

Arsenic in groundwater



northern health
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If your family gets drinking water from a private well or spring, do you know if your water has arsenic? What health risks could you and your family face? Where can you go for help or advice?

What is arsenic?

Arsenic is an element found naturally in rocks and the Earth's crust. It is odourless and tasteless in water and can only be detected through chemical testing. Arsenic is recognized as poisonous and as a cancer-causing substance (carcinogen). Arsenic can be present in various organic and inorganic forms.

<http://www.cancer.ca/en/prevention-and-screening/be-aware/harmful-substances-and-environmental-risks/arsenic/?region=on#ixzz3fW8lJvfe>

[http://www.env.gov.bc.ca/wsd/plan_protect_sustain/groundwater/library/ground_fact_sheets/pdfs/as\(020715\)_fin3.pdf](http://www.env.gov.bc.ca/wsd/plan_protect_sustain/groundwater/library/ground_fact_sheets/pdfs/as(020715)_fin3.pdf)

How can I be exposed to arsenic?

Canadians may consume arsenic from municipal or private drinking water. Arsenic is more likely to be found in groundwater than in surface waters. In British Columbia (BC), arsenic in well water is almost always associated with arsenic-containing bedrock formations, but may also be from weathering of arsenic-bearing minerals and ores and/or infiltration or runoff from locations of past mining activities.

Arsenic is only a concern if the water is being used for drinking or food preparation. Showering, bathing, swimming, and other activities involving water are not thought to be harmful because exposure through skin contact is not considered to be significant or harmful.

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What are the health effects of arsenic exposure?

There are both short- and long-term effects of arsenic exposure.

Short term (days to weeks)

Acute exposure to very high levels of arsenic can cause symptoms of poisoning, such as: stomach pain, vomiting, diarrhea, and impaired nerves resulting in a “pins and needles” sensation in hands and feet. Arsenic can cause skin flushing and rashes as well as lesions and darkening of skin most frequently found on the palms of hands or soles of feet. Fortunately, such acute effects have never been found from natural groundwater in Northern BC

Long term (years to decades)

Chronic exposure to even small concentrations of arsenic over a long period of time is known to increase the risk of several types of cancer, including lung, bladder, kidney, liver and skin cancer.

[http://www.env.gov.bc.ca/wsd/plan_protect_sustain/groundwater/library/ground_fact_sheets/pdfs/as\(020715\)_fin3.pdf](http://www.env.gov.bc.ca/wsd/plan_protect_sustain/groundwater/library/ground_fact_sheets/pdfs/as(020715)_fin3.pdf)

<http://www.healthlinkbc.ca/healthfiles/hfile49c.stm>

What amount of arsenic causes health effects?

At arsenic concentrations below 0.3 parts per billion (1 ppb = 0.001 milligrams per litre), Health Canada considers the risk of developing internal organ cancers “essentially negligible.”

However, Health Canada has established arsenic’s maximum acceptable concentration (MAC) at 10 ppb,. This level is not based on health risk, rather it is based on treatment technology and the ability of water systems to reasonably achieve arsenic reduction. For this reason, people should consider taking precautions with their drinking water even if the arsenic levels are slightly below the guideline. At the same time, consuming water that slightly exceeds the MAC for a short period - a few days or a week - would not present any significant health risk.

<http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/arsenic/index-eng.php#a1>

What factors affect the health risks of arsenic for me?

Health risks are presented as the probability (or odds) of a given health effect, like cancer, over a given time period, like a year or a lifetime. The health risks of arsenic depend on how much water you drink on average, the concentration of arsenic in that water, and how many years you use that water source. You can reduce your exposure by switching to a cleaner water source, or by installing a water treatment system.

You should also be aware that there is some inorganic arsenic in most foods - rice, leafy vegetables, and even fruit juices for instance. Your cumulative arsenic ingestion includes both food and

water, and the number of years you are consuming. The risk of adverse health effects may also be made worse by the cumulative effects of exposure to things other than arsenic. For example, smoking, radon gas, and excessive alcohol are linked to the same types of cancer as arsenic. Another factor is how your body reacts to arsenic - there isn’t much you can do to change your resistance beyond staying healthy and active.

What types of public water systems must comply with current standards.

Only water systems regulated under the Drinking Water Protection Act or other legislation are required to comply with current standards. This excludes single family residences.

How do I know if there is arsenic in my drinking water?

Since arsenic is colourless and odourless, the only way to know if you have arsenic in your private well is to get chemical testing through an accredited lab ([Approved Labs](#)). The lab will provide you with sampling and transport instructions.

It is the home owner’s responsibility to test their private well for bacteria and all toxic chemicals, including arsenic. If your well water is tested and contains significant arsenic, even if it is below the guideline, a second test is suggested to verify the results.

Any well may contain arsenic or other contaminants. Even if your neighbour’s well has been tested and is low in arsenic, that does not mean your well is not at risk. Well owners are encouraged to test their water periodically to ensure that it is safe to drink. Consult with your local Environmental Health Officer for advice

regarding specific parameters to test for, how often testing should be done, and help with interpreting sample results.

Municipalities are responsible for conducting regular sampling for public water systems.

[http://www.env.gov.bc.ca/wsd/plan_protect_sustain/groundwater/library/ground_fact_sheets/pdfs/as\(020715\)_fin3.pdf](http://www.env.gov.bc.ca/wsd/plan_protect_sustain/groundwater/library/ground_fact_sheets/pdfs/as(020715)_fin3.pdf)

I have arsenic in my drinking water. How can I reduce my exposure?

If arsenic is present in your drinking water, then you may want to consider treating the current source, obtaining water from another safe alternate source, or using bottled water. Switching to a surface water source like a lake, river, or dugout would not be safer - the arsenic might be lower, but the risk of illness due to microorganisms like E. coli, Giardia, and viruses would be much higher.

Arsenic is not removed by pitcher-type filtration units, chlorination, or boiling. **Boiling water may increase the concentration of arsenic.**

[http://www.env.gov.bc.ca/wsd/plan_protect_sustain/groundwater/library/ground_fact_sheets/pdfs/as\(020715\)_fin3.pdf](http://www.env.gov.bc.ca/wsd/plan_protect_sustain/groundwater/library/ground_fact_sheets/pdfs/as(020715)_fin3.pdf)

<http://www.doh.wa.gov/portals/1/documents/pubs/334-156.pdf>

What treatment options do I have?

Home water treatment options to reduce arsenic include:

- reverse osmosis (RO),
- greensand filtration, which also removes iron and manganese, and
- special iron-based granular media.

Treatment may be either for the whole house or just for a single drinking water tap. Water softeners and cartridge filters generally do not reduce arsenic.

Homeowners are responsible for the full cost of any water treatment. The most appropriate treatment for your water depends on a careful analysis of your chemical water quality results, and budget. Northern Health recommends using treatment devices certified by the National Sanitation Foundation (NSF), CSA, or other accredited testing agency.

Discuss your needs with a qualified water treatment professional. Always get several independent price quotes before purchasing equipment, and make sure you understand and are comfortable with the installation, operation and maintenance requirements. Finally, retest your water after treatment to ensure it is working as intended.

Important Links

Health Canada - [Arsenic in drinking water](#)

CAREX Canada - [Carcinogen profile: arsenic](#)

US Environmental Protection Agency - [Arsenic in drinking water](#)

US Environmental Protection Agency - [Just the facts for consumers: arsenic in your drinking water](#)

World Health Organization - [Arsenic in drinking water](#)

US Environmental Protection Agency - [Your private well](#)

Canadian Cancer Society - [Arsenic in Drinking Water](#)



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