Geohydrology, Yield, and Water Quality of Stratified-Drift Aquifers in the Pemigewasset River Basin, Central New Hampshire

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[Plates are in pocket]

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CONVERSION FACTORS

Multiply	By	To obtain
	Length	
inch (in.)	25.4	millimeter
foot (ft)	0.3048	meter
mile (mi)	1.609	kilometer
	Area	
acre	0.4047	hectare
square foot (ft^2)	0.0929	square meter
square mile (mi^2)	2.59	square kilometer
	Volume	
cubic foot (ft^3)	0.02832	cubic meter
gallon (gal)	3.785	liter
million gallons (Mgal)	3,785	cubic meter
	Flow	
cubic foot per second (ft^3/s)	0.02832	cubic meter per second
cubic foot per second per square mile [$(ft^3/s)/mi^2$]	0.01093	cubic meter per second per square kilometer
cubic foot per square mile (ft^3/mi^2)	0.01093	cubic meter per square kilometer
gallon per minute (gal/min)	0.06309	liter per second
million gallons per day (Mgal/d)	0.04381	cubic meter per second
million gallons per day per square mile [$(Mgal/d)/mi^2$]	9.0169	cubic meter per second per square kilometer
	Hydraulic conductivity	
foot per day (ft/d)	0.3048	meter per day
	Transmissivity	
cubic foot per day per square foot times foot of aquifer thickness {$[(ft^3/d)/ft^2]ft$} or foot squared per day (ft^2/d)	0.0929	cubic meter per day per square meter times meter of aquifer thickness or meter squared per day

Water temperature in degree Fahrenheit (°F) can be converted to degrees Celsius (°C) by using the following equation: °C = 5/9 (°F - 32)

VERTICAL DATUM

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

ABBREVIATED WATER-QUALITY UNITS

meq/L	milliequivalent per liter
mg/L	milligram per liter
µg/L	microgram per liter
µS/cm	microsiemen per centimeter at 25 °Celsius

Geohydrology, Yield, and Water Quality of Stratified-Drift Aquifers in the Pemigewasset River Basin, Central New Hampshire

By John E. Cotton *and* Joseph R. Olimpio

Abstract

Stratified-drift aquifers discontinuously underlie the land surface in valleys in the Pemigewasset River Basin in central New Hampshire. The river basin has a total drainage area of about 1,020 square miles. Saturated thickness of stratified drift in these aquifers locally exceeds 120 feet but generally is less than 80 feet. Transmissivities locally can exceed 8,000 feet squared per day but generally are less.

Storage and flow of ground water in stratified-drift aquifers are determined by the glaciofluvial environment in which the aquifer materials were deposited. These deposits were formed during the deglaciation of central New Hampshire, which occurred as stagnation-zone retreat. Within this basin, general types of stratified drift are ice-contact deposits, outwash, deltas, and lacustrine deposits.

The most productive or potentially productive stratified-drift aquifers in the Pemigewasset River Valley are between Franklin and southern Hill, at the Bristol-Hill town line; between northwestern New Hampton and the Plymouth-Bridgewater town line; at the confluence of the Baker River; and between north of Livermore Falls and southern Woodstock.

Potentially, the most productive stratified-drift aquifer in the Smith River basin is in the center of Danbury. Stratified-drift aquifers with high potential to yield water are in the lower Cockermouth and Fowler River Valleys in the Newfound Lake Basin, in the Rumney Depot area, and in Warren in the Baker River Valley.

Pumping from most municipal wells in the basin induces streamflow that recharges the aquifers. Future ground-water production could rely not only on storage within the aquifers but also on recharge from surface water. Within the basin, about 97 million gallons per day of surface water is available between streamflows equaled or exceeded 95 percent of the time and streamflows equaled or exceeded 99 percent of the time.

An example of one effective approach to evaluate the potential yield of a streamside aquifer was presented in a ground-water-flow simulation of a sand and gravel aquifer in Woodstock. Model results indicate that, with four additional production wells, pumpage from the aquifer could be increased by more than 10 times the maximum pumping rates of the two existing wells.

Water from stratified-drift aquifers within the Pemigewasset River Basin meets the U.S. Environmental Protection Agency's Maximum Contaminant Level and generally is suitable for drinking and other domestic and commercial uses. Concentrations of iron and manganese in 8 of the 26 analyzed water samples exceeded the Secondary Maximum Contaminant Levels established by the U.S. Environmental Protection Agency. Trace amounts of chloroform were detected in one ground-water sample, and trace amounts of benzene were detected in another ground-water sample.

INTRODUCTION

The population of communities in the Pemigewasset River Basin increased by about 34 percent during 1970–90 (U.S. Bureau of the Census, 1990). Recreational and second-home development has been especially rapid in this area, which includes parts of the Lakes Region in central New Hampshire and the White Mountains, because of the area's proximity to a large metropolitan area. Interstate Highway 93 in New Hampshire (pl. 3) traverses the entire length of the basin from Franconia Notch (pl. 3) to the north (site of the "Old Man of the Mountains") to the city of Franklin (pl. 1) at the southern end, providing easy access to visitors from the eastern provinces of Canada to the north, and from eastern Massachusetts to the south.

This growth has steadily increased demands for water and has stressed the capacity of existing municipal water systems as well as other community and noncommunity public-water systems. Of the 23 towns and 1 city in the Pemigewasset River Basin, 9 towns and 1 city have municipal water systems. Of these 10 municipalities, 6 use ground-water sources only, 2 use surface-water sources, and 2 use ground-water and surface-water sources, and most of them need to expand their water-supply capabilities. The rural areas of these 10 communities and the other 14 towns within the basin rely on private wells.

The U.S. Geological Survey (USGS), in cooperation with the New Hampshire Department of Environmental Services, Water Resources Division (NHDES-WRD), has done a series of ground-water studies in New Hampshire from 1983–93 to provide detailed geohydrologic information that water managers can use to determine optimal use of existing water supplies and to develop new water supplies. The Pemigewasset River Basin (fig. 1), is one of the basins included in this series.

Purpose and Scope

This report describes (1) the hydrologic and geologic characteristics of the stratified-drift aquifers within the Pemigewasset River Basin, including the areal extent of the stratified-drift aquifers, ground-water levels within these aquifers, general direction of ground-water flow, saturated thickness, and transmissivities; (2) aquifer yields, and (3) background water quality within the stratified-drift aquifers. Major watershed divides were selected as study areas because they are the natural subdivision of the hydrologic system; only a few stratified-drift aquifers in central New Hampshire extend across major surface-water divides.

Study Area

The Pemigewasset River Basin in central New Hampshire encompasses about 1,020 mi^2 in the Northeast and Superior Uplands ground-water region (Heath, 1982). The basin is about 50 mi long north to south and averages about 22 mi wide (fig. 1). The mountainous northern part is in the White Mountain Section of the New England Physiographic Province, and the southern and western parts are in the New England Upland (Feneman, 1938; Raisz, 1954). Land-surface elevation ranges from 260 ft above sea level at the mouth of the basin to greater than 4,000 ft on mountain tops in the northern part of the basin.

The Pemigewasset River is about 55 mi long and flows southward through the middle of the basin. Major west-flowing tributaries are the East Branch of the Pemigewasset and the Mad Rivers in the northern part of the basin and the Squam River and Salmon Brook in the southern part. The major east-flowing tributaries are the Baker, Newfound, and Smith Rivers.

Average annual precipitation ranges from about 40 in. in the southern part of the basin to more than 60 in. in the northern headwaters. Average annual runoff in the basin ranges from about 18 to 50 in. (Knox and Nordenson, 1955).

The stratified-drift aquifers are in the Pemigewasset River Valley and in valleys of the major tributaries. These aquifers typically are narrow deposits of sand and gravel within the valleys. Fine-grained stratified-drift deposits are in some parts of these valleys. Some segments of these valleys are directly underlain by till and bedrock; consequently, potentially productive stratified-drift aquifers are discontinuous within the basin.

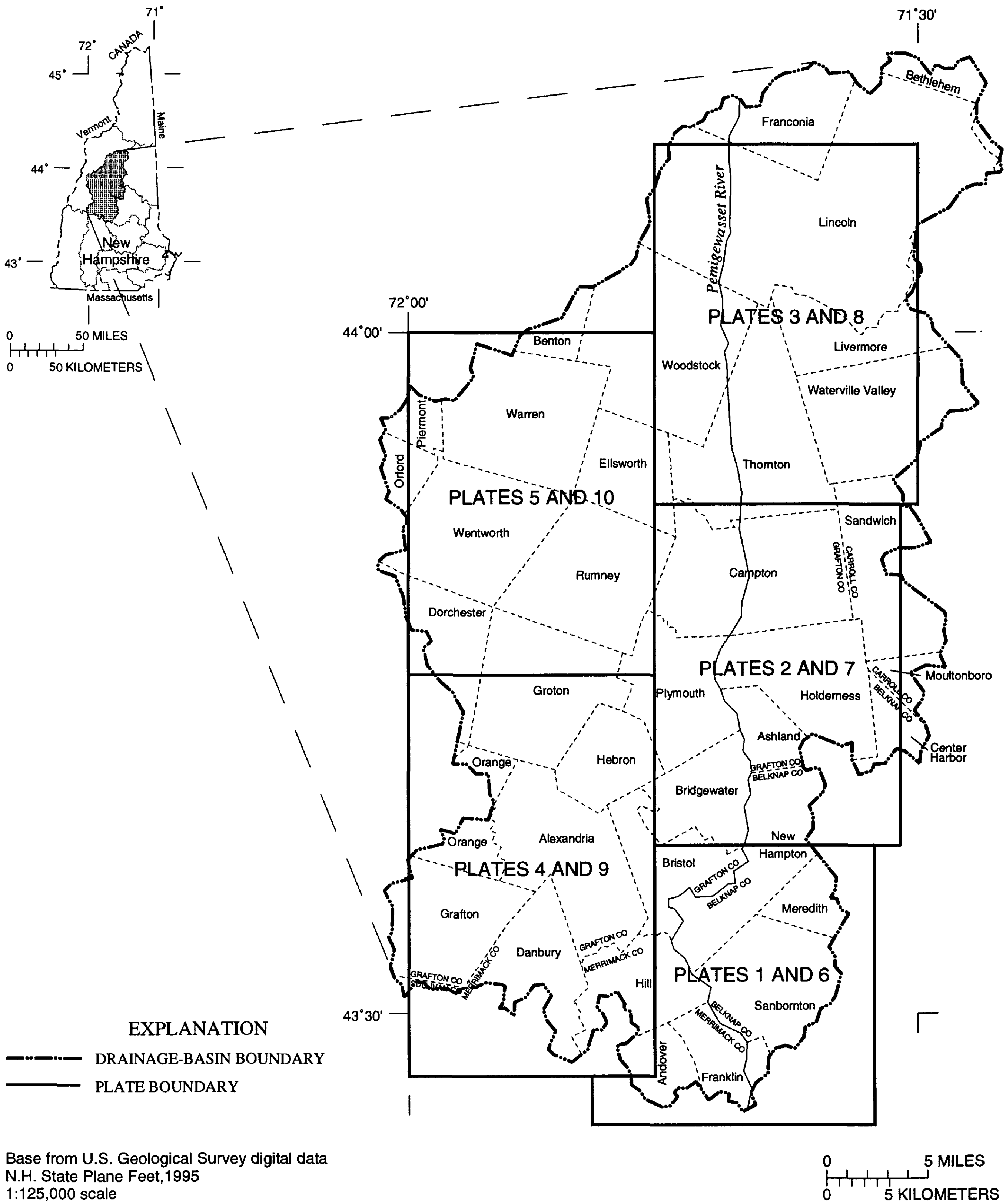


Figure 1. Location of study area and the southern (pls. 1 and 6), central (pls. 2 and 7), northern (pls. 3 and 8), southwestern (pls. 4 and 9), and northwestern (pls. 5 and 10) plates.

Previous Studies

Information from reconnaissance of the availability of ground water in the Pemigewasset and Winnipesaukee River Basins was presented by Cotton (1975). This study indicated that additional information was necessary to increase understanding of boundaries of stratified-drift aquifers, the potential productivity of these aquifers, and ground-water quality. Several consultants have produced water-supply plans and test-drilling programs for some of the towns. Generalized surficial geology of this area has been published only as part of the statewide map at a scale of 1:250,000 (Goldthwait and others, 1951). Surficial geology of part of the Baker River Basin has been addressed by Haselton and Randall (George Haselton, Clemson University, written commun., 1988; and Allan Randall, U.S. Geological Survey, written commun., 1989).

Soil surveys have been published by the Natural Resources Conservation Service (NRCS) for Belknap County (Kelsey and Vieira, 1968), Carroll County (Diers and Vieira, 1977), Grafton County (Latimer and others, 1939), and Merrimack County (Winkley, 1965). More recent unpublished soil surveys for Grafton County are available from the Natural Resources Conservation Service.

Numbering System for Wells, Borings, and Springs

The identification numbers for wells, test borings, and springs are assigned according to the grid system of latitude and longitude. Each number consists of 15 digits. The first six digits denote the degrees, minutes, and seconds of latitude; the next seven digits denote degrees, minutes, and seconds of longitude. The last two digits (assigned sequentially) identify wells or other sites within a 1-second grid. These identification numbers are the primary identifiers in the USGS data base and are included in appendixes A and B.

Local identifiers also are assigned to wells, test borings, and springs. Each identifier consists of three letters and one or more numbers. In the case of Bristol, it is letter, number, letter, and number. The first two letters designate the town, except for Bristol, which is B2 (table 1). The third letter denotes the following type of site: "A" for borings (no installed casings), which were done for hydrologic purposes; "B" for borings done primarily for constructional purposes; "S" for springs; and "W" for all kinds of wells. Each site is given a sequential number within each town. For example, the first boring in the city of Franklin is FKA-1.

Table 1. Town codes used in the numbering system for wells, borings, and springs

Town	Two-letter code	Town	Two-letter code
Alexandria	AE	Holderness	HR
Andover	AN	Lincoln	LK
Ashland	AP	Livermore	LO
Bridgewater	BY	New Hampton	NH
Bristol	B2	Plymouth	PY
Campton	CB	Rumney	RU
Danbury	DB	Sanbornton	SC
Ellsworth	EL	Sandwich	SE
Franconia	FD	Thornton	TR
Franklin	FK	Warren	WD
Grafton	GQ	Waterville Valley	WF
Groton	GX	Wentworth	WI
Hebron	HL	Woodstock	WS
Hill	HN		

Methods and Approach

The following methods were used in this study.

1. Areal extent of the stratified-drift aquifers was mapped by USGS personnel. Soils maps from the Natural Resources Conservation Service and unpublished surficial geologic information from USGS files were used to focus field mapping in the valleys of the basin.
2. Published and unpublished subsurface data on ground-water levels, saturated thickness, and stratigraphy of the aquifers from the USGS, NHDES-WRD, and the New Hampshire Department of Transportation were compiled. Additional data were obtained from municipalities, local residents, well-drilling contractors, and geohydrologic consulting firms. The locations of wells, borings, and seismic lines were plotted on base maps at a scale of 1:24,000, and pertinent well and boring data were added to the Ground Water Site Inventory (GWSI) data base maintained by the USGS. Each data point is cross-referenced to a site-identification number. The site locations are shown on plates 1–5, and information from these sites is listed in appendixes A and B.

3. Seismic-refraction profiling, a surface geophysical technique, was used to determine depths of the water table and depths to the bedrock surface. (Locations of these profiles are shown on plates 1-5.) The seismic data were interpreted by using a time-delay, ray-tracing computer program developed by Scott and others (1972). Data from nearby wells and test holes were used to verify the interpretations. Seismic-refraction profiles are shown in appendix C. Actual depths to the bedrock surface generally are within 10 percent of the estimates from seismic-refraction profiling. Till is not identified in these interpretations because it is generally thin and cannot be distinguished from stratified drift by use of seismic-refraction methods. Where till is present, but is not identified in the interpretation, the computed depth to bedrock is slightly less than the actual depth.
4. Test borings were made at 47 locations to improve definition of the thicknesses and geohydrologic characteristics of the stratified-drift aquifers. (Locations of test borings are shown on plates 1–5.) Split-spoon samples of the subsurface materials below the water table generally were collected at 10-foot intervals to estimate the horizontal hydraulic conductivity at those depths and to determine the stratigraphic sequence of materials comprising the aquifers. Where test borings were made in relatively productive aquifer materials, a 2-inch-diameter[1] well with a polyvinyl chloride (PVC) casing and a slotted well screen was installed.
5. Data from items 2, 3, and 4 were used to construct maps showing the water-table altitude and saturated thickness of the stratified-drift aquifers.
6. Bulk or vectorless hydraulic conductivities of the aquifer materials were estimated from grain-size distribution data from 454 samples of aquifer material collected during the completion of test borings and wells in southern and central New Hampshire. Transmissivities were estimated from logs of test borings and wells by assigning horizontal hydraulic conductivities to each interval sampled, multiplying the hydraulic conductivities by the saturated thickness of the interval, and summing these results. Additional transmissivities were obtained from reports by geohydrologic consultants. This information was used to prepare maps showing the transmissivity distribution of the stratified-drift aquifers (pls. 6–10).
7. Flow-duration data from eight long-term streamflow-gaging stations in the Pemigewasset River Basin were analyzed and used to correlate with miscellaneous low-flow measurements at 22 other sites. Measurements are listed in appendix D. Gain in streamflow measurements in the river basin during period of low flow can be used to estimate water availability from aquifers.
8. An aquifer in Woodstock was selected to demonstrate a technique for estimating yield on the basis of a numerical model that simulates ground-water flow. The computer program, developed by McDonald and Harbaugh (1988), is a three-dimensional model that can be used to simulate flow in two dimensions. This model was used to estimate the potential yield and the sources of water to wells in the modeled area.
9. Samples of ground water from 16 USGS observation wells, 8 public-supply wells, and 2 springs were collected and analyzed. Selected physical properties (specific conductance, pH, temperature) were measured, and concentrations of inorganic constituents were determined. Samples of water from 14 of the 16 observation wells and the 2 springs were also analyzed for 36 different volatile organic compounds. These data are listed in appendix E. The data provided by these analyses were used to assess the general quality of water from the stratified-drift aquifers.

[1]Unless otherwise indicated, pipe diameters are nominal inside diameters.

Acknowledgments

The authors thank the State, Federal, and municipal officials; residents; well contractors; and consulting firms that provided data for this study. Included are personnel from the Office of the State Geologist; the New Hampshire Department of Environmental Services, Water Resources Division; and the Natural Resources Conservation Service.

GEOHYDROLOGIC SETTING

Ground water underlies the land surface throughout the Pemigewasset River Basin (fig. 1). Subsurface formations that have sufficient saturated permeable materials yield significant quantities of water to wells are called aquifers. Even poorly productive aquifers could yield enough water to wells to satisfy small water demands. The three types of aquifers in the study area are (1) stratified drift, which is the major source of ground water for large water users; (2) till, which may supply ground water to private wells for single-family domestic use; and (3) bedrock, which is a major source of ground water for private domestic needs and small businesses (U.S. Geological Survey, 1985).

Geohydrologic Units

Stratified Drift

Stratified-drift aquifers in this basin were formed during the waning stages of continental glaciation, when the rate of melting of glacial ice exceeded the winter rate of accumulation of snow combined with any south-flowing glacial ice. Under these conditions, the margin of ice moved northward. The ice margin was not a simple edge of ice; rather it was a marginal zone within which the tops of mountains and hills became ice-free first. As melting (downwasting) continued, more of the uplands became ice-free while remnant ice filled the valleys. The Ice Age in New Hampshire ended with the melting of the residual ice.

Glacial ice contained all sizes of rock debris that had been eroded from the overridden land surface. Although much of the rock debris was contained in the basal part of the glacier, some of the debris in marginal ice areas (including along valley sides) was carried upward along shear zones to the surface of the ice (Koteff and Pessl, 1981). Thus, this material also was available for erosion and transport by meltwater.

Stratified-drift deposits within this basin were formed by the settling of material from sediment-laden meltwater in streams, ponds, and lakes that were temporarily present within the meltwater drainage system. Stratified-drift deposits are composed of layers of sediments having different grain-size distributions, sorted according to the local depositional environments. Sand and gravel deposits reflect a high-energy environment. Very fine sand, silt, and clay reflect a low-energy environment such as that found in ponds and lakes.

Glaciofluvial Deposits

Ground-water development in the Pemigewasset River Basin and throughout New Hampshire has been most successful in thick, saturated deposits of glaciofluvial sediments consisting of moderately to well sorted coarse-grained sand and sand and gravel. These aquifers—the main focus of this study—are present in the valley lowlands. These aquifers are isolated from one another and form independent ground-water systems. The different types of glaciofluvial deposits that comprise valley aquifers in the study area are shown in a block diagram in figure 2.

Glaciofluvial deposits formed by meltwater streams beneath or adjacent to glacial ice are termed "ice-contact deposits." Eskers are elongate ridges of sand and gravel deposited in meltwater channels beneath or within glacial ice. An example of an esker is found in the Pemigewasset River Valley extending southward from the Plymouth-Bridgewater town line through the western part of Ashland into New Hampton (pls. 2 and 7). The saturated thickness in parts of this esker exceeds 80 ft.

Kames are small deposits formed by small ice-marginal meltwater streams between ice and upper hillside and mountain slopes. The high altitudes of these deposits indicate that they were formed as the ice surface was lowered by downwasting, thereby exposing the upper slopes. Ice-marginal streams were constantly shifting position, and the drainage system was not organized. Most kames in the Pemigewasset River Basin are isolated, have thin or no saturated thickness, and were not mapped in this study. The lower slopes of some kames are contiguous with the upper slopes of stratified-drift valley deposits. An example is the sandy kame just northeast of Exit 24 off Interstate 93 in Ashland (pls. 2 and 7). Such kames have been included in the stratified-drift aquifer because they are part of the direct recharge area.

Kame terraces were formed by ice-marginal meltwater streams between ice and the lower hillslopes of the main valley and larger tributary valleys. Some of these deposits are coarse-grained sand and gravel, such as those terraces along the north side of the Smith River east of Danbury village and in southern Alexandria (pls. 4 and 9). Some are predominantly coarse-grained sand, such as terraces on the west side of the Pemigewasset River in Thornton and Hill (pls. 3 and 8). Some terraces are fine-grained sand and silt, such as those east of the Pemigewasset River in Thornton and

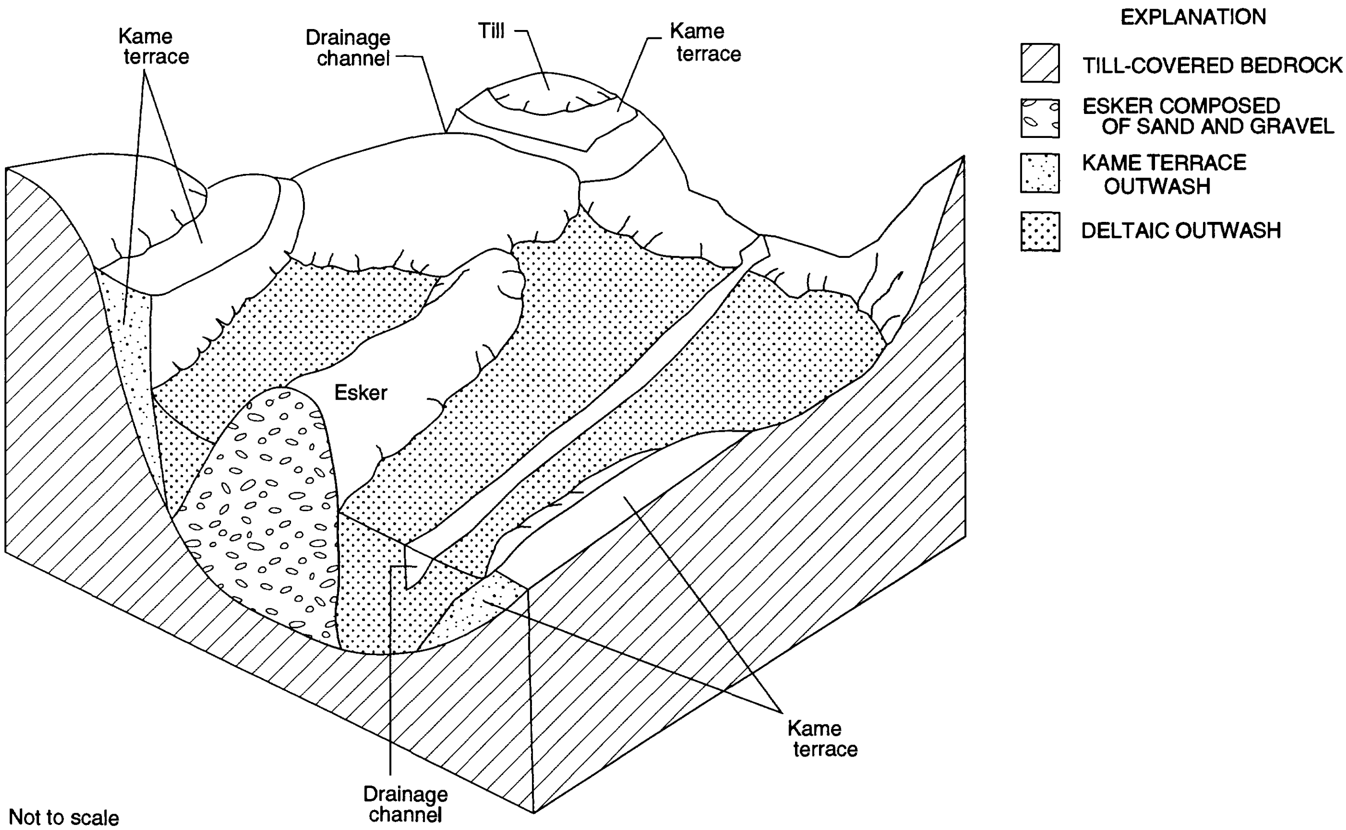


Figure 2. Conceptual model of a valley aquifer composed of ice-contact and outwash deposits.

south of the Baker River near the Rumney-Wentworth town line (pls. 5 and 10). Because these terraces are on the valley sides, the highly variable saturated thickness within these deposits depends on the grain-size distribution within these deposits and the configuration of the underlying surface. In places beneath the high terrace surface in southern Alexandria, the deposits are dry (the water table is below the terrace deposits), and in places beneath the low terrace surface, there is little saturated thickness. The saturated thickness in the fine-grained terrace near the Rumney-Wentworth town line is 40 ft.

Outwash deposits were formed by meltwater streams beyond or away from the ice margin. The coarseness of these deposits ranges from predominantly sand to predominantly gravel. Coarseness generally decreases as distance of transport increases. Distribution of grain sizes (sorting) generally increases with increasing distance of transport. Thus, outwash deposits generally are better sorted than ice-contact deposits. In this basin, outwash forms extensive deposits in the lowlands of the Pemigewasset River Valley from Lincoln to Plymouth and Bristol to Franklin, in the Baker River Valley from Warren to western Rumney, and in the Smith River Valley in Grafton and Danbury (pls. 4 and 9).

Glaciolacustrine Deposits

Sediment in meltwater streams that entered standing water formed deltaic deposits. A block diagram of the development of a typical glaciolacustrine delta is shown in figure 3. The coarseness of deltaic deposits reflects the suspended load of the stream. Foreset beds of the deltas commonly are well-sorted sands, and, where the ice margin and standing water were in proximity, sandy gravel may predominate. Such deposits may be considered either part of the fluvial sequence of deposits or part of the lacustrine deposits. Fine-grained sediment in the meltwater temporarily remained in suspension in the pond or lake. Slow settling of this material formed bottom deposits. In areas that were near the shore, these deposits can also contain sandy lenses.

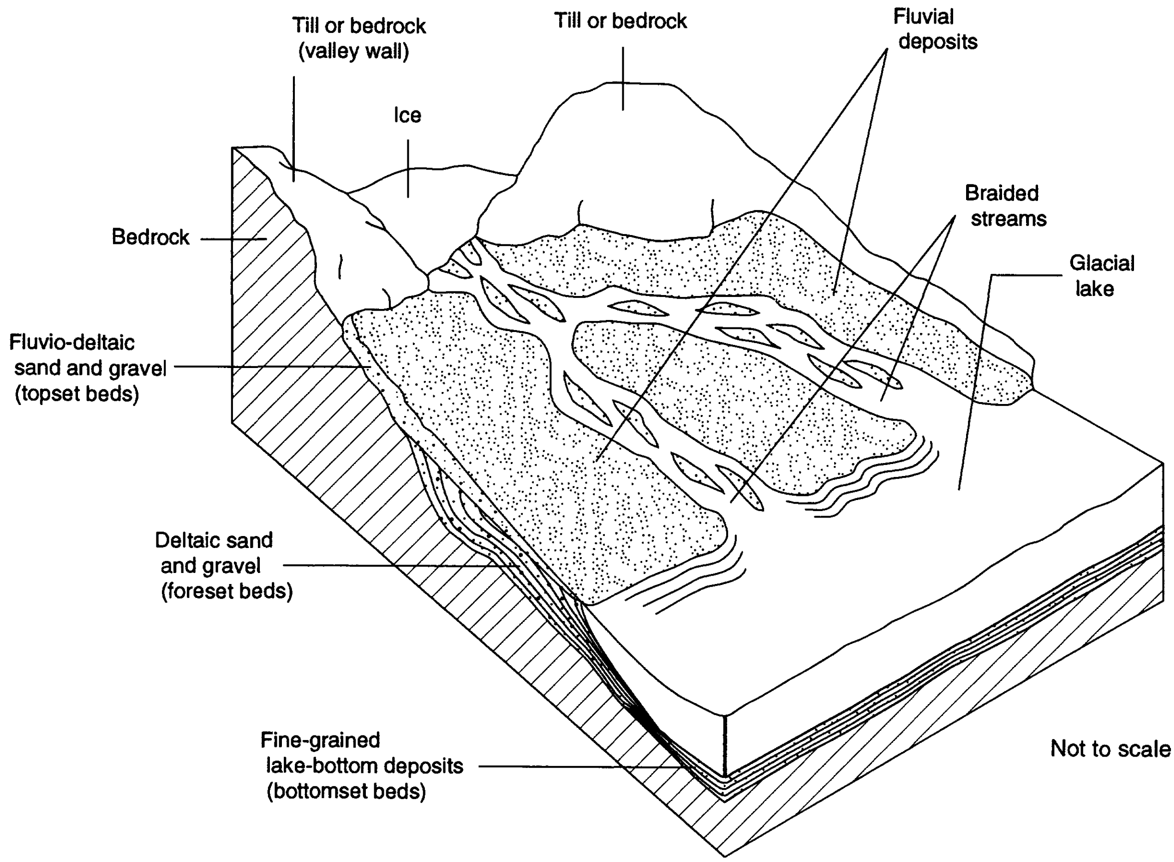


Figure 3. Development of glaciolacustrine delta and bottom deposits.

The presence of bottom deposits indicates that a glacial lake occupied the Pemigewasset and lower Baker River Valleys in Plymouth and Rumney in places; the saturated thickness of these deposits exceeds 80 ft. Fine-grained deposits indicate the presence of a small temporary glacial lake in the lowlands of the Smith River Valley in Danbury and a glacial pond in a small valley just northwest of the village of Warren.

Fine-grained deposits in lowlands are completely or nearly completely saturated and store substantial amounts of ground water, but they transmit water slowly. Although these bottom deposits are stratified drift, they are not considered productive aquifers. When these lowland basins filled with sediment or when the outlets of these temporary lakes and ponds eroded enough to drain the water bodies, through-flowing meltwater streams commonly deposited coarse sand and gravel over these bottom sediments. These partly saturated fluvial deposits may form shallow water-table aquifers. Most of the bottom deposits in the Plymouth Lowlands (pls. 5 and 10) are overlain by as much as 20 ft of saturated material consisting of medium to very coarse sand and fine, gravelly sand. In places, lake-bottom deposits are underlain by coarse-grained ice-contact deposits.

Till

Till, the dominant surficial material in the river basin, is an unsorted mixture of rock debris ranging in size from clay to boulders. Till was deposited directly by glacial ice during the advancing and retreating stages of glaciation. Beneath flowing ice, compact basal till, generally less than 30 ft thick, was deposited discontinuously on the bedrock surface. In some areas, a large amount of basal till was deposited on north- and northwest-facing bedrock hillslopes that locally hindered the flow of the debris-laden ice. Till thickness in these areas can exceed 200 ft.

Ablation till, which discontinuously overlies compact till or bedrock, formed as residual deposits on the melting (wasting) ice surface and gradually settled down on the underlying surface as the melting ice disappeared. Ablation till is less compact than basal till, is faintly stratified in places, and can contain lenses of stratified material. Generally, till in New Hampshire lies directly over bedrock. Thus, exploration for stratified-drift aquifers beneath till is seldom productive, although 20 ft of saturated fine sand was found beneath 40 ft of till in a test hole near Webster Lake in Franklin. Because ablation till containing stratified lenses may grade laterally into stratified drift, classification of specific deposits as either ablation till or stratified drift can be difficult.

Till generally is considered to be a poor aquifer because its unsorted texture reduces primary porosity (water storage) and hydraulic conductivity. Nonetheless, till is an important aquifer for domestic water supply in New Hampshire. Many old and new domestic wells are finished in till. Large-diameter dug wells provide adequate water storage to meet demands during daily high water-use periods. Water-level fluctuations within till can be several feet, making shallow dug wells less reliable than deeper, drilled wells during dry seasons.

Bedrock

The Pemigewasset River Basin is underlain by bedrock primarily associated with the Kearsarge-Central Maine synclinorium (Lyons and others, 1986). This structured belt trends north-northeast to south-southwest and contains metamorphic rocks of Devonian and Silurian age, as well as younger Devonian plutonic rocks. Faults are predominantly oriented parallel to this regional strike. Joint sets are at a variety of orientations.

These rocks are hard and compact; they contain recoverable water in open fractures. The size, distribution, and degree of interconnection of these fractures are highly variable, and their number generally decreases with depth. Thus, the capacity of bedrock to store water is variable, but relatively small, and generally decreases with depth. Bedrock wells commonly yield dependable supplies of water of acceptable quality for single-family domestic and small commercial needs. Some condominium complexes use water from bedrock wells.

Studies indicate small but probably significant differences in the water-yielding characteristics of the various bedrock types in the basin (Stewart, 1968); however, average well yield in metamorphic rocks in New Hampshire (about 13 gal/min) is slightly higher than the average well yield in igneous rocks (about 10 gal/min). These yields should be used with caution because estimates of domestic well yields are generally by aquifer tests of only a few hours' duration.

Zones where bedrock is extensively fractured can yield large quantities of water. Six municipalities in New Hampshire, all outside the study area, pump from wells in crystalline bedrock, and three of these wells are reported to yield approximately 0.5 Mgal/d each. Systematic exploration might allow location of production wells in these zones (Cotton and Hammond, 1985); such exploration by consultants did prove successful in Lincoln but not in parts of Waterville Valley.

Redistribution of Earth Sediments

Erosion and redeposition of stratified drift by streams (and to a lesser extent by wind) began soon after the stratified drift was originally deposited, perhaps while glacial ice was nearby. The coarse-grained sediments overlying the lake-bottom sediments in the Plymouth Lowlands are an example of this kind of erosion and redeposition. Steep ravines formed as tributary streams have eroded terraces. In places, parts of the terraces have been eroded by the large streams. The eroded material could have been redeposited as lower terraces and alluvium in the main valleys.

Erosion of till by small streams has continued from the time the surface became ice free to the present. Alluvial fans have formed in places where tributary streams flow from steep upland till terrain onto flat till and stratified-drift areas. These fan deposits may continue to form during large floods. Landslide deposits can be found in places in headwater areas in the northern part of the basin. Deposits of redistributed sediment that are in contact with stratified drift are included as part of the stratified-drift aquifers. In headwater areas, such as Franconia Notch, landslide deposits are the major valley-fill deposit. These deposits are not stratified-drift aquifers.

On steeper slopes, surficial material of stratified drift and till is transported downslope by a process known as mass wasting. This process was probably most active soon after glacial ice melted and before vegetation was reestablished. Where these deposits (colluvium) are found, the original boundary between till and stratified drift could be buried and the present boundary could be gradational.

GEOHYDROLOGY OF STRATIFIED-DRIFT AQUIFERS

The geohydrology of stratified-drift aquifers is described by delineating aquifer boundaries, determining generalized water tables and ground-water-flow directions, estimating saturated thicknesses, and estimating transmissivity. Data sources include soil maps, surficial-geology maps, records of wells and test borings, and seismic-refraction profiles. This geohydrologic information is shown on plates 1–10.

Delineation of Aquifer Boundaries and Water Table

Lateral and lower boundaries of stratified-drift aquifers have been determined or estimated in this study. Stratified-drift aquifers in the study area are glaciofluvial sediments that form valley-fill deposits, including those that underlie or overlie glaciolacustrine deposits. The till or bedrock surface forms the lower boundary of stratified-drift aquifer. Water tables within these deposits form the upper surface of the saturated part of these aquifers.

Areal Extent of Stratified-Drift Aquifers

The areal extent of each of these valley aquifers is limited by the lateral boundaries of stratified drift. Within each of these aquifers, the boundaries enclose the area of contiguous stratified drift. Small deposits of stratified drift on upper hillslopes that are not physically in contact with stratified-drift aquifers at lower elevations are not considered part of those aquifers. Such deposits are not designated as small individual aquifers because they typically have little or no saturated thickness during dry periods.

The entire contiguous stratified-drift deposits within the valleys are appropriately designated aquifers. Although recovery of ground water in substantial quantities is possible or feasible only in parts of these aquifers, ground water in storage within these deposits could potentially contribute to future water-supply wells.

The areal extent of the stratified-drift aquifers is shown in figure 4 and on plates 1-10. Preliminary information on the location of stratified drift was obtained from the surficial geologic maps of New Hampshire (Goldthwaite and others, 1951); soil maps produced by the NRCS for Belknap County (Kelsey and Vieira, 1968), Carroll County (Diers and Vieira, 1977), Grafton County (Latimer and others, 1939), and Merrimack County (Winkley, 1965); more recent mapping of New Grafton County (Natural Resources Conservation Service, written commun., 1988); and a reconnaissance of ground-water availability (Cotton, 1975). The stratified-drift boundaries were specifically mapped as part of this report. Boundaries of different types of stratified-drift deposits, typically shown on detailed surficial geologic maps, are not included on the plates in this report; however, main valley areas underlain by lacustrine bottom sediments are designated by a pattern on the plates. Small areas of stratified drift and alluvium along the upper reaches of the larger streams are not shown as aquifers because thin saturated thickness and small lateral extent provide only small amounts of ground-water storage.

A comparison of the boundaries of the stratified-drift boundaries on the plates with the boundaries of sandy soils formed on water-lain sediments, as mapped by Winkler (1965), Kelsey and Vieira (1968), and Diers and Vieira (1977), reveals a difference in location on hillslopes. These are typically areas where thin sand discontinuously is present at the surface along with till and bedrock; these areas are not usually designated as stratified drift on the plates in this report. Thin alluvial soils are commonly shown on soil maps along small tributary stream channels in till; these soils are from upstream and at higher elevations than stratified drift.

Aquifer boundaries are shown on the plates as solid or dashed lines. Solid lines are identified as "approximately located" because the boundary location cannot be ensured as precisely as a solid line would normally indicate. A solid-line contact on 1:24,000-scale USGS maps implies about a ±80-foot horizontal accuracy. In most areas, the solid-line boundaries probably are plotted with this accuracy. Dashed boundary lines identify inferred contacts where the level of accuracy is less certain.

Stratigraphic Boundaries and Altitude of Water Tables

Stratigraphic boundaries and altitude of subsurface stratified-drift boundaries, sediment types (lithologic units), and position (altitude) of water tables were determined by an inventory of existing water wells and borings, seismic-refraction surveys, and test drilling done during this study. Boundaries of the stratified-drift aquifers are being entered into the New Hampshire referenced analysis and information transfer system (GRANIT) and will be available for analysis relative to other geographic information that is in that data base. (GRANIT is the New Hampshire Geographic Information System (GIS), which is owned and operated by Complex Systems Research Center at the University of New Hampshire.)

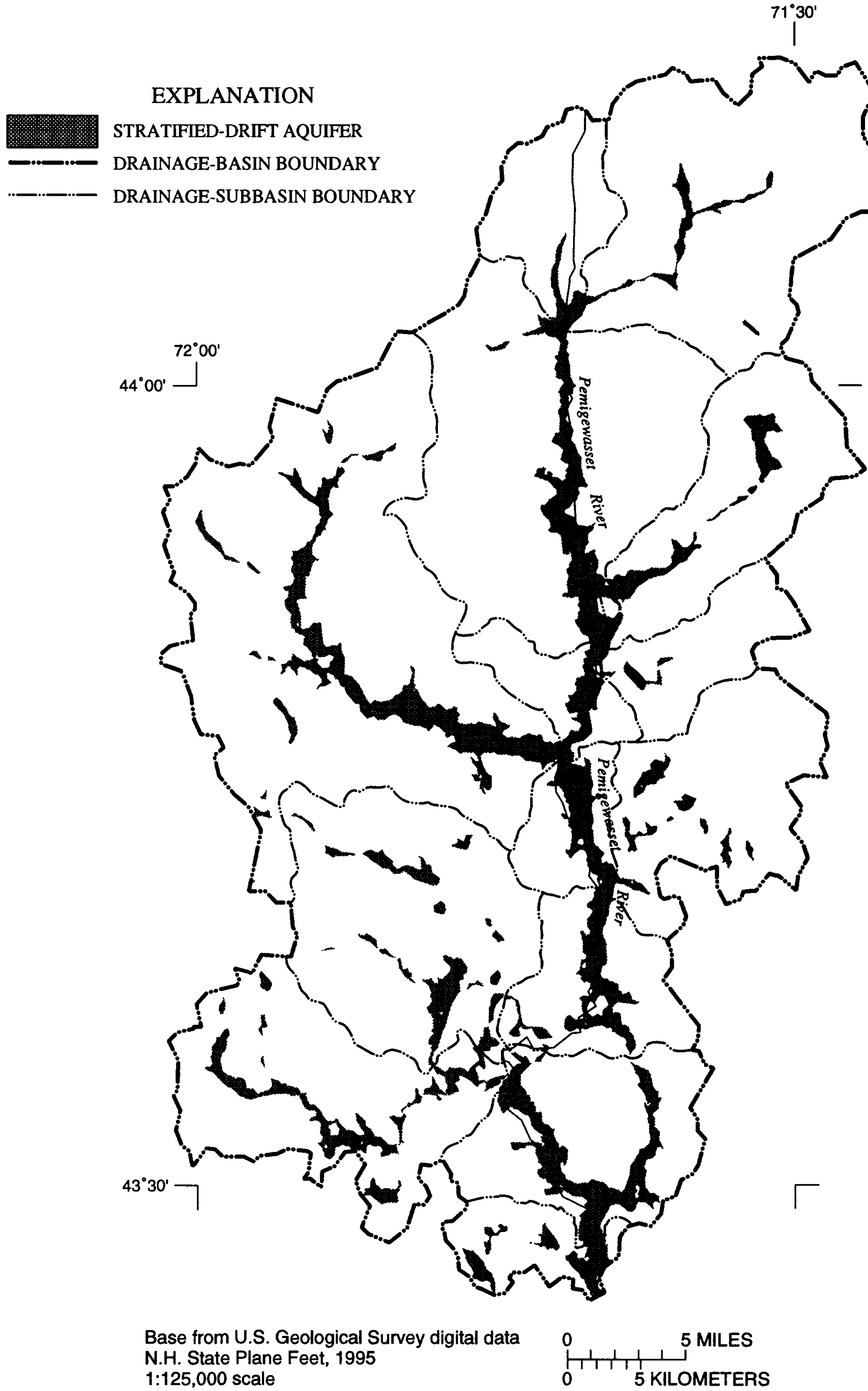


Figure 4. Location of stratified-drift aquifers in the Pemigewasset River Basin, central New Hampshire.

Well and Boring Data

Locations of inventoried subsurface data sites for wells and borings are plotted on plates 1–5. These locations have been entered in the USGS Ground-Water Site Inventory (GWSI) data base. Computer programs were used to transfer data on recently completed and inventoried water wells from the computer data base of the New Hampshire Water Well Board to the GWSI data base. Data on previously inventoried bedrock wells (Stewart, 1968) also were added to the data base. Data on bridge borings were obtained from the files of the NHDOT. Data on public water-supply wells and test wells were obtained from municipalities and consultants and were entered into the GWSI data base. Information on private wells was obtained from home owners. Data on test wells and borings done by the USGS during this study are also in the GWSI data base.

Information assembled in the GWSI data base was used to produce the plates as described in the following sections. Applications of the GWSI data base are discussed by Mercer and Morgan (1981).

Seismic-Refraction Data

Seismic-refraction surveys were completed at 45 locations in stratified-drift areas to determine depth to water table and bedrock (pls. 1–5). A 12-channel, signal-enhancement seismograph recorded the arrival times of compressional waves generated by an energy source and received at a line of 12 geophones. The data were collected according to procedures described by Haeni (1988). Interpretations of depth to water table and bedrock were made by use of a computer program (Scott and others, 1972). Profiles of these data are shown in appendix C. Estimated depths were generally in agreement with data (where available) describing nearby wells, borings, and surface water, as well as with shallow auger-hole data collected after the refraction surveys.

Seismic velocities estimated for the materials that were used in the interpretations are 900 to 1,500 ft/s for unsaturated stratified drift, about 5,000 ft/s for saturated stratified drift, and generally greater than 10,000 ft/s for bedrock. Seismic velocity does not differ significantly with coarseness or fineness of saturated drift; thus, profiling does not aid in identifying the texture of the aquifers.

The altitude of the land surface in the figures was estimated by leveling the geophone locations relative to one another, and referencing that information to sea level by use of information shown on USGS topographic quadrangle maps. The accuracy of determinations of altitude of the land surface is variable, but is at least within ± 10 ft. This accuracy is acceptable considering the uncertainty involved in determining depths of water table and bedrock.

The estimated altitude of the water table in stratified drift, as determined by interpretation of the seismic-refraction surveys, are shown in the profiles in appendix C. The altitude of the water table was estimated from well data in the GWSI data base, from seismic-refraction surveys, and from test borings. The altitudes relative to the land surface are accurate to within several feet, and they represent the water table at the time of the seismic-refraction surveys. These surveys were done in the summer and fall of 1987–89.

The estimated elevation of the buried bedrock surface are shown in appendix C. Accuracy of these elevations is less than the elevation of the water tables because errors in the interpretations of seismic-refraction surveys are cumulative. If a head, estimated by interpretation of seismic-refraction data, is high, the estimated elevation of the bedrock surface will be low by an even greater amount. Additional error will result if the relief of the bedrock surface differs considerably over distances less than the 50- to 100-foot geophone spacing used in the surveys or if a thick layer of till overlies bedrock. If the seismic velocity in one till is significantly faster than the velocity in saturated stratified drift, the estimated bedrock surface would be too high. If the seismic velocity in till only is slightly faster than the seismic velocity in saturated stratified drift, the estimated depth to bedrock would be correct, but the thickness of the saturated stratified drift would be overestimated. Estimates of depth to bedrock probably are correct to within 10 percent.

Test Borings

Test borings were drilled with a USGS hollow-stem auger rig at 50 sites during this study (pls. 1–5). Many of these sites were along or near seismic-refraction surveys to verify the depth to water table, the depth to refusal or bedrock, and the saturated thickness of the stratified drift. Samples of subsurface materials at shallow depths (less than 20 ft) and from above the water table were obtained by bringing these materials to the surface by rapid rotation of the fluted augers used for drilling. Samples from greater depths and from below the water table (saturated materials) generally were collected every 10 ft by use of a split-spoon sampler. These data were used to describe the nature of the material penetrated (stratigraphic log).

Ground Water

Recharge, Discharge, and Direction of Flow

The sole source of water to the Pemigewasset River Basin is precipitation, which returns to the atmosphere by evaporation; flows overland to streams, ponds, and swamps within the area; and infiltrates the soil. Some infiltration is stored temporarily as soil moisture and is subsequently returned to the atmosphere by evaporation and transpiration from plants. The remaining infiltration percolates downward through the porous rock materials to the water table, where it becomes ground water. Ground-water recharge is, therefore, the water that is added to the zone of saturation. Ground water can reside in the saturated zone for many years, but it can return to the atmosphere by evapotranspiration and to low areas of the land surface by seepage. Ground water naturally flows through the pores of the sediments and the fractures in bedrock to discharge into brooks, streams, rivers, ponds, and lakes. Ground water can also be obtained from wells that tap the aquifers. Water that does not leave this basin through evapotranspiration or diversion by man eventually flows into the main stem of the Pemigewasset River through Franklin to the Merrimack River.

Soil permeability and vegetation affect the quantity of recharge to stratified-drift aquifers. Sandy soil on land surfaces with low relief covered by mature forests can absorb up to about 1 in/hr for short periods of time; however, a silty, clayey soil may absorb less than 0.1 in/hr (Heath, 1983). During the growing season, vegetation uses water from the unsaturated zone above the water table (soil moisture) and from the saturated zone (ground water) when the water table is at shallow depth. Soil moisture must be replaced before new water from precipitation migrates down through the unsaturated zone to the water table. Thus, recharge rates are lower during the growing season than during spring or fall. During August through October 1977, Hill (1979) estimated that one third of the rainfall that fell on a sandy plain with low relief in southern New Hampshire reached the water table and became ground water. A high percentage of precipitation becomes ground water after the killing frost in the fall (after soil-moisture deficiencies have been replaced) and before the growing season begins in late spring. During winter, much of the precipitation is held in surface storage as snow.

Elsewhere in the Northeast, recharge to stratified-drift aquifers is estimated to be as high as one-half of the annual precipitation (MacNish and Randall, 1982; Pluhowski and Kantrowitz, 1964). In the study area, average annual precipitation ranges from about 40 in. in the south to more than 60 in. in the high elevations of the north (Knox and Nordenson, 1955). On the average, about 40 in. of precipitation falls each year on the stratified-drift aquifers in the valley. If one-half of that amount (20 in.) becomes recharge to sandy aquifers, each square mile of aquifer receives about 0.9 Mgal/d. This recharge is termed direct recharge because it is derived from precipitation that falls directly on the aquifer.

A source of indirect recharge to stratified-drift aquifers comes from adjacent till-covered bedrock uplands. Morrissey (1983) estimated that the average annual lateral inflow of ground water from upland areas to a stratified-drift aquifer in western Maine is 0.5 $[(ft^3/s)/mi^2]$. If this rate of recharge is applicable to this study area, then there could be about 0.3 Mgal/d of lateral recharge to stratified-drift aquifers from each square mile of adjacent upland area. The lateral flow probably increases after spring recharge and decreases during summer.

Indirect recharge is present where tributary streams draining upland areas cross stratified-drift aquifers (Randall, 1978). During summer, if the water table is below the stream, infiltration to the aquifer can occur through the permeable streambeds. Ambient ground water from stratified-drift aquifers discharges to streams, rivers, lakes, and wetlands and through ground-water evapotranspiration. Pumped wells produce artificial discharge. Ambient ground-water flow in stratified-drift aquifers is from the valley sides toward surface-water bodies. This flow regime is altered in some broad lowlands where ground water flows from a central area in different directions toward the main river and a tributary stream.

Water Levels

Periodic water-level measurements were made by the USGS at 27 test wells in stratified drift during this study from the time each well was installed until September 1989. Hydrographs from Franklin well 1 (an observation well with a long record in stratified drift 1 mi south of the study area) and New London well 1 (a hillside observation well with a long record in till about 8 mi west of the study area) illustrate the natural patterns of ground-water recharge and discharge (fig. 5). During the nongrowing season, a rising water table indicates that recharge exceeds discharge. During the growing season, discharge generally exceeds recharge because most of the precipitation is returned to the atmosphere through evapotranspiration. The data from Franklin well 1 and the other wells measured during this study support the conclusion reached for other parts of New Hampshire that natural water-level fluctuations rarely exceed 10 ft and are generally less than 5 ft in stratified-drift aquifers (Cotton, 1988, 1989; Moore, 1990).

The altitudes of water tables in stratified-drift aquifers are shown on plates 1–5. Maps of the water tables are based on data derived from (1) elevations of streams, rivers, ponds, and lakes as shown on USGS topographic base maps (1:24,000-scale); (2) well and boring records in the GWSI data base; and (3) seismic-refraction profiles. The contour interval on the water-table maps is either 20 or 40 ft and reflects the topographic contour interval of the base maps. In some stratified-drift areas where no water-table data were available, contours were not drawn. The horizontal component of ground-water flow is at right angles to the contour lines. Arrows are drawn on plates 1–5 to illustrate these generalized flow directions.

Aquifer Characteristics

Saturated Thickness and Storage

The saturated thickness of an unconfined stratified-drift aquifer is the vertical distance from the water table to the bottom of the aquifer, typically the contact with till or bedrock. The saturated thickness approaches zero at the hillside boundaries of these valley aquifers and is generally, but not always, greatest at some more central part of the are underlain or overlain by fine sand, silt, or clay, the total thickness can be determined through seismic-refraction profiling, but the thickness of each subunit is not known. Total saturated thickness is used for constructing saturated-thickness maps.

The amount of ground water in storage depends not only on saturated thickness but also on the storage coefficient. In water-table (unconfined) aquifers, the storage coefficient is virtually equal to the specific yield—the amount of water that can be obtained by gravity drainage from a unit volume of the aquifer. Analyses of 13 samples of unconsolidated materials from southern New Hampshire that ranged from fine-grained lacustrine sands to coarse-grained sands and gravels indicated specific yields ranged from 0.14 to 0.34 and averaged 0.26 (Weigle and Kranes, 1966).

Saturated-thickness maps can be used to estimate the total amount of ground water stored in an aquifer. The volume of an aquifer can be approximated by summing the products of the areas between successive pairs of saturated-thickness contours multiplied by the average saturated thickness for each interval. The actual volume of ground water stored in the aquifer can then be estimated by multiplying the saturated volume by the storage coefficient.

Saturated-thickness maps shown on plates 6–10 were prepared by use of data from surficial-geology maps, seismic-refraction profiles, test drilling, and the GWSI data base. A 40-foot contour interval was used to show saturated thicknesses of stratified drift, which range from 0 to more than 280 ft. The entire saturated thickness may not be aquifer sediments. Layers of saturated silts and clays that overlie, underlie, or are within the aquifer are included in the saturated thicknesses.

The contacts between stratified drift and till mark the edge of the stratified-drift aquifers and represent zero saturated thickness. Locations of bedrock outcrops within aquifer areas indicate points of zero saturated thickness.

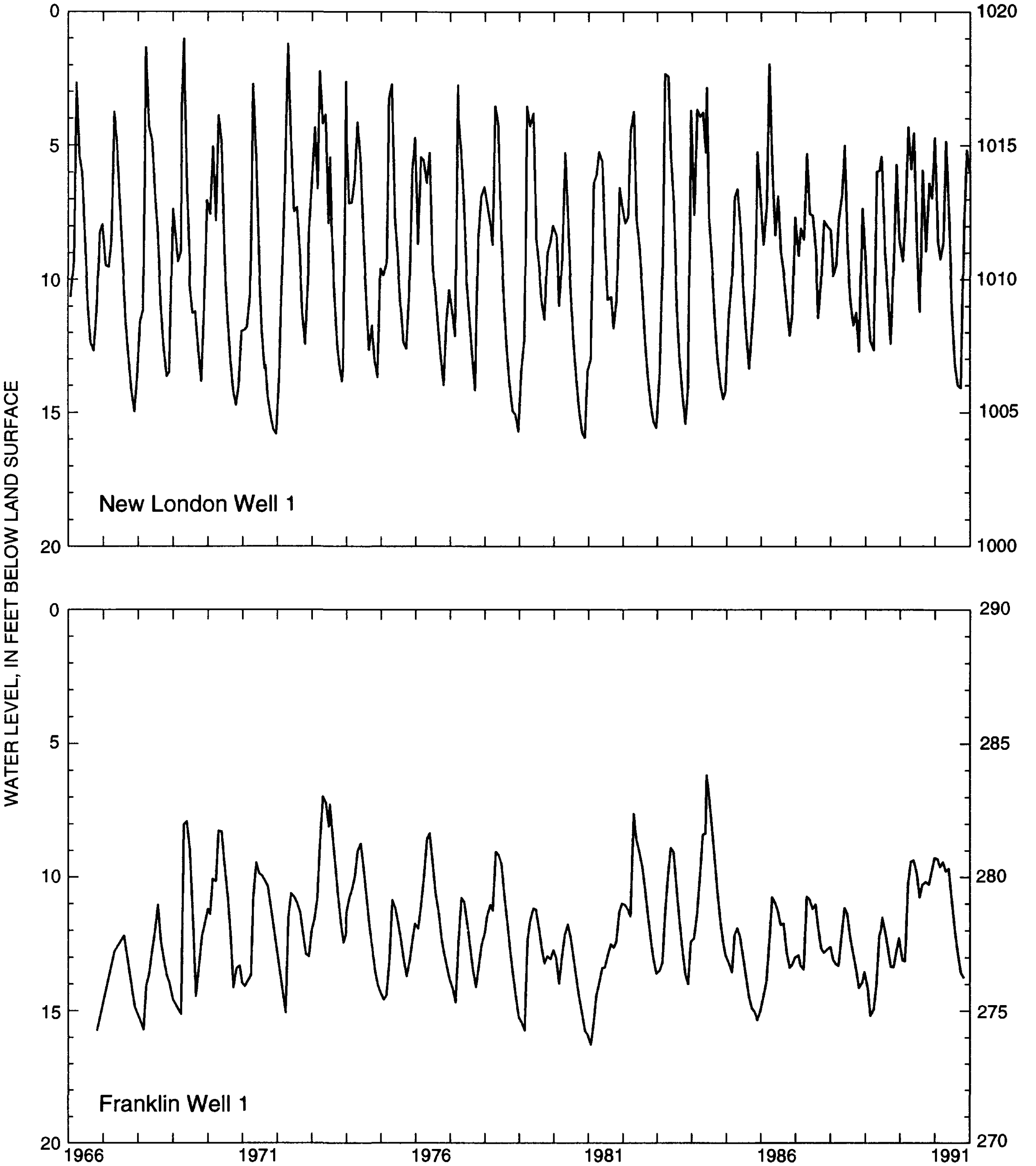


Figure 5. Long-term water levels at an observation well (New London well 1) in till and an observation well (Franklin well 1) in stratified drift, central New Hampshire.

Seismic-refraction profiles show the depths to the water table and depths to bedrock, but they generally do not show depth to till deposits unless the till is thick and has a seismic velocity that is significantly faster than the seismic velocity in saturated stratified drift. For the purpose of constructing the maps presented in this study, till was assumed to be thin (less than 10 ft thick) unless there was evidence to the contrary.

In some areas, saturated thickness was determined from test borings by the USGS. Reported saturated thickness are the distances from points where the test borings reached the water table down to the top of till or, in places, where till was not found, down to the top of bedrock.

Well and test-hole data stored in the GWSI data base were used in the construction of the saturated-thickness maps. For many sites, no data were available on the depth to the bottom of the stratified drift and the depth to the water table. For example, data from wells drilled into bedrock usually reveal depth to the bottom of the stratified drift but not depth to the water table. In contrast, data from shallow dug wells usually provide depth to the water table but not depth to the bottom of the stratified drift.

The altitude of the water table was obtained from the water-table maps (pls. 1–5). Depths to the bottom of stratified-drift deposits were assumed to be indicated by one of the following factors, in the priority shown:

1. depth to top of till, if known;
2. depth to top of bedrock, if known; and
3. length of well casing minus 10 ft, if the well is known to penetrate bedrock. Depth to bedrock is assumed to be about 10 ft above the bottom of the casing.

If a boring penetrated stratified drift but did not reach bedrock, the depth to refusal was taken to be equal to or less than the depth to the bottom of the stratified drift. Saturated thickness was then assumed to be greater than or equal to the difference between the water-table depth and the refusal depth. If a well penetrated stratified drift and neither bedrock nor refusal was reached, the bottom of the well was assumed to be above the bottom of the stratified drift. Saturated thickness was assumed to be greater than the difference between the water-table depth and the depth to the bottom of the well.

Saturated thickness could not be contoured in some areas because of a lack of data. Extrapolation of downstream bedrock-surface profiles in the Pemigewasset River and major tributary valleys must be used with caution because bedrock surfaces in several reaches were scoured and overdeepened by glacial ice. As a result, altitudes of the bedrock in these areas are below any bedrock-controlled base level.

Transmissivity and Hydraulic Conductivity

Hydraulic characteristics of stratified sediments that affect ground-water storage and flow are related to size and shape of sediment grains (and consequently the size and arrangement of voids or pore spaces between grains) and grain-size distribution (sorting) within a sediment. Thus, these characteristics are also affected by depositional environments. Stratified deposits of gravel, sand, silt, and clay have abundant pore space between grains; primary porosity may be greater than 30 percent. Primary porosity increases with the degree of sorting but not necessarily as a function of grain diameter. A well-sorted medium sand and a well-sorted fine gravel may have similar primary porosities.

Primary porosity is a measure of the space available for ground-water storage. For porosity to be effective, the pore-spaces in the aquifer material must be interconnected. A more useful measure of ground-water storage is specific yield. Specific yield is smaller than porosity because some water is held on grain surfaces by tensional forces and will not drain by gravity. Specific yield is larger in well-sorted sediments than in poorly sorted sediments. Specific yield also increases with increasing grain size in sediments with the same degree of sorting.

The relatively large pore spaces and specific yield of medium to very coarse sand and gravel allow not only significant storage but also relatively rapid transmission of ground water. In contrast, despite significant storage of ground water, the small pore spaces and specific yield of clay, silt, and fine sand allow very slow transmission of water. Consequently, the hydraulic conductivity of fine-grained sediments is low and these deposits form low-yield aquifers, whereas the hydraulic conductivity of medium sand and coarse-grained sediments is high and these deposits form high-yield aquifers.

Aquifer transmissivity at a specific site was derived from estimates of bulk hydraulic conductivity of lithologic units in the aquifers. Hydraulic conductivity, in turn, was estimated from grain-size distributions of samples of aquifer materials by use of the regression equation developed by Olney (1983). The vertical and horizontal vector components of hydraulic conductivity are not accounted for by this equation. In this relation, an effective grain size (D_{10}, in phi units) was used to estimate hydraulic conductivity (K, in feet per day) with the following equation:

$$K = 2,100 \times 10^{-0.655\,(D_{10})} \qquad (1)$$

The effective grain size (D_{10}) is a controlling factor for the hydraulic conductivity of stratified drift in New Hampshire and is defined as that grain size where 10 percent of the samples consist of smaller grains and 90 percent of the samples consist of larger grains. Olney (1983) developed this relation from the results of permeameter tests of stratified-drift samples from Massachusetts. Moore (1990) found that this relation yielded results that fall within the range of results from other relations that have been developed between grain size, size distribution, and hydraulic conductivity (Krumbein and Monk, 1942; Bedinger, 1961; Masch and Denney, 1966). Results of aquifer-test data indicate that equation 1 may not give accurate results for very coarse-grained sand and (or) gravel. Estimates of hydraulic conductivity for aquifers with coarse sands and gravels were, in part, based on comparisons with aquifer-test data for similar deposits. Hydraulic conductivities (and transmissivities) based on grain-size relations are estimates only and may differ significantly from results of aquifer tests.

Hydraulic conductivity was estimated for 454 samples of stratified drift from southern New Hampshire by means of equation 1. The samples were collected in the Exeter and Lamprey River Basins (Moore, 1990); in the seacoast area and the Lower Merrimack River Basin (Flanagan and Stekl, 1990); in the Bellamy, Cocheco, and Salmon Falls River Basins (Mack and Lawlor, 1992); in the Lower Connecticut River Basin (Moore and others, 1994); and in the Contoocook River Basin (Harte and Johnson, 1995; and Ayotte and Toppin, 1995). The grain-size distribution and the effective grain size (D_{10}) were determined for 153 samples for this study.

Hydraulic conductivities calculated from equation 1 were plotted against median grain size in phi groups, and the resulting plot was divided into three categories of degree of sorting (fig. 6). These categories are strictly relative and are used to describe the types of stratified-drift aquifer deposits found in New Hampshire. The degree of sorting was based on the standard deviation of each individual sample.

If standard deviations were large (greater than 1.75 phi), the samples were considered "poorly sorted"; if standard deviations were intermediate (1.25-1.75 phi), the samples were considered "moderately sorted"; and if standard deviations were small (less than 1.25 phi), the samples were considered "well sorted," (Ayotte and Toppin, 1995). A regression equation was developed for each of the three categories to determine the relation between hydraulic conductivity and median grain size (fig. 6). The coefficient of determination (R^2) was 0.93 for the "well sorted" samples, 0.72 for the "moderately sorted" samples, and 0.54 for the "poorly sorted" samples. The calculated hydraulic conductivity, grouped by ranges of median grain size and by ranges of standard deviation (degree of sorting), is shown in table 2.

Hydraulic conductivities were calculated for each median phi group and were averaged to determine a group mean hydraulic conductivity. For example, mean hydraulic conductivity of sediment samples whose median grain size was described as medium sand and well sorted was 38 ft/d (average of 25 and 51 ft/d; table 2). Very fine sand, silt, and clay deposits in the study area were not analyzed for grain-size distribution because their hydraulic conductivities are typically low (less than 4 ft/d) and are therefore considered insignificant (Todd, 1980).

The values in table 2 were used to estimate hydraulic conductivities from lithologic descriptions in logs from test borings and wells. For example, for a lithologic description of 10 ft of moderately sorted coarse sand overlying 20 ft of well sorted fine sand overlying bedrock, the hydraulic conductivities assigned would be 39 ft/d (the average of 30 and 48 ft/d) and 9 ft/d (the average of 12 and 6 ft/d), respectively. The estimate of transmissivity, based on the same description, would be (10 ft $\times$ 39 ft/d) + (20 ft $\times$ 9 ft/d) or 570 ft^2/d.

Ranges of transmissivity (less than 2,000; 2,000–4,000; 4,000–8,000; and greater than 8,000 ft^2/d) are shown on plates 6–10. For areas where little or no data were available, generalized drillers' logs and interpretations of depositional environments were used to estimate transmissivity from the relation between saturated thickness and hydraulic conductivity of stratified-drift aquifers shown in figure 7.

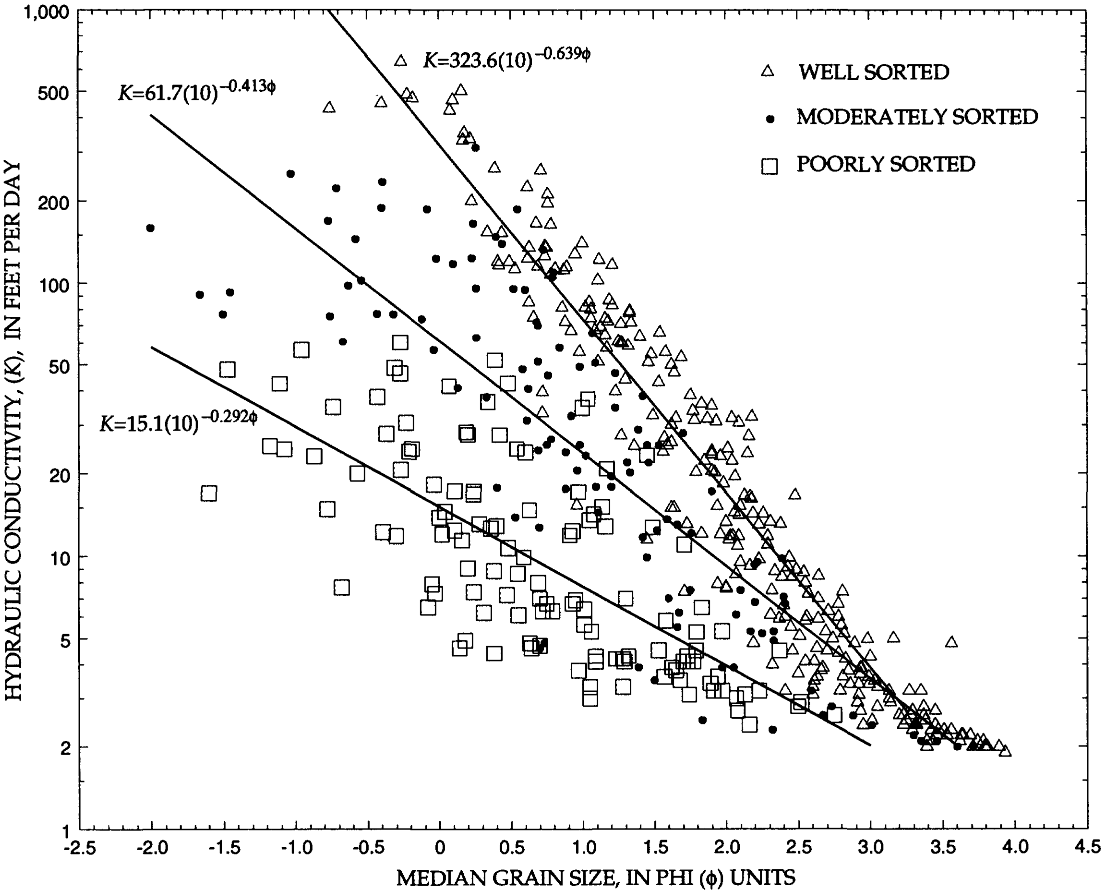


Figure 6. Relation between estimated hydraulic conductivity, median grain size, and degrees of sorting of stratified-drift samples, central New Hampshire.

Table 2. Relation of mean hydraulic conductivity to median grain size and degree of sorting

[From Ayotte and Toppin (1995). <, actual value is less than value shown; >, actual value is greater than value shown; --, no data]

Median grain size (phi units)	Median grain description	Mean hydraulic conductivity (k), in feet per day		
		Well sorted, standard deviation <1.25 phi	Moderately sorted, standard deviation 1.25 to 1.75 phi	Poorly sorted, standard deviation >1.75 phi
-1.75	Granules	--	320	49
-1.25	Granules	--	200	35
-.75	Very coarse sand	970	120	25
-.25	Very coarse sand	470	78	18
.25	Coarse sand	220	48	13
.75	Coarse sand	110	30	9
1.25	Medium sand	51	19	7
1.75	Medium sand	25	12	5
2.25	Fine sand	12	7	3
2.75	Fine sand	6	4	2
3.25	Very fine sand	3	3	--
3.75	Very fine sand	2	2	--

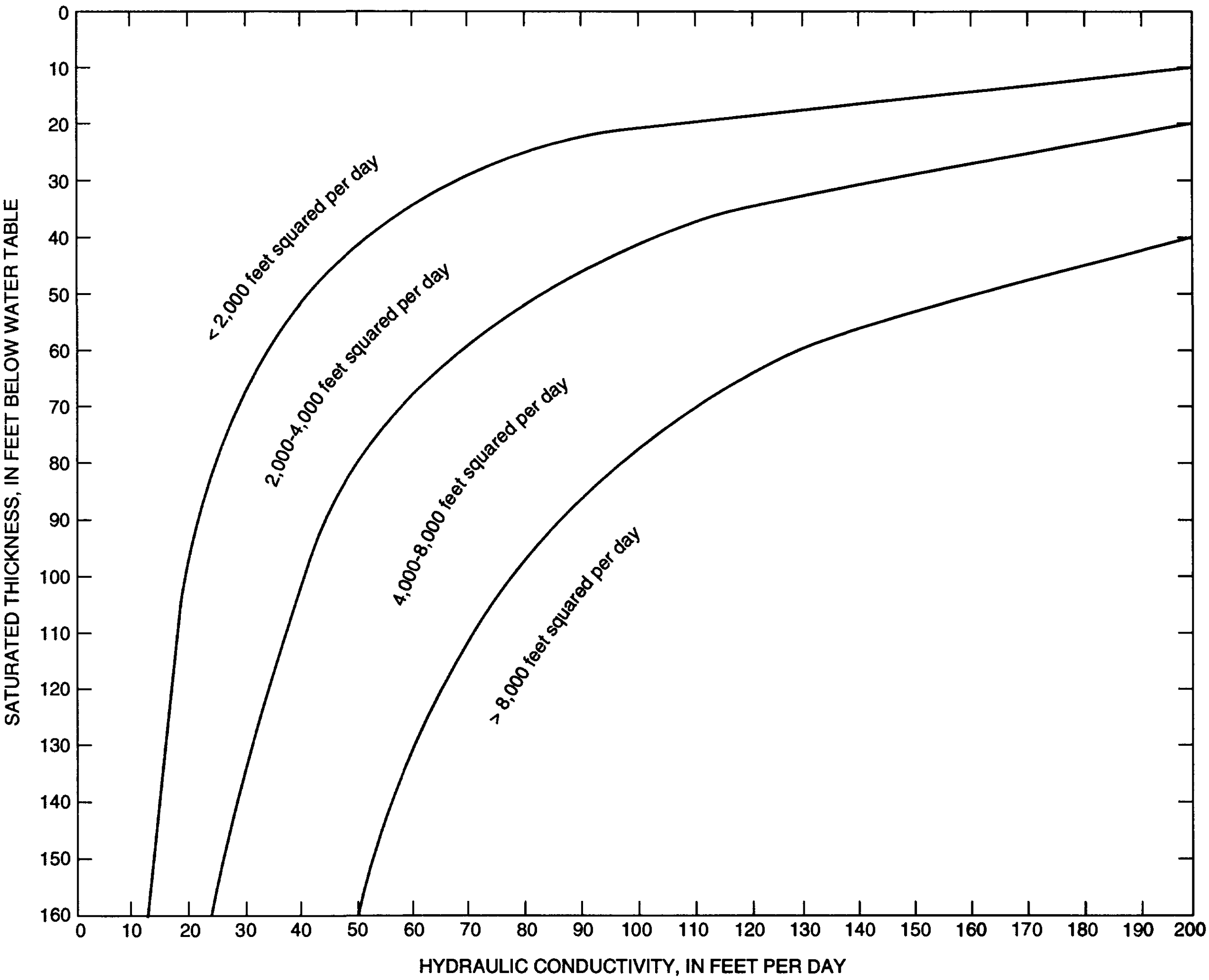


Figure 7. Ranges of transmissivity based on the relation between saturated thickness and hydraulic conductivity of stratified-drift aquifers, central New Hampshire.

Locations and Descriptions of Selected Stratified-Drift Aquifers

Most of the stratified-drift aquifers within this basin are within an area mapped as 20 contiguous topographic quadrangles (1:24,000 scale). This area has been separated into five base-map areas of four quadrangles each (fig. 1). In this report, these areas are referred to as southern, central, northern, southwestern, and northwestern areas. Aquifer boundaries, data-collection locations, and altitudes of water tables are shown on plates 1–5. Aquifer boundaries, saturated thickness, and transmissivity of stratified-drift aquifers are shown on plates 6–10. Brief discussions of information shown on the plates are included in the following sections.

Lower Pemigewasset River Basin

The lower part of the Pemigewasset River (the southern area) extends southward from New Hampton and Bristol to Franklin (pls. 1 and 6). The towns of Sanbornton and Hill also are in this area.

Bagoon Brook Valley

In Bagoon Brook Valley, stratified drift has a saturated thickness of at least 40 ft at test hole NHA-15, but because the sand is fine, the potential productivity of the aquifer is low. The aquifer deposits are coarse near the confluence of Bagoon Brook and the Pemigewasset River at the southern end of a south-trending esker.

New Hampton Town Center

The valley of the central village is filled with thin sands underlain by fine-grained deposits. Springs at the coarse-sand and fine sand contact and shallow wells in the upper sand supply much of the water used by the New Hampton Fish Hatchery.

Newfound River Valley

Surface observation indicates that stratified-drift deposits in the northern 2 mi of the Newfound River Valley are coarse grained. Saturated thickness is probably less than 40 ft except near the outlet of Newfound Lake. Transmissivity is probably less than 2,000 ft^2/d.

Stratified drift in the southern part of the valley is fine grained. Directly west of Bristol center, saturated thickness exceeds 40 ft. The aquifer deposits are fine and the potential productivity of the aquifer is low.

Confluence of the Smith and Pemigewasset Rivers

Southeast of the center of Bristol near the confluence of the Smith and Pemigewasset Rivers, saturated thickness in some areas exceeds 80 ft, as determined from seismic-refraction profiling (appendix C.4). A conceptual depositional model indicates that the deposits are coarse grained and have a high potential for ground-water production.

Needle Shop Brook Valley

The present gravel-pack well (HNW-2) that supplies the village of Hill is in a small stratified-drift aquifer along Needle Shop Brook. In the past, because of a nearby dairy farm, additional pumpage from this aquifer was not possible if wellhead-protection requirements were to be met. However, the farm ceased operations in 1992.

Pemigewasset River Valley in Hill and Franklin

The aquifer in the main valley extends from just north of the confluence of Needle Shop Brook to one-half of a mile north of the Route 3 bridge in Franklin. The aquifer deposit is sand near the confluence of Needle Shop Brook at wells HNW-6 and HNW-7 (fig. 8, appendix C.8). The aquifer deposits are coarser grained at test well SCW-129, 2 mi to the south. Coarse deposits were penetrated at test well FKW-51, which is 2,000 ft upstream from Franklin Falls Dam. The most productive gravel well for the city of Franklin (FKW-29) is about 800 ft below this dam. Municipal wells FKW-2 and FKW-3 are about 3,000 ft south of the dam; well FKW-2 was shut down in 1992 because of contamination by volatile organic compounds (VOCs).

Salmon Brook Valley

Currently (1992), only the downstream part of the aquifer in the Salmon Brook Valley is being used for large-scale water supply. Franklin has a well field consisting of 40 clustered well points in Sanbornton (SCW-50) about 1,200 ft northeast of Giles Pond. About 0.8 Mgal/d can be pumped from this well field, although only 0.5 Mgal/d was pumped in 1990.

The other area with high potential for water supply is south of Cawley Pond. Test well SCW-135 penetrated more than 60 ft of saturated sand interspersed with some gravel (fig. 9 and appendix C.12). This aquifer may be important to the village center of North Sanbornton that presently has no public water supply.

Middle Pemigewasset River Basin

The middle part of the Pemigewasset River Basin (the central area) extends northward from New Hampton to the southern part of Thornton (pls. 2 and 7). It also includes the towns of Ashland, Bridgewater, Campton, Holderness, and Plymouth.

Ashland, Bridgewater, and New Hampton

The town of Ashland uses surface water as a source for water supply. Proposals to upgrade that system are being considered by the town in response to suggestions of the NHDES, Water Supply and Pollution Control Division (WSPCD). Potentially, the most productive part of this valley aquifer in this area is an esker that extends more than 6 mi southward from about 2,000 ft north of the Plymouth-Bridgewater townline. A wastewater-treatment plant is on this esker in the southwest corner of town, and the town landfill is in fine-grained deposits just east of the esker near the treatment plant. North of these facilities a test well (APW-1) drilled in this esker in the late 1960's is reported to be about 100 ft deep. At the time of construction, water from this well reportedly contained

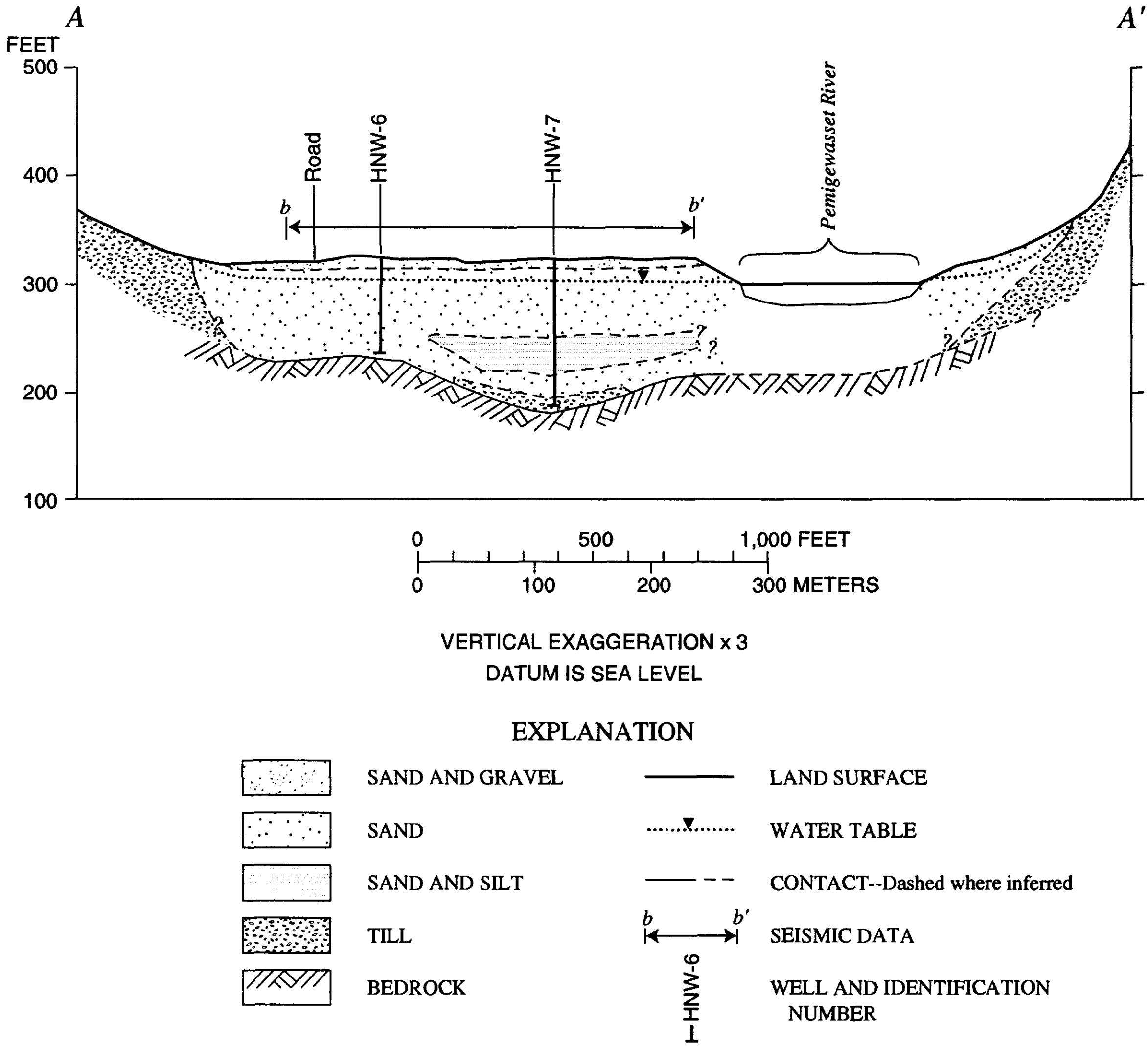


Figure 8. Geohydrologic section *A-A'* in the town of Hill. (Line of section is shown on plate 1.)

elevated chloride concentrations. The area between this test well and the place where the esker crosses the river into Bridgewater has a high potential for ground-water production.

The esker in the northeast corner of Bridgewater has high potential to yield water. A power company has two gravel-pack wells (BYW-41 and BYW-42) in this esker that yield about 450 gal/min. This rural part of town does not have a public supply and currently (1992) does not need one.

South of Squam River in New Hampton the esker is 4 to 5 mi long and is east of the Pemigewasset River; it has high potential to yield water. No public water-distribution system has been constructed in the eastern part of the town of Holderness around the western shore of Squam Lake. There is a low potential for ground-water production in the few small stratified-drift deposits near the lake.

Ashland, Holderness, and Plymouth

The two gravel-pack wells (PYW-9 and -10) that supply water to the town of Plymouth are near each other and the confluence of the Pemigewasset and Baker Rivers (pl. 2). This area and eastward to the valley wall in Holderness (fig. 10) are the only proven production sites in this part of the valley, although substantial test drilling has been done. The rest of the lowlands in both valleys are underlain by thin sands overlying glacial lake bottom very fine sand, silt, and clay (figs. 11, 12, and 13). In places in the main valley

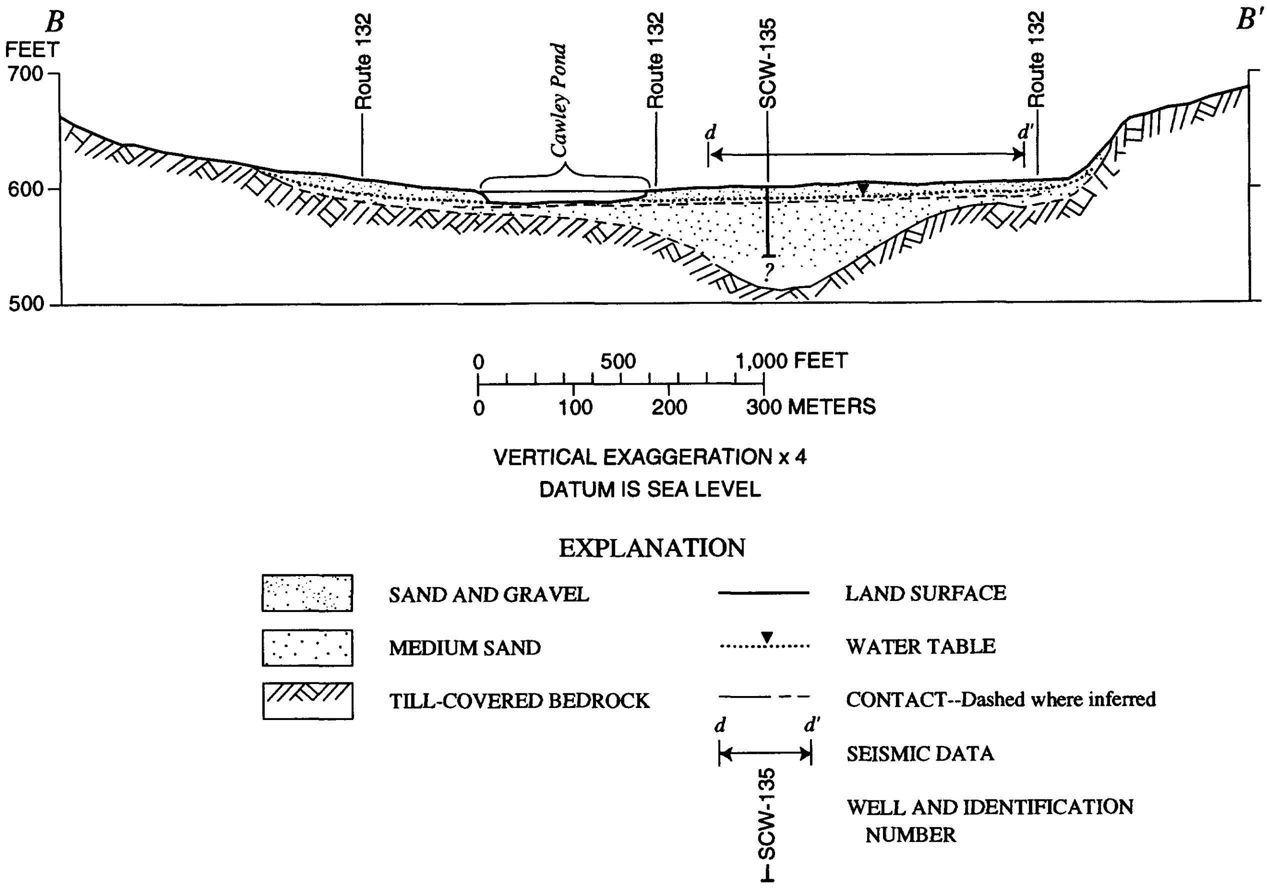


Figure 9. Geohydrologic section *B-B'* in the town of Sanbornton. (Line of section is shown on plate 1.)

(including the western most part of Holderness and northwestern corner of Ashland), the thinly saturated (about 20 ft) gravelly sand in the main valley (including the western most part of Holderness and northwestern corner of Ashland) offers some potential for a well-point well field (fig. 11 and appendix C.3). The fine sands and poorly sorted gravelly sands in the upper part of the aquifer in the lower Baker River Valley have low potential to yield significant amounts of water to wells (fig. 12 and appendix C.9).

The north end of the Bridgewater-Ashland-New Hampton esker is in southern Plymouth. Only meager yields may be possible from the esker in Plymouth. This area of potential production from the esker was not tested because of lack of access. The western bank of the Pemigewasset River downstream from Livermore Falls and north of the Interstate Highway 93 bridge over the river also has not been tested because of difficult access.

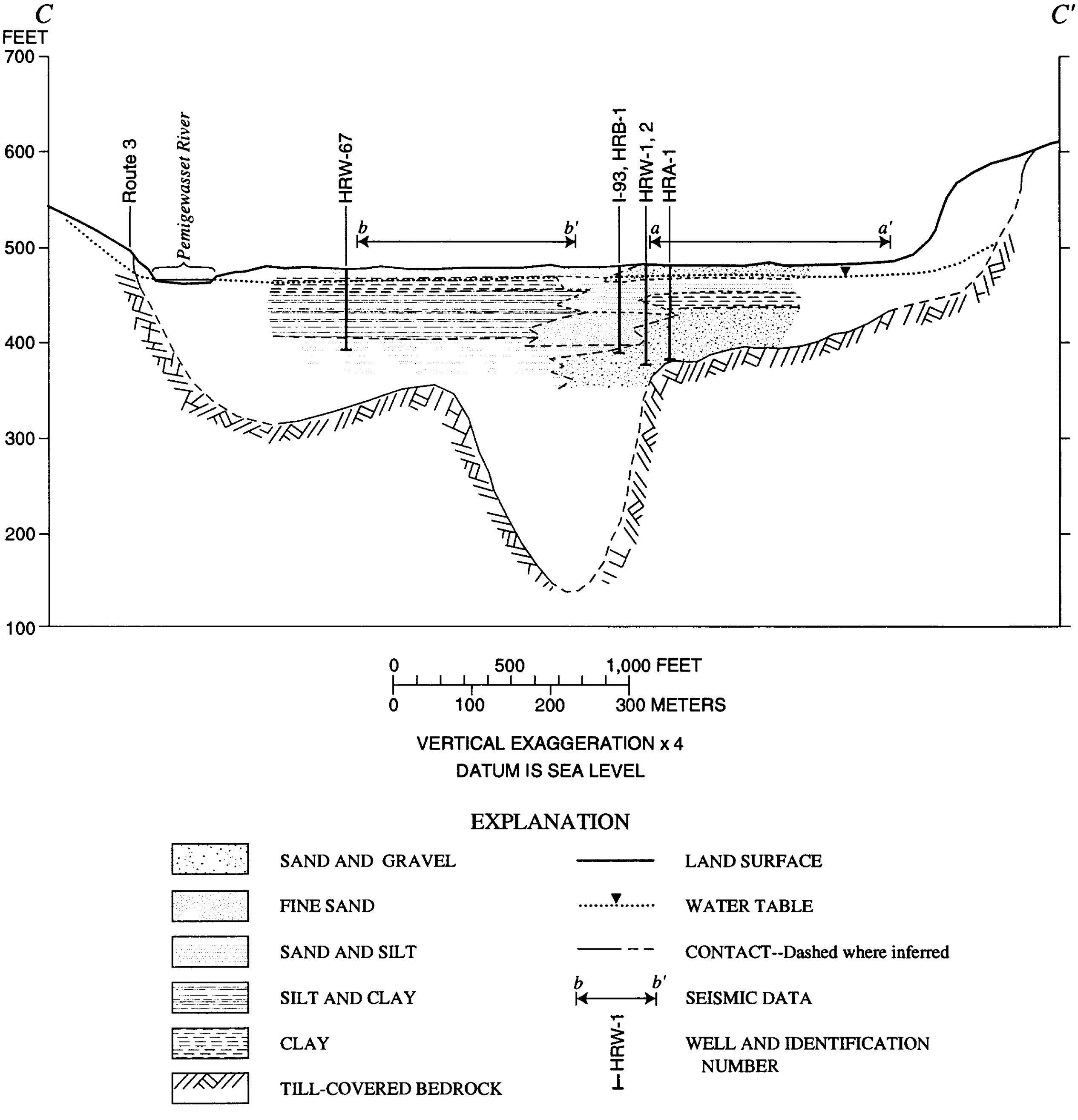


Figure 10. Geohydrologic section *C-C'* in the towns of Plymouth and Holderness. (Line of section is shown on plate 2.)

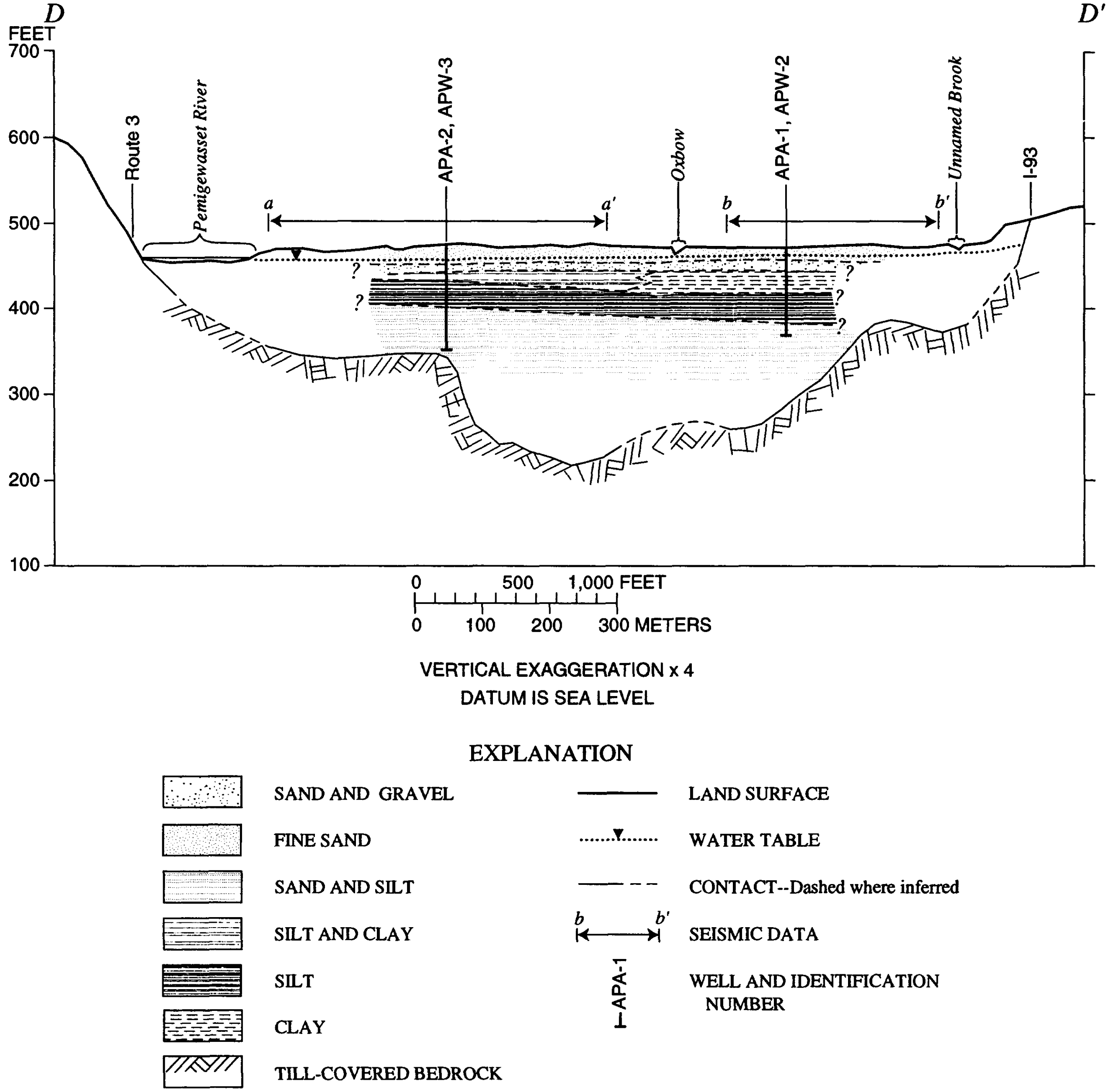


Figure 11. Geohydrologic section *D-D'* in the town of Ashland. (Line of section is shown on plate 2.)

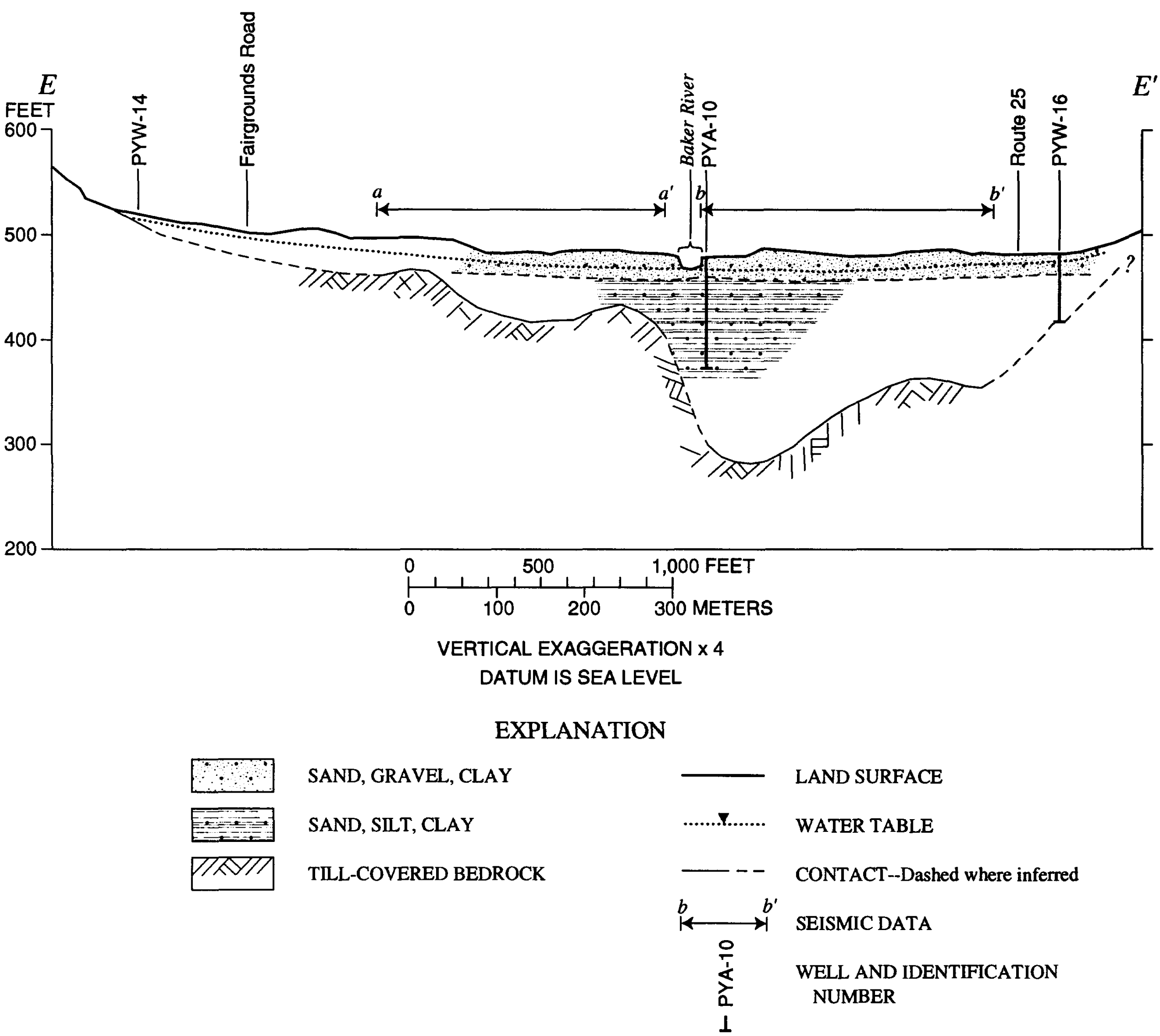


Figure 12. Geohydrologic section *E-E'* in the town of Plymouth. (Line of section is shown on plate 2.)

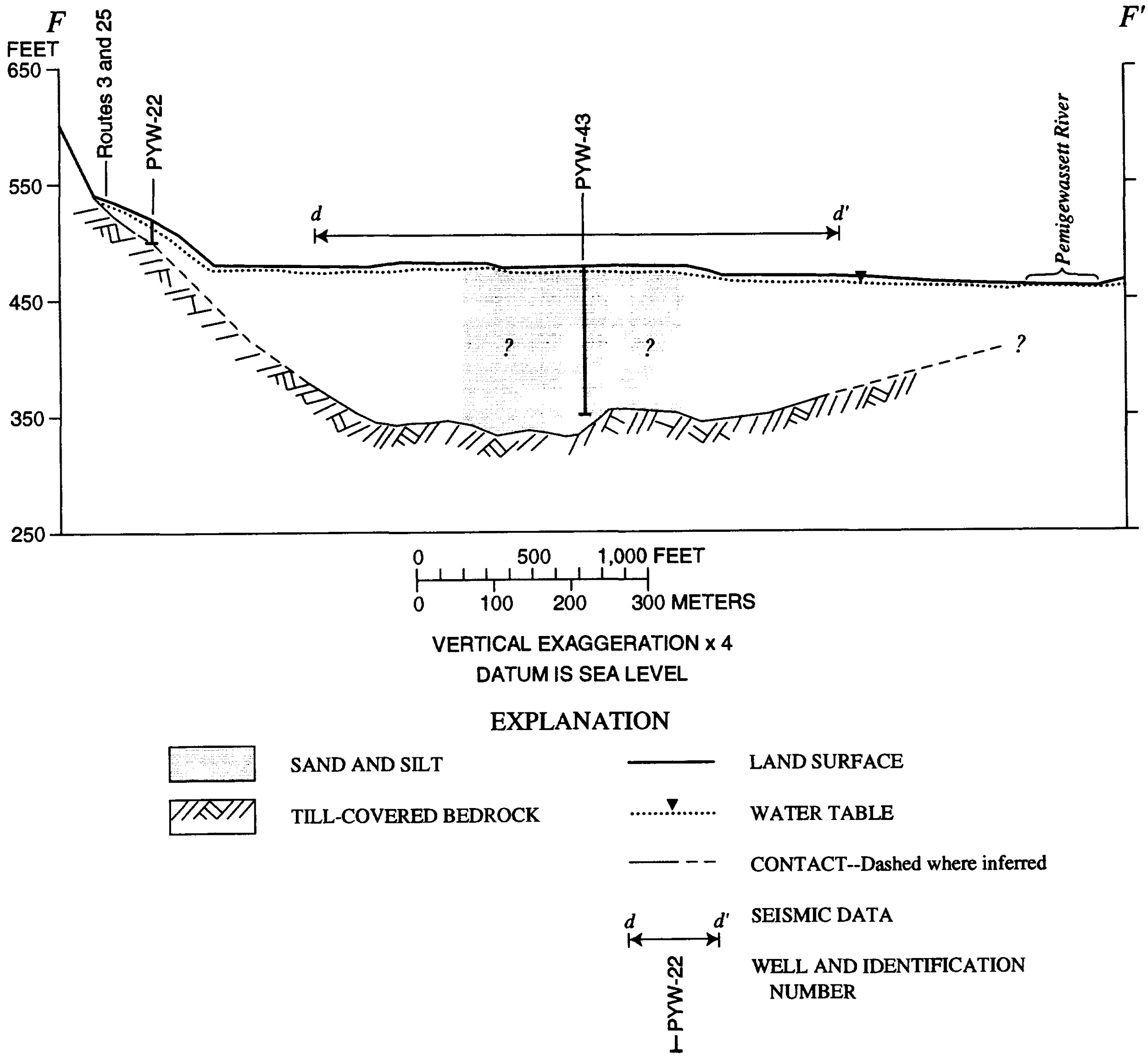


Figure 13. Geohydrologic section *F-F'* in the town of Plymouth. (Line of section is shown on plate 2.)

Campton and Southern Thornton

The Pemigewasset River Valley aquifer from southern Thornton to Beebe River consists of coarse-grained deposits. Test wells CBW-3 and CBW-4 penetrated 36 and 113 ft of saturated sediment (appendix C.5). Two production wells (CBW-84 and CBW-85) were drilled in Campton in 1990 on the western bank of the Mad River near the confluence with the Pemigewasset River. About 0.8 Mgal/d can be pumped from these wells, although only 0.04 Mgal/d was pumped in 1992.

Upper Pemigewasset River Basin

The upper part of the Pemigewasset River Basin (the northern area) extends northward from southern Thornton to Franconia Notch (pls. 3 and 8). In addition to Thornton, it includes the towns of Lincoln, Waterville Valley, and Woodstock.

Pemigewasset River Valley in Southern Thornton North to Lincoln

The stratified-drift aquifer consists of sand and gravel or sand overlying sand and silt (fig. 14 and appendix C.13). Shallow water-supply wells in the upper

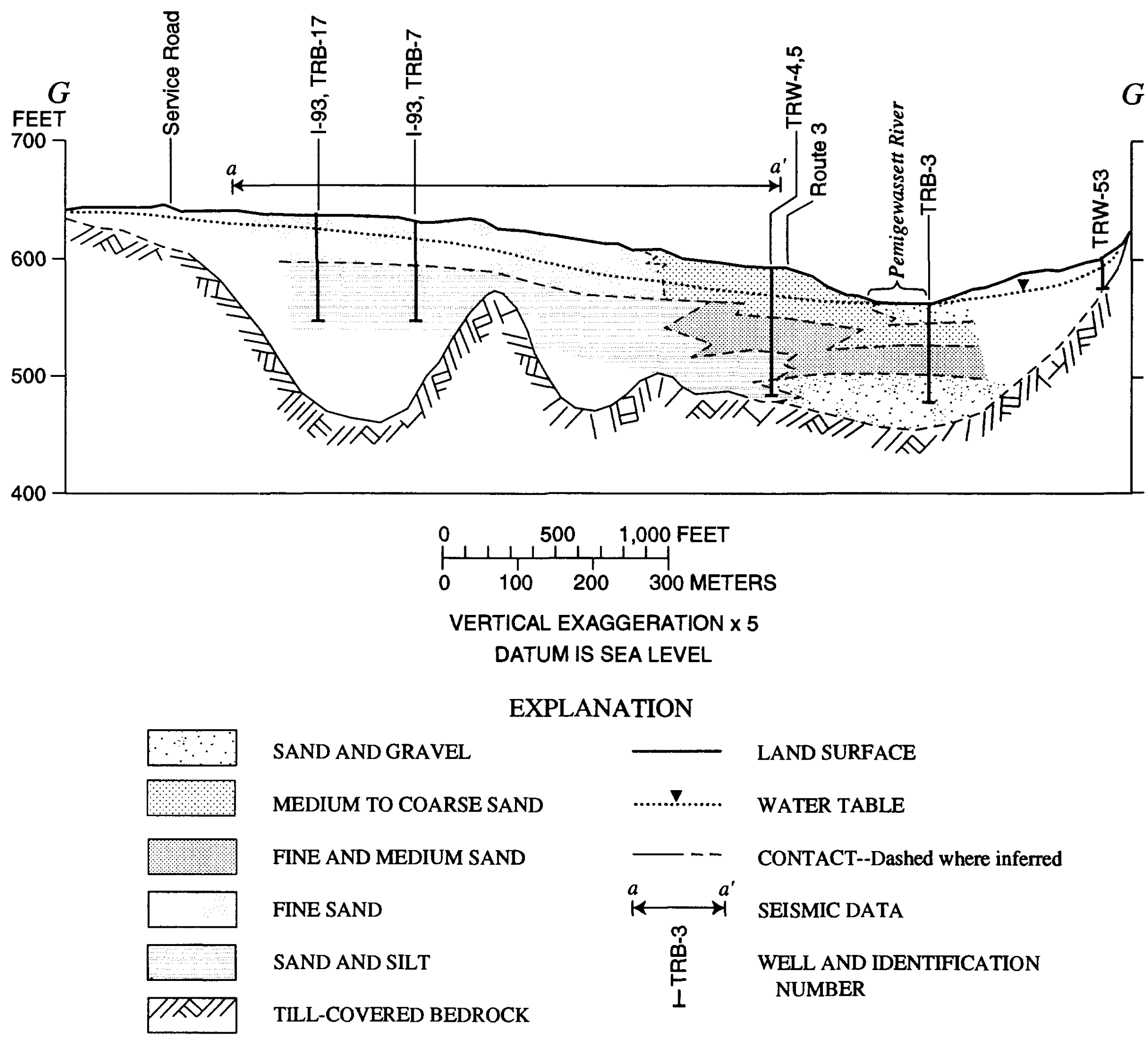


Figure 14. Geohydrologic section *G-G'* in the town of Thornton. (Line of section is shown on plate 3.)

coarse deposits provide the water supply for a local resort just south of interchange 30 on Interstate Highway 93. The stratified-drift aquifer deepens and coarsens significantly northward from the resort to the area of the two Woodstock water-supply wells (WSW-14 and WSW-38).

This public water-distribution system in Woodstock serves the small village of Woodstock and the large town center of North Woodstock. The two gravel-pack wells are on the east bank of the Pemigewasset River near Woodstock. Additional water supply is available from this aquifer. A model simulating ground-water flow was done for this aquifer and is described in the section "Evaluation of Aquifer Yield."

As part of its public-water-supply source, the town of Lincoln has a series of six shallow dug wells (LKW-1) in coarse gravel on the east bank of the main stem of the Pemigewasset River. The pumpage from these wells is primarily induced infiltration from the river. In July 1988, measured streamflow was reduced by about 1 ft^3/s in a short reach near the wells. Enough land and streamflow are probably available to allow for construction of additional large-diameter dug wells in this area.

Mad River Valley at Waterville Valley

The town of Waterville Valley pumps from a gravel-pack well (WFW-2) and a large-diameter dug well (WFW-4) in the same small stratified-drift aquifer. This is the only unconsolidated aquifer available to the town. The village center overlies part of this aquifer. Additional water can probably be withdrawn from the upgradient part of this aquifer.

Smith River and Newfound Lake Basin

In the southwestern area, the Smith River joins the Pemigewasset River in southern Bristol. The towns of Alexandria, Bristol, Danbury, Grafton, and Hebron are partly within this basin (pls. 4 and 8). The part of the Newfound Lake drainage basin shown on these plates includes parts of Alexandria, Bristol, Groton, and Hebron.

Smith River Valley in Eastern Danbury, Alexandria, and Bristol

The discontinuous stratified-drift aquifer is in this valley is composed primarily of thinly saturated kame terraces north of the river. A former glacial meltwater drainageway traverses the narrow tributary valley between Pillsbury Hill and Gordon Hill. Sands and gravels entrained by the former stream flowing through this channel were deposited in the wider part of the Smith River Valley in southeastern Alexandria. The potential productivity of the aquifer in this area is moderate.

Smith River Valley in Grafton and Danbury

Glaciofluvial sands and gravels underlie parts of the valley lowlands in Grafton and Danbury. There is a moderate to high potential for ground-water production in the valley in the western part of Danbury. Currently (1992), the town has no public water system. In the wide valley near the town center in Danbury, a seismic-refraction line (appendix C.6) indicated 110 ft of unconsolidated material; nearly 100 ft of saturated sand and gravel was penetrated by test well DBW-29 (fig. 15). At the eastern end of this broad valley, however, only silt and clay were penetrated at test hole DBA-1.

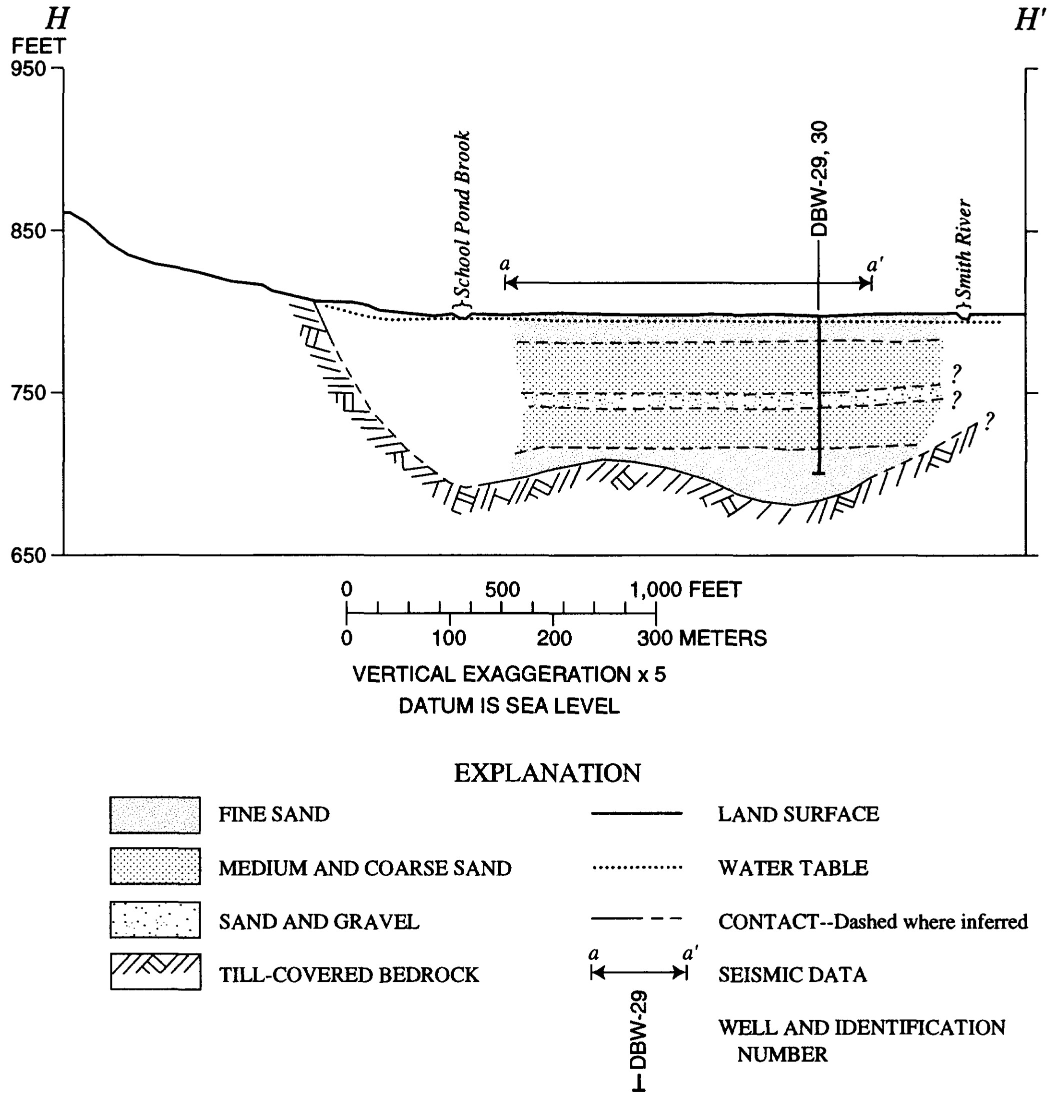


Figure 15. Geohydrologic section *H-H'* in the town of Danbury. (Line of section is shown on plate 4.)

Saturated thickness of stratified-drift deposits is not known in most of the Smith River Valley in Grafton. At one area north of Grafton Center near Kilton Pond, however, saturated deposits are more than 40 ft thick.

Fowler River Valley (Newfound Lake Basin) in Alexandria

Sand and gravel deposits are associated with a former glacial meltwater drainageway that extends southward from Hornet Cove on the southern shore of Newfound Lake in Bristol through the lower valley of the Fowler River and the tributary valley of Bog Brook. To the south of the broad lowland in Alexandria, this drainageway narrows along the headwaters of Bog Brook. The sand and gravel deposits are thin and occupy the narrow col (saddle) east of Pillsbury Hill. The potentially productive part of this aquifer is the northern part, from Newfound Lake to the area of the village. About 100 ft of saturated aquifer deposits were penetrated at test well AEW-21 (north of Bristol Road about mid-way across the valley in Alexandria) (fig. 16). The saturated thickness ranges from 40 to more than 120 ft based on about 5,000 ft of seismic-refraction profiling across the valley (appendix C.1

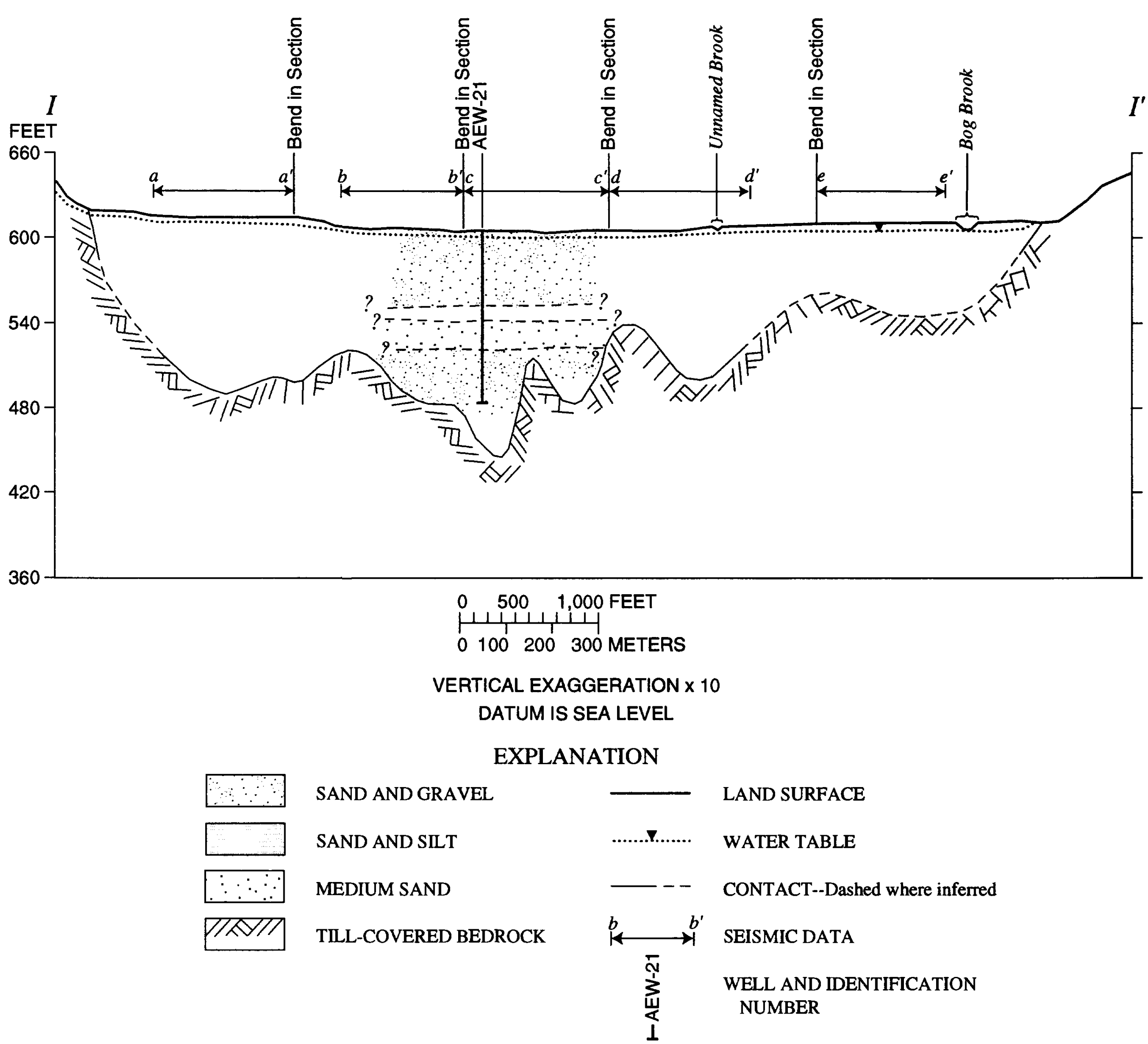


Figure 16. Geohydrologic section *I-I'* in the town of Alexandria. (Line of section is shown on plate 4.)

and C.2). Transmissivity exceeds 8,000 ft^2/d in or near the thickest deposits. Bristol pumps from a gravel-pack well (B2W-36) on the west bank of the Fowler River near West Shore Road and has purchased land on the opposite side of the river for a future well site.

Cockermouth River Valley (Newfound Lake Basin) in Groton and Hebron

Coarse-grained stratified drift underlies the valley of the Cockermouth River from the village center of Groton to Hebron Bay on Newfound Lake. Within the valley bottom in Groton, till is at or near the surface upstream from the powerline. Saturated thickness of sand and gravel ranges from 30 to 50 ft along a seismic-refraction profile about 1,200 ft east of the Groton-Hebron town line (appendix C.6). Saturated thickness ranges from 70 to 130 ft along two seismic-refraction lines (appendix C.7) on Audubon Society land at the eastern edge of Hebron village (fig. 17). Test well HLW-1 penetrated 110 ft of saturated fine to coarse sand and fine gravel on the north side of East Hebron Road. Estimated transmissivity in this aquifer exceeds 8,000 ft^2/d.

Baker River Basin

In the northwestern area, the Baker River joins the Pemigewasset River in Plymouth. The western part of Plymouth and parts of Rumney, Warren, and Wentworth are in this basin (pls. 5 and 10).

Lower Baker River Valley in Rumney and Plymouth

Most of the Baker River lowlands downstream from the central village of Rumney are underlain by fine- and medium-grained sand underlain by finer sand and silt. Coarse material underlies the terraces on the south side of Baker River (fig. 18, appendix C.11). In places, saturated thickness of these terrace deposits exceeds 120 ft. At a business location in Rumney Depot, a 355-foot well (RUW-33) with an open-end casing produces 10 gal/min from these deposits. Estimated transmissivity exceeds 8,000 ft^2/d. Coarse sand and gravel overlies fine-grained deposits in the center of the valley in West Rumney, but most of the saturated thickness is in the fine and medium sands (fig. 19 and appendix C.10).

Upper Baker River Valley in Wentworth and Warren

Glaciofluvial sands and gravels form the valley aquifers in Wentworth and Warren. Test well WIW-1 penetrated about 50 ft of saturated coarse sand and sand and gravel (fig. 20). Wentworth currently (1992) does not have a public water-supply distribution system; however, a community well may be needed for the central village in the future. There is a high potential for ground-water production upstream from the village where saturated thickness is greater than 40 ft.

Two gravel wells in Warren (WDW-18 and 19) are a major part of the water supply for the New Hampshire Fish Hatchery. Combined production of the two gravel wells is estimated to be 800 gal/min, according to records at the pumphouse. Test wells drilled as part of the exploration programs flowed until the production wells went on line. The hatchery also has a spring-fed canal at the edge of the valley. A shallow dug well (less than 8 ft deep) serves as a public-supply well for about 16 houses. Saturated thickness exceeds 40 ft in the central part of the main valley near the town proper, and estimated maximum transmissivity ranges from 4,000 to 8,000 ft^2/d.

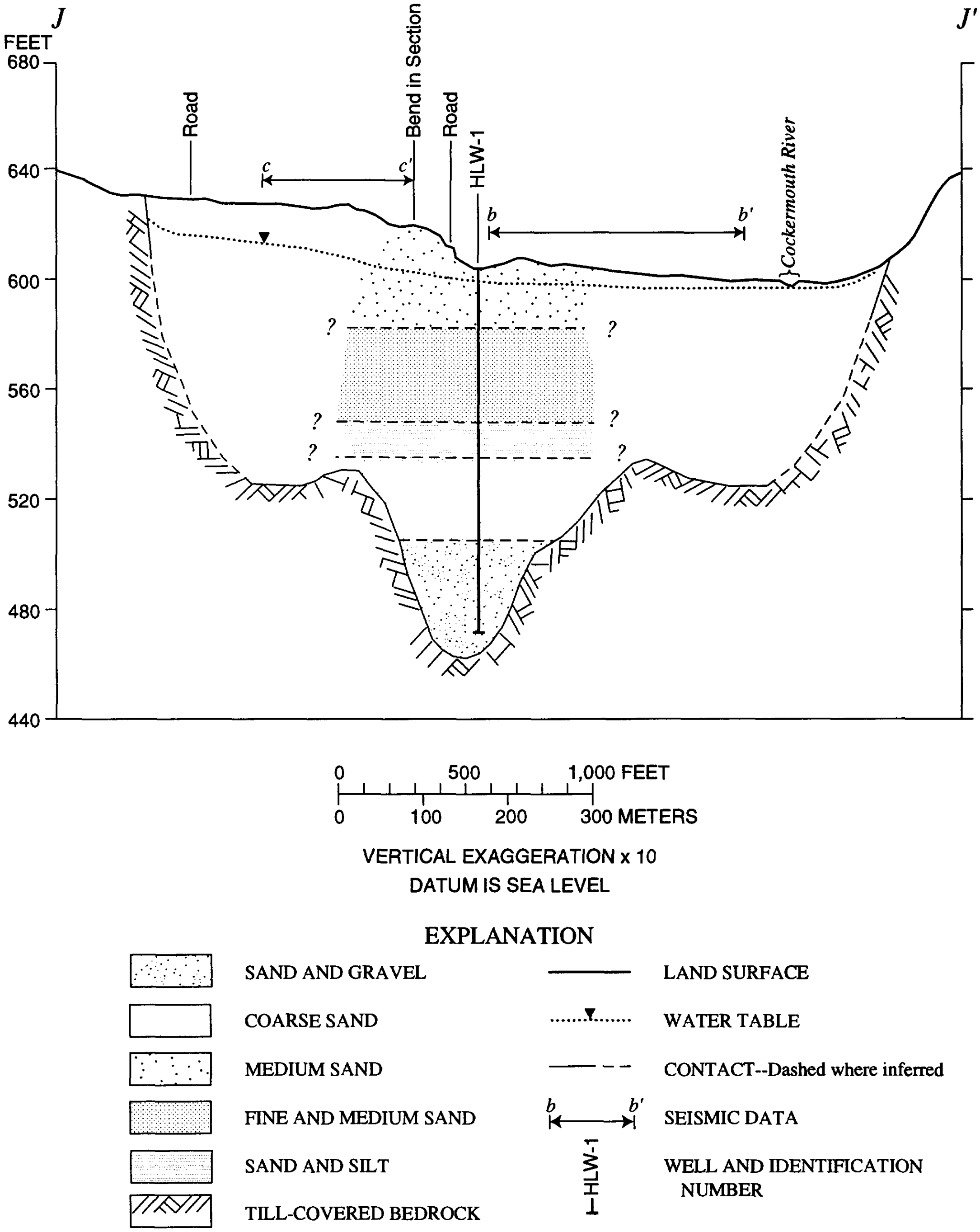


Figure 17. Geohydrologic section *J-J'* in the town of Hebron. (Line of section is shown on plate 4.)

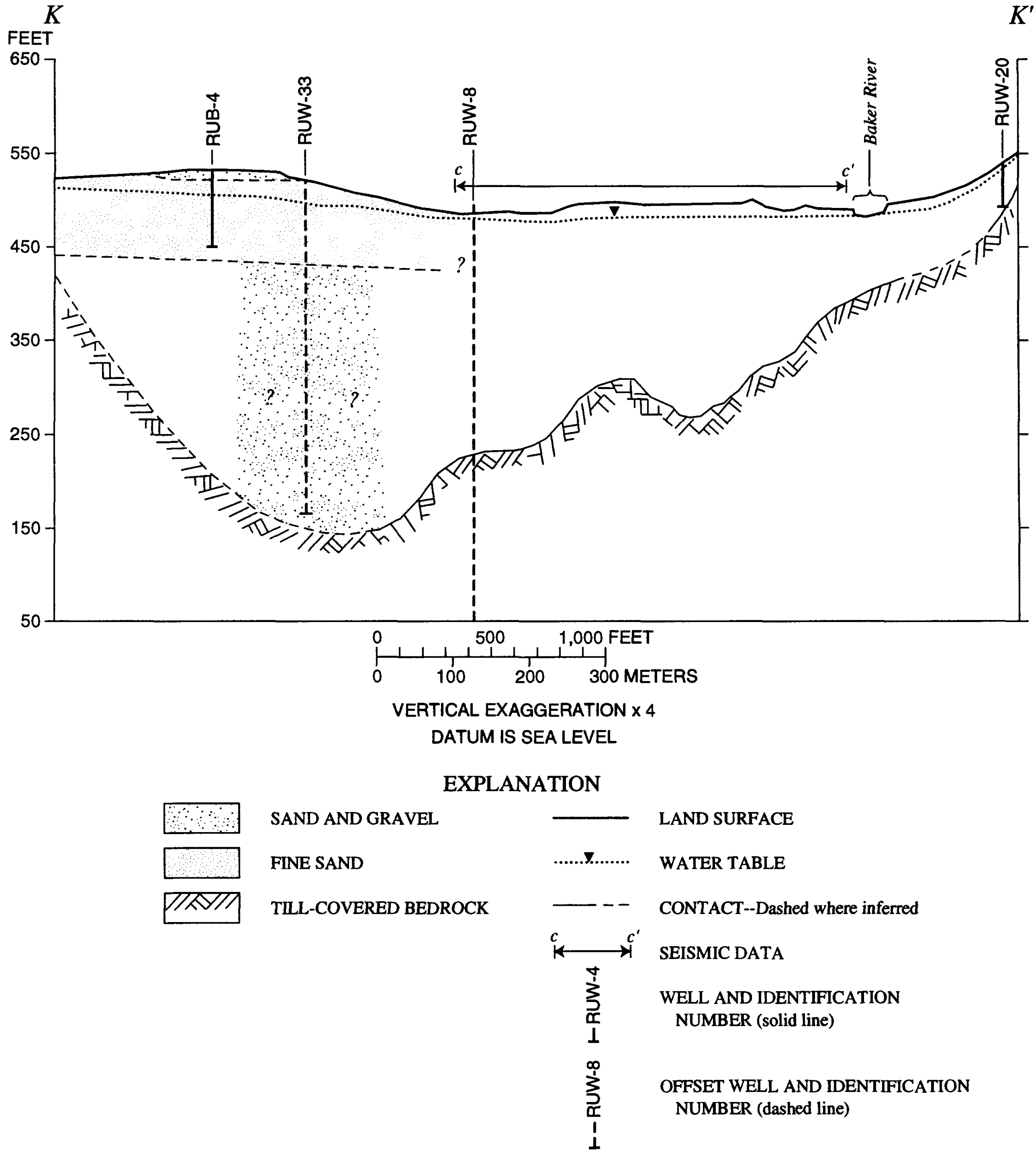


Figure 18. Geohydrologic section *K-K'* in the town of Rumney. (Line of section is shown on plate 5.)

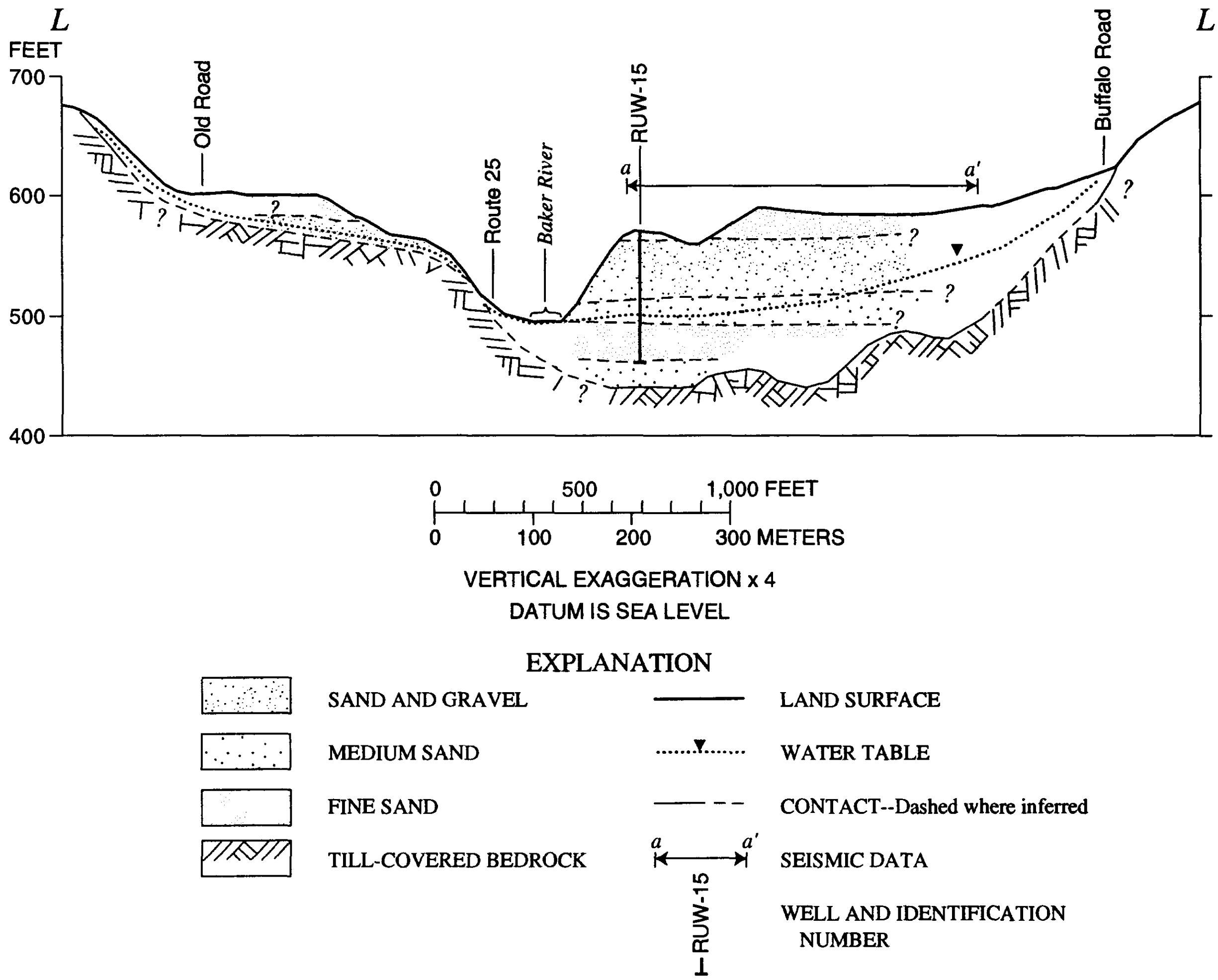


Figure 19. Geohydrologic section *L-L'* in the town of Rumney. (Line of section is shown on plate 5.)

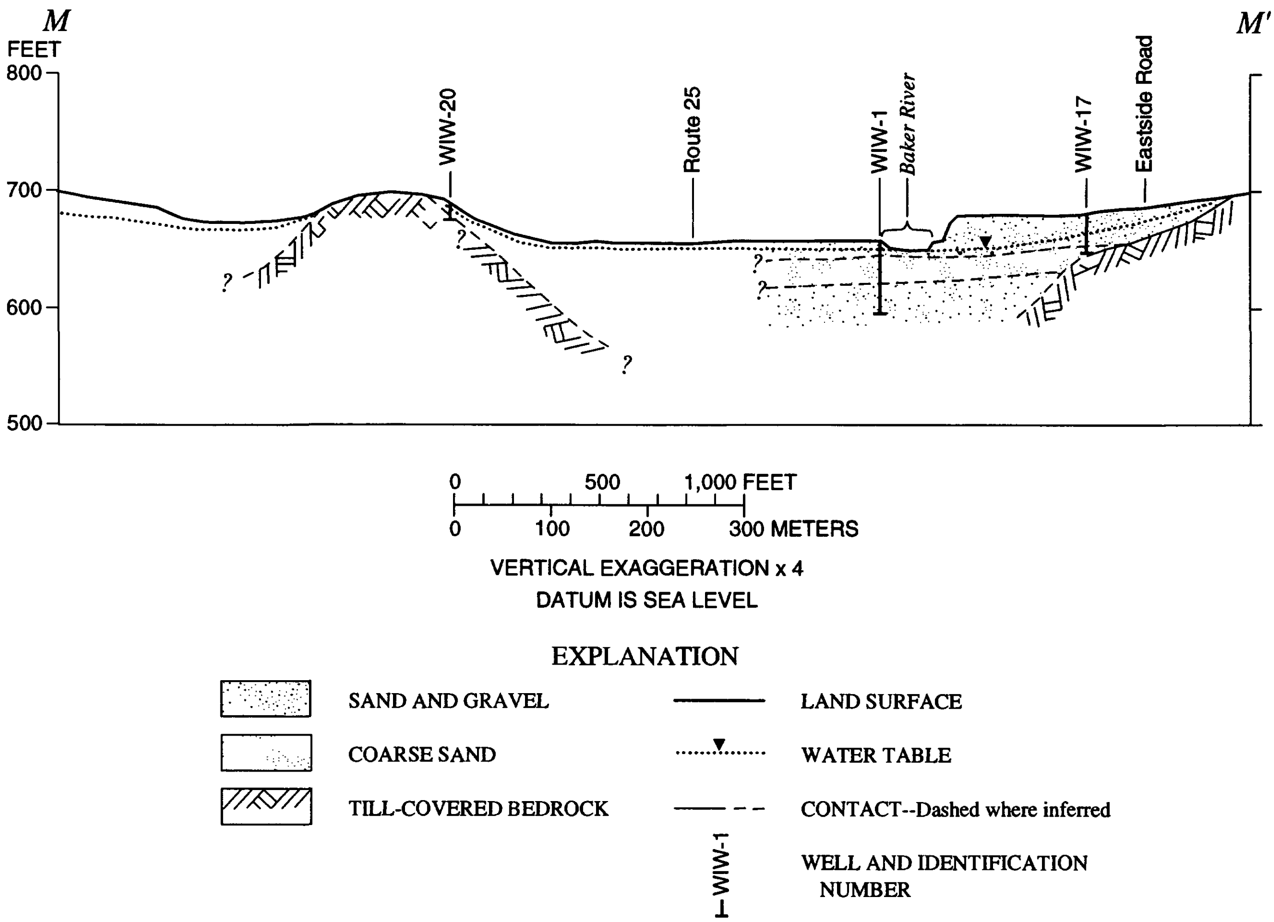


Figure 20. Geohydrologic section *M-M'* in the town of Wentworth. (Line of section is shown on plate 5.)

EVALUATION OF AQUIFER YIELD

Estimation of potential yield of each streamside aquifer within the Pemigewasset River Basin would require more site-specific information than could be obtained within the scope of this study. An example of one effective approach to evaluate the potential yield of a streamside aquifer is presented in a simulation of the sand and gravel aquifer in Woodstock by use of a ground-water-flow model. Ground-water yield in the stratified-drift aquifers generally is increased where surface-water bodies are in direct hydraulic connection with the aquifer. Recharge induced from surface water increases well yields, especially where large rivers are near pumping centers in coarse stratified drift. The Pemigewasset River is in direct hydraulic connection with coarse stratified drift in several sections of river valley. The aquifer in Woodstock, an example of this kind of connection, was selected for detailed hydrologic evaluation because of its potential importance as a public water supply.

Ground-Water Yield of the Pemigewasset River Basin

Ground-water discharge is a substantial component of total streamflow and may be the major or only source of streamflow during dry periods. Measurements of streamflow during dry periods aid in assessment of ground-water discharge to surface waters for areas upstream from measurement sites. Some of the flow in a stream reach near a pumped well may induce recharge to the aquifer.

Synoptic ground-water discharge measurements were made within the basin for the period July 6-14, 1988. Data used were based on flow-duration statistics for 9 existing or former streamflow-gaging stations and measurements made at 29 sites. These measurements are listed in appendix D. A summary of gains in streamflows for stream-valley segments with significant stratified-drift aquifers and for stream-valley segments predominantly underlain by till and bedrock are listed in table 3. Most of the streamflow gains in valley segments are the result of ground-water discharge to the streams. Some streamflow gains, such as for the Newfound River Basin, may include discharge from lakes where storage is decreasing.

During this time, total basin discharge at Franklin equaled about 457 ft^3/s. Discharge of about 203 ft^3/s came from major till areas in the headwaters of the Pemigewasset River, Mad River, Beebe River, and lower Smith River Basins, Newfound Lake Basin, and Squam Lake Basin. About 254 ft^3/s (164 Mgal/d) of water came from stratified-drift aquifers and till-bedrock areas adjacent to the Pemigewasset, Baker, and upper Smith Rivers (table 3).

Some water-use management programs suggest that offstream water use (including ground-water pumpage) not exceed water quantities between 95- and 99-percent flow duration of river basin streams. On the basis of this criterion, 97 Mgal/d could potentially be available within the river basin for offstream use for the entire basin. The amount of usable water at each of eight streamflow-gaging stations is listed in table 4.

Table 3. Streamflow gains within the Pemigewasset River Basin, central New Hampshire, July 6-14, 1988

[Million gallons per day equals cubic feet per second multiplied by 0.6463. --, no data]

Station identification and (or) informal site number	Flow duration (percent)	Stream reach	Streamflow gains, subtotals, and totals (cubic feet per second)	Streamflow gains, subtotals, and totals (million gallons per day)
Pemigewasset River Valley segments and larger tributary-valley segments with significant stratified-drift aquifers				
01075000 (7)	83	Pemigewasset River from Lincoln to Woodstock gage	28	18
01076500 (15)	90	Pemigewasset River from Woodstock to Plymouth	52	34
01075500 (10, 11)	91	Baker River downstream to Wentworth	14	9
01076000 (12, 13)	90	Baker River from Wentworth to gaging station	20	13
-- (14)	--	Baker River from gage to Pemigewasset River	16	10
01077550 (19)	--	Pemigewasset River from Plymouth to Bristol	45	29
01077900 (17)	--	Smith River downstream to eastern Danbury	7	5
01078520 (27)	--	Pemigewasset River from Bristol to Franklin	72	46
		Subtotal	**254**	**164**
Pemigewasset River Valley segments and larger tributary basins predominantly in till and bedrock terrain				
01073990 (1)	--	Pemigewasset River downstream to Lincoln	16	10
01074500 (4, 5)	83	East Branch downstream to Lincoln	70	45
01074700 (6)	--	Moosilauke Brook downstream to Lincoln	6	4
01075395 (8)	--	Mad River downstream to Campton	28	18
01075350 (9)	--	Beebe River downstream to Campton Hollow	3	2
01077000 (16)	--	Squam River Basin downstream to Ashland	8	5
01077510 (18)	--	Newfound River Basin at outlet of Newfound Lake	60	39
01078010 (20)	94	Smith River from eastern Danbury to gage	7	5
01078450 (24)	--	Salmon Brook Basin to Prescott Road	2	1
01078200 (21) 01078545 (26)	--	Needle Shop Brook and Chance Pond Brook Basins	3	2
		Subtotal	**203**	**131**
01078520 (27)		**Basin total and measured flow at Franklin**	**457**	**295**
01081400 (29)	--	Winnipesaukee River Basin at Franklin	244	158
01081500 (30)	96	**Merrimack River at Franklin Junction** (total of Pemigewasset and Winnipesaukee Rivers)	**701**	**453**

Table 4. Streamflows at selected gaging stations during low flow in the Pemigewasset River Basin, central New Hampshire

Station name and number	Informal site number (Number on plates 1-5)	Streamflow at indicated duration		Potential streamflow (95-percent minus 99-percent flow duration)	
		95-percent flow duration (cubic feet per second)	99-percent flow duration (cubic feet per second)	Cubic feet per second	Million gallons per day
East Branch Pemigewasset River near Lincoln (01074500)	5	45	29	16	10
Pemigewasset River at Woodstock (01075000)	7	77	60	17	11
Baker River at Wentworth (1075500)	10	10	7	3	2
Baker River near Rumney (01076000)	13	25	17	8	5
Pemigewasset River at Plymouth (01076500)	15	184	130	54	35
Squam River at Ashland (01077000)	16	52	7	45	29
Smith River near Bristol (01078000)	20	13	7	6	4
Pemigewasset River at Franklin (Merrimack River at Franklin Junction (01081500) minus Winnipesaukee River at Tilton (01081000))	30	500	350	150	97

Municipal water use in 1990 is listed in table 5. About 70 percent of the 3.909 Mgal/d municipal water-supply withdrawals are from ground water. Only a small amount of available ground water is presently being used.

Simulation of Ground-Water Flow in the Stratified-Drift Aquifer at the Town of Woodstock

The aquifer area near the towns of Woodstock and Thornton, selected to simulate ground-water yield (fig. 20), is approximately 1.23 mi wide and 1.32 mi long. The 1.63-square mile stratified-drift aquifer underlies the lowlands of the Pemigewasset River and the surrounding till and bedrock uplands. The general geohydrologic features of this area are typical of glaciated river valleys in New England: a river flows through a valley that overlies a bedrock channel filled with sand and gravel. Large-capacity wells constructed in the sand and gravel are pumped for public water supply. Woodstock wells WSW-14 and 38 are on the eastern bank of the Pemigewasset River (fig. 21). Ground water in the Pemigewasset River Valley near the two Woodstock wells is present in a 0.5- to 1.0-mile-wide by 1.32-mile-long stratified-drift aquifer that fills a bedrock channel. In the northern end of the modeled area near the Woodstock gaging station, bedrock outcrops are exposed in the river bottom. A seismic-refraction survey 2,500 ft south of the Woodstock wells indicates bedrock depths greater than 200 ft (appendix C.16). On the west side, stratified-drift deposits end abruptly at bedrock outcrops. On the east side, bedrock crops out in places to the north and to the south, and the contact between stratified drift and till or bedrock follows along the contour separating the valley lowland from the till and bedrock upland.

A transmissivity of 7,600 ft^2/d was calculated from an aquifer-test record of the Woodstock wells (WSW-14 and -38). (This was a 5-day aquifer test done in August 1988.) Well records indicate the presence of sand and gravel to a depth of 76 ft.

A block-centered finite-difference ground-water-flow model (McDonald and Harbaugh, 1988) was used to simulate flow in the stratified-drift aquifer in Woodstock. This model (computer program) includes independent subroutines that simulate ground-water flow, ground-water and surface-water interaction, recharge, evapotranspiration, several types of boundary conditions, and pumping stress. Algebraic approximations of the equations that describe ground-water flow can be solved by the strongly implicit procedure or the slice-successive overrelaxation method (McDonald and Harbaugh, 1988). A transient simulation of this finite-difference ground-water-flow model was used to simulate heads that would occur in the aquifer in response to pumping of production wells. This modeling technique

Table 5. Municipal water use in the Pemigewasset River Basin, central New Hampshire

[Data from New Hampshire Department of Environmental Services, Water Resources Division]

Town/city	Water-supply source	Average daily withdrawal in 1992 (million gallons per day)
Ashland	Jackson Pond	0.204
Bristol	Storm Center Well (B2W-18)	.046
	Fowler River Well (B2W-36)	.412
Campton Precinct	Campton Wells (CBW-84, 85)	.041
Franklin	Acme Well #2 (FKW-3)	.014
	Franklin Falls Well (FKW-29)	.587
	Sanbornton Wells (SCW-50)	.514
Hill	(HNW-2)	.020
Lincoln	Clear Brook Well (LKW-21)	.111
	Cold Springs Wells (LKW-1)	.128
	Boyce Brook	.461
	Loon Pond Brook	.350
New Hampton	Mountain Pond	.024
Plymouth Village	Foster Street Wells (PYW-9, 10)	.474
Waterville Valley	Well #1 (WFW-1)	.000
	Well #2 (WFW-2)	.068
	Well #3 (WFW-4)	.070
Woodstock	Bradley Well #1 (WSW-14)	.265
	Bradley Well #2 (WSW-38)	.054
	Beaver Brook	.033
	Gordon Pond Brook	.033
TOTAL		**3.909**

is based on the assumption that the heads in a real aquifer can be approximated by the heads calculated for a simpler hypothetical aquifer that is similar to the real aquifer but is recharged only by infiltration from the river.

Heads calculated from the hypothetical aquifer, after 180 days of pumping, could then be compared to heads of the real aquifer to predict its water-table configuration after 180 days of pumping (Moore, 1990). Use of image wells (a simple system consisting of a flat water table and no recharge) to predict the response of stratified-drift aquifers to pumping stresses has been described by Mazzaferro and others (1979) and Toppin (1986). In these studies, a pumping period of 180 days with no recharge also was used because that length of time approximates the growing season during which evapotranspiration is high and the recharge to the aquifers is assumed to be small. Recharge to the aquifer during the rest of the year is probably sufficient to allow continuous pumping at the assumed pumping rates.

Assumptions

Relative to the use of block-centered finite-difference ground-water-flow models the following assumptions were tested:

1. The aquifer characteristics of transmissivity and saturated thickness, the water-table configuration and streambed characteristics, are assumed to be a reasonable representation of the natural system.
2. A three-dimensional ground-water-flow system can be approximated by flow in two dimensions. Although not entirely valid, this assumption can contribute significant errors in the models under discussion, only in the immediate area of the pumped wells and near the river, where a significant vertical component of ground-water flow is present. Potential errors from this source are believed to be negligible.
3. Ground-water flow in two dimensions (map view) can be approximated by a process of discretization, whereby the aquifer area is divided into discrete blocks or cells in which all hydraulic properties are constant. Each block is represented by a single thickness, by a single hydraulic conductivity, and by a single storage coefficient. Discretization is one way in which the numerical models are superior to the analytical image-well models used by Mazzaferro and others (1979) and by Toppin (1986). In analytical image-well models, the hydraulic properties of an aquifer are assigned a uniform average value; in numerical models, aquifer properties can be varied spatially to represent field conditions more accurately. In the numerical model used in this study, a 200-foot uniform grid spacing was used. Assignment of single aquifer thickness and hydraulic conductivity to an individual grid cell can be viewed as a possible source of error because it generalizes distributed aquifer properties.

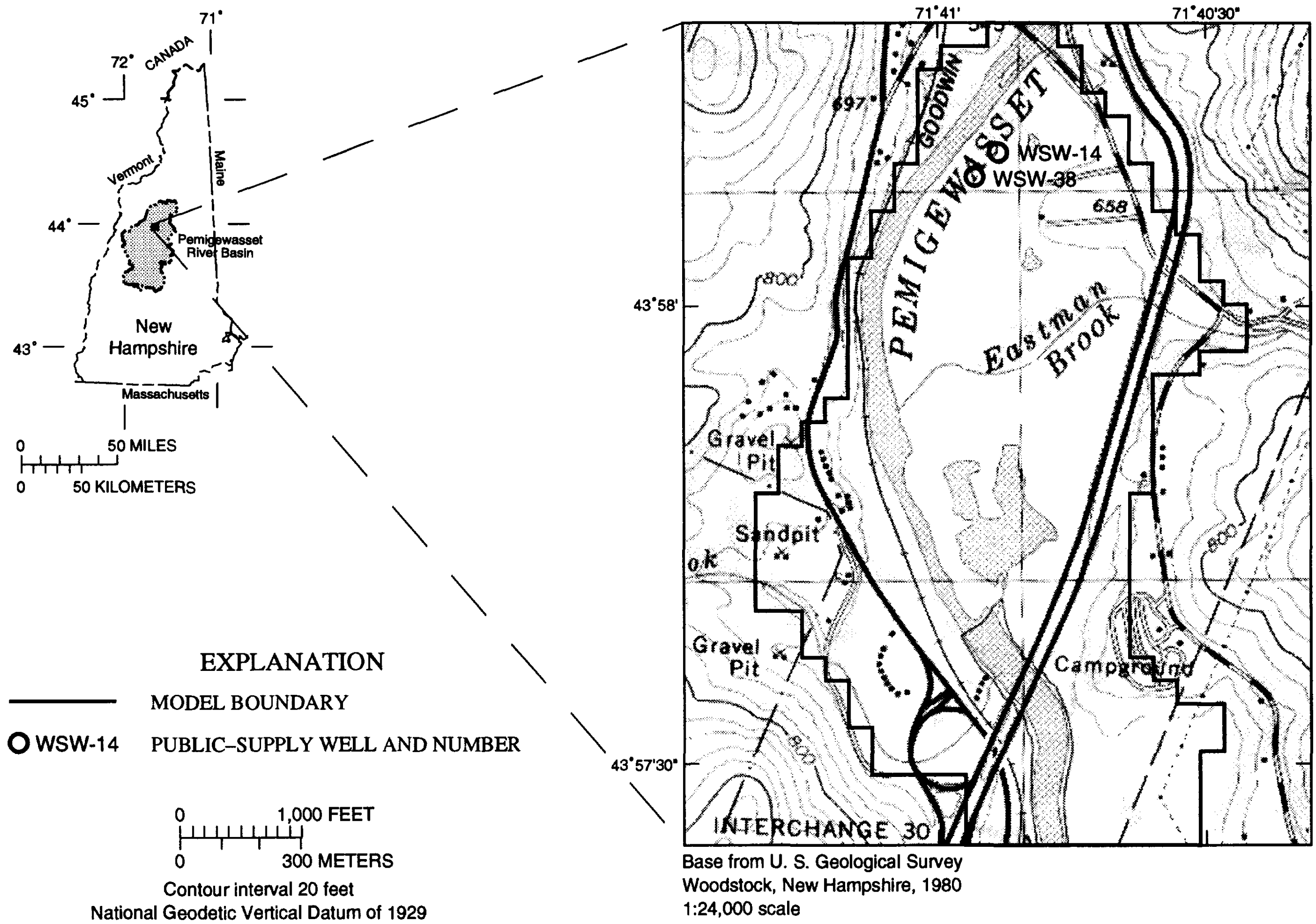


Figure 21. Location of study area and areal extent of the ground-water model of the Woodstock aquifer, central New Hampshire.

If changes in ground-water conditions with respect to time are important, time also must be discretized. For example, during extended periods of pumping, the water table declines continuously. This condition is approximated in the model by a series of time steps. The effects of 180 days of pumping were simulated with 10 discrete time steps of 18 days each. Approximations of the water-table configuration after the first 18 days of pumping were used as the initial configuration for the second 18 days, and so forth. Errors associated with this technique are minor, and the use of smaller time increments does not significantly improve the results.

4. Despite the discretization of space and time, exact solutions to the simplified systems are not possible. Instead, approximate solutions are obtained through an iterative process. The model repeatedly solved the set of governing equations until the maximum change in hydraulic head between successive iterations is less than some tolerance level. Tolerance was set at 0.01 ft in the model; potential errors associated with this source are insignificant compared to other factors.
5. The response of the ground-water-flow system can be approximated by linear equations. For natural unconfined systems, this is not strictly true because changes in saturated thickness that result from water-table fluctuations affect transmissivity and may cause nonlinear responses. In the model, however, changes in transmissivity that result from lowering of the water table in response to pumping are accounted for, and the nonlinear system is approximated by a series of linear equations. Changes in transmissivity caused by the natural fluctuation of the water table during the growing season are not accounted for. Errors from this source are thought to be small because seasonal changes in the heads are small relative to the saturated thickness.

Grid and Boundary Conditions

The finite-difference grid used to discretize the stratified-drift aquifer in Woodstock is shown in figure 22. The grid represents an area 6,900 ft long and 5,300 ft wide. Cells are 200 ft on a side. Only those cells that overlie the aquifer are assumed to be active and are involved in numerical calculations. The aquifer is represented in the model as a single unconfined layer (fig. 23).

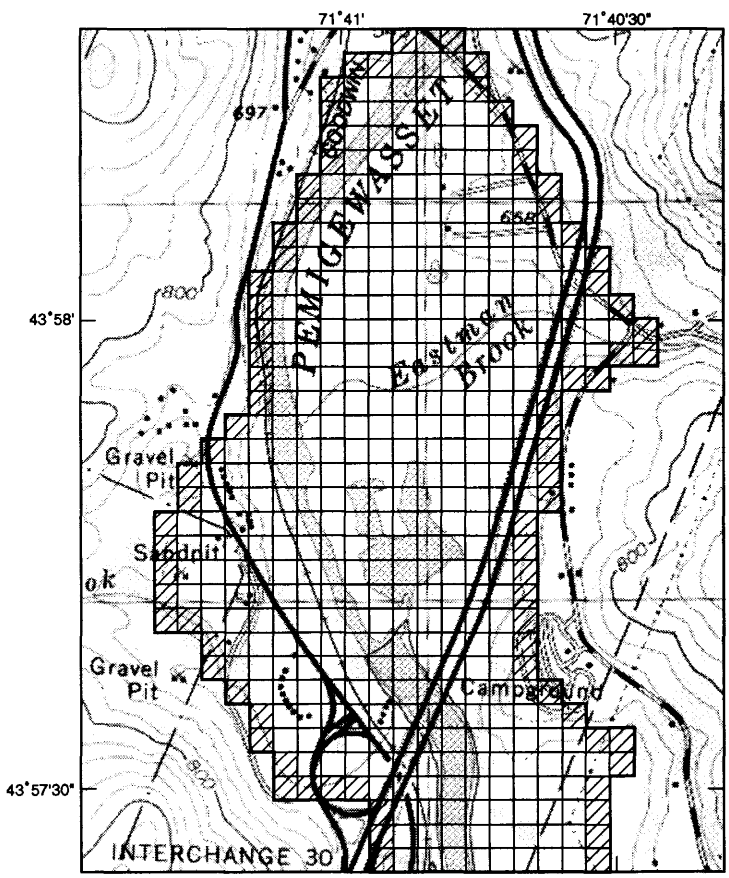
The bottom boundary of the aquifer separates the highly permeable stratified drift from the nearly impermeable till and bedrock. This boundary is simulated as a no-flow boundary; it is assumed that fluxes between the drift and the till/bedrock are negligible relative to fluxes in the overlying aquifer.

The water table, the top boundary of the aquifer, fluctuates with time. The head is dependent on the rate of evapotranspiration, areal recharge from precipitation, and local ground-water-flow patterns. This boundary is simulated in the steady-state model as a constant-flux boundary that receives recharge from areal precipitation.

The eastern and western boundaries of the aquifer separate the highly permeable stratified drift in the lowland from the nearly impermeable bedrock and semipermeable till of the uplands. These boundaries are simulated in the model as constant-flux boundaries. This constant flux represents ground-water seepage from upland areas adjacent to the aquifer.

The northern end of the aquifer is bounded by bedrock. Ground-water flow is assumed to be parallel to this boundary with no flow across this boundary; it is simulated as a no-flow boundary in the model.

The southern end of the valley is far enough from the intended pumping centers so that no flow would be induced across the boundary and, therefore, is simulated as a no-flow boundary in the model. If the locations of the intended pumping centers change in future



EXPLANATION

MODEL BOUNDARY

ACTIVE CELL

RECHARGE-WELL LOCATION

0 1,000 FEET

0 300 METERS

Contour interval 20 feet
National Geodetic Vertical Datum of 1929

Base from U. S. Geological Survey
Woodstock, New Hampshire, 1980
1:24,000 scale

Figure 22. Ground-water-model grid showing active cells and recharge-well locations in the Woodstock aquifer, central New Hampshire.

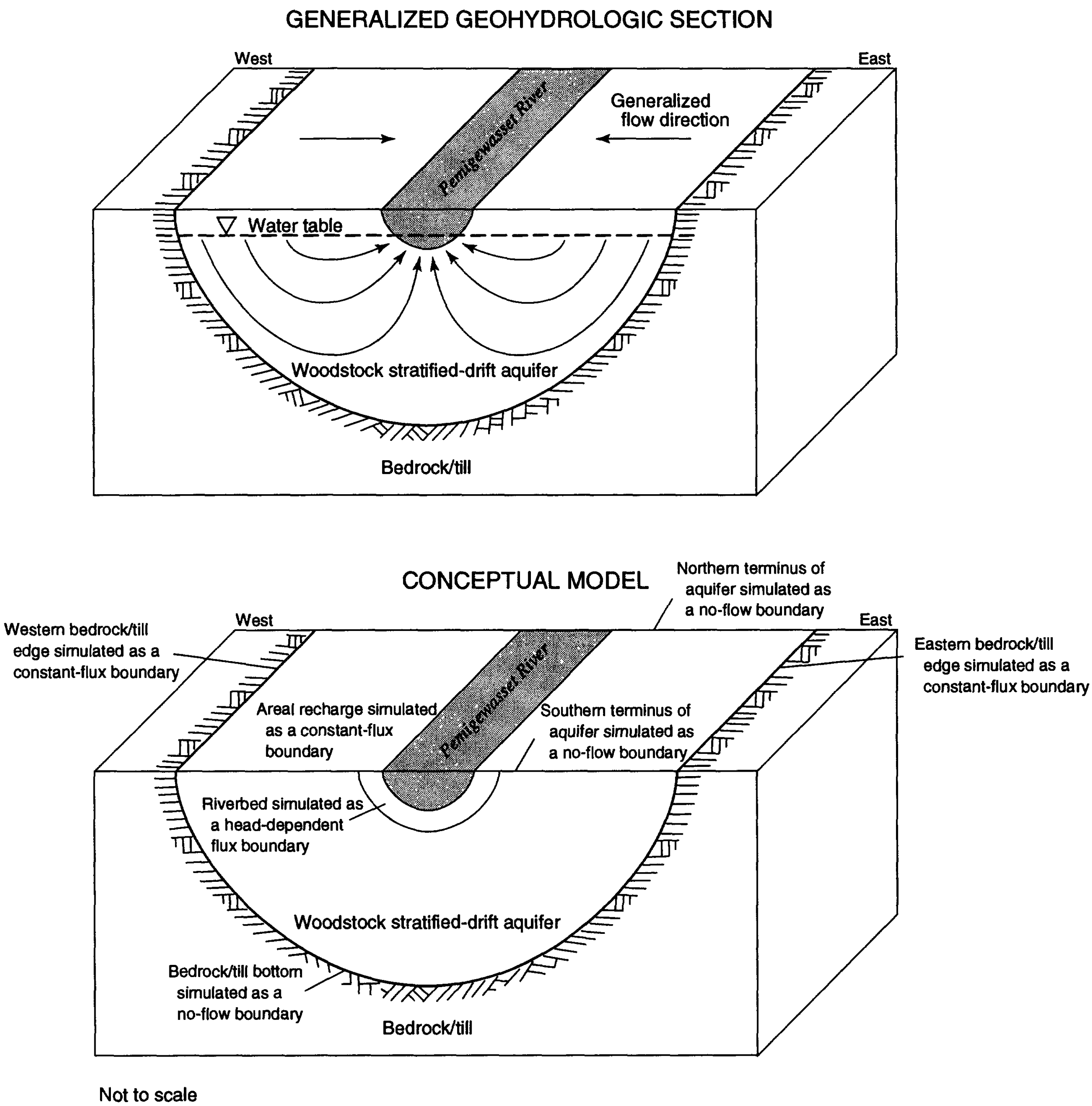


Figure 23. Generalized geohydrologic section showing direction of ground-water flow and conceptual model showing boundary conditions used to simulate the Woodstock aquifer, central New Hampshire.

simulations where they become closer to the south end of the aquifer, the no-flow status of this boundary condition would have to be reexamined.

Aquifer Parameters

The aquifer parameters used in model construction include starting heads, bedrock-surface altitudes, and hydraulic conductivity. A matrix consisting of data for each cell in the grid was constructed for these parameters. Known values for each parameter were assigned to the corresponding cells of the grid; unknown values among known points were determined through interpolation.

A starting head is needed in the model to begin the simulations. In this model, an approximate water-table surface was used as a starting head in a steady-state simulation. The resultant steady-state heads were then used as the new starting-water-table surface in a transient simulation. The bedrock-surface altitude used in the model was determined from seismic-refraction profiles, data from well logs, and interpolation. At the east side of the valley, bedrock crops out in places along the entire length of the modeled area. On the west side, saturated valley fill is adjacent to smoothed bedrock outcrops. On the north end of the valley, bedrock is exposed along the entire width of the modeled area. On the south end of the valley, saturated valley fill hides any evidence of bedrock outcrops. Depths to bedrock in this area were estimated from seismic-refraction profiling and interpolation.

A horizontal hydraulic conductivity of 100 ft/d was used as an initial input for the model. This value was determined from a 5-day aquifer test done at Woodstock wells WSW-14 and WSW-38 in August 1988. The wells are shown in figure 21.

Recharge and Discharge

Recharge to the stratified-drift aquifer is from runoff from till and bedrock uplands and from areal precipitation directly onto the aquifer. The aquifer discharges at streams and at pumping centers. Runoff from till and bedrock uplands recharges the aquifer at the contact between stratified drift and the valley wall. This recharge is simulated in the model by use of recharge wells (constant flux cells) along this boundary (fig. 21). Upland recharge to the aquifer is estimated to be 0.05 [(ft^3/s)/mi^2] of upland. This estimate is based on a discharge of 0.15 ft^3/s at the 90-percent flow duration for Stevens Brook (period of record, 1964–81), a small till-covered watershed (2.94 mi^2) 14 mi southwest of the area near Wentworth, N.H. The actual recharge applied at each boundary cell is proportional to the upland area contributing to the cell.

On the basis of discussion of recharge in the section "Recharge, Discharge, and Direction of Ground-Water Flow," areal recharge from precipitation directly on the aquifer was assumed to be equal to one-half the average annual precipitation. Mean annual precipitation for 36 years at Durham, N.H., south of the Pemigewasset River Basin, is 43 in. (National Oceanic and Atmospheric Administration, 1988). One-half of this amount (21.5 in.) was applied uniformly over the modeled area.

The main discharge from the aquifer at Woodstock is at the Pemigewasset River. Eastman and Leeman's Brooks (fig. 20) drain till-covered upland areas east and west of the Pemigewasset River. Discharges from these two brooks are assumed to be small relative to the discharge of the Pemigewasset River. Field investigations of the streambeds of the two brooks showed that the average width is 15 ft and the average depth is 0.5 ft. Field investigations of the Pemigewasset River at five locations throughout the modeled area showed that the streambed material is composed of cobbles, gravel, and fine-grained sand. Average river depth is 3 ft. The estimated vertical hydraulic conductivity of the streambeds of the Pemigewasset River and of Eastman and Leeman's Brooks is 3 ft/d, based on conductivities estimated by Lapham (1989) for three sites in Massachusetts and New Jersey. Brook and river altitude at each model cell were estimated from topographic maps. The streambeds are simulated in the model as head-dependent flux boundaries (fig. 22). This type of boundary allows simulation of flow between the aquifer and the streams as a function of head gradient and vertical hydraulic conductivity.

Currently (1992), two pumped municipal wells (WSW-14 and WSW-38) withdraw water from the stratified-drift aquifer at Woodstock. Wells WSW-14 and WSW-38 are gravel packed and are completed to a depth of 75 ft below land surface. Results from a 5-day aquifer test in August 1988 indicate that an average of 0.81 Mgal/d of water was withdrawn from the two wells. Water from a few domestic wells is pumped from the stratified-drift aquifer; however, because their numbers are few and because their discharges are returned to the aquifer through individual septic systems, the effect of domestic wells on the model simulation is assumed to be negligible.

Induced Recharge

The quantity of water available to a pumped well as induced recharge from the river depends on the pumping rate at the well and the minimum amount of flow that must be preserved in the river. An example of how availability of induced recharge is calculated can be given for USGS stream-gaging station 0107500 (informal site number 7) is on the Pemigewasset River at the northern end of the model area (fig. 20). Records of mean daily discharge for the Pemigewasset River at the Woodstock gage (period of record, 1940-77) show that streamflow equals or exceeds 77 ft^3/s 95 percent of the time and equals or exceeds 60 ft^3/s 99 percent of the time (table 4), thus 17 ft^3/s is the flow that could be withdrawn from the Pemigewasset River by induced infiltration 95 percent of the time while maintaining a flow of 60 ft^3/s (the flow at the 99-percent flow duration) in the river (table 4).

Steady-State and Transient Simulations

A steady-state simulation was done to establish a prepumping head throughout the modeled area. In this simulation, areal recharge was applied uniformly over the modeled area. Recharge from the till and bedrock uplands was applied at each boundary cell (proportional to the upland area contributing to each cell), no pumping stresses were introduced to the system, and an arbitrary water-table altitude was applied uniformly over the modeled area. The resultant head array calculated by the steady-state simulation was then used as a starting-head array for the transient simulation. In the transient simulation, areal recharge was removed uniformly from the modeled area, and recharge from the till and bedrock uplands was applied at each boundary cell. A storage coefficient was used uniformly throughout the modeled area, and various rates and durations of pumping were simulated at wells WSW-14 and 38 and hypothetical wells 3, 4, 5, 6 (fig. 24) over a 180-day period. The resultant water-table-altitude array calculated by the transient simulation was then compared to the starting water-table-altitude array calculated by the steady-state simulation, and drawdowns were calculated.

Sensitivity Analysis

A sensitivity analysis of the steady-state simulation was done to assess the sensitivity of the model to variations in input parameters. Values used in the model for aquifer hydraulic conductivity, streambed hydraulic conductivity, and areal recharge

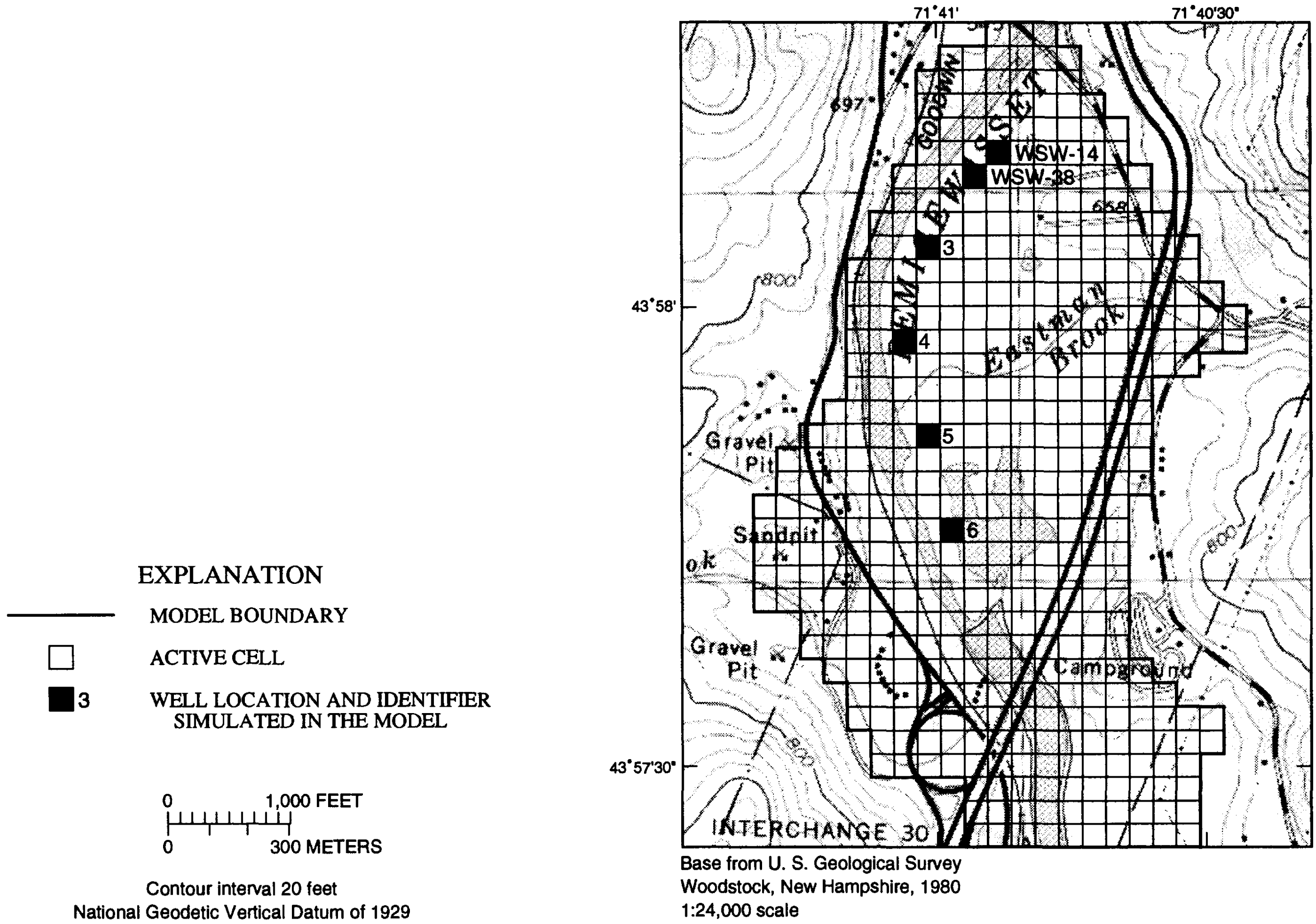


Figure 24. Well locations in the Woodstock aquifer, central New Hampshire.

were doubled and halved during sensitivity analysis. This approach provides a wider range of values for the resultant model-calculated heads given the relative uncertainty in the input parameters used in the model. The difference between heads calculated by the model for steady-state conditions and for each sensitivity run at selected pumped wells and at selected model grid cell locations are shown in tables 6 and 7.

Model-calculated heads are most sensitive to changes in horizontal hydraulic conductivity of the aquifer. When horizontal hydraulic conductivity was doubled, the model-calculated heads decreased or remained unchanged throughout the modeled area. At the pumped-well locations, the change in head ranged from 0.0 to 2.0 ft and averaged 0.6 ft. At the selected model grid-cell locations, the change in head ranged from 0.0 to 2.0 ft and averaged 1.0 ft. When horizontal hydraulic conductivity was halved, the model-calculated heads increased or remained the same throughout the modeled area. At the pumped wells, the change in head ranged from 0.0 to 1.0 ft and averaged 0.6 ft. At the selected model-grid cells, the change in head ranged from 0.0 to 4.0 ft and averaged 2.0 ft.

Changes in the streambed conductance resulted in changes in heads at the pumped wells and at the model-grid cells that were smaller than those caused by variations in horizontal hydraulic conductivity of the aquifer. When the streambed conductance was doubled, the model-calculated heads increased or remained unchanged throughout the modeled area. At the pumped wells, the change in head ranged from 0.0 to 3.0 ft and averaged 0.8 ft. At the selected model-grid cells, the change in head ranged from 0.0 to 3.0 ft and averaged 1.1 ft. When the streambed conductance was halved, the model-calculated heads decreased or remained unchanged throughout the modeled area. At the pumped wells, the change in head ranged from 0.0 to 1.0 ft and averaged 0.5 ft. At the selected model-grid cells, the change in heads ranged from 0.0 to 1.0 ft and averaged 0.9 ft.

Variations in the model-simulated areal recharge had the least effect on model-calculated heads. When the areal recharge was doubled, the model-calculated heads increased or remained unchanged throughout the modeled area. At the pumped wells, the heads remained unchanged. At the selected model-grid cells, the change in heads ranged from 0.0 to 2.0 ft and averaged 0.9 ft. When the areal recharge was halved, the model-calculated heads decreased or remained unchanged throughout the modeled area. At the pumped wells, the heads ranged from 0.0 to 1.0 ft and averaged 0.2 ft. At the model-grid cells, the change in head ranged from 0.0 to 1.0 ft and averaged 0.2 ft.

Table 6. Changes in model-calculated heads during sensitivity testing of the steady-state simulation at selected pumped wells in the Pemigewasset River Basin, central New Hampshire

[All measurements are in feet; --, no data. Well locations shown in figure 24]

	Changes in model-calculated heads in response to changes in model parameters											
	Aquifer hydraulic conductivity				Streambed conductance				Areal recharge			
	x2.0		x0.5		x2.0		x0.5		x2.0		x0.5	
Well number	New head	Amount of change	New head	Amount of change	New head	Amount of change	New head	Amount of change	New head	Amount of change	New head	Amount of change
WSW-14	615	-1.0	617	1.0	617	1.0	615	-1.0	616	0	615	-1.0
WSW-38	614	-1.0	616	1.0	616	1.0	614	-1.0	615	0	615	0
3	612	-1.0	614	1.0	614	1.0	612	-1.0	613	0	613	0
4	609	-1.0	611	1.0	611	1.0	610	--	610	0	610	0
5	606	--	606	--	606	--	606	--	606	0	606	0
6	604	--	604	--	603	-1.0	604	--	604	0	604	0
Average absolute difference:		.6		.6		.8		.5		0		.2

Table 7. Changes in model-calculated heads during sensitivity testing of the steady-state simulation at selected model-grid cells in the Pemigewasset River Basin, central New Hampshire

[All measurements are in feet. Model grid shown in figure 22]

Location	Changes in model-calculated heads in response to changes in model parameters during sensitivity testing											
	Aquifer hydraulic conducticity				Streambed conductance				Areal recharge			
	x2.0		x0.5		x2.0		x0.5		x2.0		x0.5	
	New head	Amount of change	New head	Amount of change	New head	Amount of change	New head	Amount of change	New head	Amount of change	New head	Amount of change
Adjacent to western modeled boundary												
Row 8, Column 13	614	0	616	2.0	615	1.0	614	0	615	1.0	614	0
Row 18, Column 8	606	-1.0	607	0	607	0	606	-1.0	607	0	606	-1.0
Row 30, Column 10	602	-1.0	604	1.0	604	1.0	602	-1.0	603	0	602	-1.0
Average absolute difference:		**.7**		**1.0**		**.7**		**.7**		**.3**		**.7**
Center of modeled area												
Row 8, Column 17	613	-2.0	618	3.0	617	2.0	614	-1.0	616	1.0	615	0
Row 18, Column 18	607	-1.0	610	2.0	609	1.0	607	-1.0	609	1.0	608	0
Row 30, Column 18	603	-2.0	599	1.0	598	0	599	1.0	599	1.0	598	0
Average absolute difference:		**1.7**		**2.0**		**1.0**		**1.0**		**1.0**		**0**
Adjacent to eastern modeled boundary												
Row 8, Column 20	613	-2.0	619	4.0	618	3.0	614	-1.0	617	2.0	615	0
Row 18, Column 20	608	-2.0	614	4.0	612	2.0	609	-1.0	611	1.0	610	0
Row 30, Column 23	598	0	599	1.0	599	0	600	1.0	600	1.0	599	0
Average absolute difference:		**1.0**		**3.0**		**1.7**		**1.0**		**1.3**		**0**

Prediction of Aquifer Yield

The ground-water-flow model was used to simulate the effects of the two production wells (WSW-14 and WSW-38) and four hypothetical wells (wells 3, 4, 5, and 6) on the stratified-drift aquifer and to assess potential aquifer yield (fig. 24). The hypothetical wells are 800 ft apart. They are south of the two production wells and 300 ft east of the Pemigewasset River. This location scheme places the wells toward the center of the aquifer where transmissivities are high and allows for induced infiltration from the river. Contamination from typical urban sources (paved parking areas, buildings, industry) is not a factor in the location of wells in the aquifer because this area of meadowland and forest has a small human population.

For these analyses, it was assumed that a pumping rate that caused drawdowns to exceed 50 percent of the total saturated thickness of the aquifer would be unacceptable. Also for these analyses, the maximum amount of water available to wells for offstream use is 17 ft^3/s or a total withdrawal rate of 10.9 Mgal/d. This is the amount of water potentially available based on the difference between the 99- and 95-percent flow duration for the Pemigewasset River at Woodstock (table 4).

Transient model simulations consisted of 10 time steps of 18 days each, (180 days total). Pumping rates of 6.9, 8.2, and 10.9 Mgal/d were simulated for all wells in combination. Results of these analyses are summarized in table 8. The drawdown calculated by the model for a cell simulating a production well is an average for the entire cell. Actual drawdowns at the pumped cells were determined by a formula presented by Trescott and others (1976).

For the total pumping rate of 6.9 Mgal/d, simulated drawdowns at wells WSW-14, WSW-38, 3, 4, 5, and 6 ranged from 5.9 to 21.6 ft, and the reduction in saturated thickness of the aquifer ranged from 5.2 to 24 percent. For the total pumping rate of 8.12 Mgal/d, simulated drawdowns at wells WSW-14, WSW-38, 3, 4,

Table 8. Effects of simulated transient pumping on water levels in the Woodstock aquifer and on flow in the Pemigewasset River, central New Hampshire

[Mgal/d, million gallons per day; ft, foot; ft^3/s, cubic foot per second]

Well number	Pumping rate (Mgal/d)	Drawdown at well (ft)	Percentage of saturated thickness taken up as drawdown
Total pumpage, 6.9 Mgal/d; total reduction in flow: 6.7 Mgal/d (10.4 ft^3/s)			
WSW-14	0.5	6.46	8.5
WSW-38	.5	6.56	8.7
3	.5	6.56	8.7
4	1.8	21.61	24.0
5	1.8	10.65	6.4
6	1.8	9.55	5.2
Total pumpage, 8.1 Mgal/d; total reduction in flow: 7.9 Mgal/d (12.3 ft^3/s)			
WSW-14	2.0	31.12	40.9
WSW-38	2.0	31.12	40.9
3	2.0	27.08	32.6
4	.7	7.64	8.5
5	.7	4.02	2.4
6	.7	3.62	2.0
Total pumpage, 10.8 Mgal/d; total reduction in flow: 10.7 Mgal/d (16.6 ft^3/s)			
WSW-14	1.0	13.6	17.9
WSW-38	1.0	13.8	18.4
3	1.0	12.2	14.7
4	2.6	33.3	37.0
5	2.6	15.4	9.3
6	2.6	13.8	7.5

5, and 6 ranged from 3.6 to 31.8 ft, and the reduction in saturated thickness ranged from 2.0 to 42.4 percent. For the total pumping rate of 10.9 Mgal/d (which equals the maximum amount of water available through induced infiltration of the Pemigewasset River), simulated drawdowns at wells WSW-14, WSW-38, 3, 4, 5, and 6 ranged from 12.2 to 33.3 ft, and the reduction in saturated thickness ranged from 7.5 to 37 percent.

At the total pumping rates of 6.9, 8.2, and 10.9 Mgal/d, the amount of water withdrawn from the Pemigewasset River by induced infiltration does not exceed 17 ft^3/s, the maximum allowed to maintain streamflow in the Pemigewasset River at the 99-percent flow duration minus the 95-percent flow duration. Various pumping rates could be applied to the individual wells in many different combinations in this model simulation as long as the total pumping rate does not exceed 10.9 Mgal/d and the resultant drawdowns at the wells do not exceed 50 percent of the total saturated thickness of the aquifer.

GROUND-WATER QUALITY

Ground-water samples were collected from 16 USGS observation wells, 8 public-supply wells, and 2 springs in September 1988 to describe background water quality of the stratified-drift aquifers in the Pemigewasset River Basin. Sites of known groundwater contamination were avoided during sampling to ensure that water of background quality was sampled. Groundwater samples collected from observation wells reflect the geochemical properties of the stratified-drift aquifer in a small area around the well. Ground-water samples collected from public-supply wells and springs reflect the average geochemical properties of the aquifer over a larger area and may also reflect the effects of induced recharge from nearby surface water.

The sampling procedure differed with the source of water being sampled. Untreated water was sampled from two springs and eight public-supply wells. Public-supply wells are pumped continuously and springs maintain constant flow, so additional evacuation of water before sampling was unnecessary. All observation wells installed by the USGS were developed with compressed air to remove drilling water, foreign materials, and sediments, and to improver the hydraulic connection with the aquifer. Wells were allowed to stabilize for at least 1 month before samples were collected. At the time of sampling, the wells were pumped with a stainless-steel submersible pump at an average rate of 0.8 gal/min until temperature and specific conductance readings stabilized and the volume of water in the well was evacuated at least three times. This procedure was followed to ensure that the water sampled represented water in the aquifer. Once field conditions stabilized, water was collected and filtered through a 0.4 micron pore size, polycarbonate membrane filter. Any necessary preservatives were added immediately after filtration and samples were shipped to the U.S. Geological Survey's National Water Quality Laboratory (NWQL) in Arvada, Colo. for analysis.

Results of the chemical analyses are listed in appendix E. Statistical results of the chemical analysis of the ground-water samples are summarized in table 9 and are presented for comparison with the USEPA (1988) and the NHDES (Water Supply Engineering Bureau, written commun., 1988) primary and secondary drinking-water regulations. Many of the constituents summarized in table 9 were not detectable in samples at the limits shown. Where data sets contained values less than the detection limits, statistical values were estimated by use of methods developed by Helsel and Cohn (1988) and are described as estimated means, standard deviations, and quartiles.

Table 9. Summary of results of water-quality sampling in the Pemigewasset River Basin, central New Hampshire

[SMCL—Secondary Maximum Contaminant Level: Contaminants that affect the aesthetic quality of drinking water. At high concentrations or values, health implications as well as aesthetic degradation also may exist. SMCL's are not Federally enforceable but are intended as guidelines for the States (U.S. Environmental Protection Agency, 1988b). MCL—Maximum Contaminant Levels: Enforceable, health-based regulation that is to be set as close as is feasible to the level at which no known or anticipated adverse effects on the health of a person occur. The definition of feasible means the use of the best technology, treatment techniques, and other means that the Administrator of the U.S. Environmental Protection Agency finds, after examination for efficacy under field conditions and not solely under laboratory conditions, generally are available (taking cost into consideration) (U.S. Environmental Protection Agency, 1988b). A less-than symbol precedes the values whenever a concentration less than the detection limit was used in the computation. To compute statistics, those unknown low concentrations were assigned estimated values by use of the lognormal probability plotting procedure; in cases where more than 50 percent of the values were less than the detection limit, no summary statistics were computed; °C, degrees Celsius; µS/cm at 25 °C, microsiemen per centimeter at 25 degrees Celsius; mg/L, milligram per liter; µg/L, microgram per liter; --, no data]

Constituents	SMCL	MCL	Number of samples	Mean	Median	Standard deviation	Minimum	Maximum	First quartile	Third quartile
Specific conductance (µS/cm at 25°C)	--	--	26	113.4	85.0	74.0	24.0	285	58.2	166.5
Solids, sum of constituents, dissolved (mg/L)	500	--	26	64.62	49.0	39.4	1.4	146	35.8	93.5
Chloride, dissolved (mg/L)	[1]250	--	26	15.9	9.55	16.4	.4	58.0	2.4	30.5
Sodium, dissolved (mg/L)	[1]20-250	--	26	9.5	6.1	8.7	1.3	38.0	3.2	14.5
pH (standard units)	--	--	26	--	6.7	--	5.3	9.1	--	--
Oxygen, dissolved (mg/L)	--	--	26	6.2	6	3.45	.7	13.8	3.38	8.88
Alkalinity (mg/L as $CaCO_3$)	--	--	26	15.0	13.5	8.2	2.0	37.0	8.75	19.0
Hardness, total (mg/L as $CaCO_3$)	--	--	26	29.0	23	18.19	4	81	16.25	39.5
Calcium, dissolved (mg/L)	--	--	26	7.73	6.55	5.51	1.20	28.0	4.02	9.60
Magnesium, dissolved (mg/L)	--	--	26	1.73	1.30	1.30	.12	5.5	.85	2.23
Carbon, organic, dissolved (mg/L)	--	--	26	.86	.80	.30	.50	1.7	.60	1.00
Nitrogen, nitrite, dissolved (mg/L as N)	--	--	26	--	--	--	--	--	--	--
Nitrogen, nitrite plus nitrate, dissolved (mg/L as N)	--	--	26	.547	.40	.490	<.10	2.20	.184	.87
Nitrogen, ammonia, dissolved (mg/L as N)	--	--	26	--	<.01	--	<.01	.03	<.01	.01
Nitrogen, ammonia plus organic, dissolved (mg/L as N)	--	--	26	.254	.222	.085	<.20	.40	.188	.30
Phosphorous, dissolved (mg/L as P)	--	--	26	--	<.01	--	<.01	.28	<.01	<.01
Potassium, dissolved (mg/L)	--	--	26	1.49	1.30	.75	.30	3.80	1.00	1.800
Sulfate, dissolved (mg/L)	[1]250	--	26	8.32	7.20	4.69	2.40	23.0	5.28	9.78
Fluoride, dissolved (mg/L)	[1]4.0	--	26	.132	.10	.11	<.10	.40	.06	.125
Silica, dissolved (mg/L)	--	--	26	12.01	11.00	3.82	6.10	20.0	9.25	15.25
Aluminum, dissolved (µg/L)	--	--	26	34.57	15.0	48.22	<10.0	210.0	4.58	60.0
Arsenic, dissolved (µg/L)	--	50.0	26	--	<1.0	--	<1.0	3.0	<1.0	<1.0
Barium, dissolved (µg/L)	--	2,000	26	16.85	13.0	19.03	2.0	100.0	5.75	21.0
Beryllium, dissolved (µg/L)	--	--	26	--	.15	--	<.5	2.0	.056	.41
Boron, dissolved (µg/L)	--	--	26	--	<10.0	--	<10.0	180.0	<10.0	<10.0
Cadmium, dissolved (µg/L)	--	10.0	26	--	<1.0	--	<1.0	2.00	<1.0	<1.0
Chromium, dissolved (µg/L)	--	[1]50.0	18	1.204	1.0	.602	<1.0	2.0	.725	2.0
Cobalt, dissolved (µg/L)	--	--	26	--	<3.0	--	<3.0	4.0	<3.0	<3.0
Copper, dissolved (µg/L)	1,000	--	26	--	.74	--	<10.0	540.0	.073	7.46
Iron, dissolved (µg/L)	--	--	26	702.7	10.0	3,130	<3.0	16,000	4.75	22.25
Iron, total recoverable (µg/L)	300	--	26	832.9	130	2,557	<10.0	13,000	27.5	700
Lead, dissolved (µg/L)	--	50.0	26	--	<10.0	--	<10.0	20.0	<10.0	<10.0
Lithium, dissolved (µg/L)	--	--	26	--	2.97	--	<4.0	8.0	2.08	4.22
Manganese, dissolved (µg/L)	50.0	--	26	76.09	12.0	125.1	<1.0	430	2.75	103.7
Molybdenum, dissolved (µg/L)	--	--	26	--	<10.0	--	<10.0	<10.0	<10.0	<10.0

Table 9. Summary of results of water-quality sampling in the Pemigewasset River Basin, central New Hampshire—*Continued*

Constituents	SMCL	MCL	Number of samples	Mean	Median	Standard deviation	Mini-mum	Maxi-mum	First quartile	Third quartile
Mercury, dissolved (µg/L)	--	2.0	18	--	<10.0	--	<0.10	0.20	<0.10	<0.10
Nickel, dissolved (µg/L)	--	--	26	--	<1.00	--	<1.0	2.0	<1.0	1.0
Silver, dissolved (µg/L)	50.0	--	18	--	<1.0	--	<1.0	1.0	<1.0	1.0
Selenium, dissolved (µg/L)	--	10.0	18	--	<1.0	--	<1.0	1.0	<1.0	<1.0
Strontium, dissolved (µg/L)	--	--	26	56.96	46.0	33.89	17.0	150	33.5	67.75
Vanadium, dissolved (µg/L)	--	--	26	--	<6.0	--	<6.0	<6.0	<6.0	<6.0
Zinc, dissolved, (µg/L)	5,000	--	26	7.05	6.0	4.54	<3.0	16.0	3.0	10.25
Dichlorobromomethane, total (µg/L)	--	--	16	--	--	--	--	<.20	--	--
Carbontetrachloride, total (µg/L)	--	--	16	--	--	--	--	<.20	--	--
1,2-Dichloroethane, total (µg/L)	--	--	16	--	--	--	--	<.20	--	--
Bromoform, total (µg/L)	--	--	16	--	--	--	--	<.20	--	--
Chlorodibromomethane, total (µg/L)	--	--	16	--	--	--	--	<.20	--	--
Chloroform, total (µg/L)	--	--	16	--	<.20	--	<.20	.60	<.20	<.20
Toluene (µg/L)	--	--	16	--	--	--	--	<.20	--	--
Benzene, total (µg/L)	--	--	16	--	<.20	--	<.20	.30	<.20	<.20
Chlorobenzene, total (µg/L)	--	--	16	--	--	--	--	<.20	--	--
Chloroethane, total (µg/L)	--	--	16	--	--	--	--	<.20	--	--
Ethylbenzene, total (µg/L)	--	--	16	--	--	--	--	<.20	--	--
Methylbromide, total (µg/L)	--	--	16	--	--	--	--	<.20	--	--
Methylchloride, total (µg/L)	--	--	16	--	--	--	--	<.20	--	--
Methylene chloride, total (µg/L)	--	--	16	--	--	--	--	<.20	--	--
Tetrachloroethylene, total (µg/L)	--	--	16	--	--	--	--	<.20	--	--
Trichloroflouromethane, total (µg/L)	--	--	16	--	--	--	--	<.20	--	--
1,1-Dichloroethane, total (µg/L)	--	--	16	--	--	--	--	<.20	--	--
1,1-Dichloroethylene, total (µg/L)	--	--	16	--	--	--	--	<.20	--	--
1,1,1-Trichloroethane, total (µg/L)	--	--	16	--	--	--	--	<.20	--	--
1,1,2-Trichloroethane, total (µg/L)	--	--	16	--	--	--	--	<.20	--	--
1,1,2,2 Tetrachloroethane, total (µg/L)	--	--	16	--	--	--	--	<.20	--	--
1,2-Dichlorobenzene, total (µg/L)	--	--	16	--	--	--	--	<.20	--	--
1,2-Dichloropropane, total (µg/L)	--	--	16	--	--	--	--	<.20	--	--
1,2Transdichloroethene, total (µg/L)	--	--	16	--	--	--	--	<.20	--	--
1,3-Dichloropropene, total (µg/L)	--	--	16	--	--	--	--	<.20	--	--
1,3-Dichlorobenzene, total (µg/L)	--	--	16	--	--	--	--	<.20	--	--
1,4-Dichlorobenzene, total (µg/L)	--	--	16	--	--	--	--	<.20	--	--
2-Dichloroethylvinylether, total (µg/L)	--	--	16	--	--	--	--	<.50	--	--
Dichlorodifluoromethane, total (µg/L)	--	--	16	--	--	--	--	<.20	--	--
Trans 1,3-Dichloropropene, total (µg/L)	--	--	16	--	--	--	--	<.20	--	--
Cis 1,3-Dichloropropene, total (µg/L)	--	--	16	--	--	--	--	<.20	--	--
1,2 Dibromoethylene, total (µg/L)	--	--	16	--	--	--	--	<.20	--	--
Vinylchloride, total (µg/L)	--	--	16	--	--	--	--	<.20	--	--
Trichloroethylene, total (µg/L)	--	--	16	--	--	--	--	<.20	--	--
Styrene, total (µg/L)	--	--	16	--	--	--	--	<.20	--	--
1,2-Dibromoethane, total (µg/L)	--	--	16	--	--	--	--	<.20	--	--
Xylene, total (µg/L)	--	--	16	--	--	--	--	<.20	--	--

[1]MCL for chromium is 50 µg/L Cr^{+6}.

Results of the chemical water-quality analyses indicate that water from the stratified-drift aquifers is generally suitable for drinking and other domestic and commercial uses with the following exceptions:

1. Water from three wells had dissolved sodium concentrations that exceeded the NHDES Health Advisory limit of 20 mg/L (Water Supply Engineering Bureau, written commun., 1988),
2. Water from one well had a dissolved copper concentration (540 µg/L) about one-half of the USEPA secondary maximum contaminant level[2] (SMCL) of 1,000 µg/L, and the highest lead concentration (20 µg/L) of all samples,
3. Water from eight wells had total iron concentrations that exceed the SMCL of 300 µg/L (U.S. Environmental Protection Agency, 1988a),
4. Water from eight wells and one spring had dissolved manganese concentrations that exceeded the SMCL of 50 µg/L (U.S. Environmental Protection Agency, 1988a).

Specific conductance—a measure of the ability of water to conduct electrical current—is an indication of the concentration of ions in solution or of total amount of dissolved solids. Specific conductance of water samples (measured in the field) ranged from 24 µS/cm at well WFW-2 to 285 µS/cm at well RUW-2; the median was 85 µS/cm. The State median was 132 µS/cm for public-supply wells completed in stratified-drift aquifers (Morrissey and Regan, 1987).

Dissolved-solids concentrations in water from 25 samples ranged from 1.4 (well CBW-3) to 146 mg/L (well CBW-34); the median was 49.0 mg/L. The concentrations of dissolved solids in all water samples were less than the maximum recommended limit for drinking water (500 mg/L) established by the NHDES (Water Supply Engineering Bureau, written commun., 1988). The low concentration of dissolved solids in these stratified-drift aquifers is attributed to the insolubility of the aquifer matrix and the short residence time of water (Morrissey and Regan, 1987).

[2]SMCL, Secondary Maximum Contaminant Level: Nonenforceable regulation that affects the aesthetic quality of drinking water. At high concentrations or values, health implications as well as aesthetic degradation may exist. These are intended as guidelines for the States.

Nonindigenous sources of sodium and chloride in ground water in New Hampshire are natural and manmade. The principal source of natural chloride is atmospheric precipitation and dry fallout, which contribute about 0.5 mg/L to the New Hampshire land surface (Hall, 1975). The major manmade source of sodium and chloride is salt used in road deicing. In all samples in the study area, chloride concentrations were less than the SMCL (250 mg/L) established by the USEPA (1988b). Sodium concentrations exceeded the recommended Health Advisory Limit of 20 mg/L in samples from one well and one spring—well PYW-9 (22 mg/L) and spring SCS-1 (21 mg/L). The ratio of sodium to chloride in the water sample from well PYW-9 was 1.7 to 1.6 meq/L, which indicates that sodium chloride, probably from road salt, is the source of both constituents.

The pH of water is a measure of the water's hydrogen-ion concentration. Water having a pH of 7.0 is neutral, less than 7.0 is acidic, and greater than 7.0 is alkaline. The pH of most ground water in the United States ranges from 6.5 to 8.5 (Hem, 1985). The pH of water samples collected during this study and measured in the field, ranged from 5.3 to 9.1; the median was 6.7. The pH of water from stratified-drift aquifers sampled across New Hampshire (1984-89) ranged from 5.3 to 8.5; the median was 6.1 (Moore and others, 1994). The most alkaline water in this study was from well SCW-58 (9.10) and HRW-1 (8.20). Samples from three wells (WFW-2, CBW-33, and LKW-1) had pH values of 5.3, 5.8, and 5.9 respectively, less than the minimum value of 6.0 established as the SMCL by the USEPA (1986a).

The alkalinity of a solution is defined as the capacity for solutes in water to react with and neutralize acid (Hem, 1985). The principal source of ambient alkalinity is dissolved calcium carbonate ($CaCO_3$). Because New Hampshire does not contain sizeable carbonate mineral deposits, the buffering capacity of waters from stratified-drift aquifers is low. Alkalinity of water samples ranged from 2.0 mg/L (as $CaCO_3$) at well WFW-2 to 37 mg/L (as $CaCO_3$) at well RUW-2.

Nitrogen is present in water as nitrite (NO_2^-) or nitrate (NO_3^-) anions, in cationic form as the ammonium (NH_4^+) cation, and at intermediate oxidation states as a part of organic solutes and as ammonium cations (Hem, 1985, p. 124). The predominant form of inorganic nitrogen in natural ground water is nitrate, from the oxidation of nitrogenous compounds. Excess nitrate in ground water can originate from fertilizer applications, as leachate from sewage systems, or as wastes from farm animals. Dissolved nitrite plus nitrate (as N) concentrations in 26 samples ranged from less than 0.10 to 2.2 mg/L; the median was 0.4 mg/L.

The most common sulfur specie under oxidizing conditions is sulfate. The SMCL for sulfate (SO_4^{2}) in drinking water is 250 mg/L (U.S. Environmental Protection Agency, 1988b). Oxidation of sulfide ores, gypsum, and anhydrite are natural sources of sulfate, but these minerals generally are not present in stratified-drift aquifers. Under reducing conditions, sulfate is reduced by anaerobic bacteria to hydrogen sulfide (H_2S) gas, which can be detected by smell at concentrations of only a few tenths of a milligram per liter. Sulfate concentrations for all water samples ranged from 2.4 to 23.0 mg/L; the median was 7.2 mg/L.

Iron and manganese are common elements in minerals in stratified-drift deposits within the study area. Concentrations of iron and manganese in excess of the SMCL were the most common water-quality problems found in the water samples. Eight water samples had total iron concentrations (dissolved plus suspended) above the SMCL of 300 µg/L—700 µg/L at well ANW-14; 1,000 µg/L at well APW-2; 320 µg/L at well B2W-18; 760 µg/L at well PYW-9; 13,000 µg/L at well RUW-2; 700 µg/L at well RUW-14; 3,000 µg/L at well RUW-15; and 750 µg/L at well SCW-58. If only the dissolved-iron concentration is measured, three wells (APW-2, PYW-9, and RUW-2) had concentrations above the SMCL of 300 µg/L. Water samples from eight wells and one spring had manganese concentrations above the SMCL of 50 µg/L—400 µg/L at ANW-1; 61 µg/L at APW-2; 180 µg/L at CBW-4; 250 µg/L at PYW-9; 260 µg/L at RUW-2; 130 µg/L at SCS-1; 430 µg/L at SCW-58; 95 µg/L at SCW-135; and 55 µg/L at WFW-2.

Aluminum, the third most abundant element in the Earth's crust, is rarely present in water at concentrations greater than a few tenths or a few hundredths of a milligram per liter (Hem, 1985). Water from one well (WFW-2) had the highest aluminum concentration of 210 µg/L (0.21 mg/L) and the lowest pH (5.30). In low-pH environments, aluminum may be precipitated as an aluminum-hydroxy sulfate.

Concentrations of other elements and trace metals in all the water samples were at or no more than two times the reported detection limit for the following metals: cadmium, chromium, cobalt, lead, molybdenum, mercury, nickel, silver, and vanadium. Copper is usually present as a sulfide mineral, but it can also be derived from dissolved water pipes and plumbing fixtures and can be present in sprays used as agricultural pesticides (Hem, 1985, p. 141). Water from one well (WSW-14) had a copper concentration of 540 µg/L (0.54 mg/L), which is slightly more than one-half the SMCL (1,000 µg/L) and almost seven times more than was found in any other sample. In all the water samples, the highest concentration of zinc (16 µg/L at APW-3) was less than the SMCL of 5,000 µg/L.

Arsenic is found in 10 to 15 percent of ground water in bedrock in many parts of New Hampshire at concentrations in excess of the maximum contaminant level[3] (MCL) of 50 µg/L (Morrissey and Regan, 1987). Only one sample from this study (well RUW-2) had a concentration of arsenic (3 µg/L) that exceeded the detection limit of 1 µg/L.

Water samples from 14 observation wells and 2 springs were tested for 36 different volatile organic compounds (VOC's) (appendix E). The only VOC concentrations greater than detection limits (in 2 of the 16 samples tested) were 0.60 µg/L of chloroform at well SCW-50 and 0.30 µg/L of benzene at well CBW-4.

River water induced to recharge an aquifer in response to pumping from a production well has little or no effect on the physical characteristics of the pumped water, with the exception of temperature. Suspended sediments, organic matter, turbidity, taste, and odor associated with the surface water are removed during its flow through bottom sediments and aquifer deposits (Johnston and Dickerman, 1974). Color, if present in the surface water, may not be entirely removed. The temperature of the pumped water fluctuates according to seasonal changes in surface-water temperatures and the travel time of infiltrated water to reach the pumped well. Temperature of the pumped water will vary less than that of the surface water because of mixing with the ground water, which maintains a nearly constant temperature.

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[3]MCL, maximum contaminant level: Enforceable, health-based regulation that is to be set as close to the level at which no known or anticipated adverse effects on the health of a person occur as is feasible. The definition of feasible means the use of best technology, treatment techniques, and other means that the Administrator of the U.S. Environmental Protection Agency finds, after examination for efficacy under field conditions and not solely under laboratory conditions, are generally available (taking cost into consideration).

The water quality of withdrawn ground water commonly reflects the chemistry of the infiltrated surface water and the ground water. Some dissolved chemical constituents in the infiltrating water can be altered or removed from solution by precipitation, absorption, cation exchange, or other processes as the infiltrating water migrates through the aquifer, but many chemical constituents are transported in their original form (Johnston and Dickerman, 1974). Concentrations of these constituents will change, however, as a result of the mixing of the infiltrated water with ground water.

Infiltration of class A or B surface water (table 10) does not adversely affect the quality of ground water withdrawn from production wells. New Hampshire's adopted-use classification for surface water in the Pemigewasset River Basin is "B" (New Hampshire Department of Environmental Services, Water Supply and Pollution Control Division, 1979). The water-quality standards for this classification are listed in table 10.

Table 10. Recommended-use classifications and water-quality standards for New Hampshire surface water

[Standards from New Hampshire Water Supply and Pollution Control Commission (1979). The waters in each classification shall satisfy all provisions of all lower classifications. These standards shall apply to all times except during periods when the receiving streamflows are less than the minimum average 10-day flow which occurs once in 20 years. **Class A**: Potentially acceptable for water supply uses after disinfection. No discharge of sewage, wastes, or other polluting substances into waters of this classification. (Quality uniformly excellent.) **Class B**: Acceptable for swimming and other recreation, fish habitat, and after adequate treatment, for use as water supplies. No disposal of sewage or wastes unless adequately treated. (High aesthetic value.) **Class C**: acceptable for recreational boating, fishing, and industrial water supply with or without treatment, depending on individual requirements. (Third highest quality.) **Abbreviations**: ppm, parts per million; mL, milliliter, piC/L, picocuries per liter; NTAC-DI, National Technical Advisory Committee, Department of Interior; NHF&GD, New Hampshire Fish and Game Department; NEIWPCC, New England Interstate Water Pollution Control Commission]

Characteristic	Class A	Class B	Class C
Dissolved oxygen	Not less than 75 percent of saturation, nor less than 6 ppm in cold water fisheries	Not less than 75 percent of saturation, nor less than 6 ppm in cold water fisheries unless naturally occurring.	Not less than 5 ppm in warm water fisheries, nor less than 6 ppm in cold water fisheries unless naturally occurring
Coliform bacteria	Not more than 50 colonies per 100 mL unless naturally occurring	Not more than 240 colonies per 100 mL in fresh water, unless naturally occurring. Not more than 70 coliforms per 100 mL in waters used for growing or taking of shellfish for human consumption	Not to exceed an average value of 1,000 colonies per 100 mL in any group of samples, nor shall any single sample exceed 2,500 colonies per 100 mL except when such waters are subject to over flow from a combined sewer system or as naturally occurs.
pH (acidity-alkalinity)	As naturally occurs	6.5-6.8 or as naturally occurs	6.0-8.5 or as naturally occurs
Substances, potentially toxic	None unless naturally occurring	Not in toxic concentrations or combinations	Not in toxic concentration or combinations
Sludge deposits	None	No unreasonable kinds or quantities, unless naturally occurring	No unreasonable kinds or quantities, unless naturally occurring
Oil and grease	None	No unreasonable kinds or quantities	No unreasonable kinds or quantities
Color	Not in unreasonable quantities, unless naturally occurring	Not in unreasonable quantities, unless naturally occurring	Not in unreasonable quantities, unless naturally occurring
Turbidity	Not to exceed 5 standard units unless, naturally occurring	Not to exceed 10 standard turbidity units in cold water fisheries. Not to exceed 25 standard turbidity units in warm water fisheries unless naturally occurring	Not to exceed 10 standard turbidity units in cold water fisheries. Not to exceed 25 standard turbidity units in warm water fisheries unless naturally occurring.
Slicks, odors, and surface-floating solids	None unless naturally occurring	No unreasonable kinds, quantities, or duration unless naturally occurring	No unreasonable kinds, quantities, or duration unless naturally occurring
Temperature	No artificial rise	NHF&GD, NEIWPCC, or NTAC-DI requirements, whichever provides most effective control	NHF&GD, NEIWPCC, or NTAC-DI requirements, whichever provides most effective control
Phosphorus	None, except as naturally occurs	None in such concentrations[1] that would impair any usages assigned to this class, unless naturally occurring	None in such concentrations[1] that would impair any usages assigned to this class, unless naturally occurring
Gross beta radioactivity	Not greater than 1,000 piC/L[2]	Not greater than 1,000 piC/L	Not greater than 1,000 piC/L
Strontium-90	Not greater than 10 piC/L	Not greater than 10 piC/L	Not greater than 10 piC/L
Radium-226	Not greater than 3 piC/L	Not greater than 10 piC/L	Not greater than 10 piC/L
Phenol	Not to exceed 0.001 ppm	Not to exceed 0.001 ppm	Not to exceed 0.002 ppm

[1]Generally less than 0.015 ppm.

[2]One picocurie is one trillionth of a curie, which is a standard measure of radioactivity.

SUMMARY AND CONCLUSIONS

Population and economic development, particularly related to tourism, have increased demands for water and stressed the capacity of the existing public-water-supply systems in the Pemigewasset River Basin. This report provides geohydrologic information on stratified-drift aquifers in this basin. The results of this study (1) describe the geohydrologic characteristics of the stratified-drift aquifers, (2) present an example of an aquifer-simulation technique for evaluating the yield of a streamside aquifer, and (3) describe the background water quality within the stratified-drift aquifers.

Stratified-drift aquifers are layered, sorted sediments (chiefly sand, or sand and gravel) deposited by meltwater streams during deglaciation. Ground water is stored in and flows through interconnected pore spaces between sediment particles (primary porosity). The initial glaciofluvial environment in which these deposits formed determine the storage and transmission characteristics of these aquifers.

The geohydrology of the stratified-drift aquifer was investigated by determining lateral and vertical aquifer boundaries and identifying water-table altitude and configuration, direction of ground-water flow, and aquifer saturated thickness, storage, and transmissivity. Lateral aquifer boundaries were delineated by field mapping. Vertical boundaries and water tables were delineated and saturated thickness and transmissivity were estimated by use of subsurface data from wells, test borings, and seismic-refraction surveys. Data collected were used to produce maps of stratified-drift aquifers showing water-table configurations, directions of ground-water flow, saturated thickness, and transmissivity.

South of Plymouth, the most productive or potentially productive stratified-drift aquifers in the Pemigewasset River Basin are north from Franklin to southern Hill, at the Hill-Bristol town line, north of northwestern New Hampton to the Plymouth-Bridgewater town line, and at the confluence of the Pemigewasset and Baker Rivers. Saturated thickness exceeds 80 ft in the central parts of these aquifers, and transmissivity ranges from 4,000 to 8,000 ft^2/d.

North of Plymouth, the most productive aquifer extends northward from Livermore Falls to southern Woodstock. Saturated thickness is greater than 120 ft in the central part of the valley, and transmissivity exceeds 8,000 ft^2/d from the confluence of the Beebe and the Pemigewasset Rivers northward to northern Campton. The saturated thickness in a smaller area at the north end is also greater than 120 ft, and the transmissivity exceeds 8,000 ft^2/d.

The most productive or potentially productive stratified-drift aquifer in the Smith River Basin is at the village center of Danbury, where the saturated thickness is at least 80 ft and the transmissivity exceeds 4,000 ft^2/d. In the lower Cockermouth and Fowler River Valleys of the Newfound Lake Basin, the saturated thickness is greater than 100 ft and the transmissivity exceeds 8,000 ft^2/d, thus indicating this would be a potentially productive aquifer.

The most productive or potentially productive stratified-drift aquifers in the Baker River Basin are in Rumney Depot in the southern part of the basin, where the saturated thickness is greater than 200 ft and the transmissivity may exceed 8,000 ft^2/d, and in Warren, where the saturated thickness is greater than 40 ft and the aquifer transmissivity exceeds 4,000 ft^2/d.

Pumpage from municipal wells in 1990 averaged only about 2.76 Mgal/d, and pumpage from most of these wells induced surface water to recharge the stratified-drift aquifers. Quantity of water in streams (about 97 Mgal/d for the basin) between flows equaled or exceeded 95 percent of the time and flows equal or exceeded 99 percent of the time will accommodate streamflow losses to induced recharge to streamside aquifers.

An example of one effective approach to evaluate the potential yield of a streamside aquifer was presented in a ground-water-flow simulation of a sand and gravel aquifer in Woodstock by use of a ground-water-flow model. Two municipal wells in woodstock were pumped at an average rate of 0.319 Mgal/d in 1990, but have been tested at about 0.8 Mgal/d. Model results indicate that if four additional wells were constructed, as much as 10.9 Mgal/d could be pumped from this aquifer.

Water from stratified-drift aquifers generally is suitable for drinking and other domestic and commercial uses. Samples of water from 24 wells and 2 springs were collected and analyzed for inorganic compounds. All water analyzed meets the USEPA primary drinking-water regulations. Only concentrations of iron (in water from eight wells) and manganese (in water from eight wells and one spring) were above the SMCL. Water samples from 14 wells and 2 springs were tested for 36 different VOC's. Chloroform was detected at a low concentration (0.60 µg/L) in one sample and benzene was detected at a low concentration (0.30 µg/L) in another sample.

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GLOSSARY

Ablation till: Loosely consolidated rock debris, formerly carried by glacial ice, that accumulated in place as the surface ice was removed by melting and sublimation.

Aquifer: A geologic formation, group of formations, or part of a formation that contains sufficient saturated permeable materials to yield significant quantities of water to wells and springs. Where water only partly fills an aquifer, the upper surface of the saturated zone is free to rise and decline (Heath, 1983).

Aquifer boundary: A feature that limits the extent of an aquifer.

Bedrock: Solid rock, locally called ledge, that forms the earth's crust. It may be exposed at the surface but commonly is buried beneath a few inches to more than 100 feet of unconsolidated deposits.

Cone of depression: A depression produced in a water table or other potentiometric surface by the withdrawal of water from an aquifer; in cross section, shaped like an inverted cone with its apex at the pumped well.

Confined Aquifer: An aquifer saturated with water and bounded above and below by material having a distinctly lower hydraulic conductivity than the aquifer itself.

Constant-head permeameter: A laboratory apparatus for measuring hydraulic conductivity where a sediment sample is enclosed between two porous plates in a cylindrical tube with a constant hydraulic-head difference set up across the sample as water is passed through the cylinder.

Contact: A plane or irregular surface between two different types or ages of rocks or unconsolidated sediments.

Cubic feet per second (ft^3/s): A unit expressing rate of discharge. One cubic foot per second is equal to the discharge of a stream 1foot wide and 1foot deep flowing at an average velocity of 1 foot per second.

Cubic feet per second per square mile [$(ft^3/s)/mi^2$]: A unit expressing average number of cubic feet of water flowing per second from each square mile of area drained.

Darcy's Law: An equation relating the factors controlling ground-water flow. Darcy's law is

$$Q = KA\frac{dh}{dl},$$

where Q is the quantity of water per unit of time; K is the hydraulic conductivity and depends on the size and arrangement of the water-transmitting openings (pores and fractures) and on the dynamic characteristics of the fluid (water) such as kinematic viscosity, density, and the strength of the gravitational field; A is the cross-sectional area, at a right angle to the flow direction, through which the flow occurs; and dh/dl is the hydraulic gradient.

Deposit: Earth material that has accumulated by some natural process.

Dissolved solids: The residue from a clear sample of water after evaporation and drying for 1 hour at 180°C; consists primarily of dissolved mineral constituents but may also contain organic matter and water of crystallization.

Downwasting: The thinning of a glacier by melting and sublimation.

Drainage area: The area or tract of land, measured in a horizontal plane, that gathers water and contributes it ultimately to some point on a stream channel, lake, reservoir, or other water body.

Drawdown: The lowering of the water table or potentiometric surface caused by the withdrawal of water from an aquifer by pumping; equal to the difference between the static water level and the pumping water level.

Drumlin: A low, smoothly rounded, elongated oval-shaped hill of glacial till, built under the margin of glacial ice and shaped by its flow; its longer axis is parallel to the direction of movement of the ice.

Effective grain size: The grain size at which 10 percent of the sample consists of smaller grains and 90 percent consists of larger grains.

Esker: A long ridge of sand and gravel that was deposited by water flowing in tunnels within or beneath glacial ice.

First quartile: For a set of measurements arranged in order of magnitude, that value where 25 percent of the measurements are lower in magnitude and 75 percent are higher.

Flow duration (of a stream): The percentage of time during which specified daily discharges are equaled or exceeded within a given time period.

Fracture: A break, crack, or opening in bedrock along which water may move.

Gneiss: A coarse-grained metamorphic rock with alternating bands of granular and micaceous minerals.

Granite: A coarse-grained, light colored, igneous rock.

Granodiorite: A coarse-grained, light colored, igneous rock.

Gravel: Unconsolidated rock debris composed principally of particles larger than 2 millimeters in diameter.

Ground water: Water beneath the water table in soils or geologic formations that are fully saturated.

Ground-water discharge: The discharge of water from the saturated zone by (1) natural processes such as ground-water seepage into stream channels and ground-water evapotranspiration and (2) discharge through wells and other manmade structures.

Ground-water divide: A hypothetical line on a water table on each side of which the water table slopes downward in a direction away from the line. In the vertical dimension, a plane across which ground-water does not flow.

Ground-water evapotranspiration (GWET): Ground water discharged into the atmosphere in the gaseous state either by direct evaporation from the water table or by the transpiration of plants.

Ground-water recharge: Water that is added to the saturated zone of an aquifer.

Ground-Water Site Inventory (GWSI): A computerized file maintained by the U.S. Geological Survey that contains information about wells and springs collected throughout the United States.

Head, static: The height of the surface of a water column above a standard datum that can be supported by the static pressure of a given point.

Hydraulic conductivity (K): A measure of the ability of a porous medium to transmit a fluid that can be expressed in unit length per unit time. A material with a hydraulic conductivity of 1 foot per day will transmit in 1 day, 1 cubic foot of water at the prevailing kinematic viscosity through a 1-foot-square cross section of aquifer, measured at right angles to the direction of flow, under a hydraulic gradient, of 1-foot change in head over 1-foot length of flow path.

Hydraulic gradient: The change in static head per unit of distance in a given direction. If not specified, the direction is generally understood to be that of the maximum rate of decrease in head.

Hydrograph: A graph showing stage (height), flow velocity, or other property of water with respect to time.

Ice-contact deposits: Stratified drift deposited in contact with melting glacial ice. Landforms include eskers, kames, kame terraces, and grounding-line deltas.

Igneous: Descriptive term for rocks or minerals solidified from molten or partially molten material; that is, from a magma, such as basalt or granite.

Image well: An imaginary well so placed with respect to a real well and hydrologic boundary that by discharging or recharging it produces a ground-water divide or condition of no drawdown along the boundary position.

Induced infiltration: The process by which water infiltrates an aquifer from an adjacent surface-water body in response to pumping.

Kame: A low mound, knob, hummock, or short irregular ridge composed of stratified sand and gravel deposited by glacial meltwater; the precise mode of formation is uncertain.

Kame terrace: A terrace-like ridge consisting of stratified sand and gravel formed as a glaciofluvial deposit between a melting glacier or stagnant ice lobe and a higher valley wall, and left standing after the disappearance of the ice.

Lodgement till: A firm, compact, clay-rich till deposited beneath a moving glacier, containing abraided stones oriented, in general, with their long axes parallel to the direction of ice movement.

Marine limit: The former limit of the sea. The highest shoreline during a period of late-glacial submergence.

Mass wasting: A general term for the dislodgement and downslope transport of soil and rock material under the direct application of gravity.

Mean (arithmetic): The sum of the individual values of a set, divided by their total number; also referred to as the "average."

Median: The middle value of a set of measurements that are ordered from lowest to highest; 50 percent of the measurements are lower than the median and 50 percent are higher.

Metamorphic: Descriptive term for rocks such as gneiss and schist that have formed, in the solid state, from other rocks.

Micrograms per liter (mg/L): A unit expressing the concentration of chemical constituents in solution as the mass (micrograms) of a constituent per unit volume (liter) of water. One thousand micrograms per liter is equivalent to one milligram per liter.

Milligrams per liter (mg/L): A unit for expressing the concentration of chemical constituents in solution as the mass (milligrams) of a constituent per unit volume (liter) of water.

Outwash: Stratified deposits chiefly of sand and gravel removed or "washed out" from a glacier by meltwater streams and deposited beyond the margin of a glacier. Usually occurring in flat or gently sloping plains.

Outwash deltas: Deltas formed beyond the margin of the glacier where glacial meltwater entered a water body.

pH: The negative logarithm, to the base 10, of the hydrogen-ion concentration. A ph of 7.0 indicates neutrality; values below 7.0 denote an acidic solution or condition, and those above 7.0 denote an alkaline solution or condition.

Phi grade scale: A logarithmic transformation of the Wentworth grade scale based on the negative logarithm to the base 2 of the particle diameter, in millimeters.

Phyllite: A fine-grained, metamorphic rock, similar to schist, commonly having a silky luster.

Porosity: The property of a rock or unconsolidated deposit that is a measure of the size and number of internal voids or open spaces; porosity may be expressed quantitatively as the ratio of the volume of its open spaces to total volume of the rock or deposit.

Precipitation: The discharge of water from the atmosphere, either in a liquid or solid state.

Primary porosity: Porosity that is intrinsic to the sediment or rock matrix. (See secondary porosity.)

Runoff: That part of the precipitation that appears in streams. It is the same as streamflow unaffected by artificial diversions, storage, or other human activities in or on the stream channels.

Saturated thickness (of stratified drift): Thickness of stratified drift extending down from the water table to the till or bedrock surface.

Saturated zone: The subsurface zone in which all open (interconnected) spaces are filled with water. Water below the water table, the upper limit of the saturated zone, is under pressure that is greater than atmospheric pressure.

Schist: A metamorphic rock with subparallel orientation of the visible micaceous minerals, which dominate its composition.

Secondary porosity: Porosity that may be due to such phenomena as secondary solution or structurally controlled regional fracturing.

Sediment: Fragmental material that originates from weathering of rocks. It can be transported by, suspended in, or deposited by water.

Specific capacity (of a well): The rate of discharge of water divided by the corresponding drawdown of the water level in the well. Stated in this report in gallons per minute per foot [(gal/min)/ft)].

Specific yield: The ratio of the volume of water that a rock or soil will yield, by gravity drainage, after being saturated to the total volume of the rock or soil.

Split spoon sampler: A hollow cylinder, about 2 1/2 ft long that is attached to steel rods and lowered through the inside of the hollow-stem augers to the bottom of the augers. The cylinder can be driven into the material below the auger so that a sample of this material is forced into the hollow cylinder.

Standard deviation: A measure of the amount of variability within a sample; it is the square root of the average of the squares of the deviations about the arithmetic mean of a set of data.

Storage coefficient: The volume of water an aquifer releases from or takes into storage per unit surface area of the aquifer per unit change in head. In an unconfined aquifer, the storage coefficient is virtually equal to the specific yield.

Stratified drift: Sorted and layered unconsolidated material deposited in meltwater streams flowing from glaciers or settled from suspension in still bodies of water that are fed by meltwater streams.

Surficial geology: The study or distribution of unconsolidated deposits at or near the land surface.

Superposition: For linear systems, the principle that the solution to a problem involving multiple inputs (or stress) is equal to the sum of the solutions to a set of simpler individual problems that form the composite problem.

Third quartile: for a set of measurements arranged in order of magnitude, that value where 75 percent of the measurements are lower in magnitude and 25 percent are higher in magnitude.

Till: A predominantly nonsorted, nonstratified sediment deposited directly by a glacier and composed of boulders, gravel, sand, silt, and clay mixed in various proportions.

Transmissivity: The rate at which water at the prevailing kinematic viscosity can be transmitted through a unit width of an aquifer under a unit hydraulic gradient. The transmissivity (T) of an aquifer is equal to the saturated thickness (b) multiplied by the horizontal hydraulic conductivity (K, a directional measure of the permeability) and is expressed in feet squared per day; thus,

$$T = Kb.$$

Unconfined aquifer (water-table aquifer): An aquifer only partly filled with water. In such aquifers the water is unconfined in that the water table or upper surface of the saturated zone is at atmospheric pressure and is free to rise and fall.

Unconsolidated deposit: A sediment in which the particles are not firmly cemented together, such as sand in contrast to sandstone.

Unsaturated zone: The zone between the water table and the land surface in which the open spaces are not completely filled with water.

Variable-head parameter: A laboratory apparatus for measuring hydraulic conductivity. In use, water is passed through sediment sample in a cylindrical tube enclosed between two porous plates. Time is measured as the hydraulic head that is allowed to decline over a know distance.

Water table: The upper surface of the saturated zone. Water at the water table is at atmospheric pressure.

APPENDIX A: Description of selected wells, borings, and springs in the Pemigewasset River Basin, central New Hampshire

Appendix A-1. Description of selected wells, borings, and springs in the Pemigewasset River Basin, central New Hampshire

The following table lists information about wells, boreholes, and springs used for the collection of this report. The following information is included in the tables.

Local site number: First two characters are U.S. Geological Survey town code. Third character indicates type of hole; A, auger hole or test hole bored for hydrologic information; B, highway bridge boring; W, well. The numbers are sequential numbers for each town.

Latitude, Longitude: Accurate within 5 seconds.

Owner or user: NHDOT, New Hamphsire Department of Transportation; CO, Company; Hatch, Hatchery; Bldrs, builders; COU, Course; NHPUBWKSHGWYS, New Hampshire Public Works and Highways; Produc, Products; CRT, Court; Dist, District; INC, Incorporated; FD, Fire Department; DEPT, Department; CONST, Construction; PWH, Public Works and Highways; RR, Railroad.

Elevation above sea level: Elevations are expressed in feet above sea level (National Geodetic Vertical Datum of 1929); those in whole feet are interpolated from U.S. Geological Survey topographic maps and are accurate to plus or minus half the contour interval of the map (10 to 20 feet); those in tenths of feet are instrumentally determined.

Depth drilled: The greatest depth below the land surface.

Depth to bottom of casing: Depth to the bottom of casing, in feet below land surface datum.

Depth of well: Depth of well materials.

Type of finish: G, gravel screen; O, open end; P, perforated or slotted; S, screen; X, open hole.

Depth to bottom of open section: Depth to the bottom of the screen or open section in which water enters the well, in feet below land-surface datum.

Type of site: BrW, bedrock well; Bor, bored or augered; Cbl, cable tool drill; Dr, drilled; Dug, dug; DVN, driven; Sp, spring; TH, test hole; Wsh, drive and wash.

Water level: In feet below land-surface datum; negative sign indicates water level above land-surface datum; mm-dd-yy, month-day-year.

Use:

Use of site: O, observation well drilled for water-level or water-quality observations; T, test hole.
Use of water: C, commercial; H, domestic; I, irrigation; N, industrial; P, public supply; S, stock; U, unused; Z, destroyed.

Maximum well yield: Discharge in gallons per minute.

Pumping period: The length of time, in hours, that the well was pumped before the measurement of pumping levels.

Remarks: CA, chemical analysis summarized in appendix E; GS, well inventoried by Glen Stewart (past New Hampshire State Geologist); L, Stratigraphic log listed in appendix B; USGS, well or test hole drilled by the U.S. Geological Survey for this investigation.

Other abbreviations and symbols: --, no data available.

Table A-1. Description of selected wells, borings, and springs in the Pemigewasset River Basin, central New

[--, no data available; Eoh, end of hole]

Local site number	Lat-itude	Long-itude	Owner or user	Year comp-pleted	Elevation above sea level (feet)	Depth drilled (feet)	Depth to bottom of casing (feet)	Depth of well (feet)	Type of finish	Depth to bottom of open section (feet)	Type of site
				BELKNAP COUNTY							
				Center Harbor							
CHW 4	434338	713057	Peston, R.	1984	580	362.0	46.0	362.0	X	--	BrW
CHW 16	434324	713022	Gordon	1985	580	252.0	20.0	252.0	X	--	BrW
CHW 18	434327	713059	Chalmers, T.	1986	580	420.0	39.0	420.0	X	--	BrW
				New Hampton							
NHA 11	433806	713910	NHDOT	1989	470	24.0	--	--	--	--	Bor
NHA 12	433810	713906	NHDOT	1989	460	23.0	--	--	--	--	Bor
NHA 13	433741	713859	Ambrose Company	1989	500	35.5	--	--	--	--	Bor
NHA 14	433741	713859	Ambrose Company	1989	500	33.5	--	--	--	--	Bor
NHA 15	433728	713825	Northern Insulation	1989	520	74.0	--	--	--	--	Bor
NHA 16	433452	714304	US Army Corps Engineers	1989	370	46.0	--	--	--	--	Bor
NHA 17	433614	713910	New Hampton Fish Hatch	1988	480	36.0	--	--	--	--	Bor
NHA 18	433616	713901	New Hampton Fish Hatch	1988	480	58.0	--	--	--	--	Bor
NHB 2	433612	713828	NHDOT	--	557	15.0	--	--	--	--	TH
NHB 3	433950	713859	NHDOT	--	514	67.0	--	--	--	--	TH
NHB 4	433713	713526	NHDOT	--	547	37.0	--	--	--	--	TH
NHB 5	433737	713904	NHDOT	--	455	54.0	--	--	--	--	TH
NHB 7	433649	713834	NHDOT	--	593	62.0	--	--	--	--	TH
NHB 8	433627	713822	NHDOT	--	676	90.0	--	--	--	--	TH
NHB 10	433759	713911	NHDOT	1962	535	34.0	--	--	--	--	TH
NHB 11	433647	713835	NHDOT	1962	596	66.0	--	--	--	--	TH
NHB 12	433949	713901	NHDOT	1963	499	64.0	--	--	--	--	TH
NHW 2	433627	713800	Blood, R.	1954	800	--	35.0	150.0	--	--	BrW
NHW 3	433318	714225	Carlson, H.	1969	550	--	--	94.0	--	--	BrW
NHW 4	433713	713526	Collins, J.	1951	620	120.0	13.0	120.0	--	--	BrW
NHW 5	433727	713654	Drake, O.	1953	610	142.0	21.0	142.0	--	--	BrW
NHW 6	433729	713731	LaChance, J.	1950	620	--	36.0	204.0	--	--	BrW
NHW 7	433642	713836	Price, W.	1961	600	--	48.0	109.0	--	--	BrW
NHW 8	433642	713841	Yourt, L.	1963	620	--	48.0	152.0	--	--	BrW
NHW 10	433716	713603	Pinnette, N.	1984	580	330.0	39.0	330.0	X	--	BrW
NHW 12	434022	713837	LeBlanc	1985	540	--	134.0	444.0	X	--	BrW
NHW 13	434047	713827	Downing	1985	540	--	120.0	438.0	X	--	BrW
NHW 15	433702	713713	Ladman	1985	560	--	19.0	325.0	X	--	BrW
NHW 17	433703	713811	L'Italian	1985	520	--	79.0	285.0	X	--	BrW
NHW 18	433306	714238	Jackson	1985	480	--	139.0	255.0	X	--	BrW
NHW 19	433711	713611	Curtin	1985	560	305.0	20.0	305.0	X	--	BrW
NHW 20	433956	713853	Hiltz	1986	520	--	105.0	303.0	X	--	BrW
NHW 21	433346	714305	Beshta	1984	480	--	53.0	380.0	X	--	BrW
NHW 23	433700	713725	Elliot	1986	520	--	20.0	350.0	X	--	BrW
NHW 24	433735	713750	McDermott, J.	1986	580	333.0	20.0	333.0	X	--	BrW
NHW 25	433724	713818	Brown	1986	520	--	80.0	713.0	X	--	BrW
NHW 26	433642	713838	Faucher	1986	610	--	57.0	473.0	X	--	BrW
NHW 27	433704	713814	Reno Rossi Restaurant	1986	520	--	48.0	190.0	X	--	BrW
NHW 29	433924	713911	NHDOT	1989	510	139.0	88.8	91.7	P	91.7	Bor
NHW 30	433616	713831	New Hampton Fish Hatch	1988	540	30.0	--	26.0	P	26.0	Bor

Local site number	Water level Depth (feet)	Water level Date (mm-dd-yy)	Use	Maximum well yield (gallons per minute)	Pumping period (hours)	Remarks
			BELKNAP COUNTY			
			Center Harbor			
CHW 4	20.0	09-22-84	H	--	0.3	L
CHW 16	3.0	08-28-85	H	--	.5	L
CHW 18	5.0	10-10-86	H	--	1.0	L
			New Hampton			
NHA 11	--	--	T	--	--	USGS, L
NHA 12	--	--	T	--	--	USGS, L
NHA 13	--	--	T	--	--	USGS, L
NHA 14	--	--	T	--	--	USGS, L
NHA 15	35.0	04-25-89	T	--	--	USGS, L
NHA 16	26.5	04-25-89	T	--	--	USGS, L
NHA 17	4.8	08-09-88	T	--	--	L
NHA 18	4.8	08-10-88	T	--	--	L
NHB 2	--	--	T	--	--	L
NHB 3	--	--	T	--	--	L
NHB 4	--	--	T	--	--	L
NHB 5	--	--	T	--	--	L
NHB 7	--	--	T	--	--	L
NHB 8	--	--	T	--	--	L
NHB 10	--	--	T	--	--	L
NHB 11	--	--	T	--	--	L
NHB 12	--	--	T	--	--	L
NHW 2	--	--	--	--	--	GS
NHW 3	--	--	--	--	--	GS
NHW 4	7.0	06-18-51	--	--	--	L
NHW 5	13.0	07-01-53	--	--	--	GS, L
NHW 6	10.0	01- -50	--	--	--	GS
NHW 7	32.0	01- -61	--	--	--	GS
NHW 8	--	--	--	--	--	GS
NHW 10	--	--	--	--	1.0	L
NHW 12	86.0	04-17-85	H	2.5	1.0	L
NHW 13	--	--	H	4.0	2.0	L
NHW 15	--	--	H	4.0	.5	L
NHW 17	--	--	Z	6.0	.5	L
NHW 18	--	--	H	12.0	1.0	L
NHW 19	--	--	H	--	1.0	L
NHW 20	--	--	H	40.0	1.0	L
NHW 21	--	--	H	3.5	1.0	L
NHW 23	--	--	H	6.0	1.0	L
NHW 24	--	--	H	--	.5	--
NHW 25	--	--	C	1.0	.5	L
NHW 26	--	--	H	4.5	.5	L
NHW 27	--	--	H	50.0	.5	L
NHW 29	55.0	08-03-89	O	--	--	USGS, L
NHW 30	2.6	09-27-88	T	75.0	--	L

Table A-1. Description of selected wells, borings, and springs in the Pemigewasset River Basin, central New

Local site number	Lat-itude	Long-itude	Owner or user	Year comp-pleted	Elevation above sea level (feet)	Depth drilled (feet)	Depth to bottom of casing (feet)	Depth of well (feet)	Type of finish	Depth to bottom of open section (feet)	Type of site
					BELKNAP COUNTY						
					New Hampton—*Continued*						
NHW 31	433618	713832	New Hampton Fish Hatch	1988	540	32.0	--	20.0	P	20.0	Bor
NHW 32	433848	713853	Cloutier, P.	1990	520	94.0	--	94.0	--	--	--
					Sanbornton						
SCA 1	433427	713658	Tilton Sand and Gravel	1988	640	19.0	--	--	--	--	Bor
SCA 2	433313	713622	Howe, R.	1988	600	14.8	--	--	--	--	Bor
SCA 3	433351	713640	Town of Sanbornton	1988	640	15.0	--	--	--	--	Bor
SCB 1	433119	713647	NHDOT	--	586	42.0	--	--	--	--	TH
SCB 4	432951	713754	NHDOT	--	462	14.0	--	--	--	--	TH
SCB 5	433110	713703	NHDOT	1962	582	28.0	--	--	--	--	TH
SCB 6	433017	713657	NHDOT	1961	694	--	--	--	--	--	TH
SCB 9	433016	713658	NHDOT	1962	695	12.0	--	--	--	--	TH
SCS 1	432947	713758	Public right-of-way	--	460	--	--	--	--	--	Sp
SCW 43	432931	713702	Wardner	1963	680	--	62.0	131.0	--	--	BrW
SCW 44	433054	713733	Ellis, C.	1961	600	--	--	199.0	--	--	BrW
SCW 48	432935	713823	Moses, G.	1959	440	--	66.0	132.0	--	--	BrW
SCW 50	432936	713824	Town of Franklin	1948	420	--	--	--	--	--	Dvn
SCW 58	433356	713646	Town of Sanbornton	1988	640	32.0	--	21.0	P	--	Bor
SCW 59	433250	713631	Town of Sanbornton	1988	600	28.5	--	22.0	P	--	Bor
SCW 61	433004	713920	Thompson	1984	460	--	19.0	125.0	X	--	BrW
SCW 73	433116	713549	Burbank, J.	1985	700	84.0	39.0	84.0	X	--	BrW
SCW 76	433349	713641	Noivo	1985	640	--	39.0	265.0	X	--	BrW
SCW 77	433050	713642	Thomson	1985	740	--	59.0	385.0	X	--	BrW
SCW 87	433054	713645	Matcheski	1986	720	--	158.0	436.0	X	--	BrW
SCW 90	432930	713812	Onsager	1986	480	--	39.0	210.0	X	--	BrW
SCW 95	433001	713927	Downes	1986	440	--	39.0	285.0	X	--	BrW
SCW 99	433110	713726	Rose	1986	660	--	19.0	255.0	X	--	BrW
SCW 100	433148	713549	Wyman	1986	760	--	9.0	155.0	X	--	BrW
SCW 101	433050	713745	Howe	1986	700	--	44.0	230.0	X	--	BrW
SCW 102	433009	713844	Gore	1987	480	--	29.0	180.0	X	--	BrW
SCW 103	433107	713616	Ames	1987	680	--	79.0	205.0	X	--	BrW
SCW 104	433339	713557	Gallagher	1986	660	--	59.0	385.0	X	--	BrW
SCW 113	433147	713556	Grant	1987	680	--	19.0	105.0	X	--	BrW
SCW 118	433149	714032	Tessler	1988	600	--	39.0	230.0	X	--	BrW
SCW 119	433005	713840	Driscoll	1987	480	--	40.0	270.0	X	--	BrW
SCW 120	432955	713700	Burton	1988	700	--	14.0	145.0	X	--	BrW
SCW 126	433013	713847	Auger	1987	460	--	29.0	205.0	X	--	BrW
SCW 128	433417	713625	Dupuis	1985	640	--	64.0	155.0	X	--	BrW
SCW 129	433005	714036	US Army Corps Engineers	1989	320	102.0	29.6	32.5	P	32.5	Bor
SCW 135	433206	713616	Burlingame, J.	1988	600	58.0	--	44.4	P	--	Bor
SCW 143	433123	713637	Town of Sanbornton	1988	590	20.0	--	16.0	P	--	Bor

Local site number	Water level Depth (feet)	Date (mm-dd-yy)	Use	Maximum well yield (gallons per minute)	Pumping period (hours)	Remarks
				BELKNAP COUNTY		
				New Hampton—*Continued*		
NHW 31	--	--	T	70.0	--	L
NHW 32	--	--	H	--	--	L
				Sanbornton		
SCA 1	4.0	08-08-88	O	--	--	USGS, L
SCA 2	9.0	08-10-88	O	--	--	USGS, L
SCA 3	--	--	O	--	--	USGS, L
SCB 1	--	--	T	--	--	L
SCB 4	--	--	T	--	--	L
SCB 5	--	--	T	--	--	L
SCB 6	--	--	T	--	--	L
SCB 9	--	--	T	--	--	L
SCS 1	--	--	--	--	--	CA
SCW 43	30.0	06- -63	--	--	--	GS, L
SCW 44	--	--	--	--	--	GS, L
SCW 48	10.0	03- -59	--	--	--	GS, L
SCW 50	--	--	P	--	--	CA, Well Field;49 Well Points, 29 to 53 feet deep
SCW 58	10.7	08-12-88	O	--	--	USGS, L, CA
SCW 59	4.8	08-12-88	O	--	--	USGS, L
SCW 61	--	--	H	10.0	.5	L
SCW 73	11.0	06-21-85	H	--	--	--
SCW 76	--	--	H	60.0	.5	L
SCW 77	--	--	H	10.0	.5	L
SCW 87	--	--	H	2.5	1.0	L
SCW 90	20.0	07-29-86	H	30.0	.5	L
SCW 95	--	--	H	20.0	.8	L
SCW 99	15.0	09-04-86	H	20.0	.5	L
SCW 100	--	--	H	4.0	.5	L
SCW 101	--	--	H	10.0	.5	L
SCW 102	--	--	H	50.0	.5	L
SCW 103	10.0	02-05-87	H	60.0	.8	L
SCW 104	--	--	H	5.0	.3	L
SCW 113	--	--	H	8.0	.5	L
SCW 118	--	--	H	12.0	.5	L
SCW 119	--	--	H	8.0	.3	L
SCW 120	--	--	H	8.0	1.0	L
SCW 126	--	--	H	4.0	.3	--
SCW 128	--	--	H	20.0	1.0	L
SCW 129	6.7	04-28-89	O	--	--	USGS, L
SCW 135	7.8	08-12-88	O	--	--	USGS, L, CA
SCW 143	13.0	08-12-88	O	--	--	USGS, L

Table A-1. Description of selected wells, borings, and springs in the Pemigewasset River Basin, central New

Local site number	Lat-itude	Long-itude	Owner or user	Year comp-pleted	Elevation above sea level (feet)	Depth drilled (feet)	Depth to bottom of casing (feet)	Depth of well (feet)	Type of finish	Depth to bottom of open section (feet)	Type of site
				GRAFTON COUNTY							
				Alexandria							
AEA 1	433406	714643	Morrison, B.	1988	540	13.5	--	--	--	--	Bor
AEA 2	433413	714646	Morrison, B.	1988	523	14.0	--	--	--	--	Bor
AEA 3	433420	714552	Walker, C.	1989	490	38.0	--	--	--	--	Bor
AEB 2	433850	715225	--	1961	1,320	--	--	--	X	--	TH
AEW 5	433647	714754	Town of Alexandria	1960	640	--	80.0	137.0	--	--	BrW
AEW 6	433642	714635	Young, C.	1964	720	--	106.0	277.0	--	--	BrW
AEW 7	433420	714610	Evans, J.	1963	500	--	34.0	150.0	--	--	BrW
AEW 8	433359	714630	Morrison, B.	1988	523	35.0	23.1	26.0	P	26.0	Bor
AEW 9	433637	714731	Taylor	1984	620	--	91.0	405.0	X	--	BrW
AEW 11	433444	714615	Irving	1985	620	--	19.0	305.0	X	--	BrW
AEW 16	433449	714538	Williams	1985	640	--	20.0	275.0	X	--	BrW
AEW 17	433408	714736	Smith	1984	740	--	87.0	250.0	X	--	BrW
AEW 18	433926	715113	Sloth	1985	1,000	--	69.0	553.0	X	--	BrW
AEW 19	433829	714701	McGrath	1986	600	--	75.0	365.0	X	--	BrW
AEW 21	433728	714707	Ramsey, B.	1989	600	120.0	50.0	55.8	P	55.8	Bor
				Ashland							
APA 1	434440	714005	Huckins, M.	1987	480	109.0	--	--	--	--	Bor
APA 2	434438	714029	White Mountain C.C.	1987	470	123.0	--	--	--	--	Bor
APA 10	434220	713912	Obrien Lumber Company	1989	490	119.0	--	--	--	--	Bor
APB 1	434233	713917	NHDOT	--	451	68.0	--	--	--	--	TH
APB 2	434306	713724	NHDOT	--	564	74.0	--	--	--	--	TH
APB 4	434111	713834	NHDOT	1963	458	95.0	--	--	--	--	TH
APB 11	434226	713917	NHDOT	--	498	83.0	--	--	--	--	TH
APB 12	434139	713839	NHDOT	--	540	95.0	--	--	--	--	TH
APB 14	434152	713847	NHDOT	1963	514	51.0	--	--	--	--	TH
APW 1	434155	713904	Town of Ashland	1974	480	102.0	--	102.0	--	--	TH
APW 2	434440	714005	Huckins, M.	1987	480	22.0	--	22.0	P	--	Bor
APW 3	434438	714029	White Mountain C.C.	1987	470	20.5	--	20.5	P	--	Bor
APW 8	434322	713641	Mershon	1986	580	--	90.0	341.0	X	--	BrW
APW 9	434353	713737	Hiltz	1987	680	--	60.0	401.0	X	--	BrW
APW 10	434204	713915	Town of Ashland	1995	490	123.0	75.0	95.0	S	95.0	--
APW 11	434409	713958	Riverbend Condos	1987	505	120.0	120.0	120.0	--	--	--
APW 12	434317	713654	Simoneau	1984	600	--	45.0	130.0	X	--	BrW
APW 13	434255	713750	Cole	1984	700	--	20.0	305.0	X	--	BrW
				Bristol							
B2A 1	433528	714504	Morrison, B.	1988	505	96.0	--	--	--	--	Bor
B2A 2	433542	714453	Morrison, B.	1988	460	58.5	--	--	--	--	Bor
B2A 3	433528	714434	Robbins	1946	460	67.0	--	--	--	--	Dvn
B2A 4	433525	714429	Robbins	1946	460	20.0	--	--	--	--	Dvn
B2A 5	433547	714452	Robbins	1946	460	59.0	--	--	--	--	Dvn
B2A 6	433528	714454		1946	500	8.0	--	--	--	--	Dvn

Local site number		Water level Depth (feet)	Water level Date (mm-dd-yy)	Use	Maximum well yield (gallons per minute)	Pumping period (hours)	Remarks
				GRAFTON COUNTY			
				Alexandria			
AEA	1	--	--	O	--	--	USGS, L
AEA	2	--	--	O	--	--	USGS, L
AEA	3	17.0	05-24-89	T	--	--	USGS, L
AEB	2	--	--	U	--	--	L
AEW	5	6.0	04- -60	--	--	--	GS
AEW	6	6.0	08-16-64	--	--	--	GS, L
AEW	7	20.0	04- -63	--	--	--	GS, L
AEW	8	4.0	06-21-88	O	--	--	USGS, L
AEW	9	--	--	H	15.0	1.0	L
AEW	11	--	--	H	--	--	L
AEW	16	--	--	H	4.0	1.0	L
AEW	17	--	--	H	12.0	.5	L
AEW	18	10.0	11-07-85	H	1.5	1.0	L
AEW	19	8.0	08-04-86	H	5.0	.8	L
AEW	21	12.0	04-26-89	O	--	--	USGS, L
				Ashland			
APA	1	--	--	O	--	--	USGS, L
APA	2	--	--	O	--	--	USGS, L
APA	10	38.0	04-19-89	T	--	--	USGS, L
APB	1	--	--	T	--	--	L
APB	2	--	--	T	--	--	L
APB	4	--	--	T	--	--	L
APB	11	--	--	T	--	--	L
APB	12	--	--	T	--	--	L
APB	14	--	--	T	--	--	L
APW	1	36.0	07-01-74	T	--	--	L
APW	2	8.5	06- -88	O	--	--	USGS, CA
APW	3	10.8	06- -88	O	--	--	USGS, CA
APW	8	--	--	H	75.0	1.0	L
APW	9	--	--	H	8.0	1.0	L
APW	10	13.8	11-29-95	P	532.0	168.0	L; Seven day aquifer test with 5.81 feet drawdown
APW	11	72.0	09-01-87	C	--	--	L
APW	12	2.0	08-02-84	H	20.0	1.0	L
APW	13	30.0	07-30-84	H	4.5	1.0	L
				Bristol			
B2A	1	--	--	O	--	--	USGS, L
B2A	2	--	--	O	--	--	USGS, L
B2A	3	--	--	T	--	--	L
B2A	4	--	--	T	--	--	L
B2A	5	--	--	T	--	--	L
B2A	6	--	--	T	--	--	L

Table A-1. Description of selected wells, borings, and springs in the Pemigewasset River Basin, central New

Local site number	Lat-itude	Long-itude	Owner or user	Year com-pleted	Elevation above sea level (feet)	Depth drilled (feet)	Depth to bottom of casing (feet)	Depth of well (feet)	Type of finish	Depth to bottom of open section (feet)	Type of site
					GRAFTON COUNTY						
					Bristol-*Continued*						
B2A 7	433533	714445	--	1989	460	30.0	--	--	--	--	Dvn
B2A 8	433548	714453	--	--	460	13.0	--	--	--	--	TH
B2B 1	433526	714411	NHDOT	--	446	3.0	--	--	--	--	TH
B2S 1	433612	714444	Public right-of-way	--	540	--	--	--	--	--	Sp
B2W 18	433610	714312	Town of Bristol	1949	475	53.0	39.0	49.0	--	--	Dr
B2W 23	433727	714406	Newell, G.	1958	586	128.0	81.0	128.0	--	--	BrW
B2W 24	433710	714430	McDermott, W.	1959	600	--	20.0	100.0	--	--	BrW
B2W 25	433708	714428	Osgood, R.	1959	600	--	20.0	100.0	--	--	BrW
B2W 26	433701	714423	Rearick	1962	620	--	73.0	212.0	--	--	BrW
B2W 27	433656	714412	Powden, W.	1957	650	--	168.0	266.0	--	--	BrW
B2W 28	433654	714415	Mason, L.	1961	660	--	140.0	170.0	--	--	BrW
B2W 29	433538	714511	Morrison, N.	1959	520	--	50.0	110.0	--	--	BrW
B2W 30	433505	714507	Int. Package Company	1962	500	--	135.0	400.0	--	--	BrW
B2W 31	433407	714428	Sterner, M.	1962	490	--	--	100.0	--	--	BrW
B2W 33	433707	714305	Young G.	1955	680	--	10.0	172.0	--	--	BrW
B2W 34	433702	714302	Stubbs, A.	1962	680	--	--	259.0	--	--	BrW
B2W 36	433801	714630	Town of Bristol	1979	595	75.0	65.0	75.0	S	75.0	Dr
B2W 37	433617	714234	Rice	1984	620	405.0	49.0	405.0	X	--	BrW
B2W 39	433640	714319	Ingham	1985	580	--	19.0	230.0	X	--	BrW
B2W 40	433426	714335	Kee	1985	500	--	57.0	250.0	X	--	BrW
B2W 41	433622	714440	Danahy & Mills Builders	1984	680	--	153.0	270.0	X	--	BrW
B2W 42	433626	714441	Danahy & Mills Builders	1984	680	--	88.0	312.0	X	--	BrW
B2W 43	433814	714643	Thompson	1986	620	--	14.0	365.0	X	--	BrW
B2W 44	433714	713935	Dunscombe	1986	520	--	129.0	385.0	X	--	BrW
B2W 45	433745	713930	Murphy	1986	500	--	99.0	285.0	X	--	BrW
B2W 46	433626	714345	McEwen	1986	720	--	40.0	710.0	X	--	BrW
B2W 48	433510	714417	Firth	1987	600	--	274.0	650.0	X	--	BrW
B2W 49	433628	714003	Davidson's Campground	1986	540	--	169.0	450.0	X	--	BrW
B2W 50	433728	713928	Willette	1987	520	--	80.0	252.0	X	--	BrW
B2W 51	433801	714635	Town of Bristol	1972	590	78.0	65.0	75.0	--	--	TH
B2W 52	433527	714432	Robbins	1946	460	41.0	--	--	--	--	Dvn
					Bridgewater						
BYA 5	434027	713911	Congliano, A.	1989	510	79.0	--	--	--	--	Bor
BYA 6	433817	713919	Gilpatrick, L.	1989	520	50.0	--	--	--	--	Bor
BYA 7	434255	713935	Bridgewater Power Co.	1986	480	31.0	--	--	--	--	Bor
BYA 8	434257	713936	Bridgewater Power Co.	1986	480	31.0	--	--	--	--	Bor
BYA 9	434256	713933	Bridgewater Power Co.	1984	480	27.0	--	--	--	--	Bor
BYB 1	433914	713925	--	--	457	43.0	--	--	--	--	TH
BYW 1	433944	714427	Timberlock Lodge	1960	610	--	55.0	256.0	--	--	BrW
BYW 7	433837	714404	Fogg, L.	1961	690	303.0	245.0	303.0	--	--	BrW
BYW 10	434143	713928	Bridgewater School	1961	540	--	86.0	167.0	--	--	BrW

Local site number		Water level Depth (feet)	Water level Date (mm-dd-yy)	Use	Maximum well yield (gallons per minute)	Pumping period (hours)	Remarks
				GRAFTON COUNTY			
				Bristol-*Continued*			
B2A	7	--	--	T	--	--	L
B2A	8	--	--	T	--	--	L
B2B	1	--	--	T	--	--	L
B2S	1	--	--	--	--	--	CA
B2W	18	--	--	P	--	--	L, CA
B2W	23	--	--	--	--	--	GS
B2W	24	--	--	--	--	--	GS, L
B2W	25	--	--	--	--	--	GS, L
B2W	26	--	--	--	--	--	GS, L
B2W	27	50.0	02-15-57	--	--	--	GS, L
B2W	28	17.0	12-23-61	--	--	--	GS, L
B2W	29	10.0	05- -59	--	--	--	GS, L
B2W	30	10.0	02-02-62	--	--	--	GS, L
B2W	31	20.0	06- -62	--	--	--	GS, L
B2W	33	--	--	--	--	--	GS, L
B2W	34	67.0	07- -62	--	--	--	GS, L
B2W	36	6.4	12-11-79	P	1,020.0	--	L, CA
B2W	37	--	--	H	--	1.0	L
B2W	39	--	--	H	15.0	.5	L
B2W	40	--	--	H	4.0	1.0	L
B2W	41	--	--	H	30.0	.5	L
B2W	42	--	--	H	2.0	.5	L
B2W	43	--	--	H	3.5	.8	L
B2W	44	--	--	H	2.5	.3	L
B2W	45	--	--	H	40.0	.5	L
B2W	46	--	--	H	4.0	.5	L
B2W	48	--	--	H	5.0	1.0	L
B2W	49	--	--	H	30.0	1.0	L
B2W	50	--	--	H	12.0	--	L
B2W	51	--	--	T	--	--	L
B2W	52	--	--	T	--	--	L
				Bridgewater			
BYA	5	--	--	T	--	--	USGS, L
BYA	6	46.0	04-17-89	T	--	--	USGS, L
BYA	7	24.5	07-02-86	T	--	--	L
BYA	8	21.0	07-03-86	T	--	--	L
BYA	9	22.0	09-24-84	T	--	--	L
BYB	1	--	--	T	--	--	L
BYW	1	3.0	06-18-60	--	--	--	GS, L
BYW	7	50.0	09- -61	--	--	--	GS, L
BYW	10	60.0	06- -61	--	--	--	GS, L

Table A-1. Description of selected wells, borings, and springs in the Pemigewasset River Basin, central New

Local site number		Lat-itude	Long-itude	Owner or user	Year comp-pleted	Elevation above sea level (feet)	Depth drilled (feet)	Depth to bottom of casing (feet)	Depth of well (feet)	Type of finish	Depth to bottom of open section (feet)	Type of site
				GRAFTON COUNTY								
				Bridgewater-*Continued*								
BYW	11	433828	713923	Timson, W.	1954	500	--	22.0	168.0	--	--	BrW
BYW	14	433846	714348	Delaney, M.	1985	780	505.0	129.0	505.0	X	505.0	Brw
BYW	16	433920	714321	Meacham, K.	1985	860	405.0	249.0	405.0	X	--	BrW
BYW	18	434224	714040	Rafferty	1984	520	--	41.0	350.0	X	--	BrW
BYW	22	433924	714348	Woodwind Properties Inc.	1984	940	--	21.0	334.0	X	--	BrW
BYW	23	433830	713917	Kearney	1986	480	--	65.0	472.0	X	--	BrW
BYW	24	434259	713939	Bridgewater Power Co.	1986	500	--	89.0	100.0	S	--	--
BYW	25	434300	713933	Bridgewater Power Co.	1986	480	--	74.0	85.0	--	--	--
BYW	26	434300	713933	Bridgewater Power Co.	1986	480	--	84.0	--	--	--	--
BYW	30	434259	713939	Bridgewater Power Co.	1987	500	--	94.3	106.0	G	--	--
BYW	31	434258	713938	Bridgewater Power Co.	1986	500	--	120.0	131.0	G	--	--
BYW	33	434301	713935	Bridgewater Power Co.	1987	480	--	30.7	61.9	--	--	--
BYW	34	434259	713933	Bridgewater Power Co.	1987	480	--	28.5	62.0	--	--	--
BYW	35	434300	713931	Bridgewater Power Co.	1987	480	--	31.8	56.3	--	--	--
BYW	36	434302	713934	Bridgewater Power Co.	1987	480	--	27.7	56.5	--	--	--
BYW	37	434001	714434	Outhet	1986	620	--	59.0	500.0	X	--	BrW
BYW	39	434300	713935	Bridgewater Power Co.	1986	480	--	89.0	100.0	S	--	--
BYW	41	434259	713937	Bridgewater Power Co.	1986	480	106.0	95.3	95.3	O	--	--
BYW	42	434259	713937	Bridgewater Power Co.	1986	480	138.0	121.0	131.0	--	--	--
				Campton								
CBA	1	434838	713952	State of NH	1987	550	8.0	--	--	--	--	Bor
CBB	1	435149	713930	NHDOT	--	552	71.0	--	--	--	--	TH
CBB	2	435038	713849	NHDOT	--	556	103.0	--	--	--	--	TH
CBB	3	435020	713905	NHDOT	--	535	115.0	--	--	--	--	TH
CBB	4	434904	713945	NHDOT	--	530	55.0	--	--	--	--	TH
CBB	5	435019	713904	NHDOT	--	535	125.0	--	--	--	--	TH
CBB	6	435054	713938	NHDOT	--	534	50.0	--	--	--	--	TH
CBB	7	435102	713846	NHDOT	--	600	38.0	--	--	--	--	TH
CBB	8	435126	713800	NHDOT	--	631	5.0	--	--	--	--	TH
CBB	9	435017	713859	NHDOT	--	536	141.0	--	--	--	--	TH
CBB	10	434754	714037	NHDOT	--	540	9.0	--	--	--	--	TH
CBB	11	434754	714037	NHDOT	--	560	13.0	--	--	--	--	TH
CBB	12	434841	714016	NHDOT	--	600	9.0	--	--	--	--	TH
CBB	13	435136	713910	NHDOT	--	640	10.0	--	--	--	--	TH
CBB	14	435136	713910	NHDOT	--	620	9.0	--	--	--	--	TH
CBB	15	435143	713758	NHDOT	--	640	--	--	--	--	--	TH
CBB	16	434906	713943	NHDOT	--	540	58.0	--	--	--	--	TH
CBB	17	434840	714012	NHDOT	--	595	15.5	--	--	--	--	TH
CBB	18	435038	713849	NHDOT	--	556	103.0	--	--	--	--	TH
CBB	19	435149	713930	NHDOT	--	535	77.0	--	--	--	--	TH
CBS	1	435200	713856	Public right-of-way	--	700	--	--	--	--	--	Sp
CBW	1	434834	713920	State of NH	1987	635	107.0	--	102.0	P	--	Bor
CBW	2	434835	713952	State of NH	1987	550	20.0	--	19.6	P	--	Bor

Local site number		Water level Depth (feet)	Water level Date (mm-dd-yy)	Use	Maximum well yield (gallons per minute)	Pumping period (hours)	Remarks
				GRAFTON COUNTY			
				Bridgewater-*Continued*			
BYW	11	13.0	- -54	--	--	--	GS, L
BYW	14	--	--	H	1.5	--	L
BYW	16	--	--	H	--	0.5	L
BYW	18	--	--	H	4.0	2.0	L
BYW	22	--	--	H	2.0	.5	L
BYW	23	30.0	08-22-86	H	3.0	.5	L
BYW	24	22.3	01-24-86	O	50.0	2.5	L
BYW	25	--	--	O	40.0	3.0	L
BYW	26	--	--	O	40.0	3.0	--
BYW	30	30.7	11-17-87	N	449.0	48.0	L
BYW	31	27.8	12-08-86	N	449.0	48.0	L
BYW	33	--	--	O	--	--	L
BYW	34	--	--	O	--	--	L
BYW	35	--	--	O	--	--	L
BYW	36	--	--	O	--	--	L
BYW	37	5.0	11-03-86	H	2.5	1.5	L
BYW	39	15.6	01-28-86	O	85.0	2.8	L
BYW	41	30.7	11-17-87	C	--	--	L
BYW	42	27.7	12-20-86	C	--	--	L
				Campton			
CBA	1	--	--	O	--	--	USGS, L
CBB	1	--	--	T	--	--	L
CBB	2	--	--	T	--	--	L
CBB	3	--	--	T	--	--	L
CBB	4	--	--	T	--	--	L
CBB	5	--	--	T	--	--	L
CBB	6	--	--	T	--	--	L
CBB	7	--	--	T	--	--	L
CBB	8	--	--	T	--	--	L
CBB	9	--	--	T	--	--	L
CBB	10	--	--	T	--	--	L
CBB	11	--	--	T	--	--	L
CBB	12	--	--	U	--	--	L
CBB	13	--	--	T	--	--	L
CBB	14	--	--	T	--	--	L
CBB	15	--	--	T	--	--	--
CBB	16	--	--	T	--	--	L
CBB	17	--	--	U	--	--	L
CBB	18	--	--	T	--	--	L
CBB	19	--	--	T	--	--	L
CBS	1	--	--	--	--	--	CA
CBW	1	76.8	04-07-88	O	--	--	USGS, L
CBW	2	18.0	04-07-88	O	--	--	USGS, L

Table A-1. Description of selected wells, borings, and springs in the Pemigewasset River Basin, central New

Local site number	Lat-itude	Long-itude	Owner or user	Year comp-pleted	Elevation above sea level (feet)	Depth drilled (feet)	Depth to bottom of casing (feet)	Depth of well (feet)	Type of finish	Depth to bottom of open section (feet)	Type of site
				GRAFTON COUNTY							
				Campton-*Continued*							
CBW 3	435027	713912	Campton Sand and Gravel	1987	540	45.0	43.1	45.0	P	45.0	Bor
CBW 4	435029	713919	Campton Sand and Gravel	1987	540	117.0	71.1	74.0	P	74.0	Bor
CBW 21	435102	713906	Davis, D.	1955	580	--	114.0	227.0	--	--	BrW
CBW 22	434956	713834	Casey, C.	1963	640	--	88.0	198.0	--	--	BrW
CBW 24	434904	713835	Cox, H.	1957	680	--	50.0	156.0	--	--	BrW
CBW 27	434821	714021	Muzzey	1961	600	--	16.0	212.0	--	--	BrW
CBW 32	434730	713929	Ash	1961	740	--	52.0	171.0	--	--	BrW
CBW 33	434853	713703	Moulton & Stickney	1988	755	103.0	20.2	23.1	P	23.1	Bor
CBW 34	434952	713909	Beebe Riv. Wood Products	1988	541	137.0	101.2	107.0	P	107.0	Bor
CBW 36	434816	714020	Plymouth Motor Court	1961	580	--	50.0	303.0	--	--	BrW
CBW 38	434820	714019	Cook	1961	580	--	15.0	400.0	--	--	BrW
CBW 39	435110	713725	Campton Water Dist	1984	840	875.0	35.0	875.0	X	--	BrW
CBW 40	434756	713930	Morden	1984	620	--	135.0	575.0	X	--	BrW
CBW 41	434841	714010	Malmborg	1984	560	--	39.0	380.0	X	--	BrW
CBW 42	434726	714012	Carew	1984	540	--	119.0	385.0	X	--	BrW
CBW 44	434832	714129	Downing, J.	1985	760	155.0	19.0	155.0	X	--	BrW
CBW 45	434803	713931	Daniels	1986	620	--	159.0	220.0	X	--	BrW
CBW 47	434809	713919	Joyce	1984	660	--	112.0	292.0	X	--	BrW
CBW 48	434809	713917	Duncan	1984	660	--	121.0	192.0	X	--	BrW
CBW 50	434852	713906	Strong	1984	640	--	100.0	492.0	X	--	BrW
CBW 52	434925	713818	Merrill, R.	1985	740	610.0	55.0	610.0	X	--	BrW
CBW 53	435155	713917	Wilson	1985	630	--	66.0	273.0	X	--	BrW
CBW 54	435202	713721	Coffey	1985	720	--	40.0	270.0	X	--	BrW
CBW 55	434909	714007	Chapman	1985	720	--	171.0	313.0	X	--	BrW
CBW 56	435128	713810	Powers	1985	670	--	34.0	125.0	X	--	BrW
CBW 59	435051	714006	Johnson	1986	640	--	132.0	480.0	X	--	BrW
CBW 60	434801	713937	Filion	1986	620	--	219.0	485.0	X	--	BrW
CBW 61	435056	713910	Campton Sand & Gravel	1986	580	--	179.0	365.0	X	--	BrW
CBW 62	435107	713902	Johnson (State of NH)	1968	590	--	172.0	238.0	X	--	BrW
CBW 63	435108	713901	Johnson (State of NH)	1968	590	--	--	338.0	X	--	BrW
CBW 64	435139	713911	Straw (State of NH)	1968	640	--	35.0	335.0	X	--	BrW
CBW 65	434728	714026	Alden Homes	1985	580	--	44.0	675.0	X	--	BrW
CBW 66	434801	713931	Donahue	1986	620	--	109.0	110.0	S	--	--
CBW 67	434900	713639	Boyce	1985	920	--	20.0	550.0	X	--	BrW
CBW 68	435100	713816	Waterville Estates	1974	580	70.0	--	52.6	P	--	--
CBW 69	435102	713814	Waterville Estates	1974	580	46.0	--	--	--	--	TH
CBW 70	435032	713831	Town of Campton	1989	540	49.0	21.0	26.0	P	26.0	Wsh
CBW 71	435032	713831	Town of Campton	1989	540	49.0	42.0	46.0	--	48.0	Wsh
CBW 72	435032	713831	Town of Campton	1989	540	45.0	36.0	45.0	P	42.0	Wsh
CBW 73	435032	713831	Town of Campton	1989	540	49.0	45.0	45.0	P	49.0	Wsh
CBW 74	435032	713831	Town of Campton	1989	540	56.0	42.0	48.0	P	48.0	Wsh
CBW 76	435032	713831	Town of Campton	1988	540	61.0	42.0	49.0	P	49.0	Wsh
CBW 77	435033	713846	Town of Campton	1988	540	41.0	--	34.0	P	34.0	Wsh
CBW 78	435033	713846	Town of Campton	1988	540	36.0	--	--	--	--	Wsh

Local site number	Water level Depth (feet)	Water level Date (mm-dd-yy)	Use	Maximum well yield (gallons per minute)	Pumping period (hours)	Remarks
			GRAFTON COUNTY			
			Campton—*Continued*			
CBW 3	9.2	01-29-88	O	--	--	USGS, L, CA
CBW 4	4.4	04-07-88	O	--	--	USGS, L, CA
CBW 21	--	--	--	--	--	GS, L
CBW 22	30.0	05- -63	--	--	--	GS, L
CBW 24	--	--	--	--	--	GS, L
CBW 27	--	--	--	--	--	GS, L
CBW 32	10.0	09- -61	--	--	--	GS, L
CBW 33	4.6	06-13-88	O	--	--	USGS, L, CA
CBW 34	13.0	06-14-88	O	--	--	USGS, L, CA
CBW 36	32.0	06-09-61	--	--	--	GS, L
CBW 38	--	--	--	--	--	GS, L
CBW 39	10.0	01-01-84	P	--	12.0	--
CBW 40	60.0	07-21-84	H	50.0	1.0	L
CBW 41	30.0	11-18-84	H	12.0	1.0	L
CBW 42	--	--	H	10.0	.5	L
CBW 44	--	--	H	--	1.0	L
CBW 45	--	--	H	20.0	.5	L
CBW 47	--	--	H	30.0	.5	L
CBW 48	--	--	H	3.5	.5	L
CBW 50	--	--	H	1.5	.5	L
CBW 52	25.0	08-28-85	H	--	.5	L
CBW 53	50.0	08-08-85	H	2.0	.5	L
CBW 54	15.0	08-07-85	H	8.0	.5	L
CBW 55	--	--	H	10.0	.5	L
CBW 56	--	--	H	40.0	1.0	L
CBW 59	40.0	12-16-86	H	50.0	1.0	L
CBW 60	--	--	H	10.0	.3	L
CBW 61	--	--	C	20.0	.3	L
CBW 62	--	--	H	25.0	--	L
CBW 63	--	--	H	--	--	--
CBW 64	--	--	H	6.0	--	L
CBW 65	--	--	H	5.0	2.0	L
CBW 66	--	--	H	30.0	.5	L
CBW 67	--	--	H	3.0	1.0	L
CBW 68	--	--	T	--	--	L
CBW 69	--	--	T	--	--	L
CBW 70	1.5	09-08-89	T	--	--	L
CBW 71	24.0	09-07-89	T	--	--	L
CBW 72	2.0	03-27-89	T	--	--	L
CBW 73	1.0	03-24-89	T	--	--	L
CBW 74	2.4	03-23-89	T	--	--	L
CBW 76	.9	07-08-88	T	--	--	L
CBW 77	8.8	07-07-88	T	--	--	L
CBW 78	13.2	07-06-88	T	--	--	L

Table A-1. Description of selected wells, borings, and springs in the Pemigewasset River Basin, central New

Local site number	Lat-itude	Long-itude	Owner or user	Year comp-leted	Elevation above sea level (feet)	Depth drilled (feet)	Depth to bottom of casing (feet)	Depth of well (feet)	Type of finish	Depth to bottom of open section (feet)	Type of site
					GRAFTON COUNTY						
					Campton-*Continued*						
CBW 79	435033	713846	Town of Campton	1988	540	8.0	--	--	--	--	TH
CBW 80	435203	713849	Town of Campton	1979	680	35.0	--	--	--	--	TH
CBW 81	434845	714005	Days Inn	1989	580	1,680.0	60.0	1,680.0	--	--	BrW
CBW 82	434818	714023	Piper, H.	1962	600	--	22.0	138.0	--	--	BrW
CBW 83	435106	713956	McGee, R.	1988	560	325.0	60.0	325.0	--	--	--
CBW 84	435037	713838	Campton Village Precinct	1990	560	45.0	35.0	45.0	G	45.0	Wsh
CBW 85	435039	713841	Campton Village Precinct	1990	550	45.0	--	45.0	G	45.0	Wsh
CBW 86	435038	714014	Considine, R.	1988	740	565.0	80.0	565.0	--	--	--
					Dorchester						
DIB 1	434808	715817	--	1974	1,313	--	--	--	X	--	TH
DIB 2	434800	715529	NHDOT	--	975	15.0	--	--	--	--	TH
DIB 3	434851	715648	--	1971	1,020	--	--	--	X	--	TH
DIW 1	434852	715707	Lennox, A.	1962	1,080	145.0	57.0	145.0	--	--	BrW
DIW 2	434844	715659	Dustin, H.	1962	1,040	120.0	92.0	120.0	--	--	BrW
DIW 5	434807	715558	Ryea, V.	1961	1,100	--	25.0	115.0	--	--	BrW
DIW 6	434754	715443	Ashley, A.	1948	960	112	105	112	--	--	BRW
DIW 8	434812	715808	Lachnicht, V.	1959	1,300	66	12	66	--	--	BRW
DIW 9	434751	715508	Morgan, M.	1989	1,020	525.0	200.0	525.0	--	--	BrW
					Grafton						
GQB 1	433450	715625	NHDOT	--	1,043	45.0	--	--	--	--	TH
GQB 2	433502	715618	NHDOT	1989	1,062	--	--	--	--	--	TH
GQW 1	433342	715659	Cooper, M.	1966	841	--	23.0	280.0	--	--	BrW
GQW 2	433349	715511	Hazen, L.	1950	840	--	32.0	315.0	--	--	BrW
GQW 3	433348	715440	Hazen, L.	1952	840	--	35.0	230.0	--	--	BrW
GQW 4	433342	715427	Dean, F.	1953	840	--	20.0	117.0	--	--	BrW
GQW 6	433329	715633	Thoresen	1984	840	--	79.0	305.0	X	--	BrW
GQW 7	433339	715657	Seamans	1984	840	--	39.0	325.0	X	--	BrW
GQW 8	433338	715424	Walsh	1985	840	--	20.0	505.0	X	--	BrW
GQW 10	433517	715841	Reynolds	1985	860	--	80.0	400.0	X	--	BrW
GQW 11	433510	715852	Stiles	1985	880	--	100.0	300.0	X	--	BrW
GQW 12	433344	715706	Parson's Lumber Company	1986	860	--	20.0	335.0	X	--	BrW
GQW 13	433519	715839	Spielman	1986	860	--	54.0	55.0	--	--	
GQW 15	433326	715709	Joyce	1987	840	--	59.0	300.0	X	--	BrW
GQW 17	433333	715641	Thomas	1987	840	--	29.0	160.0	X	--	BrW
GQW 19	433335	715644	Tate	1987	860	--	39.0	300.0	X	--	BrW
GQW 20	433451	715842	Ibey	1988	860	--	61.0	305.0	X	--	BrW
GQW 21	433412	715706	Nugent, T.	1988	960	--	69.0	225.0	X	--	BrW
GQW 22	433252	715650	Blair, R.	1980	880	140.0	59.0	140.0	X	--	BrW
GQW 23	433444	715843	Aldrich, D.	1990	863	0.0	109.0	445.0	--	--	BrW
GQW 24	433437	715851	King, J.	1988	865	0.0	83.0	245.0	--	--	BrW
GQW 25	433523	715840	Allard, R.	1990	890	0.0	59.0	385.0	--	--	BrW
GQW 26	433445	715846	Brown, L.	1988	870	0.0	104.0	345.0	--	--	BrW
GQW 27	433447	715842	Valia, L.	1990	865	0.0	109.0	565.0	--	--	BrW

Local site number		Water level Depth (feet)	Water level Date (mm-dd-yy)	Use	Maximum well yield (gallons per minute)	Pumping period (hours)	Remarks
					GRAFTON COUNTY		
					Campton–*Continued*		
CBW	79	--	--	T	--	--	L
CBW	80	--	--	T	--	--	L
CBW	81	--	--	C	--	--	L
CBW	82	15.0	09-23-62	--	--	--	GS
CBW	83	20.0	11-29-88	H	--	--	L
CBW	84	1.7	01-24-90	P	266.0	48.0	L
CBW	85	2.2	01-15-90	P	272.0	48.0	L
CBW	86	8.0	11-29-88	H	--	--	L
					Dorchester		
DIB	1	--	--	T	--	--	L
DIB	2	--	--	T	--	--	L
DIB	3	--	--	T	--	--	L
DIW	1	12.0	12- -62	--	--	--	GS, L
DIW	2	2.0	10- -62	--	--	--	GS, L
DIW	5	12.0	10- -61	--	--	--	GS, L
DIW	6	--	--	--	--	--	GS, L
DIW	8	--	--	--	--	--	GS, L
DIW	9	--	--	H	--	--	--
					Grafton		
GQB	1	--	--	T	--	--	L
GQB	2	--	--	T	--	--	L
GQW	1	250.0	07- -66	--	--	--	GS, L
GQW	2	20.0	11-08-50	--	--	--	GS, L
GQW	3	23.0	01-03-52	--	--	--	GS, L
GQW	4	10.0	07-09-53	--	--	--	GS, L
GQW	6	--	--	H	60.0	.5	L
GQW	7	--	--	H	3.0	.5	L
GQW	8	--	--	H	.1	--	L
GQW	10	--	--	H	3.0	1.0	L
GQW	11	--	--	H	1.5	1.0	L
GQW	12	--	--	P	6.0	2.0	L
GQW	13	--	--	--	60.0	--	L
GQW	15	--	--	H	2.0	1.0	L
GQW	17	--	--	H	12.0	1.5	L
GQW	19	30.0	09-03-87	H	2.0	.5	L
GQW	20	--	--	H	7.0	1.5	L
GQW	21	--	--	H	4.0	1.5	L
GQW	22	--	--	H	--	--	L
GQW	23	--	--	H	1.0	2.5	L
GQW	24	--	--	H	10.0	.7	L
GQW	25	--	--	H	3.0	.3	L
GQW	26	--	--	U	1.0	.7	L
GQW	27	--	--	H	1.5	2.5	L

Table A-1. Description of selected wells, borings, and springs in the Pemigewasset River Basin, central New

Local site number		Lat-itude	Long-itude	Owner or user	Year comp-pleted	Elevation above sea level (feet)	Depth drilled (feet)	Depth to bottom of casing (feet)	Depth of well (feet)	Type of finish	Depth to bottom of open section (feet)	Type of site
GRAFTON COUNTY												
Grafton-Continued												
GQW	28	433502	715854	Surette, R.	1989	875	0.0	59.0	142.0	--	--	BrW
GQW	29	433426	715900	Lavoie, R.	1990	885	0.0	69.0	225.0	--	--	BrW
Groton												
GXB	1	434533	715214	--	1960	1,227	--	--	--	X	--	TH
GXB	2	434214	715001	NHDOT	--	612	70.0	--	--	--	--	TH
GXW	1	434216	714959	Howard	1986	620	--	39.0	385.0	X	--	BrW
GXW	3	434230	715002	Lingill	1986	740	--	28.0	805.0	X	--	BrW
GXW	4	434229	715006	Denton	1986	740	--	11.0	225.0	X	--	BrW
GXW	9	434232	714958	Denten	1987	800	--	19.0	805.0	X	--	BrW
Hebron												
HLB	1	434206	714638	--	1977	590	--	--	--	X	--	TH
HLB	2	434141	714836	NHDOT	--	607	95.0	--	--	--	--	TH
HLW	1	434137	714812	Audubon Society of NH	1988	600	127.0	109.2	115.0	P	115.0	Bor
HLW	2	434200	714948	Matthews, D.	1988	600	29.0	24.1	27.0	P	27.0	Bor
HLW	3	434142	714839	Sanborn, W.	1958	600	--	32.0	125.0	--	--	BrW
HLW	4	434142	714836	Mudge	1954	600	--	--	110.0	--	--	BrW
HLW	6	434140	714830	Braley, M.	1959	600	--	--	78.0	--	--	BrW
HLW	7	434139	714824	Town of Hebron	1960	620	--	--	90.0	--	--	BrW
HLW	9	434254	714540	Gerburg, C.	1959	740	--	--	200.0	--	--	BrW
HLW	10	434254	714535	Chisholm, S.	1961	790	--	60.0	105.0	--	--	BrW
HLW	16	434026	714724	Friend & S. Larson	1984	600	--	99.0	605.0	X	--	BrW
HLW	17	434203	714632	Lonshe, Q.	1985	620	250.0	20.0	250.0	X	--	BRW
HLW	22	434202	714638	Hogan, J.	1984	600	270.0	29.0	270.0	X	--	BRW
HLW	25	434204	714950	Mathews	1987	620	--	19.0	445.0	X	--	BrW
HLW	26	434024	714733	McClelland	1986	620	--	39.0	385.0	X	--	BrW
HLW	28	434152	714859	Cowern	1987	610	--	71.0	445.0	X	--	BrW
HLW	35	434017	714720	Camp Berea Inc.	1987	600	--	40.0	510.0	X	--	BrW
HLW	37	434258	714615	Poulousi	1986	680	--	20.0	500.0	X	--	BrW
HLW	39	434146	714937	Bardsley, W.	1961	630	--	--	155.0	--	--	BrW
HLW	40	434144	714916	Barnard	1962	620	--	--	140.0	--	--	BrW
Holderness												
HRA	1	434550	714042	Holderness School	1966	480	109.0	--	--	--	--	TH
HRA	2	434512	714049	Smith	1964	470	90.0	--	--	--	--	TH
HRB	1	434536	714039	NHDOT	1962	471	74.0	--	--	--	--	TH
HRB	4	434352	713514	NHDOT	--	567	40.0	--	--	--	--	TH
HRB	6	434536	714041	NHDOT	1962	470	83.0	--	--	--	--	TH
HRB	7	434535	714109	NHDOT	--	480	50.0	--	--	--	--	TH
HRW	1	434551	714046	Holderness School	1987	480	97.5	--	87.6	P	--	Bor
HRW	2	434551	714046	Holderness School	1987	480	28.0	--	25.3	P	--	Bor
HRW	4	434540	713945	McClay, M.	1956	550	5.0	4.5	4.5	X	--	Dug

Local site number		Water level Depth (feet)	Water level Date (mm-dd-yy)	Use	Maximum well yield (gallons per minute)	Pumping period (hours)	Remarks
					GRAFTON COUNTY		
					Grafton–*Continued*		
GQW	28	--	--	H	10.0	0.7	L
GQW	29	--	--	H	5.0	2.5	L
					Groton		
GXB	1	--	--	T	--	--	L
GXB	2	--	--	T	--	--	L
GXW	1	--	--	H	3.0	.8	L
GXW	3	--	--	H	.5	1.0	L
GXW	4	--	--	H	7.0	.8	L
GXW	9	--	--	H	.3	1.0	L
					Hebron		
HLB	1	--	--	T	--	--	L
HLB	2	--	--	T	--	--	L
HLW	1	4.1	11-29-88	O	--	--	USGS, L
HLW	2	5.9	11-23-88	U	--	--	USGS, L
HLW	3	--	--	--	--	--	GS, L
HLW	4	--	--	--	--	--	GS
HLW	6	--	--	--	--	--	GS, L
HLW	7	--	--	--	--	--	
HLW	9	--	--	--	--	--	GS, L
HLW	10	35.0	07-28-61	--	--	--	GS, L
HLW	16	--	--	H	1.0	.5	L
HLW	17	--	--	H	--	1.0	L
HLW	22	--	--	H	--	.5	L
HLW	25	12.0	07-14-87	H	2.0	1.0	L
HLW	26	--	--	H	4.0	.3	L
HLW	28	30.0	09-24-87	H	1.0	1.0	L
HLW	35	--	--	H	1.5	.5	L
HLW	37	--	--	H	1.5	.5	L
HLW	39	35.0	10- -61	--	--	--	GS, L
HLW	40	20.0	10- -62	--	--	--	GS, L
					Holderness		
HRA	1	--	--	T	--	--	L
HRA	2	8.3	11-09-64	T	--	--	L
HRB	1	--	--	T	--	--	L
HRB	4	--	--	T	--	--	L
HRB	6	--	--	T	--	--	L
HRB	7	--	--	T	--	--	L
HRW	1	15.7	06- -88	O	--	--	USGS, L, CA
HRW	2	18.0	08-14-87	O	--	--	USGS, L
HRW	4	1.5	02-03-88	H	--	--	--

Table A-1. Description of selected wells, borings, and springs in the Pemigewasset River Basin, central New

Local site number		Lat-itude	Long-itude	Owner or user	Year comp-pleted	Elevation above sea level (feet)	Depth drilled (feet)	Depth to bottom of casing (feet)	Depth of well (feet)	Type of finish	Depth to bottom of open section (feet)	Type of site
				GRAFTON COUNTY								
				Holderness—*Continued*								
HRW	8	434559	714024	St.Cyr, C.	1973	610	200.0	37.0	200.0	--	--	--
HRW	9	434612	714035	Brown, T.	1987	520	205.0	97.0	205.0	--	--	--
HRW	11	434700	713948	Champney, R.	1962	580	--	28.0	93.0	--	--	BrW
HRW	12	434655	713958	Potkay, L.	1961	560	--	35.0	110.0	--	--	BrW
HRW	14	434534	713606	Conrad, F.	1962	800	--	--	94.0	--	--	BrW
HRW	15	434534	713606	Conrad, F.	1962	800	--	47.0	119.0	--	--	BrW
HRW	16	434643	713514	French, C	1947	1,000	145.0	52.0	145.0	--	--	BrW
HRW	17	434553	713329	Barnes, W.	1956	580	80.0	34.0	80.0	--	--	BrW
HRW	18	434431	713447	Hawkins, K.	1958	590	--	--	180.0	--	--	BrW
HRW	19	434329	713638	Windsor Restaurant	1963	590	--	47.0	278.0	--	--	BrW
HRW	20	434340	713546	Town of Holderness	1959	590	--	--	135.0	--	--	BrW
HRW	21	434355	713458	Werner, E.	1953	570	90.0	22.0	90.0	--	--	BrW
HRW	24	434215	713413	Plant, G.	1951	660	355.0	65.0	355.0	--	--	BrW
HRW	25	434258	713149	Twombly, G.	1964	620	--	31.0	300.0	--	--	BrW
HRW	26	434315	713225	Paley, W.	1957	590	--	--	319.0	--	--	BrW
HRW	28	434317	713319	McGrew, G.	1953	630	269.0	33.0	269.0	--	--	BrW
HRW	29	434217	713414	Sprague, R.	1984	650	705.0	19.0	705.0	X	--	BrW
HRW	30	434217	713414	Sprague, R.	1984	650	830.0	--	830.0	X	--	BrW
HRW	31	434341	713638	Howe	1984	650	--	62.0	505.0	X	--	BrW
HRW	33	434549	713300	Oldeman, J.	1984	580	305.0	19.0	305.0	X	--	BrW
HRW	35	434305	713226	Dunleavy	1985	610	--	--	580.0	X	--	BrW
HRW	38	434328	713349	McDevitt	1985	600	--	83.0	505.0	X	--	BrW
HRW	39	434334	713620	Webb	1985	620	--	40.0	675.0	X	--	BrW
HRW	41	434511	713720	Pusch	1985	800	--	18.0	312.0	X	--	BrW
HRW	42	434629	713214	Howe, S.	1985	580	193.0	39.0	193.0	X	--	BrW
HRW	48	434308	713312	Haskell, R.	1984	600	272.0	20.0	272.0	X	272.0	Brw
HRW	51	434518	713935	Corless	1984	610	--	43.0	392.0	X	--	BrW
HRW	56	434346	713505	Musgrove	1986	580	--	80.0	242.0	X	--	BrW
HRW	57	434355	713436	Poitras, R.	1986	570	421.0	70.0	421.0	X	--	BrW
HRW	58	434430	713416	Crosby	1986	580	--	39.0	422.0	X	--	BrW
HRW	59	434442	713250	King, N.	1986	570	520.0	29.0	520.0	X	--	BrW
HRW	61	434621	714036	M & S Plumbing & Heating	1984	530	--	65.0	700.0	X	--	BrW
HRW	63	434546	713300	Oldeman, J.	1984	580	305.0	19.0	305.0	X	--	BrW
HRW	64	434542	713558	Pemigewassett F&G Club	1989	850	26.0	21.1	23.0	P	23.0	Bor
HRW	65	434558	714039	Holderness School	1966	480	118.0	--	--	--	--	TH
HRW	67	434550	714105	Plymouth State College	1987	480	79.0	25.1	28.0	P	28.0	Bor
HRW	68	434512	713957	Montour, P.	1988	520	425.0	161.0	425.0	--	--	BrW
				Lincoln								
LKA	1	440244	714051	--	--	825	37.0	--	--	--	--	--
LKA	2	440240	714029	--	--	810	36.0	--	--	--	--	--
LKA	3	440234	714103	--	--	790	17.0	--	--	--	--	TH
LKA	4	440232	714105	--	--	790	22.0	--	--	--	--	TH
LKA	5	440307	713858	--	--	875	50.0	--	--	--	--	TH
LKA	6	440307	713859	--	--	875	60.0	--	--	--	--	TH

Local site number		Water level Depth (feet)	Water level Date (mm-dd-yy)	Use	Maximum well yield (gallons per minute)	Pumping period (hours)	Remarks
				GRAFTON COUNTY			
				Holderness—*Continued*			
HRW	8	--	--	H	--	--	--
HRW	9	--	--	H	--	--	--
HRW	11	15.0	01- -62	--	--	--	GS, L
HRW	12	--	--	--	--	--	GS, L
HRW	14	36.0	02- -62	--	--	--	GS
HRW	15	--	--	--	--	--	GS, L
HRW	16	--	--	--	--	--	GS, L
HRW	17	12.0	07-23-56	--	--	--	GS
HRW	18	--	--	--	--	--	GS
HRW	19	--	--	--	--	--	GS, L
HRW	20	--	--	--	--	--	GS, L
HRW	21	--	--	--	--	--	GS, L
HRW	24	35.0	05-31-51	--	--	--	GS, L
HRW	25	20.0	08-12-64	--	--	--	GS, L
HRW	26	--	--	--	--	--	GS, L
HRW	28	55.0	09-10-53	--	--	--	GS, L
HRW	29	--	--	H	--	1.0	L
HRW	30	--	--	H	--	1.0	L
HRW	31	30.0	10-20-84	H	0.8	1.0	L
HRW	33	30.0	12-06-84	H	--	1.0	L
HRW	35	--	--	H	.8	1.0	L
HRW	38	--	--	H	4.0	1.0	L
HRW	39	--	--	H	3.0	--	L
HRW	41	3.0	12-06-85	H	1.8	.5	L
HRW	42	--	--	H	--	.5	L
HRW	48	--	--	H	1.5	--	L
HRW	51	--	--	H	8.0	.5	L
HRW	56	--	--	H	10.0	1.0	L
HRW	57	--	--	H	--	1.0	L
HRW	58	--	--	H	5.0	1.0	L
HRW	59	--	--	H	--	1.0	L
HRW	61	--	--	H	10.0	1.0	L
HRW	63	--	--	H	--	1.0	L
HRW	64	17.0	04-20-89	O	--	--	USGS, L
HRW	65	13.7	12-06-66	T	--	--	L
HRW	67	23.3	08-08-88	O	--	--	USGS, L
HRW	68	--	--	H	--	--	--
				Lincoln			
LKA	1	18.0	05-21-82	T	--	--	L
LKA	2	--	--	T	--	--	L
LKA	3	5.0	05-27-82	T	--	--	L
LKA	4	3.0	05-27-82	T	--	--	L
LKA	5	--	--	T	--	--	L
LKA	6	--	--	T	--	--	L

Table A-1. Description of selected wells, borings, and springs in the Pemigewasset River Basin, central New

Local site number		Lat-itude	Long-itude	Owner or user	Year comp-pleted	Elevation above sea level (feet)	Depth drilled (feet)	Depth to bottom of casing (feet)	Depth of well (feet)	Type of finish	Depth to bottom of open section (feet)	Type of site
				GRAFTON COUNTY								
				Lincoln–*Continued*								
LKA	7	440304	713909	--	--	875	14.0	--	--	--	--	TH
LKB	1	440235	714103	NHDOT	--	820	25.0	--	--	--	--	TH
LKB	2	440339	714111	NHDOT	--	866	14.0	--	--	--	--	TH
LKB	3	440341	714113	NHDOT	--	877	25.0	--	--	--	--	TH
LKB	4	440352	714124	NHDOT	--	887	25.0	--	--	--	--	TH
LKB	5	440354	714125	NHDOT	--	882	45.0	--	--	--	--	TH
LKB	6	440326	714124	NHDOT	--	869	4.0	--	--	--	--	TH
LKB	7	440248	714109	NHDOT	--	797	40.0	--	--	--	--	TH
LKB	8	440429	714118	NHDOT	1982	984	19.5	--	--	--	--	TH
LKB	9	440500	714116	NHDOT	1982	1,030	15.0	--	--	--	--	TH
LKB	11	440402	714132	NHDOT	1983	957	26.0	--	--	--	--	TH
LKB	12	440525	714103	NHDOT	1983	1,197	24.0	--	--	--	--	TH
LKB	18	440638	714058	NHDOT	1983	1,426.3	--	--	--	X	--	TH
LKW	1	440315	714114	Town of Lincoln	1984	840	--	17.0	17.0	O	--	Dug
LKW	2	440329	713743	Swiftwater Builders	1984	1,000	--	119.0	535.0	X	--	BrW
LKW	3	440319	713820	Lyons	1985	920	--	54.0	160.0	X	--	BrW
LKW	4	440255	713942	NH Electric Cooperative	1985	840	--	80.0	512.0	X	--	BrW
LKW	5	440214	714035	McDonald's	1984	760	--	161.0	690.0	X	--	BrW
LKW	6	440330	713745	Swiftwater Builders	1987	1,000	--	65.0	605.0	X	--	BrW
LKW	7	440353	713551	US Forest Service	1987	1,120	--	101.0	330.0	X	--	BrW
LKW	8	440348	713551	US Forest Service	1987	1,120	--	72.0	430.0	X	--	BrW
LKW	9	440238	714029	--	--	810	53.0	--	51.5	--	--	--
LKW	10	440238	714028	--	--	810	53.0	--	49.5	--	--	--
LKW	11	440230	714103	--	--	790	29.0	--	29.0	--	--	--
LKW	12	440230	714105	--	--	790	35.0	--	34.0	--	--	--
LKW	13	440230	714107	--	--	790	30.0	--	27.0	--	--	--
LKW	14	440229	714105	--	--	790	36.0	--	31.0	--	--	--
LKW	15	440307	713856	--	--	875	22.0	--	--	--	--	--
LKW	16	440307	713857	--	--	875	36.0	--	21.0	--	--	--
LKW	17	440307	713909	--	--	875	28.0	--	26.0	--	--	--
LKW	18	440306	713908	--	--	875	28.0	--	21.0	--	--	--
LKW	19	440306	713909	--	--	875	20.0	--	--	--	--	--
LKW	20	440305	713909	--	--	875	14.0	--	--	--	--	--
LKW	21	440356	713625	Town of Lincoln	--	1,180	--	--	--	--	--	BrW
				Plymouth								
PYA	6	434613	714156	Southerly	1964	540	140.0	--	--	--	--	TH
PYA	7	434616	714236	Carpenter	1964	480	53.0	--	--	--	--	TH
PYA	8	434657	714414	Nims	1964	480	96.0	--	--	--	--	--
PYA	9	434626	714256	McCleod	1964	480	50.0	--	--	--	--	--
PYA	10	434626	714337	Robie	1964	480	116.0	--	--	--	--	TH
PYA	11	434610	714358	Robie	--	510	30.0	--	--	--	--	TH
PYA	12	434611	714355	Robie	1964	490	36.0	--	--	--	--	TH

Local site number		Water level Depth (feet)	Water level Date (mm-dd-yy)	Use	Maximum well yield (gallons per minute)	Pumping period (hours)	Remarks
			GRAFTON COUNTY				
			Lincoln—*Continued*				
LKA	7	10.5	06-28-82	T	--	--	L
LKB	1	--	--	T	--	--	L
LKB	2	--	--	T	--	--	L
LKB	3	--	--	T	--	--	L
LKB	4	--	--	T	--	--	L
LKB	5	--	--	T	--	--	L
LKB	6	--	--	T	--	--	L
LKB	7	--	--	T	--	--	L
LKB	8	--	--	U	--	--	L
LKB	9	--	--	U	--	--	L
LKB	11	14.5	08- -83	U	--	--	L
LKB	12	2.0	09- -83	U	--	--	L
LKB	18	3.0	09- -83	U	--	--	L
LKW	1	4.5	12-01-84	P	50.0	120.0	L, CA, Well field of six wells
LKW	2	--	--	--	60.0	.5	L
LKW	3	--	--	H	75.0	.5	L
LKW	4	10.0	11-10-85	--	1.0	.5	L
LKW	5	--	--	C	30.0	.5	L
LKW	6	--	--	--	40.0	.3	L
LKW	7	--	--	H	3.0	.3	L
LKW	8	--	--	H	.8	.3	L
LKW	9	24.3	05-25-82	T	10.0	1	L
LKW	10	24.3	05-24-82	T	30.0	1	L
LKW	11	1.9	05-25-82	T	50.0	2	L
LKW	12	3.0	05-26-82	T	60.0	2	L
LKW	13	3.5	05-25-82	T	50.0	1	L
LKW	14	10.9	05-25-82	T	10.0	--	L
LKW	15	7.0	06-24-82	T	--	--	L
LKW	16	7.0	06-24-82	T	--	--	L
LKW	17	10.5	06-26-82	T	--	--	L
LKW	18	10.5	06-26-82	T	--	--	L
LKW	19	10.5	06-28-82	T	--	--	L
LKW	20	10.5	06-28-82	T	--	--	L
LKW	21	--	--	P	--	--	--
			Plymouth				
PYA	6	13.0	10-23-64	T	--	--	L
PYA	7	6.5	08-10-64	T	--	--	L
PYA	8	5.0	10-29-64	T	--	--	L
PYA	9	10.3	07-30-64	T	--	--	L
PYA	10	10.8	08-12-64	T	--	--	L
PYA	11	11.2	08-12-64	T	--	--	L
PYA	12	10.8	08-13-64	T	--	--	L

Table A-1. Description of selected wells, borings, and springs in the Pemigewasset River Basin, central New

Local site number	Lat-itude	Long-itude	Owner or user	Year comp-pleted	Elevation above sea level (feet)	Depth drilled (feet)	Depth to bottom of casing (feet)	Depth of well (feet)	Type of finish	Depth to bottom of open section (feet)	Type of site
				GRAFTON COUNTY							
				Plymouth-*Continued*							
PYA 13	434605	714254	Hatch	1964	520	31.0	--	--	--	--	TH
PYA 14	434643	714031	Godds	1964	490	47.0	--	--	--	--	TH
PYA 15	434639	714401	Dearborn	1964	480	97.0	--	--	--	--	--
PYA 16	434545	714509	Yeaton	1964	520	50.0	--	--	--	--	--
PYA 18	434325	713951	Telfers	1965	480	66.0	--	--	--	--	TH
PYA 20	434401	714018	McCormack	1965	480	66.0	--	--	--	--	TH
PYA 21	434344	714011	Huckins	1965	480	56.0	--	--	--	--	TH
PYB 1	434559	714054	NHDOT	--	468	90.0	--	--	--	--	TH
PYB 2	434610	714241	NHDOT	--	464	57.0	--	--	--	--	TH
PYB 3	434615	714510	NHDOT	--	489	44.0	--	--	--	--	TH
PYB 5	434615	714059	NHDOT	--	500	60.0	--	--	--	--	TH
PYB 6	434646	714045	NHDOT	--	558	20.0	--	--	--	--	TH
PYB 7	434600	714054	NHDOT	--	480	83.0	--	--	--	--	TH
PYW 9	434606	714100	Town of Plymouth	1951	470	--	--	--	G	--	Dr
PYW 10	434605	714100	Town of Plymouth	1955	470	48.0	--	48.0	G	--	Dr
PYW 12	434620	714409	Bower, W.	1964	480	--	91.0	213.0	--	--	BrW
PYW 13	434648	714340	Worthen, L.	1961	520	--	73.0	173.0	--	--	BrW
PYW 14	434647	714333	McCloud	1951	510	--	15.0	98.0	--	--	BrW
PYW 15	434638	714210	Avery, A.	1959	540	--	40.0	130.0	--	--	BrW
PYW 16	434613	714327	Hatch, C.	1948	480	--	78.0	168.0	--	--	BrW
PYW 17	434542	714531	Keegan, F.	1964	580	--	106.0	180.0	--	--	BrW
PYW 18	434532	714453	Ireland, C.	1961	540	--	76.0	212.0	--	--	BrW
PYW 19	434532	714453	Ireland, C.	1963	540	--	113.0	245.0	--	--	BrW
PYW 22	434338	714035	Currier, E.	1959	520	--	40.0	165.0	--	--	BrW
PYW 23	434327	714035	Trojano, H.	1962	520	--	--	144.0	--	--	BrW
PYW 24	434318	714041	Haskell, W.	1952	710	--	--	--	--	--	BrW
PYW 25	434321	714030	Hannaford, F.	1963	540	--	--	135.0	--	--	BrW
PYW 26	434323	714024	Ahern, O.	1954	510	--	44.0	160.0	--	--	BrW
PYW 27	434259	713944	Hobart, K.	1964	500	--	52.0	340.0	--	--	BrW
PYW 28	434239	714031	Huckins, H.	1950	560	--	--	118.0	--	--	BrW
PYW 29	434615	714544	Whittemore, R.	1964	520	--	--	400.0	--	--	BrW
PYW 31	434644	714452	Barney, J.	1954	500	--	147.0	209.0	--	--	BrW
PYW 32	434506	714442	Ireland	1984	560	--	93.0	530.0	X	--	BrW
PYW 34	434612	714253	Bruce	1984	480	--	49.0	385.0	X	--	BrW
PYW 35	434257	714013	Lewis	1984	570	--	19.0	365.0	X	--	BrW
PYW 37	434548	714531	Adrian	1985	540	--	19.0	305.0	X	--	BrW
PYW 38	434630	714430	M. Piper Inc.	1985	480	--	339.0	555.0	X	--	BrW
PYW 42	434313	714017	Wakefield	1986	510	--	157.0	343.0	X	--	BrW
PYW 43	434338	714009	Ahearn's Xmas Tree Farm	1989	470	127.0	30.1	33.0	P	33.0	Bor
PYW 45	434619	714218	Carpenter	1964	540	102.0	--	88.0	--	--	TH
PYW 46	434622	714316	Speed	1964	540	78.0	--	69.0	--	--	--
PYW 47	434615	714151	Southerly	1964	540	160.0	--	--	--	--	TH
PYW 48	434627	714317	McCleod	1964	480	81.0	--	81.3	--	--	--

Local site number		Water level Depth (feet)	Water level Date (mm-dd-yy)	Use	Maximum well yield (gallons per minute)	Pumping period (hours)	Remarks
			GRAFTON COUNTY				
			Plymouth—*Continued*				
PYA	13	14.6	08-13-64	T	--	--	L
PYA	14	6.8	08-13-64	T	--	--	L
PYA	15	10.5	08-13-64	H	--	--	L
PYA	16	2.6	01-12-64	H	--	--	L
PYA	18	9.2	01-05-65	T	--	--	L
PYA	20	12.7	01-08-65	T	--	--	L
PYA	21	12.9	01-08-65	T	--	--	L
PYB	1	--	--	T	--	--	L
PYB	2	--	--	T	--	--	L
PYB	3	--	--	T	--	--	L
PYB	5	--	--	T	--	--	L
PYB	6	--	--	T	--	--	L
PYB	7	--	--	T	--	--	L
PYW	9	6.5	11-14-51	P	--	--	CA
PYW	10	5.0	10-19-55	P	--	--	
PYW	12	25.0	07-14-64	--	--	--	GS, L
PYW	13	18.0	11-18-61	--	--	--	GS, L
PYW	14	12.0	06-08-51	--	--	--	GS, L
PYW	15	20.0	10- -59	--	--	--	GS, L
PYW	16	--	--	--	--	--	GS, L
PYW	17	26.0	01-30-64	--	--	--	GS, L
PYW	18	15.0	07-27-61	--	--	--	GS, L
PYW	19	--	--	--	--	--	GS, L
PYW	22	30.0	10- -59	--	--	--	GS, L
PYW	23	20.0	04- -62	--	--	--	GS, L
PYW	24	--	--	--	--	--	GS, L
PYW	25	13.0	05- -63	--	--	--	GS, L
PYW	26	--	--	--	--	--	GS, L
PYW	27	40.0	08-13-64	--	--	--	GS, L
PYW	28	14.0	06- -50	--	--	--	GS, L
PYW	29	--	--	--	--	--	GS, L
PYW	31	70.0	02-16-54	--	--	--	GS, L
PYW	32	50.0	06-19-84	H	12.0	1.0	L
PYW	34	--	--	H	15.0	.5	L
PYW	35	--	--	H	20.0	.5	L
PYW	37	--	--	H	3.5	1.0	L
PYW	38	30.0	02-20-85	H	4.0	2.0	L
PYW	42	40.0	10-31-86	H	15.0	1.0	L
PYW	43	25.0	04-21-89	O	--	--	USGS, L
PYW	45	1.5	10-19-64	T	--	--	L
PYW	46	11.4	08-04-64	T	--	--	L
PYW	47	24.0	10-28-64	T	--	--	L
PYW	48	7.5	07-22-64	T	--	--	L

Table A-1. Description of selected wells, borings, and springs in the Pemigewasset River Basin, central New

Local site number		Latitude	Longitude	Owner or user	Year completed	Elevation above sea level (feet)	Depth drilled (feet)	Depth to bottom of casing (feet)	Depth of well (feet)	Type of finish	Depth to bottom of open section (feet)	Type of site
				GRAFTON COUNTY								
				Plymouth-*Continued*								
PYW	49	434626	714311	McCleod	1964	480	105.0	--	102.0	--	--	--
PYW	50	434628	714324	McCleod	1964	480	57.0	--	57.0	--	--	TH
PYW	51	434626	714246	Stiles	1964	480	42.0	--	41.7	--	--	--
PYW	52	434325	713945	Telfers	1965	480	88.0	--	88.3	--	--	--
PYW	53	434325	713945	Telfers	1965	480	49.0	--	--	--	--	TH
PYW	54	434325	713945	Telfers	1965	480	50.0	--	--	--	--	TH
PYW	55	434322	713942	Telfers	1965	480	51.0	--	50.6	--	--	--
PYW	56	434324	713942	Telfers	1965	480	61.0	--	60.5	--	--	--
PYW	57	434324	713942	Telfers	1965	480	50.0	--	50.0	--	--	--
PYW	58	434324	713942	Telfers	1965	480	50.0	--	50.0	--	--	--
PYW	59	434318	713942	Land, E.	1965	480	41.0	--	40.5	--	--	--
PYW	60	434319	713949	Telfers	1965	480	41.0	--	40.5	--	--	--
PYW	61	434617	714429	Stoppe Development Inc.	1989	510	625.0	120.0	--	--	--	BrW
PYW	65	434326	714035	Ahern, D.	1988	520	320.0	40.0	320.0	--	--	BrW
				Rumney								
RUA	1	434909	715328	Jacques Inc.	1989	620	95.0	--	--	--	--	Bor
RUB	1	434742	715023	NHDOT	--	505	40.0	--	--	--	--	TH
RUB	2	434742	715023	NHDOT	--	500	28.5	--	--	--	--	TH
RUB	3	434910	714838	NHDOT	--	620	23.0	--	--	--	--	TH
RUB	4	434722	714750	NHDOT	--	497	85.0	--	--	--	--	TH
RUB	5	434743	715040	NHDOT	--	509	7.0	--	--	--	--	TH
RUB	6	434845	715205	NHDOT	--	519	20.0	--	--	--	--	TH
RUB	7	434803	714852	NHDOT	--	500	41.0	--	--	--	--	TH
RUB	8	434841	715207	NHDOT	1964	520	23.0	--	--	--	--	TH
RUW	2	434752	714934	French, L.	1987	1,310	91.0	23.6	26.5	P	26.5	Bor
RUW	4	434911	715301	--	1962	580	63.0	--	--	--	--	Cbl
RUW	5	434907	715249	Foster,W.	1963	620	--	--	205.0	--	--	BrW
RUW	6	434903	715240	Town of Rumney	1956	640	--	--	325.0	--	--	BrW
RUW	7	434818	714845	Fletcher, R.	1960	500	--	--	155.0	--	--	BrW
RUW	8	434740	714810	Lyons,J.	1963	520	--	--	515.0	--	--	BrW
RUW	9	434714	714757	Hartnett,F.	1963	540	--	--	297.0	--	--	BrW
RUW	10	434652	714652	Polar Caves	1961	500	--	--	318.0	--	--	BrW
RUW	11	434639	714619	Collins, R.	1964	520	--	--	127.0	--	--	BrW
RUW	12	434633	714610	Glover, W.	1964	520	--	--	142.0	--	--	BrW
RUW	13	434627	714609	Sweet, E.	1964	520	--	--	250.0	--	--	BrW
RUW	14	434914	715226	Ford, B.	1988	540	72.0	39.9	42.8	P	42.8	Bor
RUW	15	434830	715140	Burke, G.	1988	520	110.0	75.1	78.0	P	78.0	Bor
RUW	17	434755	715046	Fantasia	1984	600	--	40.0	240.0	X	--	BrW
RUW	18	435002	715221	O'Banion	1985	680	--	59.0	250.0	X	--	BrW
RUW	19	434729	714637	Steckmest	1985	520	--	201.0	575.0	X	--	BrW
RUW	20	434752	714732	Perry	1985	540	--	60.0	334.0	X	--	BrW
RUW	23	434733	714705	Woodward	1984	510	--	169.0	600.0	X	--	BrW

Local site number		Water level Depth (feet)	Water level Date (mm-dd-yy)	Use	Maximum well yield (gallons per minute)	Pumping period (hours)	Remarks
				GRAFTON COUNTY			
				Plymouth—*Continued*			
PYW	49	11.6	07-24-64	T	--	--	L
PYW	50	11.9	07-27-64	T	--	--	L
PYW	51	6.8	07-31-64	T	--	--	L
PYW	52	12.2	01-04-65	T	--	--	L
PYW	53	13.0	09-29-65	T	--	--	L
PYW	54	16.0	10-05-65	T	--	--	L
PYW	55	14.0	01-13-65	T	--	--	L
PYW	56	10.2	01-15-65	T	--	--	L
PYW	57	11.0	10-04-65	T	--	--	L
PYW	58	11.0	10-04-65	T	--	--	L
PYW	59	9.1	01-18-65	T	--	--	L
PYW	60	12.5	01-19-65	T	--	--	L
PYW	61	--	--	T	--	--	L
PYW	65	--	--	H	--	--	--
				Rumney			
RUA	1	16.0	06-09-89	T	--	--	USGS, L
RUB	1	--	--	T	--	--	L
RUB	2	--	--	T	--	--	L
RUB	3	--	--	T	--	--	L
RUB	4	--	--	T	--	--	L
RUB	5	--	--	T	--	--	L
RUB	6	--	--	T	--	--	L
RUB	7	--	--	T	--	--	L
RUB	8	--	--	T	--	--	L
RUW	2	12.8	08-09-88	O	--	--	USGS, L, CA
RUW	4	32.0	01- -62	H	20.0	--	--
RUW	5	77.0	02- -63	--	--	--	GS, L
RUW	6	30.0	09-26-56	--	--	--	GS, L
RUW	7	--	--	--	--	--	GS, L
RUW	8	67.0	03-30-63	--	--	--	GS, L
RUW	9	6.0	09-14-63	--	--	--	GS, L
RUW	10	1.0	03-15-61	--	--	--	GS, L
RUW	11	--	--	--	--	--	GS, L
RUW	12	--	--	--	--	--	GS, L
RUW	13	--	--	--	--	--	GS, L
RUW	14	7.5	06-15-88	O	--	--	USGS, L, CA
RUW	15	--	--	O	--	--	USGS, L, CA
RUW	17	--	--	H	6.0	1.0	L
RUW	18	30.0	11-29-85	H	65.0	1.0	L
RUW	19	--	--	H	6.0	1.0	L
RUW	20	--	--	H	4.0	2.0	L
RUW	23	--	--	H	1.0	2.0	L

Table A-1. Description of selected wells, borings, and springs in the Pemigewasset River Basin, central New

Local site number		Lat-itude	Long-itude	Owner or user	Year comp-pleted	Elevation above sea level (feet)	Depth drilled (feet)	Depth to bottom of casing (feet)	Depth of well (feet)	Type of finish	Depth to bottom of open section (feet)	Type of site
				GRAFTON COUNTY								
				Rumney–*Continued*								
RUW	24	434627	714603	Kelly Auto Body	1984	520	--	63.0	430.0	X	--	BrW
RUW	25	434849	715217	Comeau	1985	540	--	145.0	473.0	X	--	BrW
RUW	26	434914	715314	Gottlin	1986	620	--	29.0	300.0	X	--	BrW
RUW	27	435141	714826	Martone, N.	1986	1,320	335.0	104.0	335.0	X	--	BrW
RUW	28	434756	715041	Roberte	1986	600	--	105.0	402.0	X	--	BrW
RUW	31	435136	714827	Lacoviello, J.	1987	1,360	422.0	220.0	422.0	X	--	BrW
RUW	32	434854	715316	Short, W.	1989	640	300.0	103.0	--	--	--	--
RUW	33	434739	714834	Huckins Oil Company	1989	530	355.0	--	355.0	--	--	Dr
				Thornton								
TRA	1	435214	713900	Campton Sand and Gravel	1987	690	8.0	--	--	--	--	Bor
TRB	1	435211	714005	NHDOT	--	553	48.0	--	--	--	--	TH
TRB	2	435203	713952	NHDOT	--	554	91.0	--	--	--	--	TH
TRB	3	435502	714101	NHDOT	--	573	87.0	--	--	--	--	TH
TRB	4	435214	713751	NHDOT	--	650	15.0	--	--	--	--	TH
TRB	5	435557	714108	NHDOT	--	596	25.0	--	--	--	--	TH
TRB	6	435559	714116	NHDOT	--	600	19.0	--	--	--	--	TH
TRB	7	435503	714129	NHDOT	--	640	90.0	--	--	--	--	TH
TRB	8	435516	714125	NHDOT	--	600	20.0	--	--	--	--	TH
TRB	9	435430	714128	NHDOT	--	640	24.0	--	--	--	--	TH
TRB	11	435318	713443	NHDOT	--	880	4.0	--	--	--	--	TH
TRB	12	435329	713430	NHDOT	--	880	6.0	--	--	--	--	TH
TRB	13	435252	713544	NHDOT	--	772	36.0	--	--	--	--	TH
TRB	15	435429	714130	NHDOT	1968	644	--	--	--	--	--	TH
TRB	17	435503	714134	NHDOT	1968	654	90.0	--	--	--	--	TH
TRW	2	435213	713904	Campton Sand and Gravel	1987	690	85.0	58.7	61.6	P	61.6	Bor
TRW	3	435213	713904	Campton Sand and Gravel	1987	690	80.0	74.9	77.8	P	77.8	Bor
TRW	4	435504	714108	State of NH	1987	590	118.0	86.6	89.5	P	89.5	Bor
TRW	5	435503	714108	State of NH	1987	590	32.0	29.3	32.2	P	32.2	Bor
TRW	8	435406	714059	Manning,D.	1961	630	--	--	150.0	--	--	BrW
TRW	9	435222	713737	Campton Campground	1960	665	--	--	490.0	--	--	BrW
TRW	12	435619	714044	Shepherd,E.	1954	610	--	--	306.0	--	--	BrW
TRW	40	435513	714108	Heafity	1984	580	--	136.0	165.0	X	--	BrW
TRW	41	435231	713944	Fournier	1984	560	--	216.0	221.0	X	--	BrW
TRW	42	435239	714025	Morrill	1984	620	--	202.0	830.0	X	--	BrW
TRW	43	435728	714015	Poulin	1985	760	--	20.0	595.0	X	--	BrW
TRW	44	435336	714053	Homes	1986	640	--	41.0	575.0	X	--	BrW
TRW	45	435312	713912	Morathana Construction	1986	740	--	22.0	500.0	X	--	BrW
TRW	46	435314	713914	Morathana Construction	1985	720	--	23.0	600.0	X	--	BrW
TRW	48	435218	714024	Marsden	1984	640	--	57.0	333.0	X	--	BrW
TRW	49	435227	713852	Leary	1984	710	--	24.0	315.0	X	--	BrW
TRW	50	435309	713641	Elgert	1984	830	--	40.0	275.0	X	--	BrW
TRW	51	435231	714037	Roberts	1984	620	--	44.0	775.0	X	--	BrW
TRW	52	435156	714009	Homes	1984	610	--	29.0	355.0	X	--	BrW

Local site number	Water level Depth (feet)	Water level Date (mm-dd-yy)	Use	Maximum well yield (gallons per minute)	Pumping period (hours)	Remarks
			GRAFTON COUNTY			
			Rumney—*Continued*			
RUW 24	--	--	H	5.5	0.5	L
RUW 25	--	--	H	12.0	.5	L
RUW 26	--	--	H	3.0	1.0	L
RUW 27	--	--	H	--	.5	L
RUW 28	--	--	H	4.5	.5	L
RUW 31	--	--	H	--	1.0	L
RUW 32	--	--	H	--	--	L
RUW 33	--	--	--	10.0	--	L
			Thornton			
TRA 1	--	--	O	--	--	USGS, L
TRB 1	--	--	T	--	--	L
TRB 2	--	--	T	--	--	L
TRB 3	--	--	T	--	--	L
TRB 4	--	--	T	--	--	L
TRB 5	--	--	T	--	--	L
TRB 6	--	--	T	--	--	L
TRB 7	--	--	T	--	--	L
TRB 8	--	--	T	--	--	L
TRB 9	--	--	T	--	--	L
TRB 11	--	--	T	--	--	L
TRB 12	--	--	T	--	--	L
TRB 13	--	--	T	--	--	L
TRB 15	--	--	T	--	--	L
TRB 17	--	--	T	--	--	L
TRW 2	47.3	06- -88	O	--	--	USGS, L
TRW 3	67.5	06- -88	O	--	--	USGS, L
TRW 4	20.7	06- -88	O	--	--	USGS, L
TRW 5	20.6	06- -88	O	--	--	USGS, L, CA
TRW 8	30.0	04- -61	--	--	--	GS, L
TRW 9	--	--	--	--	--	GS, L
TRW 12	--	--	--	--	--	GS, L
TRW 40	35.0	02-27-84	H	75.0	.5	L
TRW 41	--	--	H	50.0	3.0	L
TRW 42	--	--	H	.8	1.0	L
TRW 43	--	--	H	--	1.0	L
TRW 44	20.0	11-20-86	H	8.0	1.0	L
TRW 45	--	--	P	10.0	2.0	L
TRW 46	--	--	P	15.0	2.0	L
TRW 48	--	--	H	15.0	.5	L
TRW 49	--	--	H	15.0	.5	L
TRW 50	--	--	H	2.5	.5	L
TRW 51	--	--	H	1.5	.5	L
TRW 52	--	--	H	20.0	.5	L

Table A-1. Description of selected wells, borings, and springs in the Pemigewasset River Basin, central New

Local site number		Lat-itude	Long-itude	Owner or user	Year comp-pleted	Elevation above sea level (feet)	Depth drilled (feet)	Depth to bottom of casing (feet)	Depth of well (feet)	Type of finish	Depth to bottom of open section (feet)	Type of site
						GRAFTON COUNTY						
						Thornton–*Continued*						
TRW	53	435503	714050	Sellingham	1984	600	--	36.0	393.0	X	--	BrW
TRW	54	435228	713830	Uhlman	1984	700	--	133.0	573.0	X	--	BrW
TRW	56	435551	714052	Ingram	1986	600	--	19.0	20.0	--	--	Dug
TRW	57	435334	713457	Hubner	1985	980	--	366.0	377.0	X	--	BrW
TRW	58	435437	713931	Horgan	1985	670	--	60.0	333.0	X	--	BrW
TRW	59	435303	713731	Dubach	1985	780	--	41.0	233.0	X	--	BrW
TRW	61	435434	714103	State of NH	1985	580	--	79.0	505.0	X	--	BrW
TRW	62	435213	713835	Wallace	1986	680	--	142.0	410.0	X	--	BrW
TRW	63	435239	713955	Saunders	1987	580	--	131.0	550.0	X	--	BrW
TRW	64	435236	713954	Rollins Hill Inc.	1987	580	--	128.0	500.0	X	--	BrW
TRW	65	435545	714108	Finn	1970	600	--	48.0	251.0	X	--	BrW
TRW	66	435537	714110	Downing	1970	600	--	34.4	311.0	X	--	BrW
TRW	67	435459	714121	Levasseur	1969	590	--	134.0	330.0	X	--	BrW
TRW	68	435313	714023	Merrill	1968	580	--	114.0	388.0	X	--	BrW
TRW	69	435243	714027	Reitsman	1968	630	--	112.0	508.0	X	--	BrW
TRW	70	435236	714003	NHDOT	1972	600	--	95.0	368.0	X	--	BrW
TRW	71	435252	713545	Anderson	1974	760	--	--	145.0	X	--	BrW
TRW	72	435251	713550	Robertson	1974	760	--	127.0	400.0	X	--	BrW
TRW	73	435212	713833	Trembley	1985	680	--	139.0	325.0	X	--	BrW
TRW	74	435311	713939	Mountain River Condos	1985	600	--	154.0	625.0	X	--	BrW
TRW	75	435309	713942	Mountain River Condos	1985	600	--	136.0	800.0	X	--	BrW
TRW	76	435534	714109	Veerers	1984	600	--	70.0	437.0	X	--	BrW
TRW	77	435250	713823	Town of Campton	1984	760	--	49.0	750.0	X	--	BrW
TRW	78	435300	713713	Burrill	1984	760	--	28.0	172.0	X	--	BrW
TRW	79	435346	713956	Russinov, A.	1986	600	145.0	--	--	--	--	--
TRW	80	435346	713956	Russinov, A.	1986	600	145.0	--	--	--	--	--
TRW	81	435345	713519	Wilson, R.	1986	1,000	272.0	--	--	--	--	--
TRW	82	435254	713554	Gfalter, F.	1988	780	130.0	103.0	130.0	--	--	--
TRW	83	435206	713853	Town of Campton	1979	680	42.0	--	--	--	--	TH
TRW	84	435208	713847	Town of Campton	1979	680	12.0	--	--	--	--	TH
TRW	85	435226	713843	Town of Campton	1979	750	28.0	--	28.0	--	--	TH
TRW	86	435229	713846	Town of Campton	1979	800	50.0	--	22.0	--	--	TH
TRW	87	435228	713801	Town of Campton	1979	680	62.0	--	--	--	--	TH
TRW	89	435235	713805	Town of Campton	1979	720	72.0	--	22.0	--	--	TH
TRW	90	435208	713834	Pritchard, G.	1989	680	565.0	100.0	565.0	--	--	--
TRW	91	435637	714046	Keating,J.	1960	640	--	--	154.0	--	--	BrW
						Warren						
WDA	1	435523	715307	Wright, R.	1988	760	20.0	--	--	--	--	Bor
WDA	4	435601	715427	Cates, L.	1988	770	111.0	--	--	--	--	Bor
WDA	5	435613	715312	Foote, C.	1988	810	23.0	--	--	--	--	Bor
WDB	5	435510	715320	NHDOT	--	737	12.0	--	--	--	--	TH
WDB	6	435359	715350	NHDOT	--	676	15.0	--	--	--	--	TH

Local site number	Water level Depth (feet)	Water level Date (mm-dd-yy)	Use	Maximum well yield (gallons per minute)	Pumping period (hours)	Remarks
			GRAFTON COUNTY			
			Thornton-*Continued*			
TRW 53	--	--	H	7.5	0.5	L
TRW 54	--	--	H	2.0	.5	L
TRW 56	15.0	03-17-86	H	100.0	8.0	L
TRW 57	--	--	H	15.0	.5	L
TRW 58	--	--	H	2.0	.5	L
TRW 59	--	--	H	150.0	.5	L
TRW 61	24.0	12-11-85	H	2.8	1.0	L
TRW 62	--	--	H	8.0	.5	L
TRW 63	15.0	01-02-87	H	2.0	--	L
TRW 64	20.0	01-07-87	H	4.0	--	L
TRW 65	--	--	H	3.0	--	--
TRW 66	--	--	H	2.0	--	L
TRW 67	--	--	H	10.0	--	L
TRW 68	--	--	H	1.5	--	L
TRW 69	--	--	H	1.5	--	L
TRW 70	--	--	H	8.0	--	L
TRW 71	--	--	H	8.0	--	L
TRW 72	--	--	H	8.0	--	L
TRW 73	--	--	H	5.0	1.0	L
TRW 74	--	--	P	15.0	2.0	L
TRW 75	--	--	P	--	--	L
TRW 76	--	--	H	1.5	1.0	L
TRW 77	30.0	01-01-84	P	8.0	10.0	L
TRW 78	--	--	H	25.0	.5	L
TRW 79	--	--	H	--	--	L
TRW 80	--	--	H	--	--	L
TRW 81	--	--	H	--	--	L
TRW 82	25.0	11-30-88	H	--	--	L
TRW 83	--	--	T	--	--	L
TRW 84	--	--	T	--	--	L
TRW 85	9.0	07-16-79	T	--	--	L
TRW 86	7.0	07-13-79	T	--	--	L
TRW 87	5.0	07-12-79	T	--	--	L
TRW 89	6.0	07-10-79	T	--	--	L
TRW 90	89.0	05-04-90	H	--	--	L
TRW 91	3.0	07-06-60	--	--	--	GS
			Warren			
WDA 1	--	--	T	--	--	USGS, L
WDA 4	--	--	T	--	--	USGS, L
WDA 5	--	--	T	--	--	USGS, L
WDB 5	--	--	T	--	--	L
WDB 6	--	--	T	--	--	L

Table A-1. Description of selected wells, borings, and springs in the Pemigewasset River Basin, central New

Local site number		Lat-itude	Long-itude	Owner or user	Year comp-pleted	Elevation above sea level (feet)	Depth drilled (feet)	Depth to bottom of casing (feet)	Depth of well (feet)	Type of finish	Depth to bottom of open section (feet)	Type of site
				GRAFTON COUNTY								
				Warren–*Continued*								
WDB	7	435433	715322	NHDOT	--	694	27.0	--	--	--	--	TH
WDB	9	435454	715318	NHDOT	1961	718	56.0	--	--	--	--	TH
WDB	10	435554	715418	NHDOT	1971	765	35.0	--	--	--	--	TH
WDB	11	435535	715322	NHDOT	1974	756	55.0	--	--	--	--	TH
WDW	2	435710	715125	Wetzler	1962	1,080	--	25.0	124.0	--	--	BrW
WDW	3	435529	715336	Ray,F.	1961	770	--	--	160.0	--	--	BrW
WDW	4	435429	715315	Aldrich,H.	--	730	--	--	170.0	--	--	BrW
WDW	5	435606	715331	Morgan,J.	1955	940	--	--	115.0	--	--	BrW
WDW	6	435534	715305	Nicol	1984	780	--	34.0	380.0	X	--	BrW
WDW	7	435534	715301	Casey	1984	780	--	19.0	500.0	X	--	BrW
WDW	8	435554	715325	Schlieker	1984	800	--	60.0	140.0	X	--	BrW
WDW	9	435614	715317	Hurlburt	1984	810	--	26.0	260.0	X	--	BrW
WDW	10	435544	715400	Bumford	1984	780	--	80.0	140.0	X	--	BrW
WDW	11	435610	715316	Foote	1984	800	--	39.0	715.0	X	--	BrW
WDW	12	435544	715354	Short	1985	780	--	60.0	240.0	X	--	BrW
WDW	13	435453	715329	Ball	1985	760	--	19.0	242.0	X	--	BrW
WDW	14	435710	715145	Schofield	1986	1,080	--	19.0	635.0	X	--	BrW
WDW	16	435608	715333	Merrill	1986	930	--	19.0	300.0	X	--	BrW
WDW	17	435536	715350	Pike (State of NH)	1969	760	--	93.0	116.0	X	--	BrW
WDW	18	435451	715308		--	720	--	21.0	37.0	--	--	--
WDW	19	435448	715314		--	720	--	14.0	52.3	--	--	--
WDW	21	435725	714936	Petelle, D.	1973	1,375	6.0	--	6.0	--	--	--
WDW	22	435544	715400	Pike, R.	1984	790	140.0	81.0	140.0	--	--	BrW
WDW	23	435544	715400	Pike, R.	--	790	30.0	--	30.0	--	--	Dug
WDW	24	435539	715356	Pike, R.	1980	776	100.0	100.0	100.0	--	--	BrW
WDW	26	435534	715300	Community Well	1984	780	500.0	20.2	--	--	--	BrW
WDW	28	435534	715305	Nicol, J.	--	780	10.0	9.5	9.5	--	--	Dug
WDW	30	435523	715307	Wright, R.	1988	760	40.0	19.8	22.7	P	22.7	Bor
				Waterville Valley								
WFB	2	435455	713308	NHDOT	--	1,116	15.0	--	--	--	--	TH
WFB	3	435515	713231	NHDOT	--	1,197	17.0	--	--	--	--	TH
WFB	4	435507	713248	NHDOT	--	1,160	9.0	--	--	--	--	TH
WFB	5	435613	713051	NHDOT	--	1,370	13.0	--	--	--	--	TH
WFB	6	435730	713044	NHDOT	--	1,465	43.0	--	--	--	--	TH
WFB	7	435645	713048	NHDOT	1967	1,460	25.5	--	--	--	--	TH
WFB	8	435707	713011	NHDOT	1982	1,492	24.5	--	--	--	--	TH
WFB	9	435702	713007	NHDOT	1982	1,492	29.0	--	--	--	--	TH
WFW	1	435729	713045	Waterville Valley	1968	1,500	33.0	--	28.0	S	--	Dr
WFW	2	435734	713045	Waterville Valley	1972	1,520	47.0	35.0	47.0	G	--	Dr
WFW	3	435723	713028	Bean, R.	1948	1,500	498.0	--	--	--	--	Cbl
WFW	4	435722	713051	Waterville Valley	--	0	--	--	--	O	--	Dug
				Wentworth								
WIA	2	435137	715453	Brown, H.	1988	560	38.0	--	--	--	--	Bor

Local site number		Water level Depth (feet)	Water level Date (mm-dd-yy)	Use	Maximum well yield (gallons per minute)	Pumping period (hours)	Remarks
				GRAFTON COUNTY			
				Warren-*Continued*			
WDB	7	--	--	T	--	--	L
WDB	9	--	--	T	--	--	L
WDB	10	--	--	T	--	--	L
WDB	11	--	--	T	--	--	L
WDW	2	11.0	05- -62	--	--	--	GS
WDW	3	20.0	10- -61	--	--	--	GS
WDW	4	--	--	--	--	--	GS, L
WDW	5	--	--	--	--	--	GS, L
WDW	6	--	--	H	50.0	1.0	L
WDW	7	--	--	H	7.5	1.0	L
WDW	8	--	--	H	12.0	1.0	L
WDW	9	--	--	H	45.0	1.0	L
WDW	10	--	--	H	50.0	1.0	L
WDW	11	--	--	H	.5	1.0	L
WDW	12	--	--	H	7.5	1.0	L
WDW	13	--	--	H	60.0	1.0	L
WDW	14	--	--	H	.5	1.0	L
WDW	16	--	--	H	6.0	1.0	L
WDW	17	--	--	H	50.0	--	L
WDW	18	--	--	Z	--	--	--
WDW	19	--	--	Z	--	--	--
WDW	21	--	--	H	--	--	L
WDW	22	--	--	H	--	--	L
WDW	23	29.0	10-15-84	U	--	--	--
WDW	24	--	--	H	--	--	L
WDW	26	--	--	H	--	--	L
WDW	28	6.4	07-16-84	U	--	--	--
WDW	30	8.3	11-15-88	O	--	--	USGS, L
				Waterville Valley			
WFB	2	--	--	T	--	--	L
WFB	3	--	--	T	--	--	L
WFB	4	--	--	T	--	--	L
WFB	5	--	--	T	--	--	L
WFB	6	--	--	U	--	--	L
WFB	7	--	--	T	--	--	L
WFB	8	--	--	T	--	--	L
WFB	9	--	--	T	--	--	L
WFW	1	4.0	01-01-68	P	--	--	L
WFW	2	--	--	P	--	--	L, CA
WFW	3	--	--	H	25.0	--	L
WFW	4	--	--	P	--	--	--
				Wentworth			
WIA	2	--	--	T	--	--	USGS, L

Table A-1. Description of selected wells, borings, and springs in the Pemigewasset River Basin, central New

Local site number	Lat-itude	Long-itude	Owner or user	Year com-pleted	Elevation above sea level (feet)	Depth drilled (feet)	Depth to bottom of casing (feet)	Depth of well (feet)	Type of finish	Depth to bottom of open section (feet)	Type of site
					GRAFTON COUNTY						
					Wentworth-*Continued*						
WIB 2	435206	715443	NHDOT	--	580	69.0	--	--	--	--	TH
WIB 3	434924	715335	NHDOT	--	556	36.0	--	--	--	--	TH
WIB 4	435046	715440	NHDOT	1957	548	46.5	--	--	--	--	TH
WIB 5	435206	715434	NHDOT	1937	574	51.0	--	--	--	--	TH
WIW 1	435336	715406	Hinckley, G.	1988	660	59.0	55.6	58.5	P	58.5	Bor
WIW 2	435228	715450	Town of Wentworth	1960	660	--	--	349.0	--	--	BrW
WIW 3	435201	715430	Town of Wentworth	1960	600	--	--	121.0	--	--	BrW
WIW 4	435203	715420	Stiles, K.	1960	620	--	--	200.0	--	--	BrW
WIW 5	435149	715441	Styles, K.	1962	580	--	--	140.0	--	--	BrW
WIW 9	435041	715433	Mellican, E.	1960	560	--	--	100.0	--	--	--
WIW 10	434959	715355	Smith, D.	1962	600	--	--	146.0	--	--	--
WIW 11	435031	715323	Morrison, A.	1959	620	--	--	107.0	--	--	--
WIW 12	435211	715456		1962	600	282.0	--	--	--	--	Cbl
WIW 13	435222	715450	Clair's Snack Shack	1961	660	--	63.0	63.0	--	--	BrW
WIW 14	435210	715442	Johnson, L.	1984	620	--	39.0	545.0	X	--	BrW
WIW 16	435023	715413	Anderson	1986	640	--	49.0	365.0	X	--	BrW
WIW 17	435336	715355	NHDOT	1973	680	--	45.0	248.0	X	--	BrW
WIW 18	435246	715442	Viera, V.	1962	620	--	--	331.0	--	--	BrW
WIW 19	435245	715414	Davis, S.	--	620	12.0	11.5	11.5	--	--	Dug
WIW 20	435333	715427	Woodhaven Cottages	--	685	11.0	11.2	11.2	--	--	Dug
					Woodstock						
WSA 1	435708	714047	Jack O' Lantern Resort	1987	600	20.0	17.8	20.0	P	20.0	TH
WSA 2	435708	714047	Jack O' Lantern Resort	1987	600	86.0	--	--	--	--	TH
WSA 3	440148	714152	--	--	740	24.0	--	--	--	--	TH
WSA 4	440147	714149	--	--	740	13.0	--	--	--	--	TH
WSA 5	440148	714147	--	--	740	23.5	--	--	--	--	TH
WSA 6	440148	714132	--	--	730	40.0	--	--	--	--	TH
WSB 4	435846	714048	--	--	626	--	--	--	X	--	TH
WSB 7	440153	714042	NHDOT	--	760	85.0	--	--	--	--	TH
WSB 8	435738	714046	NHDOT	--	600	130.0	--	--	--	--	TH
WSB 9	435618	714120	NHDOT	--	680	19.0	--	--	--	--	TH
WSB 10	435922	714022	NHDOT	--	800	8.0	--	--	--	--	TH
WSB 11	440115	714037	NHDOT	--	800	21.0	--	--	--	--	TH
WSB 12	440205	714048	NHDOT	--	760	31.0	--	--	--	--	TH
WSB 13	435731	714049	NHDOT	--	600	60.0	--	--	--	--	TH
WSB 14	435821	714033	NHDOT	--	680	25.0	--	--	--	--	TH
WSB 15	435812	714031	NHDOT	--	640	25.0	--	--	--	--	TH
WSB 17	440148	714107	NHDOT	--	720	17.0	--	--	--	--	TH
WSW 1	440054	714038	Clark,D.	1962	760	--	--	234.0	--	--	BrW
WSW 2	440057	714103	Fulton,M.	1961	700	--	--	115.0	--	--	BrW
WSW 3	440038	714109	Maple Lodge	--	700	--	--	145.0	--	--	BrW
WSW 4	440031	714112	Brittons Cabins	--	720	--	--	127.0	--	--	BrW
WSW 5	440021	714106	White Mtn. Drive-in	--	700	--	--	156.0	--	--	BrW
WSW 7	435624	714124	Fulton,D.	1962	680	--	--	623.0	--	--	BrW

Local site number		Water level Depth (feet)	Water level Date (mm-dd-yy)	Use	Maximum well yield (gallons per minute)	Pumping period (hours)	Remarks
					GRAFTON COUNTY		
					Wentworth-*Continued*		
WIB	2	--	--	T	--	--	L
WIB	3	--	--	T	--	--	L
WIB	4	--	--	T	--	--	L
WIB	5	--	--	T	--	--	L
WIW	1	8.2	11-18-88	O	--	--	USGS, L
WIW	2	25.0	07- -60	--	--	--	GS
WIW	3	50.0	04- -60	--	--	--	GS
WIW	4	33.0	11- -60	--	--	--	GS
WIW	5	42.0	04- -62	--	--	--	GS
WIW	9	--	--	--	--	--	L
WIW	10	--	--	--	--	--	L
WIW	11	33.0	11- -59	--	--	--	L
WIW	12	65.0	02- -62	H	4.0	--	L
WIW	13	15.0	07- -61	--	--	--	GS
WIW	14	--	--	H	80.0	0.5	L
WIW	16	--	--	H	5.0	.3	L
WIW	17	--	--	H	12.0	--	L
WIW	18	25.0	07- -62	--	--	--	GS
WIW	19	7.5	07-17-84	H	--	--	L
WIW	20	4.1	07-01-84	H	--	--	--
					Woodstock		
WSA	1	8.9	09-30-87	T	40.0	3.0	L
WSA	2	--	--	T	--	--	L
WSA	3	3.5	09-21-82	T	--	--	L
WSA	4	3.5	09-21-82	T	--	--	L
WSA	5	3.5	09-21-82	T	--	--	L
WSA	6	4.0	09-22-82	T	--	--	L
WSB	4	--	--	--	--	--	L
WSB	7	--	--	T	--	--	L
WSB	8	--	--	T	--	--	L
WSB	9	--	--	T	--	--	L
WSB	10	--	--	T	--	--	L
WSB	11	--	--	T	--	--	L
WSB	12	--	--	T	--	--	L
WSB	13	--	--	T	--	--	L
WSB	14	--	--	T	--	--	L
WSB	15	--	--	T	--	--	L
WSB	17	--	--	T	--	--	L
WSW	1	9.0	04-13-62	--	--	--	GS, L
WSW	2	25.0	12 -- 61	--	--	--	GS, L
WSW	3	--	--	--	--	--	GS, L
WSW	4	--	--	--	--	--	GS, L
WSW	5	--	--	--	--	--	GS, L
WSW	7	--	--	--	--	--	GS, L

Table A-1. Description of selected wells, borings, and springs in the Pemigewasset River Basin, central New

Local site number		Lat-itude	Long-itude	Owner or user	Year comp-pleted	Elevation above sea level (feet)	Depth drilled (feet)	Depth to bottom of casing (feet)	Depth of well (feet)	Type of finish	Depth to bottom of open section (feet)	Type of site
				GRAFTON COUNTY								
				Woodstock-*Continued*								
WSW	8	435622	714127	Canter, S.	1954	680	--	--	150.0	--	--	BrW
WSW	14	435821	714055	Town of Woodstock	1988	630	76.0	56.0	76.0	G	--	Dr
WSW	16	440037	714035	Desjardins	1985	790	--	24.0	300.0	X	--	BrW
WSW	17	440106	714431	Simmons	1985	1,040	--	54.0	200.0	X	--	BrW
WSW	18	440153	714219	Fadden Construction	1986	800	--	84.0	400.0	X	--	BrW
WSW	20	435806	714015	Hudson	1985	700	--	20.0	280.0	X	--	BrW
WSW	21	435959	714038	Sherbinski	1970	660	--	87.5	491.0	X	--	BrW
WSW	22	435958	714034	Holtzman	1971	660	--	123.0	251.0	X	--	BrW
WSW	23	435813	714035	Avery	1986	640	--	110.0	600.0	X	--	BrW
WSW	24	435826	714040	Gilman	1971	640	--	79.0	500.0	X	--	BrW
WSW	25	435748	714033	Steele	1970	700	--	61.0	400.0	X	--	BrW
WSW	26	440105	714045	Carkins	1971	720	--	24.0	205.0	X	--	BrW
WSW	27	440011	714029	Young	1970	800	--	28.5	470.0	X	--	BrW
WSW	28	440049	714039	McAfee	1970	740	--	105.0	250.0	X	--	BrW
WSW	29	440109	714042	Cox	1969	720	--	30.8	100.0	X	--	BrW
WSW	30	440129	714044	Clark	1970	760	--	34.0	220.0	X	--	BrW
WSW	31	435947	714022	LaCombe	1971	660	--	63.0	500.0	X	--	BrW
WSW	33	440133	714043	Kneeland	1970	760	--	42.0	220.0	X	--	BrW
WSW	34	440014	714031	Mueller	1970	800	--	41.7	175.0	X	--	BrW
WSW	35	440154	714053	Summit Development Inc.	1987	720	--	199.0	205.0	--	--	--
WSW	36	440200	714223	Tetley	1986	840	--	104.0	400.0	X	--	BrW
WSW	37	440142	714100	Town of Woodstock	1982	720	48.0	--	48.0	--	--	TH
WSW	38	435817	714052	Town of Woodstock	1988	630	76.0	53.0	76.0	G	--	Dr
WSW	39	440138	714127	--	--	720	53.0	--	48.0	--	--	--
WSW	40	440138	714126	--	--	720	48.0	--	48.0	--	--	--
WSW	41	440138	714126	--	--	720	48.0	--	48.0	--	--	--
WSW	42	440137	714126	--	--	720	33.0	--	33.0	--	--	--
WSW	43	440138	714121	--	--	720	48.0	--	48.0	--	--	--
WSW	44	440139	714123	--	--	720	58.0	--	56.0	--	--	--
WSW	45	440139	714124	--	--	720	59.0	--	56.0	--	--	--
WSW	46	440139	714124	--	1977	720	58.0	--	58.0	--	--	--
WSW	47	440144	714059	--	1982	725	26.0	--	26.0	--	--	--
WSW	48	440143	714100	--	1987	718	30.0	--	30.0	--	30.0	--
WSW	49	440141	714056	--	--	715	90.0	--	75.0	--	--	--
WSW	51	440152	714157	--	--	750	44.0	--	42.0	--	--	--
WSW	52	440216	714107	--	--	760	28.0	--	28.0	--	--	--
WSW	54	440150	714132	--	--	730	51.0	--	47.0	--	--	--
				MERRIMACK COUNTY								
				Andover								
ANB	9	432805	714303	B&M RR	--	560	--	--	--	X	--	TH

Local site number		Water level Depth (feet)	Water level Date (mm-dd-yy)	Use	Maximum well yield (gallons per minute)	Pumping period (hours)	Remarks
				GRAFTON COUNTY			
				Woodstock-*Continued*			
WSW	8	--	--	--	--	--	GS, L
WSW	14	14.9	08-28-88	P	--	--	L, CA
WSW	16	--	--	H	40.0	1.0	L
WSW	17	35.0	05-08-85	P	20.0	.5	L
WSW	18	5.0	10-01-86	H	2.5	1.0	L
WSW	20	--	--	H	60.0	1.0	L
WSW	21	--	--	H	8.0	--	L
WSW	22	--	--	H	25.0	--	L
WSW	23	--	--	H	1.0	4.0	L
WSW	24	--	--	H	2.0	--	L
WSW	25	--	--	H	2.0	--	L
WSW	26	--	--	H	25.0	--	L
WSW	27	--	--	H	20.0	--	--
WSW	28	--	--	H	50.0	--	--
WSW	29	--	--	H	20.0	--	L
WSW	30	--	--	H	--	--	L
WSW	31	--	--	H	--	--	L
WSW	33	--	--	H	40.5	--	L
WSW	34	--	--	H	8.5	--	L
WSW	35	--	--	C	50.0	.3	L
WSW	36	--	--	H	5.0	1.0	L
WSW	37	--	--	T	--	--	L
WSW	38	14.9	08-28-88	P	--	--	L
WSW	39	--	--	T	20.0	2	L
WSW	40	--	--	T	30.0	3	L
WSW	41	--	--	T	30.0	1	L
WSW	42	--	--	T	3.0	.3	L
WSW	43	4.0	07-28-76	T	30.0	1	L
WSW	44	4.3	01-26-77	T	35.0	2	L
WSW	45	5.7	01-27-77	T	55.0	2	L
WSW	46	6.0	02-09-77	P	140.0	13.5	L
WSW	47	6.5	10-07-82	T	75.0	4	L
WSW	48	--	--	P	89.0	48	L
WSW	49	2.0	08-20-82	T	60.0	2.5	L
WSW	51	4.0	05-04-76	T	20.0	1	L
WSW	52	1.5	07-28-76	T	30.0	1	L
WSW	54	2.0	07-21-76	T	15.0	2	L
				MERRIMACK COUNTY			
				Andover			
ANB	9	--	--	T	--	--	L

Table A-1. Description of selected wells, borings, and springs in the Pemigewasset River Basin, central New

Local site number		Latitude	Longitude	Owner or user	Year completed	Elevation above sea level (feet)	Depth drilled (feet)	Depth to bottom of casing (feet)	Depth of well (feet)	Type of finish	Depth to bottom of open section (feet)	Type of site
				MERRIMACK COUNTY								
				Andover—*Continued*								
ANW	1	432658	714507	Thompson, M.	1987	660	107.0	40.0	42.9	P	42.9	Bor
ANW	10	432639	714449	Currier, W.	1963	660	--	68.0	121.0	--	--	BrW
ANW	13	432818	714342	Barnes, K.	1966	600	120.0	110.0	120.0	--	--	BrW
ANW	14	432653	714531	Northern Railroad	1988	660	37.0	24.2	27.1	P	27.1	Bor
ANW	23	432736	714503	Teddy Bear Inn	1985	680	--	19.0	505.0	X	--	BrW
ANW	24	432747	714548	Hazen	1985	700	--	19.0	345.0	X	--	BrW
ANW	32	432708	714537	Kenney	1986	660	--	127.0	128.0	--	--	--
ANW	42	432648	714548	Varnum	1987	660	--	219.0	565.0	X	--	BrW
				Danbury								
DBA	1	433128	714940	Phelps, J.	1989	790	84.0	--	--	--	--	Bor
DBB	1	433227	714916	NHDOT	--	780	53.0	--	--	--	--	TH
DBB	4	433143	714925	NHDOT	--	800	15.0	--	--	--	--	TH
DBB	5	433008	715041	NHDOT	1968	810	19.0	--	--	--	--	TH
DBB	6	433109	715153	NHDOT	--	830	--	--	--	X	--	TH
DBW	12	433036	715027	Sturfrant	1984	860	295.0	--	295.0	X	--	BrW
DBW	22	433133	715149	Russell	1985	820	--	20.0	130.0	X	--	BrW
DBW	29	433158	715144	Town of Danbury	1989	800	98.0	76.6	79.5	P	79.5	Bor
DBW	30	433158	715144	Town of Danbury	1989	800	98.0	7.0	9.9	P	7.0	Bor
				Franklin								
FKA	1	432900	713930	US Army Corps Engineers	1989	420	73.0	--	--	--	--	Bor
FKA	2	432814	713925	US Army Corps Engineers	1940	440	220.0	--	--	--	--	TH
FKA	3	432813	713928	US Army Corps Engineers	1940	400	132.0	--	--	--	--	TH
FKA	4	432758	713947	US Army Corps Engineers	1940	389	92.0	--	--	--	--	TH
FKA	5	432804	713952	US Army Corps Engineers	1940	390	50.0	--	--	--	--	TH
FKA	6	432803	713934	US Army Corps Engineers	1940	330	84.0	--	--	--	--	TH
FKA	7	432810	713924	US Army Corps Engineers	1940	390	100.0	--	--	--	--	TH
FKA	8	432809	713947	US Army Corps Engineers	1940	310	55.0	--	--	--	--	TH
FKA	9	432757	713940	US Army Corps Engineers	1990	380	50.0	--	--	--	--	TH
FKA	10	432811	713942	US Army Corps Engineers	1945	350	350.0	--	--	--	--	TH
FKW	2	432745	713921	City of Franklin	1964	320	--	64.0	73.0	--	--	--
FKW	3	432738	713918	City of Franklin	1964	320	--	73.0	82.0	--	--	--
FKW	4	432812	714001	Franklin Dairy	1959	440	--	--	100.0	--	--	BrW
FKW	9	432819	714047	Block, L.	1958	410	155.0	--	155.0	--	--	BrW
FKW	12	432851	714132	Doherty, W.	1961	440	205.0	--	205.0	--	--	BrW
FKW	14	432751	714137	Fell, D.	1959	420	--	--	100.0	--	--	BrW
FKW	15	432752	713950	Furlong, W.	1963	470	--	50.0	100.0	--	--	BrW
FKW	17	432830	714056	Blue	1960	420	126.0	18.0	126.0	--	--	BrW
FKW	18	432750	714122	Howard, N.	1959	420	--	--	100.0	--	--	BrW
FKW	21	432924	713949	Pligga, P.	1961	420	--	100.0	183.0	--	--	BrW
FKW	26	432742	714026	Sylvestrie, M.	1960	430	--	--	164.0	--	--	BrW
FKW	27	432804	714146	Jurta, J.	1960	450	--	--	300.0	--	--	BrW
FKW	28	432817	714211	McDonald, J.	1988	468	81.0	74.8	77.7	P	77.7	Bor

Local site number		Water level Depth (feet)	Water level Date (mm-dd-yy)	Use	Maximum well yield (gallons per minute)	Pumping period (hours)	Remarks
				MERRIMACK COUNTY			
				Andover–*Continued*			
ANW	1	18.6	08-15-88	O	--	--	USGS, L, CA
ANW	10	5.0	04- -63	--	--	--	GS, L
ANW	13	--	--	--	--	--	GS, L
ANW	14	7.7	08-15-88	O	--	--	USGS, L, CA
ANW	23	--	--	C	--	--	L
ANW	24	--	--	H	--	--	L
ANW	32	20.0	06-20-86	H	100.0	.5	L
ANW	42	30.0	09-21-87	H	1.0	1.0	L
				Danbury			
DBA	1	2.0	06-08-89	T	--	--	USGS, L
DBB	1	--	--	T	--	--	L
DBB	4	--	--	T	--	--	L
DBB	5	--	--	T	--	--	L
DBB	6	--	--	T	--	--	L
DBW	12	--	--	H	--	.5	L
DBW	22	--	--	H	6.0	--	L
DBW	29	4.8	05-25-89	O	--	--	USGS, L
DBW	30	4.1	08-08-89	O	--	--	USGS, L
				Franklin			
FKA	1	38.0	04-27-89	T	--	--	USGS, L
FKA	2	--	--	T	--	--	L
FKA	3	--	--	T	--	--	L
FKA	4	--	--	T	--	--	L
FKA	5	--	--	T	--	--	L
FKA	6	--	--	T	--	--	L
FKA	7	--	--	T	--	--	L
FKA	8	--	--	T	--	--	L
FKA	9	--	--	T	--	--	L
FKA	10	--	--	T	--	--	L
FKW	2	--	--	--	--	--	L
FKW	3	--	--	--	--	--	L
FKW	4	--	--	--	--	--	GS, L
FKW	9	--	--	--	--	--	GS, L
FKW	12	40.0	05- -61	--	--	--	GS, L
FKW	14	--	--	--	--	--	GS, L
FKW	15	35.0	07- -63	--	--	--	GS
FKW	17	2.0	05- -60	--	--	--	GS, L
FKW	18	--	--	--	--	--	GS, L
FKW	21	50.0	12- -61	--	--	--	GS
FKW	26	--	--	--	--	--	GS, L
FKW	27	--	--	--	--	--	GS, L
FKW	28	8.1	06-24-88	O	--	--	USGS, L

Table A-1. Description of selected wells, borings, and springs in the Pemigewasset River Basin, central New

Local site number		Lat-itude	Long-itude	Owner or user	Year com-pleted	Elevation above sea level (feet)	Depth drilled (feet)	Depth to bottom of casing (feet)	Depth of well (feet)	Type of finish	Depth to bottom of open section (feet)	Type of site
				MERRIMACK COUNTY								
				Franklin-*Continued*								
FKW	29	432808	713921	City of Franklin	1985	320	122.0	--	117.0	G	122.0	Wsh
FKW	31	432753	714138	Jurta	1984	440	--	--	605.0	X	--	BrW
FKW	33	432743	714114	Pisani	1986	420	--	--	230.0	X	--	BrW
FKW	34	432822	713903	Woodward	1985	460	--	59.0	305.0	X	--	BrW
FKW	35	432821	713851	Allyn Construction	1987	500	--	59.0	225.0	X	--	BrW
FKW	36	432817	713848	Allyn Construction	1987	480	--	39.0	125.0	X	--	BrW
FKW	37	432822	713856	Marceau	1987	500	--	39.0	185.0	X	--	BrW
FKW	38	432817	714211	Mayo-Smith	1986	580	--	19.0	180.0	X	--	BrW
FKW	39	432821	713854	Smith	1987	500	--	52.0	320.0	X	--	BrW
FKW	40	432824	713900	Gomes	1986	480	--	19.0	180.0	X	--	BrW
FKW	41	432836	714152	Clark	1986	420	--	89.0	485.0	X	--	BrW
FKW	42	432848	714135	Bennett, B.	1986	420	225.0	89.0	225.0	X	--	BrW
FKW	43	432830	713853	Middleton	1986	540	--	49.0	325.0	X	--	BrW
FKW	44	432824	713858	Lepene	1986	500	--	59.0	485.0	X	--	BrW
FKW	45	432831	714215	Densch	1986	560	--	109.0	725.0	X	--	BrW
FKW	47	432818	713852	Ambrose, S.	1988	460	--	62.0	205.0	X	--	BrW
FKW	48	432653	713943	--	--	380	--	99.0	280.0	X	--	BrW
FKW	49	432703	714003	Nadeau	1988	440	--	134.0	230.0	X	--	BrW
FKW	50	432740	714100	Whittemore	1987	420	--	79.0	280.0	X	--	BrW
FKW	51	432830	713937	US Army Corps Engineers	1989	330	116.0	89.6	92.5	P	92.5	Bor
				Hill								
HNA	1	433303	714259	US Army Corps Engineers	1989	320	45.0	--	--	--	--	Bor
HNW	2	433133	714322	Town of Hill	--	505	100.0	--	40.0	--	--	--
HNW	4	433112	714213	Cohen, S.	1959	434	--	--	202.0	--	--	BrW
HNW	5	433346	714409	Evans, C.	1959	480	--	--	135.0	--	--	BrW
HNW	6	433147	714147	US Army Corps Engineers	1988	329	79.0	57.4	60.3	P	60.3	Bor
HNW	7	433148	714141	US Army Corps Engineers	1988	335	128.0	--	120.0	P	--	Bor
HNW	8	433030	714506	Miner, A.	1985	1,020	545.0	279.0	545.0	X	--	BrW
HNW	9	433025	714443	Pabst, G.	1984	980	410.0	89.0	410.0	X	--	BrW
HNW	15	433350	714439	McGilviary	1988	460	--	62.0	600.0	X	--	BrW

Local site number		Water level Depth (feet)	Water level Date (mm-dd-yy)	Use	Maximum well yield (gallons per minute)	Pumping period (hours)	Remarks
				MERRIMACK COUNTY			
				Franklin–*Continued*			
FKW	29	12.2	07-29-85	P	1,100.0	96.0	L, CA
FKW	31	--	--	H	2.0	.5	L
FKW	33	--	--	H	4.0	--	L
FKW	34	--	--	H	19.0	.5	L
FKW	35	20.0	07-16-87	H	7.0	1.0	L
FKW	36	--	--	H	10.0	1.0	L
FKW	37	4.0	05-21-87	H	6.0	1.0	L
FKW	38	30.0	04-26-86	H	6.0	.5	L
FKW	39	23.0	04-25-87	H	4.0	.5	L
FKW	40	--	--	H	--	--	L
FKW	41	--	--	H	10.0	.3	L
FKW	42	--	--	H	--	.3	L
FKW	43	--	--	H	30.0	.3	L
FKW	44	--	--	H	5.0	.3	L
FKW	45	--	--	H	4.0	.3	L
FKW	47	25.0	01-06-88	H	5.5	--	L
FKW	48	--	--	H	--	--	L
FKW	49	--	--	H	30.0	.5	L
FKW	50	30.0	10-22-87	H	10.0	.5	L
FKW	51	15.1	05-22-89	O	--	--	USGS, L
				Hill			
HNA	1	6.4	05-23-89	T	--	--	USGS, L
HNW	2	--	--	P	190.0	3.0	--
HNW	4	--	--	--	--	--	GS, L
HNW	5	--	--	--	--	--	GS, L
HNW	6	25.6	06-22-88	O	--	--	USGS, L
HNW	7	22.2	06-23-88	O	--	--	USGS, L, CA
HNW	8	--	--	H	--	.5	L
HNW	9	--	--	H	--	.5	L
HNW	15	50.0	01-20-88	H	2.0	1.0	L

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APPENDIX B: Stratigraphic logs of selected wells and borings in the Pemigewasset River Basin, central New Hampshire

Table B-1. Stratigraphic logs of wells and borings in the Pemigewasset River Basin, Central New Hampshire

[**Local site number:** First two characters are U.S. Geological Survey town code. Third character indicates—A, auger hole or test hole bored for hydrologic information; B, highway bridge boring; W, well. The numbers are sequential numbers for each town. **Depth to top:** Depth to top of each stratigraphic unit in feet below land-surface datum. **Depth to bottom:** Depth to bottom of unit, in feet below land-surface datum. Sampling intervals represent when samples were taken. --, indicates no data available]

Local site number		Depth to top (feet)	Depth to bottom (feet)	Lithology
				GRAFTON COUNTY
				Center Harbor
CHW	4	35.0	--	Bedrock
CHW	16	0	6.0	Till
		6.0	--	Bedrock
CHW	18	0	10.0	Till
		10.0	--	Bedrock
				New Hampton
NHA	11	0	7.0	Sand, very fine to fine, yellow
		7.0	11.0	Gravel
		11.0	--	Refusal on boulder at 11 feet
NHA	12	2.0	7.0	Sand, very fine to fine, some silt, orange
		7.0	12.0	Sand, very fine to fine, some gravel, gray-brown
		12.0	23.0	Sand, very fine to fine, predominantly fine sand; some gravel
		23.0	--	Refusal at 23 feet
NHA	13	2.0	7.0	Sand, medium to very coarse, predominantly medium; gravel, very fine to fine, tan; some pebbles
		7.0	12.0	Sand, medium to very coarse; some fine gravel; pebbles
		12.0	17.0	Sand, very fine to medium; some pebbles
		17.0	32.0	Sand, very fine to fine, gray to tan
		32.0	33.5	Gravel
		34.5	--	Refusal on bedrock or boulder
NHA	14	2.0	12.0	Sand, fine to medium, tan
		12.0	17.0	Sand, very fine to fine, tan
		17.0	22.0	Sand, fine to coarse, predominantly medium
		22.0	27.0	Sand, very fine to coarse, predominantly medium
		27.5	32.5	Sand, very fine to coarse, predominantly fine to medium
		32.5	--	Refusal at 32.5 feet
NHA	15	2.0	7.0	Sand, very fine to coarse, predominantly medium, tan
		7.0	12.0	Sand, very fine to fine, gray to tan; some cobbles; some silt
		12.0	69.0	Sand, very fine to fine, gray to tan; some cobbles; some silt
		69.0	74.0	Sand, very fine to fine; silt
		74.0	--	Refusal at 74 feet, pegmatite fragments in bit sample
NHA	16	0	7.0	Sand, very fine to medium, predominantly fine, buff
		7.0	12.0	Sand and gravel
		12.0	17.0	Sand, very fine to medium, predominantly fine; some cobbles
		17.0	22.0	Sand, very fine to medium, predominantly fine; some cobbles
		37.0	46.0	Sand and silt, very fine, gray; some cobbles
		46.0	--	Refusal on bedrock at 46 feet
NHA	17	0	5.0	Sand, fine, brown; some medium to coarse sand
		5.0	34.0	Sand, fine, brown to gray; some coarse gravel
		34.0	36.0	Sand, fine to coarse, brown; some gravel
NHA	18	0	4.0	Sand, fine to medium, brown; some coarse sand
		4.0	8.0	Sand, fine to coarse, brown; some gravel
		8.0	22.0	Sand, fine, brown
		22.0	26.0	Sand, fine, brown; some medium to coarse sand
		26.0	30.0	Sand, fine, brown; some silt
		30.0	36.0	Sand, fine, brown; some medium to coarse sand
		36.0	45.0	Sand and silt fine, brown
		45.0	56.0	Sand, fine, brown
		56.0	58.0	Sand, fine to coarse, brown; some gravel
NHB	2	0	8.0	Sand, organic
		8.0	15.0	Till; with boulders
		15.0	--	Till; end of hole
NHB	3	0	3.0	Sand and gravel
		3.0	9.0	Sand, medium; some gravel
		9.0	25.0	Sand, fine
		25.0	35.0	Sand, coarse
		35.0	67.0	Sand, fine
		67.0	--	Sand; end of hole
NHB	4	0	37.0	Till; with boulders
		37.0	--	Till; end of hole

Table B-1. Stratigraphic logs of wells and borings in the Pemigewasset River Basin, Central New Hampshire—*Continued*

Local site number		Depth to top (feet)	Depth to bottom (feet)	Lithology
				GRAFTON COUNTY
				New Hampton—*Continued*
NHB	5	0	54.0	Sand, fine
		54.0	--	Sand; end of hole
NHB	7	0	4.0	Gravel, fine
		4.0	24.0	Sand, fine
		24.0	42.0	Gravel
		42.0	55.0	Sand, fine to medium
		55.0	62.0	Sand, silty
		62.0	--	Sand; end of hole
NHB	8	0	76.0	Sand, fine to medium
		76.0	90.0	Sand, fine to medium; some cobbles
		90.0	--	Sand; end of hole
NHB	10	0	1.0	Topsoil
		1.0	14.0	Gravel
		14.0	34.0	Till, sandy, bouldery
		34.0	--	Till; end of hole
NHB	11	0	15.0	Sand, fine
		15.0	20.0	Gravel, sandy
		20.0	49.0	Sand, coarse
		49.0	58.0	Sand, silty and cobbles
		58.0	66.0	Till
		66.0	--	Till; end of hole
NHB	12	0	6.0	Sand, fine
		6.0	13.0	Silt
		13.0	40.0	Sand, fine to medium
		40.0	64.0	Sand, coarse
		64.0	--	Sand; end of hole
NHW	4	5.0	--	--
NHW	5	14.0	--	--
NHW	10	0	30.0	Sand and gravel
		30.0	--	Bedrock
NHW	12	125.0	--	Bedrock
NHW	13	0	--	Sand
		--	--	Sand and gravel
		--	--	Till
		100.0	--	Bedrock
NHW	15	10.0	--	Bedrock
NHW	17	60.0	--	Bedrock
NHW	18	120.0	--	Bedrock
NHW	19	0	16.0	Sand and gravel
		16.0	--	Bedrock
NHW	20	0	--	Sand
		--	--	Sand and gravel
		85.0	--	Bedrock
NHW	21	0	42.0	Till
		42.0	--	Bedrock
NHW	23	0	7.0	Till
		7.0	--	Bedrock
NHW	25	0	62.0	Sand
		62.0	--	Bedrock
NHW	26	0	41.0	Sand and gravel
		41.0	--	Bedrock
NHW	27	0	30.0	Till
		30.0	--	Bedrock
NHW	29	7.0	37.0	Sand, very fine to fine; some silt, tan
		37.0	45.0	Sand, very fine to coarse, predominantly fine to medium; some pebbles
		45.0	47.0	Gravel
		47.0	49.0	Sand, fine to very coarse, predominantly medium, tan
		57.0	59.0	Sand, fine to very coarse, predominantly medium to coarse; some fine gravel; trace cobbles

Table B-1. Stratigraphic logs of wells and borings in the Pemigewasset River Basin, Central New Hampshire–*Continued*

Local site number		Depth to top (feet)	Depth to bottom (feet)	Lithology
				GRAFTON COUNTY
				New Hampton–*Continued*
NHW	29–*Continued*			
		77.0	79.0	Sand, fine to very coarse, predominantly medium; gravel, fine to coarse;some pebbles
		87.0	89.0	Sand, fine to very coarse, predominantly coarse; gravel, fine; some pebbles; cobbles
		97.0	99.0	Sand, fine to very coarse, predominantly coarse; gravel, fine; some pebbles; cobbles
		107.0	109.0	Sand, fine to very coarse, predominantly medium to coarse; gravel, fine to coarse
		117.0	119.0	Sand, fine to very coarse, predominantly medium to coarse; gravel, fine to coarse
		137.0	139.0	Sand, very fine to very coarse, predominantly medium to coarse
NHW	30	0	7.0	Sand, fine to coarse, brown; some gravel to boulders
		7.0	22.0	Sand, fine to medium, brown; some coarse sand
		22.0	26.0	Sand, fine to medium, brown; some fine to coarse gravel
		26.0	30.0	Sand, fine to medium, brown; some silt, gravel
NHW	31	0	4.0	Sand, fine to medium, some coarse sand
		4.0	7.0	Sand, fine to coarse, brown; some fine to medium gravel; trace sand
		7.0	12.0	Sand, fine, brown; some silt
		12.0	20.0	Sand, fine to coarse, brown; some fine to medium gravel
		20.0	22.5	Sand, fine, brown
		22.5	32.0	Sand, fine, brown; some gravel; some silt
NHW	32	0	90.0	Sand
		90.0	94.0	Gravel
		94.0	--	Gravel; end of hole
				Sanbornton
SCA	1	0	5.0	Sand, fine to very coarse, predominantly medium to coarse; pebbles
		5.0	7.0	Sand, fine to very coarse, predominantly medium to coarse; pebbles
		7.0	9.0	Sand, fine to very coarse, predominantly medium
		12.0	14.0	Sand, fine to very coarse; pebbles and cobbles
		17.0	19.0	Sand, very fine to very coarse, predominantly fine and medium; pebbles and cobbles; Refusal at 19 feet
SCA	2	0	5.0	Gravel and sand, predominantly medium to coarse
		5.0	9.0	Gravel and fine to very coarse sand, predominantly medium to coarse
		12.0	14.0	Sand, very fine to medium, predominantly fine, may be till, refusal at 14.8 feet
		31.0	32.0	Refusal on gray stone and granite at 32 feet
		37.0	39.0	Cobble
		47.0	49.0	Gravel; some sand, poorly sorted
		57.0	59.0	Gravel; some sand, fine to very coarse; pebbles
		67.0	69.0	Gravel; some cobbles; pebbles
		77.0	79.0	Gravel; some cobbles and sand
		87.0	89.0	Gravel, some cobbles, silt
		102.0	--	Gravel; end of hole
SCA	3	0	5.0	Gravel; cobbles and sand
		5.0	15.0	Gravel; pebbles and cobbles; refusal at 15 feet
SCB	1	0	1.0	Topsoil
		1.0	5.0	Sand, fine
		5.0	15.0	Sand, medium to coarse (muck)
		15.0	29.0	Sand, fine (muck)
		29.0	42.0	Sand, gravelly, silty
		42.0	--	Refusal on boulders or bedrock
SCB	4	0	4.0	Gravel; some boulders
		4.0	14.0	Till; with boulders
		14.0	--	Till; end of hole
SCB	5	0	1.0	Topsoil
		1.0	3.0	Silt and sand; trace of muck
		3.0	8.0	Till, gravelly
		8.0	--	Bedrock
SCB	6	0	1.0	Topsoil
		1.0	13.0	Sand, fine
		13.0	--	Bedrock
SCB	9	0	1.0	Topsoil
		1.0	8.0	Sand, fine
		8.0	12.0	Till, sandy, gravelly
		12.0	--	Refusal on boulder or bedrock (mica schist)
SCW	43	10.0	--	Bedrock
SCW	44	22.0	--	Bedrock
SCW	48	10.0	--	Bedrock
		20.0	--	Refusal at 20 feet; tight drilling may be till

Table B-1. Stratigraphic logs of wells and borings in the Pemigewasset River Basin, Central New Hampshire—*Continued*

Local site number	Depth to top (feet)	Depth to bottom (feet)	Lithology
			GRAFTON COUNTY
			Sanbornton-*Continued*
SCW 58	0	17.0	Sand and gravel to small boulders
	7.0	14.0	Sand, fine to very coarse, predominantly medium; and gravel
	17.0	19.0	Sand, medium to very coarse
	27.0	29.0	Sand, very fine to fine; cobble
SCW 59	0	17.0	Sand, predominantly coarse, gravel, cobbles, and boulders
	17.0	19.0	Sand, very fine to coarse, predominantly medium
	27.0	28.5	Refusal at 28.5 feet. Sand, very fine to very coarse; pebbles and cobbles; poorly sorted
SCW 61	3.0	--	Bedrock
SCW 73	0	--	Till
	--	--	Clay
	24.0	--	Bedrock
SCW 76	20.0	--	Bedrock
SCW 77	40.0	--	Bedrock
SCW 87	0	--	Till
	--	--	Clay
	140.0	--	Bedrock
SCW 90	0	30.0	Till
	30.0	--	Bedrock
SCW 95	0	30.0	Sand
	30.0	--	Bedrock
SCW 99	0	9.0	Sand and gravel
	9.0	--	Bedrock
SCW 100	0	5.0	Till
	5.0	--	Bedrock
SCW 101	0	39.0	Sand and gravel
	39.0	--	Bedrock
SCW 102	0	--	Sand
	--	--	Till
	10.0	--	Bedrock
SCW 103	68.0	--	Bedrock
SCW 104	50.0	--	Bedrock
SCW 113	0	8.0	Till
	8.0	--	Bedrock
SCW 118	0	20.0	
	20.0	--	
SCW 119	0	6.0	Sand and gravel
	6.0	--	Bedrock
SCW 120	0	3.0	Sand
	3.0	--	Bedrock
SCW 126	0	28.0	Till
	28.0	--	Bedrock
SCW 128	0	--	Sand and gravel
	54.0	--	Bedrock
SCW 129	2.0	27.0	Sand, very fine; silt
	27.0	29.0	Sand, very fine to very coarse, predominantly medium to coarse; gravel, very fine to fine
SCW 135	0	12.0	Gravel, cobble sizes to 0.4 feet.
	12.0	14.0	Sand, fine to very coarse, predominantly medium, pebbles and cobbles
	17.0	19.0	Sand, very fine to very coarse, predominantly medium, few pebbles and cobbles
	27.0	29.0	Sand, very fine to medium, predominantly fine to medium
	37.0	39.0	Sand, fine to coarse, predominantly medium
	47.0	49.0	Sand, very fine to very coarse, predominantly medium
	57.0	58.0	Sand, very fine to fine, broken stone
	58.0	--	Refusal at 58 feet.
SCW 143	0	11.0	Gravel and medium to very coarse sand, pebbles and cobbles
	12.0	14.0	Sand, very fine to medium
	17.0	19.0	Sand, very fine to very coarse, predominantly fine, some silt and cobbles

Table B-1. Stratigraphic logs of wells and borings in the Pemigewasset River Basin, Central New Hampshire–*Continued*

Local site number		Depth to top (feet)	Depth to bottom (feet)	Lithology
				GRAFTON COUNTY
				Alexandria
AEA	1	0	3.0	Gravel
		3.0	7.0	Sand, medium to very coarse; gravel sizes to 2.25 inches.
		7.0	13.5	Gravel
		13.5	--	Gravel; refusal at 13.5 feet
AEA	2	0	3.0	Sand, fine to very coarse; gravel
		3.0	14.0	Gravel
		14.0	--	Gravel; refusal at 14 feet
AEA	3	0	7.0	Sand, very fine to coarse
		12.0	27.0	Sand, very fine to medium; some cobbles; pebbles
		27.0	32.0	Sand, and gravel
		37.0	38.0	Sand, very fine to fine; silt
		38.0	--	Refusal on bedrock or boulder
AEB	2	0	3.0	Gravel and boulders
		3.0	23.9	Sand, medium
		23.9	--	Refusal on boulders or bedrock
AEW	6	98.0	--	Bedrock
AEW	7	24.0	--	Bedrock
AEW	8	0	4.0	Sand, very fine to coarse; gravel, fine to coarse, predominantly coarse
		4.0	22.0	Sand, very fine to very coarse; some silt; gravel, fine to coarse
		27.0	29.0	Sand, very fine to very coarse; some silt; some clay
		35.0	--	Refusal at 35 feet
AEW	9	0	--	Clay
		--	--	Sand and gravel
		80.0	--	Bedrock
AEW	11	46.0	--	Bedrock
AEW	16	0	10.0	Sand and gravel
		10.0	--	Bedrock
AEW	17	0	74.0	Clay
		74.0	--	Bedrock
AEW	18	0	20.0	Sand and gravel
		20.0	--	Bedrock
AEW	19	0	62.0	Sand and gravel
		62.0	--	Bedrock
AEW	21	0	49.0	Sand, fine to coarse, predominantly medium to coarse; gravel, very fine to fine; some cobbles
		57.0	59.0	Sand, very fine; silt, gray
		67.0	69.0	Sand, fine to very coarse, predominantly medium to coarse, orange; some pebbles
		77.0	79.0	Sand, very fine to coarse, predominantly medium; some pebbles
		87.0	89.0	Sand, very fine to very coarse; gravel, fine to coarse
		107.0	109.0	Sand, fine to coarse, predominantly medium; gravel fine to very coarse
		117.0	119.0	Sand, fine to very coarse, predominantly medium and coarse, pebbles and cobbles
				Ashland
APA	1	0	7.0	Sand, fine, tan
		27.0	29.0	Clay, gray
		57.0	59.0	Silt; very little clay, light gray
		97.0	99.0	Sand, very fine; with silt, light gray
		107.0	--	Sand; end of hole
APA	2	2.0	7.0	Sand, fine, tan
		7.0	12.0	Sand, fine, tan
		12.0	17.0	Sand, medium, dark brown
		22.0	23.0	Sand, very coarse and gravel; predominantly gravel
		23.0	24.0	Silt and clay, predominantly silt, light gray
		27.0	29.0	Silt and clay; predominantly clay; light gray
		37.0	39.0	Silt, light gray
		47.0	49.0	Silt, light gray
		57.0	59.0	Silt, light gray
		67.0	69.0	Sand, very fine, light gray
		77.0	79.0	Sand, very fine, light gray
		97.0	99.0	Sand, very fine, light gray
		123.0	--	Till?, end of hole
APA	10	2.0	37.0	Sand, very fine to medium, predominantly very fine to fine, reddish buff to buff
		37.0	39.0	Sand, very fine to coarse, predominantly fine, buff; some pebbles

Table B-1. Stratigraphic logs of wells and borings in the Pemigewasset River Basin, Central New Hampshire—*Continued*

Local site number		Depth to top (feet)	Depth to bottom (feet)	Lithology
				GRAFTON COUNTY
				Ashland—*Continued*
APA	10—*Continued*			
		47.0	59.0	Sand, very fine to fine, buff; Silt
		77.0	79.0	Sand, very fine to very coarse, predominantly coarse; some silt; cobbles
		87.0	107.0	Sand, very fine to medium, predominantly fine; some silt
		107.0	109.0	Sand, very fine to medium, buff; some silt
		119.0	--	Bottom of hole
APB	1	0	5.0	Sand and gravel
		5.0	53.0	Sand, yellow
		53.0	68.0	Sand, firm; and gravel, fine
		68.0	--	Sand and gravel; end of hole
APB	2	0	4.0	Sand; trace of muck
		4.0	8.0	Sand, fine to medium
		8.0	20.0	Sand, fine to coarse; and gravel
		20.0	51.0	Sand, fine to medium
		51.0	55.0	Sand, gravelly
		55.0	66.0	Sand, fine; trace silt
		66.0	70.0	Sand, fine to coarse
		70.0	74.0	Till
		74.0	--	Refusal on boulder or Bedrock
APB	4	0	40.0	Sand, fine
		40.0	45.0	Sand, medium
		45.0	50.0	Sand, coarse; trace gravel
		50.0	55.0	Sand, fine
		55.0	65.0	Sand, medium; trace gravel
		65.0	95.0	Gravel
APB	11	0	46.0	Sand, coarse; little gravel
		46.0	83.0	Sand, sharp, yellow
		83.0	--	Sand; end of hole
APB	12	0	1.0	Topsoil
		1.0	95.0	Sand, fine to medium; trace silt
		95.0	--	Sand; end of hole
APB	14	0	1.0	Topsoil
		1.0	14.0	Sand, coarse
		14.0	36.0	Sand, fine to medium
		36.0	39.0	sand, coarse
		39.0	42.0	sand, fine
		42.0	51.0	Sand, medium-coarse
		51.0	--	Sand; end of hole
APW	1	0	15.0	Sand
		15.0	35.0	Gravel
		35.0	55.0	Sand, medium; some pebbles
		55.0	80.0	Gravel; some pebbles
		80.0	90.0	Sand, medium; some gravel
		90.0	100.0	Gravel coarse; some pebbles
		100.0	102.0	Sand and gravel
APW	2	0	22.0	Sand, medium
		22.0	--	End of hole
APW	3	0	20.5	Sand, medium
		20.5	--	End of hole
APW	8	0	75.0	Till
		75.0	--	Bedrock
APW	9	0	16.0	Till
		16.0	--	Bedrock
APW	10	0	7.5	Sand, medium-coarse; gravel, fine-coarse
		7.5	15.0	Sand, fine-coarse; gravel, fine
		15.0	51.0	Sand, medium-coarse; gravel, fine-coarse
		51.0	58.0	Sand, fine-coarse; gravel, fine
		58.0	63.0	Sand, coarse; little gravel
		63.0	86.0	Sand, medium-coarse; gravel, fine-coarse; some boulders
		86.0	95.0	Sand, medium-coarse; gravel, fine-coarse; some boulders; red-brown
		95.0	--	End of hole
APW	11	0	120.0	Sand and gravel
APW	12	0	36.0	Till
		36.0	--	Bedrock

Table B-1. Stratigraphic logs of wells and borings in the Pemigewasset River Basin, Central New Hampshire–*Continued*

Local site number		Depth to top (feet)	Depth to bottom (feet)	Lithology
				GRAFTON COUNTY
				Bristol
APW	13	0	5.0	Till
		5.0	--	Bedrock
B2A	1	0	37.0	Sand, very fine to fine; light buff
		37.0	39.0	Sand, very fine to fine, buff and gray
		47.0	49.0	Sand, very fine to fine; some medium; gray
		77.0	79.0	Sand, very fine to medium; pebbles; silty
		91.0	96.0	Till, clayey silt matrix; pebbles
		96.0	--	Till; refusal at 96 feet
B2A	2	1.0	9.0	Sand and gravel
		7.0	17.0	Silt
		17.0	19.0	Silt
		27.0	29.0	Sand, very fine to medium, pebbles, gray; tight
B2A	2	37.0	38.0	Sand, very fine to medium; layered
		47.5	49.0	Sand, very fine to medium; with silt layers
		57.0	58.5	Silt and very fine to fine sand, gray; clayey compacted
		58.5	--	End of hole
B2A	3	0	3.5	Loam
		3.5	14.0	Sand and gravel
		14.0	66.5	Sand and clay
B2A	4	0	2.5	Sand loamy
		2.5	13.0	Sand, fine
		13.0	20.0	Sand and gravel
		19.9	20.0	Bedrock
B2A	5	0	2.5	Sand, loamy
		2.5	13.0	Sand, fine
		13.0	22.5	Sand and gravel some coarse
		22.5	58.5	Clay
B2A	6	0	8.0	Sand and clay
B2A	7	0	30.0	Sand, fine
B2A	8	0	12.5	Sand and clay
B2B	1	0	3.0	Sand; gravel and boulders
		3.0	--	Refusal on boulders or bedrock
B2W	18	0	3.0	Top soil
		3.0	4.0	Sand and gravel
		4.0	7.0	Sand, medium
		7.0	12.0	Sand and gravel
		12.0	19.0	Sand, medium
		19.0	22.0	Sand, coarse
		22.0	27.0	Sand, fine
		27.0	53.0	Gravel
B2W	23	71.0	--	Bedrock
B2W	24	10.0	--	Bedrock
B2W	25	10.0	--	Bedrock
B2W	26	63.0	--	Bedrock
B2W	27	168.0	--	Bedrock
B2W	28	132.0	--	Bedrock
B2W	29	10.0	--	Bedrock
B2W	30	125.0	--	Bedrock
B2W	31	23.0	--	Bedrock
B2W	33	5.0	--	Bedrock
B2W	34	174.0	--	Bedrock
B2W	36	0	10.0	Sand, fine
		10.0	19.0	Gravel, medium
		19.0	40.0	Sand, fine, silty; clay
		40.0	55.0	Sand, fine
		55.0	60.0	Sand, fine to medium
		60.0	75.0	Sand, medium; gravel
		75.0	--	End of hole

Table B-1. Stratigraphic logs of wells and borings in the Pemigewasset River Basin, Central New Hampshire—*Continued*

Local site number		Depth to top (feet)	Depth to bottom (feet)	Lithology
				GRAFTON COUNTY
				Bristol-*Continued*
B2W	37	0	39.0	Till
		39.0	--	Bedrock
B2W	39	0	7.0	Till
		7.0	--	Bedrock
B2W	40	0	45.0	Sand
		45.0	--	Bedrock
B2W	41	0	140.0	Sand and gravel
		140.0	--	Bedrock
B2W	42	70.0	--	Bedrock
B2W	43	0	6.0	Sand and gravel
		6.0	--	Bedrock
B2W	44	0	120.0	Other
		120.0	--	Bedrock
B2W	45	0	82.0	Sand and gravel
		82.0	--	Bedrock
B2W	46	0	12.0	Till
		12.0	--	Bedrock
B2W	48	273.0	--	Bedrock
B2W	49	156.0	--	Bedrock
B2W	50	0	--	Sand
		--	--	Sand and gravel
		65.0	--	Bedrock
B2W	51	0	10.0	Sand, fine, brown
		10.0	19.0	Gravel, medium, brown
		19.0	25.0	Sand, fine, brown
		25.0	30.0	Sand, silty, brown
		30.0	35.0	Sand, silty, brown
		35.0	40.0	Sand, silty, brown
		40.0	50.0	Sand, silty, brown
		50.0	56.0	Sand, fine, brown
		56.0	60.0	Sand, fine, brown
		63.0	70.0	Sand and gravel brown
		70.0	75.0	Gravel medium, brown
		75.0	78.0	Sand, fine, brown
B2W	52	0	3.0	Peat
		3.0	15.0	Sand and gravel
		15.0	37.0	Sand and clay
		37.0	40.0	Sand and gravel
		40.0	40.7	Sand and gravel brown
				Bridgewater
BYA	5	0	17.0	Sand, very fine to fine, tan
		17.0	37.0	Sand, very fine to medium, predominantly fine to medium, tan
		37.0	59.0	Sand, very fine to medium, gray
		67.0	69.0	Sand, very fine to fine, predominantly very fine; silt, gray; some clay
		77.0	79.0	Till; some sand; cobbles
BYA	6	7.0	19.0	Sand, fine to coarse, predominantly medium, buff; some gravel; some cobbles
		27.0	29.0	Sand, fine to coarse, predominantly coarse
		37.0	38.0	Sand, very fine to coarse; some cobbles
		47.0	49.0	Sand, fine to very coarse, predominantly medium to coarse; gravel, fine to very coarse; some cobbles
		50.0	--	Gravel, refusal at 50 feet.
BYA	7	0	1.5	Sand, fine, brown, loose; trace silt
		4.0	5.5	Sand, fine to medium, brown, dense
		9.0	10.5	Sand, fine, brown, dense; trace silt
		14.0	15.5	Sand, fine, brown, dense; trace silt
		19.0	19.5	Sand, fine, gray to brown, dense; some silt
		19.5	20.5	Sand, fine to medium, brown, dense; trace silt
		24.0	25.5	Sand, fine, gray to brown, dense; some silt
		29.0	30.5	Sand, fine, brown, dense; some silt
BYA	8	4.0	5.5	Sand, fine to coarse; some gravel
		9.0	10.5	Sand, fine to coarse; trace gravel
		14.0	15.5	Sand, fine to coarse; trace gravel
		19.0	20.5	Sand, fine to coarse; trace gravel

Table B-1. Stratigraphic logs of wells and borings in the Pemigewasset River Basin, Central New Hampshire–*Continued*

Local site number		Depth to top (feet)	Depth to bottom (feet)	Lithology
				GRAFTON COUNTY
				Bridgewater-*Continued*
BYA	9	0	2.0	Sand, medium to fine, brown, dry; little gravel
		5.0	7.0	Sand, medium to fine, brown, dry; gravel, fine to coarse
		20.0	22.0	Sand, medium to coarse, brown, wet; trace gravel, fine to medium
BYB	1	0	8.0	Gravel
		8.0	27.0	Sand and cobbles
		27.0	43.0	Till, sandy
		43.0	--	Refusal on boulders or bedrock
BYW	1	52.0	--	Bedrock
BYW	7	--	--	Bedrock
BYW	10	76.0	--	Bedrock
BYW	11	13.0	--	Bedrock
BYW	14	0	120.0	Till
		120.0	--	Bedrock
BYW	16	230.0	--	Bedrock
BYW	18	0	30.0	Sand and gravel
		30.0	--	Bedrock
BYW	22	0	10.0	Till
		10.0	--	Bedrock
BYW	23	0	48.0	Sand and gravel
		48.0	--	Bedrock
BYW	24	0	--	Sand and gravel
		--	--	Sand
		--	--	Sand and gravel
BYW	25	0	--	Sand and gravel
		--	--	Sand
BYW	30	0	--	Sand and gravel
		--	--	Sand
		--	--	Sand and gravel
BYW	31	0	--	Sand and gravel
BYW	33	0	--	Sand
		--	--	Sand and gravel
BYW	34	0	--	Sand
		--	--	Sand and gravel
BYW	35	0	--	Sand and gravel
BYW	36	0	--	Sand and gravel
		--	--	Sand
		--	--	Sand and gravel
BYW	37	0	50.0	Sand and gravel
		50.0	--	Bedrock
BYW	39	0	--	Sand and gravel
		--	--	Sand
		--	--	Sand and gravel
BYW	41	0	60.0	Sand and gravel fine to coarse
		60.0	65.0	Gravel, fine to medium
		65.0	75.0	Sand and gravel fine to medium
		75.0	85.0	Sand fine to medium; gravel, fine
		85.0	90.0	Sand and gravel fine to coarse
		90.0	105.0	Sand and gravel fine to coarse
BYW	42	0	138.0	Sand and gravel
				Campton
CBA	1	0	2.0	Sand, fine to coarse, predominantly medium, buff colored
		2.0	4.0	Gravel and sand
		4.0	5.0	Sand, fine to coarse, predominantly medium, buff colored
		5.0	8.0	Gravel, small cobbles, sand, medium to coarse
		8.0	--	Sand and gravel; refusal at 8 feet

Table B-1. Stratigraphic logs of wells and borings in the Pemigewasset River Basin, Central New Hampshire—*Continued*

Local site number		Depth to top (feet)	Depth to bottom (feet)	Lithology
				GRAFTON COUNTY
				Campton-*Continued*
CBB	1	0	9.0	Sand, fine to coarse
		9.0	17.0	gravel
		17.0	36.0	Sand, fine to medium
		36.0	50.0	Sand, fine; with trace of silt
		50.0	58.0	Sand
		58.0	68.0	Sand, fine; with stones
		68.0	70.9	Till, sandy
		71.0	--	Refusal at 71 feet
CBB	2	0	20.0	Gravel
		20.0	60.0	Sand, fine
		60.0	95.0	Sand, coarse
		95.0	100.0	Till, sandy
		100.0	--	Refusal, bedrock or boulder
CBB	3	0	14.0	Gravel
		14.0	80.0	Sand, fine
		80.0	115.0	Sand, medium to coarse
		115.0	--	Refusal, on bedrock or boulder
CBB	4	0	5.0	Sand
		5.0	18.0	Sand, medium
		18.0	20.0	gravel
		20.0	53.0	Sand, medium
		53.0	54.9	Gravel; with stones
		55.0	--	Refusal on bedrock or boulder
CBB	5	0	8.0	Sand
		8.0	12.0	Gravel
		12.0	40.0	Sand, medium to coarse
		40.0	125.0	Sand, fine
		125.0	--	Refusal on boulders or bedrock
CBB	6	0	6.0	Sand, coarse
		6.0	14.0	gravel
		14.0	22.0	Sand, fine
		22.0	49.9	Sand, fine with silt
		50.0	--	Bottom of hole
CBB	7	0	17.0	Gravel
		17.0	37.9	Gravel sandy
		38.0	--	Bottom of hole
CBB	8	0	4.9	Gravel coarse with boulders
		5.0	--	Refusal on bedrock
CBB	9	0	6.0	Gravel sandy, brown
		6.0	22.0	Sand, fine silty; with some gravel
		22.0	35.0	Sand, coarse, brown
		35.0	40.0	Sand, fine to medium
		40.0	45.0	Sand, fine
		45.0	115.0	Gravel sandy, brown
		115.0	135.0	Sand, fine to medium
		135.0	141.0	Sand, fine
		141.0	--	Refusal on bedrock or boulders
CBB	10	0	8.9	Sand, silty; some gravel
		9.0	--	Refusal on bedrock
CBB	11	0	4.0	Sand, Coarse
		4.0	6.0	Sand; some gravel
		6.0	13.0	Hardpan; refusal at 13 feet
CBB	12	0	8.9	Till sandy; with boulders
		9.0	--	Refusal on bedrock or boulder
CBB	13	0	9.9	Gravel, sandy
		10.0	--	Refusal on bedrock or boulder
CBB	14	0	3.0	Gravel
		3.0	9.0	Gravel, sandy
		9.0	--	Bedrock or boulder
CBB	16	0	10.0	Sand
		10.0	20.0	Gravel
		20.0	30.0	Sand fine
		30.0	50.0	Sand, medium
		50.0	57.9	Gravel
		58.0	--	Refusal on bedrock or boulder

Table B-1. Stratigraphic logs of wells and borings in the Pemigewasset River Basin, Central New Hampshire–*Continued*

Local site number		Depth to top (feet)	Depth to bottom (feet)	Lithology
				GRAFTON COUNTY
				Campton-*Continued*
CBB	17	0	1.0	Topsoil
		1.0	15.5	Sand, medium
		15.5	--	Refusal on boulder or bedrock
CBB	18	0	10.0	Gravel
		10.0	35.0	Sand, fine
		35.0	50.0	Gravel
		50.0	92.0	Sand, fine
		92.0	103.0	Till
		103.0	--	Refusal on boulders or bedrock
CBB	19	0	10.0	Sand, fine
		10.0	20.0	Gravel
		20.0	70.0	Sand, fine
		70.0	76.9	Sand, fine with stones
CBW	1	0	2.0	Sand, fine; silt, brown
		2.0	7.0	Sand, very fine to coarse, predominantly fine to medium; scattered cobbles
		7.0	20.0	Sand, very fine to medium, predominantly fine to medium
		20.0	22.0	Sand, very fine to medium, predominantly fine; light buff color
		27.0	29.0	Sand, predominantly very fine, light buff
		37.0	39.0	Sand, predominantly fine to medium; clayey silt
		47.0	59.0	Sand, predominantly very fine; with silt
		67.0	69.0	Sand, fine to medium; predominantly medium, light buff
		77.0	87.0	Sand, very fine, with silt
		87.0	89.0	Sand; very fine with silt
		107.0	--	Sand, end of hole
CBW	2	0	9.0	Sand, very fine to fine, predominantly fine
		9.0	20.0	Gravel; small cobbles; sand, fine to very coarse
		20.0	--	Sand and gravel; refusal at 20 feet
CBW	3	0	12.0	Gravel and sand
		12.0	37.0	Gravel, very fine to fine; sand, coarse to very coarse
		42.0	45.0	Sand, coarse to very coarse; gravel, very fine
		45.0	--	Sand and gravel; end of hole
CBW	4	0	22.0	Sand, predominantly coarse to very coarse; gravel, very fine to fine, blackish brown color
		22.0	37.0	Sand, fine to medium, brown, gravel, very fine
		47.0	57.0	Sand, coarse to very coarse, light brown, gravel, very fine
		57.0	59.0	Sand, medium to very coarse, predominantly coarse, light brown, gravel, very fine
		67.0	69.0	Sand, medium to coarse, predominantly medium
		79.0	80.0	Sand, medium to very coarse
		80.0	81.0	Sand, very fine, with silt
		87.0	89.0	Sand, medium to very coarse, predominantly medium, gray
		107.0	109.0	Sand, medium to very coarse, gray
		114.0	117.0	Till; slow and difficult drilling; bedrock at 117.5 feet
CBW	21	104.0	--	Bedrock
CBW	22	78.0	--	Bedrock
CBW	24	40.0	--	Bedrock
CBW	27	5.0	--	Bedrock
CBW	32	50.0	--	Bedrock
CBW	33	7.0	9.0	Sand, fine to very coarse, predominantly medium and coarse
		17.0	19.0	Sand, fine to very coarse, predominantly fine to medium
		27.0	29.0	Sand, very fine to very coarse
		37.0	39.0	Sand, very fine to very coarse, predominantly medium and coarse
		47.0	49.0	Sand, very fine to fine; with silt
		57.0	59.0	Sand, very fine to fine; with silt
		67.0	69.0	Sand, very fine to fine; with silt
		77.0	79.0	Sand; clayey silt
		100.0	--	Till, tight drilling at 100 feet; end of hole at 103.5 feet
CBW	34	5.0	9.0	Sand, medium to very coarse; gravel, fine to very fine
		17.0	19.0	Sand, medium to very coarse; gravel, very fine
		22.0	24.0	Sand, fine to very coarse, predominantly medium and coarse; gravel, very fine to fine
		27.0	29.0	Sand, fine to very coarse, predominantly medium and coarse; gravel, very fine to fine
		37.0	39.0	Sand, fine to very coarse, predominantly medium; gravel, very fine to fine
		47.0	49.0	Sand, fine to very coarse, predominantly medium; gravel, very fine to fine
		57.0	59.0	Sand, very fine to very coarse, predominantly medium
		67.0	69.0	Sand, fine to very coarse; little very fine to fine gravel

Table B-1. Stratigraphic logs of wells and borings in the Pemigewasset River Basin, Central New Hampshire—*Continued*

Local site number	Depth to top (feet)	Depth to bottom (feet)	Lithology
			GRAFTON COUNTY
			Campton-*Continued*
CBW 34—*Continued*			
	92.0	94.0	Sand, very fine to coarse, predominantly fine to medium
	107.0	109.0	Sand, very fine to very coarse, predominantly medium to coarse
	117.0	119.0	Sand, fine to very coarse, predominantly medium to coarse; gravel, very fine to fine
	137.0	--	Sand and gravel; end of hole
CBW 36	38.0	--	Bedrock
CBW 38	7.0	--	Bedrock
CBW 39	0	20.0	Till
	20.0	--	Bedrock
CBW 40	0	--	Sand and gravel
	--	--	Clay
	124.0	--	Bedrock
CBW 41	0	28.0	Sand
	28.0	--	Bedrock
CBW 42	90.0	--	Bedrock
CBW 44	0	15.0	Till
	15.0	--	Bedrock
CBW 45	0	142.0	Sand
	142.0	--	Bedrock
CBW 47	0	95.0	Sand and gravel
	95.0	--	Bedrock
CBW 48	0	85.0	Sand and gravel
	85.0	--	Bedrock
CBW 50	0	85.0	Sand and gravel
	85.0	--	Bedrock
CBW 52	0	28.0	Sand and gravel
	28.0	--	Bedrock
CBW 53	0	48.0	Sand and gravel
	48.0	--	Bedrock
CBW 54	0	22.0	Till
	22.0	--	Bedrock
CBW 55	0	--	Till
	--	--	Sand
	--	--	Clay
	153.0	--	Bedrock
CBW 56	0	20.0	Till
	20.0	--	Bedrock
CBW 59	105.0	--	Bedrock
CBW 60	0	210.0	Other
	210.0	--	Bedrock
CBW 61	0	170.0	Other
	170.0	--	Bedrock
CBW 62	113.0	--	Bedrock
CBW 64	18.0	--	Bedrock
CBW 65	0	30.0	Sand and gravel
	30.0	--	Bedrock
CBW 66	0	110.0	Sand and gravel
CBW 67	0	10.0	Till
	10.0	--	Bedrock
CBW 68	0	7.0	Sand, fine to coarse, brown
	7.0	14.0	Sand, fine to coarse
	14.0	21.0	Sand, medium to coarse; gravel, fine
	21.0	28.0	Sand, medium to coarse; gravel, fine
	28.0	35.0	Sand, fine to coarse, brown
	35.0	42.0	Sand, medium to coarse, some gravel

Table B-1. Stratigraphic logs of wells and borings in the Pemigewasset River Basin, Central New Hampshire–*Continued*

Local site number		Depth to top (feet)	Depth to bottom (feet)	Lithology
				GRAFTON COUNTY
				Campton-*Continued*
CBW	68–*Continued*			
		42.0	49.0	Sand, fine to medium, brown; some gravel
		49.0	53.0	Sand, fine to coarse, Brown
		53.0	70.0	Sand, fine, brown; some silt
		70.0	--	end of hole
CBW	69	0	7.0	Sand, fine to medium, some boulders
		7.0	14.0	Sand, medium to coarse, brown
		14.0	21.0	Sand, medium to coarse, brown
		21.0	28.0	Sand, medium to coarse, brown; some gravel
		28.0	35.0	Sand, medium to coarse, brown; some gravel
		35.0	42.0	Sand, medium to coarse, brown
		42.0	46.0	Sand, fine to medium, brown; refusal at 46.0 feet
CBW	70	0	6.0	Brown Sand
		6.0	19.5	Sand, fine to coarse, brown; fine to medium gravel; trace silt
		19.5	27.0	Sand, fine to coarse, brown; some coarse
		33.0	49.0	Sand, fine to medium, brown; fine gravel; some silt
CBW	71	0	5.0	Sand, fine to coarse, brown
		5.0	16.0	Sand, fine to coarse, brown; fine to medium gravel
		16.0	23.0	Sand, fine to coarse, brown; fine to medium gravel; some silt
		23.0	28.0	Sand, fine to coarse, brown; fine to medium gravel
		28.0	37.0	Sand, fine to coarse, brown; fine to medium gravel; some silt
		37.0	46.0	Sand, fine to coarse, brown; fine gravel
		46.0	49.0	Sand and gravel
		49.0	--	Till
CBW	72	0	4.0	Sand, fine to coarse, brown; cobbles, gravel
		4.0	45.0	Sand, fine to coarse, brown
CBW	73	0	5.0	Sand, fine to coarse; cobbles; boulders
		5.0	46.0	Sand, fine to coarse, brown
		46.0	49.0	Sand, fine to medium, brown
CBW	74	0	48.0	Sand, fine to coarse, brown
		48.0	56.0	Sand, fine to medium, brown
CBW	76	0	9.0	Sand, fine to coarse, brown; fine to medium gravel
		9.0	27.0	Sand, fine to coarse, brown
		27.0	42.0	Sand, fine to coarse, brown; fine to medium gravel
		42.0	51.0	Sand, fine to coarse, brown; fine gravel
		51.0	60.5	Sand, fine; some silt, brown
CBW	77	0	26.0	Sand, fine to coarse, brown; fine to medium gravel
		26.0	33.0	Sand, fine to medium, brown; some gravel
		33.0	41.0	Sand, brown; some gravel and silt
CBW	78	0	7.0	Fine to coarse Sand; some gravel
		7.0	18.0	Sand, fine to coarse, brown; some gravel
		18.0	32.0	Sand, fine to medium, brown
		32.0	36.0	Sand and gravel, brown; some silt
		36.0	--	Till
CBW	79	0	8.0	Boulders and sand
CBW	80	0	14.0	Sand and gravel; hard packed sand
		14.0	21.0	Sand fine to coarse; hard packed
		21.0	28.0	Sand fine to medium; silty
		28.0	32.0	Sand fine to coarse; hard packed
		32.0	35.0	Sand fine; silty
CBW	81	0	18.0	Sand and gravel
		18.0	--	Bedrock
CBW	83	0	25.0	Sand
		25.0	325.0	Bedrock
CBW	84	0	45.0	Medium to coarse sand and gravel, brown; some cobbles
		45.0	--	End of hole
CBW	85	0	10.0	Medium to coarse sand with large gravel and cobbles, brown
		10.0	20.0	Medium to coarse sand and gravel, brown
		20.0	30.0	Fine to coarse sand and medium gravel
		30.0	45.0	Medium to coarse sand, large gravel and cobbles, brown
		45.0	--	End of hole
CBW	86	0	60.0	Sand and gravel
		60.0	565.0	Bedrock

Table B-1. Stratigraphic logs of wells and borings in the Pemigewasset River Basin, Central New Hampshire—*Continued*

Local site number		Depth to top (feet)	Depth to bottom (feet)	Lithology
				GRAFTON COUNTY
				Dorchester
DIB	1	0	21.0	Gravel, sandy with boulders
		21.0	25.0	Till
		25.0	--	Refusal on boulder or bedrock
DIB	2	0	15.0	Till, with boulders
		15.0	--	Till; end of hole
DIB	3	0	2.0	Topsoil
		2.0	14.0	Till with boulders
		14.0	--	Till
DIW	1	47.0	--	Bedrock
DIW	2	--	--	Bedrock
DIW	5	15.0	--	Bedrock
DIW	6	100.0	--	Bedrock
DIW	8	7.0	--	Bedrock
DIW	9	7.0	--	Bedrock
				Grafton
GQB	1	0	5.0	Gravel
		5.0	11.0	Gravel with silt
		11.0	20.0	Till sandy, gray
		20.0	25.0	Till dense, gray
		25.0	33.0	Sand silty
		33.0	44.9	Granite
		45.0	--	End of hole
GQB	2	0	0.3	Topsoil
		0.3	1.2	Sand, fine, silty, Loamy
		1.2	4.0	Sand, fine to coarse and gravel, fine to coarse, cobbly; trace silt; occasional boulders
		4.0	--	Bedrock
GQW	1	13.0	--	Bedrock
GQW	2	24.0	--	Bedrock
GQW	3	30.0	--	Bedrock
GQW	4	14.0	--	Bedrock
GQW	6	60.0	--	Bedrock
GQW	7	25.0	--	Bedrock
GQW	8	8.0	--	Bedrock
GQW	10	0	--	Sand and gravel
		--	--	Till
		70.0	--	Bedrock
GQW	11	0	90.0	Sand
		90.0	--	Bedrock
GQW	12	0	8.0	Sand
		8.0	--	Bedrock
GQW	13	0	--	Sand and gravel
GQW	15	0	50.0	Sand
		50.0	--	Bedrock
GQW	17	0	13.0	Sand and gravel
		13.0	--	Bedrock
GQW	19	0	30.0	Sand and gravel
		30.0	--	Bedrock
GQW	20	0	52.0	Clay
		52.0	--	Bedrock
GQW	21	0	50.0	Clay
		50.0	--	--

Table B-1. Stratigraphic logs of wells and borings in the Pemigewasset River Basin, Central New Hampshire–*Continued*

Local site number		Depth to top (feet)	Depth to bottom (feet)	Lithology
				GRAFTON COUNTY
				Grafton-*Continued*
GQW	22	35.0	--	Bedrock
GQW	23	0	95.0	Sand
		95.0	445.0	--
GQW	24	0	45.0	--
		45.0	50.0	Clay
		50.0	64.0	Gravel
		64.0	69.0	Clay
		69.0	245.0	Bedrock
GQW	25	0	50.0	Sand and gravel
		50.0	385.0	Bedrock
GQW	26	0	90.0	Sand
		90.0	345.0	Bedrock
GQW	27	0	98.0	Sand
		98.0	565.0	Bedrock
GQW	28	0	51.0	Gravel
		51.0	142.0	Bedrock
GQW	29	0	58.0	Gravel
		58.0	225.0	Bedrock
				Groton
GXB	1	0	16.0	Gravel and boulders, silty
		16.0	--	Refusal on boulders or bedrock
GXB	2	7.0	23.0	Gravel
		23.0	41.0	Sand
		41.0	70.0	Sand and cobbles
		70.0	--	Refusal on boulder or bedrock
GXW	1	0	23.0	Sand and gravel
		23.0	--	Bedrock
GXW	3	0	18.0	Till
		18.0	--	Bedrock
GXW	4	0	3.0	Sand
		3.0	--	Bedrock
GXW	9	0	4.0	Till
		4.0	--	Bedrock
				Hebron
HLB	1	0	30.0	Sand
		30.0	--	Sand
HLB	2	0	10.0	Sand and silt; boulders
		10.0	20.0	Sand, silt and clay
		20.0	27.0	Sand, fine to medium
		27.0	57.0	Sand, medium to coarse; trace of gravel
		57.0	90.0	Sand, fine to medium, very dense (till?)
		90.0	95.0	Till
		95.0	--	Refusal on boulder or bedrock
HLW	1	0	19.0	Sand, fine to very coarse, predominantly medium, brown
		22.0	23.0	Sand, very fine to very coarse, predominantly fine to medium, gray
		27.0	49.0	Sand, very fine to fine, predominantly fine to medium; some silt; some clay
		57.0	60.0	Sand, very fine to fine, brown to gray; some silt; clay
		67.0	69.0	Sand, very fine to coarse, predominantly medium to coarse, tan
		77.0	79.0	Sand, medium to coarse, predominantly coarse, brown
		87.0	89.0	Sand, medium to coarse, predominantly coarse, brown; some pebbles
		97.0	99.0	Sand, medium to very coarse, tan; some gravel; cobbles
		107.0	109.0	Sand, medium to coarse, predominantly coarse; gravel, fine; some pebbles
		117.0	127.0	Sand, medium to very coarse, predominantly medium to coarse; pebbles; cobbles
HLW	2	0	7.0	Silt, very fine to fine, brown
		7.0	29.0	Sand, fine to very coarse, predominantly medium to coarse; some gravel; some pebbles
HLW	3	27.0	--	Bedrock
HLW	6	12.0	--	Bedrock

Table B-1. Stratigraphic logs of wells and borings in the Pemigewasset River Basin, Central New Hampshire—*Continued*

Local site number	Depth to top (feet)	Depth to bottom (feet)	Lithology
			GRAFTON COUNTY
			Hebron—*Continued*
HLW 9	136.0	--	Bedrock
HLW 10	52.0	--	Bedrock
HLW 16	80.0	--	Bedrock
HLW 17	0	10.0	Till
	10.0	--	Bedrock
HLW 22	0	11.0	Sand
	11.0	--	Bedrock
HLW 25	0	13.0	Till
	13.0	--	Bedrock
HLW 26	30.0	--	Bedrock
HLW 28	61.0	--	Bedrock
HLW 35	0	27.0	Till
	27.0	--	Bedrock
HLW 37	0	9.0	Sand and gravel
	9.0	--	Bedrock
HLW 39	43.0	--	Bedrock
HLW 40	44.0	--	Bedrock
			Holderness
HRA 1	0	20.0	Sand, fine, brown
	20.0	50.0	Sand, fine; some silt
	50.0	80.0	Silt; trace clay
	80.0	90.0	Sand, brown; some silt
	90.0	109.0	Silt, gray
HRA 2	0	21.7	Sand, fine to medium, brown; some gravel
	21.7	87.5	Sand and clay, fine, gray
HRB 1	2.0	6.0	Sand and silt, fine
	6.0	15.0	Sand, medium to coarse
	15.0	21.0	Gravel
	21.0	26.0	Sand, fine
	26.0	51.0	Sand and silt, fine
	51.0	74.0	Sand
HRB 4	0	10.0	Sand, Fill
	10.0	30.0	Sand, fine
	30.0	40.0	Till, sandy
	40.0	--	Refusal on boulder or bedrock
HRB 6	0	1.0	Topsoil
	1.0	15.0	Sand, fine; some wood
	15.0	20.0	Gravel
	20.0	32.0	Sand, fine
	32.0	46.0	Silt and sand, fine
	46.0	83.0	Silt, sand and cobbles
	83.0	--	Refusal on boulder or bedrock
HRB 7	0	9.0	Sand, coarse
	9.0	14.0	Sand, medium
	14.0	22.0	Sand, coarse with gravel
	22.0	37.0	Sand, fine
	37.0	42.0	Sand, coarse with fine gravel
	42.0	49.9	Sand, with coarse gravel
HRW 1	2.0	7.0	Sand, very fine to fine; predominantly fine
	7.0	12.0	Sand, coarse; with few pebbles; light tan
	12.0	17.0	Sand, coarse to very coarse, predominantly coarse; with pebbles
	27.0	29.0	Silt; little very fine sand, light gray
	37.0	39.0	Clay and silt, light gray
	47.0	48.0	Sand, coarse to very coarse, predominantly very coarse; some gravel and pebbles
	48.0	49.0	Silt, very fine, light gray
	57.0	59.0	Gravel, very fine to fine; and sand, coarse to very coarse
	67.0	69.0	Sand, coarse; with few pebbles
	77.0	79.0	Sand, coarse to very coarse, predominantly very coarse; some gravel
	87.0	89.0	Sand, medium to coarse, predominantly medium, tan colored
	97.0	--	Till, encountered rough drilling at 90 feet, refusal at 97.5 feet

Table B-1. Stratigraphic logs of wells and borings in the Pemigewasset River Basin, Central New Hampshire–*Continued*

Local site number	Depth to top (feet)	Depth to bottom (feet)	Lithology
			GRAFTON COUNTY
			Holderness–*Continued*
HRW 2	2.0	7.0	Sand, very fine to fine, predominantly fine
	7.0	12.0	Sand, coarse; with few pebbles
	12.0	--	Sand, coarse to very coarse, predominantly coarse; end of hole
HRW 11	18.0	--	Bedrock
HRW 12	25.0	--	Bedrock
HRW 15	37.0	--	Bedrock
HRW 16	42.0	--	Bedrock
HRW 17	24.0	--	Bedrock
HRW 19	37.0	--	Bedrock
HRW 20	52.0	--	Bedrock
HRW 21	17	--	Bedrock
HRW 24	60.0	--	Bedrock
HRW 25	25.0	--	Bedrock
HRW 26	22.0	--	Bedrock
HRW 28	24.0	--	Bedrock
HRW 29	0	8.0	Till
	8.0	--	Bedrock
HRW 30	--	--	--
HRW 31	0	--	Sand and gravel
	--	--	Till clay, hardpan
	50.0	--	Bedrock
HRW 33	0	13.0	Till
	13.0	--	Bedrock
HRW 35	0	64.0	Sand and gravel
	64.0	--	Bedrock
HRW 38	0	72.0	Clay
	72.0	--	Bedrock
HRW 39	18.0	--	Bedrock
HRW 41	0	2.0	Till
	2.0	--	Bedrock
HRW 42	0	16.0	Till
	16.0	--	Bedrock
HRW 48	0	7.0	Sand and gravel
	7.0	--	Bedrock
HRW 51	0	28.0	Sand
	28.0	--	Bedrock
HRW 56	0	--	Till
	--	--	Clay
	70.0	--	Bedrock
HRW 58	0	15.0	Sand and gravel
	15.0	--	Bedrock
HRW 57	--	--	Sand
	--	--	Till
	--	--	Clay
	55.0	--	Bedrock
HRW 59	0	10.0	Till
	10.0	--	Bedrock
HRW 61	0	50.0	Till
	50.0	--	Bedrock
HRW 63	0	14.0	Sand and gravel
	14.0	--	Bedrock

Table B-1. Stratigraphic logs of wells and borings in the Pemigewasset River Basin, Central New Hampshire—*Continued*

Local site number		Depth to top (feet)	Depth to bottom (feet)	Lithology
				GRAFTON COUNTY
				Holderness-*Continued*
HRW	64	7.0	12.0	Sand, very fine to medium, buff
		12.0	17.0	Sand, very fine to coarse, predominantly fine to medium, red to buff
		17.0	19.0	Sand, very fine to coarse, predominantly fine to medium
		22.0	25.0	Till
		26.0	--	Refusal on bedrock or boulder
HRW	65	0	15.0	Sand and gravel brown
		15.0	20.0	Sand, fine, brown
		20.0	50.0	Sand, fine, brown; some silt
		50.0	70.0	Silt, gray
		70.0	85.0	Sand, medium, brown; some gravel
		85.0	90.0	Sand, fine, Brown
		90.0	118.0	Silt, fine, gray
HRW	67	3.0	8.0	Sand, very fine to fine, predominantly fine
		8.0	13.0	Sand, fine to medium, predominantly medium
		27.0	29.0	Clay, with silt, light gray
		37.0	39.0	Silt and clay
		47.0	49.0	Silt and clay
		57.0	59.0	Silt and clay
		67.0	69.0	Silt and some stratified layers of clay
		77.0	79.0	Silt and very fine sand
		79.0	--	End of hole
				Lincoln
LKA	1	0	18.0	Sand, brown, well-graded; some large cobbles
		18.0	28.0	Sand, coarse; some silts and angular gravel
		28.0	37.0	Sand, fine to medium; some silts and medium to coarse gravel
		37.0	--	Sand; end of hole
LKA	2	0	36.0	Sand, well-graded; and gravel; some large cobbles
LKA	3	0	10.0	Sand, fine; some large cobbles
		10.0	13.0	Sand, fine, brown; some silts and angular gravel
		13.0	17.0	Sand, well-graded and gravel; some silts and large cobbles
		17.0	--	Till; refusal
LKA	4	0	17.0	Sand, coarse; some fine sand and angular gravel
		17.0	22.0	Sand, fine, brown; some large angular gravel
		22.0	--	Till; refusal
LKA	5	0	18.0	Gravel; some silt and boulders
		18.0	28.0	Sand, fine to medium; some silt
		28.0	40.0	Till, sandy
		40.0	--	Till; end of hole
LKA	6	0	20.0	Gravel; some boulders and silt
		20.0	30.0	Sand, fine to medium; some silt
		30.0	60.0	Till, sandy
		60.0	--	Till; end of hole
LKA	7	0	10.0	Sand, medium to coarse; and gravel
		10.0	14.0	Sand, medium and gravel; some silt
		14.0	--	Sand and gravel; end of hole
LKB	1	0	25.0	Gravel
		25.0	--	End of hole
LKB	2	0	14.0	Gravel with boulders
		14.0	--	Refusal on bedrock or boulder
LKB	3	0	25.0	Gravel
		25.0	--	Gravel; end of hole
LKB	4	0	6.0	Sand
		6.0	25.0	Gravel and boulders
		25.0	--	Refusal on boulder or bedrock
LKB	5	0	8.0	Sand, fine
		8.0	29.0	Sand, gravelly with cobbles and boulders
		29.0	45.0	Sand, fine; with cobbles and boulders
		45.0	--	Refusal on bedrock or boulder
LKB	6	0	4.0	Gravel
		4.0	--	Refusal on bedrock
LKB	7	0	15.0	Gravel
		15.0	40.0	Till, silty with boulders, end of hole

Table B-1. Stratigraphic logs of wells and borings in the Pemigewasset River Basin, Central New Hampshire–*Continued*

Local site number		Depth to top (feet)	Depth to bottom (feet)	Lithology
				GRAFTON COUNTY
				Lincoln–Continued
LKB	8	0	5.0	Gravel, brown; little sand; trace silt; roots; cobbles
		5.0	15.0	Sand, silty, fine to medium, gray; little gravel; trace coarse sand; cobbles; boulders
		15.0	19.5	Till
		19.5	--	Bedrock, conway granite
LKB	9	0	2.0	Silt, red brown; little sand; trace gravel and roots
		2.0	9.0	Till, sandy
		9.0	--	Bedrock, conway granite
LKB	11	0	2.5	Silt, sandy, yellow brown, compact; little roots; trace gravel
		2.5	8.0	Sand, silty, gravelly, compact
		8.5	26.0	Till, sandy, gravelly
		26.0	--	Refusal, possible bedrock
LKB	12	0	7.0	Fill, brown silt; little fine sand; trace roots
		7.0	24.0	Till, sandy
		24.0	--	Till; end of hole
LKB	18	0	2.0	Silt, sandy, brown; trace roots
		2.0	9.0	Gravel, sandy, brown; trce silt; numberous cobbles and boulders
		9.0	22.5	Till, gravelly
		22.5	--	Bedrock, conway granite
LKW	1	0	17.0	Sand and gravel
LKW	2	0	45.0	Sand
		45.0	--	Bedrock
LKW	3	0	45.0	Sand and gravel
		45.0	--	Bedrock
LKW	4	0	62.0	Till
		62.0	--	Bedrock
LKW	5	0	142.0	Sand and gravel
		142.0	--	Bedrock
LKW	6	0	40.0	Sand and gravel
		40.0	--	Bedrock
LKW	7	0	80.0	Sand and gravel
		80.0	--	Bedrock
LKW	8	0	--	Sand and gravel
		--	--	Sand
		--	--	Sand and gravel
		54.0	--	Bedrock
LKW	9	0	43.0	Sand, brown, well to graded and gravel; some large cobbles
		43.0	48.0	Sand, fine, brown and gravel
		48.0	53.0	Sand, coarse, brown; some fine sand and coarse gravel
		53.0	--	Sand; end of hole
LKW	10	0	37.0	Sand, brown, well graded and gravel; some large cobbles
		37.0	41.0	Sand, fine to medium, predominantly medium, brown
		41.0	46.0	Sand, fine, brown; some medium gravel
		46.0	53.0	Sand, fine, brown; some silt
		53.0	--	Sand; end of hole
LKW	11	0	14.0	Sand, well to graded and gravel
		14.0	17.0	Sand, fine to coarse, predominantly medium, brown
		17.0	22.0	Sand, fine to medium, predominantly fine; some silts
		22.0	29.0	Sand, fine to coarse, predominantly coarse, brown; some silt and angular gravel
		29.0	--	Till refusal
LKW	12	0	13.0	Sand, fine to coarse, predominantly fine, brown
		13.0	16.0	Sand, well-graded, brown and gravel
		16.0	21.0	Sand, fine to medium, predominately fine, brown
		21.0	32.0	Sand, coarse; some fine gravel
		32.0	35.0	Sand, coarse; some fine gravel and silts
		35.0	--	Sand; end of hole
LKW	13	0	16.0	Sand, well-graded and gravel
		16.0	26.0	Sand, fine to medium, dark brown
		26.0	30.0	Sand, fine, silty; some angular gravel
LKW	14	0	23.0	Sand, well-graded and gravel; some large cobbles
		23.0	30.0	Sand, coarse and gravel
		30.0	36.0	Sand, fine; some angular gravel
		36.0	--	Sand; end of hole

Table B-1. Stratigraphic logs of wells and borings in the Pemigewasset River Basin, Central New Hampshire—*Continued*

Local site number		Depth to top (feet)	Depth to bottom (feet)	Lithology
				GRAFTON COUNTY
				Lincoln-*Continued*
LKW	15	0	14.0	Gravel, large and boulders
		14.0	22.0	Sand, fine to coarse and gravel; some silt
		22.0	--	Refusal on boulders or bedrock
LKW	16	0	14.0	Gravel, large and boulders; some silt
		14.0	25.0	Sand, fine to medium; some silt and gravel
		25.0	36.0	Till; with boulders
		36.0	--	Till; end of hole
LKW	17	0	11.0	Sand, fine to coarse and gravel; some large boulders
		11.0	15.0	Boulders
		15.0	23.0	Sand, medium to coarse and gravel, large; fine, silty sand lenses
		23.0	28.0	Till, sandy, loose
		28.0	--	Till; end of hole
LKW	18	0	11.0	Sand, fine to coarse and gravel; some large boulders
		11.0	15.0	Boulders
		15.0	23.0	Sand, medium to coarse and gravel, large; fine, silty sand lenses
		23.0	28.0	Till, sandy, loose
		28.0	--	Till; end of hole
LKW	19	0	11.0	Sand, fine to coarse and gravel; some boulders
		11.0	15.0	Boulders
		15.0	20.0	Sand, medium to coarse and large gravel; some silt and fine sand lenses
		20.0	--	Sand and gravel; end of hole
LKW	20	0	10.0	Sand, fine to coarse and gravel; some boulders
		10.0	14.0	Boulders
		14.0	--	Boulders; end of hole
				Plymouth
PYA	6	0	20.4	Sand, fine, brown
		20.4	140.0	Sand and clay, gray, fine
		140.0	--	Bedrock
PYA	7	0	23.0	Sand, fine, brown
		23.0	48.0	Sand, fine, brown
		48.0	50.0	Sand, gray, fine
		50.0	52.0	Sand and gravel gray, fine sand
PYA	8	0	96.3	Sand and clay gray, fine
PYA	9	0	25.0	Sand, fine, brown; some gravel
		25.0	40.0	Sand, fine, light brown; some gravel
		40.0	50.0	Sand, fine, gray; some gravel
PYA	10	0	23.0	Sand, fine, brown
		23.0	100.0	Sand and clay gray, fine
		100.0	114.0	Sand and clay gray, fine to medium
PYA	11	0	30.0	Sand, fine, brown; some cobbles and clay
		30.0	--	Refusal at 30 feet
PYA	12	0	23.0	Sand, fine, brown
		23.0	28.0	Sand and clay gray, fine
		28.0	33.0	Sand and clay gray, fine
PYA	13	0	30.0	Sand, fine, brown
PYA	14	0	23.0	Sand and gravel, fine, brown sand
		23.0	41.5	Sand and gravel, fine sand
		41.5	46.5	Brown, fine sand
		47.0	--	Sand and gravel, refusal at 47 feet
PYA	15	0	23.0	Sand, fine brown; some clay; gravel
		23.0	81.0	Sand, fine, gray; some clay
		81.0	83.0	Sand, fine, gray; some clay
		83.0	95.0	Sand, fine, gray; some clay
PYA	16	0	21.7	Sand, fine, gray and clay
		21.7	46.9	Sand, medium to coarse, gray
PYA	18	0	25.5	Sand, medium to coarse, brown
		25.5	65.7	Sand, fine, gray
PYA	20	0	25.5	Sand, medium, brown
		25.5	30.4	Sand, fine, brown
		30.4	65.5	Sand, fine, gray

Table B-1. Stratigraphic logs of wells and borings in the Pemigewasset River Basin, Central New Hampshire–*Continued*

Local site number		Depth to top (feet)	Depth to bottom (feet)	Lithology
				GRAFTON COUNTY
				Plymouth–*Continued*
PYA	21	0	25.5	Sand, medium to coarse, brown; some gravel and clay
		25.5	55.5	Sand and clay gray, fine
PYB	1	0	5.0	Sand, coarse and gravel
		5.0	15.0	Sand, fine, silty
		15.0	25.0	Sand, fine
		25.0	40.0	Sand, coarse
		40.0	65.0	Sand, medium
		65.0	90.0	Sand, fine to medium
		90.0	--	Refusal (weathered mica schist)
PYB	2	0	9.0	Sand, coarse
		9.0	53.0	Silt
		53.0	57.0	Till, silty
		57.0	--	Refusal on bedrock or boulder
PYB	3	0	11.0	Sand, fine
		11.0	18.0	Sand, coarse
		18.0	20.0	Clay, silty
		20.0	44.0	Sand, fine
		44.0	--	Refusal?, Bottom of hole
PYB	5	0	12.0	Sand, fine
		12.0	17.0	Gravel
		17.0	59.9	Sand, fine
PYB	6	0	2.0	Muck
		2.0	6.0	Sand, medium
		6.0	19.9	Till, sandy with boulders
PYB	7	0	5.0	Sand, fine with gravel
		5.0	25.0	Sand, fine
		25.0	35.0	Sand and gravel
		35.0	40.0	Sand, fine; with silt
		40.0	45.0	Sand, coarse; with gravel
		45.0	55.0	Sand, medium to fine
		55.0	60.0	Sand, coarse
		60.0	82.9	Sand, fine
		83.0	--	Refusal on bedrock, mica schist
PYW	12	81.0	--	Bedrock
PYW	13	63.0	--	Bedrock
PYW	14	12.0	--	Bedrock
PYW	15	10.0	--	Bedrock
PYW	16	73.0	--	Bedrock
PYW	17	96.0	--	Bedrock
PYW	18	70.0	--	Bedrock
PYW	19	107.0	--	Bedrock
PYW	22	10.0	--	Bedrock
PYW	23	25.0	--	Bedrock
PYW	24	28.0	--	Bedrock
PYW	25	36.0	--	Bedrock
PYW	26	32.0	--	Bedrock
PYW	27	45.0	--	Bedrock
PYW	28	33.0	--	Bedrock
PYW	29	20.0	--	Bedrock
PYW	31	139.0	--	Bedrock
PYW	32	0	84.0	Other
		84.0	--	Bedrock
PYW	34	30.0	--	Bedrock
PYW	35	3.0	--	Bedrock

Table B-1. Stratigraphic logs of wells and borings in the Pemigewasset River Basin, Central New Hampshire—*Continued*

Local site number	Depth to top (feet)	Depth to bottom (feet)	Lithology
			GRAFTON COUNTY
			Plymouth-*Continued*
PYW 37	0	12.0	Sand and gravel
	12.0	--	Bedrock
PYW 38	320.0	--	Bedrock
PYW 42	140.0	--	Bedrock
PYW 43	0	29.0	Sand, very fine to fine, predominantly very fine, buff
	29.0	37.0	Sand, very fine to very coarse; predominantly medium, some pebbles
	37.0	127.0	Sand, very fine to fine; silt, gray; end of hole
PYW 45	0	58.3	Gray, fine sand and clay
	58.3	88.3	Sand, gray
	88.3	98.4	Gray, coarse sand
	102.0	--	Bedrock
PYW 46	0	28.6	Brown, fine sand; some gravel and clay
	28.6	50.0	Sand and clay, gray, fine
	50.0	69.0	Gray, fine
	69.0	74.0	Sand and gravel, fine, gray
	78.0	--	Bedrock
PYW 47	0	25.0	Brown, fine sand and clay
	25.0	137.0	Gray, fine sand and clay
	137.0	147.0	Sand, gray, medium
	147.0	157.0	Sand and clay, fine, gray
	160.0	--	Bedrock
PYW 48	0	20.0	Sand, fine, gray; some gravel, and clay
	20.0	61.0	Sand and clay, fine, gray
	61.0	81.0	Sand, fine, gray; some gravel, and clay
PYW 49	0	25.0	Sand, fine, brown; some gravel, and clay
	25.0	70.0	Sand and clay, fine, gray
	70.0	86.0	Sand, fine, gray; some gravel, and clay
	86.0	99.0	Sand, fine, gray
	99.0	105.0	Sand, fine, gray
PYW 50	0	23.0	Sand, fine brown
	23.0	56.0	Sand, fine, gray; with some clay
	56.0	57.0	Sand and gravel gray, fine
PYW 51	0	24.0	Sand, fine, brown
	24.0	39.0	Sand and gravel gray, fine
PYW 52	0	20.5	Sand, fine, brown
	20.5	35.7	Sand, medium to coarse, brown; and clay
	35.7	45.8	Sand, brown, fine to medium
	45.8	88.3	Sand, brown, fine to medium
PYW 53	0	20.0	Sand, fine to medium
	20.0	30.0	Sand, fine to coarse
	30.0	40.0	Sand, very coarse; some boulders
	40.0	48.8	Sand, fine to coarse
PYW 54	0	10.0	Sand, fine
	10.0	30.0	Sand, fine to medium; coarse gravel
	30.0	50.0	Sand and gravel; some boulders
PYW 55	0	20.3	Sand and clay brown, fine to medium
	20.3	25.3	Sand, fine to medium, brown
	25.3	30.4	Sand, fine, brown
	30.4	35.4	Sand, fine to medium, brown; some gravel and clay
	35.4	40.5	Sand, medium to coarse, brown; some clay
	40.5	50.5	Sand, brown, medium to coarse
PYW 56	0	30.3	Sand, fine to medium, brown
	30.3	45.5	Sand, fine, brown
	45.5	55.5	Sand, medium to coarse, brown
	55.5	60.5	Sand, fine to medium, brown
PYW 57	0	20.0	Sand, fine to medium
	20.0	30.0	Sand, fine to medium
	30.0	40.0	Sand, fine to medium
	40.0	50.0	Sand, fine to medium; some coarse sand
PYW 58	0	40.0	Sand, fine to medium
	40.0	50.0	Sand, fine to medium, some coarse sand
PYW 59	0	20.4	Sand and clay, fine, brown
	20.4	40.5	Sand, fine to medium, brown

Table B-1. Stratigraphic logs of wells and borings in the Pemigewasset River Basin, Central New Hampshire–*Continued*

Local site number		Depth to top (feet)	Depth to bottom (feet)	Lithology
				GRAFTON COUNTY
				Plymouth–*Continued*
PYW	60	0	35.5	Sand, fine to medium, brown
		35.5	40.5	Sand and gravel, fine to coarse, brown
PYW	61	0	110.0	Sand and gravel
		110.0	--	Bedrock
				Rumney
RUA	1	0	12.0	Sand, very fine to fine, buff; some silt
		17.0	19.0	Sand, very fine to fine, predominantly very fine; some silt
		27.0	29.0	Sand and silt
		37.0	39.0	Sand and silt
		47.0	49.0	Sand and silt
		57.0	59.0	Sand and silt
		77.0	79.0	Sand and Silt; some clay
		95.0	--	End of hole, drilling problems
RUB	1	0	4.0	Sand, loamy
		4.0	10.0	Gravel sandy
		10.0	14.0	Sand and silt
		14.0	40.0	Sand, fine, with trace of silt; end of hole
RUB	2	0	11.0	Gravel, sandy
		11.0	28.5	Sand, fine; trace silt
		28.5	--	Sand; end of hole
RUB	3	0	3.0	Gravel with boulders
		3.0	19.0	Sand, fine
		19.0	22.5	Silty, hardpan
		22.5	--	Refusal on bedrock or boulder
RUB	4	0	7.0	Gravel loamy
		7.0	10.0	Sand, fine, gray; with silt
		10.0	55.0	Sand, fine
		55.0	68.0	Sand, fine, brown; with silt
		68.0	85.0	Sand, fine, gray; with silt, end of hole
RUB	5	0	7.0	Till, gravelly
		7.0	--	Refusal on boulders or bedrock
RUB	6	0	20.0	Sand and silt, gravelly, end of hole
RUB	7	0	4.5	Sand, coarse; with boulders
		4.5	22.2	Sand, fine; with little blue clay
		22.0	40.5	Sand, fine; end of hole
RUB	8	0	4.0	Sand and cobbles
		4.0	9.0	Sand, fine
		9.0	13.0	Gravel
		13.0	20.0	Sand, coarse
		20.0	23.0	Sand, fine
		23.0	--	Sand; end of hole
RUW	2	0	7.0	Loam, fine sandy
		7.0	12.0	Sand, loamy
		20.0	22.0	Sand, fine, gray
		23.0	25.0	Sand, fine, gray
		37.0	39.0	Sand with silt, predominantly very fine sand, gray
		47.0	49.0	Sand, very fine, gray
		57.0	59.0	Sand, very fine; with silt
		67.0	69.0	Sand, fine; and silt, gray
		77.0	79.0	Sand, medium to very coarse, predominantly medium and coarse; pebbles
		87.0	89.0	Till?
		91.0	--	End of hole
RUW	5	10.0	--	Bedrock
RUW	6	285.0	--	Bedrock
RUW	7	15.0	--	Bedrock
RUW	8	367.0	--	Bedrock
RUW	9	18.0	--	Bedrock
RUW	10	70.0	--	Bedrock
RUW	11	34.0	--	Bedrock
RUW	12	22.0	--	Bedrock

Table B-1. Stratigraphic logs of wells and borings in the Pemigewasset River Basin, Central New Hampshire—*Continued*

Local site number		Depth to top (feet)	Depth to bottom (feet)	Lithology
				GRAFTON COUNTY
				Rumney-*Continued*
RUW	13	50.0	--	Bedrock
RUW	14	0	17.0	Sand, fine to very coarse, predominantly medium and coarse; gravel and pebbles
		17.0	19.0	Sand very fine to coarse, predominantly fine and medium
		27.0	29.0	Sand, very fine to coarse, predominantly fine to medium
		37.0	39.0	Sand, very fine to coarse, predominantly fine and medium
		47.0	49.0	Sand, very fine to coarse, predominantly fine to medium
		57.0	59.0	Sand, very fine to fine; minor silt
		67.0	68.0	Sand, very fine to fine; silty clay
		72.0	--	Refusal at 72 feet
RUW	15	0	5.0	Sand, very fine to fine, gray
		5.0	17.0	Sand, fine to very coarse, predominantly medium and coarse
		17.0	37.0	Sand, fine to very coarse, predominantly medium and coarse; minor fine gravel
		47.0	49.0	Sand, very fine to very coarse, predominantly medium to coarse; gravel
		57.0	59.0	Sand, fine to coarse, predominantly medium
		67.0	69.0	Sand, fine to very coarse, predominantly medium
		77.0	79.0	Sand, very fine to medium, predominantly fine, gray
		87.0	89.0	Sand, very fine to fine, minor silt
		108.0	110.0	Sand, fine to very coarse, predominantly medium; pebbles to 1 inch
		110.0	--	Sand, end of hole
RUW	17	0	--	Other
		30.0	--	Bedrock
RUW	18	0	--	Sand and gravel
		--	--	Till
		48.0	--	Bedrock
RUW	19	0	188.0	Sand
		188.0	--	Bedrock
RUW	20	0	48.0	Till
		48.0	--	Bedrock
RUW	23	0	150.0	Sand and gravel
		150.0	--	Bedrock
RUW	24	0	40.0	Sand
		40.0	--	Bedrock
RUW	25	0	129.0	Sand and gravel
		129.0	--	Bedrock
RUW	26	0	20.0	Sand and gravel
		20.0	--	Bedrock
RUW	27	0	--	Sand and gravel
		--	--	Sand
		85.0	--	Bedrock
RUW	28	0	100.0	Sand
		100.0	--	Bedrock
RUW	31	0	--	Till, gravel, hardpan
		--	--	Till
		200.0	--	Bedrock
RUW	32	0	91.0	Sand and gravel
		91.0	--	Bedrock
RUW	33	0	120.0	Sand
		120.0	200.0	Sand and gravel
		200.0	355.0	Gravel
		355.0	--	End of hole
				Thornton
TRA	1	0	8.0	Gravel, all sizes; boulders to 8 feet; sand, predominantly coarse to very coarse; refusal at 8 feet
TRB	1	0	10.0	Sand fine
		10.0	30.0	Gravel
		30.0	43.0	Sand fine
		43.0	48.0	Till, sandy
		48.0	--	Refusal on bedrock or boulder
TRB	2	0	18.0	Gravel
		18.0	91.0	Sand, fine
		91.0	--	Refusal on bedrock or boulder

Table B-1. Stratigraphic logs of wells and borings in the Pemigewasset River Basin, Central New Hampshire–*Continued*

Local site number	Depth to top (feet)	Depth to bottom (feet)	Lithology
			GRAFTON COUNTY
			Thornton–*Continued*
TRB 3	0	14.0	Gravel
	14.0	30.0	Sand, coarse
	30.0	65.0	Sand, fine to medium
	65.0	87.0	Gravel
	87.0	--	Refusal on bedrock or boulder
TRB 4	0	11.0	Gravel with boulders
	11.0	15.0	Sand, with silt, end of hole
TRB 5	0	14.0	Gravel
	14.0	17.0	Sand, fine
	17.0	25.0	Sand and gravel
	25.0	--	Refusal on bedrock or boulder
TRB 6	0	19.0	Gravel
	19.0	--	Refusal on bedrock or boulder
TRB 7	0	40.0	Sand, fine
	40.0	90.0	Silt and sand, fine
	90.0	--	Sand and gravel; end of hole
TRB 8	0	5.0	Gravel
	5.0	15.0	Sand, fine with silt
	15.0	20.0	Till, sandy; end of hole
TRB 9	0	11.0	Gravel
	11.0	21.0	Sand, coarse
	21.0	24.0	Till, sandy
	24.0	--	Refusal on bedrock or boulder
TRB 11	0	4.0	Gravel
	4.0	--	Refusal on bedrock or boulder
TRB 12	0	5.5	Sand and gravel with boulders
	5.5	--	Refusal on bedrock or boulder
TRB 13	0	4.0	Sand, with boulders
	4.0	9.0	Boulders
	9.0	35.5	Till, silty with boulders; end of hole
TRB 15	0	9.0	Gravel, sandy; and boulders
	9.0	16.0	Sand, fine and cobbles
	16.0	39.0	Till, sandy; boulders
	39.0	--	Refusal on boulders or bedrock
TRB 17	0	1.0	Topsoil
	1.0	38.0	Sand, fine
	38.0	86.0	Silt and sand, fine
	86.0	90.0	Till
	90.0	--	Till; end of hole
TRW 2	0	2.0	Gravel, all sizes; boulders to 12 feet; sand, coarse to very coarse
	2.0	7.0	Sand, fine to coarse, predominantly medium
	7.0	12.0	Sand, predominantly very fine to fine; silt
	12.0	17.0	Sand, fine to coarse, predominantly medium
	32.0	35.0	Sand, very fine to very coarse, predominantly fine
	42.0	45.0	Sand, medium to coarse, predominantly coarse; with fine pebbles
	52.0	55.0	Sand, fine to coarse in layers
	62.0	65.0	Sand, very fine to fine
	72.0	75.0	Sand, very fine with silt
	77.0	--	Till, sand, very fine to fine, silty; end of hole
TRW 3	2.0	7.0	Sand, very fine, light brown
	7.0	12.0	Sand, very fine, gray to tan colored
	40.0	42.0	Sand, very fine to fine, predominantly very fine, silt
	47.0	49.0	Sand, coarse and gravel, very fine, with pebbles
	60.0	62.0	Sand, medium to very coarse, predominantly very coarse
	67.0	69.0	Sand, very coarse, with 1/4 inch to 1 inch pebbles
	77.0	79.0	Sand, very coarse, with many 1/4 inch to 1 inch pebbles
	79.0	--	End of hole
TRW 4	3.0	22.0	Sand, medium to very coarse, predominantly medium to coarse; few pebbles
	38.0	40.0	Sand, medium to very coarse, predominantly coarse; gravel and pebbles
	58.0	60.0	Sand, fine to medium, predominantly fine
	68.0	70.0	Sand, fine to coarse, predominantly medium
	78.0	80.0	Sand, very fine; with silt

Table B-1. Stratigraphic logs of wells and borings in the Pemigewasset River Basin, Central New Hampshire—*Continued*

Local site number		Depth to top (feet)	Depth to bottom (feet)	Lithology
				GRAFTON COUNTY
				Thornton-*Continued*
TRW	4—*Continued*			
		88.0	90.0	Sand, fine to coarse, predominantly coarse
		108.0	110.0	Sand, very fine; with silt
		118.0	--	Refusal on granite at 118 feet
TRW	5	0	32.0	Sand, fine to very coarse, predominantly medium
		32.0	--	Sand, End of hole
TRW	8	36.0	--	Bedrock
TRW	9	134.0	--	Bedrock
TRW	12	18.0	--	Bedrock
TRW	40	0	120.0	Sand
		120.0	--	Bedrock
TRW	41	197.0	--	Bedrock
TRW	42	185.0	--	Bedrock
TRW	43	0	--	Sand and gravel
		--	--	Till
		15.0	--	Bedrock
TRW	44	30.0	--	Bedrock
TRW	45	0	15.0	Sand and gravel
		15.0	--	Bedrock
TRW	46	0	15.0	Sand and gravel
		15.0	--	Bedrock
TRW	48	0	47.0	Sand
		47.0	--	Bedrock
TRW	49	0	4.0	Sand
		4.0	--	Bedrock
TRW	50	0	18.0	Clay
		18.0	--	Bedrock
TRW	51	0	28.0	Sand
		28.0	--	Bedrock
TRW	52	0	15.0	Till
		15.0	--	Bedrock
TRW	53	0	20.0	Sand and gravel
		20.0	--	Bedrock
TRW	54	0	124.0	Sand and gravel
		124.0	--	Bedrock
TRW	56	0	--	Sand
		--	--	Sand and gravel
TRW	57	0	--	Sand
		--	--	Till, clay, hardpan
		345.0	--	Bedrock
TRW	58	0	44.0	Sand and gravel
		44.0	--	Bedrock
TRW	59	25.0	--	Bedrock
TRW	61	0	65.0	Sand
		65.0	--	Bedrock
TRW	62	0	120.0	Sand and gravel
		120.0	--	Bedrock
TRW	63	0	70.0	Sand
		70.0	--	Bedrock
TRW	64	0	120.0	Sand
		120.0	--	Bedrock
TRW	65	34.0	--	Bedrock
TRW	66	20.0	--	Bedrock

Table B-1. Stratigraphic logs of wells and borings in the Pemigewasset River Basin, Central New Hampshire–*Continued*

Local site number		Depth to top (feet)	Depth to bottom (feet)	Lithology
				GRAFTON COUNTY
				Thornton–*Continued*
TRW	67	120.0	--	Bedrock
TRW	68	80.0	--	Bedrock
TRW	69	60.0	--	Bedrock
TRW	70	80.0	--	Bedrock
TRW	71	90.0	--	Bedrock
TRW	72	100.0	--	Bedrock
TRW	73	0	120.0	Sand and gravel
		120.0	--	Bedrock
TRW	74	0	145.0	Sand
		145.0	--	Bedrock
TRW	75	0	120.0	Sand
		120.0	--	Bedrock
TRW	77	35.0	--	Bedrock
TRW	78	0	7.0	Clay
		7.0	--	Bedrock
TRW	79	0	90.0	Sand and gravel
TRW	80	0	92.0	Sand and gravel
TRW	81	0	46.0	Sand and gravel
TRW	82	0	130.0	Sand and gravel
TRW	83	0	14.0	Gravel
		14.0	21.0	Sand, fine; trace clay
		21.0	38.0	Sand and silt, very fine
		38.0	42.0	Clay some hardpan
TRW	84	0	4.0	Sand and gravel
		4.0	12.0	Clay some hardpan
TRW	85	0	7.0	Gravel, bony
		7.0	21.0	Sand, fine to medium, brown; trace clay
		21.0	28.0	Sand, fine to coarse, brown; some silt
TRW	86	0	7.0	Gravel, bony
		7.0	22.0	Sand, very fine to fine, light brown
		22.0	30.0	Sand, fine to coarse, brown
		30.0	35.0	Sand, very fine, light brown; and silt
		35.0	45.0	Sand and clay, light brown
		45.0	50.0	Sand; gravel and clay, gray
TRW	87	0	7.0	Sand and gravel, brown
		7.0	14.0	Sand and gravel, brown
		14.0	21.0	Sand, light brown; some gravel
		21.0	30.0	Sand, very fine, light brown
		30.0	38.0	Sand, very fine, gray
		38.0	48.0	Sand, fine to coarse, brown
		48.0	56.0	Sand, fine to coarse, gray
		56.0	62.0	Sand, fine to coarse, gray
TRW	89	0	7.0	Gravel, bony
		7.0	14.0	Sand, medium, brown
		14.0	24.0	Sand, medium to coarse, brown
		24.0	28.0	Sand very fine, light brown
		28.0	35.0	Sand, very fine, light brown; some clay
		35.0	56.0	Sand, very fine, light brown; some clay
		56.0	63.0	Sand, very fine to fine, brown; clay
		63.0	72.0	Sand, very fine, gray; some clay
TRW	90	0	78.0	Gravel
		78.0	565.0	Bedrock
				Warren
WDA	1	0	4.5	Sand, fine, buff
		4.5	9.0	Gravel
		9.0	15.0	Gravel; some cobbles
		15.0	20.0	Sand, fine to medium; some gravel, fine

Table B-1. Stratigraphic logs of wells and borings in the Pemigewasset River Basin, Central New Hampshire—*Continued*

Local site number		Depth to top (feet)	Depth to bottom (feet)	Lithology
				GRAFTON COUNTY
				Warren-*Continued*
WDA	4	17.0	19.0	Sand, very fine; silt, gray
		27.0	29.0	Silt and clay; trace sand, fine
		37.0	39.0	Silt and clay
		47.0	49.0	Clay some silt
		57.0	59.0	Silt and clay
WDA	5	0	4.0	Sand, very fine to fine, brown
		7.0	9.0	Sand, medium to very coarse; some gravel
		17.0	20.0	Sand and gravel
WDB	5	0	2.0	Gravel
		2.0	5.0	Sand
		5.0	11.9	Gravel
WDB	6	1.0	14.9	Gravel, sandy
WDB	7	0	12.0	Gravel
		12.0	22.0	Sand, medium to coarse
		22.0	26.9	Gravel silty
WDB	9	0	5.0	Sand, silty
		5.0	12.0	Gravel,
		12.0	47.0	Sand, coarse
		47.0	56.0	Till, gravelly
		56.0	--	Refusal on boulder or bedrock
WDB	10	0	35.0	Clay and silt
		35.0	--	Silt and clay; end of hole
WDB	11	0	55.0	Gravel and boulders
		55.0	--	Refusal on boulders or bedrock
WDW	4	40.0	--	Bedrock
WDW	5	23.0	--	Bedrock
WDW	6	0	25.0	Other
		25.0	--	Bedrock
WDW	7	0	10.0	Other
		10.0	--	Bedrock
WDW	8	0	50.0	Other
		50.0	--	Bedrock
WDW	9	0	15.0	Other
		15.0	--	Bedrock
WDW	10	0	70.0	Other
		70.0	--	Bedrock
WDW	11	0	20.0	Other
		20.0	--	Bedrock
WDW	12	0	51.0	Other
		51.0	--	Bedrock
WDW	13	0	7.0	Sand and gravel
		7.0	--	Bedrock
WDW	14	0	4.0	Other
		4.0	--	Bedrock
WDW	16	0	10.0	Till
		10.0	--	Bedrock
WDW	17	77.0	--	Bedrock
WDW	21	0	6.0	Gravel bony
WDW	22	71.0	--	Bedrock
WDW	24	70.0	--	Bedrock
WDW	26	10.0	--	Bedrock
WDW	30	0	2.0	Sand fine, brown; some cobbles
		17.0	19.0	Sand, fine to very coarse, gray; some pebbles
		27.0	29.0	Sand, very fine to fine; some silt
		37.0	39.0	Sand, very fine; some silt, gray

Table B-1. Stratigraphic logs of wells and borings in the Pemigewasset River Basin, Central New Hampshire–*Continued*

Local site number		Depth to top (feet)	Depth to bottom (feet)	Lithology
				GRAFTON COUNTY
				Waterville Valley
WFB	2	0	15.0	Till, sandy with boulders; end of hole
WFB	3	0	17.0	Till, gravelly with boulders
		17.0	--	Refusal on bedrock or boulder
WFB	4	0	7.0	Till, gravelly with boulders
		7.0	--	Refusal on bedrock or boulder
WFB	5	0	1.0	Sand, gravelly
		1.0	13.0	Till, sandy with silt
		13.0	--	Refusal on bedrock or boulder
WFB	6	0	5.0	Gravel
		5.0	40.0	Silt and sand, fine
		40.0	43.0	Till
		43.0	--	Till; end of hole
WFB	7	0	4.5	Sand, fine to coarse, brown; and gravel, fine to coarse
		4.5	9.0	Silt, brown; trace fine sand
		9.0	25.0	Sand, fine to coarse, brown; some silt; fine gravel; and cobbles
		25.0	--	Sand; end of hole
WFB	8	0	3.0	Gravel, fine to medium, loamy
		3.0	24.5	Till
		24.5	--	Refusal on boulders or bedrock
WFB	9	0	2.0	Sand, fine to medium
		2.0	7.0	Gravel, sandy, dense
		7.0	9.0	Sand, fine to medium, silty, loose
		9.0	15.5	Sand, fine, silty, dense
		15.5	29.0	Till, tan
		29.0	--	Till refusal
WFW	1	0	4.0	Sand and gravel
		4.0	8.0	Boulders
		15.0	30.0	Sand and gravel
		15.0	30.0	Sand fine to medium
		30.0	32.0	Sand, coarse
		32.0	33.0	Silt
WFW	2	0	5.0	Sand, brown
		5.0	13.0	Sand and gravel brown; some boulders
		13.0	20.0	Sand and gravel brown; some silt
		20.0	28.0	Sand, coarse, brown
		28.0	45.0	Sand and gravel brown
		45.0	47.0	Sand, brown, fine
WFW	3	12.0	--	Bedrock
				Wentworth
WIA	2	0	7.5	Sand, very fine to fine; some silt
		7.5	15.0	Gravel; some pebbles; cobbles
		27.0	29.0	Sand, very fine to fine, gray
WIB	2	0	2.8	Sand
		2.8	14.8	Sand and gravel coarse
		14.8	32.0	Sand
		32.0	45.0	Sand, fine
		45.0	68.7	Sand, coarse; with gravel
		68.7	--	Refusal on bedrock or boulder
WIB	3	0	2.0	Sand
		2.0	9.0	Gravel
		9.0	14.0	Sand, silty
		14.0	36.0	Till, sandy
		36.0	--	Refusal on bedrock or boulder
WIB	4	0	4.0	Sand, fine to medium, uniform
		4.0	14.0	Sand, fine to coarse and gravel
		14.0	29.0	Silt, gray and sand, fine, uniform
		29.0	39.0	Sand, fine to coarse
		39.0	44.0	Gravel, silty
		44.0	46.5	Till
		46.5	--	Refusal on boulder or bedrock
WIB	5	0	4.0	Sand
		4.0	6.0	Sand, coarse and gravel
		6.0	50.0	Sand, fine
		50.0	51.0	Sand and gravel
		51.0	--	Refusal on boulder or bedrock

Table B-1. Stratigraphic logs of wells and borings in the Pemigewasset River Basin, Central New Hampshire—*Continued*

Local site number		Depth to top (feet)	Depth to bottom (feet)	Lithology
				GRAFTON COUNTY
				Wentworth–*Continued*
WIW	1	0	7.0	Sand, fine to very coarse; gravel
		17.0	19.0	Sand, fine to very coarse, predominantly medium to coarse, buff; some cobbles; pebbles
		27.0	29.0	Sand, fine to very coarse, predominantly medium to coarse, buff; some cobbles; pebbles
		37.0	39.0	Sand, fine to very coarse, predominantly medium to coarse, buff; some cobbles; pebbles
		47.0	49.0	Sand, fine to very coarse, predominantly medium to coarse, buff; some cobbles; pebbles
		56.5	58.5	Sand, very fine to medium, predominantly fine; gravel, very fine to very coarse; some pebbles
WIW	9	22.0	--	Bedrock
WIW	10	53.0	--	Bedrock
WIW	11	10.0	--	Bedrock
WIW	12	27.0	--	Bedrock
WIW	14	25.0	--	Bedrock
WIW	16	40.0	--	Bedrock
WIW	17	28.0	--	Bedrock
WIW	19	11.5	--	Bedrock
				Woodstock
WSA	1	0	17.0	Sand and gravel coarse
		17.0	20.0	Brown; some gravel
WSA	2	0	13.0	Gravel coarse
		13.0	40.5	Clay brown, silty
		40.5	50.0	Sand and gravel fine
		50.0	65.0	Clay, brown
		65.0	78.0	Sand and gravel fine, dense; some clay
		78.0	86.0	Till
WSA	3	0	13.0	Cobbles and boulders; some silty sand and gravel
		13.0	22.0	Sand, fine to coarse, silty; some fine to coarse gravel
		22.0	24.0	Sand, fine to coarse, silty; some clay and gravel
		24.0	--	Till refusal
WSA	4	0	13.0	Cobbles and boulders; some silty sand and gravel
		13.0	--	Refusal
WSA	5	0	8.0	Cobbles and boulders; some silty sand and gravel
		8.0	23.5	Sand, fine to coarse, silty; some fine to coarse gravel
		23.5	--	Refusal in till?
WSA	6	0	3.0	Sand, black, organic
		3.0	29.0	Sand, fine to coarse, brown; some gravel; some silts and clay bottom half of interval
		29.0	34.0	Sand, fine, silty, gray; some medium sand and gravel
		34.0	40.0	Till
		40.0	--	Refusal in rock
WSB	4	0	6.0	Boulders
		6.0	13.0	Gravel
		13.0	30.0	Sand
		30.0	35.0	Gravel
		35.0	50.0	Sand, fine
		50.0	104.0	Till
		104.0	--	Refusal, boulder or bedrock
WSB	5	0	10.0	Gravel
		10.0	20.0	Sand, fine
		20.0	25.0	Sand, fine to coarse
		25.0	35.0	Sand, fine silty
		35.0	40.0	Gravel
		40.0	--	End of hole
WSB	7	0	15.0	Gravel; with cobbles
		15.0	85.0	Gravel, sandy
		85.0	--	Refusal on bedrock or boulder
WSB	8	0	5.0	Sand
		5.0	15.0	Sand and gravel

Table B-1. Stratigraphic logs of wells and borings in the Pemigewasset River Basin, Central New Hampshire–*Continued*

Local site number		Depth to top (feet)	Depth to bottom (feet)	Lithology
				GRAFTON COUNTY
				Woodstock–Continued
WSB	8–*Continued*			
		15.0	25.0	Gravel
		25.0	80.0	Sand, fine with stones
		80.0	130.0	Sand, with stones; end of hole
WSB	9	0	10.0	Sand, gravelly
		10.0	19.0	Till, gravelly; with boulders
		19.0	--	Refusal on bedrock or boulder
WSB	10	0	4.0	Silt
		4.0	8.0	Till, silty
		8.0	--	Refusal on bedrock or boulder
WSB	11	0	7.0	Sand, with boulders
		7.0	21.0	Till sandy with boulders
		21.0	--	Refusal on bedrock or boulder
WSB	12	0	15.0	Gravel with cobbles and boulders
		15.0	31.0	Sand with cobbles; end of hole
WSB	13	0	60.0	Sand and gravel; end of hole
WSB	14	0	10.0	Gravel
		10.0	24.0	Sand
		24.0	25.0	Gravel; end of hole
WSB	15	0	5.0	Gravel
		5.0	11.0	Sand, silty with clay
		11.0	25.0	Sand, fine, silty; end of hole
WSB	17	0	7.0	Gravel, silty; with boulders
		7.0	12.0	Gravel, silty
		12.0	17.0	Gravel, sandy
		17.0	--	Refusal on bedrock or boulder
WSW	1	36.0	--	Bedrock
WSW	2	4.0	--	Bedrock
WSW	3	10.0	--	Bedrock
WSW	4	27.0	--	Bedrock
WSW	5	145.0	--	Bedrock
WSW	7	58.0	--	Bedrock
WSW	8	25.0	--	Bedrock
WSW	14	0	10.0	Sand, fine to coarse; brown, with gravel and boulders
		10.0	60.0	Sand, fine to coarse; brown, gravel and some cobbles
		60.0	76.0	Sand and gravel, fine to coarse, reddish brown, some cobbles
WSW	16	0	15.0	Sand and gravel
		15.0	--	Bedrock
WSW	17	42.0	--	Bedrock
WSW	18	62.0	--	Bedrock
WSW	20	0	10.0	Till
		10.0	--	Bedrock
WSW	21	70.0	--	Bedrock
WSW	22	84.0	--	Bedrock
WSW	23	91.0	--	Bedrock
WSW	24	65.0	--	Bedrock
WSW	25	43.0	--	Bedrock
WSW	26	7.0	--	Bedrock
WSW	29	5.5	--	Bedrock
WSW	30	50.0	--	Bedrock
WSW	31	47.0	--	Bedrock

Table B-1. Stratigraphic logs of wells and borings in the Pemigewasset River Basin, Central New Hampshire—*Continued*

Local site number		Depth to top (feet)	Depth to bottom (feet)	Lithology
				GRAFTON COUNTY
				Woodstock-*Continued*
WSW	33	25.0	--	Bedrock
WSW	34	12.0	--	Bedrock
WSW	35	0	185.0	Sand
		185.0	--	Bedrock
WSW	36	0	95.0	Sand and gravel
		95.0	--	Bedrock
WSW	37	0	10.0	Fine to coarse, brown; some gravel; cobbles; boulders
		10.0	12.0	Sand, fine to coarse; some gravel
		13.0	15.0	Sand, fine to coarse; some gravel
		18.0	20.0	Sand, fine to coarse; some gravel
		20.0	22.0	Sand, fine to coarse, brown; some gravel
		24.0	26.0	Sand, fine to coarse, brown; some gravel
		26.0	28.0	Sand, fine to coarse, brown; some cobbles
		30.0	32.0	Sand, fine to coarse, brown; some cobbles
		34.0	36.0	Sand, fine to coarse, brown; some medium gravel
		38.0	40.0	Sand, fine to coarse, brown; some gravel
		43.0	45.0	Sand, fine to coarse, brown; some gravel
		43.0	46.0	Sand, fine to medium; some gravel
WSW	38	0	10.0	Sand and gravel, fine to coarse, brown, boulders
		10.0	60.0	Sand and gravel, fine to coarse, brown, some cobbles
		60.0	73.0	Sand and gravel, fine to coarse, reddish brown, some cobbles
WSW	39	0	35.0	Sand, coarse, sharp, gray; some gravel
		35.0	41.0	Sand, coarse, gray; and gravel, sharp; some silt
		41.0	53.0	Sand, gray, sharp; and gravel
		53.0	--	Till refusal
WSW	40	0	48.0	Sand, fine, brown; some gravel; trace clay
WSW	41	0	48.0	Sand, fine, brown; some gravel and clay
		48.0	--	Sand; end of hole
WSW	42	0	33.0	Sand, fine, brown; some sharp gravel; trace clay and mica
		33.0	--	Till refusal
WSW	43	0	48.0	Sand, fine, brown; some gravel; trace clay
		48.0	--	Sand; end of hole
WSW	44	0	7.0	Sand, fine, brown
		7.0	28.0	Sand, coarse; and gravel; some fines
		28.0	58.0	Sand, coarse, sharp; and gravel, gray
		58.0	--	Till refusal
WSW	45	0	7.0	Sand, fine
		7.0	59.0	Sand, coarse, gray; and gravel
		59.0	--	Till refusal
WSW	46	0	5.0	Silt, brown
		5.0	25.0	Sand, medium to coarse, brown
		25.0	30.0	Sand, fine to medium, brown
		30.0	58.0	Sand, medium to coarse, brown; and gravel
WSW	47	0	26.0	Sand, medium to coarse, brown; some fines; some fine to medium gravel
		26.0	--	Sand; end of hole (not refusal)
WSW	48	0	17.5	Sand, coarse and gravel; some cobbles
		17.5	30.0	Sand, medium to coarse, brown; some fine gravel
		30.0	--	Sand; end of hole
WSW	49	0	20.0	Sand, fine to coarse, gray; some gravel and boulders
		20.0	38.0	Sand, fine to coarse, brown; some medium gravel
		38.0	58.0	Sand, coarse, brown; some fine to medium gravel
		58.0	68.0	Sand, fine to coarse, predominantly medium, brown
		68.0	75.0	Gravel, medium; some medium to coarse brown sand; trace silt
		75.0	90.0	Sand, medium, brown; some gravel
		90.0	--	Sand; end of hole
WSW	51	0	35.0	Sand, fine brown and gravel
		35.0	44.0	Sand, fine, brown; some clay and gravel
		44.0	--	Till, refusal
WSW	52	0	28.0	Sand, fine, brown; some gravel; trace of clay

Table B-1. Stratigraphic logs of wells and borings in the Pemigewasset River Basin, Central New Hampshire–*Continued*

Local site number		Depth to top (feet)	Depth to bottom (feet)	Lithology
				GRAFTON COUNTY
WSW	54	0	34.0	Sand, grayish brown and gravel, sharp
		34.0	41.0	Silt, grayish brown and sand; some sharp gravel
		41.0	51.0	Till, gravelly
		51.0	--	Till, refusal
				MERRIMACK COUNTY
				Andover
ANB	9	0	9.5	Sand
		9.5	13.2	Sand; gravel, and clay
		13.2	--	Refusal on boulders or bedrock
ANW	1	0	37.0	Sand, very fine to medium, predominantly fine; well sorted; brown
		37.0	60.0	Sand, very fine to fine; well sorted; grayish brown
		60.0	96.0	Sand, very fine to fine; silt?; well sorted?; gray
		96.0	107.0	Sand, predominantly very fine; silt; pebbles
		107.0	--	Sand and silt; end of hole
ANW	10	10.0	--	Bedrock
ANW	13	100.0	--	Bedrock
ANW	14	0	2.0	Sand, fine to coarse, predominantly medium
		2.0	17.0	Sand, fine to coarse, predominantly fine to medium,
		17.0	27.0	Sand, fine to very coarse, predominantly medium; yellow-brown
		27.0	28.0	Sand, fine to very coarse; predominantly medium and coarse; gray
S		28.0	29.0	Sand and gravel; uniform sharp to sub-rounded pebbles and cobbles
		29.0	30.5	Till; very bumpy drilling; change in lithology, probably till
		32.0	34.0	Till, silt and clay matrix; sharp pebbles; garnet schist cobble
		37.0	--	Till; end of hole
ANW	23	67.0	--	Bedrock
ANW	24	81.0	--	Bedrock
ANW	32	0	--	Sand
		--	--	Till
		--	--	Clay
		--	--	Sand and gravel
ANW	42	207.0	--	Bedrock
				Danbury
DBA	1	0	18.5	Sand and silt
		26.5	38.5	Sand and silt, gray, very fine
		38.5	48.5	Sand and silt, gray, very fine
		66.5	68.5	Sand and silt, gray, very fine
		84.0	--	Refusal at 84 feet; Till?
DBB	1	0	3.8	Sand, loamy
		3.8	5.1	Sand and clay; trace of gravel
		5.1	11.1	Sand, firm; with gravel
		11.1	18.0	Sand, gray; with little clay
		18.0	20.5	Sand, loose; with gravel
		20.5	43.8	Sand, fine; with little clay
		43.8	53.0	Sand, fine, hard; with clay; end of hole
DBB	4	0	6.8	Sand; with boulders
		6.8	8.3	Sand; with gravel and little clay
		8.3	15.0	Sand, hard, with gravel and little clay; refusal on bedrock or boulder
DBB	5	0	2.0	Gravel
		2.0	6.0	Muck and wood
		6.0	19.0	Till, sandy
		19.0	--	Refusal on boulder or bedrock
DBB	6	0	1.7	Mud
		1.7	6.2	Sand, coarse and gravel
		6.2	7.5	Sand, fine to medium, gray
		7.5	11.5	Sand, coarse, gravel; and boulders
		11.5	--	Refusal on boulders or bedrock
DBW	12	100.0	--	Bedrock
DBW	29	0	19.0	Sand, very fine to medium, predominantly fine to medium; some gravel
		27.0	37.0	Sand, fine to very coarse, predominantly medium, gray; some cobbles
		37.0	39.0	Sand, fine to very coarse, predominantly medium, gray; some cobbles
		47.0	49.0	Sand, very coarse; some gravel; cobbles
		57.0	59.0	Sand, medium to very coarse, predominantly medium; gravel, fine

Table B-1. Stratigraphic logs of wells and borings in the Pemigewasset River Basin, Central New Hampshire—*Continued*

Local site number	Depth to top (feet)	Depth to bottom (feet)	Lithology
			MERRIMACK COUNTY
			Danbury–*Continued*
DBW 29—*Continued*	67.0	69.0	Sand, fine to very coarse, predominantly medium to coarse, gray
	77.0	79.0	Sand, fine to very coarse, predominantly medium to coarse, gray
	87.0	89.0	Sand, fine to very coarse, predominantly medium
	97.0	98.0	Sand, very fine to medium, predominantly very fine to fine, gray, firm; some pebbles
	98.0	--	Refusal at 98 feet
DBW 30	0	6.0	Sand, very fine and organic brown silt
	17.0	19.0	Sand, very fine to very coarse, predominantly fine to medium, fine gravel
	27.0	29.0	Sand, fine to very coarse, predominantly medium and coarse
	37.0	39.0	Sand, fine to very coarse, predominantly medium and coarse
	47.0	49.0	Sand, very coarse and gravel, cobbles
	57.0	59.0	Sand, predominantly medium and fine gravel
	67.0	69.0	Sand, fine to very coarse, predominantly medium and coarse
	77.0	79.0	Sand, fine to very coarse, predominantly medium to coarse
	87.0	89.0	Sand, very fine to very coarse, predominantly medium, pebbles
	97.0	--	Sand, very fine to medium, predominantly very fine to fine, pebbles, refusal at 98 feet
			Franklin
FKA 1	2.0	7.0	Sand, very fine; some silt
	7.0	12.0	Sand, very fine; some silt
	12.0	17.0	Sand, very fine; some silt
	17.0	22.0	Sand, very fine; some silt
	22.0	27.0	Sand, very fine; some silt
	27.0	32.0	Sand, very fine; some silt
	32.0	37.0	Sand, very fine; some silt
	37.0	42.0	Sand, very fine; some silt
	42.0	47.0	Sand, very fine; some silt
	57.0	59.0	Sand, very fine to medium, predominantly fine to medium, gray
	73.0	--	Refusal on bedrock or boulder
FKA 2	0	41.0	Sand, fine to coarse; some gravel,
	41.0	220.0	Sand, fine; silty
FKA 3	0	15.0	Sand, silty
	15.0	50.0	Sand, fine to medium
	50.0	117.0	Sand, silty
	117.0	--	Bedrock
FKA 4	0	9.0	Sand, fine to medium, silty
	9.0	16.5	Sand, fine to medium, silty
	16.5	76.3	Sand, fine to coarse; some silt; gravel
	76.3	--	Bedrock
FKA 5	0	9.0	Sand, fine to medium, silty
	19.0	34.0	Sand, fine to medium, silty; some gravel
	34.0	--	Bedrock
FKA 6	0	12.0	Sand, fine to medium, silty
	12.0	27.0	Sand, fine, silty
	27.0	30.0	Sand, fine, gravelly
	30.0	56.0	Sand, fine to coarse
	56.0	59.0	Sand, medium to coarse, gravelly
	59.0	72.0	Sand, fine to medium
	72.0	--	Bedrock
FKA 7	0	8.0	Sand and silt
	8.0	18.0	Sand fine, silty
	18.0	25.0	Sand, fine to coarse, silty
	25.0	55.0	Sand, fine, silty
	55.0	72.0	Sand, fine to medium
	72.0	82.0	Sand, fine, Silty
	82.0	100.0	Sand, fine to medium, silty
FKA 8	0	4.0	Sand, fine, silty
	4.0	34.8	Sand, fine, silty; some cobbles and boulders
	34.8	--	Bedrock
FKA 9	0	9.5	Sand, fine to medium
	9.5	23.5	Sand, Silty; with some gravel; boulders
	23.5	--	Bedrock
FKA 10	0	16.0	Sand, fine to coarse, silty
	16.0	42.0	Sand, fine to coarse, silty with some gravel
	42.0	--	Bedrock

Table B-1. Stratigraphic logs of wells and borings in the Pemigewasset River Basin, Central New Hampshire–*Continued*

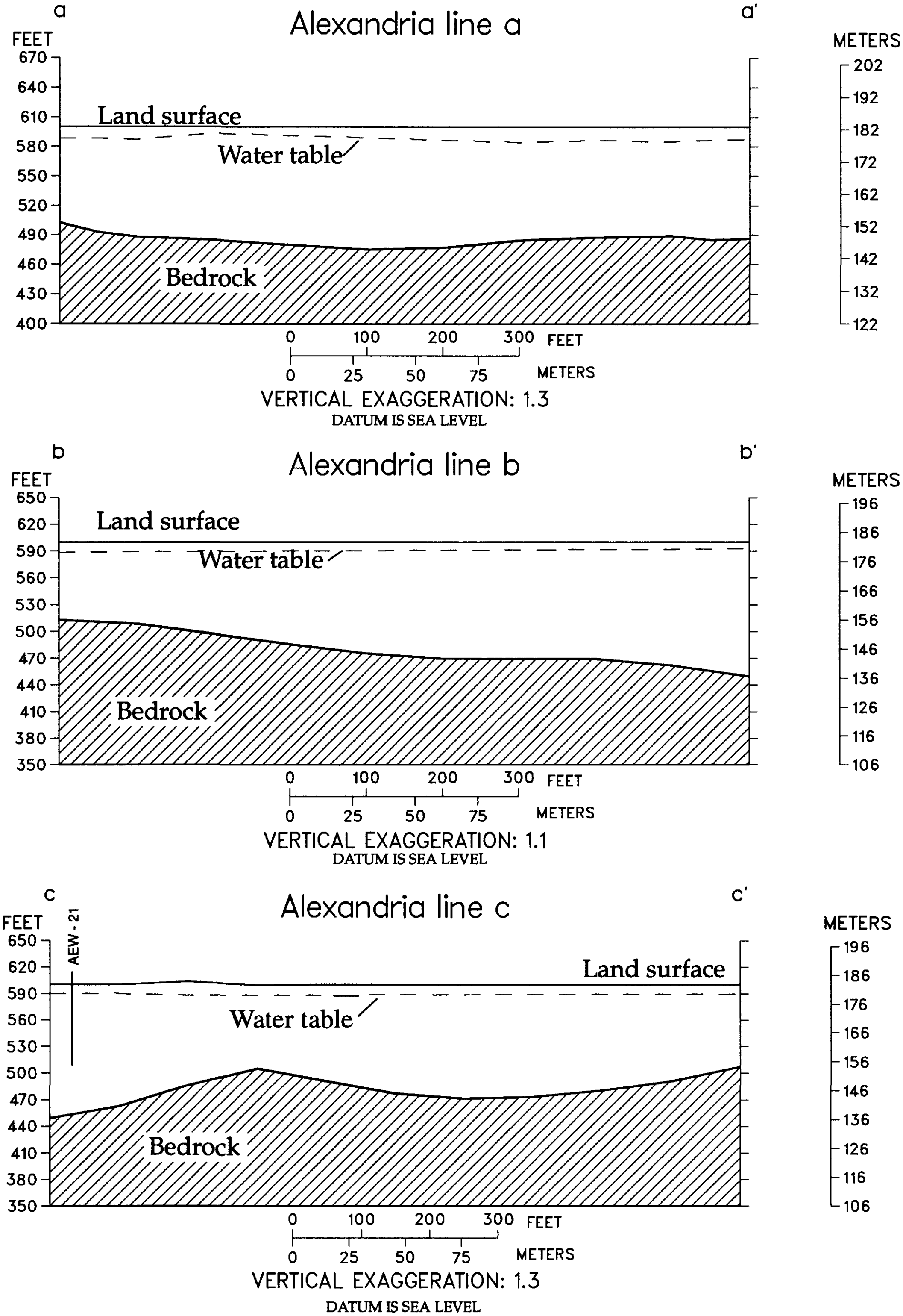
Local site number		Depth to top (feet)	Depth to bottom (feet)	Lithology
				MERRIMACK COUNTY
				Franklin–*Continued*
FKW	2	0	11.0	Sand
		11.0	20.0	Clay and sand
		20.0	30.0	Sand, medium
		30.0	50.0	Sand, fine to medium
		50.0	60.0	Sand, medium to coarse
		60.0	73.0	Sand, fine to medium
FKW	3	0	6.0	Sand, fine
		6.0	20.0	Sand, hard packed
		20.0	82.0	Sand, medium to fine
FKW	4	10.0	--	Bedrock
FKW	9	11.0	--	Bedrock
FKW	12	80.0	--	Bedrock
FKW	14	36.0	--	Bedrock
FKW	17	--	--	--
FKW	18	19.0	--	Bedrock
FKW	26	24.0	--	Bedrock
FKW	27	110.0	--	Bedrock
FKW	28	3.0	5.0	Sand, very fine to very coarse
		5.0	25.0	Till, sand, very fine to very coarse, gravel
		42.0	57.0	Clayey silt, gray
		57.0	59.0	Sand, very fine, and clayey silt
		67.0	69.0	Sand, very fine, and silt
		77.0	78.0	Grave and sand, very fine to coarse, cobbles and pebbles
		81.0	--	Refusal at 81 feet
FKW	29	0	20.0	Sand; gravel
		20.0	39.0	Sand, fine, brown; trace clay
		39.0	60.0	Sand; gravel
		60.0	65.0	Clay, gray
		65.0	75.0	Sand, fine
		75.0	122.0	Sand; gravel
		122.0	--	End of hole
FKW	31	40.0	--	Bedrock
FKW	33	0	14.0	Sand and gravel
		14.0	--	Bedrock
FKW	34	40.0	--	Bedrock
FKW	35	0	50.0	Sand and gravel
		50.0	--	Bedrock
FKW	36	0	30.0	Sand and gravel
		30.0	--	Bedrock
FKW	37	0	30.0	Sand and gravel
		30.0	--	Bedrock
FKW	38	0	--	Sand
		--	--	Sand and gravel
		15.0	--	Bedrock
FKW	39	0	--	Till
		--	--	Sand
		47.0	--	Bedrock
FKW	40	0	--	Sand
		--	--	Sand and gravel
		15.0	--	Bedrock
FKW	41	0	80.0	Other
		80.0	--	Bedrock
FKW	42	0	80.0	Other
		80.0	--	Bedrock
FKW	43	0	40.0	Other
		40.0	--	Bedrock

Table B-1. Stratigraphic logs of wells and borings in the Pemigewasset River Basin, Central New Hampshire—*Continued*

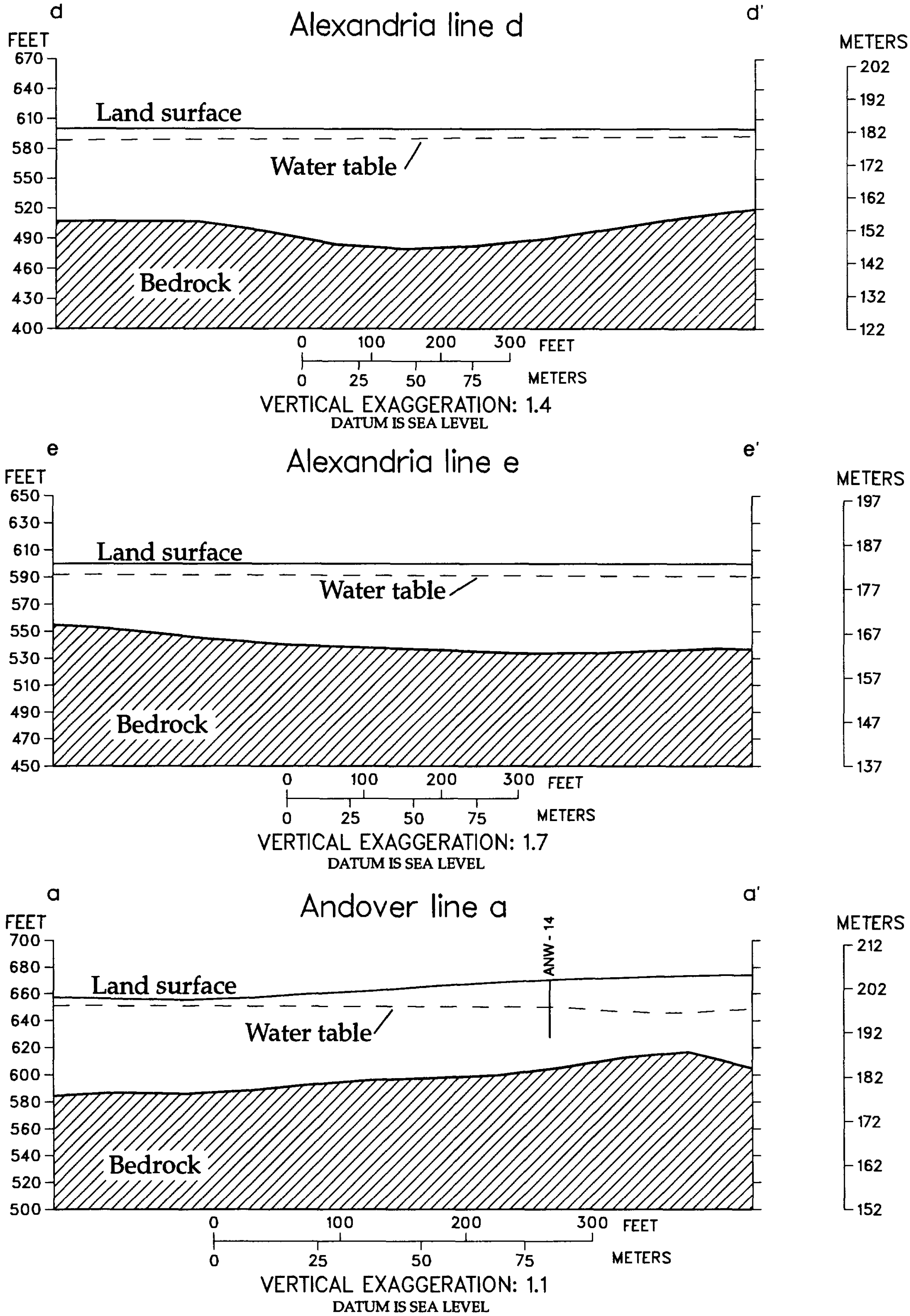
Local site number		Depth to top (feet)	Depth to bottom (feet)	Lithology
				MERRIMACK COUNTY
				Franklin-*Continued*
FKW	44	0	50.0	Other
		50.0	--	Bedrock
FKW	45	0	100.0	Other
		100.0	--	Bedrock
FKW	47	0	55.0	Sand
		55.0	--	Bedrock
FKW	48	90.0	--	Bedrock
FKW	49	0	--	Sand
		--	--	Clay
		127.0	--	Bedrock
FKW	50	0	70.0	Till
		70.0	--	Bedrock
FKW	51	0	12.0	Sand, fine to very coarse, predominantly medium to coarse; some pebbles coarse; some pebbles
		12.0	17.0	Sand, very fine to fine, buff
		27.0	29.0	Sand, fine to coarse, predominantly medium, buff
		47.0	49.0	Sand, very fine to coarse, predominantly fine to medium; some clay; some cobbles
		57.0	59.0	Sand, fine to coarse, predominantly medium, buff; some pebbles
		67.0	69.0	Sand, fine to coarse, predominantly medium, buff; some pebbles
		77.0	79.0	Sand, medium to very coarse, predominantly medium to coarse; gravel, fine to coarse
		87.0	89.0	Sand, fine to coarse, predominantly medium; gravel, fine to coarse
		97.0	99.0	Sand, fine to coarse, predominantly medium, buff
		107.0	108.0	Sand, fine to coarse, predominantly medium, pebble 3/4 inch
		108.0	109.0	Sand, very fine to coarse, predominantly very fine to fine, buff
		115.0	--	Refusal at 115 feet
				Hill
HNA	1	2.0	7.0	Sand, very fine to fine; silt
		17.0	19.0	Sand, fine to very coarse, predominantly medium; some gravel; pebbles
		20.0	27.0	Sand, fine to very coarse, predominantly medium to coarse
		27.0	29.0	Sand, very fine to coarse, predominantly fine to medium, buff
		37.0	39.0	Sand, very fine to fine, buff; some silt, refusal at 45 feet
		45.0	--	Refusal on bedrock or boulder
HNW	4	65.0	--	Bedrock
HNW	5	40.0	--	Bedrock
HNW	6	0	17.0	Sand, very fine to coarse, predominantly medium; gravel
		17.0	19.0	Sand, very fine to coarse, predominantly fine
		27.0	29.0	Sand, fine to coarse, predominantly medium
		37.0	39.0	Sand, very fine to very coarse, predominantly medium
		47.0	49.0	Sand, fine to very coarse, predominantly fine; gravel
		57.0	59.0	Sand, fine to very coarse, predominantly medium to coarse
		67.0	69.0	Sand, very fine to coarse, predominantly fine
		79.0	--	Sand; refusal at 79 feet
HNW	7	0	9.0	Gravel and sand, fine to coarse
		9.0	22.0	Sand, very fine to fine, predominantly fine, light buff
		27.0	29.0	Sand, fine to medium, predominantly fine, buff colored
		37.0	38.0	Sand, fine to medium, predominantly medium, buff colored
		38.0	39.0	Sand, fine to medium, predominantly fine
		47.0	49.0	Sand, very fine to very coarse, predominantly coarse, buff colored
		57.0	59.0	Sand, very fine to very coarse, predominantly medium
		67.0	69.0	Sand, very fine; and silt, grayish buff colored
		77.0	79.0	Sand, very fine; and silt, buff gray colored
		87.0	89.0	Sand, very fine; and silt, minor clay
		97.0	99.0	Sand, very fine to very coarse, predominantly fine; some silt
		107.0	109.0	Sand, very fine to very coarse; predominantly medium
		117.0	119.0	Sand, fine to very coarse, predominantly medium and coarse; trace very fine gravel
		128.0	--	Till, refusal at 128 feet
HNW	8	250.0	--	Bedrock
HNW	9	0	72.0	Till
		72.0	--	Bedrock
HNW	15	0	49.0	Sand and gravel
		49.0	--	

APPENDIX C: Geohydrologic sections interpreted from seismic-refraction data, in the Pemigewasset River Basin, central New Hampshire

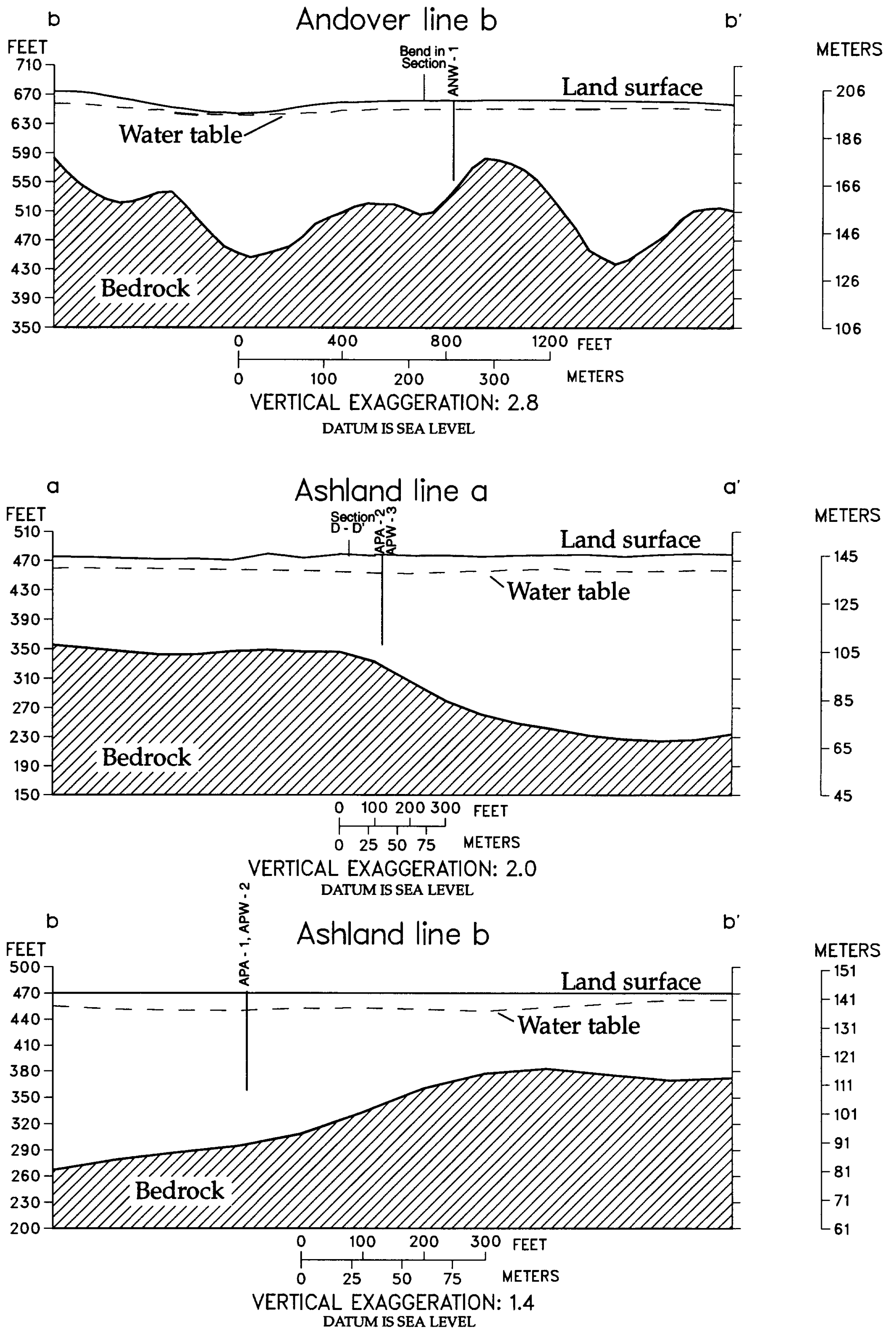
Geohydrologic sections interpreted from seismic-refraction data for:



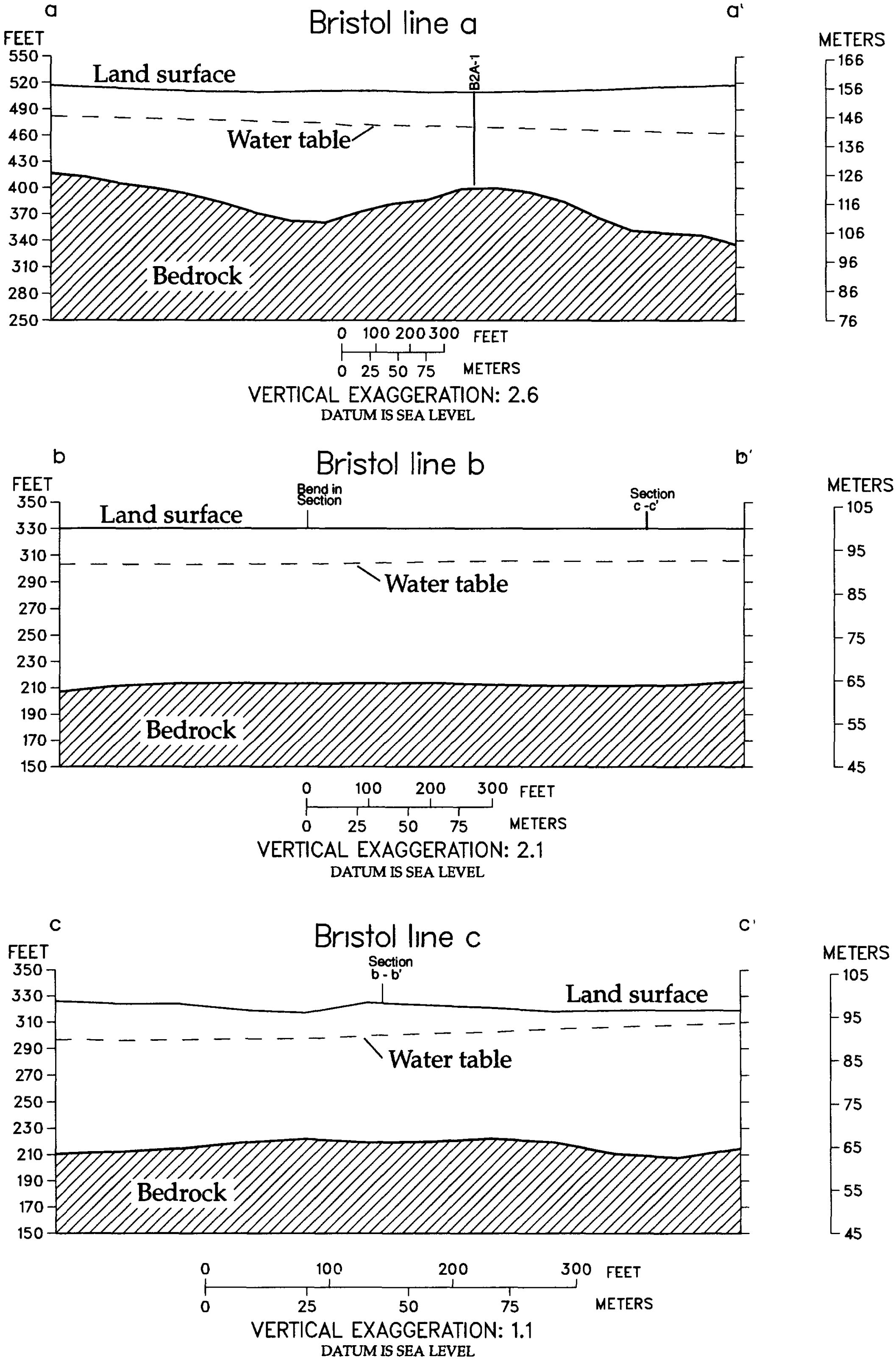
Appendix C1. Geohydrologic sections interpreted from seismic-refraction data for Alexandria lines a-a', b-b', and c-c' (locations shown on plate 4).



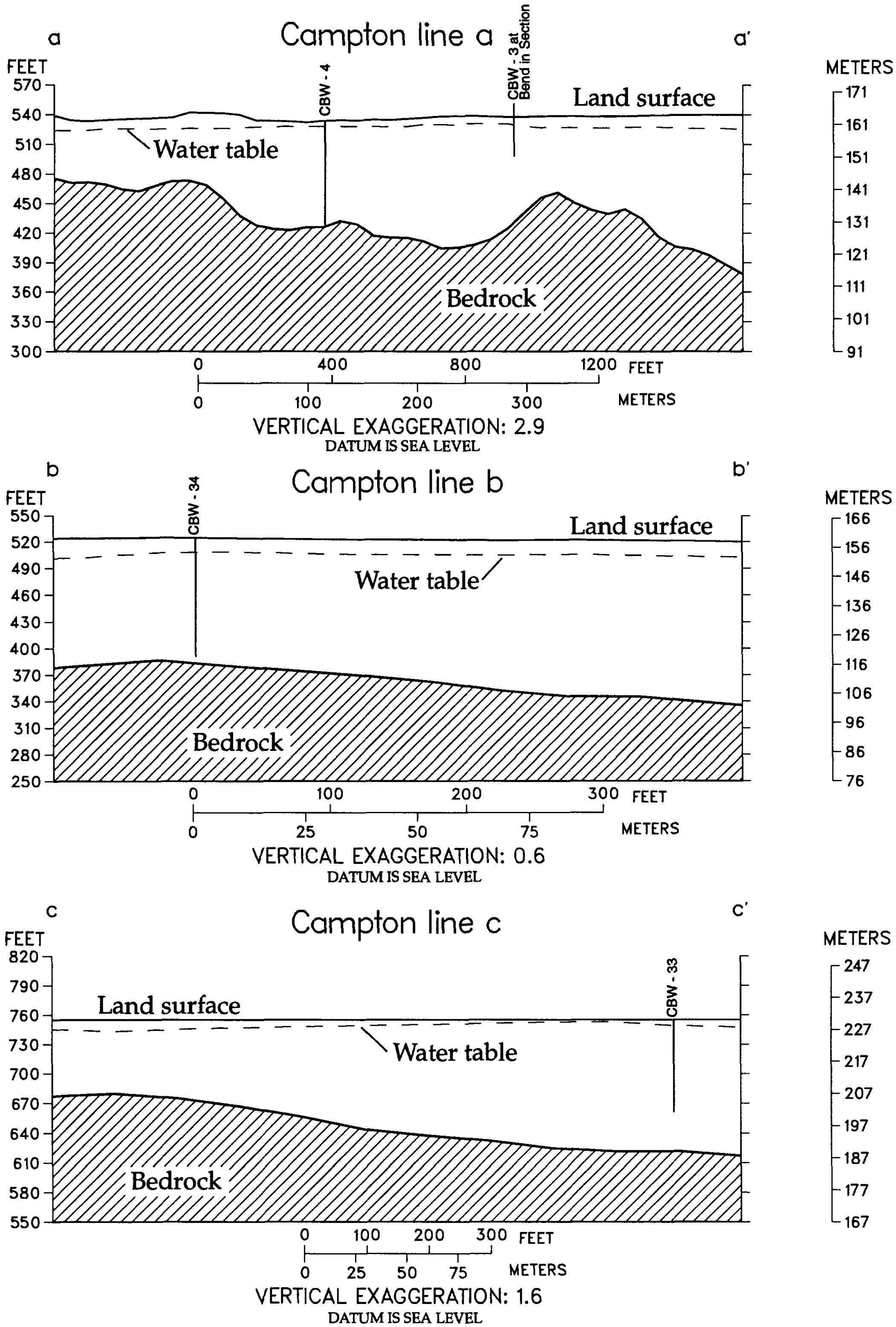
Appendix C2. Geohydrologic sections interpreted from seismic-refraction data for Alexandria lines d-d′ and e-e′(locations shown on plate 4), and Andover line a-a′(shown on plate 1).



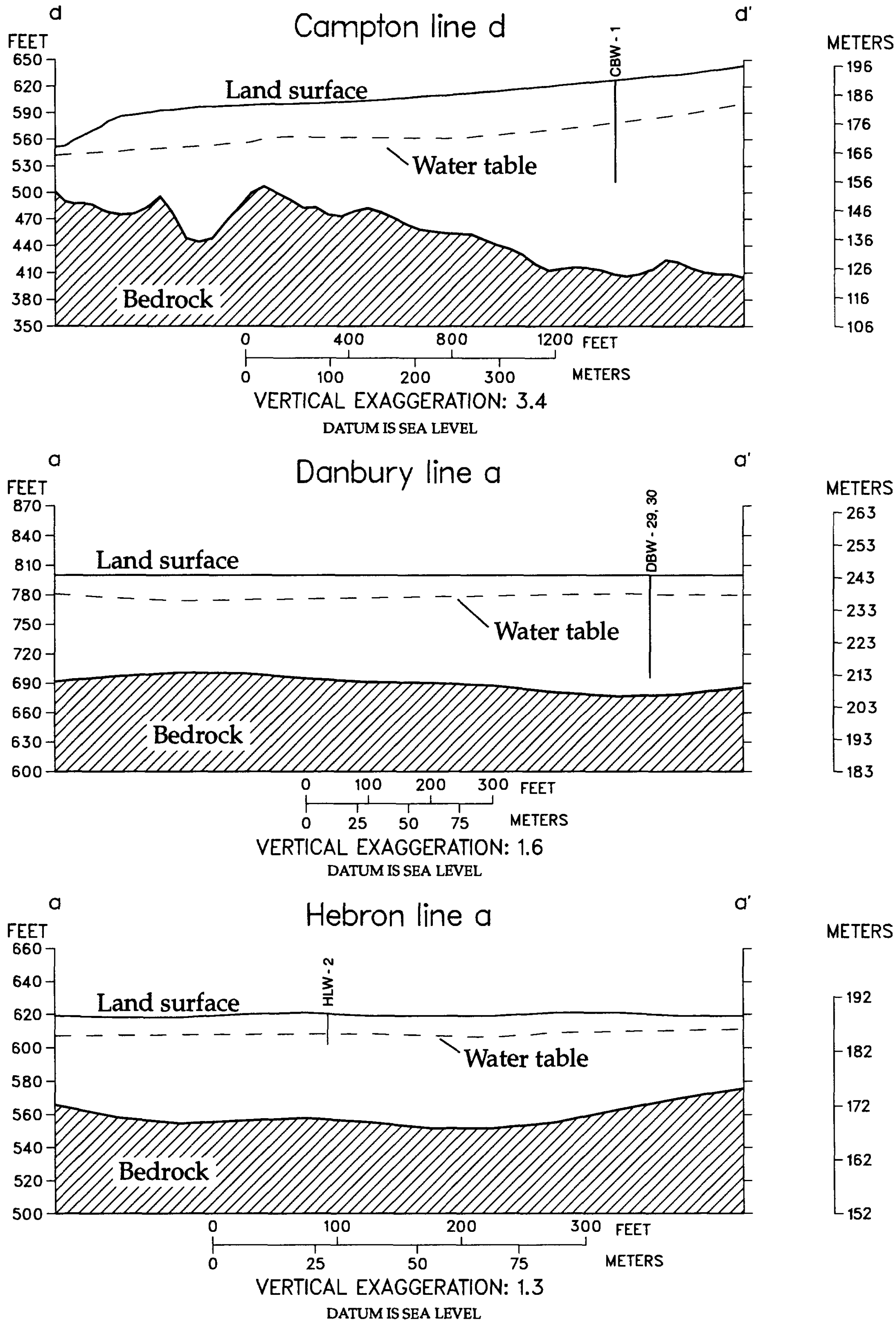
Appendix C3. Geohydrologic sections interpreted from seismic-refraction data for Andover line b -b′ (location shown on plate 1), and Ashland lines a-a′ and b -b′ (locations shown on plate 2).



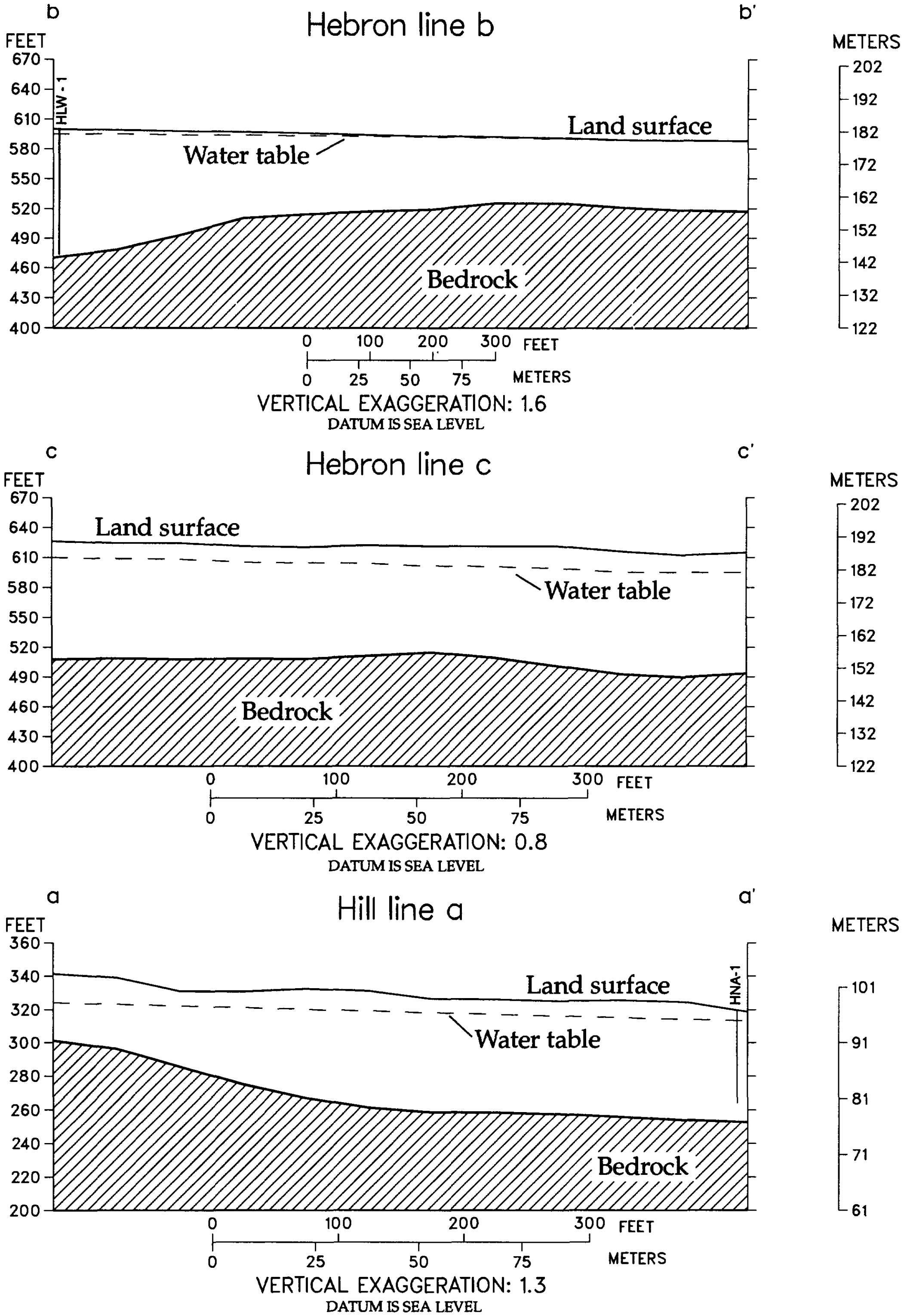
Appendix C4. Geohydrologic sections interpreted from seismic-refraction data for Bristol lines a-a′ (location shown on plate 4), and b-b′, c-c′ (locations shown on plate 1).



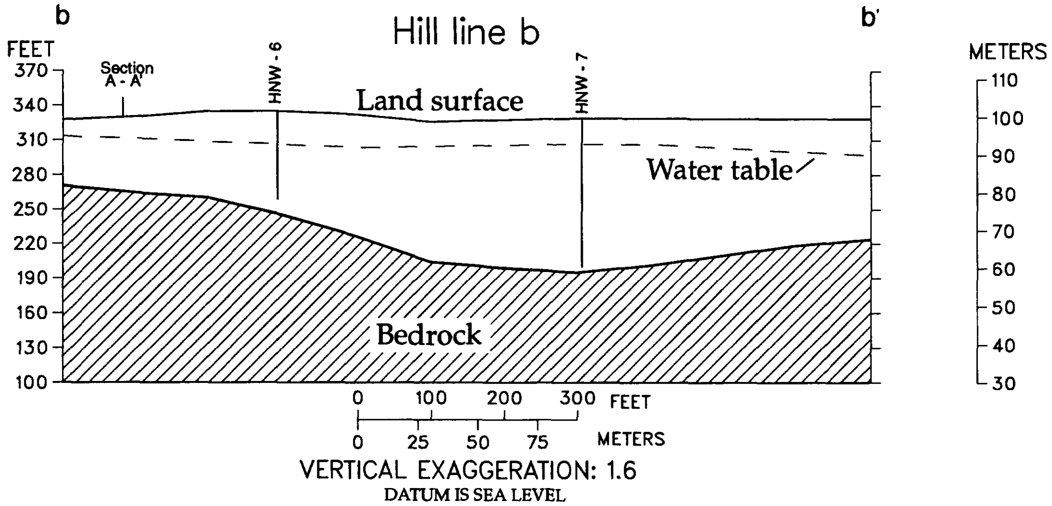
Appendix C5. Geohydrologic sections interpreted from seismic-refraction data for Campton lines a-a′, b-b′, and c-c′ (locations shown on plate 2).

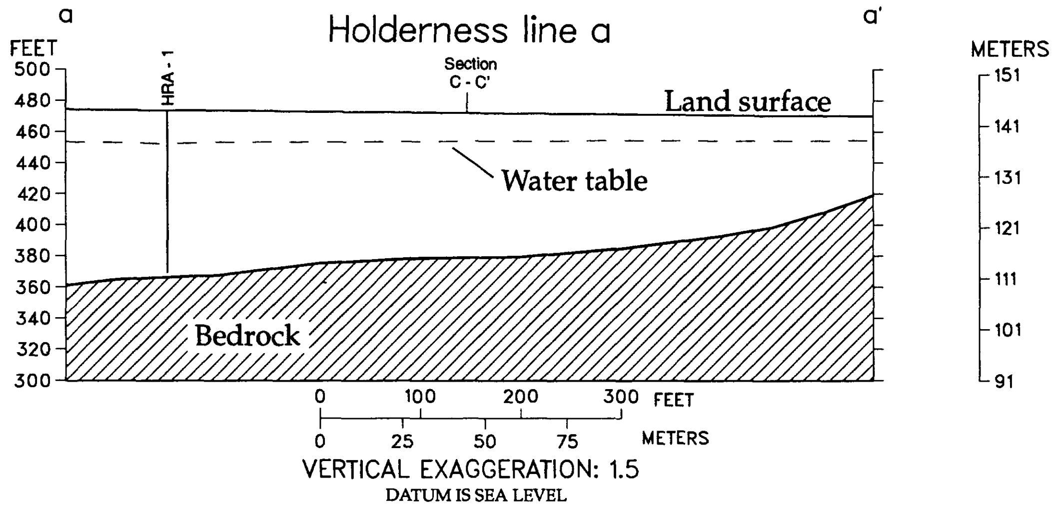


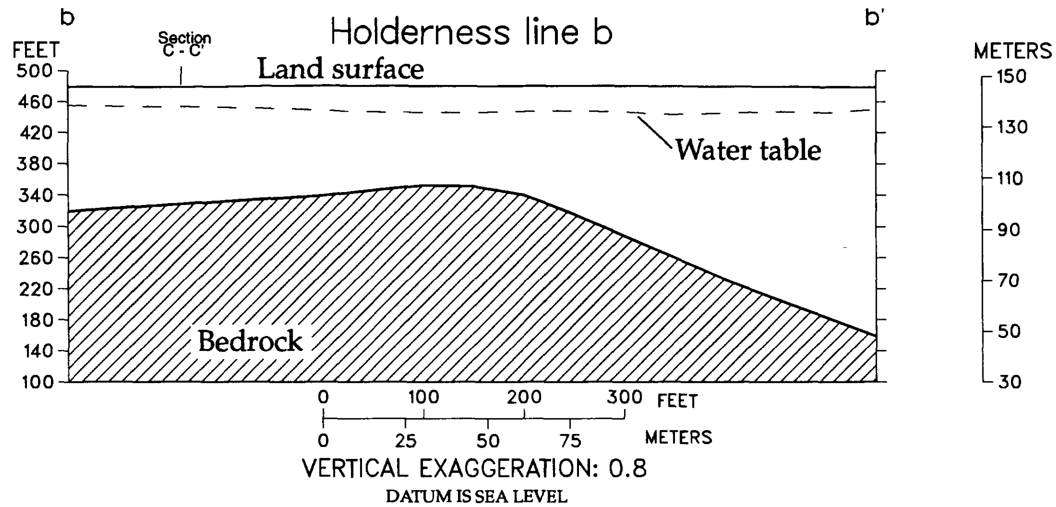
Appendix C6. Geohydrologic sections interpreted from seismic-refraction data for Campton line d-d′ (location shown on plate 2), Danbury line a-a′ (location shown on plate 4), and Hebron line a-a′ (location shown on plate 4).



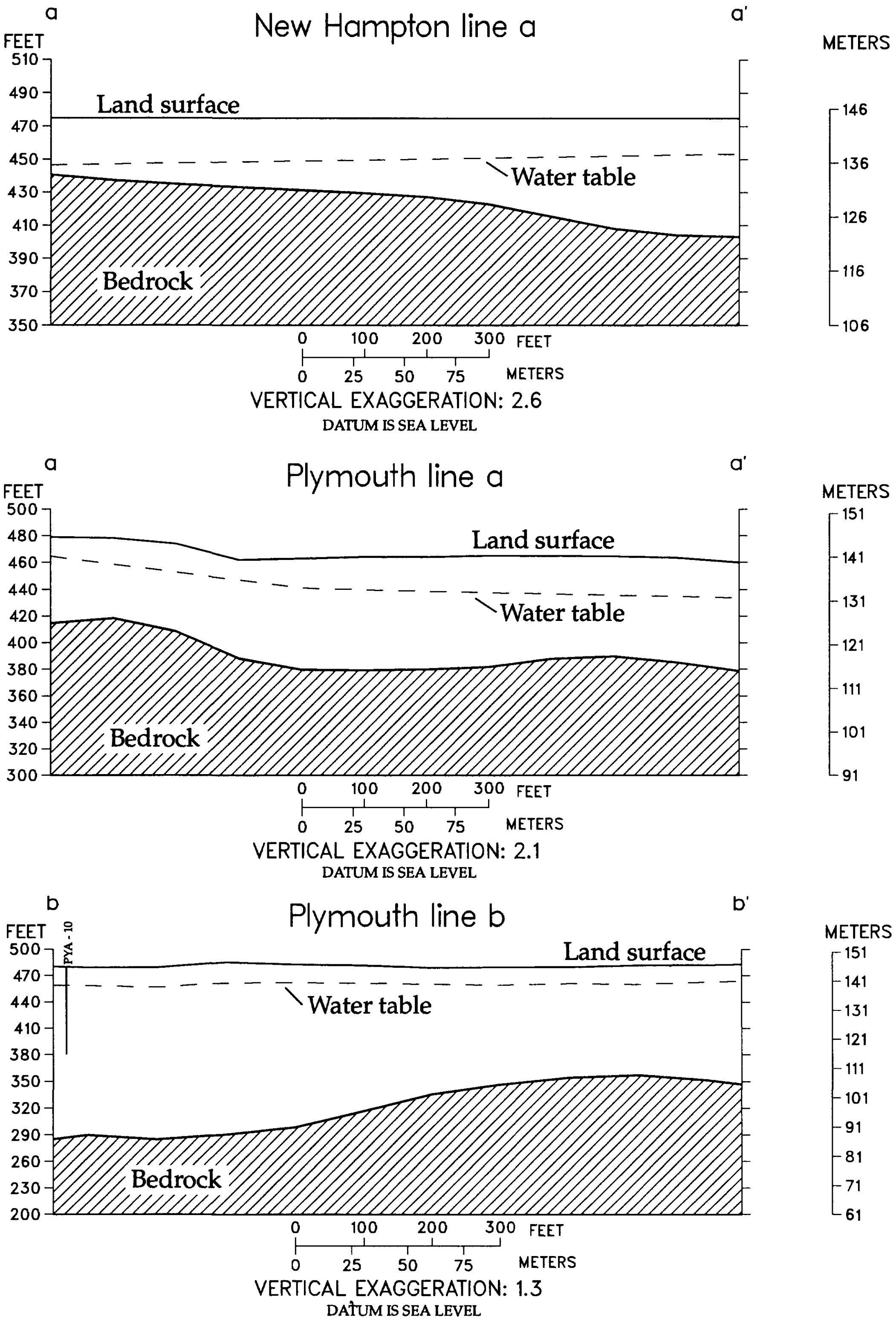
Appendix C7. Geohydrologic sections interpreted from seismic-refraction data for Hebron lines b-b′ and c-c′ (locations shown on plate 4), and Hill line a-a′ (location shown on plate 1).



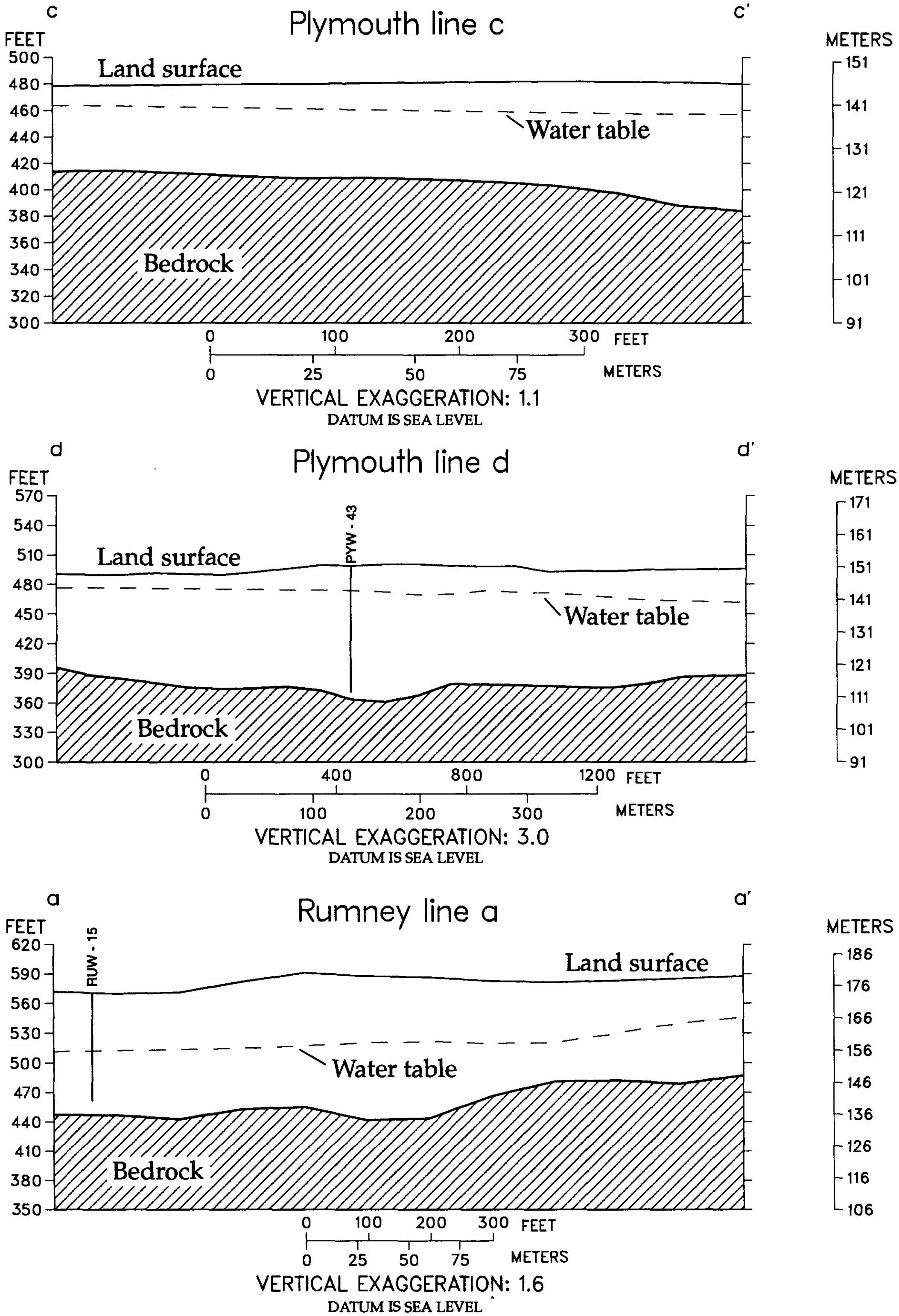




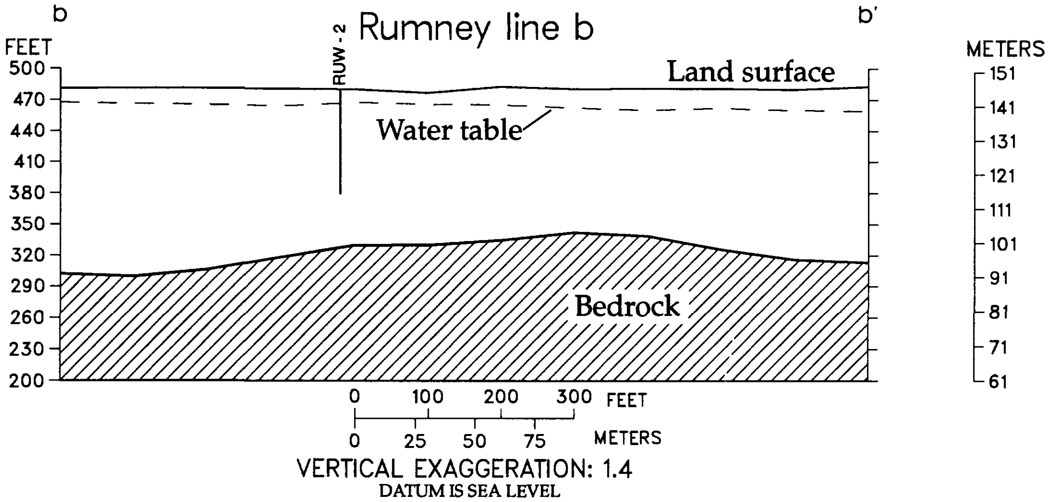
Appendix C8. Geohydrologic sections interpreted from seismic-refraction data for Hill line b-b′ (location shown on plate 1), Holderness lines a-a′ and b-b′ (locations shown on plate 2).

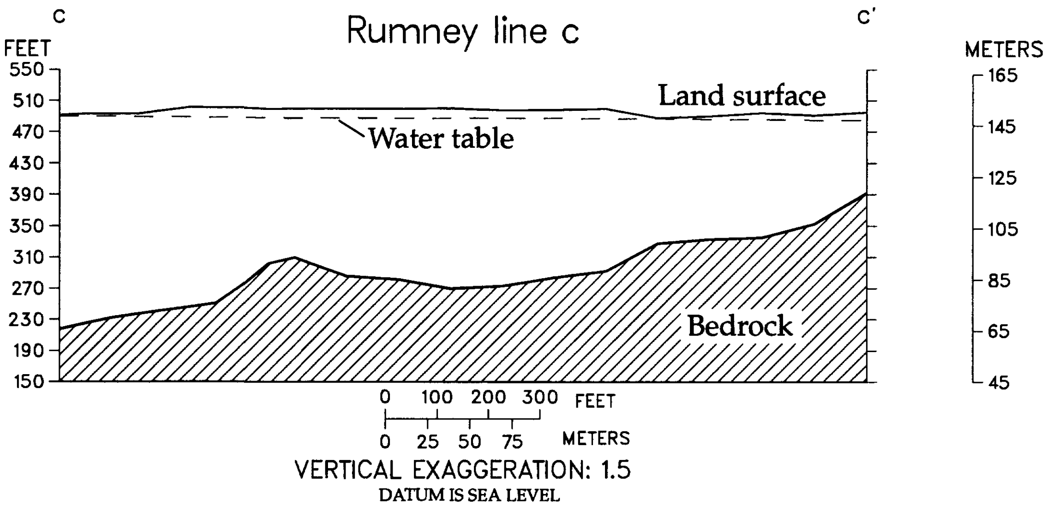


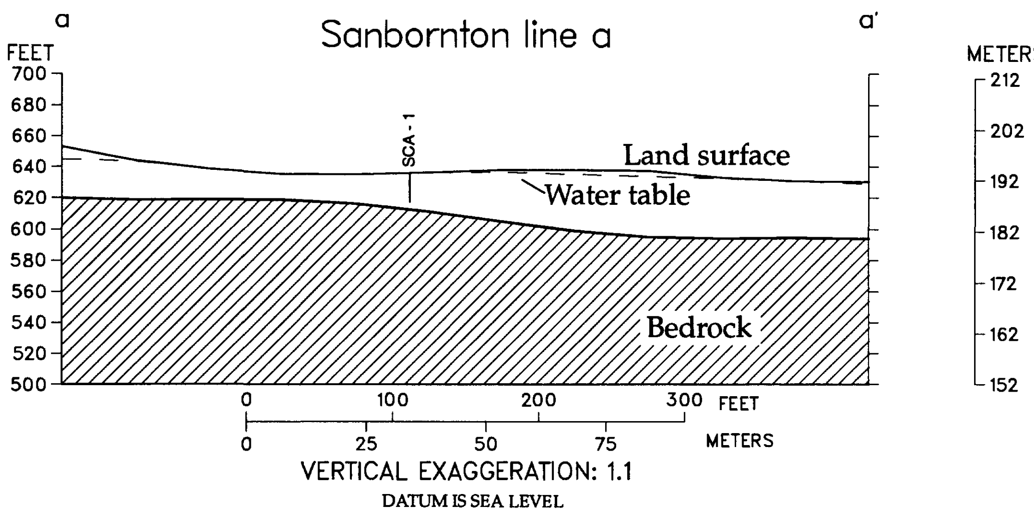
Appendix C9. Geohydrologic sections interpreted from seismic-refraction data for New Hampton line a-a′ (location shown on plate 2), Plymouth lines a-a′ and b-b′ (locations shown on plate 2).



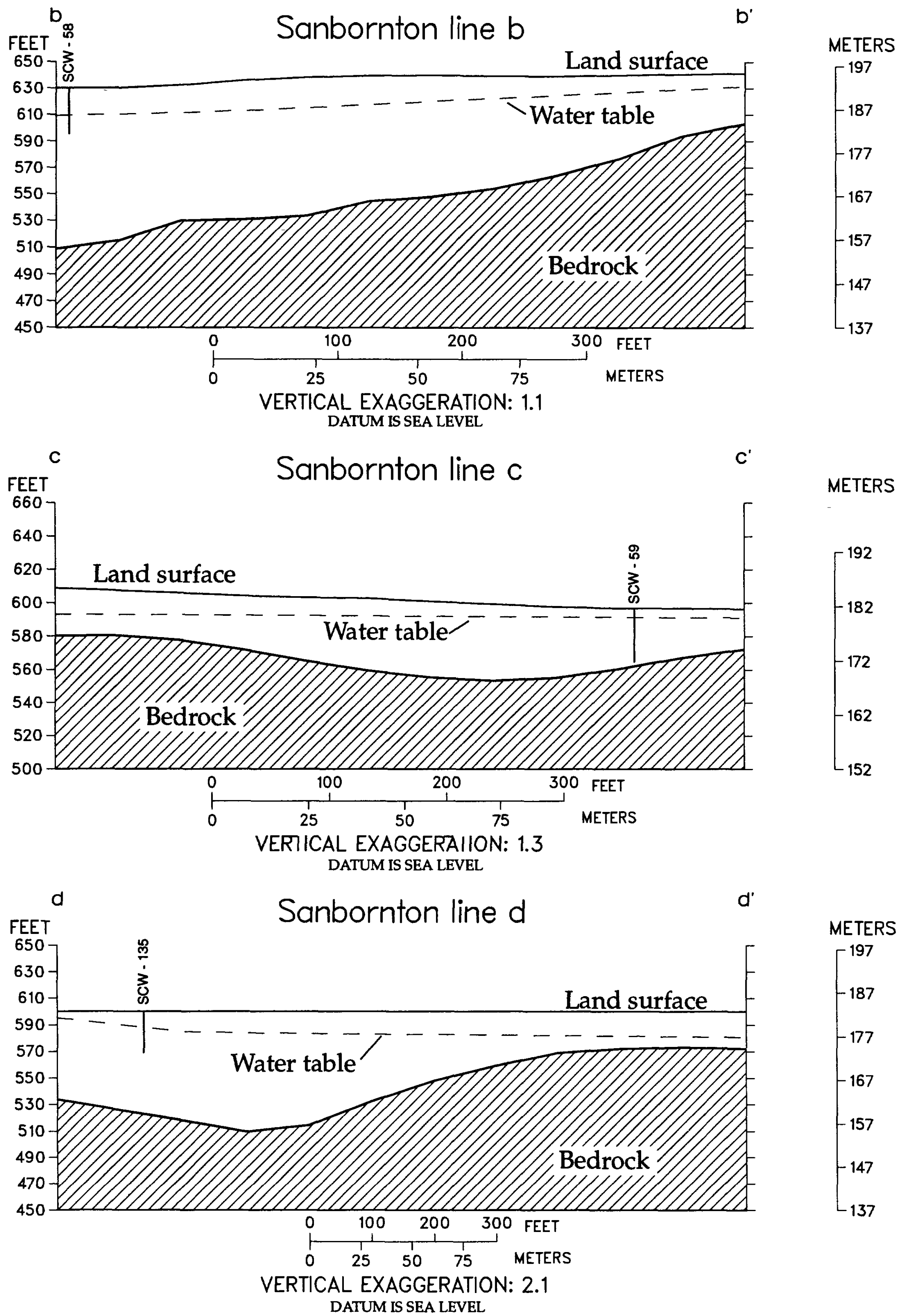
Appendix C10. Geohydrologic sections interpreted from seismic-refraction data for Plymouth lines c-c′ and d-d′ (locations shown on plate 2), and Rumney line a-a′ (location shown on plate 5).



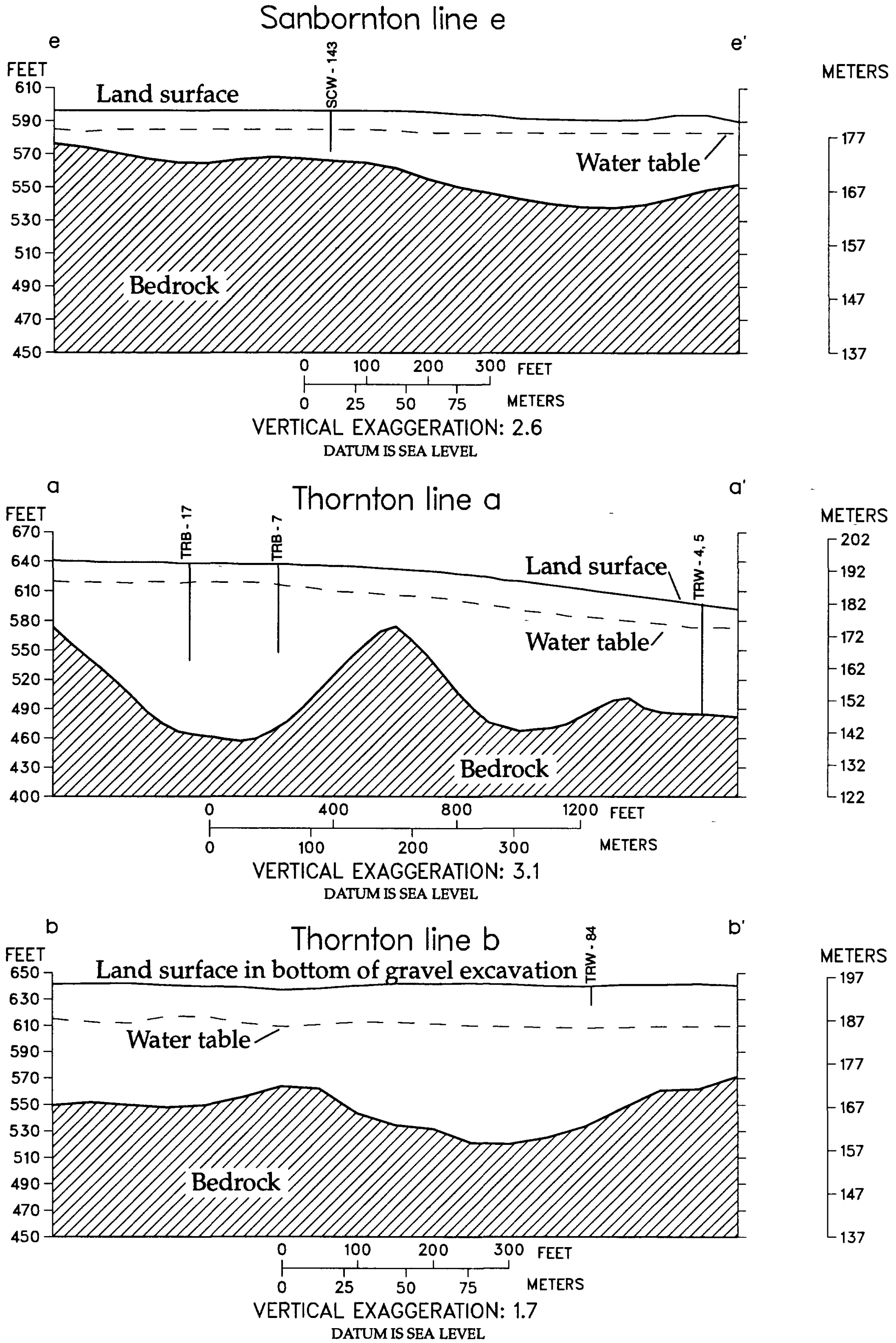




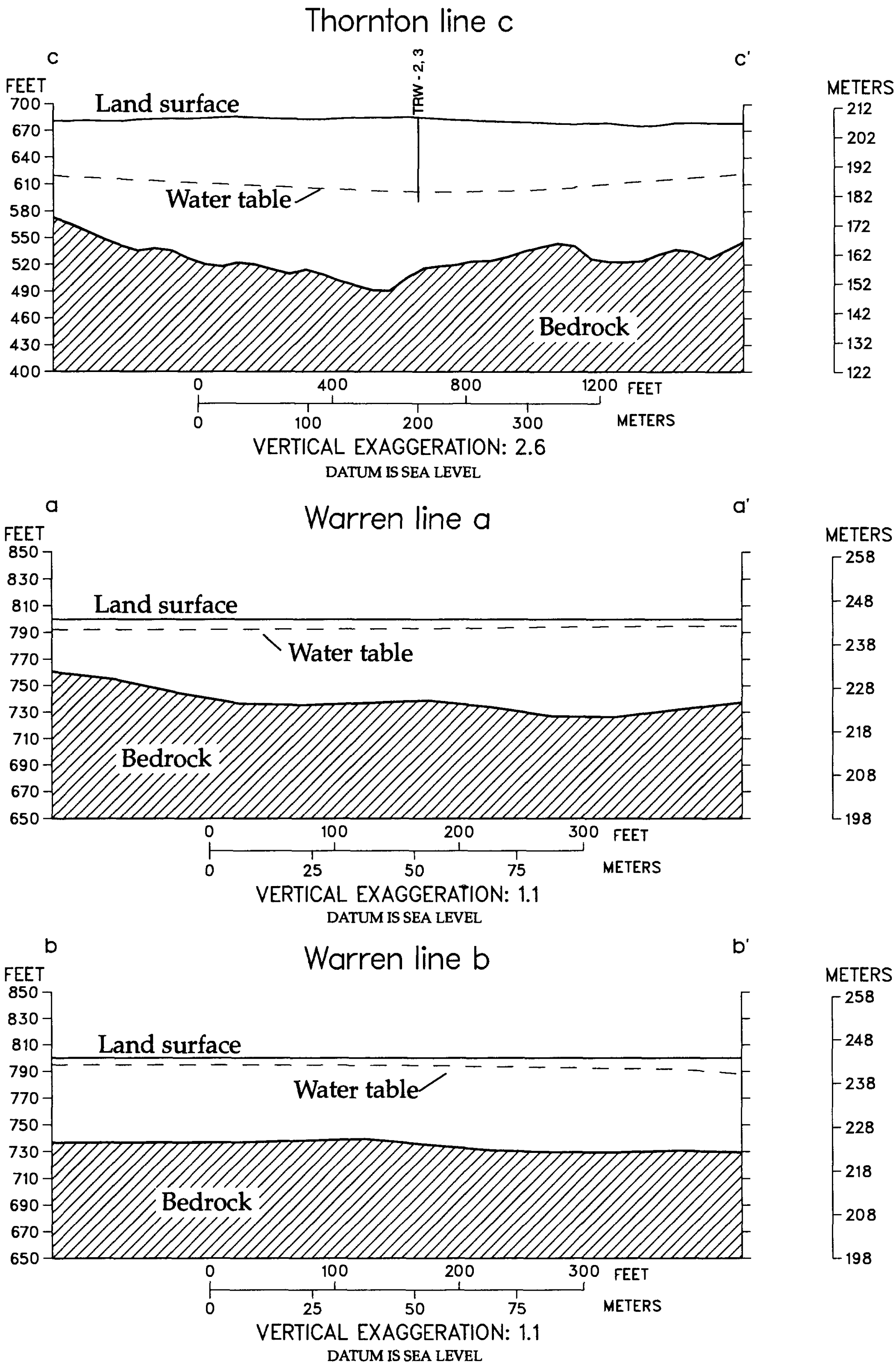
Appendix C11. Geohydrologic sections interpreted from seismic-refraction data for Rumney lines b-b′ and c-c′ (locations shown on plate 5), and Sanbornton line a-a′ (location shown on plate 1).



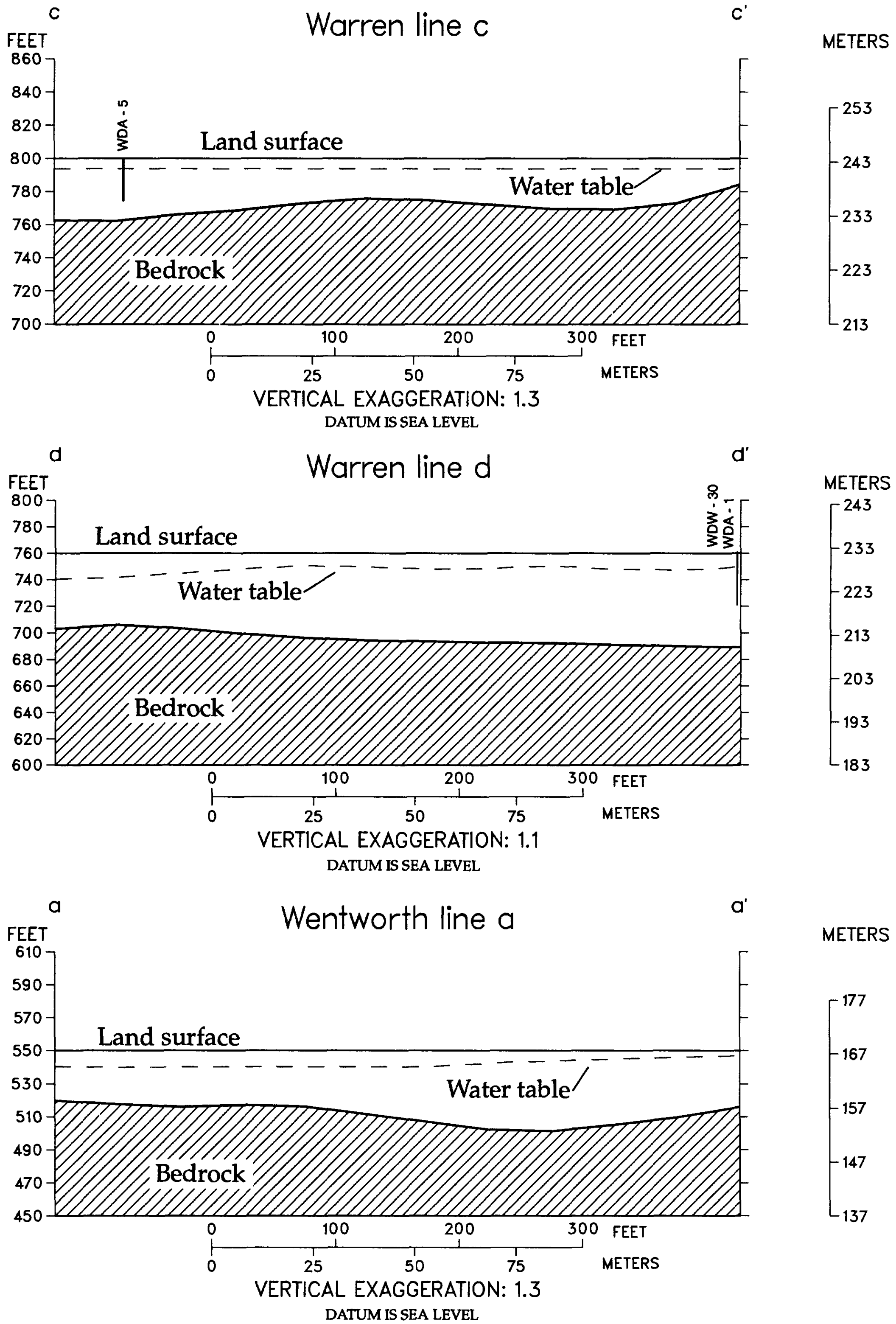
Appendix C12. Geohydrologic sections interpreted from seismic-refraction data for Sanbornton lines b-b′, c-c′, and d-d′ (locations shown on plate 1).



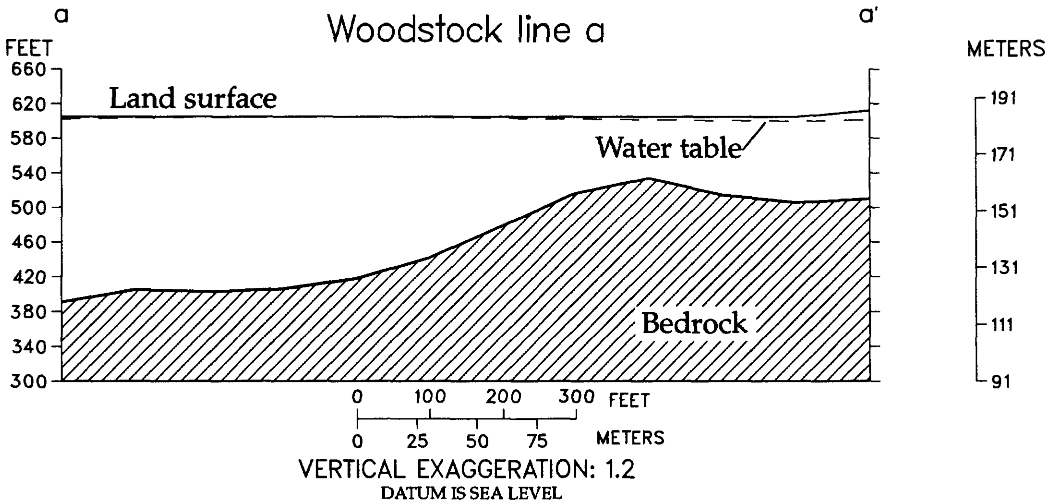
Appendix C13. Geohydrologic sections interpreted from seismic-refraction data for Sanbornton line e-e′ (location shown on plate 1), and Thornton lines a-a′ and b-b′ (locations shown on plate 3).



Appendix C14. Geohydrologic sections interpreted from seismic-refraction data for Thornton line c-c′ (location shown on plate 2), and Warren lines a-a′ and b-b′ (locations shown on plate 5).



Appendix C15. Geohydrologic sections interpreted from seismic-refraction data for Warren lines c-c′ and d-d′ (locations shown on plate 5), and Wentworth line a-a′ (location shown on plate 5).



Appendix C16. Geohydrologic sections interpreted from seismic-refraction data for Woodstock line a-a′ (location shown on plate 3).

APPENDIX D: Low-flow streamflow measurements at stream gages and miscellaneous sites, in the Pemigewasset River Basin, central New Hampshire

Table D-1. Low-flow streamflow measurements at stream gages and miscellaneous sites in the Pemigewasset River Basin, central New Hampshire

[Informal site No.: Number shown on plates 1-5. USGS, U.S. Geological Survey; mi^2, square mile ; ft^3/s, cubic foot per second; (ft^3/s)/mi^2, cubic foot per second per square mile; --, no data; lat, latitude; long, longitude]

Informal site No.	USGS site-identification No. and stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water year)	Measurements: Date	Measurements: Discharge (ft^3/s)	Measurements: Discharge [(ft^3/s)/mi^2]
1	01073990 Pemigewasset River	Merrimack River	Lat 44°03'19", long 71°41'15", Grafton County, Hydrologic Unit 01070001, adjacent to Lincoln Municipal Well Field at upstream well, 1.70 miles north of North Woodstock, N.H.	32.6	--	7-07-88	16	0.49
2	01073991 Pemigewasset River	...do...	Lat 44°03'14", long 71°41'17", Grafton County, Hydrologic Unit 01070001, 274 feet downstream from Lincoln Municipal Well Field, 1.6 miles north of North Woodstock, N.H.	32.7	--	7-07-88	14	.43
4	01074498 East Branch	Pemigewasset River	Lat 44°03'25", long 71°38'04", Grafton County, Hydrologic Unit 01070001, at downstream edge of bridge on Loon Mountain Road, 1.89 miles northeast of Lincoln, N.H.	110.9	--	7-12-88	64	.58
5	01074500 East Branch	...do...	Lat 44°03'23", long 71°38'18", Grafton County, Hydrologic Unit 01070001, 1,100 feet downstream from Loon Mountain bridge off of State Highway 112, 1.89 miles northeast of Lincoln, N.H.	109	1928-53	7-07-88	74	.66
6	01074700 Moosilaukee Brook	...do...	Lat 44°01'33", long 71°41'10", Grafton County, Hydrologic Unit 01070001, 275 feet upstream from U.S. Highway Route 3 bridge over Lost River, 0.28 mile south of North Woodstock, N.H.	27.6	--	7-08-88	6.3	.23
7	01075000 Pemigewasset River	Merrimack River	Lat 43°58'35", long 71°40'47", Grafton County, Hydrologic Unit 01070001, 0.6 miles upstream from Eastman Brook, 0.34 mile southeast of Woodstock, N.H.	194.6	1940-77 1978-87	7-06-88 7-08-88	112 121	.58 .62
8	01075395 Mad River	Pemigewasset River	Lat 43°50'60", long 71°38'21", Grafton County, Hydrologic Unit 01070001, 4,500 feet south of Campton Pond at Campton Trailer Park, 0.95 mile south of Campton Upper Village, N.H.	60.6	--	7-08-88	28	.46
9	01075350 Beebe River	...do...	Lat 43°49'16", long 71°37'54", Grafton County, Hydrologic Unit 01070001, at new highway bridge on Bump Flat Road, 0.47 mile southeast of Campton Hollow, N.H.	27.9	--	7-08-88	2.8	.10
10	01075500 Baker River	...do...	Lat 43°52'05", long 71°54'35", Grafton County, Hydrologic Unit 01070001, on left bank, immediately downstream from old Route 25 bridge in downtown Wentworth, N.H.	57.8	1940-52	--	--	--
11	01075600 Baker River	...do...	Lat 43°51'57", long 71°54'49", Grafton County, Hydrologic Unit 01070001, 1,000 feet downstream from bridge on State Highway 25, 0.19 mile west of Wentworth, N.H.	78.4	--	7-07-88	13	.17
11a	01075800 Stevens Brook	Baker River	Lat 43°50'09", long 71°53'10" Grafton County, Hydrologic Unit 01070001, on left bank 150 feet upstream from highway bridge, 0.2 mile upstream from mouth, 2.5 miles southeast of Wentworth, N.H.	3.2	1963 to current year	7-07-88	.23	.07
12	01076000 Baker River	Pemigewasset River	Lat 43°47'46", long 71°50'42", Grafton County, Hydrologic Unit 01070001, 0.3 mile upstream from Halls Brook, 1.8 miles southwest of Rumney, N.H.	142.8	1929-77 1978-87	--	--	--
13	-- Baker River	Pemigewasset River	Lat 43°47'48", long 71°50'40", Grafton County, Hydrologic Unit 01070001, 600 feet downstream of site 12, 1.8 miles southwest of Rumney, N.H.	144.3	--	7-07-88	33.5	.23
14	-- Baker River	...do...	Lat 43°45'54", long 71°41'10" Grafton County, Hydrologic Unit 01070001, 100 feet upstream from the confluence with the Pemigewasset River, and 0.4 mile upstream from the Plymouth gaging station on the Pemigewasset River	213.6	--	7-07-88	50.3	.24
15	01076500 Pemigewasset River	Merrimack River	Lat 43°45'32", long 71°41'12", Grafton County, Hydrologic Unit 01070001, on right bank 150 feet downstream from bridge at Plymouth and 0.3 mile downstream from Baker River	622.9	1903 to current year	7-08-88	253	.41
16	01077000 Squam River	Pemigewasset River	Lat 43°42'20", long 71°37'48", Grafton County, Hydrologic Unit 01070001, on right bank 200 feet upstream from highway bridge, 0.7 mile north of Ashland, and 1.4 miles downstream from Little Squam Lake	57.9	1939 to current year	7-08-88	7.9	.14

Table D-1. Low-flow streamflow measurements at stream gages and miscellaneous sites in the Pemigewasset River Basin, central New Hampshire—*Continued*

Informal site No.	USGS site-identification No. and stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water year)	Measurements: Date	Measurements: Discharge (ft^3/s)	Measurements: Discharge [(ft^3/s)/mi^2]
17	01077900 Smith River	Pemigewasset River	Lat 43°32'06", long 71°49'15", Grafton County, Hydrologic Unit 01070001, 2,500 feet downstream from steel bridge on State Highway 104, 2.08 miles northeast of Danbury, N.H.	66.2	--	7-08-88	7.4	0.11
18	01077510 Newfound River	...do...	Lat 43°37'01", long 71°44'28", Grafton County, Hydrologic Unit 01070001, 225 feet downstream from Newfound Lake Dam, 1.70 miles north of Bristol, N.H.	95.5	--	7-08-88	59	.62
19	01077550 Pemigewasset River	Merrimack River	Lat 43°34'24", long 71°43'13", Grafton County, Hydrologic Unit 01070001, 2,000 feet south of Blake Brook, 1.51 miles southeast of Bristol, N.H.	852.2	--	7-12-88	366	.43
20	01078000 Smith River	Pemigewasset River	Lat 43°34'00", long 71°44'54", Merrimack County, Hydrologic Unit 01070001, on right bank in Hill, 1.5 miles upstream from mouth and 1.8 miles southwest of Bristol, N.H.	85.9	1918 to current year	7-08-88	14	.16
20a	01078010 Smith River	Pemigewasset River	Lat 43°34'04", long 71°43'56", Grafton County, Hydrologic Unit 01070001, at upstream edge of bridge on Old Bristol Highway, in Franklin Falls Reservoir 750 feet downstream of Profile Falls, 3.5 miles north of Hill, N.H.	87.7	--	7-08-88	14	.16
21	01078200 Needle Shop Brook	...do...	Lat 43°31'45", long 71°41'49", Grafton County, Hydrologic Unit 01070001, at upstream edge of bridge on Old Hill Village Road in Franklin Falls Reservoir, 0.4 mile northeast of Hill, N.H.	8.1	--	7-13-88	1.7	.21
22	01078350 Hermit Brook	Salmon River	Lat 43°33'29", long 71°35'52", Grafton County, Hydrologic Unit 01070001, 100 feet upstream from bridge, on Hermit Woods Road, 0.68 mile northeast of North Sanbornton, N.H.	3.4	--	7-14-88	.02	.01
23	01078450 Salmon Brook	Cawley Pond	Lat 43°33'14", long 71°36'21", Grafton County, Hydrologic Unit 01070001, at upstream edge of bridge on Hermit Woods Road, 1,500 feet east of intersection with State Highway 132, 0.10 mile northeast of North Sanbornton, N.H.	7.4	--	7-14-88	.96	.13
24	01078450 Salmon Brook	Pemigewasset River	Lat 43°29'49", long 71°38'00", Grafton County, Hydrologic Unit 01070001, 400 feet downstream from bridge on Prescott Road at Sanbornton General Store, 1 mile west of Sanbornton, N.H.	22.1	--	7-13-88	1.9	.09
25	01078540 Sucker Brook	Webster Lake	Lat 43°28'15", long 71°42'05", Grafton County, Hydrologic Unit 01070002, 600 feet upstream from bridge on Lake Shore Drive, 2,000 feet north of intersection of U.S. Route 11 and Lake Shore Drive, 3.16 miles northwest of Franklin, N.H.	12.4	--	7-13-88	.76	.06
26	01078545 Chance Pond Brook	Pemigewasset River	Lat 43°26'41", long 71°39'49", Grafton County, Hydrologic Unit 01070001, 50 feet upstream from railroad bridge over Chance Pond Brook, 1,000 feet upstream from mouth, 0.8 mile northwest of Franklin, N.H.	18.5	--	7-13-88	.64	.03
27	01078520 Pemigewasset River	Merrimack River	Lat 43°26'36", long 71°39'31", Grafton County, Hydrologic Unit 01070002, 1,500 feet south of Eastman Falls Dam, 0.57 mile west of Franklin, N.H.	1,021.8	–	7-11-88	457	.45
28	01081000 Winnipesaukee River	...do...	Lat 43°26'31", long 71°35'15", Belknap County, Hydrologic Unit 01070002, on right bank at Tilton and 0.3 mile upstream from Packer Brook, Tilton, N.H.	471	1937 to current year	7-07-88	246	.52
29	01081400 Winnipesaukee River	...do...	Lat 43°26'29", long 71°39'04", Grafton County, Hydrologic Unit 01070001, behind Franklin High School, 1,500 feet north of confluence with Pemigewasset River, 0.40 mile southwest of Franklin, N.H.	--	--	7-11-88	244	--
30	01081500 Merrimack River	Atlantic Ocean	Lat 43°25'22", long 71°39'10", Merrimack County, Hydrologic Unit 01070002, 1 mile downstream from confluence of Pemigewasset and Winnipesaukee Rivers at Franklin Junction	1,507	1903-78 1983-88	7-11-88	701	.47

APPENDIX E: Summary of ground-water-quality analyses in the Pemigewasset River Basin, central New Hampshire

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Table E-1. Summary of ground-water-quality analyses in the Pemigewasset River Basin, central New Hampshire

[ft, feet; µS/cm, values are reported in microsiemen per centimeter at 25 degrees Celsius; °C, degrees Celsius; mg/L, milligram per liter; µg/L, microgram per liter; $NO_2^- + NO_3^-$, nitrite plus nitrate; WAT WH, water whole, unfiltered; TOT INC, total incremental titration; dissolved, filtered water; recoverable, less than 95 percent of total; --, no data collected. A less than sign indicates a value less than the detection limit. Agency analyzing samples was U.S. Geological Survey Central Laboratories, Arvada, Colo.]

Local identifier	Date of sampling	Depth of well total (ft)	Screened interval (ft)	Specific conductance lab (µS/cm)	pH (standard units)	Temperature (°C)	Oxygen, dissolved (mg/L)	Hardness, total (mg/L as $CaCO_3$)	Acidity (mg/L as $CaCO_3$)
ANW- 1	9-01-88	42.9	39.5-42.5	77	7.50	9.4	9.4	25	0.1
ANW-14	9-01-88	27.1	23.7-26.7	64	6.20	9.5	2.6	20	<.1
APW- 2	9-02-88	22.0	19.0-22.0	257	6.80	10.5	.7	20	<.1
APW- 3	9-02-88	20.5	17.5-20.5	93	7.70	9.5	3.5	20	<.1
B2W-18	9-13-88	36.0	39.0-49.0	60	6.00	10.1	3.0	14	<.1
B2W-36	9-13-88	70.0	--	93	7.20	8.7	5.2	28	<.1
CBS- 1	9-05-88	--	--	26	6.30	10.6	13.8	7	<.1
CBW- 3	9-05-88	29.4	26.4-29.4	189	6.90	11.1	3.5	36	<.1
CBW- 4	9-05-88	74.0	71.0-74.0	53	7.40	10.4	.7	49	<.1
CBW-33	9-03-88	23.1	19.7-22.7	64	5.80	10.9	9.9	51	<.1
CBW-34	9-03-88	107.0	103.6-106.6	237	6.20	8.8	6.0	60	<.1
FKW-29	9-07-88	45.0	97.0-122.0	116	6.70	9.9	5.8	41	<.1
HNW- 7	9-01-88	120.0	117.0-120.0	53	8.20	7.7	9.7	33	<.1
HRW-1	9-03-88	87.6	84.6-87.6	162	8.20	7.7	9.7	33	<.1
LKW- 1	9-12-88	15.0	--	70	5.90	12.8	8.2	11	<.1
PYW- 9	9-06-88	45.0	--	209	6.30	9.2	2.8	39	<.1
RUW- 2	9-03-88	26.5	23.5-26.5	285	6.70	9.9	2.8	81	<.1
RUW-14	9-03-88	42.8	39.4-42.4	151	7.20	8.5	5.3	43	<.1
RUW-15	9-03-88	77.8	74.4-77.4	70	6.70	10.2	8.7	20	<.1
SCS- 1	9-05-88	--	--	180	6.10	9.8	12.8	36	<.1
SCW-50	9-07-88	45.0	--	114	6.70	15.6	4.3	39	<.1
SCW-58	9-01-88	21.0	17.6-20.6	35	9.10	13.9	6.0	9	<.1
SCW-135	9-01-88	44.4	41.0-44.0	76	7.90	9.2	6.0	19	<.1
TRW- 5	9-05-88	32.2	29.2-32.2	53	6.30	8.6	10.6	10	<.1
WFW- 2	9-07-88	58.0	--	24	5.30	7.2	7.6	4	<.1
WSW-14	9-07-88	--	--	137	6.10	11.0	6.0	21	<.1

Local identifier	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Alkalinity, WAT WH TOT INC field (mg/L as $CaCO_3$)	Sulfate, dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Fluoride, dissolved (mg/L as F)	Silica, dissolved (mg/L as SiO_2)	Solids sum of constituents, dissolved (mg/L)
ANW-1	7.6	1.4	2.6	2.1	14	15	1.1	<0.10	11	46
ANW-14	6.2	1.1	3.4	1.0	13	3.6	6.7	.20	12	47
APW- 2	6.4	1.0	38	1.8	14	7.9	58	.40	9.7	128
APW- 3	6.7	.83	8.2	1.0	12	4.2	14	.20	11	51
B2W-18	3.8	.97	5.4	.70	9.0	6.6	6.6	.10	9.6	41
B2W-36	7.8	.0	6.9	1.2	24	5.3	9.1	.10	15	62
CBS-1	2.1	.34	2.2	.30	8.0	3.1	.80	<.10	12	18
CBW- 3	11	2.1	19	1.7	18	5.8	.36	.20	9.3	1.4
CBW-4	4.1	.96	3.9	1.3	16	6.8	.40	20	40	--
CBW-33	5.7	1.9	2.1	1.2	8.0	14	1.4	<.10	7.4	36
CBW-34	18	3.6	20	2.0	25	9.7	44	<.10	17	146
FKW-29	9.9	3.9	6.0	1.3	30	7.2	10	.10	16	71
HNW- 7	5.3	.86	2.2	1.8	14	6.5	1.9	<.10	8.3	32
HRW- 1	9.4	2.2	16	1.8	18	7.5	30	.10	16	92
LKW- 1	3.4	.49	8.7	.70	5.0	5.8	11	.40	8.4	40
PYW- 9	11	2.3	22	1.6	12	14	41	.10	16	127
RUW- 2	28	5.5	10	3.8	37	23	37	.10	20	142
RUW-14	12	3.1	10	2.5	22	16	17	.10	14	88
RUW-15	5.6	1.4	5.1	1.3	14	9.3	4.2	<.10	12	42
SCS- 1	8.3	1.8	21	2.8	11	10	32	<.10	9.3	98
SCW-50	9.5	3.7	6.2	1.3	27	7.2	10	.10	15	64
SCW-58	2.9	.49	1.6	.70	8.0	4.3	1.5	.10	9.1	18
SCW-135	5.5	1.2	5.1	1.5	12	7.7	5.8	.10	8.1	35
TRW- 5	3.0	.57	5.1	1.0	7.0	5.2	6.7	.10	10	30
WFW- 2	1.2	.12	1.3	.70	2.0	2.4	2.6	.10	6.1	12
WSW-14	6.7	1.1	14	1.6	10	8.2	25	.10	10	70

Table E-1. Summary of ground-water-quality analyses in the Pemigewasset River Basin, central New Hampshire—*Continued*

Local identifier	Nitrogen, $NO_2^- + NO_3^-$, dissolved (mg/L as N)	Nitrogen, ammonia, dissolved (mg/L as N)	Nitrogen, ammonia + organic, dissolved (mg/L as N)	Nitrogen, nitrite, dissolved (mg/L as N)	Phosphorous, dissolved (mg/L as P)	Aluminum, dissolved (µg/L as Al)	Arsenic, dissolved (µg/L as As)	Barium, dissolved (µg/L as Ba)	Beryllium, dissolved (µg/L as Be)
ANW-1	0.420	<0.020	<0.20	<0.010	<0.010	<10	<1	10	<0.5
ANW-14	.860	<.010	<.20	<.010	<.010	10	<1	4	<.5
APW-2	<.100	<.030	<.20	<.010	<.010	80	1	22	<.5
APW-3	.530	<.010	<.30	<.010	<.010	60	<1	11	<.5
B2W-18	.300	<.010	.30	<.010	<.010	40	<1	13	<.5
B2W- 36	.630	<.010	.30	<.010	.010	<10	<1	6	<.5
CBS-1	<.100	.010	<.20	<.010	<.010	20	<1	13	.8
CBW-3	.480	<.010	<.20	<.010	<.010	30	<1	18	<.5
CBW-4	<.100	<.010	<.20	<.010	<.010	<10	<1	14	<.5
CBW- 33	1.20	<.010	.40	<.010	<.010	60	<1	21	.5
CBW- 34	1.20	<.010	.30	<.010	<.010	20	<1	21	2
FKW--29	.950	<.010	.30	<.010	<.010	<10	<1	2	<.5
HNW-7	.260	<.010	<.20	<.010	<.010	<10	<1	5	<.5
HRW-1	1 .270	<.010	.30	<.010	<.010	<10	<1	9	2
LKW-4	.220	<.010	.30	<.010	<.010	130	<1	4	.7
PYW-9	.310	.010	.40	<.010	.280	80	<1	23	<.5
RUW-2	<.100	.020	.40	<.050	<.010	10	3	100	<.5
RUW-14	.480	<.010	.20	<.010	<.010	<10	<1	30	.8
RUW-15	.860	<.010	.30	<.010	<.010	10	<1	15	<.5
SCS-1	2.20	<.030	.40	<.010	<.010	20	<1	38	<.5
SCW-50	.970	.010	.30	<.010	<.010	<10	<1	17	<.5
SCW-58	<.100	<.010	<.20	<.010	<.010	<10	<1	5	<.5
SCW-135	.900	<.010	<.20	<.010	<.010	<10	<1	8	<.5
TRW-5	.200	<.010	<.20	<.010	<.010	20	<1	13	<.5
WFW-2	.110	<.010	<.20	<.010	<.010	210	12	7	<.5
WSW-14	.380	<.010	.20	<.010	<.010	60	<1	4	<.5

Local identifier	Boron, dissolved (µg/L as B)	Cadmium, dissolved (µg/L as Cd)	Chromium, dissolved (µg/L as Cr)	Cobalt, dissolved (µg/L as Co)	Copper, dissolved (µg/L as Cu)	Iron, total recoverable (µg/L as Fe)	Iron, dissolved (µg/L as Fe)	Lead, dissolved (µg/L as Pb)	Lithium, dissolved (µg/L as Li)
ANW--1	<10	<1	1	<3	<10	180	88	<10	<4
ANW-14	<10	<1	2	<3	<10	700	8	<10	<4
APW- 2	<10	<1	<1	<3	<10	1,000	1,000	<10	<4
APW- 3	<10	<1	<1	<3	<10	40	9	<10	<4
B2W-18	20	<1	--	<3	80	320	190	<10	<4
B2W-36	<10	<1	--	<3	<10	40	26	<10	<4
CBS- 1	<10	<1	<1	<3	<10	<10	16	<10	<4
CBW- 3	<10	<1	<1	<3	<10	20	3	<10	<4
CBW- 4	<10	<1	1	<3	<10	30	<3	<10	7
CBW-33	<10	<1	2	<3	<10	20	10	<10	<4
CBW-34	<10	<1	1	<3	<10	130	11	<10	8
FKW-29	<10	<1	--	<3	50	<10	7	<10	<4
HNW- 7	<10	<1	1	<3	<10	260	10	<10	<4
HRW- 1	<10	<1	2	<3	<10	230	<3	<10	<4
LKW- 1	<10	<1	--	<3	30	40	16	<10	<4
PYW- 9	<10	<1	--	<3	10	760	800	10	<4
RUW- 2	<10	2	2	4	<10	13,000	16,000	<10	6
RUW-14	<10	<1	1	<3	<10	700	<3	<10	<4
RUW-15	<10	<1	2	<3	<10	3,000	3	<10	<4
SCS- 1	80	<1	<1	<3	<10	10	12	<10	<4
SCW-50	<10	<1	<1	<3	<10	750	17	<10	<4
SCW-60	<10	<1	<1	<3	<10	60	4	<10	<4
SCW-135	<10	<1	--	<3	80	40	21	<10	<4
TRW- 5	<10	<1	2	<3	<10	130	5	<10	<4
WFW- 2	<10	<1	--	<3	<10	180	7	<10	<4
WSW-14	<10	<1	--	<3	540	10	7	20	<4

Table E-1. Summary of ground-water-quality analyses in the Pemigewasset River Basin, central New Hampshire—*Continued*

Local identifier	Man ganese, dissolved (µg/L as Mn)	Mercury, dissolved (µg/L as Hg)	Molybdenum, dissolved (µg/L as Mo)	Nickel, dissolved (µg/L as Ni)	Selenium, dissolved (µg/L as Se)	Silver, dissolved (µg/L as Ag)	Strontium, dissolved (µg/L as Sr)	Vanadium, dissovled (µg/L as V)	Zinc, dissolved (µg/L as Zn)	Carbon, orgranic, dissolved (µg/L as C)
ANW-1	400	<0.1	<10	<1	<1	<1.0	63	<6	<3	0.8
ANW-14	3	<.1	<10	<1	<1	<1.0	47	<6	<3	.8
APW- 2	61	<.1	<10	1	<1	<1.0	54	<6	9	1.0
APW- 3	4	<.1	<10	<1	<1	<1.0	42	<6	16	.6
B2W-18	2	--	<10	1	--	--	44	<6	11	1.1
B2W-36	8	--	<10	1	--	--	45	<6	10	1.0
CBS- 1	1	<.1	<10	1	<1	1.0	17	<6	3	.9
CBW- 3	<1	<.1	<10	<1	<1	<1.0	100	<6	3	.9
CBW- 4	180	<.1	<10	1	1	<1.0	35	<6	<3	.8
CBW-33	4	.1	<10	<1	<1	1.0	42	<6	4	1.2
CBW-34	19	.2	<10	<1	<1	<1.0	150	<6	7	.7
FKW-29	<1	--	<10	<1	--	--	61	<6	10	.5
HNW- 7	27	<.1	<10	<1	<1	<1.0	28	<6	3	1.1
HRW- 1	18	<.1	<10	<1	<1	1.0	64	<6	4	1.0
LKW- 1	3	--	<10	<1	--	--	22	<6	8	1.5
PYW- 9	250	--	<10	<1	--	--	91	<6	15	.5
RUW- 2	260	<.1	<10	<1	<1	1.0	140	<6	<3	1.7
RUW-14	2	<.1	<10	1	<1	1.0	57	<6	4	.8
RUW-15	2	<.1	<10	<1	<1	1.0	45	<6	5	.6
SCS- 1	11	30	<.1	<10	1	<1	1.0	76	<6	5
SCW-50	5	--	<10	1	--	--	65	<6	9	.7
SCW-58	430	<.1	<10	2	<1	<1.0	29	<6	14	.8
SCW-135	95	<.1	<10	2	<1	<1.0	38	<6	13	.8
TRW- 5	3	<.1	<10	<1	<1	<1.0	23	<6	3	.6
WFW- 2	55	--	<10	1	--	--	19	<6	7	.5
WSW-14	16	--	<10	<1	--	--	84	<6	13	.5

Local identifier	Dichloro-bromo methane, total (µg/L)	Carbon tetra-chloro-ethane, total (µg/L)	1, 2-di-chloro-form, total (µg/L)	Bromo-form, total (µg/L)	Chloro-dibromo-ethane, total (µg/L)	Chloro-form, total (µg/L)	Toluene, total (µg/L)	Benzene, total (µg/L)	Chloro-benzene, total (µg/L)	Chloro-ethane, total (µg/L)
ANW-1	--	--	--	--	--	--	--	--	--	--
ANW-14	--	--	--	--	--	--	--	--	--	--
APW- 2	--	--	--	--	--	--	--	--	--	--
APW- 3	--	--	--	--	--	--	--	--	--	--
B2W-18	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
B2W-36	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
CBS- 1	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
CBW- 3	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
CBW- 4	<.20	<.20	<.20	<.20	<.20	<.20	<.20	.30	<.20	<.20
CBW-33	--	--	--	--	--	--	--	--	--	--
CBW-34	--	--	--	--	--	--	--	--	--	--
FKW-29	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
HNW- 7	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
HRW- 1	--	--	--	--	--	--	--	--	--	--
LKW- 1	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
PYW- 9	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
RUW- 2	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
RUW-14	--	--	--	--	--	--	--	--	--	--
RUW-15	--	--	--	--	--	--	--	--	--	--
SCS- 1	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
SCW-50	<.20	<.20	<.20	<.20	<.20	.60	<.20	<.20	<.20	<.20
SCW-58	--	--	--	--	--	--	--	--	--	--
SCW-135	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
TRW- 5	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
WFW- 2	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
WSW-14	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20

Table E-1. Summary of ground-water-quality analyses in the Pemigewasset River Basin, central New Hampshire—*Continued*

Local identifier	Ethyl-benzene, total (µg/L)	Methyl-bromide, total (µg/L)	Methyl-chloride, total (µg/L)	Methylene chloride, total (µg/L)	Tetrachloro-ethylene, total (µg/L)	Tri-chloro-fluoro-methane, total (µg/L)	1,1-Dichloro-ethane, total (µg/L)	1,1-Dichloro-ethylene, total (µg/L)	1,1,1-Tri-chloro-ethane, total (µg/L)	1,1,2-Tri-chloro-ethane, total (µg/L)
ANW-1	--	--	--	--	--	--	--	--	--	--
ANW-14	--	--	--	--	--	--	--	--	--	--
APW- 2	--	--	--	--	--	--	--	--	--	--
APW- 3	--	--	--	--	--	--	--	--	--	--
B2W-18	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
B2W-36	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
CBS- 1	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
CBW- 3	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
CBW- 4	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
CBW-33	--	--	--	--	--	--	--	--	--	--
CBW-34	--	--	--	--	--	--	--	--	--	--
FKW-29	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
HNW- 7	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
HRW- 1	--	--	--	--	--	--	--	--	--	--
LKW- 1	<.20	<.20	<.20	<.20	<.20	<.20	<.20	.20	<.20	<.20
PYW- 9	<.20	<.20	<.20	<.20	<.20	<.20	<.20	.20	<.20	<.20
RUW- 2	<.20	.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
RUW-14	--	--	--	--	--	--	--	--	--	--
RUW-15	--	--	--	--	--	--	--	--	--	--
SCS- 1	<.20	.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
SCW-50	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
SCW-58	--	--	--	--	--	--	--	--	--	--
SCW-135	<.20	.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
TRW- 5	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
WFW- 2	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
WSW-14	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20

Local identifier	1,1,2,2 Tretra-chloro-ethane, total (µg/L)	1,2-Di-bromo-ethane, water whole, total (µg/L)	1,2-Dibro-moethylene, total (µg/L)	1,2-Di-chloro-benzene, total (µg/L)	1,2-Di-chloro-propane, total (µg/L)	1,2-Trans-di-chloro-ethene, total (µg/L)	1,3 Di-chloro-propene, total (µg/L)	3-Di-chloro benzene, total (µg/L)	1,4-Di-chloroether, total (µg/L)	2-Chloro ethyl vinyl ether, total (µg/L)
ANW-1	--	--	--	--	--	--	--	--	--	--
ANW-14	--	--	--	--	--	--	--	--	--	--
APW- 2	--	--	--	--	--	--	--	--	--	--
APW- 3	--	--	--	--	--	--	--	--	--	--
B2W-18	<.20	<.20	--	<.20	<.20	<.20	<.20	<.20	<.20	<.20
B2W-36	<.20	<.20	--	<.20	<.20	<.20	<.20	<.20	<.20	<.20
CBS- 1	<.20	--	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
CBW- 3	<.20	<.20	--	<.20	<.20	<.20	<.20	<.20	<.20	<.20
CBW- 4	<.20	<.20	--	<.20	<.20	<.20	<.20	<.20	<.20	<.20
CBW-33	--	--	--	--	--	--	--	--	--	--
CBW-34	--	--	--	--	--	--	--	--	--	--
FKW-29	<.20	--	<.20	<.20	<.20	<.20	<.20	<.20	<.20	.20
HNW- 7	<.20	<.20	--	<.20	<.20	<.20	<.20	<.20	<.20	<.20
HRW- 1	--	--	--	--	--	--	--	--	--	--
LKW- 1	<.20	<.20	--	<.20	<.20	<.20	<.20	<.20	<.20	<.20
PYW- 9	<.20	--	<.2	<.20	<.20	<.20	<.20	<.20	<.20	<.20
RUW- 2	<.20	<.20	--	<.20	<.20	<.20	<.20	<.20	<.20	<.20
RUW-14	--	--	--	--	--	--	--	--	--	--
RUW-15	--	--	--	--	--	--	--	--	--	--
SCS- 1	<.20	--	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
SCW-50	<.20	<.20	--	<.20	<.20	<.20	<.20	<.20	<.20	<.20
SCW-58	--	--	--	--	--	--	--	--	--	--
SCW-135	<.20	<.20	--	<.20	<.20	<.20	<.20	<.20	<.20	<.20
TRW- 5	<.20	<.20	--	<.20	<.20	<.20	<.20	<.20	<.20	<.20
WFW- 2	<.20	<.20	--	<.20	<.20	<.20	<.20	<.20	<.20	<.20
WSW-14	<.20	<.20	--	<.20	<.20	<.20	<.20	<.20	<.20	<.20

Table E-1. Summary of ground-water-quality analyses in the Pemigewasset River Basin, central New Hampshire—*Continued*

Local identifier	Dichloro-difluoro-methane, total (μg/L)	Trans-1,3-dichloro-propene, total (μg/L)	Cis 1,3-Dichloro-propene, total (μg/L)	Vinyl chloride, total (μg/L)	Tri-chloro-ethylene, total (μg/L)	Styrene, total (μg/L)	Xylene, total, water, whole recoverable (μg/L)
ANW-1	--	--	--	--	--	--	--
ANW-14	--	--	--	--	--	--	--
APW- 2	--	--	--	--	--	--	--
APW- 3	--	--	--	--	--	--	--
B2W-18	<.20	<.20	<.20	<.20	<.20	<.20	<.20
B2W-36	<.20	<.20	<.20	<.20	<.20	<.20	<.20
CBS- 1	<.20	<.20	<.20	<.20	<.20	<.20	<.20
CBW- 3	<.20	<.20	<.20	<.20	<.20	<.20	<.20
CBW- 4	<.20	<.20	<.20	<.20	<.20	<.20	<.20
CBW-33	--	--	--	--	--	--	--
CBW-34	--	--	--	--	--	--	--
FKW-29	<.20	<.20	<.20	<.20	<.20	<.20	<.20
HNW- 7	<.20	<.20	<.20	<.20	<.20	<.20	<.20
HRW- 1	--	--	--	--	--	--	--
LKW- 1	<.20	<.20	<.20	<.20	<.20	<.20	--
PYW- 9	<.20	<.20	<.20	<.20	<.20	<.20	<.20
RUW- 2	<.20	<.20	<.20	<.20	<.20	<.20	<.20
RUW-14	--	--	--	--	--	--	--
RUW-15	--	--	--	--	--	--	--
SCS- 1	<.20	<.20	<.20	<.20	<.20	<.20	<.20
SCW-50	<.20	<.20	<.20	<.20	<.20	<.20	<.20
SCW-58	--	--	--	--	--	--	--
SCW-135	<.20	<.20	<.20	<.20	<.20	<.20	<.20
TRW- 5	<.20	<.20	<.20	<.20	<.20	<.20	<.20
WFW- 2	<.20	<.20	<.20	<.20	<.20	<.20	<.20
WSW-14	<.20	<.20	<.20	<.20	<.20	<.20	<.20