

Number of Water-Level Measurements Made in Kings and Queens County Wells, Long Island, New York, 1910-95, by Decade

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CONVERSION FACTORS, ABBREVIATIONS AND VERTICAL DATUM

Multiply	By	To Obtain
	<i>Flow</i>	
million gallons per day (Mgal/d)	0.04381	cubic meters per second

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

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Abstract

The hydrogeology of Long Island has been extensively studied, and a vast amount of ground-water data has accumulated throughout the years, including water levels in the major aquifers of Kings and Queens Counties. This report briefly describes the hydrogeology and methods of water-level measurements, summarizes the water-level database, and provides a list of 309 wells for which at least one water-level record is available, the aquifer in which the well is screened, and the number of water-level measurements made at each well in each 10-year period from 1910 through 1995.

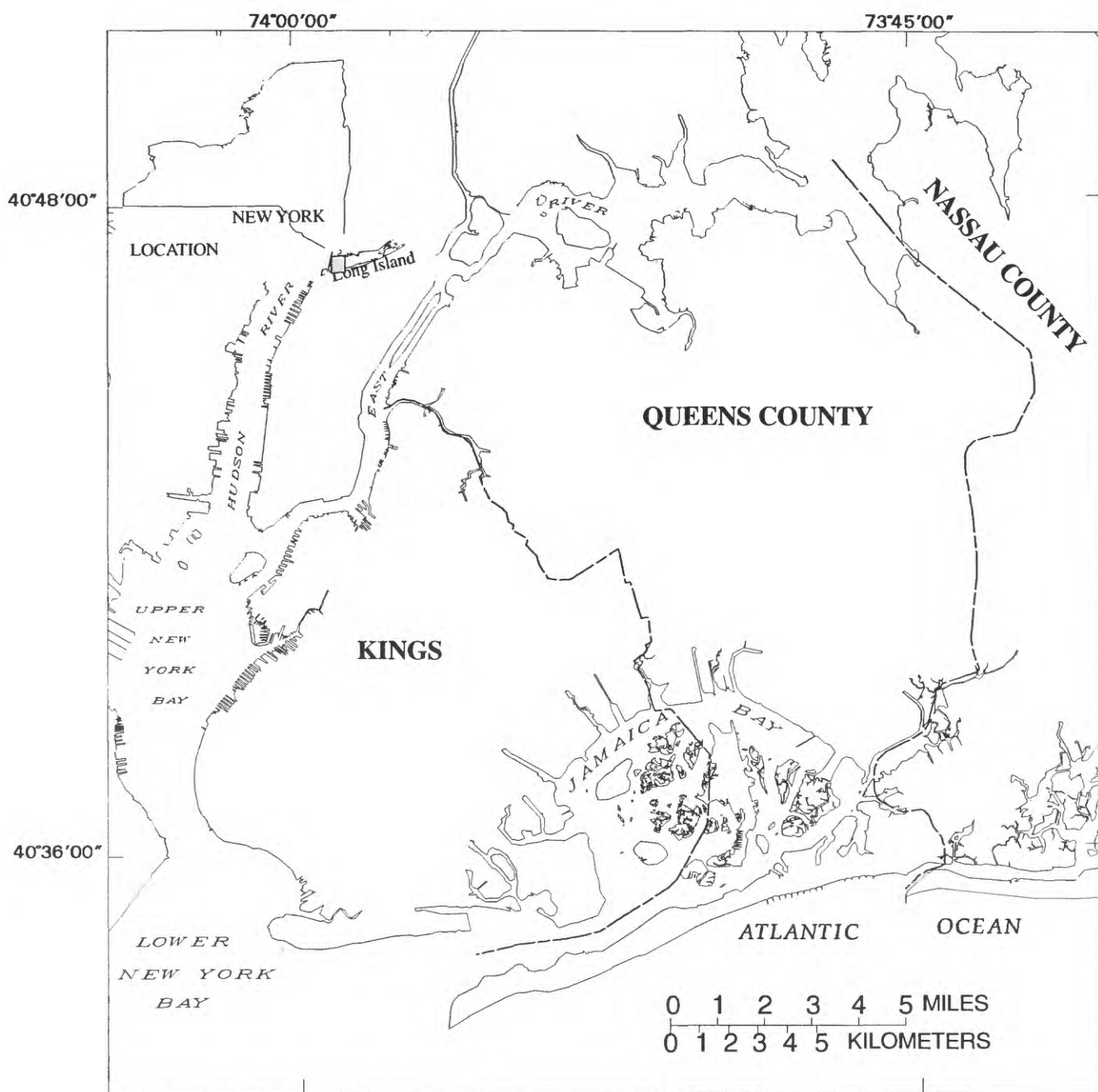
INTRODUCTION

Kings and Queens Counties, on western Long Island, N.Y. (fig. 1), obtain nearly all water (about 700 Mgal/d) (Buxton and Shernoff, 1995) from an extensive upstate reservoir system. The possibility that this source will be inadequate during future droughts or other emergencies has prompted consideration of the underlying aquifer system as a supplemental source. The aquifer system beneath Kings and Queens Counties was historically the major source of water supply until the mid 1940's. Overpumping of these aquifers in the 1930's and 1940's caused extensive saltwater encroachment into the aquifers, and contaminants from manmade surface sources entered the water-table aquifer continuously as urbanization expanded. As a result, all public-supply pumping was halted in Kings County in 1947 and in western Queens County in 1974. The Jamaica Water Supply Company continues to pump in eastern Queens County, but at decreased rates.

Pumpage for public and industrial supply in Kings and Queens Counties during 1904-47 averaged more than 120 Mgal/d (Buxton and others, 1981), and water levels in the aquifer system in Kings County in 1936 were as much as 35 ft below sea level. The curtailment of pumping in 1947 allowed water levels in Kings County to recover to within 8 ft of predevelopment levels by 1951 (Luszczynski, 1952); at present, water levels in Kings and Queens Counties are close to predevelopment levels.

Because water levels have recovered from the effects of early pumping, the question has arisen as to whether the aquifer system could safely be used as a supplemental supply under a monitored pumping regime to augment the New York City supply during water shortages. Two major concerns are (1) the extent to which intermittent pumping would reintroduce saltwater, and (2) whether the pumping would create flow gradients sufficient to induce the downward migration of contaminants (such as volatile organic compounds, nitrate, and bacteria) from the shallow aquifer to the deeper public-supply aquifers. Leaking storage tanks and sewers, together with contaminants from chemical spills and industrial discharges to underground disposal systems, already have affected the water quality throughout the shallow parts of the aquifer system. The feasibility of using the Kings-Queens aquifer system as a supply source will depend on hydraulic characteristics of the aquifers, the chemical quality of the pumped water, and location and pumping rates of production wells.

In 1992, the U.S. Geological Survey (USGS), in cooperation with the New York City Department of Environmental Protection (NYCDEP), began a 4-year study to develop a ground-water-flow model that can simulate a range of pumping scenarios to indicate what effects pumping would have on ground-water levels and flow patterns. This information would enable water managers to select opti-

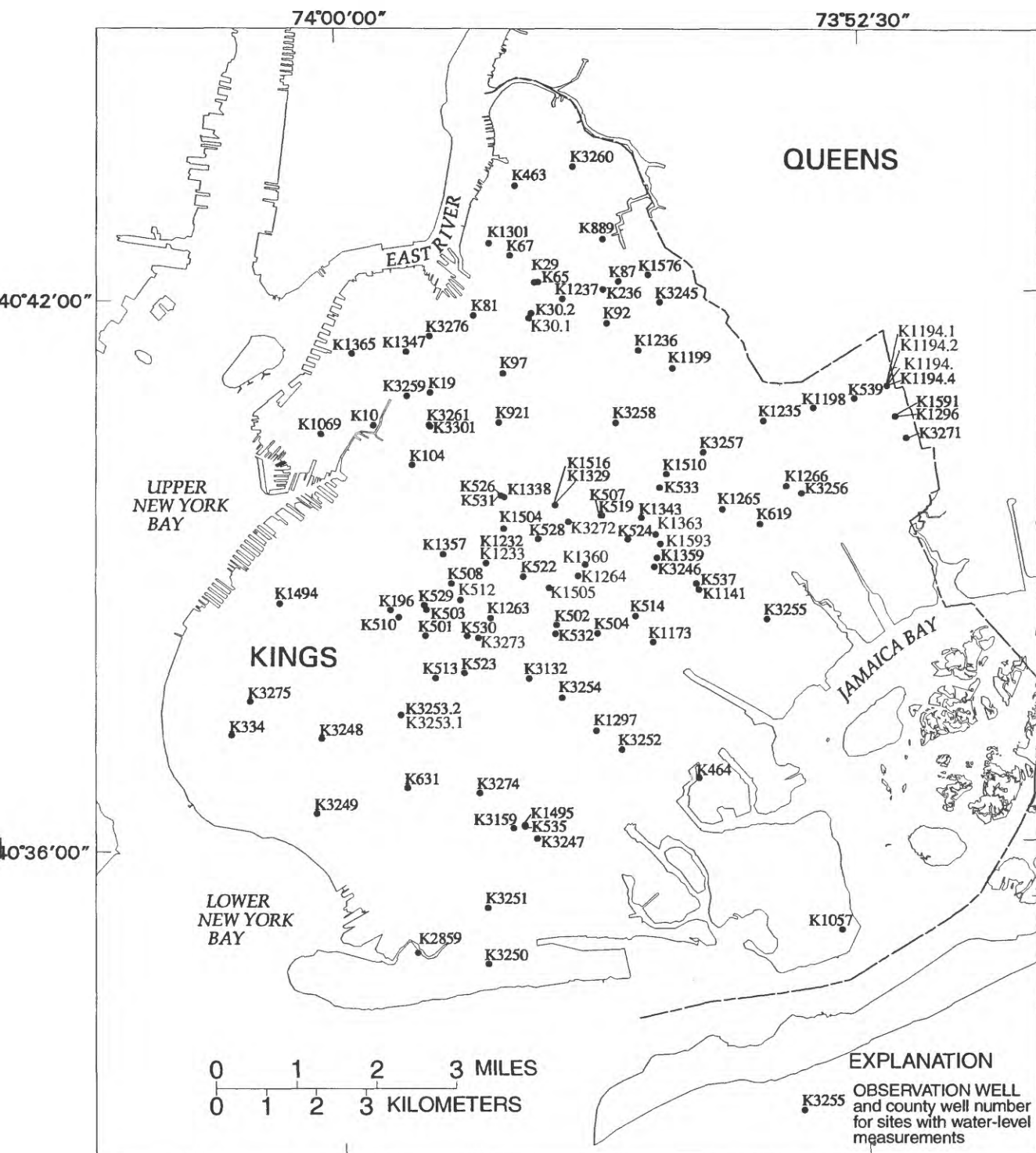


Base from New York State Department of Transportation, 1:24,000 series

Figure 1. Location of study area, Long Island, N.Y.

mum rates and locations for pumping to minimize saltwater encroachment and contaminant migration. The USGS office in Coram, N.Y., has nearly 34,100 water-level records for 309 wells in Kings and Queens Counties that are retrievable from a computerized database that is continuously updated. Each water-level record represents a sin-

gle water-level measurement from a specific well on a given date. (Specific water levels are available on request through the USGS New York District office in Troy, N.Y.) Locations of wells in Kings and Queens Counties that are represented in the database are shown in figures 2A and 2B, respectively.



Base from New York State Department of Transportation, 1:24,000 series

Figure 2A. Locations of wells represented in table 1, Kings County, N.Y.

Objectives and Approach

Objectives of the study were to (1) define ground-water quality in the Kings-Queens County aquifer system, with emphasis on contamination from volatile organic compounds (VOC's) bacteria, and saltwater intrusion; (2) establish a hydrologic data-collection network from which to obtain measurements of ground-water levels and streamflow and to delineate the saltwater interface; and (3) determine the effects of current and proposed water-supply and dewatering operations on ground-water levels and flow in the Kings-Queens system by numerical simulation. A Geographic Information System (GIS) was used to organize, update, and display data archived in the database. The GIS expedited the generation of model input. GIS was also used to compare the simulated heads with the measured heads for model calibration.

The GIS database consists of data files that are related to a well-location map coverage. Data files related to each well location contain specifications such as screen depth, aquifer tapped, measuring-point elevation, and well-identification number. Data files for some wells contain water levels, water-chemistry data, annual pumpage data, and hydrogeologic data. This report lists all wells at which water levels were measured in the 20th century, by decade. The frequency of well measurement can help indicate which wells and period of record will be useful in model calibration and other purposes.

Purpose and Scope

This report lists the wells in Kings and Queens Counties whose water-level data are being used in calibration of the model and indicates the number of water-level records available for each well in each decade from 1910 through 1995. It also briefly describes the hydrogeologic characteristics of the two-county area and explains the methods used to obtain ground-water levels.

Previous Studies

Veatch and others (1906) provided a water-table map and documentation of the underground water resources of Long Island; part of the documentation included water levels. Suter and others (1949) inter-

preted the geology of Kings County. Soren (1971 and 1978) detailed the geology of Queens County. Buxton and others (1981) described the hydrologic situation in Kings and Queens Counties in 1981. Smolensky and others (1989) present a hydrogeologic atlas of Long Island.

HYDROGEOLOGIC SETTING

Kings and Queens Counties are underlain by a sequence of unconsolidated deposits of Pleistocene and Cretaceous age, overlying a southward dipping bedrock. These deposits form four aquifers and two major confining units. This section briefly describes the geology of the principal units and is derived mainly from Soren (1971), McClymonds and Franke (1972), Jensen and Soren (1974), and Smolensky and others (1989).

Pleistocene Deposits

The upper glacial (water-table) aquifer consists of till, outwash, and glaciolacustrine and marine deposits. Till deposits, which include clay, sand, gravel, and boulders, form the moraines along the northern part of Long Island and are poorly permeable. Outwash deposits extend from the moraines to the southern shore and consist of fine to coarse sand and gravel that is moderately to highly permeable. Glaciolacustrine deposits are found in central and eastern Long Island, and marine clay deposits are found along the southern shore of Long Island; both are poorly permeable but may contain thin local deposits of sand and gravel that are moderately permeable.

The Gardiners Clay lies unconformably beneath the upper glacial aquifer along most of the southern shore of Long Island. It contains clay, silt, and a few layers of sand, marine shells, and glauconite and restricts vertical flow.

The Jameco aquifer, a south-shore glacial stream deposit of crystalline and sedimentary sand and gravel, lies unconformably beneath the Gardiners Clay. The Jameco aquifer consists of very coarse to fine sand and gravel that are moderately to highly permeable and contains a few layers of clay and silt.

Cretaceous Deposits

The Magothy aquifer lies unconformably beneath the Pleistocene deposits, primarily the Jameco aquifer. The Magothy aquifer contains beds of clay and silt that alternate with the sand and gravel and decrease the permeability locally. The sand and gravel in the Magothy aquifer consists of quartz, lignite, and pyrite; iron oxide concretions are common.

The Raritan confining unit of the Raritan formation (hereafter referred to as the Raritan clay) unconformably underlies the Magothy aquifer. It is mostly solid clay with a few lenses of sand and is poorly permeable. The Raritan clay overlies and confines the Lloyd aquifer.

The Lloyd aquifer of the Raritan formation lies conformably beneath the Raritan clay and unconformably above bedrock. The Lloyd aquifer consists of fine to coarse sand and gravel and is poorly to moderately permeable.

Precambrian Deposits

Bedrock underlies the Cretaceous deposits and, in some areas, Pleistocene deposits. It constitutes the lower boundary of the ground-water reservoir. Bedrock is composed of crystalline metamorphic and igneous rocks, muscovite-biotite schist, gneiss, and granite. It ranges from poorly permeable to virtually impermeable.

METHODS OF WATER-LEVEL MEASUREMENTS

Water-level data have been collected by several methods, the most common of which is the wetted-tape method. This consists of lowering a weighted metal measuring tape, on which the first few feet are chalked, down a well to a specific depth. The tape is then held to the nearest whole number at the measuring point of the well; this number is the "hold." Where the water level darkens, the chalked area is known as the "cut." Subtracting the cut from the hold yields the depth to water (in units of feet or meters). The water level (in feet or meters above or below sea level) is equal to the top of the measuring-point elevation of the well (referenced to sea level) minus the depth to water. Water levels also can be measured by recording

devices that give a discrete water-level record; this type of system requires postprocessing to format the recorded data for entry into the database. Other methods are air-line-pressure measurements and electronic-tape measurements; but these are used infrequently. A detailed description of these methods can be found in Driscoll (1986). Measurement of flowing (artesian) wells entails plugging the well with a reducer, and attaching clear tubing tied to a stadia rod. The stadia rod is placed on the measuring point of the well. When the water in the tube has reached a static level, the elevation of the water surface is read off the stadia rod; the water level equals the height of the water above the measuring point of the well plus the elevation of the measuring point (referenced to sea level).

NUMBER OF WATER-LEVEL MEASUREMENTS MADE AT WELLS IN KINGS AND QUEENS COUNTIES, N.Y., 1910-95, BY DECADE

Tables 1 and 2 (at end of report) list a total of 309 wells in Kings and Queens Counties, respectively. Included in the tables are the number of water-level measurements recorded in 10-year intervals, and the aquifer or zone in which each well is screened. The locations of these wells are shown in figures 2A and 2B.

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Table 1. Number of water-level records at wells in Kings County, N.Y.

[--, not available. Well locations are shown in fig. 2A]

Well number	Aquifer or zone in which well is screened	Number of water-level measurements in database								
		1910-19	1920-29	1930-39	1940-49	1950-59	1960-69	1970-79	1980-89	1990-95
K10	--	0	0	109	159	0	0	0	0	0
K19	Jameco	0	0	0	0	62	116	35	28	17
K29	--	0	0	66	0	0	0	0	0	0
K30.1	upper glacial	0	0	0	0	66	119	33	0	0
K30.2	upper glacial	0	0	0	0	0	0	8	20	0
K65	upper glacial	0	0	110	253	85	20	0	0	0
K67	upper glacial	0	0	96	245	86	27	21	0	0
K81	--	0	0	0	0	3	17	0	0	0
K87	--	0	0	111	73	0	0	0	0	0
K92	upper glacial	0	0	106	251	81	1	0	0	0
K97	upper glacial	0	0	0	83	66	22	0	0	0
K104	--	0	0	0	129	0	0	0	0	0
K196	upper glacial	0	0	0	119	45	3	0	0	0
K236	--	0	0	0	0	52	0	0	0	0
K334	upper glacial	0	0	0	0	1	15	26	0	0
K463	--	0	0	106	0	0	0	0	0	0
K464	--	0	0	0	0	0	4	28	0	0
K501	upper glacial	0	0	0	70	69	0	0	0	0
K502	--	0	0	0	67	0	0	0	0	0
K503	upper glacial	0	0	0	60	65	12	0	0	0
K504	upper glacial	0	0	0	68	64	0	0	0	0
K507	upper glacial	0	0	0	0	0	3	19	0	0
K508	upper glacial	0	0	0	64	65	21	37	24	0
K510	upper glacial	0	0	0	19	0	0	0	0	0
K512	upper glacial	0	0	0	24	0	0	0	0	0
K513	upper glacial	0	0	0	28	0	0	0	0	0
K514	upper glacial	0	0	0	33	0	0	0	0	0
K519	Jameco	0	0	0	48	15	23	23	0	0
K522	Jameco	0	0	0	65	49	19	38	29	0
K523	Jameco	0	0	0	90	47	60	2	0	0
K524	Jameco	0	0	0	66	55	1	0	0	0
K526	Jameco	0	0	0	64	35	0	0	0	0
K528	Jameco	0	0	0	29	0	0	0	0	0
K529	--	0	0	0	18	0	0	0	0	0
K530	upper glacial	0	0	0	46	86	103	31	0	0
K531	--	0	0	0	17	0	0	0	0	0
K532	Lloyd	0	0	145	93	0	0	0	0	0
K533	Jameco	0	0	0	55	0	0	0	0	0
K535	--	0	0	142	145	0	0	0	0	0
K537	--	0	0	205	148	0	0	0	0	0
K539	upper glacial	0	0	66	247	89	1	0	0	0
K619	--	0	0	0	0	81	1	0	0	0
K631	upper glacial	0	0	0	2	8	15	34	16	0
K889	upper glacial	0	0	0	101	79	25	38	22	0
K921	--	0	0	96	152	0	0	0	0	0
K1057	Lloyd	0	0	0	30	6	19	0	0	0
K1069	upper glacial	0	0	0	0	3	17	34	1	0

Table 1. Number of water-level records at wells in Kings County, N.Y.—continued

Well number	Aquifer or zone in which well is screened	Number of water-level measurements in database								
		1910-19	1920-29	1930-39	1940-49	1950-59	1960-69	1970-79	1980-89	1990-95
K1141	upper glacial	0	0	167	133	65	17	3	0	0
K1173	upper glacial	0	0	0	51	0	0	0	0	0
K1194.1	upper glacial	0	0	0	25	0	0	0	0	0
K1194.2	upper glacial	0	0	0	85	0	0	0	0	0
K1194.3	upper glacial	0	0	0	68	89	23	0	0	0
K1194.4	upper glacial	0	0	0	0	0	0	30	40	60
K1198	upper glacial	0	0	0	208	58	16	0	0	0
K1199	upper glacial	0	0	0	203	116	12	0	0	0
K1232	upper glacial	0	0	0	68	8	0	0	0	0
K1233	upper glacial	0	0	0	67	8	0	0	0	0
K1235	upper glacial	0	0	0	195	116	113	8	0	0
K1236	upper glacial	0	0	0	188	117	114	23	0	0
K1237	upper glacial	0	0	0	196	43	0	0	0	0
K1263	upper glacial	0	0	32	200	118	2	0	0	0
K1264	upper glacial	0	0	25	197	120	10	0	0	0
K1265	upper glacial	0	0	26	182	69	26	37	38	56
K1266	upper glacial	0	0	37	176	65	22	0	0	0
K1296	upper glacial	0	0	0	164	40	0	0	0	0
K1297	--	0	0	0	2	8	2	0	0	0
K1301	upper glacial	0	0	0	0	0	17	34	48	58
K1329	upper glacial	0	0	0	12	0	0	0	0	0
K1338	upper glacial	0	0	0	66	31	0	0	0	0
K1343	upper glacial	0	0	0	21	0	0	0	0	0
K1347	upper glacial	0	0	0	243	58	18	25	0	0
K1357	upper glacial	0	0	0	34	0	0	0	0	0
K1359	upper glacial	0	0	0	67	45	0	0	0	0
K1360	upper glacial	0	0	0	13	0	0	0	0	0
K1363	upper glacial	0	0	0	26	0	0	0	0	0
K1365	--	0	0	0	0	8	16	0	0	0
K1494	upper glacial	0	0	0	2	6	13	31	19	0
K1495	upper glacial	0	0	0	67	81	105	0	0	0
K1504	upper glacial	0	0	0	22	0	0	0	0	0
K1505	upper glacial	0	0	0	36	0	0	0	0	0
K1510	upper glacial	0	0	0	57	59	0	0	0	0
K1516	upper glacial	0	0	0	59	61	0	0	0	0
K1576	--	0	0	0	1	5	16	0	0	0
K1591	Jameco	0	0	0	0	21	0	0	0	0
K1593	--	0	0	0	1	36	0	0	0	0
K2859	Lloyd	0	0	0	0	0	0	0	11	4
K3132	Jameco	0	0	0	0	0	0	0	21	3
K3159	upper glacial	0	0	0	0	0	0	22	1	5
K3245	upper glacial	0	0	0	0	0	0	0	42	61
K3246	upper glacial	0	0	0	0	0	0	0	42	63
K3247	upper glacial	0	0	0	0	0	0	0	25	23
K3248	upper glacial	0	0	0	0	0	0	0	26	23
K3249	upper glacial	0	0	0	0	0	0	0	49	62
K3250	upper glacial	0	0	0	0	0	0	0	24	23
K3251	upper glacial	0	0	0	0	0	0	0	44	56

Table 1. Number of water-level records at wells in Kings County, N.Y.—continued

Well number	Aquifer or zone in which well is screened	Number of water-level measurements in database								
		1910-19	1920-29	1930-39	1940-49	1950-59	1960-69	1970-79	1980-89	1990-95
K3252	upper glacial	0	0	0	0	0	0	0	41	62
K3253.1	upper glacial	0	0	0	0	0	0	0	4	0
K3253.2	upper glacial	0	0	0	0	0	0	0	35	61
K3254	upper glacial	0	0	0	0	0	0	0	37	59
K3255	upper glacial	0	0	0	0	0	0	0	30	23
K3256	upper glacial	0	0	0	0	0	0	0	23	22
K3257	upper glacial	0	0	0	0	0	0	0	23	21
K3258	upper glacial	0	0	0	0	0	0	0	6	0
K3259	upper glacial	0	0	0	0	0	0	0	26	19
K3260	upper glacial	0	0	0	0	0	0	0	24	18
K3261	upper glacial	0	0	0	0	0	0	0	47	61
K3271	upper glacial	0	0	0	0	0	0	0	18	20
K3272	upper glacial	0	0	0	0	0	0	0	16	0
K3273	upper glacial	0	0	0	0	0	0	0	18	23
K3274	upper glacial	0	0	0	0	0	0	0	36	61
K3275	upper glacial	0	0	0	0	0	0	0	37	60
K3276	upper glacial	0	0	0	0	0	0	0	38	58
K3301	upper glacial	0	0	0	0	0	0	0	9	30

Table 2. Number of water-level records at wells in Queens County, N.Y.

[--, not available. Well locations are shown in fig. 2B]

Well number	Aquifer or zone in which well is screened	Number of water-level measurements in database								
		1910-19	1920-29	1930-39	1940-49	1950-59	1960-69	1970-79	1980-89	1990-95
Q31	--	0	0	0	2	0	4	4	0	0
Q34.2	Lloyd	0	0	0	4	2	5	43	36	6
Q64	bedrock	0	0	0	0	0	0	42	26	0
Q82	--	0	0	0	4	2	0	0	0	0
Q102	--	0	0	0	2	1	0	0	0	0
Q113	--	0	0	0	6	1	0	0	0	0
Q143	--	0	0	0	6	1	0	0	0	0
Q145	--	0	0	0	0	5	0	0	0	0
Q150	--	0	0	0	0	5	2	0	0	0
Q248	--	0	0	15	43	0	0	0	0	0
Q268	--	0	0	0	57	0	0	0	0	0
Q273	Lloyd	0	0	0	0	70	69	51	35	17
Q276	--	0	0	0	0	5	0	0	0	0
Q278	--	0	0	0	44	61	0	0	0	0
Q282	--	0	0	0	45	0	0	0	0	0
Q283.2	Lloyd	0	0	0	45	115	113	54	62	56
Q287	Lloyd	0	0	0	34	0	18	44	53	55
Q288	--	0	0	0	3	4	0	0	0	0
Q301	upper glacial	0	0	0	0	0	3	0	2	0
Q302	upper glacial	0	0	0	3	2	0	0	0	0
Q303	upper glacial	0	0	0	0	0	3	1	1	0
Q304	upper glacial	0	0	0	0	0	3	0	2	0
Q305	upper glacial	0	0	0	0	0	3	0	3	0
Q306	upper glacial	0	0	0	0	0	3	2	3	0
Q307	upper glacial	0	0	0	0	0	3	0	2	0
Q308	upper glacial	0	0	0	0	0	3	1	3	0
Q310	upper glacial	0	0	0	0	0	3	0	2	0
Q311	Jameco	0	0	0	5	0	3	0	0	0
Q312	Jameco	0	0	0	5	0	0	0	0	0
Q313	upper glacial	0	0	0	0	0	3	0	3	0
Q314	Jameco	0	0	0	5	0	3	7	1	0
Q317	Lloyd	0	0	0	9	1	4	6	5	0
Q318	Magothy	0	0	0	5	0	0	0	0	0
Q319	upper glacial	0	0	0	0	0	3	0	3	0
Q321	upper glacial	0	0	0	0	0	3	5	4	0
Q322	upper glacial	0	0	0	0	0	3	1	1	0
Q323	upper glacial	0	0	0	0	0	3	0	1	0
Q324	upper glacial	0	0	0	0	0	3	0	4	0
Q337	--	0	0	23	29	0	0	0	0	0
Q350	Jameco	0	0	149	148	98	0	0	0	0
Q470	Lloyd	0	0	0	0	63	120	51	55	61
Q471	Magothy	0	0	21	242	117	112	46	50	59
Q494	--	0	0	23	0	0	0	0	0	0
Q503	--	0	0	15	116	0	0	0	0	0
Q539	upper glacial	0	0	0	6	38	12	7	3	0
Q543	Lloyd	0	0	0	11	104	121	34	0	0
Q549	--	0	0	0	0	8	10	0	0	0

Table 2. Number of water-level records at wells in Queens County, N.Y.—continued

Well number	Aquifer or zone in which well is screened	Number of water-level measurements in database								
		1910-19	1920-29	1930-39	1940-49	1950-59	1960-69	1970-79	1980-89	1990-95
Q557	Magothy	0	0	0	8	1	0	0	0	0
Q558	upper glacial	0	0	0	0	0	3	0	0	0
Q559	Jameco	0	0	0	5	0	0	0	0	0
Q560	upper glacial	0	0	0	0	0	3	2	4	0
Q561	upper glacial	0	0	0	0	0	3	2	4	0
Q562.2	Lloyd	0	0	0	11	1	4	7	10	5
Q563	Magothy	0	0	0	0	0	3	0	2	0
Q564	Magothy	0	0	0	0	0	3	0	2	0
Q565.2	Lloyd	0	0	0	5	1	3	3	0	0
Q566	Magothy	0	0	0	4	0	3	1	1	0
Q567.2	Lloyd	0	0	0	12	0	3	5	7	5
Q568	Magothy	0	0	0	0	0	4	9	3	0
Q569	upper glacial	0	0	0	0	0	3	0	3	0
Q570	upper glacial	0	0	0	0	0	3	1	4	0
Q577	Lloyd	0	0	0	128	318	133	144	122	41
Q970	--	0	0	0	6	2	0	0	0	0
Q1026	--	0	0	0	16	0	0	0	0	0
Q1027	--	0	0	0	3	32	7	0	0	0
Q1035	--	0	0	0	4	2	0	0	0	0
Q1037	--	0	0	0	6	2	0	0	0	0
Q1058	upper glacial	0	0	0	0	0	3	1	4	0
Q1066	--	0	0	0	0	7	5	4	0	0
Q1071.2	Lloyd	0	0	0	0	0	0	3	56	54
Q1089	upper glacial	146	0	196	173	121	117	4	0	0
Q1090	upper glacial	147	0	201	202	62	6	0	0	0
Q1092	--	0	0	39	53	0	0	0	0	0
Q1096	upper glacial	0	0	0	0	9	13	7	0	0
Q1151	upper glacial	0	0	0	0	0	0	5	0	0
Q1152	--	0	0	0	35	53	0	0	0	0
Q1187	Jameco	0	0	0	0	0	3	36	52	62
Q1189	upper glacial	0	0	0	0	0	3	38	48	62
Q1218	--	0	0	0	0	8	11	3	0	0
Q1222	--	0	0	0	201	120	42	2	0	0
Q1223	upper glacial	0	0	54	226	117	119	36	24	0
Q1224	--	0	0	32	211	0	0	0	0	0
Q1225	upper glacial	0	0	56	227	70	0	0	0	0
Q1225.2	upper glacial	0	0	0	0	5	118	7	4	0
Q1230	--	0	0	0	0	6	0	0	0	0
Q1232	--	0	0	0	0	21	0	0	0	0
Q1236	--	0	0	0	0	6	5	0	0	0
Q1237	Jameco	0	0	0	0	106	91	42	58	51
Q1241	Lloyd	0	0	0	4	2	0	6	10	1
Q1248	--	0	0	0	203	61	0	0	0	0
Q1249	upper glacial	0	0	0	201	61	14	12	28	52
Q1250	upper glacial	0	0	0	202	116	0	0	0	0
Q1250.2	upper glacial	0	0	0	0	5	45	37	104	0
Q1251	--	0	0	0	205	59	4	0	0	0
Q1252	upper glacial	0	0	0	201	108	118	46	1	0

Table 2. Number of water-level records at wells in Queens County, N.Y.—continued

Well number	Aquifer or zone in which well is screened	Number of water-level measurements in database								
		1910-19	1920-29	1930-39	1940-49	1950-59	1960-69	1970-79	1980-89	1990-95
Q1253	--	0	0	0	188	56	0	0	0	0
Q1254	upper glacial	0	0	0	182	64	113	83	47	7
Q1255	upper glacial	126	0	61	179	109	46	23	1	5
Q1256	--	0	0	0	186	58	6	0	0	0
Q1267	upper glacial	0	0	0	1	59	13	6	0	0
Q1281	upper glacial	98	0	6	176	60	13	6	0	0
Q1282	upper glacial	0	0	34	167	62	14	12	0	0
Q1283	upper glacial	76	0	26	169	59	15	3	0	0
Q1284	upper glacial	54	1	20	165	57	16	12	7	0
Q1285	--	0	0	8	174	61	10	0	0	0
Q1286	--	0	0	0	168	57	1	0	0	0
Q1287	upper glacial	0	0	19	172	61	12	8	3	0
Q1288	--	0	0	24	170	120	46	0	0	0
Q1289	--	0	0	39	172	67	0	0	0	0
Q1290	upper glacial	0	0	34	173	94	102	7	0	0
Q1292	--	0	0	0	150	0	0	0	0	0
Q1326	upper glacial	0	0	0	0	9	13	11	8	6
Q1373	Lloyd	0	0	0	0	0	5	97	81	3
Q1391	upper glacial	0	0	0	0	8	13	8	3	0
Q1392	--	0	0	0	83	13	0	0	0	0
Q1395	--	0	0	0	2	16	0	0	0	0
Q1406	upper glacial	0	0	0	0	7	11	10	7	0
Q1416	upper glacial	0	0	0	0	7	13	10	6	0
Q1437	--	0	0	0	3	6	8	0	0	0
Q1459	Jameco	0	0	0	11	0	0	0	0	0
Q1508	--	0	0	0	0	9	13	0	0	0
Q1534	upper glacial	0	0	0	0	0	0	0	4	0
Q1600	Magothy	0	0	0	0	0	0	0	2	0
Q1629	Magothy	0	0	0	0	0	0	0	2	0
Q1663	upper glacial	0	0	0	0	0	1	35	3	0
Q1811	upper glacial	0	0	0	0	0	0	0	2	0
Q1812	Magothy	0	0	0	0	0	0	0	41	61
Q1815	Magothy	0	0	0	0	0	3	1	0	0
Q1829	upper glacial	0	0	0	0	0	0	9	7	0
Q1839	upper glacial	0	0	0	0	0	0	0	3	0
Q1843	upper glacial	0	0	0	0	0	0	0	3	0
Q1872	--	0	0	0	0	0	0	5	0	0
Q1929	Lloyd	0	0	0	0	0	4	2	0	0
Q1958	Magothy	0	0	0	0	0	3	8	2	0
Q1997	upper glacial	0	0	0	0	0	2	7	2	0
Q2006	upper glacial	0	0	0	0	0	0	0	3	0
Q2026	Magothy	0	0	0	0	0	3	9	3	0
Q2137	Magothy	0	0	0	0	0	2	1	3	0
Q2188	Magothy	0	0	0	0	0	2	1	1	0
Q2243	upper glacial	0	0	0	0	0	0	0	3	0
Q2275	upper glacial	0	0	0	0	0	0	0	3	0
Q2299	upper glacial	0	0	0	0	0	0	0	3	0
Q2300	Magothy	0	0	0	0	0	0	0	3	3

Table 2. Number of water-level records at wells in Queens County, N.Y.—continued

Well number	Aquifer or zone in which well is screened	Number of water-level measurements in database								
		1910-19	1920-29	1930-39	1940-49	1950-59	1960-69	1970-79	1980-89	1990-95
Q2321	upper glacial	0	0	0	0	0	3	6	6	0
Q2324	upper glacial	0	0	0	0	9	118	44	53	58
Q2325	--	0	0	0	0	1	110	9	0	0
Q2332	Magothy	0	0	0	0	0	2	5	1	0
Q2343	Magothy	0	0	0	0	0	4	1	3	0
Q2346	upper glacial	0	0	0	0	0	110	82	120	56
Q2362	Magothy	0	0	0	0	0	0	6	2	0
Q2363	Magothy	0	0	0	0	0	3	6	2	0
Q2373	Magothy	0	0	0	0	0	0	0	1	0
Q2376	--	0	0	0	0	0	0	8	0	0
Q2408	Magothy	0	0	0	0	0	0	0	1	0
Q2409	Magothy	0	0	0	0	0	0	5	1	0
Q2410	upper glacial	0	0	0	0	0	1	35	21	0
Q2416	Lloyd	0	0	0	0	0	0	0	10	5
Q2417	--	0	0	0	0	0	16	36	0	0
Q2418	upper glacial	0	0	0	0	0	11	23	30	12
Q2419	Lloyd	0	0	0	0	0	0	12	0	9
Q2420	Lloyd	0	0	0	0	0	9	40	37	1
Q2422	Magothy	0	0	0	0	0	8	139	103	43
Q2432	Magothy	0	0	0	0	0	3	9	1	0
Q2435	Magothy	0	0	0	0	0	1	2	0	0
Q2442	upper glacial	0	0	0	0	0	0	0	3	0
Q2443	Magothy	0	0	0	0	0	0	0	2	5
Q2685	upper glacial	0	0	0	0	0	1	9	0	0
Q2791	upper glacial	0	0	0	0	0	0	0	45	46
Q2814	upper glacial	0	0	0	0	0	0	0	17	20
Q2955	Magothy	0	0	0	0	0	1	9	4	5
Q2993	upper glacial	0	0	0	0	0	1	35	34	0
Q2994	upper glacial	0	0	0	0	0	3	37	30	15
Q2995	upper glacial	0	0	0	0	0	3	38	23	16
Q3015	Magothy	0	0	0	0	0	0	0	13	1
Q3036	Lloyd	0	0	0	0	0	0	0	7	2
Q3062	Magothy	0	0	0	0	0	0	0	1	0
Q3069.2	Lloyd	0	0	0	0	0	0	3	6	5
Q3083	Magothy	0	0	0	0	0	0	0	3	0
Q3109	Magothy	0	0	0	0	0	0	0	41	58
Q3110	Jameco	0	0	0	0	0	0	0	26	18
Q3112	Jameco	0	0	0	0	0	0	0	23	17
Q3114	upper glacial	0	0	0	0	0	0	0	41	60
Q3115	upper glacial	0	0	0	0	0	0	0	25	18
Q3117	upper glacial	0	0	0	0	0	0	0	17	17
Q3118	upper glacial	0	0	0	0	0	0	0	62	0
Q3119	upper glacial	0	0	0	0	0	0	0	28	21
Q3120	upper glacial	0	0	0	0	0	0	0	4	0
Q3121	upper glacial	0	0	0	0	0	0	0	44	57
Q3122	upper glacial	0	0	0	0	0	0	0	42	60
Q3123	upper glacial	0	0	0	0	0	0	0	41	0
Q3150	Jameco	0	0	0	0	0	0	0	17	21

Table 2. Number of water-level records at wells in Queens County, N.Y.—continued

Well number	Aquifer or zone in which well is screened	Number of water-level measurements in database								
		1910-19	1920-29	1930-39	1940-49	1950-59	1960-69	1970-79	1980-89	1990-95
Q3160	upper glacial	0	0	0	0	0	0	0	65	59
Q3161	upper glacial	0	0	0	0	0	0	0	34	0
Q3162	upper glacial	0	0	0	0	0	0	0	25	61
Q3163	upper glacial	0	0	0	0	0	0	0	6	21
Q3165	upper glacial	0	0	0	0	0	0	0	26	61