

Fluoride in Manitoba Well Water

This fact sheet is part of a series on naturally occurring elements sometimes found in well water. In some Manitoba wells, fluoride has been found at concentrations exceeding health guidelines.

What is fluoride?

Fluoride is a naturally occurring trace element found in low concentrations in nature. It is present in most geologic environments but particularly in igneous and sandstone rocks. Fluorides may be introduced into the environment by a variety of sources such as the manufacture of aluminum, steel, enamel, glass, bricks, tiles, pottery, cement, phosphate fertilizers and metal casting, welding and brazing.

Exposure to fluoride

Most Canadians are exposed to fluoride on a daily basis. It is found in almost all food and in many drinking water sources. Small amounts of fluoride are often added to drinking water systems to prevent tooth decay. Fluoride can also be found in dental products such as tooth paste and mouth rinse. Fluoride in groundwater and well water may occur when soil and rocks containing fluoride break down and dissolve.

Drinking water standard for fluoride

Health Canada has established a maximum acceptable concentration (MAC) of 1.5 milligrams per litre (mg/L) for fluoride in drinking water. This is the same value used in Manitoba as a standard for all public (municipal) drinking water supplies. Private well owners are not legally required to meet the standard but where levels are high, a treatment device or other corrective action is recommended.

The optimal level of fluoride in drinking water to prevent dental cavities is 0.7 mg/L.

Health effects of fluoride

The health effects of fluoride depend on the duration and level of exposure. In low doses, fluoride is beneficial and can prevent the development of dental cavities. In children under the age of eight, ingestion of elevated amounts of fluoride can result in dental fluorosis. This condition causes white areas or brown stains on the teeth. This affects the appearance of the teeth but not their function. Over the age of eight, enamel formation is complete and dental fluorosis will not occur.

Levels of fluoride in drinking water below 1.5 mg/L are unlikely to produce any significant dental fluorosis in children. The standard of 1.5 mg/L has been set to protect children age 1 to 4 years of age from developing moderate effects of fluorosis where some dental discolouring may occur.

Standard levels are set considering all usual sources of exposure to fluoride, including diet.

In adults, high levels of fluorides consumed for a very long period of time may lead to skeletal fluorosis. Skeletal fluorosis is a progressive disease, in which bones increase in density and become more brittle. In mild cases, the symptoms may include pain and stiff joints. In more severe cases, the symptoms may include difficulty in moving, deformed bones and a greater risk of bone fractures.

Ingestion of very high doses of fluoride, (concentrations not normally found in drinking water), may result in acute poisoning effects.

Current science does not show a link between fluoride and cancer. This is based on scientific reviews conducted by a number of international agencies and by Health Canada which are in agreement that the weight of evidence from all currently available studies does not support a link between exposure to fluoride in drinking water and cancer.

How fluoride gets into well water

Fluoride found in well water in Manitoba occurs naturally. It is the result of groundwater coming into contact with rocks and minerals containing fluoride. The concentration of fluoride in a well water sample depends on a number of factors, such as the amount of fluoride present in the rock through which the groundwater has passed and whether the water chemistry is favorable for fluoride to remain dissolved.

Fluoride in Manitoba well water

Manitoba Sustainable Development evaluated the results of groundwater samples obtained through a number of regional groundwater quality surveys and its provincial observation well sampling program. A map of the distribution of fluoride in the groundwater samples is available online at www.manitoba.ca/sd/water/drinking-water/well-videos/index.html.

A limited number of samples contained fluoride at concentrations above the drinking water quality standard (1.5 mg/L). Elevated fluoride concentrations have been found in:

- granitic bedrock aquifers in south-eastern Manitoba, particularly the area east of Lac du Bonnet
- some bedrock aquifers in the Gypsumville area
- the bedrock sandstone aquifer in parts of south- eastern Manitoba
- the bedrock sandstone aquifer in parts of west-central Manitoba, particularly in the Swan River and Porcupine Mountain areas

Recommendations for testing well water

Private well owners are responsible for testing and, if necessary, treating their water to ensure it is safe to drink. All wells should be tested to ensure there are no fluoride concerns. In general, well water should be tested for fluoride every three to five years in areas known to have elevated levels. More frequent testing is recommended if fluoride levels are at or near the drinking water quality standard.

Public (municipal) water systems that use well water are tested regularly by the water system owner or the Office of Drinking Water as required under *The Drinking Water Safety Act*.

How to test well water for fluoride

Fluoride does not create a taste or odour in water. The only way to know if your well water contains fluoride is to have a water sample tested by a laboratory accredited by the Canadian Association for Laboratory Accreditation (CALA). Information on accredited laboratories is available from your local telephone directory yellow pages (refer to Laboratories - Testing).

Three accredited laboratories in Manitoba have created test packages for the five elements addressed in this series of fact sheets, including fluoride:

ALS Environmental

12-1329 Niakwa Road E.
Winnipeg, MB R2J 3T4
Phone: 204-255-9720
Toll Free: 1-800-607-7555
Fax: 204-255-9721

Horizon Lab Ltd.

4055 Portage Avenue
Winnipeg, MB R3K 2E8
Phone: 204-488-2035
Fax: 204-488-4772

Bureau Veritas Canada Inc.

Unit D, 675 Berry Street
Winnipeg, MB R3H 1A7
Phone: 204-772-7276
Fax: 204-772-2386

Private well owners should ask for the Manitoba Trace Elements Package. Test costs will vary from year to year, and well owners should contact the laboratories directly for an estimate.

Well owners should use the bottle(s) provided by the laboratory and should collect samples carefully, following the instructions provided.

What to do if excess fluoride is found in your well water

If the fluoride level in the well water is above the drinking water standard, private well owners should consider how they are using this water and may wish to discuss health risks with their doctor or dentist particularly if there are young children in the home.

For young children, toothpaste may also be a significant source of fluoride, especially if they swallow it. Health Canada recommends children under three have their teeth brushed by an adult without using any toothpaste. Children age 3 to 6 years should be supervised when brushing and use only a small amount of toothpaste.

Private well owners may also wish to consider options to increase the safety of water used for drinking or food preparation (such as for beverages, baby formula, soup and coffee). These options include:

- Hooking up to a public (municipal) piped water system if one is available in the area.
- Installing a cistern and arranging for the delivery of safe drinking water by a water hauler.
- Drilling a new well at a different location or to a different depth. This may or may not solve a fluoride problem. Manitoba Water Stewardship can be consulted for advice.
- Using commercially bottled water from a supplier who is a member of the Canadian Bottled Water Association or International Bottled Water Association.
- Treating the well water.

Treating the well water

Common treatment systems like water softeners, carbon filters and sediment filters cannot adequately remove fluoride from drinking water. Boiling will only concentrate the fluoride, it will not remove it.

Water treatment methods that can remove fluoride from drinking water include reverse osmosis, distillation, anion exchange units and adsorption with activated alumina or other special filter media. A treatment device may be installed at the kitchen faucet (point-of-use) or where the water enters the home (point-of-entry).

The treatment device should be certified to meet the NSF International (NSF)/American National Standards Institute (ANSI) standard for removal of fluoride. Accredited certification organizations include NSF, the Canadian Standards Association (CSA), Underwriters Laboratories Incorporated (UL), the International Association of Plumbing and Mechanical Officials (IAPMO), and the Water Quality Association (WQA). Certified devices are tested to ensure the safety of materials used in the devices and to ensure they perform as claimed.

Quotes should be obtained from reputable water treatment equipment suppliers. The supplier should provide information on how much fluoride will be removed, maintenance requirements and costs.

Once installed, manufacturer's instructions on the use and maintenance of treatment devices and disposal of filter media should be followed. The well water and treated drinking water should be tested annually for fluoride to confirm that the treatment system is working properly.

For more information

For more information on fluoride, refer to Health Canada's website at <http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/2011-fluoride-fluorure/index-eng.php>; and www.hc-sc.gc.ca/hl-vs/iyh-vsv/environ/fluor-eng.php.

For more information on well construction or on relocating your well, contact Manitoba Sustainable Development's Groundwater Management Section at 204-945-6959.

For more information on water treatment, contact Manitoba Sustainable Development's Office of Drinking Water at 204-945-5762, or refer to the website at http://www.manitoba.ca/sd/pubs/water/drinking_water/odw_contact.pdf.html for a local office near you.

For information on certification of water treatment devices visit www.nsf.org.

For health related questions on fluoride, call Health Links/Info Santé at 204-788-8200 or toll free at 1-888-315-9257 or your local public health office.