Bedrock Aquifer Systems of Elkhart County, Indiana

by
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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 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. 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 zone.

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.

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

One bedrock aquifer system is identified for Elkhart County: the Devonian and Mississippian age Coldwater, Ellsworth, and Antrim Shales. The Coldwater, Ellsworth, and Antrim Shales Aquifer System is about 300 to 380 feet thick and subcrops throughout Elkhart County. These shales are commonly considered an aquitard; therefore, the system is an extremely limited groundwater resource.

Elkhart County has a complex glacial history and was subjected to multiple glacial advances from the north and northeast resulting in glacial sediment deposits completely covering the county. This system is overlain by unconsolidated deposits ranging in thickness from 150 feet to over 400 feet. Because of the availability of the overlying unconsolidated resources, no water wells have been completed in the Coldwater, Ellsworth, and Antrim Shales Aquifer System in Elkhart County.

In nearby St. Joseph County a few wells have been completed in this aquifer system and are capable of meeting the needs of some domestic users. Domestic well yields are commonly less than 5 gallons per minute (gpm) with a few dry holes (pumped) reported. Well depths range from 45 to 140 feet deep and static water levels typically range from 5 to 50 feet below the land surface. The amount of rock penetrated in this system ranges from 30 to 60 feet.

Since 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.

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