

Bedrock Aquifer Systems of Jay 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.

Unconsolidated deposits of varying thickness overlie bedrock aquifer systems in Jay County. Most of the bedrock aquifers in the 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 formation.

The yield of a bedrock aquifer depends on its hydraulic characteristics and the nature of the overlying deposits. Shale and glacial till 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. Because the bedrock aquifer systems have complex fracturing systems, once a contaminant has been introduced into a bedrock aquifer system, it will be difficult to track and remediate.

Two bedrock aquifer systems are identified for Jay County. They are the Silurian and Devonian Carbonates and the Maquoketa Group of Ordovician age.

Silurian and Devonian Carbonates Aquifer System

The Silurian and Devonian Carbonates Aquifer System is extensive throughout nearly all of Jay county. The system includes Silurian age carbonate rock units (limestone and dolomite) with some interbedded shale units. Total thickness of the Silurian bedrock is up to 350 feet. Depth to the bedrock surface ranges from about 7 to 300 feet but is commonly 50 to 120 feet. Total well depths range from 30 to 320 feet but are typically 100 to 170 feet. Penetration into bedrock is commonly 30 to 75 feet.

The Silurian and Devonian Carbonates Aquifer System in Jay County is capable of meeting the needs of domestic and some high-capacity users. Typical domestic yields range from 10 to 25 gallons per minute (gpm). Static water levels range from 4 to 105 feet but are commonly 20 to

45 feet. There are 8 registered high-capacity facilities (22 wells) with yields that range from 80 to 600 gpm.

Most of the Silurian and Devonian Carbonates Aquifer System in Jay County is overlain by clay deposits of variable thickness. Where overlying clay materials are thick, this aquifer system is considered at low risk to contamination. However, there are localized areas where the bedrock surface is shallow. Also, near the Salamonie and Wabash rivers bedrock is overlain by thin alluvial and outwash deposits. These areas, therefore, are at moderate to high risk to contamination.

Ordovician -- Maquoketa Group Aquifer System

The extent of the Maquoketa Group Aquifer System subcrop area is limited to two buried bedrock valleys located along the south-central and northwest portions of Jay County. The Maquoketa Group consists of, in ascending order: the Kope, Dillsboro, and Whitewater Formations and includes mostly interbedded shale and limestone units. Thickness of the Maquoketa Group in Jay County ranges from 750 to 850 feet and thins as it dips beneath younger strata to the northwest. The depth to the bedrock surface ranges from 240 to 450 feet.

Few wells have been reported in this system in Jay County because adequate supplies are available from the overlying Silurian and Devonian Carbonates and in places, unconsolidated sand and gravel resources. Reported depths of the few wells drilled in the Maquoketa Group range from 302 to 452 feet with the amount of rock penetration ranging from 4 to 273 feet. The overlying deposits may also contribute to the overall yield of wells completed in the Maquoketa Group Aquifer System. Reported well yields range from 4 to 90 gpm and static water levels are 27 to 55 feet below land surface.

Thick clay deposits cap this aquifer system; therefore, the Maquoketa Group Aquifer System is not very susceptible to contamination from the land surface.

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