

Fluoride in Groundwater

September 2002

What is fluoride?

Fluoride is a chemical that occurs naturally within many types of rock, and has the symbol “F”. 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 is 1.5 mg/L.

Fluoridation is the addition of fluoride compounds into drinking water, to adjust concentrations to levels between 0.8 and 1.4 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 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:

BC Ministry of Health Services, Health File #28: “Fluoridation Facts.” (Dec 1999)
<http://www.healthservices.gov.bc.ca/hlthfile/hfile28.html>

Health Canada, Guidelines for Canadian Drinking Water Quality Supporting Documents: “Fluoride.” (Aug 1996)
http://www.hc-sc.gc.ca/ehp/ehd/catalogue/bch_pubs/dwg_sup_doc/fluoride.pdf

British Columbia Ministry of Health Services, Health File #45. “Should I Get My Well Water Tested?” (Jun 1995)
<http://www.healthservices.gov.bc.ca/hlthfile/hfile45.html>



Where have high fluoride levels been found in BC well water?

The Ministry of Water, Land and Air Protection 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 near the

communities of Armstrong, Duncan, Enderby, Gabriola Island, Ladysmith, Nanaimo, Okanagan Falls, Penticton, Salmon Arm, Salt Spring Island, and Vernon. Fluoride levels above the drinking water guideline may also occur locally in other regions of the province.

What can well owners and water purveyors¹ do about high levels of fluoride in well water?

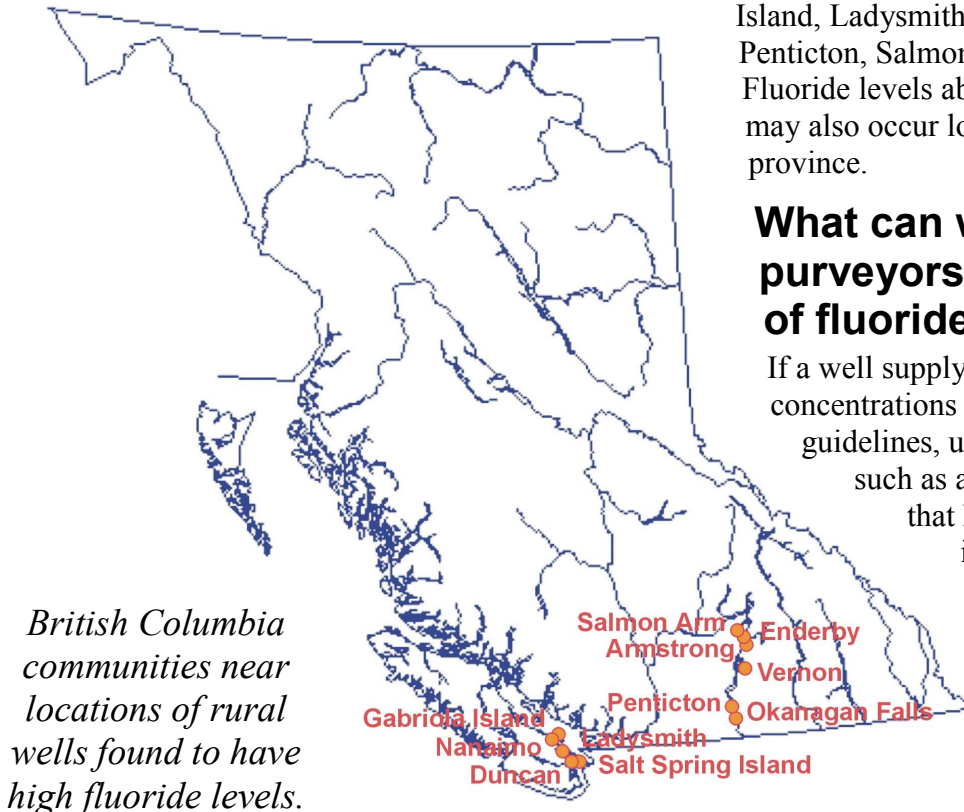
If a well supply is found to have fluoride concentrations higher than the drinking water guidelines, use water from an alternate source, such as a municipal system, or a nearby well that has been tested and found to be safe, install an effective, in-home water treatment system or use bottled water. Boiling 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. Homeowners should make sure that any water treatment product used has been certified for the specified purpose by the National Sanitation Foundation (NSF). Monitoring and upkeep of the treatment system is critical and all manufacturer's instructions should be followed carefully.

Well water testing and source protection

Well owners are encouraged to test their water periodically to ensure the water is safe to drink. Consult your local public health inspector (see the Blue Pages of your local telephone book) 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 Water, Land and Air Protection on the internet http://wlapwww.gov.bc.ca/wat/gws/well_protection/wellprotect.html to help water purveyors and communities to develop a well protection plan to minimize the threat of land use activities on groundwater quality.



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

¹A water purveyor is a person, corporation or municipality that supplies water for domestic purposes.