Public Health

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Harford County Health Department

Harford County Wells - Water Quantity and Quality

Booklet # 02-08

Water Quantity

Water sources for individual wells in Harford County are found in two main geologic areas, the **Piedmont**, typically located west of Interstate Route 95, and the **Coastal Plain,** located east of Interstate 95. Interstate 95 is roughly considered the "fall line", which is the dividing line between these two geologic areas. Drinking water wells in the Piedmont receive water from fractures in the bedrock, and as such are considered unconfined aquifers. These wells are directly impacted by rainfall as it soaks into the ground from the surface. Well yield can vary greatly from one (1) gallon per minute (gpm) or less, to over 40 gpm depending on the water-bearing fractures that intersect the well. Drinking water wells in the Coastal Plain receive water from saturated sands and gravels. The aquifer, typically a confined aquifer, has an overlying impervious clay layer above the water-bearing formation. Water found in these aquifers may have travelled several miles under the surface before being drawn out through a well. In the Coastal Plain, there is typically an abundant yield, where production of 30 gallons per minute or more is not uncommon.

In some areas of the county, specifically in the Piedmont Region, it's a challenge to develop an adequate water supply. One or more attempts may prove unsuccessful when drilling for a drinking water well. One geological area of the

county where drilling may prove difficult is located in the Lower Pelitic Schist of the Wissahickon Formation, found in the Upper Fallston/Jarrettsville area. However, dry holes may be encountered in almost any area of the Piedmont. For the vast majority of properties, even those where such problems occur, a satisfactory water supply can usually be developed.

For a new, individual domestic water well, adequate yield is required in order to provide a satisfactory supply for a household. The State requires that a well must be able to produce at least 1 gallon per minute and provide 500 gallons within a two hour period. Also, the well must be able to sustain that rate for at least six hours at 4 gallons per minute or less and for at least three hours at yields greater than 4 gallons per minute. The yield test is performed shortly after development of the well. A well cap is placed on the well to protect it from contamination. The well is also provided with a well tag for identification purposes.

Water Quality

As far as potability is concerned, the overall water quality in the Harford County aquifers is relatively good. However, prior to use of a domestic well, water sampling is performed to ensure that the water is safe for drinking purposes. The State of Maryland requires testing for bacteria, nitrate, turbidity and sand. Other tests may be required by the Local Health Department if contaminants are known or suspected in the vicinity. The following is a brief synopsis of the characterizations and potential contaminants of water wells in the county:

Bacteria- Drinking water is tested for the presence of total coliform bacteria and E. coli bacteria as an indication of water quality. Total coliform bacteria are ubiquitous in nature and are generally not harmful. However, they may indicate

that other pathogenic (disease-causing) organisms are present in the water supply. The presence of E. coli, a bacteria found in the intestinal systems of warm-blooded animals (including humans), is an indication of contamination by fecal matter which may also contain other disease-causing bacteria, viruses and protozoa.

The Piedmont wells and Coastal Plain wells in Harford County do not typically have bacterial problems, except where shallow dug wells, aging, or improperly constructed drilled wells are being utilized as a water source. Such wells are more likely to be influenced by surface water, which may carry bacteria into the well. Wells drawing from deeper aquifers, as a rule, do not harbor bacteria unless they have been introduced into the well through installation of new plumbing, pump replacement, etc. Disinfection, by adding chlorine to the well, may be necessary to destroy any bacteria that may have been introduced.

pH- The pH is a measure of hydrogen ion activity resulting in water being acidic, basic, or neutral. The pH scale ranges from 1-14, with pH 7.0 being completely neutral. Most wells in the county exhibit low pH, rendering the water acidic. It is not unusual to have readings in the 5.0-6.5 range. Low pH can cause corrosion of metals, such as copper piping and fixtures, resulting in blue-green staining, and imparting a sour taste to drinking water. Water treatment (neutralization) is recommended to bring the pH within an acceptable range (6.5-8.5).

Nitrate- The Coastal Plain aquifers are generally low in nitrate. However, within any area of the county with a history of agricultural use, there is the potential for nitrate to exceed the EPA drinking water standard of 10 parts per million (ppm). Consumption of water high in nitrate causes the condition known as methemoglobinemia, or “blue baby syndrome”, which is life-threatening for infants under 6 months of age. Nitrate decreases the oxygen carrying capacity of

blood within infants, resulting in oxygen starved tissues and organs. The deprivation of oxygen results in the bluish tinge of an infant's complexion. Water treatment equipment, typically a reverse osmosis unit (R/O Unit), can reduce nitrate in drinking water. Where it has become necessary to implement treatment, seldom has the nitrate level exceeded 20 ppm.

Turbidity- This defines the clarity of drinking water. Turbidity is measured by an instrument, the nephelometer, that measures the refraction of light. The regulatory limit for drinking water is 10 nephelometric turbidity units (NTU). Excessive turbidity (cloudiness) in water is often associated with the presence of pathogenic organisms. Turbidity may be the result of improper well development, the mineral content of the water, or colloidal clays. If the turbidity is caused by the oxidation of naturally present iron or manganese, water treatment equipment may be installed to improve the clarity of the water.

Sand- Particles with a diameter between 0.0625 mm and 2.0 mm are considered sands. For all wells constructed in the State, drinking water must contain less than 5 milligrams per liter of sand. Visual observation is typically all that is required to determine the presence or absence of sand.

Lead- The geologic formations in Harford County typically have not exhibited that there is lead in the underground aquifers. Most often, if lead is found in water, it has been leached from piping and/or plumbing fixtures of the water distribution system. Since the pH of groundwater in the county is on the acidic side, there are instances when the amount of lead leached into a water supply has exceeded the EPA action level.

Iron- Although not considered a health risk, iron may be found in several areas of the county above the EPA Secondary Drinking Water Standard of 0.3 mg per liter. Iron is considered a nuisance in a water supply due to its taste, odor, and staining properties. Areas most susceptible to iron include Churchville, Aberdeen, and Joppa. However, any individual well in the county may be affected by iron depending on underlying geologic formations.

Volatile Organic Compounds (VOCs)- These chemicals are carbon-based compounds which vaporize into the air under standard atmospheric conditions. Gasoline and kerosene are prime examples of volatile organic compounds. VOCs may be found in almost any area of the county, but, as a whole, are not a problem for most properties using individual water wells. The proper handling of these compounds by commercial entities and individuals is critical to keeping them out of the groundwater resources of the county.

Harford County is considered by the Maryland Department of the Environment (MDE) as one of the High Risk Groundwater Use Areas (HRGUA) of the State because most individual wells are located in the unconfined aquifers of the Piedmont Region. Because unconfined aquifers do not have an overlying layer of clay, they are susceptible to contamination by VOCs, if a source is present.

There are numerous properties around the county which store heating oil, diesel fuel, gasoline, or kerosene in above ground storage tanks (ASTs) or underground storage tanks (USTs). In years past, there was a gas station at almost every major intersection in the county. Also, it is not unusual to find smaller fuel tanks still in use on farms throughout the county. Some of these tanks have been in the ground long enough to have deteriorated and leaked fuel product into the surrounding soils. Over time, these products have reached the water table.

There have been a number of home heating oil tanks that have leaked and impacted the water supply on the homeowner's property, and on occasion, neighboring properties. Typically, VOC contamination remains in close proximity to its source impacting relatively few properties.

One notable exception to these findings was the leak from an ExxonMobil Service Station in the Upper Crossroads community, previously located on the southwest corner of MD Rt. 165 and 152. Although the leak apparently affected a number of wells through MTBE infiltration, contaminant measurements for a large majority of these wells were below the EPA Health Advisory.

The station was always considered to be in compliance with State regulations regarding underground storage tanks; but apparently, because of the nature of the leak (vapor) and length of time the station was in operation, many wells revealed the presence of the gasoline additive MTBE. No wells in the area exhibited any other constituents of gasoline, which gave reason to believe that there was never a liquid leak from the station.

MDE has a number of open VOC cases in the county and is working on several remediation sites. This office, in conjunction with MDE, is monitoring properties with wells that have potential risk for VOC contamination of the ground water. Water treatment options are available to ensure that drinking water standards are met.

Radiological Elements- A survey of properties performed in the western portion of the county in 2004 for radiological elements, found very little evidence of radiological contamination in drinking water wells. This survey was initiated due

to the presence of gross alpha and gross beta contamination found in the Baltimore Gneiss Formations of Baltimore and Howard Counties. There is only a small portion of Harford County which has this type of rock formation. However, there are locations in Harford County with different types of Gneiss formations, and these are being tested as wells are drilled. Thus far, no indication of radiological contamination above EPA Maximum Contaminant Levels (MCLs) has been demonstrated.

Pesticides/Herbicides- The improper storage, application and handling of these compounds may result in their entry to surface and ground water supplies. To date, there has been limited sampling for herbicides and pesticides in county drinking water wells by Health Department personnel.

Elevated levels are rarely detected in private water supplies, and when found are the result of an actual spill or gross misapplication. Random sampling of private drinking water wells has yet to reveal contamination above EPA maximum contaminant levels.

Conclusion

The quantity of groundwater in Harford County is more than adequate in the Coastal Plain aquifers, and considered sufficient for domestic use in the Piedmont areas, due to the amount of recharge produced by rainfall. Overall, the water quality of the groundwater aquifers serving the County are relatively good, except for a few areas of localized contamination, and the presence of natural nuisance substances such as iron, which can be treated.

The Health Department has created maps of the county, highlighting areas with environmental concerns. Information entered into a GIS database includes properties with above ground storage tanks, underground storage tanks, hazardous materials, biosolids applications, landfills, and other operations which may be a potential source of contamination of the groundwater. These properties, and those in close proximity, are carefully scrutinized when there is building activity or proposed subdivision of land. Environmental assessments are required when there is evidence of contamination, or if there is the possibility that contamination could migrate to the ground waters of the site under review.

The Harford County Health Department will not approve creation of new lots if an environmental assessment indicates contamination of the ground water above any drinking water standards regulated by the EPA.

Harford County Health Department

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