WHAT SHOULD I DO TO REDUCE MY ARSENIC EXPOSURE?

If analytical results show that your well water contains arsenic there are several actions you can take to limit your exposure from ingestion. These actions may include the following:

- Drink bottled water
- Treat the well water to remove arsenic
- Connect to a municipal or community water supply system
- Drill a new well

Bottled water is a viable alternative, though it may not be a good permanent solution due to the cost and inconvenience. Connection to municipal or community supply is a cost effective solution provided that water supply lines are in the area. Municipal and community supply systems are required to meet EPA drinking water standards. Drilling a new well may be an option, since there are many instances where one well contains dissolved arsenic and another well nearby is arsenic free: however, there is a risk that a new well could also contain arsenic.

The most common solution is water treatment. All treatment devices need regular maintenance. Failure to properly maintain a water treatment system may result in exposure to elevated levels of arsenic.

There are two groups of treatment systems that are generally a good choice for homeowners: (1) membrane filtration and (2) absorptive processes. Reverse osmosis, or RO, is a membrane filtration process commonly used by households to remove arsenic from water. Limitations of a RO system include premature fouling of the membrane and the need for a pre-treatment step to remove arsenic effectively. A point-of-use filter consisting of granular ferric oxide, or GFO, is an absorptive media that reliably removes most arsenic forms to below detectable levels and is relatively long-lived and inexpensive[2]. Whole-house GFO filtration systems are also available at a higher cost.

REFERENCES

1. Pippin, C, G., M. Butczynski, and J. Clayton, 2003. Distribution of arsenic in groundwater in the North Carolina Piedmont. NC DWQ report, 80 p.

2. Pratson, E., A. Vengosh, G. Dwyer, L. Pratson, and E. Klein, 2010. The effectiveness of arsenic remediation from groundwater in a private home. Groundwater Monitoring and Remediation, v. 29, n. 1, p. 87 - 93.

Front cover. Background image modified from: Cunningham, W.L. and C.C. Daniel, III, 2001, Investigation of groundwater availability and quality in Orange County, NC. USGS Water-Resources Investigations Report 00-4286, 58 p. Bedrock core sample from Morgan Mill research station, Union County (NC DWQ).

Contact Information

Please call your regional Aquifer Protection Section for more information.

Asheville Regional Office, (828) 296-4500
Fayetteville Regional Office, (910) 433-3300
Mooresville Regional Office, (704) 663-1699
Raleigh Regional Office, (919) 791-4200
Washington Regional Office, (252) 946-6481
Wilmington Regional Office, (910) 796-7215
Winston-Salem Regional Off, (336) 771-5000

Web Links

Arsenic information by EPA:
http://www.epa.gov/safewater/arsenic/pdfs/fs_arsenic_justthefactsforconsumers.pdf
http://www.epa.gov/safewater/arsenic

Groundwater studies by DWQ:
http://portal.ncdenr.org/web/wq/aps/gwp/groundwater-study-publications

Certified laboratories:
http://portal.ncdenr.org/web/wq/lab/cert/certlablists

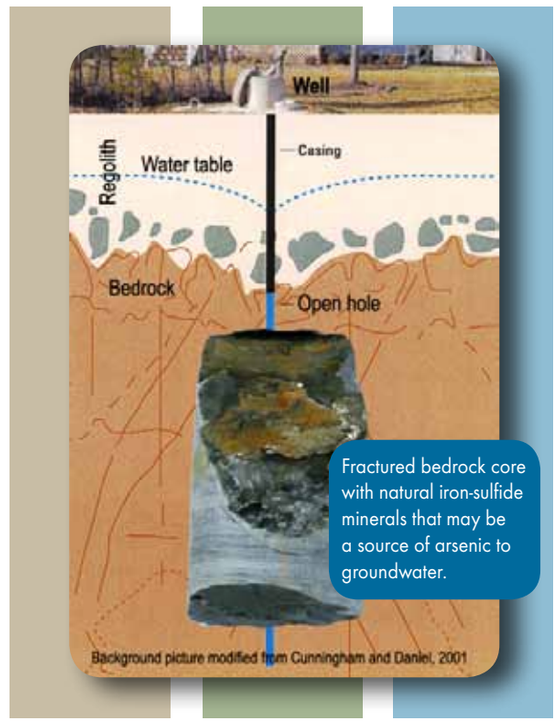
County Health Departments:
http://www.ncalhd.org/county.htm

North Carolina Department of Environment and Natural Resources

NCDENR

Arsenic in Groundwater

of North Carolina



Division of Water Quality

WaterQuality
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Aquifer Protection Section

ARSENIC OCCURRENCE IN NORTH CAROLINA'S GROUNDWATER

Arsenic occurs naturally in the earth's crust: it is the 20th most abundant element on the earth. Rocks that were formed during periods of volcanic activity tend to have a greater abundance of minerals that contain arsenic. When these rocks weather, minerals break down and arsenic can be released. Some of the arsenic may be carried by water to different parts of the environment. Areas of North Carolina's Piedmont that are underlain by metamorphosed volcanic and sedimentary rocks, commonly referred to as the "Slate Belt," have a greater number of wells with detectable and elevated levels of arsenic than in other regions[1]. However, low levels of arsenic are found in groundwater throughout North Carolina.

Arsenic is colorless, odorless and tasteless. It occurs as a dissolved component of water or attached to tiny particles in the water. Investigations by the N.C. Division of Water Quality show that arsenic in North Carolina's groundwater is most often naturally occurring.

Monitoring of a select set of private wells shows generally stable levels of arsenic over several years. In addition to natural occurrence, arsenic can also occur in groundwater as a byproduct of some agricultural and industrial activities.

HOW CAN ARSENIC GET INTO MY WATER SUPPLY?

A water supply well removes water from surrounding rocks and carries that water to the user. The water contains dissolved ions, including arsenic, that are released from the rocks when water moves through the rock fractures. In some instances, installation and use of a well can cause geochemical changes that can affect the amount of arsenic that dissolves into groundwater.

HOW CAN I BE EXPOSED TO ARSENIC?

The greatest exposure risk to arsenic in the groundwater is by using it for drinking and cooking. Arsenic may also enter your body through ingestion of some foods (for example, fish, poultry, or grains raised in or with arsenic-rich waters and feeds). Exposures to arsenic through skin contact such as bathing or through vapor inhalation are considered to be much less of a risk for most people.

WHAT ARE THE HEALTH EFFECTS ASSOCIATED WITH ARSENIC EXPOSURE?

Studies show that long-term exposure to arsenic can cause skin damage, problems with the circulatory system and significantly increase the risk of developing cancer. Arsenic exposure has been linked to cancer of the skin, lungs, bladder, kidneys and other organs. If you feel you have been exposed to arsenic, contact your health care provider.

HOW DO I GET MY WELL WATER TESTED FOR ARSENIC?

Since July 2008, North Carolina legislation has required well tests for all newly constructed domestic water-supply wells. The local health department inspects and samples the well, provides analytical results to the well owner and keeps the results on file. However, if you have an older well, you may want to consider having your well water tested for arsenic. To have your well tested for arsenic or other contaminants, contact your local county health department. For a small fee, staff from the health department will collect water samples from your well and provide the results. You may also choose to have your water tested by a certified private laboratory.

HOW DO I INTERPRET MY WATER SAMPLE RESULTS?

Federal drinking water standards and state groundwater standards provide guidelines to interpret the results of water analyses. The Environmental Protection Agency, or EPA, has set a maximum contaminant level, or MCL, of 10 micrograms per liter (µg/L, also called parts per billion) for arsenic in public water supplies. North Carolina has established the same regulatory level for groundwater quality. It is important to note that the MCL assumes a specified risk of cancer and may take other factors into account. Thus, arsenic levels below the MCL are not necessarily free from health risks. While scientific studies on safe arsenic levels are ongoing, the EPA has also established a non-regulatory goal of zero µg/L – a level at which no adverse health effects are expected from long-term consumption. Private well water users are responsible for protection and maintenance of their drinking water supplies. Private well water users are encouraged to use the EPA and state standards as guidelines to reduce their risk from arsenic exposure and consider protective measures if test results show detectable levels of arsenic.