

## **Arsenic in Groundwater in Orange County**

**What is arsenic?** Arsenic is a tasteless, odorless toxic element. It occurs naturally in the Earth's crust. It is also found in groundwater as a result of the natural breakdown of rock. Some rock types naturally contain more arsenic than others. Agricultural and industrial practices can also release arsenic to the environment.

**Why is arsenic a concern?** The EPA's 2007 *Arsenic in Your Drinking Water: Just the Facts for Consumers* states: "Some people who drink water containing arsenic in excess of EPA's standard over many years could experience skin damage or problems with their circulatory system, and may have an increased risk of getting cancer."

**How is arsenic exposure regulated?** EPA sets drinking water standards for substances that are known to cause cancer. These standards establish a Maximum Contaminant Level (MCL) to restrict exposure as much as possible to carcinogens while weighing other considerations, including costs and benefits (EPA 2007).

- **In 2002 the EPA reduced the drinking water MCL for arsenic in drinking water from 50 micrograms per liter (ug/L) to 10 ug/L.** The new MCL assumes that long term consumption of certain concentrations of arsenic will result in one person out of 150 contracting cancer, a rate which is considered "high" risk. A "low" risk (less than 1 person out of 10,000) of cancer is estimated to occur with long-term consumption of water containing arsenic at a concentration of 0.5 ug/L.
- **The EPA has also established a non-regulatory health-based Maximum Contaminant Level Goal (MCLG) of 0.0 ug/L.** The MCLG is considered the concentration at which **no adverse health impact** would be expected to occur from long-term consumption.
- **The North Carolina Department of Health and Human Services (NCDHHS) has recently recommended a health-based MCL of 0.02 ug/L for arsenic.**

**What do we know about arsenic in the groundwater in Orange County?** The rock that underlies large portions of the Piedmont region of North Carolina originated during past volcanic activity. This area has been termed the Carolina Slate belt, more recently known as the Carolina Terrane. Volcanic activity produces and concentrates arsenic bearing minerals in rock. Most of Orange County lies within the former Carolina Slate belt (now Carolina Terrane) and significant portions of Orange County are underlain by ancient volcanic bedrock. Thus certain areas of Orange County are underlain by arsenic-containing bedrock.

The "*Investigation of Ground-Water Availability and Quality in Orange County, North Carolina*" (Cunningham and Daniel, 2001) includes information concerning arsenic content in 31 groundwater samples collected in 1998 in Orange County. Arsenic was detected in 16 percent of the wells analyzed, with detections ranging from 1.3 - 4.3 ug/L.

Pippin (2005b) described an area of elevated arsenic underlain by volcanic and volcanoclastic bedrock within the Carolina Slate belt. NCDHHS data of statewide

groundwater sampling conducted from 1976-2001 (11,214 total samples, of which 1,321 were collected in Orange County) was analyzed by Pippin (2005b). Orange County was found to rank 5<sup>th</sup> out of the 16 counties within the Carolina Slate belt which were included in this study with regard for the greatest potential for groundwater to contain arsenic at a concentration greater than 1 ug/L. Orange County had a lower probability (again, out of the 16 counties studied) of containing arsenic at a concentration greater than 10 ug/L.

The occurrence of arsenic in groundwater in southern Orange County has also been studied by Kim et al. (2007) and Bradley et al. (2008). Using statistical analysis they found that generalities can be made regarding arsenic concentrations in groundwater in the study area:

- Deeper wells tend to exhibit higher arsenic concentrations.
- Analysis of more than 1,600 groundwater samples from across Orange County seems to show that certain areas of the county appear to yield relatively higher arsenic content in groundwater than other areas, as shown in Figure 1. It is important to point out that nearly all of the arsenic concentrations shown in this figure are less than the current arsenic MCL of 10ug/L. The differences in arsenic content in well water may be related to differences in the underlying bedrock geology.

**How can you find out if your well contains arsenic?** All new wells are permitted by the Orange County Health Department (OCHD) and are tested for a variety of contaminants including the total arsenic content of the well water. These results are forwarded to the property owner. Owners of other wells can also request that the OCHD test their well water for arsenic. Contact information for the OCHD-Environmental Health Services is listed below.

**What should you do if your well contains arsenic?** As discussed above, some think there is no safe concentration of arsenic in drinking water. Methods of reducing the arsenic concentration in groundwater from a domestic well in Orange County were evaluated by Pratson et al. (2008). They reported that “granular ferric oxide media reliably reduces initial arsenic levels down to a zero arsenic level. The small point-of-use granular ferric oxide filters are easy to install...”

Pippin (2005b) concluded that “well users whose groundwater sample results have returned detectable concentrations of arsenic are encouraged to share the results and their exposure history with their personal physicians or they can contact NCDHHS OEEB (Occupational and Environmental Epidemiology Branch) for further guidance.” Contact information for the NCDHHS OEEB is included below.

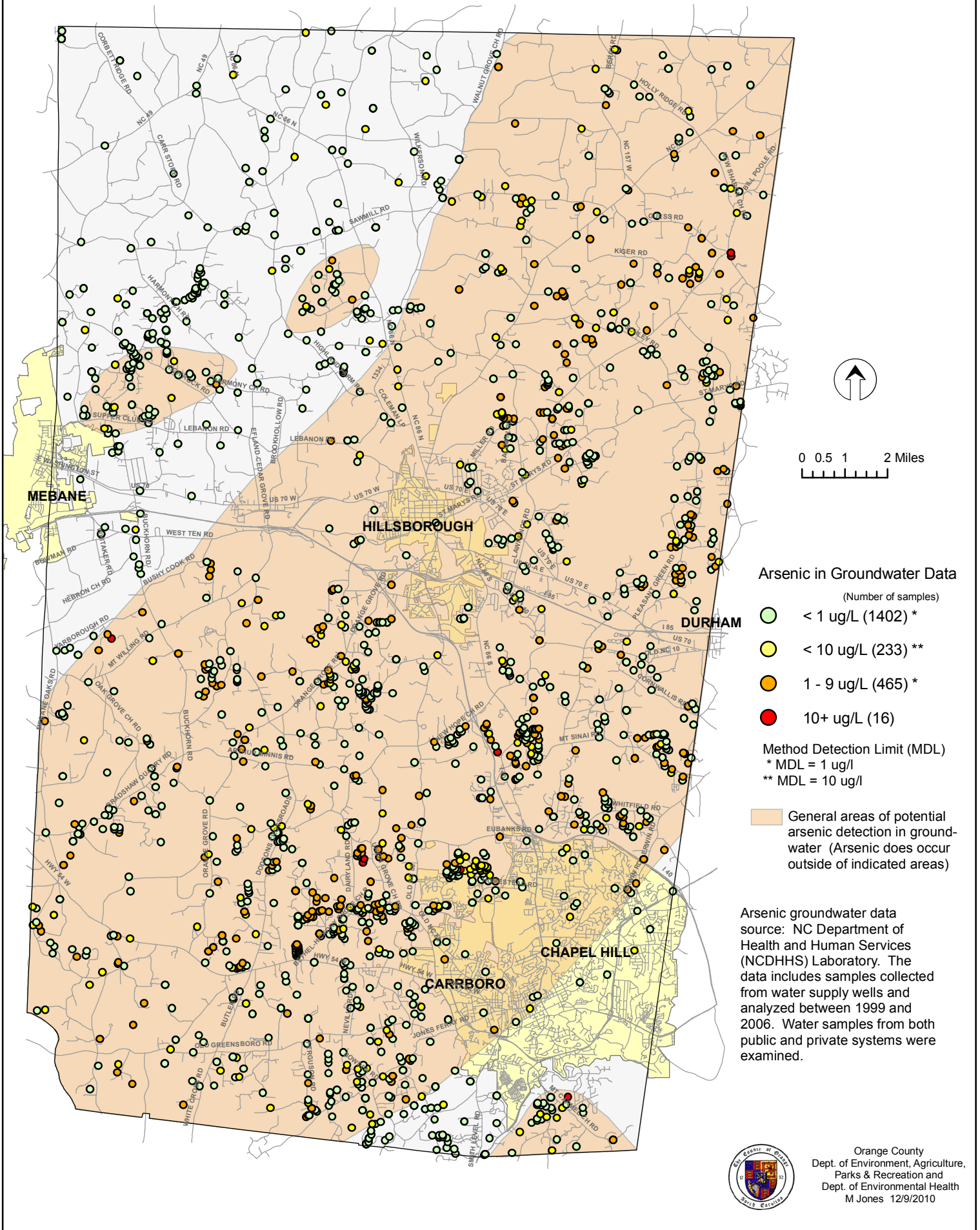
Further information concerning appropriate steps to reduce or eliminate arsenic concentrations in well water can be obtained from the contacts listed below.



## References:

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