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GEOLOGICAL SURVEY

GROUND-WATER AVAILABILITY AND WATER QUALITY IN FARMINGTON, CONNECTICUT

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GLOSSARY

Aerosol: A suspension of fine solid or liquid particles in a gas. Smoke, fog, and insecticide spray are examples.

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.

Arkose: A sandstone containing 25 percent or more feldspar.

Bedrock: Solid rock, commonly called "ledge", that forms the earth's crust. It is locally exposed at the surface but more commonly is buried beneath a few inches to more than 300 feet of unconsolidated deposits.

Coliform organisms: Any of a group of bacteria, some of which, inhabit the intestinal tracts of vertebrates. Their occurrence in a water sample is regarded as evidence of possible sewage pollution and fecal contamination, although these are generally considered to be nonpathogenic.

Color unit: A standard of color in water measured by the platinum-cobalt method. The color produced by 1 milligram per liter of platinum in water equals one color unit.

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

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

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

Effective well diameter: The assumed diameter of a water well, used in certain hydraulic computations, that considers both the diameter of the well screen and the construction characteristics of the well. For example, a well with a 1-foot diameter screen surrounded by a 2-foot diameter gravel pack would have an effective diameter of 2 feet.

Evapotranspiration: Loss of water to the atmosphere by direct evaporation from water surfaces and moist soil, combined with transpiration from living plants.

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

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

Ground water: Water in the saturated zone.

Ground-water discharge: The discharge of water form the saturated zone by 1) natural processes such as ground-water runoff, ground-water evapotranspiration, and underflow and 2) discharge through wells and other man-made structures.

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

Ground-water outflow: The sum of ground-water runoff and underflow; it includes all natural ground-water discharge from a drainage area exclusive of groundwater evapotranspiration.

Ground-water recharge: The amount of water that is added to the saturated zone.

Ground-water runoff: Ground water that has discharged into stream channels by seepage from saturated earth materials.

Hardness, of water: The property of water generally attributable to salts of the alkaline earths. Hardness has soap-consuming and encrusting properties and is expressed as the concentration of calcium carbonate ($CaCO_3$) that would be required to produce the observed effect.

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

Hydraulic boundary: A physical feature that limits the areal extent of an aquifer. The two types of boundaries are termed impermeable-barrier boundaries and line-source boundaries.

Hydraulic conductivity: A measure of the ability of a porous medium to transmit a fluid. The material has a hydraulic conductivity of unit length per unit time if it will transmit in unit time a unit volume of water at the prevailing kinematic viscosity through a cross section of unit area, measured at right angles to the direction of flow, under a hydraulic gradient, of unit change in head over unit length of flow path.

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

Impermeable-barrier boundary: The contact between an aquifer and adjacent impermeable material that limits the areal extent of the aquifer. For example, the termination of permeable valley-fill deposits of sand and gravel against the bedrock valley walls. Its significant hydraulic feature is that ideally no ground water flows across it.

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

Ion: An atom or group of atoms that carries an electric charge as a result of having lost or gained electrons.

Line-source boundary: A boundary formed by a surface-water body that is hydraulically connected to an adjacent aquifer. Ideally there is no drawdown along such a boundary.

Long-term well yield: The yield of a well or group of wells that can be reasonably expected under conditions of continuous pumping over extended time periods. In this report, the time period is 180 days.

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

Median: The middle value in a set of values arranged according to numerical rank. It is an average of position, whereas the mean is an average of quantity.

Milliequivalents per liter: A measure of the concentration of ions in water espressed in chemically equivalent units. It is calculated by dividing the concentration, in milligrams per liter, by the equivalent weight.

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

Natural recharge: Water that, under natural conditions, infiltrates to the saturated zone and supplies aquifers. In Connecticut, precipitation is the principal source of natural recharge.

Noncarbonate hardness: A measure of the amount of alkaline-earth cations in excess of available carbonate (and bicarbonate) anions.

Partial penetration: A condition in which a water well is not open to the entire saturated thickness of the aquifer.

Perennial stream: A stream that flows during all seasons of the year.

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

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

Recharge: Water that infiltrates to, and supplies 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.

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

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

Saturated zone: The subsurface zone in which all open 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.

Screened well: A water well that uses a continuous slot, wire wrapped, or other type of screen as an intake structure.

Specific capacity, of a well: The rate of discharge of water divided by the corresponding drawdown of the water level in the well (gal/min/ft).

Specific conductance, of water: A measure of the ability of water to conduct an electric current, expressed in micromhos per centimeter at $25^{\circ}C$. It is related to the dissolved-solids content and serves as an approximate measure thereof.

Specific yield: The ratio of the volume of water which, after being saturated, a rock or soil will yield by gravity, to its own volume.

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

Stratified drift: 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.

Surface runoff: Water which travels over the soil surface to the nearest stream channel.

Till: Nonsorted, nonstratified sediments deposited directly by a glacier and composed of boulders, gravel, sand, silt, and clay.

Transmissivity: The rate at which water of the prevailing kinematic viscosity is transmitted through a unit width of aquifer under a unit hydraulic gradient. Equal to the average hydraulic conductivity times the saturated thickness.

Transpiration: The process whereby plants release water vapor to the atmosphere.

Turbidity, of water: The extent to which penetration of light is restricted by suspended sediment, microorganisms, or other insoluble material. Residual or "permanent" turbidity is that caused by insoluble material that remains in suspension after a long settling period.

Unconfined aquifer (water-table aquifer): One in which the upper surface of the saturated zone, the water table, is at atmospheric pressure and is free to rise and fall.

Underflow: The downstream movement of ground water through the permeable deposits that underlie a stream.

Water table: The upper surface of the saturated zone.

CONVERSION FACTORS

Factors shown below are used to convert the English units used in this report to the International System of Units (SI):

Multiply English unit	By	To obtain SI unit
inches (in)	25.40	millimeters (mm)
feet (ft)	.3048	meters (m)
miles (mi)	1.609	kilometers (km)
square miles (mi^2)	2.590	square kilometers (km^2)
gallons (gal)	3.785×10^{-3}	cubic meters (m^3)
cubic feet per second (ft^3/s)	.02832	cubic meters per second (m^3/s)
gallons per minute (gal/min)	.06309	liters per second (L/s)
million gallons per day (Mgal/d)	3.785×10^3	cubic meters per day ($m3_{/d}$)
feet squared per day (ft^2/d)	.09296	meters squared per day (m^2/d)
tons, short (2,000 lb)	.9072	megograms (Mg)

GROUND-WATER AVAILABILITY AND WATER QUALITY IN FARMINGTON, CONNECTICUT

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ABSTRACT

Long-range development plans for Farmington, Conn. require accurate information regarding the quantity and quality of water available from the stratified-drift aquifer. This aquifer is capable of yielding large amounts of good quality water to individual wells and is the chief aquifer in the area in terms of water availability and suitability for management.

About 14 square miles of the Farmington area is underlain by stratified-drift deposits, which, in places, are more than 450 feet thick. Much of this material is fine grained, however, and incapable of yielding large amounts of water. The most productive stratified-drift deposits are found in the Farmington River valley, from Unionville southeast past River Glen and along Scott Swamp Brook in the vicinity of Hyde Road. In these areas, saturated, coarse-grained stratified drift is more than 80 feet thick, in places, and estimated yields to individual wells range from 250 to 1,000 gallons per minute.

Results of mathematical model analysis of three of the most favorable ground-water areas in Farmington indicate that long-term yields range from 1.2 to 2.5 million gallons per day.

Water in the aquifer is of generally good quality with the exception of dissolved manganese. All but one of the 11 wells sampled had manganese concentrations above 0.05 milligrams per liter; the maximum level recommended by the U.S. Environmental Protection Agency for public water systems.

Water in the Farmington and Pequabuck Rivers meets the Connecticut Drinking Water Standards, assuming complete conventional treatment, for the six characteristics measured (coliform organisms, color, turbidity, chloride, copper, nitrate plus nitrite). High coliform bacteria concentrations in the Pequabuck River (12-month geometric mean of about 6,800 colonies per 100 milliliters of water) indicate a potential problem.

INTRODUCTION

Purpose and Scope

In 1976, the U.S. Geological Survey (U.S.G.S.) published a report (Melvin, 1976) which updated the hydrogeologic information for the major stratified-drift areas in the Town of Farmington, Conn. and outlined data requirements for future evaluation and management of the ground-water resources of the area. The report concluded that available hydrogeologic information for much of the stratified-drift areas in Farmington was inadequate and that water-quality data for the area was sparse. As a result of that report and subsequent discussions with Town officials, the U.S.G.S., in co-operation with the Town of Farmington, began the present investigation, which has as its objectives:

1) Description of the configuration of the water table in the stratified-drift areas and determination of the directions of ground-water movement.

2) Description of the hydrogeologic framework of the major stratified-drift areas.

3) Estimation of the amount of ground water potentially available in the stratified-drift areas.

4) Assessment of the ground-water and surface-water quality of the area.

This report covers the major stratified-drift deposits in Farmington. Only this aquifer is generally capable of large sustained yields to individual wells, and it is the most significant aquifer in terms of water availability and management. Hydrogeologic data collected to meet the objectives of the study include information describing extent and characteristics of the stratified-drift aquifer, ground-water levels, and water-quality analyses. Two methods were used to estimate the quantity of water available. The first method provides a general estimate of ranges of long-term well yields over the entire aquifer and is based on the relationship between well yield, saturated thickness, and transmissivity. The second method, which evaluates three of the most favorable areas, uses an analytical model based on the Theis (1935) nonequilibrium equation and the theory of image wells (Ferris and others, 1962).

Location and Description

Farmington is located in central Connecticut, about 8 miles southwest of Hartford, the capitol of the State. The Town has an area of 28.7

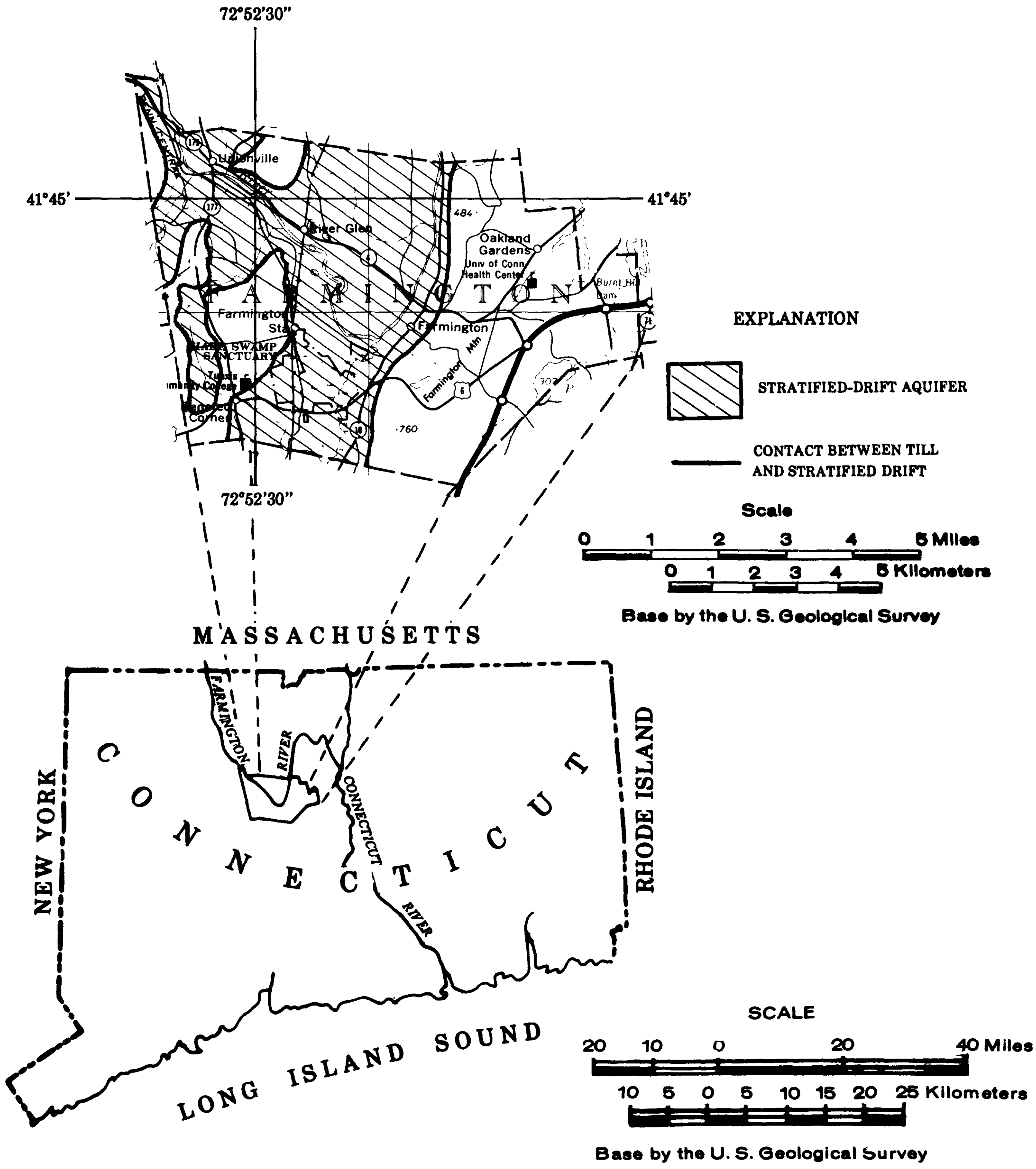


Figure 1.--Location and extent of the stratified-drift aquifer.

square miles and is underlain by unconsolidated deposits of stratified drift and till. The study area includes only the stratified-drift areas and covers about 14 square miles (fig. 1).

The Farmington River and its tributary, the Pequabuck River, drain the entire study area. Upstream from the points these streams enter Farmington, they drain a combined area of about 430 square miles.

The topography is flat to gently rolling in the valley floor and hilly or terraced along the valley margins. Land surface altitudes in the stratified-drift area range from about 160 to 350 feet.

Previous Investigations

Several hydrologic studies which include all or part of the Town of Farmington have been published in the past 15 years. In addition, Connecticut Water Resources Bulletins No. 24 and No. 31, which include parts of Farmington, are in preparation by the U.S.G.S. Connecticut District office. The most recent U.S.G.S. publication for the area, "Hydrogeology of stratified drift in Farmington, Connecticut: Available data and future needs" (Melvin, 1976), describes these investigations and notes that unpublished subsurface information, which is periodically updated, is on file at the U.S.G.S. District office in Hartford, Conn. Published and unpublished information from previous investigations of the area was used to supplement the data collected specifically as part of the present study and is incorporated in this report.

Acknowledgments

This investigation was made by the U.S.G.S. in cooperation with the Town of Farmington. Data on which this report is based were collected and analyzed by the U.S.G.S. Additional information was obtained from previous hydrologic studies of the area (Hopkins and Handman, 1975; Melvin, 1976) and from the files of the Connecticut Department of Environmental Protection (Conn. DEP).

The author is grateful for the assistance and information provided by Town officials, the Unionville Water Company, Town residents and other property owners, and the Conn. DEP. Their contributions helped in the preparation of this report and are sincerely appreciated.

DATA COLLECTION

The evaluation of the hydrologic characteristics of the stratified-drift aquifer in Farmington, determination of the directions of ground-water movement, estimation of well yields, and assessment of ground-water quality require the collection of several types of hydrogeologic information. Data collected for this study include:

1) Seismic profiles
2) Test borings and subsurface materials samples.
3) Observation well information.
4) Subsurface materials analyses.
5) Water-level measurements.
6) Chemical analyses of water samples.

The data collection phase is summarized below. Locations of collection sites are shown on plate A; data tabulations are shown in tables 8 through 15.

Seismic Profiles

Seismic-refraction profiles provided information on depth to bedrock and depth to the water table that was used to define the framework of the aquifer and aided in selecting test-hole sites. Profiles at six locations in the stratified-drift areas totaled approximately 18,350 linear feet. They showed that the maximum thickness of material was along Line 4, south of Hyde Road. Thicknesses of stratified drift along that profile range from 340 to 460 feet. The locations of the seismic profile lines are shown on plate A, and data from each of the profiles are summarized in table 8.

Test Borings

Test borings are used to determine the thickness and physical characteristics of the aquifer and aid in determining the configuration of the water table. Subsurface materials collected during the test boring phase of the study were analyzed for physical and hydrologic characteristics and the results were used to determine the overall hydrologic characteristics of the aquifer. In the stratified-drift areas, where hydrologic data were considered inadequate, 45 test borings totaling 3,295 vertical feet were completed. Forty-two of these were augered and three were drilled with mud-rotary equipment. At 17 of the sites, observation wells were installed in the upper part of the aquifer. The locations of the test borings are shown on plate A. Geologic logs are shown in table 9.

Observation Wells

Observation wells, 2 inches in diameter and completed at depths ranging from 19 to 36 feet, were used to measure ground-water levels and collect water-quality samples. At most sites the borings were continued to greater depths to obtain additional information regarding the characteristics of the aquifer. Locations of the observation wells are shown on plate A. Geologic logs of the wells are included in table 9, and the physical characteristics of the wells are given in table 10.

Subsurface-Materials Analyses

Analyses of subsurface materials aid in determining the hydrologic characteristics of the aquifer. During test boring and observation well installation, 211 subsurface samples were collected and analysed for the determination of grain-size distribution and other characteristics. Two of the samples were analysed for vertical hydraulic conductivity. Results of the laboratory analyses are shown in table 11.

Water-Level Measurements

Systematic measurements of ground-water levels were used to determine the altitude of the water table in the stratified-drift areas. These data were used to prepare a water-table map which, in turn, was used to determine the direction of ground-water movement. Ground-water levels measured monthly at 17 observation wells tapping stratified-drift from September 1976 to September 1977 are listed in table 12. Locations of the observation wells are shown on plate A.

Water-Quality Analyses

Chemical analyses of ground-water samples are used to determine the general chemical characteristics of water in an aquifer. In the stratified-drift areas of Farmington, water from 11 wells was analysed for several chemical and physical characteristics. In addition, water samples from the two major streams, the Farmington and the Pequabuck Rivers, were collected and analyzed periodically from October 1975 to June 1977. Chemical analyses of water samples from streams adjacent to an aquifer allow an evaluation of changes in ground-water quality that might result as a consequence of large ground-water withdrawals and subsequent infiltration of surface water. Locations of the sampling sites are shown on plate A; results of the chemical analyses are shown in tables 13 through 15.

HYDROGEOLOGIC SYSTEM

Evaluation and management of water resources require a knowledge of the components of the hydrogeologic system and an understanding of how the system functions. In Farmington, major components of the system with respect to large ground-water yields include stratified-drift deposits and the water associated with them.

Stratified drift consists of interbedded layers of gravel, sand, silt, and clay deposited by meltwater streams during the retreat of continental ice masses from southern New England. Stratified drift has pore spaces between its individual grains; where these spaces are interconnected, they provide places for the storage and movement of water. If the saturated, stratified drift is capable of yielding adequate quantities of water to wells, it is called an aquifer.

Much of Farmington is underlain by deposits of stratified drift, the valleys of the Farmington and Pequabuck Rivers contain extensive deposits of this material. Where it is coarse grained, saturated, and of sufficient thickness, it forms the stratified-drift aquifer.

Water that recharges the stratified-drift aquifer comes from precipitation falling upon the land surface above the aquifer and adjacent areas. Precipitation and recharge are parts of the hydrologic cycle, a

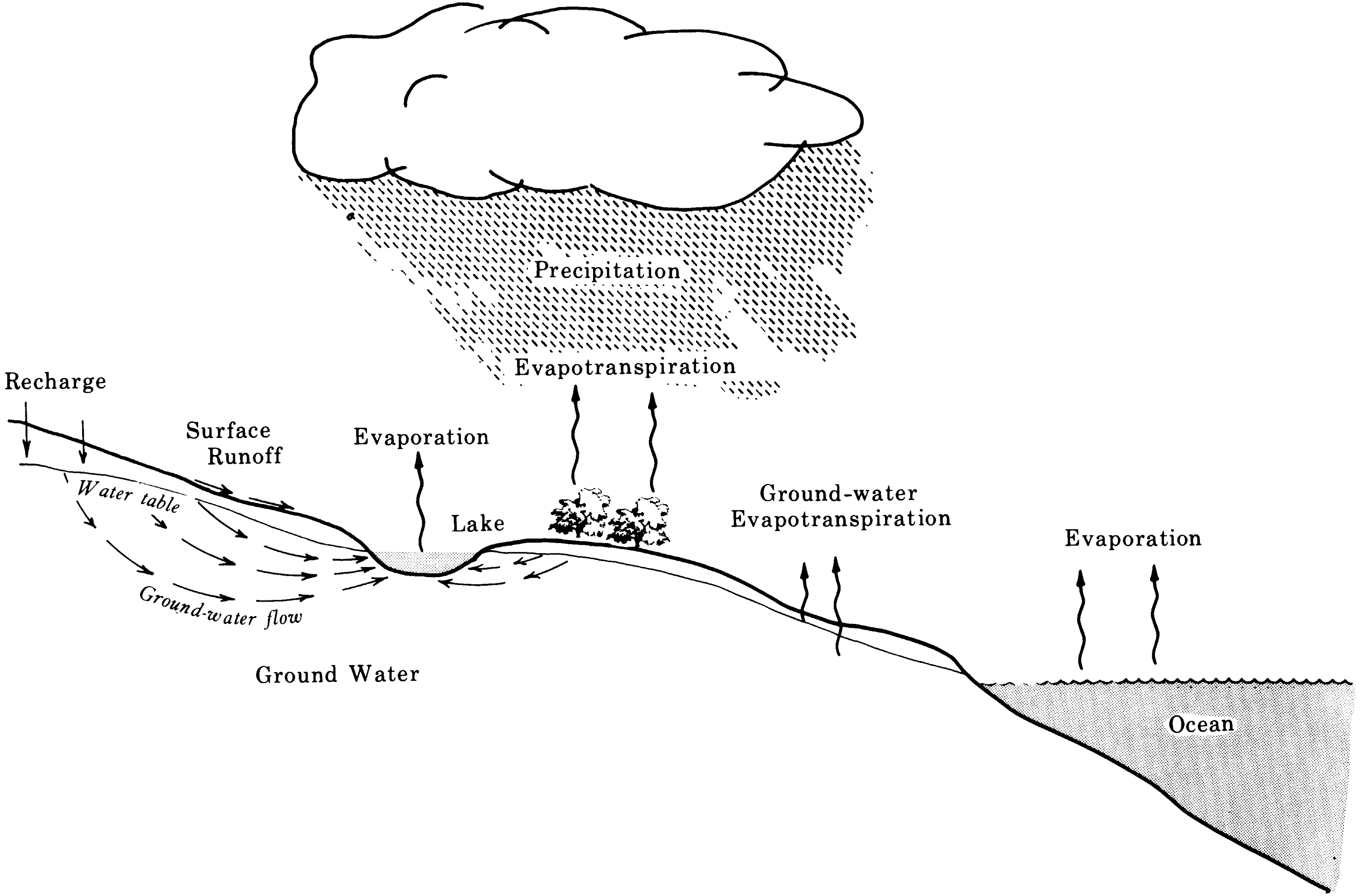


Figure 2.--The hydrologic cycle.

term used to describe the circulation of water between land masses, oceans, and the atmosphere (see fig. 2). Precipitation that reaches the land surface may flow across the land and discharge to streams and lakes, or it may seep into the ground. Much of the water on the land surface or beneath it is soon evaporated or used by plants and returned to the atmosphere by the process of transpiration. The remaining water moves through permeable soils and rocks and eventually discharges into nearby surface-water bodies. Water that reaches streams, lakes, and ultimately the ocean, evaporates to complete the cycle. Water that reaches the saturated zone and moves through the soil and rocks in this zone is called ground water. It is the water that supplies springs and wells.

The movement of water in stratified drift is governed by the characteristics of the pore spaces between individual grains and the pressure or head of the water in the flow system. The general pattern of circulation in stratified drift is idealized in figure 3. The size and shape of the pore spaces and their degree of interconnection determine to a large extent the rate at which water moves through stratified drift and this, in turn, is a major factor controlling the yields of wells tapping the deposit. The size of the pore spaces in stratified drift is determined by the size (diameter) of individual grains in the deposit and the degree of sorting of the deposit as a whole. In general, stratified drift that is coarse grained and well sorted (clean sand and gravel) has relatively large pore spaces; this permits high rates of ground-water movement and large well yields.

The head in a ground-water flow system is a measure of the potential energy of the fluid. Ground water flows in the direction of decreasing head; differences in the altitude of the water table of an unconfined aquifer indicate the direction of the horizontal component of ground-water flow.

Water in the stratified-drift aquifer is in constant motion, with water continually entering and leaving the system. Changes in the quantity of water in the aquifer are indicated by the periodic rise and fall of the water table. (See fig. 4.) These water-level fluctuations represent changes in ground-water storage and are controlled by variations in the recharge and discharge rates of the system. Under conditions of equilibrium, the ground-water system is in dynamic balance; water entering or leaving must be accounted for. Under natural conditions, water entering the system is treated as one item, ground-water recharge; water leaving the system is divided into three components: ground-water runoff, ground-water evapotranspiration, and underflow. Differences between amounts entering and leaving the system are reflected by changes in storage. The equation that describes the balance is:

$$GW(r) = GW(ro) + GW(et) + U \pm S$$

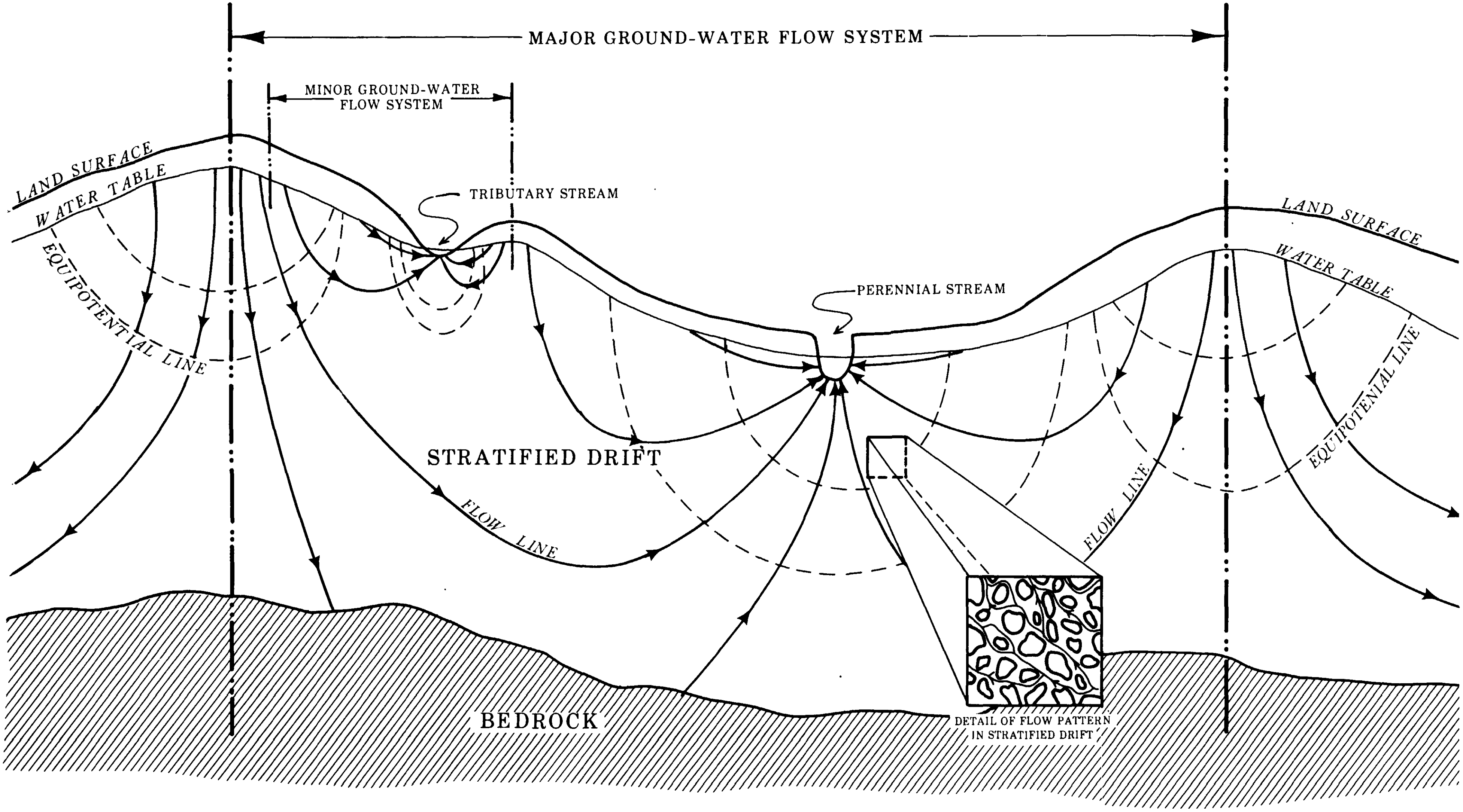


Figure 3.--Idealized pattern of water circulation in stratified drift.

(The direction of flow and distribution of head in stratified drift are depicted by flow and equipotential lines. The actual configuration of these lines in nature is more complex than shown, principally because of variations in hydraulic conductivity of earth materials.)

Where:

GW(r) = Ground-water recharge
GW(ro) = Ground-water runoff
GW(et) = Ground-water evapotranspiration
U = Underflow
S = Changes in ground-water storage

Ground-water recharge in the Farmington area generally occurs during the nongrowing season (mid-October to mid-May). Ground-water discharge (GW(ro) + GW(et) + U) occurs throughout the year. The difference between recharge and discharge over any time period is equal to the change in ground-water storage.

Changes in one of the elements of a ground-water flow system will cause it to establish a new equilibrium condition with corresponding changes in one or more of the remaining elements. For example, reductions in recharge, which could result from extended drought or large increases in sewered or paved areas over the surface of an aquifer, can lead to a reduction in ground-water discharge and a decrease in storage.

Ground-water and surface-water flow systems are interrelated. Ground-water runoff contributes to streamflow and, during extended periods of little or no rainfall, constitutes a significant part of the flow of the Farmington River. Pumping wells near a stream can cause surface water to infiltrate and recharge the aquifer. If large amounts of water are recharged in this manner, the quality of the water in the aquifer will change, and streamflow will be reduced.

Water Table and Ground-Water Movement

The water table is the top of the saturated zone. It marks the upper surface of an unconfined aquifer and rises or falls in response to variations in rates of recharge and discharge. In the stratified-drift areas of Farmington, the periodic changes in the altitude of the water table follow seasonal patterns. Figure 4 shows seasonal variations in observation well F 282. They are typical for the area and represent changes in ground-water storage.

Water-level measurements in the stratified-drift areas from observation wells and selected surface-water sites were used to construct a water-table map; a graphic representation of the configuration of the water table. It shows the shape of the water table in the same way a topographic map shows the shape of the land surface. (See plate B).

Water-table maps are used to determine the depth below land surface at which ground water is present and the horizontal direction in which it is moving. Hydraulic gradient or slope of the water table is the

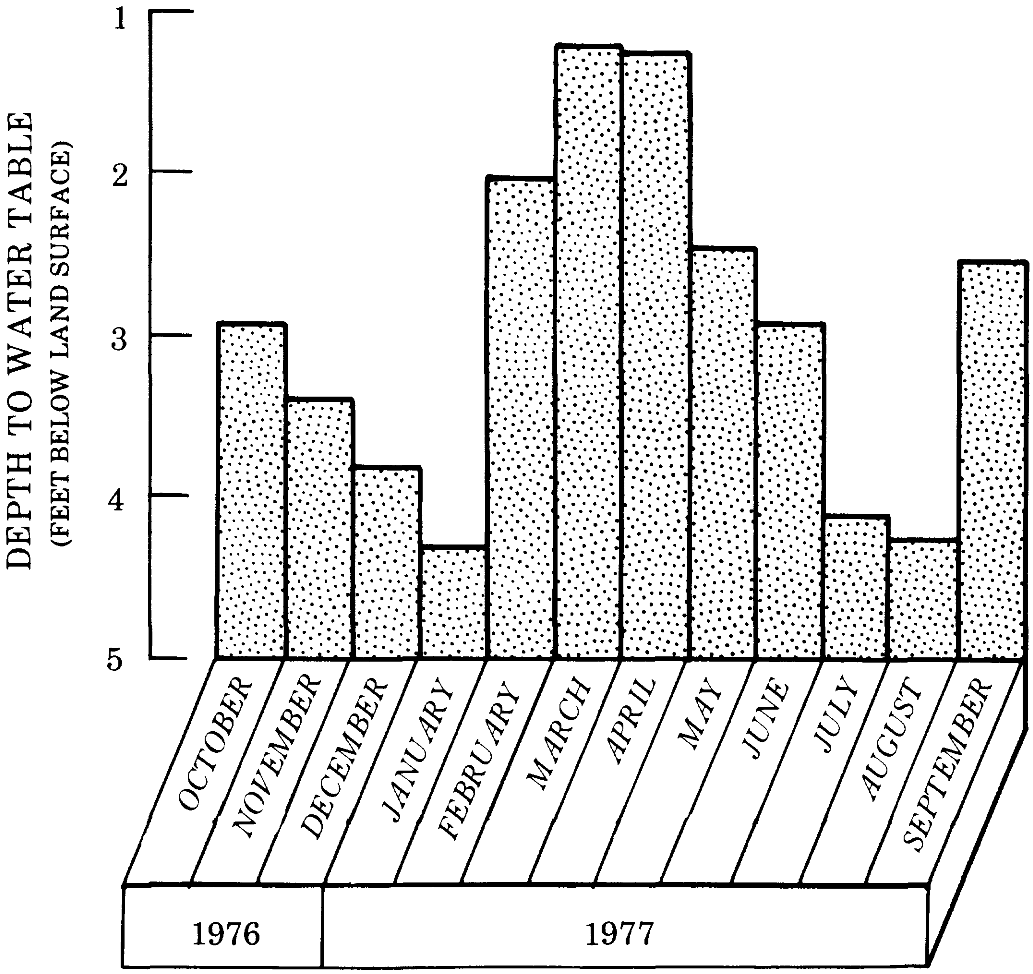


Figure 4.--Hydrograph of observation well F 282.

(Water levels show changes in ground-water storage. As levels rise, storage is increased; as they fall, storage is reduced.)

difference in water-table altitude over a known distance. The horizontal direction of ground-water flow is perpendicular to the lines of equal water-table altitude and in the direction of decreasing gradient. Plate B shows the general directions of the horizontal component of ground-water flow in the stratified-drift aquifer.

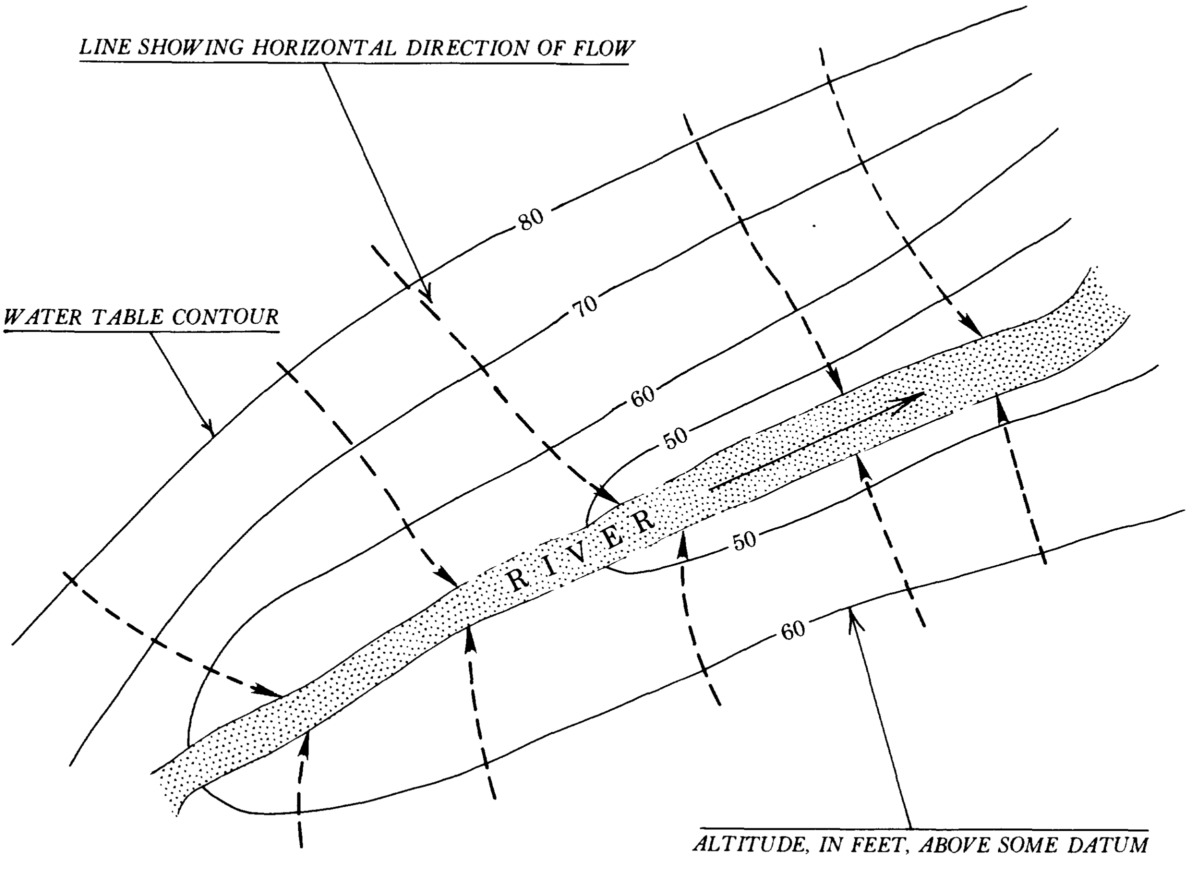
Water-level measurements used to construct the water-table contours shown on plate B were made on November 30 and December 1, 1976. Water table altitudes at this time were declining over much of the aquifer after a recharge period in early autumn. During other times of the year, the water table could be higher (March and April) or lower (January and February). Under natural conditions, the general configuration of the water table is similar throughout the year. If a stress is placed on the system, such as a large, concentrated withdrawal of ground water, the configuration of the water table in the vicinity of the stress will change. Under pumping conditions, the water table around the pumping center is lowered, and the water-table gradient becomes steeper. Ground-water movement in the vicinity is influenced, and water flows toward the pumping center. (See fig. 5.)

A map showing the direction of movement of the horizontal component of ground-water flow can aid in assessing the effect of a potential or actual occurrence of ground-water contamination. Figure 6 illustrates the possible consequences of introducing a contaminant to a ground-water system that includes a center of pumping. The arrows depicting direction of horizontal ground-water flow indicate that a substance entering the aquifer at site B would eventually migrate to the pumping center and could effect the quality of water being pumped. A substance introduced at site A, under the conditions depicted, would move away from the pumping wells. It could, however, affect the quality of ground water as it moved through the aquifer and it could also affect the quality of water in the stream into which it discharged. The directions of the horizontal component of ground-water flow in the stratified-drift aquifer in Farmington are shown on plate B.

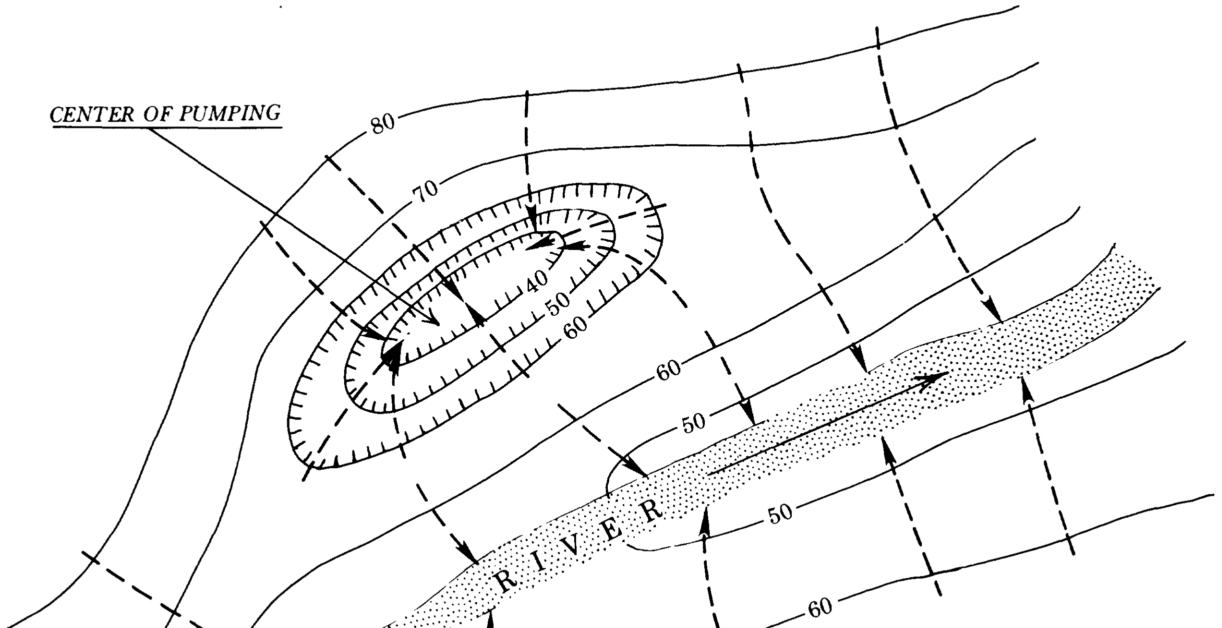
Stratified-Drift Aquifer

The stratified-drift deposits in Farmington can yield a few, to several hundred gallons of water per minute (gal/min), to individual wells, and some areas have the potential for large, sustained, ground-water yields. The areal distribution of the significant stratified-drift deposits is shown on plate C.

The amount of water that can be withdrawn from an aquifer depends on factors to include saturated thickness, transmissivity, and storage coefficient. In Farmington, the stratified-drift aquifer is unconfined, and its saturated thickness is the vertical extent from the water table to the bottom of the aquifer. The thickness of the saturated section



A. WATER TABLE CONTOURS AND LINES SHOWING THE DIRECTION OF GROUND-WATER FLOW UNDER NONPUMPING CONDITIONS.



B. EQUIVALENT HYDRAULIC SYSTEM UNDER THE INFLUENCE OF A CENTER OF PUMPING.

Figure 5.--Map view of a hypothetical aquifer showing water-table contours and flow lines under nonpumping (A) and pumping (B) conditions.

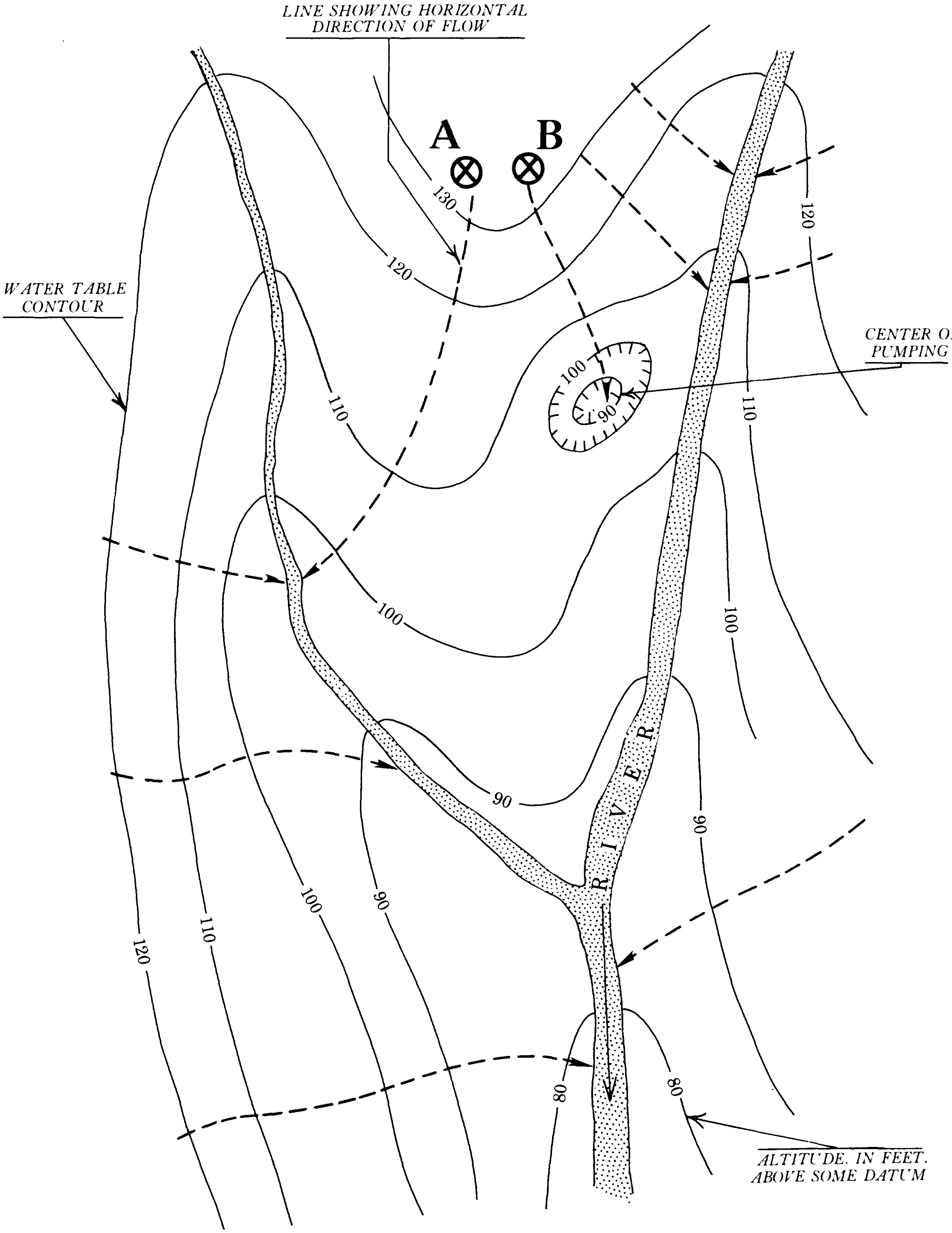


Figure 6.--Map view of a hypothetical aquifer showing the flow directions at two sites and their relationship to a center of pumping.

(A substance introduced to the aquifer at site A would eventually discharge to the tributary stream. A substance introduced at site B would flow toward the center of pumping and could affect the quality of the water at that point.)

determines the amount of drawdown available at a site and is an important factor in estimating the yields of individual wells. Those parts of the aquifer with relatively thick saturated sections (40 feet or greater) have the best potential for large, sustained ground-water yields.

The total saturated thickness of the stratified-drift deposits in Farmington ranges from less than a few feet along the margins to more than 360 feet in places along the Pequabuck River valley south of Meadow Road. The distribution and saturated thickness of this material in Farmington is shown on plate B of U.S.G.S. Open-file Report 76-248 (Melvin, 1976). Much of this material, especially in the eastern half of the report area, is fine grained at depth, and only the upper, coarse-grained part of the deposit is suitable for the installation of large-capacity wells. In general, coarse-grained stratified drift (medium sand to coarse gravel) extends to bedrock along the Farmington River valley from Unionville southeast to the vicinity of River Glen. Saturated thickness of this material exceeds 80 feet in places. In much of the rest of the stratified-drift area, coarse-grained material overlies much finer grained material (fine to very fine sand and silt). The saturated coarse-grained material is generally less than 40 feet thick over most of the area, but in places it is more than 80 feet thick. Beneath the coarse-grained deposits, fine-grained material extends to bedrock. In places along the Pequabuck River valley, these fine-grained deposits are more than 400 feet thick. The distribution of saturated coarse-grained stratified drift is shown on plate C. This unit, in places, is capable of yielding several hundred gal/min to individual wells, and, for purposes of this report, constitutes the stratified-drift aquifer.

A second factor used in the evaluation of the potential yield of an aquifer is its transmissivity. Transmissivity is the property that describes the rate at which water moves through a unit width of the aquifer under unit hydraulic gradient. It is equal to the average hydraulic conductivity (a measure of the rate at which water moves through a unit cross-sectional area of the aquifer) times the saturated thickness. Transmissivity, in this report, is expressed in "feet squared per day" (ft^2/day) which is a reduction of the equivalent dimensional term "cubic feet per day per foot".

Estimated transmissivities of the stratified-drift aquifer range from near zero in places where the saturated section is thin to about 10,000 ft^2/day in the most favorable areas. Transmissivity values used to evaluate the stratified-drift aquifer in Farmington were computed either from specific-capacity data (Theis, 1963) or were estimated from the relationship between grain size of the stratified-drift materials and hydraulic conductivity (Krumbein and Monk, 1942; Masch and Denny, 1966). The latter method uses data from test borings that have grain-size analyses of the materials penetrated. This technique is described in Connecticut Water Resources Bulletin No. 17 (Ryder and others, 1970). The distribution of estimated transmissivity of the stratified-drift aquifer in Farmington is shown on plate D.

Storage coefficient is a measure of the ability of an aquifer to store and yield water. Under unconfined conditions, it is equivalent to specific yield and is determined by the gravity drainage of interconnected pore spaces. Storage coefficient depends upon grain-size distribution of the material and time of drainage (Johnson 1967). In unconfined aquifers it generally ranges from 0.1 to 0.3 and averages about 0.2 (Lohman, 1972). The evaluation of an unconfined aquifer must consider the fact that storage coefficient varies with time because gravity drainage or release from storage is not instantaneous. The yield estimates for the stratified-drift aquifer in Farmington are based on a drainage time equal to a long-term period of pumping (180 days) and use a storage coefficient of 0.2. Storage coefficient is dimensionless.

GROUND-WATER YIELDS

Two methods are used to evaluate well-yields from the stratified-drift aquifer in Farmington. The first provides a general assessment of long-term well yields. Yields determined from this method are used to compare the relative performance of different areas of the aquifer and to identify favorable areas for more detailed analysis.

The second method, used to evaluate three of the most favorable areas of the stratified-drift aquifer, gives a more accurate estimate of ground-water potentially available from specific sites. Both methods assume that wells have relatively large diameter screens (1.5 ft), and that well-construction characteristics are typical of screened wells common to the study area. The two methods are discussed below.

Long-Term Well Yields

The estimated ranges of long-term yields of individual wells tapping the stratified-drift aquifer are shown on plate E. They are obtained from the saturated thickness and estimated transmissivity of the aquifer as calculated by the following equation:

$$\text{Well yield (gal/min)} = \frac{Tb}{750} \qquad (1)$$

Where:

T = transmissivity, in ft^2/day
b = saturated thickness, in feet.

Equation (1) is derived on the basis of the relation between yield, specific capacity, and drawdown which is shown by:

$$\text{Well yield} = \text{Specific capacity} \times \text{Drawdown} \qquad (2)$$

and the method of estimating the transmissivity of a water-table aquifer from specific capacity described by Theis (1963). The Theis equation may be closely approximated by the expression:

$$s = \frac{15.32\ Q}{T} \quad -0.577 - \ln \frac{0.25r^2S}{Tt} \qquad (3)$$

Where:

s = drawdown, in ft,
Q = well discharge, in gal/min,
T = transmissivity, in ft^2/day,
r = well radius, in ft,
S = storage coefficient
t = pumping period, in days,

provided that the values of $0.25r^2S/Tt$ are less than about 0.01 (Lohman, 1972).

Using an assumed well radius of 0.75 ft, a storage coefficient of 0.2, and a pumping period of 180 days, the following expression is derived from equation (3):

$$\frac{267\ Q}{s} = T \ \frac{-35.27\ Q}{s} \quad \log\ (T \quad 10^{-4}) \qquad (4)$$

Solving equation (4) for T in terms of specific capacity (Q/s) for a range of Q/s from 5 to 50 gal/min/ft gives the expression:

$$\frac{Q}{s} = \frac{T}{260} \qquad (5)$$

which is the average (arithmetic mean) relation ship between the assumed specific capacities and the calculated values of transmissivity.

The specific capacity approximated by equation (5) assumes that drawdown is uncorrected for partial penetration effects, dewatering of the aquifer, and other factors. Assuming that under field conditions these factors will reduce specific capacity by about 50 percent, the relation becomes:

$$\text{Specific capacity} = \frac{T}{520} \qquad (6)$$

Maximum available drawdown at a site is assumed to equal 70 percent of the saturated thickness. The remaining 30 percent of the section would be occupied by the well screen. Thus, equation (2) can be rewritten:

$$\text{Well yield} = \text{Specific capacity} \times 0.7\ b \qquad (7)$$

Combining equations (6) and (7) gives the relation:

$$\text{Well yield} = \frac{T}{520} \times 0.7b \qquad (8)$$

which reduces to:

$$\text{Well yield} = \frac{Tb}{743} \qquad (9)$$

or rounded to a more convenient form:

$$\text{Well yield} = \frac{Tb}{750} \qquad (1)$$

The ranges of long-term well yields shown on plate E were estimated by equation (1). The plate is a general guide to the estimated yields of individual wells tapping the stratified-drift aquifer. Since other factors such as well spacing, well construction characteristics, and aquifer hydraulic characteristics, also effect well yield, the values shown on plate E are general approximations of the amount of water individual wells might yield.

Favorable Areas

In three of the most hydrologically favorable areas of the stratified-drift aquifer a second, more detailed method is used to estimate long-term well yields. This method employs hypothetical pumping wells and a mathematical model based on the Theis nonequilibrium equation (Theis, 1935; Ferris and others, 1962) and the theory of image wells (Ferris and others, 1962). The estimated yields obtained from this method consider (1) hydraulic properties of the aquifer (saturated thickness, average transmissivity, vertical-to-horizontal hydraulic conductivity ratio, and storage coefficient), (2) characteristics of the hypothetical wells (depth, screen length, effective well diameter, and pumping period), (3) the effects of nearby pumping wells, and (4) the effects of hydraulic boundaries.

This method consists of four principal steps:

1) Determine aquifer and well characteristics.

2) Calculate an initial discharge rate for each of the hypothetical pumping wells.

3) Calculate total drawdown in each of the hypothetical wells using the data obtained in steps 1) and 2) above; in this analysis, total drawdown (s_t) assumed to include some or all of the following components:

s_1, drawdown due to aquifer and well characteristics.
s_2, drawdown due to dewatering of the aquifer.
s_3, drawdown due to partial penetration of the aquifer.
s_4, drawdown due to flow through the screen and flow inside the well (well loss).
s_5, drawdown due to nearby pumping wells.
s_6, drawdown (or buildup) due to hydraulic boundaries.

The total drawdown (s_t) for a given well discharge is a summation of these components and is calculated by the following equation:

$$s_t = s_1 + s_2 + s_3 + s_4 + s_5 + s_6$$

4) Compare the total drawdown (s_t) calculated in step (3) to the available drawdown in the well. Available drawdown at each site is assumed to equal 70 percent of the initial saturated thickness. Adjust the discharge rate, if required, to insure that:

(a) Total drawdown (s_t) drop below the top of the well screen.
(b) Drawdown due to well and aquifer characteristics (s_1) does not exceed 30 percent of the saturated thickness of the aquifer.

The drawdown constraints included in step 4) are needed because (a) lowering the water level below the top of the well screen may lead to screen deterioration and (b) the ground-water flow equations used in the model require that the drawdown component due to well and aquifer characteristics (s_1) be small relative to the initial saturated thickness. After discharges and drawdowns are adjusted to meet the stated criteria, estimated long-term yields for the area are obtained by summing the discharges of the individual wells.

A detailed discussion of this technique, which includes the equations on which the model is based and examples of the calculations appears in Connecticut Water Resources Bulletin No. 27 (Mazzaferro and others, 1979).

In the analysis of the favorable areas of the stratified-drift aquifer shown on plate F, the following conditions apply to operation of the model. Hypothetical pumping wells are generally located in the thickest, most transmissive part of the modeled area and are assigned effective diameters of 2.0 feet. Screen lengths are assumed to be equal to 30 percent of the initial saturated thickness at each well site and the wells are assumed to be 100 percent efficient. The aquifer is assigned a vertical-to-horizontal hydraulic conductivity ratio of 0.1 and a storage coefficient of 0.2. A pumping period of 180 days is used in the analysis because it approximates the longest period of little or no recharge in an average year. It is assumed that pumping rates based on this time period can be sustained throughout the year. Hydraulic boundaries used in the model are idealized as vertical planes located to generally represent existing hydraulic conditions. Two types of boundaries are used in the model; line-source boundaries which are positioned generally parallel to the Farmington River, and impermeable-barrier boundaries which are positioned generally parallel to areas of low transmissivity. Pumping levels in the hypothetical wells are not allowed to exceed 70 percent of the initial saturated thickness and thus remain above the top of the well screen.

The locations and long-term yields of the three areas of the stratified-drift aquifer analysed by the described models are shown on plate F. At each of the sites, the Farmington River is considered to be fully penetrating and is treated as a line-source boundary in the analyses. Plate F also shows the locations of the hypothetical pumping wells, the positions and types of boundaries, and the average transmissivities used to calculate the estimated yields.

The estimated long-term yields of the three favorable areas range from 1.2 to 2.5 million gallons per day (Mgal/d). The characteristics assigned to the hypothetical pumping wells, their calculated drawdowns, and corresponding discharges are included in table 1.

The estimated long-term yields determined for each of the favorable areas represent amounts of water that could be pumped from the aquifer under the conditions and assumptions discussed previously. They do not take into consideration the amount of water available from the aquifer over the long term. Under present practices, ground-water withdrawal rates are fairly constant throughout the year but have greatest effect on the aquifer during periods of little or no natural recharge. In addition, much of the water pumped from an aquifer is discharged at some distance away from the point of withdrawal and is unavailable for reuse. These constraints generally limit the amount of water available to natural recharge and induced recharge from surface water bodies.

Data from other areas of Connecticut indicate that ground-water outflow, a conservative estimate of natural recharge, averages 23 inches per year in stratified-drift areas (Ryder and others, 1970). Assuming that this rate is representative of average conditions in

Table 1.--Summary of input data and calculated results for ground-water models in three favorable areas.

Model Area	Well Number	Saturated Thickness (ft)	Transmissivity (ft^2/day) 1/	Available Drawdown (ft)	Calculated Drawdown (ft)	Calculated Discharge (gal/min)	Calculated Long-term Yield (Mgal/d) 2/
(see Plate F for location)							
1	1P	60.0	4,500	42.0	41.9	312	2.0
	2P	85.0	do.	59.5	59.3	429	
	3P	60.0	do.	42.0	41.9	308	
	4P	60.0	do.	42.0	41.9	316	
2	1P	70.0	5,000	49.0	48.8	424	2.5
	2P	85.0	do.	59.5	59.3	480	
	3P	90.0	do.	63.0	62.8	501	
	4P	60.0	do.	42.0	41.9	341	
3	1P	45.0	4,300	31.5	31.3	251	1.2
	2P	40.0	do.	28.0	27.7	202	
	3P	30.0	do.	21.0	20.8	158	
	4P	40.0	do.	28.0	27.8	214	

1/ Average transmissivity of favorable area.

2/ Combined pumpage of hypothetical wells.

Farmington and that 50 percent of this can be captured by wells, the amount of water potentially available from this source, under average conditions, is about 0.5 Mgal/d per square mile.

In addition, the three favorable areas are located adjacent to the Farmington River, and much of the water that might be withdrawn from the aquifer at these sites would be induced from the river. Calculations based on a technique discussed by Theis (1941) indicate that, after 180 days of pumping, approximately 80 percent of the water pumped from hypothetical well number 1P in Model Area 2 (see plate F) would infiltrate from the river. Under low-flow conditions (90 percent duration flow), the discharge of the Farmington River at Unionville (Station No. 01188085) for the 1931-60 period of record, is estimated to be 78 Mgal/d. This is 14 times the combined estimated long-term yields of the three favorable areas.

The relatively high average recharge rate to stratified drift, when considered with the extensive area of stratified drift in Farmington and the large 90 percent duration flow of the Farmington River, indicate that sufficient water is available over the long term to supply the amounts estimated for the favorable areas.

The analyses of the favorable areas require several assumptions and approximations regarding the hydraulic properties of the system, the characteristics of the hypothetical wells, and the operation of the models. Consequently, the resulting yield values are not exact. They are, however, believed by the author to be reasonable estimates of the amounts of water available from each of the areas over the long term.

WATER QUALITY

Water moving through the hydrologic cycle undergoes changes in its physical and chemical properties. As a vapor in the atmosphere, it comes in contact with and is affected by aerosols, gases and particulate matter. When the water vapor condenses and falls to the earth as rain or snow, it already contains some dissolved and suspended substances. The nature of these substances depends upon several factors including wind direction, duration of the storm, and agricultural, industrial, and urban activities. For example, precipitation from storms that pass over the ocean may have high concentrations of sodium and chloride derived from salt-water spray; precipitation from storms that pass over industrial areas may have high concentrations of sulfate derived from smoke and fumes.

Surface-water quality is determined by the quality of precipitation, the nature of the earth materials in the drainage area, and local land-use practices. Surface water, typically, is composed of varying proportions of surface runoff and ground-water runoff and as a consequence,

Table 2.--Chemical quality of precipitation near Burlington, Conn.

(Samples collected from April to September 1971 at the National Weather Service Station at Burlington, Connecticut. Concentrations in milligrams per liter; other units of measure noted in brackets).

Period of Collection	Precipitation inches	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Ammonia (NH_4)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Dissolved solids (calculated)	Hardness (Ca,Mg)	Noncarbonate hardness	pH units	Specific conductance umhos/cm
04-10-71 to 05-05-71	2.96	5.0	0.47	22	1.7	0.63	0.0	26	3.10	23	135	87	14	14	5.3	151
05-05-71 to 05-31-71	4.93	3.0	0.30	5.9	1.8	6.1	22	9.7	0.90	9.6	67	48	9	0	6.7	84
05-31-71 to 06-30-71	.97	3.0	0.50	2.0	3.2	19	30	17	2.40	38	--	101	10	0	6.8	133
06-30-71 to 08-01-71	4.69	1.5	0.10	1.1	0.9	4.13	10	6.7	0.50	2.65	--	23	4	0	6.4	46
08-01-71 to 08-31-71	6.73	0.7	0.10	0.9	0.4	1.07	4.0	3.50	0.20	1.33	--	10	2	0	5.8	19
08-31-71 to 09-30-71	5.88	0.3	0.01	0.7	0.5	1.03	0.0	2.30	0.30	1.33	--	6	1	1	5.2	19

its general quality reflects the relative contributions of these sources. Under high-flow conditions, direct runoff predominates and streamflow quality may approach that of precipitation. Under low-flow conditions, ground-water runoff is a major component of streamflow and the quality of stream water may be similar to that of ground water. Surface-water quality may also be greatly influenced by effluent discharge, especially during low flow periods.

Quality of ground water is also determined, to a great extent, by quality of precipitation, nature of earth materials, and land-use practices. It is generally more mineralized than precipitation or surface water. However, practices such as the infiltration of large amounts of less mineralized surface water to an aquifer can dilute ground water and significantly decrease its dissolved-solids concentration.

Calcium, magnesium, sodium, bicarbonate, sulfate and chloride are the most abundant constituents in water in Farmington. Under natural conditions, they are derived principally from precipitation, the weathering of soil and rock materials, and the solution of materials in sediments. Man's activities can significantly increase the concentrations of these constituents. High concentrations of sodium and chloride, for example, can result from on-site sewage disposal systems and the application of road deicing salts.

Interpretation of water quality in Farmington is based on analyses of water samples collected from 1975 to 1977. They include 44 samples collected at 4 surface-water sites and 11 samples collected from wells tapping the stratified-drift aquifer. The results of the chemical analyses of these samples are shown in tables 13 through 15. The locations of the sampling sites are shown on plate A.

Precipitation

Six composite samples of precipitation and dry fallout were collected monthly at the National Weather Service station near Burlington , Connecticut as part of the water resources inventory of the Farmington River basin (U.S. Geological Survey, 1972). These samples, collected from April 10, 1971, to September 30, 1971, are believed by the author to represent the general quality of precipitation in the Farmington area.

Sulfate and nitrate are the major dissolved constituents and together average 38 percent, by weight, of the dissolved material in the precipitation samples. The mean concentration of dissolved solids, estimated from specific conductance and weighted to precipitation amount, is 47 mg/L. This corresponds to 3.4 tons per square mile of dissolved material falling to the land surface with each inch of rain. The pH of the samples ranges from 5.2 to 6.8; the normal pH value for water in the atmosphere is 5.7 (Barrett and Brodin, 1955). The results of the analyses of precipitation samples at the Burlington station is shown in Table 2.

Surface Water

The quality of water samples collected from the Farmington River at Unionville (Station No. 01188085) and the Pequabuck River at Farmington (Station No. 01189030) is summarized in table 3 for the period from October 29, 1975, to June 8, 1977. The ranges and median values at the two sites show that the quality of water in the Farmington River is superior to that in the Pequabuck River. This is due primarily to the large amounts of treated industrial and domestic sewage from the Bristol area that are discharged to the Pequabuck River.

The median concentrations of the six predominant constituents (calcium, magnesium, sodium, chloride, bicarbonate, and sulfate) are plotted to form irregular polygons that indicate similarities and differences in water composition (Stiff, 1951). The shapes of the polygons, or modified Stiff patterns, which are shown on plate G, show that water from both rivers is of similar relative composition. The widths of the patterns, however, indicate that concentrations are significantly higher in the Pequabuck River.

The six characteristics included in table 4 are among those that have limits set by the Connecticut Department of Health Services (Conn. D.H.S.) (Connecticut General Assembly, 1975) for sources of drinking water. Water samples from the Farmington and Pequabuck Rivers are compared to the Conn. D.H.S. standards in the table. Coliform bacteria concentrations and turbidity in both rivers exceed the limits established by the State for disinfection and chemical treatment procedures. All six characteristics are under the limits for complete conventional treatment.

Samples from the Farmington and Pequabuck Rivers show that the water from these sources is soft to moderately hard. In fact, of the 30 water samples analyzed for hardness during the October 1975 - May 1977 period (15 samples from each river), 26 are classified as soft. The remaining four samples, all from the Pequabuck River, are moderately hard. The ranges in hardness and median values for water samples from the two rivers are compared to the hardness classification ranges used by the U.S.G.S. (Durfor and Becker, 1964) in table 5. This table also includes data for 10 ground-water samples and indicates that surface water is generally softer than ground water in the area. This means that surface water recharged to the stratified-drift aquifer by means of induced infiltration would dilute the ground water and make it softer.

Limits for iron and manganese in public drinking water have not been established by the Conn. D.H.S. These constituents can be troublesome above certain concentrations; they can impair the taste of drinking water and cause staining problems for both industrial and domestic users. The U.S. Environmental Protection Agency (U.S.E.P.A.) has recommended limits of 0.3 mg/L for iron and 0.05 mg/L for manganese (1977) in

Table 3.--Summary of water quality of the Farmington and Pequabuck Rivers

(Concentrations in milligrams per liter; other units of measure noted in brackets)

Constituent or Property	Water Source							
	Farmington River at Unionville Station no. (Pl. A) 01188085				Pequabuck River at Farmington Station no. (Pl. A) 01189030			
	Number of Samples	Maximum	Minimum	Median	Number of Samples	Maximum	Minimum	Median
Calcium (Ca)	15	8.1	3.6	5.0	15	21	8.7	17
Magnesium (Mg)	15	2.3	.6	1.5	15	4.1	1.5	3.3
Sodium + Potassium (Na + K)	14	8.6	.3	6.8	15	69	8.1	20
Iron (Fe)	15	.15	.06	.11	15	.27	.12	.22
Manganese (Mn)	15	.03	.01	.02	15	.22	.05	.18
Copper (Cu)	21	.01	.00	.00	21	.05	.00	.02
Bicarbonate (HCO_3)	15	20	8.0	17	15	102	22	48
Chloride (Cl)	14	14	6.0	8.0	15	70	12	25
Sulfate (SO_4)	14	10	5.8	7.6	15	43	12	23
Nitrate + Nitrate (NO_2 + NO_3)	21	.42	.10	.18	21	1.2	.26	.90
Hardness (as $CaCO_3$)	15	29	14	19	15	69	30	56
Dissolved Solids (Residue at 180° C)	14	62	35	44	15	259	54	139
Specific Conductance umhos/cm	15	105	46	72	15	520	120	230
Color Platinum cobalt units	21	35	0	7	21	20	0	8
Turbidity Jackson Turbidity units	21	7	1	2	21	20	2	6
Coliform Bacteria Colonies per 100 ml	20	7,900	27	220	18	210,000	32	9,000

Table 4.--Comparison of analyses of water from the Farmington and Pequabuck Rivers with the Connecticut Department of Health drinking water standards for six selected characteristics.

Parameter	Connecticut Department of Health standards for disinfection and chemical treatment	Farmington River at Unionville Station no. (Pl. A) 01188085	Pequabuck River at Farmington Station no. (Pl. A) 01189030
Coliform organisms	Not to exceed 100 colonies per 100 ml monthly average, based on a running arithmetic average for most recent 12 month period. No individual sample is to exceed 500 colonies.	Exceeds limits (12 month average about 1500 colonies per 100 ml for period July, 1976 to June, 1977)	Exceeds limits (12 month average about 39,000 colonies per 100 ml for period July, 1976 to June, 1977)
Color	Not to exceed 20 standard units in more than 10 percent of samples for most recent 12 month period.	Under limits	Under limits
Turbidity	Not to exceed 1 NTU except as allowed under EPA regulations for finished water. 1/	Exceeds limits (61 percent of 21 samples exceeded 1 JTU) 1/	Exceeds limits (100 percent of 21 samples exceeded 1 JTU) 1/
Chloride	250 mg/L	Under limits	Under limits
Copper	0.05 mg/L		
Nitrate + Nitrite (calculated as N)	10 mg/L	Under limits	Under limits

Parameter	Connecticut Department of Health standards for complete conventional treatment	Farmington River at Unionville Station no. (Pl. A) 01188085	Pequabuck River at Farmington Station no. (Pl. A) 01189030
Coliform organisms	Not to exceed 20,000 colonies per 100 ml as measured by a monthly geometric mean.	Under limits (12 month geometric mean is about 500 colonies per 100 ml for period July, 1976 to June, 1977)	Under limits (12 month geometric mean is about 6,800 colonies per 100 ml for period July, 1976 to June, 1977)
Color	Not to exceed 250 standard units as measured by a monthly geometric mean.	Under limits	Under limits
Turbidity	Not to exceed 250 standard units (NTU) as measured by a monthly geometric mean.	Under limits	Under limits
Chloride	250 mg/L	Under limits	Under limits
Copper	1.0 mg/L	Under limits	Under limits
Nitrate + Nitrite (calculated as N)	10 mg/L	Under limits	Under limits

1/ Nephelometric Turbidity Units (NTU) are considered comparable to Jackson Turbidity Units (JTU). (U.S. Environmental Protection Agency, 1974, p. 295).

Table 5.--Comparison of hardness in ground water and surface water with the U.S. Geological Survey Hardness Scale.

(Concentrations in milligrams per liter)

Source or Standard	Calcium Magnesium Hardness
Farmington River:	
(Station no. 01188085)	
Maximum	29
Minimum	14
Median	19
Pequabuck River:	
(Station no. 01189030)	
Maximum	69
Minimum	30
Median	56
Ground Water: 1/	
Maximum	140
Minimum	13
Median	72
U.S. Geological Survey Hardness Ranges	
Soft	0 - 60
Moderately Hard	61 -120
Hard	121 -180
Very Hard	181 - or more

1/ Analyses from 10 of 11 wells sampled; F 298 not included.

Table 6.--Comparison of iron and manganese concentrations in ground water and surface water with the U.S. Environmental Protection Agency recommended limits for drinking water. 1/

(Concentrations in milligrams per liter)

Source or Standard	Constituent	
	Iron	Manganese
Farmington River: (Station no. 01188085)		
Maximum	0.15	0.03
Minimum	.06	.01
Median	.11	.02
Pequabuck River: (Station no. 01189030)		
Maximum	.27	.22
Minimum	.12	.05
Median	.22	.18
Ground water: 2/		
Maximum	.07	1.4
Minimum	.01	.03
Median	.05	.36
U.S. Environmental Protection Agency recommended limits	.3	.05

1/ U.S. Environmental Protection Agency National Secondary Drinking Water Regulations (1977)

2/ Analyses from 9 of 11 wells sampled, F 298 and F 299 not included.

drinking water to avoid these problems. Table 6 shows the ranges and median values for iron and manganese concentrations in water from the Farmington and Pequabuck Rivers and compares them to the U.S.E.P.A. limits. As the table indicates, iron is not a major problem in either river. Manganese, however, may be a problem in water from the Pequabuck River, as the data indicate that over 90 percent of the water samples exceeded the recommended limit. Excessively high concentrations of either iron or manganese can be reduced to acceptable levels by treatment.

Ground Water

The quality of water in the stratified-drift aquifer in Farmington is summarized in table 15. Modified Stiff patterns, shown on plate G, indicate that both the relative concentrations of the constituents (shape) and the total concentrations (width) vary considerably from place to place. These variations can be the result of differences in aquifer composition, subsurface flow patterns, biological processes, and man's activities.

Chemical analyses show that 9 of the 11 wells sampled yielded calcium-bicarbonate water (calcium and bicarbonate ions, together, constitute more than half of the constituents in the sample). Two of the wells (F 286 and F 300) yielded a mixed water, with calcium and bicarbonate being the chief ions present, but together they constitute less than half of the total constituents. In water from well F 286, sodium and sulfate were the next most common ion pair. In water from well F 300, magnesium and sulfate ranked as the second most abundant ion pair. All of the wells sampled tap the upper part of the stratified-drift aquifer, and, under natural conditions, the water they yield is probably less mineralized than that from wells tapping the lower part of the aquifer. Wells screened in the lower part of a stratified-drift aquifer commonly obtain some of their water from the underlying bedrock, and the quality of the water they yield will reflect the relative contributions of the two sources.

The chemical analyses of water from well F 298 illustrates the possible harmful effects of man's activities on the quality of ground water. This well, which is adjacent to the town landfill in the Tunxis Meade area, yields water that has been contaminated by leachate from the landfill. Of the 11 wells sampled, it has the highest concentrations of all the six major constituents, and its dissolved solids concentration of 1,280 mg/L is more than 10 times the median concentration of the 11 samples.

Iron and manganese are also present in excessive amounts in well F 298. The iron and manganese concentrations in water from this well are 9.7 mg/L and 38 mg/L, respectively. The very high level of iron and manganese in the ground water at this site is indicated in table 7, which compares the concentrations of these ions to the median value of 11 ground-water samples and the U.S.E.P.A. recommended limit.

A second well, F 299, also yields water with an abnormally high manganese concentration. This well is near the Pequabuck River, and the stratified-drift aquifer in the vicinity is overlain by organic-rich alluvium deposited by the river. The composition of this material probably contributes to the excessive amount of manganese in water from this well. As table 7 shows, manganese concentrations in well F 299 are many times higher than both the median ground-water value and the U.S.E.P.A. recommended limit.

Iron and manganese concentrations in water from the remaining 9 wells (F 298 and F 299 ommitted) are summarized in table 6. The data indicate that iron concentrations in water from the stratified-drift aquifer are generally lower than those in the surface waters of the area and are well below the U.S.E.P.A. recommended limits. Manganese concentrations, on the other hand, seem to be higher in ground water than in surface water, and all but one of the samples in the group exceeded the U.S.E.P.A. limits.

The data in table 6 indicate that induced infiltration of surface water to the stratified-drift aquifer would tend to increase iron concentrations but probably not to objectionable levels. Induced infiltration of surface water would tend to lower the concentrations of manganese in ground water, and, in the case of water from the Farmington River, the reduction could be significant.

Water from 10 of the 11 wells sampled (F 298 omitted) ranged from soft to hard, with 60 percent of the samples classed as moderately hard. The hardness ranges and median values shown in table 5 indicate that water in the stratified-drift aquifer is generally harder than water from either the Farmington or Pequabuck Rivers, although it does not seem to pose a major problem. Most of the ground-water samples fall within the moderately hard category, and water in this hardness range is commonly useable for most applications. The data indicate that induced infiltration of surface water would tend to improve the quality of the water in the aquifer with respect to hardness.

Water sampled from well F 298, which was not included in table 5, had a hardness of 720 mg/L. This very high value is the result of contamination by leachate from the landfill.

Sodium concentrations in water samples from the 11 wells ranged from 3.0 to 140 mg/L. However, only F 298, the well effected by leachate from the landfill, had a sodium concentration higher than 20 mg/L. Sodium concentrations above this level in public supplies require consumer notification under Public Act No. 75-513 (Connecticut General Assembly, 1975). Water from the other wells had sodium concentrations well below the recommended limit. (See table 15.)

Table 7.--Comparison of iron and manganese concentrations in ground water with the U.S. Environmental Protection Agency recommended limits for drinking water. 1/

(Concentrations in milligrams per liter)

Source or Standard	Constituent	
	Iron	Manganese
Well F 298	9.7	38.0
Well F 299	.18	16.0
Median of 11 ground-water samples	.05	.52
U.S. Environmental Protection Agency recommended limits	.5	.03

1/ U.S. Environmental Protection Agency National Secondary Drinking Water Regulations (1977).

Nitrate concentrations (total nitrite plus nitrate measured as nitrogen) ranged from 0.9 to 4.3 mg/L. This is below the limit of 10 mg/L established for drinking water in Connecticut (Connecticut General Assembly, 1975). The highest nitrogen concentration was from well F 300, located on the edge of a cornfield, south of Meadow Road. The relatively high nitrate level (4.3 mg/L) for the ground water in this area is probably due to the use of agricultural fertilizer.

Table 8.--Summary of seismic refraction profile data.

Line Number (see Plate A)	Location (see Plate A)	Length (feet)	Calculated Depth to Rock Minimum (feet)	Calculated Depth to Rock Maximum (feet)
1A	South of Meadow Road from intersection of Red Oak Hill Road northwest to vicinity of Farmington Station.	1,800	30	110
1B	South of Meadow Road from Pequabuck River northwest to intersection of Red Oak Hill Road.	3,700	160	350
3	West of New Britain Avenue from vicinity of Pratt & Whitney Aircraft plant northwest across railroad tracks.	1,350	80	150
4	South of Hyde Road from Pequabuck River west to pond in gravel pit.	2,250	340	460
6	West of Plainville Avenue (Westwoods Golf Club) across Scott Swamp Brook.	1,000	12	21
7A	South of Farmington Avenue from edge of field northwest to Farmington River.	2,500	115	260
7B	South of Farmington Avenue from Farmington River northwest to edge of field.	3,750	90	250
8	West of Town Farm Road, northwest along HELCO-MDC right-of-way.	2,000	60	105

Table 9.--Logs of test holes and wells

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

Identification number: U.S. Geological Survey number assigned to each site. The "F" and "A" prefixes denote the towns of Farmington and Avon, respectively. Test holes are identified by the "th" suffix. Sites are shown on Plate A.

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 in feet above NGVD (National Geodetic Vertical Datum) of 1929 which is approximately equal to mean sea level, at each site. Test-hole altitudes are estimated from topographic maps with 10-ft contour intervals. Well altitudes are determined by differential leveling.

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.

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

Terms used in logs of test holes and wells.

"Poorly sorted"---Indicates approximately equal amounts, by weight, of all grain sizes present in sample.

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

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

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

Percentage by weight of individual components in the sample;

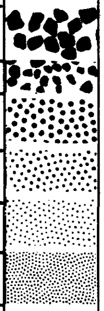
Trace	less than 2
Little	2 - 5
Some	5 - 15
No modifier	greater than 15

Terms in parentheses are interpretations by D. L. Mazzaferro.

Grain size chart

Grain size (millimeters)	Wentworth grade scale U.S. Geological Survey logs		Grain size (inches)
	Boulders (gravel)		
256			10.08
	Cobbles (gravel)		
64			2.52
	Pebbles (gravel)	Very coarse gravel	
32			1.260
		Coarse gravel	
16			.630
		Medium gravel	
8			.315
		Fine gravel	
4			.157
	Granules - very fine gravel		
2			.079
	Very coarse sand		
1			.039
	Coarse sand		
0.5			.019
	Medium sand		
.25			.0098
	Fine sand		
.125			.0049
	Very fine sand		
.063			.0025
	Silt		
.004			
	Clay		

Actual grain size



F 42 th. 414332N0724958.1. Town of Farmington. Drilled 1976. Altitude 160 ft. Depth to water 11 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Soil (loam)	0 - 3	3
Sand, fine to very fine	3 - 6	3
Sand, some gravel	6 - 12	6
Sand, medium to very fine, and gravel; some coarse to very coarse sand, some silt and clay	12 - 16.5	4.5
Sand, medium to very coarse, and gravel; some very fine sand, silt and clay	16.5- 20	3.5
Sand, very fine, and silt; little clay	20 - 27	7
Sand, very fine, and silt; some clay	27 - 37	10
Silt and clay; trace very fine to coarse sand	37 - 57	20
Silt and clay; little very fine to fine sand	57 - 64	7
Till	64 - 77	13
End of hole	at 77	

F 43 th. 414316N0725014.1. Riverside Cemetery Association. Drilled 1976. Altitude 170 ft. Depth to water 11.5 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Soil (loam and sand)	0 - 2	2
Gravel	2 - 5	3
Sand, fine to medium	5 - 8.5	3.5
Gravel	8.5- 9	.5
Silt, some clay; little very fine to coarse sand	9 - 16	7
Sand, very fine to fine, some silt; little clay, trace medium to coarse sand	16 - 33	17
Silt, some clay; some very fine to medium sand	33 - 42	9
Silt and clay; some very fine sand	42 47	5
Silt and very fine to fine sand; some clay, little medium to coarse sand	47 - 54.5	7.5
Gravel, poorly sorted, and fine to very fine sand and silt, in layers	54.5- 58	3.5
Till, sandy	58 - 60	2
Refusal (till)	at 60	

F 44 th. 414411N0724937.1. Angelo Tomasso, Jr. Drilled 1976. Altitude 163 ft. Depth to water 22.7 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Soil	0 - 1	1
Gravel	1 - 4	3
Sand, fine to medium	4 - 5	1
Gravel, fine to coarse, and cobbles	5 - 15	10
Gravel, very fine to coarse; and pebbles to 2 inches in diameter	15 24	9
Sand, fine to medium	24 - 27	3
Silt and very fine sand; some clay, some fine to coarse sand	27 - 41	14
Gravel, poorly sorted	41 - 45	4
Sand, very fine to fine, some silt; little clay, trace medium to very coarse sand	45 - 57	12
Sand, very fine to fine, and silt; little clay, trace medium to coarse sand	57 - 67	10
Silt and very fine sand, some fine sand, little clay; trace medium to very coarse sand, trace very fine gravel	67 - 72.5	5.5
Till	72.5- 80	7.5
Refusal (bedrock)	at 80	

F 45 th. 414422N0724928.1. Tunxis Plantation Golf Course. Drilled 1976. Altitude 158 ft. Depth to water 11 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Sand, medium to fine	0 - 7	7
Sand, medium	7 - 12	5
Sand, fine to very fine	12 - 12.5	.5
Gravel, very fine to medium, and medium to very coarse sand; some fine to very fine sand, little silt and clay	12.5 - 15	2.5
Sand, medium to fine	15 - 17	2
Gravel, very fine to coarse, and medium to very coarse sand; some fine sand, silt, and clay	17 - 19.5	2.5
Silt and very fine sand; some clay, some fine sand, trace medium to very coarse sand	19.5 - 27	7.5
Silt, some very fine sand, little clay; trace fine to medium sand.	27 - 35	8
Silt and very fine sand; some clay, little fine sand, trace medium to coarse sand	35 - 47	12
Sand, very fine to fine, and silt; little medium sand, little clay; trace coarse to very coarse sand, trace gravel	47 - 68	21
Till	68 - 79.5	11.5
Refusal (till)	at 79.5	

F 46 th. 414204N0725132.1. Angelo Tomasso, Jr. Drilled 1976. Altitude 205 ft. Depth to water 27.4 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Sand, medium; little coarse sand, trace very coarse sand and pebbles	0 - 11.5	11.5
Gravel; coarse to very coarse sand and granules; few pebbles to 1 inch in diameter	11.5 - 17	5.5
Gravel; coarse to very coarse sand, sand, granules, and pebbles	17 - 32	15
Sand, medium to very coarse, some very fine to medium gravel; trace silt and clay	32 - 35	3
Sand, fine to medium, some very fine sand; trace silt and clay, trace coarse to very coarse sand	35 - 38	3
Sand, very fine to fine, some silt, some medium sand; little clay, trace coarse sand	38 - 47	9
Sand, very fine, and silt; little clay, little medium to coarse sand	47 - 57	10
Silt and very fine sand, some clay; little fine to coarse sand	57 - 67	10
Silt; little very fine sand, trace clay	67 - 77	10
Silt and very fine sand, some fine silt; little clay, little medium to very coarse sand	77 - 92	15
Silt, some very fine sand, some clay; little fine to medium sand	92 -132	40
End of hole	at 132	

F 47 th. 414221N0725211.1. Felicia Kozlowski. Drilled 1976. Altitude 230 ft. Depth to water 29 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Sand and gravel, clean	0 - 4	4
Gravel, poorly aorted; cobbles to 5 inches in diameter	4 - 12	8
Gravel, fine; some sand and silt	12 - 17	5
Sand, coarse to very coarse, and granules; some silt and clay, occasional layer of pebble gravel	17 - 28	11
Gravel, fine to medium, some sand and silt	28 - 32	4
Till or decomposed bedrock	32 - 37	5
Arkose	37 - 38	1

F 48 th. 414409N0724928.1. Farmington Country Club. Drilled 1976. Altitude 170 ft. Depth to water 4 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Soil	0 - 1	1
Sand, fine to very fine, some clay, some medium to very course sand	1 - 9	8
Gravel; granules, pebbles, and medium to coarse sand, some very coarse sand, some fine to very fine sand, some silt and clay	9 - 17	8
Gravel; granules and pebbles, and medium to very coarse sand, some fine to very fine sand, some silt and clay	17 - 22	5
Sand, medium to very coarse, some gravel, some fine to very fine sand	22 - 30	8
Silt and very fine sand, some fine sand, some clay; trace medium to very coarse sand	30 - 37	7
Gravel; granules, pebbles, and silt, some very fine to very coarse sand, little clay	37 - 45	8
Gravel; granules, pebbles, and fine to very fine sand, some medium to very coarse sand, some silt and clay	45 - 56	11
Till	56 - 67	11
Refusal (till)	at 67	

F 49 th. 414447N0724915.1. HELCO. Drilled 1976. Altitude 170 ft. Depth to water greater than 16 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Soil	0 - 1.5	1.5
Gravel and cobbles; silt and clay in matrix	1.5 - 5	3.5
Gravel, very dirty (reworked till?)	5 - 16	11
Refusal (till)	at 16	

F 50 th. 414531N0725006.1. Pennington Corp. Drilled 1976. Altitude 255 ft. Depth to water 97 ft. Log by U.S. Geol. Survey

	Depth (feet)	Thickness (feet)
Soil, sandy	0 - 2.5	2.5
Gravel; granules, pebbles, and fine to coarse sand	2.5 - 8	5.5
Sand, medium, some fine sand, some coarse sand	8 -13	5
Sand, very fine to medium, some coarse sand; little silt	13 - 21	8
Sand, very fine to fine, some medium sand, some silt	21 - 81	60
Gravel; granules and fine to coarse sand	81 - 82	1
Sand, very fine to fine, some medium sand	82 -112	30
Till	112 -113	1
Refusal (till)	at 113	

F51 th. 414507N0725101.1. Winding Trails Recreation Association. Drilled 1976. Altitude 252 ft. Depth to water 48 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Soil, sandy	0 - 4	4
Gravel; granules, pebbles, and medium to very coarse sand	4 - 14.5	10.5
Sand, medium, some coarse sand, some fine to very fine sand	14.5- 32	17.5
Sand, fine to medium; little coarse sand	32 - 50	18
Sand, fine to medium, some very fine sand, some coarse to very coarse snad and gravel; little silt and clay	50 - 60	10
Sand, very fine to fine, and silt; little medium to very coarse sand, little clay	60 - 70	10
Silt and very fine sand, some fine sand, some clay; trace medium to very coarse sand	70 -75	5
Till	75 - 83.5	8.5
Refusal (till)	at 83.5	

F 52 th. 414619N0725411.1. Connecticut Sand and Stone. Drilled 1976. Altitude 232 ft. Depth to water 15 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Soil, sandy	0 - 1	1
Sand, fine to very fine, some medium to coarse sand and gravel	1 - 8	7
Gravel; pebbles and cobbles, some fine to very coarse sand and granules	8 - 14.5	6.5
Sand, coarse to fine, some very fine sand; little very coarse sand, trace silt and clay	14.5 - 25	10.5
Sand, coarse to medium, some very coarse sand, some silt; little clay, trace gravel	25 - 29	4
Gravel; granules and pebbles, some very fine to very coarse sand; little silt and clay	29 - 35	6
Sand, fine to coarse, some very coarse sand and gravel, aome very fine sand, some silt and clay	35 - 42	7
Sand, coarse to very coarse, and gravel, some medium to fine sand; little silt, little clay	42 - 47	5
Gravel; cobbles and boulders	47 - 48	1
Refusal (boulder)	at 48	

F 53 th. 414528N0725049.1. Winding Trails Recreation Association. Drilled 1976. Altitude 228 ft. Depth to water 15 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Soil, sandy	0 - 1	1
Sand, medium to fine	1 - 3	2
Gravel; granules, pebbles, and fine to coarae sand	3 - 5	2
Sand, medium to fine, some coarse sand	5 - 15	10
Sand, fine to very coarse, some gravel; little very fine sand, trace clay	15 - 22	7
Gravel; granules, pebbles, and medium to coarse sand; little fine to very fine sand, silt, and clay, trace very coarse sand	22 - 24	2
Till (on poorly sorted gravel)	24 - 27	3
Till	27 - 32	5
Refusal (till)	at 32	

F 68 th. 414344N0725020.2. Town of Farmington. Drilled 1977. Altitude 165 ft. Depth to water 6 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Soil; loam and fine sand	0 - 5	5
Sand, very fine to fine, silt and clay;	5 - 7.5	2.5
Gravel; cobbles, pebbles and sand	7.5 - 25	17.5
Sand, fine to very fine, and silt	25 - 35	10
Sand, medium to coarse; some very fine to fine sand	35 - 55	20
Sand, very fine to fine, silt and clay; little medium sand, little coarse sand	55 - 70	15
Gravel; pebbles, granules and medium to very coarse sand	70 - 90	20
Gravel; pebbles, granules and coarse to very coarse sand	90 - 95	5
Sand, fine to coarse; trace very coarse sand, trace very fine sand, silt, and clay	95 -103	8
Gravel and sand	103 -108	5
Sand, fine to medium, some coarse sand, some fine sand	108 -128	20
Gravel; granules and medium to very coarse sand	128 -130	2
Sand, fine to coarse and fine gravel, in layers	130 -145	15
Sand and gravel, some silt	145 -155	10
Gravel, silty	155 -158	3
Silt, very fine to medium sand, and gravel	158 -160	2
Fine to very fine sand, silt and clay	160 -200	40
Sand, medium to fine; some very fine sand, silt and clay	200 -203	3
Sand, fine to very fine, silt and clay; some medium to coarse sand	203 -230	27
Clay and silt; little very fine to very coarse sand	230 -245	15
Till	245 -247	2
End of hole	at 247	

A 27 th. 414605N0725313.1. Farmington Woods. Drilled 1976. Altitude 235 ft. Depth to water 7 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Soil and medium sand	0 - 2	2
Silt, organic mud, and peat	2 - 5	3
Gravel; granules and pebbles	5 - 7	2
Sand, coarse to very coarse, and gravel, some fine to medium sand	7 - 12	5
Gravel; granules, pebbles, medium to very coarse sand, silt, and clay, some fine to very fine sand (poorly sorted gravel)	12 - 14	2
Sand, medium to coarse, some fine sand, some very coarse sand	14 - 17	3
Gravel; pebbles; little fine to very coarse sand and granules, trace very fine sand, silt, and clay	17 - 22	5
Gravel; granules, pebbles, and coarse to very coarse sand, some fine to medium sand, some very fine sand, silt, and clay	22 - 27	5
Gravel; granules, pebbles, and medium to very coarse sand, some fine to very fine sand, some silt and clay (poorly sorted gravel)	27 - 36	9
Silt and coarse to very fine sand, some very coarse sand and gravel, some clay (poorly sorted sand and gravel	36 - 42	6
Sand, fine to coarse, and silt, some clay	42 44	2
Till	44 - 46	2
Refusal (till)	at 46	

F 282. 414331N0725024.1. Town of Farmington. Drilled 1976. Altitude 161.12 ft. Depth to water 4.49 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Soil, loam	0 - 2	2
Sand, fine to medium	2 - 9	7
Gravel, coarse to very fine, and medium to very coarse sand; some fine to very fine sand, little silt and clay	8 - 15	6
Sand, very fine to medium, some coarse sand, some silt and clay	15 - 22	7
Sand, fine to coarse, some very fine sand; little silt and clay, trace very coarse sand and gravel	22 - 27	5
Sand, medium to coarse, some gravel; some fine to very fine sand, silt, and clay	27 - 34	7
Sand, medium to fine	34 - 37	3
Sand, fine to very fine, some silt and clay	37 - 44	7
Sand, very fine to fine, and silt; little medium to very coarse sand, little clay	44 - 65	21
Silt and very fine sand; some clay; little fine to very coarse sand	65 -100	35
Silt and very fine sand; some clay, little medium to coarse sand	100 -113.5	13.5
End of hole	at 113.5	

F 283. 414315N0725114.1. Town of Farmington. Drilled 1976. Altitude 164.03 ft. Depth to water 5.60 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Soil, loam	0 - 4	4
Sand, fine to very fine, and silt	4 - 8	4
Sand, fine to coarse, some very fine sand, some silt and clay; little gravel	8 - 12	4
Gravel, very fine to coarse, and coarse to very coarse sand, some medium to fine sand; little very fine sand, little silt and clay	12 - 17	5
Gravel, coarse to very fine, and medium to very coarse sand, some fine sand, some very fine sand; little silt and clay	17 - 22	5
Gravel, medium to very fine, and fine to very fine sand	22 - 28.5	6.5
Sand, very fine, and silt, some fine sand, some clay; trace medium to coarse sand	28.5 - 40	11.5
Silt and very fine sand, some fine sand, some clay; trace medium to very coarse sand	40 - 87	47
Silt, some clay, some very fine sand; trace medium to coarse sand	87 -118	31
Silt and very fine sand, some clay	118 -140	22
End of hole	at 140	

F 284. 414522N0724940.1. Richard Merritt. Drilled 1976. Altitude 175.15 ft. Depth to water 21.48 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Soil, sandy	0 - 2.5	2.5
Gravel, fine to very fine, and sand	2.5 - 4	1.5
Sand, fine to medium, some coarse sand	4 - 22.5	18.5
Gravel	22.5 - 23	.5
Sand, medium to coarse, some very coarse sand, some gravel	23 - 31	8
Gravel, coarse to very fine, and coarse to very coarse sand, some medium to very fine sand, some silt and clay	31 - 32	1
Gravel, poorly sorted, dirty with silt and clay (reworked till)	32 - 37	5
Till	37 - 39	2
Refusal (till)	at 39	

Table 9.--Logs of test holes and wells--Continued

F 54 th. 414456N0725344.1. Connecticut Sand and Stone. Drilled 1976. Altitude 255 ft. Depth to water 12 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Soil	0 - .5	.5
Gravel; pebbles and fine to coarse sand	.5 - 8	7.5
Gravel, tightly packed with silt and clay (reworked till?)	8 - 16	8
Till	16 - 17	1
Refusal (bedrock)	at 17	

F 55 th. 414303N0725326.1. Cope Estate. Drilled 1976. Altitude 295 ft. Depth to water 7 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Soil (loam)	0 - 2	2
Sand, very fine to fine, and silt, some medium to very coarse sand, some clay	2 - 12	10
Silt, clay, fine sand, and gravel, some fine to very coarse sand (poorly sorted gravel)	12 - 17	5
Gravel; granules, pebbles, very fine to coarse sand, and silt, some clay, some very coarse sand (poorly sorted gravel)	17 - 20	3
Gravel; granules, pebbles, and fine to coarse sand, some very fine sand, some very coarse sand and clay (poorly sorted gravel)	20 - 27	7
Gravel; granules, pebbles, and fine to coarse sand, some silt and clay, some very fine sand; little very coarse sand (poorly sorted gravel)	27 - 30	3
Till	30 - 32	2
Refusal (bedrock)	at 32	

F 56 th. 414513N0725328.1. Peter Krell. Drilled 1976. Altitude 245 ft. Depth to water greater than 22 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Soil, sandy	0 - .5	.5
Sand, fine to medium	.5 - 2.5	2
Gravel; medium to coarse sand, pebbles and cobbles to 4 inches in diameter	2.5 - 7	4.5
Gravel; cobbles	7 - 18.5	11.5
Gravel; cobbles and pebbles	18.5 - 22	3.5
Refusal (gravel)	at 22	

F 57 th. 414532N0725257.1. Town of Farmington. Drilled 1976. Altitude 220 ft. Depth to water greater than 8.5 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Soil, sandy (fill)	0 - 1	1
Gravel and sand; cobbles to 8 inches in diameter	1 - 3	2
Gravel; cobbles and boulders	3 - 8.5	5.5
Refusal (gravel)	at 8.5	

F 58 th. 414410N0725129.1. Town of Farmington. Drilled 1976. Altitude 175 ft. Depth to water greater than 10 feet. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Soil, sandy	0 - 1	1
Sand, fine to very fine	1 - 4	3
Sand, fine to medium; trace very fine gravel	4 - 6	2
Gravel; cobbles to 4 inches in diameter	6 - 10	4
Refusal (gravel)	at 10	

F 59 th. 414239N0725309.1. Westwoods Country Club. Drilled 1976. Altitude 292 ft. Depth to water 3 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Gravel; granules, pebbles, very fine sand, and silt (poorly sorted gravel)	0 - 7	7
Gravel; granules, pebbles, very fine to coarse sand, silt and clay; little very coarse sand (poorly sorted gravel)	7 - 9	2
Sand, fine to coarse, some very fine sand, silt, and clay, some gravel	9 - 12	3
Sand, very fine to medium, and silt, some coarse to very coarse sand, some gravel; little clay	12 - 15	3
Sand, very fine to medium, and silt, some very coarse sand and gravel, some clay	15 - 16.5	1.5
Till	16.5 - 18	1.5
Refusal (till)	at 18	

F 60 th. 414531N0725302.1. Connecticut Sand and Stone. Drilled 1976. Altitude 295 ft. Depth to water greater than 8 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Soil, humus	0 - 1	1
Gravel: fine to medium sand, granules and pebbles	1 - 7	6
Gravel; cobbles	7 - 8	1
Refusal (gravel)	at 8	

F 61 th. 414517N0725000.1. Pennington Corp. Drilled 1976. Altitude 255 ft. Depth to water 93 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Soil, sandy	0 - 1	1
Sand, very fine to medium, some silt; trace gravel	1 - 22	21
Sand, fine to medium, some coarse sand, some very fine sand, silt, and clay	22 - 27	5
Sand, very fine to medium, some silt and clay	27 - 47	20
Sand, very fine to fine, some silt and clay, little medium sand	47 - 67	20
Silt and very fine sand, some fine sand, some clay; trace medium to coarse sand	67 - 97	30
Sand, fine to very fine, some silt and clay; little medium to very coarse sand	97 -100.5	3.5
End of hole	at 100.5	

F 62 th. 414516N0724909.1. Farmington Land Trust. Drilled 1976. Altitude 180 ft. Depth to water 8.5 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Soil (fill?)	0 - 1	1
Gravel; granules, pebbles, sand silt and clay (poorly sorted gravel or fill)	1 - 7	6
Gravel; granules, pebbles, sand silt and clay (poorly sorted gravel)	7 - 12	5
Clay and silt; occasional sand and gravel layer	12 - 17	5
Gravel; granules, pebbles, sand silt and clay (poorly sorted gravel or till)	17 - 18	1
Till	18 - 22	4
Refusal (till)	at 22	

F 63 th. 414442N0725028.1. Winding Trails Recreation Association. Drilled 1976. Altitude 195 ft. Depth to water greater than 20 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Soil, sandy	0 - .5	.5
Gravel; medium to very coarse sand and pebbles	.5 - 6.5	6
Gravel; granules and pebbles	6.5 - 8.5	2
Sand, medium, some fine sand, some coarse sand; occasional layer of gravel	8.5 - 18	9.5
Till	18. - 19	1
Arkose	19 - 20	1

F 64 th. 414628N0725418.1. Connecticut Sand and Stone. Drilled 1976. Altitude 238 ft. Depth to water greater than 10 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Soil, sandy	0 - 1	1
Sand, fine to medium	1 - 2.5	1.5
Gravel; pebbles and cobbles	2.5 - 10	7.5
Refusal	at 10	

F 65 th. 414247N0725152.1. Connecticut Dept. of Environmental Protection. Drilled 1976. Altitude 232 ft. Depth to water 56 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Soil	0 - 3	3
Gravel; granules, pebbles, and fine to coarse sand	3 - 7	4
Sand, medium to coarse; little very coarse sand and gravel	7 - 17	10
Sand, medium; little coarse sand, little fine sand	17 - 22	5
Sand, medium to fine	22 - 27	5
Sand, fine to very fine; occasional layer of silt and clay	27 - 32	5
Sand, very fine, some silt and clay; little medium sand	32 - 37	5
Silt and very fine sand	37 - 47	10
Silt and clay; occasional layer of fine to very fine sand	47 - 52	5
Sand, very fine to fine, and silt, in layers; little clay, little medium to very coarse sand	52 - 57	5
Sand, very fine to fine, some silt and clay in layers; little medium to coarse sand	57 - 58.5	1.5
Sand, very fine to fine, some medium sand, some silt and clay	58.5 - 61	2.5
Silt, some clay, some very fine to fine sand in layers; trace medium to coarse sand	61 - 77	16
Silt and clay layered with fine to very fine sand, some medium sand; little coarse to very coarse sand	77 - 79	2
Till	79 - 90	11
Refusal (till)	at 90	

F 66 th. 414302N0725103.2. Town of Farmington. Drilled 1977. Altitude 162 ft. Depth to water 4 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Soil; loam	0 - 3	3
Gravel; granules, pebbles, and sand, trace silt and clay	3 - 25	22
Sand, fine to medium, some very fine sand and silt	25 - 30	5
Silt and clay; some very fine to fine sand	30 - 77	47
Silt and clay; little very fine to medium sand	77 -137	60
Sand, very fine, and silt; some clay	137 -142	5
Sand, very fine to fine, silt and clay; some medium to coarse sand	142 -167	25
Silt and very fine sand, some clay	167 -172	5
Sand, fine to coarse; little very fine sand, some silt and clay	172 -182	10
Sand, fine to very fine, some medium; some silt and clay	182 -222	40
Sand, fine to medium, some very fine sand, some silt	222 -245	23
Sand, medium to very fine, and gravel; some coarse sand	245 -247	2
Silt, clay, and very fine sand, tightly packed	247 -257	10
Till	257 -265	8
End of hole	at 265	

F 67 th. 414344N0725020.1. Town of Farmington. Drilled 1977. Altitude 165 ft. Depth to water 6 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Soil; loam and sand	0 - 5	5
Gravel; pebbles, granules and coarse to fine sand, little silt and clay	5 - 30	25
Sand, fine to very fine and silt	30 - 35	5
Sand, medium to coarse; some fine to very fine sand, little very coarse sand	35 - 45	10
Sand, coarse to fine; little very coarse sand, little very fine sand	45 - 55	10
Sand very fine to fine, silt and clay; little medium sand, little coarse sand	55 - 75	20
Sand, medium to very coarse	75 - 77	2
Gravel; granules, pebbles, and very coarse sand	77 - 80	3
End of hole	at 80	

F 291. 414438N0725145.1. Town of Farmington. Drilled 1976. Altitude 183.18 ft. Depth to water 15.10 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Soil (loam and sand)	0 - 2	2
Gravel; pebbles, cobbles and boulders; some medium to very coarse sand	2 - 20	18
Sand, medium to coarse, some fine sand, some very fine sand and silt, some very coarse sand; little gravel	20 - 24	4
Gravel; granules, pebbles, and fine to coarse sand, some very fine sand, silt, and clay; little very coarse sand	24 - 30	6
Gravel; granules and pebbles, some medium to very coarse sand, some fine sand, some very fine sand, some silt and clay	30 - 33	3
Sand, fine to coarse, and very coarse sand and gravel, some very fine sand, some silt and clay	33 - 42	9
Gravel; granules, pebbles, and fine to very coarse sand, some very fine sand, some silt and clay	42 - 53	11
Till	53 - 55	2
Refusal (till)	at 55	

F 292. 414403N0725035.1. Dunning Sand and Gravel. Drilled 1976. Altitude 171.47 ft. Depth to water 8.97 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Soil, sandy	0 - 1	1
Gravel (fill)	1 - 4	3
Gravel; granules, pebbles, and cobbles	4 - 14.5	10.5
Gravel; granules and pebbles	14.5 - 22	7.5
Sand, fine to medium, some very fine sand; little silt and clay, little coarse to very coarse sand, trace gravel	22 - 25	3
Sand, very fine to medium, silt, and clay; trace coarse to very coarse sand, trace gravel	25 - 30	5
Sand, very fine to fine, and silt; little clay, little medium to very coarse sand	30 - 35	5
Sand, very fine to fine, some silt and clay; little medium to very coarse sand	35 - 42	7
Sand, fine to very fine, and silt; little clay, little medium to very coarse sand	42 - 55	13
Sand, fine to very fine, some silt; little medium sand, trace clay, trace coarse sand	55 - 65	10
Silt and very fine sand, some fine sand; little clay, trace coarse sand	65 - 85	20
Sand, very fine, and silt, some fine sand; little clay, trace medium sand	85 - 95	10
Sand, fine to very fine, and silt, some medium sand, some coarse sand; little very coarse sand, little clay	95 -108	13
Silt, very fine to fine sand, and clay; little medium to very coarse sand	108 -122	14
End of hole	at 122	

F 294. 414517N0725033.1. Pennington Corp. Drilled 1976. Altitude 231.96 ft. Depth to water 16.76 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Soil, sandy	0 - 2	2
Sand, fine to medium; little coarse sand, trace very fine sand and silt	2 - 25	23
Sand, medium to very coarse, and gravel, some fine to very fine sand, some silt and clay	25 - 31	6
Till	31 - 34.5	3.5
Refusal (bedrock)	at 34.5	

F 295. 414334N0725046.1. Town of Farmington. Drilled 1976. Altitude 167.34 ft. Depth to water 7.43 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Soil, sandy	0 - 1	1
Sand, medium	1 - 6.5	5.5
Gravel; granules and pebbles	6.5 - 12	5.5
Gravel; granules, pebbles, and coarse to very coarse sand, some medium sand, some fine sand, some very fine sand, silt, and clay	12 - 17	5
Sand, fine to coarse, and gravel, some coarse sand, some very fine sand, silt, and clay	17 - 22	5
Sand, fine to coarse	22 - 27	5
Sand, fine to medium, some very fine sand and silt	27 - 32	5
Sand, fine to very fine, some medium to very coarse sand, some gravel, some silt and clay	32 - 37	5
Silt, some clay, some very fine sand, trace fine to coarse sand	37 - 47	10
Sand, very fine to fine, and silt, some clay; trace medium to coarse sand	47 - 65	18
Sand, very fine to fine, and silt; little medium to coarse sand, little clay	65 - 92	27
Sand, very fine to fine, and silt, some clay, some medium sand, trace coarse to very coarse sand	92 -107	15
Sand, very fine, and silt, some fine sand; little clay, trace medium to very coarse sand	107 -118.5	11.5
End of hole	at 118.5	

F 296. 414402N0725118.1. Town of Farmington. Drilled 1976. Altitude 177.47 ft. Depth to water 13.77 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Soil, sandy	0 - 1	1
Sand, fine to medium	1 - 8	7
Gravel; granules, pebbles, and fine to coarse sand	8 - 21	13
Sand, fine to coarse, some very fine sand, silt, and clay; little very coarse sand and gravel	21 - 28	7
Gravel; granules, pebbles, and medium to very coarse sand, some fine sand, some silt and clay; little very fine sand	28 - 34	6
Sand, medium to fine, some coarse to very coarse sand, some gravel, some silt and clay	34 - 52	18
Sand, medium to very coarse, some fine sand, some very fine sand, silt, and clay, some gravel	52 - 60	8
Sand, medium to very coarse, and gravel, some fine sand, some very fine sand, silt, and clay	60 - 70	10
Gravel; granules, pebbles, and fine to coarse sand, some very coarse sand, some silt and clay	70 - 87	17
Gravel; granules, pebbles, and fine to coarse sand, some very fine sand, silt, and clay	87 - 96	9
Till	96 -100	4
Refusal (till)	at 100	

F 285. 414359N0724956.1. Angelo Tomasso, Jr. Drilled 1976. Altitude 163.81 ft. Depth to water 8.63 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Soil, loam	0 - 2	2
Gravel and sand (fill)	2 - 5	3
Gravel; cobbles to 6 inches in diameter	5 - 12	7
Gravel, coarse to very fine, and medium to very coarse sand, some fine to very fine sand; little silt and clay	12 - 17	5
Gravel, very fine to coarse, and medium to very coarse sand, some fine to very fine sand, some silt and clay	17 - 19.5	2.5
Sand, medium, some fine sand, some coarse sand	19.5 - 27	7.5
Sand, very fine to fine, and silt; little clay, trace medium to coarse sand	27 - 52	25
Silt and very fine to sand; little clay, trace medium to coarse sand	52 - 67	15
Sand, fine to very fine, and silt; little clay, little medium sand	67 - 72	5
Sand, medium to fine, some coarse to very coarse sand, some very fine sand, silt, and clay; little gravel	72 - 73	1
Sand, very fine, and silt, some clay; trace rock fragments	73 - 82	9
Sand, very fine, and silt, some clay	82 - 92	10
Silt and very fine sand; some clay, some fine to coarse sand	92 -122	30
Silt and clay, some very fine sand; trace medium to very coarse sand	122 -140	18
End of hole	at 140	

F 286. 414204N0725135.2. Angelo Tomasso, Jr. Drilled 1976. Altitude 206.92 ft. Depth to water 27.40 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Sand, medium; little coarse sand, trace very coarse sand and pebbles	0 - 11.5	11.5
Gravel; coarse to very coarse sand and granules; few pebbles to 1 inch in diameter	11.5 - 17	5.5
Gravel; coarse to very coarse sand, granules, and pebbles	17 - 32	15
Sand, medium to very coarse, some very fine to medium gravel; trace silt and clay	32 - 35	3
Sand, fine to medium, some very fine sand; little silt and clay, trace coarse to very coarse sand	35 - 37	2
End of hole	at 37	

F 288. 414458N0724947.1. Pennington Corp. Drilled 1976. Altitude 179.17 ft. Depth to water 19.85 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Soil	0 - 2	2
Gravel; pebbles, granules, and medium to very coarse sand	2 - 4	2
Sand, fine to coarse; some clay, silt, and very fine sand, trace very coarse sand, occasional gravel layer	4 - 35	31
Sand, very fine to medium; some clay, silt, and very fine sand, little coarse sand, trace very coarse sand, little gravel	35 - 40	5
Sand, coarse to very coarse; some fine to medium sand, little very fine sand, some silt and clay, some gravel	40 - 45	5
Sand, very fine, and silt; little fine sand, trace medium to very coarse sand	45 - 60	15
Silt and very fine sand, some clay, some fine sand; trace medium to coarse sand	60 - 80	20
Silt and very fine sand, some clay; trace fine sand, trace medium to coarse sand	80 -100	20
Silt and very fine to medium sand, some clay; little coarse sand, trace very coarse sand	100 -115	15
Sand, very fine to medium, and silt, some clay; little coarse sand	115 -118.5	3.5
End of hole	at 118.5	

F 289. 414429N0725030.1. Pennington Corp. Drilled 1976. Altitude 176.05 ft. Depth to water 6.64 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Soil	0 - .5	.5
Gravel; cobbles, pebbles, and coarse to very coarse sand	.5 - 11	10.5
Sand, coarse to medium, some fine to very fine sand, some very coarse sand and gravel; trace clay	11 - 22	11
Gravel; granules, pebbles and medium to very coarse sand; some fine to very fine sand, some silt, little clay	22 - 23	1
Silt and very fine sand, some clay; little fine to coarse sand, little gravel	23 - 27	4
Till	27 - 33	6
Refusal (boulder)	at 33	

F 290. 414421N0725112.1. Connecticut Sand and Stone. Drilled 1976. Altitude 177.35 ft. Depth to water 12.20 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Soil, sandy	0 - 2	2
Sand, fine to medium	2 - 5.5	3.5
Gravel; pebbles, granules, and medium to very coarse sand	5.5 - 14.5	9
Sand, medium to coarse	14.5 - 20	5.5
Sand, coarse to very coarse; occasional layer of gravel	20 - 27	7
Gravel; granules, pebbles, some fine to coarse sand; little very fine sand, little silt and clay	27 - 40	13
Gravel; granules, pebbles, and coarse to very coarse sand; some very fine sand, silt, and clay	40 - 45	5
Gravel; granules, pebbles, and coarse to very coarse sand; some fine to medium sand, some silt and clay	45 - 65	20
Gravel; granules, pebbles, and medium to very coarse sand	65 - 79	14
Till	79 - 82.5	3.5
Refusal (till)	at 82.5	

F 297. 414348N0725118.1. Town of Farmington. Drilled 1976. Altitude 172.21 ft. Depth to water 9.44 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Soil (humus and fill)	0 - 3	3
Sand, fine to coarse; occasional gravel layer	3 - 8	5
Gravel; granules and pebbles, some medium to coarse sand	8 - 12	4
Gravel; granules, pebbles, and fine to very coarse sand, some very fine sand, some silt and clay	12 - 21	9
Sand, fine to medium, some very fine sand, silt, snd clay, some coarse to very coarse sand; trace gravel	21 - 25	4
Sand, fine to very fine, some medium to very coarse sand, some silt and clay	25 - 30	5
Sand, very fine to medium, some silt and clay; little coarse to very coarse sand	30 - 40	10
Sand, fine to very fine, some silt and clay, some medium sand; trace coarse to very coarse sand	40 - 52	12
Sand, medium to very fine, some silt and clay, some coarse to very coarse sand	52 - 62	10
Sand, fine to coarse, some very fine sand; trace very coarse sand, trace silt and clay	62 - 72	10
Sand, fine to medium, some very fine sand and silt	72 - 78	6
Till	78 - 83.5	5.5
Refusal (till)	at 83.5	

F 298. 414358N0725133.1. Town of Farmington. Drilled 1976. Altitude 177.74 ft. Depth to water 9.19 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Sand, fine	0 - 3	3
Gravel; pebbles and cobbles	3 - 5	2
Mud (swamp deposits)	5 - 8.5	3.5
Gravel; granules, pebbles, and fine to medium sand, some organic material	8.5 - 15	6.5
Gravel; granules, pebbles, and medium to very coarse sand, some fine to very fine sand, some silt and clay	15 - 20	5
Till	20 - 23.5	3.5
Refusal	at 23.5	

F 299. 414302N0725028.1. Farmington Land Trust. Drilled 1976. Altitude 161.16 ft. Depth to water 4.42 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Soil (swamp deposits)	0 - 2	2
Mud and silt	2 - 7	5
Silt, clay, and organic material	7 - 16	9
Sand, fine to medium and gravel, some coarse to very coarse sand, some very fine sand, silt, and clay	16 - 18.5	2.5
Gravel; granules, pebbles, and medium to very coarse sand, some fine sand, some very fine sand, silt, and clay	18.5 - 22	3.5
Sand, medium to fine, occasional gravel layer	22 - 24	2
Silt and very fine sand, some fine sand, some clay; trace coarse to very coarse sand	24 - 35	11
Silt, some clay, some fine to very fine sand, trace medium to very coarse sand	35 - 40	5
Silt and clay; trace very fine to coarse sand	40 - 53	13
Silt and very fine sand, some clay; little fine to very coarse sand, trace gravel	53 - 67	14
Sand, very fine, and silt, some clay; little fine to medium sand	67 - 77	10
Silt and very fine sand, some clay; little fine to coarse sand	77 - 85	8
Sand, very fine, and silt, some fine ssnd, some clay; little medium to coarse sand	85 - 98	13
Silt, some clay, some very fine sand; trace medium to coarse sand	98 -112	14
Silt and very fine sand, some fine sand, some clay; trace medium to coarse sand	112 -113.5	1.5
End of hole	at 113.5	

F 300. 414302N0725103.1. Town of Farmington. Drilled 1976. Altitude 161.98. Depth to water 3.43 ft. Log by U.S. Geol. Survey.

	Depth (feet)	Thickness (feet)
Soil (loam)	0 - 1	1
Sand, fine to medium, some silt and clay	1 - 7	6
Sand, fine to coarse, some very fine sand, some silt and clay, some very coarse sand and gravel	7 - 9	2
Gravel; granules, pebbles, and fine to very coarse sand, some silt and clay; little very fine sand	9 - 20	11
Sand, fine to medium, and silt, some very fine sand; little coarse to very coarse sand, little clay	20 - 27	7
Sand, very fine to fine, and silt, some medium to very coarse sand; little clay	27 - 35	8
Sand, very fine to fine, some silt and clay; trace medium sand	35 - 38.5	3.5
End of hole	at 38.5	

Table 10.--Records of wells.

Identification number: U.S. Geological Survey local number assigned to each well. Numbers are assigned sequentially; "F" prefix denotes town of Farmington. Sites shown on plate A.

Location number: Latitude and longitude of each well. site. Number after decimal point is in sequential number used to identify closely spaced wells.

Altitude: Land surface datum at well site in feet above NGVD of 1929, which is approximately equal to mean sea level. Determined by differential leveling.

Well depth: Finished depth of well in feet below land surface.

Casing depth: Depth to bottom of unperforated casing in feet below land surface.

Water level: State water level in feet below land surface. Measurements made by steel tape to 0.01 ft. accuracy.

Remarks: CA, Chemical analysis published in table 13.

Note: All wells are 2 inches in diameter, have slotted casing finish, and were installed using a power auger. Monthly water-level measurements for each well are included in table 12.

Identification number	Location number	Owner	Date drilled	Altitude (ft)	Well depth (ft)	Casing depth (ft)	Water level (ft)	Date of water-level measurement	Remarks
F 282	414331N0725024.1	Town of Farmington	07-23-76	161.12	26.9	21.9	2.92	10-12-76	
F 283	414315N0725114.1	Town of Farmington	07-27-76	164.03	23.0	18.0	4.17	10-13-76	
F 284	414522N0724940.1	Richard Merritt	07-30-76	175.15	32.5	27.5	21.64	10-12-76	
F 285	414359N0724956.1	Angelo Tomasso	07-29-76	163.81	24.0	19.0	7.75	10-12-76	
F 286	414204N0725132.2	Angelo Tomasso	08-05-76	206.92	35.7	30.7	27.43	10-14-76	CA., located near F 46TH
F 288	414458N0724947.1	Pennington Corp.	08-12-76	179.17	32.4	27.4	20.20	10-12-76	CA.
F 289	414429N0725030.1	Pennington Corp.	08-13-76	176.05	23.2	18.2	7.59	10-14-76	CA.
F 290	414421N0725112.1	Conn. Sand & Stone	08-16-76	177.35	28.1	23.1	13.04	10-14-76	CA.
F 291	414438N0725145.1	Town of Farmington	08-17-76	183.18	22.6	17.6	16.35	10-14-76	CA.
F 292	414403N0725035.1	Dunning Sand & Gravel	08-19-76	171.47	23.0	18.0	9.58	10-14-76	
F 294	414517N0725033.1	Pennington Corp.	09-07-76	231.96	28.4	23.4	20.42	10-12-76	
F 295	414334N0725046.1	Town of Farmington	09-09-76	167.34	21.3	16.3	7.18	10-12-76	CA.
F 296	414402N0725118.1	Town of Farmington	09-13-76	177.47	28.7	23.7	13.75	10-13-76	CA.
F 297	414348N0725118.1	Town of Farmington	09-14-76	172.21	18.6	13.6	10.23	10-13-76	CA.
F 298	414358N0725133.1	Town of Farmington	09-16-76	177.74	23.2	18.2	9.20	10-13-76	CA.
F 299	414302N0725028.1	Farmington Land Trust	09-21-76	161.16	26.8	21.8	4.15	10-13-76	CA.
F 300	414302N0725103.1	Town of Farmington	09-22-76	161.98	20.1	15.1	2.70	10-13-76	CA., located near F 66TH

Table 11.--Grain-size analyses of samples of stratified drift

All analyses by U.S. Geological Survey. Size class intervals are those of the Wentworth grade scale (see heading of Table 9) and are expressed in millimeters (mm).

Identification (well or test-hole) number: U.S. Geological Survey number assigned to each site. The "F" and "A" prefixes denote the towns of Farmington and Avon, respectively. Test holes are identified by the "th" suffix. Sites shown on plate A.

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.

Median grain size: A measure of average particle size obtained by calculating the partical size associated with the midpoint of the cumulative partical-size distribution curve.

Samples were disturbed but uncontaminated and were collected by driving a split-spoon sampler or split core-barrel sampler vertically through the depth interval indicated.

Test-hole no. or well no.	Location number	Depth interval sampled (ft below land surface)	Clay & silt (less than 0.0625 mm)	Very fine sand (0.0625-.125 mm)	Fine sand (0.125-.25 mm)	Medium sand (0.25-.5 mm)	Coarse sand (0.5-1.0 mm)	Very coarse sand (1.0-2.0 mm)	Gravel (greater than 2.0 mm)	Median grain size (mm)
F 42 th	414332N0724958.1	12 - 13.5	5.2	14.3	11.9	17.5	7.9	4.6	38.6	0.57
		17 - 18.5	4.5	7.9	2.6	10.9	18.4	13.8	41.9	1.4
		22 - 23.5	33.2	29.8	18.8	1.2	1.2	1.0	14.9	.092[1/]
		41 - 48.5	98.5	.8	.2	.3	.2	.0	.0	.007
		67 - 68.5	16.9	5.7	.7	7.3	9.9	10.8	48.8	1.9
F 43 th	414316N0725014.1	12 - 13.5	96.9	1.8	.6	.3	.4	.0	.0	.016
		27 - 28.5	18.9	41.6	38.5	.9	.1	.0	.0	.10
		33 - 33.5	88.6	10.7	.6	.1	.0	.0	.0	.023
		54 - 54.5	59.0	20.5	16.6	2.1	1.7	.2	.0	.03
		54.5 - 55.5	24.6	11.2	13.2	10.7	16.3	6.5	17.5	.27
		57 - 58	35.6	27.9	32.9	2.6	1.1	.1	.0	.08
		58 - 58.5	36.8	14.1	15.5	7.5	9.5	3.0	13.6	.12
F 44 th	414411N0724937.1	37 - 38.5	69.9	24.3	5.7	.3	.2	.0	.0	.026
		47 - 48.5	16.4	47.4	34.8	.9	.3	.1	.0	.10
		62 - 63.5	21.2	50.7	27.2	.8	.2	.0	.0	.093
		72 - 72.5	65.9	25.8	6.3	.5	.4	.2	1.0	.046
		72.5 - 73.5	49.4	7.6	7.6	7.4	6.8	6.5	14.6	.066
F 45 th	414422N0724928.1	13 - 13.5	2.6	3.2	9.4	18.0	9.1	7.5	50.2	2.0
		17 - 18.5	4.3	3.5	5.7	7.1	9.6	7.9	61.9	6.0
		22 - 24	70.1	24.3	5.0	.5	.1	.1	.0	.033
		27 - 27.5	82.5	12.2	1.1	.1	.0	.0	4.1	.023
		28 - 29	54.7	39.8	5.2	.2	.0	.1	.0	.05
		37 - 38.5	80.7	16.7	2.3	.2	.1	.0	.0	.027
		47 - 48.5	23.4	44.1	25.7	4.5	.4	.1	1.9	.095
		57 - 58.5	22.1	50.0	24.7	1.4	.3	.2	1.3	.09
		67 - 68.5	16.3	53.6	24.9	1.0	.2	.0	4.0	.097
F 46 th	414204N0725132.1	32 - 33.5	1.0	3.9	9.9	20.0	37.7	19.6	7.8	.66
		37 - 38	4.2	12.7	47.9	33.2	1.9	.2	.0	.20
		38 - 38.5	17.3	38.6	38.0	5.9	.3	.0	.0	.11
		47 - 48.5	42.8	41.7	12.8	2.5	.3	.0	.0	.07
		57 - 59	79.6	18.1	2.0	.1	.2	.0	.0	.026
		77 - 80	62.1	29.2	6.7	1.8	.1	.1	.0	.043
		92 - 94	85.1	12.8	1.9	.1	.0	.0	.0	.024
F 47 th	414221N0725211.1	32 - 33	31.0	10.3	13.9	14.3	10.7	3.8	15.9	.19
F 48 th	414409N0724928.1	7 - 8.5	25.2	36.7	32.4	4.2	1.1	.4	.0	.10
		12 - 13.5	9.5	6.0	9.2	9.9	20.9	7.3	37.3	.84
		17 - 18.5	7.0	3.8	5.9	14.0	11.2	14.8	43.3	1.3
		32 - 33.5	61.7	25.9	11.4	.3	.4	.4	.0	.042
		37 - 38.5	20.6	5.5	2.6	3.5	2.2	2.0	63.7	11.
		47 - 48.5	5.8	8.1	9.2	4.7	2.0	1.5	68.9	17.
		62 - 63	19.1	3.3	3.3	2.7	5.0	4.6	62.2	11.
		66.5 - 67	29.6	10.6	6.8	5.7	9.0	5.9	32.4	.33
F 50 th	414531N0725006.1	108 -110	6.2	2.0	4.2	10.3	7.2	6.6	63.5	3.0
		110 -113	25.8	5.7	6.7	10.1	5.9	3.3	42.5	.6
F 51 th	414507N0725101.1	52 - 53.5	2.2	12.4	57.7	19.2	3.6	.3	4.5	.19
		62 - 63.5	20.7	42.9	33.3	1.3	1.6	.2	.0	.10
		72 - 73.5	49.3	38.1	10.7	1.0	.5	.3	.0	.063
F 52 th	414619N0725411.1	17 - 18.5	1.5	7.9	25.6	33.0	28.4	3.5	.0	.34
		27 - 28.5	16.0	7.1	9.5	23.6	30.1	11.9	1.9	.42
		32 - 33.5	4.9	2.1	2.8	2.4	3.0	2.0	82.8	19.0
		37 - 38.5	7.1	14.0	24.3	20.9	22.7	8.0	2.8	.29
		43 - 44.5	4.3	3.1	6.0	8.9	27.7	25.1	24.8	1.0
F 53 th	414528N0725049.1	17 - 18.5	.8	2.5	17.1	25.3	33.6	15.2	5.4	.55
		22 - 23.5	.4	1.3	2.5	12.7	22.1	.2	60.8	2.3
F 55 th	414303N0725326.1	7 - 8.5	34.9	42.6	15.4	3.8	2.8	.5	.0	.08
		12 - 13.5	48.0	9.2	7.9	4.0	4.6	2.3	24.0	.07
		17 - 18.5	25.9	10.7	12.5	9.3	9.9	6.8	24.8	.25
		22 - 23.5	16.0	6.1	10.2	10.8	13.5	9.0	34.6	.7
		27 - 28.5	11.1	6.1	9.1	7.5	7.7	4.4	54.3	3.3
F 59 th	414239N0725309.1	7 - 8.5	25.0	10.9	14.0	9.1	9.1	4.3	27.6	.25
		9.5 - 11	4.9	8.4	19.0	17.3	26.8	15.0	8.5	.50
		12 - 13.5	24.9	17.3	22.3	13.5	10.0	4.4	7.8	.17
		15 - 16.5	24.7	17.6	21.0	12.8	12.6	5.4	5.9	.16
F 61 th	414517N0725000.1	87 - 88	53.6	31.6	13.4	1.2	.2	.0	.0	.055[2/]
		98 - 99	8.0	34.2	53.5	3.8	.3	.2	.0	.14
		99 -100.5	10.9	31.4	54.2	3.3	.3	.0	.0	.14

Table 11.--Grain-size analyses of samples of stratified drift--Continued

Test-hole no. or well no.	Location number	Depth interval sampled (ft below land surface)	Clay & silt (less than 0.0625 mm)	Very fine sand (0.0625-.125 mm)	Fine sand (0.125-.25 mm)	Medium sand (0.25-.5 mm)	Coarse sand (0.5-1.0 mm)	Very coarse sand (1.0-2.0 mm)	Gravel (greater than 2.0 mm)	Median grain size (mm)
F 62 th	414516N0724909.1	17 - 17.5	12.8	2.9	5.9	6.9	12.8	12.8	45.8	1.6
F 65 th	414247N0725152.1	52 - 53.5	21.2	47.3	27.9	3.2	.4	.1	.0	.095
		57 - 58.5	10.6	46.5	39.2	3.2	.6	.0	.0	.11
		67 - 69	89.9	7.0	2.2	.6	.3	.0	.0	.012
		77 - 78.5	54.1	17.3	19.9	5.8	2.7	.1	.0	.028
		87 - 88	29.0	10.0	12.3	10.6	8.5	6.1	23.5	.23
F 66 th	414302N0725103.2	20 - 25	.5	1.3	1.9	2.2	5.7	7.4	80.4	5.0 3/
		56.5 - 57	79.2	14.3	4.4	1.2	.3	.2	.0	.02
		92 - 97	96.7	1.3	.8	.6	.3	.0	.0	.01
		117 -122	97.3	2.2	.1	.1	.0	.0	.0	.02
		147 -152	31.2	39.5	23.8	4.6	.6	.0	.0	.09
		179 -180	9.0	3.9	21.4	18.0	47.2	.1	.0	.46
		212 -216	12.1	25.2	47.3	13.3	1.6	.0	.0	.16
		232 -234	8.2	14.5	39.1	24.3	13.4	.1	.0	.21
		246 -247	2.8	14.6	27.4	18.9	8.4	.4	24.2	.28
F 67 th	414344N0725020.1	25 - 30	4.5	4.0	6.5	8.2	10.5	2.2	62.3	5.0
		35 - 36	.6	1.8	12.9	36.2	44.3	3.6	.0	.49
		45 - 50	.2	3.2	22.3	36.8	35.1	1.7	.0	.41 4/
		55 - 60	37.7	36.7	17.6	4.8	2.5	.3	.0	.08
		77 - 80	.0	.0	.0	.0	3.7	23.1	72.6	5.6 5/
F 68 th	414344N0725020.2	5 - 7.5	29.7	25.7	27.1	12.6	4.6	.0	.0	.11
		70 - 75	.1	1.6	9.9	17.1	22.8	20.3	27.7	.80 4/
		85 - 90	.1	1.0	6.0	15.0	33.5	5.8	38.1	.95
		90 - 95	.0	.0	.2	.7	5.3	17.7	75.7	3.3 4/
		108 -110	.1	.5	23.3	59.0	16.7	.1	.0	.36
		128 -130	.6	1.9	12.2	36.8	35.9	12.1	.0	.49 4/
		140 -145	.1	.1	2.5	12.5	40.0	16.3	28.2	.93 3/
		147 -150	.3	.6	7.6	28.9	37.6	18.3	5.4	.67 3/
		165 -170	27.5	33.1	34.9	3.2	.7	.0	.0	.10
		170 -175	31.0	19.9	35.2	12.2	1.4	.0	.0	.12
		190 -195	30.2	29.6	31.0	7.1	1.6	.0	.0	.10
		200 -203	5.3	7.9	37.1	41.5	6.0	.1	.0	.24
		220 -225	11.6	33.7	36.2	8.0	3.1	.1	.0	.12
		235 -240	96.8	1.9	.5	.2	.1	.1	.0	.02
		240 -245	93.2	.8	2.1	3.6	.0	.0	.0	.01
A 27 th	414605N0725313.1	12 - 13.5	22.9	4.8	8.3	10.1	16.8	11.4	25.7	.59
		17 - 18.5	.7	.7	1.2	1.3	1.8	1.4	92.9	21.0
		22 - 23.5	7.4	3.9	7.1	7.4	12.4	10.5	51.3	2.2
		27 - 28.5	16.9	4.9	7.8	9.2	11.3	13.2	36.6	1.0
		37 - 38.5	31.5	18.0	21.2	11.3	9.0	3.9	5.0	.13
		44 - 45	26.7	5.7	6.7	6.1	8.2	4.8	41.8	.70
F 282	414331N0725024.1	12 - 13.5	4.1	4.1	7.6	10.1	16.3	4.6	53.2	2.6
		17 - 17.5	4.5	18.4	36.3	18.4	3.8	7.0	11.5	.21 6/
		17.5 - 18.5	8.2	24.6	37.2	22.7	7.3	.0	.0	.17
		22 - 23.5	3.5	11.3	30.2	29.8	23.5	.7	1.0	.28
		27 - 28.5	.8	1.3	5.6	22.6	55.6	3.0	11.2	.64
		52 - 53.5	32.0	39.6	24.6	3.0	.5	.4	.0	.086
		72 - 73.5	79.5	17.7	2.1	.4	.1	.2	.0	.029
		97 - 98.5	77.3	18.8	3.1	.4	.2	.0	.0	.028
F 283	414315N0725114.1	12 - 13	8.1	15.1	26.7	21.5	25.1	1.5	2.0	.25
		13 - 13.5	3.7	3.3	5.5	7.5	11.6	14.5	54.0	2.4
		17 - 18.5	2.7	5.5	12.6	15.5	27.2	5.8	30.7	.71
		22 - 23.5	3.8	24.9	29.7	2.5	2.3	3.0	33.8	.21
		32 - 33.5	40.8	48.1	10.5	.4	.1	.0	.0	.07
		47 - 48.5	52.3	38.2	8.8	.6	.2	.1	.0	.06
		67 - 68.5	55.9	37.0	6.5	.4	.1	.1	.0	.055
		102 -103.5	91.2	7.7	.9	.1	.0	.0	.0	.016
F 284	414522N0724940.1	32 - 33.5	11.4	2.3	3.4	3.9	16.8	2.7	59.4	4.0
		37 - 38.5	13.3	2.6	3.4	5.1	6.2	7.3	62.2	4.5
F 285	414359N0724956.1	12 - 13.5	2.2	2.4	5.3	9.2	21.3	6.2	53.3	2.7
		17 - 18.5	7.3	4.5	6.6	6.3	14.3	5.0	56.1	2.6
		27 - 28.5	31.9	50.6	16.4	.9	.1	.0	.0	.080
		42 - 43.5	29.1	55.8	14.5	.5	.2	.0	.0	.080
		57 - 58.5	48.1	32.8	17.9	1.1	.1	.0	.0	.065
		72 - 73	8.0	6.4	32.6	37.8	9.2	1.3	4.7	.26
		92 - 93.5	60.6	32.3	6.1	.6	.1	.3	.0	.04
		112 -113.5	56.1	36.9	6.5	.4	.1	.0	.0	.05
		132 -133.5	85.1	7.9	5.1	1.5	.3	.1	.0	.015
F 288	414458N0724947.1	32 - 33.5	12.8	8.2	36.3	12.3	30.1	.2	.0	.22
		37 - 38.5	15.5	12.5	34.2	30.9	2.7	.9	3.3	.20
		42 - 43.5	8.8	2.5	5.7	12.1	32.7	28.1	10.1	.70
		47 - 48.5	61.8	33.1	4.6	.3	.2	.1	.0	.04
		57 - 58.5	45.2	49.7	4.2	.4	.3	.2	.0	.06
		67 - 68.5	54.0	34.8	10.1	.9	.1	.0	.0	.055
		87 - 88.5	73.9	23.5	2.0	.4	.2	.0	.0	.031
		102 -103.5	59.0	13.7	9.2	14.5	2.9	.8	.0	.04
		117 -117.5	31.9	32.8	22.1	10.2	2.9	.1	.0	.092
		117.5 -118.5	14.7	11.5	34.0	38.7	1.1	.0	.0	.20

Table 11.--Grain-size analyses of samples of stratified drift--Continued

Test-hole no. or well no.	Location number	Depth interval sampled (ft below land surface)	Clay & silt (less than 0.0625 mm)	Very fine sand (0.0625-.125 mm)	Fine sand (0.125-.25 mm)	Medium sand (0.25-.5 mm)	Coarse sand (0.5-1.0 mm)	Very coarse sand (1.0-2.0 mm)	Gravel (greater than 2.0 mm)	Median grain size (mm)
F 289	414429N0725030.1	17 - 18	1.4	2.3	6.3	28.7	50.7	6.7	3.8	.58
		22 - 22.5	17.8	8.5	3.5	10.5	20.7	8.1	30.9	.69
		22.5 - 23	70.0	22.8	1.9	.6	2.2	.0	2.5	.022
F290	414421N0725112.1	27 - 28.5	4.6	3.7	5.9	7.7	7.3	4.9	66.0	6.3
		32 - 33.5	2.9	3.0	4.6	6.4	7.0	4.4	71.6	10.
		42 - 43.5	5.4	4.4	6.8	10.2	15.6	10.0	47.6	1.7
		47 - 48.5	5.8	3.7	5.2	4.5	8.6	7.1	65.2	7.0
		62 - 63.5	6.4	4.6	7.0	7.5	13.1	5.2	56.2	4.0
		72 - 73.5	6.8	5.1	8.2	12.1	16.5	15.5	35.7	1.0
F 291	414438N0725145.1	22 - 23.5	3.0	3.2	9.4	26.7	43.1	9.7	4.9	.57
		27 - 28.5	9.2	10.6	14.8	12.0	12.3	4.6	36.5	.61
		32 - 33.5	11.6	9.4	11.2	5.0	5.7	3.0	54.2	4.0
		33.5 - 35	14.1	12.0	20.2	15.3	14.1	6.3	18.0	.30
		42 - 43.5	12.9	7.5	10.7	11.7	9.9	8.4	39.0	.83
F 292	414403N0725035.1	22 - 23.5	2.4	7.6	42.3	41.3	4.4	.3	1.6	.24
		27 - 28.5	19.4	26.7	35.0	15.8	1.3	.2	1.7	.13
		32 - 33.5	19.6	45.4	30.8	4.0	.2	.1	.0	.10
		37 - 38.5	9.2	57.7	30.4	1.9	.6	.2	.0	.10
		47 - 48.5	30.0	48.8	18.1	2.4	.6	.1	.0	.083
		57 - 58.5	15.3	45.4	36.7	2.3	.2	.0	.0	.11
		67 - 68.5	55.6	31.1	10.3	2.9	.2	.0	.0	.05
		87 - 88.5	44.3	46.9	8.2	.5	.0	.0	.0	.07
		107 -107.5	21.8	27.7	26.4	11.6	10.1	2.5	.0	.13
		107.5 -108.5	60.1	20.4	15.2	2.6	.9	.8	.0	.033
F 294	414517N0725033.1	27 - 28.5	8.2	4.2	6.3	16.2	33.0	16.4	15.6	.69
F 295	414334N0725046.1	12 - 13.5	5.9	4.5	9.1	11.5	21.8	11.8	35.3	.91
		17 - 18.5	8.1	8.5	14.3	20.9	24.0	6.9	17.4	.47
		32 - 32.5	11.3	36.9	33.5	6.8	3.4	2.8	5.3	.13
		42 - 43.5	84.4	13.5	1.7	.2	.2	.0	.0	.02
		57 - 58.51	25.2	52.2	20.6	1.3	.6	.0	.0	.087
		77 - 78.5	30.0	42.2	24.1	3.6	.1	.0	.0	.09
		92 - 93.5	34.7	31.6	26.8	6.4	.4	.1	.0	.087
		117 -118.5	31.1	57.4	9.7	1.3	.5	.1	.0	.079
F 296	414402N0725118.1	22 - 23.5	2.0	3.4	16.3	49.7	24.1	3.2	1.4	.35
		32 - 33.5	5.3	4.5	9.8	13.3	22.4	14.0	30.7	.85
		37 - 38.5	5.2	6.1	27.5	39.0	11.6	3.2	7.5	.31
		42 - 43.5	.3	.7	7.3	51.3	36.0	4.3	.0	.44
		52 - 53.5	5.9	4.8	10.3	19.4	31.5	20.4	7.6	.60
		67 - 68.5	4.1	3.6	9.4	15.0	28.5	20.7	18.8	.77
		77 - 78.5	13.3	8.9	10.9	9.0	12.3	6.8	38.8	.78
F 297	414348N0725118.1	13 - 14.5	13.5	5.4	10.0	15.3	13.4	9.9	32.6	.68
		17 - 18.5	10.0	5.8	8.9	12.7	12.9	7.1	42.6	.98
		22 - 23.5	7.0	8.4	33.8	36.5	12.5	.7	1.1	.25
		27 - 28.5	8.4	30.2	51.9	8.9	.6	.1	.0	.15
		32 - 33.5	10.1	23.8	37.4	25.3	3.0	.4	.0	.17
		42 - 43.5	14.7	30.1	43.1	11.4	.6	.1	.0	.14
		52 - 53.5	8.7	16.7	38.8	31.4	4.2	.1	.0	.19
		62 - 63.5	1.7	9.1	37.1	34.1	17.4	.6	.0	.26
F 298	414358N0725133.1	17 - 18	11.6	4.8	8.2	13.8	21.4	17.0	23.0	.73
F 299	414302N0725028.1	17 - 18.5	4.7	7.2	27.6	30.5	12.3	1.3	16.5	.32
		18.5 - 19	4.0	5.3	10.1	19.5	17.1	8.2	35.8	.78
		27 - 28.5	53.6	34.6	10.7	1.0	.1	.0	.0	.06
		37 - 38.5	90.7	6.9	1.1	.6	.5	.2	.0	.034
		47 - 48.5	98.2	1.2	.2	.3	.1	.0	.0	.02
		57 - 58.5	70.3	24.2	3.5	.5	.2	.1	1.2	.044
		77 - 78.5	74.4	21.6	3.7	.2	.1	.0	.0	.044
		97 - 97.5	43.6	39.4	13.9	2.5	.5	.0	.0	.070
		98 - 98.5	93.2	5.3	.8	.3	.3	.0	.0	.033
		112 -113.5	63.8	27.1	8.0	.9	.2	.0	.0	.04
F 300	414302N0725103.1	7 - 8.5	8.0	11.8	23.2	23.5	22.1	6.6	4.7	.31
		12 - 13.5	7.4	4.5	7.6	8.6	17.0	12.7	42.2	1.3
		17 - 18.5	7.3	4.9	8.7	9.2	13.1	7.3	49.4	1.9
		22 - 23	19.5	9.4	44.4	23.5	2.5	.7	.0	.17
		27 - 28.5	26.8	38.1	30.1	4.6	.2	.2	.0	.095
		37 - 38.5	13.6	61.5	24.1	.8	.0	.0	.0	.094

1/ Laboratory determination of vertical hydraulic conductivity is 0.12 feet/day.
2/ Sample collected from bit flight.
3/ Sample screened from drilling mud.
4/ Sample may contain material from higher in the section.
5/ Sample collected from drill bit.
6/ Laboratory determination of vertical hydraulic conductivity is 8.2 feet/day.

Table 12.--Descriptions of observation wells and water levels.

Entries include identification number, location number, owner, topographic setting and location of well site, date of installation, and monthly water levels.

Identification number: U.S. Geological Survey local number assigned to each well. Numbers are assigned sequentially; "F" prefix denotes town of Farmington. Sites shown on plate A.

Location number: Latitude and longitude of each well site. Number after decimal point is a sequential number used to identify closely spaced wells.

Altitude: Land surface datum at well site in feet above mean sea level. Determined by differential leveling.

Water level: Static water level in feet below land surface. Measurements made by steel tape to 0.01 ft accuracy.

F 282. 414331N0725024.1. Town of Farmington. Valley flat; south of Connecticut Route 4. Installed July 23, 1976. Altitude 161.12 ft.

Jul. 23, 1976----4.49	Apr. 27, 1977----1.24
Oct. 12, 1976----2.92	May 24, 1977----2.45
Nov. 30, 1976----3.40	Jun. 22, 1977----2.92
Dec. 30, 1976----3.82	Jul. 28, 1977----4.10
Jan. 24, 1977----4.31	Aug. 25, 1977----4.24
Feb. 28, 1977----2.02	Sep. 29, 1977----2.52
Mar. 31, 1977----1.20	

F 283. 414315N0725114.1. Town of Farmington. Valley flat; south of Meadow Road. Installed July 27, 1976. Altitude 164.03 ft.

Jul. 27, 1976----5.60	Apr. 27, 1977----2.85
Oct. 13, 1976----4.17	May 24, 1977----4.23
Dec. 1, 1976----2.86	Jun. 22, 1977----4.79
Dec. 30, 1976----5.06	Jul. 29, 1977----5.52
Jan. 24, 1977----5.45	Aug. 25, 1977----5.14
Feb. 28, 1977----3.98	Sep. 29, 1977----3.17
Mar. 31, 1977----2.34	

F 284. 414522N0724940.1. Richard Merritt. Valley; east of Town Farm Road. Installed July 30, 1976. Altitude 175.15 ft.

Jul. 30, 1976---21.48	Apr. 27, 1977---18.73
Oct. 12, 1976---21.64	May 24, 1977---18.89
Nov. 30, 1976---21.95	Jun. 22, 1977---20.54
Dec. 29, 1976---21.99	Jul. 28, 1977---21.81
Jan. 24, 1977---22.47	Aug. 25, 1977---22.24
Feb. 28, 1977---22.48	Sep. 29, 1977---22.01
Mar. 30, 1977---19.53	

F 285. 414359N0724956.1. Angelo Tomasso, Jr. Valley flat; north of Connecticut Route 4. Installed July 29, 1976. Altitude 163.81 ft.

Jul. 29, 1976----8.63	Apr. 27, 1977----5.86
Oct. 12, 1976----7.75	May 24, 1977----6.98
Nov. 30, 1976----8.11	Jun. 22, 1977----7.51
Dec. 29, 1976----9.96	Jul. 28, 1977----8.39
Jan. 24, 1977----8.60	Aug. 25, 1977----8.61
Feb. 28, 1977----7.50	Sep. 29, 1977----7.63
Mar. 30, 1977----5.39	

F 286. 414204N0725132.2. Angelo Tomasso, Jr. Terrace; north of Hyde Road. Installed Aug. 5, 1976. Altitude 206.92 ft.

Aug. 5, 1976---27.40	Apr. 27, 1977---27.06
Oct. 14, 1976---27.43	May 24, 1977---27.22
Dec. 1, 1976---27.64	Jun. 22, 1977---27.29
Dec. 30, 1976---27.59	Jul. 29, 1977---27.67
Jan. 24, 1977---27.83	Aug. 25, 1977---27.97
Feb. 28, 1977---27.67	Sep. 30, 1977---27.50
Mar. 31, 1977---27.19	

F 288. 414458N0724947.1. Pennington Corp. Valley; west of Town Farm Road. Installed Aug. 12, 1976. Altitude 179.17 ft.

Aug. 12, 1976---19.85	Apr. 27, 1977---17.96
Oct. 12, 1976---20.20	May 17, 1977---17.61
Nov. 30, 1976---20.69	Jun. 22, 1977---18.37
Dec. 29, 1976---20.83	Jul. 29, 1977---19.66
Jan. 24, 1976---21.19	Aug. 25, 1977---20.52
Feb. 28, 1977---21.52	Sep. 29, 1977---21.07
Mar. 30, 1977---19.61	

F 289. 414429N0725030.1. Pennington Corp. Valley flat; north of Connecticut Route 4. Installed Aug. 13, 1976. Altitude 176.05. ft.

Aug. 13, 1976----6.64	Apr. 27, 1977----3.36
Oct. 14, 1976----7.59	May 24, 1977----4.70
Nov. 30, 1976----7.78	Jun. 22, 1977----6.29
Dec. 29, 1976----7.66	Jul. 28, 1977----8.25
Jan. 24, 1977----7.74	Aug. 25, 1977----8.76
Feb. 28, 1977----5.96	Sep. 29, 1977----6.58
Mar. 30, 1977----3.13	

F 290. 414421N0725112.1. Connecticut Sand and Stone Inc. Valley flat; south of Connecticut Route 4. Installed Aug. 16, 1976. Altitude 177.35.ft.

Aug. 16, 1976---12.20	Apr. 27, 1977---10.22
Oct. 14, 1976---13.04	May 24, 1977---11.24
Nov. 30, 1976---13.26	Jun. 22, 1977---12.36
Dec. 29, 1976---13.49	Jul. 28, 1977---13.12
Jan. 24, 1977---13.94	Aug. 25, 1977---12.47
Feb. , 1977---	Sep. 29, 1977---12.01
Mar. 31, 1977----9.93	

F 291. 414438N0725145.1. Town of Farmington. Valley flat; east of Woewassa Lane. Installed Aug. 17, 1976. Altitude 183.18 ft.

Aug. 17, 1976---15.10	Apr. 27, 1977---13.70
Oct. 14, 1976---16.35	May 24, 1977---14.30
Nov. 30, 1976---16.63	Jun. 22, 1977---15.68
Dec. 29, 1976---15.48	Jul. 28, 1977---16.55
Jan. 24, 1977---17.09	Aug. 25, 1977---16.37
Feb. 28, 1977---16.15	Sep. 29, 1977---15.73
Mar. 31, 1977---13.28	

F 292. 414403N0725035.1. Dunning Sand and Gravel Co. Valley flat; south of Connecticut Route 4. Installed Aug. 19, 1976. Altitude 171.47 ft.

Aug. 19, 1976----8.97	Apr. 27, 1977----5.74
Oct. 14, 1976----9.58	May 24, 1977----6.86
Nov. 30, 1976----9.70	Jun. 22, 1977----8.32
Dec. 29, 1976---10.13	Jul. 28, 1977----9.88
Jan. 24, 1977---10.47	Aug. 25, 1977---10.16
Feb. 28, 1977----8.78	Sep. 29, 1977----9.60
Mar. 31, 1977----5.51	

F 294. 414517N0725033.1. Pennington Corp. Hillside; west of Town Farm Road; south of MDC-HELCO right of way. Installed Sept. 7, 1976. Altitude 231.96 ft.

Sep. 7, 1976 16.76	Apr. 27, 1977---14.71
Oct. 12, 1976---20.42	May , 1977---
Nov. 30, 1976---21.23	Jun. 22, 1977---15.39
Dec. 29, 1976---21.45	Jul. 29, 1977---17.09
Jan. 24, 1977---21.51	Aug. 25, 1977---18.47
Feb. 28, 1977---21.43	Sep. 29, 1977---20.00
Mar. 30, 1977---17.19	

F 295. 414334N0725046.1. Town of Farmington. Valley flat; south of Connecticut Route 4. Installed Sept. 9, 1976. Altitude 167.34 ft.

Sep. 9, 1976----7.43	Apr. 27, 1977----4.89
Oct. 12, 1976----7.18	May 24, 1977----5.67
Nov. 30, 1976----7.48	Jun. 22, 1977----6.99
Dec. 29, 1976----7.54	Jul. 28, 1977----8.03
Jan. 24, 1977----8.19	Aug. 25, 1977----8.07
Feb. 28, 1977----7.08	Sep. 29, 1977----7.22
Mar. 31, 1977----4.77	

F 296. 414402N0725118.1 Town of Farmington. Valley flat; east of New Britain Avenue. Installed Sept. 13, 1976. Altitude 177.47 ft.

Sep. 13, 1976---13.77	Apr. 27, 1977---11.10
Oct. 13, 1976---13.75	May 24, 1977---12.73
Dec. 1, 1976---13.91	Jun. 22, 1977---13.88
Dec. 29, 1976---12.96	Jul. 29, 1977---14.42
Jan. 24, 1977---14.62	Aug. 25, 1977---15.59
Feb. 28, 1977----9.54	Sep. 29, 1977---12.86
Mar. 31, 1977----9.63	

F 297. 414348N0725118.1. Town of Farmington. Valley flat; north of Red Oak Hill Road. Installed Sept. 14, 1976. Altitude 172.21.ft.

Sep. 14, 1976--- 9.44	Apr. 27, 1977--- 6.40
Oct. 13, 1976---10.23	May 24, 1977--- 7.35
Dec. 1, 1976--- 9.23	Jun. 22, 1977--- 9.01
Dec. 30, 1976--- 9.43	Jul. 29, 1977--- 9.88
Jan. 24, 1977---10.00	Aug. 30, 1977--- 9.43
Feb. 28, 1977--- 8.50	Sep. 29, 1977--- 8.39
Mar. 31, 1977--- 5.69	

F 298. 414358N0725133.1. Town of Farmington. Terrace; east of New Britain Avenue. Installed Sept. 16, 1976. Altitude 177.74 ft.

Sep. 16, 1976----9.19	Apr. 27, 1977----8.04
Oct. 13, 1976----9.20	May 24, 1977----8.47
Dec. 1, 1976---10.47	Jun. 22, 1977----9.66
Dec. 30, 1976---10.78	Jul. 29, 1977---10.81
Jan. 24, 1977---11.56	Aug. 25, 1977---11.29
Feb. 28, 1977---10.87	Sep. 29, 1977---10.85
Mar. 31, 1977--- 7.91	

F 299. 414302N0725028.1. Farmington Land Trust. Valley flat; north of Meadow Road. Installed Sept. 21, 1976. Altitude 161.16 ft.

Sep. 21, 1976----4.47	Apr. 27, 1977----2.53
Oct. 13, 1976----4.15	May 24, 1977----4.22
Dec. 1, 1976----4.49	Jun. 22, 1977----4.73
Dec. 30, 1976----4.83	Jul. 29, 1977----5.32
Jan. 24, 1977----5.14	Aug. , 1977----
Feb. 28, 1977----3.00	Sep. 29, 1977----2.14
Mar. 27, 1977---- .96	

F 300. 414302N0725103.1. Town of Farmington. Valley flat; south of Meadow Road. Installed Sept. 22, 1976. Altitude 161.98 ft.

Sep. 22, 1976----3.43	Apr. 27, 1977----1.70
Oct. 13, 1976----2.70	May 24, 1977----3.04
Dec. 1, 1976----3.45	Jun. 22, 1977----3.56
Dec. 30, 1976----3.79	Jul. 29, 1977----4.39
Jan. 24, 1977----4.14	Aug. 25, 1977----3.88
Feb. 28, 1977----1.85	Sep. 29, 1977----2.37
Mar. 31, 1977----1.05	

Table 13.--Analyses of water from the Farmington River at Unionville, Station no. (Pl. A) 01188085 Farmington, Connecticut.

Date of sample	Eastern Standard Time	Instant-aneous discharge (cfs)	Dis-solved calcium (mg/L)	Calcu-lated sodium and po-tassium (mg/L)	Dis-solved magne-sium (mg/L)	Dis-solved iron (ug/L)	Dis-solved manga-nese (ug/L)	Bicar-bonate (mg/L)
10-29-75	0930	1680	7.6	0.3	1.8	140	30	11
11-18-75	1055	1660	5.0	8.0	.6	120	30	18
12-16-75	1100	852	5.0	5.8	1.5	80	10	16
01-20-76	1055	765	4.8	7.0	1.3	80	20	16
02-10-76	1255	998	5.0	7.1	1.3	80	20	14
03-16-76	1100	960	4.2	5.6	1.6	60	20	8.0
04-20-76	1005	447	4.9	7.4	1.3	80	20	17
05-11-76	1050	724	6.1	4.4	1.7	90	30	16
06-15-76	1115	285	5.0	7.2	1.8	130	10	20
07-20-76	1015	173	5.8	--	2.3	130	10	20
08-03-76	0925	601	5.4	6.6	1.5	140	10	19
09-21-76	1150	560	3.7	8.6	1.2	130	10	19
11-17-76	0940	560	5.8	5.7	2.1	150	10	18
02-09-77	1045	---	8.1	7.8	2.1	110	20	19
05-10-77	1110	2650	3.6	4.9	1.2	110	20	10
	MAXIMUM	--	8.1	8.6	2.3	150	30	20
	MINIMUM	--	3.6	.3	.6	60	10	8.0
	MEDIAN	--	5.0	6.8	1.5	110	20	17

Date of sample	Dis-solved sulfate (mg/L)	Dis-solved chlor-ide (mg/L)	Dis-solved silica (mg/L)	Dis-solved solids, residue at 180°C (mg/L)	Calcium, magne-sium hardness (mg/L)	Spec-ific conduct-ance (umhos/cm)	Field pH (units)	Water temper-ature (deg. C)
10-29-75	8.1	6.7	5.3	--	26	61	6.5	12.0
11-18-75	7.2	7.2	5.2	45	15	63	7.2	8.5
12-16-75	8.0	6.9	5.5	44	19	46	7.3	6.0
01-20-76	7.7	8.1	6.2	51	17	87	---	.0
02-10-76	9.5	8.4	6.1	35	18	75	7.2	1.0
03-16-76	9.8	8.8	5.6	48	17	75	7.3	3.0
04-20-76	7.0	8.8	4.5	43	18	69	7.3	19.0
05-11-76	7.3	7.9	4.7	43	22	71	7.7	14.5
06-15-76	7.6	8.0	4.5	44	20	77	7.6	19.5
07-20-76	--	--	4.6	54	24	87	7.7	21.5
08-03-76	7.4	7.6	4.6	46	20	72	7.4	17.0
09-21-76	5.8	8.0	3.2	37	14	66	7.6	20.0
11-17-76	6.4	9.9	3.9	49	23	75	7.2	4.0
02-09-77	10	14	7.0	62	29	105	7.0	.0
05-10-77	7.5	6.0	4.9	40	14	59	6.9	7.0
MAXIMUM	10	14	7.0	62	29	105	7.7	21.5
MINIMUM	5.8	6.0	3.2	35	14	46	6.5	.0
MEDIAN	7.6	8.0	4.9	44	19	72	7.2	8.5

Table 13.--Analyses of water from the Farmington River at Unionville, Station no. (Pl. A) 01188085 Farmington, Connecticut. --Continued

Date of sample	Eastern Standard Time	Instantaneous discharge (cfs)	Dissolved copper (ug/L)	Dissolved zinc (ug/L)	Total nitrite & nitrate (mg/L)	Total phosphorus (mg/L)	Total organic carbon (mg/L)
10-29-75	0930	1680	0	0	0.11	0.03	6.0
11-18-75	1055	1660	0	20	.12	.03	4.2
12-16-75	1100	852	0	0	.16	.04	2.9
01-20-76	1055	765	0	10	.21	.04	3.2
02-10-76	1255	998	0	0	.22	.03	3.2
03-16-76	1100	960	0	0	.19	.04	8.3
04-20-76	1005	447	0	0	.13	.03	3.9
05-11-76	1050	724	0	0	.10	.04	3.1
06-15-76	1115	285	0	0	.15	.04	10
07-20-76	1015	173	0	0	.22	.04	--
08-03-76	0925	601	0	10	.14	.06	--
09-21-76	1150	560	0	0	.12	.05	3.9
10-12-76	1110	419	0	10	.12	.09	7.5
11-17-76	0940	560	0	0	.18	.07	10
12-06-76	1310	229	0	0	.18	.06	6.6
01-19-77	1015	--	10	20	.42	.08	4.6
02-09-77	1045	--	0	10	.41	.09	3.4
03-08-77	1110	496	10	10	.32	.04	3.2
04-05-77	1115	4090	0	0	.19	.04	3.6
05-10-77	1110	2650	0	10	.12	.03	5.3
06-08-77	1335	285	7	60	.36	.05	5.7
MAXIMUM	--	--	10	60	.42	.09	10
MINIMUM	--	--	0	0	.10	.03	2.9
MEDIAN	--	--	0	0	.18	.04	4.2
06-06-77 1/	1405	--	4	30	.24	.04	6.5
06-06-77 2/	1450	--	5	30	.55	.22	7.2

Date sample	Color (units)	Turbidity (JTU)	Dissolved oxygen (mg/L)	Dissolved oxygen (percent saturation)	Coliform (col./100ml)	Fecal streptococci (col./100ml)	Fecal coliform (col./100ml)
10-29-75	12	2	11.0	102	92	9	40
11-18-75	15	2	12.1	103	42	16	19
12-16-75	6	1	12.7	102	39	16	13
01-20-76	8	1	14.6	100	200	21	5
02-10-76	2	1	14.2	100	100	7	1
03-16-76	6	1	13.6	101	27	2	7
04-20-76	7	3	10.3	111	1300	4	19
05-11-76	8	1	10.7	104	1000	6	13
06-15-76	3	3	10.2	110	480	42	42
07-20-76	6	1	9.5	107	240	100	68
08-03-76	19	2	10.1	104	1000	120	71
09-21-76	10	1	9.8	106	320	27	31
10-12-76	35	1	11.4	105	84	56	43
11-17-76	15	3	14.0	106	130	22	9
12-06-76	15	2	15.0	104	85	15	13
01-19-77	7	3	17.9	123	120	190	19
02-09-77	10	2	14.2	97	7900	680	960
03-08-77	7	3	13.8	99	400	160	11
04-05-77	3	7	5.7	43	--	520	700
05-10-77	0	4	12.2	100	4700	260	260
06-08-77	0	3	10.6	102	1200	51	200
MAXIMUM	35	7	17.9	123	7900	680	960
MINIMUM	0	1	5.7	43	27	2	1
MEDIAN	7	2	12.1	103	220	27	19
06-06-77 1/	0	--	10.1	106	360	29	96
06-06-77 2/	0	--	8.9	95	2200	48	150

1/ Water from Farmington River at River Glen, Station No. (Pl. A) 01188130.

2/ Water from Farmington River near Farmington, Station No. (Pl. A) 01189036.

Table 14.--Analyses of water from the Pequabuck River at Farmington, Station no. (Pl. A) 01189030.

Date of sample	Eastern Standard Time	Instantaneous discharge (cfs)	Dissolved calcium (mg/L)	Calculated sodium and potassium (mg/L)	Dissolved magnesium (mg/L)	Dissolved iron (ug/L)	Dissolved manganese (ug/L)	Bicarbonate (mg/L)
10-08-75	1330	82	17	19	3.4	220	210	56
11-18-75	0920	126	15	8.4	2.4	260	120	40
12-16-75	0930	101	13	12	3.5	220	130	32
01-20-76	0930	86	14	23	3.0	220	160	48
02-10-76	1420	113	12	20	2.5	140	170	35
03-16-76	0930	120	13	16	2.5	200	140	36
04-20-76	0840	64	17	25	3.3	250	220	60
05-11-76	0900	69	15	23	3.3	250	180	55
06-15-76	0935	40	19	20	4.1	190	190	46
07-20-76	0910	23	21	40	1.5	120	170	55
08-03-76	1230	31	18	18	3.4	270	220	43
09-21-76	0920	29	18	50	4.0	160	210	102
11-16-76	1425	38	18	38	4.0	250	200	79
02-09-77	0930	--	21	69	4.1	200	200	99
05-10-77	1010	183	8.7	8.1	2.0	260	50	22
MAXIMUM		--	21	69	4.1	270	220	102
MINIMUM		--	8.7	8.1	1.5	120	50	22
MEDIAN		--	17	20	3.3	220	180	48

Date of sample	Dissolved sulfate (mg/L)	Dissolved chloride (mg/L)	Dissolved silica (mg/L)	Dissolved solids, residue at 180°C (mg/L)	Calcium, magnesium hardness (mg/L)	Specific conductance (umhos/cm)	Field pH (units)	Water temperature (deg. C)
10-08-75	20	22	12	139	56	220	6.4	15.5
11-18-75	20	18	11	54	47	140	7.2	7.5
12-16-75	22	17	11	113	47	182	6.7	8.0
01-20-76	21	26	11	128	47	280	--	.0
02-10-76	19	25	10	109	40	205	7.1	2.5
03-16-76	18	21	9.0	100	43	195	6.6	4.5
04-20-76	24	25	8.8	148	56	230	6.6	17.5
05-11-76	23	23	9.7	135	51	235	6.5	15.0
06-15-76	27	29	12	169	64	310	6.8	19.0
07-20-76	43	39	13	212	59	225	7.0	22.0
08-03-76	31	21	11	157	59	245	7.0	18.5
09-21-76	35	35	14	194	61	370	6.9	19.0
11-16-76	33	32	14	168	61	330	6.9	6.0
02-09-77	37	70	15	259	69	520	7.0	.0
05-10-77	12	12	6.0	73	30	120	6.8	7.0
MAXIMUM	43	70	15	259	69	520	7.2	22.0
MINIMUM	12	12	6.0	54	30	120	6.4	.0
MEDIAN	23	25	11	139	56	230	6.8	8.0

Table 14.--Analyses of water from the Pequabuck River at Farmington, Station no. (Pl. A) 01189030.--Continued

Date of sample	Eastern Standard Time	Instant-aneous discharge (cfs)	Dis-solved copper (ug/L)	Dis-solved zinc (ug/L)	Total nitrite & ni-trate (mg/L)	Total phos-phorus (mg/L)	Total org-anic carbon (mg/L)
10-08-75	1330	82	10	50	0.95	0.72	5.9
11-18-75	0920	126	20	60	1.0	.57	6.8
12-16-75	0930	101	0	40	.93	.70	4.4
01-20-76	0930	86	20	70	1.0	.83	6.6
02-10-76	1420	113	10	40	.99	.46	3.9
03-16-76	0930	120	10	40	.87	.58	7.3
04-20-76	0840	64	10	30	.79	.92	16
05-11-76	0900	69	20	40	.88	1.2	9.1
06-15-76	0935	40	20	40	1.20	2.0	8.6
07-20-76	0910	23	20	40	.90	2.1	11
08-03-76	1230	31	10	40	.79	1.3	7.4
09-21-76	0920	29	20	40	.50	2.9	5.6
10-12-76	1310	43	20	70	.79	1.0	--
11-16-76	1425	38	20	60	1.1	1.5	11
12-06-76	1135	31	20	70	.26	2.0	15
01-17-77	1500	--	20	90	.90	1.5	15
02-09-77	0930	--	50	160	1.0	3.7	20
03-08-77	0935	101	10	60	.62	.39	5.1
04-04-77	1315	132	10	40	.59	.19	5.2
05-10-77	1010	183	14	40	.53	.27	6.0
06-06-77	1300	48	11	50	.99	.99	5.1
MAXIMUM	--	--	50	160	1.20	3.7	20
MINIMUM	--	--	0	30	.26	.19	3.9
MEDIAN	--	--	20	40	.90	.99	7.0

Date of sample	Color (units)	Turbidity (JTU)	Dis-solved oxygen (mg/L)	Dis-solved oxygen (percent satur-ation)	Coliform (col./100ml)	Fecal strepto-cocci (col./100ml)	Fecal coliform (col./100ml)
10-08-75	9	7	6.5	65	--	365	1400
11-18-75	7	6	7.6	63	17,000	700	1200
12-16-75	4	4	7.9	67	78,000	1400	1300
01-20-76	6	9	11.5	79	340	56	4
02-10-76	1	5	11.7	85	86,000	4200	1100
03-16-76	5	6	10.2	78	120	2	3
04-20-76	10	6	4.4	46	5,000	68	140
05-11-76	14	2	4.9	48	180,000	1300	16,000
06-15-76	6	6	3.3	35	7,000	80	600
07-20-76	17	6	.8	9	3,600	180	270
08-03-76	19	5	4.0	43	100,000	460	7,200
09-21-76	17	5	.6	6	210,000	800	15,000
10-12-76	20	8	5.3	48	320	50	150
11-16-76	8	15	6.8	54	32	5	26
12-06-76	10	15	6.4	46	40,000	12,000	47,000
01-17-77	17	9	9.3	64	--	17,000	28,000
02-09-77	20	20	10.4	71	190	240	4
03-08-77	7	7	10.1	73	8,000	22	21
04-04-77	7	4	4.9	42	--	3	660
05-10-77	0	5	8.1	66	10,000	1,200	1,600
06-06-77	0	6	4.0	41	14,000	88	240
MAXIMUM	20	20	11.7	85	210,000	17,000	47,000
MINIMUM	0	2	.6	6	32	2	3
MEDIAN	8	6	6.5	54	9,000	180	660

Table 15.--Analyses of water from the stratified-drift aquifer; Farmington, Connecticut. Well locations are shown on plate A.

Well no.	Date of sample	Well depth (ft)	Dis-solved calcium (mg/L)	Dis-solved magne-sium (mg/L)	Dis-solved sodium (mg/L)	Dis-solved potas-sium (mg/L)	Dis-solved iron (ug/L)	Dis-solved manga-nese (ug/L)	Bicar-bonate (mg/L)	Dis-solved sulfate (mg/L)	Dis-solved chlor-ide (mg/L)
F 286	5-17-77	35.7	3.7	1.0	3.7	1.8	30	30	10	8.3	4.0
F 288	5-18-77	32.4	26	5.0	4.6	4.5	10	100	100	7.1	2.2
F 289	5-19-77	23.2	22	2.3	3.0	1.8	50	690	64	11	3.3
F 290	5-17-77	28.1	15	2.3	6.4	1.7	10	120	35	15	8.0
F 291	5-17-77	22.6	26	2.0	12	2.3	60	720	74	12	15
F 295	5-17-77	21.3	21	4.4	3.5	4.2	70	1,400	68	14	3.5
F 296	5-16-77	28.7	32	5.5	6.1	2.2	60	360	91	17	23
F 297	5-16-77	18.6	15	1.9	5.0	1.6	10	520	32	13	9.8
F 298	5-12-77	23.2	240	29	140	3.9	9,700	38,000	1,030	3.4	190
F 299	5-12-77	26.8	46	5.2	4.0	2.0	180	16,000	120	24	12
F 300	5-18-77	20.1	22	4.5	4.2	2.1	50	180	30	27	7.7
MAXIMUM		--	240	29	140	4.5	9,700	38,000	1,030	27	190
MINIMUM		--	3.7	1.0	3.0	1.6	10	30	10	3.4	2.2
MEDIAN		--	22	4.4	4.6	2.1	50	520	68	13	8.0

Well no.	Dis-solved flour-ide (mg/L)	Dis-solved solids, residue at 180°C (mg/L)	Total nitrate & ni-trite (mg/L)	Total phos-phorus (mg/L)	Calcium, magne-sium hardness (mg/L)	Noncar-bonate hardness (mg/L)	Spec-ific conduct-ance (umhos/cm)	Field pH (units)	Temper-ature (deg C)
F 286	0.0	42	0.05	0.40	13	5	70	6.7	10
F 288	.1	114	.05	.10	86	3	190	7.9	9
F 289	.1	91	.00	.64	64	12	146	7.7	11
F 290	.0	81	1.2	.05	47	18	132	7.4	12
F 291	.1	116	.53	.11	73	12	220	7.6	11
F 295	.1	98	.05	.16	71	15	162	6.8	9.5
F 296	.1	151	.46	.18	100	28	244	7.4	11
F 297	.0	82	1.4	.56	45	19	121	6.1	10.5
F 298	.1	1,280	.02	.32	720	0.0	2,250	6.5	10.5
F 299	.1	193	.38	.13	140	38	290	6.4	9
F 300	.1	119	4.30	.65	73	49	178	5.9	11
MAXIMUM	.1	1,280	4.30	.65	720	49	2,250	7.9	12
MINIMUM	.0	42	.00	.05	13	0.0	70	5.9	9
MEDIAN	.1	114	.38	.18	73	15	178	6.8	10.5

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