

# British Columbia Working Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture (August 2024)

Ministry of Water, Land and Resource Stewardship  
Water Stewardship and Security Branch



The Working Water Quality Guidelines are a collection of British Columbia (B.C.) Ministry of Environment and Climate Change Strategy water quality guidelines (WQGs) that are adopted from other environmental jurisdictions for the substances without approved WQGs. Working WQGs are developed to protect a variety of water values and uses: aquatic life, livestock watering, irrigation, and wildlife.

**Document citation:**

B.C. Ministry of Water, Land and Resource Stewardship 2024. Working Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture. Water Quality Guideline Series, WQG-08-01. Prov. B.C., Victoria B.C.

© Copyright 2024

**Cover Photograph:**

Location: Sooke, B.C.

Disclaimer: The use of any trade, firm, or corporation names in this publication is for the information and convenience of the reader. Such use does not constitute an official endorsement or approval by the Government of British Columbia of any product or service to the exclusion of any others that may also be suitable. Contents of this report are presented for discussion purposes only. Funding assistance does not imply endorsement of any statements or information contained herein by the Government of British Columbia.

Updates in the August 2024 version:

- Working water quality guidelines were added for 174 pesticides, 1,4-dioxane, chlorinated alkanes, endosulfan (short-term), hydrazine, PBDE-BDE99, PBDE-BDE100, petroleum hydrocarbons groups, siloxane-D4, strontium, TBBPA (tetrabromobisphenol A), triclocarban, uranium (acute maximum), vanadium (freshwater aquatic life), and vinyl chloride.
- Working water quality guidelines were updated for acrolein, alkalinity, chromium (Cr(VI); freshwater), endosulfan (long-term), imidacloprid, glyphosate, malathion (freshwater), quinoline, uranium (chronic long-term), vanadium (marine aquatic life), and thallium (freshwater).
- Working sediment and working wildlife dietary guidelines were added for tetrabromobisphenol A (TBBPA).

Updates in the February 2021 version:

- Sediment quality guideline was added for molybdenum.
- Water Quality guidelines for Perfluorooctane Sulfonate (PFOS), and Polybrominated Diphenyl Ethers (PBDE) including heptaBDE and octaBDE were corrected.
- Sediment quality guidelines for Benzo(g,h,i)perylene and Polychlorinated dibenzo-*p*-dioxins/dibenzo furans (PCDD/Fs) were corrected.

Updates in the July 2020 version:

- Water quality guidelines were added for the following 11 substances: Bisphenol A (BPA), Diazinon, Hexabromocyclododecane (HBCD), Perfluorooctane Sulfonate (PFOS), Permethrin, Polybrominated Diphenyl Ethers (PBDE) including triBDE, tetraBDE, pentaBDE, hexaBDE, heptaBDE, octaBDE and Triclosan.
- Sediment quality guidelines for Polychlorinated Biphenyls (PCBs) previously adopted from CCME (2001) were rescinded including Arochlor 1016, Arochlor 1248, Arochlor 1254, Arochlor 1260, and total PCBs.
- Sediment quality guidelines were added for the following 6 substances: Atrazine, Bisphenol A (BPA), Chlorpyrifos, Diazinon, Hexabromocyclododecane (HBCD), Polychlorinated Biphenyls (PCBs).
- Tissue residues guidelines were added for the following five substances: Polybrominated Diphenyl Ethers (PBDE) including triBDE, tetraBDE, pentaBDE, hexaBDE, and Perfluorooctane Sulfonate (PFOS).
- Wildlife dietary guidelines were added for the following 13 substances: Bisphenol A (BPA), DDT, Hexabromocyclododecane (HBCD), Polybrominated Diphenyl Ethers (PBDE) including triBDE, tetraBDE, pentaBDE, hexaBDE, heptaBDE, octaBDE, nonaBDE, decaBDE, Polychlorinated Biphenyls (PCBs), and Perfluorooctane Sulfonate (PFOS).

## Introduction

This document presents BC's updated Working Water Quality Guidelines (WWQGs). These guidelines are revised periodically to incorporate new information and represent the best guidance the Ministry of Water, Land, and Resource Stewardship (WLRS) can provide, at the time of publication, for substances without approved water quality guidelines (WQGs). The 2024 edition supersedes all previous versions.

Many jurisdictions develop WQGs to protect water quality. BC's WQGs represent safe levels of substances that protect different water uses, including: drinking water, recreation, aquatic life, wildlife and agriculture. In BC, the definition of water quality includes sediment, and therefore WQG documents may include sediment quality values.

WQGs provide policy direction to those making decisions affecting water quality. Although WQGs do not have any direct legal standing, once approved, BC WQGs must be considered in any decision affecting water quality made within the Ministry of Environment and Climate Change Strategy (ENV). WQGs are used to assess water quality and may be used as the basis for determining the allowable limits in waste discharge authorizations. Exceeding a WQG does not imply that unacceptable risks exist, but rather that the potential for adverse effects may be increased and additional investigation may be required. BC's approved WQGs are located at: <http://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/water-quality-guidelines/approved-water-quality-guidelines>

Working water quality guidelines (WWQGs) can be used when there is no approved B.C. WQG for a substance. These guidelines are adopted from other jurisdictions or from the scientific literature and represent a best estimate for predicted no-effects concentration of a given substance. WWQGs include guidelines for sediment, tissue residue and wildlife diets.

## Working Water Quality Guidelines (WWQGs)

The working WQGs (WWQGs) are listed alphabetically by substance in Table 1 and are classified by substance type (e.g., Metals, Herbicides, Organics etc.). WWQGs are derived to be protective of specific water values (e.g. AL, agriculture) and these are listed for each substance in the table. WWQG values are protective of chronic long-term exposures unless identified as a short-term maximum in the "Notes" column.

The averaging period for the long-term WWQG may differ depending upon the substance under investigation. A 5 samples in 30 days averaging period (5-in-30) provides a reasonable and practical duration to assess long-term effects. However, in some cases where concentrations fluctuate widely in nature, more than 5 samples may be necessary. In other situations where concentrations are uniform and rarely exceed the long-term WWQG, less frequent monitoring may be justified. In this case, failure of any individual sample to meet the long-term WWQG would serve as an alert signal to increase the monitoring. Notes and references for Table 1 are provided at the end of the table.

### **Working Sediment Quality Guidelines (WSQGs)**

WSQGs substances are listed alphabetically in Table 2 are classified by substance type and may include values for both freshwater and marine aquatic life (AL). In addition, most of the WSQGs have two values:

- Lower WSQG – a concentration that will protect aquatic life from the adverse effects of a toxic substance in most situations (equivalent to CCME's Threshold Effect Level or Interim Sediment Quality Guidelines (TEL or ISQGs; CCME 2001)); and
- Upper WSQGs – a concentration that if exceeded will likely cause severe effects on AL (equivalent to CCME's Probable Effect Level (PEL; CCME [2001])).

The two values provide three ranges of concentrations to support sediment decision making (CCME 2001):

- Concentrations < Lower WSQG are rarely associated with adverse biological effects;
- Concentrations > Lower WSQG but < Upper WSQG are occasionally associated with adverse biological effects; and
- Concentrations > Upper WSQG are frequently associated with adverse biological effects.

These guidelines are not based on cause-effect studies, but on levels of toxic substances found in the sediment where biological effects have been measured. Caution should be exercised in the application of these guidelines. Further information on each WSQG can be found by referring to the reference. Notes and references for Table 2 are provided at the end of the table.

### **Working Tissue Residue Guidelines (WTRGs)**

Tissue Residue Guidelines (TRGs) are intended to protect fish from direct adverse effects of bioaccumulative substances. Working TRG (WTRGs) are listed alphabetically in Table 3, classified by substance type, and apply to both freshwater and marine fish. WTRGs specify the concentration of substance in whole body fish tissue (wet weight) which is not expected to cause adverse effects to the fish. Notes and references for Table 3 are provided at the end of the table.

### **Working Wildlife Dietary Guidelines (WWDGs)**

Wildlife Dietary Guidelines (WDGs) are concentrations of toxic substances in aquatic biota (whole body, wet weight) which are consumed by terrestrial and semi-aquatic wildlife. Working WDG (WWDGs) are listed alphabetically in Table 4 and are classified according to substance type. WWDGs specify the concentration of a substance in whole food (wet weight) which is not expected to cause adverse effects to the wildlife consumers. Notes and references for Table 4 are provided at the end of the table.

**Table 1. Working Water Quality Guidelines. AL = Aquatic Life.**

Substance <sup>1</sup>	Class	Water Value	Long-term WWQG <sup>2</sup>	Units <sup>3</sup>	Notes	Reference
1,1,2,2-tetrachloroethene (tetrachloroethylene, perchlorethylene)	Chlorinated ethenes	Freshwater AL	110	µg/L		CCME (1993)
1,1,2-trichloroethene, trichloroethylene	Chlorinated ethenes	Freshwater AL	21	µg/L		CCME (1991)
1,1,2-trichloroethene, trichloroethylene	Chlorinated ethenes	Livestock watering	50	µg/L		CCME (1991)
1,2,3,4-tetrachlorobenzene	Chlorinated benzenes	Freshwater AL	1.8	µg/L		CCME (1997)
1,2,3-trichlorobenzene	Chlorinated benzenes	Freshwater AL	8	µg/L		CCME (1997)
1,2,4-trichlorobenzene	Chlorinated benzenes	Freshwater AL	24	µg/L		CCME (1997)
1,2,4-trichlorobenzene	Chlorinated benzenes	Marine AL	5.4	µg/L		CCME (1997)
1,2-dichlorobenzene	Chlorinated benzenes	Freshwater AL	0.7	µg/L		CCME (1997)
1,2-dichlorobenzene	Chlorinated benzenes	Marine AL	42	µg/L		CCME (1997)
1,2-dichloroethane	Chlorinated ethanes	Freshwater AL	100	µg/L		CCME (1991)
1,2-dichloroethane	Chlorinated ethanes	Livestock watering	5	µg/L		CCME (1991)
1,2-propylene glycol	Glycols	Freshwater AL	500	mg/L		CCME (1997)
1,3-dichlorobenzene	Chlorinated benzenes	Freshwater AL	150	µg/L		CCME (1997)

Substance <sup>1</sup>	Class	Water Value	Long-term WWQG <sup>2</sup>	Units <sup>3</sup>	Notes	Reference
1,4-dichlorobenzene	Chlorinated benzenes	Freshwater AL	26	µg/L		CCME (1997)
1,4-dioxane	Organics	Freshwater AL	20	mg/L		OME (1991)
Abamectin	Pesticides	Freshwater AL	0.0085	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2023a); US EPA (2013a)
Acephate	Pesticides	Freshwater AL	37.5	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2019a); HC PMRA (2016a); HC PMRA (2004a)
Acetamiprid	Pesticides	Freshwater AL	0.037	µg a.i./L	Adapted from Raby <i>et al.</i> (2018)	Raby <i>et al.</i> (2018)
Acetochlor	Herbicides	Freshwater AL	0.143	µg/L	Adapted from US EPA ALB <sup>9</sup>	US EPA (2020a)
Acibenzolar-S-methyl	Pesticides	Freshwater AL	8.7	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2010a)
Acifluorfen-sodium	Herbicides	Freshwater AL	25.2	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2006a); US EPA (2010a)
Acrolein	Pesticide	Freshwater AL	0.35	µg/L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2016b); US EPA (2020b)
Aldicarb	Pesticides	Freshwater AL	1	µg/L		CCME (1993)
Aldicarb	Pesticides	Irrigation	54.9	µg/L		CCME (1993)
Aldicarb	Pesticides	Livestock	11	µg/L		CCME (1993)
Aldicarb	Pesticides	Marine AL	0.15	µg/L		CCME (1993)
Alkalinity (total CaCO <sub>3</sub> )	Inorganics	Freshwater AL	>20	mg/L CaCO <sub>3</sub>	20 mg/L or more as CaCO <sub>3</sub> except where natural concentrations are less.	USEPA (1986); Swain (1987)

Substance <sup>1</sup>	Class	Water Value	Long-term WWQG <sup>2</sup>	Units <sup>3</sup>	Notes	Reference
Ametoctradin	Pesticides	Freshwater AL	0.78	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2011a)
Aniline (total)	Organics	Freshwater AL	2.2	µg/L		CCME (1993)
Antimony (III)	Metals	Marine AL	270	µg/L		ANZECC (2000b)
Atrazine	Pesticides	Freshwater AL	1.8	µg/L	Atrazine metabolites <sup>5</sup>	CCME (1989)
Atrazine	Pesticides	Irrigation	10	µg/L	Atrazine metabolites	CCME (1989)
Atrazine	Pesticides	Livestock	5	µg/L	Atrazine metabolites	CCME (1989)
Azoxystrobin	Pesticides	Freshwater AL	10	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2007a)
Barium	Metals	Freshwater AL	1	mg/L		Haywood & Drinnin (1983)
Bensulide	Herbicides	Freshwater AL	5.5	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2003a); US EPA (2016a)
Bentazon	Herbicides	Freshwater AL	450	µg a.e./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2007b); US EPA (2014a)
Benzovindiflupyr	Pesticides	Freshwater AL	0.18	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2015a)
Beryllium	Metals	Freshwater AL	0.13	µg/L		ANZECC (2000a)
Beryllium	Metals	Marine AL	100	µg/L		NAS-NAE (1972)
Beryllium	Metals	Irrigation	100	µg/L		CCREM (1987)
Beryllium	Metals	Livestock	100	µg/L		CCREM (1987)
Bicyclopyrone	Herbicides	Freshwater AL	1.3	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2015b)
Bifenazate	Pesticides	Freshwater AL	25	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2006b)
Bisphenol A (BPA)	Organics	Freshwater AL	0.9	µg/L	See footnote #6	ECCC (2018)



Substance <sup>1</sup>	Class	Water Value	Long-term WWQG <sup>2</sup>	Units <sup>3</sup>	Notes	Reference
Bisphenol A (BPA)	Organics	Marine AL	0.9	µg/L	See footnote #6	ECCC (2018)
Bixafen	Pesticides	Freshwater AL	2.3	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2019b)
Boscalid	Pesticides	Freshwater AL	70	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2004b)
Bromocil	Pesticides	Freshwater AL	5	µg/L		CCME (1997)
Bromocil	Pesticides	Irrigation	0.2	µg/L		CCME (1997)
Bromocil	Pesticides	Livestock	1.1	mg/L		CCME (1997)
Bromoform	Organics	See Chloromethanes				
Bromoxynil	Herbicides	Freshwater AL	5	µg/L		CCME (1993)
Bromoxynil	Herbicides	Irrigation	0.33	µg/L		CCME (1993)
Bromoxynil	Herbicides	Livestock	11	µg/L		CCME (1993)
Cadmium	Metals	Marine AL	0.12	µg/L		CCME (2014)
Cadmium	Metals	Irrigation	5.1	ug/L	Short-term maximum guideline	CCME (1996)
Cadmium	Metals	Livestock	80	µg/L	Short-term maximum guideline	CCME (1996)
Calcium (dissolved)	Metals	Livestock	1,000	mg/L		CCREM (1987)
Captan	Pesticides	Freshwater AL	1.3	µg/L		CCME (1991)
Captan	Pesticides	Livestock	13	µg/L		CCME (1991)
Carbaryl	Pesticides	Freshwater AL	0.2	µg a.i./L		CCME (2009)
Carbaryl	Pesticides	Livestock	1.1	mg/L		CCME (1997)
Carbaryl	Pesticides	Marine AL	0.29	µg a.i./L		CCME (2009)
Carbathiin / carboxin	Pesticides	Freshwater AL	37	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2008a); US EPA (2022)

Substance <sup>1</sup>	Class	Water Value	Long-term WWQG <sup>2</sup>	Units <sup>3</sup>	Notes	Reference
Carbofuran	Pesticides	Freshwater AL	1.8	µg/L		CCME (1989)
Carbofuran	Pesticides	Livestock	45	µg/L		CCME (1989)
Carbon tetrachloride	Halogenated methanes	See Chloromethanes				
Carfentrazone-ethyl	Herbicides	Freshwater AL	0.6	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2011b)
Chlorantraniliprole	Pesticides	Freshwater AL	1.3	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2008b)
Chlorinated alkanes - Long chain -LCCAs	Chlorinated organics	Freshwater AL	1.2	µg/L	See footnote #7	ECCC (2016)
Chlorinated alkanes - Long chain -LCCAs	Chlorinated organics	Marine AL	1.2	µg/L	See footnote #7	ECCC (2016)
Chlorinated alkanes - Medium chain - MCCAs	Chlorinated organics	Freshwater AL	1.2	µg/L	See footnote #7	ECCC (2016)
Chlorinated alkanes - Medium chain - MCCAs	Chlorinated organics	Marine AL	1.2	µg/L	See footnote #7	ECCC (2016)
Chlorinated alkanes -Short chain - SCCAs	Chlorinated organics	Freshwater AL	1.2	µg/L	See footnote #7	ECCC (2016)
Chlorinated alkanes -Short chain - SCCAs	Chlorinated organics	Marine AL	1.2	µg/L	See footnote #7	ECCC (2016)
Chlorothalonil (2,4,5,6-tetrachloro-1,3-benzenecarbonitrile, Daconil)	Fungicides, Organochlorine	Freshwater AL	0.18	µg/L	Chlorothalonil + 4-hydroxy transformation product	CCME (1994)
Chlorothalonil (2,4,5,6-tetrachloro-1,3-benzenecarbonitrile, Daconil)	Fungicides, Organochlorine	Livestock watering	170	µg/L		CCME (1994)

Substance <sup>1</sup>	Class	Water Value	Long-term WWQG <sup>2</sup>	Units <sup>3</sup>	Notes	Reference
Chlorothalonil (2,4,5,6-tetrachloro-1,3-benzenecarbonitrile, Daconil)	Fungicides, Organochlorine	Marine AL	0.36	µg/L	Chlorothalonil + 4-hydroxy transformation product	CCME (1994)
Chlorothalonil (2,4,5,6-tetrachloro-1,3-benzenecarbonitrile, Daconil)	Fungicides, Organochlorine	Irrigation	5.8	µg/L	All crops other than cereals, tame hays or pastures	CCME (1994)
Chlorpyrifos	Pesticides	Freshwater AL	0.002	µg a.i./L		CCME (2008a)
Chlorpyrifos	Pesticides	Livestock watering	24	µg/L		CCME (1997)
Chlorpyrifos	Pesticides	Marine AL	0.002	µg a.i./L		CCME (2008a)
Chlorsulfuron	Herbicides	Freshwater AL	0.035	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2007c); US EPA (2012)
Chromium (Cr(III))	Metals	Freshwater AL	8.9	µg/L		CCME (1999)
Chromium (Cr(III))	Metals	Irrigation	4.9	µg/L		CCME (1997)
Chromium (Cr(III))	Metals	Livestock watering	50	µg/L		CCME (1997)
Chromium (Cr(III))	Metals	Marine AL	56	µg/L		CCME (1997)
Chromium (Cr(VI))	Metals	Freshwater AL	2.5	µg/L	See footnote #8	ECCC (2018)
Chromium (Cr(VI))	Metals	Irrigation	8	µg/L		CCME (1997)
Chromium (Cr(VI))	Metals	Livestock watering	50	µg/L		CCME (1997)
Chromium (Cr(VI))	Metals	Marine AL	1.5	µg/L		CCME (1997)
Clethodim	Herbicides	Freshwater AL	0.42	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2016c)
Clodinafop propargyl	Herbicides	Freshwater AL	7	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2018a)

Substance <sup>1</sup>	Class	Water Value	Long-term WWQG <sup>2</sup>	Units <sup>3</sup>	Notes	Reference
Clofentezine	Pesticides	Freshwater AL	3	µg a.i./L	Adapted from US EPA ALB <sup>9</sup>	HC PMRA (2013a);US EPA (2013b)
Clomazone	Herbicides	Freshwater AL	8.35	µg a.i./L	Adapted from US EPA ALB <sup>9</sup>	US EPA (2009a)
Clopyralid	Herbicides	Freshwater AL	690	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2010b)
Cloransulam-methyl	Herbicides	Freshwater AL	0.39	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2008c)
Clothianidin	Pesticides	Freshwater AL	0.028	µg a.i./L	Adapted from Raby <i>et al.</i> (2018)	Raby <i>et al.</i> (2018)
Cobalt	Metals	Irrigation	50	µg/L	Continuous or intermittent use on all soils	CCME (1999)
Cobalt	Metals	Livestock watering	1	mg/L		CCME (1987)
Conductivity (specific)	Physical	Irrigation	<0.7	mS/cm	For low tolerance crops <sup>10</sup>	CCREM (1987)
Conductivity (specific)	Physical	Irrigation	<1.2	mS/cm	For slightly tolerant crops <sup>10</sup>	CCREM (1987)
Conductivity (specific)	Physical	Irrigation	<2.2	mS/cm	For moderately tolerant crops <sup>10</sup>	CCREM (1987)
Conductivity (specific)	Physical	Irrigation	<3.6	mS/cm	For tolerant crops <sup>10</sup>	CCREM (1987)
Conductivity (specific)	Physical	Irrigation	<5	mS/cm	For very tolerant crop <sup>10</sup>	CCREM (1987)
Cyanazine	Pesticides	Freshwater AL	2	µg/L		CCME (1990)
Cyanazine	Pesticides	Irrigation	0.5	µg/L		CCME (1990)

Substance <sup>1</sup>	Class	Water Value	Long-term WWQG <sup>2</sup>	Units <sup>3</sup>	Notes	Reference
Cyanazine	Pesticides	Livestock watering	10	µg/L		CCME (1990)
Cyantraniliprole	Pesticides	Freshwater AL	3.3	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2013b)
Cyazofamid	Pesticides	Freshwater AL	9.5	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2016d)
Cyclaniliprole	Pesticides	Freshwater AL	5	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2017a)
Cypermethrin	Pesticides	Freshwater AL	0.00006	µg a.i./L	Adapted from US EPA ALB <sup>9</sup>	HC PMRA (2016e); US EPA (2016b)
Cyprodinil	Pesticides	Freshwater AL	4.1	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	US EPA (2017a)
Cyromazine	Pesticides	Freshwater AL	6.3	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2020a)
Dehydroabietic acid (DHA)	Resin acids	Freshwater AL	1	µg/L	Short-term maximum at pH 5.0	Environment Ontario (1988)
Dehydroabietic acid (DHA)	Resin acids	Freshwater AL	2	µg/L	Short-term maximum at pH 5.5	Environment Ontario (1988)
Dehydroabietic acid (DHA)	Resin acids	Freshwater AL	2	µg/L	Short-term maximum at pH 6.0	Environment Ontario (1988)
Dehydroabietic acid (DHA)	Resin acids	Freshwater AL	4	µg/L	Short-term maximum at pH 6.5	Environment Ontario (1988)
Dehydroabietic acid (DHA)	Resin acids	Freshwater AL	8	µg/L	Short-term maximum at pH 7.0	Environment Ontario (1988)
Dehydroabietic acid (DHA)	Resin acids	Freshwater AL	12	µg/L	Short-term maximum at pH 7.5	Environment Ontario (1988)
Dehydroabietic acid (DHA)	Resin acids	Freshwater AL	13	µg/L	Short-term maximum at pH 8.0	Environment Ontario (1988)
Dehydroabietic acid (DHA)	Resin acids	Freshwater AL	14	µg/L	Short-term maximum at pH 8.5	Environment Ontario (1988)

Substance <sup>1</sup>	Class	Water Value	Long-term WWQG <sup>2</sup>	Units <sup>3</sup>	Notes	Reference
Dehydroabiatic acid (DHA)	Resin acids	Freshwater AL	14	µg/L	Short-term maximum at pH 9.0	Environment Ontario (1988)
Deltamethrin	Pesticides	Freshwater AL	0.0004	µg/L		CCME (1997)
Deltamethrin	Pesticides	Livestock watering	2.5	µg/L		CCME (1997)
Di-(2-ethylhexyl) phthalate (DEHP)	Phthalate esters	Freshwater AL	16	µg/L		CCME (1993)
Diazinon	Pesticide	Freshwater AL	0.0043	µg/L	See footnote #11	Efroymson <i>et al.</i> (1997)
Dibutyl phthalate (DBP, di- <i>n</i> -butylphthalate)	Phthalate esters	Freshwater AL	19	µg/L		CCME (1993)
Dicamba	Organic Pesticides; Aromatic carboxylic acid	Freshwater AL	10	µg/L		CCME (1993)
Dicamba	Organic Pesticides; Aromatic carboxylic acid	Irrigation	0.006	µg/L		CCME (1993)
Dicamba	Organic Pesticides; Aromatic carboxylic acid	Livestock watering	122	µg/L		CCME (1993)
Dichlorobromomethane	Halogenated methanes	Livestock watering	100	µg/L		CCME (1992)
Dichloromethane (methylene chloride)	Halogenated methanes	Freshwater AL	98.1	µg/L		CCME (1992)
Dichloromethane (methylene chloride)	Halogenated methanes	Livestock watering	50	µg/L		CCME (1992)
Dichlorophenoxyacetic acid (2,4-D)	Herbicides	Freshwater AL	4	µg/L		CCME (1999)

Substance <sup>1</sup>	Class	Water Value	Long-term WWQG <sup>2</sup>	Units <sup>3</sup>	Notes	Reference
Dichlorophenoxyacetic acid (2,4-D)	Herbicides	Livestock watering	100	µg/L		CCME (1999)
Dichlorprop-p	Herbicides	Freshwater AL	2000	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2013c)
Dichlorvos (DDVP)	Pesticides	Freshwater AL	0.0029	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2017b); US EPA (2020c)
Diclofop-methyl	Pesticides	Freshwater AL	6.1	µg/L		CCME (1993)
Diclofop-methyl	Pesticides	Irrigation	0.18	µg/L		CCME (1993)
Diclofop-methyl	Pesticides	Livestock watering	9	µg/L		CCME (1993)
Didecyl dimethyl ammonium chloride (DDAC)	Pesticides	Freshwater AL	1.5	µg/L		CCME (1999)
Difenoconazole	Pesticides	Freshwater AL	1.4	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2015c); HC PMRA (2011c)
Diflubenzuron	Pesticides	Freshwater AL	0.000025	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2004c); US EPA (2009b)
Diflufenzopyr	Herbicides	Freshwater AL	1.7	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2017c)
Dimethenamid-P	Herbicides	Freshwater AL	0.9	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2009a)
Dimethoate	Pesticides	Freshwater AL	6.2	µg/L		CCME (1993)
Dimethoate	Pesticides	Livestock watering	3	µg/L		CCME (1993)
Dimethomorph	Pesticides	Freshwater AL	28	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2019c)
Di-n-butyl tin (total)	Organotin compounds	Freshwater AL	0.08	µg/L		Ontario MOEE (1994)
Dinoseb	Pesticides	Freshwater AL	0.05	µg/L		CCME (1992)

Substance <sup>1</sup>	Class	Water Value	Long-term WWQG <sup>2</sup>	Units <sup>3</sup>	Notes	Reference
Dinoseb	Pesticides	Irrigation	16	µg/L		CCME (1992)
Dinoseb	Pesticides	Irrigation	46	µg/L	Cereals and hay	CCME (1999)
Dinoseb	Pesticides	Irrigation	93	µg/L	Legumes	CCME (1999)
Dinoseb	Pesticides	Livestock watering	150	µg/L		CCME (1992)
Diquat	Herbicides	Freshwater AL	0.075	µg /L cation	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2008d); US EPA (2009c)
Dithiopyr	Herbicides	Freshwater AL	0.61	µg a.i./L	Adapted from US EPA ALB <sup>9</sup>	HC PMRA (2009b); US EPA (2020d)
Diuron	Herbicides	Freshwater AL	0.013	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	US EPA (2020e)
Dodine	Pesticides	Freshwater AL	0.016	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2008e); US EPA (2021a)
Endosulfan	Pesticides	Freshwater AL	0.0015	µg a.i./L	see footnote #12	CCME (2010)
Endosulfan	Pesticides	Freshwater AL	0.03	µg a.i./L	short-term maximum; see footnote #12	CCME (2010)
Endosulfan	Pesticides	Marine AL	0.001	µg a.i./L	see footnote #13	CCME (2010)
Endosulfan	Pesticides	Marine AL	0.015	µg a.i./L	short-term maximum; see footnote #13	CCME (2010)
EPTC / S-ethyl dipropylthiocarbamate	Herbicides	Freshwater AL	13	µg a.i./L	Adapted from US EPA ALB <sup>9</sup>	HC PMRA (2007d); US EPA (2017b)
Ethaboxam	Pesticides	Freshwater AL	8.3	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2014a)
Ethametsulfuron methyl	Herbicides	Freshwater AL	0.005	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2008f)



Substance <sup>1</sup>	Class	Water Value	Long-term WWQG <sup>2</sup>	Units <sup>3</sup>	Notes	Reference
Ethephon	Organophosphonate plant growth regulator	Freshwater AL	250	µg a.i./L	Adapted from US EPA ALB <sup>9</sup>	HC PMRA (2018b); US EPA (2015a)
Ethofumesate	Herbicides	Freshwater AL	100	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2007e); US EPA (2020f)
Ethylene glycol	Glycols	Freshwater AL	192	mg/L		CCME (1997)
Famoxadone	Pesticides	Freshwater AL	0.043	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2003b)
Fenamidone	Pesticides	Freshwater AL	2.4	µg a.i./L	Adapted from US EPA ALB <sup>9</sup>	HC PMRA (2007f); HC PMRA (2003c); US EPA (2019a)
Fenbuconazole	Pesticides	Freshwater AL	13	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2005a)
Fenhexamid	Pesticides	Freshwater AL	50.5	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2020b); HC PMRA (2003d)
Fenoxaprop-P-ethyl	Herbicides	Freshwater AL	22	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2011d); US EPA (2014b)

Substance <sup>1</sup>	Class	Water Value	Long-term WWQG <sup>2</sup>	Units <sup>3</sup>	Notes	Reference
Fenpropathrin	Pesticides	Freshwater AL	0.00078	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2020c); US EPA (2011a)
Flazasulfuron	Herbicides	Freshwater AL	0.004	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2018c)
Flonicamid	Pesticides	Freshwater AL	1003	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2010c)
Florasulam	Herbicides	Freshwater AL	0.31	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2004d)
Fluazifop-p-butyl	Herbicides	Freshwater AL	33.8	µg a.e./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2011e); US EPA (2014c)
Fluazinam	Pesticides	Freshwater AL	0.35	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2017d); HC PMRA (2003e)
Flucarbazone	Herbicides	Freshwater AL	1.2	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2022a); HC PMRA (2000)
Fludioxonil	Pesticides	Freshwater AL	9.5	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2006c); US EPA (2017c)

Substance <sup>1</sup>	Class	Water Value	Long-term WWQG <sup>2</sup>	Units <sup>3</sup>	Notes	Reference
Fluensulfone	Pesticides	Freshwater AL	1.5	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2017e)
Flufenacet	Herbicides	Freshwater AL	0.145	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2021a); HC PMRA (2003f)
Flumetsulam	Herbicides	Freshwater AL	0.5	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2014b)
Fluopicolide	Pesticides	Freshwater AL	20	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2011f)
Fluopyram	Pesticides	Freshwater AL	67.5	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2014c)
Fluoxastrobin	Pesticides	Freshwater AL	21.8	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2012a)
Flupyradifurone	Pesticides	Freshwater AL	5.25	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2014d)
Fluroxypyr-meptyl	Herbicides	Freshwater AL	3.7	µg a.e./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2017f); HC PMRA (2012b); US EPA (2014d)
Flutriafol	Pesticides	Freshwater AL	6.5	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2014e)
Fluxapyroxad	Pesticides	Freshwater AL	11	µg a.i./L	Adapted from US EPA ALB <sup>9</sup>	US EPA (2013c)
Fomesafen	Herbicides	Freshwater AL	9.2	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2018d)
Foramsulfuron	Herbicides	Freshwater AL	0.17	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2003g); HC PMRA (2008g)
Fosetyl-Al	Pesticides	Freshwater AL	53.3	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2023b); HC PMRA (2017g)

Substance <sup>1</sup>	Class	Water Value	Long-term WWQG <sup>2</sup>	Units <sup>3</sup>	Notes	Reference
Glufosinate-ammonium	Herbicides	Freshwater AL	7.2	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	US EPA (2013d)
Glyphosate	Herbicides	Freshwater AL	400	µg a.i./L	see footnote #14	CCME (2012)
Glyphosate	Herbicides	Freshwater AL	13500	µg a.i./L	short-term maximum; see footnote #14	CCME (2012)
Glyphosate	Herbicides	Livestock watering	280	µg/L		CCREM (1987)
Halauxifen-methyl	Herbicides	Freshwater AL	0.0149	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2014f)
Halosulfuron-methyl	Herbicides	Freshwater AL	0.0038	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2014g)
Hexabromocyclododecane (HBCD)	Organics	Freshwater AL	0.56	µg/L		ECCC (2016)
Hexabromocyclododecane (HBCD)	Organics	Marine AL	0.56	µg/L		ECCC (2016)
Hexachlorobenzene	Chlorinated benzenes	Livestock	0.52	µg/L		CCREM (1987)
Hexachlorobutadiene (HCBd)	Organics	Freshwater AL	1.3	µg/L		CCME (1999)
Hexachlorocyclohexane (Lindane)	Pesticides	Freshwater AL	0.01	µg/L		CCREM (1987)
Hexachlorocyclohexane (Lindane)	Pesticides	Livestock watering	4	µg/L		CCREM (1987)
Hexazinone	Herbicides	Freshwater AL	0.7	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2019d); HC PMRA (2007g); US EPA (2015b)
Hydrazine	Inorganic	Freshwater AL	2.6	µg/L		ECCC (2013)
Hydrazine	Inorganic	Marine AL	0.2	µg/L		ECCC (2013)

Substance <sup>1</sup>	Class	Water Value	Long-term WWQG <sup>2</sup>	Units <sup>3</sup>	Notes	Reference
Imazamethabenz-methyl	Herbicides	Freshwater AL	7.28	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2008h)
Imazapyr	Herbicides	Freshwater AL	1.8	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2020d); HC PMRA (2011g)
Imazethapyr	Herbicides	Freshwater AL	1.01	µg a.e./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2010d)
Imidacloprid	Pesticides	Marine AL	0.65	µg a.i./L		CCME (2007)
Imidacloprid	Pesticides	Freshwater AL	0.013	µg a.i./L	Adapted from Raby <i>et al.</i> (2018)	Raby <i>et al.</i> (2018)
Inpyrfluxam	Pesticides	Freshwater AL	0.8	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2020e)
Iodosulfuron-methyl-sodium	Herbicides	Freshwater AL	0.07	µg a.i./L	Adapted from US EPA ALB <sup>9</sup>	HC PMRA (2008i); HC PMRA (2004e); US EPA (2013e)
IPBC (3-Iodo-2-propynylbutylcarbamate)	Pesticides	Freshwater AL	1.9	µg/L		CCME (1999)
Ipconazole	Pesticides	Freshwater AL	0.030	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2011h); US EPA (2020g)
Iprodione	Pesticides	Freshwater AL	4.8	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2016f)
Isofetamid	Pesticides	Freshwater AL	43	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2014h); US EPA (2013f)
Isoxaben	Herbicides	Freshwater AL	1.0	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2014i); US EPA (2014e)
Isoxaflutole	Herbicides	Freshwater AL	0.32	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2021b)
Kresoxim-methyl	Pesticides	Freshwater AL	2.9	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2020f)

Substance <sup>1</sup>	Class	Water Value	Long-term WWQG <sup>2</sup>	Units <sup>3</sup>	Notes	Reference
Lead - Tetra-ethyl lead	Metals, Organic	Freshwater AL	0.0007	µg/L		Ontario MOEE (1994)
Lead - Tetra-methyl lead	Metals, Organic	Freshwater AL	0.006	µg/L		Ontario MOEE (1994)
Linuron	Pesticides	Freshwater AL	7	µg/L		CCME (1995)
Linuron	Pesticides	Irrigation	3.3	µg/L	Cereals, hay and pastures	CCME (1999)
Linuron	Pesticides	Irrigation	0.071	µg/L	(e.g., tomato)	CCME (1995)
Lithium	Metals	Irrigation	2.5	mg/L	See footnote #15	CCREM (1987)
Lithium	Metals	Irrigation	0.75	mg/L	Citrus	CCREM (1987)
Malathion	Pesticides	Freshwater AL	0.03	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2010e)
Malathion	Pesticides	Marine AL	0.1	µg/L		US EPA (1986)
Maleic Hydrazide	Herbicides	Freshwater AL	4,800	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2008j); US EPA (2014f)
Mandestrobin	Pesticides	Freshwater AL	6.5	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2016g)
Mandipropamid	Pesticides	Freshwater AL	38	µg a.i./L	Adapted from US EPA ALB <sup>9</sup>	HC PMRA (2009c); US EPA (2019b)
Manganese	Metals	Marine AL	100	µg/L	To protect consumers of shellfish	US EPA (1986)
Manganese	Metals	Irrigation	200	µg/L		CCREM (1987)
MCPB	Herbicides	Freshwater AL	21	µg a.e./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2011i)
Mecoprop-P (MCP-P)	Herbicides	Freshwater AL	0.8	µg/L		Kroll <i>et al.</i> (2023)
Mefentrifluconazole	Pesticides	Freshwater AL	4.57	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2019e)

Substance <sup>1</sup>	Class	Water Value	Long-term WWQG <sup>2</sup>	Units <sup>3</sup>	Notes	Reference
Mesosulfuron-methyl	Herbicides	Freshwater AL	0.064	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2010f)
Mesotrione	Herbicides	Freshwater AL	1	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2005b)
Metalaxyl	Pesticides	Freshwater AL	600	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2007h); US EPA (2016c)
Metconazole	Pesticides	Freshwater AL	0.97	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2011j)
Methamidophos	Pesticides	Freshwater AL	0.225	µg a.i./L	Adapted from US EPA ALB <sup>9</sup>	HC PMRA (2007i); US EPA (2008)
Methlychlorophenoxyacetic acid (4-chloro-2-methylphenoxy acetic acid) (MCPA)	Herbicides	Freshwater AL	2.6	µg/L		CCME (1995)
Methlychlorophenoxyacetic acid (4-chloro-2-methylphenoxy acetic acid) (MCPA)	Herbicides	Irrigation	0.025	µg/L		CCME (1995)
Methlychlorophenoxyacetic acid (4-chloro-2-methylphenoxy acetic acid) (MCPA)	Herbicides	Livestock watering	25	µg/L		CCME (1995)
Methlychlorophenoxyacetic acid (4-chloro-2-methylphenoxy acetic acid) (MCPA)	Herbicides	Marine AL	4.2	µg/L		CCME (1995)
Methomyl	Pesticides	Freshwater AL	0.13	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2016h)

Substance <sup>1</sup>	Class	Water Value	Long-term WWQG <sup>2</sup>	Units <sup>3</sup>	Notes	Reference
Methoxyfenozide	Pesticides	Freshwater AL	0.65	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2004f)
Metolachlor	Pesticides	Freshwater AL	7.8	µg/L		CCME (1991)
Metolachlor	Pesticides	Irrigation	28	µg/L		CCME (1991)
Metolachlor	Pesticides	Livestock watering	50	µg/L		CCME (1991)
Metrafenone	Pesticides	Freshwater AL	41	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2011k)
Metribuzin	Pesticides	Freshwater AL	1	µg/L		CCME (1990)
Metribuzin	Pesticides	Irrigation	0.5	µg/L		CCME (1990)
Metribuzin	Pesticides	Livestock watering	80	µg/L		CCME (1990)
Metsulfuron methyl	Herbicides	Freshwater AL	0.007	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2008k)
MGK-264 (N-octyl bicycloheptene dicarboximide)	Pesticides	Freshwater AL	0.8	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	US EPA (2016d)
Monochlorobenzene	Chlorinated benzenes	Freshwater AL	1.3	µg/L		CCME (1997)
Monochlorobenzene	Chlorinated benzenes	Marine AL	25	µg/L		CCME (1997)
Myclobutanil	Pesticides	Freshwater AL	17.5	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2010g); US EPA (2015c)
Napropamide	Herbicides	Freshwater AL	35	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	US EPA (2021b)
Nickel	Metals	Irrigation	200	µg/L		CCREM (1987)
Nickel	Metals	Livestock watering	1	mg/L		CCREM (1987)
Nickel	Metals	Marine AL	8.3	µg/L		US EPA (1986)



Substance <sup>1</sup>	Class	Water Value	Long-term WWQG <sup>2</sup>	Units <sup>3</sup>	Notes	Reference
Nicosulfuron	Herbicides	Freshwater AL	2.8	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2008l)
Nonylphenol and its ethoxylates	Organics	Freshwater AL	1	µg/L	See footnote #16	CCME (2002)
Nonylphenol and its ethoxylates	Organics	Marine AL	0.7	µg/L	See footnote #16	CCME (2002)
Oxadiazon	Herbicides	Freshwater AL	0.44	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	US EPA (2020h)
Oxamyl	Pesticides	Freshwater AL	13.5	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2007j); US EPA (2010b)
Oxathiapiprolin	Pesticides	Freshwater AL	34.5	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2015d)
Oxyfluorfen	Herbicides	Freshwater AL	0.022	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2006d); HC PMRA (2005c); US EPA (2019c)
Paraquat	Herbicides	Freshwater AL	0.040	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2015e); US EPA (2019d)
Pendimethalin	Herbicides	Freshwater AL	1.25	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2007k); US EPA (2017d)
Penflufen	Pesticides	Freshwater AL	4.5	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2012c)
Pentachlorobenzene	Chlorinated benzenes	Freshwater AL	6	µg/L		CCME (1997)
Penthiopyrad	Pesticides	Freshwater AL	15	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2014j); HC PMRA (2011l); US EPA (2011b)
Perfluorooctane Sulfonate (PFOS)	Organics	Freshwater AL	3.4	µg/L	See footnote #17	ECCC (2018)
Permethrin	Pesticides	Freshwater AL	0.004	µg/L		CCME (2006)

Substance <sup>1</sup>	Class	Water Value	Long-term WWQG <sup>2</sup>	Units <sup>3</sup>	Notes	Reference
Permethrin	Pesticides	Marine AL	0.001	µg/L		CCME (2006)
Pethoxamid	Herbicides	Freshwater AL	0.17	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2019f)
Petroleum hydrocarbons (PHC)-F1 - Aliphatics C <sub>6</sub> – C <sub>8</sub>	Organics	Freshwater AL	46.5	µg /L		CCME (2008b)
Petroleum hydrocarbons (PHC) - F1-Aliphatics C <sub>&gt;8</sub> – C <sub>10</sub>	Organics	Freshwater AL	7.6	µg /L		CCME (2008b)
Petroleum hydrocarbons (PHC) - F1 -Aromatics C <sub>&gt;8</sub> – C <sub>10</sub>	Organics	Freshwater AL	140	µg /L	See footnote #18	CCME (2008b)
Petroleum hydrocarbons (PHC) - F2 -Aliphatics C <sub>&gt;10</sub> – C <sub>12</sub>	Organics	Freshwater AL	1.18	µg /L		CCME (2008b)
Petroleum hydrocarbons (PHC) - F2 -Aliphatics C <sub>&gt;12</sub> – C <sub>16</sub>	Organics	Freshwater AL	0.074	µg /L		CCME (2008b)
Petroleum hydrocarbons (PHC) - Aromatics C <sub>&gt;10</sub> – C <sub>12</sub>	Organics	Freshwater AL	96	µg /L		CCME (2008b)
Petroleum hydrocarbons (PHC) F2 -Aromatics C <sub>&gt;12</sub> – C <sub>16</sub>	Organics	Freshwater AL	55.4	µg /L		CCME (2008b)
Phorate	Pesticides	Freshwater AL	0.07	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2003h); US EPA (2020i)
Picloram	Pesticides	Freshwater AL	29	µg/L		CCME (1990)
Picloram	Pesticides	Livestock watering	190	µg/L		CCME (1990)
Picolinafen	Herbicides	Freshwater AL	0.034	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2005d)
Picoxystrobin	Pesticides	Freshwater AL	4	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2012d)

Substance <sup>1</sup>	Class	Water Value	Long-term WWQG <sup>2</sup>	Units <sup>3</sup>	Notes	Reference
Pinoxaden	Herbicides	Freshwater AL	1.1	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2006e)
Piperonyl butoxide	Pesticides	Freshwater AL	9.5	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2023c); HC PMRA (2020g)
Polybrominated Diphenyl Ethers (PBDE) (triBDE)	Organics	Marine AL	0.046	µg/L		ECCC (2013)
Polybrominated Diphenyl Ethers (PBDE) (triBDE)	Organics	Freshwater AL	0.046	µg/L		ECCC (2013)
Polybrominated Diphenyl Ethers (PBDE) (tetraBDE)	Organics	Marine AL	0.024	µg/L		ECCC (2013)
Polybrominated Diphenyl Ethers (PBDE) (tetraBDE)	Organics	Freshwater AL	0.024	µg/L		ECCC (2013)
Polybrominated Diphenyl Ethers (PBDE) (pentaBDE)	Organics	Freshwater AL	0.0002	µg/L		ECCC (2013)
Polybrominated Diphenyl Ethers (PBDE) (pentaBDE)	Organics	Marine AL	0.0002	µg/L		ECCC (2013)
Polybrominated Diphenyl Ethers (PBDE) (hexaBDE)	Organics	Marine AL	0.12	µg/L		ECCC (2013)
Polybrominated Diphenyl Ethers (PBDE) (hexaBDE)	Organics	Freshwater AL	0.12	µg/L		ECCC (2013)
Polybrominated Diphenyl Ethers (PBDE) (heptaBDE)	Organics	Freshwater AL	0.017	µg/L		ECCC (2013)
Polybrominated Diphenyl Ethers (PBDE) (heptaBDE)	Organics	Marine AL	0.017	µg/L		ECCC (2013)
Polybrominated Diphenyl Ethers (PBDE) (octaBDE)	Organics	Marine AL	0.017	µg/L		ECCC (2013)
Polybrominated Diphenyl Ethers (PBDE) (octaBDE)	Organics	Freshwater AL	0.017	µg/L		ECCC (2013)

Substance <sup>1</sup>	Class	Water Value	Long-term WWQG <sup>2</sup>	Units <sup>3</sup>	Notes	Reference
Polybrominated Diphenyl Ethers (PBDE) (pentaBDE)-BDE99	Organics	Freshwater AL	0.004	µg/L		ECCC (2013)
Polybrominated Diphenyl Ethers (PBDE) (pentaBDE)-BDE-99	Organics	Marine AL	0.004	µg/L		ECCC (2013)
Polybrominated Diphenyl Ethers (PBDE) (pentaBDE) BDE-100	Organics	Freshwater AL	0.0002	µg/L		ECCC (2013)
Polybrominated Diphenyl Ethers (PBDE) (pentaBDE) BDE-100	Organics	Marine AL	0.0002	µg/L		ECCC (2013)
Prometryn	Herbicides	Freshwater AL	0.104	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2007l); US EPA (2013g)
Propiconazole	Pesticides	Freshwater AL	9.3	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2011m)
Propoxycarbazone-sodium	Herbicides	Freshwater AL	0.64	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2016i)
Propyzamide	Herbicides	Freshwater AL	112	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2008m); US EPA (2015d)
Prosulfuron	Herbicides	Freshwater AL	0.126	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2015f)
Pydiflumetofen	Pesticides	Freshwater AL	21	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2010h)
Pymetrozine	Pesticides	Freshwater AL	8.37	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2021c); HC PMRA (2002); US EPA (2013h)

Substance <sup>1</sup>	Class	Water Value	Long-term WWQG <sup>2</sup>	Units <sup>3</sup>	Notes	Reference
Pyraclostrobin	Pesticides	Freshwater AL	0.16	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2008n)
Pyraflufen-ethyl	Herbicides	Freshwater AL	0.032	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2016j); HC PMRA (2014k)
Pyrasulfotole	Herbicides	Freshwater AL	2.8	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2007m)
Pyrethrins	Pesticides	Freshwater AL	0.020	µg a.i./L	Adapted from US EPA ALB <sup>9</sup>	HC PMRA (2023d); HC PMRA (2020h); US EPA (2016e)
Pyridaben	Pesticides	Freshwater AL	0.022	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2016k)
Pyrimethanil	Pesticides	Freshwater AL	39	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2006f)
Pyriofenone	Pesticides	Freshwater AL	6.2	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2016l)
Pyroxasulfone	Herbicides	Freshwater AL	0.032	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2012e)
Pyroxsulam	Herbicides	Freshwater AL	0.258	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2010i)
Quinoline	Aromatic hydrocarbons (PAHs)	Freshwater AL	50	µg/L	See footnote #19	ECCC (2020)
Quinoxifen	Pesticides	Freshwater AL	6.5	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2018e); HC PMRA (2013d)
Quizalofop-P-ethyl	Herbicide	Freshwater AL	2.1	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2022b); US EPA (2013i)
Resin acids (total)	Organics	Freshwater AL	1	µg/L	Short-term maximum at pH 5.0 <sup>20</sup>	Environment Ontario (1988)

Substance <sup>1</sup>	Class	Water Value	Long-term WWQG <sup>2</sup>	Units <sup>3</sup>	Notes	Reference
Resin acids (total)	Organics	Freshwater AL	3	µg/L	Short-term maximum at pH 5.5 <sup>20</sup>	Environment Ontario (1988)
Resin acids (total)	Organics	Freshwater AL	4	µg/L	Short-term maximum at pH 6.01 <sup>20</sup>	Environment Ontario (1988)
Resin acids (total)	Organics	Freshwater AL	9	µg/L	Short-term maximum at pH 6.5 <sup>20</sup>	Environment Ontario (1988)
Resin acids (total)	Organics	Freshwater AL	25	µg/L	Short-term maximum at pH 7.0 <sup>20</sup>	Environment Ontario (1988)
Resin acids (total)	Organics	Freshwater AL	45	µg/L	Short-term maximum at pH 7.5 <sup>20</sup>	Environment Ontario (1988)
Resin acids (total)	Organics	Freshwater AL	52	µg/L	Short-term maximum at pH 8.0 <sup>20</sup>	Environment Ontario (1988)
Resin acids (total)	Organics	Freshwater AL	60	µg/L	Short-term maximum at pH 8.5 <sup>20</sup>	Environment Ontario (1988)
Resin acids (total)	Organics	Freshwater AL	62	µg/L	Short-term maximum at pH 9.0 <sup>20</sup>	Environment Ontario (1988)
Rimsulfuron	Herbicides	Freshwater AL	0.46	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2008o)
Saflufenacil	Herbicides	Freshwater AL	4.2	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2009d)
Salinity	Inorganics	Estuarine aquatic life	± 10%		± 10% change in concentration	DoE (1972)

Substance <sup>1</sup>	Class	Water Value	Long-term WWQG <sup>2</sup>	Units <sup>3</sup>	Notes	Reference
					(NaCl equivalent) <sup>21</sup> or	
Sedaxane	Pesticides	Freshwater AL	31	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2012f)
Sethoxydim	Herbicides	Freshwater AL	21	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2007n); US EPA (2015e)
Siloxane-D4	Organics	Freshwater AL	0.20	µg/L		ECCC (2022)
Simazine	Herbicides	Freshwater AL	10	µg/L		CCME (1991)
Simazine	Herbicides	Irrigation	0.5	µg/L		CCME (1991)
Simazine	Herbicides	Livestock watering	10	µg/L		CCME (1991)
Spinetoram	Insecticide	Freshwater AL	0.031	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2012); HC PMRA (2008p)
Spinosad	Insecticide	Freshwater AL	0.31	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2015g); HC PMRA (2001a); US EPA (2016f)
Spirodiclofen	Pesticides	Freshwater AL	0.65	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2006g)
Spiromesifen	Pesticides	Freshwater AL	0.13	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2007o)
Spirotetramat	Pesticides	Freshwater AL	50	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2008q)
Spiroxamine	Pesticides	Freshwater AL	0.090	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2015h)
Strontium (dissolved)	Metal	Freshwater AL	1,250	µg/L	See footnote #22	ECCC (2020)
Styrene	Organic, Monocyclic aromatic compounds	Freshwater AL	72	µg/L		CCME (1999)
Sulfentrazone	Herbicides	Freshwater AL	2.90	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2010j)

Substance <sup>1</sup>	Class	Water Value	Long-term WWQG <sup>2</sup>	Units <sup>3</sup>	Notes	Reference
Sulfoxaflor	Pesticides	Freshwater AL	22.7	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2015i); US EPA (2013j)
Sulphate (dissolved)	Inorganic	Livestock watering	1,000	mg/L		CCME (1987)
Sulphide (as unionized H <sub>2</sub> S)	Inorganic	Freshwater AL	2	µg/L	See footnote #23	US EPA (1976) (p. 410)
Surfactant – Alcohol ethoxylated sulphate (AES)	Organics	Freshwater AL	340	µg/L	99% level of protection	ANZECC (2000a)
Surfactant – Alcohol ethoxylated surfactants (AE)	Organics	Freshwater AL	50	µg/L	99% level of protection	ANZECC (2000a)
Surfactant – Linear alkylbenzene sulphonates (LAS)	Organics	Freshwater AL	65	µg/L	99% level of protection	ANZECC (2000a)
Surfactant –alcohol ethoxylate homologue C13.7 EO5	Organics	Freshwater AL	35	µg/L	See footnote #24	ECCC 2013
TBBPA (Tetrabromobisphenol A)	Organics	Freshwater AL	3.1	µg/L		ECCC (2016)
TBBPA (Tetrabromobisphenol A)	Organics	Marine AL	3.1	µg/L		ECCC (2016)
TCMTB [2-(thiocyanomethylthio) benzothiazole]	Pesticides	Freshwater AL	0.11	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2016m)
Tebuconazole	Pesticides	Freshwater AL	6.0	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2021d)
Tebufenozide	Pesticides	Freshwater AL	4.9	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2021e); HC PMRA (2019g)
Tebuthiuron	Herbicides	Freshwater AL	1.6	µg/L		CCME (1995)



Substance <sup>1</sup>	Class	Water Value	Long-term WWQG <sup>2</sup>	Units <sup>3</sup>	Notes	Reference
Tebuthiuron	Herbicides	Irrigation	0.27	µg/L	Cereals, hay and pastures	CCME (1995)
Tebuthiuron	Herbicides	Livestock watering	130	µg/L		CCME (1995)
Tembotrione	Herbicides	Freshwater AL	0.52	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2012h)
Tepraloxymid	Herbicides	Freshwater AL	370	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2004g)
Tetrachloromethane (carbon tetrachloride)	Halogenated methanes	Freshwater AL	13.3	µg/L		CCME (1992)
Tetrachloromethane (carbon tetrachloride)	Halogenated methanes	Livestock Organic watering	5	µg/L		CCME (1992)
Tetraconazole	Pesticides	Freshwater AL	27.0	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2012i)
Tetraniliprole	Pesticides	Freshwater AL	0.176	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2019h)
Thallium	Metals	Freshwater AL	0.03	µg/L		ANZECC (2000a)
Thiacloprid	Pesticides	Freshwater AL	0.0026	µg a.i./L	Adapted from Raby <i>et al.</i> (2018)	Raby <i>et al.</i> (2018)
Thiamethoxam	Pesticides	Freshwater AL	0.15	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2021f); HC PMRA (2007p)
Thiencarbazone-methyl	Herbicides	Freshwater AL	0.034	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2010k)
Thifensulfuron methyl	Herbicides	Freshwater AL	0.25	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2008r)
Tin, Tributyltin	Organotin compounds	Freshwater AL	0.008	µg/L		CCME (1992)
Tin, Tributyltin	Organotin compounds	Livestock watering	250	µg/L		CCME (1992)

Substance <sup>1</sup>	Class	Water Value	Long-term WWQG <sup>2</sup>	Units <sup>3</sup>	Notes	Reference
Tin, Tributyltin	Organotin compounds	Marine AL	0.001	µg/L		CCME (1992)
Tin, Tricyclohexyltin	Organotin compounds	Livestock watering	250	µg/L		CCME (1992)
Tin, Triethyltin	Organotin compounds	Freshwater AL	0.4	µg/L		Ontario MOEE (1994)
Tin, Triphenyltin	Organotin compounds	Freshwater AL	0.022	µg/L		CCME (1992)
Tin, Triphenyltin	Organotin compounds	Livestock watering	820	µg/L		CCME (1992)
Tioxazafen	Pesticides	Freshwater AL	3.0	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2017h)
Tolpyralate	Herbicides	Freshwater AL	0.590	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2017i)
Total dissolved solids (filterable residue)	Inorganics	Livestock watering	1,000-3,000	mg/L	Species dependent - see Table 4-13 in CCREM 1987	CCREM (1987)
Total dissolved solids (filterable residue)	Physical	Irrigation	<500	mg/L	For low tolerance crops <sup>10</sup>	CCREM (1987)
Total dissolved solids (filterable residue)	Physical	Irrigation	<800	mg/L	For slightly tolerant crops <sup>10</sup>	CCREM (1987)
Total dissolved solids (filterable residue)	Physical	Irrigation	<1500	mg/L	For moderately tolerant crops <sup>10</sup>	CCREM (1987)
Total dissolved solids (filterable residue)	Physical	Irrigation	<2500	mg/L	For tolerant crops <sup>10</sup>	CCREM (1987)
Total dissolved solids (filterable residue)	Physical	Irrigation	<3500	mg/L	For very tolerant crops <sup>10</sup>	CCREM (1987)

Substance <sup>1</sup>	Class	Water Value	Long-term WWQG <sup>2</sup>	Units <sup>3</sup>	Notes	Reference
Tralkoxydim	Herbicides	Freshwater AL	100	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2009e)
Triallate	Pesticides	Freshwater AL	0.24	µg/L		CCME (1992)
Triallate	Pesticides	Livestock watering	230	µg/L		CCME (1992)
Tribenuron methyl	Herbicides	Freshwater AL	0.1	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	US EPA (2011c)
Tribromomethane (bromoform)	Halogenated methanes	Livestock watering	100	µg/L		CCME (1992)
Trichlorfon	Pesticides	Freshwater AL	0.009	µg a.i./L		CCME (2012)
Trichloromethane (chloroform)	Halogenated methanes	Freshwater AL	1.8	µg/L		CCME (1992)
Trichloromethane (chloroform)	Halogenated methanes	Livestock watering	100	µg/L		CCME (1992)
Triclocarban	Chlorinated organics	Freshwater AL	0.05	µg/L	See footnote #26	ECCC (2024)
Triclopyr	Herbicides	Freshwater AL	13	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2004h); US EPA (2019e)
Triclosan	Organics	Freshwater AL	0.12	µg/L	See footnote #27	ECCC (2017)
Trifloxystrobin	Pesticides	Freshwater AL	1.5	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2004i)
Trifluralin	Herbicides	Freshwater AL	0.2	µg/L		CCME (1993)
Trifluralin	Herbicides	Livestock watering	45	µg/L		CCME (1992)
Triflurosulfuron-methyl	Herbicides	Freshwater AL	0.203	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2014l); HC PMRA (1999)
Trinexapac-ethyl	Herbicides	Freshwater AL	19	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2020i); US EPA (2013k)

Substance <sup>1</sup>	Class	Water Value	Long-term WWQG <sup>2</sup>	Units <sup>3</sup>	Notes	Reference
Triticonazole	Pesticides	Freshwater AL	10.5	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2021g); US EPA (2019f)
Uranium	Metals	Freshwater AL	7.5	µg/L	See footnote #28	CCME (2011)
Uranium	Metals	Freshwater AL	16.5	µg/L	See footnote #28 - short term acute	CCME (2011)
Uranium	Metals	Irrigation	10	µg/L		CCREM (1987)
Uranium	Metals	Livestock watering	200	µg/L		CCREM (1987)
Vanadium	Metals	Freshwater AL	60	µg/L	See footnote #29	ECCC(2016)
Vanadium	Metals	Marine AL	5	µg/L		ECCC(2016)
Vanadium	Metals	Irrigation	100	µg/L		CCREM (1987)
Vanadium	Metals	Livestock watering	100	µg/L		CCREM (1987)
Vinyl chloride	Organics	Freshwater AL	625	µg/L	Adapted from Nam and An (2010)	Nam and An (2010)
Zoxamide	Pesticides	Freshwater AL	1.74	µg a.i./L	Adapted from HC PMRA <sup>4</sup>	HC PMRA (2022c); HC PMRA (2001b)

## Notes

1. WWQG are given for total substance concentrations unless otherwise noted.
2. Values are for long-term chronic concentrations unless otherwise noted.
3. Note that a.i. = active ingredient and a.e. = acid equivalent.
4. The aquatic life reference values (ALRVs) for the most sensitive taxa by the Health Canada (HC) Pest Management Regulatory Agency (PMRA) were adapted using assessment factors (AF) to account for uncertainty and meet the protection goals of the BC water quality guidelines (BC WQG). The assessment factor was calculated following the approach suggested by Okonski *et al.* (2021).
5. New evidence presented in Tillitt *et al.* (2010) suggests a more conservative value may be needed.
6. An assessment factor of 4 was applied to the HC<sub>5</sub> of 3.5 µg/L derived by ECCC for Bisphenol A (BPA).

7. An assessment factor of 2 was applied to the HC<sub>5</sub> of 2.4 µg/L derived by ECCC for chlorinated alkanes.
8. An assessment factor of 2 was applied to the HC<sub>5</sub> of 5 µg/L derived by ECCC for hexavalent chromium in freshwater.
9. The aquatic life benchmarks (ALBs) for the most sensitive taxa by the US Environmental Protection Agency (EPA) were adapted using assessment factors (AF) to account for uncertainty and meet the protection goals of the BC water quality guidelines (BC WQG). The assessment factor was calculated following the approach suggested by Okonski *et al.* (2021).
10. Low tolerance crops: strawberry, raspberry, bean, carrot; slightly tolerant crops: all other fruits and berries, onions, parsnip, radish, pea, pumpkin, lettuce, pepper, muskmelon, sweet potato, sweet corn, potato, celery, cabbage kohlrabi, cauliflower, cowpea, broadbean, flax, sunflower, corn, clover; moderately tolerant crops: spinach, cantaloupe, cucumber, tomato, squash, brussel sprout, broccoli, turnip, brome, alfalfa, big trefoil, beardless, wildrye, vetch timothy, crested wheatgrass; tolerant crops: beet, zucchini, canola, sorghum, oat hay, wheat hay, brume, tall fescue, sweet clover, perennial ryegrass; very tolerant crops: asparagus, soybean, safflower, oats, rye wheat, sugar beet, barley, barley hay, tall wheatgrass (Source: Table 4-7 CCREM 1987).
11. An assessment factor of 10 was applied to the guideline derived by Efroymson *et al.* (1997) for diazinon.
12. An assessment factors of 2 was applied to the short-term and long-term HC<sub>5</sub>s derived by CCME for Endosulfan in freshwater.
13. An assessment factors of 6 was applied to the short-term HC<sub>5</sub> and a factor of 2 to the long-term WQG derived by the CCME for Endosulfan in marine waters.
14. An assessment factors of 2 was applied to both the long-term and the short-term HC<sub>5</sub>s, derived by the CCME for Glyphosate.
15. May not be protective of barley and other cereal crops; 1.0 mg/L lithium suggested for cereal crops.
16. WWQG is for the total concentration of nonylphenols and nonylphenol ethoxylates which is calculated as the concentration of the mixture of nonylphenolic compounds expressed as the toxic equivalent of nonylphenolic compounds. See CCME (2002) for more information.
17. An assessment factor of 2 was applied to the HC<sub>5</sub> of 6.8 µg/L derived by ECCC for Perfluorooctane Sulfonate (PFOS) in freshwater.
18. In assessing aromatics hydrocarbons, BTEX (benzene, toluene, ethylbenzene and xylene) are to be tested separately and compared to their own BC approved WQGs.
19. An assessment factor of 3 was applied to the HC<sub>5</sub> of 150 µg/L derived by ECCC for quinoline in freshwater.
20. Resin Acids — Total resin acids include abietic acid, neoabietic acid, pimaric acid, isopimaric acid, and sandaracopimaric acid but not dehydroabietic acid.
21. 24-hour change in salinity should not exceed 1 ‰ if natural salinity is 0 to 3.5 ‰; 2 ‰ if natural salinity is 3.5 to 13.5 ‰; and 4 ‰ if natural salinity is 13.5 to 35 ‰ (US EPA 1976).
22. An assessment factor of 2 was applied to the HC<sub>5</sub> of 2,500 µg/L derived by ECCC for dissolved strontium. Given that dissolved strontium concentrations are approximately equivalent to total strontium concentrations, this guideline can be compared to total strontium concentrations when dissolved strontium concentrations are unavailable (ECCC 2020).

23. Sulphide. In aquatic environments  $H_2S$  and  $HS^-$  are in equilibrium as  $H_2S \rightleftharpoons H^+ + HS^-$ . Therefore, the un-ionized  $H_2S$  can be calculated from dissolved sulphide concentration  $[S^{2-}]$ , pH, and the dissociation constant (pK) which is dependent on the sample water temperature. Ionic strength or salinity can be used to select an accurate pK. Look-up tables to select the pK can be found in USEPA (1983; page 11 [here](#)). The formula to calculate  $[H_2S]$  given a total dissolved sulphide concentration  $[S^{2-}]$  is as follows (where both  $[H_2S]$  and  $[S^{2-}]$  are in mg/L):

$$[H_2S] = [S^{2-}] \left[ \frac{1}{(1 + (10^{(pH-pK)}))} \right]$$

24. An assessment factor of 2 was applied to the  $HC_5$  of 70  $\mu\text{g/L}$  derived by ECCC (2013) for the average homologue distribution of AEs in freshwater (based on Canadian municipal wastewater effluent as  $C_{13.7}EO_5$ ).
25. 30-day average, site-specific objective for the lower Columbia River, BC (MacDonald Environmental Sciences 1997).
26. An assessment factor of 3 was applied to the  $HC_5$  of 0.15  $\mu\text{g/L}$  derived by ECCC (2024) for Triclocarban.
27. An assessment factor of 4 was applied to the  $HC_5$  of 0.47  $\mu\text{g/L}$  derived by ECCC for Triclosan.
28. Assessment factor of 2 was applied to chronic and acute  $HC_5$  of 15 and 33  $\mu\text{g/L}$  derived by CCME for uranium in freshwater.
29. Assessment factor of 2 was applied to the  $HC_5$  of 120  $\mu\text{g/L}$  derived by ECCC for vanadium in freshwater.

## References for Table 1:

- Australia and New Zealand Environment and Conservation Council (ANZECC). 2000a. Australian and New Zealand guidelines for fresh and marine water quality, 2000. Volume 1, October 2000. National Water Quality Management Strategy, Paper No. 4. Canberra, AU: Australian and New Zealand Environment and Conservation. 314p. Accessed on-line at <https://www.waterquality.gov.au/anz-guidelines/guideline-values/default/water-quality-toxicants>
- Australia and New Zealand Environment and Conservation Council (ANZECC). 2000b. Australian and New Zealand guidelines for fresh and marine water quality, 2000. Volume 2 - Aquatic ecosystems - rationale and background information. National Water Quality Management Strategy, Australian and New Zealand Environment and Conservation. 678p. Accessed on-line at <https://www.waterquality.gov.au/anz-guidelines/guideline-values/default/water-quality-toxicants>
- Canadian Council of Ministers of the Environment (CCME). 1989. Canadian environmental quality guidelines. Canadian Council of Ministers of the Environment, Winnipeg. Accessed on-line at <https://ccme.ca/en/summary-table>.
- Canadian Council of Ministers of the Environment (CCME). 1990. Canadian environmental quality guidelines. Canadian Council of Ministers of the Environment, Winnipeg. Accessed on-line at <https://ccme.ca/en/summary-table>.
- Canadian Council of Ministers of the Environment (CCME). 1991. Canadian environmental quality guidelines. Canadian Council of Ministers of the Environment, Winnipeg.
- Canadian Council of Ministers of the Environment (CCME). 1992. Canadian environmental quality guidelines. Canadian Council of Ministers of the Environment, Winnipeg. Accessed on-line at <https://ccme.ca/en/summary-table>.
- Canadian Council of Ministers of the Environment (CCME). 1993. Canadian environmental quality guidelines. Canadian Council of Ministers of the Environment, Winnipeg. Accessed on-line at <https://ccme.ca/en/summary-table>.
- Canadian Council of Ministers of the Environment (CCME). 1994. Canadian environmental quality guidelines. Canadian Council of Ministers of the Environment, Winnipeg.
- Canadian Council of Ministers of the Environment (CCME). 1995. Canadian environmental quality guidelines. Canadian Council of Ministers of the Environment, Winnipeg. Accessed on-line at <https://ccme.ca/en/summary-table>.
- Canadian Council of Ministers of the Environment (CCME). 1996. Canadian environmental quality guidelines. Canadian Council of Ministers of the Environment, Winnipeg. Accessed on-line at <https://ccme.ca/en/summary-table>.
- Canadian Council of Ministers of the Environment (CCME). 1997. Canadian environmental quality guidelines. Canadian Council of Ministers of the Environment, Winnipeg. Accessed on-line at <https://ccme.ca/en/summary-table>.
- Canadian Council of Ministers of the Environment (CCME). 1999. Canadian environmental quality guidelines. Canadian Council of Ministers of the Environment, Winnipeg. Accessed on-line at <https://ccme.ca/en/summary-table>.

- Canadian Council of Ministers of the Environment (CCME). 2002. Canadian environmental quality guidelines. Canadian Council of Ministers of the Environment, Winnipeg. Accessed on-line at <https://ccme.ca/en/summary-table>.
- Canadian Council of Ministers of the Environment (CCME). 2006. Canadian environmental quality guidelines. Canadian Council of Ministers of the Environment, Winnipeg. Accessed on-line at <https://ccme.ca/en/summary-table>.
- Canadian Council of Ministers of the Environment (CCME). 2008a. Canadian environmental quality guidelines. Canadian Council of Ministers of the Environment, Winnipeg. Accessed on-line at <https://ccme.ca/en/summary-table>.
- Canadian Council of Ministers of the Environment (CCME). 2008b. Canada-Wide Standard for Petroleum Hydrocarbons (PHC) in Soil: Scientific Rationale Supporting Technical Document. January 2008. PN 1399. 100 p. + appendices.
- Canadian Council of Ministers of the Environment (CCME). 2009. Canadian environmental quality guidelines. Canadian Council of Ministers of the Environment, Winnipeg. Accessed on-line at <https://ccme.ca/en/summary-table>.
- Canadian Council of Ministers of the Environment (CCME). 2010. Canadian environmental quality guidelines. Canadian Council of Ministers of the Environment, Winnipeg. Accessed on-line at <https://ccme.ca/en/summary-table>.
- Canadian Council of Ministers of the Environment (CCME). 2011. Canadian environmental quality guidelines. Canadian Council of Ministers of the Environment, Winnipeg. Accessed on-line at <https://ccme.ca/en/summary-table>.
- Canadian Council of Ministers of the Environment (CCME). 2012. Canadian environmental quality guidelines. Canadian Council of Ministers of the Environment, Winnipeg. Accessed on-line at <https://ccme.ca/en/summary-table>.
- Canadian Council of Ministers of the Environment (CCME). 2014. Canadian environmental quality guidelines. Canadian Council of Ministers of the Environment, Winnipeg. Accessed on-line at <https://ccme.ca/en/summary-table>.
- Canadian Council of Resource and Environmental Ministers (CCREM). 1987. Canadian Water Quality Guidelines. 1484 p.
- Department of Environment (DoE). 1972. Guidelines for water quality objectives and standards. Technical bulletin No. 67, Ottawa, CA: Department of the Environment, Inland Waters Branch. 168 p.
- Efroymsen, R. A., Suter II, G. W., Sample, B. E., and Jones, D. S. (1997). Preliminary remediation goals for ecological endpoints. August 1997. Prepared for US Department of Energy, Oak Ridge, TN. Available at: Environmental Sciences Division, Oak Ridge National Laboratory. Accessed on-line at <https://rais.ornl.gov/documents/tm162r2.pdf>
- Environment and Climate Change Canada (ECCC). 2013. Federal Environmental Quality Guidelines. Environment and Climate Change Canada. Accessed on-line at <https://www.canada.ca/en/environment-climate-change/services/evaluating-existing-substances/federal-environmental-quality-guidelines-summary-table.html>.
- Environment and Climate Change Canada (ECCC). 2016. Federal Environmental Quality Guidelines. Environment and Climate Change Canada. Accessed on-line at



- <https://www.canada.ca/en/environment-climate-change/services/evaluating-existing-substances/federal-environmental-quality-guidelines-summary-table.html>.
- Environment and Climate Change Canada (ECCC). 2017. Federal Environmental Quality Guidelines. Environment and Climate Change Canada. Accessed on-line at <https://www.canada.ca/en/environment-climate-change/services/evaluating-existing-substances/federal-environmental-quality-guidelines-summary-table.html>.
- Environment and Climate Change Canada (ECCC). 2018. Federal Environmental Quality Guidelines. Environment and Climate Change Canada. Accessed on-line at <https://www.canada.ca/en/environment-climate-change/services/evaluating-existing-substances/federal-environmental-quality-guidelines-summary-table.html>.
- Environment and Climate Change Canada (ECCC). 2020. Federal Environmental Quality Guidelines. Environment and Climate Change Canada. Accessed on-line at <https://www.canada.ca/en/environment-climate-change/services/evaluating-existing-substances/federal-environmental-quality-guidelines-summary-table.html>.
- Environment and Climate Change Canada (ECCC). 2022. Federal Environmental Quality Guidelines. Environment and Climate Change Canada. Accessed on-line at <https://www.canada.ca/en/environment-climate-change/services/evaluating-existing-substances/federal-environmental-quality-guidelines-summary-table.html>.
- Environment and Climate Change Canada (ECCC). 2024. Federal Environmental Quality Guidelines. Environment and Climate Change Canada. Accessed on-line at <https://www.canada.ca/en/environment-climate-change/services/evaluating-existing-substances/federal-environmental-quality-guidelines-summary-table.html>.
- Environment Ontario. 1988. Scientific Criteria Document for Development of Provincial Water Quality Objectives and Guidelines, Resin Acids. ISBN 0-7729-4347-8.
- Haywood, G. P., and R. W. Drinnan (Dobrocky Seatech Ltd.). 1983. A Literature Review and Report on Barium Toxicity in Freshwater, In Relation to the Monkman Coal Project, February, 1983, 49 p. (Prepared for: Petro-Canada Exploration Ltd.).
- Health Canada Pest Management Regulatory Agency (HC PMRA). 1999. Regulatory Note REG99-03. Triflurosulfuron-methyl. 55 p. + appendices.
- Health Canada Pest Management Regulatory Agency (HC PMRA). 2000. Regulatory Note REG2000-09. Flucarbazone-sodium. 27 p. + appendices.
- Health Canada Pest Management Regulatory Agency (HC PMRA). 2001a. Regulatory Note REG2001-10. Spinosad Success™ 480SC Naturalyte Insect Control Product Conserve™ 480SC Naturalyte Insect Control Product. 50 p. + appendices.
- Health Canada Pest Management Regulatory Agency (HC PMRA). 2001b. Regulatory Note REG2001-09. Zoxamide Zoxium® 80W Fungicide, Gavel® 75DF Fungicide. 39 p. + appendices."
- Health Canada Pest Management Regulatory Agency (HC PMRA). 2002. Proposed Review Decision Document PRDD2002-03. Pymetrozine (TGAI) Endeavor 50WG Fulfill 50WG. 15 p. + appendices.
- Health Canada Pest Management Regulatory Agency (HC PMRA). 2003a. Proposed Acceptability for Continuing Registration. Document PACR2003-06. Re-evaluation of Bensulide. 28 p. + appendices.
- Health Canada Pest Management Regulatory Agency (HC PMRA). 2003b. Regulatory Note REG2003-10. Famoxadone/Tanos 50DF. 46 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2003c. Regulatory Note REG2003-11. Fenamidone Technical Fungicide, Reason 500 SC Fungicide. 53 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2003d. Proposed Regulatory Decision Document PRDD2003-04. Fenhexamid. 53 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2003e. Regulatory Note REG2003-12. Fluazinam. 42 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2003f. Regulatory Decision Document PRDD2003-07. Flufenacet. 51 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2003g. Regulatory Note REG2003-08. Foramsulfuron Technical Herbicide, Option 2.25 SC Herbicide, and Option 35 DF Herbicide. 113 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2003h. Proposed Acceptability for Continuing Registration. Document PACR2003-01. Re-evaluation of Phorate. 14 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2004a. Proposed Acceptability for Continuing Registration. Document PACR2004-40. Re-evaluation of Acephate. 34 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2004b. Regulatory Note REG2004-02. Boscalid/BAS 510. 62 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2004c. Proposed Acceptability for Continuing Registration. Document PACR2004-35. Re-evaluation of Diflubenzuron. 7 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2004d. Proposed Regulatory Decision Document PRDD2004-04. Florasulam EF-1343 Suspension Concentrate Herbicide. 60 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2004e. Regulatory Note REG2004-04. Iodosulfuron-methyl-sodium. 56 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2004f. Regulatory Note REG2004-08. Methoxyfenozide. 54 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2004g. Proposed Regulatory Decision Document PRDD2004-01. Tepraloxydim, Equinox EC and Dash HC. 71 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2004h. Proposed Acceptability for Continuing Registration PACR2004-37. Re-evaluation of Triclopyr. 5 p. + appendix.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2004i. Regulatory Note REG2004-03. Trifloxystrobin. 56 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2005a. Proposed Regulatory Decision Document PRDD2005-03. Fenbuconazole. 56 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2005b. Regulatory Note REG2005-02. Mesotrione Callisto 480SC Herbicide. 76 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2005c. Proposed Acceptability for Continuing Registration PACR2005-03. Re-evaluation of Oxyfluorfen. 6 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2005d. Proposed Registration Decision PRD2005-05. AC 900001 (Picolinafen). 48 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2006a. Proposed Acceptability for Continuing Registration. Document PACR2006-02. Re-evaluation of Acifluorfen. 5 p. + appendix.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2006b. Regulatory Note REG2006-01. Bifenazate. 44 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2006c. Regulatory Note REG2006-08. Switch 62.5 WG Fungicide. 55 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2006d. Re-evaluation Decision Document RRD2006-19. Oxyfluorfen. 9 p.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2006e. Regulatory Note REG2006-14. Pinoxaden. 58 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2006f. Regulatory Note REG2006-04. Pyrimethanil. 78 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2006g. Regulatory Note REG2006-06. Spirodiclofen. 72 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2007a. Regulatory Note REG2007-02. Azoxystrobin and Dynasty 100FS Fungicide. 22 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2007b. Proposed Re-evaluation Decision PRVD2007-14. Bentazon. 18 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2007c. Proposed Re-evaluation Decision PRVD2007-09. Chlorsulfuron. 16 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2007d. Proposed Re-evaluation Decision PRVD2007-03. Re-evaluation of S-ethyl Dipropylthiocarbamate (EPTC). 4 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA) 2007e. Proposed Re-evaluation Decision PRVD2007-12. Ethofumesate. 16 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA) 2007f. Proposed Registration Decision PRD2007-07. Fenamidone. 20 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2007g. Proposed Re-evaluation Decision PRVD2007-13. Hexazinone. 17 p. + appendices. PRVD2007-13.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2007h. Proposed Re-evaluation Decision PRVD2007-10. Metalaxyl and Metalaxyl-M. 31 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2007i. Re-evaluation Note REV2007-11. Preliminary Risk and Value Assessments of Methamidophos. 19 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2007j. Proposed Re-evaluation Decision PRVD2007-02. Re-evaluation of Oxamyl. 19 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2007k. Proposed Re-evaluation Decision PRVD2007-07. Pendimethalin. 19 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2007l. Re-evaluation Decision RVD2007-02. Prometryn. 4 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2007m. Evaluation Report ERC2007-11. Pyrasulfotole. 39 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2007n. Proposed Re-evaluation Decision PRVD2007-17. Sethoxydim. 17 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2007o. Evaluation Report ERC2007-08. Spiromesifen. 38 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2007p. Evaluation Report. Thiamethoxam. 54 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2008a. Proposed Re-evaluation Decision PRVD2008-25. Carbothiin and Oxycarboxin. 17 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2008b. Evaluation Report ER2008-03. Chlorantraniliprole. PMRA Document Number: 158316. 36 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2008c. Proposed Registration Decision PRD2008-09. Cloransulam-methyl. 19 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2008d. Proposed Re-evaluation Decision PRD2008-12. Diquat Dibromide. 23 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2008e. Proposed Re-evaluation Decision PRVD2008-11. Dodine. 19 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2008f. Proposed Re-evaluation Decision PRVD2008-05. Ethametsulfuron methyl. 27 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2008g. Proposed Registration Decision PRD2008-05. Foramsulfuron Technical Herbicide. 20 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2008h. Proposed Re-evaluation Decision PRVD2008-29. Imazamethabenz-Methyl. 31 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2008i. Proposed Registration Decision PRD2008-06. Iodosulfuron-Methyl-Sodium Technical Herbicide. 21 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2008j. Proposed Re-evaluation Decision PRVD2008-24. Maleic Hydrazide. 15 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2008k. Proposed Re-evaluation Decision PRVD2008-08. Metsulfuron methyl. 27 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2008l. Proposed Re-evaluation Decision PRVD2008-01. Nicosulfuron. 26 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2008m. Proposed Re-evaluation Decision PRVD2008-20. Propyzamide. 15 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2008n. Proposed Registration Decision PRD2008-04. Pyraclostrobin, Insignia EG Fungicide, Headline EC Fungicide, Cabrio EG Fungicide. 29 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2008o. Proposed Re-evaluation Decision PRVD2008-06. Rimsulfuron. 28 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2008p. Evaluation Report ERC2008-01. Spinetoram (XDE-175). 50 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2008q. Proposed Registration Decision PRD2008-07. Spirotetramat. PMRA Document Number: 1568427. 38 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2008r. Proposed Re-evaluation Decision PRVD2008-03. Thifensulfuron methyl. 27 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2009a. Proposed Registration Decision PRD2009-04. Dimethenamid-P. 38 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2009b. Proposed Re-evaluation Decision PRVD2009-01. Dithiopyr. 31 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2009c. Evaluation Report ERC2009-01. Mandipropamid Technical Fungicide. 49 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2009d. Proposed Registration Decision PRD2009-18. Saflufenacil. 56 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2009e. Proposed Re-evaluation Decision PRVD2009-08. Tralkoxydim. 38 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2010a. Proposed Registration Decision PRD2010-19. Acibenzolar-S-Methyl. 35 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2010b. Proposed Re-evaluation Decision PRVD2010-17. Clopyralid. 34 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2010c. Proposed Registration Decision PRD2010-25. Flonicamid. 35 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2010d. Proposed Re-evaluation Decision PRVD2010-02. Imazethapyr. 31 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2010e. Proposed Re-evaluation Decision PRVD2010-18. Malathion. 60 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2010f. Proposed Registration Decision PRD2010-01. Mesosulfuron-methyl. 28 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2010g. Proposed Re-evaluation Decision PRVD2010-14. Myclobutanil. 44 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2010h. Proposed Registration Decision PRVD2018-06. Pydiflumetofen, A19649 Fungicide, A19649TO Fungicide, A20259 Fungicide, A20560 Fungicide, and A21461 Fungicide. 46 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2010i. Evaluation Report ERC2010-04. Pyroxulam. 35 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2010j. Evaluation Report ERC2010-08. Sulfentrazone. 39 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2010k. Evaluation Report ERC2010-03. Thien carbazon-methyl. 40 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2011a. Proposed Registration Decision PRD2011-25. Ametoctradin. 37 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2011b. Proposed Registration Decision PRD2011-08. Carfentrazone-ethyl. 21 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2011c. Evaluation Report ERC 2011-06. Difenconazole. 47 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2011d. Proposed Re-evaluation Decision Consultation Document PRVD2011-04. Fenoxaprop-p-ethyl. 21 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2011e. Proposed Re-evaluation Decision PRVD2011-11. Fluazifop-p-butyl. 16 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2011f. Evaluation report ERC2011-08. Fluopicolide. 46 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2011g. Proposed Registration Decision PRD2011-12. Imazapyr. 33 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2011h. Evaluation Report ERC2011-04. Ipconazole. 45 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2011i. Proposed Re-evaluation Decision PRVD2011-06. MCPB. 42 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2011j. Evaluation Report ERC2011-02. Metconazole. 50 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2011k. Evaluation Report ERC2011-10. Metrafenone. 33 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2011l. Proposed Registration Decision PRD2011-26. Penthiopyrad. 50 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2011m. Proposed Re-evaluation Decision PRVD2011-02. Propiconazole. 45 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2012a. Proposed Registration Decision PRD2012-07. Fluoxastrobin Technical Fungicide. 41 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2012b. Proposed Registration Decision PRD2012-18. Fluroxypyr. 29 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2012c. Proposed Registration Decision PRD2012-02. Penflufen. 43 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2012d. Proposed Registration Decision PRD2012-10. Picoxystrobin. 40 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2012e. Proposed Registration Decision PRD2012-20. Pyroxasulfone. 36 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2012f. Evaluation Report ERC2012-01. Sedaxane. 47 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2012g. Proposed Registration Decision RD2012-31. Spinetoram. 22 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2012h. Evaluation Report ERC2012-02. Tembotrione. 44 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2012i. Proposed Registration Decision PRD2012-29. Tetraconazole Technical Fungicide. 42 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2013a. Proposed Re-evaluation Decision PRVD2013-05. Clofentezine. 42 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2013b. Proposed Registration Decision PRD2013-09. Cyantraniliprole. 66 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2013c. Proposed Registration Decision PRD2013-15. Dichlorprop-P. 47 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2013d. Evaluation Report ERC2013-02. Quinoxifen. 35 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2014a. Proposed Registration Decision PRD2014-13. Ethaboxam. 47 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2014b. Proposed Re-evaluation Decision PRVD2014-05. Flumetsulam. 20 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2014c. Evaluation Report ERC2014-02. Fluopyram. 49 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2014d. Proposed Registration Decision PRD2014-20. Flupyradifurone. 62 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2014e. Proposed Registration Decision PRD2014-16. Flutriafol. 45 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2014f. Proposed Registration Document PRD2014-12. Halauxifen-Methyl. 48 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2014g. Proposed Registration Decision PRD2014-05. Halosulfuron, present as methyl ester. 53 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2014h. Proposed Registration Decision PRD2014-19. Isofetamid. 53 pp-. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2014i. Proposed Re-evaluation Decision PRVD2014-04. Isoxaben. 17 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2014j. Proposed Registration Decision PRD2014-01. Penthiopyrad. 23 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2014k. Evaluation Report ERC2014-03. Pyraflufen-ethyl. 38 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2014l. Proposed Re-evaluation Decision PRVD2014-06. Triflurosulfuron-methyl. 17 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2015a. Proposed Registration Decision PRD2015-07. Benzovindiflupyr. 57 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2015b. Proposed Registration Decision PRD2015-02. Bicyclopyrone. 48 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2015c. Proposed Registration Decision PRD2015-10. Difenconazole. 32 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2015d. Proposed Registration Decision PRD2015-22. Oxathiapiprolin. 46 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2015e. Re-evaluation Note REV2015-10. Special Review of Paraquat: Proposed Decision for Consultation. 8 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2015f. Proposed Re-evaluation Decision PRVD2015-02. Prosulfuron. 16 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2015g. Proposed Registration Decision RD2015-05. Spinosad. 24 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2015h. Proposed Registration Decision PRD2015-14. Spiroxamine. 43 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2015i. Proposed Registration Decision PRD2015-08. Sulfoxaflor. 58 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2016a. Proposed Re-evaluation Decision PRVD2016-01. Acephate. 55 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2016b. Proposed Re-evaluation Decision PRVD2016-16. Acrolein. 14 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2016c. Proposed Re-evaluation Decision. PRVD2016-11. Clethodim. 31 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2016d. Proposed Registration Decision PRD2016-34. Cyazofamid. 21 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2016e. Proposed Re-evaluation Decision PRVD2016-18. Cypermethrin. 46 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2016f. Proposed Re-evaluation Decision PRVD2016-09. Iprodione. 52 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2016g. Proposed Registration Decision PRD2016-03. Mandestrobin. 45 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2016h. Proposed Re-evaluation Decision PRVD2016-02. Methomyl. 50 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2016i. Proposed Registration Decision PRD2016-06. Propoxycarbazon sodium. 32 p. + appendices.



Health Canada Pest Management Regulatory Agency (HC PMRA). 2016j. Proposed Registration Decision PRD2016-32. Pyraflufen-ethyl. 18 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2016k. Proposed Re-evaluation Decision PRVD2016-04. Pyridaben. 35 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2016l. Proposed Registration Decision. PRD2016-23. Pyriofenone. 39 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2016m. Proposed Re-evaluation Decision PRVD2016-23. Antisapstain Use of 2-(Thiocyanomethylthio) benzothiazole (TCMTB). 24 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2017a. Proposed Registration Decision. PRD2017-12. Cyclaniliprole and Cyclaniliprole 50SL Insecticide. 43 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2017b. Proposed Re-evaluation Decision Consultation Document PRVD2017-16. Dichlorvos and Its Associated End-use Products. 48 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2017c. Proposed Re-evaluation Decision PRVD2017-04. Diflufenzopyr-sodium. 15 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2017d. Proposed Registration Decision PRD2017-14. Fluazinam and Secure Fungicide. 30 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2017e. Proposed Registration Decision PRD2017-02. Fluensulfone. 33 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2017f. Proposed Re-evaluation Decision Consultation Document PRVD2017-11. Fluroxypyr (present as ester) and Its Associated End-use Products. 18 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2017g. Proposed Re-evaluation Decision. Consultation Document PRVD2017-19. Fosetyl-aluminum and Its Associated End-use Products. 35 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2017h. Proposed Registration Decision PRD2017-10. Tioxazafen and MON 102133 SC Nematicide Seed Treatment. 38 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2017i. Proposed Registration Decision PRD2017-13. Tolpyralate and Tolpyralate 400SC Herbicide. 38 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2018a. Proposed Re-evaluation Decision. Consultation Document PRVD2018-16. Clodinafop-propargyl and Its Associated End-use Product. 27 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2018b. Proposed Re-evaluation Decision Consultation Document PRVD2018-01. Ethephon and Its Associated End-use Products. 25 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2018c. Proposed Registration Decision PRD2018-03. Flazasulfuron and Flazasulfuron 25WG Herbicide. 37 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2018d. Proposed Re-evaluation Decision Consultation Document PRVD2018-15. Fomesafen and Its Associated End-use Products. 26 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2018e. Registration Decision RD2018-11. Quinoxifen. 2 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2019a. Proposed Re-evaluation Decision. Consultation Document PRVD2019-04. Acephate and Its Associated End-use Products Updated Environmental Risk Assessment. 19 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2019b. Proposed Registration Decision PRD2019-04. Bixafen and F9651-2 Fungicide. 37 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2019c. Proposed Re-evaluation Decision Consultation Document PRVD2019-03. Dimethomorph and Its Associated End-use Products. 25 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2019d. Special Review Decision SRD2019-01. Hexazinone and Its Associated End-use Products. Final Decision Document. 1 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2019e. Proposed Registration Decision PRD2019-09. Mefentrifluconazole and related end-use products. 56 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2019f. Proposed Registration Decision PRD2019-12. Pethoxamid and Pethoxamid 480EC. 38 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2019g. Proposed Re-evaluation Decision PRVD2019-06. Tebufenozide and Its Associated End-use Products. 7 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2019h. Proposed Registration Decision PRD2019-14. Tetraniliprole and Tetraniliprole 200SC Insecticide, Tetraniliprole 480FS, Tetraniliprole 200SC Turf Insecticide and Tetrino. 55 p. + appendices."

Health Canada Pest Management Regulatory Agency (HC PMRA). 2020a. Proposed Re-evaluation Decision Consultation Document PRVD2020-02. Cyromazine and Its Associated End-use Products. 43 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2020b. Proposed Re-evaluation Decision Consultation Document PRVD2020-01.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2020c. Proposed Registration Decision PRD2020-05. Fenpropathrin and Danitol EC Spray. 42 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2020d. Proposed Registration Decision PRD2020-17. Imazapyr, Habitat Aqua. 26 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2020e. Proposed Registration Decision PRD2020-10. Inpyrfluxam, Excalia Fungicide and Zeltera Fungicide. 50 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2020f. Proposed Re-evaluation Decision Consultation Document PRVD2020-10. Kresoxim-methyl and its associated end-use products. 30 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2020g. Proposed Re-evaluation Decision PRVD2020-09. Consultation Document. Piperonyl butoxide and associated end-use products. 51 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2020h. Proposed Re-evaluation Decision PRVD2020-08. Pyrethrins and associated end-use products. Consultation document. 50 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2020i. Proposed Re-evaluation Decision PRD2020-13. Trinexapac-ethyl and Its Associated End-use Products Consultation Document. 15 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2021a. Proposed Re-evaluation Decision Consultation Document PRVD2021-01. Flufenacet and Its Associated End-use Products. 33 p. + appendices. Available at: [https://publications.gc.ca/collections/collection\\_2021/sc-hc/h113-27/H113-27-2021-1-eng.pdf](https://publications.gc.ca/collections/collection_2021/sc-hc/h113-27/H113-27-2021-1-eng.pdf).

Health Canada Pest Management Regulatory Agency (HC PMRA). 2021b. Proposed Re-evaluation Decision Consultation Document PRVD2021-02. Isoxaflutole and Its Associated End-use Products. 25 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2021c. Special Review Decision SRD2021-05. Pymetrozine. Final Decision Document. 3 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2021d. Proposed Re-evaluation Decision Consultation Document PRVD2021-08. Tebuconazole and Its Associated End-use Products. 36 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2021e. Re-evaluation Decision RVD2021-01. Tebufenozide and Its Associated End-use Products. 27 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2021f. Special Review Decision: Thiamethoxam Risk to Aquatic Invertebrates. Final Decision Document SRD2021-04. 50 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2021g. Proposed Re-evaluation Decision PRD2021-05. Triticonazole and Its Associated End-use Products Consultation Document.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2022a. Proposed Re-evaluation Decision Consultation Document PRVD2022-02. Flucarbazon (present as flucarbazon-sodium) and Its Associated End-use Product. 26 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2022b. Proposed Re-evaluation Decision PRVD2022-17. Quizalofop-p-ethyl and Its Associated End-use Products. Consultation Document. 30 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2022c. Proposed Re-evaluation Decision PRD2022-06. Zoxamide and Its Associated End-use Products Consultation Document. 24 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2023a. Proposed Re-evaluation Decision Consultation Document PRVD2023-01. Abamectin and Its Associated End-use Products. 37 p. + appendices.

Health Canada Pest Management Regulatory Agency (HC PMRA). 2023b. Proposed Special Review Decision. Consultation Document PSRD2023-02. Proposed Special Review Decision of Fosetyl-aluminum and Its Associated End-use Products. 6 p. + appendices.

- Health Canada Pest Management Regulatory Agency (HC PMRA). 2023c. Proposed Re-evaluation Decision PRVD2023-07. Final Decision. Piperonyl Butoxide and Its Associated End-use Products. 20 p. + appendices.
- Health Canada Pest Management Regulatory Agency (HC PMRA). 2023d. Re-evaluation Decision RVD2023-06. Pyrethrins and Its Associated End-use Products. Final Decision. 20 p. + appendices.
- Kroll A., C. Casado-Martinez, and M. Junghans. 2023. EQS - Vorschlag des Oekotoxizentrums für: Mecoprop-P. Dübendorf (CH): Swiss Centre for Applied Ecotoxicology. 50 p.
- MacDonald Environmental Sciences Ltd. 1997. Lower Columbia River from Birchbank to the international border: Water quality assessment and recommended objectives technical report. Prepared for Environment Canada and BC Ministry of Environment, Lands and Parks. 218 p.
- Nam, S.H., and Y.J. An. 2010. Assessing the Ecotoxicity of Vinyl Chloride Using Green Alga *P. subcapitata*, Nematode *C. elegans*, and the SOS Chromotest in a Closed System Without Headpace. *Sci. Total Environ.* 408(16): 3148-3152.
- National Academy of Sciences-National Academy of Engineering (NAS-NAE). 1972. Water Quality Criteria 1972. Washington, DC (US): National Academy of Sciences and National Academy of Engineering. 625 p. (The Blue Book).
- National Technical Advisory Committee (NTAC). 1968. Water quality criteria. Washington, DC (US): Federal Water Pollution Control Administration, US Department of the Interior. 251 p.
- Okonski A.I., MacDonald D.B., Potter K., and Bonnell M. 2021. Deriving predicted no-effect concentrations (PNECs) using a novel assessment factor method. *Human and Ecological Risk Assessment: An International Journal*, 27(6), 1613-1635.
- Ontario Ministry of the Environment (OME). 1991. Interim Water Quality Guideline for 1,4-Dioxane. Water Resources Branch. 10 p.
- Ontario Ministry of Environment and Energy (Ontario MOEE). 1994. Water Management Policies, Guidelines, Provincial Water Quality Objectives of the Ministry of Environment and Energy. 32 p.
- Raby M, Zhao X, Hao C, Poirier DG, and Sibley PK. 2018. Chronic toxicity of 6 neonicotinoid insecticides to *Chironomus dilutus* and *Neocloeon triangulifer*. *Environmental toxicology and chemistry* 37(10): 2727-2739.
- Swain, L. G. 1987. Second report on chemical sensitivity of BC lakes to acidic inputs. Victoria, BC (CA): Water Management Branch, Ministry of Environment. 31 p.
- US Environmental Protection Agency (US EPA). 1976. Quality criteria for water. Washington, DC (US): Office of Water Regulations and Standards, July 1976. 534 p. (The Red Book).
- US Environmental Protection Agency (US EPA). 1986. Quality criteria for water 1986. (The Gold Book) Washington, DC (US): Office of Water Regulations and Standards. 477 p. EPA 440/5-86-001.
- US Environmental Protection Agency (US EPA). 2008. Registration review. Ecological risk assessment problem formulation for Methamidophos. Document EPA-HQ-OPP-2008-0842-0006. 27 p. + appendix. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2008-0842-0006>.
- US Environmental Protection Agency (US EPA). 2009a. Registration Review. Ecological risk assessment and effects determination. Clomazone. Document EPA-HQ-OPP-2009-0081-0124. 134 p. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2009-0081-0124>

- US Environmental Protection Agency (US EPA). 2009b. Risks of Diflubenzuron Use to Federally Threatened California Red-legged Frog. Document EPA-HQ-OPP-2009-0081-0134. 116 p. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2009-0081-0134>.
- US Environmental Protection Agency (US EPA). 2009c. Registration Review – Preliminary Problem Formulation for the Ecological Risk Assessment of Diquat Dibromide. Document EPA-HQ-OPP-2009-0081-0139. 28 p.
- US Environmental Protection Agency (US EPA). 2010a. Registration Review: Preliminary Problem Formulation for the Ecological Risk and Drinking Water Exposure Assessment for Sodium Acifluorfen. Document EPA-HQ-OPP-2010-0135-0003. 29 p. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2010-0135-0003>.
- US Environmental Protection Agency (US EPA). 2010b. Registration Review: Preliminary Problem Formulation for Environmental Fate, Ecological Risk, Endangered Species, and Drinking Water Exposure Assessments for Oxamyl. Document ID EPA-HQ-OPP-2010-0028-0005. 53 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2010-0028-0005>.
- US Environmental Protection Agency (US EPA) 2011a. Preliminary Comparative Environmental Fate and Ecological Risk Assessment for the Registration Review of Eight Synthetic Pyrethroids and the Pyrethrins. Document EPA-HQ-OPP-2011-0039-0040. 72 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2011-0039-0040>.
- US Environmental Protection Agency (US EPA). 2011b. Penthiopyrad Environmental Fate and Ecological Assessment 11.30.11. Document EPA-HQ-OPP-2010-0349-0010. 123 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2010-0349-0010>.
- US Environmental Protection Agency (US EPA). 2011c. Registration Review - Preliminary Problem Formulation for the Environmental Fate, Ecological Risk, Endangered Species and Drinking Water Assessments for Tribenuron methyl. Document EPA-HQ-OPP-2010-0626-0003. 52 p. + appendix. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2010-0626-0003>.
- US Environmental Protection Agency (US EPA). 2012. Document EPA-HQ-OPP-2012-0878-0003. Problem Formulation for the Environmental Fate and Ecological Risk, Endangered Species, and Human Health Drinking Water Assessments in Support of the Registration Review of Chlorsulfuron. 59 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2012-0878-0003>.
- US Environmental Protection Agency (US EPA). 2013a. Registration Review Problem Formulation for Abamectin. Document EPA-HQ-OPP-2013-0360-0004. 23 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2013-0360-0004>.
- US Environmental Protection Agency (US EPA) 2013b. Ecological Risk Assessment in Support of Registration Review of Clofentezine. Document EPA-HQ-OPP-2006-0240-0016. 69 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2006-0240-0016>.
- US Environmental Protection Agency (US EPA). 2013c. Environmental Fate and Ecological Risk Assessment for Proposed Foliar and Seed Treatment Uses of the Fungicide Fluxapyroxad (BAS 700F). 77 p. + appendices.
- USEPA. 2013d. Environmental Fate and Ecological Risk Assessment for the Registration Review of Glufosinate 1/28/13. Document EPA-HQ-OPP-2008-0190-0023. 111 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2008-0190-0023>.

- US Environmental Protection Agency (US EPA). 2013e. Registration Review – Preliminary Problem Formulation for the Ecological Exposure and Risk Assessment for Iodosulfuron-methyl-sodium. Document EPA-HQ-OPP-2012-0717-0002. 39 p. + appendices. Available at <https://www.regulations.gov/document/EPA-HQ-OPP-2012-0717-0002>.
- US Environmental Protection Agency (US EPA). 2013f. Ecological Risk Assessment for the Section 3 Registration of the New Chemical Isofetamid. Document EPA-HQ-OPP-2013-0138-0010. 70 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2013-0138-0010>.
- US Environmental Protection Agency (US EPA). 2013g. Environmental Fate and Ecological Risk Assessment. Problem Formulation In Support of Registration Review of Prometryn. Document EPA-HQ-OPP-2013-0032-0007. 52 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2013-0032-0007>.
- US Environmental Protection Agency (US EPA). 2013h. Registration Review: Preliminary Problem Formulation for Pymetrozine. Document EPA-HQ-OPP-2013-0368-0002. 34 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2013-0368-0002>.
- US Environmental Protection Agency (US EPA). 2013i. Registration Review--Ecological Risk Assessment and Effects Determination of Quizalofop-p-ethyl. Document EPA-HQ-OPP-2007-1089-0031. 137 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2007-1089-0031>.
- US Environmental Protection Agency (US EPA). 2013j. Environmental Fate and Ecological Risk Assessment for Sulfoxaflor Registration. Document EPA-HQ-OPP-2010-0889-0022. 121 p. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2010-0889-0022>.
- US Environmental Protection Agency (US EPA). 2013k. Registration Review Ecological Risk Assessment and Effects Determination of Trinexapac-ethyl. Document EPA-HQ-OPP-2008-0657-0016. 90 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2008-0657-0016>.
- US Environmental Protection Agency (US EPA). 2014a. Registration Review. Ecological Risk Assessment and Effects Determination. Sodium Bentazon. Document EPA-HQ-OPP-2010-0117-0016. 40 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2010-0117-0016>.
- US Environmental Protection Agency (US EPA). 2014b. Environmental Fate and Ecological Risk Assessment for the Registration Review of Fenoxaprop-p-ethyl. Document EPA-HQ-OPP-2007-0437-0017. 88 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2007-0437-0017>.
- US Environmental Protection Agency (US EPA). 2014c. EFED Registration Review Problem Formulation for Fluazifop-p-butyl. Document EPA-HQ-OPP-2014-0779-0002. 50 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2014-0779-0002>.
- US Environmental Protection Agency (US EPA) 2014d. Problem Formulation for the Ecological Risk and Drinking Water Exposure Assessments to be Conducted in Support of the Registration Review for Fluroxypyr-MHE. Document EPA-HQ-OPP-2014-0570-0008. 46 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2014-0570-0008>.
- US Environmental Protection Agency (US EPA). 2014e. Transmittal of the Preliminary Environmental Fate and Ecological Risk Assessment in Support of the Registration Review of Isoxaben. Document EPA-HQ-OPP-2007-1038-0024. Available at <https://www.regulations.gov/document/EPA-HQ-OPP-2007-1038-0024>

- US Environmental Protection Agency (US EPA). 2014f. Environmental Fate and Ecological Risk Assessment for the Registration of Maleic Hydrazide and its Potassium Salt. Document EPA-HQ-OPP-2009-0387-0012. 46 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2009-0387-0012>.
- US Environmental Protection Agency (US EPA). 2015a. Transmittal of the Preliminary Environmental Fate and Ecological Risk Assessment for the Registration Review of Ethephon. Document EPA-HQ-OPP-2010-0098-0019. 76 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2010-0098-0019>.
- US Environmental Protection Agency (US EPA). 2015b. Preliminary Ecological Risk Assessment in Support of the Registration Review of Hexazinone. Document EPA-HQ-OPP-2009-0755-0021. 88 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2009-0755-0021>.
- US Environmental Protection Agency (US EPA). 2015c. Myclobutanil: Draft Ecological Risk Assessment for Registration Review. Document EPA-HQ-OPP-2015-0053-0022. 81 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2015-0053-0022>.
- US Environmental Protection Agency (US EPA). 2015d. Preliminary Ecological Risk Assessment for the Registration Review of the Herbicide Propyzamide and Proposed New Use on Leaf Lettuce. Document ID EPA-HQ-OPP-2009-0326-0015. 61 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2009-0326-0015>.
- US Environmental Protection Agency (US EPA). 2015e. EFED Registration Review Problem Formulation for Sethoxydim. Document EPA-HQ-OPP-2015-0088-0004. 49 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2015-0088-0004>.
- US Environmental Protection Agency (US EPA). 2016a. Bensulide: Preliminary Ecological Risk Assessment for Registration Review. Document EPA-HQ-OPP-2008-0022-0016. 51 p. + appendices. <https://www.regulations.gov/document/EPA-HQ-OPP-2008-0022-0016>.
- US Environmental Protection Agency (US EPA) 2016b. Preliminary Comparative Environmental Fate and Ecological Risk Assessment for the Registration Review of Eight Synthetic Pyrethroids and the Pyrethrins. Document EPA-HQ-OPP-2011-0039-0040.800 p. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2011-0039-0040>.
- US Environmental Protection Agency (US EPA). 2016c. Preliminary Ecological Risk Assessment for Registration Review of Metalaxyl and Mefenoxam (Metalaxyl-M) and Proposed Crop Group Conversion for Oilseed Group 20. Document EPA-HQ-OPP-2009-0863-0025. 90 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2009-0863-0025>.
- US Environmental Protection Agency (US EPA). 2016d. MGK-264. Preliminary Ecological Risk Assessment for Registration Review. Document ID EPA-HQ-OPP-2012-0415-0022. 19 p. + appendix. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2012-0415-0022>.
- US Environmental Protection Agency (US EPA). 2016e. Preliminary Comparative Environmental Fate and Ecological Risk Assessment for the Registration Review of Eight Synthetic Pyrethroids and the Pyrethrins. Document EPA-HQ-OPP-2011-0039-0040. 55 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2011-0039-0040>.
- US Environmental Protection Agency (US EPA) 2016f. Ecological Risk Assessment for the Proposed New Use of Spinosad as a Commercial Seed Treatment. Document EPA-HQ-OPP-2009-0081-0233. 35 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2009-0081-0233>.

- US Environmental Protection Agency (US EPA). 2017a. Preliminary environmental fate and ecological risk assessment for the registration review of Cyprodinil. Document EPA-HQ-OPP-2011-1008-0021. 77 p. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2011-1008-0021>.
- US Environmental Protection Agency (US EPA). 2017b. DRAFT Preliminary Ecological Risk Assessment for the Registration Review of EPTC. Document. EPA-HQ-OPP-2012-0720-0015. 93 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2012-0720-0015>.
- US Environmental Protection Agency (US EPA). 2017c. Registration Review: Preliminary Environmental Fate and Ecological Risk Assessment for Fludioxonil. Document EPA-HQ-OPP-2010-1067-0020. 78 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2010-1067-0020>.
- US Environmental Protection Agency (US EPA). 2017d. Pendimethalin – Transmittal of the Preliminary Environmental Fate and Ecological Risk Assessment for Registration Review. Document ID EPA-HQ-OPP-2012-0219-0020. 67 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2012-0219-0020>.
- US Environmental Protection Agency (US EPA). 2019a. Draft Ecological Risk Assessment for the Registration Review of Fenamidone. Document EPA-HQ-OPP-2014-0048-0026. 54 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2014-0048-0026>.
- US Environmental Protection Agency (US EPA). 2019b. Mandipropamid: Summary of Ecological Risk for the Registration Review of Mandipropamid. Document EPA-HQ-OPP-2019-0536-0002. 9 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2019-0536-0002>.
- US Environmental Protection Agency (US EPA). 2019c. Oxyfluorfen: Draft Ecological Risk Assessment for Registration Review: June 27, 2019. Document ID EPA-HQ-OPP-2014-0778-0023. 96 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2014-0778-0023>.
- US Environmental Protection Agency (US EPA). 2019d. Paraquat: Preliminary Ecological Risk Assessment for Registration Review. Document EPA-HQ-OPP-2011-0855-0128. 105 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2011-0855-0128>.
- US Environmental Protection Agency (US EPA). 2019e. Triclopyr (Acid, Choline salt, TEA salt, BEE): Draft Ecological Risk Assessment for Registration Review. Document EPA-HQ-OPP-2014-0576-0026. 123 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2014-0576-0026>.
- US Environmental Protection Agency (US EPA). 2019f. Triticonazole: Draft Ecological Risk Assessment for Registration Review. Document EPA-HQ-OPP-2015-0602-0027. 59 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2015-0602-0027>.
- US Environmental Protection Agency. 2020a. Acetochlor: Draft Ecological Risk Assessment for Registration Review. Document EPA-HQ-OPP-2016-0298-0021. 75 p. + appendices. Available at <https://www.regulations.gov/document/EPA-HQ-OPP-2016-0298-0021>.
- US Environmental Protection Agency. 2020b. Acrolein: Draft Ecological Risk Assessment in Support of Registration Review. Document EPA-HQ-OPP-2015-0571-0028. 49 p. + appendices. Available at <https://www.regulations.gov/document/EPA-HQ-OPP-2015-0571-0028>.
- US Environmental Protection Agency (US EPA). 2020c. Draft Ecological Risk Assessment for the Registration Review of Dichlorvos, Naled, and Trichlorfon. EPA-HQ-OPP-2009-0053-0054. 167 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2009-0053-0054>.



- US Environmental Protection Agency (US EPA). 2020d. Dithiopyr: Revised Draft Ecological Risk Assessment for Registration Review. Document EPA-HQ-OPP-2013-0750-0069. 59 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2013-0750-0069>.
- US Environmental Protection Agency (US EPA). 2020e. Diuron: Draft Ecological Risk Assessment for Registration Review. Document EPA-HQ-OPP-2015-0077-0041. 78 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2015-0077-0041>.
- US Environmental Protection Agency (US EPA). 2020f. Ethofumesate: Draft Ecological Risk Assessment for Registration Review. Document EPA-HQ-OPP-2015-0406-0019. 168 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2015-0406-0019>
- US Environmental Protection Agency (US EPA). 2020g. Ipconazole: Draft Ecological Risk Assessment for Registration Review. Document EPA-HQ-OPP-2015-0590-0022. 55 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2015-0590-0022>.
- US Environmental Protection Agency (US EPA). 2020h. Oxadiazon: Draft Ecological Risk Assessment for Registration Review. Document ID EPA-HQ-OPP-2014-0782-0017. 69 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2014-0782-0017>.
- US Environmental Protection Agency (US EPA). 2020i. Phorate: Draft Ecological Risk Assessment for Registration Review. Document EPA-HQ-OPP-2009-0055-0015. 51 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2009-0055-0015>.
- US Environmental Protection Agency (US EPA). 2021a. Draft Ecological Risk Assessment of Conventional Uses Registration Review of Dodine. Document EPA-HQ-OPP-2015-0477-0020. 62 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2015-0477-0020>.
- US Environmental Protection Agency (US EPA). 2021b. Napropamide: Draft Ecological Risk Assessment for Registration Review. Document EPA-HQ-OPP-2016-0019-0034. 105 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2016-0019-0034>.
- US Environmental Protection Agency (US EPA). 2022. Carboxin and Oxycarboxin: Draft Ecological Risk Assessment for Registration Review. Document EPA-HQ-OPP-2004-0124-0037. 70 p. + appendices. Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2004-0124-0037>.

**Table 2. Working Sediment Quality Guidelines (WSQGs)**

Substance	Group	Water Value	Lower SWQG (µg/g dry weight)	Upper SWQG (µg/g dry weight)	Notes <sup>1</sup>	Reference
1,2,4-Trichlorobenzene	Organics	Marine AL	0.00812	0.0182		Washington State DoE (2013)
1,2-Dichlorobenzene	Organics	Marine AL	0.0232	N/A		Washington State DoE (2013)
1,4-Dichlorobenzene	Organics	Marine AL	0.0312	0.092		Washington State DoE (2013)
2-methylnaphthalene	PAHs	Freshwater AL	0.0202	0.201	Lower = ISQG; Upper = PEL	CCME (1998)
2-methylnaphthalene	PAHs	Marine AL	0.02	0.202	Lower = ISQG; Upper = PEL	CCME (1998)
Acenaphthene	PAHs	Freshwater & marine AL	0.00671	0.0889	Lower = ISQG; Upper = PEL	CCME (1998)
Acenaphthylene	PAHs	Freshwater & marine AL	0.00587	0.128	Lower = ISQG; Upper = PEL	CCME (1998)
Aldrin	Pesticides	Freshwater AL	0.0022	0.082	Based on SLC; upper SWQG is for severe effects	Jaagumagi (1993a)
Aldrin	Pesticides	Marine AL	0.005	N/A	EPA chronic marine EqP threshold; 0.0001 significantly toxic to R. abronius based on CoA	Long and Morgan (1990)
Anthracene	PAHs	Freshwater & marine AL	0.0469	0.245	Lower = ISQG; Upper = PEL	CCME (1998)
Arsenic (total)	Metalloids	Marine AL	7.24	42	Lower = ISQG; Upper = PEL	CCME (1998)

Substance	Group	Water Value	Lower SWQG (µg/g dry weight)	Upper SWQG (µg/g dry weight)	Notes <sup>1</sup>	Reference
Arsenic (total)	Metalloids	Freshwater AL	5.9	17	Lower = ISQG; Upper = PEL	CCME (1998)
Atrazine	Pesticides	Freshwater AL	0.0066	N/A		USEPA (2006)
Benzo(a)anthracene	PAHs	Freshwater AL	0.0317	0.385	Lower = ISQG; Upper = PEL	CCME (1998)
Benzo(a)anthracene	PAHs	Marine AL	0.0748	0.693	Lower = ISQG; Upper = PEL	CCME (1998)
Benzo(a)pyrene	PAHs	Freshwater AL	0.0319	0.782	Lower = ISQG; Upper = PEL	CCME (1998)
Benzo(a)pyrene	PAHs	Marine AL	0.0888	0.763	Lower = ISQG; Upper = PEL	CCME (1998)
Benzo(g,h,i)perylene	PAHs	Freshwater AL	0.17	3.22	Based on SLC	Ontario MOEE (1993)
Benzo(g,h,i)perylene	PAHs	Marine AL	0.312	0.782		Washington State DoE (2013)
Benzo(k)fluoranthene	PAHs	Freshwater AL	0.24	13.42		Ontario MOEE (1993)
Benzofluoranthene	PAHs	Freshwater AL	0.3	N/A	Based on BA method	EC and QC MoE (1992)
Benzofluoranthenes (all)	PAHs	Marine AL	2.32	4.52		CCME (1998)
Bis (2-ethylhexyl) phthalate (DEHP)	Phthalate esters	Marine AL	0.472	0.782		Washington State DoE (2013)
Bisphenol A (BPA)	Pesticides	Freshwater AL	0.0252	N/A		ECCC (2018)
Bisphenol A (BPA)	Pesticides	Marine AL	0.0252	N/A		ECCC (2018)
Butyl benzyl phthalate	Phthalate esters	Marine AL	0.0492	0.642		Washington State DoE (2013)

Substance	Group	Water Value	Lower SWQG (µg/g dry weight)	Upper SWQG (µg/g dry weight)	Notes <sup>1</sup>	Reference
Cadmium (total)	Metals	Freshwater AL	0.6	3.5	Lower = ISQG; Upper = PEL	CCME (1997)
Cadmium (total)	Metals	Marine AL	0.7	4.2	Lower = ISQG; Upper = PEL	CCME (1997)
Chlordane (total)	Metals	Freshwater AL	0.0045	0.00887	Lower = ISQG; Upper = PEL	CCME (1998)
Chlordane (total)	Metals	Marine AL	0.00226	0.00479	Lower = ISQG; Upper = PEL	CCME (1998)
Chlorpyrifos	Pesticides	Freshwater AL	0.012	0.063	Lower = ISQG; Upper = PEL	NYSDEC (2013)
Chlorpyrifos	Pesticides	Marine AL	0.008	0.017	Lower = ISQG; Upper = PEL	NYSDEC (2013)
Chromium (total)	Metals	Freshwater AL	37.3	90	Lower = ISQG; Upper = PEL	CCME (1998)
Chromium (total)	Metals	Marine AL	52.3	160	Lower = ISQG; Upper = PEL	CCME (1998)
Chrysene	PAHs	Freshwater AL	0.0571	0.862	Lower = ISQG; Upper = PEL	CCME (1998)
Chrysene	PAHs	Marine AL	0.108	0.846	Lower = ISQG; Upper = PEL	CCME (1998)
Copper (total)	Metals	Freshwater AL	35.7	197	Lower = ISQG; Upper = PEL	CCME (1998)
Copper (total)	Metals	Marine AL	18.7	108	Lower = ISQG; Upper = PEL	CCME (1998)
Diazinon	Pesticides	Freshwater AL	0.0024	N/A		USEPA (2006)
Dibenzo(a,h) anthracene	PAHs	Freshwater & marine AL	0.00622	0.135	Lower = ISQG; Upper = PEL	CCME (1998)

Substance	Group	Water Value	Lower SWQG (µg/g dry weight)	Upper SWQG (µg/g dry weight)	Notes <sup>1</sup>	Reference
Dibenzofuran	Organics	Marine AL	0.152	0.582		Washington State DoE (2013)
Dichloro diphenyl dichloroethane (1,1-Dichloro 2,2-bis (p-chloro-phenyl) ethane) p,p'-DDD	Pesticides	Freshwater AL	0.00354	0.00851	Lower = ISQG; Upper = PEL	CCME (1998)
Dichloro diphenyl dichloroethane (1,1-Dichloro 2,2-bis (p-chloro-phenyl) ethane) p,p'-DDD	Pesticides	Marine AL	0.00122	0.00781	Lower = ISQG; Upper = PEL	CCME (1998)
Dichloro diphenyl dichloroethene (1,1-Dichloro 2,2-bis (p-chloro-phenyl) ethene) p,p'-DDE	Pesticides	Freshwater AL	0.00142	0.00675	Lower = ISQG; Upper = PEL	CCME (1998)
Dichloro diphenyl dichloroethene (1,1-Dichloro 2,2-bis (p-chloro-phenyl) ethene) p,p'-DDE	Pesticides	Marine AL	0.00207	0.374	Lower = ISQG; Upper = PEL	CCME (1998)
Dichloro diphenyl trichloroethane (1,1,1-Trichloro 2,2-bis (p-chloro-phenyl) ethane, total DDT)	Pesticides	Freshwater & marine AL	0.00119	0.00477	Lower = ISQG; Upper = PEL	CCME (1998)
Dieldrin	Pesticides	Freshwater AL	0.00285	0.00667	Lower = ISQG; Upper = PEL	CCME (1998)
Dieldrin	Pesticides	Marine AL	0.00071	0.0043	Lower = ISQG; Upper = PEL	CCME (1998)

Substance	Group	Water Value	Lower SWQG (µg/g dry weight)	Upper SWQG (µg/g dry weight)	Notes <sup>1</sup>	Reference
Diethyl phthalate	Phthalate esters	Marine AL	0.612	1.102	When sediment contains 1% organic carbon	Washington State DoE (2013)
Dimethyl phthalate	Phthalate esters	Marine AL	0.532	0.532	Same value is given in reference	Washington State DoE (2013)
Di-n-butyl phthalate	Phthalate esters	Marine AL	2.22	172		Washington State DoE (2013)
Di-n-octyl phthalate	Phthalate esters	Marine AL	0.582	452		Washington State DoE (2013)
Endrin	Pesticides	Freshwater & marine AL	0.00267	0.0624	Lower = ISQG; Upper = PEL	CCME (1998)
Fluoranthene	PAHs	Freshwater AL	0.111	2.355	Lower = ISQG; Upper = PEL	CCME (1998)
Fluoranthene	PAHs	Marine AL	0.113	1.494	Lower = ISQG; Upper = PEL	CCME (1998)
Fluorene	PAHs	Freshwater & marine AL	0.0212	0.144	Lower = ISQG; Upper = PEL	CCME (1998)
Heptachlor (Heptachlor epoxide)	Pesticides	Freshwater & marine AL	0.0006	0.00274	Lower = ISQG; Upper = PEL	CCME (1998)
Hexabromocyclododecane (HBCD)	Organics	Freshwater AL	1.6	N/A		ECCC (2016a)
Hexabromocyclododecane (HBCD)	Organics	Marine AL	1.6	N/A		ECCC (2016a)
Hexachlorobenzene	Fungicides	Freshwater AL	0.012	0.242	Lower SWQG based on EqP	Jaagumagi (1993a)
Hexachlorobenzene	Fungicides	Marine AL	0.00382	0.0232	0.23 µg/g maximum level for dredge disposal based on AET	Washington State DoE (2013)

Substance	Group	Water Value	Lower SWQG (µg/g dry weight)	Upper SWQG (µg/g dry weight)	Notes <sup>1</sup>	Reference
Hexachlorobutadiene	Organics	Marine AL	0.0392	0.0622		Washington State DoE (2013)
Hexachlorocyclohexane - alpha (Benzene hexachloride-alpha; alpha-HCH)	Organics	Freshwater AL	0.0062	0.102	Effect levels based on SLC	Jaagumagi (1993a)
Hexachlorocyclohexane - beta (Benzene hexachloride-beta; beta-HCH)	Organics	Freshwater AL	0.0052	0.212	Effect levels based on SLC	Jaagumagi (1993a)
Hexachlorocyclohexane - total (Benzene hexachloride-total; BHC)	Organics	Freshwater AL	0.0032	0.122	Effect levels based on SLC	Jaagumagi (1993a)
Hexachlorocyclohexane (Lindane-gamma BHC)	Pesticides	Freshwater AL	0.00094	0.00138	Lower = ISQG; Upper = PEL	CCME (1998)
Hexachlorocyclohexane (Lindane-gamma BHC)	Pesticides	Marine AL	0.00032	0.00099	Lower = ISQG; Upper = PEL	CCME (1998)
Indeno (1,2,3,c,d) pyrene	PAHs	Freshwater AL	0.2	3.22	Effect levels based on SLC	Ontario MOEE (1993)
Indeno (1,2,3,c,d) pyrene	PAHs	Marine AL	0.342	0.882		Washington State DoE (2013)
Iron (total)	Metals	Freshwater AL	21,200 (about 2%)	43,766 (about 4%)	Effect levels based on SLC	Jaagumagi (1993b)
Lead (total)	Metals	Freshwater AL	35	91.3	Lower = ISQG; Upper = PEL	CCME (1998)
Lead (total)	Metals	Marine AL	30.2	112	Lower = ISQG; Upper = PEL	CCME (1998)
Manganese (total)	Metals	Freshwater AL	460	1100	Effect levels based on SLC	Jaagumagi (1993b)

Substance	Group	Water Value	Lower SWQG (µg/g dry weight)	Upper SWQG (µg/g dry weight)	Notes <sup>1</sup>	Reference
Mercury (total)	Metals	Freshwater AL	0.17	0.486	Lower = ISQG; Upper = PEL	CCME (1997)
Mercury (total)	Metals	Marine AL	0.13	0.7	Lower = ISQG; Upper = PEL	CCME (1997)
Mirex	Pesticides	Freshwater AL	0.0072	1.32	Effect levels based on SLC	Jaagumagi (1993a)
Molybdenum	Metals	Freshwater AL	25	23000	Lower=MPC; Upper=SRC	Verbruggen et al. 2001
Naphthalene	PAHs	Freshwater & marine AL	0.0346	0.391	Lower = ISQG; Upper = PEL	CCME (1998)
Nickel (total)	Metals	Freshwater AL	16	75	Effect levels based on SLC	Jaagumagi (1993b)
Nickel (total)	Metals	Marine AL	30	50	Effect levels based on NSTPA	Long and Morgan (1990)
N-Nitrosodiphenylamine	Organics	Marine AL	0.112	0.112	Same value is given in reference	Washington State DoE (2013)
Nonylphenol and its ethoxylates	Organics	Freshwater AL	1.42	N/A	ISQG using equilibrium partitioning approach, expressed on a toxic equivalency basis using NP toxic equivalency factors. See reference.	CCME (2002)



Substance	Group	Water Value	Lower SWQG (µg/g dry weight)	Upper SWQG (µg/g dry weight)	Notes <sup>1</sup>	Reference
Nonylphenol and its ethoxylates	Organics	Marine AL	1.02	N/A	ISQG using equilibrium partitioning approach, expressed on a toxic equivalency basis using NP toxic equivalency factors. See reference.	CCME (2002)
Phenanthrene	PAHs	Freshwater AL	0.0419	0.515	Lower = ISQG; Upper = PEL	CCME (1998)
Phenanthrene	PAHs	Marine AL	0.0867	0.544	Lower = ISQG; Upper = PEL	CCME (1998)
Polybrominated diphenyl ethers (PBDE) (total)	Organics	Marine AL	0.001	N/A		Alava et al. (2016)
Polychlorinated Biphenyls (PCBs) (total PCBs)	Organics	Marine AL	0.0000037	N/A		Alava et al. (2012)
Polychlorinated dibenzo- <i>p</i> -furans (PCDD/Fs)	Organics	Freshwater & marine AL	0.00000085	0.0000215	Upper SWQG is provisional maximum expressed on a toxic equivalency basis using toxic equivalent factors for fish. See reference.	CCME (2001)
Polycyclic Aromatic Hydrocarbon (PAH) Benzo(g,h,i)perylene	PAHs	Freshwater AL	0.17	3.22	Effect levels based on SLC	Ontario MOEE (1993)
Polycyclic Aromatic Hydrocarbons (PAHs) HPAH higher molecular weight	PAHs	Freshwater AL	1	N/A	Based on BA method	EC and QC MoE (1992)

Substance	Group	Water Value	Lower SWQG (µg/g dry weight)	Upper SWQG (µg/g dry weight)	Notes <sup>1</sup>	Reference
Polycyclic Aromatic Hydrocarbons (PAHs) HPAH higher molecular weight	PAHs	Marine AL	9.62	532		Washington State DoE (2013)
Polycyclic Aromatic Hydrocarbons (PAHs) LPAH lower molecular weight	PAHs	Freshwater AL	0.1		Based on BA method	EC and QC MoE (1992)
Polycyclic Aromatic Hydrocarbons (PAHs) LPAH lower molecular weight	PAHs	Marine AL	3.72	7.82		Washington State DoE (2013)
Polycyclic Aromatic Hydrocarbons (PAHs) total	PAHs	Freshwater AL	4	35	Based on NSTPA, 100 µg/g shows severe effects (Persuad et al. 1993)	Long and Morgan (1990)
Pyrene	PAHs	Freshwater AL	0.053	0.875	Lower = ISQG; Upper = PEL	CCME (1998)
Pyrene	PAHs	Marine AL	0.153	1.398	Lower = ISQG; Upper = PEL	CCME (1998)
Silver (total)	Metals	Freshwater AL	0.5	N/A	Ontario sediment guideline	Ontario MOEE (1993)
Silver (total)	Metals	Marine AL	1	2.2	Based on NSTPA	Long and Morgan (1990)
TBBPA (Tetrabromobisphenol A)	Organic	Freshwater AL	0.6			ECCC (2016b)
TBBPA (Tetrabromobisphenol A)	Organic	Marine AL	0.6			ECCC (2016b)
Toxaphene	Pesticides	Freshwater & marine AL	0.00012	N/A	ISQG	CCME (2002)

Substance	Group	Water Value	Lower SWQG (µg/g dry weight)	Upper SWQG (µg/g dry weight)	Notes <sup>1</sup>	Reference
Zinc (total)	Metals	Freshwater AL	123	315	Lower = ISQG; Upper = PEL	CCME (1998)
Zinc (total)	Metals	Marine AL	124	271	Lower = ISQG; Upper = PEL	CCME (1998)

<sup>1</sup>Acronyms:

AET = Apparent Effects Threshold

BA = Background Approach

CoA = Co-Occurrence analysis

EqP = Equilibrium Partitioning

ISQG = Interim Sediment Quality Guideline

MPC=Maximum permissible Concentration

NSTPA = National Status and Trends Program Approach

PEL = Probable Effect Level

SLC = Screening Level Concentration

SRC=Serious Risk Concentration

<sup>2</sup>Concentrations are expressed as µg/g sediment containing 1% organic carbon. A guideline expressed as µg/g is based on the sediment as a whole and does not require adjustment for organic carbon content. Adjustments to guidelines are required when they are expressed in terms of the sediment containing 1% organic carbon. For sediments with organic carbon other than 1%, an adjustment in guidelines should be made by multiplying the guideline by the % organic carbon content of the sediment.

<sup>3</sup> This SQG is based on the water column guideline which is adapted by application an assessment factor of 4. Therefore, the tissue guideline recommended by ECCC, 2018 is divided by a factor of 4 to reflect the application of assessment factor to the water column guideline.

## References for Table 2

- Alava, J. J., Ross, P. S., & Gobas, F. A. (2016). Food web bioaccumulation model for resident killer whales from the Northeastern Pacific Ocean as a tool for the derivation of PBDE-sediment quality guidelines. *Archives of environmental contamination and toxicology*, 70(1), 155-168.
- Alava, J. J., Ross, P. S., Lachmuth, C., Ford, J. K., Hickie, B. E., & Gobas, F. A. (2012). Habitat-based PCB environmental quality criteria for the protection of endangered killer whales (*Orcinus orca*). *Environmental science & technology*, 46(22), 12655-12663.
- Canadian Council of Ministers of the Environment (CCME). 1997. Canadian sediment quality guidelines. Canadian Council of Ministers of the Environment, Winnipeg. Accessed on-line at <http://cegg-rcqe.ccme.ca/en/index.html#void>
- Canadian Council of Ministers of the Environment (CCME). 1998. Canadian sediment quality guidelines. Canadian Council of Ministers of the Environment, Winnipeg. Accessed on-line at <http://cegg-rcqe.ccme.ca/en/index.html#void>
- Canadian Council of Ministers of the Environment (CCME). 2001. Canadian sediment quality guidelines. Canadian Council of Ministers of the Environment, Winnipeg. Accessed on-line at <http://cegg-rcqe.ccme.ca/en/index.html#void>
- Canadian Council of Ministers of the Environment (CCME). 2002. Canadian sediment quality guidelines. Canadian Council of Ministers of the Environment, Winnipeg. Accessed on-line at <http://cegg-rcqe.ccme.ca/en/index.html#void>
- Environment Canada and Ministry of the Environment of Quebec (EC & QC MoE). July 1992. Interim criteria for quality assessment of St. Lawrence River Sediment. Environment Canada, St. Lawrence Centre, and Ministry of the Environment of Quebec.
- Environment and Climate Change Canada (ECCC). 2013. Federal Environmental Quality Guidelines. Environment and Climate Change Canada: Polybrominated Diphenyl Ethers (PBDEs). Accessed on-line at [http://www.ec.gc.ca/ese-ees/05DF7A37-60FF-403F-BB37-0CC697DBD9A3/FEQG\\_PBDE\\_EN.pdf](http://www.ec.gc.ca/ese-ees/05DF7A37-60FF-403F-BB37-0CC697DBD9A3/FEQG_PBDE_EN.pdf)
- Environment and Climate Change Canada (ECCC). 2016a. Federal Environmental Quality Guidelines. Environment and Climate Change Canada: Hexabromocyclododecane. Accessed on-line at [http://www.ec.gc.ca/ese-ees/8BA57E1C-C4D7-4B37-A2CD-2EC50030C427/FEQG\\_HBCD\\_EN.pdf](http://www.ec.gc.ca/ese-ees/8BA57E1C-C4D7-4B37-A2CD-2EC50030C427/FEQG_HBCD_EN.pdf)
- Environment and Climate Change Canada (ECCC). 2016b. Federal Environmental Quality Guidelines. Environment and Climate Change Canada: Tetrabromobisphenol A (TBBPA). Accessed on-line at [https://www.ec.gc.ca/ese-ees/2FE86525-C439-4BC8-B20A-315AF1CB6F6A/FEQG\\_TBBPA\\_EN.pdf](https://www.ec.gc.ca/ese-ees/2FE86525-C439-4BC8-B20A-315AF1CB6F6A/FEQG_TBBPA_EN.pdf)
- Environment and Climate Change Canada (ECCC). 2018. Federal Environmental Quality Guidelines. Environment and Climate Change Canada: Bisphenol A. Accessed on-line at <https://www.canada.ca/content/dam/eccc/documents/pdf/pded/bpa/20180626-BPA-EN.pdf>
- Jaagumagi, R. 1993a. Development of the Ontario Provincial Sediment Quality Guidelines for PCBs and the Organochlorine Pesticides. Water Resources Branch, Ontario Ministry of the Environment.
- Jaagumagi, R. 1993b. Development of the Ontario Provincial Sediment Quality Guidelines for Arsenic, Cadmium, Chromium, Copper, Iron, Lead, Manganese, Mercury, Nickel, and Zinc. Water Resources Branch, Ontario Ministry of the Environment.

- Long, E. R., and Morgan, L. G. 1990. The Potential for Biological Effects of Sediment Sorbed Contaminants Tested in the National Status and Trends Program, National Oceanic and Atmospheric Administration, Seattle, Washington.
- New York State Department of Environmental Conservation (NYSDEC). 2014. Screening and Assessment of Contaminated Sediment. New York State Department of Environmental Conservation, Division of Fish, Wildlife and Marine Resources Bureau of Habitat. Accessed online at [https://www.dec.ny.gov/docs/fish\\_marine\\_pdf/screenasssedfin.pdf](https://www.dec.ny.gov/docs/fish_marine_pdf/screenasssedfin.pdf)
- Ontario Ministry of Environment and Energy (MOEE). 1993. Guidelines for the protection and management of aquatic sediment quality in Ontario. Report No. ISBN 0772992487. Ontario Ministry of Environment, Water Resources Branch.
- United States Environmental Protection Agency (USEPA). 1986. Quality Criteria for Water. United States Environmental Protection Agency. Office of Water Regulations and standards, Washington, DC 20460.
- United States Environmental Protection Agency (USEPA). 2006. Region III BTAG Freshwater Sediment Screening Benchmarks. United States Environmental Protection Agency. Accessed online at [https://www.epa.gov/sites/production/files/2015-09/documents/r3\\_btag\\_fw\\_sediment\\_benchmarks\\_8-06.pdf](https://www.epa.gov/sites/production/files/2015-09/documents/r3_btag_fw_sediment_benchmarks_8-06.pdf)
- Verbruggen, E.M.J., Posthumus, R. and Van Wezel, A.P., 2001. Ecotoxicological Serious Risk Concentrations for soil, sediment and (ground) water: updated proposals for first series of compounds. RIVM Rapport 711701020. Accessed online at <https://www.rivm.nl/bibliotheek/rapporten/711701020.pdf>
- Washington State Department of Ecology (DoE). 2013. Sediment Management Standards. Available online at: <https://fortress.wa.gov/ecy/publications/SummaryPages/1309055.html>.

**Table 1. Working tissue residue guidelines (WTRGs).**

Substance	Class	Water use	Long-term WWQG	Unit	Reference
Polybrominated Diphenyl Ethers (PBDE) (triBDE)	Organics	AL-fish tissue	120	µg/kg ww	ECCC (2013)
Polybrominated Diphenyl Ethers (PBDE) (tetraBDE)	Organics	AL-fish tissue	88	µg/kg ww	ECCC (2013)
Polybrominated Diphenyl Ethers (PBDE) (pentaBDE)	Organics	AL-fish tissue	1	µg/kg ww	ECCC (2013)
Polybrominated Diphenyl Ethers (PBDE) (hexaBDE)	Organics	AL-fish tissue	420	µg/kg ww	ECCC (2013)
Perfluorooctane Sulfonate (PFOS)	Organics	AL-fish tissue	4,700 <sup>1</sup>	µg/kg ww	ECCC (2018)

<sup>1</sup>: An assessment factor of 2 was applied to the ECCC 2018 tissue guideline.

### References for Table 3

Environment and Climate Change Canada (ECCC). 2013. Federal Environmental Quality Guidelines. Environment and Climate Change Canada: Polybrominated Diphenyl Ethers (PBDEs). Accessed on-line at [http://www.ec.gc.ca/ese-ees/05DF7A37-60FF-403F-BB37-0CC697DBD9A3/FEQG\\_PBDE\\_EN.pdf](http://www.ec.gc.ca/ese-ees/05DF7A37-60FF-403F-BB37-0CC697DBD9A3/FEQG_PBDE_EN.pdf)

Environment and Climate Change Canada (ECCC). 2018. Federal Environmental Quality Guidelines. Environment and Climate Change Canada: Perfluorooctane Sulfonate (PFOS). Accessed on-line at <https://www.canada.ca/content/dam/eccc/documents/pdf/pded/fegq-pfos/20180620-PFOS-EN.pdf>

**Table 4. Working wildlife dietary guidelines (WWDGs).**

Substance	Class	Long-term WWQG	Unit	Reference
Bisphenol A (BPA)	Organics	110	µg/kg food ww	ECCC (2018a)
DDT	Pesticides	14	µg/kg food ww	CCME (1997)
Hexabromocyclododecane (HBCD)	Organics	40,000	µg/kg food ww	ECCC (2016a)
Polybrominated Diphenyl Ethers (PBDE) (tetraBDE)	Organics	44	µg/kg food ww	ECCC (2013)
Polybrominated Diphenyl Ethers (PBDE) (pentaBDE)	Organics	3	µg/kg food ww	ECCC (2013)
Polybrominated Diphenyl Ethers (PBDE) (hexaBDE)	Organics	4	µg/kg food ww	ECCC (2013)
Polybrominated Diphenyl Ethers (PBDE) (heptaBDE)	Organics	64	µg/kg food ww	ECCC (2013)
Polybrominated Diphenyl Ethers (PBDE) (octaBDE)	Organics	63	µg/kg food ww	ECCC (2013)
Polybrominated Diphenyl Ethers (PBDE) (nonaBDE)	Organics	78	µg/kg food ww	ECCC (2013)
Polybrominated Diphenyl Ethers (PBDE) (decaBDE)	Organics	9	µg/kg food ww	ECCC (2013)
Polychlorinated Biphenyls (total PCBs)	Organics	0.29	µg/kg food ww	Alava et al. (2012)
Perfluorooctane Sulfonate (PFOS)	Organics	4.6	µg/kg food ww	ECCC (2018b)
(TBBPA (Tetrabromobisphenol A)	Organics	20,000	µg/kg food ww	ECCC (2016b)

#### References for Table 4.

- Alava, J. J., Ross, P. S., Lachmuth, C., Ford, J. K., Hickie, B. E., & Gobas, F. A. (2012). Habitat-based PCB environmental quality criteria for the protection of endangered killer whales (*Orcinus orca*). *Environmental science & technology*, 46(22), 12655-12663.
- Canadian Council of Ministers of the Environment (CCME). 1997. Canadian environmental quality guidelines. Canadian Council of Ministers of the Environment, Winnipeg. Accessed on-line at <http://cegg-rcqe.ccme.ca/en/index.html#void>
- Environment and Climate Change Canada (ECCC). 2013. Federal Environmental Quality Guidelines. Environment and Climate Change Canada: Polybrominated Diphenyl Ethers (PBDEs). Accessed on-line at [http://www.ec.gc.ca/ese-ees/05DF7A37-60FF-403F-BB37-0CC697DBD9A3/FEQG\\_PBDE\\_EN.pdf](http://www.ec.gc.ca/ese-ees/05DF7A37-60FF-403F-BB37-0CC697DBD9A3/FEQG_PBDE_EN.pdf)
- Environment and Climate Change Canada (ECCC). 2016a. Federal Environmental Quality Guidelines. Environment and Climate Change Canada: Hexabromocyclododecane (HBCD). Accessed on-line at [http://www.ec.gc.ca/ese-ees/8BA57E1C-C4D7-4B37-A2CD-2EC50030C427/FEQG\\_HBCD\\_EN.pdf](http://www.ec.gc.ca/ese-ees/8BA57E1C-C4D7-4B37-A2CD-2EC50030C427/FEQG_HBCD_EN.pdf)
- Environment and Climate Change Canada (ECCC). 2016b. Federal Environmental Quality Guidelines. Environment and Climate Change Canada: Tetrabromobisphenol A (TBBPA). Accessed on-line at [https://www.ec.gc.ca/ese-ees/2FE86525-C439-4BC8-B20A-315AF1CB6F6A/FEQG\\_TBBPA\\_EN.pdf](https://www.ec.gc.ca/ese-ees/2FE86525-C439-4BC8-B20A-315AF1CB6F6A/FEQG_TBBPA_EN.pdf)
- Environment and Climate Change Canada (ECCC). 2018a. Federal Environmental Quality Guidelines. Environment and Climate Change Canada: Bisphenol A (BPA). Accessed on-line at <https://www.canada.ca/content/dam/eccc/documents/pdf/pded/bpa/20180626-BPA-EN.pdf>
- Environment and Climate Change Canada (ECCC). 2018b. Federal Environmental Quality Guidelines. Environment and Climate Change Canada: Perfluorooctane Sulfonate (PFOS). Accessed on-line at <https://www.canada.ca/content/dam/eccc/documents/pdf/pded/feqg-pfos/20180620-PFOS-EN.pdf>