

# **Bedrock Aquifer Systems of Cass County, Indiana**

by

Gerald A. Unterreiner

Division of Water, Resource Assessment Section

August 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.

One bedrock aquifer system is identified for Cass 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. About half of the wells in this county are completed in bedrock. Most of the bedrock aquifers in Cass 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 Silurian and Devonian Carbonates Aquifer System in Cass County is overlain by unconsolidated deposits of varying thickness. Bedrock is at or near the surface in places along the Wabash River and some tributaries. However, the bedrock surface is buried beneath more than 300 feet of unconsolidated materials in the deepest parts of a bedrock valley, which cuts across the county from east, near the town of Hoover, through Lake Cicott to the southwest. Additionally, the areas of greatest unconsolidated thickness correspond to the rolling morainic topography found in the north-central and northeastern part of Cass County. Adjacent to and south of the Wabash River, the unconsolidated deposits thin and many wells are completed in bedrock.

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**

The Silurian and Devonian Carbonates Aquifer System outcrops/subcrops throughout all of Cass County. The system includes carbonate rock units (limestone and dolomite) with some interbedded shale units. 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. Stratigraphically in Cass County, the uppermost rock units of the system consist of the Devonian age Muscatatuck Group and the older Silurian age Wabash Formation of the Salina Group. The Devonian rocks have been eroded from most of the county and only a few isolated remnants remain. The total thickness of the Silurian and Devonian Carbonates Aquifer System in Cass County ranges from about 400 feet to 500 feet.

Wells producing from the Silurian and Devonian Carbonates Aquifer System in this county have reported depths ranging from 25 to 380 feet, but are commonly 80 to 180 feet deep. The amount of rock penetrated in this system typically ranges from 25 to 100 feet.

Wells completed in the Silurian and Devonian Carbonates Aquifer System are capable of meeting the needs of domestic and some high-capacity users in this county. Domestic well yields commonly range from 15 to 50 gallons per minute (gpm). Static water levels typically range from 10 to 50 feet below the land surface with a few reports of flowing wells in the county. There are 10 registered significant ground-water withdrawal facilities (32 wells) using the Silurian and Devonian Carbonates Aquifer System in Cass County. Reported high-capacity well yields range from 80 to 400 gpm. The dominant use of these facilities is for industry. Other uses are for public water supply, energy production, irrigation, and miscellaneous (fire protection). A table containing information about these facilities accompanies the Aquifer Systems maps.

The susceptibility to surface contamination of the Silurian and Devonian Carbonates Aquifer System in Cass County varies considerably from place to place. The system is not very susceptible to contamination in much of north-central and northeastern Cass County because of the thick glacial deposits. In the northwestern corner and southern two-thirds of the county, where the thickness of till is highly variable, the aquifer system is moderately to highly susceptible in places where clay aquitards are absent. In and adjacent to some of the stream valleys in the county, where unconsolidated materials are thin or absent or may consist primarily of sand and gravel outwash materials, the system is at moderate to high risk to contamination.

### **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.