Bedrock Aquifer Systems of Kosciusko 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.

The bedrock aquifer systems in Kosciusko County are overlain by unconsolidated deposits of varying thickness, ranging from 150 to more than 350 feet. Most of the bedrock aquifers, therefore, 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 Kosciusko County. They are, from younger to older: the Devonian and Mississippian Coldwater, Ellsworth and Antrim Shales; and the Silurian and Devonian Carbonates.

Devonian and Mississippian -- Coldwater, Ellsworth and Antrim Shales Aquifer System

In Kosciusko County only the Antrim Shale and Ellsworth Shale subcrop in the Coldwater, Ellsworth and Antrim Shales Aquifer System. The Antrim Shale in Indiana is typically described as brownish-black shale and the Ellsworth is described as greenish-gray shale. These shales are commonly considered an aquitard: therefore, the system is an extremely limited ground-water resource. However, in some places the lower portion of the aquifer unit may contain some limestone.

The subcrop area for this system is present primarily in the northern half of Kosciusko County and is generally less than 125 feet thick. Depth to bedrock ranges from around 180 to more than 300 feet.

Due to the availability of ground water in the overlying unconsolidated aquifers very few wells have been completed in the Coldwater, Ellsworth and Antrim Shales Aquifer System in Kosciusko County. However, a few domestic wells have been reported. Total depths of domestic wells completed in this system range from 240 to 315 feet with penetration into bedrock generally less than 100 feet. Reported yields are less than 10 gallons per minute (gpm).

Because the permeability of shale materials is considered low and the overlying unconsolidated deposits are thick, susceptibility to contamination introduced at or near the surface is low.

Silurian and Devonian Carbonates Aquifer System

The Silurian and Devonian Carbonates Aquifer System subcrops throughout most of the southern half of Kosciusko County. The aquifer system in this county consists primarily of Silurian age carbonates of the Wabash Group and middle Devonian age carbonates of the Muscatatuck Group. Total thickness of this aquifer system exceeds 900 feet in places.

Due to the availability of the overlying unconsolidated resources very few wells have been completed in the Silurian and Devonian Carbonates Aquifer System. Reported domestic wells utilizing this system in Kosciusko County have depths ranging from 277 to 504 feet deep. The amount of rock penetrated in this system varies from 3 to 127 feet. Domestic well yields range from 12 to 60 gpm. Static water levels are between 22 to 80 feet below the land surface. There are 2 registered significant ground-water withdrawal facilities (4 wells). Reported yields from the individual wells are 50 to 70 gpm. Refer to the table for details on the wells and to the map for facility locations. In Kosciusko County the Silurian and Devonian Carbonates Aquifer System has a low susceptibility to surface contamination because thick clay deposits overlie the system.

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