

Atlantic RBCA - Ecological Tier II Pathway-Specific Standards (PSS) for Surface Water and Groundwater - Freshwater and Marine (µg/L)

Media		Surface Water (Including Groundwater < 10m from Surface Water Body)						Groundwater (> 10 metres from Surface Water Body)				
Pathway		Fresh Water			Marine Water			Fresh Water		Marine Water		
Parameter	Units	Value	Comments	Reference	Value	Comments	Reference	Value	Comments	Value	Comments	
Inorganic Parameters												
Aluminum	µg/L	5	5 µg/L at pH<6.5; 100 µg/L at pH > 6.5	CCME: at pH <6.5	-			50		-		
Antimony	µg/L	9		BC CSR Schedule 3.2	250			2500				
Arsenic	µg/L	5.0		CCME	12.5			50		125		
Barium	µg/L	1000	this is a 30 day avg; BC also has 5000 µg/L as a max acceptable value	BC CSR Schedule 3.2	500	this is min risk level; BC also has 1000 µg/L as hazardous concentration	BC CSR Schedule 3.2	10,000		5000		
Beryllium	µg/L	0.15		BC CSR Schedule 3.2	100	this is min risk level; BC also has 1500 µg/L as hazardous concentration	BC CSR Schedule 3.2	1.5		1000		
Boron	µg/L	1500		CCME	1200		BCMOECCS, 2019 - Approved	15,000		12,000		
Cadmium	µg/L	0.09	10[0.86(log(hardness)-3.2) - Cadmium guideline value ranges from 0.01 µg/L at hardness of 25 mg/L CaCO3 to 0.055 µg/L at hardness of 180 mg/L CaCO3	CCME	0.12		CCME	0.9		1.2		
Chromium (hexavalent)	µg/L	1.0		CCME	1.5		CCME	10		15		
Chromium (total)	µg/L	8.9		CCME	56		CCME	89		560		
Cobalt	µg/L	1	The freshwater guideline assumes a hardness of 100 mg/L. There is an equation: FWQG = exp[0.414(ln(hardness)) - 1.887], for other hardness values between 52-396 mg/L.	FEQG	4	30-d average; max value of 110 µg/L.	BCMOECCS, 2019 - Approved	10		40		
Copper	µg/L	2.0	The CWQG for copper is related to water hardness (as CaCO3). When the water hardness is 0 to < 82 mg/L, the CWQG is 2 µg/L. At hardness >82 to <180 mg/L, the CWQG is calculated using this equation (see calculator below) CWQG (µg/L) = 0.2 * e[(0.8545(ln(hardness))-1.465)] At hardness >180 mg/L, the CWQG is 4 µg/L. If the hardness is unknown, the CWQG is 2 µg/L.	CCME	2	this is a 30 d avg; BC also has a max acceptable value of 3 µg/L.	BCMOECCS, 2019 - Approved	20		20		
Cyanide	µg/L	5		CCME	1	max weak-acid dissociable CN	BCMOECCS, 2019 - Approved	50		10		
Iron	µg/L	300		CCME	-			3000		-		
Lead	µg/L	1	Lead guideline: 1 µg/L at a water hardness of 0-60 mg/L (soft) as CaCO3; 2 µg/L at a water hardness of 60-120 mg/L (medium) as CaCO3; 4 µg/L at a water hardness of 120-180 mg/L (hard) as CaCO3; 7 µg/L at a water hardness of >180 mg/L (very hard) as CaCO3	CCME	2	this is a 30 day avg; BC also has a max value of 140 µg/L	BCMOECCS, 2019 - Approved	10	10 X Surface Fresh Water value	20	10 X Surface Marine Water value	
Manganese	µg/L	430	Guideline value is based on hardness of 50 mg/L and pH of 7.5. Guideline values that correspond to other hardness and pH values are in Table 5 of the CCME Fact sheet. The tabulated guideline values are valid between a hardness range of 25 to 670 mg/L and a pH range of 5.8 to 8.4.	CCME	-			4300		-		
Mercury (total)	µg/L	0.026		CCME	0.016		CCME	0.26		0.16		
Methylmercury	µg/L	0.004		CCME	0.004	adopted the FW WQG as a marine WQG in the absence of a marine WQG	CCME	0.04		0.04		
Molybdenum	µg/L	73		CCME	1000		BC CSR Schedule 3.2	730		10,000		
Nickel	µg/L	25	Nickel guideline: 25 µg/L at a water hardness of 0-60 mg/L (soft) as CaCO3; 65 µg/L at a water hardness of 60-120 mg/L (medium) as CaCO3; 110 µg/L at a water hardness of 120-180 mg/L (hard) as CaCO3; 150 µg/L at a water hardness of >180 mg/L (very hard) as CaCO3	CCME	8.3	this is a 4 day avg; BC also has a 1 hour avg of 75 µg/L.	BC CSR Schedule 3.2	250		83		
Selenium	µg/L	1.0		CCME	2		BCMOECCS, 2019 - Approved	10		20		
Silver	µg/L	0.25		CCME	1.5	this is a 30 day avg; BC also has max acceptable value of 3 µg/L.	BCMOECCS, 2019 - Approved	2.5		15		
Strontium	µg/L	21,000	final chronic value	MDEQ, 2008	-			210,000		-		
Thallium	µg/L	0.8		CCME	0.3		BC CSR Schedule 3.2	8		3		
Tin	µg/L	-			-			-		-		
Uranium	µg/L	15		CCME	8.5	this is a min risk level; BC also has 500 µg/L as the hazardous concentration	BC CSR Schedule 3.2	150		85		
Vanadium	µg/L	120		FEQG	5	trigger value for 99% level of protection	FEQG	1200		50		
Zinc	µg/L	7		CCME	10		BCMOECCS, 2019 - Approved	70		100		
General Chemistry Parameters												
Ammonia	µg/L		pH and temperature dependent; consult CCME fact sheet. unionized Ammonia guideline (fresh water). See CCME (2000) for guideline values as a function of pH and temperature.	CCME		pH, salinity and temperature dependent; consult BCMOE schedule. this is a 5-30 day avg; BC also has a max value of 14,000 µg/L. Ammonia guideline (sea water): Both maximum and 5-30 d average guidelines are expressed as total ammonia N, assuming salinity of 30 g/kg, temperature of 5 degrees C, and pH of 8.2.; (all of which are typical sea water values); see BCMOE, 2001 for tables for total ammonia-N as a function of salinity, temperature and pH. To convert from unionized ammonia to ammonia-N, multiply by 0.8 (CCME, 2000).	BC CSR Schedule 3.2		pH and temperature dependent; consult CCME fact sheet.	10 X Surface Fresh Water value	pH, salinity and temperature dependent; consult BCMOE schedule.	10 X Surface Marine Water value
Chloride	µg/L	120,000	based on salinity as NaCl	CCME		No more than a 10% change in ambient sea water salinity (as NaCl).	BCMOECCS, 2019 - Approved	1,200,000	10 X Surface Fresh Water value	No more than a 10% change in ambient sea water salinity (as NaCl).		
Colour	TCU		True Colour: Mean absorbance of filtered samples at 456 nm shall not be significantly higher than seasonally adjusted expected value for system under consideration. Apparent Colour: Mean percent transmission of white light per metre shall not be significantly less than seasonally adjusted value for system under consideration (CCME, 2001).						True Colour: Mean absorbance of filtered samples at 456 nm shall not be significantly higher than seasonally adjusted expected value for system under consideration. Apparent Colour: Mean percent transmission of white light per metre shall not be significantly less than seasonally adjusted value for system under consideration (CCME, 2001).			

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Media		Surface Water (Including Groundwater < 10m from Surface Water Body)							Groundwater (> 10 metres from Surface Water Body)			
Pathway		Fresh Water			Marine Water				Fresh Water		Marine Water	
Parameter	Units	Value	Comments	Reference	Value	Comments	Reference	Value	Comments	Value	Comments	
Fluoride	µg/L	120		CCME	1500	max value	BCMOECCS, 2019 - Approved	1200		15,000		
Hydrogen Sulphide	µg/L	2		OMOE, 1999	-			20		-		
Nitrate (as N)	µg/L	13,000	this benchmark does not protect against potential eutrophication; equivalent to 2900 µg nitrate-N/L	CCME	200,000	this benchmark does not protect against potential eutrophication; equivalent to 3600 µg nitrate-N/L	CCME	130,000	10 X Surface Fresh Water value	2,000,000	10 X Surface Marine Water value	
Nitrate + Nitrite (as N)	µg/L	-			-			-		-		
Nitrite (as N)	µg/L	60		CCME	-			600		-		
pH	Units	6.5 to 9		CCME	7.0 to 8.7		CCME	#VALUE!		-		
Sodium	µg/L	-			-			-		-		
Sulphate	µg/L	128,000	max acceptable value	BCMOECCS, 2019 - Approved	-			1,280,000		-		
Total Dissolved Solids (TDS)	µg/L	-			-			-		-		
Petroleum Hydrocarbons (PHC) Parameters												
Benzene	µg/L	2100	Eco-screening Protocol, ARBCA	ARBCA, 2021	2100	Eco-screening Protocol, ARBCA	ARBCA, 2021	4600	Eco-screening Protocol, ARBCA	4600	Eco-screening Protocol, ARBCA	
Toluene	µg/L	770	Eco-screening Protocol, ARBCA	ARBCA, 2021	770	Eco-screening Protocol, ARBCA	ARBCA, 2021	4200	Eco-screening Protocol, ARBCA	4200	Eco-screening Protocol, ARBCA	
Ethylbenzene	µg/L	320	Eco-screening Protocol, ARBCA	ARBCA, 2021	320	Eco-screening Protocol, ARBCA	ARBCA, 2021	3200	Eco-screening Protocol, ARBCA	3200	Eco-screening Protocol, ARBCA	
Xylene	µg/L	330	Eco-screening Protocol, ARBCA	ARBCA, 2021	330	Eco-screening Protocol, ARBCA	ARBCA, 2021	2800	Eco-screening Protocol, ARBCA	2800	Eco-screening Protocol, ARBCA	
Modified TPH (Gas)	µg/L	1500	Eco-screening Protocol, ARBCA	ARBCA, 2021	1500	Eco-screening Protocol, ARBCA	ARBCA, 2021	13,000	Eco-screening Protocol, ARBCA	13,000	Eco-screening Protocol, ARBCA	
Modified TPH (Fuel)	µg/L	100	Eco-screening Protocol, ARBCA	ARBCA, 2021	100	Eco-screening Protocol, ARBCA	ARBCA, 2021	840	Eco-screening Protocol, ARBCA	840	Eco-screening Protocol, ARBCA	
Modified TPH (Lube)	µg/L	100	Eco-screening Protocol, ARBCA	ARBCA, 2021	100	Eco-screening Protocol, ARBCA	ARBCA, 2021	480	Eco-screening Protocol, ARBCA	480	Eco-screening Protocol, ARBCA	
MTBE	µg/L	10,000		CCME	5000		CCME	100,000	10 X Surface Fresh Water value	50,000	10 X Surface Marine Water value	
Polycyclic Aromatic Hydrocarbons (PAH) Parameters												
Non-Carcinogenic PAH Compounds												
Naphthalene	µg/L	1.1		CCME	1.4		CCME	11		14		
1-Methylnaphthalene	µg/L	2	Interim PWQO	OMOE, 1999	1		BCMOECCS, 2019 - Approved	20		10		
2-Methylnaphthalene	µg/L	2	Interim PWQO	OMOE, 1999	1		BCMOECCS, 2019 - Approved	20		10		
Acenaphthene	µg/L	5.8		CCME	6		BCMOECCS, 2019 - Approved	58		60		
Acenaphthylene	µg/L	-			-			-		-		
Anthracene	µg/L	0.012		CCME	0.1		BC CSR Schedule 3.2	0.12		1		
Fluoranthene	µg/L	0.04		CCME	0.2		BC CSR Schedule 3.2	0.4		2		
Fluorene	µg/L	3		CCME	12		BCMOECCS, 2019 - Approved	30		120		
Phenanthrene	µg/L	0.4		CCME	0.3		BC CSR Schedule 3.2	4		3		
Pyrene	µg/L	0.025		CCME	0.02		BC CSR Schedule 3.2	0.25		0.2		
Carcinogenic PAH Compounds												
BaP Total Potency Equivalents	µg/L	-			-			-		-		
Benzo[a]anthracene	µg/L	0.018		CCME	-			0.18		-		
Benzo[a]pyrene	µg/L	0.015		CCME	0.01		BCMOECCS, 2019 - Approved	0.15		0.1		
Benzo[b,k]fluoranthene isomers	µg/L	-			-			-		-		
Benzo[g,h,i]perylene	µg/L	-			-			-		-		
Chrysene	µg/L	0.1		BC CSR Schedule 3.2	0.1		BCMOECCS, 2019 - Approved	1		1		
Dibenzo[a,h]anthracene	µg/L	-			-			-		-		
Indeno[1,2,3-c,d]pyrene	µg/L	-			-			-		-		
Volatile Organic Compound (VOC) Parameters												
Bromodichloromethane	µg/L	200	Interim PWQO	OMOE, 1999	6400	marine chronic criteria; applies to sum of all halomethanes	New Hampshire DES, 2016	2000		64,000		
Bromoform	µg/L	60	Interim PWQO	OMOE, 1999	6400	marine chronic criteria; applies to sum of all halomethanes	New Hampshire DES, 2016	600		64,000		
Bromomethane	µg/L	0.9	Interim PWQO	OMOE, 1999	6400	marine chronic criteria; applies to sum of all halomethanes	New Hampshire DES, 2016	9		64,000		
Carbon Tetrachloride (Tetrachloromethane)	µg/L	13.3		CCME	13		BC CSR Schedule 3.2	133		130		
Chlorobenzene	µg/L	1.3		CCME	25		CCME	13		250		
Chloroethane	µg/L	1100		MDEQ, 2008	-			11,000		-		
Chloroform	µg/L	1.8		CCME	2		BC CSR Schedule 3.2	18		20		
Chloromethane	µg/L	700		OMOE, 1999	6400	marine chronic criteria; applies to sum of all halomethanes	New Hampshire DES, 2016	7000		64,000		
Dibromochloromethane	µg/L	40	Interim PWQO	OMOE, 1999	6400	marine chronic criteria; applies to sum of all halomethanes	New Hampshire DES, 2016	400		64,000		
1,2-Dichlorobenzene	µg/L	0.7		CCME	42		CCME	7		420		
1,3-Dichlorobenzene	µg/L	150		CCME	150		BC CSR Schedule 3.2	1500		1500		
1,4-Dichlorobenzene	µg/L	26		CCME	26		BC CSR Schedule 3.2	260		260		
1,1-Dichloroethane	µg/L	200	Interim PWQO	OMOE, 1999	-			2000		-		
1,2-Dichloroethane	µg/L	100		CCME	100		BC CSR Schedule 3.2	1000		1000		
1,1-Dichloroethylene	µg/L	40	Interim PWQO	OMOE, 1999	-			400		-		
cis-1,2-Dichloroethylene	µg/L	200	Interim PWQO	OMOE, 1999	-			2000		-		
trans-1,2-Dichloroethylene	µg/L	200	Interim PWQO	OMOE, 1999	-			2000		-		
1,2-Dichloropropane	µg/L	0.7	Interim PWQO	OMOE, 1999	3040	marine chronic criteria	New Hampshire DES, 2016	7		30,400		
1,3-Dichloropropane	µg/L	7	assumed same toxicity as the trans isomer	OMOE, 1999	-			70		-		
Ethylene Dibromide	µg/L	5	Interim PWQO	OMOE, 1999	-			50		-		
Methylene Chloride (Dichloromethane)	µg/L	98.1		CCME	98		BC CSR Schedule 3.2	981		980		
Styrene	µg/L	72		CCME	-			720		-		
1,1,1,2-Tetrachloroethane	µg/L	20	Interim PWQO	OMOE, 1999	-			200		-		
1,1,2,2-Tetrachloroethane	µg/L	70	Interim PWQO	OMOE, 1999	-			700		-		
Tetrachloroethylene	µg/L	110		CCME	110	marine chronic criteria	BC CSR Schedule 3.2	1100		1100		
1,1,1-Trichloroethane	µg/L	10	Interim PWQO	OMOE, 1999	-			100		-		
1,1,2-Trichloroethane	µg/L	800	Interim PWQO	OMOE, 1999	-			8000		-		
Trichloroethylene	µg/L	21		CCME	20		BC CSR Schedule 3.2	210		200		
Vinyl Chloride	µg/L	600	Interim PWQO	OMOE, 1999	-			6000		-		

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Media		Surface Water (Including Groundwater < 10m from Surface Water Body)						Groundwater (> 10 metres from Surface Water Body)			
Pathway		Fresh Water			Marine Water			Fresh Water		Marine Water	
Parameter	Units	Value	Comments	Reference	Value	Comments	Reference	Value	Comments	Value	Comments
Pesticides											
Aldicarb	µg/L	1		CCME	0.15		CCME	10		1.5	
Aldrin	µg/L	See Dieldrin, PWOO is for sum of aldrin + dieldrin	applies to sum of concentrations of aldrin+dieldrin isomers in water	OMOE, 1999	-			See Dieldrin, PWOO is for sum of aldrin + dieldrin		-	
Alazine	µg/L	1.8		CCME	-		CCME	18		-	
Azinphos-methyl	µg/L	0.01		AEP, 2018	0.01		Quebec MDEQ	0.1		0.1	
Bendiocarb	µg/L	-			-			-		-	
Bromoxynil	µg/L	5		CCME	-			50		-	
Carbaryl	µg/L	0.2		CCME	0.29		CCME	2		2.9	
Carbofuran	µg/L	1.8		CCME	-			18		-	
Chlorothalonil	µg/L	0.18		CCME	0.36		CCME	1.8		3.6	
Chlorpyrifos	µg/L	0.002		CCME	0.002		CCME	0.02		0.02	
Cyanazine	µg/L	2		CCME	-			20		-	
2,4-D	µg/L	4	max ester formulation	BC CSR Schedule 3.2	4		BC CSR Schedule 3.2	40		40	
DDT*	µg/L	0.001	applies to sum of DDT, DDD and DDE concentrations in water	BC CSR Schedule 3.2	0.001	applies to sum of DDT, DDD and DDE concentrations in water	BC CSR Schedule 3.2	0.01		0.01	
Diazinon	µg/L	0.003		BC CSR Schedule 3.2	0.82		New Hampshire DES, 2016	0.03		8.2	
Dicamba	µg/L	10		CCME	-			100		-	
Dichlorop-methyl	µg/L	6.1		CCME	-			61		-	
Dieldrin*	µg/L	0.001	applies to sum of concentrations of aldrin+dieldrin isomers in water	OMOE, 1999	0.0019	this is a chronic criterion; the acute criterion is 0.71 ug/L	New Hampshire DES, 2016	0.01		0.019	
Dimethoate	µg/L	6.2		CCME	-			62		-	
Dimoseb	µg/L	0.05		CCME	-			0.5		-	
Diquat	µg/L	0.5		OMOE, 1999	-			5		-	
Diuron	µg/L	1.6		OMOE, 1999	-			16		-	
Endosulfan	µg/L	0.003		CCME	0.002		CCME	0.03		0.02	
Endrin*	µg/L	0.002		MOE, 1999	0.0023	this is a chronic criterion; the acute criterion is 0.037 ug/L	New Hampshire DES, 2016	0.02		0.023	
Glyphosate	µg/L	800		CCME	-			8000		-	
Heptachlor*	µg/L	0.001		OMOE, 1999	0.0036	this is a chronic criterion; the acute criterion is 0.053 ug/L	New Hampshire DES, 2016	0.01		0.036	
Lindane	µg/L	0.01		CCME	-			0.1		-	
Linuron	µg/L	7		CCME	-			70		-	
Malathion	µg/L	0.1		BC CSR Schedule 3.2	0.1		BC CSR Schedule 3.2	1		1	
MCPA	µg/L	2.6		CCME	4.2		CCME	26		42	
Methoxychlor	µg/L	0.03		AEP, 2018	-			0.3		-	
Melolachlor	µg/L	7.8		CCME	-			78		-	
Methibuzin	µg/L	1		CCME	-			10		-	
Paraquat	µg/L	16	Chronic Criterion	MDEQ, 1996	-			160		-	
Parathion	µg/L	0.008		OMOE, 1999	-			0.08		-	
Phorate	µg/L	-			-			-		-	
Picloram	µg/L	29		CCME	-			290		-	
Simazine	µg/L	10		CCME	-			100		-	
Tebuthiuron	µg/L	1.6		CCME	-			16		-	
Terbufos	µg/L	-			-			-		-	
Toxaphene*	µg/L	0.008		OMOE, 1999	0.0002	this is a chronic criterion; the acute criterion is 0.21 ug/L	New Hampshire DES, 2016	0.08		0.002	
Triallate	µg/L	0.24		CCME	-			2.4		-	
Trifluralin	µg/L	0.2		CCME	-			2		-	
PFAS Substances											
Perfluorooctane sulfonate (PFOS)	µg/L	6.8		FEQG	-			68		-	
Perfluorooctanoic acid (PFOA)	µg/L	-			-			-		-	
Perfluorobutanoate (PFBA)	µg/L	-			-			-		-	
Perfluorobutanesulfonate (PFBS)	µg/L	-			-			-		-	
Perfluorohexanesulfonate (PFHxS)	µg/L	-			-			-		-	
Perfluoropentanoate (PFPeA)	µg/L	-			-			-		-	
Perfluorohexanoate (PFHxA)	µg/L	-			-			-		-	
Perfluorooheptanoate (PFHpA)	µg/L	-			-			-		-	
Perfluorononanoate (PFNA)	µg/L	-			-			-		-	
Other Parameters											
Polychlorinated Biphenyls (Total PCB)	µg/L	0.001	PCBs do not partition to water to any significant extent	OMOE, 1999	-	PCBs do not partition to water to any significant extent		0.01	PCBs do not partition to water to any significant extent	-	PCBs do not partition to water to any significant extent
Dioxins and Furans (TEQ)	µg/L	-	Dioxins/furans do not partition to water to any significant extent		-	Dioxins/furans do not partition to water to any significant extent		-	Dioxins/furans do not partition to water to any significant extent	-	Dioxins/furans do not partition to water to any significant extent
Pentachlorophenol (PCP)	µg/L	0.5		CCME	7.9	chronic criterion	U.S. EPA, 2017	5		79	
Organotins - Tributyltin	µg/L	0.008		CCME	0.001		CCME	0.08		0.01	
Ethylene Glycol	µg/L	192,000		CCME	192,000		BC CSR Schedule 3.2	1,920,000		1,920,000	
Propylene Glycol	µg/L	500,000		CCME	500,000		BC CSR Schedule 3.2	5,000,000		5,000,000	
Phenol	µg/L	4		CCME	200		BC CSR Schedule 3.2	40		2000	

Notes:
 All values in µg/L unless otherwise noted.
 ** indicates no guideline available.

The Atlantic PIRI benchmarks for BTEX and TPH (gasoline, diesel, #6 oil) are based on the Target Lipid Narcosis Model (TLNM), as these substances have a general narcotic mode of action. Because of this, it can be assumed that benchmarks for freshwater organisms are protective of marine organisms. This assumption is based on the similar sensitivity of freshwater and marine organisms to narcotic chemicals. Thus, most benchmarks derived on the basis of the TLNM are protective of both freshwater and marine organisms. For chemicals with more specific modes of action, freshwater and marine organisms can not be assumed to be similar in sensitivity, and separate freshwater and marine benchmarks should be applied or derived (if sufficient data exists).

* Indicates the benchmark value is below currently achievable analytical RDLs. For sites with potential surface water or groundwater contamination in relation to this substance, additional aquatic assessment and/or consultation with provincial regulators should occur to confirm this substance is not likely to be present at levels that could adversely affect aquatic biota.