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Radon-222 in the Ground Water of Chester County, Pennsylvania

by Lisa A. Senior

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prepared in cooperation with the
CHESTER COUNTY WATER RESOURCES AUTHORITY
and the
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CONVERSION FACTORS AND ABBREVIATIONS

Multiply	By	To obtain
	Length	
inch (in)	2.54	centimeter
foot (ft)	0.3048	meter
	Area	
square mile (mi^2)	2.590	square kilometer
	Flow rate	
gallon per minute (gal/min)	0.06309	liter per second
	Radioactivity	
picocurie per liter (pCi/L)	0.037	becquerel per liter
	Temperature	
degree Fahrenheit (°F)	°C=5/9 (°F-32)	degree Celsius

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

Abbreviated water-quality units used in report:

ppm, parts per million
mg/L, milligrams per liter
µg/L, micrograms per liter
µS/cm, microsiemens per centimeter at 25 degrees Celsius
pCi/L, picocuries per liter

Radioactivity Units

A commonly used unit of measure for radioactivity is the picocurie. One Curie is the activity of one gram of radium-226, which is equal to 3.7×10^{10} atomic disintegrations per second; a picocurie is 10^{-12} Curies, which is about equal to 2.2 atomic disintegrations per minute. Activity refers to the decay of a radioactive substance, which is measured by the number of particles emitted by a radionuclide per unit of time. The rate of decay is proportional to the number of atoms of a radioactive substance present, and inversely proportional to its half life, which is the time necessary for the substance to lose half its radioactivity. Activity is defined as being equal to $n \cdot \lambda$, where n is the number of atoms of a radionuclide and λ is the decay constant. The decay constant, λ, is equal to the natural logarithm of 2 divided by the half-life of the radionuclide. Although picocurie is strictly a measure of activity, this report uses the term concentration to refer to measurements of radon-222 in picocuries per liter (activity per volume).

RADON-222 IN THE GROUND WATER OF CHESTER COUNTY, PENNSYLVANIA

by Lisa A. Senior

ABSTRACT

Radon-222 concentrations in ground water in 31 geologic units in Chester County, Pa., were measured in 665 samples collected from 534 wells from 1986 to 1997. Chester County is underlain by schists, gneisses, quartzites, carbonates, sandstones, shales, and other rocks of the Piedmont Physiographic Province. On average, radon concentration was measured in water from one well per 1.4 square miles, throughout the 759 square-mile county, although the distribution of wells was not even areally or among geologic units.

The median concentration of radon-222 in ground water from the 534 wells was 1,400 pCi/L (picocuries per liter). About 89 percent of the wells sampled contained radon-222 at concentrations greater than 300 pCi/L, and about 11 percent of the wells sampled contained radon-222 at concentrations greater than 5,000 pCi/L. The highest concentration measured was 53,000 pCi/L. Of the geologic units sampled, the median radon-222 concentration in ground water was greatest (4,400 pCi/L) in the Peters Creek Schist, the second most areally extensive formation in the county. Significant differences in the radon-222 concentrations in ground water among geologic units were observed. Generally, concentrations in ground water in schists, quartzites, and gneisses were greater than in ground water in anorthosite, carbonates, and ultramafic rocks. The distribution of radon-222 in ground water is related to the distribution of uranium in aquifer materials of the various rock types.

Temporal variability in radon-222 concentrations in ground water does not appear to be greater than about a factor of two for most (75 percent) of wells sampled more than once but was observed to range up to almost a factor of three in water from one well. In water samples from this well, seasonal variations were observed; the maximum concentrations were measured in the fall and the minimum in the spring.

INTRODUCTION

Radon-222 is a naturally occurring radioactive gas that can be present in ground water. Radon-222 concentrations in ground water are related to the uranium concentrations in the aquifer material and, in general, appear to differ by geologic unit (Loomis, 1987; Michel and Jordana, 1987). To minimize health risks associated with this naturally occurring radioactive gas, the U.S. Environmental Protection Agency (USEPA) had proposed a maximum contaminant level (MCL) of 300 pCi/L for radon-222 in drinking water (U.S. Environmental Protection Agency, 1991); however, the USEPA withdrew the proposed MCL for radon-222 in drinking water in 1997 (Federal Register Document 97-20666, filed August 5, 1997) and has been directed to promulgate a final regulation by August 1999 [Safe Drinking Water Act Amendments of 1996, section 1412(b)(13)(D-E)].

In Chester County, Pa., many residences and businesses rely for drinking water supplies on ground water that can contain elevated concentrations of radon-222. Data on the concentrations of radon-222 in ground water in Chester County have been collected by the U.S. Geological Survey (USGS) since 1986 as part of studies done in cooperation with county and state agencies and a watershed association. Most of the ground-water samples contained radon-222 at concentrations exceeding 300 pCi/L (the proposed MCL for radon that was withdrawn in 1997), and concentrations as high as 53,000 pCi/L were measured. Although many samples had been collected, the data prior to 1995 were insufficient to characterize radon-222 concentrations in ground water in Chester County as a whole because (1) data on radon-222 ground-water concentrations in some geologic units were limited or missing, (2) the spatial distribution of samples was uneven, and (3) little was known about temporal variations and the uranium content of geologic units. Most samples for radon-222 analysis collected prior to 1995 generally were from wells sampled for other studies and were not evenly distributed throughout the county or in all geologic units. For example, many wells were sampled as part of the Chester County ground-water monitoring program that emphasizes sampling of wells near suspected point and nonpoint sources of contamination regardless of geologic setting or spatial distribution. Therefore, additional data on radon-222 concentrations in ground water were collected by USGS in 1995-97 to provide better information on the spatial and temporal distribution of radon-222 in ground water. This work was done by USGS in cooperation with the Chester County Water Resources Authority and the Chester County Health Department.

Purpose and Scope

This report presents data on radon-222 concentrations in ground-water samples collected by USGS in Chester County from 1986 to 1997. Radon-222 concentrations in ground water are summarized for the county and for the major geologic units that are used for drinking water supply. The relation between radon-222 concentrations in ground water and geologic unit is discussed to provide a better understanding of the spatial distribution of radon-222 in ground water of the county. In addition, results of analyses of samples collected from several wells over periods ranging from 1 to 3 years are discussed to provide better understanding of the temporal variability of radon-222 in ground water. These data can be used by residents and businesses in the county who rely on ground water for supply and by public health officials and planners to help assess possible health risks posed by radon-222 in ground water.

Description of Chester County

Chester County encompasses 759 mi^2 in the Piedmont Physiographic Province of southeastern Pennsylvania (Berg and others, 1989). The topography of the Piedmont Physiographic Province is characterized by gently rolling uplands dissected by narrow valleys. Elevation of the land surface ranges from about 100 to 1,040 ft above sea level in Chester County. The county is underlain predominantly by metamorphic rocks of igneous and sedimentary origin.

Chester County has a modified humid continental climate. Winters are mild to moderately cold and summers are warm and humid. Normal mean annual air temperatures at the National Oceanic and Atmospheric Administration (NOAA) weather station in West Chester, Pa. (pl. 2), for 1961-90 is 52.9 °F (11.6 °C) (Owenby and Ezell, 1992). Normal mean temperature for 1961-90 for January, the coldest month, is 29.5 °F (-1.4 °C), and normal mean temperature for July, the warmest month, for 1961-90 is 74.8 °F (23.8 °C). Normal mean annual precipitation for 1961-90 is 45.88 in. at West Chester. Precipitation is distributed fairly evenly throughout the year.

The population of Chester County from the 1990 census is 376,396 (Chester County Planning Commission, 1994). Much of the county is rural. About 580 mi^2 (76 percent) of the county area is sparsely developed, which includes agricultural, recreation, wooded, and vacant land (Delaware Valley Regional Planning Commission, 1994). Many residences and businesses in rural areas use private wells for water supply.

Well-Numbering System

The well-numbering system used in this report consists of an abbreviation prefix followed by a sequentially-assigned local well number. The prefix is a county abbreviation, and the prefix “CH” denotes a well in Chester County. In addition to the local well number, each well or spring is assigned a unique 15-digit site-identification number, on the basis of the latitude and longitude (in degrees, minutes, and seconds) of the well and a two-digit site sequence number.

Previous Studies

Data on radon concentrations in ground water in Chester County were published in Sloto (1989) and Sloto (1994). The extent and distribution of radium and radon in ground water in the Chickies Quartzite in Chester County, as well as in the neighboring counties in southeastern Pennsylvania, were studied 1986-89 (Cecil and others, 1991; Senior and Vogel, 1995). Seasonal variations in radium and radon concentrations in water from one well sampled over 3 years was described by Senior (1992). Radon concentrations in ground water in the Red Clay Creek and West Valley Creek Basins, Chester County, are presented in Senior (1996) and Senior and others (1997), respectively. Lindsey and Ator (1996) made a regional assessment of radon concentrations in ground water in the Lower Susquehanna Basin, including part of western Chester County.

Acknowledgments

The cooperation of well owners who made their wells accessible for water samples and water-level measurements is greatly appreciated, especially those owners that allowed repeated sampling of their wells for temporal variability studies.

RADON-222 IN GROUND WATER

Radon-222 can migrate away from its source in rock materials because of differences in physical and chemical properties. Radon-222 is a virtually inert gas and the only member of the uranium-238 decay series that is in the gaseous state under standard temperature and pressure conditions. Radon-222 and its parents are soluble under different geochemical conditions. For example, uranium is most soluble in oxidizing waters in the +6 oxidation state (especially as a uranyl complex UO^{2+}) and in the +8 oxidation state (uranyl carbonates at pH greater than 8) (Langmuir, 1978). Radium is found only in the +2 oxidation state and is most mobile in reducing, chloride-rich ground water with elevated total dissolved solids (Tanner, 1964).

Differences in the chemical properties of radionuclides within a decay series may result in partitioning of the radionuclides within a closed physical-chemical system. In a closed ground-water system, where no intermediate decay product of the uranium-238 or other radionuclide decay series is lost, secular equilibrium is reached after a period based on the half-life of the longest-lived intermediate radionuclide of the decay series. Secular equilibrium describes a state in which activities of parents and daughter products in a decay series are equal, and mass ratios are fixed at some constant value. Radon-222 reaches 99-percent equilibrium with its parent, radium-226, after about 25.4 days (Durrance, 1986, p. 286). In an open system, if partitioning results in transport of some decay products or parent radionuclides out of the system, secular equilibrium no longer prevails. Many ground-water systems are open systems at the local scale.

The dominant means of radon-222 migration from sources in aquifer materials is mechanical transport as a solute in flowing ground water (Durrance, 1986, p. 209). Radon can physically enter the ground-water system from aquifer materials by (1) alpha recoil of radon-222, the product nucleus of alpha decay, resulting in ejection from the parent radium-226 atom in a solid (crystal structure or disordered surface condition); (2) diffusion through mineral grains; and (3) diffusion and transport in rock mass, including fractures (Andrews and Wood, 1972; Durrance, 1986).

Many studies have shown that radon-222 is not supported by its parent radium-226 in solution, which means that the amount of dissolved radium-226 generally is insufficient to generate the observed amount of radon-222 in ground water. Most radon-222 in ground water is derived from radium-226 in the solid phase of aquifer materials (in minerals in the rock matrix and on fracture surfaces), which in turn is ultimately derived from uranium-238 and subsequent daughters (fig. 3). Radon-222 commonly is present in ground water in concentrations that are greater than that of any of its parents because solubility limits on these radionuclides are greater than those for radon-222 in most ground waters.

Radon-222 concentrations in ground water vary because of variable concentrations of sources in the aquifer materials, emanation rates from mineral sources, aquifer porosity, and permeability. King and Connor (1989) published calculations that show for a given radium-226 (or uranium-238) content of rock, variations in the normal range of emanation coefficients (10 to 30 percent) and aquifer porosity (5 to 35 percent) can cause radon concentrations to vary by up to an order of magnitude. In their study, the spatial distribution of elevated radon-222 concentrations in ground water is described and related to factors that include sources within the aquifer, lithology, aquifer and well-construction characteristics, ground-water chemistry, and hydrogeologic setting.

HYDROGEOLOGIC SETTING AND SOURCES OF RADON-222 IN ROCKS OF CHESTER COUNTY

In Chester County and elsewhere in the Piedmont Physiographic Province, the fractured bedrock generally acts as an unconfined aquifer that is recharged by precipitation and discharges water to streams. Ground-water-flow systems tend to be of local rather than regional extent. Lithology, geologic structure, the ground-water system, and sources of radon-222 in rocks are described below to provide a basis for understanding relations between the occurrence of radon-222 in ground water, uranium content of aquifer materials, and hydrogeologic factors, including aquifer permeability, ground-water chemistry, and flow of ground water in the county. The hydrogeology and ground-water-flow systems in major rock types in Chester County are described in more detail by Sloto (1994) and Vogel and Reif (1993).

Lithology

The geologic units mapped in Chester County can be grouped into three terranes composed of related groups that reflect the origin, metamorphic, and structural history of the rocks (fig. 1) (Sloto, 1994, p. 6). The Brandywine terrane in southern Chester County includes Paleozoic metasedimentary rocks (schists and phyllites), felsic and mafic gneisses, and mafic and ultramafic rocks. The Lancaster terrane in northern Chester County includes the Chester Valley sequence of Paleozoic metamorphosed clastic and carbonate rocks and Precambrian anorthosite and gneisses. These Precambrian gneisses and anorthosite form a group known as the Honeybrook massif, and the Paleozoic sediments form the Chester Valley Sequence (fig. 1). The Mesozoic terrane in the northernmost part of Chester County includes sandstones, shales, conglomerate, and diabase. Much of the current structure of rocks in Chester County was formed during the early Paleozoic when a tectonic collision at the eastern edge of North America caused folding of continental shelf rocks and thrusting of oceanic

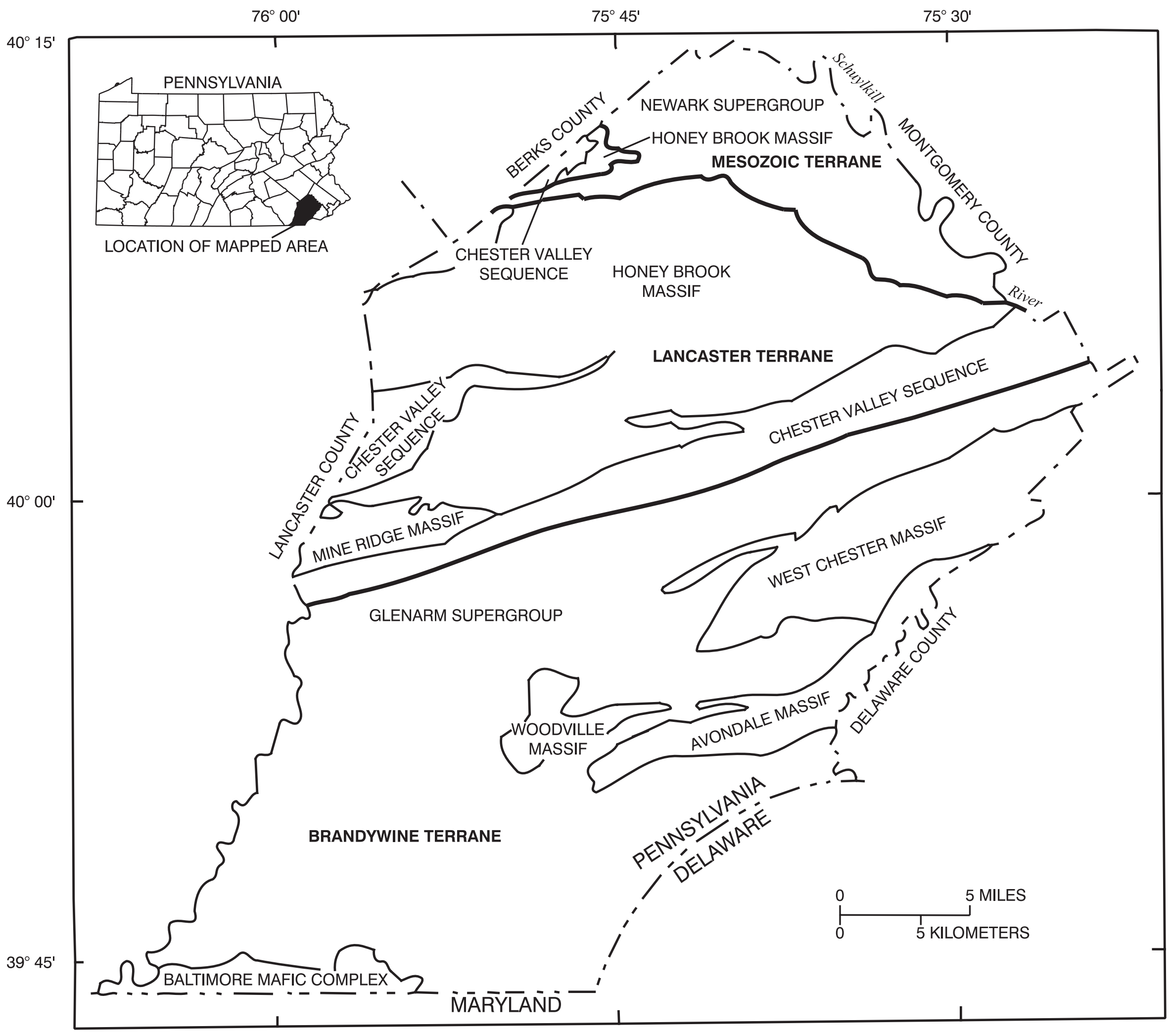

Figure 1. Geologic terranes of Chester County, Pennsylvania. (From Sloto, 1994, fig. 3.)

sediments and magmatic arc rocks over the Grenville (Precambrian) basement and Paleozoic clastic and carbonate rocks (Wagner and Srogi, 1987, p. 22). The Mesozoic rocks of northernmost Chester County were deposited during continental rifting in the Triassic and Jurassic that resulted in the formation of the Newark Basin.

The stratigraphic column for geologic units mapped in Chester County is shown in table 1. The nomenclature for geologic units in the county is that of the Pennsylvania Geological Survey (PAGS) as presented in Sloto (1994). North of the Chester Valley, some geologic units were remapped since publication of the map by Berg and others (1980), whereas south of the Chester Valley, much of the original mapping is retained. Other reports prior to Sloto (1994) used the previous PAGS nomenclature (Berg and others, 1980). USGS nomenclature for the geologic units is given by Lyttle and Epstein (1987).

Ground-Water System

The bedrock water-table aquifer in Chester County is recharged directly by precipitation that infiltrates through the overlying soil and saprolite (decomposed bedrock) and from lateral inflow from adjacent geologic units. Thickness of soil and saprolite and depth to competent bedrock varies, ranging from less than 10 ft to more than 80 ft, but commonly is about 20 to 40 ft. The saprolite typically has greater porosity and storage than the fractured bedrock. Together, the bedrock and overlying saprolite can act as a single water-table aquifer (Vogel and Reif, 1993, p. 12), although in places the weathered zone acts as a confining or semiconfining layer. Openings to the surface and within the aquifer have developed along a complex interconnected network of bedding, joints, and structurally controlled planes, such as cleavage, faults, and fractures. In carbonate aquifers especially, these openings may be enlarged by mineral dissolution.

Ground-water flow is driven by the hydraulic gradient through a network of fractures. Many wells intercept more than one water-bearing fracture. Each fracture opening penetrated by a well can have a different hydraulic head; ground water flows from areas of higher head to areas of lower head. Analysis of frequency of water-bearing zones (water-producing fractures) for 1,414 wells in Chester County indicates most (92 percent) water-bearing zones are within 200 ft of land surface (Sloto, 1994, p. 16). The frequency of water-bearing zones decreases with depth, and no such zones are reported at depths greater than 600 ft below land surface. The data are sparse for depths greater than 600 ft but do not preclude ground-water flow at such depths. This analysis supports the model of a shallow, local flow system in Chester County, similar to that in other geologic units in the Piedmont (Trainer, 1988).

Generally, the water table is a subdued replica of the topography, and ground-water divides coincide with ridge tops. Median depth to water tends to be greater in wells on hilltops than in wells on slopes. Springs on slopes are indicative of a shallow water table and (or) a local flow system. Geologic units that are relatively resistant to erosion form ridges. Ground water recharged there can discharge to streams, springs, and to adjacent geologic units. Wells in the fractured bedrock, especially in upland areas, generally supply water that was recharged locally.

Sources of Radon-222 in Rocks

Radon-222 is a naturally occurring radionuclide produced from the radioactive decay of uranium-238, the most abundant of the naturally occurring isotopes of uranium. Uranium is present in small amounts in many minerals. Uranium concentrations generally differ among rock types and can vary considerably within one geologic unit. Shales and granites typically contain more uranium than limestone or basalt, for example (table 2).

Uranium-238 is the primary parent of the radioactive-decay series that includes radium-226 (Ra-226) and its daughter product radon-222 and ends in the stable isotope lead-206 (Pb-206) (fig. 2). Uranium-238 has a long half-life of 4.5×10^9 years and, therefore, decays slowly. Other radionuclides in the decay series have half-lives many orders of magnitude shorter and decay rapidly. Radium-226 has a half-life of 1,600 years and radon-222 has a half-life of 3.82 days. Radon-222 is the most abundant isotope of radon. Rn-220 and Rn-219 are other less abundant short-lived naturally occurring radon isotopes that belong to the thorium-232 and uranium-235 decay series, respectively. Rn-220 and Rn-219 are difficult to measure because of their low abundance and short half-lives of 55.6 and 3.92 seconds, respectively. Another consequence of the short half-lives of Rn-220 and Rn-219 is that these isotope have little time to migrate from their sources (Durrance, 1986, p. 209).

Table 1. *Stratigraphic column of geologic units in Chester County, Pennsylvania (from Sloto, 1994, p. 7)*

Age	Structural group	Geologic unit
Quaternary		Alluvium
Tertiary		Pensauken and Bridgeton Formations, undivided
		Bryn Mawr Formation
Early Jurassic	Newark Supergroup	Diabase
Late Triassic		Brunswick Group
		Hammer Creek Formation[1]
		Lockatong Formation
		Stockton Formation
Ordovician and Cambrian	Chester Valley Sequence	Conestoga Limestone
		Elbrook Limestone
		Ledger Dolomite
		Kinzers Limestone
		Vintage Dolomite
Cambrian and Late Precambrian		Antietam Quartzite and Harpers Phyllite, undivided
		Chickies Quartzite
Age uncertain, probably Cambrian	Baltimore Mafic Complex	Serpentinized ultramafite
		Gabbro and metagabbro
Late Precambrian to middle Ordovician	Glenarm Supergroup	Peters Creek Schist
		Octoraro Phyllite
		Wissahickon Schist
		Cockeysville Marble
		Setters Quartzite
Age unknown, probably late Precambrian and(or) early Paleozoic		Pegmatite
		ultramafite
		metadiabase
		Metagabbro
		mafic gneiss, amphibolite facies
		marble
Precambrian	Avondale, West Chester, and Woodville massifs[2]	Felsic gneiss, amphibolite facies
		Mafic gneiss, amphibolite facies
		Felsic gneiss, granulite facies
		Mafic gneiss, granulite facies
		marble
Precambrian	Mine Ridge massif	Felsic and mafic gneiss
Precambrian	Honey Brook massif	Anorthosite
		Felsic gneiss, amphibolite facies
		Graphitic felsic gneiss, amphibolite facies
		Felsic and intermediate gneiss, amphibolite facies
		Banded mafic gneiss, amphibolite facies
		Felsic gneiss, granulite facies
		Graphitic felsic gneiss, granulite facies
		marble
		Mafic gneiss, granulite facies

[1] Quartz-pebble conglomerate of the Brunswick Formation of McGreevy and Sloto (1977).

[2] Includes Baltimore gneiss and gabbro of Bascom and Stose (1932), and granite gneiss, gabbroic gneiss and gabbro, and gabbro of McGreevy and Sloto (1977).

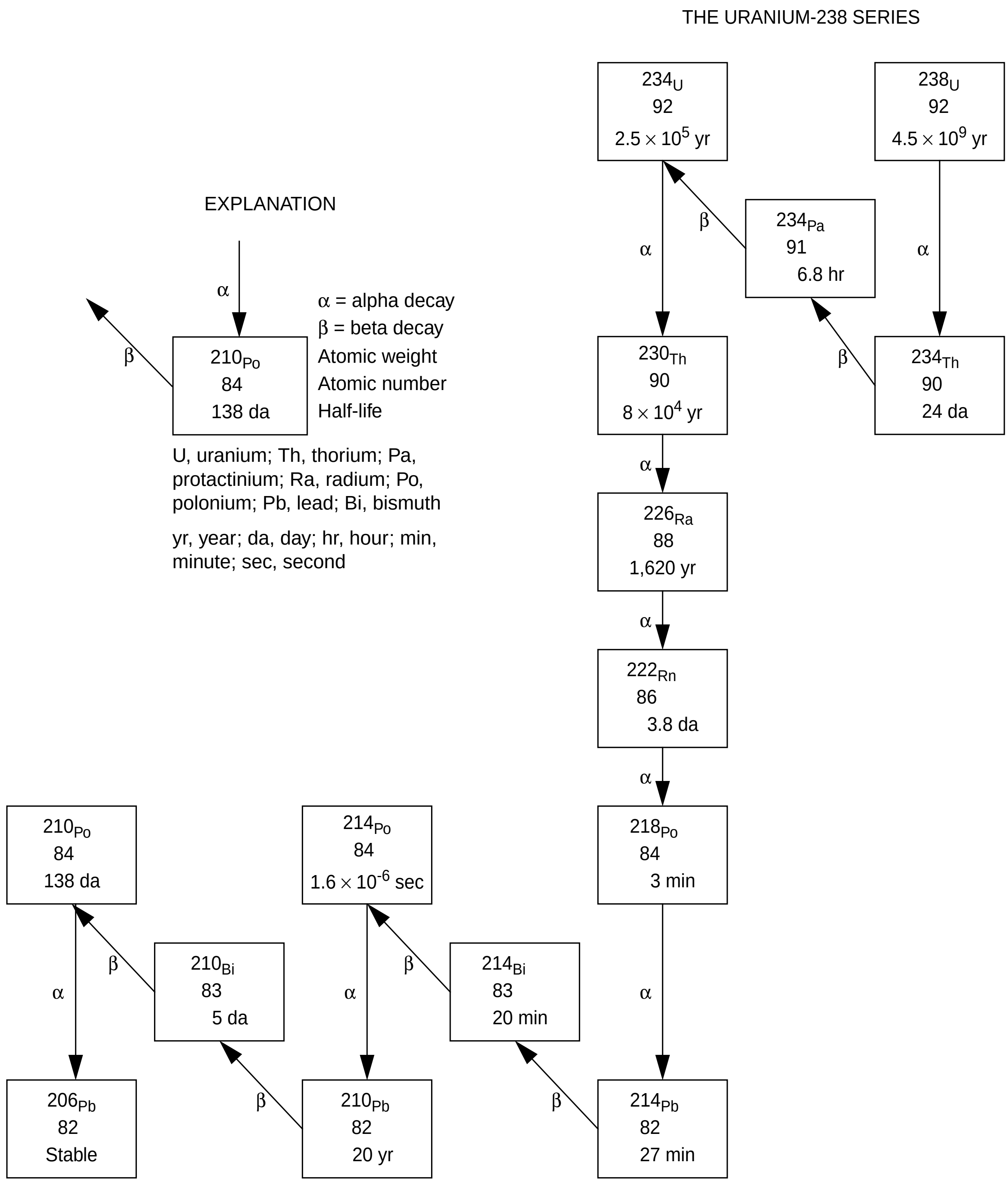

Figure 2. Uranium-238 radioactive decay series (from U.S. Environmental Protection Agency, 1981).

Table 2. *Average uranium abundance in the earth's crust and some sedimentary and igneous rocks (from Durrance, 1986, p. 31-33)*

Rock type	Uranium concentration (parts per million)
Earth's crust	2.7
Sandstone	.45
Shale	3.7
Limestone	2.2
Basalt[1]	1
Ultramafic rock	.003
Granite	3

[1] A mafic rock.

Radon-222 decays by alpha emission (fig. 2). Alpha particles are composed of two protons and two neutrons and are emitted from the nucleus of a radionuclide undergoing alpha decay. Alpha particles are heavy, high-energy particles that do not travel far because matter impedes their progress and absorbs the particles' energy. Some other radionuclides in the uranium-238 series decay by beta-particle emission (fig. 2). Beta particles are electrons (or positrons) that are derived from the transformation of a neutron to a proton (or proton to neutron) during beta- (or beta+) decay. During radioactive decay, each radionuclide emits gamma rays of a specific energy and wavelength. Gamma radiation is not as effectively blocked by matter as are alpha and beta particles.

The sources of radon-222 in the rocks of Chester County are uranium-238-bearing minerals and mineral phases including radionuclides produced by the decay of uranium-238. These sources can be identified and quantified by use of a number of methods. The radioactivity of radionuclides can be quantified by use of alpha-particle or gamma-ray detectors. Specific radionuclides can be identified by use of alpha or gamma spectrometry, in which activities are measured over a range of energies. Chemical methods can be used to quantify the uranium or radium content of rocks or minerals. Further mineralogical analysis can be done to determine which minerals contain uranium.

In Chester County, aerial gamma-ray surveys were made as part of the National Uranium Resource Evaluation Program (NURE) in the 1970's. The aerial surveys detect gamma-ray radiation emitted from the near surface and, therefore, are more indicative of the radioactivity of soils than bedrock. In southeastern Pennsylvania, some elements may be enriched or depleted in the soils compared to the bedrock because the soils are derived from weathering of the bedrock, a process that may involve leaching or formation of insoluble precipitates. Soils over limestone, for example, can contain more uranium (and radium) than bedrock (Gundersen and Smoot, 1993, p. 133). However, the data are useful for gaining an overall view of near-surface radioactivity and potential for anomalously elevated concentrations of uranium, the primary source of radon-222.

The NURE aerial gamma-ray surveys done in the northern half of Chester County for the Newark 1° × 2° quadrangle (scale 1:250,000) indicate anomalously elevated radioactivity. This radioactivity, associated with uranium-238, was identified in western and central Chester County north of the Chester Valley in areas underlain by gneiss (graphitic felsic gneiss, designated Yhga, in mapping published by Sloto (1994)), Chickies Quartzite, and the Elbrook Limestone (LKB Resources, Inc. 1978). NURE aerial gamma-ray data processed for Pennsylvania by Duval and others (1989) indicate relatively elevated (greater than 2.5 ppm) equivalent uranium (eU) in western, southwestern, and a few areas in northern Chester County (Gundersen and Smoot, 1993, p. 123); these areas appear to be underlain by the Wissahickon Schist, Peters Creek Schist, Octoraro Phyllite, Triassic rocks of the Newark Basin, and several gneisses and metasedimentary formations north of the Chester Valley. Equivalent uranium is calculated from counts received by a gamma-ray detector for the emission energy (1.76 mega-electron volts) corresponding to bismuth-214, a member of the uranium-238 decay series, with the assumption that all radionuclides in the series are in secular equilibrium (Gundersen and others, 1993, p. 6).

Uranium-enriched zones in the Triassic-age sandstones of the Stockton Formation and thin mudstone beds of the Stockton and Lockatong Formations in the Newark Basin in Pennsylvania and New Jersey have concentrations up to 1.28 and 0.02 percent, respectively (Turner-Petersen, 1977, p. 742). The probable source of uranium in the Triassic rocks is older uranium-enriched metamorphic rocks along the southern flank of the Newark Basin (Turner-Petersen, 1988, p. 354); these rocks include some schists and gneisses that crop out in northern Chester County. The Precambrian to lower Paleozoic Wissahickon Schist (and the Reading Prong to the north of the Newark Basin) are reported to be one of four uranium-rich provinces of crystalline rocks in the eastern United States (Turner-Petersen, 1980; Grauch and Zarinski, 1976).

Gamma-ray logging of wells can provide data on natural radioactivity of the bedrock. The main sources of natural gamma-ray activity are uranium-238 and thorium-232 series radionuclides and potassium-40. Radionuclides can be differentially distributed in a geologic unit because of variability in source areas and depositional processes in sedimentary rocks or other formation processes for igneous and metamorphic rocks. In Chester County, the USGS has logged wells in several geologic units including wells in the Chickies Quartzite as part of a study of radium and radon (Senior and Vogel, 1995) and in schists, shales, and carbonates for other studies. Analyses of rock samples (well cuttings) from boreholes were done for a few wells to quantify uranium and thorium content of zones associated with elevated gamma-ray activity. Examples of gamma-ray logs of wells drilled in rocks with variable radioactivity in Chester County are shown in figure 3. In these wells, which penetrate the Chickies Quartzite, low gamma-ray activity is associated with low uranium and thorium content of the well cuttings and high gamma-ray activity with high uranium (up to 8.1 ppm) and thorium content. Well CH-3122 was drilled through the Chickies Quartzite into the underlying mafic gneiss (fig. 3), which has a low uranium content typical of mafic rocks (table 2). Variable amounts of radioactivity on logs from two wells penetrating carbonate rocks are shown in figure 4. The large gamma-ray spike in well CH-249 drilled in the Ledger Dolomite and elevated uranium content of well cuttings (up to 18.4 ppm) from this well (fig. 4) indicate an uranium enrichment that is not typical of carbonate rocks. Zones of elevated gamma-ray activity are not commonly observed in logs of wells completed in carbonate rocks in Chester County. Many gamma-ray logs of wells such as CH-4147 in carbonate rocks indicate relatively low radioactivity (fig. 4), although zones of elevated radioactivity in the weathered overburden and at depths in bedrock have been detected. The uranium content of rocks in Chester County may deviate significantly from estimates of average uranium content for rock types (table 2). For example, the uranium content of rock samples from the Chickies Quartzite ranged from 0.8 to 8.1 ppm (Senior and Vogel, 1995, p. 32-33); the overall median was about 2.5 ppm.

Other examples of gamma-ray logs in Chester County for wells completed in the Brunswick Formation and Peters Creek Schist indicate a magnitude of gamma-ray activity (fig. 5) intermediate between the higher radioactivity of some wells in the Chickies Quartzite (fig. 3) and the lower radioactivity of the wells completed in typical carbonate rocks such as the Elbrook Limestone (fig. 5). Some apparent differences in radioactivity may be a function of well diameter, because the gamma-ray activity is attenuated over distance to the detector and casing dampens the signal. On logs run in wells in the Brunswick Group and other Triassic rocks (Lockatong and Stockton Formations) in Montgomery and Bucks Counties to the east of Chester County, thin zones of extremely elevated gamma-ray activity are commonly observed (Sloto and others, 1996; Sloto and Schreffler, 1994), and similar zones might be expected in these rocks in Chester County.

Of the wells logged in Chester County for various projects, only wells in the Chickies Quartzite (Senior and Vogel, 1995) and one in carbonate rocks were sampled for radon; among these, samples of water from wells CH-3315, CH-3122, and CH-249 (figs. 3 and 4) were analyzed for radon-222. Results of those analyses are discussed later in this report.

Mineral hosts for uranium in the noncarbonate metasedimentary rocks of Chester County include the heavy resistate minerals zircon and monazite. These minerals were isolated from well cuttings in the Chickies Quartzite and determined to be radioactive (Senior and Vogel, 1995). Allanite, another radioactive mineral, has been reported in several localities in Chester County (Wherry, 1908). Results of stream sediment surveys made for the NURE program indicate that elevated concentrations of uranium are probably associated with zircon in the crystalline Piedmont rocks on the $1° \times 2°$ Newark quadrangle. The bulk uranium content of stream sediments in places in northern Chester County was more than 15 ppm, indicating relative uranium enrichment (Heffner, 1980). Zircons also have been identified in the gneisses of the Honeybrook massif, Wissahickon Schist, Octoraro Phyllite (formerly mapped as albite-chlorite Wissahickon Schist), and Antietam Quartzite in Chester County (Dryden and Dryden, 1964). The heavy resistate minerals in the clastic Paleozoic sediments were derived from the weathering of the Precambrian basement rocks that could have been enriched in uranium.

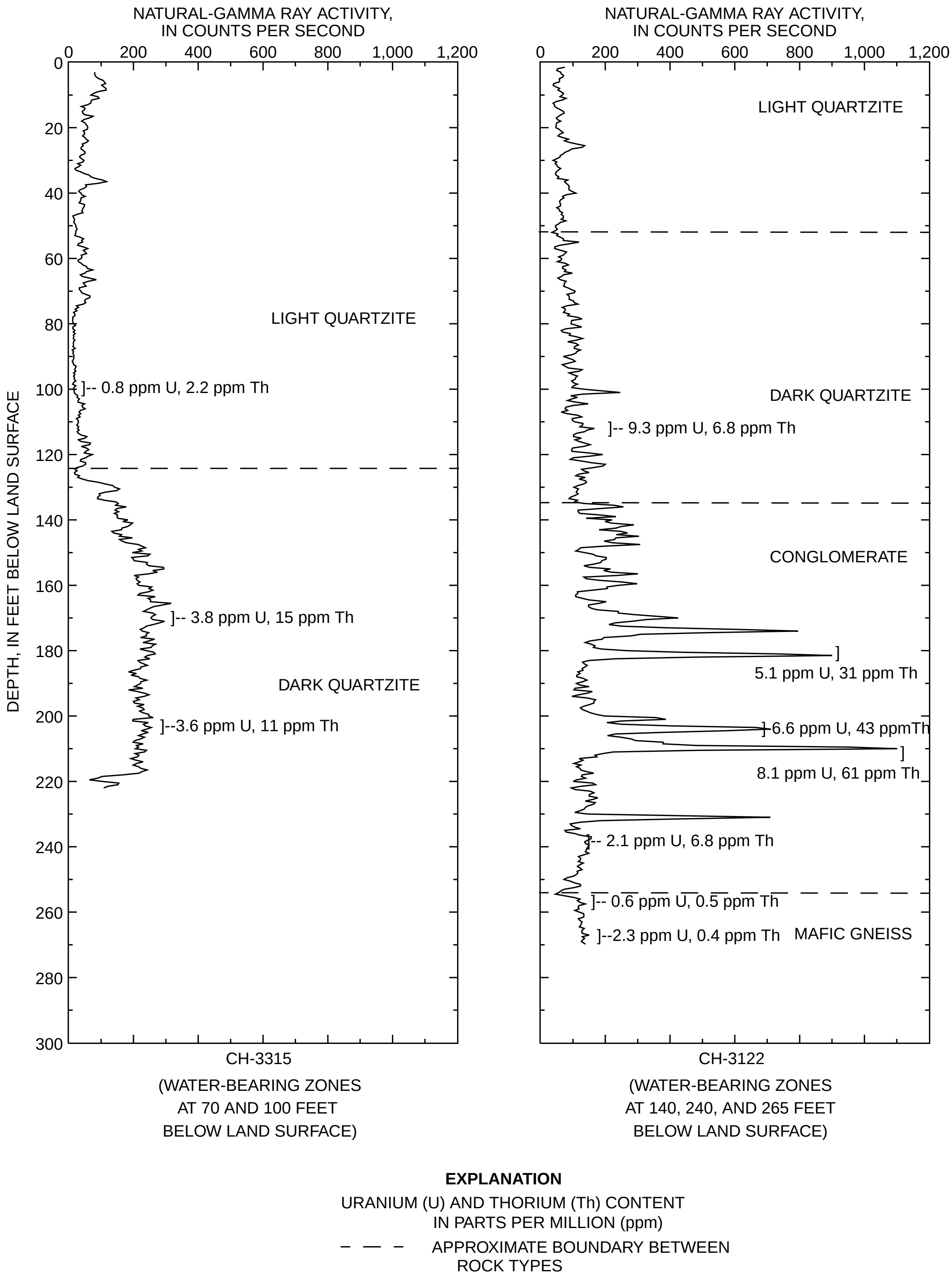

Figure 3. Gamma-ray logs and uranium and thorium content of rock samples from wells CH-3315 and CH-3122 in the Chickies Quartzite, Chester County, Pennsylvania.

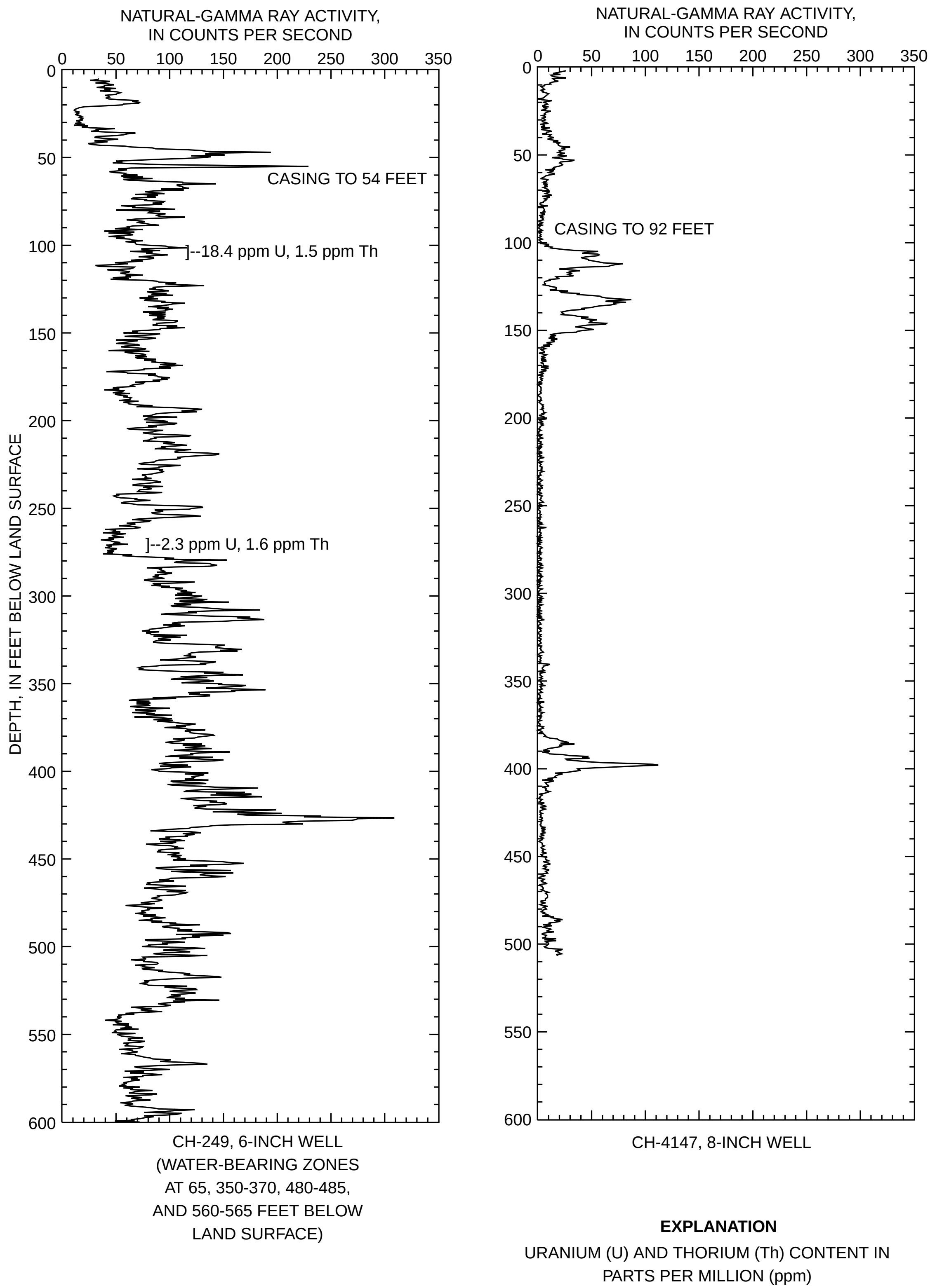

Figure 4. Gamma-ray logs from wells CH-249 and CH-4147 in the Ledger Dolomite and uranium and thorium content of rock samples from well CH-249, Chester County, Pennsylvania.

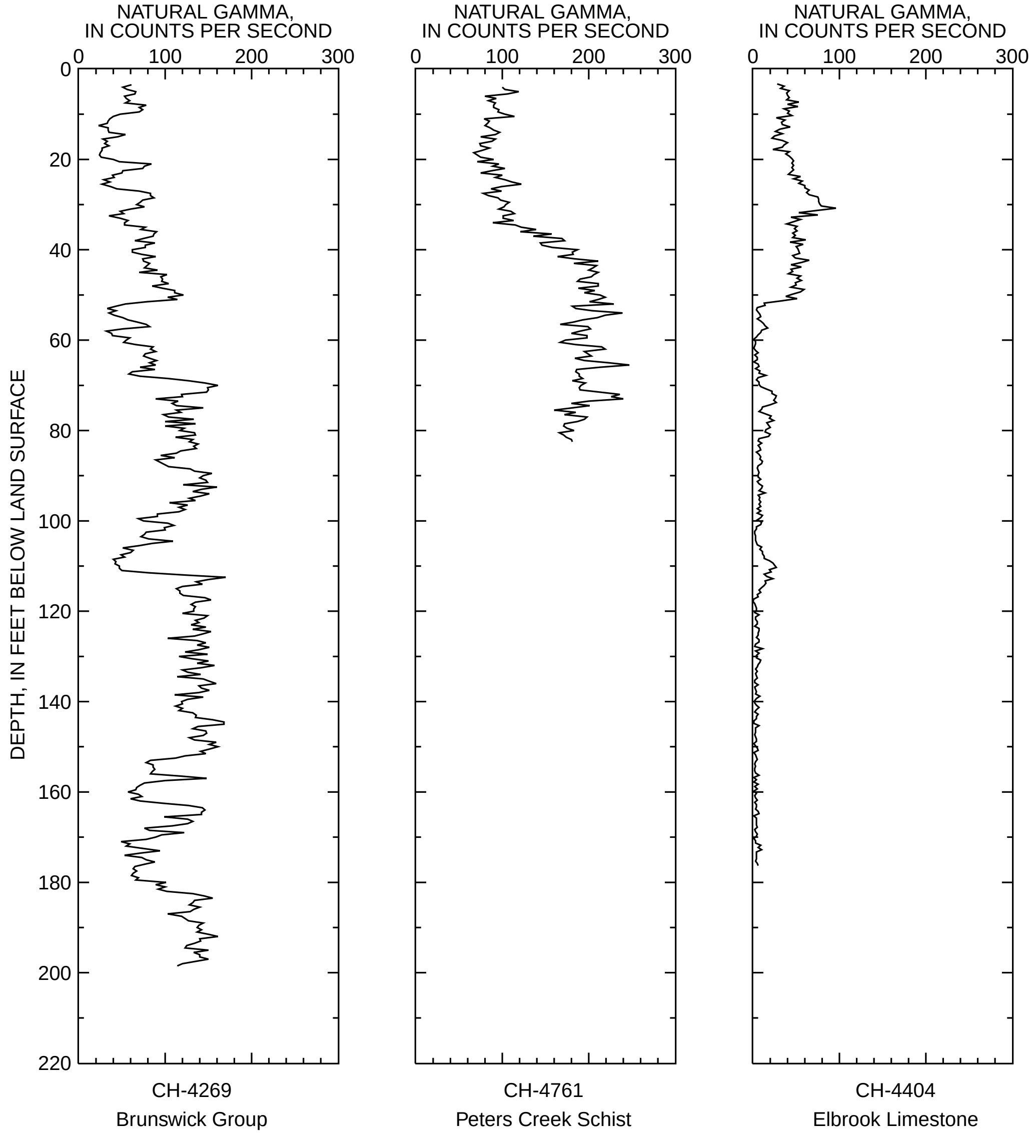

Figure 5. Gamma-ray logs from well CH-4269 in the Brunswick Group, well CH-4761 in the Peters Creek Schist, and well CH-4404 in the Elbrook Limestone, Chester County, Pennsylvania.

RADON-222 IN GROUND WATER IN CHESTER COUNTY

Concentrations of radon-222 in ground water in Chester County are described based on samples collected from 1986-1997. Many of these samples were collected during sampling of wells for objectives other than an assessment of radon in ground water. Additional wells specifically were sampled in 1995 to improve spatial distribution of data on radon-222 in ground water and to include areas of the county with few or no data.

Methods of Data Collection and Analysis

Data collection was designed to (1) characterize radon-222 concentrations in ground water in Chester County and (2) determine the association between radon-222 concentrations in ground water and geologic unit (formation) in the county. An areally-weighted stratified random sampling scheme with geologic units as a category was used to determine the number and distribution of additional samples required to represent all geologic units. All samples were collected by the same procedures. Geologic units were chosen as a sampling category because soil and bedrock chemical and hydrologic characteristics control the concentration of radon-222 in ground water. Geologic units were determined from available geologic maps, which were digitized to create digital geologic unit spatial data sets in a Geographic Information System (GIS).

Sample Selection

The sampling scheme provided spatially distributed samples (data) throughout the county in almost all of the geologic units, excluding only a few units with very small areal extent. Thirty-nine geologic units, not including unconsolidated tertiary and quaternary sediments, have been mapped in Chester County (pl. 1; Sloto, 1994); wells in 31 geologic units were sampled for radon (table 3). The geologic units Harpers Phyllite and Antietam Quartzite are grouped as undivided units and serpentinite and ultramafite were combined. Areas of the county underlain by each geologic unit were calculated from digitized data in GIS spatial data sets (table 3). The sampling scheme was designed to provide about one site (well) per 2 mi^2 of area underlain by each geologic unit. The overall average sample density for the county is about one well per 1.4 mi^2, but site density for geologic units that were sampled ranged from one site (well) per 0.3 mi^2 to one site per 6.5 mi^2. The distribution of sites differs from an even areal coverage largely because some geologic units were sampled more extensively for other studies prior to 1995.

Geologic units (pl. 1) that were not sampled because of limited areal extent included marble (also mapped as Franklin Marble) (m, 0.003 mi^2), metagabbro (mgb, 0.005 mi^2), marble (Ybm, 0.007 mi^2), marble (Yhm, 0.10 mi^2), metadiabase (md, 0.44 mi^2), metagabbro and gabbro (Cgb, 2.18 mi^2), Vintage Limestone (Cv, 2.73 mi^2), and diabase (Jrd, 5.77 mi^2). In addition, neither of the two tertiary unconsolidated sedimentary units mapped in Chester County, Pensauken and Bridgeton Formations, undivided (Tpb, 0.04 mi^2) and Bryn Mawr Formation (Tbm, 0.17 mi^2), were sampled.

Sample Collection

A total of 665 samples from 534 wells were collected for radon-222 analysis from November 1986 through April 1997. Twenty-eight of the 534 wells were resampled at least once including one well sampled monthly for 3 years, one well monthly for 4 months, four wells sampled quarterly for 1 year, five wells sampled bi-monthly for over 1 year, and 17 wells twice at irregular intervals of months to years. Repeat sampling of a few wells continued through April 1997, but no new wells were sampled after September 1996. Thirteen wells were repeatedly sampled at different time intervals while pumping during a site visit. Radon-222 concentrations from the first sampling event of wells sampled more than once were used in statistical analysis and are plotted on plate 1.

Most sampling sites were domestic wells equipped with submersible pumps. Data on well construction (depth and length of casing), well yield, and specific capacity were generally from driller reports and were available for most wells. Data on well construction and location are listed in table 7 at the back of the report. The depth to water was measured, when possible, in the well prior to pumping, and the rate and duration of pumping prior to sampling was recorded. Most pumping rates ranged from about 4 to 10 gal / min. All filters and treatment systems were bypassed. Wells were pumped until temperature and specific conductance stabilized, usually after 30 to 60 minutes. Probes to monitor temperature and specific conductance were placed below the surface of a continuously overflowing sampling container supplied by the well discharge; use of the overflowing container reduced contact of the water with the atmosphere.

Field measurements of pH, temperature, alkalinity, dissolved-oxygen concentration, and specific conductance were made by established methods (Wood, 1976). Alkalinity was determined by titration to the point of inflection (usually between 4.5 and 5.0 pH units) and is reported as milligrams per liter of calcium carbonate ($CaCO_3$). Bicarbonate (HCO_3) is assumed to be the dominant component of alkalinity in dilute ground waters with neutral to acidic pH and (or) organic content. Dissolved-oxygen concentration was determined by use of the azide modification of the Winkler titration method (American Public Health Association and others, 1976).

Table 3. *Geologic unit, lithologic code, aquifer code, and area of geologic units, listed in order of increasing area; number of wells sampled for radon 1986-96 and average sample density in geologic units, Chester County, Pennsylvania*

[mi^2, square miles]

Geologic unit	Lithologic code (see plate 1)	Aquifer code	Area (mi^2)	Percent of county area	Number of wells sampled	Average sample density (mi^2 per sample)
Mafic gneiss, amphibolite facies	Ybma	400MFCGP	0.36	0.05	1	0.4
Kinzers Limestone	Ck	377KZRS	.72	.09	1	.7
Pegmatite	pg	000PGMT	1.11	.15	3	.4
Lockatong Formation	Trl	231LCKG	4.62	.61	6	.8
Graphitic felsic gneiss, granulite facies	Yhgg	400GPCGG	5.25	.69	2	2.6
Mafic gneiss, amphibolite facies	ma	000MFCGH	6.36	.84	10	.6
Mafic gneiss, granulite facies	Ybmg	400MFCGP	6.52	.86	1	6.5
Mafic gneiss, granulite facies	Yhmg	400MFCGG	7.29	.96	3	2.4
Felsic gneiss, amphibolite facies	Yhfa	400FLCGA	7.48	.98	3	2.5
Harpers Phyllite / Antietam Quartzite, undivided	CZah	377AMHP	8.17	1.08	15	.5
Cockeysville Marble	ck	300CCKV	9.67	1.27	19	.5
Elbrook Limestone	Ce	371ELBK	10.26	1.35	11	.9
Setters Quartzite	st	300STRS	10.50	1.38	18	.6
Hammer Creek Formation	Trh	231HMCK	11.22	1.48	11	1.0
Felsic and mafic gneiss	Ymfa	400FMFG	11.60	1.53	9	1.3
Ledger Dolomite	Cl	377LDGR	12.71	1.67	25	.5
Serpentinite, ultramafite[1]	Csp, um	000SRPN	12.75	1.68	7	1.8
Conestoga Limestone	OCc	367CNSG	14.40	1.87	13	1.1
Anorthosite	Yhan	000ANRS	15.44	2.03	7	2.2
Banded mafic gneiss, amphibolite facies	Yhma	400BMFGA	17.46	2.30	8	2.2
Stockton Formation	Trs	231SCKN	24.53	3.23	16	1.5
Brunswick Group	Trb	231BRCK	26.28	3.46	22	1.2
Chickies Quartzite	Zch	377CCKS	26.96	3.55	87	.3
Graphitic felsic gneiss, amphibolite facies	Yhga	400GPCGA	29.43	3.88	13	2.3
Felsic and intermediate gneiss, amphibolite facies	Ybfa	400FLCGH	35.33	4.65	27	1.3
Felsic and intermediate gneiss, amphibolite facies	Yhia	400FCIGA	36.46	4.80	20	1.8
Felsic gneiss, granulite facies	Ybfg	400FLCGP	39.41	5.19	15	2.6
Octoraro Phyllite	oct	300WSCKA	47.97	6.32	20	2.4
Felsic gneiss, granulite facies	Yhfg	400FLCGG	54.15	7.13	14	3.9
Peters Creek Schist	pc	300PRCK	69.88	9.20	35	2.0
Wissahickon Schist	wb	300WSCKO	184.26	24.27	92	2.0
All units			[2] 748.55	98.5	534	1.4

[1] Combined map units Csp (8.77 mi^2) and um (3.98 mi^2).
[2] Total area of county is about 759 mi^2 but some geologic units were not sampled.

Samples for radon-222 analysis by liquid scintillation were collected with a syringe from a continuously overflowing beaker (U.S. Environmental Protection Agency, 1978). Duplicate samples were collected routinely for quality-assurance purposes at all wells prior to October 1993. After October 1993, single samples were collected for analysis. Sequential samples were collected at a few wells to determine variability in radon concentration during pumping.

Laboratory Analysis

Ground-water samples collected in 1995-97 for this study were analyzed for dissolved major ions, nutrients, selected minor ions, metals, and radon-222. Many ground-water samples analyzed for radon-222 for other studies also were analyzed for these constituents. Analysis of ground-water samples for inorganic constituents was done by the USGS National Water-Quality Laboratory (NWQL) by use of standard methods (Fishman and Friedman, 1989; Faires, 1993). The NWQL has set a minimum reporting level (MRL) for inorganic compounds on the basis of the accuracy of the laboratory's methods. Results of available analyses for major ions, nutrients, radium-226, radium-228, and uranium are given in table 8 at the back of the report.

Radon-222 concentrations in samples collected 1986-88 were measured by liquid scintillation by use of methods outlined by Pritchard and Gesell (1977) at the University of Maine[1], Orono, Maine. After 1988, radon-222 analyses were done at the NWQL by use of similar methods. From 1986 to 1993, radon-222 concentrations were reported as the mean of results of duplicate sample analyses. After September 1993, the energy window of the scintillation counter at NWQL was narrowed, which, in most cases, did not affect results by more than 5 percent (decrease) (A. Mullin, U.S. Geological Survey, oral commun., June 1997), and analysis of sample duplicates was discontinued. Results of radon analyses of all samples are presented in table 8 at the back of the report. Counting errors at the 95-percent confidence interval also are presented in table 8 to quantify uncertainty of laboratory analyses.

[1] The use of names of private laboratories is for identification purposes only and does not constitute endorsement by the U.S. Geological Survey.

Statistical Analysis

Hydrologic data, and water-quality data in particular, commonly are not normally distributed (Helsel, 1987, p. 180). In normally distributed data sets, the mean and median are equivalent or very close in value; in data sets that are not normally distributed, the mean and median are not equivalent. Water-quality data commonly are positively skewed (mean is greater than median). Nonparametric statistics commonly are used to analyze data when the distribution of the data is unknown or not normal, such as environmental data that can be badly skewed. Nonparametric statistical analyses use ranked values of variables. Because calculations are performed on ranked data rather than actual values, nonparametric statistics can handle less-than values that arise when data are bounded at the detection limit of the analytical method and concentrations are reported as less than the detection limit.

Nonparametric statistics were used in data analysis of radon-222 concentrations and their relation to lithology and other variables. Differences between groups, on the basis of the categories of geologic unit (lithology), were determined by nonparametric analysis of variance (ANOVA) by use of the Krusal-Wallis test. This method can be used on groups of unequal sample sizes. To determine the relative ranking of radon-222 concentrations in geologic units, a multiple comparison test by use of the Krusal-Wallis statistic (Campbell and Skilling, 1985; Helsel and Hirsch, 1992, p. 201) was performed. Significant relations between a factor, such as well depth or depth to water, and the observed water-quality variable were determined by use of two-tail nonparametric Spearman rho (r_s) correlation statistical tests. The selected significance level of statistical tests was 0.05, which corresponds to a 95-percent confidence interval.

Spatial Distribution and Factors Affecting Spatial Distribution

The distribution of radon-222 concentrations in ground water depends on the distribution of its parent, radium-226 of the uranium-238 decay series, in the aquifer as well as other physical and chemical factors such as the radon emanation efficiency, aquifer porosity, permeability, and rate of ground-water flow. Many of these factors differ by rock type (lithology) and, therefore, radon-222 concentrations may be expected to differ by lithology.

Although the 534 wells sampled for radon-222 in Chester County are not spaced evenly throughout the county (table 3, pl. 1), the data represent all major geologic units and, therefore, are summarized to provide an estimate of the overall distribution of radon in ground water in the county. Geologic units with greater sample density (table 3) are better characterized than those with lower sample density. Summary statistics are given in table 4.

The cumulative frequency of radon-222 concentrations are shown in figure 6. The lowest concentration measured was 50 pCi/L, which is about equal to the minimum reporting level for the analytical method. The maximum concentration measured was 53,000 pCi/L. About 89 percent (473) of the 534 wells sampled contained dissolved radon-222 in concentrations above the proposed MCL of 300 pCi/L. This percentage is slightly higher than

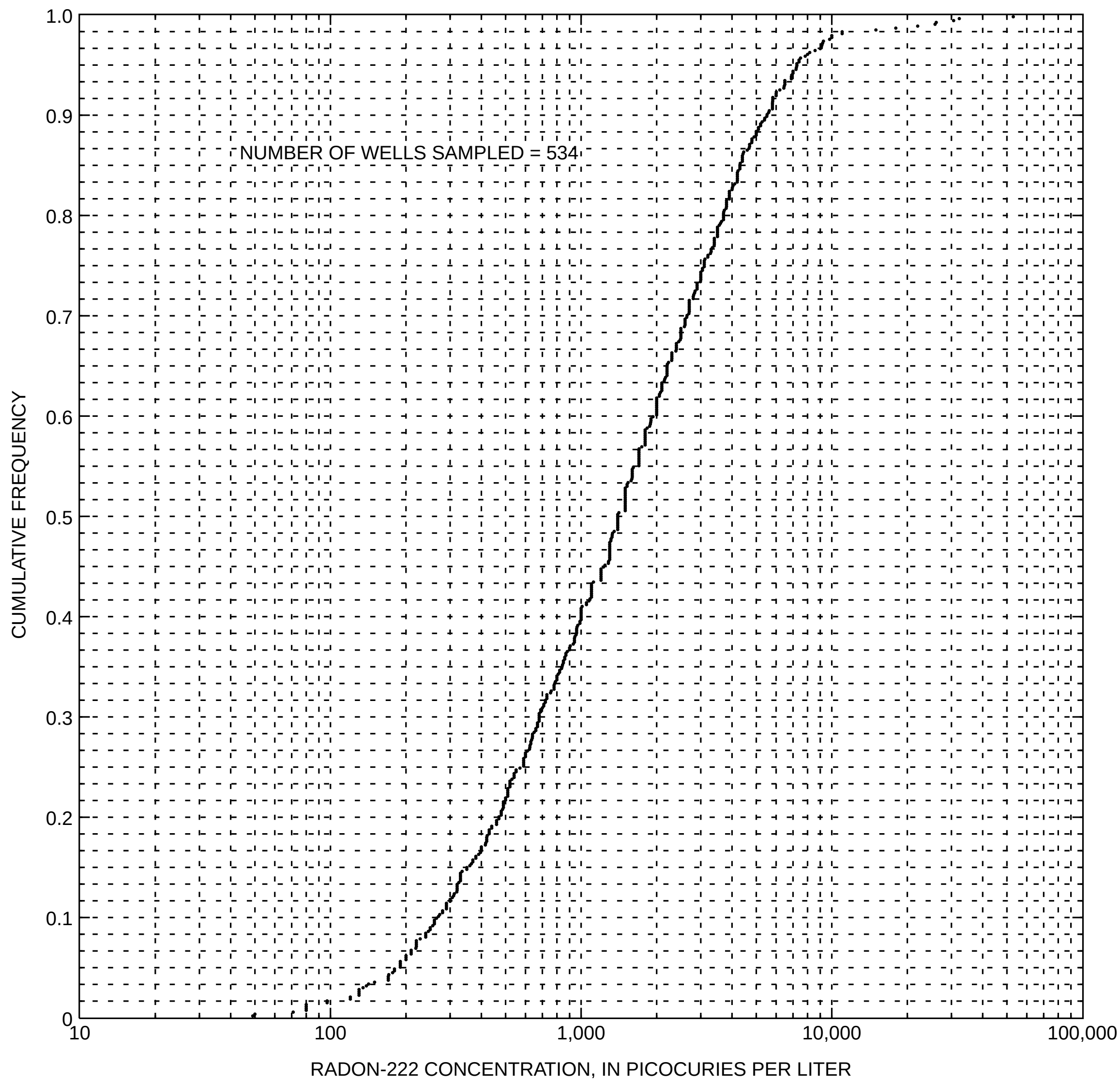

Figure 6. Cumulative frequency of radon-222 concentrations in ground-water samples from 534 wells, Chester County, Pennsylvania.

Table 4. *Summary statistics of radon-222 concentrations in ground water in geologic units in Chester County, Pennsylvania, listed in order of increasing median concentrations*

[--, data not available or not calculated]

Geologic unit	Lithologic code (see plate 1)	Number of samples	Radon-222 concentration (picocuries per liter)				
			Minimum	10th percentile	Median	90th percentile	Maximum
Serpentinite, ultramafite	Csp, um	7	50	--	150	--	2,700
Mafic gneiss, granulite facies	Ybmg	1	--	--	170	--	--
Graphitic felsic gneiss, granulite facies	Yhgg	2	130	--	175	--	220
Kinzers Limestone	Ck	1	--	--	190	--	--
Felsic gneiss, granulite facies	Ybfg	15	70	105	300	5,200	10,000
Anorthosite	Yhan	7	80	--	360	--	800
Lockatong formation	Trl	6	265	--	405	--	960
Ledger Dolomite	Cl	25	80	90	430	1,390	5,810
Elbrook Limestone	Ce	12	50	80	435	1,630	2,000
Mafic gneiss, amphibolite facies	ma	10	100	110	580	990	1,010
Mafic gneiss, amphibolite facies	Ybma	1	--	--	600	--	--
Felsic gneiss, granulite facies	Yhfg	14	170	190	610	3,325	4,400
Conestoga Limestone	OCc	12	480	490	720	1,980	2,050
Felsic and intermediate gneiss, amphibolite facies	Yhia	20	135	180	1,150	7,730	9,800
Stockton Formation	Trs	16	610	680	1,200	1,940	2,200
Hammer Creek Formation	Trh	11	680	680	1,300	2,695	2,900
Brunswick Formation	Trb	22	200	590	1,450	2,300	3,500
Cockeysville Marble	ck	19	180	240	1,500	3,400	4,700
Mafic gneiss, granulite facies	Yhmg	3	1,100	--	1,500	--	2,700
Wissahickon Schist	wb	92	130	320	1,500	4,220	11,000
Setters Quartzite	st	18	365	480	1,590	3,920	5,000
Banded mafic gneiss, amphibolite facies	Yhma	8	490	--	1,600	--	53,000
Felsic and intermediate gneiss, amphibolite facies	Ybfa	27	130	260	1,700	4,250	9,000
Chickies Quartzite	Zch	87	180	415	2,170	7,990	32,280
Graphitic felsic gneiss, amphibolite facies	Yhga	13	250	280	2,500	9,560	11,000
Felsic and mafic gneiss	Ymfa	9	600	--	2,800	--	22,000
Octoraro Phyllite	oct	20	220	1,340	2,910	6,350	15,000
Pegmatite	pg	3	480	--	3,400	--	4,600
Harpers Phyllite / Antietam Quartzite, undivided	CZah	15	230	560	3,400	14,231	25,830
Felsic gneiss, amphibolite facies	Yhfa	3	680	--	3,500	--	6,900
Peters Creek Schist	pc	35	1,800	2,370	4,400	7,440	9,135
All units		534	50	270	1,400	5,500	53,000

that determined for the state as a whole on the basis of results of a survey of 989 private wells in Pennsylvania in which 80 percent of the sampled wells contained radon-222 concentrations greater than 300 pCi/L (Swistock and others, 1993). About 12 percent (63) of wells sampled in Chester County contained radon-222 concentrations that equaled or exceeded 5,000 pCi/L, and about 2 percent of the samples contained radon concentrations greater than or equal to 10,000 pCi/L. The overall median concentration of radon-222 is 1,400 pCi/L. An estimate of the median for the county adjusted for area of geologic units can be calculated by assuming the median for each geologic unit is a good estimate of radon-222 in ground water in that unit and then weighting the median of radon-222 in ground water in each geologic unit (table 4) by the percentage of area represented by that unit in the county (table 3); this area-weighted median is 1,700 pCi/L.

These data for Chester County are similar to those reported for other areas with similar geology in the eastern United States. For example, in water samples from 68 wells in the Piedmont Physiographic Province in South Carolina, radon-222 concentrations ranged from 400 to 59,000 pCi/L; the median concentration was 2,300 pCi/L (King and others, 1982, p. 1175). In a study of the occurrence of radon-222 and other radioactivity in public water supplies of the United States, highest radon-222 concentrations generally were associated with the Appalachian Highlands, Piedmont and New England Physiographic Provinces (Hess and others, 1985). In a study of 989 private wells in Pennsylvania, high concentrations of radon-222 in well water were measured in all regions of that state but were most prevalent near the Reading Prong (Swistock and others, 1993), which is part of the New England Physiographic Province (fig. 1). Although radon-222 concentrations in ground water in the Piedmont rocks are greater than in many areas of the United States, much higher radon-222 concentrations in ground water have been measured in some other areas; for example, radon concentrations of up to 1,000,000 pCi/L or more were measured in water from wells in New England and Colorado (Hess and others, 1985, p. 570; A. Mullin, U.S. Geological Survey, oral commun., June 1997).

Lithology

The concentrations of radon-222 in ground water differ among the geologic units in Chester County. Summary statistics for each geologic unit are listed in order of increasing median concentrations in table 4. Medians are a better measure of the central tendency than means because radon-222 concentrations in ground water commonly are log-normally distributed apparently because of the heterogeneous distribution of uranium in aquifers (Zikovsky and Chah, 1990). The distribution of radon-222 concentrations in ground water in geologic units is shown in figure 7. Data for geologic units with only one sample is shown as a single point (or outlier). The distributions reflect differences in chemical and physical factors between the geologic units.

Statistical tests (Kruskal-Wallis) indicate significant differences in the distribution of radon-222 concentrations in the ground water of some geologic units. In figure 7, boxplots of actual values are shown in order (decreasing) of ranked distributions of radon-222 concentrations in geologic units. Statistically significant differences between radon-222 concentrations in geologic units are indicated by lack of overlap in bars above boxplots (fig. 7). Geologic units with fewer than six samples were not included in the statistical analysis. Ground water in the Peters Creek Schist has the highest median radon-222 concentration of 4,400 pCi/L and the highest ranked distribution of radon-222 in ground water compared to other geologic units. The distribution of radon-222 in the Peters Creek Schist is statistically greater than radon-222 in ground water in all other geologic units except the felsic and mafic gneiss (fig. 7).

Ground water in the ultramafite/serpentinite unit has the lowest median radon-222 concentration of 150 pCi/L (table 4, fig. 7).

Generally, the geologic units with statistically higher radon-222 concentrations in ground water include schists and phyllite, quartzites, pegmatite, and some gneisses; units with statistically lower radon-222 concentrations in ground water include the Triassic rocks and some limestones, schists, and gneisses. Geologic units with the lowest radon-222 concentrations include limestones, dolomite, anorthosite, ultramafic rocks (including serpentinite), and some gneisses.

The radon-222 concentrations in ground water (table 4) in the geologic units are indicative of the uranium content of aquifer materials and generally are consistent with reported average uranium concentrations of various rock types, except for sandstone (table 2). Many quartzites (metamorphosed sandstone) in Chester County contain detrital minerals other than quartz and probably contain more

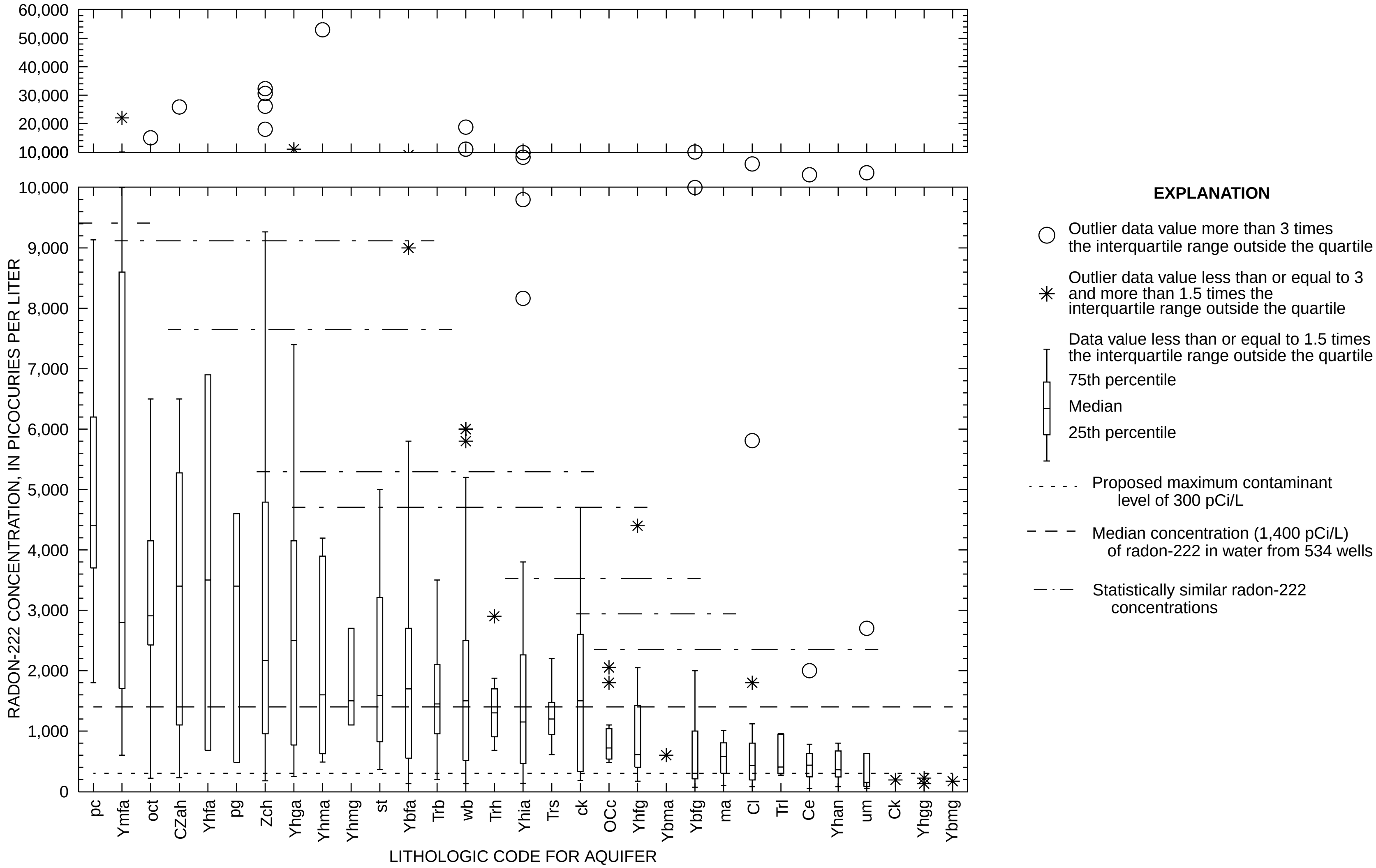

Figure 7. Distributions of radon-222 concentrations in ground water by geologic unit in statistically ranked order, Chester County, Pennsylvania. Differences in radon-222 concentrations in ground water are statistically significant (95-percent confidence interval) between the indicated groups of geologic units (see table 1, plate 1 for explanation of lithologic code abbreviations).

uranium than an average sandstone. The uranium content of granite and shale is on average greater than in limestone, basalt, sandstone, and ultramafic rocks (table 2). The felsic gneisses in Chester County are similar to granites in composition, and ground water in some of these rocks contain radon-222 concentrations higher than in the carbonates (limestone and dolomite), some mafic gneisses, and ultramafic rocks. Ground water in some schists and phyllite in Chester County, which are metamorphosed clastic sediments including shale, also contains relatively elevated concentrations of radon-222. Rock samples of the Harpers Phyllite and Antietam Quartzite, undivided, in York County, Pa., contained from 3.6 to 5.7 ppm uranium (Senior and Vogel, 1995, p. 32-33).

The highest radon-222 concentrations measured were in ground water in gneisses and metasedimentary rocks. NURE data indicated elevated uranium anomalies in some of these rocks. Radon concentrations in ground water were as high as 53,000 pCi/L in banded mafic and felsic gneiss, amphibolite facies; 32,280 pCi/L in the Chickies Quartzite; 25,830 pCi/L in the Harpers Phyllite and Antietam Quartzite, undivided; 22,000 pCi/L in felsic and mafic gneiss of the Mine Ridge massif; and 15,000 pCi/L in the Octoraro Phyllite. Wells in the Chickies Quartzite, Harpers Phyllite-Antietam Quartzite, undivided, and felsic and mafic gneiss produced the highest percentage of water samples with concentrations of radon-222 above 20,000 pCi/L compared to other formations. The sample with the greatest radon-222 concentration measured (53,000 pCi/L) was collected from a well drilled very near the mapped contact between the Chickies Quartzite and the underlying banded mafic and felsic gneiss; this well could be completed in the Chickies Quartzite as indicated by the pH of the water, which was in the range typically observed for ground water in the Chickies Quartzite rather than the gneiss (table 8).

Although uranium mineralization has been reported in the Stockton and Lockatong Formations (Turner-Peterson, 1977), the distribution of radon-222 concentrations in ground water in the Triassic sedimentary rocks does not indicate elevated uranium concentrations in these rocks compared to the county as a whole. Because the uranium-enriched layers in these rocks tend to be thin, water-bearing zones may not frequently intersect them, and therefore, ground water in these rocks frequently may not contain elevated concentrations of radon-222. Ground water in the Lockatong Formation contains some of the lowest radon-222 concentrations of geologic units sampled in the county. The radon-222 concentrations in the Brunswick Group (predominantly shale and siltstone), Hammer Creek Formation (conglo-merate), Stockton Formation (predominantly sandstone), and Lockatong Formation (calcareous siltstone and shale) are similar to or slightly lower than those reported for these rocks in Bucks County, Pa., to the east (Sloto and Schreffler, 1994).

The range of radon-222 concentrations in ground water differed among geologic units in Chester County, from about a factor of two to more than two orders of magnitude, although some differences may be because of variable sample size. The largest range of radon-222 concentrations were in geologic units (Chickies Quartzite, Wissahickon Schist) with the largest number of samples (table 4) and, therefore, the most likely to include extreme values of a sample population. However, the range of radon-222 concentrations probably reflect partly variable distribution of uranium or radium-226 in the aquifer and partly variable distribution of other aquifer properties affecting radon-222 concentrations in ground water. In rock samples of the Chickies Quartzite, the geologic unit with the largest range of radon-222 concentrations (from 180 to 32,280 pCi/L, more than two orders of magnitude), uranium concentrations ranged over more than an order of magnitude (from 0.6 to 8.1 ppm) (Senior and Vogel, 1995, p. 32-33). Water from well CH-249 contained 5,800 pCi/L radon-222, the highest concentration measured in the Ledger Dolomite; concentrations of uranium from 2.3 to 18 ppm were measured in rock cuttings from this well, but the main water-bearing zone at about 420 ft is near a zone of elevated gamma-ray activity (fig. 4). For geologic units with at least 10 samples, the range in radon-222 concentrations was least in ground water in the Stockton Formation, Hammer Creek Formation, and the Conestoga Limestone, which may indicate that uranium-238 or radium-226 concentrations in water-bearing zones of these aquifer materials are less variable than in other geologic units.

A map of geologic units grouped by ranges in median concentrations of radon-222 in ground water (from high to low) is shown on plate 1. These groups correspond roughly to the groups of geologic units with statistically significant differences in radon-222 concentrations in ground water shown in figure 7 but are not exactly the same because of overlap between statistical groups. The spatial pattern of geologic units with elevated radon-222 concentrations in ground water is consistent with a north-east trending pattern of elevated eU determined from NURE data (Duval and others, 1989) in western and northern Chester County. While these groups may be useful in assessing the general radon potential of ground water in each geologic unit, differences within geologic units are apparent when the data are studied in more detail. For example, radon-222 concentrations in ground water in the lower member of the Chickies Quartzite, the Hellam Conglomerate, was found to be significantly greater than those in ground water in the overlying quartzite (Senior and Vogel, 1995). Also, in the Red Clay Creek Basin, ground water in the Wissahickon Schist in the northern part of the basin contained higher radon-222 concentrations than ground water in the Wissahickon Schist in the southern part of the basin (Senior, 1996).

Some aquifers that represent a large percentage of land area in Chester County have among the highest radon-222 concentrations in ground water. The Peters Creek Schist, the second most areally extensive unit (about 70 mi^2 or 9 percent of the county; table 3), has the highest median radon-222 concentration in ground water of all geologic units in the county. The Octoraro Phyllite, which underlies about 48 mi^2 or 6 percent of the county, has a median of 3,000 pCi/L for radon-222 in ground water. The Wissahickon Schist is the most areally extensive unit in the county (184 mi^2 or about 24 percent of county area) and has a median radon-222 concentration of 1,400 pCi/L, the same concentration as for the county as a whole.

Hydrogeologic Setting and Well Characteristics

Relations between the concentrations of radon-222 in ground water and hydrogeologic setting and well characteristics for each geologic unit were tested statistically by use of a two-tail non-parametric Spearman rho correlation. Few correlations were statistically significant (95-percent confidences level), and of those, no variable was significant for many geologic units (table 5). For example, radon-222 concentrations were inversely correlated with well depth for the Chickies Quartzite (n = 34), Harpers Phyllite and Antietam Quartzite, undivided (n = 8), felsic and intermediate gneiss (n = 8), felsic gneiss, granulite facies (n = 6), and Lockatong Formation (n = 3) but not significantly correlated for any other geologic units. Differences in radon-222 concentrations in ground water between topographic settings (hilltop, slope, or valley) were tested by use of ANOVA and Krusal-Wallis statistic. No statistically significant differences in radon-222 concentrations in various topographic settings were determined, although significant differences were indicated for other variables (well depth, depth to water, and well yield). The lack of strongly significant relations between radon-222 concentrations and well characteristics and topographic setting probably indicate that hydrogeologic controls on radon-222 in ground water are difficult to determine on a regional basis. Further limitations on a statistical approach to identify relations between radon-222 and these variables are small sample sizes for some geologic units.

Despite the lack of strong statistically significant correlations, the relation between hydrogeologic setting and radon-222 concentrations in ground water sometimes can be identified when several factors are considered. For example, wells on slopes tend to have higher yields than wells on hills, indicating greater permeability and greater probability of dilution of radon-222 in ground water. In the Chickies Quartzite, however, ground water in rocks underlying hilltops commonly contained lower concentrations of radon-222 than ground water on slopes. Possible explanations for this observation include (1) the less resistant Hellam Conglomerate member of the formation contained more uranium than rocks underlying ridge tops and (2) radium-226, the direct parent of radon-222, was leached more extensively from rocks in the recharge areas of the ridge tops than from rocks down the flow path on the slopes and perhaps even precipitated in aquifer materials underlying the slopes (Senior and Vogel, 1995). Ground water must flow directly past aquifer materials bearing uranium-238 or radium-226 to acquire radon-222. Radon-222 concentrations differed by more than one order of magnitude in the two wells shown in figure 3. Well CH-3315 was completed in the Chickies Quartzite on a hilltop and well CH-3122 was completed in the lower Hellam Conglomerate member on the underlying slope. Water-bearing zones in well CH-3315 are in rocks with low uranium concentrations and hence, the radon-222 concentration in water from the well is relatively low, 330 pCi/L. In contrast, water-bearing zones in well CH-3122 are in rocks with

Table 5. *Range of radon-222 concentrations in water from 28 wells sampled on two or more dates, Chester County, Pennsylvania*

Local well number CH-	Geologic unit	Number of samples	Time interval, if regular	Radon-222 concentration (picocuries per liter)					
				Minimum	Date of minimum	Maximum	Date of maximum	Difference	Percentage difference[1]
Carbonate rocks									
1985	OCc	2		639	09-08-86	780	08-16-93	141	22
2740	OCc	2		730	07-12-89	2,054	06-27-88	1,324	189
2161	Cl	2		1,120	06-27-88	1,900	09-05-90	780	70
2746	Cl	2		120	08-30-90	171	09-09-86	51	43
3516	ck	2		1,900	08-02-93	1,900	07-13-94	0	0
4344	ck	4	Quarterly	3,100	03-31-93	3,400	06-16-93	300	10
Median of 6 wells in carbonate rocks								220	33
Schists and quartzites									
75	wb	2		2,900	08-23-90	4,223	07-14-86	1,324	46
1720	wb	4	Quarterly	3,800	06-10-93	4,500	04-06-93	700	18
3445	wb	2		980	07-12-94	1,200	08-19-93	220	22
4343	wb	4	Quarterly	2,000	12-30-92	2,200	09-23-93	200	10
4345	wb	2		380	08-19-93	420	07-11-94	40	11
85	oct	2		2,647	07-21-86	4,100	08-04-89	1,453	55
1514	pc	8	Bi-monthly	3,800	08-28-95	4,200	10-22-96	400	11
4274	pc	4	Quarterly	7,000	03-31-93	8,200	09-16-93	1,200	171
4730	st	2		2,000	09-07-93	2,100	07-11-94	100	5
1616	Zch	2		3,395	11-12-86	3,665	10-23-87	270	8
1617	Zch	6	Monthly	[2]280	06-03-87	1,100	08-01-91	820	293
3112	Zch	2		590	08-28-87	750	06-01-89	160	27
3331	Zch	2		710	10-05-90	822	08-23-88	122	17
3335	Zch	38	Monthly	2,800	05-31-89	7,900	01-31-89	5,100	182
Median of 14 wells in schists and quartzites								335	20
Gneisses									
3384	Ybfa	2		890	07-13-94	1,700	09-08-93	810	91
3430	Ybfa	2		1,200	08-04-93	1,500	07-12-94	300	25
3482	Ybfa	2		2,200	07-13-94	2,400	07-27-93	200	9
3484	Ybfa	9	Bi-monthly	7,600	12-23-96	9,305	04-30-97	1,700	22
4339	Yhia	8	Bi-monthly	1,500	12-23-96	2,700	06-27-96	800	53
4773	Yhia	3		2,300	06-27-96	2,600	04-23-96	300	13
5238	Yhia	8	Bi-monthly	870	12-23-96	1,600	09-28-95	730	84
4027	Yhga	7	Bi-monthly	3,500	02-28-97	7,400	09-29-95	3,900	111
Median of 8 wells in gneisses								765	39
Median of 28 wells								350	24

[1] Percent difference = [(maximum - mininum)/minimum] × 100.

[2] This value may be low because of sample loss before analysis; later concentrations were consistently equal to or greater than 1,000 pCi/L; consequently, actual difference between maximum and minimum concentrations would be substantially less—see table 7.

elevated uranium concentrations and the radon-222 concentration in water from the well is relatively high, 9,200 pCi/L.

Without detailed studies, the relation between hydrogeologic setting and radon-222 concentrations is difficult to determine. Radon-222 concentrations in closely spaced wells with similar characteristics in the same hydrogeologic setting can vary by an order of magnitude or more (Senior and Vogel, 1995, p. 68-69). Each fracture intersected by a well can contribute water with concentrations of radon-222 different than that in water from other fractures. Heterogeneous distribution of uranium-238 and its daughter products (down to radium-226), aquifer porosity, and mineralogy will result in heterogeneous distribution of radon-222 concentrations in ground water, even on a local scale.

Relation to Other Dissolved Constituents in Ground Water

The chemical composition of ground water differs by geologic unit, as does radon-222 concentration, because of differences in mineralogy of aquifer materials. Ground water in the carbonate-rock aquifers, and to a lesser extent the Triassic sedimentary rocks, typically has elevated alkalinity (bicarbonate) and hardness (calcium plus magnesium), near neutral pH (7.0), and lower radon-222 concentrations compared to the generally soft and slightly acidic (pH less than 7.0) ground water in the schists, quartzites, and felsic rocks (table 8). Ground water in ultramafite (serpentinite) commonly has elevated magnesium concentrations and pH compared to ground water in other geologic units. Differences in chemical composition of ground water in rock types in Chester County are described by Poth (1973), Sloto, (1994), Senior (1996), and Senior and others (1997).

Because radon-222 is relatively inert, radon-222 concentrations in ground water are unlikely to be controlled chemically. In a study of radium and radon for 160 wells in the Chickies Quartzite, few statistically significant correlations were found between radon-222 and other chemical constituent concentrations in ground water, and those correlations were relatively weak (Senior and Vogel, 1995). Other studies have reported a similar lack of correlation between dissolved radon-222 and other chemical constituents in ground water in other aquifers (Szabo and Zapecza, 1991, p. 262-263; Lico and Rowe, 1991, p. 287). No strong relations between chemical constituents and radon-222 concentrations are indicated for geologic units in Chester County. The few statistically significant correlations (Spearman rho) between radon-222 and major dissolved constituents were positive for some geologic units but negative for others. For example, radon-222 concentrations in ground water are negatively correlated with dissolved sulfate concentrations in the Wissahickon Schist and the Chickies Quartzite, positively correlated with dissolved sulfate in the Peters Creek Schist, and not significantly correlated with dissolved sulfate in the Ledger Dolomite. The inverse relation between sulfate and radon-222 in rocks of similar compositions, such as the schists and quartzite, suggests that the correlations may not be due to geochemical controls or that the relation between chemistry of ground water and radon is complex.

Data for the Chickies Quartzite and other geologic units in Chester County indicate concentrations (activities) of radon-222 generally are not in secular equilibrium or correlated with the concentrations of radium-226 and uranium, parents of radon-222, in ground water (Senior and Vogel, 1995; table 8). This implies that the main source of radon-222, radium-226, and its parents is in the solid phase of aquifer materials, rather than in the ground water, and that geochemical controls on solubility and mobility of uranium, radium, and other products in the decay series differ. In addition, because of their longer half-lives, radium-226 and its parents can migrate farther from sources in the aquifer than radon-222, and, therefore, radium-226 and its parents may become spatially separated from radon-222 in flowing ground water. The lack of relation between radon-222 and its parents in ground water is apparent for analyses of ground water of a single rock type as well as for comparisons between different rock types.

Ground waters with high uranium or radium-226 concentrations can have a wide range of radon-222 concentrations. Uranium is more soluble and is present in relatively higher concentrations in ground waters in carbonate rocks and Triassic-age sedimentary rocks than other rocks in the county, but ground water in these rocks typically contains relatively low concentrations of radon-222. In exception to this observation, water from one well in the Ledger Dolomite has unusually high concentrations of uranium (97 µg/L) compared to ground water in the county overall and unusually high concentrations of radon-222 (5,800 pCi/L) compared to water from other wells in the formation. Ground water in the Lockatong Formation has consistently detectable concentrations of uranium (up to 11 µg/L) but has among the lowest concentrations or radon-222 (maximum of 960 pCi/L) of geologic units in the county. The chemistry of ground water that favors uranium or radium solubility perhaps can contribute to a leaching (and depletion) of these sources of radon-222 from surfaces of the aquifer in contact with ground water.

Temporal Variability

Radon-222 concentrations in ground water can vary through time because of factors such as dilution by recharge, changes in contributing areas of the aquifer as a result of pumping, or seasonal fluctuations in the water table. In other studies, significant temporal variability was observed in a study of radon-222 concentrations in water from five wells drilled in granites and gneisses in Connecticut; hourly samples ranged from 15,400 to 28,400 pCi/L in 1 day and daily samples ranged from about 16,400 to 38,900 pCi/L over 2 weeks (McHone and Thomas, 1997). In Chester County, data on temporal variability is available for 28 wells that were resampled on two or more dates: 1 well (CH-3335) sampled monthly for 3 years; 1 well (CH-1617) sampled monthly for 4 months; 4 wells (CH-1720, CH-4274, CH-4343, CH-4344) sampled quarterly for about 9 months; 5 wells (CH-1514, CH-3484, CH-4027, CH-4339, CH-5238) sampled bi-monthly for 1 year; and 18 wells sampled twice at irregular intervals of months to years (table 5). In addition, 13 wells were sampled periodically while pumping to assess radon-222 variability during the period of sample collection (30 minutes to 1 hour) (table 6).

The range of radon-222 concentrations for wells sampled on more than one date is given in table 5, and the complete time-series data are given in table 8. The maximum difference in radon-222 concentrations in two samples collected at one well was 5,100 pCi/L, and the median was 350 pCi/L for all 28 wells (table 5). Radon-222 concentrations differed by less than 50 percent in more than half (17 of 28) of the wells sampled on more than one date and varied by less than 100 percent (a factor of two) in 75 percent (21 of 28) of the wells. Some

Table 6. *Range of radon-222 concentrations in replicate samples of ground water from 13 wells, Chester County, Pennsylvania*

[gal/min, gallons per minute; --, no data]

Local well number CH-	Geologic unit	Sample data						Radon-222 concentration (picocuries per liter)			
		Date	Start time of pumping	Pumping rate (gal/min)	Number of samples	Time of radon minimum	Time of radon maximum	Minimum	Maximum	Difference	Percentage difference[1]
1514	pc	10-22-96	14:30	6.3	3	15:05	15:15	4,100	4,200	100	2
1720	wb	04-06-93	11:33	6.3	4	12:15	12:48	4,200	4,500	300	7
2593	st	09-09-93	11:55	4.2	2	12:43	12:40	470	540	70	13
3210	ck	08-10-93	15:15	15.8	2	16:00	15:56	270	290	20	7
3219	Zch	06-16-88	14:16	7.6	3	14:37	14:41	670	671	1	.1
3301	Ymfa	06-16-88	12:00	6.3	2	12:35	12:39	560	600	40	7
3445	wb	08-19-93	13:42	4.2	2	14:24	15:26	1,000	1,200	200	20
3484	Ybfa	10-22-96	12:16	5.0	3	12:51	12:57	8,100	8,400	300	4
4142	Cah	10-16-91	--	--	2	09:44	09:45	3,300	3,400	100	3
4344	ck	06-16-93	10:43	9.5	2	11:22	11:28	3,400	3,400	0	0
4344	ck	07-07-94	12:07	9.5	2	12:51	12:47	3,100	3,100	0	0
5170	Yhfg	08-31-95	13:40		2	14:15	14:16	160	170	10	6
5272	Trs	10-12-95	16:33	4.8	2	17:15	16:53	540	610	70	13
5481	Yhfg	09-24-96	10:38	10.5	2	11:14	11:16	430	820	390	91
Median of 13 wells										70	6.5

[1] Percent difference = [(maximum - minimum)/minimum] × 100.

variability may be caused by short-term fluctuations in concentration while pumping, although this variability usually was relatively low, or sampling error. The difference between measured radon-222 concentrations for replicate samples collected during one sampling event (typically about 1 hour in duration) was less than 15 percent in most (85 percent or 11 of 13) of the wells sampled multiple times while pumping (table 6). Wells were purged by pumping for about 30 minutes to 1 hour before sampling. In the study of temporal variability in wells in Connecticut, McHone and Thomas (1997, p. 29) report that radon-222 concentrations in well-water samples collected from mid-morning to mid-afternoon were the most stable, possibly because of patterns of well use. Almost all well-water samples in Chester County were collected by USGS from mid-morning to late afternoon.

Wells sampled several times at regular intervals provide data on seasonal variability. Of the wells that were sampled at regular time intervals for at least 1 year, significant repeatable seasonal fluctuations in radon-222 concentrations in ground water of up to almost a factor of three were observed for only one well, CH-3335. Concentrations of radon-222 in ground water from well CH-3335 were greatest in the fall and least in the spring and were inversely related to depth to water and sulfate concentrations (figs. 8, 9). These seasonal fluctuations in radon-222 were accompanied by similar fluctuations in concentrations of radium-226 (parent of radon-222) and radium-228, although the ratios between these radionuclides also fluctuated, indicating possible seasonal changes in source areas in the aquifer (Senior, 1992). During the period of most active recharge in the spring, sulfate concentrations increased while radon-222 concentrations decreased, suggesting that the reduction in radon-222 concentrations may be because of dilution by sulfate-rich recharge.

In wells sampled periodically other than CH-3335, radon-222 concentrations (table 8) did not exhibit a strong seasonal pattern of fluctuation and were not consistently related to changes in depth to water (fig. 10). Data for these other wells, however, is more limited than for CH-3335 and data for the five wells sampled in 1996, a year of record-high precipitation, may not be representative of average conditions. Nevertheless, some evidence of dilution by recharge is indicated. Observed radon-222 concentrations in five wells sampled bimonthly decreased during a period of high water levels in December 1996, indicating at least a short-term dilution by recharge. Decreases up to 1,000 pCi/L (or 40 percent for well CH-4339) from the October 1996 sample were measured in the December 1996 sample (fig. 10; table 8). Generally, other water-quality constituents monitored (major ions, pH, dissolved oxygen, specific conductance, and alkalinity) varied little during the monitoring period, suggesting that ground water in these wells has a relatively stable composition despite seasonal changes in recharge. Radon-222 in ground water might be expected to come into equilibrium with sources in aquifer materials in about a month [25.4 days, calculated by use of a formula from Durrance (1986, p. 286)].

SUMMARY

Radon-222 is a naturally occurring radioactive gas that is derived from the decay of uranium, is soluble in water, and commonly is present in ground water. Radon-222 may pose a health risk. Radon-222 concentrations in ground water are related to the concentrations of uranium in aquifer materials that differ in general by rock type.

Radon-222 concentrations measured in 665 water samples collected from 534 wells in Chester County, Pa., from 1986 to 1996 were used to characterize the spatial and temporal distribution of radon-222 in ground water in the county. Ground water in the fractured metamorphic, igneous, and sedimentary rocks that underlie the county is the main source of water supply for many homes and businesses. Data were collected for this and other studies. Samples collected in 1995 were selected to complete the spatial distribution in the most areally extensive geologic units in Chester County. Thirty-nine bedrock geologic units have been mapped in the county; 31 were sampled. Chester County is about 759 mi^2 in area, and thus the average well density was about one well per 1.4 mi^2, although well density varied among geologic units. Data on temporal variability was compiled for samples collected through 1996, and a few wells were resampled through April 1997 to complete a year-long study of temporal variability of radon-222 in ground water.

The median concentration of radon-222 in ground water for all 534 wells sampled was 1,400 pCi/L, and the maximum concentration measured was 53,000 pCi/L. Concentrations of radon-222 greater than or equal to 10,000 pCi/L were measured in 2 percent (12 of 534) of wells sampled. About 89 percent of the wells sampled in

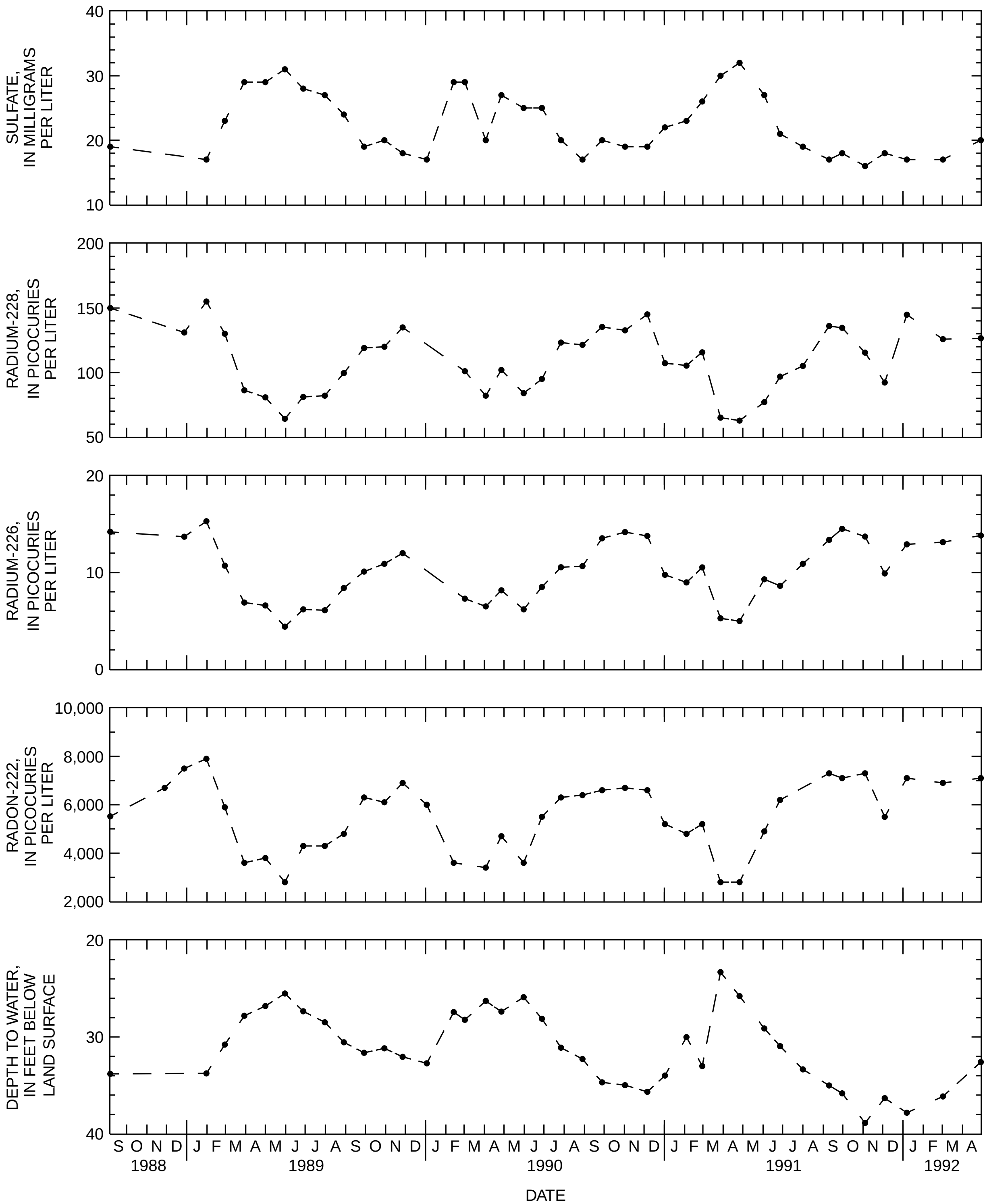

Figure 8. Temporal variations of depth to water and concentrations of dissolved radon-222, radium-226, radium-228, and sulfate measured monthly for well CH-3335, Chester County, Pennsylvania, September 1988 to April 1992.

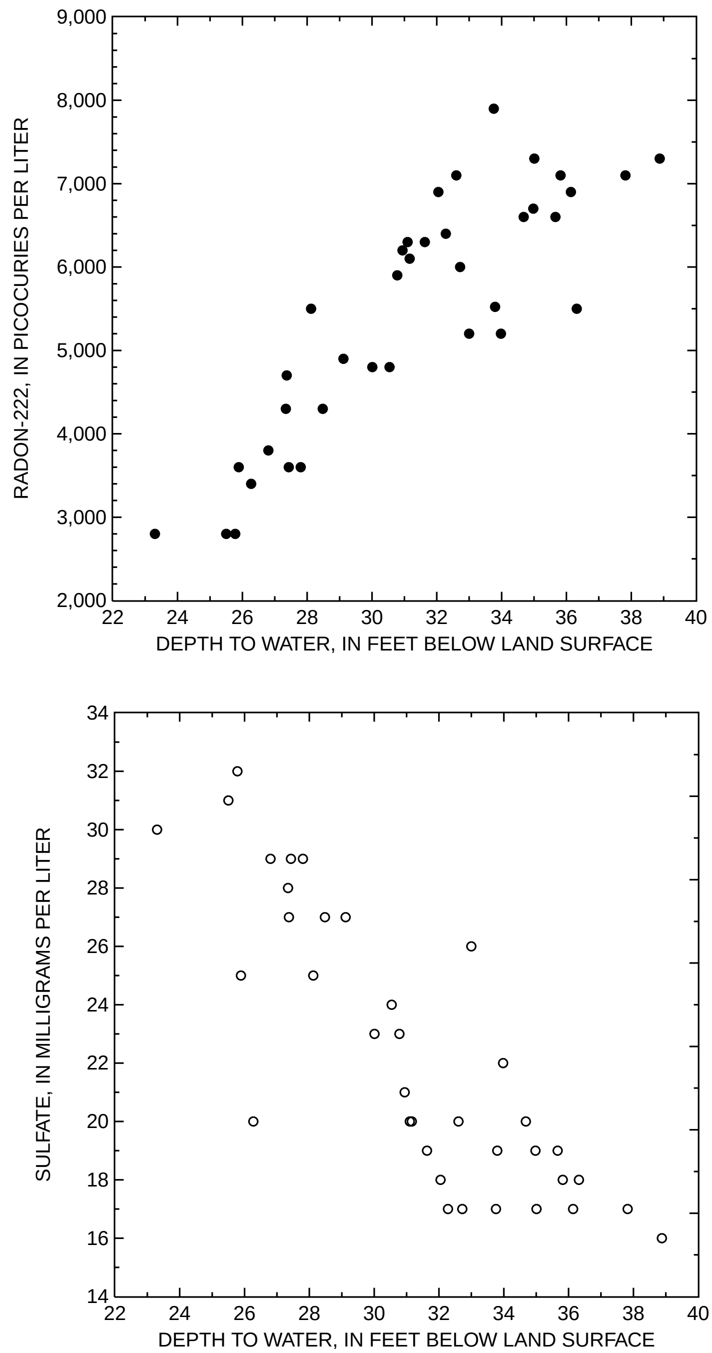

Figure 9. Relation between depth to water and radon-222 and sulfate concentrations in monthly samples from well CH-3335, Chester County, Pennsylvania, September 1988 to April 1992.

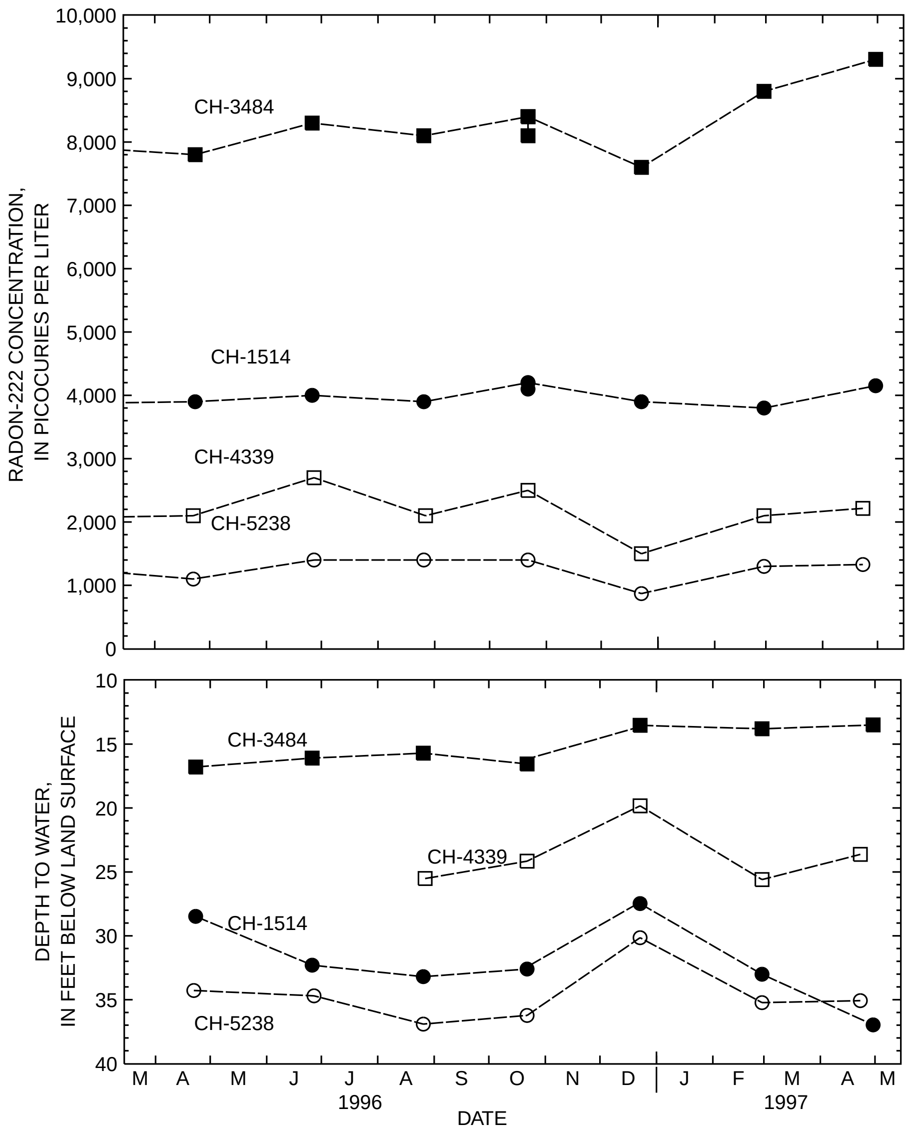

Figure 10. Temporal variation of radon-222 concentrations in samples from and depth to water in wells CH-1514, CH-3484, CH-4339, and CH-5238, Chester County, Pennsylvania, April 1996 to April 1997.

the county contained radon-222 in concentrations greater than 300 pCi/L, the maximum contaminant level proposed by the U.S. Environmental Protection Agency for drinking water. Of the geologic units sampled, the median concentration of radon-222 in ground water was greatest in the Peter Creek Schist (4,400 pCi/L). The Peters Creek Schist is the second most areally extensive geologic unit in the county, representing about 70 mi^2 or 9 percent of the county. The median concentration of radon-222 in ground water in the Wissahickon Schist, the most areally extensive (184 mi^2 or 24 percent) geologic unit in the county, was 1,400 pCi/L. Other geologic units with relatively high radon-222 ground-water concentrations include the Harper Phyllite-Antietam Quartzite, undivided (median 3,700 pCi/L), Octoraro Phyllite (median 3,000 pCi/L), and felsic and mafic gneiss (median 2,800 pCi/L). Wells in the Chickies Quartzite, Harpers Phyllite-Antietam Quartzite, undivided, and felsic and mafic gneiss produced the highest percentage of water samples with concentrations of radon-222 above 20,000 pCi/L compared to other formations. Radon-222 concentrations can range over three orders of magnitude in ground water from a geologic unit and can differ significantly from well to well on a local scale.

Radon-222 concentrations in ground water in Chester County appears to be related to the uranium concentration in aquifer materials. Rocks, such as schists and granites, typically contain higher uranium concentrations than rocks such as limestones and ultramafic rocks. In Chester County, radon-222 concentrations were greater in ground water from schist, granites, gneisses, and quartzites than in most carbonate (limestone and dolomite) and ultramafic/serpentinite rocks. Measured radon-222 concentrations were higher in water from wells with water-bearing zones in rocks with elevated uranium content than in wells with water-bearing zones in rocks with lower uranium content.

Radon-222 concentrations in ground water in Chester County generally were not statistically significantly correlated with well characteristics, such as depth or yield. Significant (95-percent confidence interval) Spearman rho inverse correlations between well depth and radon-222 were indicated for some but not all geologic units. Radon-222 concentrations generally also were not statistically significantly correlated with concentrations of dissolved major ions, pH, and other chemical constituents. Weak, but significant, Spearman rho inverse correlations between dissolved sulfate and radon-222 concentrations were indicated for some but not all geologic units.

Temporal variations of radon-222 concentrations in ground water in wells sampled in Chester County ranged up to a factor of almost three but were less than a factor of two for most wells sampled on more than one date. Of wells sampled on a regular interval for at least a year, significant seasonal fluctuations of radon-222 concentrations in ground water were observed for only one well. In ground water from this well, radon-222 concentrations were inversely related to the water level; the highest radon-222 concentrations were detected in the fall, when depth to water was greatest, and the lowest radon-222 concentrations were detected in the spring, when depth to water was least.

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Table 7. *Wells sampled for radon in Chester County, Pennsylvania, 1986-96*

USGS well number: 4-digit number assigned by USGS that follows a 2-letter abbreviation for county (CH- for Chester County).

Township or borough: Name refers to township unless noted as Boro for Borough.

Use of site: U, unused; W, withdrawal; O, observation.

Use of water: A, air conditioning; C, commercial; H, domestic; I, irrigation; N, industrial; P, public supply; S, stock; T, institutional; U, unused; Z, other miscellaneous.

Aquifer codes: 000ANRS, anorthosite (Yhan); 000MFCGH, mafic gneiss, amphibolite facies (ma); 000PGMT, pegmatite (pg); 000SRPN, serpentinite and ultramafite (Csp, um); 231BRCK, Brunswick Group (Trb); 231HMCK, Hammer Creek Formation (Trh); 231LCKG, Lockatong Formation (Trl); 231SCKN, Stockton Formation (Trs); 300CCKV, Cockeysville Marble (ck); 300PRCK, Peters Creek Schist (pc); 300STRS, Setters Quarztite (st); 300WSCKA, Octoraro Phyllite (oct); 300WSCKO, Wissahickon Schist (wb); 367CNSG, Conestoga Limestone (OCc); 371ELBK, Elbrook Limestone (Ce); 377AMHP, Antietam Quartzite-Harpers Phyllite, undivided (ZCah); 377CCKS, Chickies Quartzite (Zch); 377KZRS, Kinzers Limestone (Ck); 377LDGR, Ledger Dolomite (Cl); 400BMFGA, banded mafic gneiss, amphibolite facies (Yhma); 400FCIGA, felsic and intermediate gneiss, amphibolite facies (Yhia); 400FLCGA, felsic gneiss, amphibolite facies (Yhfa); 400FLCGG, felsic gneiss, granulite facies (Yhfg); 400FLCGH, felsic and intermediate gneiss, amphibolite facies (Ybfa); 400FLCGP, felsic gneiss, granulite facies (Ybfg); 400FMFG, felsic and mafic gneiss (Ymfa); 400GPCGA, graphitic felsic gneiss, amphibolite facies (Yhga); 400GPCGG, graphitic felsic gneiss, granulite facies (Yhgg); 400MFCGG. mafic gneiss, granulite facies (Yhmg); 400MFCGH, mafic gneiss amphibolite facies (Ybma); 400MFCGP, mafic gneiss, granulite facies (Ybmg).

Diameter of casing is in inches (in.)

Discharge in gallons per minute (gal/min) is reported rate of pumping and commonly is indicative of well yield.

Water level is in feet below land surface. Altitude of land surface is estimated from topographic maps. Datum is National Geodetic Vertical Datum of 1929.

--, no data

Table 7. *Wells sampled for radon-222 in Chester County, Pennsylvania, 1986-96—Continued*

Local well number CH-	Aquifer code	Latitude (degrees)	Longitude (degrees)	Township or borough	Date well constructed	Depth of well (feet)	Bottom of casing (feet)	Diameter of casing (in.)	Primary use of site	Primary use of water	Discharge (gal/min)	Date water level measured	Water level (feet)
21	300WSCKO	395254	0754410	E MARLBOROUGH TWP	12-17-54	135	27	6	U	H	--	11-22-55	24.2
26	000MFCGH	395021	0755220	KENNETT TWP	04-20-72	155	--	6	U	U	--	04-20-72	.00
30	300STRS	395046	0754150	KENNETT TWP	01-01-25	86.0	66	6	W	I	--	--	--
71	300CCKV	395011	0754348	NEW GARDEN TWP	--	50.3	50	6	W	H	--	03-15-57	8.67
75	300WSCKO	394735	0755809	OXFORD BORO	12-22-38	400	70	8	W	P	116	12-22-38	.00
83	300WSCKA	395346	0754210	E MARLBOROUGH T	--	220	--	--	W	H	--	--	--
85	300WSCKA	395706	0754530	W BRADFORD TWP	00-00-72	307	--	--	W	P	40	07-21-86	56.4
86	377CCKS	400227	0754308	E BRANDYWINE TW	00-00-65	300	33.7	6	W	H	25	07-25-86	65
87	300WSCKA	395705	0754527	W BRADFORD TWP	--	305	52	--	W	P	50	00-00-72	41
88	377LDGR	400234	0753426	E WHITELAND TWP	--	--	--	--	W	H	--	--	--
118	300WSCKA	400055	0753614	W WHITELAND TWP	01-01-61	100	--	6	W	H	--	06-27-86	26.9
202	371ELBK	400404	0752845	TREDYFFRIN TWP	01-01-29	--	--	--	W	H	30	11-01-83	3.10
204	371ELBK	400404	0752900	TREDYFFRIN TWP	01-01-63	170	22	5	W	H	4.0	10-20-83	2.12
245	371ELBK	400355	0752911	TREDYFFRIN TWP	06-27-58	560	37.5	6	W	H	20	10-21-64	18
249	377LDGR	400103	0753901	W WHITELAND TWP	12-01-86	600	--	8	W	P	100	--	--
255	300WSCKA	400200	0753148	WILLISTOWN TWP	12-06-55	160	24	6	W	H	1.0	12-06-55	42.0
293	377CCKS	400422	0753128	TREDYFFRIN TWP	04-01-27	90	--	10	W	P	96	04-01-27	19.0
307	367CNSG	400124	0753741	W WHITELAND TWP	01-01-58	139	24	6	U	N	100	--	--
333	377CCKS	400504	0752904	SCHUYKILL TWP	08-01-77	265	48	6	W	H	4.0	11-15-86	50.5
386	231SCKN	400300	0753237	E PIKELAND TWP	--	108	--	--	W	H	--	--	--
410	400FLCGH	395240	0753908	PENNSBURY TWP	01-01-70	270	40	6	W	H	--	08-26-86	32.8
412	400BMFGA	395957	0755039	VALLEY TWP	04-15-68	377	22	6.25	W	H	.5	04-15-68	40.0
417	377CCKS	395728	0755707	W SADSBURY	03-01-86	160	35	6.5	W	H	20	11-24-86	50.6
418	377CCKS	400740	0755230	W NANTMEAL TWP	06-21-78	140	82	6	W	H	15	12-05-86	93.6
427	377CCKS	400837	0755107	W NANTMEAL TWP	01-01-77	--	--	--	W	H	--	--	--
505	377CCKS	400535	0752847	SCHUYKILL TWP	--	--	--	--	W	H	--	05-08-87	45.5
509	300WSCKO	395157	0755106	LONDONDERRY TWP	--	100	--	6	W	C	18	01-01-25	20.0
605	400FLCGP	395819	0753156	EAST GOSHEN TWP	01-01-62	130	28	6	W	H	4.0	08-01-62	30.0
693	377CCKS	400614	0754154	W VINCENT TWP	11-07-73	145	83.5	6.25	W	H	60	11-07-73	60
703	377AMHP	400854	0755017	WEST NANTMEAL	02-13-87	208	45	6	W	H	1.5	06-05-87	82.3
754	400FLCGH	395534	0754036	POCOPSON TWP	06-01-59	321	38.5	5.6	W	H	8.0	10-15-63	42.1
770	300STRS	395238	0754138	E MARLBOROUGH T	01-01-32	94	60	6	W	H	--	01-01-32	3.0
848	300WSCKO	395359	0754519	EAST MARLBOROUG	01-01-68	80.0	43	6	W	H	7.0	09-01-68	40.0
895	300CCKV	395438	0754841	WEST MARLBOROUG	--	67.0	--	10	W	H	--	09-18-63	52.0
929	300WSCKO	395504	0755038	WEST MARLBOROUG	01-01-40	180	--	10	W	H	--	--	--
945	377CCKS	395918	0755002	VALLEY TWP	--	80.0	--	--	W	H	--	11-14-63	36.1
952	300PRCK	395626	0755101	E FALLOWFIELD TWP	01-01-45	100	--	6	W	H	--	--	--
989	367CNSG	395737	0755357	SADSBURY TWP	09-03-63	50	42	6	W	H	--	09-03-63	26.0
991	377CCKS	395810	0755343	SADSBURY TWP	01-01-50	131	60	6	W	T	--	10-02-63	18.0
992	377HRPR	395808	0755303	SADSBURY TWP	01-01-49	125	120	6	W	H	30	05-27-64	8.00
1000	300PRCK	395433	0755436	HIGHLAND TWP	06-25-63	210	110	6	W	H	15	08-21-63	33.0
1005	300WSCKA	395648	0755427	HIGHLAND TWP	01-01-40	105	--	--	W	H	--	08-02-63	28.0

Table 7. *Wells sampled for radon-222 in Chester County, Pennsylvania, 1986-96—Continued*

Local well number CH-	Aquifer code	Latitude (degrees)	Longitude (degrees)	Township or borough	Date well constructed	Depth of well (feet)	Bottom of casing (feet)	Diameter of casing (in.)	Primary use of site	Primary use of water	Discharge (gal/min)	Date water level measured	Water level (feet)
1074	377HRPR	395703	0755850	ATGLEN BORO	01-02-47	160	--	8	W	N	23	08-06-63	43.0
1089	377CCKS	400909	0755038	ELVERSON BORO	05-01-84	140	80	6	W	H	40	06-12-87	90.9
1090	377CCKS	400108	0755458	WEST CALN TWP	07-26-79	63	21	6	W	H	20	06-17-87	29
1091	377CCKS	400030	0755542	WEST CALN TWP	12-11-75	153	39	6	W	H	5	12-11-75	45
1092	377CCKS	400335	0754905	W BRANDYWINE TWP	--	95	--	--	W	H	12	06-23-87	40
1093	377CCKS	400225	0753814	W WHITELAND TWP	--	150	43	6	W	H	5	06-26-87	59.8
1094	377CCKS	400254	0755313	WEST CALN TWP	01-01-81	155	--	--	W	H	22	06-26-87	70
1095	377CCKS	395817	0755313	SADSBURY TWP	03-01-78	150	63	6	W	H	10	--	--
1096	377CCKS	400206	0755337	WEST CALN TWP	07-19-87	120	42	6	W	H	10	07-29-87	29.9
1097	377AMHP	400214	0755551	WEST CALN TWP	04-14-78	200	21	6	W	H	6	08-04-87	82
1098	377CCKS	400246	0755423	WEST CALN TWP	04-11-77	200	40	6	W	H	9	--	--
1099	400FLCGG	400927	0754927	ELVERSON BORO	01-01-74	--	--	--	W	H	--	08-06-87	24
1106	300WSCKA	395807	0754557	E FALLOWFIELD TWP	01-01-66	--	--	6	W	H	--	06-23-87	3.2
1110	300WSCKO	400114	0753223	WILLISTOWN TWP	--	--	--	5.5	W	H	--	06-30-86	33.6
1123	400FLCGP	395854	0753435	WEST GOSHEN TWP	--	--	--	6	W	H	--	07-09-86	28.6
1213	377CCKS	400224	0754055	UWCHLAN TWP	02-26-71	70	40	6.25	W	H	15	01-01-74	29.0
1217	377CCKS	400216	0754056	UWCHLAN TWP	01-01-72	120	75	6	W	H	15	02-01-74	18.0
1262	400MFCGG	400339	0755609	HONEY BROOK TWP	08-03-68	43	43	6	W	H	15	03-04-74	27.0
1265	377CCKS	400708	0755506	HONEY BROOK TWP	10-29-68	110	86	6	W	H	25	--	--
1268	400FLCGG	400506	0755536	HONEY BROOK TWP	09-24-69	100	75	6	W	H	8	09-24-69	36.0
1272	400MFCGG	400400	0755609	HONEY BROOK TWP	05-27-71	183	30	6	W	H	5.0	02-28-74	41.0
1281	400FLCGG	400538	0755330	HONEY BROOK TWP	08-12-67	94	40	6	W	H	75	08-12-67	3.00
1286	377CCKS	400359	0755146	HONEY BROOK TWP	07-18-68	182	35	6	U	U	5.0	--	--
1296	377CCKS	400338	0755144	HONEY BROOK TWP	01-01-71	123	40	6.25	W	H	15	--	--
1299	300WSCKO	395420	0753937	POCOPSON TWP	09-28-57	215	55	8	W	T	75	09-28-57	2.00
1311	000ANRS	400547	0755037	W NANTMEAL TWP	04-30-69	85.0	52	6	W	H	30	03-15-74	15.7
1315	377LDGR	400205	0753723	W WHITELAND TWP	01-01-52	107	90	8	W	P	200	11-01-52	22.0
1316	377LDGR	400205	0753721	W WHITELAND TWP	06-13-53	85	74	8	W	P	150	09-01-53	22.0
1361	377HRPR	400109	0755455	W CALN TWP	06-23-70	101	20	6	W	H	10	03-28-74	36.0
1364	377CCKS	400241	0755352	W CALN TWP	00-00-73	183	39	6	W	H	12	04-01-74	31.0
1367	377CCKS	400300	0755237	W CALN TWP	10-24-72	280	63	6	W	H	25	--	--
1376	377CCKS	400046	0755211	WEST CALN TWP	09-20-71	75.5	21.6	6	W	H	18	09-20-71	35.0
1434	400FLCGG	400634	0754600	WALLACE TWP	11-13-69	107	87	6	W	H	60	04-18-74	17.5
1435	400FLCGG	400706	0754315	E NANTMEAL TWP	10-16-72	85	40	6	W	H	40	--	--
1478	400FLCGG	400935	0754321	WARWICK TWP	07-19-73	60	30	6	W	H	25	07-19-73	30.0
1483	231SCKN	401020	0754335	WARWICK TWP	02-17-71	108	45	6	W	H	40	04-01-74	17.0
1496	231HMCK	401143	0754148	S COVENTRY TWP	06-30-70	108	70	6	W	H	50	06-01-70	65.0
1499	231LCKG	401039	0753911	S COVENTRY TWP	06-28-69	600	82	8	W	T	380	06-01-69	161
1501	231SCKN	401032	0753947	S COVENTRY TWP	07-03-68	225	56	6	W	H	4.0	--	--
1514	300PRCK	395912	0753940	E BRADFORD TWP	06-09-72	99	41	6	W	H	30	06-09-72	35.0
1528	231HMCK	401259	0754055	N COVENTRY TWP	10-06-69	125	47	6	W	H	12	--	--
1547	231BRCK	401200	0753546	E COVENTRY TWP	10-24-67	123	24	6	W	H	12	--	--

Table 7. Wells sampled for radon-222 in Chester County, Pennsylvania, 1986-96—Continued

Local well number CH-	Aquifer code	Latitude (degrees)	Longitude (degrees)	Township or borough	Date well constructed	Depth of well (feet)	Bottom of casing (feet)	Diameter of casing (in.)	Primary use of site	Primary use of water	Discharge (gal/min)	Date water level measured	Water level (feet)
1564	231LCKG	400928	0753455	E VINCENT TWP	04-14-72	138	40	6	W	H	32	--	--
1565	231LCKG	400935	0753604	E VINCENT TWP	09-28-67	198	23	6	W	H	8.0	--	--
1567	231BRCK	400954	0753545	E VINCENT TWP	02-24-73	105	28	7	W	H	40	05-20-74	15.0
1593	231SCKN	400800	0753432	E PIKELAND TWP	10-02-67	98	24	6	W	H	15	10-02-67	16.0
1599	400GPCGA	400501	0753856	W PIKELAND TWP	04-02-73	255	245	6	W	H	150	04-02-73	17.0
1613	400GPCGA	400536	0753815	W PIKELAND TWP	01-01-68	168	60	6	W	H	100	05-01-74	48.0
1616	377CCKS	400329	0753622	CHARLESTOWN TWP	01-01-73	130	79	6	W	H	35	07-19-90	34.2
1617	377CCKS	400338	0753527	CHARLESTOWN TWP	04-11-73	194	50	6	W	H	5.0	04-11-73	93.0
1618	377CCKS	400417	0753411	CHARLESTOWN TWP	08-11-72	240	96	6	W	H	4.0	--	--
1627	400FCIGA	400537	0753307	CHARLESTOWN TWP	11-11-66	280	41	6	W	Z	20	11-11-66	42.0
1651	300PRCK	394555	0760301	W NOTTINGHAM TW	03-10-71	134	46	6	W	H	12	03-19-71	45.0
1659	000SRPN	394411	0760018	W NOTTINGHAM TW	11-06-70	83.0	29	6	W	H	12	11-01-70	18.0
1703	300WSCKO	394445	0755802	E NOTTINGHAM TW	05-18-72	146	106	6	W	H	15	06-20-74	21.0
1709	300PRCK	394859	0755917	L OXFORD TWP	07-27-67	109	40	6	W	H	15	07-27-67	48.0
1720	300WSCKO	394803	0755638	L OXFORD TWP	08-21-69	111	78	6	W	H	10	06-24-74	31.0
1727	300PRCK	395120	0755831	U OXFORD TWP	02-16-68	80	16	6	W	H	15	02-16-68	32.0
1737	300WSCKO	394752	0755459	L OXFORD TWP	09-06-66	68	36	6	W	H	25	09-06-66	33.0
1742	300PRCK	395024	0755941	U OXFORD TWP	10-22-68	200	20	6	W	H	2.0	10-22-68	53.0
1761	000SRPN	394407	0755625	ELK TWP	07-22-68	73	21	6	W	H	30	07-22-68	5.00
1765	300WSCKO	394620	0755412	NEW LONDON TWP	08-24-66	72	52	6	W	H	25	08-24-66	38.0
1829	300WSCKO	394456	0754938	FRANKLIN TWP	01-01-66	165	54	6	W	H	15	11-01-66	31
1843	300PRCK	395540	0755253	HIGHLAND TWP	09-26-68	130	19	6	W	H	10	09-26-68	42.0
1846	300WSCKA	395737	0755058	E FALLOWFIELD T	05-17-71	105	35	6	W	H	15	05-17-71	15.0
1954	300STRS	395002	0754602	NEW GARDEN TWP	04-25-67	101	70	6	W	C	20	08-28-74	24.0
1978	371ELBK	400231	0753347	E WHITELAND TWP	05-25-68	500	34	8	W	I	75	09-26-83	3.59
1981	300WSCKA	400126	0753419	E WHITELAND TWP	12-08-67	240	20	6	W	H	2.0	12-09-67	38.0
1985	367CNSG	400238	0753203	E WHITELAND TWP	03-24-70	320	36	6	W	H	2.0	10-11-83	27.0
2015	300CCKV	395010	0754320	KENNETT TWP	06-13-66	197	49	6	W	H	20	09-24-74	19.0
2021	300WSCKO	394933	0754038	KENNETT TWP	09-17-70	97.0	61	6	W	H	30	09-17-70	5.00
2033	300CCKV	395228	0754219	E MARLBOROUGH T	03-14-73	84.0	62	6	W	H	25	03-14-73	20.0
2067	400FLCGH	395132	0754520	E MARLBOROUGH T	06-19-67	175	70	6	W	H	30	10-03-74	65.0
2071	300STRS	395058	0753940	KENNETT TWP	05-25-73	230	198	6	W	H	15	05-25-73	25.0
2084	400FLCGP	395947	0753047	WILLISTOWN	01-01-70	104	68	6	W	H	23	11-01-74	21.0
2095	400FLCGP	400021	0752811	WILLISTOWN TWP	04-18-69	280	74	6	W	H	6.0	11-07-74	34.4
2108	400FLCGP	400130	0752547	EASTTOWN TWP	05-22-67	86.0	59	5	O	Z	30	11-08-74	17.9
2113	377CCKS	400120	0754144	E CALN TWP	01-01-66	155	35	6	W	I	32	11-01-66	63.0
2115	377CCKS	400046	0754440	CALN TWP	01-01-67	137	12	6	W	H	8.0	06-01-67	64.0
2138	371ELBK	400350	0752915	TREDYFFRIN TWP	01-01-58	252	--	--	W	H	9.0	--	--
2161	377LDGR	400118	0753832	W WHITELAND TWP	01-01-68	97.0	37	6	W	C	5.0	11-01-68	12.0
2186	300WSCKO	394755	0755839	L OXFORD TWP	01-01-41	400	56	8	W	P	90	05-01-41	3.00
2189	300WSCKO	394646	0755925	OXFORD BORO	01-01-67	430	50	8	W	P	72	02-01-67	10.0
2197	377CCKS	400512	0752910	SCHUYLKILL TWP	01-01-53	--	--	--	W	H	--	--	--

Table 7. *Wells sampled for radon-222 in Chester County, Pennsylvania, 1986-96—Continued*

Local well number CH-	Aquifer code	Latitude (degrees)	Longitude (degrees)	Township or borough	Date well constructed	Depth of well (feet)	Bottom of casing (feet)	Diameter of casing (in.)	Primary use of site	Primary use of water	Discharge (gal/min)	Date water level measured	Water level (feet)
2271	000ANRS	400425	0754908	WEST BRANDYWINE	11-10-72	100	62	6	W	H	35	--	--
2279	300PRCK	395916	0753819	WEST GOSHEN TWP	02-22-73	145	24	7	W	H	8.0	02-22-73	28.0
2293	400FLCGH	395549	0753418	WESTTOWN TWP	01-01-69	90	35	6	W	H	24	07-01-69	10.0
2308	300WSCKO	400049	0753249	EAST GOSHEN TWP	10-10-66	128	40	6	W	H	12.0	10-11-66	37.0
2315	377CCKS	400239	0753715	W WHITELAND TWP	05-20-68	175	154	6	W	H	50.0	05-20-68	35.0
2317	400FLCGG	401006	0754314	WARWICK TWP	07-20-73	86	32	6	W	Z	18.0	07-20-73	4.00
2342	400FLCGH	395213	0754119	E MARLBOROUGH T	05-06-74	152	51	6	W	H	100	05-06-74	55.0
2347	400GPCGA	400640	0753341	CHARLESTOWN TWP	01-14-74	225	21	6	W	H	60.0	01-14-74	105
2348	377LDGR	400038	0754011	E CALN TWP	06-07-74	100	48	7	W	C	100	06-07-84	25.3
2402	377LDGR	400323	0753150	E WHITELAND TWP	--	--	--	--	W	H	--	--	--
2403	377CCKS	395936	0755425	WEST CALN TWP	--	50	--	--	W	H	--	--	--
2410	377CCKS	400301	0755451	WEST CALN TWP	06-15-78	145	20.2	6	W	H	10.0	07-24-80	52.9
2411	377LDGR	400329	0753155	E WHITELAND TWP	--	--	--	--	W	H	--	10-14-83	28.6
2417	377CCKS	400117	0755415	WEST CALN TWP	--	--	--	--	W	H	--	--	--
2418	377CCKS	400340	0755012	WEST BRANDYWINE	08-27-80	--	--	--	W	H	--	--	--
2429	377CCKS	400227	0754312	E BRANDYWINE TW	--	--	--	--	W	P	--	--	--
2436	377CCKS	400313	0753655	W PIKELAND TWP	--	--	--	--	W	H	--	--	--
2451	300WSCKO	395727	0754149	W BRADFORD TWP	--	--	--	--	W	H	--	--	--
2461	300WSCKO	394940	0755239	PENN TWP	--	--	--	--	W	I	--	--	--
2465	231LCKG	400930	0753212	E PIKELAND TWP	--	--	--	--	W	H	--	--	--
2494	377LDGR	400334	0753138	E WHITELAND TWP	--	380	--	--	W	H	--	10-21-78	72.1
2497	377LDGR	400136	0753855	W WHITELAND TWP	01-01-59	150	--	--	W	I	500	07-03-84	30.0
2505	300PRCK	395707	0754414	W BRADFORD TWP	--	--	--	--	W	H	--	--	--
2513	300STRS	395223	0754426	E MARLBOROUGH T	07-29-76	200	25	6	W	H	20	08-04-83	24.3
2541	377CCKS	400254	0753358	E WHITELAND TWP	--	--	--	--	W	H	--	09-26-83	42.8
2543	377LDGR	400244	0753337	E WHITELAND TWP	--	60	--	--	W	H	--	09-26-83	29.6
2555	377CCKS	400422	0753316	E WHITELAND TWP	01-01-60	80	--	--	W	H	--	09-28-83	40.2
2560	371ELBK	400427	0753206	CHARLESTOWN TWP	12-01-81	247	201	6	W	H	30	09-28-83	132
2574	377LDGR	400423	0753101	TREDYFFRIN TWP	--	--	--	--	W	H	--	09-29-83	100
2586	300CCKV	395040	0754037	KENNETT TWP	11-17-76	57	87	6	W	H	15	09-26-83	17.7
2593	300STRS	395053	0754319	KENNETT TWP	09-01-80	206	40	6	W	H	5	09-27-83	21.7
2596	000MFCGH	394958	0754211	KENNETT SQUARE	05-01-78	195	50	6	W	H	20	09-28-83	34.4
2611	371ELBK	400344	0753111	TREDYFFRIN TWP	--	--	--	--	W	H	--	09-29-83	23.6
2634	371ELBK	400330	0753036	TREDYFFRIN TWP	--	110	--	--	W	H	--	10-19-83	41.5
2676	371ELBK	400402	0753047	TREDYFFRIN TWP	--	--	--	--	W	H	--	--	--
2677	371ELBK	400356	0752952	TREDYFFRIN TWP	--	--	--	--	W	H	--	--	--
2714	377LDGR	400102	0754236	CALN TWP	--	12.0	--	--	W	P	500	06-04-84	0.0
2719	300WSCKA	400020	0754011	E CALN TWP	11-01-80	100	60.0	6	W	C	20	06-05-84	35.0
2723	367CNSG	400103	0753958	E CALN TWP	--	180	--	6	W	H	--	06-06-84	29.8
2724	377LDGR	400033	0754009	E CALN TWP	05-30-73	100	71	6.25	W	C	25	06-07-84	28.5
2725	371ELBK	400058	0753848	E CALN TWP	00-00-67	40	--	6	W	H	--	06-07-84	5.60
2728	377LDGR	400053	0753918	W WHITELAND TWP	12-03-83	62.0	21.0	6	W	C	24	06-07-84	19.8

Table 7. Wells sampled for radon-222 in Chester County, Pennsylvania, 1986-96—Continued

Local well number CH-	Aquifer code	Latitude (degrees)	Longitude (degrees)	Township or borough	Date well constructed	Depth of well (feet)	Bottom of casing (feet)	Diameter of casing (in.)	Primary use of site	Primary use of water	Discharge (gal/ min)	Date water level measured	Water level (feet)
2730	377LDGR	400108	0753825	W WHITELAND TWP	05-11-79	43	27.0	6	W	C	60	06-08-84	7.58
2740	367CNSG	400153	0753535	W WHITELAND TWP	01-01-19	150	--	8	W	T	--	--	--
2742	377LDGR	400227	0753613	W WHITELAND TWP	--	53	--	6	W	H	--	06-12-84	3.60
2743	377LDGR	400224	0753705	W WHITELAND TWP	--	--	--	6	W	H	--	06-12-84	18.8
2746	377LDGR	400200	0753650	W WHITELAND TWP	02-08-77	220	40	6	W	H	30	06-12-84	18.2
2752	400FLCGH	395753	0753742	E BRADFORD TWP	--	--	--	--	W	Z	--	--	--
2755	300WSCKO	395153	0755119	LONDONDERRY TWP	00-00-52	117	--	--	W	H	--	06-26-84	24.9
2766	300STRS	395100	0755031	LONDON GROVE TWP	00-00-60	--	--	--	W	H	--	06-26-84	8.81
2769	300STRS	395131	0755034	LONDON GROVE TW	--	--	--	--	W	H	--	06-24-84	--
2777	300CCKV	395045	0754742	LONDON GROVE TW	--	62	--	--	W	H	--	06-27-84	26.5
2806	400FCIGA	400010	0754654	CALN TWP	07-01-75	--	--	--	W	H	--	--	--
2828	367CNSG	395750	0755302	SADSBURY TWP	12-01-81	146	86	6	W	H	20	11-14-84	29.5
2840	367CNSG	395713	0755556	W SADSBURY TWP	--	25	--	6	W	S	--	11-17-84	15.6
2847	377CCKS	400320	0753553	CHARLESTOWN TWP	--	123	89	6	W	H	15	09-05-87	60
2874	400FLCGP	395730	0753405	WEST GOSHEN TWP	00-00-54	85	--	6	W	H	--	08-15-86	30.7
2969	300WSCKA	395949	0753908	EAST BRADFORD T	--	--	--	6	W	H	--	07-22-87	31.4
2998	400FLCGG	400611	0755438	HONEYBROOK TWP	01-01-63	73	--	--	W	H	--	--	--
3026	400FLCGP	395850	0753300	EAST GOSHEN TWP	08-14-69	120	--	--	W	H	5.0	08-14-69	37.0
3048	400FMFG	395811	0755443	SADSBURY TWP	07-15-70	78	40	6	W	H	30	07-15-70	40.0
3073	000MFCGH	395323	0753500	BIRMINGHAM TWP	01-01-73	143	--	6	W	H	100	--	--
3076	377CCKS	400221	0755304	WEST CALN TWP	--	--	--	--	W	H	--	--	--
3079	377HRPR	400454	0752817	TREDYFFRIN TWP	09-01-78	182	146	6	W	H	12	07-27-87	61.2
3086	400FCIGA	400439	0753325	CHARLESTOWN TWP	03-22-78	125	55	6	W	H	23	08-07-87	38.6
3087	377CCKS	400325	0753555	CHARLESTOWN TWP	08-19-83	160	21	6	W	H	10	08-13-87	47
3088	377CCKS	400305	0753651	CHARLESTOWN TWP	06-86	280	168	6	W	H	2	07-08-90	49.5
3089	400FCIGA	400222	0754418	E BRANDYWINE TW	04-02-75	210	55	6	W	H	5	08-12-87	46.2
3090	400FCIGA	400158	0754415	E BRANDYWINE T	08-15-78	170	20	6	W	H	8	08-12-87	35.3
3092	231LCKG	400927	0753358	EAST VINCENT T	-65	400	--	--	W	H	--	-65	25
3099	231BRCK	401004	0753625	E VINCENT TWP	--	--	--	--	W	H	--	--	--
3100	231BRCK	400947	0753350	E VINCENT TWP	10-01-86	150	--	--	W	H	--	--	--
3103	231BRCK	401049	0753816	E VINCENT TWP	00-00-75	190	--	6	W	H	--	10-12-89	43.7
3105	231HMCK	401050	0754024	S COVENTRY TWP	00-00-75	265	--	6	W	H	--	--	--
3106	231SCKN	400911	0753604	EAST VINCENT TW	00-00-69	110	--	--	W	H	22.0	--	--
3107	231SCKN	401117	0754330	WARWICK TWP	--	--	--	--	W	H	--	--	--
3108	231HMCK	401253	0753952	N COVENTRY TWP	01-01-68	130	--	--	W	H	--	--	--
3111	377CCKS	400315	0753540	E WHITELAND TWP	06-28-82	146	20	6	W	H	7	08-26-87	30.3
3112	377CCKS	400508	0752919	SCHUYKILL TWP	10-01-81	263	24	6	W	H	3.5	08-28-87	70
3113	377CCKS	400507	0752907	TREDYFFRIN TWP	03-01-79	220	20	6	W	H	4	03-01-79	15
3114	377CCKS	400408	0753415	CHARLESTOWN TWP	10-01-79	248	60	6	W	H	--	08-29-87	105
3115	231BRCK	401336	0754136	N COVENTRY TWP	00-00-78	90	--	--	W	H	--	--	--
3116	231BRCK	401246	0753810	EAST COVENTRY T	--	--	--	--	W	C	--	--	--
3117	400FCIGA	400148	0754301	E BRANDYWINE T	03-01-83	100	40	6	W	H	45	--	--

Table 7. *Wells sampled for radon-222 in Chester County, Pennsylvania, 1986-96—Continued*

Local well number CH-	Aquifer code	Latitude (degrees)	Longitude (degrees)	Township or borough	Date well constructed	Depth of well (feet)	Bottom of casing (feet)	Diameter of casing (in.)	Primary use of site	Primary use of water	Discharge (gal/min)	Date water level measured	Water level (feet)
3118	300PRCK	395443	0755527	HIGHLAND TWP	12-29-81	275	122	6	W	H	4.5	--	--
3119	300PRCK	395337	0755505	W FALLOWFIELD T	01-01-81	--	--	--	W	H	--	--	--
3120	300PRCK	395251	0755815	W FALLOWFIELD T	07-30-79	300	20	6	W	H	.5	--	--
3121	231HMCK	401152	0753834	EAST COVENTRY T	01-01-63	70	--	--	W	H	--	--	--
3122	377CCKS	400206	0755336	WEST CALN TWP	09-02-87	270	56	6	W	H	18	09-04-87	37
3123	377CCKS	400227	0755229	WEST CALN TWP	--	--	--	--	W	H	--	09-02-87	66.5
3124	377CCKS	400315	0755230	WEST CALN TWP	07-01-84	185	42	6	W	H	8	09-02-87	41.3
3125	377CCKS	400224	0754327	E BRANDYWINE TW	03-05-79	103	44	6	W	H	11	09-01-87	35.9
3126	377CCKS	400213	0754240	E BRANDYWINE T	02-00-79	100	46	6	W	H	7.5	09-01-87	49.8
3127	377CCKS	400232	0754107	UWCHLAN TWP	10-01-83	81	27	6	W	H	35	--	--
3128	377CCKS	400419	0753358	CHARLESTOWN TWP	01-29-79	165	40	6	W	H	6	09-03-87	97.7
3129	300STRS	395057	0754007	KENNETT TWP	00-00-69	225	--	--	W	H	--	--	--
3131	377CCKS	400207	0755337	WEST CALN TWP	09-03-87	155	58	6	W	H	15	09-04-87	52
3132	377CCKS	400418	0753400	CHARLESTOWN TWP	03-26-79	143	21	6	W	H	5	03-26-79	58
3133	377CCKS	400217	0755343	WEST CALN TWP	01-01-87	155	98	6	W	-	--	10-21-87	9.95
3134	300STRS	395122	0755032	LONDON GROVE T	11-00-85	100	--	6	W	H	12.0	--	--
3135	400FCIGA	400358	0753503	CHARLESTOWN TWP	09-26-86	291	44	6	W	H	2	09-05-87	66.8
3136	377AMHP	400318	0753526	E WHITELAND TWP	--	200	--	--	W	H	--	--	--
3150	231SCKN	400656	0753240	CHARLESTOWN TWP	00-00-86	--	--	6	W	H	--	09-21-87	19.5
3160	377CCKS	400404	0755156	HONEYBROOK TWP	09-00-87	330	72	6	W	H	7	09-16-87	32.8
3166	377CCKS	400253	0755358	WEST CALN TWP	09-18-87	277	99	6	W	H	2.3	09-18-87	71.9
3168	377CCKS	400109	0754320	E BRANDYWINE TW	09-25-78	188	38.5	6	W	H	3	09-29-87	79.6
3184	231BRCK	400935	0753318	E PIKELAND TWP	--	--	--	6	W	H	--	10-08-87	52.5
3189	377CCKS	400236	0755440	WEST CALN TWP	10-00-87	220	60	6	W	H	--	--	--
3210	300CCKV	395035	0754223	KENNETT SQUARE	10-25-76	101	38	8	W	N	200	09-01-87	22
3214	377CCKS	400037	0755502	WEST CALN TWP	10-00-79	70	42	6	W	-	30	10-22-87	36.8
3215	377CCKS	400332	0753615	CHARLESTOWN TWP	--	109	--	--	W	H	--	--	--
3219	377CCKS	400243	0755343	WEST CALN TWP	10-09-87	335	60	6	W	H	4	06-16-88	66
3272	231BRCK	401107	0753559	S COVENTRY TWP	--	--	--	6	W	H	--	12-07-87	27.4
3301	400FMFG	395914	0755538	SADSBURY TWP	--	175	--	6	W	H	--	06-16-88	40.2
3310	300WSCKO	394947	0754203	KENNETT TWP	--	63	--	--	W	H	--	--	--
3315	377CCKS	400238	0755356	WEST CALN TWP	07-29-88	225	26	6	W	H	3	09-01-88	44.9
3316	300WSCKO	395154	0755509	W FALLOWFIELD T	--	--	--	--	W	S	--	--	--
3325	377CCKS	395920	0755755	W SADSBURY TWP	--	--	--	--	W	H	--	08-16-88	46.2
3326	377CCKS	400005	0755415	WEST CALN TWP	00-00-87	200	74	6	W	H	4	08-16-88	47.5
3327	377CCKS	400212	0755411	WEST CALN TWP	12-00-77	195	21	6	W	P	3	08-26-88	80.5
3328	377CCKS	400105	0755348	WEST CALN TWP	00-00-80	--	--	6	W	H	--	--	--
3329	377CCKS	400251	0755312	WEST CALN TWP	11-00-85	175	34.1	6	W	H	8.0	08-22-88	31.0
3330	377CCKS	400010	0755650	W SADSBURY TWP	00-00-65	87	35	6	W	H	40	00-00-87	15
3331	377CCKS	400507	0752924	SCHUYLKILL TWP	00-00-57	120	--	--	W	H	--	--	--
3332	377AMHP	400125	0755602	WEST CALN TWP	--	--	--	--	W	H	--	08-30-88	53.4
3333	377CCKS	400457	0753002	TREDYFFRIN TWP	00-00-60	--	--	--	W	H	--	--	--

Table 7. *Wells sampled for radon-222 in Chester County, Pennsylvania, 1986-96—Continued*

Local well number CH-	Aquifer code	Latitude (degrees)	Longitude (degrees)	Township or borough	Date well constructed	Depth of well (feet)	Bottom of casing (feet)	Diameter of casing (in.)	Primary use of site	Primary use of water	Discharge (gal/ min)	Date water level measured	Water level (feet)
3334	377CCKS	400510	0752925	SCHUYLKILL TWP	10-00-83	243	121	6	W	H	20	09-06-88	68.3
3335	377CCKS	400332	0753618	CHARLESTOWN TWP	09-27-82	150	20	6	W	H	20	09-06-88	33.8
3336	400BMFGA	400454	0753046	CHARLESTOWN TWP	11-00-86	280	84	6	W	H	8	09-06-88	46.6
3337	377CCKS	400232	0755257	WEST CALN TWP	10-15-86	120	78	6	W	H	8	09-08-88	28.6
3338	377CCKS	400421	0753400	CHARLESTOWN TWP	--	143	42	6	W	H	6	09-08-88	45.5
3339	377CCKS	400348	0753515	CHARLESTOWN TWP	05-09-86	220	98	6	W	H	9	09-09-88	69.9
3355	377CCKS	400519	0752917	SCHUYLKILL TWP	00-00-55	450	--	--	W	H	--	06-01-89	190
3356	300WSCKO	395313	0754517	E MARLBOROUGH T	05-00-85	280	60	6	W	H	15	06-02-89	81.3
3357	231SCKN	400812	0753417	E PIKELAND TWP	--	300	--	6	W	H	--	06-12-89	30.9
3358	400FMFG	395902	0755122	VALLEY TWP	00-00-41	30	30	--	W	H	--	--	--
3359	231SCKN	400822	0753421	E PIKELAND TWP	03-01-60	94	--	--	W	H	--	--	--
3360	377CCKS	400517	0752916	SCHUYLKILL TWP	06-01-81	245	--	--	W	H	--	07-03-89	61.3
3361	400MFCGH	395629	0753427	WESTTOWN TWP	00-00-64	--	--	--	W	H	--	--	--
3362	377LDGR	400220	0753647	W WHITELAND TWP	--	52	42	--	W	H	--	--	--
3363	377LDGR	400156	0753629	W WHITELAND TWP	--	--	--	--	W	H	--	--	--
3364	367CNSG	395807	0755144	VALLEY TWP	00-00-39	--	--	--	W	H	--	07-25-89	5.50
3365	377CCKS	400237	0755406	WEST CALN TWP	04-01-89	255	80	--	W	H	5.0	08-01-89	14.1
3382	400FLCGH	395202	0754108	E MARLBOROUGH T	08-16-85	140	39	6	W	H	35	06-26-89	23.0
3383	300WSCKO	395254	0754340	E MARLBOROUGH T	03-85	200	50	6	W	H	4.0	06-27-89	5.5
3384	400FLCGH	395201	0754216	E MARLBOROUGH T	00-00-78	80	--	--	W	H	--	06-28-89	11.9
3392	300WSCKO	395255	0754234	E MARLBOROUGH T	03-23-89	412	--	--	W	H	12	06-29-89	27.9
3396	400FLCGH	395143	0754245	E MARLBOROUGH T	06-29-78	240	78	6	W	H	6	06-30-89	55.0
3398	400FLCGH	395157	0754059	E MARLBOROUGH T	09-00-83	200	40	6	W	H	8	07-03-89	29.3
3405	000MFCGH	395041	0753858	KENNETT TWP	10-00-78	135	24	6	W	H	5	07-10-89	31.8
3426	300WSCKO	395022	0754103	KENNETT TWP	11-00-88	125	105	6	W	H	50	07-17-89	16.0
3430	400FLCGH	395123	0754002	KENNETT TWP	08-17-88	575	55	6	W	H	5	07-18-89	41.7
3432	300WSCKO	395008	0754037	KENNETT TWP	09-23-66	115	30.5	6.6	W	H	17	07-18-89	50.1
3434	300WSCKO	395004	0753956	KENNETT TWP	00-00-72	125	--	--	W	H	25	07-18-89	14.8
3441	300WSCKO	394853	0754340	NEW GARDEN TWP	11-00-88	120	60	6	W	H	14	07-20-89	25.8
3444	000MFCGH	395033	0753936	KENNETT TWP	00-00-75	--	--	--	W	H	--	07-20-89	19.4
3445	300WSCKO	394833	0754401	NEW GARDEN TWP	02-00-88	225	100	6	W	H	10	07-21-89	25.9
3447	300WSCKO	394939	0754000	KENNETT TWP	06-00-87	510	70	6	W	H	6.0	07-21-89	60.7
3448	300WSCKO	394900	0754406	NEW GARDEN TWP	11-20-78	300	26	6	W	H	--	07-21-89	17.1
3458	000MFCGH	394952	0754152	KENNETT TWP	10-00-87	180	57	6	W	H	20.0	08-01-89	4.10
3467	400FLCGH	395135	0754131	E MARLBOROUGH T	00-00-68	57	48	--	W	H	--	--	--
3468	000MFCGH	394948	0754213	KENNETT TWP	00-00-28	60	--	--	W	H	--	--	--
3469	300WSCKO	394942	0754414	NEW GARDEN TWP	00-00-59	104	--	--	W	H	2.0	--	--
3470	300WSCKO	394947	0754342	NEW GARDEN TWP	01-00-62	68	--	--	W	H	--	--	--
3471	300STRS	395049	0754034	KENNETT TWP	00-00-52	--	--	--	W	H	--	--	--
3472	300WSCKO	394757	0754333	NEW GARDEN TWP	03-00-27	155	--	4	W	I	4	--	--
3473	300STRS	395053	0753958	KENNETT TWP	06-00-72	180	85	6	W	H	2.0	08-23-89	-.45
3474	300CCKV	395008	0754441	NEW GARDEN TWP	00-00-69	70	--	--	W	H	75	08-24-89	7.35

Table 7. *Wells sampled for radon-222 in Chester County, Pennsylvania, 1986-96—Continued*

Local well number CH-	Aquifer code	Latitude (degrees)	Longitude (degrees)	Township or borough	Date well constructed	Depth of well (feet)	Bottom of casing (feet)	Diameter of casing (in.)	Primary use of site	Primary use of water	Discharge (gal/min)	Date water level measured	Water level (feet)
3478	300WSCKO	394927	0754304	KENNETT TWP	00-00-70	--	--	6	W	H	--	08-03-89	9.96
3482	400FLCGH	395115	0754411	E MARLBOROUGH T	05-10-76	195	40	6	W	H	6.0	08-04-89	19.5
3484	400FLCGH	395054	0754506	NEW GARDEN TWP	11-00-87	100	35	6	W	H	30	08-04-89	14.1
3485	300WSCKO	394927	0754429	NEW GARDEN TWP	08-00-78	154	53	6	W	H	10	08-07-89	18.0
3487	400FLCGH	395121	0753940	KENNETT TWP	10-00-86	305	54	6	W	H	8.0	07-25-89	23.5
3488	300WSCKO	394956	0754439	NEW GARDEN TWP	05-00-87	126	60	6	W	H	25	08-07-89	8.33
3495	400FLCGP	395215	0754533	W MARLBOROUGH T	05-01-76	116	80	6	W	H	22	08-07-89	19.7
3504	300WSCKO	395406	0754418	E MARLBOROUGH T	12-14-88	250	80	6	W	H	30	08-08-89	25.1
3506	300WSCKO	395318	0754527	E MARLBOROUGH T	05-00-85	285	53	6	W	H	5.0	08-10-89	22.1
3513	300WSCKO	394832	0754447	NEW GARDEN TWP	03-08-77	76	36	5.6	W	H	7.0	08-23-89	7.0
3516	300CCKV	395131	0754544	W MARLBOROUGH T	02-15-66	150	27	6	W	H	12	08-16-89	17.3
3532	400FLCGH	395037	0754514	NEW GARDEN TWP	00-00-89	450	80	4	W	C	80	09-05-89	3.28
3533	300STRS	395020	0754508	NEW GARDEN TWP	00-00-58	68	--	--	W	H	--	09-05-89	7.06
3539	300WSCKO	395005	0754228	KENNETT TWP	--	--	--	5.5	W	H	--	08-30-89	22.9
3540	400FLCGP	395650	0753526	WEST GOSHEN TWP	00-00-65	90	--	5.5	W	H	21.5	08-30-89	5.19
3543	400FLCGH	395141	0754320	E MARLBOROUGH T	09-10-86	75	45	6	W	H	30	09-05-89	7.70
3551	377CCKS	400228	0753544	W WHITELAND TWP	--	--	--	--	W	H	--	--	--
3558	300WSCKO	394902	0754125	KENNETT TWP	09-10-82	401	55	6	W	H	1.0	08-11-89	76.0
3561	300WSCKO	395058	0753837	KENNETT TWP	00-00-51	53	--	6	W	H	--	09-25-89	15.7
3573	300WSCKO	394804	0754232	KENNETT TWP	00-00-49	140	--	--	W	H	5.5	09-12-89	34.2
3580	300WSCKO	394912	0754005	KENNETT TWP	05-00-83	144	70	6	W	H	120	09-27-89	6.91
3613	231HMCK	401250	0754059	N COVENTRY TWP	04-00-89	147	101	6.25	W	H	60	11-22-89	41.4
3624	300WSCKO	395200	0755026	LONDON GROVE T	05-13-86	33	3	6	O	U	--	11-29-89	9.41
3625	300WSCKO	395147	0755034	LONDON GROVE T	12-26-84	70	--	6	O	U	--	11-28-89	33.4
3627	300WSCKO	395154	0755057	LONDON GROVE T	12-13-77	130	--	6	O	U	--	11-27-89	28.0
3640	231BRCK	401316	0754210	N COVENTRY TWP	10-00-86	155	60	6.25	W	H	20	12-10-89	37.0
3655	231BRCK	401302	0754315	N COVENTRY TWP	--	174	--	--	W	H	--	12-18-89	80.1
3657	231HMCK	401236	0754331	N COVENTRY TWP	08-07-78	94	53	6	W	H	15	12-18-89	23.8
3673	231HMCK	401342	0754318	N COVENTRY TWP	07-29-75	160	68	6	W	C	30	12-24-89	63.7
3719	377CCKS	400214	0753912	W WHITELAND TWP	--	--	--	--	W	H	--	--	--
3758	231HMCK	401058	0753835	S COVENTRY TWP	--	--	--	--	W	H	--	02-11-90	103
3837	231BRCK	401408	0754001	N COVENTRY TWP	00-00-20	60	--	--	W	H	--	03-13-90	18.6
3838	231BRCK	401411	0754213	N COVENTRY TWP	00-00-75	--	--	--	W	H	--	01-16-90	18.3
3841	231BRCK	401406	0753922	N COVENTRY TWP	00-00-90	--	--	--	W	H	--	03-15-90	28.0
3859	367CNSG	400214	0753343	E WHITELAND TWP	--	--	--	--	W	Z	--	11-09-83	24.6
3867	400GPCGA	400557	0754013	W VINCENT TWP	07-00-83	120	73	6	W	H	30	05-23-90	38.4
3873	400FLCGG	400753	0754019	W VINCENT TWP	00-00-58	202	--	6	W	H	4	05-24-90	16.9
3900	400FLCGG	400826	0753912	W VINCENT TWP	07-00-86	197	42.1	6	W	H	5	06-11-90	34.9
3926	377LDGR	400233	0753556	W WHITELAND TWP	11-00-87	50	10	.5	O	U	3	05-30-90	9.71
3932	300WSCKO	395156	0755102	LONDONDERRY TWP	--	--	--	--	W	N	--	--	--
3936	400FCIGA	400551	0753512	W PIKELAND TWP	07-00-84	97	31.8	6	W	H	12	07-20-90	40.1
3941	400FCIGA	400452	0753424	CHARLESTOWN	02-00-87	337	44.3	6	W	H	15	--	--

Table 7. *Wells sampled for radon-222 in Chester County, Pennsylvania, 1986-96—Continued*

Local well number CH-	Aquifer code	Latitude (degrees)	Longitude (degrees)	Township or borough	Date well constructed	Depth of well (feet)	Bottom of casing (feet)	Diameter of casing (in.)	Primary use of site	Primary use of water	Discharge (gal/min)	Date water level measured	Water level (feet)
3944	400FCIGA	400424	0753524	CHARLESTOWN TWP	10-00-78	223	47	6	W	H	2.5	07-28-90	56.0
3953	400FCIGA	400609	0753139	CHARLESTOWN TWP	00-00-73	400	40	6	W	H	9	07-31-90	37.8
3970	400FCIGA	400503	0753138	CHARLESTOWN TWP	00-00-48	275	150	8	W	H	--	08-17-90	43.6
3982	400FCIGA	400559	0753157	CHARLESTOWN TWP	08-00-86	205	67	6	W	H	9	08-25-90	46.0
4004	300WSCKO	395312	0754313	E MARLBOROUGH T	--	365	--	--	W	T	--	--	--
4005	300WSCKO	394832	0754357	NEW GARDEN TWP	00-00-85	250	--	--	W	I	--	--	--
4006	300PRCK	395340	0755525	W FALLOWFIELD T	--	--	--	--	W	H	--	08-21-90	36.9
4007	300STRS	395013	0754643	NEW GARDEN TWP	10-04-47	--	--	6.25	W	H	--	--	--
4008	400FLCGP	395220	0754733	W MARLBOROUGH T	--	--	--	--	W	H	--	--	--
4009	300PRCK	395334	0755519	W FALLOWFIELD T	10-00-67	--	--	--	W	H	--	08-24-90	21.8
4010	000ANRS	400527	0754710	WALLACE TWP	12-16-83	75	36	6	W	H	50	08-30-90	22.7
4022	000ANRS	400454	0755116	HONEYBROOK TWP	09-00-79	120	60	6	W	H	15	08-31-90	2.05
4023	300WSCKO	395108	0753829	KENNETT TWP	06-00-54	125	--	--	W	H	--	--	--
4024	400FLCGH	395200	0754056	E MARLBOROUGH T	09-00-75	90	--	6	W	H	5	09-04-90	17.0
4025	000ANRS	400516	0755103	HONEYBROOK TWP	10-00-81	120	61	6	W	H	100	09-05-90	6.53
4026	300CCKV	394617	0754449	NEW GARDEN TWP	00-00-85	90	--	6	W	H	--	09-07-90	10.1
4027	400GPCGA	400448	0753710	W. PIKELAND TWP	00-00-86	410	--	6	W	H	9	09-16-90	23.5
4075	400GPCGA	400757	0753618	W VINCENT TWP	00-00-84	197	42.2	6	W	H	18	09-30-90	43.4
4118	300WSCK	394638	0755636	E NOTTINGHAM T	05-00-84	160	63	6	W	H	20	07-08-91	44.1
4119	300PRCK	394854	0760107	L OXFORD TWP	02-20-51	81	39	6	W	H	15	--	--
4120	000SRPN	394338	0760239	NOTTINGHAM TWP	00-00-73	140	--	--	W	H	--	--	--
4121	300WSCKO	394913	0754631	NEW GARDEN TWP	00-00-45	90	--	6	W	H	--	07-16-91	10.1
4122	300WSCKO	394814	0754643	NEW GARDEN TWP	--	140	--	--	W	I	--	--	--
4123	400FLCGP	395559	0753953	E BRADFORD TWP	00-00-70	110	--	6	W	H	6	--	--
4124	400GPCGA	400503	0753859	W PIKELAND TWP	00-00-40	--	--	--	W	H	--	--	--
4125	300WSCKO	395106	0753828	KENNETT TWP	--	--	--	--	W	H	--	08-07-91	32.4
4126	300WSCKO	394752	0755828	L OXFORD TWP	00-00-37	118	--	--	W	H	--	--	--
4127	300PRCK	395319	0755521	W FALLOWFIELD T	--	--	--	--	W	H	--	--	--
4128	300PRCK	395333	0755519	W FALLOWFIELD T	00-00-46	--	--	--	W	H	--	--	--
4129	367CNSG	400026	0754009	EAST CALN TWP	00-00-61	54	--	6	W	H	--	09-09-91	11.1
4133	300WSCKO	394858	0754823	LONDON GROVE T	10-21-77	235	67	8	W	I	412	11-29-77	42.0
4137	377AMHP	400205	0755542	WEST CALN TWP	00-00-91	69	--	6	W	H	--	05-20-91	43.7
4138	377AMHP	400308	0755540	HONEY BROOK TWP	00-00-91	--	--	6	W	H	--	05-23-91	20.7
4142	377AMHP	400142	0755441	WEST CALN TWP	01-24-90	200	40	6	W	H	10	05-21-91	56.0
4143	377AMHP	400059	0755517	WEST CALN TWP	00-00-91	126	70	6	W	H	6.0	05-21-91	66.8
4148	300PRCK	395909	0753847	E BRADFORD TWP	--	--	--	--	W	H	--	--	--
4261	400FCIGA	400111	0754918	W BRANDYWINE T	06-28-78	100	80	6	W	H	80	05-30-92	31.1
4270	300PRCK	395332	0755521	W FALLOWFIELD T	12-30-91	150	66	6	W	H	10	08-07-92	28.9
4271	000SRPN	395423	0754311	NEWLIN TWP	07-00-89	342	60	6	W	H	8.0	08-20-92	70.0
4272	300PRCK	394523	0760443	W NOTTINGHAM T	00-00-42	37	--	6	W	H	--	--	--
4273	300PRCK	394438	0760356	W NOTTINGHAM T	12-09-81	185	49	6	W	H	8	09-09-92	34.5
4274	300PRCK	394439	0760356	W NOTTINGHAM T	10-16-81	305	61	6	W	H	2.5	09-09-92	45.7

Table 7. *Wells sampled for radon-222 in Chester County, Pennsylvania, 1986-96—Continued*

Local well number CH-	Aquifer code	Latitude (degrees)	Longitude (degrees)	Township or borough	Date well constructed	Depth of well (feet)	Bottom of casing (feet)	Diameter of casing (in.)	Primary use of site	Primary use of water	Discharge (gal/min)	Date water level measured	Water level (feet)
4275	300WSCKO	394656	0755518	E NOTTINGHAM T	11-00-90	--	--	6	W	H	--	09-09-92	13.8
4276	231BRCK	401220	0753937	N COVENTRY TWP	00-00-40	--	--	--	W	C	--	--	--
4277	231HMCK	401254	0753949	N COVENTRY TWP	--	--	--	--	W	H	--	--	--
4278	231HMCK	401244	0753906	N COVENTRY TWP	--	--	80	6	W	H	--	--	--
4291	000PGMT	395137	0754928	LONDON GROVE T	07-00-61	134	30	--	W	H	5	--	--
4292	367CNSG	400106	0753815	W WHITELAND TWP	00-00-85	152	--	6	W	H	--	09-28-92	27.4
4293	377LDGR	400113	0753827	W WHITELAND TWP	--	--	--	--	W	H	--	--	--
4294	300WSCKO	394857	0755042	LONDON GROVE T	10-00-84	210	65	6	W	H	13	09-29-92	23.5
4295	300WSCKO	394913	0755023	LONDON GROVE T	06-00-48	121	25	--	W	H	90	09-29-92	18.0
4296	300WSCKO	394647	0754849	FRANKLIN TWP	--	--	--	--	W	H	--	10-28-92	24.9
4297	300WSCKO	394752	0755822	L OXFORD TWP	08-00-84	165	101	6	W	H	30	10-01-92	19.8
4298	400GPCGA	400458	0753857	W PIKELAND TWP	11-06-85	165	159	6	W	H	100	10-07-92	20.3
4299	000MFCGH	394659	0754504	NEW GARDEN TWP	08-00-86	266	63	6	W	H	50	12-09-92	20.5
4339	400FCIGA	400238	0754659	E BRANDYWINE T	04-22-80	120	20	6	W	H	1	07-23-93	28.5
4341	300WSCKO	394726	0755055	NEW LONDON TWP	05-00-87	140	--	6	W	H	35	12-17-92	40.4
4342	300WSCKO	395038	0755136	PENN TWP	05-00-91	260	86	6	W	H	10	12-22-92	44.0
4343	300WSCKO	395330	0754344	E MARLBOROUGH T	10-22-76	160	85	6	W	H	4	12-30-92	55.5
4344	300CCKV	395231	0754201	E MARLBOROUGH T	10-18-63	95	54.5	6	W	H	142	03-31-93	--
4345	300WSCKO	394842	0754238	KENNETT TWP	06-12-76	100	24	6	W	H	15	08-19-93	27.0
4361	300WSCKO	394917	0754228	KENNETT TWP	04-00-88	222	75	6	W	H	8	08-26-93	20.3
4362	300WSCKO	395003	0753838	KENNETT TWP	00-00-59	154	--	--	W	H	--	--	--
4409	231SCKN	401001	0753957	S COVENTRY TWP	--	65.7	--	--	W	H	--	07-20-93	9.28
4410	300WSCKO	395307	0754343	E MARLBOROUGH T	10-26-84	280	80	6	W	H	10	07-21-93	29.7
4411	300PRCK	395655	0754400	W BRADFORD TWP	--	105	--	--	W	H	--	07-21-93	11.1
4412	400FLCGH	395158	0754318	E MARLBOROUGH T	06-27-83	68	34	6	W	H	25	07-28-93	17.5
4414	300WSCKO	395316	0754408	E MARLBOROUGH T	02-15-67	157	--	6	W	H	15	08-04-93	43.0
4415	400FLCGH	395129	0754159	E MARLBOROUGH T	20-00-87	305	70	6	W	H	1	08-05-93	52.4
4416	300WSCKO	394919	0754336	NEW GARDEN TWP	03-00-91	242	84	6	W	H	5	08-18-93	49.6
4417	300STRS	395100	0754048	KENNETT TWP	02-00-92	123	60	6	W	H	25	08-24-93	21.2
4418	400FLCGH	395130	0754140	E MARLBOROUGH T	03-00-90	342	120	6	W	H	12	08-25-93	5.37
4441	400GPCGA	400359	0754130	U UWCHLAN TWP	00-00--76	--	--	6	W	H	--	06-01-94	5.27
4491	231BRCK	401338	0753602	E COVENTRY TWP	00-00--73	120	--	6	W	H	--	07-22-93	59.4
4493	231BRCK	401353	0753618	E COVENTRY TWP	00-00--76	155	--	6	W	H	--	07-27-93	71.5
4495	300WSCKO	394516	0760046	E NOTTINGHAM T	--	--	--	--	W	C	--	--	--
4496	231BRCK	401033	0753534	E VINCENT TWP	00-00--88	120	--	6	W	H	--	08-12-93	9.80
4497	231SCKN	400749	0753238	SCHUYLKILL TWP	--	--	--	--	W	H	--	--	--
4498	231SCKN	400713	0752803	SCHUYLKILL TWP	--	--	--	--	W	C	--	--	--
4499	377LDGR	400104	0753835	W WHITELAND TWP	--	--	--	--	W	C	--	--	--
4500	300WSCKO	394648	0760017	E NOTTINGHAM T	--	103	--	--	W	H	--	08-19-93	22.9
4501	300WSCKO	394756	0755816	L OXFORD TWP	--	--	--	--	W	H	--	--	--
4502	231BRCK	401243	0753514	E COVENTRY TWP	--	--	--	--	W	H	--	--	--
4539	400FCIGA	400229	0754656	E BRANDYWINE T	--	--	--	6	W	H	--	07-27-93	17.2

Table 7. Wells sampled for radon-222 in Chester County, Pennsylvania, 1986-96—Continued

Local well number CH-	Aquifer code	Latitude (degrees)	Longitude (degrees)	Township or borough	Date well constructed	Depth of well (feet)	Bottom of casing (feet)	Diameter of casing (in.)	Primary use of site	Primary use of water	Discharge (gal/ min)	Date water level measured	Water level (feet)
4546	367CNSG	395702	0755712	W SADSBURY TWP	00-00--78	109	--	6	W	H	--	08-23-93	18.0
4547	000GRGS	395940	0755412	WEST CALN TWP	00-00--63	65	--	--	W	H	--	--	--
4548	300CCKV	394922	0755003	WEST GROVE BORO	--	89	--	--	W	P	--	08-24-93	52
4549	000MFCGH	394802	0754615	NEW GARDEN TWP	--	60	--	--	W	P	--	--	--
4550	231SCKN	400652	0752819	SCHUYLKILL TWP	--	150	--	--	W	U	78	08-26-93	17
4551	300CCKV	394925	0754632	AVONDALE BORO	--	100	--	--	W	C	--	--	--
4552	300CCKV	395024	0754317	KENNETT TWP	--	80	--	--	W	C	200	--	--
4553	300PRCK	395614	0754357	NEWLIN TWP	--	75.5	--	--	W	H	--	09-07-93	19.4
4578	400FMFG	395904	0755316	SADSBURY TWP	12-00-84	80	50	6	W	H	6	08-04-93	14.5
4601	377ANTM	400032	0755704	W SADSBURY TWP	--	120	--	6	W	H	--	08-10-93	54.8
4602	300PRCK	395740	0754204	W BRADFORD TWP	03-19-66	115	26	6	W	H	17	--	--
4604	400BMFGA	395947	0755728	W SADSBURY TWP	12-18-84	300	58	6	W	H	1.5	08-10-93	77.1
4693	400FMFG	395845	0755711	W SADSBURY TWP	10-00-79	250	25	6	W	H	2	08-23-93	72.3
4727	300WSCKO	394906	0754214	KENNETT TWP	02-23-80	140	35	6	W	H	20	08-31-93	34.0
4728	300CCKV	395230	0754150	E MARLBOROUGH T	10-00-87	355	62	6	W	H	12	09-01-93	6.82
4729	300CCKV	395223	0754235	E MARLBOROUGH T	01-00-74	95	--	--	W	H	--	--	--
4730	300STRS	395048	0754136	KENNETT TWP	11-00-88	160	61	6	W	I	30	09-07-93	11.8
4731	300STRS	395234	0754252	E MARLBOROUGH T	--	--	--	--	W	H	--	--	--
4740	400BMFGA	400146	0755227	WEST CALN TWP	02-00-93	318	--	6	W	H	--	11-07-93	9.97
4766	400FLCGA	400103	0754846	W BRANDYWINE TWP	10-00-87	280	--	--	W	H	8	01-15-93	20.8
4767	377AMHP	400123	0755444	WEST CALN TWP	00-00-92	230	40	--	W	H	--	--	--
4768	231LCKG	400918	0753032	SCHUYLKILL TWP	--	--	--	--	W	H	--	08-14-95	39.4
4769	231BRCK	401107	0753432	E VINCENT TWP	06-30-94	237	60	6.25	W	-	--	08-16-95	60.0
4770	400GPCGA	400409	0753843	UWCHLAN TWP	--	--	--	--	W	-	--	--	--
4771	377CCKS	400122	0755432	WEST CALN TWP	08-16-94	210	63	--	W	H	20	08-22-95	71.3
4772	300WSCKA	400045	0753813	W WHITELAND TWP	--	--	--	--	W	H	--	08-23-95	26.5
4773	400FCIGA	400237	0754354	E BRANDYWINE T	00-00-84	--	--	--	W	H	--	08-29-95	27.7
4774	400FCIGA	400308	0754051	UWCHLAN TWP	00-00-63	67	--	--	W	H	--	--	--
4775	400FLCGA	401015	0754734	WARWICK TWP	11-28-61	60	--	--	W	H	30	--	--
4776	400GPCGA	400337	0754452	E BRANDYWINE	--	--	--	--	W	H	--	--	--
4777	400GPCGG	400811	0754948	W NANTMEAL TWP	10-00-93	--	--	--	W	H	--	08-31-95	21.5
4778	400FCIGA	400016	0754732	CALN TWP	--	--	--	--	W	H	--	09-06-95	40.2
4779	400FMFG	395902	0755138	VALLEY TWP	--	24	--	--	W	-	--	--	--
4780	400FLCGA	400146	0754837	W BRANDYWINE T	12-00- 89	135	--	--	W	H	--	--	--
4781	000ANRS	400533	0754850	W NANTMEAL TWP	--	60	--	--	W	-	--	09-07-95	6.71
4782	400FLCGG	400702	0755106	HONEYBROOK TWP	02-00-86	155	--	--	W	H	20	09-20-95	36.0
4801	231BRCK	401228	0753532	E COVENTRY TWP	11-00-71	120	46	6	W	N	100	06-01-94	14.4
4802	377KZRS	400055	0754218	CALN TWP	00-00-72	250	--	6	W	C	--	06-08-94	12.4
4803	231BRCK	401017	0753529	E VINCENT TWP	--	108	--	--	W	H	--	--	--
4804	377LDGR	400327	0753148	E WHITELAND TWP	11-14-57	82	23.5	--	W	H	5	--	--
4805	371ELBK	400241	0753321	E WHITELAND TWP	09-09-49	210	--	--	--	H	--	--	--
4806	300WSCKO	394750	0755829	L OXFORD TWP	-	-37	--	--	6	H	--	--	--

Table 7. *Wells sampled for radon-222 in Chester County, Pennsylvania, 1986-96—Continued*

Local well number CH-	Aquifer code	Latitude (degrees)	Longitude (degrees)	Township or borough	Date well constructed	Depth of well (feet)	Bottom of casing (feet)	Diameter of casing (in.)	Primary use of site	Primary use of water	Discharge (gal/min)	Date water level measured	Water level (feet)
4807	300WSCKO	394812	0754429	NEW GARDEN TWP	--	--	--	--	W	N	--	07-05-94	8.43
4808	000MFCGH	394758	0754504	NEW GARDEN TWP	--	--	--	--	W	H	--	07-06-94	33.4
4809	300STRS	395044	0754356	NEW GARDEN TWP	--	--	--	--	W	H	--	07-12-94	41.6
4815	400GPCGA	400447	0754312	U UWCHLAN TWP	00-00-51	90	--	6	W	H	--	06-03-94	36.8
4934	300PRCK	395335	0755635	W FALLOWFIELD	02-05-91	135	73.4	5	W	H	3.33	12-23-93	9.5
4931	300WSCKO	394426	0755335	ELK TWP	11-00-92	132	59	6	W	H	5.28	12-15-93	25.9
4932	300WSCKO	394606	0760020	NOTTINGHAM	09-08-81	143	52	6	W	H	6.19	12-14-93	43.2
4933	300WSCKO	394759	0755603	LOWER OXFORD	00-00-76	157	87	5	W	H	6.92	11-24-93	34.3
5065	300WSCKO	395554	0754247	NEWLIN TWP	--	--	--	6	W	H	--	08-19-94	68.9
5087	400BMFGA	400202	0755040	WEST CALN TWP	04-22-82	96	46	6	W	H	90	08-17-94	13.5
5088	400BMFGA	400152	0755127	WEST CALN TWP	00-00-55	--	--	--	W	H	--	--	--
5089	400BMFGA	400151	0755126	WEST CALN TWP	00-00-60	51	--	5	W	H	--	08-17-94	15.0
5090	300PRCK	395712	0754409	W BRADFORD TWP	--	--	--	--	W	H	--	09-07-94	62.3
5091	377AMHP	400106	0755523	WEST CALN TWP	00-00-48	98	--	6	W	H	--	09-08-94	42.4
5170	400FLCGG	400708	0754408	E NANTMEAL TWP	03-00-90	180	40	6	E	A	15	04-06-95	35.1
5220	300PRCK	395709	0754416	W BRADFORD TWP	--	--	--	6	W	H	--	07-31-95	58.3
5221	400FLCGH	395105	0754121	KENNETT TWP	--	80	--	--	W	H	--	--	--
5222	300CCKV	395017	0754427	NEW GARDEN TWP	--	--	--	--	W	I	--	--	--
5223	300WSCKO	394918	0754508	NEW GARDEN TWP	--	--	--	6	W	I	--	08-07-95	20.4
5225	000SRPN	394427	0760221	NOTTINGHAM TWP	--	284	--	--	W	C	--	--	--
5226	000SRPN	394347	0760311	NOTTINGHAM TWP	01-00-90	180	--	6	W	H	17	--	--
5227	300WSCKA	395924	0754056	E BRADFORD TWP	--	--	--	--	W	H	--	--	--
5228	300WSCKO	395345	0754132	POCOPSON TWP	11-00-94	275	85	6	W	H	25	08-10-95	35.4
5229	300WSCKO	394942	0754200	KENNETT TWP	00-00-81	160	--	6	W	H	6	08-10-95	44.6
5230	300PRCK	395207	0755755	W FALLOWFIELD T	11-00-83	145	59	6	W	H	25	08-14-95	66.7
5231	300WSCKO	395010	0755544	U OXFORD TWP	--	100	70	6	W	H	--	08-14-95	30.5
5232	300WSCKA	400140	0753223	WILLISTOWN TWP	00-00-62	97	--	8	W	H	--	08-15-95	41.8
5234	300WSCKA	395805	0754730	E FALLOWFIELD T	07-00-89	260	36	6	W	H	2	08-23-95	36.3
5235	300PRCK	395657	0754852	E FALLOWFIELD T	00-00-88	132	--	6	W	H	--	08-24-95	52.0
5236	400FLCGP	395656	0753848	E BRADFORD TWP	00-00-60	132	34	6	W	H	55	--	--
5237	300WSCKA	395759	0754342	W BRADFORD TWP	--	--	--	--	W	H	--	--	--
5238	400FCIGA	400227	0754637	E BRANDYWINE T	08-20-79	170	--	--	W	H	--	09-28-95	42.4
5239	000ANRS	400621	0754734	WALLACE TWP	--	--	--	--	W	H	--	09-29-95	13.2
5240	400FLCGG	400833	0754814	W NANTMEAL TWP	--	--	--	--	W	H	--	--	--
5245	300PRCK	395607	0754644	NEWLIN TWP	--	--	--	--	W	H	--	08-28-95	32.7
5246	300WSCKA	395524	0755726	W FALLOWFIELD T	00-00-73	250	--	--	W	H	3	08-29-95	20.9
5247	300PRCK	395442	0755739	W FALLOWFIELD T	00-00-72	206	--	--	W	H	--	08-29-95	132
5248	300PRCK	394751	0760127	L OXFORD TWP	--	52	--	--	W	H	--	--	--
5249	000PGMT	394800	0754318	NEW GARDEN TWP	07-20-60	123	65	6	W	H	20	--	--
5250	000PGMT	395535	0754425	NEWLIN TWP	05-00-83	125	44	6	W	H	15	08-31-95	45.6
5251	300WSCKO	395426	0753605	BIRMINGHAM TWP	10-00-083	145	--	6	W	H	--	09-01-95	29.0
5252	400FLCGP	400000	0753238	EAST GOSHEN TWP	00-00-62	130	--	--	W	H	--	--	--

Table 7. Wells sampled for radon-222 in Chester County, Pennsylvania, 1986-96—Continued

Local well number CH-	Aquifer code	Latitude (degrees)	Longitude (degrees)	Township or borough	Date well constructed	Depth of well (feet)	Bottom of casing (feet)	Diameter of casing (in.)	Primary use of site	Primary use of water	Discharge (gal/min)	Date water level measured	Water level (feet)
5253	400FLCGP	395918	0752853	WILLISTOWN TWP	--	--	--	--	W	H	--	--	--
5254	400FLCGH	395833	0752840	WILLISTOWN TWP	--	--	--	--	W	H	--	--	--
5255	400FLCGH	395556	0753251	THORNBURY TWP	--	--	--	--	W	H	--	--	--
5256	400FMFG	395825	0755823	W SADSBURY TWP	08-15-92	200	36	6	W	S	--	09-06-95	32.6
5257	400FLCGP	400110	0752835	WILLISTOWN TWP	--	--	--	--	W	H	--	--	--
5258	400MFCGP	400056	0752916	WILLISTOWN TWP	00-00-86	400	--	6	W	H	1	09-19-95	124
5259	400FLCGH	395610	0753343	WESTTOWN TWP	00-00-63	--	--	6	W	H	--	09-20-95	10.3
5260	400FLCGH	395612	0753347	WESTTOWN TWP	--	--	--	--	W	H	--	--	--
5261	400FLCGH	395614	0753357	WESTTOWN TWP	--	--	--	--	W	H	--	09-26-95	35.4
5262	300WSCKA	400348	0752532	TREDYFFRIN TWP	--	75	--	--	W	H	--	09-27-95	25.7
5263	300WSCKA	400301	0752759	TREDYFFRIN TWP	00-00-78	200	--	6	W	H	--	--	--
5267	400GPCGG	400849	0754137	E NANTMEAL TWP	07-00-78	99	40	6.25	W	H	30	09-20-95	50.2
5268	400GPCGG	400848	0754136	E NANTMEAL TWP	11-28-87	360	40	6	W	H	.5	09-20-95	28.0
5269	231SCKN	400911	0753646	E VINCENT TWP	07-11-74	97	47	6	W	H	10	10-11-95	28.1
5270	231SCKN	400922	0753647	E VINCENT TWP	03-16-73	85	24	6	W	H	12	10-11-95	9.00
5271	400MFCGG	400807	0753742	W VINCENT TWP	--	--	--	--	W	H	--	10-12-95	31.9
5272	231SCKN	400918	0753658	E VINCENT TWP	--	--	--	--	W	H	--	--	--
5469	000SRPN	400047	0753127	WILLISTOWN TWP	--	--	--	--	W	H	--	08-08-96	19.5
5470	300PRCK	394847	0755824	L OXFORD TWP	10-00-92	120	97	6	W	C	45	08-22-96	25.0
5471	300CCKV	394958	0754802	LONDON GROVE T	--	--	--	--	W	-	--	--	--
5472	400FMFG	395914	0755349	SADSBURY TWP	--	95	--	--	W	H	--	08-28-96	10.8
5473	400BMFGA	400213	0755129	WEST CALN TWP	09-12-62	75	25	6.25	W	H	35	08-29-96	39.2
5474	300WSCKO	394942	0754958	LONDON GROVE T	--	--	--	--	W	H	--	08-30-96	47.3
5475	300WSCKA	395722	0754546	WEST BRADFORD T	00-00-71	--	--	--	W	H	--	--	--
5476	300WSCKO	394732	0755610	E NOTTINGHAM T	05-00-96	390	--	--	W	H	8	09-04-96	31.8
5477	300WSCKO	394620	0755612	E NOTTINGHAM T	11-00-95	345	92	6	W	H	4	09-04-96	43.4
5478	300CCKV	395009	0754708	LONDON GROVE T	00-00-90	--	--	6	W	H	--	09-05-96	16.4
5479	300WSCKO	394913	0755229	PENN TWP	00-00-39	105	--	5	W	H	--	09-05-96	8.00
5480	300WSCKO	395343	0754353	E MARLBOROUGH T	04-00-83	166	85	6	W	H	10	09-11-96	20.4
5481	400FLCGG	400620	0754335	U UWCHLAN TWP	00-00-87	--	--	6	W	H	--	09-24-96	15.3

Table 8. *Results of analyses for radon-222, uranium, radium-226, radium-228, major ions, and physical and chemical properties in ground-water samples from 534 wells, Chester County, Pennsylvania, summer 1986 through spring 1997*

USGS well number: 4-digit number assigned by USGS that follows a 2-letter abbreviation for county (CH- for Chester County).

Aquifer codes: 000ANRS, anorthosite (Yhan); 000MFCGH, mafic gneiss, amphibolite facies (ma); 000PGMT, pegmatite (pg); 000SRPN, serpentinite and ultramafite (Csp, um); 231BRCK, Brunswick Group (Trb); 231HMCK, Hammer Creek Formation (Trh); 231LCKG, Lockatong Formation (Trl); 231SCKN, Stockton Formation (Trs); 300CCKV, Cockeysville Marble (ck); 300PRCK, Peters Creek Schist (pc); 300STRS, Setters Quarztite (st); 300WSCKA, Octoraro Phyllite (oct); 300WSCKO, Wissahickon Schist (wb); 367CNSG, Conestoga Limestone (OCc); 371ELBK, Elbrook Limestone (Ce); 377AMHP, Antietam Quartzite-Harpers Phyllite, undivided (ZCah); 377CCKS, Chickies Quartzite (Zch); 377KZRS, Kinzers Limestone (Ck); 377LDGR, Ledger Dolomite (Cl); 400BMFGA, banded mafic gneiss, amphibolite facies (Yhma); 400FCIGA, felsic and intermediate gneiss, amphibolite facies (Yhia); 400FLCGA, felsic gneiss, amphibolite facies (Yhfa); 400FLCGG, felsic gneiss, granulite facies (Yhfg); 400FLCGH, felsic and intermediate gneiss, amphibolite facies (Ybfa); 400FLCGP, felsic gneiss, granulite facies (Ybfg); 400FMFG, felsic and mafic gneiss (Ymfa); 400GPCGA, graphitic felsic gneiss, amphibolite facies (Yhga); 400GPCGG, graphitic felsic gneiss, granulite facies (Yhgg); 400MFCGG. mafic gneiss, granulite facies (Yhmg); 400MFCGH, mafic gneiss amphibolite facies (Ybma); 400MFCGP, mafic gneiss, granulite facies (Ybmg).

Counting errors give analytical uncertainty at the 2 sigma or 95-percent confidence level

µS/cm, microsiemens per centimeter at 25 degrees Celsius

mg/L, milligrams per liter

µg/L, micrograms per liter

pCi/L, picocuries per liter

CE, counting error

°C, degrees Celsius

--, no data

Table 8. *Results of analyses for radon-222, uranium, radium-226, radium-228, major ions, and physical and chemical properties in ground-water samples from 534 wells, Chester County, Pennsylvania, summer 1986 through spring 1997—Continued*

Local well number	Aquifer code	Date (YYYYMMDD)	Time (HHMM)	Water temperature (°C)	Specific conductance (µS/cm)	Dissolved oxygen (mg/L)	pH	Alkalinity (mg/L as $CaCO_3$)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)
CH-1311	000ANRS	19950927	1447	11.5	271	8.2	5.9	29	--	--	--	--
2271	000ANRS	19860822	1120	14.0	165	--	6.3	--	17	3.3	8.2	0.80
4010	000ANRS	19900830	1555	14.5	139	8.3	6.0	--	14	3.5	6.8	.80
4022	000ANRS	19900831	1540	14.5	229	7.1	6.5	--	25	5.2	8.7	1.7
4025	000ANRS	19900905	1144	14.0	162	8.0	5.9	--	15	2.3	8.1	.80
4781	000ANRS	19950907	1531	15.5	545	4.6	6.1	66	--	--	--	--
5239	000ANRS	19950929	1404	11.5	182	8.5	5.7	28	--	--	--	--
26	000MFCGH	19930817	1215	17.5	218	.7	8.0	69	27	5.0	6.7	3.0
2596	000MFCGH	19930811	1417	14.0	428	9.3	6.4	65	39	17	9.2	2.4
3073	000MFCGH	19860906	1310	12.5	165	--	6.3	--	14	4.7	7.1	2.4
3405	000MFCGH	19930809	1326	13.0	172	9.3	6.4	49	15	8.1	5.1	1.4
3444	000MFCGH	19930810	1336	13.0	213	5.4	7.7	69	21	9.0	5.9	4.4
3458	000MFCGH	19890803	1432	13.5	268	2.2	7.8	--	--	--	--	--
3468	000MFCGH	19890814	1350	16.0	248	10.2	5.7	--	--	--	--	--
4299	000MFCGH	19921209	1057	12.5	243	1.5	7.0	57	--	--	--	--
4549	000MFCGH	19930824	1700	14.0	740	9.4	6.1	63	80	25	22	5.8
4808	000MFCGH	19940706	1642	13.0	348	6.1	6.2	49	32	10	13	3.1
4291	000PGMT	19920916	1436	13.5	137	8.9	6.0	15	9.1	3.4	5.8	2.5
5249	000PGMT	19950831	1600	12.5	67	8.8	5.9	15	--	--	--	--
5250	000PGMT	19950831	1800	15.0	105	9.8	6.4	19	--	--	--	--
1659	000SRPN	19910711	1045	14.5	405	3.0	8.4	--	3.1	50	3.6	.50
1761	000SRPN	19910822	1152	14.0	457	1.8	8.5	--	4.2	59	2.3	.20
4120	000SRPN	19910711	1400	15.0	310	2.9	9.1	--	2.1	35	1.9	.30
4271	000SRPN	19920820	1030	13.5	218	6.4	9.3	119	--	--	--	--
5225	000SRPN	19950808	1500	13.0	239	1.0	10	111	1.1	30	2.1	.50
5226	000SRPN	19950808	1630	14.0	298	1.0	9.5	148	1.1	43	1.0	.20
5469	000SRPN	19960808	1347	13.5	95	7.9	6.3	38	6.1	4.9	4.7	1.2
1547	231BRCK	19860819	1400	15.0	350	--	7.0	--	41	15	11	1.2
1567	231BRCK	19870813	1222	13.0	340	5.8	6.9	--	55	8.2	11	1.3
3099	231BRCK	19870813	1058	17.0	190	2.6	6.2	--	19	5.2	7.5	3.7
3100	231BRCK	19870813	1432	13.0	290	6.6	7.4	--	39	7.5	10	1.1
3103	231BRCK	19870817	1258	15.0	90	7.8	6.1	--	7.7	2.5	4.7	.50
3115	231BRCK	19870828	1050	13.0	220	8.8	6.8	--	18	8.6	11	1.2
3116	231BRCK	19870828	1225	14.5	350	6.9	7.2	--	48	12	9.7	.80
3184	231BRCK	19960828	1230	13.5	608	4.7	7.3	136	71	24	14	1.6
3272	231BRCK	19910717	1315	15.0	182	8.2	5.5	--	--	--	--	--
3640	231BRCK	19900827	1730	13.0	98	1.8	5.7	--	6.9	3.0	4.2	.90
3655	231BRCK	19900828	1059	12.5	103	9.0	5.3	--	3.0	1.8	10	.80
3837	231BRCK	19900828	0848	13.5	211	7.6	5.7	--	18	4.3	11	.80
3838	231BRCK	19900827	1927	13.0	66	9.6	5.5	--	4.0	1.8	5.1	.90
3841	231BRCK	19910717	1630	16.5	205	6.0	5.6	--	--	--	--	--
4276	231BRCK	19920914	1419	16.0	258	5.3	5.0	2	--	--	--	--
4491	231BRCK	19930722	1500	17.0	260	7.6	6.6	62	35	4.1	11	.80

Table 8. *Results of analyses for radon-222, uranium, radium-226, radium-228, major ions, and physical and chemical properties in ground-water samples from 534 wells, Chester County, Pennsylvania, summer 1986 through spring 1997—Continued*

Chloride (mg/L)	Sulfate (mg/L)	Fluoride (mg/L)	Silica (mg/L)	Ammonium (mg/L as N)	Nitrate (mg/L as N)	Radon-222 (pCi/L)	CE Radon-222 (pCi/L)	Uranium (µg/L)	Radium-228 (pCi/L)	Radium-226 (pCi/L)	Aquifer code	Well number
39	--	--	--	<0.015	7.00	360	22	--			000ANRS	CH-1311
11	11	<0.10	28	--	--	312	--	<0.40	<2.0	--	000ANRS	2271
15	5.2	--	23	.010	5.80	800	55	--	--	--	000ANRS	4010
7.8	9.8	--	30	.010	4.80	<80	45	--	--	--	000ANRS	4022
--	--	--	31	.010	1.30	420	34	--	--	--	000ANRS	4025
89	35	<.10	--	.020	1.20	670	26	--	--	--	000ANRS	4781
5.5	--	--	--	--	6.40	240	19	--	--	--	000ANRS	5239
5.1	20	.20	18	.020	.370	210	34	--	--	--	000MFCGH	26
28	63	<.10	27	.020	1.0	520	47	--	--	--	000MFCGH	2596
7.6	28	.20	25	--	--	1,010	--	<.40	<2.0	--	000MFCGH	3073
5.5	16	<.10	30	.010	2.40	330	46	--	--	--	000MFCGH	3405
3.8	24	<.10	20	.010	.990	790	50	--	--	--	000MFCGH	3444
14	24	--	--	<.010	5.30	640	42	--	--	--	000MFCGH	3458
14	43	--	--	<.010	8.60	97	28	--	--	--	000MFCGH	3468
12	35	<.10	--	.020	.340	850	28	--	--	--	000MFCGH	4299
58	140	<.10	20	.020	24.0	480	37	--	--	--	000MFCGH	4549
32	19	.20	28	<.010	11.0	640	25	--	--	--	000MFCGH	4808
2.5	30	<.10	24	<.010	1.80	4,600	42	--	--	--	000PGMT	4291
5.5	--	--	--	<.015	1.40	480	22	--	--	--	000PGMT	5249
2.9	--	--	--	<.015	.620	3,400	50	--	--	--	000PGMT	5250
13	9.3	<.10	21	.020	1.30	150	44	--	--	--	000SRPN	1659
5.4	3.5	<.10	28	.020	.050	120	48	--	--	--	000SRPN	1761
10	7.3	<.10	8.7	.010	1.40	630	46	--	--	--	000SRPN	4120
4.5	7.7	.10	--	.010	.830	<80	40	--	--	--	000SRPN	4271
1.5	7.8	<.10	.22	<.015	<.050	50	15	<1.0	--	--	000SRPN	5225
1.8	8.5	<.10	2.2	<.015	.130	190	18	<1.0	--	--	000SRPN	5226
3.1	.60	<.10	32	.020	1.00	2,700	45	<1.0	--	--	000SRPN	5469
18	30	<.10	31	--	--	1,285	--	1.2	<2.0	--	231BRCK	1547
27	13	.10	22	--	--	840	--	1.4	<.50	0.50	231BRCK	1567
6.2	27	.20	18	--	--	520	--	1.7	2.0	1.4	231BRCK	3099
9.2	13	.10	26	--	--	2,155	--	.60	<.90	<.20	231BRCK	3100
2.5	1.1	.10	27	--	--	755	--	<.05	<.80	<.20	231BRCK	3103
14	23	.10	27	--	--	1,540	--	<.05	1.4	.59	231BRCK	3115
20	8.6	.10	27	--	--	1,615	--	1.6	<.60	.55	231BRCK	3116
83	19	<.10	17	<.015	4.40	1,400	35	3.0	--	--	231BRCK	3184
10	20	<.10	--	--	--	2,100	72	--	--	--	231BRCK	3272
3.7	15	--	17	.010	.500	1,500	35	--	--	--	231BRCK	3640
21	2.6	--	12	.010	.600	960	36	--	--	--	231BRCK	3655
14	31	--	25	<.010	4.50	2,100	44	--	--	--	231BRCK	3837
4.3	7.7	--	18	<.010	.900	1,300	36	--	--	--	231BRCK	3838
11	30	<.10	--	.020	6.90	1,800	63	--	--	--	231BRCK	3841
34	17	<0.10	--	<.010	5.00	1,400	28	--	--	--	231BRCK	4276
7.9	27	<.10	31	.010	4.00	2,300	43	--	--	--	231BRCK	4491

Table 8. *Results of analyses for radon-222, uranium, radium-226, radium-228, major ions, and physical and chemical properties in ground-water samples from 534 wells, Chester County, Pennsylvania, summer 1986 through spring 1997—Continued*

Local well number	Aquifer code	Date (YYYYMMDD)	Time (HHMM)	Water temperature (°C)	Specific conductance (µS/cm)	Dissolved oxygen (mg/L)	pH	Alkalinity (mg/L as $CaCO_3$)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)
CH-4493	231BRCK	19930727	1220	15.5	445	1.1	7.6	136	54	17	13	2.7
4496	231BRCK	19930812	1030	14.0	443	4.0	6.8	76	55	11	14	1.3
4502	231BRCK	19930823	1240	14.0	240	4.4	6.0	40	22	8.2	8.5	.80
4769	231BRCK	19950816	0850	13.5	322	10.3	6.5	81	32	9.8	14	.90
4801	231BRCK	19940601	1648	13.5	228	6.8	5.6	11	12	6.9	14	1.2
4803	231BRCK	19940609	1224	14.0	349	1.3	7.4	102	47	4.1	14	.60
1496	231HMCK	19870818	1206	12.5	29	8.7	5.1	--	.70	.77	2.0	.80
1528	231HMCK	19860908	1140	13.5	205	--	6.7	--	19	7.6	9.9	1.0
3105	231HMCK	19870818	1047	15.5	255	3.3	7.8	--	31	10	8.9	.80
3108	231HMCK	19870821	1340	16.5	230	6.8	7.4	--	26	9.1	8.9	1.0
3121	231HMCK	19870901	0950	14.0	118	7.1	5.2	--	6.1	3.7	7.3	1.2
3613	231HMCK	19900827	1510	13.0	138	7.9	6.3	--	16	3.2	8.6	.50
3657	231HMCK	19900828	1255	13.0	81	8.4	5.8	--	2.3	2.9	6.9	.90
3673	231HMCK	19900828	1420	13.5	129	6.6	6.1	--	11	3.0	7.8	.70
3758	231HMCK	19900827	1208	13.0	150	8.4	6.8	--	19	5.7	4.9	.60
4277	231HMCK	19920915	1234	14.0	128	13.1	6.5	56	--	--	--	--
4278	231HMCK	19920915	1532	14.5	175	7.0	5.8	31	9.6	3.8	15	1.2
1499	231LCKG	19870820	1156	18.5	880	6.3	7.4	--	170	14	18	.60
1564	231LCKG	19870817	1030	13.5	650	2.0	7.5	--	72	33	15	1.8
1565	231LCKG	19860903	1300	13.5	378	--	7.7	--	38	17	18	.80
2465	231LCKG	19870812	1404	14.0	500	6.6	7.3	--	66	19	15	1.4
3092	231LCKG	19870812	1535	15.0	490	--	7.3	--	66	17	13	1.2
4768	231LCKG	19950814	1302	14.5	365	2.8	7.4	147	.04	.03	89	.20
386	231SCKN	19860811	1515	15.0	290	--	7.1	--	--	--	--	--
1483	231SCKN	19870821	1110	14.0	440	3.1	5.8	--	45	14	18	1.0
1501	231SCKN	19870820	1325	19.0	180	8.6	6.3	--	18	4.3	9.3	.80
1593	231SCKN	19860904	1230	13.0	460	--	7.1	--	67	7.0	9.0	1.1
3106	231SCKN	19870818	1400	14.5	330	3.0	6.9	--	34	9.8	17	.90
3107	231SCKN	19870821	1222	12.5	135	10.4	6.2	--	10	4.5	5.3	2.3
3150	231SCKN	19930805	1600	14.0	400	4.1	7.4	165	61	11	7.6	.90
3357	231SCKN	19890612	1537	13.5	340	2.0	6.3	--	--	--	--	--
3359	231SCKN	19890630	1400	13.5	278	10.2	6.4	--	--	--	--	--
4409	231SCKN	19930720	1410	16.0	420	2.8	6.4	87	39	10	35	.90
4497	231SCKN	19930812	1355	16.0	300	4.9	6.0	40	23	5.7	23	1.1
4498	231SCKN	19930816	1130	17.5	282	5.2	7.1	102	32	9.8	10	.80
4550	231SCKN	19930826	0800	14.0	320	6.8	7.1	104	49	4.6	9.3	.90
4550		19930831	0830	--	--	--	--	--	--	--	--	--
5269	231SCKN	19951011	1210	13.5	324	7.0	6.7	71	35	8.0	12	.90
5270	231SCKN	19951011	1407	13.5	191	6.1	6.1	40	18	3.3	11	1.0
5272	231SCKN	19951012	1633	14.0	283	6.9	6.3	47	32	6.2	9.2	1.0
5272		19951012	1715	--	--	--	--	--	--	--	--	--
71	300CCKV	19930830	1410	14.0	680	3.8	7.6	161	78	41	3.6	3.1
895	300CCKV	19900907	1143	14.5	258	9.5	6.1	--	17	9.7	10	1.6

Table 8. *Results of analyses for radon-222, uranium, radium-226, radium-228, major ions, and physical and chemical properties in ground-water samples from 534 wells, Chester County, Pennsylvania, summer 1986 through spring 1997—Continued*

Chloride (mg/L)	Sulfate (mg/L)	Fluoride (mg/L)	Silica (mg/L)	Ammonium (mg/L as N)	Nitrate (mg/L as N)	Radon-222 (pCi/L)	CE Radon-222 (pCi/L)	Uranium (µg/L)	Radium-228 (pCi/L)	Radium-226 (pCi/L)	Aquifer code	Well number
18	67	<0.10	17	0.020	1.70	1,500	35	--	--	--	231BRCK	CH-4493
10	95	<.10	18	.030	8.00	1,300	58	--	--	--	231BRCK	4496
7.5	42	<.10	23	<.010	5.20	3,500	55	--	--	--	231BRCK	4502
19	18	<.10	32	.050	9.00	200	19	--	--	--	231BRCK	4769
24	24	<.10	24	<.010	5.40	2,300	45	--	--	--	231BRCK	4801
1.9	65	.10	22	.020	<.050	940	52	--	--	--	231BRCK	4803
2.5	.40	.10	11	--	--	690	--	<0.05	<0.60	<0.10	231HMCK	1496
14	18	<.10	29	--	--	1,875	--	.90	<2.0	--	231HMCK	1528
3.6	11	.10	19	--	--	905	--	4.3	<.80	<.20	231HMCK	3105
2.6	8.5	.10	30	--	--	1,245	--	.23	<.80	<.20	231HMCK	3108
6.7	18	<.10	17	--	--	990	--	<.05	<.80	<.20	231HMCK	3121
7.5	3.2	--	29	.010	.700	1,700	38	--	--	--	231HMCK	3613
3.5	6.4	--	31	.010	4.60	680	34	--	--	--	231HMCK	3657
2.1	12	--	27	<.010	2.00	1,500	39	--	--	--	231HMCK	3673
3.4	1.1	--	26	.020	.600	1,300	36	--	--	--	231HMCK	3758
2.0	5.5	<.10	--	<.010	1.20	2,900	37	--	--	--	231HMCK	4277
21	19	<.10	29	<.010	2.80	1,400	32	--	--	--	231HMCK	4278
9.2	390	.20	22	--	--	265	--	<.05	<.80	<.20	231LCKG	1499
68	39	.10	16	<.010	3.80	945	--	8.6	<.50	.17	231LCKG	1564
7.0	7.7	.20	15	--	--	962	--	6.0	<2.0	--	231LCKG	1565
31	31	.10	16	.010	5.30	420	--	1.6	<.50	.24	231LCKG	2465
39	35	.10	14	--	--	390	--	11	<.70	<.20	231LCKG	3092
6.3	30	<.10	13	.040	.54	300	21	6.0	--	--	231LCKG	4768
21	12	--	--	--	--	1,050	--	--	--	--	231SCKN	386
75	33	.10	21	--	--	1,330	--	<.05	<.70	<.20	231SCKN	1483
16	4.1	.10	21	--	--	1,835	--	.20	<1.0	<.20	231SCKN	1501
32	24	<.10	15	--	--	709	--	1.4	<2.0	--	231SCKN	1593
25	20	.10	28	--	--	1,050	--	.15	<.50	<.20	231SCKN	3106
7.2	10	<.10	25	--	--	730	--	<.0	<.70	<.20	231SCKN	3107
16	16	<.10	20	.010	2.00	940	58	--	--	--	231SCKN	3150
12	26	--	--	<.010	4.50	1,300	41	--	--	--	231SCKN	3357
26	4.0	--	--	.020	5.40	1,400	63	--	--	--	231SCKN	3359
42	18	.10	23	.020	6.10	2,200	33	--	--	--	231SCKN	4409
48	9.9	<.10	23	.020	3.30	1,700	59	--	--	--	231SCKN	4497
10	19	<.10	32	.030	2.80	1,500	47	--	--	--	231SCKN	4498
19	20	<.10	24	.040	3.10	1,100	47	--	--	--	231SCKN	4550
--	--	--	--	--	--	--	--	--	--	--		4550
17	18	<.10	30	<.015	6.00	940	30	--	--	--	231SCKN	5269
9.6	14	<.10	28	<.015	4.40	1,400	35	--	--	--	231SCKN	5270
22	14	<.10	24	<.015	4.30	610	24	--	--	--	231SCKN	5272
--	--	--	--	--	--	540	23	--	--	--		5272
27	110	<.10	14	.030	18.0	990	42	--	--	--	300CCKV	71
49	1.4	--	11	<.010	3.90	3,400	56	--	--	--	300CCKV	895

Table 8. *Results of analyses for radon-222, uranium, radium-226, radium-228, major ions, and physical and chemical properties in ground-water samples from 534 wells, Chester County, Pennsylvania, summer 1986 through spring 1997—Continued*

Local well number	Aquifer code	Date (YYYYMMDD)	Time (HHMM)	Water temperature (°C)	Specific conductance (µS/cm)	Dissolved oxygen (mg/L)	pH	Alkalinity (mg/L as $CaCO_3$)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)
CH-2015	300CCKV	19890830	1110	13.5	331	0.2	6.8	--	--	--	--	--
2033	300CCKV	19960911	1628	14.0	402	7.6	7.4	115	55	16	3.3	2.5
2586	300CCKV	19890808	1235	16.0	208	4.1	5.5	--	--	--	--	--
2777	300CCKV	19900906	1302	13.5	380	8.6	6.6	--	42	15	9.8	4.5
3210	300CCKV	19930810	1515	15.0	848	2.4	7.3	258	79	41	25	5.9
3210		19930810	1600	16.0	848	2.4	7.3	258	75	42	25	5.7
3474	300CCKV	19890824	1055	16.5	502	4.9	7.7	--	--	--	--	--
3516	300CCKV	19930802	1428	13.5	830	7.3	7.2	250	87	51	9.0	2.2
3516		19940713	1500	13.5	855	7.1	7.0	292	82	49	9.2	--
4026	300CCKV	19900907	1506	12.5	248	<.1	6.7	--	26	6.0	7.2	2.1
4344	300CCKV	19930331	1513	12.5	254	4.9	6.3	35	21	9.4	10	1.8
4344		19930616	1043	12.5	248	7.0	6.1	51	25	7.3	11	2.1
4344		19930616	1128	12.5	248	7.0	6.1	51	--	--	--	--
4344		19930927	1030	13.0	266	5.3	6.0	41	24	6.8	11	2.0
4344		19940707	1207	11.5	273	5.0	5.9	53	25	7.4	11	--
4344		19940707	1247	11.5	273	5.0	5.9	53	--	--	--	--
4548	300CCKV	19930824	1500	15.0	325	7.2	7.2	114	45	9.3	6.3	1.9
4551	300CCKV	19930826	1430	14.0	803	3.2	7.0	306	82	48	24	2.9
4552	300CCKV	19930830	1210	15.0	600	3.8	7.6	212	68	36	7.6	2.9
4728	300CCKV	19930901	1658	13.5	333	.2	8.0	119	37	16	4.7	3.1
4729	300CCKV	19930902	1111	16.5	430	6.0	7.8	144	58	15	4.5	<.10
5222	300CCKV	19950802	1830	15.0	1,200	.7	7.2	306	110	69	27	11
5471	300CCKV	19960822	1503	17.5	754	4.6	7.1	244	77	40	13	8.0
5478	300CCKV	19960905	1155	13.5	804	3.2	7.0	227	84	47	6.1	4.8
952	300PRCK	19950830	1515	14.0	265	8.6	5.8	13	--	--	--	--
1000	300PRCK	19860825	1130	13.5	125	--	6.8	--	14	4.2	4.2	.50
1514	300PRCK	19950828	1030	14.0	150	8.2	5.8	17	--	--	--	--
1514		19960423	1513	14.0	132	8.9	5.4	16	9.8	4.0	6.2	1.1
1514		19960626	1450	14.5	139	9.0	5.8	15	9.9	4.2	6.4	1.2
1514		19960826	1416	14.0	150	9.0	5.4	13	11	4.6	6.5	1.1
1514		19961022	1430	14.0	138	9.6	5.7	16	9.9	3.8	6.4	1.1
1514		19961022	1431	--	--	--	--	--	--	--	--	--
1514		19961022	1515	--	--	--	--	--	--	--	--	--
1514		19961223	1351	13.5	135	9.2	5.4	27	9.8	4.0	6.0	1.1
1514		19970228	1518	13.5	145	8.6	5.5	19	11	4.5	6.4	1.1
1514		19970430	1521	14.0	149	8.3	5.1	13	11	4.8	6.4	1.1
1514		19970702	1409	--	151	--	5.4	--	11	4.9	6.9	--
1651	300PRCK	19910709	1440	14.5	98	9.2	6.4	--	6.5	2.0	6.0	1.8
1709	300PRCK	19910709	1145	15.0	177	9.0	5.7	--	15	8.3	11	1.5
1727	300PRCK	19870831	1102	13.0	155	7.5	5.3	--	12	4.7	5.4	1.2
1742	300PRCK	19950814	1400	13.0	360	1.8	7.0	64	--	--	--	--
1843	300PRCK	19950829	1830	14.0	155	9.6	6.0	12	--	--	--	--
2279	300PRCK	19920908	1545	14.5	201	8.7	6.2	13	17	7.0	4.3	1.0

Table 8. *Results of analyses for radon-222, uranium, radium-226, radium-228, major ions, and physical and chemical properties in ground-water samples from 534 wells, Chester County, Pennsylvania, summer 1986 through spring 1997—Continued*

Chloride (mg/L)	Sulfate (mg/L)	Fluoride (mg/L)	Silica (mg/L)	Ammonium (mg/L as N)	Nitrate (mg/L as N)	Radon-222 (pCi/L)	CE Radon-222 (pCi/L)	Uranium (µg/L)	Radium-228 (pCi/L)	Radium-226 (pCi/L)	Aquifer code	Well number
18	33	--	--	0.010	2.90	530	62	--	--	--	300CCKV	CH-2015
16	11	<0.10	12	<.015	5.90	1,800	37	<1.0	--	--	300CCKV	2033
15	27	--	--	.010	4.70	680	39	--	--	--	300CCKV	2586
10	33	--	17	<.010	5.50	3,200	64	--	--	--	300CCKV	2777
47	75	<.10	18	.010	8.80	290	45	--	--	--	300CCKV	3210
49	73	<.10	17	.020	8.90	270	49	--	--	--		3210
15	29	--	--	<.010	6.00	240	49	--	--	--	300CCKV	3474
41	46	<.10	14	.020	16.0	1,900	48	--	--	--	300CCKV	3516
44	42	<.10	14	.020	17.0	1,900	40	--	--	--		3516
10	30	--	23	.030	<.10	250	39	--	--	--	300CCKV	4026
30	24	<.10	18	.010	7.00	3,100	35	--	--	--	300CCKV	4344
24	22	<.10	29	<.010	6.90	3,400	38	--	--	--		4344
--	--	--	--	--	--	3,400	39	--	--	--		4344
25	21	<.10	30	.020	7.30	3,400	53	--	--	--		4344
26	22	.10	30	<.010	7.00	3,100	49	--	--	--		4344
--	--	--	--	--	--	3,100	49	--	--	--		4344
11	6.8	<.10	19	.020	7.20	4,700	60	--	--	--	300CCKV	4548
51	47	<.10	16	.030	8.40	1,500	47	--	--	--	300CCKV	4551
26	50	<.10	18	.030	7.90	440	39	--	--	--	300CCKV	4552
15	31	.10	10	.020	.33	2,600	54	--	--	--	300CCKV	4728
14	16	<.10	15	.020	8.10	330	44	--	--	--	300CCKV	4729
65	150	<.10	20	.030	18.0	180	18	--	--	--	300CCKV	5222
31	41	<.10	14	<.015	6.80	1,500	37	4.0	--	--	300CCKV	5471
51	42	<.10	13	.020	5.30	2,600	46	10	--	--	300CCKV	5478
26	--	--	--	<.015	7.00	5,800	69	--	--	--	300PRCK	952
2.5	7.3	<.10	16	--	--	2,849	--	<.40	<2.0	--	300PRCK	1000
--	--	--	--	--	--	3,800	55	--	--	--	300PRCK	1514
7.3	13	--	14	<.015	5.30	3,900	56	--	--	--		1514
7.2	14	--	14	.050	5.20	4,000	56	--	--	--		1514
7.7	15	--	14	<.015	5.70	3,900	54	--	--	--		1514
6.7	14	--	14	.030	6.70	4,200	56	--	--	--		1514
--	--	--	--	--	--	4,100	56	--	--	--		1514
--	--	--	--	--	--	4,200	57	--	--	--		1514
6.5	13	--	13	<.015	5.30	3,900	53	--	--	--		1514
7.0	15	--	14	<.015	5.70	3,800	65	--	--	--		1514
7.0	16	--	15	--	--	4,152	56	--	--	--		1514
7.1	16	--	14	--	--	--	--	--	--	--		1514
12	4.2	<.10	18	<.010	1.90	3,500	47	--	--	--	300PRCK	1651
18	1.5	.10	23	<.010	9.80	3,500	49	--	--	--	300PRCK	1709
8.3	5.1	<.10	8.7	--	--	6,010	--	<.05	.74	0.27	300PRCK	1727
25	--	--	--	.060	5.70	7,500	76	--	--	--	300PRCK	1742
4.9	--	--	--	<.015	5.50	6,200	68	--	--	--	300PRCK	1843
35	5.7	<.10	9.5	.020	3.50	3,900	38	--	--	--	300PRCK	2279

Table 8. *Results of analyses for radon-222, uranium, radium-226, radium-228, major ions, and physical and chemical properties in ground-water samples from 534 wells, Chester County, Pennsylvania, summer 1986 through spring 1997—Continued*

Local well number	Aquifer code	Date (YYYYMMDD)	Time (HHMM)	Water temperature (°C)	Specific conductance (µS/cm)	Dissolved oxygen (mg/L)	pH	Alkalinity (mg/L as $CaCO_3$)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)
CH-2505	300PRCK	19860711	1145	14.0	260	--	7.6	--	--	--	--	--
3118	300PRCK	19870831	1500	15.5	115	9.8	5.6	--	5.9	4.3	6.8	0.80
3119	300PRCK	19870831	1345	15.0	260	2.0	5.3	--	11	7.6	25	3.5
3120	300PRCK	19870831	1220	14.5	180	9.9	6.4	--	17	6.0	5.7	1.0
4006	300PRCK	19900821	1433	12.5	200	9.6	5.3	--	--	--	--	--
4009	300PRCK	19900824	1415	13.5	321	6.5	5.9	--	--	--	--	--
4119	300PRCK	19910710	1600	14.0	310	9.2	5.8	--	23	13	5.7	1.2
4127	300PRCK	19910826	1037	14.5	258	1.0	6.3	--	--	--	--	--
4128	300PRCK	19910827	1005	14.0	360	5.1	5.2	--	--	--	--	--
4148	300PRCK	19921006	1330	13.5	240	2.8	6.7	37	21	7.1	8.6	.80
4270	300PRCK	19920810	1136	13.5	575	.6	6.9	112	--	--	--	--
4272	300PRCK	19920902	1414	16.0	222	8.8	5.9	9	19	6.5	8.3	2.1
4273	300PRCK	19920909	1055	13.5	308	8.0	6.1	20	23	9.0	14	1.8
4274	300PRCK	19921130	1049	13.5	278	8.2	6.6	20	22	9.9	10	1.7
4274		19930331	1115	13.5	262	7.6	6.6	18	22	6.6	10	2.1
4274		19930614	1056	13.5	274	7.7	6.4	22	24	10	11	1.8
4274		19930916	1011	13.5	288	8.0	6.6	26	24	10	12	1.5
4411	300PRCK	19930721	1600	15.0	460	.1	7.4	75	65	7.5	13	3.9
4553	300PRCK	19930907	1246	14.0	96	8.6	6.1	20	7.8	3.8	4.5	1.1
4602	300PRCK	19950816	1645	13.0	373	6.6	5.9	21	--	--	--	--
4934	300PRCK	19940719	1400	12.5	213	9.2	6.1	16	17	7.1	6.2	.80
5090	300PRCK	19940907	1325	12.5	323	7.9	6.3	57	39	8.0	14	2.2
5220	300PRCK	19950731	1610	13.0	360	.2	7.6	90	48	8.5	7.7	2.2
5230	300PRCK	19950814	1530	15.0	148	8.3	5.5	7	--	--	--	--
5235	300PRCK	19950824	1830	13.0	218	6.7	5.6	15	--	--	--	--
5245	300PRCK	19950828	1800	13.5	215	9.0	6.7	48	--	--	--	--
5247	300PRCK	19950829	1700	13.0	240	7.2	6.6	25	--	--	--	--
5248	300PRCK	19950830	1300	14.0	200	9.3	5.5	8	--	--	--	--
5470	300PRCK	19960822	1058	13.5	54	9.3	5.4	1	2.9	1.5	4.5	.80
30	300STRS	19950802	1400	15.0	699	3.8	5.5	20	56	25	26	7.5
770	300STRS	19930722	1249	14.0	1,010	.4	5.8	58	120	33	17	5.6
1954	300STRS	19860815	1130	14.5	105	--	6.3	--	6.8	3.8	3.5	2.3
2071	300STRS	19930809	1057	13.5	43	8.5	6.0	5	.81	2.0	1.8	1.6
2513	300STRS	19930803	1148	14.0	208	6.9	6.5	54	19	7.5	6.6	1.3
2593	300STRS	19930909	1155	14.0	392	10.2	6.4	33	35	13	15	3.6
2593	300STRS	19930909	1156	14.0	392	10.2	6.4	33	38	13	17	3.5
2766	300STRS	19870903	1255	15.0	279	6.2	5.5	--	20	7.9	14	1.7
2769	300STRS	19860714	1240	14.0	285	--	6.2	--	--	--	--	--
3129	300STRS	19870902	1145	14.5	122	9.3	5.4	--	9.0	3.5	4.2	2.7
3134	300STRS	19870903	1147	13.0	265	6.4	6.1	--	23	12	7.6	1.3
3471	300STRS	19890816	1430	13.0	169	5.7	5.8	--	--	--	--	--
3473	300STRS	19890823	1630	15.0	220	4.6	6.2	--	--	--	--	--
3533	300STRS	19931122	1235	14.0	210	9.8	6.4	36	24	4.3	4.9	3.1

Table 8. *Results of analyses for radon-222, uranium, radium-226, radium-228, major ions, and physical and chemical properties in ground-water samples from 534 wells, Chester County, Pennsylvania, summer 1986 through spring 1997—Continued*

Chloride (mg/L)	Sulfate (mg/L)	Fluoride (mg/L)	Silica (mg/L)	Ammonium (mg/L as N)	Nitrate (mg/L as N)	Radon-222 (pCi/L)	CE Radon-222 (pCi/L)	Uranium (µg/L)	Radium-228 (pCi/L)	Radium-226 (pCi/L)	Aquifer code	Well number
7.1	54	--	--	--	--	4,456	--	--	--	--	300PRCK	CH-2505
9.3	.30	<0.10	11	--	--	9,135	--	<0.05	--	--	300PRCK	3118
39	18	<.10	11	--	--	7,220	--	<.05	2.2	0.78	300PRCK	3119
12	15	.10	9.9	--	--	2,485	--	.54	.88	.26	300PRCK	3120
23	10	--	--	<0.010	9.30	3,700	46	--	--	--	300PRCK	4006
34	17	--	--	.010	12.0	4,800	66	--	--	--	300PRCK	4009
14	31	<.10	12	.020	19.0	4,300	49	--	--	--	300PRCK	4119
14	.80	<.10	--	.020	.57	6,900	86	--	--	--	300PRCK	4127
31	10	<.10	--	.030	17.0	4,200	64	--	--	--	300PRCK	4128
27	16	<.10	13	<.010	1.90	5,600	44	--	--	--	300PRCK	4148
63	53	.10	--	.020	.60	4,400	45	--	--	--	300PRCK	4270
8.9	51	<.10	15	.020	6.70	5,200	51	--	--	--	300PRCK	4272
49	27	<.10	14	.020	5.30	7,400	49	--	--	--	300PRCK	4273
29	25	<.10	19	.020	6.60	8,000	73	--	--	--	300PRCK	4274
23	21	<.10	31	.010	7.00	7,000	48	--	--	--		4274
32	25	<.10	16	.010	7.20	8,000	52	--	--	--		4274
32	25	<.10	18	.020	7.30	8,200	76	--	--	--		4274
55	56	<.10	22	.040	<.050	5,800	53	--	--	--	300PRCK	4411
2.6	18	.10	17	.020	1.10	3,900	110	--	--	--	300PRCK	4553
45	--	--	--	<.015	11.0	2,200	40	--	--	--	300PRCK	4602
16	5.2	<.10	13	.010	12.0	3,900	57	<.40	--	--	300PRCK	4934
42	26	<.10	15	.020	5.00	7,000	74	--	--	--	300PRCK	5090
24	47	<.10	15	<.015	<.05	2,000	41	--	--	--	300PRCK	5220
13	--	--	--	.050	9.70	7,000	72	--	--	--	300PRCK	5230
16	--	--	--	.020	5.10	5,400	66	--	--	--	300PRCK	5235
2.7	--	--	--	<.015	2.60	3,100	49	--	--	--	300PRCK	5245
16	--	--	--	<.015	5.60	1,800	38	--	--	--	300PRCK	5247
11	--	--	--	<.015	9.10	3,900	57	--	--	--	300PRCK	5248
3.7	<.10	<.10	12	<.015	3.80	4,300	60	--	--	--	300PRCK	5470
46	120	<.10	18	<.015	27.0	1,200	33	--	--	--	300STRS	30
110	130	<.10	30	.050	38.0	1,200	39	--	--	--	300STRS	770
3.6	13	<.10	16	--	--	1,582	--	--	<.40	<2.0	300STRS	1954
2.0	.20	<.10	12	.010	1.40	930	52	--	--	--	300STRS	2071
8.2	14	<.10	23	.010	4.60	5,000	60	--	--	--	300STRS	2513
16	67	.30	22	.020	15.0	540	60	--	--	--	300STRS	2593
16	69	<.10	23	.010	15.0	470	58	--	--	--	300STRS	2593
34	11	.10	25	--	--	3,790	--	.22	1.8	.29	300STRS	2766
--	--	--	--	--	--	3,047	--	--	4.0	--	300STRS	2769
6.6	18	<.10	18	--	--	900	--	<.40	.20	--	300STRS	3129
27	<.20	.10	41	--	--	365	--	<.05	<.70	<.20	300STRS	3134
9.6	30	--	--	<.010	1.30	490	57	--	--	--	300STRS	3471
11	37	--	--	.030	1.30	2,900	50	--	--	--	300STRS	3473
7.0	25	<.10	16	.010	6.70	3,800	57	--	--	--	300STRS	3533

Table 8. *Results of analyses for radon-222, uranium, radium-226, radium-228, major ions, and physical and chemical properties in ground-water samples from 534 wells, Chester County, Pennsylvania, summer 1986 through spring 1997—Continued*

Local well number	Aquifer code	Date (YYYYMMDD)	Time (HHMM)	Water temperature (°C)	Specific conductance (µS/cm)	Dissolved oxygen (mg/L)	pH	Alkalinity (mg/L as $CaCO_3$)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)
CH-4007	300STRS	19900821	1737	13.5	391	8.0	6.7	--	--	--	--	--
4417	300STRS	19930824	1308	13.5	217	.4	7.4	53	24	5.6	5.5	4.4
4730	300STRS	19930907	1553	13.5	1,010	.7	7.0	146	150	31	12	8.7
4730		19940711	1523	13.0	1,100	.5	6.7	145	150	32	12	--
4731	300STRS	19930910	1440	15.0	340	6.6	6.7	82	33	8.9	21	5.5
4809	300STRS	19940712	1448	13.5	266	8.0	6.3	54	29	4.5	8.6	2.1
83	300WSCKA	19860711	1340	13.0	220	--	7.6	--	--	--	--	--
85	300WSCKA	19860721	1130	13.0	322	--	7.1	--	--	--	--	--
85		19890804	1100	13.0	299	3.3	6.6	--	--	--	--	--
87	300WSCKA	19890804	1055	13.5	300	7.4	5.6	--	--	--	--	--
118	300WSCKA	19950907	1700	13.5	180	8.4	5.7	11	--	--	--	--
255	300WSCKA	19950913	1100	13.5	700	3.4	6.3	54	--	--	--	--
1005	300WSCKA	19950829	1310	12.5	157	9.3	5.9	9	--	--	--	--
1106	300WSCA	19950824	1600	13.0	124	9.6	5.8	7	--	--	--	--
1846	300WSCKA	19950828	1630	14.0	380	7.0	6.4	49	--	--	--	--
1981	300WSCKA	19860827	1030	13.5	170	--	6.0	--	13	4.6	11	1.0
2719	300WSCKA	19930715	1525	14.5	160	8.2	6.0	22	11	5.4	5.7	1.8
2969	300WSCKA	19920831	1200	14.5	251	11.6	5.9	18	18	9.2	7.7	.70
4772	300WSCKA	19950823	1024	12.5	183	9.3	6.0	33	19	6.7	2.9	.70
5227	300WSCKA	19950810	1048	13.0	96	4.6	5.8	23	5.9	4.0	3.9	.40
5232	300WSCKA	19950815	1525	14.0	245	8.0	5.4	7	--	--	--	--
5234	300WSCKA	19950823	1630	15.0	180	6.0	6.9	42	--	--	--	--
5237	300WSCKA	19950828	1430	13.0	133	7.9	6.3	22	--	--	--	--
5246	300WSCKA	19950829	1520	13.0	289	8.4	6.5	30	--	--	--	--
5262	300WSCKA	19950927	1345	14.0	190	5.4	6.2	20	--	--	--	--
5263	300WSCKA	19950928	1200	13.5	305	4.6	6.8	77	--	--	--	--
5475	300WSCKA	19960903	1303	14.5	314	9.0	5.9	10	10	12	25	.90
21	300WSCKO	19930721	1401	14.0	160	12.1	6.2	13	13	6.3	6.1	1.8
75	300WSCKO	19860714	1400	14.0	165	--	5.6	--	--	--	--	--
75		19900823	1410	13.0	192	8.5	5.2	--	--	--	--	--
509	300WSCKO	19910904	1232	13.0	217	9.3	6.3	--	--	--	--	--
848	300WSCKO	19890823	1137	12.5	53	10.4	5.3	--	--	--	--	--
929	300WSCKO	19950830	1700	13.0	245	8.8	6.1	23	--	--	--	--
1110	300WSCKO	19960814	1418	14.0	185	1.7	7.1	36	17	4.5	11	.90
1299	300WSCKO	19860806	1515	--	--	--	--	--	--	--	--	--
1703	300WSCKO	19910805	1405	14.5	76	7.5	6.5	--	3.2	1.8	5.2	1.5
1720	300WSCKO	19921001	1415	13.5	239	5.9	6.0	37	--	--	--	--
1720		19930406	1133	13.0	240	6.3	5.9	21	17	7.5	15	3.0
1720		19930406	1155	12.0	246	--	--	--	--	--	--	--
1720		19930406	1247	13.5	234	--	--	--	--	--	--	--
1720		19930610	1613	13.5	253	6.0	5.9	9	19	8.0	16	3.0
1720		19930916	1254	13.5	302	6.9	6.0	52	19	8.1	24	2.9
1737	300WSCKO	19910711	1629	14.0	235	7.6	6.4	--	11	5.9	9.8	1.0

Table 8. *Results of analyses for radon-222, uranium, radium-226, radium-228, major ions, and physical and chemical properties in ground-water samples from 534 wells, Chester County, Pennsylvania, summer 1986 through spring 1997—Continued*

Chloride (mg/L)	Sulfate (mg/L)	Fluoride (mg/L)	Silica (mg/L)	Ammonium (mg/L as N)	Nitrate (mg/L as N)	Radon-222 (pCi/L)	CE Radon-222 (pCi/L)	Uranium (µg/L)	Radium-228 (pCi/L)	Radium-226 (pCi/L)	Aquifer code	Well number
5.9	25	--	--	0.010	4.00	3,700	45	--	--	--	300STRS	CH-4007
1.6	42	0.10	24	.020	<.05	2,100	49	--	--	--	300STRS	4417
85	160	<.10	15	.040	24.0	2,000	98	--	--	--	300STRS	4730
82	150	.10	19	.020	34.0	2,100	41	--	--	--		4730
10	47	<.10	22	.080	5.20	1,600	61	--	--	--	300STRS	4731
16	2.6	<.10	24	<.010	14.0	590	25	--	--	--	300STRS	4809
13	30	--	--	.020	.12	219	--	--	--	--	300WSCKA	83
12	31	--	--	--	--	2,647	--	--	--	--	300WSCKA	85
11	30	--	--	.010	3.10	4,100	54	--	--	--		85
21	29	--	--	.020	9.00	4,400	55	--	--	--	300WSCKA	87
21	--	--	--	<.015	3.30	1,700	37	--	--	--	300WSCKA	118
150	--	--	--	--	.62	2,500	45	--	--	--	300WSCKA	255
15	--	--	--	<.015	8.50	1,700	38	--	--	--	300WSCKA	1005
9.6	--	--	--	.020	4.90	3,800	55	--	--	--	300WSCKA	1106
46	--	--	--	<.015	7.40	3,500	52	--	--	--	300WSCKA	1846
28	10	<.10	8.1	--	--	2,816	--	<0.40	<2.0	--	300WSCKA	1981
6.8	24	<.10	9.4	<.010	3.10	2,400	40	--	--	--	300WSCKA	2719
30	29	.10	7.7	.010	3.70	3,000	38	--	--	--	300WSCKA	2969
6.9	24	<.10	6.0	.020	3.70	15,000	110	--	--	--	300WSCKA	4772
7.0	1.0	<.10	11	<.015	1.30	4,000	57	--	--	--	300WSCKA	5227
43	--	--	--	.050	5.10	1,300	35	--	--	--	300WSCKA	5232
3.2	--	--	--	<.015	1.60	2,500	41	--	--	--	300WSCKA	5234
11	--	--	--	<.015	3.20	6,500	71	--	--	--	300WSCKA	5237
25	--	--	--	<.015	3.60	2,700	47	--	--	--	300WSCKA	5246
26	--	--	--	<.015	2.30	3,700	55	--	--	--	300WSCKA	5262
37	--	--	--	--	1.00	4,200	56	--	--	--	300WSCKA	5263
50	24	<.10	4.5	<.015	7.20	5,000	61	<1.0	--	--	300WSCKA	5475
9.8	19	<.10	17	<.010	6.90	1,300	31	--	--	--	300WSCKO	21
21	5.0	--	--	.020	7.60	4,224	--	--	--	--	300WSCKO	75
26	16	--	--	<.010	7.40	2,900	56	--	--	--		75
8.4	20	<.10	--	<.010	15.0	1,600	100	--	--	--	300WSCKO	509
2.5	<1.0	--	--	<.010	2.40	200	38	--	--	--	300WSCKO	848
18	--	--	--	<.015	13.0	1,100	32	--	--	--	300WSCKO	929
10	9.9	.10	12	.030	1.50	2,600	43	<1.0	--	--	300WSCKO	1110
9.5	29	--	--	--	--	624	--	--	--	--	300WSCKO	1299
3.0	3.0	.10	19	<.010	2.20	2,900	42	--	--	--	300WSCKO	1703
21	2.4	<.10	--	<.010	11.0	3,900	55	--	--	--	300WSCKO	1720
22	3.0	<.10	28	.010	11.0	4,500	46	--	--	--		1720
--	--	--	--	--	--	4,200	44	--	--	--		1720
--	--	--	--	--	--	4,500	47	--	--	--		1720
27	3.4	<.10	28	.010	11.0	3,800	42	--	--	--		1720
40	4.0	<.10	30	.010	13.0	4,100	58	--	--	--		1720
16	4.6	<.10	14	.020	14.0	2,500	56	--	--	--	300WSCKO	1737

Table 8. *Results of analyses for radon-222, uranium, radium-226, radium-228, major ions, and physical and chemical properties in ground-water samples from 534 wells, Chester County, Pennsylvania, summer 1986 through spring 1997—Continued*

Local well number	Aquifer code	Date (YYYYMMDD)	Time (HHMM)	Water temperature (°C)	Specific conductance (µS/cm)	Dissolved oxygen (mg/L)	pH	Alkalinity (mg/L as $CaCO_3$)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)
CH-1765	300WSCKO	19910822	1512	13.5	164	9.9	5.7	--	9.4	6.6	5.2	2.1
1829	300WSCKO	19950831	1340	13.5	849	7.0	5.3	11	--	--	--	--
2021	300WSCKO	19930907	1427	14.5	164	8.6	6.3	18	15	4.9	6.1	1.4
2186	300WSCKO	19930818	1130	13.5	141	7.2	6.1	20	11	4.8	6.5	1.7
2189	300WSCKO	19930818	1400	14.0	325	1.2	6.3	76	30	11	18	2.3
2308	300WSCKO	19860905	1220	13.5	115	--	6.0	--	4.0	6.5	7.1	.70
2451	300WSCKO	19910715	1653	15.0	163	8.2	6.5	--	--	--	--	--
2461	300WSCKO	19950808	1110	13.5	229	6.4	5.9	22	16	7.5	7.9	3.0
2755	300WSCKO	19910823	1438	14.5	197	7.6	5.9	--	--	--	--	--
3310	300WSCKO	19890602	1509	15.5	309	12.6	5.5	--	--	--	--	--
3316	300WSCKO	19900906	1540	12.5	193	0	6.8	--	--	--	--	--
3356	300WSCKO	19890602	1147	15.5	220	7.0	5.8	--	--	--	--	--
3383	300WSCKO	19930908	1747	13.5	240	1.1	7.1	70	24	8.6	8.2	2.7
3392	300WSCKO	19930908	1604	13.5	252	.4	7.4	68	29	6.8	9.9	1.3
3426	300WSCKO	19930901	0929	14.5	805	.4	7.6	258	86	50	9.2	2.9
3432	300WSCKO	19930908	1006	13.0	167	.8	7.1	58	15	5.9	8.3	2.6
3434	300WSCKO	19930831	1630	13.5	228	9.9	6.3	26	19	8.2	7.1	1.4
3441	300WSCKO	19930909	1043	12.5	159	.2	7.1	51	17	3.6	6.0	2.0
3445	300WSCKO	19930819	1342	15.0	160	.3	6.3	37	19	2.7	5.2	1.9
3445		19930819	1450	14.0	165	.4	6.3	48	18	2.6	5.5	.90
3445		19940712	1220	14.5	158	.3	6.9	39	18	2.7	4.7	--
3447	300WSCKO	19930812	1210	14.5	267	4.4	6.4	136	31	8.6	8.2	3.4
3448	300WSCKO	19930909	1252	14.0	215	4.8	6.7	41	18	7.0	11	3.4
3469	300WSCKO	19890815	1400	17.5	198	2.8	6.4	--	--	--	--	--
3470	300WSCKO	19890816	1110	15.5	132	8.1	6.1	--	--	--	--	--
3472	300WSCKO	19890817	1545	14.0	320	9.9	6.1	--	--	--	--	--
3478	300WSCKO	19890901	1027	14.0	224	1.0	9.5	--	--	--	--	--
3485	300WSCKO	19930812	1020	14.0	144	7.9	6.0	15	9.9	3.6	7.6	3.2
3488	300WSCKO	19930902	1641	14.0	208	.4	6.3	51	12	3.5	21	2.9
3504	300WSCKO	19930720	1300	14.5	110	6.2	6.3	26	7.2	3.5	8.1	2.3
3506	300WSCKO	19930708	1412	13.0	140	7.9	6.2	67	10	3.9	7.7	2.0
3513	300WSCKO	19930902	1507	13.5	260	5.2	6.2	34	21	7.6	12	2.9
3539	300WSCKO	19890830	1357	14.0	202	<.1	6.3	--	--	--	--	--
3558	300WSCKO	19930830	1015	13.5	295	.2	7.9	96	45	5.1	5.7	4.0
3561	300WSCKO	19910814	1231	14.0	196	6.2	6.6	--	--	--	--	--
3573	300WSCKO	19930909	1545	15.0	248	9.0	6.3	28	19	8.0	11	3.0
3580	300WSCKO	19930826	1658	14.0	177	7.7	6.5	45	17	4.1	6.9	2.2
3624	300WSCKO	19900718	1015	14.0	236	<.1	6.3	--	--	--	--	--
3625	300WSCKO	19900716	1500	18.5	159	6.5	5.6	--	--	--	--	--
3627	300WSCKO	19900716	1330	16.0	185	10.0	5.7	--	--	--	--	--
3932	300WSCKO	19900718	1111	19.5	690	7.0	5.0	--	--	--	--	--
4004	300WSCKO	19900801	1055	19.0	137	4.9	7.2	--	--	--	--	--
4005	300WSCKO	19900814	1539	13.5	152	6.0	6.7	--	--	--	--	--

Table 8. *Results of analyses for radon-222, uranium, radium-226, radium-228, major ions, and physical and chemical properties in ground-water samples from 534 wells, Chester County, Pennsylvania, summer 1986 through spring 1997—Continued*

Chloride (mg/L)	Sulfate (mg/L)	Fluoride (mg/L)	Silica (mg/L)	Ammonium (mg/L as N)	Nitrate (mg/L as N)	Radon-222 (pCi/L)	CE Radon-222 (pCi/L)	Uranium (µg/L)	Radium-228 (pCi/L)	Radium-226 (pCi/L)	Aquifer code	Well number
20	3.0	<0.10	13	0.010	8.00	1,400	52	--	--	--	300WSCKO	CH-1765
130	--	--	--	<.015	36.0	1,500	36	--	--	--	300WSCKO	1829
4.9	29	.10	26	.020	3.50	2,400	100	--	--	--	300WSCKO	2021
8.3	5.3	<.10	17	<.010	7.10	5,200	63	--	--	--	300WSCKO	2186
38	23	.10	26	.020	2.40	4,300	58	--	--	--	300WSCKO	2189
7.7	3.2	<.10	10	--	--	1,887	--	<0.40	<2.0	--	300WSCKO	2308
--	--	--	--	.020	2.20	2,200	35	--	--	--	300WSCKO	2451
10	2.6	<.10	20	<.015	15.0	3,000	47	--	--	--	300WSCKO	2461
21	.6	<.10	--	.020	10.0	1,500	51	--	--	--	300WSCKO	2755
26	34	--	--	<.010	12.0	240	41	--	--	--	300WSCKO	3310
6.7	21	--	--	.010	<.100	11,000	130	--	--	--	300WSCKO	3316
10	25	--	--	<.010	6.90	4,200	58	--	--	--	300WSCKO	3356
9.8	28	<.10	17	.020	.710	1,300	50	--	--	--	300WSCKO	3383
21	15	.10	18	<.010	1.80	2,000	56	--	--	--	300WSCKO	3392
16	110	.20	17	.120	11.0	490	43	--	--	--	300WSCKO	3426
3.6	14	<.10	22	<.010	1.00	670	47	--	--	--	300WSCKO	3432
8.1	29	.10	25	.020	8.40	520	43	--	--	--	300WSCKO	3434
5.2	18	.10	28	.010	.100	1,500	66	--	--	--	300WSCKO	3441
3.9	28	.10	32	.020	<.050	1,000	64	--	--	--	300WSCKO	3445
4.4	28	.10	32	.030	<.050	1,200	64	--	--	--		3445
3.5	26	.20	32	<.010	<.050	980	30	--	--	--		3445
6.3	24	<.10	24	.020	1.20	1,200	65	--	--	--	300WSCKO	3447
8.3	42	.10	30	<.010	<.050	400	58	--	--	--	300WSCKO	3448
15	15	--	--	<.010	1.60	2,500	84	--	--	--	300WSCKO	3469
3.3	16	--	--	<.010	2.70	690	58	--	--	--	300WSCKO	3470
11	49	--	--	<.010	4.90	510	55	--	--	--	300WSCKO	3472
6.4	15	--	--	.020	<.100	320	65	--	--	--	300WSCKO	3478
7.9	21	.10	23	.010	2.70	460	59	--	--	--	300WSCKO	3485
11	30	.20	22	.090	<.050	650	45	--	--	--	300WSCKO	3488
7.0	2.7	<.10	29	<.010	4.40	3,600	39	--	--	--	300WSCKO	3504
8.8	7.7	<.10	22	.020	5.60	2,300	38	--	--	--	300WSCKO	3506
9.6	24	<.10	32	.020	11.0	1,800	53	--	--	--	300WSCKO	3513
6.1	42	--	--	.010	<.10	180	62	--	--	--	300WSCKO	3539
6.0	32	.10	16	.020	1.30	2,000	49	--	--	--	300WSCKO	3558
17	15	<.10	--	<.010	2.40	330	48	--	--	--	300WSCKO	3561
4.9	35	<.10	17	<.010	12.0	1,800	69	--	--	--	300WSCKO	3573
4.8	26	.10	26	.010	2.30	1,900	50	--	--	--	300WSCKO	3580
18	11	--	--	.090	.800	680	35	--	--	--	300WSCKO	3624
12	<1.0	--	--	--	--	1,500	43	--	--	--	300WSCKO	3625
4.9	<1.0	--	--	.060	15.0	400	37	--	--	--	300WSCKO	3627
87	150	--	--	--	--	730	36	--	--	--	300WSCKO	3932
3.9	6.0	--	--	.050	.400	280	54	--	--	--	300WSCKO	4004
4.4	30	--	--	<.010	.700	1,600	40	--	--	--	300WSCKO	4005

Table 8. *Results of analyses for radon-222, uranium, radium-226, radium-228, major ions, and physical and chemical properties in ground-water samples from 534 wells, Chester County, Pennsylvania, summer 1986 through spring 1997—Continued*

Local well number	Aquifer code	Date (YYYYMMDD)	Time (HHMM)	Water temperature (°C)	Specific conductance (µS/cm)	Dissolved oxygen (mg/L)	pH	Alkalinity (mg/L as $CaCO_3$)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)
CH-4023	300WSCKO	19900904	1247	15.5	249	7.0	5.7	--	--	--	--	--
4118	300WSCKO	19910708	1450	14.0	94	9.0	5.7	--	2.6	5.0	2.9	1.3
4121	300WSCKO	19910716	1844	14.0	275	3.4	6.5	--	--	--	--	--
4122	300WSCKO	19910719	1600	15.0	690	7.0	5.7	--	--	--	--	--
4125	300WSCKO	19910807	1203	13.5	153	4.7	6.3	--	--	--	--	--
4126	300WSCKO	19910807	1545	13.5	202	9.2	5.9	--	--	--	--	--
4133	300WSCKO	19950807	1505	12.5	220	.1	6.6	39	17	5.8	10	3.3
4275	300WSCKO	19920909	1627	14.0	154	7.1	6.0	21	--	--	--	--
4294	300WSCKO	19920929	1323	13.0	119	6.0	6.8	23	--	--	--	--
4295	300WSCKO	19920929	1634	14.5	133	.7	7.0	60	--	--	--	--
4296	300WSCKO	19921028	1252	13.5	109	10.1	6.6	12	--	--	--	--
4297	300WSCKO	19921001	1743	13.5	228	7.2	6.2	22	--	--	--	--
4341	300WSCKO	19921217	1105	11.0	520	5.6	6.1	23	52	21	12	3.0
4342	300WSCKO	19921222	0948	12.0	146	<.1	6.8	28	7.6	4.9	7.5	3.1
4343	300WSCKO	19921230	0928	12.5	174	<.1	6.9	28	4.0	4.5	8.3	1.7
4343		19930401	1029	12.5	122	<.1	6.8	64	3.9	4.3	8.2	1.7
4343		19930610	1020	13.5	119	<.1	6.8	21	4.1	4.7	8.2	1.7
4343		19930923	1006	13.5	128	<.1	6.8	33	4.0	4.3	8.4	1.7
4345	300WSCKO	19930819	1123	14.0	120	10.0	6.0	18	9.8	3.0	5.1	1.7
4345		19940711	1042	13.5	107	9.0	6.1	22	8.2	2.6	4.7	--
4361	300WSCKO	19930826	1235	13.5	58	9.5	6.6	13	3.2	.75	4.2	1.5
4362	300WSCKO	19930830	1550	13.5	149	7.3	6.2	27	11	4.8	6.5	2.2
4410	300WSCKO	19930721	1120	13.5	201	.4	7.2	42	16	8.6	11	2.5
4414	300WSCKO	19930804	1051	14.0	229	5.3	6.3	22	16	5.8	14	2.4
4416	300WSCKO	19930818	1447	13.5	228	.3	6.4	28	21	5.5	10	2.0
4495	300WSCKO	19930819	1230	15.0	89	6.8	5.6	10	4.0	1.9	8.1	1.4
4500	300WSCKO	19930819	1530	15.0	335	8.0	5.8	15	22	8.4	20	3.0
4501	300WSCKO	19930819	1715	14.5	190	4.0	6.0	31	14	6.2	9.0	2.5
4727	300WSCKO	19930831	1316	15.0	162	10.0	6.4	22	15	3.7	6.2	2.2
4806	300WSCKO	19940628	1516	12.0	248	9.4	5.7	26	14	7.1	11	3.3
4807	300WSCKO	19940705	1214	14.0	162	.9	6.6	51	13	3.8	8.3	1.8
4931	300WSCKO	19940721	1010	13.0	74	10.0	5.3	6	2.8	3.1	3.3	1.7
4932	300WSCKO	19940718	1330	13.0	154	9.3	5.7	10	9.9	5.2	6.5	1.8
4933	300WSCKO	19940714	1000	14.5	106	8.9	7.4	14	5.6	3.4	6.6	1.4
5065	300WSCKO	19950817	1615	13.0	147	.0	7.2	43	--	--	--	--
5223	300WSCKO	19950807	1300	13.0	510	1.0	6.0	65	51	18	17	4.5
5228	300WSCKO	19950810	1400	13.0	119	.1	7.1	31	5.4	4.9	7.4	1.7
5229	300WSCKO	19950810	1630	13.0	375	6.4	6.2	33	37	14	7.9	2.4
5231	300WSCKO	19950814	1730	13.0	161	9.0	5.9	20	--	--	--	--
5251	300WSCKO	19950901	1610	13.5	135	<.1	6.8	33	--	--	--	--
5474	300WSCKO	19960830	0845	13.5	124	2.9	6.7	33	11	3.2	5.2	1.7
5476	300WSCKO	19960904	1100	13.0	158	3.4	6.8	44	14	3.4	10	1.7
5477	300WSCKO	19960904	1504	12.5	126	7.1	5.9	10	8.4	3.9	5.9	1.7

Table 8. *Results of analyses for radon-222, uranium, radium-226, radium-228, major ions, and physical and chemical properties in ground-water samples from 534 wells, Chester County, Pennsylvania, summer 1986 through spring 1997—Continued*

Chloride (mg/L)	Sulfate (mg/L)	Fluoride (mg/L)	Silica (mg/L)	Ammonium (mg/L as N)	Nitrate (mg/L as N)	Radon-222 (pCi/L)	CE Radon-222 (pCi/L)	Uranium (µg/L)	Radium-228 (pCi/L)	Radium-226 (pCi/L)	Aquifer code	Well number
38	27	--	--	<0.010	1.30	330	63	--	--	--	300WSCKO	CH-4023
6.1	.20	<0.10	7.5	<.010	6.80	1,400	37	--	--	--	300WSCKO	4118
8.8	78	.10	--	.040	.780	350	60	--	--	--	300WSCKO	4121
67	57	<.10	--	.030	33.0	570	41	--	--	--	300WSCKO	4122
17	15	<.10	--	.010	.910	880	35	--	--	--	300WSCKO	4125
31	.20	<.10	--	.020	6.50	5,100	52	--	--	--	300WSCKO	4126
14	36	.10	30	<.015	<.050	260	19	--	--	--	300WSCKO	4133
17	7.0	<.10	--	.080	5.90	4,200	39	--	--	--	300WSCKO	4275
3.5	5.2	.10	--	.010	1.90	6,000	60	--	--	--	300WSCKO	4294
9.8	22	.20	--	.030	<.050	1,500	41	--	--	--	300WSCKO	4295
4.8	14	<.10	--	<.010	2.80	270	24	--	--	--	300WSCKO	4296
20	4.3	<.10	--	.020	11.0	3,300	53	--	--	--	300WSCKO	4297
53	69	<.10	22	.050	23.0	420	25	--	--	--	300WSCKO	4341
7.0	17	.10	29	.060	<.050	1,700	31	--	--	--	300WSCKO	4342
4.9	16	.10	26	.030	<.050	2,000	33	--	--	--	300WSCKO	4343
5.2	2.2	<.10	26	.030	<.050	2,000	32	--	--	--		4343
5.5	17	.10	24	<.010	<.050	2,100	36	--	--	--		4343
5.2	17	.20	26	.020	<.050	2,200	68	--	--	--		4343
7.5	2.6	.10	19	.010	4.70	380	61	--	--	--	300WSCKO	4345
5.8	2.8	.10	19	<.010	3.70	420	23	--	--	--		4345
1.4	7.5	<.10	21	.010	.770	320	41	--	--	--	300WSCKO	4361
4.4	20	.10	22	.010	3.30	320	37	--	--	--	300WSCKO	4362
9.2	31	.10	25	.050	.076	2,900	39	--	--	--	300WSCKO	4410
13	8.6	<.10	30	.020	12.0	2,200	49	--	--	--	300WSCKO	4414
31	15	.10	22	.020	1.80	360	37	--	--	--	300WSCKO	4416
8.8	.50	.10	19	<.010	3.90	3,000	82	--	--	--	300WSCKO	4495
51	12	<.10	19	.020	13.0	4,400	87	--	--	--	300WSCKO	4500
14	.40	<.10	22	.010	8.70	4,100	84	--	--	--	300WSCKO	4501
3.8	27	.10	23	.020	4.60	310	43	--	--	--	300WSCKO	4727
29	.10	<.10	19	.010	12.0	5,800	66	--	--	--	300WSCKO	4806
6.3	20	.20	32	.010	.059	710	27	--	--	--	300WSCKO	4807
6.5	1.5	<.10	9.5	.030	4.60	2,000	42	<0.40	--	--	300WSCKO	4931
13	2.6	<.10	14	.010	6.60	6,000	69	<.40	--	--	300WSCKO	4932
6.7	1.0	<.10	22	<.010	--	3,500	53	<.40	--	--	300WSCKO	4933
4.5	--	--	--	<.015	.51	1,100	32	--	--	--	300WSCKO	5065
31	76	<.10	34	<.015	15.0	900	29	--	--	--	300WSCKO	5223
4.2	12	.10	28	<.015	.21	370	21	<1.0	--	--	300WSCKO	5228
3.8	73	<.10	26	.020	12.0	660	26	--	--	--	300WSCKO	5229
14	--	--	--	.050	7.10	2,200	41	--	--	--	300WSCKO	5231
5.8	--	--	--	<.015	<.05	130	25	--	--	--	300WSCKO	5251
3.8	11	<.10	16	<.015	2.70	1,200	32	<1.0	--	--	300WSCKO	5474
4.7	8.6	.50	16	<.015	2.40	1,400	35	--	--	--	300WSCKO	5476
7.5	.50	<.10	10	.070	9.30	2,100	41	<1.0	--	--	300WSCKO	5477

Table 8. *Results of analyses for radon-222, uranium, radium-226, radium-228, major ions, and physical and chemical properties in ground-water samples from 534 wells, Chester County, Pennsylvania, summer 1986 through spring 1997—Continued*

Local well number	Aquifer code	Date (YYYYMMDD)	Time (HHMM)	Water temperature (°C)	Specific conductance (µS/cm)	Dissolved oxygen (mg/L)	pH	Alkalinity (mg/L as $CaCO_3$)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)
CH-5479	300WSCKO	19960905	1450	13.5	82	6.7	6.0	23	5.5	1.7	6.6	1.7
5480	300WSCKO	19960911	1351	13.5	73	6.5	6.6	30	6.1	1.7	5.9	1.0
307	367CNSG	19910716	1240	22.0	670	7.0	6.9	--	84	22	22	1.3
989	367CNSG	19880810	1245	14.0	490	5.8	5.6	--	--	--	--	--
1985	367CNSG	19860908	1415	13.5	480	--	7.3	--	60	20	17	1.7
1985		19930816	1700	15.0	495	6.1	7.5	183	58	18	15	1.5
2723	367CNSG	19910911	1235	13.5	855	8.4	7.2	--	100	20	29	2.6
2740	367CNSG	19880627	1545	12.5	440	10.0	7.1	--	--	--	--	--
2740		19890712	1405	15.5	472	5.6	7.3	--	--	--	--	--
2828	367CNSG	19870729	1330	13.0	677	6.6	7.0	--	92	12	25	3.0
2840	367CNSG	19880810	1040	13.0	560	5.8	7.0	--	--	--	--	--
3364	367CNSG	19890725	1518	16.0	409	7.2	7.2	--	--	--	--	--
3859	367CNSG	19930715	1000	15.5	760	<.1	7.4	280	78	26	40	2.3
4129	367CNSG	19910909	1540	15.0	805	3.8	7.0	--	130	25	14	2.6
4292	367CNSG	19920928	1323	12.5	351	2.3	7.2	202	48	8.9	8.9	.80
4546	367CNSG	19930823	1620	14.5	--	7.2	7.4	143	71	6.4	4.9	1.8
202	371ELBK	19960910	1159	15.0	733	.8	7.0	240	75	40	18	3.0
204	371ELBK	19960807	1353	13.5	1,010	3.5	7.0	283	96	62	21	2.8
245	371ELBK	19960909	1354	13.0	585	8.5	7.3	204	61	38	5.9	2.1
1978	371ELBK	19930630	1424	14.0	410	11.2	7.2	151	42	15	11	1.6
2138	371ELBK	19860912	1125	13.0	480	--	7.6	--	53	29	3.7	1.4
2560	371ELBK	19960910	1003	15.0	1,160	4.8	7.0	244	110	58	29	3.3
2611	371ELBK	19940706	1112	11.0	650	6.5	7.1	304	64	41	16	1.8
2634	371ELBK	19880815	1600	13.5	480	9.0	7.3	--	--	--	--	--
2676	371ELBK	19950817	0905	14.5	790	1.1	6.9	321	81	52	13	2.9
2677	371ELBK	19890629	1040	11.5	653	7.6	7.2	--	--	--	--	--
2725	371ELBK	19910905	1530	14.0	500	4.6	7.5	--	67	15	11	1.9
4805	371ELBK	19940622	1502	12.5	599	7.6	7.1	226	56	30	20	2.0
703	377AMHP	19870605	1300	12.0	160	7.6	6.1	--	12	6.2	5.8	3.2
992	377AMHP	19870728	1700	13.0	265	.7	5.0	--	7.1	6.7	22	5.0
1074	377AMHP	19860813	1210	15.0	530	--	4.2	--	--	--	--	--
1097	377AMHP	19870804	1415	13.0	121	8.7	4.9	--	4.5	5.6	4.7	3.8
1361	377AMHP	19860808	1540	12.0	170	--	5.3	--	2.6	2.4	22	2.1
3079	377AMHP	19870727	1550	13.5	103	<.1	6.6	--	3.6	4.0	2.9	3.0
3136	377AMHP	19870908	1305	12.5	150	7.5	4.9	--	3.2	3.1	15	2.8
3332	377AMHP	19880830	1450	12.0	150	9.0	5.7	--	11	4.5	5.7	3.0
4137	377AMHP	19911015	1225	14.0	101	6.0	5.1	--	--	--	--	--
4138	377AMHP	19950906	1749	12.0	50	6.8	5.8	15	--	--	--	--
4142	377AMHP	19911016	0944	--	--	--	--	--	--	--	--	--
4142		19911016	0945	11.0	60	9.6	6.1	--	--	--	--	--
4143	377AMHP	19911015	1340	13.0	100	7.4	4.9	--	--	--	--	--
4601	377AMHP	19950906	1428	14.5	223	2.3	4.9	8	--	--	--	--
4767	377AMHP	19950810	1416	11.5	52	7.8	5.6	6	.87	1.8	2.3	1.7

Table 8. *Results of analyses for radon-222, uranium, radium-226, radium-228, major ions, and physical and chemical properties in ground-water samples from 534 wells, Chester County, Pennsylvania, summer 1986 through spring 1997—Continued*

Chloride (mg/L)	Sulfate (mg/L)	Fluoride (mg/L)	Silica (mg/L)	Ammonium (mg/L as N)	Nitrate (mg/L as N)	Radon-222 (pCi/L)	CE Radon-222 (pCi/L)	Uranium (µg/L)	Radium-228 (pCi/L)	Radium-226 (pCi/L)	Aquifer code	Well number
4.0	0.90	<0.10	25	<0.015	2.60	3,700	54	<1.0	--	--	300WSCKO	CH-5479
3.9	.80	<.10	20	<.015	1.20	2,100	41	<1.0	--	--	300WSCKO	5480
52	31	.10	8.8	.020	3.80	510	65	--	--	--	367CNSG	307
22	51	--	--	--	--	800	--	.01	<1.0	0.16	367CNSG	989
33	32	1.4	8.0	--	--	639	--	1.2	2.0	--	367CNSG	1985
31	29	1.2	7.5	.030	1.20	780	40	--	--	--		1985
46	66	.20	11	<.010	3.40	590	37	--	--	--	367CNSG	2723
16	37	--	--	--	--	2,054	--	.28	--	--	367CNSG	2740
17	37	--	--	.020	4.50	730	30	--	--	--		2740
26	33	.10	13	--	--	520	--	2.4	<.50	.33	367CNSG	2828
24	36	--	--	--	--	600	--	.26	<1.0	.07	367CNSG	2840
17	19	--	--	<.010	4.70	1,800	42	--	--	--	367CNSG	3364
68	47	.20	9.4	<.010	.390	1,100	35	--	--	--	367CNSG	3859
28	62	<.10	15	<.010	4.00	800	62	--	--	--	367CNSG	4129
17	15	<.10	7.5	.010	1.70	480	24	--	--	--	367CNSG	4292
16	31	.10	11	.020	6.70	860	39	--	--	--	367CNSG	4546
25	32	.20	8.3	<.015	1.40	470	23	2.0	--	--	371ELBK	202
110	25	.40	7.7	.020	.22	2,000	41	--	--	--	371ELBK	204
9.9	20	.20	8.8	<.015	3.30	660	26	--	--	--	371ELBK	245
20	16	<.10	8.6	.040	2.90	500	27	--	--	--	371ELBK	1978
12	21	.20	8.2	--	--	306	--	<.40	<2.0	--	371ELBK	2138
150	51	<.10	24	<.015	3.70	400	22	--	--	--	371ELBK	2560
24	28	.10	6.3	.020	2.00	380	22	<1.0	--	--	371ELBK	2611
6.7	37	--	--	--	--	142	--	.16	<1.0	.07	371ELBK	2634
32	78	.20	9.8	.030	2.20	49	15	--	--	--	371ELBK	2676
11	32	--	--	--	--	220	43	--	--	--	371ELBK	2677
22	22	<.10	7.9	--	--	540	90	--	--	--	371ELBK	2725
33	29	<.10	10	.010	2.40	780	31	--	--	--	371ELBK	4805
13	5.6	.10	21	--	--	228	--	.14	<1.0	<.20	377CCKS	703
15	13	.10	8.3	--	--	5,275	--	.05	2.0	1.8	377AMHP	992
16	260	--	--	--	--	2,637	--	.50	<2.0	--	377AMHP	1074
6.8	4.9	.10	11	--	--	2,835	--	<.05	--	--	377AMHP	1097
38	3.1	<.10	7.1	--	--	4,013	--	<.40	<.80	.36	377AMHP	1361
2.0	9.8	.20	19	--	--	1,075	--	<.05	<2.0	--	377AMHP	3079
24	12	.10	6.9	--	--	785	--	<.05	<.90	.64	377AMHP	3136
9.9	5.8	.10	12	<.010	7.80	25,829	--	<.01	12	2.9	377AMHP	3332
--	--	--	--	--	--	4,700	42	--	1.3	.08	377AMHP	4137
1.3	--	--	--	<.015	.08	1,100	32	--	--	--	377AMHP	4138
--	--	--	--	--	--	3,400	40	--	--	--	377AMHP	4142
--	--	--	--	--	--	3,300	40	--	--	--		4142
--	--	--	--	--	--	6,500	46	--	--	--	377AMHP	4143
21	--	--	--	<.015	10.0	5,500	64	--	--	--	377AMHP	4601
4.4	4.9	<.10	7.6	.020	.73	1,700	38	--	--	--	377AMHP	4767

Table 8. *Results of analyses for radon-222, uranium, radium-226, radium-228, major ions, and physical and chemical properties in ground-water samples from 534 wells, Chester County, Pennsylvania, summer 1986 through spring 1997—Continued*

Local well number	Aquifer code	Date (YYYYMMDD)	Time (HHMM)	Water temperature (°C)	Specific conductance (µS/cm)	Dissolved oxygen (mg/L)	pH	Alkalinity (mg/L as $CaCO_3$)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)
CH-5091	377AMHP	19940908	1540	11.0	115	8.6	5.3	4	2.5	4.5	5.6	2.7
86	377CCKS	19860725	1115	12.0	140	--	6.0	--	3.4	3.0	16	2.3
293	377CCKS	19861113	1000	11.5	340	6.6	6.4	--	27	14	19	1.6
333	377CCKS	19861115	1230	11.5	189	6.1	4.8	--	9.7	7.8	8.3	2.2
417	377CCKS	19861124	1300	11.5	77	5.2	5.2	--	2.2	2.5	3.8	3.5
418	377CCKS	19861205	1200	11.5	41	6.2	4.9	--	.50	.70	2.7	2.5
427	377CCKS	19861205	1330	11.0	19	9.0	5.2	--	.40	.50	1.2	.7
505	377CCKS	19870508	1300	12.0	125	8.8	5.9	--	12	3.1	4.4	1.9
693	377CCKS	19870529	1330	14.0	64	8.0	5.9	--	7.0	2.0	2.4	1.0
945	377CCKS	19861113	1315	14.0	93	5.2	5.5	--	4.0	4.4	2.7	3.4
991	377CCKS	19860718	1210	17.0	55	--	5.7	--	--	--	--	--
1089	377CCKS	19870612	1130	12.0	145	7.3	5.3	--	4.4	3.5	12	3.9
1090	377CCKS	19870617	1400	12.0	76	--	4.7	--	1.8	3.0	4.4	1.5
1091	377CCKS	19870618	1330	12.0	39	5.1	4.8	--	.47	1.0	3.8	2.0
1092	377CCKS	19870623	1645	13.5	62	8.4	5.0	--	.44	1.3	8.6	1.6
1093	377CCKS	19870626	1130	13.0	193	8.0	5.6	--	5.4	4.7	19	3.7
1094	377CCKS	19870626	1640	11.5	10	11.3	5.2	--	.10	.37	1.5	.8
1095	377CCKS	19870728	1230	13.5	163	7.3	4.7	--	3.7	6.6	11	3.3
1096	377CCKS	19870729	1545	11.5	15	10.2	4.9	--	.46	.45	1.5	1.4
1098	377CCKS	19870805	1600	11.5	70	10.0	4.7	--	.64	2.7	2.4	1.4
1213	377CCKS	19870702	1045	12.5	203	7.3	5.3	--	8.0	10	2.2	11
1217	377CCKS	19870630	1520	14.0	114	8.8	5.6	--	9.6	2.5	6.8	2.5
1265	377CCKS	19861121	1130	11.5	229	2.3	4.8	--	3.2	4.6	26	2.1
1286	377CCKS	19861201	1430	11.5	200	6.0	4.6	--	2.5	2.5	29	4.6
1296	377CCKS	19870902	1700	13.0	118	9.5	4.8	--	2.2	1.8	13	4.3
1364	377CCKS	19860718	1445	16.5	85	--	4.7	--	--	--	--	--
1367	377CCKS	19870805	1400	13.0	70	9.1	4.5	--	1.7	3.1	4.3	2.4
1376	377CCKS	19870904	1645	12.0	131	3.2	4.8	--	3.6	3.2	13	2.1
1616	377CCKS	19861112	1240	12.0	203	5.1	5.3	--	6.6	5.4	22	1.6
1616		19871023	1500	12.0	242	6.4	5.1	--	6.8	5.5	23	1.3
1617	377CCKS	19870603	1149	13.0	116	8.2	4.7	--	5.2	3.5	7.5	1.1
1617		19910801	1730	12.5	111	8.0	4.6	--	5.0	3.8	6.2	1.1
1617		19910910	1414	12.5	110	8.5	4.6	--	5.3	3.8	5.0	1.2
1617		19910930	1656	12.0	109	8.8	4.7	--	5.1	3.7	4.8	1.1
1617		19911104	1423	12.0	107	8.6	4.7	--	5.2	3.8	4.3	1.2
1617		19920107	1200	12.0	115	7.8	4.8	--	--	--	--	--
1618	377CCKS	19870522	1400	13.5	164	7.4	4.6	--	3.5	6.8	7.5	4.8
2113	377CCKS	19861110	1500	--	--	--	--	--	7.8	3.3	13	1.6
2115	377CCKS	19861110	1100	11.5	127	10.6	6.6	--	13	5.0	3.9	2.2
2197	377CCKS	19860715	1635	12.0	40	--	5.0	--	--	--	--	--
2315	377CCKS	19890808	1655	17.5	84	8.7	6.0	--	--	--	--	--
2403	377CCKS	19860808	1330	13.5	112	--	5.2	--	--	--	--	--
2410	377CCKS	19861120	1200	--	--	--	--	--	6.3	4.3	11	1.2

Table 8. *Results of analyses for radon-222, uranium, radium-226, radium-228, major ions, and physical and chemical properties in ground-water samples from 534 wells, Chester County, Pennsylvania, summer 1986 through spring 1997—Continued*

Chloride (mg/L)	Sulfate (mg/L)	Fluoride (mg/L)	Silica (mg/L)	Ammonium (mg/L as N)	Nitrate (mg/L as N)	Radon-222 (pCi/L)	CE Radon-222 (pCi/L)	Uranium (µg/L)	Radium-228 (pCi/L)	Radium-226 (pCi/L)	Aquifer code	Well number
13	0.70	<0.10	8.6	0.010	4.90	4,900	61	<1.0	--	--	377AMHP	CH-5091
8.6	24	.20	7.6	--	--	3,207	--	--	--	--	377CCKS	86
28	46	<.10	12	--	--	320	--	.30	3.5	1.6	377CCKS	293
6.5	62	.10	8.8	--	--	1,317	--	.30	22	9.5	377CCKS	333
7.8	2.7	<.10	10	--	--	4,315	--	.17	<1.0	.48	377CCKS	417
4.9	1.4	<.10	9.0	--	--	9,266	--	.32	7.6	2.9	377CCKS	418
2.8	.4	<.10	6.4	--	--	273	--	.16	1.8	.78	377CCKS	427
10	12	<.10	18	--	--	397	--	.21	.60	<.10	377CCKS	505
8.2	.6	.20	18	--	--	2,231	--	.26	<.60	<.20	377CCKS	693
4.3	13	<.10	8.7	--	--	3,119	--	.15	<1.0	.82	377CCKS	945
--	--	--	--	--	--	9,087	--	--	3.5	1.6	377CCKS	991
21	.7	<.10	12	--	--	3,629	--	<.05	22	9.5	377CCKS	1089
9.0	9.6	.20	6.7	--	--	1,415	--	<.05	<1.0	.48	377CCKS	1090
5.8	3.7	.10	10	--	--	3,335	--	<.05	7.6	2.9	377CCKS	1091
7.3	7.4	.10	8.3	--	--	415	--	<.05	1.8	.78	377CCKS	1092
34	8.3	.10	12	--	--	2,993	--	<.05	.60	<.10	377CCKS	1093
2.4	<.2	.10	6.0	--	--	2,073	--	<.05	<.60	<.20	377CCKS	1094
12	7.4	.10	9.8	--	--	5,630	--	.18	<1.0	<.20	377CCKS	1095
1.9	.3	.10	8.0	--	--	4,790	--	<.05	<1.0	.82	377CCKS	1096
5.4	5.6	.10	7.1	--	--	490	--	<.05	3.6	1.4	377CCKS	1098
8.7	37	.20	7.0	--	--	1,200	--	.09	2.9	2.1	377CCKS	1213
8.7	6.6	.10	22	--	--	1,745	--	<.05	.70	.93	377CCKS	1217
58	1.8	<.10	7.1	--	--	370	--	.18	2.7	2.7	377CCKS	1265
44	2.6	<.10	9.0	--	--	3,280	--	.18	12	.40	377CCKS	1286
24	10	.10	9.6	--	--	1,935	--	.24	6.3	4.8	377CCKS	1296
--	--	--	--	--	--	955	--	--	21	--	377CCKS	1364
8.2	.30	.10	7.4	--	--	7,255	--	.35	9.9	3.8	377CCKS	1367
13	11	.10	7.0	--	--	5,820	--	.06	--	--	377CCKS	1376
35	27	<.10	5.7	--	--	3,395	--	.30	26	2.5	377CCKS	1616
36	26	.10	5.7	--	--	3,665	--	.87	29	4.1		1616
14	25	.10	6.5	--	--	280	--	.25	17	3.7	377CCKS	1617
8.9	22	--	6.4	<.010	1.10	1,100	43	--	--	--		1617
9.1	27	--	6.6	<.010	1.00	1,100	55	--	--	--		1617
8.0	25	.20	6.5	.030	1.20	1,000	33	--	--	--		1617
7.3	25	.20	6.6	<.010	1.20	1,000	33	--	--	--		1617
--	--	--	--	--	--	1,000	37	--	--	--		1617
17	26	.30	9.3	--	--	1,894	--	.21	32	3.7	377CCKS	1618
16	27	<.10	4.7	--	--	2,170	--	.22	12	1.7	377CCKS	2113
2.3	21	<.10	19	--	--	1,595	--	.25	<1.0	<.60	377CCKS	2115
--	--	--	--	--	--	2,584	--	--	13	--	377CCKS	2197
3.1	<1.0	--	--	.020	3.30	18,000	87	--			377CCKS	2315
18	11	--	--	--	--	1,525	--	<.40	4.0	--	377CCKS	2403
23	.90	<.10	16	--	--	8,577	--	.15	4.9	2.3	377CCKS	2410

Table 8. *Results of analyses for radon-222, uranium, radium-226, radium-228, major ions, and physical and chemical properties in ground-water samples from 534 wells, Chester County, Pennsylvania, summer 1986 through spring 1997—Continued*

Local well number	Aquifer code	Date (YYYYMMDD)	Time (HHMM)	Water temperature (°C)	Specific conductance (µS/cm)	Dissolved oxygen (mg/L)	pH	Alkalinity (mg/L as $CaCO_3$)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)
CH-2417	377CCKS	19880826	1442	12.0	25	9.6	5.1	--	0.27	0.45	2.2	1.1
2418	377CCKS	19861122	1300	11.5	27	7.7	5.4	--	.50	.80	2.2	1.5
2429	377CCKS	19860729	0945	12.5	262	--	4.4	--	--	--	--	--
2436	377CCKS	19860715	1230	13.0	75	--	5.3	--	--	--	--	--
2541	377CCKS	19860729	1440	13.0	700	--	7.4	--	--	--	--	--
2555	377CCKS	19860805	1210	13.5	430	--	5.1	--	7.0	7.8	57	5.3
2847	377CCKS	19870905	1200	12.0	49	8.0	4.8	--	1.5	1.8	4.0	2.4
3076	377CCKS	19870716	1650	11.0	160	6.8	4.8	--	5.2	4.8	8.9	3.5
3087	377CCKS	19870813	1705	12.5	82	--	4.3	--	3.4	3.0	1.6	1.4
3088	377CCKS	19870813	1430	11.5	33	--	5.5	--	.98	1.2	2.1	2.7
3111	377CCKS	19870826	1620	12.0	36	--	4.9	--	1.0	1.2	4.2	1.3
3112	377CCKS	19870828	1305	12.5	214	--	4.4	--	6.2	1.7	23	1.6
3112		19890601	1005	13.0	150	7.2	4.3	--	--	--	--	--
3113	377CCKS	19870828	1505	12.0	219	--	5.6	--	.67	2.0	1.7	1.2
3114	377CCKS	19870829	0955	12.5	--	--	4.7	--	3.3	3.8	40	2.1
3122	377CCKS	19870904	1400	11.0	70	--	6.2	--	6.5	1.9	2.2	3.6
3123	377CCKS	19870902	1245	12.0	42	--	5.0	--	1.9	2.6	2.2	1.2
3124	377CCKS	19870902	1500	12.0	38	--	4.6	--	5.9	5.7	7.7	1.4
3125	377CCKS	19870901	1110	12.5	271	--	4.3	--	5.2	3.1	23	3.2
3126	377CCKS	19870901	1305	12.0	16	--	5.3	--	.49	.49	1.3	2.2
3127	377CCKS	19870901	1625	12.5	165	--	5.3	--	6.8	3.9	12	9.7
3128	377CCKS	19870903	1015	12.5	68	--	4.3	--	2.6	2.4	1.6	.9
3131	377CCKS	19870904	1530	11.5	16	--	5.2	--	.50	.42	1.7	1.7
3132	377CCKS	19870903	1245	12.0	304	--	4.4	--	5.9	6.2	33	1.9
3133	377CCKS	19871021	1359	11.0	19	5.5	4.8	--	.31	.40	2.3	1.6
3160	377CCKS	19880822	1046	13.0	37	6.7	5.1	--	.45	.59	3.3	1.6
3166	377CCKS	19871019	1500	12.0	23	--	5.1	--	.53	.87	3.0	.70
3168	377CCKS	19870929	1040	12.5	114	9.4	4.8	--	5.4	4.6	3.3	2.7
3189	377CCKS	19880830	1123	11.5	37	9.8	4.9	--	.33	1.1	2.1	1.9
3214	377CCKS	19871022	1550	12.5	226	8.7	4.6	--	4.0	7.4	18	2.0
3215	377CCKS	19871023	1315	12.5	465	7.8	5.3	--	7.1	8.0	52	3.3
3219	377CCKS	19880616	1440	13.0	44	10.0	5.4	--	.44	1.6	1.6	--
3219		19880616	1441	--	--	--	--	--	--	--	--	--
3219		19880823	1542	13.5	44	10.6	4.5	--	.58	2.1	.90	1.4
3315	377CCKS	19880901	1611	13.0	58	9.8	4.9	--	2.5	2.2	1.2	1.0
3325	377CCKS	19880816	1330	12.0	130	7.2	4.6	--	5.1	5.5	3.3	3.1
3326	377CCKS	19880816	1643	11.5	92	5.5	6.4	--	6.7	3.7	2.9	4.6
3327	377CCKS	19880826	1238	16.5	77	10.4	4.4	--	1.5	2.3	1.5	1.4
3328	377CCKS	19880826	1609	13.0	53	8.0	5.3	--	1.8	1.4	4.0	1.5
3329	377CCKS	19880822	1321	12.0	36	9.0	5.0	--	.59	1.0	2.6	3.1
3330	377CCKS	19880823	1414	12.0	57	9.2	4.8	--	.58	1.9	3.2	2.0
3331	377CCKS	19880823	1055	14.0	245	7.4	4.4	--	15	3.2	14	4.0
3331	377CCKS	19900105	1547	10.5	260	7.9	4.4	--	--	--	--	--

Table 8. *Results of analyses for radon-222, uranium, radium-226, radium-228, major ions, and physical and chemical properties in ground-water samples from 534 wells, Chester County, Pennsylvania, summer 1986 through spring 1997—Continued*

Chloride (mg/L)	Sulfate (mg/L)	Fluoride (mg/L)	Silica (mg/L)	Ammonium (mg/L as N)	Nitrate (mg/L as N)	Radon-222 (pCi/L)	CE Radon-222 (pCi/L)	Uranium (µg/L)	Radium-228 (pCi/L)	Radium-226 (pCi/L)	Aquifer code	Well number
2.6	0.40	<0.10	7.9	<0.010	0.59	3,558	--	<0.01	<1.0	0.47	377CCKS	CH-2417
3.3	1.1	<.10	8.8	--	--	1,328	--	.12	2.6	<.70	377CCKS	2418
39	47	--	--	--	--	1,229	--	--	--	--	377CCKS	2429
--	--	--	--	--	--	416	--	--	--	--	377CCKS	2436
60	45	--	--	--	--	177	--	--	--	--	377CCKS	2541
120	1.0	<.10	11	<.010	.72	2,299	--	<.40	<2.0	--	377CCKS	2555
7.6	.90	<.10	9.7	--	--	3,725	--	.08	2.9	.78	377CCKS	2847
14	3.6	.20	9.7	--	--	7,840	--	.12	10	2.4	377CCKS	3076
3.2	24	.20	5.8	--	--	335	--	<.05	32	8.7	377CCKS	3087
2.7	1.8	.10	10	--	--	7,260	--	<.05	<.70	.38	377CCKS	3088
7.1	4.2	<.10	7.3	--	--	970	--	<.05	2.3	1.2	377CCKS	3111
20	34	.20	4.4	--	--	590	--	<.05	44	8.0	377CCKS	3112
12	25	--	--	<.010	2.90	750	46	--	--	--		3112
4.2	9.0	.10	8.2	--	--	1,335	--	1.1	--	--	377CCKS	3113
83	3.9	.10	8.1	--	--	590	--	<.05	54	5.2	377CCKS	3114
2.3	1.9	.10	11	--	--	9,195	--	.13	1.8	1.0	377CCKS	3122
3.2	9.2	.10	9.5	--	--	6,460	--	.55	8.0	2.1	377CCKS	3123
9.7	45	.10	8.0	--	--	3,705	--	.07	2.7	2.4	377CCKS	3124
18	41	.50	6.8	--	--	625	--	.10	8.0	4.9	377CCKS	3125
2.1	1.7	.10	9.4	--	--	6,920	--	<.05	<.80	<.20	377CCKS	3126
12	18	.10	9.9	--	--	6,440	--	.09	6.7	1.2	377CCKS	3127
3.1	23	.20	5.8	--	--	1,085	--	<.05	30	11	377CCKS	3128
1.8	.70	<.10	8.4	--	--	4,680	--	.08	3.4	.68	377CCKS	3131
42	28	.30	7.4	--	--	1,355	--	<.05	55	31	377CCKS	3132
2.6	2.0	.10	9.5	--	--	4,425	--	<.05	<.80	.77	377CCKS	3133
6.0	1.4	.10	6.5	<.010	.290	1,704	--	<.01	1.5	.20	377CCKS	3160
6.0	.20	.10	7.4	--	--	836	--	<.05	4.1	1.5	377CCKS	3166
5.6	31	.10	8.7	--	--	700	--	<.05	17	2.1	377CCKS	3168
3.1	.40	.10	7.9	<.010	1.70	2,690	--	.03	2.4	4.2	377CCKS	3189
39	15	.10	9.0	--	--	5,820	--	.11	8.7	5.2	377CCKS	3214
100	14	.10	7.3	--	--	630	--	.08	25	5.4	377CCKS	3215
--	--	--	6.0	<.010	.230	670	--	--	13	4.6	377CCKS	3219
--	--	--	--	--	--	671	--	--	16	6.2	377CCKS	3219
1.8	10	.10	5.8	.020	.270	772	--	.02	--	--	377CCKS	3219
1.9	15	.10	5.9	<.010	.280	325	--	.04	19	5.3	377CCKS	3315
6.0	14	.10	7.8	<.010	6.00	1,314	--	.10	10	6.2	377CCKS	3325
2.6	.60	.10	14	.010	.720	32,280	--	1.0	<1.0	1.2	377CCKS	3326
3.2	17	.20	6.1	.020	.540	843	--	.09	28	12	377CCKS	3327
6.0	<.20	<.10	13	<.010	1.40	26,097	--	.32	<1.0	1.0	377CCKS	3328
5.5	2.6	<.10	6.6	<.010	<.100	2,208	--	.04	<1.0	1.9	377CCKS	3329
8.0	1.3	.10	7.1	<.010	1.50	1,525	--	.03	1.9	3.1	377CCKS	3330
22	27	.20	5.4	<.010	9.90	822	--	.07	160	12	377CCKS	3331
--	--	--	--	--	--	710	86	--	--	--	377CCKS	3331

Table 8. *Results of analyses for radon-222, uranium, radium-226, radium-228, major ions, and physical and chemical properties in ground-water samples from 534 wells, Chester County, Pennsylvania, summer 1986 through spring 1997—Continued*

Local well number	Aquifer code	Date (YYYYMMDD)	Time (HHMM)	Water temperature (°C)	Specific conductance (µS/cm)	Dissolved oxygen (mg/L)	pH	Alkalinity (mg/L as $CaCO_3$)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)
CH-3333	377CCKS	19880906	1215	12.5	75	6.0	4.9	--	1.1	2.9	2.8	3.9
3334	377CCKS	19880906	1405	12.0	49	10.1	5.1	--	.82	2.3	1.9	1.1
3335	377CCKS	19880906	1653	12.5	370	2.6	4.6	--	5.7	8.0	45	2.4
3335		19881128	1555	11.5	320	--	4.8	--	--	--	--	--
3335		19881228	1301	11.5	350	1.8	4.6	--	--	--	--	--
3335		19890131	1544	11.5	370	1.4	4.6	--	--	--	--	--
3335		19890228	1434	11.0	403	2.8	4.6	--	--	--	--	--
3335		19890501	1152	11.5	475	3.3	4.7	--	--	--	--	--
3335		19890330	1253	11.0	409	3.4	4.9	--	--	--	--	--
3335		19890531	1102	12.0	408	6.0	4.9	--	--	--	--	--
3335		19890628	1152	12.5	440	1.6	4.6	--	--	--	--	--
3335		19890731	1328	12.0	477	2.6	4.7	--	--	--	--	--
3335		19890829	1639	13.0	455	1.8	4.5	--	--	--	--	--
3335		19890929	1234	12.0	422	.9	4.6	--	--	--	--	--
3335		19891030	1158	12.0	418	2.2	4.6	--	--	--	--	--
3335		19891127	1328	11.5	408	2.3	4.5	--	--	--	--	--
3335		19900103	1153	11.5	359	3.2	4.7	--	--	--	--	--
3335		19900213	1351	10.5	370	5.6	5.0	--	--	--	--	--
3335		19900403	1134	10.5	323	4.5	4.8	--	--	--	--	--
3335		19900427	1216	13.5	455	3.9	4.7	--	--	--	--	--
3335		19900531	1309	11.5	412	4.0	5.0	--	--	--	--	--
3335		19900628	1529	12.5	420	3.2	4.7	--	--	--	--	--
3335		19900727	1319	12.5	388	2.3	4.6	--	--	--	--	--
3335		19900829	1626	12.0	388	1.4	4.7	--	--	--	--	--
3335		19900928	1530	11.5	382	1.6	4.6	--	--	--	--	--
3335		19901102	1647	11.5	358	1.5	5.0	--	--	--	--	--
3335		19901206	1506	11.0	351	1.5	4.7	--	--	--	--	--
3335		19910102	1450	11.0	292	2.6	5.0	--	6.3	7.3	40	2.7
3335		19910204	1616	11.0	456	1.6	4.8	--	--	--	--	--
3335		19910228	1433	11.5	448	1.5	4.5	--	--	--	--	--
3335		19910328	1118	11.5	373	3.9	5.1	--	--	--	--	--
3335		19910426	1613	11.5	412	3.8	5.1	--	--	--	--	--
3335		19910603	1554	12.0	442	2.2	4.5	--	--	--	--	--
3335		19910627	1205	12.0	430	1.3	4.7	--	6.9	8.5	62	2.3
3335		19910910	1209	12.5	370	.9	4.5	--	6.0	7.6	49	2.9
3335		19910930	1520	12.0	360	1.5	4.7	--	5.8	7.3	48	2.7
3335		19911104	1649	12.0	361	1.5	4.7	--	5.4	7.2	47	2.8
3335		19911204	1550	12.0	295	3.0	5.0	--	6.2	6.4	35	3.4
3335		19920107	1354	12.0	379	1.6	4.6	--	--	--	--	--
3335		19920302	1547	11.5	363	1.5	4.9	--	--	--	--	--
3335		19920429	1413	12.0	435	1.7	5.2	--	--	--	--	--
3337	377CCKS	19880908	1333	12.0	29	10.4	5.7	--	1.6	.61	1.8	1.2
3338	377CCKS	19880908	1558	12.0	160	6.6	4.5	--	3.7	5.8	9.3	2.2

Table 8. *Results of analyses for radon-222, uranium, radium-226, radium-228, major ions, and physical and chemical properties in ground-water samples from 534 wells, Chester County, Pennsylvania, summer 1986 through spring 1997—Continued*

Chloride (mg/L)	Sulfate (mg/L)	Fluoride (mg/L)	Silica (mg/L)	Ammonium (mg/L as N)	Nitrate (mg/L as N)	Radon-222 (pCi/L)	CE Radon-222 (pCi/L)	Uranium (µg/L)	Radium-228 (pCi/L)	Radium-226 (pCi/L)	Aquifer code	Well number
4.8	15	0.10	8.8	0.030	0.810	2,799	--	0.17	25	3.7	377CCKS	CH-3333
3.1	11	<.10	8.0	<.010	<.100	1,287	--	.01	12	1.1		3334
86	19	.10	7.4	.220	2.60	5,523	--	.21	150	14		3335
--	--	--	--	--	--	6,700	--	--	--	--		3335
--	--	--	--	--	--	7,500	--	--	131	13.7		3335
92	17	--	--	.250	2.40	7,900	65	--	155	15.3		3335
100	23	--	--	.390	2.50	5,900	79	--	130	10.7		3335
120	29	--	--	.130	2.60	3,800	51	--	86.3	6.9		3335
95	29	--	--	.190	2.70	3,600	73	--	80.7	6.6		3335
94	31	--	--	.020	1.90	2,800	29	--	64.2	4.4		3335
110	28	--	--	.080	2.60	4,300	91	--	81.1	6.2		3335
120	27	--	--	.100	2.90	4,300	65	--	82.0	6.1		3335
110	24	--	--	.200	2.90	4,800	96	--	99.6	8.4		3335
110	19	--	--	.240	2.80	6,300	78	--	119	10.1		3335
110	20	--	--	.230	3.00	6,100	53	--	120	10.9		3335
100	18	--	--	.180	2.80	6,900	40	--	135	12.0		3335
86	17	--	--	.110	2.90	6,000	55	--	--	--		3335
95	29	--	--	.020	2.20	3,600	86	--	--	--		3335
87	20	--	--	.150	2.30	3,400	48	--	82	6.5		3335
100	27	--	--	.050	2.30	4,700	58	--	102	8.2		3335
94	25	--	--	.040	2.20	3,600	60	--	84	6.2		3335
100	25	--	--	.080	2.50	5,500	68	--	95	8.5		3335
95	20	--	--	.150	2.70	6,300	65	--	123	10.6		3335
94	17	--	--	.190	2.70	6,400	53	--	121	10.7		3335
88	20	.20	--	.180	2.70	6,600	60	--	135	13.5		3335
78	19	.40	--	.280	2.60	6,700	60	--	133	14.2		3335
85	19	.30	--	.270	2.50	6,600	70	--	145	13.8		3335
74	22	.20	6.3	.120	1.90	5,200	72	--	107	9.8		3335
110	23	.10	--	.340	3.10	4,800	93	--	105	9.0		3335
110	26	--	--	--	--	5,200	73	--	116	10.5		3335
76	30	--	--	.090	2.20	2,800	63	--	65	5.3		3335
90	32	--	--	.080	2.30	2,800	51	--	63	5.0		3335
110	27	--	--	0.110	3.00	4,900	46	--	77	9.3		3335
100	21	--	6.8	.210	3.00	6,200	95	--	97	8.6		3335
90	17	--	7.2	.280	2.40	7,300	80	--	105	10.9		3335
83	18	.10	7.1	.330	2.80	7,100	79	--	136	13.4		3335
85	16	.20	7.2	.300	2.60	7,300	55	--	135	14.5		3335
70	18	<.10	6.2	--	--	5,500	49	--	115	13.7		3335
98	17	.20	--	.340	2.40	7,100	61	--	92	9.9		3335
90	17	.10	--	.280	2.50	6,900	52	--	145	12.9		3335
100	20	<.10	--	.190	2.80	7,100	54	--	126	13.1		3335
2.2	1.6	<.10	9.6	.010	.110	30,601	--	.04	--	--	377CCKS	3337
13	31	.20	7.8	.010	2.20	2,387	--	.14	--	--	377CCKS	3338

Table 8. *Results of analyses for radon-222, uranium, radium-226, radium-228, major ions, and physical and chemical properties in ground-water samples from 534 wells, Chester County, Pennsylvania, summer 1986 through spring 1997—Continued*

Local well number	Aquifer code	Date (YYYYMMDD)	Time (HHMM)	Water temperature (°C)	Specific conductance (µS/cm)	Dissolved oxygen (mg/L)	pH	Alkalinity (mg/L as $CaCO_3$)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)
CH-3339	377CCKS	19880909	1527	11.5	110	8.1	5.3	--	3.3	3.3	9.5	2.0
3355	377CCKS	19890601	1347	12.5	172	2.4	6.8	--	--	--	--	--
3360	377CCKS	19890703	0930	12.5	51	11.0	5.8	--	--	--	--	--
3365	377CCKS	19890801	1440	11.5	26	10.6	4.8	--	--	--	--	--
3551	377CCKS	19890905	1443	13.0	33	10.2	5.3	--	--	--	--	--
3719	377CCKS	19900105	1141	13.0	193	4.9	5.6	--	--	--	--	--
4771	377CCKS	19950822	1002	12.5	116	6.7	5.9	33	1.0	1.7	18	2.0
4802	377CCKS	19940608	1359	13.5	620	2.9	7.1	248	66	36	11	2.2
88	377LDGR	19860729	1300	13.5	600	--	7.5	--	--	--	--	--
249	377LDGR	19870825	1220	13.0	380	1.0	7.8	--	50	16	4.8	2.1
1315	377LDGR	19920928	0950	13.0	403	7.0	7.4	163	36	23	8.0	1.1
1316	377LDGR	19920928	1000	13.5	459	9.2	7.6	156	42	26	15	1.2
2161	377LDGR	19880627	1135	15.0	510	4.8	7.5	--	--	--	--	--
2161		19900905	0928	14.5	575	3.5	6.8	--	99	11	3.5	1.6
2348	377LDGR	19880624	1415	14.0	850	1.8	7.3	--	--	--	--	--
2402	377LDGR	19940607	1639	12.5	1,270	.6	7.1	398	78	56	91	6.1
2411	377LDGR	19890822	1620	14.5	990	.5	7.1	--	--	--	--	--
2494	377LDGR	19890726	1345	13.0	1,080	4.7	7.2	--	--	--	--	--
2497	377LDGR	19950821	1250	13.5	393	6.7	6.9	148	37	22	10	1.1
2543	377LDGR	19940615	1432	11.5	1,040	8.9	6.8	308	84	54	40	2.7
2574	377LDGR	19960913	1219	14.5	1,460	<.1	6.2	74	44	35	160	6.2
2714	377LDGR	19860725	1330	12.5	285	--	7.6	--	--	--	--	--
2724	377LDGR	19900831	1253	13.0	1,010	.7	6.5	--	120	51	26	3.8
2728	377LDGR	19930713	1615	15.5	740	3.4	7.4	225	77	22	34	2.7
2730	377LDGR	19910911	1535	12.5	500	3.6	7.3	--	73	15	12	1.4
2742	377LDGR	19910912	1058	13.5	645	7.0	7.5	--	65	38	15	1.1
2743	377LDGR	19890718	1125	15.5	290	2.6	7.9	--	--	--	--	--
2746	377LDGR	19860909	1400	15.5	650	--	7.2	--	64	38	26	3.1
2746		19900830	1255	15.0	765	5.0	7.0	--	67	39	26	3.8
3362	377LDGR	19890717	0940	17.0	595	8.0	7.4	--	--	--	--	--
3363	377LDGR	19890718	1605	12.5	780	4.8	7.2	--	--	--	--	--
3926	377LDGR	19910425	1000	16.5	530	8.6	7.3	--	58	33	4.2	1.4
4293	377LDGR	19920928	1506	16.0	498	3.2	7.1	224	77	16	15	--
4499	377LDGR	19930816	1430	13.5	500	4.0	7.3	209	68	15	12	9.4
4804	377LDGR	19940616	1018	12.0	860	4.0	7.0	283	60	39	48	2.7
412	400BMFGA	19860909	1200	12.5	135	--	6.2	--	12	6.1	3.0	1.6
3336	400BMFGA	19880906	1850	11.5	105	6.4	5.9	--	9.3	3.8	5.7	1.3
4604	400BMFGA	19950828	1640	13.0	141	4.4	6.1	55	--	--	--	--
4740	400BMFGA	19950929	1700	12.5	230	3.0	6.4	46	--	--	--	--
5087	400BMFGA	19940823	1124	12.5	87	8.2	6.2	26	6.5	3.4	3.0	.40
5088	400BMFGA	19940831	1102	13.0	206	7.9	6.0	24	18	7.1	7.0	.60
5089	400BMFGA	19940831	1343	12.0	215	7.7	6.0	26	16	6.8	10	.60
5473	400BMFGA	19960829	1420	13.0	252	6.2	6.2	48	24	7.9	9.2	1.7

Table 8. *Results of analyses for radon-222, uranium, radium-226, radium-228, major ions, and physical and chemical properties in ground-water samples from 534 wells, Chester County, Pennsylvania, summer 1986 through spring 1997—Continued*

Chloride (mg/L)	Sulfate (mg/L)	Fluoride (mg/L)	Silica (mg/L)	Ammonium (mg/L as N)	Nitrate (mg/L as N)	Radon-222 (pCi/L)	CE Radon-222 (pCi/L)	Uranium (µg/L)	Radium-228 (pCi/L)	Radium-226 (pCi/L)	Aquifer code	Well number
17	5.7	<0.10	11	<0.010	1.20	5,386	--	0.10	--	--	377CCKS	CH-3339
4.8	4.0	--	--	--	--	960	45	--	--	--	377CCKS	3355
3.4	7.0	--	--	--	--	4,800	58	--	--	--	377CCKS	3360
2.3	<1.0	--	--	<.010	.360	720	48	--	--	--	377CCKS	3365
2.7	<1.0	--	--	.010	.980	1,500	39	--	--	--	377CCKS	3551
--	--	--	--	--	--	870	85	--	--	--	377CCKS	3719
8.3	1.3	<.10	10	.020	2.10	6,500	72	--	--	--	377CCKS	4771
38	28	<.10	21	.010	2.20	190	17	<1.0	--	--	377CCKS	4802
28	32	--	--	--	--	635	--	--	--	--	377LDGR	88
8.6	28	.20	8.6	.050	5.00	5,810	--	97	20	98	377LDGR	249
17	11	<.10	7.6	.010	4.50	350	25	--	--	--	377LDGR	1315
25	18	<.10	7.5	<.010	5.00	290	25	--	--	--	377LDGR	1316
12	48	--	--	--	--	1,120	--	.56	1.1	.42	377LDGR	2161
14	46	.20	8.9	<.010	2.80	1,900	60	--	--	--		2161
38	130	--	--	--	--	622	--	.80	<1.0	.35	377LDGR	2348
180	41	<.10	11	.840	2.70	510	23	--	--	--	377LDGR	2402
110	42	--	--	2.50	1.50	190	41	--	--	--	377LDGR	2411
8.3	73	--	--	.010	8.10	1,800	36	--	--	--	377LDGR	2494
24	7.7	<.10	9.6	.020	3.90	120	16	--	--	--	377LDGR	2497
100	40	.50	5.6	.020	9.30	490	23	--	--	--	377LDGR	2543
350	40	<.10	5.2	.070	2.00	97	16	<1.0	--	--	377LDGR	2574
13	7.7	--	--	.020	1.50	256	--	--	--	--	377LDGR	2714
46	240	<.10	9.7	.280	1.60	680	50	--	--	--	377LDGR	2724
66	36	<.10	8.0	.030	2.60	730	27	--	--	--	377LDGR	2728
22	18	<.10	6.7	--	--	1,000	40	--	--	--	377LDGR	2730
30	30	<.10	7.6	<.010	13.0	<80	26	--	--	--	377LDGR	2742
3.3	13	--	--	.010	.530	430	32	--	--	--	377LDGR	2743
49	28	.10	7.7	--	--	171	--	<.40	<2.0	--	377LDGR	2746
48	31	<.10	8.0	.030	4.60	120	51	--	--	--		2746
15	26	--	--	.020	9.70	<80	38	--	--	--	377LDGR	3362
37	26	--	--	0.020	8.50	260	31	--	--	--	377LDGR	3363
14	27	<0.10	6.4	<.010	11.0	190	49	--	--	--	377LDGR	CH-3926
19	22	.10	8.7	.010	2.00	1,000	28	--	--	--	377LDGR	4293
25	25	<.10	8.1	.380	1.80	870	42	--	--	--	377LDGR	4499
90	31	<.10	9.6	.010	3.40	220	19	--	--	--	377LDGR	4804
3.0	21	<.10	23	--	--	4,195	--	.70	<2.0	--	400BMFGA	412
5.4	3.0	.10	21	.010	.260	486	--	<.01	<1.0	.06	400BMFGA	3336
3.4	--	--	--	<.015	1.10	53,000	200	--	--	--	400BMFGA	4604
11	--	--	--	--	8.80	2,000	41	--	--	--	400BMFGA	4740
2.7	8.3	<.10	18	<.010	.450	500	24	<1.0	--	--	400BMFGA	5087
13	23	<.10	28	<.010	5.50	3,000	50	<1.0	--	--	400BMFGA	5088
12	21	<.10	25	<.010	8.50	1,200	33	<1.0	--	--	400BMFGA	5089
17	24	<.10	20	<.015	5.70	1,000	30	<1.0	--	--	400BMFGA	5473

***Table 8.** Results of analyses for radon-222, uranium, radium-226, radium-228, major ions, and physical and chemical properties in ground-water samples from 534 wells, Chester County, Pennsylvania, summer 1986 through spring 1997—Continued*

Local well number	Aquifer code	Date (YYYYMMDD)	Time (HHMM)	Water temperature (°C)	Specific conductance (µS/cm)	Dissolved oxygen (mg/L)	pH	Alkalinity (mg/L as $CaCO_3$)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)
CH-1627	400FCIGA	19860820	1600	14.0	235	--	6.1	--	21	5.5	12	4.3
2806	400FCIGA	19950828	1207	13.5	208	3.4	5.7	36	--	--	--	--
3086	400FCIGA	19870807	1440	11.5	175	8.6	5.7	--	14	4.5	8.0	2.1
3089	400FCIGA	19870812	1620	12.5	95	--	6.5	--	9.1	3.8	4.5	1.9
3090	400FCIGA	19870812	1350	11.5	131	--	5.6	--	10	4.0	6.6	1.5
3117	400FCIGA	19870831	1510	12.0	77	--	5.3	--	5.3	2.7	5.2	1.1
3135	400FCIGA	19870905	1330	11.5	152	7.5	5.1	--	6.2	3.3	14	1.7
3936	400FCIGA	19950919	1005	13.5	317	8.0	6.2	67	--	--	--	--
3941	400FCIGA	19950912	1432	13.5	196	9.4	5.7	36	--	--	--	--
3944	400FCIGA	19950912	1631	13.0	270	1.2	6.4	46	--	--	--	--
3953	400FCIGA	19950907	1540	14.5	406	4.7	6.6	120	--	--	--	--
3970	400FCIGA	19950929	1644	12.5	209	7.4	6.5	44	--	--	--	--
3982	400FCIGA	19950928	1328	14.5	81	9.5	5.6	13	--	--	--	--
4261	400FCIGA	19960815	1130	13.0	160	9.1	6.4	25	18	4.8	3.2	1.4
4339	400FCIGA	19950921	1344	12.5	205	8.9	5.7	20	15	5.6	7.4	3.5
4339		19960422	1125	12.5	159	9.0	5.7	14	13	4.4	6.0	--
4339		19960627	0910	12.5	172	9.0	6.0	14	13	5.0	6.5	--
4339	400FCIGA	19960827	1025	12.5	175	9.2	6.2	15	15	5.3	6.7	--
4339		19961022	0922	12.5	175	9.4	5.7	27	14	4.9	6.6	--
4339		19961223	1037	12.0	136	9.6	5.9	10	10	3.6	4.9	--
4339		19970228	0950	12.0	160	9.3	5.7	17	12	4.6	6.3	--
4339		19970423	1033	12.5	159	9.4	5.3	18	13	4.9	5.7	--
4339		19970626	1540	12.5	177	9.0	5.5	21	13	4.8	6.4	--
4539	400FCIGA	19950921	1622	12.5	158	9.5	5.5	18	11	4.9	4.0	2.5
4773	400FCIGA	19950829	1217	14.5	87	10.3	5.7	21	--	--	--	--
4773		19960423	1209	12.0	92	10.9	5.9	13	5.4	2.0	6.8	--
4773		19960627	1413	13.0	91	10.1	5.8	14	4.9	2.0	7.4	--
4774	400FCIGA	19950829	1657	12.5	148	8.9	5.9	35	--	--	--	--
4778	400FCIGA	19950906	1106	13.5	348	4.6	5.8	41	30	9.9	8.5	5.5
5238	400FCIGA	19950928	1527	12.5	203	9.0	5.8	33	16	6.3	5.2	3.6
5238		19960422	1540	12.0	408	9.4	6.0	18	36	16	6.6	--
5238		19960627	1121	12.0	249	8.0	6.2	28	23	9.0	6.1	--
5238		19960826	1618	12.5	246	7.8	6.3	22	21	8.2	6.3	--
5238		19961022	1446	12.5	233	8.6	5.9	26	21	7.3	6.0	--
5238		19961223	1317	11.5	221	8.9	5.7	21	17	8.2	5.1	--
5238		19970228	1149	11.5	210	7.8	5.7	31	17	7.2	5.5	--
5238		19970423	1312	11.5	215	8.0	5.4	34	20	7.8	5.5	--
5238		19970625	1109	12.5	219	8.3	5.5	32	19	7.0	5.8	--
4766	400FLCGA	19950828	1511	13.5	233	7.1	5.4	22	--	--	--	--
4775	400FLCGA	19950830	1238	13.5	124	4.2	6.0	30	--	--	--	--
4780	400FLCGA	19950907	1201	15.5	520	7.8	5.5	19	--	--	--	--
1099	400FLCGG	19870806	1440	13.5	100	10.0	5.1	--	7.3	3.3	3.6	3.6
1268	400FLCGG	19950905	1555	12.5	155	8.2	6.0	22	--	--	--	--

Table 8. *Results of analyses for radon-222, uranium, radium-226, radium-228, major ions, and physical and chemical properties in ground-water samples from 534 wells, Chester County, Pennsylvania, summer 1986 through spring 1997—Continued*

Chloride (mg/L)	Sulfate (mg/L)	Fluoride (mg/L)	Silica (mg/L)	Ammonium (mg/L as N)	Nitrate (mg/L as N)	Radon-222 (pCi/L)	CE Radon-222 (pCi/L)	Uranium (µg/L)	Radium-228 (pCi/L)	Radium-226 (pCi/L)	Aquifer code	Well number
32	26	0.10	24	--	1.60	319	--	<0.40	<2.0	--	400FCIGA	CH-1627
14	--	--	--	0.020	2.00	2,300	42	--	--	--	400FCIGA	2806
27	4.8	.10	18	--	--	470	--	<.05	<.60	<0.20	400FCIGA	3086
2.0	3.0	.10	21	--	--	135	--	<.05	--	<.10	400FCIGA	3089
9.6	24	.10	19	--	--	2,145	--	<.05	<.70	<.20	400FCIGA	3090
6.6	17	.10	18	--	--	8,165	--	1.7	1.7	1.1	400FCIGA	3117
29	1.0	.10	11	--	--	3,800	--	<.05	<.70	.38	400FCIGA	3135
60	--	--	--	--	1.30	860	29	--	--	--	400FCIGA	3936
5.2	--	--	--	--	4.50	1,000	30	--	--	--	400FCIGA	3941
16	--	--	--	--	.940	1,700	37	--	--	--	400FCIGA	3944
34	--	--	--	<.015	.480	170	17	--	--	--	400FCIGA	3953
8.3	--	--	--	--	1.80	460	23	--	--	--	400FCIGA	3970
3.4	--	--	--	--	1.30	290	20	--	--	--	400FCIGA	3982
4.1	18	<.10	14	.020	4.00	550	24	<1.0	--	--	400FCIGA	4261
9.6	28	<.10	18	<.015	5.50	2,000	41	--	--	--	400FCIGA	4339
6.4	25	--	19	<.015	4.70	2,100	42	--	--	--		4339
7.6	25	--	19	.050	4.70	2,700	47	--	--	--		4339
8.0	26	--	20	<.015	5.40	2,100	41	--	--	--	400FCIGA	4339
7.8	26	--	19	.030	5.10	2,500	47	--	--	--		4339
5.2	22	--	17	.020	3.20	1,500	37	--	--	--		4339
7.3	24	--	18	<.015	4.30	2,100	51	--	--	--		4339
6.4	24	--	20	<.015	4.09	2,216	43	--	--	--		4339
7.5	24	--	19	<.015	4.92	2,212	42	--	--	--		4339
10	19	<.10	15	<.015	3.90	1,000	31	--	--	--	400FCIGA	4539
4.2	--	--	--	<.015	.440	2,400	46	--	--	--	400FCIGA	4773
5.2	19	--	19	<.015	.360	2,600	46	--	--	--		4773
5.1	20	--	19	.050	.280	2,300	43	--	--	--		4773
8.1	--	--	--	<.015	.830	1,300	35	--	--	--	400FCIGA	4774
45	22	<.10	18	<.015	6.20	9,800	88	--	--	--	400FCIGA	4778
9.5	28	<.10	17	<.015	5.60	1,600	36	--	--	--	400FCIGA	5238
89	24	--	16	<.015	5.30	1,100	31	--	--	--		CH-5238
29	29	--	17	.060	5.70	1,400	35	--	--	--		5238
21	28	--	18	<.015	6.90	1,400	35	--	--	--		5238
17	28	--	18	.030	5.80	1,400	35	--	--	--		5238
23	26	--	14	.020	4.40	870	29	--	--	--		5238
14	28	--	17	<.015	5.10	1,300	41	--	--	--		5238
15	29	--	19	<.015	5.18	1,328	34	--	--	--		5238
15	28	--	17	<.015	5.20	1,678	39	--	--	--		5238
20	--	--	--	<.015	6.10	3,500	51	--	--	--	400FLCGA	4766
7.2	--	--	--	<.015	2.30	680	28	--	--	--	400FLCGA	4775
80	--	--	--	.020	12.0	6,900	71	--	--	--	400FLCGA	4780
8.6	5.7	.10	15	--	--	440	--	<.05	.73	.15	400FLCGG	1099
8.6	--	--	--	<.015	8.50	4,400	58	--	--	--	400FLCGG	1268

Table 8. *Results of analyses for radon-222, uranium, radium-226, radium-228, major ions, and physical and chemical properties in ground-water samples from 534 wells, Chester County, Pennsylvania, summer 1986 through spring 1997—Continued*

Local well number	Aquifer code	Date (YYYYMMDD)	Time (HHMM)	Water temperature (°C)	Specific conductance (µS/cm)	Dissolved oxygen (mg/L)	pH	Alkalinity (mg/L as $CaCO_3$)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)
CH-1281	400FLCGG	19950905	1340	13.0	264	5.6	6.3	34	--	--	--	--
1281		19970909	1145	12.5	270	5.3	5.5	47	26	6.5	7.4	1.8
1434	400FLCGG	19950927	1753	11.5	128	9.2	5.8	19	--	--	--	--
1435	400FLCGG	19860820	1320	13.0	133	--	5.7	--	11	3.8	5.2	1.3
1478	400FLCGG	19950920	1659	13.0	162	7.6	6.1	23	--	--	--	--
2317	400FLCGG	19940906	1242	11.5	138	7.5	6.0	30	14	4.2	5.1	.90
2998	400FLCGG	19870716	1345	12.5	340	8.0	5.4	--	33	10	11	3.0
3873	400FLCGG	19950928	1537	13.0	126	8.0	5.7	21	--	--	--	--
3900	400FLCGG	19950926	1602	12.0	102	9.8	5.8	7	--	--	--	--
4782	400FLCGG	19950920	1444	13.0	142	8.5	6.1	30	--	--	--	--
5170	400FLCGG	19950831	1340	13.5	181	8.0	5.8	24	--	--	--	--
5170		19950831	1416	13.5	181	--	--	--	--	--	--	--
5240	400FLCGG	19950929	1627	12.5	177	8.5	5.5	19	--	--	--	--
5481	400FLCGG	19960924	1038	11.5	59	9.8	5.8	17	5.8	1.9	2.7	.70
5481		19960924	1116	11.5	59	9.8	5.8	17	--	--	--	--
410	400FLCGH	19860826	1500	--	--	--	--	--	--	--	--	--
754	400FLCGH	19950817	1240	14.0	390	7.4	6.3	73	--	--	--	--
2067	400FLCGH	19930802	1617	13.0	442	3.6	7.5	149	47	21	7.4	7.4
2293	400FLCGH	19860906	1020	13.5	380	--	5.5	--	32	12	17	4.0
2342	400FLCGH	19930729	1550	14.0	179	<.1	6.6	37	10	5.3	5.7	3.6
2752	400FLCGH	19900905	1425	13.5	480	2.7	5.8	--	--	--	--	--
3382	400FLCGH	19930910	1249	13.0	164	9.6	6.0	22	14	4.3	7.0	1.3
3384	400FLCGH	19930908	1256	14.0	360	9.2	6.3	37	32	11	15	<.10
3384		19940713	1703	14.5	428	10.4	6.0	39	42	12	15	--
3396	400FLCGH	19930727	1549	14.0	191	3.8	6.7	62	20	5.5	6.6	3.7
3398	400FLCGH	19930729	1336	14.0	212	<.1	6.9	35	20	5.1	6.6	3.3
3430	400FLCGH	19930804	1438	13.5	252	6.1	6.5	40	28	6.4	5.2	<.10
3430		19940712	0917	13.5	251	4.1	6.2	43	23	6.4	5.3	--
3467	400FLCGH	19890809	1435	13.5	360	4.4	6.0	--	--	--	--	--
3482	400FLCGH	19930727	1258	13.5	269	5.8	6.3	47	28	7.1	10	3.5
3482		19940713	1310	12.0	308	5.3	6.4	72	39	8.1	9.2	--
3484	400FLCGH	19930803	1431	14.0	360	6.5	5.7	27	27	14	11	3.0
3484		19940713	1041	12.5	360	6.2	5.7	18	29	14	11	--
3484		19960423	1253	13.0	334	6.7	5.4	22	24	14	10	3.0
3484		19960626	1240	13.0	343	6.7	5.7	16	24	14	11	3.1
3484		19960826	1155	13.0	349	6.8	5.3	16	26	14	11	3.0
3484		19961022	1216	13.0	368	6.4	5.3	20	24	14	11	3.0
3484		19961022	1256	--	--	--	--	--	--	--	--	--
3484		19961022	1257	--	--	--	--	--	--	--	--	--
3484		19961223	1153	12.5	342	7.0	5.4	24	23	14	10	2.7
3484		19970228	1408	12.0	365	6.2	5.3	24	25	14	12	3.1
3484		19970430	1323	12.5	369	6.4	5.0	19	27	14	12	3.1
3484		19970702	1046	--	366	--	5.2	--	27	15	12	--

Table 8. *Results of analyses for radon-222, uranium, radium-226, radium-228, major ions, and physical and chemical properties in ground-water samples from 534 wells, Chester County, Pennsylvania, summer 1986 through spring 1997—Continued*

Chloride (mg/L)	Sulfate (mg/L)	Fluoride (mg/L)	Silica (mg/L)	Ammonium (mg/L as N)	Nitrate (mg/L as N)	Radon-222 (pCi/L)	CE Radon-222 (pCi/L)	Uranium (µg/L)	Radium-228 (pCi/L)	Radium-226 (pCi/L)	Aquifer code	Well number
19	--	--	--	<0.015	10.0	1,300	34	--	--	--	400FLCGG	CH-1281
19	20	<0.10	23	<.015	9.37	1,208	34	<1.0	--	--		1281
10	--	--	--	<.015	1.90	1,300	34	--	--	--	400FLCGG	1434
8.2	12	<.10	19	--	--	422	--	<.40	<2.0	--	400FLCGG	1435
6.8	--	--	--	--	4.30	760	27	--	--	--	400FLCGG	1478
5.5	15	<.10	21	.020	2.40	780	28	<1.0	--	--	400FLCGG	2317
60	3.0	.10	19	.020	14.0	2,050	--	<.05	<.70	<0.20	400FLCGG	2998
13	--	--	--	--	3.00	460	23	--	--	--	400FLCGG	3873
7.8	--	--	--	--	3.20	210	20	--	--	--	400FLCGG	3900
9.0	4.4	<.10	--	<.015	5.30	1,800	39	--	--	--	400FLCGG	4782
11	--	--	--	<.015	3.90	170	18	--	--	--	400FLCGG	5170
--	--	--	--	--	--	160	18	--	--	--		5170
12	--	--	--	<.015	9.90	330	20	--	--	--	400FLCGG	5240
2.7	1.0	<.10	20	<.015	.970	430	26	<1.0	--	--	400FLCGG	5481
--	--	--	--	--	.970	820	32	--	--	--		5481
26	63	--	--	--	--	4,038	--	--	--	--	400FLCGH	410
40	--	--	--	.060	4.10	130	18	--	--	--	400FLCGH	754
12	33	<.10	14	.020	7.60	850	42	--	--	--	400FLCGH	2067
72	32	<.10	19	--	--	139	--	<.40	<2.0	--	400FLCGH	2293
4.3	40	.10	28	.010	<.050	2,500	82	--	--	--	400FLCGH	2342
43	40	--	--	<.010	6.20	550	36	--	--	--	400FLCGH	2752
3.8	29	.10	25	.020	4.50	2,700	69	--	--	--	400FLCGH	3382
36	74	.10	24	.020	1.20	1,700	53	--	--	--	400FLCGH	3384
57	64	<.10	24	.030	.820	890	29	--	--	--		3384
5.3	13	<.10	23	.020	1.40	1,100	33	--	--	--	400FLCGH	3396
3.9	50	.10	29	.020	<.050	2,200	80	--	--	--	400FLCGH	3398
6.9	36	<.10	21	.030	3.00	1,200	45	--	--	--	400FLCGH	3430
6.3	36	.10	21	<.010	3.60	1,500	37	--	--	--		3430
29	17	--	--	<.010	15.0	2,700	60	--	--	--	400FLCGH	3467
25	26	<.10	20	.020	3.50	2,400	40	--	--	--	400FLCGH	3482
28	27	<.10	21	.020	1.90	2,200	42	--	--	--		3482
47	31	<.10	24	.020	8.30	9,000	74	--	--	--	400FLCGH	3484
50	27	<.10	24	.010	7.00	9,000	83	--	--	--		3484
44	28	--	22	<.015	9.60	7,800	77	--	--	--		3484
50	27	--	22	.050	8.10	8,300	79	--	--	--		3484
48	28	--	22	<.015	8.40	8,100	79	--	--	--		3484
58	28	--	22	.030	7.40	8,400	79	<1.0	--	--		3484
--	--	--	--	--	--	8,100	80	--	--	--		3484
--	--	--	--	--	--	8,400	81	--	--	--		3484
23	40	--	20	.020	7.40	7,600	75	--	--	--		3484
55	27	--	23	<.015	6.80	8,800	98	--	--	--		3484
59	28	--	24	--	--	9,305	82	--	--	--		3484
59	29	--	23	--	--	--	--	--	--	--		3484

Table 8. *Results of analyses for radon-222, uranium, radium-226, radium-228, major ions, and physical and chemical properties in ground-water samples from 534 wells, Chester County, Pennsylvania, summer 1986 through spring 1997—Continued*

Local well number	Aquifer code	Date (YYYYMMDD)	Time (HHMM)	Water temperature (°C)	Specific conductance (µS/cm)	Dissolved oxygen (mg/L)	pH	Alkalinity (mg/L as $CaCO_3$)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)
CH-3487	400FLCGH	19930728	1330	12.5	193	0.1	6.6	46	17	7.0	5.6	3.1
3532	400FLCGH	19931116	1440	13.0	595	3.3	6.1	64	71	16	15	3.8
3543	400FLCGH	19930901	1215	15.0	273	6.9	5.7	22	23	9.4	9.8	2.0
4008	400FLCGH	19900823	1647	14.5	309	1.3	7.1	--	--	--	--	--
4024	400FLCGH	19900904	1545	13.5	222	7.1	5.9	--	--	--	--	--
4412	400FLCGH	19930728	1637	13.0	243	7.5	6.0	--	20	9.4	7.4	2.7
4415	400FLCGH	19930805	1402	16.0	330	4.0	6.3	41	32	9.7	10	3.2
4418	400FLCGH	19930825	1452	14.0	235	.4	6.3	71	25	7.9	6.6	3.6
5221	400FLCGH	19950801	1420	14.5	625	4.2	5.8	26	69	25	12	3.1
5254	400FLCGH	19950913	1300	14.0	165	8.3	6.2	21	--	--	--	--
5255	400FLCGH	19950914	1500	13.0	445	6.3	6.1	43	--	--	--	--
5259	400FLCGH	19950920	1350	13.5	390	7.7	6.0	31	24	20	9.8	1.8
5260	400FLCGH	19950926	1600	13.0	290	6.2	6.2	49	23	10	13	3.5
5261	400FLCGH	19950926	1300	13.0	190	9.2	5.9	16	14	6.7	5.6	2.6
605	400FLCGP	19950907	1445	13.5	399	1.0	7.1	83	--	--	--	--
1123	400FLCGP	19950911	1600	14.0	175	7.6	6.2	33	--	--	--	--
2084	400FLCGP	19860905	1400	12.5	112	--	6.7	--	7.5	6.4	4.6	1.3
2095	400FLCGP	19950824	1240	14.0	149	7.2	6.1	26	--	--	--	--
2108	400FLCGP	19950918	1600	13.0	233	7.0	6.4	57	--	--	--	--
2874	400FLCGP	19950914	1245	14.0	504	7.6	6.2	62	--	--	--	--
3026	400FLCGP	19950906	1620	13.0	248	7.0	6.2	38	--	--	--	--
3495	400FLCGP	19930722	1558	14.0	92	9.2	6.4	43	9.4	1.5	5.2	.50
3540	400FLCGP	19890830	1635	14.5	840	.6	6.3	--	--	--	--	--
4008	400FLCGH	19900823	1647	14.5	309	1.3	7.1	--	--	--	--	--
4123	400FLCGP	19910720	1055	14.0	180	7.2	6.2	--	--	--	--	--
5236	400FLCGP	19950828	1210	12.0	279	2.2	6.8	64	--	--	--	--
5252	400FLCGP	19950906	1440	13.0	183	7.0	6.2	29	--	--	--	--
5253	400FLCGP	19950912	1520	12.5	110	9.4	6.2	16	--	--	--	--
5257	400FLCGP	19950919	1230	13.0	95	9.0	6.1	20	--	--	--	--
3048	400FMFG	19860822	1330	12.5	185	--	5.8	--	14	4.9	8.4	2.7
3301	400FMFG	19880616	1240	11.5	34	8.1	5.3	--	--	--	--	--
3301		19880616	1241	--	--	--	--	--	1.5	1.4	1.9	.80
3358	400FMFG	19890615	1115	13.0	252	6.4	5.9	--	--	--	--	--
4547	400FMFG	19930824	1125	15.0	122	7.8	5.4	11	6.9	4.1	5.9	2.8
4578	400FMFG	19950828	1816	13.5	222	8.2	5.5	9	--	--	--	--
4693	400FMFG	19950828	1440	13.0	320	1.2	6.8	95	--	--	--	--
4779	400FMFG	19950907	0844	16.0	416	5.7	5.9	59	27	16	22	5.7
5256	400FMFG	19950906	1257	14.0	400	4.0	6.9	90	--	--	--	--
5472	400FMFG	19960828	1549	13.5	122	8.1	5.9	20	7.2	5.4	4.9	1.8
1599	400GPCGA	19930722	1120	14.5	159	5.7	7.1	64	26	2.0	4.2	.90
1613	400GPCGA	19860805	1515	15.5	200	--	6.1	--	22	3.9	7.2	2.0
2347	400GPCGA	19950926	1406	12.5	540	.1	6.9	67	--	--	--	--
3867	400GPCGA	19950928	1500	13.5	125	9.0	6.2	20	--	--	--	--

Table 8. *Results of analyses for radon-222, uranium, radium-226, radium-228, major ions, and physical and chemical properties in ground-water samples from 534 wells, Chester County, Pennsylvania, summer 1986 through spring 1997—Continued*

Chloride (mg/L)	Sulfate (mg/L)	Fluoride (mg/L)	Silica (mg/L)	Ammonium (mg/L as N)	Nitrate (mg/L as N)	Radon-222 (pCi/L)	CE Radon-222 (pCi/L)	Uranium (µg/L)	Radium-228 (pCi/L)	Radium-226 (pCi/L)	Aquifer code	Well number
4.5	26	0.10	26	0.030	<0.050	540	68	--	--	--	400FLCGH	CH-3487
50	110	<.10	26	.020	8.90	4,200	56	--	--	--	400FLCGH	3532
33	29	<.10	25	.020	4.10	2,600	56	--	--	--	400FLCGH	3543
												4008
13	34	--	--	<.010	3.80	2,700	71	--	--	--	400FLCGH	4024
5.6	46	<.10	16	.010	6.40	5,800	89	--	--	--	400FLCGH	4412
23	25	<.10	25	.020	12.0	1,700	71	--	--	--	400FLCGH	4415
11	24	.10	21	.020	<.050	510	37	--	--	--	400FLCGH	4418
35	130	<.10	28	.020	26.0	3,100	49	--	--	--	400FLCGH	5221
4.7	--	--	--	--	5.00	810	27	--	--	--	400FLCGH	5254
68	--	--	--	--	4.40	3,400	53	--	--	--	400FLCGH	5255
64	24	<.10	29	<.015	6.40	510	24	--	--	--	400FLCGH	5259
35	21	<.10	22	<.015	3.10	1,600	37	--	--	--	400FLCGH	5260
7.3	20	<.10	20	<.015	7.90	290	21	--	--	--	400FLCGH	5261
43	--	--	--	<.015	.580	250	19	--	--	--	400FLCGP	605
14	--	--	--	--	4.00	260	19	--	--	--	400FLCGP	1123
2.3	1.4	.40	34	--	--	71	--	<0.40	--	--	400FLCGP	2084
8.8	--	--	--	<.015	3.50	200	19	--	--	--	400FLCGP	2095
13	--	--	--	--	6.30	590	24	--	--	--	400FLCGP	2108
77	--	--	--	--	9.60	130	18	--	--	--	400FLCGP	2874
26	--	--	--	<.015	4.30	1,000	29	--	--	--	400FLCGP	3026
1.4	.80	<.10	25	<.010	.79	10,000	71	--	--	--	400FLCGP	3495
100	96	--	--	.020	11.0	430	60	--	--	--	400FLCGP	3540
9.8	42	--	--	<.010	1.40	2,000	50	--	--	--	400FLCGP	4008
2.3	35	.10	--	.010	3.50	1,400	39	--	--	--	400FLCGP	4123
6.5	--	--	--	<.015	<.050	300	20	--	--	--	400FLCGP	5236
14	--	--	--	<.015	3.40	780	27	--	--	--	400FLCGP	5252
5.6	--	--	--	--	2.60	220	20	--	--	--	400FLCGP	5253
2.7	--	--	--	--	4.40	210	18	--	--	--	400FLCGP	5257
19	9.3	<.10	16	--	--	2,450	--	<.40	--	--	400FMFG	3048
--	--	--	--	<.010	.110	600	--	.01	<1.0	0.03	400FMFG	3301
2.8	.80	.10	9.8			560	--	--	--	--		3301
22	20	--	--	<.010	2.60	5,100	63	--	--	--	400FMFG	3358
18	2.8	.10	11	.010	3.40	960	41	--	--	--	400FMFG	4547
15	--	--	--	<.015	8.20	22,000	130	--	--	--	400FMFG	4578
13	--	--	--	<.015	1.40	2,700	46	--	--	--	400FMFG	4693
57	26	<.10	17	<.015	4.80	10,000	90	--	--	--	400FMFG	4779
19	--	--	--	<.015	3.50	2,800	48	--	--	--	400FMFG	5256
8.9	1.5	<.10	19	<.015	5.40	7,200	72	<1.0	--	--	400FMFG	5472
2.3	5.6	<.10	23	.010	1.80	2,500	45	--	--	--	400GPCGA	1599
23	16	<.10	23	--	--	246	--	<.40	--	--	400GPCGA	1613
87	--	--	--	--	<.050	320	22	--	--	--	400GPCGA	2347
3.1	--	--	--	--	2.80	720	26	--	--	--	400GPCGA	3867

Table 8. *Results of analyses for radon-222, uranium, radium-226, radium-228, major ions, and physical and chemical properties in ground-water samples from 534 wells, Chester County, Pennsylvania, summer 1986 through spring 1997—Continued*

Local well number	Aquifer code	Date (YYYYMMDD)	Time (HHMM)	Water temperature (°C)	Specific conductance (µS/cm)	Dissolved oxygen (mg/L)	pH	Alkalinity (mg/L as $CaCO_3$)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)
CH-4027	400GPCGA	19950929	1510	13.5	147	3.6	6.8	67	--	--	--	--
4027		19960423	1659	11.0	136	5.2	6.9	56	18	5.0	5.5	2.1
4027		19960626	1637	20.5	164	4.4	7.0	67	18	5.0	5.3	2.4
4027		19960826	1554	20.5	170	3.6	6.1	65	19	5.2	5.3	2.3
4027		19961022	1610	13.5	167	7.6	6.8	55	18	5.0	5.3	2.1
4027		19961223	1540	8.5	166	10.4	6.7	58	18	5.0	5.0	2.1
4027		19970228	1700	9.0	167	9.4	6.7	54	18	5.0	5.2	2.0
4075	400GPCGA	19950919	1351	12.5	375	8.4	5.9	24	--	--	--	--
4124	400GPCGA	19910814	1730	14.0	50	5.0	5.9	--	--	--	--	--
4298	400GPCGA	19921007	0803	12.0	151	6.6	6.7	61	--	--	--	--
4441	400GPCGA	19950929	1500	14.0	148	8.1	6.2	18	--	--	--	--
4770	400GPCGA	19950817	1422	15.0	291	5.7	5.5	43	27	9.1	8.2	2.2
4776	400GPCGA	19950830	1743	14.5	170	7.0	5.9	39	--	--	--	--
4777	400GPCGA	19950831	1642	12.5	144	.1	6.6	53	--	--	--	--
4815	400GPCGA	19960815	1434	13.0	315	6.6	5.9	30	29	11	8.2	2.0
5267	400GPCGG	19950920	1430	12.0	475	<.1	5.0	4	--	--	--	--
5268	400GPCGG	19950920	1520	13.0	154	7.0	6.1	26	--	--	--	--
1262	400MFCGG	19950906	1621	14.0	174	9.4	6.2	116	--	--	--	--
1272	400MFCGG	19911015	1640	12.0	208	7.9	5.9	--	--	--	--	--
5271	400MFCGG	19951012	1504	13.0	90	7.8	5.7	13	--	--	--	--
3361	400MFCGH	19890712	1100	13.0	425	6.2	5.8	--	--	--	--	--
5258	400MFCGP	19950919	1400	13.0	350	1.1	7.9	84	--	--	--	--

__Table 8.__ Results of analyses for radon-222, uranium, radium-226, radium-228, major ions, and physical and chemical properties in ground-water samples from 534 wells, Chester County, Pennsylvania, summer 1986 through spring 1997—Continued

Chloride (mg/L)	Sulfate (mg/L)	Fluoride (mg/L)	Silica (mg/L)	Ammonium (mg/L as N)	Nitrate (mg/L as N)	Radon-222 (pCi/L)	CE Radon-222 (pCi/L)	Uranium (µg/L)	Radium-228 (pCi/L)	Radium-226 (pCi/L)	Aquifer code	Well number
3.1	--	--	--	--	0.500	7,400	74	--	--	--	400GPCGA	CH-4027
2.8	10	--	23	<0.015	.270	6,800	71	--	--	--		4027
2.8	11	--	20	<.015	.140	3,500	61	--	--	--		4027
2.9	11	--	22	<.015	.160	4,900	60	--	--	--		4027
2.7	10	--	22	.030	.180	4,400	57	--	--	--		4027
2.6	10	--	20	.020	.150	4,300	56	--	--	--		4027
2.8	11	--	20	<.015	.140	3,500	61	--	--	--		4027
53	--	--	--	--	7.10	820	28	--	--	--	400GPCGA	4075
3.1	.80	0.10	--	--	--	3,100	49	--	--	--	400GPCGA	4124
2.3	3.4	<.10	--	<.010	2.20	3,000	41	--	--	--	400GPCGA	4298
5.8	--	--	--	--	6.90	5,000	63	--	--	--	400GPCGA	4441
16	48	<.10	23	<.015	5.10	1,800	38	--	--	--	400GPCGA	4770
4.4	--	--	--	<.015	4.30	11,000	91	--	--	--	400GPCGA	4776
1.1	--	--	--	<.015	<.050	3,300	51	--	--	--	400GPCGA	4777
43	28	<.10	22	.020	4.60	1,100	31	<1.0	--	--	400GPCGA	4815
13	--	--	--	--	<.050	220	18	--	--	--	400GPCGG	5267
4.9	--	--	--	--	1.80	130	16	--	--	--	400GPCGG	5268
11	--	--	--	<.015	1.90	1,500	36	--	--	--	400MFCGG	1262
--	--	--	--	--	--	1,100	40	--	--	--	400MFCGG	1272
4.4	--	--	--	--	.890	2,700	45	--	--	--	400MFCGG	5271
75	19	--	--	<.010	6.90	600	34	--	--	--	400MFCGH	3361
13	--	--	--	--	7.50	170	17	--	--	--	400MFCGP	5258