

Bedrock Aquifer Systems of LaGrange County, Indiana

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The occurrence of bedrock aquifers depends on the original composition of the geologic material 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. In general, hydraulic properties of bedrock aquifers are highly variable. Most bedrock aquifers overlain by thick glacial deposits, such as in LaGrange 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 LaGrange County; the Devonian and Mississippian age Coldwater, Ellsworth, and Antrim Shales. The shales subcrop throughout the entire county and thicken from south to north. Oil and gas drillers' logs show that the shales attain a thickness of about 250 feet in the southern part of the county and thicken to over 500 feet in the north. These shales are commonly considered an aquitard; therefore, the system is an extremely limited ground-water resource.

LaGrange County has a complex glacial history and was subjected to multiple glacial advances from the north, northeast, and east resulting in glacial sediment deposits completely covering the county. The unconsolidated sediments range in thickness from about 100 feet to over 400 feet. Major sand and gravel aquifers occur in these unconsolidated deposits overlying the bedrock. Because unconsolidated ground-water resources are readily available, only two water wells reportedly utilize the Coldwater, Ellsworth, and Antrim Shales Aquifer System in LaGrange County. These domestic wells are located just east of the intersection of State Road 9 and County Road 400 North. The wells utilizing this system have depths ranging from 117 to 136

feet. The amount of rock penetrated in this bedrock system for the two wells is 3 and 4 feet. The well yields are 10 and 13 gallons per minute with static water levels of 9 and 10 feet below the land surface.

Since the permeability of shale materials is considered low and the overlying unconsolidated deposits are thick, this bedrock system is not very susceptible to contamination introduced at or near the surface.

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