

Recreational Water Quality Guidelines

Guideline Summary

Ministry of Environment & Climate Change Strategy

Water Protection & Sustainability Branch



The **Water Quality Guideline Series** is a collection of British Columbia (B.C.) Ministry of Environment and Climate Change Strategy water quality guidelines. Water quality guidelines are developed for a variety of water uses; aquatic life, drinking water sources, recreation and aesthetics and wildlife. The Water Quality Guideline Series focuses on publishing water quality guideline technical reports and guideline summaries using the best available science to aid in the management of B.C.'s water resources. For additional information on water quality parameter specific guidelines visit: <http://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/water-quality-guidelines/approved-water-quality-guidelines>

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EXECUTIVE SUMMARY

The British Columbia (B.C.) Ministry of Environment and Climate Change Strategy (ENV) develops ambient water quality guidelines (WQGs) for chemical substances and physical attributes of importance for both fresh and marine waters. These WQGs are used to assess and manage the health, safety and sustainability of B.C.'s aquatic resources; supporting environmental assessments and decisions related to the protection of water uses including aquatic life, wildlife, drinking water sources and recreation.

The Recreational Water Quality Guidelines (RWQGs) are specifically used to help manage recreational water quality and assess the risks to human health. As with all ENV WQGs, the RWQGs are not directly enforceable, but may be used to support the development of waste management permits, approvals, plans or operating certificates.

The numerical and narrative guidelines provided in this document replace the RWQGs specified in B.C. WQG overview and technical documents prepared between 1985 and 2016. An exceedance of the RWQGs presented in this document does not imply that unacceptable risks are present; but rather that the potential for adverse effects is increased and additional investigation and monitoring should be considered.

Primary Contact Recreation

In most cases, B.C. ENV RWQGs are adopted from Health Canada's Guidelines for Canadian Recreational Water Quality. These guidelines are for primary contact recreation, where the whole body or face and trunk are frequently immersed and/or when it is likely some water will be swallowed (Health Canada 2012).

B.C. has two approaches to establishing RWQGs:

- adoption of Health Canada's Guidelines for Canadian Recreational Water Quality;
- development of a provincial guideline when none are available from Health Canada, or when required by B.C.-specific circumstances. In these cases, ENV and the Ministry of Health (HLTH) and other pertinent groups develop or adopt an appropriate guideline.

Microbiological Water Quality for Shellfish Harvesting

Microbiological WQGs for shellfish harvesting are developed by the Canadian Food Inspection Agency through the Canadian Shellfish Sanitation Program (CSSP) and not included in this update. Readers should refer to the [CSSP Manual of Operations](#) for further information.

Recreational Water Quality Guideline Updates

In this update, RWQGs were updated in one of four ways (Table 1):

- 1) No change to the guideline.
- 2) Guideline updated: New science resulted in a RWQG being adopted from Health Canada.
- 3) New Guideline: RWQG not previously approved for recreational use in B.C.
- 4) Guideline archived: RWQG is no longer needed or relevant for B.C.

GUIDELINE SUMMARY TABLE

Table 1. B.C. water quality guidelines for primary contact recreational uses.

Parameter	Recreational Water Quality Guidelines	Guideline Source	2017 Update
Chlorophenols:			
<i>Monochlorophenol</i>	0.0001 mg/L	ENV 1997a	No change
<i>Total Dichlorophenols</i>	0.0003 mg/L	ENV 1997a	No change
<i>Total Trichlorophenols</i>	0.002 mg/L	ENV 1997a	No change
<i>Total Tetrachlorophenols</i>	0.001 mg/L	ENV 1997a	No change
<i>Pentachlorophenol</i>	0.03 mg/L	ENV 1997a	No change
<i>Chlorophyll a</i>	50 mg/m ² (streams)	ENV 1985	No change
Colour, True	15 TCU (AO); mean (minimum of 5 samples in 30 days)	ENV 1997b	No change
Cyanobacterial Toxins: Total Cyanobacteria or Total Microcystins	100 000 cells/mL or, 0.02 mg/L (expressed as microcystin-LR)	Health Canada 2012	New for recreation use in BC.
Methyl Tertiary-Butyl Ether (MTBE)	0.02 mg/L	ENV 2001c	No change
Microbiological Indicators:			
<i>Escherichia coli</i>	≤ 200 <i>E. coli</i> /100 mL; geometric mean concentration (minimum of 5 samples*) or, ≤ 400 <i>E. coli</i> /100 mL; single sample maximum concentration (units will depend on whether the multiple-tube fermentation method (MPN/100 mL) or the membrane filtration method (<i>E. coli</i> /100 mL) is used).	Health Canada 2012	Increased from ≤ 77 <i>E. coli</i> /100 mL
Enterococci	≤ 35 Enterococci /100 mL; geometric mean concentration (minimum of 5 samples*), or, ≤ 70 Enterococci /100 mL; single sample maximum concentration (units will depend on whether the multiple-tube fermentation method or the membrane filtration method is used).	Health Canada 2012	Increased from ≤ 20 enterococci/100 mL

Parameter	Recreational Water Quality Guidelines	Guideline Source	2017 Update
Nitrate	45 mg/L (nitrate) 10 mg/L (nitrate-N)	ENV 2009	No change
Nitrite	3.0 mg/L (nitrite) 1.0 mg/L (nitrite-N)	ENV 2009	No change
pH	5.0 - 9.0	Health Canada 2012	No change
Phosphorus	0.01 mg/L (lakes)	ENV 1985	No change
Temperature	Should not cause an appreciable increase or decrease in the deep body temperature of swimmers	Health Canada 2012	Updated to Health Canada's current narrative guideline.
Turbidity	50 NTU (AO)	Health Canada 2012	Updated to Health Canada's current guideline; not based on background levels.

*The 5 samples should be collected at times and sites so as to provide representative information on the water quality likely to be encountered by users (Health Canada 2012).

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ABBREVIATIONS

AO	Aesthetic Objective
B.C.	British Columbia
CSSP	Canadian Shellfish Sanitation Program
ENV	B.C. Ministry of Environment and Climate Change Strategy
HLTH	Ministry of Health
MPN	Most probable number
NTU	Nephelometric unit
RWQG	Recreational water quality guideline
TCU	Total colour units
WQG	Water Quality Guideline

GLOSSARY

Aesthetic Objective: established for parameters that may impair the taste, smell, or colour of water; or which may interfere with the supply of good quality water. They do not cause adverse health effects.

Ambient: Ambient refers to open waters such as rivers, lakes and streams, as opposed to closed water supply systems that distribute treated water or wastewater.

Indicator Organism: Types of bacteria used to detect the human health risk of fecal contamination in water.

Interim Guidelines: Interim guidelines are developed when data is available but is limited. Interim guidelines may be revised to guideline status when information becomes available.

Maximum Acceptable Concentration: a level that has been established for certain substances that are known or suspected to cause adverse health effects.

Primary Contact: Activities, such as swimming (this includes bathing/wading for the purposes of this document), windsurfing and waterskiing, as well as secondary contact activities, such as canoeing or fishing, in natural waters through intentional or incidental immersion.

GUIDELINE RATIONALE

1.1 Primary Contact Recreation

1.1.1 Aluminum

RWQG: Archived

Rationale: Exposure to inorganic chemical contaminants is not considered a significant health risk for recreational water users (Health Canada 2012).

1.1.2 Chlorophenols

RWQG: See Table 3

Rationale: Chlorophenols can cause taste and odour problems at concentrations below toxic levels, therefore, the ENV established aesthetic objectives (AO) for total monochlorophenols, dichlorophenols, trichlorophenols, tetrachlorophenols and pentachlorophenol (Table 3) (ENV 1997a). As swimming involves face contact with the water, taste and odour thresholds for chlorophenols should be met.

Table 2. B.C. aesthetic objectives for total chlorophenols in recreational waters.

Chlorophenols	Aesthetic Objective (mg/L)
Total Monochlorophenols	0.0001
Total Dichlorophenols	0.0003
Total Trichlorophenols	0.002
Total Tetrachlorophenols	0.001
Total Pentachlorophenol	0.03

1.1.3 Chlorophyll a

RWQG: 50 mg/m² (streams)

Rationale: The ENV developed a guideline as Health Canada (2012) does not supply one for chlorophyll a. The ENV will continue to use the ambient recreational water quality guideline for chlorophyll a developed in 1985 (ENV 1985). The guideline is specified as an index of algal biomass rather than nutrient concentrations since there are several other factors (e.g., water velocity, light, temperature and invertebrate grazing pressure) that contribute to algal growth in streams.

1.1.4 Colour, True

RWQG: 15 total colour units (TCU) (minimum of 5 samples in 30 days)

Rationale: The ENV will continue to use the RWQG for true colour (ENV 1997b) as Health Canada (2012) only provides the following narrative guideline: *colour should not be so intense as to impede visibility in areas used for swimming*".

1.1.5 Copper

RWQG: Archived

Rationale: Exposure to inorganic chemical contaminants is not considered a significant health risk for recreational water users (Health Canada 2012).

1.1.6 *Cyanobacterial Toxins*

RWQG: Total microcystins: 0.02 mg/L (expressed as microcystin-LR) or,
Total cyanobacteria: 100 000 cells/mL

Rationale: The ENV adopted Health Canada's (2012) guideline without modification. Exceedance of these guideline values, or development of a bloom, indicates potential exposure to cyanobacterial cells and/or their toxins in concentrations which may be harmful to human health. In general, contact with water where a bloom has (currently or recently) occurred should be avoided.

The development of cyanobacterial blooms in recreational waters is difficult to predict. Blooms can develop quickly under the right conditions, even in lakes that have never had a problem with blooms. If toxic species are present, the potential for toxic conditions generally lasts as long as the bloom; however, some toxins may still be present when the bloom dissipates (Chorus and Bartram 1999; Falconer 2005).

Microcystins represent the most frequently encountered cyanotoxins in temperate surface waters in North America, based on available monitoring data, and are the cyanotoxins of most relevance for recreational waters in Canada. The guideline value for total microcystins (expressed as microcystin-LR) is intended to be protective against exposure to other microcystin variants that may also be present.

1.1.7 *Mercury*

RWQG: Archived

Rationale: Exposure to inorganic chemical contaminants is not considered a significant health risk for recreational water users (Health Canada 2012).

1.1.8 *Methyl Tertiary-Butyl Ether (MTBE)*

RWQG: 0.02 mg/L

Rationale: The ENV will continue to use the MTBE AO drinking water guideline of 0.02 mg/L as a RWQG. This value protects primary contact recreational water users from unaesthetically pleasing taste and odours (ENV 2001c).

1.1.9 *Microbial Indicators:*

Fecal coliforms

RWQG: Archived

Rationale: This guideline was originally specified as an interim guideline in 1988 until use of other preferred bacterial indicators were fully adopted. *E.coli* has since been identified as the preferred fecal bacterial indicator for microbial water quality analysis.

Pseudomonas aeruginosa

RWQG: Archived

Rationale: *Pseudomonas* spp. are not known to be associated with fecal contamination (Tallon *et al* 2005; Yates 2007). As such, this indicator organism has not been adopted as a common tool in accessing microbial water quality since it was introduced in the 1988 water quality guidelines for microbiological indicators (ENV 1988).

Escherichia coli

RWQG: ≤ 200 *E. coli* /100 mL (geometric mean of a minimum of 5 samples in 30 days);
 ≤ 400 *E. coli* /100 mL (single sample maximum concentration).

Rationale: The ENV adopted the updated Health Canada (2012) RWQGs to support the Ministry of Health's public health goals. These guidelines are based on analysis of epidemiological evidence relating concentrations of these organisms to the incidence of swimming-associated gastrointestinal illness observed among swimmers. The values represent risk management decisions based on the assessment of possible health risks for the recreational water user and the recognition of the significant benefits that recreational water activities provide in terms of health and enjoyment. The guidelines advise that recreational water areas routinely used for primary contact recreation are monitored at a minimum of once per week; increased monitoring is recommended for those beaches that are highly frequented or known to experience high user densities. Similarly, under certain scenarios, a reduction in the recommended sampling frequency may be justified (Health Canada 2012).

Enterococci

RWQG: ≤ 35 enterococci /100 mL (geometric mean of a minimum of 5 samples in 30 days);
 ≤ 70 enterococci /100 mL (single sample maximum concentration).

Rationale: As above.

1.1.10 Nitrate

RWQG: 45 mg/L as nitrate (10 mg/L as nitrate-nitrogen)

Rationale: Recreational water use with nitrate in the water body is not likely to cause any direct problems in terms of body contact or visual deterioration. However, to protect recreational users who may ingest water, it is recommended that the drinking water guidelines (Health Canada 2013) apply to protect recreational uses.

1.1.11 Nitrite

RWQG: 3.0 mg/L as nitrite (1.0 mg/L as nitrite-nitrogen)

Rationale: Recreational water use with nitrite in the water body is not likely to cause any direct problems in terms of body contact or visual deterioration. However, to protect recreational users who may ingest water, it is recommended that the drinking water guidelines (Health Canada 2013) apply to protect recreational uses.

1.1.12 pH

RWQG: 5.0 – 9.0

Rationale: The ENV adopted the Health Canada (2012) updated guideline without modification. Both alkaline and acidic waters may cause eye irritations. To protect against the risk of eye irritation, the pH of primary use recreational waters should be within the range of 5.0 to 9.0 (Health Canada 2012).

1.1.13 Phosphorus

RWQG: 0.01 mg/L (lakes)

Rationale: The ENV will continue to use its ambient recreational water quality guideline (Nordin 1985) for phosphorus to ensure safe water clarity. This guideline value was deemed to provide a high level of protection against aesthetic deterioration for recreational use.

1.1.14 Temperature

RWQG: No numerical guideline is recommended.

Rationale: ENV adopted Health Canada's (2012) updated guideline without modification. Precise guideline values for the temperature of waters to be used for swimming cannot be established. Tolerance to water temperatures can vary considerably from individual to individual. *Users should not engage in recreational activities at temperature-time combinations sufficient to cause an appreciable increase or decrease in their core body temperature* (Health Canada 2012).

1.1.15 Turbidity

RWQG: 50 NTU (AO)

Rationale: The ENV adopted Health Canada's (2012) updated guideline without modification to satisfy most recreational uses. Turbidity is important for aesthetic, safety and, to a lesser degree, health reasons. High turbidity is aesthetically displeasing and can be a safety concern when it reduces visibility through the water. Because filtration equipment and modern water treatment processes are not feasible at natural swimming areas, safety concerns associated with turbid or unclear water are dependent upon the intrinsic quality of the water itself. Health considerations associated with turbidity are related primarily to the ability of particles to adsorb microorganisms and chemical contaminants (Health Canada 2012).

1.1.16 Zinc

RWQG: Archived

Rationale: Exposure to inorganic chemical contaminants is not considered a significant health risk for recreational water users (Health Canada 2012).

1.2 Microbiological Water Quality for Shellfish Harvesting

Microbiological WQGs for [shellfish harvesting](#) can be found at the [Canadian Food Inspection Agency Website](#) (CFIA 2015) in the [Canadian Shellfish Sanitation Program Manual of Operations](#).

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