AVAILABILITY OF WATER FROM STRATIFIED-DRIFT AQUIFERS IN THE FARMINGTON RIVER VALLEY, SIMSBURY, CONNECTICUT

By Robert L. Melvin and James W. Bingham

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CONVERSION FACTORS AND ABBREVIATIONS

For the convenience of readers who prefer metric (International System) units rather than inch-pound units used in this report, the following conversion factors may be used:

Multiply inch-pound units	by	To obtain metric units
	Length	
inch (in.)	25.4	millimeter (mm)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
	Area	
square foot (ft^2)	0.09294	square meter (m^2)
square mile (mi^2)	2.590	square kilometer (km^2)
	Volume	
million gallons (Mgal)	3,785	cubic meters (m^3)
gallon (gal)	0.003785	cubic meter (m^3)
cubic feet (ft^3)	0.02832	cubic meters (m^3)
	Flow	
gallon per minute (gal/min)	0.06308	liter per second (L/s)
cubic foot per second (ft^3/s)	0.02832	cubic meter per second (m^3/s)
million gallons per day (Mgal/d)	0.04381	cubic meter per second (m^3/s)
	Hydraulic conductivity	
foot per day (ft/d)	0.3048	meter per day (m/d)
	Transmissivity	
foot squared per day (ft^2/d)	0.09290	meter squared per day (m^2/d)

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

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ABSTRACT

Extensive stratified-drift deposits underlie the Farmington River valley and several tributary valleys in Simsbury, Connecticut. Most of these deposits are lacustrine and are composed predominantly of fine to very fine sand, silt, and clay. In a few places, coarse-grained, saturated, stratified-drift deposits constitute significant aquifers capable of yielding several million gallons of water per day.

Major aquifers are located near the community of Hoskins in northern Simsbury, on the east side of the Farmington River near Avon, in the Stratton Brook basin, and in the part of the Bissell Brook basin that extends from Simsbury northward into the town of Granby. The major aquifers are termed the Hoskins aquifer, the Nod Road aquifer, the Stratton Brook aquifer, and the Bissell Brook aquifer in this report. The long-term yields, estimated from regional information on recharge rates and analytical flow models, are estimated to be 1.6 million gallons per day for the Hoskins aquifer, 1.8 to 2.7 million gallons per day for the Nod Road aquifer, and 3.4 million gallons per day for the Stratton Brook aquifer. A rudimentary estimate of the maximum long-term yield of the Bissell Brook aquifer of 3 million gallons per day is based only on assumed recharge rates. No analytical flow model was made for the Bissell Brook aquifer as it is largely outside the boundaries of the study area. Smaller quantities of ground water can be developed at other locations where less extensive coarse-grained, saturated, stratified-drift deposits, greater than 40 feet thick, are present.

INTRODUCTION

Simsbury is a rapidly growing town of about 23,000 people, located in the Farmington River valley, 14 mi (miles) from Hartford, Connecticut. (See fig. 1.) The area is entirely dependent on ground water for public supply and recent and anticipated growth in population and industrial and commercial development have prompted concern over the adequacy of this resource in the future. To acquire hydrogeologic information needed for water-resources planning and management, the town of Simsbury and the U.S. Geological Survey, in 1981, began a cooperative study of ground-water availability from stratified drift--the major aquifer for public- and industrial-water supplies. The initial phase of this study identified several stratified-drift areas with potential for development of additional ground water in the Farmington River valley and in valleys drained by Bissell, Hop, and Stratton Brooks (Bingham, 1984). The second phase of the cooperative study began in 1984 and focused on these stratified-drift areas and on other deep parts of the Farmington valley where hydrogeologic information was inadequate to assess the potential for ground-water development. The results of the second and final part of the study are contained in this report.

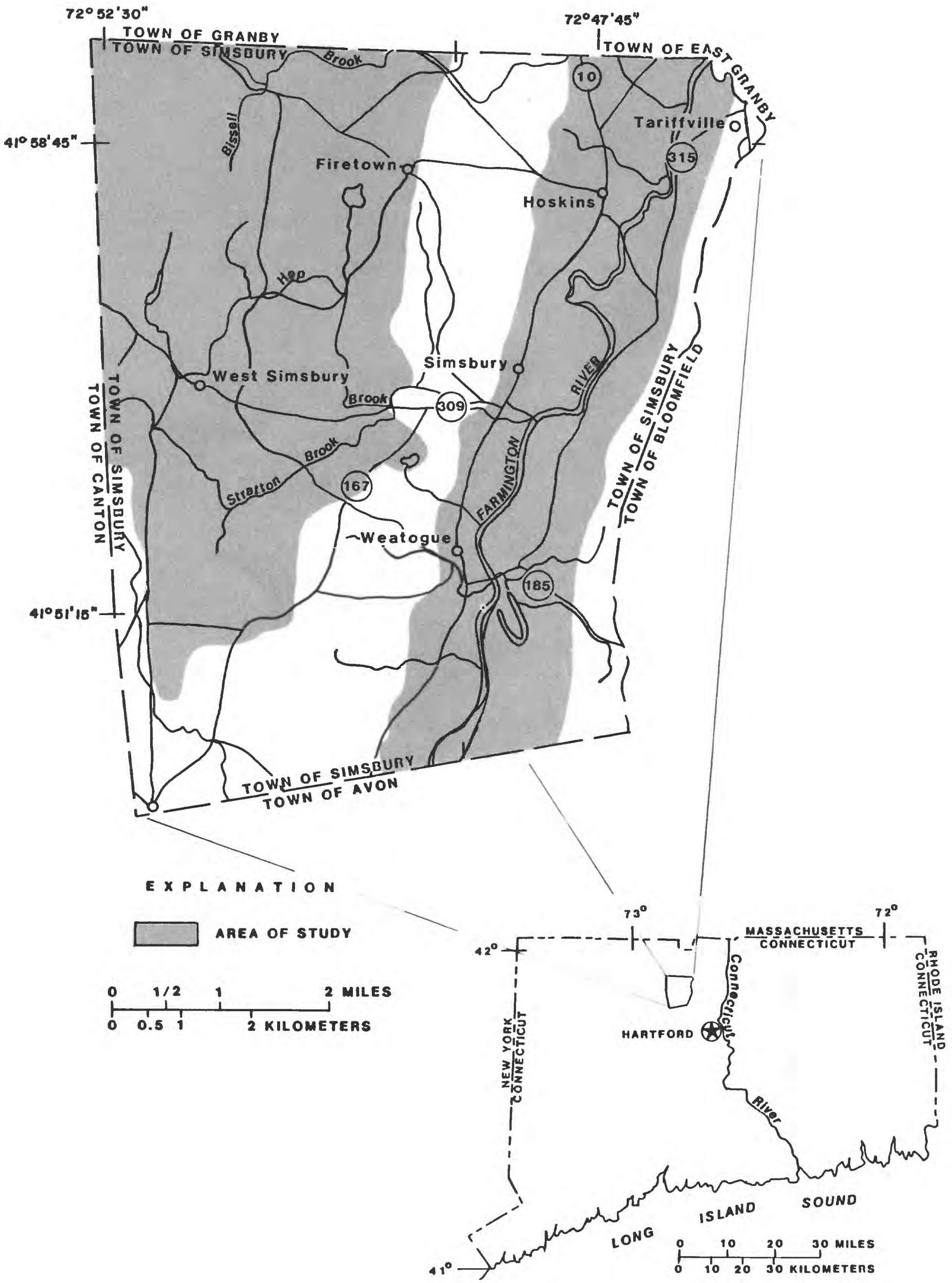


Figure 1.--Location of study area.

Purpose and Scope

This report describes the extent, lithology, and hydrogeologic characteristics of the stratified drift in parts of the Farmington River valley and the Bissell, Hop, and Stratton Brook drainage basins within Simsbury; identifies where hydrogeologic conditions are most favorable for additional development of large quantities of ground water from stratified drift; and estimates how much ground water can be withdrawn on a sustained basis at these locations. No attempt has been made to investigate the quality of water in the stratified drift or in the streams that are hydraulically connected to these deposits. Some useful water-quality data, however, are contained in previous studies (Randall, 1964a, 1964b; U.S. Geological Survey, 1970, 1971, 1972; Grady and Handman, 1983; and Handman and others, 1986). The water quality of the Farmington River at Avon, Connecticut and Tariffville, Connecticut (U.S. Geological Survey station numbers 01189120 and 01189995) is also monitored monthly by the U.S. Geological Survey. The results of the monthly monitoring are published in the annual series of U.S. Geological Survey publications titled Water Resources Data For Connecticut.

The information on the extent, lithology, and hydrogeologic characteristics of stratified drift contained in this report are based on previously published maps of surficial geology (Schnabel, 1962; Randall, 1970), data from wells and test holes, geophysical surveys, and analyses of short-term pumping tests. Logs of more than 200 wells and test holes were used to define the lithology and hydrogeologic characteristics of the stratified drift. Thirty-six wells and test holes were drilled specifically for this study, including five that reached depths greater than 200 ft (feet). Geophysical surveys conducted for the study included 26 seismic-refraction profiles and 2 seismic-reflection profiles along the channel of the Farmington River. The results of the seismic-reflection surveys have been described by Haeni and Melvin (1984). Geologic sections interpreted from seismic-refraction and seismic-reflection data are shown in appendices B and C and the well and test-hole data, including selected logs, are contained in appendices D, E, and F (located at the end of the text). All data-collection sites are shown on plate 1.

Previous Investigations

Hydrologic and geologic studies conducted prior to 1980 are cited by Bingham (1984, p. 3-4) and the most significant (Randall, 1964a, 1964b, 1970; Hopkins and Handman, 1975; and Schnabel, 1962) are referenced in this report. The town of Simsbury lies within the Farmington River basin, whose water resources have been recently described by Handman and others (1986).

The report by Bingham (1984) summarized the existing information on stratified-drift aquifers in Simsbury, including the information contained in Handman and others (1986). It did not however, include information on ground-water quality. Plates 2 and 3 that accompany Bingham's 1984 report show the known distribution, saturated thickness[1/], and lithology of stratified-drift aquifers at that time. Bingham's report also identified areas believed to have the best potential for future development of ground water. These areas included part of the Farmington River valley and parts of the Bissell, Hop, and Stratton Brook drainage basins.

Acknowledgments

Appreciation is extended to the Village Water Company for records of wells and test holes and to public agencies, companies, and individuals who allowed access to property in order to drill test holes and conduct geophysical surveys.

HYDROGEOLOGIC SETTING

General Description

Sedimentary and igneous rocks of Triassic age underlie almost all of Simsbury. The major topographic features reflect the distribution of these two rock types. Talcott Mountain, along the eastern side of the town, and another prominent ridge west of West Simsbury are composed of eastward-dipping beds or layers of basalt and diabase--igneous rocks that are resistant to erosion. The broad lowland between the ridges is underlain by less erosion-resistant sedimentary rocks, principally sandstones and shales. The bedrock geology of the area is shown in detail on geologic maps prepared by Schnabel (1960) and Schnabel and Eric (1965).

Many home owners in Simsbury have their own wells, most of which tap sedimentary and (or) igneous bedrock. The sedimentary bedrock is locally capable of sustaining yields greater than 100 gal/min (gallons per minute), which is adequate for commercial establishments and small industries. At one site in the adjacent Connecticut River valley, yields ranging from 179 to 500 gal/min have been obtained from wells tapping sedimentary bedrock (Ryder and Weiss, 1971, p. 6-7). Bedrock aquifers were not part of this study, but for those interested, information on well yields and quality of water in these aquifers is contained in reports on the water resources of the Farmington River basin (Hopkins and Handman, 1975 and Handman and others, 1986) and upper Connecticut River basin (Ryder and others, 1981).

Over the last 1 or 2 million years, the bedrock in Simsbury was scoured and eroded by glacial ice, especially along the present valley occupied by the Farmington River. Erosion by the ice and the subsequent widespread deposition of unconsolidated glacial sediments are responsible for many minor topographic features, including terraces, small hills, ridges, and valleys, which collectively form the hummocky or rolling land surface west of the Farmington River.

[1/] The thickness between the water table, which defines the top of the saturated zone, and the underlying till or bedrock. See figure 2.

The unconsolidated glacial sediments include till and stratified drift, which differ in origin, texture, and hydrogeologic characteristics as defined below. Till is a compact sediment deposited by glacial ice that is characterized by the absence of stratification (layering), poor sorting (presence of a wide range of grain sizes, from clay to boulders), and low permeability. A generally thin layer of till (less than 15-ft thick) mantles the bedrock on most hills, and in lowlands the bedrock may be separated from the overlying stratified drift by several feet of till. Till is a poor aquifer and will not be discussed further.

Stratified drift consists of layers of gravel, sand, silt, and (or) clay, deposited by, or in, glacial meltwater. Most individual layers are well sorted to moderately well sorted--that is, the range in grain sizes within each layer is relatively small and much less than in till. Where stratified drift is thick, saturated, and composed largely of coarse-grained materials (fine to very coarse sand and gravel) it is highly permeable and may constitute a very productive aquifer. Fine-grained stratified drift (clay, silt, and very fine sand) yields little water to wells and may be a barrier to ground-water flow. Because all these sediments were deposited by flowing water, most stratified drift is present in valleys and lowlands that were drainageways for streams issuing from the melting ice or sites of temporary glacial lakes. Subsurface relations between bedrock, till, and stratified drift that are typical of the Farmington Valley are shown in figure 2.

During deglaciation the Farmington lowland was temporarily dammed by ice and drift, resulting in a succession of lakes into which a considerable volume of fine-grained stratified drift was deposited. Coarser sediments deposited along meltwater streams or in deltas associated with the glacial lakes cover much of the area west of the Farmington River valley (Randall, 1970; J.R. Stone, U.S. Geological Survey, written commun., 1986), including Bissell Brook valley in northern Simsbury and Stratton Brook valley. In some parts of the Farmington lowland the coarse-grained sediments overlie or are buried beneath lake-bottom deposits of clay, silt, and very fine sand.

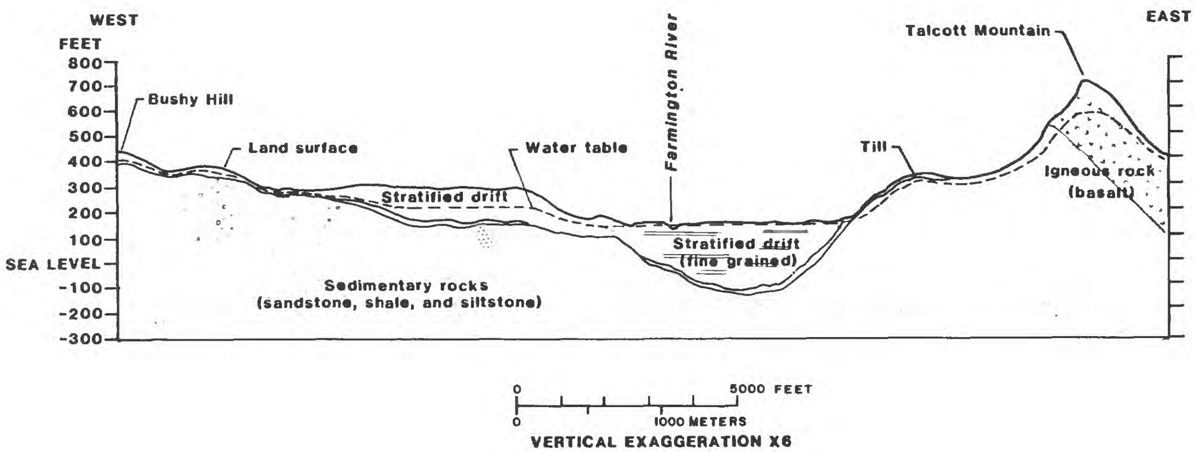


Figure 2.--Generalized geologic section showing subsurface relations between bedrock, till, and stratified drift in the Farmington Valley, Simsbury, Connecticut.

The general distribution of fine-grained and coarse-grained deposits in much of Simsbury is shown on plate 2. Locally, the distribution of coarse-grained and fine-grained deposits shown on plate 2 differs from, or is more extensive than that in Bingham (1984, plate 3), largely because of the addition of new data rather than the reinterpretation of old data.

Terraces and flood plains have been developed by streams in lowland areas since the end of the glacial period. Alluvial sediments deposited within these stream terraces and flood plains are most extensive in the Farmington River valley where 10 to 30 ft of alluvium occur (Randall, 1964a, p. 65). As much as 28 ft of sandy alluvium was encountered in holes drilled for this study (see SI 365 in appendix E). The alluvial sediments are similar in texture and water-bearing characteristics to the stratified drift and, except where organic plant fragments are present, can not be readily distinguished from underlying stratified-drift deposits. For these reasons, they are included with and are considered part of the stratified-drift aquifers described in this report.

Stratified-Drift Aquifers

The most productive aquifers in Simsbury, as elsewhere in Connecticut, are composed of saturated, coarse-grained stratified drift. These aquifers are generally unconfined, with an upper boundary (the water table) that fluctuates several feet each year. In a few places where fine-grained stratified drift overlies coarser stratified drift the aquifer may be locally "confined" (artesian) or "semiconfined" (leaky), signifying that the top of the aquifer is defined by the base of the overlying fine-grained deposits rather than the water table. Unconfined, confined, and semi-confined conditions are discussed in detail in many recent texts and reports, such as those by Freeze and Cherry (1979) and Lohman (1972). Less permeable till and bedrock commonly underlie and form the lower boundary of stratified-drift aquifers in Simsbury. Similarly, the lateral boundaries of these aquifers are commonly defined by the till-bedrock valley walls. The vertical and (or) lateral extent of a stratified-drift aquifer, in a few locations, is defined by an abrupt or gradual transition to less permeable fine-grained stratified drift.

The potential for developing ground-water supplies varies considerably from place to place and with time--principally because of differences in the amount of water that enters the stratified drift (recharge) and in the hydraulic characteristics of the aquifer. Natural recharge to stratified-drift aquifers is derived from three principal sources: (1) precipitation that falls on the land surface above the aquifer and percolates downward to the saturated zone, (2) water that flows into the aquifer from adjacent till and bedrock uplands or from less permeable stratified drift, and (3) infiltration of surface water into the aquifer from adjacent streams and lakes. It was not feasible to directly measure recharge from any of these sources. Estimates of long-term average annual recharge to stratified-drift aquifers, based on water budgets, have been made on Long Island, N.Y. (Pluhowski and Kantrowitz, 1964, p. 38), Cape Cod, Mass. (LeBlanc, 1984, p. 7), and the Pomperaug River valley in western Connecticut (Mazzaferro, 1986, p. 19-23). The values range from about 19 to 24 in. (inches) and apply to recharge from precipitation that falls on land surface above the aquifer.

For this study the long-term average recharge to stratified drift from precipitation on the overlying land is assumed to be 21 in./yr (inches per year). This is an "effective rate" and does not include water that enters the aquifer but is then returned to the atmosphere in vapor form by the process of ground-water evapotranspiration.

Additional recharge may flow into a stratified-drift aquifer from adjacent till and bedrock uplands. Where this occurs, the rate of inflow is assumed to be equal to the ground-water outflow from areas of till-mantled bedrock. Several studies, summarized by Handman and others (1986, fig. 20), indicate that in southern New England this ground-water outflow is approximately 35 percent of the total runoff. Accordingly, in Simsbury where the long-term total runoff is about 26 in./yr (Handman and others, 1986), the long-term ground-water outflow from till and bedrock areas would be about 9 in./yr (0.35 × 26 in.). The value of 9 in./yr should be considered a conservative estimate of recharge from adjacent till and bedrock as it is likely that a large part of the surface runoff from these areas also infiltrates into the stratified drift near where these materials are in contact. Recharge from streams, under natural conditions, may also occur where tributaries flow onto stratified-drift areas from adjacent uplands. In this type of setting the water table may locally be lower than the stream channel for at least part of the year. Water will then leak vertically downward through permeable streambed sediments and into the stratified drift. No measurements of streamflow leakage were made for this study but Saxton Brook, a tributary of the Farmington River (plate 1), in northeastern Simsbury reportedly loses water to the underlying stratified drift (Griswold and Fuss, 1976, p. IV-2).

Recharge from streams and (or) ponds can also be induced by pumping of nearby wells. This "induced recharge" occurs where pumping lowers the water table to the extent that the natural hydraulic gradient from the aquifer toward the surface-water body is reversed so that surface water flows into the aquifer. Induced recharge can be a significant source of water for wells tapping unconfined stratified-drift aquifers.

Ground water within stratified-drift aquifers flows from areas of recharge to points of discharge. Hydraulic gradients that determine flow directions are from valley margins or drainage divides toward streams and swamps that are the low points in respect to water-table altitudes. Consequently, under natural (nonpumping) conditions, most ground water in stratified-drift aquifers in Simsbury is discharged into the Farmington River and its tributaries that flow across the stratified drift. Discharge by ground-water evapotranspiration may be locally significant in low, swampy parts of the Farmington River valley where the water table is at or near land surface. Pumpage from wells may also be locally significant but constitutes a small fraction of the total discharge of ground water from stratified drift. Public-supply pumpage from well fields near Stratton Brook State Park (see SI 285 on plate 1), near the junction of Route 10 and Route 315 (see SI 335 and 337 on plate 1), and near Tariffville (see SI 37 on plate 1) makes up the largest known withdrawals from stratified drift in Simsbury. Withdrawals at these sites in 1985 were 535, 43, and 58.5 Mgal (million gallons) respectively (Connecticut Department of Environmental

Protection, written commun., 1987). This total annual public-supply withdrawal of 636.5 Mgal is about equal to the estimated average annual recharge from precipitation on 1.74 mi^2 (square miles) of stratified drift, assuming a recharge rate of 21 in./yr (1.75 ft/yr (feet per year)).

[1.75 ft/yr	×	48.8×10^6 ft^2	×	7.48 gal/ft^3	=	635 Mgal/yr
(average annual recharge rate)		(square feet in an area of 1.74 square miles)		(gallons per cubic foot)		

Transmissivity (T) and specific yield (S_y) are hydraulic properties of unconfined stratified-drift aquifers that directly affect well yields. Transmissivity is the product of the average hydraulic conductivity (K) of the aquifer materials, as measured in the horizontal direction, and the saturated thickness of the aquifer (b). Hydraulic conductivity is a measure of the conductive properties of a unit volume of the aquifer and is a function of both the physical properties of the porous aquifer materials and the fluid as discussed by Freeze and Cherry (1979, p. 26-28). In this report, hydraulic conductivity is expressed in units of ft/d (feet per day). Transmissivity ($K \times b$) is a measure of the conductive properties of the aquifer over its entire thickness and is expressed in units of ft^2/d (feet squared per day). [$K(ft/d) \times b(ft) = T(ft^2/d)$].

Specific yield is a measure of the ability of an unconfined aquifer to release water. It is defined as the volume of water that the aquifer releases from storage per unit surface area of aquifer per unit decline in the water table, and it is dimensionless. Physically, it is equivalent to the ratio of the volume of water that the saturated stratified drift will yield by gravity, to its own volume. Specific yield is a function of porosity and size of pore spaces as well as the time period over which drainage occurs. The analogous property for a confined aquifer is the storage coefficient or storativity (Freeze and Cherry, 1979, p. 58-61).

Transmissivity and specific yield of the major stratified-drift aquifers had to be measured or estimated in order to evaluate their long-term yields in subsequent sections of this report. Data on well discharge and well drawdown were used in estimating transmissivity at four sites by a method developed by Theis (1963, p. 332-336). Drawdowns were approximately adjusted for the dewatering of the aquifer and the effects of partial penetration of the pumping well using methods described by Walton (1962, p. 7-8). At other well and test-hole sites where there were detailed geologists' or drillers' logs, the hydraulic conductivity of each described interval was estimated from a relation between grain size, sorting, and hydraulic conductivity of stratified drift shown in figure 3 and from values assigned in previous Connecticut studies (Cervione and others, 1972, p. 46; and Handman and others, 1986, p. 37) to gravels and to sediments finer than the range shown in figure 3. These estimated hydraulic conductivities were then multiplied by the respective saturated thickness of each interval and the resulting values were summed to produce an estimated transmissivity of the stratified-drift aquifer at the well or test-hole site. Figures 4, 6, 7, and 9 show the areal distribution of transmissivity in major aquifer areas as well as the values estimated at well and test-hole sites. The transmissivity distributions shown in these figures were delineated by plotting the values for each well and test hole and then interpolating between these data points to establish the boundaries for each selected range of transmissivity.

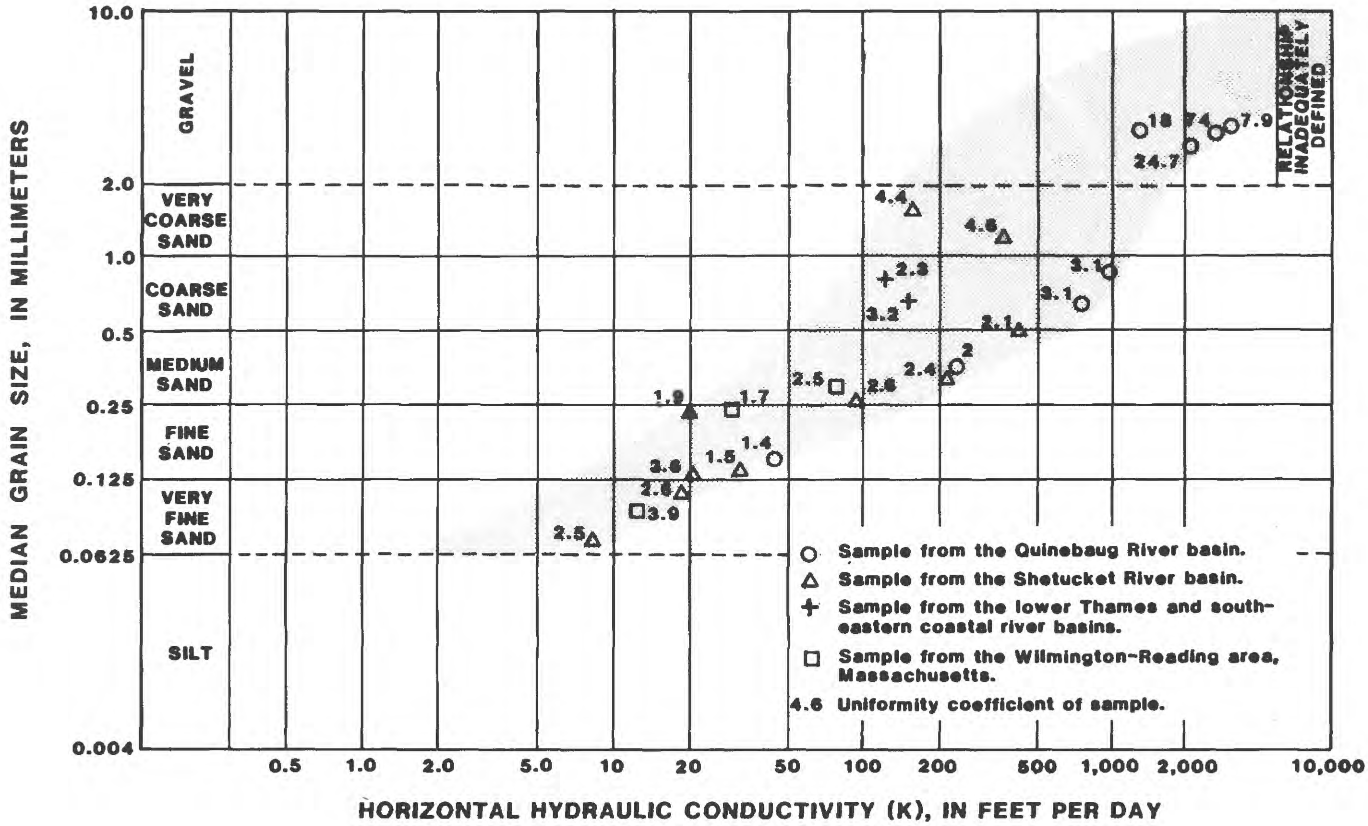


Figure 3.--Relation of median grain size and sorting to horizontal hydraulic conductivity of stratified drift in Connecticut.

Values for the specific yield of stratified-drift aquifers in Simsbury have not been determined. Lohman (1972, p. 53-54) states that specific yield generally ranges between 0.1 and 0.3 and that for long periods of pumping one would not be very far off in assuming a value of 0.2 for an unconfined aquifer. The range is consistent with values of 0.16 and 0.32 reported from pumping tests of wells tapping stratified-drift aquifers in the adjacent Connecticut River basin (Ryder and others, 1981, p. 34). A value of 0.2 is therefore used in analysis of aquifer yields presented in subsequent parts of this report.

AREAS FAVORABLE FOR DEVELOPMENT

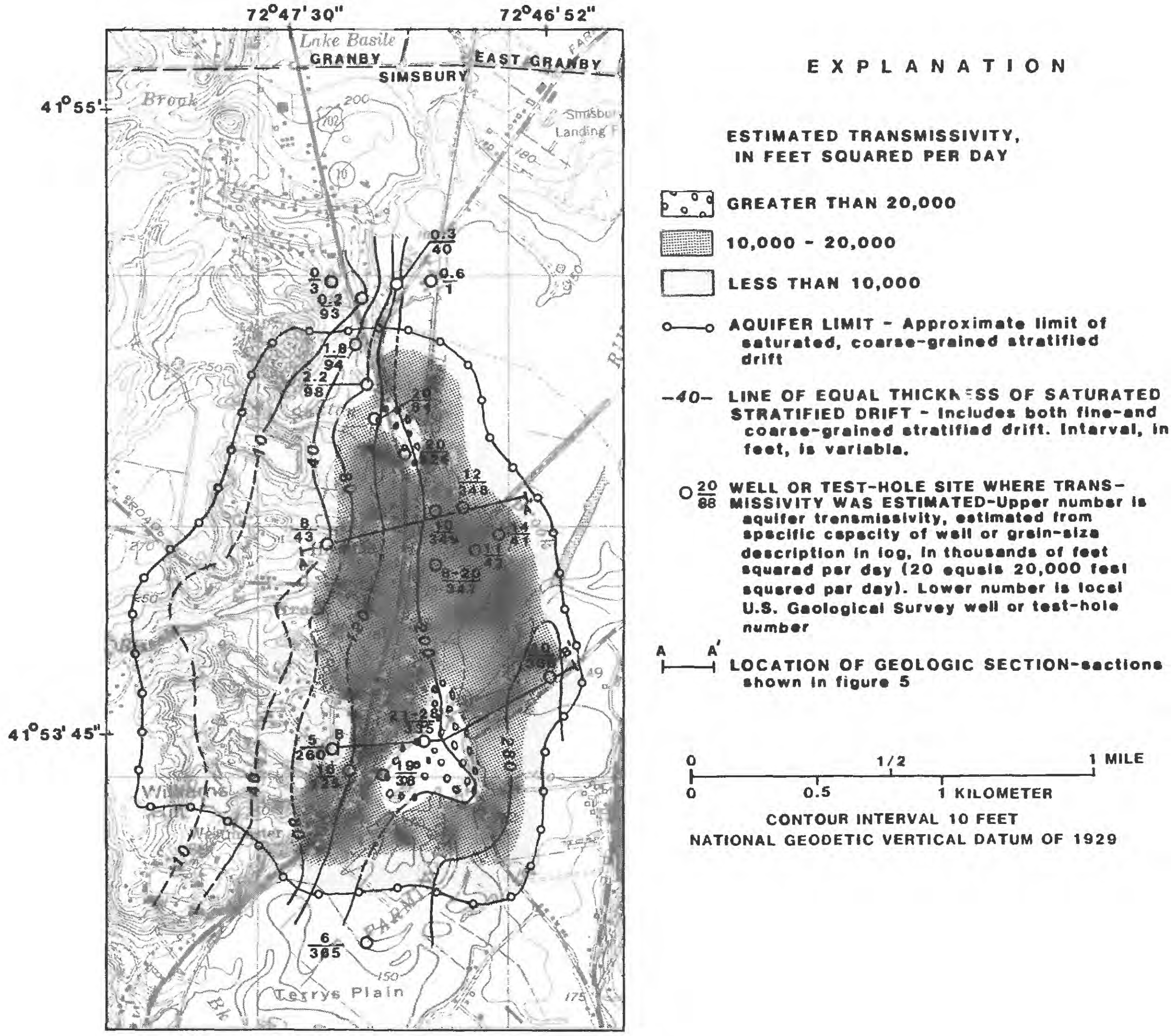
The Farmington River Valley

The Farmington River valley in Simsbury was deeply eroded by glacial ice. The altitude of the bedrock surface is commonly below sea level, and is as low as 231 ft below sea level just west of Terrys Plain (plate 2). (See SI 208 in appendix E.) Stratified drift, as much as 400 ft thick, accumulated in this overdeepened valley. The most recent geologic interpretation (J.R. Stone, U.S. Geological Survey, written commun., 1986) characterizes most of this stratified drift as delta or lake-bottom deposits associated with major lakes that occupied the Farmington River valley and the adjacent Connecticut River valley to the east.

The Farmington River valley may be divided into four hydrogeologic areas on the basis of the texture of the stratified drift. The first area lies north and east of the junction of Route 10 and Wolcott Road. (See plate 2.) Logs of wells and test holes show that almost all the stratified drift in this area is composed of very fine sand, silt, and clay. For example, SI 1TH, SI 75TH, and SI 296 penetrated 89, 236, and 144 ft of such material respectively, as shown in appendices E and F. These materials have relatively low hydraulic conductivity and are not suitable for development of large quantities of ground water.

The second area lies along the west side of the Farmington River and extends southward from the junction of Route 10 and Wolcott Road past Route 315 to the vicinity of Williams Hill. The saturated stratified drift that underlies this second area constitutes a significant aquifer that is termed the "Hoskins aquifer" after the community located near its center. The approximate extent, saturated thickness, and estimated transmissivity of this aquifer are shown in figure 4. The saturated thickness of the stratified drift shown in figure 4 ranges from 0 ft near the western margin to more than 280 ft near the southeast margin, but these thicknesses include both fine-grained and coarse-grained materials. The maximum known thickness of saturated coarse-grained material is about 120 ft. The estimated transmissivity ranges from 0 (where the saturated thickness equals 0) to over 20,000 ft^2/d. The highest transmissivities were estimated from pump-test data for wells SI 84 and SI 335, using the method developed by Theis (1963, p. 332-336).

The limits of the Hoskins aquifer are well defined on the west and north but are poorly defined on the south and east because of sparse subsurface data. West of Route 10, the stratified drift is dominantly composed of coarse-grained deltaic sediments as shown in the logs of test holes SI 3TH and SI 43TH (appendix F) that penetrate 37 ft and 78 ft of sand and gravel respectively. The saturated thickness decreases to the west and ultimately thins to 0 or near 0 over shallow bedrock. Deposits that have at least 10 ft of saturated thickness extend as much as 2,800 ft west of Route 10 as shown on plate 2. The northern extent of the Hoskins aquifer is defined by a fairly abrupt transition to fine-grained stratified drift as shown in the logs of test holes SI 1TH and SI 40TH.



Base from U.S. Geological Survey Tariffville, quadrangle, 1956, photorevised 1984

Figure 4.--Extent, saturated thickness, and transmissivity of the Hoskins aquifer.

The coarse-grained stratified drift is overlain by fine-grained lake-bottom sediments east of Route 10, as well as in a small area immediately west of this highway. The buried coarse-grained stratified drift is tapped by some of the most productive wells in Simsbury, including SI 84 tested at 1,200 gal/min and SI 335 tested at 1,000 gal/min (appendix D). Well SI 84, located near the junction of Route 10 and Wolcott Road, penetrates 73 ft of silt and fine sand that overlies at least 37 ft of coarse sand. Well SI 337, located near SI 335 (plate 1), penetrates 98 ft of fine-grained sediments, that overlie 84 ft of coarse sand (appendix E).

The eastern and southern limits of appreciable coarse-grained stratified drift are not precisely known. On the basis of well logs in appendix E and seismic-reflection profiles in appendix C, it is likely that the buried coarse-grained sediments thin to the east and terminate near the Farmington River. The log of well SI 366, located on the eastern side of the Farmington River, shows the presence of only scattered coarse-grained layers that are a few feet thick. To the south, buried coarse-grained materials occur in wells SI 336 and 337 but are absent in well SI 365 located just north of Terrys Plain. (See plate 2.) The southern limit of the aquifer has been inferred to be about 700 ft north of SI 365 as shown on plate 2, but the exact location is unknown. Two geologic sections (fig. 5) depict the known and inferred distribution of coarse-grained and fine-grained stratified drift in the central part of the Hoskins aquifer.

Coarse-grained stratified drift also underlies a relatively small area on the east side of the Farmington River near Tariffville (plate 2). Wells drilled in this area for the Tariffville Fire District penetrated about 30 ft of sand and gravel (SI 37 and 316 in appendix E) and one well, SI 37, has a reported yield of 265 gal/min. Because of the limited extent and thickness of the stratified drift and the present development by the Tariffville Fire District, no further assessment of this area has been conducted.

The third hydrologic area includes most of the Farmington River valley, between Terrys Plain and Avon, which is almost entirely underlain by fine to very fine sand, silt, and clay. The maximum known thickness of these fine-grained lacustrine sediments is 391 ft at Terrys Plain (well SI 208 on plate 1). Other test holes and wells also penetrated thick deposits of very fine sand, silt, and clay as shown by logs of SI 363-365, SI 20TH, 44TH, and 84TH in appendices E and F. The fine-grained sediments are commonly overlain by a veneer of coarser material that has a maximum known thickness of 64 ft at well SI 365. At least 28 ft of the coarse material at this site is postglacial alluvium. Elsewhere the coarse material is less than 20 ft thick and likely to consist entirely of postglacial alluvium.

Seismic-reflection records indicate that the fine-grained lacustrine sediments in this part of the Farmington River valley are locally underlain by other kinds of unconsolidated material. (See cross sections between stations 6 and 7 and 11 and 12, in appendix C.) This material may be till as indicated by test holes SI 20TH and SI 34TH that reportedly had refusal on hardpan (appendix F) or stratified drift of unknown thickness.

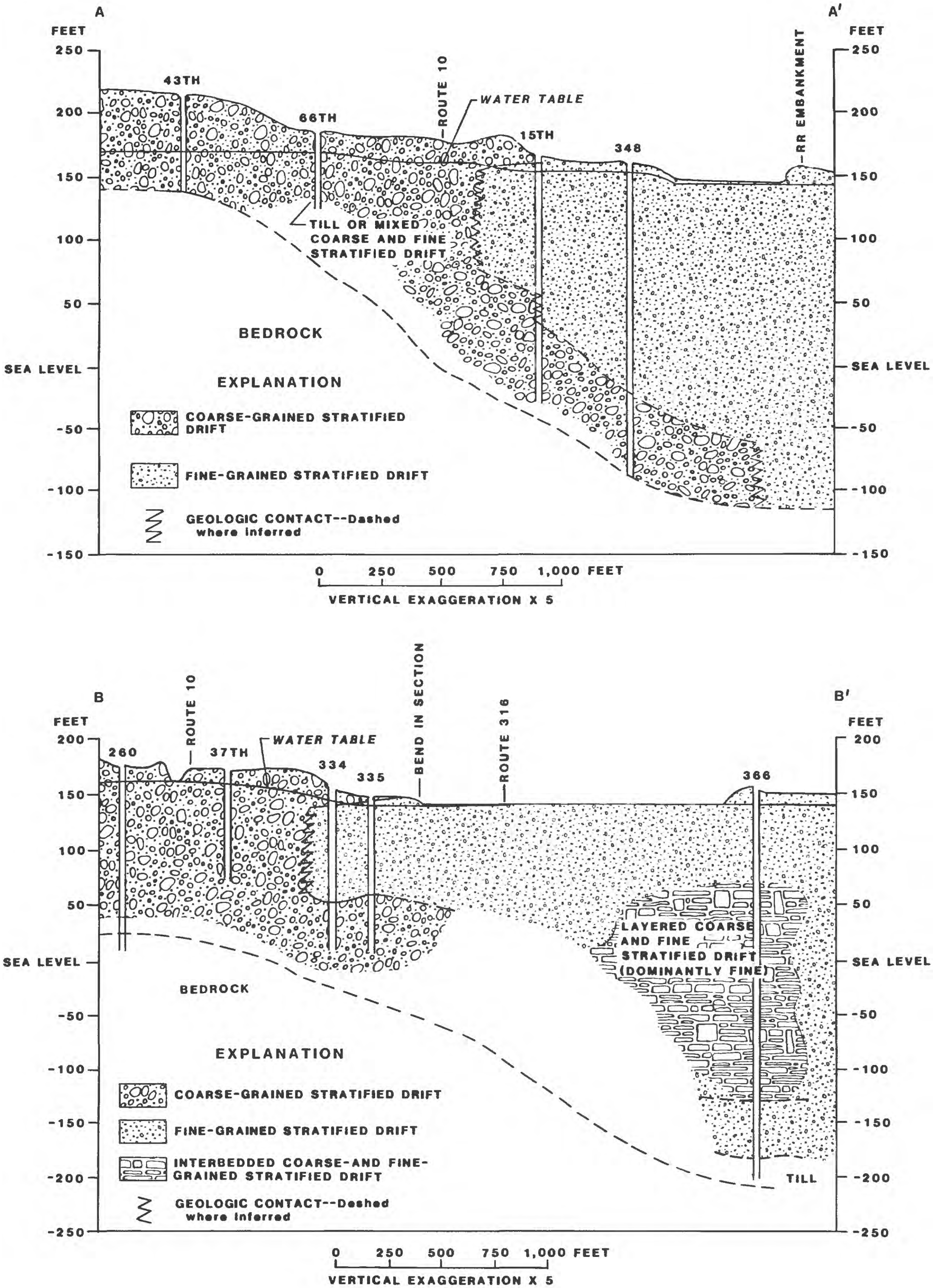
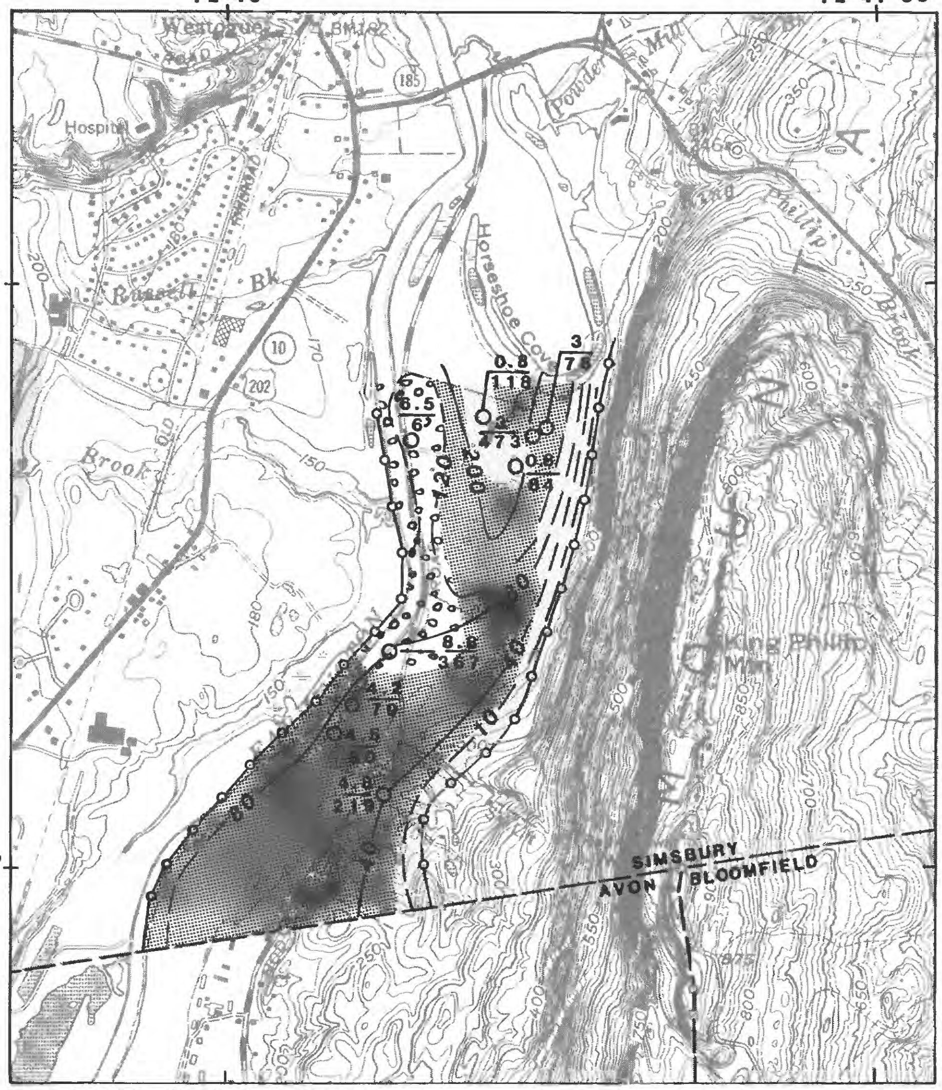


Figure 5.--Geologic sections of the Hoskins aquifer.

The last hydrologic area, located at the south end of the Farmington River valley near Avon, is underlain by coarse-grained deltaic sediments that are locally interbedded with, or overlain by fine-grained lake-bottom sediments. The saturated part of these stratified-drift deposits is termed the "Nod Road aquifer". The approximate extent, saturated thickness, and estimated transmissivity of this aquifer are shown in figure 6. The saturated thickness of the stratified drift near Nod Road ranges from 0 ft along the base of Talcott Mountain to over 200 ft just south of Horseshoe Cove. Where thickest, much of the saturated material is fine grained. The estimated transmissivity varies from 0 at the eastern edge of the aquifer to almost 9,000 ft^2/d at the site of well SI 367. At several places along the western side of the aquifer the relatively high transmissivity (greater than 4,000 ft^2/d) is due to the presence of a few layers or zones of coarse-grained stratified drift.

The Nod Road aquifer is bounded on the east by the steep west face of Talcott Mountain. In the other directions the limits of this aquifer are not as well defined--particularly to the north. Starting about 0.5 mi north of the Avon town line and extending a considerable distance south into Avon, the stratified drift is almost all coarse grained. Well SI 219, located in this part of the aquifer, penetrates 52 ft of saturated sand and gravel and has a reported yield of 400 gal/min (Hopkins and Handman, 1975, p. 19). Farther north the sand and gravel thins and becomes interbedded with lake-bottom silts and clays as shown in the log of well SI 367 (appendix E). Coarse-grained stratified drift occurs as far north as Horseshoe Cove where several test holes and wells of the Village Water Company encountered deeply buried sand and gravel of variable thickness (SI 472 and 473 in appendix E and SI 78TH and 81TH in appendix F). One well, SI 473, tested at 675 gal/min, penetrated 22 ft of coarse-grained stratified drift from 216 ft to 238 ft below land surface. The overlying material is almost all clay and silt and consequently, this part of the aquifer is confined as evidenced by flowing wells (SI 472). It should be noted that other nearby test holes, SI 6TH, 84TH, and 118TH (plate 1 and appendix F), did not encounter any buried coarse-grained stratified drift. It is assumed that the coarse-grained stratified found at depth near Horseshoe Cove is continuous with the main part of the aquifer to the south. However, no subsurface data are available for the area between Horseshoe Cove and wells SI 219 and 367 that would definitely establish this continuity.

The western limit of the Nod Road aquifer shown in figure 6 is also approximate. Along the eastern bank of the Farmington River, well SI 367 (appendix E) and test holes SI 79TH and 80TH (appendix F) penetrate interbedded coarse-grained and fine-grained stratified drift, whereas on the western side of the river, test holes SI 7TH, 8TH, 69TH, and 70TH (appendix F) show that the stratified drift is predominantly fine grained. SI 7TH however, is shallow (64 ft) and the refusal recorded in the log may have been caused by coarse-grained material. The western boundary, approximately coincident with the west side of the Farmington River, is consistent with existing subsurface data.



Base by U.S. Geological Survey
Avon quadrangle 1957,
photorevised 1984

EXPLANATION

ESTIMATED TRANSMISSIVITY, IN FEET SQUARED PER DAY

- 6,001 - 9,000
- 2,001 - 6,000
- 0 - 2,000

o——o AQUIFER LIMIT - Approximate limit of saturated, coarse-grained stratified drift

—10— LINE OF EQUAL THICKNESS OF SATURATED STRATIFIED DRIFT - Includes both fine-and coarse-grained stratified drift. Interval, in feet, is variable

4.8/219 O WELL OR TEST-HOLE SITE WHERE TRANSMISSIVITY WAS ESTIMATED-Upper number is aquifer transmissivity, estimated from specific capacity of well or grain-size description in log, in thousands of feet squared per day (8.8 equals 8,800 feet squared per day). Lower number is local U.S. Geological Survey well or test-hole number

0 — 1/2 — 1 MILE

0 — 0.5 — 1 KILOMETER

CONTOUR INTERVAL 10 FEET

NATIONAL GEODETIC VERTICAL DATUM OF 1929

Figure 6.--Extent, saturated thickness, and transmissivity of the Nod Road aquifer.

Stratton Brook and Hop Brook Basins

The valleys drained by Stratton Brook and Hop Brook in western Simsbury are largely underlain by fluvial and deltaic deposits of coarse-grained stratified drift (plate 2). In the middle and lower parts of the Stratton Brook valley, the saturated stratified drift is mainly composed of fine to coarse sand and gravel, as shown by logs of wells SI 81, 313, 324, 338, 339, and 371 in appendix E. The headwaters of the basin, near the Stratton Brook-Nod Brook drainage divide in southwest Simsbury, are underlain by finer-grained sediments--mainly very fine to coarse sand and silt as described in logs of test holes SI 10TH and 11TH (appendix F).

The saturated stratified drift in the Stratton Brook valley is a major aquifer, termed the "Stratton Brook aquifer" in this report. This aquifer contains the largest pumping center in Simsbury--the Village Water Company well field located to the west of Stratton Brook State Park (plate 1). Four public-supply wells at this site withdrew about 623 Mgal of water from the Stratton Brook aquifer in 1987 (H.W. Sternberg, Connecticut Department of Environmental Protection, oral commun., 1988).

The approximate extent, saturated thickness, and estimated transmissivity of the Stratton Brook aquifer are shown in figure 7. Saturated thickness ranges from 0 ft along the valley walls to greater than 80 ft in the center of the valley. The estimated transmissivity ranges from 0 at the margins of the aquifer to about 32,000 ft^2/d at the site of well SI 230 near Stratton Brook State Park (plate 1). The areas of highest transmissivity (12,000 to 32,000 ft^2/d) are in the middle part of Stratton Brook valley near Town Pool and in the lower part of the valley near Stratton Brook State Park (fig. 7). Figure 8, a geologic section through the middle and lower parts of Stratton Brook valley, is drawn across both these high transmissivity areas. In the southern part of the aquifer near the Stratton Brook-Nod Brook basin divide the stratified drift is finer grained and the estimated transmissivity is less than 12,000 ft^2/d.

The limits of the Stratton Brook aquifer shown in figure 7 generally lie between the 10-ft saturated thickness line and the geologic contact with adjacent till and bedrock. At some places the aquifer limit is coincident with the Stratton Brook basin drainage divide or extends across narrow depressions between till and (or) bedrock hills that protrude through the stratified drift. In two places in figure 7 where the Stratton Brook basin divide crosses thick, saturated stratified drift, the aquifer limits are not defined, because surface-water and ground-water drainage divides may differ. The first such area is the Stratton Brook-Nod Brook drainage divide near Canton Road and the second is the Stratton Brook-Hop Brook drainage divide near Farms Village Road (plate 2).

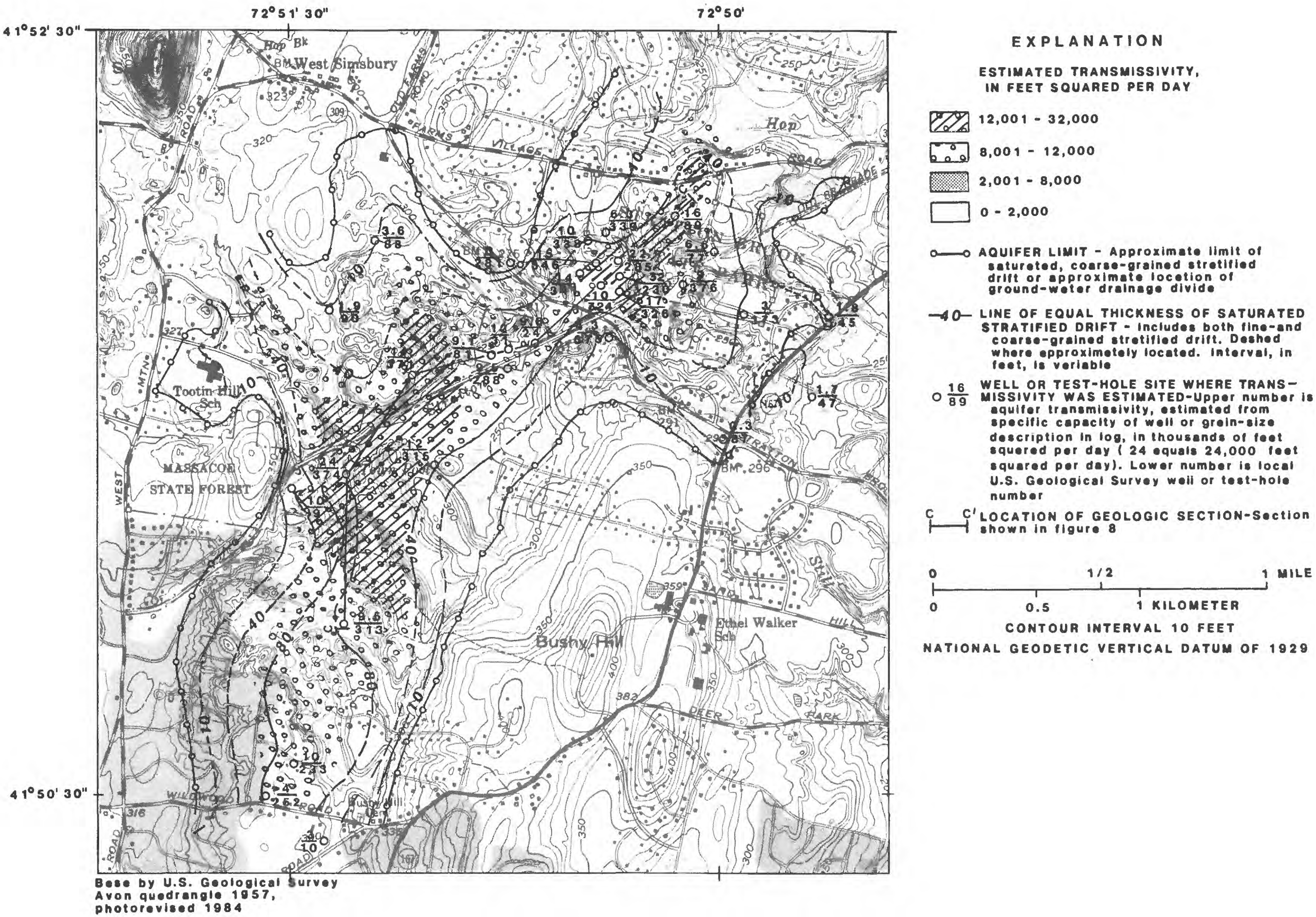


Figure 7.--Extent, saturated thickness, and transmissivity of the Stratton Brook aquifer.

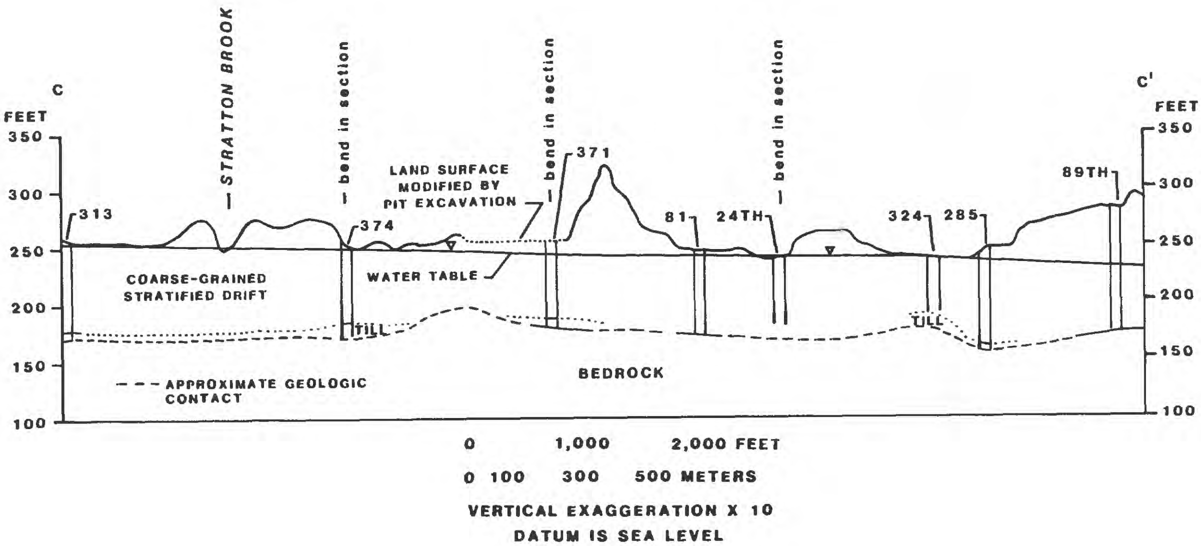


Figure 8.--Geologic section of the Stratton Brook aquifer.

The Hop Brook drainage basin above Stratton Brook also contains areas of coarse-grained stratified drift with potential for development. The three most favorable areas all have a maximum saturated thickness in excess of 40 ft. In the first area, located north of West Simsbury and south and east of Hedgehog Lane (plate 2), the stratified drift ranges from predominantly coarse grained to interbedded coarse and fine grained as shown in logs of SI 352 and SI 111TH in appendices E and F. Well SI 352, drilled for the town's golf course, was tested at 500 gal/min for a 72-hour period. The second area is located north of Hedgehog Lane and west of Old Farms Road (plate 2). Drillers' logs of SI 274 and 409 show as much as 65 ft of sand and gravel in the area. The third and most extensive area is located in a tributary valley partly occupied by Great Pond. In this valley, test holes SI 102TH, 105TH, and 108TH penetrate 36 to 50 ft of saturated sand and gravel (appendix F). None of these areas are considered major aquifers and their yields are not evaluated in this report because of their relatively small size.

Bissell Brook Basin

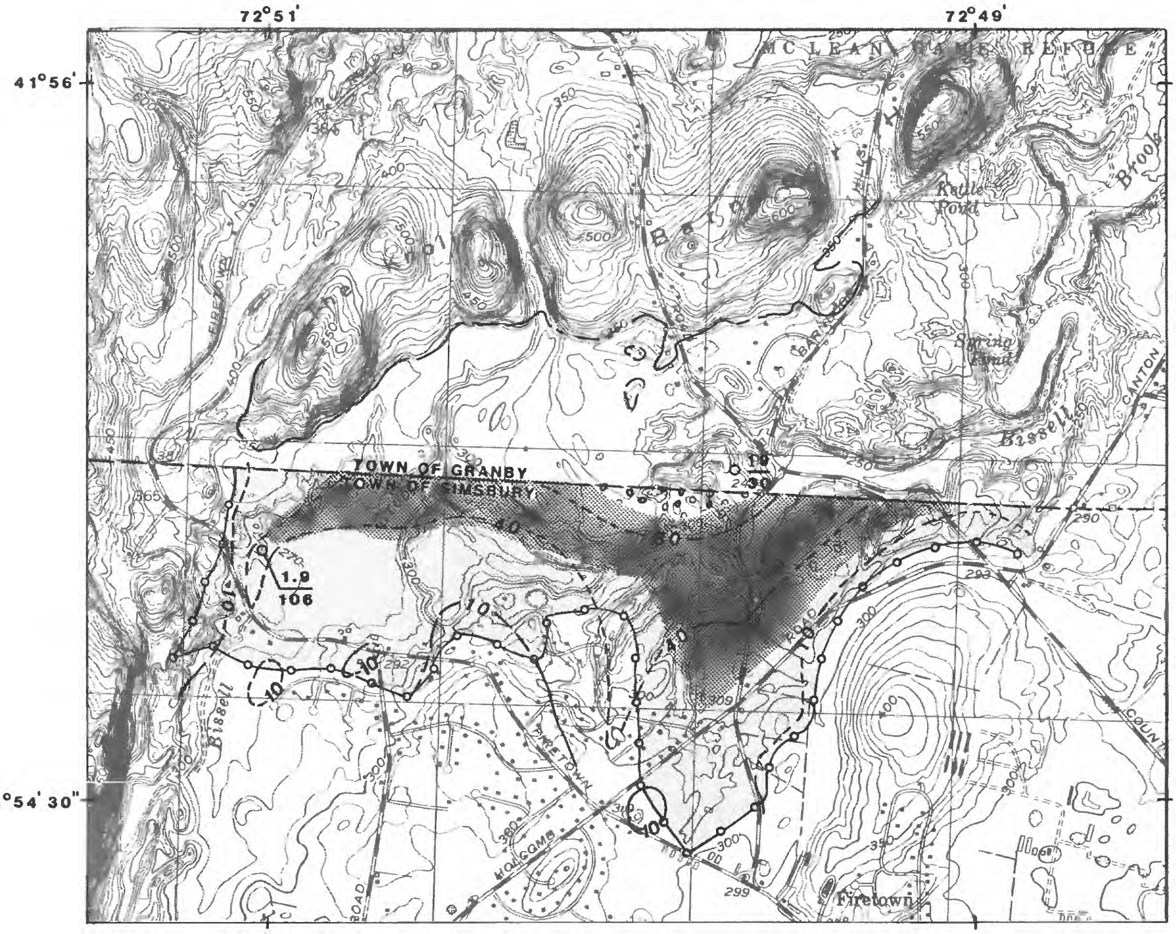
The Bissell Brook valley in northwest Simsbury and south-central Granby is underlain by extensive deposits of stratified drift. These fluvial and deltaic sediments show evidence of deposition in close proximity to glacial ice. Consequently, although generally coarse grained, the deposits show significant textural variation over small distances. The upper end of the valley, south of Firetown Road, contains thinly saturated deposits that range in texture from fine sand to gravel. Subsurface information on the thickness and texture of the stratified drift in Bissell Brook valley is sparse north of Firetown Road. The deposits extend northward into Granby and terminate against a series of till-bedrock hills known as "The Knolls", "Barndoor Hills", and "Stony Hill". (See Randall, 1970 and Handman and others, 1975, plate B.) Available data, including the absence of bedrock outcrop on the geologic map, the logs of test hole GR 30TH (appendix F) and well GR 62 (Hopkins and Handman, 1975, p. 27), and seismic-refraction line AA-AA' (appendix B) suggest that thick and generally coarse-grained stratified drift underlies this part of Bissell Brook valley.

The saturated part of the stratified drift, briefly described in the previous paragraph, is termed the "Bissell Brook aquifer" in this report. The extent of a part of this aquifer and the estimated saturated thickness and transmissivity within Simsbury are shown in figure 9. The saturated thickness ranges from 0 ft (or almost 0 ft) along the western and southern margins of the aquifer to greater than 80 ft in the area south of test hole GR 30TH (plate 2). The aquifer thickens to the north and the greatest saturated thickness is likely to be along the valley axis in Granby. The highest estimate of transmissivity, 19,000 ft^2/d, was made from the log of test hole GR 30TH. In Simsbury, the transmissivity is generally estimated to range from 2,000 to 16,000 ft^2/d where the saturated thickness exceeds 40 ft.

AQUIFER YIELDS

Long-term yields have been estimated for the Hoskins, Nod Road, and Stratton Brook aquifers, based on assumed average recharge rates and the hydraulic characteristics of each aquifer. A similar analysis was not made for the Bissell Brook aquifer because of limited hydrogeologic data. Estimates of long-term average recharge to this aquifer are given and can be considered the upper limit on the water that could be withdrawn on a sustained basis. The yield estimates made in this study are long-term averages--greater yields could be obtained over shorter periods of time and lesser yields may be available during prolonged droughts.

The methodology for estimating the long-term yields of the Simsbury aquifers has previously been used to evaluate yields of other stratified-drift aquifers in Connecticut (Cervione and others, 1972, p. 53-56; Melvin, 1974; Mazzaferro and others, 1979, p. 53-56; and Weaver, 1988). The method assumes an upper limit on aquifer yield that is equal to the estimated long-term recharge and this yield may be further constrained by the aquifer's hydraulic features. An analytical model of the aquifer was constructed on



Base from U.S. Geological Survey
Tariffville quadrangle, 1956
photorevised 1970

EXPLANATION

ESTIMATED TRANSMISSIVITY, IN FEET SQUARED PER DAY

- GREATER THAN 16,000
- 2,000 - 16,000
- LESS THAN 2,000

AQUIFER LIMIT - Approximate limit of saturated, coarse-grained stratified drift in the Simsbury part of the Bissell Brook aquifer

GEOLOGIC CONTACT - Contact between stratified drift and till mantled bedrock on the north side of Bissell Brook valley

10 LINE OF EQUAL THICKNESS OF SATURATED STRATIFIED DRIFT - Includes both fine- and coarse-grained stratified drift. Dashed where approximately located. Interval, in feet, is variable.

19/30 WELL OR TEST-HOLE SITE WHERE TRANSMISSIVITY WAS ESTIMATED- Upper number is aquifer transmissivity, estimated from grain-size description in log, in thousands of feet squared per day. Lower number is local U.S. Geological Survey well or test-hole number

0 — 1/2 — 1 MILE
0 — 0.5 — 1 KILOMETER

CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Figure 9.--Extent, saturated thickness, and transmissivity of part of the Bissell Brook aquifer.

the basis of the Theis nonequilibrium formula (Theis, 1935, p. 520) and the theory of images (Ferris and others, 1962, p. 145-161). The model was used to calculate the quantity of water that could be withdrawn during a 180-day period of no recharge through an array of hypothetical or real wells located in hydraulically favorable parts of the aquifer. This withdrawal rate was then compared with the estimate of long-term recharge and the smaller of these two quantities of water is considered to be the best estimate of the aquifer's long-term yield.

The estimates of long-term average recharge to the Simsbury aquifers are equal to the sum of (1) the long-term average annual recharge from precipitation that falls on the aquifer, (2) the long-term average inflow from adjacent areas of till and bedrock, and (3) induced recharge from streams hydraulically connected to the aquifer. Because these individual components have been estimated from regional values or are based on generalized hydrogeologic conditions, their sum constitutes an imprecise estimate of long-term average recharge.

Average annual recharge derived from precipitation that falls on the aquifer is assumed to be 21 in. (p. 7). This component of the total long-term recharge can be estimated for any of the Simsbury aquifers by the following equation:

$$R_A = (7.48)(rch)(A),$$

where R_A is the long-term average annual recharge from precipitation, in million gallons;

7.48 is a factor that converts cubic feet of water to million gallons;

rch is the average annual rate of recharge to stratified drift, in feet; and

A is the area of the land surface above the aquifer, in square feet.

The average annual inflow from adjacent areas of till and bedrock can be estimated in a similar manner. The extent of these areas is delineated on a topographic map, under the assumption that the topographic drainage divides and ground-water drainage divides coincide. The size of each area is subsequently measured. Another assumption is that all the ground water beneath these adjacent areas flows downgradient into the stratified-drift aquifer. The long-term ground-water outflow from till and bedrock areas is approximately 9 in./yr in this part of Connecticut (p. 7). The long-term average annual inflow into the stratified-drift aquifer will be the product of this rate expressed in feet, the upgradient area expressed in square feet, and 7.48, the factor for converting from cubic feet to million gallons.

A potential for significant induced recharge exists in the Nod Road, Stratton Brook, and Bissell Brook aquifer areas, but not at the Hoskins aquifer area where thick silt and clay separate the aquifer from the Farmington River. Data on the physical and hydraulic streambed characteristics that control induced recharge were not collected and this potential cannot be accurately quantified. However, estimates can be made that incorporate the following assumptions: (1) The maximum induced recharge will not exceed the 90-percent-duration flow of the stream or streams that are hydraulically connected to the aquifer (the flow equaled or exceeded 90 percent of the time), (2) large ground-water withdrawals would result in an average head difference of 1 ft between the stream and underlying aquifer, and (3) the vertical hydraulic conductivities of coarse-grained and fine-grained streambed materials are 0.25 ft/d and 2.5 ft/d respectively.

The 90-percent-duration flow was selected as an upper limit on induced recharge to reduce the length of time that ground-water withdrawals would significantly affect streamflow and even dry up the stream. A quantitative assessment of the impact of ground-water withdrawals on streamflow would require detailed hydrogeologic information at each site and predictive simulations using more precise numerical flow models. The values for head difference and vertical hydraulic conductivity are consistent with those from other studies of stream-aquifer systems in the glaciated northeast (Rosenshein and others, 1968, p. 23; Gonthier and others, 1974, p. 15; Randall, 1978, p. 295; Mazzaferro, 1986; and Yager, 1986).

The assumptions listed in the previous paragraph allow induced recharge to be estimated for the Simsbury aquifers. The 90-percent-duration flow of streams flowing into the aquifer areas can be determined from records of nearby streamflow-gaging stations where present, or estimated through regionalization techniques developed for Connecticut by Thomas (1966) and described for the Farmington River basin by Handman and others (1986, p. 14-19). The induced recharge for the specified average stream-aquifer head difference and streambed vertical hydraulic conductivity and thickness can be calculated by the following formulation of Darcy's equation:

$$R = 7.48 \, (KIA),$$

where R is the potential recharge from induced streambed infiltration, in gallons per day;

K is the average vertical hydraulic conductivity of the streambed sediments, in feet per day;

I is the average hydraulic gradient across the streambed, in feet per foot; and

A is the streambed area of infiltration, in square feet.

The recharge available to an aquifer from induced infiltration will be equal to the value calculated by the above equation, unless that value is greater than the 90-percent-duration flow of the stream(s) at the point it flows into the aquifer model area. If greater, the estimated induced recharge will be limited to the 90-percent-duration flow.

The first step in developing an analytical model of an aquifer is to idealize its surface as a rectangle or other simple straight-sided geometric shape. The straight-line sides of the model area are positioned as coincidently as possible with any hydraulic boundaries that limit the continuity of the aquifer. Where the extent of the aquifer is limited by its contact with relatively impermeable material, the analyst has assigned an impermeable-barrier boundary condition to the corresponding side of the model area. This commonly occurs along valley margins where the stratified drift is in contact with till and bedrock and also in the Farmington Valley where coarse-grained stratified drift grades into glaciolacustrine silt and clay. An impermeable-barrier boundary can be physically viewed as a vertical plane across which there is no ground-water flow. A second type of boundary, termed a line-source boundary, may be present where the aquifer is in contact with a stream or other surface-water body. Ideally such a boundary requires that the surface-water body penetrate the full thickness of the aquifer. Large, partially penetrating streams with good hydraulic connection to the aquifer often constitute line-source boundaries although the exact boundary location cannot be determined without controlled aquifer tests. For these reasons this type of boundary condition has been assigned at only one of the modeled areas. A constant head (water level) is the condition specified along such a boundary and at the boundary there is no drawdown as a result of pumped wells in the model area.

The aquifer within the boundaries of a model area must be transformed into the hydraulic equivalent of an infinite aquifer. This transformation is accomplished through the method of images (Ferris and others, 1962, p. 144-161) whereby image wells placed at appropriate locations mathematically duplicate the effects of hydraulic boundary conditions on the ground-water flow system. In the case of impermeable-barrier boundaries, an image well with a discharge equal to that of the real or hypothetical pumped well is placed the same distance from, but on the opposite side of the boundary. The intersecting cones of depression of the real well and image well form a ground-water divide across which there is no ground-water flow. A recharging image well is used to satisfy the hydraulic condition imposed by a line-source boundary. This image well is also placed the same distance from the boundary as the real well but on the opposite side. The recharging image well injects water into the aquifer at the same rate as the discharging real well, with the net result of producing zero drawdown (constant head) along the boundary.

The average transmissivity of the stratified drift that is within the model area is computed. Hypothetical or real pumped wells are located at sites in the model area where transmissivity and saturated thickness are high and any impermeable-barrier and line-source boundaries are respectively as far away and close by as feasible. Distances between the pumped wells are generally large enough that interference effects are minor. Construction of the analytical model is essentially complete at this point.

The analyst then selects an initial discharge rate for each pumped well based on transmissivity and saturated thickness at the well site, and calculates the total drawdown that would result from pumping the well at this rate for a 180-day period. These drawdowns are compared with the maximum available--the drawdown that would bring the pumping water level to within 1 ft of the top of the well screen. If the calculated drawdowns are excessive, pumping rates are reduced. Conversely, if the resulting drawdowns are less than the maximum available, the pumping rates are increased. This iterative process is repeated until the water level in each well during pumping is within 1 ft of the top of the well screen. The 180-day pumping period was selected because it approximates the duration of annual periods of little or no recharge from precipitation in this part of Connecticut. If a given rate of pumpage could be sustained for 180 days without excessive drawdown then it is probable this rate could be sustained for the remainder of the year, as long as the total withdrawal does not exceed the water available from both natural and induced recharge.

Drawdown in each hypothetical or real pumped well is calculated by the Theis nonequilibrium formula (Theis, 1935). Several adjustments to the process of computing drawdowns are necessary as the stratified-drift aquifers and pumped wells do not fully meet the assumptions upon which the Theis equation is based (Ferris and others, 1962, p. 93). Most notably, the aquifers are not homogeneous, isotropic, and of infinite areal extent; transmissivity is not constant at all times and places; and the wells do not penetrate and receive water from the entire thickness of the aquifer.

The total drawdown (s_{total}) calculated for each pumped well is equal to the aquifer drawdown (s_a) adjusted for (1) reduced transmissivity resulting from a decrease in saturated thickness (termed s_d, the dewatering correction), (2) the effects of partial penetration of the aquifer by the screened section of the well (termed s_p, the partial penetration correction), (3) interference from other pumped wells (termed s_i, well interference), and (4) the effects of discharging and recharging image wells necessitated by aquifer boundaries (termed s_b, drawdown from discharging image wells and s_r, buildup from recharging image wells). All pumped wells are assumed 100-percent efficient, resulting in no additional drawdown as a consequence of moving water from the aquifer into the well. In summary, total drawdown in any hypothetical or real pumped well located in an aquifer model area can be expressed as: $s_{total} = s_a + s_d + s_p + s_i + s_b - s_r$

The computational scheme for calculating the total drawdown is outlined in appendix A. These calculated drawdowns should be considered approximate and likely differ from those that would be observed in a real well of similar construction characteristics. This is mainly because an average uniform value of transmissivity and an assumed specific yield of 0.2 are used in the Theis equation, partial penetration corrections use an assumed ratio of vertical to horizontal hydraulic conductivity of 1:10 (appendix A), the assumption is made that wells are 100-percent efficient, and the locations of hydraulic boundaries are inexact.

The Hoskins Aquifer

Estimated long-term recharge to the modeled part of the Hoskins aquifer includes recharge from precipitation falling on the model area and subsurface inflow from adjacent upgradient areas. Induced recharge is not considered because the thick fine-grained deposits beneath the river make such recharge unlikely. The modeled area covers almost 1.3 mi^2 (36×10^6 ft^2) as shown in figure 10. The recharge is assumed to be uniformly distributed throughout the area and to average 21 in./yr (1.75 ft/yr). Using this rate and the equation on p. 21 results in an estimated long-term average recharge from precipitation of 471 Mgal/yr (million gallons per year) (36×10^6 $ft^2 \times 1.75$ ft/yr $\times 7.48$ gal/ft^3) or 1.29 Mgal/d (million gallons per day).

The upgradient area, as defined by topographic drainage divides, is 0.73 mi^2 (20.4×10^6 ft^2). This area may be even smaller if the ground-water drainage divide is actually located farther east where there is a buried bedrock ridge. The average annual subsurface inflow from bedrock into the Hoskins aquifer, using the 20.4×10^6 ft^2 area and a ground-water outflow rate of 9 in./yr (0.75 ft/yr), is about 114 Mgal (20.4×10^6 $ft^2 \times$ 0.75 ft $\times 7.48$ gal/ft^3) or 0.3 Mgal/d. The estimated long-term recharge to the Hoskins aquifer model area is equal to 585 Mgal/yr (1.6 Mgal/d), the sum of the recharge from precipitation and the subsurface inflow.

The model area for the Hoskins aquifer (fig. 10) was defined using hydrogeologic features described on p. 10 and 12 and shown in figures 4 and 5. The northwestern side of the model area, shown in figure 10, is placed just beyond the actual aquifer limit (fig. 4). Along this margin of the aquifer the saturated thickness thins to 0 against a buried bedrock hill. An impermeable-barrier boundary condition has been assigned to the northwest side of the model area even though some ground water flows into the aquifer from the bedrock areas that are upgradient. This same boundary condition is also assumed to exist along the parallel southeastern side of the model area which is located near the inferred eastern limit of buried coarse-grained stratified drift (fig. 4). The northeastern side is positioned close to the real limit of the aquifer which is defined by an abrupt transition to relatively impermeable fine-grained stratified drift. An impermeable-barrier boundary condition is again assumed to exist along this side of the model area. No hydraulic boundary condition has been imposed along the remaining (southwestern) side because the inferred limit of the aquifer in this direction (fig. 4) is sufficiently far away that the effects of boundaries on the drawdown of wells in the model area would be negligible.

The hydrologic setting described on p. 10 and 12 and water-level data from selected wells indicate that the western part of the Hoskins aquifer model area is unconfined while the eastern part is confined or leaky. The aquifer is considered unconfined throughout the model area in this analysis of long-term yield. A uniform specific yield of 0.2 and a K_v:K_h ratio of 0.1 are assumed and the saturated thickness values apply to all the stratified drift at a given site, whether fine grained or coarse grained. The average transmissivity of the stratified drift within the model area is about 10,000 ft^2/d.

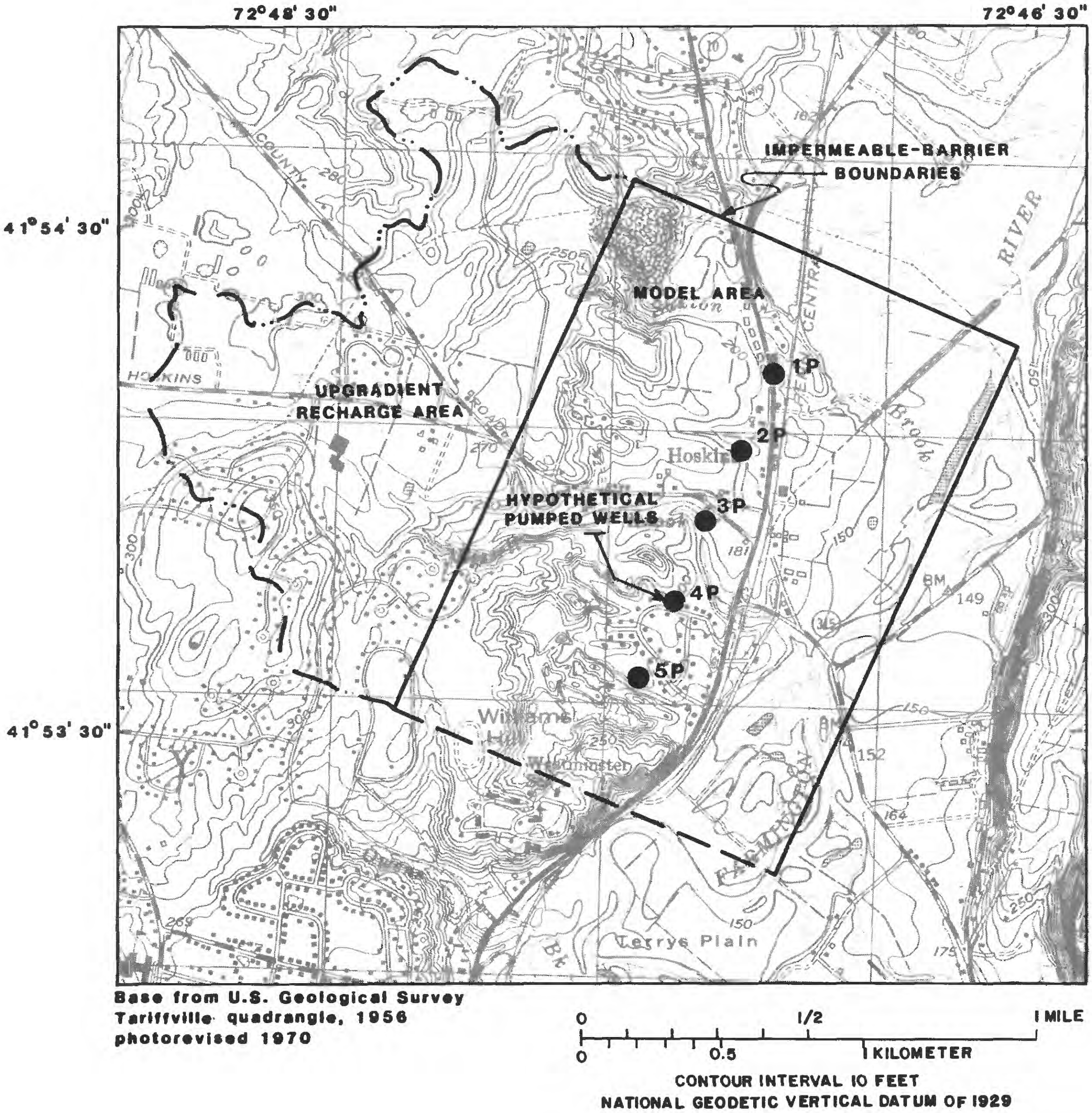


Figure 10.--Hoskins aquifer model area, assumed hydraulic boundaries, and locations of hypothetical wells.

Five hypothetical pumped wells, shown in figure 10, are used to simulate large ground-water withdrawals from the model area. These wells are placed in parts of the aquifer where hydraulic conditions (transmissivity and saturated thickness) favor high rates of pumpage. Distances between the wells and impermeable-barrier boundaries are as far apart as feasible in order to minimize the effects of the boundaries on total drawdown. Each hypothetical pumped well has a 1-ft radius, is screened in the lower three-tenths (0.3) of the aquifer, and is 100-percent efficient. An initial pumping rate was selected for each well and the total drawdown in these wells after 180 days of pumping was calculated by the procedure shown in appendix A and compared to the maximum available drawdown. Pumping rates were subsequently adjusted and drawdowns recalculated until the total drawdown in each well was within 1 ft of the top of the well screen. The final pumping rates and corresponding total drawdowns are shown in table 1. The pumping rates range from 1,330 gal/min at well 1P to 384 gal/min at well 4P and the total withdrawal from all five wells is about 4.9 Mgal/d.

Table 1.--Summary of well and aquifer characteristics, maximum pumping rates, and drawdowns in wells used in the Hoskins aquifer model

[All wells have an effective radius of 1 foot, have a screen length equal to 30 percent of the initial saturated thickness, and are 100-percent efficient. The aquifer has an assumed specific yield of 0.2 and an assumed ratio of 0.1 between the hydraulic conductivities in the vertical and horizontal directions (K_v:K_h). Values of saturated thickness and drawdown rounded to nearest foot; transmissivity rounded to nearest 100 feet squared per day; and pumping rate rounded to nearest 10 gallons per minute]

Hypothetical well number	Initial saturated thickness (feet)	Initial transmissivity (feet squared per day)	Transmissivity adjusted for aquifer thinning (feet squared per day)	Maximum pumping rate (gallons per minute)	Total drawdown (s_{total}) after 180 days of pumping (feet)	Maximum available drawdown (feet)
1P	180	10,000	8,900	1,330	106	107
2P	120	10,000	8,100	650	61	61
3P	100	10,000	7,900	510	49	49
4P	80	10,000	7,700	380	38	38
5P	80	10,000	8,400	540	43	43

The withdrawal rate of 4.9 Mgal/d simulated by the analytical flow model is much greater than the estimated long-term recharge of 1.6 Mgal/d. The estimated long-term yield of the Hoskins aquifer will be equal to the lesser of these quantities (1.6 Mgal/d) under the stated assumptions of this method of analysis. The yield could be greater than 1.6 Mgal/d only if the long-term rate of recharge exceeds the value assumed in this study. The estimated long-term yield of 1.6 Mgal/d is less than the reported yield of two wells that presently tap the Hoskins aquifer (SI 84 and SI 335, appendix D) but far exceeds the 60 Mgal/yr withdrawn by the major pumping center in this aquifer, the Village Water Company well field located south of Route 315 (H.W. Sternberg, Connecticut Department of Environmental Protection, oral commun., 1988).

The Nod Road Aquifer

The long-term recharge to the Nod Road aquifer is estimated to be about 2.7 Mgal/d and is derived from three sources--precipitation on the model area, subsurface inflow from adjacent upgradient areas, and induced recharge from the Farmington River. Recharge from precipitation averages 21 in./yr (1.75 ft/yr) and is uniformly distributed over the approximately 0.43-mi^2 (12×10^6 ft^2) model area shown in figure 11. The estimated long-term average recharge from this source is about 157 Mgal/yr (12×10^6 ft^2 $\times$ 1.75 ft/yr $\times$ 7.48 gal/ft^3) or 0.43 Mgal/d.

The upgradient area adjoins the southeastern side of the model area and extends to the drainage divide along the crest of Talcott Mountain (fig. 11). It is approximately 0.52 mi^2 (14.5×10^6 ft^2) in area. The average annual subsurface inflow to the Nod Road aquifer model area is estimated to be about 81 Mgal/yr (14.5×10^6 ft^2 $\times$ 0.75 ft/yr $\times$ 7.48 gal/ft^3) or 0.22 Mgal/d.

The estimate of induced recharge from the Farmington River is based on assumptions listed on p. 22. The streambed materials in this reach of the Farmington River are fine to medium grained where visible near the river banks. It is assumed that the texture of the streambed sediments is similar throughout the rest of the reach. Recharge from induced infiltration of Farmington River water was estimated by the equation on p. 22, where

$$R = 7.48 (KIA).$$

The value of K, the vertical hydraulic conductivity of the streambed sediments in the above equation, is assumed equal to 1.5 ft/d. This is about midway between 0.25 ft/d and 2.5 ft/d, the values considered representative for fine-grained and coarse-grained streambed sediments (p. 22). The average hydraulic gradient I, is equal to 0.33 ft/ft (feet/foot) and is based on an average head difference across the streambed of 1 ft and an average streambed thickness of 3 ft. The area A, over which infiltration occurs, is estimated to be about 562,500 ft^2. This area was computed on the basis of a 4,500-ft length of reach that has an average width of 125 ft. The northernmost segment of the river that is adjacent to the model area was not included because the thick fine-grained sediments that separate this segment of the river from the aquifer make induced

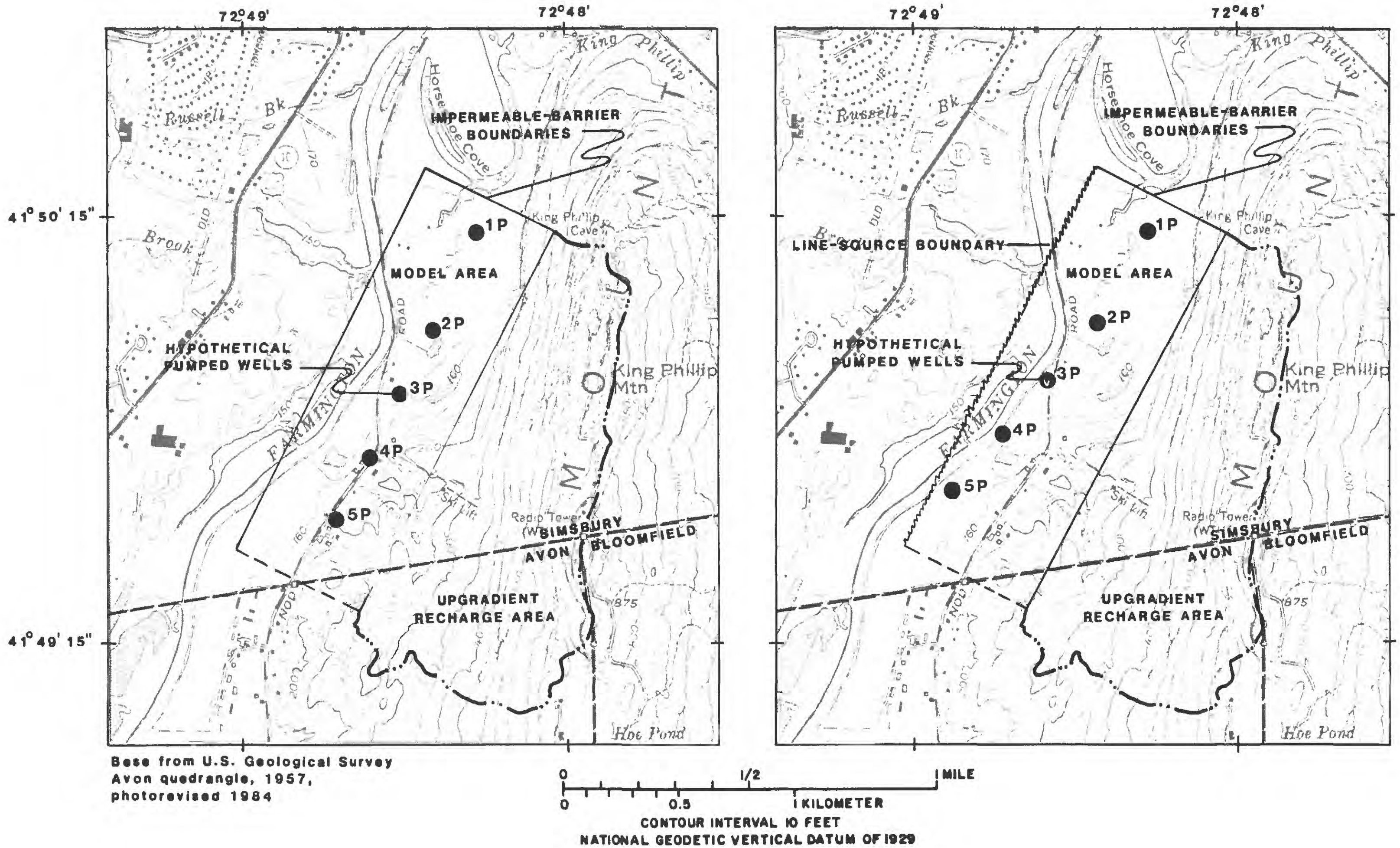


Figure 11.--Nod Road aquifer model area, assigned hydraulic boundaries, and locations of hypothetical wells.

infiltration unlikely. The induced recharge estimated using these values of K, I, and A is about 2.08 Mgal/d (7.48 gal/ft^3 × 1.5 ft/d × 0.33 ft/ft × 562,500 ft^2). This quantity of water is considerably less than the lowest daily flow of the Farmington River that has been recorded at the U.S. Geological Survey gage at Tariffville (128 ft^3/s (cubic feet per second), equivalent to about 83 Mgal/d (Cervione and others, 1988, p. 102)).

Two different models of the Nod Road aquifer were constructed (fig. 11) because of uncertainty about the nature of the hydraulic boundary condition on the northwestern side. The other three sides and their assigned boundary conditions are the same for the two models and were defined by hydrogeologic features described on p. 14 and shown in figure 6. The southeastern side is approximately coincident with the contact between the stratified drift and the till-mantled bedrock that forms Talcott Mountain. The upper 1,000 ft of this side of the model extends across the geologic contact and the northeastern corner of the model area consequently contains a minor amount of till and bedrock. An impermeable-barrier boundary condition is assigned to the southeastern side of the model area as shown in figure 11, even though some water from the adjacent upgradient area flows across this boundary.

The northeastern limit of the model area is located near the south end of Horseshoe Cove--the northernmost place where coarse-grained stratified drift has been encountered. An impermeable-barrier boundary condition is also assigned to this side of the model area. The parallel southwestern side extends across the Simsbury-Avon town line. No hydraulic boundary condition has been assigned because saturated coarse-grained stratified drift extends several thousand feet beyond the model area in that direction (Handman and others, 1986, plate B).

The northwestern side of the model area is roughly coincident with the average position of the Farmington River--each end is west of the river while the central part is east of the river (fig. 11). Two alternative boundary conditions are assigned to this side of the model area because of uncertainty about the hydraulic effects of the Farmington River on head distribution in the aquifer. An impermeable-barrier boundary condition is assigned in the first case. This condition assumes that there is little or no flow into the model area from the fine-grained stratified drift to the northwest and no hydraulic connection with the Farmington River. A line-source boundary condition is assigned in the second case. This condition assumes a good hydraulic connection between the Farmington River and the aquifer that results in a constant-head condition at or close to the river. This constant-head condition applies to the northwestern side of the model area although both ends of the line that define this side of the model area are physically located on the eastern side of the river. The actual position of the boundary in a less idealized system would have to be coincident with, or to the west of the Farmington River.

The northern part of the Nod River aquifer is confined as described on p. 14. Confined conditions may also occur elsewhere where fine-grained stratified drift overlies coarse-grained stratified drift. This aquifer is considered to be unconfined throughout the model area in order to simplify the analysis. A uniform specific yield of 0.2 and a K_v:K_h ratio of 0.1 are assumed throughout the aquifer and saturated thickness values apply to both the fine-grained and coarse-grained stratified drift at any site. The average transmissivity within the model area is approximately 3,800 ft^2/d.

Five hypothetical pumped wells are used to simulate large ground-water withdrawals from the model area. The locations for wells 3P through 5P, shown on figure 11, differ for the two different models of the Nod Road aquifer. Well 1P is near the real pumping center where public-supply wells SI 472 and SI 473 tap a confined part of the aquifer. The remaining wells (2P to 5P), located southwest of well 1P, are equidistant from the parallel impermeable-barrier boundaries in the first model. In the second model wells 3P, 4P, and 5P are located on the east bank of the Farmington River near the line-source boundary. Distances between the wells are at least 1,000 ft to minimize well interference. Each hypothetical well has a 1-ft radius, is screened in the lower three-tenths (0.3) of the aquifer, and is 100-percent efficient.

The first analysis was done for the model that has three impermeable-barrier boundaries. Initial pumping rates were selected for each of the five hypothetical wells and the total drawdowns were calculated by the previously described procedures. After several iterations, final pumping rates were calculated that resulted in drawdowns that were within 1 ft of the top of the well screens. These final pumping rates, ranging from 534 gal/min at well 1P to 112 gal/min at well 4P, and corresponding total drawdowns, are shown in table 2. The total withdrawal from all five wells is about 1.8 Mgal/d.

Table 2.--Summary of well and aquifer characteristics, maximum pumping rates, and drawdowns in wells used in the Nod Road aquifer models

[All wells have an effective radius of 1 foot, have a screen length equal to 30 percent of the initial saturated thickness, and are 100-percent efficient. The aquifer has an assumed specific yield of 0.2 and an assumed ratio of 0.1 between the hydraulic conductivities in the vertical and horizontal directions ($K_v:K_h$). Values of saturated thickness and drawdown rounded to nearest foot; transmissivity rounded to nearest 100 feet squared per day; and pumping rate rounded to nearest 10 gallons per minute]

Hypothetical well number	Initial saturated thickness (feet)	Initial transmissivity (feet squared per day)	Transmissivity adjusted for aquifer thinning[1/] (feet squared per day)	Maximum pumping rate (gallons per minute)	Total drawdown (s_{total}) after 180 days of pumping (feet)	Maximum available drawdown (feet)
			Model with three impermeable-barrier boundaries			
1P	200	3,800	3,300	530	113	113
2P	130	3,800	3,100	310	68	68
3P	75	3,800	2,800	120	33	33
4P	60	3,800	2,900	110	27	27
5P	55	3,800	3,100	150	29	30
			Model with two impermeable-barrier boundaries and one line-source boundary			
1P	200	3,800		710	131	131
2P	130	3,800		460	83	84
3P	80	3,800		300	51	51
4P	80	3,800		360	55	55
5P	80	3,800		380	56	56

[1/]Adjustments to transmissivity not made in model with line-source boundary as drawdowns due to other pumping wells (s_i) and discharging image wells (s_b) did not exceed the buildup due to recharging image wells (s_r).

The second analysis was for the model that has parallel line-source and impermeable-barrier boundaries and a third impermeable-barrier boundary. The final pumping rates for the five hypothetical pumped wells in this model range from 712 gal/min at well 1P to 297 gal/min at well 3P. The combined withdrawal from all 5 wells is about 3.2 Mgal/d. The results of this analysis are summarized in table 2.

The estimated long-term recharge of 2.7 Mgal/d is between the 1.8 and 3.2 Mgal/d yields simulated for the two model configurations of the Nod Road aquifer. The estimated long-term yield cannot exceed the long-term recharge of 2.7 Mgal/d, but could be as low as 1.8 Mgal/d if the hydraulic connection with the Farmington River is very poor. The estimated long-term yield of the Nod Road aquifer is therefore given as a range--from 1.8 to 2.7 Mgal/d because of uncertainty about the stream-aquifer relation in respect to induced recharge and hydraulic boundary conditions.

The Stratton Brook Aquifer

Estimated long-term recharge to the modeled part of the Stratton Brook aquifer is estimated to be about 3.4 Mgal/d. This recharge is derived from precipitation that falls directly on the model area, from subsurface inflow from adjacent areas, and from induced recharge. Recharge from precipitation is assumed to average 21 in./yr (1.75 ft/yr) over the relatively large (40×10^6 ft^2) model area. Total estimated recharge from this source is about 524 Mgal/yr or 1.4 Mgal/d.

The upgradient areas that are the sources of subsurface inflow are located on the northwestern and southeastern sides of the model area (fig. 12). Their extent is defined by topographic drainage divides and their area totals 0.96 mi^2. About 60 percent (0.57 mi^2) of this upgradient area is underlain by stratified drift and the other 40 percent (0.38 mi^2) by till and bedrock. The estimate of average annual subsurface inflow from the stratified drift is based on a ground-water outflow rate of 21 in./yr (1.75 ft/yr) from the entire 0.57 mi^2 (16×10^6 ft^2) area. The average annual subsurface inflow from the till and bedrock is based on a ground-water outflow rate of 9 in./yr (0.75 ft/yr) from a 0.38 mi^2 (10.6×10^6 ft^2) area. The total recharge from subsurface inflow calculated using these two rates is about 269 Mgal/yr or 0.74 Mgal/d $((16 \times 10^6\ ft^2 \times 1.75\ ft/yr \times 7.48\ gal/ft^3) + (10.6 \times 10^6\ ft^2 \times 0.75\ ft/yr \times 7.48\ gal/ft^3))$.

The estimate of induced recharge from Stratton Brook is based on both the equation $R = 7.48\ (KIA)$ and the low flow of this stream. The vertical hydraulic conductivity (K) of the streambed is estimated to be 1.5 ft/d and the hydraulic gradient across the streambed is estimated to be 1.0 ft/ft. The length of stream reach in the model area as measured on a topographic map is 12,000 ft, whereas the average width based on several Geological Survey streamflow measurements at two sites is 12 ft. The area (A) over which infiltration would occur is therefore estimated to be about 144,000 ft^2. Substituting these values of K, I, and A into the induced recharge equation results in a value for R of 1.6 Mgal/d.

This potential recharge from streambed infiltration was compared to low-flow estimates of streams entering the model area to see how often the available streamflow could be less than 1.6 Mgal/d. Two streams flow into the model area (fig. 12): one enters from the northwest and drains about 2.3 mi^2 and the other enters from the southwest and drains about 0.8 mi^2. Flows have not been measured at either site. Low-flow estimates for the period 1931-60 can be obtained from a regionalization technique developed for Connecticut by Thomas (1966) that relates low flow of unregulated streams to the proportion of drainage underlain by coarse-grained stratified drift. This technique has been described for the Farmington River basin by Handman and others (1986, p. 14-19). The combined flow for both streams that will be equaled or exceeded 90 percent of the time (90-percent-duration flow) is estimated to be 1.3 Mgal/d. Ten percent of the time the streamflow would be less than this value. The potential recharge from streambed infiltration is 0.3 Mgal/d greater than the estimated 90-percent-duration flow. Consequently, recharge from streambed leakage is limited to the 90-percent-duration flow of 1.3 Mgal/d.

The model area for the Stratton Brook aquifer (fig. 12) includes all the coarse-grained and highly transmissive stratified drift shown in figure 7. The upper 4,000 ft and lower 2,000 ft of the northwestern side of the model area coincides with parts of the valley margin where saturated thickness is less than 10 ft. The intervening 4,000 ft of this side of the model area crosses stratified drift that has a saturated thickness of about 40 ft. An impermeable-barrier boundary condition has been assigned to the northwestern side of the model area even though there is probably substantial ground-water inflow in the area of thick stratified drift.

The lower 6,500 ft of the parallel southeastern side of the model area almost coincides with the contact between stratified drift and till on the valley margin. The upper 3,500 ft crosses stratified drift that has a saturated thickness greater than 40 ft. This side of the model area is also considered to represent an impermeable-barrier boundary condition, but substantial ground-water inflow probably occurs across the upper part. The placement of the parallel northwest-southeast boundaries in figure 12 represents the best approximation to straight-line boundaries that could be made for this irregular-shaped aquifer.

No hydraulic boundary conditions have been imposed along the northeast- and northwest-facing sides of the model area. Extensive saturated stratified drift extends several thousand feet beyond the southwestern side and at least 1,500 ft beyond the northeastern side. The limits of the aquifer in these two directions are considered to be far enough away that their effects on drawdowns of wells within the model area would be negligible.

Six hypothetical pumping wells, shown in figure 12, are used to simulate large ground-water withdrawals within the Stratton Brook aquifer model area. The wells were placed in areas where high transmissivity and large saturated thickness favor high pumping rates. The wells are also as far from each other and from the parallel impermeable-barrier boundaries as feasible in order to minimize drawdowns due to interference effects and boundaries. Wells 2P and 3P are close to the locations of public-supply wells that are part of the Village Water Company's Stratton Brook well field.

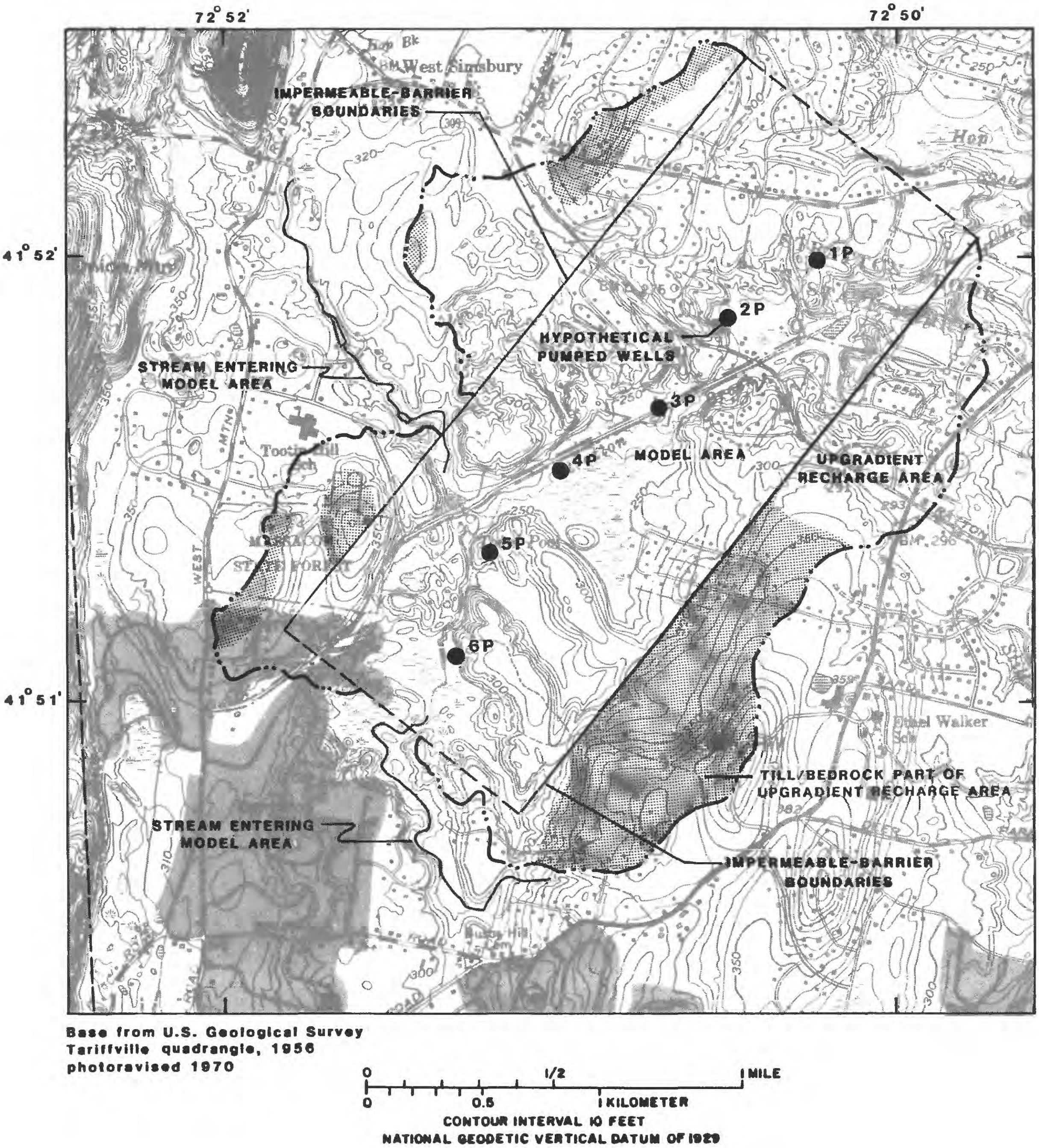


Figure 12.--Stratton Brook aquifer model area, assigned hydraulic boundaries, and locations of hypothetical wells.

Each of the hypothetical pumped wells has a 1 ft radius, is screened in the lower three-tenths (0.3) of the aquifer, and is 100-percent efficient. Initial pumping rates were selected for each well and the total drawdowns in the wells after a 180-day pumping period were calculated using the procedure outlined in appendix A. These drawdowns were compared to the maximum available drawdown and pumping rates were subsequently adjusted until the calculated total drawdown in each well was within 1 ft of the top of the well screen. The final pumping rates and corresponding drawdowns are listed in table 3. The largest pumping rate is 560 gal/min at hypothetical well 6P, while the lowest, 260 gal/min, is at hypothetical well 4P. The total pumpage from all six wells is 3.5 Mgal/d.

The withdrawal rate simulated by the analytical flow model and the estimated long-term recharge to the Stratton Brook aquifer are almost identical--3.5 Mgal/d compared to 3.4 Mgal/d. Either number exceeds the reported 1987 withdrawal by the Village Water Company wells of 623 Mgal or 1.7 Mgal/d (H.W. Sternberg, Connecticut Department of Environmental Protection, oral commun., 1988). The estimated long-term yield of this aquifer is equal to the estimated long-term recharge of 3.4 Mgal/d. Development of this amount of ground water or even lesser amounts may substantially reduce the flow of Stratton Brook during dry weather periods. This brook has a relatively small low flow during such periods (estimated 90-percent-duration flow of 1.3 Mgal/d entering the model area).

Table 3.--Summary of well and aquifer characteristics, maximum pumping rates, and drawdowns in wells used in the Stratton Brook aquifer model

[All wells have an effective radius of 1 foot, have a screen length equal to 30 percent of the initial saturated thickness, and are 100-percent efficient. The aquifer has an assumed specific yield of 0.2 and an assumed ratio of 0.1 between the hydraulic conductivities in the vertical and horizontal directions (K_v:K_h). Values of saturated thickness and drawdown rounded to nearest foot; transmissivity rounded to nearest 100 feet squared per day; and pumping rate rounded to nearest 10 gallons per minute]

Hypothetical well number	Initial saturated thickness (feet)	Initial transmissivity (feet squared per day)	Transmissivity adjusted for aquifer thinning (feet squared per day)	Maximum pumping rate (gallons per minute)	Total drawdown (s_{total}) after 180 days of pumping (feet)	Maximum available drawdown (feet)
1P	55	8,000	7,000	360	32	32
2P	75	8,000	7,100	480	44	44
3P	65	8,000	6,800	360	35	35
4P	55	8,000	6,400	260	28	28
5P	70	8,000	6,900	410	39	39
6P	80	8,000	7,300	560	49	49

The Bissell Brook Aquifer

An analytical model was not constructed for the Bissell Brook aquifer because most of the aquifer area is in the town of Granby and subsurface data are sparse. A rudimentary estimate of long-term yield may be obtained by calculating an estimated long-term recharge for the aquifer area. While the actual yield is unlikely to exceed this estimated recharge value, it could be considerably less, if the hydraulic characteristics are not as favorable throughout the aquifer as they are at the few locations where data are available.

The area of stratified drift that borders Bissell Brook from Firetown Road to where it joins the outlet of Spring Pond in Granby (fig. 13) is about 1.95 mi^2 (54.4×10^6 ft^2). The recharge from precipitation that falls on this area is estimated to be 712 Mgal/yr or 1.95 Mgal/d, assuming an average recharge rate of 1.75 ft/yr. (54.4×10^6 $ft^2 \times 1.75$ ft/yr $\times$ 7.48 gal/ft^3 = 712 Mgal/yr.) The stratified drift is bordered by 0.55 mi^2 (15.3×10^6 ft^2) of till and bedrock that contributes recharge through subsurface flow (fig. 13). This recharge is calculated to be about 86 Mgal/yr or 0.24 Mgal/d based on an assumed outflow rate of 0.75 ft/yr (15.3×10^6 $ft^2 \times 0.75$ ft/yr $\times$ 7.48 gal/ft^3 = 86 Mgal/yr).

Induced recharge from Bissell Brook is also a potential source of recharge. Bissell Brook and an unnamed tributary join just above Firetown Road and enter the aquifer area as shown in figure 13. The 90-percent-duration flow of these streams at the point they join and enter the aquifer area can be estimated by the regionalization technique developed by Thomas (1966) and described by Handman and others (1986, p. 14-19). The resulting estimates of the flows that would be equaled or exceeded 90 percent of the time are considered as an estimate of the potential recharge from induced infiltration. The 90-percent-duration flow of Bissell Brook at Firetown Road, where 53 percent of the 1.3-mi^2 upstream drainage area is underlain by stratified drift, is estimated to be about 0.6 Mgal/d. The unnamed tributary drains 1.62 mi^2, only 14 percent of which is underlain by stratified drift. The flow of this tributary that is equaled or exceeded 90 percent of the time is estimated to be about 0.2 Mgal/d. The combined 90-percent-duration flow of 0.8 Mgal/d is considered to be the amount of water available for induced recharge.

The total estimated recharge to the Bissell Brook aquifer between Firetown Road and the point where the outlet of Spring Pond joins Bissell Brook is 3 Mgal/d. This is the sum of the estimated recharge values from precipitation, subsurface inflow, and induced infiltration. The value of 3 Mgal/d is also a rudimentary index of estimated long-term yield.

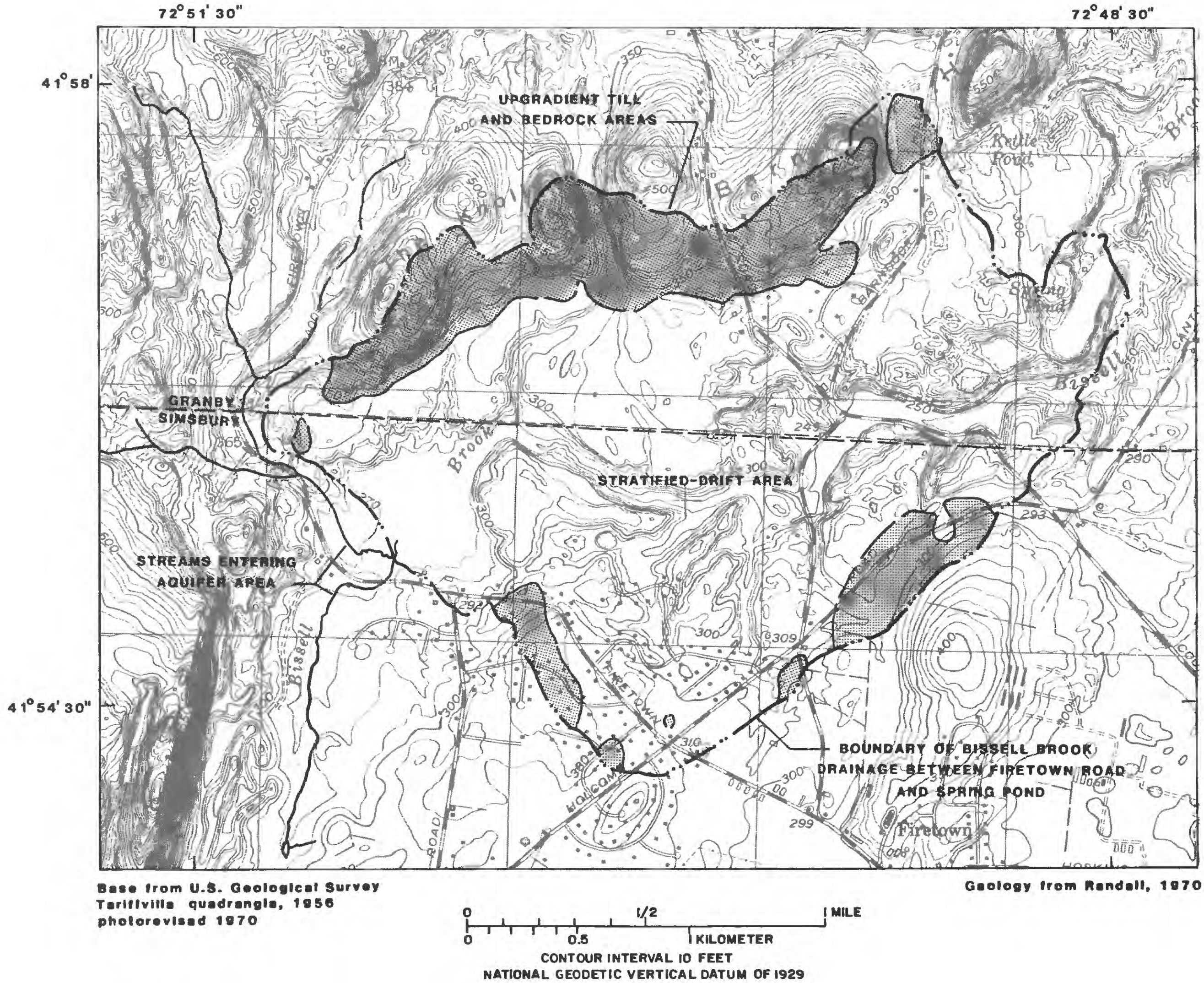


Figure 13.--Areas that recharge the stratified drift in the Bissell Brook basin between Firetown Road in Simsbury and Spring Pond in Granby.

SUMMARY AND CONCLUSIONS

Large quantities of ground water are available locally from saturated stratified-drift deposits in the Farmington lowland in Simsbury, including tributary valleys drained by Hop, Stratton, and Bissell Brooks. In the main valley of the Farmington River, coarse-grained deposits near Hoskins and near the Simsbury-Avon town line constitute the Hoskins and Nod Road aquifers respectively. A less extensive coarse-grained stratified-drift deposit on the eastern side of the valley near Tariffville is the source of water for the Tariffville Fire District. Elsewhere in the Farmington River valley, the stratified drift consists mostly of fine-grained sediments that yield only small to moderate quantities of ground water. Ground-water withdrawals from the Hoskins and Nod Road aquifers have been small through 1987. Estimated long-term yields, based on regional values of recharge and analytical flow models, are 1.6 Mgal/d for the Hoskins aquifer and from 1.8 to 2.7 Mgal/d for the Nod Road aquifer. Estimates of yield for the Nod Road aquifer reflect uncertainty about the degree of hydraulic connection between this aquifer and the Farmington River. Additional study of the stream-aquifer interaction at this locale would allow refinement of the yield estimate.

Almost all of the Stratton Brook valley in western Simsbury is underlain by coarse-grained stratified drift. The saturated thickness of this material exceeds 40 ft over a large part of the valley. These favorable hydrologic conditions have led to the development of a major pumping center, the Village Water Company well field adjacent to Stratton Brook State Park. This well field reportedly produced 623 Mgal of water in 1987. The long-term yield of the Stratton Brook aquifer, estimated in this study, is 3.4 Mgal/d, about twice the 1987 pumpage. The estimated yield of 3.4 Mgal/d is dependent upon water available from induced infiltration. Withdrawals at this rate could have a significant effect on streamflow during dry periods.

Hop Brook valley, to the north of the Stratton Brook basin, locally contains coarse-grained stratified drift that has a saturated thickness of 40 ft or more. Three such areas, identified in this study, are smaller than those in the Stratton Brook valley and have lower transmissivities. No attempt was made to estimate the long-term yields of these areas, but they would be less than in the modeled areas.

The last area where thick, saturated deposits of stratified drift were identified is the Bissell Brook basin along the Simsbury-Granby town line. Deposits in this area, termed the Bissell Brook aquifer, have a maximum known saturated thickness in excess of 100 ft and the transmissivity at the same site is estimated to be 19,000 ft^2/d. Because most of the stratified drift in the Bissell Brook basin underlies the town of Granby and areas outside the study area, it was not possible to estimate the long-term yield of this aquifer using an analytical flow model. A rough estimate of 3 Mgal/d is based on estimated long-term recharge from precipitation on the aquifer, subsurface inflow from adjacent till and bedrock, and water potentially available for induced recharge. Additional hydrogeologic data collection in both Simsbury and Granby would be required to refine the yield estimate for this aquifer.

REFERENCES CITED

Bingham, J.W., 1984, Hydrogeologic reconnaissance of the stratified-drift aquifers near Simsbury, Connecticut: U.S. Geological Survey Water-Resources Investigations Report 83-4145, 16 p.

Butler, S.S., 1957, Engineering hydrology: Englewood Cliffs, New Jersey, Prentice-Hall Inc., 356 p.

Cervione, M.A., Jr., Mazzaferro, D.L., and Melvin, R.L., 1972, Water resources inventory of Connecticut, part 6, upper Housatonic River basin: Connecticut Water Resources Bulletin 21, 84 p.

Cervione, M.A., Jr., Weiss, L.A., Bohr, J.R., and Bingham, J.W., 1988, Water resources data Connecticut Water Year 1986: U.S. Geological Survey Water-Data Report CT-86-1, 263 p.

Ferris, J.G., Knowles, D.B., Brown, R.H., and Stallman, R.W., 1962, Theory of aquifer tests: U.S. Geological Survey Water-Supply Paper 1536-E, p. 69-174.

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

Gonthier, J.B., Johnston, H.E., and Malmberg, G.T., 1974, Availability of ground water in the lower Pawcatuck River basin, Rhode Island: U.S. Geological Survey Water-Supply Paper 2033, 40 p.

Grady, S.G. and Handman, E.H., 1983, Hydrogeologic evaluation of selected stratified-drift deposits in Connecticut: U.S. Geological Survey Water-Resources Investigations Report 83-4010, 51 p.

Griswold and Fuss, Inc., 1976, Sanitary landfill feasibility study for Town of Simsbury, Connecticut: Griswold and Fuss Consulting Engineers and Surveyors, Manchester, Connecticut, 53 p.

Handman, E.H., Haeni, F.P., and Thomas, M.P., 1986, Water resources inventory of Connecticut, part 9, Farmington River basin: Connecticut Water Resources Bulletin 29, 91 p.

Hopkins, H.J. and Handman, E.H., 1975, Hydrogeologic data for the Farmington River basin: Connecticut Water Resources Bulletin 28, 49 p.

Jacob, C.E., 1944, Notes on determining permeability by pumping tests under water-table conditions: U.S. Geological Survey Open-File Report, 25 p.

Krumbein, W.C. and Monk, G.D., 1942, Permeability as a function of the size parameters of unconsolidated sand: American Institute of Mining and Metallurgical Engineers Technical Publication 1492, p. 153-163.

LeBlanc, D.R., 1984, Sewage plume in a sand and gravel aquifer, Cape Cod, Massachusetts: U.S. Geological Survey Water-Supply Paper 2218, 28 p.

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

Masch, F.D. and Denny, K.J., 1966, Grain size distribution and its effect on the permeability of unconsolidated sands: Water Resources Research, v. 2, no. 4, p. 665-677.

Mazzaferro, D.L, 1986, Ground-water availability and water quality at Southbury and Woodbury, Connecticut: U.S. Geological Survey Water-Resources Investigations Report 84-4221, 105 p.

Mazzaferro, D.L., Handman, E.H., and Thomas, M.P., 1979, Water resources inventory of Connecticut, part 8, Quinnipiac River basin: Connecticut Water Resources Bulletin 27, 88 p.

Melvin, R.L., 1974, Hydrogeology of southeastern Connecticut: Connecticut Department of Finance and Control, Office of State Planning and Finance, 6 pl., scale 1:24,000.

Pluhowski, E.J. and Kantrowitz, I.H., 1964, Hydrology of the Babylon-Islip area, Suffolk County, Long Island, New York: U.S. Geological Survey Water-Supply Paper 1768, 119 p.

Randall, A.D., 1964a, Geology and ground water in the Farmington-Granby area, Connecticut: U.S. Geological Survey Water-Supply Paper 1661, 130 p.

----- 1964b, Records and logs of selected wells and test borings, records of springs, and chemical analyses of water in the Farmington-Granby area, Connecticut: Connecticut Water Resources Bulletin 3, 25 p.

----- 1970, Surficial geology of the Tariffville Quadrangle, Connecticut: U.S. Geological Survey Geologic Quadrangle Map GQ-798, 1 sheet, scale 1:24,000.

----- 1978, Infiltration from tributary streams in the Susquehanna River basin, New York: Journal of Research of the U.S. Geological Survey, v. 6, no. 3, p. 285-297.

Rosenshein, J.S., Gonthier, J.B., and Allen, W.B., 1968, Hydrologic characteristics and sustained yield of principal ground-water units, Potowomut-Wickford area, Rhode Island: U.S. Geological Survey Water-Supply Paper 1775, 38 p.

Ryder, R.B., Thomas, M.P., and Weiss, L.A., 1981, Water resources inventory of Connecticut, part 7, upper Connecticut River basin: Connecticut Water Resources Bulletin 24, 78 p.

Ryder, R.B. and Weiss, L.A., 1971, Hydrogeologic data for the upper Connecticut River basin, Connecticut: Connecticut Water Resources Bulletin 25, 54 p.

Schnabel, R.W., 1960, Bedrock geology of the Avon Quadrangle, Connecticut: U.S. Geological Survey Geologic Quadrangle Map GQ-134, 2 sheets, scale 1:24,000.

----- 1962, Surficial geology of the Avon Quadrangle, Connecticut: U.S. Geological Survey Geologic Quadrangle Map GQ-147, 2 sheets, scale 1:24,000.

Schnabel, R.W. and Eric, J.H., 1965, Bedrock geologic map of the Tariffville Quadrangle, Hartford County, Connecticut and Hampden County, Massachusetts: U.S. Geological Survey Geologic Quadrangle Map GQ-370, 1 sheet, scale 1:24,000.

Theis, C.V., 1935, Relation between the lowering of the piezometric surface and the rate and duration of discharge of a well using ground-water storage: American Geophysical Union Transactions, pt. 2, p. 519-524.

----- 1963, Estimating the transmissibility of a water-table aquifer from the specific capacity of a well, in Bentall, Ray, compiler, Methods of determining permeability, transmissibility and drawdown: U.S. Geological Survey Water-Supply Paper 1536-I, p. 332-336.

Thomas, M.P., 1966, Effect of glacial geology upon the time distribution of streamflow in eastern and southern Connecticut: U.S. Geological Survey Professional Paper 550-B, p. B209-B212.

U.S. Geological Survey, 1970, Water resources data for Connecticut, Part 1-3: U.S. Geological Survey, 206 p.

----- 1971, Water resources data for Connecticut, Part 1-3: U.S. Geological Survey, 273 p.

----- 1972, Water resources data for Connecticut, Part 1-3: U.S. Geological Survey, 266 p.

Walton, W.C., 1962, Selected analytical methods for well and aquifer evaluation: Illinois State Water Survey Bulletin 49, 81 p.

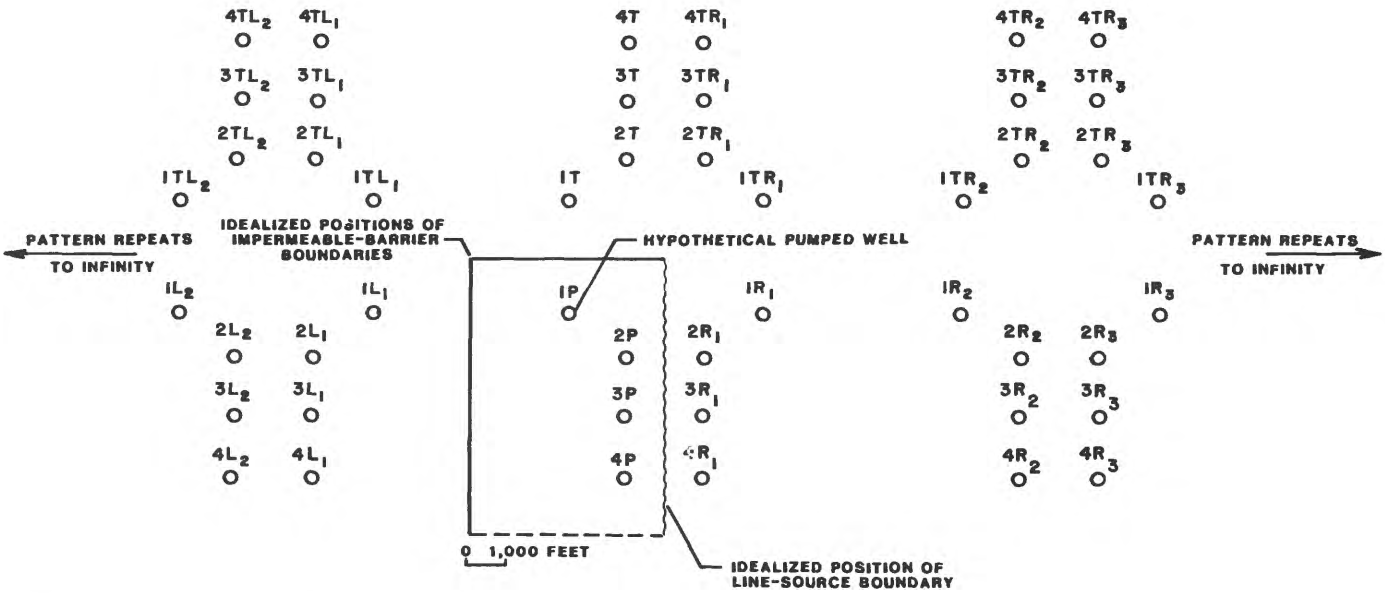
Walton, W.C., Hills, D.L., and Grundeen, G.M., 1967, Recharge from induced streambed infiltration under varying ground-water level and stream-stage conditions: University of Minnesota Water Resources Research Center Bulletin 6, 42 p.

Weaver, M.F., 1988, Ground-water availability from selected stratified-drift aquifers in southwestern Connecticut: Connecticut Water Resources Bulletin 33B, 63 p.

Yager, R.M., 1986, Simulation of ground-water flow and infiltration from the Susquehanna River to a shallow aquifer at Kirkwood and Conklin, Broome County, New York: U.S. Geological Survey Water-Resources Investigations Report 86-4123, 70 p.

(PAGE 43 FOLLOWS)

Appendix A.--Image-well pattern for hypothetical pumped wells in an aquifer model area and calculations of total drawdown in hypothetical well 1P



(A.) Computation of s_r and s_b at well 1P, *from Theis equation:*

$$s = \frac{Q}{4\pi T} \; W(u)],$$

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

$$W(u) = -0.5772 - \ln u + u - \frac{u^2}{2\;2!} + \frac{u^3}{3\;3!} - \frac{u^4}{4\;4!} + \ldots\ldots\ldots \frac{u^n}{n\;n!}$$

where:

s = drawdown or buildup of the water table at any point of observation in the vicinity of well 1P, in feet;

Q = discharge or injection rates for image wells, in cubic feet per day;

T = average transmissivity of the aquifer (10,000 ft²/d);

r = distance from the center of well 1P to the point of observation, in feet

S = storage coefficient of the aquifer (0.2, dimensionless); and

t = time since pumping started (180 days).

For 13 repeating patterns of image wells in each direction, $\sum s_r = 9.2$ ft, and $\sum s_b = 9.3$ ft. Values of Q for image wells range from 1,670 to 2,200 gal/min (321,500 to 423,530 ft³/d).

(B.) Computation of s_i at well 1P due to pumping of wells 2P, 3P, and 4P, from Theis equation:

$$\sum s_i = 11.4 \text{ ft}$$

(C.) Adjustment of aquifer transmissivity:

$$\sum s_b + s_i - s_r = 9.3 \text{ ft} + 11.4 \text{ ft} - 9.2 \text{ ft} = 11.5 \text{ ft}$$

The initial saturated thickness at well 1P is 200 ft and this amount of drawdown therefore represents a 6 percent decrease in saturated thickness. Consequently the transmissivity used in subsequent computations is reduced by 6 percent to 9,400 ft²/d.

(D.) Computation of aquifer drawdown (s_a) at well 1P, from Theis equation:

$$s_a = \frac{Q}{4\pi T}\left[W(u)\right]; \quad u = \frac{r_w^2 S}{4Tt}$$

where:

r_w = radius of well 1P (1 ft)

T = adjusted transmissivity (9,400 ft²/d)

All other terms are as previously defined.

$$u = \frac{(1 \text{ ft}^2)\ (0.2)}{(4)\ (9{,}400 \text{ ft}^2/\text{d})(180 \text{ days})}$$

$$u = 3 \times 10^{-8}$$

W(u) = 16.7449 (Lohman, 1972, p. 16)

$$s_a = \frac{(321{,}500 \text{ ft}^3/\text{d})}{(4\pi)(9{,}400 \text{ ft}^2/\text{d})}\ (16.7449)$$

$$s_a = 45.6 \text{ ft}$$

(E.) Computation of drawdown due to dewatering of the aquifer (s_d) [from equation derived by C. E. Jacob (Walton, 1962, p. 7)]

$$s' = s - (s^2/2b)$$

where:

s' = drawdown if saturated thickness did not decrease (equal to s_a), in feet;

s = observed drawdown under water-table conditions (equal to $s_a + s_d$), in feet;

b = saturated thickness of aquifer, in feet, (adjusted value = 188.6 ft)

Expressing equation in quadratic form and solving for s_d:

$$s_d = b - \sqrt{b^2 - 2b\,s_a} - s_a$$

$$s_d = 188.6 \text{ ft} - \sqrt{(188.6 \text{ ft}^2) - 2(188.6 \text{ ft})(45.6 \text{ ft})} - 45.6 \text{ ft}$$

$$s_d = 7.5 \text{ ft}$$

(F.) Computation of drawdown due to the effects of partial penetration of the pumping well 1P (s_p) [from Butler, 1957, p. 160; based on equation developed by J. Kozeny]

$$s_{pp} = \frac{s_a}{C_{pp}}$$

where:

s_{pp} = observed drawdown for partially penetrating conditions, in feet;

s_a = aquifer drawdown in the pumped well for fully penetrating conditions, in feet; and

C_{pp} = partial penetration correction factor, dimensionless

C_{pp} is evaluated from the following equation:

$$C_{pp} = \alpha\left[1 + \left(7\sqrt{\frac{r_w}{2\alpha b}}\sqrt{\frac{K_v}{K_h}}\left(\cos\frac{\pi\alpha}{2}\right)\right)\right]$$

where:

α = fractional penetration (screen length/b), dimensionless;

K_v = hydraulic conductivity in the vertical direction, in feet squared per day;

K_h = hydraulic conductivity in the horizontal direction, in feet squared per day.

All other terms are as previously defined. The ratio K_v:K_h has not been measured but is assumed equal to 0.1, = 60 ft/188.6 ft or 0.32. Substituting the appropriate values for well 1P:

$$C_{pp} = 0.32\left[1 + \left(7\sqrt{\frac{1 \text{ ft}}{(2)(0.32)(188.6 \text{ ft})}}\sqrt{0.1}\left(\cos\frac{0.32\pi}{2}\right)\right)\right]$$

$$C_{pp} = 0.42$$

Solving for s_{pp}:

$$s_{pp} = \frac{45.6 \text{ ft}}{0.42}$$

$$s_{pp} = 108.6 \text{ ft}$$

The drawdown due to partial penetration (s_p) is equal to $s_{pp} - s_a$ or 63 ft

(G.) Total drawdown at hypothetical well 1P:

$$s_{total} = s_a + s_d + s_p + s_i + s_b - s_r$$

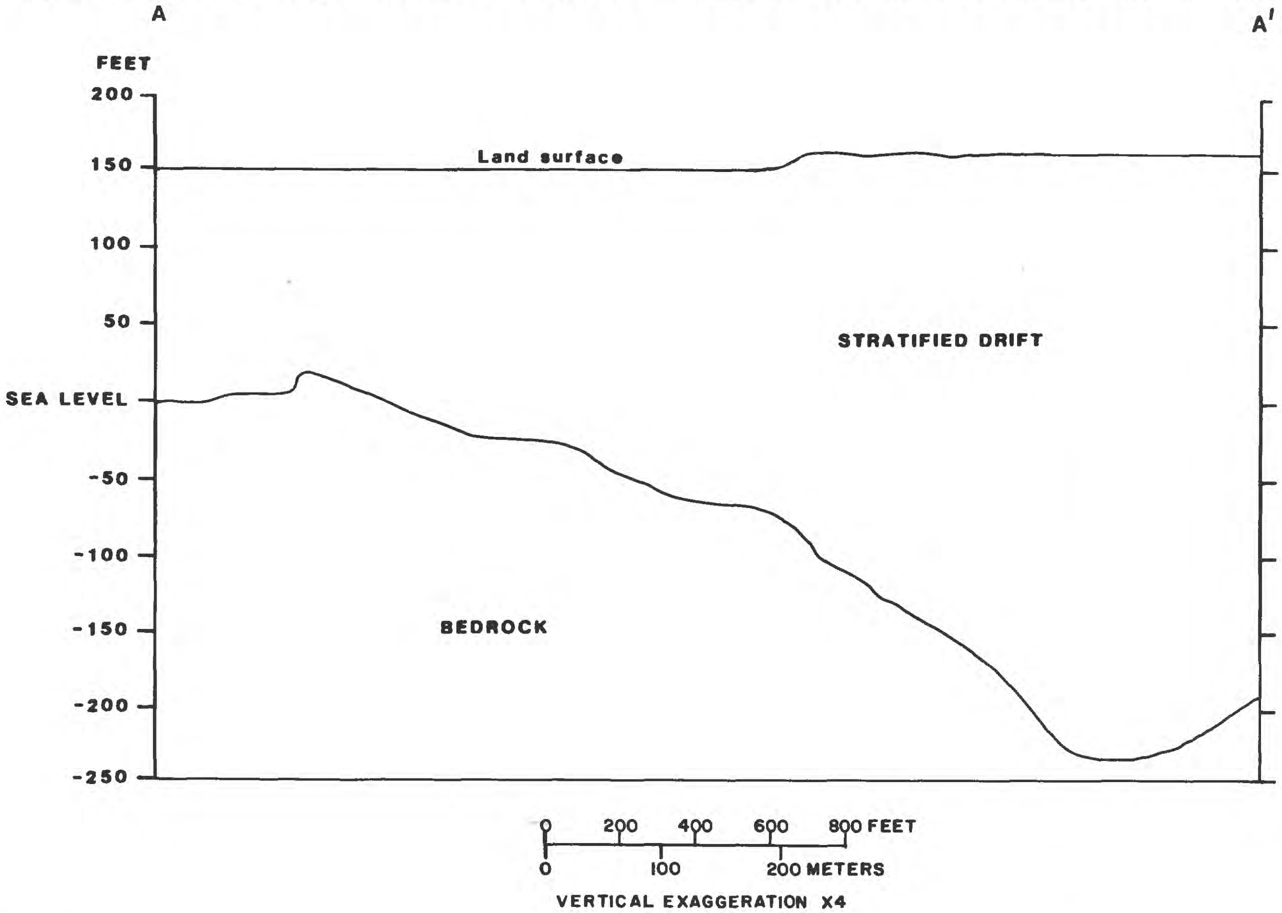
Substituting the computed values:

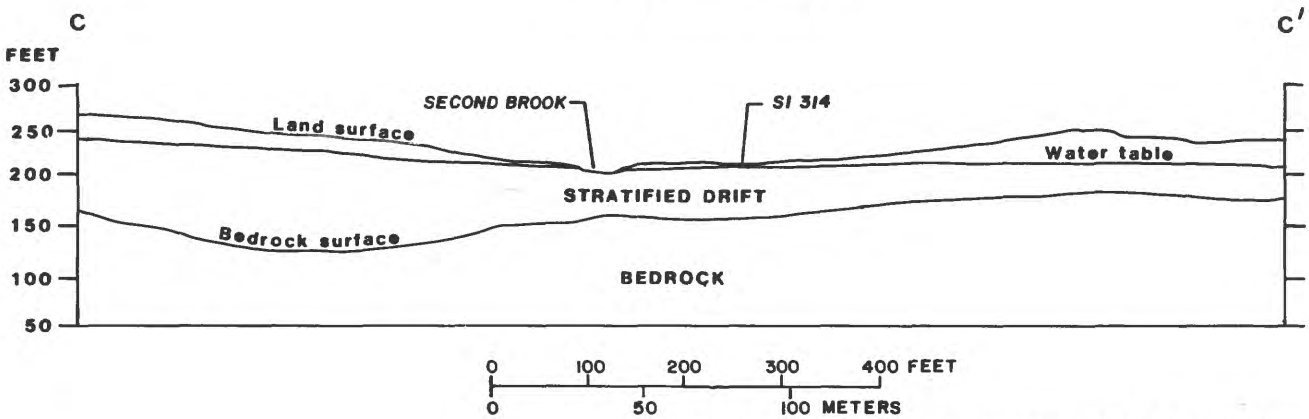
$$s_{total} = 45.6 \text{ ft} + 7.5 \text{ ft} + 63 \text{ ft} + 11.4 \text{ ft} + 9.3 \text{ ft} - 9.2 \text{ ft}$$

$$s_{total} = 127.6 \text{ ft}$$

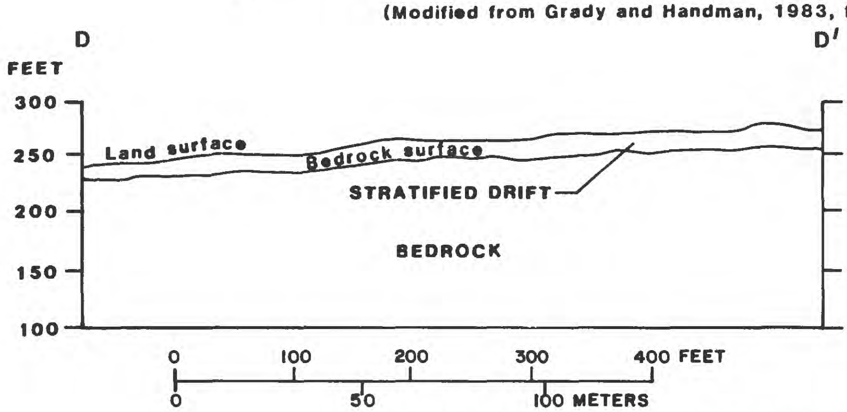
The maximum available drawdown has been defined as being within 1 ft of the top of the well screen which in the case of well 1P is equal to 128 ft (the adjusted saturated thickness minus the screen length). Well 1P is therefore considered capable of yielding 1,670 gal/min.

Appendix B.--Geologic sections based on interpretation of seismic-refraction data

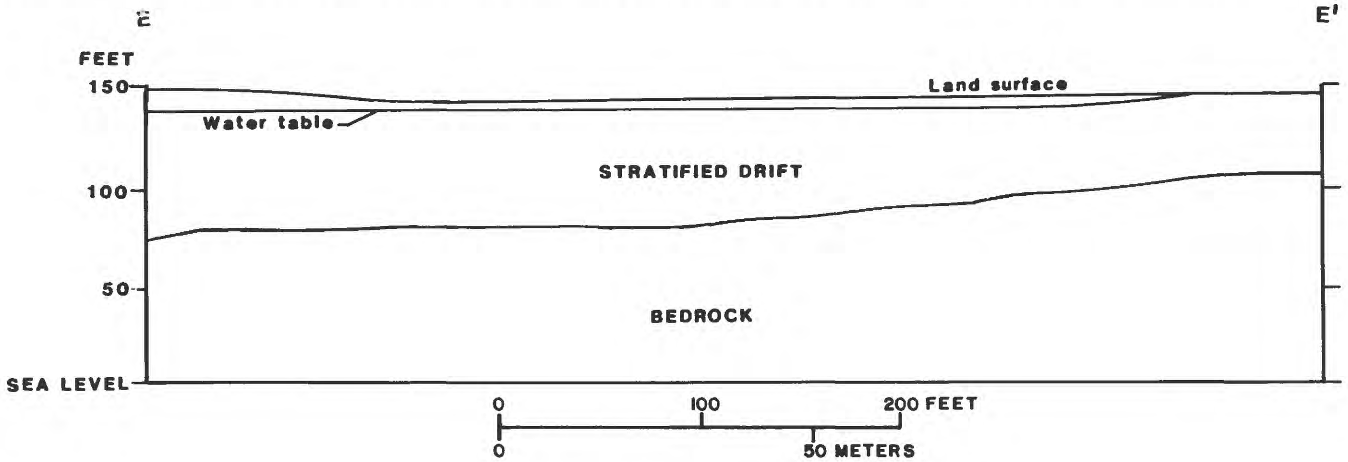


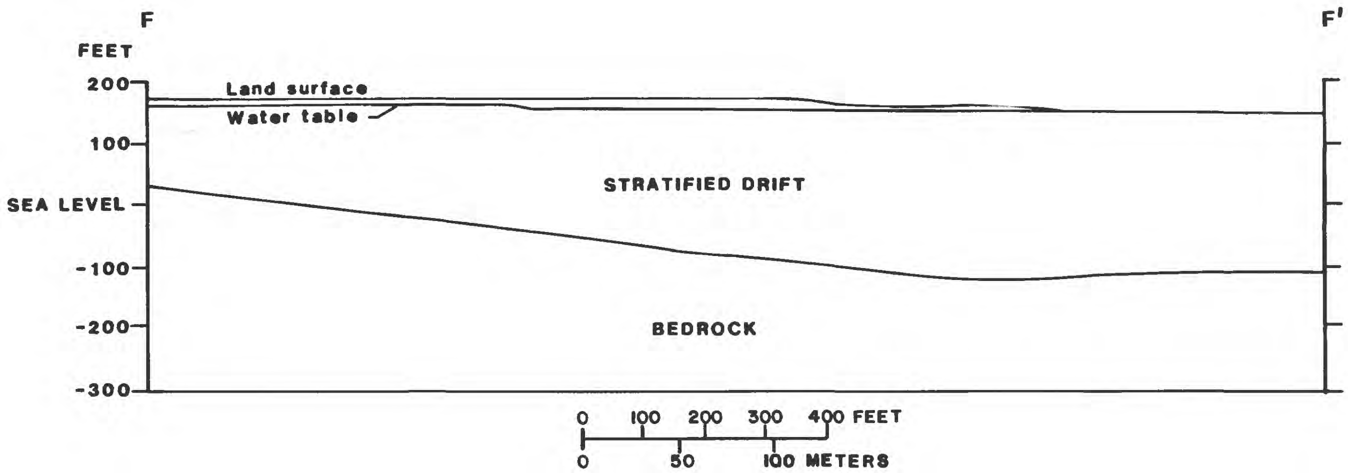


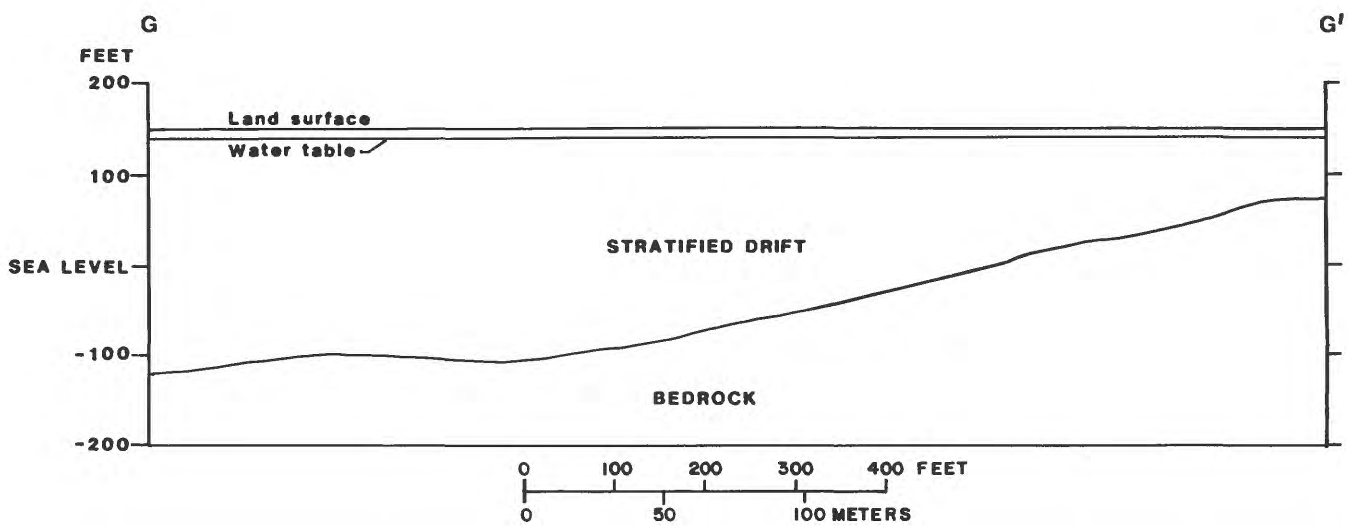
(Modified from Grady and Handman, 1983, fig. 7, section I-I')



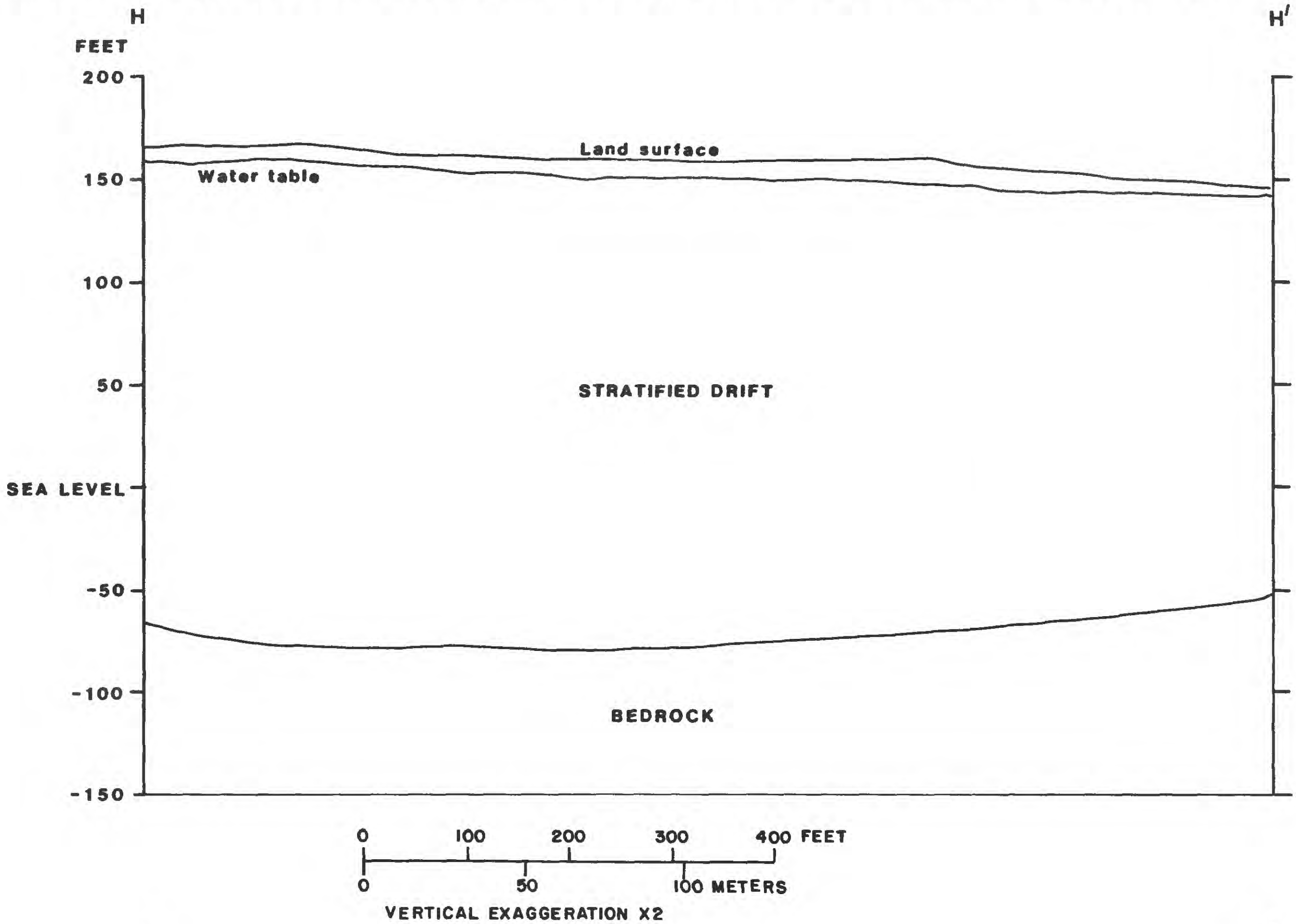
(Modified from Grady and Handman, 1983, fig. 7, section H-H')

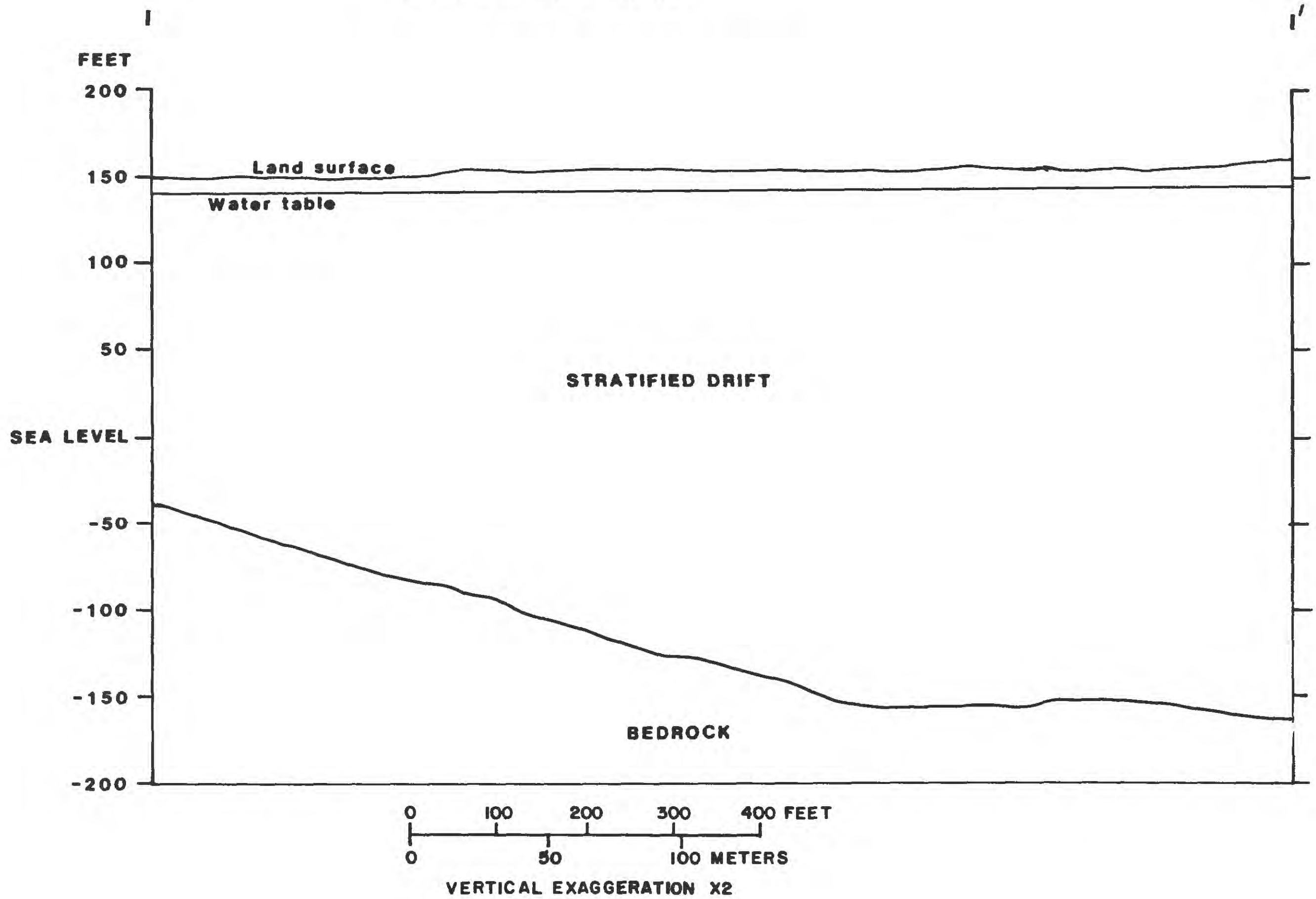

E
E'
FEET
150
100
50
SEA LEVEL
Land surface
Water table
STRATIFIED DRIFT
BEDROCK
0
100
200 FEET
0
50 METERS


F
F'
FEET
200
100
SEA LEVEL
-100
-200
-300
Land surface
Water table
STRATIFIED DRIFT
BEDROCK
0
100
200
300
400 FEET
0
50
100 METERS

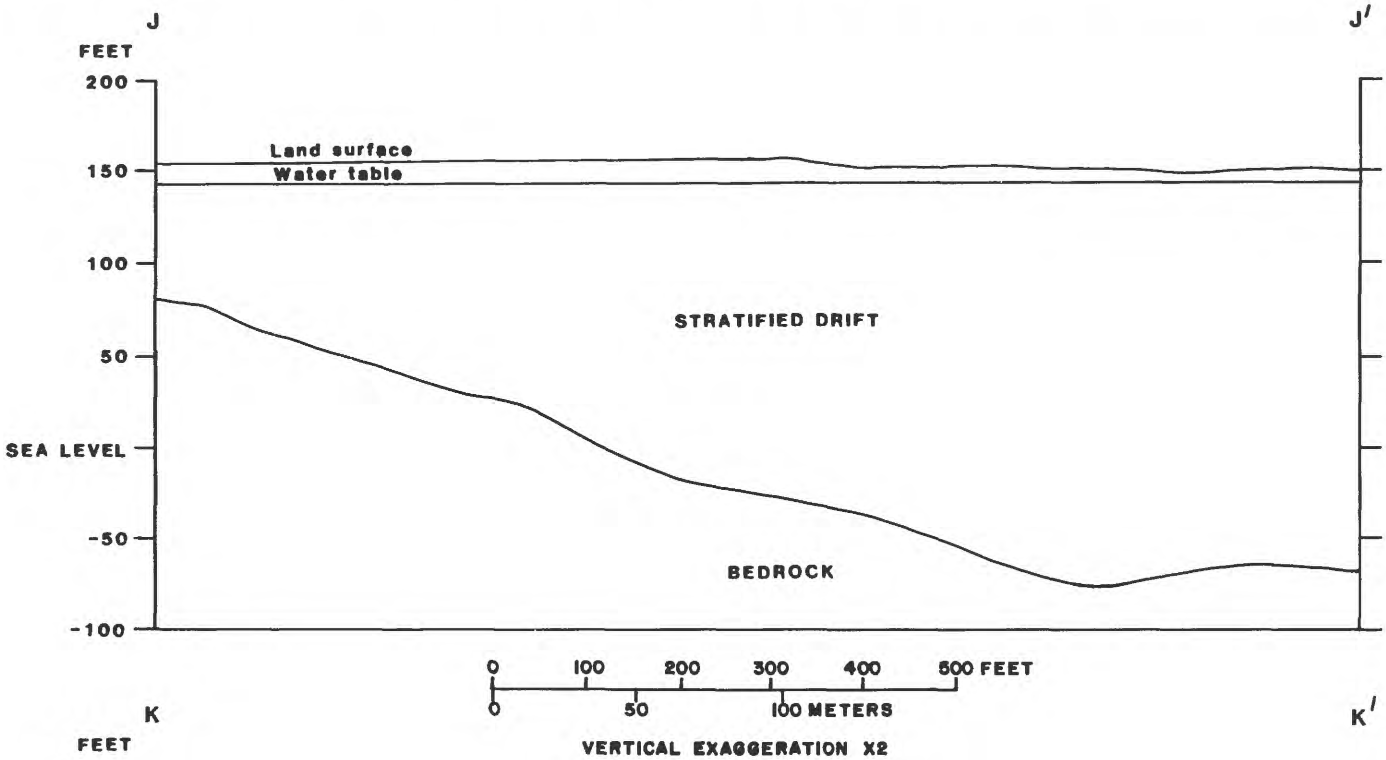

G
G'
FEET
200
100
SEA LEVEL
-100
-200
Land surface
Water table
STRATIFIED DRIFT
BEDROCK
0
100
200
300
400 FEET
0
50
100 METERS

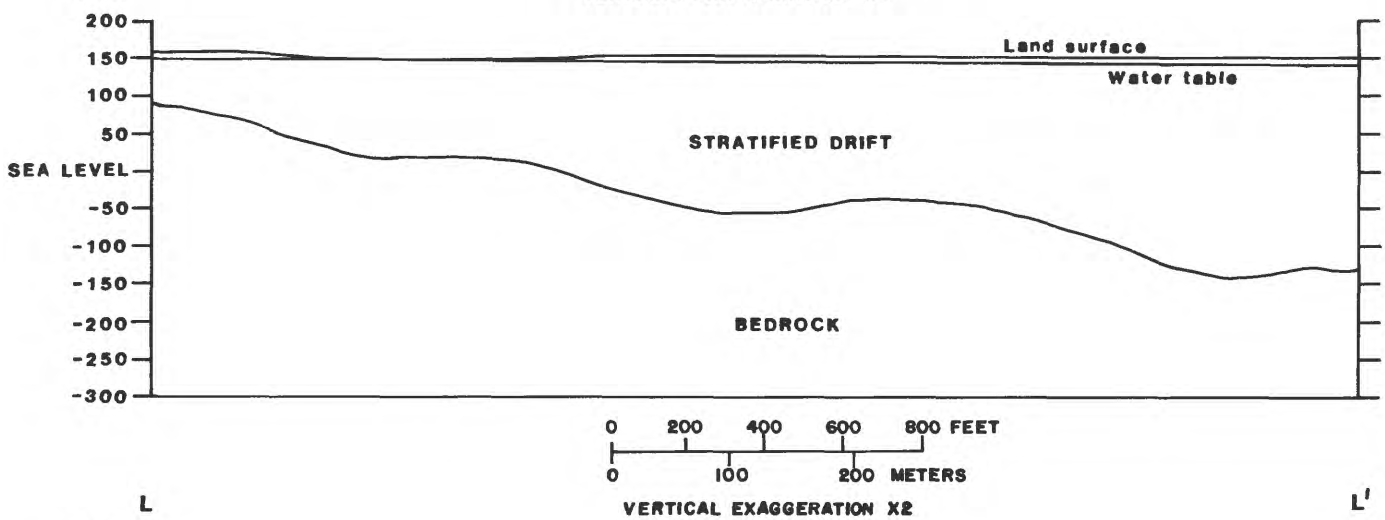
Appendix B.--Geologic sections based on interpretation of seismic-refraction data - continued

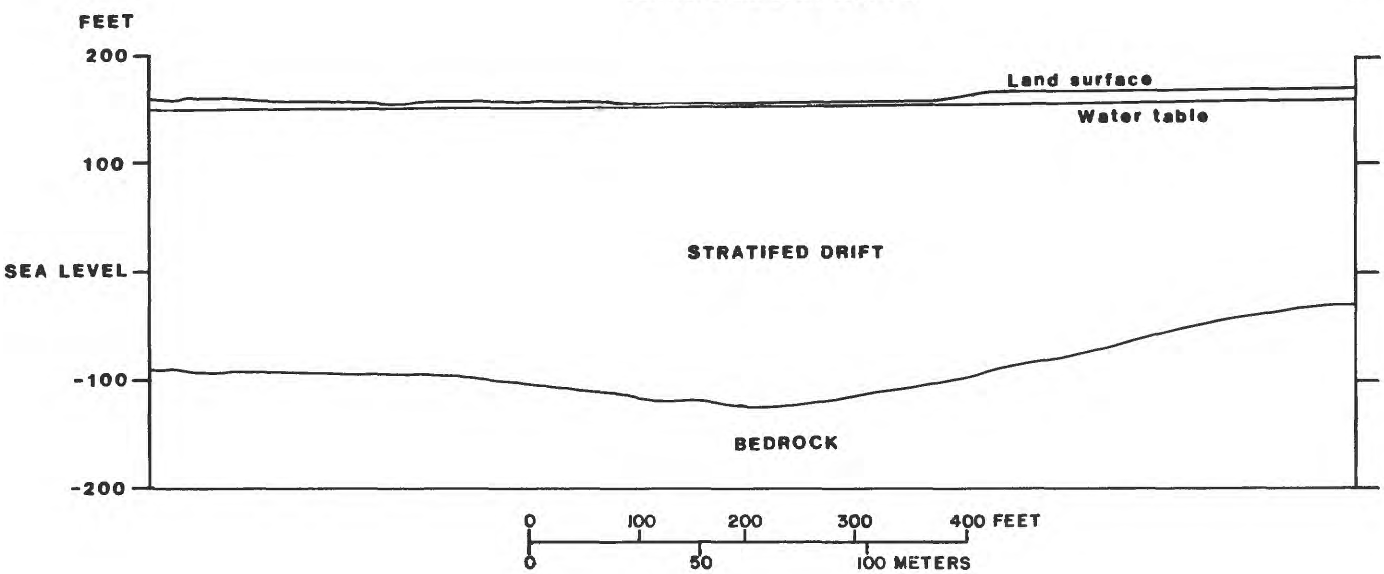




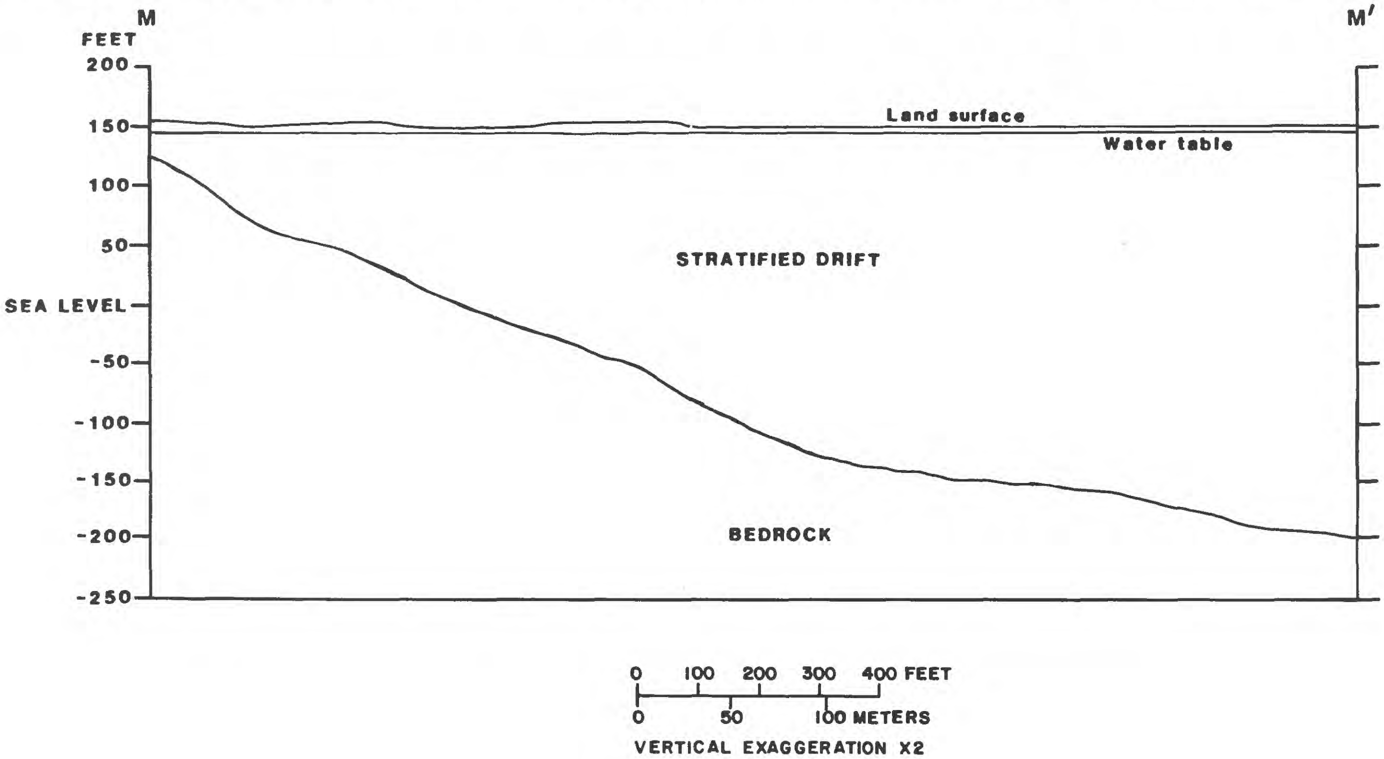
Appendix B.--Geologic sections based on interpretation of seismic-refraction data - continued

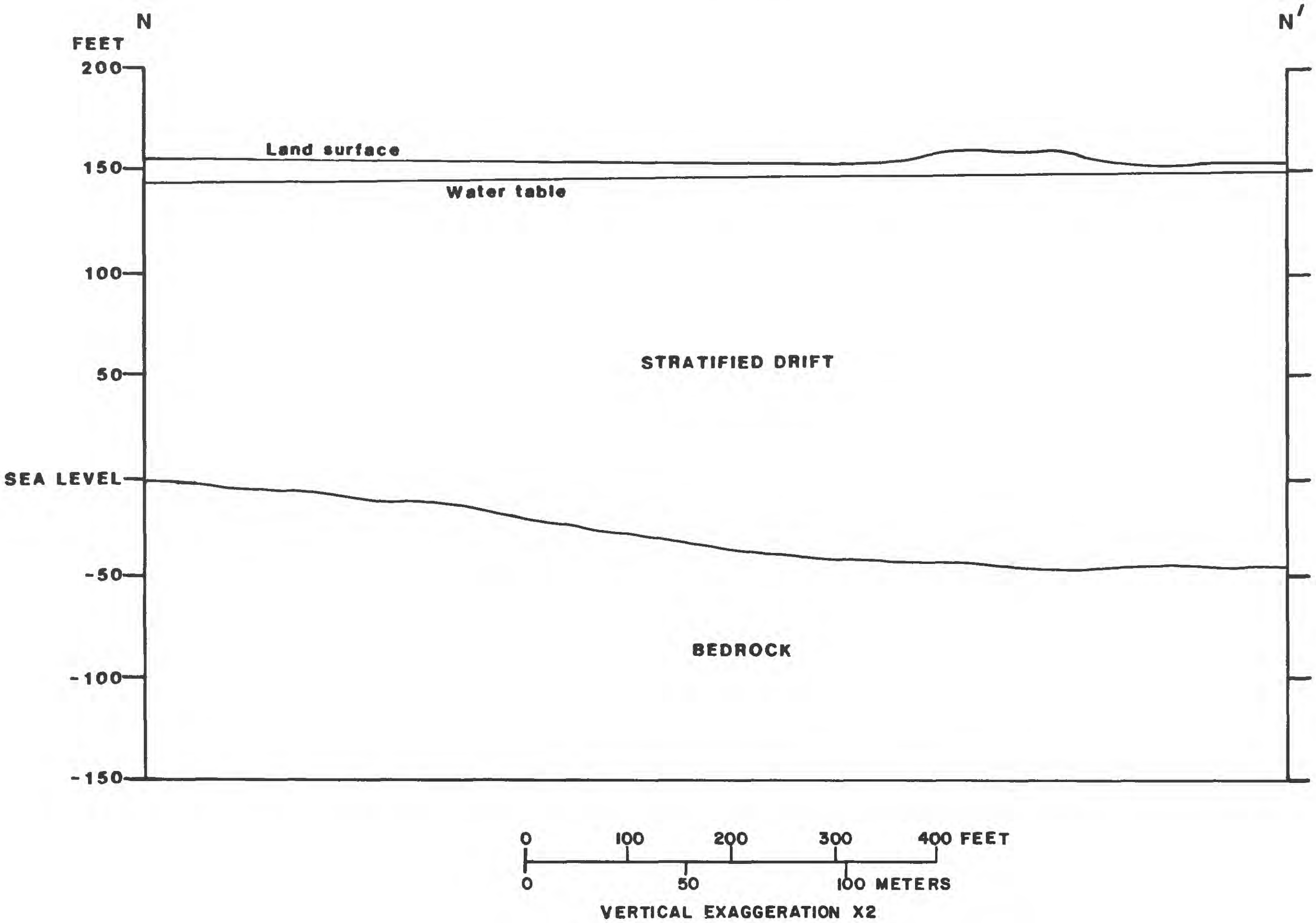




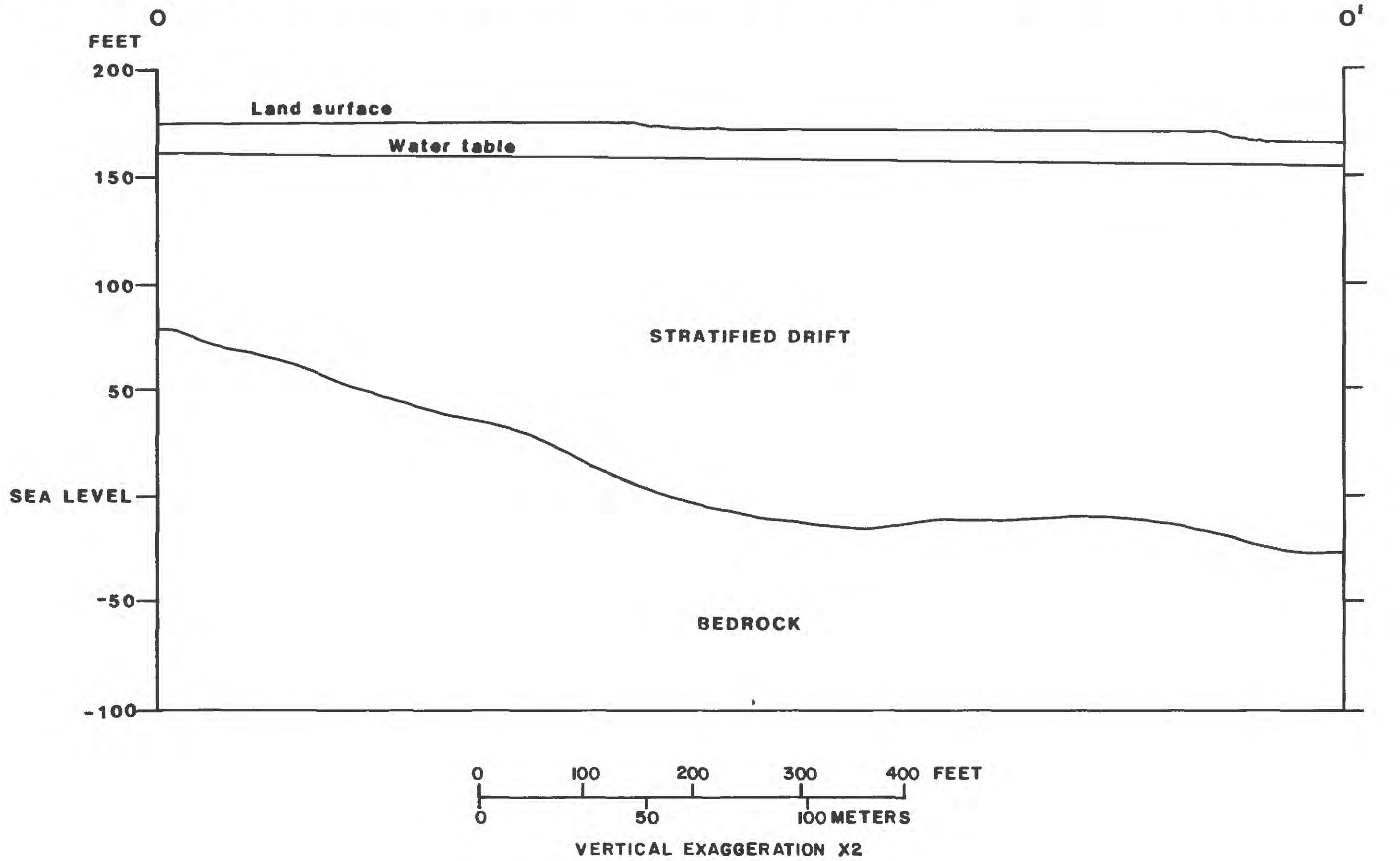


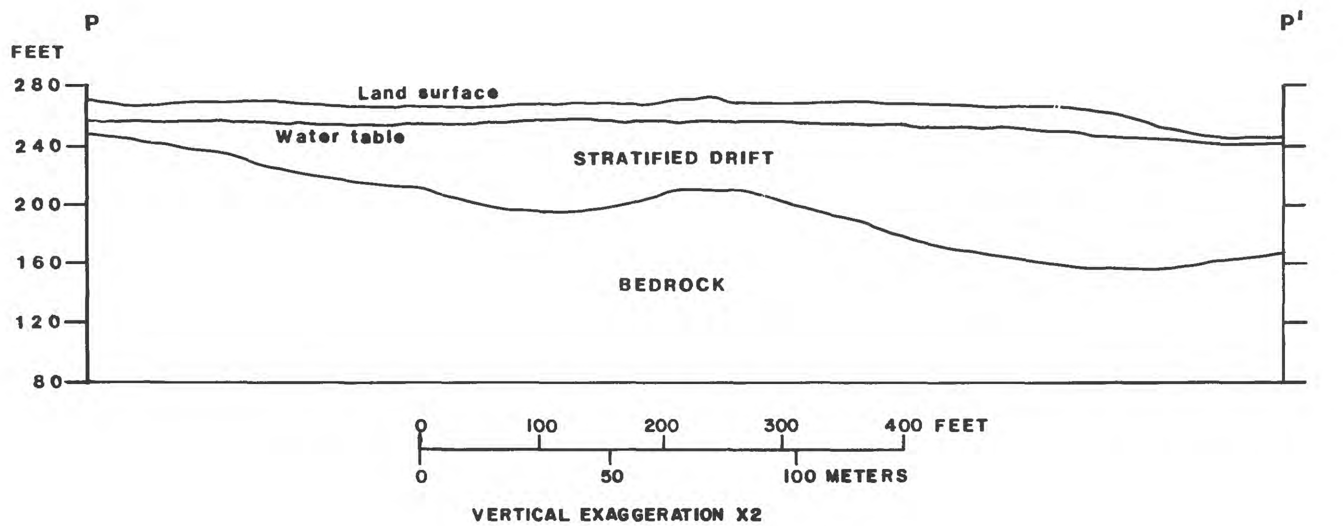
pendix B.--Geologic sections based on interpretation of seismic-refraction data - continued

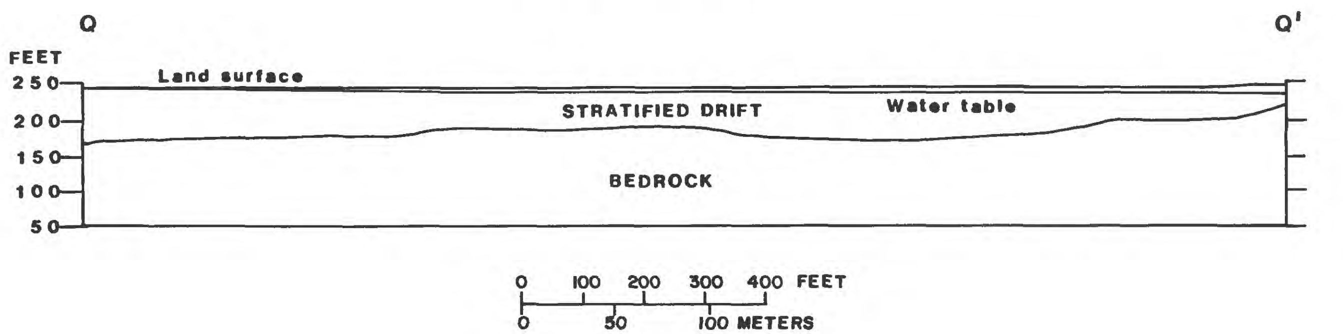




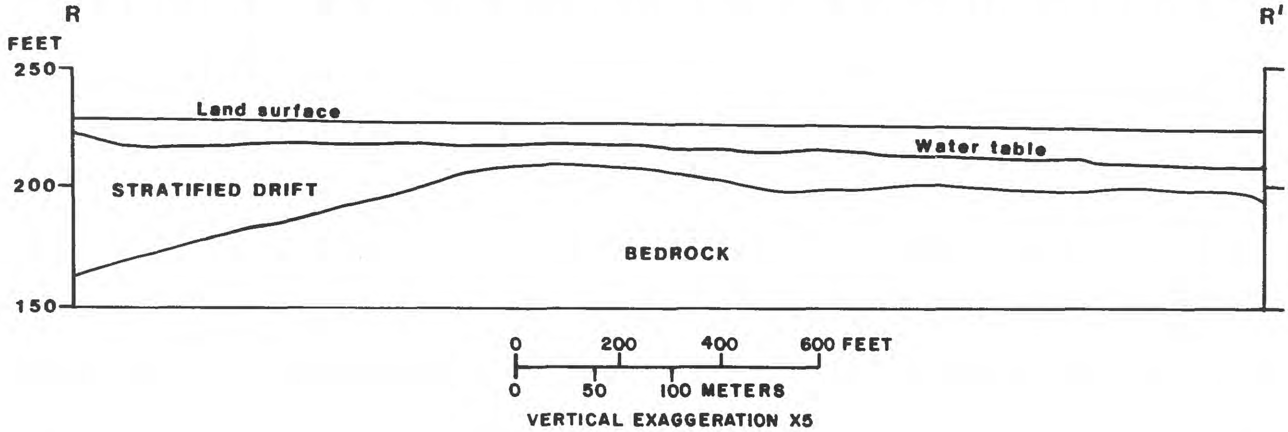
Appendix B.--Geologic sections based on interpretation of seismic-refraction data - continued

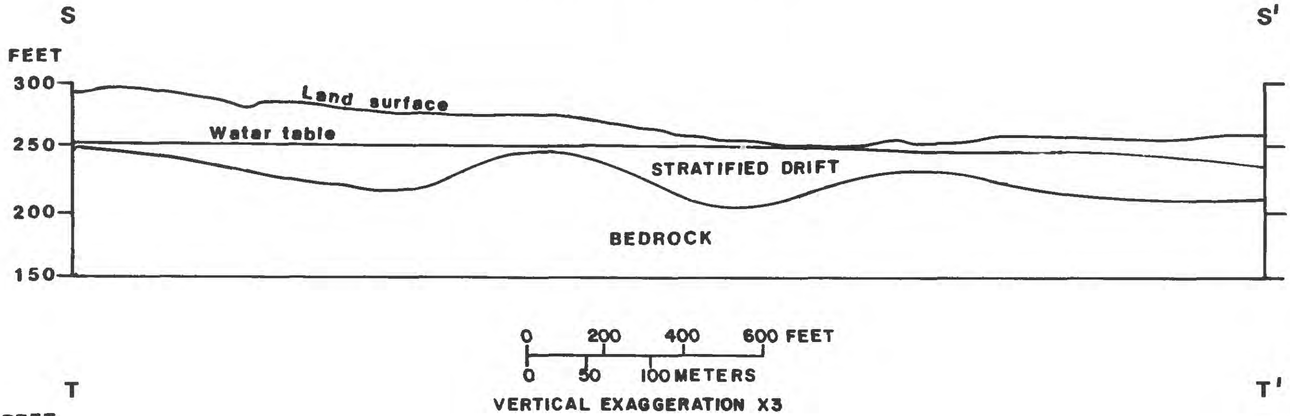


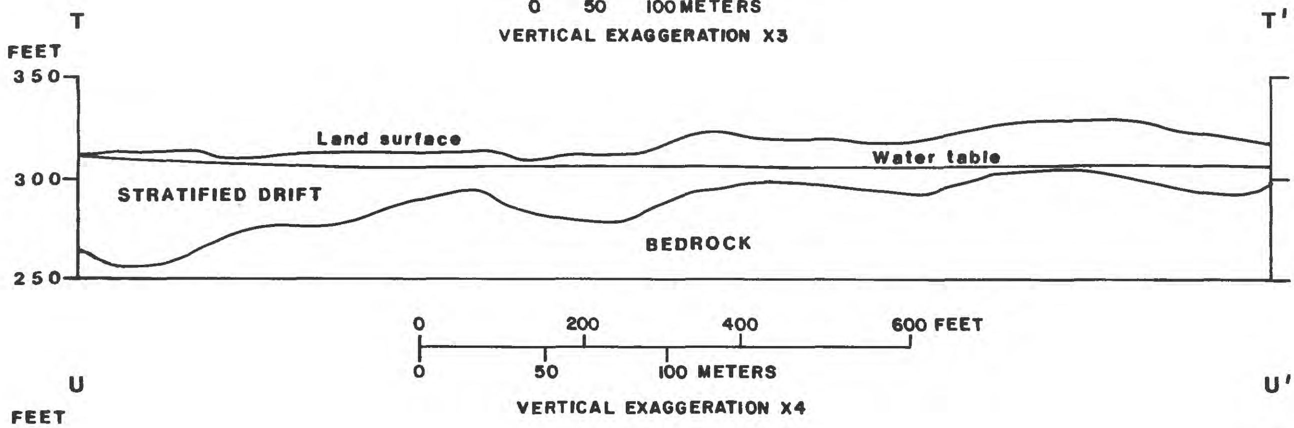


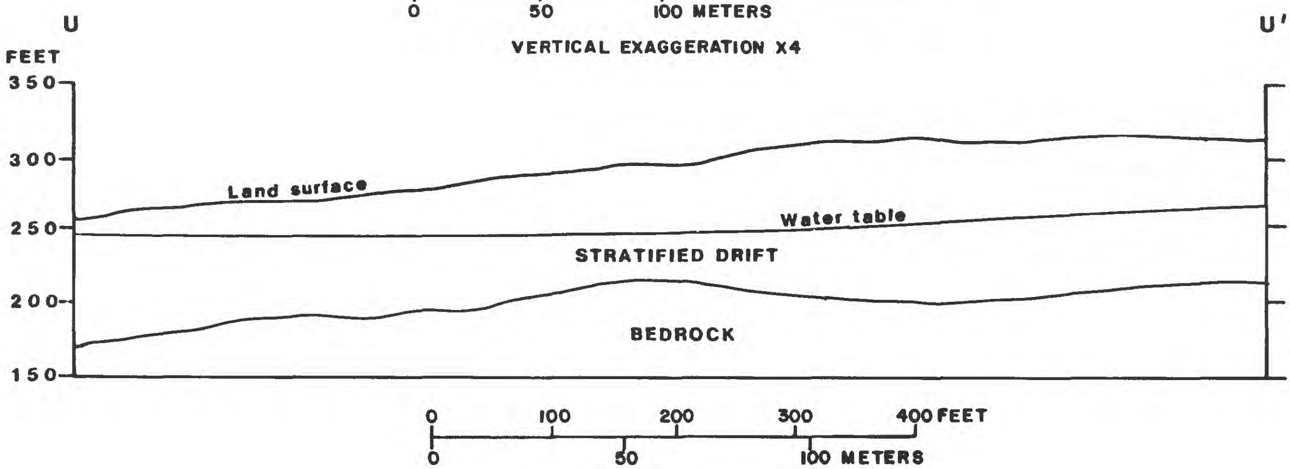


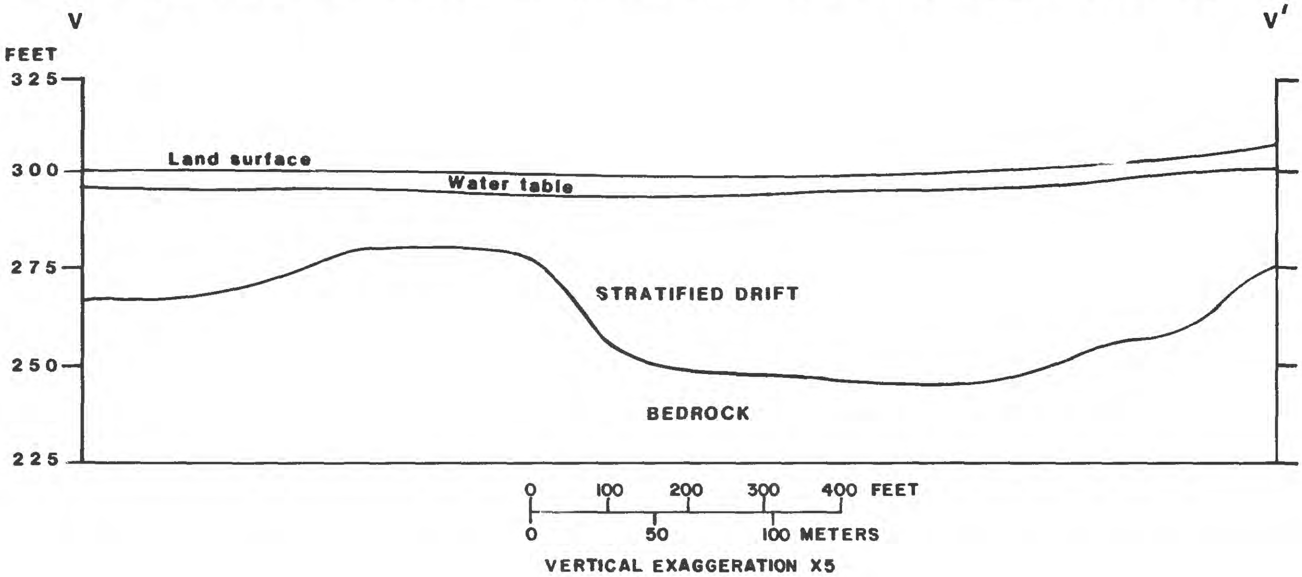
Appendix B.--Geologic sections based on interpretation of seismic-refraction data - continued

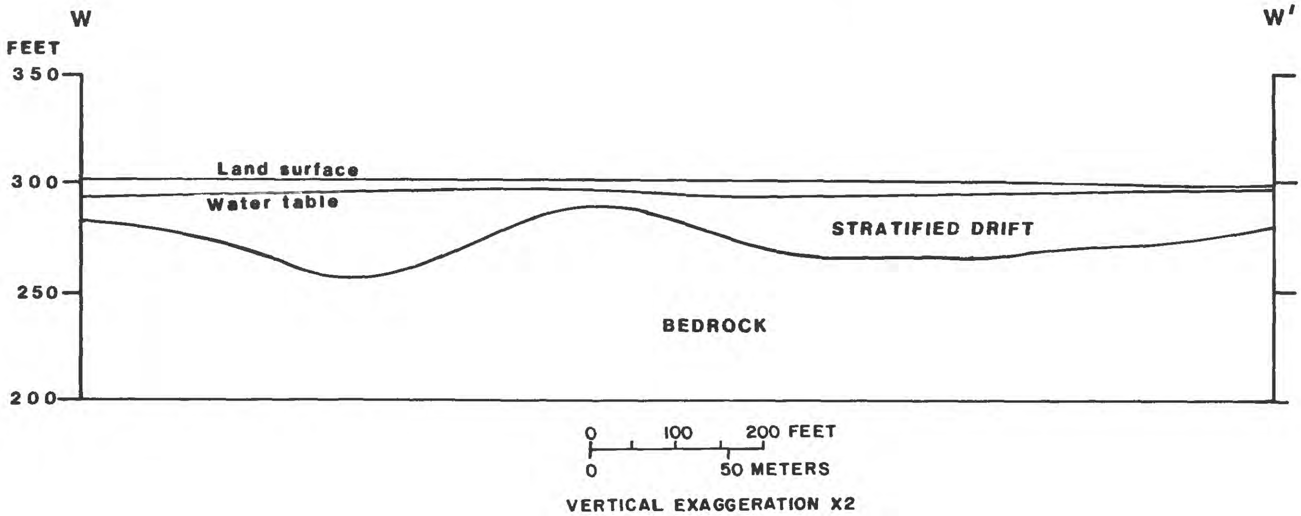


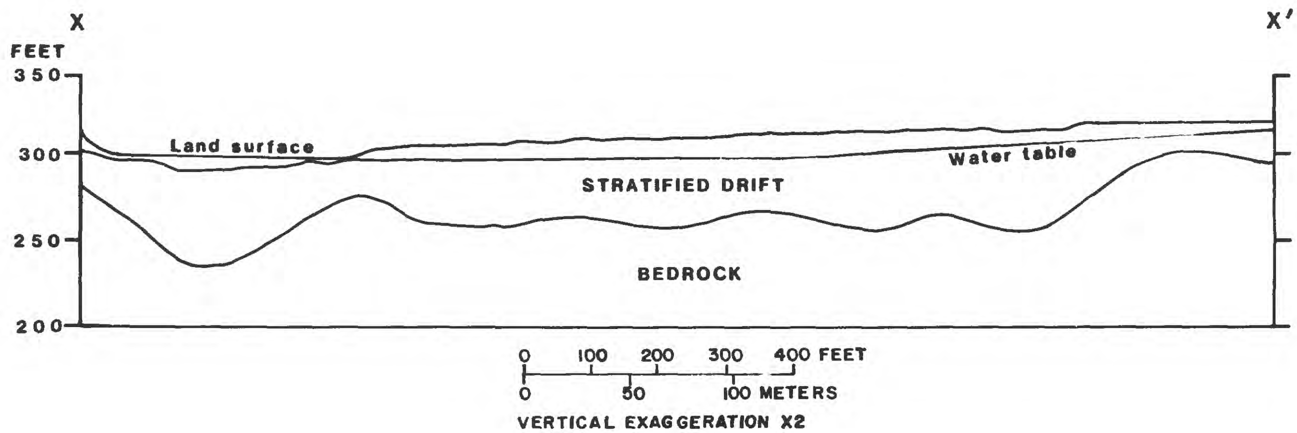




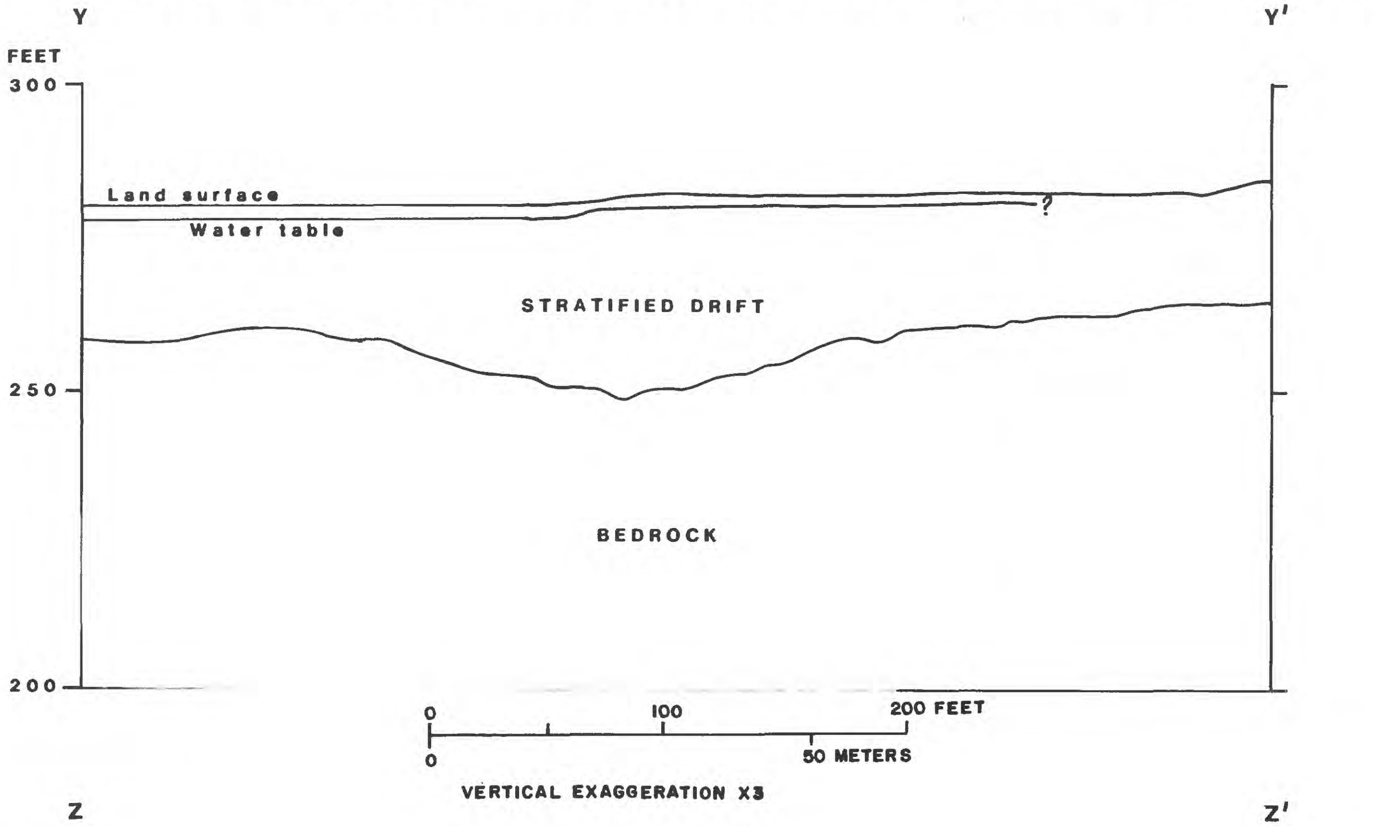


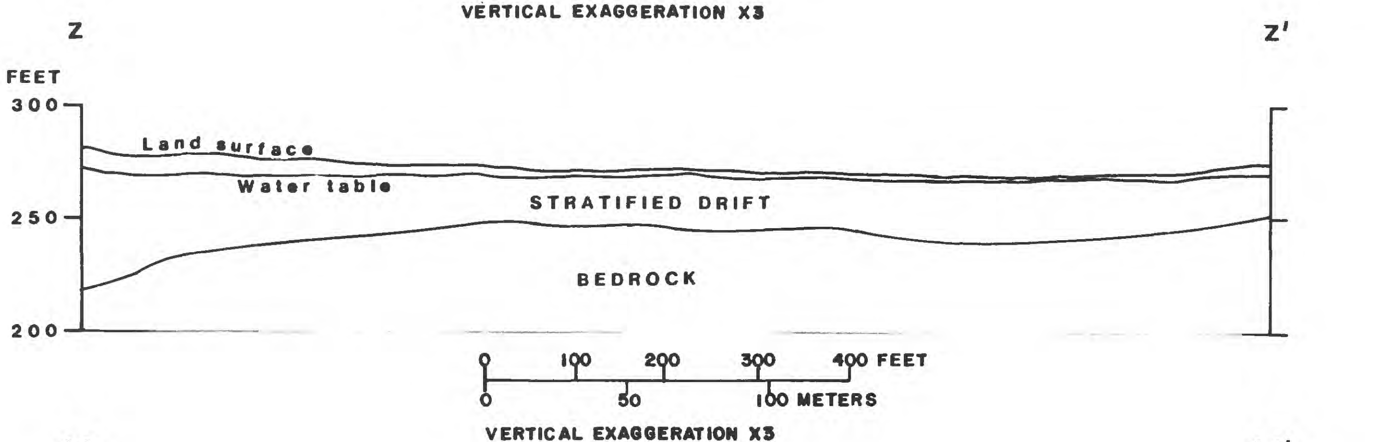

V
V'
FEET
325
300
275
250
225
Land surface
Water table
STRATIFIED DRIFT
BEDROCK
0 100 200 300 400 FEET
0 50 100 METERS
VERTICAL EXAGGERATION X5

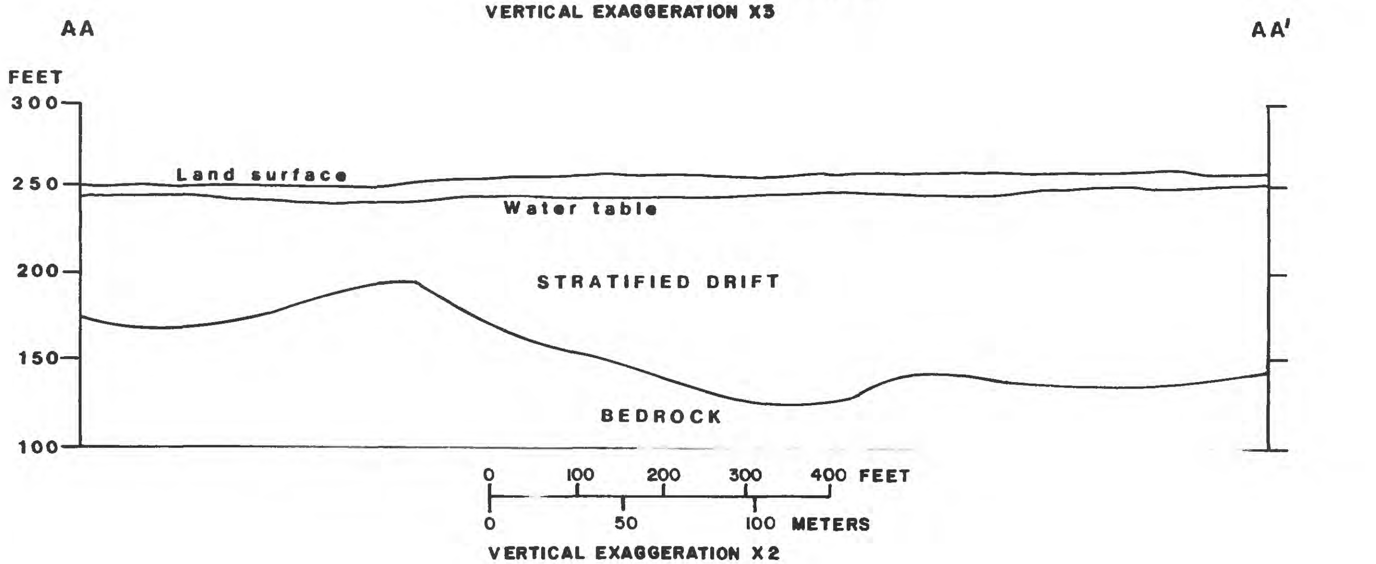

W
W'
FEET
350
300
250
200
Land surface
Water table
STRATIFIED DRIFT
BEDROCK
0 100 200 FEET
0 50 METERS
VERTICAL EXAGGERATION X2

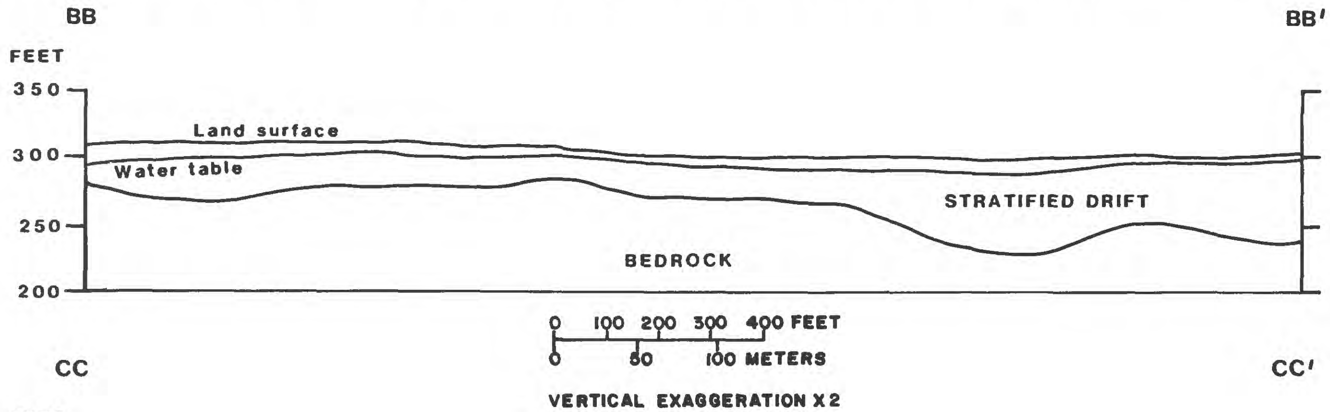

X
X'
FEET
350
300
250
200
Land surface
Water table
STRATIFIED DRIFT
BEDROCK
0 100 200 300 400 FEET
0 50 100 METERS
VERTICAL EXAGGERATION X2

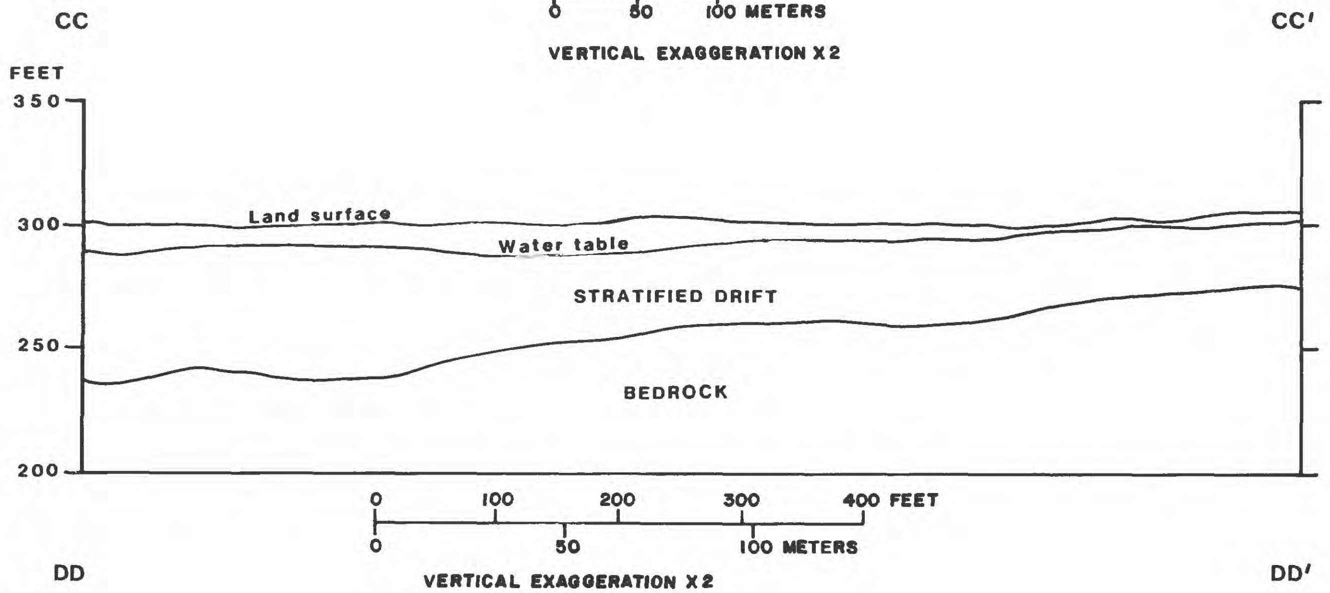
Appendix B.--Geologic sections based on interpretation of seismic-refraction data - continued

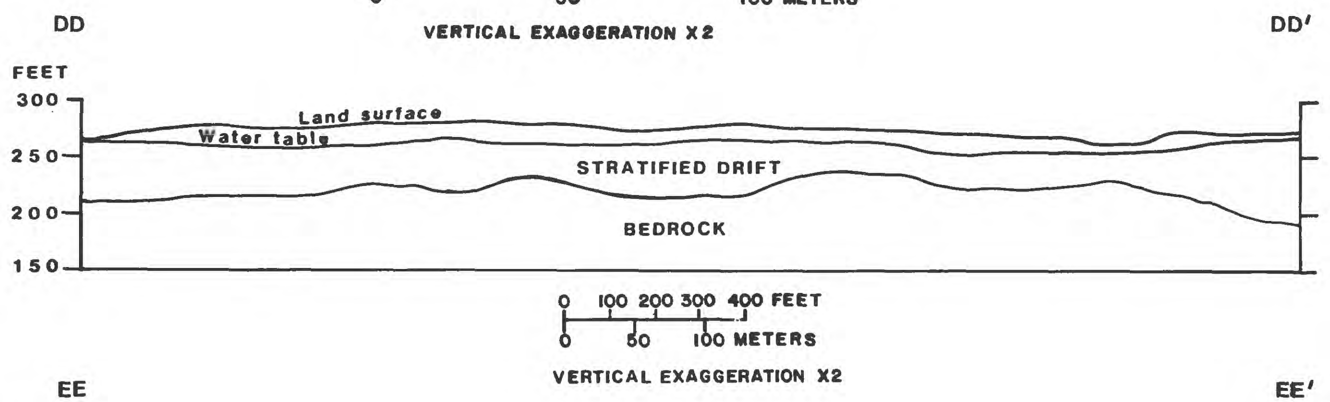


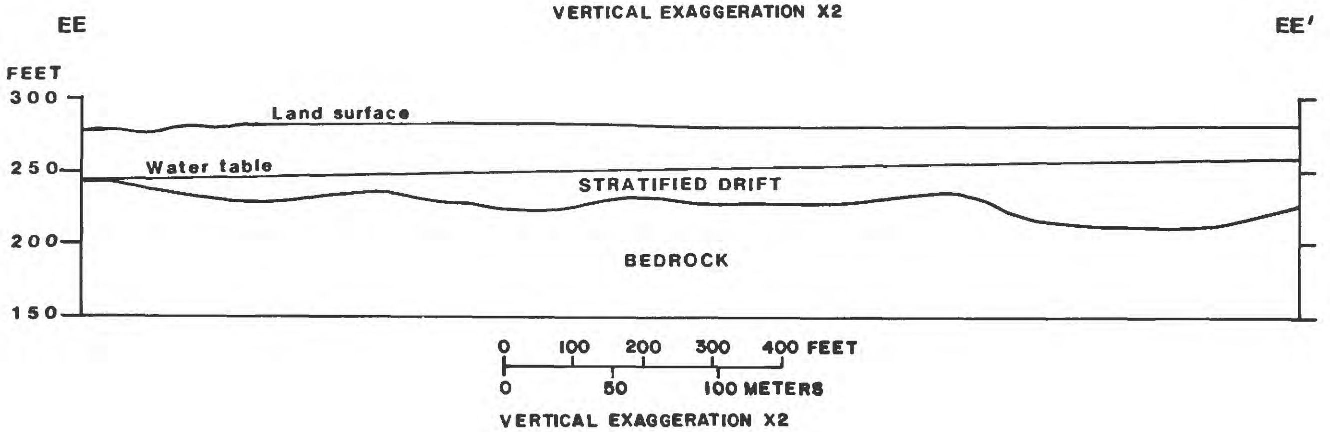




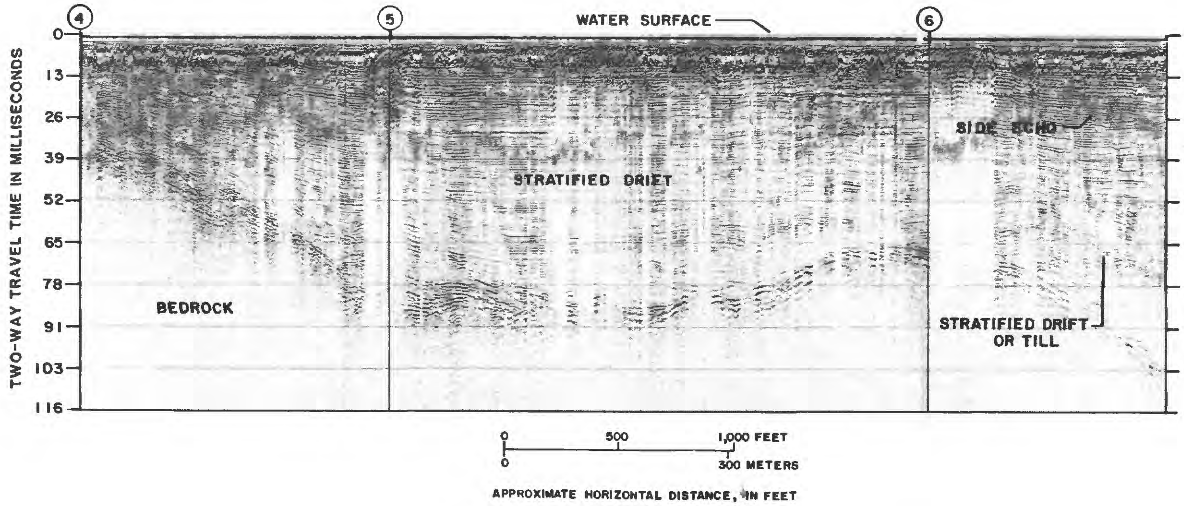

BB
BB'
FEET
350
300
250
200
Land surface
Water table
STRATIFIED DRIFT
BEDROCK
0 100 200 300 400 FEET
0 50 100 METERS
VERTICAL EXAGGERATION X2

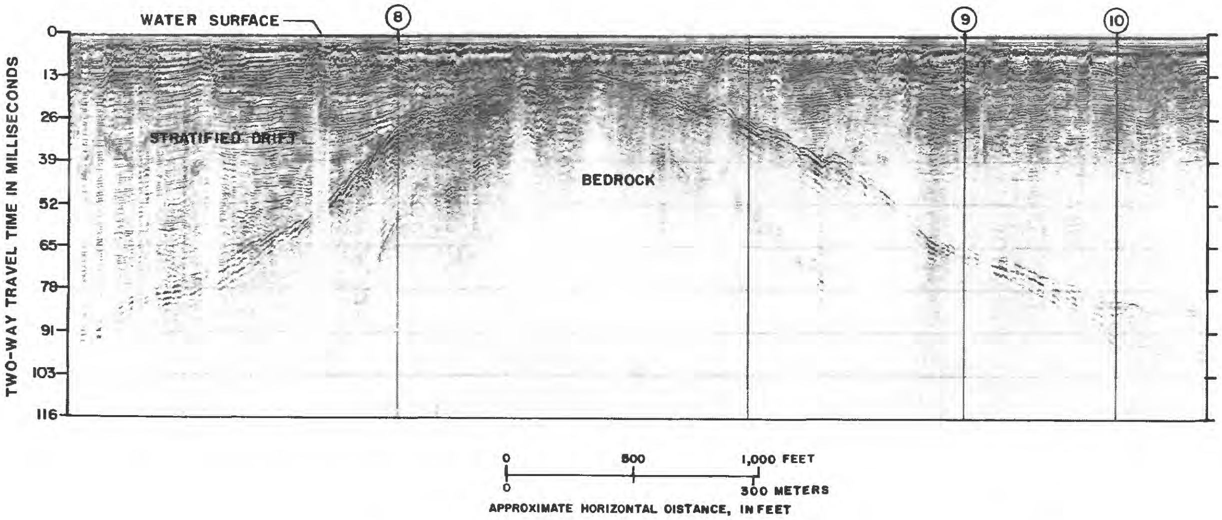

CC
CC'
FEET
350
300
250
200
Land surface
Water table
STRATIFIED DRIFT
BEDROCK
0 100 200 300 400 FEET
0 50 100 METERS
VERTICAL EXAGGERATION X2

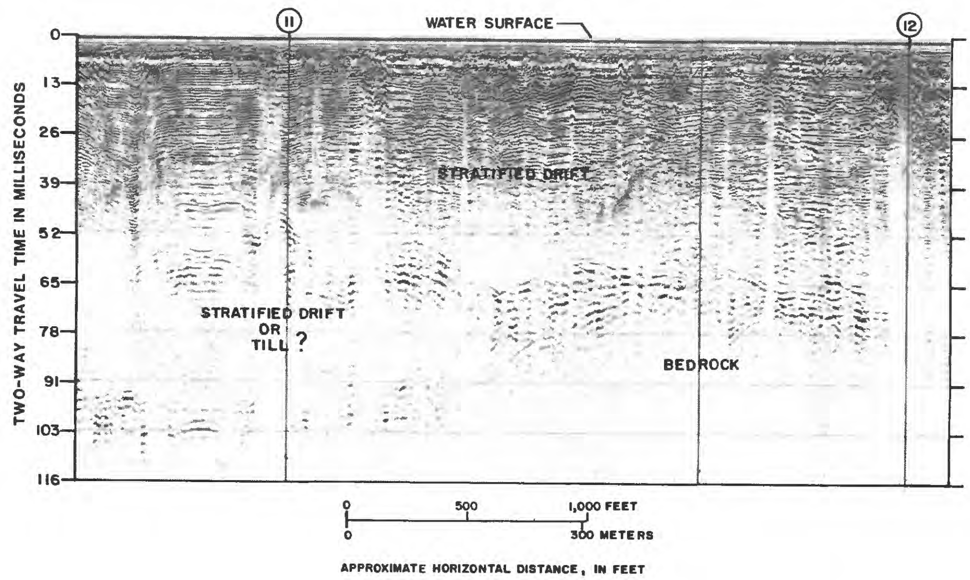

DD
DD'
FEET
300
250
200
150
Land surface
Water table
STRATIFIED DRIFT
BEDROCK
0 100 200 300 400 FEET
0 50 100 METERS
VERTICAL EXAGGERATION X2

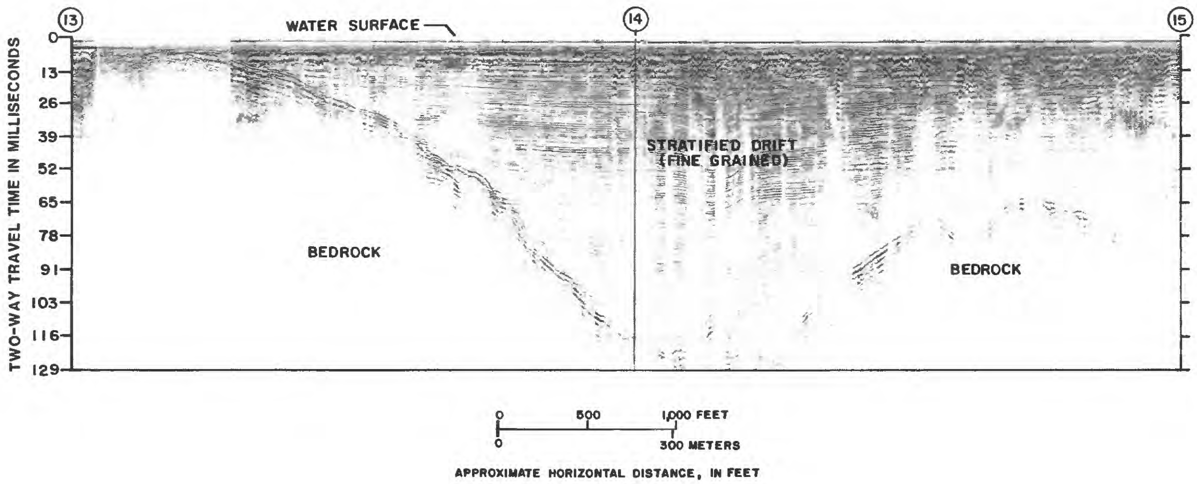

EE
EE'
FEET
300
250
200
150
Land surface
Water table
STRATIFIED DRIFT
BEDROCK
0 100 200 300 400 FEET
0 50 100 METERS
VERTICAL EXAGGERATION X2

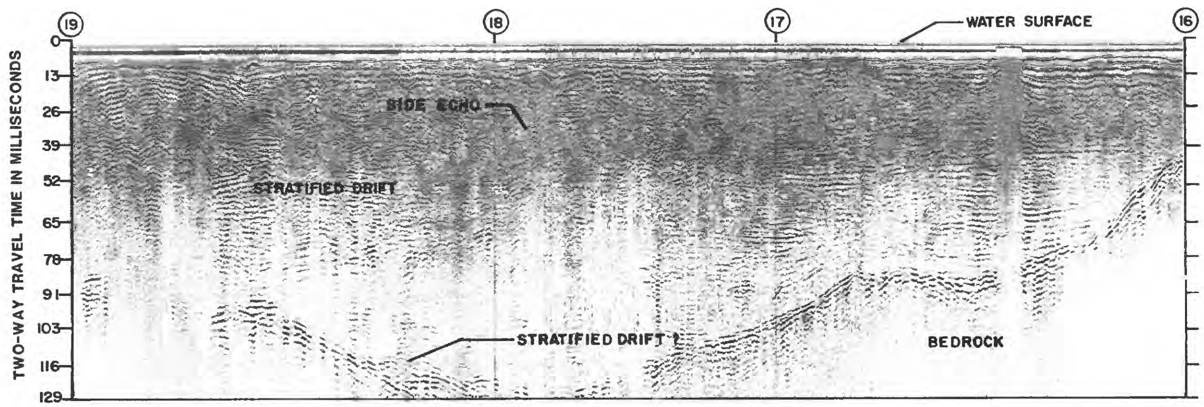
Appendix C.--Geologic interpretations of seismic-reflection profiles








13
14
15
WATER SURFACE
STRATIFIED DRIFT (FINE GRAINED)
BEDROCK
BEDROCK
TWO-WAY TRAVEL TIME IN MILLISECONDS
0
13
26
39
52
65
78
91
103
116
129
0
500
1,000 FEET
0
300 METERS
APPROXIMATE HORIZONTAL DISTANCE, IN FEET


19
18
17
16
WATER SURFACE
SIDE ECHO
STRATIFIED DRIFT
STRATIFIED DRIFT ?
BEDROCK
TWO-WAY TRAVEL TIME IN MILLISECONDS
0
13
26
39
52
65
78
91
103
116
129

Appendix D.--Selected well records

Local well number: U.S.Geological Survey number assigned to each well site in town.

Site identification number: A 15-character number based on latitude and longitude. The first six digits represent degrees, minutes, and seconds of latitude at the well site. The next seven digits represent degrees, minutes, and seconds of longitude. The last two digits are assigned sequentially to wells within the same 1-second quadrangle (about 75 ft by 100 ft) defined by the latitude and longitude number. All well data in the U.S. Geological Survey computerized data bases are keyed to this number,

Altitude: Land surface datum (LSD) in feet above NGVD of 1929. Altitudes estimated from topographic maps with 10-foot contour intervals.

Depth of well: Depth to bottom of well, in feet below LSD.

Bottom of casing: Depth to bottom of well casing, in feet below LSD.

Type of finish: G, screen with gravel pack; O, open end; S, well screen; X, open hole; Z, other.

Static water level: Nonpumping water level, in feet below LSD.

Discharge: Reported yield of well in gallons per minute.

Drawdown: Difference, in feet, between the static water level measured before a pumping test and the water level measured at the end of the pumping test.

Lithology: Generalized composition of the water-bearing unit tapped by the well. More complete lithologic information for some wells is contained in table 6. Abbreviations are: DIBS, diabase; GRDS, gravel, sand, and silt; GRVL, gravel; SDCL, sand and clay; SDGL, sand and gravel; SDMN, sedimentary rock (undifferentiated); SDST, sand and silt; SGVC, sand,gravel, and clay; SHLE, shale; SNDS, sandstone; STCL, silt and clay.

Depth to bedrock: Depth to the top of bedrock, in feet below LSD.

--: Indicates no data

LOCAL WELL NUMBER	SITE IDENTIFICATION NUMBER	OWNER	DATE OF CONSTRUCTION	ALTITUDE OF LAND SURFACE (FEET)	DEPTH OF WELL (FEET)	DIAMETER OF CASING (INCHES)	BOTTOM OF CASING (FEET)	TYPE OF FINISH	STATIC WATER LEVEL (FEET)	DATE WATER LEVEL MEASURED	DISCHARGE (GALLONS PER MINUTE)	DRAWDOWN (FEET)	LITH OLOGY	DEPTH TO BEDROCK (FEET)
GR 62	415522072495001	L J BRESSOR	03-05-51	320	208	6	145	X	90	03-1951	5.5	--	DIBS?	145
SI 13	415047072484201	R KINSCHERF JR	1933	170	400	6	76	X	FLOWS	08-1933	30	80	SNDS	--
SI 37	415411072462901	TARIFFVILLE FIRE DISTRICT	1939	165	50	10	38	G	17	10-1939	265	11	GRVL	--
SI 51	414947072491601	HTFD SPEC MACH	1953	185	648	8	158	X	--	--	0.5	--	SNDS	134
SI 64	415443072501701	H BRADSHAW	1953	325	227	6	48	X	30	05-1953	10	197	SDMN	43
SI 76	415026072515101	A PELCHER	1950	305	102	6	26	X	--	--	--	--	SDMN	26
SI 78	414957072491901	B ANDRUS	1949	185	270	8	--	X	4	04-1949	20	136	SDMN	135
SI 81	415139072504501	VILLAGE WATER CO.	1954	245	74	12	66	S	3	04-1954	400	50	SAND	74
SI 84	415421072471801	CULBRO	1955	185	105	16	88	G	39	05-1955	1,200	26	SAND	--
SI 113	414958072491101	SMITH-KESER CO	1956	185	267	6	161	X	19	01-1956	--	--	SDMN	153
SI 125	415335072472201	L RICE	1956	190	200	6	150	X	40	02-1956	35	--	SDMN	150
SI 131	415048072485301	CARLSON LUMBER	1955	180	160	5	100	X	FLOWS	06-1956	6	--	SDMN	60
SI 137	415045072491001	SIMS CONV HOME	1947	285	202	8	--	X	40	--	25	40	SDMN	110
SI 138	415054072491401	G TRAINOR	1953	290	195	6	120	X	85	03-1953	9	35	SDMN	116
SI 201	415013072514101	H MESSENGER	1957	300	200	6	117	X	40	08-1957	5	72	SDMN	117
SI 202	415043072490801	N RODERICK	1957	200	140	6	56	X	22	12-1957	4	53	SDMN	56
SI 205	415336072505001	L SHAW	1958	315	87	6	22	X	7	11-1965	6	43	SDMN	18
SI 206	415440072503801	K BRAUN	1958	295	125	6	30	X	10	02-1958	5	40	SDMN	30
SI 208	415308072470201	H KNAPP	1957	160	414	6	394	X	--	--	20	--	SDMN	391
SI 210	415427072500701	E FENSTER	1959	310	99	6	30	X	15	12-1959	6	50	SDMN	28
SI 212	415438072501701	M YARDACH	1958	325	121	6	26	X	0	12-1958	15	40	SDMN	23
SI 213	415414072502701	W DUSCHANECK	1959	320	103	6	43	X	18	09-1959	10	27	SDMN	40
SI 216	415437072470801	PRATT JIG BORER	1960	165	303	6	--	X	FLOWS	--	20	265	SDMN	265?
SI 219	414937072483601	CLIFFSIDE CLUB	1960	175	77	10	67	G	25	05-1960	400	--	SAND	--
SI 221	415309072505901	R SANSOUCIE	1963	295	60	6	28	X	2	06-1963	20	8	SDMN	25
SI 223	415442072501101	E GORDON	1963	320	166	6	63	X	28	12-1963	5	102	SDMN	63
SI 225	415438072494801	R JOHNSON	1963	300	124	6	20	X	28	12-1963	10	--	SDMN	18
SI 226	415416072471201	SIMSBURY DRUGS	1962	180	216	6	200	X	40	06-1962	25	5	SDMN	195
SI 227	415416072502401	FRANCIS, WARD	11-1964	315	30	6	27	O	--	--	75	--	GRVL	--
SI 230	415151072501901	VILLAGE WATER CO.	1966	238	74	18	59	G	2	09-1966	700	13	SAND	--
SI 231	415036072513101	J WILSON	1967	310	114	6	109	S	57	06-1967	30	57	SAND	140

Appendix D.--Selected well records - Continued

LOCAL WELL NUMBER	SITE IDENTIFICATION NUMBER	OWNER	DATE OF CONSTRUCTION	ALTITUDE OF LAND SURFACE (FEET)	DEPTH OF WELL (FEET)	DIAMETER OF CASING (INCHES)	BOTTOM OF CASING (FEET)	TYPE OF FINISH	WATER LEVEL (FEET)	DATE WATER LEVEL MEASURED	DISCHARGE (GALLONS PER MINUTE)	DRAWDOWN (FEET)	LITHOLOGY	DEPTH TO BEDROCK (FEET)
SI 233	415035072512701	P DOWNEY	1967	305	140	6	140	O	60	05-1967	100	75	GRVL	150
SI 237	415039072491701	J BITTERN	1964	200	115	6	69	X	30	05-1964	15	30	SDMN	65
SI 244	414933072484501	D CARVILLE	1965	165	250	6	107	X	--	--	10	--	SNDS	85
SI 245	415004072515701	W WALKER	1965	335	206	6	84	X	64	02-1965	6	64	SDMN	79
SI 246	415023072514701	B SCHUBERT	1967	290	230	6	38	X	15	08-1967	7	215	SDMN	34
SI 247	415015072515801	J BERLE	1968	340	160	6	74	X	65	10-1968	8	55	SDMN	74
SI 250	414958072491901	A OTT	1968	185	120	6	83	X	20	07-1968	32	100	SDMN	70
SI 252	415029072513601	J CLARK	1971	315	140	6	140	O	30	07-1971	50	105	GRVL	--
SI 256	414951072491201	HTFD SPEC MACH	1953	182	632	8	166	X	34	10-1953	235	86	SDMN	146
SI 259	415432072501501	R LARSEN	1960	325	104	6	43	X	14	04-1960	6	66	SDMN	40
SI 260	415338072472501	L LAVIGNE	1964	195	175	6	158	X	46	09-1964	6	54	SDMN	158
SI 261	415433072482401	J CLARK JR	1964	270	112	6	69	X	8	06-1964	40	4	SDMN	65
SI 264	415255072512801	R GILBERT	1965	325	156	6	66	X	30	05-1965	8	50	SDMN	62
SI 267	415410072491801	SIMS FIRE DEPT	1965	300	100	6	16	X	16	01-1965	2	64	SDMN	14
SI 270	415339072501401	CONN DEP	1968	285	160	6	60	X	--	--	2	--	SNDS	39
SI 272	415450072500401	H ROHDE JR	1969	290	182	6	71	X	57	05-1969	10	43	SDMN	71
SI 273	415342072511801	G JACKSON	1969	315	250	6	50	X	25	08-1969	2	225	SDMN	35
SI 274	415343072510801	N MAYER	1969	305	205	6	80	X	20	04-1969	5	185	SDMN	68
SI 275	415338072505501	E BRINLEY JR	1968	310	160	6	55	X	28	08-1968	7	92	SDMN	50
SI 276	415442072504601	T CODY	1968	285	140	6	50	X	23	07-1968	7	67	SDMN	47
SI 278	415340072505202	J UNANGST	1968	310	154	6	56	X	35	05-1968	10	45	SDMN	52
SI 281	415154072504201	D GRIFFIN	1968	280	100	6	22	X	12	10-1968	20	20	SDMN	18
SI 285	415153072502201	VILLAGE WATER CO.	1970	248	90	18	73	G	14	11-1970	710	19	SAND	--
SI 288	415139072504504	VILLAGE WATER CO.	1954	245	30	2	30	O	4	03-1954	75	--	SAND	74
SI 294	415319072504801	H HOMLIN	1972	325	225	6	44	X	38	09-1972	40	182	SDMN	34
SI 295	415312072464701	F DRENA	1970	170	240	6	218	O	--	--	--	--	SAND	--
SI 296	415502072464301	SIMS AIR SERV	1970	195	152	6	145	X	30	07-1970	12	122	SHLE	144
SI 297	415448072493301	C & M BLD	1972	295	232	6	58	X	60	10-1972	2	170	SDMN	58
SI 298	415024072485601	FARMTN RACQUET	1972	175	400	6	114	X	--	--	--	--	SNDS	104
SI 299	415047072513301	C PRINCE	1971	310	400	6	160	X	75	12-1971	5	225	SDMN	155
SI 313	415057072511901	ETHEL WALKER SCHOOL	05 14 80	260	54.35	2	51.35	S	6.08	05 14 80		--	SDGL	83?
SI 314	415133072491401	ENSIGN BICKFORD	05 15 80	230	24.15	2	21	S	3.10	05 15-80	--	--	SDGL	53
SI 315	415122072510001	ETHEL WALKER SCHOOL	05-23 80	250	32.1	2	29.1	S	5.8	05 23 80	--	--	SDGL	53?
SI 316	415411072462902	TARIFFVILLE FIRE DISTRICT	10-1977	162	54.83	10	42.83	S	21	10 24-77	189	23.5	GRDS	--
SI 319	415414072462901	TARIFFVILLE FIRE DISTRICT	03 11 81	171	50	2.5	40	S	26.71	06-1981	7	--	GRDS	--
SI 322	415139072504505	VILLAGE WATER CO.	01-04 66	240	60	--	46	S	5	01-1966	60	--	SDGL	
SI 324	415150072502401	VILLAGE WATER CO.	01 05-66	240	50	--	35	S	1.67	01-05-66	65	--	SDGL	--
SI 326	415149072502101	VILLAGE WATER CO.	01 05-66	235	74		59	S	1.5	01 05 66	60	--	GRDS	--
SI 327	415236072512101	VILLAGE WATER CO.	08 11 70	300	33		28	S	1.67	08 11 70	50	--	GRDS	--
SI 329	415228072511401	VILLAGE WATER CO.	08 12 70	298	40	--	35	S	2	08 12-70	45	--	GRDS	--
SI 334	415339072471101	VILLAGE WATER CO.	10 04 73	150	149	1.25	139	S	8.08	10 04 73	60	--	SAND	--
SI 335	415339072471001	VILLAGE WATER CO.	04 09 74	150	148	24	133	G	9.5	04 09-74	1,000	47	GRDS	--
SI 336	415337072471101	VILLAGE WATER CO.	03-18 75	150	124	--	114	S	9.08	03 19 73	35	--	SAND	--
SI 337	415337072470701	VILLAGE WATER CO.	03 20 75	150	189		174	S	FLOWS	03-20-75	--	--	SDCL	--
SI 338	415158072502701	VILLAGE WATER CO.	11-29 77	254	67		57	S	27	11-29 77	--	--	SAND	--
SI 339	415158072502301	VILLAGE WATER CO.	11 30 70	257	50	--	41	S	25	11 30-70	--	--	SAND	--
SI 341	415152072502901	VILLAGE WATER CO.	07-10-78	239	82	--	72.33	S	8.19	07-10-78	60	--	GRDS	--
SI 346	415153072502603	VILLAGE WATER CO.	09 05 78	239	84	--	69	S	--	--	300	--	GRDS	--
SI 347	415402072470701	TOWN OF SIMSBURY	10 31 78	170	225	--	212	S	10.19	11 03 78	75	0.87	SDCL	--
SI 348	415409072470301	TOWN OF SIMSBURY	11 07 78	160	250	--	235	S	6.83	11-07 78	60	--	SDCL	--
SI 350	415303072464301	WEGNER , ARTHUR	11 1978	170	95	6	93	X	20	11 01 78	20	60	SHLE	84

Appendix D.--Selected well records - Continued

Appendix D.--Selected well records - continued

LOCAL WELL NUMBER	SITE IDENTIFICATION NUMBER	OWNER	DATE OF CONSTRUCTION	ALTITUDE OF LAND SURFACE (FEET)	DEPTH OF WELL (FEET)	DIAMETER OF CASING (INCHES)	BOTTOM OF CASING (FEET)	TYPE OF FINISH	WATER LEVEL (FEET)	DATE WATER LEVEL MEASURED	DISCHARGE (GALLONS PER MINUTE)	DRAWDOWN (FEET)	LITH-OLOGY	DEPTH TO BEDROCK (FEET)
SI 351	415259072463901	LOOMIS, JOHN	08-31-77	190	97	6	92	0?	40	08-31-77	60	--	SGVC	--
SI 352	415252072511301	TOWN OF SIMSBURY	10-15-79	300	56	24	46	G	3.17	10-15-79	500	15.67	SGVC	--
SI 355	415222072500501	JALBERT, MRS.JEAN	05-01-80	260	220	6	71	Z	32	05-01-80	10	10	SDGL/SDMN	68
SI 356	415443072510001	BUILDERS, K&V	12-27-77	280	103	6	47.25	X	12	12-27-77	20	4	SDMN	41
SI 358	415043072513001	HARTWELL, H. J.	05-17-78	310	157	6	155	Z	56	05-17-78	20	0	SAND	--
SI 359	415503072465601	PLUMBING, MITCHELL	09-18-79	190	160	6	154	X	36	09-18-79	10	0	SDMN	150
SI 360	415036072511101	STYX INC.	12-30-80	290	202	6	106	X	48	12-30-80	12	32	SDMN	--
SI 362	415436072511301	LANDEV INC.	06-10-81	310	250	6	85	X	60	06-10-81	6	165	SDMN	75
SI 363	415247072473901	BAKER NURSERIES	11-01-82	150	100	2	98	S	--	--	--	--	SDST	200
SI 364	415150072475701	LANDEV INC.	07-27-83	155	238	--	--	--	15	07-27-83	--	--	STCL	227
SI 365	415312072472001	CONN DEP	08-03-83	155	232	--	--	--	15	08-02-83	--	--	SDST	225?
SI 366	415346072464701	TOWN OF SIMSBURY	07-28-83	150	360	--	--	--	10	07-28-83	--	--	GRDS	--
SI 367	414951072483601	CLIFFSIDE CLUB	08-01-83	155	130	--	--	--	15	08-01-83	--	--	SGVC	102?
SI 371	415136072510401	TOWN OF SIMSBURY	05-09-84	255	35	2	33	S	13	05-09-84	--	--	SAND	72
SI 372	415142072493901	ENSIGN-BICKFORD	05-10-84	270	39.3	2	37.35	S	30.45	05-10-84	--	--	SDGL	--
SI 373	415146072495401	CONN DEP	05-11-84	292	81	2	78	S	58.03	05-11-84	--	--	SDGL	103
SI 374	415121072511801	TOWN OF SIMSBURY	05-14-84	250	22	2	19	S	3	05-14-84	--	--	SDGL	--
SI 375	415143072502201	GARRITY , TOM	05-15-84	250	21	2	19	S	17.24	05-15-84	--	--	SDGL	26
SI 376	415151072500701	CONN DEP	06-08-84	235	21	2	19	S	8	06-08-84	--	--	SDGL	--
SI 377	415431072511101	LANDEV INC.	04-30-79	278	150	6	46	X	20	04-30-79	12	80	GRDS	36
SI 380	415428072511701	LANDEV INC.	06-13-80	325	300	6	82	X	30	06-13-80	10	220	SDMN	72
SI 382	415424072511601	LANDEV INC.	04-15-80	310	400	6	54	X	40	04-15-80	3	260	SDMN	44
SI 383	415448072505401	ZAHORODNI , GARY	05-22-79	270	90	6	32	X	5	05-22-79	20	10	SDMN	30
SI 384	415449072504901	TAYLOR , DAVID	10-09-73	272	116	6	44	X	16	10-09-73	12	69	SDMN	40
SI 388	415445072504701	MADIGAN , THOMAS	09-27-73	280	102	6	22	X	12	09-27-73	15	53	SDMN	20
SI 389	415444072505201	LEASKA CONST. CO.	06-19-74	270	300	6	41.7	X	8	06-19-74	6	290	SDMN	30
SI 390	415445072505601	LEASKA , GEORGE	04-14-76	265	150	6	40	X	30	04-14-76	8	118	SDMN	26
SI 391	415436072503701	HARTWELL , H. J	11-05-74	315	300	6	43	X	150	11-05-74	4	148	SDMN	30
SI 394	415419072504301	TOBLER , DON	07-02-73	320	176	6	36	X	14	07-02-73	25	96	SDMN	33
SI 396	415417072505001	BERGMAN , CHARLES	05-02-73	305	108	6	27	X	14	05-02-73	9	46	SDMN	25
SI 398	415412072510201	BERGMAN BUILDING CO.	06-22-79	300	250	6	42	X	25	06-22-79	9	200	SDMN	32
SI 400	415407072510601	BERGMAN BUILDING CO.	09-10-81	300	180	6	41	X	10	09-10-81	10'	150	SDMN	6
SI 403	415406072511001	BERGMAN BUILDING CO.	08-25-82	300	400	6	47	X	30	08-25-82	3	270	SDMN	35
SI 404	415406072511501	BERGMAN BUILDING CO.	05-05-81	305	200	6	30	X	15	05-05-81	15	160	SDMN	20
SI 407	415419072505901	BERGMAN , CHARLES	06-18-73	300	138	6	22	X	24	06-18-73	8	86	SDMN	20
SI 409	415342072510501	ZAMPAGLIONE , ANTHONY	03-15-77	315	185	6	79	X	22	03-15-77	5	163	SDMN	70
SI 411	415335072512101	JOHNSON , CARL JR.	10-24-70	305	200	6	40	X	15	10-24-70	4	160	SDMN	35
SI 412	415329072512201	JOHNSON , CARL JR.	05-02-72	305	370	6	59	X	27	05-02-72	.75	--	SDMN	52
SI 413	415327072512301	PARMELEE , SHERRY	07-30-71	310	310	6	40	X	12	07-30-71	1.5	--	SDMN	32
SI 416	415323072512101	JOHNSON , CARL JR.	07-25-70	305	148	6	40	X	34	07-25-70	12	76	SDMN	35
SI 417	415317072512101	JOHNSON , CARL JR.	02-18-71	315	260	6	37	X	15	02-18-71	2.5	--	SDMN	30
SI 418	415311072512101	HARTWELL , JOHN	07-09-76	315	450	6	62	X	26	07-09-76	2	404	SDMN	45
SI 419	415415072502501	DERLYCIA , WILLIAM	06-12-82	318	240	6	60	X	20	06-12-82	7	220	SDMN	47
SI 420	415430072500301	C AND M BUILDERS	06-01-72	305	196	6	75	X	45	06-01-72	7.5	95	SDMN	75
SI 422	415447072493801	C AND M BUILDERS	10-08-71	305	208	6	84	X	55	10-08-71	3	135	SDMN	84
SI 438	415335072500001	ARMOUR , NORMAN	08-22-70	295	404	6	40	X	21	08-22-70	2.5	--	SDMN	19
SI 439	415332072500601	OELHURT , EDWARD	01-23-79	295	80	6	77	X	25	01-23-79	60	50	SDMN	68
SI 441	415414072480201	STERMER , CHARLES	03-18-74	282	345	6	41	X	31	03-18-74	4	219	SDMN	31
SI 443	415414072512301	UNKNOWN	03-29-82	328	33	--	28	S	22	03-29-82	--	--	SDGL	--
SI 472	415014072481801	VILLAGE WATER CO.	05-15-84	160	227	8	214	S	FLOWS	05-15-84	400	--	SDGL	227
SI 473	415013072481601	VILLAGE WATER CO.	10-26-86	160	237	18	217	S	2.6	11-1986	675	95.1	SDGL	--

Appendix E.--Lithologic logs of selected wells

(Entries include well number, site-identification number, owner, altitude of land surface, water level, date drilled and driller, source of log, and description of materials penetrated. See heading of Appendix D for additional explanation of specific items; LSD, land surface datum.)

Description of earth materials: Logs of wells drilled by the U.S. Geological Survey are based on the grain-size classification shown on the chart to the right.

Terms used in logs of wells and test holes of the U.S. Geological Survey:

Sand and gravel--Sorted stratified sediment varying in size from boulders to very fine sand. "Poorly sorted" indicates approximately equal amounts, by weight, of all grain sizes.

Till--A predominantly nonsorted, nonstratified sediment deposited directly by a glacier and composed of boulders, gravel, sand, silt, and clay.

Refusal--Depth at which the drill equipment could not penetrate the earth material.

Percentage by weight of individual components in the sample.

Trace	0 - 10	Little	10 - 20
Some	20 - 35	..and..	35 - 50

Underscored terms in driller's logs are geological interpretations by U.S. Geological Survey.

Grain size (millimeters)	Wentworth grade scale U.S. Geological Survey logs
	Boulders
256	
	Cobbles
64	
	Pebbles
4	
	Granules - very fine gravel
2	
	Very coarse sand
1	
	Coarse sand
0.5	
	Medium sand
0.25	
	Fine sand
0.125	
	Very fine sand
0.063	
	Silt
0.004	
	Clay

Town of Simsbury

SI 51. 414947072491601. Hartford Special Machinery Co. Altitude 185 ft. Drilled 1953 by S. B. Church Co. Log by S. B. Church Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, yellow	0	9	9
Clay, gray	9	99	90
Quicksand, red	99	134	35
Sandstone, red	134	648	514

SI 81. 415139072504501. Village Water Company. Altitude 245 ft. Water level: 3 ft. Drilled 1954 by R. E. Chapman Co. Log by R. E. Chapman Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, fine	0	15	15
Sand, coarse	15	30	15
Sand, fine, dirty	30	65	35
Sand, water-bearing	65	74	9
Ledge	at 74		

SI 84. 415421072471801. Culbro Tobacco Division. General Cigar Co., Inc. Altitude 185 ft. Water level: 39 ft. Drilled 1955 by S. B. Church Co. Log by S. B. Church Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand	0	12	12
Silt and fine sand	12	73	61
Sand, coarse, good	73	100	27
Sand, good	100	110	10

SI 208. 415308072470201. H. A. Knapp. Altitude 160 ft. Drilled 1957 by Water Development Corp. Log by Water Development Corp.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, very fine, silt, and clay	0	391	391
Rock, red	391	414	23

SI 219. 414937072483601. Cliffside Country Club. Altitude 175 ft. Water level: 25 ft. Drilled 1960 by Windham Well Co. Log by Windham Well Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand and gravel	0	77	77
Ledge	at 77		

SI 226. 415416072471201. Simsbury Drug Store. Altitude 180 ft. Drilled 1962 by George L. Engel. Log by George L. Engel.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, medium	0	30	30
Clay, gray	30	80	50
Quick sand	80	180	100
Hardpan (till?)	180	195	15
Red rock, medium hard	195	216	21

SI 230. 415151072501901. Village Water Co. Altitude 238 ft. Drilled 1966 by R. E. Chapman Co. Log by R. E. Chapman Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Mud, black	0	5	5
Clay, sandy, fine	5	15	10
Sand, medium	15	45	30
Gravel, coarse	45	55	10
Sand, medium	55	74	19

SI 233. 415035072512701. P. Downey. Altitude 305 ft. Water level: 60 ft. Drilled 1967 by Farmington Drilling Co. Log by Farmington Drilling Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand	0	130	130
Gravel, coarse to fine, mixed	130	147	17
End of hole	at 147		

Town of Simsbury - continued

SI 252. 415029072513601. Joseph Clark. Altitude 315 ft. Water level: 30 ft. Drilled 1971 by Premco Drilling Inc. Log by Premco Drilling Inc.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, fine	0	138	138
Gravel	138	140	2

SI 260. 415338072472501. L. Lavigne. Altitude 195 ft. Water level: 46 ft. Drilled by Valley Artesian Well Co. Inc. Log by Valley Artesian Well Co. Inc.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand	0	147	147
Clay, red	147	158	11
Rock, red	158	175	17

SI 274. 415343072510801. N. F. Mayer. Altitude 305 ft. Water level: 20 ft. Drilled 1969 by Rizza Drilling Corp. Log by Rizza Drilling Corp.

	Depth below LSD, in feet From	To	Thickness (feet)
Sand and gravel	0	68	68
Sandstone, red and gray	68	205	137

SI 285. 415153072502201. Village Water Co. Altitude 240 ft. Water level: 13.5 ft. Drilled 1970 by R. E. Chapman Co. Log by R. E. Chapman Co.

	Depth below LSD, in feet From	To	Thickness (feet)
Sand, medium, brown, and gravel	0	15	15
Sand, medium, brown	15	20	5
Gravel, medium, brown	20	35	15
Sand, coarse, brown	35	45	10
Gravel, coarse, brown	45	50	5
Sand, fine to medium brown	50	55	5
Gravel, medium to coarse, brown	55	60	5
Sand, medium to coarse, brown	60	75	15
Sand, medium to coarse	75	88	13
Gravel and clay, hard-packed (till)	88	90	2

SI 288. 415139072504504. Village Water Co. Altitude 245 ft. Water level: 4 ft. Drilled 1954 by R. E. Chapman Co. Log by R. E. Chapman Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, medium, and gravel	0	15	15
Sand, coarse, and gravel	15	30	15
Sand, medium, and scattered gravel	30	42	12
Sand, medium	42	50	8
Sand, fine to medium	50	64	14
Sand, fine and hardpan	64	72	8
Refusal	at 72		

SI 295. 415312072464701. Frank Drena. Altitude 170 ft. Drilled 1970. Log by driller.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand and silt	0	218	218
Silt, very fine	218	240	22

SI 296. 415502072464301. Simsbury Air Service. Altitude 195 ft. Drilled 1970 by Premco Drilling Inc. Log by Premco Drilling Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, silt and clay	0	40	40
Silt and clay	40	144	104
Shale, red	144	152	8

SI 299. 415047072513301. C. Prince. Altitude 310 ft. Drilled 1971 by George L. Engel. Log by George L. Engel.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, medium	0	70	70
Silt	70	110	40
Sand, fine	110	155	45
Rock, red, medium-hard	155	400	245

SI 313. 415057072511901. Ethel Walker School. Altitude 260 ft. Water level 6.08 ft. Drilled 1980. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Topsoil, sandy	0	2	2
Sand, very coarse, brown; some gravel; little very fine to medium sand	2	7	5
Sand, coarse to very coarse, brown; little fine to medium sand; trace silt	7	12	5
Sand, medium to very coarse, tan; trace fine sand, trace of gravel	12	22	10
Sand, medium to very coarse, tan; little medium to coarse gravel; little fine sand	22	27	5
Sand, fine to medium, pink-tan; little silt to very fine sand; little medium to coarse gravel	27	32	5
Sand, fine to very coarse, tan; some gravel; little silt	32	47	15
Sand, medium to very coarse, and gravel; little silt to fine sand	47	57	10
Silt, and very fine to medium sand, tan; trace coarse sand to medium gravel	57	67	10
Sand, medium to coarse; some fine sand	67	77	10
Till and weathered rock	77	83	6
Refusal (bedrock?)	at 83		

SI 314. 415133072491401. Ensign Bickford Co. Altitude 230 ft. Water level 3.1 ft. Drilled 1980. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Topsoil, sandy	0	2	2
Sand, very fine to medium, brown; little silt; trace coarse sand	2	7	5
Sand, medium to coarse, orange-brown; trace very fine to fine sand	7	17	10
Sand, medium to very coarse; some fine gravel; little silt to fine sand in layers	17	32	15
Silt and very fine to fine sand	32	43	11
Sand, fine to coarse, and angular gravel; some clay and silt; red sandstone and shale fragments (weathered bedrock or till)	43	53	10
Refusal (bedrock)	at 53		

Town of Simsbury - continued

SI 315. 415122072510001. Ethel Walker School. Altitude 250 ft. Water level 5.8 ft. Drilled 1980. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Topsoil, sandy	0	2	2
Sand, medium to very coarse, brown; little silt	2	7	5
Sand, coarse to very coarse, brown-gray; little medium sand; trace silt to fine sand	7	45	38
Sand and angular gravel, multi-colored; very poorly sorted; compact (till)	45	53	8
Refusal	at 53		

SI 316. 415411072462902. Tariffville Fire District. Altitude 162 ft. Water level: 21 ft. Drilled 1977 by S. B. Church Co. Log by S. B. Church Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Fill, tight-packed and medium to coarse sand	0	10	10
Sand, coarse and fine gravel; heavy silt and clay	10	15	5
Sand, fine to medium, tight-packed; heavy silt	15	20	5
Sand, coarse and gravel; some silt	20	25	5
Sand, fine to medium, tight-packed; some gravel stones	25	30	5
Sand, coarse, and gravel; some clay	30	35	5
Sand, coarse; some gravel stones; heavy ______	35	41	6
Sand, coarse and gravel; some silt	41	44	3
Gravel, very coarse, tight; heavy clay (till?)	44	52	8
Hardpan	at 52		

SI 319. 415414072462901. Tariffville Fire District. Altitude 171 ft. Water level: 26.7 ft. Drilled 1981 by S. B. Church Co. Log by S. B. Church Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Clay and gravel	0	10	10
Sand, coarse; some gravel; mixing with clay	10	15	5
Sand, coarse gravel and cobbles; mixing with clay	15	20	5
Sand, coarse and gravel; with clay	20	25	5
Sand and coarse gravel; cobbles; less clay	25	30	5
Sand, coarse and gravel; with little clay	30	35	5
Sand, coarse and gravel	35	40	5
Sand, coarse and gravel; cobbles; little clay	40	45	5
Sand, coarse and gravel; with clay	45	50	5
Sand, coarse and gravel; with more clay	50	51	1

SI 322. 415139072504505. Village Water Co. Altitude 240 ft. Water level: 5 ft. Drilled 1966 by R. E. Chapman Co. Log by R. E. Chapman Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, coarse and fine gravel	0	30	30
Sand, medium to coarse	30	40	10
Sand, coarse and fine gravel	40	60	20

SI 324. 415150072502401. Village Water Co. Altitude 240 ft. Water level: 1.7 ft. Drilled 1966 by R. E. Chapman Co. Log by R. E. Chapman Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, medium to coarse	0	7	7
Sand, coarse and fine gravel	7	17	10
Sand, medium to coarse	17	27	17
Sand, medium to coarse, and fine gravel	27	51	24
Hardpan	51	53	2
Refusal	at 53		

SI 326. 415149072502101. Village Water Co. Altitude 235 ft. Water level: 1.5 ft. Drilled 1966 by R. E. Chapman Co. Log by R. E. Chapman Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Clay, loam	0	3	3
Sand, medium to coarse	3	35	32
Gravel, fine to medium	35	40	5
Sand, coarse and fine gravel	40	74	34
Refusal	at 74		

SI 327. 415236072512101. Village Water Co. Altitude 300 ft. Water level: 1.7 ft. Drilled 1970 by R. E. Chapman Co. Log by R. E. Chapman Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Soil	0	7	7
Sand and gravel	7	21	14
Sand, coarse and fine gravel	21	29	8
Coarse layers	29	35	6
Gravel, coarse and clay	35	36	1

SI 334. 415339072471101. Village Water Co. Altitude 150 ft. Water level: 8.08 ft. Drilled by R. E. Chapman Co. Log by R. E. Chapman Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, coarse, brown	0	7	7
Sand, coarse, brown and gravel	7	14	7
Sand, fine, silty and clay	14	70	56
Sand, fine red	70	105	35
Sand, coarse, red	105	149	44
Refusal	at 149		

SI 335. 415339072471001. Village Water Co. Altitude 150 ft. Water level: 9.5 ft. Drilled 1974 by R. E. Chapman Co. Log by R. E. Chapman Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Gravel, coarse, brown	0	5	5
Silt and clay, red	5	62	57
Sand, fine, red	62	90	28
Sand, medium to coarse, red	90	115	25
Sand, coarse, red	115	148	33

Town of Simsbury - continued

SI 336. 415337072471101. Village Water Co. Altitude 150 ft. Water level: 9.08 ft. Drilled by R. E. Chapman Co. Log by R. E. Chapman Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Topsoil	0	2	2
Sand, medium, brown	2	7	5
Clay, red	7	42	35
Gravel, coarse and clay	42	49	7
Sand, fine, red and clay	49	56	7
Sand fine, red-brown	56	77	21
Sand, fine to medium, red	77	98	21
Sand, medium to coarse, red	98	119	21
Sand, very fine, red	119	124	5
Refusal	at 124		

SI 337. 415337072470701. Village Water Co. Altitude 150 ft. Water level: Flows. Drilled 1975 by R. E. Chapman Co. Log by R. E. Chapman Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, fine, gray to red	0	28	28
Sand, fine, red and clay	28	56	28
Sand, fine, gray	56	70	14
Sand, fine, red	70	98	28
Sand, coarse, red	98	182	84
Sand, fine, red	182	189	7
Refusal	at 189		

SI 338. 415158072502701. Village Water Co. Altitude 254 ft. Water level: 27 ft. Drilled 1977 by R. E. Chapman Co. Log by R. E. Chapman Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, fine, red	0	21	21
Sand, coarse, red	21	67	46
Refusal	at 67		

SI 339. 415158072502301. Village Water Co. Altitude 257 ft. Water level: 25 ft. Drilled by R. E. Chapman Co. Log by R. E. Chapman Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, fine, red	0	14	14
Sand, coarse, brown	14	50	36
Refusal	at 50		

SI 341. 415152072502901. Village Water Co. Altitude 239 ft. Water level: 8.2 ft. Drilled 1978 by R. E. Chapman Co. Log by R. E. Chapman Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, red to fine gravel	0	19	19
Sand, red to coarse gravel	19	24	5
Sand, red to fine gravel	24	40	16
Sand, red to fine, angular gravel	40	51	11
Sand, medium to coarse, red; some fine gravel	51	56	5
Sand, fine to coarse, red; some fine gravel	56	82	26
Refusal	at 82		

SI 346. 415153072502603. Village Water Co. Altitude 239 ft. Drilled 1978 by R. E. Chapman Co. Log by R. E. Chapman Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, medium	0	20	20
Sand, medium to coarse, and gravel	20	45	25
Sand, coarse and gravel	45	50	5
Sand, medium	50	55	5
Sand, medium, and gravel	55	60	5
Sand, medium	60	65	5
Sand, medium to coarse	65	84	19
Hardpan	84	1	1

SI 347. 415402072470701. Town of Simsbury. Altitude 170 ft. Water level: 10.2 ft. Drilled 1978 by R. E. Chapman Co. Log by R. E. Chapman Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, fine, brown	0	21	21
Clay, fine, gray, sandy	21	49	28
Clay, fine, red, sandy	49	77	28
Sand, very fine, red, silty	77	168	91
Sand, fine, red	168	203	35
Sand, medium, red	203	225	22

SI 351. 415259072463901. John Loomis. Altitude 190 ft. Water level: 40 ft. Drillers log.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand and clay	0	90	90
Gravel	90	97	7

SI 352. 415252072511301. Town of Simsbury. Altitude 300 ft. Water level: 3.2 ft. Drilled by R. E. Chapman Co. Log by R. E. Chapman Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, medium and gravel	0	10	10
Sand, medium	10	20	10
Clay, gray	20	36	16
Hardpan, mixed, and gravel	36	40	4
Gravel, coarse	40	56	16

SI 355. 41522072500501. Mrs. Jean Jalbert. Altitude 260 ft. Drilled 1980 by John F. Sima Drilling Co. Log by John F. Sima Drilling Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand and gravel	0	50	50
Hardpan	50	68	18
Redrock	68	220	152

SI 359. 415503072465601. Mitchell Plumbing. Altitude 190 ft. Drilled 1979 by Alan Spence. Log by Alan Spence.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, fine	0	92	92
Sand, silty	92	144	52
Gravel, red	145	150	5
Redrock	151	160	9

Town of Simsbury - continued

SI 363. 415247072473901. Baker Nurseries. Altitude 150 ft. Drilled 1982 by U.S. Geological Survey. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, very fine to medium brown	0	5	5
Sand, fine to very coarse	5	12	7
Sand, fine to very coarse; little gravel	12	14	2
Clay, silty, reddish-brown with layers of gray silt	14	58	44
Silt, reddish-brown with layers of very fine sand, occasional clay layer	58	87	29
Sand, very fine and silt, reddish-brown	87	96	9
Sand, very fine to fine, gray-brown, with silt	96	105	9
Silt with thin, very fine sand layers.	105	130	25
Sand, very fine to fine	130	132	2
Silt and clay, layered; little very fine sand	132	162	30
Sand, very fine to medium; some silt	162	170	8
Sand, very fine to very coarse, with chips of assorted rock types (till?)	170	183	13
Silt and clay	183	187	4
Till	187	200	13
Sandstone, fine-grained, maroon	200	204	4

SI 364. 415150072475701. Landev Inc. Altitude 155 ft. Water level: 15 ft. Drilled 1983 by John F. Sima Drilling Co. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, medium to very coarse	0	6	6
Gravel	6	7	1
Sand, medium to very coarse; some silt	7	10	3
Silt; little very fine sand; trace of medium to coarse sand; trace of clay	10	20	10
Silt and clay	20	45	25
Clay and silt; occasional granules	45	107	62
Silt; some clay; some medium to coarse sand, layered	107	111	4
Silt, some clay	111	145	31
Silt; some medium to coarse sand	145	148	3
Silt; some clay, layered	148	153	5
Sand, fine to medium	153	155	2
Silt; little clay; trace of very fine sand	155	160	5
Silt; some very fine to very coarse sand	160	168	8
Silt and clay	168	198.5	30.5
Silt; little very fine sand; little clay; occasional granules	198.5	210	11.5
Silt; trace of very fine sand; trace of clay	210	221	11
Till or weathered bedrock	221	227	6
Bedrock (sandstone)	227	238	11

SI 365. 415312072472001. Connecticut Department of Environmental Protection. Altitude 155 ft. Water level: 15 ft. Drilled 1983 by John F. Sima Drilling Co. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, very fine and silt (alluvium).	0	8	8
Sand, fine to very coarse; few granules and wood fragments (alluvium)	8	12	4
Sand, medium to very coarse; some gravel and organic material (alluvium)	12	18	6
Sand and gravel (alluvium)	18	22	4
Sand, medium to very coarse; trace of gravel, trace of fine sand and some organic fragments (alluvium)	22	28	6
Sand, medium to very coarse, some granules	28	36	8
Sand, medium; little fine sand; trace of coarse to very coarse sand--layered (coarser zones at 39 ft, 43-46 ft, 52-57 ft, and 62-64 ft)	36	64	28
Clay ?	64	65	1
Silt, clay and very fine to medium sand, layered (coarser zones at 66-69 ft, 74-77 ft, 80-82 ft)	65	82	17
Silt and clay; little very fine to medium sand; trace of coarse to very coarse sand and occasional granules.	82	87	5
Sand, very fine to medium, silt and clay; trace of coarse to very coarse sand and occasional granules; layered	87	92	5
Clay ?	92	94	2
Silt, clay and sand; layered	94	100	6
Sand, coarse	100	105	5
Clay ?	106	107	1
Silt and very fine sand; trace of coarse sand	107	127	20
Silt and clay	127	129	2
Silt and very fine sand; little fine to coarse sand; trace of clay; (coarser zones at about 134 ft, 138 ft, 147.5-148.5 ft)	129	165	36
Clay ?	165	167	2
Silt, clay and very fine sand	167	178.5	11.5
Silt and very fine sand; trace of fine to medium sand; layered	178.5	187	8.5
Silt and very fine sand; trace of clay (clay at 187-188? ft); few granules	187	192	5
Clay ?	192	195	3
Clay and silt	195	216.5	21.5
Sand, very coarse and gravel; many angular rock fragments (till?)	216.5	221	4.5
Silt, clay and rock chips (till?)	221	225	4
Bedrock or till	225	232	7

Town of Simsbury - continued

SI 366. 415346072464701. Town of Simsbury.
Altitude 150 ft. Water level: 10 ft.
Drilled 1983 by John F. Sima Drilling Co.
Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, fine; dirty	0	2	2
Gravel, fine; little silt	2	4	2
Sand, very fine to very coarse; trace of silt; few granules	4	18	14
Silt; little very fine to very coarse sand; trace of clay; (more clay from about 35-38.5 ft)	18	42	24
Sand ?	42	44	2
Silt; little clay	44	55	11
Clay	55	58.5	3.5
Clay and silt	58.5	74	15.5
Gravel ?	74	75	1
Silt; little clay	75	93	18
Gravel	93	98.5	5.5
Silt; some clay; little fine to very coarse sand	98.5	107	8.5
Gravel ?	107	115	8
Silt and sand	115	118.5	3.5
Silt and very fine sand; little medium to very coarse sand; little clay	118.5	138.5	20
Silt and fine to coarse sand; little clay (coarser material from 148-150 ft)	138.5	150	11.5
Silt and very fine sand; some medium sand	150	167	17
Silt and very fine sand; some medium sand; trace of clay	167	175	8
Gravel ?	175	177	2
Silt and very fine sand; some medium to coarse sand	177	185	9
Silt and very fine sand; some medium sand	185	195	10
Sand, fine to very coarse; some very fine sand and silt, layered	195	202	7
Gravel and sand	202	205	3
Silt and very fine sand; some clay	205	208.5	3.5
Gravel ?	208.5	215	6.5
Sand, very fine to very coarse and silt	215	224	9
Gravel	224	225	1
Silt and medium sand	225	227	2
Silt, clay and fine to medium sand; little very coarse sand; trace of gravel	227	238.5	11.5
Silt and clay, some sand ?	238.5	256	17.5
Gravel, fine ?	256	258.5	2.5
Silt and very fine sand; trace of clay; trace of fine to very coarse sand	258.5	284.5	26
Gravel ?	284.5	289	4.5
Clay and silt; trace of very fine to coarse sand	289	343	54
Till ?	343	352	9
Till with large traprock boulders	352	360	8

SI 367. 414951072483601. Cliffside Club.
Altitude 155 ft. Water level: 15 ft.
Drilled 1983 by John F. Sima Drilling Co.
Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, very fine and silt; trace of fine to medium sand	0	7	7
Silt; little very fine sand; trace of clay; trace of fine to medium sand	7	12	5
Sand, medium to coarse; some silt and very fine sand	12	16	4
Sand, medium to very coarse and gravel	16	23	7
Sand, medium to very coarse	23	26	3
Clay	26	27	1
Sand, medium to very coarse	27	30	3
Clay	30	51	21
Sand, coarse to very coarse	51	52	1
Clay	52	56	4
Clay; occasional lenses of coarse to very coarse sand	56	68	12
Gravel	68	69	1
Sand, medium to very coarse and gravel	69	81	12
Clay	81	83	2
Clay and medium to very coarse sand; trace of silt	83	90	7
Sand and gravel ?	90	92	2
Silt	92	94	2
Sand, fine to very coarse and gravel (till?)	94	98.5	4.5
Till	98.5	102	3.5
Till or bedrock (may be weathered bedrock or fracture 122-124 ft)	102	124	22
Bedrock	124	130	6

SI 371. 415136072510401. Town of Simsbury.
Altitude 255 ft. Water level: 13 ft.
Drilled 1984 by U.S. Geological Survey.
Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, very fine to fine; some medium sand	0	10	10
Sand, very fine to medium; some coarse sand	10	16	6
Sand, medium to very coarse, clean	16	26	10
Sand, fine to very coarse; some granules, clean	26	35	9
Sand, fine to very coarse; some pebbles, clean	35	36	1
Sand, very fine to very coarse; trace of silt (gravel 40-40.5 ft)	36	47	11
Sand, very fine to coarse; some silt	47	58	11
Sand, very fine to fine, brown; trace of silt	58	68	10
Till, red, sandy	68	72	4
Rock, weathered sandstone	72	73	1
Refusal	at 73		

Town of Simsbury - continued

SI 372. 415142072493901. Ensign-Bickford Co.
Altitude 270 ft. Water level: 30.5 ft.
Drilled 1984 by U.S. Geological Survey.
Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Soil, black, silty loam	0	4	4
Sand, very fine to very coarse; some brown silt	4	6	2
Sand, medium to very coarse; some brown fine sand	6	9	3
Sand, medium to very coarse; some pebble gravel; trace of very fine sand	9	12	3
Sand, coarse to very coarse; and granule to pebble gravel	12	15	3
Sand, coarse to very coarse; trace of medium sand; trace of granules	15	24	9
Sand, fine to very coarse; trace of pebbles and granules	24	32	8
Sand, fine to coarse	32	43	11
Sand, very fine to very coarse; some granules and firm silt (till?)	43	56	13
Refusal	at 56		

SI 373. 415146072495401. Connecticut
Department of Environmental Protection.
Altitude 292 ft. Water level: 58 ft.
Drilled 1984 by U.S. Geological Survey.
Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, medium to very coarse; trace of fine to very fine sand; trace of granules	1	4	4
Sand, coarse to very coarse; trace of medium sand; trace of pebbles	4	7	3
Sand, fine to medium; little silt; trace of pebbles and granules	7	10	3
Sand coarse to very coarse; little pebbles and granules	10	13	3
Sand, fine to medium, brown; trace of coarse sand	13	20	7
Sand, very fine to medium; trace of coarse sand, trace of silt(bedded)	20	29	9
Sand, very fine	29	42	13
Sand, fine to very coarse; trace of granules	42	47	5
Sand, fine to coarse; some very very coarse sand; trace of very fine sand	47	57	10
Sand, very fine to medium brown	57	94	37
Till	94	103	9
Refusal	at 103		

SI 374. 415121072511801. Town of Simsbury.
Altitude 250 ft. Water level: 3 ft.
Drilled 1984 by U.S. Geological Survey.
Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Soil, black silt, and fill	0	4	4
Sand, very fine to very coarse, and granule to pebble gravel, silty	4	9	5
Sand, medium to very coarse, and clean granule gravel	9	18	9
Sand, fine to very coarse, clean	18	28	10
Sand, coarse to very coarse; trace of fine to medium sand and granules, clean	28	47	19
Sand, fine to medium, clean, bedded	47	48	1
Sand, medium to very coarse, and granule to pebble gravel; occasional thin silt layer	48	67	19
Till, red-brown	67	78	11
Refusal	at 78		

SI 375. 415143072502201. Tom Garrity.
Altitude 250 ft. Water level: 17.2 ft.
Drilled 1984 by U.S. Geological Survey.
Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, fine to very coarse	0	3	3
Sand, medium to very coarse; some granule to pebble gravel; trace of small cobbles	3	14	11
Sand, very fine to coarse; some very coarse sand to pebble gravel	14	16	2
Sand, medium to very coarse; some granule to pebble gravel; trace of very fine to fine sand	16	24	8
Till, red	24	26	2
Bedrock, weathered sandstone	26	31	5
Refusal	at 31		

SI 376. 415151072500701. Connecticut
Department of Environmental Protection.
Altitude 235 ft. Water level: 8 ft.
Drilled 1984 by U.S. Geological Survey.
Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Fill	0	2	2
Gravel and very fine to very coarse sand	2	5	3
Sand, fine to medium, some coarse to very coarse sand; occasional gravel layer, clean	5	40	35
Sand, fine to medium, clean	40	57	17
Sand, very fine, clean	57	61	4
Till, red	61	63	2
Refusal	at 63		

SI 409. 415342072510501. Anthony Zampaglione.
Altitude 315 ft. Drilled 1977 by Louis E. Allyn
and Sons Inc. Log by Louis E. Allyn and
Sons Inc.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand and gravel	0	65	65
Hardpan	65	70	5
Redrock	70	185	115

SI 443. 415414072512301. Owner unknown.
Altitude 328 ft. Water level: 22 ft.
Drilled 1982 by Clarence Welti Associates
Inc. Log by Clarence Welti Associates Inc.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Silt, brown; trace of sand	0	4	4
Sand, fine to coarse, brown; little fine to coarse gravel; trace of cobbles and small boulders	4	17	13
Sand, fine to coarse, brown, fine sand lenses; trace of fine gravel	17	30	13
Sand, fine, red; little silt; trace of fine gravel	30	33	3
Refusal	at 33		

Town of Simsbury - continued

SI 472. 415014072481801. Village Water Company. Altitude 160 ft. Water level: flows. Drilled 1984 by R. E. Chapman Co. Log by R. E. Chapman Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, fine, red	0	8	8
Sand, medium, brown	8	20	12
Silt and clay, red	20	70	50
Clay, grey to red	70	175	105
Silt and clay, red	175	210	35
Clay, red; some red sand and cobbles	210	220	10
Gravel, medium, red, sharp	220	227	7
Rock, red	227	230	3

SI 473. 415013072481601. Village Water Company. Altitude 160 ft. Water level: 2.6 ft. Drilled 1986 by R. E. Chapman Co. Log by R. E. Chapman Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, silty	0	6	6
Sand, medium and gravel	6	23	17
Clay, grayish-red	23	185	162
Clay, red, silty	185	196	11
Sand, fine to medium, hardpacked	196	198	2
Rocks and clay, hardpacked (till?)	198	203	5
Sand and gravel, some clay (till?)	203	205	2
Hardpan and rocks (till?)	205	207	2
Sand, medium	207	210	3
Hardpan (till?)	210	212	2
Clay, hardpacked (till?)	212	214	2
Gravel, coarse; some clay (till?)	214	216	2
Gravel, coarse and sand	216	220	4
Gravel, hardpacked	220	222	2
Gravel and sand, loose	222	225	3
Gravel, medium and sand	225	228	3
Sand, coarse to medium	228	230	2
Sand, medium to fine	230	238	8
Sand, fine, silty	238	240	2

Appendix F.--Lithologic logs of selected test holes

(Entries include local test-hole number, site-identification number, owner, altitude of land surface, date drilled, depth to water, source of log and description of earth materials penetrated. Locations shown on plate 1. Logs for test holes SI 1TH-44TH previously published in Hopkins and Handman, 1975, P. 43-45; logs for test holes SI 45TH-47TH previously published in Grady and Handman, 1983, p. 44)

Altitude: Land surface datum (LSD) at test-hole site, in feet above NGVD of 1929. Estimated from topographic map with 10-foot contour interval.

Depth to water: Depth to static water level, in feet below land surface. Measurements were made shortly after completion of test hole and may not represent static conditions.

Description of earth materials: Logs of test holes drilled by the U.S. Geological Survey and Connecticut Department of Transportation based on the appropriate grain-size classification shown in the table to the right.

Grain size (millimeters)	Wentworth grade scale U.S. Geological Survey logs	Grade scale used by Conn. Dapt. of Transportation before 1959	AASHO Classification used by Conn. Dept. of Transportation since about 1959
	Boulders	Gravel	Boulders
256	Cobbles		203 mm Cobbles
64	Pebbles		Gravel: Coarse; 25.4 mm; Medium; 9.5 mm
4	Granules - very fine gravel		Fine
2	Very coarse sand	Coarse sand	Coarse sand
1	Coarse sand	0.6 mm	
0.5	Medium sand	Medium sand	0.42 mm
0.25	Fine sand	0.2 mm	Fina sand
0.125	Very fine sand	Fine sand	0.074 mm
0.063	Silt	0.06 mm Silt	Silt
0.004	Clay	0.002 mm Clay	0.004 mm Clay

Terms used in logs of wells and test holes of the U.S. Geological Survey:

Sand and gravel--Sorted stratified sediment varying in size from boulders to very fine sand. "Poorly sorted" indicates approximately equal amounts, by weight, of all grain sizes.

Till--A predominantly nonsorted, nonstratified sediment deposited directly by a glacier and composed of boulders, gravel, sand, silt, and clay.

End of hole--Depth to bottom of test hole in which bedrock or refusal was not reached.

Refusal--Depth at which the drill equipment could no longer penetrate.

Percentage by weight of individual components in the sample.

Trace	0 - 10	Some	20 - 35
Little	10 - 20	..and..	35 - 50

Town of Granby

GR 30TH. 415511N0724941.1. McLean Foundation. Drilled 1985. Altitude 255 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Silt and very fine sand	0	5	5
Sand, very fine to very coarse, and granule to pebble gravel	5	16	11
Sand, fine to very coarse, clean	16	30	14
Sand, fine to very coarse, granules; trace silt	30	42	12
Sand, very fine to very coarse, and granule to pebble gravel, silty	42	55	13
Sand, very fine to very coarse, and granules	55	72	17
Sand, very fine to very coarse, and granule gravel; little silt and very fine sand	72	80	8
Sand, fine to very coarse, and granule to pebble gravel; little very fine sand	80	100	20
Sand	100	120	20
Till (?)	120	124	4
Refusal		at 124	

Town of Simsbury

SI 1TH. 415439N0724706.1. Pratt Jig Borer Serv. Inc. Drilled 1971. Altitude 155 ft. Depth to water 6 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Silt, very fine sand; little clay; trace fine to coarse sand, brownish-yellow	0	10	10
Sand, fine to very fine; some silt and clay; trace medium to coarse sand, gray	10	25	15
Gravel and sand	25	26	1
Sand, very fine, silt, and clay; trace fine to medium sand, gray	26	89	63
Sand, fine to medium; little coarse sand, silt and clay; trace of fine gravel	89	91	2
Refusal		at 91	

SI 2TH. 415346N0724648.1. Town of Simsbury, Parks and Recreation Dept. Drilled 1971. Altitude 150 ft. Depth to water 8 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, fine to very fine, and silt, yellow-brown	0	7	7
Silt and very fine sand; trace of clay, dark brown	7	13	6
Sand, fine to medium; little coarse sand, very fine sand, silt, and clay; trace very coarse sand and fine gravel	13	14	1
Sand, very fine; some silt and clay; little fine sand; trace medium to very coarse sand and fine gravel	14	19	5
Sand, fine to very fine, and silt; trace of clay, gray	19	50	31
Sand, very fine, silt, and clay; layered	50	60	10
Silt; clay; trace to little very fine sand	60	97	37

SI 3TH. 415439N0724725.1. Bureau of Highways, Conn. Dept. of Transportation. Drilled 1971. Altitude 210 ft. Depth to water 36 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, coarse to medium; little fine sand; trace silt; trace fine gravel	0	19	19
Sand, fine to very fine, and silt; little medium sand	19	24	5
Gravel, sand, silt, and few boulders	24	37	13
Angular fragments red sandstone, sand, silt, and clay (till)	37	38	1
Refusal on till		at 38	

SI 4TH. 415414N0724838.1. Culbro Tobacco Div., General Cigar Co., Inc. Drilled 1971. Altitude 300 ft. Depth to water 9 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Soil, sandy	0	3	3
Gravel and coarse sand; few cobbles	3	10	7
Sand, coarse to medium; little fine sand; trace to little fine gravel and silt	10	19	9
Sand, fine to very fine, silt, and clay; trace of medium and coarse sand, trace of fine gravel, layered	19	54	35
Sand, fine to coarse, silt; little fine to coarse gravel	54	62	8
Refusal		at 62	

SI 5TH. 415428N0725044.1. Culbro Tobacco Div., General Cigar Co., Inc. Drilled 1971. Altitude 315 ft. Depth to water 7 ft. Log by U.S. Geological Survey.

Materials	Depth below LDS, in feet From	To	Thickness (feet)
Sand, medium to fine, silt; trace coarse sand, dark brown	0	2	2
Sand, fine, and silt; trace of fine gravel and coarse sand, tan	2	5	3
Gravel, fine, coarse to medium sand; trace of coarse gravel, fine sand and silt	5	9	4
Till, clayey	9	12	3
Refusal on till		at 12	

SI 6TH. 415014N0724832.1. Vernon Case. Drilled 1971. Altitude 155 ft. Depth to water 11 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Topsoil; sand and silt, dark brown	D	3	3
Sand, fine to very fine, and silt, yellow	3	10	7
Sand, fine to coarse; trace of very fine and very coarse sand and fine to medium gravel; trace of silt and clay, layered	10	15	5
Gravel, fine to coarse	15	16	1
Sand with scattered gravel layers	16	21	5
Gravel, coarse; little medium, fine, and very fine gravel; trace of very coarse to very fine sand	21	24	3
Sand, medium to very fine, and silt	24	29	5
Gravel, fine	29	30	1
Sand, very fine, silt, and clay, gray	30	37	7
Silt and clay; little very fine sand	37	47	10
Clay, gray; little silt	47	70	23
Clay, silt; little very fine and fine sand	70	72	2
Clay and silt	72	92	20

SI 7TH. 414933N0724907.1. Holloway Bros., Inc. Drilled 1971. Altitude 155 ft. Depth to water 16 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Topsoil; sand, silt; brown	0	10	1D
Silt with fine to coarse sand, brown	10	16	6
Sand, coarse, and fine gravel	16	17	1
Sand, medium; some fine sand; trace of coarse sand and fine gravel	17	22	5
Sand, medium to coarse, with gravel, brown	22	25	3
Sand, very fine, silt, and clay; trace of fine to very coarse sand, brown-red	25	37	12
Clay; little silt, brown and gray	37	45	8
Clay and silt, brown	45	49	4
Clay and silt, red-brown	49	62	13
Clay, silt, sand, fine gravel, hard, reddish-brown	62	64	2
Refusal		at 64	

SI 8TH. 414936N0724916.1. Holloway Bros., Inc. Drilled 1971. Altitude 165 ft. Depth to water 26 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Soil, silty, dark brown	0	6	6
Silt, clay, moist, dark brown	6	9	3
Clay, silt, dark brown with gray clay	9	14	5
Gravel	14	15	1
Clay; some silt, brown	15	24	9
Clay and silt, dark brown	24	48	24
Sand, very fine, silt; little fine sand; little clay, brown	48	51	3
Sand, fine, silt, and clay	51	60	9
Sand, fine, and silt; some medium sand	60	71	11
Sand, fine, silt, and clay	71	84	13
Sand, fine to coarse, and gravel	84	85	1
Clay, silt, fine sand; brown	85	96	11
Sand and gravel	96	100	4

SI 9TH. 415118N0725129. Town of Simsbury, Park and Recreation Dept. Drilled 1971. Altitude 265 ft. Depth to water 14 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Gravel, medium to coarse, sand, and cobbles	0	3	3
Gravel, fine, and medium to coarse sand	3	8	5
Gravel, coarse, and sand	8	10	2
Gravel, very coarse, cobbles, and boulders	10	12	2
Sand, coarse; some medium sand; little fine sand; trace of silt and gravel	12	18	6
Gravel, coarse to fine, sand, and silt	18	21	3
Sand, coarse to fine, silt; little gravel	21	25	4
Gravel, coarse to fine, and sand; little to trace of silt and clay	25	34	9
Sand, medium to coarse, and gravel; little fine sand; trace of silt and clay, layered	34	47	14
Till, clayey, red-brown	47	48	1
Refusal		at 48	

SI 10TH. 415023N0725122.1. Dorothea Hoban. Drilled 1971. Altitude 290 ft. Depth to water 32 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Topsoil, silty, dark brown	0	2	2
Sand, medium to fine, brown-yellow	2	7	5
Sand, fine, and silt; few scattered pebbles	7	9	2
Sand, fine, and silt	9	22	13
Gravel and sand	22	23	1
Sand, fine, and silt	23	29	6
Sand, medium to fine	29	35	6
Sand with scattered gravel	35	37	2
Sand, fine; some medium sand; trace of very fine and coarse sand	37	45	8
Silt; some very fine and fine sand; trace of medium and coarse sand and clay	45	53	8
Sand, fine; some medium sand; little very fine sand; trace of coarse sand; scattered gravel	53	65	12
Sand, fine to very fine, and silt; scattered fine gravel and coarse sand	65	72	7
Sand, fine, silt, clay	72	83	11
Sand, silt; scattered gravel	83	91	8
Gravel, fine, clayey (till?)	91	94	3
Refusal		at 94	

SI 11TH. 415002N0725150.1. Leonard Bull. Drilled 1971. Altitude 300 ft. Depth to water 36 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Gravel, sand; little silt	0	6	6
Gravel, sand; little silt; cobbles	6	7	1
Gravel, fine, sand, and little silt	7	13	6
Sand, coarse to fine, and silt; little scattered fine gravel	13	19	6
Sand	19	20	1
Sand, fine to very fine, and silt; trace medium sand	20	35	15
Gravel and sand	35	36	1
Sand, fine to very fine, and silt	36	37	1
Sand, coarse to very fine, silt, and clay, red-brown	37	41	4
Refusal		at 41	

SI 15TH. 415408N0724707.1. (Formerly SI 217) Village Water Co. Drilled 1960. Altitude 165 ft. Depth to water 11 ft. Log by S. B. Church Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, medium	0	5	5
Sand, fine, and silt; trace of medium sand	5	15	10
Sand, fine to very fine	15	40	25
Silt	40	85	45
Sand, very fine, and silt	85	100	15
Sand, fine, and silt with interbedded medium to coarse sand	100	130	30
Sand, medium; some fine and coarse sand	130	175	45
Sand, medium to very fine	175	194	19

SI 16TH. 415342N0724711.1. (Formerly SI 218) Village Water Co. Drilled 1960. Altitude 162 ft. Depth to water 10 ft. Log by S. B. Church Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand	0	7	7
Silt	7	42	35
Silt; some very fine sand	42	58	16
Sand, coarse to very fine	58	95	37
Sand, very coarse to very fine, with pebbles	95	105	10
Sand, very coarse to very fine	105	125	20

SI 17TH. 415304N0724756.1. (Formerly SI 103) Village Water Co. Drilled 1953. Altitude 170 ft. Depth to water 6 ft. Log by Layne-New York Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Topsoil	0	1	1
Sand, medium, red	1	18	17
Sand, fine, red	18	44	26
Sand, fine, and clay, red	44	48	4
Sand, fine, hard-packed, red	48	55	7

SI 18TH. 415238N0724758.1. (Formerly SI 105) Village Water Co. Drilled 1953. Altitude 160 ft. Log by Layne-New York Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, medium, brown	0	19	19
Sand, fine, and silt, red	19	43	24
Clay and silt	43	45	2
Sand, fine, silty, red	45	69	24
Clay and silt	69	71	2
Silt	71	87	16
Hardpan	87	90	3

SI 19TH. 415206N0724822.1. (Formerly SI 209) Bureau of Highways, Conn. Dept. of Transportation. Drilled 1956. Altitude 161 ft. Depth to water 3 ft.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Fill; flood rubbish, tar, and concrete pavement, medium boulders	0	5	5
Sand, fine to coarse, red; fine to coarse gravel; little silt	5	16	11
Sand, medium to fine; some silt and clay; trace of coarse sand; trace of gravel; red	16	20	4
Sand, medium; some silt, red and gray	20	26	6
Sand, coarse, and gravel; cobbles; some silt, red and gray	26	40	14

SI 20TH. 415052N0724825.1. (Formerly SI 128) Bureau of Highways, Conn. Dept. of Transportation. Date drilled unknown. Altitude 154 ft.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Topsoil	0	2	2
Sand, medium to coarse	2	12	10
Sand, silt, woodchips, and decayed material	12	20	8
Sand, medium to coarse, and silt	20	26	6
Silt and very fine sand; brown	26	46	20
Silt, interlayered with clay, brown	46	186	140
Hardpan (till)		at 186	

SI 21TH. 415051N0724808.1. (Formerly SI 129) Bureau of Highways, Conn. Dept. of Transportation. Date drilled unknown. Altitude 151 ft.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Topsoil, silt, sand	0	3	3
Silt, organic, black and brown, with grass roots; soft	3	8	5
Silt, organic, coarse sand, woodchips, pignuts (hickory nuts)	8	18	10
Sand, very fine, and silt, brown	18	40	22
Silt and clay, layered, brown and gray	40	185	145
Sand, very fine, and silt	185	252	67

SI 24TH. 415141N0725038.1. (Formerly SI 108) Village Water Co. Drilled 1953. Altitude 240 ft. Depth to water 2 ft. Log by Layne-New York Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Fill	0	2	2
Clay and silt	2	8	6
Sand, fine, red	8	20	12
Sand, medium, red	20	35	15
Sand, medium, and gravel, brown	35	60	25

SI 25TH. 415107N0724751.1. (Formerly SI 109) Village Water Co. Drilled 1953. Altitude 172 ft. Depth to water 11 ft. Log by Layne-New York Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Topsoil	0	2	2
Sand, fine, and gravel, brown	2	28	26
Clay	28	30	2
Silt	30	80	50

SI 27TH. 414941N0724913.1. (Formerly SI 51c) Hartford Special Machinery Co. Date drilled unknown. Altitude 183 ft. Depth to water 3 ft.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, loamy	0	2	2
Sand, coarse, firm, and fine gravel	2	8	6
Clay, medium; some fine sand	8	22	14
Silt and clay, reddish-brown	22	45	23
Sand, very fine, red	45	90	45

SI 28TH. 414951N0724912.1. (Formerly SI 51b) Hartford Special Machinery Co. Date drilled unknown. Altitude 180 ft. Depth to water 2 ft.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, loamy	0	2	2
Sand, coarse, firm, and gravel	2	8	6
Clay and silt, medium brown	8	12	4
Clay and silt; soft, red-brown	12	25	13
Silt and little clay, loose, red-brown	25	35	10
Sand, very fine, to silt; little clay, firm, red	35	58	23
Silt, red-brown	58	70	12
Silt to very fine sand, red-brown	70	95	25
Refusal on hardpan or rock		at 95	

SI 29TH. 414921N0724928.1. (Formerly SI 51d) Hartford Special Machinery Co. Date drilled unknown. Altitude 190 ft. Depth to water 1 ft.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, peaty	0	1	1
Clay and silt; soft, brown	1	12	11
Silt; trace clay, red-brown	12	30	18
Silt to very fine sand and strata of clay, firm, red-brown	30	60	30
Silt; little clay, brown	60	95	35
Sand, hard, red, and gravel	95	101	6

SI 31TH. 415140N0725044.1. (Formerly SI 81d) Village Water Co. Drilled 1954. Altitude 245 ft. Depth to water 2 ft. Log by R. E. Chapman Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand and gravel	0	26	26
Sand and fine gravel	26	32	6
Sand, medium	32	55	23
Sand, fine	55	65	10

SI 34TH. 415050N0724829.1. Bureau of Highways, Conn. Dept. of Transportation. Drilled 1952. Altitude 156 ft.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Fill; coarse sand	0	10	10
Sand, fine, silt, woodchips, and decayed material	10	21	11
Sand, fine, and silt, brown	21	34	13
Silt, very fine sand; trace of clay, brown	34	80	46
Sand, very fine, silt; trace of clay, brown	80	184	104
Hardpan		at 184	

SI 36TH. 415450N0724654.1. Town of Simsbury, Sewage Treatment Plant. Drilled 1968. Altitude 158 ft. Depth to water 4 ft. Log by Engineering Service Inc.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Topsoil	0	1	1
Silt; trace of fine sand, dark gray	1	4	3
Sand, fine to medium; little silt, brown-gray	4	6	2
Silt with layers of fine sand, gray	6	25	19
Silt; trace of clay with layers of fine sand, gray	25	35	10
Silt; some fine sand	35	45	10

SI 37TH. 415337N0724718.1. Village Water Co. Drilled 1972. Altitude 170 ft. Depth to water 14 ft. Log by R. E. Chapman Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Gravel, coarse, brown	0	14	14
Sand, fine, brown	14	35	21
Sand, coarse, brown	35	56	21
Sand, medium, brown	56	91	35
Sand, fine, brown	91	99	8

SI 38TH. 415334N0724717.1. Village Water Co. Drilled 1972. Altitude 155 ft. Depth to water 5 ft. Log by R. E. Chapman Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Gravel, coarse, brown	0	14	14
Sand, medium, reddish-brown	14	126	112
Sand, fine, red, and clay	126	140	14
Refusal		at 140	

SI 40TH. 415438N0724713.1. Village Water Co. Drilled 1972. Altitude 165 ft. Log by R. E. Chapman Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, medium, gray	0	7	7
Sand, medium, gray, and clay	7	21	14
Silt, red, and clay	21	63	42
Shale, red	63	70	7
Refusal		at 70	

SI 41TH. 415405N0724656.1. Village Water Co. Drilled 1972. Altitude 155 ft. Depth to water 4 ft. Log by R. E. Chapman Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, medium, brown	0	28	28
Silt, brown, and clay	28	49	21
Silt, red, and clay	49	174	125
Sand, fine, red	174	189	15
Sand, medium, red	189	232	43

SI 42TH. 415402N0724700.1. Village Water Co. Drilled 1972. Altitude 160 ft. Depth to water 9 ft. Log by R. E. Chapman Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, fine, brown	0	21	21
Sand, fine, gray, and clay	21	49	28
Clay, sandy, red	49	77	28
Sand, very fine, silty, red	77	168	91
Sand, fine, red	168	203	35
Sand, medium, red	203	239	36
Refusal		at 239	

SI 43TH. 415405N0724725.1. Village Water Co. Drilled 1972. Altitude 210 ft. Depth to water 45 ft. Log by R. E. Chapman Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Gravel, medium, brown	0	21	21
Sand, coarse, red	21	78	57
Refusal		at 78	

SI 44TH. 415013N0724848.1. Village Water Co. Drilled 1972. Altitude 150 ft. Log by R. E. Chapman Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Gravel, coarse, brown	0	7	7
Sand, fine, brown	7	14	7
Silt, red, and clay	14	133	119
Sand, fine, silty, red	133	168	35

SI 45TH. 415145N0724930.1. Ensign Bickford Co. Drilled 1980. Altitude 265 ft. Depth to water 23 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, medium, brown; trace of silt to fine sand	0	32	32
Sand, very fine to fine, brown; little silt; trace of medium sand	32	42	10
Sand, medium; some silt to fine sand; little gravel (mostly rounded sandstone fragments); poorly sorted (till?)	42	58	16
Sandstone, friable (weathered bedrock)	58	60	2
Refusal (bedrock)		at 60	

SI 46TH. 415144N0724853.1. Ensign Bickford Co. Drilled 1980. Altitude 215 ft. Depth to water 5 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Topsoil, brown, sandy	0	2	2
Silt to medium sand, pink-brown; some coarse sand; little very coarse sand to fine gravel	2	17	15
Sandstone and siltstone, red, weathered, loose	17	18	1
Refusal		at 18	

SI 47TH. 415133N0724941.1. Ensign Bickford Co. Drilled 1980. Altitude 250 ft. Depth to water 4 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Topsoil, silt, and sand	0	2	2
Sand, fine to medium; some coarse sand and silt	2	12	10
Sand, coarse and gravel; some silt and clay; poorly sorted	12	23	11
Silt and clay, with sub-angular gravel (sandstone fragments); (weathered bedrock)	23	27	4
Refusal		at 27	

SI 51TH. 415209N0724920.1. Village Water Co. Drilled 1965. Altitude 235 ft. Log by R. E. Chapman Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, fine; gravel	0	7	7
Clay; gravel (till?)	7	22	15
Refusal		at 22	

SI 52TH. 415153N0724925.1. Village Water Co. Drilled 1965. Altitude 260 ft. Log by R. E. Chapman Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, medium to coarse	0	8	8
Clay and gravel (till?)	8	17	9
Refusal		at 17	

SI 53TH. 415103N0724903.1. Village Water Co. Drilled 1965. Altitude 210 ft. Log by R. E. Chapman Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Gravel, medium to coarse	0	8	8
Sand, fine to silty, and clay	8	17	9
Refusal		at 17	

SI 54TH. 415101N0724900.1. Village Water Co. Drilled 1965. Altitude 200 ft. Depth to water 7 ft. Log by R. E. Chapman Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, coarse; and gravel	0	7	7
Sand, very fine and silty	7	40	33
Refusal		at 40	

SI 55TH. 415119N0724840.1. Village Water Co. Drilled 1965. Altitude 170 ft. Depth to water 5 ft. Log by R. E. Chapman Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand; and gravel	0	5	5
Clay	5	25	20
Refusal		at 25	

SI 56TH. 415119N0724834.1. Village Water Co. Drilled 1961. Altitude 160 ft. Depth to water 5 ft. Log by R. E. Chapman Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, medium to coarse	0	6	6
Clay	6	40	34
Silt, fine, and clay	40	50	10
Clay	50	60	10
Refusal		at 60	

SI 57TH. 415124N0724830.1. Village Water Co. Drilled 1965. Altitude 160 ft. Depth to water 5 ft. Log by R. E. Chapman Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Clay	0	60	60
Refusal		at 60	

SI 58TH. 415127N0724839.1. Village Water Co. Drilled 1965. Altitude 180 ft. Depth to water 15 ft. Log by R. E. Chapman Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, medium to coarse, brown	0	7	7
Clay	7	30	23
Sand, fine and silty	30	35	5
Hardpan (till?)	35	40	5
Refusal		at 40	

SI 60TH. 415211N0725205.1. Village Water Co. Drilled 1965. Altitude 325 ft. Depth to water 5 ft. Log by R. E. Chapman Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, coarse, and gravel	0	5	5
Sand, medium to coarse	5	17	12
Refusal		at 17	

SI 66TH. 415406N0724718.1. Village Water Co. Drilled 1970. Altitude 190 ft. Depth to water 50 ft. Log by R. E. Chapman Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Topsoil and gravel	0	7	7
Sand and gravel	7	49	42
Sand, fine, and gravel with clay	49	60	11
Bottom		at 60	

SI 69TH. 415006N0724846.1. Hartford Insurance Group. Drilled 1981. Altitude 171 ft. Depth to water 22 ft. Log by Clarence Welti Assoc., Inc.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Topsoil	0	1.5	1.5
Sand, fine to medium; trace of fine gravel, brown	1.5	4	2.5
Sand, fine to coarse; some fine gravel, brown	4	6.5	2.5
Sand, fine to coarse and fine to medium gravel, brown	6.5	9	2.5
Sand, fine to medium and fine to medium gravel	9	12	3
Sand, fine to medium	12	14	2
Sand, fine, brown	14	37	23
Sand, fine to medium, with silt layers	37	41.5	4.5
Sand, fine to medium, with clay layers	41.5	45	3.5
Silt; little clay	45	59	14
Silt and clay	59	65	6
Silt; little clay; trace of very fine sand	65	90	25
Silt and clay	90	99	9
Sand, fine, and silt	99	100	1
Silt and clay	100	101.5	1.5

SI 70TH. 414959N0724843.1. Hartford Insurance Group. Drilled 1981. Altitude 171 ft. Depth to water 19 ft. Log by Clarence Welti Assoc., Inc.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Topsoil	0	1.5	1.5
Sand, medium; little fine gravel	1	10	8.5
Sand, medium, brown	10	16	6
Sand, fine; trace of silt, brown	16	20	4
Silt; some clay, layered	20	50	30
Silt; trace of fine sand	50	80	30
Silt; little clay	80	98	18
Sand, medium to coarse, and silt	98	99.5	1.5

SI 71TH. 415259N0724655.1. Loomis and Wegner. Drilled 1977. Altitude 165 ft. Depth to water 5 ft. Log by S. B. Church Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Topsoil, and gravel	0	10	10
Sand, fine, silt, and clay	10	150	140
Bottom		at 150	

SI 73TH. 415304N0724645.1. Loomis and Wegner. Drilled 1977. Altitude 170 ft. Depth to water 5 ft. Log by S. B. Church Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, coarse, and gravel	0	15	15
Clay, and gravel	15	20	5
Clay	20	34	14
Gravel, dirty, with clay	34	35	1
Clay	35	50	15
Clay and gravel streaks	50	55	5
Clay	55	60	5
Clay; silt layer at bottom	60	65	5
Clay	65	83	18
Hardpan, gravel	83	84	1
Refusal		at 84	

SI 74TH. 415304N0724650.1. Loomis and Wegner. Drilled 1977. Altitude 160 ft. Depth to water 5 ft. Log by S. B. Church Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Topsoil and gravel	0	10	10
Sand, fine, silt, and clay	10	150	140
Bottom		at 150	

SI 75TH. 415444N0724638.1. Town of Simsbury. Drilled 1982. Altitude 155 ft. Depth to water 10 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Silt; and very fine sand; little fine to medium sand, tan	0	15	15
Silt, light brown-gray	15	26	11
Silt, brown and gray, very fine to medium sand, and clay	26	60	34
Silt, gray, and very fine sand	60	70	10
Silt, brown-gray, and clay; little very fine sand	70	100	30
Silt, brown-gray	100	110	10
Silt; some medium to very coarse sand	110	135	25
Silt and clay; little very fine sand	135	173	38
Silt; some clay; some very fine sand	173	210	37
Clay; some silt and very fine sand	210	236	26
Sand, very fine to very coarse, silt, clay, and cobbles (till)	236	266	30
Sandstone, fine-grained; and shale, red	266	272	6
Bottom		at 272	

SI 76TH. 415113N0724826.1. Robert Bonetti. Drilled 1982. Altitude 155 ft. Depth to water 10 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Clay and silt, black	0	5	5
Clay and silt, gray	5	6	1
Silt; some clay, gray	6	7	1
Sand, very fine to very coarse, and fine gravel	7	15	8
Clay, and silt; some very fine sand	15	35	20
Clay, gray	35	45	10
Clay and silt	45	80	35
Silt and clay	80	154	74
Till (silt, clay, granules, and pebbles)	154	158	4
Clay, red, and very coarse sand (weathered bedrock?)	158	159	1
Sandstone, fine-grained, maroon	159	169	10
Bottom		at 169	

SI 77TH. 415156N0725001.1. Conn. Dept. of Environmental Protection (Stratton Brook State Park). Drilled 1982. Altitude 227 ft. Depth to water 3 ft. Log by U.S. Geological Survey

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Topsoil, fill	0	3	3
Sand, fine to very fine; some medium sand	4	13	9
Sand, very coarse to coarse; some medium sand; scattered granules	13	37	24
Sand, medium to fine; some very fine sand	37	43	6
Sand, fine to very fine, and silt	43	50	7
Till	50	62	8
Refusal		at 62	

SI 78TH. 415015N0724813.1. Village Water Co. Drilled 1982. Altitude 155 ft. Depth to water 5 ft. Log by R. E. Chapman Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, fine to medium	0	21	21
Sand, fine; some clay	21	35	14
Clay, red	35	154	119
Sand, fine, red, and silt	154	180	26
Sand, medium to coarse, red	180	194	14
Refusal		at 194	

SI 79TH. 414946N0724840.1. Cliffside Country Club. Drilled 1971. Altitude 150 ft. Depth to water 11 ft. Log by Water Exploration and Development Corp.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Topsoil	0	1	1
Sand fine to coarse, brown; some silt, trace of fine gravel	1	15	14
Sand fine to coarse, brown; some silt, medium gravel	15	25	10
Clay, brown; some brown sand	25	40	15
Clay brown and silt, with sharp rock particles	40	45	5
Sand fine to medium, brown; some silt.	45	50	5
Sand fine to coarse, brown; some silt.	50	55	5
Sand, fine to coarse, brown	55	65	10
Sand, fine to medium, brown	65	70	5
Sand, medium to fine, brown	70	75	5
Refusal		at 75	

SI 80TH. 414943N0724842.1. Cliffside Country Club. Drilled 1971. Altitude 150 ft. Depth to water 11 ft. Log by Water Exploration and Development Corp.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, fine to coarse, and silt; trace of gravel, brown	0	15	15
Sand, fine to coarse, brown	15	30	15
Sand, fine to coarse; trace of clay, brown	30	35	5
Sand, fine to medium, silt, and clay, brown	35	45	10
Sand, very fine, and silt, brown	45	50	5
Not logged	50	55	5
Sand, very fine to fine, and silt, brown	55	70	15

SI 81TH. 415015N0724817.1. Village Water Co. Drilled 1982. Altitude 155 ft. Depth to water 5 ft. Log by R. E Chapman Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, fine, red......................	0	7	7
Sand, fine, brown....................	7	14	7
Sand, fine, red......................	14	21	7
Sand, fine, red; some clay...........	21	28	7
Sand, fine red, and silt.............	28	70	42
Clay, red............................	70	154	84
Sand, red, and clay; some silt.......	154	217	63
Sand, medium to coarse, red..........	217	225	8
Refusal..............................		at 225	

SI 84TH. 415011N0724818.1. Village Water Co. Drilled 1983. Altitude 155 ft. Depth to water 3 ft. Log by R. E. Chapman Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Loam and fine brown sand.............	0	10	10
Sand, fine, brown....................	10	20	10
Silt and clay, reddish-brown.........	20	170	150
Silt and clay, red...................	170	203	33
Clay and fine sand, red..............	203	218	15
Till.................................	218	230	12
Rock, red, soft......................	230	248	18

SI 85TH. 415153N0724904.1. Ensign-Bickford Co. Drilled 1984. Altitude 260 ft. Depth to water 16 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Soil, sandy loam.....................	0	2	2
Sand, very fine to very coarse.......	2	6	4
Sand, fine to very coarse; few granules............................	6	8	2
Sand, very fine to medium; little coarse sand.........................	8	14	6
Sand, very fine to fine; little medium sand, clean.................	14	22	8
Sand, very fine, and silt, firm, mottled.............................	22	25	3
Sand, very fine to fine, clean........	25	29	4
Sand, very fine to medium, clean, laminated...........................	29	46	17
Till, red, silty; some pebbles........	46	57	11
Bottom of hole at 57' (probably bedrock)			

SI 86TH. 415201N0724849.1. Ensign-Bickford Co. Drilled 1984. Altitude 219 ft. Depth to water 5 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Road fill and soil...................	0	2	2
Sand, very fine; and silt; occasional pebble; trace of coarse sand, red.....	2	4	2
Silt, red............................	4	10	6
Sand, very fine; some silt, red.......	10	21	11
Silt; some very fine sand, red........	21	29	8
Silt, sand, and angular gravel, red...	29	34	5
Sand, very fine to medium; some very coarse sand to pebble gravel........	34	38	4
Till, red............................	38	40	2
Refusal..............................		at 40	

SI 87TH. 415126N0724959.1. Ethel Walker School. Drilled 1984. Altitude 295 ft. Depth to water 36 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Loam, sandy, brown...................	0	3	3
Sand, medium to very coarse; trace of fine sand; trace of pebble to granule gravel......................	3	8	5
Gravel, granule to cobble, and coarse to very coarse sand; trace of fine to medium sand................	8	19	11
Sand, coarse to very coarse; trace of fine to medium sand................	19	23	4
Sand, medium to very coarse, clean; layer of pebbles at 29 ft...........	23	35	12
Sand, very fine to medium, and silt; some pebbles, "till like"...........	35	38	3
Sand, very fine to fine; trace of silt; few pebbles, (layers of interbedded very fine sand and silt)............	38	51	13
Till, sandy, silty, reddish pink......	51	53	2
Refusal on rock......................		at 53	

SI 88TH. 415158N0725111.1. Oliver Tuller. Drilled 1984. Altitude 305 ft. Depth to water 25 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Soil, sandy loam.....................	0	2	2
Sand, very fine to very coarse, and silt; few pebbles.....................	2	5	3
Sand, medium to very coarse, granule to pebble gravel; trace of fine sand................................	5	8	3
Sand, medium to very coarse, clean; little granule to pebble gravel.....	8	15	7
Sand, medium to very coarse, and granule to pebble gravel; trace of fine sand...........................	15	34	19
Till, clayey, silty, gravelly, red, mottled............................	34	36	2
Till, clayey, silty, gravelly, gray, firm................................	36	44	8

SI 89TH. 415201N0725009.1. Conn. Dept. of Environmental Protection. Drilled 1984. Altitude 280 ft. Depth to water 53 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Soil, silty, sandy...................	0	1	1
Sand, fine to coarse; trace of very fine sand and silt.................	1	4	3
Sand, fine-coarse, clean; trace of pebble gravel......................	4	7	3
Sand, medium to very coarse; little granule gravel, clean...............	7	20	13
Sand, very fine to very coarse; little granule gravel; trace of silt.......	20	23	3
Sand, very fine to medium; trace of coarse sand to pebble gravel........	23	48	15
Sand, fine to very coarse, clean......	48	62	14
Sand, fine to coarse, clean; with layers of medium to very coarse sand...............................	62	77	15
Clay, silty, red.....................	77	78	1
Sand, medium to very coarse, clean....	78	92	14
Sand, fine to coarse, firm; little pebble gravel......................	92	107	15
Weathered rock (red sandstone)........	107	108	1
Refusal..............................		at 108	

SI 90TH. 415146N0725121.1. Oliver Tuller. Drilled 1984. Altitude 290 ft. Depth to water 3 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Gravel, granule to cobble; some coarse to very coarse sand..........	0	3	3
Sand, fine to coarse; trace of very fine sand and silt..................	3	16	13
Sand, very fine to very coarse, and granule gravel; trace of silt.......	16	19	3
Till, clayey, silty, gravelly, gray...	19	27	8

SI 91TH. 415118N0724855.1. Ensign-Bickford Co. Drilled 1984. Altitude 203 ft. Depth to water 6 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Soil, sandy loam......................	0	1	1
Sand, very fine to medium, brown......	1	5	4
Sand, fine to coarse..................	5	8	3
Sand, very fine to very coarse, and granule to pebble gravel; little silt.................................	8	11	3
Silt, red, fine to very coarse sand, and cobbles (till?).................	11	19	8
Till, silty, sandy, gravelly, hard, red..................................	19	24	5

SI 92TH. 415049N0724935.1. Ethel Walker School. Drilled 1984. Altitude 260 ft. Depth to water 7 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Soil, loam, black	0	2	2
Sand, very fine to medium; some coarse sand; trace of silt..........	2	9.5	7.5
Gravel, silty, sandy..................	9.5	13.5	4
Clay, red.............................	13.5	16.5	3
Till, silty, sandy, red...............	16.5	17.5	1
Rock, broken, sandstone...............	17.5	18	.5
Refusal on rock.......................		at 18	

SI 93TH. 415436N0724719.1. Town of Simsbury. Drilled 1974. Altitude 195 ft. Depth to water 41 ft. Log by Clarence Welti Assoc. Inc.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Topsoil, sandy........................	0	1	1
Sand, fine to medium; trace of coarse sand................................	1	13	12
Silt and sand, gray-brown; some fine sand, varied........................	13	34	21
Sand, fine to medium, brown...........	34	43	9
Sand, fine to coarse, red-brown; trace of fine to coarse gravel and silt (till?)....................	43	48	5

SI 94TH. 415430N0724720.1. Town of Simsbury. Drilled 1974. Altitude 204 ft. Depth to water 53 ft. Log by Clarence Welti Assoc. Inc.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Topsoil, silty........................	0	0.5	0.5
Silt..................................	0.5	2.5	2
Sand, fine, brown to light brown......	2.5	40.5	38
Silt, sandy, gray.....................	40.5	49	8.5
Silt, tan; little clay................	49	52	3
(Material not specified only says "tan fine-CRS" - assumed sand)......	52	68	16

SI 95TH. 415431N0724729.1. Town of Simsbury. Drilled 1974. Altitude 221 ft. Depth to water 37 ft. Log by Clarence Welti Assoc. Inc.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, fine to coarse; some fine to coarse gravel, red-brown............	0	33	33
Silt; some fine to coarse gravel; trace of fine to coarse sand (till).	33	43.5	10.5
Refusal...............................		at 43.5	

SI 97TH. 415422N0724733.1. Town of Simsbury. Drilled 1974. Altitude 193 ft. Depth to water 10 ft. Log by Clarence Welti Assoc. Inc.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Topsoil, black, organic...............	0	1	1
Sand, fine to coarse, brown; trace of silt; trace of fine gravel..........	1	16	15
Sand, fine, tan; trace of silt........	16	19	3
Sand, fine, red, and silt; trace of fine gravel (till?)................	19	23.6	4.6
Refusal...............................		at 23.6	

SI 98TH. 415424N0724718.1. Town of Simsbury. Drilled 1974. Altitude 192 ft. Depth to water 38 ft. Log by Clarence Welti Assoc. Inc.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Topsoil, silty........................	0	1	1
Sand, very fine, brown and occasional 4- to 6-inch silt layers............	1	25	24
Silt, gray, sandy.....................	25	40	15
Silt, gray, trace of fine sand........	40	58	18
Silt, tan; trace of clay..............	58	73	15
Sand, fine to medium, tan.............	73	93	20
Refusal...............................		at 93	

SI 99TH. 415110N0724901.1. Covenant Life Insurance. Drilled 1983. Altitude 254 ft. Depth to water 43 ft. Log by East Coast Drilling and Boring Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Forest material.......................	0	0.2	0.2
Sand, fine, brown; little organic silt	0.2	2.5	2.3
Sand, fine to medium, brown...........	2.5	10±	7.5±
Sand, fine to coarse; trace of fine gravel...............................	10±	20±	10±
Sand, fine, brown.....................	20±	25±	5±
Sand, fine to coarse, brown; trace of fine gravel (layered with very fine sand); little silt..................	25±	40±	15±
Sand, fine, brown; some medium to coarse sand.........................	40±	41	1
Silt, red-brown; some fine to coarse sand; trace of fine gravel.........	41	46	5
Sand, fine, brown.....................	46	72	26
Sand, fine, brown; some fine to coarse gravel......................	72	77	5

SI 100TH. 415450N0724822.1. Culbro Inc. Drilled 1985. Altitude 265 ft. Depth to water 21 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, very fine to medium; some coarse sand; little silt	0	5	5
Sand, fine to very coarse, and occasional granule or pebble	5	32	27
Sand, very fine to medium	32	36	4
Till, red, clayey, silty	36	45	9
Sandstone, reddish brown	45	47	2

SI 101TH. 415426N0724852.1. Culbro Inc. Drilled 1985. Altitude 291 ft. Depth to water 7 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, very fine to medium	0	1	1
Silt, black to brown	1	4	3
Sand, medium to very coarse, clean; little granules and pebbles	4	21	17
Sand, very fine to fine, clean	21	35	14
Till, silty, sandy, gravelly, soft	35	44	9
Till, sandy, silty, with pebbles, firm	44	46	2
Rock, sandstone, red, coarse-grained	46	47	1
Refusal		at 47	

SI 102TH. 415413N0724942.1. Culbro Inc. Drilled 1985. Altitude 295 ft. Depth to water 10 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Soil, sandy, silty	0	1	1
Gravel, granule to cobble; very fine to very coarse sand; trace silt	1	4	3
Gravel, granule to pebble; and medium to very coarse sand	4	8	4
Gravel, granule; and coarse to very coarse, clean, sand	8	22	14
Sand, fine to very coarse; trace of granules	22	32	10
Sand, very fine to medium, clean; trace of granules	32	45	13
Sand, fine to very coarse, clean	45	47	2
Sand, very fine to coarse, clean	47	59	12
Till, sandy, soft	59	65	6
Till, clayey, silty, very hard, red-maroon	65	66	1

SI 103TH. 415442N0724752.1. Culbro Inc. Drilled 1985. Altitude 268 ft. Depth to water 16 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Soil, sandy, silty	0	2	2
Sand and pebble gravel, silt-coated, layered reddish brown (till or dirty gravel)	2	11	9
Till	11	25	14
Sand, very fine to medium; trace of coarse to very coarse sand	25	26.5	1.5
Sand, medium to very coarse; some silt-clay layers	26.5	30	3.5
Silt; trace of clay	30	31	1
Sand, very fine to medium, and layers of silt	31	33	2
Silt and very fine sand	33	34	1
Till, red-brown	34	35	1
Rock, decomposed	35	37	2
Sandstone, red-brown	37	37.5	.5

SI 104TH. 415404N0724753.1. Culbro Inc. Drilled 1985. Altitude 268 ft. Depth to water 24 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Topsoil	1	4	3
Sand, medium to coarse; gravel at 6 ft	4	6	2
Sand, medium to very coarse, (mostly coarse), and few granules	6	12	6
Gravel, granule to pebble	12	21.5	9.5
Till	21.5	25	3.5
Bedrock, fine sandstone or siltstone, red	25	27	2

SI 105TH. 415414N0724933.1. Culbro Inc. Drilled 1985. Altitude 295 ft. Depth to water 5 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Soil, sandy	0	1	1
Sand, medium to very coarse, and layers of granules to pebbles	1	20	19
Sand, very fine to coarse, clean	20	30	10
Gravel, pebbles, and fine to very coarse sand	30	31	1
Sand, fine to very coarse; and granules	31	50	19
Sand, very fine to fine, clean	50	55	5
Silt; very fine sand; occasional layer of sand and granules	55	60	5
Sand, very fine to very coarse, and dirty granules (till)	60	62	2
Rock, sandstone		at 62	

SI 106TH. 415500N0725102.1. McLean Foundation. Drilled 1985. Altitude 285 ft. Depth to water 11 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand and boulders	0	6	6
Sand, very fine to medium, and granule to pebble gravel	6	22	16
Sand, very fine to very coarse; and silty, granule, gravel	22	26	4
Till and weathered pebbles	26	36	10
Sand, very fine to medium, red	36	40	4
Till, sandy, gravelly, silty	40	45	5
Refusal		at 45	

SI 107TH. 415405N0724925.1. John Helstosky. Drilled 1985. Altitude 295 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Silt, black, soft	0	5	5
Sand and gravel	5	8	3
Sandstone, red, hard	8	13	5
Refusal		at 13	

SI 108TH. 415351N0725003.1. Conn. Dept. of Environmental Protection. Drilled 1985. Altitude 300 ft. Depth to water 20 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, very fine to medium	0	5	5
Sand, fine to very coarse, and granules, reddish	5	12	7
Sand very fine to very coarse; layers of well-sorted very fine, fine, medium, and medium to very coarse sand; occasional layers of pebble gravel	12	50	38
Sand, very fine to medium, and trace of silt	50	56	6
Till, silty, sandy, firm	56	62	6
Rock, weathered	62	64	2
Refusal		at 64	

SI 109TH. 415352N0725007.1. Conn. Dept. of Environmental Protection. Drilled 1985. Altitude 300 ft. Depth to water 26 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Soil, silty, sandy, light	0	2	2
Sand; and pebble gravel; occasional layer with large pebble	2	19	17
Gravel, cobble, and sand	19	22	3
Till	22	30	8
Sandstone, refusal		at 30	

SI 110TH. 415246N0725125.1. Oliver Tuller. Drilled 1985. Altitude 300 ft. Depth to water 5 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Sand, very fine to very coarse, and granule to cobble gravel; trace of silt	0	5	5
Sand, fine to very coarse; some granules	5	28	23
Till, silty, sandy, red	28	35	7
Till, silty, clayey, gravelly, very hard	35	37	2

SI 111TH. 415248N0725116.1. Oliver Tuller. Drilled 1985. Altitude 295 ft. Depth to water 7 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Soil, black loam	0	3	3
Sand, very fine to very coarse, gray	3	10	7
Sand, very fine to medium, gray	10	15	5
Sand, very fine to fine, gray	15	25	10
Silt, laminated	25	38	13
Sand, fine to very coarse, and granule to pebble gravel; trace of silt	38	51	13
Till, silty, gravelly, red	51	57	6

SI 112TH. 415300N0725116.1. Town of Simsbury. Drilled 1985. Altitude 295 ft. Depth to water 3 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Soil, black loam	0	2	2
Sand, very fine to coarse, and silt	2	8	6
Sand, very fine to coarse; little silt	8	15	7
Sand, fine to very coarse, clean	15	35	20
Till, silty, sandy, red	35	43	8
Refusal		at 43	

SI 114TH. 415334N0725119.1. Mrs. Edwin Bartlett. Drilled 1985. Altitude 310 ft. Depth to water 0 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Loam, sandy	0	1	1
Sand, medium to coarse	1	8	7
Sand, very fine to very coarse, and granule to pebble gravel; trace of silt	8	16	8
Boulder, sandstone, cored	16	17	
Refusal		at 17	

SI 118TH. 415015N0724823.1 Village Water Co. Drilled 1984. Altitude 160 ft. Depth to water not reported. Log by R. E. Chapman Co.

Materials	Depth below LSD, in feet From	To	Thickness (feet)
Loam and muck	0	4	4
Sand to fine gravel, brown and red	4	10	6
Silt and clay, red, soft	10	119	109
Silt; some clay, red	119	158	39
Silt and clay, red	158	182	24
Silt, red; trace of clay	182	211	29
Silt, red; trace of fine sand	211	260	49
Refusal		at 260	

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