

Bedrock Aquifer Systems of Rush County, Indiana

by

Judith E. Beaty

Division of Water, Resource Assessment Section

February 2008

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. In Rush County, rock types exposed at the bedrock surface are moderately productive limestones and dolomites with varying amounts of interbedded shales to poorly productive shale.

Two bedrock aquifer systems are identified for Rush County, from west to east and younger to older: the Silurian and Devonian Carbonates and the Maquoketa Group of Ordovician age. Nearly half of the wells in Rush County are completed in bedrock; and in the southern part of the county, nearly all wells are completed in bedrock. Most of the bedrock aquifers in Rush County are 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 bedrock aquifer systems in Rush County are overlain by unconsolidated deposits of varying thickness, ranging from less than one foot to more than 350 feet. However, for nearly half of the county, the depth to bedrock is 50 feet or less. This shallow area of bedrock lies primarily in the southern part of the county and along major streams.

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 highly 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 is introduced into a bedrock aquifer system, it is difficult to track and remediate.

Silurian and Devonian Carbonates Aquifer System

The Silurian and Devonian Carbonates Aquifer System outcrops/subcrops throughout most of Rush County and consists of middle Devonian age carbonates of the Muscatatuck Group and

underlying Silurian carbonates. Because individual units of the Silurian and Devonian systems are composed of similar carbonate rock types and cannot easily be distinguished on the basis of water well records, they are considered as a single water-bearing system. Total thickness of the Silurian and Devonian Carbonates Aquifer System in Rush County ranges from 0 in the deepest part of the major bedrock valleys to approximately 180 feet in much of the western part of the county.

The depth to bedrock is commonly 35 to 80 feet. Water wells producing from the Silurian and Devonian Carbonates Aquifer System in Rush County have reported depths that are generally 60 to 115 feet deep. The amount of rock penetrated in this system typically ranges from 5 to 40 feet. Static water levels are typically 5 to 30 feet below land surface.

Water wells completed in this system are generally capable of meeting the needs of domestic users and some high-capacity users in this county. Typical yields for domestic wells in Rush County range from 5 to 15 gallons per minute (gpm), although wells yielding 20 to 30 gpm are not uncommon. However, a few dry holes have also been reported. There is 1 registered significant ground-water withdrawal facility (2 wells) serving the town of Milroy that has reported capacities of about 100 gpm for each well. A table containing information about this facility accompanies the Aquifer Systems maps. There are also 5 known water wells that lie elsewhere within this system that have reported capacities of 60 to 80 gpm. Since there is no centralized location in the county for these higher-producing wells, the higher production is probably related to localized features.

Describing the susceptibility to surface contamination of the Silurian and Devonian Carbonates Aquifer System in Rush County is not simple, because it varies considerably from place to place. The system is not very susceptible to contamination in much of the northern part of Rush County due to thick till deposits. However, the aquifer system is moderately to highly susceptible in places where clay aquitards are absent and in the vicinity of the major river valleys where unconsolidated materials may consist primarily of sand and gravel outwash materials. In the southern part of the county where the thickness of till cover is highly variable, the aquifer system susceptibility to surface contamination is also variable.

Ordovician -- Maquoketa Group Aquifer System

The subcrop area of the Maquoketa Group occurs in buried pre-glacial valleys where the overlying Silurian and Devonian bedrock has been removed by erosion. The Maquoketa Group consists mostly of shales with interbedded limestone units.

There are only about a half dozen wells in Rush County that are thought to be completed in the Maquoketa Group Aquifer System. The wells range in depth from about 100 to 205 feet and are barely capable of meeting the needs of domestic users in Rush County. Static water levels are highly variable.

The few reported yields for domestic wells range from 2 to 4 gpm. One dry hole was reported. This aquifer system has a low susceptibility to surface contamination because of thick clay deposits which cover the subcrop area.

Map Use and Disclaimer Statement

We request that the following agency be acknowledged in products derived from this map:
Indiana Department of Natural Resources, Division of Water.

This map was compiled by staff of the Indiana Department of Natural Resources, Division of Water using data believed to be reasonably accurate. However, a degree of error is inherent in all maps. This product is distributed “as is” without warranties of any kind, either expressed or implied. This map is intended for use only at the published scale.