

**November 2017**

## **Ministry of the Environment and Climate Change**

### **2016 Mobile Air Monitoring in St. Marys**

#### **Introduction**

In the fall of 2016, the Ministry of the Environment and Climate Change (MOECC) conducted mobile air monitoring around the St. Marys Cement facility. This enabled the ministry to address community concerns, improve local ministry programs and support efforts to reduce ambient concentrations of priority contaminants such as particulate matter, sulphur dioxide and benzene.

#### **Method**

Mobile monitoring was conducted around the St. Marys Cement facility, within the Town of St. Marys, over nine days between August and November, 2016.

The monitoring focused on:

- total suspended particulates (TSP)
- particulate matter less than 10 µm in diameter (PM<sub>10</sub>)
- particulate matter less than 2.5 µm in diameter (PM<sub>2.5</sub>)
- sulphur dioxide (SO<sub>2</sub>)
- benzene.
- other Volatile Organic Compounds (VOCs) analyzed intermittently

On each of the nine days, one upwind sample and four to six downwind samples were collected. Sample locations varied depending on the wind direction and sample times were 30 minutes or less at each location.

The measured concentrations of each pollutant were assessed against comparison values based on the Ontario Ambient Air Quality Criteria (AAQC), and adjusted to account for the short sample time.

An AAQC is a desirable concentration of a contaminant in air and is used to assess general air quality resulting from all sources of a contaminant to air. The AAQC for each contaminant and the corresponding comparison values are listed in Table 1. These comparison values should only be considered indicators of possible issues, since they lie outside the realm of the ministry's published AAQC.

#### **Results**

- All particulate matter (PM<sub>2.5</sub>) and sulphur dioxide (SO<sub>2</sub>) samples were below their applicable comparison value.
- One particulate matter (PM<sub>10</sub>) and one total suspended particulates (TSP) sample were above their applicable comparison value (2 per cent of downwind samples).
- Four benzene samples were above their applicable comparison value (9 per cent of downwind samples).
- All additional VOCs that were sampled and detected (toluene, ethylbenzene, and m&p-

xylene) were below their applicable comparison values.

A full table of the results is shown in Table 2. Concentrations measured above the relevant comparison value are highlighted in orange.

Although concentrations of benzene were higher in the downwind samples, it should be noted that benzene is not only emitted from industrial sources. Benzene occurs naturally in crude oil, is a component of gasoline, and readily evaporates into the air. In addition to industrial sources, benzene is also released from motor vehicle exhaust, gasoline service station emissions, and tobacco smoke.

These results indicate that further review of these contaminants may be warranted, but do not provide an indication if an AAQC is actually being exceeded.

### Outcomes and Next Steps

Following the 2016 mobile air monitoring, the ministry has taken a number of steps to monitor air quality in St. Marys, including additional mobile air monitoring and the installation of a temporary air monitoring station in 2017. The ministry expects to share the results of this monitoring in the spring of 2018.

The ministry will continue to work with the local residents, the town and local industry to address complaints related to air quality within the Town of St. Marys.

**Table 1: Relevant AAQC and Comparison Values**

Contaminant	Unit	AAQC <sup>1</sup>				Comparison Value <sup>2</sup>	
		10-minute	1-hour	24-hour	annual	15-minute	30-minute
TSP	µg/m <sup>3</sup>	-	-	120	60	431	355
PM <sub>10</sub>	µg/m <sup>3</sup>	-	-	50	-	179	148
PM <sub>2.5</sub>	µg/m <sup>3</sup>	-	-	28	10	101	83
SO <sub>2</sub>	ppb	-	250	100	-	359	296
Benzene	ppb	-	-	0.68	0.13	2.44	2.01
Toluene	ppb	-	-	504	-	1809	1490
Ethylbenzene	ppb	416	-	219	-	786	647
m&p-Xylene	ppb	657	-	160	-	574	473

Notes:

[1] For SO<sub>2</sub>, benzene, toluene, ethylbenzene, and m&p-xylene, the AAQC was converted from µg/m<sup>3</sup> to ppb assuming a pressure of 101,325 Pa and a temperature of 10 °C.

[2] The comparison values for 15-minute and 30-minute averaging periods were derived based on the 24-hour AAQC and converted to a shorter time-period using the formula which is prescribed in O. Reg. 419/05.

**Table 2: Measured Concentrations**

Date	Sample Name	Upwind or Downwind <sup>1</sup>	Wind Direction <sup>2</sup>	Particulate and Sulphur Dioxide					Volatile Organic Compounds				
				Sample Time	Concentration				Sample Time	Concentration <sup>3</sup>			
					TSP	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>		Benzene	Toluene	Ethylbenzene	m&p-Xylene
(degrees)	(min)	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(ppb)	(min)	(ppb)	(ppb)	(ppb)	(ppb)			
11-Aug-16	D1_1	Upwind	235	16	20	17	15	0.1	1	nd	nd	nd	nd
	D1_2	Downwind	167	16	176	56	26	0.7	1	nd	nd	nd	nd
	D1_3	Downwind	217	15	446	93	24	0.8	1	0.90	nd	nd	nd
	D1_4	Downwind	59	16	237	79	21	0.7	1	1.17	nd	nd	nd
	D1_5	Downwind	226	16	105	35	15	1.1	1	nd	nd	nd	nd
	D1_6	Downwind	118	17	92	32	13	1.5	1	nd	nd	nd	nd
	D1_7	Downwind	241	16	199	52	17	2.5	1	nd	nd	nd	nd
23-Aug-16	D2_1	Upwind	217	16	2	2	1	0.2	1	nd	-	-	-
	D2_2	Downwind	241	17	6	6	2	2.0	1	nd	-	-	-
	D2_3	Downwind	230	16	55	37	9	2.3	1	nd	-	-	-
	D2_4	Downwind	229	21	18	14	5	1.5	1	nd	nd	nd	nd
	D2_5	Downwind	254	17	15	9	4	2.3	1	nd	-	-	-
	D2_6	Downwind	256	16	11	10	4	2.7	1	nd	-	-	-
09-Sep-16	D3_1	Upwind	56	17	16	9	5	0.2	1	nd	-	-	-
	D3_2	Downwind	195	17	62	33	13	1.7	1	nd	-	-	-
	D3_3	Downwind	159	17	26	12	5	2.1	1	nd	-	-	-
	D3_4	Downwind	14	17	30	17	5	2.3	1	nd	-	-	-
	D3_5	Downwind	318	17	9	7	4	2.6	1	nd	-	-	-
	D3_6	Downwind	300	22	7	6	3	2.2	1	nd	0.99	nd	nd
	D3_7	Downwind	215	16	24	7	3	2.8	1	nd	-	-	-
13-Sep-16	D4_1	Upwind	241	16	34	17	5	0.1	1	nd	-	-	-
	D4_2	Downwind	233	16	45	15	4	2.6	1	nd	-	-	-
	D4_3	Downwind	251	17	16	11	3	2.4	1	nd	-	-	-

Date	Sample Name	Upwind or Downwind <sup>1</sup>	Wind Direction <sup>2</sup>	Particulate and Sulphur Dioxide					Volatile Organic Compounds				
				Sample Time	Concentration				Sample Time	Concentration <sup>3</sup>			
					TSP	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>		Benzene	Toluene	Ethylbenzene	m&p-Xylene
(degrees)	(min)	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(ppb)	(min)	(ppb)	(ppb)	(ppb)	(ppb)			
	D4_4	Downwind	171	17	26	20	6	2.5	1	nd	-	-	-
	D4_5	Downwind	257	17	48	20	6	0.5	1	nd	1.10	nd	nd
	D4_6	Downwind	224	16	78	36	9	3.5	1	nd	-	-	-
16-Sep-16	D5_1	Upwind	119	16	11	10	4	0.1	1	nd	-	-	-
	D5_2	Downwind	91	16	223	77	15	2.7	1	nd	-	-	-
	D5_3	Downwind	108	16	88	29	6	3.4	1	nd	-	-	-
	D5_4	Downwind	99	16	39	18	4	3.4	1	nd	-	-	-
	D5_5	Downwind	196	16	347	138	29	0.5	1	nd	1.04	nd	nd
	D5_6	Downwind	191	16	80	24	4	3.8	1	nd	-	-	-

Date	Sample Name	Upwind or Downwind <sup>1</sup>	Wind Direction <sup>2</sup>	Particulate and Sulphur Dioxide					Volatile Organic Compounds				
				Sample Time	Concentration				Sample Time	Concentration <sup>3</sup>			
					TSP	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>		Benzene	Toluene	Ethylbenzene	m&p-Xylene
(degrees)	(min)	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(ppb)	(min)	(ppb)	(ppb)	(ppb)	(ppb)			
05-Oct-16	D6_1	Upwind	183	30	19	14	12	0.2	30	0.02	-	-	-
	D6_2	Downwind	308	30	133	58	16	0.3	30	0.37	-	-	-
	D6_3	Downwind	166	31	199	86	18	0.3	30	nd	-	-	-
	D6_4	Downwind	177	30	77	27	9	0.4	30	1.44	-	-	-
	D6_5	Downwind	220	31	122	54	14	0.7	30	0.88	-	-	-
12-Oct-16	D7_1	Upwind	218	31	11	11	9	0.3	30	nd	nd	nd	nd
	D7_2	Downwind	282	31	108	39	11	0.4	30	nd	nd	nd	nd
	D7_3	Downwind	181	31	130	63	16	0.5	30	2.66	-	-	-
	D7_4	Downwind	220	31	55	30	10	0.3	30	nd	-	-	-

Date	Sample Name	Upwind or Downwind <sup>1</sup>	Wind Direction <sup>2</sup>  (degrees)	Particulate and Sulphur Dioxide					Volatile Organic Compounds				
				Sample Time  (min)	Concentration				Sample Time  (min)	Concentration <sup>3</sup>			
					TSP  (µg/m <sup>3</sup> )	PM <sub>10</sub>  (µg/m <sup>3</sup> )	PM <sub>2.5</sub>  (µg/m <sup>3</sup> )	SO <sub>2</sub>  (ppb)		Benzene  (ppb)	Toluene  (ppb)	Ethylbenzene  (ppb)	m&p-Xylene  (ppb)
	D7_5	Downwind	234	31	118	61	13	0.6	30	1.32	-	-	-
26-Oct-16	D8_1	Upwind	57	31	10	6	3	0.4	30	nd	0.57	nd	nd
	D8_2	Downwind	110	30	56	23	6	0.5	30	3.61	2.49	0.57	0.38
	D8_3	Downwind	105	30	94	40	8	0.4	30	3.70	2.44	0.52	0.34
	D8_4	Downwind	99	31	48	22	6	0.5	30	2.06	3.20	0.90	0.60
	D8_5	Downwind	102	31	9	8	4	0.3	30	nd	nd	nd	nd
08-Nov-16	D9_1	Upwind	252	31	26	19	18	0.1	30	nd	-	-	-
	D9_2	Downwind	226	31	310	159	47	0.3	30	nd	-	-	-
	D9_3	Downwind	217	31	113	65	26	0.8	30	0.75	-	-	-
	D9_4	Downwind	246	31	41	27	17	0.7	30	nd	-	-	-
	D9_5	Downwind	243	31	110	74	27	0.6	30	nd	-	-	-

**Notes:**

[1] The first sample of each day was upwind (highlighted in grey) and the others were downwind. In some cases, the wind direction varied during the downwind samples and may not have been directly downwind of the St. Marys Cement facility.

[2] Wind directions were reported on a minute-by-minute basis. The mean wind direction shown is the crossover-corrected average of the wind direction samples (accounts for the crossover from 1 to 360 degrees in the average calculation). During some samples, the wind direction was quite variable which may cause errors in the crossover-corrected average.

[3] Concentration is listed as "nd" when it was not detected. Benzene was the only VOC that was consistently sampled throughout the monitoring campaign. Other VOCs that were detected are also shown and the concentration is indicated with a "-" when they were not analyzed in the sample.

[4] Concentrations that are above their relevant comparison value are highlighted in orange. Samples taken in September and October were compared against the 15-minute comparison value whereas samples taken in October and November were compared against the 30-minute comparison value.