

Arsenic 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, arsenic has been found at concentrations exceeding health guidelines.

What is arsenic?

Arsenic is a naturally occurring trace element found in low concentrations in the Earth's crust. It is present in certain types of soil and rocks. It is present in small amounts in all living matter. Arsenic compounds are also used for a wide variety of commercial and industrial purposes.

Exposure to arsenic

Since arsenic is a natural part of our environment, everyone is exposed to small amounts. Sources of arsenic exposure include:

- foods containing trace amounts of arsenic
- smoke from burning wood, coal and tobacco products
- dust from some industrial processes
- drinking water that contains arsenic
- arsenic-treated wood
- soil ingestion

Most of the arsenic found in Manitoba well water occurs naturally. It is the result of the water coming into contact with soil or rock that contains arsenic. Occasionally, arsenic in well water may be a result of commercial or industrial operations, or the use or disposal of arsenic-containing products such as pesticides.

Drinking water standard for arsenic

Health Canada has established a maximum acceptable concentration (MAC) for arsenic in drinking water of milligrams per litre (mg/L). Manitoba has adopted this guideline value as a provincial standard for all public (municipal) drinking water supplies within the province. 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. At this guideline level, it is estimated that 3 to 39 people in 100,000 may develop a cancer related to arsenic exposure in drinking water in their lifetime. It should be noted that exposure to arsenic in drinking water, even at levels lower than the guideline may result in a very low risk of developing cancer over a lifetime.

Health effects of arsenic

Despite its reputation as a poison, arsenic's effect on human health depends on factors such as the level and length of exposure.

Exposure to arsenic, including drinking well water with elevated levels of arsenic over a lifetime can increase the risk for some cancers such as the bladder, liver, kidney, lung and skin cancer.

Long-term exposure to high levels of arsenic over many years or decades may also cause thickening and discoloration of the skin, nausea and diarrhea, decreased production of blood cells, abnormal heart rhythm, blood vessel damage or numbness of the hands and feet. These health effects are not normally associated with the levels of naturally occurring arsenic commonly found in Manitoba's well waters.

How arsenic gets into well water

Most of the arsenic found in Manitoba well water occurs naturally. It is a result of groundwater coming into contact with rocks or soils containing arsenic. The concentration of arsenic in well water depends on a number of factors, such as the amount of arsenic present in the soil through which the groundwater has passed and whether the water chemistry is favourable for arsenic to remain dissolved.

Less commonly, arsenic in groundwater may be caused by waste from commercial or industrial operations, or through the use or disposal of arsenic-containing products such as pesticides.

Arsenic in Manitoba well water

Manitoba Sustainable Development evaluated the results of groundwater samples collected through regional groundwater quality surveys and its provincial observation well sampling program. A map of the distribution of arsenic in groundwater samples is available online at www.manitoba.ca/sd/pubs/water/drinking_water/map_arsenic.pdf.

Naturally occurring arsenic in Manitoba well water has been measured at levels up to 0.05 mg/L in fresh groundwater and as high as 0.30 mg/L in areas with poor quality well water.

Arsenic concentrations above the drinking water quality standard (0.01 mg/L) have been found in buried sand and gravel aquifers in south central and southwestern Manitoba, particularly near Notre Dame de Lourdes, Virden, Birtle, Russell, Winkler, St. Malo and Tolstoi.

The deeper parts of the shallow sand aquifer centered near Carberry have also been found to produce groundwater with elevated arsenic concentrations. Arsenic concentrations exceeding drinking water guideline levels are found locally in other 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 arsenic concerns. In general, well water should be tested for arsenic every three to five years in areas known to have elevated levels. More frequent testing is recommended if arsenic 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 arsenic

Arsenic does not create a taste or odour in water. The only way to know if well water contains arsenic 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 arsenic:

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 arsenic is found in your well water

If the arsenic 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, who can consult their regional medical officer of health for more information.

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 an arsenic problem. Manitoba Sustainable Development 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 arsenic from drinking water. Boiling will only concentrate the arsenic, it will not remove it.

Water treatment methods that can remove arsenic from drinking water include reverse osmosis, distillation, anion exchange units and adsorption with activated alumina or other special filter media such as iron or titanium oxide. 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 arsenic. 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 arsenic 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 arsenic to confirm that the treatment system is working properly.

For more information

For more information on arsenic, refer to Manitoba Health's website at www.gov.mb.ca/health/publichealth/environmentalhealth/arsenic.html or to Health Canada's website at www.hc-sc.gc.ca/ewh-semt/water-eau/drink-potab/guide/index_e.html.

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 for a local office near you.

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

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

For information on agricultural uses of water containing arsenic, refer to the Canadian Water Quality Guidelines for the Protection of Agricultural Water Uses – Arsenic Fact Sheet <http://ceqg-rcqe.ccme.ca/>.