GROUND WATER POLLUTION POTENTIAL OF PIKE COUNTY, OHIO

BY

CARRIE FREDERICK AND MICHAEL P. ANGLE

GROUND WATER POLLUTION POTENTIAL REPORT NO. 29

OHIO DEPARTMENT OF NATURAL RESOURCES

DIVISION OF WATER

WATER RESOURCES SECTION

2003

ABSTRACT

A ground water pollution potential map of Pike County has been prepared using the DRASTIC mapping process. The DRASTIC system consists of two major elements: the designation of mappable units, termed hydrogeologic settings, and the superposition of a relative rating system for pollution potential.

Hydrogeologic settings incorporate hydrogeologic factors that control ground water movement and occurrence including depth to water, net recharge, aquifer media, soil media, topography, impact of the vadose zone media, and hydraulic conductivity of the aquifer. These factors, which form the acronym DRASTIC, are incorporated into a relative ranking scheme that uses a combination of weights and ratings to produce a numerical value called the ground water pollution potential index. Hydrogeologic settings are combined with the pollution potential indexes to create units that can be graphically displayed on a map.

Ground water pollution potential analysis in Pike County resulted in a map with symbols and colors, which illustrate areas of varying ground water pollution potential indexes ranging from 65 to 199.

Pike County lies almost entirely within the Nonglaciated Central hydrogeologic setting. The extreme northwestern corner of the county (near Cynthiana) is within the Glaciated Central hydrogeologic setting. The buried valley underlying the present main channel of the Scioto River contains sand and gravel outwash that are capable of yielding over 1,000 gallons per minute (gpm) from properly designed, large diameter wells. The valley extending from Piketon to Beaver that was associated with the ancestral Teays Valley Drainage System and Lake Tight contains primarily fine-grained sediments. Wells completed in sand and gravel lenses interbedded with these fines yield 5 to 25 gpm. Other tributary valleys typically have yields ranging from less than 5 gpm to 25 gpm that are derived from thin sand and gravel lenses.

Bedrock in Pike County varies from Silurian limestones in the west, to Devonian and Mississippian shales in the central part of the county to sandstones in the eastern margin of the county. Typically, all of the bedrock units constitute poor aquifers and experience low yield and high drawdown. The sandstones commonly occupy high ridge tops, are well above drainage, and also experience low yields with limited recharge.

The ground water pollution potential mapping program optimizes the use of existing data to rank areas with respect to relative vulnerability to contamination. The ground water pollution potential map of Pike County has been prepared to assist planners, managers, and local officials in evaluating the potential for contamination from various sources of pollution. This information can be used to help direct resources and land use activities to appropriate area, or to assist in protection, monitoring, and clean-up efforts.

TABLE OF CONTENTS

Page

LIST OF FIGURES

Number Page

LIST OF TABLES

Number Page

ACKNOWLEDGEMENTS

The preparation of the Pike County Ground Water Pollution Potential report and map involved the contribution and work of a number of individuals in the Division of Water. Grateful acknowledgement is given to the following individuals for their technical review and map production, text authorship, report editing, and preparation:

Map preparation and review:	Carrie Frederick
GIS coverage production and review:	Paul Spahr
Report production and review:	Carrie Frederick Michael P. Angle
Report editing:	James Raab Kathy Sprowls Michael Hallfrisch

INTRODUCTION

The need for protection and management of ground water resources in Ohio has been clearly recognized. About 42 percent of Ohio citizens rely on ground water for drinking and household use from both municipal and private wells. Industry and agriculture also utilize significant quantities of ground water for processing and irrigation. In Ohio, approximately 750,000 rural households depend on private wells; 1700 of these wells exist in Pike County.

The characteristics of the many aquifer systems in the state make ground water highly vulnerable to contamination. Measures to protect ground water from contamination usually cost less and create less impact on ground water users than clean up of a polluted aquifer. Based on these concerns for protection of the resource, staff of the Division of Water conducted a review of various mapping strategies useful for identifying vulnerable aquifer areas. They placed particular emphasis on reviewing mapping systems that would assist in state and local protection and management programs. Based on these factors and the quantity and quality of available data on ground water resources, the DRASTIC mapping process (Aller et al., 1987) was selected for application in the program.

Considerable interest in the mapping program followed successful production of a demonstration county map and led to the inclusion of the program as a recommended initiative in the Ohio Ground Water Protection and Management Strategy (Ohio EPA, 1986). Based on this recommendation, the Ohio General Assembly funded the mapping program. A dedicated mapping unit has been established in the Division of Water, Water Resources Section to implement the ground water pollution potential mapping program on a countywide basis in Ohio.

The purpose of this report and map is to aid in the protection of our ground water resources. This protection can be enhanced by understanding and implementing the results of this study, which utilizes the DRASTIC system of evaluating an area's potential for ground water pollution. The mapping program identifies areas that are vulnerable to contamination and displays this information graphically on maps. The system was not designed or intended to replace site-specific investigations, but rather to be used as a planning and management tool. The map and report can be combined with other information to assist in prioritizing local resources and in making land use decisions.

APPLICATIONS OF POLLUTION POTENTIAL MAPS

The pollution potential mapping program offers a wide variety of applications in many counties. The ground water pollution potential map of Pike County has been prepared to assist planners, managers, and state and local officials in evaluating the relative vulnerability of areas to ground water contamination from various sources of pollution. This information can be used to help direct resources and land use activities to appropriate areas, or to assist in protection, monitoring, and clean-up efforts.

An important application of the pollution potential maps for many areas will be assisting in county land use planning and resource expenditures related to solid waste disposal. A county may use the map to help identify areas that are suitable for disposal activities. Once these areas have been identified, a county can collect more site-specific information and combine this with other local factors to determine site suitability.

Pollution potential maps may be applied successfully where non-point source contamination is a concern. Non-point source contamination occurs where land use activities over large areas impact water quality. Maps providing information on relative vulnerability can be used to guide the selection and implementation of appropriate best management practices in different areas. Best management practices should be chosen based upon consideration of the chemical and physical processes that occur from the practice, and the effect these processes may have in areas of moderate to high vulnerability to contamination. For example, the use of agricultural best management practices that limit the infiltration of nitrates, or promote denitrification above the water table, would be beneficial to implement in areas of relatively high vulnerability to contamination.

A pollution potential map can assist in developing ground water protection strategies. By identifying areas more vulnerable to contamination, officials can direct resources to areas where special attention or protection efforts might be warranted. This information can be utilized effectively at the local level for integration into land use decisions and as an educational tool to promote public awareness of ground water resources. Pollution potential maps may be used to prioritize ground water monitoring and/or contamination clean-up efforts. Areas that are identified as being vulnerable to contamination may benefit from increased ground water monitoring for pollutants or from additional efforts to clean up an aquifer.

Individuals in the county who are familiar with specific land use and management problems will recognize other beneficial uses of the pollution potential maps. Planning commissions and zoning boards can use these maps to help make informed decisions about the development of areas within their jurisdiction. Developers proposing projects within ground water sensitive areas may be required to show how ground water will be protected.

Regardless of the application, emphasis must be placed on the fact that the system is not designed to replace a site-specific investigation. The strength of the system lies in its ability to make a "first-cut approximation" by identifying areas that are vulnerable to contamination. Any potential applications of the system should also recognize the assumptions inherent in the system.

SUMMARY OF THE DRASTIC MAPPING PROCESS

DRASTIC was developed by the National Ground Water Association for the United States Environmental Protection Agency. This system was chosen for implementation of a ground water pollution potential mapping program in Ohio. A detailed discussion of this system can be found in Aller et al. (1987).

The DRASTIC mapping system allows the pollution potential of any area to be evaluated systematically using existing information. Vulnerability to contamination is a combination of hydrogeologic factors, anthropogenic influences, and sources of contamination in any given area. The DRASTIC system focuses only on those hydrogeologic factors that influence ground water pollution potential. The system consists of two major elements: the designation of mappable units, termed hydrogeologic settings, and the superposition of a relative rating system to determine pollution potential.

The application of DRASTIC to an area requires the recognition of a set of assumptions made in the development of the system. DRASTIC evaluates the pollution potential of an area under the assumption that a contaminant with the mobility of water is introduced at the surface and flushed into the ground water by precipitation. Most important, DRASTIC cannot be applied to areas smaller than 100 acres in size and is not intended or designed to replace site-specific investigations.

Hydrogeologic Settings and Factors

To facilitate the designation of mappable units, the DRASTIC system used the framework of an existing classification system developed by Heath (1984), which divides the United States into 15 ground water regions based on the factors in a ground water system that affect occurrence and availability.

Within each major hydrogeologic region, smaller units representing specific hydrogeologic settings are identified. Hydrogeologic settings form the basis of the system and represent a composite description of the major geologic and hydrogeologic factors that control ground water movement into, through, and out of an area. A hydrogeologic setting represents a mappable unit with common hydrogeologic characteristics and, as a consequence, common vulnerability to contamination (Aller et al., 1987).

Figure 1 illustrates the format and description of a typical hydrogeologic setting found within Pike County. Inherent within each hydrogeologic setting are the physical characteristics that affect the ground water pollution potential. These characteristics or factors identified during the development of the DRASTIC system include:

D – Depth to Water
R – Net Recharge
A – Aquifer Media
S – Soil Media
T – Topography
I – Impact of the Vadose Zone Media
C – Conductivity (Hydraulic) of the Aquifer

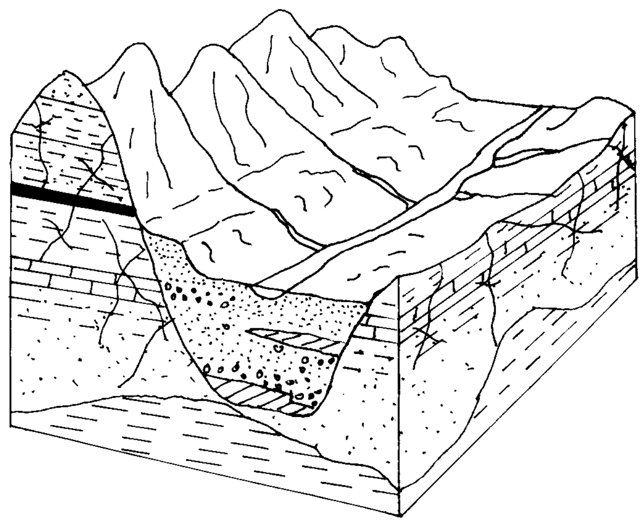
These factors incorporate concepts and mechanisms such as attenuation, retardation, and time or distance of travel of a contaminant with respect to the physical characteristics of the hydrogeologic setting. Broad consideration of these factors and mechanisms coupled with existing conditions in a setting provide a basis for determination of the area's relative vulnerability to contamination.

Depth to water is considered to be the depth from the ground surface to the water table in unconfined aquifer conditions or the depth to the top of the aquifer under confined aquifer conditions. The depth to water determines the distance a contaminant would have to travel before reaching the aquifer. The greater the distance the contaminant has to travel, the greater the opportunity for attenuation to occur or restriction of movement by relatively impermeable layers.

Net recharge is the total amount of water reaching the land surface that infiltrates the aquifer measured in inches per year. Recharge water is available to transport a contaminant from the surface into the aquifer and affects the quantity of water available for dilution and dispersion of a contaminant. Factors to be included in the determination of net recharge include contributions due to infiltration of precipitation, in addition to infiltration from rivers, streams and lakes, irrigation, and artificial recharge.

Aquifer media represents consolidated or unconsolidated rock material capable of yielding sufficient quantities of water for use. Aquifer media accounts for the various physical characteristics of the rock that provide mechanisms of attenuation, retardation, and flow pathways that affect a contaminant reaching and moving through an aquifer.

Soil media refers to the upper six feet of the unsaturated zone that is characterized by significant biological activity. The type of soil media influences the amount of recharge that can move through the soil column due to variations in soil permeability. Various soil types also have the ability to attenuate or retard a contaminant as it moves throughout the soil profile. Soil media is based on textural classifications of soils and considers relative thicknesses and attenuation characteristics of each profile within the soil.



7D Buried Valley

This setting was used for the buried valley underlying the Scioto River Valley, the Teays River Valley, and for an area of deep drift in Benton Township, northwestern Pike County. Broad, flat-lying valleys that may or may not contain a modern river characterize this setting. The Scioto River Valley contains thick sequences of coarse, clean sand and gravel outwash deposits. Yields from these deposits can range up to 1000 gpm, depending upon whether the deposits are in hydraulic connection with the river. Water in the Teays River Valley is obtained from sand and gravel lenses interbedded with thick sequences of fine-grained alluvial and lacustrine deposits. Wells completed in these lenses have yields ranging up to 50 gpm, with most yields being in the 5 to 25 gpm range. Water in the buried valley located in Benton Township is typically obtained from the underlying limestone; a few wells encounter thin sand lenses. These areas have yields usually less than 5 gpm. Soils are highly variable. Depths to water are commonly shallow. Recharge is high in the Scioto River Valley due to the highly permeable vadose and aquifer and proximity of the modern river. Recharge in the Teays River Valley and in the Benton Township valley is moderate due to the finer-grained nature of the vadose zone media and aquifer and the general lack of substantial surface water bodies.

GWPP index values for the hydrogeologic setting Buried Valley range from 111 to 199 with the total number of GWPP index calculations equaling 80.

Figure 1. Format and description of the hydrogeologic setting - 7D Buried Valley.

Topography refers to the slope of the land expressed as percent slope. The slope of an area affects the likelihood that a contaminant will run off or pond and ultimately infiltrate into the subsurface. Topography also affects soil development and often can be used to help determine the direction and gradient of ground water flow under water table conditions.

The impact of the vadose zone media refers to the attenuation and retardation processes that can occur as a contaminant moves through the unsaturated zone above the aquifer. The vadose zone represents that area below the soil horizon and above the aquifer that is unsaturated or discontinuously saturated. Various attenuation, travel time, and distance mechanisms related to the types of geologic materials present can affect the movement of contaminants in the vadose zone. Where an aquifer is unconfined, the vadose zone media represents the materials below the soil horizon and above the water table. Under confined aquifer conditions, the vadose zone is simply referred to as a confining layer. The presence of the confining layer in the unsaturated zone has a significant impact on the pollution potential of the ground water in an area.

Hydraulic conductivity of an aquifer is a measure of the ability of the aquifer to transmit water, and is also related to ground water velocity and gradient. Hydraulic conductivity is dependent upon the amount and interconnectivity of void spaces and fractures within a consolidated or unconsolidated rock unit. Higher hydraulic conductivity typically corresponds to higher vulnerability to contamination. Hydraulic conductivity considers the capability for a contaminant that reaches an aquifer to be transported throughout that aquifer over time.

Weighting and Rating System

DRASTIC uses a numerical weighting and rating system that is combined with the DRASTIC factors to calculate a ground water pollution potential index or relative measure of vulnerability to contamination. The DRASTIC factors are weighted from 1 to 5 according to their relative importance to each other with regard to contamination potential (Table 1). Each factor is then divided into ranges or media types and assigned a rating from 1 to 10 based on their significance to pollution potential (Tables 2-8). The rating for each factor is selected based on available information and professional judgment. The selected rating for each factor is multiplied by the assigned weight for each factor. These numbers are summed to calculate the DRASTIC or pollution potential index.

Once a DRASTIC index has been calculated, it is possible to identify areas that are more likely to be susceptible to ground water contamination relative to other areas. The higher the DRASTIC index, the greater the vulnerability to contamination. The index generated provides only a relative evaluation tool and is not designed to produce absolute answers or to represent units of vulnerability. Pollution potential indexes of various settings should be compared to each other only with consideration of the factors that were evaluated in determining the vulnerability of the area.

Pesticide DRASTIC

A special version of DRASTIC was developed for use where the application of pesticides is a concern. The weights assigned to the DRASTIC factors were changed to reflect the processes that affect pesticide movement into the subsurface with particular emphasis on soils. Where other agricultural practices, such as the application of fertilizers, are a concern, general DRASTIC should be used to evaluate relative vulnerability to contamination. The process for calculating the Pesticide DRASTIC index is identical to the process used for calculating the general DRASTIC index. However, general DRASTIC and Pesticide DRASTIC numbers should not be compared because the conceptual basis in factor weighting and evaluation differs significantly. Table 1 lists the weights used for general and pesticide DRASTIC.

Table 1. Assigned weights for DRASTIC features

Feature	**General DRASTIC Weight**	**Pesticide DRASTIC Weight**
Depth to Water	5	5
Net Recharge	4	4
Aquifer Media	3	3
Soil Media	2	5
Topography	1	3
Impact of the Vadose Zone Media	5	4
Hydraulic Conductivity of the Aquifer	3	2

Table 2. Ranges and ratings for depth to water

Depth to Water (feet)	
Range	**Rating**
0-5	10
5-15	9
15-30	7
30-50	5
50-75	3
75-100	2
100+	1
Weight: 5	Pesticide Weight: 5

Table 3. Ranges and ratings for net recharge

Net Recharge (inches)	
Range	**Rating**
0-2	1
2-4	3
4-7	6
7-10	8
10+	9
Weight: 4	Pesticide Weight: 4

Table 4. Ranges and ratings for aquifer media

Aquifer Media		
Range	**Rating**	**Typical Rating**
Shale	1-3	2
Glacial Till	4-6	5
Sandstone	4-9	6
Limestone	4-9	6
Sand and Gravel	4-9	8
Interbedded Ss/Sh/Ls/Coal	2-10	9
Karst Limestone	9-10	9
Weight: 3	Pesticide Weight: 3	

Table 5. Ranges and ratings for soil media

Soil Media	
Range	**Rating**
Thin or Absent	10
Gravel	10
Sand	9
Peat	8
Shrink/Swell Clay	7
Sandy Loam	6
Loam	5
Silty Loam	4
Clay Loam	3
Muck	2
Clay	1
Weight: 2	Pesticide Weight: 5

Table 6. Ranges and ratings for topography

Topography (percent slope)	
Range	**Rating**
0-2	10
2-6	9
6-12	5
12-18	3
18+	1
Weight: 1	Pesticide Weight: 3

Table 7. Ranges and ratings for impact of the vadose zone media

Impact of the Vadose Zone Media		
Range	**Rating**	**Typical Rating**
Confining Layer	1	1
Silt/Clay	2-6	3
Shale	2-5	3
Limestone	2-7	6
Sandstone	4-8	6
Interbedded Ss/Sh/Ls/Coal	4-8	6
Sand and Gravel with Silt and Clay	4-8	6
Glacial Till	2-6	4
Sand and Gravel	6-9	8
Karst Limestone	8-10	10
Weight: 5	Pesticide Weight: 4	

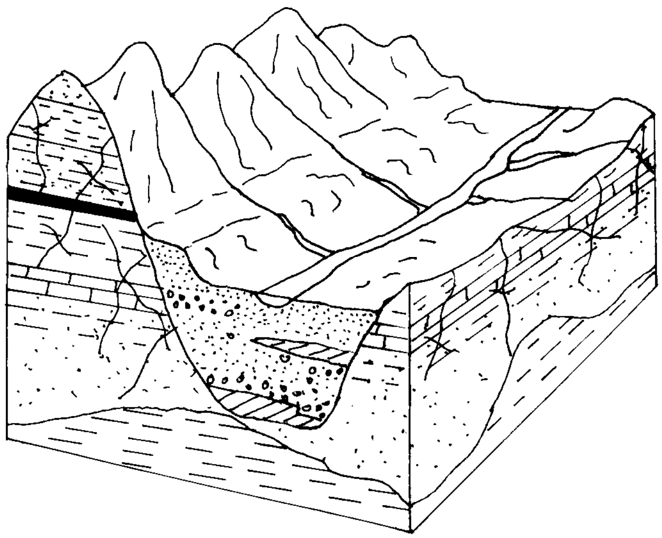
Table 8. Ranges and ratings for hydraulic conductivity

Hydraulic Conductivity (GPD/FT^2)	
Range	**Rating**
1-100	1
100-300	2
300-700	4
700-1000	6
1000-2000	8
2000+	10
Weight: 3	Pesticide Weight: 2

Integration of Hydrogeologic Settings and DRASTIC Factors

Figure 2 illustrates the hydrogeologic setting 7D1, Buried Valley, identified in mapping Pike County, and the pollution potential index calculated for the setting. Based on selected ratings for this setting, the pollution potential index is calculated to be 151. This numerical value has no intrinsic meaning, but can be readily compared to a value obtained for other settings in the county. DRASTIC indexes for typical hydrogeologic settings and values across the United States range from 45 to 223. The diversity of hydrogeologic conditions in Pike County produces settings with a wide range of vulnerability to ground water contamination. Calculated pollution potential indexes for the fourteen settings identified in the county range from 65 to 199.

Hydrogeologic settings identified in an area are combined with the pollution potential indexes to create units that can be graphically displayed on maps. Pollution potential analysis in Pike County resulted in a map with symbols and colors that illustrate areas of ground water vulnerability. The map describing the ground water pollution potential of Pike County is included with this report.



SETTING 7D1		GENERAL		
FEATURE	**RANGE**	**WEIGHT**	**RATING**	**NUMBER**
Depth to Water	5-15	5	9	45
Net Recharge	4-7	4	6	24
Aquifer Media	Sand & Gravel	3	6	18
Soil Media	Sandy Loam	2	6	12
Topography	0-2%	1	10	10
Impact of Vadose Zone	Sand & Gravel w/Significant Silt & Clay	5	6	30
Hydraulic Conductivity	300-700	3	4	12
		DRASTIC	INDEX	151

Figure 2. Description of the hydrogeologic setting - 7D1 Buried Valley.

INTERPRETATION AND USE OF GROUND WATER POLLUTION POTENTIAL MAPS

The application of the DRASTIC system to evaluate an area's vulnerability to contamination produces hydrogeologic settings with corresponding pollution potential indexes. The higher the pollution potential index, the greater the susceptibility to contamination. This numeric value determined for one area can be compared to the pollution potential index calculated for another area.

The map accompanying this report displays both the hydrogeologic settings identified in the county and the associated pollution potential indexes calculated in those hydrogeologic settings. The symbols on the map represent the following information:

7D1	-	defines the hydrogeologic region and setting
151	-	defines the relative pollution potential

Here the first number (**7**) refers to the major hydrogeologic region and the upper case letter (**D**) refers to a specific hydrogeologic setting. The following number (**1**) references a certain set of DRASTIC parameters that are unique to this setting and are described in the corresponding setting chart. The second number (**151**) is the calculated pollution potential index for this unique setting. The charts for each setting provide a reference to show how the pollution potential index was derived.

The maps are color-coded using ranges depicted on the map legend. The color codes used are part of a national color-coding scheme developed to assist the user in gaining a general insight into the vulnerability of the ground water in the area. The color codes were chosen to represent the colors of the spectrum, with warm colors (red, orange, and yellow) representing areas of higher vulnerability (higher pollution potential indexes), and cool colors (greens, blues, and violet) representing areas of lower vulnerability to contamination. Large man-made features such as landfills, quarries, or strip mines have been marked on the map for reference.

GENERAL INFORMATION ABOUT PIKE COUNTY

Pike County is located in south-central Ohio where it occupies an area of approximately 444 square miles. Pike County is bounded to the north by Ross County, to the east by Jackson County, to the south by Scioto and Adams Counties, and to the west by Adams and Highland Counties (Figure 3).

The City of Waverly is the county seat and lies in the north-central part of the county along the Scioto River. According to the 2000 census, Waverly has an estimated population of 4,433. The estimated population of the entire county is 27,695 (Ohio Department of Development, County Profiles, unpublished data). Other larger communities are the Villages of Piketon and Beaver.

Approximately 65% of Pike County is forested, and timber is the leading industry within the county. Most of the non-forested land is used for agricultural purposes. Cropland and pasture account for approximately 27% of the county's land use. Industrial development is significant along the Scioto River valley and includes the U.S. Department of Energy uranium enrichment plant located near the Village of Piketon (Ohio Department of Development, County Profiles, unpublished data). More specific information on land usage can be obtained from the Ohio Department of Natural Resources, Division of Real Estate and Land Management (REALM), Resource Analysis Program (formerly OCAP).

Waverly has a fifty-year (1931-1980) average annual precipitation of 39.6 inches. The *Hydrologic Atlas of Ohio* (Harstine, 1991) showed an average rainfall of about 41 inches with rainfall declining to the north. The average annual temperature for the same period was 52.9 degrees Fahrenheit (Owenby and Ezell, 1992). Harstine (1991) reported an average temperature of roughly 54 degrees Fahrenheit for Pike County with temperature's decreasing to the north

Physiography and Topography

Pike County lies within the Unglaciated Allegheny Plateau section of the Appalachian Plateau Province (Frost, 1931, Fenneman, 1938, and Bier, 1956). The area has been deeply dissected by streams to form narrow ridges and steep-sided valleys, with the exception of the Scioto River Valley. The Scioto River Valley is a broad, U-shaped valley that bisects the county as it enters at the northeast corner, flows south, and exits in the south-central part of the county. The valley floor is 1 to 2 miles wide and quite flat, interrupted only by terraces

Figure 3. Location map of Pike County, Ohio.

on the floodplain. Pike County has moderately high relief with a maximum elevation of 1330 feet above sea level at Greenbrier Ridge and a minimum elevation of 540 feet above sea level where the Scioto River exits the county.

The topography of Pike County is predominantly influenced by the nature of the bedrock. The bedrock changes within the county from limestone and dolomite in the very west, to shale, then to interbedded sandstone and shale, and then to massive sandstone near the eastern county border. The limestone creates broad ridges and steep-walled, U-shaped valleys. Where shale overlies the limestone, ridge tops are narrow and gradually steep with V-shaped valleys. Overlying the shale in the western third of the county is thin, but highly resistant, sandstone that "holds up" the ridges, protecting the less resistant shale and creating wide, flat ridge tops with steeper sides (Hendershot, 1990 and Smith and Schmidt, 1952).

Only a few areas within the county are known to be glacially-derived. The old Teays River Valley looping to the east from Piketon towards Beaver, and the relatively-flatter area in the northwestern corner near the Village of Cynthiana are composed of glacial lake deposits and thin glacial till. This area is known locally as Beech Flats. The only other areas of known glacial origin are the Scioto River Valley and its nearest tributaries that are filled with sand and gravel outwash (Quinn and Goldthwait, 1985).

Modern Drainage

Nearly all of Pike County drains into the Scioto River. Major tributaries within the county include Sunfish Creek, Pee Pee Creek, Long Fork Creek, Camp Creek, Big Beaver Creek, Carr's Run, Meadows Run, South Big Run, and Crooked Creek. Bakers Fork drains the southwest corner of the county and is a tributary of Ohio Brush Creek. The very southeastern corner drains toward the Little Scioto River.

Preglacial Drainage

The Teays River and its tributaries were the dominant drainage system in Ohio prior to Pleistocene glaciation. The Teays River (Teays Stage) originated in the Piedmont region of Virginia and North Carolina and entered Ohio near Wheelersburg, Scioto County (Stout et al.., 1943). The Teays River entered Pike County in the very southeastern corner, flowed northeastward into Jackson County and then looped towards what is now the Village of Beaver (Fig. 4). The Teays River then continued flowing westward towards Piketon. North of Piketon, the Teays River roughly followed a course similar to the modern Scioto River Valley. An important tributary to the Teays River was the Portsmouth River that followed a course similar to the modern Scioto River, from Portsmouth to Piketon.

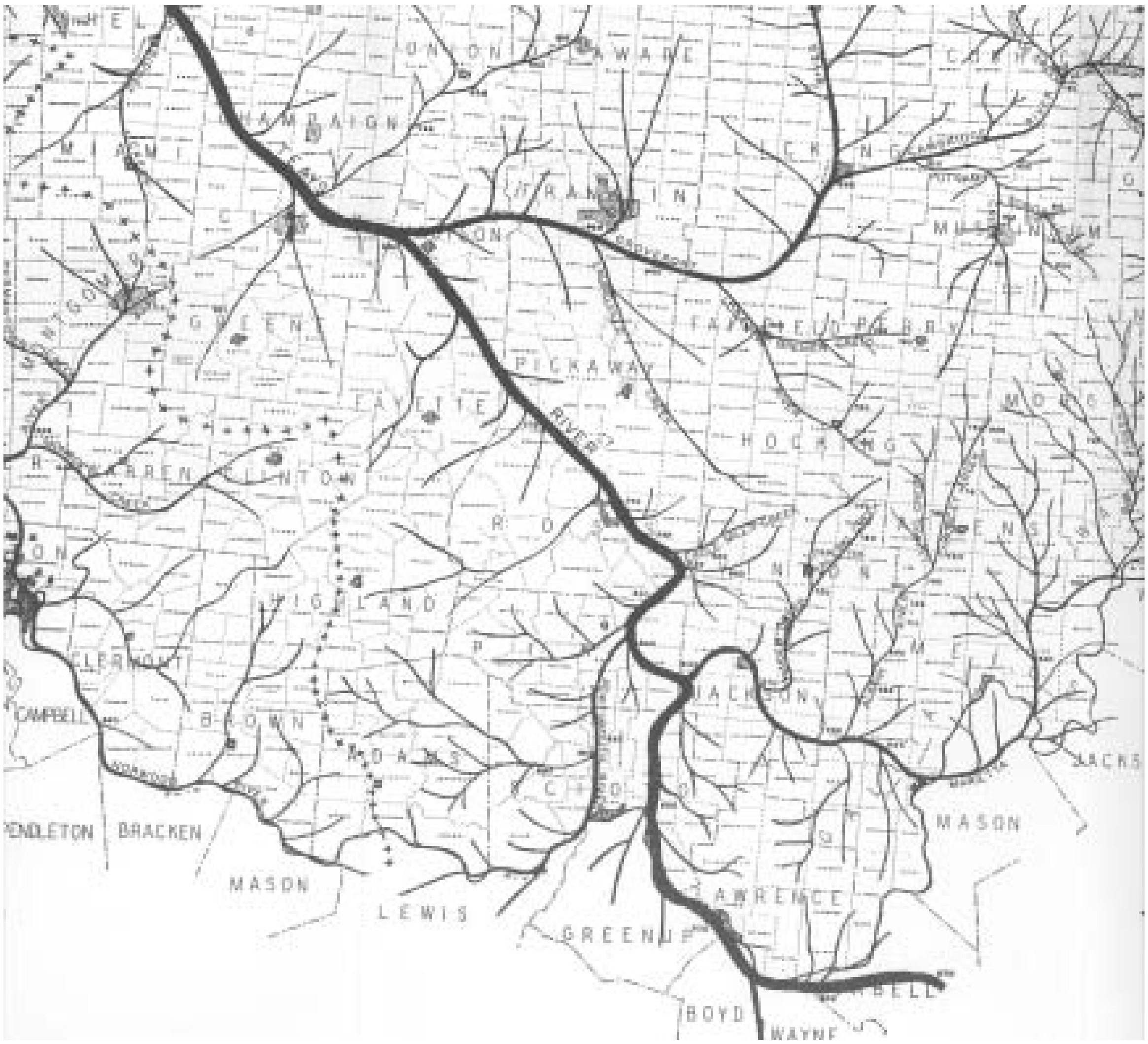


Figure 4. Teays Stage drainage in south-central Ohio (after Stout et al., 1943)

Flow in the Teays abruptly stopped when its channel was dammed with glacial ice early in the Pleistocene Epoch (Pre-Illinoian). Water ponded in the valley, forming a long, narrow, deep lake referred to as Lake Tight (Stout et al., 1943). Sediments, primarily silt and clay, were washed into the lake by surface runoff. These sediments eventually settled to the bottom of the now nearly stagnant water and formed thick deposits. The oldest, basal lacustrine deposits associated with Lake Tight and interconnected lakes are referred to as the Minford Silts.

With time, water behind the ice dam rose and overtopped the valley walls. Eventually, a new drainage system, commonly called Deep Stage drainage, was established in Ohio (Stout et al., 1943 and Smith and Schmidt, 1953). Deep Stage drainage is characterized by much deeper erosion than Teays Stage Rivers. The Cincinnati River was the master stream of this system and followed approximately the same course as the modern Ohio River. The Newark River, a tributary to the Cincinnati River with it's headwaters in northeastern Ohio, followed and deepened the course of the Teays River from the Ross/Pike County Line to the vicinity of Piketon (Figure 5). However, the direction of flow was to the south, opposite that of the Teays River. South of Piketon the Newark River abandoned the original Teays Channel and followed the course of the previous Teays Stage tributary, the Portsmouth River, south to its confluence with the master stream near present day Portsmouth

Southeast of Piketon the original Teays channel is still evident as a broad, flat valley with only very small modern streams flowing across it. Throughout Pike County, abandoned portions of tributaries to the Teays River still exist as broad flat valleys cutting through steep, narrow ridges with pronounced relief. Typically, these valleys have small, sometimes intermittent, streams flowing through them. The bottoms of these valleys are often several hundred feet above the level of the modern Scioto River. Abandoned river valleys of this type, where erosion has ceased and the valley base is above the level of modern drainage, are referred to as hanging valleys. Good examples of hanging valleys are found along the east margin of the Scioto River Valley, just northeast of Piketon as well as just south of little Beaver Creek (Smith and Schmidt, 1953).

The Illinoian glaciation brought further changes to the drainage of Pike County. Stout et al. (1943) referred to the southerly-flowing stream following the course of the previous Newark River as the Richmondale River (Fig. 6). The valley began to fill with outwash and alluvial deposits. Tributary streams were backed-up by these thick deposits, their valleys were backwater areas that were largely filled with finer-grained materials. The Wisconsinan glaciation brought a large volume of coarse outwash that was deposited in the ancestral Scioto River valley (Fig. 7). Numerous distinct terrace levels composed of Wisconsinan-age outwash remain elevated slightly above the modern floodplain (Quinn and Goldthwait, 1985).

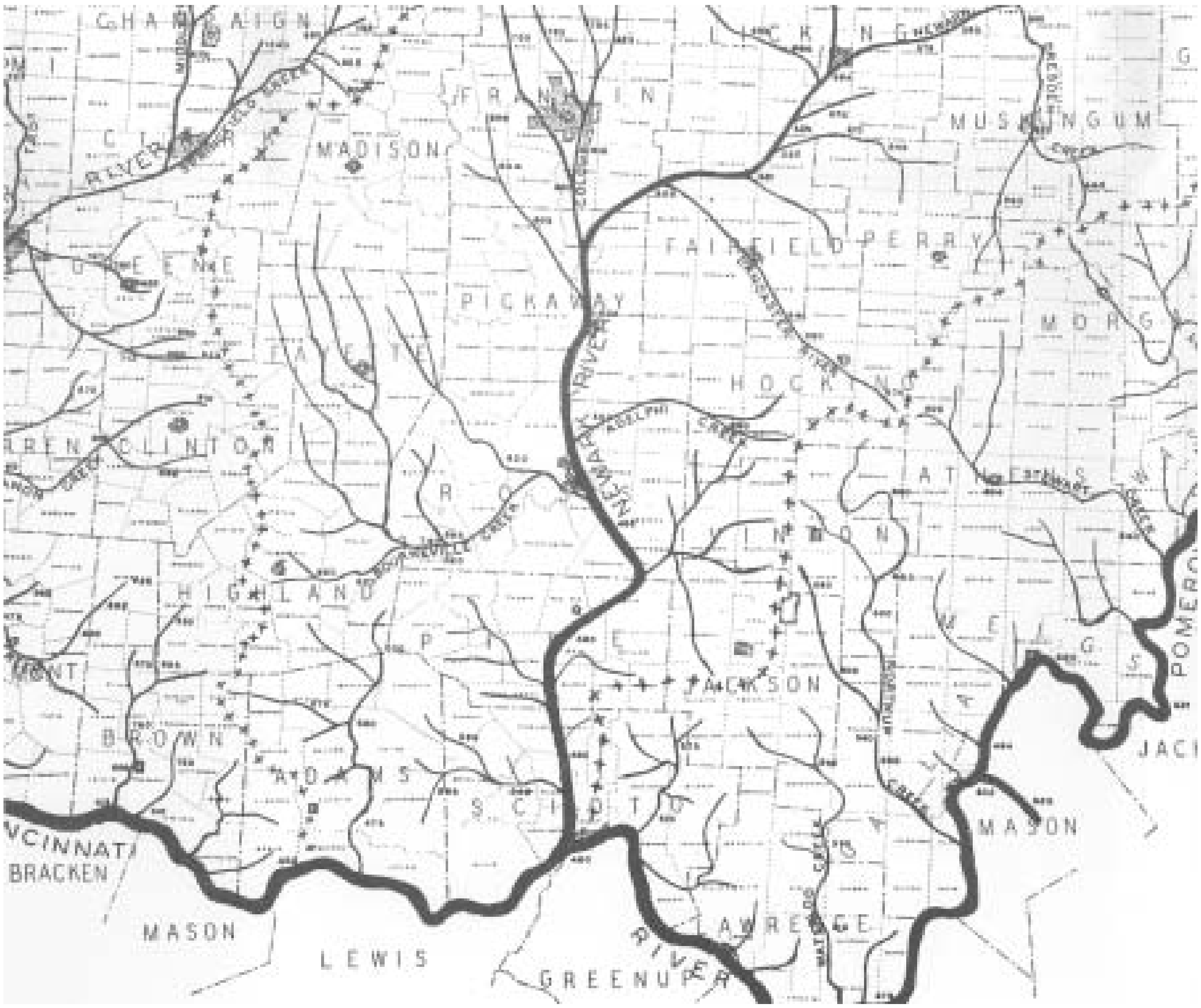


Figure 5. Deep Stage drainage in south-central Ohio (after Stout et al., 1943).

Figure 6. Post-Illinoian Stage drainage in south-central Ohio (after Stout et al., 1943).

Figure 7. Post-Wisconsinan drainage in south-central Ohio (after Stout et al., 1943).

Glacial Geology

Glacial features other than those associated with the major buried valley and alluvial systems of the county are limited to the far northwestern corner of the county near Cynthiana. These glacially derived deposits include some thin Illinoian till deposited along hill slopes. Till is an unsorted mix of sand, silt, clay and gravel. The till, which extends into Pike County, is very thin and highly weathered. The flat areas surrounding Cynthiana contain relatively thick deposits of flat-lying, silty lacustrine sediments. These Illinoian-age lakes were created as gravelly kame deposits blocked tributaries flowing northward to Paint Creek just across the border into Ross County (Goldthwait et al., 1961 and Quinn and Goldthwait, 1985). Fine silts and clays were deposited into these low energy bodies of water.

Bedrock Geology

Bedrock in Pike County varies from Silurian carbonates in the west to Pennsylvanian sandstone and shale in the east (Table 9). Pike County lies on the eastern flank of the Cincinnati Arch. Bedrock units show dip and thickening toward the Appalachian Basin to the east.

Deposition of the sediments that eventually solidified into the Silurian and Devonian bedrock of Pike County occurred in a warm sea that covered most of western Ohio during these times. Silurian carbonates (limestones and dolomites) crop out in the deeper river valleys in the western portion of the county. Limestones and dolomites are derived from near shore sedimentations. Shells from various forms of marine life and the direct precipitation of carbonate from seawater are the principal components of these rocks. Warm, shallow seas with clear water are essential to the formation of these rocks. Silurian rock units include the Tymochtee-Greenfield Dolomite, the Peebles Dolomite, and the Bisher and Lilly Formations undivided. These units overlie the deeper Massie Shale, Laurel Dolomite, Osgood Shale, Dayton Limestone, and Brassfield Formation. Yields from all of these carbonate units is relatively low, averaging less than 5 gallons per minute (gpm).

Shale results from the deposition of clay-rich sediments in relatively deep, quiet-water environments that had limited circulation of fresher waters. These sediments are derived from the erosion of dry land rocks and the transport of these sediments to the sea by streams (Mack, 1982 and Crawford, 1982). These shales are rich in organic matter, pyrite, and locally, natural gas. Devonian shales in Pike County are all associated with the Ohio Shale.

Mississippian rocks were deposited in a deltaic environment, building out into a shallow sea. Deltaic environments are typically complex. Over time, the delta tends to migrate out to sea as sediments build up. Also, the source of the sediments deposited in the delta may

Table 9. Bedrock stratigraphy of Pike County, Ohio

System	Group/Formation (Symbol)	Lithologic Description
Pennsylvanian	Allegheny and Pottsville Groups Undivided (Pap)	Gray to black shales, dirty sandstones, siltstone, thin limestone, coal, clay, and flint. Poor aquifer, wells yield less than 5 gpm. Rocks located above local drainage.
Mississippian	Mississippian Undivided (Mu)	Gray to black thin shales, siltstones, minor fine-grained sandstones. Poor aquifer.
	Sunbury Shale Berea Sandstone Bedford Shale (Ms-b)	The Sunbury is a black to brown carbonaceous shale. The Berea is a thin, fine-grained sandstone with shale partings. The Bedford is a gray to brown, massive, clayey shale. All units are poor aquifers.
Devonian	Ohio Shale (Dohol)	Black, fissile, thin-bedded, carbonaceous shale rich in organic matter and pyrite. Meager supplies (< 5gpm) of poor quality ground water available.
Silurian	Tymochtee Dolomite Greenfield Dolomite Peebles Dolomite Lilly Formation Bisher Formation (St-b)	Thin to massive dolomite, argillaceous with thin shale, chert, and limestone zones. Some vuggy, porous zones. Moderate source of ground water, yields under 25 gallons per minute.
	Massie Shale Laurel Dolomite Osgood Shale Dayton Limestone Brassfield Limestone (Sm-b)	Vary from gray shales to dolomitic limestone to argillaceous dolomite. Moderate to poor source of water, yields less than 25 gallons per minute.

change over time as the source or supply of sediments changes. The numerous changes in sea level that are known to have occurred throughout the Mississippian further complicate the bedrock sequence.

The Bedford Shale consists of fine sediments carried to the sea by streams sluggishly flowing through the delta. These fine sediments were dispersed outwards from the delta and were quietly deposited (Spraitzer, 1982). The Berea Sandstone was formed by fine sand deposited on the front edge of the delta. These sands were, in part, redistributed by waves and deposited as bars. Sediments comprising the Sunbury Shale settled to the sea floor far away from the delta in deep quiet water (Hoover, 1960). The Sunbury Shale and its depositional environment are both similar to the Devonian Ohio Shale.

The upper Mississippian units (Cuyahoga Group and Logan Formation) are composed of rocks formed in a variety of deltaic environments. The sandstone units represent channel deposits, where relatively coarse sediments are deposited in the stream channel and finer-grained sediments are carried farther out to sea. Some of the siltstones and light-colored shales represent floodplain deposits occurring between the stream channels. The remaining shales were deposited at the very front of the delta or farther out ahead of the delta in a shallow marine environment (Stofer, 1982 and Larsen, 1984).

The lowermost Pennsylvanian unit in Pike County is the Sharon Conglomerate. This formation consists of white, medium-grained sandstone with scattered white quartzite pebbles (Fuller, 1967). This unit tends to become conglomeratic towards its base. The Sharon is not quite as high in quartz, contains more mica, and is less cemented than the typical Sharon found in northeastern Ohio (Larsen, 1984). The Sharon was originally deposited in a high-energy stream channels associated with an alluvial plain type environment. Overlying the Sharon Conglomerate are the Sharon Coal, the Sharon Shale, and the Massillon Sandstone.

The Serpent Mound cryptoexplosion structure fringes the extreme southwestern corner of Pike County. The possible origins and nature of this complex geologic structure are discussed in Reidel (1975).

Hydrogeology

Ground water in Pike County is obtained from both unconsolidated (glacial-alluvial) and consolidated (bedrock) aquifers. Glacial aquifers are primarily associated with the buried valleys and thicker alluvial deposits.

The highest yielding aquifer in the county is the sand and gravel outwash deposits underlying the Scioto River Valley. In areas near the river, where large production wells are able to induce infiltration of river water through the river bed and into the aquifer, yields over 1,000 gpm are obtainable (Smith and Schmidt, 1953, Walker et al., 1965, Raab, 1989, and ODNR, Div. of Water, Open File, Glacial State Aquifer Map, 2000). In areas of the aquifer away from the river, where wells do not receive induced recharge from the river, yields of

100 to 500 gpm are common for large diameter wells (Smith and Schmidt, 1953, Walker et al., 1965, Raab, 1989, and ODNR, Div. of Water, Open File, Glacial State Aquifer Map, 2000). Test drilling or geophysical exploration methods may be necessary to find the highest-yielding zones.

Alluvial sand and gravel deposits underlie the larger tributaries to the Scioto River such as Sunfish Creek, Pee Pee Creek, and Beaver Creek (Smith and Schmidt, 1953, Raab, 1989, and ODNR, Div. of Water, Open File, Glacial State Aquifer Map, 2000). These deposits serve as aquifers capable of delivering small to moderate quantities of water for domestic or farm needs. Yields commonly range from 5 to 25 gpm. Some of the smaller tributaries of the Scioto, especially on the eastern side and south of Little Beaver Creek (and Piketon) primarily contain clay and silt and lack coarser sediments. These short, relatively steep valleys commonly have meager yields averaging less than 5 gpm.

The abandoned portions of the Teays River channel contain a variety of deposits consisting primarily of thick sequences of silt and clay interbedded with thin lenses of sand and gravel. These thin sand and gravel lenses are commonly dirty, not laterally extensive, and generally are deep, near the valley bottom. Yields from these wells range from 5 to 25 gpm to less than 10 gpm (Raab, 1989). Nearby the Village of Beaver, there are some shallow sand and gravel aquifers. These aquifers experience water table-type conditions and are subject to drying-up during long, dry summers (Smith and Schmidt, 1953). They also may be vulnerable to contamination.

The Illinoian glacial deposits found in the northwest corner of the county near Cynthiana contain a few scattered lenses of sand and gravel interbedded with the fine-grained lacustrine sediments. Deposits of this type usually yield less than 10 gpm (Raab, 1989 and ODNR, Div. of Water, Open File, Glacial State Aquifer Map, 2000).

Bedrock aquifers in Pike County all tend to be poor, supplying meager yields suitable only for domestic needs. Yields for the Silurian limestones average less than 5 gpm due to some shaley layers, lack of solution features, and the dense, fine-grained nature of the limestone (Smith and Schmidt, 1953, Raab, 1989, and ODNR, Div. of Water, Open File, Bedrock State Aquifer Map, 2000). The Devonian and Mississippian shales are commonly poor sources of water, experiencing low yields, high drawdowns, and slow recovery to the pre-pumping static water level. Yields for the shales and interbedded formations are commonly less than 5 gpm (Smith and Schmidt, 1953, Raab, 1989, and ODNR, Div. of Water, Bedrock State Aquifer Map, 2000). The Berea Sandstone and Sharon Sandstone, two units that usually experience higher yields elsewhere in Ohio, are also poor sources of ground water in Pike County. Reasons for this include the fact that these formations typically are found on higher ridge tops and are well above drainage. In areas where the Sharon creates wide, flat ridge tops, small domestic yields may be possible from shallower depths and localized perched water tables. These shallow wells tend to dry-up seasonally and have limited recharge areas. Also, these units may be somewhat less porous and are less clean than in other areas. Yields from these sandstones average less than 5 gpm (Smith and Schmidt, 1953, Raab, 1989, and ODNR, Div. of Water, Open File, Bedrock State Aquifer Map, 2000).

REFERENCES

Aller, L., T. Bennett, J.H. Lehr, R.J. Petty, and G. Hackett, 1987. DRASTIC: A standardized system for evaluating ground water pollution potential using hydrogeologic settings. U.S. Environmental Protection Agency EPA/600/2-87-035, 622 p.

Allong, A.F., 1971. Hydrogeology of the Scioto Drainage Basin. Unpublished Ph.D. dissertation, The Ohio State University, Columbus, Ohio, 217 p.

Crawford, M., 1982. Devonian rock sequence, in Martin, W. (ed.), Guidebook of field trip from Oxford to southcentral and southeastern Ohio, third edition. Unpublished field trip guidebook, Miami University, pp. II-1 - II-14.

Fenneman, N.M., 1938. Physiography of the Eastern United States. McGraw-Hill Publishing Co., New York, 714 p., 7 plates.

Frederick, C.L., 1991. Ground water pollution potential of Ross County. Ohio Department of Natural Resources, Division of Water, GWPP Report no. 24, 400 p., 2 maps.

Freeze, R.A. and J.A. Cherry, 1979. Groundwater. Englewood Cliffs, New Jersey, Prentice-Hall Inc., 604 p.

Frost, R.B., 1931. Physiographic map of Ohio. Oberlin College, The Geographical Press, Columbia Univ., N.Y., N.Y., map with text.

Fuller, J.O., 1967. Sharon Conglomerate, a source of high silica raw material. Division of Geological Survey, Ohio Department of Natural Resources, Reprint Series No. 6, from The Ohio State University Engineering Experiment Station News, Vol. XIX, No. 2, April, 1947, pp. 48-55.

Goldthwait, R.P., G.W. White, and J.L. Forsyth, 1961. Glacial geology of Ohio. Division of Water and Geological Survey, Ohio Department of Natural Resources, Misc. Geological Investigation Map I-316, 1 map.

Harstine, L.J., 1991. Hydrologic atlas for Ohio. Ohio Department of Natural Resources, Division of Water, Water Inventory Report, No. 28, 13 pp.

Heath, R.C., 1984. Ground-water regions of the United States. U.S.Geological Survey, Water Supply Paper 2242, 78 pp.

Hendershot, R.L., 1990. Soil survey of Pike County, Ohio. U.S. Department of Agriculture, Soil Conservation Service, 252 p., 22 tables, 54 maps.

Hoover, K.V., 1960. Devonian-Mississippian shale sequence in Ohio. Ohio Department of Natural Resources, Division of Geological Survey, Information Circular no. 27, 154 p.

Larsen, G., 1984. A detailed gravity survey of central Pike County, Ohio. Unpublished M.S. thesis, The Ohio State University, Columbus, Ohio, 136 pp.

Mack, R., 1982. Models for Devonian sedimentation in the northern Appalachian Region, in Martin, W. (ed.), Guidebook of field trip from Oxford to southcentral and southeastern Ohio, third edition. Unpublished field trip guidebook, Miami University, pp. II-15 - II-22

Norris, S.E., 1975. The ground-water situation in the Circleville area, Pickaway County, south-central Ohio. Ohio Department of Natural Resources, Division of Geological Survey, Report of Investigations No. 96, 14 pp.

Norris, S.E. and R.E. Fidler, 1969. Hydrogeology of the Scioto River valley near Piketon, south-central Ohio. U.S. Geological Survey, Water-supply Paper 1872, 70 p., 4 plates.

Ohio Department of Natural Resources, Division of Geological Survey, Open File, Reconnaissance Bedrock Geology Maps. Available on a U.S.G.S. 7-1/2 minute quadrangle basis.

Ohio Department of Natural Resources, Division of Geological Survey, Open File, Bedrock Topography Maps. Available on a U.S.G.S. 7-1/2 minute quadrangle basis.

Ohio Department of Natural Resources, Division of Water, Open File Bedrock State Aquifer Maps. Available on a U.S.G.S. 7-1/2 minute quadrangle basis.

Ohio Department of Natural Resources, Division of Water, Open File Glacial State Aquifer Maps. Available on a U.S.G.S. 7-1/2 minute quadrangle basis.

Owenby, J.R. and D.S. Ezell, 1992. Monthly station normals of temperature, precipitation, and heating and cooling degree days, 1961-1990. Climatography of the United States No. 81, OHIO. U.S. Department of the Interior, Project A-051-OHIO, U.S. Department of Commerce, National Oceanic and Atmospheric Administration, 30 pp.

Payne, C.A., 1992. Delineation of travel time-related capture zones of the municipal wells at Circleville, Ohio. Unpublished M.S. thesis, The Ohio State University, Columbus, Ohio, 240 pp.

Pettyjohn, W.A. and R. Henning, 1979. Preliminary estimate of ground-water recharge rates, related streamflow and water quality in Ohio. Water Resources Center, The Ohio State University, 323 p.

Quinn, M.J. and R.P. Goldthwait, 1985. Glacial geology of Ross County, Ohio. Ohio Department of Natural Resources, Division of Geological Survey, Report of Investigations no. 127, 42 p., 1 map.

Raab, J.M., 1989. Ground-water resources of Pike County. Division of Water, Ohio Department of Natural Resources. 1 map with text.

Reidel, S.P., 1975. Bedrock geology of the Serpent Mound cryptoexplosion structure, Adams, Highland, and Pike Counties, Ohio. Division of Geological Survey, Ohio Department of Natural Resources. 1 map with text.

Schmidt, J.J., 1952. Correspondence to Mr. J.F. Freeman, Lawrenceburg, Indiana. Re: New gaseous diffusion plant, Pike County, Ohio. Unpublished letter, September 5, 1952, 2 p.

Smith, R.C., and J.J. Schmidt, 1953. The water resources of Pike County, Ohio. Division of Water, Ohio Department of Natural Resources, Information Circular no. 1, 12 p.

Spraitzer, R., 1982. Mississippian rock sequence: The Bedford, Berea, and Sunbury Formations, in Martin, W. (ed.), Guidebook of field trip from Oxford to southcentral and southeastern Ohio, third edition. Unpublished field trip guidebook, Miami University, pp. III-A-1 - III-A-7.

Stoffer, P., 1982. The Cuyahoga and Logan Formations, in Martin, W. (ed.), Guidebook of field trip from Oxford to southcentral and southeastern Ohio, third edition. Unpublished field trip guidebook, Miami University, pp. III-C-1 - III-C-11.

Stout, W., K. Ver Steeg, and G.F. Lamb, 1943. Geology of water in Ohio. Division of Geological Survey, Ohio Department of Natural Resources, Bulletin 44, 694 p., 8 maps, 1 table.

Walker, A.C., J.J. Schmidt, R.B. Stein, H.L. Pree, and N.G. Bailey, 1965. Ground water for industry in the Scioto River valley. Ohio Department of Natural Resources, Division of Water, Buried Valley Investigation no. 1, 29 p., 3 plates (ratings in Scioto Valley)

UNPUBLISHED DATA

Ohio Department of Development. Office of Strategic Research, County-wide profiles, 1999.

Ohio Department of Natural Resources, Division of Real Estate and Land Management (REALM), Resource Program. Land use and land cover data for 1977.

Ohio Department of Natural Resources, Division of Water, Ground Water Resources Section. Well log and drilling reports for Pike County.

APPENDIX A

DESCRIPTION OF THE LOGIC IN FACTOR SELECTION

Depth to Water

This factor was primarily evaluated using information from water well log records on file at the Ohio Department of Natural Resources (ODNR), Division of Water, Water Resources Section (WRS). Approximately 1,700 water well log records are on file for Pike County. Data from roughly 800 water well log records were analyzed and plotted on U.S.G.S. 7-1/2 minute topographic maps during the course of the project. Static water levels and information as to the depths water was encountered were taken from these records. Other important sources of information include the following: Smith and Schmidt, 1953, Walker et al., 1965, Schmidt, 1952, Norris and Fidler, 1969, and Raab, 1989. Depth to water values from the adjacent *Ross County Ground Water Pollution Potential Map* (Frederick, 1991) proved useful as a guideline. In areas with little or no depth to water data, interpretation of surficial geology, bedrock geology, and topography was important in selecting a value.

Ground water levels throughout the county are generally shallow with the exception of the Pennsylvanian bedrock area in the very eastern portion. Depths to water of 5 to 15 feet (9) were selected along most of the major streams, tributaries and headwaters in the county. The depth rating of 5 to 15 feet (9) was also chosen for many of the upland areas in the central portion of the county. These areas contain shallow, perched shale aquifers. Depths to water of 5 to 15 feet (9) were common in the Preglacial Valleys (6N) setting. Within the Scioto River Valley, ground water levels generally deepen away from the river. Areas adjacent to the river have depths of 5 to 15 feet (9) and areas closer to the valley walls are rated as 15 to 30 feet (7) or 30 to 50 feet (5). Ground water levels that were interpreted as being artificially lowered, due to heavy pumping from industrial wells, were ignored. Depths to water of 15 to 30 feet (7) were prevalent in much of western and southeastern Pike County. Depths to water of 30 to 50 feet (5) were chosen for much of the Massive Sandstone (6M) setting and for other isolated low ridge tops in eastern Pike County. Depths to water of 50 to 75 feet (3) and 75 to 100 feet (2) were assigned to the Glacial Lake Deposits (7F) setting and some high isolated sandstone ridge tops in northeastern Pike County. Depths to water greater than 100 feet were selected for some isolated Sharon Sandstone highs in eastern Pike County.

Net Recharge

Net recharge is the precipitation that reaches the aquifer after evapotranspiration and run-off. This factor was evaluated using many criteria, including depth to water, topography, soil type, surface drainage, vadose zone material, aquifer type, and annual precipitation. General estimates of recharge provided by Pettyjohn and Henning (1979) and Dumouchelle and Schiefer (2002) proved to be helpful. The *Soil Survey of Pike County* (Hendershot, 1990) contained useful recharge data.

Recharge to the sand and gravel aquifer within the buried valley underlying the Scioto River was rated as 7 to 10 inches per year (in/yr) (8) in most areas. Recharge to the tributary buried valleys, including the Teays valley, were typically rated as 4 to 7 in/yr (6).

Net recharge to the bedrock aquifers was generally low. Typically, areas underlain by bedrock aquifers have a combination of unfavorable factors such as impermeable soil and vadose zone media, steep slopes, and great depth to water that together all contribute to reduce recharge. The bedded sedimentary rock aquifers received ratings of 0 to 2 in/yr (1) or 2 to 4 in/yr (3). A few areas underlain by this aquifer, where slopes were mild and depth to water was shallow, received ratings of 4 to 7 in/yr (6). The sandstone and shale bedrock aquifers received recharge ratings of 2 to 4 in/yr (3) or 0 to 2 in/yr (1) similar to the bedded sedimentary rock aquifers due to common factors that control recharge.

Net recharge values vary considerably for limestone aquifers. Limestone immediately below the surface and underlying alluvial or outwash deposits were given recharge values ranging from 7 to 10 in/yr (8). Where the aquifers are close to the surface and underlie moderately permeable soils and vadose, recharge rates of 4 to 7 in/yr (6) were selected. Where the limestone is deeper, the soils and vadose zone media is less permeable, and the slopes become steeper, recharge rates of 2 to 4 in/yr (3) were assigned.

Aquifer Media

Information on evaluating aquifer media was obtained from the reports of Schmidt (1952), Smith and Schmidt (1953), Norris and Fidler (1969), Quinn and Goldthwait (1985), Walker et al. (1965), and Raab (1989). Aquifer media mapping in adjoining Ross County (Frederick, 1991) proved helpful. Open File Bedrock Reconnaissance Maps and Open File Bedrock Topography Maps, based upon U.S.G.S. 7-1/2 minute topographic maps from the ODNR, Division of Geological Survey proved helpful. The ODNR, Division of Water, Glacial State Aquifer Map and Bedrock State Aquifer Map were an important source of aquifer data. Water well log records on file at the ODNR, Division of Water, were the primary source of aquifer information.

In areas where more than one aquifer is present, the first aquifer encountered was evaluated. An aquifer rating of (9) was given to very coarse and well-sorted sand and gravel outwash deposits underlying the Scioto River Valley. Slightly less well-sorted, less coarse deposits were given an aquifer rating of (8) or (7). These deposits are found along the margins of the Scioto River. Thinner, less extensive sand and gravel lenses found in the northern end of the Scioto River Valley and in the Teays valley received ratings of (7). Some of the minor tributaries, headwaters, and margins along valleys were given aquifer ratings (6) or (5). In these valleys thin sand and gravel lenses are interbedded with thicker sequences of fine-grained alluvium or lacustrine deposits.

Media ratings for the bedrock aquifers ranged from (2) to (6). Shale aquifers, because of their low permeability and high clay content, received a rating of only (2). This value is considered typical for shale (Aller et al., 1987). Bedded sedimentary rocks received ratings of (3) to (5) depending on the shale and limestone content of the aquifer. Aquifers with more shale received lower ratings. The thick limestone aquifer in the far western portion of the county received a rating of (5). Typically, limestone aquifers receive a rating of (6) (Aller et al., 1987). However, the limestone in Pike County is somewhat less permeable than most limestone aquifers. The sandstone formation present in the eastern portion of the county received a rating of (6), typical for a sandstone aquifer (Aller et al., 1987). It was decided that although the sandstone aquifer has relatively poor yields due to its high elevation above drainage, that the sandstone was still fairly permeable to contaminants applied directly above the formation.

<u>Soil Media</u>

Soils were evaluated using the descriptions from the *Soil Survey of Pike County* (Hendershot, 1990). Each soil was rated in terms of textural and organic composition, shrink-swell potential, and permeability. The soil descriptions were examined to determine the most significant unit affecting the pollution potential. Table 10 is a list of the soils, parent materials, setting, and corresponding DRASTIC values for Pike County.

Soils were considered to be thin or absent (10) along many steep ridge tops and slopes where bedrock was exposed. Shrink-swell (aggregated) clay (7) was selected for many ridge tops and slopes where the soils were developed from very clayey shales. Sandy loams (6) were selected for soils overlying outwash terraces, plains, and kames overlying buried valleys and for coarse, modern alluvium derived from sandstone ridges. Loam soils (5) were designated for medium-textured soils on floodplain terraces and overlying lacustrine, buried valley and outwash deposits. Silt loam (4) was selected for silty alluvial and lacustrine deposits on floodplains. Silt loam (4) was also selected for residual bedrock soils, especially along sandstone ridges and slopes consisting of interbedded sediments. Clay loam (3) soils were evaluated for areas with residual shale and limestone bedrock throughout Pike County. Clay loam (3) soils were also used for fine-grained alluvial and lacustrine soils, especially those overlying the Teays River Valley. Nonshrinking (nonaggregated) clay (1) was selected for a limited number of areas within the Teays River Valley.

Table 10. Pike County soils

Soil Name	Parent Material or Setting	DRASTIC Rating	Soil Media
Allegheny	Old alluvial terrace	6	Sandy loam
Blairton	Bedrock regolith	10	Thin or absent
Bratton	Loess over limestone	10	Thin or absent
Clifty	Coarse alluvium	6	Sandy loam
Coolville	Loess over shale, sandstone	3	Clay loam
Doles	Depressions in old drainage ways	4	Silt loam
Elkinsville	Alluvial terraces	4	Silt loam
Ernest	Colluvium	3	Clay loam
Fox	Outwash terraces	5	Loam
Genesee	Alluvium	4	Silt loam
Gilpin	Shale bedrock	10	Thin or absent
Haymond	Alluvium	4	Silt loam
Huntington	Alluvium	4	Silt loam
Latham	Shale or siltstone	3	Clay loam
Markland	Lacustrine terrace	7	Shrink-swell clay
Martinsville	Alluvium	5	Loam
McGary	Lacustrine, loess	7	Shrink-swell clay
Melvin	Alluvium	4	Silt loam
Miami Variant	Till over bedrock	3	Clay loam
Miamian	Till	3	Clay loam
Montgomery	Lacustrine, alluvium	3	Clay loam
Negley	Outwash terraces	5	Loam
Omulga	Old high terraces, loess	5	Loam
Opequon	Limestone, dolomite	10	Thin or absent
Orrville	Alluvium	4	Silt loam
Otwell	Loess	4	Silt loam
Parke	Loess over outwash	4	Silt loam
Peoga	Loess, lacustrine	3	Clay loam
Princeton	Loess over outwash	5	Loam
Purdy	Lacustrine	3	Clay loam
Rarden	Shale, siltstone	10	Thin or absent
Richland	Colluvium over lacustrine	3	Clay loam
Rigley	Sandstone colluvium	5	Loam
Shelocta	Sandstone colluvium	4	Silt Loam
Skidmore	Old alluvial terraces	5	Loam
Stendal	Alluvium	4	Silt loam
Stonelick	Coarse alluvium	5	Loam
Taggart	Loess over outwash, alluvium	4	Silt loam
Tilsit	Loess over sandstone	4	Silt loam
Trappist	Sandstone, shale colluvium	3	Clay loam
Wernock	Loess over shale ridge tops	3	Clay loam
Wharton	Shale, siltstone	3	Clay loam
Wilbur	Alluvium	4	Silt loam
Wyatt	Lacustrine	3	Clay loam

Topography

This factor was evaluated using the contour lines printed on USGS 7.5 minute quadrangle maps and from the *Soil Survey of Pike County* (Hendershot, 1990). Slopes of 0 to 2 percent (10) and 2 to 6 percent (9) were selected for flat-lying floodplains, valley floors, terraces, pre-glacial valleys and lacustrine deposits. Slopes of 0 to 2 percent (10) and 2 to 6 percent (9) were assigned to some ridge tops and toes of slopes where the weathered bedrock left a flat-lying terrain. Slopes of 6 to 12 percent (5) were also used for less steep ridge tops and the toes of slopes. Slopes of 12 to 18 percent (3) and greater than 18 percent (1) were selected for steeper slopes in higher relief, upland areas.

Impact of the Vadose Zone Media

Information on evaluating vadose zone media was obtained from the reports of Schmidt (1952), Smith and Schmidt (1953), Norris and Fidler (1969), Quinn and Goldthwait (1985), Walker et al. (1965), and Raab (1989). Vadose zone media mapping in adjoining Ross County (Frederick, 1991) proved helpful. Open File Bedrock Reconnaissance Maps and Open File Bedrock Topography Maps, based upon U.S.G.S. 7-1/2 minute topographic maps from the ODNR, Division of Geological Survey proved helpful. The ODNR, Division of Water, Glacial State Aquifer Map and Bedrock State Aquifer Map were an important source of vadose data. Water well log records on file at the ODNR, Division of Water, were the primary source of vadose information.

Vadose zone media in the buried valley underlying the Scioto River consists of sand and gravel. In these areas these units received vadose zone ratings ranging from (7) to (9). The assigned value was determined based on the clay content, coarseness, and sorting of the sand and gravel. Tributary valleys including the Teays Valley were determined to have vadose zone media consisting of sand and gravel with significant silt and clay. Ratings for these areas were (5) or (6).

Vadose zone media for the Glacial Lake Deposits (7F) settings was rated as sand and gravel with significant silt and clay. Numerical values of (5) or (6) were assigned to these areas.

A few non-glaciated settings such as River Alluvium with Overbank Deposits (6Fa) and River Alluvium without Overbank Deposits (6Fb) have significant thicknesses of unconsolidated material between the soil and the aquifer. In these settings the vadose material is typically sand and gravel with significant silt and clay (6) or silt and clay (4).

Vadose materials vary greatly throughout the non-glaciated portion of the county. In most of the non-glaciated areas the soils are relatively thin and the bedrock serves as the vadose media. Interbedded sedimentary rocks were given a rating of (5) for vadose media. Shale, because of its high clay content and relatively low permeability, was assigned a value of (4). Limestone was given a vadose rating of (5). Sandstone vadose media received a rating of (6) or (7) because of its relatively high permeability and low clay content. The sandstone is also typically highly fractured and jointed and has a high number of bedding planes. These factors help account for the high vadose zone media rating.

Hydraulic Conductivity

Published data for hydraulic conductivity for Pike County included the reports of Smith and Schmidt (1953), Norris and Fidler (1969), and Walker et al. (1965). Hydraulic conductivity data for the Scioto River Valley was extrapolated from reports in Circleville/Pickaway County including Allong (1971), Norris (1975), and Payne (1992). Mapping in adjoining Ross County (Frederick, 1991) was used as a guideline. Mapping conducted by the ODNR, Division of Water, Glacial State Aquifer Map and Bedrock State Aquifer Map proved valuable. Water well log records on file at the ODNR, Division of Water, were the primary sources of information. Textbook tables (Freeze and Cherry, 1979, Fetter, 1980, and Driscoll, 1986) were useful in obtaining estimated values for hydraulic conductivity in a variety of sediments**.**

Bedrock aquifers in Pike County have relatively low hydraulic conductivities. Interbedded sedimentary rocks, shales, and sandstones typically have hydraulic conductivity values ranging from 1 to 100 gallons per day per square foot (gpd/ft^2) (1). Limestone aquifers in the county were assigned a hydraulic conductivity rating of 100 to 300 gpd/ft^2 (2) because of solution widening of fractures and bedding planes that is common to these formations.

Sand and gravel aquifers within the main buried valley underlying the Scioto River, and major tributaries to this valley, are highly permeable and received ratings of 1000 to 2000 gpd/ft^2 (8) or 2000+ gpd/ft^2 (10). Sand and gravel units along the margins of the Scioto River Valley received ratings ranging from 700 to 1000 gpd/ft^2 (6). The sand and gravel aquifer within the Teays Valley is relatively poor and received a rating of 300 to 700 gpd/ft^2 (4). Sand and gravel lenses in tributaries and headwaters were assigned hydraulic conductivity values of 100 to 300 gpd/ft^2 (2). These units tend to be thin, poorly sorted, and not as coarse-grained or as laterally extensive.

APPENDIX B

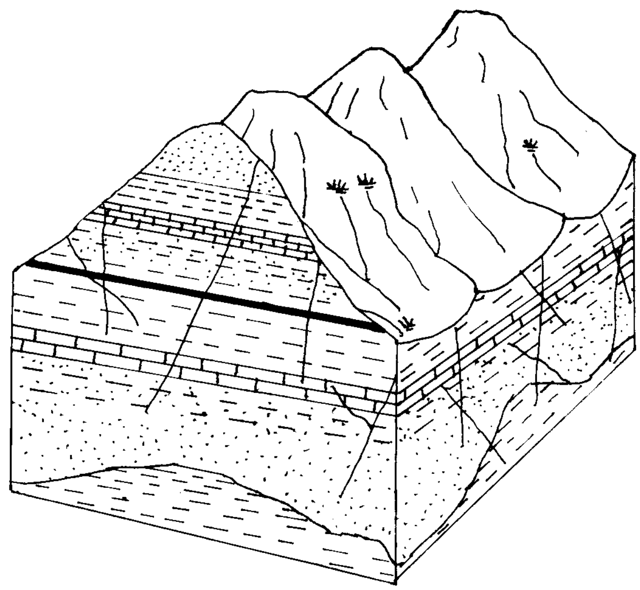
DESCRIPTION OF HYDROGEOLOGIC SETTINGS AND CHARTS

Ground water pollution potential mapping in Pike County resulted in the identification of fourteen hydrogeologic settings within the Glaciated and Nonglaciated Central Region. The list of these settings, the range of pollution potential index calculations, and the number of index calculations for each setting are provided in Table 11. Computed pollution potential indexes for Pike County range from 65 to 199.

Table 11. Hydrogeologic settings mapped in Pike County, Ohio

Hydrogeologic Settings	Range of GWPP Indexes	Number of Index Calculations
6Da-Alternating sandstone, limestone, shale-thin regolith	73-147	74
6Db-Alternating sandstone, limestone, shale-thick regolith	107-124	6
6E-Solution limestone	87-145	30
6Fa-River alluvium with overbank deposits	97-169	71
6Fb-River alluvium without overbank deposits	115-187	22
6L-Massive shale	65-102	13
6M-Massive sandstone	85-140	23
6N-Preglacial valley	110-152	7
7Ae-Glacial till over shale	80-88	2
7Ba-Outwash	141	1
7Bc-Outwash over solution limestone	133-136	2
7Be-Outwash over shale	138	1
7D-Buried valley	111-199	80
7F-Glacial lake deposits	98-153	26

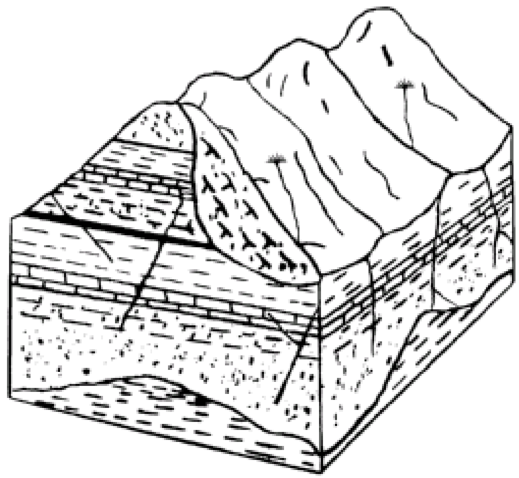
The following information provides a description of each hydrogeologic setting identified in the county, a block diagram illustrating the characteristics of the setting, and a listing of the charts for each unique combination of pollution potential indexes calculated for each setting. The charts provide information on how the ground water pollution potential index was derived and are a quick and easy reference for the accompanying ground water pollution potential map. A complete discussion of the rating and evaluation of each factor in the hydrogeologic settings is provided in Appendix A, Description of the Logic in Factor Selection.



6Da Alternating Sandstone, Limestone, Shale – Thin Regolith

This hydrogeologic setting is widespread, encompassing most slopes and ridge tops in central and eastern Pike County and ridge tops in the western portion of the county. The area is characterized by high relief with broad, steep slopes and narrow, somewhat flatter ridge tops. The vadose zone and aquifers consist of slightly dipping, fractured, alternating sequences of dirty sandstones, shales, and siltstones of the Mississippian System. Multiple aquifers are typically present. Depth to water is typically shallow, shallower perched zones commonly overlie low permeability shales and siltstones. Soils are highly variable and reflect the surficial bedrock parent material on gentler slopes. Soils are evaluated as being thin to absent on steeper slopes. Ground water supplies are typically poor with yields averaging less than 5 gpm. Recharge is limited due to steep slopes and to low permeability soils, vadose and aquifers.

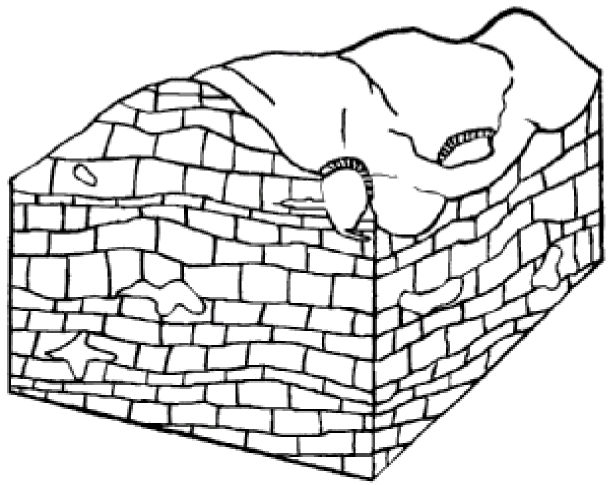
GWPP index values for the hydrogeologic setting of Alternating Sandstone, Limestone, Shale – Thin Regolith range from 73 to 147, with the total number of GWPP index calculations equaling 74.



<u>6Db Alternating Sandstone, Limestone, Shale – Thick Regolith</u>

This hydrogeologic setting is limited to the margins of some upland areas that border buried valleys in central Pike County. These areas are similar to the 6Da Alternating Sandstone, Limestone, Shale-Thin Regolith except that the regolith is much thicker and may contain a mixture of bedrock residuum, colluvium, and alluvium. The area is characterized by high relief with broad, steep slopes and narrow, somewhat flatter ridge tops. The vadose zone and aquifers consist of slightly dipping, fractured, alternating sequences of dirty sandstones, shales, and siltstones of the Mississippian System. Multiple aquifers are typically present. Depth to water is typically shallow, shallower perched zones commonly overlie low permeability shales and siltstones. Soils are usually either sandy loams or clay loams. Slopes are variable, but the areas are typically less steep than the adjacent uplands. Ground water supplies are typically poor with yields averaging less than 5 gpm. Recharge is moderate due to steep slopes, shallow depth to water and to low permeability soils, vadose and aquifers.

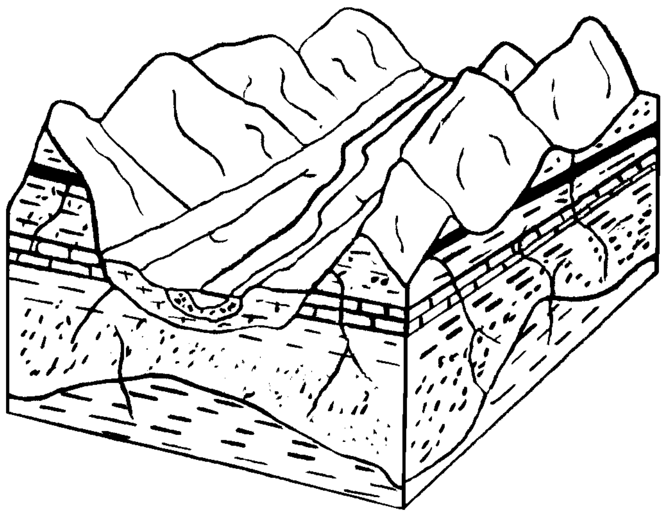
GWPP index values for the hydrogeologic setting of Alternating Sandstone, Limestone, Shale – Thick Regolith range from 107 to 124, with the total number of GWPP index calculations equaling 6.



6E Solution Limestone

This hydrogeologic setting is limited to steep valley walls in southwestern Pike County. The limestone usually crops out just above stream base. The aquifer consists of relatively dense, low porosity limestone with a relatively low percentage of solution features. The vadose zone consists of limestone or dense, overlying Devonian shale. Depth to water is typically shallow due to the close proximity of streams. Soils are highly variable and are dependent upon the underlying parent material. Slopes are commonly steep. Ground water supplies are typically poor with yields averaging less than 5 gpm. Recharge is moderately low due to steep slopes and low permeability vadose zone media and soils.

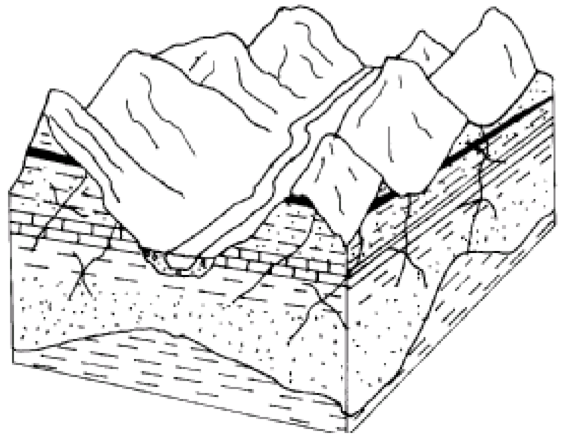
GWPP index values for the hydrogeologic setting of Solution Limestone range from 87 to 145, with the total number of GWPP index calculations equaling 30.



6Fa River Alluvium with Overbank Deposits

This hydrogeologic setting is widespread and includes most of the tributary valleys throughout the county. The setting is similar to the 6Fb-River Alluvium without Overbank Deposits except that the valleys are broader and more flat lying. Depth to water is usually shallow, averaging less than 30 feet. Thin alluvium, composed primarily of fine-grained floodplain ("overbank") sediments overlies bedrock. Soils are generally silty loams or clay loams derived from the fine-grained alluvium. The alluvial deposits are typically saturated and may be in hydraulic connection with the underlying bedrock. The bedrock aquifers are variable and include limestone, shale, and interbedded shale and sandstone. Ground water yields average less than 5 gpm. Recharge is moderate due to the relatively shallow depth to water, flatter topography, the relatively high permeability of the alluvium and the contrasting lower permeability of the bedrock. Recharge is much higher than the surrounding uplands.

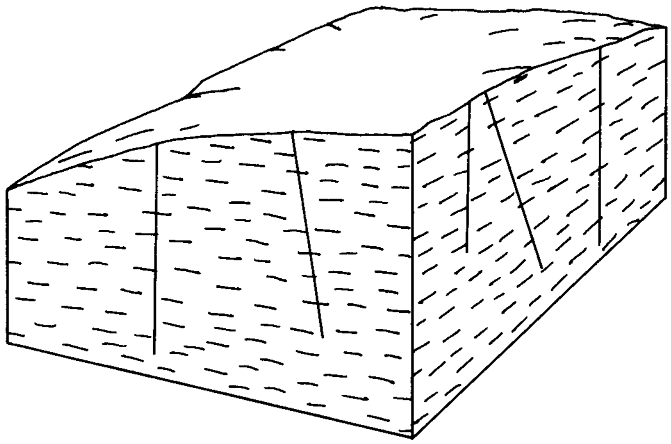
GWPP index values for the hydrogeologic setting of River Alluvium with Overbank Deposits range from 97 to 169, with the total number of GWPP index calculations equaling 71.



6Fb River Alluvium without Overbank Deposits

This hydrogeologic setting is widespread and includes the upper headwaters of most of the tributary streams throughout the county. The setting is similar to the 6Fa-River Alluvium with Overbank Deposits except that the valleys are narrower, steeper, and contain coarser-grained alluvium. Depth to water is usually shallow, averaging less than 30 feet. Soils are generally sandy loams derived from the coarse-grained alluvium. Thin alluvium, composed primarily of coarser-grained sediments deposited by steeper gradient streams overlies bedrock. The alluvial deposits are typically saturated and may be in hydraulic connection with the underlying bedrock. The bedrock aquifers are variable and include limestone, shale, and interbedded shale and sandstone. Ground water yields average less than 5 gpm. Recharge is moderately high due to the relatively shallow depth to water, flatter topography, the relatively high permeability of the alluvium and the contrasting lower permeability of the bedrock. Recharge is much higher than the surrounding uplands.

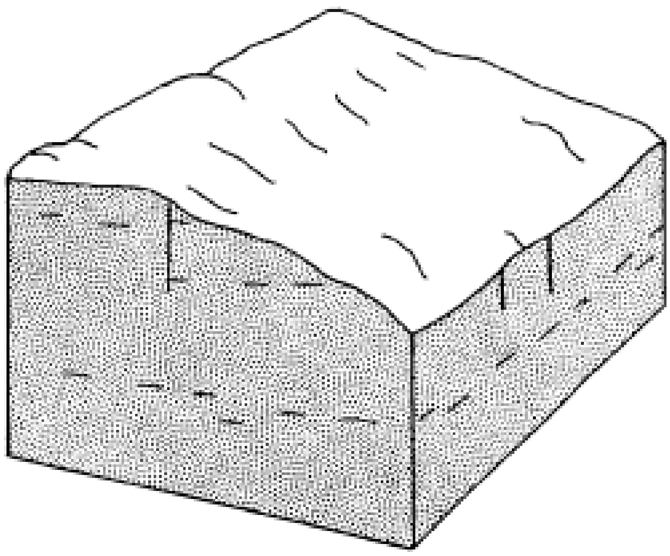
GWPP index values for the hydrogeologic setting of River Alluvium without Overbank Deposits range from 115 to 187, with the total number of GWPP index calculations equaling 22.



<u>6L Massive Shale</u>

This hydrogeologic setting is limited to steep valley walls in western Pike County. The shale occupies the majority of the valley wall. Limestone may crop out at the bottom of the shale or it may be encountered deeper in the subsurface. A thin, hard layer of Berea Sandstone commonly caps the shale. The aquifer and vadose consist of relatively dense, low permeability shale. Depth to water is typically shallow. Soils are usually silt loams. Slopes are commonly steep. Ground water supplies are typically poor with yields averaging less than 5 gpm. Wells usually obtain water from the uppermost few feet of weathered, broken shale. The remainder of the well depth is available for extra borehole storage. Recharge is low due to steep slopes and low permeability of the shale vadose zone and aquifer media.

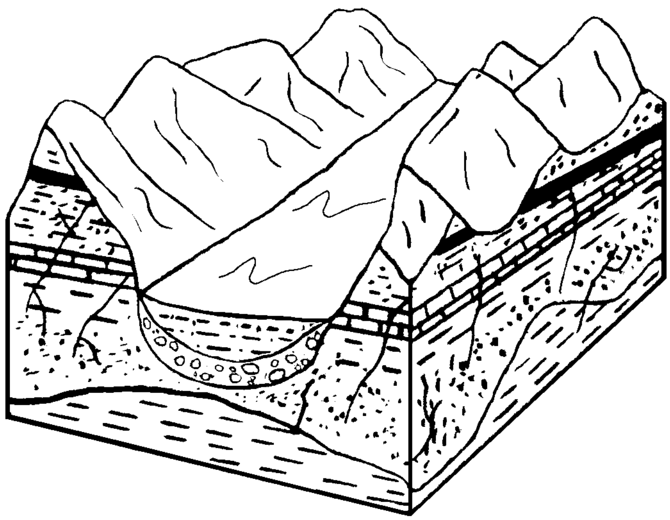
GWPP index values for the hydrogeologic setting Massive Shale range from 65 to 102, with the total number of GWPP index calculations equaling 13.



6M Massive Sandstone

This hydrogeologic setting is limited to steep uplands in eastern Pike County. The sandstone is primarily of the Pennsylvanian Sharon Conglomerate (Sandstone). The area is characterized by high relief with steep slopes and broad, relatively flat ridge tops. The aquifer and vadose consist of relatively dense, massive sandstone. Although the sandstone is moderately coarse-grained, the porosity is somewhat low due to the nature of the cementation. Permeability depends upon fractures, joints, and bedding planes. Depth to water is variable and depends upon the topography at any given area. Soils are variable with silt loams being most common. Slopes are commonly steep. Ground water supplies are typically poor with yields averaging less than 10 gpm. The sandstone ridges usually are well above drainage and have limited recharge areas. The water levels in these aquifers tend to decline during the summer months. Recharge is low due to steep slopes and greater depth to water.

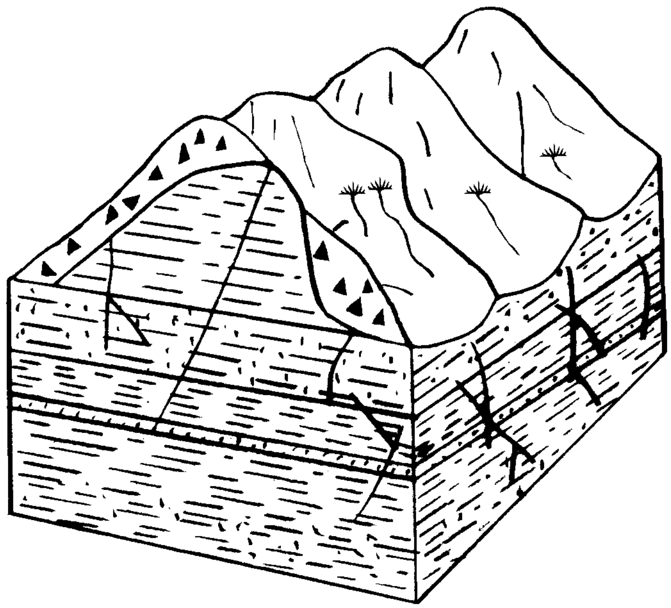
GWPP index values for the hydrogeologic setting Massive Sandstone range from 85 to 140, with the total number of GWPP index calculations equaling 23.



6N Preglacial Valleys

This hydrogeologic setting is limited to the central part of Pike County and is characterized by relatively broad, short valleys. These valleys represented former tributaries of the preglacial Teays River Valley System. These valleys are now hanging valleys that are at elevations well above the modern floor of the Scioto River Valley. The preglacial valleys typically lack modern streams. Depths to water are moderately shallow. Topography is flat to gently sloping. Soils are clay loams. The aquifer consists of thin sand and gravel lenses interbedded with thicker sequences of clayey to silty lacustrine and alluvial deposits. Wells that do not obtain water from these sand and gravel lenses can be drilled deeper and completed in the underlying interbedded sandstone and shale bedrock. Yields are typically less than 5 gpm for bedrock wells and less than 10 gpm for wells completed in the sand and gravel lenses. Recharge is moderately high due to the shallow depth to water, flat topography and the moderate permeability of the sand and gravel lenses.

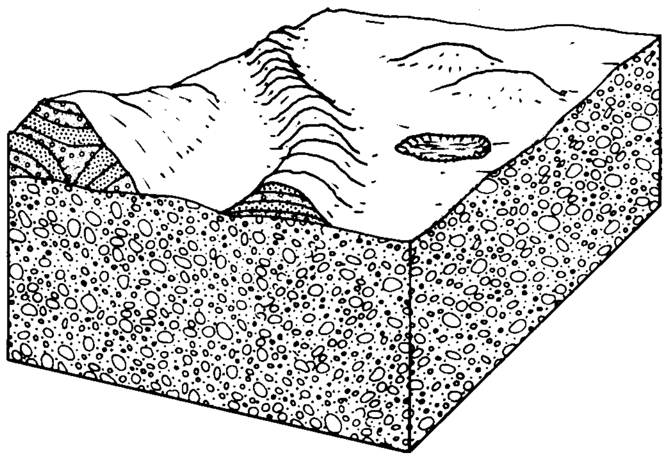
GWPP index values for the hydrogeologic setting Preglacial Valleys range from 110 to 152, with the total number of GWPP index calculations equaling 7.



7Ae Glacial Till over Shale

This setting is limited to a small area of northwestern Pike County where thin Illinoian-age glacial till extends from Ross County. The setting is characterized by rolling uplands that are less steep than the adjacent unglaciated uplands. The aquifer consists of massive Devonian-age black shale. Ground water supplies are typically poor with yields averaging less than 5 gpm. Wells usually obtain water from the uppermost few feet of weathered, broken shale. The remainder of the well depth is available for extra borehole storage. The vadose zone media is comprised of silty Illinoian-age till. The till may be fractured, especially where it is thin and weathered. Soils are derived from the weathering of till and vary from clay loam to silt loam. Recharge is low due to the low permeability of the soils, vadose, and aquifer materials.

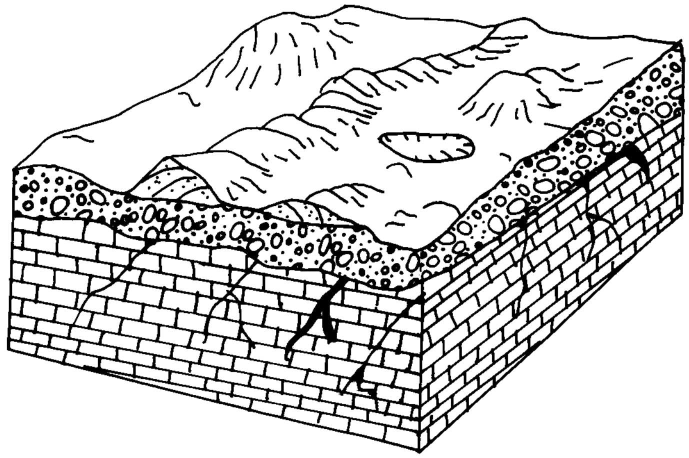
GWPP index values for the hydrogeologic setting Glacial Till over Shale range from 80 to 88, with the total number of GWPP index calculations equaling 2.



7Ba Outwash

This area is limited to a small area of northwestern Pike County where thin Illinoian kame/outwash deposits extend from Ross County. A steep, gravelly terrace characterizes this setting. This terrace is found at the toe of a steeper upland area. The depth to water is relatively shallow. Ground water is obtained from sand and gravel lenses interbedded with finer-grained silt and clay. Yields are in the 5 to 25 gpm range. Soils are loams and slopes are quite steep. Recharge is moderately high due to the relatively permeable soils, vadose zone media, and aquifer and the shallow depth to water.

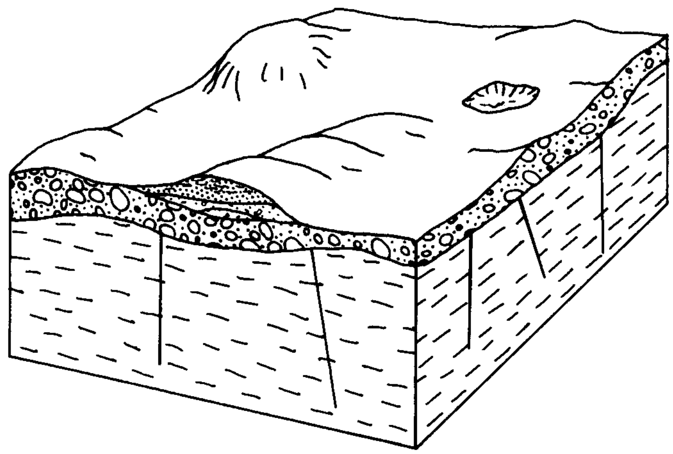
The GWPP index value for the hydrogeologic setting Outwash is 141, with the total number of GWPP index calculations equaling 1.



7Bc Outwash over Solution Limestone

This area is limited to a small area of northwestern Pike County where thin Illinoian kame/outwash deposits extend from Ross County. This setting is similar to the 7Ba Outwash setting except that the outwash is somewhat thinner and overlies solution limestone instead of interbedded shale and sandstone. The depth to water is shallow. Ground water is obtained from the limestone that underlies the outwash. Yields are in the 5 to 25 gpm range. The sand and gravel outwash may be in direct hydraulic connection with the underlying limestone. Soils are silt loams and the topography is flat. Recharge is high due to the flat topography, relatively permeable soils, vadose zone media and aquifer, and the shallow depth to water.

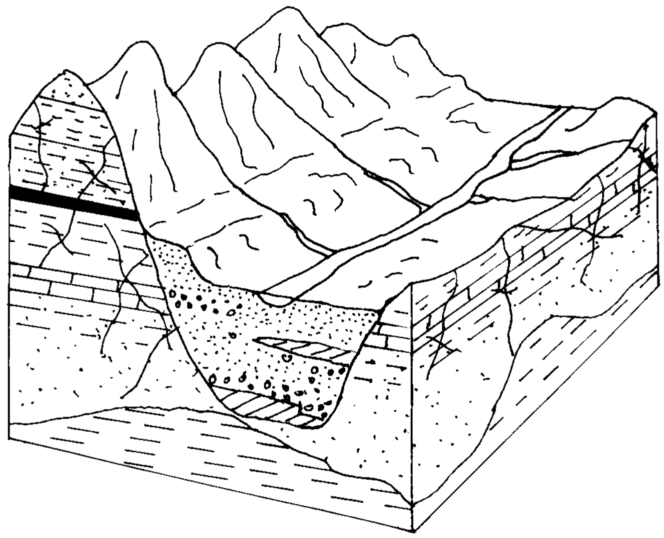
GWPP index values for the hydrogeologic setting Outwash over Solution Limestone range from 133 to 136, with the total number of GWPP index calculations equaling 2.



7Be Outwash over Shale

This area is limited to a small area of northwestern Pike County where thin Illinoian kame/outwash deposits extend from Ross County. This setting is similar to the 7Bc Outwash over Solution Limestone setting except that the outwash overlies massive shale instead of solution limestone. The depth to water is shallow. Ground water is obtained from fractured, massive shale that underlies the outwash. Yields are usually less than 10 gpm. The sand and gravel may be in direct hydraulic connection with the underlying shale. Soils are sandy loams and topography is flat. Recharge is high due to the flat topography, the relatively permeable soils and vadose zone media, and the shallow depth to water.

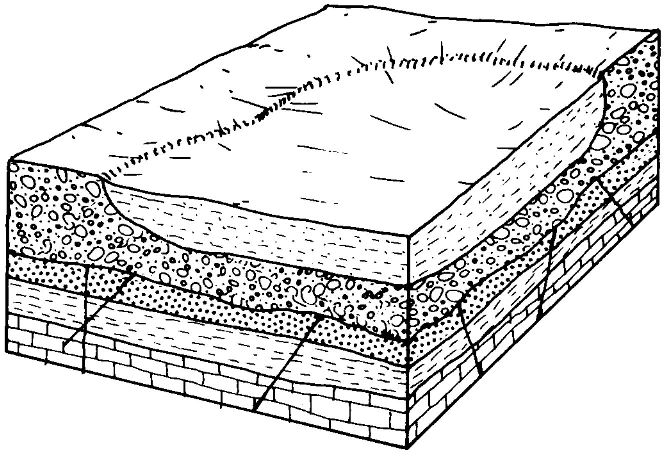
The GWPP index value for the hydrogeologic setting Outwash Over Shale is 138, with the total number of GWPP index calculations equaling 1.



7D Buried Valley

This setting was used for the buried valley underlying the Scioto River Valley, the Teays River Valley, and for an area of deep drift in Benton Township, northwestern Pike County. Broad, flat-lying valleys that may or may not contain a modern river characterize this setting. The Scioto River Valley contains thick sequences of coarse, clean sand and gravel outwash deposits. Yields from these deposits can range up to 1000 gpm, depending upon whether the deposits are in hydraulic connection with the river. Water in the Teays River Valley is obtained from sand and gravel lenses interbedded with thick sequences of fine-grained alluvial and lacustrine deposits. Wells completed in these lenses have yields ranging up to 50 gpm, with most yields being in the 5 to 25 gpm range. Water in the buried valley located in Benton Township is typically obtained from the underlying limestone; a few wells encounter thin sand lenses. These areas have yields usually less than 5 gpm. Soils are highly variable. Depths to water are commonly shallow. Recharge is high in the Scioto River Valley due to the highly permeable vadose and aquifer and proximity of the modern river. Recharge in the Teays River Valley and in the Benton Township valley is moderate due to the finer-grained nature of the vadose zone media and aquifer and the general lack of substantial surface water bodies.

GWPP index values for the hydrogeologic setting Buried Valley range from 111 to 199, with the total number of GWPP index calculations equaling 80.



7F Glacial Lake Deposits

This setting was used for a flat-lying area in Benton Township, northwestern Pike County. This area is referred to as Beech Flats. This setting is similar to the 7D Buried Valley setting for the buried valley immediately to the southwest of the 7F Glacial Lakes Deposit except that the drift is thinner and contains fewer sand lenses. The fine-grained sediments are associated with Illinoian-age lacustrine deposits that extend from Ross County. Wells not completed in the thin sand lenses are finished in the underlying bedrock. Yields are commonly less than 10 gpm. Depths vary and tend to become shallower to the south. Soils are variable and the topography is flat lying. Recharge is moderate due to the flat topography and moderately permeable vadose zone media and aquifer.

GWPP index values for the hydrogeologic setting Glacial Lake Deposits range from 98 to 153, with the total number of GWPP index calculations equaling 26.

Table 12. Hydrogeologic Settings, DRASTIC Factors, and Ratings

Setting	Depth To Water (feet)	Recharge	Aquifer Media	Soil Media	Topog-raphy (% Slope)	Vadose Zone Media	Hydro. Cond.	DRASTIC Rating	Pesticide DRASTIC Rating
6Da1	30-50	0-2	Bedded Sed. Rocks	Clay Loam	18+	Bedded Sed. Rocks	1-100	73	78
6Da2	15-30	0-2	Bedded Sed. Rocks	Clay Loam	18+	Bedded Sed. Rocks	1-100	83	88
6Da3	5-15	2-4	Bedded Sed. Rocks	Clay Loam	0-2	Bedded Sed. Rocks	1-100	110	133
6Da4	15-30	2-4	Bedded Sed. Rocks	Clay Loam	2-6	Bedded Sed. Rocks	1-100	99	120
6Da5	5-15	0-2	Bedded Sed. Rocks	Shrink/ Swell Clay	12-18	Bedded Sed. Rocks	1-100	103	124
6Da6	15-30	2-4	Bedded Sed. Rocks	Clay Loam	0-2	Bedded Sed. Rocks	1-100	100	123
6Da7	15-30	2-4	Bedded Sed. Rocks	Silty Loam	18+	Bedded Sed. Rocks	1-100	93	101
6Da8	15-30	2-4	Bedded Sed. Rocks	Silty Loam	12-18	Bedded Sed. Rocks	1-100	95	107
6Da9	15-30	2-4	Bedded Sed. Rocks	Silty Loam	6-12	Bedded Sed. Rocks	1-100	97	113
6Da10	15-30	2-4	Bedded Sed. Rocks	Clay Loam	12-18	Bedded Sed. Rocks	1-100	93	102
6Da11	5-15	2-4	Bedded Sed. Rocks	Clay Loam	2-6	Bedded Sed. Rocks	1-100	109	130
6Da12	5-15	2-4	Bedded Sed. Rocks	Shrink/ Swell Clay	6-12	Bedded Sed. Rocks	1-100	113	138
6Da13	30-50	2-4	Bedded Sed. Rocks	Clay Loam	0-2	Bedded Sed. Rocks	1-100	90	113
6Da14	5-15	2-4	Bedded Sed. Rocks	Shrink/ Swell Clay	12-18	Bedded Sed. Rocks	1-100	111	132
6Da15	15-30	2-4	Bedded Sed. Rocks	Shrink/ Swell Clay	12-18	Bedded Sed. Rocks	1-100	101	122
6Da16	5-15	2-4	Bedded Sed. Rocks	Clay Loam	12-18	Bedded Sed. Rocks	1-100	103	112
6Da17	5-15	2-4	Bedded Sed. Rocks	Clay Loam	6-12	Bedded Sed. Rocks	1-100	105	118
6Da18	5-15	2-4	Bedded Sed. Rocks	Silty Loam	18+	Bedded Sed. Rocks	1-100	103	111
6Da19	5-15	2-4	Bedded Sed. Rocks	Shrink/ Swell Clay	18+	Bedded Sed. Rocks	1-100	120	136
6Da20	5-15	2-4	Bedded Sed. Rocks	Clay Loam	0-2	Bedded Sed. Rocks	1-100	121	143
6Da21	5-15	2-4	Bedded Sed. Rocks	Silty Loam	2-6	Bedded Sed. Rocks	1-100	111	135
6Da22	5-15	0-2	Bedded Sed. Rocks	Silty Loam	18+	Bedded Sed. Rocks	1-100	95	103
6Da23	15-30	2-4	Bedded Sed. Rocks	Silty Loam	18+	Bedded Sed. Rocks	1-100	104	111
6Da24	5-15	2-4	Bedded Sed. Rocks	Shrink/ Swell Clay	18+	Bedded Sed. Rocks	1-100	109	126
6Da25	15-30	2-4	Bedded Sed. Rocks	Shrink/ Swell Clay	18+	Bedded Sed. Rocks	1-100	99	116

Setting	Depth To Water (feet)	Recharge	Aquifer Media	Soil Media	Topog-raphy (% Slope)	Vadose Zone Media	Hydro. Cond.	DRASTIC Rating	Pesticide DRASTIC Rating
6Da26	5-15	2-4	Bedded Sed. Rocks	Sandy Loam	0-2	Bedded Sed. Rocks	1-100	116	148
6Da27	5-15	2-4	Bedded Sed. Rocks	Shrink/ SwellClay	2-6	Bedded Sed. Rocks	1-100	128	160
6Da28	5-15	2-4	Bedded Sed. Rocks	Clay Loam	6-12	Bedded Sed. Rocks	1-100	116	128
6Da29	15-30	2-4	Bedded Sed. Rocks	Shrink/ SwellClay	6-12	Bedded Sed. Rocks	1-100	103	128
6Da30	5-15	2-4	Bedded Sed. Rocks	Silty Loam	0-2	Bedded Sed. Rocks	1-100	123	148
6Da31	5-15	0-2	Bedded Sed. Rocks	Shrink/ SwellClay	18+	Bedded Sed. Rocks	1-100	101	118
6Da32	15-30	0-2	Bedded Sed. Rocks	Silty Loam	18+	Bedded Sed. Rocks	1-100	96	103
6Da33	15-30	0-2	Bedded Sed. Rocks	Shrink/ SwellClay	18+	Bedded Sed. Rocks	1-100	102	118
6Da34	15-30	0-2	Bedded Sed. Rocks	Shrink/ SwellClay	18+	Bedded Sed. Rocks	1-100	91	108
6Da35	15-30	0-2	Bedded Sed. Rocks	Silty Loam	18+	Bedded Sed. Rocks	1-100	85	93
6Da36	15-30	0-2	Bedded Sed. Rocks	Silty Loam	12-18	Bedded Sed. Rocks	1-100	98	109
6Da37	5-15	2-4	Bedded Sed. Rocks	Shrink/ SwellClay	6-12	Sand & Gravel w/Sig Silt & Clay	1-100	119	144
6Da38	5-15	4-7	Bedded Sed. Rocks	Clay Loam	0-2	Bedded Sed. Rocks	1-100	122	145
6Da39	5-15	4-7	Bedded Sed. Rocks	Shrink/ SwellClay	0-2	Bedded Sed. Rocks	1-100	130	165
6Da40	5-15	2-4	Bedded Sed. Rocks	Silty Loam	6-12	Bedded Sed. Rocks	1-100	107	123
6Da41	30-50	2-4	Bedded Sed. Rocks	Silty Loam	18+	Bedded Sed. Rocks	1-100	94	101
6Da42	15-30	2-4	Bedded Sed. Rocks	Clay Loam	6-12	Bedded Sed. Rocks	1-100	95	108
6Da43	5-15	4-7	Bedded Sed. Rocks	Thin/Absent Gravel	2-6	Bedded Sed. Rocks	1-100	135	177
6Da44	15-30	4-7	Bedded Sed. Rocks	Thin/Absent Gravel	0-2	Bedded Sed. Rocks	1-100	126	170
6Da45	15-30	2-4	Bedded Sed. Rocks	Thin/Absent Gravel	18+	Bedded Sed. Rocks	1-100	105	131
6Da46	15-30	4-7	Bedded Sed. Rocks	Thin/Absent Gravel	6-12	Bedded Sed. Rocks	1-100	121	155
6Da47	5-15	2-4	Bedded Sed. Rocks	Silty Loam	12-18	Bedded Sed. Rocks	1-100	105	117
6Da48	5-15	4-7	Bedded Sed. Rocks	Thin/Absent Gravel	0-2	Bedded Sed. Rocks	1-100	147	190
6Da49	15-30	2-4	Bedded Sed. Rocks	Silty Loam	0-2	Bedded Sed. Rocks	1-100	102	128
6Da50	30-50	2-4	Bedded Sed. Rocks	Silty Loam	18+	Bedded Sed. Rocks	1-100	83	91
6Da51	15-30	2-4	Bedded Sed. Rocks	Silty Loam	12-18	Bedded Sed. Rocks	1-100	106	117

Setting	Depth To Water (feet)	Recharge	Aquifer Media	Soil Media	Topog-raphy (% Slope)	Vadose Zone Media	Hydro. Cond.	DRASTIC Rating	Pesticide DRASTIC Rating
6Da52	15-30	2-4	Bedded Sed. Rocks	Clay Loam	12-18	Bedded Sed. Rocks	1-100	104	112
6Da53	30-50	2-4	Bedded Sed. Rocks	Clay Loam	18+	Bedded Sed. Rocks	1-100	92	96
6Da54	30-50	2-4	Bedded Sed. Rocks	Silty Loam	12-18	Bedded Sed. Rocks	1-100	96	107
6Da55	30-50	2-4	Bedded Sed. Rocks	Clay Loam	12-18	Bedded Sed. Rocks	1-100	94	102
6Da56	30-50	2-4	Bedded Sed. Rocks	Clay Loam	6-12	Bedded Sed. Rocks	1-100	96	108
6Da57	15-30	2-4	Bedded Sed. Rocks	Silty Loam	6-12	Bedded Sed. Rocks	1-100	108	123
6Da58	30-50	2-4	Bedded Sed. Rocks	Shrink/ SwellClay	18+	Bedded Sed. Rocks	1-100	100	116
6Da59	5-15	2-4	Bedded Sed. Rocks	Shrink/ Swell Clay	2-6	Bedded Sed. Rocks	1-100	117	150
6Da60	5-15	2-4	Bedded Sed. Rocks	Thin/Absent Gravel	18+	Bedded Sed. Rocks	1-100	115	141
6Da61	30-50	2-4	Bedded Sed. Rocks	Silty Loam	12-18	Bedded Sed. Rocks	1-100	85	97
6Da62	15-30	4-7	Bedded Sed. Rocks	Thin/Absent Gravel	6-12	Bedded Sed. Rocks	1-100	132	165
6Da63	15-30	2-4	Bedded Sed. Rocks	Clay Loam	6-12	Bedded Sed. Rocks	1-100	106	118
6Da65	5-15	4-7	Bedded Sed. Rocks	Silty Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	124	150
6Da66	5-15	4-7	Bedded Sed. Rocks	Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	126	155
6Da67	5-15	4-7	Bedded Sed. Rocks	Shrink/ Swell Clay	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	130	165
6Da68	5-15	4-7	Bedded Sed. Rocks	Clay Loam	2-6	Sand & Gravel w/Sig Silt & Clay	1-100	121	142
6Da69	15-30	4-7	Bedded Sed. Rocks	Clay Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	112	135
6Da70	5-15	4-7	Bedded Sed. Rocks	Clay Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	122	145
6Da71	15-30	4-7	Bedded Sed. Rocks	Shrink/ Swell Clay	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	120	155
6Da72	5-15	4-7	Shale	Silty Loam	6-12	Sand & Gravel w/Sig Silt & Clay	1-100	116	132
6Da73	5-15	4-7	Shale	Shrink/ Swell Clay	6-12	Sand & Gravel w/Sig Silt & Clay	1-100	122	147
6Da74	15-30	4-7	Shale	Clay Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	114	136

Setting	Depth To Water (feet)	Recharge	Aquifer Media	Soil Media	Topog-raphy (% Slope)	Vadose Zone Media	Hydro. Cond.	DRASTIC Rating	Pesticide DRASTIC Rating
6Db1	5-15	4-7	Bedded Sed. Rocks	Clay Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	122	145
6Db2	15-30	4-7	Bedded Sed. Rocks	Clay Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	107	131
6Db3	15-30	4-7	Bedded Sed. Rocks	Sandy Loam	2-6	Sand & Gravel w/Sig Silt & Clay	1-100	117	147
6Db4	5-15	4-7	Bedded Sed. Rocks	Sandy Loam	6-12	Sand & Gravel w/Sig Silt & Clay	1-100	123	145
6Db5	5-15	4-7	Bedded Sed. Rocks	Sandy Loam	12-18	Sand & Gravel w/Sig Silt & Clay	1-100	121	139
6Db6	5-15	4-7	Bedded Sed. Rocks	Silty Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	124	150
6E1	15-30	2-4	Limestone	Clay Loam	18+	Shale	100-300	95	100
6E2	15-30	2-4	Limestone	Clay Loam	12-18	Shale	100-300	97	106
6E3	15-30	2-4	Limestone	Silty Loam	18+	Shale	100-300	97	105
6E4	15-30	2-4	Limestone	Thin/Absent Gravel	6-12	Shale	100-300	113	147
6E5	15-30	2-4	Limestone	Thin/Absent Gravel	12-18	Shale	100-300	111	141
6E6	30-50	2-4	Limestone	Clay Loam	6-12	Shale	100-300	89	102
6E7	5-15	4-7	Limestone	Thin/Absent Gravel	6-12	Limestone	100-300	140	173
6E8	5-15	4-7	Limestone	Clay Loam	2-6	Limestone	100-300	130	150
6E9	15-30	2-4	Limestone	Shrink/ Swell Clay	2-6	Shale	100-300	111	144
6E10	30-50	2-4	Limestone	Shrink/ Swell Clay	2-6	Shale	100-300	101	134
6E11	30-50	2-4	Limestone	Clay Loam	2-6	Shale	100-300	93	114
6E12	15-30	2-4	Limestone	Clay Loam	2-6	Shale	100-300	103	124
6E13	5-15	4-7	Limestone	Sandy Loam	6-12	Limestone	100-300	132	153
6E14	5-15	4-7	Limestone	Silty Loam	6-12	Limestone	100-300	128	143
6E15	5-15	4-7	Limestone	Clay Loam	6-12	Limestone	100-300	126	138
6E16	5-15	4-7	Limestone	Shrink/ Swell Clay	2-6	Limestone	100-300	138	170
6E17	5-15	4-7	Limestone	Shrink/ Swell Clay	6-12	Limestone	100-300	134	158
6E18	5-15	4-7	Limestone	Thin/Absent Gravel	2-6	Limestone	100-300	144	185
6E19	5-15	4-7	Limestone	Thin/Absent Gravel	0-2	Limestone	100-300	145	188
6E20	5-15	4-7	Limestone	Shrink/ Swell Clay	0-2	Limestone	100-300	139	173
6E21	5-15	4-7	Limestone	Loam	0-2	Limestone	100-300	135	163

Setting	Depth To Water (feet)	Recharge	Aquifer Media	Soil Media	Topog-raphy (% Slope)	Vadose Zone Media	Hydro. Cond.	DRASTIC Rating	Pesticide DRASTIC Rating
6E22	5-15	4-7	Limestone	Sandy Loam	0-2	Limestone	100-300	137	168
6E23	5-15	4-7	Limestone	Clay Loam	0-2	Limestone	100-300	131	153
6E24	5-15	2-4	Limestone	Sandy Loam	0-2	Shale	100-300	120	152
6E25	5-15	2-4	Limestone	Clay Loam	0-2	Shale	100-300	114	137
6E26	30-50	2-4	Limestone	Shrink/ Swell Clay	6-12	Shale	100-300	97	122
6E27	30-50	2-4	Limestone	Clay Loam	12-18	Shale	100-300	87	96
6E28	15-30	4-7	Limestone	Clay Loam	6-12	Limestone	100-300	116	128
6E29	15-30	2-4	Limestone	Clay Loam	6-12	Shale	100-300	99	112
6E30	15-30	2-4	Limestone	Silty Loam	6-12	Shale	100-300	101	117
6Fa1	5-15	4-7	Shale	Clay Loam	0-2	Silt/Clay	1-100	114	138
6Fa2	5-15	4-7	Shale	Silty Loam	6-12	Sand & Gravel w/Sig Silt & Clay	1-100	121	136
6Fa3	5-15	4-7	Shale	Clay Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	124	146
6Fa4	5-15	4-7	Shale	Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	128	156
6Fa5	5-15	4-7	Bedded Sed. Rocks	Clay Loam	2-6	Sand & Gravel w/Sig Silt & Clay	1-100	126	146
6Fa6	5-15	4-7	Bedded Sed. Rocks	Loam	2-6	Sand & Gravel w/Sig Silt & Clay	1-100	130	156
6Fa7	5-15	4-7	Limestone	Clay Loam	2-6	Sand & Gravel w/Sig Silt & Clay	100-300	135	154
6Fa8	5-15	4-7	Limestone	Clay Loam	0-2	Sand & Gravel w/Sig Silt & Clay	100-300	136	157
6Fa9	5-15	4-7	Limestone	Loam	0-2	Sand & Gravel w/Sig Silt & Clay	100-300	140	167
6Fa10	5-15	2-4	Bedded Sed. Rocks	Silty Loam	18+	Silt/Clay	1-100	98	107
6Fa11	5-15	4-7	Bedded Sed. Rocks	Silty Loam	0-2	Silt/Clay	1-100	119	146
6Fa12	5-15	4-7	Bedded Sed. Rocks	Shrink/ Swell Clay	0-2	Silt/Clay	1-100	125	161
6Fa13	5-15	4-7	Bedded Sed. Rocks	Clay Loam	0-2	Silt/Clay	1-100	117	141
6Fa14	5-15	4-7	Bedded Sed. Rocks	Silty Loam	6-12	Sand & Gravel w/Sig Silt & Clay	1-100	124	139
6Fa15	5-15	4-7	Bedded Sed. Rocks	Clay Loam	2-6	Silt/Clay	1-100	116	138
6Fa16	5-15	4-7	Shale	Silty Loam	6-12	Silt/Clay	1-100	111	128

Setting	Depth To Water (feet)	Recharge	Aquifer Media	Soil Media	Topog-raphy (% Slope)	Vadose Zone Media	Hydro. Cond.	DRASTIC Rating	Pesticide DRASTIC Rating
6Fa17	5-15	4-7	Bedded Sed. Rocks	Clay Loam	6-12	Silt/Clay	1-100	112	126
6Fa18	5-15	4-7	Bedded Sed. Rocks	Sandy Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	128	160
6Fa19	5-15	2-4	Bedded Sed. Rocks	Sandy Loam	6-12	Silt/Clay	1-100	112	135
6Fa20	5-15	4-7	Bedded Sed. Rocks	Silty Loam	6-12	Silt/Clay	1-100	114	131
6Fa21	5-15	2-4	Shale	Silty Loam	12-18	Silt/Clay	1-100	97	110
6Fa22	5-15	4-7	Limestone	Loam	0-2	Silt/Clay	100-300	130	159
6Fa23	5-15	4-7	Limestone	Silty Loam	0-2	Silt/Clay	100-300	128	154
6Fa24	5-15	4-7	Limestone	Clay Loam	0-2	Silt/Clay	100-300	126	149
6Fa25	5-15	4-7	Shale	Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	123	152
6Fa26	5-15	4-7	Shale	Clay Loam	6-12	Sand & Gravel w/Sig Silt & Clay	1-100	114	127
6Fa27	5-15	4-7	Limestone	Silty Loam	0-2	Sand & Gravel w/Sig Silt & Clay	100-300	133	158
6Fa28	5-15	4-7	Limestone	Clay Loam	0-2	Sand & Gravel w/Sig Silt & Clay	100-300	131	153
6Fa29	5-15	4-7	Limestone	Loam	0-2	Sand & Gravel w/Sig Silt & Clay	100-300	135	163
6Fa30	5-15	4-7	Shale	Clay Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	119	142
6Fa31	5-15	4-7	Shale	Silty Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	121	147
6Fa32	5-15	4-7	Shale	Clay Loam	2-6	Sand & Gravel w/Sig Silt & Clay	1-100	118	139
6Fa33	5-15	4-7	Bedded Sed. Rocks	Clay Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	122	145
6Fa34	5-15	4-7	Shale	Loam	6-12	Sand & Gravel w/Sig Silt & Clay	1-100	118	137
6Fa35	5-15	4-7	Shale	Silty Loam	2-6	Silt/Clay	1-100	115	140
6Fa36	5-15	4-7	Shale	Loam	6-12	Silt/Clay	1-100	113	133
6Fa37	5-15	4-7	Bedded Sed. Rocks	Loam	6-12	Silt/Clay	1-100	116	136
6Fa38	5-15	4-7	Bedded Sed. Rocks	Silty Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	124	150
6Fa39	15-30	4-7	Bedded Sed. Rocks	Silty Loam	0-2	Bedded Sed. Rocks	1-100	114	140

Setting	Depth To Water (feet)	Recharge	Aquifer Media	Soil Media	Topog-raphy (% Slope)	Vadose Zone Media	Hydro. Cond.	DRASTIC Rating	Pesticide DRASTIC Rating
6Fa40	5-15	4-7	Bedded Sed. Rocks	Clay Loam	2-6	Sand & Gravel w/Sig Silt & Clay	1-100	121	142
6Fa41	15-30	4-7	Bedded Sed. Rocks	Shrink/ Swell Clay	6-12	Bedded Sed. Rocks	1-100	115	140
6Fa42	15-30	4-7	Bedded Sed. Rocks	Silty Loam	2-6	Bedded Sed. Rocks	1-100	113	137
6Fa43	15-30	4-7	Bedded Sed. Rocks	Clay Loam	2-6	Bedded Sed. Rocks	1-100	111	132
6Fa44	5-15	4-7	Bedded Sed. Rocks	Silty Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	129	154
6Fa45	5-15	4-7	Bedded Sed. Rocks	Clay Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	133	155
6Fa46	5-15	4-7	Bedded Sed. Rocks	Silty Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	135	160
6Fa47	5-15	4-7	Bedded Sed. Rocks	Clay Loam	6-12	Sand & Gravel w/Sig Silt & Clay	1-100	123	136
6Fa48	5-15	4-7	Bedded Sed. Rocks	Clay Loam	2-6	Sand & Gravel w/Sig Silt & Clay	1-100	127	148
6Fa49	5-15	4-7	Bedded Sed. Rocks	Clay Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	127	149
6Fa50	15-30	4-7	Bedded Sed. Rocks	Silty Loam	2-6	Bedded Sed. Rocks	1-100	124	147
6Fa51	15-30	4-7	Bedded Sed. Rocks	Clay Loam	2-6	Sand & Gravel w/Sig Silt & Clay	1-100	122	142
6Fa52	15-30	4-7	Sandstone	Loam	6-12	Sand and Gravel	1-100	130	147
6Fa53	5-15	4-7	Sandstone	Silty Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	138	163
6Fa54	5-15	4-7	Bedded Sed. Rocks	Silty Loam	2-6	Sand & Gravel w/Sig Silt & Clay	1-100	134	157
6Fa55	15-30	4-7	Bedded Sed. Rocks	Silty Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	125	150
6Fa56	15-30	4-7	Sandstone	Silty Loam	2-6	Sand & Gravel w/Sig Silt & Clay	1-100	127	150
6Fa57	5-15	4-7	Bedded Sed. Rocks	Loam	2-6	Sand & Gravel w/Sig Silt & Clay	1-100	136	162
6Fa58	15-30	4-7	Sandstone	Silty Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	128	153

Setting	Depth To Water (feet)	Recharge	Aquifer Media	Soil Media	Topog-raphy (% Slope)	Vadose Zone Media	Hydro. Cond.	DRASTIC Rating	Pesticide DRASTIC Rating
6Fa59	5-15	4-7	Sandstone	Sandy Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	142	173
6Fa60	5-15	4-7	Sand and Gravel	Silty Loam	0-2	Sand and Gravel	700-1000	169	187
6Fa61	5-15	4-7	Sandstone	Silty Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	133	159
6Fa62	5-15	4-7	Sandstone	Silty Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	138	163
6Fa63	5-15	7-10	Sand and Gravel	Silty Loam	2-6	Sand & Gravel w/Sig Silt & Clay	100-300	143	166
6Fa64	5-15	4-7	Sand and Gravel	Shrink/ Swell Clay	0-2	Sand & Gravel w/Sig Silt & Clay	100-300	142	176
6Fa66	5-15	7-10	Sand and Gravel	Sandy Loam	0-2	Sand & Gravel w/Sig Silt & Clay	700-1000	168	194
6Fa68	5-15	4-7	Sand and Gravel	Silty Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	132	157
6Fa69	5-15	4-7	Shale	Shrink/ Swell Clay	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	127	162
6Fa70	5-15	4-7	Bedded Sed. Rocks	Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	131	159
6Fa71	5-15	4-7	Sand and Gravel	Silty Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	127	153
6Fb1	5-15	4-7	Shale	Sandy Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	130	161
6Fb2	5-15	4-7	Limestone	Sandy Loam	0-2	Sand & Gravel w/Sig Silt & Clay	100-300	142	172
6Fb3	5-15	4-7	Shale	Sandy Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	125	157
6Fb4	5-15	4-7	Bedded Sed. Rocks	Sandy Loam	0-2	Silt/Clay	1-100	123	156
6Fb5	5-15	4-7	Limestone	Sandy Loam	0-2	Silt/Clay	100-300	132	164
6Fb6	5-15	4-7	Limestone	Sandy Loam	0-2	Sand & Gravel w/Sig Silt & Clay	100-300	137	168
6Fb7	5-15	2-4	Limestone	Sandy Loam	6-12	Shale	100-300	115	137
6Fb8	5-15	4-7	Shale	Sandy Loam	2-6	Silt/Clay	1-100	119	150
6Fb9	5-15	4-7	Bedded Sed. Rocks	Sandy Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	128	160

Setting	Depth To Water (feet)	Recharge	Aquifer Media	Soil Media	Topog-raphy (% Slope)	Vadose Zone Media	Hydro. Cond.	DRASTIC Rating	Pesticide DRASTIC Rating
6Fb10	15-30	4-7	Bedded Sed. Rocks	Sandy Loam	2-6	Bedded Sed. Rocks	1-100	117	147
6Fb11	5-15	4-7	Bedded Sed. Rocks	Sandy Loam	2-6	Sand & Gravel w/Sig Silt & Clay	1-100	127	157
6Fb12	5-15	4-7	Bedded Sed. Rocks	Sandy Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	134	166
6Fb13	5-15	4-7	Bedded Sed. Rocks	Sandy Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	133	164
6Fb14	15-30	4-7	Bedded Sed. Rocks	Sandy Loam	2-6	Bedded Sed. Rocks	1-100	128	157
6Fb15	15-30	4-7	Bedded Sed. Rocks	Sandy Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	118	150
6Fb16	5-15	4-7	Bedded Sed. Rocks	Sandy Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	139	170
6Fb17	15-30	4-7	Sandstone	Sandy Loam	2-6	Sand & Gravel w/Sig Silt & Clay	1-100	131	160
6Fb18	5-15	4-7	Bedded Sed. Rocks	Silty Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	135	160
6Fb19	5-15	7-10	Sand and Gravel	Sandy Loam	0-2	Sand and Gravel	1000-2000	187	209
6Fb20	5-15	4-7	Sandstone	Sandy Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	137	169
6Fb21	5-15	4-7	Sand and Gravel	Sandy Loam	0-2	Sand & Gravel w/Sig Silt & Clay	100-300	145	175
6Fb22	5-15	4-7	Sand and Gravel	Sandy Loam	2-6	Silt/Clay	300-700	119	168
6L1	15-30	0-2	Shale	Shrink/ Swell Clay	12-18	Shale	1-100	85	107
6L2	15-30	0-2	Shale	Silty Loam	18+	Shale	1-100	77	86
6L3	30-50	0-2	Shale	Silty Loam	18+	Shale	1-100	67	76
6L4	5-15	0-2	Shale	Shrink/ Swell Clay	6-12	Shale	1-100	97	123
6L5	15-30	0-2	Shale	Clay Loam	0-2	Shale	1-100	84	108
6L6	5-15	0-2	Shale	Clay Loam	12-18	Shale	1-100	87	97
6L7	5-15	2-4	Shale	Clay Loam	0-2	Shale	1-100	102	126
6L8	15-30	0-2	Shale	Clay Loam	2-6	Shale	1-100	83	105
6L9	15-30	0-2	Shale	Clay Loam	18+	Shale	1-100	75	81
6L10	30-50	0-2	Shale	Clay Loam	18+	Shale	1-100	65	71
6L11	5-15	0-2	Shale	Silty Loam	18+	Shale	1-100	87	96
6L12	15-30	0-2	Shale	Clay Loam	12-18	Shale	1-100	77	87

Setting	Depth To Water (feet)	Recharge	Aquifer Media	Soil Media	Topography (% Slope)	Vadose Zone Media	Hydro. Cond.	DRASTIC Rating	Pesticide DRASTIC Rating
6L13	5-15	2-4	Shale	Clay Loam	6-12	Shale	1-100	97	111
6M1	30-50	2-4	Sandstone	Silty Loam	18+	Sandstone	1-100	102	108
6M2	15-30	2-4	Sandstone	Silty Loam	18+	Sandstone	1-100	112	118
6M3	15-30	2-4	Sandstone	Silty Loam	6-12	Sandstone	1-100	111	126
6M4	15-30	2-4	Sandstone	Clay Loam	6-12	Sandstone	1-100	109	121
6M5	30-50	2-4	Sandstone	Clay Loam	18+	Sandstone	1-100	100	103
6M6	15-30	2-4	Sandstone	Clay Loam	6-12	Sandstone	1-100	114	125
6M7	15-30	2-4	Sandstone	Silty Loam	6-12	Sandstone	1-100	116	130
6M8	15-30	2-4	Sandstone	Silty Loam	12-18	Sandstone	1-100	109	120
6M9	15-30	2-4	Sandstone	Clay Loam	18+	Sandstone	1-100	110	113
6M10	15-30	2-4	Sandstone	Clay Loam	2-6	Sandstone	1-100	118	137
6M11	15-30	2-4	Sandstone	Silty Loam	18+	Sandstone	1-100	107	114
6M12	30-50	2-4	Sandstone	Shrink/ Swell Clay	18+	Sandstone	1-100	108	123
6M13	15-30	2-4	Sandstone	Shrink/ Swell Clay	18+	Sandstone	1-100	118	133
6M14	15-30	2-4	Sandstone	Silty Loam	12-18	Sandstone	1-100	114	124
6M15	15-30	2-4	Sandstone	Clay Loam	12-18	Sandstone	1-100	112	119
6M16	15-30	4-7	Sandstone	Thin/Absent Gravel	6-12	Sandstone	1-100	140	172
6M17	30-50	2-4	Sandstone	Silty Loam	6-12	Sandstone	1-100	106	120
6M18	100+	2-4	Sandstone	Silty Loam	12-18	Sandstone	100-300	87	96
6M19	100+	2-4	Sandstone	Silty Loam	18+	Sandstone	100-300	85	90
6M20	Number omitted.								
6M21	Number omitted.								
6M22	50-75	2-4	Sandstone	Silty Loam	12-18	Sandstone	1-100	94	104
6M23	5-15	4-7	Sandstone	Clay Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	136	158
6N1	5-15	4-7	Sand and Gravel	Clay Loam	2-6	Sand & Gravel w/Sig Silt & Clay	300-700	144	161
6N2	5-15	4-7	Sand and Gravel	Silty Loam	2-6	Sand & Gravel w/Sig Silt & Clay	300-700	146	166
6N3	5-15	4-7	Sand and Gravel	Shrink/ Swell Clay	2-6	Sand & Gravel w/Sig Silt & Clay	300-700	152	181
6N4	5-15	4-7	Bedded Sed. Rocks	Clay Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	122	145
6N5	5-15	4-7	Sand and Gravel	Clay Loam	0-2	Sand & Gravel w/Sig Silt & Clay	300-700	140	160

Setting	Depth To Water (feet)	Recharge	Aquifer Media	Soil Media	Topog-raphy (% Slope)	Vadose Zone Media	Hydro. Cond.	DRASTIC Rating	Pesticide DRASTIC Rating
6N6	5-15	2-4	Bedded Sed. Rocks	Clay Loam	0-2	Bedded Sed. Rocks	1-100	110	133
6N7	5-15	4-7	Bedded Sed. Rocks	Clay Loam	2-6	Sand & Gravel w/Sig Silt & Clay	1-100	121	142
7Ae1	15-30	2-4	Shale	Clay Loam	12-18	Till	1-100	80	91
7Ae2	15-30	2-4	Shale	Silty Loam	2-6	Till	1-100	88	114
7Ba1	15-30	4-7	Sand and Gravel	Loam	18+	Sand and Gravel	700-1000	141	145
7Bc1	15-30	7-10	Limestone	Silty Loam	0-2	Sand & Gravel w/Sig Silt & Clay	100-300	136	160
7Bc2	15-30	7-10	Limestone	Clay Loam	2-6	Sand & Gravel w/Sig Silt & Clay	100-300	133	152
7Be1	5-15	7-10	Shale	Sandy Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	138	169
7D1	5-15	4-7	Sand and Gravel	Sandy Loam	0-2	Sand & Gravel w/Sig Silt & Clay	300-700	151	179
7D2	5-15	4-7	Sand and Gravel	Shrink/ Swell Clay	0-2	Sand & Gravel w/Sig Silt & Clay	300-700	153	184
7D3	5-15	4-7	Sand and Gravel	Silty Loam	0-2	Sand & Gravel w/Sig Silt & Clay	700-1000	156	176
7D4	15-30	7-10	Sand and Gravel	Loam	0-2	Sand and Gravel	1000-2000	170	190
7D5	5-15	4-7	Sand and Gravel	Shrink/ Swell Clay	0-2	Sand & Gravel w/Sig Silt & Clay	300-700	156	187
7D6	5-15	4-7	Sand and Gravel	Silty Loam	0-2	Sand & Gravel w/Sig Silt & Clay	300-700	147	169
7D7	15-30	4-7	Bedded Sed. Rocks	Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	127	155
7D8	5-15	4-7	Sand and Gravel	Loam	12-18	Sand & Gravel w/Sig Silt & Clay	300-700	145	156
7D9	Number omitted.								
7D10	5-15	4-7	Sand and Gravel	Loam	6-12	Sand & Gravel w/Sig Silt & Clay	300-700	147	162
7D11	5-15	4-7	Sand and Gravel	Silty Loam	0-2	Sand & Gravel w/Sig Silt & Clay	300-700	150	172

Setting	Depth To Water (feet)	Recharge	Aquifer Media	Soil Media	Topog-raphy (% Slope)	Vadose Zone Media	Hydro. Cond.	DRASTIC Rating	Pesticide DRASTIC Rating
7D12	15-30	7-10	Sand and Gravel	Silty Loam	0-2	Sand and Gravel	2000+	177	192
7D13	15-30	7-10	Sand and Gravel	Sandy Loam	0-2	Sand and Gravel	2000+	181	202
7D14	5-15	7-10	Sand and Gravel	Silty Loam	0-2	Sand and Gravel	2000+	187	202
7D15	5-15	7-10	Sand and Gravel	Sandy Loam	0-2	Sand and Gravel	2000+	191	212
7D16	15-30	7-10	Sand and Gravel	Clay Loam	0-2	Sand and Gravel	1000-2000	166	180
7D17	15-30	4-7	Sand and Gravel	Silty Loam	0-2	Sand & Gravel w/Sig Silt & Clay	300-700	140	162
7D18	15-30	4-7	Sand and Gravel	Loam	6-12	Sand & Gravel w/Sig Silt & Clay	300-700	137	152
7D19	15-30	4-7	Sand and Gravel	Clay Loam	0-2	Sand & Gravel w/Sig Silt & Clay	300-700	138	157
7D20	5-15	4-7	Bedded Sed. Rocks	Sandy Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	134	166
7D21	5-15	4-7	Bedded Sed. Rocks	Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	132	161
7D22	5-15	4-7	Sand and Gravel	Silty Loam	0-2	Sand & Gravel w/Sig Silt & Clay	300-700	142	165
7D23	5-15	4-7	Sand and Gravel	Shrink/ Swell Clay	0-2	Sand & Gravel w/Sig Silt & Clay	300-700	148	180
7D24	15-30	4-7	Sand and Gravel	Silty Loam	0-2	Sand & Gravel w/Sig Silt & Clay	300-700	132	155
7D25	15-30	4-7	Sand and Gravel	Loam	2-6	Sand & Gravel w/Sig Silt & Clay	2000+	160	178
7D26	15-30	4-7	Sand and Gravel	Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1000-2000	152	174
7D27	15-30	4-7	Sand and Gravel	Silty Loam	2-6	Sand & Gravel w/Sig Silt & Clay	300-700	131	152
7D28	15-30	7-10	Sand and Gravel	Loam	0-2	Sand and Gravel	2000+	189	205
7D29	15-30	4-7	Sand and Gravel	Sandy Loam	6-12	Sand & Gravel w/Sig Silt & Clay	300-700	133	151
7D30	15-30	4-7	Sand and Gravel	Silty Loam	6-12	Sand & Gravel w/Sig Silt & Clay	300-700	129	141
7D31	15-30	4-7	Sand and Gravel	Clay Loam	0-2	Sand & Gravel w/Sig Silt & Clay	300-700	132	151

Setting	Depth To Water (feet)	Recharge	Aquifer Media	Soil Media	Topog-raphy (% Slope)	Vadose Zone Media	Hydro. Cond.	DRASTIC Rating	Pesticide DRASTIC Rating
7D32	5-15	4-7	Sand and Gravel	Clay Loam	0-2	Sand & Gravel w/Sig Silt & Clay	300-700	137	157
7D33	15-30	4-7	Sand and Gravel	Clay Loam	0-2	Sand & Gravel w/Sig Silt & Clay	300-700	127	147
7D34	5-15	4-7	Sand and Gravel	Silty Loam	2-6	Sand & Gravel w/Sig Silt & Clay	300-700	138	159
7D35	5-15	4-7	Sand and Gravel	Sandy Loam	0-2	Sand & Gravel w/Sig Silt & Clay	300-700	143	172
7D36	15-30	7-10	Sand and Gravel	Clay Loam	0-2	Sand and Gravel	2000+	185	195
7D37	15-30	7-10	Sand and Gravel	Loam	0-2	Sand and Gravel	2000+	189	205
7D38	5-15	7-10	Sand and Gravel	Silty Loam	0-2	Sand and Gravel	2000+	197	210
7D39	5-15	7-10	Sand and Gravel	Loam	0-2	Sand and Gravel	2000+	199	215
7D40	15-30	7-10	Sand and Gravel	Sandy Loam	0-2	Sand and Gravel	1000-2000	172	195
7D41	15-30	7-10	Sand and Gravel	Clay Loam	0-2	Sand and Gravel	2000+	175	187
7D42	5-15	7-10	Sand and Gravel	Loam	0-2	Sand and Gravel	1000-2000	180	200
7D43	5-15	7-10	Sand and Gravel	Sandy Loam	0-2	Sand and Gravel	1000-2000	182	205
7D44	5-15	7-10	Sand and Gravel	Silty Loam	0-2	Sand and Gravel	1000-2000	178	195
7D45	15-30	7-10	Sand and Gravel	Silty Loam	0-2	Sand and Gravel	1000-2000	168	185
7D46	5-15	7-10	Sand and Gravel	Silty Loam	0-2	Sand and Gravel	2000+	192	206
7D47	5-15	7-10	Sand and Gravel	Sandy Loam	0-2	Sand and Gravel	2000+	196	216
7D48	15-30	7-10	Sand and Gravel	Silty Loam	0-2	Sand and Gravel	2000+	182	196
7D49	15-30	7-10	Sand and Gravel	Sandy Loam	0-2	Sand and Gravel	2000+	186	206
7D50	15-30	7-10	Sand and Gravel	Loam	0-2	Sand and Gravel	2000+	184	201
7D51	30-50	7-10	Sand and Gravel	Loam	0-2	Sand and Gravel	2000+	174	191
7D52	30-50	7-10	Sand and Gravel	Silty Loam	0-2	Sand and Gravel	2000+	172	186
7D53	30-50	7-10	Sand and Gravel	Sandy Loam	0-2	Sand and Gravel	2000+	176	196
7D54	15-30	4-7	Sand and Gravel	Loam	0-2	Sand & Gravel w/Sig Silt & Clay	300-700	136	161
7D55	15-30	4-7	Sand and Gravel	Clay	0-2	Sand & Gravel w/Sig Silt & Clay	300-700	128	141

Setting	Depth To Water (feet)	Recharge	Aquifer Media	Soil Media	Topog-raphy (% Slope)	Vadose Zone Media	Hydro. Cond.	DRASTIC Rating	Pesticide DRASTIC Rating
7D56	15-30	4-7	Sand and Gravel	Shrink/ Swell Clay	0-2	Sand & Gravel w/Sig Silt & Clay	300-700	140	171
7D57	5-15	7-10	Sand and Gravel	Clay Loam	0-2	Sand and Gravel	2000+	190	201
7D58	15-30	7-10	Sand and Gravel	Clay Loam	0-2	Sand and Gravel	2000+	180	191
7D59	5-15	4-7	Sand and Gravel	Silty Loam	0-2	Sand & Gravel w/Sig Silt & Clay	300-700	145	168
7D60	5-15	4-7	Sand and Gravel	Clay Loam	0-2	Sand & Gravel w/Sig Silt & Clay	300-700	143	163
7D61	5-15	4-7	Sand and Gravel	Shrink/ Swell Clay	0-2	Sand & Gravel w/Sig Silt & Clay	300-700	151	183
7D62	15-30	4-7	Sand and Gravel	Silty Loam	0-2	Sand & Gravel w/Sig Silt & Clay	300-700	134	156
7D63	15-30	4-7	Sand and Gravel	Clay Loam	0-2	Sand & Gravel w/Sig Silt & Clay	300-700	130	150
7D64	30-50	4-7	Sand and Gravel	Clay Loam	0-2	Sand & Gravel w/Sig Silt & Clay	300-700	120	140
7D65	30-50	4-7	Sand and Gravel	Silty Loam	0-2	Sand & Gravel w/Sig Silt & Clay	300-700	122	145
7D66	15-30	4-7	Sand and Gravel	Shrink/ Swell Clay	0-2	Sand & Gravel w/Sig Silt & Clay	300-700	138	170
7D67	5-15	4-7	Sand and Gravel	Clay Loam	0-2	Sand & Gravel w/Sig Silt & Clay	300-700	140	160
7D68	5-15	4-7	Bedded Sed. Rocks	Clay Loam	0-2	Sand & Gravel w/Sig Silt & Clay	300-700	146	166
7D69	5-15	4-7	Bedded Sed. Rocks	Silty Loam	0-2	Sand & Gravel w/Sig Silt & Clay	300-700	148	171
7D70	Number omitted.								
7D71	5-15	4-7	Limestone	Clay Loam	0-2	Sand & Gravel w/Sig Silt & Clay	100-300	136	157
7D72	5-15	4-7	Limestone	Shrink/ Swell Clay	0-2	Sand & Gravel w/Sig Silt & Clay	100-300	144	177
7D73	5-15	4-7	Limestone	Loam	0-2	Sand & Gravel w/Sig Silt & Clay	100-300	140	167
7D74	15-30	4-7	Limestone	Clay Loam	0-2	Sand & Gravel w/Sig Silt & Clay	100-300	126	147

Setting	Depth To Water (feet)	Recharge	Aquifer Media	Soil Media	Topog-raphy (% Slope)	Vadose Zone Media	Hydro. Cond.	DRASTIC Rating	Pesticide DRASTIC Rating
7D75	15-30	4-7	Limestone	Shrink/ Swell Clay	0-2	Sand & Gravel w/Sig Silt & Clay	100-300	134	167
7D76	15-30	4-7	Limestone	Silty Loam	0-2	Sand & Gravel w/Sig Silt & Clay	100-300	128	152
7D77	30-50	4-7	Limestone	Shrink/ Swell Clay	12-18	Sand & Gravel w/Sig Silt & Clay	100-300	117	136
7D78	30-50	4-7	Limestone	Clay Loam	0-2	Sand & Gravel w/Sig Silt & Clay	100-300	111	133
7D79	30-50	4-7	Limestone	Shrink/ Swell Clay	0-2	Sand & Gravel w/Sig Silt & Clay	100-300	119	153
7D80	15-30	4-7	Shale	Loam	6-12	Sand & Gravel w/Sig Silt & Clay	1-100	113	131
7F1	75-100	4-7	Limestone	Silty Loam	0-2	Sand & Gravel w/Sig Silt & Clay	100-300	98	123
7F2	50-75	4-7	Limestone	Silty Loam	0-2	Sand & Gravel w/Sig Silt & Clay	100-300	103	128
7F3	30-50	4-7	Limestone	Clay Loam	0-2	Sand & Gravel w/Sig Silt & Clay	100-300	111	133
7F4	15-30	4-7	Bedded Sed. Rocks	Clay Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	112	135
7F5	15-30	4-7	Bedded Sed. Rocks	Shrink/ Swell Clay	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	120	155
7F7	75-100	4-7	Limestone	Loam	0-2	Sand & Gravel w/Sig Silt & Clay	100-300	100	128
7F8	75-100	4-7	Limestone	Clay Loam	0-2	Sand & Gravel w/Sig Silt & Clay	100-300	96	118
7F9	50-75	4-7	Limestone	Clay Loam	0-2	Sand & Gravel w/Sig Silt & Clay	100-300	101	123
7F10	50-75	4-7	Limestone	Loam	0-2	Sand & Gravel w/Sig Silt & Clay	100-300	105	133
7F11	50-75	4-7	Limestone	Shrink/ Swell Clay	0-2	Sand & Gravel w/Sig Silt & Clay	100-300	109	143
7F12	30-50	4-7	Limestone	Shrink/ Swell Clay	0-2	Sand & Gravel w/Sig Silt & Clay	100-300	119	153

Setting	Depth To Water (feet)	Recharge	Aquifer Media	Soil Media	Topog-raphy (% Slope)	Vadose Zone Media	Hydro. Cond.	DRASTIC Rating	Pesticide DRASTIC Rating
7F13	30-50	4-7	Limestone	Silty Loam	0-2	Sand & Gravel w/Sig Silt & Clay	100-300	113	138
7F14	30-50	4-7	Limestone	Shrink/ Swell Clay	6-12	Sand & Gravel w/Sig Silt & Clay	100-300	114	138
7F15	5-15	4-7	Sand and Gravel	Loam	12-18	Sand & Gravel w/Sig Silt & Clay	300-700	142	153
7F16	5-15	4-7	Sand and Gravel	Clay Loam	0-2	Sand & Gravel w/Sig Silt & Clay	300-700	145	164
7F17	5-15	4-7	Sand and Gravel	Shrink/ Swell Clay	0-2	Sand & Gravel w/Sig Silt & Clay	300-700	153	184
7F18	Number omitted.								
7F19	5-15	4-7	Shale	Clay Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	119	142
7F20	5-15	4-7	Shale	Shrink/ Swell Clay	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	127	162
7F21	5-15	4-7	Shale	Silty Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	121	147
7F22	15-30	4-7	Shale	Loam	6-12	Sand & Gravel w/Sig Silt & Clay	1-100	108	127
7F23	15-30	4-7	Shale	Clay Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	109	132
7F24	30-50	4-7	Shale	Clay Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	99	122
7F25	30-50	4-7	Shale	Silty Loam	0-2	Sand & Gravel w/Sig Silt & Clay	1-100	101	127
7F26	30-50	4-7	Shale	Shrink/ Swell Clay	6-12	Sand & Gravel w/Sig Silt & Clay	1-100	102	127

Ground Water Pollution Potential of Pike County

by
Carrie Frederick

Ground Water Pollution Potential maps are designed to evaluate the susceptibility of ground water to contamination from surface sources. These maps are based on the DRASTIC system developed for the USEPA (Aller et al., 1987). The DRASTIC system consists of two major elements: the designation of mappable units, termed hydrogeologic settings, and a relative rating system for determining the ground water pollution potential within a hydrogeologic setting. The application of DRASTIC to an area requires the recognition of a set of assumptions made in the development of the system. The evaluation of pollution potential of an area assumes that a contaminant with the mobility of water is introduced at the surface and is flushed into the ground water by precipitation. DRASTIC is not designed to replace specific on-site investigations.

In DRASTIC mapping, hydrogeologic settings form the basis of the system and incorporate the major hydrogeologic factors that affect and control ground water movement and occurrence. The relative rating system is based on seven hydrogeologic factors: Depth to water, net Recharge, Aquifer media, Soil media, Topography, Impact of the vadose zone media, and hydraulic Conductivity. These factors form the acronym DRASTIC. The relative rating system uses a combination of weights and ratings to produce a numerical value called the ground water pollution potential index. Higher index values indicate higher susceptibility to ground water contamination. Polygons (outlined in black on the map at left) are regions where the hydrogeologic setting and the pollution potential index are combined to create a mappable unit wtih specific hydrogeologic characteristics, which determine the region's relative vulnerability to contamination. Additional information on the DRASTIC system, hydrogeologic settings, ratings, and weighting factors is included in the report.

Description of Map Symbols

Hydrogeologic Region → 7D24 ← Hydrogeologic Setting
170 ← Relative Pollution Potential

Legend

Colors are used to depict the ranges in the pollution potential indexes shown below. Warm colors (red, orange, yellow) represent areas of higher vulnerability (higher pollution potential indexes), while cool colors (green, blue, violet) represent areas of lower vulnerability to contamination (lower pollution potential indexes).

- Roads
- Streams
- Lakes
- Townships

Index Ranges

- Not Rated
- Less Than 79
- 80 - 99
- 100 - 119
- 120 - 139
- 140 - 159
- 160 - 179
- 180 - 199
- Greater Than 200

Black grid represents the State Plane South Coordinate System (NAD27, feet).

0 0.5 1 2 3 4 5
Miles

0 1 2 4 6 8
Kilometers

Ohio Department of Natural Resources
Division of Water
Ground Water Resources Section
1939 Fountain Square
Columbus Ohio 43224
www.dnr.state.oh.us

2003