

WATER

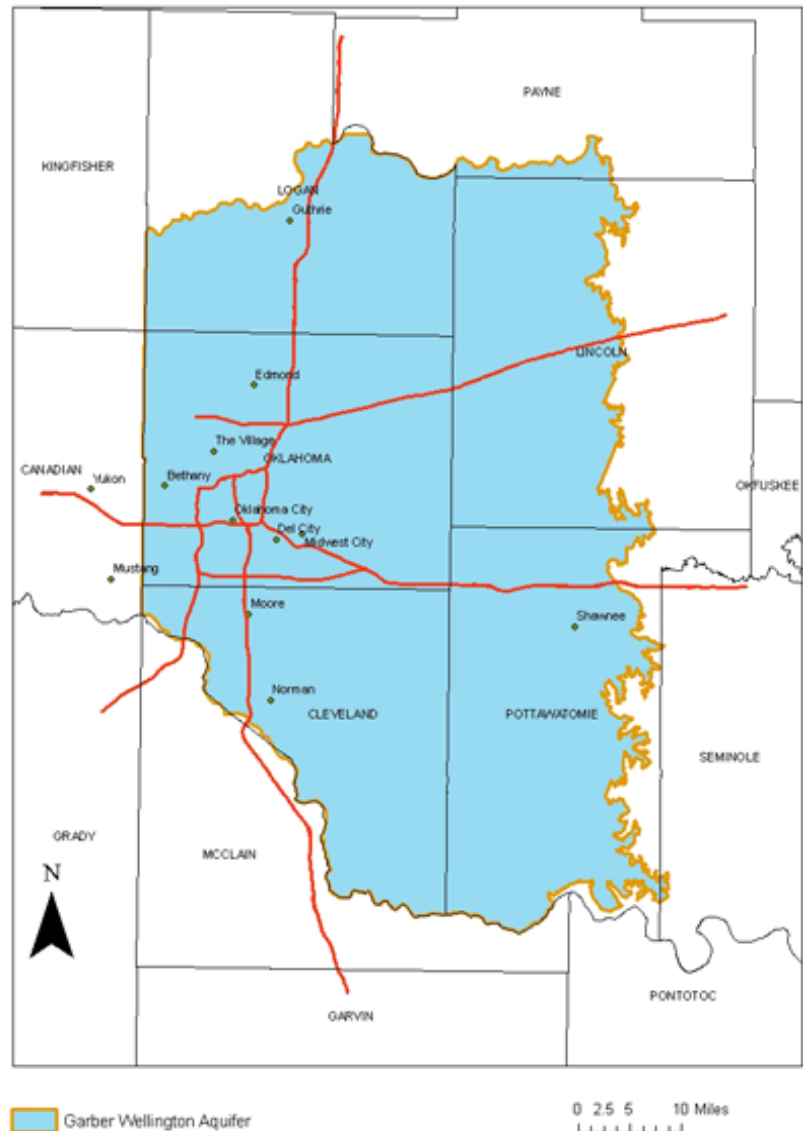
Arsenic, Chromium, Selenium, and Uranium in Private Drinking Water Wells on the Garber Wellington/Central Oklahoma Aquifer

This report explains a risk of elevated levels of arsenic, chromium, selenium, and uranium for drinking water wells on the Central Oklahoma Aquifer, consisting of the Chase-Admire Formations and the Garber-Wellington Formations. The Central Oklahoma Aquifer is a major source of drinking water for central Oklahoma. Concentrations of dissolved arsenic, chromium, selenium, and uranium in regions of the aquifer occasionally exceed the Federal Drinking Water Standards (or Maximum Contaminant Level, MCL, or the highest level of a contaminant that is allowed in drinking water) for each of these chemicals. These high concentrations are found in both shallow and deep wells and are not confined to any particular area of the aquifer, so until chemical analysis has been completed, risk is unknown. All public water systems are being checked for arsenic, chromium, selenium, and uranium to ensure they are safe for drinking. Testing of private water wells is not a requirement of The Department of Environmental Quality (DEQ), but due to health concerns related to these chemicals, individuals on private water wells may want to have their

water tested. A sample kit can be obtained by contacting Stan Johnson with the State Environmental Laboratory at (405) 702-1114. There is a charge of \$60 for this analysis. Turn around time for this analysis is two weeks. *The normal cost of this analysis is \$85.00. This is a special rate for private drinking water wells drawing water from the Central Oklahoma Aquifer.

Uranium

Uranium is a naturally and commonly occurring radioactive element. Rocks, soils, surface and underground water, air, plants, and animals all contain varying amounts of uranium. Naturally occurring uranium is radioactive but poses a small risk because it gives off very small amounts of radiation. Cancer is not usually a result of exposure to naturally occurring uranium. However, health studies have shown large amounts of uranium can cause kidney damage. We do not know whether children differ from adults in their susceptibility to the health effects of uranium exposure. The Environmental Protection Agency (EPA) MCL of 30 ug/L for uranium was adopted in December 2003. There was not a uranium drinking water standard in effect from 1998-2003.



Arsenic

Arsenic is a naturally occurring element that can enter water from deposits in the earth or from agricultural and industrial practices. Arsenic can cause various health effects from long term consumption including skin disorders; irritation of the

stomach, intestines, and lungs; neurological disturbances; and cancer. The EPA MCL of 10 ug/L for arsenic in drinking water was adopted January 2001, a decrease from the previous MCL of 50 ug/L.

Selenium

Selenium occurs naturally in the environment. People are exposed to low levels of selenium daily through food, water, and air. Selenium is also an essential nutrient for humans and animals. However, selenium can be harmful when regularly taken in amounts higher than those needed for good health. EPA has set an MCL for selenium at 50 ug/L. EPA has found selenium to cause the following health effects when people are

exposed to levels above the MCL for relatively short periods of time: hair and fingernail changes, damage to the peripheral nervous system, fatigue, and irritability. A lifetime exposure to selenium at levels above the MCL could lead to hair and fingernail loss, damage to kidney and liver tissue, and damage to the nervous and circulatory systems.

Chromium

Chromium is a metal found in three forms: chromium (0), chromium (III) or trivalent chromium, and chromium (VI) or hexavalent chromium. Trivalent chromium is naturally occurring in food and is an essential trace nutrient. Hexavalent chromium can enter the water from natural deposits in deep aquifers or from industrial practices. Ingesting large amounts

of hexavalent chromium can cause stomach upsets and ulcers, convulsions, and kidney and liver damage. Some people are extremely sensitive to trivalent and hexavalent chromium and can develop allergic reactions consisting of severe redness and swelling of the skin. EPA has set an MCL for Total Chromium of 100 ug/L.

Water Treatment Options

If feasible, the best treatment option is to purchase water from a public water system. Commercial water treatment systems, such as reverse osmosis and ion exchange, advertise the capability to remove arsenic, chromium, selenium, and uranium. There are two types of treatment options available - point of entry into the household and point of use, i.e. faucet. With point of entry treatment, water is treated when it enters the house, therefore treating all the water utilized by the household. These systems generally utilize sediment filters and

iron granules to absorb the metals as water passes from the well to the house. With point of use treatment, water is treated at the tap using granular ferric adsorption. Both of these methods involve cost and system upkeep to ensure they are working properly. Each method should be carefully investigated before choosing a system. Public water systems have additional treatment options, and when feasible, the best option may be to purchase water from the local water supply that services your area.

More Information

A detailed study of the groundwater in the Oklahoma Aquifer was conducted by the US Geological Society in 1998. This study is titled "Ground-Water-Quality Assessment of the Central Oklahoma Aquifer, Oklahoma: Results of Investigations" (Water-Supply Paper 2357-A). It can be found at <http://pubs.er.usgs.gov/usgspubs/wsp/wsp2357A>.

References

- ATSDR. 1999. Toxicological Profile for Uranium. Atlanta, GA: US Department of Health and Human Services, Public Health Service. <<http://www.atsdr.cdc.gov/toxprofiles/tp150.html>>
- ATSDR. 2005. Toxicological Profile for Arsenic (Draft for Public Comment). Atlanta, GA: US Department of Health and Human Services, Public Health Service. <<http://www.atsdr.cdc.gov/toxprofiles/tp2.html>>
- ATSDR. 2003. Toxicological Profile for Selenium (Update). Atlanta, GA: US Department of Health and Human Services, Public Health Service. <<http://www.atsdr.cdc.gov/toxprofiles/tp92.html>>
- ATSDR. 2000. Toxicological Profile for Chromium. Atlanta, GA: US Department of Health and Human Services, Public Health Service. <<http://www.atsdr.cdc.gov/toxprofiles/tp7.html>>
- EPA. 2006. Drinking Water Contaminants. <<http://www.epa.gov/safewater/contaminants/index.html>>
- USGS. 1998. Ground-Water-Quality Assessment of the Central Oklahoma Aquifer, Oklahoma: Results of Investigation. Water Supply Paper 2357-A. Oklahoma City, OK. US Department of the Interior, US Geological Survey.
- USGS/DEQ. 2006. Comparison of Ground-Water Quality in Samples from Selected Shallow and Deep Wells in the Central Oklahoma Aquifer, 2003-2005. Reston, Virginia. US Department of the Interior, US Geological Survey.