HYDROGEOLOGIC EVALUATION OF SELECTED STRATIFIED-DRIFT DEPOSITS IN CONNECTICUT

By Stephen J. Grady and Elinor H. Handman

U.S. GEOLOGICAL SURVEY

Water-Resources Investigations Report 83-4010

Prepared in cooperation with the

MIDSTATE REGIONAL PLANNING AGENCY,

CONNECTICUT

Hartford, Connecticut

1983

UNITED STATES DEPARTMENT OF THE INTERIOR

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

Inch-pound units	Multiplied by	Are converted to SI units
	Length	
foot (ft)	3.408×10^{-1}	meter (m)
mile (mi)	1.609	kilometer (km)
	Flow	
gallon per minute (gal/min)	6.309×10^{-2}	liter per second (L/s)

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ABSTRACT

Stratified-drift deposits in five areas of Connecticut were evaluated to provide hydrogeologic information on the water-yielding potential and water-quality characteristics of the deposits. Data from wells and test holes, seismic-refraction profiles, and chemical analyses of ground water provide information on saturated thickness, grain-size characteristics, and water quality.

The thickness of saturated, coarse-grained stratified drift at some locations in all five study areas is sufficient to potentially yield moderate to possibly very large quantities of water (50 to 2,000 gallons per minute) to individual wells. However, saturated thickness and grain size of sediments differ considerably over short distances and some sites are unsuitable for developing moderate to very large quantities of water from wells.

The most extensive coarse-grained stratified-drift deposits occur in the towns of Glastonbury, Haddam, and Simsbury; these areas probably have the best potential for development of large quantities of water. Saturated thickness exceeds 150 feet in parts of the Glastonbury and Haddam areas and exceeds 100 feet in parts of the Simsbury and Willimantic areas, but in most other places it is less than 100 feet.

Stratified-drift deposits in all five areas are hydraulically connected to surface-water bodies. Additional water may be obtained from aquifers through induced infiltration from surface-water bodies. The best potential for induced recharge exists along the Connecticut River in Glastonbury and Haddam and along the Willimantic River in Coventry.

Water in the stratified-drift aquifers is generally of good chemical quality and has low concentrations of dissolved solids (43 to 208 milligrams per liter). The major water-quality problem is excessive iron (0.64 to 20 milligrams per liter) and manganese (0.1 to 10 milligrams per liter), particularly in samples from Coventry, Mansfield, and Tolland. Low concentrations of phenols (0.001 to 0.004 milligrams per liter) were detected in three samples and arsenic (0.018 milligrams per liter) was also detected in one sample.

INTRODUCTION

Connecticut is developing water-supply plans under State Statute 25-5b and water-quality management plans under Section 208 of the Federal Water Pollution Control Act Amendments of 1972 (Public Law 92-500). Water-quality management of major aquifers now used or anticipated for use as public-water supplies has been recommended by the Connecticut Areawide Waste Treatment Management Planning Board (1979).

The major aquifers in Connecticut are primarily stratified-drift deposits that:

(1) are areally extensive or hydraulically connected to a stream or lake that can supply large quantities of induced recharge,

(2) have a saturated thickness greater than 40 feet,

(3) are composed dominantly of sand- and gravel-size sediment.

Such deposits commonly yield moderate to very large quantities of water (50 to 2,000 gal/min) to individual wells. A general discussion of the availability of ground water in stratified-drift deposits in specific parts of the State is contained in the recent series of Connecticut Water Resources Bulletins (for example, Ryder and others, 1981; Mazzaferro and others, 1979).

Some stratified-drift deposits are inferred to be major aquifers mainly on the basis of their large areal extent or proximity to a potential source of induced recharge. However, little hydrologic information is available to substantiate these inferences, particularly about the saturated thickness and grain-size characteristics of the deposits. The lack of information on many stratified-drift deposits located in areas where public water supply is insufficient to meet projected needs has impeded programs for water-resources planning and water-quality management.

Purpose and Scope

The purpose of this investigation was to estimate the water-yielding potential and water-quality characteristics of stratified-drift deposits in five areas of Connecticut. The objectives were to determine for each area (1) the thickness and grain-size characteristics of materials in the saturated zone, (2) the probable range of well yields based on saturated thickness, grain size, and other hydrogeologic characteristics, such as areal extent and proximity to potential sources of induced recharge, and (3) the existing ground-water quality with respect to State and federal drinking-water standards. This study was a reconnaissance-level appraisal rather than a detailed quantitative appraisal, therefore only a minimum amount of new information was collected.

The five areas selected for evaluation were inferred to be major aquifers composed of saturated, coarse-grained stratified drift, as shown on the State's ground-water availability map (Meade, 1978). They were selected on the basis of (1) a projected need for additional public water supplies, (2) little existing hydrogeologic data, and (3) no known ground-water contamination. Information on the water-yielding potential and water quality of these aquifers is intended to provide guidance for development of plans for water supply and water-quality management.

Location

The general locations of the five study areas are shown in figure 1. Three of the areas are named for the towns in which they are largely or completely located: the Glastonbury, Haddam, and Simsbury areas. The remaining two areas include parts of several towns; the Willimantic River area includes Coventry, Mansfield, Tolland, and Willington, and the Bladens River area includes Bethany, Seymour, and Woodbridge. Each of the five areas is described in a separate section of this report.

Acknowledgments

The U.S. Geological Survey, in cooperation with the Midstate Regional Planning Agency, collected and analyzed the data on which this report is based. Appreciation is extended to private citizens and public officials who allowed access to property to conduct seismic surveys and test borings.

Methods

Seismic-refraction profiles in each of the study areas provided information on the saturated thickness of stratified drift, and aided in selecting sites for subsequent test borings. Seismic profiles at 16 sites totaled approximately 17,800 linear feet. The locations of the seismic profile lines are shown in figures 2, 4, 6, 8, and 10, and the profiles, interpreted from field data using techniques described by Scott and others (1972), are shown in figures 3, 5, 7, 9, and 11.

Test borings were made by the U.S. Geological Survey to determine the thickness and grain-size characteristics of the aquifer materials. Test borings at 28 sites in the five areas penetrated a total of 1,517 vertical feet. Additional hydrogeologic data were compiled from existing wells and test holes. The locations of all wells and test holes are shown in figures 2, 4, 6, 8, and 10, and their logs are in table 1. (An explanation of well and test hole identification numbers is included in the headnotes to table 1.)

Ground-water from 10 wells was analyzed in the field for specific conductance, pH, and fecal coliform and fecal streptococci bacteria. Samples were collected and analyzed for selected inorganic and organic constituents by the U.S. Geological Survey laboratory. Results of the analyses are shown in tables 2 and 3.

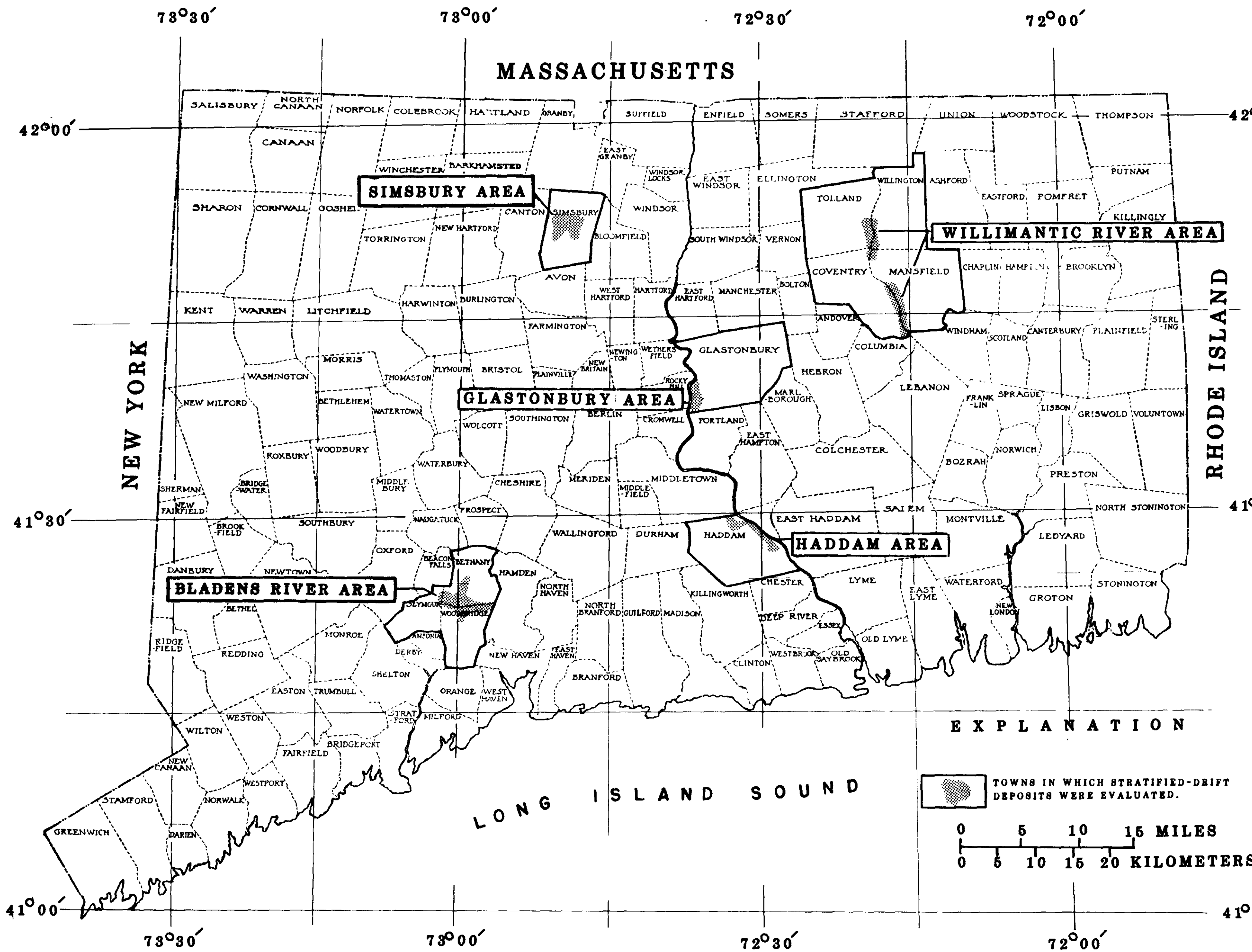

Figure 1.--General locations of study areas.

GLASTONBURY AREA

Stratified drift underlies an extensive area in southwestern Glastonbury. The study area is about 6,000 feet wide and 13,000 feet long, and is bounded on the west by the Connecticut River and on the east by the till and bedrock uplands that parallel, and are almost coincident with Connecticut Route 17. The area extends from near Roaring Brook in the north to the Glastonbury-Portland town line in the south. (See fig. 2.)

Geologic and Hydrologic Data

The Glastonbury area is in the upper Connecticut River basin. The hydrology of the basin has been described by Ryder and others (1981). The surficial geology has been mapped by Deane (1967) and Langer (1977), and the distribution and texture of unconsolidated materials directly below the land surface have been described by Langer (1976) and Langer and others (1976). Contour maps of the bedrock surface have also been prepared by Ryder and Handman (1973, 1974). Drillers' logs for wells GL 106, 208, and 227 (Ryder and Weiss, 1971) indicated that as much as 200 feet of stratified drift was present. However, little subsurface data were available prior to this study on the texture, saturated thickness, and water-yielding characteristics of the aquifer.

Substantially more data were available for the stratified drift on the west side of the Connecticut River in the towns of Cromwell and Rocky Hill. Numerous wells and test holes in that area penetrate dominantly coarse-grained stratified drift, and several wells produce large quantities of water. A public-supply well in Cromwell (CR 307) penetrates 145 feet of sand and gravel and was tested at 900 gallons per minute (Ryder and Weiss, 1971, p. 8). Further north in Rocky Hill, a collector well (RH 78) near the Connecticut River reportedly yielded 4,200 gallons per minute (Ryder and Weiss, 1971, p. 14). Additional hydrogeologic data were needed to determine whether the stratified-drift deposits on the east side of the river are capable of yielding large quantities of water to wells.

For this study, six seismic profiles, A-A', B-B', C-C', D-D', E-E', and F-F', and four test borings, GL 40th, 235, 236, and 237, were completed. Data from test holes GL 41th, 42th, 43th (table 1) bored in 1975 by Clarence Welti and Associates for the town of Glastonbury were also used in evaluating the hydrogeologic conditions. (See locations in fig. 2.)

Hydrogeologic Evaluation

A thick section of saturated stratified drift underlies the northern part of the Glastonbury area. Seismic profiles A-A' and B-B' (see fig. 3) show about 20 to 165 feet of saturated stratified drift, but much of this material may be fine-grained. The log of GL 40th, for example, indicates that stratified drift at the site is dominantly fine to medium sand, silt, and clay. Fine-grained materials are also reported in the driller's log of GL 106, 3,700

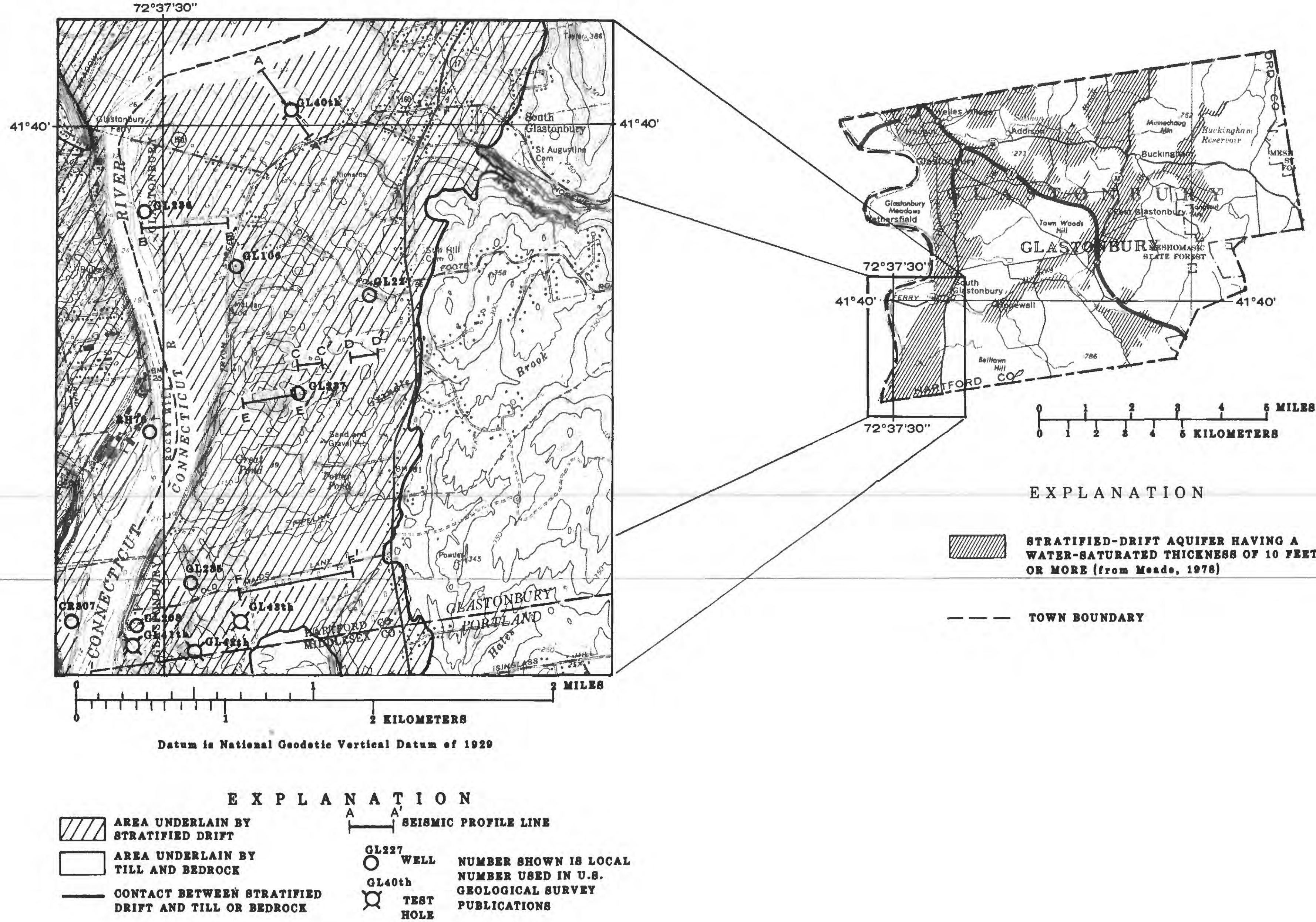

Figure 2.--Location of wells and test holes, seismic profiles, and extent of stratified-drift deposits in the Glastonbury area.

feet to the south. However, GL 236, located between GL 40th and GL 106, but only 150 feet from the Connecticut River, penetrated 65 feet of dominantly coarse-grained stratified drift. The log of GL 236 shows moderately well-sorted, fine to very coarse sand in the upper part of the saturated zone. From 48 to 74 feet below land surface, the well penetrated 17 feet of poorly sorted sand and gravel and 9 feet of till. A well at or near this site may be capable of yielding several hundred gallons per minute by inducing recharge from the adjacent Connecticut River. Wells located farther from the river and in fine-grained material would probably have smaller yields.

In the east-central part of the Glastonbury area, the stratified drift is generally less than 100 feet thick, as shown in seismic profiles C-C′ and D-D′ (fig. 3) and the log of well GL 227. The seismic data are interpreted as indicating that the materials are unsaturated or very thinly saturated. Consequently, wells in this area are unlikely to yield significant quantities of water. However, further to the west, seismic profile E-E′ (fig. 3) shows that the saturated thickness increases to as much as 100 feet. Well GL 237, near the east end of profile line E-E′, penetrated only 15 feet of saturated strattified drift but the material is mostly coarse-grained. If coarse-grained large quantities of water could be developed through induced recharge.

In the southern part of the Glastonbury area, 150 feet or more of saturated stratified drift occurs near GL 208 and GL 41th and extends beneath the Connecticut River to the vicinity of CR 307. The log of CR 307 shows fine-grained material to a depth of 70 feet below land surface, overlying 75 feet or more of coarse sand and gravel. Test hole GL 41th penetrated 188 feet of mostly fine to coarse sand interlayered with silt and clay. Well GL 235, 2,000 feet northeast of GL 41th, penetrated 57 feet of similar materials (layered fine to coarse sand, silt and clay) before ending in sand and gravel at 82 feet below land surface. Saturated thickness of the stratified drift near GL 235 is at least 40 feet, however it decreases to the east. Although the stratified drift along profile F-F′ is as much as 100 feet thick in places, the seismic data are interpreted as indicating that it is thinly saturated or unsaturated. Test holes GL 42th and 43th reportedly did not reach the water table although drilled to about 100 feet below land surface. Therefore, in the southern part of the Glastonbury area, moderate to large well yields could most likely be obtained only in the area within approximately 1,500 feet of the Connecticut River. Wells located farther from the river would probably yield only small to moderate quantities of water, due to limited aquifer saturated thickness.

Water Quality

One well in the Glastonbury area, GL 236, was sampled and the chemical analysis is reported in tables 2 and 3. The sample contained a low concentration of dissolved solids (208 mg/L) and only manganese (0.3 mg/L) exceeded Federal drinking-water standards (U.S. Environmental Protection Agency, 1977). However, because only one well was sampled, data are insufficient to adequately assess the quality of water in this aquifer.

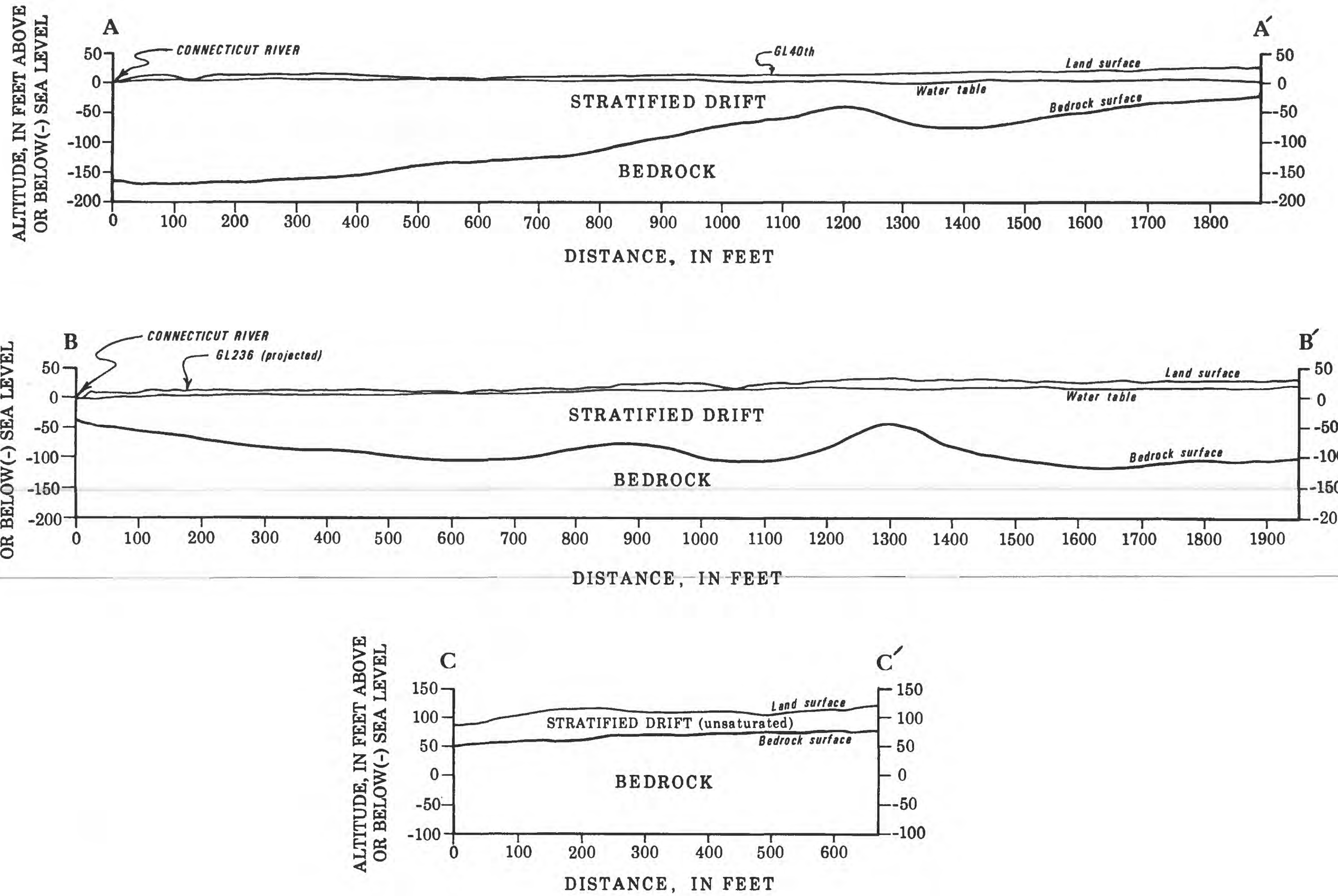

Figure 3.--Seismic-refraction profiles in the Glastonbury area.
(Locations of profile lines are shown in figure 2: interpretation of materials based on velocity data and logs of wells and test holes.)

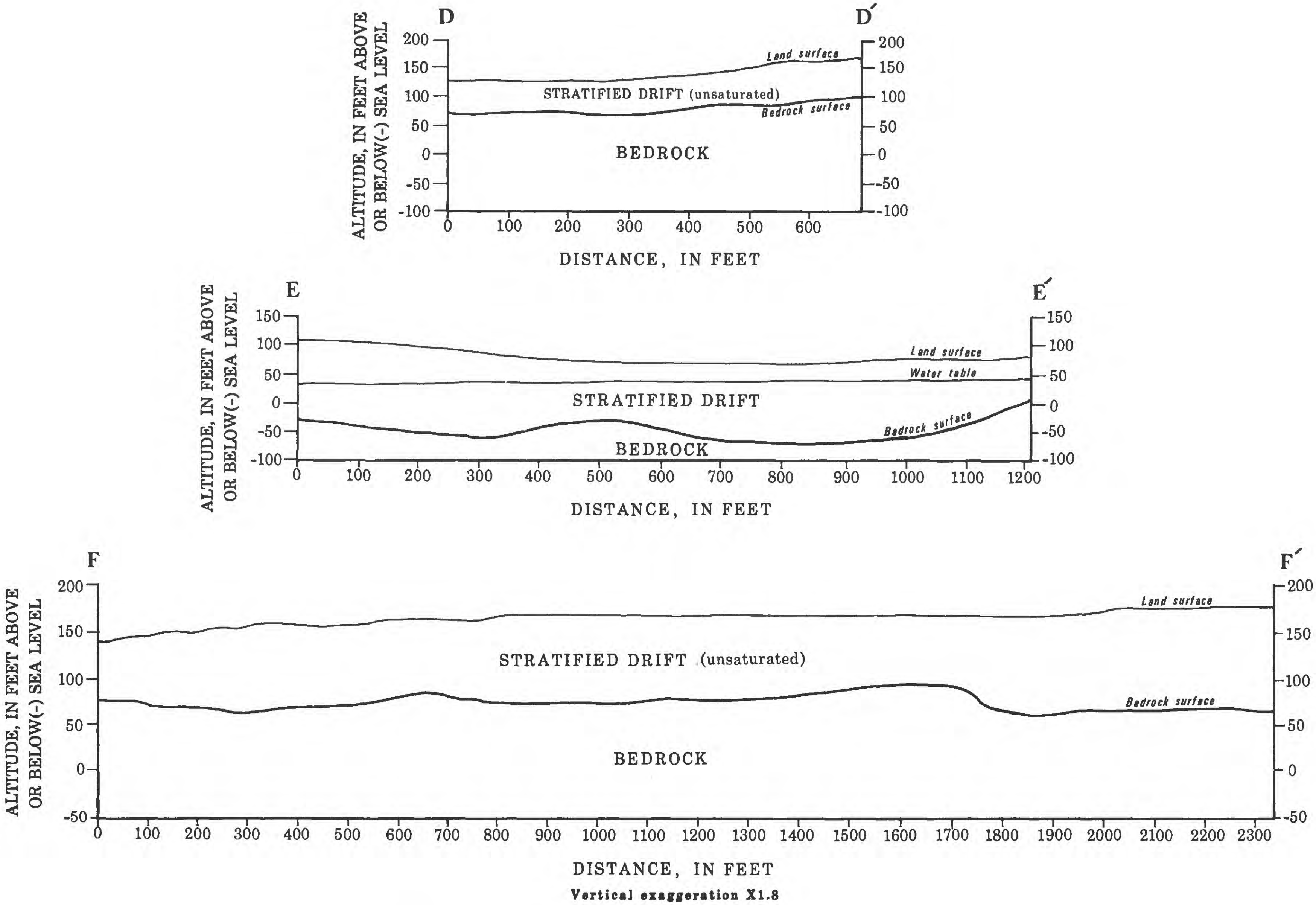

Figure 3.--Continued--Seismic-refraction profiles in the Glastonbury area. (Locations of profile lines are shown in figure 2: interpretation of materials based on velocity data and logs of wells and test holes.)

HADDAM AREA

A narrow band of stratified drift underlies most of the west side of the Connecticut River in the Town of Haddam. The area included in this investigation extends from 1 mile north of the village of Higganum southward along the river for approximately 7 miles to Camp Bethel (see fig. 4). The stratified drift in the Haddam area is bounded on the east by the Connecticut River and on the west by till-and-bedrock uplands. The width of area underlain by stratified drift varies from a few hundred feet to as much as 4,500 feet.

Geologic and Hydrologic Data

The Haddam area is in the lower Connecticut River basin and the hydrology of this basin is described by Weiss and others, 1982. The surficial geology has been mapped by Tharin (1973), O'Leary (1977) and Flint (1978a). The distribution and texture of unconsolidated materials directly below the land surface in part of the area has been described by O'Leary (1973). Few subsurface data were available prior to this study. Drillers' logs for a few domestic-supply wells, HD 421, 428, 435, and 461, all in the southern half of the Haddam area, showed as much as 125 feet of stratified drift, however, these logs provided no information on grain-size characteristics or saturated thickness. One U.S. Geological Survey test hole, HD 23th, penetrated 100 feet of saturated sand and gravel above till (Bingham and others, 1975, p. 38). Additional subsurface data collected for this study include one seismic-refraction profile, G-G', and five test borings, HD 30th, 31th, 32th, 470, and 471. (See locations in fig. 4.)

Hydrogeologic Evaluation

In the northern part of the Haddam area, near the village of Higganum, two test borings penetrated about 40 feet of saturated stratified drift before refusal in till. At well HD 471 the sediments are mostly medium to coarse sand and gravel, but HD 32th, 700 feet to the southeast, penetrated dominantly fine-grained sediments (fine to very fine sand, silt, and clay). A well at or near HD 471 may be capable of yielding moderate to large amounts of water because the stratified drift is relatively thick, saturated, and coarse-grained, and the potential for inducing recharge from the Connecticut River is high. However, where the sediments are dominantly fine grained, as at HD 32th, potential well yields may be considerably smaller.

In the central part of the study area, near the village of Haddam, seismic profile G-G' (fig. 5) shows from 50 to 150 feet of saturated stratified drift. Logs of HD 23th and 470 (table 1) show that the material is dominantly coarse grained. Properly constructed wells in the area near the Connecticut River have the potential of yielding moderate to large quantities of water.

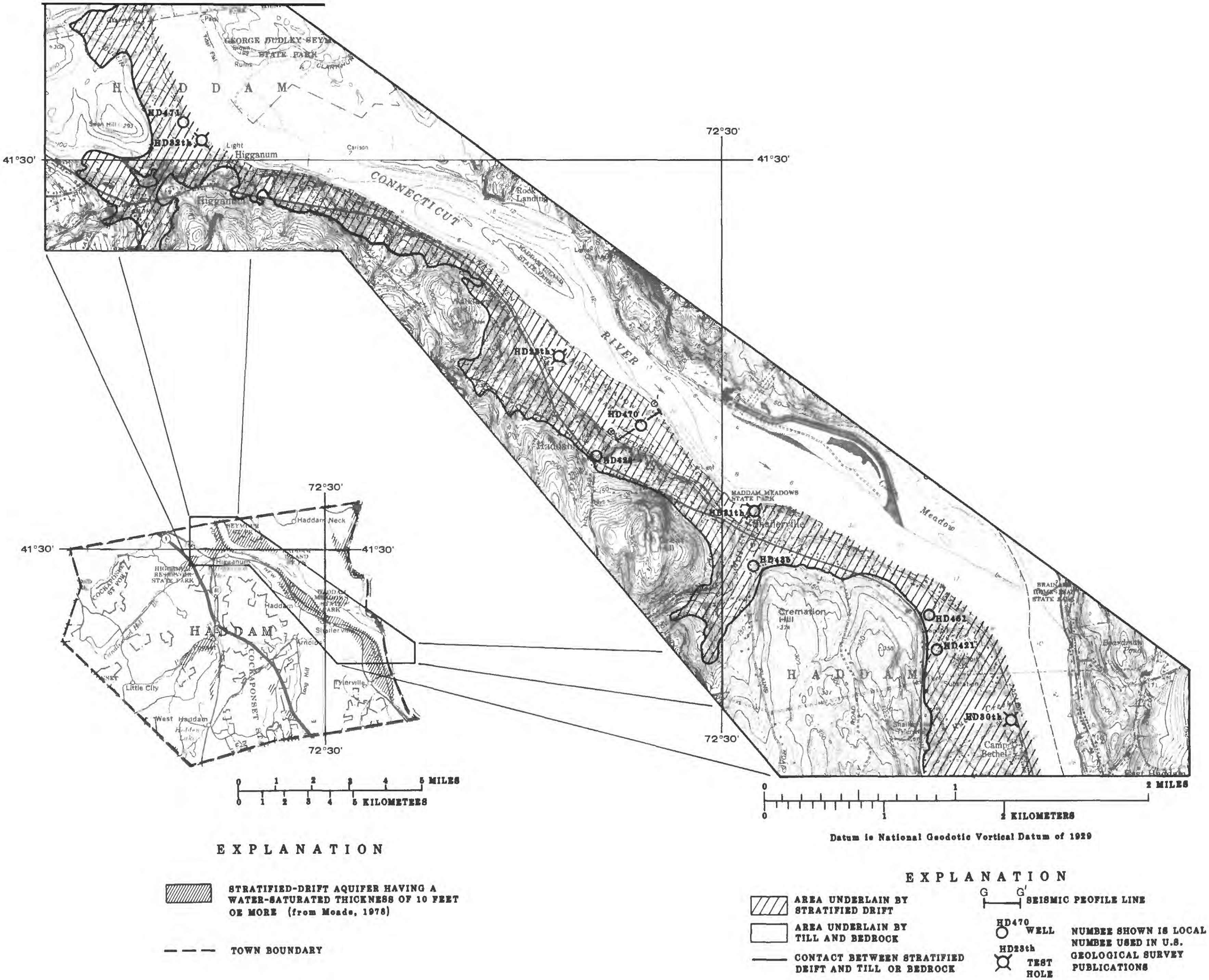

Figure 4.--Location of wells and test holes, seismic profiles, and extent of stratified-drift deposits in the Haddam area.

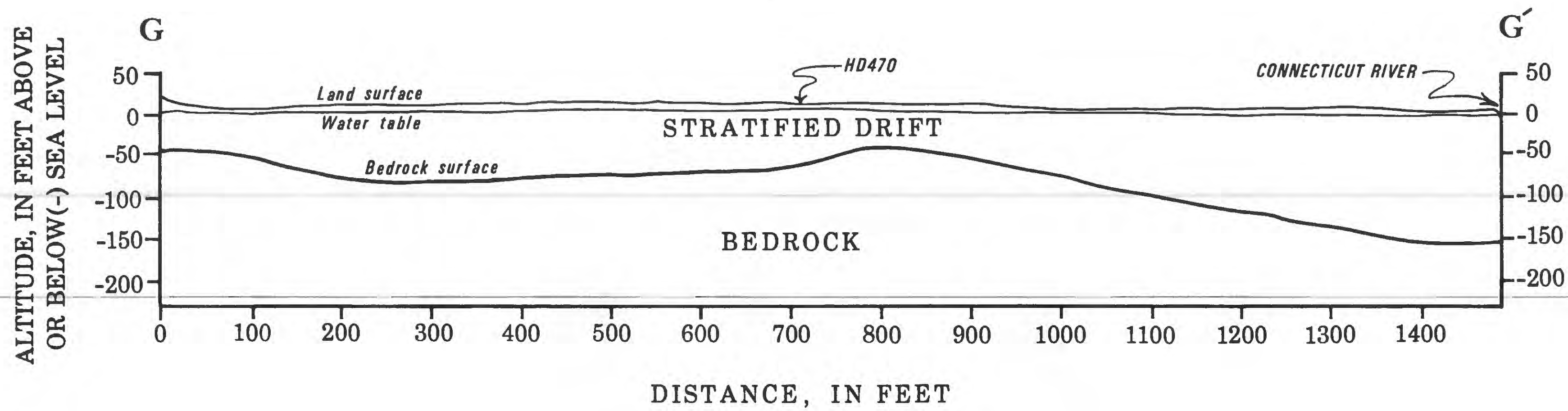

Figure 5.--Seismic-refraction profile in the Haddam area.
(Location of profile line shown in figure 4: interpretation of materials based on velocity data and logs of wells and test holes.

Farther south in the vicinity of Mill Creek, HD 31th penetrated 6 feet of saturated, medium to fine sand and ended on boulders at 17 feet below land surface. Well HD 435, approximately 1600 feet to the south, reportedly penetrated only 26 feet of stratified drift. The total saturated thickness and lithology of the stratified drift in this locale is not known. Additional test holes that penetrate the entire section of stratified drift are necessary for estimating the potential yield of wells.

In the southern part of the Haddam area near Camp Bethel, logs for HD 30th, 421, and 461 show that the stratified drift is generally more than 90 feet thick. The saturated thickness of these deposits, however, is much less because most of the material underlies a terrace where the water table is relatively deep. Test hole HD 30th, for example, penetrated 68 feet of unsaturated sand and gravel and only 25 feet of saturated stratified drift. This hole ended in sand above the base of the aquifer, indicating that some additional saturated materials may be present. The logs show that the material is mostly coarse-grained, and if saturated thickness is sufficient, particularly in the area adjacent to the Connecticut River, moderate to large quantities of water could be developed. Additional borings in this area are necessary to determine total saturated thickness and grain-size characteristics.

Water Quality

The analysis of a sample of water from well HD 470 is reported in tables 2 and 3. The only parameter analyzed that did not meet State or federal drinking-water standards was pH, which at 6.0 was slightly below the recommended range (Connecticut General Assembly, 1975; U.S. Environmental Protection Agency, 1977). Although the water is of good chemical quality and contains a low concentration of dissolved solids (83 mg/L), a complete assessment of ground-water quality in the study area would require additional samples from more wells.

Handman and Bingham (1980, p. 37) report ground-water contamination in the stratified-drift aquifer just south of the study area. Water from wells HD 467 and 468 (not shown in figure 4), approximately 2,000 feet south of Camp Bethel, contained excessive concentrations of sodium (450 mg/L), chloride (730 mg/L), cadmium (0.047 mg/L), and chromium (0.36 mg/L). Additional information on the configuration of the water table and the hydrologic properties of the aquifer is necessary to evaluate what effects this contamination could have on ground-water quality in the southern part of the Haddam area.

SIMSBURY AREA

A large part of the town of Simsbury is underlain by stratified drift inferred to be coarse-grained, saturated, and capable of yielding moderate to large quantities of water to wells (Meade, 1978). This study is limited to stratified-drift deposits in south-central Simsbury. The study area is bounded by West Mountain Road on the west, Connecticut Route 10 on the east, Farms Village Road on the north, and Wildwood Road and Stratton Brook Road, east of Connecticut Route 167, on the south (see fig. 6).

Geologic and Hydrologic Data

The Simsbury area is in the Farmington River basin. The surficial geology has been mapped by Schnabel (1962) and Randall (1970). The distribution and texture of unconsolidated materials directly below the land surface have been described by Radway and Schnabel (1976). Contour maps of the bedrock surface have also been prepared by Handman and Ryder (1973).

Numerous wells and test holes had been constructed prior to this study in the area north and west of Stratton Brook. Drillers' logs for wells SI 81, 230, 233, 285, and 299, and test holes SI 9th and 24th (table 1) indicate that the stratified drift in that area is dominantly coarse grained and the saturated thickness is greater than 70 feet. However, little subsurface data were available for the deposits south and east of the Stratton Brook, particularly in the vicinity of Hazel Meadow Pond and Second Brook. Two seismic-refraction profiles, H-H′ and I-I′, and six additional test borings, SI 45th, 46th, 47th, 313, 314, and 315, were completed for this study; their locations are shown in figure 6.

Hydrogeologic Evaluation

The contour map of the bedrock surface by Handman and Ryder (1973) and data from wells and test holes indicate that a buried bedrock valley underlies Stratton Brook. The altitude of the bedrock surface is lower than 180 feet and may be as low as 150 feet in places. This bedrock valley is filled with 100 to 150 feet or more of dominantly coarse-grained stratified drift. It extends for at least 2 miles from Wildwood Road to the vicinity of wells SI 230 and 285, northeast of Stratton Brook Road, and is about one-half mile wide. The stratified-drift deposits filling the bedrock valley are capable of yielding moderate to large quantities of water, as demonstrated by yields of 100 to 710 gal/min reported for wells SI 81, 230, 233, and 285 (Hopkins and Handman, 1975, p. 18-20).

The possibility that the bedrock valley described above may extend beneath the Hazel Meadow Pond-Second Brook area, as indicated by Handman and Ryder (1973), was investigated by seismic-refraction profiles along lines H-H′ and I-I′ and test borings SI 45th, 46th, 47th, and 314. Seismic profile I-I′ (fig. 7) shows a narrow depression in the bedrock surface south of Second

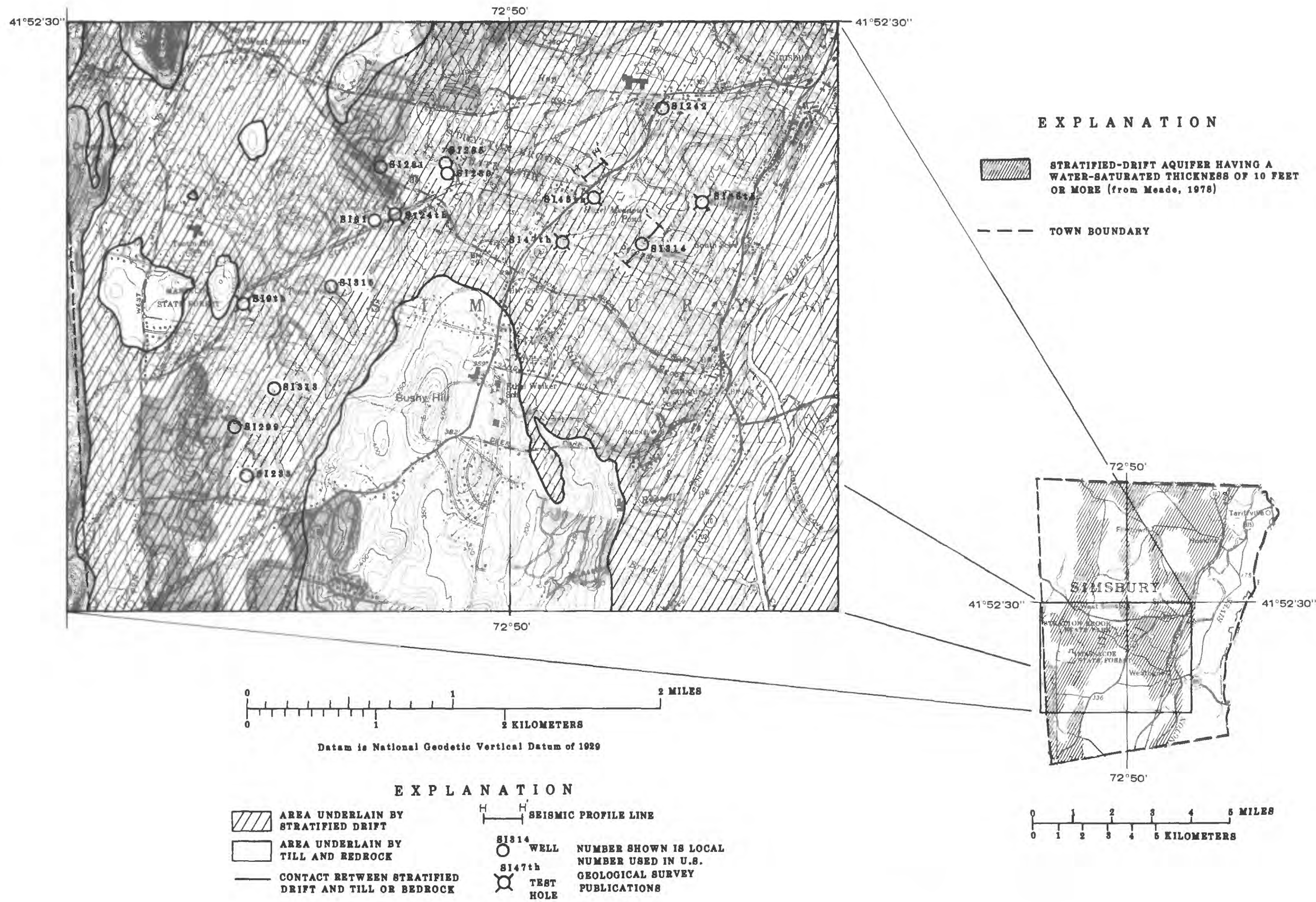

Figure 6.--Location of wells and test holes, seismic profiles, and the extent of stratified-drift deposits in the Simsbury area.

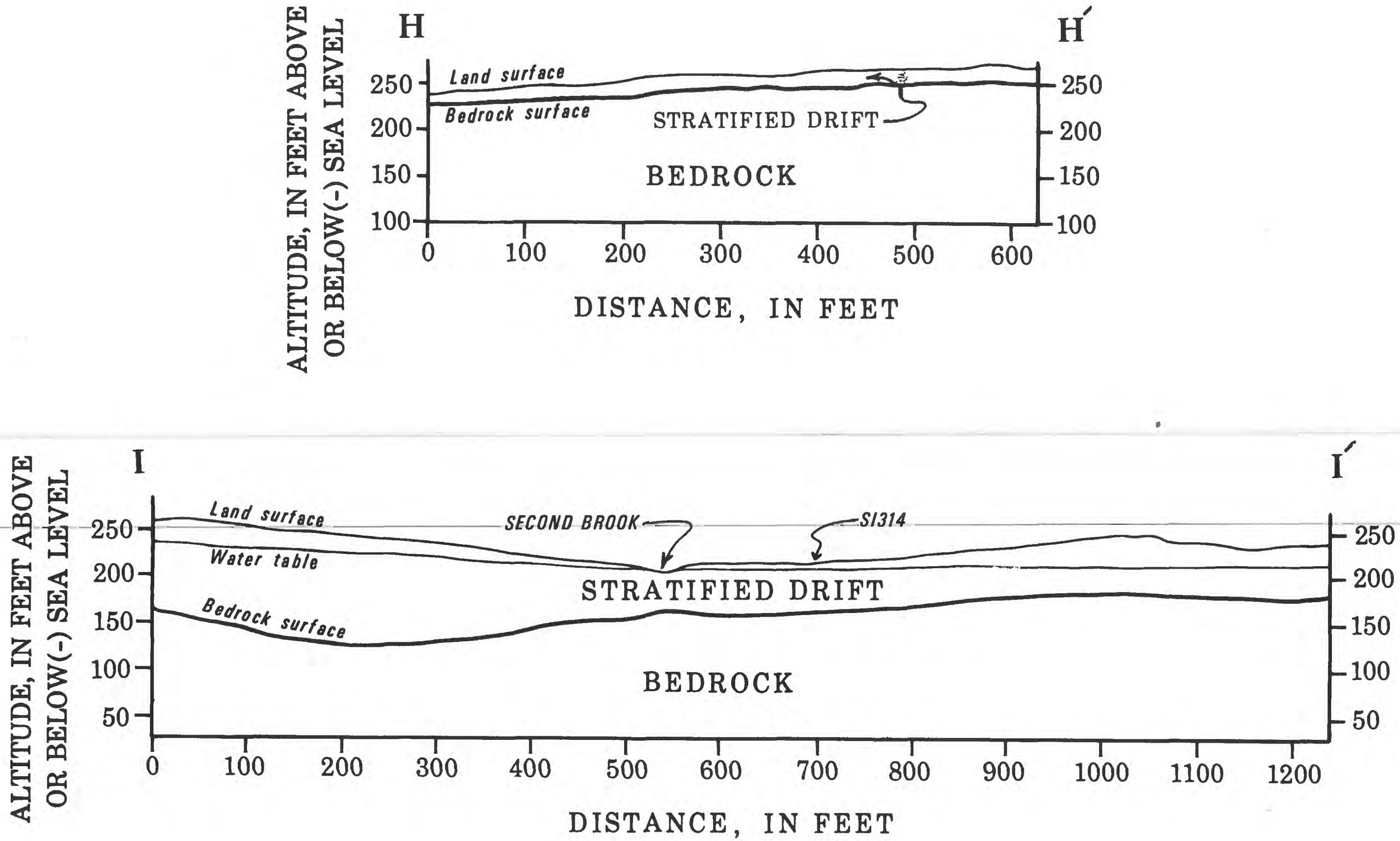

Figure 7.--Seismic-refraction profiles in the Simsbury area. (Location of profile lines shown in figure 6: interpretation of materials based on velocity data and logs of wells and test holes.)

Brook extending to an altitude of about 125 feet. The stratified drift filling the depression is greater than 100 feet thick and mostly saturated. The thickness of the stratified drift, however, decreases north of Second Brook. Bedrock occurs at 60 feet or less below land surface at SI 45 and 314. Test holes SI 46th and 47th penetrated less than 30 feet of stratified drift, and seismic profile H-H′ (fig. 7) shows only a thin layer of stratified drift. Additional data are needed to determine whether the narrow depression in the bedrock surface south of Second Brook is continuous with the buried valley beneath Stratton Brook or whether they are separated by a bedrock ridge, and if it continues to the southeast toward the Farmington River.

The stratified drift penetrated at SI 45th, 46th, and 47th is mostly fine-grained or a poorly-sorted mixture of coarse and fine material. Well SI 314 penetrated 25 feet of well sorted, coarse sand overlying 21 feet of fine sand, silt, and till. Because the stratified drift is thinly saturated and mostly fine-grained, it is unlikely that wells in the Hazel Meadow Pond-Second Brook area would yield more than small to moderate quantities of water. However, moderate to large quantities may be possible south of Second Brook if the bedrock depression is continuous over a large areal extent and filled with coarse-grained stratified drift.

Water Quality

Water from three wells in the Simsbury area, SI 313, 314, and 315, was sampled. Chemical analyses of the samples (tables 2 and 3) indicate that water in the stratified-drift aquifer is of good chemical quality and is suitable for public supply, irrigation, and industrial uses. All three samples contained low concentrations of dissolved solids (43-88 mg/L). The only chemical constituent analyzed that exceeded Federal drinking-water standards (U.S. Environmental Protection Agency, 1977) was manganese (0.1 mg/L in SI 314). A pH of 6.1 for water from SI 314 is also slightly below the recommended range (Connecticut General Assembly, 1975; U.S. Environmental Protection Agency, 1977).

Also, low concentrations of phenols (4 ug/L in SI 313; 1 ug/L in SI 315) were detected. The presence of phenols in water may cause an aesthetic problem because conventional water treatment can produce chlorinated phenol compounds which have a persistent odor-producing effect.

WILLIMANTIC RIVER AREA

Stratified drift underlies much of the Willimantic River valley in northeastern Connecticut. Two separate areas of the valley underlain by stratified drift were evaluated in this study (fig. 8). The northern area extends from 2.75 miles north of, to 1 mile south of, the Tolland-Coventry and Willington-Mansfield town lines. The southern area extends for 3 miles south of the village of Eagleville. Stratified-drift deposits in the northern area are greater than 1 mile wide in places, whereas in the southern area, the deposits are generally less than a half mile wide.

Geologic and Hydrologic Data

The Willimantic River area is in the Shetucket River basin, and the hydrology of this basin is described by M. P. Thomas and others (1967). The surficial geology in parts of the study area has been mapped by Frankel (1968) and Pease (1975). Little subsurface information was available prior to this study. A U.S. Geological Survey test hole, CV 9th, in the southern area, penetrated 109 feet of mostly very fine to fine sand (C. E. Thomas, Jr., and others, 1967, p. 21). M. P. Thomas and others (1967) indicate that saturated, coarse-grained stratified drift is as much as 80 feet thick in places, and that large sustained yields are possible from these deposits.

Additional subsurface data collected for this study include three seismic profiles, J-J′, K-K′, and L-L′, and four test borings, MS 38, TO 1th, TO 7, and WG 1, in the northern area, and two seismic profiles, M-M′ and N-N′, and four test borings, CV 19th, 35, 36, and 37, in the southern area. Locations of seismic profiles and test borings are shown in figure 8.

Hydrogeologic Evaluation

In the northern area TO 1th, MS 38, TO 7, and WG 1 penetrated mostly coarse-grained stratified drift consisting of generally poorly-sorted, fine to coarse sand and gravel. However, all four borings end on boulders or bedrock at depths between 24 to 38 feet below land surface. The thickness of the stratified drift in seismic profiles J-J′, K-K′, and L-L′ (fig. 9) is 50 feet or less, and the saturated thickness is generally less than 40 feet. Consequently, wells in the northern area would probably yield only small to moderate quantities of water.

In the southern area, both fine- and coarse-grained stratified drift is present. Wells CV 35 and 36 penetrated mostly medium to coarse sand and gravel, whereas logs of CV 9th, 19th and 37 show dominantly fine to medium sand. Test hole CV 9th reached refusal at 109 feet below land surface, and wells CV 36 and 37 each ended in stratified drift at 97 feet below land surface. The saturated thickness of the aquifer at these wells is at least 80 feet. Saturated stratified drift is as much as 120 feet thick in places along seismic profiles N-N′ and M-M′ (fig. 9). Both profiles show that the stratified drift thins abruptly near the Willimantic River, and that the maximum saturated thickness probably

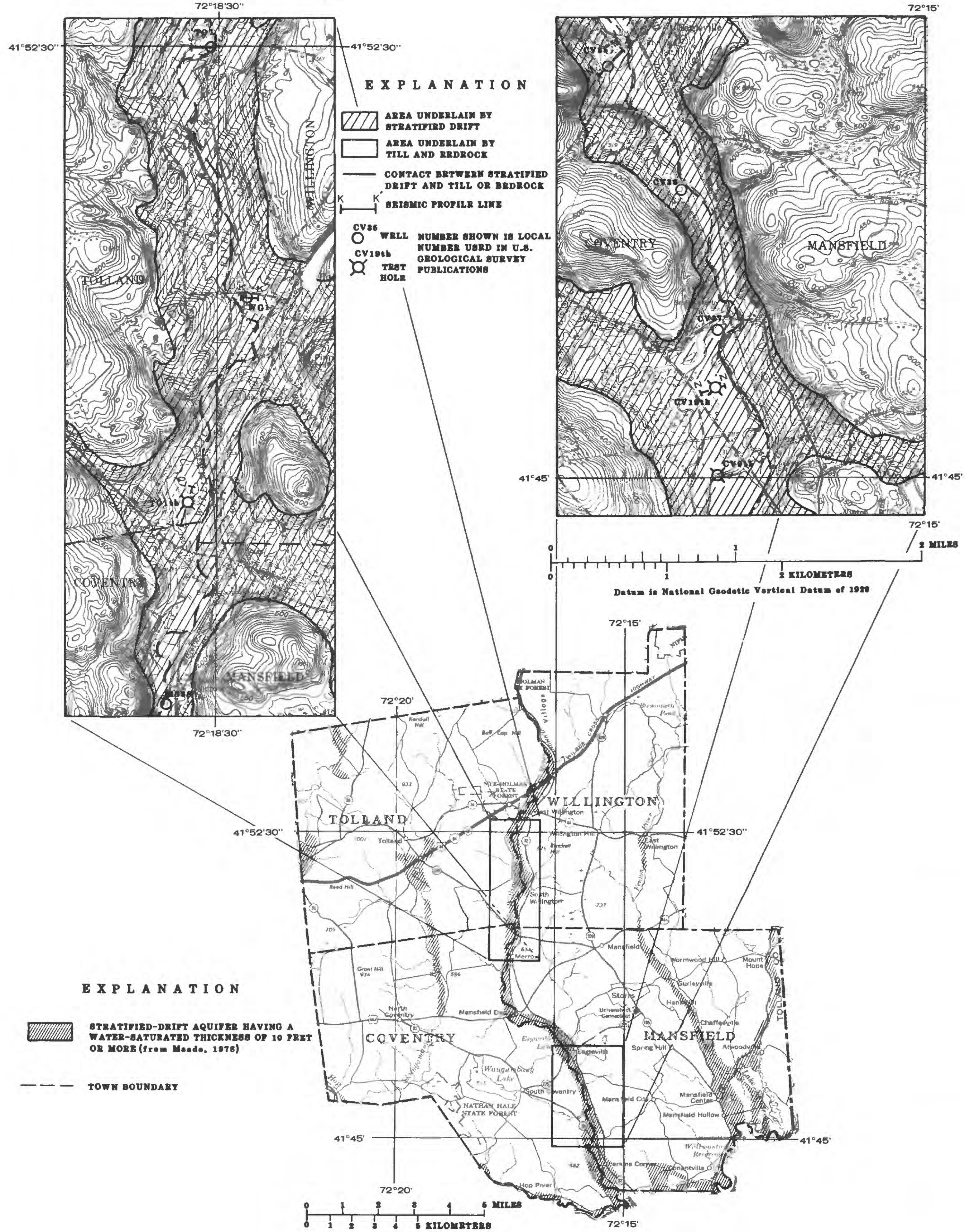

Figure 8.--Location of wells and test holes, seismic profiles, and extent of stratified-drift deposits in the Willimantic River area.

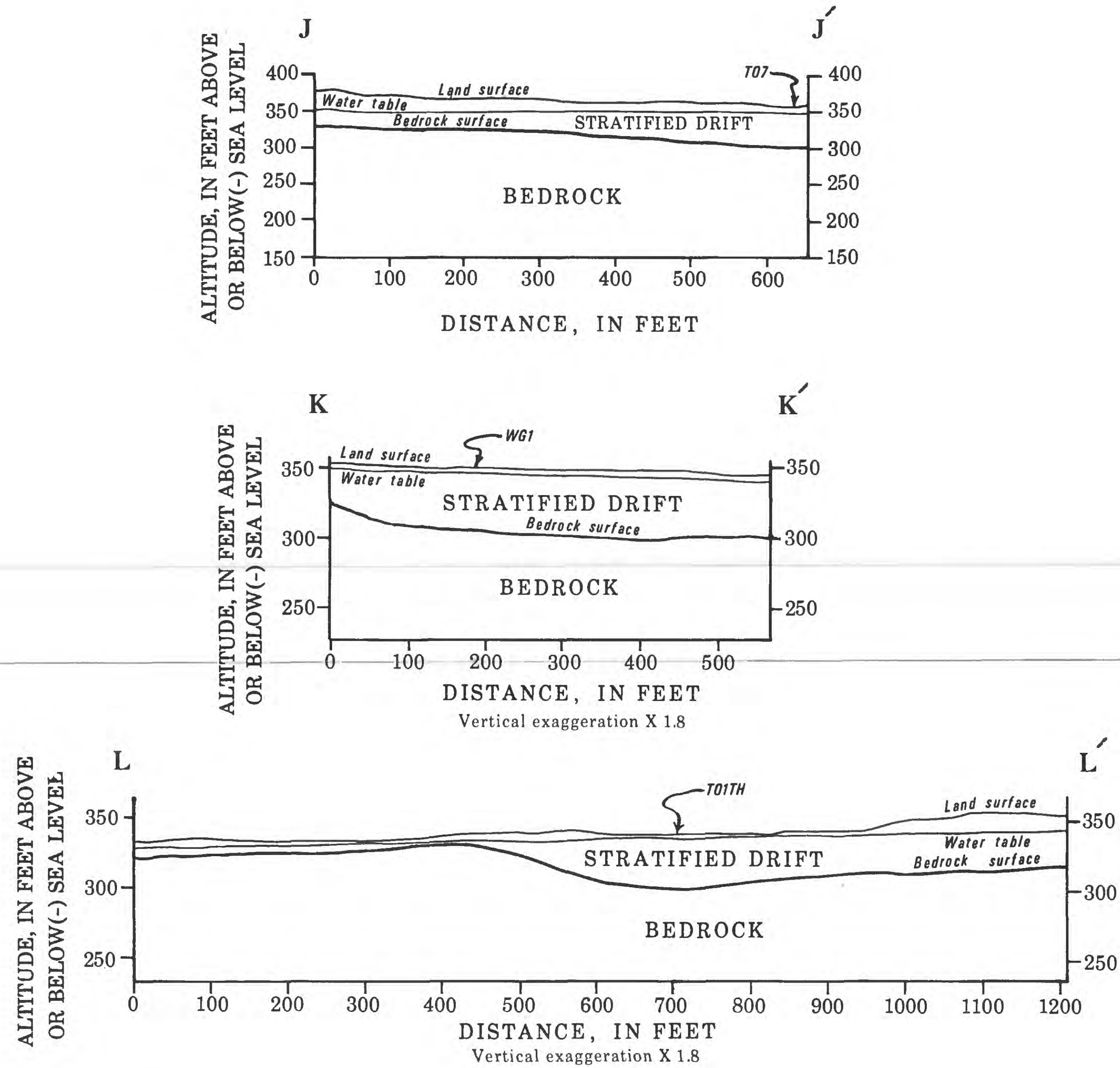

Figure 9.--Seismic-refraction profiles in the Willimantic River area. (Location of profile lines shown in figure 8: interpretation of materials based on velocity data and logs of wells and test holes.)

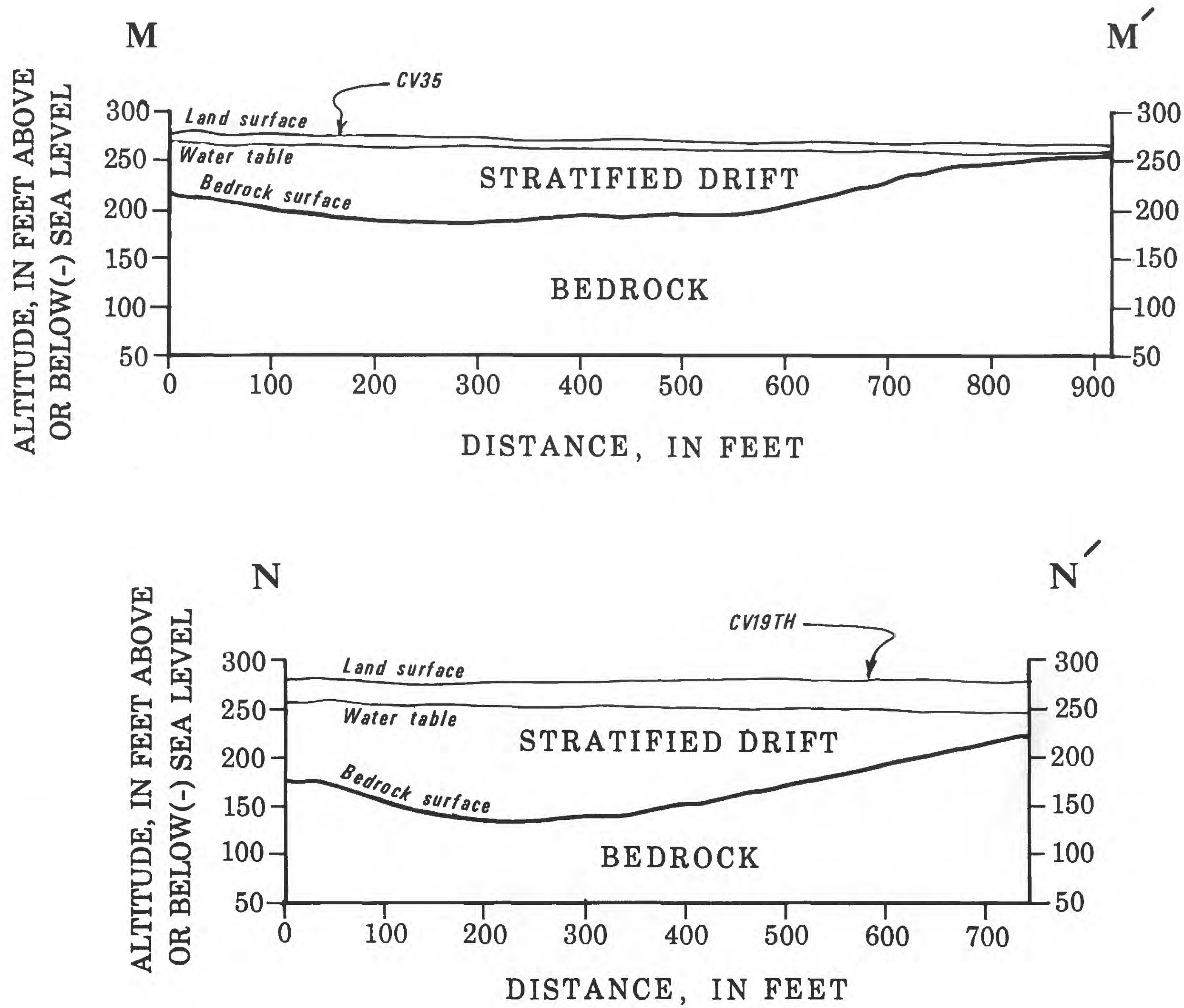

Figure 9.--Continued--Seismic-refraction profiles in the Willimantic River area.
(Location of profile lines shown in figure 8: interpretation of materials based on velocity data and logs of wells and test holes.)

occurs 500 to 600 feet west of the river. The best sites for developing wells capable of yielding moderate to large quantities of water are in the vicinity of CV 35 and 36 where the stratified drift is primarily coarse-grained, the saturated thickness is greater than 80 feet, and the potential for inducing infiltration from the Willimantic River is high.

Water Quality

Chemical analyses of samples from two wells in the northern area, MS 38 and TO 7, and one well in the southern area, CV 37, (tables 2 and 3) indicate that water in the stratified-drift aquifer contains low concentrations of dissolved solids (79-116 mg/L). However high concentrations of iron (20 mg/L in CV 37; 3 mg/L in MS 38) and manganese (10 mg/L in MS 38; 3 mg/L in TO 7; 0.3 mg/L in CV 37) were measured. M. P. Thomas and others (1967, p. 72) indicate that ground water in this part of the Shetucket River basin commonly contains moderate to excessive concentrations of iron and manganese. Probable sources or iron- and manganese-bearing ground water in this area are solution of minerals in the bedrock and stratified drift which contains oxides, sulfides, and carbonates of iron. Iron and manganese in water are objectionable for food and textile processing at concentrations exceeding about 0.3 mg/L and 0.05 mg/L, respectively. Most iron-bearing waters, when treated by aeration and filtration, are satisfactory for domestic use.

The pH of water from TO 7 (5.9) is below the range recommended for drinking water (Connecticut General Assembly, 1975; U.S. Environmental Protection Agency, 1977). Also, low but detectable concentrations of arsenic (0.018 mg/L in CV 37) and phenols (2 ug/L in TO 7) were observed. Additional sampling would be necessary to determine the extent and source of arsenic and phenols in the aquifer.

BLADENS RIVER AREA

Stratified drift underlies parts of the towns of Seymour, Bethany, and Woodbridge. This study is limited to two discontinuous deposits of stratified drift in the Bladens River valley (fig. 10). The larger of the two deposits extends for approximately 8,500 feet along the Bladens River and is connected to stratified-drift deposits underlying its tributaries, Hopp Brook and Black Brook. A second, smaller deposit of stratified drift in upper Bladens River valley underlies an area approximately 2,500 feet long and 1,500 feet wide.

Geologic and Hydrologic Data

The Bladens River area is in the lower Housatonic River basin and the hydrology of this basin is described by Wilson and others (1974). The surficial geology was mapped by Flint (1978b). Some subsurface data were available prior to this study from logs of test borings BE 4th, 5th, and 6th and WO 283, 284, 285, 286, 287, and 288 (table 1). To supplement this information, two seismic-refraction profiles, O-O′ and P-P′, and five test borings, BE 3th, SE 8, WO 5th, 6th, and 282, were made. Locations of seismic profiles and test borings are shown in figure 10.

Hydrogeologic Evaluation

In the western part of the Bladens River area, near the contact between stratified drift and till or bedrock, well SE 8 penetrated only 25 feet of saturated stratified drift. The material at this site is dominantly fine to medium sand with some interlayered silt and clay. Wells near SE 8 would probably yield only small to medium quantities of water.

In the area just east of where Hopp Brook enters the Bladens River, seismic profile O-O′ (fig. 11) shows 50 to approximately 100 feet of stratified drift. However, test holes BE 4th, 5th, and 6th, located within a few hundred feet of profile O-O′, reportedly end on bedrock at 35 to 67 feet below land surface. Although the logs of these borings (table 1) show dominantly poorly sorted, coarse-grained material, BE 6th penetrated 27 feet of silt and clay and the bottom 20 feet of material in both BE 5th and 6th may be till. However, these sediments are largely saturated, adjacent to a potential source of induced recharge, and may be sufficiently permeable to yield moderate to possibly large quantities of water to wells. Additional information on the distribution of fine- and coarse-grained material in this part of the Bladens River area is needed to better estimate potential well yields.

In the area north of the Bladens River at Black Brook, 60 to 80 feet of saturated stratified drift is indicated in the log of BE 3th (table 1) and seismic profile P-P′ (fig. 11). However, most of the material is fine to very fine sand, silt, and clay. It is unlikely that more than small quantities of water could be obtained at this locality.

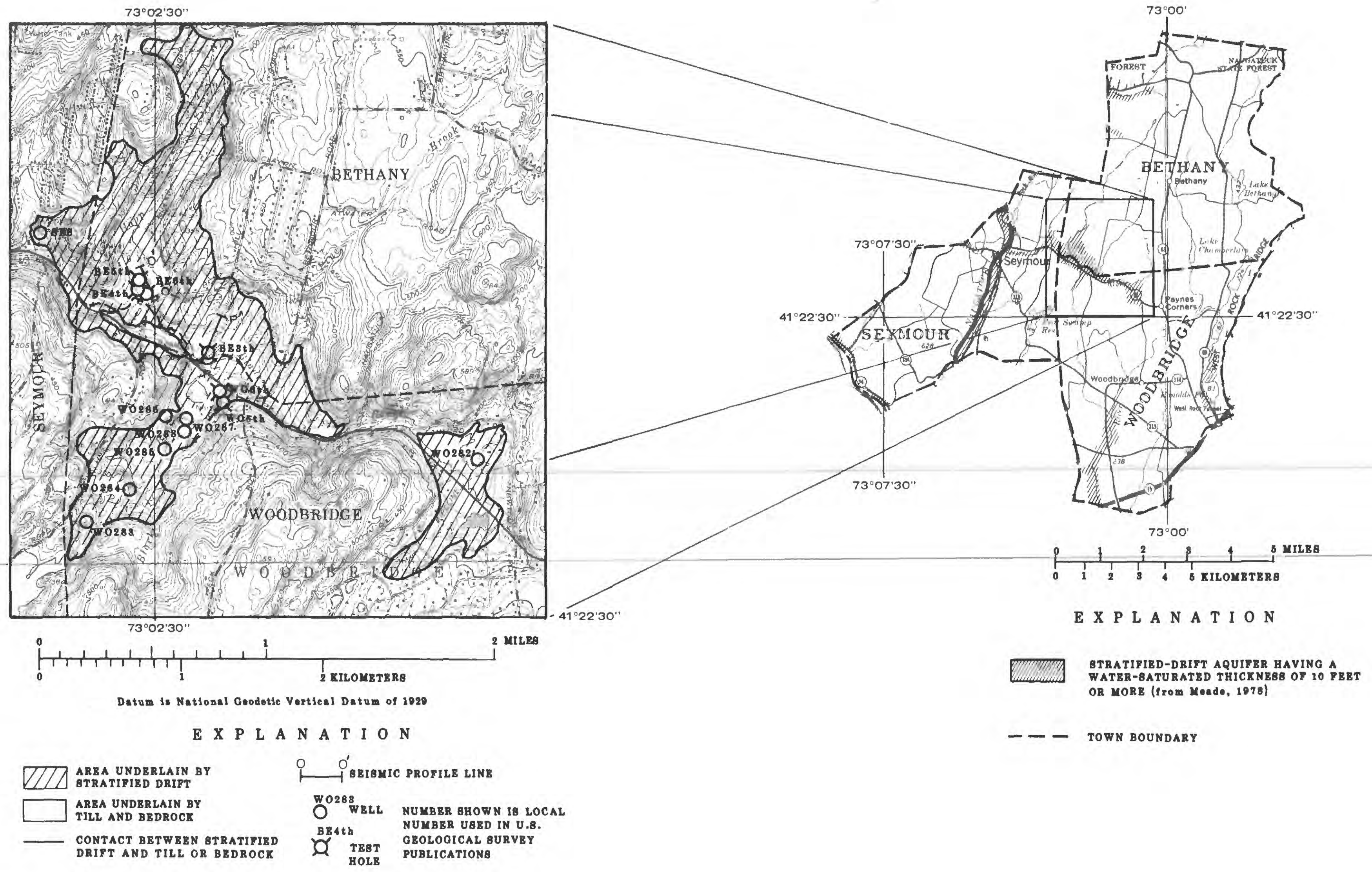

Figure 10.--Location of wells and test holes, seismic profiles, and extent of stratified-drift deposits in the Bladens River area.

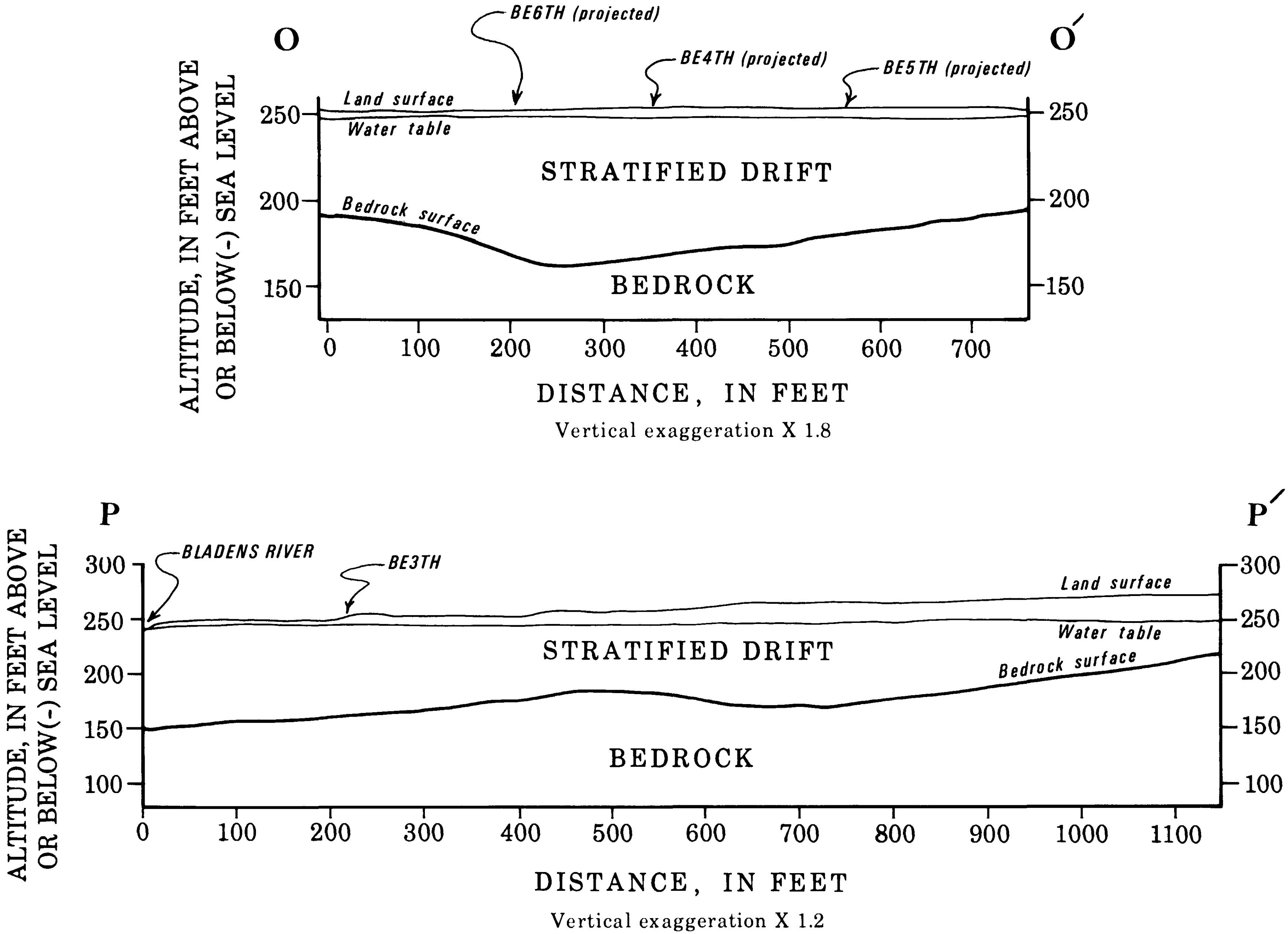

Figure 11.--Seismic-refraction profiles in the Bladens River area.
(Location of profile lines shown in figure 10: interpretation of materials based on velocity data and logs and test holes.)

In the Black Brook valley, test borings WO 285, 286, 287 and 288 reached refusal in till at depths of less than 38 feet below land surface. The stratified drift penetrated by these borings was thinly saturated or unsaturated and consists of layers of fine- and coarse-grained material. Wells WO 283 and 284 penetrated a somewhat thicker section of stratified drift, with as much as 58 feet of saturated thickness at WO 283. Logs of WO 283 and 284 show mostly coarse-grained stratified drift, however in WO 284, it is generally poorly sorted and includes layers of silt and clay. Therefore, it is unlikely that wells in the Black Brook valley area would yield more than small to moderate quantities of water.

Well WO 282 is the only source of subsurface data for the small deposit of stratified drift in the upper Bladens River valley. The well penetrated mostly fine to coarse sand before refusal on bedrock at 58 feet below land surface. The saturated thickness at WO 282 is 51 feet. The available data are insufficient to allow estimation of the probable range of well yields from this aquifer.

Water Quality

Water from two wells in the Bladens River area, SE 8 and WO 282, was sampled. Chemical analyses (tables 2 and 3) indicate that the water contains low concentration of dissolved solids (64-115 mg/L). Only iron (0.64 mg/L in SE 8) and manganese (0.3 mg/L in SE 8 and WO 282) equaled or exceeded Federal drinking-water standards (U.S. Environmental Protection Agency, 1977). Values of pH (5.6 to 5.8) were slightly below the recommended range (Connecticut General Assembly, 1975; U.S. Environmental Protection Agency, 1977).

SUMMARY AND CONCLUSIONS

Stratified-drift deposits in five areas of Connecticut were investigated in order to provide hydrogeologic information for State and local water-supply planning and water-quality management. The deposits were selected for study because they were inferred to be major aquifers composed of coarse-grained material with suitable hydrologic characteristics for supplying moderate to very large quantities of water, and are located in communities where additional water supplies are needed. Data obtained from logs of test holes and wells, seismic-refraction profiles, and chemical analyses of ground water were used to interpret the water-yielding potential and water-quality characteristics of stratified-drift aquifers in each area and provide the basis for the following conclusions.

(1) There is sufficient thickness of saturated, coarse-grained stratified drift at some locations in all five areas to potentially yield at least 50 to possibly 2,000 gal/min to individual wells.

(2) The saturated thickness and grain-size characteristics differ greatly over short distances, and some sites are unsuitable for developing moderate to very large quantities of water from wells. However, hydraulic continuity exists between most sites within each study area. Therefore, for purposes of development and management, each aquifer can be considered as a single unit.

(3) The Glastonbury, Haddam, and Simsbury areas have the most extensive coarse-grained deposits and therefore have the greatest potential for development of large quantities of ground water.

(4) The maximum saturated thickness of stratified drift exceeds 150 feet at some locations in the Glastonbury area, but most areas contain less than 100 feet of saturated stratified drift.

(5) Additional water may be obtained from aquifers in all five areas by induced infiltration from surface-water bodies. The best potential for induced recharge is along the Connecticut River in the Glastonbury and Haddam areas, and in the southern part of the Willimantic River area in Coventry.

(6) Water in the stratified-drift aquifers is generally of good chemical quality and meets most State and Federal drinking-water standards (Connecticut General Assembly, 1975; U.S. Environmental Protection Agency, 1975; 1977). Dissolved solids range from 43 to 208 mg/L. The major water-quality problem is excessive iron, 0.64 to 20 mg/L, and manganese, 0.1 to 10 mg/L, in some wells, particularly in the Willimantic River and Bladens River areas. Additional sampling would be necessary to determine the extent and source of phenols and arsenic detected in some water samples from the Simsbury and Willimantic River areas.

This study provides a preliminary evaluation of the potential of stratified-drift deposits in five selected areas of Connecticut to yield large quantities of potable water. The hydrogeologic and water-quality data collected are minimal and allow only a qualitative evaluation of each aquifer. However, these limited data are sufficient to indicate the great variability of grain-size characteristics and saturated thickness of the stratified-drift deposits, both areally and with depth. More detailed, quantitative studies would be required for thorough evaluations of ground-water availability and quality at each site prior to development.

GLOSSARY

Aquifer: A geologic formation, group of formations, or part of a formation that contains sufficient saturated permeable materials to yield significant quantities of water to wells and springs. In this report, the term refers to stratified-drift deposits known or inferred to be capable of yielding moderate to very large amounts of water to individual wells.

Bacteria: Microscopic unicellular organisms, typically spherical, rodlike, or spiral and threadlike in shape, often clumped into colonies. Some bacteria cause disease, others perform an essential role in nature in the recycling of materials; for example, by decomposing organic matter into a form available for reuse by plants.

Fecal coliform bacteria are bacteria that are present in the intestines or feces of warm-blooded animals. They are often used as indicators of the sanitary quality of the water. In the laboratory, they are defined as all organisms which produce blue colonies within 24 hours when incubated at $44.5^{\circ} \pm 0.2^{\circ}$. Celsius on M-FC medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 milliliters of sample.

Fecal streptococcal bacteria are bacteria found also in intestines of warm-blooded animals. Their presence in water is considered to verify fecal pollution. They are characterized as gram-positive, cocci bacteria which are capable of growth in brain-heart infusion broth. In the laboratory, they are defined as all the organisms which produce red or pink colonies within 48 hours at $35^{\circ} \pm 1.0^{\circ}$ Celsius on KF medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 milliliters of sample.

Bedrock: Solid rock, commonly called "ledge," that forms the Earth's crust. It is locally exposed at the surface but more commonly in Connecticut is buried beneath a few inches to more than 400 feet of unconsolidated deposits.

Color unit: Color unit is produced by 1 milligram per liter of platinum in the form of the chloroplatinate ion. Color is expressed in units of the platinum-cobalt scale.

Dissolved: Refers to that material in a representative water sample which passes through a 0.45-micrometer membrane filter. This is a convenient operational definition used by Federal agencies that collect water data. Determinations of "dissolved" constituents are made on subsamples of the filtrate.

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

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

Ground water: Water in the saturated zone.

Induced infiltration: The process by which water in a stream or lake moves into an aquifer by establishing a hydraulic gradient from the surface-water body toward a pumping well or wells.

Induced recharge: The amount of water entering an aquifer from an adjacent surface-water body by the process of induced infiltration.

Methylene blue active substance (MBAS): A measure of apparent detergents, as indicated by the formation of a blue color when methylene blue dye reacts with synthetic detergent compounds.

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

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

National Geodetic Vertical Datum of 1929 (NGVD of 1929): A geodetic datum derived from a general adjustment of the first-order level nets of the United States and Canada, formerly called "mean sea level." NGVD of 1929 is referred to as sea level in this report.

Organochlorine compounds: Widely used synthetic organic compounds that are toxic and persistent in the environment. These include aldrin, chlordane, DDT, lindane, toxaphene, and others.

pH: The negative logarithm (base 10) of the hydrogen-ion concentration. A pH of 7.0 indicates neutrality; values below 7.0 denote acidity, those above 7.0 denote alkalinity.

Phenols: A class of aromatic organic compounds in which one or more hydroxyl groups are attached directly to the benzene ring. Commonly a toxic organic compound obtained from coal tar or derivative of benzene.

Polychlorinated biphenyls (PCB); Polychlorinated napthalenes (PCN): Industrial chemicals that are mixtures of chlorinated biphenyl or napthalene compounds having various percentages of chlorine. They are similar in structure to organochlorine insecticides.

Recharge: Water that is added to the saturated zone. Recharge may be natural or artificial, depending upon the source of the water and the process that allows it to infiltrate to an aquifer.

Saturated thickness: Thickness of an aquifer below the water table.

Saturated zone: The subsurface zone in which all interconnected spaces are filled with water. The water table is the upper limit of this zone. Water in the saturated zone is under pressure equal to or greater than atmospheric.

Specific conductance, of water: A measure of the ability of water to conduct an electric current; expressed in micromhos per centimeter at 25°C. It is related to the type and concentration of ions in solution and serves as an approximate measure of the dissolved-solids contents of the water.

Stratified drift: A predominantly sorted sediment laid down by or in bodies of meltwater from a glacier; includes gravel, sand, silt, or clay deposited in layers of similar grain size.

Till: A nonsorted, nonstratified sediment deposited directly by a glacier and composed of boulders, gravel, sand, silt, and clay mixed in various proportions. It is sometimes referred to by New England well drillers as "hardpan".

Total (as used in tables of chemical analyses):

"Total recoverable" is the amount of a given constituent that is in solution after a representative water-supended sediment sample has been digested by a method (usually using a dilute acid solution) that results in dissolution of only readily soluble substances. Complete dissolution of all particulate matter is not achieved by the digestion treatment, and thus the determination represents something less than the "total" amount (that is, less than 95 percent) of the constituent present in the dissolved and suspended phases of the sample. To achieve comparability of analytical data, equivalent digestion procedures would be required of all laboratories performing such analyses because different digestion procedures are likely to produce different analytical results.

"Total" is the total amount of a given constituent in a representative water-suspended sediment sample, regardless of the constituents's physical or chemical form. This term is used only when the analytical procedure assures measurement of at least 95 percent of the constituent present in both the dissolved and suspended phases of the sample. A knowledge of the expected form of the constituent in the sample, as well as the analytical methodology used, is required to judge when the results should be reported as "total". (Note that the word "total" does double duty here, indicating both that the sample consists of a water-suspended sediment mixture and that the analytical method determines all of the constituent in the sample.)

Volatile organics: Synthetic organic compounds that include hydrocarbon or halogenated hydrocarbon molecules, commonly industrial solvents and degreasers.

Water table: The surface in an unconfined water body at which the pressure is atmospheric. It is defined by the levels at which water stands in wells that penetrate the water body just far enough to hold standing water. In wells penetrating to greater depths, the water level will stand above or below the water table if an upward or downward component of ground-water flow exists.

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TABLES

Table 1.--Logs of test holes and wells

Entries include identification number, location number, owner, year drilled, altitude, depth to water (if applicable), source of log, and description of earth materials penetrated.

Identification number: U.S. Geological Survey number assigned to each site. The letter prefix denotes the town in which it is located followed by a sequential number. The test holes are identified by the "th" suffix.

Location number: Latitude and longitude of test-hole or well site. Number after decimal point is a sequential number used to identify closely spaced wells and test holes.

Altitude: Land-surface datum (LSD) in feet above sea level, which is approximately equal to the National Geodetic Vertical Datum of 1929. Altitudes are estimated from topographic maps with 10-feet contour intervals.

Depth to water: Measurement generally made shortly after completion of test hole or well and may not represent static conditions. Expressed in feet below land surface.

Source of log: U.S. Geological Survey, drilling contractor, or others, as indicated.

Description of earth materials: Logs of test holes and wells are based on the appropriate grain-size classification shown in the chart to the right.

Terms used in logs of test holes and wells:

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 present in sample.

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

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

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

Percentage of weight of individual components in the sample:

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

Terms in parantheses on logs described by the U.S. Geological Survey are interpretations or observations by hydrologists based on field examination of cuttings and samples.

Terms in all other logs are those used by drillers, however, some are rearrenged for uniformity of presentation.

Grain size chart

Grain size (millimeters)	Wentworth grade scale U.S. Geological Survey logs		Grain size (inches)	Actual grain size
	Boulders (gravel)			
256			10.08	
	Cobbles (gravel)			
64			2.52	
	Pebbles (gravel)	Very coarse gravel		
32			1.260	
		Coarse gravel		
16			0.630	
		Medium gravel		
8			0.315	
		Fine gravel		
4			0.157	
	Granules - very fine gravel			
2			0.079	
	Very coarse sand			
1			0.039	
	Coarse sand			
0.5			0.019	
	Medium sand			
0.25			0.0098	
	Fine sand			
0.125			0.0049	
	Very fine sand			
0.063			0.0025	
	Silt			
0.004			0.0002	
	Clay			

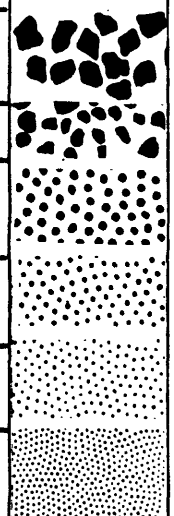

Table 1.--Logs of wells and test holes

Town of Bethany

BE 3 th. 412331N0730213.1. Jon Davison and Paul Rieur. Drilled 1980. Altitude 260 ft. Depth to water 12 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD in feet From	To	Thickness (feet)
Sand, fine to coarse, and cobble gravel......	0	- 2	2
Sand, medium, brown; some fine sand; little very fine sand.............	2	- 15	13
Sand, very fine to fine, silt and clay, layered, orange to brown........	15	- 38	23
Silt and clay, gray, layered; some very fine to fine sand layers....	38	- 62	24
Sand, fine; little clay; silt and very fine sand in layers.............	62	- 74	12
Sand, medium to very coarse, tan-brown; some fine gravel and fine sand..................	74	- 81	7
Sand and gravel, very poorly sorted (till)...	81	- 88	7
Refusal (bedrock).......	at 88		

BE 4 th. 412346N0730234.1. Joseph Kriz. Drilled 1967. Altitude 240 ft. Log by S. B. Church Co.

Materials	Depth below LSD in feet From	To	Thickness (feet)
Boulders................	0	- 10	10
Gravel (hardpan)........	10	- 20	10
Sand, coarse...........	20	- 25	5
Sand, medium...........	25	- 30	5
Sand, coarse, and gravel	30	- 35.5	5.5
Ledge..................	at 35.5		

BE 5 th. 412348N0730234.1. Joseph Kriz. Drilled 1967. Altitude 240 ft. Log by S. B. Church Co.

Materials	Depth below LSD in feet From	To	Thickness (feet)
Cobbles.................	0	- 15	15
Sand and gravel, very dirty..................	15	- 25	10
Hardpan.................	25	- 45	20
Ledge...................	at 45		

BE 6 th. 412345N0730231.1. Joseph Kriz. Drilled 1967. Altitude 245 ft. Log by S. B. Church Co.

Materials	Depth below LSD in feet From	To	Thickness (feet)
Boulders................	0	- 18	18
Silt and clay...........	18	- 45	27
Sand, medium............	45	- 48	3
Hardpan, gravel.........	48	- 67.5	19.5
Ledge...................	at 67.5		

Town of Cromwell

CR 307. 413810N0723758.1. Cromwell Fire District, Water Department. Drilled 1969. Altitude 15 ft. Depth to water 7 ft. Log by Water Explanation and Development Corp. (previously published in Ryder and Weiss, 1971, p. 8).

Materials	Depth below LSD in feet From	To	Thickness (feet)
Sand, very fine, brown, and silt...............	0	- 70	70
Sand, very fine to coarse, brown; some gravel and silt...................	70	- 90	20
Sand, medium to coarse, brown; some gravel.....	90	-145	55
End of hole.............	at 145		

Town of Coventry

CV 9 th. 414501N0721618.1. U.S. Geological Survey. Drilled 1963. Altitude 270 ft. Log by U.S. Geological Survey (previously published in Thomas, C.E., Jr., and others, 1967, p. 21).

Materials	Depth below LSD in feet From	To	Thickness (feet)
Sand, very fine to fine, silty, overlying medium to coarse sand.........	0	- 89	89
Sand and gravel.........	89	-109	20
Refusal.................	at 109		

Town of Coventry - continued

CV 19 th. 414525N0721619.1. St. Mary's Church. Drilled 1980. Altitude 285 ft. Depth to water 27 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD in feet From	To	Thickness (feet)
Topsoil, sandy; some silt....................	0	- 2	2
Sand, fine to coarse, and gravel, brown; trace very coarse sand.	2	- 7	5
Sand, coarse, brown; some very coarse sand; little fine to medium sand; trace fine gravel......	7	- 22	15
Sand, fine to medium, tan; little coarse sand; trace very coarse sand to fine gravel.........	22	- 47	25
End of hole (augers sand-locked)...........	at 47		

CV 35. 414656N0721659.1. Town of Coventry. Drilled 1980. Altitude 275 ft. Depth to water 6.5 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD in feet From	To	Thickness (feet)
Topsoil, brown, sandy...	0	- 1	1
Sand, coarse, tan; some medium to very coarse sand; trace gravel; trace fine sand........	1	- 6	5
Sand and gravel, poorly sorted.................	6	- 41	35
End of hole.............	at 41		

CV 36. 414621N0721632.1. Conrad Ricard. Drilled 1980. Altitude 280 ft. Depth to water 12.9 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD in feet From	To	Thickness (feet)
Topsoil, dark brown.....	0	- 0.5	0.5
Sand, coarse to very coarse, and cobble gravel, yellow-brown...	.5	- 3	2.5
Sand, medium; some coarse sand; little fine gravel; trace very fine to fine sand..................	3	- 32	29
Sand, medium to coarse; some very coarse sand to fine gravel, layered; little fine to medium sand..................	32	- 62	30
Sand, fine to coarse; little gravel; trace silt..................	62	- 92	30
Sand, medium to very coarse, and gravel; little fine sand; trace very fine sand.........	92	- 97	5
End of hole.............	at 97		

CV 37. 414541N0721618.1. Mathew Moriarity. Drilled 1980. Altitude 280 ft. Depth to water 9.5 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD in feet From	To	Thickness (feet)
Gravel..................	0	- 5	5
Sand, fine to medium; little silt to very fine sand; occasional thin layers of silt and clay	5	- 77	72
Sand, medium, gray; little coarse sand; layers of very fine to fine sand.	77	- 97	20
End of hole.............	at 97		

Town of Glastonbury

GL 40 th. 414003N0723653.1. Alec Gondek. Drilled 1980. Altitude 20 ft. Depth to water 15 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD in feet From	To	Thickness (feet)
Topsoil, brown..........	0	- 2	2
Gravel, coarse..........	2	- 6	4
Sand, medium to very coarse, and fine gravel, layered................	6	- 12	6
Sand, coarse, and cobble gravel; silt and clay; poorly sorted..........	12	- 17	5
Silt and clay, brown; little fine to medium sand...................	17	- 47	30
Silt; layers of fine to coarse gravel..........	47	- 52	5
Silt and clay; some coarse sand and gravel layers.................	52	- 62	10
Sand, fine to medium, brown; trace very fine sand, silt and clay....	62	- 82	20
Till....................	82	- 89	7
Refusal.................	at 89		

GL 41 th. 413804N0723739.1. Town of Glastonbury. Drilled 1976. Altitude 38 ft. Depth to water 36 ft. Log by Clarence Welti Assoc., Inc.

Materials	Depth below LSD in feet From	To	Thickness (feet)
Topsoil.................	0	- 1	1
Sand and silt...........	1	- 5	4
Sand, fine to coarse....	5	- 14	9
Sand, fine to coarse; little fine to coarse gravel; some cobbles...	14	- 35	21
Sand, fine to coarse; little fine to coarse gravel; trace silt.....	35	- 38	3
Sand, fine to coarse; trace fine gravel......	38	- 44	6
Silt, red...............	44	- 46	2
Sand, fine to coarse, and fine gravel........	46	- 66	20
Sand, fine to coarse; little fine to medium gravel; trace silt.....	66	- 75	9
Sand, fine; trace silt, layered................	75	- 90	15
Silt and sand...........	90	-135	45
Sand, fine to coarse; little fine to coarse gravel; layers of fine sand, silt and clay....	135	-140	5
Sand, fine to coarse; little fine gravel and silt; trace cobbles; layers fine sand and silt..................	140	-188	48
Hardpan, and basalt cobbles................	188	-195	7
Basalt, siltstone, and fine sandstone.........	195	-199	4

Town of Glastonbury - continued

GL 42 th. 413803N0723721.1. Town of Glastonbury. Drilled 1975. Altitude 166 ft. Log by Clarence Welti Assoc., Inc.

Materials	Depth below LSD in feet From	To	Thickness (feet)
Topsoil.................	0	- 0.5	0.5
Gravel, fine to coarse; some fine to coarse sand; trace cobbles..........	.5	- 5.5	5
Sand, fine.............	5.5	- 11	5.5
Sand, fine to coarse; trace fine to coarse gravel.................	11	- 20	9
Silt, and fine sand.....	20	- 25	5
Sand, fine.............	25	- 30	5
Sand, fine; little silt and fine sand in lenses	30	- 40	10
Silt; some fine sand; trace sandstone fragments..............	40	- 50	10
Sand, fine to medium; little silt; trace shale fragments..............	50	- 70	20
Sand, fine to medium, cemented; some fine to coarse gravel and cobbles; trace boulders (till?)................	70	- 80	10
Sand, fine, and silt; some fine to coarse gravel; little cobbles; trace boulders (till)..	80	-101	21
End of hole.............	at 101		

GL 43 th. 413810N0723708.1. Town of Glastonbury. Drilled 1975. Altitude 166 ft. Log by Clarence Welti Assoc., Inc.

Materials	Depth below LSD in feet From	To	Thickness (feet)
Topsoil.................	0	- 0.3	0.3
Sand, fine, and silt....	.3	- 3	2.7
Sand, fine to coarse; some fine to coarse gravel and cobbles.....	3	- 5	2
Sand, fine to medium; trace fine to coarse gravel.................	5	- 18	13
Sand, fine; trace fine sand and silt in layers	18	- 81	63
Sand, fine; trace silt; trace clay in layers...	81	-102	21
End of hole.............	at 102		

GL 106. 413928N0723709.1. John Quagliaroli. Drilled 1954. Altitude 55 ft. Log by Paganetti Well Drilling Co. (previously published in Ryder and Weiss, 1971, p. 24).

Materials	Depth below LSD in feet From	To	Thickness (feet)
Sand, hard, red.........	0	- 93	93
Sand, fine, and silt....	93	-123	30
Rock, red...............	123	-400	277

GL 208. 413809N0723738.1. Consolidated Cigar Corp. Drilled 1959. Altitude 50 ft. Log by I. W. Taylor (previously published in Ryder and Weiss, 1971, p. 24).

Materials	Depth below LSD in feet From	To	Thickness (feet)
Subsoil and sand........	0	- 80	80
Gravel..................	80	- 82	2
Sand....................	82	-200	118
Brownstone..............	200	-330	130

GL 227. 413922N0723629.1. Joseph Clemens. Drilled 1957. Altitude 150 ft. Log by I. W. Taylor (previously published in Ryder and Weiss, 1971, p. 25).

Materials	Depth below LSD in feet From	To	Thickness (feet)
Sand and gravel.........	0	- 85	85
Sandstone, red..........	85	-160	75

Town of Glastonbury - continued

GL 235. 413819N0723722.1. Consolidated Cigar Corp. Drilled 1980. Altitude 50 ft. Depth to water 39.45 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD in feet From	To	Thickness (feet)
Sand, very fine to fine, and gravel, red; some silt; little medium to very coarse sand.......	0	5	5
Sand, very fine to medium, red, changes to brown at 8 feet........	5	12	7
Silt, red; clay; very fine to fine sand; trace gravel; layered,.......	12	55	43
Sand, very fine to coarse, and gravel; little silt	55	60	5
Sand, medium to coarse, and very fine to fine gravel; trace fine sand; trace clay............	60	82.5	22.5
End of hole (augers sand-locked)..........	at 82.5		

GL 236. 413941N0723735.1. Alec Gondek. Drilled 1980. Altitude 15 ft. Depth to water 10.03 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD in feet From	To	Thickness (feet)
Silt, and fine sand, brown..................	0	27	27
Sand, fine to very coarse.................	27	38	11
Sand, fine to very coarse, brown; little very fine gravel.......	38	39	1
Sand, fine to very coarse, red...........	39	47	8
Sand, very fine to very coarse; some silt; little very fine gravel	47	48	1
Sand, fine to very coarse, red, poorly sorted; little silt and gravel.	48	63	15
Gravel, poorly sorted; some clay (till?)......	63	65	2
Till....................	65	74	9
Refusal - (bedrock or boulder)..............	at 74		

GL 237. 413901N0723651.1. Burt Rosen. Drilled 1980. Altitude 100 ft. Depth to water 31.5 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD in feet From	To	Thickness (feet)
Silt and medium sand....	0	2	2
Silt and medium sand; some medium gravel....	2	7	5
Sand, fine to medium, red; trace coarse sand and gravel, silt, and very fine sand.............	7	12	5
Sand, fine to medium, red; some coarse sand and fine to coarse gravel; trace silt and very fine sand	12	17	5
Sand, medium to coarse, red; trace fine sand and fine to medium gravel..	17	22	5
Sand, medium to very coarse, red; little gravel; trace fine sand	22	32	10
Sand, coarse to very coarse, red; little fine gravel; trace medium sand...........	32	47	15
Till....................	47	53.5	6.5
Refusal.................	at 53.5		

Town of Haddam

HD 23 th. 412907N0723100.1. State of Connecticut. Drilled 1972. Altitude 12 ft. Depth to water 5 ft. Log by U.S. Geological Survey (previously published in Bingham and others, 1975, p. 38).

Materials	Depth below LSD in feet From	To	Thickness (feet)
Silt, black (alluvium)..	0	7	7
Gravel, dirty, with layers of sand.........	7	15	8
Sand, coarse to very coarse, trace very fine to medium sand; trace dirty gravel...........	15	25	10
Gravel, dirty...........	25	70	45
Sand, very fine to medium, red; trace silt; occasional fine gravel.....	70	107	37
Till, gray.............	107	112	5
End of hole............	at 112		

Town of Haddam - continued

HD 30 th. 412725N0722817.1. Camp Bethel. Drilled 1980. Altitude 70 ft. Depth to water 68 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD in feet From	To	Thickness (feet)
Sand, fine to coarse; little very fine sand; trace gravel...........	0	- 7	7
Sand, medium to coarse; some very coarse sand; trace fine sand; trace gravel.................	7	- 12	5
Sand, coarse to very coarse; some medium and very coarse sand; trace fine sand; trace gravel	12	- 27	15
Sand, coarse to very coarse, and gravel; little medium sand; trace fine sand........	27	- 47	20
Sand, medium; some coarse sand; trace fine sand; trace very coarse sand to gravel (gravel grain size increasing with depth............	47	- 72	25
Sand, coarse to very coarse; some silt; trace medium sand, poorly sorted; layers of medium sand with little silt..	72	- 77	5
Sand, medium; some fine sand; trace of silt and coarse sand...........	77	- 87	10
Sand, fine to medium; thin gravel layers.....	87	- 93	6
End of hole.............	at 93		

HD 31 th. 412824N0722950.1. Spencer and Sons Amusements. Drilled 1980. Altitude 20 ft. Depth to water 11 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD in feet From	To	Thickness (feet)
Sand, fine to medium, brown; trace very fine sand; trace coarse sand	0	- 7	7
Sand, medium, brown; some fine sand; trace coarse sand to cobble gravel (rounded).......	7	- 17	10
Refusal (boulders)......	at 17		

HD 32 th. 413006N0723310.1. Whitney Brooks. Drilled 1980. Altitude 10 ft. Depth to water 10 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD in feet From	To	Thickness (feet)
Sand, medium, brown; some fine and coarse sand...................	0	- 2	2
Sand, very fine to fine; trace medium sand......	2	- 12	10
Clay and silt to very fine sand, gray, layered................	12	- 55	43
Sand, medium to very coarse, and gravel, hard, multi-colored (till?)..	55	- 60	5
Refusal................	at 60		

HD 421. 412746N0722844.1. R. Alderman. Drilled 1964. Altitude 88 ft. Depth to water 77 ft. Log by Rachbauer Bros.

Materials	Depth below LSD in feet From	To	Thickness (feet)
Sand and gravel.........	0	-125	125
Granite.................	125	-254	129

HD 428. 412839N0723047.1. Mrs. E. Pattee. Drilled 1964. Altitude 90 ft. Depth to water 24 ft. Log by Paganetti Drilling.

Materials	Depth below LSD in feet From	To	Thickness (feet)
Sand and gravel.........	0	- 40	40
Granite.................	40	-205	165

HD 435. 412809N0722949.1. D.S. MacGlashan. Drilled 1964. Altitude 85 ft. Depth to water 18 ft. Log by Paganetti Drilling.

Materials	Depth below LSD in feet From	To	Thickness (feet)
Sand....................	0	- 26	26
Granite.................	26	- 85	59

Town of Haddam - continued

HD 461. 412756N0722845.1. R. Doolittle. Drilled 1964. Altitude 82 ft. Log by owner.

Materials	Depth below LSD in feet From	To	Thickness (feet)
Sand and gravel.........	0	-105	105
Bedrock.................	105	-135	30

HD 470. 412848N0723030.1 State of Connecticut. Drilled 1980. Altitude 10 ft. Depth to water 5.8 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD in feet From	To	Thickness (feet)
Topsoil, brown, sandy; trace gravel...........	0	- 5	5
Silt, and very fine sand, gray...................	5	- 17	12
Clay, silt, and very fine sand, gray-green..	17	- 27	10
Sand, medium, gray; little very fine to fine sand, little coarse to very coarse sand....	27	- 32	5
Sand, coarse to very coarse, gray; little fine to medium sand; little very fine gravel	32 -	42	10
Sand, medium gray; some coarse to very coarse sand; little silt to fine sand; trace very fine gravel...........	42	- 52	10
Sand, coarse, gray; little medium sand; trace very fine to fine sand..................	52	- 62	10
Sand, coarse, gray; some medium sand; little silt to fine sand; little very coarse sand to very fine gravel...........	62	- 72	10
Sand and gravel, reddish brown; poorly sorted (till)................	72	- 78	6
Till....................	78	- 82	4
End of hole............	at 82		

HD 471. 413011N0723316.1. State of Connecticut. Drilled 1980. Altitude 10 ft. Depth to water 10 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD in feet From	To	Thickness (feet)
Sand, medium to coarse, and fine to very coarse gravel; trace fine sand; trace very coarse sand (fill?)...........	0	- 7	7
Sand, coarse to very coarse; some medium sand; trace fine sand and very fine to medium gravel.................	7	- 12	5
Sand, very coarse, and gravel, brown; little coarse sand; trace medium sand............	12	- 17	5
Sand, fine to medium; trace very fine sand...	17	- 17.5	.5
Sand, coarse to very coarse, and gravel, brown; little medium sand..................	17.5-	20	2.5
Sand, fine to medium, and silt, brown; little medium sand; interbedded with layers of coarse to very coarse sand and gravel; some medium sand...........	20	- 27	7
Sand, coarse to very coarse, and gravel, brown, poorly sorted; interbedded with layers of silt to fine sand, yellow; little medium sand..................	27	- 37	10
Sand and gravel, very poorly sorted..........	37	- 52	15
Sand and gravel, very poorly sorted, compact, multi-colored (till)...	52	- 59	7
Refusal (bedrock or boulder)..............	at 59		

Town of Mansfield

MS 38. 414925N0721849.1. George Merrow. Drilled 1980. Altitude 310 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
Sand, fine to very coarse, and gravel; little silt to very fine sand, layered..........	2	- 28	26
Refusal (boulder).......	at 28		

Town of Rocky Hill

RH 78. 413852N0723733.1. Pratt & Whitney Div., United Aircraft. Drilled 1946. Altitude 2 ft. Depth to water 0 ft. Log by Ranney Method Water Supplies (previously published in Ryder and Weiss, 1971, p. 26).

Materials	Depth below LSD in feet From	To	Thickness (feet)
Water...................	0	- 4	4
Sand, coarse, and gravel	4	- 42	38
Sand, fine, red.........	42	- 46	4
Sand, coarse, and gravel	46	- 55	9
Sand, gravel, clay and boulders (till)........	55	- 63	8
Traprock, blue..........	63	- 64	1

Town of Seymour

SE 8. 412358N0730304.1. William Molsick. Drilled 1980. Altitude ft. Depth to water 12 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD in feet From	To	Thickness (feet)
Sand, fine to medium; trace coarse sand to gravel; trace very fine sand...................	0	- 2	2
Sand, fine to very coarse, and gravel.....	2	- 7	5
Sand, fine to medium; trace very fine sand; trace coarse sand......	7	- 12	5
Sand, fine to medium; clay, silt, and very fine sand, layered..........	12	- 32	20
Sand, fine to medium; interbedded with medium to coarse sand layers..	32	- 37	5
Silt, sand, and gravel; angular fragments; compact; gray-black; (till or weathered bedrock)..	37	- 38	1
Refusal.................	at 38		

Town of Simsbury

SI 9 th. 415118N0725129.1. Town of Simsbury, Parks and Recreation Dept. Drilled 1971. Altitude 265 ft. Depth to water 14 ft. Log by U.S. Geological Survey (previously published in Hopkins and Handman, 1975, p. 43).

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, and some medium sand; little fine sand; trace silt and gravel.................	12	- 18	6
Gravel, coarse to fine, sand and silt..........	18	- 21	3
Sand, coarse to fine, and silt; little gravel....	21	- 25	4
Gravel, coarse to fine, and sand; little to trace silt and clay....	25	- 34	9
Sand, medium to coarse, and gravel; little fine sand; trace silt and clay; layered..........	34	- 47	13
Till, clayey, red-brown.	47	- 48	1
Refusal.................	at 48		

SI 24 th. 415141N0725038.1. (Formerly SI 108). Village Water Co. Drilled 1953. Altitude 240 ft. Depth to water 2 ft. Log by Layne-New York Co. (previously published in Hopkins and Handman, 1975, p. 44).

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
End of hole.............	at 60		

SI 45 th. 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 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 46 th. 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 47 th. 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 subangular gravel (sandstone fragments); (weathered bedrock)....	23	- 27	4
Refusal.................	at 27		

Town of Simsbury - continued

SI 81. 415139N0725045.1. Village Water Co. Drilled 1954. Altitude 245 ft. Depth to water 3 ft. Log by R.E. Chapman Co. (previously published in Hopkins and Handman, 1975, p. 30).

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 230. 415151N0725019.1. Village Water Co. Drilled 1966. Altitude 238 ft. Depth to water 2 ft. Log by R.E. Chapman Co. (previously published in Hopkins and Handman, 1975, p. 31).

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
End of hole	at 74		

SI 233. 415035N0725127.1. P. Downey. Drilled 1967. Altitude 305 ft. Depth to water 60 ft. 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		

SI 242. 415208N0724906.1. Valley Cab Co. Drilled 1966. Altitude 230 ft. Depth to water 20 ft. Log by A-well Industries, Inc.

Materials	Depth below LSD in feet From	To	Thickness (feet)
Sand, fine, and silt	0	- 30	30
Rock, red	30	-250	220

SI 281. 415154N0725042.1. D. Griffin. Drilled 1968. Altitude 280 ft. Depth to water 12 ft. Log by George L. Engel (previously published in Hopkins and Handman, 1975, p. 31).

Materials	Depth below LSD in feet From	To	Thickness (feet)
Clay	0	- 10	10
Hardpan	10	- 18	8
Red rock, medium-hard	18	-100	82

SI 285. 415153N0725022.1. Village Water Co. Drilled 1970. Altitude 248 ft. Depth to water 14 ft. Log by R.E. Chapman Co. (previously published in Hopkins and Handman, 1975, p. 31).

Materials	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
End of hole	at 90		

SI 299. 415047N0725133.1. C. Prince. Drilled 1971. Altitude 310 ft. Depth to water 75 ft. Log by George L. Engel (previously published in Hopkins and Handman, 1975, p. 32).

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

Town of Simsbury - continued

SI 313. 415057N07251191.1. Ethel Walker School. Drilled 1980. Altitude 260 ft. Depth to water 6.08 ft. 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. 415133N0724914.1. Ensign Bickford Co. Drilled 1980. Altitude 230 ft. Depth to water 3.1 ft. 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		

SI 315. 415122N0725100.1. Ethel Walker School. Drilled 1980. Altitude 250 ft. Depth to water 5.8 ft. 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		

Town of Tolland

TO 1 th. 415019N0721842.1. Pheobe Dimock King. Drilled 1980. Altitude 345 ft. Depth to water 1 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD in feet From	To	Thickness (feet)
Sand, coarse and cobble gravel, brown; little fine to medium sand; trace very fine sand...	0	2	2
Sand, medium to very coarse, and fine to medium gravel, yellow-brown; little very fine to fine sand; trace silt....................	2	12	10
Sand, very fine to medium, and gravel, poorly sorted, yellow-brown; some silt; trace clay....................	12	17	5
Sand, coarse to very coarse, and gravel, poorly sorted, brown; some silt to fine sand; trace clay.............	17	23	6
Sand, fine, and angular gravel, blue-gray; (weathered bedrock?)...	23	24	1
Refusal (bedrock?)......	at 24		

TO 7. 415229N0721833.1. Angeline DeSiato. Drilled 1980. Altitude 360 ft. Depth to water 9 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD in feet From	To	Thickness (feet)
Topsoil, sandy..........	0	2	2
Sand, medium to coarse, brown; some very coarse sand; trace very fine to fine sand...........	2	7	5
Sand, fine to medium, brown; some coarse sand; little very coarse sand; trace very fine sand; trace cobbles (rounded)	7	12	5
Sand, fine to coarse, and gravel, brown; poorly sorted..........	12	22	10
Sand, fine to medium, brown; little silt to very fine sand; trace coarse sand............	22	27	5
Sand, medium to very coarse, and fine gravel, brown; little very fine to fine sand; trace silt, layered................	27	38	11
Refusal (rock or boulders)..............	at 38		

Town of Willington

WG 1. 415119N0721816.1. Joseph Mihaliak. Drilled 1980. Altitude 350 ft. Depth to water 9.4 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD in feet From	To	Thickness (feet)
Sand, fine to medium, brown..................	0	7	7
Sand, medium and gravel, light brown; trace fine sand..................	7	12	5
Sand, medium to very coarse, and gravel, gray-brown; little very fine to fine sand......	12	24	12
Refusal (boulder).......	at 24		

Town of Woodbridge

WO 5 th. 412319N0730208.1. Town of Woodbridge. Drilled 1980. Altitude 285 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD in feet From	To	Thickness (feet)
Topsoil, sandy, dark brown	0	2	2
Sand	2	5	3
Refusal (boulder)	at 5		

WO 6 th. 412321N0730210.1. Town of Woodbridge. Drilled 1980. Altitude 280 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD in feet From	To	Thickness (feet)
Topsoil, sandy, brown	0	2	2
Sand, very fine to fine, gray-brown; some silt; trace medium to coarse sand; trace clay	2	15	13
Clay, silt, and very fine sand, gray-brown; trace fine sand; layered	15	27	12
Sand and gravel, yellow-brown; poorly sorted (till)	27	28	1
Refusal	at 28		

WO 282. 412306N0730050.1. Town of Woodbridge. Drilled 1980. Altitude 250 ft. Depth to water 7 ft. Log by U.S. Geological Survey.

Materials	Depth below LSD in feet From	To	Thickness (feet)
Gravel (fill)	0	2	2
Topsoil; trace gravel	2	7	5
Sand, medium; some fine sand; little silt to very fine sand; trace coarse sand to gravel	7	17	10
Sand, coarse to very coarse; some medium sand; little fine sand; trace silt; trace fine gravel	17	32	15
Sand, fine to medium; trace silt to very fine sand; trace fine gravel	32	42	10
Sand, very fine to fine; some silt; little medium sand; trace clay	42	58	16
Refusal (bedrock)	at 58		

WO 283. 412251N0730250.1. Town of Woodbridge. Drilled 1976. Altitude 320 ft. Depth to water 10 ft. Log by S.B. Church Co.

Materials	Depth below LSD in feet From	To	Thickness (feet)
Sand, fine to medium	0	10	10
Sand, medium	10	15	5
Sand, medium to coarse, dirty, with fines, (poorly sorted)	15	20	5
Sand, coarse, dirty with fines	20	25	5
Sand, medium to coarse, some fines	25	30	5
Sand, fine to medium, dirty, with clay and silt	30	35	5
Sand, medium, dirty, with clay layers	35	40	5
Sand, fine to medium, with clay layers	40	50	10
Sand, medium to coarse, dirty, with fines and some clay	50	68	18
Hardpan	68	72.5	4.5
Refusal	at 72.5		

WO 284. 412259N0730237.1. Town of Woodbridge. Drilled 1976. Altitude 320 ft. Depth to water 34.5 ft. Log by S. B. Church Co.

Materials	Depth below LSD in feet From	To	Thickness (feet)
Topsoil and subsoil	0	3	3
Sand, medium	3	10	7
Sand, fine, tight	10	27	17
Gravel, coarse and cobbles	27	30	3
Sand, coarse, and gravel; in layers	30	43	13
Sand, coarse	43	45	2
Sand, medium, brown	45	50	5
Sand, medium to coarse, yellow	50	57	7
Hardpan	57	61	4
Refusal	at 61		

Town of Woodbridge - continued

WO 285. 412308N0730226.1. Town of Woodbridge. Drilled 1976. Altitude 265 ft. Depth to water 2.1 ft. Log by S. B. Church Co.

Materials	Depth below LSD in feet From	To	Thickness (feet)
Fill....................	0	- 5	5
Silt....................	5	- 13	8
Gravel, coarse..........	13	- 19	6
Sand, fine, and silt....	19	- 26	7
Gravel (hardpan)........	26	- 31	5
Refusal.................	at 31		

WO 286. 412316N0730226.1. Town of Woodbridge. Drilled 1976. Altitude 290 ft. Depth to water 8.2 ft. Log by S.B. Church Co.

Materials	Depth below LSD in feet From	To	Thickness (feet)
Hardpan, gravel with cobbles................	0	- 10	10
Hardpan.................	10	- 14	4
Refusal.................	at 14		

WO 287. 412315N0730219.1. Town of Woodbridge. Drilled 1976. Altitude 280 ft. Depth to water 1.25 ft. Log by S.B. Church Co.

Materials	Depth below LSD in feet From	To	Thickness (feet)
Sand and gravel; some cobbles................	0	- 5	5
Clay....................	5	- 7	2
Sand, fine; with layers of clay................	7	- 15	8
Sand, fine, and silt....	15	- 23	8
Sand, fine; layer of clay..................	23	- 37	14
Hardpan; clay...........	37	- 38	1
Refusal.................	at 38		

WO 288. 412312N0730220.1. Town of Woodbridge. Drilled 1976. Altitude 260 ft. Depth to water 2.67 ft. Log by S.B. Church Co.

Materials	Depth below LSD in feet From	To	Thickness (feet)
Fill....................	0	- 4	4
Gravel, coarse..........	4	- 7	3
Sand, fine, dirty, with clay..................	7	- 18	11
Gravel, coarse, dirty, with clay..............	18	- 24	6
End of hole.............	at 24		

Table 2.--Inorganic and bacteriological analyses of water from selected wells

[Chemical constituents dissolved, except as indicated; concentrations in milligrams per liter, except as indicated; < = less than]

Constituent or property	Well number and date sampled (month, day, and year) CV 37 4-3-81	GL 236 3-30-81	HD 420 3-31-81	MS 38 4-3-81	SE 8 4-1-81	SI 313 4-2-81	SI 314 4-2-81	SI 315 4-2-81	TO 7 4-3-81	WO 282 4-1-81	Limiting value	Basis for limiting value (A)
Alkalinity, as $CaCO_3$	26	83	14	36	36	29	33	11	18	13	-	-
Arsenic (As)	0.018	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.05	1,2
Bacteria, fecal coliform, in col/100 mL	0	0	0	0	0	0	0	0	0	0	-	-
Bacteria, fecal streptococci, in col/100 mL	0	0	0	0	0	0	0	0	0	0	-	-
Chloride (Cl)	19	9.9	15	15	8.5	7.4	3.7	1.6	25	8.0	250	1,3
Chromium (Cr)	.010	.010	<.010	.010	.010	.010	.010	.010	.010	<.010	.050	1,2
Color, units	0	5	5	0	5	5	0	0	0	5	15	1,3
Dissolved solids (residue on evaporation, at 180°C)	79	208	83	116	115	88	53	43	87	64	-	-
Fluoride (F)	.1	.2	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	2.0	1,2
Iron (Fe)	20	.01	.02	3	.64	0	.01	0	.16	0	.3	3
Mercury (Hg)	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	.002	1,2
Nitrite (NO_2) + Nitrate (NO_3) as N	.02	<.01	1.5	.48	1.8	.03	.01	.25	.54	1.8	10	1,2
pH, units	6.6	7.3	6.0	6.4	5.8	7.0	6.1	-	5.9	5.6	6.4-8.5	1,3
Selenium (Se)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.010	1,2
Silver (Ag)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.050	1,2
Specific conductance, in micromhos/cm	180	320	132	205	159	120	90	53	141	99	-	-
Sulfate (SO_4)	1.7	31	15	29	16	11	5.7	9.5	11	12	-	-

Semi-quantitative analysis by Inductively Coupled Plasma Emission Spectroscopy (ICP).
[Results are rounded to the nearest reporting level. Reporting levels range from the detection limit in steps of 1, 3, 5, 7, and 10. Levels which are less than the detection limit are reported as < that value. Levels which are greater than the upper concentration limit are reported as > that value. For example, for an analysis of lead, the result would be reported as one of the following concentrations in mg/L: <0.03, 0.05, 0.07, 0.1, 0.3, 0.5, 0.7, 1, 3, 5, 7, >10. Results are reported to one significant figure only. Due to the rounding technique, even one significant figure is an estimate. The precision is approximately plus or minus one step at the 68 percent confidence level (1 std. dev.) and two steps at 95 percent confidence level (2 std. dev.)].

Aluminum (Al)	<.05	<.05	<.05	<.05	.7	<.05	<.05	<.05	<.05	<.05	-	-
Antimony (Sb)	<.03	<.03	<.03	<.03	<.03	<.03	<.03	<.03	<.03	<.03	-	-
Barium (Ba)	.03	.1	.01	.03	.03	.03	.03	.01	.01	.01	1.0	1,2
Beryllium (Be)	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	-	-
Bismuth (Bi)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-
Boron (B)	.05	.05	.03	.03	.03	.01	.01	.01	.01	.01	-	-
Cadmium (Cd)	.003	.001	.001	.001	<.001	<.001	<.001	<.001	<.001	<.001	.010	1,2
Calcium (Ca)	7	50	10	10	10	10	10	5	7	5	-	-
Cobalt (Co)	-	<.005	<.005	.05	.01	<.005	<.005	<.005	.01	<.005	-	-
Copper (Cu)	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03	1.0	1,3
Gallium (Ga)	<.03	<.03	<.03	<.03	<.03	<.03	<.03	<.03	<.03	<.03	-	-
Germanium (Ge)	<.03	<.03	<.03	<.03	<.03	<.03	<.03	<.03	<.03	<.03	-	-
Lead (Pb)	<.03	<.03	<.03	<.03	<.03	<.03	<.03	<.03	<.03	<.03	.050	1,2
Lithium (Li)	<.005	<.005	<.005	<.005	.01	<.005	<.005	<.005	<.005	<.005	-	-
Magnesium (Mg)	3	7	3	5	5	3	1	<1	3	1	-	-
Manganese (Mn)	.3	.3	.003	10	.3	<.001	.1	.003	3	.3	.050	3
Molybdenum (Mb)	.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	-	-
Nickel (Ni)	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	-	-
Potassium (K)	3	<1	3	3	3	<1	<1	<1	1	1	-	-
Silica (SiO_2)	7	10	10	10	10	10	10	10	10	10	-	-
Sodium (Na)	7	5	7	10	7	3	3	3	10	5	20	1
Strontium (Sr)	.05	.1	.03	.07	.07	.03	.03	.03	.07	.05	-	-
Tin (Sn)	.1	.5	.1	.3	.3	.1	.07	.05	.1	.1	-	-
Titanium (Ti)	<.005	<.005	<.005	<.005	.07	<.005	<.005	<.005	<.005	<.005	-	-
Vanadium (V)	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	-	-
Zinc (Zn)	.005	<.005	.03	<.005	.01	<.005	<.005	<.005	<.005	<.005	5	3
Zirconium (Zr)	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	-	-

A. Most stringent criterion based on:
1. Maximum permissible level for drinking water, Connecticut Public Health Regulation 19-13-B102 (Connecticut General Assembly, 1975).
2. Maximum contaminant level established by: National Interim Primary Drinking Water Regulations, U.S. Environmental Protection Agency, 1975.
3. Maximum level recommended by: National Secondary Drinking Water Regulations, U.S. Environmental Protection Agency, 1977.

Table 3.--Organic analyses of water from selected wells

[Chemical constituents dissolved, except as indicated; concentrations in micrograms per liter (ug/L), except as indicated; < = less than.]

Constituent or property	Well number and date sampled (month, day, and year) CV 37 4-3-81	GL 236 3-30-81	HD 420 3-31-81	MS 38 4-3-81	SE 8 4-1-81	SI 313 4-2-81	SI 314 4-2-81	SI 315 4-2-81	TO 7 4-3-81	WO 282 4-1-81	Limiting value	Basis for limiting value (A)
Cyanide (CN) (mg/L)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-
Methylene blue active substance (MBAS), total (mg/L)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	-	-
Organochlorine compounds:												
Gross polychlorinated biphenyls (PCBs)	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	-	-
Gross polychlorinated napthalenes (PCNs)	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10	-	-
Pesticides:												
Aldrin	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	-	-
Chlordane	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10	-	-
DDD	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	-	-
DDE	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	-	-
DDT	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	-	-
Dieldrin	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	-	-
Endosulfan	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	-	-
Endrin	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	0.2	1,2
Heptachlor epoxide	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	-	-
Heptachlor	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	-	-
Lindane	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	4.0	1,2
Methoxychlor	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	100	1,2
Mirex	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	-	-
Perthane	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	-	-
Toxaphene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	5	1,2
Phenols, total recoverable	0	0	0	0	0	4	0	1	2	0	-	-

Volatile organics, total recoverable (quantitative GC/MS analyses of purgeable organics in water).
[In order to identify these purgeable compounds in water, they must first be separated from the water by a technique known as "vapor stripping". A stream of inert gas is bubbled through the water sample and then passes through a tube of absorbent material. Nitrogen carries the volatile organics out of the water and into the absorbent trap.

The trap is then connected to a computer-controlled HP 5992A GC/MS spectrometer and heated rapidly to drive the volatile organics into the GC/MS system. Volatile organic compounds pass through the GC column (6′ x 18"ID 0.2% cabowax 1500 on carbopack C) where they are separated prior to entering the mass-spectrometer. A mass spectrum for each compound is then collected, stored on magnetic tape, and compared against a library of known compounds for positive identification.

A quantitative analysis was made by comparing the total abundance value at the top of each GC/MS peak with the abundance value of the known standards.]

Constituent or property	CV 37	GL 236	HD 420	MS 38	SE 8	SI 313	SI 314	SI 315	TO 7	WO 282	Limiting value	Basis for limiting value (A)
Benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-	-
Bromoform	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-	-
Carbon, tetrachloride	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-	-
Chlorodibromomethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-	-
Chloroform	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-	-
Dichlorobromomethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-	-
1,2-dichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-	-
Methylene chloride	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-	-
1,1,2,2-tetrachloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-	-
Toluene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-	-
1,1,2-trichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-	-
1,1,2-trichloroethylene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-	-

A. Most stringent criterion based on:
1. Maximum permissible level for drinking water, Connecticut Public Health Regulation 19-13-B102 (Connecticut General Assembly, 1975).
2. Maximum contaminant level established by: National Interim Primary Drinking Water Regulations, U.S. Environmental Protection Agency, 1975.
3. Maximum level recommended by: National Secondary Drinking Water Regulations, U.S. Environmental Protection Agency, 1977.