



Village of McBride
2020 Annual Water System Report
(Prepared: March 2021)



McBride Water System Annual Report for 2020

In 2020, the McBride Water System supplied 123,833,200 liters of potable water to approximately twelve hundred (1200) persons. This year's annual water consumption has decreased by 10,323,400 liters. This equates to approximately four hundred (400) connections to the water system. The system utilizes a gravity intake that draws water from Dominion Creek. The water is detained in two underground settling tanks equaling sixty cubic meters (60M³) that slows down the velocity of the water allowing the suspended solids time to settle out before it is delivered to the Water Treatment Plant. The water is first treated with Ultraviolet Light and secondly treated with Chlorine to further treat the water for bacteria. Now that the water has traveled through the treatment process at the treatment plant it is stored below ground in an eight hundred cubic meter (800M³) below ground concrete reservoir until it is needed by the village residents. The water leaves the reservoir through a variety of different types and sizes of pipe that eventually connect to the user's building through a curb stop and a service line.

This year's annual water consumption was lower for several reasons. First, the do not consume order issued by Northern Health and the Village of McBride supplying both bottled water and potable water via water tanker reduced the water demand during this period. Secondly, the Village of McBride used less water due to the impacts of the COVID-19. The combination of businesses being closed and fewer visitors due to provincial travel restrictions drastically lowered water consumption. Finally, the above average amount of rain received in 2020 reduced the need of grass and garden watering also reducing consumption.

Water was sampled 135 times in 2020. The water samples were taken from the following locations:

Table 1
Water Sampling Locations

Location 1: McBride Secondary School
Location 2: McBride Hospital
Location 3: McBride Husky/Esso
Location 4: Dominion Creek water system intake
Location 5: McBride Reservoir

Table 2
Water Quality

Month	Number of samples with Escherichia Coli in Treated Water	Number of Samples with Coliforms in Treated Water	Minimum Turbidity of Raw Water (NTU)	Maximum Turbidity of Raw Water (NTU)	Average Turbidity of Raw Water (NTU)
January	0	0	0.124	0.204	0.147
February	0	0	0.153	0.261	0.172
March	0	0	0.164	0.222	0.183
April	0	0	0.175	1.240	0.524
May	0	0	0.133	1.230	0.354
June	0	0	0.156	9.720	2.517
July	0	0	0.978	9.030	2.050
August	0	0	0.131	0.343	0.196
September	0	0	0.113	0.686	0.193
October	0	0	0.115	0.339	0.169
November	0	0	0.120	0.529	0.195
December	0	0	0.138	0.207	0.160

Escherichia coli (commonly abbreviated **E. coli**) is commonly found in the lower intestine of warm-blooded organisms. Most E. coli strains are harmless, but some serotypes can cause serious food poisoning in humans, and are occasionally responsible for product recalls due to food contamination.

Coliform bacteria are commonly used bacteria indicator of sanitary quality of foods and water. Coliforms can be found in the aquatic environment, in soil and on vegetation; they are universally present in large numbers in the feces of warm blooded animals. While coliforms themselves do not normally cause serious illness, they are easy to culture and their presence is used to indicate that other pathogenic organism of fecal origin may be present. Fecal pathogens include bacteria, viruses, or protozoa and many multicellular parasites.

Turbidity is the cloudiness or haziness of a fluid caused by individual particles (suspended solids) that are generally invisible to the naked eye, similar to smoke in air. The measurement of turbidity is a key test of water quality.

From the data shown previously in Table 2 it is quite obvious the water quality is very good. The water is not a concern for health risk and is rated as low on the Public Health Protection Website that is operated by Northern Health. The water Plant Operator collected Raw Water Samples for testing in 2020. Northern Health requires a complete water chemistry test to be completed every five (5) years. A full set of water samples was collected and tested July 17, 2020. This data is shown in Table 3(A-C) below. The full lab report is attached. Only one of the results exceeded the Guidelines for The Canadian

Drinking Water Quality Regulations. The test for Turbidity exceeded the guidelines for the Canadian Drinking Water Regulations because the sample was collected during our seasonal freshet. These guidelines are also attached to this report.

Table 3A

Water Chemistry Taken July 17, 2020

Analyte (Metals Extractable)		Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments
Aluminum	Extractable	mg/L	0.067	0.001	0.1	Below OG
Antimony	Extractable	mg/L	<0.00002	0.00002	0.006	Below Mac
Arsenic	Extractable	mg/L	0.0002	0.0001	0.010	Below Mac
Barium	Extractable	mg/L	0.0019	0.0001	2.0	Below Mac
Boron	Extractable	mg/L	<0.002	0.002	5	Below Mac
Cadmium	Extractable	mg/L	<0.00001	0.00001	0.005	Below Mac
Chromium	Extractable	mg/L	0.00015	0.00005	0.05	Below Mac
Copper	Extractable	mg/L	0.0006	0.0005	1AO:2Mac	Below AO
Lead	Extractable	mg/L	0.00038	0.00001	0.005	Below Mac
Selenium	Extractable	mg/L	<0.0002	0.0002	0.05	Below Mac
Strontium	Extractable	mg/L	0.032	0.0001	7.0	Below Mac
Uranium	Extractable	mg/L	0.00013	0.00001	0.02	Below Mac
Vanadium	Extractable	mg/L	<0.00005	0.00005		
Zinc	Extractable	mg/L	0.0009	0.0005	5.0	Below AO

Table 3B

Analyte Physical & Aggregate Properties		Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments
Colour	True	Colour Units	9	5		
Turbidity		NTU	4.06	0.1	0.1	Above OG

Table 3C

Analyte Routine Water		Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments
ph	At 25 C		7.61	0.01	7.0-10.5	Within Range
Electrical Conductivity		uS/cm at 25 C	56	1		
Calcium	Extractable	mg/L	8.0	0.01		
Iron	Extractable	mg/L	0.13	0.004	0.3	Below AO
Magnesium	Extractable	mg/L	1.3	0.02		
Manganese	Extractable	mg/L	0.016	0.001	0.02 AO 0.12 Mac	Below AO
Potassium	Extractable	mg/L	0.18	0.04		
Silicon	Extractable	mg/L	1.1	0.005		
Sodium	Extractable	mg/L	0.3	0.1	200	Below AO
T-Alkalinity	as CaCO ₃	mg/L	27	5		
Chloride	Dissolved	mg/L	<0.05	0.05	250	Below AO
Fluoride	Dissolved	mg/L	<0.01	0.01	1.5	Below Mac
Nitrate-N	Dissolved	mg/L	<0.01	0.01	10	Below Mac
Nitrite-N	Dissolved	mg/L	<0.01	0.01	1	Below Mc
Sulfate (SO ₄)	Dissolved	mg/L	2.0	0.1	500	Below AO
Hardness	As CaCO ₃	mg/L	25	1		
Total Dissolved Solids	Extractable	mg/L	31	1	500	Below AO

NOTE: Lab results containing < means there is a lower amount than the Detection Limit of the equipment.

At present the intake for the water system has been replaced. The settling pond that the Village relied on for years had served its time. It was replaced with two underground 60 m³ settling tanks. All changes to our system were submitted to Northern Health and were approved and permits were awarded prior to the start of this project. The new system works great giving the operators capabilities to control turbidity during run off. Maintenance on the intake is a lot quicker and more effective with the design of the new system. The new system can be flushed on the regular basis to remove sediment that has settled out of the water serving the Village a higher quality of water. An Emergency Response Plan was updated in 2019 and is posted in numerous locations in case of emergency. A daily log of the chlorine residuals shows that the average yearly concentration is 0.41 mg/l (milligrams per liter) through the distribution system. The breakdown of samples taken per month is shown below in Table 4. Chlorine Residual

Samples are taken a minimum of 80 times per month at four different locations in the Village. Environmental Operators Certification Program classified the water treatment and distribution a Level 2 facility. This requires the operators to possess Level 2 training and operational skills to be able to operate the water system.

Table 4

Chlorine Residual throughout the Distribution System

Month	Average	Minimum	Maximum
January	0.33	0.24	0.42
February	0.29	0.21	0.36
March	0.34	0.14	0.49
April	0.28	0.09	0.63
May	0.33	0.10	0.71
June	0.47	0.08	0.78
July	0.37	0.20	0.56
August	0.32	0.15	0.44
September	0.28	0.16	0.41
October	0.29	0.11	0.46
November	0.21	0.06	0.38
December	0.41	0.24	0.49
Yearly	0.33	0.15	0.51

Table 5

Bacteriological Testing 2020 (Coliforms [Coli] and E. Coli) (Raw Water)

Date	# of locations	System Intake	Reservoir	McBride Hospital	Secondary School	McBride Husky
January	3	No sample	0/100ml	0/100ml	0/100ml	0/100ml
February	3	No sample	0/100ml	0/100ml	0/100ml	0/100ml
March	3	No sample	0/100ml	0/100ml	0/100ml	0/100ml
April	3	No sample	0/100ml	0/100ml	0/100ml	0/100ml
May	3	No sample	0/100ml	0/100ml	0/100ml	0/100ml
June 2	5	7.3 Coli/100ml	0/100ml	0/100ml	0/100ml	0/100ml
June 9	5	5.2 Coli/100ml	0/100ml	0/100ml	0/100ml	0/100ml
June 12	5	Timed Out	0/100ml	0/100ml	0/100ml	0/100ml
June 16	5	Timed Out	0/100ml	0/100ml	0/100ml	0/100ml
June 23	5	88 Coli/100ml 1 E. Coli/100ml	0/100ml	0/100ml	0/100ml	0/100ml
July 7	5	27.5 Coli/100ml 1 E. Coli/100ml	0/100ml	0/100ml	0/100ml	0/100ml
July 14	5	19.9 Coli/100ml	0/100ml	0/100ml	0/100ml	0/100ml
July 21	5	43.2 Coli/100ml	0/100ml	0/100ml	0/100ml	0/100ml
July 28	5	37.9 Coli/100ml	0/100ml	0/100ml	0/100ml	0/100ml

Aug 4	5	105 Coli/100ml	0/100ml	0/100ml	0/100ml	0/100ml
Aug 11	5	129 Coli/100ml	0/100ml	0/100ml	0/100ml	0/100ml
Sept 1	5	47.2 Coli/100ml 1 E. Coli/100ml	0/100ml	0/100ml	0/100ml	0/100ml
Sept 9	5	39.9 Coli/100ml	0/100ml	0/100ml	0/100ml	0/100ml
Sept 15	5	38.4 Coli/100ml	0/100ml	0/100ml	0/100ml	0/100ml
Sept 22	5	69.1 Coli/100ml 3 E. Coli	0/100ml	0/100ml	0/100ml	0/100ml
Sept 29	5	178 Coli/100ml 2 E. Coli/100ml	0/100ml	0/100ml	0/100ml	0/100ml
Oct 6	5	517 Coli/100ml 5.2 E. Coli/100ml	0/100ml	0/100ml	0/100ml	0/100ml
Oct 13	5	34.1 Coli/100ml 1 E. Coli/100ml	0/100ml	0/100ml	0/100ml	0/100ml
Oct 20	5	Timed Out	0/100ml	0/100ml	0/100ml	0/100ml
Oct 27	5	36.4 Coli/100ml 1 E. Coli/100ml	0/100ml	0/100ml	0/100ml	0/100ml
Nov 3	5	35.4 Coli/100ml	0/100ml	0/100ml	0/100ml	0/100ml
Nov 24	5	8.6 Coli/100ml	0/100ml	0/100ml	0/100ml	0/100ml
Dec 1	5	9.8 Coli/100ml	0/100ml	0/100ml	0/100ml	0/100ml
Dec 15	5	9.7 Coli/100ml	0/100ml	0/100ml	0/100ml	0/100ml



This is a photo taken at the peak of the 2020 freshet. In the above photo the high turbidity levels are easily visible. During these periods water conservation notices were posted to restrict water usage so we do not bring too much turbid water into the system. During the freshet in 2020 when the first conservation notice was posted our daily water usage increased by 100,000 l/day. It was issued due to high turbidity levels not because there was a shortage of water. We hope that seeing this photo will educate residents why a conservation notice is issued.



Dominion Creek near the end of seasonal freshet August 2020

For additional information or if you have any questions concerning the water system and treatment, please contact the Village of McBride at (250) 569-2229 or in person at 100 Robson Centre, 855 SW Frontage Rd., McBride, BC.

The water treatment plant for the Community Water System in McBride is in good operating condition. It is constantly being maintained and upgraded to provide better and more reliable service to the community. Please refer to Northern Health Reports for more information on the samples taken in 2020.

Works Cited

1. Wikipedia, "Escherichia coli", 8 May 2014. (Online). Available: http://en.wikipedia.org/wiki/Escherichia_Coli. (Accessed 24 July 2018)
2. Wikipedia, "Coliform Bacteria", 22 July 2018 (Online). Available: http://en.wikipedia.org/wiki/coliform_bacteria. (Accessed 22 July 2018)
3. Wikipedia, "Turbidity", 12 May 2014. (Online). Available: <http://en.wikipedia.org/wiki/Turbidity>. (Accessed 22 July 2018)
4. Northern health, "Public Health Protection", Northern Health, 22 July 2018. (Online): Available <http://healthspace.ca/nha>. (Accessed 22 July, 2018)



210-1811 Victoria St.
Prince George, BC V2L2L6
(250)301-7898
www.wellnesswaterlab.com
contact@wellnesswaterlab.com

Report Status:

- ☒ Final
☐ Pending
☐ None-Conformance

General Information**Laboratory Report**

Client Name:
SLANEY, MATTHEW

Address:
100 ROBSON CENTRE MC BRIDE B.C. V0J2E0

Report ID: **4557**
Water Sampler: SLANEY, MATTHEW
Collection Date/Time: 2020-07-16 10:30
Receiving Date/Time: 2020-07-16 12:52
Analysis Start Date/Time: 2020-07-16 14:00
Analysis End Date/Time: 2020-07-17 14:00
Reported Date/Time: 2020-07-17 15:00
Sample Temperature (°C): *14.0

Bacteriology Results:

Project Name, Address and Source	Lab Reference Number	Microorganisms (MPN/100 ML)		Comment
		Total Coliform	E.Coli	
MC BRIDE COMMUNITY WATER SYSTEM MCBRIDE B.C. V0S2E0 RIVER, WATER SYSTEM INTAKE (RAW)	4557	*62.4	*4.2	*ABOVE MAC

Analytical Comments:

Total coliform and E.coli results exceeded maximum standard limit of <1

The information contained in this report is considered confidential and is intended for the addressee whose name is specified above.
Should you receive this report by error, please notify us by phone and delete this message from your mailbox.



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Sample Temperature (°C): *14.0

Sample Details:

Project Name & Address Provided on Chain of Custody Form and/or Sample Label	Site Code	Collection Date/Time	Hold Time (hh:mm)	Chlorination (mg/L)	Comment
MC BRIDE COMMUNITY WATER SYSTEM MCBRIDE B.C. V0S2E0 RIVER, WATER SYSTEM INTAKE (RAW)	NA	2020-07-16 10:30	3:30	NI	

Note To Clients:

- a) Temperature shown in the above is the average of up to three sample temperatures in the same cooler taken at receipt
b) Sample Holding Time is the elapsed time between collection date/time and analysis start date/time



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Reported Date/Time: 2020-07-17 15:00
Sample Temperature (°C): *14.0

Quality Assurance:

#1 Positive Control, Klebsiella pneumoniae
#2 Positive Control, Escherichia coli
#3 Negative Control, Pseudomonas aeruginosa

Methodology:

Analyte: Total coliform & Escherichia coli
Method: Enzyme Substrate Colilert 24
Unit: MPN/100ml
Detection Limit: 1.0 MPN/100ml

Guideline:

Bacteria Growth Limit: None Detected = 0.0 = <1.0 MPN/100ml
Sample Temperature: 2 to 10 °C
Maximum Sample Holding Time: 30 hours

References:

British Columbia Drinking Water Protection Act
Guideline for Canadian Drinking Water Quality
Standard Methods for the Examination of Water and Wastewater, 23rd Edition
Enhanced Water Quality Assurance Program (EWQA)

PHO Approval:

[Provincial Health Officer Approved Laboratory List](#)

Acronyms:

BML: Below Minimum Limit	MPN: Most Probable Number (per 100 ml)	PW: Private Well
BT: Bathroom Tap	NA: Not Applicable	SC: See Comment
BW: Bottled Water	NC: Non-Conformance	SPL: Sampling Point Locator
CWS: Community Water System	NCD: No Collection Date	t: Total Chlorine
EC: E. coli (<i>Escherichia coli</i>)	NCT: No Collection Time	TC: Total Coliform
EML: Exceeded Maximum Limit	NI: Not Indicated	<: Below
f: Free Chlorine	NR: No Result	>: Above
IL: Illegible	NSQ: Not Sufficient Quantity	°C: Degree Celsius
KT: Kitchen Tap	NT: Not Tested	* : Indicates Criteria Not Met
MAC: Maximum Acceptable Concentration	OT: Outside Tap	



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Analysis Start Date/Time:	2020-07-16 14:00
Analysis End Date/Time:	2020-07-17 14:00
Reported Date/Time:	2020-07-17 15:00
Sample Temperature (°C):	*14.0

Signature Page:

The results and Quality Control validations in this report were reviewed and approved by:

Arian Javaherdashti, MLT, CSMLS, Senior Analyst

Report Transmission Cover Page

Bill To: Wellness Water Testing 210, 1811 Victoria Street Prince George, BC, Canada	Project ID: 4557 Project Name: Matthew Slaney Project Location: McBride Community Water System LSD: McBride, BC V05 2E0 P.O.: 1435402 Proj. Acct. code:	Lot ID: 1435402 Control Number: Date Received: Jul 17, 2020 Date Reported: Jul 22, 2020 Report Number: 2531768
Attn: Arian Javaherdashti Sampled By: Matthew Slaney Company:		

Contact	Company	Address
Arian Javaherdashti	Wellness Water Testing Laboratory Inc.	210, 1811 Victoria Street Prince George, BC null Phone: (250) 301-7898 Fax: Email: contact@wellnesswaterlab.com

Delivery	Format	Deliverables
Email - Multiple Reports By Lot	PDF	COC / Test Report
Email - Multiple Reports By Lot	Standard Crosstab without Tabs	Test Report
Email - Single Report	PDF	COA
Email - Single Report	PDF	COR
Email - Single Report	PDF	Invoice

Notes To Clients:

- Jul 22, 2020 - Sample 1435402-1; 7133976: Analysis was performed on sample 1435402-1 that exceeded the recommended holding time for nitrate and nitrite analysis.

Analytical Report

Bill To: Wellness Water Testing 210, 1811 Victoria Street Prince George, BC, Canada	Project ID: 4557 Project Name: Matthew Slaney Project Location: McBride Community Water System McBride, BC V0S 2E0 LSD: 1435402 P.O.: 1435402 Proj. Acct. code:	Lot ID: 1435402 Control Number: Date Received: Jul 17, 2020 Date Reported: Jul 22, 2020 Report Number: 2531768
Attn: Arian Javaherdashti Sampled By: Matthew Slaney Company:		

Reference Number	1435402-1
Sample Date	July 16, 2020
Sample Time	10:30
Sample Location	
Sample Description	4557 / Water System Intake (RAW) / 15.9 °C
Sample Matrix	Drinking Water

Analyte	Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments
Metals Extractable					
Aluminum	Extractable mg/L	0.067	0.001	0.1	Below OG
Antimony	Extractable mg/L	<0.00002	0.00002	0.006	Below MAC
Arsenic	Extractable mg/L	0.0002	0.0001	0.010	Below MAC
Barium	Extractable mg/L	0.0019	0.0001	2.0	Below MAC
Boron	Extractable mg/L	<0.002	0.002	5	Below MAC
Cadmium	Extractable mg/L	<0.00001	0.00001	0.005	Below MAC
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Selenium	Extractable mg/L	<0.0002	0.0002	0.05	Below MAC
Strontium	Extractable mg/L	0.032	0.0001	7.0	Below MAC
Uranium	Extractable mg/L	0.00013	0.00001	0.02	Below MAC
Vanadium	Extractable mg/L	<0.00005	0.00005		
Zinc	Extractable mg/L	0.0009	0.0005	5.0	Below AO
Physical and Aggregate Properties					
Colour	True	Colour units	9	5	
Turbidity		NTU	4.06	0.1	Above OG
Routine Water					
pH - Holding Time		Exceeded			
pH	at 25 °C	7.61	0.01	7.0-10.5	Within Range
Electrical Conductivity		µS/cm at 25 °C	56	1	
Calcium	Extractable mg/L	8.0	0.01		
Iron	Extractable mg/L	0.13	0.004	0.3	Below AO
Magnesium	Extractable mg/L	1.3	0.02		
Manganese	Extractable mg/L	0.016	0.001	0.02 AO; 0.12 MAC	Below AO
Potassium	Extractable mg/L	0.18	0.04		
Silicon	Extractable mg/L	1.1	0.005		
Sodium	Extractable mg/L	0.3	0.1	200	Below AO
T-Alkalinity	as CaCO3	27	5		
Chloride	Dissolved mg/L	<0.05	0.05	250	Below AO
Fluoride	Dissolved mg/L	<0.01	0.01	1.5	Below MAC
Nitrate - N	Dissolved mg/L	<0.01	0.01	10	Below MAC
Nitrite - N	Dissolved mg/L	<0.01	0.01	1	Below MAC
Sulfate (SO4)	Dissolved mg/L	2.0	0.1	500	Below AO
Hardness	as CaCO3 (extractable)	25	1		
Total Dissolved Solids	Extractable mg/L	31	1	500	Below AO

Analytical Report

Bill To:	Wellness Water Testing	Project ID:	4557	Lot ID:	1435402
	210, 1811 Victoria Street	Project Name:	Matthew Slaney	Control Number:	
	Prince George, BC, Canada	Project Location:	McBride Community	Date Received:	Jul 17, 2020
Attn:	Arian Javaherdashti		Water System	Date Reported:	Jul 22, 2020
Sampled By:	Matthew Slaney	LSD:	McBride, BC V05 2E0	Report Number:	2531768
Company:		P.O.:	1435402		
		Proj. Acct. code:			

Approved by:

Max Hewitt
Operations Manager

Data have been validated by Analytical Quality Control and Element's Integrated Data Validation System (IDVS).

Generation and distribution of the report, and approval by the digitized signature above, are performed through a secure and controlled automatic process.

Methodology and Notes

Bill To: Wellness Water Testing 210, 1811 Victoria Street Prince George, BC, Canada	Project ID: 4557 Project Name: Matthew Slaney Project Location: McBride Community Water System	Lot ID: 1435402 Control Number: Date Received: Jul 17, 2020 Date Reported: Jul 22, 2020 Report Number: 2531768
Attn: Arian Javaherdashti Sampled By: Matthew Slaney Company:	LSD: McBride, BC V05 2E0 P.O.: 1435402 Proj. Acct. code:	

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Alk, pH, EC, Turb in water (BC)	APHA	* Alkalinity - Titration Method, 2320 B	Jul 20, 2020	Element Vancouver
Alk, pH, EC, Turb in water (BC)	APHA	* Conductivity, 2510 B	Jul 20, 2020	Element Vancouver
Alk, pH, EC, Turb in water (BC)	APHA	* pH - Electrometric Method, 4500-H+ B	Jul 20, 2020	Element Vancouver
Anions by IEC in water (VAN)	APHA	* Ion Chromatography with Chemical Suppression of Eluent Cond., 4110 B	Jul 21, 2020	Element Vancouver
Metals SemiTrace (Extractable) in water (VAN)	US EPA	* Metals & Trace Elements by ICP-AES, 6010C	Jul 20, 2020	Element Vancouver
Trace Metals (extractable) in Water (VAN)	US EPA	* Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	Jul 20, 2020	Element Vancouver
True Color in water (VAN)	APHA	* Spectrophotometric - Single Wavelength Method, 2120 C	Jul 21, 2020	Element Vancouver
Turbidity - Water (VAN)	APHA	* Turbidity - Nephelometric Method, 2130 B	Jul 18, 2020	Element Vancouver

* Reference Method Modified

References

APHA	Standard Methods for the Examination of Water and Wastewater
US EPA	US Environmental Protection Agency Test Methods

Guidelines

Guideline Description	Health Canada GCDWQ
Guideline Source	Guidelines for Canadian Drinking Water Quality, Health Canada, June 2019
Guideline Comments	MAC = Maximum Acceptable Concentration AO = Aesthetic Objective OG = Operational Guideline for Water Treatment Plants (does not apply to private groundwater wells). Refer to Health Canada for complete guidelines at www.hc-sc.gc.ca

Comments:

- Jul 22, 2020 - Sample 1435402-1; 7133976: Analysis was performed on sample 1435402-1 that exceeded the recommended holding time for nitrate and nitrite analysis.

The comparison of test results to guideline limits is provided for information purposes only. This is not to be taken as a statement of conformance / nonconformance to any guideline, regulation or limit. The data user is responsible for all conclusions drawn with respect to the data and is advised to consult official regulatory references when evaluating compliance.

Please direct any inquiries regarding this report to our Client Services group.

Results relate only to samples as submitted.

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Guidelines for Canadian Drinking Water Quality Summary Table

Prepared by

Health Canada

In collaboration with the

Federal-Provincial-Territorial Committee on Drinking Water

of the

Federal-Provincial-Territorial Committee on Health and the Environment

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Canada 

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Other documents for the Guidelines for Canadian Drinking Water Quality can be found on the following web page:
<https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/water-quality.html>

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Introduction

The Guidelines for Canadian Drinking Water Quality are established by Health Canada in collaboration with the [Federal-Provincial-Territorial Committee on Drinking Water](#) (CDW) and other federal government departments. They are published by Health Canada. This table is a summary of the values and key information from each of the guidelines. It is updated regularly and published on Health Canada's website (<https://www.canada.ca/en/health-canada/services/environmental-workplace-health/water-quality/drinking-water.html>).

Each guideline was established based on current, published scientific research related to health effects, aesthetic effects, and operational considerations. Guidelines (maximum acceptable concentrations or treatment goals) are based on a comprehensive review of the known health effects associated with each contaminant, on exposure levels and on the availability of treatment and analytical technologies. Aesthetic objectives (e.g., for taste or odour) are provided when they play a role in determining whether consumers will consider the water drinkable. Operational guidance values are provided when a substance may interfere with or impair a treatment process or technology (e.g., turbidity interfering with chlorination or UV disinfection) or adversely affect drinking water infrastructure (e.g., corrosion of pipes).

Guidelines for Canadian Drinking Water Quality are established specifically for contaminants that meet all of the following criteria:

1. Exposure to the contaminant could lead to adverse health effects in humans;
2. The contaminant is frequently detected or could be expected to be found in a large number of drinking water supplies throughout Canada; and
3. The contaminant is detected, or could be expected to be detected, in drinking water at a level that is of possible human health significance.

If a contaminant or issue of interest does not meet all these criteria, Health Canada and CDW may choose not to establish a numerical guideline or develop a guideline technical document. In that case, advice may be provided through a guidance document in order to convey operational or management information related to a contaminant or issue of concern.

Guidelines are [systematically reviewed](#) to assess the need to update them. When a guideline is reaffirmed, both the year of the original publication and the year of reaffirmation are shown after the name of the parameter.

Science-based guideline technical documents and guidance documents are published to support the *Guidelines for Canadian Drinking Water Quality*. These are developed following a literature review, internal and external peer-reviews, public consultations, and approval by federal, provincial and territorial partners. For more information on specific guidelines, please refer to the guideline technical document or guidance document for the parameter of concern, available on the Health Canada website (<https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/water-quality.html>)

Acronyms

A	acceptability (parameter type)
ALARA	as low as reasonably achievable
AO	aesthetic objective
CDW	Federal-Provincial-Territorial Committee on Drinking Water
D	disinfectant (parameter type)
DBP	disinfectant by-product (parameter type)
HPC	heterotrophic plate count
I	inorganic chemical (parameter type)
MAC	maximum acceptable concentration
NTU	nephelometric turbidity units
O	organic chemical (parameter type)
OG	operational guidance value
P	pesticide (parameter type)
QMRA	quantitative microbial risk assessment
T	treatment-related (parameter type)
TCU	true colour units

Tables

Table 1. Microbiological Parameters

In general, the highest priority guidelines are those dealing with microbiological contaminants, such as bacteria, protozoa and viruses. Since it is difficult to perform routine analysis of harmful microorganisms that might be present in inadequately treated drinking water, the microbiological guidelines focus on indicator organisms such as *E.coli* and total coliforms, and treatment goals for pathogens. The use of a source-to-tap approach that includes source water protection, adequate treatment, and a well maintained distribution system helps to reduce microorganisms to levels that have not been associated with illness and meet the guidelines outlined below.

Parameter (published, reaffirmed)	Guideline	Common Sources	Health Considerations	Applying the Guideline/Comments
Enteric protozoa: <i>Giardia</i> and <i>Cryptosporidium</i> (2019)	Treatment goal: Minimum 3 log removal and/or inactivation of cysts and oocysts	Human and animal faeces	<i>Giardia</i> and <i>Cryptosporidium</i> are commonly associated with gastrointestinal upset (nausea, vomiting, diarrhoea). Less common health effects vary. <i>Giardia</i> infections may include prolonged gastrointestinal upset, malaise and malabsorption. <i>Cryptosporidium</i> infections, in immunocompromised individuals, can occur outside the gastrointestinal tract.	Monitoring for <i>Cryptosporidium</i> and <i>Giardia</i> in source waters will provide valuable information for a risk-based assessment of treatment requirements. Depending on the source water quality, a greater log removal and/or inactivation may be required.
Enteric viruses (2019)	Treatment goal: Minimum 4 log reduction (removal and/or inactivation) of enteric viruses	Human faeces	Commonly associated with gastrointestinal upset (nausea, vomiting, diarrhoea); less common health effects can include respiratory symptoms, central nervous system infections, liver infections and muscular syndromes.	Enteric viruses have been detected in surface and groundwater sources. Routine monitoring for viruses is not practical, and assessing the vulnerability of source waters to viral contamination is difficult; thus, treatment is a way to reduce risk. Disinfection is a critical barrier.

Parameter (published, reaffirmed)	Guideline	Common Sources	Health Considerations	Applying the Guideline/Comments
<i>Escherichia coli</i> (<i>E. coli</i>) (2020)	MAC: None detectable per 100 mL	Human and animal faeces	<i>E. coli</i> is an indicator of fecal contamination that is used as a tool to verify the quality of the drinking water. Its detection indicates recent fecal contamination and that microorganisms capable of causing gastrointestinal illnesses may also be present. Pathogens in human and animal feces pose the greatest immediate danger to public health.	In water leaving a treatment plant, the presence of <i>E. coli</i> indicates a serious breach in treatment. In a distribution or storage system, detection of <i>E. coli</i> can indicate that the water has become contaminated during distribution. In <u>non-disinfected groundwater</u> , the presence of <i>E. coli</i> indicates that the groundwater has been affected by fecal contamination. <i>E. coli</i> should be monitored in conjunction with other indicators, as part of a source-to-tap approach to producing drinking water of an acceptable quality.
Total coliforms (2020)	MAC of none detectable/100 mL in water leaving a treatment plant and in non-disinfected groundwater leaving the well	Human and animal faeces; naturally occurring in water, soil and vegetation	Total coliforms are not used as indicators of potential health effects from pathogenic microorganisms; they are used as a tool to determine how well the drinking water treatment system is operating and to indicate water quality changes in the distribution system.	Total coliforms should be monitored in the distribution system because they are used to indicate changes in water quality. In <u>water leaving a treatment plant</u> , total coliforms should be measured in conjunction with other indicators to assess water quality; the presence of total coliforms indicates a serious breach in treatment. In <u>a distribution and storage system</u> , detection of total coliforms can indicate regrowth of the bacteria in biofilms or intrusion of untreated water. Detection of total coliforms from consecutive samples from the same site or from more than 10% of the samples collected in a given sampling period should be investigated. In <u>non-disinfected groundwater</u> , the presence of total coliforms may indicate that the system is vulnerable to contamination, or it may be a sign of bacterial regrowth.

Parameter (published, reaffirmed)	Guideline	Common Sources	Health Considerations	Applying the Guideline/Comments
Turbidity (2012)	Treatment limits for individual filters or units: - Conventional and direct filtration: ≤ 0.3 NTU ¹ - slow sand and diatomaceous earth filtration: ≤ 1.0 NTU ² - membrane filtration: ≤ 0.1 NTU ³	Naturally occurring particles: <i>Inorganic</i> : clays, silts, metal precipitates <i>Organic</i> : decomposed plant & animal debris, microorganisms	Particles can harbour microorganisms, protecting them from disinfection, and can entrap heavy metals and biocides; elevated or fluctuating turbidity in filtered water can indicate a problem with the water treatment process and a potential increased risk of pathogens in treated water.	Guidelines apply to individual filter turbidity for systems using surface water or groundwater under the direct influence of surface water. The decision to exempt a waterworks from filtration should be made by the appropriate authority based on site-specific considerations, including historical and ongoing monitoring data. To ensure effectiveness of disinfection and for good operation of the distribution system, it is recommended that water entering the distribution system have turbidity levels of 1.0 NTU or less. For systems that use groundwater, turbidity should generally be below 1.0 NTU. Filtration systems should be designed and operated to reduce turbidity levels as low as reasonably achievable and strive to achieve a treated water turbidity target from individual filters of less than 0.1 NTU.

¹ in at least 95% of measurements either per filter cycle or per month; never to exceed 1.0 NTU.

² in at least 95% of measurements either per filter cycle or per month; never to exceed 3.0 NTU.

³ in at least 99% of measurements per operational filter period or per month. Measurements greater than 0.1 NTU for a period greater than 15 minutes from an individual membrane unit should immediately trigger an investigation of the membrane unit integrity.

Table 2. Chemical and Physical Parameters

Guidelines for chemical and physical parameters are:

1. health based and listed as maximum acceptable concentrations (MAC);
2. based on aesthetic considerations and listed as aesthetic objectives (AO); or
3. established based on operational considerations and listed as operational guidance values (OG).

In general, the highest priority guidelines are those dealing with microbiological contaminants. Any measure taken to reduce concentrations of chemical contaminants should not compromise the effectiveness of disinfection.

Type ¹	Parameter (published, reaffirmed)	MAC (mg/L)	Other value (mg/L)	Common sources of parameter in water	Health considerations	Applying the Guideline/Comments
T	Aluminum (1998)		OG: < 0.1 (conventional treatment); < 0.2 (other treatment types)	Aluminum salts used as coagulants in drinking water treatment; naturally occurring	There is no consistent, convincing evidence that aluminum in drinking water causes adverse health effects in humans.	The operational guideline applies to treatment plants using aluminum-based coagulants; it does not apply to naturally occurring aluminum found in groundwater. For treatment plants using aluminum- based coagulants, monthly samples should be taken of the water leaving the plant; the OGs are based on a running annual average of monthly samples.
I	Ammonia (2013)	None required		Naturally occurring; released from agricultural or industrial wastes; added as part of chloramination for drinking water disinfection	Levels of ammonia, either naturally present in the source water or added as part of a disinfection strategy, can affect water quality in the distribution system (e.g., nitrification) and should be monitored. A guideline value is not necessary as it is produced in the body and efficiently metabolized in healthy people; no adverse effects at levels found in drinking water.	To help prevent nitrification, limit excess free ammonia entering the distribution system to below 0.1 mg/L, and preferably below 0.05 mg/L, measured as nitrogen. Nitrification can lead to the formation of nitrite/nitrate, decreased chloramine residual and increased bacterial count.

Type ¹	Parameter (published, reaffirmed)	MAC (mg/L)	Other value (mg/L)	Common sources of parameter in water	Health considerations	Applying the Guideline/Comments
I	Antimony (1997)	0.006		Naturally occurring (erosion); soil runoff; industrial effluents; leaching from plumbing materials and solder	Health basis of MAC: Microscopic changes in organs and tissues (thymus, kidney, liver, spleen, thyroid)	MAC takes into consideration analytical achievability; plumbing should be thoroughly flushed before water is used for consumption.
I	Arsenic (2006)	0.010 ALARA		Naturally occurring (erosion and weathering of soils, minerals, ores); releases from mining; industrial effluent	Health basis of MAC: Cancer (lung, bladder, liver, skin) (classified as human carcinogen) Other: Skin, vascular and neurological effects (numbness and tingling of extremities)	MAC based on treatment achievability; elevated levels associated with certain groundwaters; levels should be kept as low as reasonably achievable.
I	Asbestos (1989, 2005)	None required		Naturally occurring (erosion of asbestos minerals and ores); decay of asbestos-cement pipes		Guideline value not necessary; no evidence of adverse health effects from exposure through drinking water.
P	Atrazine (1993)	0.005		Leaching and/or runoff from agricultural use	Health basis of MAC: Developmental effects (reduced body weight of offspring) Other: Potential increased risk of ovarian cancer or lymphomas (classified as possible carcinogen)	MAC applies to sum of atrazine and its <i>N</i> - dealkylated metabolites - diethylatrazine, deisopropylatrazine, hydroxyatrazine, diaminochlorotriazine; Persistent in source waters.
P	Azinphos-methyl (1989, 2005)	0.02		Leaching and/or runoff from agricultural use	Health basis of MAC: Neurological effects (plasma cholinesterase)	All uses were phased out by 2012.
I	Barium (2020)	2.0		Naturally occurring; releases or spills from industrial uses	Health basis of MAC: Kidney effects	MAC is for total barium and takes into consideration exposure estimates from all sources.
O	Benzene (2009)	0.005		Releases or spills from industrial uses	Health basis of MAC: Bone marrow (red and white blood cell) changes and cancer (classified as human carcinogen) Other: Blood system and immunological responses	MAC takes into consideration all exposures from drinking water, which include ingestion, as well as inhalation and dermal absorption during showering and bathing.
O	Benzo[<i>a</i>]pyrene (2016)	0.000 04		Leaching from liners in water distribution systems	Health basis of MAC: Stomach tumours (classified as human carcinogen)	

Type ¹	Parameter (published, reaffirmed)	MAC (mg/L)	Other value (mg/L)	Common sources of parameter in water	Health considerations	Applying the Guideline/Comments
I	Boron (1990)	5		Naturally occurring; leaching or runoff from industrial use	Health basis of MAC: Reproductive effects (testicular atrophy, spermatogenesis) Other: Limited evidence of reduced sexual function in men	MAC based on treatment achievability.
DBP	Bromate ³ (2018)	0.01		Contaminant in hypochlorite solution; by- product of drinking water disinfection with ozone	Health basis of MAC: Tumours of the testicular mesothelium (classified as a possible human carcinogen)	Efforts to reduce bromate concentrations must not compromise the effectiveness of disinfection. Bromate is difficult to remove from drinking water once formed. The recommended strategy is controlling the ozonation process; use of certified treatment chemicals and; appropriate handling and storage of hypochlorite. Quarterly monitoring of raw water bromide is recommended to allow correlation to bromate or brominated DBPs.
P	Bromoxynil (1987, 2005)	0.005		Leaching or runoff from agricultural use	Health basis of MAC: Reduced liver to body weight ratios	
I	Cadmium (2020)	0.007		Leaching from galvanized pipes and solders ; industrial and municipal waste	Health basis of MAC: Kidney damage. Other: Bone effects (decreased bone density)	MAC is for total cadmium and takes into consideration exposure estimates from all sources. Sampling should be done at the tap to reflect average exposure similar to sampling done for lead. The contribution of cadmium in drinking water is generally from the galvanized steel used in pipes and well components. The best approach to minimize exposure to cadmium from drinking water is to replace galvanized steel and components. Drinking water treatment devices are also an effective option.
I	Calcium (1987, 2005)	None required		Naturally occurring (erosion and weathering of soils, minerals, ores)	No evidence of adverse health effects from calcium in drinking water.	Guideline value not necessary; calcium contributes to hardness.

Type ¹	Parameter (published, reaffirmed)	MAC (mg/L)	Other value (mg/L)	Common sources of parameter in water	Health considerations	Applying the Guideline/Comments
P	Carbaryl (1991, 2005)	0.09		Leaching or runoff from agricultural use	Health basis of MAC: Decreased kidney function (may be rapidly reversible after exposure ceases)	MAC takes into consideration exposure estimates from all sources.
P	Carbofuran (1991, 2005)	0.09		Leaching or runoff from agricultural use	Health basis of MAC: Nervous system effects (cholinesterase inhibition) and growth suppression	MAC takes into consideration exposure estimates from all sources.
O	Carbon tetrachloride (2010)	0.002		Industrial effluents and leaching from hazardous waste sites	Health basis of MAC: Liver toxicity Other: Kidney damage; liver tumours (classified as probable carcinogen)	MAC takes into consideration all exposures from drinking water, which include ingestion, as well as inhalation and dermal absorption during showering and bathing.
D	Chloramines (2020)	None required		Monochloramine is used as a secondary disinfectant; formed in drinking water when chlorine is added in the presence of ammonia	Guideline value not necessary due to low toxicity at concentrations found in drinking water	Chloramine residuals in most Canadian drinking water distribution systems are typically below 4 mg/L.
DBP	Chlorate (2008)	1		By-product of drinking water disinfection with chlorine dioxide; possible contaminant in hypochlorite solution	Health basis of MAC: Thyroid gland effects (colloid depletion)	As chlorate is difficult to remove once formed, its formation should be controlled by respecting the maximum feed dose of 1.2 mg/L of chlorine dioxide and managing /monitoring formation in hypochlorite solutions.
I	Chloride (1979, 2005)		AO: ≤ 250	Naturally occurring (seawater intrusion); dissolved salt deposits, highway salt, industrial effluents, oil well operations, sewage, irrigation drainage, refuse leachates	A guideline value is not necessary as health effects are not of concern at levels found in drinking water.	Based on taste and potential for corrosion in the distribution system.
D	Chlorine (2009)	None required		Used as drinking water disinfectant	A guideline value is not necessary due to low toxicity at concentrations found in drinking water	Free chlorine concentrations in most Canadian drinking water distribution systems range from 0.04 to 2.0 mg/L.
D	Chlorine dioxide (2008)	None required		Used as drinking water disinfectant (primary disinfection only)	A guideline value for chlorine dioxide is not required because of its rapid reduction to chlorite in drinking water	A maximum feed dose of 1.2 mg/L of chlorine dioxide should not be exceeded to control the formation of chlorite and chlorate.

Type ¹	Parameter (published, reaffirmed)	MAC (mg/L)	Other value (mg/L)	Common sources of parameter in water	Health considerations	Applying the Guideline/Comments
DBP	Chlorite (2008)	1		By-product of drinking water disinfection with chlorine dioxide	Health basis of MAC: Neurobehavioural effects (lowered auditory startle amplitude, decreased exploratory activity), decreased absolute brain weight, altered liver weights	Chlorite formation should be controlled by respecting the maximum feed dose of 1.2 mg/L of chlorine dioxide and managing /monitoring formation in hypochlorite solutions.
P	Chlorpyrifos (1986)	0.09		Leaching and/or runoff from agricultural or other uses	Health basis of MAC: Nervous system effects (cholinesterase inhibition)	Not expected to leach significantly into groundwater.
I	Chromium (2018)	0.05		Naturally occurring (erosion of minerals); releases or spills from industrial uses	Health basis of MAC: Hyperplasia of the small intestine from chromium (VI). Other: No definitive evidence of toxicity to Chromium (III).	MAC protects against both cancer and non-cancer effects from Chromium (VI) and is established for total chromium.
T	Colour (1979, 2005)		AO: ≤ 15 TCU	Naturally occurring organic substances, metals; industrial wastes	A guideline value is not necessary as health effects are not of concern at levels found in drinking water.	May interfere with disinfection; removal is important to ensure effective treatment.
I	Copper (2019)	2	AO: 1	Naturally occurring; leaching from copper piping	Health basis of MAC: Gastrointestinal effects (short-term), liver and kidney effects (long-term).	Water samples should be taken at the tap. MAC is for total copper and protects against both short term and long term exposures. AO is based on taste and water discolouration (resulting in staining of laundry and plumbing fixtures).
I	Cyanide (1991)	0.2		Industrial and mining effluents; release from organic compounds	Health basis of MAC: No clinical or other changes at the highest dose tested	At the levels seen in Canadian waters, cyanide is not a concern as it can be detoxified to a certain extent in the human body.

Type ¹	Parameter (published, reaffirmed)	MAC (mg/L)	Other value (mg/L)	Common sources of parameter in water	Health considerations	Applying the Guideline/Comments
O	Cyanobacterial toxins (2018)	0.0015		Naturally occurring - released from populations of cyanobacteria (planktonic blooms and benthic mats)	Health basis of MAC: Liver effects	MAC is for total microcystins (intra- and extra-cellular) Note that infants can ingest a significantly larger volume of water per body weight. As a precautionary measure, where levels of total microcystins in treated water are detected above a reference value of 0.4 µg/L, the public in the affected area should use an alternate suitable source of drinking water (such as bottled water) to reconstitute infant formula.
P	Diazinon (1986, 2005)	0.02		Runoff from agricultural or other uses	Health basis of MAC: Nervous system effects (cholinesterase inhibition)	Not expected to leach significantly into groundwater.
P	Dicamba (1987, 2005)	0.12		Leaching or runoff from agricultural or other uses	Health basis of MAC: Liver effects (vacuolization, necrosis, fatty deposits and liver weight changes)	Readily leaches into groundwater.
O	1,2- Dichlorobenzene ² (1987)	0.2	AO: ≤ 0.003	Releases or spills from industrial effluents	Health basis of MAC: Increased blood cholesterol, protein and glucose levels	AO based on odour; levels above the AO would render drinking water unpalatable.
O	1,4- Dichlorobenzene ² (1987)	0.005	AO: ≤ 0.001	Releases or spills from industrial effluents; use of urinal deodorants	Health basis of MAC: Benign liver tumours and adrenal gland tumours (classified as probable carcinogen)	AO based on odour; levels above the AO would render drinking water unpalatable.
O	1,2-Dichloroethane (2014)	0.005		Releases or spills from industrial effluents; leachate from waste disposal	Health basis of MAC: Cancer of the mammary gland (classified as probable carcinogen)	The MAC protects against both cancer and non-cancer effects and takes into consideration all exposures from drinking water, which include ingestion as well as inhalation and dermal absorption during showering and bathing.
O	1,1- Dichloroethylene (1994)	0.014		Releases or spills from industrial effluents	Health basis of MAC: Liver effects (fatty changes)	

Type ¹	Parameter (published, reaffirmed)	MAC (mg/L)	Other value (mg/L)	Common sources of parameter in water	Health considerations	Applying the Guideline/Comments
O	Dichloromethane (2011)	0.05		Industrial and municipal wastewater discharges	Health basis of MAC: Liver effects (liver foci and areas of cellular alteration). Other: Classified as probable carcinogen	The MAC protects against both cancer and non-cancer effects and takes into consideration all exposures from drinking water, which include ingestion as well as inhalation and dermal absorption during showering and bathing.
O	2,4-Dichlorophenol (1987, 2005)	0.9	AO: ≤ 0.0003	By-product of drinking water disinfection with chlorine; releases from industrial effluents	Health basis of MAC: Liver effects (cellular changes)	AO based on odour; levels above the AO would render drinking water unpalatable.
P	2,4- Dichlorophenoxy acetic acid (2,4-D) (1991)	0.1		Leaching and/or runoff from use as a weed controller; releases from industrial effluents	Health basis of MAC: Kidney effects (tubular cell pigmentation)	MAC takes into consideration exposure estimates from all sources.
P	Diclofop-methyl (1987, 2005)	0.009		Leaching and/or runoff from use as a weed controller; added directly to water to control aquatic weeds	Health basis of MAC: Liver effects (enlargement and enzyme changes)	Low potential for groundwater contamination.
P	Dimethoate (1986, 2005)	0.02		Leaching and/or runoff from residential, agricultural and forestry use	Health basis of MAC: Nervous system effects (cholinesterase inhibition)	MAC takes into consideration exposure estimates from all sources.
P	Diquat (1986, 2005)	0.07		Leaching and/or runoff from agricultural use; added directly to water to control aquatic weeds	Health basis of MAC: Cataract formation	Unlikely to leach into groundwater.
P	Diuron (1987, 2005)	0.15		Leaching and/or runoff from use in controlling vegetation	Health basis of MAC: Weight loss, increased liver weight and blood effects	High potential to leach into groundwater.

Type ¹	Parameter (published, reaffirmed)	MAC (mg/L)	Other value (mg/L)	Common sources of parameter in water	Health considerations	Applying the Guideline/Comments
O	Ethylbenzene (2014)	0.14	AO: 0.0016	Emissions, effluents or spills from petroleum and chemical industries	Health basis of MAC: Effects on the liver and pituitary gland. Other: Tumour formation at various sites in animals, including kidney, lung, liver and testes.	MAC protects against both cancer and non-cancer health effects. MAC takes into consideration all exposures from drinking water, which include ingestion, as well as inhalation and dermal absorption during showering and bathing. AO is based on odour.
I	Fluoride (2010)	1.5		Naturally occurring (rock and soil erosion); may be added to promote dental health	Basis of MAC: Moderate dental fluorosis (based on cosmetic effect, not health)	Beneficial in preventing dental caries.
DBP	Formaldehyde (1997)	None required		By-product of disinfection with ozone; releases from industrial effluents	A guideline value is not necessary as health effects are not of concern at levels found in drinking water.	A guideline value is not necessary, as levels in drinking water are below the level at which adverse health effects may occur.
P	Glyphosate (1987, 2005)	0.28		Leaching and/or runoff from various uses in weed control	Health basis of MAC: Reduced body weight gain	Not expected to migrate to groundwater.
DBP	Haloacetic acids – Total (HAAs) ³ (2008)	0.08 ALARA		By-product of drinking water disinfection with chlorine	Health basis of MAC: Liver cancer (DCA); DCA is classified as probably carcinogenic to humans Other: Other organ cancers (DCA, DBA, TCA); liver and other organ effects (kidney and testes weights) (MCA)	Refers to the total of monochloroacetic acid (MCA), dichloroacetic acid (DCA), trichloroacetic acid (TCA), monobromoacetic acid (MBA) and dibromoacetic acid (DBA); MAC is based on ability to achieve HAA levels in distribution systems without compromising disinfection; precursor removal limits formation.
T	Hardness (1979)	None required		Naturally occurring (sedimentary rock erosion and seepage, runoff from soils); levels generally higher in groundwater	Although hardness may have significant aesthetic effects, a guideline has not been established because public acceptance of hardness may vary considerably according to the local conditions; major contributors to hardness (calcium and magnesium) are not of direct public health concern	Hardness levels between 80 and 100 mg/L (as CaCO ₃) provide acceptable balance between corrosion and incrustation; where a water softener is used, a separate unsoftened supply for cooking and drinking purposes is recommended.

Type ¹	Parameter (published, reaffirmed)	MAC (mg/L)	Other value (mg/L)	Common sources of parameter in water	Health considerations	Applying the Guideline/Comments
I	Iron (1978, 2005)		AO: ≤ 0.3	Naturally occurring (erosion and weathering of rocks and minerals); acidic mine water drainage, landfill leachates, sewage effluents and iron-related industries	No evidence exists of dietary iron toxicity in the general population.	Based on taste and staining of laundry and plumbing fixtures.
I	Lead (2019)	0.005 ALARA		Leaching from plumbing (lead service lines, lead solder and brass fittings)	Health basis of MAC: Reduced intelligence in children measured as decreases in IQ is the most sensitive and well established health effect of lead exposure. There is no known safe exposure level to lead. Other: Possible effects include behavioral effects in children. Reduced cognition, increased blood pressure, and renal dysfunction in adults are also possible; classified as probably carcinogenic to humans	MAC is for total lead. Lead levels should be kept as low as reasonably achievable. Sampling should be done at the tap to reflect average exposure. The most significant contribution of lead in drinking water is generally from the lead service line that supplies drinking water to the home. The best approach to minimize exposure to lead from drinking water is to remove the full lead service line. Drinking water treatment devices are also an effective option.
I	Magnesium (1978)	None required		Naturally occurring (erosion and weathering of rocks and minerals)	No evidence of adverse health effects from magnesium in drinking water, therefore a guideline value is not necessary.	No additional comments.
P	Malathion (1986, 2005)	0.19		Leaching and/or runoff from agricultural and other uses	Health basis of MAC: Nervous system effects (cholinesterase inhibition)	Not expected to leach into groundwater.
I	Manganese (2019)	0.12	AO: ≤ 0.02	Dissolution of naturally occurring minerals commonly found in soil and rock. Other sources include industrial discharge, mining activities and leaching from landfills.	Health Basis of MAC: Effects on neurological development and behaviour; deficits in memory, attention, and motor skills. Other: Formula-fed infants (where water containing manganese at levels above the MAC is used to prepare formula) may be especially at risk.	AO based on minimizing the occurrence of discoloured water, consumer complaints and staining of laundry.

Type ¹	Parameter (published, reaffirmed)	MAC (mg/L)	Other value (mg/L)	Common sources of parameter in water	Health considerations	Applying the Guideline/Comments
I	Mercury (1986)	0.001		Releases or spills from industrial effluents; waste disposal; irrigation or drainage of areas where agricultural pesticides are used	Health basis of MAC: Irreversible neurological symptoms	Applies to all forms of mercury; mercury generally not found in drinking water, as it binds to sediments and soil.
P	2-Methyl-4-chlorophenoxyacetic acid (MCPA) (2010)	0.1		Leaching and/or runoff from agricultural and other uses	Health basis of MAC: Kidney effects (increased absolute and relative weights, urinary bilirubin, crystals and pH) Other: Systemic, liver, testicular, reproductive/developmental and nervous system effects	Can potentially leach into groundwater.
O	Methyl tertiary-butyl ether (MTBE) (2006)		AO: ≤ 0.015	Spills from gasoline refineries, filling stations and gasoline-powered boats; seepage into groundwater from leaking storage tanks	The AO is lower than levels associated with potential toxicological effects, it is considered protective of human health. Studies on toxic effects remain inconclusive.	AO based on odour; levels above the AO would render water unpalatable.
P	Metolachlor (1986)	0.05		Leaching and/or runoff from agricultural or other uses	Health basis of MAC: Liver lesions and nasal cavity tumours	Readily binds to organic matter in soil; little leaching expected in soils with high organic and clay content
P	Metribuzin (1986, 2005)	0.08		Leaching and/or runoff from agricultural use	Health basis of MAC: Liver effects (increased incidence and severity of mucopolysaccharide droplets)	Leaching into groundwater depends on the organic matter content of the soil.
O	Monochlorobenzene (1987)	0.08	AO: ≤ 0.03	Releases or spills from industrial effluents	Health basis of MAC: Reduced survival and body weight gain	AO based on odour.
I	Nitrate (2013)	45 as nitrate; 10 as nitrate-nitrogen		Naturally occurring; leaching or runoff from agricultural fertilizer use, manure and domestic sewage; may be produced from excess ammonia or nitrification in the distribution system	Health basis of MAC: Methaemoglobinaemia (blue baby syndrome) and effects on thyroid gland function in bottle-fed infants Other: Classified as possible carcinogen under conditions that result in endogenous nitrosation	Systems using chloramine disinfection or that have naturally occurring ammonia should monitor the level of nitrate in the distribution system. Homeowners with a well should test concentration of nitrate in their water supply.

Type ¹	Parameter (published, reaffirmed)	MAC (mg/L)	Other value (mg/L)	Common sources of parameter in water	Health considerations	Applying the Guideline/Comments
I	Nitritotriacetic acid (NTA) (1990)	0.4		Sewage contamination	Health basis of MAC: Kidney effects (nephritis and nephrosis) Other: Classified as possible carcinogen	MAC is based upon exposure mainly attributable (80%) to drinking water with 20% of exposure attributable to food.
I	Nitrite (2013)	3 as nitrite; 1 as nitrite- nitrogen		Naturally occurring; leaching or runoff from agricultural fertilizer use, manure and domestic sewage; may be produced from excess ammonia or nitrification in the distribution system	Health basis of MAC: Methaemoglobinaemia (blue baby syndrome) in bottle-fed infants less than 6 months of age Other: Classified as possible carcinogen under conditions that result in endogenous nitrosation	Systems using chloramine disinfection or that have naturally occurring ammonia should monitor the level of nitrite in the distribution system. Homeowners with a well should test concentration of nitrite in their water supply.
DBP	<i>N</i> -Nitroso dimethylamine (NDMA) (2010)	0.000 04		By-product of drinking water disinfection with chlorine or chloramines; industrial and sewage treatment plant effluents	Health basis of MAC: Liver cancer (classified as probable carcinogen)	MAC takes into consideration all exposures from drinking water, which include ingestion, as well as inhalation and dermal absorption during showering and bathing.; levels should be kept low by preventing formation during treatment.
A	Odour (1979, 2005)		Inoffensive	Biological or industrial sources	Not applicable	Important to provide drinking water with no offensive odour, as consumers may seek alternative sources that are less safe.
P	Paraquat (1986, 2005)	0.01 as paraquat dichloride; 0.007 as paraquat ion		Leaching and/or runoff from agricultural and other uses; added directly to water to control aquatic weeds	Health basis of MAC: Various effects on body weight, spleen, testes, liver, lungs, kidney, thyroid, heart and adrenal gland	Entry into drinking water unlikely from crop applications (clay binding); however, may persist in water for several days if directly applied to water.
O	Pentachlorophenol (1987, 2005)	0.06	AO: ≤ 0.03	By-product of drinking water disinfection with chlorine; industrial effluents	Health basis of MAC: Reduced body weight, changes in clinical parameters, histological changes in kidney and liver, reproductive effects (decreased neonatal survival and growth)	AO based on odour; levels above the AO would render drinking water unpalatable.

Type ¹	Parameter (published, reaffirmed)	MAC (mg/L)	Other value (mg/L)	Common sources of parameter in water	Health considerations	Applying the Guideline/Comments
O	Perfluorooctane Sulfonate (PFOS) (2018)	0.0006		Synthetic chemical used in consumer products and fire-fighting foams for their water and oil repellant properties.	Health basis of MAC: Adverse effects in the liver. Additional effects at low doses include thyroid and immune effects and changes in serum lipid levels.	Additive effects with PFOA were considered. The sum of PFOS and PFOA concentrations in drinking water divided by their respective MAC should not exceed 1.
O	Perfluorooctanoic Acid (PFOA) (2018)	0.0002		Synthetic chemical used in consumer products and fire-fighting foams for their water and oil repellant properties.	Health basis of MAC: Adverse effects in the liver. Additional effects at low doses include delay in mammary, estrogenic and developmental effects.	Additive effects with PFOS were considered. The sum of PFOA and PFOS concentrations in drinking water divided by their respective MAC should not exceed 1.
T	pH (2015)		7.0–10.5 ⁴	Not applicable	Not applicable	The control of pH is important to maximize treatment effectiveness, control corrosion and reduce leaching from distribution system and plumbing components.
P	Phorate (1986, 2005)	0.002		Leaching and/or runoff from agricultural and other uses	Health basis of MAC: Nervous system effects (cholinesterase inhibition)	Some potential to leach into groundwater.
P	Picloram (1988, 2005)	0.19		Leaching and/or runoff from agricultural and other uses	Health basis of MAC: Changes in body and liver weights and clinical chemistry parameters Other: Kidney effects (liver to body weight ratios and histopathology)	Significant potential to leach into groundwater.
I	Selenium (2014)	0.05		Naturally occurring (erosion and weathering of rocks and soils) and release from coal ash from coal-fired power plants and mining, refining of copper and other metals.	Health basis of MAC: chronic selenosis symptoms in humans following exposure to high levels Other: Hair loss, tooth decay, weakened nails and nervous system disturbances at extremely high levels of exposure	Selenium is an essential nutrient. Most exposure is from food; little information on toxicity of selenium from drinking water. Selenium can be found in non-leaded brass alloy where it is added to replace lead.
I	Silver (1986, 2005)	None required		Naturally occurring (erosion and weathering of rocks and soils)	Not applicable	Guideline value not required as drinking water contributes negligibly to an individual's daily intake.
P	Simazine (1986)	0.01		Leaching and/or runoff from agricultural and other uses	Health basis of MAC: Body weight changes and effects on serum and thyroid gland	Extent of leaching decreases with increasing organic matter and clay content.

Type ¹	Parameter (published, reaffirmed)	MAC (mg/L)	Other value (mg/L)	Common sources of parameter in water	Health considerations	Applying the Guideline/Comments
I	Sodium (1979)		AO: ≤ 200	Naturally occurring (erosion and weathering of salt deposits and contact with igneous rock, seawater intrusion); sewage and industrial effluents; sodium-based water softeners	For persons on strict sodium-reduced diets applying to all sources, levels in drinking water should be below 20 mg/L	Based on taste; where a sodium-based water softener is used, a separate unsoftened supply for cooking and drinking purposes is recommended.
I	Strontium (2019)	7.0		Naturally occurring (erosion and weathering of rocks); effluents from mining or other industries	Health basis of MAC: Bone effects (adverse effects on bone formation in infants as well as rickets, osteomalacia)	MAC is protective of the most sensitive sub-population, infants.
I	Sulphate (1994)		AO: ≤ 500	Industrial wastes	High levels (above 500 mg/L) can cause physiological effects such as diarrhoea or dehydration	Based on taste; it is recommended that health authorities be notified of drinking water sources containing sulphate concentrations above 500 mg/L.
I	Sulphide (1992)		AO: ≤ 0.05	Can occur in the distribution system from the reduction of sulphates by sulphate-reducing bacteria; industrial wastes	Not applicable	Based on taste and odour; levels above the AO would render water unpalatable.
A	Taste (1979, 2005)		Inoffensive	Biological or industrial sources	Not applicable	Important to provide drinking water with no offensive taste, as consumers may seek alternative sources that are less safe.
T	Temperature (1979, 2005)		AO: $\leq 15^{\circ}\text{C}$	Not applicable	Not applicable	Temperature indirectly affects health and aesthetics through impacts on disinfection, corrosion control and formation of biofilms in the distribution system.
P	Terbufos (1987, 2005)	0.001		Leaching and/or runoff from agricultural and other uses	Health basis of MAC: Nervous system effects (cholinesterase inhibition)	Based on analytical achievability.

Type ¹	Parameter (published, reaffirmed)	MAC (mg/L)	Other value (mg/L)	Common sources of parameter in water	Health considerations	Applying the Guideline/Comments
O	Tetrachloroethylene (2015)	0.01		Spill or other point source of contamination	Health basis of MAC: Neurological effects (colour confusion) in humans Other: Classified as probably carcinogenic to humans, based on sufficient evidence in experimental animals and limited evidence in humans	Primarily a concern in groundwater, as it volatilizes easily from surface water; MAC takes into consideration all exposures from drinking water, which include ingestion, as well as inhalation and dermal absorption during showering and bathing.
O	2,3,4,6- Tetrachlorophenol (1986, 2005)	0.1	AO: ≤ 0.001	By-product of drinking water disinfection with chlorine; industrial effluents and use of pesticides	Health basis of MAC: Developmental effects (embryotoxicity)	AO based on odour; levels above the AO would render drinking water unpalatable.
O	Toluene (2014)	0.06	AO: 0.024	Emissions, effluents or spills from petroleum and chemical industries	Health basis of MAC: Adverse neurological effects, including vibration thresholds, colour discrimination, auditory thresholds, attention, memory and psychomotor functions Other: Insufficient information to determine whether toluene is carcinogenic to humans.	MAC takes into consideration all exposures from drinking water, which include ingestion, as well as inhalation and dermal absorption during showering and bathing. AO is based on odour.
A	Total dissolved solids (TDS) (1991)		AO: ≤ 500	Naturally occurring; sewage, urban and agricultural runoff, industrial wastewater	Not applicable	Based on taste; TDS above 500 mg/L results in excessive scaling in water pipes, water heaters, boilers and appliances; TDS is composed of calcium, magnesium, sodium, potassium, carbonate, bicarbonate, chloride, sulphate and nitrate.
O	Trichloroethylene (2005)	0.005		Industrial effluents and spills from improper disposal	Health basis of MAC: Developmental effects (heart malformations) Other: Classified as probable carcinogen	MAC takes into consideration all exposures from drinking water, which include ingestion, as well as inhalation and dermal absorption during showering and bathing.
O	2,4,6- Trichlorophenol (1987, 2005)	0.005	AO: ≤ 0.002	By-product of drinking water disinfection with chlorine; industrial effluents and spills	Health basis of MAC: Liver cancer (classified as probable carcinogen)	AO based on odour; levels above the AO would render drinking water unpalatable.

Type ¹	Parameter (published, reaffirmed)	MAC (mg/L)	Other value (mg/L)	Common sources of parameter in water	Health considerations	Applying the Guideline/Comments
P	Trifluralin (1989, 2005)	0.045		Runoff from agricultural uses	Health basis of MAC: Changes in liver and spleen weights and in serum chemistry	Unlikely to leach into groundwater.
DBP	Trihalomethanes ³ (THMs) (2006)	0.1		By-product of drinking water disinfection with chlorine; industrial effluents	Health basis of MAC: Liver effects (fatty cysts) (chloroform classified as possible carcinogen) Other: Kidney and colorectal cancers	Refers to the total of chlorodibromomethane, chloroform, bromodichloromethane and bromoform; MAC based on health effects of chloroform. MAC takes into consideration all exposures from drinking water, which include ingestion, as well as inhalation and dermal absorption during showering and bathing. Utilities should make every effort to maintain concentrations as low as reasonably achievable without compromising the effectiveness of disinfection. Recommended strategy is precursor removal. The separate MAC for BDCM was rescinded in April 2009.
I	Uranium (2019)	0.02		Naturally occurring (erosion and weathering of rocks and soils); mill tailings; emissions from nuclear industry and combustion of coal and other fuels; phosphate fertilizers	Health basis of MAC: Kidney effects	Based on challenges and operational cost impacts for some private wells and small systems; MAC is for total uranium and is protective in relation to both chemical and radiological hazards.
O	Vinyl chloride (2013)	0.002 ALARA		Industrial effluents; degradation product from organic solvents in groundwater; leaching from polyvinyl chloride pipes	Health basis of MAC: Liver cancer (classified as human carcinogen) Other: Raynaud's disease, effects on bone, circulatory system, thyroid, spleen, central nervous system	Based on analytical achievability. MAC takes into consideration all exposures from drinking water, which include ingestion, as well as inhalation and dermal absorption during showering and bathing. Leaching from polyvinyl chloride pipe is not expected to be significant.

Type ¹	Parameter (published, reaffirmed)	MAC (mg/L)	Other value (mg/L)	Common sources of parameter in water	Health considerations	Applying the Guideline/Comments
O	Xylenes (total) (2014)	0.09	AO: 0.02	Emissions, effluents or spills from petroleum and chemical industries	Health basis of MAC: Adverse neuromuscular effects Other: Insufficient information to determine whether xylenes are carcinogenic to humans	MAC takes into consideration all exposures from drinking water, which include ingestion, as well as inhalation and dermal absorption during showering and bathing. AO is based on odour.
I	Zinc (1979, 2005)		AO: ≤ 5.0	Naturally occurring; industrial and domestic emissions; leaching may occur from galvanized pipes, hot water tanks and brass fittings	Zinc is an essential element and is generally considered to be non-toxic, however levels above the AO in water would render it unpalatable.	AO based on taste; water with zinc levels above the AO tends to be opalescent and develops a greasy film when boiled; plumbing should be thoroughly flushed before water is consumed.

¹ Parameter types: **A** – Acceptability; **D** – Disinfectant; **DBP** – Disinfection by-product; **P** – Pesticide; **I** – Inorganic chemical; **O** – Organic chemical; **T** – Treatment related parameter.

In cases where total dichlorobenzenes are measured and concentrations exceed the most stringent value (0.005 mg/L), the concentrations of the individual isomers should be established.

³ Expressed as a locational running annual average of quarterly samples.

⁴ No units.

Table 3. Radiological Parameters

Guidelines for radiological parameters focus on routine operational conditions of existing and new water supplies and do not apply in the event of contamination during an emergency involving a large release of radionuclides into the environment. MACs have been established for the most commonly detected natural and artificial radionuclides in Canadian drinking water sources, using internationally accepted equations and principles and based solely on health considerations.

The MACs are based on exposure solely to a specific radionuclide. The radiological effects of two or more radionuclides in the same drinking water source are considered to be additive. Thus, the sum of the ratios of the observed concentration to the MAC for each contributing radionuclide should not exceed 1.

Water samples may be initially analysed for the presence of radioactivity using gross alpha and gross beta screening rather than measurements of individual radionuclides. If screening levels are exceeded (0.5 Bq/L for gross alpha and 1.0 Bq/L for gross beta), then concentrations of specific radionuclides should be analysed. A guideline for radon in drinking water is not deemed necessary and has not been established. Information on radon is presented because of its significance for indoor air quality in certain situations.

Parameter (published, reaffirmed)	MAC (Bq/L)	Common sources	Health basis of MAC	Comments
Cesium-137 (2009)	10	Nuclear weapons fallout and emissions from nuclear reactors	Cancer of the lung, breast, thyroid, bone, digestive organs and skin; leukaemia	Fixation by sediments in aquatic environments reduces its concentration in water bodies. Ingested ¹³⁷ Cs is readily absorbed into soft tissues, but is eliminated relatively quickly.
Iodine-131 (2009)	6	Sewage effluent	Cancer of the lung, breast, thyroid, bone, digestive organs and skin; leukaemia	No additional comments
Lead-210 (2009)	0.2	Naturally occurring (decay product of radon)	Cancer of the lung, breast, thyroid, bone, digestive organs and skin; leukaemia	Corresponds to total lead concentration of 7×10^{-8} µg/L
Radium-226 (2009)	0.5	Naturally occurring	Cancer of the lung, breast, thyroid, bone, digestive organs and skin; leukaemia	No additional comments
Radon (2009)	None required	Naturally occurring (leaching from radium-bearing rocks and soils; decay product of radium-226)	Health risk from ingestion considered negligible due to high volatility	Mainly a groundwater concern; if concentrations in drinking water exceed 2000 Bq/L actions should be taken to reduce release into indoor air (e.g. proper venting of drinking water supply)

Parameter (published, reaffirmed)	MAC (Bq/L)	Common sources	Health basis of MAC	Comments
Strontium-90 (2009)	5	Nuclear weapons fallout	Cancer of the lung, breast, thyroid, bone, digestive organs and skin; leukaemia	Has a long residence time in bone and its beta particles have high energy. Radioactive strontium (90Sr) should not be confused with stable strontium. The two species of strontium have quite different origins, and their concentrations in drinking water are not correlated.
Tritium (2009)	7000	Naturally occurring (cosmogenic radiation); releases from nuclear reactors	Cancer of the lung, breast, thyroid, bone, digestive organs and skin; leukaemia	Not removed by drinking water treatment
Uranium 1999	N/A		MAC based on chemical properties	See information provided in Table 2

Table 4. Guidance Documents

In certain situations, Health Canada, in collaboration with the Federal-Provincial-Territorial Committee on Drinking Water, may choose to develop guidance documents for issues that do not meet the criteria for guideline development and for specific issues for which operational or management guidance is warranted. These documents are offered as information for drinking water authorities and help provide guidance relating to contaminants, drinking water management issues or emergency situations.

Parameter/subject (published)	Comments
Chloral hydrate in drinking water (2008)	Exposure levels in Canada far below concentration that would cause health effects; levels above 0.2 mg/L may indicate a concern for health effects and should be investigated.
Controlling corrosion in drinking water distribution systems (2009)	Addresses strategies to deal with leaching of lead from materials in the distribution system; sampling protocols can be used to assess corrosion and the effectiveness of remediation/control measures to reduce lead levels in drinking water; corrective measures are outlined to address lead sources.
Heterotrophic plate count (HPC) (2012)	A useful operational tool for monitoring general bacteriological water quality through the treatment process and in the distribution system. HPC results are not an indicator of water safety and should not be used as an indicator of potential adverse human health effects.
Issuing and rescinding boil water advisories in Canadian drinking water supplies (2015)	Summarizes factors for consideration when responsible authorities issue or rescind boil water advisories. Provides trend information on reasons boil water advisories are issued in Canada.

Parameter/subject (published)	Comments
Issuing and rescinding drinking water avoidance advisories in emergency situations (2009)	Summarizes factors for consideration when responsible authorities issue or rescind drinking water avoidance advisories in emergency situations.
Natural organic matter in drinking water (NOM) (2020)	The presence and characteristics of natural organic matter (NOM) can have significant impacts on drinking water treatment processes, and consequently the safety of drinking water. Seasonal and weather-related events can significantly affect the concentration and character of NOM. This guidance document reviews and assesses: 1) the impacts of NOM and the associated indirect health risks; 2) source-specific treatability study requirements to ensure the most appropriate process is selected to meet treated water quality goals; 3) treatment options and their effectiveness; 4) tools available to monitor raw, treated and distribution system water quality.
Potassium from water softeners (2008)	Not a concern for general population; those with kidney disease or other conditions, such as heart disease, coronary artery disease, hypertension or diabetes, and those who are taking medications that interfere with normal body potassium handling should avoid the consumption of water treated by water softeners using potassium chloride.
Use of Enterococci as an indicator in Canadian drinking water supplies (2020)	Enterococci are a bacteriological indicator of fecal contamination. This indicator can supplement E. coli and total coliforms monitoring programs to provide additional information into fecal contamination issues. The document provides information on how enterococci can be used in a drinking water monitoring program.
Use of the microbiological drinking water guidelines (2013)	Provides an overview of the microbiological considerations to ensure drinking water quality, integrating key content of the relevant guideline technical documents and guidance documents to illustrate how they fit into the source-to-tap approach.
Use of Quantitative Microbial Risk Assessment (QMRA) in Drinking Water (2019)	Provides guidance on the use of QMRA to assist in understanding microbiological risks in Canadian water systems.
Waterborne bacterial pathogens (2013)	Originate from human or animal faeces or may be naturally occurring in the environment. Commonly associated with gastrointestinal upset (nausea, vomiting, diarrhoea); some pathogens may infect wounds, lungs, skin, eyes, central nervous system or liver. Document provides information on these pathogens and treatment options, and recommends using the source-to-tap approach to reduce their levels.

Table 5. Withdrawn Guidelines

Health Canada, in collaboration with the Federal-Provincial-Territorial Committee on Drinking Water, has established a science-based process to systematically review older guidelines and withdraw those that are no longer required. Guidelines are withdrawn for parameters that are no longer found in Canadian drinking water supplies at levels that could pose a risk to human

health. This includes pesticides that are no longer registered for use in Canada and mixtures of contaminants that are addressed individually.

Type	Parameter	Type	Parameter
P	Aldicarb	P	Parathion
P	Aldrin + dieldrin	P	Pesticides (total)
P	Bendiocarb	O	Phenols (total)
P	Chlordane (total isomers)	O	Phthalic acid esters (PAE)
P	Cyanazine	O	Polychlorinated biphenyls (PCBs)
P	Dichlorodiphenyltrichloroethane (DDT) + metabolites	O	Polycyclic aromatic hydrocarbons (PAHs) (excluding benzo[a]pyrene)
P	Dinoseb	O	Resin acids
P	Endrin	O	Tannin
O	Gasoline and its organic constituents	P	Temephos
P	Heptachlor + heptachlor epoxide	O	Total organic carbon
O	Lignin	P	Toxaphene
P	Lindane	P	Triallate
P	Methoxychlor	P	2,4,5-Trichlorophenoxyacetic acid ² (2,4,5-T)
P	Methyl-parathion	P	2,4,5-Trichlorophenoxypropionic acid (2,4,5-TP)
P	Mirex		