

**Clean Harbors (Sarnia)**  
**Air Monitoring Plan and Sampling Results**

Southwestern Region - Technical Support Section  
Updated October 21, 2011

**Executive Summary**

The ministry is conducting air sampling in the vicinity of Clean Harbors with the mobile air monitoring van, in response to recent odour complaints at the facility. The first monitoring event occurred in the evening of August 11, 2011 and weekly sampling has continued from September 13 until October 7, when Clean Harbors implemented their enhanced air monitoring plan. The Ministry monitored for: Ammonia, Total Reduced Sulphur (TRS) which may include methyl mercaptan, hydrogen sulphide, and Volatile Organic Compounds (VOC) which includes benzene, toluene and xylenes.

In addition, the ministry conducted co-located air sampling at the same time as Clean Harbors, using Summa canisters provided by Environment Canada and which will allow the ministry to look for 160 compounds. The ministry has participated in two sampling sessions with Clean Harbors – each time using two canisters, upwind and downwind of the property to ensure we can separate their emissions from the background, if any. These samples were conducted for audit purposes, and we expect to have sampling results back from Environment Canada in the next couple of weeks.

Based on all the air sampling and monitoring to date, the equipment was capable of detecting the presence of small amounts of substances, but the amounts were so low that concentrations could not be calculated. All the VOC, the ministry detected were below the 30 minute standards. The ministry compares all sampling results to standards, guidelines or Ambient Air Quality Criteria (AAQC) for a variety of compounds. TRS was detected at levels that were odourous and Naphthalene was occasionally detected in levels that were above the 30 minute (odour based) guideline. Small amounts of ammonia and some other VOC were detected but at levels below their respective odour thresholds. The air monitoring sampling and results conducted by the ministry have not identified any compounds that exceed health-based standards in the vicinity of Clean Harbors.

**Background**

On the evening of August 11, at the request of the Sarnia District Office, the Ministry's mobile air monitoring van and technical staff were called to sample air quality, due to odour complaints at the Thermal Desorber Unit upset on August 10. Further, regional air monitoring began on September 13 and continued on the 14, 22, 27, 29 and October 7. We will continue with periodic sampling following the company's implementation of their enhanced air-monitoring plan, which was in place on October 7. The attached map identifies the sampling locations.

The company completed a comprehensive odour assessment of all potential on-site odour sources and submitted a preliminary report on September 30, 2011. The Ministry's Regional Air Quality Analyst reviewed the samples submitted by Clean Harbors, compared it to odour thresholds and found that these thresholds were not exceeded. Odour thresholds for each person are highly variable and as such, the results should be regarded as typical. For example, a person does not need 30 minutes to identify an odour, and an instant detection of an odour can be more intense than a 30 minute instrument reading - especially under windy conditions.

A final report must be submitted by Clean Harbors by November 15, 2011 and will be reviewed by Ministry staff.

### Ministry's Air Sampling Plan

In developing the sampling program, the ministry first established the appropriate compounds for the monitoring by reviewing the leachate pond analysis and air monitoring results from Clean Harbors' air sampling program. Monitoring with the regional air monitoring van was conducted on days with appropriate weather conditions. The first step in the monitoring was to complete a initial scan for the presence of a broad range of compounds using the GC/MS (Gas Chromatograph/Mass Spectrometer) to confirm that the compounds selected based on the reviews were appropriate. These are called qualifying samples. The second step was to determine the concentration of those compounds identified in the qualifying samples (called quantifying samples). Using this process monitoring was conducted for ammonia, TRS which includes methyl mercaptan and hydrogen sulphide, and VOC which includes benzene, toluene and xylenes simultaneously.

### Ministry's Audit Sampling

The Ministry has conducted co-located air sampling with Clean Harbors using Summa canisters provided by Environment Canada. Between 4 -6 canisters will be used for upwind and downwind sampling. On September 27 and October 6, a set of two canisters (one upwind, one downwind) were placed outside the fence line where the odours were detected at Clean Harbors. These samples were co-located for audit purposes, and we expect to have sampling results back in the next couple of weeks from Environment Canada.

### Air Sampling Results and Analysis – Considerations and Context

In some cases the instruments detected the presence of small amounts of substances that were too low to determine their actual concentration. These are listed as "trace" in the tables. This means that they are present in the sample but at very low levels.

The samples are compared to half hour point of impingement (POI) standards (Schedule 2 in Ontario Regulation 419) where such exist. These were chosen as they correspond to the thirty minute sampling time that was used while monitoring. It should be noted that not all standards are based on health effects, some such standards, as that for naphthalene, are based on odour.

Where no standard exists, guidelines from ministry publication *Summary of Standards and Guidelines to support Ontario Regulation 419: Air pollution – Local Air Quality* (6569e) have been used if they exist to provide reference levels.

As well, a limited number of Ambient Air Quality Criteria (AAQC) has been included, where appropriate. Not all AAQC are appropriate for comparison for 30 minute samples because they have longer averaging times.

The ministry has recently implemented standards for benzene and 1, 3 butadiene, neither of which have previously had standards. The standards are for 24 hour averaging periods and will be phased in over the next 5 years. There are AAQC for both but again only for a 24 hour averaging period. For these reasons, these standards are not included in the tables.

All values are quoted in parts per billion. To convert the values, from  $\mu\text{g}/\text{m}^3$  to ppb, it was assumed the ambient temperature was 20 °C and the atmospheric pressure was 1013 hPa.

### Air Sampling Results

On the evening of August 11<sup>th</sup>, four samples were taken. The winds were light and the ground cool, so mixing should not be strong and thus conditions favoured finding compounds if they were present. Air data from the nearby ministry monitoring station at Aamjiwnaang First Nation showed that earlier winds were from the East to North East. The wind speed was very low and

below detectable limits and therefore, the movement of any gases would be minimal. None of the compounds detected on this day exceeded any ministry standard. In addition, all of them were well below values of the odour threshold.

On September 13<sup>th</sup>, six samples were taken, of which the first two were qualifying samples and the other four were thirty minute quantifying samples. Wind was light from the south and southwest, but variable. Weather was sunny and about 20 degrees C. Odours were moderate for samples 1 to 4, but became inconsistent and hard to find for samples 5 and 6, as the wind became gusty from the southwest to west. TRS was detected when the odour was present. The TRS odours were detected while the winds were from the west. No VOC (benzene, toluene and xylene) was detected at significant levels. The presence of Ammonia could not be confirmed. Neither instrument suggested exceedences.

On September 14<sup>th</sup>, five samples were taken, of which one was a qualifying sample and the other four were thirty minute quantifying samples. Wind was light from the west to slightly southwest. Weather was partly sunny and about 16 degrees C. Odours were moderate and consistent for samples 1 to 3, but became hard to find as the wind became gusty and variable for samples 4 and 5. Much less TRS detected. 155 TRS samples were taken. 18 would have been above the H<sub>2</sub>S odour threshold while 35 were above the methyl mercaptan odour threshold. Small amounts of naphthalene were seen on the first two. The first sample also showed benzene though it was not seen again on the rest of the day's results. The presence of Ammonia could not be confirmed. Neither instrument suggested exceedences.

On September 22<sup>nd</sup>, five samples were taken, all of which were thirty minute quantifying samples. There were fewer odours detected and results of samples were lower compared to the 14<sup>th</sup>. TRS was detected at levels that were odourous, and small amounts of ammonia and VOC found at levels below the odour threshold. Naphthalene was detected in levels that were above the thirty minute guideline. Levels of naphthalene above the 10 minute AAQC and the guideline were seen on two of these. Toluene, tetrachloroethylene, m & p xylene, and ethyl benzene were seen on all five samples, though in relatively small amounts. Other related compounds were seen in one or more samples at similar levels. Benzene was again seen at low levels in two of the samples. There were six one minute detections of ammonia but the average was always well below the standard. The half hour average of TRS peaked at about 12 ppb which is well below the estimated standard.

On September 27<sup>th</sup>, two samples were taken, which were thirty minute quantifying samples. Toluene and tetrachloroethylene were the only species that could be quantified in these samples. They appeared in both of the samples though at lower concentrations than on the previous sampling day.

On September 29<sup>th</sup>, two samples were taken, which were thirty minute quantifying samples. Low levels of five different species were seen on both samples. Naphthalene was not present in quantifiable amounts, and benzene was not detected.

On October 7<sup>th</sup>, three samples were taken, which were thirty minute quantifying samples. The TRS half hour average reached a max of 6.14 ppb. The ammonia instrument was not run. Naphthalene again exceeded the AAQC and the guideline. Many more substances were seen, especially in the first sample where 16 were quantifiable. Tetrachloroethylene reached nearly half its standard on two of the samples.

As part of the monitoring around Clean Harbors, the ministry ran instruments which measured ammonia and total reduced sulphur in near-real time, resulting in one minute average concentrations.

One minute average sampling was conducted for TRS (174 samples), whereby:

- 46 samples were above the odour threshold of 7 ppb and

- 66 samples were above the odour threshold of 3 ppb for methyl mercaptan.
- 7 samples exceeded the 30 minute standard for hydrogen sulfide (H<sub>2</sub>S).

One minute average sampling was conducted for ammonia (168 samples), whereby:

- 86 samples were above the odour threshold of 5 ppb and
- 9 samples were flagged as "valid" determinations by the instrument software, however of these, 7 were above the odour threshold.

TRS is a mixture of reduced sulphur compounds, primarily composed of hydrogen sulphide (H<sub>2</sub>S), mercaptans (typically represented by methyl mercaptan), dimethyl sulphide (DMS), and dimethyl disulphide (DMDS). Hydrogen sulphide and methyl mercaptan are both colourless gases, with strong and unpleasant odour. (Ontario Air Standard For Total Reduced Sulphur, June 2007). As the instrument in place does not speciate, all values are approximate.

The half hour standard for ammonia (NH<sub>3</sub>) is 300 µg/m<sup>3</sup>. This is about 423 ppb with the same conversion conditions. In addition, because the instrument is subject to local interference, there were very few valid readings.

#### Air Monitoring Results – Raw Data

The tables on the following pages contain a summary of quantitative half-hour monitoring for VOC in the neighbourhood of Clean Harbors.

Aug-11							
	1/2 hr POI	1/2 hr Guideline	AAQC	Location 3	Location 4	Location 5	Location 6
1,3-Butadiene	---	---	---				
Bromomethane	---	1014	---				
Ethyl Chloride	6266	---	---	trace	trace	trace	trace
Vinyl Bromide	---	---	---	trace			
Acetone	14765	---	---	trace		trace	trace
Isopropyl Alcohol	8808	---	---	trace	trace		trace
Acrylonitrile	0.8	---	---		trace		
1,2-Dichloroethylene	---	78	---				
Methylene Chloride	187	---	---			trace	
Carbon Disulfide	104	---	---				
cis 1,2-Dichloroethene	---	78	---				
1,1-Dichloroethane	120	---	---				
Methyl Tert Butyl Ether	---	600	---	trace			trace
Methyl Ethyl Ketone	1001	---	---	trace	trace		trace
cis 1,2-Dichloropropene	---	---	---				
Hexane	6282	---	---		trace	trace	
Trichloromethane	0.6	---	---				
Tetrahydrofuran	31031	---	---				
1,2-Dichloroethane	1.5	---	---				
1,1,1-Trichloroethane	63128	---	---				
Benzene	?	---	---				
Carbon Tetrachloride	1.1	---	---				
Cyclohexane	5232	---	---	trace			trace
1,2-dichloropropane	511	---	---	trace			
Bromodichloromethane	---	---	---				
Trichloroethylene	6.6	---	---				
Heptane	7923	---	---	trace		trace	trace
cis 1,3-Dichloropropene	---	---	---				
Methyl Isobutyl Ketone	288	---	---				trace
trans 1,3-Dichloropropene	---	---	---				
1,1,2-Trichloroethane	---	---	---				trace
Toluene	522	---	---	trace	trace	1.51	
Methyl Butyl Ketone	---	---	---			trace	
Dibromochloromethane	---	---	---			trace	trace
1,2-Dibromoethane	---	1.2	---				
Tetrachloroethylene	157	---	---			8.208	trace
Chlorobenzene	---	898	962. (10 min)				
Ethylbenzene	317	---	431. (10 min)	trace		1.114	trace
m & p-Xylene	499	---	680. (10 min)	trace		0.561	trace
Tribromomethane	---	15.7	---				
Styrene	92	---	---				
o-Xylene	499	---	680. (10 min)			trace	trace
1,3,5-Trimethylbenzene	132	---	---	trace	trace	trace	trace
1,2,4-Trimethylbenzene	132	---	---	trace	trace	trace	trace
1,3-Dichlorobenzene	---	---	---				
1,4-Dichlorobenzene	47	---	---				
1,2-Dichlorobenzene	---	6056	4992. (1 hr)				
1,2,4-Trichlorobenzene	---	13.3	---				
Naphthalene	---	6.8	9.4 (10 min)	1.877	1.39	trace	trace
Hexachloro-1,3-Butadiene	---	---	---			trace	

Sep-13							
	1/2 hr POI	1/2 hr Guideline	AAQC	Location 3	Location 4	Location 5	Location 6
1,3-Butadiene	?	---	---				
Bromomethane	---	1014	---	trace		trace	trace
Ethyl Chloride	6266	---	---				
Vinyl Bromide	---	---	---				
Acetone	14765	---	---	3.184	3.484	trace	
Isopropyl Alcohol	8808	---	---	trace			
Acrylonitrile	0.8	---	---				
1,2-Dichloroethylene	---	78	---				
Methylene Chloride	187	---	---				
Carbon Disulfide	104	---	---				
cis 1,2-Dichloroethene	---	78	---				
1,1-Dichloroethane	120	---	---				
Methyl Tert Butyl Ether	---	600	---		trace		
Methyl Ethyl Ketone	1001	---	---		trace		trace
cis 1,2-Dichloropropene	---	---	---				
Hexane	6282	---	---				trace
Trichloromethane	0.6	---	---				
Tetrahydrofuran	31031	---	---				
1,2-Dichloroethane	1.5	---	---				
1,1,1-Trichloroethane	63128	---	---				
Benzene	?	---	---				
Carbon Tetrachloride	1.1	---	---				
Cyclohexane	5232	---	---	trace	trace	trace	trace
1,2-dichloropropane	511	---	---	trace	trace	trace	trace
Bromodichloromethane	---	---	---				
Trichloroethylene	6.6	---	---				
Heptane	7923	---	---				trace
cis 1,3-Dichloropropene	---	---	---				
Methyl Isobutyl Ketone	288	---	---	trace	trace	1.032	
trans 1,3-Dichloropropene	---	---	---				
1,1,2-Trichloroethane	---	---	---				
Toluene	522	---	---	2.496	1.497	trace	
Methyl Butyl Ketone	---	---	---	trace	trace	trace	trace
Dibromochloromethane	---	---	---		trace	trace	
1,2-Dibromoethane	---	1.2	---				
Tetrachloroethylene	157	---	---	9.621	1.622	trace	
Chlorobenzene	---	898	962. (10 min)				
Ethylbenzene	317	---	431. (10 min)	1.557	0.58	trace	
m & p-Xylene	499	---	680. (10 min)	0.784	0.292	trace	
Tribromomethane	---	15.7	---				
Styrene	92	---	---				
o-Xylene	499	---	680. (10 min)	trace	trace	trace	
1,3,5-Trimethylbenzene	132	---	---	0.424		trace	trace
1,2,4-Trimethylbenzene	132	---	---	trace	trace	trace	trace
1,3-Dichlorobenzene	---	---	---				
1,4-Dichlorobenzene	47	---	---				
1,2-Dichlorobenzene	---	6056	4992. (1 hr)				
1,2,4-Trichlorobenzene	---	13.3	---				
Naphthalene	---	6.8	9.4 (10 min)	5.233	4.292	3.249	trace
Hexachloro-1,3-Butadiene	---	---	---				

**Sept 14**

	1/2 hr POI	1/2 hr Guideline	AAQC	Location 2	Location 3	Location 4	Location 5
1,3-Butadiene	?	---	---				
Bromomethane	---	1014	---			trace	
Ethyl Chloride	6266	---	---	trace	trace	trace	
Vinyl Bromide	---	---	---				
Acetone	14765	---	---	trace	trace		
Isopropyl Alcohol	8808	---	---		trace		
Acrylonitrile	0.8	---	---				
1,2-Dichloroethylene	---	78	---				
Methylene Chloride	187	---	---				
Carbon Disulfide	104	---	---				
cis 1,2-Dichloroethene	---	78	---				
1,1-Dichloroethane	120	---	---				
Methyl Tert Butyl Ether	---	600	---	trace			
Methyl Ethyl Ketone	1001	---	---	trace			
cis 1,2-Dichloropropene	---	---	---				
Hexane	6282	---	---		trace		
Trichloromethane	0.6	---	---				
Tetrahydrofuran	31031	---	---		trace		
1,2-Dichloroethane	1.5	---	---				
1,1,1-Trichloroethane	63128	---	---				
Benzene	?	---	---	2.64	trace		
Carbon Tetrachloride	1.1	---	---				
Cyclohexane	5232	---	---	trace	trace		
1,2-dichloropropane	511	---	---	trace	trace		
Bromodichloromethane	---	---	---				
Trichloroethylene	6.6	---	---				
Heptane	7923	---	---				
cis 1,3-Dichloropropene	---	---	---				
Methyl Isobutyl Ketone	288	---	---	trace		trace	trace
trans 1,3-Dichloropropene	---	---	---				
1,1,2-Trichloroethane	---	---	---				
Toluene	522	---	---			trace	trace
Methyl Butyl Ketone	---	---	---				trace
Dibromochloromethane	---	---	---		trace		
1,2-Dibromoethane	---	1.2	---				
Tetrachloroethylene	157	---	---				
Chlorobenzene	---	898	962. (10 min)				
Ethylbenzene	317	---	431. (10 min)	trace	trace	trace	trace
m & p-Xylene	499	---	680. (10 min)	trace	trace	trace	trace
Tribromomethane	---	15.7	---				
Styrene	92	---	---				
o-Xylene	499	---	680. (10 min)				
1,3,5-Trimethylbenzene	132	---	---	trace		trace	trace
1,2,4-Trimethylbenzene	132	---	---			trace	trace
1,3-Dichlorobenzene	---	---	---				
1,4-Dichlorobenzene	47	---	---				
1,2-Dichlorobenzene	---	6056	4992. (1 hr)				
1,2,4-Trichlorobenzene	---	13.3	---				
Naphthalene	---	6.8	9.4 (10 min)	2.553	2.17	trace	trace
Hexachloro-1,3-Butadiene	---	---	---				

Sept 22

	1/2 hr POI	1/2 hr Guideline	AAQC	Location 1	Location 2	Location 3	Location 4	Location 5
1,3-Butadiene	?	---	---		trace			
Bromomethane	---	1014	---	trace	trace	trace	trace	trace
Ethyl Chloride	6266	---	---	trace	trace	trace	trace	trace
Vinyl Bromide	---	---	---	trace	trace	trace	trace	trace
Acetone	14765	---	---	trace	trace	trace	trace	trace
Isopropyl Alcohol	8808	---	---	trace	trace	trace	trace	trace
Acrylonitrile	0.8	---	---	trace		trace	trace	trace
1,2-Dichloroethylene	---	78	---	trace	trace	trace		trace
Methylene Chloride	187	---	---	trace		trace		trace
Carbon Disulfide	104	---	---	trace	trace	trace	trace	trace
cis 1,2-Dichloroethene	---	78	---		trace	trace	trace	
1,1-Dichloroethane	120	---	---	trace	trace	trace	trace	trace
Methyl Tert Butyl Ether	---	600	---	trace	trace	trace		
Methyl Ethyl Ketone	1001	---	---	trace	trace	1.361	trace	trace
cis 1,2-Dichloropropene	---	---	---	trace		trace	trace	trace
Hexane	6282	---	---	trace	trace	0.437	trace	trace
Trichloromethane	0.6	---	---	trace			trace	trace
Tetrahydrofuran	31031	---	---	trace	trace	trace	trace	trace
1,2-Dichloroethane	1.5	---	---	trace	trace	trace	trace	
1,1,1-Trichloroethane	63128	---	---	trace	trace	trace	trace	trace
Benzene	?	---	---	trace	1.068	1.742	trace	trace
Carbon Tetrachloride	1.1	---	---		trace	trace	trace	trace
Cyclohexane	5232	---	---				trace	trace
1,2-dichloropropane	511	---	---	trace	trace	trace	trace	trace
Bromodichloromethane	---	---	---	trace	trace	trace		
Trichloroethylene	6.6	---	---	trace	trace	trace		
Heptane	7923	---	---		trace	trace	trace	trace
cis 1,3-Dichloropropene	---	---	---		trace	trace	trace	0.058
Methyl Isobutyl Ketone	288	---	---	trace	trace	trace		trace
trans 1,3-Dichloropropene	---	---	---	trace	trace	trace		trace
1,1,2-Trichloroethane	---	---	---				trace	
Toluene	522	---	---	1.388	1.87	4.729	0.146	3.114
Methyl Butyl Ketone	---	---	---	trace	trace	trace	trace	trace
Dibromochloromethane	---	---	---		trace			trace
1,2-Dibromoethane	---	1.2	---			trace		trace
Tetrachloroethylene	157	---	---	1.289	5.466	4.726	0.234	4.839
Chlorobenzene	---	898	962. (10 min)	trace		trace	trace	
Ethylbenzene	317	---	431. (10 min)	0.49	0.446	0.807	0.055	1.253
m & p-Xylene	499	---	680. (10 min)	0.882	0.908	2.206	0.099	2.256
Tribromomethane	---	15.7	---					trace
Styrene	92	---	---	trace	trace	trace		trace
o-Xylene	499	---	680. (10 min)	0.057	trace	0.142	0.006	0.145
1,3,5-Trimethylbenzene	132	---	---	trace	trace	5.006	trace	
1,2,4-Trimethylbenzene	132	---	---	trace	trace	5.19	trace	trace
1,3-Dichlorobenzene	---	---	---					trace
1,4-Dichlorobenzene	47	---	---					trace
1,2-Dichlorobenzene	---	6056	4992. (1 hr)					trace
1,2,4-Trichlorobenzene	---	13.3	---					
Naphthalene	---	6.8	9.4 (10 min)	trace	trace	54.25	trace	48.27
Hexachloro-1,3-Butadiene	---	---	---	trace		trace		

Sept 27

	1/2 hr POI	1/2 hr Guideline	AAQC	Location 1	Location 2
1,3-Butadiene	?	---	---	trace	trace
Bromomethane	---	1014	---	trace	trace
Ethyl Chloride	6266	---	---	trace	trace
Vinyl Bromide	---	---	---	trace	trace
Acetone	14765	---	---	trace	trace
Isopropyl Alcohol	8808	---	---	trace	trace
Acrylonitrile	0.8	---	---	trace	trace
1,2-Dichloroethylene	---	78	---	trace	trace
Methylene Chloride	187	---	---		trace
Carbon Disulfide	104	---	---		
cis 1,2-Dichloroethene	---	78	---	trace	trace
1,1-Dichloroethane	120	---	---	trace	trace
Methyl Tert Butyl Ether	---	600	---		trace
Methyl Ethyl Ketone	1001	---	---	trace	trace
cis 1,2-Dichloropropene	---	---	---	trace	
Hexane	6282	---	---	trace	trace
Trichloromethane	0.6	---	---		
Tetrahydrofuran	31031	---	---	trace	trace
1,2-Dichloroethane	1.5	---	---	trace	
1,1,1-Trichloroethane	63128	---	---		trace
Benzene	?	---	---	trace	trace
Carbon Tetrachloride	1.1	---	---	trace	
Cyclohexane	5232	---	---		
1,2-dichloropropane	511	---	---	trace	trace
Bromodichloromethane	---	---	---	trace	trace
Trichloroethylene	6.6	---	---	trace	
Heptane	7923	---	---	trace	trace
cis 1,3-Dichloropropene	---	---	---	trace	trace
Methyl Isobutyl Ketone	288	---	---	trace	trace
trans 1,3-Dichloropropene	---	---	---	trace	trace
1,1,2-Trichloroethane	---	---	---	trace	trace
Toluene	522	---	---	0.534	0.381
Methyl Butyl Ketone	---	---	---	trace	trace
Dibromochloromethane	---	---	---		
1,2-Dibromoethane	---	1.2	---	trace	trace
Tetrachloroethylene	157	---	---	0.941	0.633
Chlorobenzene	---	898	962. (10 min)		trace
Ethylbenzene	317	---	431. (10 min)	trace	trace
m & p-Xylene	499	---	680. (10 min)	trace	trace
Tribromomethane	---	15.7	---	trace	
Styrene	92	---	---	trace	trace
o-Xylene	499	---	680. (10 min)	trace	trace
1,3,5-Trimethylbenzene	132	---	---	trace	trace
1,2,4-Trimethylbenzene	132	---	---	trace	trace
1,3-Dichlorobenzene	---	---	---	trace	
1,4-Dichlorobenzene	47	---	---	trace	
1,2-Dichlorobenzene	---	6056	4992. (1 hr)	trace	trace
1,2,4-Trichlorobenzene	---	13.3	---		
Naphthalene	---	6.8	9.4 (10 min)	trace	
Hexachloro-1,3-Butadiene	---	---	---		

Sept 29

all values in ppb	1/2 hr POI	1/2 hr Guideline	AAQC	Location 1	Location 2
1,3-Butadiene	?	---	---	trace	trace
Bromomethane	---	1014	---		
Ethyl Chloride	6266	---	---	trace	trace
Vinyl Bromide	---	---	---		
Acetone	14765	---	---	trace	trace
Isopropyl Alcohol	8808	---	---	trace	trace
Acrylonitrile	0.8	---	---	trace	trace
1,2-Dichloroethylene	---	78	---		trace
Methylene Chloride	187	---	---	trace	trace
Carbon Disulfide	104	---	---	trace	trace
cis 1,2-Dichloroethene	---	78	---		
1,1-Dichloroethane	120	---	---	4.061	2.999
Methyl Tert Butyl Ether	---	600	---	trace	
Methyl Ethyl Ketone	1001	---	---	4.125	3.047
cis 1,2-Dichloropropene	---	---	---		
Hexane	6282	---	---	2.237	1.653
Trichloromethane	0.6	---	---		
Tetrahydrofuran	31031	---	---	trace	trace
1,2-Dichloroethane	1.5	---	---		
1,1,1-Trichloroethane	63128	---	---		
Benzene	?	---	---		
Carbon Tetrachloride	1.1	---	---		
Cyclohexane	5232	---	---		
1,2-dichloropropane	511	---	---	trace	trace
Bromodichloromethane	---	---	---		
Trichloroethylene	6.6	---	---		
Heptane	7923	---	---	trace	trace
cis 1,3-Dichloropropene	---	---	---	trace	trace
Methyl Isobutyl Ketone	288	---	---	trace	trace
trans 1,3-Dichloropropene	---	---	---		
1,1,2-Trichloroethane	---	---	---		
Toluene	522	---	---	0.75	0.583
Methyl Butyl Ketone	---	---	---	trace	trace
Dibromochloromethane	---	---	---		
1,2-Dibromoethane	---	1.2	---		
Tetrachloroethylene	157	---	---	0.707	0.484
Chlorobenzene	---	898	962. (10 min)		
Ethylbenzene	317	---	431. (10 min)	trace	trace
m & p-Xylene	499	---	680. (10 min)	trace	trace
Tribromomethane	---	15.7	---		
Styrene	92	---	---		
o-Xylene	499	---	680. (10 min)	trace	trace
1,3,5-Trimethylbenzene	132	---	---		
1,2,4-Trimethylbenzene	132	---	---		
1,3-Dichlorobenzene	---	---	---		
1,4-Dichlorobenzene	47	---	---		
1,2-Dichlorobenzene	---	6056	4992. (1 hr)		
1,2,4-Trichlorobenzene	---	13.3	---		
Naphthalene	---	6.8	9.4 (10 min)	trace	
Hexachloro-1,3-Butadiene	---	---	---	trace	trace

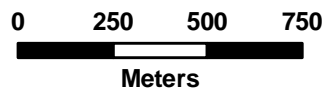
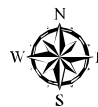
## Oct 7

	1/2 hr POI	1/2 hr Guideline	AAQC	Location 1	Location 2	Location 3
1,3-Butadiene	?	---	---			
Bromomethane	---	1014	---			trace
Ethyl Chloride	6266	---	---	trace	trace	trace
Vinyl Bromide	---	---	---			
Acetone	14765	---	---	trace	trace	trace
Isopropyl Alcohol	8808	---	---	40.56	trace	38.89
Acrylonitrile	0.8	---	---			
1,2-Dichloroethylene	---	78	---		trace	
Methylene Chloride	187	---	---	trace	trace	trace
Carbon Disulfide	104	---	---			
cis 1,2-Dichloroethene	---	78	---			
1,1-Dichloroethane	120	---	---	5.318		
Methyl Tert Butyl Ether	---	600	---	trace		trace
Methyl Ethyl Ketone	1001	---	---	4.792		trace
cis 1,2-Dichloropropene	---	---	---			
Hexane	6282	---	---	5.417	trace	
Trichloromethane	0.6	---	---			
Tetrahydrofuran	31031	---	---	4.016	3.577	3.653
1,2-Dichloroethane	1.5	---	---			
1,1,1-Trichloroethane	63128	---	---			
Benzene	?	---	---			trace
Carbon Tetrachloride	1.1	---	---			
Cyclohexane	5232	---	---	trace	trace	trace
1,2-dichloropropane	511	---	---	trace	trace	trace
Bromodichloromethane	---	---	---			
Trichloroethylene	6.6	---	---			
Heptane	7923	---	---	4.484	trace	3.728
cis 1,3-Dichloropropene	---	---	---	2.087	1.641	
Methyl Isobutyl Ketone	288	---	---			trace
trans 1,3-Dichloropropene	---	---	---	trace		
1,1,2-Trichloroethane	---	---	---			trace
Toluene	522	---	---	16.42	5.222	10.95
Methyl Butyl Ketone	---	---	---	4.781	1.211	3.131
Dibromochloromethane	---	---	---	trace	trace	trace
1,2-Dibromoethane	---	1.2	---			
Tetrachloroethylene	157	---	---	63.03	70.17	34.62
Chlorobenzene	---	898	962. (10 min)			
Ethylbenzene	317	---	431. (10 min)	9.711	2.501	5.221
m & p-Xylene	499	---	680. (10 min)	1.407	0.398	0.791
Tribromomethane	---	15.7	---			
Styrene	92	---	---	1.082	trace	
o-Xylene	499	---	680. (10 min)	trace	trace	trace
1,3,5-Trimethylbenzene	132	---	---	4.672	1.248	1.485
1,2,4-Trimethylbenzene	132	---	---	4.066	1.086	1.293
1,3-Dichlorobenzene	---	---	---			
1,4-Dichlorobenzene	47	---	---			
1,2-Dichlorobenzene	---	6056	4992. (1 hr)			
1,2,4-Trichlorobenzene	---	13.3	---			
Naphthalene	---	6.8	9.4 (10 min)	24.39	15.53	12.19
Hexachloro-1,3-Butadiene	---	---	---			



**Samples By Date**

- August 11 2011
- September 13 2011
- September 14 2011
- September 22 2011
- September 27 2011
- September 29 2011
- October 7 2011
- October 13 2011
- Wind Flow By Date



Scale 1:20,000

October 14, 2011  
Southwestern Region  
Ministry of the Environment

Orthophoto: © SWOOP 2010  
Sample Sites: MOE

NAD83 UTM17  
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