Arsenic Occurrence in Groundwater in Orange and Durham Counties

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The presence of naturally occurring arsenic is controlled by chemical interactions between groundwater and the underlying geology. Orange and Durham Counties are underlain by two very different geologic areas: the Carolina terrane and the Triassic basin (fig. 1). Arsenic has been detected in approximately 500 privately owned drinking water wells in Orange and Durham counties. Most wells that contain detectable arsenic are present in Carolina terrane rocks.

Arsenic occurs naturally in groundwater statewide and has been detected in over 2,500 wells with the majority of the detections in areas underlain by rocks of the Carolina terrane (fig. 2). The Aquifer Protection Section of the NC Division of Water Quality and the North Carolina Geological Survey have been working together to assess the scope of arsenic occurrence in groundwater and factors affecting its occurrence in water supply wells.

Long-term exposure to low levels of arsenic may pose health risks to humans. It has been linked to skin, bladder, lung, kidney, nasal, liver and prostate cancer as well as other non-cancerous effects. The maximum concentration of arsenic that is safe to drink is debatable as reports offer different figures. The U.S. Environmental Protection Agency (EPA) has established a standard, called the maximum contaminant level (MCL), for arsenic in water of less than 10 parts per billion for public water systems. The EPA's maximum contaminant level goal (MCLG) for arsenic is 0 parts per billion. This means that ideally, water for human consumption would have no detectable level of arsenic.

If you receive your water from a privately owned well, you may want to have your water tested for arsenic. If you would like to find out how to have your well tested in Orange and Durham counties, contact your county Health Department:

Orange County
919-245-2360

Durham County
919-560-7800

Information Sources Online:

U.S. Environmental Protection Agency, Safewater: Arsenic in Drinking Water.
http://www.epa.gov/safewater/arsenic/index.html
URL to Code of Federal Regulations Concerning Arsenic in Groundwater
http://www.epa.gov/safewater/arsenic/regulations.html
NC Department of Environment and Natural Resources, NC Division of Water Quality.
http://www.ncwaterquality.org

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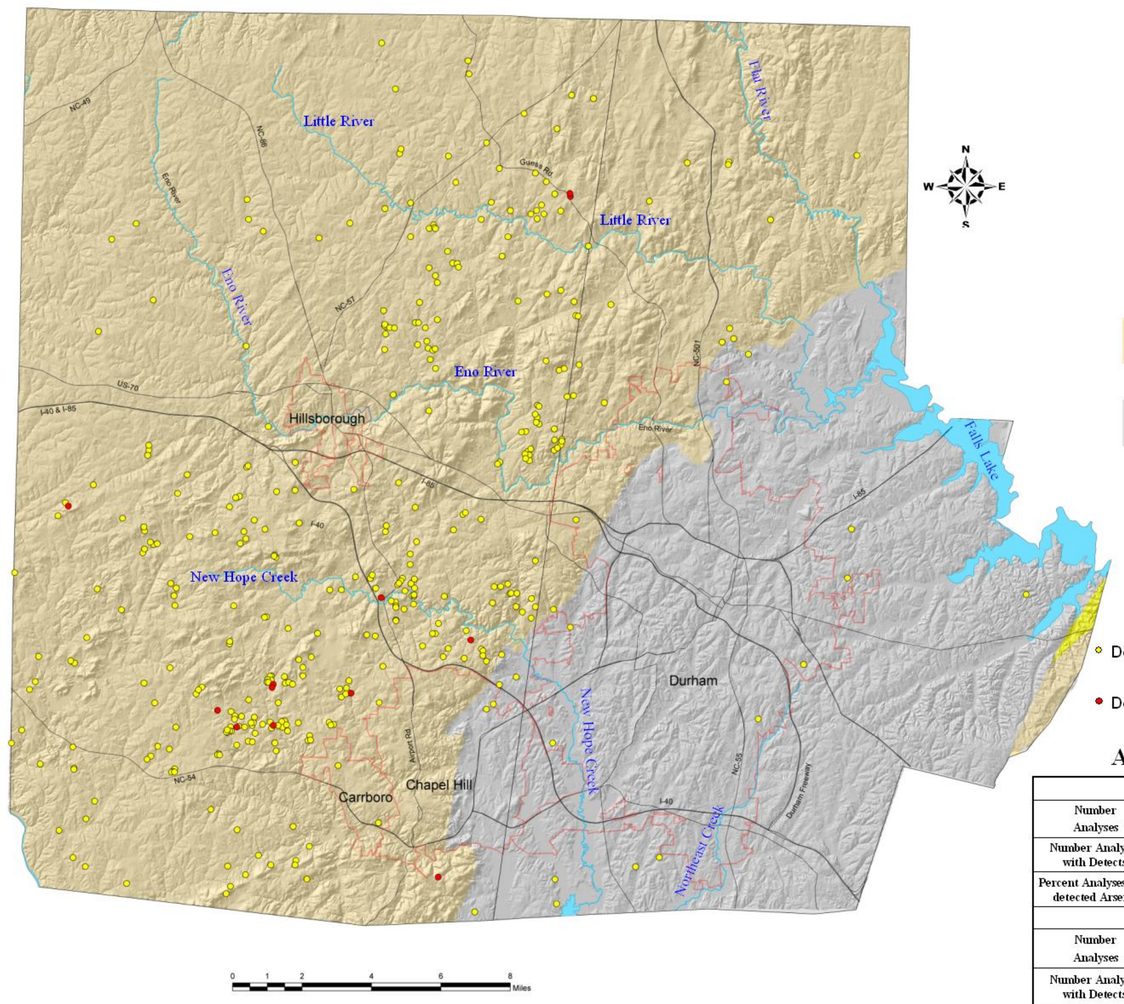
References:

Pippin, C.G., Butczynski, M. M., and Clayton, J.H., 2003, Distribution of Total Arsenic in Groundwater of the North Carolina Piedmont Province, NC DENR, Division of Water Quality, Aquifer Protection Section, Staff Report, October 2003.

Pippin, C.G., 2005, Distribution of total arsenic in groundwater in the North Carolina Piedmont, in Abstracts, 2005 NGWA Naturally Occurring Contaminants Conference: Arsenic, Radium, Radon, and Uranium, February 24-25, 2005, Charleston, SC, pages 89-102.



ARSENIC DATA INFORMATION

	Orange County	Durham County	Total
Number Analyses	2104	118	2222
Number Analyses with Detects	480	33	513
Percent Analyses with detected Arsenic	22.8%	28%	23%
	Carolina terrane	Triassic basin	Total
Number Analyses	2178	44	2222
Number Analyses with Detects	500	13	513
Percent Analyses with detected Arsenic	23%	29.5%	

Figure 1 – Map indicating dissolved concentration of arsenic in groundwater from Orange and Durham Counties (Data points from DHHS Groundwater Database).

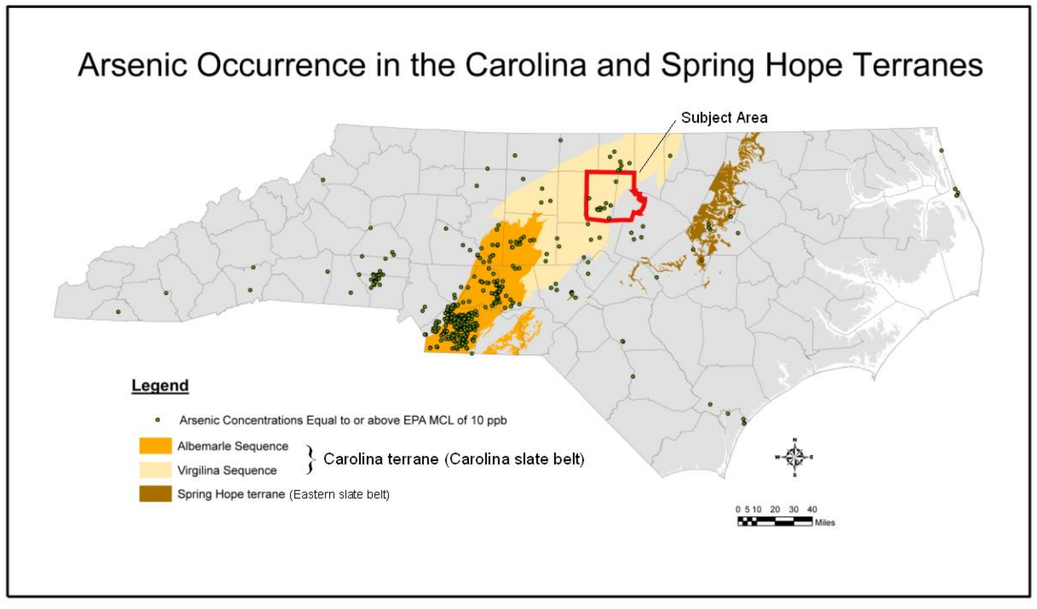


Figure 2 –Dissolved groundwater arsenic occurrence in the Carolina and Spring Hope terranes at concentrations equal to or above the EPA MCL of 10 ppb.

(Data points from DHHS Groundwater Database, Pippin et al., 2003 and Pippin, 2005 – modified by J. Tootoo)

The Carolina terrane spans across a large portion of the Piedmont region of North Carolina. There are two main components of the Carolina Terrane: 1) the northern portion, called the Virgilina sequence and 2) the southern portion, referred to as the Albemarle sequence.

Orange County and northern portions of Durham County are underlain by the Virgilina sequence, while counties such as Union, Stanly, and Randolph are underlain by the Albemarle sequence. The Albemarle sequence has a greater probability for the occurrence of dissolved arsenic concentrations that are much higher than the EPA standard.