USGS
science for a changing world

Prepared in cooperation with
the West Virginia Bureau for Public Health, Office of Environmental Health Services

Aquifer-Characteristics Data for West Virginia

Water-Resources Investigations Report 01-4036

U.S. Department of the Interior
U.S. Geological Survey

U.S. Department of the Interior
U.S. Geological Survey

Aquifer-Characteristics Data for West Virginia

By Mark D. Kozar and Melvin V. Mathes

Water-Resources Investigations Report 01-4036

Prepared in cooperation with
the West Virginia Bureau for Public Health, Office of Environmental Health Services

Charleston, West Virginia
2001

U.S. DEPARTMENT OF THE INTERIOR
GALE A. NORTON, SECRETARY

U.S. Geological Survey
Charles G. Groat, Director

For additional information write to:

District Chief
U.S. Geological Survey
11 Dunbar Street
Charleston, WV 25301

Copies of this report can be purchased from:

U.S. Geological Survey
Branch of Information Services
Box 25286
Denver, CO 80225-0286

CONTENTS

FIGURES

TABLES

CONVERSION FACTORS AND VERTICAL DATUM

Multiply	By	To obtain
inch (in.)	25.4	millimeter
foot (ft)	0.3048	meter
foot squared per day (ft^2/d)	0.09290	meter squared per day
gallon per minute (gal/min)	0.00006309	cubic meter per second
gallons (gal)	0.2642	liters
mile (mi)	1.609	kilometer
square foot (ft^2)	0.09290	square meter
square mile (mi^2)	2.590	square kilometer
gallons per minute per foot (gal/min/ft)	12.418	liters per minute per meter
gallons per day per foot (gpd/ft)	0.0124	square meters per day
foot per day (ft/d)	0.3048	meters per day
inches per year (in./yr)	2.540	centimeters per year

Sea level: In this report, “sea level” refers to the National Geodetic Vertical Datum of 1929 (NGVD of 1929)—a geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called Sea Level Datum of 1929.

Aquifer-Characteristics Data for West Virginia

by Mark D. Kozar and Melvin V. Mathes

Abstract

Specific-capacity, storage-coefficient, and specific-yield data for wells in West Virginia were compiled to provide a data set from which transmissivity could be estimated. This data can be used for analytical and mathematical ground-water flow modeling. Analysis of available storage-coefficient and (or) specific-yield data indicates that the Ohio River alluvial aquifer has a median specific yield of 0.20, which is characteristic of an unconfined aquifer. The Kanawha River alluvial aquifer has a median specific yield of 0.003, which is characteristic of a semi-confined aquifer. The median storage coefficient of fractured-bedrock aquifers is only 0.007, which is characteristic of confined aquifers.

The highest median transmissivity of a specific aquifer in West Virginia occurs in Ohio River alluvium (4,800 ft^2/d); the second highest occurs in Kanawha River alluvium (1,600 ft^2/d). The lowest median transmissivity (23 ft^2/d) is for the McKenzie-Rose Hill-Tuscarora aquifer. Rocks of Cambrian age within the Waynesboro-Tomstown-Harpers-Weverton-Loudon aquifer had a low median transmissivity of only 67 ft^2/d. Other aquifers with low transmissivities include the Hampshire Formation, Brallier-Harrell Formations, Mahantango Formations, Oriskany Sandstone, and the Conococheague Formation with median transmissivities of 74, 72, 92, 82, and 92 ft^2/d, respectively. All other aquifers within the State had intermediate values of transmissivity (130-920 ft^2/d). The highest median transmissivities among bedrock aquifers were those for aquifers within the Pennsylvanian age Pocahontas Formation (1,200 ft^2/d) and Pottsville Group (1,300 ft^2/d), and the Mississippian age Mauch Chunk Group (1,300 ft^2/d). These rocks crop out primarily in the southern part of the State and to a lesser extent within the Valley and Ridge Physiographic Province in West Virginia's Eastern Panhandle.

The highest mean annual ground-water recharge rates within West Virginia (24.6 in.) occur within a band that extends through the central part of the State within the eastern part of the Kanawha River Basin. This area of relatively high relief has peaks higher than 4,000 ft and precipitation greater than 50 in./yr. The band of high recharge rates extends northward towards Pennsylvania and includes the Monongahela River Basin, which has a mean annual recharge of 21.4 inches.

To the west of this central band lies a region of lower relief with much lower mean annual precipitation (approximately 40 in.). Consequently, this area has much lower ground-water recharge rates. Mean annual recharge for the Tug Fork, Twelvepole Creek, and Guyandotte River Basins is only 12.6 inches. For the western part of the Kanawha River Basin, mean recharge is 11.9 inches. The lowest mean annual recharge rates (8.4 in.) within the State occur in the Little

Kanawha River Basin and the tributary streams in the region that discharge directly to the Ohio River.

West Virginia’s Eastern Panhandle is an area characterized by long linear northeast to southwest trending ridges and valleys. The mean annual ground-water recharge rate for this region, which is drained almost entirely by the Potomac River and its tributaries, is 9.4 inches. This area, which is located within a rain shadow resulting from orographic lifting in the higher altitude area to the west, receives less precipitation (approximately 30 in.) than the region to the west.

INTRODUCTION

The West Virginia Bureau for Public Health, Office of Environmental Health Services (OEHS), has been mandated by the U.S. Environmental Protection Agency (USEPA) to delineate well-head (source-water) protection areas for all public-supply wells and well fields within West Virginia. These delineations can be used to help protect water supplies from the effects of land-use activities. OEHS delineates most well-head protection areas for ground-water supplies using analytical ground-water flow models, but also plans to use the mathematical flow model MODFLOW 2000 (Harbaugh and others, 2000) to delineate well-head protection areas for certain ground-water supplies that cannot be adequately described using simplified analytical models.

The development of analytical or numerical ground-water flow models requires data such as aquifer thickness, transmissivity, hydraulic conductivity, hydraulic gradient, storage coefficient and (or) specific yield, water levels, and the amounts of recharge and water withdrawn from the aquifer. Such “aquifer-characteristic data” are difficult to obtain, especially transmissivity, hydraulic conductivity, ground-water recharge, storage coefficient and (or) specific yield. These data are needed to allow OEHS to effectively delineate realistic well-head protection areas for public-supply water systems within the State. Currently, OEHS uses the data available for West Virginia aquifers that have been published in past hydrogeologic reports, but little published information is available for many areas within the State. The United States Geological Survey (USGS), in cooperation with OEHS, compiled this data to help OEHS effectively delineate well-head protection areas for public-supply water systems within West Virginia.

All data within this report are first aggregated by hydrogeologic unit and then by county. The formation and group names used within this report are those adopted by the West Virginia Geologic and Economic Survey (WVGES) as they appear on the 1968 State geologic map of West Virginia (Cardwell and others, 1968). The level of detail needed to display geologic information necessary to locate transmissivity data for a respective area was not possible on a page size map. In order to locate within the appropriate hydrogeologic unit, the wells for which transmissivity values are presented in this report, the reader must obtain large-scale geologic maps of the area of interest and then match the hydrogeologic unit (aquifer) with those values in the appendix. Geologic maps for individual counties and localities, as well as for the State of West Virginia may be obtained from the WVGES (http://www.wvgs.wvnet.edu).

Purpose and Scope

This report presents estimates of transmissivity for aquifers throughout West Virginia. Published estimates of saturated aquifer thickness, hydraulic conductivity, storage coefficient and (or) specific yield are documented. Three sources of data were used to develop these estimates. First, published data from existing hydrogeologic reports were tabulated and organized by aquifer. Second, estimates of transmissivity were made from specific-capacity data stored in the USGS National Water Information System (NWIS) ground-water site inventory (GWSI) database. Additional aquifer test and specific-capacity data were obtained from OEHS files maintained for public ground-water supplies.

This report also provides estimates of ground-water recharge, which are needed for development of analytical and numerical ground-water flow models. Recharge estimates were made by analysis of streamflow data using the USGS software package RORA (Rutledge, 1998). The software RORA uses the recession-curve displacement method to estimate ground-water recharge rates (Rorabaugh, 1964). Hydrograph-separation methods (Sloto and Crouse, 1996) were used to estimate ground-water discharge and recharge.

Acknowledgments

The authors thank the staff of OEHS for providing data used in this report. These data enhanced the number of transmissivity estimates published in this report and helped to fill data gaps in areas of the State where USGS data were minimal.

Description of Study Area

The study area for this report is the State of West Virginia (fig. 1). It includes (1) Quaternary age alluvial aquifers primarily along the Kanawha and Ohio Rivers, (2) Cambrian and Ordovician age karst limestone and dolomite aquifers in the State's Eastern Panhandle, (3) Mississippian age sandstone, shale, and limestone aquifers including the karst limestone aquifer in the Greenbrier Formation, (4) Silurian and Devonian age limestone, shale, siltstone and sandstone aquifers in the State's eastern portion, (5) lower Pennsylvanian age fractured sandstone, limestone, coal, shale and siltstone aquifers in the southern portion of the State, and (6) upper Pennsylvanian through Permian age fractured shale, siltstone, sandstone, coal, and limestone aquifers of Pennsylvanian through Permian age in the northern portion of the State (fig. 2).

DATA SOURCES, COMPILATIONS, AND LIMITATIONS

Data referenced in this report were obtained from several sources. Once data were obtained, it was compiled into one large data set for analysis (see appendix). There are, however, limitations of the available data. To understand the quality of the data presented, it is necessary to discuss its sources, compilation, and limitations.

Data Sources

Data compiled, analyzed, and presented were obtained from three sources. First, literature was reviewed and pertinent hydrogeologic reports containing aquifer-characteristic data were obtained. In addition to the actual aquifer-test data, additional data were compiled including the county in which the data were obtained, the aquifer (hydrogeologic unit) tested, well depth, and casing length. Much of the published data were obtained from U.S. Geological Survey or West Virginia Geological and Economic Survey reports. The second source of data was the USGS GWSI database. It contains data for wells inventoried or sampled by the USGS as part of hydrogeologic investigations. Even though the database was not established until 1977, USGS personnel in West Virginia entered available historical data from paper files into the database. The database contains well data from as far back as 1940 and continues to grow as additional USGS hydrogeologic investigations are conducted. It currently contains data for approximately 13,090 wells within West Virginia.

Third, in addition to historical published data and the GWSI database, data were available from the OEHS. OEHS maintains files for each public-supply well or well field within the State. Data for some sites, especially the larger public suppliers (primarily larger municipal water systems), includes data from aquifer tests. Aquifer-characteristic and specific-capacity data available from OEHS were included in the computer database developed in support of this project. Specific-capacity data are available from the GWSI database and OEHS for 677 wells from which 636 estimates of transmissivity were made.

In addition to estimates of transmissivity, ground-water recharge rates were estimated from historical streamflow data using hydrograph-analysis techniques. Streamflow data (daily discharge data) from 41 stream-gaging stations (fig. 3) throughout West Virginia were analyzed using computer software (Rutledge, 1998) to determine recharge rates for selected areas. The software uses the recession-curve displacement method (Rorabaugh, 1964). Data used in these analyses were obtained from the USGS Automated Data Processing Software (ADAPS) database.

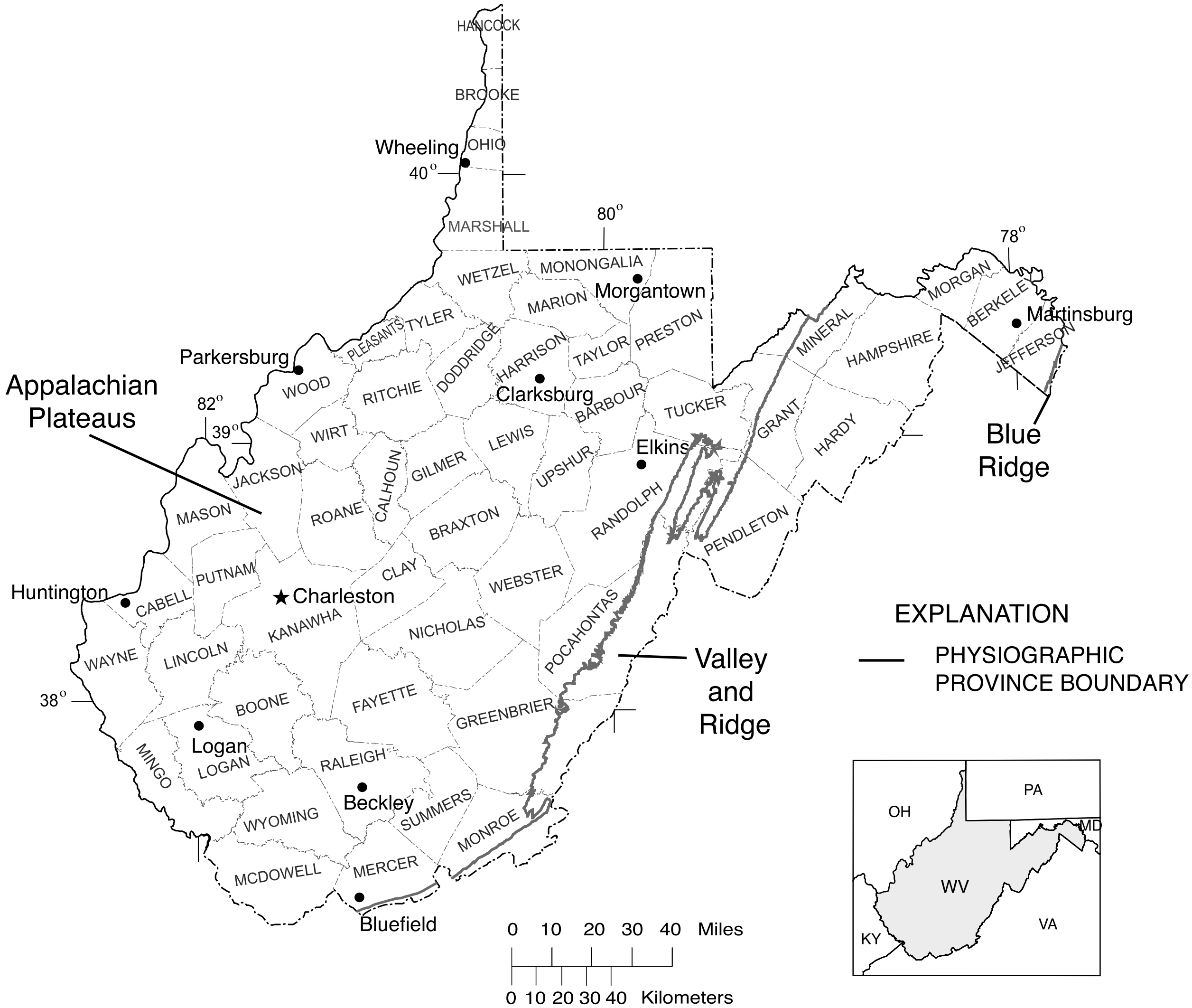
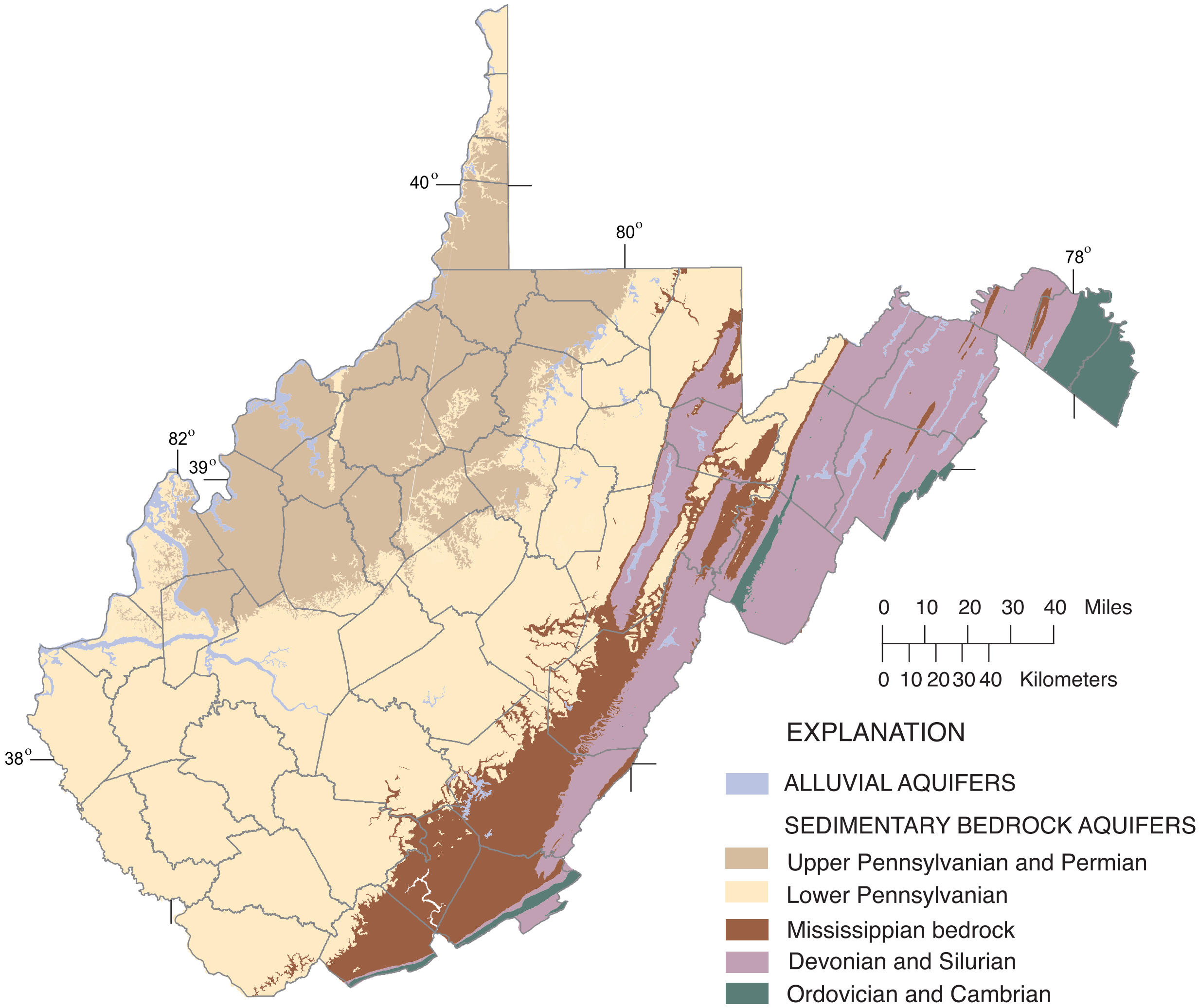


Figure 1. Physiographic provinces, counties, and selected towns in West Virginia.



Modified from digital geology data from the West Virginia Department of Environmental Protection, 1998

Figure 2. Major hydrogeologic units in West Virginia.

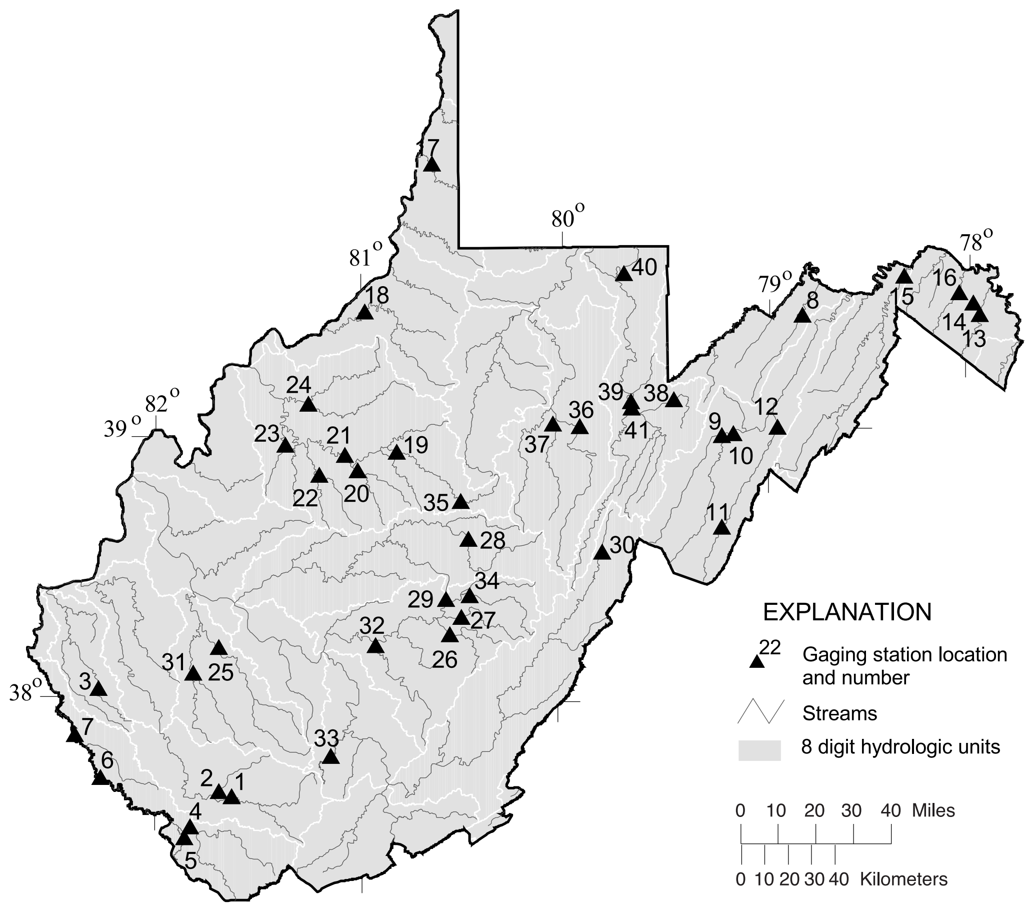


Figure 3. Location of gaging stations and basins for which ground-water recharge was estimated using the streamflow recession-curve displacement method.

Data Compilations

At the onset of this study it was recognized that there were limitations on published information in the State related to aquifer characteristics such as transmissivity (T), hydraulic conductivity (K), saturated thickness (b), storage coefficient (S), and specific yield (S_y). The cost and time for performing hundreds of aquifer tests to obtain sufficient information to characterize hydraulic properties of aquifers throughout the State would have been prohibitive. Because of limited available data and funding and time constraints, specific-capacity data were used as a foundation for initial estimates of transmissivity. Ground-water scientists commonly use transmissivity estimates based on specific-capacity tests as the basis for quantitative ground-water investigations, especially in areas where aquifer test data are limited (Lohman, 1972).

Specific capacity is simply the discharge of the well divided by the drawdown produced in the well as it is pumped and may be expressed as $C_s = Q/s$, where C_s is the specific capacity in gal/min/ft; Q is the discharge of a pumping well in gal/min, and s is the drawdown in feet produced in the pumping well over a period of time (Freeze and Cherry, 1979). Given certain additional data such as the approximate radius of a well (r), an estimate of the storage coefficient (S), and (or) specific yield (S_y) and the total length of time the well was pumped (t); it is possible to estimate transmissivity (T).

Transmissivity is a primary data element needed for input into analytical or mathematical ground-water flow models. It is defined as "the rate at which water of the prevailing kinematic viscosity is transmitted through a unit width of an aquifer under a unit hydraulic gradient" (Bates and Jackson, 1984). Transmissivity is commonly expressed in units of feet squared per day (cubic feet per day per foot of aquifer or ft^2/d) but is also sometimes seen expressed in the older unit of gallons per day per foot (gpd/ft) or in metric units. The equation for estimating transmissivity from specific capacity (Bentall and others, 1963) data may be written as:

$$T' = Q/s(K - 264 \log_{10} 5S + 264 \log_{10} t)$$

where

Q/s = specific capacity of the well (gpm/ft), S = the storage coefficient or the specific yield of the well,

T' = initial estimate of transmissivity (gpd/ft) adjusted for specific capacity,

K = a constant which varies with well diameter (r), and

t = the total time (in days) of the test over which drawdown was determined.

A 6-inch diameter well (r=0.5 ft) has a K of 1,684, a 24-inch well has a K of 1,367, and a 50-foot diameter well has a K of only 469. As alluvial wells typically have a much larger diameter than bedrock wells, two separate equations were used for estimating transmissivity from specific capacity data. Two equations were needed because the storage coefficient and (or) specific yield of the two aquifer types differ so much that one equation could not be applied to both settings. Equation 1 is used for small diameter open borehole wells in fractured bedrock aquifers and equation 2 is applied to data for wells tapping unconsolidated alluvial water table aquifers.

For a 6-inch diameter open-borehole well tapping consolidated bedrock, the equation for estimating transmissivity developed by C.V. Theis (Bentall and others, 1963) may be written as:

$$T' = C(K - 264 \log_{10} 5S + 264 \log_{10} t) \quad (1)$$

where

C = Q/s = specific capacity of the well

This equation was applied to all bedrock wells listed in appendix 1. K values used in equation 1 were adjusted for well diameter according to:

K=1,791 for 4-in. well, K=1,737 for 5-in. well, K=1,684 for 6-in. well, K=1,631 for 8-in. well, K=1,577 for 10-in. well, K=1,524 for 12-in. well, and K=1,305 for 30-in. well.

Wells with unknown diameters were assumed to have a diameter of six inches because most wells in fractured rock listed in the GWSI database are domestic home-owner wells, which are typically six inches in diameter.

For 1-foot diameter wells that tap water-table aquifers consisting of unconsolidated sediments (such as are common along the Ohio and Kanawha Rivers), the equation developed for estimating transmissivity from specific capacity may be written as;

$$T' = C(1 + \text{or} - 0.3)(1{,}300 - 264 \log_{10} 5S + 264 \log_{10} t). \quad (2)$$

The factor (1 ± or - 0.3) may be adjusted upward for wells having a small diameter, for wells that are poorly developed, and for wells with poorly perforated casing. It may be adjusted downward for larger, better developed wells. A factor of 1.0 was applied to transmissivity estimates made for alluvial wells with diameters less than or equal to 24 inches. A factor of 0.85 was applied to alluvial wells with diameters greater than 24 inches. This approach seems reasonable because most estimates of transmissivity were made for alluvial wells with diameters of 8 to 24 inches and only a few wells had diameters larger than 24 inches.

Both equations were derived from the same general equations but with differing assumptions of basic aquifer properties. Transmissivity cannot be determined explicitly from the two equations described. For values of T', transmissivity must be determined graphically from a plot of known values of T' and Q/s. For a full discussion of the method used to estimate transmissivity refer to USGS Water-Supply Paper 1536-I (Bentall and others, 1963). All available specific capacity data and estimates of transmissivity referenced within this report are included in appendix 1.

Finally, for 83 wells there were insufficient data to estimate transmissivity with the methods previously discussed. For those sites where the period of the specific capacity test was unknown and where confined aquifer conditions were expected, transmissivity was estimated using equation 3 (Driscoll, 1986):

$$T = Q/s \times 2{,}000 \qquad (3)$$

Estimates of transmissivity were made using this simplified approach for three wells in alluvium on minor tributary streams and for 87 wells in bedrock. The resulting transmissivity expressed in gpd/ft was then corrected to obtain transmissivity in ft^2/d. Transmissivity estimates made using this simplified approach compared favorably with estimates made using the method developed by Theis discussed earlier. This estimation method was not applied to data for wells in alluvium along the Ohio and Kanawha Rivers for two primary reasons. First, estimates made using this simplified approach for Kanawha and Ohio River alluvial wells did not compare favorably with the estimates made using the more quantitative Theis approach. Second, the method is applicable only to confined aquifer settings and the Ohio and Kanawha River alluvial aquifers are typically unconfined to semi-confined. Transmissivities determined for 90 sites using this approach are identified as estimated in appendix 1.

Data Limitations

Published information related to transmissivity, hydraulic conductivity, saturated thickness, storage coefficient and (or) specific yield is limited. The best way to obtain such aquifer-characteristic data is to conduct a series of well-designed long-term aquifer tests. The cost and time for performing such tests prohibit ground-water scientists from obtaining sufficient aquifer-characteristic data. The specific-capacity data from which estimates of transmissivity were made, however, were abundant. Specific-capacity data were available for all geographic areas and aquifers within the State. Transmissivity estimates based on specific-capacity data are intended to be used as a starting point for first approximation ground-water flow models or analytical analyses of wells or well fields. Long-term aquifer tests should be conducted to determine aquifer characteristics for use in mathematical or analytical models if at all possible.

The major assumption made before transmissivity estimates were developed was related to storage coefficient and (or) specific yield. Errors in transmissivity are possible if inappropriate values of storage coefficient are used in the estimation process. Median storage coefficients (0.20, 0.003, and 0.007, respectively) for alluvial aquifers along the Ohio and Kanawha Rivers and for fractured bedrock aquifers were obtained from previously published reports (table 1) and were used in estimating transmissivity.

To understand the margin of error associated with estimating transmissivity, an example for fractured bedrock aquifers, which had the largest range in storage coefficient, is presented. For a 6-inch well with a specific capacity of 0.10 pumped over a 24-hour period, transmissivity was estimated to be 207 gpd/ft, assuming a storage coefficient of 0.007. If storage coefficients of 0.070 or 0.0007 are used, transmissivity estimates of 180 and 233 gpd/ft are obtained. Thus a 12 or 13 percent error in estimated transmissivity is possible based on an order of magnitude error in storage coefficient and (or) specific yield applied to a particular aquifer. This error is small in comparison to the order of magnitude variability in transmissivity that is possible in aquifers.

Table 1. Storage-coefficient and (or) specific-yield data for hydrogeologic units in West Virginia and published reports from which data were obtained

[N/D, no data; Fm., Formation]

Hydrogeologic Unit (Aquifer)	Geologic Age	Storage Coefficient	Method	Reference
	Fractured Bedrock Aquifers			
Pottsville Group	Pennsylvanian System	0.007	Aquifer test	Ward and Wilmoth, 1968
Pocono Group	Mississippian System	0.00015	Aquifer test	Ward and Wilmoth, 1968
Pocono Group	Mississippian System	0.0001	Aquifer test	Ward and Wilmoth, 1968
Hampshire Formation	Devonian System	0.015	Channel method	Hobba, 1985
Hampshire Formation	Devonian System	0.015	Channel method	Hobba, 1985
Tonoloway Formation	Silurian System	0.3	Channel method	Hobba, 1985
Rockdale Run Formation	Ordovician System	0.14	Aquifer test	Trainer and Watkins, 1975
Stonehenge Formation	Ordovician System	0.018	Aquifer test	Trainer and Watkins, 1975
Wills Creek Formation	Silurian System	0.008	Aquifer test	Trainer and Watkins, 1975
Wills Creek Formation	Silurian System	0.01	Aquifer test	Trainer and Watkins, 1975
Helderberg Group and Tonoloway Formation	Devonian and Silurian System	0.004	Aquifer test	Trainer and Watkins, 1975
Pocono Group	Mississippian System	0.0042	Aquifer test	Trainer and Watkins, 1975
Pocono Group	Mississippian System	0.0006	Aquifer test	Trainer and Watkins, 1975
Pocono Group	Mississippian System	0.0001	Aquifer test	Schwietering, J.F., 1981
Pocono Group	Mississippian System	0.00015	Aquifer test	Schwietering, J.F., 1981
Pottsville Group	Pennsylvanian System	0.0004	Aquifer test	Wilmoth, 1966
Beekmantown and St. Paul Groups, and Elbrook, Connococheague,and Chambersburg Formations	Cambrian and Ordovician Systems	0.044	Specific yield	Shultz and others, 1995
Beekmantown and St. Paul Groups, and Elbrook, Connococheague, and Chambersburg Formations	Cambrian and Ordovician Systems	0.049	Specific yield	Shultz and others, 1995
Helderberg Group and Tonoloway Fm.	Devonian and Silurian System	0.002-0.004	N/D	Hobba and others, 1972
Tonoloway and Wills Creek Fms.	Silurian System	0.001-0.008	N/D	Hobba and others, 1972

Table 1. Storage-coefficient and (or) specific-yield data for hydrogeologic units in West Virginia and published reports from which data were obtained —Continued

[N/D, no data; Fm., Formation]

Hydrogeologic Unit (Aquifer)	Geologic Age	Storage Coefficient	Method	Reference
Helderburg Group, Tonoloway, Wills Creek, and Williamsport Formations	Devonian and Silurian System	0.001-0.043	N/D	Schwietering, J.F., 1981
Beekmantown Group	Ordovician System	0.0014-0.145	N/D	Hobba and others, 1972
Catoctin Formation	Cambrian or Precambrian System	0.002-0.004	N/D	Hobba and others, 1972
Pocono Group	Pennsylvanian System	0.0006-0.0042	Aquifer test	Schwietering, J.F., 1981
Conemaugh Group	Pennsylvanian System	0.0001-0.031	Aquifer test	Schwietering, J.F., 1981
		0.007	**Median for fractured bedrock aquifers**	
	Alluvial Aquifers			
Alluvium (Ohio River)	Quaternary System	0.29	Aquifer test	Wilmoth, 1966
Alluvium (Ohio River)	Quaternary System	0.2	Aquifer test	Wilmoth, 1966
Alluvium (Ohio River)	Quaternary System	0.16	Aquifer test	Wilmoth, 1966
Alluvium (Ohio River)	Quaternary System	0.22	Aquifer test	Wilmoth, 1966
Alluvium (Ohio River)	Quaternary System	0.19	Aquifer test	Wilmoth, 1966
Alluvium (Ohio River)	Quaternary System	0.2	Aquifer test	Wilmoth, 1966
Alluvium (Ohio River)	Quaternary System	0.21	Aquifer test	Wilmoth, 1966
Alluvium (Ohio River)	Quaternary System	0.15	Aquifer test	W.Va. Bureau for Public Health
Alluvium (Ohio River)	Quaternary System	0.29	Aquifer test	W.Va. Bureau for Public Health
Alluvium (Ohio River)	Quaternary System	0.42	Aquifer test	W.Va. Bureau for Public Health
		0.20	**Median for Ohio River Alluvium**	
Alluvium (Kanawha River)	Quaternary System	0.004	Aquifer test	Wilmoth, 1966
Alluvium (Kanawha River)	Quaternary System	0.002	Aquifer test	Wilmoth, 1966
		0.003	**Median for Kanawha River Alluvium**	

Another assumption used when analyzing aquifer-test data is that the aquifer tested is homogenous and isotropic. Most fractured bedrock aquifers are not homogenous or isotropic at a local scale, but are commonly assumed to be so on a regional scale. For a given well, these assumptions are typically not valid, but for the entire recharge area to a public-supply well field, the assumptions are more realistic. A wide range of transmissivity is possible in a fractured bedrock aquifer; therefore, users of the data are cautioned to not assume that median values referenced in this report are characteristic of an aquifer that they may be evaluating.

AQUIFER CHARACTERISTICS ESTIMATED FROM WELL DATA

All of the specific capacity and transmissivity data referenced within this report (table 2) were determined from well-drawdown data except for storage coefficient and (or) specific yield, which was obtained from published reports (table 1). Estimates of transmissivity presented in appendix 1 were determined from specific-capacity data.

Specific Capacity

Specific capacity of wells in West Virginia is highly variable and is affected by many factors. In bedrock aquifers, the major factor affecting specific capacity is the number, extent, and aperture of fractures encountered by a well bore. The more fractures (joints, faults, and bedding-plane separations) encountered by a well, the higher the specific capacity will be, because bedrock aquifers within West Virginia have little primary porosity. Alluvial aquifers comprise unconsolidated sediments such as sand, silt, clay, gravel, and boulders. The major factor affecting the specific capacity of a well is the proportion of coarse-grained sediments to fine-grained sediments. Alluvial sediments with a high proportion of gravel and sand will generally have a higher specific capacity than sediments with a larger proportion of fine-grained sediments, such as silts and clay.

Alluvial aquifers in West Virginia are primarily in areas bordering the Ohio and Kanawha Rivers. Alluvial sediments also border a few smaller streams throughout the State. The relatively high proportion of sand and gravel glacial outwash in Ohio River sediments produces a highly permeable and productive aquifer (Carlston and Graeff, 1955). Specific capacity of wells completed in Ohio River alluvial aquifers ranges from 4 to 381 gallons per minute per foot of drawdown (gpm/ft) with a median of 31.8 gpm/ft (table 2). These high specific capacities are reflective of highly productive aquifers. Alluvial aquifers along the Kanawha River are comprised of finer grain sediments (sand, silt, and clay) than are alluvial aquifers along the Ohio River. The finer grain sand and silts of Kanawha River alluvial aquifers have much lower specific capacities ranging from 3.64 to 132 gpm/ft with a median of 11.8 gpm/ft (table 2). Consequently, Kanawha River alluvial aquifers are not used as frequently as the Ohio River alluvial aquifers as a source of water for public, industrial, or domestic supply. Finally, alluvial sediments along smaller streams such as the New River, the Little Kanawha River, the West Fork River, the Tygart River, and the ancestral Teays River Valley also can be sources of potable water. The composition of alluvial sediments along these streams is similar hydrologically to Kanawha River alluvial sediments but contains an even higher proportion of silt and clay, so they are rarely used as a source of water supply. Specific capacity of these minor alluvial aquifers ranges from 0.40 to 10.5 gpm/ft with a median of 3.43 gpm/ft (table 2).

Other than alluvial aquifers bordering the Ohio River, ground-water withdrawals in the remainder of the State are primarily from fractured-bedrock aquifers. These sedimentary bedrock aquifers can generally be classified as carbonate (consisting of limestone and dolomite) or as clastic sedimentary rocks (consisting of sandstone, siltstone, shale or coal). In the southern part of the State, wells are commonly drilled into voids left as a result of abandoned underground coal mines. Wells drilled into underground mine voids within the Pocahontas and New River Formations have the highest specific capacities of all aquifers analyzed for the State, commonly exceeding 1,000 gpm/ft (appendix 1 and table 2).

Table 2. Statistical summary of specific capacity and transmissivity data for hydrogeologic units in West Virginia

[gpm/ft, gallons per minute per foot; ft^2/d, feet squared per day]

Hydrogeologic Unit (Aquifer)	Specific Capacity (gpm/ft)				Transmissivity (ft^2/d)			
	median value	minimum value	maximum value	number of sites	median value	minimum value	maximum value	number of sites
Ohio River Alluvium	31.8	4.00	381	168	4,800	540	59,000	128
Kanawha River Alluvium	11.8	3.64	132	8	1,600	670	31,000	7
Other Alluvium	3.43	0.40	10.5	4	920	110	2,800	4
Dunkard Group	0.50	0.01	130	31	130	3.0	33,000	31
Monongahela Group	0.57	0.01	10.0	18	150	3.0	27,000	18
Conemaugh Group	0.75	0.01	100	55	170	3.0	24,000	55
Allegheny Formation	3.12	0.02	138	18	850	6.0	41,000	18
Kanawha Formation	2.00	0.01	113	74	520	3.0	31,000	74
New River Formation	1.33	0.09	2,780	18	330	19	750,000	18
Pocahontas Formation	4.95	1.00	1,000	4	1,200	210	270,000	4
Pottsville Group	5.09	0.06	44.1	24	1,300	16	12,000	24
Bluestone and Princeton Formations	2.15	0.13	26.7	11	480	27	6,600	11
Hinton Formation	1.40	0.08	7.50	13	310	19	1,300	13

Table 2. Statistical summary of specific capacity and transmissivity data for hydrogeologic units in West Virginia —Continued

[gpm/ft, gallons per minute per foot; ft^2/d, feet squared per day]

Hydrogeologic Unit (Aquifer)	Specific Capacity (gpm/ft)				Transmissivity (ft^2/d)			
	median value	minimum value	maximum value	number of sites	median value	minimum value	maximum value	number of sites
Mauch Chunk Group	5.00	0.38	30.8	15	1,300	83	7,200	15
Greenbrier Group	2.05	0.03	50.0	13	470	8.0	13,000	13
Maccrady Formation and Pocono Group	0.83	0.17	8.67	7	210	33	2,300	7
Hampshire Formation	0.31	0.01	12.5	22	74	3.0	2,900	22
Chemung Group	1.35	0.12	30.7	22	270	32	8,300	22
Brallier and Harell Formations	0.28	0.01	1.60	7	72	3.0	390	7
Upper to middle Devonian units	0.76	0.19	4.29	15	180	44.	760	15
Mahantango Formation	0.38	0.01	3.75	10	92	3.0	840	10
Marcellus and Needmore Formations	0.86	0.07	7.00	15	170	16	1,300	15
Onesquethaw Group and Oriskany Sandstone	0.35	0.10	8.00	8	82	19	1,500	8
Helderburg Group, Tonoloway, Wills Creek and Williamsport Formations	0.82	0.07	600	13	200	17	160,000	13

Table 2. Statistical summary of specific capacity and transmissivity data for hydrogeologic units in West Virginia —Continued

[gpm/ft, gallons per minute per foot; ft^2/d, feet squared per day]

	Specific Capacity (gpm/ft)				Transmissivity (ft^2/d)			
Hydrogeologic Unit (Aquifer)	**median value**	**minimum value**	**maximum value**	**number of sites**	**median value**	**minimum value**	**maximum value**	**number of sites**
Clinton Group, Mckenzie and Tuscarora Formations	0.11	0.02	6.50	3	23	6.0	1,100	3
Martinsburg Formation	1.00	0.11	10.0	15	240	23	2,400	15
Trenton, Black River, St. Paul or Beekmantown Groups	2.36	0.01	68.0	32	590	2.0	18,000	32
Conococheague Formation	0.38	0.04	74.3	16	92	9.0	20,000	16
Elbrook Formation	0.46	0.05	34.3	9	100	13	9,200	9
Waynesboro, Tomstown, and Harpers-Weverton-Loudon Formations	0.25	0.02	3.20	9	67	5.0	740	9

Karst limestone and (or) dolomite aquifers are important sources of water supply in the Greenbrier Valley in Monroe, Greenbrier, and Pocahontas Counties and the Cambrian and Ordovician age karst aquifers are important sources of water supplying Jefferson, Berkeley, and Morgan Counties in West Virginia's Eastern Panhandle. Additionally, several less important (small in areal extent) karst aquifers occur in areas of the Valley and Ridge Province in eastern West Virginia. Most karst aquifers in West Virginia (except for the Greenbrier limestone) have been classified primarily as diffuse-flow karst aquifers rather than as conduit-dominated systems (Jones, 1997), and are generally not as productive as the alluvial aquifers or even many of the clastic sedimentary rocks. Even though very large springs may flow from limestone aquifers, (McColloch, 1986), specific capacities of wells drilled in limestone and dolomite are typically low. The median specific capacities of wells completed in the Greenbrier and Beekmantown Groups are 2.05 and 2.36 gpm/ft, respectively. Median specific capacity for karst limestone/dolomite aquifers of the Helderburg Group and the Tonoloway, Wills Creek, Conococheague, Elbrook, Waynesboro, Tomstown and Harpers-Weverton-Loudon Formations, ranged from a minimum of 0.25 to a maximum of 0.82 gpm/ft.

Other than alluvial sediments along the State's major rivers, the highest median specific capacities (3.12 to 5.09 gpm/ft respectively) are from wells completed in the Pottsville and Mauch Chunk Groups and the Pocahontas and Allegheny Formations (table 2). These units are adjacent to one another and form a band of sandstone, shale and coal dominated by bedrock that outcrops in a southwest to northwest trending band across central West Virginia. Wells drilled in younger age bedrock of the Conemaugh, Monongahela, and Dunkard Groups generally have much lower median specific capacities of 0.50 to 0.75 gpm/ft, respectively. Other than the Chemung Group and the Martinsburg Formation, which have median specific capacities of 1.35 and 1.00 gpm/ft respectively, shale dominated bedrock of Cambrian through Devonian age (table 3), including the McKenzie, Tuscarora, Marcellus, Needmore, Mahantango, Brallier, Harrel, and Hampshire Formations, all have specific capacities less than 1.0 gpm/ft.

Estimates of Transmissivity

The estimates of transmissivity presented were derived mostly from specific-capacity data (appendix 1), although data from a few aquifer tests are included in the data set. The estimates based on specific capacities compare favorably to transmissivity computed by analysis of multi-well aquifer tests. Because transmissivity estimates (table 2) were based on specific-capacity data, trends in transmissivity are similar to those discussed previously for specific capacity. Also, because of the wide range in estimates and a few extreme outliers on the higher end of the range, mean transmissivity for specific geologic units is significantly higher than median values; therefore, within this discussion only references to median values will be made. Aquifers are identified with respect to lithology and geologic system in table 3.

The greatest median transmissivity for a specific geologic unit (table 2) was for the Ohio River alluvium (4,800 ft^2/d), and the second highest median transmissivity was for Kanawha River Alluvium (1,600 ft^2/d). As noted earlier, the Ohio River Alluvium is the most productive aquifer within the State. The high transmissivity of Ohio River alluvial sediments results from the high proportion of coarse grained gravel and sand within it. The Kanawha River, however, with its higher proportion of sand and silt, is much less transmissive.

Among bedrock aquifers, median transmissivities (table 2) are highest within the Pennsylvanian-age Pocahontas Formation and Pottsville Group and the Mississippian-age Mauch Chunk Group (1,200, 1,300, and 1,300 ft^2/d, respectively). These rocks crop out primarily in the southern portion of the State and to a lesser extent within the Valley and Ridge Physiographic Province in West Virginia's Eastern Panhandle. The Pocahontas Formation is characterized by interbedded sequences of sandstone, shale, siltstone, and coal. The Pottsville Group includes the Pocahontas, New River, and Kanawha Formations and is also comprised primarily of sandstone with interbedded shale, siltstone, and coal (Cardwell and others, 1968). The Mauch Chunk Group comprises primarily red, green, and gray shale and sandstone with a few thin limestone units.

Median transmissivities are lowest within Cambrian through Ordovician age strata, which outcrop only in the State's eastern portion. The McKenzie Group, Clinton Formation, and Tuscarora Formation (table 2) have a median transmissivity of only 23 ft^2/d.

Cambrian age rocks within the Waynesboro, Tomstown, and Harpers-Weverton-Loudon Formations also have a low median transmissivity of only 67 ft^2/d (table 2). Other units with low transmissivities include the Hampshire Formation, Brallier and Harrell Formations, Mahantango Formations, Onesquethaw Group and Oriskany Sandstone, and the Conococheague Formation with median transmissivities of 74, 72, 92, 82, and 92 ft^2/d, respectively. All other bedrock aquifers within the State had intermediate values of transmissivity.

Several interesting trends were noticed when examining the specific-capacity and transmissivity data. First, the highest transmissivity estimates documented (see appendix) were determined for the New River (750,000 ft^2/d) and Pocahontas Formations (270,000 ft^2/d). These extremely high transmissivities do not represent natural conditions and are characteristic of wells completed in abandoned underground coal mines. Such wells tap aquifers with extreme porosities created by the many interconnected passages in old mines, which are commonly used as sources of water in southern West Virginia. This effect should be considered when developing ground-water flow models for areas within the southern part of the State. Careful examination of old mine maps are useful for determining the location of abandoned mine workings.

Table 3. Hydrogeologic units in West Virginia for which estimates of transmissivity were made including the geologic system and lithology of respective formations or groups

Geologic system	Hydrogeologic Unit (Aquifer)	Dominant litholology
Quaternary	Alluvium	Gravel, sand, silt, and clay
Permian	Dunkard Group	Sandstone,
Pennsylvanian	Monongahela Group	siltstone, shale,
	Conemaugh Group	limestone,
	Allegheny Formation	and coal
	Kanawha Formation	Sandstone,
	New River Formation	siltstone,
	Pocahontas Formation	shale and coal
Mississippian	Pottsville Group	Sandstone and shale
	Mauch Chunk Group	Shale and sandstone
	Hinton Formation	Shale, sandstone, and limestone
	Bluefield, Bluestone, and Princeton Formations	Shale, sandstone, and limestone
	Greenbrier Group	Limestone, shale, and sandstone
	Maccrady Formation and Pocono Group	Sandstone and shale
Devonian	Hampshire Formation	Shales with sandstone
	Chemung Group	Siltstone, sandstone, and shale
	Brallier-Harrell Formations	Shale, siltstone, and sandstone
	Marcellus and Needmore Formations	Shale
	Mahantango Formation	Shale
	Helderburg Group, Tonoloway, Wills Creek, and Williamsport Formations	Limestone, sandstone, and shale
Silurian	Upper and middle Devonian strata	Shale, sandstone, and siltstone
	Oriskany Formation	Sandstone
	Clinton Group, Mckenzie and Tuscarora Formations	Shale and sandstone
Ordovician	Juniata and Oswego Formations	Sandstone and shale
	Martinsburg Formation	Shale, limestone, and sandstone
	Trenton, Black River, and St. Paul Groups	
	Beekmantown Group	Limestone and dolomite
	Ordovician middle calcareous units	
Cambrian	Conococheague Formation	
	Elbrook Formation	Limestone, shale, and dolomite
	Antietam, Tomstown, Harpers, Weverton, Loudon, and Waynesboro Formations	Sandstone, shale, quartzite, and dolomite
Pre-Cambrian	Catoctin Formation and other Pre-Cambrian strata	Greenstones or other metamorphic rocks

In addition to underground coal mines, karst aquifers can have extremely high transmissivities if a well drilled in such a terrain intersects a cavernous area. The Helderburg Group-Tonoloway-Wills Creek aquifer, for example, has a maximum transmissivity of 160,000 ft^2/d (table 2). Other karst aquifers for which cavernous zones may be present include the Greenbrier Group, Beekmantown Group, Conococheague Formation, Elbrook Formation, Waynesboro Formation, and the Tomstown Dolomite, all in the eastern part of the state. As with underground coal mines, when developing models in aquifers with potential karst topography, the modeler must determine whether ground-water flow in the area to be modeled is characteristic of diffuse or conduit flow. Site-specific aquifer tests and mapping of karst features are useful for determining whether an area to be modeled is underlain by a diffuse or conduit ground-water flow system.

Saturated Thickness of Aquifers

The saturated thickness of an aquifer must be measured or estimated in order to calculate the transmissivity of an aquifer. The saturated thickness of an unconfined aquifer bounded by an impermeable barrier below can be determined from well-log data (to define the bottom depth) and water-level measurements. For example, a surficial, 50-foot thick unconfined aquifer in which the water level is 10 feet below land surface would have a saturated thickness of 40 feet. For fractured bedrock aquifers, determining the saturated thickness is much more difficult, because the bottom of the aquifer may not be well defined. In such aquifers, the fractures that yield water to a well generally pinch out or become narrower (and perhaps disconnected) with depth, and the bottom of the aquifer is defined by the level, or depth, at which ground-water flow becomes negligible.

Saturated thickness and depth to water in alluvial sediments can vary widely. Twelve wells completed in alluvial sediments along the Ohio River between Hancock and Cabell Counties in West Virginia (Carlston and Graeff, 1955) have a median depth of 85 ft, median depth to water of 35 ft, and thus, a median saturated thickness of 50 ft. There is, however, considerable variability from site to site, and site-specific data should be used in model simulations whenever possible. These estimates are similar to those reported for Ohio River alluvial sediments in a ground-water investigation of Mason and Putnam Counties (Wilmoth, 1966), which reported average well depth of 85 ft, average depth to water of 43 ft, and average saturated thickness of 42 ft.

In Wilmoth's investigation, the average depth of Kanawha River alluvial sediments was estimated to be about 58 ft, average depth to water was 18 ft, and average saturated thickness was approximately 40 ft. A ground-water investigation of Kanawha County (Doll and others, 1960) reported average depths of about 50 ft, average depth to water of 20-24 ft, and average saturated aquifer thickness of 34 ft. As with Ohio River alluvial sediments, there is wide variability between saturated aquifer thickness and depth to water from site to site within Kanawha River alluvial sediments.

For wells completed in fractured bedrock, determination of saturated aquifer thickness is difficult. Only general conceptions of relative thickness are available from published reports. In Berkeley County, well yields generally decrease with increasing well depth (Shultz and others, 1995). Higher well yields are encountered in the upper 150 ft of bedrock and become less as well depth increases. Generally for wells 300 ft and deeper, yields are barely adequate for domestic use (Shultz and others, 1995). For these deeper wells, water is most likely being derived from shallower zones, and the wells were drilled deeper only to intersect additional water-bearing fractures or to provide storage within the casing between periods of pumping. The 300-foot depth of water-yielding fractures was characteristic of both carbonate and non-carbonate rocks within the County but is applicable only to areas in the State's eastern most section, generally in either Jefferson and Berkeley Counties.

In an investigation of ground-water flow processes in sequences of sandstone, shale, siltstone, and coal in southwestern Virginia, bedrock was found to be permeable (transmissivity greater than 0.001 ft^2/d) to depths of approximately 100 ft on the basis hydraulic testing of discrete bedrock intervals (Harlow and LeCain, 1993). Coal seams, however, were found to be permeable to depths of approximately 200 ft. Most of these wells were on hilltops and hillsides, and few were located in valley settings.

Circulation depth was analyzed on the basis of the increase in temperature as water flows deeper within an aquifer and is heated by natural thermal gradients within the Earth. For 25 sites analyzed within the Kanawha River Basin in West Virginia, median depths of circulation for wells in hilltop, hillside, and valley settings were estimated to be 133, 200, and 317 ft, respectively (Kozar, 1998). The 25 sites analyzed are all within the Appalachian Plateaus Physiographic Province. These estimates should not be applied to sites located in the Valley and Ridge Physiographic Province in West Virginia's Eastern Panhandle.

The maximum saturated aquifer thickness, therefore, for most fractured-bedrock aquifers in valley settings in the Appalachian Plateaus Physiographic Province is most likely about 300 ft minus the average depth to water in the area of interest. For fractured-bedrock aquifers in hillside and hilltop areas, saturated thickness is probably 130 to 200 ft, minus the average depth to water in the area of interest. Further hydraulic testing and logging of wells in various aquifers and topographic settings is needed to confirm these simplified estimates.

For wells in the Valley and Ridge, ground-water flow processes are much more complicated than in the Appalachian Plateaus. Not only can ground water flow within the shallow fracture systems near the surface, as is common in the Appalachian Plateaus, but also can flow to great depths along thrust faults or bedding-plane separations. Within the Valley and Ridge, 60 to 98 percent of warm spring discharges are believed to come from depths as great as 1,800 ft (Lessing and others, 1991). These estimates were based on the isotopic signature of water samples collected from warm springs in the region. Side looking airborne radar (SLAR) imagery was used to determine the structural geologic setting in which the springs were located. Thrust faults and other major fractures were found to be major avenues of ground-water flow for the deeply circulating warm springs (Lessing and others, 1991). An investigation of the hydrology and geochemistry of thermal springs in the Valley and Ridge portion of the Appalachians determined that ground-water circulation for thermal springs may be as deep as one mile. There is little data to describe depths of circulation for shallow aquifer systems in the region. Because of the potential for both shallow and deep circulation of ground water within the region, no simple rule can be used to estimate saturated aquifer thickness within the Valley and Ridge. Each site must be evaluated with respect to isotopic signature and (or) dissolved-gas data to determine the depth of ground-water circulation.

Hydraulic Conductivity

Hydraulic conductivity (K), typically expressed in units of feet per day (ft/d), is the transmissivity (T) of an aquifer divided by the saturated thickness of the aquifer (b) and may be expressed by the equation $K=T/b$. Because of the lack and limitations of available data on the saturated thickness of aquifers within the State, and the wide variability of transmissivity within aquifers, Statewide estimates of hydraulic conductivity can not be made from currently available data. Hydraulic conductivity for initial model development may be obtained by dividing the transmissivity data presented in the appendix by the generalized descriptions of saturated thickness presented above, but should be used only for initial estimates where no site-specific data are available.

An alternative approach is to estimate saturated thickness (b) by subtracting the depth to water from the total well depth (p). Because most wells are drilled to a depth at which no significant additional water is encountered during drilling, in most instances, subtracting the depth to water from the well depth will give a rough approximation (p) of saturated thickness. Hydraulic conductivity can then be estimated using the equation $K=T/p$, where depth to water is subtracted from total well depth and substituted in lieu of saturated aquifer thickness (b). For low-yielding wells, however, wells are commonly drilled deeper than the lowest encountered water-bearing zone to provide a storage pocket from which the pump may pull water during periods of peak demand. For low-yielding wells, subtracting the water level from the well depth will most likely yield highly inaccurate estimates of hydraulic conductivity.

Storage Coefficient and Specific Yield

Storage coefficients for confined aquifers generally range from 0.001 to 0.00001, and specific yields for unconfined aquifers generally range from 0.1 to 0.3 and average 0.2 (Lohman, 1972). The median specific yield for alluvial aquifers along the Ohio and Kanawha Rivers, and for fractured-bedrock aquifers are 0.200, 0.003, and 0.007, respectively (table 1). Each of the two alluvial aquifer settings, as well as the fractured-bedrock aquifers, have distinct ranges of storage coefficient and (or) specific yield. The 0.20 average specific yield for wells completed in Ohio River alluvial sediments is characteristic of unconfined aquifers, even though overlying silt and clay units confine the coarser glacial outwash sand and gravel deposits in most localities (Carlston and Graeff, 1955). Aquifers in these settings are unconfined because water levels within the aquifer commonly (except during flood conditions) are well below the base of silt and clay confining units (if present).

For wells completed in Kanawha River alluvial deposits and alluvial aquifers bordering smaller streams, storage coefficients are much less. For two wells completed in Kanawha River alluvial sediments, storage coefficients were 0.002 and 0.004 (average of 0.003). These numbers are at the uppermost region of what is commonly considered a confined aquifer setting. Wells completed in alluvial sediments bordering some of the smaller streams throughout the State most likely have specific yields similar to that of the Kanawha River, but few if any data are available for these minor and relatively unused aquifers.

Storage coefficients of fractured-bedrock aquifers within the State are highly variable, as would be expected, and range from 0.0001 to 0.3, with a median of 0.007 (table 1). Examination of available storage-coefficient data indicates that most fractured-bedrock aquifers within West Virginia may be considered confined to semi-confined. Only two of 25 storage coefficient estimates available for fractured bedrock aquifers are characteristic of unconfined aquifers. Analysis of specific yields for the Tonoloway Formation (0.3) and the Rockdale Run Formation (0.14), indicate both are unconfined aquifers. These two formations are composed of limestone and (or) dolomite. Conduit or solution enlargement of the limestone and dolomite in these formations likely allows rapid infiltration into the karst aquifer, thus yielding a storage coefficient characteristic of unconfined aquifers. Although not indicated by the limited data available in table 1, it is likely that aquifers in similar karst settings may also exhibit unconfined conditions. Diffuse-flow karst aquifers are common in eastern West Virginia, especially in Jefferson and Berkeley Counties, and conduit flow systems occur in karst areas where the Greenbrier limestone crops out, especially in Greenbrier, Monroe, and Pocahontas Counties.

RECHARGE

Once precipitation falls in an aquifer's recharge area, a part of that precipitation runs off into streams, while the remainder percolates into the soil (Winter and others, 1998). Some of the water that runs off is lost to evaporation on and near the land surface, while the part that percolates into the soil is used (transpired) by plants. The remainder infiltrates the soil and continues downward where it recharges ground-water reservoirs (aquifers). It is this portion that is commonly referred to as recharge (Winter and others, 1998). Ground water also may be lost to evaporation and transpiration by plants near discharge areas bordering streams (riparian ET). The remainder of ground water then typically discharges to streams as base flow or recharges deeper aquifers. Base flow discharge of ground water is roughly equivalent to recharge only if there is little riparian ET and recharge or discharge to and from deeper aquifers is negligible. Within this report, recharge refers to the component that actually recharges ground water and is not assumed to be equivalent to base flow discharge.

Recharge data are crucial for developing realistic simulations of ground-water flow. Analysis of streamflow data can provide information on ground-water discharge to streams. From streamflow data, estimates of aquifer recharge can also be made. Streamflow data from 41 gaging stations on unregulated streams (fig. 3 and table 4) throughout West Virginia were analyzed using computer software (Rutledge, 1998) to determine mean recharge rates for selected areas. Estimates were made using the recession-curve displacement method (Rorabaugh, 1964). Data used in these analyses were obtained from the USGS Automated Data Processing Software (ADAPS) database. Data for the entire period of record at each of the gaging stations were used in the analyses, except for certain streams for which shorter periods of record were analyzed to avoid data collected after flood-retention structures were installed in the early 1970's. It is imperative to analyze data for unregulated streams because the storage of water in flood-retention structures radically alters the runoff characteristics of a stream and results in erroneous estimates of recharge.

Estimates of recharge based on records for individual gaging stations are summarized by the major river basin in which they occur (table 4). This approach is considered logical because the stations within each river basin share similar geologic, topographic, and climatological settings. Precipitation, average basin slope, bedrock lithology, bedrock permeability, and topography are a few of the major

Table 4. Mean ground-water recharge rates estimated from streamflow data obtained from 41 gaging stations in West Virginia

[in./yr, inches per year; mi^2, square miles; Map ID number, map identification number as listed in figure 3]

Station Name	Map ID Number	County	Drainage area (mi^2)	Recharge (in./yr)
Potomac River Basin				
Back Creek near Jones Springs, WV	16	Berkeley	235.	8.5
South Fork South Branch Potomac River at Brandywine, WV	11	Pendleton	103.	9.0
North Fork South Branch Potomac River at Cabins, WV	9	Grant	335.	11.0
Cacapon River near Great Cacapon, WV	15	Morgan	675.	8.7
South Fork South Branch Potomac River near Moorefield, WV	12	Hardy	277.	7.3
Opequon Creek near Martinsburg, WV	13	Berkeley	273.	9.8
South Branch Potomac River near Petersburg, WV	10	Grant	676.	11.6
Tuscarora Creek above Martinsburg, WV	14	Berkeley	11.3	11.4
Patterson Creek near Headsville, WV	8	Mineral	211.	7.3
		Mean		**9.4**
Little Kanawha River Basin and Ohio River Tributaries				
Hughes River at Cisco, WV	24	Ritchie	453.	7.1
Wheeling Creek at Elm Grove, WV	17	Ohio	281.	9.6
Little Kanawha River at Glenville, WV	19	Gilmer	387.	9.3
Little Kanawha River at Grantsville, WV	21	Calhoun	913.	8.8
Middle Island Creek at Little, WV	18	Tyler	458.	8.0
Reedy Creek near Reedy, WV	23	Wirt	79.4	6.7
West Fork Little Kanawha River at Rocksdale, WV	22	Calhoun	205.	8.7
Steer Creek near Grantsville, WV	20	Calhoun	162.	9.2
		Mean		**8.4**
Monongahela River Basin				
Big Sandy Creek at Rockville, WV	40	Preston	200.	21.2
Blackwater River at Davis, WV	38	Tucker	85.9	22.5
Cheat River near Parsons, WV	39	Tucker	722.	19.9
Middle Fork River at Audra, WV	37	Barbour	148.	24.5
Shavers Fork at Parsons, WV	41	Tucker	213.	24.8
Tygart Valley River at Belington, WV	36	Barbour	406.	15.4
		Mean		**21.4**

Table 4. Mean ground-water recharge rates estimated from streamflow data obtained from 41 gaging stations in West Virginia —Continued

[in./yr, inches per year; mi^2, square miles; Map ID number, map identification number as listed in figure 3]

Station Name	Map ID Number	County	Drainage area (mi^2)	Recharge (in./yr)
Kanawha River Basin (Western Portion)				
Big Coal River at Ashford, WV	25	Boone	391.	11.9
Little Coal River at Danville, WV	31	Boone	269.	11.9
Piney Creek at Raleigh, WV	33	Raleigh	52.7	11.9
		Mean		**11.9**
Kanawha River Basin (Eastern Portion)				
Cherry River at Fenwick, WV	26	Nicholas	150.	27.8
Cranberry River near Richwood, WV	27	Nicholas	80.4	31.6
Elk River Below Webster Springs, WV	28	Webster	266.	23.9
Gauley River at Camden on Gauley, WV	29	Webster	236.	25.2
Greenbrier River at Durbin, WV	30	Pocahontas	133.	21.1
Meadow River near Mount Lookout, WV	32	Nicholas	365.	20.6
Little Kanawha River near Wildcat, WV [1]	35	Braxton	112.	19.8
Williams River at Dyer, WV	34	Webster	128.	26.4
		Mean		**24.6**
Tug, Twelvepole Creek and Guyandotte River Basins				
Guyandotte River at Baileysville, WV	1	Wyoming	306.	14.5
Clear Fork at Clear Fork, WV	2	Wyoming	126.	14.8
East Fork Twelvepole Creek near Dunlow, WV	3	Wayne	38.5	12.4
Tug Fork at Litwar, WV	4	McDowell	504.	11.3
Panther Creek near Panther, WV	5	McDowell	31.0	11.1
Tug Fork at Williamson, WV	6	Mingo	936.	12.5
Tug Fork at Kermit, WV	7	Mingo	1,280.	11.2
		Mean		**12.6**

[1] Although the Little Kanawha River near Wildcat is located in the Little Kanawha River Basin, it has precipitation and recharge rates characteristic of the eastern portion of the Kanawha River Basin.

factors that affect ground-water recharge. The highest mean ground-water recharge rates within West Virginia occur within a band that extends through the central part of the State within the eastern portion of the Kanawha River Basin (fig. 3). This area of relatively high relief has peaks higher than 4,000 ft and precipitation greater than 50 in./yr. (NOAA, 1982). Mean ground-water recharge within this region is 24.6 in./yr (table 4). This band extends northward towards Pennsylvania and includes the Monongahela River Basin with a mean recharge rate of 21.4 in./yr.

To the west of this central band of high relief topography lies a region of lower relief with much lower average precipitation, approximately 40 inches annually (NOAA, 1982). This area has much lower ground-water recharge rates. Mean recharge for the Tug Fork, Twelvepole Creek, and Guyandotte River Basins is only 12.6 inches. For the western portion of the Kanawha River Basin mean recharge is 11.9 inches. The lowest mean recharge rates in the State occur within the Little Kanawha River Basin and the smaller tributary streams in the region that discharge directly to the Ohio River. Mean recharge for the Little Kanawha River Basin and the Ohio River tributary streams is only 8.4 inches.

The State's third major ground-water region is located in the Valley and Ridge. This area, which lies east of the band of higher altitude topography, is characterized by long linear northeast to southwest trending alternating ridges and valleys. A high altitude rain shadow caused by orographic lifting along the western edge of this area results in lower precipitation within the region, with approximately 30 inches of annual precipitation, except for the extreme eastern tip of the State where annual precipitation averages approximately 40 inches (NOAA, 1982). Mean ground-water recharge rates for the region, which is drained almost entirely by the Potomac River and its tributaries, is 9.4 in./yr (table 4). Precipitation is a major factor affecting ground-water recharge, but bedrock permeability and topographic effects must also be considered when using this data for development of site-specific ground-water flow models.

FUTURE DATA NEEDS

To compile a database that would provide information necessary to delineate source-water protection areas for public-supply wells and well fields throughout West Virginia, future data needs should include additional data on storage coefficients and (or) specific yield and saturated thicknesses of aquifers. Storage-coefficient and (or) specific-yield data are essential for verifying transmissivity estimates based on specific capacity. Although limited data available for storage coefficient and (or) specific yield are consistent for each of the major aquifer types (alluvial and fractured bedrock), additional data are needed to confirm and further refine understanding of which aquifers within the State are confined and which are unconfined. The only way to obtain such data is by conducting long-term aquifer tests, especially in fractured-bedrock aquifers and alluvial aquifers bordering the Kanawha River and some of the smaller streams. Additional transmissivity estimates are needed for lower Pennsylvanian- and Mississippian-age rocks in southern West Virginia and Ordovician- to Devonian-age rocks in the eastern portion of the State. These transmissivity estimates may be obtained from single-well aquifer tests.

A deficiency exists with respect to data on saturated thickness of aquifers, especially for fractured bedrock aquifers. Aquifer tests and (or) well logging will be necessary to determine the fracture distribution within fractured-bedrock aquifers. Documenting the depth, orientation, and aperture width of significant water-bearing fractures in wells in various bedrock units would also be useful. Logging of wells in various units, especially using acoustic televiewers, is needed to document fracture distribution, depth, and orientation. Heat-pulse flow-meter logs could help to provide similar data on the depth of significant water-bearing fractures. Hydraulic testing could be conducted on discrete intervals in wells to determine the depth and water-producing capacity of significant water-bearing fractures.

SUMMARY AND CONCLUSIONS

Specific-capacity data were obtained from the U.S. Geological Survey National Water Information System database and from files of the West Virginia Bureau for Public Health - Office of Environmental Health Services. The data were used to estimate transmissivity for aquifers located throughout West Virginia. In addition, literature was reviewed to obtain previously published estimates of storage coefficient and (or) specific yield for aquifers within the State. The storage-coefficient and (or) specific-yield data are needed to make estimates of transmissivity from specific-capacity data.

The highest median transmissivity of a specific aquifer in West Virginia (table 2) occurs in Ohio River alluvium (4,800 ft^2/d), and the second highest median transmissivity occurs in Kanawha River alluvium (1,600 ft^2/d). The lowest median transmissivities occur within older Cambrian through Ordovician age strata which outcrop only within the State's eastern portion. The McKenzie-Tuscarora-Clinton aquifers had a median transmissivity of only 23 ft^2/d. Cambrian age rocks within the Waynesboro-Tomstown-Harpers-Weverton-Loudon aquifer also had a low median transmissivity of only 67 ft^2/d (table 2). Other units with low transmissivities include the Hampshire Formation, Brallier-Harrell Formations, Mahantango Formations, Onesquethaw Group-Oriskany Sandstone, and the Conococheague Formation with median transmissivities of 74, 72, 92, 82, and 92 ft^2/d respectively. All other bedrock aquifers had intermediate values of transmissivity.

For bedrock aquifers, the highest median transmissivities of 1,200, 1,300, and 1,300 ft^2/d occur within the Pennsylvanian age Pocahontas Formation and Pottsville Group and the Mississippian age Mauch Chunk Group, respectively. These rocks outcrop primarily in the southern coal fields and to a lesser extent within the Valley and Ridge in West Virginia's Eastern Panhandle.

The highest individual transmissivity estimates were determined for the New River (750,000 ft^2/d) and Pocahontas Formations (270,000 ft^2/d). These transmissivities are extremely high, and are not likely a result of natural processes but are more easily explained as indicative of wells completed in abandoned underground coal mines. Such wells tap aquifers with very high porosities because of the large number of interconnected passages in old mine workings and are commonly used as sources of water in southern West Virginia.

In addition to underground coal mines, karst aquifers can also have extremely high transmissivities if a well completed in such a terrane intersects a large cavernous area, as is evident for the Helderburg Group-Tonoloway-Wills Creek-Williamsport Formations, which has a maximum transmissivity of 160,000 ft^2/d (table 2). Other karst aquifers include the Greenbrier Group, Beekmantown Group, Conococheague Formation, Elbrook Formation, Waynesboro Formation, and the Tomstown Dolomite. All of these aquifers are in eastern West Virginia.

An aquifer's saturated aquifer thickness and depth to water can vary widely. Data for twelve wells completed in alluvial sediments along the Ohio River between Hancock and Cabell Counties in West Virginia (Carlston and Graeff, 1955) have a median saturated aquifer thickness of 50 ft. These estimates are similar to those reported for Ohio River alluvial sediments in Mason and Putnam Counties (Wilmoth, 1966), which reported an average saturated thickness of 42 ft. In Wilmoth's investigation, the average saturated thickness of Kanawha River alluvial sediments was estimated to be approximately 40 ft. A ground-water investigation of Kanawha County (Doll and others, 1960) reported average saturated aquifer thickness of 34 ft. There is wide variability of saturated aquifer thickness from site to site within Kanawha River alluvial sediments.

For most fractured-bedrock aquifers in valley settings in the Appalachian Plateaus, the maximum saturated thickness is believed to be approximately 300 ft minus the average depth to water in the area of interest. For fractured-bedrock aquifers in hillside and hilltop areas, saturated thickness is probably 130 to 200 ft minus the average depth to water in the area of interest. Further hydraulic testing and logging of wells in various aquifers and topographic settings are needed to confirm these simplified estimates for wells completed in fractured bedrock. There is no good rule that can be used to estimate saturated thickness for fractured-bedrock aquifers within the Valley and Ridge.

Analysis of available specific-yield data indicates that the Ohio River alluvial aquifer is characteristic of an unconfined aquifer, with a median specific yield of 0.20. The Kanawha River alluvial aquifer has a much lower specific yield (median of 0.003) and is considered a semi-confined aquifer because of its higher composition of fluvial silts and clays. The Ohio River alluvial deposits have coarser grained sand and gravel deposits. Storage coefficients for fractured-bedrock aquifers vary significantly from a minimum of 0.0001 to a maximum of 0.3 with a median of 0.007. Excluding the Stonehenge limestone, Tonoloway Formation, Beekmantown Group, and Rockdale Run Formation, which can exhibit karst characteristics, the maximum storage coefficient for fractured bedrock aquifers was only 0.015. Generally, for fractured-bedrock aquifers, storage-coefficient data are characteristic of confined aquifer settings.

Estimates of recharge were summarized according to the major river basin in which the stream basin occurs (table 4). The highest mean ground-water recharge rates within West Virginia (24.6 inches) occur within a band that extends through the central portion of the State within the eastern portion of the Kanawha River Basin. This area is at relatively high altitude (peaks in excess of 4,000 ft altitude) and has above average precipitation (in excess of 50 in./yr). This band extends northward towards Pennsylvania and includes the Monongahela River Basin, which has a mean recharge of 21.4 in./yr.

To the west of this central band of high altitude topography lies a region of lower relief with much lower average annual precipitation (approximately 40 in./yr). Consequently, this area also has much lower ground-water recharge rates. Mean recharge for the Tug Fork, Twelvepole Creek, and Guyandotte River Basins is only 12.6 in./yr. For the western portion of the Kanawha River basin mean recharge is 11.9 inches. The lowest mean recharge rates within the State (8.4 in./yr) occur within the Little Kanawha River Basin and the smaller tributary streams in the region that discharge directly to the Ohio River.

To the east of the band of higher altitude, in West Virginia's Eastern Panhandle, is an area characterized by long, northeast to southwest trending ridges and valleys. The area is located within a rain shadow resulting from orographic lifting in the higher altitude area to the west. This results in lower precipitation within the region (approximately 30 in./yr). Mean ground-water recharge rates for the region, which is drained almost entirely by the Potomac River and its tributaries, is 9.4 in./yr (table 4).

REFERENCES CITED

Bates, R.L., and Jackson, J.A., 1984, Dictionary of Geological terms: prepared in cooperation with the American Geological Institute by Anchor Press-Doubleday, New York, NY, p. 534.

Bentall, R., Brown, R.H., Ferris, J.G., Jacob, C.E., Knowles, D.B., Meyer, R.R., Skibitzke, H.E., and Theis, C.V., 1963, Methods of determining permeability, transmissibility, and drawdown: U.S. Geological Survey Water-Supply Paper 1536-I, p. 331-338.

Cardwell, D.H., Erwin, R.B., and Woodward, H.P., 1968, Geologic Map of West Virginia: West Virginia Geological and Economic Survey map, 2 sheets, scale 1:250,000.

Carlston, C.W., and Graeff, G.D., Jr., 1955, Ground-water resources of the Ohio River Valley in West Virginia: West Virginia Geological and Economic Survey v. XXIII, part III, 131 p.

Doll, W.L., Wilmoth, B.M., and Whetstone, G.W., 1960, Water resources of Kanawha County, West Virginia: West Virginia Geological and Economic Survey Bulletin 20, 189 p.

Driscoll, F.G., 1986, Groundwater and Wells: Johnson Division, St. Paul, MN, p. 572.

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

Harbaugh, A.W., Banta, E.R., Hill, M.C., and McDonald, M.G., MODFLOW 2000, the U.S. Geological Survey modular ground-water model—User guide to modularization concepts and the ground-water flow process: U.S. Geological Survey Open-File Report 00-92, 121 p.

Harlow, G.E., and LeCain, G.D., 1993, Hydrologic characteristics of, and ground-water flow in, coal bearing rocks of southwestern Virginia: U.S. Geological Survey Water-Supply Paper 2388, 36 p.

Hobba, W.A., Jr., Friel, E.A., and Chisholm, J.L., 1972, Water resources of the Potomac River basin, West Virginia: West Virginia Geological and Economic Survey River Basin Bulletin no. 3, 110 p.

Hobba, W.A., Jr., 1985, Water in Hardy, Hampshire, and western Morgan Counties, West Virginia: West Virginia Geological and Economic Survey Environmental Geology EGB-19, 91 p.

Jones, W.K., 1997, Karst Hydrology Atlas of West Virginia: Karst Water Institute Special Publication 4, 111 p.

Kozar, 1998, Ground-water age data applied to understanding fractured bedrock aquifers in West Virginia: in proceedings of West Virginia nonpoint source conference, Charleston, W.Va., October 1-3, 1998, p. 13.

Lessing, P., Hobba, W.A., Jr., Dean, S.L., and Kulander, B.R., 1991, Relations between warm springs and geology delineated by side-looking airborne-radar imagery in eastern West Virginia: United States Geological Survey Water Resources Investigation Report 88-4096, 44 p.

Lohman, S.W., 1972, Ground-Water Hydraulics: U.S. Geological Survey Professional Paper 708, 70 p.

McColloch, J.S., 1986, Springs of West Virginia: West Virginia Geological and Economic Survey Volume V-6A, 493 p.

NOAA, 1982, Climate of West Virginia: U.S. Department of Commerce, National Oceanographic and Atmospheric Administration, climatography of the United States, no. 60, 19 p.

Robison, T.M., 1964 Occurrence and availability of ground water in Ohio County, West Virginia: West Virginia Geological and Economic Survey Bulletin 27, 57 p.

Rorabaugh, M.I., 1964, Estimating changes in bank storage and ground-water contribution to streamflow: International Association of Scientific Hydrology, Publication 63, p. 352-363.

Rutledge, A.T., 1998, Computer programs for describing the recession of ground-water discharge and for estimating mean ground-water recharge and discharge from streamflow records-update: U.S. Geological Survey Water-Resources Investigation Report 98-4148, 43 p.

Schwietering, J.F., 1981, Brief description of ground water conditions and aquifers in West Virginia with annotated bibliography: West Virginia Geological and Economic Survey Open File Report OF-8102, 121 p.

Sheets, C.J., and Kozar, M.D., 2000, Ground-water quality in the Appalachian Plateaus, Kanawha Basin, West Virginia: U.S. Geological Survey Water Resources Investigation Report 99-4269, 25 p.

Shultz, R.A., Hobba, W.A., Jr., and Kozar, M.D., 1995, Geohydrology, ground-water availability, and ground-water quality of Berkeley County, West Virginia, with emphasis on the carbonate-rock area: U.S. Geological Survey Water Resources Investigation Report 93-4073, 88 p.

Sloto, R.A., and Crouse, M.Y., 1996, HYSEP, a computer program for streamflow hydrograph separation and analysis: U.S. Geological Survey Water Resources Investigation Report 96-4040, 46 p.

Trainer, F.W., and Watkins, F.A., 1975, A geohydrologic reconnaissance of the upper Potomac River Basin: U.S. Geological Survey Water-Supply Paper 2035, 68 p.

Ward, P.E., and Wilmoth, B.M., 1968, Ground-water hydrology of the Monongahela River basin in West Virginia: West Virginia Geological and Economic Survey River Basin Bulletin 1, 54 p.

Wilmoth, B.M., 1966, Ground water in Mason and Putnam Counties, West Virginia: West Virginia Geological and Economic Survey Bulletin 32, 152 p.

Winter, T.C., Harvey, J.W., Franke, O.L., and Alley, W.M., 1998, Ground Water and Surface Water, a Single Resource: U.S. Geological Survey Circular 1139, 79 p.

APPENDIX

Specific Capacity and Transmissivity Data Segregated by Aquifer for Selected Wells in West Virginia

The following abbreviations are used in this appendix:

ddmmss	degrees-minutes-seconds of latitude and longitude
in	inches
e	estimated
ft	feet
gpm	gallons per minute
ft bls	feet below land surface
gpm/ft	gallons per minute per foot of drawdown
ft^2/d	feet squared per day
Lit	from literature
N/D	not determined

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
401344080392301	401344	803923	Brooke	79	16	Alluvium (Ohio River)	700		21.8	14	25	50.0	8,400
401346080391801	401346	803918	Brooke	70	10	Alluvium (Ohio River)	200			19.67	0.33	10.2	670
401630080364601	401630	803646	Brooke	71	20	Alluvium (Ohio River)	800	55	34	21		38.1	
401634080364701	401634	803647	Brooke	67	20	Alluvium (Ohio River)	700	44	23	21	9	33.3	4,800
401635080364701	401635	803647	Brooke	67.3	20	Alluvium (Ohio River)	800			20.33	4.25	39.4	5,200
401640080364601	401640	803646	Brooke	69	20	Alluvium (Ohio River)	1250			24.42	15.75	51.2	8,300
401917080354801	401917	803548	Brooke	75	20	Alluvium (Ohio River)	750	47.8	34.8	13.0		57.7	
401939080355301	401939	803553	Brooke	74.5	30	Alluvium (Ohio River)	252	38.75	34.92	3.83	0.8	65.8	8,000
402035080363201	402035	803632	Brooke	74.5	36	Alluvium (Ohio River)	1450					30.0	
402319080374101	402319	803741	Brooke	73	36	Alluvium (Ohio River)	762			14	24	54.0	7,600
402040080364001	402040	803640	Brooke	78	36	Alluvium (Ohio River)	740			25		33.8	
402040080364004	402040	803640	Brooke	78		Alluvium (Ohio River)	710			12		59.0	

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diam-eter (in.)	Hydrogeologic Unit (Aquifer)	Dis-charge (gpm)	Pro-duc-tion level (ft bls)	Static level (ft bls)	Draw-down (ft)	Test duration (hours)	Specific Capac-ity (gpm/ft)	Trans-miss-ivity (ft^2/d)
402040080364005	402040	803640	Brooke	78		Alluvium (Ohio River)	1240			9		138	
402040080364006	402040	803640	Brooke			Alluvium (Ohio River)	1890			14		135	
402040080364008	402040	803640	Brooke			Alluvium (Ohio River)	1685			19		89.0	
2-1-16.A	402040	803640	Brooke	80		Alluvium (Ohio River)	960			23		41.6	
2-1-17.B	402040	803640	Brooke	78.5		Alluvium (Ohio River)	1100			10		110	
2-1-18.C	402040	803640	Brooke	82.8		Alluvium (Ohio River)	200			14		14.3	
2-1-19.D	402040	803640	Brooke	77.5		Alluvium (Ohio River)	600			7		85.7	
2-1-20.E	402040	803640	Brooke	61.5		Alluvium (Ohio River)	1440			11		131	
401336080392501	401336	803925	Brooke	70		Alluvium (Ohio River)	500			32		15.6	
401913080355103	401913	803551	Brooke	75	12	Alluvium (Ohio River)	508	48.25	34.5	13.8	24	37.0	5,600
401933080355501	401933	803555	Brooke	75		Alluvium (Ohio River)	700	53	46	7		100	
402040080364000	402040	803640	Brooke	77		Alluvium (Ohio River)	720	64	46	18		40.0	
402040080364003	402040	803640	Brooke	78		Alluvium (Ohio River)	1150	43	33	10		115	

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
Beech Bottom #1	N/D	N/D	Brooke	71	12	Alluvium (Ohio River)	145			10.92	0.33	13.3	1,100
Follansbee #4	N/D	N/D	Brooke	70	20	Alluvium (Ohio River)	800			20.83	49.25	38.4	6,700
Hammond PSD #1	`N/D	N/D	Brooke	60	8	Alluvium (Ohio River)	300			9	1.5	33.3	4,300
Hammond PSD #2	N/D	N/D	Brooke	60	8	Alluvium (Ohio River)	300			7	1	42.9	4,700
382521082263201	382521	822632	Cabell	60	12	Alluvium (Ohio River)	300			6.5	24	46.2	7,800
383233082172101	383313	821707	Cabell	90	10	Alluvium (Ohio River)	100	38	35	3	10	33.3	4,800
382445082271201	382445	822712	Cabell	120	8	Alluvium (Ohio River)	300	15	13	1.5	24	200	36,000
382533082255901	382533	822559	Cabell	63	8	Alluvium (Ohio River)	125	53	43	10	6	12.5	1,500
382508082255601	382508	822556	Cabell	80	10	Alluvium (Ohio River)	100	80	60	20	0.25	5.0	670
403444080394501	403444	803945	Hancock	111		Alluvium (Ohio River)	620	81.2	58.2	23.2	24	26.7	4,300
403716080362901	403717	803627	Hancock	76	24	Alluvium (Ohio River)	1140			3.00		381	
403716080363001	403718	803627	Hancock	76	24	Alluvium (Ohio River)	1280			6.5		196	
403718080362301	403720	803619	Hancock	76	24	Alluvium (Ohio River)	1410			4		285	

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diam-eter (in.)	Hydrogeologic Unit (Aquifer)	Dis-charge (gpm)	Pro-duc-tion level (ft bls)	Static level (ft bls)	Draw-down (ft)	Test duration (hours)	Specific Capac-ity (gpm/ft)	Trans-miss-ivity (ft^2/d)
402959080363401	402959	803634	Hancock	117	10	Alluvium (Ohio River)	305			10.6	2	28.8	3,300
403714080361901	403714	803619	Hancock	82		Alluvium (Ohio River)	550	42	32	10	24	55.0	9,200
403714080361902	403714	803619	Hancock	82		Alluvium (Ohio River)	550	42	32	10	24	55.0	9,200
385703081453801	385703	814538	Jackson	93	12	Alluvium (Ohio River)	225	74	59	15	8	15.0	2,000
385705081454001	385704	814540	Jackson	93	8	Alluvium (Ohio River)	250	52	32	20	12	12.5	1,600
385309081512201	385309	815122	Jackson	89	84	Alluvium (Ohio River)	50	53	46	7	0.5	7.14	540
Ravens. Alum F-9	N/D	N/D	Jackson	78	12	Alluvium (Ohio River)	1012			12.7	8	79.7	13,000
394421080503801	394421	805038	Marshall	69	10	Alluvium (Ohio River)	283	57.25	43	14.3	8	19.9	2,500
4-1-1 Old McMechen	395857	804400	Marshall	75	8	Alluvium (Ohio River)	300			17	0.5	17.6	1,400
394935080504901	394935	805049	Marshall	68	20	Alluvium (Ohio River)	650			19	24	34.2	5,500
394443080510501	394443	805105	Marshall	85	20	Alluvium (Ohio River)	850	69	53	16.3	12	52.1	8,000
394446080511301	394446	805113	Marshall	79.5	8	Alluvium (Ohio River)	400	58	43	15	12	26.7	3,700
394450080511701	394450	805117	Marshall	81	20	Alluvium (Ohio River)	700	73	51	22		31.8	

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
394459080511501	394459	805115	Marshall	98.6	10	Alluvium (Ohio River)	250	72	66	6	24	41.7	6,700
395058080444201	395459	804442	Marshall	100	8	Alluvium (Ohio River)	200	90	60	30	22	6.67	960
395434080482001	395428	804824	Marshall	60.5	156	Alluvium (Ohio River)	3000	56	46	10		300	
395502080444201	395502	804442	Marshall	100	8	Alluvium (Ohio River)	300	90	60	30		10.0	
395503080425501	395503	804255	Marshall	67	156	Alluvium (Ohio River)	530				31		53,000 Lit
Salvoy A	N/D	N/D	Marshall			Alluvium (Ohio River)	450				72		40,000 Lit
Salvoy B	N/D	N/D	Marshall			Alluvium (Ohio River)	500				72		33,000 Lit
Salvoy C	N/D	N/D	Marshall			Alluvium (Ohio River)	520				72		31,000 Lit
Salvoy D	N/D	N/D	Marshall			Alluvium (Ohio River)	210				72		27,000 Lit
395537080451501	395537	804515	Marshall	68		Alluvium (Ohio River)	750	46	29	16.5	168	45.5	8,800
395540080451701	395540	804517	Marshall	68		Alluvium (Ohio River)	750	39	30	9	168	83.3	17,000
395601080452801	N/D	N/D	Marshall	75	24	Alluvium (Ohio River)	450			21.5	24	20.9	3,200
Marshall Co. PSD	N/D	N/D	Marshall	70	10	Alluvium (Ohio River)	500			12.58	1.17	39.7	4,400

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diam-eter (in.)	Hydrogeologic Unit (Aquifer)	Dis-charge (gpm)	Pro-duc-tion level (ft bls)	Static level (ft bls)	Draw-down (ft)	Test duration (hours)	Specific Capac-ity (gpm/ft)	Trans-miss-ivity (ft^2/d)
Benwood #1	N/D	N/D	Marshall	70	14	Alluvium (Ohio River)	500			26.75	24	18.7	2,700
Benwood #2	N/D	N/D	Marshall	72	14	Alluvium (Ohio River)	500			27.58	24	18.1	2,700
AEP Krammer	N/D	N/D	Marshall	70	12	Alluvium (Ohio River)	490			1.75	12	280	47,000
AEP Krammer	N/D	N/D	Marshall	71	12	Alluvium (Ohio River)	600			4.33	1.50	139	19,000
Glendale TH1	N/D	N/D	Marshall	75	6	Alluvium (Ohio River)	213			5.1	3	41.8	5,300
Glendale TH2	N/D	N/D	Marshall	78	6	Alluvium (Ohio River)	213			5.38	3	39.6	5,100
Mt. Carbon Co.	395006	804916	Marshall	81	18	Alluvium (Ohio River)	754			5.3	8.5	142	23,000
383959082102001	383959	821016	Mason	85		Alluvium (Ohio River)	450			20		22.5	
383959082102001	384000	821016	Mason	85	13	Alluvium (Ohio River)	300	65	53	12	24	25.0	3,900
383959082102002	383958	821013	Mason	86		Alluvium (Ohio River)	325			12.7		25.6	
383959082102002	383958	821013	Mason	86	13	Alluvium (Ohio River)	325	65	52	13	24	25.0	3,900
383959082102003	383958	821016	Mason	86		Alluvium (Ohio River)	330			15.9		20.8	
383959082102003	383958	821016	Mason	86	13	Alluvium (Ohio River)	325	69	53	16	24	20.3	2,900

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
384456082112601	384456	821126	Mason	72	8	Alluvium (Ohio River)	300	37	20	17	4	17.6	2,000
384618082120801	384618	821208	Mason	83		Alluvium (Ohio River)	325	49	41	8	36	40.6	7,000
384618082121201	384618	821212	Mason	83		Alluvium (Ohio River)	200	47	41	6	30	33.3	5,500
384621082121001	384621	821210	Mason	83		Alluvium (Ohio River)	180	48	41	7	67	25.7	4,300
384628082121201	384628	821212	Mason	83		Alluvium (Ohio River)	217	52	41	11	74	19.7	3,300
385419082071701	385419	820717	Mason	81	20	Alluvium (Ohio River)	500	52.79	39.5	13.3	8.5	37.6	5,500
385420082072101	385420	820721	Mason	84.3	20	Alluvium (Ohio River)	500	61.88	49.25	12.6		39.6	
385421082071801	385421	820718	Mason	84	20	Alluvium (Ohio River)	500	57	42	15	8	33.3	4,800
385421082072001	385421	820720	Mason	84.5	20	Alluvium (Ohio River)	500	56.6	44	12.6	9	39.7	5,700
385421082072301	385421	820723	Mason	84.4	20	Alluvium (Ohio River)	500	61.73	49.67	12.1		41.5	
385422082072201	385422	820722	Mason	84	20	Alluvium (Ohio River)	500	59.7	44.2	15.5	8	32.3	4,700
385735082053801	385735	820538	Mason	71	156	Alluvium (Ohio River)	5500						16,000 Lit
385039082082002	385039	820820	Mason	67		Alluvium (Ohio River)	30	53	50	3	1	10.0	1,100

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
385207082075301	385207	820753	Mason	94		Alluvium (Ohio River)	250	47	42	5	48	50.0	9,000
385439082065801	385439	820658	Mason	80		Alluvium (Ohio River)	110	60	45	15	48	7.33	1,100
385753081554501	385753	815545	Mason	99.1		Alluvium (Ohio River)	210			25.5	8	8.2	1,100
385802081552601	385802	815526	Mason	80	6	Alluvium (Ohio River)	240	63	53	10	16	24.0	3,500
385802081552602	385802	815526	Mason	80	10	Alluvium (Ohio River)	330	64	53	11	72	30.0	5,300
385804081552501	385804	815525	Mason	80	8	Alluvium (Ohio River)	500	61	55	5.5	48	91.0	17,000
385845081560101	385845	815601	Mason	78		Alluvium (Ohio River)	150	39.6	37	2.3	24	65.2	11,000
385846081560201	385846	815602	Mason	78		Alluvium (Ohio River)	150	41	36	5	24	30.0	4,700
Pt. Pleasant #7	385419	820715	Mason	92	18	Alluvium (Ohio River)	700	70.5	55	15.5	27	45.2	7,500
385737082053801	N/D	N/D	Mason	71	8	Alluvium (Ohio River)	280			9.5	5.5	29.5	3,700
385739082053601	N/D	N/D	Mason	71		Alluvium (Ohio River)	220			7.58	5.5	29.0	3,700
385304081554701	N/D	N/D	Mason	54	12	Alluvium (Ohio River)	125			7.25	4	17.2	1,900
385304081554501	385305	815545	Mason	57	12	Alluvium (Ohio River)	125			7.17	3.5	17.4	1,900

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
Letart #3	N/D	N/D	Mason	55	12	Alluvium (Ohio River)	225			8	11.5	28.1	4,000
384458082112601	N/D	N/D	Mason	73	8	Alluvium (Ohio River)	220			10.67	4	20.6	2,400
390048082020901	N/D	N/D	Mason	90		Alluvium (Ohio River)	192			4	0.5	48.0	4,800
390051082020801	N/D	N/D	Mason	90		Alluvium (Ohio River)	187			6.67	2	28.0	3,100
385920081581501	N/D	N/D	Mason	94	8	Alluvium (Ohio River)	150			2.33	24	64.4	11,000
385920081581901	N/D	N/D	Mason	93	8	Alluvium (Ohio River)	150			5	23	30.0	4,500
New Haven #3	N/D	N/D	Mason	81	12	Alluvium (Ohio River)	500			11.5	33.33	43.5	7,200
400234080433501	400234	804335	Ohio	84	12	Alluvium (Ohio River)	450	40	36	4	1	112	14,000
400550080431201	400550	804312	Ohio	45		Alluvium (Ohio River)	500	24	19	4.7	6.5	106	16,000
400824080423001	400824	804230	Ohio	56	12	Alluvium (Ohio River)	350	17	14	3	24	117	21,000
Wheeling #2	N/D	N/D	Ohio	84	24	Alluvium (Ohio River)	402			21.75	25.5	18.5	2,700
Wheeling #3	N/D	N/D	Ohio	87	24	Alluvium (Ohio River)	351			22.67	26	15.5	2,100
Wheeling #4	N/D	N/D	Ohio	86	24	Alluvium (Ohio River)	603			18.96	24	31.8	5,100

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
Wheeling #5	N/D	N/D	Ohio	83	24	Alluvium (Ohio River)	603			25.59	24	23.6	3,600
Wheeling #6	N/D	N/D	Ohio	90	26.75	Alluvium (Ohio River)	600			11.64	4	51.5	5,600
392022081213201	392022	812132	Pleasants	53	13	Alluvium (Ohio River)	174			13		13.0	
392022081213901	392022	812139	Pleasants	52.8	12	Alluvium (Ohio River)	300			16.5		18.2	
392023081212601	392023	812126	Pleasants	50	10	Alluvium (Ohio River)	140	35.3	24.6	10.7		13.1	
392334081121501	392334	811215	Pleasants	73.3	18	Alluvium (Ohio River)	200	49.5	46	3.5	72	57.1	11,000
392503081110901	392503	811109	Pleasants	78	12	Alluvium (Ohio River)	715	46.5	35	11.5		62.2	
392554081101301	392554	811013	Pleasants	80	30	Alluvium (Ohio River)	300	48.25	35	13.3	7.67	22.6	2,400
Cyanamid Site 1	N/D	N/D	Pleasants			Alluvium (Ohio River)							6,700 Lit
Cyanamid Site 2	N/D	N/D	Pleasants			Alluvium (Ohio River)							2,300 Lit
Cyanamid Site 3	N/D	N/D	Pleasants			Alluvium (Ohio River)							5,300 Lit
Cyanamid Site 4	N/D	N/D	Pleasants			Alluvium (Ohio River)							23,000 Lit
Cyanamid Site 5	N/D	N/D	Pleasants			Alluvium (Ohio River)							13,000 Lit

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
392315081124001	392315	811240	Pleasants	48	26	Alluvium (Ohio River)	150	48	22	26		5.77	
St. Marys #6	N/D	N/D	Pleasants	81	12	Alluvium (Ohio River)	510			9.41	24	54.2	9,100
392834081061101	392834	810611	Tyler	47.5		Alluvium (Ohio River)	2350	32	12	20		118	
393403080593401	393403	805934	Tyler	52	90	Alluvium (Ohio River)	300	52	27	25	0.5	12.0	670
Friendly test well	N/D	N/D	Tyler	60	8	Alluvium (Ohio River)	152			6.5	22	23.4	3,600
382358082331101	382358	823311	Wayne	58	12	Alluvium (Ohio River)	160			7	56	22.9	4,000
382350082321801	382350	823218	Wayne	61	12	Alluvium (Ohio River)	40	61	51	10	1	4.00	
382410082343801	382410	823438	Wayne	66		Alluvium (Ohio River)	300	52	47	5		60.0	
393622080560901	393622	805609	Wetzel	92	12	Alluvium (Ohio River)	500	57	42	15	2	33.3	4,000
393909080513601	393911	805149	Wetzel	57.5		Alluvium (Ohio River)	328	48.4	37.05	11.40		28.9	
393911080513701	393913	805149	Wetzel	59		Alluvium (Ohio River)	500	42.75	31.58	11.2		44.6	
393937080513801	393938	805150	Wetzel	74.5	20	Alluvium (Ohio River)	550	61	45	16	8	34.4	4,900
394018080513601	394018	805149	Wetzel	82	20	Alluvium (Ohio River)	700	70	54.7	16		43.8	

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
394050080514201	394050	805149	Wetzel	73.3	24	Alluvium (Ohio River)	700			10	24	70.0	12,200
394247080493401	394247	804934	Wetzel	65		Alluvium (Ohio River)	102	40	30	10	12	10.2	1,300
393835080515801	393835	805158	Wetzel	52	240	Alluvium (Ohio River)	700	48	30	18		38.9	
393900080510001	393900	805100	Wetzel	57.5		Alluvium (Ohio River)	440	31.4	30.15	1.25		352	
393912080513601	393912	805136	Wetzel	59	10	Alluvium (Ohio River)	300	44	36	8	240	37.5	7,800
394042080512601	394042	805126	Wetzel	120		Alluvium (Ohio River)	250	120	75	45		5.56	
394247080493402	394247	804934	Wetzel	60	8	Alluvium (Ohio River)	150			8.67	6	17.3	2,300
Grand. Doolin #3	N/D	N/D	Wetzel	61	8	Alluvium (Ohio River)	131			5	1	26.2	2,600
391547081402201	391548	814028	Wood	96	10	Alluvium (Ohio River)	234	84	73	11		21.3	
391548081402401	391546	814031	Wood	93		Alluvium (Ohio River)	213	80	73	7		30.4	
391548081402401	391546	814031	Wood	93	10	Alluvium (Ohio River)	325	85	70	15	24	21.7	3,300
391548081403001	391548	814030	Wood	94	10	Alluvium (Ohio River)	236	82	73	9		26.2	
391550081403401	391550	814034	Wood	86	12	Alluvium (Ohio River)	250					29.0	

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
391551081403201	391551	814032	Wood	83	12	Alluvium (Ohio River)	383	68	61	7		54.7	
391611081402901	391611	814029	Wood	96.5	192	Alluvium (Ohio River)	470			10	103	47.0	7,600
391717081333802	391717	813338	Wood	55	156	Alluvium (Ohio River)	500				9.2		13,000 Lit
391717081333603	391717	813336	Wood	49	156	Alluvium (Ohio River)	165				30		5,600 Lit
391718081333101	391718	813331	Wood	46	156	Alluvium (Ohio River)	200				46.25		35,000 Lit
391752081334201	391752	813342	Wood	80		Alluvium (Ohio River)	350				61.25		17,000 Lit
391929081325201	391929	813252	Wood	100	10	Alluvium (Ohio River)	231			11.1		20.8	
391931081325001	391929	813253	Wood	100	8	Alluvium (Ohio River)	235			16.1		14.6	
391931081325002	391930	813252	Wood	100	8	Alluvium (Ohio River)	267			16.2		16.5	
391931081325003	391930	813251	Wood	100	10	Alluvium (Ohio River)	210			3.55		59.2	
391937081325901	391937	813259	Wood	91	10	Alluvium (Ohio River)	168			5.5		30.5	
391937081330001	391937	813300	Wood	89	10	Alluvium (Ohio River)	310			12		25.8	
391947081331201	391947	813312	Wood	75	13	Alluvium (Ohio River)	500			13.4	8	374	59,000

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
391948081331101	391948	813311	Wood	76	13	Alluvium (Ohio River)	500			14.2	8	35.1	4,900
392131081240901	392058	812347	Wood	64		Alluvium (Ohio River)	300	45	32.3	12.7	24	23.6	3,500
392407081271002	392407	812710	Wood	90	8	Alluvium (Ohio River)	100			10		10.0	
392407081271003	392407	812710	Wood	90.	8	Alluvium (Ohio River)	100			10		10.0	
391603081402901	391603	814029	Wood	96	12	Alluvium (Ohio River)	265	72	62	10.38	48	25.5	4,300
G.E. Plastics	391542	814043	Wood	94	12	Alluvium (Ohio River)	250	80.9	73.2	7.7	25	32.5	5,300
Vienna #13	392051	813232	Wood	73.2	12	Alluvium (Ohio River)	299	54.35	37.8	16.55	36	18.1	2,800
Vienna #14	392050	813233	Wood	73.8	12	Alluvium (Ohio River)	351	52	37.45	14.55	36	24.1	4,000
Vienna Green #1T	N/D	N/D	Wood	83.8	12	Alluvium (Ohio River)	500			20.8	24	24.0	3,700
Vienna Green #2T	N/D	N/D	Wood	84.7	12	Alluvium (Ohio River)	457			20.6	24	22.2	3,500
Lubeck #PW-A	N/D	N/D	Wood	66.5	12	Alluvium (Ohio River)	600			27.25	24	22.0	3,500
Lubeck #PW-C	N/D	N/D	Wood	62	12	Alluvium (Ohio River)	500			29.41	24	17.0	2,500
Lubeck #PW-D	N/D	N/D	Wood	67	12	Alluvium (Ohio River)	400			28.57	24	14.0	2,100

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
Union Williams 4	N/D	N/D	Wood	58	12	Alluvium (Ohio River)	500			16.42	5.5	30.5	4,300
392400081273401	392400	812734	Wood	91	12	Alluvium (Ohio River)	600			24.5	4.75	24.5	3,200
											Median	**31.8**	**4,800**
											Minimum	**4.00**	**540**
											Maximum	**381**	**59,000**
381936081354501	381936	813545	Kanawha	58		Alluvium (Kanawha River)	60	24	22	2	8	30.0	6,400
382207081404001	382207	814040	Kanawha	50		Alluvium (Kanawha River)	100	45	32	13	12	7.69	1,600
382303081352301	382303	813523	Kanawha	60	6	Alluvium (Kanawha River)	43	46	40	6	1	7.17	1,100
383150081554803	383147	815552	Putnam	56	38	Alluvium (Kanawha River)	135			8.5		15.9	
383200081554001	383200	815540	Putnam	51.5	24	Alluvium (Kanawha River)	102	42.35	41.35	1	12	102	24,000
383203081554701	383203	815547	Putnam	51.4	24	Alluvium (Kanawha River)	99	37.55	36.8	0.75	12	132	31,000
383704081584501	383704	815845	Putnam	57		Alluvium (Kanawha River)	80	44	22	22	6	3.64	670
383911081570201	383911	815702	Putnam	39		Alluvium (Kanawha River)	10	28	26	2	9	5.00	940

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
											Median	**11.8**	**1,600**
											Minimum	**3.64**	**670**
											Maximum	**132**	**31,000**
375720081041301	375720	810413	Fayette	117		Alluvium (New River)	8	47	27	20		0.40	110e
382551082015501	382551	820155	Putnam	72		Alluvium (Teays River)	11	45	27	18	258	0.61	160
382610082012001	382610	820120	Putnam	24		Alluvium (Teays River)	50	20	12	8		6.25	1,700e
390344081232801	390343	812325	Wirt	55		Alluvium (Little Kanawha River)	105	46	36	10		10.5	2,800e
											Median	**3.43**	**920**
											Minimum	**0.40**	**110**
											Maximum	**10.5**	**2,800**
391731080335801	391731	803358	Harrison	112	8	Dunkard Group	8	80	62	18	16	0.44	120
391734080340201	391734	803402	Harrison	110	8	Dunkard Group	15	67	42	25	1008	0.60	200
385052081391801	385052	813918	Jackson	250		Dunkard Group	6.7		100	150		0.04	11e
384813081420001	384813	814200	Jackson	135	6	Dunkard Group	65	28	27	0.5	4	130	33,000
384820081420101	384820	814201	Jackson	135	6	Dunkard Group	18	28	27	0.5	1	36.0	8,000
384832081420401	384832	814204	Jackson	140	6	Dunkard Group	20	16	15	0.5	4	40.0	9,900
395027080465101	395027	804651	Marshall	75		Dunkard Group	4			17		0.24	64e
New Vrindaban	395705	803605	Marshall	100	8	Dunkard Group	25			30	6	0.83	210

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
394010080060501	394010	800605	Monongalia	96		Dunkard Group	4	21	13	8		0.50	130e
394812080124701	394812	801247	Monongalia	63		Dunkard Group	4	60	20	40	1	0.10	23
394034080202101	394034	802021	Monongalia	68		Dunkard Group	6	29	11	18	2	0.33	79
391226081024901	391226	810249	Ritchie	118	6	Dunkard Group	300			9		33.0	8,800e
391000081024501	391000	810245	Ritchie	122	6	Dunkard Group	12	15	5	10		1.20	320e
391405081004201	391405	810042	Ritchie	60	6	Dunkard Group	7	16	13	3		2.33	630e
391624081024001	391624	810240	Ritchie	110		Dunkard Group	20			110		0.18	48e
391624081024002	391624	810240	Ritchie	182	6	Dunkard Group	40	18	6	12	18	3.33	800
391645080590401	391645	805904	Ritchie	80	8	Dunkard Group	220	20	14	6	6.5	36.7	9,000
391655081100801	391655	811008	Ritchie	57	8	Dunkard Group	110	12	0	12		9.17	2,400e
391700080580001	391700	805800	Ritchie	100	10	Dunkard Group	5	45	20	25	12	0.20	51
384604081262401	384604	812624	Roane	420		Dunkard Group	25	270	50	220		0.11	29e
384711081285101	384711	812851	Roane	56	6	Dunkard Group	5	56	10	46	1	0.11	25
384716081260601	384716	812606	Roane	193	6	Dunkard Group	25	95	40	55	0.50	0.45	98
385352081255401	385352	812554	Roane	120	6	Dunkard Group	1.5	120	20	100		0.02	5e
393750080513701	393750	805137	Wetzel	50	6	Dunkard Group	10	35	15	20		0.50	130e
394058080510301	394058	805103	Wetzel	92	8	Dunkard Group	6	92	80	12	1	0.50	110
394100080272501	394100	802725	Wetzel	96	8	Dunkard Group	35	62	50	12	24	2.92	740
390144081242701	390144	812427	Wirt	100	6	Dunkard Group	16	80	17	63		0.25	67e
390852081214801	390852	812148	Wirt	130		Dunkard Group	10	49	33	16	28	0.63	170

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
390617081355501	390617	813555	Wood	120		Dunkard Group	10			4		2.50	670e
391115081314201	391115	813142	Wood	200		Dunkard Group	2	200	40	160		0.01	3e
391729081323801	391729	813238	Wood	156		Dunkard Group	2	156	100	56		0.04	11e
											Median	**0.50**	**130**
											Minimum	**0.01**	**3**
											Maximum	**130**	**33,000**
385215081033001	385215	810330	Calhoun	110		Monongahela Group	3	110	70	40		0.07	19e
Midway Mart	385745	803140	Lewis	280	6	Monongahela Group	1.5	280	40	240	36	0.01	3
Roanoke Elem	385517	803018	Lewis	100	6	Monongahela Group	8	100	29	71	1.5	0.11	25
393502080140301	393502	801403	Marion	77		Monongahela Group	2	20	16	4	8	0.50	130
384405081582901	384405	815833	Mason	22	30	Monongahela Group	10	19	7	12	8	0.83	170
384425081583801	384425	815838	Mason	103		Monongahela Group	20	60	40	20	8	1.00	250
384618082011001	384618	820110	Mason	50		Monongahela Group	10	40	35	5	48	2.00	580
384827081570701	384827	815707	Mason	70	6	Monongahela Group	10	57	10.5	46.5	0.15	0.22	44
393447080020501	393447	800205	Monongalia	160		Monongahela Group	7	28	8	20	680	0.35	120
393625080005201	393625	800052	Monongalia	123		Monongahela Group	20	120	80	40		0.50	130e
391314081025201	391314	810252	Ritchie	115	8	Monongahela Group	30			10		3.00	800e
391235081080001	391235	810800	Ritchie	55	6	Monongahela Group	10	13	12	1		10.0	27,000e
391337081021501	391337	810215	Ritchie	60	8	Monongahela Group	35	24	15	9		3.89	1,000e
383326081264301	383326	812643	Roane	155	6	Monongahela Group	10	130	110	20	1	0.50	110

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
384707081155201	384707	811552	Roane	44		Monongahela Group	10	12	10	2		5.00	1,300e
384720081155101	384720	811551	Roane	40	7	Monongahela Group	10	13	11	2	24	5.00	1,200e
384815081215801	384815	812158	Roane	320		Monongahela Group	13	122	12	110		0.12	32e
390057081205001	390057	812050	Wirt	130		Monongahela Group	30	90	43	47		0.64	170e
											Median	**0.57**	**150**
											Minimum	**0.01**	**3**
											Maximum	**10.0**	**27,000**
14-1-12	391400	800718	Barbour	110		Conemaugh Group	5			80	3	0.06	15
383713080364101	383713	803641	Braxton	210		Conemaugh Group	2	205	126	79	4	0.03	7
383656080544101	383656	805441	Braxton	32		Conemaugh Group	10	21	9	12	1	0.83	190
384025080482201	384025	804822	Braxton	46		Conemaugh Group	8	2	1	1	1	8.00	1,500
384133080485501	384133	804855	Braxton	78		Conemaugh Group	10	18	13	5	1	2.00	460
384145081001801	384145	810018	Braxton	100		Conemaugh Group	20	27	24	3		6.67	1,800
384410080355701	384410	803557	Braxton	87		Conemaugh Group	0.3	38	32	6		0.05	13
382901082180501	382901	821805	Cabell	85	6	Conemaugh Group	10	55	35	20	1	0.50	110
383155082173601	383155	821736	Cabell	115	6	Conemaugh Group	60	105	70	35	1	1.71	390
383138081094201	383138	810942	Clay	160	6	Conemaugh Group	8	155	100	55	2	0.15	36
383407081055301	383407	810553	Clay	50	6	Conemaugh Group	16	34	24	10	1	1.60	360
383624080593701	383624	805937	Clay	60	6	Conemaugh Group	4	57	27	30		0.13	35e
383659081023201	383659	810232	Clay	100	6	Conemaugh Group	16	60	55	5	1	3.20	720

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
385103080561801	385103	805618	Gilmer	104		Conemaugh Group	50	62	44	18	3	2.78	680
403038080332401	403038	803324	Hancock	95	10	Conemaugh Group	200	41	16.5	24.5	48	8.16	2,100
Oakland PSD #5	N/D	N/D	Hancock	95	10	Conemaugh Group	200			25.92	48	7.72	2,000
391022080200701	391022	802007	Harrison	86	6	Conemaugh Group	3	0.92	0.52	0.4	0.25	7.50	1,300
391450080231201	391450	802312	Harrison	50	5	Conemaugh Group	6.7	4	1	3	12	2.23	590
382542081281001	382542	812810	Kanawha	62	6	Conemaugh Group	17	55	25	30		0.57	150e
382636081432801	382636	814328	Kanawha	73	6	Conemaugh Group	10	22.4	9.54	13	0.5	0.77	170
382845081300301	382845	813003	Kanawha	75	6	Conemaugh Group	4	64.1	33.9	30.2	0.5	0.14	31
383052081244301	383052	812443	Kanawha	75	6	Conemaugh Group	10	65	35	30		0.33	88e
383229081263701	383229	812637	Kanawha	46	6	Conemaugh Group	24	45	15	30	1	0.80	190
382332081432201	382332	814322	Kanawha	41		Conemaugh Group	5	19	16	3	72	1.67	440
382708081344701	382708	813447	Kanawha	130	6	Conemaugh Group	0.8	120	70	50	4	0.01	3
382825081300901	382825	813009	Kanawha	70	6	Conemaugh Group	10	50	20	30	1	0.33	75
382830081313301	382830	813133	Kanawha	111	6	Conemaugh Group	30	90	80	10	0.5	3.00	620
Ireland Headstart	384819	802852	Lewis	380	6	Conemaugh Group	8.9	107	65	42	36	0.21	59
392835080090001	392835	800900	Marion	170		Conemaugh Group	4	170	80	90	2	0.04	9
393525079552601	393525	795526	Monongalia	50		Conemaugh Group	2	15	11	4		0.50	130e
393147080024601	393147	800246	Monongalia	70		Conemaugh Group	3	24	16	8		0.38	100e
393750079521201	393750	795212	Monongalia	216		Conemaugh Group	5	210	180	30	1	0.17	39
393824079573601	393824	795736	Monongalia	605		Conemaugh Group	100	108	73	35		2.86	760e

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
393913079514301	393913	795143	Monongalia	60		Conemaugh Group	5	91	31	60	1	0.08	19
393946079571901	393946	795719	Monongalia	16		Conemaugh Group	3	15	11	4	60	0.75	210
400946080355701	400946	803557	Ohio	452		Conemaugh Group	7	52	49	3	9	2.33	630
393328079481801	393328	794818	Preston	124		Conemaugh Group	300	12	9	3	2	100	24,000
Hendershrout MHP	392909	795020	Preston	305	6	Conemaugh Group	2.5	70	46	24	4	0.10	25
Hendershrout MHP	392909	795020	Preston	305	6	Conemaugh Group	3	160	34	126	6	0.02	5
Hendershrout MHP	392909	795020	Preston	185	6	Conemaugh Group	25	68	28	40	2	0.62	150
381858081575201	381858	815752	Putnam	53		Conemaugh Group	20	20	10	10	1	2.00	460
381900081575801	381900	815758	Putnam	24		Conemaugh Group	20	7	2	5	1	4.00	800
382350082001401	382350	820014	Putnam	100	6	Conemaugh Group	11	50.5	34.93	15.6	0.2	0.67	130
382624081501201	382624	815012	Putnam	94	6	Conemaugh Group	13	30.2	19.28	10.9	0.5	1.19	250
382702082003201	382702	820032	Putnam	70	6	Conemaugh Group	33	19.9	12.52	7.38	0.5	0.93	200
381908081583001	381908	815830	Putnam	43		Conemaugh Group	3	22	20	2	3	1.50	360
382151082011801	382151	820118	Putnam	75		Conemaugh Group	20	20	12	8	2	2.50	590
382340081545702	382340	815457	Putnam	125		Conemaugh Group	10	28	8	20	4	0.50	120
382652081580902	382652	815809	Putnam	175		Conemaugh Group	8	75	33	42	1	0.19	43
391125081161001	391125	811610	Ritchie	35	6	Conemaugh Group	10	23	20	3		3.33	900e
383302081160801	383302	811608	Roane	57	6	Conemaugh Group	24	25	15	10	1	2.40	550
383447081201701	383447	812017	Roane	83	6	Conemaugh Group	12	82	42	40	1	0.30	68
391734080011901	391734	800119	Taylor	385		Conemaugh Group	17	208	55	153	51	0.11	32

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
392053080023801	392053	800238	Taylor	23		Conemaugh Group	5	25	15	10	4	0.50	120
390457081191401	390457	811914	Wirt	50	6	Conemaugh Group	6	15	6	9	2	0.67	160
											Median	**0.75**	**170**
											Minimum	**0.01**	**3**
											Maximum	**100**	**24,000**
384043080352701	384043	803527	Braxton	30		Allegheny Formation	3	1	0	1	1	3.00	540
382303081121301	382303	811213	Clay	35	6	Allegheny Formation	16	16	12	4		4.00	1,100e
403235080343801	403235	803438	Hancock	120		Allegheny Formation	27	90	60	30	0.5	0.90	200
403244080303801	403244	803038	Hancock	235		Allegheny Formation	7	235	50	185	3	0.04	10
382210081414001	382210	814140	Kanawha	96		Allegheny Formation	69	74	40	34	4	2.03	510
382210081414501	382210	814145	Kanawha	153		Allegheny Formation	150	91	40	51	696	2.94	800
382211081454701	382211	814547	Kanawha	153		Allegheny Formation	120	70	33	37	696	3.24	900
382215081414201	382215	814142	Kanawha	155		Allegheny Formation	220	85	38	47	216	4.68	1,300
382215081414301	382215	814143	Kanawha	156		Allegheny Formation	170	85	39	46	216	3.70	990
382619081331401	382619	813314	Kanawha	300		Allegheny Formation	11	335	170	165	1	0.07	16
392359079442201	392359	794422	Preston	200	8	Allegheny Formation	150	125	100	25	30	6.00	1,400
Tunnelton New #2	N/D	N/D	Preston	200	8	Allegheny Formation	100			3.46	36	28.9	7,800
Bruceton #3	N/D	N/D	Preston	150	6	Allegheny Formation	60			3.23	36	18.6	5,100
Bruceton #4	N/D	N/D	Preston	150	8	Allegheny Formation	25			0.18	36	138	41,000
Camp Roy Weller	N/D	N/D	Preston	400	6	Allegheny Formation	5	380	81	299	48	0.02	6

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
382224081544301	382224	815443	Putnam	80		Allegheny Formation	33	49	9	40		0.82	210e
392150080090201	392150	800902	Taylor	76		Allegheny Formation	34	11	10	1		34.0	9,100e
Dean Conv. Store	385849	800512	Upshur	224	6	Allegheny Formation	20	100	86	14	36	1.43	400
											Median	**3.12**	**850**
											Minimum	**0.02**	**6**
											Maximum	**138**	**41,000**
Junior #1	385845	795701	Barbour	182	6	Kanawha Formation	90			7	24	12.9	3,300
Junior #3	385855	795641	Barbour	218	6	Kanawha Formation	78			4	24	19.5	5,100
Boone Co. 1W	N/D	N/D	Boone	175	6	Kanawha Formation	9			40	2	0.22	52
Boone Co. 2E	N/D	N/D	Boone	325	8	Kanawha Formation	9			50	2	0.18	41
375232081382701	375232	813827	Boone	146	6	Kanawha Formation	10	120	40	80	1	0.13	29
375943081304601	375943	813046	Boone	94	6	Kanawha Formation	30	57.98	55.7	2.28	0.5	2.34	510
380444081351401	380444	813514	Boone	64		Kanawha Formation	7	20.5	7.1	13.4	0.5	0.20	43
380818081502301	380818	815023	Boone	200	6	Kanawha Formation	6	36.7	18.4	18.3	0.5	0.32	70
380939081504801	380939	815048	Boone	130	6	Kanawha Formation	2	96	50.58	45.4	0.1	0.20	39
380613081483601	380613	814836	Boone	150		Kanawha Formation	20	33.5	17.5	16	17	1.25	290
Ind. Coal Co.	375908	814632	Boone	154	6	Kanawha Formation	65	128	59	69		0.94	250e
Macks MHP	380747	814816	Boone	157	6	Kanawha Formation	30		15	10	1	3.00	670
383248080420001	383248	804200	Braxton	32		Kanawha Formation	37	7	6	1	1	37.0	8,200
383449080423402	383449	804234	Braxton	60		Kanawha Formation	10	6	5	1	1	10.0	2,000

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
382131081091501	382131	810915	Clay	50	6	Kanawha Formation	50	23.8	18.8	4.97	0.5	10.1	1,900
382046081094701	382046	810947	Clay	40		Kanawha Formation	5	11	9	2	1	2.50	540
382739080515101	382739	805151	Clay	180		Kanawha Formation	1000	80	40	40	1	25.0	5,300
382740080515501	382740	805155	Clay	180		Kanawha Formation	200	217	42	175	20	1.14	310
382747080514101	382747	805141	Clay	180		Kanawha Formation	200	18	16	2	15	100	28,000
380847081173901	380847	811739	Fayette	92		Kanawha Formation	2	60	46	14		0.14	37
381201081174601	381201	811746	Fayette	311		Kanawha Formation	88	52	35	17	10	5.18	1,200
380402081224701	380402	812247	Kanawha	132	8	Kanawha Formation	100	44.4	38.9	5.47	3	18.3	4,000
381216081450101	381216	814501	Kanawha	80	6	Kanawha Formation	10	50.9	30.7	20.2	0.3	0.31	64
381852081404401	381852	814044	Kanawha	65	6	Kanawha Formation	5	40.3	32.8	7.53	0.3	0.70	150
381916081405001	381916	814050	Kanawha	280	6	Kanawha Formation	15		110	10	0.1	1.50	290
381938081355001	381938	813550	Kanawha	90		Kanawha Formation	90	75	23	52	6	1.73	440
381939081354501	381939	813545	Kanawha	225		Kanawha Formation	115	22	20	2	11	57.5	15,000
381940081354901	381940	813549	Kanawha	100		Kanawha Formation	192	60	26	34	8	5.65	1,300
382210081342901	382210	813429	Kanawha	1860		Kanawha Formation	100	16	12	4	8	25.0	6,200
381102081284901	381102	812849	Kanawha	220		Kanawha Formation	225	9	7	2	18	113	31,000
381509081474101	381509	814741	Kanawha	80		Kanawha Formation	97	41	33	8	1	12.1	2,500
381650081452701	381650	814527	Kanawha	167		Kanawha Formation	10	27	22	5	10	2.00	520
382100081380801	382100	813808	Kanawha	215		Kanawha Formation	196	151	30	121		1.62	430e
382100081380802	382100	813808	Kanawha	215		Kanawha Formation	120	149	28	121		0.99	270e

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
382101081380501	382101	813805	Kanawha	215		Kanawha Formation	209	150	28	122	12	1.71	460
382101081380502	382101	813805	Kanawha	215		Kanawha Formation	180	120	30	90	12	2.00	540
382105081382101	382105	813821	Kanawha	150		Kanawha Formation	135	130	30	100	1	1.35	310
382143081385601	382143	813856	Kanawha	131		Kanawha Formation	470	39	30	9	10	52.2	14,000
382211081342801	382211	813428	Kanawha	1860		Kanawha Formation	100	16	12	4	8	25.0	6,300
Toll plaza B	380610	812257	Kanawha	210	6	Kanawha Formation	15			0.68	36	22.1	6,000
Atenville Elem	380254	820836	Lincoln	109	6	Kanawha Formation	25	96	40	56	1	0.45	100
374740081424901	374740	814249	Logan	198	8	Kanawha Formation	66	120	36.5	83.5	36	0.79	210
374309081592701	374309	815927	Logan	400	4	Kanawha Formation	96	37	8	29	82	3.31	940
374331081595001	374331	815950	Logan	400	4	Kanawha Formation	73	375	18	357	74	0.20	62
374346082000201	374346	820002	Logan	600	5	Kanawha Formation	186	121	33	88	132	2.11	640
374407082000601	374407	820006	Logan	600	5	Kanawha Formation	120	421	16	405	42	0.30	86
374428082000201	374428	820002	Logan	600	5	Kanawha Formation	165	75	25	50	146	3.30	960
374548081591201	374548	815912	Logan	220	10	Kanawha Formation	58.5	20	3	17.2	1.25	3.40	670
374743081425101	374743	814251	Logan	240	8	Kanawha Formation	89		29		36		
374750081424901	374750	814249	Logan	175	8	Kanawha Formation	56.7		10.82		40		
374804081422801	374804	814228	Logan	200	8	Kanawha Formation	127		22.45		70.67		
374740081424901	374740	814249	Logan	198	8	Kanawha Formation	66		36.5		36		
374737081424301	374737	814243	Logan	210	8	Kanawha Formation	95	71	60		53		
Buffalo PSD #11	N/D	N/D	Logan	225	8	Kanawha Formation	19.6	142	71		18		

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
374748081430801	374748	814308	Logan	190	8	Kanawha Formation	60		12	87	48	0.69	190
Buffalo PSD #15	N/D	N/D	Logan	200	8	Kanawha Formation	60	27	15		48		
374823081422001	374823	814220	Logan	245	8	Kanawha Formation	181	42.5	30.05		49		
374823081420701	374823	814207	Logan	245	8	Kanawha Formation	340		23	39.5	52	8.61	2,100
374813081420101	374813	814201	Logan	170	8	Kanawha Formation	172	76	36.01		51		
374916081503501	374916	815035	Logan	70	8	Kanawha Formation	36	30.4	29	1.4	0.5	25.7	5,100
Sharples Elem	375447	814833	Logan	60	6	Kanawha Formation	20	55	10	45	1	0.44	100
Marrowbone Dev.	375126	821909	Mingo	81	8	Kanawha Formation	10	75	4	71	24	0.14	37
Marrowbone Dev.	375126	821909	Mingo	210	6	Kanawha Formation	10	175	90	85	24	0.12	33
Marrowbone Dev.	375229	821935	Mingo	1010	8	Kanawha Formation	10	1010	32	978		0.01	3e
381321080411201	381321	804112	Nicholas	78.5	6	Kanawha Formation	2		15.6	23.2	0.7	0.09	20
381533081020301	381533	810203	Nicholas	26	6	Kanawha Formation	6		5.02	2.31	0.3	2.60	550
381552081014801	381552	810148	Nicholas	60		Kanawha Formation	7.5		3.18	16.5	0.1	0.46	88
381623080552701	381623	805527	Nicholas	60	6	Kanawha Formation	12.5		21.66	0.45	0.7	27.7	5,700
381656080543301	381656	805433	Nicholas	48.4	6	Kanawha Formation	1.3	17.69	15.46	2.23	1.5	0.38	90
381754080490401	381754	804904	Nicholas	100	6	Kanawha Formation	7.5		47.5		0.3	0.31	64
381915080371901	381915	803719	Nicholas	72	6	Kanawha Formation	4		9	3.8	0.4	1.05	230
382123080381701	382123	803817	Nicholas	57	6	Kanawha Formation	2	20.9	18.23	2.67	0.5	0.75	160
381513081094201	381513	810942	Nicholas	95.2	6	Kanawha Formation	13.6	13.12	12.81	0.31	1	43.9	9,600
383050080461701	383050	804617	Nicholas	36		Kanawha Formation	5	27	12	15	1	0.33	75

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
383101080465901	383101	804659	Nicholas	44		Kanawha Formation	7	18	15	3	1	2.33	540
375739081311101	375739	813111	Raleigh	151		Kanawha Formation	30	42.75	39.2	3.55	36	8.45	2,300
375745081302201	375745	813022	Raleigh	150		Kanawha Formation	30	20.5	15	5.5	36	5.45	1,500
375704081263101	375704	812631	Raliegh	84		Kanawha Formation	146	56	15.75	40.3	12	3.63	860
375704081263101	375704	812631	Raliegh	84		Kanawha Formation	108	24	11	13	12	8.31	1,900
Hutte Restaurant	384230	801230	Randolph	150	6	Kanawha Formation	15	4	2	2	4	7.50	1,600
375811082212401	375811	822124	Wayne	108		Kanawha Formation	16	18.8	16.02	1.98	15	8.08	1,900
382038080331801	382038	803318	Webster	109	6	Kanawha Formation	10		18.74	33	0.1	0.30	57
382046080332701	382046	803327	Webster	100		Kanawha Formation	13.3		6.86	0.2		0.16	43
											Median	**2.00**	**520**
											Minimum	**0.01**	**3**
											Maximum	**113**	**31,000**
375610081075301	375610	810753	Fayette	72		New River Formation	3	25	22	3		1.00	270e
380358081045501	380358	810455	Fayette	54		New River Formation	16	37	30	7		2.29	620e
380632080592101	380632	805921	Fayette	141	6	New River Formation	4.3		89.45	2.05	0.1	2.07	400
380708081001601	380708	810016	Fayette	170	6	New River Formation	6		63.5	49.2	0.2	0.12	24
380715080582801	380715	805828	Fayette	160	6	New River Formation	4.8		30.52	12.8	0.2	0.38	78
380844080581001	380844	805810	Fayette	400	6	New River Formation	3	86.1	64.4	21.7	0.3	0.09	19
Page-Kincaid #1	380235	811609	Fayette	165	10	New River Formation	375			71.6	8	5.24	1,100
Page-Kincaid #2	380236	811609	Fayette	150	10	New River Formation	375			28.2	8	13.3	2,900

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diam-eter (in.)	Hydrogeologic Unit (Aquifer)	Dis-charge (gpm)	Pro-duc-tion level (ft bls)	Static level (ft bls)	Draw-down (ft)	Test duration (hours)	Specific Capac-ity (gpm/ft)	Trans-miss-ivity (ft^2/d)
380124080405601	380124	804056	Greenbrier	46	6	New River Formation	2		19.4		0.1	0.78	150
380333080435601	380333	804356	Greenbrier	67	6	New River Formation	7.5		21.9		0.2	0.19	39
381415081330001	381415	813300	Kanawha	600		New River Formation	180	130	21	109		1.65	440e
380751080453201	380751	804532	Nicholas	160	6	New River Formation	2.3		50	5	1	0.45	100
381239080563301	381239	805633	Nicholas	140	6	New River Formation	6.5		123	15	2	0.43	100
381724080320901	381724	803209	Nicholas	59.5	6	New River Formation	14.4		3.7	4.8	0.2	3.01	600
381729080320801	381729	803208	Nicholas	51.5	6	New River Formation	6.9		11	0.94	0.1	7.34	1,200
374917081194601	374917	811946	Raleigh	191		New River Formation	400	54	38	16	24	25.0	6,700
Beckley Smokeless	374531	811803	Raleigh	226	6	New River Formation	30	210	157	53	4.75	0.57	150
Ravencliff #2	374026	812808	Wyoming	220	8	New River Formation	752			0.27	17	2780	750,000
											Median	**1.33**	**330**
											Minimum	**0.09**	**19**
											Maximum	**2780**	**750,000**
Northfork No.1	372453	812558	McDowell	205	8	Pocahontas Formation	160	180	20	160	1	1.00	210
Northfork No. 2	372453	812558	McDowell	145	8	Pocahontas Formation	150	120	20	100	1	1.50	320
Kimball+Carswell	N/D	N/D	McDowell	119	8	Pocahontas Formation	250			0.25	2	1000	270,000
373503081225101	373503	812251	Wyoming	286		Pocahontas Formation	258	81.6	51	30.7	30	8.40	2,100
											Median	**4.95**	**1,200**
											Minimum	**1.00**	**210**
											Maximum	**1000**	**270,000**

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
390622079595001	390622	795950	Barbour	265		Pottsville Group	100	182	120	62	70	1.61	470
375719081392401	375719	813924	Boone	260		Pottsville Group	270	79	70	9	5	30.0	7,500
375825081425001	375825	814250	Boone	104	8	Pottsville Group	72	32	11	21		3.43	920
382339081064901	382339	810649	Clay	40	6	Pottsville Group	24	9	4	5		4.80	1,300
380815081180701	380815	811807	Fayette	291		Pottsville Group	250	53	40	13	2	19.2	4,300
380236081161002	380236	811610	Fayette	158		Pottsville Group	185	34.74	13.7	21.1	24	8.78	2,100
Thurmond Depot	N/D	N/D	Fayette	255		Pottsville Group	20	39.45	37.8	1.6	30	12.5	3,200
381417081325101	381417	813251	Kanawha	440		Pottsville Group	350	85	21	64	24	5.47	1,300
382250081230601	382250	812306	Kanawha	60	6	Pottsville Group	10	30	15	15	0.5	0.67	150
372312081242601	372312	812426	Mcdowell	398	8	Pottsville Group	75	36.4	34.7	1.7		44.1	12,000e
393928079510001	393928	795100	Monongalia	154		Pottsville Group	41	72	63	9	8	4.56	1,100
374551081244101	374551	812441	Raleigh	125		Pottsville Group	30	17	16	1		30.0	8,000e
374646081201401	374646	812014	Raleigh	120		Pottsville Group	10	7	6	1	2	10.0	2,100
374933081200201	374933	812002	Raleigh	150		Pottsville Group	402	31	20	11	24	36.5	10,000
375145081280301	375145	812803	Raleigh	186		Pottsville Group	8	41	40	1	24	8.00	2,100
375203081265101	375203	812651	Raleigh	45		Pottsville Group	25	17	8	9		2.78	750e
385618079574501	385618	795745	Randolph	500	10	Pottsville Group	220	149.33	30.1	119.2	24.5	1.84	470
382717080282301	382717	802823	Webster	90	6	Pottsville Group	10	30	27	3		3.33	900e
383413080273001	383413	802730	Webster	83	6	Pottsville Group	10	45	28	17		0.59	160e
373252081294701	373252	812947	Wyoming	247	14	Pottsville Group	220	65	24	41		5.37	1,400e

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
373627081302201	373627	813022	Wyoming	30	6	Pottsville Group	5	30	10	20		0.25	67e
373629081304301	373629	813043	Wyoming	145	6	Pottsville Group	5	145	60	85		0.06	16e
373837081255301	373837	812553	Wyoming	80	8	Pottsville Group	47				4	3.00	700
373840081255001	373840	812550	Wyoming	80	8	Pottsville Group	45				4	6.00	1,300
											Median	**5.09**	**1,300**
											Minimum	**0.06**	**16**
											Maximum	**44.1**	**12,000**
375239080475801	375239	804758	Fayette	59	6	Bluestone and Princeton Formations	4.6		8.97		0.9	5.70	1,200
375348080453801	375348	804538	Greenbrier	50	6	Bluestone and Princeton Formations	2.4		10.16		0.1	0.45	87
375804080460401	375804	804604	Greenbrier	250	8	Bluestone and Princeton Formations	260			23.10	6.5	11.3	2,500
375905080425901	375905	804259	Greenbrier	60	6	Bluestone and Princeton Formations	8				0.9	1.04	240
375958080450601	375958	804506	Greenbrier	74	6	Bluestone and Princeton Formations	5		9.90		0.5	2.20	480
381353080263101	381353	802631	Greenbrier	77	6	Bluestone and Princeton Formations	5		21.6	38.5	0.2	0.13	27
371809081092001	371809	810920	Mercer	225		Bluestone and Princeton Formations	160	31	25	6	6	26.7	6,600
373020081075601	373020	810756	Mercer	144		Bluestone and Princeton Formations	100	44.1	42.35	1.75	0.7	7.79	1,500

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
381925080262301	381925	802623	Webster	58	6	Bluestone and Princeton Formations	10.9		4.18	5.07	1	2.15	480
381929080263001	381929	802630	Webster	65	6	Bluestone and Princeton Formations	5.4		8.41	3.81	0.6	1.40	310
381934080262901	381934	802629	Webster	61.5	6	Bluestone and Princeton Formations	8.3		19.47	7.43	0.5	1.11	240
											Median	**2.15**	**480**
											Minimum	**0.13**	**27**
											Maximum	**26.7**	**6,600**
375343080365601	375343	803656	Greenbrier	67	6	Hinton Formation	2.2				0.2	1.30	250
375457080405301	375457	804053	Greenbrier	65	6	Hinton Formation	6		6.35		0.9	2.10	470
375717080411601	375717	804116	Greenbrier	101	6	Hinton Formation	7.5				0.3	0.50	100
375828080382601	375828	803826	Greenbrier	85	6	Hinton Formation	8.6				0.5	1.40	310
24-unit motel	N/D	N/D	Greenbrier	135	6	Hinton Formation	6	120	45	75	2	0.08	19
372118081040701	372118	810407	Mercer	628	8	Hinton Formation	250			42	15	5.95	1,300
371812081155301	371812	811553	Mercer	237		Hinton Formation	50	36	18	18	4	2.78	670
372135081051001	372135	810510	Mercer	495	10	Hinton Formation	200	353	71	282	15	0.71	170
372144081062401	372144	810624	Mercer	500	8	Hinton Formation	120	60	14	46	24	2.61	680
372629080464601	372629	804646	Monroe	82		Hinton Formation	40	35	25	10	1	4.00	910
372651080491601	372651	804916	Monroe	130		Hinton Formation	30	112	108	4	2	7.50	1,300
372658080464701	372658	804647	Monroe	81		Hinton Formation	30	75	35	40	2	0.75	180

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
381059080151201	381059	801512	Pocahontas	240	6	Hinton Formation	3.6		164.8		24	0.24	67
											Median	**1.40**	**310**
											Minimum	**0.08**	**19**
											Maximum	**7.50**	**1,300**
375623081034201	375623	810342	Fayette	91		Mauch Chunk Group	10	47	45	2		5.00	1,300
375807080460001	375807	804600	Greenbrier	85	8	Mauch Chunk Group	260	80	57	23.1	6.5	11.3	2,400
372143081054001	372141	810541	Mercer	445	8	Mauch Chunk Group	300	41	21	20	12	15.0	3,700
372145081053901	372141	810541	Mercer	548	12	Mauch Chunk Group	350	43	11	32	15	10.9	2,400
372147081054901	372143	810545	Mercer	550	8	Mauch Chunk Group	250	43	10	33	15	7.58	1,700
372536080594801	372356	805948	Mercer	421-589		Mauch Chunk Group	116			17.5	4	6.63	1,300
372132081051001	372132	810510	Mercer	247	12	Mauch Chunk Group	400			13	12	30.8	7,200
Vital-18 campground	372404	805243	Mercer	305	6	Mauch Chunk Group	20			6	36	3.33	900
Vital-18 lodge	372404	805243	Mercer	305	6	Mauch Chunk Group	200	305		260	1.03	0.77	170
381843080111801	381843	801118	Pocahontas	85	6	Mauch Chunk Group	5.4		43	2.07	0.5	2.59	560
385612079550701	385612	795507	Randolph	60.1	6	Mauch Chunk Group	21.4	26.4	3.66	22.7	0.5	0.94	200
373151080575601	373151	805756	Summers	110		Mauch Chunk Group	60			20	6	3.00	760
374908080435601	374908	804356	Summers	170	6	Mauch Chunk Group	10	22.98	6.34	16.6	0.5	0.38	83
373719080563001	373719	805630	Summers	151	8	Mauch Chunk Group	60	111	108	3	4	20.0	4,400
382921080224201	382921	802242	Webster	90	6	Mauch Chunk Group	10	50	30	20	1	0.50	110

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
											Median	**5.00**	**1,300**
											Minimum	**0.38**	**83**
											Maximum	**30.8**	**7,200**
374836080300601	374836	803006	Greenbrier	523	6	Greenbrier Group	30	523	417	106	1	0.28	64
Organ Cave	374304	802609	Greenbrier	240	6	Greenbrier Group	45	230	215	15	1	3.00	680
Frankford subdiv.	N/D	N/D	Greenbrier	140	6	Greenbrier Group	6	60	34	26	1	0.23	52
372715080395501	372715	803955	Monroe	50		Greenbrier Group	30	24	12	12	0.4	2.50	540
373528080314501	373528	803145	Monroe	385		Greenbrier Group	20	176	100	76	0.1	0.26	49
373718080314001	373718	803140	Monroe	185		Greenbrier Group	4	140	8	132	24	0.03	8
373732080311501	373732	803115	Monroe	256		Greenbrier Group	20	181	81	100	1	0.20	45
382416080013701	382416	800137	Pocahontas	175	6	Greenbrier Group	57	73.05	71.7	1.35	0.5	6.47	1,300
382500080063501	382500	800635	Pocahontas	54	6	Greenbrier Group	40	50	30.5	19.5	1	2.05	470
Hillsboro #1	380754	801237	Pocahontas	204	8	Greenbrier Group	30			29	72	1.03	290
Alpine Lake #4	392729	793018	Preston	145	8	Greenbrier Group	174			6.9	24	25.2	6,600
385608079544401	385608	795444	Randolph	55	6	Greenbrier Group	100	22	20	2	12	50.0	13,000
Timberline Resort	390233	792405	Tucker	100	6	Greenbrier Group	72	50.08	48	2.08	17	34.6	9,200
											Median	**2.05**	**470**
											Minimum	**0.03**	**8**
											Maximum	**50.0**	**13,000**

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
380030080002501	380030	800025	Greenbrier	83		Pocono Group	12	60	26	34		0.35	94e
393435079514101	393435	795141	Monongalia	250		Pocono Group	175	250	40	210	8	0.83	210
393437079514201	393437	795142	Monongalia	180		Pocono Group	180	176	26	150	8	1.20	310
373710080212101	373710	802121	Monroe	50		Maccrady Formation	15	30	15	15		1.00	270e
373805080202001	373805	802020	Monroe	265		Maccrady Formation	15	100	60	40	4	0.38	95
385602079542401	385602	795424	Randolph	42.2	6	Pocono Group	5.1	40.2	10.8	29.4	0.1	0.17	33
385507079313901	385507	793139	Randolph	220	6	Pocono Group	300			34.6	24	8.67	2,300
											Median	**0.83**	**210**
											Minimum	**0.17**	**33**
											Maximum	**8.67**	**2,300**
392509078105801	392509	781058	Berkeley	110	6	Hampshire Formation	25	105	55	50	18	0.50	130
392523078104201	392523	781042	Berkeley	107	6	Hampshire Formation	25	18	16	2	18	12.5	2,900
Woods Resort #8	393453	780606	Berkeley	406	6	Hampshire Formation	10	239.83	45.5	194.3	36	0.05	15
Woods Resort #9	393453	780600	Berkeley	366	6	Hampshire Formation	30	232.58	49	183.6	24	0.16	44
391118078272901	391118	782729	Hampshire	223		Hampshire Formation	10	78	20	58	0.1	0.17	32
391223078255301	391223	782553	Hampshire	36		Hampshire Formation	15	46	9	37	3	0.41	100
391234078254401	391234	782544	Hampshire	245		Hampshire Formation	14	137	52	85	0.1	0.16	31
391720078340801	391720	783408	Hampshire	57		Hampshire Formation	8	47	20	27	0.1	0.30	57
391840078430001	391840	784300	Hampshire	750		Hampshire Formation	5	969	582	387	3	0.01	3
391943078435301	391943	784353	Hampshire	29		Hampshire Formation	6	13	1	12	0.1	0.50	96

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
392322078393301	392322	783933	Hampshire	135		Hampshire Formation	9	31	2	29	0.1	0.31	59
392556078360401	392556	783604	Hampshire	39		Hampshire Formation	8	17	6	11	0.1	0.73	140
392730078273601	392730	782736	Hampshire	185		Hampshire Formation	8	28	26	2	0.1	4.00	670
392921078252500	392921	782525	Hampshire	118		Hampshire Formation	6	96	51	45		0.13	35e
Slanesville School	392214	783152	Hampshire	500	6	Hampshire Formation	70	498	94	404	1	0.17	39
Slanesville School	392214	783152	Hampshire	200	6	Hampshire Formation	40	198	55	143	2	0.28	67
385332078553601	385332	785536	Hardy	180	6	Hampshire Formation	8	38	36.3	1.7	30	4.70	1,200
Lost River Park	385338	785531	Hardy	200	6	Hampshire Formation	47	40.7	17	23.7	36	1.98	540
393138078253101	393138	782531	Morgan	60		Hampshire Formation	8	52	43	9		0.89	240e
Greenbrier tr. 63.7	381525	800059	Pocahontas	125	6	Hampshire Formation	12	86	18	68	8	0.18	47
Greenbrier tr. 69.6	381908	795818	Pocahontas	125	6	Hampshire Formation	20	80	16	64	8	0.31	80
392612079315801	392612	793158	Preston	265		Hampshire Formation	50	40	0	40	5	1.25	320
											Median	**0.31**	**74**
											Minimum	**0.01**	**3**
											Maximum	**12.5**	**2,900**
393002078070201	393002	780702	Berkeley	128		Chemung Group	5			40		0.12	32
391442078413201	391442	784132	Hampshire	182		Chemung Group	8	60	57	3	0.1	2.67	460
391532078405201	391532	784052	Hampshire	71		Chemung Group	3	8	0	8		0.38	100
391742078385501	391742	783855	Hampshire	90		Chemung Group	8	56	52	4	0.1	2.00	310
391756078390701	391756	783907	Hampshire	97		Chemung Group	3	3	1	2		1.50	400

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
391759078372901	391759	783729	Hampshire	30		Chemung Group	12	7	4	3	48	4.00	1,100
391817078392001	391817	783920	Hampshire	60		Chemung Group	6	30	11	19	0.1	0.32	62
391835078372701	391835	783727	Hampshire	64		Chemung Group	8	57	8	49		0.16	43e
391837078392601	391837	783926	Hampshire	66		Chemung Group	5	8	5	3	0.1	1.67	320
391944078422502	391944	784225	Hampshire	523		Chemung Group	9	164	111	53		0.17	45e
392023078385001	392023	783850	Hampshire	148		Chemung Group	12	90	60	30		0.40	110e
392036078383601	392036	783836	Hampshire	36		Chemung Group	8	11	8	3	0.1	2.67	500
392106078381301	392106	783813	Hampshire	85		Chemung Group	8	49	7	42		0.19	51e
392154078372201	392154	783722	Hampshire	70		Chemung Group	3	21	14	7	0.1	0.43	82
392802078425801	392802	784258	Hampshire	41		Chemung Group	35	18	15	3	1	11.7	2,400
390458078331501	390458	783315	Hardy	48	6	Chemung Group	5.9	13	8	5	0.33	1.20	240
381817079563801	381817	795638	Pocahontas	86		Chemung Group	15	15	10	5	1	3.00	640
National Radio Ob	382656	795011	Pocahontas	175	6	Chemung Group	25	86.75	16	70.75	36	0.35	99
National Radio Ob	382656	795011	Pocahontas	175	10	Chemung Group	30	82.83	16	66.83	36	0.45	120
381823079563701	381823	795637	Pocahontas	152	6	Chemung Group	20	30	20	10	1	2.00	460
392618079322701	392618	793227	Preston	207	8	Chemung Group	430			14	36	30.7	8,300
384917079501101	384917	795011	Randolph	24	6	Chemung Group	7.1	7.17	3.2	3.97	0.2	1.80	360
											Median	**1.35**	**270**
											Minimum	**0.12**	**32**
											Maximum	**30.7**	**8,300**

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
391618078532301	391618	785323	Hampshire	392		Brallier Formation	2	389	1	388		0.01	3e
390725078404501	390725	784045	Hardy	45	6	Harrell or Brallier Formations	10	14	6	8	8	1.25	320
393116078474601	393116	784746	Mineral	22		Brallier Formation	8	5	0	5	3	1.60	390
381730079554601	381730	795546	Pocahontas	396		Harrell Shale	12	128	3	125	52	0.10	29
381742079554201	381742	795542	Pocahontas	396		Harrell Shale	9	56	3	53	49	0.17	49
Stuart Recreation	N/D	N/D	Randolph	101	6	Harrell Shale	6	27.17	5.75	21.4	8	0.28	72
384537079552601	384537	795526	Randolph	108	6	Brallier Formation	6	16.5	9	7.5	70	0.80	230
											Median	**0.28**	**72**
											Minimum	**0.01**	**3**
											Maximum	**1.60**	**390**
385537078502001	385537	785020	Hardy	90	6	Upper to Middle Devonian Formations	10	43	3	40	1.25	0.25	57
390339078372001	390339	783720	Hardy	82	6	Upper to Middle Devonian Formations	30	13	6	7	0.25	4.29	760
382601079491101	382601	794911	Pocahontas	100		Upper to Middle Devonian Formations	15	52	26	26	27	0.58	160
384740079540301	384740	795403	Randolph	71.4	6	Upper to Middle Devonian Formations	37.5	16.38	6.33	10.1	0.5	3.73	600
384826079532201	384826	795322	Randolph	85	6	Upper to Middle Devonian Formations	6.5	16.86	5.3	11.6		0.56	150e
385007079523901	385007	795239	Randolph	140	8	Upper to Middle Devonian Formations	7.5	10.47	6.1	4.37	6	1.72	430

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
385051079522001	385051	795220	Randolph	80.3	6	Upper to Middle Devonian Formations	11.5	35.3	12.2	23.1	24	0.50	140
385058079522601	385058	795226	Randolph	86	6	Upper to Middle Devonian Formations	33	17.65	1.28	16.4	2	2.02	480
385059079522901	385059	795229	Randolph	96	6	Upper to Middle Devonian Formations	10.7	31.94	1.84	30.1	4.5	0.36	91
385100079522901	385100	795229	Randolph	98	6	Upper to Middle Devonian Formations	11.1	15.56	1	14.6	1.8	0.76	180
385101079522701	385101	795227	Randolph	97	6	Upper to Middle Devonian Formations	33	27.8	0.93	26.9	0.1	1.23	230
385537079530301	385537	795303	Randolph	84.4	6	Upper to Middle Devonian Formations	10	64	12.07	51.9		0.19	51e
385538079530701	385538	795307	Randolph	80	6	Upper to Middle Devonian Formations	10	57.55	10.84	46.7	0.3	0.21	44
385817079502701	385817	795027	Randolph	33.4	6	Upper to Middle Devonian Formations	21.4	17.2	4	13.2	0.5	1.62	350
385127079520301	385127	795203	Randolph	133	6	Upper to Middle Devonian Formations	11.5	6.5	1.56	4.94	0.5	2.33	510
											Median	**0.76**	**180**
											Minimum	**0.19**	**44**
											Maximum	**4.29**	**760**
392310078081501	392310	780815	Berkeley	55	6	Mahantango Formation	5			15		0.33	88e
393337078013601	393337	780136	Berkeley	117	6	Mahantango Formation	16.6	60	20	40	1	0.42	95

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
393459078025201	393459	780252	Berkeley	53	6	Mahantango Formation	3	53	10	43		0.07	19e
393654078015901	393647	780157	Berkeley	141	6	Mahantango Formation	2	80	40	40	0.5	0.05	11
Deerwood F #1	392452	780700	Berkeley	700	6	Mahantango Formation	32			580	24	0.06	16
392208078433401	392208	784334	Hampshire	129		Mahantango Formation	8	18	7	11	0.1	0.73	140
392009078543001	392009	785430	Mineral	42		Mahantango Formation	6	9	1	8	8	0.75	200
Burlington Elem.	392010	785508	Mineral	410	6	Mahantango Formation	3.5	400	15	385	36	0.01	3
372840080243801	372840	802438	Monroe	68		Mahantango Formation	40	26	6	20	1	2.00	460
383730079144001	383730	791440	Pendleton	40		Mahantango Formation	30	22	14	8	3	3.75	840
											Median	**0.38**	**92**
											Minimum	**0.01**	**3**
											Maximum	**3.75**	**840**
393141078030001	393141	780300	Berkeley	55	6	Marcellus and Needmore Formations	3.3	55	5	50	1	0.07	16
374800080173502	374800	801735	Greenbrier	205		Marcellus Formation	100	521	5	516	521	0.19	62
391247078323301	391247	783233	Hampshire	78		Marcellus Formation	7	7	2	5	0.1	1.40	270
391425078304001	391425	783040	Hampshire	98		Marcellus Formation	8	6	3	3	0.1	2.67	460

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
391923078524901	391923	785249	Hampshire	47		Marcellus Formation	20	14	2	12		1.67	440e
393130078370901	393130	783709	Hampshire	27		Marcellus Formation	35	11	6	5	1	7.00	1,300
390246078380901	390246	783809	Hardy	28	6	Marcellus Formation	5	4	2	2.4	0.13	2.08	400
390306078380501	390306	783805	Hardy	86	6	Marcellus Formation	4	37	11	26.2	0.17	0.15	29
390327078374701	390327	783747	Hardy	60	6	Marcellus Formation	5.6	22	15	6.5	0.35	0.86	170
390741078340001	390741	783400	Hardy	125	6	Marcellus Formation	5.3	6	1	4.6	5	1.15	280
393128078374601	393128	783746	Hampshire	83		Marcellus and Needmore Formations	25	72	49	23	1	1.09	240
Peterkin conf. Cen.	391749	784739	Hampshire	203	6	Marcellus and Needmore Formations	17	160	60	100	36	0.17	48
392154078585001	392154	785850	Mineral	115		Marcellus Formation	25	109	49	60	1	0.42	96
393911078124401	393911	781244	Morgan	450		Marcellus and Needmore Formations	50	270	115	155	62	0.32	92
393001078174101	393001	781741	Morgan	445		Marcellus and Needmore Formations	35	374	1	373	8	0.09	24
											Median	**0.86**	**170**
											Minimum	**0.07**	**16**
											Maximum	**7.00**	**1,300**
390822078395901	390822	783959	Hampshire			Onesquethaw Group	8	12	8	4	0.1	2.00	390
391423078303801	391423	783038	Hampshire	111		Oriskany Sandstone	8	95	70	25	0.1	0.32	62
391639078301002	391639	783010	Hampshire	48		Oriskany Sandstone	3	43	40	3		1.00	270e
392418078435602	392418	784356	Hampshire	398		Oriskany Sandstone	4	219	178	41	0.1	0.10	19

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
392610078423001	392610	784230	Hampshire	85		Oriskany Sandstone	7	56	31	25	0.1	0.28	53
392620078403701	392620	784037	Hampshire	56		Oriskany Sandstone	8	3	2	1	2	8.00	1,500
390235078381501	390235	783815	Hardy	60	6	Oriskany Sandstone	4	34	16	17.8	0.33	0.22	47
Pinnacle Water	393105	785148	Mineral	420	6	Oriskany Sandstone	50			133	12	0.38	100
											Median	**0.35**	**82**
											Minimum	**0.10**	**19**
											Maximum	**8.00**	**1,500**
374834080174501	374834	801745	Greenbrier	400	17.5	Helderburg Group	2400	8	4	4		600	60,000e
Buffalo Gap CC	392000	782725	Hampshire	100	6	Helderburg Group	60	98	25	73	2	0.82	200
392028078265101	392028	782651	Hampshire	145		Wills Creek Formation	9	88	85	3	0.1	3.00	560
385711078453501	385711	784535	Hardy	87	6	Helderburg Group	7.4	33	21	12.2	0.33	0.61	130
385712078453001	385712	784530	Hardy	44	6	Helderburg Group	7.9	20	15	5	0.33	1.58	320
390658078395101	390658	783951	Hardy	98	6	Tonoloway Formation	8	38	30	7.7	0.33	1.04	210
390605078390001	390605	783900	Hardy	25	5	Tonoloway or Wills Creek Formations	7.9	18	0	18.4	0.33	0.43	91
390302078415201	390302	784152	Hardy	132	6	Wills Creek Formation	16	55	44	11	0.75	1.45	320
390701078380801	390701	783808	Hardy	42	6	Tonoloway or Wills Creek Formations	3.6	33	18	14.8	7	0.24	62
393339078493801	393339	784938	Mineral	328		Helderburg Group	60	199	9	190	6	0.32	82
393031078500101	393031	785001	Mineral	200		Tonoloway Formation	100	35	15	20		5.00	1,300e

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
393339078500501	393339	785005	Mineral	300		Tonoloway Formation	45	127	22	105		0.43	120e
Rocket Center	393340	785011	Mineral	740	6	Wills Creek Formation	33	500	40	460	3	0.07	17
											Median	**0.82**	**200**
											Minimum	**0.07**	**17**
											Maximum	**600**	**160,000**
393043078012401	393043	780124	Berkeley	115	6	Mckenzie Formation	65	69	59	10	0.25	6.50	1,100
390232078424501	390232	784245	Hardy	83	6	Clinton Group	7.5	77	9	67.5	0.33	0.11	23
East R. Mt. Over	371520	811103	Mercer	627	6	Tuscarora Sandstone	4	590	336	254	36	0.02	6
											Median	**0.11**	**23**
											Minimum	**0.02**	**6**
											Maximum	**6.50**	**1,100**
392602078040801	392602	780408	Berkeley	81	6	Martinsburg Formation	30	81	20	61	0.5	0.49	110
392059078070801	392059	780708	Berkeley	63	6	Martinsburg Formation	25	57	9	48	0.67	0.52	120
392518077555201	392518	775552	Berkeley	85	6	Martinsburg Formation	22	85	25	60	0.67	0.37	82
393355077523701	393355	775237	Berkeley	110		Martinsburg Formation	71	51.69	40.4	11.3	45	6.27	1,500
393523077512001	393523	775120	Berkeley	60	6	Martinsburg Formation	20	50	30	20		1.00	270e

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
Broad Lane MHP	393454	775122	Berkeley	150	12	Martinsburg Formation	100	140	40	100	12	1.00	240
Midway MHP	393500	775100	Berkeley	205	6	Martinsburg Formation	60	45	34	11	12	5.45	1,300
392403077590001	392403	775900	Berkeley	110	8	Martinsburg Formation	100	65	20	45	24	2.22	520
393039077541201	393039	775412	Berkeley	131	6	Martinsburg Formation	50	35	25	10	0.2	5.00	800
393429077524601	393429	775246	Berkeley	90	6	Martinsburg Formation	9	90	30	60		0.15	40e
393459077521101	393459	775211	Berkeley	90	6	Martinsburg Formation	11	85	5	80		0.14	37e
385419078475602	385419	784756	Hardy	146	6	Martinsburg Formation	6.8	120	58	62.4	0.18	0.11	23
385718078410601	385718	784106	Hardy	100	6	Martinsburg Formation	15	32	30	2.1	0.33	7.50	1,300
390031078353301	390031	783533	Hardy	60	6	Martinsburg Formation	5	39	17	22	0.17	0.23	45
392309077552701	392309	775527	Jefferson	75		Martinsburg Formation	15	29	27	1.5	10	10.0	2,400
											Median	**1.00**	**240**
											Minimum	**0.11**	**23**
											Maximum	**10.0**	**2,400**

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
392910077563701	392910	775637	Berkeley	40	6	Trenton or Black River Groups	16.6	11	9	2		8.30	2,300e
392704077530701	392704	775307	Berkeley	425	6	Beekmantown Group	10	55.37	19.53	35.8	2.6	0.16	39
392902077571301	392902	775713	Berkeley	190	6	Beekmantown Group	10			22	2	0.45	110
393032077563601	393032	775636	Berkeley	364		Beekmantown Group	65	47.1	40.76	6.34	46	10.3	2,800
393139077551401	393139	775514	Berkeley	107	6	Beekmantown Group	3	135	35	100		0.03	8e
393150077563301	393150	775633	Berkeley	114	6	Beekmantown Group	13			0.2	27	65.0	18,000
393315077555601	393315	775556	Berkeley	123	6	Beekmantown Group	15	68.27	49.3	19		0.25	67e
392124078024302	392124	780243	Berkeley	411	8	Beekmantown Group	340	130	70	60	24	5.67	1,400
392124078024305	392124	780243	Berkeley	370		Beekmantown Group	25	90	25	65	24	0.38	100
392128078024902	392128	780249	Berkeley	175	8	Beekmantown Group	175	65	45	20		8.75	2,300e
392128078024903	392128	780249	Berkeley	363	8	Beekmantown Group	150	142	62	80	10	1.88	410
392146078020801	392146	780208	Berkeley	266	6	Beekmantown Group	10	140	90	50	1	0.20	45
392458077542101	392458	775421	Berkeley	410	12	Beekmantown Group	34	8	7	0.5	3	68.0	15,000
392501077541301	392501	775413	Berkeley	191	6	Beekmantown Group	245	105	58	47	1.5	5.21	1,100
392507077540701	392507	775407	Berkeley	191	6	Beekmantown Group	105	114	56	57.8	31	1.82	4,800
392753077584601	392753	775846	Berkeley	470	6	Beekmantown Group	4	470	60	410	1	0.01	2
392941077514301	392941	775143	Berkeley	38	4	Beekmantown Group	22.5	37	35	2.25	3	10.0	2,300
393109077500301	393109	775003	Berkeley	300	6	Beekmantown Group	10	240	90	150		0.07	19e
Harranda MHE	392238	780220	Berkeley	175	6	Beekmantown Group	30	150	60	90	1	0.33	75

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
IRS Computer Fac	392353	775452	Berkeley	250	12	Beekmantown Group	110	117	44	73	4	1.51	290
392429078044001	392429	780440	Berkeley	48.5	6	Beekmantown Group	10	22	20	2		5.00	1,300e
392305078010501	392305	780105	Berkeley	153	12	Beekmantown Group	248	16	11	5	48	49.6	13,000
393333077551001	393333	775510	Berkeley	165	6	Beekmantown Group	5	175	20	155		0.03	8e
391723077534601	391723	775346	Jefferson	556		Beekmantown Group	105		66			0.24	64e
391910077524401	391910	775244	Jefferson	150	6	Beekmantown Group	35	60	50	10		3.50	940e
392105077554601	392105	775546	Jefferson	155	6	Beekmantown Group	115	34	24	9.54		12.1	3,200e
392102077555201	392102	775552	Jefferson	302		Beekmantown Group	100	21	12	9	48	11.1	2,900
392102077555301	392102	775553	Jefferson	120		Beekmantown Group	100	57.9	16.5	41.4	96	2.42	670
392102077555301	392102	775553	Jefferson	120	6	Beekmantown Group	100	63	19	43.5	2	2.30	510
392105077555401	392116	775548	Jefferson	88	6	Beekmantown Group	40	17	14	3.33	17	12.0	2,900
391918077580001	391918	775800	Jefferson	127	6	Beekmantown Group	5	127	18	109		0.05	13e
373449080202501	373449	802025	Monroe	81		Beekmantown Group	30	45	37	8	4	3.75	820
											Median	**2.36**	**590**
											Minimum	**0.01**	**2**
											Maximum	**68.0**	**18,000**
393450077562801	393450	775628	Berkeley	220		Conococheague Formation	13			50		0.26	70e
392340078025101	392340	780251	Berkeley	113	6	Conococheague Formation	15	113	60	53		0.28	75e
392410078030801	392410	780308	Berkeley	69	6	Conococheague Formation	23.3	69	28	41	1	0.57	130

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
392751077593601	392751	775936	Berkeley	350	6	Conococheague Formation	14	89	74	15		0.93	250e
392950077590201	392950	775902	Berkeley	221	6	Conococheague Formation	20	125	95	30	2	0.67	160
393010077580001	393010	775800	Berkeley	150	8	Conococheague Formation	10	65	25	40	8	0.25	63
392053077504401	392053	775044	Jefferson	80		Conococheague Formation	223	12	9	3	8	74.3	20,000
392902077483801	392902	774838	Jefferson	267	6	Conococheague Formation	7	267	105	162	0.83	0.04	9
391507077563101	391507	775631	Jefferson	150	6	Conococheague Formation	11	135	25	110	24	0.10	28
Hunt Field Subdiv.	391558	775315	Jefferson	465	8	Conococheague Formation	200	460	32	428	1	0.47	100
Hunt Field Subdiv.	391558	775315	Jefferson	505	8	Conococheague Formation	100	500	96	404	17	0.25	66
Breckenridge sub.	391914	774956	Jefferson	310	8	Conococheague Formation	300	300	20	280	20	1.07	270
N. Jeff Elem Sch	392205	775253	Jefferson	355	6	Conococheague Formation	50	350	80	270	24	0.19	52
USFWS NETC 3a	N/D	N/D	Jefferson	305	6	Conococheague Formation	15			55	72	0.27	79
USFWS NETC 3c	N/D	N/D	Jefferson	170	8	Conococheague Formation	100			25	72	4.00	1,100
USFWS NETC 4c	N/D	N/D	Jefferson	185	8	Conococheague Formation	100			11	72	9.09	2,400

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
											Median	**0.38**	**92**
											Minimum	**0.04**	**9**
											Maximum	**74.3**	**20,000**
393238077592701	393238	775927	Berkeley	65	6	Elbrook Formation	15	65	30	35	1	0.43	98
Chestnut Ridge HO	392820	780116	Berkeley	185	6	Elbrook Formation	60	170	60	110	1	0.55	130
392849078014301	392849	780143	Berkeley	106	6	Elbrook Formation	20	106	41	65	0.66	0.31	68
391423077522801	391423	775228	Jefferson	200	6	Elbrook Formation	25			4		7	1,900e
391724077520001	391722	775200	Jefferson	67		Elbrook Formation	240	25	18	7	18	34.3	9,200
392045077484401	392045	774844	Jefferson	325		Elbrook Formation	30	332	224	108	13	0.28	75
392344077460001	392344	774600	Jefferson	152	6	Elbrook Formation	23	78	28	50	1	0.46	100
392231077464901	392231	774649	Jefferson	135	6	Elbrook Formation	26	626	66	560		0.05	13e
Walnut Grove	391906	774952	Jefferson	293	6	Elbrook Formation	140	290	80	210	3.5	0.67	160
											Median	**0.46**	**100**
											Minimum	**0.05**	**13**
											Maximum	**34.3**	**9,200**
391736077473401	391736	774734	Jefferson	363		Waynesboro Fm.	64	68	48	20	2	3.20	740
391727077471801	391727	774718	Jefferson	125		Tomstown Dolomite	50	115	15	100	1	0.50	110
391233077483101	391233	774831	Jefferson	185	6	Harpers and Weverton Formations	20	185	50	135	1	0.15	33
391442077472201	391442	774722	Jefferson	110	6	Harpers and Weverton Formations.	17	110	30	80	1	0.21	48

Appendix. Specific capacity and transmissivity data segregated by aquifer for selected wells in West Virginia —Continued

[ddmmss, degrees-minutes-seconds of latitude and longitude; in., inches; e, estimated; ft, feet; gpm, gallons per minute; ft bls, feet below land surface; gpm/ft, gallons per minute per foot of drawdown; ft^2/d, feet squared per day; Lit, from literature; N/D, not determined]

Site identification number or name	Latitude (ddmmss)	Longitude (ddmmss)	County	Well depth (ft)	Well diameter (in.)	Hydrogeologic Unit (Aquifer)	Discharge (gpm)	Production level (ft bls)	Static level (ft bls)	Drawdown (ft)	Test duration (hours)	Specific Capacity (gpm/ft)	Transmissivity (ft^2/d)
391539077455001	391539	774550	Jefferson	171	6	Harpers and Weverton Formation	2	171	65	106		0.02	5e
391542077454801	391542	774548	Jefferson	135	6	Harpers and Weverton Formations	5	50	30	20		0.25	67e
391623077471601	391623	774716	Jefferson	152	6	Harpers and Weverton Formations	33	62	50	12	1.5	2.75	620
391736077461101	391736	774611	Jefferson	212		Harpers and Weverton Formations	20	212	100	112	1	0.18	41
391819077445601	391819	774456	Jefferson	107		Harpers and Weverton Formations	40	107	44	63	0.25	0.63	130
											Median	**0.25**	**67**
											Minimum	**0.02**	**5**
											Maximum	**3.20**	**740**