Water Resource Report 62

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GROUNDWATER RESOURCES OF ERIE COUNTY, PENNSYLVANIA

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U.S. Geological Survey

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
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PREPARED IN COOPERATION WITH
U.S. GEOLOGICAL SURVEY

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GROUNDWATER RESOURCES OF ERIE COUNTY, PENNSYLVANIA

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David B. Richards, H. Jack McCoy, and John T. Gallaher

ABSTRACT

In Erie County, potable groundwater is available from unconsolidated glacial deposits and from fractured bedrock aquifers. The groundwater is generally of good chemical quality. Locally, however, groundwater ranges from moderately hard to very hard and is high in iron. Water from a few wells exceeds recommended drinking water limits of the U.S. Environmental Protection Agency for iron, chloride, and total dissolved solids. In bedrock wells, the high concentrations of chloride may be caused by connate water at shallow depths in the valleys and locally by brine disposal associated with petroleum exploration and production.

The best aquifers are glacial-outwash and glacial-beach deposits, based upon reported well yields and specific capacities. The outwash deposits are restricted to the major stream (buried) valleys of the central and southern parts of the county. The beach deposits are restricted to the vicinity of the Lake Erie shoreline. Nearly one fourth of all of the wells completed in outwash deposits have reported well yields of more than 20 gallons per minute. The largest reported well yield was 1,000 gallons per minute, from outwash deposits at Waterford. Wells completed in lacustrine and beach deposits are reported to yield as much as 500 to 800 gallons per minute.

The buried-valley deposits consist of stratified sand, gravel, silt, and clay. These deposits have saturated thicknesses commonly exceeding 100 feet and locally exceeding 400 feet, and are favorable locations for high-yield (400 to 500 gallons per minute) wells. The saturated parts of these deposits can be located, prior to the final well-site selection, by seismic-refraction and gravity surveys.

Glacial-till and bedrock aquifers are widespread in the county. However, the availability of groundwater from these units is significantly less than the availability of groundwater from the glacial-outwash and glacial-beach deposits. The till and bedrock aquifers locally do not provide sufficient groundwater for most domestic uses due to low permeability. The yields of bedrock wells vary according to geologic unit. The median yield for wells located in till and bedrock, for all types of topography, is about 5 gallons per minute. The range of yields for wells in glacial till and bedrock is from 0.1 to about 60 gallons per minute.

INTRODUCTION

PURPOSE AND SCOPE

From January 1975 through March 1980, hydrologic data were collected in Erie County, Pennsylvania, as part of a program to appraise the groundwater resources of the state. These data have been compiled and interpreted, and the results are presented in this report.

The purpose of the report is to provide water managers and planners with sufficient data to enable them to provide for the prudent use and protection of an invaluable natural resource. The report is also intended to supply homeowners with understandable facts and figures that will help them provide for their own water needs.

In this report, the authors describe the occurrence, availability, and quality of groundwater in Erie County, the geology, the water-bearing characteristics of aquifers, and the thickness of unconsolidated deposits. Data are included on the depths, yields, and quality of water from more than 1,700 wells.

DESCRIPTION OF THE STUDY AREA

Erie County covers 812 square miles in the northwesternmost corner of Pennsylvania (Figure 1). It is bordered on the west by Ohio, on the east by New York and Warren County, on the north by Lake Erie, and on the south by Crawford County. The city of Erie is the county seat, the industrial and cultural center of the area, and Pennsylvania's only freshwater port. About 47 percent of the land in the county is used for agriculture. Orchards and vineyards predominate in the north on the lake plain and escarpment slope. On the upland plateau in the south, cattle raising and agriculture are important activities.

TOPOGRAPHY AND DRAINAGE

There are three physiographic divisions in the county (Figure 1): the *lake plain* bordering Lake Erie, the *upland plateau* covering the southeastern two thirds of the area, and the *escarpment slope,* which separates the other two (Tomikel and Shepps, 1967). The lake plain begins at the lake level, approximately 572 feet above sea level, and extends inland to an altitude of about 800 feet. The plain is about 2 miles wide in the eastern part of the county and widens to about 5 miles in the west. The surface of the lake plain is flat to very gently sloping except where cut by streams or interrupted by glacial beach ridges. The upland plateau borders the escarpment slope and rises to an altitude of about 1,900 feet above sea level in the Corry area. The surface is generally smooth and rolling except where cut by broad valleys that have relatively steep walls and flat bottoms. In the Edinboro-Waterford area, much of the land surface consists of long, parallel ridges separated by intervening valleys, which are oriented about N35°W.

Topographic relief differs widely within the county. In the western part, the difference in altitude between the high and low points is on the order of 100 feet or less. The difference increases to the east and southeast, reaching a maximum of about 600 feet in the Corry area.

Two separate drainage systems transport water from the area (Figure 1). North-flowing streams empty into Lake Erie, which is part of the St. Lawrence River drainage system. With the exception of Conneaut Creek, these streams have steep gradients, and flow on, or have cut deeply into, bedrock. The south-flowing streams are part of the French Creek-Allegheny River drainage system. They are much slower moving and flow on the glacial sediments that fill broad valleys.

Also shown in Figure 1 are the stream-gaging stations in the county. Some low-flow data associated with these stations are listed in Table 1. During periods of little or no precipitation, streamflow is maintained by groundwater discharge from the aquifers (base flow). In areas of relatively impermeable bedrock and till, the base flow is very small or zero. In areas of permeable materials, base flow may be sufficient for municipal and industrial supplies, and for maintenance of conditions necessary for aquatic life. The stream characteristic commonly used in planning for low-flow utilization is the 7-day, 10-year low flow, which is defined as the lowest average rate of flow for 7 consecutive days that is likely to occur in 10 years. The maximum 7-day, 10-year low flow per square mile from Table 1 is 0.09 ft^3/s (cubic foot per second).

POPULATION AND WATER USE

The population of Erie County in 1980 was 279,780 (U.S. Department of Commerce, 1980). More than half of the people live in the Erie metropolitan area and use water pumped from Lake Erie. The remainder use groundwater, ex-

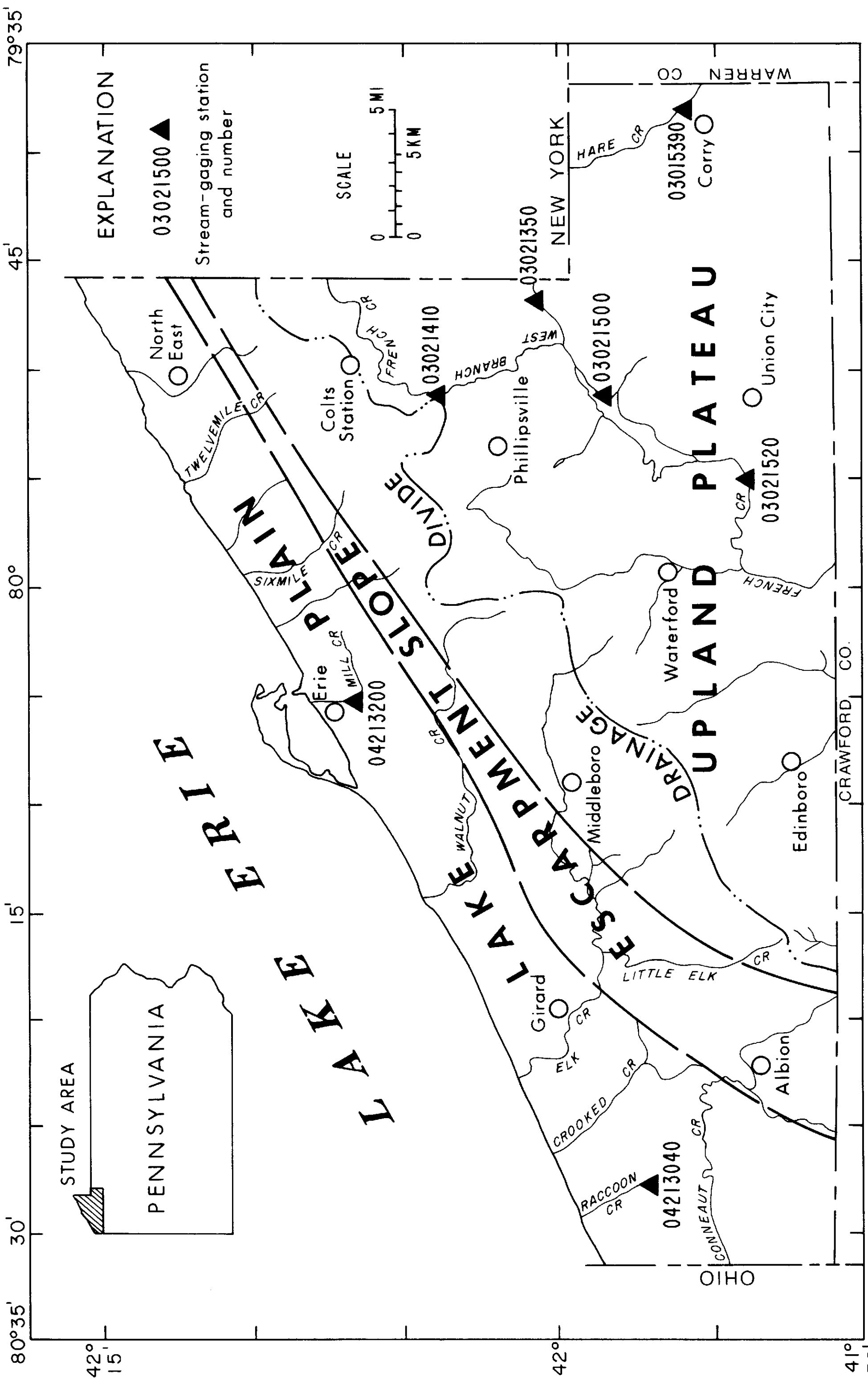

Figure 1. Location, physiographic divisions, principal streams, and stream-gaging stations of the study area.

Table 1. *Summary of Streamflow Data from Seven Gaging Stations*

Surface-water gaging station number and name/location		Drainage area (mi^2)	Length of record	7-day, 10-year low flow (ft^3/s) and	$[(ft^3/s)/mi^2]$	Remarks
03015390	Hare Creek near Corry	12.3	1964–80	[1]0.7	0.06	Partial record station
03021350	French Creek near Wattsburg	92	1974 to current year	[2]4	.04	Minimum flow for period of record = 6.0 ft^3/s
03021410	West Branch French Creek near Lowville	52.3	1974 to current year	1 estimated	.02	Minimum flow for period of record = 3.2 ft^3/s
03021500	French Creek at Carters Corners	208	1910–71	9.6	.05	Minimum low flow for 62 years of record = 3.9 ft^3/s
03021520	French Creek near Union City	221	1909 to current year	NA[3]	NA	Regulated flow since 1971
04213040	Raccoon Creek near West Springfield	2.53	1962–68 1968 to current year	NA	NA	No flow on many days
04213200	Mill Creek at Erie	9.16	1964–80	[1].8	.09	Partial record station

[1]From Page and Shaw (1977).
[2]Calculated from Flippo (1982, Table 11, p. 18).
[3]NA, not applicable.

cept in the boroughs of North East and Union City, where reservoirs are used. Seventeen municipalities and water companies pump an average daily total of about 4 Mgal/d (million gallons per day), mostly from glacial-outwash and glacial-beach deposits. Approximately 57,000 people obtain their water supplies from domestic wells. The estimated consumption rate is about 90 gallons per day per person, which totals more than 5 Mgal/d (Table 2).

Water supplied for cattle and for irrigation is not shown in Table 2 because these data were not available. The dairy industry uses an estimated 1 Mgal/d for watering, milk processing, and sanitary purposes. The total irrigated land area ranges from 400 to 600 acres, depending upon climatological conditions. Irrigation water use ranges from about 50 million to 200 million gallons per year.

PREVIOUS STUDIES

The groundwater resources of Erie County were described by Leggette (1936) and Mangan and others (1952). The geology and hydrology of western Crawford County, bordering much of Erie County on the south, were discussed by Schiner and Gallaher (1979). Poth (1962) described the occurrence of saline waters (brines) in western Pennsylvania. White (1881), Leggette (1936), and Tomikel and Shepps (1967) presented information on the bedrock, glacial deposits, and groundwater in the area. The stratigraphy of the Lower Mississippian rocks was described by de Witt (1946, 1951), Pepper and others (1954), and Schiner and Kimmel (1972). The glacial geology of Erie County was presented by Leverett (1902), Shepps and others (1959), and White and others (1969).

Table 2. *Water Use in Erie County*

(From Pennsylvania Department of Environmental Resources, Office of Resources Management, Bureau of Resources Planning, written communication, 1980)

Water supplier	Total gallons per capita used per day in 1970	Total use in 1970 (Mgal/d)	Water source
	Surface water		
City of Erie, Bureau of Water	262	44.44	Lake Erie
North East Borough Water Department	380	1.799	3 reservoirs; 1 spring
Union City Borough	146	.539	Reservoir
	Ground water		
Albion Borough	69	.182	3 wells; 3 springs
Corry Water Supply Co.	162	1.229	21 wells
Borough of Edinboro Water Department	94	.458	3 wells
Fairview Borough	57	.097	3 wells
Girard Borough	67	.174	3 wells
Lake City Borough	139	.264	3 wells
Lake Shore Maintenance Association	77	.057	2 wells
Palmer Shores	45	.006	1 well
Pennsylvania Water Co. (Erie Suburban Water Co.)	87	.614	17 wells
Ridgeville Water Co.	66	.021	3 wells
Waterford Borough	73	.110	1 well

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GROUNDWATER SYSTEM

OCCURRENCE AND MOVEMENT

The source of potable groundwater supplies in Erie County is precipitation that infiltrates from the land surface. Most of the water of precipitation either flows overland to streams or is returned to the atmosphere by evaporation or transpiration. The remainder moves downward through the soil and rock until it reaches the zone of saturation, within which all pores and fractures are filled with water. The water within this zone of saturation is called groundwater.

Groundwater moves downward and laterally through the soil and rock by gravity, traveling slowly from the areas of intake, at topographic highs, to areas of discharge at lower altitudes. The direction of flow is controlled by the composition and structure of the subsurface materials, but generally is in the direction of the slope of the topography. Groundwater discharges in places as seeps, swamps, and springs along stream valleys and maintains minimal streamflows (base flow) during periods of drought. This groundwater, en route to discharge areas, is available for use when intercepted and tapped by water wells.

The movement of water in unconsolidated materials, such as sand and gravel, is through intergranular openings (primary openings); in bedrock, the movement is mainly through interconnected fractures (secondary openings). The capability of these geologic units to transmit water is referred to as permeability or hydraulic conductivity. Saturated permeable geologic units that yield significant quantities of water to wells and springs are called aquifers (Lohman, 1972, p. 2). In Erie County, the aquifers consist of unconsolidated glacial and alluvial deposits overlying sedimentary bedrock—mainly sandstones, siltstones, and shales of Devonian and Mississippian ages. Groundwater availability is highly variable in both the unconsolidated deposits and the bedrock. Water is stored in and transmitted through the primary and secondary openings. The distribution, interconnection, and number of these openings have a direct relationship to the yields of the wells penetrating the aquifers. Groundwater may occur under either water-table (unconfined) or artesian (confined under pressure) conditions, as shown in Figure 2. Under water-table conditions, the water surface is at atmospheric pressure, and the water level rises in response to recharge and falls in response to discharge. To a lesser extent, the water level also fluctuates in response to changes in barometric pressure. The water level in a well in an unconfined aquifer is at the top of the zone of saturation and is referred to as the water table. The areal configuration of the water table generally parallels the land surface. Water-table conditions are present in the unconsolidated deposits and in the bedrock units of the upland plateau.

Artesian conditions are a common groundwater occurrence in the county. Under artesian conditions, the water-bearing unit is overlain and underlain by relatively impermeable beds, such as the sandstone between the shales shown in Figure 2; thus, the aquifer is confined. The water level in a well in a confined aquifer rises to the level of hydrostatic pressure in the aquifer, which is above the top of the aquifer. Flowing wells, which represent a special type of artesian well, are also common. These occur when the level of hydrostatic pressure is higher than the land surface (Figure 2). The areal configuration of the water surface for artesian aquifers is known as the potentiometric surface. Within wells tapping artesian aquifers, the water levels fluctuate in

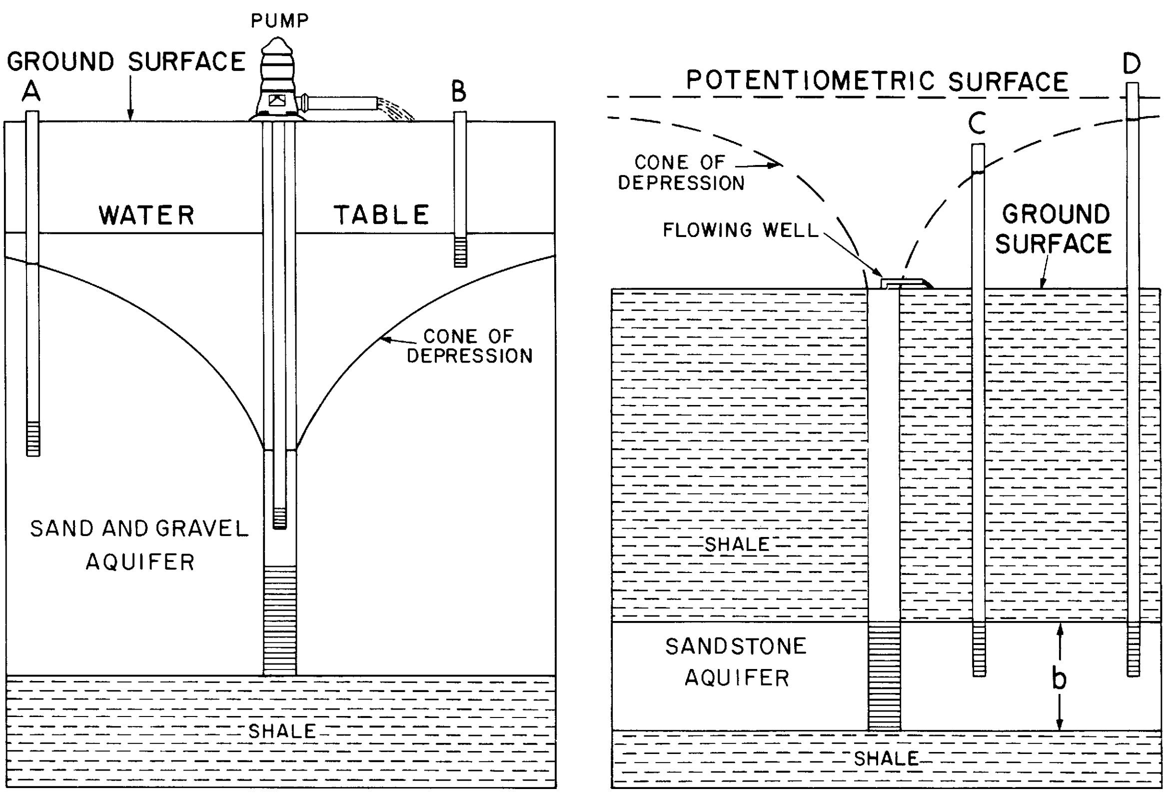


Figure 2. The effect of discharging wells in an unconfined aquifer (left) and a confined aquifer (right) (modified from Lohman, 1972, Figure 8, p. 8). The water level in the deep well A has declined due to the pumping well. The shallow well B is dry due to the pumping well. The hydrostatic pressure in well C has declined more than in well D due to the proximity of the flowing well. (The "b" represents the thickness of the confined aquifer.)

response to changes in barometric pressure. Artesian conditions are present in the unconsolidated deposits and in the interbedded sandstones and shales of the bedrock units in the county.

WATER LEVELS

Water levels in wells rise and fall according to the relative amounts of recharge (additions to the aquifer) and discharge (losses to springs, streams, and wells). Water levels are generally highest (shallowest) in March and April, and are generally lowest (deepest) in September and October. During the summer months, little infiltrated precipitation recharges the saturated zone due to the high rate of plant water use (evapotranspiration). However, patterns of water-level fluctuations can vary from the normal due to winter thaws, prolonged droughts, and sustained rainfall.

The water levels of wells shown in Tables 3 and 12 were reported by well drillers at the time of completion of the wells. In general, water levels fluctuate less in wells tapping unconfined aquifers than in wells tapping confined aquifers because the unconfined aquifers have a greater capacity to store water. Water levels in both types of aquifers fluctuate less in the discharge areas (valley bottoms and lake plain) than in the recharge areas (uplands).

The summary of well data (Table 3) indicates that the median water levels in wells tapping the different aquifers are quite similar in magnitude. However, water levels in wells in each aquifer range from near or above land surface (flowing) to depths of several tens of feet. The variables that cause this range in water levels include topography, well depths, the number of water-bearing zones penetrated, the depth of hole cased, well construction, the degree of fracturing, the presence of artesian conditions, and the seasonal water-level conditions at the time of drilling. In most instances, the complexity of the hydrologic conditions created by combinations of these variables makes it difficult to predict the water level at any given well site.

Most of the wells tap groundwater that exhibits artesian tendencies to a small degree; therefore, water levels in the wells commonly rise above the water-bearing zones. Water levels commonly are (1) deepest in wells drilled in hilltops, (2) shallowest in wells drilled in and near valley bottoms and on the lake plain, and (3) intermediate in wells drilled in other topographic sites.

Water levels in wells tapping unconfined aquifers are affected by local precipitation, whereas water levels in wells tapping artesian aquifers may respond to both local and regional precipitation or to only regional precipitation.

The average precipitation in Erie County ranges from 38 inches (at Erie) to 46 inches (at Corry). Long-term data from the Union City Filtration Plant precipitation station (U.S. Department of Commerce, 1950–82) indicate an average annual precipitation of 43.45 inches. The precipitation is fairly evenly distributed throughout the year.

In well Er–82, which is located north of Edinboro and is part of the statewide observation-well network, the artesian water conditions of the fractured shale of the Venango Formation have been monitored continuously since July 1966. The hydrograph record of this well is shown in Figure 3. The monthly precipitation of the Union City station is also synchronously plotted with the water levels of well Er–82. The deepest water levels generally coincide with periods of below normal precipitation, such as in 1968 and 1978. Conversely, the shallowest water levels coincide with periods of above normal precipitation, such as in 1969–70, 1972, and 1977.

More detailed information on basic hydrologic and geologic relationships is given in *Ground Water in Pennsylvania* by Becher (1970), *A Primer on Ground Water,* by Baldwin and McGuinness (1963), and *Ground Water Manual,* by U.S. Department of the Interior (1981).

AVAILABILITY

The availability of groundwater resources is determined by means of collection and analysis of hydrologic data. These data are both collected in the field and compiled from records of well drillers, well owners, consulting firms, and state, federal, and other government agencies. Other sources of information include water-, gas-, and

Table 3. *Summary of Well Data*

Geologic unit	Well depth (feet)			Reported yield (gal/min)			Specific capacity [(gal/min)/ft]			Water level (feet below land surface)		
	Number of wells	Median	Range	Number of wells	Median	Range	Number of wells	Median	Range	Number of wells	Median	Range
Domestic wells												
Sands of Presque Isle	1	26	—	1	30	—	1	—	—	1	3	—
Glacial-beach deposits	93	35	9-105	59	7	0.1-30	24	0.8	0.05-10	62	12	1-71
Glacial-outwash deposits	441	62	15-402	395	15	.1-360	170	1.2	.04-30	370	20	[1]F-150
Glacial-till deposits	282	55	17-220	252	5	.1-50	125	.26	.009-30	237	15	F-87
Total for glacial drift	816	56	9-402	696	10	.1-360	319	.7	.009-30	669	18	F-150
Cuyahoga Group	9	69	38-102	8	13.5	5-62	7	.5	.18-62	9	12	1-30
Berea Sandstone through Riceville Formation	28	71	40-130	27	15	2-40	20	.52	.12-10	27	22	1-78
Corry Sandstone through Riceville Formation	25	72	35-150	24	15	2-50	15	.75	.02-20	23	20	6-52
Berea Sandstone through Venango Formation	80	52	31-112	72	7	.1-46	42	.21	.02-20	72	8	1-20
Venango Formation	170	65	36-250	166	8	.5-50	71	.2	.01-30	151	10	F-95
Chadakoin Formation	311	60	33-160	283	4	.1-50	115	.14	.01-45	268	10	1-90
Girard Shale	41	60	30-140	33	2	.1-50	10	.06	.01-4	29	15	5-78
Northeast Shale	53	40	12-250	21	4	.1-25	7	.36	.006-25	23	12	1-60
Total for bedrock	717	60	12-250	634	5	.1-62	287	.2	.006-62	602	15	F-95
Nondomestic wells												
Glacial-beach deposits	55	32	10-96	47	75	1-850	20	17	.03-270	31	8	F-38
Glacial-outwash deposits	50	59	13-405	39	60	1-1,000	20	9	.1-140	40	11	F-78
Glacial-till deposits	13	60	33-195	8	11.5	.1-50	3	1.5	.47-3.3	9	8	0-56
Total for glacial drift, combined	118	45	10-405	94	56.5	.1-1,000	43	10	.03-270	80	8	F-78
Total for bedrock, combined	25	63	26-185	18	6	1-55	6	.17	.02-.4	22	11	F-73

[1]F, flowing.

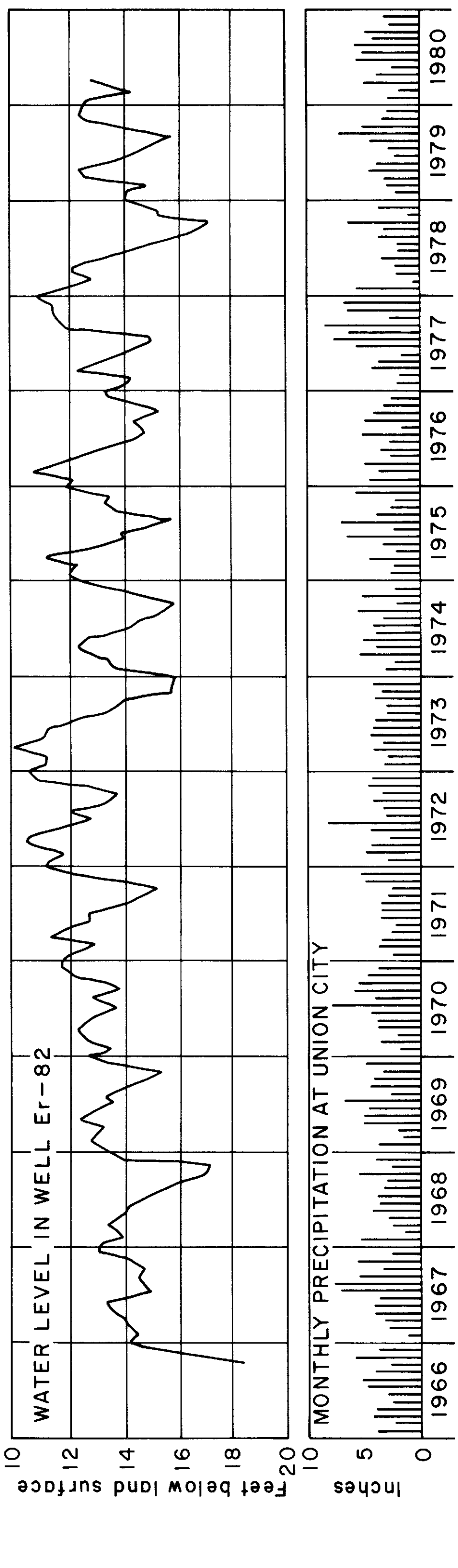


Figure 3. The water level in well Er-82 and the monthly precipitation at Union City, 1966-80.

oil-well records, test wells, highway borings, rock outcrops, and geophysical surveys.

Hydrologic data collected from inventoried wells include static water level below land surface, well depth, depth to water-bearing zones, aquifer definition, well yield, specific capacity, characteristics of well construction (casing and perforations), and chemical quality. Water-well data for more than 1,700 inventoried wells are tabulated in Table 12. The summarization and analysis of selected data from wells, tabulated by geologic unit, are shown in Table 3. The selected data include well depth, reported yield, specific capacity, and water level. Well locations are shown on Plates 1 and 2.

Well Yield and Specific Capacity

The amount of water available to a well is commonly expressed as the well yield in gallons per minute (gal/min). The yield data given in Tables 3 and 12 are from information provided by well drillers. These yield values are from short-term pumping periods, generally minutes and not hours. Long-term well yields (weeks and months) are significantly lower.

A more reliable index of water availability is specific capacity, which is the well yield divided by the drawdown of water level (in feet) within the well during pumping. Drawdown is the drop in water level from the static level to the pumping level. In poor aquifers, specific capacity decreases with increased pumping rates and time. A well pumped at 10 gal/min, with 5 feet of drawdown (specific capacity = 2 (gal/min)/ft [gallons per minute per foot]) will not necessarily discharge 20 gal/min with 10 feet of drawdown. Ideally, the yield and specific capacity are based on pumping or bailing rates, which lower the water in the well to a level at which the water level is stabilized. That is, the rate of withdrawal equals the flow of water from the aquifer into the borehole. In many instances, especially in wells of low to moderate yield, the rate of withdrawal during the drillers' tests exceeds the rate of flow into the well, and equilibrium is not established. Therefore, the specific-capacity values shown should be considered as maximum and valid only for short-term pumpage.

Water-Bearing Properties

Wells sited in glacial unconsolidated deposits have higher reported yields and specific capacities than wells sited in bedrock units, as indicated in Table 3. The thickness distribution of these unconsolidated deposits is presented on Plate 2. The areas of greatest saturated thickness have the best potential for groundwater availability. However, in the area of the lake plain and escarpment slope, salty water commonly occurs at shallow depths (see Table 8).

The well yields and specific capacities depend upon the ease of movement of water through the subsurface materials, and upon the amount of water the materials can release from storage. The ability of soil and rock material to transmit water is known as hydraulic conductivity (K) and is related to the size, amount, and degree of interconnection of openings in the material. The product of hydraulic conductivity (K) and the saturated thickness (b) is called transmissivity (T); that is, $T = K \cdot b$. The larger the value of transmissivity, the greater the availability of groundwater for supply. For example, a large thickness of saturated sand and gravel is an excellent well site. The volume of water released from storage in subsurface materials is called storage coefficient (S) for confined aquifers and specific yield for unconfined aquifers and is related to the amount of water-filled openings for a given volume of saturated material. Specific yield may range from 0.02 for clay to 0.22 for coarse gravel (Johnson, 1967, p. D70).

Long-term well yield and the effect of pumpage on the aquifer system can be determined by knowing the water-bearing properties K, T, and S. Figure 4 shows the range in values of hydraulic conductivity for both rock material and unconsolidated deposits. Table 4 also shows the average hydraulic conductivities for materials of various grain sizes in unconsolidated deposits. For example, the hydraulic conductivity for sand and gravel ranges from about 100 to 10,000 ft/d (feet per day), and about 1×10^{-8} to 1×10^{-3} ft/d for shale.

The hydraulic properties of unconfined and confined aquifers are determined by aquifer tests. These tests are controlled field experiments

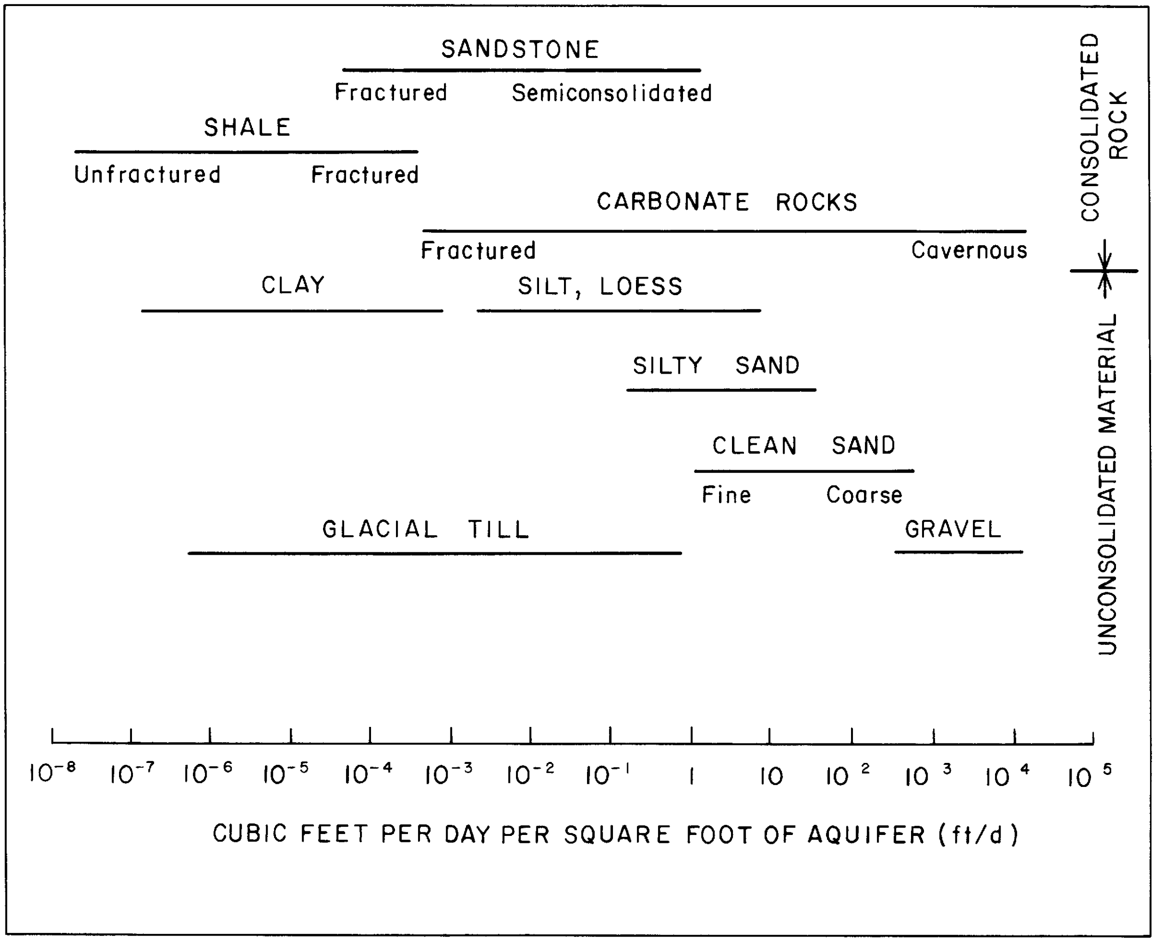


Figure 4. Range of hydraulic-conductivity values for selected geologic materials (modified from Heath, 1983, p. 13).

in which a known quantity of water is withdrawn from (or recharged to) an aquifer by means of a well. Aquifer tests are not discussed in this report. More detailed information on aquifer testing can be found in *Ground-Water Hydraulics* by Lohman (1972), *Applied Hydrogeology* by Fetter (1980), *Theory of Aquifer Tests* by Ferris and others (1962), *Ground Water Manual* by U.S. Department of the Interior (1981), and *Groundwater and Wells* by Driscoll (1986).

An aquifer test was made in Summit Township in the saturated fractured shale of the Venango Formation. Details of the test are included in Appendix 1. The calculated hydraulic properties were 1,100 (gal/d)/ft (gallons per day per foot) for K, 147 ft^2/d for T, and 6×10^{-4} for S.

The greatest potential for groundwater resource development in Erie County is from the saturated, highly permeable unconsolidated deposits. Field aquifer testing is the most accurate and reliable, as well as the most expensive and time consuming, means of determining hydraulic properties. Table 4 and Figure 4, however, can provide some assistance in evaluating and comparing the water-supply potentials of various

Table 4. *Hydraulic Conductivities for Estimating Transmissivity for Unconfined Alluvial Aquifers*

(From Lohman, 1972, Table 17, p. 53)

Material	Hydraulic conductivity (ft/d)
GRAVEL	
Coarse	1,000
Medium	950
Fine	900
SAND	
Gravel to very coarse	800
Very coarse	700
Very coarse to coarse	500
Coarse	250
Coarse to medium	100
Medium	50
Medium to fine	30
Fine	15
Fine to very fine	5
Very fine	3
CLAY	1

aquifer sites. Inasmuch as $T = K \cdot b$, the T at a potential well site is the sum of the $K \cdot b$ values for all of the layers, or

$$T = K_1 \cdot b_1 + K_2 \cdot b_2 + \ldots + K_n \cdot b_n.$$

Thus, the transmissivity of soil and rock material recorded on drillers' logs or on geologic sections can be estimated by use of this equation. An application of this method is applied to the driller's log of well Er–808, as illustrated in Table 5. At this site, the transmissivity of the glacial-outwash aquifer is estimated to be 7,000 ft^2/d.

Fracture Traces

In bedrock terrain, groundwater availability (well yield) is generally greatest along fracture traces (Siddiqui and Parizek, 1971). Fracture traces are natural linear features on the land surface that appear as topographic, vegetal, or soil-tonal alignments visible on aerial photographs.

Table 5. *Transmissivity Estimation for the Driller's Log of Well Er–808*

(Reported water level was at 3 feet below land surface; however, the reported water-bearing zones were 12 to 16 feet and 90 to 100 feet. The well construction is disregarded in the estimation.)

Material	Thickness (feet)	Estimated hydraulic conductivity[1] (ft/d)	Estimated transmissivity (ft^2/d)
Clay and gravel	12	—	—
Gravel and sand, containing clay	4	800	3,200
Clay	74	1	74
Sand, fine-grained	6	15	90
Gravel and sand, coarse	4	1,000	4,000
			Total 7,364

[1]Estimated from Table 4.

Because most water obtained from bedrock aquifers is from fractures, a well located on a fracture trace should have the optimum yield for a given area. Even greater yields would be expected from a well at the intersection of two fracture traces. Locating a well on a fracture trace is more likely to increase yield where the well is drilled in dense and well-cemented rocks such as siltstone and sandstone. According to Lattman (written communication, 1974), locating a well on a fracture trace in shale probably does not increase yield because the plastic quality of the shale allows the fracture to close up and seal itself off.

WATER QUALITY

As groundwater slowly moves through the aquifer(s), it dissolves chemical constituents from the rock material and carries them in solution. The natural chemical quality of groundwater is determined by the concentrations of the dissolved constituents. These concentrations are determined largely by the type and solubility of the minerals in the rock and by the length of time that the water is in contact with the rock. The measurements of water quality include specific conductance, dissolved solids, hardness, major anions, and major cations. The major anions include bicarbonate, sulfate, nitrate, and chloride. The major cations include calcium, magnesium, sodium, potassium, manganese, and iron.

The majority of natural groundwater problems are the result of high concentrations of dissolved solids, hardness (compounds of calcium and magnesium), iron, sulfate, nitrate, and chloride. The severity of a groundwater-quality problem is defined by comparing the concentration of a given constituent to the U.S. Environmental Protection Agency (1977) recommended drinking water limit for that constituent.

The chemical type of water is defined from the dominant anion and cation in the water. According to Durfor and Anderson (1963, p. W10), the principal type of low-flow surface water in Erie County is calcium bicarbonate. The chemical analyses published by Mangan and others (1952) for the Lake Erie shore region also indicate that the principal type of most of the low-flow surface water (base flow) and groundwater is calcium bicarbonate. However, water in Twelvemile Creek and Sixteenmile Creek is a calcium sulfate type.

The evaluation of groundwater quality is based on 402 analyses from 371 wells, and on analyses from low-flow stream sites. The results of these analyses, which were made by the U.S. Geological Survey, Pennsylvania state agencies, and private analysts, are shown in Tables 9, 10, and 11. In Table 6, the quality characteristics that generally are important to groundwater users in the area are summarized. Only the principal aquifer is listed in the tables, although in many instances the water entering a well is a mixture from several aquifers. Some wells were sampled several times to determine seasonal or long-term quality changes. Well Er-1481 was sampled at progressively greater depths during drilling to relate changes in water quality to depth.

The chemical analyses of groundwater in Tables 9, 10, and 11 indicate that the principal chemical types are calcium bicarbonate and sodium chloride. Groundwater, especially from the unconsolidated deposits, is commonly hard to very hard (median concentration of 160 mg/L (milligrams per liter) to a maximum concentration of 720 mg/L) and in places has high iron concentrations (from 0.01 to 30 mg/L). During prolonged periods of no precipitation, the base flow of streams reflects the chemical type of areal groundwater, but the chemical-analyses base in Table 11 is insufficient to define the principal chemical types of base flow. The important water-quality characteristics of base flow are summarized in Table 7. For groundwater and for base flow, chloride concentrations, specific conductance, and hardness are higher in the lake plain and escarpment slope than in the upland plateau.

Computer-generated maps show the distribution of specific-conductance values and the concentrations of chloride, hardness, and iron (Figures 5, 6, 7, and 8). The data used are those from groundwater samples, and the interpretation is intended only as a generalization of water-quality conditions in the county.

Chloride concentration and overall water quality may be estimated by measuring specific conductance, which is the measure of the capacity of water to conduct an electric current. Specific conductance varies directly with the concentration of dissolved solids and the degree of ionization of the aquifer material. Figures 9 and 10 show, respectively, the relationship between specific conductance and chloride concentration and between specific conductance and dissolved-solids concentration. Data from northwestern Pennsylvania and nearby areas were used to determine the slopes in the lines representing these relationships. In water containing low dissolved solids, chloride is not a major element and specific conductance is related to other constituents. As shown in Figure 9, the change in slope below a chloride concentration of about 800 mg/L indicates a change in the ratio of specific conductance to chloride concentration.

In Figure 10, the terminology of Krieger and others (1957) has been modified by placing the division between "fresh" and "slightly saline" water at 500 mg/L dissolved solids, rather than at the 1,000 mg/L generally used by the U.S. Geological Survey. This modification was made to conform with local usage. The maximum recommended limit of total dissolved solids for

Table 6. *Summary of Selected Groundwater-Quality Characteristics*

Geologic unit	Iron (Fe) (mg/L)			Chloride (Cl) (mg/L)			Hardness as $CaCO_3$ (mg/L)			Specific conductance (μmho/cm at 25°C)		
	Number of analyses	Median	Range	Number of analyses	Median	Range	Number of analyses	Median	Range	Number of determinations	Median	Range
Glacial-beach deposits	46	0.39	0.03-30	76	24	4-1,000	77	220	92-610	41	460	281-3,500
Glacial-outwash deposits	83	.15	.01-2.6	120	10	1.5-1,200	117	140	5-720	97	422	146-4,800
Glacial-till deposits	46	.19	.01-2.8	54	27	2.5-1,110	51	120	5-570	89	547	251-3,840
Unconsolidated deposits, combined	175	.2	.01-30	250	15	1.5-1,200	245	160	5-720	187	442	146-4,800
Berea Sandstone through Riceville Formation	5	.05	.02-.7	5	3	2.5-6.2	5	158	120-210	4	400	300-480
Corry Sandstone through Riceville Formation	7	.09	.05-2.5	7	10	2-22	6	110	6-120	6	260	190-320
Berea Sandstone through Venango Formation	9	.15	.05-.52	11	42	3.8-716	8	122	35-180	7	520	300-2,800
Venango Formation	25	.13	.01-.43	25	18	2.5-600	25	120	50-230	25	400	280-2,800
Chadakoin Formation	37	.08	.01-3.2	59	18	3-5,200	52	122	5-310	47	401	220-2,400
Girard Shale	6	1.7	.21-66	12	48	12-3,000	14	190	13-600	12	778	369-9,870
Northeast Shale	8	.08	.025-5.5	32	135	3-9,500	33	132	26-2,500	32	695	239-25,800
Bedrock, combined	97	.11	.01-66	151	23	2-9,500	143	130	5-2,500	133	430	190-25,800

Table 7. Summary of Selected Low-Flow Water-Quality Characteristics for the Period 1970–78

(Data collected by Pennsylvania Department of Environmental Resources)

Physiographic division	Iron (mg/L) Number of analyses	Iron (mg/L) Range	Iron (mg/L) Median	Chloride (mg/L) Number of analyses	Chloride (mg/L) Range	Chloride (mg/L) Median
Escarpment slope and lake plain[1]	12	0.05–1.97	0.19	13	23–79	47
Upland plateau	4	.30–1.18	.70	7	4–11	8.0

Physiographic division	Hardness as $CaCO_3$ (mg/L) Number of analyses	Hardness as $CaCO_3$ (mg/L) Range	Hardness as $CaCO_3$ (mg/L) Median	Specific conductance (μmho/cm at 25 °C) Number of analyses	Specific conductance (μmho/cm at 25 °C) Range	Specific conductance (μmho/cm at 25 °C) Median
Escarpment slope and lake plain[1]	13	124–212	192	13	260–600	460
Upland plateau	6	82–130	108	7	182–290	218

[1]Gaging station data period from 1976 to 1978 only.

drinking water is 500 mg/L (U.S. Environmental Protection Agency, 1977, p. 17146). An approximation of the straight line in Figure 10 may be used for the conversion of specific conductance (SC) to dissolved solids (DS); that is, dissolved solids can be estimated by multiplying specific conductance by 0.6, or, DS = 0.6 x SC. From the data listed in Table 10, the calculated coefficient value is 0.61. According to Hem (1985, p. 67), the coefficient can range from 0.55 to 0.75.

Figure 5 is a computer-generated map showing the general distribution of specific conductance in the county, based on 320 specific-conductance determinations of water from all of the major aquifers. All of the median specific conductances shown for the various aquifers in Table 6 are comparable in magnitude. The higher specific-conductance values were measured from wells that had excessive chloride concentrations. Most of the areas of high specific conductance are in the lake plain and escarpment slope (Figure 5). The specific conductance of water from wells in the upland plateau generally is lower. An exception is in the upland area west and northwest of the borough of Waterford. This lower conductivity of water in the uplands is generally attributed to the circulation of recharge water from precipitation. The lowlands is the discharge area of the more mineralized groundwater.

Chloride

In many locations in Erie County, the chloride concentration of groundwater exceeds 250 mg/L and increases with depth. This is especially true of the bedrock aquifers where the groundwater containing high chloride concentration is considered to be connate or native water—that is, trapped in the interstices of the sedimentary rocks at the time of deposition. However, some unconsolidated aquifers contain groundwater that has high chloride concentrations. The presence of high chloride concentrations in the

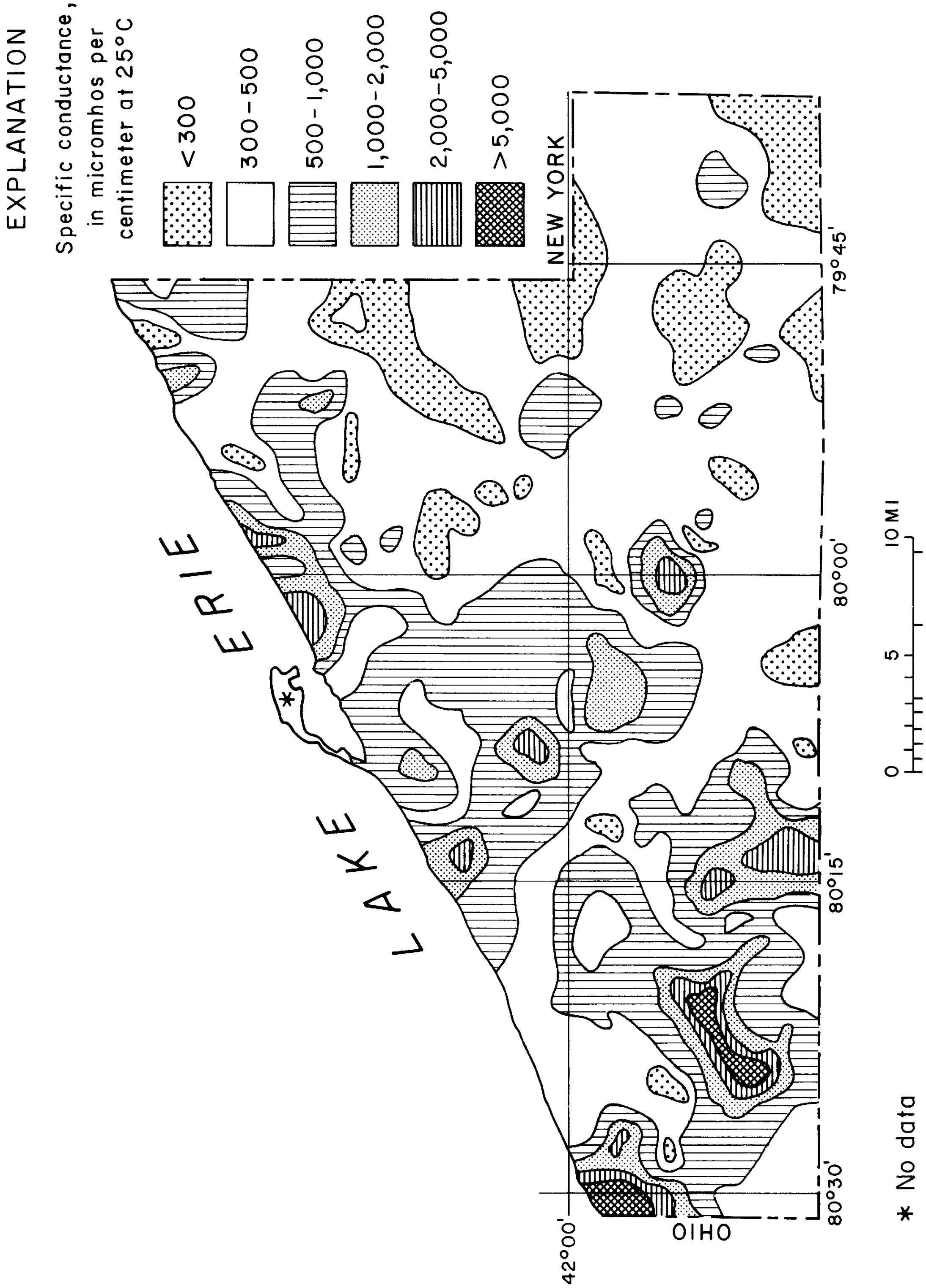


Figure 5. Distribution of specific-conductance values in the wells sampled.

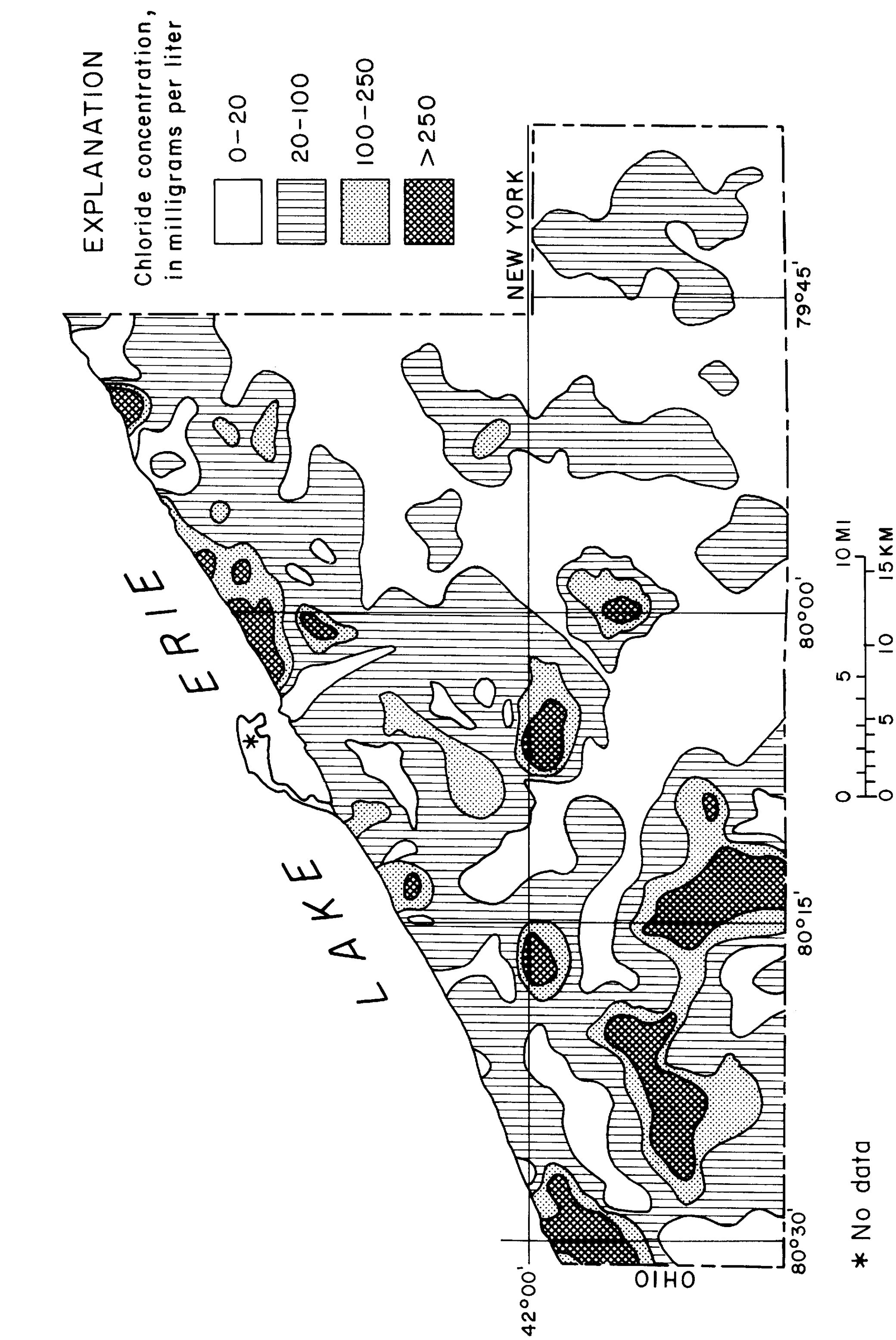


Figure 6. Distribution of chloride concentrations in the wells sampled.

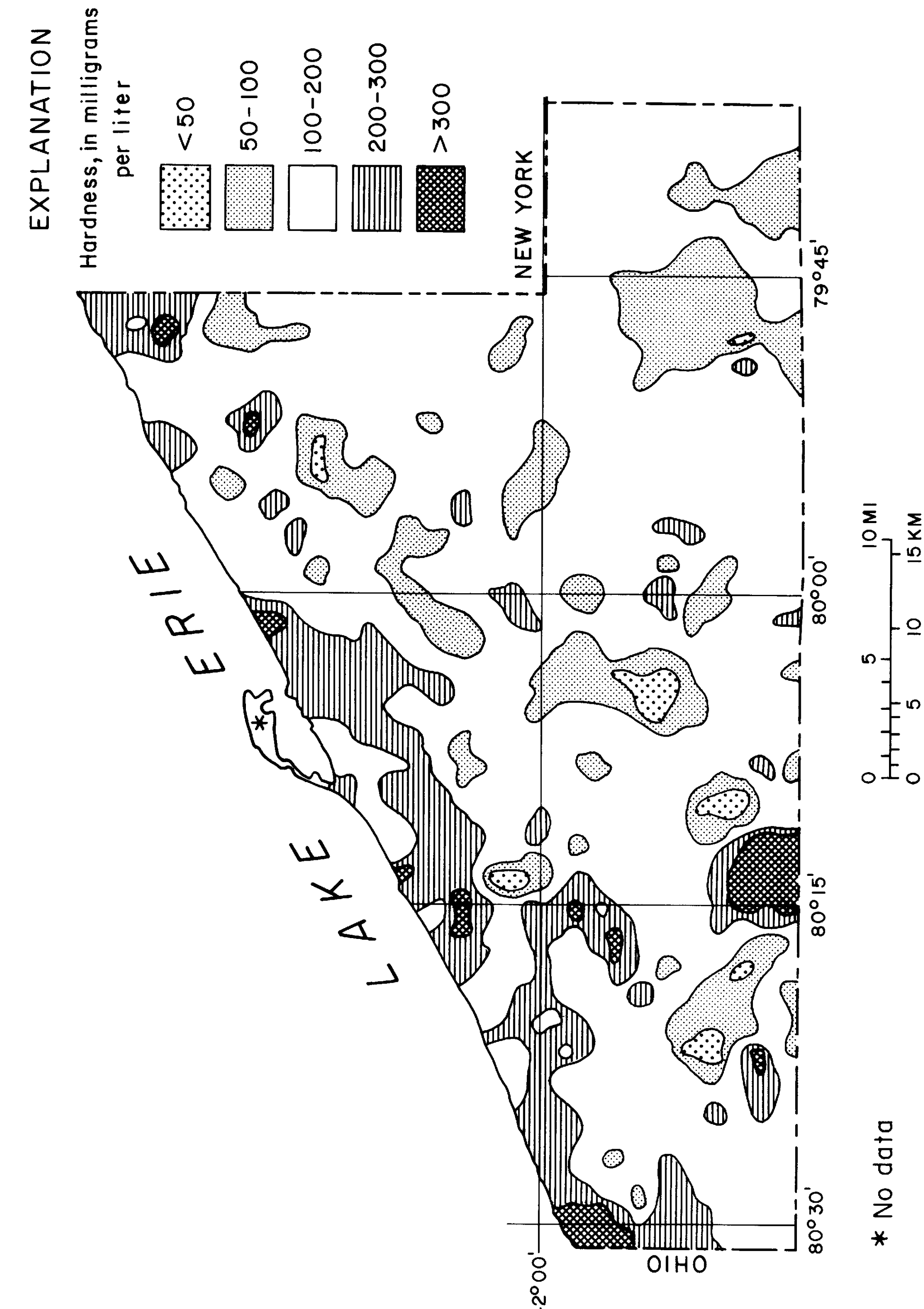


Figure 7. Distribution of total-hardness concentrations in the wells sampled.

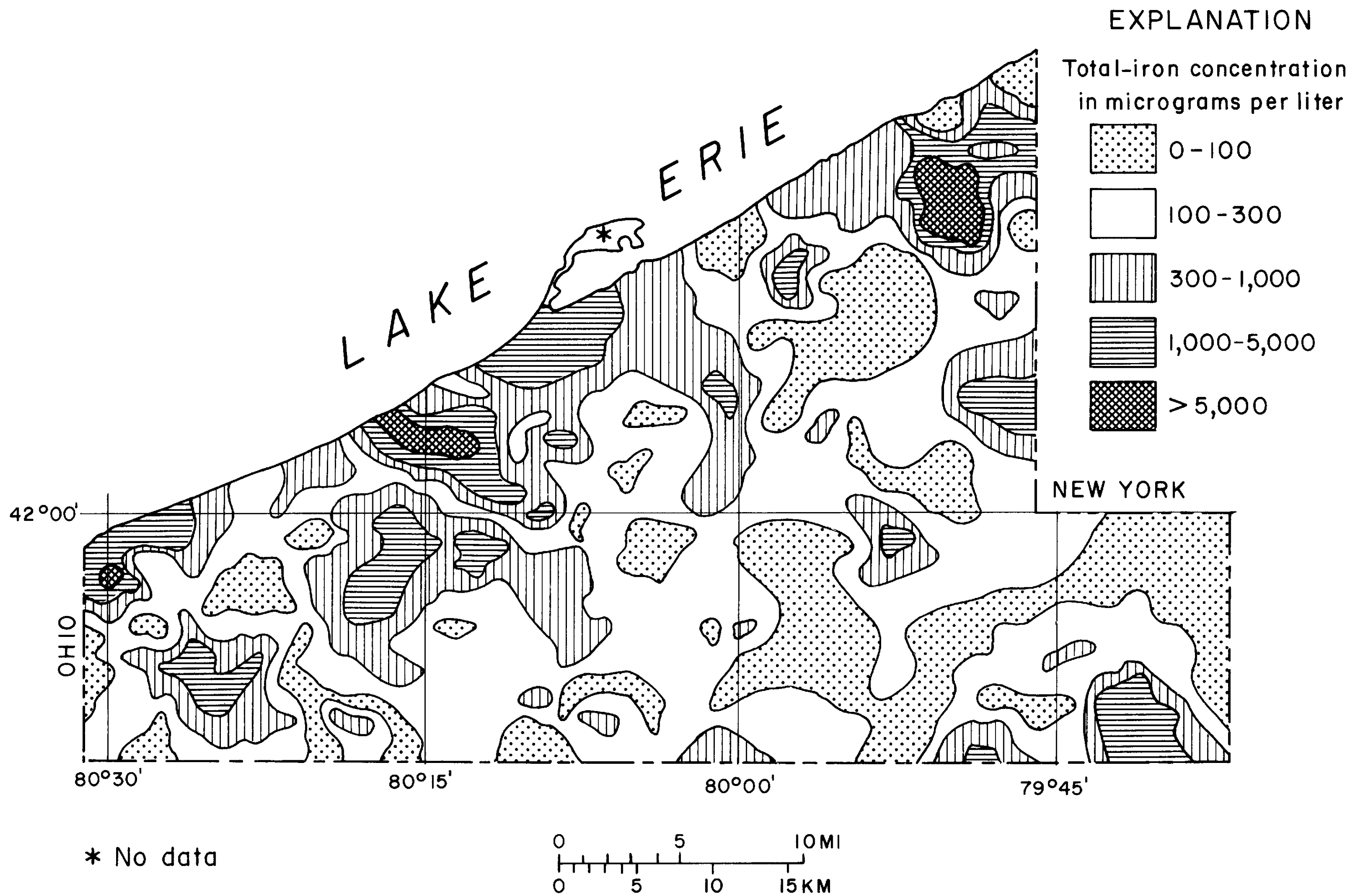


Figure 8. Distribution of total-iron concentrations in the wells sampled.

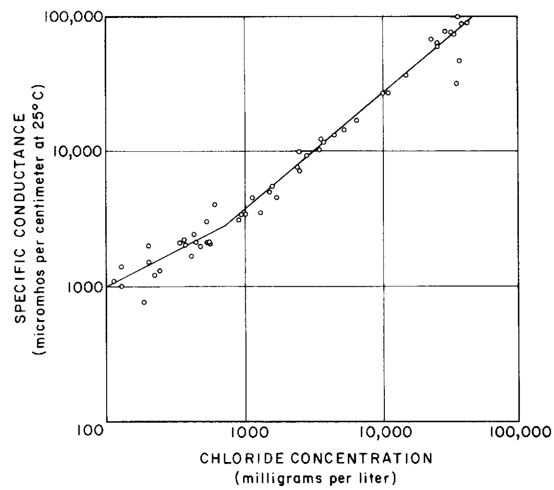


Figure 9. Relationship between specific conductance and chloride concentration (from Schiner and Gallaher, 1979, Figure 2, p. 31).

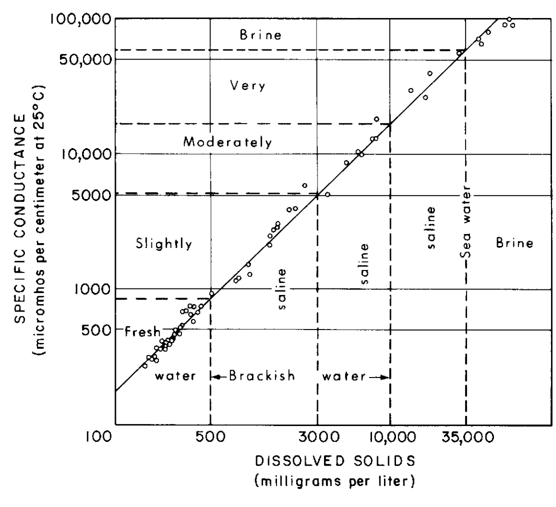


Figure 10. Relationship between specific conductance and dissolved solids, and the classification of salinity of water (from Schiner and Gallaher, 1979, Figure 3, p. 32).

county is probably due to restricted flushing by percolating fresh groundwater.

In the upland plateau, glacial and preglacial valleys have divided much of the upland area into hydrologically isolated "islands" (Poth, 1962). Before the valleys were filled with glacial drift, these "islands" stood as much as from 400 to 800 feet above the valley floor, creating a hydraulic gradient that permitted the draining and flushing of the units standing above the drainage level. Also, the upland area of the county is capped by sediments that are higher in the stratigraphic column and are generally more permeable than the lower, tighter units. For these reasons, the problem of salinity in bedrock wells in this area is much less common than in similar wells in the lake plain and escarpment slope. Wells Er-1122 and Er-1123, in the upland area about 3 miles east of Edinboro, penetrated more than 400 feet of bedrock, and salt water was not reported by the driller. The bottoms of these wells, at about 1,000 feet above sea level, are probably 300 feet or more above the bedrock floor underlying nearby Conneauttee Creek valley. Wells of such depth, drilled beneath the flushing zone, would normally yield water similar to that of sea water. Some exceptions exist in the upland area. A few wells drilled near the centers of some of the areally larger and topographically lower upland "islands" reportedly yield saline water. Wells drilled near the edges of the same upland "islands" generally yield fresh water.

In the lake plain especially, and to some degree in the western end of the escarpment slope, topographic relief is minimal and the connate water has drained from only the uppermost part of the bedrock. In much of the eastern half of the lake plain, the drift overlying the bedrock is very thin and impermeable, and does not yield water to wells. Attempts to obtain adequate household water supplies by drilling into the bedrock often result in saltwater wells, with accompanying natural gas in some places (see Table 9).

In most of the area west and south of Elk Creek, in the western part of the county, the conditions are similar. The drift there is relatively thick, but it generally is composed of clayey, impervious till that commonly yields quantities of water that are inadequate even for domestic supplies. The underlying bedrock consists of shaly units that contain brine at shallow depths (about 100 feet). In the deep, buried valleys of this area, the brines are still slowly draining from the bedrock into the valley-fill drift, but the movement of water through the drift is too slow to permit complete flushing. Deep wells in the valley-fill drift of preglacial Conneaut Creek yield saline water even in the more permeable outwash deposits near Lake Erie. Well Er–1481, about 3 miles north of Albion, was drilled to determine the thickness and composition of the drift in this buried valley. As recorded in Table 9, the chloride concentration increased gradually to about 100 mg/L at the 120-foot depth, and to about 400 mg/L at the 141-foot depth (top of bedrock).

Tolerance to chloride varies among individuals. The maximum recommended limit for chloride concentration is 250 mg/L (U.S. Environmental Protection Agency, 1977).

Figure 6 is a map showing the distribution of chloride (saline) concentrations in wells sampled and inventoried in the county. Wells that yield excessively saline water normally are destroyed and not reported or are plugged from the bottom of the well to above the salty zone and used, but not recorded as failures. Also, well drillers have learned by experience and word of mouth not to exceed depths at which salt water is known or suspected to be present. Whenever saline water is encountered during drilling, it is pointless to drill deeper. The salinity increases rapidly with depth, and there is no fresh water below the saline zone. Table 8 is a compilation of relevant data on the occurrence of saline water (chloride in excess of 250 mg/L), aquifer, and well depth for the wells inventoried and sampled in the county. This table, together with Tables 9, 10, 11, and 12 and Plates 1 and 2, can provide information to well drillers and potential well owners about the approximate depth to the saline zone.

In areas of shallow salt water, some procedures are available to help minimize the problem. Critical factors include well depth and the occurrence and amount of overlying fresh water available for dilution. During routine well construction, the well depth could be increased a few feet into bedrock to create additional storage. Large-diameter dug wells could be used to provide more area for freshwater entry and more storage volume. Slotted well casing set loosely at the top of the bedrock would allow the entry of water from the drift into the borehole.

Table 8. *Aquifer, Well Depth, and Chloride Concentrations Greater than 250 mg/L*

(In part from Koester and Miller, 1980)

Aquifer	Well number	Township location	Well depth (feet)	Chloride concentration (mg/L)
Glacial-beach deposits	Er– 377	Fairview	53	RS[1]
	556	do.	73	1,000
	1220	Millcreek	38	300
	1415	Harborcreek	17	320
	1523	Millcreek	34	710
Glacial-outwash deposits	71	Girard	77	RS
	99	Waterford	144	RS
	503	Elk Creek	40	720
	1061	Waterford	165	1,220
	1206	Millcreek	48	490
	1254	Conneaut	120	380
	1423	Waterford	227	RS
Glacial-till deposits	957	Millcreek	70	280
	1481	Girard	141	425
	1496	McKean	55	RS
	1651	Conneaut	50	250
	1686	Springfield	60	410
	1687	do.	55	480
Berea Sandstone through Venango Formation	67	Elk Creek	36	RS
	68	do.	54	716
	69	do.	50	RS
	1280	Franklin	70	550
Venango Formation	562	do.	70	250
	1495	McKean	61	600
Chadakoin Formation	70	Franklin	72	RS
	72	Girard	100	RS
	306	Conneaut	46	616
	414	McKean	64	450
	649	North East	35	RS
	863	Summit	50	310
	872	do.	50	RS
Girard Shale	1222	Girard	84	540
	1683	Springfield	63	1,400
	1685	do.	150	3,000
Northeast Shale	15	Harborcreek	36	655
	16	do.	40	RS
	18	do.	40	490
	19	do.	34	1,170
	29	do.	82	470
	34	do.	41	1,540
	35	do.	40	305
	36	do.	35	280
	41	do.	30	255
	42	do.	30	255
	50	North East	60	1,110
	103	Harborcreek	159	RS
	104	North East	250	RS
	106	do.	128	RS
	1646	Springfield	50	RS
	1684	do.	185	9,500

[1]RS, driller reported salty groundwater.

Hardness

Hardness is a property of water indicating the concentrations of calcium and magnesium ions. Hardness affects the lathering properties of soap, causes scale to form in pipes, in boilers, and on cooking utensils, and may leave a curd on bathtubs and wash basins.

Hardness may be expressed either in milligrams per liter (mg/L) or in grains per gallon (gr/gal) of $CaCO_3$ (calcium carbonate). According to the U.S. Environmental Protection Agency (1976, p. 75), a concentration of 0 to 75 mg/L (0 to 4.4 gr/gal) is considered soft, 75 to 150 mg/L (4.4 to 8.8 gr/gal) is moderately hard, 150 to 300 mg/L (8.8 to 17.5 gr/gal) is hard, and more than 300 mg/L (17.5 gr/gal) is very hard.

The range of groundwater hardness in Erie County is from soft to very hard, but the median hardness of all aquifers is hard to very hard. As seen in Table 6, the water from glacial-beach deposits is considerably harder than that from the other aquifers. Also, the water from bedrock wells generally is not as hard as that from alluvium. Water moving through shale units may be partially modified from a calcium bicarbonate type to a sodium bicarbonate type by a natural ion-exchange process not unlike that which takes place in home water-softening units.

The areal distribution of hardness is based on 388 determinations and is shown in Figure 7. As indicated on this map and from the medians in Table 6, the water in most of the area has a hardness ranging from 100 to 200 mg/L as $CaCO_3$. Most of the samples containing the highest hardness concentrations were taken from wells in the western parts of the lake plain and escarpment slope areas.

Hardness in water can be removed with treatment by such processes as lime-soda softening and zeolite or ion-exchange systems.

Iron

Iron is dissolved from many soil and rock components. Upon exposure to air, the dissolved iron is oxidized and redeposited as a reddish to dark-brown stain. The U.S. Environmental Protection Agency (1977) recommends that iron concentrations not exceed 0.3 mg/L. In the quantities usually found in groundwater, iron is objectionable because it may impart an unpleasant taste to the water and stain clothing, utensils, and plumbing fixtures.

Under conditions of high concentration, the iron problem may be complicated by the presence of ferrian (iron) bacteria. This bacterial growth forms a slimy, rust-colored mass, which builds up on plumbing fixtures and may clog water pipes. Chlorine bleach introduced into the water system will temporarily control this growth. Iron concentrations can be reduced by aeration followed by sedimentation and filtration processes.

Iron concentrations in the groundwater of Erie County differ widely, as shown in Figure 8. The aquifers of the upland plateau supply water of lower iron concentration, generally, than those in the lake plain. The summary of water-quality characteristics (Table 6) indicates that water from glacial-beach deposits and the Girard Shale generally has the highest iron concentrations, and water from the glacial-outwash deposits and other bedrock units has the least.

Gases

Hydrogen sulfide (H_2S) and natural gas are present in some wells in the county. Hydrogen sulfide is formed by the decomposition of sulfide minerals, and has an odor similar to that of rotten eggs. Heavy concentrations may cause black staining of fixtures and utensils. The odor may be dispelled by allowing the water to sit in an open container at room temperature, or, if the concentration is not too high, it may be eliminated by running the water through an iron-removal filter. The gas can also be released from the water before use by venting the gas to the atmosphere at the well. A hydrogen sulfide odor was observed or reported in water from wells Er–99, 115, 210, 296, 520, 609, 706, 940, 1356, and 1357 (Table 9). These wells tap a variety of bedrock and alluvial aquifers.

Natural or "shale" gas, often accompanied by saline water, was noted in wells Er–67, 70, 71, 103, 104, 107, 109, 210, 218, 272, 317, 365, 377, 608, 609, 668, 683, 694, 702, 744, 863, 919, 1132, 1179, 1232, 1318, 1368, 1397, 1495, 1496, 1578, 1644, and 1646 (Table 9). Most of the gas was in bedrock wells having depths of less than 70 feet, but some was reported in wells drilled in alluvium. In general, these wells were in the lake plain area of the county. The source of the gas may be the thin sandstones in the Northeast Shale that may have been tapped for domestic gas supplies, or, in a few local instances, leaking or abandoned gas wells. To avoid possible excess gas accumulation with resulting explosion hazard, it is recommended that water wells in this area be vented to allow escape of the gas.

DESCRIPTION AND WATER-BEARING CHARACTERISTICS OF CONSOLIDATED DEPOSITS

The bedrock exposed in the county (Plate 1) is the result of the compaction and cementation of sediments that were deposited in ancient seas. The age of these sedimentary rocks ranges from Late Devonian to Early Mississippian. The outcrops are progressively younger toward the south. The regional dip of the rock units is generally toward the south at a slope of about 15 to 20 feet per mile. In the southern and southeastern parts of the county, contacts between many of the Mississippian and Devonian units are indistinguishable or questionable. For this reason, many of the units have been combined on the map.

In the county, names assigned to many rock units, or combinations of units, have differed greatly since geologic studies began. The nomenclature of Berg and others (1980), which is the nomenclature of the 1980 Pennsylvania state geologic map, is used in this report. The stratigraphic nomenclature for the rocks of Devonian age does not follow the usage of the U.S. Geological Survey.

Generally, the rocks become more coarse grained in the upper units of the stratigraphic sequence. Also, the coarseness of many of the younger aquifer units increases towards the east and southeast.

The drillers' logs of many wells in the upland plateau area indicate that much of the uppermost bedrock surface consists of "broken, soft, or fractured" rock material. The maximum thickness of the fractured zone is about 10 feet.

The description and water-bearing characteristics of the geologic units in the county follow the format below:

Description—Includes the composition, geographic occurrence and extent, and general thickness of the geologic unit.

Water-Bearing Characteristics—Includes a description of the availability of groundwater from the geologic unit in terms of well yield, specific capacity, and well depth, based on the well inventory. The range of values and the median value for these characteristics, summarized in Table 3, are assumed to be representative of all wells tapping the aquifer.

Water-Quality Characteristics—Provides an indication of the chemical quality of groundwater from the geologic unit in terms of concentrations of chloride and iron ions, hardness, and specific conductance. The range of analytical results, and the median value, for these characteristics are summarized for each aquifer in Table 6.

Evaluation of the Aquifer—Contains a summary of the significant hydrogeologic characteristics of the geologic unit, including water quantity and quality. The quantity characteristics primarily include well yield and specific capacity. The characteristics for nondomestic wells are assumed to represent maximum aquifer capability. The water-quality characteristics include chloride concentration, hardness, and dissolved-solids concentration.

DEVONIAN

Northeast Shale

Description

The Northeast Shale lies in a band along Lake Erie and is the oldest bedrock exposed in Erie

County. Near the borough of North East, the outcrop area is more than 3 miles wide and the unit is 400 feet thick. The unit thins and narrows toward the west and is not exposed at the Ohio state line. The formation is a gray shale containing layers of fine-grained sandstone which are generally less than 1 foot thick. Locally, shallow wells penetrating the sandstone layers may yield enough natural gas for domestic use. Most of the wells inventoried and sampled were in Harborcreek and North East Townships in the lake plain physiographic division.

Water-Bearing Characteristics

As shown in Table 3, the median reported yield for 21 inventoried domestic wells sited in the Northeast Shale was 4 gal/min, and the range was 0.1 to 25 gal/min. The median specific capacity for seven inventoried domestic wells in this aquifer was 0.36 (gal/min)/ft, and the range was 0.006 to 25 (gal/min)/ft. The median reported well depth for 53 inventoried wells in this aquifer was 40 feet, and the range was 12 to 250 feet.

Water-Quality Characteristics

Chemical-quality data from the shale aquifer indicate high concentrations of dissolved solids and chloride at shallow depths. As shown in Table 6, the chloride concentration ranged from 3 to 9,500 mg/L, and the median was 135 mg/L. The hardness ranged from 26 to 2,500 mg/L as $CaCO_3$ (soft to very hard); the median hardness was 132 mg/L (moderately hard). For eight samples analyzed for iron concentrations, the range was from 0.025 to 5.5 mg/L, and the median was 0.08 mg/L, which does not indicate a serious problem. Specific conductance ranged from 239 to 25,800 μmho/cm (micromhos per centimeter at 25 °C), and the median was 695 μmho/cm. Values of dissolved solids, estimated from Figure 10, were about 150 to 15,000 mg/L, and the median was about 400 mg/L.

Evaluation of the Aquifer

The Northeast Shale does not have the potential for a good potable water supply due to generally poor water-bearing characteristics and poor water quality.

The chloride concentrations sampled from this aquifer are the highest in the county (up to 9,500 mg/L), possibly because of the presence of connate water in the aquifer, brine disposal associated with natural gas exploration and production from the sandstone layers of this unit, or the upward movement of saline water from the underlying Upper Devonian shales.

Because this aquifer is in contact with Lake Erie, there is some speculation regarding the infiltration of lake water into the aquifer. However, due to the general impermeable nature of the shale and glacial-drift deposits locally overlying the shale, infiltration is believed to be insignificant. Many water wells drilled along the lake shore were completely dry, even though the depths of some wells were far below the lake level.

Girard Shale

Description

The Girard Shale overlies the Northeast Shale and ranges from 50 to 200 feet in thickness. It forms a band roughly paralleling the Lake Erie shore, and it widens and thickens toward the west. The Girard Shale is very fine grained, uniform in texture, and light gray in color.

Water-Bearing Characteristics

As shown in Table 3, the median reported yield for 33 inventoried domestic wells sited in the Girard Shale was 2 gal/min, and the range was 0.1 to 50 gal/min. The median specific capacity for 10 inventoried domestic wells was 0.06 (gal/min)/ft, and the range was 0.01 to 4 (gal/min)/ft. The median reported well depth for 41 wells was 60 feet, and the range was 30 to 140 feet.

Water-Quality Characteristics

Chemical-quality data indicate excessive dissolved-solids and iron concentrations in some places. As shown in Table 6, the iron concentrations ranged from 0.21 to 66 mg/L, and the median was 1.7 mg/L; five of the six analyses exceeded the drinking water limit of the U.S. Environmental Protection Agency (1977). The chloride concentrations ranged from 12 to 3,000 mg/L, and the median value was 48 mg/L. The hardness ranged from 13 to 600 mg/L as $CaCO_3$ (soft to very hard); the median hardness was 190 mg/L (hard). Specific conductance ranged from 369 to 9,870 μmho/cm, and the median was 778 μmho/cm. The range of dissolved solids as estimated from Figure 10 was about 200 to 6,000 mg/L; the estimated median was about 470 mg/L.

Evaluation of the Aquifer

The Girard Shale is the poorest aquifer in Erie County, as measured by reported well yields and specific capacity.

Chadakoin Formation

Description

The Chadakoin Formation is a shale and sandstone unit overlying the Girard Shale, and is about 300 feet thick. This formation is the most common bedrock unit in the county. It underlies most of the valleys of the southward-flowing streams, and, to the north, it is incised by streams tributary to Lake Erie. The Chadakoin Formation is noticeably more coarse grained than the underlying units and contains thicker sandstone beds.

Water-Bearing Characteristics

As shown in Table 3, the median of reported yields for 283 inventoried domestic wells was 4 gal/min, and the range was 0.1 to 50 gal/min. The median specific capacity for 115 inventoried domestic wells was 0.14 (gal/min)/ft, and the range was 0.01 to 45 (gal/min)/ft. The median of reported well depths for 311 inventoried wells was 60 feet, and the range was 33 to 160 feet.

Water-Quality Characteristics

As shown in Table 6, the chloride concentration ranged from 3 to 5,200 mg/L, and the median was 18 mg/L. The hardness ranged from 5 to 310 mg/L as $CaCO_3$ (soft to very hard); the median hardness was 122 mg/L (moderately hard). The range of iron concentrations was from 0.01 to 3.2 mg/L, and the median was 0.08 mg/L. The specific conductance ranged from 220 to 2,400 μmho/cm, and the median was 401 μmho/cm. The estimated range of dissolved solids was about 130 to 1,400 mg/L, and the median was about 240 mg/L.

Evaluation of the Aquifer

The Chadakoin Formation is an extensive aquifer which is marginally acceptable for water supply. The water quality is better than the quality of the underlying aquifer. The elevated chloride concentrations are a local problem and are considered by some (Harrison, 1983) to be related to the groundwater discharge of the connate water from the underlying aquifers or to brines associated with natural gas exploration and production.

Venango Formation

Description

The Venango Formation is nearly 250 feet thick and consists of three coarse-grained sandstones separated by two shales. The shales average 100 feet in thickness and the sandstones average 30 feet. The three sandstone members—the Woodcock, Salamanca, and LeBoeuf—are known to oil-well drillers as the First, Second, and Third Venango oil sands. The lowest of the three, the LeBoeuf Sandstone Member, has been extensively quarried in the southern part of the county. The Venango Formation underlies much of the flat upland surface in the southeastern part of the county.

Water-Bearing Characteristics

As shown in Table 3, the median of reported yields for 166 domestic wells was 8 gal/min, and the range was 0.5 to 50 gal/min. The median specific capacity for 71 domestic wells was 0.2 (gal/min)/ft, and the range was 0.01 to 30 (gal/min)/ft. The median of reported well depths for 170 inventoried wells was 65 feet, and the range was 36 to 250 feet.

Water-Quality Characteristics

The chloride concentration ranged from 2.5 to 600 mg/L, and the median was 18 mg/L. The hardness ranged from 50 to 230 mg/L as $CaCO_3$ (soft to hard); the median hardness was 120 mg/L (moderately hard). The range of iron concentration was from 0.01 to 0.43 mg/L; the median was 0.13 mg/L. Specific conductance ranged from 280 to 2,800 μmho/cm, and the median was 400 μmho/cm. The estimated range of dissolved solids was about 170 to 1,700 mg/L, and the median was about 240 mg/L.

Evaluation of the Aquifer

The Venango Formation is a good aquifer for water supply. The water quantity and quality are generally better than those of the underlying aquifers. As with the Chadakoin Formation, high chloride concentrations are a local problem, and probably indicate restricted natural flushing of the aquifer by fresh water.

DEVONIAN AND MISSISSIPPIAN

Riceville Shale, Berea Sandstone, and Corry Sandstone

Description

The Riceville Shale overlies the Venango Formation and is the uppermost Devonian unit. It is about 80 feet thick, consists primarily of light-gray shales separated by thin layers of siltstone and fine-grained sandstone, and forms much of the upland area in the extreme southern part of the county. The Mississippian Cussewago Sandstone and Bedford Shale, both present in Crawford County to the south, are unidentifiable in Erie County; the Riceville Shale is capped by the Berea Sandstone in western Erie County and the Corry Sandstone in eastern Erie County. On Plate 1, the Mississippian Berea and Corry Sandstones are included with the Devonian Riceville Shale as combined units. In the Albion area, where the combined Berea and Riceville sequence is indefinite because of the lack of exposures, the mappable unit is the sequence from the Venango upward through the Berea.

The Berea Sandstone is a finer grained facies of the sandstone found at the type locality in Berea, Ohio. The Berea consists primarily of hard siltstone containing interbedded shales and very fine grained sandstones. It is about 15 feet thick in the southwestern part of the county and thins toward the east and north.

The Corry Sandstone is the eastern equivalent of the Berea. It thickens from west to east and is about 20 feet thick at the type locality near Corry. It is a light-buff fine-grained sandstone, locally conglomeratic near its base. The combined Corry and Riceville sequence forms much of the uplands in the southeastern part of Erie County.

Water-Bearing Characteristics

As summarized in Table 3 for the inventoried wells sited in the Berea Sandstone through the Riceville Shale, the median reported yield for 27 domestic wells was 15 gal/min, and the range was 2 to 40 gal/min. The median specific capacity for 20 domestic wells was 0.52 (gal/min)/ft, and the range was 0.12 to 10 (gal/min)/ft. The median reported well depth was 71 feet, and the range was 40 to 130 feet.

For the inventoried wells sited in the Corry Sandstone through the Riceville Shale, the median yield for 24 domestic wells was 15 gal/min, and the range was 2 to 50 gal/min. The median specific capacity for 15 domestic wells was 0.75 (gal/min)/ft, and the range was 0.02 to 20 (gal/min)/ft. The median reported well depth was 72 feet, and the range was 35 to 150 feet.

Water-Quality Characteristics

As shown in Table 6, for the analyzed samples from the Berea Sandstone through the Riceville Shale, the chloride concentration ranged from 2.5 to 6.2 mg/L; the median was 3 mg/L. The hardness ranged from 120 to 210 mg/L as $CaCO_3$ (moderately hard to hard); the median hardness was 158 mg/L (hard). The iron concentration ranged from 0.02 to 0.7 mg/L, and the median was 0.05 mg/L. Specific conductance ranged from 300 to 480 μmho/cm, and the median was 400 μmho/cm. The estimated range of dissolved solids was about 180 to 290 mg/L, and the median was about 240 mg/L.

For the analyzed samples from the Corry Sandstone through the Riceville Shale, the chloride concentration ranged from 2 to 22 mg/L, and the median was 10 mg/L. The hardness ranged from 6 to 120 mg/L (soft to moderately hard); the median hardness was 110 mg/L (moderately hard). The iron concentration ranged from 0.05 to 2.5 mg/L; the median was 0.09 mg/L. Specific conductance ranged from 190 to 320 μmho/cm, and the median was 260 μmho/cm. The estimated range of dissolved solids was about 110 to 190 mg/L, and the median was about 160 mg/L.

Evaluation of the Aquifer

The Riceville Shale, including the overlying Berea and Corry Sandstones, is the best bedrock aquifer in Erie County, as measured by reported well yields and specific-capacity values. Considering the limited water-quality sampling, the groundwater quality is not significantly different from that of the underlying Venango Formation, as measured by hardness and dissolved solids (specific conductance). However, iron and chloride concentrations are the lowest of all aquifers in the county. This is related to the upland position of the aquifer and the natural flushing of the unit by percolating fresh groundwater.

MISSISSIPPIAN

The Mississippian-age rocks conformably overlie the Devonian-age rocks in southern Erie County. As previously discussed, the Cussewago Sandstone and Bedford Shale, both found in Crawford County to the south, are unidentifiable in Erie County. Therefore, the lowest recognizable Mississippian units are the Corry and Berea Sandstones, which are discussed in the previous section.

Cuyahoga Group

Description

The Cuyahoga Group caps the uplands and lies above the Berea and Corry Sandstones. Where well developed, the group consists of the Orangeville Shale, the Sharpsville Sandstone, and the Meadville Shale, in ascending order. The Orangeville Shale is relatively soft and easily eroded. The Sharpsville Sandstone is composed mostly of sandstone but includes interbedded layers of shale and siltstone. The Meadville Shale is composed mostly of silty shale, thin beds of siltstone, and some sandstone lenses. Erosion has removed much of the Cuyahoga Group and made identification of the individual units difficult. In Erie County, the maximum thickness of the group is about 100 feet.

Water-Bearing Characteristics

As shown in Table 3, the median reported yield of eight domestic wells was 13.5 gal/min, and the range was 5 to 62 gal/min. The median specific capacity for seven domestic wells was 0.5 (gal/min)/ft; the range was 0.18 to 62 (gal/min)/ft. The median reported well depth was 69 feet, and the range was 38 to 102 feet.

Water-Quality Characteristics

Samples for chemical analysis were not collected from this aquifer.

Evaluation of the Aquifer

The areal extent of the Cuyahoga Group is limited to the southern boundary of the county. The presence of the sandstone units near the land surface makes both water-bearing characteristics and water-quality characteristics favorable for groundwater development.

Shenango Formation

The Shenango Formation overlies the Cuyahoga Group in some of the uplands in the southeastern part of Erie County. The shaly upper member has been removed by erosion, and only a few feet of the sandstone and siltstone of the lower member remain. No wells were inventoried or sampled in the Shenango Formation because of its limited areal extent.

DESCRIPTION AND WATER-BEARING CHARACTERISTICS OF UNCONSOLIDATED DEPOSITS

Nearly all bedrock in the county is covered by unconsolidated deposits of glacial origin known as drift. Collectively, the groundwater is more readily available in these deposits than in the underlying bedrock units. Figure 11 shows the general distribution of the unconsolidated deposits in the county. Plate 2 shows the thickness distribution. Although as thick as 450 feet, the deposits differ widely in texture, composition, and degree of particle size sorting. The selected drillers' logs in Appendix 2 illustrate this variable composition.

As described by Shepps and others (1959), Tomikel and Shepps (1967), and White and others (1969), Pleistocene glaciation formed Lake Erie, the lake plain, the present stream-drainage system, inland lakes, swamps, and the various types of unconsolidated deposits—namely till, outwash, and beach sands.

Presque Isle and the mainland extension are known as a sand spit and are postglacial in age. These areas of fine-grained lake sediments were built up by the action of lake currents. The maximum thickness of the lake sediments is about 150 feet.

The topics of discussion for the unconsolidated deposits parallel the topics for the bedrock aquifer units—that is, description, water-bearing characteristics, water-quality characteristics, and evaluation of the aquifer for water supply.

In the discussion of water-bearing characteristics, the analyses for nondomestic wells (industrial and public-supply wells) are separate from the analyses of the domestic wells. The well yields and specific capacities for the domestic wells are significantly less than for the nondomestic wells constructed as part of subsurface exploratory programs using sophisticated well-construction and completion techniques. The domestic-well owner generally does not use these techniques. The exploratory programs include test drilling and seismic refraction. The objective of these programs is to locate sites where the water-bearing units have the greatest transmissivity. The well-construction and completion techniques include (1) use of large-diameter casing; (2) selection of well screens and gravel packs to maximize infiltration surface; and (3) use of wells that are open to the full saturated thickness of the aquifer. Domestic-well owners generally drill wells to depths only necessary to supply household needs.

THICKNESS OF DEPOSITS

The general location of outwash channels in northwestern Pennsylvania and the associated thickness of unconsolidated deposits were initially presented by Leggette (1936, Plate 4). Plate 2 shows the thickness of unconsolidated deposits in the county and supports Leggette's original concept of the buried drainage channels. The outwash deposits in these buried channels are very favorable locations for high-yield wells. The thickness data used in contouring Plate 2 were obtained from water-, oil-, and gas-well records, highway test borings, test wells, rock outcrops, and seismic exploration.

The seismic-refraction method was used to define the depth and shape of the major buried river valleys in Erie County. The cross sections resulting from the application of this method are shown on Plate 2. In Erie County, the density of geologic materials increases with depth, and there is a sharp density contrast between unconsolidated saturated deposits and the underlying bedrock, both necessary conditions for the successful application of this method (Eaton and Watkins, 1970).

For example, past seismic surveys north of Corry, near well Er-1536, showed the following seismic velocities of various materials: unsaturated soils, 2,000 ft/s (feet per second); saturated sand and gravel, 5,000 ft/s; dense glacial till, 6,000 ft/s; and bedrock, about 14,000 ft/s. The composition of subsurface material was determined from nearby drill holes in the evaluation of relative seismic velocities. The drill holes that have known material logs are termed drill-hole controls.

The following eight seismic lines, totaling about 30,000 feet, were run:

(1) *North of Albion (Conneaut Creek valley and vicinity), 16,000 feet of line (sections A-A', B-B', and C-C' on Plate 2)*—The interpreted maximum thickness of 280 feet of unconsolidated deposits may represent the location of the preglacial buried channel for Conneaut Creek (Carll, 1880; Leverett, 1902); drill-hole control for the line was well Er-1481.

(2) *South of Waterford (French Creek valley), 6,000 feet of line (sections F-F' and G-G' on Plate 2)*—The interpreted maximum thickness of unconsolidated deposits was 240 feet; drill-hole control consisted of wells Er-1041 and 1081.

(3) *North of Lowville (valley of West Branch of French Creek), 4,500 feet of line (section H-H' on Plate 2)*—The interpreted maximum thickness of unconsolidated deposits was 190 feet; drill-hole control was well Er-808.

(4) *West of Corry (valley of South Branch of French Creek), 3,000 feet of line (sections D-D' and E-E' on Plate 2)*—The interpreted maximum thickness of unconsolidated deposits was 480 feet; drill-hole control was well Er-971.

Drillers' logs for the numbered wells are in Appendix 2.

The seismic-refraction method and the associated equipment are explained in several reports and texts: Bonini and Hickok (1959), Eaton and Watkins (1970), Zohdy and others (1974), Birch (1976), and Dobrin (1976).

Another indirect method of thickness determination of subsurface deposits is the gravity method. This has also been used with some success in glaciated terrain and was applied in Erie County. In addition to the previous references cited, reports that contain an explanation of this method include the following: Spangler and Libby (1968), Rankin and Lavin (1970), Ibrahim and Hinze (1972), Calkin and others (1974), and Carmichael and Henry (1977).

The gravity method is commonly used as a reconnaissance tool because it is comparatively quick and inexpensive, provided that equipment is rented or already available, and it does not disrupt the environment.

In conjunction with the geohydrologic investigation of Erie County, two college theses were also undertaken to demonstrate the applicability of the gravity method to the definition of the buried valleys. The unpublished theses were by J. A. Rhodes of Pennsylvania State University (1980) and M. A. Ruof of Allegheny College (1980).

GLACIAL-TILL DEPOSITS

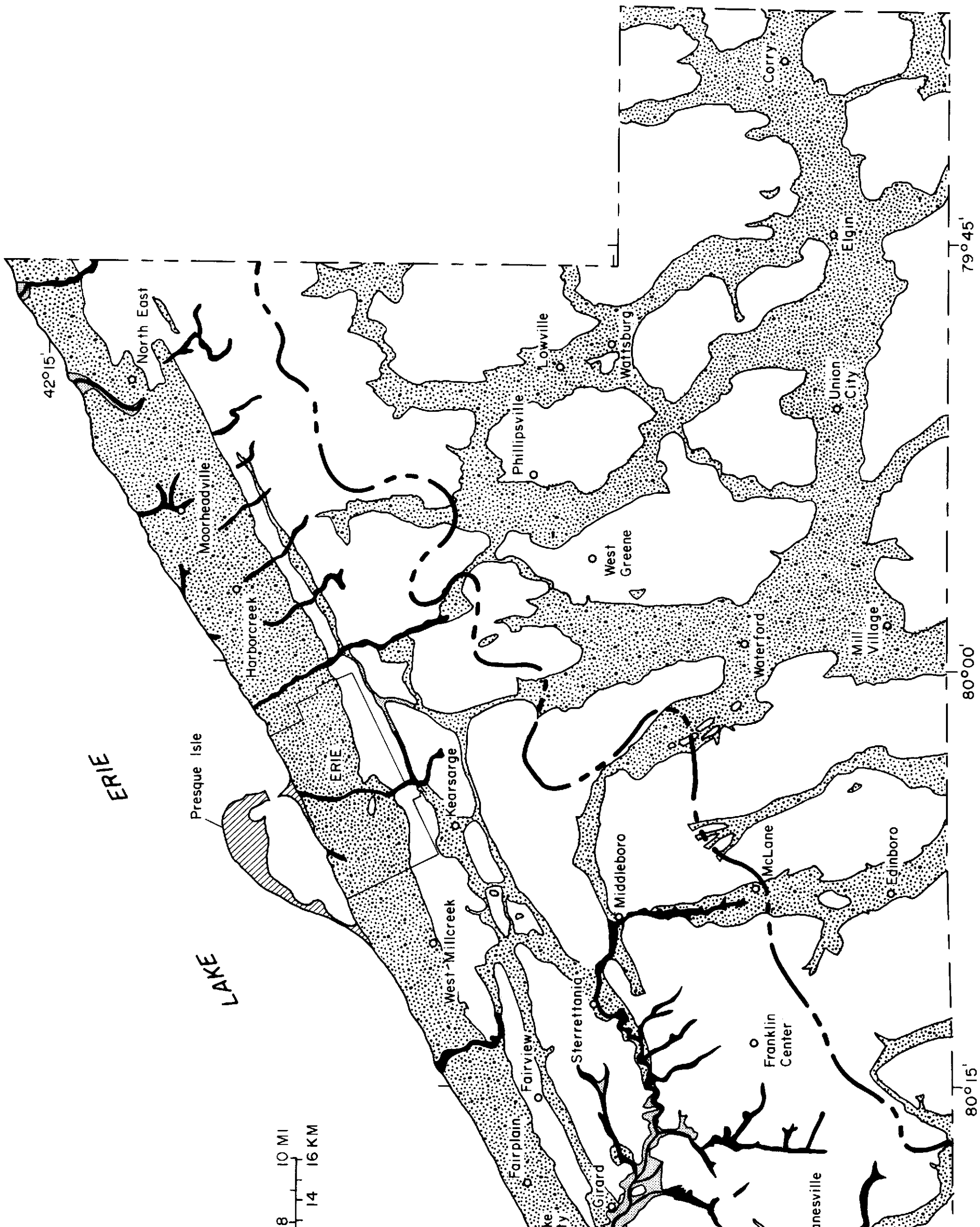
Description

Glacial till, which covers the greater part of Erie County, was deposited as ground moraine beneath the main ice mass and as end moraines at the limits of the ice advances. Ground moraines are generally irregular in shape and have little topographic expression. End moraine remnants in the area display some sinuous linearity and a knobby surface.

Glacial till consists of a relatively unstratified, unsorted mixture of clay, silt, sand, gravel, and boulders. Till deposits, especially in the upland areas, almost always overlie either bedrock or the till of an earlier glacial-ice advance. The thickness of the till over most of the county is less than 50 feet; however, well depths in till have exceeded 200 feet.

Water-Bearing Characteristics

As shown in Table 3, the median reported yield for 252 domestic wells was 5 gal/min, and for eight nondomestic wells was 11.5 gal/min. The range of reported yields for all wells was 0.1 to 50 gal/min. The median specific capacity for 125 domestic wells was 0.26 (gal/min)/ft. The median specific capacity for three nondomestic


LAKE
ERIE
Presque Isle
ERIE
North East
Moorheadville
Harborcreek
Kearsarge
West Millcreek
Fairview
Fairplain
Lake City
Girard
Sterrettania
North Springfield
East Springfield
West Springfield
Phillipsville
Lowville
Wattsburg
West Greene
Waterford
Middleboro
McLane
Edinboro
Franklin Center
Cranesville
Albion
Mill Village
Union City
Elgin
Corry
42°15'
42°00'
79°45'
80°00'
80°15'
80°30'
0 2 4 6 8 10 MI
0 2 4 6 8 10 12 14 16 KM

EXPLANATION

MAP FEATURE	CHARACTER AND DISTRIBUTION	WATER-BEARING CHARACTERISTICS
Presque Isle	Fine-grained sand deposited by lake currents.	A good aquifer (limited aquifer information).
Bedrock and alluvium	Bedrock (black) covered with recent stream alluvium (stipple pattern) of varying thickness.	A good aquifer where fractured and in hydraulic connection with the stream (limited aquifer information).
Undifferentiated unconsolidated deposits	Stratified deposits of sand, gravel, silt, and clay. Includes glacial-beach, glacial-outwash, kame, and lacustrine deposits, and recent stream alluvium in the French Creek watershed.	A good aquifer; yields range from 0.1 to 1,000 gal/min.
Ground moraine and end moraine	Till consisting of relatively unstratified, unsorted mixture of silt, loam, and silty clay to clay.	A good aquifer; yields range from 0.1 to 50 gal/min, and the median is 5 gal/min.
Drainage divide		

Figure 11. Map showing the distribution of unconsolidated deposits in Erie County (modified from Shepps and others, 1959, Plate 1).

wells was 1.5 (gal/min)/ft. The range of specific capacity for all wells was 0.009 to 30 (gal/min)/ft. The median well depth for 282 domestic wells was 55 feet, and the median depth for 13 nondomestic wells was 60 feet. The range of well depths for all wells was 17 to 220 feet.

Water-Quality Characteristics

As shown in Table 6, the chloride concentration of groundwater from till ranged from 2.5 to 1,110 mg/L, and the median was 27 mg/L. The iron concentration ranged from 0.01 to 2.8 mg/L; the median was 0.19 mg/L. The hardness ranged from 5 to 570 mg/L as $CaCO_3$ (soft to very hard), and the median was 120 mg/L (moderately hard). The specific conductance ranged from 251 to 3,840 μmho/cm, and the median was 547 μmho/cm. The estimated range for dissolved solids was about 150 to 2,300 mg/L, and the median was about 330 mg/L.

Evaluation of the Aquifer

Glacial till is a marginally acceptable aquifer but is areally extensive. Considering well yields and water quality, till is the poorest aquifer of the unconsolidated deposits. As indicated in Table 8, chloride concentrations may locally exceed the 250 mg/L recommended limit in wells that are 50 to 141 feet deep. The quality of groundwater from till is generally comparable to that of the underlying bedrock aquifers. Locally, the groundwater in till may be of poorer quality.

GLACIAL-OUTWASH DEPOSITS

Description

Glacial outwash is a drift deposit that is transported and deposited by, or in, water. These deposits were carried from the glacial ice by meltwater streams originating below, within, and from the face and sides of the ice sheets of the past glacial epoch. These deposits are known as eskers, kames, kame terraces, kame moraines, valley trains, and lake-type sediments.

Glacial outwash consists of relatively well sorted, stratified deposits of sand, gravel, silt, and clay. The lake-type sediments (silt and clay) generally are found in the lake plain. The other outwash deposits occur in the major stream valleys, as illustrated by Leggette (1936, Plate 4). The composition of these deposits generally remains the same with depth and commonly extends to bedrock, but on the slopes of valley walls, isolated remnants of glacial till are locally present. The thickness of the outwash generally is more than 100 feet and is more than 400 feet in some areas in the French Creek buried valley (see Plate 2). The ponded outwash deposits in much of French Creek valley are uniform in grain size, but generally are so fine that well yields are very small or nonexistent.

Water-Bearing Characteristics

As shown in Table 3, the median reported yield for 395 domestic wells was 15 gal/min, and for 39 nondomestic wells was 60 gal/min. The range of reported yields for all wells was 0.1 to 1,000 gal/min. The median specific capacity for 170 domestic wells was 1.2 (gal/min)/ft and for 20 nondomestic wells was 9 (gal/min)/ft. The range of specific capacity for all wells was 0.04 to 140 (gal/min)/ft. The median well depth for domestic wells was 62 feet and for nondomestic wells was 59 feet. The range of well depth for all wells was 13 to 405 feet.

Water-Quality Characteristics

As shown in Table 6, the chloride concentration for groundwater ranged from 1.5 to 1,200 mg/L, and the median was 10 mg/L. The iron concentration ranged from 0.01 to 2.6 mg/L, and the median was 0.15 mg/L. The hardness ranged from 5 to 720 mg/L as $CaCO_3$ (soft to very hard); the median was 140 mg/L (moderately hard). The specific conductance ranged from 146 to 4,800 μmho/cm, and the median was 422 μmho/cm. The estimated dissolved-solids concentration ranged from about 90 to 2,900 mg/L, and the median was about 250 mg/L.

Evaluation of the Aquifer

Glacial-outwash deposits are a very good aquifer; however, they are restricted to the major stream valleys and near the shoreline of Lake Erie. Also, the lateral extent of the layers may be limited and unpredictable because of the nature of deposition, erosion, and redeposition related to the multiple advances and retreats of the glaciers.

The greatest saturated thicknesses of outwash deposits can be accurately located through an exploration program that consists of test drilling, supplemented with seismic refraction when possible. The seismic-refraction geophysical technique was demonstrated in four areas of Erie County—near Albion, Waterford, Lowville, and Corry. The seismic lines and thicknesses of deposits are shown on Plate 2. The well sites that have the greatest saturated thickness of sand and gravel will provide the best sustained well yield and the highest specific capacity. Also, those wells that are located near, and hydraulically connected to, streams will sustain the best long-term well discharge.

Groundwater quality in the outwash deposits is the best of any of the unconsolidated aquifers. However, as indicated in Table 8, chloride concentrations may locally exceed the 250 mg/L recommended limit in wells from 40 to 227 feet deep.

GLACIAL-BEACH DEPOSITS

Description

Overlying the outwash deposits of the lake plain are remnants of former beach ridges. These were deposited during the various higher stages of ancestral Lake Erie and are similar in texture and composition to modern lake bottoms and ridges. These beach deposits range in composition from sand to gravelly sand.

Water-Bearing Characteristics

As shown in Table 3, the median reported well yield for 59 inventoried domestic wells was 7 gal/min and for 47 inventoried nondomestic wells was 75 gal/min. The range of reported yields for all wells was 0.1 to 850 gal/min. The median specific capacity for 24 domestic wells was 0.8 (gal/min)/ft, and the median for 20 nondomestic wells was 17 (gal/min)/ft. The range of specific capacity for all wells was 0.03 to 270 (gal/min)/ft. The median depth was 35 feet for 93 domestic wells and 32 feet for 55 nondomestic wells. The range of depths for all wells was 9 to 105 feet.

Water-Quality Characteristics

As shown in Table 6, the iron concentration of groundwater ranged from 0.03 to 30 mg/L, and the median was 0.39 mg/L. The chloride concentration ranged from 4 to 1,000 mg/L; the median was 24 mg/L. The hardness ranged from 92 to 610 mg/L as $CaCO_3$ (moderately hard to very hard), and the median was 220 mg/L (hard). The specific conductance ranged from 281 to 3,500 μmho/cm, and the median was 460 μmho/cm. The estimated dissolved-solids concentration ranged from about 170 to 2,100 mg/L, and the median was about 280 mg/L.

Evaluation of the Aquifer

The glacial-beach deposits constitute the best aquifer in Erie County as measured by the median well yield and the median specific capacity for nondomestic wells. However, these deposits are restricted in areal extent. Careful well-site selection, assisted by a test-drilling program and a seismic exploratory program, can result in a better well than one sited in a bedrock aquifer.

Water quality is about the same as the water quality from the other glacial-drift aquifers. However, groundwater from the beach deposits is notably higher in dissolved iron; more than half of the results exceed the recommended limit of the U.S. Environmental Protection Agency of 0.3 mg/L. The groundwater is also characteristically hard. As indicated in Table 8, the chloride concentration may locally exceed the 250 mg/L recommended limit in wells from 17 to 73 feet deep.

SOURCES OF ADDITIONAL INFORMATION

In addition to this report, other information on obtaining water for domestic supplies is available from governmental agencies.

The Bureau of Topographic and Geologic Survey, of the Pennsylvania Department of Environmental Resources, systematically maps, describes, and evaluates the geology, mineral resources, physiography, and groundwater resources of the Commonwealth, and the results of these investigations are published for use by the public. The bureau also has reports on recently drilled wells.

The Bureau of Water Quality Management, Pennsylvania Department of Environmental Resources, directs efforts to provide clean water for a variety of uses for the Commonwealth. The bureau, through regional offices, tests domestic water samples (for a fee) for contamination and provides advice on necessary corrective measures. The bureau also supplies information on public water supplies—that is, proper well construction requirements, biological reports, and chemical quality.

The Bureau of Community Environmental Control, Pennsylvania Department of Environmental Resources, administers programs relating to individual sewage and water systems.

The Water Resources Division of the U.S. Geological Survey has the principal responsibility within the federal government for providing water-resources information. The division obtains this information by investigating the occurrence, quantity, quality, distribution, and movement of surface water and groundwater, in cooperation with other federal and state governmental agencies. After collection, the data are analyzed and interpreted and the results are reported in various publications. The Pennsylvania District (P. O. Box 1107, Harrisburg, PA 17108) of the Water Resources Division is responsible for the federal effort in water-resources studies in the Commonwealth.

Basic information on groundwater quantity and quality may be obtained from the pamphlets by Baldwin and McGuinness (1963) and Swenson and Baldwin (1965), which are available from the Superintendent of Documents, Government Printing Office, Washington, D. C. 20402. Pennsylvania geological publications, such as *Ground Water in Pennsylvania* by Becher (1970), are available from the Pennsylvania Geological Survey, Department of Environmental Resources, P. O. Box 2357, Harrisburg, PA 17120.

GUIDELINES FOR DEVELOPING DOMESTIC WATER SUPPLIES

The homeowner generally has little choice in the selection of a well site. Usually, wells are drilled close to the residence, and the only consideration given to well location is for the prevention of possible contamination. However, an understanding of the geologic and hydrologic information given in this report, combined with proper well construction, increases the chances of obtaining a successful well. The following facts should be kept in mind when planning a domestic well system.

1. The depth, yield, water quality, and type of construction of nearby wells commonly indicate what may be expected of a similar well.
2. The drilling and testing of wells during dry periods, when water levels and yields are lowest, permits the optimum setting of pumps. Also, water quality at that time commonly is at its worst.
3. In areas where well yields are marginal, as much reservoir capacity as possible is desirable, either within the well itself or in a reservoir tank at the surface. Underground storage commonly is increased by use of larger diameter well casing and by extending the borehole below the water-bearing zone. Each foot of water in a 6-inch-diameter well represents about 1.5 gallons. In the more commonly used 8-inch-diameter well casing, each foot of water equals about 2.5 gallons. The cost of drilling wells greater than 8 inches in diameter may be prohibitive in deep wells, and the

cost of well storage should be compared with that of ground-level storage.

4. Where water supplies must be developed in relatively thin, poorly permeable drift, consideration should be given to the construction of very large diameter dug or bored wells. Each foot of water in a well 3 feet in diameter represents about 53 gallons. Additionally, the greater circumference adds considerably to the area of entry for water moving into the well. Randall and others (1966) report that a dug well in glacial till can provide enough water for an average family of three. In the construction of dug wells extreme care must be taken to avoid pollution.
5. Where yields from the bedrock are small and water is to be obtained from drilled wells in drift, the well casing should be slotted at the bottom and seated loosely into the top of the rock. This allows inflow of the water, which commonly lies at the drift-bedrock contact.
6. The use of screened wells should be considered in areas where the drift is thick but only fine or very fine sand deposits can be tapped.

A good reference for general information on the construction and development of small well-supply systems is the U.S. Environmental Protection Agency (1975) publication *Manual of Individual Water Supply Systems*. This may be obtained for a nominal fee from the Superintendent of Documents, Washington, D. C. 20402.

SUMMARY AND CONCLUSIONS

Potable groundwater resources in Erie County are available from unconsolidated deposits and from fractured bedrock aquifers. The aquifers that have the highest well yields and specific capacities are glacial-outwash and glacial-beach deposits. However, these deposits are limited in areal extent, being restricted to the major stream (buried) valleys and near the Lake Erie shoreline. The maximum saturated thickness in these valleys can be effectively defined prior to final well-site selection by seismic-refraction and gravity techniques. The highest well yields from these deposits are about 1,000 gal/min.

Glacial-till and bedrock aquifers are widespread in the county. However, their groundwater availabilities are significantly less than the availabilities of the glacial-outwash and glacial-beach deposits. Low permeability is responsible for these low well yields, which are suitable only for domestic needs.

The yields of bedrock wells differ according to geologic unit. Yields are lowest in the Northeast and Girard Shales in the lake plain and highest in the coarser, stratigraphically higher units in the upland plateau. There is little difference in yield between domestic bedrock wells and those drilled for public or industrial supplies. There is little variation in yield on the basis of topographic location of the bedrock well sites. The medians of all bedrock wells in all types of topography range from 5 to 6 gal/min. The range of well yields for bedrock wells was 0.1 to 62 gal/min.

Most wells in the area tap more than one water-bearing zone, and the water is usually under artesian conditions. Medians of water levels in bedrock wells average about 10 feet below land surface; those in drift wells are about twice as deep. Water levels are generally deepest at hilltop sites and shallowest (commonly flowing) in wells drilled in the valleys of southward-flowing streams.

Potential sites for high-yielding wells include the kame deposits in the Corry-Union City area, the southward-flowing valleys tributary to French Creek, and the relatively thick northeast-southwest-trending outwash deposits south of Harborcreek. Some of these areas may contain extensive lenses of coarse, permeable drift capable of supplying the water needs of industry and small communities. Problems of low yield exist where the drift is thin or highly impermeable and overlies low-yielding bedrock containing saline water. In parts of the eastern lake plain and in much of the county west of the Albion-East Springfield areas, suitable supplies of potable water may be difficult to find.

The overall quality of groundwater in Erie County is generally satisfactory. However, the water is hard to very hard, and iron and chloride concentrations differ widely. On the basis of median values, only water from the glacial-beach deposits and the Girard Shale exceeds the maximum recommended limits of iron concentration. The major potential water-quality problem is chloride concentrations in excess of the recommended limit. The presence of connate brines is associated directly with topographic relief. Bedrock within the shallow groundwater-flow system has mostly been flushed of its original marine brines. Bedrock at or below the shallow groundwater-flow system, such as the shaly units in the lake plain, contains high chloride concentrations at relatively shallow depths (30 to 100 feet). Saline water is also found in deep impermeable drift below drainage, as in the buried preglacial valley of Conneaut Creek. Generally, salinity in the bedrock decreases upward in the stratigraphic column. The uppermost bedrock units yield water that is very low in chloride. Median chloride concentrations in water from glacial drift range from 10 to 27 mg/L, which approximates the chloride concentrations of surface water during base flow.

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FACTORS FOR CONVERTING INCH-POUND UNITS TO INTERNATIONAL SYSTEM UNITS (SI)

Multiply inch-pound units	*By*	*To obtain SI units*
inch (in.)	2.540	centimeter (cm)
foot (ft)	.3048	meter (m)
mile (mi)	1.609	kilometer (km)
square foot (ft^2)	.09290	square meter (m^2)
square mile (mi^2)	2.590	square kilometer (km^2)
foot per second (ft/s)	3.281	meter per second (m/s)
foot per mile (ft/mi)	.1895	meter per kilometer (m/km)
cubic foot (ft^3)	.02832	cubic meter (m^3)
gallon (gal)	3.785	liter (L)
gallon per minute (gal/min)	.06309	liter per second (L/s)
gallon per day per foot [(gal/d)/ft]	12.42	liter per day per meter [(L/d)/m]
million gallons per day (Mgal/d)	.0438	cubic meter per second (m^3/s)
grains per gallon (gr/gal)	17.12	milligram per liter (mg/L)
micromhos (μmho)	1.0	microsiemens (μS)
degree Fahrenheit (°F)	°C = 5/9(°F − 32)	degree Celsius (°C)

APPENDICES

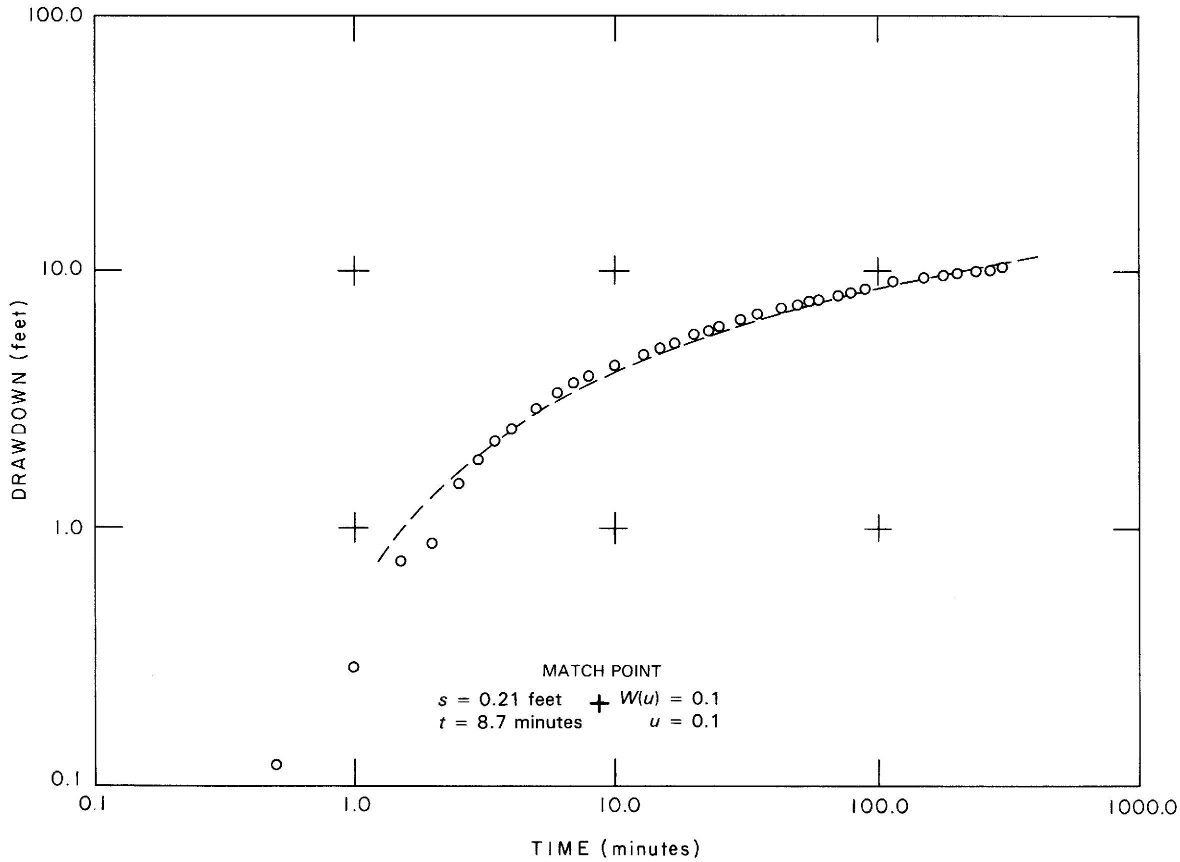
APPENDIX 1. AQUIFER TEST IN SUMMIT TOWNSHIP

An aquifer test in Summit Township was made by personnel of the U.S. Geological Survey. Well Er-80 was pumped and water levels were measured in an observation well 24 feet to the east. Both wells tapped the saturated fractured shale of the Venango Formation. Well Er-80 was pumped continuously for 5 hours at 21 gal/min (see table below). The water level in well Er-80 had declined from a static level of 6 feet below land surface to 37 feet below land surface, and only 1 foot of water remained above the pump intake. The base of the saturated fractured shale was at a depth of 44 feet, and the saturated thickness was 38 feet. The specific capacity for this test was 0.68 (gal/min)/ft. A plotting of the drawdown versus time is shown on the following graph. Using the Theis curve-fitting method,

Aquifer Test in Summit Township

Date: October 5, 1965
Location: Summit Township, Erie County
Proposed State Police barracks
Hydrologist-in-Charge: Harold Meisler, U.S. Geological Survey, Water Resources Division
East well observation: 24 feet from pumping well
Pumping-well discharge: Q = 21 gallons per minute

Elapsed time (minutes)	Water level (feet)	Drawdown (feet)	Elapsed time (minutes)	Water level (feet)	Drawdown (feet)
0	6.86	0	30	13.40	6.54
.25	6.87	.01	35	13.70	6.84
.50	6.98	.12	43	14.08	7.22
1	7.15	.29	50	14.33	7.47
1.5	7.60	.74	55	14.50	7.64
2	7.98	.88	60	14.62	7.76
2.5	8.35	1.49	71	14.895	8.035
3	8.70	1.84	80	15.145	8.285
3.5	9.03	2.17	90	15.45	8.59
4	9.31	2.45	115	16.065	9.20
5	9.81	2.95	120	16.14	9.28
6	10.19	3.33	140	16.33	9.47
7	10.51	3.65	150	16.41	9.55
8	10.76	3.90	165	16.53	9.67
10	11.17	4.31	180	16.62	9.76
13	11.64	4.78	202	16.75	9.89
15	11.93	5.07	211	16.81	9.95
17	12.18	5.32	240	16.95	10.09
20	12.52	5.66	273	17.21	10.35
23	12.85	5.99	300	17.46	10.60
25	13.04	6.18			



the hydraulic properties T and S are determined to be as follows:

$$T = 114.6 \frac{QW(u)}{s} \qquad S = \frac{Tut}{2{,}693r^2}$$

$$T = 114.6 \text{ x } 21 \text{ x } \frac{0.1}{0.21} \qquad S = \frac{1{,}146 \text{ x } 0.1 \text{ x } 8.7}{2{,}693 \text{ x } (24)^2}$$

$$= 1{,}146 \text{ [(gal/d)/ft]} \qquad = 0.0006427$$

where

s = drawdown in an observation well located at a given radius from the pumping well at a specific time since pumping began [in feet];

Q = uniform discharge from the pumping well [in gallons per minute];

T = transmissivity of the aquifer at the test site [in gallons per day per foot];

r = distance from the pumping well to the observation well [in feet];

S = coefficient of storage [no units];

t = time since pumping began [in days];

u = $\frac{r^2S}{4Tt}$; and

$W(u)$ = well function of u (table of values can be found in Ferris and others, 1962; Lohman, 1972; Fetter, 1980; Heath, 1983; and Driscoll, 1986).

The hydraulic conductivity for the fractured shale at this site would be about 4 ft/d [from $K = T/b = 1{,}100/(38 \text{ x } 7.48)$] (7.48 is the conversion factor for the number of gallons per cubic foot).

APPENDIX 2. REPRESENTATIVE DRILLERS' LOGS

Well Er-80
(Summit Township)

Latitude: 42°01'56"N
Longitude: 80°03'29"W
Aquifer: Venango Formation
Date drilled: August 20, 1965
Well depth: 53 feet
Land-surface altitude (LSD): 1,370 feet
Depth to water below LSD and date of measurement: 5 feet (October 4, 1965)

Lithologic description	Thickness (feet)	Depth (feet)
Clay, brown	8	8
Shale, black	5	13
Shale, black (broken)	31	44
Shale, black	9	53

Well construction: Hole drilled with cable-tool rig; 6-inch casing to depth of 46 feet, 7 inches, and perforated from 12 feet, 7 inches to 46 feet, 7 inches.

Well Er-82
(Washington Township)

Latitude: 41°56'07"N
Longitude: 80°04'46"W
Aquifer: Venango Formation
Date drilled: June 15, 1966
Well depth: 82 feet
Land-surface altitude (LSD): 1,419 feet
Depth to water below LSD and date of measurement: 17.0 feet (June 21, 1966)

Lithologic description	Thickness (feet)	Depth (feet)
Soil	1	1
Till, brown, with gravel and sand	12	13
Till, light-gray, with gravel and sand	42	55
Shale, dark-gray	27	82

Well construction: Hole drilled with air-rotary rig; 6-inch steel casing to 56 feet and then open hole to depth of well.

Well Er-120
(Union Township)

Latitude: 41°53'49"N
Longitude: 79°51'34"W
Aquifer: Glacial-outwash deposits
Date drilled: Unknown
Well depth: 160 feet
Land-surface altitude (LSD): 1,272 feet
Depth to water below LSD and date of measurement: Flowed in October 1928

Lithologic description	Thickness (feet)	Depth (feet)
Clay and gravel	110	110
Shale	50	160

Well construction: Cased to 110 feet and then open hole.

Well Er-126
(Union Township)

Latitude: 41°53'49"N
Longitude: 79°45'51"W
Aquifer: Glacial-outwash deposits
Date drilled: 1905
Well depth: 315 feet
Land-surface altitude (LSD): 1,355 feet
Depth to water below LSD and date of measurement: 5 feet (1905)

Lithologic description	Thickness (feet)	Depth (feet)
Gravel and "quicksand"	310	310
Sand, gray	5	315

Well construction: Hole drilled with cable-tool rig; cased the full depth of hole and open ended.

Well Er-137
(City of Corry)

Latitude: 41°55′41″N
Longitude: 79°38′28″W
Aquifer: Glacial-outwash deposits
Date drilled: 1926
Well depth: 402 feet
Land-surface altitude (LSD): 1,410 feet
Depth to water below LSD and date of measurement: 5 feet (1926)

Lithologic description	Thickness (feet)	Depth (feet)
Soil	2	2
Gravel	20	22
"Quicksand"	80	102
Clay, blue	280	382
Hardpan, gravelly	10	392
Shale	10	402

Well construction: Hole drilled with cable-tool rig; cased to 392 feet and then open hole; cased with 6-inch casing.

Well Er-370
(Girard Township)

Latitude: 42°00′37″N
Longitude: 80°17′51″W
Aquifer: Glacial-beach deposits
Date drilled: June 1972
Well depth: 61 feet
Land-surface altitude (LSD): 785 feet
Depth to water below LSD and date of measurement: 2.2 feet (June 19, 1972)

Lithologic description	Thickness (feet)	Depth (feet)
Clay and sand, blue, stratified	10	10
Silt, gray, and sand, fine	15	25
Sand, gray, fine, and silt	15	40
Sand, medium, and gravel	20	60
Till, compact	1	61

Well construction: Hole drilled with air-rotary rig; 12-inch and 8-inch steel casing to 49 feet, 8 inches, and then 10 feet of screen.

Well Er-323
(Springfield Township)

Latitude: 41°58′53″N
Longitude: 80°24′26″W
Aquifer: Glacial-beach deposits
Date drilled: August 17, 1970
Well depth: 96 feet
Land-surface altitude (LSD): 722 feet
Depth to water below LSD and date of measurement: 18 feet (August 17, 1970)

Lithologic description	Thickness (feet)	Depth (feet)
Sand, brown	11	11
Clay and gravel, brown	2	13
Clay and gravel, blue	72	85
Sand, fine, silty	.5	85.5
Clay, blue	5.5	91
Sand, coarse, with silt	1	92
Clay and gravel, hard-packed	8	100
Shale(?)	1	101

Well construction: Hole drilled with cable-tool rig; cased the full depth of hole with 8-inch steel casing and open ended.

Well Er-403
(Fairview Township)

Latitude: 42°00′51″N
Longitude: 80°13′02″W
Aquifer: Glacial-till deposits
Date drilled: April 1974
Well depth: 152 feet
Land-surface altitude (LSD): 952 feet
Depth to water below LSD and date of measurement: 83 feet (April 15, 1974)

Lithologic description	Thickness (feet)	Depth (feet)
Topsoil	1	1
Clay	49	50
Sand and gravel, cemented	3	53
Clay, "gummy," blue	76	129
Shale	33	152

Well construction: Hole drilled with cable-tool rig; 8-inch steel casing to 130 feet and then open hole.

Well Er-497
(Millcreek Township)

Latitude: 42°03′57″N
Longitude: 80°10′36″W
Aquifer: Glacial-outwash deposits
Date drilled: July 1969
Well depth: 44 feet
Land-surface altitude (LSD): 804 feet
Depth to water below LSD and date of measurement: 5 feet (July 18, 1969)

Lithologic description	Thickness (feet)	Depth (feet)
Clay and gravel, brown	12	12
Clay and gravel, blue	6	18
Clay and gravel, coarse, and sand	1	19
Clay and gravel, blue	17	36
Gravel, coarse, and sand	9	45
Clay, blue	5	50
Shale	5	55

Well construction: Hole drilled with cable-tool rig; 10-inch steel casing to 39 feet and then 5 feet of screen.

Well Er-556
(Fairview Township)

Latitude: 42°04′06″N
Longitude: 80°13′38″W
Aquifer: Glacial-beach deposits
Date drilled: January 15, 1969
Well depth: 73 feet
Land-surface altitude (LSD): 690 feet
Depth to water below LSD and date of measurement: 4 feet (January 15, 1969)

Lithologic description	Thickness (feet)	Depth (feet)
Gravel and sand, brown	28	28
Clay and gravel, blue	17	45
Sand, fine, and silt (water-bearing)	3	48
Clay and gravel, blue	5	53
Shale, blue	20	73

Well construction: No casing.

Well Er-711
(Harborcreek Township)

Latitude: 42°11′32″N
Longitude: 79°57′13″W
Aquifer: Glacial-till deposits
Date drilled: April 6, 1968
Well depth: 82 feet
Land-surface altitude (LSD): 660 feet
Depth to water below LSD and date of measurement: 50 feet (April 1968)

Lithologic description	Thickness (feet)	Depth (feet)
Clay, brown, sandy	14	14
Clay and gravel, blue	10	24
Sand, blue, fine (water-bearing)	1	25
Clay and gravel, hard-packed	43	68
Shale, blue	14	82

Well construction: Hole drilled with cable-tool rig; 8-inch steel casing to 72 feet and then open hole.

Well Er-808
(Venango Township)

Latitude: 42°04′15″N
Longitude: 79°50′31″W
Aquifer: Glacial-outwash deposits
Date drilled: July 20, 1964
Well depth: 100 feet
Land-surface altitude (LSD): 1,320 feet
Depth to water below LSD and date of measurement: 3 feet (July 20, 1964)

Lithologic description	Thickness (feet)	Depth (feet)
Clay and gravel, yellow	12	12
Gravel and sand, brown (water-bearing)	4	16
Clay, blue	74	90
Sand, blue, fine	6	96
Gravel and sand, coarse (water-bearing)	4	100

Well construction: Hole drilled with cable-tool rig; cased to 95 feet and then 4 feet of perforated casing; cased with 6-inch casing.

Well Er-947
(Millcreek Township)

Latitude: 42°05′17″N
Longitude: 80°02′01″W
Aquifer: Glacial-outwash deposits
Date drilled: March 21, 1963
Well depth: 119 feet
Land-surface altitude (LSD): 1,089 feet
Depth to water below LSD and date of measurement: 90 feet (March 21, 1963)

Lithologic description	Thickness (feet)	Depth (feet)
Clay and gravel, brown	19	19
Clay and gravel, blue	9	28
Sand and gravel, brown, cemented	18	46
"Quicksand"	26	72
Clay and gravel, blue	45	117
Gravel, blue, hard	1	118
Shale, blue	1	119

Well construction: Hole drilled with cable-tool rig; 6-inch steel casing to 115 feet and then 4 feet of perforated casing.

Well Er-971
(Concord Township)

Latitude: 41°55′08″N
Longitude: 79°40′11″W
Aquifer: Glacial-outwash deposits
Date drilled: March 5, 1971
Well depth: 220 feet
Land-surface altitude (LSD): 1,392 feet
Depth to water below LSD and date of measurement: 0 feet (March 1971)

Lithologic description	Thickness (feet)	Depth (feet)
Clay and gravel	10	10
Clay, blue	30	40
Clay and gravel	20	60
Sand	100	160
Clay and gravel	20	180
"Quicksand"	10	190
Clay and gravel	24	214
Rock	6	220

Well construction: Hole drilled with cable-tool rig; 6-inch steel casing to 214 feet and then open hole.

Well Er-1041
(Le Boeuf Township)

Latitude: 41°54′29″N
Longitude: 79°55′05″W
Aquifer: Glacial-outwash deposits
Date drilled: October 30, 1969
Well depth: 70 feet
Land-surface altitude (LSD): 1,214 feet
Depth to water below LSD and date of measurement: 35 feet (October 30, 1969)

Lithologic description	Thickness (feet)	Depth (feet)
Gravel, brown, coarse	12	12
Clay and gravel, brown	3	15
Clay and gravel, blue	15	30
Gravel and clay, hard	18	48
Sand, fine	1	49
Sand and gravel, cemented	21	70

Well construction: Hole drilled with cable-tool rig; 8-inch steel casing down to 70 feet and then open end.

Well Er-1081
(Le Boeuf Township)

Latitude: 41°54′33″N
Longitude: 79°58′40″W
Aquifer: Glacial-outwash deposits
Date drilled: October 1966
Well depth: 34 feet
Land-surface altitude (LSD): 1,175 feet
Depth to water below LSD and date of measurement: 10 feet (October 1966)

Lithologic description	Thickness (feet)	Depth (feet)
Clay and gravel, brown	10	10
Gravel, brown	2	12
Clay and gravel, blue	22	34

Well construction: Hole drilled with cable-tool rig; 8-inch steel casing to 34 feet and then open end.

Well Er-1172
(McKean Township)

Latitude: 41°59′03″N
Longitude: 80°03′55″W
Aquifer: Venango Formation
Date drilled: May 1975
Well depth: 160 feet
Land-surface altitude (LSD): 1,325 feet
Depth to water below LSD and date of measurement: 62 feet (May 2, 1975)

Lithologic description	Thickness (feet)	Depth (feet)
Clay and gravel, brown	8	8
Gravel and clay, blue	7	15
Clay, blue	8	23
Gravel, blue	7	30
Sand, blue	1	31
Clay and gravel, blue	94	125
Sand and gravel, cemented	1	126
Shale, rock	34	160

Well construction: Hole drilled with cable-tool rig; 8-inch casing down to 130 feet and then open hole.

Well Er-1285
(McKean Township)

Latitude: 42°01′15″N
Longitude: 80°11′10″W
Aquifer: Glacial-outwash deposits
Date drilled: April 4, 1977
Well depth: 145 feet
Land-surface altitude (LSD): 1,100 feet
Depth to water below LSD and date of measurement: 78 feet (April 1, 1977)

Lithologic description	Thickness (feet)	Depth (feet)
Clay, brown	8	8
Clay and gravel	67	75
Sand	1	76
Clay and cobbles, blue	58	134
Sand and gravel	3	137
Shale	8	145

Well construction: Hole drilled with cable-tool rig; 8-inch casing down to 140 feet and then open hole.

Well Er-1331
(Greene Township)

Latitude: 42°04′27″N
Longitude: 79°58′06″W
Aquifer: Glacial-outwash deposits
Date drilled: November 1977
Well depth: 108 feet
Land-surface altitude (LSD): 1,210 feet
Depth to water below LSD and date of measurement: 2 feet above LSD (November 1977)

Lithologic description	Thickness (feet)	Depth (feet)
Clay and gravel, brown	12	12
Gravel and clay, blue	12	24
Sand and gravel, blue	12	36
Clay, gravel, and sand, pink	8	44
Sand and gravel, blue	5	49
Gravel and clay, blue	2	51
Clay, blue	24	75
Clay and gravel, blue	17	92
Shale	16	108

Well construction: Hole drilled with cable-tool rig; 8-inch casing down to 94 feet and then open hole.

Well Er-1423
(Waterford Township)

Latitude: 41°56′03″N
Longitude: 79°58′46″W
Aquifer: Glacial-outwash deposits
Date drilled: August 13, 1956
Well depth: 227 feet
Land-surface altitude (LSD): 1,180 feet
Depth to water below LSD and date of measurement: 80 feet (no date)

Lithologic description	Thickness (feet)	Depth (feet)
Sand and gravel, and clay and gravel, blue	20	20
"Quicksand"	70	90
Clay and gravel, blue, sandy	35	125
Sand and gravel, cemented	10	135
Clay and gravel, blue	20	155
Shale, black(?)	72	227

Well construction: Hole drilled with cable-tool rig; 7-inch casing down to 155 feet and then open hole.

Well Er-1481 (Conneaut Township)

Latitude: 41°56′24″N
Longitude: 80°21′49″W
Aquifer: Glacial-till deposits
Date drilled: October 5, 1978
Well depth: 141 feet
Land-surface altitude (LSD): 850 feet
Depth to water below LSD and date of measurement: 35 feet (October 5, 1978)

Lithologic description	Thickness (feet)	Depth (feet)
Clay, blue	89	89
Sand, brown, very fine	2	91
Clay, gray	13	104
Clay, blue, gray	33	137
Shale	3	140

Well construction: Hole drilled with cable-tool rig; 8-inch steel casing down to 111 feet and then open hole.

Well Er-1536 (Wayne Township)

Latitude: 41°56′23″N
Longitude: 79°38′28″W
Aquifer: Glacial-outwash deposits
Date drilled: August 1974
Well depth: 209 feet
Land-surface altitude (LSD): 1,415 feet
Depth to water below LSD and date of measurement: No data

Lithologic description	Thickness (feet)	Depth (feet)
Topsoil	2	2
Gravel	2	4
Sand and gravel	4	8
Clay and gravel, brown	7	15
Clay, brown; some gravel, fine	10	25
Gravel, fine	4	29
Clay and gravel, gray	8	37
Clay, blue	162	199
Shale, gray, sandy	10	209

Well construction: Hole drilled with air-rotary rig; 8-inch steel casing down to 200 feet and then open hole.

Well Er-1484 (Conneaut Township)

Latitude: 41°54′18″N
Longitude: 80°21′37″W
Aquifer: Glacial-outwash deposits
Date drilled: August 1960
Well depth: 111 feet
Land-surface altitude (LSD): 892 feet
Depth to water below LSD and date of measurement: No data

Lithologic description	Thickness (feet)	Depth (feet)
Clay and gravel, yellow, mixed	15	15
Clay and gravel, blue, mixed	7	22
Gravel, coarse	2	24
Clay and gravel, blue	1	25
Gravel, coarse	2	27
Clay, blue	22	49
Gravel, coarse	4	53
Clay, blue	1	54
Sand, blue, fine	20	74
Clay, blue	36	110
Shale	1	111

Well construction: Hole drilled with cable-tool rig; steel casing down to 110 feet and then open end.

Well Er-1648 (Concord Township)

Latitude: 41°55′04″N
Longitude: 79°43′29″W
Aquifer: Glacial-outwash deposits
Date drilled: June 26, 1964
Well depth: 138 feet
Land-surface altitude (LSD): 1,404 feet
Depth to water below LSD and date of measurement: Flowed on June 26, 1964

Lithologic description	Thickness (feet)	Depth (feet)
Clay and gravel, yellow	12	12
"Quicksand," brown	14	26
Clay, blue	10	36
"Quicksand"	14	50
Clay, blue	40	90
Sand, fine, with trace gravel, coarse	2	92
Clay, blue	38	130
Gravel	2	132
Clay, blue	4	136
Shale, blue	2	138

Well construction: Hole drilled with cable-tool rig; 6-inch steel casing down to 134 feet and then 4 feet of perforated casing.

Well Er-1661
(Wayne Township)

Latitude: 41°56′32″N
Longitude: 79°38′39″W
Aquifer: Glacial-outwash deposits
Date drilled: August 1974
Well depth: 71 feet
Land-surface altitude (LSD): 1,420 feet
Depth to water below LSD and date of measurement: 16.3 feet (August 1974)

Lithologic description	Thickness (feet)	Depth (feet)
Gravel, fine	22	22
Sand and gravel	15	37
Sand and gravel; some clay	15	52
Sand and gravel; some silty clay	19	71

Well construction: Hole drilled with air-rotary rig; 12-inch steel casing down to 59 feet and then screen to bottom of hole.

Well Er-1680
(Wayne Township)

Latitude: 41°55′50″N
Longitude: 79°40′10″W
Aquifer: Glacial-outwash deposits
Date drilled: February 1968
Well depth: 405 feet
Land-surface altitude (LSD): 1,420 feet
Depth to water below LSD and date of measurement: 12.2 feet (February 1968)

Lithologic description	Thickness (feet)	Depth (feet)
Topsoil	1	1
Clay and gravel	6	7
Gravel and sand	8	15
Clay and gravel	13	28
Gravel with streaks of clay	16	44
Clay and gravel	12	56
Clay	4	60
Sand	11	71
Clay	4	75
"Quicksand"	15	90
Clay and gravel	15	105
Clay	293	398
Clay and gravel	4	402
Rock	3	405

Well construction: Hole drilled with air-rotary rig; 8-inch casing.

Well Er-1719
(North East Township)

Latitude: 42°12′51″N
Longitude: 79°46′19″W
Aquifer: Girard Shale
Date drilled: June 21, 1968
Well depth: 95 feet
Land-surface altitude (LSD): 1,108 feet
Depth to water below LSD and date of measurement: 34 feet (June 21, 1968)

Lithologic description	Thickness (feet)	Depth (feet)
Clay and gravel, yellow	8	8
Gravel, coarse, and clay	9	17
Clay and gravel, blue	6	23
Clay and gravel, brown	5	28
Clay and gravel, blue	1	29
Shale, rock, blue	66	95

Well construction: Hole drilled with cable-tool rig; 8-inch steel casing down to 32 feet and then open hole.

Well Er-1723
(Amity Township)

Latitude: 41°59′02″N
Longitude: 79°50′14″W
Aquifer: Glacial-outwash deposits
Date drilled: July 1974
Well depth: 85 feet
Land-surface altitude (LSD): 1,284 feet
Depth to water below LSD and date of measurement: No data

Lithologic description	Thickness (feet)	Depth (feet)
Gravel, brown	11	11
Clay, brown-gray	17	28
Sand and gravel, cemented	13	41
Clay and gravel, blue	13	54
Clay and gravel, brown	1	55
Clay and gravel, blue	1	56
Clay, blue	13	69
Hardpan	4	73
Clay, blue	9	82
Shale, blue	3	85

Well construction: Hole drilled with cable-tool rig; 8-inch steel casing down to 52 feet and then open hole.

Table 9. *Field Analyses of Groundwater*

Aquifer: Qb, glacial-beach deposits; Qo, glacial-outwash deposits; Qt, glacial-till deposits; MDbr, Berea Sandstone through Riceville Formation, undivided; MDcr, Corry Sandstone through Riceville Formation, undivided; MDbv, Berea Sandstone through Venango Formation, undivided; Dv, Venango Formation; Dch, Chadakoin Formation; Dg, Girard Shale; Dne, Northeast Shale.

Well number	Aquifer	Date of analysis or comment	Iron (mg/L)	Chloride (mg/L)	Hardness (mg/L as $CaCO_3$)	Specific conductance (μmho/cm at 25°C)	Remarks (*indicates driller's comments)
Er- 45	Qb	6/22/79	0.28	20	190	460	---
67	MDbv	7/26/28	---	---	---	---	*Salty; gas.
68	MDbv	6/11/29	---	---	---	---	*Very salty.
69	MDbv	6/11/29	---	---	---	---	*Very salty.
71	Qo	7/26/28	---	---	---	---	*Gas from gravel; salty.
72	Dch	7/26/28	---	---	---	---	*Salty.
91	Qo	9/13/78	.01	32	120	420	---
99	Qo	6/30/28	---	---	---	---	*Slightly salty; sulfur odor.
103	Dne	7/ 2/28	---	---	---	---	*Slightly salty; gas.
104	Dne	7/ 2/28	---	---	---	---	*Salty; gas.
106	Dne	7/ 2/28	---	---	---	---	*Salty.
107	Qt	7/ 2/28	---	---	---	---	*Some gas.
109	Dne	7/ 2/28	---	---	---	---	*Gas.
114	Qo	9/13/78	.01	2	75	220	---
115	Qo	7/ 3/28	---	---	---	---	*Sulfur odor.
128	Qo	6/20/79	.09	50	30	560	---
148	MDbv	7/12/79	.05	120	35	1,100	---
164	Qt	7/16/79	.44	22	220	530	---
185	Dch	6/22/79	.75	5	90	330	---
189	Qo	5/10/71	---	---	---	---	*Very hard; very high iron.
210	Dg	7/28/70	---	---	---	---	*Gas; sulfur odor.
218	Qo	12/ 7/66	---	---	---	---	*Gas at 61 feet.
241	Qo	7/16/79	.05	28	190	640	---
272	Qo	7/ 8/64	---	---	---	---	*Gas at bottom.
289	Dch	6/ 6/79	.11	30	160	430	---
292	Qo	6/13/79	.12	10	130	500	---
296	Qo	7/ 9/75	---	---	---	---	*Strong sulfur odor.
310	Qt	7/ 6/79	.28	32	160	640	---
314	Qo	7/ 6/79	.05	8	260	610	---
317	Qo	9/20/68	---	---	---	---	*Gas at 80 feet.
332	Qt	7/ 6/79	.59	190	310	1,050	---
339	Dch	9/15/70	---	---	---	---	*Iron bacteria.
344	Dch	10/19/73	---	---	---	---	*Very high iron.
345	Dch	7/ 6/79	.039	22	100	310	---
347	Qt	7/ 6/79	.08	28	70	300	---
365	Qt	6/28/75	---	---	---	---	*Gas at 74 feet.
375	Qb	7/ 6/79	.08	15	160	330	---
377	Qb	8/ 1/72	---	---	---	---	*Gas and salt water at 50 feet.
378	Qb	7/ 6/79	.20	42	180	550	---
404	Qt	7/ 6/79	.14	2	20	390	---
414	Dch	7/ 6/79	.17	450	140	2,400	---
427	Qo	7/ 6/79	2.6	20	150	580	---
429	Qo	7/ 6/79	.09	15	5	500	---
455	Qo	7/ 6/79	.03	60	200	720	---
503	Qo	7/ 6/79	.20	550	720	2,700	---
520	Qo	12/ 8/67	---	---	---	---	*Sulfur odor.
536	Qo	7/ 6/79	.28	20	190	460	---
555	Qb	4/ 6/72	---	---	---	---	*Very hard.
556	Qb	7/ 6/79	.05	1,000	310	3,500	Well abandoned.
562	Dv	7/ 6/79	.32	250	25	1,500	---
591	MDbv	7/ 6/79	.15	22	125	490	---
596	Qo	7/ 6/79	.60	18	105	430	---
608	MDbv	6/23/76	---	---	---	---	*Gassy, oily water.
609	MDbv	11/30/68	---	---	---	---	*Gas and sulfur odor at 70 feet.
620	MDcr	6/28/79	1.25	5	60	190	---
622	MDcr	6/28/79	.05	5	110	305	---
624	MDcr	6/28/79	.05	20	115	320	---
637	Dv	6/25/79	.04	5	105	280	---

Table 9. *(Continued)*

Well number	Aquifer	Date of analysis or comment	Iron (mg/L)	Chloride (mg/L)	Hardness (mg/L as $CaCO_3$)	Specific conductance (μmho/cm at 25°C)	Remarks (*indicates driller's comments)
Er- 643	Qt	6/25/79	.08	200	90	1,200	---
649	Dch	10/12/73	---	---	---	---	*Salty.
650	Dch	6/25/79	.05	15	170	410	---
654	Dch	6/25/79	.04	25	75	330	---
658	Dch	6/25/79	.02	110	310	840	---
660	Qt	6/25/79	.90	72	85	590	---
663	Qt	6/25/79	.08	35	60	525	---
664	Dg	6/25/79	1.19	12	160	500	---
666	Dne	6/25/79	.03	25	150	400	---
668	Dne	6/18/73	--	---	---	---	*Gas at 60 feet.
675	Qo	6/25/79	.05	15	70	330	---
677	Qt	6/25/79	.09	70	170	600	---
680	Dch	6/25/79	.06	8	5	220	---
690	Dch	6/25/79	.02	30	170	460	---
694	Dne	9/24/72	---	---	---	---	*Gas at 48 feet; plugged back.
702	Dg	12/17/75	---	---	---	---	*Gas at 56 feet.
704	Dg	6/25/79	2.2	62	240	700	---
706	Dne	8/26/67	---	---	---	---	*Sulfur odor.
707	Dne	6/25/79	.45	50	140	560	---
713	Qo	6/25/79	.52	28	200	530	---
714	Dne	6/25/79	.04	40	200	600	---
726	Qt	6/28/79	.41	5	100	260	---
744	Dch	9/25/72	---	---	---	---	*Some natural gas.
756	Dch	6/21/79	.29	8	95	230	---
766	Dch	6/21/79	.08	22	140	380	---
777	Dv	6/21/79	.01	25	140	400	---
806	Qo	6/21/79	.08	3	120	290	---
810	Qt	4/23/74	---	---	---	---	*High iron.
822	Qo	6/21/79	.25	58	110	550	---
829	Dv	6/21/79	.20	15	115	620	---
852	Qt	6/21/79	.16	22	160	600	---
863	Dch	6/ 3/76	---	---	---	---	*Natural gas at 50 feet.
872	Dch	7/20/71	---	---	---	---	*Salty at 60 feet.
879	Qo	6/21/79	.06	18	240	625	---
893	Qo	6/21/79	.22	35	120	565	---
919	Qt	2/10/73	---	---	---	---	*Some natural gas.
940	Qo	12/28/76	---	---	---	---	*Strong sulfur odor.
957	Qt	7/ 9/79	.18	28	140	540	---
967	Qo	7/ 9/79	.02	18	140	370	---
968	MDcr	7/ 9/79	.09	10	120	280	---
969	Qo	7/ 9/79	.25	2	95	300	---
971	Qo	7/ 9/79	.18	68	90	700	---
1015	Dch	7/ 9/79	2.0	5	110	265	---
1026	Dch	7/ 9/79	.05	10	200	500	---
1029	Qo	7/ 9/79	.02	180	400	1,000	---
1032	Dv	7/ 9/79	.10	20	120	420	---
1041	Qo	7/ 9/79	.05	5	120	270	---
1042	Dch	7/ 9/79	.03	15	85	370	---
1048	Dv	7/ 9/79	.05	8	120	300	---
1061	Qo	6/14/79	.23	1,220	510	4,800	---
1064	Qo	8/22/79	.12	5	90	245	---
1073	Dch	6/18/79	.08	8	85	245	---
1077	Qo	6/18/79	.01	8	140	320	---
1085	Dv	6/18/79	.04	5	50	300	---
1086	Qo	6/18/79	.08	5	120	300	---
1087	Dv	6/18/79	.10	40	230	600	---
1091	Dv	6/18/79	.17	80	180	530	---
1092	Qt	6/18/79	.02	8	180	420	---
1094	Qo	6/18/79	.08	8	90	290	---
1096	MDcr	6/18/79	.05	10	85	240	---
1100	Dv	6/18/79	.15	45	160	500	---
1101	Dv	6/18/79	.25	8	150	375	---
1110	MDbr	8/ 8/79	.70	2	210	480	---
1113	Qo	8/10/79	.11	5	90	225	---
1115	Dv	8/22/79	.43	6	160	360	---
1120	Qo	8/23/79	.15	9	100	220	---

Table 9. *(Continued)*

Well number	Aquifer	Date of analysis or comment	Iron (mg/L)	Chloride (mg/L)	Hardness (mg/L as $CaCO_3$)	Specific conductance (μmho/cm at 25°C)	Remarks (*indicates driller's comments)
Er-1121	Qt	8/15/79	.05	2	110	300	---
1129	Dv	8/28/79	.26	2	120	380	---
1131	MDbr	8/24/79	.02	2	120	300	---
1132	MDbr	7/23/68	---	---	---	---	*Natural gas at 75 feet.
1135	Dv	8/22/79	.19	5	120	310	---
1141	Dv	8/ 9/79	.18	8	85	340	---
1143	Dv	7/31/79	.02	8	180	410	---
1146	Dv	8/10/79	.15	15	20	580	---
1153	Dv	8/ 9/79	.18	18	150	650	---
1172	Dv	8/ 7/79	.02	150	60	1,200	---
1175	Qo	8/ 8/79	.02	180	95	1,700	---
1179	Dv	7/29/66	---	---	---	---	*Shale gas at 32 feet.
1180	MDbv	7/30/79	.23	32	120	560	---
1185	Qo	7/24/79	.07	8	140	340	---
1230	Dch	6/15/79	3.2	8	190	700	---
1232	Dv	---	---	---	---	---	*Natural gas at 83 feet.
1237	MDbv	6/15/79	.05	42	80	520	---
1239	Dch	6/15/79	.03	5	50	275	---
1245	Qt	6/15/79	.01	15	5	650	---
1254	Qo	6/28/79	1.1	380	120	1,850	---
1256	Qo	6/15/79	.03	8	100	275	---
1259	Qt	6/15/79	.02	5	10	525	---
1267	Qt	6/15/79	3.0	18	230	800	---
1279	MDbv	6/28/79	.19	5	110	300	---
1280	MDbv	6/28/79	.15	550	180	2,800	---
1283	Dch	6/28/79	.17	18	200	520	---
1291	Qo	6/28/79	.1	10	90	380	---
1311	Dch	6/28/79	.12	5	110	275	---
1313	Qt	6/28/79	.28	5	100	270	---
1316	Dch	6/28/79	.02	78	120	610	---
1318	Qb	5/21/76	---	---	---	---	*Natural gas at 35 feet.
1319	Dne	6/28/79	.08	40	120	420	---
1321	Dg	6/28/79	.21	68	220	650	---
1325	Dch	8/ 9/79	1.6	30	75	305	---
1330	Dch	6/28/79	.03	48	55	490	---
1334	Dch	6/28/79	.05	5	80	260	---
1343	Qt	6/28/79	.02	5	140	350	---
1354	Dch	7/11/79	.05	20	150	600	---
1356	Qt	5/31/77	---	---	---	---	*Sulfur odor.
1357	Qo	5/27/77	---	---	---	---	*Sulfur odor.
1368	Dv	6/11/64	---	---	---	---	*Gas at 60 feet.
1372	Dch	7/11/79	.15	65	55	745	---
1394	Qo	8/19/79	.05	50	110	320	---
1396	MDbr	7/19/79	.04	6	200	440	---
1397	Dv	7/19/79	.13	80	55	780	---
1397	Dv	9/--/51	---	---	---	---	*Gas at 63 feet.
1408	Dch	7/19/79	.06	12	35	420	---
1411	Qo	7/19/79	.14	12	100	300	---
1413	Dch	7/11/79	.10	18	85	240	---
1415	Qb	7/19/79	.37	320	160	1,450	---
1417	Dne	7/11/79	.09	38	120	400	---
1423	Qo	8/13/56	---	---	---	---	*Salty water.
1424	Qo	7/19/79	.18	10	100	270	---
1425	Qb	---	---	---	---	---	*Very hard.
1431	Qt	---	---	---	---	---	*Very hard.
1440	Qt	7/11/79	.38	45	240	830	---
1443	Qo	7/11/79	1.1	75	---	750	---
1445	Dch	7/11/79	.02	10	80	405	---
1448	Dch	7/19/79	.03	8	100	340	---
1452	Qo	7/11/79	.5	8	210	450	---
1458	Dch	7/19/79	.07	6	120	300	---
1460	Qo	9/ 6/78	.22	2	75	200	---
1469	Qo	7/19/79	.3	6	95	260	---
1474	Dch	7/11/79	.1	12	140	370	---
1477	Qo	7/11/79	.08	18	120	310	---

Table 9. *(Continued)*

Well number	Aquifer	Date of analysis or comment	Iron (mg/L)	Chloride (mg/L)	Hardness (mg/L as $CaCO_3$)	Specific conductance (µmho/cm at 25°C)	Remarks (*indicates driller's comments)
Er-1481	Qt	10/ 1/78	.03	10	85	450	At 89-foot depth.
1481	Qt	10/ 3/78	.07	75	150	720	At 100-foot depth.
1481	Qt	10/ 5/78	.1	400	185	2,300	At 141-foot depth.
1481	Qt	7/19/79	.1	425	95	2,500	---
1482	Qt	7/19/79	.55	18	120	600	---
1488	Qo	9/13/78	.05	2	125	340	---
1488	Qo	7/19/79	.09	5	140	340	---
1490	Dv	9/13/79	.02	2	145	390	---
1495	Dv	4/22/76	---	---	---	---	*Salt and gas at 70 feet.
1495	Dv	7/19/79	.13	600	160	2,800	Cemented back to 61 feet.
1496	Qt	7/31/76	---	---	---	---	*Salt and gas at 59 feet; plugged back to 55 feet.
1512	Qb	7/23/79	.10	58	200	600	---
1544	Qo	7/27/79	.18	10	120	320	---
1561	Dch	7/16/79	.57	55	210	635	---
1564	Dch	7/24/79	.60	12	100	395	---
1567	Qo	7/24/79	.03	25	150	440	---
1569	Dv	8/29/79	.12	5	120	310	---
1574	MDbr	7/24/79	.05	4	140	360	---
1575	Qb	7/16/79	.08	22	190	480	---
1578	Qo	12/--/51	---	---	---	---	*Gas from bedrock.
1579	Qb	7/16/79	.20	22	140	430	---
1581	Qb	---	---	---	---	---	*Hard; very low iron.
1583	Qo	7/24/79	.23	72	240	560	---
1587	Dch	7/24/79	.11	5	100	325	---
1593	MDcr	11/19/70	---	---	---	---	*Hard; high iron.
1599	Qt	7/16/79	3.3	28	570	1,400	---
1605	Dv	7/27/79	.05	32	140	360	---
1609	Qt	8/21/79	.20	2	80	240	---
1612	Dch	7/27/79	.10	4	110	280	---
1614	Dv	7/27/79	.05	120	120	950	---
1616	Qt	7/24/79	.08	32	180	470	---
1618	Qt	7/16/79	.25	25	110	400	---
1619	Dch	7/16/79	.05	22	110	400	---
1622	Qo	7/16/79	.15	5	140	360	---
1623	Dv	10/ 2/72	---	---	---	---	*Hard; very high iron.
1626	Dch	7/16/79	.02	20	240	560	---
1630	Qt	7/16/79	.07	5	150	380	---
1642	Qt	7/27/79	.03	12	120	440	---
1643	Qo	7/24/79	.01	18	170	420	---
1644	Qb	1/23/67	---	---	---	---	*Gas at 25 feet.
1644	Qb	7/24/79	3.3	32	320	800	---
1646	Dne	12/24/66	---	---	---	--	*Some gas; very salty.
1647	MDbv	7/27/79	.52	4	170	510	---
1649	Dv	7/16/79	.09	30	120	350	---
1650	MDcr	7/16/79	2.5	22	85	230	---
1651	Qt	7/24/79	.43	250	200	1,700	---
1652	Qo	7/24/79	.03	5	110	280	---
1666	Dch	7/24/79	.16	5	130	320	---
1668	Qt	6/28/77	---	---	---	---	*Very high iron.
1693	Qo	9/13/78	.20	8	100	260	---
1694	Qt	8/20/79	.32	2	110	300	---
1696	Qt	9/ 9/79	1.4	15	180	380	---
1708	Qo	8/19/79	.10	10	125	320	---
1722	Qo	9/ 6/78	.01	15	120	320	---

Table 10. *Chemical Analyses of Groundwater from Selected Wells*[1]

(Results are in milligrams per liter unless otherwise indicated)

Aquifer: Qb, glacial-beach deposits; Qo, glacial-outwash deposits; Qt, glacial-till deposits; MDbv, Berea Sandstone through Venango Formation, undivided; Dch, Chadakoin Formation; Dg, Girard Shale; Dne, Northeast Shale.

Well number	Aquifer	Date of sampling	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Dissolved solids	Hardness (as $CaCO_3$)	Specific conductance (μmho/cm at 25°C)
Er- 2	Qo	5/23/51	0.67	61	14	11	1.9	217	37	9.0	259	210	428
3	Dch	5/24/51	1.3	32	12	132	4.4	144	17	206	491	130	949
4	Qo	5/25/51	.42	61	15	5.4	1.8	227	30	4.0	247	210	416
5	Qo	5/24/51	.96	41	20	159	5.2	386	46	110	587	190	1,020
6	Qb	5/24/51	1.3	68	12	4.2	1.4	182	69	7.0	268	220	434
7	Dg	5/24/51	66	48	14	7.8	2.1	104	80	18	241	180	395
8	Qo	5/23/51	.29	85	20	4.5	1.9	230	88	14	348	300	559
67	MDbv	9/27/28	.42	32	14	160	6.3	406	3.2	115	[2]544	140	---
73	Qb	7/22/29	.12	58	12	3.4	4.0	171	41	6.0	[2]239	190	---
91	Qo	9/25/28	.39	27	7.8	26	1.6	168	14	3.2	[2]179	100	---
98	Qo	10/ 1/28	.30	25	8.3	37	2.2	162	5.1	28	[2]204	97	---
102	Dne	9/27/28	.38	28	6.4	4.4	1.6	48	48	10	[2]133	96	---
116	Qo	10/ 2/28	.08	30	9.6	9.1	1.1	148	6.4	2.8	[2]147	110	---
132	Qo	9/26/28	.19	27	7.7	7.7	1.4	121	18	1.8	[2]137	99	---
132	Qo	9/30/64	.22	28	7.8	16	.7	132	19	3.8	144	100	252
136	Qo	7/20/29	.05	36	6.4	3.0	3.5	130	19	3.6	158	120	---
141	Qo	10/ 5/64	.49	35	11	27	1.1	168	25	15	207	130	340
1523	Qb	11/16/73	.18	68	17	144	6.4	228	133	165	792	240	1,200
1523	Qb	5/19/77	---	125	25	403	5.8	---	---	710	1,620	420	2,400
1683	Dg	4/28/77	.32	190	31	710	10	380	86	1,400	---	600	5,110
1684	Dne	4/27/77	5.5	660	210	2,900	42	130	3.0	9,500	---	2,500	25,800
1685	Dg	4/14/77	5.6	140	48	1,700	18	540	6.0	3,000	---	550	9,870
1686	Qt	4/27/77	.04	68	6.8	310	4.7	87	230	410	---	200	2,090
1687	Qt	4/27/77	.01	39	6.2	390	3.5	270	11	480	---	120	2,110
1688	Qt	4/27/77	.33	33	8.5	48	4.6	120	75	170	---	120	941
1689	Qt	4/27/77	.40	30	5.5	14	2.0	160	60	53	---	98	613

[1]From Koester and Miller (1980), p. 12-18.
[2]Sum of constituents.

Table 11. *Selected Chemical Analyses of Low-Flow Surface Water in Erie County*[1]

(Results are in milligrams per liter unless otherwise indicated)

Low-flow stream site[2]	Date of sampling	Iron (Fe)	Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO_3)	Sul-fate (SO_4)	Chlo-ride (Cl)	Dis-solved solids	Hard-ness (as $CaCO_3$)	Specific conductance (µmho/cm at 25°C)	Dis-charge (ft^3/s)
03021400 West Branch of French Creek near Hornby (DA = 43.7 mi²)	5/21/70	---	25	4.6	---	---	105	12	4.0	---	82	182	16
	8/31/71	---	40	7.2	---	---	98	46	8.7	---	130	290	5.3
	9/26/74	---	---	---	---	---	110	20	8.0	---	---	218	9.7
	9/16/75	0.30	32	4.4	---	---	---	12	7.0	---	100	200	29
03021500 French Creek at Carters Corners (DA = 208 mi²)	5/17/77	1.18	33	7.7	---	---	---	12	10	176	116	250	---
	8/22/78	.79	37	8.3	---	---	---	20	11	196	126	225	---
03021520 French Creek at Union City (DA = 211 mi²)	8/18/76	.62	30	5.8	---	---	---	8.0	8.0	124	100	210	---
04213150 Walnut Creek near Erie (DA = 26.9 mi²)	8/17/76	---	55	13	---	---	---	40	79	378	194	530	---
	5/18/77	1.97	54	12	---	---	---	44	71	402	188	550	---
	8/16/78	.27	55	18	---	---	---	62	67	392	212	540	
04213160 Lake Erie at Erie Waterworks intake	8/19/76	.15	24	35	---	---	---	16	26	184	204	320	NA[3]
	5/11/77	.50	34	9.2	---	---	---	16	23	204	124	300	NA
	8/31/78	.05	35	12	---	---	---	---	24	200	136	260	NA
04213294 Sixteenmile Creek near North East (DA = 9.83 mi²)	10/23/75	3.48	52	15	---	---	---	50	48	360	192	490	---
	8/18/76	.19	56	6.2	---	---	---	34	41	320	166	420	---
	5/19/77	.16	64	9.7	---	---	---	43	47	366	200	380	---
	8/22/78	.16	---	---	---	---	---	110	56	442	206	600	---
04233085 Elk Creek at Lake City	8/17/76	.19	51	11	---	---	---	42	47	314	176	460	---
	5/16/77	.14	44	12	---	---	---	42	35	294	160	420	---
	8/15/78	.48	56	14	---	---	---	66	51	362	200	490	---

[1]From U.S. Geological Survey (1971, 1972a, 1972b, 1974, 1975a, 1975b, 1976, 1977, 1978, 1979). Data collected and analyzed by Pennsylvania Department of Environmental Resources.
[2]DA, drainage area.
[3]NA, not applicable.

Table 12. *Record of Wells*

Well location: The number that is assigned to identify the well. It is prefixed by a two-letter abbreviation of the county. The lat-long is the coordinates, in degrees and minutes, of the southeast corner of a 1-minute quadrangle within which the well is located.

Use: C, commercial; D, dewater; F, fire; H, domestic; I, irrigation; N, industrial; P, public supply; R, recreation; S, stock; T, test; U, unused; Z, other.

Topographic setting: C, stream channel; F, flat; H, hilltop; L, swamp; S, hillside; T, terrace; U, undulating; V, valley flat.

Aquifer: Qs, sands of Presque Isle; Qb, glacial-beach deposits; Qo, glacial-outwash deposits; Qt, glacial-till deposits; Mc, Cuyahoga Group; MDbr, Berea Sandstone through Riceville Formation, undivided; MDcr, Corry Sandstone through Riceville Formation, undivided; MDbv, Berea Sandstone through Venango Formation, undivided; Dv, Venango Formation; Dch, Chadakoin Formation; Dg, Girard Shale; Dne, Northeast Shale.

Lithology: c, clay; clgr, clayey gravel; fsed, fractured sedimentary rock, unclassified; fsh, fractured shale; fss, fractured sandstone; fst, fractured siltstone; gr, gravel; sd, sand; sdgr, sand and gravel; sed, sedimentary rock, unclassified; sh, shale; ss, sandstone; ssh, soft shale; st, siltstone; t, till; u, unconsolidated sediments, unclassified.

Static water level: Depth--F, flows but head is not known.
Date--month/last two digits of year.

Reported yield: gal/min, gallons per minute.

Specific capacity: (gal/min)/ft, gallons per minute per foot of drawdown.

Hardness: mg/L, milligrams per liter.

Specific conductance: µmho/cm at 25°C, micromhos per centimeter at 25 degrees Celsius.

Table 12.

Well location: Number	Well location: Lat-Long	Owner	Driller	Year completed	Use	Altitude of land surface (feet)	Topographic setting	Aquifer/ lithology
Er- 1	4157-7952	G. P. Estes	---	1936	U	1,440	S	Qt/gr
2	4204-8010	Kenneth Kallenbach	Vernon Reed	1948	H	790	S	Qo/gr
3	4205-8001	C. H. Lyons	do.	1950	H	1,030	S	Dch/sh
4	4206-8001	H. W. Zillman	Oakes and Bennett	1949	H	980	H	Qo/sdgr
5	4211-7957	C. A. Masso	Vircle L. Griffin	1947	H	650	F	Qo/gr
6	4212-7951	L. L. Parmenter	Ralph C. Parmenter	1947	H	790	F	Qb/gr
7	4211-7950	H. S. Orton	do.	1943	H	990	S	Dg/sh
8	4200-8020	Lake City Borough	Vernon Reed	1949	P	730	F	Qo/gr
9	4206-8001	Frank Schrimper	do.	1900	N	1,005	T	Dch/sh
10	4206-8000	R. E. Guckes	Oakes and Bennett	1946	H	1,025	S	Dch/sh
11	4205-8000	Joseph Holdsworth, Jr.	Ralph Freeman	1951	H	1,120	S	Dch/sh
12	4206-8000	W. E. Brightman	Vernon Reed	1950	H	1,105	H	Dch/sh
13	4207-8000	Clara Black	Oakes and Bennett	1947	H	805	S	Dne/sh
14	4208-8000	Carl Hayward	do.	1949	H	778	F	Dne/sh
15	4209-8000	William Bendig	---	---	H	652	T	Qb/u
16	4208-7959	Ralph Freeman	Ralph Freeman	1945	H	721	F	Dne/sh
17	4208-7959	Glenn Freeman	do.	1946	H	718	F	Dne/sh
18	4208-7959	Robert Hesch	---	1948	H	720	F	Dne/sh
19	4208-7959	Eugene Beliveau	Oakes and Bennett	1948	H	728	F	Dne/sh
20	4206-7958	A. C. Kellogg	---	1938	H	1,190	S	Dch/sh
21	4206-7957	Seth Tuttle	Oakes and Bennett	1947	H	1,255	S	Dch/sh
22	4206-7956	Fred Akerly	do.	---	H	1,220	S	Dch/sh
23	4209-7959	Raymond Fenell	Ralph Freeman	1946	H	650	F	Dne/sh
24	4209-7959	Kenneth Bird	do.	1947	H	685	F	Dne/sh
25	4209-7959	Clifford Bash	---	1949	H	685	F	Dne/sh
26	4209-7959	do.	---	1951	H	685	F	Dne/sh
27	4210-7956	M. Richards	---	---	H	725	F	Dne/sh
28	4210-7956	D. A. Parker	---	---	H	730	F	Dne/sh
29	4210-7958	C. G. Carlson	---	1949	H	640	U	Dne/sh
30	4215-7947	G. H. Hartman	Ralph C. Parmenter	1947	H	590	F	Dne/sh
31	4214-7946	John McGaughey	do.	1950	H	790	F	Dne/sh
32	4214-7949	Howard Post	Vircle L. Griffin	1945	H	705	---	Qo/sdgr
33	4212-7952	F. W. Allen	---	1930	H	780	F	Qo/u
34	4209-7958	Robert Wood	Ralph Freeman	1949	H	730	F	Dne/sh
35	4208-7959	Lawrence Schroll	do.	---	N	722	F	Dne/sh
36	4208-7958	Bernie Rice	do.	1949	H	745	F	Dne/sh
37	4210-7955	L. N. Field	---	1941	H	730	F	Dne/sh
38	4211-7953	Tacoma Pneumatic Foundry	Oakes and Bennett	1947	H	760	F	Dne/sh
39	4213-7948	P. R. Thompson	Vircle L. Griffin	1931	H	820	F	Dne/sh
40	4209-7959	Glenn Kauffman	Oakes and Bennett	1944	H	720	F	Dne/sh
41	4208-7959	Fred Edwards	do.	1943	H	730	F	Dne/sh
42	4208-7959	W. L. Speigelhalter	---	---	H	730	F	Dne/sh
43	4209-7959	E. Lachesky	Oakes and Bennett	1948	H	715	F	Dne/sh
44	4204-8012	Leo Garris	Vernon Reed	1950	C	720	F	Qb/gr
45	4203-8011	Colly Shilliff	Bernard P. Kuntz	1946	C	728	S	Qb/u
46	4207-7958	Donald Shepard	Oakes and Bennett	1950	H	983	S	Qo/gr
47	4212-7953	John Archer	Vircle L. Griffin	1947	C	750	F	Qo/gr
48	4212-7953	do.	do.	1947	C	750	F	Qo/gr
49	4212-7953	Gerald Bemis	do.	1951	H	750	F	Qo/gr
50	4214-7949	Paul Luke	do.	1947	H	605	U	Qt/u
52	4208-7959	Lawrence Schroll	---	---	H	735	F	Qb/gr
54	4212-7951	Cramer Motors Inc.	Vircle L. Griffin	1949	C	780	F	Qt/u
55	4214-7946	A. J. Reiman	---	1920	H	790	F	Qb/gr
56	4214-7946	David Worster	---	---	H	765	F	Qb/u
57	4214-7947	Mrs. Carl Hood	---	1920	H	700	S	Qb/u
58	4209-7959	Willard Harman	Oakes and Bennett	1946	H	732	F	Qt/u
60	4154-8024	G. Hagebone	J. M. Cole	1918	H	900	S	Dch/fst
61	4154-8022	Elmer Thompson	do.	---	H	860	V	Qt/gr
62	4153-8021	Bessemer and Lake Erie Railroad	---	---	H	910	V	Qo/sdgr
63	4152-8019	John Zeblecabage	J. M. Cole	1929	H	1,010	S	Qt/t
64	4151-8017	Albion Borough	---	1913	P	1,090	T	Qo/gr
65	4151-8017	do.	---	1913	P	1,090	T	Qo/gr
66	4152-8018	William Revak	J. M. Cole	1920	H	1,110	S	MDbv/sh
67	4154-8017	F. R. Warner	do.	1916	H	1,126	U	MDbv/st
68	4154-8016	Andy Sabol	---	1914	U	1,160	F	MDbv/sh
69	4154-8016	do.	J. M. Cole	1914	U	1,160	F	MDbv/st
70	4154-8014	Redlis Inc.	do.	1913	H	1,248	S	MDbv/fst
71	4157-8019	Charles Langdon	do.	1918	H	860	S	Qo/sdgr
72	4257-8017	Joseph Buren	do.	1915	H	930	F	Dch/fst
73	4201-8018	Girard Borough	---	1900	P	740	S	Qb/sdgr
74	4201-8015	J. T. Raine	Vernon Reed	1928	P	820	F	Qb/gr
75	4201-8015	do.	do.	1928	P	820	F	Qb/gr
79	4201-8003	Summit Township	Moody Drilling Co., Inc.	1965	U	1,370	S	Dv/fsh

(Continued)

Total depth below land surface (feet)	Casing: Depth (feet)	Casing: Diameter (inches)	Depth(s) to water-bearing zone(s) (feet)	Static water level: Depth below land surface (feet)	Static water level: Date measured (mo/yr)	Reported yield (gal/min)	Specific capacity [(gal/min)/ft]	Hardness (mg/L as $CaCO_3$)	Specific conductance (µmho/cm at 25°C)	pH (units)	Well number
19	---	48	---	19	8/36	---	---	---	---	---	Er- 1
18	---	8	---	F	5/51	15	---	210	428	8.0	2
72	---	6	---	28	1950	---	---	130	949	7.4	3
82	82	5	---	64	5/50	---	---	210	416	8.0	4
72	70	6	30	5	1947	---	---	190	1,020	8.0	5
52	---	4	---	---	---	---	---	220	434	8.0	6
49	---	6	---	5	7/51	---	---	180	395	7.3	7
36	36	8	---	8	5/51	110	---	300	559	7.8	8
32	---	---	---	---	---	---	---	256	618	7.8	9
45	---	---	---	---	---	---	---	168	354	7.8	10
46	---	---	---	---	---	---	---	98	348	8.0	11
75	65	---	---	---	---	---	---	156	455	7.9	12
40	---	---	---	---	---	---	---	178	554	7.8	13
40	---	---	---	---	---	---	---	126	533	7.8	14
36	---	---	---	---	---	---	---	312	2,310	7.5	15
40	---	---	---	---	---	---	---	96	295	6.6	16
32	---	---	---	---	---	---	---	98	563	7.8	17
40	---	---	---	---	---	---	---	132	1,790	7.6	18
34	---	---	---	---	---	---	---	258	3,560	7.2	19
65	9	---	---	9	---	---	---	124	654	7.6	20
80	8	---	---	---	---	---	---	190	505	7.7	21
45	---	---	---	---	---	---	---	118	359	7.7	22
26	---	---	---	---	---	---	---	98	262	6.7	23
35	---	---	---	---	---	---	---	346	1,000	7.4	24
39	---	---	---	---	---	---	---	192	1,170	7.6	25
12	12	24	---	---	---	---	---	238	1,160	7.7	26
30	22	---	---	---	---	---	---	94	275	6.5	27
25	---	---	---	---	---	---	---	26	797	8.4	28
82	32	6	42	20	---	---	---	184	2,010	7.6	29
53	---	---	---	---	---	---	---	364	750	7.3	30
51	---	---	---	---	---	---	---	176	347	7.5	31
60	---	---	---	---	---	---	---	120	279	7.7	32
64	---	---	---	27	---	---	---	146	321	6.6	33
41	6	---	---	---	---	---	---	444	5,060	6.9	34
40	---	---	35	---	---	---	---	236	1,240	7.2	35
35	---	---	---	---	---	---	---	158	1,230	7.2	36
24	---	---	---	---	---	---	---	124	566	6.9	37
39	---	---	---	---	---	---	---	76	195	6.5	38
45	---	---	---	---	---	---	---	178	360	7.6	39
40	15	---	---	---	---	---	---	38	641	7.8	40
30	---	---	---	---	---	---	---	116	1,140	7.8	41
30	---	---	---	---	---	---	---	91	1,170	7.6	42
48	---	---	---	---	---	---	---	68	239	6.3	43
60	60	---	---	---	---	---	---	120	417	8.0	44
38	38	---	---	F	---	---	---	190	460	7.6	45
35	---	---	22	---	---	---	---	82	206	6.8	46
78	78	---	---	---	---	---	---	252	494	7.8	47
50	---	---	---	---	---	---	---	258	497	7.7	48
79	79	---	---	12	7/51	---	---	238	459	7.7	49
60	---	---	---	---	---	---	---	190	3,840	7.3	50
15	15	---	---	8	7/51	---	---	100	318	6.3	52
65	65	---	---	---	---	---	---	122	251	7.1	54
28	28	---	---	---	---	---	---	310	568	7.3	55
20	---	5	---	---	---	---	---	144	420	7.5	56
28	28	---	---	---	---	---	---	136	315	7.4	57
30	---	---	22	---	---	---	---	88	303	6.4	58
103	83	4	---	30	7/28	---	---	---	---	---	60
113	80	4	---	6	---	---	---	---	---	---	61
30	30	3	---	---	---	---	---	---	---	7.4	62
51	14	4	---	15	---	---	---	---	---	---	63
29	29	8	---	F	---	---	---	---	---	7.6	64
20	20	10	---	3	---	---	---	---	---	---	65
72	43	4	---	4	9/20	---	---	---	---	---	66
36	17	4	---	6	---	---	---	140	---	8.1	67
54	---	4	---	6	---	---	---	---	---	---	68
50	---	4	---	6	---	---	---	---	---	---	69
72	19	4	---	16	---	---	---	---	---	---	70
77	77	4	55	40	---	---	---	---	---	---	71
100	43	4	---	---	---	---	---	---	---	---	72
12	12	20	---	8	---	---	---	190	---	7.6	73
52	52	8	40	24	---	15	---	---	---	8.0	74
51	51	8	41	24	---	15	15	---	---	8.0	75
46	46	6	13	5	10/65	4	.25	---	---	---	79

Table 12.

Well location		Owner	Driller	Year completed	Use	Altitude of land surface (feet)	Topographic setting	Aquifer/ lithology
Number	Lat-Long							
Er- 80	4201-8003	Summit Township	Moody Drilling Co., Inc.	1965	U	1,370	S	Dv/fsh
82	4156-8004	U.S. Geological Survey	do.	1966	U	1,419	H	Dv/sh
88	4151-8009	J. T. Young	J. M. Cole	1923	H	1,535	H	Mc/fst
90	4151-8012	Raymond Hotchkiss	do.	1929	H	1,260	S	MDbv/fst
91	4152-8000	Charles Pollock	---	---	H	1,200	S	Qo/u
93	4155-7959	T. B. Matchett	McCray Bros.	1923	H	1,190	V	Qo/gr
97	4156-7959	Waterford Water Supply Co.	---	1928	P	1,173	V	Qo/gr
98	4156-7959	do.	---	1924	P	1,173	V	Qo/gr
99	4156-7959	do.	---	1927	P	1,173	S	Qo/gr
102	4210-7957	New York Central Railroad	Vircle L. Griffin	1927	H	730	F	Dne/sh
103	4212-7953	R. C. Bard	Adgate Marshall	1911	H	750	F	Dne/ss
104	4212-7953	Louise Trejchel	do.	1911	H	750	F	Dne/ss
105	4210-7952	Roger Marshall	do.	1911	H	990	S	Qt/gr
106	4212-7950	Ross Jones	do.	1911	H	800	S	Dne/ss
107	4212-7950	North East Borough	do.	1911	H	800	F	Qt/u
108	4214-7950	May MacLachlan	do.	1911	H	640	S	Dne/ss
109	4213-7948	Margaret Pero	do.	1911	H	830	F	Dne/ss
110	4210-7948	Nora Morse	do.	1911	H	1,240	S	Dch/ss
111	4210-7946	W. R. Desin	do.	1911	H	1,480	S	Dch/ss
112	4207-7949	Josephine Lang	do.	1911	S	1,440	S	Dch/ss
113	4207-7949	do.	do.	1911	H	1,440	S	Dch/ss
114	4201-7949	Art Conrad	---	1930	C	1,297	V	Qo/u
115	4201-7948	A. T. Gilmore	---	---	H	1,290	V	Qo/u
116	4201-7946	L. J. Jensen	---	1913	H	1,340	V	Qo/gr
117	4156-7946	Amity Township School	McCray Bros.	1913	H	1,540	S	Qt/gr
118	4156-7946	Garry Prebble	do.	1917	H	1,480	T	Qo/gr
119	4155-7945	H. Dunn	do.	1913	H	1,420	V	Qo/gr
120	4153-7951	Merril Soul Milk Co.	---	---	N	1,272	V	Qo/gr
121	4154-7951	Will Gross	McCray Bros.	1915	H	1,250	V	Qo/sdgr
122	4154-7951	---	---	---	U	1,260	V	Dv/sh
123	4154-7948	Union City Borough	---	1920	P	1,380	S	Dv/sh
126	4153-7945	Crowley	McCray Bros.	1905	H	1,355	V	Qo/sd
127	4154-7944	Harrington	---	---	H	1,385	V	Qo/gr
128	4154-7944	Dave Lyons	---	---	H	1,380	V	Qo/gr
129	4152-7944	Lilley	---	---	H	1,390	S	Dv/fss
130	4154-7942	Charles Gates	McCray Bros.	1916	H	1,380	V	Qo/gr
131	4151-7943	Charles Drake	do.	1913	H	1,460	S	Qt/gr
132	4155-7940	State Fish Hatchery	do.	1921	Z	1,400	T	Qo/gr
136	4156-7938	Corry Water Supply Co.	---	1927	Z	1,420	V	Qo/gr
137	4155-7938	Ed Marsh	---	1926	H	1,410	V	Qo/u
138	4155-7938	A. A. Williams	---	1926	H	1,420	S	Dv/fss
139	4155-7938	Sweet	---	1903	H	1,435	F	Dv/sh
140	4154-7938	Corry Water Supply Co.	---	---	N	1,680	S	Dv/fss
141	4156-7959	Waterford Borough	Moody Drilling Co., Inc.	1962	P	1,175	V	Qo/sdgr
142	4152-8018	F. L. Kitcey	Alfred L. Burch	1970	H	1,112	S	Qt/sdgr
143	4152-8018	Ronald Mayer	Richard L. Ticknor	1975	H	1,162	H	MDbv/fsh
144	4152-8018	Daniel Donch	do.	1975	H	1,130	S	MDbv/fsh
145	4153-8015	John Surovick	B. W. Bateman and Son	1966	H	1,250	S	Qt/u
146	4153-8015	Jack Baker	Donald L. Hermann	1972	H	1,220	S	Qt/u
147	4153-8015	Francis Surovick	Moody Drilling Co., Inc.	1956	H	1,220	U	MDbv/fsh
148	4153-8018	R. T. Hallstead	do.	1957	H	1,150	U	MDbv/ss
149	4153-8018	Bliss Miller	B. W. Bateman and Son	1967	H	1,125	S	MDbv/fsh
150	4153-8018	Larry Valentine	Boyd Lee Hall	1971	H	1,135	S	MDbv/fsh
151	4153-8018	Stanley Rosecky	Alfred L. Burch	1967	H	1,142	S	MDbv/fsh
152	4153-8019	Dalton Hammett	do.	1974	H	1,076	T	MDbv/fsh
153	4153-8019	Glenn Hanas	Michael W. Burch	1976	H	1,088	S	MDbv/fss
154	4153-8019	W. L. Nelson	do.	1975	H	1,080	S	MDbv/fsh
155	4153-8019	David Timko	Alfred L. Burch	1970	H	1,050	S	MDbv/fsh
156	4153-8019	Edwin Sherman	Moody Drilling Co., Inc.	1964	H	1,080	S	MDbv/fsh
157	4153-8020	Lawrence Steinhoff	John E. Gage, Jr.	1971	H	985	T	Dch/fsh
158	4153-8020	Keith Merchants	Max E. Hickernell	1961	H	957	V	Dch/fsh
159	4153-8020	Lundy's Lane Church	Moody Drilling Co., Inc.	1959	H	938	V	Dch/fsh
160	4153-8020	John Dziak	B. W. Bateman and Son	1967	H	942	V	Dch/fsh
161	4153-8020	Archie Dodge	do.	1967	H	955	T	Qt/t
162	4153-8020	Milton Viard	do.	1967	H	942	T	Qt/t
163	4153-8021	Joseph Bayus	Richard L. Ticknor	1975	H	900	T	Dch/fsh
164	4154-8015	J. M. Semple	Boyd Lee Hall	1971	H	1,202	S	Qt/t
165	4154-8015	D. A. Soltis	B. W. Bateman and Son	1969	H	1,230	S	Qt/t
166	4154-8016	J. J. Schanz	Donald L. Hermann	1972	H	1,169	U	MDbv/ssh
167	4154-8016	A. P. Sabol	John E. Gage, Jr.	1974	H	1,172	U	MDbv/ssh
168	4154-8017	N. D. Martin	Alfred L. Burch	1972	H	1,132	U	MDbv/ssh
169	4154-8017	P. R. Crane	Moody Drilling Co., Inc.	1957	H	1,110	U	Dch/fsh
170	4154-8017	do.	Alfred L. Burch	1971	H	1,110	U	MDbv/fsh
171	4154-8018	Vergil Taylor	John E. Gage, Jr.	1972	H	1,100	U	Qt/gr

(Continued)

Total depth below land surface (feet)	Casing		Depth(s) to water-bearing zone(s) (feet)	Static water level		Reported yield (gal/min)	Specific capacity [(gal/min)/ft]	Hardness (mg/L as $CaCO_3$)	Specific conductance (μmho/cm at 25°C)	pH (units)	Well number
	Depth (feet)	Diameter (inches)		Depth below land surface (feet)	Date measured (mo/yr)						
53	46	6	---	5	10/65	21	.06	---	---	---	Er- 80
82	56	6	---	17	6/66	---	---	---	---	---	82
38	18	4	---	6	---	---	---	---	---	---	88
60	60	4	---	15	---	---	---	---	---	---	90
104	80	6	40	24	---	---	---	120	420	---	91
200	200	3	198	1	---	---	---	---	---	---	93
52	52	8	42	F	---	53	---	---	---	---	97
100	100	6	97	F	---	20	---	97	---	---	98
114	114	6	38	F	---	90	---	---	---	---	99
40	22	6	---	20	---	---	---	96	---	---	102
159	110	6	---	60	---	---	---	---	---	---	103
250	150	6	---	---	---	---	---	---	---	---	104
75	20	6	---	---	---	---	---	---	---	---	105
128	14	6	---	60	---	---	---	---	---	---	106
99	30	6	---	---	---	---	---	---	---	---	107
90	69	6	---	60	---	---	---	---	---	---	108
52	33	6	---	15	---	---	---	---	---	---	109
85	19	6	---	3	---	---	---	---	---	---	110
77	52	6	---	20	---	---	---	---	---	---	111
104	52	6	---	---	---	---	---	---	---	---	112
108	24	6	---	---	---	---	---	---	---	---	113
305	300	3	---	---	---	---	---	75	220	8.2	114
260	260	4	---	6	---	---	---	---	---	---	115
120	120	4	---	F	---	---	---	110	---	---	116
44	20	---	---	20	---	---	---	---	---	---	117
110	110	---	---	20	---	---	---	---	---	---	118
111	111	---	---	20	---	---	---	---	---	---	119
160	110	---	---	F	---	---	---	---	---	---	120
75	75	---	---	20	---	---	---	---	---	---	121
---	---	---	225	F	---	---	---	---	---	---	122
100	20	6	---	16	---	---	---	---	---	---	123
315	315	---	310	5	---	---	---	---	---	---	126
160	160	---	---	F	---	---	---	---	---	---	127
250	250	---	---	F	---	---	---	30	560	---	128
250	---	4	123	F	---	---	---	---	---	---	129
315	315	4	314	F	---	---	---	---	---	---	130
61	25	---	19	30	---	---	---	---	---	---	131
65	65	4	---	F	10/28	15	---	100	252	8.0	132
50	50	---	---	F	---	---	---	120	---	---	136
402	392	6	392	5	---	---	---	---	---	---	137
120	22	6	80;110	5	---	---	---	---	---	---	138
120	100	---	---	F	---	---	---	---	---	---	139
140	20	6	---	40	---	---	---	---	---	---	140
96	80	12	86	76	---	360	---	130	340	7.6	141
32	32	8	24	4	8/70	12	---	---	---	---	142
50	27	8	12;22	5	6/75	5	.23	---	---	---	143
50	17	8	14;16	5	6/75	7	.33	---	---	---	144
50	40	6	41	15	10/66	6	.24	---	---	---	145
52	21	12	21	10	11/72	15	.36	---	---	---	146
42	25	8	---	10	6/56	18	---	---	---	---	147
70	---	8	---	---	---	.1	---	35	1,100	---	148
53	20	6	34	10	6/67	3	.08	---	---	---	149
39	29	12	28;39	---	---	---	---	---	---	---	150
49	27	8	24	10	7/67	1	---	---	---	---	151
50	15	12	15;20;30	8	8/74	5	---	---	---	---	152
50	20	8	19;42	---	---	1	---	---	---	---	153
50	14	8	10;28	7	8/75	9	.22	---	---	---	154
40	21	8	16;20	---	---	10	---	---	---	---	155
55	47	8	45	14	4/64	12	.39	---	---	---	156
47	23	8	12;27	6	3/71	2	.05	---	---	---	157
75	26	12	60	24	6/61	5	---	---	---	---	158
83	30	8	---	20	9/59	2	---	---	---	---	159
50	27	6	18;30	12	8/67	3	.09	---	---	---	160
45	20	6	24	18	4/67	4	.18	---	---	---	161
50	23	6	16;25	6	11/67	8	.24	---	---	---	162
70	19	8	16	13	7/75	2	---	---	---	---	163
50	28	12	28;43	8	7/71	---	.30	220	530	---	164
45	24	6	28	4	10/69	5	.14	---	---	---	165
70	29	8	26	3	8/72	25	---	---	---	---	166
45	26	8	22	10	7/74	3	.20	---	---	---	167
50	27	8	23;48	5	4/72	5	.11	---	---	---	168
72	31	8	---	20	11/57	.5	---	---	---	---	169
60	31	8	10;14;40	4	7/71	5	---	---	---	---	170
34	24	---	12;23	7	6/72	7	.88	---	---	---	171

Table 12.

Well location		Owner	Driller	Year completed	Use	Altitude of land surface (feet)	Topographic setting	Aquifer/ lithology
Number	Lat-Long							
Er- 172	4154-8018	Jerry Pender	John E. Gage, Jr.	1974	H	1,116	H	MDbv/sh
173	4154-8018	do.	do.	1974	H	1,116	H	MDbv/sh
174	4154-8019	R. L. Jones	Moody Drilling Co., Inc.	1958	H	1,041	S	Dch/sh
175	4154-8019	James Klobusnik	Alfred L. Burch	1970	H	1,064	S	Qt/sdgr
176	4154-8021	C. W. Summerville	---	---	H	895	V	Qt/t
177	4155-8015	Erwin Koestel	B. W. Bateman and Son	1967	H	1,146	S	Qt/t
178	4155-8017	Roy Lydic	John E. Gage, Jr.	1972	H	1,078	T	Dch/fsh
179	4155-8018	Daniel Longstreth	Michael W. Burch	1975	H	1,100	S	Dch/sh
180	4155-8019	M. J. Pietrowski	Robert Anderson	1975	H	1,020	S	Qt/c
181	4155-8019	William Reiser	John E. Gage, Jr.	1975	H	958	S	Qt/c
182	4155-8019	Edith Margetta	do.	1973	H	1,040	S	Qt/sd
183	4155-8019	Lawrence Orr	B. W. Bateman and Son	1968	H	1,026	S	Dch/sh
184	4155-8017	John Morrison	John E. Gage, Jr.	1973	H	1,085	U	Dch/fsh
185	4155-8018	Donna Burger	Michael W. Burch	1975	H	1,089	S	Dch/sh
186	4155-8018	Edward Fletcher	John E. Gage, Jr.	1972	H	1,112	F	MDbv/fsh
187	4155-8019	Phillip Garlick	Richard L. Ticknor	1975	H	1,030	S	Dch/sh
188	4155-8019	R. J. Thoms	John E. Gage, Jr.	1973	H	960	S	Qo/sd
189	4155-8019	Paul Panko	Alfred L. Burch	1971	H	930	H	Qo/sdgr
190	4155-8020	Albert Kuzma	do.	1974	H	930	S	Qo/gr
191	4155-8020	E. J. Angellotti	John E. Gage, Jr.	1972	H	930	S	Qo/sd
192	4155-8022	W. H. Keith	do.	1970	H	860	H	Qt/gr
193	4153-8020	Elk Creek Township	Jack Young	1976	H	972	S	Qt/t
194	4156-8017	Dale Starr	do.	1976	H	1,068	S	Dch/fsh
195	4156-8018	D. L. Platz	John E. Gage, Jr.	1972	H	965	T	Qo/gr
196	4156-8018	R. M. Halm	do.	1972	H	920	U	Qo/gr
197	4156-8019	Richard Otteni	do.	1971	H	940	H	Qo/gr
198	4156-8019	Walter Youngs	George H. Ackerman	1972	H	942	H	Qt/t
199	4156-8019	T. V. Hunt	B. W. Bateman and Son	1969	H	875	S	Qt/t
200	4156-8019	William Hunt	do.	1969	H	872	S	Qt/t
201	4156-8020	Dennis Clendenning	John E. Gage, Jr.	1974	H	873	U	Dch/sh
202	4156-8020	Carl Pedano	do.	1970	H	875	S	Qt/sd
203	4156-8020	John Struchen	B. W. Bateman and Son	1969	H	875	S	Dch/sh
204	4156-8021	J. B. Shope	Lowell Halstead	1973	H	840	H	Qo/sd
205	4157-8015	O. R. Tome	Alfred L. Burch	1972	H	1,142	U	MDbv/sh
206	4157-8015	George Bucho	do.	1975	H	1,071	S	Dch/sh
207	4157-8015	Thomas Steinmiller	do.	1975	H	1,075	S	Dch/sh
208	4157-8017	R. P. Krahe	do.	1973	H	930	S	Dch/fsh
209	4157-8017	A. J. Silva	do.	1974	H	950	T	Dch/fsh
210	4157-8017	J. B. Cook	do.	1970	H	880	S	Dg/sh
211	4157-8017	J. A. Olack	George H. Ackerman	1974	H	932	H	Qo/u
212	4157-8017	William Felege	Lowell Halstead	1973	H	920	S	Qo/gr
213	4157-8018	William Soudan	Alfred L. Burch	1975	H	880	S	Qo/sdgr
214	4157-8019	J. L. Borland	do.	1974	H	860	F	Qo/u
215	4157-8019	Muriel Hollenbeck	do.	1973	H	873	H	Qo/sd
216	4157-8019	E. S. Rakowski	do.	1972	H	882	H	Qo/sd
217	4157-8019	Gordon Beers	B. W. Bateman and Son	1968	H	878	H	Qo/sd
218	4157-8019	John Shaffer	Alfred L. Burch	1966	H	862	T	Qo/gr
219	4157-8019	David Struchen	Lowell Halstead	1973	H	868	H	Qo/gr
220	4157-8019	Robert Shepherd	Alfred L. Burch	1975	H	890	H	Qo/sdgr
221	4157-8019	G. L. Strobel	John E. Gage, Jr.	1974	H	880	H	Qo/gr
222	4157-8020	T. D. Sterrett	Donald L. Hermann	1972	H	880	F	Qo/sdgr
223	4158-8016	William Bushelman	Alfred L. Burch	1969	U	755	H	Dg/sh
224	4158-8017	Lewis McDonald	Lowell Halstead	1973	H	870	F	Qo/gr
225	4158-8018	P. R. Hokanson	Michael W. Burch	1975	H	785	S	Dg/sh
226	4158-8021	H. C. Klein	B. W. Bateman and Son	1969	H	815	H	Qo/gr
227	4158-8021	Carol Feasler	do.	1969	H	816	F	Qo/gr
228	4158-8021	John Vancise	John E. Gage, Jr.	1974	H	817	H	Qo/gr
229	4158-8021	S. F. Gnacinski	Charles J. Richardson III	1973	H	830	F	Qo/sdgr
230	4158-8022	Anshelm Sundberg	McCray Bros.	1972	H	790	S	Qt/t
231	4159-8016	R. C. Herhold	Felix J. Waible	1974	H	890	H	Qo/sdgr
232	4159-8015	John Eckels	John E. Gage, Jr.	1975	H	945	H	Qo/sdgr
233	4159-8016	B. B. Gilmore	Alfred L. Burch	---	U	875	H	Qo/u
234	4159-8016	John Spaulding	Robert Anderson	1977	H	880	H	Qo/gr
235	4159-8016	B. B. Gilmore	Alfred L. Burch	1969	H	875	H	Qo/gr
236	4159-8017	Gerard Schellang	Michael W. Burch	1976	H	864	H	Dg/sh
237	4159-8017	Gunnison Bros. Tannery	Moody Drilling Co., Inc.	1958	H	750	S	Dg/sh
238	4157-8019	John Mitrison	Alfred L. Burch	1973	H	888	S	Qo/sd
239	4159-8019	Dennis Bills	do.	1975	H	828	S	Qo/sdgr
240	4159-8019	D. A. Graham	do.	1975	H	800	S	Qo/sdgr
241	4159-8019	Milton Baldwin	do.	1971	H	790	S	Qo/gr
242	4159-8019	Stephen Sorgen	do.	1974	H	795	S	Qo/sdgr
243	4159-8019	Joseh Michalski	do.	1973	H	826	S	Qo/sdgr
244	4159-8020	E. E. Cook	do.	1975	H	795	S	Qo/sdgr
245	4159-8020	Jack Baudau	do.	1972	H	738	V	Qo/gr

(Continued)

Total depth below land surface (feet)	Casing		Depth(s) to water-bearing zone(s) (feet)	Static water level		Reported yield (gal/min)	Specific capacity [(gal/min)/ft]	Hardness (mg/L as $CaCO_3$)	Specific conductance (μmho/cm at 25°C)	pH (units)	Well number
	Depth (feet)	Diameter (inches)		Depth below land surface (feet)	Date measured (mo/yr)						
38	28	8	13;22	5	8/74	8	.53	---	---	---	Er- 172
38	25	8	15;25	10	7/74	8	.40	---	---	---	173
75	19	10	---	15	6/58	.1	---	---	---	---	174
27	27	8	18	10	8/70	30	---	---	---	---	175
30	30	6	29	20	8/76	3	.43	---	---	---	176
45	31	6	33	12	6/67	6	.24	---	---	---	177
40	24	8	12;24	4	3/72	8	.57	---	---	---	178
50	13	8	---	8	9/75	4	.10	---	---	---	179
65	13	8	12;25;30	10	8/75	6	.12	---	---	---	180
50	18	8	18	---	---	4	---	---	---	---	181
31	21	8	10;21	3	5/73	18	1.5	---	---	---	182
45	19	6	20	10	8/68	2	.06	---	---	---	183
52	32	8	32	5	---	12	.67	---	---	---	184
50	13	8	9;28	2	---	4	.09	90	330	---	185
38	34	8	11;28	3	6/72	15	.68	---	---	---	186
50	19	8	16	6	7/75	6	---	---	---	---	187
46	29	8	9;15;29	2	5/73	18	1.4	---	---	---	188
30	30	8	12;20	---	---	20	.8	---	---	---	189
40	39	8	33	8	10/74	18	---	---	---	---	190
26	26	8	16;22	10	6/72	15	1.5	---	---	---	191
62	62	6	59	20	9/70	3	.10	---	---	---	192
50	30	8	19;24	15	9/76	8	.27	---	---	---	193
50	17	8	14;28;42	10	9/76	12	.34	---	---	---	194
30	24	---	19	15	6/72	7	.7	---	---	---	195
35	26	8	19	10	6/72	7	7	---	---	---	196
43	43	8	43	28	7/71	12	12	---	---	---	197
100	100	8	96	---	---	2	---	---	---	---	198
80	25	6	30	15	3/69	1	.02	---	---	---	199
85	30	6	32	20	2/69	2	.03	---	---	---	200
61	60	8	7;54	30	6/74	3	.3	---	---	---	201
127	127	8	121	61	6/70	3	.08	---	---	---	202
65	60	6	61	15	9/69	8	.23	---	---	---	203
98	98	8	90	---	---	60	---	---	---	---	204
60	10	8	11;25;50	10	9/72	8	---	---	---	---	205
45	16	8	15;20	14	10/75	.5	---	---	---	---	206
60	13	8	13;30	9	10/75	1	---	---	---	---	207
55	25	8	20;25;43	12	8/73	15	---	---	---	---	208
60	18	8	---	1	5/74	10	---	---	---	---	209
60	10	8	32	25	7/70	10	---	---	---	---	210
135	121	8	114	102	8/74	35	---	---	---	---	211
79	76	8	75	40	8/73	15	---	---	---	---	212
65	57	8	52	22	5/75	8	---	---	---	---	213
89	89	6	89	72	10/74	10	---	---	---	---	214
112	112	8	106	80	---	18	---	---	---	---	215
119	119	8	114	89	10/72	20	---	---	---	---	216
100	100	6	100	50	4/68	8	.19	---	---	---	217
85	73	8	69	---	---	10	---	---	---	---	218
82	82	8	25;78	20	8/73	30	---	---	---	---	219
111	111	8	105	86	5/75	20	2.0	---	---	---	220
118	118	8	112	60	5/74	12	.3	---	---	---	221
212	212	8	22;207	150	8/72	30	1.5	---	---	---	222
50	---	---	14	10	5/69	.3	.06	---	---	---	223
65	65	8	65	---	8/73	50	---	---	---	---	224
90	45	5	47	40	8/75	3	---	---	---	---	225
63	63	5	63	18	11/69	3	.08	---	---	---	226
68	68	5	68	33	10/69	4	.13	---	---	---	227
66	66	8	64	30	10/74	23	23	---	---	---	228
38	38	24	38	18	6/73	6	.5	---	---	---	229
53	53	---	10;20;50	20	3/72	1	.03	---	---	---	230
88	88	8	84	63	6/74	10	---	---	---	---	231
44	44	8	26;38	30	5/75	10	10	---	---	---	232
60	60	8	---	---	---	---	---	---	---	---	233
36	36	8	32	18	2/77	15	2.1	---	---	---	234
32	32	8	27	17	5/69	5	---	---	---	---	235
117	90	8	95	70	4/76	.3	.01	---	---	---	236
60	21	10	---	---	---	3	---	---	---	---	237
60	44	8	37;46	22	8/73	9	---	---	---	---	238
68	68	8	40;60	34	7/75	20	2.0	---	---	---	239
74	74	8	41;50;65	25	1/75	18	.46	---	---	---	240
42	42	8	38	14	4/71	50	---	190	640	---	241
60	60	8	55	20	8/74	30	1.5	---	---	---	242
88	88	8	41;44	45	8/73	30	---	---	---	---	243
60	60	8	30;56	15	11/75	20	1	---	---	---	244
20	20	8	15	8	4/72	10	---	---	---	---	245

Table 12.

Well location		Owner	Driller	Year completed	Use	Altitude of land surface (feet)	Topographic setting	Aquifer/lithology
Number	Lat-Long							
Er- 246	4159-8020	J. W. Pustelak	Alfred L. Burch	1972	H	736	V	Qo/gr
247	4159-8021	D. L. Lance	do.	1972	H	745	S	Qo/sdgr
248	4159-8021	Neil Anderson	do.	1970	H	742	S	Qo/sd
249	4159-8021	D. S. Carey	do.	1974	H	755	H	Qo/sd
250	4158-8022	L. V. Komisarski	Max E. Hickernell	1971	H	754	V	Qo/gr
251	4154-8023	Fred Kiedaisch	Jack Young	1976	H	859	S	Qo/sdgr
252	4151-8024	W. J. Lawrence	Alfred L. Burch	1971	H	870	V	Dch/sh
253	4152-8023	D. C. Byerley	do.	1971	H	890	S	Dch/sh
254	4152-8027	C. M. English	Richard L. Ticknor	1975	H	954	T	Dch/sh
255	4151-8024	Kenneth Adams	Boyd Lee Hall	1973	H	850	V	Qo/sd
256	4152-8028	Paul Valinsky	Lorenze Lee Hall	1976	H	955	T	Dch/ssh
257	4151-8024	William Knapp	B. W. Bateman and Son	1969	H	930	S	Dch/ssh
258	4151-8023	Napoleon Lockhart	do.	1968	H	965	H	Dch/sh
259	4151-8025	William Hale	Lorenze Lee Hall	1976	H	952	S	Dch/fsh
260	4152-8025	J. A. Harrington	Alfred L. Burch	1973	H	880	S	Qo/sd
261	4152-8028	J. J. Frey	Richard L. Ticknor	1975	H	952	F	Qo/gr
262	4152-8029	J. A. Lloyd	do.	1975	H	960	U	Qo/gr
263	4152-8031	Roy Huston	Lowell Halstead	1973	H	955	F	Dch/sh
264	4152-8031	Barbara Fawcett	John E. Gage, Jr.	1972	H	910	U	Qt/sd
265	4154-8031	R. R. Hammer	Max E. Hickernell	1970	H	850	H	Qo/gr
266	4156-8030	Richard Reinke	do.	1968	H	680	F	Qt/gr
267	4152-8024	Stanley Loomis	Moody Drilling Co., Inc.	1963	H	861	T	Qo/gr
268	4152-8026	A. B. Nearhoof	John E. Gage, Jr.	1970	H	940	U	Qo/gr
269	4152-8026	D. P. Blood	Alfred L. Burch	1972	H	950	F	Qo/sd
270	4152-8028	George Fronce	Lorenze Lee Hall	1975	H	952	F	Dch/sh
271	4153-8023	John Kulyk	Moody Drilling Co, Inc.	1954	H	892	U	Qo/sdgr
272	4153-8023	Arturs Eigners	Alfred L. Burch	1964	H	860	V	Qo/gr
273	4153-8023	William Greenlee	Max E. Hickernell	1966	H	860	V	Qo/gr
274	4153-8024	W. J. Simlick	Boyd Lee Hall	1973	H	856	H	Qt/c
275	4153-8024	Thomas Roan	do.	1970	H	868	S	Qt/u
276	4153-8024	Charles English	Max E. Hickernell	1972	H	850	S	Qt/gr
277	4153-8024	E. L. Simlick	John E. Gage, Jr.	1974	H	850	H	Qt/c
278	4153-8025	William Van Genewitt	Max E. Hickernell	1965	H	900	H	Dch/fsh
279	4153-8025	Pearl Moyer	Moody Drilling Co., Inc.	1961	H	902	F	Dch/fsh
280	4153-8026	Rex Jackson	John E. Gage, Jr.	1972	H	924	S	Qt/c
281	4153-8026	Pearl Callahan	Boyd Lee Hall	1970	H	901	H	Qt/c
282	4153-8026	Harry Minch	B. W. Bateman and Son	1969	H	910	H	Dch/fsh
283	4153-8026	Frank Czulewicz	Max E. Hickernell	1967	H	920	H	Dch/fsh
284	4153-8028	Clarence Bricker	Jack Young	1976	H	925	U	Dch/fsh
285	4153-8028	A. F. Hemstreet	John E. Gage, Jr.	1974	H	905	V	Qo/gr
286	4153-8029	Gordon Hill	Berkley D. Bossard	1967	H	910	U	Dch/sh
287	4153-8029	Arnold Hill	do.	1967	H	918	U	Dch/fsh
288	4153-8026	Peter Loepp	do.	1967	H	935	U	Dch/sh
289	4153-8026	John Gable	do.	1967	H	935	U	Dch/sh
290	4153-8026	John Avey	do.	1967	H	922	U	Dch/sh
291	4153-8027	Elmer Randall	B. W. Bateman and Son	1967	H	925	U	Dch/fsh
292	4153-8029	Harold Isiminger	Lowell Halstead	1973	H	920	H	Qo/gr
293	4153-8025	Bernard Kinney	B. W. Bateman and Son	1966	H	898	S	Dch/sh
294	4154-8026	Roy Beckman	Berkley D. Bossard	1967	H	910	S	Qo/gr
295	4154-8024	Rodney Klemm	B. W. Bateman and Son	1968	H	915	S	Qo/gr
296	4154-8023	D. K. Braddock	Michael W. Burch	1975	H	850	S	Qo/sdgr
297	4154-8023	Carl White	Max E. Hickernell	1971	H	890	S	Qo/gr
298	4154-8023	Carl Hahn	Alfred L. Burch	1967	H	892	H	Qt/c
299	4154-8023	Carlyle Krieg	John E. Gage, Jr.	1974	H	912	U	Qt/sd
300	4154-8024	Dale Fobes	Max E. Hickernell	1970	H	920	S	Qt/clgr
301	4154-8024	David Carnes	U. S. Dean	1973	H	905	S	Qt/gr
302	4154-8025	T. M. Ryan	Alfred L. Burch	1970	H	908	S	Qt/clgr
303	4154-8025	R. L. Bomboy	John E. Gage, Jr.	1974	H	890	V	Qt/t
304	4154-8025	Merle Sterling	Max E. Hickernell	1969	H	900	S	Qt/clgr
305	4154-8025	Michael Rastetter	Ralph Wayne Grant	1974	H	900	S	Qt/c
306	4154-8026	Walter Henderson	Lowell Halstead	1973	H	910	V	Dch/fsh
307	4154-8026	E. B. Brennan	Berkley D. Bossard	1970	H	910	V	Qt/c
308	4154-8026	Roland Zuschlag	Lowell Halstead	1973	H	905	S	Qt/gr
309	4154-8027	R. H. White	Max E. Hickernell	1971	H	910	S	Qt/gr
310	4154-8027	D. L. Robson	John E. Gage, Jr.	1974	H	910	U	Qt/gr
311	4154-8025	Robert Dorchester	do.	1974	H	904	S	Qt/sd
312	4155-8022	Joseph Iesue	Lorenze Lee Hall	1975	H	862	H	Qo/sdgr
313	4155-8027	Anson Thornton	Max E. Hickernell	1969	H	882	H	Qo/gr
314	4155-8027	R. H. Henck	Charles J. Richardson III	1973	H	867	H	Qo/sdgr
315	4155-8028	W. J. Elliott	John E. Gage, Jr.	1974	H	855	S	Qo/sd
316	4156-8024	Earl Born	do.	1975	H	826	S	Qo/gr
317	4156-8027	G. W. Hills	Alfred L. Burch	1968	H	784	S	Qo/sdgr
318	4157-8024	Donald Adams	Max E. Hickernell	1970	H	790	S	Qt/sd
319	4157-8025	William Marino	John E. Gage, Jr.	1970	H	735	F	Qb/sd

(Continued)

Total depth below land surface (feet)	Casing		Depth(s) to water-bearing zone(s) (feet)	Static water level		Reported yield (gal/min)	Specific capacity [(gal/min)/ft]	Hardness (mg/L as $CaCO_3$)	Specific conductance (μmho/cm at 25°C)	pH (units)	Well number
	Depth (feet)	Diameter (inches)		Depth below land surface (feet)	Date measured (mo/yr)						
22	22	8	16	7	7/72	20	---	---	---	---	Er- 246
34	34	8	21	19	11/72	20	---	---	---	---	247
40	40	8	---	21	12/70	6	6	---	---	---	248
26	26	8	18;21	14	8/74	15	---	---	---	---	249
38	38	8	34	24	11/71	10	---	---	---	---	250
60	60	8	12;58	10	7/76	10	.33	---	---	---	251
60	23	8	21;33	10	10/71	8	---	---	---	---	252
50	25	8	13;20;37	10	4/71	2	---	---	---	---	253
45	24	8	14;20	4	7/75	11	.48	---	---	---	254
124	124	8	95;110	14	10/73	25	1.8	---	---	---	255
49	24	8	20;30	3	6/76	6	.14	---	---	---	256
45	12	6	14	8	3/69	3	.09	---	---	---	257
50	12	6	16	8	10/68	2	.05	---	---	---	258
64	21	8	25	---	---	5	---	---	---	---	259
37	37	8	10;30	19	10/73	30	5	---	---	---	260
40	22	8	12;18	5	5/75	4	---	---	---	---	261
50	24	8	20	6	6/75	7	.2	---	---	---	262
55	25	8	25	---	---	5	---	---	---	---	263
48	24	8	12;17	15	10/72	7	7	---	---	---	264
76	57	8	53;68	48	8/70	12	---	---	---	---	265
65	54	8	56	20	11/68	1	---	---	---	---	266
108	104	8	65	35	10/63	8	8	---	---	---	267
38	38	6	34	10	9/70	3	.14	---	---	---	268
50	38	8	30	13	6/72	8	---	---	---	---	269
50	29	8	26;43	---	---	---	---	---	---	---	270
48	45	12	---	35	3/54	15	---	---	---	---	271
128	105	6	100;102	---	---	2	---	---	---	---	272
130	101	6	103	80	9/66	.5	---	---	---	---	273
52	50	8	50	5	10/73	3	.06	---	---	---	274
36	36	5	36	16	10/70	5	5	---	---	---	275
80	69	8	74	60	6/72	2	---	---	---	---	276
51	40	8	43	15	9/74	5	.2	---	---	---	277
42	21	8	36;41	20	7/65	5	---	---	---	---	278
50	---	8	---	12	12/61	15	---	---	---	---	279
40	22	8	12;22	10	9/72	12	12	---	---	---	280
44	23	8	39	15	10/70	5	.62	---	---	---	281
40	21	5	25	2	8/69	10	.36	---	---	---	282
60	23	8	25;39	2	10/67	3	---	---	---	---	283
35	22	8	9;20	5	7/76	7	.28	---	---	---	284
35	35	8	31	15	10/74	8	---	---	---	---	285
50	23	8	17	9	7/67	2	.05	---	---	---	286
50	20	8	14;20	1	9/67	15	1.1	---	---	---	287
47	24	8	18	8	6/67	4	.45	---	---	---	288
44	---	6	12;18	4	6/67	2	.18	160	430	---	289
44	27	6	22	6	7/67	.5	---	---	---	---	290
40	13	6	14;22	1	8/67	8	.3	---	---	---	291
88	88	8	80	58	6/73	6	---	130	500	---	292
40	24	6	26	10	9/66	3	.12	---	---	---	293
65	61	6	56;65	14	7/67	12	.33	---	---	---	294
80	78	6	80	15	6/68	3	.05	---	---	---	295
105	105	8	11;83;103	50	7/75	15	.50	---	---	---	296
81	81	6	77	40	1971	7	---	---	---	---	297
110	99	8	21	---	---	---	---	---	---	---	298
113	113	8	113	40	8/74	4	.20	---	---	---	299
80	68	8	---	20	8/70	15	---	---	---	---	300
71	71	8	68	---	---	20	---	---	---	---	301
75	44	8	40;52	---	---	4	---	---	---	---	302
34	34	8	19;21	15	10/74	7	---	---	---	---	303
40	27	8	31	12	7/69	20	---	---	---	---	304
55	35	8	---	---	---	---	---	---	---	---	305
46	40	8	35;42	---	---	5	---	---	---	8.3	306
53	43	6	38	7	9/70	16	.47	---	---	---	307
57	57	8	57	35	9/73	5	---	---	---	---	308
70	70	8	67	50	11/71	15	---	---	---	---	309
72	72	8	68	30	10/74	5	---	160	640	---	310
48	48	8	18;41	18	4/74	7	7	---	---	---	311
97	95	6	97	32	6/75	18	---	---	---	---	312
55	55	8	51	39	10/69	20	---	---	---	---	313
36	36	30	24	24	6/73	5	.50	255	610	---	314
93	93	8	29;86	53	4/74	22	22	---	---	---	315
50	50	8	44	14	2/75	2	---	---	---	---	316
80	64	8	60	55	9/68	.5	---	---	---	---	317
86	86	8	78	55	7/70	10	---	---	---	---	318
39	39	6	33	10	9/70	2	.2	---	---	---	319

Table 12.

Well location		Owner	Driller	Year completed	Use	Altitude of land surface (feet)	Topographic setting	Aquifer/lithology
Number	Lat-Long							
Er- 320	4157-8026	C. E. Ryen	John E. Gage, Jr.	1971	H	711	F	Qb/gr
321	4157-8023	Charles Schmidt	Max E. Hickernell	1968	H	812	S	Qt/sd
322	4157-8025	Steven Lascak	B. W. Bateman and Son	1967	H	735	F	Qb/sd
323	4158-8024	H. L. Althouse	Alfred L. Burch	1970	P	722	F	Qb/sd
324	4157-8023	Merle English	B. W. Bateman and Son	1967	H	830	F	Qt/u
325	4156-8027	Leonard Coleman	do.	1966	H	750	H	Qb/sd
326	4152-8023	Earl Davis	do.	1968	H	890	S	Dch/sh
327	4152-8023	Esther Brooks	do.	1968	H	912	S	Dch/sh
328	4153-8022	Alex Bennett	Max E. Hickernell	1973	H	875	S	Dch/sh
329	4155-8028	Timothy Kupetz	Michael W. Burch	1976	H	850	H	Dg/sh
330	4154-8021	Lynn Drury	B. W. Bateman and Son	1967	H	890	S	Qo/gr
331	4154-8022	John Gage	do.	1968	H	890	H	Qo/sd
332	4152-8022	Alex Pankion	do.	1969	H	1,010	V	Qt/t
333	4151-8019	Norman Stevens	do.	1968	H	1,088	S	Qt/t
334	4152-8019	Sylvester Graczyk	Boyd Lee Hall	1973	H	985	S	Qt/t
335	4152-8019	Gerald Ulan	Max E. Hickernell	1968	H	1,021	S	Dch/st
336	4151-8016	Ronald Kimmy	Alfred L. Burch	1968	H	1,245	S	MDbv/fsh
337	4151-8016	James Loughner	do.	1966	H	1,245	S	MDbv/fsh
338	4151-8018	Paul Uram	Max E. Hickernell	1973	H	1,090	S	Dch/st
339	4152-8022	Stephen Duda	Alfred L. Burch	1970	H	1,008	F	Dch/fsh
340	4151-8021	A. B. McAdoo	Max E. Hickernell	1970	H	1,083	H	MDbv/st
341	4152-8022	George Rendulic	Alfred L. Burch	1967	H	987	U	Dch/fsh
342	4151-8019	R. F. Main	Max E. Hickernell	1975	H	1,080	U	Qo/gr
343	4151-8018	Violet Rath	do.	1970	H	1,088	U	Qt/gr
344	4152-8022	George Watral	Alfred L. Burch	1973	H	1,005	V	Dch/sh
345	4152-8020	D. E. Terry	John E. Gage, Jr.	1975	H	1,030	S	Dch/fsh
346	4151-8018	Gordon Neal	Boyd Lee Hall	1971	H	1,095	U	Dch/sh
347	4151-8007	Ward Hambry	Alfred L. Burch	1966	H	1,200	V	Qt/clgr
349	4151-8008	Ronald Larson	Boyd Lee Hall	1969	H	1,340	S	MDbr/sh
350	4151-8008	S. W. Bowne	Alfred L. Burch	1966	H	1,325	S	MDbr/fsh
351	4151-8009	J. C. Snyder	Boyd Lee Hall	---	H	1,485	S	Mc/fsh
352	4151-8009	Casimer Yeast	Moody Drilling Co., Inc.	1965	H	1,525	S	Mc/sh
353	4151-8009	R. A. Davis	Boyd Lee Hall	1967	H	1,525	S	Mc/sh
354	4151-8009	L. K. Harned	Max E. Hickernell	1966	H	1,455	S	MDbr/fsh
355	4151-8009	Gordon Flood	Boyd Lee Hall	1971	H	1,515	S	Mc/fsh
356	4151-8012	H. G. Hardman	do.	1973	S	1,378	S	MDbv/fsh
357	4151-8013	Robert Ward	do.	1975	H	1,225	S	MDbv/fsh
358	4152-8008	Bruce Hackensmith	Max E. Hickernell	1967	H	1,250	S	Dv/sed
359	4152-8009	T. K. Rowland	John E. Gage, Jr.	1973	H	1,450	S	Qt/u
360	4152-8011	Boyd Nelson	Alfred L. Burch	1969	H	1,445	V	Qt/sdgr
361	4152-8013	Steve Watrol	Max E. Hickernell	1971	H	1,243	V	Qo/gr
362	4152-8013	Steve Panko, Jr.	Lorenze Lee Hall	1973	H	1,250	S	Qo/sdgr
363	4200-8015	R. S. Pustelak	Lowell Halstead	1973	H	885	S	Qo/sd
364	4200-8015	Richard Gill	George H. Ackerman	1968	H	910	T	Qo/gr
365	4200-8015	Joseph Lamberton	Alfred L. Burch	1975	U	880	V	Qt/t
366	4200-8015	do.	do.	1975	H	870	V	Qo/sdgr
367	4200-8016	Louis Kolarick	Max E. Hickernell	1963	H	845	U	Qo/gr
368	4200-8016	---	Donald L. Hermann	1972	H	880	U	Qo/t
369	4200-8016	Patrick Filutze	Felix J. Waible	1977	H	840	S	Qo/gr
370	4200-8017	Lucman Land Corp.	Moody Drilling Co., Inc.	1972	P	785	F	Qb/gr
371	4200-8017	do.	do.	1972	P	790	F	Qb/gr
372	4200-8021	L. H. Laborde	B. W. Bateman and Son	1969	H	660	S	Dne/sh
373	4201-8015	Fairview Borough	Alfred L. Burch	1974	P	815	T	Qb/gr
374	4201-8016	George Wiser	Michael W. Burch	1975	H	760	S	Qb/gr
375	4201-8021	P. A. Burger	Charles J. Richardson III	1974	H	640	F	Qb/sdgr
376	4203-8016	W. H. Neason	do.	1973	H	660	F	Qb/sdgr
377	4203-8016	A. E. Narducci	Alfred L. Burch	1972	H	640	F	Qb/clgr
378	4203-8016	do.	Charles J. Richardson III	1973	H	600	S	Qb/sdgr
379	4203-8015	E. J. Seppala	Alfred L. Burch	1976	H	655	F	Qb/sd
380	4200-8015	G. W. Kunz	Donald L. Hermann	1972	H	900	F	Qo/sdgr
381	4200-8015	W. H. Williams, Jr.	George H. Ackerman	1974	H	840	S	Qo/sd
382	4200-8015	W. H. Williams	do.	1973	H	840	S	Qo/sd
383	4200-8015	R. J. Carter	do.	1972	H	862	H	Qo/u
384	4200-8016	R. C. Weed, Jr.	Charles J. Richardson III	1973	H	852	S	Qo/sdgr
385	4200-8017	A. A. Bartfai	Lowell Halstead	1973	H	860	H	Qo/gr
386	4200-8017	D. P. Cassell	do.	1973	H	880	H	Qo/gr
387	4200-8020	Frederick Leffingwell	Alfred L. Burch	1972	H	640	V	Qo/u
388	4201-8015	Fairview Borough Water Authority	do.	1970	P	815	T	Qo/gr
389	4201-8019	Michael Sakuta	Charles J. Richardson III	1973	H	723	F	Qb/sdgr
390	4202-8015	D. C. Schaper	George H. Ackerman	1972	H	676	F	Qb/u
391	4202-8015	V. G. Rice	Donald L. Hermann	1973	H	690	F	Qb/sdgr
392	4202-8015	Richard Wheeler	Charles J. Richardson III	1973	H	688	T	Qb/sdgr
393	4202-8018	J. O. Evans	Robert Anderson	1974	H	615	S	Qb/c

(Continued)

Total depth below land surface (feet)	Casing: Depth (feet)	Casing: Diameter (inches)	Depth(s) to water-bearing zone(s) (feet)	Static water level: Depth below land surface (feet)	Static water level: Date measured (mo/yr)	Reported yield (gal/min)	Specific capacity [(gal/min)/ft]	Hardness (mg/L as $CaCO_3$)	Specific conductance (µmho/cm at 25°C)	pH (units)	Well number
38	38	8	32;35	25	6/71	5	5	---	---	---	Er- 320
91	91	8	85	50	5/68	10	---	---	---	---	321
50	50	6	23;50	15	3/67	3	.09	---	---	---	322
96	96	8	11;85;91	18	8/70	10	---	---	---	---	323
65	65	6	65	25	7/67	2	.06	---	---	---	324
46	46	6	32	2	9/66	2	.05	---	---	---	325
40	18	6	20	10	8/68	2	.07	---	---	---	326
45	11	6	12	6	7/68	2	.06	---	---	---	327
75	43	8	48	14	2/73	1	---	---	---	---	328
55	17	8	21	11	6/76	2	.05	---	---	---	329
22	21	6	20	12	4/67	3	.38	---	---	---	330
102	102	6	46;102	40	11/68	4	.09	---	---	---	331
40	15	6	16	3	5/69	10	.59	310	1,050	---	332
85	35	6	45;75	25	1/68	2	.08	---	---	---	333
40	29	8	18	10	7/73	5	.36	---	---	---	334
80	32	6	60	25	7/68	2	---	---	---	---	335
50	31	8	31;40	20	8/68	20	1	---	---	---	336
50	25	8	22;33;42	8	7/66	30	2.5	---	---	---	337
68	37	8	42	12	3/73	5	---	---	---	---	338
47	32	8	12;13;17;32	8	9/70	9	---	---	---	---	339
62	62	8	41;58	10	8/70	2	---	---	---	---	340
40	21	8	8;15;30	2	3/67	15	---	---	---	---	341
60	52	6	45;55	45	10/75	30	30	---	---	---	342
70	41	6	---	34	5/70	---	---	---	---	---	343
50	28	8	14;18;29	10	10/73	3	---	---	---	---	344
47	8	8	12;14;17	---	---	7	---	100	310	---	345
71	31	8	35	12	8/71	2	.04	---	---	---	346
50	30	8	15;25;40	8	7/66	15	---	70	300	---	347
101	---	8	69;97	50	5/69	11	.9	---	---	---	349
45	39	8	35;40	27	9/66	30	10	---	---	---	350
69	38	8	44;64	8	---	12	.3	---	---	---	351
102	20	7	28;91	30	9/65	7	---	---	---	---	352
41	27	8	---	1	---	20	1.4	---	---	---	353
130	34	6	60;85;110	30	9/66	2	---	---	---	---	354
69	38	12	44;66	20	7/71	62	62	---	---	---	355
40	20	8	15;35	10	1973	20	1	---	---	---	356
74	21	10	20;65	11	5/75	10	.17	---	---	---	357
52	25	6	29;39;45	---	---	20	---	---	---	---	358
36	28	8	16;24	8	8/73	15	15	---	---	---	359
60	45	8	14;30;41	7	3/69	8	---	---	---	---	360
40	26	8	19	7	9/71	15	---	---	---	---	361
40	38	8	35	8	7/63	40	3.3	---	---	---	362
84	84	8	38;81	---	---	30	---	---	---	---	363
38	38	6	38	6	5/68	20	---	---	---	---	364
74	62	8	8;58	---	---	---	---	---	---	---	365
17	17	8	7	4	6/75	20	---	---	---	---	366
41	41	7	---	10	3/63	20	---	---	---	---	367
96	92	8	22;92	18	7/72	5	.07	---	---	---	368
49	49	8	45	7	3/77	40	---	---	---	---	369
61	61	8	40	2	6/72	600	25	---	---	---	370
51	32	8	30	F	6/72	490	22	---	---	---	371
40	26	6	12;26	6	6/69	6	.23	---	---	---	372
40	35	12	---	24	5/74	100	7.7	---	---	---	373
45	45	8	38	35	8/75	13	1.6	---	---	---	374
34	34	30	20	20	6/74	6	.5	160	330	---	375
20	20	24	8	8	10/73	7	.7	---	---	---	376
53	---	8	15;53	---	---	---	---	---	---	---	377
34	34	30	24	16	9/73	5	.4	180	550	---	378
70	64	8	28;59	15	5/76	1	---	---	---	---	379
113	113	8	105;110	83	8/72	16	2.3	---	---	---	380
70	60	8	---	---	---	---	---	---	---	---	381
110	60	8	100	---	---	0	---	---	---	---	382
66	---	8	62	---	---	10	---	---	---	---	383
23	23	24	10	8	8/73	6	.43	---	---	---	384
78	78	8	70	---	---	6	---	---	---	---	385
74	74	8	74	19	9/73	80	---	---	---	---	386
40	13	8	7	8	10/72	1	---	---	---	---	387
50	37	8	19;30;42	24	3/70	30	---	---	---	---	388
16	16	30	7	7	7/73	12	4	---	---	---	389
50	16	8	16	5	6/72	10	---	---	---	---	390
32	32	8	29	13	1/73	20	2.2	---	---	---	391
18	18	30	7	8	11/73	7	.9	---	---	---	392
20	10	12	2	1	6/74	6	.35	---	---	---	393

Table 12.

Well location		Owner	Driller	Year completed	Use	Altitude of land surface (feet)	Topographic setting	Aquifer/ lithology
Number	Lat-Long							
Er- 394	4203-8016	Hugh McClelland	Charles J. Richardson III	1973	H	662	F	Qb/gr
395	4200-8007	Stanley Tecza	Donald L. Hermann	1973	H	1,080	H	Dch/ssh
396	4200-8008	A. J. Hoehn	Lowell Halstead	1973	H	1,082	H	Qt/gr
397	4200-8009	R. A. Jaworowicz	Robert Anderson	1975	H	1,060	S	Qt/t
398	4200-8009	F. E. Hammer	Donald L. Hermann	1972	H	1,032	S	Qt/clgr
399	4200-8010	Ronald Waisley	do.	1976	H	1,018	S	Dch/sh
400	4200-8010	J. A. Spaulding	Robert Anderson	1974	H	1,005	S	Dch/fsh
401	4200-8010	James Toner	do.	1974	H	1,022	S	Dch/fst
402	4200-8011	Spartan Inns of America Inc.	Felix J. Waible	1975	P	1,000	H	Qo/sdgr
403	4200-8013	Paul Bacik, Jr.	Robert Anderson	1974	H	952	H	Qt/t
404	4200-8013	Thomas Terella	---	---	H	950	H	Qt/u
405	4200-8013	David Pollock	Alfred L. Burch	1966	H	950	T	Qo/sd
406	4200-8014	W. R. Meyer	do.	1964	H	920	H	Qo/sdgr
407	4200-8014	J. M. Walsh	---	---	H	920	S	Qo/u
408	4200-8014	J. D. Baker	Alfred L. Burch	1971	H	930	S	Qt/sd
409	4201-8007	J. A. Bernet	do.	1969	H	1,076	F	Dch/fsh
410	4201-8007	Allan Otteni	do.	1970	H	1,082	F	Dch/fsh
411	4201-8007	W. H. Heath	Robert Anderson	1972	H	1,080	S	Dch/fsh
412	4201-8007	Robert Broussard	Michael W. Burch	1976	H	1,075	F	Dch/fsh
413	4201-8008	P. J. Zukowski	Harlan and Fenical	1974	H	1,062	F	Qo/u
414	4201-8008	H. D. Taylor	Lorenze Lee Hall	1973	H	1,063	S	Dch/fsh
415	4201-8008	Ross Wyman	John A. Quarno, Jr.	1976	H	1,055	S	Qo/sdgr
416	4201-8008	Happy Homes Enterprises Inc.	Michael W. Burch	1975	P	1,080	F	Dch/fsh
417	4201-8010	Paul Malinchak	Alfred L. Burch	1975	H	970	H	Qo/sdgr
418	4201-8010	Lloyd Hickey	George H. Ackerman	1976	H	990	T	Qo/sdgr
419	4201-8010	Lucien Lawson	Robert Anderson	1976	H	1,000	S	Dch/fsh
420	4201-8010	D. E. Nash	Bernard P. Kuntz	1945	H	975	H	Qo/gr
421	4201-8011	J. R. Rinderle	Robert Anderson	1974	H	890	S	Qo/gr
422	4201-8011	F. R. Chernek	do.	1974	H	1,002	H	Qo/gr
424	4201-8012	Steve Hetz	Alfred L. Burch	1973	H	930	S	Qo/sdgr
425	4201-8012	Donald Bartosik	Donald L. Hermann	1973	H	900	S	Qo/sdgr
426	4201-8012	Steve Gurak	John E. Gage, Jr.	1974	H	945	S	Qo/gr
427	4201-8012	E. S. Lindenberger	George H. Ackerman	1973	H	948	S	Qo/sd
428	4201-8013	J. T. Heinlein	Alfred L. Burch	1972	H	826	V	Qo/sdgr
429	4201-8013	Donald Vogt	Boyd Lee Hall	1968	H	848	S	Qo/u
430	4201-8014	J. A. Spaulding	Robert Anderson	1974	H	822	S	Qo/sdgr
431	4201-8014	James Benson	Alfred L. Burch	1973	H	855	S	Qo/sd
432	4201-8014	G. A. Shallenberger	do.	1971	H	832	S	Qo/sdgr
433	4202-8007	R. D. Bliley	Max E. Hickernell	1975	H	1,087	H	Dch/sh
434	4202-8007	W. H. Bachmann	Alfred L. Burch	1974	H	1,020	T	Qo/u
435	4202-8007	Ray Yosten	Michael W. Burch	1976	H	1,010	T	Dch/fsh
436	4202-8008	W. C. Dunlavey	Alfred L. Burch	1974	H	1,015	S	Dch/fsh
437	4202-8008	T. R. Brown	George H. Ackerman	1973	H	1,030	T	Qt/u
438	4202-8008	K. J. Sauers	Robert Anderson	1974	H	1,020	T	Qt/u
439	4202-8008	M. D. Dunlavey	do.	1975	H	1,010	S	Qo/gr
440	4202-8008	Roy Korrell	George H. Ackerman	1974	H	1,022	T	Qo/u
441	4202-8008	Keith Holland	Alfred L. Burch	1972	H	1,025	T	Qo/sdgr
442	4202-8008	P. M. Mead	do.	1973	H	1,010	T	Qo/sdgr
443	4202-8008	A. J. Hartleb	Donald L. Hermann	1972	H	945	S	Dch/ssh
444	4202-8008	J. E. Zietler	do.	1973	H	975	S	Dch/ssh
445	4202-8008	J. J. Grimaldi	do.	1972	H	955	S	Dch/fsh
446	4202-8008	A. L. Massey	do.	1972	H	940	S	Qo/sdgr
447	4202-8010	Harrison Putnam	Alfred L. Burch	1972	H	846	V	Qo/gr
448	4202-8010	Ernest Barber	do.	1971	H	840	V	Qo/gr
449	4202-8011	J. E. Nelsen	George H. Ackerman	1975	H	875	S	Qo/gr
450	4202-8010	Darcy Whitman	Michael W. Burch	1976	I	902	F	Qo/gr
451	4202-8011	G. G. Ellsworth	George H. Ackerman	1973	H	814	S	Qo/u
452	4202-8011	H. K. Bierer	Alfred L. Burch	1973	H	832	S	Qo/sdgr
453	4202-8011	J. P. Lantzy	do.	1973	H	852	U	Qo/gr
454	4202-8011	G. E. Beck	Donald L. Hermann	1972	H	844	U	Qo/sdgr
455	4202-8011	Methodist Church	Alfred L. Burch	1968	H	854	F	Qo/sdgr
456	4202-8011	Ronald Till	Michael W. Burch	1977	H	860	S	Qo/sdgr
457	4202-8011	Peter Czernyicky	Alfred L. Burch	1967	H	853	F	Qo/sdgr
458	4202-8011	Lillian Berarducci	George H. Ackerman	1975	H	852	F	Qo/sdgr
459	4202-8012	Thomas Gleason	Felix J. Waible	1976	H	820	U	Qo/gr
460	4202-8012	Richard Carson	Alfred L. Burch	1967	H	825	F	Qo/sdgr
461	4202-8013	W. F. Hafner	George H. Ackerman	1975	H	750	F	Qb/clgr
462	4202-8013	Gerald Allender	Felix J. Waible	1976	H	810	U	Qo/gr
463	4202-8013	Edwin Sopp	George H. Ackerman	1974	H	800	T	Qo/gr
464	4202-8014	Jarecki Industries, Ltd.	Alfred L. Burch	1973	N	800	T	Qb/clgr
465	4202-8014	Leslie Shafer	George H. Ackerman	1974	H	810	T	Qb/gr
466	4202-8014	David Keck	Alfred L. Burch	1975	H	820	H	Qb/sdgr

(Continued)

Total depth below land surface (feet)	Casing		Depth(s) to water-bearing zone(s) (feet)	Static water level		Reported yield (gal/min)	Specific capacity [(gal/min)/ft]	Hardness (mg/L as $CaCO_3$)	Specific conductance (μmho/cm at 25°C)	pH (units)	Well number
	Depth (feet)	Diameter (inches)		Depth below land surface (feet)	Date measured (mo/yr)						
14	14	24	4	4	6/73	6	.67	---	---	---	Er- 394
60	20	12	20	16	6/73	2	---	---	---	---	395
60	50	12	50	---	---	3	---	---	---	---	396
49	27	8	26;31	16	---	5	.17	---	---	---	397
72	42	12	37	---	---	2	---	---	---	---	398
50	23	8	10;18	3	4/76	4	---	---	---	---	399
47	16	8	16;36	10	3/74	7	.2	---	---	---	400
75	16	8	16;25	11	7/74	2	.03	---	---	---	401
113	113	8	109	47	8/75	10	---	---	---	---	402
152	130	8	130	83	4/74	1	.02	---	---	---	403
105	105	6	106	38	3/76	18	---	20	390	---	404
96	96	8	59;96	---	---	20	---	---	---	---	405
127	127	6	44;70;115;123	85	11/64	15	---	---	---	---	406
105	90	5	90	58	9/76	15	---	---	---	---	407
115	---	8	72;103	---	---	---	---	---	---	---	408
60	19	8	8;20;43	1	7/69	2	---	---	---	---	409
60	18	8	16;18	8	4/70	5	---	---	---	---	410
50	17	12	22;28	11	8/72	1	.03	---	---	---	411
60	21	8	17;45	9	8/76	2	.04	---	---	---	412
67	---	8	16;42	---	---	25	---	---	---	---	413
64	---	12	23;40	8	7/73	9	.2	140	2,400	---	414
60	40	8	34	21	11/76	10	---	---	---	---	415
50	13	8	14;18	3	10/75	6	.14	---	---	---	416
73	73	8	62;68	58	2/75	24	12	---	---	---	417
65	65	8	61	42	6/76	18	---	---	---	---	418
72	12	8	35;45	24	10/76	2	---	---	---	---	419
122	122	---	---	---	---	---	---	150	430	7.7	420
42	42	8	28;40	8	8/74	15	.5	---	---	---	421
49	49	8	47	36	3/74	15	3.7	---	---	---	422
68	68	8	18;62	56	8/73	30	---	---	---	---	424
75	75	8	52;72	---	---	10	---	---	---	---	425
58	58	8	51	36	7/74	28	28	---	---	---	426
82	82	8	58;80	58	10/73	8	---	150	580	---	427
41	41	8	38	23	9/72	18	1	---	---	---	428
70	70	8	---	40	9/68	20	3.3	5	500	---	429
41	41	8	29;41	26	11/74	15	1.5	---	---	---	430
103	103	8	24;98	35	9/73	30	---	---	---	---	431
62	62	8	57	29	7/71	18	---	---	---	---	432
48	14	16	18	8	8/75	---	---	---	---	---	433
78	50	5	46	40	12/74	5	---	---	---	---	434
40	13	8	11;30	7	10/76	5	.16	---	---	---	435
60	26	8	24;48	28	4/74	6	---	---	---	---	436
75	---	8	54	20	4/73	2	---	---	---	---	437
67	46	8	45	35	7/74	3	.1	---	---	---	438
57	57	8	56	43	---	14	1.4	---	---	---	439
62	---	8	---	---	---	22	---	---	---	---	440
61	61	8	55;61	46	8/72	20	---	---	---	---	441
60	55	8	38;47;55	34	9/73	8	---	---	---	---	442
82	73	8	73	36	6/72	4	.08	---	---	---	443
60	53	8	40;46	21	1/73	10	.3	---	---	---	444
65	52	8	48	23	9/72	8	.25	---	---	---	445
55	40	8	37;42	18	12/72	15	.75	---	---	---	446
28	28	8	12	12	6/72	50	---	---	---	---	447
28	28	8	14	8	10/71	50	---	---	---	---	448
58	58	8	53	18	9/75	20	---	---	---	---	449
29	29	8	24	22	9/76	10	3.3	---	---	---	450
90	---	8	34	16	5/73	2	---	---	---	---	451
40	---	8	14;34	20	5/73	2	---	---	---	---	452
33	33	8	20;28	17	5/73	20	1.8	---	---	---	453
40	40	8	36	20	6/72	30	15	---	---	---	454
41	41	8	20;31	20	11/68	30	30	200	720	---	455
80	65	8	20;36;56;72	22	3/77	10	.2	---	---	---	456
35	35	8	22;30;35	16	9/67	30	3.3	---	---	---	457
40	40	8	28;34	10	5/75	50	---	---	---	---	458
43	43	8	39	23	5/76	---	---	---	---	---	459
26	26	8	6;16;22	2	8/67	40	5	---	---	---	460
40	40	8	36	33	7/75	25	---	---	---	---	461
52	52	8	48	30	5/76	20	---	---	---	---	462
70	60	8	59	42	11/74	5	---	---	---	---	463
54	54	10	45	38	1/73	20	10	---	---	---	464
95	95	8	92	62	11/74	12	---	---	---	---	465
86	86	8	80	71	7/75	20	4	---	---	---	466

Table 12.

Well location		Owner	Driller	Year completed	Use	Altitude of land surface (feet)	Topographic setting	Aquifer/lithology
Number	Lat-Long							
Er- 467	4152-8012	Frederick Swift	Boyd Lee Hall	1970	H	1,349	S	Qt/u
468	4202-8014	T. E. Fitzgerald	Alfred L. Burch	1974	H	804	T	Qo/gr
469	4202-8014	Peter Wowk	George H. Ackerman	1976	H	815	S	Qo/clgr
470	4203-8007	David Shallenberger	Robert Anderson	1973	H	975	S	Qt/t
471	4203-8007	C. R. Shallenberger	do.	1972	H	1,010	H	Qt/t
472	4203-8007	J. A. Reitz	Donald L. Hermann	1973	H	900	S	Qo/sdgr
473	4203-8007	W. B. Conner	do.	1973	H	905	S	Dg/ssh
474	4203-8007	C. D. Artz	Alfred L. Burch	1965	H	1,028	H	Qo/gr
475	4203-8007	James Papucci	do.	1964	H	915	U	Qo/gr
476	4203-8008	R. E. Brucker	George H. Ackerman	1972	H	910	S	Dg/fsh
477	4203-8008	J. J. Sarback	do.	1973	H	870	S	Dg/fsh
478	4203-8008	A. R. Malena	Alfred L. Burch	1973	H	886	S	Qo/sdgr
479	4203-8008	C. F. Onorato	George H. Ackerman	1972	H	825	S	Dg/fsh
480	4203-8008	H. M. Love	Felix J. Waible	1974	H	850	S	Qt/clgr
481	4203-8008	R. D. Lutsch	Alfred L. Burch	1971	H	835	S	Qt/sd
482	4203-8008	J. D. Clouser	do.	1974	H	865	S	Qo/sdgr
483	4203-8009	Robert Vogel	George H. Ackerman	1976	H	830	S	Dg/fsh
485	4203-8009	J. H. Wittman	Donald L. Hermann	1972	H	855	S	Qo/sdgr
486	4203-8009	W. L. Green	Felix J. Waible	1975	H	862	S	Qo/gr
487	4203-8009	Baldwin Brothers Inc.	do.	1975	H	875	S	Qo/sdgr
488	4203-8009	James Edgett	George H. Ackerman	1976	H	876	S	Qo/sdgr
489	4203-8009	Henry Truchanowicz	Felix J. Waible	1975	H	865	S	Qo/gr
491	4203-8009	Thomas McLaughlin	do.	1976	H	880	S	Qo/gr
492	4203-8010	Richard Blose	B. W. Bateman and Son	1968	H	832	T	Qt/t
493	4203-8010	D. M. Schlabach	Alfred L. Burch	1971	H	835	H	Qo/sdgr
494	4203-8010	D. J. Strong	do.	1971	H	815	S	Qo/sd
495	4203-8010	B. R. Phillips	do.	1971	H	815	S	Qo/gr
496	4203-8009	Winston Warren	George H. Ackerman	1976	H	828	S	Qo/gr
497	4203-8010	Westminster Water Co.	Alfred L. Burch	1969	P	804	S	Qo/sdgr
498	4203-8010	Richard Samsel	do.	1969	H	862	H	Qo/gr
499	4203-8011	M. E. Vonbuseck	Donald L. Hermann	1972	H	805	S	Qo/gr
500	4203-8011	G. L. Locke	Alfred L. Burch	1972	H	840	H	Qo/sdgr
501	4203-8011	James Glazier	Robert Anderson	1972	H	818	S	Qo/gr
502	4203-8011	Mykola Kuvshinikov	George H. Ackerman	1973	H	750	S	Qb/sdgr
503	4152-8013	James Kearney	B. W. Bateman and Son	1968	H	1,264	S	Qo/gr
504	4203-8011	David Shontz	Felix J. Waible	1976	H	795	S	Qo/gr
505	4152-8013	Frank Connell	Max E. Hickernell	1966	H	1,275	S	MDbv/fst
506	4203-8011	L. R. Ritts	Bernard P. Kuntz	1950	H	798	S	Qo/gr
507	4203-8012	George Simitoski	Alfred L. Burch	1967	H	795	S	Qo/sdgr
508	4203-8012	Swanville Development Co.	do.	1974	H	800	S	Qo/sdgr
509	4203-8012	Erie Bronze and Aluminum Co.	do.	1972	N	748	T	Qb/sdgr
510	4203-8012	Anna Lazarow	George H. Ackerman	1973	H	786	S	Qb/u
511	4153-8014	Cyril Ley, Jr.	Max E. Hickernell	1966	H	1,273	S	MDbv/fst
512	4203-8014	D. J. Hart	Charles J. Richardson III	1973	H	735	T	Qb/sdgr
513	4203-8014	R. E. Erven	Alfred L. Burch	1964	H	704	T	Qb/t
514	4154-8013	Joseph Shepegi	John E. Gage, Jr.	1972	H	1,300	S	MDbv/sh
515	4154-8014	H. R. Grill	Alfred L. Burch	1967	H	1,300	H	Qt/clgr
516	4204-8008	Rose Bock	Robert Anderson	1975	H	918	H	Qo/gr
517	4204-8008	David Czarnecki	Max E. Hickernell	1963	H	910	U	Qt/gr
518	4204-8008	P. E. Wright	Robert Anderson	1975	H	900	H	Qo/gr
519	4204-8008	W. G. Shepard	do.	1974	H	900	S	Qo/gr
520	4204-8008	Leroy Peterson	Alfred L. Burch	1967	H	820	S	Qo/sd
521	4204-8008	Robert Brudnock	Michael W. Burch	1976	H	840	S	Qt/t
522	4204-8008	Springhurst Inc.	do.	1977	H	866	S	Qo/gr
523	4204-8008	R. E. Peterson	Robert Anderson	1972	H	866	H	Qo/gr
524	4204-8008	Walter Gorney	George H. Ackerman	1975	H	876	S	Qo/sdgr
525	4204-8009	J. J. Sturgeon	do.	1973	H	838	S	Qo/u
526	4204-8009	William Walker	Alfred L. Burch	1967	H	835	S	Qo/sdgr
527	4204-8008	Robert Brudnock	Michael W. Burch	1976	H	850	S	Dg/fsh
528	4204-8009	C. F. Kingston	Donald L. Hermann	1972	H	850	S	Qo/sdgr
529	4204-8009	John Williams	Felix J. Waible	1976	H	882	S	Qo/gr
530	4204-8009	Donald Fabian	Michael W. Burch	1975	H	860	S	Qo/u
531	4204-8009	J. E. Walaconis	Alfred L. Burch	1972	H	844	S	Qo/sd
532	4204-8009	Richard Estock	do.	1964	H	815	S	Qo/sd
533	4204-8009	Raymond Burns	do.	1964	H	820	S	Qo/sdgr
534	4204-8009	N. C. Calvano	Charles Rumsey	1973	H	850	S	Qo/sdgr
535	4204-8009	A. A. Krista	Felix J. Waible	1974	H	820	S	Qt/t
536	4204-8009	Theodore Stolz	Max E. Hickernell	1966	H	844	S	Qo/gr
537	4204-8010	Stanley Clark	Alfred L. Burch	1966	H	778	S	Qb/gr
539	4204-8010	Eighty-Four Lumber Co.	Felix J. Waible	1975	H	738	F	Qb/sdgr
540	4204-8010	Reginald Payne	Max E. Hickernell	1971	H	767	S	Qb/clgr
541	4204-8011	R. J. Dieter	Alfred L. Burch	1974	H	736	F	Qb/sd
542	4204-8011	G. J. Blattenberger	do.	1974	H	734	F	Qb/sd
543	4204-8011	J. F. Mahoney	do.	1972	H	734	F	Qb/sd

(Continued)

Total depth below land surface (feet)	Casing: Depth (feet)	Casing: Diameter (inches)	Depth(s) to water-bearing zone(s) (feet)	Static water level: Depth below land surface (feet)	Static water level: Date measured (mo/yr)	Reported yield (gal/min)	Specific capacity [(gal/min)/ft]	Hardness (mg/L as $CaCO_3$)	Specific conductance (μmho/cm at 25°C)	pH (units)	Well number
54	29	6	29;51	10	11/70	45	4.5	---	---	---	Er- 467
57	57	8	51	37	7/74	5	---	---	---	---	468
42	42	8	36	20	6/76	12	---	---	---	---	469
123	95	8	75	69	1/73	4	.08	---	---	---	470
120	87	8	87	66	10/72	1	.02	---	---	---	471
41	41	8	35;40	12	7/63	30	3	---	---	---	472
70	29	8	18;27	18	7/73	8	.18	---	---	---	473
80	68	8	65	60	9/65	10	---	---	---	---	474
61	61	6	37;53	30	6/64	15	---	---	---	---	475
75	---	---	52	---	---	10	---	---	---	---	476
85	---	8	---	5	7/73	4	---	---	---	---	477
32	32	8	17;23	10	5/73	50	7.1	---	---	---	478
55	---	8	16;32	---	10/72	20	---	---	---	---	479
70	17	8	13	14	8/74	2	---	---	---	---	480
26	26	8	22;26	15	8/71	12	---	---	---	---	481
50	50	8	38;44	28	6/74	20	---	---	---	---	482
60	30	8	25;55	18	8/76	50	4	---	---	---	483
35	35	8	31	12	8/72	7	.39	---	---	---	485
66	66	8	62	48	5/75	20	---	---	---	---	486
73	73	8	69	50	8/75	20	---	---	---	---	487
101	101	8	95	65	8/76	50	3.8	---	---	---	488
66	66	8	62	---	6/75	20	---	---	---	---	489
80	80	8	76	57	10/76	20	---	---	---	---	491
65	20	6	21	15	8/68	1	.02	---	---	---	492
50	39	8	32	28	10/71	30	2.5	---	---	---	493
28	28	8	22	16	10/71	20	---	---	---	---	494
40	22	8	12	1	10/71	30	---	---	---	---	495
50	38	8	34	6	3/76	50	8.3	---	---	---	496
44	39	10	18;36	13	7/69	180	7.5	250	---	7.7	497
46	46	8	25;42	22	1/69	9	---	---	---	---	498
43	43	8	42	23	8/72	15	1.5	---	---	---	499
80	80	8	39;70;73	50	1/72	30	3	---	---	---	500
55	55	8	55	32	8/72	15	2.5	---	---	---	501
31	31	8	---	3	8/73	16	---	---	---	---	502
40	20	6	17;33	8	9/68	6	.27	720	2,700	---	503
45	45	8	40	12	8/76	15	---	---	---	---	504
41	22	8	26;33;38	6	1966	20	---	---	---	---	505
46	46	--	---	---	---	---	---	230	418	7.5	506
46	46	6	25;38	---	---	30	---	---	---	---	507
55	55	8	49	30	12/74	30	4.3	---	---	---	508
19	14	8	7	+2	9/72	75	---	---	---	---	509
49	49	8	44	7	7/73	18	---	---	---	---	510
44	33	6	29;37	6	10/66	20	---	---	---	---	511
23	23	24	11	11	5/73	16	8	---	---	---	512
44	44	6	14;32	12	11/64	5	---	---	---	---	513
61	47	8	12;48	10	6/72	3	.08	---	---	---	514
50	36	8	31	11	7/67	4	---	---	---	---	515
87	87	---	85	77	7/75	6	6	---	---	---	516
95	95	6	91	70	8/63	15	---	---	---	---	517
75	75	8	72	60	7/75	25	5	---	---	---	518
76	76	8	58;76	55	8/74	15	3.8	---	---	---	519
67	67	8	44;55	34	12/67	10	.3	---	---	---	520
60	60	8	31	26	4/76	1	.03	---	---	---	521
65	65	8	57	22	3/77	30	30	---	---	---	522
51	51	8	51	29	8/72	15	7.5	---	---	---	523
83	83	8	74	50	5/75	40	---	---	---	---	524
60	60	8	54	---	---	20	---	---	---	---	525
57	55	6	33;37	25	5/67	9	1.8	---	---	---	526
97	72	8	35;46;71	20	4/76	.2	---	---	---	---	527
46	46	8	34	12	12/72	7	.24	---	---	---	528
80	80	8	70	---	---	---	---	---	---	---	529
68	68	8	27;62	50	11/75	15	1	---	---	---	530
80	69	8	12;25;62	40	6/72	.8	---	---	---	---	531
72	65	8	22;54;61	30	6/64	2	---	---	---	---	532
42	40	6	36	29	10/64	10	---	---	---	---	533
75	55	8	---	---	---	---	---	---	---	---	534
70	54	12	50	29	11/74	1	---	---	---	---	535
40	40	9	36	10	5/66	17	---	190	460	---	536
50	48	8	30;44	24	11/66	6	.23	---	---	---	537
29	29	8	25	8	4/75	20	---	---	---	---	539
60	60	8	56	50	9/71	10	10	---	---	---	540
36	36	8	19;30	8	11/74	10	---	---	---	---	541
77	77	8	17;46;71	14	9/74	4	---	---	---	---	542
35	35	8	21;33	10	7/72	10	---	---	---	---	543

Table 12.

Well location		Owner	Driller	Year completed	Use	Altitude of land surface (feet)	Topographic setting	Aquifer/ lithology
Number	Lat-Long							
Er- 544	4204-8011	B. A. Brocious	Alfred L. Burch	1972	H	733	F	Qb/sdgr
545	4204-8011	A. G. Youngquist	do.	1971	H	734	F	Qb/sd
546	4204-8012	R. M. Kennelley	George H. Ackerman	1972	H	732	F	Qb/u
547	4204-8012	C. W. Bennett	Alfred L. Burch	1973	H	734	F	Qb/sdgr
548	4204-8012	Edward Bogert	do.	1968	H	728	F	Qb/sd
549	4204-8012	P. S. Rathmell	do.	1970	H	738	F	Qb/sd
550	4204-8012	Russell Wright	Bernard P. Kuntz	1948	H	730	F	Qb/gr
551	4204-8012	D. R. Blose	George H. Ackerman	1974	H	731	F	Qb/sdgr
552	4204-8011	Bruce Rogers	Alfred L. Burch	1966	H	738	F	Qb/t
553	4204-8012	Lake Shore Volunteer Fire Department	do.	1967	F	730	F	Qb/sdgr
554	4204-8012	D. S. Brougham	do.	1974	H	733	F	Qb/sdgr
555	4204-8012	Roy Dean	do.	1972	H	737	F	Qb/gr
556	4204-8013	J. N. Reed	do.	1969	H	690	F	Qb/sd
557	4205-8008	Elmer Shorts	do.	1969	H	764	S	Qb/sdgr
558	4152-8009	Thomas Kirdahy	Lorenze Lee Hall	1975	H	1,275	S	Dv/fsh
559	4152-8009	Culbertson Co.	Boyd Lee Hall	1976	H	1,313	S	Dv/fsh
560	4152-8009	The Country Villa	Max E. Hickernell	1972	P	1,300	S	Dv/fsh
561	4153-8007	F. F. Curtze	do.	1971	H	1,230	S	Qt/gr
562	4153-8009	John Yatzor, Jr.	Alfred L. Burch	1966	H	1,325	S	Dv/sh
563	4153-8009	Daniel Overheim	Boyd Lee Hall	1968	H	1,280	S	Qt/u
564	4153-8009	Orville Porterfield	do.	1968	H	1,248	S	Qt/u
565	4153-8009	Daniel Horn	do.	1968	H	1,258	S	Qt/u
566	4153-8009	P. A. Smith	Max E. Hickernell	1967	H	1,255	S	Dv/fsh
567	4153-8009	P. S. Smith	Boyd Lee Hall	1971	H	1,260	S	Dv/fsh
568	4153-8009	D. H. Karrfalt	Robert Anderson	1974	H	1,260	S	Dv/fsh
569	4153-8008	T. D. Hutchison	Boyd Lee Hall	1971	H	1,235	S	Dv/fsh
570	4153-8008	Gertrude McCracken	Felix J. Waible	1977	H	1,225	S	Qo/gr
571	4153-8008	Richard Goodenow	Boyd Lee Hall	1976	H	1,261	S	Dv/fsh
572	4153-8008	John Hebert	Moody Drilling Co., Inc.	1965	H	1,200	V	Qo/sdgr
573	4153-8008	M. L. Smith	Boyd Lee Hall	1970	H	1,264	S	Dv/fsh
574	4153-8008	T. N. Davies	Alfred L. Burch	1971	H	1,240	S	Dv/fsh
575	4153-8008	Glen Harned	do.	1968	H	1,222	S	Qt/gr
576	4153-8011	James Pfadt	do.	1968	H	1,416	S	MDbv/fsh
577	4153-8012	David Bucko	Lorenze Lee Hall	1975	H	1,355	S	MDbv/fsh
578	4153-8012	Finley Horn	Max E. Hickernell	1962	H	1,340	S	MDbv/fsh
579	4154-8007	John Lovett	Alfred L. Burch	1967	P	1,268	S	Qo/gr
580	4154-8009	Martha Chernichky	Robert Anderson	1977	H	1,390	S	Dv/fsh
581	4154-8012	Frank Reichart	Boyd Lee Hall	1972	H	1,310	S	MDbv/fsh
582	4154-8012	W. L. Harman	do.	1974	H	1,330	S	MDbv/fsh
583	4154-8012	D. E. Lohr	do.	1973	H	1,322	S	Qt/u
584	4154-8012	Ella Weed	do.	1966	H	1,323	S	Qt/u
585	4154-8012	Harold Fritzges	B. W. Bateman and Son	1967	H	1,338	S	MDbv/fsh
586	4154-8013	L. E. Pieper	Boyd Lee Hall	1970	H	1,322	S	MDbv/fsh
587	4155-8007	Ronald Coleman	Donald E. Hall	1976	H	1,264	S	Qt/u
588	4155-8008	H. E. Allen	Max E. Hickernell	1967	H	1,290	S	Dv/fst
589	4155-8008	R. P. Baxter	Boyd Lee Hall	1973	H	1,274	S	Qt/u
590	4155-8012	Gloria Bochert	B. W. Bateman and Son	1966	H	1,304	S	MDbv/fsh
591	4155-8012	Woodrow Mooney	do.	1967	H	1,308	S	MDbv/fsh
592	4155-8012	I. W. Hardman	Boyd Lee Hall	1971	H	1,268	S	MDbv/fsh
593	4155-8013	William Sheffer	Max E. Hickernell	1976	H	1,240	S	MDbv/fsh
594	4155-8014	Bernard Vincent	Felix J. Waible	1975	H	1,178	S	Qt/u
595	4156-8007	Ronald Price	Boyd Lee Hall	1974	H	1,360	S	Dv/fsh
596	4156-8008	C. M. Bolla	do.	1975	H	1,205	S	Qo/gr
597	4156-8008	T. M. Ponting	Robert Anderson	1974	H	1,208	S	Qt/clgr
598	4156-8008	J. B. Mares	Max E. Hickernell	1967	H	1,315	S	Dv/fsh
599	4156-8009	C. D. Irwin	Alfred L. Burch	1968	H	1,372	S	Qt/gr
600	4156-8009	Raymond Scalise	do.	1968	H	1,328	S	Dv/sh
601	4156-8011	R. P. Beck	do.	1966	H	1,300	S	Dv/fsh
602	4156-8011	do.	do.	1966	H	1,295	S	Dv/fsh
603	4156-8012	Albert Vogt	Max E. Hickernell	1974	H	1,282	S	Qt/gr
604	4156-8012	C. F. Krautter	do.	1970	H	1,265	S	MDbv/fsh
605	4156-8013	George Gresh	Alfred L. Burch	1968	H	1,224	S	MDbv/fsh
606	4156-8013	Franklin Center Church	Max E. Hickernell	1964	H	1,228	S	MDbv/fst
607	4156-8013	Robert Farmer	Alfred L. Burch	1967	H	1,224	S	Qt/sdgr
608	4156-8013	Timothy Broderick	Robert Anderson	1976	H	1,184	S	MDbv/sh
609	4156-8014	Alice Fernandes	Alfred L. Burch	1968	H	1,206	S	MDbv/fsh
610	4156-8014	D. M. Lewis	Donald L. Hermann	1972	H	1,193	S	MDbv/ssh
611	4156-8014	Paul Homchenko	Felix J. Waible	1975	H	1,191	S	Qt/t
612	4156-8014	Edward Pulinski	do.	1975	H	1,182	S	Qt/t
613	4157-8008	Edward Willey	Alfred L. Burch	1969	H	1,158	S	Qt/gr
614	4157-8008	Michael Wilkoz	Donald L. Hermann	1972	H	1,120	V	Dch/ssh
615	4157-8009	D. E. Osterberg	do.	1973	H	1,248	S	Dv/ssh
616	4157-8009	K. R. Gnagi	Alfred L. Burch	1973	H	1,294	H	Dv/sh

(Continued)

Total depth below land surface (feet)	Casing: Depth (feet)	Casing: Diameter (inches)	Depth(s) to water-bearing zone(s) (feet)	Static water level: Depth below land surface (feet)	Static water level: Date measured (mo/yr)	Reported yield (gal/min)	Specific capacity [(gal/min)/ft]	Hardness (mg/L as $CaCO_3$)	Specific conductance (µmho/cm at 25°C)	pH (units)	Well number
51	51	8	36;46	29	7/72	10	---	---	---	---	Er- 544
65	65	8	18;28	10	10/71	10	---	---	---	---	545
90	---	8	86	12	6/72	1	---	---	---	---	546
77	77	8	21;72	12	4/73	20	.7	---	---	---	547
90	90	8	44;84	---	---	4	---	---	---	---	548
36	36	8	13;29	---	---	10	---	---	---	---	549
32	32	---	---	---	---	---	---	130	400	7.8	550
105	92	8	85	17	11/74	1	---	---	---	---	551
63	53	8	12;25;49	8	8/66	2	---	---	---	---	552
32	32	8	24	20	5/67	15	---	---	---	---	553
61	61	8	17;34;41	8	6/74	5	---	---	---	---	554
31	31	8	16;25	7	4/72	15	---	---	---	---	555
73	---	---	45;53	48	1/69	.1	---	310	3,500	---	556
50	27	8	32	14	4/69	7	---	---	---	---	557
50	20	8	28;45	5	5/75	23	.57	---	---	---	558
68	48	8	48;55	---	---	20	---	---	---	---	559
70	25	10	27;39	6	3/72	15	---	---	---	---	560
32	32	8	28	21	10/71	10	10	---	---	---	561
70	19	8	19	10	9/66	1	---	25	1,500	---	562
60	60	8	60	5	12/68	10	10	---	---	---	563
60	60	8	60	4	12/68	10	10	---	---	---	564
52	52	8	50	10	12/68	10	10	---	---	---	565
80	46	6	51;62;79	20	6/67	15	---	---	---	---	566
63	50	8	60	---	---	5	.6	---	---	---	567
68	44	8	44;52	14	4/74	6	.11	---	---	---	568
53	22	8	30;50	8	4/71	30	30	---	---	---	569
37	37	8	33	15	3/77	20	---	---	---	---	570
60	37	8	36;57	15	5/76	10	.25	---	---	---	571
47	47	7	21	4	11/65	20	2.5	---	---	---	572
52	30	8	32;47	10	10/70	22	1.8	---	---	---	573
60	41	8	21;50	7	5/71	19	---	---	---	---	574
39	39	8	22	20	12/68	10	1	---	---	---	575
53	17	8	14;40	5	6/68	15	---	---	---	---	576
55	33	8	21;49	2	5/75	46	1.6	---	---	---	577
48	26	7	---	20	5/62	4	---	---	---	---	578
50	---	8	17;43	12	4/67	2	---	---	---	---	579
87	15	8	20;75	7	3/77	30	1.5	---	---	---	580
55	14	8	21;51	4	5/72	7	.15	---	---	---	581
68	21	10	28;61	5	1974	15	.3	---	---	---	582
70	24	8	24	10	10/73	10	.2	---	---	---	583
65	30	6	51;63	14	8/66	20	20	---	---	---	584
40	22	6	24	15	5/67	4	.2	---	---	---	585
92	24	8	45	12	11/70	1	---	---	---	---	586
37	37	8	21;37	---	---	---	---	---	---	---	587
46	24	8	28;42	8	1/67	7	---	---	---	---	588
48	48	8	18	---	---	---	---	---	---	---	589
38	31	6	33	12	8/66	6	.3	---	---	---	590
52	38	6	40	8	6/67	3	.07	125	490	---	591
52	30	8	---	---	---	4	---	---	---	---	592
42	29	8	29;38	1	5/76	7	.2	---	---	---	593
40	13	8	9	1	5/75	6	---	---	---	---	594
110	54	8	90;105	6	8/74	50	.7	---	---	---	595
110	110	8	53;110	12	7/75	10	.14	105	430	---	596
44	44	8	22	2	3/74	7	.17	---	---	---	597
46	16	8	16;35	4	1/67	10	---	---	---	---	598
40	24	8	20;38	3	6/68	50	3.3	---	---	---	599
55	21	8	8;20	10	9/68	1	---	---	---	---	600
50	12	8	11;20;28	10	6/66	3	---	---	---	---	601
60	28	8	22;40	6	6/66	3	---	---	---	---	602
50	40	8	37	12	4/74	7	---	---	---	---	603
64	36	8	38	---	---	5	---	---	---	---	604
60	37	8	34;40	9	8/68	4	---	---	---	---	605
43	27	8	27;40	8	7/64	5	---	---	---	---	606
40	20	6	15;19;32	8	3/67	10	---	---	---	---	607
61	25	8	38	8	6/76	1	.02	---	---	---	608
70	55	8	18;65	15	11/68	3	---	---	---	---	609
35	15	8	12;15	4	6/72	2	.07	---	---	---	610
40	13	8	9	1	5/75	6	---	---	---	---	611
40	13	8	9	1	5/75	18	---	---	---	---	612
86	86	8	33	20	3/69	5	---	---	---	---	613
80	73	8	73	32	9/72	2	---	---	---	---	614
41	37	8	37	12	2/73	3	---	---	---	---	615
80	38	8	21;33;74	16	6/73	1	---	---	---	---	616

Table 12.

Well location		Owner	Driller	Year completed	Use	Altitude of land surface (feet)	Topographic setting	Aquifer/lithology
Number	Lat-Long							
Er- 617	4157-8012	William Bland	Robert Anderson	1974	H	1,196	S	MDbv/fsh
618	4151-7946	Hattie Miles	McCray Bros.	1974	H	1,558	S	MDcr/fsh
619	4151-7946	R. M. Fuller	do.	1974	H	1,615	S	MDcr/fsh
620	4151-7948	Leo Kusiak	Harold F. Anderson	1975	H	1,609	S	MDcr/fsh
621	4151-7949	L. E. Sorenson	Donald L. Hermann	1973	H	1,582	V	Mc/fsh
622	4151-7951	Delmont Taylor	McCray Bros.	1973	H	1,535	S	MDcr/fsh
623	4152-7945	Robert Crandall	do.	1972	H	1,522	S	MDcr/sh
624	4152-7945	John Edwards	do.	1972	H	1,515	H	MDcr/fsh
625	4152-7952	Clarence Baker	Robert Rindfuss	1974	H	1,450	S	MDcr/fsh
626	4151-7953	E. J. Brown	Alfred L. Burch	1972	H	1,590	S	MDcr/fsh
627	4151-7953	Paul Mongera	do.	1970	H	1,602	S	MDcr/fsh
628	4151-7954	W. J. Wurst, Jr.	Donald L. Hermann	1973	H	1,618	S	Mc/fsh
629	4151-7957	R. P. Cole	Robert Rindfuss	1972	H	1,516	S	MDcr/fsh
630	4151-7957	M. L. Blum	do.	1972	H	1,390	S	MDcr/fsh
631	4152-7957	J. T. Kerr	Alfred L. Burch	1970	H	1,262	S	Dv/fsh
632	4152-7958	R. A. Marzka	Robert Rindfuss	1977	H	1,275	S	Dv/fsh
633	4152-7958	W. C. Blum	Alfred L. Burch	1969	H	1,248	S	Dv/fsh
634	4158-7937	Terry Darnofall	McCray Bros.	1972	H	1,520	S	Qt/clgr
635	4207-7951	Robert Sedelmyer	George H. Ackerman	1976	H	1,449	S	Qt/sdgr
636	4208-7951	Nick Woznicki	Michael W. Burch	1976	H	1,480	S	Qt/sdgr
637	4207-7951	J. P. Heyer	Robert Anderson	1972	H	1,468	S	Dv/fsh
638	4208-7947	David Ihrig	George H. Ackerman	1976	H	1,425	S	Qt/u
639	4208-7950	A. F. Barnett	Harold F. Anderson	1974	H	1,480	H	Qo/gr
640	4208-7951	Richard Cass	Robert Rindfuss	1975	H	1,419	S	Dch/fsh
641	4208-7951	J. W. Sienicki	George H. Ackerman	1973	H	1,485	S	Qt/u
642	4208-7951	R. B. Abbey	Alfred L. Burch	1972	H	1,488	S	Qt/t
643	4208-7951	Paul Mosher	George H. Ackerman	1975	H	1,430	S	Qt/clgr
644	4209-7949	W. R. Brooks	Robert F. Rumball	1973	H	1,415	S	Dch/sh
645	4209-7950	C. J. Babcock	Alfred L. Burch	1968	H	1,360	S	Dch/fst
646	4209-7950	R. E. Snyder	do.	1974	H	1,350	S	Dch/fsh
647	4209-7950	do.	do.	1973	H	1,345	S	Dch/fst
648	4209-7950	do.	do.	1973	H	1,353	S	Dch/fsh
649	4209-7951	T. L. Fuller	Donald L. Hermann	1973	H	1,333	S	Dch/fsh
650	4209-7950	John Ferko	Ralph Wayne Grant	1973	H	1,270	S	Dch/fst
651	4209-7951	David Edwards	Robert Anderson	1976	H	1,335	S	Dch/ssh
652	4209-7951	Jerry Burkett	do.	1976	H	1,338	S	Dch/sh
653	4210-7946	Raymond Manning	Ralph C. Parmenter	1974	H	1,432	S	Qt/gr
654	4210-7947	Raymond Way	do.	1972	H	1,295	S	Dch/fsh
655	4210-7947	Gerald Wilcher	do.	1975	H	1,325	S	Dch/fsh
656	4210-7949	D. W. Gregory	George H. Ackerman	1975	H	1,230	S	Qt/clgr
657	4210-7949	Charles Herman	Ralph C. Parmenter	1976	H	1,302	S	Dch/fsh
658	4210-7951	G. V. McCumber	Robert Anderson	1972	H	1,230	S	Dch/fsh
659	4211-7946	J. D. Genet	George H. Ackerman	1972	H	1,354	S	Dch/fsh
660	4211-7947	R. L. Newton	do.	1973	H	1,165	S	Qt/u
661	4211-7950	N. F. Hubert	do.	1973	H	1,025	S	Qt/u
662	4211-7951	W. C. Walker, Jr.	Alfred L. Burch	1975	H	815	S	Dg/ssh
663	4211-7951	James Cook	Harold F. Anderson	1975	H	864	S	Qt/t
664	4211-7952	J. R. Culver	Alfred L. Burch	1971	H	855	S	Dg/sh
665	4212-7948	D. C. McClelland	Robert Anderson	1974	H	960	S	Dg/sh
666	4213-7948	J. M. Phillips-Fruit Acres	Ralph C. Parmenter	1974	H	820	U	Dne/fsh
667	4213-7950	Bernard Duda	do.	1974	H	670	S	Dne/fsh
668	4213-7950	G. J. Otto	Alfred L. Burch	1973	H	680	S	Dne/sh
669	4213-7951	William Edder	do.	1976	H	720	S	Qt/sdgr
670	4213-7952	George Crittendon	Ralph C. Parmenter	1974	H	732	F	Qt/u
671	4214-7946	Edward Orton	George H. Ackerman	1974	H	743	F	Qo/gr
672	4214-7946	John Verakis	do.	1974	H	744	F	Qo/u
673	4214-7947	Dennis Geraci	do.	1976	H	795	S	Qo/gr
674	4214-7949	Harry Schiemer	McCray Bros.	1974	H	625	H	Dne/fsh
675	4214-7950	E. E. Kent	Alfred L. Burch	1973	H	710	F	Qo/sdgr
676	4215-7948	Thomas McCoy	do.	1975	H	610	H	Qt/sdgr
677	4215-7946	Catherine Weyers	do.	1968	H	704	S	Qt/gr
678	4215-7947	T. C. Jones	Michael W. Burch	1976	H	600	S	Dne/ssh
679	4215-7947	do.	do.	1976	H	620	S	Dne/sh
680	4207-7953	D. G. Bliley	Robert Anderson	1972	H	1,390	S	Dch/fsh
681	4207-7957	James Carroll	Alfred L. Burch	---	U	994	V	Qt/clgr
682	4208-7958	Dean Etzel	do.	1968	H	920	S	Qo/sdgr
683	4208-7958	Joseph Garner	do.	1968	H	775	S	Dg/sh
684	4207-7958	R. H. Lapenz	Robert Anderson	1974	H	1,010	H	Qt/t
685	4207-7958	Monte Collier	do.	1976	H	1,020	H	Qo/sdgr
686	4207-7958	---	Michael W. Burch	1977	H	1,022	H	Dch/fsh
687	4207-7958	K. F. Bellotti	Alfred L. Burch	1971	H	1,000	H	Qo/sdgr
688	4208-7958	R. P. Overdorff	do.	1969	H	845	S	Dg/sh
689	4208-7954	Graydon Dougan	Ralph C. Parmenter	1974	H	1,165	U	Dch/fsh
690	4208-7954	William Gindy	Robert Anderson	1975	H	1,140	S	Dch/fsh

(Continued)

Total depth below land surface (feet)	Casing		Depth(s) to water-bearing zone(s) (feet)	Static water level		Reported yield (gal/min)	Specific capacity [(gal/min)/ft]	Hardness (mg/L as $CaCO_3$)	Specific conductance (µmho/cm at 25°C)	pH (units)	Well number
	Depth (feet)	Diameter (inches)		Depth below land surface (feet)	Date measured (mo/yr)						
62	13	8	20;25	4	7/74	5	.09	---	---	---	Er- 617
105	41	6	45;63;79;100	37	4/74	12	.3	---	---	---	618
65	20	6	28;40;60	25	4/74	15	.75	---	---	---	619
60	21	8	21;55	6	10/75	5	---	60	190	---	620
45	20	8	15;32	12	8/73	5	.18	---	---	---	621
65	30	6	40;50;60	20	4/73	10	.33	110	305	---	622
120	60	6	70;80;90	20	7/72	2	.02	---	---	---	623
70	20	6	40;50;60	20	5/72	20	20	115	320	---	624
57	40	8	48	25	1974	30	1.3	---	---	---	625
80	14	8	12;14;70	30	12/72	30	1.5	---	---	---	626
80	35	8	13;17;32	13	12/70	14	---	---	---	---	627
75	27	12	27;65	15	11/73	10	.22	---	---	---	628
65	35	8	55	22	7/72	8	.2	---	---	---	629
48	---	8	38	15	6/72	10	---	---	---	---	630
55	---	8	17	5	9/70	15	---	---	---	---	631
71	45	8	42;61	---	---	5	.1	---	---	---	632
60	24	8	30;40	22	8/69	5	---	---	---	---	633
100	90	6	90	5	7/72	20	20	---	---	---	634
50	22	8	17	3	8/76	5	---	---	---	---	635
80	56	8	36;53	45	7/76	3	.12	---	---	---	636
50	25	8	25;30	6	10/72	6	.15	105	280	---	637
55	28	8	21	+2	5/76	15	---	---	---	---	638
82	62	8	62;70	---	---	7	---	---	---	---	639
75	35	8	42	9	8/75	4	.07	---	---	---	640
50	34	8	30	---	---	12	---	---	---	---	641
50	41	8	37;45	21	6/72	20	---	---	---	---	642
60	35	8	29;54	5	9/75	2	---	90	1,200	---	643
69	14	8	35;60	---	---	1	---	---	---	---	644
60	22	8	22;40;50	2	1/68	12	---	---	---	---	645
60	18	8	13	4	6/74	3	---	---	---	---	646
60	17	8	17;38	6	11/73	2	---	---	---	---	647
55	19	8	8;20;35	5	11/73	4	---	---	---	---	648
35	10	8	30	3	10/73	4	.15	---	---	---	649
50	25	8	30;45	12	2/73	---	---	170	410	---	650
35	11	12	14	4	2/76	1	.03	---	---	---	651
40	12	12	16;20	40	9/76	.5	---	---	---	---	652
168	168	5	---	60	7/74	3	.05	---	---	---	653
55	20	5	---	35	6/72	3	.3	75	330	---	654
50	15	6	20	7	9/75	4	.11	---	---	---	655
70	24	12	21;34;56	10	4/75	14	---	---	---	---	656
40	15	6	---	---	---	10	---	---	---	---	657
51	12	8	26	16	10/72	7	.23	310	840	7.0	658
78	22	8	16;38;46	6	7/72	12	---	---	---	---	659
62	21	8	21	---	---	2	---	85	590	---	660
60	22	8	20	---	---	12	---	---	---	---	661
50	19	8	5;18;20;32	8	6/75	5	---	---	---	---	662
30	16	12	14;28	---	---	6	---	60	525	---	663
35	10	8	12;14	9	9/71	.5	---	160	500	---	664
50	18	8	---	34	10/74	.1	---	---	---	---	665
43	20	6	---	20	7/74	5	.41	150	400	---	666
40	20	8	---	12	10/74	5	.36	---	---	---	667
65	22	8	17;30	5	6/73	2	.04	---	---	---	668
150	120	8	---	---	---	---	---	---	---	---	669
47	47	5	3	30	7/74	5	.5	---	---	---	670
70	42	12	36;62	23	11/74	5	---	---	---	---	671
87	31	8	30	12	2/74	.5	---	---	---	---	672
30	30	8	---	22	4/76	5	---	---	---	---	673
80	30	8	37;45;60	35	1/74	3	.08	---	---	---	674
94	94	8	45;86	60	6/73	10	---	70	330	---	675
50	33	8	23;48	30	10/75	5	---	---	---	---	676
50	16	8	9;15	7	6/68	2	---	170	600	---	677
89	12	8	9	7	1/76	.5	.006	---	---	---	678
60	23	8	16;20	4	1/76	.5	.009	---	---	---	679
53	10	8	12	12	10/72	7	.18	5	220	---	680
60	---	8	30	---	---	---	---	---	---	---	681
55	37	8	26;32;48	5	7/68	20	.5	---	---	---	682
50	14	8	14;27	6	2/68	.5	---	---	---	---	683
75	74	8	67;74	37	9/74	8	.27	---	---	---	684
66	66	8	65	45	3/76	17	2.4	---	---	---	685
110	97	8	99	52	3/77	2	.04	---	---	---	686
70	64	10	10;59	15	4/71	5	---	---	---	---	687
60	---	8	30	19	9/69	1	---	---	---	---	688
60	20	5	31	---	---	---	---	---	---	---	689
40	27	8	27	7	11/75	8	.29	170	460	---	690

Table 12.

Well location		Owner	Driller	Year completed	Use	Altitude of land surface (feet)	Topographic setting	Aquifer/ lithology
Number	Lat-Long							
Er- 691	4208-7956	Gary Anderson	Donald E. Hall	1976	H	1,000	S	Qo/sdgr
692	4208-7957	R. T. Becker	Alfred L. Burch	1971	H	1,020	H	Qo/gr
693	4208-7957	Clara Merritt	do.	1969	H	982	H	Qo/gr
694	4209-7959	Lena Asel	do.	1972	H	720	V	Dne/sh
695	4208-7959	J. M. Trinoski	do.	1973	H	735	V	Dne/sh
696	4209-7953	R. M. Di Santi	Ralph C. Parmenter	1973	H	1,295	S	Dch/sh
697	4209-7953	J. S. Darby	Robert Rindfuss	1972	H	1,275	S	Dch/sh
698	4209-7956	Edward Jackson	Harold F. Anderson	1975	H	826	S	Dne/fsh
699	4209-7956	Robert Maison	Alfred L. Burch	1975	H	818	S	Dne/ssh
700	4209-7956	James Sider	Michael W. Burch	1976	H	795	S	Dne/ssh
701	4209-7956	L. D. Sweatman	Donald L. Hermann	1972	H	810	S	Dne/ssh
702	4209-7956	Charles Bauer	Michael W. Burch	1975	H	892	S	Dg/ssh
703	4209-7956	do.	do.	1975	H	872	C	Dg/fsh
704	4209-7956	C. J. Dill	Alfred L. Burch	1970	H	872	S	Dg/fsh
705	4209-7957	Robert Gindlespeger	do.	1969	P	727	V	Qb/clgr
706	4209-7959	John Lipchik	do.	1967	H	685	V	Dne/ssh
707	4210-7953	Mary Gelsie	Ralph C. Parmenter	1974	H	880	S	Dne/sh
708	4210-7953	D. A. Meehl	Robert Anderson	1974	H	867	S	Dne/fsh
709	4210-7956	D. F. Langer	Michael W. Burch	---	H	732	V	Dne/fsh
710	4211-7956	Louise Yaggie	George H. Ackerman	1976	H	674	V	Qo/sdgr
711	4211-7957	Susan Bossart	Alfred L. Burch	1968	H	660	F	Qt/sd
712	4211-7957	A. D. Bencivenga	Michael W. Burch	1975	H	664	F	Qt/sdgr
713	4212-7953	W. J. Filipkowski	Alfred L. Burch	1972	H	740	V	Qo/sdgr
714	4209-7958	John Waterhouse	J. W. Waterhouse	1975	H	715	F	Dne/sh
715	4208-7959	Gridler Builders	Donald L. Hermann	1972	H	864	S	Dch/fsh
716	4200-7953	D. R. Morey	George H. Ackerman	1974	H	1,475	S	Dv/fsh
717	4200-7953	Charles Leasure	do.	1976	H	1,412	S	Qt/u
718	4200-7953	Stephen Dylewski	Harold F. Anderson	1973	H	1,498	H	Dv/fsh
719	4201-7958	Penny Dias	Donald L. Hermann	1975	H	1,250	S	Dch/fsh
720	4201-7957	Carol Weiser	Robert Anderson	1976	H	1,370	S	Qo/gr
721	4202-7956	Raymond Peplinski	do.	1976	H	1,280	S	Qo/sdgr
722	4202-7959	Charles Schendlar	Alfred L. Burch	1972	H	1,358	S	Dch/fsh
723	4202-7959	Michael Paris	Robert Anderson	1974	H	1,350	S	Dv/sh
724	4203-7953	James Giles	do.	1976	H	1,360	H	Qo/gr
725	4203-7954	James Schreiber	George H. Ackerman	1976	H	1,343	S	Qo/gr
726	4203-7955	August Newcamp	Alfred L. Burch	1970	H	1,340	S	Qt/u
727	4203-7954	David Spaeder	Harold F. Anderson	1975	H	1,370	S	Dch/fsh
728	4203-7955	Ralph King	George H. Ackerman	1967	H	1,310	S	Qo/gr
729	4203-7957	Donald Johnston	Robert Anderson	1972	H	1,370	S	Dch/fsh
730	4203-7957	George Nellis	Donald L. Hermann	1972	H	1,385	S	Dch/ssh
731	4203-7957	Carl Rose	Robert Anderson	1973	H	1,352	S	Qt/gr
732	4204-7953	Charles Malliard	Harold F. Anderson	1973	H	1,363	S	Qo/gr
733	4204-7955	Steven Hoover	Donald L. Hermann	1975	H	1,393	S	Dch/fsh
734	4204-7957	Duane Rose	Alfred L. Burch	1971	H	1,390	S	Dch/sh
735	4204-7957	William Seelinger	George H. Ackerman	1973	H	1,358	S	Dch/fsh
736	4204-7957	E. C. Steele	Alfred L. Burch	1966	H	1,392	S	Dch/sh
737	4204-7957	William Ducz	Lowell Halstead	1973	H	1,370	S	Dch/fsh
738	4204-7957	Lloyd Baldwin	George H. Ackerman	1977	H	1,375	S	Qt/clgr
739	4204-7957	John Douglas	Michael W. Burch	---	H	1,370	S	Dch/fsh
740	4204-7958	James Kellogg	Harold F. Anderson	1972	H	1,232	S	Dch/fsh
741	4204-7959	Richard Nies	Alfred L. Burch	1966	H	1,370	S	Dch/fsh
742	4204-7959	Joseph Jendrack	Robert Anderson	1976	H	1,340	S	Qt/t
743	4204-7959	Edward Plonsky	do.	1972	H	1,348	S	Dch/sh
744	4204-7959	Marcelline Gibbs	Alfred L. Burch	1972	H	1,320	S	Dch/fsh
745	4204-7959	Walter Pieniazek	Harold F. Anderson	1974	H	1,300	S	Dch/fsh
746	4205-7952	Donald Spinks	George H. Ackerman	1976	H	1,504	S	Qt/u
747	4205-7954	Richard Page	Michael W. Burch	1975	H	1,260	H	Qo/sdgr
748	4205-7957	Robert Hunt	Alfred L. Burch	1975	H	1,340	S	Dch/fsh
749	4205-7957	Joseph Sharkey	do.	1971	H	1,350	S	Dch/fsh
750	4205-7958	William Hughes	do.	1975	H	1,215	S	Dch/sh
751	4205-7958	Walter Nowarowsky	George H. Ackerman	1974	H	1,212	S	Qt/u
752	4205-7958	Donald Kidder	Harold F. Anderson	1973	H	1,278	S	Dch/fsh
753	4205-7958	Richard Kirby	Donald L. Hermann	1973	H	1,200	S	Qo/sdgr
754	4205-7958	James Praetzel	Alfred L. Burch	1973	H	1,195	S	Qo/sd
755	4205-7959	Edward Bukowski	do.	1967	H	1,298	S	Dch/fss
756	4205-7959	Lynn Hofius	Michael W. Burch	1976	H	1,160	S	Dch/ssh
757	4205-7959	J. R. Young	Donald L. Hermann	1972	H	1,295	S	Dch/ssh
758	4206-7953	Alfred Grzegorzewski	Alfred L. Burch	1974	H	1,350	S	Qo/clgr
759	4206-7954	Ronald White	Ralph C. Parmenter	1975	H	1,370	S	Qt/u
760	4206-7955	D. L. Cosner	Robert Anderson	1975	H	1,300	S	Dch/fsh
761	4206-7955	R. G. Stelle	do.	1975	H	1,182	S	Dch/sh
762	4206-7955	J. B. Urbaniac	do.	1973	H	1,195	S	Dch/fsh
763	4206-7955	Richard Suscheck	do.	1976	H	1,207	S	Dch/fsh
764	4206-7956	T. J. Wood	Alfred L. Burch	1974	H	1,346	S	Dch/fsh

(Continued)

Total depth below land surface (feet)	Casing: Depth (feet)	Casing: Diameter (inches)	Depth(s) to water-bearing zone(s) (feet)	Static water level: Depth below land surface (feet)	Static water level: Date measured (mo/yr)	Reported yield (gal/min)	Specific capacity [(gal/min)/ft]	Hardness (mg/L as $CaCO_3$)	Specific conductance (μmho/cm at 25°C)	pH (units)	Well number
50	50	8	50	---	---	17	---	---	---	---	Er- 691
56	56	8	45;52	42	9/71	20	---	---	---	---	692
54	54	8	40;54	25	9/69	10	.53	---	---	---	693
35	11	8	38	---	---	.1	---	---	---	---	694
50	11	8	8;38	10	5/73	.4	---	---	---	---	695
50	22	5	4	40	6/73	1	---	---	---	---	696
38	25	8	27	10	9/72	6	---	---	---	---	697
38	13	8	18;30	---	---	9	---	---	---	---	698
50	16	8	15;20	12	10/75	4	---	---	---	---	699
50	25	8	8;10;12;19	3	4/76	19	.5	---	---	---	700
32	18	12	18	6	6/72	2	---	---	---	---	701
60	24	8	26	26	12/75	26	---	---	---	---	702
50	10	8	15;28	6	12/73	2	---	---	---	---	703
50	23	8	13;17;25	8	8/70	5	---	240	700	---	704
40	20	8	12;14;28	6	12/69	10	---	---	---	---	705
50	14	8	14;30	6	8/67	1	---	---	---	---	706
40	15	8	25	---	---	---	---	140	560	---	707
40	8	12	11	6	1/74	3	.09	---	---	---	708
30	---	6	14;17	10	---	6	---	---	---	---	709
42	30	8	24	2	2/76	2	---	---	---	---	710
82	72	8	24;68	50	4/68	.3	---	---	---	---	711
70	49	8	14;45	10	7/75	1	---	---	---	---	712
32	32	8	16;27	8	8/72	20	.9	200	530	---	713
30	20	8	20	15	7/75	1	---	200	600	---	714
50	25	8	22;30	8	11/72	8	---	---	---	---	715
70	28	8	26;45	---	---	2	---	---	---	---	716
55	31	8	25	10	7/76	40	---	---	---	---	717
72	---	8	70	---	---	20	---	---	---	---	718
66	50	8	40;60	12	6/75	20	4	---	---	---	719
69	69	8	67	58	8/76	15	3	---	---	---	720
66	66	8	18;63	2	4/76	4	.06	---	---	---	721
50	33	8	26;32;40	5	7/72	18	---	---	---	---	722
65	27	8	28	4	1/74	.5	.01	---	---	---	723
128	128	8	75;127	30	6/76	6	.12	---	---	---	724
94	94	8	45;90	54	9/76	10	---	---	---	---	725
106	70	5	70	31	5/70	2	---	100	260	---	726
72	29	8	30;50	30	8/75	2	.09	---	---	---	727
69	69	6	---	F	5/67	12	---	---	---	---	728
95	73	8	75	31	11/72	7	.12	---	---	---	729
80	47	8	---	12	7/72	4	.07	---	---	---	730
70	70	8	68	47	1/73	7	.4	---	---	---	731
60	60	8	49;60	---	---	12	---	---	---	---	732
50	32	8	26;28	---	---	4	---	---	---	---	733
70	15	12	13;48	7	7/71	1	---	---	---	---	734
75	35	8	31;52	---	---	20	---	---	---	---	735
80	26	8	10;35	6	5/26	1	---	---	---	---	736
50	23	8	20;24	---	---	20	---	---	---	---	737
72	56	8	52	37	3/77	30	---	---	---	---	738
90	---	8	60;75	20	5/75	8	---	---	---	---	739
110	28	8	50;80	10	8/72	2	---	---	---	---	740
80	28	8	23;30	15	10/66	1	---	---	---	---	741
25	24	8	16;25	12	10/76	30	10	---	---	---	742
50	14	12	30	25	8/72	.2	.01	---	---	---	743
60	14	8	14;25	18	9/72	1	---	---	---	---	744
60	23	12	43;50;58	---	---	20	---	---	---	---	745
45	28	8	23	20	7/76	4	---	---	---	---	746
58	58	8	24;45;53	21	9/75	30	15	---	---	---	747
70	30	8	22;42	10	5/75	4	---	---	---	---	748
60	15	8	17	13	7/71	10	---	---	---	---	749
75	22	8	20;28;62	18	7/75	2	---	---	---	---	750
40	20	8	20	---	---	1	---	---	---	---	751
150	42	8	54;75;114	---	---	4	---	---	---	---	752
152	152	8	90;120;150	70	3/73	20	.7	---	---	---	753
114	114	8	11;87	62	8/73	14	---	---	---	---	754
80	19	8	20;55	23	10/67	1	---	---	---	---	755
55	17	8	12	8	6/76	15	.5	95	230	---	756
72	21	8	18;22	10	9/72	2	.03	---	---	---	757
72	34	8	28;40	24	6/74	2	---	---	---	---	758
45	15	6	4	8	9/75	3	.1	---	---	---	759
60	11	8	20;41	5	10/75	6	---	---	---	---	760
60	17	12	22	7	5/75	15	---	---	---	---	761
55	17	8	17;22;30	4	3/73	3	.06	---	---	---	762
61	16	8	16;19	14	4/76	6	.11	---	---	---	763
50	20	8	12;38;40	6	5/74	20	---	---	---	---	764

Table 12.

Well location		Owner	Driller	Year completed	Use	Altitude of land surface (feet)	Topographic setting	Aquifer/ lithology
Number	Lat-Long							
Er- 765	4206-7956	M. K. Simmons	Michael W. Burch	1975	H	1,274	S	Qt/clgr
766	4206-7956	Vince Pepicello	Alfred L. Burch	1973	H	1,263	S	Dch/fsh
767	4205-7957	Arthur Jenson	Harold F. Anderson	1973	H	1,360	S	Qo/gr
768	4204-7957	Rodney Riblett	George H. Ackerman	1973	H	1,422	S	Qt/u
769	4205-7958	Daryl Waldinger	Robert Anderson	1976	H	1,100	S	Qt/gr
770	4206-7956	L. J. Rodler	Alfred L. Burch	1972	H	1,243	S	Dch/fsh
771	4206-7956	Jerry Lindenberger	do.	1972	H	1,250	S	Dch/fsh
772	4206-7956	Atlas Homes Inc.	do.	1967	H	1,240	S	Dch/fsh
773	4205-7959	Bernard Hill	Robert Anderson	1976	H	1,135	H	Qt/clgr
774	4206-7958	William De Platchett	Michael W. Burch	1976	H	1,175	S	Dch/ssh
775	4206-7958	Paul Daube	do.	1976	H	1,190	S	Dch/fsh
776	4206-7959	Nick Mindek	do.	---	H	995	S	Qt/u
777	4207-7952	Eugene Trayer	Alfred L. Burch	1969	H	1,480	S	Dv/fsh
778	4207-7953	C. F. Merhar	George H. Ackerman	1974	H	1,412	S	Qt/t
779	4205-7955	Rosemary Preece	Alfred L. Burch	1968	H	1,433	H	Dch/fsh
780	4206-7957	C. M. Young	Ralph Wayne Grant	1974	H	1,270	S	Dch/fst
781	4204-7959	Edward Monkowski	Alfred L. Burch	1972	H	1,343	S	Qt/t
782	4206-7958	W. D. Martin	do.	1968	H	1,295	S	Qt/t
783	4207-7958	James Moser	Ralph Wayne Grant	1974	H	1,120	S	Dch/fst
784	4200-7953	Phillip Carlson	Donald L. Hermann	1973	H	1,430	S	Dch/ssh
785	4204-7958	William Schick	do.	1972	H	1,210	S	Dch/fsh
786	4205-7959	Ralph Shaw	Alfred L. Burch	1968	H	1,140	H	Dch/fsh
787	4204-7957	Otto Stablein	do.	1973	H	1,400	S	Dv/fsh
788	4205-7958	Parmney Sprouse	do.	1973	H	1,296	S	Dch/fsh
789	4205-7954	Joseph Stubenhofer	do.	1968	H	1,350	H	Qo/sdgr
790	4205-7954	Kenneth Weed	do.	1968	H	1,350	S	Qo/sdgr
791	4203-7956	W. W. Yaple	McCray Bros.	1974	H	1,310	S	Qo/sd
792	4205-7958	Thomas Kirsch	Donald L. Hermann	1972	H	1,220	S	Qo/sdgr
793	4206-7959	George Church	Alfred L. Burch	1971	H	970	S	Dch/fsh
794	4205-7955	Gary Cage	do.	1973	H	1,433	H	Dch/fsh
795	4205-7957	Charles Lander	do.	1973	H	1,372	S	Dch/fsh
796	4201-7957	David Kaschak	Robert Rindfuss	1974	H	1,310	S	Qo/gr
797	4205-7956	J. W. Houpt	George H. Ackerman	1973	H	1,450	H	Dv/fsh
798	4203-7956	George Burbules	Michael W. Burch	1976	H	1,356	T	Dch/fsh
799	4203-7957	William Lapenz	Robert Anderson	1977	H	1,405	H	Qt/t
800	4202-7959	Terry Ottaway	Alfred L. Burch	1975	H	1,398	S	Dv/ssh
801	4203-7958	Edward Kearney	do.	1975	H	1,350	U	Dch/fsh
802	4204-7958	Al Kirsch	Robert Anderson	1976	H	1,260	S	Qt/t
803	4204-7958	James Saltsman	Alfred L. Burch	1966	H	1,274	S	Qt/t
804	4204-7958	Edward Vallimont	Donald L. Hermann	1975	H	1,270	S	Qo/sdgr
805	4205-7955	Walter Kuhl	Robert Anderson	1977	H	1,418	S	Qt/t
806	4200-7948	Ronald Huzinec	Harold F. Anderson	1975	H	1,302	S	Qo/sdgr
807	4202-7949	Roy Huntley	Ralph C. Parmenter	1974	H	1,350	V	Qo/u
808	4204-7950	Leslie Burlingham	Alfred L. Burch	1964	H	1,320	V	Qo/sd
809	4206-7951	G. W. Dana	Felix J. Waible	1975	H	1,420	S	Qo/gr
810	4206-7951	E. D. Boyd	Alfred L. Burch	1974	H	1,470	S	Qt/u
811	4206-7951	L. A. Wescott	Raymond L. Butterfield	1970	H	1,400	S	Dch/fsh
812	4206-7951	Louis Ganza	Alfred L. Burch	1973	H	1,490	S	Dv/fsh
813	4206-7951	John Pomorski	George H. Ackerman	1976	H	1,415	S	Qt/sdgr
814	4207-7947	Ralph Neal	Ralph C. Parmenter	1974	H	1,425	H	Qt/u
815	4207-7951	R. E. Snyder	Alfred L. Burch	1970	H	1,455	S	Dv/fsh
816	4207-7951	Betty Angerer	Michael W. Burch	1975	H	1,467	S	Dv/fsh
817	4200-8002	R. D. Beals	Donald L. Hermann	1972	H	1,445	S	Dv/fsh
818	4200-8002	Shaul Equipment and Supply	Alfred L. Burch	1969	H	1,428	S	Dv/fsh
819	4200-8004	John Brozell	do.	1972	H	1,434	H	Dv/fsh
820	4200-8004	C. C. Moore	Ralph Wayne Grant	1974	H	1,115	V	Qo/sdgr
821	4200-8005	Anthony Pastore	Alfred L. Burch	1972	H	1,140	S	Qo/sdgr
822	4200-8006	R. P. Eck	Tony Simonetti	1972	H	1,058	V	Qo/sdgr
823	4200-8006	W. W. Spires	Max E. Hickernell	1969	H	1,070	V	Qo/gr
824	4200-8007	F. J. Dylewski	Donald L. Hermann	1972	H	1,035	S	Dch/ssh
825	4200-8007	Lauren Krautter	Alfred L. Burch	1967	H	1,040	S	Qt/gr
826	4201-8000	L. R. Kulik	Robert Anderson	1972	H	1,240	V	Qo/sdgr
827	4201-8002	Jerry Dunn	do.	1974	H	1,405	S	Qt/t
828	4201-8002	Gene Groenendaal	do.	1974	H	1,415	S	Qt/t
829	4201-8002	Walter Lego	Alfred L. Burch	1967	H	1,400	S	Dv/fsh
830	4201-8002	John Chojnacki	do.	1976	H	1,388	H	Dch/fsh
831	4201-8003	J. K. Robinson	Donald L. Hermann	1972	H	1,358	S	Dv/fsh
832	4201-8003	Lovittie Schaffer	do.	1973	H	1,374	S	Dv/fsh
833	4201-8003	J. F. Donahue	George H. Ackerman	---	H	1,375	S	Qt/u
834	4201-8003	Robert Huffman	Tony Simonetti	1973	H	1,362	S	Dv/fsh
835	4201-8003	Gartner Harf Co.	Donald L. Hermann	1972	S	1,434	S	Dv/fsh
836	4201-8004	Larry Lucas	do.	1974	H	1,412	S	Dv/fsh
837	4201-8005	J. C. Lander	do.	1972	H	1,260	S	Dch/fsh
838	4201-8006	J. F. Regan	Alfred L. Burch	1972	H	1,132	S	Dch/fsh

(Continued)

Total depth below land surface (feet)	Casing		Depth(s) to water-bearing zone(s) (feet)	Static water level		Reported yield (gal/min)	Specific capacity [(gal/min)/ft]	Hardness (mg/L as $CaCO_3$)	Specific conductance (μmho/cm at 25°C)	pH (units)	Well number
	Depth (feet)	Diameter (inches)		Depth below land surface (feet)	Date measured (mo/yr)						
50	18	8	16;19	4	10/75	30	---	---	---	---	Er- 765
60	17	8	14;22;48	8	7/73	2	---	140	380	---	766
40	22	8	20;35	---	6/73	20	---	---	---	---	767
100	---	8	18;48	6	3/73	3	---	---	---	---	768
92	92	8	90	74	5/76	20	2	---	---	---	769
50	19	10	12;18;36	5	10/72	10	---	---	---	---	770
50	19	8	16;19;36	8	10/72	10	---	---	---	---	771
50	30	8	15;20	8	6/67	10	---	---	---	---	772
60	17	8	---	4	7/76	5	.09	---	---	---	773
65	14	12	10;16	7	5/76	1	---	---	---	---	774
60	12	8	12;21	8	10/76	2	.04	---	---	---	775
47	22	10	18	11	12/76	1	---	---	---	---	776
60	14	8	14;40	10	9/69	1	---	140	400	---	777
65	28	8	26	8	6/74	1	---	---	---	---	778
140	16	8	10;130	4	5/68	2	---	---	---	---	779
50	19	8	---	---	---	10	---	---	---	---	780
60	40	8	30;52	27	8/72	8	---	---	---	---	781
50	20	8	16;40	8	10/68	10	---	---	---	---	782
55	25	8	---	---	---	---	---	---	---	---	783
60	24	8	20;23	---	---	4	---	---	---	---	784
80	42	8	45	28	12/72	2	---	---	---	---	785
50	15	8	12;14;20	1	5/68	.5	---	---	---	---	786
90	18	8	17;20;50	3	11/73	1	---	---	---	---	787
60	33	8	25;28;57	2	6/73	17	---	---	---	---	788
67	67	8	40;63;67	57	10/68	15	---	---	---	---	789
58	58	8	48	43	5/68	10	---	---	---	---	790
140	140	8	---	---	---	---	---	---	---	---	791
129	129	8	126	90	7/72	15	.75	---	---	---	792
54	21	12	---	19	12/71	4	---	---	---	---	793
150	16	8	12;130	8	7/73	2	---	---	---	---	794
95	28	8	24;80	18	8/73	5	---	---	---	---	795
78	78	8	75	20	5/74	30	.8	---	---	---	796
50	24	8	24	---	8/73	2	---	---	---	---	797
50	29	8	13;24;42	4	11/76	9	.22	---	---	---	798
125	91	8	95	52	3/77	2	.01	---	---	---	799
65	26	8	24;52	24	9/75	4	---	---	---	---	800
75	57	8	58	25	9/75	5	---	---	---	---	801
54	26	8	25;35	9	3/76	11	.27	---	---	---	802
60	30	6	15;30	20	5/66	2	---	---	---	---	803
149	149	6	59;148	1	10/75	10	.08	---	---	---	804
78	14	8	16;25	6	1/77	30	3	---	---	---	805
45	32	8	25;35	9	7/75	5	---	120	290	---	806
110	110	5	---	30	6/74	8	.16	---	---	---	807
100	100	6	12;90	3	7/64	20	---	---	---	---	808
43	43	8	39	9	5/75	6	---	---	---	---	809
43	---	5	15	15	4/74	9	---	---	---	---	810
68	37	6	40;64	15	7/70	15	1	---	---	---	811
60	27	8	15;24;35	10	7/73	9	---	---	---	---	812
60	32	8	27;55	15	8/76	8	---	---	---	---	813
43	43	5	---	12	6/74	3	.12	---	---	---	814
70	22	8	20	1	1/70	1	---	---	---	---	815
73	22	8	30	7	5/75	1	.02	---	---	---	816
50	37	8	35;37	8	10/72	10	---	---	---	---	817
65	30	8	20;30	6	11/69	1	---	---	---	---	818
50	37	8	32;40	8	7/72	6	---	---	---	---	819
71	62	8	---	---	---	---	---	---	---	---	820
46	46	8	40;46	7	---	70	---	---	---	---	821
65	65	8	46;65	10	9/72	10	.25	110	550	---	822
80	80	8	77	---	---	15	---	---	---	---	823
50	22	8	18	---	---	.3	---	---	---	---	824
31	31	8	5;21;31	---	---	20	---	---	---	---	825
20	20	8	17	5	9/72	6	.46	---	---	---	826
62	28	8	28	2	2/74	.6	.01	---	---	---	827
63	31	8	31	8	6/74	.5	.01	---	---	---	828
50	24	8	12;18;40	8	5/67	14	---	115	620	---	829
100	57	8	75	37	4/76	.7	---	---	---	---	830
48	38	8	35;45	10	10/72	10	.36	---	---	---	831
50	23	8	20	20	7/73	3	.1	---	---	---	832
55	30	8	30	---	---	4	---	---	---	---	833
43	42	8	38	8	8/73	20	1.2	---	---	---	834
60	41	8	36;41;45	15	9/72	20	.6	---	---	---	835
60	26	8	25;45	16	5/74	3	---	---	---	---	836
50	22	12	22	8	6/72	2	---	---	---	---	837
70	15	8	7;15;62	2	5/72	10	---	---	---	---	838

Table 12.

Well location		Owner	Driller	Year completed	Use	Altitude of land surface (feet)	Topographic setting	Aquifer/lithology
Number	Lat-Long							
Er- 839	4201-8006	Donna Barrows	Alfred L. Burch	1967	H	1,185	S	Dch/fsh
840	4201-8007	Robert Griffith	do.	1974	H	1,073	V	Dch/fsh
841	4201-8007	C. E. Nelson	Donald L. Hermann	1972	H	1,084	F	Dch/fsh
842	4202-8001	P. A. Laughery	Alfred L. Burch	1970	H	1,230	S	Dch/fsh
843	4202-8001	R. A. Hodas	Donald L. Hermann	1973	H	1,275	S	Dch/fsh
844	4202-8001	N. P. Pederson	do.	1972	H	1,312	S	Dch/fsh
845	4202-8001	Gary Osborne	do.	1975	H	1,266	V	Qo/sdgr
846	4202-8001	Robert Kightlinger	Michael W. Burch	1976	H	1,212	S	Dch/fsh
847	4202-8002	Eugene Bosch	Alfred L. Burch	1968	H	1,332	S	Dch/sh
848	4202-8002	Summit Township	Donald L. Hermann	1975	H	1,280	S	Dch/ssh
849	4202-8002	Melvin Davis	Charles J. Richardson III	1974	H	1,295	S	Qt/sdgr
850	4202-8002	Lee Strain	Donald L. Hermann	1972	H	1,270	S	Dch/fsh
851	4202-8003	William Winkleman	do.	1972	H	1,360	H	Dv/fsh
852	4202-8003	Carl Gentile	do.	1974	H	1,358	H	Qt/t
853	4202-8003	John Mospan	Alfred L. Burch	1975	H	1,342	S	Dv/fsh
854	4202-8004	WUET Television	do.	1971	H	1,305	S	Qt/clgr
855	4202-8004	Virgil Lawson	do.	1967	H	1,212	S	Dch/fsh
856	4202-8004	R. C. Herman	Donald L. Hermann	1972	H	1,270	S	Qt/t
857	4202-8004	Paul Wetzel	Robert Anderson	1975	C	1,309	S	Dch/fsh
858	4202-8005	Alex Horwath	Alfred L. Burch	1974	H	1,235	S	Dch/fsh
859	4202-8006	Norman Grode	do.	1965	H	1,070	T	Dch/fsh
860	4202-8006	C. F. Sult	George H. Ackerman	1973	H	1,133	S	Dch/fsh
861	4202-8006	George Havican	Lorenze Lee Hall	1973	H	1,124	S	Dch/fsh
862	4202-8006	Emil Kesselring	Michael W. Burch	1976	S	1,096	S	Dch/fsh
863	4202-8006	do.	do.	---	H	1,103	S	Dch/fsh
864	4203-8001	E. C. Hull	Ralph Wayne Grant	1974	H	1,175	S	Dch/fsh
865	4203-8001	Joseph Ferraro	Donald L. Hermann	1973	H	1,190	S	Dch/fsh
866	4203-8001	Frank Starvaggi	do.	1974	H	1,140	S	Dch/fsh
867	4203-8001	Gerald Leib	do.	1972	S	1,220	S	Qt/t
868	4203-8002	Joseph Kula	do.	1974	H	1,245	S	Dch/fsh
869	4203-8002	W. E. Klick	Alfred L. Burch	1972	H	1,170	S	Dch/sh
870	4203-8002	M. L. Small	Robert Anderson	1972	H	1,128	S	Dch/fsh
871	4203-8002	Ruby Snyder	Donald L. Hermann	1973	H	1,155	S	Dch/fsh
872	4203-8002	Judge Lawson	Alfred L. Burch	1971	H	1,105	S	Dch/fsh
873	4203-8002	W. M. Curtis	Donald L. Hermann	1973	H	1,115	S	Dch/fsh
874	4203-8003	John Ollarek	do.	1972	H	1,188	S	Dch/fsh
875	4203-8004	Merton Wilson	Alfred L. Burch	1975	H	1,110	S	Qo/sdgr
876	4203-8004	Gregory Gehrlein	do.	1972	H	1,110	H	Qt/clgr
877	4203-8004	T. A. DeGeorge	Robert Anderson	1974	H	1,100	H	Qt/clgr
878	4203-8004	J. M. McCreary	Donald L. Hermann	1972	H	1,110	H	Dch/fsh
879	4203-8004	Leonard Niederriter	Robert Anderson	1974	H	1,095	H	Qo/gr
880	4203-8004	Lee Schaaf	Donald L. Hermann	1973	H	1,104	H	Qo/gr
881	4203-8004	Leo Ranowiecki	Robert Rindfuss	1972	H	1,013	S	Dch/fsh
882	4203-8004	H. T. Welka	Donald L. Hermann	1973	H	1,070	S	Dch/fsh
883	4203-8004	Dale Kibbe	Robert Anderson	1976	H	1,015	S	Dch/fsh
884	4203-8004	L. A. Wurst	Alfred L. Burch	1972	H	1,050	S	Qo/clgr
885	4203-8004	Paul Lorei	do.	1968	H	1,065	S	Dch/fsh
886	4203-8005	Robert Hutchinson	Donald L. Hermann	1972	H	990	S	Dch/fsh
887	4203-8005	Rose Mozur	do.	1972	H	1,050	S	Dch/fsh
888	4203-8005	Jerry Lindenberger	Alfred L. Burch	1967	H	1,063	S	Qo/gr
889	4203-8005	Richard Camphausen	do.	1967	H	1,070	H	Qt/gr
890	4203-8005	P. B. Balkovic	do.	1972	H	1,052	S	Dch/fsh
891	4203-8005	E. A. Rohan	do.	1973	H	1,070	H	Qt/clgr
892	4203-8005	Ivan Yaple	do.	1966	H	1,070	S	Dch/fsh
893	4203-8006	R. E. McNaughton	Donald L. Hermann	1973	H	1,030	V	Qo/sdgr
894	4203-8006	Raymond Feikls	do.	1974	H	1,085	S	Qt/clgr
895	4203-8006	J. J. Desser	do.	1973	H	1,060	H	Qt/sd
896	4203-8006	J. P. Dedinsky	do.	1972	H	972	S	Qt/sdgr
897	4203-8007	Charles Ives	Robert Anderson	1976	H	888	S	Dg/fsh
898	4203-8007	Dolores Reitz	Donald L. Hermann	1972	H	906	U	Qt/clgr
899	4203-8007	Thomas Bujnoski	Lorenze Lee Hall	1973	H	1,013	F	Dch/fsh
900	4204-8000	Donald Harrah	Harold F. Anderson	1973	H	1,255	S	Dch/fsh
901	4204-8000	Richard Lakari	Michael W. Burch	1976	H	1,266	S	Dch/fsh
902	4204-8000	Robert Amendola	Alfred L. Burch	1970	H	1,360	S	Dch/fsh
903	4204-8001	William Koppes	Michael W. Burch	1976	H	1,206	S	Dch/fsh
904	4204-8001	Roger Baker	Felix J. Waible	1975	H	1,160	S	Qt/t
905	4204-8002	Delbert Shopene	Donald L. Hermann	1972	H	1,100	U	Qo/sdgr
906	4200-8002	Derrick Rosaire	Robert Anderson	1972	H	1,445	S	Dv/fsh
907	4204-8003	David Lawrence	George H. Ackerman	1976	H	1,070	S	Dch/sh
908	4204-8003	Theodore Nowak	do.	1973	H	1,050	H	Dch/fsh
909	4204-8003	A. S. Ferralli, Jr.	do.	1975	H	1,042	S	Qt/clgr
910	4204-8003	Douglas Courter	Alfred L. Burch	1974	H	922	S	Qt/clgr
911	4204-8003	Edward Kuhn	do.	1973	H	960	S	Qo/gr
912	4204-8003	D. A. Hill	Michael W. Burch	1975	H	972	S	Qo/clgr

(Continued)

Total depth below land surface (feet)	Casing		Depth(s) to water-bearing zone(s) (feet)	Static water level		Reported yield (gal/min)	Specific capacity [(gal/min)/ft]	Hardness (mg/L as $CaCO_3$)	Specific conductance (μmho/cm at 25°C)	pH (units)	Well number
	Depth (feet)	Diameter (inches)		Depth below land surface (feet)	Date measured (mo/yr)						
52	21	8	---	10	8/67	2	---	---	---	---	Er- 839
50	16	8	14;35	3	1/74	10	---	---	---	---	840
90	20	8	20	18	8/72	.4	---	---	---	---	841
70	30	6	30;45	13	5/70	3	---	---	---	---	842
52	34	8	23;28	15	2/73	10	.37	---	---	---	843
80	49	8	49	32	7/72	2	---	---	---	---	844
30	30	8	27	12	12/75	10	1.2	---	---	---	845
55	25	8	20	10	10/76	22	.5	---	---	---	846
50	33	8	11;34	2	3/68	2	---	---	---	---	847
62	61	12	29;61	12	9/75	3	---	---	---	---	848
20	20	30	8	8	7/74	5	.5	---	---	---	849
60	46	8	46	20	7/72	2	.04	---	---	---	850
46	40	8	32;35;40	10	10/72	6	.25	---	---	---	851
50	39	8	36	8	6/74	6	.19	160	600	---	852
50	37	8	13;20;32;45	8	4/75	10	.3	---	---	---	853
60	23	12	16;19;20	8	9/71	5	---	---	---	---	854
50	15	8	3;20	1	12/67	1	---	---	---	---	855
46	18	12	18	12	10/72	2	.06	---	---	---	856
59	21	8	23;30	1	---	1	.02	---	---	---	857
60	15	8	13;24	5	11/74	4	---	---	---	---	858
50	20	12	18;30;40	13	3/65	.3	---	---	---	---	859
35	20	12	20	---	---	1	---	---	---	---	860
63	20	8	23	9	7/73	8	.16	---	---	---	861
37	17	8	9;32	9	6/76	2	.07	---	---	---	862
50	20	8	---	16	6/76	1	.03	76	---	7.8	863
55	20	8	---	---	---	---	---	---	---	---	864
68	18	12	25	25	12/73	1	---	---	---	---	865
70	22	12	20;40	18	3/74	2	---	---	---	---	866
40	22	8	22	15	10/72	.5	.02	---	---	---	867
50	20	8	18;26	15	6/74	4	---	---	---	---	868
50	17	12	17;42	17	8/72	1	---	---	---	---	869
40	14	12	14;21	5	8/72	2	.05	---	---	---	870
48	25	8	19;25	8	1/73	4	---	---	---	---	871
50	17	8	12;23	10	7/71	.8	.08	---	---	---	872
50	28	8	23;28	8	1/73	10	.3	---	---	---	873
65	20	8	20;45	12	6/72	2	.04	---	---	---	874
65	18	8	13;55	6	3/75	6	.43	---	---	---	875
70	45	8	39	35	9/72	5	---	---	---	---	876
24	24	12	22	12	8/74	9	1.1	---	---	---	877
70	40	8	35	28	6/72	5	---	---	---	---	878
23	23	8	10;22	6	5/74	30	---	240	625	---	879
38	38	8	32;35	18	4/73	15	1.1	---	---	---	880
60	30	8	33	25	6/72	2	---	---	---	---	881
60	32	12	21;32	18	4/73	4	---	---	---	---	882
51	15	8	15;20	12	7/76	1	.04	---	---	---	883
56	42	8	37;42	8	7/72	6	---	---	---	---	884
50	24	8	20;30	14	4/68	7	---	---	---	---	885
70	58	8	62;68	30	7/72	10	---	---	---	---	886
83	76	8	70;76	45	7/72	15	---	---	---	---	887
95	81	8	76	70	5/67	18	1.8	---	---	---	888
120	65	8	12;64;80	66	10/67	.5	---	---	---	---	889
95	58	8	55	50	1/72	2	---	---	---	---	890
36	36	8	29	18	5/73	30	---	---	---	---	891
105	69	8	70	70	10/66	1	---	---	---	---	892
35	26	8	24	12	9/73	10	1.7	120	565	---	893
50	20	8	18;25	15	4/74	4	---	---	---	---	894
80	74	8	69	40	9/73	4	.12	---	---	---	895
78	63	8	58	40	6/72	8	.32	---	---	---	896
65	22	8	29	17	10/76	.7	.01	---	---	---	897
36	36	8	33	6	10/72	20	1	---	---	---	898
57	14	12	28	10	7/73	6	.12	---	---	---	899
50	14	12	30;40	---	---	4	---	---	---	---	900
50	17	8	8;24	7	1/76	5	.12	---	---	---	901
50	23	8	7;15;33	8	9/70	5	---	---	---	---	902
51	20	6	30	20	6/76	2	.08	---	---	---	903
50	20	12	16	5	3/75	2	---	---	---	---	904
103	103	8	60;95	63	6/72	30	2.5	---	---	---	905
67	37	8	38	21	12/72	2	.04	---	---	---	906
70	23	12	18	22	7/76	.8	---	---	---	---	907
118	108	8	---	90	6/73	15	---	---	---	---	908
120	102	8	97	---	---	.6	---	---	---	---	909
55	20	8	16;19	16	2/74	1	---	---	---	---	910
31	31	8	22;25	20	3/73	20	---	---	---	---	911
50	25	8	24	18	8/75	10	---	---	---	---	912

Table 12.

Well location		Owner	Driller	Year completed	Use	Altitude of land surface (feet)	Topographic setting	Aquifer/ lithology
Number	Lat-Long							
Er- 913	4204-8003	Hamilton Lumber Co.	Donald L. Hermann	1972	H	1,005	S	Qt/sd
914	4204-8003	Cyrus Lee	do.	1972	H	990	S	Qt/sd
915	4204-8003	H. E. Camp	George H. Ackerman	1973	H	990	S	Qo/u
916	4204-8003	L. H. Carnicelli	Alfred L. Burch	1971	H	1,045	H	Qo/gr
917	4204-8003	E. R. Greenfield, Jr.	George H. Ackerman	1973	H	1,040	U	Qt/u
918	4204-8003	D. M. Granahan	Alfred L. Burch	1972	H	1,032	S	Qt/clgr
919	4204-8003	do.	do.	1973	H	1,025	S	Qt/sd
920	4204-8003	M. J. Cipicchio	do.	1973	H	1,037	S	Qo/gr
921	4204-8003	Robert Wally	Robert Anderson	1974	H	1,048	H	Dch/fsh
922	4204-8004	M. C. Wolfe	Alfred L. Burch	1967	H	990	S	Qo/sdgr
923	4204-8004	D. B. Siggins	Robert Anderson	1973	H	1,032	S	Qt/t
924	4204-8004	R. W. Heidt	Tony Simonetti	1972	H	1,050	H	Dch/fsh
925	4204-8005	La Nar Corp.	Alfred L. Burch	1967	N	905	V	Qo/gr
926	4204-8005	J. L. Shauberger	Donald L. Hermann	1972	H	924	U	Qo/sdgr
927	4204-8005	Texaco Oil Co.	Max E. Hickernell	1971	C	920	S	Dg/fsh
928	4204-8005	Frank Roscher	Michael W. Burch	1975	H	958	S	Qt/u
929	4204-8005	Atlas Homes Co.	Alfred L. Burch	1968	H	1,020	H	Qt/gr
930	4204-8005	David Spath	Donald L. Hermann	1973	H	924	U	Qt/sd
931	4204-8006	Donald Morrison	George H. Ackerman	1974	H	920	S	Qo/gr
932	4204-8006	Harry Wagner	Robert Anderson	1972	H	885	V	Qo/gr
933	4204-8006	G. W. Schermer	do.	1975	H	900	S	Qt/clgr
934	4204-8007	Kenneth Foht	Felix J. Waible	1976	H	937	U	Qo/gr
935	4204-8007	E. A. Nicholson	Michael W. Burch	1975	H	922	U	Qt/u
936	4205-8000	Robert Praetzel	Alfred L. Burch	1971	H	1,118	U	Qo/gr
937	4205-8000	Ted Gray	do.	1970	H	1,100	S	Qo/sdgr
938	4204-8000	Charles Huff	do.	1968	H	1,258	S	Dch/fsh
939	4205-8000	Ramada Inn	Max E. Hickernell	1971	P	1,110	U	Qo/gr
940	4205-8001	Ernest Simpson	Robert Anderson	1976	H	1,102	S	Qo/t
941	4205-8001	E. C. Onorato	Harold F. Anderson	1973	H	1,100	S	Qo/gr
942	4205-8001	Paul Martin	Alfred L. Burch	1969	H	1,010	S	Qo/gr
943	4205-8001	do.	do.	1969	H	1,080	S	Qo/sdgr
944	4205-8002	John Becker	Michael W. Burch	1976	H	978	S	Qo/clgr
945	4205-8002	Norman Rapela	George H. Ackerman	1974	H	975	S	Qo/u
946	4205-8002	Ronald Walter	Robert Anderson	1977	H	925	S	Dch/fsh
947	4205-8002	Kenneth Boyles	Max E. Hickernell	1963	H	1,089	S	Qo/gr
948	4205-8002	Richard Bilski	Alfred L. Burch	1970	H	1,082	S	Qo/sdgr
949	4205-8002	M. J. Sznajder	Michael W. Burch	1975	H	955	S	Qo/u
950	4205-8003	Arthur Whiteman	do.	1975	H	960	H	Qo/u
951	4205-8003	Harry Shaffer	Alfred L. Burch	1971	H	928	S	Dg/fsh
952	4205-8003	P. R. Amendola	do.	1972	H	970	S	Qo/clgr
953	4205-8003	Max Stankowski	do.	1964	H	835	S	Dg/fsh
954	4205-8001	P. J. Martin	do.	1971	H	1,000	S	Qo/clgr
955	4205-8007	Frederick Steger	---	---	U	775	F	Qt/u
956	4205-8000	Robert Halmuth	Alfred L. Burch	1976	H	1,124	S	Qo/sdgr
957	4206-8000	E. C. Messenger	George H. Ackerman	1975	H	1,002	S	Qt/clgr
958	4206-8000	Robert Hostetler	Michael W. Burch	1976	H	1,108	S	Qt/gr
959	4206-8000	Andreas Zafiropoulos	do.	1975	P	1,068	S	Qt/clgr
960	4206-8000	do.	do.	1976	P	1,105	S	Qt/clgr
961	4206-8000	do.	do.	1975	P	1,115	S	Qt/gr
962	4206-8001	John Schertzer	Ralph Wayne Grant	1973	H	1,002	S	Dg/fsh
963	4206-8001	George Bennett	Harold F. Anderson	1974	H	975	S	Qt/t
964	4206-8001	Millcreek School District	Robert Anderson	1974	T	960	V	Dg/fsh
965	4206-8001	M. M. Phillips	Donald L. Hermann	1972	H	925	S	Dg/fsh
966	4206-8001	George Jackson	Alfred L. Burch	1968	H	945	V	Qt/sdgr
967	4153-7943	Blaine Geddes	Harold F. Anderson	1974	H	1,522	S	Qo/sdgr
968	4154-7937	Joseph Sanders	Alfred L. Burch	1964	H	1,725	S	MDcr/fsh
969	4154-7942	Gerald Parsons	Harry Bros.	1968	H	1,372	V	Qo/t
970	4154-7943	Paul Balek	McCray Bros.	1974	H	1,380	V	Qo/gr
971	4155-7940	Gerald Krasa	do.	1971	H	1,392	V	Qo/clgr
972	4155-7944	Hughpert Dawdy	Max E. Hickernell	1977	H	1,387	V	Qo/gr
973	4155-7943	Ferdinand Mihalus	Harold F. Anderson	1974	H	1,395	V	Qo/gr
974	4156-7939	Keppel Tiffany	Alfred L. Burch	1964	H	1,462	U	Qo/sd
975	4159-7943	Cash Szymanski	Boyd Lee Hall	1973	H	1,826	H	Qo/gr
976	4152-8014	R. F. Felix	John E. Gage, Jr.	1974	H	1,265	S	MDbv/fsh
977	4203-8016	Michael Bond	Charles J. Richardson III	1974	H	652	F	Qb/sd
978	4202-8016	George Dohanic	do.	1973	H	694	S	Qb/sdgr
979	4204-8009	L. C. Penna	George H. Ackerman	1972	H	920	S	Qo/u
980	4209-8000	M. H. Harriger	Alfred L. Burch	1971	H	647	U	Dne/fsh
981	4209-8000	E. D. Campbell	Robert F Rumball	1973	H	612	U	Qo/sdgr
982	4204-8009	R. W. Mills	George H. Ackerman	1972	H	855	S	Qt/u
983	4203-8013	Louis Kulczycke	McCray Bros.	1972	H	712	S	Qo/gr
984	4202-8007	Theodore Zelinski	Alfred L. Burch	1967	H	1,018	F	Qo/sdgr
985	4202-8016	Betty Kinsinger	do.	1967	H	670	F	Qb/u
986	4202-8013	Laverne Brace	George H. Ackerman	1973	H	802	F	Qo/u

(Continued)

Total depth below land surface (feet)	Casing: Depth (feet)	Casing: Diameter (inches)	Depth(s) to water-bearing zone(s) (feet)	Static water level: Depth below land surface (feet)	Static water level: Date measured (mo/yr)	Reported yield (gal/min)	Specific capacity [(gal/min)/ft]	Hardness (mg/L as $CaCO_3$)	Specific conductance (μmho/cm at 25°C)	pH (units)	Well number
105	95	8	92	45	8/72	2	---	---	---	---	Er- 913
76	76	8	73	38	10/72	5	---	---	---	---	914
90	86	8	76	---	---	25	---	---	---	---	915
103	103	8	98;103	90	8/71	19	---	---	---	---	916
120	94	8	94	---	---	3	---	---	---	---	917
110	79	8	75;80	60	11/72	2	---	---	---	---	918
115	84	8	51;78	59	2/73	2	---	---	---	---	919
100	100	8	50;95	86	4/73	20	---	---	---	---	920
130	106	8	108	88	8/74	.5	.01	---	---	---	921
105	90	8	94	60	1/67	15	---	---	---	---	922
52	19	12	19	17	1/73	2	.06	---	---	---	923
63	48	8	44;48	32	9/72	10	.5	---	---	---	924
45	27	8	15;19	6	7/67	75	8	---	---	---	925
52	52	8	47	22	9/72	20	2	---	---	---	926
70	27	10	30	20	12/71	2	---	---	---	---	927
45	45	5	45	30	5/75	10	3.3	---	---	---	928
91	87	8	84	66	3/68	10	---	---	---	---	929
60	57	8	54	---	---	8	---	---	---	---	930
87	87	8	---	57	7/74	40	---	---	---	---	931
25	22	8	18;21	7	8/72	15	5	---	---	---	932
53	24	8	22	14	4/75	9	.26	---	---	---	933
98	98	8	90	53	7/76	20	---	---	---	---	934
98	98	6	---	87	6/75	10	---	---	---	---	935
30	30	8	22;26	18	7/71	30	---	---	---	---	936
57	53	8	10;18;52	12	3/70	20	---	---	---	---	937
55	18	8	14;37;48	10	---	5	---	---	---	---	938
42	---	16	36	26	5/71	60	6	---	---	---	939
131	116	8	115	100	12/76	5	.17	---	---	---	940
130	115	8	115;125	---	---	6	---	---	---	---	941
60	---	8	16;29	3	7/69	50	2.5	---	---	---	942
50	---	8	40	32	7/69	15	---	---	---	---	943
45	45	8	45	24	9/76	7	.37	---	---	---	944
65	52	8	48	30	4/74	15	---	---	---	---	945
57	11	8	12;24	5	3/77	10	.22	---	---	---	946
119	118	6	119	90	3/63	8	---	---	---	---	947
96	96	8	92	84	6/70	20	---	---	---	---	948
43	30	6	---	21	3/75	10	1.1	---	---	---	949
48	48	8	48	30	11/75	9	.9	---	---	---	950
75	25	8	25;68	22	11/71	2	---	---	---	---	951
40	40	8	32;35	28	5/72	30	---	---	---	---	952
56	16	8	14;36	10	6/64	2	---	---	---	---	953
60	34	10	16;27	4	3/71	20	6.6	---	---	---	954
44	---	6	---	21	7/51	---	---	---	---	---	955
43	43	8	32	---	---	20	---	---	---	---	956
70	30	8	24	17	7/75	2	---	140	540	---	957
45	45	8	21;30	21	7/76	28	3.1	---	---	---	958
50	37	8	29	0	8/75	50	3.3	---	---	---	959
80	72	8	30;68	52	6/76	30	1.5	---	---	---	960
96	95	8	90	56	6/75	15	.47	---	---	---	961
50	30	8	---	---	---	---	---	---	---	---	962
50	22	8	22;45	---	---	12	---	---	---	---	963
63	20	8	23;33;60	20	8/74	10	.3	---	---	---	964
75	66	8	62;65	---	---	10	---	---	---	---	965
30	14	12	10;14;27	2	1/68	6	1.5	---	---	---	966
55	26	8	---	---	7/74	3	---	140	370	---	967
72	19	6	40	30	4/64	15	---	120	280	---	968
70	70	6	70	F	1/68	24	1	95	300	---	969
246	246	6	---	0	9/74	15	.6	---	---	---	970
220	214	6	110;200;220	0	3/71	20	1	90	700	---	971
126	126	6	122	F	3/77	12	12	---	---	---	972
112	112	6	60;90	F	10/74	6	6	---	---	---	973
50	---	---	15;40	---	---	---	---	---	---	---	974
71	19	8	14;30;58	10	8/73	20	.5	---	---	---	975
60	17	8	16;28	12	6/74	4	.22	---	---	---	976
30	30	30	22	12	7/74	10	---	---	---	---	977
14	14	24	8	8	10/73	8	2	---	---	---	978
92	---	8	88	15	7/72	16	---	---	---	---	979
30	---	---	8;14	1	1/71	2	---	---	---	---	980
66	66	8	---	---	---	23	---	---	---	---	981
100	100	8	96	18	9/72	3	---	---	---	---	982
72	---	8	20;30;50	20	5/72	2	.08	---	---	---	983
42	22	12	16;18	12	3/67	30	3	---	---	---	984
14	14	24	---	0	11/67	5	2.5	---	---	---	985
55	55	8	51	18	8/73	25	---	---	---	---	986

Table 12.

Well location		Owner	Driller	Year completed	Use	Altitude of land surface (feet)	Topographic setting	Aquifer/ lithology
Number	Lat-Long							
Er- 987	4203-8007	Richard Harrington	Donald L. Hermann	1973	H	913	S	Qt/sd
988	4200-8008	Harborcreek School for Boys	Felix J. Waible	1974	H	1,025	S	Qt/u
989	4205-8008	Henry Woodworth	Boyd Lee Hall	---	H	714	F	Dne/fsh
990	4152-8013	Richard Koob	Michael W. Burch	1976	H	1,340	S	Qt/clgr
991	4154-8008	Ralph Scrafford	George H. Ackerman	1967	H	1,255	S	Qo/gr
992	4159-8008	Eleanor Musica	---	---	H	1,145	S	Dch/fsh
993	4158-8011	Edward Chernichky	Robert Anderson	1974	H	1,153	S	Dch/fsh
994	4157-8012	J. D. Parker	do.	1974	H	1,193	S	MDbv/fsh
995	4157-8012	Bernard Franks	Max E. Hickernell	1968	H	1,225	S	MDbv/fst
996	4155-8012	Stanley Hudy	B. W. Bateman and Son	1967	H	1,290	S	MDbv/sh
997	4155-8011	Richard Lewandowski	Lorenze Lee Hall	1976	H	1,290	S	Dv/fsh
998	4155-8011	Louis Beck	Alfred L. Burch	1967	H	1,308	U	MDbv/fsh
999	4155-8011	do.	do.	1975	H	1,313	U	MDbv/sh
1000	4153-8014	Bernard Rosenberg	B. W. Bateman and Son	1968	H	1,275	S	MDbv/fsh
1001	4154-8014	Henry Brown	Lowell Halstead	1975	H	1,264	U	Qt/clgr
1002	4154-8010	Makco Manufacturing Co.	Max E. Hickernell	1968	N	1,300	S	MDbv/fst
1003	4158-8012	Donovan Rounds	Boyd Lee Hall	1971	H	1,180	S	MDbv/fsh
1004	4157-8012	Edward Kuzma	Max E. Hickernell	1962	H	1,206	U	MDbv/fsh
1005	4157-8013	Thomas Noble	Alfred L. Burch	1968	H	1,170	U	MDbv/fsh
1006	4157-8013	T. J. Kitcey	do.	1972	H	1,172	U	MDbv/fsh
1007	4157-8013	Marvin Wilkinson	Robert Anderson	1972	H	1,183	S	Qt/clgr
1008	4157-8013	F. L. Heibel	do.	1974	H	1,180	S	Qt/gr
1009	4157-8014	S. E. Thornton	Lowell Halstead	1973	H	1,124	S	Dch/fsh
1010	4158-8009	R. E. Griffith	Donald L. Hermann	1973	H	1,242	S	Dv/sh
1011	4158-8009	Robert Osterberg	do.	1973	H	1,215	S	Dv/ssh
1012	4158-8011	M. M. Sharpe	Robert Anderson	1974	H	1,223	S	Dv/fsh
1013	4158-8012	Marion Russell	George H. Ackerman	1976	H	1,138	S	Dch/fsh
1014	4158-8012	Thomas Kozlowski	do.	1976	H	1,125	S	Dch/fsh
1015	4158-8012	J. A. Tupitza	do.	1975	H	995	S	Dch/sh
1016	4159-8008	Edwin Sterrett	Alfred L. Burch	1971	H	1,103	S	Qt/sdgr
1017	4159-8008	Paul Keller	Robert Anderson	1975	H	1,102	S	Dch/fsh
1018	4159-8008	Theodore Stossmeister	Donald L. Hermann	1973	H	1,028	S	Dch/fsh
1019	4159-8008	B. J. Clapper	do.	1972	H	1,013	S	Dch/ssh
1020	4159-8008	F. F. Harrison	Robert Anderson	1975	H	1,050	S	Dch/fsh
1021	4159-8008	B. J. Clapper	Donald L. Hermann	1972	H	1,022	S	Dch/fsh
1022	4159-8008	D. A. Meyer	Alfred L. Burch	1974	H	1,070	S	Dch/fsh
1023	4159-8008	Clarence Baker	do.	1966	H	1,102	S	Dch/fsh
1024	4159-8009	Daniel Corwin	Ralph Wayne Grant	1974	H	975	V	Dch/fsh
1025	4159-8009	M. J. Ferrick	Donald L. Hermann	1974	H	990	V	Dch/fsh
1026	4159-8011	Kenneth Neuberger	do.	1975	H	958	U	Dch/fsh
1027	4159-8012	Thomas Kaliszewsky	Herbert G. Orr	1976	H	923	F	Dch/fsh
1028	4159-8012	Anthony Milano	Robert Anderson	1972	H	897	S	Dg/fsh
1029	4159-8014	A. L. Farley	Charles J. Richardson III	1973	H	897	F	Qo/sdgr
1030	4159-8014	L. J. Nelson	Alfred L. Burch	1971	H	933	U	Qo/clgr
1031	4152-7953	Walter Bujnowski	do.	1974	H	1,352	S	Dv/fsh
1032	4152-7953	Kenneth Ignasiak	Donald L. Hermann	1972	H	1,377	S	Dv/fsh
1033	4152-7953	Gordon Ward	Alfred L. Burch	1972	H	1,358	S	Dv/fsh
1034	4152-7955	R. P. Langdon	Robert Rindfuss	---	H	1,377	S	Dv/fsh
1035	4152-7957	Steven Lesik	Max E. Hickernell	1973	H	1,350	S	Dv/fsh
1036	4152-7958	Nathan Carr	McCray Bros.	1972	H	1,180	V	Qo/sdgr
1037	4153-7959	Ronald Bennett	Robert Rindfuss	1974	H	1,180	S	Dv/fsh
1038	4153-7959	J. A. Bennett	do.	1972	H	1,182	V	Qo/gr
1039	4153-7959	A. J. Eckard	do.	1974	H	1,225	S	Dv/fsh
1040	4153-7959	H. D. Williams	do.	1972	H	1,180	S	Dch/fsh
1041	4154-7955	George Hall	Alfred L. Burch	1969	H	1,214	V	Qo/sdgr
1042	4154-7959	Elizabeth Wilkins	Robert Rindfuss	1972	H	1,225	S	Dch/sh
1043	4154-7959	B. F. Holewski	do.	1974	H	1,308	S	Dv/fsh
1044	4155-7953	Lester Swaim	Max E. Hickernell	1966	H	1,332	S	Dv/ss
1045	4155-7955	Thomas Holman	Alfred L. Burch	1967	H	1,368	S	Dv/fsh
1046	4155-7955	do.	do.	1973	H	1,392	S	Dv/fsh
1047	4155-7955	William Weber	Michael W. Burch	1976	H	1,380	S	Dv/fsh
1048	4155-7954	Ormal Brown	Alfred L. Burch	1972	H	1,409	S	Dv/sh
1049	4155-7955	Paul Wester	Robert Rindfuss	1973	H	1,324	S	Dv/fsh
1050	4155-7956	Thomas Post	do.	1972	H	1,233	S	Qo/gr
1051	4156-7954	Robert Verga	Alfred L. Burch	1974	H	1,355	S	Dv/fsh
1052	4157-7953	Thomas Davies	do.	1975	H	1,290	S	Qo/sdgr
1053	4156-7955	Joseph Borczon	George H. Ackerman	1967	H	1,354	S	Qo/gr
1054	4156-7955	Dennis Alloway	Lorenze Lee Hall	1973	H	1,350	S	Qt/u
1055	4156-7956	Patricia Adams	Robert Rindfuss	1975	H	1,380	S	Qt/t
1056	4156-7955	T. S. Salusky	Donald E. Hall	1973	H	1,312	S	Qo/gr
1057	4156-7957	H. E. Ruckman	Boyd Lee Hall	1971	H	1,205	S	Dch/fsed
1058	4156-7958	J. R. Goldsmith	Robert Rindfuss	1972	H	1,222	S	Qo/gr
1059	4155-7958	Raymond Hershey	Lowell Halstead	1973	H	1,190	T	Qo/gr
1060	4156-7959	Cynthia Lane	Michael W. Burch	1976	H	1,190	V	Qo/sdgr

(Continued)

Total depth below land surface (feet)	Casing Depth (feet)	Casing Diameter (inches)	Depth(s) to water-bearing zone(s) (feet)	Static water level Depth below land surface (feet)	Static water level Date measured (mo/yr)	Reported yield (gal/min)	Specific capacity [(gal/min)/ft]	Hardness (mg/L as $CaCO_3$)	Specific conductance (μmho/cm at 25°C)	pH (units)	Well number
60	57	8	54	---	---	8	---	---	---	---	Er- 987
50	22	12	18	14	6/74	3	---	---	---	---	988
70	45	8	60;69	---	---	25	25	---	---	---	989
23	23	8	8;17	1	12/76	9	.5	---	---	---	990
98	98	8	98	24	6/67	3	---	---	---	---	991
82	40	8	42	40	10/76	.5	---	---	---	---	992
53	12	8	15;30	15	6/74	5	.15	---	---	---	993
60	17	8	23;28	4	7/74	4	.07	---	---	---	994
53	15	6	23;48	6	5/68	7	---	---	---	---	995
100	30	6	18	---	---	---	---	---	---	---	996
49	30	8	34;46	8	11/76	25	2	---	---	---	997
60	15	8	15;40	7	8/67	1	---	---	---	---	998
40	19	8	19;22	15	7/75	1	---	---	---	---	999
65	42	6	45	10	7/68	10	.04	---	---	---	1000
50	30	8	26	---	---	2	---	---	---	---	1001
90	44	6	54;68;85	17	5/68	10	---	---	---	---	1002
58	18	8	40;50	12	3/71	6	.16	---	---	---	1003
41	26	7	28	20	5/62	20	4	---	---	---	1004
50	22	8	20;30	8	6/68	20	.5	---	---	---	1005
50	15	8	12;30	1	1/72	---	---	---	---	---	1006
21	21	8	21	8	10/72	18	9	---	---	---	1007
25	24	8	21;24	12	9/74	28	5.6	---	---	---	1008
40	18	8	21	35	7/73	6	---	---	---	---	1009
50	18	12	18	8	9/73	2	.05	---	---	---	1010
45	29	8	24;29	10	3/73	10	---	---	---	---	1011
67	11	8	18	2	6/74	1	.01	---	---	---	1012
70	16	12	---	11	7/76	1	---	---	---	---	1013
75	18	12	17;28	17	6/76	1	---	---	---	---	1014
35	20	8	14;22	10	5/75	9	---	110	265	---	1015
50	31	12	16;22	10	9/71	4	---	---	---	---	1016
51	20	8	---	12	6/75	5	.14	---	---	---	1017
50	29	8	22;27	11	1/73	15	---	---	---	---	1018
80	53	8	49;52	18	8/72	4	---	---	---	---	1019
65	---	12	15;25	4	4/75	.7	---	---	---	---	1020
60	43	8	38;44	10	8/72	10	---	---	---	---	1021
60	20	12	22;35;48	20	8/74	4	---	---	---	---	1022
65	28	8	21;40	20	7/66	4	---	---	---	---	1023
50	30	8	---	---	---	---	---	---	---	---	1024
55	20	12	15	3	5/74	3	---	---	---	---	1025
50	21	8	17;20	8	5/75	2	---	200	500	---	1026
80	38	8	35	30	5/76	9	.22	---	---	---	1027
47	10	8	24	13	6/72	2	.08	---	---	---	1028
25	25	24	23	12	5/73	6	.75	400	1,000	---	1029
105	93	8	60;80;87	25	3/71	4	---	---	---	---	1030
60	20	8	15;22;47	5	5/74	10	---	---	---	---	1031
70	37	8	---	14	8/72	5	.1	120	420	---	1032
100	17	8	18;20;23;70	6	12/72	6	.06	---	---	---	1033
65	---	8	27	---	---	15	---	---	---	---	1034
93	34	6	54;84	40	2/73	15	---	---	---	---	1035
51	51	8	10;20;50	1	6/72	5	.11	---	---	---	1036
83	73	8	76	40	7/74	30	6	---	---	---	1037
48	48	8	48	25	6/72	13	.65	---	---	---	1038
87	20	8	25	12	1974	2	---	---	---	---	1039
73	45	8	55	35	10/72	3	---	---	---	---	1040
70	70	8	48;64	35	10/69	4	---	120	220	---	1041
100	25	8	25	20	7/72	2	---	85	370	---	1042
75	45	8	62	---	---	15	.27	---	---	---	1043
54	43	6	51	33	10/66	7	---	---	---	---	1044
45	25	8	21;25	11	7/67	6	---	---	---	---	1045
36	18	8	20;25	10	12/73	8	---	---	---	---	1046
80	13	8	12;60	10	9/76	2	.04	---	---	---	1047
45	25	8	12;34	15	6/72	10	---	120	300	---	1048
73	25	8	55	25	3/73	12	---	---	---	---	1049
210	190	8	190	14	11/72	.2	---	---	---	---	1050
145	130	8	17;110;130	37	7/74	4	---	---	---	---	1051
52	52	8	31;47	25	9/75	9	---	---	---	---	1052
68	68	8	12	4	10/67	10	---	---	---	---	1053
90	86	8	76;86	14	11/73	2	.03	---	---	---	1054
53	29	8	29;56	12	9/75	12	.36	---	---	---	1055
32	32	8	32	---	---	8	---	---	---	---	1056
82	72	8	79	20	9/71	22	.55	---	---	---	1057
43	43	8	40	32	9/72	6	.86	---	---	---	1058
130	130	8	130	110	11/73	30	2	---	---	---	1059
33	33	8	3;28	1	8/76	9	.33	---	---	---	1060

Table 12.

Well location		Owner	Driller	Year completed	Use	Altitude of land surface (feet)	Topographic setting	Aquifer/ lithology
Number	Lat-Long							
Er-1061	4156-7959	Victor Malinowski	Robert Rindfuss	1974	H	1,200	V	Qo/gr
1062	4157-7955	Charles Whitney	do.	1975	H	1,394	S	Dv/fsh
1063	4157-7956	David Risjan	do.	1975	H	1,458	S	Dv/fsh
1064	4155-7958	Frank Ethridge	---	---	H	1,092	V	Qo/gr
1065	4157-7956	Joseph Krol	Harold F. Anderson	1972	H	1,506	H	Dv/fsh
1066	4157-7957	J. G. Risjan	Robert Rindfuss	1974	H	1,210	S	Dch/fsh
1067	4157-7958	S. T. Chase	do.	1972	H	1,310	H	Qo/gr
1068	4157-7958	M. C. Vogt	Alfred L. Burch	1973	H	1,310	S	Qo/sdgr
1069	4157-7958	R. S. Petko	Robert Anderson	1974	H	1,290	S	Qo/gr
1070	4158-7957	R. A. Hull	Max E. Hickernell	1967	H	1,280	S	Qo/gr
1071	4159-7957	Arnold Burlingham	do.	1967	H	1,282	S	Qo/gr
1072	4158-7959	L. G. McClimans	Donald L. Hermann	1972	H	1,220	S	Qo/gr
1073	4158-7959	D. K. Coon	Robert Rindfuss	1973	H	1,238	U	Dch/fsh
1074	4159-7957	J. J. Capenos	Robert Anderson	1974	H	1,385	S	Dch/fsh
1075	4159-7953	D. A. Kirik	Max E. Hickernell	1971	H	1,340	S	Dch/fsh
1076	4158-7953	George Lowe	Harold F. Anderson	1975	H	1,310	V	Qo/sd
1077	4158-7957	Daniel Haibach	George H. Ackerman	1968	H	1,340	S	Qo/sd
1078	4157-7958	Raymond Baker	Alfred L. Burch	1975	H	1,310	S	Qo/sdgr
1079	4154-7954	Glenn Troyer	do.	1975	H	1,390	S	Dv/ss
1080	4154-7954	Marian Lopus	do.	1967	H	1,400	S	Dv/fsh
1081	4154-7958	Portia Lewis	Max E. Hickernell	1966	H	1,175	V	Qo/gr
1082	4152-7948	V. C. Akam	Harold F. Anderson	1973	H	1,360	S	Dv/fsh
1084	4152-7951	J. E. Musiek	Max E. Hickernell	1966	H	1,412	S	Qo/sdgr
1085	4153-7947	W. G. Shamp	Harold F. Anderson	1973	H	1,346	S	Dv/fsh
1086	4153-7949	Thomas Shayko	Alfred L. Burch	1964	H	1,312	S	Qo/gr
1087	4153-7949	Connie Ainsworth	Max E. Hickernell	1974	H	1,380	S	Dv/fst
1088	4153-7951	N. G. Troyer	do.	1973	H	1,355	S	Dv/fsed
1089	4153-7951	do.	do.	1972	H	1,367	S	Dv/fsed
1090	4154-7949	Gladys Chase	do.	1971	H	1,338	S	Qo/gr
1091	4154-7951	James Edwards	do.	1971	H	1,460	S	Dv/fsh
1092	4155-7950	Paul Gregor	Alfred L. Burch	1969	H	1,485	S	Qt/clgr
1093	4155-7952	G. L. Hinkson	Donald L. Hermann	1973	H	1,500	U	Dv/fsh
1094	4156-7947	Walter Ingalls	Lorenze Lee Hall	1975	H	1,538	S	Qo/gr
1095	4156-7947	Floyd McClellan	Harold F. Anderson	1973	H	1,524	S	Dv/fsh
1096	4156-7949	Herman Manross	do.	1974	H	1,610	H	MDcr/fsh
1097	4156-7949	Nelan Seltzer	Max E. Hickernell	1971	H	1,590	T	MDcr/fsh
1098	4156-7949	George Kirik	do.	1971	H	1,610	S	MDcr/fsh
1099	4155-7950	Rulaf Chapin	do.	1971	H	1,440	S	Dv/fsh
1100	4157-7951	S. H. Capela	Robert Rindfuss	1972	H	1,508	H	Dv/fsh
1101	4158-7947	Harold Amann	Alfred L. Burch	1966	H	1,564	S	Dv/fsh
1102	4157-7949	Robert Harrison	Harold F. Anderson	1973	H	1,355	S	Qo/gr
1103	4154-7950	Donald Thomas	McCray Bros.	1974	H	1,485	H	Dv/fsh
1104	4155-7950	Victor Cross	George H. Ackerman	1976	H	1,432	S	Dv/fsh
1105	4155-7950	Larry Beezub	Harold F. Anderson	1975	H	1,478	H	Dv/fsh
1106	4156-7951	Thomas Sebald	Robert Rindfuss	1975	H	1,468	S	Dv/fsh
1107	4154-7951	Cross and Co.	George H. Ackerman	1976	H	1,243	V	Qo/sdgr
1108	4201-7950	Robert Waite	McCray Bros.	1972	H	1,326	V	Qt/clgr
1109	4155-7937	Viking Plastics	do.	1972	N	1,400	V	Qo/sd
1110	4151-8000	Kathryn Van Zandt	Robert Rindfuss	1973	H	1,485	H	MDbr/fsh
1111	4152-8000	Marvin Armogost	Alfred L. Burch	1964	H	1,310	S	Dv/fsh
1112	4151-8001	P. A. Davis	Robert Rindfuss	1974	H	1,480	S	MDbr/fsh
1113	4151-8003	G. E. Collier	Boyd Lee Hall	1975	H	1,168	V	Qo/gr
1114	4151-8005	G. E. Vierkorn	Robert Anderson	1972	H	1,370	S	MDbr/fsh
1115	4151-8006	G. P. Woods	Boyd Lee Hall	1973	H	1,220	S	Dv/fsh
1116	4152-8003	D. L. Klakamp	Robert Rindfuss	1972	H	1,175	V	Qo/gr
1117	4151-8005	Ralph Burger	Alfred L. Burch	1968	H	1,404	S	Qo/sdgr
1118	4151-8004	N. L. Sauers	B. W. Bateman and Son	1969	H	1,450	S	Qo/sd
1119	4152-8001	Eugene Wright	Max E. Hickernell	1969	H	1,560	S	MDbr/fst
1120	4152-8003	D. A. Trowbridge	Boyd Lee Hall	1971	H	1,200	V	Qo/gr
1121	4152-8004	Gary Kuffer	Felix J. Waible	1976	H	1,400	S	Qt/t
1122	4152-8005	Lucman Land Corp.	Moody Drilling Co., Inc.	1972	P	1,465	S	MDbr/fst
1123	4152-8005	do.	do.	1972	P	1,450	S	MDbr/fst
1124	4152-8005	Edward Yurcak	B. W. Bateman and Son	1969	H	1,485	S	MDbr/fsh
1125	4152-8006	David Davis	Donald E. Hall	1973	H	1,380	S	Dv/fsed
1126	4153-8001	Jack Hoffman	Donald L. Hermann	1976	H	1,550	S	MDbr/fsh
1127	4153-8001	Edward Kovschak	Lorenze Lee Hall	1972	H	1,443	H	MDbr/fst
1128	4153-8001	Beatrice May	do.	1973	H	1,480	S	MDbr/fsec
1129	4153-8002	Richard Babbitt	Max E. Hickernell	1968	H	1,423	H	Dv/fsh
1130	4153-8002	Terry Hall	John E. Gage, Jr.	1971	H	1,309	S	Qt/t
1131	4153-8005	David Sundean	Max E. Hickernell	1971	H	1,495	S	MDbr/fsh
1132	4153-8005	Alton Huntley	Alfred L. Burch	1968	H	1,432	S	MDbr/fsh
1133	4153-8008	Edward Meinert	Max E. Hickernell	1969	H	1,210	V	Qo/sdgr
1134	4154-8000	Herbert Yaple	Robert Rindfuss	1975	H	1,260	S	Dv/fsh
1135	4154-8003	George Smith	Alfred L. Burch	1967	H	1,400	S	Dv/ssh

(Continued)

Total depth below land surface (feet)	Casing Depth (feet)	Casing Diameter (inches)	Depth(s) to water-bearing zone(s) (feet)	Static water level: Depth below land surface (feet)	Static water level: Date measured (mo/yr)	Reported yield (gal/min)	Specific capacity [(gal/min)/ft]	Hardness (mg/L as $CaCO_3$)	Specific conductance (µmho/cm at 25°C)	pH (units)	Well number
165	135	8	135	45	8/74	2	---	510	4,800	---	Er-1061
133	85	8	123	35	4/75	5	.06	---	---	---	1062
75	25	8	26;58	3	1/75	4	---	---	---	---	1063
201	201	4	---	24	---	---	---	90	245	---	1064
70	41	8	40;45;50	---	---	6	---	---	---	---	1065
77	45	8	62	8	5/74	15	---	---	---	---	1066
51	51	8	50	35	7/72	12	1.2	---	---	---	1067
45	45	8	34	28	5/73	30	4.3	---	---	---	1068
46	46	8	43	31	2/74	20	1.5	---	---	---	1069
82	82	8	76	40	3/67	20	---	---	---	---	1070
41	41	8	35	20	3/67	15	---	---	---	---	1071
52	52	8	49	6	6/72	12	.5	---	---	---	1072
95	83	8	85	35	12/73	23	.42	85	245	---	1073
69	25	8	25;35;50	12	8/74	6	.11	---	---	---	1074
68	---	6	35;52;64	23	9/71	15	---	---	---	---	1075
55	29	8	30;50	---	---	10	---	---	---	---	1076
142	142	6	142	60	4/68	4	---	140	320	---	1077
58	58	8	40;50	34	9/75	8	---	---	---	---	1078
200	24	8	15;65;120	59	9/75	4	---	---	---	---	1079
125	18	8	30;95	95	2/67	10	.33	---	---	---	1080
34	34	8	10;12	10	10/66	20	---	---	---	---	1081
116	74	8	100;116	---	---	5	---	---	---	---	1082
28	28	8	24	18	10/66	6	---	---	---	---	1084
71	35	8	53;61;66	---	---	15	---	50	300	---	1085
123	122	6	21;121	9	10/64	20	---	120	300	---	1086
92	19	6	64;87	15	8/74	20	---	230	600	---	1087
116	56	6	89	32	9/73	8	---	---	---	---	1088
130	26	8	75;118	14	7/72	5	---	---	---	---	1089
105	105	6	102	20	11/71	20	1.3	---	---	---	1090
76	37	8	46;59;68	16	4/71	20	---	180	530	---	1091
50	36	8	25;34	23	8/69	20	2.9	180	420	---	1092
50	29	8	25;27;29	6	4/73	8	---	---	---	---	1093
35	34	6	32	22	6/75	6	1	90	290	---	1094
50	39	8	45	---	---	7	---	---	---	---	1095
40	21	8	22;30	---	---	33	---	85	240	---	1096
85	24	6	46;76	47	9/71	5	---	---	---	---	1097
67	26	8	32;46;59	12	3/71	20	---	---	---	---	1098
44	25	6	29;39	6	11/71	20	---	---	---	---	1099
84	35	8	40;70	20	1972	10	---	160	500	---	1100
50	16	6	18;40	8	6/66	5	---	150	375	---	1101
30	28	8	30	---	---	6	---	---	---	---	1102
85	40	6	75;80;85	20	5/74	10	.2	---	---	---	1103
80	60	8	54;72	32	6/76	50	3	---	---	---	1104
55	25	8	29;50	10	10/75	12	---	---	---	---	1105
41	22	8	32	6	7/75	10	.4	---	---	---	1106
76	76	8	72	7	6/76	70	5.4	---	---	---	1107
180	96	6	90	20	8/72	2	.01	---	---	---	1108
20	20	---	20	10	6/72	50	50	---	---	---	1109
115	---	8	110	60	3/73	10	.2	210	480	---	1110
95	56	8	54;85	---	3/64	2	.04	---	---	---	1111
84	45	8	73	30	6/74	18	.53	---	---	---	1112
45	45	8	45	10	5/75	7	---	90	225	---	1113
56	13	8	35	13	9/72	17	.46	---	---	---	1114
45	35	8	32	10	10/73	20	.8	160	360	---	1115
60	60	8	58	13	6/72	25	2.1	---	---	---	1116
50	46	8	42	35	10/68	8	---	---	---	---	1117
50	42	5	12;43	8	10/69	10	1.2	---	---	---	1118
51	---	8	34;47	---	---	15	---	---	---	---	1119
49	49	8	44	30	11/71	12	1.2	100	220	---	1120
55	19	8	15	12	4/76	20	---	110	300	---	1121
442	19	12	62;77;377	F	4/72	25	.12	158	---	7.8	1122
407	14	12	77;167	5	4/72	15	.19	---	---	---	1123
40	20	5	27	16	10/69	8	1	---	---	---	1124
60	23	8	34;55	---	---	16	---	---	---	---	1125
60	35	8	32;36	21	3/76	6	---	---	---	---	1126
70	31	8	40;63	8	6/72	25	.64	---	---	---	1127
58	28	6	26;47	8	10/73	15	.4	---	---	---	1128
104	97	6	99	20	11/68	10	---	120	380	---	1129
50	40	8	40	6	7/71	3	.09	---	---	---	1130
73	32	6	49;61;68	14	10/71	15	---	120	300	---	1131
75	12	8	14;30;50	20	7/68	---	---	---	---	---	1132
68	68	6	15;68	16	8/69	15	---	---	---	---	1133
100	78	8	90	45	5/75	8	.18	---	---	---	1134
43	30	8	30;40	25	6/67	20	---	120	310	---	1135

Table 12.

Well location		Owner	Driller	Year completed	Use	Altitude of land surface (feet)	Topographic setting	Aquifer/ lithology
Number	Lat-Long							
Er-1136	4154-8004	I. O. Murphy	Alfred L. Burch	1970	H	1,422	S	Dv/fsh
1137	4154-8005	Joseph Kuhn	Robert Anderson	1976	H	1,495	S	MDbr/fsh
1138	4154-8007	John Lovett	Alfred L. Burch	1967	P	1,330	H	Dv/fsh
1139	4154-8007	do.	do.	1967	P	1,282	S	Qo/gr
1140	4154-8007	do.	do.	1967	P	1,319	S	Qt/clgr
1141	4155-8000	R. J. Schroeck	do.	1971	H	1,370	S	Dv/fsh
1142	4155-8000	James Wolfe	do.	1969	H	1,360	S	Dv/fsh
1143	4155-8000	Dominick Cisson	Robert Rindfuss	1972	H	1,403	H	Dv/fsh
1144	4155-8001	Stanley Orbanick	Max E. Hickernell	1967	H	1,410	S	Dv/fst
1145	4155-8003	Emil Loesel	Donald L. Hermann	1972	H	1,580	S	MDbr/ssh
1146	4155-8004	Jerry Fellows	do.	1975	H	1,386	H	Dv/sh
1147	4156-8004	Merle Kifer	do.	1975	H	1,425	S	Qt/gr
1148	4156-8000	W. A. Flook	Alfred L. Burch	1970	H	1,310	S	Dv/fsh
1149	4156-8000	Alfred Miles	Boyd Lee Hall	1972	H	1,320	S	Dv/fsed
1150	4156-8000	Joseph Yakulis	Alfred L. Burch	1970	H	1,300	S	Qo/gr
1151	4156-8003	William Fetzner	Robert Rindfuss	1973	H	1,595	H	MDbr/fsh
1152	4156-8007	F. J. Soboski	Boyd Lee Hall	---	H	1,350	S	Dv/fsed
1153	4156-8007	W. J. Keith, Sr.	Robert Anderson	1974	H	1,408	S	Dv/ssh
1154	4156-8007	Chester Kutz	Alfred L. Burch	1966	H	1,298	S	Dv/fsh
1155	4156-8007	Robert Eastman	do.	1964	H	1,395	S	Dv/ssh
1156	4157-8000	Raymond Paproski	Robert Rindfuss	1974	H	1,294	S	Dv/fsh
1157	4157-8002	T. W. Arneman	Alfred L. Burch	1973	H	1,270	S	Qo/gr
1158	4157-8003	John Beres	Max E. Hickernell	1967	H	1,408	S	Dv/ss
1159	4157-8003	Ralph Klapthor	Donald L. Hermann	1975	H	1,550	S	MDbr/fsh
1160	4158-8003	David Winkelbauer	Alfred L. Burch	1966	H	1,360	S	Dv/fsh
1161	4157-8005	Richard Babo	do.	1967	H	1,465	S	Qo/sdgr
1162	4157-8006	Philip Wilkosz	Boyd Lee Hall	1973	H	1,435	S	Dv/fsh
1163	4158-8002	Robert Behrendt	Alfred L. Burch	1968	H	1,333	H	Qo/sdgr
1164	4158-8005	C. N. Villa, Jr.	do.	1974	H	1,418	U	Dv/fsh
1165	4158-8006	Theo Scarlett	Michael W. Burch	1976	H	1,384	U	Dv/fsh
1166	4159-8001	Elmer Johnson	Donald L. Hermann	1975	H	1,470	H	Dv/fsh
1167	4159-8001	Harry Rearick	Alfred L. Burch	1967	H	1,495	H	Dv/fsh
1168	4159-8002	A. C. Haibach	Donald L. Hermann	1972	H	1,282	S	Qo/sdgr
1169	4159-8002	do.	do.	1972	H	1,254	S	Dch/ssh
1170	4159-8002	do.	do.	1972	H	1,284	S	Dch/fsh
1171	4159-8003	Robert Shupala	Alfred L. Burch	1968	H	1,228	S	Qt/t
1172	4159-8003	Jeffrey Young	do.	1975	H	1,325	S	Dv/fsh
1173	4159-8004	Herbert Hafenmaier	do.	1975	H	1,280	S	Qo/sdgr
1174	4156-8016	Edward Marhola	Lowell Halstead	1973	H	1,080	S	Qt/gr
1175	4155-8020	Eugene Brooks	Max E. Hickernell	1965	H	920	V	Qo/u
1176	4156-8015	Richard Agresti	Robert Anderson	1974	H	1,120	S	Dch/fsh
1177	4156-8019	Kenneth Baker	Lowell Halstead	1973	H	930	V	Qo/gr
1178	4153-8008	John Walsh	Max E. Hickernell	1964	H	1,288	S	Dv/fst
1179	4156-8009	George Smith	Alfred L. Burch	1966	H	1,345	S	Dv/fsh
1180	4157-8011	Michael Kavelish	Boyd Lee Hall	1974	H	1,254	S	MDbv/fsh
1181	4157-8014	Ronald Farmer	Michael W. Burch	1975	H	1,090	S	Dch/fsh
1182	4154-8026	James Case, Jr.	Richard L. Ticknor	1975	H	924	V	Qt/gr
1183	4210-7956	Mary O'Brien	Michael W. Burch	1975	H	733	T	Dne/fst
1184	4153-8029	Wilber Brown	Max E. Hickernell	1963	H	922	V	Qt/clgr
1185	4202-7954	Charles Cottrell	Robert Rindfuss	1972	H	1,382	H	Qo/gr
1186	4205-7959	Thomas Welsh	George H. Ackerman	---	H	1,134	H	Qt/u
1187	4206-7959	Joseph Helsley	do.	1973	H	1,134	H	Dch/fsh
1188	4208-8000	Whipple and Allen Co.	Michael W. Burch	1975	H	715	T	Qb/sdgr
1189	4159-8027	Robert Dumars	---	---	H	642	T	Qb/gr
1190	4154-8030	Sulo Mackey	---	1921	H	833	S	Qo/gr
1191	4155-8027	Harold Thayer	---	---	H	873	T	Qo/gr
1192	4157-8024	Emery Sherman	---	---	H	730	T	Qb/u
1193	4159-8014	George Luther	---	---	H	810	S	Dch/sed
1194	4159-8012	Ralph Leopold	---	---	H	948	S	Qo/sdgr
1195	4202-8016	Hazel Soule	---	---	H	672	F	Qb/gr
1196	4202-8018	Joseph Ziesenheim	---	1948	C	683	F	Qb/gr
1197	4200-8017	John Borsukoff	---	1941	H	790	F	Qb/u
1198	4157-8017	John Wagner	---	---	H	900	S	Dg/sh
1199	4159-8020	Eugene Miller	---	1930	H	868	H	Qo/u
1200	4156-8019	John Kuvik	---	1930	H	876	U	Dch/fsh
1201	4202-8008	Ernest Abbott	Vernon Reed	---	H	1,000	S	Dch/fsh
1202	4204-8007	Harold Stiles	Bernard P. Kuntz	1949	H	950	H	Qo/gr
1203	4203-8009	John Kort	Vernon Reed	1950	H	870	U	Qo/sdgr
1204	4210-7954	James Bernet	---	---	H	784	S	Qb/gr
1205	4204-8005	George Smith	Bernard P. Kuntz	1949	H	933	U	Qo/gr
1206	4204-8005	Leroy Grossholz	do.	1948	H	915	U	Qo/gr
1207	4205-8007	Harry Kuhns	do.	1946	H	850	S	Qo/gr
1208	4204-8005	Frank Swalley	do.	1938	H	915	U	Qo/sdgr
1209	4204-8002	Arthur Schultz	do.	---	H	1,090	S	Qo/sdgr

(Continued)

Total depth below land surface (feet)	Casing		Depth(s) to water-bearing zone(s) (feet)	Static water level		Reported yield (gal/min)	Specific capacity [(gal/min)/ft]	Hardness (mg/L as $CaCO_3$)	Specific conductance (μmho/cm at 25°C)	pH (units)	Well number
	Depth (feet)	Diameter (inches)		Depth below land surface (feet)	Date measured (mo/yr)						
110	70	8	65;96	32	11/70	12	.17	---	---	---	Er-1136
64	28	12	28;32	16	1/76	40	1.2	---	---	---	1137
57	34	8	32;40	21	4/67	6	---	---	---	---	1138
40	---	---	12	---	---	1	---	---	---	---	1139
40	11	8	11	---	---	---	---	---	---	---	1140
60	28	8	12;34	10	4/71	10	---	85	340	---	1141
50	24	8	30;40	4	6/69	5	---	---	---	---	1142
60	30	8	45	14	6/72	2	---	180	410	---	1143
70	31	8	33;45;60	12	3/67	10	---	---	---	---	1144
60	49	8	49	30	6/72	5	.2	---	---	---	1145
145	75	8	74	45	5/75	1	---	20	580	---	1146
70	57	8	46	12	7/75	2	---	---	---	---	1147
50	17	8	13;25	10	5/70	5	---	---	---	---	1148
52	22	8	26;46	9	4/72	10	.3	---	---	---	1149
24	24	8	16;20	5	5/70	10	---	---	---	---	1150
73	55	8	65	25	3/73	11	---	---	---	---	1151
70	32	8	63;70	8	---	15	1.2	---	---	---	1152
51	25	8	26	6	4/74	15	.37	150	650	---	1153
70	18	8	40	12	12/66	5	.09	---	---	---	1154
110	47	8	16;45	15	7/64	4	---	---	---	---	1155
83	62	8	65	30	5/74	2	---	---	---	---	1156
46	46	8	20;38	19	4/73	30	2.7	---	---	---	1157
69	38	6	48;57	8	6/67	15	---	---	---	---	1158
72	56	8	53;59	23	9/75	5	.12	---	---	---	1159
70	36	8	30;50	42	10/66	10	---	---	---	---	1160
50	47	8	23;47	18	6/67	4	---	---	---	---	1161
52	45	8	18;45	3	---	12	.3	---	---	---	1162
200	162	6	20;145;158	85	11/68	5	---	---	---	---	1163
60	33	8	28;33	9	6/74	10	---	---	---	---	1164
50	20	8	15;38	4	12/76	5	.11	---	---	---	1165
55	35	8	27;33	8	7/75	6	.14	---	---	---	1166
55	30	8	---	6	2/67	10	---	---	---	---	1167
35	35	8	31	18	6/72	8	---	---	---	---	1168
50	41	8	38;41	24	6/72	15	.8	---	---	---	1169
50	38	8	35;42	24	6/72	8	.4	---	---	---	1170
45	45	8	---	26	8/68	8	---	---	---	---	1171
160	130	8	30;126;145	62	5/75	10	---	60	1,200	---	1172
87	87	8	64	25	1/75	4	---	---	---	---	1173
100	26	8	23	---	---	2	---	---	---	---	1174
55	25	8	---	11	8/65	3	---	95	1,700	---	1175
35	10	8	13	2	4/74	5	.18	---	---	---	1176
43	43	8	38	---	---	---	---	---	---	---	1177
57	27	6	29;41;48	7	9/64	10	.3	---	---	---	1178
60	18	8	14;40	8	7/66	.6	---	---	---	---	1179
50	33	8	42	---	---	11	---	120	560	---	1180
60	18	8	12;18	2	---	3	.05	---	---	---	1181
55	55	8	35	20	5/75	25	1.7	---	---	---	1182
30	26	5	18	12	5/75	4	---	---	---	---	1183
52	52	8	---	5	3/63	15	---	---	---	---	1184
80	80	8	80	20	9/72	30	1.5	140	340	---	1185
65	19	12	19	---	---	2	---	---	---	---	1186
70	44	8	44;50	---	---	6	---	---	---	---	1187
45	13	8	6;18	15	5/75	4	.14	---	---	---	1188
15	15	---	---	10	7/51	---	---	160	340	7.0	1189
20	20	---	---	---	---	---	---	220	433	6.9	1190
18	18	---	---	---	---	---	---	---	---	---	1191
20	20	---	---	---	---	---	---	110	281	6.9	1192
60	---	---	---	---	---	---	---	230	747	7.1	1193
15	15	---	---	---	---	---	---	48	146	6.2	1194
18	18	---	---	---	---	---	---	290	661	7.3	1195
30	30	---	---	---	---	---	---	200	---	7.0	1196
72	72	---	---	---	---	---	---	140	558	7.8	1197
50	---	6	---	20	7/51	---	---	340	655	7.4	1198
80	---	---	---	---	---	---	---	230	445	7.7	1199
47	---	---	---	---	---	---	---	200	1,110	7.6	1200
60	---	---	---	---	---	---	---	70	228	7.6	1201
121	121	---	---	---	---	---	---	200	394	7.6	1202
80	80	---	---	---	---	---	---	180	337	7.8	1203
28	28	---	---	24	---	---	---	---	---	---	1204
57	57	---	---	---	---	---	---	170	493	7.7	1205
48	48	---	---	---	---	---	---	240	1,810	6.9	1206
44	44	---	---	---	---	---	---	230	449	7.4	1207
40	40	---	---	---	---	---	---	72	160	6.6	1208
97	97	---	---	---	---	12	---	170	517	---	1209

Table 12.

Well location								
Number	Lat-Long	Owner	Driller	Year completed	Use	Altitude of land surface (feet)	Topographic setting	Aquifer/ lithology
Er-1210	4205-8003	Otto Meyer, Jr.	Bernard P. Kuntz	---	H	980	H	Qo/sdgr
1211	4157-8017	Donald Lewis	---	1948	H	905	H	Dch/fsh
1212	4204-8011	Port Erie Airport	Vernon Reed	---	C	732	F	Qo/sdgr
1213	4205-8007	Jack Kilpatrick	do.	1949	H	784	T	Qb/u
1214	4204-8009	Robert Becker	Bernard P. Kuntz	1949	H	780	T	Qb/gr
1215	4204-8009	George Singer	Vernon Reed	1950	H	824	T	Qo/sdgr
1216	4205-8008	Byrd Tool and Mold Co.	do.	1949	H	712	F	Qb/gr
1217	4204-8011	Daniel Wiley	do.	1944	H	730	F	Qo/gr
1218	4204-8011	August Hohnke	---	---	H	730	F	Qb/u
1219	4204-8011	Jay Nelson	Oakes and Bennett	1947	H	734	F	Dne/fsh
1220	4204-8011	do.	---	---	H	734	F	Qb/gr
1221	4204-8005	Calvin Johnson	Bernard P. Kuntz	1947	H	925	T	Dg/---
1222	4158-8016	William Bushelman	---	---	H	755	H	Dg/fsh
1223	4156-7958	Charles Gardner	---	---	H	1,209	V	Qo/gr
1224	4152-8018	Michael Hayes	John E. Gage, Jr.	1974	H	1,168	H	MDbv/sh
1225	4159-8019	Judd Seldon	Moody Drilling Co., Inc.	1953	H	775	T	Qo/gr
1226	4159-8020	Pennsylvania State Police Barracks	do.	1954	H	740	T	Qo/gr
1227	4159-8021	Jim Frey	do.	1954	H	740	T	Qo/gr
1228	4158-8021	Lawrence Frey	do.	1954	H	760	V	Qo/t
1229	4158-8022	G. H. Cox	do.	1956	H	755	V	Qo/gr
1230	4157-8017	Mike Felege	do.	1951	H	902	S	Dch/fsh
1231	4157-8019	Lewis Stafford	do.	1954	H	869	U	Qt/gr
1232	4153-8009	Bruce Iffi	do.	---	H	1,360	H	Dv/fsh
1233	4152-8028	Roy Sawalter	do.	1957	U	960	F	Dch/sh
1234	4152-8024	Sam Russin	do.	1958	H	854	V	Qo/gr
1235	4154-8030	Roland Hammer	do.	1956	H	850	U	Qo/gr
1236	4151-8022	M. L. Cherry	do.	1959	H	1,065	S	MDbv/fsh
1237	4151-8022	Herb Cherry	do.	1956	H	1,060	S	MDbv/fsh
1238	4151-8022	Sam Pittsenberger	do.	1955	H	960	S	MDbv/fsh
1239	4151-8019	Alfred Fahlen	do.	1950	H	1,110	U	Dch/fst
1240	4151-8018	Kenneth Raymond	do.	1957	H	1,130	V	Qo/gr
1241	4153-8025	Milo Brown	do.	1955	H	900	U	Dch/fsh
1242	4157-8025	Chester Osterberg	do.	1956	H	735	F	Qb/gr
1243	4157-8023	Ernest Testo	do.	1957	U	810	V	Qt/t
1244	4154-8028	Tom Freeman	do.	1956	H	825	S	Qo/gr
1245	4153-8022	Bill Tucker	do.	1956	H	890	S	Qt/gr
1246	4153-8028	Kane Stanton	do.	1957	H	930	V	Dch/fsh
1247	4153-8023	Noble Lawrence	do.	1955	H	865	V	Dch/fsh
1248	4153-8023	V.F.W. Club	do.	1958	C	865	V	Qt/sd
1249	4151-8024	Albion Sportsmens Club	Lorenze Lee Hall	1977	R	860	V	Qo/sdgr
1250	4151-8025	Gary Simpson	Alfred L. Burch	1977	H	930	S	Dch/fsh
1251	4153-8026	William Palo	Moody Drilling Co., Inc.	1956	H	915	U	Dch/fsh
1253	4154-8025	Neil Shade	Alfred L. Burch	1977	H	890	U	Dch/sh
1254	4154-8023	Carlyle Krieg	Lorenze Lee Hall	1977	H	890	S	Qo/gr
1255	4156-8027	Minute Man Service	Harry Bros.	1977	C	734	U	Qb/sd
1256	4152-8015	James Crosby	Jack Young	1977	H	1,205	V	Qo/gr
1257	4152-8013	John Dascanio	Robert Anderson	1977	H	1,274	S	MDbv/fsh
1258	4151-8013	Charles Lupka	Boyd Lee Hall	1977	H	1,265	S	MDbv/fsh
1259	4151-8016	Jerry Skelton	do.	1977	H	1,260	U	Qt/t
1260	4151-8018	James Kreider	Lorenze Lee Hall	1977	H	1,070	V	Qo/gr
1261	4152-8019	Albert Bainbridge	do.	1977	H	1,005	V	Dch/ssh
1262	4151-8020	James Beveridge	Alfred L. Burch	1976	H	1,130	U	MDbv/fsh
1263	4159-8016	J. Spaulding	Robert Anderson	1978	H	835	S	Qo/gr
1264	4159-8015	Charles Longnecker	do.	1977	H	868	S	Qt/sdgr
1265	4159-8020	Samuel Orlando	Alfred L. Burch	1976	H	814	S	Qo/sdgr
1266	4159-8020	Boehm Realty	do.	1976	H	780	S	Qo/sd
1267	4159-8015	Anthony Mitcho	do.	1976	H	910	U	Qt/sd
1268	4159-8014	Barry Smitti	George H. Ackerman	1977	H	924	S	Qo/sdgr
1269	4159-8014	Adam Brezinski	Michael W. Burch	1977	H	930	S	Qo/gr
1270	4159-8013	G. Bennett	Felix J. Waible	1977	H	940	F	Qt/gr
1271	4203-8014	Patrick Luciano	Donald L. Hermann	1976	H	720	F	Qb/gr
1272	4202-8014	Keith Johnson	Alfred L. Burch	1976	H	820	T	Qo/u
1273	4203-8013	Ralph Baybrook	George H. Ackerman	1977	H	750	T	Qo/sdgr
1274	4203-7958	Gorniak Bros.	Moody Drilling Co., Inc.	1958	H	1,352	U	Dch/fsh
1275	4203-8011	Michael Yarbenet	Donald L. Hermann	1976	H	845	U	Qo/gr
1276	4203-8012	Lynwood Nursery	Felix J. Waible	1977	I	790	U	Qo/gr
1277	4202-8013	Kenneth Swift	Alfred L. Burch	1939	H	820	F	Qo/u
1278	4200-8014	Alice Olmstead	do.	1976	H	930	U	Qo/sd
1279	4156-8014	Yvette Rosenberg	Felix J. Waible	1927	H	1,190	U	MDbv/fsh
1280	4154-8014	John Levis	Robert Anderson	1977	H	1,260	U	MDbv/fsh
1281	4153-8009	Bruce Iffi	Alfred L. Burch	1976	N	1,360	F	Dv/fsh
1282	4153-8013	Fred Suhy	Robert Anderson	1977	H	1,285	U	MDbv/fsh
1283	4159-8009	J. Hicks	do.	1978	H	1,069	S	Dch/sh

(Continued)

Total depth below land surface (feet)	Casing		Depth(s) to water-bearing zone(s) (feet)	Static water level		Reported yield (gal/min)	Specific capacity [(gal/min)/ft]	Hardness (mg/L as $CaCO_3$)	Specific conductance (μmho/cm at 25°C)	pH (units)	Well number
	Depth (feet)	Diameter (inches)		Depth below land surface (feet)	Date measured (mo/yr)						
81	81	---	---	---	---	9	---	220	620	7.6	Er-1210
49	---	5	---	6	7/51	---	---	200	401	7.6	1211
90	90	---	---	---	---	---	---	150	857	7.9	1212
55	---	---	---	---	---	---	---	180	359	7.9	1213
40	40	---	---	---	---	---	---	200	493	7.7	1214
75	75	---	---	---	---	---	---	180	442	7.7	1215
30	30	8	---	---	---	---	---	230	580	7.7	1216
70	70	---	---	---	---	---	---	330	613	7.3	1217
28	28	---	---	---	---	---	---	140	314	6.5	1218
78	---	---	---	---	---	---	---	120	1,280	7.8	1219
38	38	---	---	---	---	---	---	260	500	7.3	1220
54	---	---	---	---	---	---	---	170	923	7.3	1221
84	---	---	---	---	---	---	---	110	2,080	7.5	1222
242	242	6	---	---	---	---	---	---	---	---	1223
49	30	8	14;20	5	8/74	3	.09	---	---	---	1224
34	34	12	20	15	5/53	20	---	---	---	---	1225
53	53	7	49	18	9/54	6	---	---	---	---	1226
46	46	7	38	27	9/54	20	---	---	---	---	1227
127	120	7	31;62;127	---	---	.1	---	---	---	---	1228
34	34	8	29	24	10/56	9	---	---	---	---	1229
58	44	10	39	30	9/51	3	---	190	700	---	1230
93	93	7	89	63	8/54	5	---	---	---	---	1231
83	28	8	---	13	---	1	---	---	---	---	1232
40	---	---	---	---	---	.2	---	---	---	---	1233
135	135	6	59;130	15	1/58	5	---	---	---	---	1234
52	52	8	45	38	10/56	20	---	---	---	---	1235
78	20	8	20	8	8/59	4	---	---	---	---	1236
54	14	8	---	3	6/56	33	---	80	520	---	1237
65	11	8	---	11	9/55	10	---	---	---	---	1238
51	35	5	---	39	9/50	5	---	50	275	---	1239
22	22	8	17	15	11/57	6	---	---	---	---	1240
50	18	6	---	2	11/55	2	---	---	---	---	1241
34	34	8	29	11	12/56	10	---	---	---	---	1242
42	---	---	---	---	---	---	---	---	---	---	1243
48	48	8	---	25	8/56	10	---	---	---	---	1244
46	46	7	41	36	9/56	5	---	5	650	---	1245
40	10	10	---	7	6/57	6	---	---	---	---	1246
110	107	6	---	---	---	6	---	---	---	---	1247
195	182	8	---	---	---	.1	---	---	---	---	1248
62	62	8	27;56	14	9/77	24	.9	---	---	---	1249
50	39	8	18;41	10	3/77	10	---	---	---	---	1250
38	24	7	---	8	8/56	4	---	---	---	---	1251
90	35	8	---	40	3/77	.1	---	---	---	---	1253
120	120	6	93;120	80	9/77	2	.06	120	1,850	---	1254
31	24	8	24	---	---	3	.6	---	---	---	1255
20	20	8	12;17	10	5/77	10	10	100	275	---	1256
71	17	8	35;45	10	8/77	1	.02	---	---	---	1257
112	33	8	33;105	8	6/77	8	.08	---	---	---	1258
62	62	8	45;60	10	5/77	30	30	10	525	---	1259
52	28	6	30;47	15	8/77	40	2.6	---	---	---	1260
52	25	10	20;39	11	3/77	1	.03	---	---	---	1261
60	32	8	10;25	4	11/76	10	---	---	---	---	1262
52	52	8	49	9	1/78	5	.1	---	---	---	1263
55	55	8	27;53	16	7/77	4	.1	---	---	---	1264
50	50	8	40	30	7/76	20	---	---	---	---	1265
35	35	8	24	12	6/76	20	---	---	---	---	1266
100	94	8	77;90	64	9/76	2	---	230	800	---	1267
120	108	8	101	32	9/77	50	4.5	---	---	---	1268
71	71	8	26;65	29	5/77	30	1.9	---	---	---	1269
78	78	8	75	28	5/77	5	---	---	---	---	1270
34	34	8	30	18	6/76	15	2.1	---	---	---	1271
86	---	6	85	70	12/76	6	.6	---	---	---	1272
40	40	8	31	20	10/77	50	10	---	---	---	1273
80	48	8	---	4	6/58	5	---	---	---	---	1274
89	89	8	82;86	42	9/76	15	.5	---	---	---	1275
45	45	8	40	22	7/77	20	---	---	---	---	1276
49	49	6	49	35	9/76	14	---	---	---	---	1277
47	47	8	40	22	10/76	30	---	---	---	---	1278
31	18	8	14	14	10/27	20	---	110	300	---	1279
70	26	8	27;37	5	5/77	1	.02	180	2,800	---	1280
70	43	8	36;50	10	6/76	4	---	---	---	---	1281
60	13	8	35	5	6/77	1	.02	---	---	---	1282
63	18	8	20;29	5	3/78	6	.1	200	520	---	1283

Table 12.

Well location		Owner	Driller	Year completed	Use	Altitude of land surface (feet)	Topographic setting	Aquifer/ lithology
Number	Lat-Long							
Er-1284	4158-8009	Leroy Preston	Michael W. Burch	1977	H	1,165	S	Dch/fsh
1285	4201-8011	Sun Oil Co.	Donald L. Hermann	1977	C	1,100	H	Qo/sdgr
1286	4200-8009	James Wittmaak	do.	1976	H	1,065	S	Dch/ssh
1287	4200-8009	John Schultz	Michael W. Burch	1977	H	1,025	S	Qt/gr
1288	4200-8010	Theodore Waisley	Donald L. Hermann	1976	H	960	V	Dch/fsh
1289	4157-8007	Adam Jaroszewski	George H. Ackerman	1977	H	1,405	S	Qt/gr
1290	4201-8006	Thomas West	Donald L. Hermann	1976	H	1,190	S	Dch/sh
1291	4200-8004	David Sharie	George H. Ackerman	1977	H	1,145	V	Qo/sdgr
1292	4155-7944	James Platt	Max E. Hickernell	1977	H	1,400	V	Qo/gr
1293	4156-7946	David Jagta	George H. Ackerman	1977	H	1,590	S	MDcr/fsed
1294	4156-7946	David Lindberg	do.	1977	H	1,595	S	MDcr/fsh
1295	4210-7945	William Desin	Ralph C. Parmenter	1977	H	1,508	S	Qt/u
1296	4209-7947	Eugene Groves	do.	1977	H	1,382	S	Dch/fsh
1297	4153-8001	Ronald Poker	Robert Rindfuss	1976	H	1,560	S	MDbr/fsh
1298	4153-8001	Joseph Shesman	Robert Anderson	1977	H	1,515	S	MDbr/fsh
1299	4153-8001	Charles Merry	Donald L. Hermann	1976	H	1,525	S	MDbr/fsh
1300	4152-8000	Carl Miller	Robert Rindfuss	1976	H	1,220	S	Dv/fsh
1301	4152-8000	do.	do.	1976	H	1,245	S	Dv/fsh
1302	4151-7957	George Peters	do.	1976	H	1,470	S	MDcr/fsh
1303	4159-8054	Arthur Loop	Michael W. Burch	1977	H	1,375	S	Dch/ssh
1304	4156-7957	Gary Tagliente	Robert Rindfuss	1976	H	1,310	U	Dv/fsh
1305	4155-7955	Merle Willey	do.	1976	S	1,305	U	Dv/fsh
1306	4158-7953	Brady Marks	Robert Anderson	1977	H	1,405	S	Dv/fsh
1307	4205-7953	John Afton	Michael W. Burch	1977	H	1,370	U	Dv/fsh
1308	4204-7946	Calvin Pifer	George H. Ackerman	1977	H	1,690	S	Qo/sdgr
1309	4203-7953	David Rockwell	Donald L. Hermann	1977	H	1,370	S	Qo/sd
1310	4203-7953	Arlo Applebee	Michael W. Burch	1977	H	1,350	S	Qo/gr
1311	4202-7952	Steven Gorniak	Alfred L. Burch	1976	H	1,475	H	Dch/fsh
1312	4206-7951	Merle Lewis	Robert Anderson	1977	H	1,415	S	Dch/fsh
1313	4206-7946	Robert Gibbons	Ralph C. Parmenter	1977	H	1,670	S	Qt/u
1314	4206-7951	Greenfield Fire Co.	do.	1976	H	1,475	S	Qt/u
1315	4209-7952	Daniel Lyons	do.	1976	H	1,325	S	Dch/fsh
1316	4209-7953	John Skinner	Michael W. Burch	1977	H	1,305	S	Dch/sh
1318	4211-7955	Richard Kosik	Alfred L. Burch	1976	H	665	V	Qb/sd
1319	4210-7956	Richard Eisert	do.	1976	H	765	S	Dne/fsh
1320	4208-7958	Ruth Speice	Michael W. Burch	1977	H	842	S	Dg/fsh
1321	4209-7955	Roy Shannon	do.	1977	H	910	S	Dg/ssh
1322	4207-7958	James Stensen	J. W. Waterhouse	1977	H	1,020	S	Dch/sed
1323	4206-7958	Erie County Cable TV	Michael W. Burch	1977	H	1,170	S	Dch/fsh
1324	4206-7957	Charles Young	do.	1977	H	1,272	S	Dch/fsh
1325	4204-8000	Ralph Semrau	Robert Anderson	1977	H	1,318	S	Dch/fsh
1326	4204-8000	D. O. Nupp	Felix J. Waible	1977	H	1,380	S	Dch/fsh
1327	4205-7959	J. Kirby	Michael W. Burch	1978	H	1,140	S	Dch/ssh
1328	4206-7957	Sal Randazzo	Donald L. Hermann	1976	H	1,358	S	Dch/fsh
1329	4205-7954	John Phelps	George H. Ackerman	1977	H	1,300	S	Qo/gr
1330	4206-7954	Perry Bennett	Robert Anderson	1977	H	1,210	V	Dch/fsh
1331	4204-7958	D. Kreger	Michael W. Burch	1977	H	1,210	S	Qo/sdgr
1332	4204-7959	Donn Nicalo	Felix J. Waible	1977	H	1,360	S	Qt/clgr
1333	4202-7957	Roger Klein	Michael W. Burch	1977	H	1,310	S	Qt/sdgr
1334	4204-7957	Raymond Orlemanski	Alfred L. Burch	1976	H	1,355	S	Dch/fsh
1335	4203-7956	David Hale	Felix J. Waible	1977	H	1,368	S	Dch/fsh
1336	4203-7956	George Palmer	Michael W. Burch	1977	H	1,359	S	Dch/fsh
1337	4203-7954	Edward Snippert	George H. Ackerman	1977	H	1,335	S	Qo/sd
1338	4201-7955	James Spaeder	Robert Rindfuss	1976	H	1,395	S	Qo/gr
1339	4201-7959	James Collins	Donald L. Hermann	1976	H	1,352	S	Dch/ssh
1340	4201-7958	Jack Farrell	do.	1976	H	1,240	V	Dch/fsh
1341	4154-8009	Robert Sokolowski	Robert Anderson	1977	H	1,384	S	Dv/fsh
1342	4153-8009	James Hobbs	Boyd Lee Hall	1977	H	1,250	S	Dv/fsed
1343	4156-7957	Terry Page	Alfred L. Burch	1976	H	1,214	V	Qt/clgr
1344	4156-7957	do.	Moody Drilling Co., Inc.	1976	H	1,220	V	Qt/clgr
1345	4153-8009	R. D. Overheim	Max E. Hickernell	1977	H	1,275	S	Dv/fsh
1346	4153-8005	Len Krzywicki	Boyd Lee Hall	1976	H	1,505	S	MDbr/fsed
1347	4151-8005	John Berger	Donald L. Hermann	1976	H	1,430	S	MDbr/fsh
1348	4202-8006	Raymond Andrus	do.	1976	H	1,125	S	Dch/ssh
1349	4202-8006	Carl Hahn	Robert Anderson	1977	H	1,080	U	Dch/fsh
1350	4203-8003	David Menzies	Alfred L. Burch	1977	H	1,050	S	Dch/fsh
1351	4203-8001	Caesar Lombardozzi	Donald L. Hermann	1977	H	1,214	S	Dch/sh
1352	4202-8005	Sal Altadonna	George H. Ackerman	1977	H	1,210	S	Qt/gr
1353	4202-8006	Andrew Glass	Moody Drilling Co., Inc.	1976	H	1,190	S	Dch/ssh
1354	4201-8005	Michael Rock	Donald L. Hermann	1976	H	1,272	S	Dch/ssh
1355	4201-8004	Lawrence Gehrlein	do.	1976	S	1,370	S	Dv/ssh
1356	4201-8001	George Kuebel	Michael W. Burch	1977	U	1,230	V	Qt/gr
1357	4201-8000	Leonard Siegel	do.	1977	U	1,226	V	Qo/sdgr
1358	4201-8001	Michael Komarow	Donald L. Hermann	1976	H	1,242	V	Dch/fsh

(Continued)

Total depth below land surface (feet)	Casing		Depth(s) to water-bearing zone(s) (feet)	Static water level		Reported yield (gal/min)	Specific capacity [(gal/min)/ft]	Hardness (mg/L as $CaCO_3$)	Specific conductance (µmho/cm at 25°C)	pH (units)	Well number
	Depth (feet)	Diameter (inches)		Depth below land surface (feet)	Date measured (mo/yr)						
55	23	8	17	8	4/77	10	.2	---	---	---	Er-1284
145	140	8	75;134	78	4/77	20	.5	---	---	---	1285
50	22	8	---	10	6/76	3	---	---	---	---	1286
65	43	8	39	13	5/77	2	.04	---	---	---	1287
60	16	12	18	6	9/76	2	---	---	---	---	1288
65	36	8	30;58	F	5/77	50	1.6	---	---	---	1289
55	22	8	18	8	10/76	1	---	---	---	---	1290
78	78	8	76	F	5/77	25	---	90	380	---	1291
127	127	6	124	F	5/77	20	---	---	---	---	1292
60	21	8	14;52	6	8/77	25	1.8	---	---	---	1293
70	21	8	16;62	7	8/77	50	1.1	---	---	---	1294
50	15	6	4	---	---	2	---	---	---	---	1295
40	18	6	10	6	6/77	3	.3	---	---	---	1296
65	27	8	55	35	7/76	35	1.8	---	---	---	1297
76	53	8	62;73	33	9/77	30	1.5	---	---	---	1298
50	24	8	21;30	18	6/76	12	.5	---	---	---	1299
66	46	8	55	30	5/76	20	.5	---	---	---	1300
91	73	8	83	31	4/76	6	.1	---	---	---	1301
113	40	8	42;103	52	9/76	13	.2	---	---	---	1302
50	31	8	15;27	12	5/77	12	---	---	---	---	1303
65	35	8	38	9	3/76	6	.1	---	---	---	1304
130	45	8	45;98	25	5/76	10	.1	---	---	---	1305
110	73	8	75;90	32	11/77	30	3	---	---	---	1306
95	20	5	18;25	15	9/77	2	.02	---	---	---	1307
67	67	8	34	34	8/77	20	---	---	---	---	1308
95	95	8	27;92	35	3/77	2	.04	---	---	---	1309
48	48	8	40	18	4/77	8	.4	---	---	---	1310
60	57	8	37;57	16	8/76	10	---	110	275	---	1311
64	13	8	20;25	1	9/77	2	.03	---	---	---	1312
64	32	6	10	30	9/77	4	.2	100	270	---	1313
60	20	12	---	10	12/76	5	.2	---	---	---	1314
40	16	6	20	10	5/76	3	.1	---	---	---	1315
55	15	8	8;25	20	7/77	5	---	120	610	---	1316
40	36	8	34	18	5/76	2	---	---	---	---	1318
50	9	8	9;11	5	5/76	5	---	120	420	---	1319
52	22	8	15;24	15	6/77	1	.02	---	---	---	1320
40	26	8	20;28;34	7	5/77	5	.2	220	650	---	1321
68	35	8	39;50	20	9/77	10	---	---	---	---	1322
71	15	8	11	8	11/77	5	.08	---	---	---	1323
55	12	---	12;18	8	7/77	8	.2	---	---	---	1324
55	12	8	15;26	10	4/77	5	.1	75	305	---	1325
55	15	8	9	8	7/77	5	---	---	---	---	1326
50	25	8	21	5	3/78	15	---	---	---	---	1327
55	18	8	16;23	5	8/76	6	.1	---	---	---	1328
120	120	8	72;113	54	10/77	50	2.1	---	---	---	1329
60	12	8	10;15	3	9/77	7	.1	55	490	---	1330
108	94	8	9;24;36	F	11/77	3	---	---	---	---	1331
51	49	8	48	25	6/77	5	---	---	---	---	1332
90	90	8	17;82	11	8/77	45	2.4	---	---	---	1333
70	17	8	17;22	---	9/76	3	---	80	260	---	1334
60	35	8	30	18	10/77	4	---	---	---	---	1335
60	23	8	14;33	16	8/77	45	45	---	---	---	1336
80	80	8	75	15	7/77	12	---	---	---	---	1337
84	84	8	75	60	8/76	9	.5	---	---	---	1338
55	26	8	20	3	6/76	5	---	---	---	---	1339
70	56	8	48;62	35	7/76	15	1.4	---	---	---	1340
72	31	8	29;35	2	10/77	30	1.5	---	---	---	1341
75	40	8	55;70	25	6/77	8	1.6	---	---	---	1342
80	65	8	50;60	28	10/76	.5	---	140	350	---	1343
66	65	8	---	30	10/76	.1	---	---	---	---	1344
60	19	8	21;36	5	5/77	15	---	---	---	---	1345
105	44	8	56;103	20	8/76	30	.5	---	---	---	1346
75	33	8	28;55	23	10/76	15	.4	---	---	---	1347
50	18	8	14;19	8	8/76	4	---	---	---	---	1348
55	15	8	18	13	4/77	1	.04	---	---	---	1349
40	17	8	9;35	6	2/77	5	---	---	---	---	1350
53	24	8	28;38	12	2/77	7	.2	---	---	---	1351
55	14	8	9	5	6/77	5	---	---	---	---	1352
50	17	8	17	8	8/76	5	.1	---	---	---	1353
35	18	8	19	5	7/76	2	---	150	600	---	1354
55	28	8	19;24	8	8/76	3	---	---	---	---	1355
60	57	8	13;48	7	5/77	50	1.5	---	---	---	1356
66	60	8	6;59	1	5/77	60	1.5	---	---	---	1357
52	26	8	20;35	8	11/76	18	1	---	---	---	1358

Table 12.

Well location		Owner	Driller	Year completed	Use	Altitude of land surface (feet)	Topographic setting	Aquifer/ lithology
Number	Lat-Long							
Er-1359	4201-8000	Daniel Collins	Donald L. Hermann	1976	H	1,318	S	Dch/ssh
1360	4200-8002	Harry Winkleman	do.	1976	H	1,442	S	Dv/ssh
1361	4201-8003	Frank Di Bartolomeo	Robert Anderson	1977	H	1,372	V	Qt/gr
1362	4203-8000	Great Lakes Communication	Moody Drilling Co., Inc.	1957	H	1,380	S	Dv/fst
1363	4205-8007	Marshall Thompson	do.	1955	H	730	F	Qb/gr
1364	4201-8002	Summit Central Elementary School	do.	1955	T	1,340	S	Dv/fst
1365	4201-8003	Stanley Przybylak	do.	1957	H	1,330	S	Dv/fsh
1366	4202-8002	John Sloan	do.	1956	H	1,282	U	Dch/fsh
1367	4202-8004	Miles Baker	do.	1955	H	1,269	V	Dch/fsh
1368	4201-8003	Pennsylvania Department of Transportation	McCray Bros.	1964	D	1,400	U	Dv/fss
1369	4203-8003	Ed Bronakowski	Moody Drilling Co., Inc.	1955	H	1,253	S	Dch/fst
1370	4201-8003	Marcella Hanes	do.	1956	H	1,390	U	Dv/fsh
1371	4206-8002	Dorothy Wagner	do.	1957	H	809	F	Qt/t
1372	4203-8002	Walter Brogeuricz	do.	1956	H	1,262	S	Dch/fsh
1373	4204-8005	Lillian Conner	do.	1955	H	925	S	Qt/gr
1374	4203-8005	Boy Scouts of America	do.	1956	U	960	V	Dch/fsh
1375	4205-8004	William Sapper	do.	1955	H	902	S	Qo/gr
1376	4204-8006	John Parmertor	do.	1955	H	930	U	Dg/fsh
1377	4205-7959	Richard Conyngham	do.	1956	H	1,180	S	Dch/fsh
1378	4204-8005	Cornell Cracium	do.	1955	H	912	V	Dg/fsh
1379	4205-8005	F. M. Carlson	do.	1955	H	940	U	Qt/clgr
1380	4206-8007	Jewish Temple	do.	---	U	665	F	Qb/sd
1381	4209-8004	U.S. Coast Guard	do.	1954	H	581	F	Qs/sdgr
1382	4205-8009	Brown	do.	1953	H	715	F	Qo/u
1383	4206-8008	Clem Schwab	do.	1954	U	700	F	Dne/fst
1384	4204-8011	Miriam Bowman	do.	1957	H	733	F	Qo/gr
1385	4205-8008	Edward Zielinski	do.	1956	H	715	F	Qb/gr
1386	4204-8011	Siemieniak	do.	1956	H	730	F	Qo/gr
1387	4204-8009	Bob Parker	do.	1956	H	769	U	Qo/gr
1388	4204-8008	Ralph Riehl	do.	1957	H	875	U	Qo/gr
1389	4204-8008	do.	do.	1957	H	898	U	Qo/gr
1390	4204-8008	James Sebastian	do.	1958	H	879	U	Qo/gr
1391	4204-8008	Jack Spiriti	do.	1955	H	900	U	Qo/gr
1392	4204-8009	Wayne Pemberton	do.	1955	H	880	U	Qo/gr
1393	4203-8009	W. C. Hengalbrok	do.	1954	H	888	U	Qo/gr
1394	4151-8007	James Skelton	do.	1952	H	1,192	V	Qo/sd
1395	4152-8002	John Kovshak	do.	1957	H	1,240	S	Dv/fsh
1396	4152-8001	Carlton Palmer	do.	1957	H	1,553	S	MDbr/fsh
1397	4154-8011	Peter Gregan	do.	1951	H	1,318	S	Dv/fst
1398	4152-8012	T. H. Young	do.	1956	H	1,370	S	MDbv/fsh
1399	4152-8008	Robert Bender	do.	1956	H	1,215	S	Qo/gr
1400	4152-8008	William Ulbing	do.	1958	H	1,241	S	Dv/fsh
1401	4203-8017	Galbo	do.	1955	H	652	F	Qb/clgr
1402	4200-8014	Arthur Ihsen	do.	1957	U	910	U	Qo/sd
1403	4200-8014	Ted Niebeauer	do.	1957	H	919	U	Qo/gr
1404	4200-8026	Baptist Church	do.	1958	H	600	F	Qb/c
1405	4200-8017	John Runser	do.	1957	H	784	F	Qb/gr
1406	4202-8019	Carl Rimpa	do.	1958	H	696	F	Qb/sd
1407	4202-8014	Herbert Wilson	do.	1954	H	802	U	Qb/gr
1408	4200-7953	C. V. Myers	do.	1955	H	1,349	S	Dch/fst
1409	4203-7953	Gerald Arnold	do.	1956	H	1,355	U	Qo/gr
1410	4205-7959	John Nesselhauf	do.	1957	H	1,140	F	Dch/fsh
1411	4201-7955	P. E. Smock	do.	1957	H	1,406	H	Qo/gr
1412	4205-7953	J. A. Jantzer	do.	1958	H	1,446	S	Qo/gr
1413	4207-7958	Louis Balmer	do.	1956	H	1,015	S	Dch/fsh
1414	4210-7957	Elroy McArthur	do.	1957	H	651	S	Qb/sd
1415	4211-7956	Kenneth McGuigan	do.	1957	H	658	F	Qb/sd
1416	4211-7956	Alexander Kuklinski	do.	1958	H	674	F	Qb/clgr
1417	4210-7956	George Palmer	do.	1957	H	738	F	Dne/fsh
1418	4208-7959	Bert Sharaff	do.	1954	H	818	S	Dg/fst
1419	4208-7959	Leo Ranawiecki	do.	1957	H	805	S	Dg/fsh
1420	4207-7959	Sam Richardson	do.	1958	H	838	S	Qt/clgr
1421	4155-7958	Deane Schlosser	do.	1963	H	1,182	V	Qo/sdgr
1422	4157-7957	Raymond Schuschu	do.	1957	H	1,400	U	Dv/fst
1423	4156-7958	E. H. Hopkins	do.	1956	H	1,180	V	Qo/t
1424	4204-7951	G. A Smith	do.	1954	H	1,363	S	Qo/gr
1425	4203-8013	Concrete Paper Co. of America	do.	---	N	740	U	Qb/sdgr
1426	4203-8012	Whitlings Motel	do.	1958	H	773	U	Qb/gr
1427	4200-8014	Ernest Kemling	do.	---	H	908	U	Qo/gr
1428	4204-8008	Jack Van Tassell	do.	1957	H	920	U	Qo/gr
1429	4204-8011	Mary Sheall	Alfred L. Burch	1976	H	733	F	Qb/sdgr

(Continued)

Total depth below land surface (feet)	Casing		Depth(s) to water-bearing zone(s) (feet)	Static water level		Reported yield (gal/min)	Specific capacity [(gal/min)/ft]	Hardness (mg/L as $CaCO_3$)	Specific conduc-tance (µmho/cm at 25°C)	pH (units)	Well number
	Depth (feet)	Diameter (inches)		Depth below land surface (feet)	Date measured (mo/yr)						
56	26	8	23	3	6/76	5	---	---	---	---	Er-1359
50	31	8	29;39	10	7/76	30	2.7	---	---	---	1360
52	46	8	18	7	8/77	5	.1	---	---	---	1361
65	31	10	---	---	---	15	---	---	---	---	1362
31	31	6	25	12	8/55	5	---	---	---	---	1363
153	37	36	---	12	10/55	8	---	---	---	---	1364
68	37	8	---	18	6/57	3	---	---	---	---	1365
71	38	8	---	12	1/56	3	---	---	---	---	1366
40	19	12	---	9	9/55	2	---	---	---	---	1367
65	22	12	16;45	10	9/64	11	.2	---	---	---	1368
35	20	8	---	7	6/55	15	---	---	---	---	1369
68	47	10	---	22	6/56	1	---	---	---	---	1370
30	2	24	---	---	---	---	---	---	---	---	1371
52	21	8	---	3	4/56	5	---	55	745	---	1372
60	60	7	55	30	4/55	5	---	---	---	---	1373
50	---	---	---	---	---	---	---	---	---	---	1374
48	48	6	42	10	11/55	15	---	---	---	---	1375
100	96	6	---	---	---	1	---	---	---	---	1376
65	15	8	---	6	7/56	3	---	---	---	---	1377
35	21	6	---	6	8/55	15	---	---	---	---	1378
84	84	8	---	40	6/55	30	---	---	---	---	1379
20	16	---	---	---	---	---	---	---	---	---	1380
26	---	7	21	3	2/54	30	---	---	---	---	1381
62	62	---	---	1	4/53	5	---	---	---	---	1382
50	---	---	---	4	5/54	10	---	---	---	---	1383
60	60	7	33;55	45	10/57	9	---	---	---	---	1384
28	28	8	23	3	9/56	8	---	---	---	---	1385
41	41	8	36	28	6/56	15	---	---	---	---	1386
87	87	8	26;82	60	8/56	20	---	---	---	---	1387
69	69	7	62	45	10/57	20	---	---	---	---	1388
76	76	6	71	45	12/57	15	---	---	---	---	1389
70	70	---	64	43	3/58	20	---	---	---	---	1390
90	90	7	84	65	4/55	15	---	---	---	---	1391
79	79	---	69	50	6/55	30	---	---	---	---	1392
79	79	7	74	64	11/54	15	---	---	---	---	1393
27	27	---	---	5	12/52	5	---	110	320	---	1394
100	67	7	---	17	10/57	2	---	---	---	---	1395
80	31	6	---	48	5/57	30	---	200	440	---	1396
63	17	8	---	10	9/51	1	---	55	780	---	1397
50	40	6	---	12	1/56	6	---	---	---	---	1398
42	42	8	38	12	12/56	7	---	---	---	---	1399
68	53	8	---	30	4/58	3	---	---	---	---	1400
86	75	8	---	---	---	---	---	---	---	---	1401
100	100	---	---	---	---	---	---	---	---	---	1402
47	47	6	42	29	7/57	20	---	---	---	---	1403
9	9	24	---	---	---	---	---	---	---	---	1404
45	45	8	40	35	12/57	7	---	---	---	---	1405
21	21	24	---	4	7/58	2	---	---	---	---	1406
40	40	7	35	20	11/54	10	---	---	---	---	1407
80	43	7	---	---	---	.6	---	35	420	---	1408
23	23	8	19	10	6/56	5	---	---	---	---	1409
51	22	8	---	10	4/57	3	---	---	---	---	1410
112	112	7	107	75	10/57	15	---	100	300	---	1411
43	43	8	38	10	2/58	4	---	---	---	---	1412
60	21	8	---	7	1956	10	---	85	240	---	1413
26	26	24	---	---	---	---	---	---	---	---	1414
17	17	24	---	6	10/57	2	---	160	1,450	---	1415
16	16	24	---	8	5/58	1	---	---	---	---	1416
45	29	8	16	10	9/57	20	---	120	400	---	1417
30	20	7	---	8	11/54	3	---	---	---	---	1418
41	25	8	---	---	---	3	---	---	---	---	1419
17	17	---	---	3	4/58	1	---	---	---	---	1420
56	36	6	---	12	6/63	60	---	---	---	---	1421
70	21	7	---	25	11/57	15	---	---	---	---	1422
227	155	7	---	80	---	---	---	---	---	---	1423
55	55	7	40	10	10/54	4	---	100	270	---	1424
23	23	10	---	6	---	85	5.4	---	---	---	1425
47	20	8	---	46	7/58	30	---	---	---	---	1426
37	37	8	---	22	---	10	---	---	---	---	1427
100	100	7	95	82	11/57	20	---	---	---	---	1428
43	43	8	12;36	12	11/76	5	---	---	---	---	1429

Table 12.

Well location		Owner	Driller	Year completed	Use	Altitude of land surface (feet)	Topographic setting	Aquifer/ lithology
Number	Lat-Long							
Er-1430	4203-8011	John Seber	George H. Ackerman	1977	H	814	U	Qo/sdgr
1431	4204-8007	John Kielczewski	Robert Anderson	---	H	882	S	Qt/gr
1432	4204-8008	James Jones	Moody Drilling Co., Inc.	---	H	880	U	Qt/gr
1433	4204-8009	Springhurst Inc.	Michael W. Burch	1977	H	850	U	Qt/gr
1434	4203-8009	Chester Kubiak	Felix J. Waible	1978	H	888	U	Qo/gr
1436	4203-8007	Rickey Taraszki	George H. Ackerman	1977	H	908	U	Qo/sdgr
1437	4206-8000	T. Kellogg	Michael W. Burch	1978	H	1,069	S	Qt/clgr
1438	4203-8008	Paul Canfield	Robert Anderson	1977	H	870	U	Qt/clgr
1439	4203-8008	David McDonald	do.	1977	H	882	T	Qo/gr
1440	4205-8003	Robert Gehrlein	Michael W. Burch	1977	H	950	F	Qt/sdgr
1441	4204-8003	John Maleno	George H. Ackerman	1977	H	984	S	Qt/gr
1442	4205-8001	James Clark	Donald L. Hermann	1976	H	1,056	S	Dch/fsh
1443	4202-8008	Joseph Leonardi	Robert Anderson	1977	H	932	U	Qo/gr
1444	4203-8006	C. Black	do.	1978	H	1,045	S	Qt/t
1445	4205-7959	A. Kirby	Michael W. Burch	1978	H	1,130	F	Dch/fsh
1446	4152-8027	George Kessler	Lorenze Lee Hall	1977	H	953	U	Dch/fsh
1447	4151-8025	Ronald Noe	Alfred L. Burch	1977	H	869	S	Dch/fsh
1448	4152-8019	Ward Norton, Jr.	Lorenze Lee Hall	1977	H	1,008	S	Dch/fsh
1449	4152-8020	Richard Johnson	Jack Young	1977	H	1,068	S	MDbv/fsh
1450	4157-8016	Michael Pacansky	Moody Drilling Co., Inc.	---	H	912	S	Qt/u
1451	4159-8016	David Thomas	Robert Anderson	1977	H	870	U	Qt/gr
1452	4200-8016	William Nies	Felix J. Waible	1977	H	850	F	Qo/gr
1453	4201-8015	Carl Triola	George H. Ackerman	1977	H	830	F	Dg/sh
1454	4203-8014	Harold Litzel	Donald L. Hermann	1977	H	751	F	Qb/gr
1455	4155-8013	James Will	Michael W. Burch	1977	H	1,272	S	MDbv/fsh
1456	4157-8011	Al Machinski	Robert Anderson	1977	H	1,222	S	Qt/clgr
1457	4158-8010	David Hutnyak	Donald L. Hermann	1976	H	1,222	S	Dv/fsh
1458	4159-8008	Mark Benson	Robert Anderson	1977	H	1,185	S	Dch/fsh
1459	4200-8007	Stanley Paschel	Donald L. Hermann	1976	H	1,063	S	Qt/gr
1460	4154-7944	John Wisniewski	McCray Bros.	1975	H	1,395	T	Qo/gr
1461	4158-7952	Ronald Waite	Robert Rindfuss	1976	H	1,315	S	Dch/sh
1462	4159-8006	Joseph Seth	Donald L. Hermann	1976	H	1,252	S	Dch/fsh
1463	4200-8004	Robert Franz	Felix J. Waible	1977	H	1,200	S	Qt/gr
1464	4151-7950	Harold Maynard	Max E. Hickernell	1977	H	1,610	H	Mc/st
1465	4151-7950	Inspirational Times Inc.	do.	---	H	1,605	H	Mc/fsh
1466	4156-8003	Richard Falkowski	Robert Anderson	1977	H	1,540	U	MDbr/fsh
1467	4155-8001	Ronald Shields	Robert Rindfuss	1976	H	1,425	V	MDbr/fsh
1468	4203-7952	Theodore Wolozanski	George H. Ackerman	1977	H	1,335	V	Qo/gr
1469	4200-7946	Stuart Foradora	do.	1977	H	1,335	V	Qo/sdgr
1470	4202-7952	Mario Farino	Robert Anderson	1978	H	1,425	S	Dch/fsh
1471	4203-7952	Robert Kruse	Michael W. Burch	1977	H	1,370	S	Qo/sdgr
1472	4205-7957	Charles Lander	do.	1977	H	1,372	S	Dch/fsh
1473	4202-7959	William Peters	Robert Anderson	1977	H	1,352	S	Dch/fsh
1474	4203-7958	James Kennerknecht	Lorenze Lee Hall	1977	H	1,350	U	Dch/fsh
1475	4200-7954	Dennis Hancock	Michael W. Burch	1977	H	1,330	T	Dch/ssh
1476	4204-7959	R. Sandle	George H. Ackerman	1977	H	1,374	F	Dv/fsh
1477	4205-7954	Richard Trimble	Michael W. Burch	1977	H	1,306	S	Qo/gr
1478	4207-7950	Tim Buck	do.	1977	H	1,484	U	Dv/fsh
1479	4206-7954	L. Vincent	Robert Rindfuss	1976	H	1,188	S	Dch/fsh
1480	4201-8002	W. Williams	Robert Anderson	1978	H	1,400	U	Dv/fsh
1481	4156-8021	Richard Gloskey	Max E. Hickernell	1978	U	850	U	Qt/sd
1482	4157-8019	Howard Bowen	John E. Gage, Jr.	1973	H	885	U	Qt/sd
1483	4154-8021	Albion Borough	Moody Drilling Co., Inc.	1960	Z	870	V	Qo/gr
1484	4154-8021	do.	do.	1960	Z	892	S	Qo/gr
1485	4203-8009	Michael Haggerty	George H. Ackerman	1977	H	892	U	Qo/gr
1486	4206-8006	National Forge	Moody Drilling Co., Inc.	1957	N	710	F	Qb/gr
1487	4158-8014	Girl Scouts of America	do.	---	H	1,000	S	Dch/fsh
1488	4152-8000	J. W. Hanas	Robert Rindfuss	1972	H	1,300	S	Qo/gr
1489	4152-8000	John Hanas	Moody Drilling Co., Inc.	1952	H	1,210	S	Qo/gr
1490	4152-8000	Mrs. John Hanas	Donald L. Hermann	1973	H	1,300	S	Dv/fsh
1491	4158-8004	Walter Kosienski	do.	1972	H	1,450	U	Dv/ssh
1492	4157-8000	Charles Brace	do.	1975	H	1,278	S	Dch/fsh
1493	4157-8004	William Pennock	do.	1976	H	1,520	S	MDbr/fsh
1494	4153-8005	Robert Hamilton	Boyd Lee Hall	1977	H	1,483	S	MDbr/fsh
1495	4159-8006	Kenneth Felix	Michael W. Burch	1976	H	1,340	S	Dv/fsh
1496	4159-8006	Gordon Smith	do.	1976	H	1,338	S	Qt/sdgr
1497	4159-8006	do.	do.	1976	H	1,345	S	Dv/fsh
1499	4157-8007	Janice Dennis	Robert Anderson	1976	H	1,409	S	Dv/fsh
1500	4151-8017	Albion Borough	---	1930	P	1,085	V	Qo/sdgr
1501	4156-7959	Waterford Borough	---	---	P	1,180	V	Qo/sdgr
1502	4156-7938	Corry Water Supply Co.	---	1947	P	1,415	V	Qo/sdgr
1503	4156-7938	do.	---	---	P	1,425	V	Qo/sdgr
1504	4156-7938	do.	---	---	P	1,430	V	Qo/gr
1505	4152-8007	Edinboro Municipal Water Works	---	1910	P	1,200	V	Qo/sdgr

(Continued)

Total depth below land surface (feet)	Casing: Depth (feet)	Casing: Diameter (inches)	Depth(s) to water-bearing zone(s) (feet)	Static water level: Depth below land surface (feet)	Static water level: Date measured (mo/yr)	Reported yield (gal/min)	Specific capacity [(gal/min)/ft]	Hardness (mg/L as $CaCO_3$)	Specific conductance (μmho/cm at 25°C)	pH (units)	Well number
67	67	8	32;62	38	10/77	50	3.6	---	---	---	Er-1430
65	65	8	60;65	57	---	10	3.3	---	---	---	1431
63	63	---	59	37	---	20	---	---	---	---	1432
90	90	8	47;82	60	9/77	30	30	---	---	---	1433
73	73	8	70	55	3/78	20	20	---	---	---	1434
62	62	8	32;57	20	4/77	25	---	---	---	---	1436
50	47	8	42	30	3/78	15	3	---	---	---	1437
55	55	8	50	28	10/77	30	3	---	---	---	1438
50	35	8	33	19	7/77	8	---	---	---	---	1439
38	38	8	33	23	8/77	18	9	240	830	---	1440
63	43	8	---	8	12/77	30	---	---	---	---	1441
100	81	8	77	42	7/76	4	---	---	---	---	1442
53	53	8	51	20	6/77	12	.6	---	750	---	1443
89	70	8	68	64	2/78	18	.9	---	---	---	1444
55	12	8	8;20;26	5	3/78	2	---	80	405	---	1445
51	26	8	31;41	6	4/77	8	.2	---	---	---	1446
70	53	8	30;47	10	3/77	---	---	---	---	---	1447
52	27	8	15;28	24	6/77	12	.5	100	340	---	1448
45	23	8	20;27	8	3/77	10	5	---	---	---	1449
34	34	8	15	13	---	5	.3	---	---	---	1450
31	31	8	30	15	5/77	12	1.2	---	---	---	1451
52	52	8	47	19	4/77	20	---	210	450	---	1452
140	115	8	28;95;112	78	---	---	---	---	---	---	1453
27	27	8	---	12	3/77	15	2.5	---	---	---	1454
50	32	8	14;44	1	5/77	10	.2	---	---	---	1455
43	43	8	37;42	17	5/77	10	.5	---	---	---	1456
53	36	8	31;45	7	10/76	5	.1	---	---	---	1457
66	37	8	38;40	20	6/77	8	.2	120	300	---	1458
50	29	8	24	8	9/76	2	---	---	---	---	1459
112	112	6	112	F	2/75	5	.5	75	200	---	1460
101	85	8	90	50	7/76	3	.07	---	---	---	1461
65	30	12	24	12	7/76	.5	---	---	---	---	1462
45	41	8	41	12	7/77	20	---	---	---	---	1463
91	19	8	55;84	22	4/77	30	.6	---	---	---	1464
82	27	6	58;76	8	---	15	.5	---	---	---	1465
50	17	8	20;25	3	5/77	7	.2	---	---	---	1466
67	41	8	57	22	10/76	9	.2	---	---	---	1467
97	97	8	30;78;92	5	5/77	25	.4	---	---	---	1468
104	104	8	42;96	F	5/77	25	.5	95	260	---	1469
66	30	8	31	2	3/78	20	.5	---	---	---	1470
107	107	8	14;103	40	9/77	15	.3	---	---	---	1471
100	28	8	12;27	7	9/77	2	.02	---	---	---	1472
56	25	8	26;30	10	6/77	9	.2	---	---	---	1473
66	52	8	35;48;57	21	6/77	16	.4	140	370	---	1474
71	71	8	15;33;66	23	5/77	45	6.4	---	---	---	1475
55	32	8	23;45	5	11/77	50	---	---	---	---	1476
55	55	8	45	22	4/77	30	1.6	120	310	---	1477
60	17	8	10;20	1	10/77	1	---	---	---	---	1478
65	38	8	48	12	6/76	8	.2	---	---	---	1479
64	29	8	30	6	1/78	6	.1	---	---	---	1480
141	111	8	---	35	10/78	5	.03	95	2,500	---	1481
115	112	6	32	70	9/73	1	---	120	600	---	1482
70	67	---	15	6	8/60	235	---	---	---	---	1483
111	110	--	22;25;53	---	---	---	---	---	---	---	1484
96	96	8	92	70	6/77	25	---	---	---	---	1485
36	36	20	---	20	1957	70	4.6	---	---	---	1486
33	15	7	---	6	---	25	---	---	---	---	1487
96	---	8	---	35	8/72	33	.6	125	340	---	1488
97	96	7	---	4	11/52	10	.16	---	---	---	1489
80	39	8	36	32	10/73	2	.05	140	340	---	1490
75	60	8	55;60	22	7/72	4	---	---	---	---	1491
80	57	8	54	32	8/75	2	---	---	---	---	1492
52	34	8	34;48	1	8/76	20	.8	---	---	---	1493
88	44	6	---	78	6/77	5	1.7	---	---	---	1494
61	29	8	9;12;21;52	4	4/76	4	.06	160	2,800	---	1495
55	24	8	19	10	7/76	4	.1	---	---	---	1496
65	53	8	25;40	12	3/76	10	.3	---	---	---	1497
62	30	8	31;45	12	7/76	4	.08	---	---	---	1499
40	38	8	---	0	1930	65	---	200	---	7.2	1500
100	58	12	---	---	---	1,000	34	150	---	7.8	1501
32	24	12	24	5	1947	250	28	120	---	7.5	1502
65	48	---	---	12	---	500	---	120	---	7.9	1503
65	52	---	---	16	---	400	11	120	308	7.9	1504
20	20	20	---	---	---	350	---	220	---	7.5	1505

Table 12.

Well location		Owner	Driller	Year completed	Use	Altitude of land surface (feet)	Topographic setting	Aquifer/lithology
Number	Lat-Long							
Er-1506	4152-8007	Edinboro Municipal Water Works	---	---	P	1,200	V	Qo/sdgr
1507	4202-8015	Whitehall Village	---	1967	P	680	F	Qb/u
1508	4202-8015	do.	---	---	P	680	F	Qb/u
1509	4202-8015	do.	---	---	P	692	F	Qb/u
1510	4200-8020	Lake City Borough	---	---	P	725	F	Qb/u
1511	4200-8019	do.	---	---	P	735	F	Qb/u
1512	4202-8016	Palmer Shores Water Co.	---	---	P	680	F	Qb/gr
1513	4200-8019	Girard Borough	---	---	P	735	F	Qb/u
1514	4200-8019	do.	---	---	P	735	F	Qb/u
1515	4201-8018	do.	---	---	P	740	F	Qb/u
1516	4201-8015	Fairview Borough	---	---	P	825	F	Qb/u
1517	4201-8015	do.	---	---	P	820	F	Qb/u
1518	4201-8015	do.	---	1961	P	815	F	Qb/u
1519	4202-8013	Westminster Water Co.	Moody Drilling Co., Inc.	---	P	800	F	Qb/gr
1520	4202-8013	do.	---	---	P	800	F	Qb/sdgr
1521	4203-8011	Greenbrier Hill Corp.	---	1964	P	855	H	Qo/u
1522	4204-8014	Manchester Heights	---	---	P	580	F	Qb/u
1523	4205-8009	Erie Suburban Water Co.	---	---	P	731	F	Qb/u
1524	4204-8010	do.	---	---	P	740	F	Qb/u
1525	4204-8010	do.	---	---	P	740	F	Qb/u
1526	4204-8010	do.	---	---	P	770	F	Qb/sdgr
1527	4204-8010	do.	---	---	P	770	F	Qb/u
1528	4204-8010	do.	---	---	P	770	F	Qb/u
1529	4205-8009	do.	---	---	P	740	F	Qb/u
1530	4205-8009	do.	---	---	P	740	F	Qb/u
1531	4205-8009	do.	---	---	P	740	F	Qb/u
1532	4159-8009	Idyll Whyle Village, Inc.	---	---	P	970	V	Qo/u
1533	4201-8007	Happy Homes Mobile Park	---	---	P	1,076	F	Dch/fsh
1534	4203-8013	Erie Suburban Water Co.	---	---	P	735	F	Qb/u
1535	4203-8012	do.	---	1972	P	765	F	Qb/sdgr
1536	4156-7938	Corry Water Supply Co.	Moody Drilling Co., Inc.	1974	U	1,415	V	Qo/sdgr
1537	4204-8013	Lake Shore Maintenance Association	do.	---	P	730	F	Qb/u
1539	4204-7958	James Foltz	Alfred L. Burch	1976	H	1,262	S	Dch/fsh
1540	4200-8018	Patrick Luciano	Moody Drilling Co., Inc.	1972	H	788	F	Qb/sdgr
1541	4157-8007	David Hogan	Felix J. Waible	1974	H	1,406	S	Dv/fsh
1542	4157-8001	D. J. Dolph	Robert Anderson	1975	H	1,290	S	Qo/sdgr
1544	4157-8001	Ted Goring	Robert Rindfuss	1975	H	1,270	S	Qo/gr
1545	4158-8001	Abram Thomas	Alfred L. Burch	1972	P	1,285	S	Qt/gr
1546	4158-8001	do.	do.	1973	P	1,300	S	Dv/fsh
1547	4153-8003	Edward Humes	Max E. Hickernell	1963	H	1,540	S	Dv/fst
1548	4155-8000	Charles Burge	Moody Drilling Co., Inc.	---	H	1,394	H	Dv/fsh
1549	4159-8002	Deimel-Heynes Farm	Michael W. Burch	---	S	1,450	S	Dv/fsh
1550	4153-8030	Robert Taylor	Lowell Halstead	1973	H	870	U	Qo/gr
1551	4203-8007	First Alliance Church	W. K. Bailey	1976	H	908	U	Qt/sd
1552	4205-8002	A. C. Schenck	Alfred L. Burch	1971	H	1,050	S	Qt/gr
1553	4205-8000	Andy Zafiropoulous	Michael W. Burch	1977	H	1,130	U	Qt/t
1554	4206-8000	do.	do.	1977	H	1,110	U	Qt/t
1555	4206-8000	do.	do.	1977	H	1,058	U	Qt/gr
1556	4200-8006	J. A. Meyer	do.	1975	H	1,240	S	Dch/sh
1557	4202-8003	Great Lakes Television	Moody Drilling Co., Inc.	1954	H	1,340	S	Dv/fst
1558	4202-8001	Joseph Mientkiewicz	George H. Ackerman	1977	H	1,332	H	Dch/sh
1559	4204-8002	Robert Stewart	Donald L. Hermann	1972	H	1,029	V	Dch/ssh
1560	4201-8005	J. R. Ott	do.	1972	H	1,335	S	Dv/fsh
1561	4200-8000	Kevin Osborne	do.	1976	H	1,255	S	Dch/fsh
1562	4151-8022	Larry Kadley	Jack Young	1978	H	1,048	S	Dch/fsh
1563	4151-8016	Nevin Shoaf	Alfred L. Burch	1966	H	1,222	S	MDbv/ssh
1564	4158-8008	J. A. Lange	George H. Ackerman	1975	H	1,210	S	Dch/fsh
1565	4156-8013	Frank Pertl	John E. Gage, Jr.	1974	H	1,195	S	Qt/t
1566	4157-8012	J. R. Crandall	Donald L. Hermann	1972	H	1,210	U	MDbv/fsh
1567	4154-8007	W. E. Adams	Donald L. Hermann	1972	N	1,265	T	Qo/sdgr
1568	4159-8013	W. C. Kinstler	Moody Drilling Co. Inc.	1957	H	955	F	Qt/clgr
1569	4155-8008	Roger Soth	Alfred L. Burch	1976	H	1,375	S	Dv/fsh
1570	4158-8011	J. R. Baldwin	do.	1972	H	1,175	S	Dch/fsh
1571	4156-8011	Wayne Washburn	do.	1967	H	1,303	U	MDbv/fsh
1572	4159-8014	Adam Brezinski	Herbert G. Orr	1976	H	930	S	Dch/fsh
1573	4152-8014	L. K. Stroup	John E. Gage, Jr.	1970	H	1,282	H	MDbv/ss
1574	4152-8010	David Robinson	Max E. Hickernell	1966	H	1,491	U	MDbr/fs
1575	4201-8017	West Ridge Gravel Co.	Charles J. Richardson III	1973	N	790	F	Qb/sd
1576	4202-8016	M. A. Roseman	Robert Anderson	1972	H	672	F	Dne/sh
1577	4201-8016	Erie County Infirmary	Moody Drilling Co., Inc.	---	T	808	F	Qo/sdgr
1578	4202-8015	Robert Gidner	do.	1951	H	780	T	Qo/gr
1579	4201-8016	Michael Tarasovitch	Alfred L. Burch	1968	C	810	F	Qb/sdgr
1580	4201-8016	Erie County Infirmary	do.	1971	T	805	F	Qb/gr

(Continued)

Total depth below land surface (feet)	Casing		Depth(s) to water-bearing zone(s) (feet)	Static water level		Reported yield (gal/min)	Specific capacity [(gal/min)/ft]	Hardness (mg/L as $CaCO_3$)	Specific conductance (μmho/cm at 25°C)	pH (units)	Well number
	Depth (feet)	Diameter (inches)		Depth below land surface (feet)	Date measured (mo/yr)						
38	36	12	36	0	---	500	---	220	---	7.3	Er-1506
30	24	120	24	4	7/67	32	---	540	---	6.9	1507
30	24	120	24	4	---	14	---	390	---	7.0	1508
22	15	120	15	3	---	49	---	320	---	7.6	1509
16	15	180	15	---	---	250	---	200	---	7.1	1510
44	39	10	---	4	12/64	600	---	260	---	7.0	1511
17	17	120	---	---	---	100	---	200	600	7.4	1512
30	---	---	---	6	---	850	67	220	400	7.4	1513
17	17	216	---	8	---	300	270	220	420	7.4	1514
12	12	120	---	8	---	200	---	200	420	7.4	1515
43	43	---	---	---	---	120	---	220	---	7.4	1516
38	38	8	---	---	---	44	50	220	---	7.4	1517
46	38	12	---	28	8/63	90	29	190	---	7.4	1518
46	41	12	---	---	---	200	---	260	---	7.1	1519
65	---	12	36	---	---	100	---	330	---	7.0	1520
73	68	7	---	50	1/64	70	140	240	530	7.9	1521
10	---	96	---	6	---	40	---	300	---	7.0	1522
34	24	12	---	---	---	75	---	420	2,400	8.0	1523
32	---	---	---	---	---	200	---	220	---	7.5	1524
30	28	120	---	---	---	150	19	320	---	7.5	1525
29	24	72	---	---	---	100	---	250	---	7.4	1526
34	24	72	---	15	---	75	15	260	---	7.6	1527
43	36	72	---	---	---	50	---	220	---	8.0	1528
20	18	---	---	---	---	50	---	260	---	7.6	1529
25	---	12	---	---	---	200	---	260	---	6.9	1530
24	---	72	---	---	---	100	---	240	---	6.8	1531
13	13	60	---	---	---	15	---	170	---	7.6	1532
26	22	96	---	10	---	55	---	120	---	7.6	1533
16	---	---	---	---	---	50	---	300	---	7.6	1534
20	---	120	15	---	---	160	---	230	---	7.5	1535
209	---	8	---	---	---	---	---	---	---	---	1536
17	17	60	---	---	---	100	---	---	---	---	1537
62	19	8	35	---	---	.1	---	---	---	---	1539
80	80	---	---	---	---	---	---	200	---	7.0	1540
45	30	8	26	12	6/74	12	---	---	---	---	1541
85	44	8	42;50	F	7/75	15	.2	---	---	---	1542
56	56	8	50	11	7/75	6	.1	120	320	---	1544
33	33	8	3;14;25	4	7/72	50	---	---	---	---	1545
60	27	8	14;20	7	7/73	8	---	---	---	---	1546
54	21	6	28;51	14	8/63	10	.2	---	---	---	1547
80	51	8	---	40	4/56	3	---	---	---	---	1548
82	34	8	21;64;72	15	9/77	7	.1	---	---	---	1549
46	46	8	42	---	---	---	---	---	---	---	1550
55	48	8	44	27	5/76	10	.4	---	---	---	1551
82	82	8	77	69	10/71	18	---	---	---	---	1552
105	97	8	98	65	6/77	1	.02	---	---	---	1553
70	64	8	5;68	54	6/77	.2	---	---	---	---	1554
34	30	8	21	F	6/77	45	2.2	---	---	---	1555
80	16	8	42	---	---	.6	---	---	---	---	1556
65	30	8	---	7	3/54	10	---	---	---	---	1557
80	52	8	46	18	6/77	1	---	---	---	---	1558
82	73	8	67;73	---	---	5	---	---	---	---	1559
47	30	8	26;30;32	12	6/72	15	.8	---	---	---	1560
75	60	8	58;61	55	7/76	15	3	210	635	---	1561
35	9	---	---	---	---	---	---	---	---	---	1562
45	32	8	26;40	12	12/66	20	1.5	---	---	---	1563
60	24	8	14;48	---	6/75	50	---	100	395	---	1564
49	32	8	13;25	10	7/74	2	.09	---	---	---	1565
70	20	8	22	---	---	.2	---	---	---	---	1566
30	30	8	26	10	9/72	15	3	150	440	---	1567
111	111	8	---	32	3/57	3	---	---	---	---	1568
60	31	8	15;25;40	13	10/76	10	---	120	310	---	1569
75	17	8	17;40;68	38	7/72	3	---	---	---	---	1570
40	32	8	29;36	7	7/67	20	.6	---	---	---	1571
134	85	8	110;125	25	7/76	4	.04	---	---	---	1572
43	43	5	33;43	3	7/70	10	.3	---	---	---	1573
107	29	8	51;83;96	12	8/66	30	---	140	360	---	1574
24	24	30	6;20	6	10/73	52	3.7	190	480	---	1575
74	61	8	23;61	22	6/72	.5	---	---	---	---	1576
79	79	5	---	54	---	20	3.3	---	---	---	1577
140	90	7	---	---	---	---	---	---	---	---	1578
53	53	8	46	36	6/68	40	40	140	430	---	1579
46	46	8	20;36	9	9/71	40	---	---	---	---	1580

Table 12.

Well location		Owner	Driller	Year completed	Use	Altitude of land surface (feet)	Topographic setting	Aquifer/ lithology
Number	Lat-Long							
Er-1581	4201-8015	Parker White Metal	Moody Drilling Co., Inc.	---	N	785	F	Qb/gr
1582	4203-7957	William Marie	George H. Ackerman	1975	H	1,320	S	Dch/fsh
1583	4202-7956	Richard Kircher	do.	1967	H	1,335	S	Qo/gr
1584	4206-7958	Pennsylvania Department of Transportation	Robert Anderson	1974	P	1,170	S	Dch/sh
1585	4203-7959	David Young	do.	1975	H	1,415	S	Dv/fsh
1586	4202-7956	Wayne Price	George H. Ackerman	1975	H	1,385	H	Qo/sdgr
1587	4200-7956	Lawrence Yaple	Donald L. Hermann	1972	H	1,405	S	Dch/fsh
1588	4203-7957	John Noonan	Ralph Wayne Grant	1974	H	1,330	S	Qo/sdgr
1589	4207-7957	Humble Oil Co.	Alfred L. Burch	1971	C	1,150	F	Dch/fsh
1590	4202-7956	Robert Smith	Donald L. Hermann	1975	H	1,325	S	Qo/sdgr
1591	4151-7959	Mystic Inc.	Robert Rindfuss	1974	N	1,158	V	Qo/gr
1592	4152-7958	Floyd King	Alfred L. Burch	1964	H	1,250	S	Dv/fsh
1593	4151-7954	Stanley Allen	do.	1970	H	1,594	U	MDcr/fsh
1594	4151-7956	Max Brown	Max E. Hickernell	1968	H	1,560	H	MDcr/fsh
1595	4213-7950	Max Reid	Moody Drilling Co., Inc.	1957	H	793	F	Qo/sd
1596	4209-7948	George Pilch	Ralph C. Parmenter	1974	H	1,380	S	Qo/u
1597	4215-7947	Ruth Mattson	Alfred L. Burch	1972	H	605	S	Qt/t
1598	4211-7949	Lake View Motel	McCray Bros.	1974	U	1,040	S	Dg/fsh
1599	4214-7946	Exxon Corp.	Max E. Hickernell	1970	C	810	F	Qt/t
1600	4210-7948	North East Borough	Robert Rindfuss	1975	P	1,306	U	Dch/fsh
1601	4156-7949	Vic Dasconio	Robert Anderson	1976	H	1,530	S	Dv/fsh
1602	4153-7951	Gary Potts	Robert Rindfuss	1975	H	1,332	U	Qo/gr
1603	4158-7947	Stanley Phillips	Harold F. Anderson	1975	H	1,538	S	Dv/fsh
1604	4152-7951	Victor Powell	do.	1975	H	1,425	S	Dv/fsh
1605	4153-7951	Robert Miller	Max E. Hickernell	1972	H	1,350	S	Dv/fsh
1606	4153-7951	Dan Tarbell	do.	1974	H	1,300	U	Qt/gr
1607	4154-7949	Joseph Tomcho	do.	1974	N	1,370	S	Qo/gr
1608	4157-7946	Norman Troyer	do.	---	H	1,500	V	Dv/fst
1609	4154-7947	Rexford Morris	Alfred L. Burch	1966	H	1,460	H	Qt/gr
1610	4155-7946	Bargain Road Trailer Sales	do.	1970	H	1,604	H	MDcr/fsh
1611	4202-7949	J. Whitehill	Lorenze Lee Hall	1976	H	1,330	V	Qo/gr
1612	4205-7951	Gene Penberthy	Ralph C. Parmenter	1975	H	1,440	S	Dch/fsh
1613	4200-7952	Paul Vogel	Harold F. Anderson	1974	H	1,525	S	Dv/fsh
1614	4200-7952	Lawrence Vogel	do.	1974	H	1,490	S	Dv/fsh
1616	4202-7949	John Wroblewski	Ralph C. Parmenter	1977	H	1,325	V	Qt/u
1617	4152-7958	Betty Wallace	Robert Rindfuss	1972	H	1,220	V	Qo/gr
1618	4152-7958	Thomas McLaughlin	Lorenze Lee Hall	1974	H	1,210	V	Qt/clgr
1619	4159-7953	Francis O'Sullivan	Alfred L. Burch	1964	H	1,315	V	Dch/fsh
1620	4153-7955	Henry Rupert	do.	1971	H	1,288	S	Dv/fsh
1621	4153-7959	Lovewells Country Market	do.	1968	H	1,172	V	Qo/gr
1622	4153-7959	Thomas Lovewell	do.	1968	H	1,198	V	Qo/gr
1623	4155-7954	Atlas Construction Co.	do.	1972	H	1,405	S	Dv/fsh
1624	4157-7959	Happy Homes Trailer Park	do.	1972	H	1,230	S	Qo/gr
1625	4154-7959	William Anysz	Robert Rindfuss	1974	H	1,285	S	Dv/fsh
1626	4155-7957	Troyer Farms	Donald L. Hermann	1975	I	1,252	H	Dch/fsh
1627	4153-7953	Nolan Webb	Max E. Hickernell	1969	H	1,302	S	Dv/fss
1628	4153-7958	O. J. Stull	Harold F. Anderson	1973	H	1,190	V	Qo/sdgr
1629	4156-7957	G. A. Rieder	Donald L. Hermann	1972	H	1,220	V	Dch/fsh
1630	4158-7954	R. E. Petty	Robert Rindfuss	1974	H	1,534	U	Qt/c
1631	4201-8009	Erie Skeet Club	Moody Drilling Co., Inc.	1956	H	992	F	Qt/sdgr
1632	4203-8014	Robert Seth	do.	1957	H	700	F	Qb/sdgr
1633	4203-8007	D. Rogala	Robert Anderson	1977	H	922	U	Qt/sdgr
1634	4204-8013	Fred Ralph	Vernon Reed	1947	Z	610	V	Qb/gr
1635	4204-8013	do.	Alfred L. Burch	1970	Z	625	V	Qb/sdgr
1637	4157-8024	R. R. Robison	---	---	H	740	F	Qb/gr
1638	4205-8008	W. Blakesley	Vernon Reed	1946	H	715	F	Dne/sh
1639	4205-8008	Willard Johnson	---	1950	H	715	F	Qb/sd
1640	4203-8012	Edward Lunenberger	Bernard P. Kuntz	1946	H	782	F	Qb/gr
1641	4203-8008	James Di Cara	do.	1949	H	857	U	Qo/gr
1642	4158-8018	John Bair	Vernon Reed	1950	H	862	F	Qt/gr
1643	4157-8023	Richard Godfrey	John E. Gage, Jr.	1974	H	820	U	Qo/gr
1644	4159-8028	Erie County Parks Commission	Alfred L. Burch	1967	Z	590	V	Qb/sdgr
1645	4159-8028	do.	do.	1967	U	620	U	Qt/clgr
1646	4159-8028	do.	do.	1966	U	625	T	Dne/sh
1647	4152-8018	Edwin Horrigan	do.	1972	H	1,149	S	MDbv/fsh
1648	4155-7943	John Frontera	do.	1964	H	1,404	V	Qo/gr
1649	4156-7942	Martin Dewitt	do.	1969	H	1,570	S	Dv/fsh
1650	4152-7941	Dale Bunnell	do.	1966	H	1,720	S	MDcr/fsh
1651	4154-8024	B. H. Anderson	B. W. Bateman and Son	1969	H	895	U	Qt/t
1652	4156-8024	William Dunegan	do.	1969	H	825	U	Qo/gr
1653	4203-8012	Standard Oil Co.	Vernon Reed	1951	C	795	T	Qb/gr
1654	4204-8008	William Rounds	do.	1950	H	910	U	Qo/gr
1655	4203-8009	Walter Schreiber	Bernard P. Kuntz	1950	H	890	U	Qo/gr

(Continued)

Total depth below land surface (feet)	Casing: Depth (feet)	Casing: Diameter (inches)	Depth(s) to water-bearing zone(s) (feet)	Static water level: Depth below land surface (feet)	Static water level: Date measured (mo/yr)	Reported yield (gal/min)	Specific capacity [(gal/min)/ft]	Hardness (mg/L as $CaCO_3$)	Specific conductance (μmho/cm at 25°C)	pH (units)	Well number
49	41	12	37	31	---	300	38	---	---	---	Er-1581
65	38	8	34;62	10	5/75	20	---	---	---	---	1582
55	55	8	50	12	6/67	15	---	240	560	---	1583
65	12	8	12;17	7	8/74	5	.09	---	---	---	1584
50	20	8	20;30	10	5/75	2	.06	---	---	---	1585
98	95	8	92	68	4/75	6	---	---	---	---	1586
90	80	8	76;82	72	8/72	4	.2	100	325	---	1587
80	80	8	---	---	---	---	---	---	---	---	1588
60	20	8	12;14	4	9/71	18	---	---	---	---	1589
85	85	8	80;85	38	7/75	20	2.5	---	---	---	1590
96	96	8	91	55	12/74	5	.1	---	---	---	1591
60	28	6	40	12	8/64	5	---	---	---	---	1592
75	31	8	17;22;25	10	11/70	12	.2	---	---	---	1593
83	31	8	58;72	20	10/68	15	---	---	---	---	1594
17	17	24	---	---	---	2	---	---	---	---	1595
24	24	5	1	F	6/74	4	4	---	---	---	1596
60	31	8	23;53	36	8/72	20	---	---	---	---	1597
60	16	12	24;36	---	8/74	2	.05	---	---	---	1598
78	31	8	32	15	11/70	8	---	570	1,400	---	1599
52	33	8	40	10	4/75	12	.4	---	---	---	1600
91	24	8	26;78	41	8/76	4	.09	---	---	---	1601
33	33	8	22	6	10/75	12	.6	---	---	---	1602
55	23	8	23;50	---	---	27	---	---	---	---	1603
110	17	8	---	---	---	24	---	---	---	---	1604
90	19	6	---	11	1972	10	---	140	360	---	1605
48	48	6	44	15	10/74	20	1.3	---	---	---	1606
50	50	8	36	1	1/74	10	---	---	---	---	1607
53	28	6	34;50	6	---	20	---	---	---	---	1608
123	102	6	70;123	52	6/66	3	.04	80	240	---	1609
125	70	8	74;115	30	9/70	6	.06	---	---	---	1610
100	95	8	57;90	15	6/76	50	1.1	---	---	---	1611
60	25	6	---	10	8/75	3	.08	110	280	---	1612
70	36	8	36;60;65	---	---	8	---	---	---	---	1613
75	22	8	2;60;65;70	---	---	8	---	120	950	---	1614
50	50	6	---	10	4/77	4	.1	180	470	---	1616
52	52	8	52	39	7/72	12	12	---	---	---	1617
79	45	8	47;72	38	9/74	5	.1	110	400	---	1618
62	30	6	50	20	8/64	20	---	110	400	8.1	1619
67	17	8	16;40;50	28	5/71	4	---	---	---	---	1620
98	96	6	21	9	---	20	1.2	---	---	---	1621
55	55	8	40;51;55	27	8/68	30	2.3	140	360	---	1622
100	15	8	15;20;70	6	10/72	7	.07	---	---	---	1623
49	47	8	2;27;30;42	13	6/72	10	.3	---	---	---	1624
60	45	8	50	26	1/74	5	.14	---	---	---	1625
100	80	8	79	42	8/75	2	---	240	560	8.0	1626
120	50	6	87	45	6/69	1	---	---	---	---	1627
50	33	8	30;44;50	---	---	6	---	---	---	---	1628
55	28	8	27	14	6/72	3	.08	---	---	---	1629
70	35	8	35;57	15	5/74	7	.1	150	380	---	1630
44	44	8	---	20	8/56	20	---	---	---	---	1631
44	44	6	---	7	7/57	3	---	---	---	---	1632
86	58	8	56	28	11/77	2	.04	---	---	---	1633
31	31	---	---	---	---	---	---	280	547	6.9	1634
40	14	8	11	4	10/70	1	.03	---	---	---	1635
18	18	---	---	---	---	---	---	110	324	7.0	1637
90	---	---	---	---	---	---	---	88	903	8.0	1638
20	20	---	---	---	---	---	---	270	525	7.7	1639
35	35	---	---	---	---	---	---	200	488	7.7	1640
54	54	---	---	---	---	---	---	210	369	7.7	1641
60	60	---	---	---	---	---	---	120	440	7.7	1642
112	112	8	63;112	80	9/74	9	.6	170	420	---	1643
25	---	---	9	6	1/67	2	.1	320	800	---	1644
58	58	8	45	---	---	.1	---	---	---	---	1645
50	---	---	---	20	12/66	.1	---	---	---	---	1646
70	35	8	17;24;38	10	4/72	5	.08	170	510	---	1647
138	136	6	11;36;90;130	F	6/64	360	---	---	---	---	1648
110	25	8	26;40;92	27	7/69	20	.4	120	350	---	1649
35	15	8	20;30	20	8/66	20	1.3	85	230	---	1650
50	45	6	46	20	5/69	6	.3	200	1,700	---	1651
48	48	---	20	3	7/69	6	.6	110	280	---	1652
32	32	---	---	---	---	---	---	240	482	7.4	1653
100	100	---	---	---	---	---	---	210	407	7.8	1654
108	108	---	---	---	---	---	---	260	522	7.5	1655

Table 12.

Well location		Owner	Driller	Year completed	Use	Altitude of land surface (feet)	Topographic setting	Aquifer/ lithology
Number	Lat-Long							
Er-1656	4211-7950	W. M. Luke	Ralph C. Parmenter	1920	H	1,008	S	Dg/sh
1658	4156-8028	Hugh Seeley	---	1941	H	712	F	Qb/u
1659	4157-8024	George Jones	---	---	H	750	T	Qb/gr
1660	4159-8029	S. Wilcox	---	---	H	620	F	Qb/gr
1661	4156-7938	Corry Water Supply Co.	Moody Drilling Co., Inc.	1974	P	1,420	V	Qo/sdgr
1662	4152-8008	Edinboro Waste Plant	Robert Rindfuss	1976	C	1,250	S	Dv/fsh
1663	4203-7954	Wattsburg Joint Area High School	Alfred L. Burch	1971	T	1,345	U	Qo/sdgr
1664	4201-7958	Richard Ziegler	Michael W. Burch	1976	H	1,235	V	Qo/sdgr
1665	4205-7952	Gregory Spinks	do.	1975	H	1,504	S	Dv/fsh
1666	4204-7953	Robert Austin	do.	1976	H	1,354	S	Dch/fsh
1667	4203-7958	Raymond Jonczak	do.	1977	H	1,309	V	Qo/sdgr
1668	4201-7952	Paris Bros.	do.	1977	H	1,578	H	Qt/gr
1669	4203-7959	Dennis Heberlein	do.	1977	H	1,372	H	Dv/ssh
1670	4203-7955	Atlas Homes	Alfred L. Burch	1976	H	1,305	V	Qo/sdgr
1671	4202-7955	John Shick	do.	1967	H	1,328	U	Qo/sd
1672	4202-7959	Dale Zimmerly	do.	1972	H	1,360	S	Dch/fsh
1673	4203-7956	Wattsburg Joint Area High School	do.	1969	Z	1,335	S	Qo/gr
1674	4203-7956	do.	do.	1969	U	1,335	S	Qo/sdgr
1675	4203-7956	do.	do.	1969	Z	1,345	S	Qt/gr
1676	4203-7956	do.	do.	1969	Z	1,348	S	Qt/clgr
1677	4200-8013	Lakelands Racing Association	Max E. Hickernell	1973	C	920	F	Qo/gr
1678	4209-7946	Edith Munger	Adgate Marshall	1915	H	1,470	S	Dch/sed
1679	4155-7940	Pennsylvania Fish Commission	Moody Drilling Co., Inc.	1961	R	1,390	V	Qo/gr
1680	4155-7940	do.	do.	1968	Z	1,420	V	Qo/gr
1681	4155-7940	do.	do.	1961	Z	1,388	V	Qo/gr
1682	4155-7940	do.	do.	1967	Z	1,392	V	Qo/gr
1683	4158-8030	U.S. Steel Corp.	Lininger Drilling and Pumps	1977	Z	621	F	Dg/sh
1684	4158-8030	do.	do.	1977	Z	640	F	Dne/sh
1685	4157-8030	do.	do.	1977	Z	640	F	Dg/sh
1686	4156-8031	do.	do.	1977	Z	680	F	Qt/t
1687	4158-8028	do.	do.	1977	Z	653	F	Qt/t
1688	4158-8030	do.	---	---	H	622	F	Qt/t
1689	4158-8028	do.	---	---	H	658	F	Qt/t
1690	4156-8031	Frank Talarico	Max E. Hickernell	---	H	680	F	Qb/sd
1691	4156-8012	Perry Mills	---	---	H	1,245	U	Qt/t
1692	4214-7948	Frank Mehler	Robert Anderson	1975	H	673	S	Dne/sh
1693	4208-7947	Russell Arrigo	Boyd Lee Hall	1977	H	1,425	S	Qo/sdgr
1694	4207-7947	William Penn	Ralph C. Parmenter	1976	H	1,442	H	Qt/sd
1695	4202-8004	New's Volvo	Donald L. Hermann	1971	C	1,280	U	Dch/fsh
1696	4204-7946	D. Bull	Michael W. Burch	1979	H	1,682	H	Qt/clgr
1697	4152-8026	J. R. Smith	John E. Gage, Jr.	1970	H	943	U	Qt/gr
1698	4207-7958	Richard Horton	Alfred L. Burch	1973	H	940	S	Qo/gr
1699	4200-8018	Imperial Mobile Home Park	Moody Drilling Co., Inc.	1972	P	780	F	Qb/sdgr
1700	4158-8027	Pennzoil Service Station	---	---	C	680	T	Qb/u
1701	4159-8028	Erie County Parks	---	---	H	615	S	Qt/t
1702	4159-8025	Ford Bailey	---	---	H	664	F	Qt/clgr
1703	4202-8018	Jack Northrup	---	---	H	684	F	Qb/u
1704	4201-8021	Samuel Repoff	---	---	H	693	F	Qb/u
1705	4154-8017	T. Rader	---	---	H	1,110	F	Qt/t
1706	4203-8014	Munch Fisheries	---	---	H	688	T	Qb/sdgr
1707	4204-7946	Timothy Shumac	Ralph C. Parmenter	1976	H	1,755	H	Dv/sh
1708	4155-8007	Erie County Schools	Moody Drilling Co., Inc.	1957	I	1,250	V	Qo/gr
1709	4200-7951	Walter Meyers	Lorenze Lee Hall	1974	H	1,520	S	Qt/clgr
1710	4200-7949	Floyd Parsons	McCray Bros.	1975	H	1,376	S	Dch/sh
1711	4205-8001	Carl Pepper	Ralph Wayne Grant	1975	H	1,108	S	Qo/sdgr
1712	4154-8023	Carlyle Krieg	Moody Drilling Co., Inc.	---	H	912	U	Qt/clgr
1713	4153-8024	Rudler's Auto Service	---	1952	C	855	F	Qt/t
1714	4151-7942	Allison Bell	---	---	H	1,555	S	MDcr/ss
1715	4151-7938	Robert Kraft	---	1977	H	1,677	S	MDcr/fsh
1716	4153-7937	G. E. Haenel	McCray Bros.	1974	H	1,800	S	Qt/sd
1717	4155-7942	Carroll Colonial Estates	---	---	H	1,405	V	Qt/u
1718	4152-7950	Walter Downer	Max E. Hickernell	1971	H	1,542	S	MDcr/fsh
1719	4212-7946	Edward Calvin	Alfred L. Burch	1968	H	1,108	S	Dg/sh
1720	4209-7958	Curt Hoover	---	---	Z	700	F	Dne/sh
1721	4210-7956	Rainbow Motel	---	---	C	730	F	Qb/sdgr
1722	4154-7942	A. C. Gates	---	---	H	1,382	V	Qo/sdgr
1723	4159-7950	Ralph Bacon	Alfred L. Burch	1974	H	1,284	L	Qo/u

(Continued)

Total depth below land surface (feet)	Casing Depth (feet)	Casing Diameter (inches)	Depth(s) to water-bearing zone(s) (feet)	Static water level Depth below land surface (feet)	Static water level Date measured (mo/yr)	Reported yield (gal/min)	Specific capacity [(gal/min)/ft]	Hardness (mg/L as $CaCO_3$)	Specific conductance (µmho/cm at 25°C)	pH (units)	Well number
80	---	---	---	---	---	---	---	140	443	7.7	Er-1656
25	25	---	---	---	---	---	---	98	293	6.7	1658
22	22	---	---	---	---	---	---	160	355	6.8	1659
20	20	---	---	---	---	---	---	610	1,350	7.4	1660
71	59	12	---	16	8/74	400	12	160	---	7.0	1661
60	35	8	35;54	57	1976	5	---	---	---	---	1662
57	53	8	46	23	6/71	40	4.4	---	---	---	1663
41	41	8	17;36	9	9/76	17	.8	---	---	---	1664
45	27	8	16;28	4	5/75	2	.05	---	---	---	1665
75	32	8	26;50	6	9/76	22	.4	130	320	---	1666
30	29	8	12	8	9/77	10	.5	---	---	---	1667
55	52	8	47	25	6/77	30	6	---	---	---	1668
50	43	8	31;41	F	5/77	28	.9	---	---	---	1669
64	64	6	59	F	8/66	15	---	---	---	---	1670
159	159	8	20;35;141	40	3/67	5	.04	---	---	---	1671
50	24	8	16;40	6	5/72	20	.4	---	---	---	1672
70	53	8	21;49	17	2/69	8	---	---	---	---	1673
72	72	8	20;62	F	5/69	10	---	---	---	---	1674
103	53	8	36;84	15	4/69	5	---	---	---	---	1675
50	---	---	11;27	4	2/69	1	---	---	---	---	1676
52	45	12	40	29	5/73	60	10	---	---	---	1677
98	---	---	---	---	---	---	---	160	324	7.7	1678
82	78	8	48;55;73	+4	4/61	100	---	---	---	---	1679
405	---	8	---	12	2/68	---	12	---	---	---	1680
337	260	6	42;204;241	---	---	---	---	---	---	---	1681
140	40	10	10;30	0	12/67	290	26	---	---	---	1682
63	60	2	60	43	4/77	---	---	600	5,110	6.3	1683
185	50	6	---	73	5/77	---	---	2,500	25,800	6.0	1684
150	43	6	---	21	4/77	2	---	550	9,870	7.1	1685
60	55	2	55	5	4/77	---	---	200	2,090	6.6	1686
55	50	2	48	8	5/77	---	---	120	2,110	6.7	1687
26	26	48	---	5	---	---	---	120	941	6.7	1688
28	28	48	---	24	---	---	---	98	613	6.7	1689
25	25	8	15	10	---	---	---	---	---	---	1690
25	25	36	---	---	---	---	---	---	---	8.1	1691
47	24	8	---	20	---	.1	---	---	---	---	1692
36	36	8	---	15	---	10	---	100	260	---	1693
220	220	6	---	20	7/76	5	.1	110	300	---	1694
80	15	8	---	F	---	5	---	118	---	7.9	1695
52	52	8	---	35	7/79	20	---	180	380	---	1696
41	41	6	38	10	9/70	3	.12	---	---	---	1697
50	40	8	31	F	9/73	15	---	---	---	---	1698
51	41	8	30	30	---	490	22	200	---	7.7	1699
22	22	36	---	---	---	---	---	92	---	7.3	1700
26	26	48	---	---	---	---	---	400	---	7.0	1701
27	27	36	---	---	---	---	---	260	---	7.7	1702
25	25	48	---	---	---	---	---	110	---	7.5	1703
22	22	36	---	---	---	---	---	150	---	7.3	1704
25	25	6	---	---	---	---	---	---	---	8.2	1705
26	26	36	---	---	---	---	---	160	---	7.7	1706
80	60	6	75	20	6/76	4	.08	---	---	---	1707
30	30	8	---	5	11/57	155	13	125	320	7.5	1708
120	120	8	112	40	9/74	17	.7	---	---	---	1709
160	40	6	84;96;130	40	2/75	---	---	---	---	---	1710
120	109	8	---	---	---	---	---	---	---	---	1711
140	140	6	---	---	---	.1	---	---	---	---	1712
51	---	5	---	---	---	---	---	---	---	8.5	1713
150	---	---	---	20	---	---	---	---	---	7.9	1714
122	105	6	106	30	10/77	30	10	---	---	---	1715
147	147	6	---	---	6/74	12	.5	---	---	---	1716
42	42	8	---	---	---	---	---	---	---	8.2	1717
114	---	6	85;97;108	---	---	20	---	---	---	---	1718
95	32	8	30;50;85	34	6/68	2	---	---	---	---	1719
29	29	36	---	---	---	---	---	150	---	7.4	1720
14	14	36	---	---	---	---	---	210	---	6.6	1721
79	79	6	---	---	---	---	---	120	320	---	1722
85	52	8	18;72	---	---	.1	---	---	---	---	1723

Ground-Water-Quality Data in Pennsylvania—
A Compilation of Computerized [Electronic] Databases, 1979-2004

By Dennis J. Low and Douglas C. Chichester

In cooperation with the Pennsylvania Department of Environmental Protection

Data Series 150

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

U.S. Department of the Interior
Gale A. Norton, Secretary

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Inch/Pound to SI

Multiply	By	To obtain
	Length	
inch (in.)	2.54	centimeter (cm)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
	Area	
square mile (mi^2)	2.590	square kilometer (km^2)
	Flow rate	
gallon per day (gal/d)	0.003785	cubic meter per day
	Radioactivity	
picocurie per liter (pCi/L)	0.037	becquerel per liter
	Temperature	
degree Fahrenheit (^oF)	$^oC=5/9\ (^oF-32)$	degree Celsius

Horizontal coordinate information is referenced to either the North American Datum (NAD 1927) or the North American Datum of 1983 (NAD 83).

Water-Quality Units

Concentrations of chemical constituents in water are given either in milligrams per liter (mg/L) or micrograms per liter (µg/L). Milligrams per liter is a unit expressing the concentration of chemical constituents in solution as mass (milligrams) of solute per unit volume (liter) of water. One-thousand micrograms per liter is equivalent to 1 milligram per liter. For concentrations less than 7,000 mg/L, the numerical value is the same as for concentrations in parts per million. Bacterial concentrations are reported in units of colonies per 100 milliliters (col/100 mL). Specific conductance is given in microsiemens per centimeter at 25 degrees Celsius (µS/cm at 25°C). Turbidity is reported in nephelometric turbidity units (NTU).

Radioactivity Units

A commonly used unit of measure for radioactivity is the picocurie. One Curie is the activity of one gram of radium-226, which is equal to 3.7×10^{10} atomic disintegrations per second; a picocurie is 10^{-12} Curies, which is about equal to 2.2 atomic disintegrations per minute. Activity refers to the decay of a radioactive substance, which is measured by the number of particles emitted by a radionuclide per unit of time. The rate of decay is proportional to the number of atoms of a radioactive substance present, and inversely proportional to its half life, which is the time necessary for the substance to lose half its radioactivity. Activity is defined as being equal to n x l, where n is the number of atoms of a radionuclide and l is the decay constant. The decay constant, l, is equal to the natural logarithm of 2 divided by the half-life of the radionuclide.

Ground-Water-Quality Data in Pennsylvania—A Compilation of Computerized [Electronic] Databases, 1979-2004

By Dennis J. Low and Douglas C. Chichester

Abstract

This study, by the U.S. Geological Survey (USGS) in cooperation with the Pennsylvania Department of Environmental Protection (PADEP), provides a compilation of ground-water-quality data for a 25-year period (January 1, 1979, through August 11, 2004) based on water samples from wells. The data are from eight source agencies—Borough of Carroll Valley, Chester County Health Department, Pennsylvania Department of Environmental Protection-Ambient and Fixed Station Network, Montgomery County Health Department, Pennsylvania Drinking Water Information System, Pennsylvania Department of Agriculture, Susquehanna River Basin Commission, and the U.S. Geological Survey. The ground-water-quality data from the different source agencies varied in type and number of analyses; however, the analyses are represented by 12 major analyte groups: biological (bacteria and viruses), fungicides, herbicides, insecticides, major ions, minor ions (including trace elements), nutrients (dominantly nitrate and nitrite as nitrogen), pesticides, radiochemicals (dominantly radon or radium), volatile organic compounds, wastewater compounds, and water characteristics (dominantly field pH, field specific conductance, and hardness).

A summary map shows the areal distribution of wells with ground-water-quality data statewide and by major watersheds and source agency. Maps of 35 watersheds within Pennsylvania are used to display the areal distribution of water-quality information. Additional maps emphasize the areal distribution with respect to 13 major geolithologic units in Pennsylvania and concentration ranges of nitrate (as nitrogen). Summary data tables by source agency provide information on the number of wells and samples collected for each of the 35 watersheds and analyte groups.

The number of wells sampled for ground-water-quality data varies considerably across Pennsylvania. Of the 8,012 wells sampled, the greatest concentration of wells are in the southeast (Berks, Bucks, Chester, Delaware, Lancaster, Montgomery, and Philadelphia Counties), in the vicinity of Pittsburgh, and in the northwest (Erie County). The number of wells sampled is relatively sparse in south-central (Adams, Cambria, Cumberland, and Franklin Counties), central (Centre, Indiana, and Snyder Counties), and north-central (Bradford, Potter, and Tioga Counties) Pennsylvania. Little to no data are available for approximately one-third of the state. Water characteristics and nutrients were the most frequently sampled major analyte groups; approximately 21,000 samples were collected for each group. Major and minor ions were the next most-frequently sampled major analyte groups; approximately 17,000 and 12,000 samples were collected, respectively. For the remaining eight major analyte groups, the number of samples collected ranged from a low of 307 samples (wastewater compounds) to a high of approximately 3,000 samples (biological).

The number of samples that exceeded a maximum contaminant level (MCL) or secondary maximum contaminant level (SMCL) by major analyte group also varied. Of the 2,988 samples in the biological analyte group, 53 percent had water that exceeded an MCL. Almost 2,500 samples were collected and analyzed for volatile organic compounds; 14 percent exceeded an MCL. Other major analyte groups that frequently exceeded MCLs or SMCLs included major ions (17,465 samples and a 33.9 percent exceedence), minor ions (11,905 samples and a 17.1 percent exceedence), and water characteristics (21,183 samples and a 20.3 percent exceedence). Samples collected and analyzed for fungicides, herbicides, insecticides, and pesticides (4,062 samples), radiochemicals (1,628 samples), wastewater-compounds (307 samples), and nutrients (20,822 samples) had the lowest exceedences of 0.3, 8.4, 0.0, and 8.8 percent, respectively.

Introduction

Ground-water-quality data have been collected in Pennsylvania for more than 100 years. Unfortunately, most data are confined to paper copies, and it is prohibitively expensive to compile the data. However, with the advent of computers and increased storage capacities, most recent (since about 1980) data now reside in electronic databases making access less expensive. By compiling the electronic data from local, state, and Federal agencies, it may be possible to identify areas where (1) data are sparse and further studies of ground-water quality may be needed, and (2) ground water contains analytes of concern at elevated concentrations.

In 2001, the Pennsylvania Department of Environmental Protection (PADEP) re-oriented its resource management and planning strategy to a watershed, as opposed to political boundary, approach. With this watershed-focused approach, PADEP established 35 watershed teams (fig. 1 and table 1) to address 17 indicators of environmental improvement at a watershed scale.

Pennsylvania is a physiographically and geologically diverse state. Over 200 different geologic formations or members are recognized by the Pennsylvania Topographic and Geologic Survey (PAGS). For this study, geologic formations were consolidated into 13 major aquifer categories based on dominant rock type or geolithologies (table 2). Even with this simplified categorization, however, geology extends beyond watershed and political boundaries (fig 2).

Purpose and Scope

This report provides geologic, hydrologic, and geographic information regarding electronically available ground-water-quality data in the Commonwealth of Pennsylvania on watershed and statewide scales from January 1, 1979, through August 11, 2004. This report presents ground-water-quality data from eight local, state, or Federal source agencies in a standard electronic format. The geographic distribution of the data also are presented in a standard electronic format, most commonly by watershed. Ancillary information, including local well numbers, and major geolithologic units are included by well for each source agency. More detailed information, specifically the aquifer sampled and the original scientific or data report in which the water-quality data were released, is provided for individual wells sampled as part of various U.S. Geological Survey (USGS) studies or investigations.

Nitrate nitrogen was identified as an analyte of interest to better evaluate the potential of an electronic database for visually displaying ground-water-quality data. Nitrate nitrogen was selected because (1) it is widespread in Pennsylvania, (2) it is commonly analyzed for, and (3) it has a maximum contaminant level (MCL). As a result, maps were generated summarizing nitrate nitrogen concentrations by watershed and geology.

Data-Compilation Methods

The compiled ground-water-quality data varies by (1) number of constituents, (2) frequency of sample collection, (3) source agency, and (4) geographic distribution. For example, the Borough of Carroll Valley collects water-quality data on bacteria and nutrients from selected wells within the Borough once every 10 years. The PADEP Ambient and Fixed Station Network (FSN) collects water-quality data (major ions, minor ions, trace elements, and nutrients) from across the state at individual wells. The frequency of this collection varies from one time only to multiple samples spread out over a period of years. Although the USGS collects ground-water-quality samples across the state, the geographic distribution may vary from several wells at a field research site to major river basins. A specific contaminant of concern such as arsenic may lead to a geographic distribution relating to land use or other factors. Geographic distribution of data collection also may be restricted to specific geologic formations and members.

Table 1. The 35 watersheds used by Pennsylvania Department of Environmental Protection to subdivide Pennsylvania for resource management.

Watershed number	Watershed name
1	Central Penn
2	Upper West Branch
3	Susquehannock/Genessee
4	Lower North Branch Susquehanna
5	Big Bend
6	Bradford/Tioga
7	Upper Susquehanna
8	Wyoming Valley
9	Lackawanna
10	Upper Delaware
11	Brodhead/Toby/Tunk
12	Upper Schuylkill/Middle Lehigh
13	Lower Lehigh
14	Delaware River/Tohickon Creek
15	Delaware Common Tributaries/Neshaminy
16	Middle Schuylkill
17	French/Manatawny
18	Perkiomen Creek
19	Wissahickon Creek/Schuylkill River
20	Darby/Chester/Ridley/Crum Creeks
21	Christina River/Elk/North East River/ Brandywine Creek/White Clay
22	Pennypack/Tacony
23	Lower Susquehanna East
24	Lower Susquehanna West
25	Potomac
26	Juniata
27	Kiski-Conemaugh
28	Youghiogheny
29	Monongahela
30	Ohio
31	Allegheny
32	Moraine
33	Middle Allegheny
34	Upper Allegheny
35	Lake Erie/French & Oil Creek

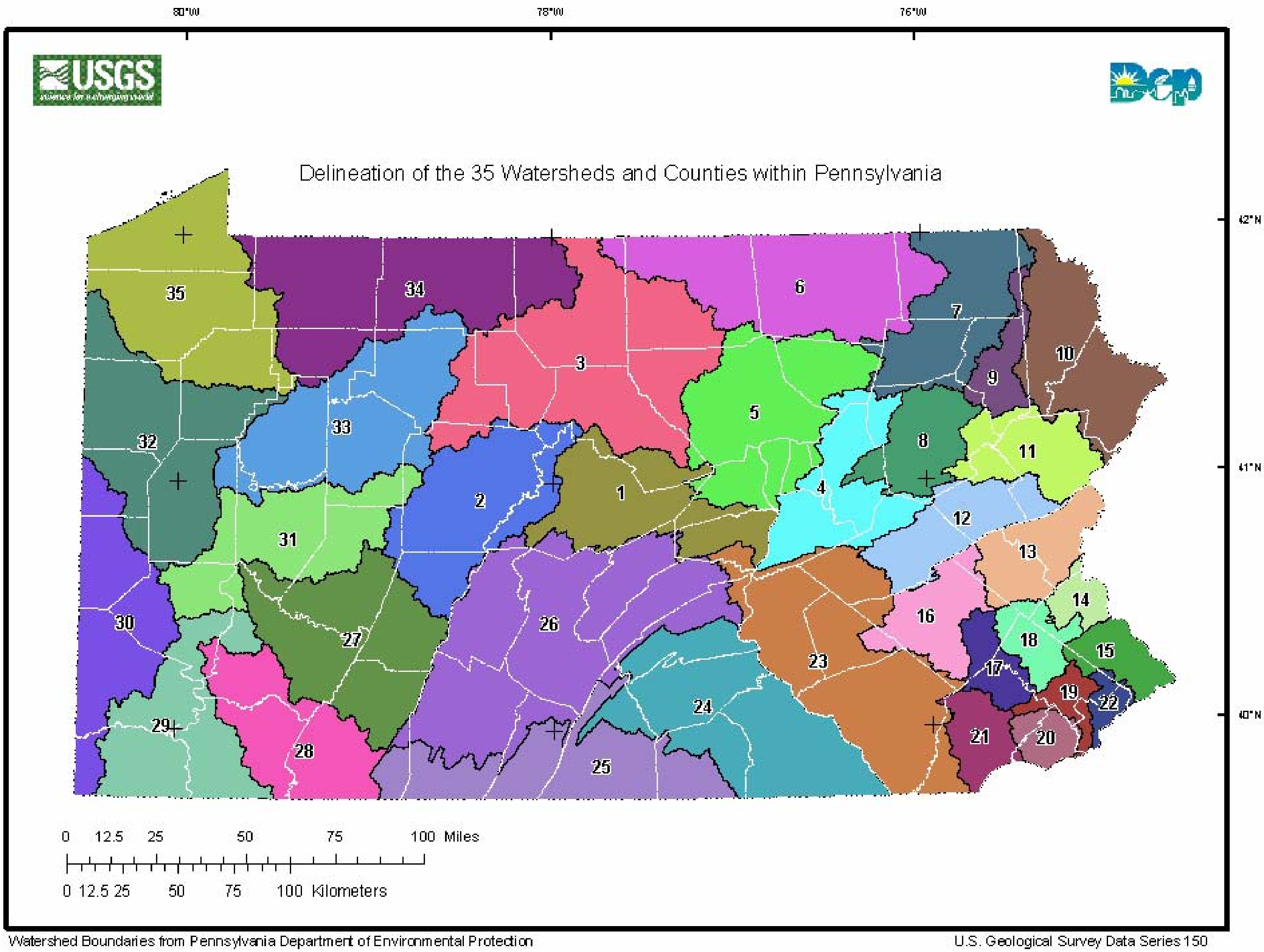

Figure 1. The 67 counties in Pennsylvania and boundaries of the 35 watersheds used by Pennsylvania Department of Environmental Protection to subdivide Pennsylvania for resource management (see table 1 for watershed names). (modified from Pennsylvania Department of Environmental Protection, 2005)

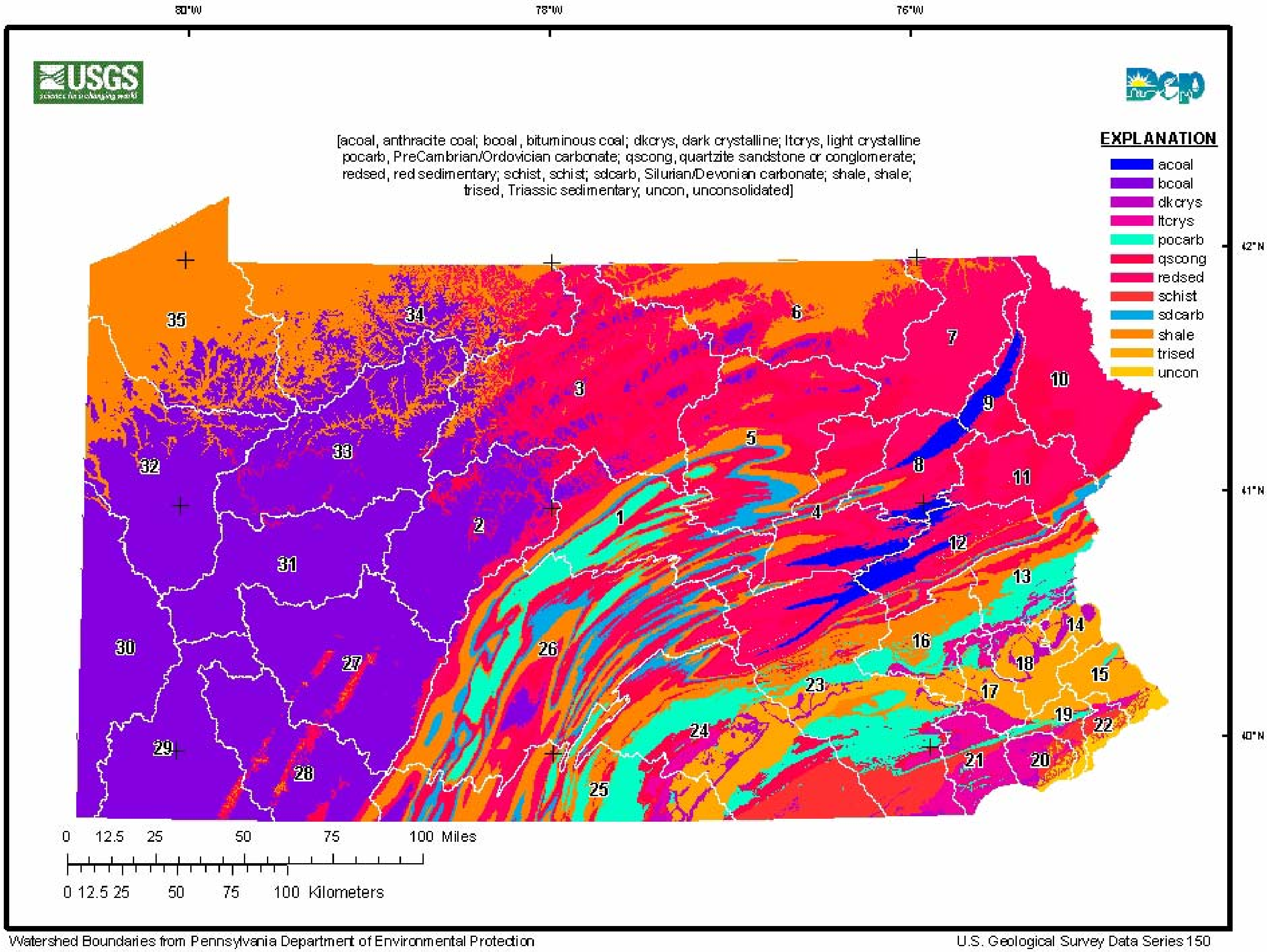

Figure 2. Dominant aquifer (excludes Glacial outwash or "ice") and boundaries of the 35 watersheds used by Pennsylvania Department of Environmental Protection to subdivide Pennsylvania for resource management.

Table 2. The 13 dominant aquifer and rock-type categories used for this data compilation with abbreviations.

Dominant aquifer	Geo-Abbreviation	Dominant rock type.
Anthracite coal	acoal	Anthracite coal bearing
Bituminous coal	bcoal	Bituminous coal bearing
Dark crystalline	dkcrys	Intrusive crystalline rocks that are dark in color (for example, diabase)
Light crystalline	ltcrys	Intrusive crystalline rocks that are light in color (for example, granite)
PreCambrian/Ordovician carbonates	pocarb	Precambrian- through Ordovician-age limestones and dolomites (with or without minor siliciclastics)
Quartzite, sandstone, or conglomerate	qscong	Quartz rich, dominantly sedimentary rocks (for example, Tuscarora Formation)
Red sedimentary	redsed	Rocks that are dominantly red in color, excludes Triassic age sediments (for example, Catskill Formation)
Schist	schist	A strongly foliated crystalline rock, formed by dynamic metamorphism, that have a dominant cleavage plane due to well developed parallelism of the minerals (for example, Marburg Schist)
Silurian/Devonian carbonates	sdcarb	Silurian- through Devonian-age limestones and dolomites (with or without minor siliciclastics)
Shale	shale	Dark, fine-grained, sedimentary rocks (for example, Hamilton Group)
Triassic sedimentary	trised	Sedimentary rocks that are Triassic in age (for example, Gettysburg Formation)
Unconsolidated	uncon	Gravels, sands, and clays along the Delaware River (for example, Trenton Gravel)
Glacial outwash	ice	Dominantly sand and gravel that were deposited by glaciers or associated fluvial action (for example, outwash)

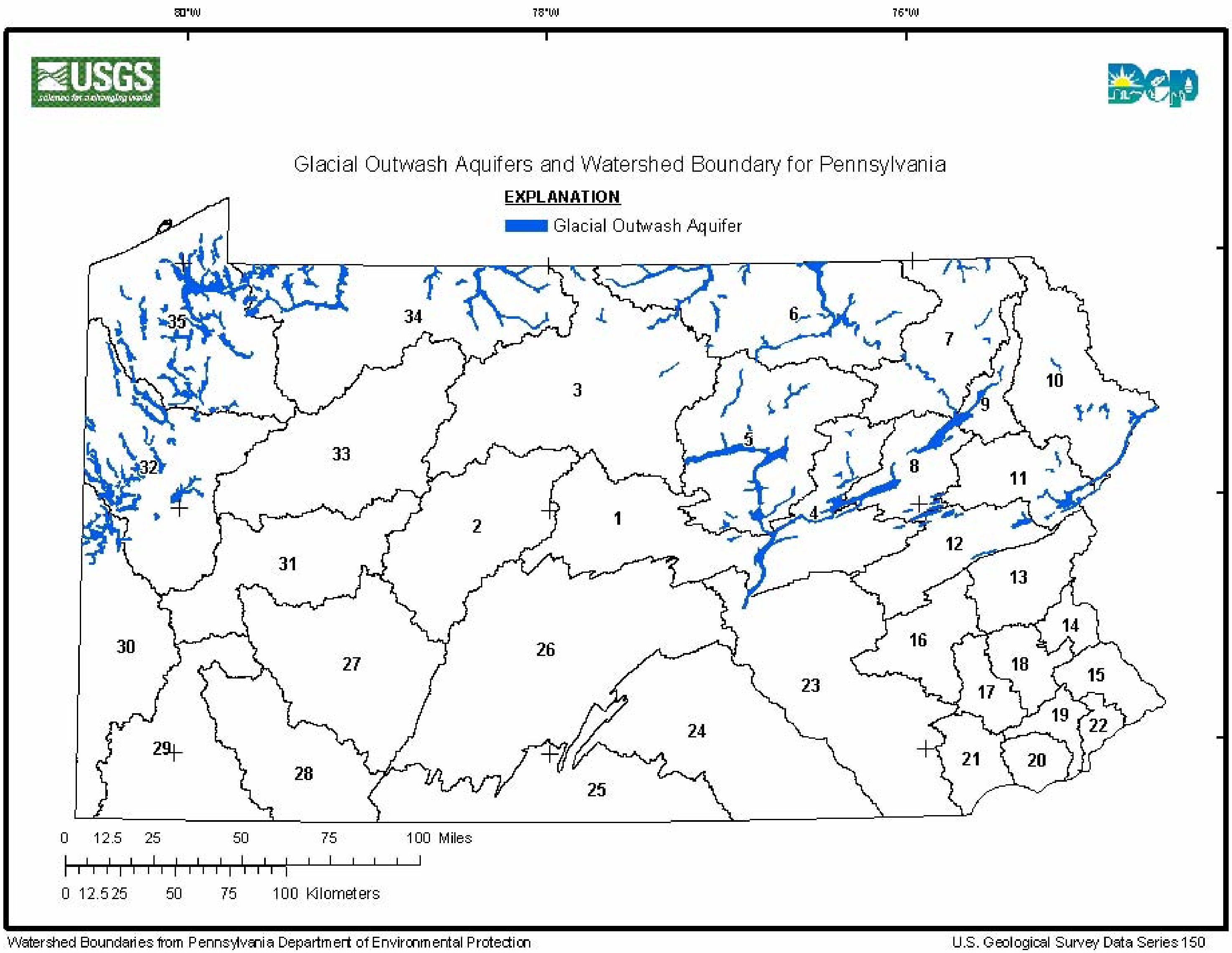

Figure 3. Glacial outwash or "ice" aquifers and boundaries of the 35 watersheds used by Pennsylvania Department of Environmental Protection to subdivide Pennsylvania for resource management. (modified from Sevon and Braun, 2000)

Data Sources

Despite the widespread use of computers and related software, electronic archival or storage of ground-water-quality data is limited when compared to what is available in hard or paper copy. Many local and county agencies as well as universities contacted for this study maintain paper copies as the final repository format for ground-water-quality data. As a result, the sources of the collected data in this study are dominated by state and Federal agencies. Information on the source of the ground-water-quality data collected for this study and reasons for data collection are presented in table 3.

About every 10 years, as part of their Act 537 Sewage Facilities Program (Carl Bower, Borough of Carroll Valley, oral commun., 2004), the Borough of Carroll Valley (CV) evaluates the effectiveness of the community's onlot septic systems. This is done by collecting water-quality samples from domestic wells for analysis of nitrate as nitrogen and bacteria (fecal and total coliform). Carroll Valley tries to obtain a representative sample from about 10 percent of the domestic wells.

Since 1984, the Chester County Health Department (CCDH) has required that recently drilled and completed domestic wells be sampled and tested for a fixed group of analytes. Although the number of analytes tested is extensive, only a small part of the data is stored electronically (water characteristics, major ions, and nutrients).

PADEP is charged with determining the ambient ground-water quality of water in Pennsylvania. PADEP addresses this effort through the FSN. The FSN consists of a large number of wells in selected basins generally in the eastern or western parts of Pennsylvania.

Since February 1, 1997, the Montgomery County Health Department (MCHD) has required that recently drilled and completed domestic wells be sampled and tested for a fixed group of analytes. These analytes include bacteria, water characteristics, major ions, minor ions, nutrients, trace elements, volatile organic compounds, and wastewater compounds.

PADEP also is responsible for assessments of ground-water quality for community and non-community water systems to determine whether ground water meets the primary drinking-water standards. One method utilized by PADEP to meet this directive is through the Pennsylvania Drinking Water Information System (PADWIS). Through PADWIS, raw (unfiltered) ground-water samples are collected from non-private wells and submitted to private water-quality labs for analysis. The resulting data are then reviewed and entered into PADWIS.

The Pennsylvania Department of Agriculture (PennAg) has long been interested in monitoring for pesticides in ground water. As a result, PennAg has sampled wells in agricultural areas to determine occurrence and distribution of pesticides in ground water; the most recent sampling was directed at an assessment of concentration trends.

The Susquehanna River Basin Commission (SRBC) issues permits for large supply wells (wells that yield more than 100,000 gallons per day). Water-quality data is a part of the data that SRBC collects.

The U.S. Geological Survey (USGS) has collected data through various water-resources and water-quality studies. Much of the water-quality data collected by the USGS was obtained from analysis of water samples from domestic wells.

Table 3. Data sources and reason(s) for data collection.

Data Sources	Source abbreviation	Reason for data collection
Borough of Carroll Valley	CV	Act 537 (sewage facilities program)
Chester County Health Department	CCDH	Permitting of domestic wells
Pennsylvania Department of Environmental Protection—Ambient and Fixed Station Network	FSN	Monitoring of ground-water quality by ground-water basin
Montgomery County Health Department	MCHD	Permitting of domestic wells
Pennsylvania Drinking Water Information System	PADWIS	Permitting of public and non-community wells (self-reporting system)
Pennsylvania Department of Agriculture	PennAg	Pesticides in ground water
Susquehanna River Basin Commission	SRBC	Permitting of public, industrial, and commercial water-supply wells
U.S. Geological Survey	USGS	Various water-resources and water-quality studies

Mandatory Latitude and Longitude in Data Files

Water-quality data collected from January 1, 1979, through August 11, 2004, were obtained from the source government agencies in a variety of electronic formats but were dominated by Microsoft Excel or .dbf4 type files (.dbf4 or dBase files are simple sequential files of fixed-length records. .dbf file formats commonly are understood by Windows spreadsheets and organizers.). Although the number of analytes varied by source agency and the objective(s) of historical studies, each data set was required to have (1) a site-specific identifier such as a local name or well number, (2) a geographic reference, and (3) an analyte of interest. The CV data set lacked latitudes and longitudes but contained street addresses and parcel numbers. The parcel and address information was combined with an available Geographic Information System (GIS) parcel coverage to assign latitudes and longitudes. The wells comprising the MCHD data set contained a mixture of latitudes, longitudes, and street addresses. The GIS parcel coverage from Montgomery County was not available; therefore, wells lacking latitudes or longitudes were removed from the data set.

Assigning a Geolithology to Wells

Utilizing previous work (Barker, 1984; Low and others, 2002), the geologic formations represented on PAGS Map 1 (Berg and others, 1980) were condensed into 13 geolithologic units (table 2), and a GIS coverage was developed. A second GIS coverage that contained attributes for the 35 watersheds was obtained from PADEP (fig. 1). On the basis of their geographic distribution, the wells in each data set were brought into the various GIS coverages and assigned a specific geolithologic unit and watershed.

Clean-up of Data Records and Bulk Processing

The data sets from MCHD and CCDH included a large segment of text embedded with quantified results. A substantial effort at hand editing was involved to separate the text from the quantified results. In many of these cases, qualitative results were converted into numeric remark codes such as “sample exceeded the MCL for lead,” or “an analyte was sampled for but not detected.”

To efficiently combine the water-quality data sets and the GIS data sets, a series of SAS Institute Inc. (SAS) programs were developed. The SAS programs not only merged the water-quality and GIS data sets by site identifier but also were written to identify which samples contained an analyte that exceeded a U.S. Environmental Protection Agency (USEPA) maximum contaminant level (MCL) or secondary maximum contaminant level (SMCL). Because of the size of some files generated by the SAS program, the data sets were exported as .dbf4 files and hand edited for possible errors prior to conversion to Microsoft Excel format where additional editing took place. Additional GIS coverages were then developed from the Microsoft Excel data files to show the distribution of wells by data source across the state and for individual major watershed.

Categories of Analytes

The source-agency data files are subdivided into 12 analyte groups described below. These analyte groups represent subfiles or folders. Some source agency files, such as the CV, consisted of two subfiles—bacteria and nutrients. Others, like the USGS, consisted of 11 subfiles. Because some source agencies such as the USGS collect a large amount of pesticide data, it was necessary to further divide this analyte group into fungicides, herbicides, and insecticides.

Analyte Group Abbreviations and Descriptions

- Micro—Bacteria, viruses, and other micro-organisms group. Total coliform and fecal coliform are the most common bacteria analyzed. Enteric and coliphage are the most common viruses analyzed. Clostridium and enterococci are some of the other micro-organisms analyzed.

  Source agency—CV: Total and fecal bacteria; 124 samples.
  Source agency—MCHD: Total, fecal, and *Escherichia coli* (*E. coli*) bacteria; 971 samples.
  Source agency—PADWIS: Total, fecal, and *E. coli* bacteria; 360 samples.
  Source agency—PennAg: Total and *E. coli* bacteria; 269 samples.
  Source agency—USGS: 11 methods or organisms including viruses; 1,264 samples.

- Field—Water characteristics group. pH and specific conductance are the most common analytes.

  Source agency—CCDH: Turbidity and pH; 833 samples.
  Source agency—FSN: lab pH, lab alkalinity, and total hardness; 10,590 samples.
  Source agency—MCHD: pH; 971 samples.
  Source agency—SRBC: 4 parameters or analytes; 681 samples.
  Source agency—USGS: 16 parameters or analytes; 8,132 samples

- Fungus—Fungicide group. Chlorothalonil and cis-1,3-Dichloropropane are the most common analytes.

  Source agency—USGS: 10 analytes (including filtered and unfiltered); 1,196 samples.

- Herb—Herbicide group. Atrazine, Alachlor, and Cyanazine are among the most common analytes.

  Source agency—USGS: 107 analytes (including filtered and unfiltered); 1,319 samples.

- Insec—Insecticide group. Carbaryl, Dieldrin, and Lindane are among the most common analytes.

  Source agency—USGS: 87 analytes (including filtered and unfiltered); 1,280 samples.

- Major—Major cations and anions group. Chloride, calcium, and iron are among the most common analytes.

  Source agency—FSN: 11 analytes; 10,591 samples.
  Source agency—MCHD: 4 analytes; 971 samples.
  Source agency—SRBC: 8 analytes; 724 samples.
  Source agency—USGS: 31 analytes (including filtered and unfiltered); 5,175 samples.

- Minors—Minor cations, anions, and trace elements group. Aluminum, arsenic, and lead are common analytes.

  Source agency—FSN: 8 analytes (trace elements); 7,675 samples.
  Source agency—MCHD: 4 analytes (trace elements); 75 samples.
  Source agency—PADWIS: 12 analytes; 36 samples.
  Source agency—SRBC: 6 analytes (trace elements); 706 samples.
  Source agency—USGS: 41 analytes (including filtered and unfiltered); 3,413 samples.

- Nuts—Nutrient group. Nitrate, nitrite, and total organic carbon are among the most common analytes.

  Source agency—CV: Nitrate; 124 samples.
  Source agency—CCDH: Nitrate; 849 samples.
  Source agency—FSN: 5 analytes; 10,594 samples.
  Source agency—MCHD: Nitrate; 971 samples.
  Source agency—PennAg: Nitrate, nitrite; 269 samples.
  Source agency—SRBC: Nitrate, orthophosphate, and total organic carbon; 707 samples.
  Source agency—USGS: 27 analytes (including filtered and unfiltered); 7,315 samples.

- Pest—Pesticide group. Atrazine, Cyanazine, and Simazine are among the most common analytes.

  Source agency—PADWIS: Carbofuran, and 2,4-D; 2 samples.
  Source agency—PennAg: 10 analytes; 273 samples.

- Radio—Radiochemicals (radionuclides) group. Radon-222 and uranium are the most common analytes.

  Source agency— PADWIS: 6 analytes; 19 samples.
  Source agency—USGS: 16 analytes (including filtered and unfiltered); 1,609 samples.

- Voa—Volatile organic compounds group. Benzene, toluene, styrene, and xylenes are among the most common analytes.

  Source agency—MCHD: 25 analytes; 971 samples.
  Source agency—PADWIS: 27 analytes; 183 samples.
  Source agency—USGS: 104 analytes (including filtered and unfiltered); 1,280 samples

- Waste—Wastewater and pharmaceuticals group. Methylene blue active substance and caffeine are among the most common analytes.

  Source agency—MCHD: Trihalomethanes; 5 samples.
  Source agency—USGS: 54 analytes (including filtered and unfiltered); 304 samples.

Formats, Naming Conventions, and Abbreviations Used in Data Files

The data format is Microsoft Excel 2003 (Excel); supporting documents are in Portable Document Format (PDF). Each folder is identified by the source agency. For example, the folder titled MCHD contains files compiled from the Montgomery County Health Department. Within each folder are a series of files. Each file is organized by analyte group. For example, the Excel file titled MCHD.Voa.xls contains the water-quality data for volatile organic compounds collected by the Montgomery County Health Department. Also included in this file are ancillary data such as local well number, site identifier (site ID), latitude, longitude, and geolithologic unit. Information regarding an exceedence of a USEPA MCL or SMCL is presented in an adjacent column and cell. Analyte results for MCHD and CCDH also contain numeric qualifiers. Data files from the USGS also contain analyte remark codes such as less than, estimated, and missing, as well as information on the study for which the samples were collected. The USGS data files also contain a seven or eight length alphanumeric code that details a specific geologic formation or unit.

MCHD.Comments.Micro.pdf is a PDF file that provides supporting information on the water-quality measurements (in this case about bacteria and viruses), including analytes, definitions, and USEPA contaminant levels on samples collected by or for the Montgomery County Health Department.

USGS.CrossReferenceNumbers is an Excel table that presents the abbreviated author and report citation for the scientific or data report in which the data were originally published. This allows the interested reader a means to locate the study and determine the purpose for which the data were collected. It is an aid in locating the complete citation listed in the Selected References, which also lists the abbreviated report citation in bold. USGS.MicroReport is an Excel file that lists the abbreviated citations for bacteria and virus studies and includes local well numbers, site IDs, latitudes, longitudes, watersheds, geolithologic units, and geologic formations.

Maps and Tables Summarizing the Ground Water-Quality Data

The maps generated for this study (accessed through hyperlinks in the Appendix) are PDF images. The 35 images titled Basin1_Wells through Basin35_Wells show the distribution of wells with available water-quality data by watershed and source agency. The 35 images titled Basin1_QWNO3 through Basin35_QWNO3 show the distribution of nitrate data (NO3) by watershed and source agency. The 12 images pre-fixed by “Statewide” show the distribution of wells with water-quality data by source agency.

Summary tables (accessed through hyperlinks in the Appendix) are included within each source-agency file. For example, SRBC.Summary.pdf (table 4) presents information on the number of (1) wells sampled by major river basin, (2) wells sampled by watershed, (3) samples collected by analyte group, and (4) samples that exceeded USEPA contaminant levels.

Statewide Summary Map

Figure 4 shows the distribution of the 8,012 wells from the eight source agencies. The greatest concentration of wells with water-quality data are in watersheds 17, 18, 21, and 23 of southeastern Pennsylvania (Chester, Lancaster, and Montgomery Counties). The part of watershed 35 that has been extensively sampled is Erie County. About half of the watersheds in Pennsylvania have fewer than 100 wells with water-quality data; watershed 9 contains no ground-water-quality data.

Summary Maps for 35 Watersheds

Figure 5 shows the distribution by county and watershed from the PDF image Basin35_Wells. Almost all 246 wells sampled for ground-water-quality data in watershed 35 were the result of USGS studies specifically related to Erie County. Similar images for all 35 watersheds can be viewed through the hyperlinks in the Appendix.

Summary Maps for Nitrate Nitrogen Concentrations in Ground Water for 35 Watersheds

Figure 6 shows the distribution of 461 wells by county in watershed 24 (from the PDF image Basin24_QWNO3). Of the 565 nutrient samples collected and analyzed, 31 samples (5.5 percent) exceeded the USEPA MCL of 10.0 mg/L for nitrate. Results were averaged for wells that were sampled more than once. About 50 percent of the wells visited and sampled are the result of USGS studies. Similar images for all 35 watersheds can be viewed through the hyperlinks in the Appendix.

Summary Tables by Source Agency

Table 4 is a summary of the ground-water-quality data collected by the SRBC and contained within the various Excel data spreadsheet files listed for the SRBC in the Appendix. Similar summary files for the other source agencies also are available through hyperlinks in the Appendix. Each summary table presents information on the number of wells sampled, the number of samples collected, the number of exceedences for USEPA MCL and SMCL analytes. The summary data are organized by PADEP watershed and major analyte group.

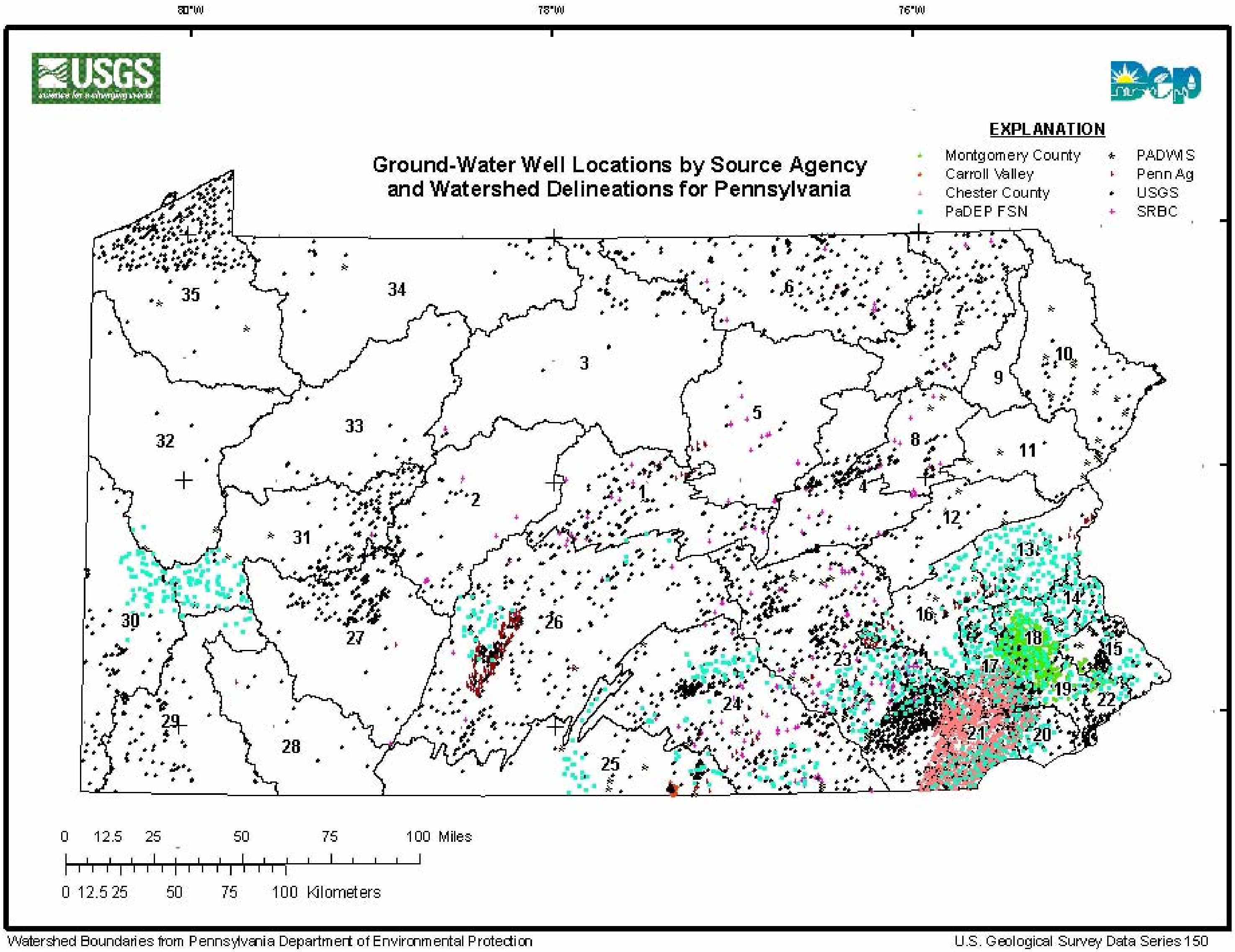

Figure 4. Well locations with ground-water-quality data compiled from eight source agencies representing the period 1979-2004 for Pennsylvania.

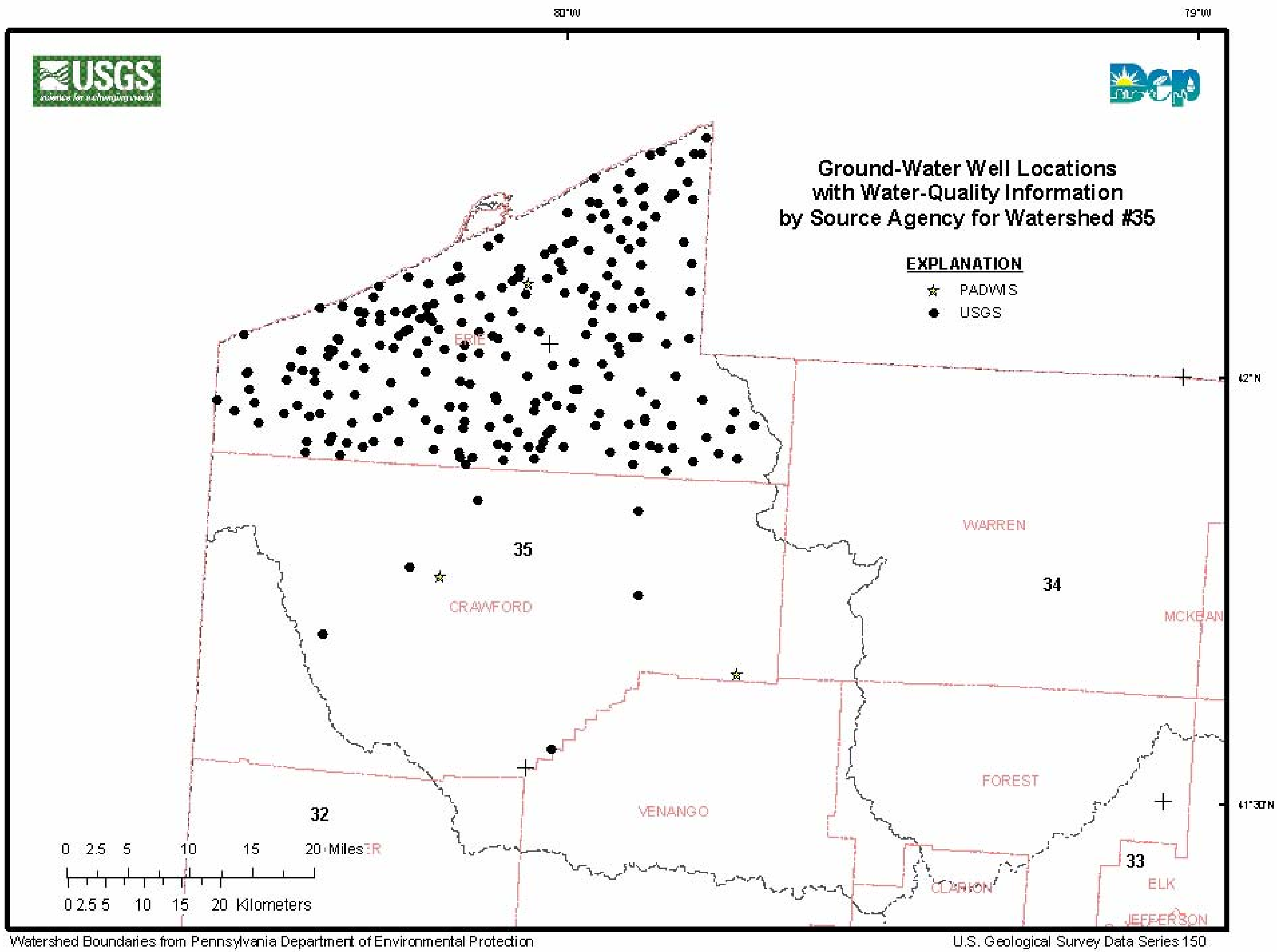

Figure 5. Well locations of water-quality data compiled from two source agencies (Pennsylvania Drinking Water Information System and U.S. Geological Survey) for Watershed Number 35, Lake Erie/French & Oil Creek, northwestern Pennsylvania.

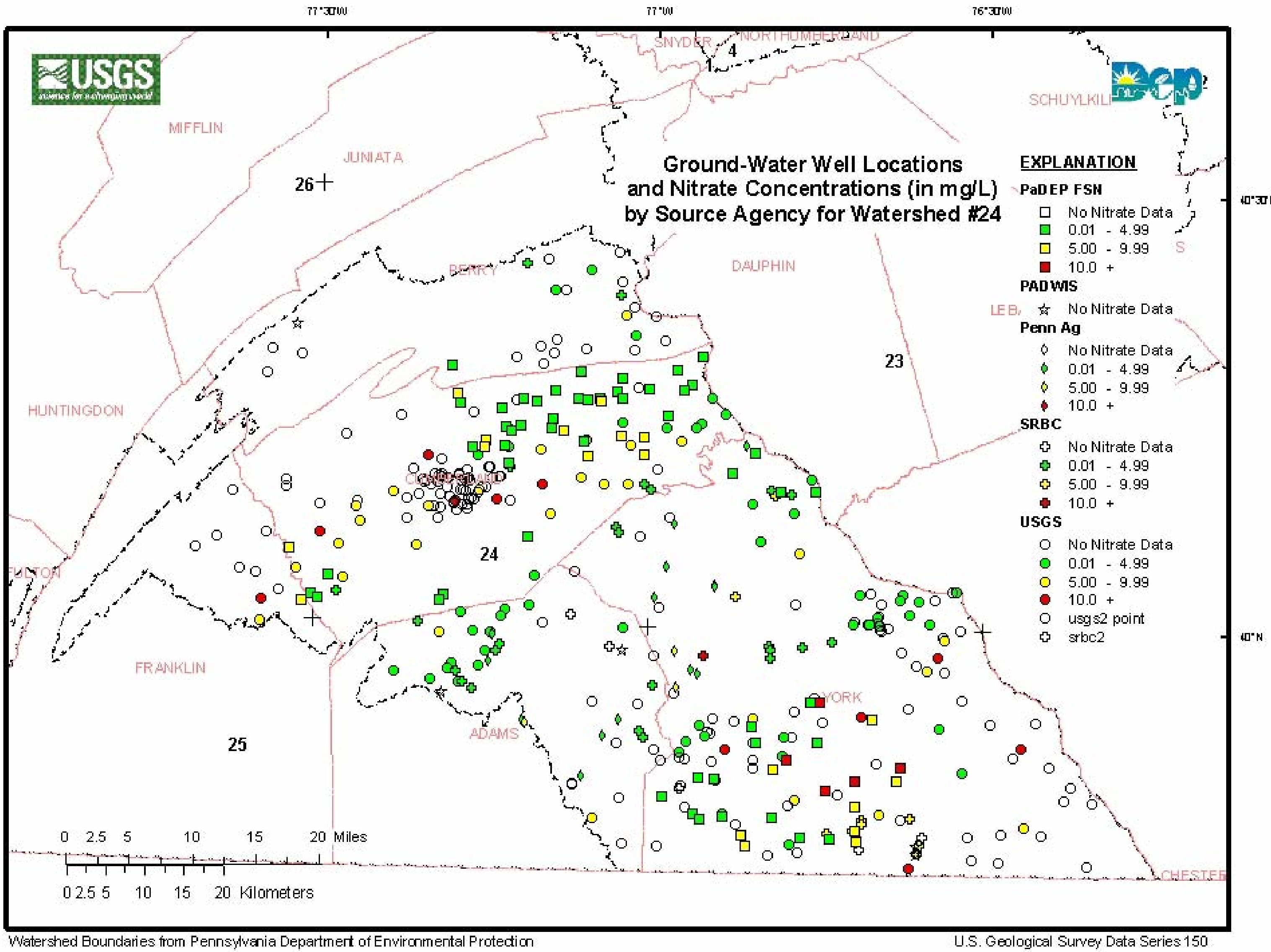

Figure 6. Ranges of concentration for nitrate nitrogen in ground water for Watershed Number 24, southcentral Pennsylvania.

Table 4. Summary table of Susquehanna River Basin Commission (SRBC) ground-water-quality studies by major river basins in Pennsylvania.

[2/ 0, number of samples collected/number of samples that exceeded a U.S. Environmental Protection Agency Maximum or Secondary Maximum Contaminant Level]

Pennsylvania Department of Environmental Protection watershed	Wells	Major ions	Minor and trace elements	Nutrients	Water characteristics (field measurements)
Ohio and St. Lawrence River Basins					
31	1	2/ 0	2/ 0	2/ 0	2/ 0
Delaware River Basin					
12	6	13/ 4	14/ 4	13/ 0	13/ 8
Lower Susquehanna River Basin					
23	123	289/ 73	278/ 27	236/ 34	267/ 27
24	61	147/ 14	145/ 22	138/ 3	144/ 23
26	18	40/ 3	39/ 6	31/ 3	33/ 2
Upper Susquehanna River Basin					
1	23	39/ 9	38/ 5	36/ 0	37/ 1
2	10	35/ 15	35/ 5	28/ 0	33/ 7
3	1	2/ 0	3/ 0	2/ 0	2/ 0
4	14	21/ 12	21/ 5	21/ 0	21/ 7
5	24	44/ 12	41/ 3	41/ 0	43/ 10
6	17	33/ 23	32/ 8	28/ 0	31/ 0
7	3	7/ 0	6/ 1	7/ 0	6/ 1
8	28	52/ 22	52/ 7	49/ 1	49/ 17

Summary

This study, by the U.S. Geological Survey (USGS) in cooperation with the Pennsylvania Department of Environmental Protection (PADEP) Bureau of Watershed Management, provides detailed ground-water-quality data from January 1, 1979, to August 11, 2004, on 8,612 wells for 35 watersheds throughout Pennsylvania. Eight source agencies—Borough of Carroll Valley (CV), Chester County Health Department (CCDH), Pennsylvania Department of Environmental Protection-Ambient and Fixed Station Network (FSN), Montgomery County Health Department (MCHD), Pennsylvania Drinking Water Information System (PADWIS), Pennsylvania Department of Agriculture (PennAg), Susquehanna River Basin Commission (SRBC), and USGS provided the data in various electronic formats that were suitable for editing and compiling. The resulting ground-water-quality data were divided, by source agency, into 12 analyte groups—micro-organisms, major ions, minor ions and trace elements, nutrients, pesticides (USGS pesticide data were further subdivided into fungicides, herbicides, and insecticides), radiochemicals, volatile organic compounds, wastewater compounds, and water characteristics.

For each source agency, Microsoft Excel files and Portable Document Format files were created. The Excel files (for example, CV.Micro.xls) contain the edited ground-water-quality data, whereas the PDF files (for example, SRBC.Summary.pdf) contain a summary of the results by watershed and analyte group. As a result of the large number of independent studies conducted by the USGS, additional Excel files were created. These Excel files (for example, USGS.MicroReport.xls) contain an abbreviated reference to the original citation listed in Selected References. This allows the interested reader a means to locate the study and determine the purpose for which the ground-water-quality data were collected.

A series of PDF images were created to show the 35 watersheds within Pennsylvania, the 13 geolithologic units that were used to represent the complex geology of Pennsylvania, and the distribution of 8,612 wells with ground-water-quality data. An additional 35 images were created to show the distribution of the 8,612 wells by watershed, another 35 were images created to show the distribution and range of nitrate (as nitrogen) concentrations in the 35 watersheds.

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Appendix—Files of Comments, Data, and Map Images by Source

[“Click” on filename in lists below to link to the file]

Borough of Carroll Valley

Comment Files	**Data Spreadsheet Files**	**Map Image Files**
Portable Document Format	Microsoft Excel Format	Portable Document Format
CV.Comments.Micro.pdf	CV.Micro.xls	Statewide_WellsCarrollValley.pdf
CV.Comments.Nuts.pdf	CV.Nuts.xls	
CV.Summary.pdf		

Chester County Health Department

Comment Files	**Data Spreadsheet Files**	**Map Image Files**
Portable Document Format	Microsoft Excel Format	Portable Document Format
CCDH.Comments.Field.pdf	CCDH.Field.xls	Statewide_WellsChesterCo.pdf
CCDH.Comments.Nuts.pdf	CCDH.Nuts.xls	
CCDH.Summary.pdf		

Pennsylvania Department of Environmental Protection Ambient and Fixed Station Network

Comment Files	**Data Spreadsheet Files**	**Map Image Files**
Portable Document Format	Microsoft Excel Format	Portable Document Format
FSN.Comments.Field.pdf	FSN.Field.xls	Statewide_WellsPaDEPFSN.pdf
FSN.Comments.Major.pdf	FSN.Major.xls	
FSN.Comments.Minor.pdf	FSN.Minor.xls	
FSN.Comments.Nuts.pdf	FSN.Nuts.xls	
FSN.Summary.pdf		

Montgomery County Health Department

Comment Files	**Data Spreadsheet Files**	**Map Image Files**
Portable Document Format	Microsoft Excel Format	Portable Document Format
MCHD.Comments.Micro.pdf	MCHD.Micro.xls	Statewide_WellsMontgomeryCo.pdf
MCHD.Comments.Field.pdf	MCHD.Field.xls	
MCHD.Comments.Major.pdf	MCHD.Major.xls	
MCHD.Comments.Minor.pdf	MCHD.Minor.xls	
MCHD.Comments.Nuts.pdf	MCHD.Nuts.xls	
MCHD.Comments.Voa.pdf	MCHD.Voa.xls	
MCHD.Comments.Waste.pdf	MCHD.Waste.xls	
MCHD.Summary.pdf		

Pennsylvania Drinking Water Information System

Comment Files	Data Spreadsheet Files	Map Image Files
Portable Document Format	Microsoft Excel Format	Portable Document Format
PADWIS.Comments.Micro.pdf	PADWIS.Micro.xls	Statewide_WellsPADWIS.pdf
PADWIS.Comments.Minor.pdf	PADWIS.Minor.xls	
PADWIS.Comments.Pest.pdf	PADWIS.Pest.xls	
PADWIS.Comments.Radio.pdf	PADWIS.Radio.xls	
PADWIS.Comments. Voa.pdf	PADWIS.Voa.xls	
PADWIS.Summary.pdf		

Pennsylvania Department of Agriculture

Comment Files	Data Spreadsheet Files	Map Image Files
Portable Document Format	Microsoft Excel Format	Portable Document Format
PennAg.Comments.Micro.pdf	PennAg.Micro.xls	Statewide_WellsPennAg.pdf
PennAg.Comments.Nuts.pdf	PennAg.Nuts.xls	
PennAg.Comments.Pest.pdf	PennAg.Pest.xls	
PennAg.Summary.pdf		

Susquehanna River Basin Commission

Comment Files	Data Spreadsheet Files	Map Image Files
Portable Document Format	Microsoft Excel Format	Portable Document Format
SRBC.Comments.Field.pdf	SRBC.Field.xls	Statewide_WellsSRBC.pdf
SRBC.Comments.Major.pdf	SRBC.Major.xls	
SRBC.Comments.Minor.pdf	SRBC.Minor.xls	
SRBC.Comments.Nuts.pdf	SRBC.Nuts.xls	
SRBC.Summary.pdf		

U.S. Geological Survey—Pennsylvania Water Science Center

Comment Files	Data Spreadsheet Files		Map Image Files
Portable Document Format	Microsoft Excel Format		Portable Document Format
USGS.Comments.Micro.pdf	USGS.Micro.xls	USGS.MicroReport.xls	Statewide_WellsUSGS.pdf
USGS.Comments.Field.pdf	USGS.Field.xls	USGS.FieldReport.xls	
USGS.Comments.Fungus.pdf	USGS.Fungus.xls	USGS.FungusReport.xls	
USGS.Comments.Herb.pdf	USGS.Herb.xls	USGS.HerbReport.xls	
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USGS.Comments.Waste.pdf	USGS.Waste.xls	USGS.WasteReport.xls	
USGS.Summary.pdf	USGS.CrossReference Numbers.xls		

Pennsylvania Geology

Map Image Files

Portable Document Format

Statewide_Geology.pdf

Statewide_SurficialGeology.pdf

Pennsylvania Well Locations

Map Image Files
Portable Document Format
Statewide_Wells2.pdf

Pennsylvania Watersheds

Map Image Files
Portable Document Format
Statewide_Watershed.pdf
Basin1_Wells.pdf
Basin2_Wells.pdf
Basin3_Wells.pdf
Basin4_Wells.pdf
Basin5_Wells.pdf
Basin6_Wells.pdf
Basin7_Wells.pdf
Basin8_Wells.pdf
Basin9_Wells.pdf
Basin10_Wells.pdf
Basin11_Wells.pdf
Basin12_Wells.pdf
Basin13_Wells.pdf
Basin14_Wells.pdf
Basin15_Wells.pdf
Basin16_Wells.pdf
Basin17_Wells.pdf
Basin18_Wells.pdf
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Basin35_Wells.pdf

Pennsylvania Watersheds and Nitrate Ranges

Map Image Files
Portable Document Format
Basin1_QWNO3.pdf
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Basin22_QWNO3.pdf
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Basin35_QWNO3.pdf

Pennsylvania Watersheds 17 and 18 Geology and Nitrate Ranges

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Basin18_QWNO3GEO.pdf