

Bedrock Aquifer Systems of Tipton County, Indiana

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The occurrence of bedrock aquifers depends on the original composition of the rocks and subsequent changes which influence the hydraulic properties. Post-depositional processes, which promote jointing, fracturing, and solution activity of exposed bedrock, generally increase the hydraulic conductivity (permeability) of the upper portion of bedrock aquifer systems. Because permeability in many places is greatest near the bedrock surface, bedrock units within the upper 100 feet are commonly the most productive aquifers.

Only one bedrock aquifer system is identified for Tipton County: the Silurian and Devonian Carbonates. Rock types exposed at the bedrock surface include moderately productive to prolific limestones and dolomites with varying amounts of interbedded shale. Bedrock wells represent about 25 percent of all wells completed in this county. Most of the bedrock system in Tipton County is under confined conditions. In other words, the potentiometric surface (water level) in most wells completed in bedrock rises above the top of the water-bearing zone.

The Silurian and Devonian Carbonates Aquifer System in Tipton County is overlain by unconsolidated deposits of varying thickness, ranging from about 25 feet to over 250 feet. In general, the thickness of unconsolidated deposits increases from the northeast to the southwest.

The yield of a bedrock aquifer depends on its hydraulic characteristics and the nature of the overlying deposits. Shale and clay act as aquitards, restricting recharge to underlying bedrock aquifers. However, fracturing and/or jointing may occur in aquitards, which can increase recharge to the underlying aquifers. Hydraulic properties of the bedrock aquifers are extremely variable.

The susceptibility of bedrock aquifer systems to surface contamination is largely dependent on the type and thickness of the overlying sediments. However, because bedrock aquifer systems may have complex fracturing systems, once a contaminant has been introduced into a bedrock aquifer system, it will be difficult to track and remediate.

Silurian and Devonian Carbonates Aquifer System

This aquifer system includes carbonate rock units (limestone and dolomite) with some interbedded shale units. In Tipton County, the system consists of the Pleasant Mills and Wabash formations of Silurian age, and the Muscatatuck group of Devonian age. Generally, the thickness of the Silurian and Devonian Carbonates Aquifer System ranges from less than 275 feet in the western portion to over 360 feet in the eastern portion of Tipton County.

Wells in the Silurian and Devonian Carbonates Aquifer System in this county are commonly 65 to 150 feet deep. The amount of rock penetrated in this system typically ranges from 20 to 105 feet.

Wells completed in this system are capable of meeting the needs of domestic and some high-capacity users in this county. Domestic well yields commonly range from 10 to 45 gallons per minute (gpm). Static water levels typically range from 10 to 20 feet below the land surface with a few reports of flowing wells in the county. There are 4 registered significant groundwater withdrawal facilities (8 wells) using the Silurian and Devonian Carbonates Aquifer System in Tipton County. Reported high-capacity well yields range from 75 to 300 gpm.

This aquifer system has a low susceptibility to surface contamination due to thick clay deposits over most of the county. However, the Silurian and Devonian Carbonate Aquifer System is moderately to highly susceptible to contamination where overlying clays are thin or absent.

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