An Examination of Arsenic Levels in St. Mary's County

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Abstract

This poster will assess the impact of naturally occurring arsenic in groundwater in St. Mary's County. Long term exposure to arsenic in drinking water above 10 parts per billion (ppb) may be associated with dermal conditions including skin lesions and hyperkeratosis, and cancer.. Results will be presented using geographical information system (GIS) mapping to illustrate hot spots where arsenic levels in individual wells exceed the current maximum contaminant level (MCL) of 10 ppb and the use of arsenic removal technology is required. Well construction depth will be compared to arsenic concentrations. Results will discuss the potential to predict arsenic levels based on location and well construction depth. Results may also be able to be used to support the identification of specific areas in St. Mary's County where it is appropriate to test for arsenic in drinking water.

Background on Arsenic Testing

On January 22, 2001, the EPA published a regulation that mandated a change in the MCL for arsenic in drinking water from 50 parts per billion (ppb) to 10 ppb. St. Mary's County has been identified by the state of Maryland as an automatic testing county. This means that every newly drilled drinking water well in St. Mary's County is automatically tested for arsenic. My project mostly focused on the hotspots areas in St. Mary's County where naturally occurring arsenic is present in groundwater at or above the MCL of 10 ppb and considered the correlation between the depth of wells and arsenic levels.

Long term consumption of arsenic in drinking water can cause cancer and skin lesions. It can also cause cardiovascular disease, neurotoxicity and diabetes. Short term exposure to high quantities of arsenic can cause headaches, confusion, severe diarrhea, and drowsiness. These are very serious problems, and are the reasons that the MCL for arsenic in drinking water was reduced from 50 ppb to 10 ppb.

In St. Mary's county there are two main sources of groundwater for private wells. The two aquifers are the Piney Point aquifer and the Aquia aquifer. These aquifers are present at different depths throughout the county.

Pure arsenic
Source: Robinson Library

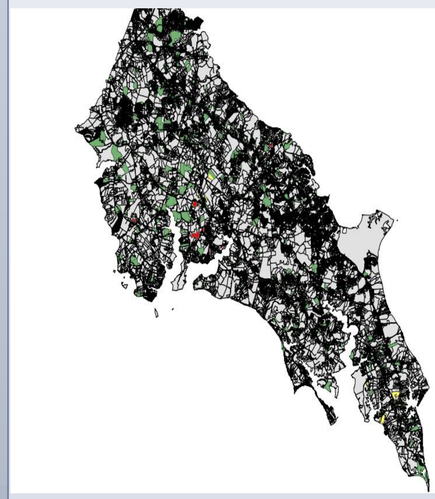
Hotspots in St. Mary's County

After compiling existing data on well construction logs and water sampling results, two primary hotspots with arsenic levels above 10 ppb were identified in areas of Ridge and Leonardtown. Identification of these hotspots may provide several benefits.

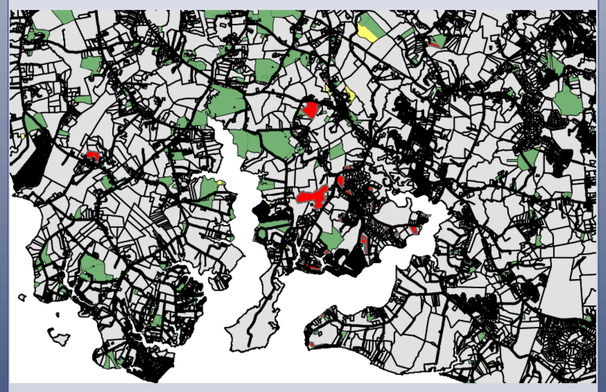
A primary benefit could be the identification of specific areas in St. Mary's County where testing for arsenic in private drinking water wells is appropriate. This would allow for more efficient use of local and state resources.

Another possible use could be to identify existing wells near the hot spots which were constructed before the 10 ppb arsenic rule and may benefit from potential voluntary arsenic testing or installation of arsenic removal technology.

Another important part of this project was the use of the presentation tool, GIS. This software allowed the department to map out the arsenic data, identify the hotspots and more easily present the data. The GIS presentation tool is very important for both this project and future environmental health department projects.



The GIS map of the entire county of St. Mary's. Spots of red indicate arsenic readings that are over 10 parts per billion, yellow indicates 10 parts per billion, and green indicates under 10 parts per billion.



The arsenic hotspot in an area of Leonardtown. Spots of red indicate arsenic readings that are over 10 parts per billion, yellow indicates 10 parts per billion, and green indicates under 10 parts per billion.

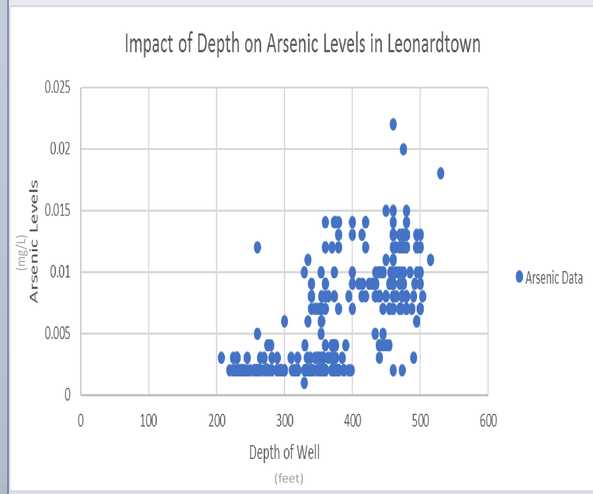
Arsenic Data in St. Mary's County

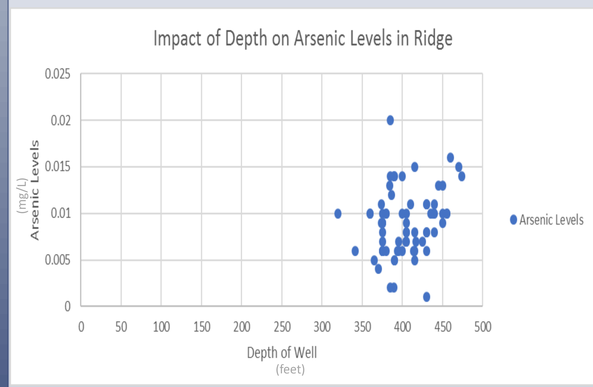
After reviewing arsenic data in St. Mary's county there seemed to be some correlation between the arsenic level and the depth of the well.

In reviewing information from 299 wells drilled in Leonardtown, the overall trend was as the well depth increased, the arsenic level also increased.

Unfortunately, a similar trend was not as obvious in Ridge. The data reviewed from 68 wells was much more muddled and did not indicate as clear a correlation between well depth and arsenic data.

Another important part of this project was the updating of the electronic database of well construction logs and water sampling records. The updating of these records will be important for both future projects and any continuation of this project by the health department.





Future Projects

There are many future applications for this research and the project that was completed.

The first could be a possible program that evaluates arsenic in drinking water from previously untested wells in hotspot areas. There are many wells in the hot spot area of Leonardtown that were constructed before the current arsenic regulations were put into effect. This program could be used to identify wells that may benefit from use of arsenic removal technology.

Another future project could be to review electronic records related to wells in the hot spot areas for completeness and accuracy of well depth information. Additional GIS mapping of data from those records could allow for a better analysis of the correlation between the depth of wells and arsenic levels. Wells located close together and using the same water could be compared. If a trend is identified, future wells might be drilled to a specific depth based on a predicted arsenic level.

A final project is sharing project information with the St. Mary's County Metropolitan Commission concerning the options for providing a public water supply to the hot spot areas. The main pitch could be about public health and a decrease in health problems because of arsenic.

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