BRITISH COLUMBIA | Ministry of Environment

DATA RELEASE – March 21, 2012

Prince George Neighbourhood VOC Sampling Data Release

The Ministry of Environment (MoE) is working in collaboration with city residents in Prince George to collect ambient air samples within selected neighbourhoods and have them analyzed for volatile organic compounds (VOCs). MoE staff has trained volunteers in the community to collect 1-hour air samples. These volunteers live in the neighbourhood so that samples can be collected while odour is present and without a lag time. Priority for testing is given to locations where residents have reported high levels of odour causing discomfort. The results of this program are available to the public following the sample analysis at a contracted lab and quality assurance procedures.

This release contains information on all (7) of the 1-hour samples collected in 2011 (March - December 2011). Due to the long list of VOCs analyzed (total of 194 compounds), this release focuses on VOCs with the highest concentrations relative to objectives/screening levels (i.e. those > 5% of objective) and the highest measured VOC. None of the samples collected to date has exceeded any specified objective levels (Table 1). Appendix A includes a summary of information on the VOCs listed in Table 1. Appendix B lists all of the VOC data including objectives/jurisdictions reported for the samples.

In addition since August 2005, VOC samples have been collected at the MoE Plaza 400 monitoring station. These samples are 24-hour averages and are collected on a regular schedule, every 6 days. A summary of the data is available in the MoE Prince George annual air quality reports located at: http://www.env.gov.bc.ca/epd/regions/omineca/air/annual_info.htm

VOCs include a wide range of individual substances containing at least one carbon and one hydrogen atom, from many substance classes such as hydrocarbons, halocarbons and oxygenates (Source: http://www.ec.gc.ca/cov-voc/default.asp?lang=En&n=C8C72F33-1). Each VOC has different properties and chemical make-up but is generally associated with odour and/or health effects. The province currently does not have any ambient air quality objectives associated with the VOCs measured in this project therefore 1-hour objectives and screening levels from other jurisdictions as thresholds are reported for comparative purposes. Priority was given to Canadian jurisdictions with existing objectives.

This summary is posted on the BC Air Quality webpage at: http://www.bcairquality.ca/reports/region_Omineca.html. Future test results will be posted to this website.

Updates on the website are dependent on the frequency of samples taken.

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Table 1: VOCs with concentrations greater than 5% of their objective level. The compound with the highest measured concentration is also included (*).

Sample Date	**2011-03-09 – Patricia Blvd 9:15-10:15 PST**			
VOC Name	Sampled Concentration (µg/m^3)	Objective Level (µg/m^3)	jurisdiction	Concentration relative to Objective level (%)
Acrolein (2-Propenal)	1.69	4.5	Ontario	37.6%
a-Pinene	10.39	60	Texas	17.3%
MVK (methyl vinyl ketone)	0.75	6	Texas	12.5%
b-Pinene	6.09	64	Texas	9.5%
Butylaldehyde (Butanal)	0.80	14	Texas	5.7%
Hexanal	4.55	80	Texas	5.7%
Acetaldehyde	4.99	90	Texas	5.5%
Methanol (methyl alcohol)	* 36.29	2600	Alberta	1.4%
Sample Date	**2011-03-10 – Patricia Blvd 8:25-9:25 PST**			
VOC Name	Sampled Concentration (µg/m^3)	Objective Level (µg/m^3)	jurisdiction	Concentration relative to Objective level (%)
Acrolein (2-Propenal)	1.31	4.5	Ontario	29.0%
Hexanal	5.32	80	Texas	6.7%
a-Pinene	3.75	60	Texas	6.3%
Butylaldehyde (Butanal)	0.71	14	Texas	5.0%
Methanol (methyl alcohol)	* 13.90	2600	Alberta	0.5%
Sample Date	**2011-03-15 – Ash St 6:33-7:33 PST**			
VOC Name	Sampled Concentration (µg/m^3)	Objective Level (µg/m^3)	jurisdiction	Concentration relative to Objective level (%)
Acrolein (2-Propenal)	2.92	4.5	Ontario	64.8%
a-Pinene	23.33	60	Texas	38.9%
b-Pinene	12.62	64	Texas	19.7%
Acetaldehyde	7.22	90	Texas	8.0%
Camphene	3.42	50	Texas	6.8%
Butylaldehyde (Butanal)	0.88	14	Texas	6.3%
Methanol (methyl alcohol)	* 75.75	2600	Alberta	2.9%

Table 1 continued

Sample Date	**2011-05-19 – Ash St 8:28-9:27 PST**			
VOC Name	Sampled Concentration ($\mu g/m^3$)	Objective Level ($\mu g/m^3$)	jurisdiction	Concentration relative to Objective level (%)
Acrolein (2-Propenal)	0.38	4.5	Ontario	8.4%
a-Pinene	3.12	60	Texas	5.2%
Butane	*22.26	23750	Texas	0.1%
Sample Date	**2011-11-23 – Ash St 7:44-8:44 PST**			
VOC Name	Sampled Concentration ($\mu g/m^3$)	Objective Level ($\mu g/m^3$)	jurisdiction	Concentration relative to Objective level (%)
Methanol (methyl alcohol)	*49.35	2600	Alberta	1.9%
Sample Date	**2011-12-05– Ash St 7:44-8:44 PST**			
VOC Name	Sampled Concentration ($\mu g/m^3$)	Objective Level ($\mu g/m^3$)	jurisdiction	Concentration relative to Objective level (%)
Acrolein (2-Propenal)	1.70	4.5	Ontario	37.7%
Acetaldehyde	5.23	90	Texas	5.8%
Methanol (methyl alcohol)	*38.46	2600	Alberta	1.5%
Sample Date	**2011-12-14– Ash St 11:22-12:22 PST**			
VOC Name	Sampled Concentration ($\mu g/m^3$)	Objective Level ($\mu g/m^3$)	jurisdiction	Concentration relative to Objective level (%)
Acrolein (2-Propenal)	2.25	4.5	Ontario	50.0%
Carbon Disulfide	3.89	30	Alberta	13.0%
Butylaldehyde (Butanal)	1.43	14	Texas	10.2%
Acetaldehyde	9.07	90	Texas	10.1%
Camphene	3.78	50	Texas	7.6%
Hexanal	4.85	80	Texas	6.1%
Methanol (methyl alcohol)	26.32	2600	Alberta	1.0%

Appendix A: Characteristics of VOCs from Table 1

VOC	Odour Properties	Potential Sources/Exposure	Reference
Acetaldehyde	Acetaldehyde has a pungent suffocating odour, but at dilute concentrations it has a fruity and pleasant odour. The odour threshold of acetaldehyde is 0.05 parts per million (ppm) (90 µg/m^3).	Acetaldehyde can be measured throughout the ambient environment. It is an intermediate product of higher plant respiration and formed as a product of incomplete wood combustion in fireplaces and woodstoves, burning of tobacco, vehicle exhaust fumes, and waste processing. Hence, many individuals are exposed to acetaldehyde by breathing ambient air. Industries releasing acetaldehyde include pulp & paper, OSB plants and sawmills/wood preserving. In addition, acetaldehyde is formed in the body from the breakdown of ethanol; this would be a source of acetaldehyde among those who consume alcoholic beverages.	http://www.epa.gov/ttnatw01/hlthef/acetalde.html http://www.ec.gc.ca/inrp-npri/default.asp?lang=En&n=B85A1846-1
Acrolein	Acrolein has a burned, sweet, pungent odour that most people may begin to smell at air concentrations around 0.25 ppm (600 µg/m^3).	Acrolein may be formed from the breakdown of certain pollutants found in outdoor air, from the burning of organic matter including tobacco, or from the burning of fuels such as gasoline or oil. Industries releasing acrolein include OSB plants and pulp & paper. Airborne exposure to acrolein may occur by breathing contaminated air, by smoking tobacco or by being in the proximity of someone who is smoking, or by being near vehicle exhaust. Small amounts of acrolein may be found in some foods, such as fried foods, cooking oils, and roasted coffee.	http://www.epa.gov/ttnatw01/hlthef/acrolein.html http://www.ec.gc.ca/inrp-npri/default.asp?lang=En&n=B85A1846-1 http://www.atsdr.cdc.gov/toxprofiles/tp124-c6.pdf
Butylaldehyde (Butanal)	Butylaldehyde (also called butanal) has an odour threshold of 0.0046 ppm (13 µg/m^3).	Butylaldehyde occurs naturally in essential oils of plants and in foods such as fruits, vegetables, cheeses, meat, wines, coffee, honey, and nuts. It is produced by the poplar tree and ferns. Butylaldehyde is released to the environment from facilities that manufacture and use it. The largest users of butylaldehyde are companies that make rubber accelerators, synthetic resins, solvents, plasticizers, and high molecular weight polymers. Butylaldehyde	http://www.epa.gov/chemfact/butyr-fs.txt http://www.epa.gov/chemfact/butyr-sd.txt

VOC	Odour Properties	Potential Sources/Exposure	Reference
		has been detected in exhaust emissions from diesel engines, in gaseous emissions from fireplaces burning jack pine or red oak logs and at hazardous waste sites.	
Butane (n-butane) Butane (n-butane) cont'd	An odourless gas although odorants are sometimes added to butane to provide an indication of its presence	Commonly used as a gasoline blending component. Used as a fuel, refrigerant, aerosol propellant and food additive.	http://toxnet.nlm.nih.gov/cgi-bin/sis/search/f?./temp/~XJ3Vbt:1 http://www.cdc.gov/niosh/docs/81-123/pdfs/0068.pdf
Camphene	Camphene is described as having a camphor-like (aromatic and woody) odour. No odour threshold has been identified.	Produced and used as a food additive, synthetic feedstock, and fragrance. Camphene is also a byproduct of pulp & paper production. Camphene is present in the emissions of various plant and tree species.	http://toxnet.nlm.nih.gov/cgi-bin/sis/search/a?dbs+hsdb:@term+@DOCNO+900 https://www.atsdr.cdc.gov/ToxProviles/tp94-c5.pdf
Carbon Disulphide	Strong unpleasant odour (rotten-eggs) due to traces of organic sulphur compounds	By-product of oil and gas processing, chemical industry, and tire manufacturing. Natural sources of carbon disulphide include emissions from soil, sediment, aquatic microorganisms, vegetation, forest/grass fires and volcanoes.	http://publications.gc.ca/collections/Collection/En40-215-46E.pdf
Hexanal (hexaldehyde)	Hexanal (also called hexaldehyde) has a fruity, green grass, or sharp aldehyde odour. The odour threshold is 58 µg/m3.	Hexaldehyde is produced and used as a food additive, in organic synthesis of plasticizers, rubber chemicals, dyes, synthetic resins, and insecticides, and in perfumery. Hexaldehyde occurs naturally in many fruits, vegetables, meats, and shellfish. Hexaldehyde is also in vapor given off by northern red oak, dawn redwood, bass wood, tulip poplar trees, and many other plants.	http://toxnet.nlm.nih.gov/cgi-bin/sis/search/a?dbs+hsdb:@term+@DOCNO+560 Odour threshold: http://www.nrc-cnrc.gc.ca/obj/irc/doc/pubs/nrcc48314/nrcc48314
MVK (methyl vinyl ketone)	Methyl vinyl ketone has a pungent, powerfully irritating odor. No odour threshold has been identified.	Methyl vinyl ketone's production and use as a component of ionomer resins and a precursor of styrene-methyl vinyl ketone polymers may result in its release to the environment through various waste streams. Methyl vinyl ketone has been identified in the volatile emissions of trees and has been found in crabs.	http://toxnet.nlm.nih.gov/cgi-bin/sis/search/a?dbs+hsdb:@term+@DOCNO+716
a-Pinene	alpha-Pinene has a characteristic odour of pine or turpentine. The odour threshold	Widely detected in air samples as it is emitted by a variety of vegetation including trees, fruits, grasses, bushes, fungi, herbs, and flowers. It is also released in process vapours from pulp mills. The general population may be	http://toxnet.nlm.nih.gov/cgi-bin/sis/search/a?dbs+hsdb:@term+@DOCNO+720 http://ecb.jrc.it/documents/P

VOC	Odour Properties	Potential Sources/Exposure	Reference
a-Pinene (cont'd)	is 3900 µg/m3.	exposed to alpha-pinene via inhalation and by ingestion of foods where it occurs naturally or was added as a flavouring component, and skin contact with consumer products in which it is contained as a solvent or fragrance. alpha-Pinene's production and use as a solvent, synthetic intermediate, fragrance, and flavouring may result in its release to the environment through various waste streams.	BT_EVALUATION/PBT_sum084_CAS_91770-80-8.pdf Odour threshold: http://www.nrc-cnrc.gc.ca/obj/irc/doc/pubs/nrcc48314/nrcc48314
b-Pinene	beta-Pinene is has a characteristic turpentine/ woody/ resinous odour. No odour threshold has been identified.	beta-Pinene is a natural hydrocarbon emission product from softwood trees, in particular spruce. It is also released in process vapours from pulp mills. beta-Pinene is produced and used as an intermediate for perfumes and flavourings, in polyterpene resins, and as a fragrance ingredient.	http://toxnet.nlm.nih.gov/cgi-bin/sis/search/a?dbs+hsdb:@term+@DOCNO+5615 http://ecb.jrc.it/documents/PBT_EVALUATION/PBT_sum084_CAS_91770-80-8.pdf
Methanol (methyl alcohol)	Methanol has a slightly alcoholic odor when pure and a repulsive, pungent odor when in its crude form; it is difficult to smell methanol in the air at less than 2,000 parts per million (ppm) (2,622,000 µg/m3).	Primarily used as an industrial solvent for inks, resins, adhesives, and dyes. It is also used as a solvent in the manufacture of cholesterol, streptomycin, vitamins, hormones, and other pharmaceuticals. Industries releasing methanol include pulp & paper, OSB plants, sawmills/wood preservers, chemical manufacturing and oil & gas. Methanol is also used as an antifreeze for automotive radiators, an ingredient of gasoline (as an antifreezing agent and octane booster), and as fuel for picnic stoves. It is an ingredient in paint and varnish removers. Individuals may be exposed to methanol in the ambient air from its evaporation during solvent uses or from automobile exhaust, through the consumption of various foods, and through contact with various consumer products such as paint thinners and strippers, adhesives, cleaners, and inks. Natural emission sources of methanol include volcanic gases, vegetation, microbes, and insects; methanol is also formed during biological decomposition of biological wastes, sewage, and sludge.	http://www.epa.gov/ttnatw01/hlthef/methanol.html http://www.ec.gc.ca/inrp-npri/default.asp?lang=En&n=B85A1846-1

Appendix B: Summary table of all VOC concentrations (µg/m3) measured for all samples collected during study, March 2011 to March 2012 (red font indicates no objective available)

VOC	Jurisdiction	1-hr Objective (µg/m3)	Concentration (µg/m^3)						
			9-Mar-11	10-Mar-11	15-Mar-11	19-May-11	23-Nov-11	5-Dec-11	14-Dec-11
1,1,1-Trichloroethane	Texas	10800	0.03	0.03	0.03	0.04	0.03	0.04	0.03
1,1,2,2-Tetrachloroethane	Texas	70	0.00	0.00	0.00	0.00	0.00	0.01	0.00
1,1,2-Trichloroethane	Texas	550	0.00	0.00	0.00	0.00	0.00	0.01	0.00
1,1-Dichloroethane	Texas	4000	0.01	0.01	0.00	0.01	0.01	0.01	0.00
1,1-Dichloroethene (1,1-dichloroethylene)	Texas	210	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,2,3-Trimethylbenzene (hemimellitene)	Texas	1250	0.26	0.17	0.36	0.19	0.00	0.08	0.17
1,2,4-Trichlorobenzene	Texas	400	0.01	0.01	0.00	0.00	0.00	0.01	0.04
1,2,4-Trimethylbenzene (pseudocumene)	Texas	1250	0.55	0.26	0.62	0.37	0.60	0.09	0.11
1,2-Dibromoethane (EDB)	Texas	4	0.00	0.00	0.00	0.00	0.00	0.01	0.00
1,2-Dichlorobenzene	Ontario	30500	0.00	0.00	0.00	0.00	0.00	0.01	0.01
1,2-Dichloroethane	Texas	160	0.06	0.06	0.06	0.08	0.07	0.08	0.05
1,2-Dichloropropane	Texas	460	0.02	0.02	0.02	0.02	0.04	0.03	0.02
1,2-Diethylbenzene	Texas	2500	0.03	0.01	0.01	0.01	0.05	0.00	0.01
1,3,5-Trimethylbenzene	Texas	1250	0.17	0.09	0.18	0.12	0.17	0.02	0.04
1,3-Butadiene	Texas	510	0.14	0.04	0.14	0.10	0.19	0.16	0.18
1,3-Dichlorobenzene	Texas	720	0.00	0.00	0.00	0.00	0.00	0.01	0.01
1,3-Diethylbenzene	Texas	2500	0.04	0.03	0.02	0.03	0.02	0.00	0.01
1,4-Dichlorobenzene	Texas	720	0.01	0.01	0.01	0.01	0.04	0.02	0.02
1,4-Dichlorobutane			0.00	0.00	0.00	0.00	0.00	0.01	0.00
1,4-Diethylbenzene			0.19	0.20	0.00	0.21	0.08	0.01	0.05
1-Butanol (Butyl alcohol)	Texas	610	0.00	0.00	0.00	0.20	0.27	0.10	0.28
1-Butene/2-ethylpropene	Texas	820	2.16	0.70	1.10	0.56	1.08	1.08	1.99
1-Butyne (ethyl acetylene)	Texas	16400	0.01	0.00	0.00	0.01	0.01	0.01	0.02

VOC	Jurisdiction	1-hr Objective (µg/m3)	Concentration (µg/m^3)						
			9-Mar-11	10-Mar-11	15-Mar-11	19-May-11	23-Nov-11	5-Dec-11	14-Dec-11
1-Decene	Texas	116	0.04	0.04	0.00	0.01	0.03	0.00	0.01
1-Heptene	Texas	16	0.00	0.04	0.00	0.00	0.00	0.00	0.00
1-Hexene/2-Methyl-1-Pentene	Texas	70	0.15	0.07	0.15	0.07	0.13	0.07	0.06
1-Methylcyclohexene	Texas	940	0.01	0.00	0.02	0.01	0.01	0.01	0.01
1-Methylcyclopentene	Texas	8100	0.04	0.01	0.08	0.04	0.07	0.03	0.01
1-Nonene	Texas	30	0.00	0.06	0.05	0.03	0.07	0.00	0.00
1-Octene	Texas	20	0.08	0.08	0.10	0.05	0.04	0.02	0.02
1-Pentene	Texas	290	0.19	0.09	0.14	0.07	0.14	0.09	0.08
1-Undecene	Texas	100	0.03	0.02	0.00	0.01	0.00	0.00	0.00
2,2,3-Trimethylbutane	Texas	3500	0.01	0.01	0.02	0.01	0.02	0.01	0.01
2,2,4-Trimethylpentane (isooctane)	Texas	3500	0.85	0.17	2.25	0.60	1.03	1.56	0.22
2,2,5-Trimethylhexane			0.02	0.00	0.04	0.00	0.02	0.09	0.01
2,2-Dimethylbutane (neohexane)	Texas	3500	0.24	0.57	0.57	0.87	0.36	0.39	0.30
2,2-Dimethylhexane	Texas	3500	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,2-Dimethylpentane	Texas	3500	0.05	0.03	0.06	0.07	0.06	0.05	0.04
2,2-Dimethylpropane (dimethyl propane)	Texas	3500	0.02	0.05	0.02	0.09	0.02	0.03	0.02
2,3,4-Trimethylpentane			0.07	0.01	0.21	0.02	0.09	0.29	0.02
2,3-Dimethylbutane	Texas	3500	0.24	0.28	0.47	0.61	0.31	0.32	0.19
2,3-Dimethylpentane	Texas	3500	0.43	0.09	0.61	0.24	0.47	0.72	0.20
2,4-Dimethylhexane	Texas	3500	0.11	0.02	0.13	0.06	0.09	0.13	0.03
2,4-Dimethylpentane	Texas	3500	0.16	0.06	0.27	0.15	0.23	0.31	0.09
2,5-Dimethylhexane	Texas	3500	0.08	0.02	0.10	0.04	0.07	0.12	0.02
2-Butanol (sec-butyl alcohol)	Texas	1240	0.06	0.00	0.00	0.00	0.00	0.00	0.00
2-Butenal	Texas	9	0.00	0.00	0.00	0.00	0.00	0.00	0.00

VOC	Jurisdiction	1-hr Objective (µg/m3)	Concentration (µg/m^3)						
			9-Mar-11	10-Mar-11	15-Mar-11	19-May-11	23-Nov-11	5-Dec-11	14-Dec-11
(Crotonaldehdye)									
2-Ethyl-1-Butene			0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-Ethyltoluene			0.12	0.05	0.13	0.06	0.12	0.05	0.03
2-Heptanone	Texas	32	0.05	0.02	0.00	0.06	0.07	0.03	0.02
2-Hexanone	Texas	40	0.08	0.05	0.00	0.00	0.00	0.00	0.08
2-Methyl-1-Butene			0.24	0.06	0.29	0.14	0.19	0.18	0.10
2-Methyl-2-Butene (ß-isoamylene)	Texas	720	0.30	0.09	0.52	0.30	0.36	0.25	0.11
2-Methylbutanal (Isovaleraldehyde)	Texas	1800	0.19	0.12	0.00	0.16	0.30	0.23	0.35
2-Methylbutane (isopentane)	Texas	3500	3.67	6.42	5.09	12.85	3.49	4.89	2.39
2-Methylfuran	Texas	550	0.32	0.00	0.44	0.09	0.81	0.96	0.54
2-Methylheptane	Texas	3500	0.30	0.10	0.20	0.19	0.22	0.19	0.10
2-Methylhexane	Texas	3070	0.79	0.21	0.59	0.56	0.72	0.59	0.44
2-Methylpentane	Texas	290	1.23	1.27	2.07	2.67	1.49	1.39	0.83
2-Methyl-Propanal (Isobutylaldehyde)	Texas	140	0.25	0.40	0.65	0.15	3.17	1.61	3.11
2-Pentanone	Texas	5300	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3,6-Dimethyloctane			0.05	0.02	0.00	0.00	0.00	0.01	0.01
3-Ethyltoluene			0.32	0.13	0.39	0.20	0.36	0.11	0.09
3-Methyl1-Butanol (isoamyl alcohol)	Texas	150	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3-Methyl-1-Butene			0.12	0.04	0.18	0.06	0.12	0.12	0.07
3-Methyl-1-Pentene			0.02	0.01	0.03	0.01	0.02	0.01	0.01
3-Methylfuran			0.00	0.00	0.00	0.00	0.00	0.00	0.00
3-Methylheptane	Texas	3500	0.33	0.07	0.20	0.17	0.21	0.17	0.08
3-Methylhexane	Texas	3070	1.18	0.24	0.66	0.64	0.82	0.64	0.43
3-Methylpentane	Texas	3500	0.81	0.75	1.35	1.63	0.99	0.92	0.57

VOC	Jurisdiction	1-hr Objective (µg/m3)	Concentration (µg/m^3)						
			9-Mar-11	10-Mar-11	15-Mar-11	19-May-11	23-Nov-11	5-Dec-11	14-Dec-11
4-Ethyltoluene			0.15	0.06	0.19	0.10	0.19	0.06	0.06
4-Methyl-1-Pentene	Texas	1000	0.02	0.01	0.02	0.00	0.02	0.01	0.00
4-Methylheptane	Texas	3500	0.13	0.03	0.08	0.07	0.09	0.07	0.03
Acetaldehyde	Texas	90	4.99	3.33	7.22	3.08	4.70	5.23	9.07
Acetone	Alberta	5900	7.08	4.81	18.18	7.79	5.51	5.28	5.79
Acetonitrile	Texas	340	0.25	0.20	0.46	0.11	0.13	0.08	0.08
Acetylene	Texas	26620				0.92	1.58	1.24	2.39
Acrolein (2-Propenal)	Ontario	4.5	1.69	1.31	2.92	0.38	2.09	1.70	2.25
Acrylonitrile (2-Propennitrile)	Alberta	43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
a-Pinene	Texas	60	10.39	3.75	23.33	3.12	13.62	0.33	1.00
Benzaldehyde	Texas	22	0.49	0.26	0.22	0.55	0.87	0.44	0.60
Benzene	Alberta	30	1.03	0.75	1.10	0.96	1.22	1.01	0.79
Benzyl Chloride	Texas	50	0.00	0.01	0.01		0.00		0.00
b-Pinene	Texas	64	6.09	1.96	12.62	2.53	8.68	0.00	0.00
Bromodichloromethane	Texas	700	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bromoform	Texas	50	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Bromomethane (methyl bromide)	Texas	120	0.04	0.05	0.04	0.05	0.04	0.04	0.04
Bromotrichloromethane			0.00	0.00	0.00		0.00	0.00	0.00
Butane	Texas	23750	6.35	9.54	4.84	22.26	3.29	7.86	4.76
Butylacetate	Ontario	15000	0.06	0.03	0.00	0.00	0.90	0.35	0.25
Butylaldehyde (Butanal)	Texas	14	0.80	0.71	0.88	0.52	0.71	0.45	1.43
c-1,2-Dichloroethene (1,2-dichloroethylene)	Texas	7900	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c-1,2-Dimethylcyclohexane	Texas	3500	0.03	0.01	0.01	0.01	0.02	0.02	0.01
c-1,3-Dichloropropene	Texas	45	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c-1,3-			0.09	0.03	0.05	0.06	0.06	0.07	0.04

VOC	Jurisdiction	1-hr Objective (µg/m3)	Concentration (µg/m^3)						
			9-Mar-11	10-Mar-11	15-Mar-11	19-May-11	23-Nov-11	5-Dec-11	14-Dec-11
Dimethylcyclohexane									
c-1,4/t-1,3-Dimethylcyclohexane	Texas	3500	0.04	0.01	0.02	0.02	0.03	0.03	0.01
c-2-Butene	Texas	4800	0.50	0.13	0.41	0.19	0.30	0.38	0.33
c-2-Heptene	Texas	16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c-2-Hexene	Texas	70	0.03	0.01	0.04	0.02	0.03	0.02	0.01
c-2-Pentene	Texas	7500	0.12	0.03	0.18	0.08	0.11	0.09	0.05
c-3-Heptene	Texas	16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
c-3-Methyl-2-Pentene			0.07	0.03	0.10	0.06	0.13	0.04	0.03
c-4-Methyl-2-Pentene			0.04	0.01	0.08	0.04	0.04	0.03	0.02
Camphene	Texas	50	1.46	0.46	3.42	0.57	2.10	0.89	3.78
Carbon Disulfide	Alberta	30	0.18	0.17	0.20	0.95	0.46	0.34	3.89
Carbontretrachloride	Texas	130	0.42	0.43	0.40	0.54	0.44	0.43	0.40
Chlorobenzene	Texas	460	0.00	0.00	0.00	0.00	0.00	0.01	0.01
Chloroethane	Texas	500	0.02	0.02	0.02	0.02	0.02	0.02	0.01
Chloroform	Texas	100	0.20	0.12	0.28	0.18	0.27	0.34	0.15
Chloromethane (methyl chloride)	Texas	1030	1.18	1.21	1.16	1.34	1.13	1.06	0.96
Cyclohexane	Texas	3400	0.31	0.34	0.61	0.69	0.39	0.44	0.43
Cyclohexanone	Texas	480	0.03	0.02	0.00	0.03	0.12	0.06	0.00
Cyclohexene	Texas	600	0.02	0.01	0.00	0.01	0.02	0.01	0.01
Cyclopentane	Texas	3400	0.16	0.26	0.25	0.48	0.18	0.20	0.11
Cyclopentanone	Texas	1700	0.05	0.00	0.00	0.00	0.00	0.00	0.00
Cyclopentene	Texas	8100	0.03	0.01	0.05	0.02	0.05	0.03	0.01
Decane	Ontario	60000	0.59	0.38	0.20	0.09	0.21	0.15	0.16
Dibromochloromethane	Texas	20	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Dibromomethane (methylene bromide)	Texas	1320	0.00	0.03	0.03	0.03	0.02	0.03	0.03
Dichloromethane	Texas	260	0.32	0.28	0.27	0.25	0.67	2.50	1.13

VOC	Jurisdiction	1-hr Objective (µg/m3)	Concentration (µg/m^3)						
			9-Mar-11	10-Mar-11	15-Mar-11	19-May-11	23-Nov-11	5-Dec-11	14-Dec-11
Dodecane	Texas	3500	0.49	0.26	0.22		0.29	0.02	0.16
Ethane						6.79	3.09	4.98	5.02
Ethanol (ethyl alcohol)	Ontario	19000	5.41	3.16	5.30	5.43	9.52	7.43	7.65
Ethylacetate	Ontario	19000	0.05	0.03	0.06	0.03	0.38	0.63	0.16
Ethylbenzene	Texas	740	0.39	0.21	0.53	0.38	0.50	0.33	0.13
Ethylbromide (bromoethane)	Texas	220	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethylene	Texas	1170				1.66	3.29	2.94	4.20
Ethylene oxide	Ontario	15	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Freon 11 (Trichlorofluoromethane)	Texas	28000	1.35	1.34	1.23	1.52	1.40	1.39	1.18
Freon 113 (1,1,2-Trichlorotrifluoroethane	Texas	38000	0.52	0.53	0.48	0.57	0.54	0.54	0.47
Freon 114 (1,2-Dichlorotetrafluoroethane	Texas	70000	0.11	0.11	0.10	0.11	0.11	0.12	0.09
Freon 12 (Dichlorodifluoromethane)	Texas	49500	2.36	2.37	2.17	2.57	2.50	2.47	2.09
Freon 134A	Alberta	17140					0.50	0.53	0.36
Freon 22 (Chlorodifluoromethane)	Texas	18000	0.67	0.65	0.61	0.69	0.75	0.75	0.60
Heptane	Texas	3500	1.82	0.30	0.54	0.56	0.68	0.62	0.00
Hexachlorobutadiene	Texas	2	0.00	0.00	0.00	0.00	0.00	0.01	0.01
Hexanal	Texas	80	4.55	5.32	1.12	1.57	4.97	2.23	4.85
Hexane	Alberta	21000	1.29	0.95	1.58	1.98	1.10	1.09	0.79
Hexylbenzene	Texas	1250	0.01	0.00	0.00	0.01	0.01	0.00	0.01
Indan (2,3-Dihydroindene) (indane)	Texas	480	0.20	0.10	0.08	0.07	0.57	0.01	0.03
Isobutane (2-Methylpropane)	Texas	4800	4.70	4.05	2.22	10.06	1.74	3.71	4.75

VOC	Jurisdiction	1-hr Objective (µg/m3)	Concentration (µg/m^3)						
			9-Mar-11	10-Mar-11	15-Mar-11	19-May-11	23-Nov-11	5-Dec-11	14-Dec-11
Isobutylacetate	Texas	630	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Isobutylalcohol	Texas	1520	0.00	0.00	0.00	0.00	0.00	0.00	0.00
iso-Butylbenzene	Texas	2740	0.04	0.02	0.01	0.01	0.15	0.00	0.01
Isoprene (2-Methyl-1,3-Butadiene)	Texas	14	0.08	0.02	0.11	0.13	0.16	0.07	0.02
Isopropyl Alcohol	Texas	4920	0.50	0.21	0.49	0.00	1.01	0.47	0.30
Isopropylacetate	Texas	3760	0.00	0.00	0.00	0.00	0.00	0.00	0.00
iso-Propylbenzene (cumene)	Alberta	500	0.03	0.02	0.03	0.01	0.04	0.03	0.02
Limonene			3.15	1.21	2.53	0.90	5.46	0.01	0.50
m,p-Xylene	Alberta	2300	1.56	0.81	2.13	1.73	2.09	1.06	0.41
MAC (2-Methyl-2-propenal)			0.12	0.12	0.23	0.09	0.20	0.10	0.13
MEK (methyl ethyl ketone)	Texas	1300	0.83	0.65	1.11	0.46	0.87	0.58	0.93
Methanol (methyl alcohol)	Alberta	2600	36.29	13.90	75.75	12.52	49.35	38.46	26.32
Methyl Acetate	Texas	6000	0.24	0.08	0.11	0.00	0.27	0.37	0.18
Methylcyclohexane	Texas	600	0.41	0.16	0.23	0.27	0.28	0.34	0.22
Methylcyclopentane	Texas	3500	0.47	0.42	0.88	0.92	0.65	0.58	0.37
Methyl-t-Butyl Ether (MTBE)	Texas	450	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MIBK (methyl isobutyl ketone)	Texas	820	0.08	0.03	0.07	0.08	0.09	0.07	0.05
MVK (methyl vinyl ketone)	Texas	6	0.75	0.00	0.00	0.00	0.00	0.00	0.00
Naphthalene	Texas	440	0.12	0.06	0.05	0.06	0.13	0.01	0.10
n-Butylbenzene	Texas	2740	0.04	0.00	0.00	0.03	0.02	0.01	0.01
Nonane	Texas	10500	0.65	0.29	0.14	0.10	0.17	0.16	0.13
n-Propylbenzene	Texas	1250	0.09	0.04	0.09	0.05	0.08	0.05	0.03
Octane	Texas	3500	0.68	0.16	0.22	0.21	0.22	0.23	0.15
o-Xylene	Alberta	2300	0.53	0.27	0.69	0.55	0.67	0.37	0.14

VOC	Jurisdiction	1-hr Objective (µg/m3)	Concentration (µg/m^3)						
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p-Cymene (1-Methyl-4-Isopropylbenzene)	Texas	2750	2.04	0.76	6.20	0.68	5.80	1.18	3.31
Pentanal (valeraldehyde)	Texas	100	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pentane	Texas	3500	2.12	2.92	2.27	6.13	1.60	2.18	1.14
Propane	Texas *	18000	3.67	2.82	1.50	11.36	5.78	5.77	7.54
Propene (propylene)	Texas *	8750	2.90	0.94	1.34	0.83	1.50	1.22	9.37
Propionaldehyde	Texas	20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Propyl alcohol (1-Propanol)	Texas	2460	0.16	0.14	0.09	0.07	0.16	0.09	0.19
Propylene Oxide	Alberta	480	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Propyne	Texas	16400	0.14	0.05	0.12	0.14	0.18	0.12	0.51
sec-Butylbenzene	Texas	2740	0.02	0.01	0.01	0.00	0.00	0.01	0.00
Styrene (vinyl benzene)	Alberta	215	0.09	0.02	0.09	0.06	0.15	0.01	0.00
t-1,2-Dichloroethene			0.00	0.00	0.00	0.00	0.00	0.00	0.00
t-1,2-Dimethylcyclohexane	Texas	3500	0.08	0.03	0.03	0.04	0.05	0.06	0.03
t-1,3-Dichloropropene	Texas	45	0.00	0.00	0.00	0.00	0.00	0.00	0.00
t-1,4-Dimethylcyclohexane			0.04	0.01	0.02	0.02	0.03	0.03	0.02
t-2-Butene	Texas	4800	0.74	0.23	0.61	0.27	0.39	0.55	0.50
t-2-Heptene	Texas	16	0.01	0.00	0.02	0.01	0.01	0.01	0.01
t-2-Hexene			0.05	0.01	0.08	0.04	0.06	0.04	0.02
t-2-Octene	Texas *	100	0.00	0.00	0.00	0.00	0.00	0.00	0.00
t-2-Pentene	Texas	7500	0.24	0.07	0.39	0.21	0.25	0.18	0.10
t-3-Heptene	Texas	16	0.01	0.00	0.02	0.01	0.01	0.01	0.01
t-3-Methyl-2-Pentene			0.02	0.01	0.04	0.02	0.04	0.02	0.01
t-4-Methyl-2-Pentene			0.01	0.00	0.01	0.00	0.00	0.00	0.00
tert-Butylbenzene	Texas	2740	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tetrachloroethene (tetrachloroethylene)	Texas	2000	0.22	0.03	0.05	0.03	0.11	0.11	0.06
Toluene	Alberta	1880	2.40	1.12	3.66	3.11	3.11	2.48	1.25

VOC	Jurisdiction	1-hr Objective (µg/m3)	Concentration (µg/m^3)						
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Trichloroethene			0.29	0.12	0.72	0.00	0.01	0.07	0.04
Undecane	Texas	3500	0.53	0.42	0.26	0.14	0.31	0.08	0.23
Vinylchloride (Chloroethene)	Alberta	130	0.01	0.00	0.00	0.00	0.01	0.01	0.00

* No 2010 numerical Texas ESL available, 2009 reported