Dichloromethane

Environmental estimates (circa 2011): Supplemental data

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1. Data for lifetime excess cancer risk estimates

Overview

The summary data used to calculate lifetime excess cancer risk and the results for dichloromethane are provided in the tables below. For more detailed information on supporting data and sources, use the tabs for each exposure pathway.

i. Environmental Concentrations

Exposure pathway	Units	Average	Maximum	Notes
Outdoor air	µg/m³	0.68	11.1	
Indoor air	µg/m³	6.44	150.0	
Drinking water	µg/L	Insufficient data		
Foods and beverages		Insufficient data		

ii. Calculated Lifetime Daily Intake

Exposure pathway	Average intake (mg/kg bodyweight per day)	Maximum intake (mg/kg bodyweight per day)
Outdoor air	0.000016	0.00026
Indoor air	0.0021	0.0487
Drinking water	Insufficient data	
Foods and beverages	Insufficient data	

iii. Cancer Potency Factors

Exposure route	Health Canada	US EPA	CA OEHHA
Inhalation	0.0001	0.00004	0.0035
Ingestion	0.00008	0.002	0.014

Sources for Cancer Potency Factors:

- Health Canada, 2010. Federal Contaminated Site Risk Assessment in Canada, Part I: Guidance on Human Health Preliminary Quantitative Risk Assessment. Version 2.0.
- Health Canada, 2010. Federal Contaminated Site Risk Assessment in Canada, Part II: Health Canada Toxicological Reference Values (TRVs) and Chemical-Specific Factors. Version 2.0. (
- United States Environmental Protection Agency Integrated Risk Information System
- California Office of Environmental Health Hazard Assessment, 2009. Air Toxics Hot Spots Risk Assessment Guidelines Part II: Technical Support Document for Cancer Potency Factors, Appendix A. (Updated 2011)

iv. Lifetime Excess Cancer Risk (per million people)

	Average[1]			Maximum[2]
Exposure pathway	Health Canada	US EPA	CA OEHHA[3]	
Outdoor air	0.00157	0.0006	0.0551	0.899
Indoor air	0.2092	0.0732	7.322	170.56
Drinking water	Insufficient data			
Foods and beverages	Insufficient data			

[1]Lifetime excess cancer risk based on average intake x cancer potency factor from each agency
[2]Lifetime excess cancer risk based on maximum intake x highest cancer potency factor
[3]California Office of Environmental Health Hazard Assessment

Supporting data by exposure pathway

i. Outdoor air

Outdoor air concentrations are from the National Air Pollution Surveillance monitoring network operated by Environment Canada, for the year 2010.

Source	Stations (n)	Min	Max	Mean	DF
NAPS 2010 (µg/m³)	53	0.12	11.1	0.68	1.0

DF = Detection frequency

We assume dichloromethane is present at these levels in all outdoor air, although concentrations may vary from one location to another.

ii. Indoor air

Indoor air concentrations are based on data published in peer-reviewed literature since 2000. A ranking system was used to select data most representative of Canadian conditions circa 2011:

1. Canadian data collected in 2000 or more recently, sample duration of 24 hours or longer;
2. US studies of similar currency and sample duration;
3. Studies from northern European countries of similar currency and sample duration;
4. Canadian, US or European studies with data collected prior to 2000 and similar sample duration; and
5. Studies with sample duration of less than 24 hours regardless of country or collection date, or studies from countries not comparable to Canada.

Rank: 1	Author:	Health Canada (2012)					Location:	Halifax, NS			
Samples (n)	DF*	DL**	Sample Date	Units	Sample Duration	Min	Max	Mean (AM)	Med	Geomean (GM)	Percentile
331	1.0	0.055	2009 summer	µg/m³	24hr	0.192	173.20	6.854	0.715	1.197	25th 0.308 75th 3.664 90th 13.33 95th 28.79
312	1.0		winter			0.203	156.60	6.969	0.802	1.448	25th 0.412 75th 6.472 90th 15.73 95th 22.24

*DF = Detection frequency
**DL = Detection limit

Rank: 1	Author:	Health Canada (2010)					Location:	Regina, SK			
Samples (n)	DF*	DL**	Sample Date	Units	Sample Duration	Min	Max	Mean (AM)	Med	Geomean (GM)	Percentile
105	1.0	0.024	2007 Summer	µg/m³	24hr	0.210	77.495	5.152	1.060	1.469	25th 0.525 75th 2.970 90th 10.450 95th 27.615
101	1.0				5 day	0.260	105.900	6.842	0.985	1.683	25th 0.497 75th 5.015 90th 21.270 95th 42.405
105	1.0		winter		24hr	0.207	81.183	5.425	1.140	1.546	25th 0.490 75th 3.643 90th 13.987 95th 24.820
89	1.0				5 day	0.157	39.907	5.169	1.667	1.876	25th 0.567 75th 4.937 90th 17.820 95th 25.173

*DF = Detection frequency
**DL = Detection limit

Rank: 1	Author:	Health Canada (2010)					Location:	Windsor, ON			
Samples (n)	DF*	DL**	Sample Date	Units	Sample Duration	Min	Max	Mean (AM)	Med	Geomean (GM)	Percentile
217	1.0	0.089	2005 summer	µg/m³	24hr	0.265	79.600	5.054	1.015	1.630	25th 0.665 75th 2.830 90th 12.547 95th 27.060
232	1.0		winter			0.212	17.020	1.956	0.520	0.893	25th 0.393 75th 1.783 90th 5.308 95th 9.808
211	0.995	0.081	2006 summer		24hr	0.040	389.347	15.140	1.480	2.029	25th 0.483 75th 4.373 90th 22.220 95th 49.053
224	1.0		winter			0.170	130.080	4.963	0.695	1.238	25th 0.387 75th 4.532 90th 11.330 95th 29.627

*DF = Detection frequency
**DL = Detection limit

Rank: 1	Author:	Stocco (2008)					Location:	Windsor ON			
Samples (n)	DF*	DL**	Sample Date	Units	Sample Duration	Min	Max	Mean (AM)	Med	Geomean (GM)	Percentile
48	1.0	0.009	2005	µg/m³	24h					0.93 1.56	

Notes: homes of non-smokers, 5 repeated measures, Values listed in following order: Winter, Summer
*DF = Detection frequency
**DL = Detection limit

Rank: 2	Author:	Johnson (2010)					Location:	Detroit, MI			
Samples (n)	DF*	DL**	Sample Date	Units	Sample Duration	Min	Max	Mean (AM)	Med	Geomean (GM)	Percentile
41	0.07		2006	µg/m³	7-day		17.7	0.1			All < dl, except 95th 2.5

Notes: homes of non-smokers, 5 repeated measures, Values listed in following order: Winter, Summer
*DF = Detection frequency
**DL = Detection limit

Sources for indoor air data:

- Health Canada. 2012. Halifax Indoor Air Quality Study (2009) – Volitile Organic Compounds (VOC) Data Summary. Available online at http://www.healthcanada.gc.ca.
- Health Canada. 2010. Regina Indoor Air Quality Study (2007) : Data Summary for Volatile Organic Compound Sampling. Available online at http://www.healthcanada.gc.ca.
- Health Canada . 2010. Windsor Exposure Assessment Study (2005-2006) : Data Summary for Volatile Organic Compound Sampling. Available online at : http://www.healthcanada.gc.ca.
- Johnson MM, Williams R, Fan Z, Lin L, Hudgens E, Gallagher J, et al. 2010. Participant-based monitoring of indoor and outdoor nitrogen dioxide, volatile organic compounds, and polycyclic aromatic hydrocarbons among MICA-Air households. Atmospheric Environment In Press: 1-10.

- Stocco C, MacNeill M, Wang D, Xu X, Guay M, Brook J, et al. 2008. Predicting personal exposure of Windsor, Ontario residents to volatile organic compounds using indoor measurements and survey data. Atmospheric Environment 42: 5905-5912.

iii. Dust

Dichloromethane is not expected to be present in indoor dust in significant amounts.

iv. Drinking water

No recent data or studies were identified.

v. Food and Beverages

No recent data or studies were identified.

2. Data quality for lifetime excess cancer risk estimates

Only publicly available data were used to calculate these indicators. Data that are not publicly available may produce different results.

No systematic method for measuring data quality was possible, so we provide the following assessments of how well the data used may represent the actual Canadian average levels. Quality is rated higher when there are data from a number of Canadian monitors, or from Canadian studies that show results similar to other comparable studies. Quality is rated lower when data from few monitors or studies were available, and lowest when estimates are based on non-Canadian data. Others may rate data quality differently.

Exposure Pathway	Data Quality	Notes
Outdoor air	High	• Dichloromethane is regularly measured in outdoor air at 53 monitoring stations across Canada using accepted protocols.
Indoor air	Moderate	• Good agreement between mean concentrations measured in recent studies in Halifax NS, Regina SK, and Windsor ON.
Drinking water	Gap	• No recent Canadian data or studies were identified.
Foods and beverages	Gap	• No Canadian or US data on concentrations of dichloromethane in foods or beverages were identified.

3. Data for mapping concentrations

The maps use geographic coordinates at the census block level to represent residential locations. Concentration estimates are mapped at the health region level, which are created with aggregated census block data.

We used a model to predict annual average concentrations of dichloromethane in outdoor air at residential locations for 2011. These are predicted using levels measured from the National Air Pollution Surveillance (NAPS) monitors and estimated concentrations from known emitters. For more information on how these estimates were created, please see the Mapping Methods document on the Environmental Approach section of our website.

Estimates by health region

The table below shows predicted dichloromethane concentrations by province based on data at the health region level. The median concentration of dichloromethane measured in outdoor air in 2011 at the health region level was 0.530 µg/m^3, while the mean concentration was 0.533 µg/m^3. Concentrations of dichloromethane can be higher or lower than average in many locations.

i. Provincial averages of predicted dichloromethane concentrations (µg/m^3) in outdoor air in 2011 based on health regions

Province	Median	Mean
BC	0.487	0.476
AB	0.518	0.527
SK	0.588	0.574
MB	0.520	0.498
ON	0.512	0.537
QC	0.560	0.574
NB	0.527	0.521
PE	0.624	0.624
NS	0.429	0.414
NL	0.576	0.544
YK	0.532	0.532
NT	0.572	0.572
NU	0.608	0.608
Canada	**0.530**	**0.533**

Estimates by census block

The table below shows provincial populations by concentration levels (either annual average or number of times above/below the national average) based on the census block data and the associated potential lifetime excess risk given different cancer potency factors.

i. Provincial population distribution by estimated average concentration (µg/m³) of dichloromethane in outdoor air in 2011 based on NAPS data at the census block

Estimated annual average concentration (µg/m³)	Less than 0.23	0.23 to 0.27	0.27 to 0.34	0.34 to 0.45	0.45 to 0.68	0.68 to 1.02	1.02 to 1.36	1.36 to 1.70	1..70 to 2.04	More than 2.04
Compared to national average (0.68µg/m³)*	>3x lower	2.5 to 3x lower	2 to 2.5x lower	1.5 to 2x lower	1 to 1.5x lower	1 to 1.5x higher	1.5 to 2x higher	2 to 2.5x higher	2.5 to 3x higher	>3.0x higher
	← Below Average					Above Average →				
BC	399,586 (9.1%)	260,658 (5.9%)	477,283 (10.8%)	864,077 (19.6%)	1,325,961 (30.1%)	882,670 (20.1%)	84,230 (1.9%)	--	--	105,592 (2.4%)
AB	42,059 (1.2%)	--	670,479 (18.4%)	2,117,733 (58.1%)	246,542 (6.8%)	526,338 (14.4%)	40,368 (1.1%)	1,738 (<0.1%)	--	--
SK	--	4,425 (0.4%)	610,544 (59.1%)	--	--	418,412 (40.5%)	--	--	--	--
MB	--	--	327,399 (27.1%)	785,679 (65.0%)	--	95,190 (7.9%)	--	--	--	--
ON	973,363 (7.6%)	91,258 (0.7%)	1,837,746 (14.2%)	1,580,605 (12.3%)	4,946,187 (38.5%)	2,374,525 (18.5%)	223,711 (1.7%)	88,460 (0.7%)	721 (<0.1%)	735,245 (57.2%)
QC	627,995 (7.9%)	190,148 (2.4%)	1,171,706 14.8%)	390,595 (4.9%)	274,178 (3.5%)	4,908,910 (62.1%)	288,018 (3.6%)	45,511 (0.6%)	5,940 (<0.1%)	--
NB	50,658 (6.7%)	96,554 (12.9%)	272,980 (36.3%)	--	--	330,979 (44.1%)	--	--	--	--
NS	--	24,690 (2.7%)	264,044 (28.6%)	407,087 (44.1%)	--	225,906 (24.5%)	--	--	--	--
PE	--	--	55,830 (39.8%)	--	--	48,128 (34.3%)	24,444 (17.4%)	11,035 (7.9%)	767 (<0.1%)	--
NL	--	--	237,900 (46.2%)	235,709 (45.8%)	--	40,927 (8.0%)	--	--	--	--
NU	0 (<0.1%)	--	31,906 (100.0%)	--	--	--	--	--	--	--
NT	--	--	22,228 (53.6%)	--		19,234 (46.4%)	--	--	--	--
YT	--	--	7,869 (23.2%)	--	--	26,028 (76.8%)	--	--	--	--
CANADA	2,093,661	667,733	5,987,914	6,381,485	6,792,868	9,897,247	660,771	146,744	7,428	840,837
% of pop.	(6.3%)	(2.0%)	(17.9%)	(19.1%)	(20.3%)	(29.6%)	2.0%)	(0.4%)	(<0.1%)	(2.5%)

ASSOCIATED LIFETIME EXCESS CANCER RISK (per million people):
RED = POTENTIAL LIFETIME EXCESS RISK IS GREATER THAN 1 PER MILLION PEOPLE

Health Canada CPF: 0.0001	< 0.0005	0.0005 to < 0.0006	0.0006 to <0.0008	0.0008 to < 0.001	0.001 to < 0.0016	0.0016 to < 0.0024	0.0024 to < 0.0031	0.0031 to < 0.0039	0.0039 to < 0.0047	> 0.0047
California OEHHA CPF: 0.0035	< 0.018	0.018 to < 0.02	0.02 to < 0.03	0.03 to < 0.04	0.04 to < 0.06	0.06 to < 0.08	0.08 to < 0.11	0.11 to < 0.14	0.14 to < 0.17	> 0.17
US EPA CPF: 0.00004	< 0.002	0.002 to < 0.0025	0.0025 to < 0.003	0.003 to < 0.004	0.004 to < 0.006	0.006 to < 0.009	0.009 to < 0.013	0.013 to < 0.016	0.016 to < 0.019	> 0.019

* measured at National Air Pollution Surveillance (NAPS) monitors in 2011
CPF: Cancer Potency Factor