Bedrock Aquifer Systems of Harrison County, Indiana

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Three bedrock aquifer systems, all of Mississippian age, have been mapped in Harrison County. They are from west to east and youngest to oldest: the Buffalo Wallow, Stephensport, and West Baden Groups; the Blue River and Sanders Groups; and the Borden Group. The bedrock aquifer systems extend across Harrison County generally as a series of bands primarily trending north to south.

The thickness of unconsolidated materials covering the bedrock of Harrison County varies, but for the most part is less than 50 feet. Rock types exposed at the bedrock surface range from relatively unproductive shales to moderately productive limestones. Because permeability in many places is greatest near the bedrock surface, bedrock units within the upper 100 feet are commonly the most productive aquifers. 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. Bedrock wells represent over 95 percent of all wells completed in Harrison County. However, much of the county is served by a public water supply system originating from the prolific unconsolidated sand and gravel deposits within the Ohio River valley.

The susceptibility of bedrock aquifer systems to surface contamination is largely dependent on the type and thickness of the overlying sediments. However, 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.

Mississippian -- Buffalo Wallow, Stephensport, and West Baden Groups Aquifer System

The Buffalo Wallow, Stephensport, and West Baden Groups are mapped as a bedrock aquifer system in Indiana. However, no Buffalo Wallow strata are present in Harrison County. The older Stephensport and West Baden Groups outcrop primarily along ridge tops in the western portion of the county.

The older West Baden Group consists dominantly of sandstone, siltstone, and shale; however, it has limestone beds of variable thickness. The younger Stephensport Group is comprised of limestone, shale, and cliff-forming sandstone. The combined thickness of the West Baden and Stephensport in the county ranges from less than one foot where the older Blue River Group rocks are exposed to a maximum of about 115 feet in the western part of the county.

The depth to the bedrock surface is typically less than 20 feet on the uplands in Harrison County. Well depths of the very few wells started in the Buffalo Wallow, Stephensport, and West Baden

Groups Aquifer System range from 94 to 503 feet. The amount of rock penetrated by a well typically ranges from about 170 to 340 feet. Therefore, all of the wells penetrate into the underlying Blue River and Sanders Groups Aquifer System. Static water levels are highly variable in the wells completed in this aquifer system. Reported water levels range from 50 to 300 feet below the land surface.

The Buffalo Wallow, Stephensport, and West Baden Groups Aquifer System is not regarded as a major ground-water resource in this county. Wells started in this system are typically completed in the older, more productive Blue River and Sanders Groups Aquifer System. The domestic wells completed in the underlying Blue River and Sanders Groups Aquifer System have commonly been tested between less than 1 and 10 gallons per minute (gpm) with a few dry holes reported. At least one domestic well was tested as high as 30 gpm. However, very few wells can sustain a pumping rate over 10 gpm.

In the outcrop/subcrop area of this aquifer system the rock is predominantly shallow and contains numerous, irregular joints. In addition, karst features (sinkholes) are noted on topographic maps (see map). These conditions warrant considering the aquifer system in Harrison County to be moderately to highly susceptible to contaminants introduced at and near the land surface.

Mississippian -- Blue River and Sanders Groups Aquifer System

This aquifer system outcrops throughout most of the county. The older Sanders group consists of limestone and dolomite. Chert and siliceous intervals of carbonate rocks are common, and minor amounts of shale and siltstone are present. The Blue River Group formations are primarily limestone, but they may contain significant amounts of dolomite, gypsum, anhydrite, shale, chert, and calcareous sandstone.

The combined thickness of the Blue River and Sanders Groups ranges from less than 1 foot where they are eroded along parts of the eastern and southeastern border of Harrison County to over 500 feet in the southwestern part of the county. The formations thicken as they dip to the west-southwest. Limestones within the Blue River Group are especially noted for development of karst features on the land surface where the bedrock is quite shallow. Some of the karst features in the county include caves, sinkholes, collapsed sinkholes, sinking streams, stream rises, and springs. These features are produced by the action of ground water dissolving the limestone, primarily along planes or zones of weakness. Refer to the karst extra text document for more information.

Some well records describe cavities or solution channels up to 15 feet in height. As expected, the yields of wells tapping this aquifer system are quite variable. The Division of Water has records for over 800 wells in this aquifer system in the county. The depth to solid bedrock is typically between 20 and 50 feet on the uplands of the central portion of the county (Mitchell Plateau), but may be as much as 90 feet where broken limestone and clay are present due to extensive weathering and/or karstification.

Well depths range from about 25 to 525 feet, but wells are commonly completed at depths of 75 to 175 feet. Reported test rates for water wells vary from less than 1 to 300 gpm. There is one registered significant ground-water withdrawal facility (6 wells) with reported yields of 25 to 300 gpm. Domestic well yields in this system commonly range from 1 to 20 gpm and a few isolated dry holes have been reported. Reported static water levels range from less than 1 foot to 300 feet below the land surface, but are typically between 40 and 90 feet.

In Harrison County, the Blue River and Sanders Groups Aquifer System is considered a moderately dependable ground-water source. Water quality is generally good, except for several wells reporting a sulfur odor, which may be due to chemical reactions associated with gypsum deposits in the Blue River Group. Because the rock is generally quite shallow, and contains numerous fractures, open joints, and solution channels, the aquifer system is considered very susceptible to contamination from the land surface.

Mississippian -- Borden Group Aquifer System

The Borden Group Aquifer System outcrops/subcrops in small areas along the eastern county boundary. This bedrock aquifer system is composed mostly of siltstone and shale, but fine-grained sandstones are common. Carbonates are rare, but do occur as discontinuous interbedded limestone lenses, mostly in the upper portion of the group.

The Borden Group in Harrison County is up to 600 feet thick. The very few wells completed in the Borden Group Aquifer System range in depth from 48 to 145 feet. Reported static water levels in the wells completed in this aquifer system range from 10 to 120 feet below the land surface. Because the Borden Group is generally not very productive, it is typically used only where unconsolidated deposits do not contain an aquifer. In fact, dry holes and yields of less than 1 gpm have been reported. The domestic wells completed in the group have testing rates ranging from less than 1 to 40 gpm. The higher yielding wells likely occur along significant bedrock fractures. There is little chance for development of high-capacity wells in the Borden Group Aquifer System in Harrison County.

This aquifer system is regarded as moderately susceptible to surface contamination. However, in areas where coarse-grained alluvium overlies the fractured and jointed rock, there is a high risk of contamination from surface or near-surface sources.

Registered Significant Ground-water Withdrawal Facilities

Currently there is one registered significant ground-water withdrawal facility using a bedrock aquifer in the county. The facility utilizes the Blue River and Sanders Group Aquifer System for the purpose of public water supply. The Blue River Regional Water District has six wells with reported capacities ranging from 25 to 300 gpm. Refer to Table 1 for some details on the wells and to the map for the facility location.

Map Use and Disclaimer Statement

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