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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 |
| M | microbiological (parameter type) |
| 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 multi-barrier 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. |
| <i>Escherichia coli</i> (<i>E. coli</i>) (2012) | MAC: None detectable per 100 mL | Human and animal faeces | The presence of <i>E. coli</i> indicates recent faecal contamination and the potential presence of microorganisms capable of causing gastrointestinal illnesses; pathogens in human and animal faeces pose the most immediate danger to public health. | <i>E. coli</i> is used as an indicator of the microbiological safety of drinking water; if detected, enteric pathogens may also be present. <i>E. coli</i> monitoring should be used, in conjunction with other indicators, as part of a multi-barrier approach to producing drinking water of an acceptable quality. |

| Parameter (published, reaffirmed) | Guideline | Common Sources | Health Considerations | Applying the Guideline/Comments |
|-----------------------------------|--|--|---|---|
| Total coliforms (2012) | 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. | <p>Total coliforms should be monitored in the distribution system because they are used to indicate changes in water quality.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p> |

| 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 (1990) | 1.0 | | Naturally occurring; releases or spills from industrial uses | Health basis of MAC: Increases in blood pressure, cardiovascular disease | MAC takes into consideration exposure estimates from food, water and air. |
| 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 (1986, 2005) | 0.005 | | Leaching from galvanized pipes, solders or black polyethylene pipes; industrial and municipal waste | Health basis of MAC: Kidney damage and softening of bone | MAC takes into consideration exposure estimates from food, water and air |
| 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.. |
| 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. |

| 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 | 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 (1995) | 3.0 | | Monochloramine is used as a secondary disinfectant; formed in presence of both chlorine and ammonia | Health basis of MAC: Reduced body weight gain Other: immunotoxicity effects | MAC is for total chloramines based on health effects associated with monochloramine and analytical achievability. |
| 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. |
| 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. |

| 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 | 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 discoloration (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. |
| 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. |

| 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 | 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) | |
| 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. |

| 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 | 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. |
| 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. |

| 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 | 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. |
| 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 | 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. |

| 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 | 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. |
| 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. |

| 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 | 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. |
| 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 | N-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. |

| Type ¹ | Parameter (published, reaffirmed) | MAC (mg/L) | Other value (mg/L) | Common sources of parameter in water | Health considerations | Applying the Guideline/Comments |
|-------------------|---|--|-----------------------|--|--|---|
| 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. |
| O | Perfluorooctane Sulfonate (PFOS) (2018) | 0.0006 | | Synthetic chemical used in consumer products and fire-fighting foams for their water and oil repellent 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 repellent 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. |

| 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 | 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. |
| 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. |

| 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 | 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: ≤ 15°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. |
| 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. |

| Type ¹ | Parameter (published, reaffirmed) | MAC (mg/L) | Other value (mg/L) | Common sources of parameter in water | Health considerations | Applying the Guideline/Comments |
|-------------------|--|------------|--------------------|--|---|--|
| 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. |
| 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. |

| 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 | Uranium (1999) | 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 (various lesions); may be rapidly reversible after exposure ceases | Based on treatment achievability; MAC based on chemical effects, as uranium is only weakly radioactive; uranium is rapidly eliminated from the body. |
| 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. |
| 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; Γ – Treatment related parameter.

² 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) |
| 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 (⁹⁰ Sr) should not be confused with stable strontium. The two species of strontium have quite different origins, and their concentrations in drinking water |

| | | | | |
|----------------|------|--|---|--|
| Tritium (2009) | 7000 | Naturally occurring (cosmogenic radiation); releases from nuclear reactors | Cancer of the lung, breast, thyroid, bone, digestive organs and skin; leukaemia | are not correlated. 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. |
| 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. |
| 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 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 multi-barrier approach. |

| Parameter/subject (published) | Comments |
|---|--|
| 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 multi-barrier 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 | | |