrial complex. Both of the SLEA monitoring sites are impacted by long-range transport of O<sub>3</sub> and its precursors from the United States. Over 50 per cent of Ontario's ground level ozone originates in the United States.

Concentrations are generally lower in urban areas due to its reduction by reaction with nitric oxides (NO) that are emitted by vehicles and local combustion sources. The highest 2015 hourly concentration was 74 ppb and was measured under westerly winds at River Bend (Corunna) on September 2.

Exceedances of the Ontario AAQC and the Canada-Wide Standard for 2015 and the past 10 years are shown in Table 1 (Page 11). Ozone concentrations did not exceed Ontario's hourly Ambient Air Quality Criterion (80 ppb) during 2015 at either of the monitoring stations. This is significantly lower than the 10-year average at both stations.

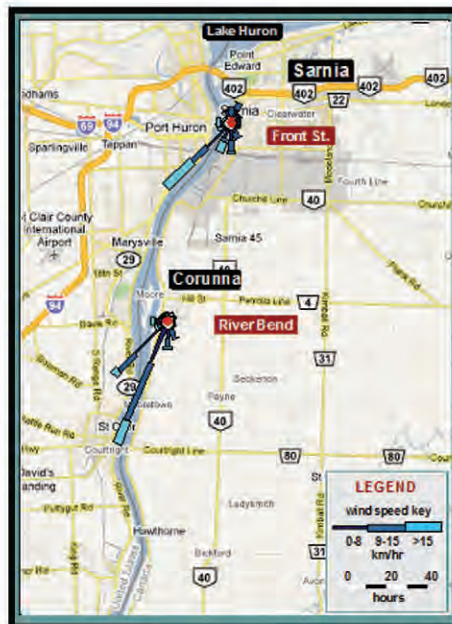
Under the old Air Quality Index, the MOECC designated 50 ppb as the trigger level, above which air quality is designated as "poor." Figure 4 illustrates, as a wind directional plot, the annual number of hours greater than 50 ppb in 2015. The highest frequency of hours is from southerly directions, supporting the probability of long-range transport of O<sub>3</sub> and its precursors from the US.

Figure 5 (Page 11) illustrates the maximum one-hour ozone concentrations for the past 10 years. The graph shows very little change over the 10-year period. Most of the major NO<sub>x</sub> emission reductions in Ontario and the United States were made before 2004 and these reductions resulted in decreased ozone production during the summer months.

Figure 6 (Page 11) shows the annual means over the past 10 years. The increasing trend seen from 2005 to 2013 has reversed in 2014 and 2015. Generally, the increasing trend was attributed to the higher O<sub>3</sub> global background concentrations.

## 2015 Ozone – Number of Hours Exceeding 50 ppb

Figure 4





# Monitoring Our Air Quality

|                     | Front Street     |                   |                   | River Bend       |                   |                   |
|---------------------|------------------|-------------------|-------------------|------------------|-------------------|-------------------|
|                     | Ontario          |                   | CDN               | Ontario          |                   | CDN               |
|                     | AQI<br>50<br>ppb | 1 hr<br>80<br>ppb | 8 hr<br>65<br>ppb | AQI<br>50<br>ppb | 1 hr<br>80<br>ppb | 8 hr<br>65<br>ppb |
| 2015                | 112              | 0                 | 0                 | 133              | 0                 | 0                 |
| 2014                | 221              | 0                 | 0                 | 728              | 31                | 13                |
| 2013                | 308              | 4                 | 5                 | 533              | 21                | 21                |
| 2012                | 699              | 68                | 31                | 785              | 67                | 39                |
| 2011                | 594              | 24                | 16                | 593              | 36                | 24                |
| 2010                | 672              | 25                | 16                | 678              | 37                | 16                |
| 2009                | 334              | 7                 | 5                 | 287              | 6                 | 4                 |
| 2008                | 428              | 7                 | 6                 | 429              | 4                 | 4                 |
| 2007                | 546              | 58                | 0                 | 481              | 43                | 0                 |
| 2006                | 536              | 24                | 14                | 505              | 33                | 15                |
| 2005                | 383              | 11                | 12                | 523              | 64                | 29                |
| <b>10-Year Avg.</b> | <b>469</b>       | <b>23</b>         | <b>10</b>         | <b>554</b>       | <b>34</b>         | <b>16</b>         |

Table 1  
Ontario AAQC &  
Canada-Wide  
Standard Exceedances

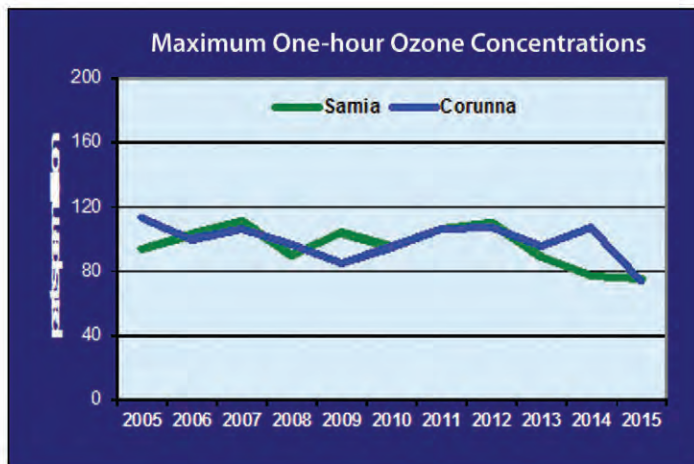


Figure 5

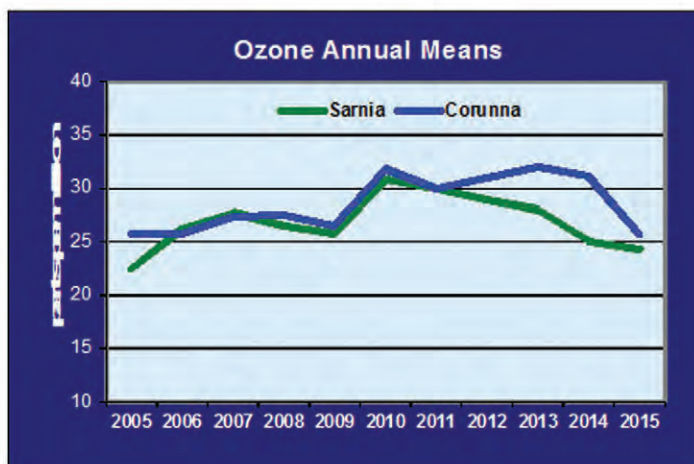


Figure 6



# Monitoring Our Air Quality

## Particulate Matter

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<sub>2.5</sub>) refer to particles 2.5 microns or less in diameter that may penetrate deep into the respiratory system.

Particulates originate from many different industrial and transportation sources as well as natural sources. Similar to O<sub>3</sub>, long-range transport of fine particulates has a major effect on Sarnia-Lambton's particulate levels as these particles can be carried over great distances by prevailing winds.

The SLEA has measured PM<sub>2.5</sub> since 2000 at Moore Line to complement the MOECC monitoring activities in Sarnia. A second Sarnia monitor was commissioned by the SLEA at its Front Street site, beginning in 2005.

## 2015 Results

Annual respirable particulate levels are shown in Figure 7. Sarnia is north and Mooretown is south of the industrial complex. Levels over the past 10 years in Sarnia have generally been higher than those of Moore Line due to local industrial activities. In 2015 levels were higher at Moore Line than Sarnia and this may be due to some nearby construction activities which were occurring to the south of the monitoring site.

The Canada Wide Daily Standard for PM<sub>2.5</sub> is 30 micrograms per cubic meter (µg/m<sup>3</sup>). This standard was exceeded once during 2015 at Moore Line. The maximum daily average of 34 µg/m<sup>3</sup> was measured on March 10 under southerly winds at 7 kph.

Figure 8 (on page13) illustrates, as a wind directional plot, the annual average concentrations from each of the 16 points of the compass. The highest concentrations are from southerly directions supporting the probability of long-range transport of PM<sub>2.5</sub> from the US.

Figure 7





# Monitoring Our Air Quality

2015 PM<sub>2.5</sub> - Directional Distributions



Figure 8

## Nitrogen Oxides

Nitric oxide (NO) and nitrogen dioxide (NO<sub>2</sub>) – together known as nitrogen oxides (NO<sub>x</sub>) – are gases with a pungent and irritating odour that are colourless to reddish-brown and are released into the atmosphere during combustion processes. NO<sub>2</sub> transforms in air to form gaseous nitric acid and nitrates which contribute to the formation of fine particulate matter. NO<sub>x</sub> plays a major role in atmospheric reactions that produce ground-level ozone. The largest sources of NO<sub>x</sub> are motor vehicles, fossil fuel power generation and industrial processes. The monitoring method is chemiluminescence.

## 2015 Results

The SLEA has monitored NO<sub>x</sub> in Sarnia and Corunna for over 30 years. Figure 9 illustrates the annual levels at monitoring sites. Over the past 10 years local NO<sub>x</sub> levels have shown some decline with an approximate decrease of 25 per cent at Sarnia. Reductions from local industry as well as vehicles, due to more stringent emission standards, have contributed to the lower levels. The Ontario nitrogen dioxide hourly and daily criteria were not exceeded during 2015.

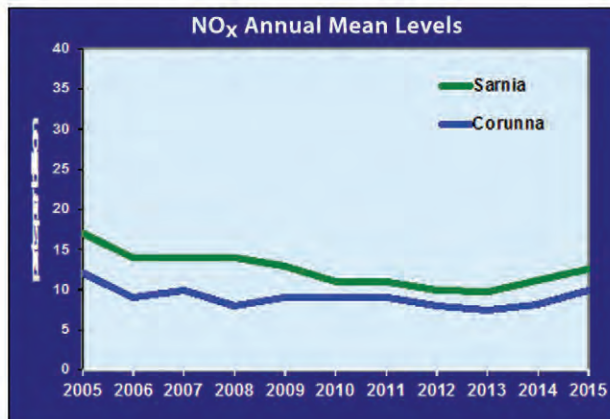


Figure 9



# Monitoring Our Air Quality

## Volatile Organic Compounds

Volatile Organic Compounds (VOCs) are compounds containing carbon that are easily absorbed into the atmosphere at normal temperatures. VOCs have a property of conversion into vapour or gas without any chemical change. They are highly reactive and participate in several atmospheric reactions, including the formation of ground level ozone as well as particulate matter. VOCs are of natural origin, however many owe their existence to human activities such as vehicular emissions, petroleum products, chemicals, manufacturing industries, paint/varnishes and coating operations. Many VOCs are toxic air pollutants that can cause adverse health effects in humans and the environment.

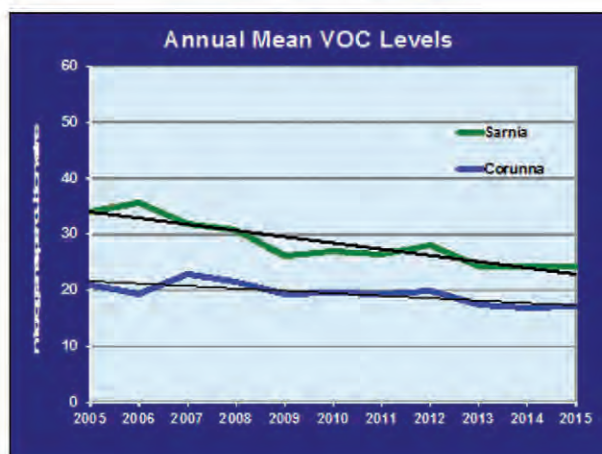
The SLEA's monitoring program has been implemented in three phases, using monitoring sites that align with major industry under the prevailing northerly and southerly winds. Ethylene, a VOC, has been monitored on a continuous hourly basis at five sites since 1976. This compound is of particular interest as it is a major commodity produced, used and stored locally. A group of 50 VOCs are collected over a 24-hour period once every 12 days from the Sarnia and Corunna monitoring sites and then sent to the laboratory for analysis. This program was established in 1986. A sub-group of 11 of the 50 VOCs are measured via hourly automated sampling at the Sarnia site. This unique program has been ongoing since 1994.

## 2015 Results

The annual sum averages of the group of 50 VOCs (excluding ethylene) shows a downward trend over the past 10 years (see Figure 10). Total levels have dropped by approximately 30 per cent at Sarnia and 20 per cent at Corunna over the past 10 years. However, annual levels have not changed much over the last five years.

In 2015 all concentrations (except for ethylene and benzene) were below any associated Ontario ambient air quality criteria (AAQC). In 2011 the Ontario Ministry of the Environment and Climate Change (MOECC) promulgated a daily and annual AAQC for benzene – 2.3 and 0.45  $\mu\text{g}/\text{m}^3$  respectively – which are among the most stringent in the world. The daily criterion was exceeded on a total of 110 days during the year and the annual criterion was exceeded at both the Sarnia and Corunna monitoring sites. The benzene levels in Sarnia and Corunna are in the range of many other Canadian cities.

Figure 10





## Monitoring Our Air Quality

The Ontario daily ambient air quality criterion for ethylene was exceeded for a total of 23 days during 2015 at the various monitoring locations which is within the range of the last five years (see Figure 11).

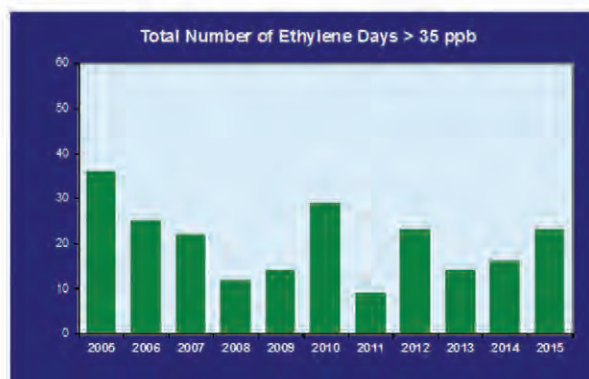


Figure 11

## Monitoring Our Water Quality

### 2015 at a Glance

8,685 samples from the St. Clair River were collected and analysed which resulted in 173,820 analyses under the SLEA's continuous water quality monitoring program.

- 12 of the 20 VOCs were detected
- 99.25 per cent of analyses were below detection limits
- 100 per cent on-line time reliability

The primary activity of the SLEA's annual water quality program is the continued operation of a St. Clair River monitoring station. The SLEA and its predecessor organizations have been actively monitoring water quality since the 1950s.

Since 1987 the SLEA has operated a continuous volatile organic compounds monitor which collects hourly samples, 24 hours a day. The monitor is capable of detecting extremely low levels of any targeted chemicals present. The success of the SLEA's water quality program is a result of the deliberate location and continuous operation of the monitoring station. Strategically located south of Courtright, just downstream of Sarnia-Lambton's main industrial complex the station gathers the main flows of the river. The analyzer is highly accurate and reliable, lending substantial credibility to the SLEA's immediate and long-term water quality database.

In addition to an automated stream sample, the monitoring system (see Figure 12 on page 16) has a purge and trap sample concentrator that purges organic volatiles from the sample. The main component within the system is a gas chromatograph which identifies the chemical composition of the sample and targets any compounds detected with the corresponding local industrial process. A telemetry system is also used to generate and transmit data to a network server where a third-party technical specialist can analyze results. The results reported are archived for reference purposes. Should the targeted chemicals be detected at any time during the routine sampling process, a tiered system of alarms is triggered and automatic warnings of potential water quality concerns are relayed to the SLEA, as well as to the Ontario Ministry of the Environment and Climate Change.

# Monitoring Our Water Quality

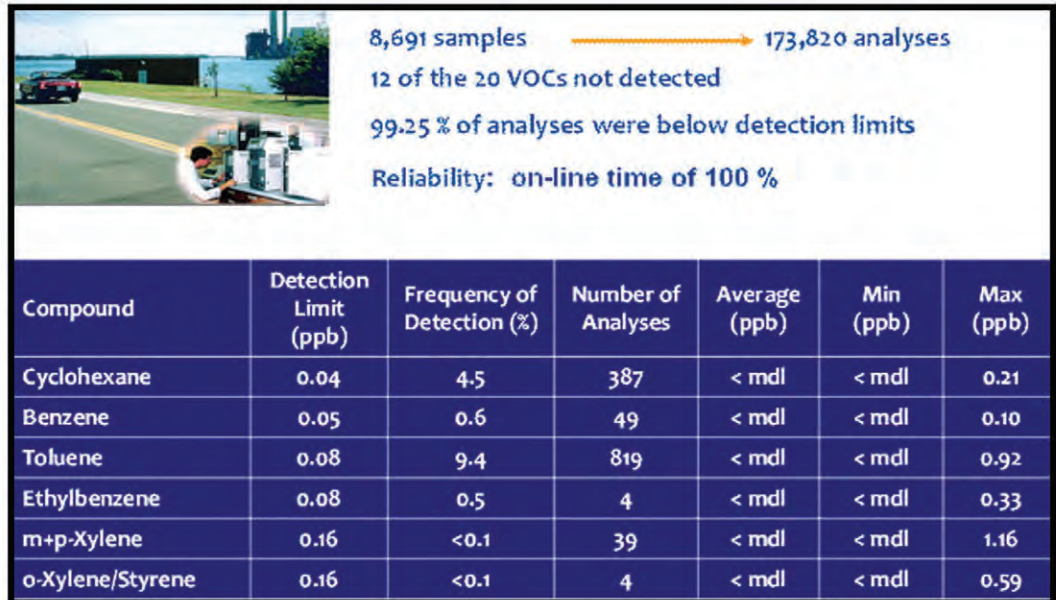
The SLEA's water monitoring program assists the Ontario Ministry of the Environment and Climate Change to assess the type and severity of any spills to the river. While the primary role of the analyzer is to monitor long-term trends concerning the water quality of the St. Clair River, the data also serves to challenge SLEA members to meet their ultimate objective of no spills to the river.

**Important note:** The SLEA does not oversee other non-industry discharge sources which have been identified by its water quality monitoring system. One example is the presence of toluene and benzene which have been determined to be the result of increased pleasure craft and recreational boat traffic during the summer.

## Continuous Water Monitor

Figure 12 illustrates monitoring hourly samples which can detect the presence of even minute levels, concentrations of less than one part per billion.

Figure 12

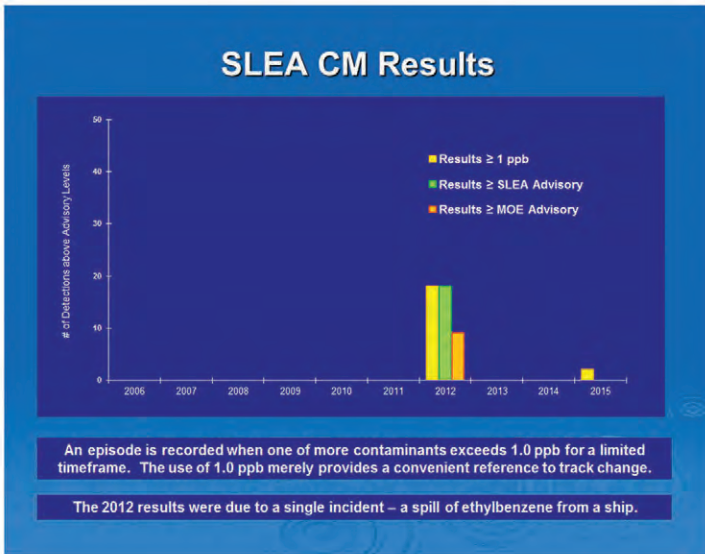


Water Station Calibration





# Monitoring Our Water Quality



**Figure 13**

Under the SLEA’s 2015 continuous water quality monitoring program, 8,691 samples from the St. Clair River were collected and analyzed for compounds commonly associated with local industrial activities. During the year, eight of the SLEA’s 20 targeted compounds were detected. From a total of 173,820 separate findings, only 1,302 results (0.75 per cent) were greater than or equal to the minimum detection limit established for precise instruments performing the laboratory tests. There were only two results greater than 1 ppb measured during 2015. (See Figure 13)

**ORTECH team at Front Street monitoring site (left to right) Devin Golub; Nathan VanBelois; Neil Dalton; Ed Kuley; Rod Brooks**



**Front Street Sulphur Dioxide Calibration**



**Rain Gauge Service**





## Community Outreach and Involvement

### Real Time Air Quality Data Project Underway

The Clean Air Sarnia and Area Community Advisory (CASA) is providing advice and suggestions to the Ministry of the Environment and Climate Change (MOECC) and the Sarnia-Lambton Environmental Association (SLEA) on ways to improve the air monitoring network, and a process to access timely, relevant, and accurate information on air quality. These insights will help to inform the public about decisions related to air quality in the Sarnia area.

The MOECC and SLEA will consider proposals and recommendations from this advisory panel for the development and implementation of an air quality and data-sharing website that provides access to timely, accurate and relevant information about local air quality. The website is expected to be available in 2016.

### St. Clair River: An Update on Area of Concern Delisting

A critical shipping artery within the Great Lakes system, the St. Clair River (which flows from Lake Huron to Lake St. Clair) remains an *Area of Concern* under the Canada-U.S. Great Lakes Water Quality Agreement. Local Sarnia-Lambton industry, environmental groups, regulatory agencies, First Nations and concerned community members continue to work with their equivalents in the United States to complete significant remediation work to improve the quality of the river water, riverbed and adjacent lands. These efforts are a critical step in the delisting process.

Contaminated sediments at three priority areas in the St. Clair River contain elevated levels of mercury and methyl mercury resulting from historical industrial processes. A draft study presenting options to clean up the remaining contaminated sediments on the Canadian side of the St. Clair River was completed in 2012. The options reviewed for managing remaining contaminated sediments within the St. Clair River were:

- Monitored Natural Recovery
- Thin Area Capping
- Isolation Capping
- Sediment Removal (Dredging)

In late 2013, a consultation process concluded in a recommendation to pursue hydraulic dredging with a thin-layer backfill for the three priority areas. Discussions are currently being held with key stakeholders to determine the best path forward. The detailed engineering phase could possibly begin in 2017.

### 2015 Update Community Health Study

Initiated in 2006, the Lambton Community Health Study (LCHS) was a multi-phase, multi-stakeholder process intended to address concerns expressed by residents of Lambton County, particularly those living in close proximity to its network of petrochemical and refining complexes.

According to Dean Edwardson, General Manager of the Sarnia-Lambton Environmental Association and LCHS board member, "The Lambton Community Health Study was a very worthwhile endeavour as it brought a broad cross-section of the community together in an attempt to address health issues which may be related to environmental impacts. Working with individuals invested in the community, the study was able to make connections with researchers who will help advance our understanding of cancer outcomes, respiratory health and birth sex ratios. We look forward to learning more about this research in the future."

*Note, a draft report on the Health Study including learnings and future recommendations is currently underway. When completed, it will be submitted to Lambton County Council for review and recommendation about how its research and learnings can be leveraged.*



## Community Outreach and Involvement

### Protecting Water: Our Most Vital Resource

The Town of Walkerton, Ontario experienced an E. coli water poisoning tragedy in May 2000 that spurred a grassroots effort in the province to vigorously protect all sources of drinking water. A science-based plan developed by private- and public-sector groups in Ontario to protect *all* sources of local drinking water led to a more formal water protection initiative from the Ontario Ministry of the Environment. A local plan has been guided in large part by the Thames-Sydenham and Region Source Protection Committee, appointed in 2007. The broad spectrum of knowledge and experience among its 25 members – including SLEA General Manager, Dean Edwardson, and representatives from local governments, major economic sectors of the region, environmental nongovernment organizations, recreationalists, academics, First Nations, and farmers – shape the water protection plan process.

After almost a decade of research and public consultation, the Thames-Sydenham and Region Source Protection Plan has been approved by the province and is now law.

The Source Protection Plan contains local policies that address a range of drinking water threats. The Source Protection Committee worked hard to create a balance between the important goal of protecting our municipal supplies of drinking water and the burden this would create on municipalities and other implementers. In general, for existing activities that are a significant risk, the approach was to manage the risk through the use of Risk Management Plans and Prescribed Instruments. This allows the activities to continue while managing the risk such that the activity is no longer a significant threat to the drinking water source.

For future activities that would create a new significant risk, generally the approach was to prohibit this activity in those vulnerable areas where it would be a significant threat. The Committee also felt it was important to address moderate and low risks. This was done primarily through education and outreach.

Information about the Thames-Sydenham and Region Source Protection Committee and its progress is available on its website at [www.sourcewaterprotection.on.ca](http://www.sourcewaterprotection.on.ca)

### 20 Years Later SCRCA Programs Remain Top Tier and Top Choice

For 20 years the Sarnia-Lambton Environmental Association (SLEA) and St. Clair Region Conservation Authority (SCRCA) have partnered to provide curriculum-based programs to tens of thousands of students within the Lambton-Kent and St. Clair Catholic District School Boards. And, thanks to the on-going support of the SLEA, the well-received *St. Clair River Bottom Critters* and *Go With The Flow* programs for elementary and secondary students have ensured these students enjoy truly hands-on experiences that illustrate the wonders of the environment.

According to Sharon Nethercott, Conservation Education Coordinator, the popular programs fill up quickly because they are key to developing environmental literacy. “Each year we offer the programs during November, January and February. However, in 2015 a work-to-rule campaign for the Lambton Kent District School Board prevented teachers from booking outside field trips during September and October. They were still allowed to invite ‘free education’ programs into their schools and, as a result, the number of students participating in the SLEA-sponsored programs rose by 914 students over 2014.” As Sharon notes, this increase in numbers speaks to the popularity of the SCRCA modules.



## Community Outreach and Involvement

**Go With The Flow:**  
1769 students  
participated from 19  
schools

Using an interactive groundwater model, *Go With The Flow* introduces students to local watershed and water supply issues. The program encourages students in grades four through eight to think like geologists, engineers and hydrologists for the day as they participate in locally-relevant experiments that, depending on the grade level, explore earth materials, energy production, conservation, the role of water in ecosystems and water consumption.

A primary version of the groundwater program was first introduced in the fall of 2014. Students learn about the many reasons humans need and depend upon water in everyday life. Participants are led through an interactive story about a fish named Freddy, exploring the ways humans could negatively impact the quality of Freddy's water, and what can be done to minimize these effects. In addition, students learn about erosion through experiments using soil and water to observe the effects of rainfall on local waterways. During the experiment the students compare erosion rates of a bare riverbank and a riverbank with vegetation. "The expansion of our *Go With The Flow* program has allowed more students to benefit from an increased understanding of water and see their own connection to it. Fostering this education at a young age typically translates into a strong personal connection to water in their environment," says Melissa.

*River Bottom Critters*, the other cornerstone of the SCRCA programming, allows students in kindergarten through grade 10 to embark on a variety of investigations of live benthic creatures. They are introduced to the program with the aid of a slide presentation, followed by an examination of Petri dishes swimming with life.

**St. Clair River Bottom  
Critters:**  
2718 students  
participated from 24  
schools

Sharon is proud of the work that she and Melissa have done to bring environmental learning to life, "The SCRCA programs provide a valuable link between theoretical learning and real world experiences. Even though these programs have been offered for many years, teachers continue to invite us into their schools because they recognize the importance of these locally-based lessons. They are excited to see the enthusiasm for learning in their students and many of the students themselves thank us for visiting their school. Some have even said that they hope to be biologists when they grow up."

Teachers appreciate the responsiveness of Sharon and Melissa who update the program to align with curriculum changes. "We appreciate all feedback and listen to suggestions about how we can grow aspects of our modules. When we get positive feedback it reinforces the value these programs are bringing to the local education system," says Sharon.





## Community Outreach and Involvement



### Comments from participating classes:

"My son participated in this program last year when he was in JK. Seeing the program for myself today, I now understand why he was so excited. He talked about the critters for days. Thank you for bringing this local program into our schools!"

"An amazing interactive program that demonstrates the harsh realities of environmental issues and is an invaluable resource for this Grade 4/5 teacher!"

"Where else can you get highly interactive centres regarding energy in one educational program?"

"The *Go With The Flow* program presented to my Grade 3/4 class was highly engaging for the students. It was informative and thought-provoking, getting students more awareness of the importance of water."

"My class said they learned that it is important to keep our water clean for all water creatures and humans."

"I love to see that expression on the faces of students as they learn more about the environment. There are so many 'aha' moments. The swimming critters really excite the students, even the intermediate/senior kids!"  
~ Sharon Nethercott

### The SLEA Co-Sponsors Health, Safety and Environmental Award

In 2015, the SLEA and the Industrial Education Cooperative (IEC) co-sponsored the Sarnia-Lambton Chamber of Commerce Health, Safety and Environmental Award. This is the fourth year that the SLEA has provided sponsorship and the first year for the IEC.

The award, formerly called the Environmental Award, recognizes an organization or business that demonstrates leading environmental, social, and health and safety performance.

This year's recipient, Anderson Webb, was presented with its award during the annual Chamber of Commerce Outstanding Business Awards Ceremony which was held on March 27.



Charlie and Cindy Webb (centre) with award sponsors Rob Taylor (IEC General Manager on left) and Dean Edwardson (General Manager of the SLEA on right).

\*Photo courtesy of Sarnia-Lambton Chamber of Commerce



## Community Outreach and Involvement

The Chemical Valley Emergency Coordinating Organization (CVECO) and its education and outreach arm, Community Awareness and Emergency Response (CAER), work to ensure local community residents are protected, prepared and know what to do in the event of an emergency event or unforeseen incident. Emergency responders from local industry and municipal governments participate to maintain and ensure public safety, given the Sarnia community's proximity to large chemical manufacturing, industrial and oil refining industries.

The organization deals with two primary aspects of emergency preparedness denoted by the acronym CAER:

**Community Awareness** – Through communication and outreach activities, the organization keeps the community aware and informed about actions to take in the event of a natural or industrial emergency. In particular, CAER prepares and distributes *"Your Home Emergency Preparedness Guide,"* in conjunction with The County of Lambton. This handy web-based tool is available on the CAER website and includes a checklist of activities and home preparation tasks. To download the Guide please visit [www.caer.ca](http://www.caer.ca)

CAER uses a number of tools to inform the community of non-routine activities. Sirens are located strategically to warn residents of unusual events such as severe weather or industrial activity. CAER supported this endeavour by funding 50 per cent of the cost.

CAER continues to investigate additional resources to ensure the most robust notification system for our community. This includes providing timely, accurate information.

### Update Line Informs Community

The Update Line is a 24-hour pre-recorded "call-in" telephone message line available to Sarnia-Lambton and St. Clair County Michigan residents. By calling 1-855-4SARNIA or 1-855-472-7642, residents can access information on non-routine industry activity. The line is available to callers in the 519, 226, and 810 area codes.

### Local industry members participating in the Update Line are:

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

The concept has been successfully used in cities with an industrial presence similar to Sarnia's. The Update Line complements other tools already in place such as the sirens.



# Community Outreach and Involvement



## My CNN Subscriptions Growing

My Community Notification Network (My CNN) is a notification system that contacts subscribers through a method of their choice, such as telephone, cell phone, email, and text messages.

Initially, subscribers in the City of Sarnia, Point Edward and St. Clair Twp. will receive messages about road closures and boil water advisories, tornados and events that require the public to shelter in place or evacuate. As the system is developed, subscribers will also be able to receive other messages, such as bus cancellations.

It is free to register for the service, which is available through the co-operation of participating municipalities, first responders and area industries. My CNN is provided by a company called Everbridge and has been used successfully in a variety of communities across North America, including notification during the Boston Marathon bombings.

To learn more about My CNN Community Notification Network or to subscribe to the service, please go to [www.caer.ca](http://www.caer.ca).

**Emergency Response** – Local municipal and industrial emergency responders use their skills and expertise to identify potential risks associated with local industrial operations, and develop emergency plans to address them. Regular training activities ensure they are ready to respond in case of an unplanned natural or industrial event.

CVECO is a mutual aid emergency response system maintained with representatives from private and public sectors. CVECO activities cover a variety of areas including public notification, traffic control and the activation of a highly trained and fully equipped team of first responders ready to react to any emergency situation.

The Sarnia Area Disaster Simulation (SADS) exercise has been held annually for well over 20 years for municipal and local industrial emergency responders. The exercise simulates real-life incidents such as plant site emergencies, tanker truck/car accidents, and highway incidents, and provides responders with hands-on experience in order to be prepared in the event of an actual disaster. Planning for the annual SADS exercise is done months in advance, and the community is notified about when the simulation will occur. From planning to implementation, a broad group of community representatives including fire, ambulance, police responders, industrial responders and others are called in to participate, just as they would in a real emergency.

## 2015 SADS Exercise Simulates Emergency Scenario

On August 25, 2015 NOVA Chemicals' Corunna Site helped local emergency responders practice their skills by hosting a simulated industrial disaster. Public advertisements prior to the exercise ensured the community was aware that it was only a simulated event, and that no one was in real danger. Following the incident, participants gathered to analyze the response and discuss recommendations for improvement.

## Celebrating 20 Years of Emergency Preparedness Week in Canada

More than 1,000 students and families attended the Community Awareness Emergency Response's (CAER) annual Emergency Preparedness Day at the Clearwater Arena in Sarnia on May 8, 2015. The free event featured close to 100 displays from fire and police services as well as industrial and manufacturing companies, and included several live demonstrations.





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