

Fluoride in Groundwater¹

February 2007

What is fluoride?

Fluoride is a chemical that occurs naturally within many types of rock. The average concentration of inorganic fluoride from natural sources in British Columbia drinking water is generally less than 0.050 milligrams per litre (mg/L), but concentrations can get higher than 10 mg/L. The Maximum Acceptable Concentration of fluoride in drinking water in Canada is 1.5 mg/L.

Fluoridation is the addition of fluoride compounds into drinking water, to adjust concentrations to levels between 0.8 and 1.0 mg/L for the beneficial effect of tooth decay prevention. Studies have shown that children drinking fluoridated water can expect to have up to 35% less tooth decay than those drinking non-fluoridated water. Within British Columbia approximately 4.5% of the population drink fluoridated water. Everyone is exposed to fluoride in their diet. Most people are also exposed to fluoride in toothpaste or other dental products.

What are the known sources of fluoride?

Most of the fluoride found in groundwater is naturally occurring from the breakdown of rocks and soils or weathering and deposition of atmospheric volcanic particles. Fluoride can also come from:

- Runoff and infiltration of chemical fertilizers in agricultural areas
- Septic and sewage treatment system discharges in communities with fluoridated water supplies
- Liquid waste from industrial sources

What are the environmental health concerns?

At low concentrations fluoride can reduce the risk of dental cavities. Exposure to somewhat higher amounts of fluoride can cause dental fluorosis. In its mildest form this results in discolouration of teeth, while severe dental fluorosis includes pitting and alteration of tooth enamel. Even higher intakes of fluoride taken over a long period of time can result in changes to bone, a condition known as skeletal fluorosis. This can cause joint pain, restriction of mobility, and possibly increase the risk of some bone fractures.

Other information sources:

Health Canada, Guidelines for Canadian Drinking Water Quality Supporting Documents. http://www.hc-sc.gc.ca/ewh-sem/sem/pubs/water-eau/doc_sup-appui/index_e.html

Health Canada, *It's Your Health*. http://www.hc-sc.gc.ca/iyh-vsv/environ/index_e.html

B.C.'s Ground Water Protection Regulation: http://www.env.gov.bc.ca/wsd/plan_protect_sustain/groundwater/index.html

B.C. Ministry of Health, "Safe Water Supply Vital to Your Health." (1999) <http://www.healthservices.gov.bc.ca/protect/pdf/PHI052.pdf>

B.C. Ministry of Health, Health Files. <http://www.bchealthguide.org/healthfiles/index.stm>

Type "water" in the search section and look for various articles including:

- #45 "Should I Get My Well Water Tested?"
- #49b "How to Disinfect Drinking Water."
- #28 "Fluoride Facts."



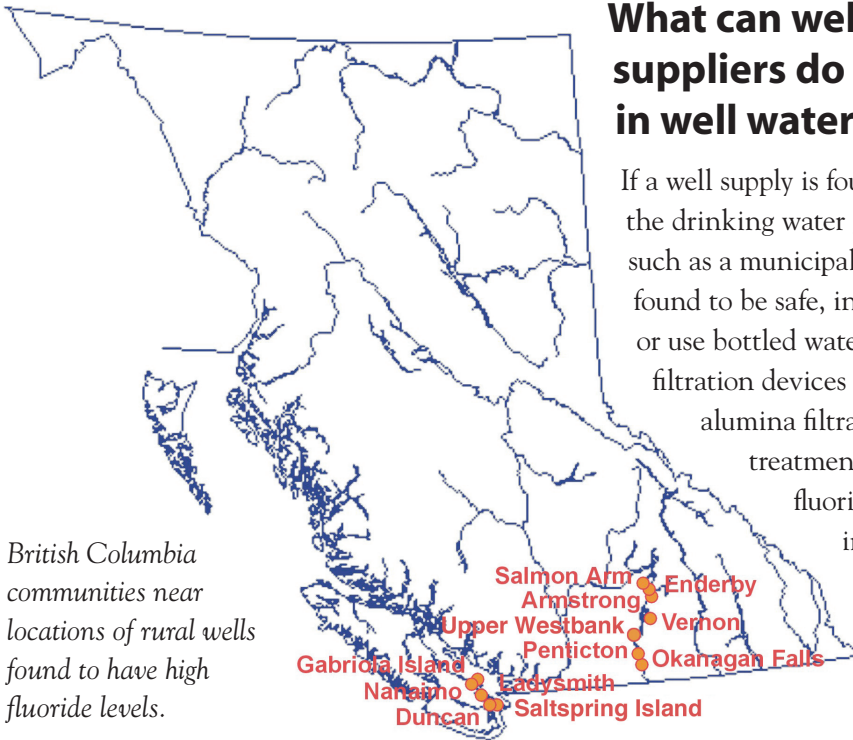
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¹ Information in this fact sheet is generally intended for private wells. Please note that any water supply system or well serving anything other than one single family dwelling is defined as a water supply system under the *Drinking Water Protection Act* and Regulations and must be sampled according to the Act and Regulations. The person operating such a system is defined as a water supplier.

Where have high fluoride levels been found in B.C. well water?

The Ministry of Environment evaluated the results of groundwater samples obtained between 1977 and 1993 through the *Water Quality Check Program*. Of over 8,500 samples analysed for fluoride, 270 or 3.1% had fluoride levels above the Canadian drinking water guideline of 1.5 mg/L, and 0.1% of samples had fluoride concentrations greater than or equal to 10 mg/L. High concentrations of fluoride in groundwater were observed in rural wells in the upper rural area of Westbank and near the communities of Armstrong, Duncan, Enderby, Gabriola Island, Ladysmith, Nanaimo, Okanagan Falls, Penticton, Salmon Arm, Saltspring Island, and Vernon. Fluoride levels above the drinking water guideline may also occur locally in other regions of the province.



British Columbia communities near locations of rural wells found to have high fluoride levels.

What can well owners and water suppliers do about high levels of fluoride in well water?

If a well supply is found to have fluoride concentrations higher than the drinking water guidelines, use water from an alternate source, such as a municipal system, or a nearby well that has been tested and found to be safe, install an effective, in-home water treatment system or use bottled water. Boiling water or using pitcher-type carbon filtration devices will not reduce fluoride concentrations. Activated alumina filtration, distillation, ion exchange or reverse osmosis treatment methods can reduce the concentration of fluoride in drinking water but are expensive for use in small water systems or households. If water tests indicate a fluoride concentration greater than 1.5 mg/L but less than 4 mg/L, retesting is recommended prior to considering costly treatment options. When purchasing a treatment device, you should consider one that

has been certified by an organization accredited by the Standards Council of Canada (SCC). The treatment device should meet the following standards: NSF/ANSI Standard 62 on drinking water distillation systems, or Standard 58 on reverse osmosis drinking water treatment systems, or Standards 53 on drinking water treatment units — with specific designation for the water quality parameters you are trying to remove (e.g. fluoride). Certification assures that a device works as the manufacturer or distributor claims. Devices can be certified for treating a range of water quality concerns, so make sure that the device you purchase is explicitly certified for iron and manganese removal. Find an up-to-date list of accredited organizations at www.scc.ca.

Well water testing and source protection

Well owners are encouraged to test their water periodically to ensure the water is safe to drink. Consult Public Health at your local Health Authority for advice regarding the specific parameters to test for and how often testing should be done. For more information on protecting community well water sources, a *Well Protection Toolkit* is available from the Ministry of Environment on the internet at http://www.env.gov.bc.ca/wsd/plan_protect_sustain/groundwater/wells/well_protection/wellprotect.html to help water suppliers and communities to develop a well protection plan to minimize the threat of land use activities on groundwater quality.
