Bedrock Aquifer Systems of Brown County, Indiana

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May 2003

Bedrock aquifers are commonly used in Brown County because the overlying unconsolidated materials are so thin. Two bedrock aquifer systems are utilized: the Mississippian Borden Group (occurring at or near land surface) and the Silurian and Devonian Carbonate Aquifer System. Stratigraphically separating these two bedrock aquifer systems is the Devonian and Mississippian New Albany Shale Aquifer System, which in the subsurface of Brown County is regarded more as an aquitard.

Mississippian -- Borden Group Aquifer System

The Mississippian Borden Group Aquifer System encompasses all of Brown County and is a primary but extremely limited source of ground water. The thickness of this aquifer system in the county ranges from about 250 feet to 700 feet, with the bedrock strata dipping and thinning to the southwest. The Borden is composed mostly of siltstone and shale. Fine-grained sandstones are common, especially in the upper third of the group. Carbonates are rare, occurring mostly as discontinuous interbedded limestone lenses in the upper portion of the group. Immediately below the Borden is the Rockford Limestone. Where present it is an important marker bed separating the Borden Group from the underlying Devonian and Mississippian New Albany Shale.

Depths of existing wells in the Borden Group range from 15 to 380 feet. Most wells, however, are completed at depths between 60 and 175 feet. The amount of Borden rock penetrated typically ranges from about 40 to 140 feet, with a maximum of 320 feet. Most of the water is found in the upper 100 feet of the rock, although data are not sufficient to correlate yields with the amount of penetration. Static water levels in the wells completed in the Borden range from 0 to 300 feet below land surface, but are commonly between 20 and 60 feet.

The Borden Group is often regarded as an aquitard. Its water production potential is quite limited and many dry holes are noted. Attempts to get large volumes of water from wells drilled into it have generally failed. In some instances the Borden is bypassed and deeper wells are drilled into the underlying Silurian and Devonian Carbonate Aquifer System. Wells over 400 or 500 feet deep will commonly encounter nonpotable (mineralized or salty) water.

Many wells in the Borden Group are barely able to produce sufficient water for domestic purposes. Few wells yield more than 5 gpm. A very limited number of wells report up to 20 gpm, but it is doubtful that they can sustain such a high rate for more than a few minutes. The higher yielding wells may be located where the amount of sandstone in the

Borden is greatest. In addition, wells may have a little higher yield where thicker unconsolidated deposits of the Alluvial, Lacustrine, and Backwater Deposits Aquifer System overlie the Borden (in the larger valley bottoms). However, to date no attempt has been made to test these hypotheses.

Devonian and Mississippian -- New Albany Shale Aquifer System (beneath the Mississippian Borden Group Aquifer System)

This aquifer system occurs only in the subsurface of Brown County. It consists of predominantly brownish-black, carbon-rich shale having a thickness of about 100 to 125 feet. The Division has no records for wells completed in it. Permeability of this formation in the subsurface is probably quite low so that the potential for successful wells even for domestic needs would be very limited.

Silurian and Devonian Carbonate Aquifer System (beneath the New Albany Shale Aquifer System)

The Silurian and Devonian Carbonate Aquifer system is a limited ground-water resource in Brown County with very few wells utilizing this system. Depth and cost are two limiting factors. Most wells drilled into this system are intended for public supply or other larger volume needs. A few domestic wells resulted from converted oil and gas wells or test holes. Drilling to such depths, however, usually results in wells producing mineralized or salty water. Water containing hydrogen sulfide is also common where the New Albany Shale overlies the Silurian and Devonian Carbonate Aquifer system.

The Silurian and Devonian Carbonate Aquifer system is composed primarily of limestones and dolomite with some interbedded shale units. Because most individual units of the Silurian and Devonian system are composed of similar carbonate rock types, and cannot be easily distinguished on the basis of water well records, they are considered as a single water-bearing system.

The thickness of the Silurian and Devonian Carbonate Aquifer system in Brown County ranges from about 240 to 400 feet. Depths of existing wells completed in this aquifer system range from 475 to 850 feet. Because there are so few wells in this system, it is difficult to determine typical yields. Drillers have reported test rates as low as 4 gpm to as high as 415 gpm. A well drilled for the T.C. Steele State Historical Site is 790 feet deep. The well penetrates 570 feet of Borden, 112 feet of New Albany, and 103 feet of Devonian carbonates. The well was tested at 50 gpm, but the water is highly mineralized (2200 mg/L total dissolved solids and 1050 mg/L chlorides). Refer to the map for the location of this well. Static water levels in this system vary from approximately 150 feet to 300 feet below land surface. Water level drawdowns of 140 to 500 feet have been reported during well testing.

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