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Water Talk

Uranium in Drinking Water

What is uranium?

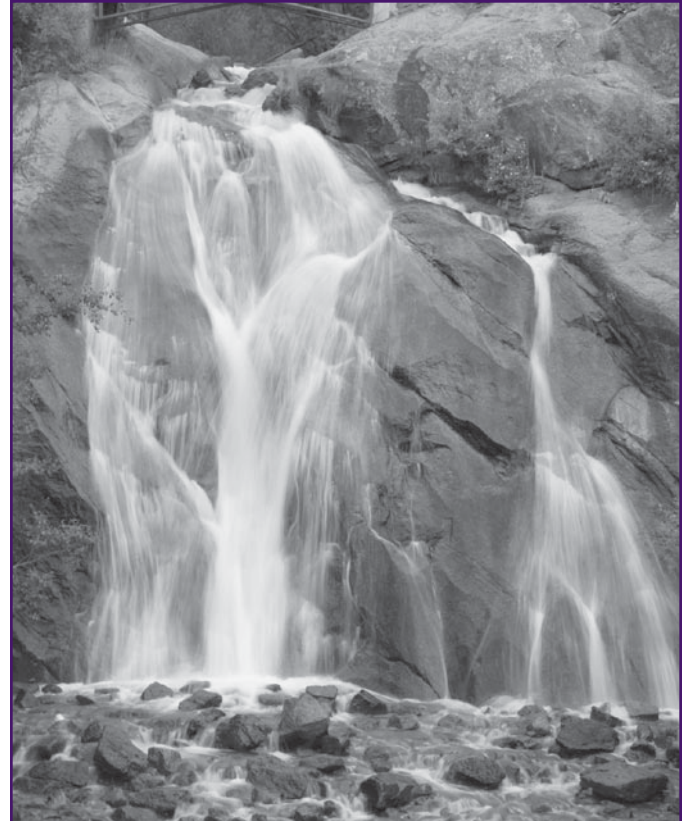
Uranium is a naturally-occurring element commonly found in soil and rocks. The concentration of uranium in water is typically very small, but varies from region to region; depending on the type of minerals in the soil and bedrock. For example, in granite bedrock, the average concentration tends to be higher.

How does uranium get into drinking water?

Uranium gets into drinking water sources when **groundwater** dissolves minerals that contain uranium. Elevated levels of uranium are more likely to be found in deeper drilled wells, rather than in dug wells or surface water supplies. The amount of uranium in wells varies throughout Canada depending on the concentration of uranium in the bedrock. Wells most likely to have elevated levels of uranium are those in areas with granite or alkaline sandstone and shale bedrock.

What is the effect of uranium in drinking water on our health?

Kidney injury is the most sensitive endpoint for uranium, which means that the kidney is the organ that is most susceptible to the effects of uranium. Most uranium from drinking water is eliminated from the body. However, a



small amount is absorbed and carried through the bloodstream. Once in the bloodstream, the uranium compounds are filtered by the kidneys, where they can cause damage to the kidney cells. The potential health effects from uranium in drinking water come from its heavy metal characteristics and not its radioactivity, which is very low. Bathing or showering with water that contains uranium is not a health concern.

How do I know if I have uranium in my drinking water?

The only way to know if you have elevated levels of uranium in your drinking water is to test for it. Drinking water system owners/operators and private well owners should contact a laboratory accredited by the Standards Council

For more information on drinking and recreational water quality issues:

Visit Health Canada's Water Quality Web site at:
www.healthcanada.gc.ca/waterquality

Email: water_eau@hc-sc.gc.ca

Fax: 613-952-2574

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of Canada or the Canadian Association for Laboratory Accreditation in their area to have their water tested. In some provinces or territories, the laboratory must also obtain a licence or certification from the drinking water authority. The laboratory will provide you with the appropriate sampling container and any required preservative.

Where can I find a list of accredited laboratories?

For a current list of laboratories accredited in your province or territory, contact the drinking water authority in your jurisdiction. You can also visit the following website:

- Standards Council of Canada: www.scc.ca
- Canadian Association for Laboratory Accreditation: www.cala.ca

What is the Guideline for Canadian Drinking Water Quality for uranium?

The current guideline for uranium in drinking water is a Maximum Acceptable Concentration (MAC) of 0.02 milligrams/litre (mg/L). This means that no adverse health effects would occur from the ingestion of 1.5 L of drinking water per day containing uranium (at this level) over a lifetime (70 years).

What can I do if the uranium in my drinking water is above the Guideline?

In the short-term, levels that moderately exceed the guideline are unlikely to have an effect on health. However, in the event that testing shows ongoing elevated levels of uranium, there are several options available:

- switch to an alternate source of water;
- treat the water in your well to reduce uranium levels; or
- if no other options are available, use bottled water for drinking and food preparation.



RESIDENTIAL METHODS FOR REMOVING URANIUM FROM DRINKING WATER

Drinking water treatment devices can be used to remove specific contaminants, such as uranium, from drinking water. There are drinking water treatment devices available to reduce the levels of uranium in drinking water to levels below the guideline level of 0.02 mg/L. A water treatment professional should be consulted for advice on your particular situation. He or she will also be able to provide you with an accurate cost of the available systems, as well as installation and maintenance costs, based on your specific water quality.

How do I choose a drinking water treatment device?

When you purchase a drinking water treatment device, the packaging will identify the contaminants it is able to remove. Ideally, you should choose a treatment device that has been certified by an accredited certification body. There are two main categories of treatment devices:

1. Point of use (POU) devices are installed directly at the tap, and are used to reduce specific contaminants at that one tap; for uranium, these devices would use either a reverse osmosis or a distillation process.
2. Point of entry (POE) devices are installed where the water supply enters the home, and are used to reduce specific contaminants in drinking water for the entire household; for uranium, these devices would be based on ion exchange, specifically anion exchange.

Although there are no certified treatment devices currently available that were specifically designed to remove uranium from water, there are several devices available that use technologies that are effective in removing uranium. For most households, a POU device installed on a single tap will be sufficient to provide safe water for drinking. Look for POU devices using reverse osmosis or distillation, or POE devices using anion exchange.

Why should I choose drinking water treatment devices that are certified?

The certification process provides assurance that a product conforms to applicable standards. Generally, Health Canada recommends that consumers use devices that have been certified as meeting the appropriate NSF International/American National Standards Institute standard for drinking water treatment units by an accredited certification body. These standards have been designed to safeguard drinking water by helping to ensure the material safety and performance of products that come into contact with drinking water.

Certification organizations must be accredited by the Standards Council of Canada (SCC). An up-to-date list of accredited certification organizations can be obtained from the SCC (www.scc.ca). Additional information on drinking water treatment devices can be found on Health Canada's website (www.healthcanada.gc.ca/waterquality).

Do I need to test my water before choosing a treatment device?

Before a treatment device is selected, the water should be tested by an accredited laboratory to determine general water chemistry and to verify the concentration of uranium. The testing should also include assessing. The presence and concentration of competing ions in the water which could limit the efficiency of uranium removal. This information will help in the selection of the most appropriate treatment method, and also help determine if a pre-filter or other pre-treatment is needed. A reputable water treatment dealer should be able to provide advice on the best treatment method to use, based on your specific water quality.

How do I know if my treatment device is working properly?

Periodic testing by an accredited laboratory should be conducted on both the water entering a treatment device and the water it produces to ensure the device is reducing the uranium concentrations to below 0.02 mg/L.

How does reverse osmosis remove uranium?

Reverse osmosis is a process that filters most impurities from water by passing it through a very fine membrane. Contaminants such as uranium are left behind on the membrane while treated water passes through. You may need to install a pre-filter before the reverse osmosis system.

How does distillation remove uranium?

A distillation system works by boiling water into water vapour, then returning it to its liquid state. The minerals and contaminants such as uranium form scales and are trapped in the boiling chamber. The condensed water is collected in a storage container for consumption.

How does anion (negatively-charged ion) exchange remove uranium?

Anion exchange is a form of ion exchange similar to that used for water softening. The principle of ion exchange is the removal of undesirable ions, by exchanging them for other ions as the water passes through a bed of a specialized resin. Ion exchange resins are specific to the types of ions you wish to remove. The type of resin used for removing uranium is an anion based resin, which is different than the resin used in water softeners.

For more information:

Health Canada has collaborated with the Canada Mortgage and Housing Corporation (CMHC) to develop fact sheets on various treatment technologies. These CMHC fact sheets (including specific fact sheets on reverse osmosis, distillation, and water softeners) provide additional information, including information on general costs and maintenance. They can be found at: www.cmhc-schl.gc.ca/en/co/maho/wawa.