

Unconsolidated Aquifer Systems of Benton County, Indiana

by
Robert A. Scott
Division of Water, Resource Assessment Section
May 2009

Five unconsolidated aquifer systems have been mapped in Benton County: the Till Veneer; the Iroquois Basin; the Iroquois Till; the Iroquois Till Subsystem; and the Iroquois Complex. Boundaries of all aquifer systems described are commonly gradational and individual aquifers may extend across aquifer system boundaries.

The thickness of unconsolidated deposits in Benton County is quite variable, due to glacial material that has been deposited over an uneven bedrock surface. The thickness of unconsolidated deposits ranges from outcropping in the northern half of the county to about 400 feet along the Lafayette (Teays) Bedrock Valley System located along the southern boundary of the county.

Regional estimates of potential contamination to aquifer systems from the surface can differ considerably by location. Variations within geologic environments can result in a wide range of susceptibility to these systems. In addition, man-made structures such as poorly constructed water wells, unplugged or improperly abandoned wells, and open excavations, can provide contaminant pathways that bypass the naturally protective clays.

Till Veneer Aquifer System

In Benton County, the Till Veneer Aquifer System consists of areas where the unconsolidated material is predominantly thin till overlying bedrock. Along some of the major streams, this system also includes thin alluvium and surficial sand and gravel outwash deposits overlying shallow bedrock. The Till Veneer Aquifer System in Benton County is mapped in portions of the eastern half of the county. This system has the most limited ground-water resources of the unconsolidated aquifer systems in the county. There is little potential for ground-water production in this system in Benton County. Potential aquifers within this system include thin isolated sand and/or gravel layers ranging up to 10 feet thick. These sands and gravels are overlain by a till cap which is commonly 20 to 40 feet thick.

Very few of the reported wells penetrating this aquifer system in the county are completed in unconsolidated materials. Approximately 70 percent of wells started in the Till Veneer Aquifer System are completed in the underlying bedrock aquifer system in Benton County. The depth of the few wells completed in the Till Veneer Aquifer System range from 30 to 50 feet deep with static water levels between 10 to 15 feet below the surface. The majority of the wells have reported capacities of less than 10 gallons per minute (gpm) with associated drawdowns between 10 to 18 feet. There are no registered significant ground-water withdrawal facilities in this system in Benton County.

This system is generally not very susceptible to contamination from surface sources because of the low permeability of the near-surface materials. However, areas where protective clay layers are thin or absent are susceptible to contamination.

Iroquois Basin Aquifer System

The Iroquois Basin Aquifer System in Benton County is an extension of a broad regional aquifer system initially described in the published report; Water Resource Availability in the Kankakee River Basin, Indiana, IDNR, 1990. The system is mapped along most of the northwestern quarter of the county. Characteristics of this system generally consist of either thick clay deposits with thin intermittent sands and gravels that overlie shallow bedrock, or, isolated surface sands with thin to no clay that directly overlie bedrock. Total thickness of these deposits ranges from about 10 feet to over 120 feet.

Approximately 50 percent of the wells completed in the mapped area utilize the underlying bedrock aquifer system. However, this system is capable of meeting the needs of most domestic users and some high-capacity users in the county. Potential aquifer sands and gravels generally range from 2 to 10 feet thick and may directly overlie the bedrock surface. Domestic well yields generally range from 5 to 30 gpm with static water levels from 10 to 40 feet below surface. There is one registered significant ground-water withdrawal facility (2 wells) in this system in Benton County. Each of the high-capacity wells is reported to yield up to 450 gpm.

This aquifer system is generally not very susceptible to surface contamination where sand and gravel units are overlain by thick till deposits. However, areas where overlying clays are thin or absent are at moderate to high risk of contamination.

Iroquois Till Aquifer System

In Benton County, the Iroquois Till Aquifer System ranges from approximately 100 to 400 feet in thickness. Wells completed in this system are capable of meeting the needs of most domestic users in Benton County. However, approximately 40 percent of wells started in this system utilize the underlying bedrock aquifer. Saturated aquifer materials include sand and/or gravel deposits that are commonly 2 to 10 feet thick and are generally overlain by 40 to 100 feet of till. Wells producing from the Iroquois Till Aquifer System are typically 55 to 110 feet deep. Domestic well capacities are commonly 5 to 30 gpm and static water levels generally range from 10 to 35 feet below the surface. There is one registered significant ground-water withdrawal facility (2 wells) in this system in Benton County. The reported yield for each high capacity well is 250 gpm.

Along the southern boundary, this system overlies part of the Lafayette (Teays) Bedrock Valley System. Wells completed in this portion of the system produce from both shallow and deep sand and gravel aquifers. The wells completed in the shallow portions of the buried bedrock valley are up to 90 feet in depth with aquifer thicknesses ranging from 2 to 15 feet. Domestic well capacities are generally up to 10 gpm with static water levels averaging 40 feet below the surface. The few wells completed in the deeper portion of the buried bedrock valley range from approximately 300 to 345 feet deep with aquifer

thicknesses up to 35 feet. Well capacities are generally up to 40 gpm with static water levels around 92 feet below surface.

The Iroquois Till Aquifer System typically has a low susceptibility to surface contamination because intratill sand and gravel units are commonly overlain by thick glacial till. Shallow wells completed in this system are moderately susceptible to contamination where surficial clay deposits are thin.

Iroquois Till Aquifer Subsystem

The Iroquois Till Aquifer Subsystem is mapped similar to the Iroquois Till Aquifer System, however, potential aquifer materials are typically thinner and potential yield is generally less in the subsystem. The unconsolidated material in the Iroquois Till Aquifer Subsystem ranges from about 50 to 200 feet thick. Potential aquifer materials include thin intratill sand and gravel deposits. Where present, aquifer materials are typically capped by till that is commonly 25 to 60 feet thick.

In Benton County, approximately 60 percent of wells started in the Iroquois Till Aquifer Subsystem are completed in the underlying bedrock aquifer system. However, this subsystem is capable of meeting the needs of some domestic users in the county. The few wells producing from the subsystem are generally completed at depths of 50 to 90 feet. Intratill sand and gravel aquifer materials are typically 5 to 10 feet thick. Reported well yields generally range from 5 to 15 gpm and static water levels are commonly 10 to 30 feet below the surface. There are no registered significant ground-water withdrawal facilities in this system in Benton County.

This subsystem is generally not very susceptible to surface contamination because intratill sand and gravel units are overlain by thick till deposits. However, in some areas where aquifers are shallow and overlying clay deposits are thin, the system is at moderate risk.

Iroquois Complex Aquifer System

The Iroquois Complex Aquifer System is characterized by unconsolidated deposits that are quite variable in materials and thickness. Aquifers within the system range from thin to thick and include single or multiple intratill sands and gravels. The aquifers are highly variable in depth and lateral extent and are typically confined by thick clay layers. The total unconsolidated thickness of the Iroquois Complex Aquifer System generally ranges from about 150 to 300 feet in Benton County.

This system is capable of meeting the needs of domestic and most high-capacity users in the county. However, approximately 15 percent of wells started in this system utilize the underlying bedrock aquifer. Aquifer layers utilized in this system are generally 10 to 20 feet thick sands and/or gravels. These sands and gravels are overlain by a till cap which is commonly 15 to 60 feet thick with thin intratill sand and gravel layers. Wells in this system are typically completed at depths ranging from 85 to 160 feet. Domestic well yields are commonly 15 to 60 gpm and static water levels are generally 5 to 35 feet below the surface. There are four registered

significant ground-water withdrawal facilities (7 wells) in this system in Benton County. High-capacity well yields up to 650 gpm are reported.

In the southern third of Benton County a portion of this system overlies the Lafayette (Teays) Bedrock Valley System. Wells completed in this portion of the system produce from both shallow and deep sand and gravel aquifers. The wells completed in the shallow portion of the buried bedrock valley are up to 175 feet in depth with aquifer thicknesses ranging from 2 to 30 feet. Well capacities are generally up to 25 gpm with static water levels around 30 feet below surface. The few wells completed in the deeper portion of the buried bedrock valley are up to 250 feet in depth with aquifer thicknesses up to 100 feet. Well capacities are generally up to 60 gpm with static water levels around 60 feet below surface.

The Iroquois Complex Aquifer System is generally not susceptible to contamination because it is typically overlain by thick clay deposits. However, in some areas where surficial clay deposits are thin or lacking, the shallow aquifer, if present, is at moderate to high risk to surface contamination.

Map Use and Disclaimer Statement

We request that the following agency be acknowledged in products derived from this map:
Indiana Department of Natural Resources, Division of Water.

This map was compiled by staff of the Indiana Department of Natural Resources, Division of Water using data believed to be reasonably accurate. However, a degree of error is inherent in all maps. This product is distributed “as is” without warranties of any kind, either expressed or implied. This map is intended for use only at the published scale.