

THE TEMPEST

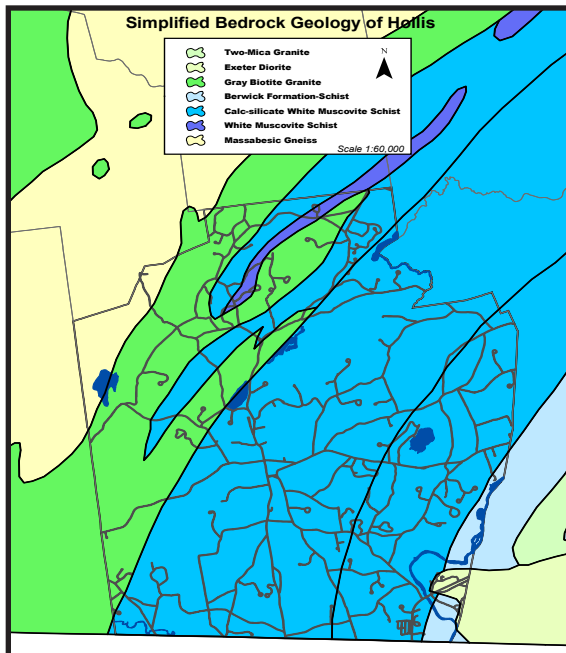
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How Geology Affects Water Quality

A basic understanding of the physical geology (what lies beneath your feet) of a region is important because geology has a significant effect on water quality. If you start to dig a hole in Hollis, chances are you will hit bedrock within twenty feet. Bedrock is the solid material that makes up the earth's crust. As illustrated in the simplified geologic map below, the bedrock underlying Hollis is of two types: igneous or metamorphic. Igneous rocks such as granite and diorite, were formed from slowly cooling pockets of magma (molten rock) trapped beneath the earth's surface. Metamorphic rocks such as schist and gneiss, were modified by heat, pressure and chemical processes while buried deep below the surface of the earth. From the map below you can see that the bedrock in Hollis consists predominately of granite, which is located to the west of the fault line that runs from southwestern Hollis in a northeasterly direction west of Silver Lake, and schist, which runs to the east of this fault line and covers over two-thirds of the Town.



Hollis does not have a town-wide municipal water supply system. Except for the school well, that also serves several residences in Town Center, and the Flint Pond Water Company that provides drinking water to a few residences on Flint Pond Drive, most homes in Town get their drinking water from on-site private wells. Most private wells in New Hampshire are drilled bedrock wells. The depth of drilled wells can range from 100 to well over 400 feet. In these types of wells groundwater percolates through soils and rock and is stored in the cracks and fissures.

While the State regulates well drillers and pump installers, it does not regulate the water quality from private wells. In Hollis, the building department requires water testing and disclosure of results

of the testing prior to the issuance of a certificate of occupancy for new residences. Common contaminants tested for include, arsenic, bacteria, chloride, copper, fluoride, hardness, iron, lead, manganese, nitrate/nitrite, pH (a measure of acidity [<7] and alkalinity [>7]), sodium, VOC (solvents and hydrocarbons), and radon.

In June of 2005 over one hundred Hollis residents participated in a Private Well Initiative. The purpose of the Initiative was to establish baseline data for monitoring water quality in Hollis. Planning Board member Bill Beauregard led this initiative, which was prompted by the Planning Board's concern that a large development, proposed at that time, could potentially impact the water quality of neighboring private wells. Water samples were collected and delivered to the New Hampshire Department of Environmental Services (NHDES), where each sample was analyzed. The test results yielded intriguing information about the chemistry and quality of Hollis's water. State Geologist David Wunsch, PhD presented the findings at a Selectmen's meeting in March of 2006.

From the data collected, Dr. Wunsch found that none of the granite wells had arsenic levels above the recommended drinking water maximum contaminant level (mcl) regardless of the depth of the well. 23% of the wells tested in the schist had arsenic levels that were above the mcl. The deeper schist wells ($>500'$) had higher arsenic and higher pH (>8) levels than the wells that were less than 500' deep. The data indicated a trend of arsenic concentrations increasing with well depth. Because of the higher pH levels in the deep wells Dr. Wunsch's hunch was that less arsenic is absorbed into the rock and therefore is freed up into the water. There also appeared to be a correlation between high iron oxide and elevated arsenic levels.

Another element of concern for Hollis residents is the presence of uranium. Eleven out of seventy-one schist wells had detectable concentrations of uranium. The average concentration was .89 ug/L. Three out of eighteen of the granite wells (17%) had detectable concentrations of uranium. The average concentration of uranium in these wells was 65.5 ug/L. Radon occurs in association with uranium. The study found that granite wells tended to have higher radon and uranium levels than the schist wells.

Only four wells tested had high natural fluoride levels. All of these were schist wells and all had high pH levels (>8). Currently, there is a health controversy regarding the benefits of fluoride in drinking water. Studies have shown that excessive fluoride concentrations may cause skeletal problems and staining of the teeth.

It is up to you, the homeowner, to ensure that the water from your well is safe for you and your family. The State recommends that private well owners make sure their well is constructed properly and that the water is tested yearly for arsenic and fluoride. A complete water test should be done every three years.

For more information about private wells and well testing visit the NHDES website at www.des.nh.gov/programs