

Bromodichloromethane 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 bromodichloromethane are provided in the tables below. For more detailed information on supporting data and sources, see below for each exposure pathway.

i. Environmental Concentrations								
Exposure pathway	Units	Average	Maximum	Notes				
Indoor air	µg/m³	0.4	4.05					
Drinking water	μg/L	6.2	32.4					
Foods and beverages		See detailed data	Not estimated					

ii. Calculated Lifetime Daily Intake

Exposure pathway	Average intake (mg/kg bodyweight per day)	Maximum intake (mg/kg bodyweight per day)
Indoor air	0.00013	0.0013
Drinking water	0.00016	0.0008
Foods and beverages	0.0000011	Not estimated

iii. Cancer Pote	ency Factors		
Exposure route	Health Canada	US EPA	CA OEHHA
Inhalation			0.13
Ingestion		0.062	0.13

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	
Indoor air			16.89	171.0
Drinking water		9.98	20.93	109.4
Foods and beverages		0.0663	0.1389	Not estimated

¹Lifetime excess cancer risk based on average intake x cancer potency factor from each agency

²Lifetime excess cancer risk based on maximum intake x highest cancer potency factor

³California Office of Environmental Health Hazard Assessment

Supporting data by exposure pathway

i. Outdoor air

Bromodichloromethane is not expected to be present in outdoor air in significant amounts.

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:	Healt	h Canada (20	12)			Location:	Halifax, NS			
Samples (n)	DF*	DL**	Sample Date	Units	Sample Duration	Min	Max	Mean (AM)	Med	Geomean (GM)	Percentile
331	0.637	0.035	2009 summer	µg/m³	24h	<dl< td=""><td>1.188</td><td>0.114</td><td>0.064</td><td><dl< td=""><td>25th <dl 75th <dl 90th <dl 95th <dl< td=""></dl<></dl </dl </dl </td></dl<></td></dl<>	1.188	0.114	0.064	<dl< td=""><td>25th <dl 75th <dl 90th <dl 95th <dl< td=""></dl<></dl </dl </dl </td></dl<>	25 th <dl 75th <dl 90th <dl 95th <dl< td=""></dl<></dl </dl </dl
312	0.641		winter			<dl< td=""><td>0.843</td><td>0.093</td><td>0.07</td><td><dl< td=""><td>25th <dl 75th <dl 90th <dl 95th <dl< td=""></dl<></dl </dl </dl </td></dl<></td></dl<>	0.843	0.093	0.07	<dl< td=""><td>25th <dl 75th <dl 90th <dl 95th <dl< td=""></dl<></dl </dl </dl </td></dl<>	25 th <dl 75th <dl 90th <dl 95th <dl< td=""></dl<></dl </dl </dl

*DF = Detection frequency **DL = Detection limit

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	Author	r: Heal	th Canada (20)10)			Location:	Regina, SK			
Samples (n)	DF*	DL**	Sample Date	Units	Sample Duration	Min	Max	Mean (AM)	Med	Geomean (GM)	Percentile
105	0.819	0.096	2007 Summer	µg/m³	24hr 5 day	0.048	6.910 3.865	0.615	0.330	0.321	25th 0.177 75th 0.765 90th 1.270 95th 2.010 25th 0.207
105	0.081		winter		246-	0.048	3 577	0.890	0.762	0.502	75 th 1.015 90 th 1.710 95 th 2.340
105	0.981		winter		24hr	0.048	2.577	0.889	0.763	0.693	25 th 0.507 75 th 1.133 90 th 1.737 95 th 2.160
89	0.989				5 day	0.048	2.860	0.876	0.747	0.679	25 th 0.390 75 th 1.213 90 th 1.770 95 th 2.033

*DF = Detection frequency **DL = Detection limit



Rank: 1	Author	: Heal	lth Canada (20)10)			Location:	Windsor, ON	4		
Samples (n)	DF*	DL**	Sample Date	Units	Sample Duration	Min	Мах	Mean (AM)	Med	Geomean (GM)	Percentile
217	0.889	0.154	2005 summer	µg/m³	24hr	0.077	8.350	0.785	0.640	0.534	25 th 0.337 75 th 1.040 90 th 1.543 95 th 1.830
232	0.897		winter			0.077	3.144	0.428	0.360	0.342	95th 1.830 25th 0.237 75th 0.537 90th 0.707 95th 0.927
211	0.015	0.037	2006 summer		24hr	0.018	0.095	0.018	1.353	0.019	25 th 0.018 75 th 0.018 90 th 0.018
224	0.0		winter			0.018	0.018	0.018	0.018	0.018	95th 0.018 25th 0.018 75th 0.018 90th 0.018 95th 0.018

**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.

iii. Dust

Bromodichloromethane is not expected to be present in indoor dust.

iv. Drinking water

Drinking water data are from the Ontario Drinking Water Surveillance Program (DWSP) for 2011. A review of published reports was also conducted in order to compare how well the Ontario data represented other regions in Canada.

Source	Units	DL							
Ontario DWSP 2011	(µg/L)	0.2							
Sample Type	Parameter	Mean	SD	Min	25 th	50 th	75 th	Max	N
Distribution		6.2	5.3	0.4	2.8	4.8	8.4	32.4	34

DL = Detection limit

SD = Standard Deviation



v. Food and Beverages

Food consumption data are from the Statistics Canada Food Survey (2006) - Food available, adjusted for losses tables, and from the Nutrition Canada Survey (1970-1972).

Food concentration data are primarily from the US-FDA Total Diet Study (2003-2004), with additional data on metals and several PAHs from the Canadian Food Inspection Agency (CFIA) - National Chemical Residue Monitoring Program: 2009-2010 Annual Report and the US-FDA (TDS Statistics on Element Results - 2008).

In order to better represent actual intake, we incorporated data for cooked and/or processed foods, as in some cases, this can either add to or diminish the amount measured in raw food.

Concentration data were obtained for 11% of total fruit consumed, 8% of total vegetables consumed, 12% of total dairy and eggs consumed, 1% of total grains consumed, and 21% of total beverages consumed.



Food or Beverage	Concentration (µg/g)	DF	Food or Beverage	Concentration (µg/g)	DF
Beef			Peaches fresh		
Chicken			Pears canned		
Mutton and lamb			Pears fresh		
Offal			Pineapples canned		
Oils and fats			Pineapples fresh		
Pork			Plums total fresh		
Salad oils			Quinces fresh		
Shortening and shortening oils	5		Raspberries frozen		
Stewing hen			Strawberries canned		
Turkey			Strawberries fresh	0.00300	0.02326
Veal			Strawberries frozen		
Fish fresh and frozen seafish			Sugar maple		
Fish freshwater			Sugar refined		
Fish processed seafish			Honey		
Apple pie filling			Artichokes fresh		
Apple sauce			Asparagus canned		
Apples canned			Asparagus fresh		
Apples dried			Avocados fresh		
Apples fresh			Beans baked and canned		
Apples frozen			Beans dry		
Apricots canned			Beans green and wax canned		
Apricots fresh			Beans green and wax fresh		
Bananas fresh			Beans green and wax frozen		
Berries other fresh			Beets canned		
Blueberries canned			Beets fresh		
Blueberries fresh			Broccoli fresh		
Blueberries frozen			Broccoli frozen		
Cherries fresh			Brussels sprouts fresh		
Cherries frozen			Brussels sprouts frozen		
Citrus other fresh			Cabbage Chinese fresh		
Coconut fresh			Cabbage fresh		
Cranberries fresh			Carrots canned		
Dates fresh			Carrots fresh		
Figs fresh			Carrots frozen		
Fruit dried			Cauliflower fresh		
Grapefruit fresh			Cauliflower frozen		
Grapes fresh			Celery fresh		
Guava and mangoes fresh			Corn canned		
Kiwi fresh			Corn flour and meal		
Lemons fresh			Corn fresh		
Limes fresh			Corn frozen		
Mandarins fresh			Cucumbers fresh		
Melons musk, cantaloupe fres	h		Eggplant fresh		
Melons other fresh			Garlic fresh		
Melons watermelons fresh			Kohlrabi fresh		
Melons, winter melons fresh			Leeks fresh		
Nectarines fresh			Lettuce fresh		
Oranges fresh	0.01400	0.02273	Lima beans frozen		
Papayas fresh			Manioc fresh		
Peaches canned			Mushrooms canned		

Bromodichloromethane



(µg/g) (µg/g) Mulk buttermilk (µg/g) Mulk chocolate drink						
Okra fresh Milk chocolate drink Image: Steph S	Food or Beverage		DF	Food or Beverage		D
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Parsley fresh Milk other whole milk products Parsings fresh Milk spartly skimmed 2% Peas canned Milk skim Peas fresh Milk skim Peas fresh Milk standard Peas fresh Milk standard Peas frozen Milk sweetened concentrated skim Peterson 0.01400 0.02273 Potatoes frozen Powder skim milk Potatoes other processed Powder skim milk Potatoes other processed Sherbet Potatoes white fresh and processed Cereal products Potatoes white fresh and processed Potatoes and use fresh Putatoes white fresh Cereal products Pattores white fresh Otatonal paral barley Pattoes white fresh Potatoe skim milk Spinach fresh Polase and nuts Rutabagas and turnip fresh Tree nuts Tomatoes canned Unice grape Tomatoes fresh 0.01100 0.02273 Ale, beer, stout and porter Use grape Vegetables unspecified fresh Juice grape fruit Vegetables unspecified fresh Juice grape Vegetables unspecified f	Olives fresh			Milk concentrated skim		
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Vegetables unspecified ranned Juice apple 0.03300 0.022 Vegetables unspecified fresh Juice grape Juice fruit Image: State	-			Distilled spirits		
Vegetables unspecified frozen Juice tomato Butter 0.00600 0.02273 Juice fruit Cheese cheddar Juice grapefruit Juice lemon Juice lemon Cheese processed 0.00300 0.02273 Juice orange 0.00300 0.2500 Cheese variety 0.00036 0.06818 Juice vegetable Juice vegetable					0.03300	0.022
Butter 0.00600 0.02273 Juice fruit Cheese cheddar Juice grapefruit Juice lemon Cheese cottage 0.00300 0.02273 Juice orange 0.00300 0.250 Cheese variety 0.00036 0.06818 Juice pineapple 0.00030 0.250 Cream cereal 10% Juice vegetable Juice vegetable 0.00043 0.0909 Cream sour 0.00030 0.09091 Soft drinks 0.00043 0.090 Cream whipping 32% or 35% Tea Vines Ite pineapple Ite pineapp	Vegetables unspecified fresh			Juice grape		
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Cheese variety 0.00036 0.06818 Juice pineapple Cream cereal 10% Juice vegetable Cream sour 0.00030 0.09091 Cream table 18% Tea Cream whipping 32% or 35% Water bottled Eggs Wines Ice cream 0.00034 0.11364 Cocoa Cocoa	Cheese cottage			Juice lemon		
Cheese variety 0.00036 0.06818 Juice pineapple Cream cereal 10% Juice vegetable Juice vegetable Cream sour 0.00030 0.09091 Soft drinks 0.00043 0.090 Cream table 18% Tea Tea <td>Cheese processed</td> <td>0.00300</td> <td>0.02273</td> <td>Juice orange</td> <td>0.00300</td> <td>0.250</td>	Cheese processed	0.00300	0.02273	Juice orange	0.00300	0.250
Cream cereal 10% Juice vegetable Cream sour 0.00030 0.09091 Cream table 18% 0.00043 0.0004 Cream whipping 32% or 35% Tea Eggs Water bottled Ice cream 0.00034 0.11364 Ice milk Cocoa	Cheese variety		0.06818	Juice pineapple		
Cream table 18% Tea Cream whipping 32% or 35% Water bottled Eggs 0.00034 0.11364 Ice milk Cocoa	Cream cereal 10%			Juice vegetable		
Cream table 18% Tea Cream whipping 32% or 35% Water bottled Eggs 0.00034 0.11364 Ice milk Cocoa	Cream sour	0.00030	0.09091	Soft drinks	0.00043	0.090
Eggs Wines Ice cream 0.00034 0.11364 Cocoa	Cream table 18%			Теа		
Ice cream 0.00034 0.11364 Cocoa	Cream whipping 32% or 35%			Water bottled		
Ice milk	Eggs			Wines		
	lce cream	0.00034	0.11364	Cocoa		
Margarine 0.00030 0.06818	Ice milk					
	Margarine	0.00030	0.06818			



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
Indoor Air	Moderate	 Reasonable agreement in mean concentrations measured in three recent Canadian studies (Halifax NS, Regina SK, and Windsor ON).
Drinking water	Moderate	 Bromodichloromethane was detected in all samples (n = 342) of water in distribution systems, based on data from the Ontario Drinking Water Surveillance Program in 2011.
Foods and beverages	Very Low	 No Canadian data on concentrations of bromodichloromethane in foods and beverages were identified. Data from the US-FDA (TDS-2003-2004) were used for this estimate.