GEOLOGY and GROUND WATER RESOURCES of SUSSEX COUNTY and the WARREN COUNTY PORTION of the TOCKS ISLAND IMPACT AREA

Department of Environmental Protection
Division of Water Resources

BULLETIN 73
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GEOLOGY and GROUND WATER RESOURCES of SUSSEX COUNTY and the WARREN COUNTY PORTION of the TOCKS ISLAND IMPACT AREA

by

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ABSTRACT

Sussex County and the Warren County portion of the Tocks Island Impact Area are primarily agricultural. Commercial, industrial and resort developments are occurring at an increasingly rapid rate.

Ground water supplies approximately 60% of the estimated daily water consumption. Water utilities furnish the balance with surface water or a combination of ground water and surface water. Most of the ground water is obtained from rock wells; only a small percentage of the wells are located in unconsolidated Pleistocene deposits.

Over 3,000 records of domestic, industrial and public supply wells were examined and are included in the report. The interpretations and conclusions presented are based on these driller's records which, although not precise or complete, give a good indication of reasonable expectations of depth and yield for each formation.

There are no known areas where ground water levels have declined because of over pumping. Domestic supplies may be developed almost anywhere in the study area. Moderate to large supplies can generally be developed from wells located in stratified drift, in cavernous members of the Kittatinny Formation and in shear zones near faults. Wells completed in the Precambrian crystallines, in the non-cavernous members of the Kittatinny Formation, and in the Martinsburg Formation usually will have very low yields: between 36 to 47% will have yields of 5 gpm or less.

The quality of ground water is generally good for most uses. Locally, the water will have to be treated for hardness, low pH, high iron content and high SO_4.

ACKNOWLEDGMENTS

This report was prepared under the general supervision of Kemble Widmer, State Geologist of New Jersey, who provided guidance and invaluable counsel and advice.

The author is indebted to numerous organizations, industries and individuals who provided data for this report. The following geologists from the New Jersey Geological survey made contributions to this report: Haig F. Kasabach prepared the Geologic Map, supervised the preparation of the Base Map, and plotted a good portion of the wells on the Well Location Map. The text follows the format of his Geology and Ground Water Resources of Hunterdon County, N. J. Carol Lucey assisted in the well tabulations, proofreading and editing the text. Frank Markewicz provided much valuable information pertaining to the geology of the counties and revised the Precambrian and Paleozoic geology in several areas; his description is used in the breakdown of the Kittatinny Formation and he critically reviewed the chapter on geology and the Geologic Map. Mr. George Banino also critically reviewed this report.

The United States Geological Survey at Trenton provided base flow data for the major watersheds. Mr. Donald Dunlap of the United States Weather Bureau in New Brunswick provided the climatological data. The Bureau of Water Control, in the Department of Environmental Protection, furnished most of the water consumption data. The New Jersey Department of Health furnished the chemical analyses of the Public Water Supplies. Mrs. Gladys W. Ellsworth, Chief, Bureau of Research and Statistics, Division of Economic Development, Department of Labor and Industry, furnished the population data. Mr. J. L. Baum furnished bedrock data in the Franklin, Hamburg, McAfee and Ogdensburg areas.

Special acknowledgment is extended to Miss Beverly Birban and Mrs. Dorene Sarnoski for their care and patience in typing this report; to Mr. George Caruso, who drafted most of the plates and illustrations; and to Mr. John Kremper, who finished the drafting.

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Purpose and Scope of the Investigation

The study of the geology and ground water resources of Sussex County and the Warren County portion of the Tocks Island Impact Area is part of a statewide program studying the ground water resources of New Jersey. The project was initiated by a request from the Delaware Basin Commission for a report on the Tocks Island Impact Area, and was expanded to include all of Sussex County.

This investigation compiles all available well records, hydrologic information, and interprets, summarizes and makes available the results of this data to the public.

Records and logs of 3,161 wells, furnished by licensed New Jersey drillers and located in the files of the Bureau, were studied and tabulated. The scope of this report did not permit the author to conduct aquifer tests, establish observation wells to study fluctuations of ground water levels, or run new chemical analyses of ground water. Summaries of chemical analyses were obtained from various sources.

Location, Area and Population Data

Sussex County is the northernmost county in the state. It is bounded on the northwest by the Delaware River and Pennsylvania; on the northeast by New York State; on the southeast by Passaic and Morris Counties; and on the southwest by Warren County (Figure 1).

The county has a land area of 526.3 square miles. In 1964, 63.5% of the land was private forest and farm land; 10.9% was publicly owned and 26.8% was in residential, commercial, or other use. (New Jersey Division of State & Regional Planning, Department of Community Affairs, 1966.)

In 1967, 547 employer units provided jobs for 8,850 persons. Manufacturing accounted for 35% and retail and wholesale trade accounted for 26.3% (New Jersey Division of Economic Development, Bureau of Statistics, 1967).

The Warren County section of the Tocks Island Impact Area is bounded on the north and west by the Delaware River and Pennsylvania; on the northeast by Sussex County and on the south by Allamuchy, Hope, Independence, and White Townships in Warren County. It has a land area of 118.30 square miles. In 1964, 7.85% of the land was publicly owned. Information is not available for the Warren County section on manufacturing and employment.

Sussex County ranked 21st in population among the State's 21 counties in the 1950 census and 20th in the 1960 census. The population increase from 1950 to 1960 was 43.09% against 25.47% for the State. The estimated population of July 1, 1967 showed an increase of 32.5% from 1960 to 1967. The 1967 estimated population of the county was 65,240 (Table 1), or 01.92% of the State population. The population density is 120.7 per square mile.

In the Warren County portion of this report the population increase from 1950 to 1960 was 8.61%. The estimated population of July 1, 1967, of 5,050, showed an increase of 11.8% from 1960 to 1967.

Political Subdivisions

Sussex County contains 24 municipalities, 9 boroughs, and 15 townships. Hopatcong Borough, 10.8 square miles, is the largest borough and Branchville Borough, 0.5 square miles, is the smallest. Of the townships both Vernon and Wantage contain 67.9 square miles and are the two largest. Green, 16.5 square miles, is the smallest.

The Tocks Island Impact Area of Warren County contains 5 municipalities; Blairstown Township, 30.7 square miles, is the largest and Hardwick Township, 17.8 square miles, is the smallest.

Geologic Base Map

The geologic descriptions of formations given in this report are not intended to be detailed or comprehensive, but only to provide enough background for the more detailed discussions of the ground water geology of the county. The geologic map of Sussex County is compiled from the Geologic Map of New

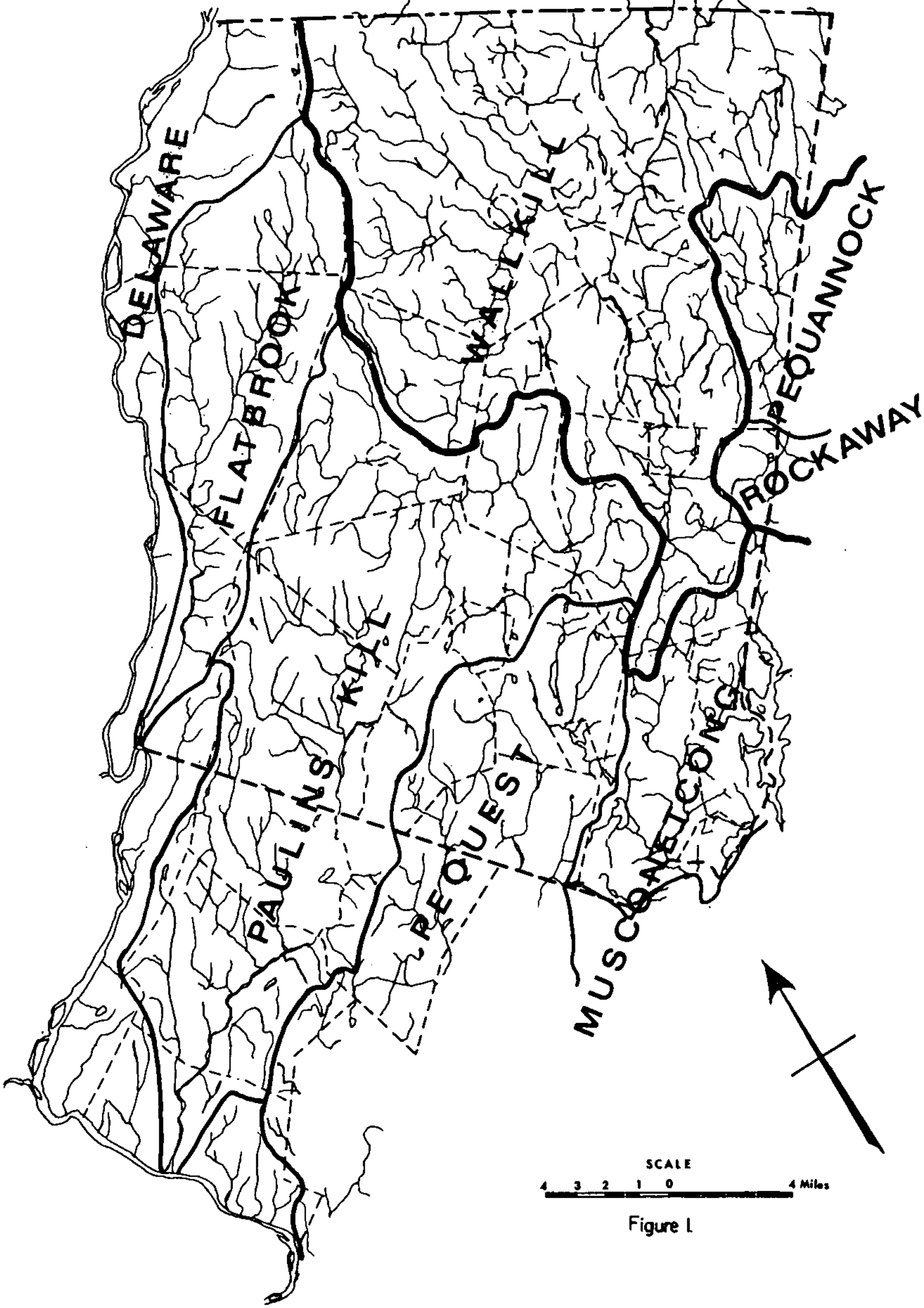
DELAWARE
FLATBROOK
WALLKILL
PEQUANNOCK
ROCKAWAY
KILL
PAULINS
PEQUEST
MUSCONETCONG
SCALE
4 3 2 1 0 4 Miles

Figure I.

Jersey (Johnson, 1950); Geology of the Franklin and part of the Hamburg quadrangles (Buddington and others, 1961); Geology of the Milford, Port Jervis South, Culvers Gap and Branchville Quadrangles (Spink, 1967); and Geology and Structure of the Franklin-Sterling Area, New Jersey (Hague and others, 1956); and well data.

Previous Investigations

This report discusses the availability of ground water and the geology of Sussex County and the Warren County portion of the Tocks Island Impact Area. A report on the general geology and ground water of

TABLE 1

AREA AND POPULATION OF MUNICIPALITIES IN SUSSEX AND WARREN COUNTIES, NEW JERSEY, SINCE 1930

MUNICIPALITIES	*Area in Sq. Miles*	*1930*	*1940*	*1950*	*1960*	*Estimated Population July 1, 1967*	*Percent Change 60/67*
Andover Boro.	2.00	479	512	560	734	850	15.8
Andover Twp.	20.40	496	591	1,052	2,177	2,750	26.3
Branchville Boro.	0.50	665	715	810	963	1,030	7.0
Byram Twp.	20.60	245	373	761	1,616	2,920	80.7
Frankford Twp.	34.80	1,074	1,244	1,530	2,170	2,510	15.7
Franklin Boro.	4.40	4,176	4,009	3,864	3,624	4,170	15.1
Fredon Twp.	18.30	412	478	584	804	1,240	54.2
Green Twp.	16.50	539	540	596	854	1,290	51.1
Hamburg Boro.	1.20	1,160	1,116	1,305	1,532	1,980	29.2
Hampton Twp.	24.70	581	611	668	1,174	1,810	54.2
Hardyston Twp.	32.60	946	1,034	1,279	2,206	2,860	29.6
Hopatcong Boro.	10.80	534	660	1,173	3,391	4,550	34.2
Lafayette Twp.	18.30	735	803	836	1,100	1,370	24.5
Montague Twp.	44.60	581	621	602	879	1,150	30.8
Newton Town	3.00	5,401	5,533	5,781	6,563	8,120	23.7
Ogdensburg Boro.	2.10	1,138	1,165	1,169	1,212	2,190	80.7
Sandyston Twp.	42.10	610	651	829	1,019	1,110	8.9
Sparta Twp.	38.80	1,316	1,729	3,021	6,717	8,840	31.6
Stanhope Boro.	2.00	1,089	1,100	1,351	1,814	2,920	61.0
Stillwater Twp.	28.04	706	679	816	1,339	1,780	32.9
Sussex Boro.	0.90	1,415	1,478	1,541	1,656	1,890	14.1
Vernon Twp.	67.90	1,279	1,407	1,548	2,155	3,470	61.0
Walpack Twp.	23.86	178	207	204	248	350	41.1
Wantage Twp.	67.90	2,075	2,376	2,543	3,308	4,090	23.6
County Total	526.30	27,830	29,632	34,423	49,255	65,240	32.5

Source—New Jersey Bureau of Commerce.

WARREN COUNTY

MUNICIPALITIES	*Area in Sq. Miles*	*1930*	*1940*	*1950*	*1960*	*Estimated Population July 1, 1967*	*Percent Change 60/67*
Blairstown Twp.	30.70	1,416	1,449	1,571	1,797	1,970	9.6
Frelinghuysen Twp.	23.60	696	715	779	845	940	11.2
Hardwick Twp.	17.80	331	367	370	370	420	13.5
Knowlton Twp.	25.90	1,049	1,084	1,260	1,442	1,650	14.4
Pahaquarry Twp.	20.30	80	72	67	63	70	11.1
Total	118.30	3,572	3,687	4,047	4,517	5,050	11.8

Source—New Jersey Bureau of Commerce.

the Delaware River Basin (Olmstead and others, 1959) included part of Sussex County and the Warren County portion of the Tocks Island Impact Area.

The geology of parts of Sussex County is discussed at length in the Franklin Furnace Quadrangle (Spencer and others, 1908); the Raritan Folio (Baley and others, 1914); Geology and Structure of the Franklin-Sterling Area, New Jersey (Hague and others, 1956); Geology of Franklin and part of the Hamburg quadrangles (Buddington and others, 1961); The Geology of New Jersey (Kummel, 1940); Silurian and Devonian Stratigraphy—Pennsylvania—New Jersey—New York (Epstein and others, 1967); The Geology and Geography of New Jersey (Widmer, 1964); and other publications.

Well Locations and Numbering System

Drillers provided most of the well locations shown on the maps accompanying this report. It was not possible to field check locations; however, all well logs used in the tabulations were checked against the geologic map. Those interested in precise well locations should note the dates that wells were drilled because names listed in the tabulations are those for whom wells were originally drilled, and may not be the present property owners.

Well locations are shown on Plate 1 in the pocket. A separate number series, beginning with the number 1, has been used to list the wells in each municipality; thus identical well numbers will appear in the tabulations and on the map. Boroughs and towns are included in the well numbering series of surrounding or adjacent townships. The first page of each well record tabulation stipulates which boroughs and towns are included within the township tabulation.

It is not feasible to locate wells precisely on a map scale of one inch to one mile. However, the size requirements and handling ease indicated that this scale would be the best compromise. On all maps included in this report, an industrial or public supply well is indicated by a solid triangle. A circled dot shows the location of a domestic well. If a large number of wells are located in a small area, the area is shaded and the sequence of well numbers is, for example, shown as: 51-199.

Topography

Sussex County and the Warren County portion of the Tocks Island Impact Area lie within two of the four physiographic provinces which trend in a northeast-southwest direction across New Jersey. The northernmost two thirds of the counties are in the Valley and Ridge Province, which is subdivided into two sub-provinces: the Kittatinny Ridge and the Kittatinny Valley. The southeastern third of Sussex County is in the New Jersey Highland Province, which is a southwesterly extension of the Reading Prong of the New England Province.

Kittatinny Ridge

Kittatinny Ridge sub-province in New Jersey encompasses all of the area between the Delaware River, New York State line, and the eastern escarpment which forms the southeastern flank of the Kittatinny Mountains. The townships of Montague, Sandyston, Wallpack and Pahaquarry are located in this sub-province.

Its width at the New York line is three miles. It widens to eight miles at Montague and narrows to three and a half miles at Flatbrookville. The Delaware River forms the western boundary with an elevation of 411 feet at Port Jervis and 321 feet at Flatbrookville. The base of the eastern escarpment rests on the high Martinsburg shale hills on the west side of Kittatinny Valley and has an elevation ranging between 900 and 1,000 feet. The crest of the mountain is generally 600 to 1,200 feet west of the base of the escarpment and is from 450 to 600 feet above the valley floor. The ridge has a double crest except for the first four miles south-westward from the New York State line. The higher ridge forms the top of the excarpment. The elevation of the crest at the New York line is 1,539 feet; at High Point it is 1,803 feet, and at the Warren County line it is 1,480 feet. The ridge is cut by Culvers Gap, where the elevation of the Gap is 915 feet. The western flank is cut by Flatbrook Valley.

In Warren County, the mountain is characterized by three marked offsets in the eastern escarpment. The first is where the Millbrook-Blairstown Road crosses the mountain, and is about 700 yards long. The next, five and a half miles to the southwest, is nearly a mile long. The third one, about 240 yards long, is at the Delaware Water Gap. The elevation of the ridge at the Gap is 1,486 feet and rises to 1,635 feet one mile to the northeast. The elevation of the Delaware River at this point is 283 feet.

Kittatinny Valley Sub-province

The width of the valley is eight miles at the New York State line and is 11.5 miles at the Warren County line. On the northwest it is bounded by the Kittatinny escarpment and on the east by the irregular edges of the Highlands province. Two well defined sub-valleys traverse the valley's length. The Paulins Kill drains into the Delaware River and the Wallkill River drains to the northeast into New York State. To the west of the Wallkill River the Martinsburg shale hills rise steeply to an elevation of 700-900 feet. They form ridges whose axes are parallel to Kittatinny Mountain. They are intersected by transverse stream valleys. Between Branchville and Swartswood the ridges form a plateau. There are few lakes in Kittatinny Valley northeast of Culvers Lake, however, there are quite a few more southwest of this lake.

New Jersey Highlands Province

The Highlands lie to the southeast of Kittatinny Valley and extend past the Sussex County line. Next to Kittatinny Valley, the Highlands rise from 1,400 to 1,500 feet near Vernon and from 1,000 to 1,200 feet to the southwest. They consist of several flat topped ridges separated by narrow steep-walled valleys; the valleys in the Highlands are underlain by more easily eroded dolomites, limestones and shales.

Climate

Sussex County and the Warren County portion of the Tocks Island Impact Area have a modified continental type climate. Although Sussex County is approximately 50 miles west of the Atlantic Ocean, the prevailing off-shore winds tend to cancel the tempering oceanic influence.

Using the principle that there is a 1° F. drop in temperature for every 300 feet elevation, this would make the Highlands 2° F. cooler than the adjacent valleys and the crest of Kittatinny Mountain would be 3° or 4° F. cooler than Kittatinny Valley. The highest temperatures recorded in Layton, Newton and Sussex (1931-1966) were as follows: 104° F., 104° F., 102° F., (9/3/53). The lowest temperatures recorded in Layton, Newton and Sussex (1931-1966) were as follows: –29° F., –25° F., –25° F., (1/22/61). Mean monthly and annual temperatures for the above are given in Table 2.

The median date of the last killing frost in the spring at Layton is April 23, at Newton, April 7 and at Sussex, April 7. The median date of the first killing frost in the fall at Layton is October 20, at Newton, November 5 and at Sussex, October 27. This gives the sub-province, Kittatinny Ridge, an average growing season of 178 days and the Kittatinny Valley, 204 days. There are no weather stations in the townships included from Warren County.

Precipitation throughout the report area is nearly equally distributed through the seasons. December and February are the driest months, and the period of May through September, has the greatest average rainfall due to thunderstorms. The mean yearly precipitation at Canistear Reservoir is 44.16 inches, at Culvers Lake, 44.26 inches (prior to 1952), at High Point State Park, 36.54 inches (average from 1957 through 1966), at Layton the mean is 43.91 inches, at Newton 44.79 inches and at Sussex it is 45.78 inches. It should be noted that during the period 1961-1966, the departure from normal was as follows: Canistear Reservoir, –40.75 inches or the equivalent of 92% of the annual mean precipitation; at Layton, –58.96 inches or the equivalent of 134% of the annual mean precipitation; at Newton, –66.06 inches or the equivalent of 147% of the annual mean precipitation; and at Sussex, –63.80 inches or the equivalent of 139% of the annual mean precipitation.

Major Watersheds

The drainage area of the Flat Brook watershed is 65.1 square miles. It drains an area underlain by Silurian sandstone and conglomerate to the east and Devonian limestones and shales to the west, and the glacial deposits covering most of the area. The drainage area of the Paulins Kill watershed is 126 square miles. Approximately 44 square miles is underlain by the Kittatinny Limestone and glacial deposits; the balance underlain by the Martinsburg Formation and accompanying glacial deposits. The drainage area of the Wallkill River watershed is 140 square miles. It has its headwaters in the Precambrian crystallines, then flows in valleys underlain by the Precambrian Franklin Formation (marble), the Kittatinny Formation and glacial deposits; it also drains a large area underlain by the Martinsburg Formation.

TABLE 2

TEMPERATURE AND PRECIPITATION DATA, SUSSEX COUNTY, N. J.

	Mean Air Temperature (°F) (Years of record)			*Precipitation in inches (1931-1966)* *Maximum*						*Minimum*						*Mean Precipitation (Years of record)*					
	Layton Period 57 yrs.	*Newton Period 74 yrs.*	*Sussex Period 57 yrs.*	*Branchville 1951-1960*	*Culvers Lake 1931-1952*	*Canistear Res. 1951-1960*	*Layton 1931-1960*	*Newton 1931-1960*	*Sussex 1931-1960*	*Branchville 1951-1960*	*Culvers Lake 1931-1952*	*Canistear Res. 1951-1960*	*Layton 1931-1960*	*Newton 1931-1960*	*Sussex 1931-1960*	*Branchville Record 58 yrs.*	*Canistear Res. Record 12 yrs.*	*Culvers Lake Record 22 yrs.*	*Layton Record 59 yrs.*	*Newton Record 73 yrs.*	*Sussex Record 65 yrs.*
January	25.9	26.6	27.2	5.52 '53	5.80 '37	5.85 '53	5.61 '53	5.99 '36	6.83 '49	0.83 '55	1.47 '40	0.51 '55	0.46 '46	0.72 '55	0.71 '55	3.07	3.29	3.42	2.90	3.26	3.35
February	26.4	27.4	27.4	4.29 '58	5.65 '30	4.77 '51	4.83 '56	4.62 '39	5.05 '50	1.98 '65	0.94 '34	2.07 '54	0.63 '41	1.13 '47	1.01 '62	2.86	2.57	3.26	2.71	3.09	3.03
March	36.0	36.2	36.9	5.64 '51	6.00 '40	7.57 '51	6.55 '51	5.53 '53	7.27 '42	2.01 '64	1.39 '49	2.24 '60	0.71 '43	1.53 '49	1.57 '60	3.37	3.49	4.35	3.42	3.39	3.35
April	47.4	48.1	48.7	10.31 '52	10.31 '52	8.70 '52	11.60 '52	8.97 '52	8.66 '52	1.30 '63	0.87 '46	2.29 '55	0.79 '46	1.44 '35	0.83 '63	3.71	3.47	4.72	3.78	3.55	3.68
May	57.9	59.2	59.6	6.25 '52	7.24 '47	4.93 '54	7.49 '46	9.24 '47	7.80 '47	0.64 '62	0.51 '35	0.81 '59	0.70 '62	0.63 '55	0.78 '59	3.63	3.98	3.55	3.62	3.84	3.75
June	66.4	67.8	67.5	5.97 '59	11.26 '38	7.75 '52	8.82 '38	10.29 '38	7.26 '35	0.52 '54	0.05 '49	1.09 '54	0.39 '49	0.43 '49	0.21 '49	4.40	4.60	3.70	4.07	4.17	4.06
July	71.2	72.4	72.4	9.03 '60	10.94 '45	9.34 '51	10.51 '45	12.43 '45	12.77 '45	1.15 '55	1.15 '36	1.87 '54	0.53 '55	0.38 '36	0.94 '36	4.59	4.90	4.87	4.61	4.80	4.73
August	69.0	70.2	70.0	16.16 '55	8.63 '33	21.74 '55	14.95 '55	15.19 '55	17.30 '55	1.14 '57	0.11 '35	1.43 '57	0.64 '64	1.16 '64	1.40 '34	4.62	4.20	5.99	4.22	4.44	4.70
September	62.4	63.5	63.9	7.70 '60	9.13 '38	7.16 '52	9.64 '38	9.36 '33	12.03 '34	1.27 '65	0.15 '48	1.77 '53	0.28 '42	0.19 '48	0.29 '41	4.04	3.84	4.18	3.97	3.77	3.89
October	51.4	52.7	53.0	9.89 '55	5.96 '43	13.52 '55	10.14 '55	8.96 '43	9.24 '55	0.68 '52	0.68 '52	0.72 '52	0.24 '63	0.15 '63	0.93 '52	3.51	2.99	3.84	3.46	3.55	3.27
November	39.7	41.0	41.5	6.27 '51	7.59 '32	6.54 '52	7.53 '32	6.33 '50	7.99 '50	1.90 '60	0.62 '33	1.70 '53	0.54 '33	0.67 '33	0.24 '33	3.33	3.81	4.11	3.29	3.35	3.52
December	28.5	30.0	29.9	6.67 '53	6.44 '48	9.56 '57	6.23 '49	6.42 '48	7.10 '47	0.49 '55	0.75 '34	0.64 '55	0.22 '43	0.51 '55	0.70 '55	3.32	3.12	4.50	3.29	3.38	3.33

GROUND WATER HYDROLOGY

The Hydrologic Cycle

"Hydrologic Cycle" is the term used to describe the endless circulation of water from the oceans and surface bodies of water to the atmosphere, to the land and back to the ocean, over or beneath the land surface. The precipitation portion of the cycle may be divided into the following categories: 1) Evaporation, 2) Transpiration (water loss from plants), 3) Runoff, and 4) Recharge. The first two terms are usually combined under the heading: EVAPO-TRANSPIRATION. The entire concept is often expressed as : RAINFALL = EVAPO-TRANSPIRATION + RUNOFF + RECHARGE. The percentage of precipitation controlled by each component is affected by various physical conditions, some of which are discussed below.

Evapo-Transpiration

The percentage of precipitation lost to evapo-transpiration is nearly always large, ranging in New Jersey from 30 to 60% of the total precipitation (Widmer, 1963). Evapo-transpiration is a combined term embracing that portion of the precipitation returned to the air through direct evaporation or by transpiration of vegetation, no attempt being made to distinguish between them. The season of the year, temperature, humidity, wind velocity, kind and abundance of vegetation and height of water table all affect the amount of water lost by evaporation and transpiration. Thus, the greatest loss is during the growing season. To measure evaporation and transpiration directly is very difficult (Kohler and others, 1959), though ways of doing it as a means of analyzing the hydrologic cycle more accurately are being explored (McGuiness, C. L., 1963).

Runoff

Runoff, the water that reaches streams, includes ground water discharge. This means that ground water and runoff are part of the same supply. It is the discharge of ground water that sustains the dry season or base flow of most streams. Direct runoff is the remainder of rainfall and snowmelt after evapo-transpiration and ground water recharge have taken their share. Runoff is affected by the penetrativeness of soil, rock, plant surfaces and the absorbtive capacity of soil and subsoil. These factors, and the subsequent division of the retained water into evapo-transpiration and ground water recharge, in turn vary with: 1) the rate and form of precipitation, 2) the type and density of the vegetation and the season of the year, 3) the temperature and humidity of the air and the force of the wind, 4) the type of soil and its previous moisture content, 5) the configuration of the land surface, 6) the type, thickness, and geology of the rocks beneath the soil (McGuiness, C. L., 1963).

Runoff is usually negligible in the flat, sandy, tree-covered, highly permeable soils of the New Jersey Coastal Plain. However, it is high in Sussex and Warren Counties, in the Highlands Physiographic Province, and areas in the Valley and Ridge Physiographic Province (Figure 1) underlain by the: Martinsburg Formation, Shawangunk Conglomerate, and the High Falls Formation (Map Plates 1 and 2). Areas underlain by the Kittatinny Formation, especially where it is cavernous, and areas underlain by Stratified Drift, have much less runoff. There are many more streams and rivers in the rock country of northern New Jersey than in the sandy areas of southern New Jersey.

Recharge

Recharge is affected by more variables than the other two components, and is the remainder of the precipitation after evapo-transpiration and runoff. Therefore, during a period of drought, a lower percentage of total precipitation becomes recharge. In a plowed field, with no vegetation and contour plowing, the runoff-recharge relationship will solely depend on the ability of the soil to absorb water. In a pasture the grass roots will encourage a certain amount of recharge and the grass blades will hold or slow down the speed of some runoff. Forests also reduce surface runoff because of the heavier mulch zone and a deeper and more open root zone, which will first hold large quantities of rainfall and then slowly release some of it to recharge. During the growing season, May until frost in September or October, there is very little net recharge because of heavy demands made by evaporation and transpiration. Most natural recharge takes place between late fall and early spring when the vegetation is dormant and when the ground is not frozen.

Snow has its own runoff-recharge relationships. If the ground is frozen, no recharge will occur. If the ground is not frozen, recharge and runoff depend on the way the snow melts. If there is a cold spell with daily temperature maximums only slightly above freezing, most of the snow may evaporate. If a sudden thaw sets in, much of the melted water may go to runoff. Warm days and cold nights may keep the snow melt at rates low enough for the unfrozen ground to accept some of the melt as recharge.

The recharge component of precipitation first enters the soil and then percolates through the unsaturated zone (zone of aeration) to the underlying saturated zone (zone of saturation). The average percolation rate of the several soil types is known or can be determined. In the soil zone, the degree of development of the soil profiles and the presence or absence of hard pan or of "soil pan" (caused by plowing in clayey soil at the same depth for many years) will affect the rate at which rain can enter the weathered rock zone. The weathered rock or "c horizon" of soil profile develops from the underlying rock and its character and thickness are determined by slope, weather and age or soil development.

Occurrence and Movement of Ground Water

A judge once stated that "water moves beneath the ground in ways unknown and unknowable". To a degree this is still true, although a great deal is known about ground water occurrence and movement in specific areas, much is unknown because of the cost of the many tests that are required to obtain specific answers. Most calculations with respect to ground water are, therefore, not precise figures, but rather indications of the degree of magnitude.

Porosity, defined as the percentage of open space in a rock, depends primarily upon the shape of the grains and the degree of sorting. A rock composed of highly spherical grains which are all approximately the same size, has a maximum porosity.

If spaces between individual grains are interconnected so that water may travel more or less freely from opening to opening, the rock is said to be permeable. A thin film of silica between grains could make a normally porous sandstone relatively impermeable. Similarly, a vesicular basalt may have innumerable pore spaces, but be relatively impermeable because the spaces are not interconnected. Non-porous rocks are, of course, non-permeable.

Ground water unable to travel through the spaces between grains must travel through fractures, joints and solution openings found throughout many non-porous formations. Frequently, these fractures and openings are interconnected so that the formation acquires a secondary porosity and permeability.

The amount of water that any specific well will yield in a non-porous formation is unpredictable. Several good wells in an area would suggest that there is a relatively abundant open fracture system, and it would be reasonable to assume that another well within this area would be equally good at about the same depth. However, one should not be surprised if a new well is considerably shallower or deeper than any of the previous wells, especially if the estimate had been based on a small selected sample within a local area.

Wells drilled in coarse sandstone will yield large amounts of water and will depend on the natural porosity of the rock. Wells drilled in fine grained sandstone will yield less water and will have to depend mainly on the water-bearing cracks and joints as a source of their water.

Wells drilled in the limestones and dolomites that intersect caverns will produce large amounts of water. In non-cavernous limestone and dolomite, the wells have to depend on water bearing cracks and crevices for all of the water that is pumped.

There are quite a few areas of deep Pleistocene deposits (Map Plate 2). The sands and gravels have primary porosity and permeability. They form the greatest, virtually untapped, source for future public supply and industrial wells.

Precipitation which infiltrates the ground and is not lost to evaporation and transpiration is called recharge. This recharge water travels more or less vertically downward by gravity to the saturated zone. The water table is the upper surface of the saturated zone. Water table conditions exist when ground water is free to rise and fall. Water in a well tapping a water table aquifer is therefore under atmospheric pressure and will not rise above the upper surface of the saturated zone.

The depth to the water table beneath the surface is highly variable and dependent upon weather conditions and geology. It is not a flat plane, but rather an undulating surface, which more or less reflects the topography. In the same region it may be at or near the surface in valleys and further below the surface under hills.

Ground water under water table conditions, like surface water, moves from high to low elevations. It flows along the natural hydraulic gradient of the water table until it intersects the land surface at a stream, lake or spring. Rate of movement is generally measured in fractions of an inch to several feet per day because of the great amount of friction and the capillary attraction offered by small sinuous openings in the rock. Occasionally, the fractures of a closely spaced joint system, a fault or shear zone, or solution channels may be able to transmit water at a very rapid rate. The rate of movement may also be increased where an artificial hydraulic gradient is established around a pumping well. Solution cavities in limestone are especially efficient for movement of large quantities of water. For example, Schuster Pond in Hardwick Township, Warren County, situated on cavernous limestone, was dye tested; the dye appeared in less than two hours in a large spring located a mile to the northeast in Stillwater Township, Sussex County on Route 521 (R. Meyers, personal communication).

Occasionally, one may encounter a perched water table, that is a local water table above the level of the regional water table. This happens when an impervious bed in the unsaturated zone interrupts percolation to the saturated zone and causes ground water to accumulate above the regional water table.

Artesian conditions occur if the water at the top and bottom of an aquifer is confined by a relatively impervious material so that the ground water is not free to rise and fall. Water under artesian conditions, when tapped by a well, will rise above the aquifer and if there is sufficient pressure may even flow out of the well. The source of water in artesian aquifers must be at a higher elevation than the section of the aquifer being intersected by the well. The level to which the water rises in wells intersecting an artesian aquifer is called the piezometric level and should not be confused with the water table. Under artesian conditions ground water moves "down gradient", below the confining bed. Ground water under artesian pressure usually moves just as slowly as ground water under water table conditions, but it may travel longer distances because an artesian aquifer may conduct water beneath rivers and other surface water bodies.

In the non-porous rocks a confining bed may be only slightly less permeable than the underlying bed, but water in the lower bed will still be under greater pressure than water in the confining bed. The upper bed may be an aquifer for small capacity wells and the lower bed, being more permeable, may be an aquifer which is utilized for higher capacity wells. In this case, although both units are aquifers, the lower permeability of the upper bed partially confines the water in the lower bed even though there probably is some exchange of water between the two units through interconnecting fractures. The water in wells tapping the lower bed will then rise some distance above the top of its system of water bearing fractures. Many of the deeper wells in the study area encounter this kind of condition and are described as semi-artesian in this report. Because of the variation in length, width, and direction of the joints in non-porous rocks, movement of ground water under semi-artesian conditions is generally more erratic and unpredictable than water under either water table or artesian conditions.

Storage

A good aquifer with high primary porosity and permeability may have 10 to 40% of its volume in saturated pore spaces. Most of this water is recoverable through wells. Silt and clay have higher porosities than most sands and can store more water, but because the pores are so small, most of the water is retained and very little can be recovered through wells.

Pumping tests, observation wells and stream gaging stations may give a fairly accurate picture for a watershed, providing that the entire watershed is underlain by the same rock type. Unfortunately, the geology in Sussex County and the northern part of Warren County is not homogenous.

The non-porous formations of Sussex and northern Warren Counties, which must store ground water in fractures and solution openings, are capable of storing much less water than the porous and permeable aquifers of the New Jersey Coastal Plain formations, such as the Cohansey and Raritan Formations. The storage capacity of these non-porous rocks is directly related to the amount of fracturing and/or solution openings.

Many of the non-porous rocks of Sussex County and northern Warren County lack abundant open fractures and consequently contain little water in proportion to their volume. In these areas the fractures and openings may be filled rapidly during periods of heavy rain and all subsequent precipitation will go to runoff in the form of flash floods. This very rarely happens in the porous aquifers of southern New Jersey. The difference in storage between an area underlain by permeable sediments and one underlain by non-porous rocks is strikingly illustrated by a study made by Barksdale and Remson (1955). The extremes in stream flow of the Great Egg Harbor River which drains a region underlain by the porous sediments of the Coastal Plain of southern New Jersey were compared with those for the Neshanic River which drains an area of non-porous rocks in the Raritan Lowlands of Somerset and Hunterdon Counties. For the same period of record, the maximum observed stream flow of the Great Egg Harbor River is only 75 times the minimum observed flow. In contrast, the maximum observed flow of the Neshanic River is 29,000 times the minimum.

The greatest and virtually untapped unexplored area of ground water storage is in the stratified glacial drift (Map Plate 2). Next in terms of stored volume are the cavernous members of the Kittatinny Formation, currently being mapped by Markewicz and Dalton of this Bureau. The non-cavernous members are nearly impervious.

Another indication of the ability of an aquifer to store water is the base flow of the major streams. Base flow is the amount of water entering a stream from ground water discharge. This is the stored ground water which slowly feeds a stream after surface runoff has ceased. Streams which maintain a fairly constant flow, even though there has been little recent rain, are being supplied with ground water from aquifers with considerable storage space. "Flashy" streams like the Neshanic River carry large volumes of water during and immediately after a heavy rain, but relatively little a few days later. This is an indication that there is little storage of ground water taking place in that particular watershed. Streams draining an area underlain by Martinsburg Shale and Precambrian crystallines are the "flashy" type. However, after a long drought, some of these streams lose their "flashy" character for a short period. This is an indication that the fractures and openings are capable of accepting and storing a portion of the rainfall until they have been recharged to their capacity.

Large frequent rapid fluctuations of static water level (level below the ground surface to which the water rises in a non-pumping well) in water table and semi-artesian aquifers is also an indication of small storage capacity. In this case, the static water level rises rapidly after a rain and begins to decline shortly thereafter. In areas of heavy pumpage, this situation is aggravated and during a time of drought, people may accuse a large user of water for the drop in the water table. Most wells undergo a seasonal fluctuation. Therefore, one should realize that because of the limited storage capability of most of the aquifers in the underlying rock, the water table can be expected to drop whenever there is a period of below average rainfall and to rise during periods of normal to excessive rainfall. The water table drops in mid-spring and summer because evapo-transpiration and runoff account for almost all of the rainfall during this period. It then recovers during late fall and early spring when the vegetation is dormant.

The third most common cause of water level fluctuations in wells, after season and climate, is nearby pumping wells. A well which affects the static water level in another well is called an interfering well. In porous aquifers the extent of the interference is usually easy to define, but in non-porous aquifers it is very difficult. A textbook example of the unpredictability of a non-porous aquifer was illustrated recently in Tewksbury Township. Figure 2 shows six domestic, six inch diameter wells in the Tamarak Farms subdivision. The wells are nearly in a straight line approximately 175 feet apart and between 100 and 140 feet deep. All are pumping from weathered Pre-Cambrian crystalline rocks and all are under water table conditions. Note that the water table is a subdued reflection of the topography.

Wells five and six were pumped individually at 55 gallons per minute and each was able to maintain that rate for four hours. However, when both wells were pumped simultaneously, number five had to be cut to 35 gallons per minute and number six had to be cut to 45 gallons per minute. During the simultaneous pumping of wells five and six, water levels in wells one through four were checked. At the end of the four hour test, static water levels had dropped 10 feet in well number two and 26 feet in well number four. The static water levels in wells number one and three remained the same. Evidently, the complex set of fractures, which supplies numbers five and six does not supply one and three, but at least partially supplies numbers two and four. Note the position of these wells in relation to the pumping well (Figure 2). Although a four hour pump test is not of sufficient length to determine the ultimate interference patterns, this case does illustrate the difficulty in predicting interference patterns in fractured rock. Another interesting and important point is that while five and six are able to produce 55 gallons per minute when pumped separately, together they cannot pump 110 gallons per minute, but only 80 gallons per minute, since some of the water bearing fractures intersect both wells, Kasabach (1966).

Occurrence and movement of ground water in fractured rock of the Triassic age of Northern New Jersey was described by Vecchioli and others (1967). It is noted that these rocks do not transmit water equally in all directions. The greatest drawdowns are observed in those wells located along the strike of the sedimentary layers with respect to the pumping well. The least amount of drawdown is observed in observation wells located transverse to strike. These observations have been interpreted to indicate that

	Well No.1	Well No.2	Well No.3	Well No.4	Well No.5	Well No.6
Approximate Elevation	793	797	804	811	821	823
Static Water Level	15	19	26	30	38	40
Depth of Well	100	100	100	115	140	140

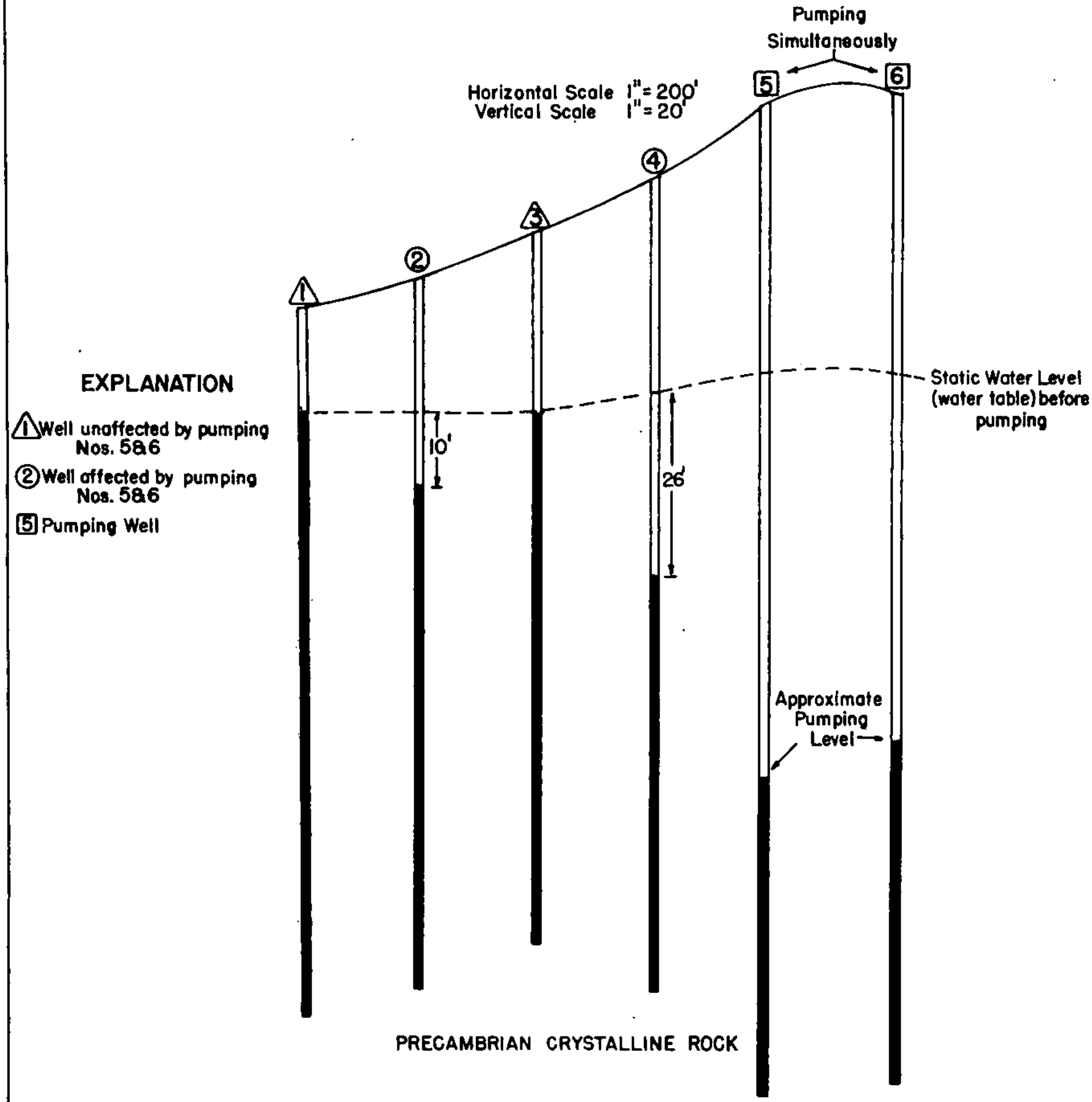

Figure 2

Plan & Section through 6 wells of the Tamarack Farm Development, Tewksbury Township, showing water level before nos. 5&6 were pumped and while nos. 5&6 were pumped simultaneously. (Test made by Studer and McEldowny, Civil Engineers - Nov. 1963) water moves more rapidly along joints and fractures which strike parallel to the strike of the bedding than along joints and fractures which strike in other directions.

During the drilling and development of the 150 foot wells hexametaphosphate "Calgon" was added to the water in the well. Surging continued and the yields of the three wells treated was increased about 30 to 40%.

It is hoped that this brief discussion of ground water will provide some background for the following chapters. Anyone wishing more detailed information on this subject should refer to one of the many excellent textbooks on the subject of ground water hydrology, some of which are cited in this report. Probably the one best suited to the layman is "Ground Water and Wells", Edward E. Johnson, Inc. (1966).

WATER USE IN SUSSEX COUNTY AND THE WARREN COUNTY PORTION OF THE TOCKS ISLAND IMPACT AREA

Total Water Resource

The Sussex County and Warren County portion of the Tocks Island Impact Area, unlike most of New Jersey, relies most heavily for its water resources on the streams which originate within the boundaries and on the precipitation which falls on the area. The other influences are the Delaware River which forms the northwest and southwest boundaries, the Paulins Kill River which flows southwestward into the Delaware, and the Wallkill River which flows northeastward into New York State. The numerous lakes around the area are also a great influence.

The following reservoirs are located in Sussex County: Canistear Reservoir (The City of Newark), Lake Wawayanda (The City of Newark), and Morris Lake (Newton).

There are twenty-five water utility systems (Figure 3), three of which obtain water from surface supplies, fourteen from wells, and four from a combination of wells and surface supplies. All of the larger towns and boroughs have a central water distribution system. The remainder of the area is rural and the population depends on domestic wells for its water supply.

Public Water Supplies

The requirements and development of public water supplies have grown over the years along with the increasing population needs. Daily water consumption varies with the season and the weather. The Sussex County Planning Board estimates that its summer population jumps from 65,240 to 150,000 (Maron, J., personal communication). In twenty-eight years (1940-1967), the average demand per day for the county has increased from 2.507 mgd. to 8.038 mgd. Industry is pumping 2.53 mgd. from wells and surface supplies.

The population served has increased from 33,319 to 70,290. Several new large developments have been built and all of the homes depend on individual domestic wells. These are mainly summer homes and the residents are not included in the census population.

Ground Water Withdrawals

The average daily withdrawal from domestic wells in Sussex County and the Warren County portion of the Tocks Island Impact Area in 1967 was approximately 1.50 mgd. The pumpage from domestic, industrial and public supply wells has tripled from 1940 to 1967 (Tables 3 and 4 and Figure 3). Of the 2,886 domestic wells on record, only 104 (3.7%) obtain their water from unconsolidated Stratified Drift (Qsd); the balance are all rock wells. However, 20 or 21% of the industrial wells are located in Stratified Drift.

TABLE 3

ESTIMATED WATER CONSUMPTION OF SUSSEX COUNTY AND THE WARREN COUNTY PORTION OF THE TOCKS ISLAND IMPACT AREA IN MILLIONS OF GALLONS PER DAY

					Water Utilities [2]			
Year	*Total With-drawal mgd.*	*Industrial wells* [1]	*Ind. Surface* [1]	*Domestic Wells*	*Wells*	*Surf.**	*Comb.**	*Total*
1940	2.507	....	....	.760	.208	1.260	.279	1.747
1950	2.789	....	....	.750	.428	1.197	.414	2.039
1960	3.675	....	....	.980	.587	1.461	.647	2.695
1967	8.038	2.230	.300	1.500	1.169	1.715	1.124	4.008

[1] Information obtained from industries.
[2] Information obtained from Division of Water Policy and Supply.
* Surf.—Surface supplies from rivers, lakes, brooks and reservoirs.
Comb.—Combination of wells and surface supplies.

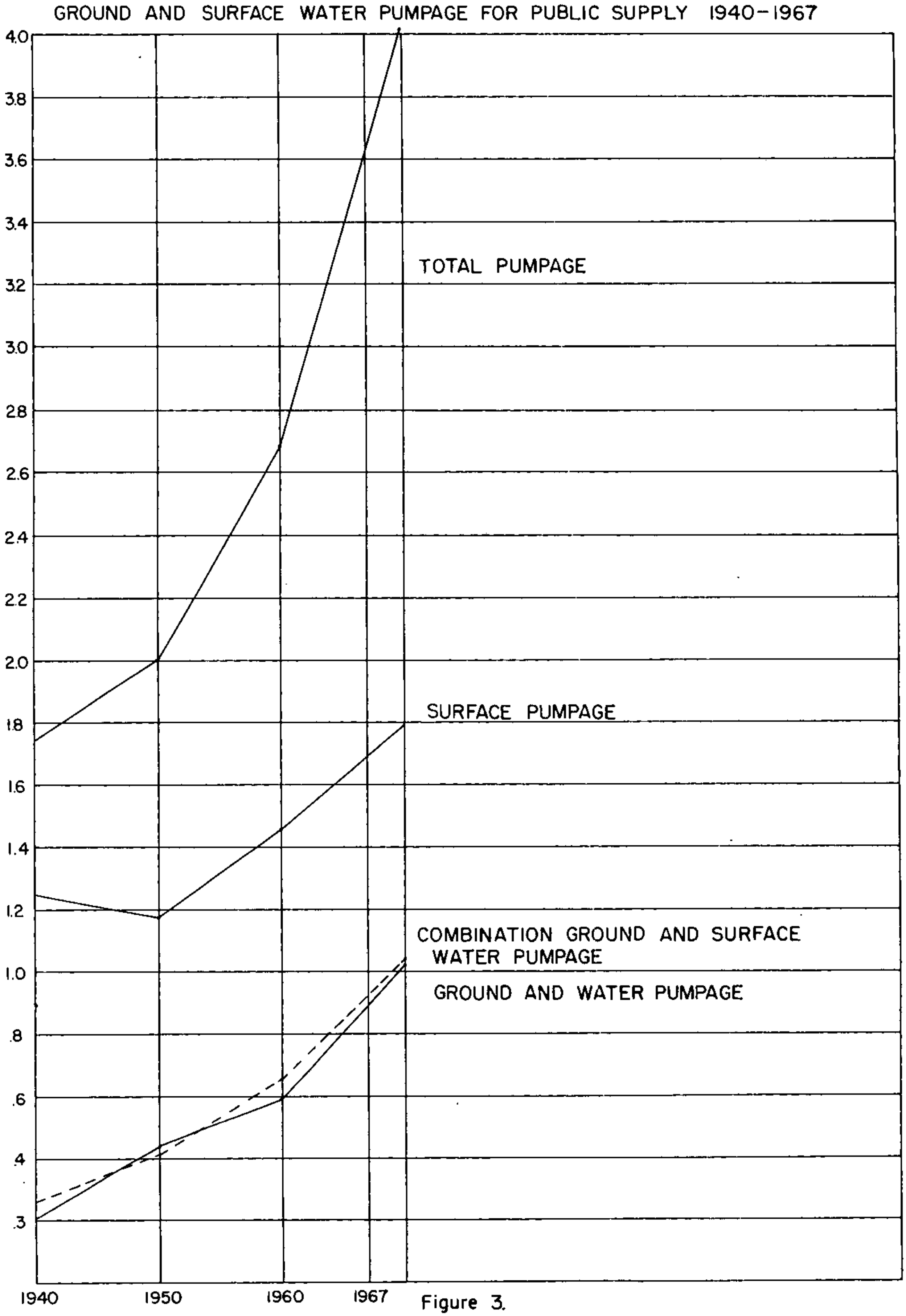
GROUND AND SURFACE WATER PUMPAGE FOR PUBLIC SUPPLY 1940-1967
4.0
3.8
3.6
3.4
3.2
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
.8
.6
.4
.3
1940
1950
1960
1967
TOTAL PUMPAGE
SURFACE PUMPAGE
COMBINATION GROUND AND SURFACE WATER PUMPAGE
GROUND AND WATER PUMPAGE

Figure 3.

TABLE 4

POPULATION SERVED BY CENTRAL WATER AS COMPARED WITH POPULATION WITH DOMESTIC WELLS

Year	*Total Population* [1]	*Population Served Central Water* [2]	*% Total Population*	*Population Dom. Wells*	*% Total Population*
1940	33,319	23,124	69	10,195	31
1950	38,470	28,471	74	9,999	26
1960	53,772	40,285	76	13,062	24
1967	70,290	51,455	71	19,953	28

[1] Information obtained from The Bureau of Research and Statistics.
[2] Information obtained from The Bureau of Water Control.

Industry in 1967, including large farms, supplied itself with 2.53+ mgd from its own wells (personal communication). Domestic wells acounted for 1.50+ mgd and public supply wells produce 1.98 mgd., which supplied residences and businesses.

Assuming 130,000 as a figure for the summer population of Sussex County and the Warren County portion of the Tocks Island Impact Area and 75 gallons per day per person, it would take 9.75 mgd to supply them. This is an increase of 8.25 mgd over the current estimated water consumption (Table 3).

Summary of Yield and Depth Tabulations

A comparison of the maximum, minimum, average and median yields and depths of a large number of wells in each formation indicates the probability of successfully completing a well for a desired amount of water (Tables 5 and 6). Only wells with sufficient pumping data were used.

High yielding rock wells are invariably located in a geologic structure: shattered rock, shear zone, fault zone or solution cavities.

Wells located near bodies of water, especially permeable Pleistocene deposits, will yield more than the average for the formation.

Industrial wells are summarized in Table 6. Domestic and Industrial wells are further summarized in Tables 7 and 8.

It should be pointed out that: 45% of all domestic wells drilled in the Martinsburg Formation yielded 5 gpm (gallons per minute) or less, 34% of all domestic wells drilled in the Kittatinny Formation yielded 5 gpm or less, and 46% of all wells drilled in the Precambrian crystallines yielded 5 gpm or less.

Future Ground Water Withdrawals

Although a safe sustained yield cannot be calculated for particular areas, in Sussex County and the Warren County portion of the Tocks Island Impact Area, with the available data, it is possible to make a general estimate for planning purposes. We can assume that between 75% to 90% of the average yearly precipitation is lost to evapo-transpiration and runoff. There is no data to substantiate these figures, but work elsewhere in similar formations indicates that this estimate is in the right order of magnitude (Widmer, personal communication).

There has never been a quantitive recharge study in Sussex County and the Warren County Portion of the Tocks Island Impact Area. The closest quantitive study cited by Parker and others (1964) was a study for the Pomperaug River Basin, Connecticut, where ground water recharge or discharge was calculated at .75 mgd per square mile (Availability of Ground Water from Wells).

TABLE 5

SUSSEX COUNTY AND THE WARREN COUNTY PORTION OF THE TOCKS ISLAND IMPACT AREA

SUMMARY OF DOMESTIC WELLS

Formation	*No. of Wells*	*YIELDS* *Maximum*	*Minimum*	*Average*	*Median*
Stratified Drift (Qsd)	121	75	¾	17	15
Onondaga Limestone (Don)	69	100	1	19	15
Esopus Siltstone (Des)	13	70	1	9	4½
All Formations					
Poxono Is.-Oriskany Form. (Spi-Do)	62	80	2	18	12
High Falls Formation (Shf)	96	60	½	17	15
Shawangunk Formation (Ssg)	15	20	½	6	4
Martinsburg Hornfels (Ombh)	12	18	1	5½	3
Martinsburg Formation (Omb)	919	120	½	10½	6
Kittatinny Formation (COk)	422	120	¼	14	10
Franklin Limestone (fl)	162	100	¼	14	10
Precambrian crystallines (PC)	1018	100	⅙	10	8

Formation	*No. of Wells*	*DEPTHS* *Maximum*	*Minimum*	*Average*	*Median*
Stratified Drift (Qsd)	121	218	35	95	84
Onondaga Limestone (Don)	69	315	35	149	135
Esopus Siltstone (Des)	13	339	98	186	157
All Formations					
Poxono Is.-Oriskany Form. (Spi-Do)	62	278	51	122	105
High Falls Formation (Shf)	96	320	36	136	125
Shawangunk Formation (Ssg)	15	306	97	177	158
Martinsburg Hornfels (Ombh)	12	273	104	179	173
Martinsburg Formation (Omb)	919	683	35	169	132
Kittatinny Formation (COk)	422	485	27	138	113
Franklin Limestone (fl)	162	520	45	149	130
Precambrian crystallines (PC)	1018	440	35	133	122

TABLE 6

SUSSEX COUNTY AND THE WARREN COUNTY PORTION OF THE TOCKS ISLAND IMPACT AREA

SUMMARY OF INDUSTRIAL WELLS

Formation	*No. of Wells*	*YIELDS* *Maximum*	*Minimum*	*Average*	*Median*
Stratified Drift (Qsd)	24	942	6	250	180
All Formations					
Poxono Is.-Oriskany Form. (Spi-Do)	2	100-100	..	..	..
Martinsburg Formation (Omb)	20	220	2	57	48
Kittatinny Formation (COk)	32*	815	18	162	100
Franklin Limestone (fl)	2	800	80	..	..
Precambrian crystallines (PC)	35	157	5	62	57

Formation	*No. of Wells*	*DEPTHS* *Maximum*	*Minimum*	*Average*	*Median*
Stratified Drift (Qsd)	24	253	35	89	73
All Formations					
Poxono Is.-Oriskany Form. (Spi-Do)	2	250-250	..	..	..
Martinsburg Formation (Omb)	20	833	178	333	304
Kittatinny Formation (COk)	32*	521	43	239	200
Franklin Limestone (fl)	2	73	35	..	..
Precambrian crystallines (PC)	35	305	37	155	156

* 1000′ deep Frelinghuysen well not used in computation.

YIELD OF DOMESTIC WELLS AS REPORTED BY DRILLERS FOR 942 WELLS IN MARTINSBURG FORMATION,
283 WELLS IN KITTATINNY LIMESTONE, 124 IN PRECAMBRIAN CRYSTALLINES.

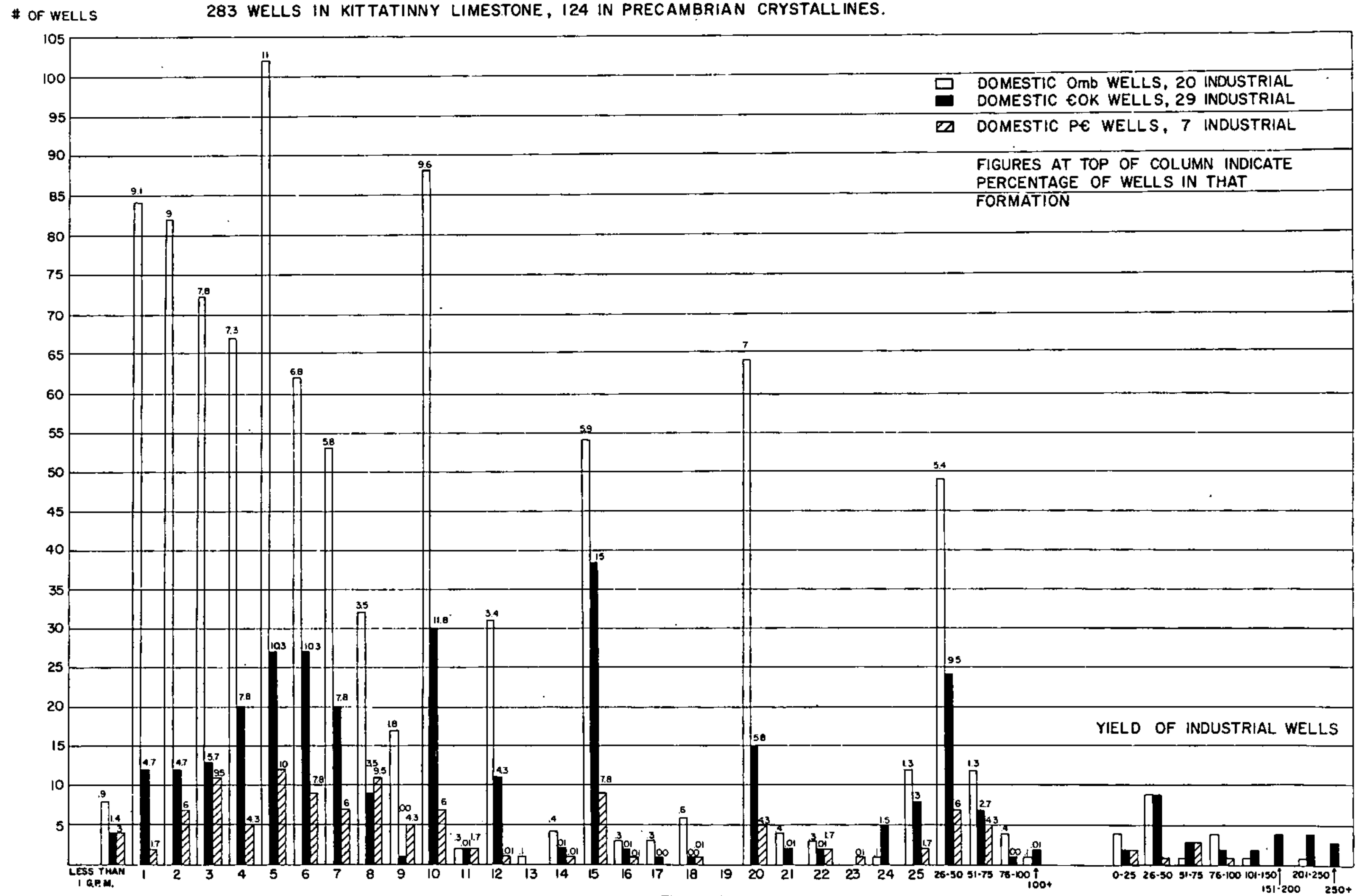

Figure 4.

TABLE 7

AVERAGE SPECIFIC CAPACITY PER FT. OF DRAWDOWN OF WELLS BY FORMATION AND DEPTH
SUSSEX COUNTY AND WARREN COUNTY PORTION OF THE TOCKS ISLAND IMPACT AREA

Domestic Wells	*DEPTH IN FEET*							
Formation	*0-49*	*50-99*	*100-149*	*150-199*	*200-249*	*250-299*	*300 +*	*Average*
Stratified Drift (Qsd)	3.07 (7) * ∞ (1)	1.67 (31)	.98 (20)	.48 (5)	1.04 (2)			1.50 (65) * ∞ (1)
All Formations								
Poxono Is.-Oriskany Fm. (Spi-Do)			.36 (1)	.17 (3)	.52 (3)	.14 (3)	.02 (1)	.26 (11)
High Falls Formation (Shf)	1.86 (3)	.66 (5)	.42 (26)	.56 (7)	.13 (2)	1.24 (2)	1.50 (1)	.61 (46)
Shawangunk Formation (Ssg)			.25 (5)		.08 (4)		* .00 (1)	.17 (9)
Martinsburg Hornfels (Ombh)			.37 (3)	.02 (1)	.03 (2)	.01 (1)		.17 (7)
Martinsburg Formation (Omb)	1.04 (9) * ∞ (2)	.85 (107) * ∞ (3)	.30 (131) * ∞ (1)	.29 (102)	.28 (56)	.07 (45) * .00 (3)	.13 (45) * .00 (9)	.39 (495) * ∞ (6) * .00 (12)
Kittatinny Formation (COk)	3.11 (9) * ∞ (2)	1.58 (106) * ∞ (4)	1.01 (90) * ∞ (2)	.29 (50) * ∞ (2) * .00 (2)	.33 (27) * .00 (2)	.11 (11) * .00 (1)	.42 (5) * .00 (1)	1.05 (298) * ∞ (8) * .00 (6)
Franklin Limestone (fl)	4.00 (1)	.84 (40) * ∞ (1)	.59 (39)	.44 (26)	.10 (6)	.02 (7)	.04 (10) * .00 (1)	.57 (129) * ∞ (1) * .00 (1)
Precambrian crystallines (PC)	1.86 (16)	.41 (307) * ∞ (3) * .00 (2)	.21 (274) * .00 (1)	.13 (107)	.13 (53) * .00 (7)	.13 (16) * ∞ (1) * .00 (5)	.21 (21) * .00 (6)	.30 (794) * .00 (21) * ∞ (4)
Industrial Wells								
Stratified Drift (Qsd)	25.19 (2)	22.67 (7)	5.39 (4)					17.72 (13)
Martinsburg Formation (Omb)		6.25 (1)		1.78 (1) * ∞ (1)	1.82 (1)	.16 (2)	.65 (7) * ∞ (1)	1.22 (12) * ∞ (2)
Kittatinny Formation (COk)	* ∞ (1)	2.25 (1)	7.49 (7)	5.88 (2)	6.23 (7)	.78 (1)	.45 (8)	4.40 (26) * ∞ (1)
Precambrian crystallines (PC)	.52 (1)	1.65 (9)	.83 (4)	.62 (8)	.68 (5)	.11 (2)	.36 (2)	.90 (31)

* Not used in computation.
Number in parenthesis to right of specific capacity indicates number of wells in sample.

TABLE 8

Era	*Periods (millions of years ago)*	*Epochs*	*Formation or Rock Type (approx. thickness)*	*Lithology*
Cenozoic	Quaternary (Present to 1±)	Recent	Recessional Moraine	Elongate sinuous ridges composed of heterogeneous unsorted materials (sand, gravel, boulders and clay) including some stratified drift in kames and eskers.
		Pleistocene	Unstratified Glacial Drift	Heterogeneous unsorted deposits ranging from clay to boulders. Forms a discontinuous, generally thin irregular blanket over most of the region.
			Stratified Glacial Drift (0-460 ft.)	Sorted deposits of sand and gravel plains, deltas, eskers, kames, river terraces and valley trains.
	Tertiary (1-70±)	Pliocene Miocene Oligocene Eocene Paleocene	Not present in Northern New Jersey	
Mesozoic	Cretaceous (70-135±)		Not present in Northern New Jersey	
	Jurassic (135-180±)		Not present in State	
	Triassic (180-225±)		Not present in Northern New Jersey	
Paleozoic	Permian (225-270±)		Not present in State	
	Pennsylvanian (270-305±)		Not present in State	
	Mississippian (305-350±)		Not present in State	
	Devonian (350-400±)		* Marcellus shale (Traces)	Fissile black shale (included with Onondaga limestone on map).
			Onondaga Limestone (200? feet)	Dark gray cherty limestone, shaly limestone and limy shale.
			Esopus Grit (375 feet)	Dark gray to black fine sandstone and siltstone with strong cleavage.
			* Oriskany Formation (170 feet)	Sandy limestone grading to sandstone to the south.
			Port Ewen Shale (80 feet)	Dark gray to black shale.

* Shown unclassified on map.

TABLE 8

Era	*Periods (millions of years ago)*	*Epochs*	*Formation or Rock Type (approx. thickness)*	*Lithology*
			Becraft Limestone (20 feet)	Hard, gray cherty limestone, fossiliferous.
			New Scotland Formation (160 feet)	Hard cherty limestone and limy shale.
			Stormville Sandstone (0-10 feet)	Medium light gray calcareous sandstone.
			Coeymans Limestone (40 feet)	Light gray limestone–pure to sandy, highly fossiliferous.
			Manlius Formation (35 feet)	Thin bedded dark blue to nearly black fossiliferous limestone.
			Rondout Formation (39 feet)	Limestone at base with alternating beds of shale and dolomite with a bed of silty dolomite at the top.
			Decker Ferry Limestone (52 feet)	Thin beds of limestone and shale, becoming sandy to the south.
			Bossardville Limestone (12-100 feet)	Banded fine grained bluish gray limestone.
Paleozoic	Silurian (400-440±)		Poxono Island Shale (600? feet)	Buff or greenish calcareous shale and dolomite.
			High Falls Formation (2,300 feet)	Predominately hard red sandstone and shales with interbedded green shales; some conglomerate near base.
			Shawangunk Formation (1,900 feet)	Conglomerate of white quartz pebbles in hard bluish matrix, red towards top, with beds of hard quartzite and shale.
			Volcanic Breccia	Numerous fragments of slate, limestone and gneiss enclosed in a matrix of basic lava (ouachitite) filling old volcanic necks.
			Nepheline Syenite	Intrusive mass of gray, coarse to fine grained rock in Sussex County.
	Ordovician (440-500±)		Martinsburg Hornfels (2,000+ feet)	Black, dense, highly metamorphosed shale, frequently with orange iron stains on joint surfaces (in outcrop).
			Martinsburg Formation (5,000 to 11,000 feet)	Upper portion medium to fine grained, arkosic sandstone or graywacke, and a few lenses of shale and conglomerate. Lower unit? banded bluish gray shale and slate, some fine grained limy sandstones and some red beds.
			Jacksonburg Limestone (125-300 feet)	Dark blue, gray or black fossiliferous limestone, thin layers of calcareous shale are interbedded with limestone and become thicker and more abundant near the top.
			**Kittatinny Formation (2,500-3,000 feet)	Subdivided into Epler, Rickenback, Allentown and Leithsville Formations.

** Shown as Kittatinny Limestone on map.
Dashed lines indicate formation being deposited in two time periods.

TABLE 8

Era	Periods (millions of years ago)	Epochs	Formation or Rock Type (approx. thickness)	Lithology
			Epler Formation (800+ feet)	Light to dark gray, fine to medium grained to cryptogranular impure dolomite with interbedded units of banded to lenticular limestone and laminated to massive shale. Occasional dark, fine to medium crystalline dolomite beds give a fetid odor when struck with a hammer.
			Rickenbach Formation (700+ feet)	The lower Rickenbach consists of gray to dark gray, fine to coarse crystalline rock that sparkles on a fresh surface. Basal beds are massive with local irregularly spaced undulatory subbeds separated by thin shaly to silty partings. Chert occurs as spotty, discontinuous, thin beds. When struck with a hammer, basal beds give off a fetid odor.
Paleozoic	Cambro-Ordovician			Upper beds become finer grained, less crystalline, lighter colored, and more thinly bedded with some calcareous sandstone and occasional dolomite beds containing frosted quartz grains and scattered "smoky" calcite crystal clusters. The fetid odor is still present, though not as strong as in the lower section.
			Allentown Formation (1,300± feet)	A thick rhythmically bedded light to dark gray, fine to medium grained, crystalline, impure dolomite in beds several inches to more than three feet thick.
			Leithsville Formation (1,000 feet)	A massive, medium to fine grained, impure, calcareous dolomite, commonly referred to as "dolomitic limestone." In basal section weathered surfaces are gray to dark gray. Above the basal section it tends to be lighter colored on both weathered and fresh surfaces.
	Cambrian (500-600±)		Hardyston Quartzite (5200 feet)	A vitreous, light pink to steel gray to brown, generally arkosic, fine to coarse grained, resistant quartzite with variations to shale and sandstone both horizontally and vertically. Basal beds are commonly arkosic quartz pebble conglomerate with pebbles and fragments of Precambrian gneiss and granite.
Proterozoic	Precambrian (600 to several billion years)		Franklin Limestone (1,500+ feet)	Coarse white marble, crystalline limestone, magnesium in part, containing chondradite, pyroxene and other minerals. Contains zinc ore in Sussex County.
			Various Crystalline Rocks	Complex igneous and metamorphic rocks.

SUMMARY OF GEOLOGIC HISTORY

***Precambrian Era* (?600,000,000 years ago)**

The oldest rocks in Sussex County and the Warren County portion of the Tocks Island Impact Area are those formed during the Precambrian Era, which is the oldest and longest Era in the geologic time scale. Relatively little is known of the geologic events of this era because of the complex relationship between igneous, sedimentary and metamorphic rocks which have been repeatedly intruded, folded, faulted and metamorphosed. A long period of erosion occurred before the Paleozoic Era and vast amounts of Precambrian rock were removed. Rocks of the Precambrian age are frequently called "basement rocks" because they underlie all younger rocks.

***Paleozoic Era* (600,000,000-225,000,000 years ago)**

The Paleozoic Era began with the formation of the Appalachian Geosyncline, a trough located in the area now occupied by the Appalachian Mountains. Gradually, arms of the sea advanced in the trough from Alabama to Labrador. Streams and rivers, draining the high land mass east of the trough, deposited sediment. During most of the Paleozoic Era the trough continued to sink but there were brief periods when the sea withdrew and erosion occurred. It is likely that over 25,000 feet of sediment were deposited in New Jersey during this Era.

The Taconic Orogeny, which affected New England during the Ordovician Period, (450,000,000-500,000,000 years ago), probably also had some effect on the Precambrian and early Paleozoic rocks in New Jersey. A long period of structural movement called the Appalachian Revolution (225,000,000-350,000,000 years ago) ended the Paleozoic Era when all the Precambrian and Paleozoic rocks in New Jersey were folded, faulted and uplifted. Erosion has been continuous to the present in the study area and the mountains have been reduced to a fraction of their former height. There was vulcanism and volcanic activity near the middle of the Era in Sussex County.

***Mesozoic Era* (225,000,000-70,000,000 years ago)**

During Triassic Time erosion continued and sediments were deposited to the southeast of the Highlands forming the Newark Group. The latter part of the Triassic Period was one of igneous activity in Sussex County. Buddington and Baker (1961) mapped several dikes as Triassic diabase on the Geology of the Franklin and Part of the Hamburg Quadrangles, Sussex County, New Jersey. Hague and others (1956) mapped and described minor dikes in the Franklin-Sterling area, Sussex County which are generally considered Triassic.

During the Triassic time there was continued faulting along the northwestern edge of the Triassic basin, and the entire basin was tilted toward the northwest.

A long interval of erosion followed during the Jurassic and Early Cretaceous Periods. A gentle southeastern plain was formed as many thousands of feet of Precambrian, Paleozoic and Triassic rocks were eroded away and deposited in the coastal plane.

***Cenozoic Era* (70,000,000 years ago to present)**

Tertiary and Cretaceous Period deposits are not present in the study area and erosion continued.

The Quaternary Period in the study area is divided into the Pleistocene, commonly known as the Ice Age, and Recent Time. The Pleistocene commenced with the advance of glaciers from the north about 1,000,000 years ago. Three periods of continental glaciation covered northern New Jersey. The two oldest: the Jerseyan (Kansas) and Illinoian advanced from the northwest completely covering the study area. Glacial drift or till was deposited, most of which was removed by subsequent glaciation. The most recent Wisconsin glacier retreated from New Jersey about 10,000 years ago depositing unstratified and stratified drift over the entire study area and the terminal moraine which was deposited at the southern tip of Hopatcong Borough. Numerous deeply buried river valleys were filled with stratified drift. (Map Plate 2 Bedrock Map). Glacial lakes, formed along the front of the retreating glaciers, deposited considerable clay (Well Logs). Numerous drumlins, eskers and river terraces were deposited in Kittatinny Valley. Recessional Moraine is found in an arc from Lake Grinnell northwest to Lake Owassa continuing on top of Kittatinny Mountain in two belts to the Delaware River (Minard, 1961) and also at Augusta and north of Lafayette. (Map Plate I, Geologic Map). Stratified drift is found in most of the present river valleys.

Except for a small amount of erosion and the deposition of recent alluvium in stream valleys, the topography and geology of Sussex County and the Warren County portion of the Tocks Island Impact Area has changed little since the end of Wisconsin glaciation.

PRECAMBRIAN ROCKS

Geology

The Precambrian rocks in Andover, Byram, Green, Hardyston, Hopatcong Borough, Sparta and Vernon Townships are part of a belt which extends from southern New York State across northwestern New Jersey to the vicinity of Reading, Pennsylvania (Map Plate I). It is known as the Reading Prong of the New England Upland Section of the New England Physiographic Province. In New Jersey it is called "The Highlands".

The Highlands consist of several flat-topped ridges and rounded hills that rise several hundred feet above the adjacent Kittatinny Valley. The ridges trend northeast-southwest and are largely composed of highly metamorphosed Precambrian rocks. Infolded and downfaulted Paleozoic sedimentary rocks usually underlie the northeast-southwest trending valleys.

The Franklin Limestone is usually a white crystalline marble, generally coarsely granular, but in some places fine-grained, and in a few localities nearly amorphous. It ranges from a nearly pure calcium carbonate (calcite) to a dolomitic marble. At many places the rock is free from intruded igneous minerals, but usually it contains varying amounts of the following minerals: diopside, tremolite, chondrodite, phlogopite, quartz and graphite are found throughout the formation J. Baum, (personal communication). At Franklin and Ogdensburg (Sterling Hill) the formation contains large deposits of zinc ore, and in a few places iron ore deposits occur Kummel, (1940). The Franklin and Sterling Hill mines are famous for their suite of minerals.

The Precambrian crystallines are subdivided into Byram, Losee and Pochuck gneisses on the geologic map of New Jersey (Johnson, 1950). Subsequent work by Markewicz (1969), Buddington and others (1961), Hague and others (1956), and Drake and others (1967) indicates this breakdown is oversimplified and practically useless because of the great variety and complexity of the Precambrian rocks in New Jersey.

Many of the gneisses are described as metasediments and metavolcanics, (Hague and others, 1956). Over a long period of time they were metamorphosed by forces that folded and compressed them. The compressional forces were such that most of the major structures (folds and faults) are aligned in a northeast-southwest direction. These gneisses were frequently intruded by dikes.

It is known that some Precambrian crystalline rocks weather more rapidly and deeply than others and recent studies of small areas by the New Jersey Geological Survey show that some Precambrian rocks also have better water-bearing characteristics than others. However, until detailed geologic mapping of the area is completed, the Precambrian Crystalline rocks will have to be treated as a single unit.

PALEOZOIC ROCKS

Geology

The Hardyston Quartzite of Cambrian age is included with the Precambrian crystallines in this report. It is difficult to distinguish the Hardystone Quartzite from the Precambrian rocks on driller's logs, since they have similar hydrologic characteristics. The Hardyston Quartzite rests unconformably upon the Precambrian crystallines. However, in places it grades so imperceptibly from the Precambrian, that the contact cannot be readily defined.

"The formation is a vitreous, light pink to steel gray to brown, generally arkosic, fine to coarse grained, resistant quartzite with gradations to sandstone and shale, both horizontally and vertically. Basal beds are commonly arkosic quartz pebble conglomerate with pebbles and fragments of Precambrian gneiss and granite. These pebbles vary from very coarse grains to more than two inches in diameter", (Markewicz, 1969).

In some areas the quartzite contains so much feldspar that it is difficult to distinguish it from granite. Thickness estimates vary from a few feet to over 200 feet for the Hardyston Quartzite in New Jersey.

Hydrology

Unweathered Precambrian crystallines and the Hardyston Quartzite have similar hydrologic properties. For all practical purposes, the unweathered rocks have no porosity. Practically all ground water in the fresh rock occurs in joints and faults, but in areas where the joints are far apart and not interconnected, a true water table may not exist, and each system of joints will have its own level.

Normally, the following zones are penetrated in downward succession in the crystalline rocks: 1) soil and decomposed rock, 2) weathered, fractured rock, 3) relatively fresh fractured rock, and 4) fresh tight rock. Some of these zones may be very thin or even absent. In much of the glaciated part of the New England Upland, glacial deposits lie on fresh rock. Near the surface small fractures may be enlarged by tree roots, frost action and circulating ground water until the rocks are eventually broken down. The most abundant fractures and the weathered zone occur at depths of less than 150 feet below the surface.

Deep weathering often occurs in fault shear zones and in areas of closely spaced open joints. Wells drilled in these areas usually yield large amounts of water.

Better than 75% of the wells drilled in the crystalline rocks are less than 150 feet deep. Open fractures usually do not extend beyond 300 feet. However, a few wells have obtained water from greater depths. They probably intersected fault or shear zones.

Of the 1,018 Precambrian crystalline wells, only 794 had pumping data; Fourteen percent were between 150 to 199 feet deep; 61.5% were between 200 to 249 feet deep; 2% were between 250 to 299 feet deep, and 2.5% were deeper than 300 feet.

Precambrian crystalline rocks, including the Hardyston Quartzite, are usually reliable sources of ground water for domestic use. Reported yields of 1,018 domestic wells range from 0 to 100 gpm. The average yield is 10 gpm, and the median is 8 gpm. Forty-six percent of the wells yielded 5 gpm or less. Specific capacities of 794 domestic Precambrian crystalline wells range from .00 to 1.86 gpm per foot of drawdown and average .30 gpm per foot of drawdown. Four wells had a specific capacity of infinity and 21 had a specific capacity of .00 gpm per foot of drawdown. The specific capacity of a well is calculated by dividing the discharge of the well by the drawdown (the difference between the static water level and the pumping level). The resulting number, the yield, expressed as gallons per minute per foot of drawdown, is a measure of the effectiveness of the well and the character of the aquifer.

Industrial and public supply wells in the Precambrian crystallines have been only moderately successful. The average yield of 35 wells drilled with the hope of obtaining 100 gpm or more, is 157 gpm and the median is 57 gpm. Specific capacities range from .11 to 1.65 gpm per foot of drawdown, and the average is .90 gpm per foot of drawdown.

Unweathered and unfractured Franklin Limestone is a very dense rock. The Franklin and Sterling Hill mines are considered to be dry, and they produced 400 gpm and 65 gpm respectively (Baum, personal communication). Large amounts of water can only be obtained from solution cavities. Lime Crest Products have a well drilled into a cavern which produced 800 gpm when first drilled and is now estimated to have a potential of 2,300 gpm; however, they only pump 100 gpm (personal communication). Of the 162 Franklin Limestone domestic wells, only 129 had pumping data. Reported yields of 162 domestic wells range from ¼ gpm to 100 gpm with an average of 14 gpm, and a median of 10 gpm. Sixty-two percent were found to be shallower than 149 feet, 20% were between 150 and 199 feet deep, 10% were between 200 and 299 feet deep, and 8% were over 300 feet deep. Specific capacities of 129 domestic wells range from .01 to 4.00 gpm per foot of drawdown and average .57 gpm per foot of drawdown. There are two industrial wells: one produced 800 gpm (it was described above); the second produced 80 gpm from a depth of 73 feet.

In general, wells drilled near perennial streams, ponds or lakes will have a better chance of success than those drilled far away. The average specific capacity of five Precambrian crystalline industrial wells drilled near a lake is 1.37 gpm per foot of drawdown. The average specific capacity of five industrial wells not near a body of water is .44 gpm per foot of drawdown.

CAMBRO-ORDOVICIAN
KITTATINNY FORMATION

Geology

The Kittatinny Formation lies conformably upon the Hardyston Quartzite, which was described with the Precambrian rocks. On the geologic map it is mapped as a single unit. However, it has been divided into four members by Drake and others (1967) and Markewicz (1969). Detailed mapping is being done by Markewicz and Dalton in Sussex and Warren Counties. The following breakdown is from Markewicz (1969).

Leithsville Formation

The Lower Cambrian Leithsville Formation is a massive, medium to fine-grained, impure, calcareous dolomite, commonly referred to as "dolomite limestone". Locally it can be coarsely crystalline and very massive.

Basal Leithsville can consist of massive, thick bedded, very dark dolomite or bluish gray, fine to medium grained dolomite in beds from one to three feet thick with some minor thin shaley interbeds. Weathered surfaces are gray to dark gray. Fresh rock is bluish to dark gray with local units almost black. Chert, often present in some basal units, is usually associated with the thinner bedded dolomite. This dark lower unit has yielded specimens of the fossil *Hyolithellus-micans.*

Above the basal beds the Leithsville tends to be lighter colored on both weathered and fresh exposures. It is medium bedded to locally laminated with calcareous shale and tan micaceous shale interbeds, which weather yellowish. Above this the dolomite becomes medium to thick bedded with occasional chert and sandy beds.

Mud cracks, coarse-bedding, chert nodules, edgewise conglomerate and horizons of oolitic and pisolitic structure have been observed in the upper section. The formation appears to be about 1,000 feet thick (Drake and others, 1967).

Allentown Formation

It is a thick (1,300 ft. +) Markewicz, (1969) rhythmically bedded, light to dark gray, fine to medium grained, crystalline, impure dolomite in beds from several inches to more than three feet thick. Weathered rock is light gray to dark gray with a fine to smooth textured surface.

The lower half of the formation is an alternating sequence of light to dark thin bedded dolomite with intercalated shaley bands. Thin, undalatory, dark, medium to coarse grained, impure dolomitic and oolitic beds are common. These beds may give off a light to strong foul odor when struck with a hammer. Stromatolites, oolites, chert lenses, ripple marks, cut and fill structure, edgewise conglomerate and sedimentary breccia are common.

Upper Allentown is generally thicker bedded with scattered thin beds that weather to a very smooth textured, cream colored surface. Chert is more abundant and stromatolites, oolites, shaley beds, ripple marks and sedimentary breccia are less abundant as compared to the lower part.

Rickenbach Formation

The Lower Rickenbach (700 ft. +) Markewicz, (1969) consists of gray to dark gray, fine to coarse crystalline rock that sparkles on the fresh surface. Basal beds are massive with local thin shaley beds. Chert occurs as spotty, discontinuous thin beds and lenses. When struck with a hammer, basal beds emit a very fetid odor.

Upper beds become finer grained, less crystalline, lighter colored and more thinly bedded with some calcareous sandstone and occasional dolomite beds containing frosted quartz grains and scattered smokey calcite crystal clusters. The offensive odor is not as strong. Chert becomes more abundant as nodules and thin bands.

Epler Formation

The Epler Formation (800 ft. +) Markewicz, (1969) is an interbedded, very fine grained to cryptogranular, light to medium gray limestone and fine to medium grained, light to dark, medium gray dolomite. Nodular and bedded chert are common and there is a prominent chert rich zone near the base.

Hydrology

The Kittatinny Formation has no primary porosity and ground water has to move through joints, fractures and solution cavities within the rock. Carbonate rocks differ from other consolidated rocks because they are relatively soluble in weak acid solutions. Rain falling through the atmosphere picks up carbon dioxide and forms a weak carbonic acid. Water percolating downward through the soil picks up additional carbonic acid and weak organic acids. This weak acid solution then percolates down through joints and fractures, slowly dissolving the limestone until large channels and caverns are formed.

Solution channels are usually more abundant in valleys, depressions, and near streams and rivers. The distribution of the channels is extremely irregular, and usually is difficult to predict. However, sinkholes, funnel shaped depressions in the land surface, are usually connected with large solution channels in the underlying limestone. A series of sinkholes may be aligned along an underground cavern. A well drilled on this line would have a good chance of intercepting a cavern and could produce a large quantity of water. Many of the solution channels are more or less filled with clay but with prolonged pumping an excellent well can be developed. On the other hand, wells which encounter relatively unfractured limestone or dolomite will have low yields.

Faults which may contain large quantities of water in other consolidated non-porous rocks are generally tight in the Kittatinny Limestone. The recemented breccia, mylonite and recrystallized rock in the fault proper are frequently harder and better cemented than the surrounding rock and often form a slightly higher ridge in the terrain. However, the unbrecciated limestone adjacent to the fault is usually more fractured than the normal unfractured limestone elsewhere. These numerous fractures tend to become enlarged by ground water and form sizeable solution channels and caverns.

Ground water in the Kittatinny Formation is found under both water-table and semi-artesian conditions. Water table conditions exist near the ground surface and semi-artesian conditions occur in some of the deeper solution channels, which are recharged through sinkholes or water table aquifers. Because the solution channels are usually quite irregular, two neighboring high-capacity wells may tap different solution channels and not interfere with each other at all. However, two high yielding wells on the same system would rapidly transmit the effect of pumping over considerable distances with a consequent increase in drawdown.

Most successful wells have intersected large caverns between 50 and 300 feet. Below 600 feet the chances of obtaining a good supply from the Kittatinny Formation is generally slight, although there have been exceptions in areas not covered by this report.

Wells drilled in either the Rickenbach or Leithsville Formation would be much more apt to intersect solution channels than those drilled in the Epler or Allentown Formations Dalton, (1969).

Reported yields from 422 domestic wells, pumping from the Kittatinny Formation, range from 1/4 to 120 gpm with an average of 14 gpm. Thirty-five percent yielded 5 gpm or less. Fifteen percent yield between 16 and 25 gpm. Fourteen percent yield between 26 and 79 gpm. Three wells yield 100 gpm and two wells yield 120 gpm.

Yields from the 32 industrial wells range from a minimum of 18 gpm to a maximum of 815 gpm, with an average of 162 gpm and median of 100 gpm. Forty-one percent yielded less than 100 gpm. Thirty-four percent yielded between 200 and 299 gpm. Nine percent yielded over 300 gpm.

Specific capacities of 273 domestic Kittatinny Formation wells range from .00 to 3.11 gpm per foot of drawdown and averaged 1.05 gpm per foot of drawdown. Specific capacities for 26 industrial Kittatinny Formation wells range from .08 to 33.95 gpm per foot of drawdown and averaged 4.40 gpm per foot of drawdown. Eight wells had a specific capacity of infinity and six wells had a specific capacity of .00 gpm per foot of drawdown.

ORDOVICIAN

JACKSONBURG LIMESTONE

Geology

The Jacksonburg Limestone rests unconformably on the Epler Formation (upper member of the Kittatinny Formation). It is a black or dark blue limestone often with dolomite pebbles at the base, and limy shale (cement rock) at the top. "The thickness of the Jacksonburg varies greatly in New Jersey. It probably is between 125-300 feet thick." Kummeel (1940).

Hydrology

There are too few wells drawing from the Jacksonburg Limestone to summarize.

MARTINSBURG FORMATION

Geology

The Martinsburg Formation lies unconformably on the Jacksonburg Limestone. It is the most extensive formation in the Valley and Ridge Province. It is seven miles wide at the New York State Line. It is an intensely crumpled and faulted sequence of shale, slate, sandstone and calcareous siltstone. On the whole, the fine grained shale and slate are black and are more abundant in the lower part, whereas the sandstone beds are dark bluish gray, many of them calcareous, and occur more commonly higher in the formation. Estimates of the thickness of the formation vary from 5,000 to 11,000 feet. Kummel, (1940).

Hydrology

The Martinsburg Formation has no primary porosity or permeability except in some of the sandstones and calcareous sandstone beds. They are described by one well driller as "honey comb rock." Nearly all the ground water is contained in fractures.

In the Appalachian Valley and Ridge Province of Sussex and Warren Counties the fractures in the Martinsburg seem to be quite tight and it is, on the whole, a very poor aquifer. Ground water occurs under water-table conditions except in some of the deeper wells where water may be semi-confined in sandstone, limestone, a more permeable shale horizon, or a fault shear zone.

Of the 919 domestic wells, only 495 have sufficient pumping data to summarize. The reported yields range from ½ gpm to 120 gpm with an average of 10½ gpm, and a median of 6 gpm. The specific capacities range from .00 to 20.00 gpm per foot of drawdown with an average of .39 gpm per foot of drawdown. Six wells had a specific capacity of infinity and twelve wells have a specific capacity of .00 gpm per foot of drawdown. Forty-seven percent yielded 5 gpm or less. Thirty-five percent yielded between 6 and 15 gpm. Nine percent yielded between 16 and 25 gpm. Eight percent yielded between 26 and 75 gpm. One percent yielded between 100 and 120 gpm.

Of the 20 industrial wells, only 12 had sufficient pumping data to summarize. The reported yields range from 109 to 6.25 gpm per foot of drawdown with an average of 1.22 gpm per foot of drawdown. Fifty-three percent yielded 40 gpm or less. One well yields 45 gpm; three wells yield 50 gpm; one well yields 75 gpm and one well yields 220 gpm.

The reported depths of the 919 domestic wells range from 35 feet to a maximum of 683 feet. The average is 169 feet and the median is 132 feet. Fifty-one percent were shallower than 149 feet. Thirty-two percent ranged between 250 and 299 feet deep, and the balance, or 9%, are 300+ feet deep.

The reported depths of the industrial wells range from 178 to a maximum of 833 feet. The average depth is 333 feet and the median is 304 feet. Thirty-three percent of the industrial wells range between 200 and 299 feet deep; 26% range between 300 and 399 feet deep and the balance were 400+ feet deep.

Most successful wells in the Martinsburg Formation are in the weathered zone within 200 feet of the surface. Depths of wells are completely unpredictable.

NEPHELINE SYENITE

Geology

The Beemerville Nepheline Syenite is perhaps the largest intrusive body of its type in the eastern United States. There are several facies, all with abundant nephelite, but with textures varying from coarsely granular to fine grained tinguaite. The tinguaite occurs as small dike-like bodies cutting the granular and porphyritic types of nephelite syenite Milton (1952). It is further described by Wilkerson (1946) and Kemp (1892).

There are numerous dikes (mostly unmapped) and several volcanic plugs, the largest being Rutan Hill.

Hydrology

The Nepheline Syenite and its accompanying dikes and volcanic plugs are insignificant as far as ground water is concerned.

MARTINSBURG HORNFELS

Geology

The Martinsburg Hornfels was formed when the Beemerville Nepheline Syenite and its associated dikes intruded and metamorphosed the Martinsburg Shale in Wantage Township, Sussex County. It is a dense, fine-grained dark gray to black rock, and extends 2,000± feet from the intrusive body (Spink, 1967).

Hydrology

The Martinsburg Hornfels has no primary porosity. Ground water is found only in the vertical cracks and crevices. There are only 12 domestic wells drilled in this formation. The reported yields range from 1 to 18 gpm with an average of 5½ gpm, and a median of 3 gpm. Fifty-eight percent of the wells yield less than 5 gpm. The reported depths range from 104 feet to 273 feet with an average of 179 feet and a median of 173 feet. There are no industrial wells in the Martinsburg Hornfels.

SILURIAN
SHAWANGUNK FORMATION

Geology

The Shawangunk Conglomerate lies unconformably on the Martinsburg Shale. It forms the crest and eastward facing cliff of Kittatinny Mountain, and is well exposed at Delaware Water Gap, where the river cuts through the mountains in a deep gorge, 1,200 feet below the crest. It is chiefly a quartzite and conglomerate composed of small white quartz, and in some beds, slate pebbles. Cobbles have been found in the basal bends north of Culvers Gap Spink, (1967). Its color is generally medium gray with interbedded gray sandstones, black shale, and some red beds.

The formation is broken down into three members: lower conglomerate member, lower quartzite conglomerate member, and quartzite argillite member (Epstein and Epstein, and Spink, 1967). The thickness at the Water Gap is 1,900 feet Kummel, (1940) and thins to the northeast. Just south of Lake Rutherford a section was measured at 1,309 feet and another section was measured along Interstate Route 84 at 1,040+feet Spink (1967).

Hydrology

The Shawangunk Formation has no primary porosity in most of its members. There is some porosity in the sandstone members. With the above exception, ground water is found only in vertical cracks and crevices. Of the 15 domestic wells, only 9 have sufficient pumping data to summarize. The reported yields range from ½ to 20 gpm, with an average of 6, and a median of 4 gpm. The average specific capacity is .17 gpm per foot of drawdown. Fifty-nine percent yielded less than 5 gallons per minute. The reported depths range from 97 to 306 feet with an average of 177 feet and a median of 158 feet. There are no industrial wells in the Shawangunk Formation.

HIGH FALLS FORMATION

Geology

At the Delaware Water Gap above the Shawangunk Conglomerate, there are about 1,345 feet of red, green and olive colored sandstones and shales with some beds of pea conglomerate (Pennsylvania Second Geological Survey .G6). They are in sharp contrast in color and texture to the underlying light colored conglomerate. Kummel (1940) estimated the maximum thickness to be 2,300 feet.

Hydrology

The High Falls shale and sandstone has very little primary porosity. Most of the ground water is found in vertical cracks and crevices. Of the 96 domestic wells, the reported yields range from ½ to 60 gpm, with an average of 17, and a median of 15 gpm. The average specific capacity is .61 gpm per foot of drawdown. Twenty percent of the wells yield 5 gpm or less. Reported depths range from 36 to 320 feet, with an average of 136 feet, and a median of 125 feet. There are no industrial wells in the High Falls Formation.

POXONO ISLAND through ORISKANY FORMATION

Geology

All Formations from Poxono Island through the Oriskany Formation are combined and are mapped as Spi-Do. They are described in detail by Epstein & Epstein & Spink (1967). This report will use the descriptions by Kummel (1940).

Poxono Island Formation—A buff or greenish calcareous shale. At Tocks Island, the U. S. Corps of Engineers cored 675+ feet of this formation (Spink, 1967).

Bossardville Limestone—A fine grained, compact, bluish gray, banded limestone. It increases in thickness southwestward from 12 feet at the New York State Line to about 100 feet where it crosses the Delaware River.

Decker Formation—Grades from a limestone in the northeast to a calcareous sandstone at the southwest. Thin bands of more or less fissile, green shale separate the limestone layers. A 52 foot thick bed of reddish, crystalline, highly fossiliferous limestone, about the middle of the series, is a striking feature.

Rondout Formation—Consists of 39 feet of calcareous shales, limestone, dolomitic limestone and calcareous dolomite. The limestone and dolomitic limestone beds are dark gray to medium dark gray, very fine grained to medium grained, and argillaceous, weathering medium gray. The calcareous shale is medium dark gray, weathers medium gray, and contains mud cracks.

Manlius Limestone—A somewhat thin bedded, knotty, dark blue or almost black limestone, 34 or 35 feet thick. It is the limestone that constitutes the quarry stone of Wallpack Ridge.

DEVONIAN

Coeymans Formation—The limestone is coarsely crystalline, has many crinoid stems, and is minutely rough on its weathered surface, which resembles a coarse sandstone. Chert is more or less abundant in the upper layers. The Coeymans thickens from 34 feet near Port Jervis, New York to 93 feet at Shawnee on Delaware, Pennsylvania.

Stormville Formation—It is composed of interbedded, flaggy to massive, fine to coarse grained, calcareous sandstone and flaggy to massive fossiliferous limestone. Both are medium dark gray to medium gray in color. Kummel reports its thickness as 0 to 10 feet. Spink (1967) reports a 5 foot thickness near Wallpack Center.

New Scotland Formation—The lower 20 feet consists of very hard cherty limestone. This is followed by a series of calcareous, fossiliferous shale, having an estimated thickness of 140 feet. It weathers to light gray, medium dark gray, dense limestone pods, scattered beds and lenses of medium gray fine grained argillaceous, fossiliferous limestone occur 20 to 25 feet above the base of the shale. Alteration of silty and non-silty shale gives the rock its laminated appearance.

Becraft Formation—A hard, gray, cherty limestone, is generally semicrystalline and locally made up largely of crinoid stems and broken shells. It is estimated to be 20 feet thick.

Port Ewen Shale—A calcareous silty shale, is medium dark gray when fresh, and weathers to a light to medium gray. It is the most poorly exposed formation in the Upper Silurian and Devonian section. It is estimated to be 80 feet thick.

Oriskany Formation—It is composed of argillaceous to silty limestone and calcareous siltstone to fine grained sandstone strata that are massive. It is dark gray in color when fresh and weathers to medium gray. Limestone beds are common near the base. It is estimated to be 170 feet thick.

Hydrology

The formations Poxono Island through the Oriskany have no primary porosity. Ground water occurs in the normal joint system and in solution cavities. The reported yields of the 62 domestic wells in this grouping of formations are as follows: 80 gpm maximum, 2 gpm minimum, 18 gpm average and 12 gpm median. Eighteen percent of the wells yield 5 gpm or less; 24% yield between 6 and 15 gpm; 19% yield between 16 and 25 gpm and 21% yield 30 gpm or more.

The reported depths range from a minimum of 51 feet to a maximum of 278 feet, with an average of 122 feet and a median of 105 feet. Forty-six percent of the wells were between 50 and 99 feet deep; 28% were between 100 and 149 feet deep; 15% were between 150 and 199 feet deep; 11% were between 200 and 249 feet deep; and one well was deeper than 250 feet. There are too few wells that have sufficient pumping data to make a comparison of specific capacities.

There are two industrial wells with a reported yield of 100 gpm each, and both are 250 feet deep.

ESOPUS FORMATION

Geology

This is a black massive gritty siltstone, estimated to be 304 feet thick (Spink, 1967) and overlain by the Schoharie Formation. This is a fine grained, argillaceous, dark gray limestone, which weathers yellowish gray. Its thickness is estimated at 175 feet Spink, (1967).

Hydrology

The reported yields of domestic wells range from a minimum of 1 gpm to a maximum of 70 gpm. with an average of 9 gpm and a median of 4½ gpm.

The reported depths range from a minimum of 98 feet to a maximum of 339 feet, with an average of 186 feet and a median of 157 feet.

There are too few wells to summarize further. There are no industrial wells.

ONONDAGA FORMATION

Geology

Towards its base it is somewhat shaley. The limestone is hard, cherty and regularly bedded in layers three to twelve inches thick. It is slightly dolomitic, fine grained, dark gray limestone, which weathers to a light to medium light gray. It is estimated to be 200 feet thick.

Hydrology

The reported yields of the 69 wells range from a minimum of 1 gpm to a maximum of 100 gpm. with an average of 19 gpm and a median of 15 gpm. Twenty percent of the wells yield 5 gpm or less; 30% yield between 6 and 15 gpm; 32% yield between 16 and 25 gpm; 15% yield between 26 and 50 gpm and 3% yield 100 gpm. Specific capacities range from .02 to .52 gpm per foot of drawdown, and average .26. Only 11 wells had sufficient pumping data.

The reported depths range from a minimum of 35 feet to a maximum of 315 feet, with an average of 149 feet and a median of 135 feet. Three percent of the wells are less than 49 feet deep; 11% are between 50 and 99 feet deep; 47% are between 100 and 149 feet deep; 11% are between 200 and 249 feet deep; 4% are between 250 and 299 feet deep; and 3% are deeper than 300 feet.

MARCELLUS SHALE FORMATION

Geology

It is the highest Devonian formation exposed in New Jersey and it is a fissile black shale which is only exposed in two places in the State.

Hydrology

There are insufficient wells to summarize.

QUATERNARY DEPOSITS

Geology

Glaciers advanced into New Jersey three times during the Pleistocene Epoch. Material deposited by this ice has been divided, from oldest to youngest, into Jerseyan (Kansan), Illinoian, and Wisconsin glacial deposits Parker and others, (1964).

Ice covered all of Sussex County and the Warren County portion of the Tocks Island Impact Area during Jerseyan and Illinoian time removing loose material and weathered bedrock. The Wisconsin ice sheet covered the whole area and deposited till over all but the southern tip of Hopatcong Borough which is covered by terminal moraine. The older Jerseyan and Illinoian tills are covered by the Wisconsin deposits. The Quaternary sediments consist of river silt and stratified drift in the valleys, till in drumlins, terminal and recessional moraines, stratified drift in eskers, stratified drift in kames and kame terraces, and glacial lake bed deposits. Most of these sediments have been eroded off the top of the mountains. The terminal and recessional moraine and the stratified drift are shown on the geologic map and depth to bedrock map on Map Plates I and II.

Hydrology

Till and glacial lake deposits have generally low permeability and are unimportant as aquifers in the area. Occasionally, a well dug or drilled into these sediments will provide sufficient water for domestic purposes. Water levels will drop during periods of drought and shallow wells in these deposits will usually go dry unless they are frequently recharged by precipitation.

Wisconsin valley train (stratified drift) is usually an excellent source of water, provided it contains enough coarse material. However, even when there is insufficient thickness of sand and gravel for the development of a "sand well", this more permeable material acts as a sponge and allows more precipitation to percolate into the underlying rock. This additional ground water circulation also weathers the bedrock to a greater depth than elsewhere so that rocks in areas covered by some sandy valley fill usually give better than average yields.

Most valley train deposits are under water table conditions. The more coarse deposits are the most permeable in northern New Jersey and have the highest coefficients of storage capacity. Recharge of these deposits is affected by precipitation, ground water from the rock aquifers in the flood plain, and from streams and bodies of water (lakes and ponds). Although all streams and rivers in Sussex County and the Warren County Portion of the Tocks Island Impact Area are gaining streams (effluent streams, spring fed, receiving ground water) during times of high flow and during periods of drought, they may recharge the stratified deposits along their banks and also through the stream bed itself.

Wells drilled in the stratified deposits near a lake or river may yield large reliable quantities of water by inducing recharge from the river or lake. This can be accomplished where permeable material is hydraulically connected with the river by pumping larger quantities of water than is available through recharge from precipitation.

Of the 121 domestic wells, only 65 have sufficient pumping data. The reported yields range from ¾ gpm to 75 gpm with an average of 17 gpm and a median of 15 gpm. The specific capacities range from .02 to 12.00 gpm per foot of drawdown with an average of 1.50 gpm per foot of drawdown. Twenty-three percent of the wells yield 5 gpm or less. Thirty-five percent yield between 6 and 15 gpm. Twenty-six percent yield between 16 and 25 gpm. Fifteen percent yield between 26 and 74 gpm. One well yields 75 gpm.

Of the 24 industrial wells, only 13 had sufficient pumping information. The reported yields range from 6 to 942 gpm with an average of 250 gpm and a median of 180 gpm. The specific capacities range from 1.59 to 25.19 gpm per foot of drawdown with an average of 17.72 gpm per foot of drawdown. Twenty-one percent of the wells yield 50 gpm or less. Twelve percent of the wells yield between 51 and 100 gpm. Twenty-nine percent yield between 101 and 250 gpm. The Borough of Hamburg well (1961) was not included in the tabulation of specific capacity. It yields 942 gpm and had a specific capacity of 117.70 gpm per foot of drawdown.

The reported depths of domestic wells range from 35 to 218 feet with an average of 95 feet and a median of 84 feet. Eleven percent of the wells were less than 49 feet deep. Forty-one percent were between 100 to 149 feet deep. Ten percent were between 150 and 199 feet deep. Four percent were between 200 and 249 feet deep.

The reported depths of the industrial wells range from 35 to 253 feet with an average of 91 feet and a median of 73 feet. Eight percent of the wells were less than 49 feet deep. Forty-five percent were between 50 and 99 feet deep. Twenty-nine percent were between 100 and 149 feet deep. Twelve percent were between 150 and 199 feet deep. One well was 253 feet deep.

QUALITY OF GROUND WATER

Introduction

Rain water is not pure. Precipitation picks up dust and gases plus very small amounts of dissolved mineral matter derived from the atmosphere. Water flowing over the land surface or infiltrating into the soil or through the rocks picks up organic acids, mineral matter, and gases by solution of the rocks, soils, and organic material with which it comes in contact. Normally, the kinds and amounts of dissolved minerals in ground water depend on the types of rock and the soluble products of rock weathering through which the water has flowed. In cases where recharge has been induced from surface supplies, the quality of the ground water is modified by the quality of the surface water. In populated areas the natural water quality may be impaired by chemical, organic, or biological materials which have infiltrated into the ground water supply. The heavy use of liquid nitrogen fertilizer poses a constant threat to ground water in agricultural areas.

A well intersecting ground water with disease bearing organisms is said to be polluted or contaminated. Polluted water is never potable. Some water that is harmless to man or animals may not be potable because of material in suspension (e.g. colloidal clay and ferric iron) or in solution (e.g. ferrous iron and hydrogen sulphide=rotten egg odor). For further examples see Table 8. Water quality is a function of the use to which it is put. The U.S.G.S. monthly Water Resources Review, 1968, says that during Roman times different aqueducts brought waters of quite different qualities. The best water was used for domestic purposes, another quality for baths and public purposes, while the water from one aqueduct was of such poor quality that is was used for irrigation and for supplying the basin of a marine circus. Today, a well may be polluted and unsafe to drink, but, it can be used for cooling or irrigation purposes. Water may also be completely safe for drinking, but undesirable without treatment for domestic and certain industrial and agricultural uses.

Drinking Water Standards

For drinking water, the presence of the following substances in excess of the concentrations listed below "shall constitute grounds for rejection of supply" by the New Jersey Department of Environmental Protection (Potable Water Standards, 1967). In New Jersey the presence of these elements in excess of concentrations listed below is usually indicative of industrial pollution.

MAXIMUM ALLOWABLE CONCENTRATIONS IN PARTS PER MILLION

Substance	*Maximum Concentration*		
Arsenic (As)	0.05	ppm	(mg/L)
Barium (Ba)	1.00	"	"
Cadmium (Cd)	0.01	"	"
Chromium (hexavalent Cr.+6)	0.05	"	"
Cyanide (CN)	0.20	"	"
Fluoride (F)	2.00	"	"
Lead (Pb)	0.05	"	"
Selenium (Se)	0.01	"	"
Silver (Ag)	0.05	"	"

"The following chemical substances should not be present in a water intended for potable purposes in excess of, or (where applicable) below, the listed concentrations. Their presence may constitute grounds for the rejection of the supply if, in the opinion of this Department, such substances, either singly or in combination, are present in such concentrations as would render the water unduly corrosive, unpalatable, hazardous to the consumers or aesthetically objectionable." New Jersey Department of Environmental Protection (Potable Water Standards, 1967).

	Recommended Concentration	
Substance	Maximum	Minimum
A.B.S./L.A.S.*	0.5 ppm (mg/L)	
Chloride (Cl)	250.0 " "	
Copper (Cu)	1.0 " "	
Fluoride (F)	1.5 " "	1.0 ppm (mg/L)
Hardness (as CaCO3)	150.0 " "	50.0 " "
Iron (Fe) **	0.3 " "	
Manganese (Mn)**	0.05 " "	
Nitrate (NO3)	30.0	
Phenolic Compounds (as phenol)	0.001	
Sodium (Na)	50.0	
Sulphate (SO4)	250.0	
Total Dissolved Solids	500.0	
Zinc (Zn)	5.0	
Mercury (Hg)	0.002	

* Alkyl-Benzene-Sulfonate and Linear-Alkyl-Sulfonate, or similar Methelene blue reactive substances contained in synthetic detergents.

** A public water supply, prior to distribution, shall be subjected to an appropriate removal process if the raw water contains concentrations exceeding 0.6 ppm iron or 0.1 ppm manganese.

Chemical and Physical Characteristics of Ground Water

The chemical quality of the ground water that is to be used for a specific purpose is as important as the amount of water that can be obtained. In parts of the study area the ground water has limited use unless treated. The kind of treatment depends on the quality and the intended use of the water. Some industrial and municipal uses have a narrow tolerance of chemicals.

Chemical analyses reveal the kinds and amounts of important mineral constituents in ground water. These minerals, being in solution, are present as ions. An ion of mineral matter is an atom or group of atoms with an electrical charge. Some important negatively charged ions (anions) are carbonate (CO3), bicarbonate (HCO3), chloride (Cl), sulphate (SO4), nitrate (NO3) and fluoride (F). Positively charged ions (cations) include calcium (Ca), sodium (Na), magnesium (Mg), potassium (K), aluminum (Al), iron (Fe) and manganese (Mn).

Most of the dissolved mineral matter in the fresh ground water in the study area is calcium or magnesium carbonate from carbonate and dolomite rocks. In general, water from wells drilled in the Martinsburg Formation will yield water with hydrogen sulphide, iron, low hardness, and low pH (acid). Wells drilled in the Precambrian crystallines will normally yield water high in iron, low hardness and low pH (acid). (Table 7)

Complete chemical analyses of ground water and surface water in New Jersey include most of the dissolved minerals listed in Table 8. The total list includes minerals which may not be encountered in the study area, but will be found in other parts of the state.

Water temperatures reflect seasonal fluctuations in shallow wells. Analyses of thousands of well records throughout the United States show that between 30 and 60 feet below the surface the water temperatures are roughly 2 to 3° F above the mean annual air temperatures for the area, and remain fairly constant (Todd, 1959). Below the stable zone the water temperature increases according to the geothermal gradient which is probably slightly less than 1° F for every 100 feet in the study area. The geothermal gradient appears to have very little effect upon water temperatures in the study area wells with depths of less than 400 feet below the surface. This may be due in part to the tempering effect of ground water entering from the upper part of the well.

The temperature of ground water adjacent to or drawn from wells which are recharged from surface supplies will be modified depending on how quickly and how much of the water is derived from the surface source and its temperature. For example, the mean temperature of the Delaware River near East Stroudsburg, Pa., for July and August of 1967 was 75° F. (Water Resources Data for New Jersey—Part 2. Water Quality Records, 1967). This is approximately 5° higher than the mean temperature for Layton, Newton, and Sussex for July and August. Recharge wells which return warmer than usual water to the ground also gradually cause a rise in ground water temperature.

In the study area, ground water temperatures higher than 55° or 56° F, in drilled wells between 30 and 500 feet deep, are suspicious. The increased temperature indicates that the water is probably at least partially derived from a surface source.

Pollution

Most of the processes which degrade or remove contaminants operate within the unsaturated zone (zone of aeration) above the water table. In areas where the water table is high, contaminants may enter the aquifer directly and the ground water must then be made potable by filtration and dilution. In areas underlain by stratified glacial drift with no clay beds, the effluent from septic systems often is drawn into shallow wells, especially during periods of drought. Septic systems, disposal fields or cesspools which are closely spaced may introduce more contaminants to the aquifer than can be filtered, degraded, or sufficiently diluted and the results will be polluted wells.

Ground water at any level or location may be subject to pollution. Well pollution is most apt to occur in rock wells which intersect large open fractures. Open fractures have little filtration capability and act as open conduits. Therefore, ground water must travel long distances through fractures before organic or chemical contaminants are degraded, diluted or removed by natural processes. All things being equal, wells drilled in the soluble carbonate rocks such as limestone are the most prone to contamination from a distant source.

In 1968, Shuster Pond in Warren County was dye tested by the New Jersey Department of Health. The dye appeared in a large spring about a mile to the northeast in Sussex County in less than two hours (Meyers, personal communication). This shows how fast ground water can move in large open solution cavities with no opportunity for filtration or time for degradation. However, there are also highly fractured beds or zones in the non-carbonate rocks where pollution may spread rapidly over a large area from ground water being withdrawn from wells.

Where there is a considerable thickness of unconsolidated permeable material above the fractured rock, the danger of well pollution is greatly diminished because the permeable material acts as a filter and retards the flow of septic system effluent above the water table so that oxidation can occur. This is the reason for the stringent percolation tests and minimum distance in feet a well can be located from various sewerage systems. These are spelled out in the New Jersey State Department of Environmental Protection publications: PW-13, November 71, Chapter 199, P.L. 1954 and Standards For The Construction Of Water Supply Systems For Realty Improvements (Revised 1966) and H-D3, Chapter 199, P.L. 1954 and Standards For The Construction Of Sewerage Facilities For Realty Improvements (Revised 1963). However, even a thick permeable overburden may not be enough if a small area has too many wells and septic systems, because as is the case with a high water table, the required amount of filtration, degradation and dilution cannot take place before the ground water reaches a nearby well.

In recent years many wells have been contaminated with concentrations of detergents (both A.B.S. and L.A.S.). Although there is no evidence that either type of detergent is harmful by itself, its presence in well water may be indicative of contamination by sewerage and to most of us is unpleasant psychologically. Tests at the Robert A. Taft Sanitary Engineering Center (Cohen, 1963) indicated that A.B.S. concentrations up to 1000 ppm have no odor. Taste, however, could be detected by 5% of the panel of researchers when a concentration of 16 ppm A.B.S. was present, and 50% of the panel could detect a bitter taste in concentrations of 60 ppm. It should be noted that all of these concentrations are above the maximum recommended by the New Jersey State Department of Environmental Protection.

Many highly stable chemicals, such as Alkyl-Benzene-Sulfonate (A.B.S. detergent) and Linear-Alkyl-Sulfonate (L.A.S. detergent) or similar substances contained in synthetic detergents, degrade under aerobic conditions in a sewer plant and degrade more slowly in the ground above the water table. However, when they enter the anaerobic environment below the water table they become practically indestructable through natural degradational processes.

A number of chemical compounds dissolved in waste or wash water may be discharged into seepage pits by some industries or activities and may pollute the ground water or at least render it unpotable. Leachate from improperly located and mismanaged dumps or sanitary land fills can pollute not only surface water, but also the underlying ground water.

Public water companies obtain their water from ground water, surface water or a combination of both. Chemical analyses of these supplies are shown in Tables 9 and 10. The data were obtained from the New Jersey State Department of Health, Typical Analyses of Public Water Supplies in New Jersey, October, 1966. Chemical analyses of ground water in the Delaware Basin by rock type is summarized in Tables 10 and 10A.

TABLE 9

DISSOLVED MINERAL CONSTITUENTS AND PROPERTIES OF GROUND WATER

Modified from Ward, P. E. and Wilmoth, B. M., 1968

Mineral constituent or property	*Source or cause*	*Effect on water use*
Silica (SiO_2)	Dissolved from practically all rocks and soils; the silica content of ground water is commonly less than 30 ppm.	Forms hard scale in pipes and boilers. Carries over in steam of high-pressure boilers to form deposits on blades of turbines. Inhibits deterioration of zeolite-type water softeners.
Aluminum (Al)	Commonly present only in negligible quantities in natural waters except in areas where the waters have been in contact with the more soluble rocks of high aluminum content such as bauxite and certain shales. Acid waters often contain large amounts.	May be troublesome in feed waters by forming scale on boiler tubes. High concentrations generally indicate the presence of acid mine drainage or industrial waste.
Iron (Fe)	Dissolved from practically all rocks and soils. May also be derived from iron pipes, pumps, and other equipment. More than 1 or 2 ppm of soluble iron in surface waters generally indicates acid wastes from mine drainage or other sources.	On exposure to air, iron in ground water oxidizes to reddish-brown precipitate. More than 0.3 ppm stains laundry and utensils reddish-brown. Objectionable for food processing, textile processing, beverages, ice manufacture, brewing, and other processes. Large quantities cause unpleasant taste and favor growth of iron bacteria.
Manganese (Mn)	Dissolved from some rocks and soils. Not so common as iron. Large quantities often associated with high iron content and with acid waters.	Same objectionable features as iron. Causes dark brown or black stain.
Calcium (Ca) and Magnesium (Mg)	Dissolved from practically all soils and rocks, but especially from limestone, dolomite and gypsum. Calcium and magnesium are found in large quantities in some brines.	Cause most of the hardness and scale-forming properties of water; soap consuming (see hardness). Waters low in calcium and magnesium desired in electroplating, tanning, dyeing and in textile manufacturing.
Barium (Ba)	Found in some igneous rock materials and as an industrial waste from certain manufacturing processes.	Ordinarily no toxicological significance in natural waters. Sulfate concentrations greater than 2 ppm preclude the presence of measurable amounts of barium.
Sodium (Na) and Potassium (K)	Dissolved from practically all rocks and soils. Found also in ancient brines, industrial brines and sewerage.	Large amounts, in combination with chloride, give a salty taste. Moderate quantities have little effect on the usefulness of water for most purposes. Sodium salts may cause foaming in steam boilers and a high sodium content may limit the use of water for irrigation.
Lithium (Li)	Leached from some rocks. Found in low concentrations in highly mineralized brines.	Not considered significant in concentrations commonly found in natural waters.

TABLE 9— (Continued)

DISSOLVED MINERAL CONSTITUENTS AND PROPERTIES OF GROUND WATER

Mineral constituent or property	*Source or cause*	*Effect on water use*
Ammonia (Nitrogen as NH_4)	Includes nitrogen in the form of NH_3 and NH_4+. Found in many waters but usually only in trace amounts. Found in waters polluted with sewerage and other organic waste.	Generally indicates organic pollution. Toxicity to fish is dependent on the pH of the water, 2.5 ppm ammonia nitrogen can be harmful in the 7.4 to 8.5 pH range. (Ellis, M.M., Westfall, A.B., and Ellis, M.D., 1946). Ammonium salts are destructive to concrete made from portland cement.
Bicarbonate (HCO_3) and Carbonate (CO_3)	Action of carbon dioxide in water on carbonate rocks such as limestone and dolomite.	Bicarbonate and carbonate produce alkalinity. Bicarbonates of calcium and magnesium decompose in steam boilers and hot-water facilities to form scale and release corrosive carbon-dioxide gas. In combination with calcium and magnesium cause carbonate hardness.
Sulfate (SO_4)	Dissolved from rocks and soils containing gypsum, iron sulfides and other sulfur compounds. Commonly present in mine waters and in some industrial wastes.	Sulfate in water containing calcium forms hard scale in steam boilers. In large amounts sulfate in combination with other ions gives bitter taste to water. Some calcium sulfate is considered beneficial in the brewing process.
Chloride (Cl)	Dissolved from rocks and soils. Present in sewerage and found in large amounts in ancient brines and industrial brines.	In large amounts in combination with sodium, gives salty taste to drinking water. In large quantities, increases the corrosiveness of water.
Fluoride (F)	Dissolved in small to minute quantities from most rocks and soils. Added to many waters by fluoridation of municipal supplies.	Fluoride in drinking water reduces the incidence of tooth decay when the water is consumed during the period of enamel calcification. However, it may cause mottling of the teeth, depending on the concentration of fluoride, the age of the child, amount of drinking water consumed, and susceptibility of the individual (Maier, F. J., 1950).
Bromide (Br) and Iodide (I)	Found in brines, evaporite beds and some industrial wastes.	Minute concentrations normally found in natural waters are not considered significant.
Nitrite (NO_2)	Unstable in the presence of oxygen and is present in only small amounts in most waters. Found in sewerage and other organic wastes.	Presence of nitrite is generally an indication of organic pollution. Undesirable in waters for some dyeing and brewing processes.
Nitrate (NO_3)	Decaying organic matter, sewerage, fertilizers and nitrates in soil.	Concentrations much greater than the local average may suggest pollution. Waters of high nitrate content have been reported to be the cause of methemoglobinemia (an often fatal disease in infants, symptom, blue babies) and therefore should not be used in infant feeding. Nitrate has been shown to be helpful in reducing intercrystalline cracking of boiler steel. It encourages undesirable tastes and odors.

TABLE 9— (Continued)

DISSOLVED MINERAL CONSTITUENTS AND PROPERTIES OF GROUND WATER

Mineral constituent or property	*Source or cause*	*Effect on water use*
Phosphate (PO_4)	Dissolved from many rocks and soils. The orthophosphate form is the only form derived from natural sources. Orthophosphate and other forms come from fertilizers, detergent, domestic and industrial wastes. Small amounts of polyphosphate are used in some water treatment plants for softening.	Generally, concentrations encountered in water are not toxic to man, animals or fish. Phosphates stimulate the growth of algae which causes odor problems in water supplies.
Boron (B)	Found in some waste materials where borates are used as detergents. Also dissolved from igneous minerals such as tourmaline.	Concentrations found in drinking water not considered hazardous to humans. Concentrations as low as 1.0 ppm may be toxic to certain plants.
Dissolved Solids	Chiefly mineral constituents, dissolved from rocks and soils. Includes some water of crystallization.	Water containing more than 1,000 ppm of dissolved solids are unsuitable for many purposes.
Hardness as $CaCO_3$	In most waters nearly all the hardness is due to calcium and magnesium. All of the metallic cations other than the alkali metals also cause hardness.	Consumes soap before a lather will form. Deposits soap curd on bathtubs. Hard water forms scale in boilers, water heaters and pipes. Hardness equivalent to the bicarbonate and carbonate is called carbonate hardness. Any hardness in excess of this is called noncarbonate hardness. Waters of hardness up to 55 ppm are considered soft; 56 to 100 ppm, hard; more than 200 ppm, very hard.
Specific conductance (microhms at 25° C)	Magnitude governed by mineral content of water.	Indicates degree of mineralization. Specific conductance is a measure of the capacity of the water to conduct an electric current. Varies with concentration and degree of ionization of the constituents.
Hydrogen ion concentration (pH)	Acids, acid-generating salts, and free carbon dioxide lower the pH. Carbonates, bicarbonates, hydroxides, phosphates, silicates and borates raise the pH.	A pH of 7.0 indicates neutrality of a solution. Values higher than 7.0 denote increasing alkalinity; values lower than 7.0 indicate increasing acidity. pH is a measure of the activity of the hydrogen ions. Corrosiveness of water generally increases with decreasing pH. However, excessively alkaline waters may also attack metals.
Color	Yellow-to-brown color of some waters is usually caused by organic matter extracted from leaves, roots and other organic substances. Color in water also results from industrial wastes and sewerage.	Water for domestic and some industrial uses should be free from perceptible color. Color in water is objectionable in food and beverage processing and many manufacturing processes.

TABLE 9—(Continued)

DISSOLVED MINERAL CONSTITUENTS AND PROPERTIES OF GROUND WATER

Mineral constituent or property	*Source or cause*	*Effect on water use*
Free Carbon dioxide (CO_2)	Decomposition product of sewage and other organic matter. Liberated from bicarbonate by acids. Absorbed from the air.	Contributes to the corrosiveness of water and is likely to damage calcareous building materials such as cement (Terzaghi, R.D., 1949). Fish and other aquatic life are affected by carbon dioxide depending to a degree on the amount of oxygen present and the temperature.
Temperature	Climatic conditions, use of water as a cooling agent, industrial pollution.	Affects usefulness of water for many purposes. For most uses, a water of uniformly low temperature is desired. Shallow wells show some seasonal fluctuations in water temperature. Ground waters from moderate depths usually are nearly constant in temperature, which is near the mean annual air temperature of the area. In very deep wells, the water temperature generally increases on the average about 1° F with each 100-foot increment of depth. Seasonal fluctuations in temperatures of surface waters are comparatively large depending on the volume of water.

TABLE 10A
NEW JERSEY STATE DEPARTMENT OF HEALTH
TYPICAL ANALYSES OF PUBLIC WATER SUPPLIES IN NEW JERSEY

Municipality Water Supply	*Color*	*Odor*	*Turbidity*	*Total Solids*	*Total Hardness*	*Total Hardness grains per gallon*	*Chloride*	*pH*	*Alkalinity*	*Nitrate (NO_3)*	*Iron (Fe)*	*Manganese (Mn)*	*Fluoride (F)*	*A.B.S./L.A.S.*	*Sodium (Na)*	*Sulphate (SO_4)*	*Formation*	*Source*
Andover Township																		
Andover Borough Water Co.	0	0	0	290	216	13	28	7.5	177	1.98	0.08	0	0	0	8.5	0	Qsd & COk	Wells
Lake Lenape Water Co.	0	IIE	0	200	88	5	8	7.1	151	1.20	0.00	0	0	0	32.2	0	Qsd	Wells
Andover Water Corp.	0	0	0	270	238	14	12	7.7	190	4.80	0.04	0	0	0	4.2	0	Qsd	Wells
Blairstown																		
Blair Academy Water Co.	5	0	0	322	232	14	14	7.0	209	0.04	0.04	0.02	0.4	0	7.7	32	Omb	Wells
Byram Township																		
Brookwood-Musconetcong Water Co.	0	0	0	113	66	4	28	6.4	41	0	0.10	0	0	0	14	21	PC	Wells
Forest Lake Club	0	IE	0	195	170	10	11	7.9	139	0	0.00	0.04	0	0	6	28	PC	Wells
Frenches Grove Water Co.	0	0	0	400	250	15	66	6.4	125	0.44	0.18	0	0	0	13.6	28	PC	Wells
Sparta Mountain Water Co., Seneca Lake	0	0	0	101	52	3	21	7.2	58	2.00	0	0	0.2	0	5	3	COk	Wells
Stanhope Borough Water Co.	0	0	0	180	144	9	5	7.6	125	0.27	0.06	0	0.1	0	4.6	0	Qsd & PC	Wells
Frankford Township																		
Branchville Borough Water Co.	5	0	15	75	28	2	10	6.3	10	0.40	0.64	0	0.4	0	1.8	16	COk	Combination
Hardyston Township																		
Franklin Borough Water Co.	0	0	0	182	108	6	20	6.7	70	0.44	0.46	0	0.2	0	7.2	0	Qsd	Combination
																	Qsd	Wells
Hamburg Water Co.	0	0	0	403	274	16	16	6.7	215	1.64	0.04	0	0	0	3.6	24	Qsd	Wells
Ogdensburg Borough Water Co.	5	0	0	300	256	15	7	7.1	209	0.62	0	0	0.1	0	3.6	0	Qsd	Wells
Lake Stockholm Inc.	10	0	5	94	32	2	2	7.1	26	0	0.74	0.06	0.2	0	4.1	11		Surface
Lake Tamarack Water Co.	0	0	0	96	56	3	9	6.2	36	1.32	0.1	0	0.4	0	3.1	12	PC	Wells
Hopatcong Borough																		
Lake Hopatcong Water Corp.	0	0	0	160	86	5	18	6.1	45	1.90	0.16	0	0.1	0	5.9	14	PC	Wells
Lake Hopatcong Morris & Sussex Service	0	IE	0	290	134	8	36	7.3	83	0.80	0.08	0	0.1	0	8.5	0	PC	Wells
Lake Hopatcong West Shore Water Co.	5	0	0	125	78	5	39	5.7	23	3.50	0.10	0	0	0	12.7	0	Surface & PC	Combination
Lafayette Township																		
Newton Borough Water Co.	5	0	7	90	54	3	8	6.7	20	0.66	0.18	0	0	0	2.8	15		Surface
Sparta Township																		
Highland Water Co.	0	0	0	130	102	6	15	7.4	81.0	0.3	0.06	0	0.1	0	3.2	7	PC	Wells
Lake Mohawk-Sparta Water Co.	0	0	0	215	156	9	14	6.9	124	0.62	0	0	0	0	5.4	10	PC	Combination
Stillwater Township																		
Paulinskill Lake Corp.	0	0	0	430	368	22	22	7.1	276	0	0	0	0	0	9.2	30	COk	Wells
Vernon Township																		
Highland Lakes Improvement Co.	10	0	5	30	34	2	5	6.4	50	0	0.20	0	0.1	0	1.8	0		Surface
Lake Wallkill Club	15	0	5	86	82	5	6	7.1	80	0	0	0	0.1	0	2.8	0		Surface
Wantage Township																		
Sussex Borough	5	0	6	73	16	1	6	5.6	9	0	0.28	0	0.2	0	7.5	11		Surface

TABLE 10B

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
TYPICAL ANALYSES OF PUBLIC WATER SUPPLIES IN NEW JERSEY
(Chemical results expressed in p.p.m. or mg/1) (1972)

Municipality Water Supply	*Color*	*Odor*	*Turbidity*	*Total Solids*	*Total Hardness*	*Chloride*	*pH*	*Alkalinity*	*Nitrate (NO3)*	*Iron*	*Manganese*	*Fluoride*	*A.B.S./L.A.S.*	*Sodium*	*Sulphate (SO4)*
Andover Township															
Andover Borough Water Co.	0	0	0	390	240	65	7.8	181	13	0	0	0	0	19	28
Andover Water Corporation	0	0	0	408	180	44	7.7	200	22	0.04	0	0.1	0	22	38
Lake Lenape Water Co.	0	0	0	318	184	25	8.1	161	4	0	0	0	0	5	23
Blairstown															
Blair Academy Water Co.	10	0	0	336	166	17	7.8	221	9	0	0.07	0	0	0.8	32
Byram															
Brookwood Musconetcong River Estates	0	0	0	194	60	53	6.6	40	9	Neg.	0	Neg.	Neg.	13.5	21
East Brookwood Estates Property Owners Ass.	0	0	0	220	148	25	7.3	110	13	Neg.	Neg.	Neg.	Neg.	7	17
Sparta Mt. Water Co. (Seneca Lake Supply)	0	0	0	372	270	59	7.4	173	5	0	0	0.3	0	5	27
Forest Lake Club	0	0	0	226	96	26	8.2	160	9	0	0	0	0	6	25
Frenches Grove Water Co.	0	0	0	416	232	70	7.3	139	13	0.04	0	0	0	16.2	27
Frankford															
Branchville Borough Water Co.	0	IIcc	0	398	84	78	6.8	104	13	0.16	0	0	0	27	31
Hardyston Township															
Lake Tamarack Water Co.	0	0	0	258	138	31	7.0	83	9	0.06	0	0	0	5	25
Sparta Mt. Water Co.	5	0	0	218	128	32	7.1	202	13	0.06	0	0	0	7	10
Franklin Boro Water Co.	5	0	0	294	80	45	7.4	125	9	0.20	0	0	0	17	27
Hamburg Borough Water Co.	0	0	0	394	200	20	7.7	254	13	0	0	0	0	7	28
Ogdensburg Borough Water Co.	0	0	0	364	72	41	7.5	172	13	0	0	0	0	16	22
Lake Stockholm Inc.	20	0	31	360	142	93	6.6	62	19.9	1.86	0	0	0	37.5	22
Hopatcong Boro															
Lake Hopatcong Water Co.	10	0	6	372	190	70	6.7	92	9	0.42	0	0.2	0	15	35
West Shore Water Co. (Main Supply)	0	0	0	313	80	71	6.8	66	22	0.18	0	0	0	17.2	30
Logan Hills Supply	0	IE	0	134	58	36	7.5	39	0	0.20	0	0	0	18	21
West Shore Supply	5	VD	0	286	134	56	7.0	75	22	0.04	0	0	0	18	27
Lafayette Township															
Newton Boro Water Co.	0	0	0	72	49	17	7.1	40	0	0	0	0.1	0	9	16
Sparta Township															
Lake Mohawk-Sparta Water Co.	0	0	0	285	200	41	7.8	188	7	0.1	0	0	0	13.5	21
Sparta Township Water District No. 1	0	0	0	312	38	44	7.8	188	9	0	0	0	0	17	30
Highlands Water Co.	0	IB	0	96	65	4	7.0	64	13	0.2	0.14	0.2	0	2	9.5
Stillwater Township															
Paulinskill Lake Corp.	0	0	0	340	300	20	7.5	259	4	0.04	0	0	0	8.8	31
Vernon Township															
Highland Lakes Improvement Co.	5	0	0	110	60	8	7.7	51	0	0.3	0.2	0	0	2.0	17
Lake Wallkill Club	0	0	0	108	66	12	7.2	53	0	0.2	0	0	0	2.7	20
Wantage Township															
Sussex Borough Water Co.	0	0	0	40	32	6	6.4	13	4	0.48	0.01	0	0	2	0.55

TABLE 11

SUMMARY OF CHEMICAL ANALYSES OF GROUND WATER IN THE DELAWARE BASIN

(Parts Per Million Unless Otherwise Stated)

Rock Type	Crystalline Rock		Carbonate Rock		Martinsburg Formation		Stratified Drift	
No. of Samples	12		60		9		25	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Silica (SiO_2)	35	8.7	33	4.7	..	..	20	5.1
Iron (Fe)	1.5	0.02	Trace	Trace	..	..	7.2	0.04
Calcium (Ca)	20	2.9	107	5.6	..	..	57	4.1
Magnesium (Mg)	9	1.3	52	2.4	..	..	43	3.4
Sodium (Na)	16	4.3	38	1.3	Na + K		76	3.1
Potassium (K)	3.3	0.4	7.7	0.6	5.3	0:9	12	0.9
Bicarbonate (HCO_3)	106	8	388	41	62	16	123	7
Sulphate (SO_4)	42	0.3	120	2.3	61	8.3	189	4.9
Chloride (Cl)	14	1	58	1	10	5	122	3
Fluoride (F)	0.1	0	..	..	..	..	0.4	0
Nitrate (NO_3)	23	1.5	73	0	33	7.8	107	0.5
Dissolved Solids	170	51	609	75	..	..	716	63
Hardness ($CaCO_3$)	108	13	508	24	124	43	319	18
Non-Carbonate Hardness (As $CaCO_3$)	58	0	..	..	89	29	276	12
Specific Conductance (Microhms at 25° C)	284	64	633	138	320	121	1090	82
pH	7.9	5.3	8.3	6	7.7	6.3	9.3	5.2
Temperature (°F)	57	53	..	..	55	51	60	47

Olmstead and others, 1959, Delaware River Basin Report, Vol. VII.

AVAILABILITY OF GROUND WATER FROM WELLS

Parker and others, 1964, Water Resources of the Delaware Basin, page 92 say:

"The average rate of natural recharge to the aquifers of the Appalachian Highlands differs more from place to place and is more difficult to estimate than the recharge to the aquifers of the Coastal Plain. However, the average recharge in the Highlands may be estimated roughly by comparison with a nearby area of similar climatic, hydrologic and geologic conditions, the Pomperaug River Basin in Connecticut, where a detailed water budget was calculated by Meinzer and Stearns (1929)."

They estimated that 750,000 gallons per day per square mile was the total recharge or base flow portion of runoff. In Sussex County and the Warren County portion of the Tocks Island Impact area, there are different bedrock types with dissimilar base flow characteristics. There are many deep, buried valleys filled with Stratified Drift (Bedrock Map, Plate No. 2).

The following table gives the total ground water budget for the major watersheds, by geologic formation, during normal precipitation and also during periods of drought:

TABLE No. 12

WATERSHED GROUND WATER BUDGET ACCORDING TO ROCK TYPE UNDER BOTH NORMAL AND DROUGHT CONDITIONS

Watershed	*Total Ground Water Budget During Normal Precipitation Gallons per day per square mile*	*Total Ground Water Budget During Periods of Drought Gallons per day per square mile*	*Geologic Formations in the Watershed*				
			PC	*COk*	*Omb*	*Ssg/Don*	*Qsd*
Flatbrook	350,000	240,000				X	X
Paulins Kill	650,000	220,000		X	X		X
Paulins Kill	350,000	250,000			X		X
Wallkill	*200,000	*100,000	X				
Wallkill	680,000	250,000		X			X
Wallkill	350,000	250,000			X		
Musconetcong	*200,000	*100,000	X				X
Pequest	*200,000	*100,000	X				
Pequest	650,000	220,000		X			X
Pequest	350,000	250,000			X		X

NOTE: The Gallons per day per sq. mile were calculated from Surface Water Supply of N. J., prepared by the U.S. Geol. Survey in cooperation with the State of N. J., 1968.
* Vecchioli, J., 1973.

The total ground water budget is not to be construed as the amount of ground water that can be removed from springs and wells. It represents the average low flow or base flow of the rivers. If all of this were withdrawn, lakes, rivers and streams would dry up.

Because of the low productivity and small storage capacity of most of the geologic formations, and also because of many practical limitations, mostly economic, only a small percent of the ground water discharge at surface outlets can be diverted for man's use. However, pumpage many times greater than the 1968 rate of 4.9 mgd (page 15) can be maintained with properly managed ground water development (page 16), especially in the Stratified Drift deposits and in cavernous limestones in the major valleys, where induced recharge from streams, rivers and lakes is significant.

LOT SIZE AS RELATED TO WELLS

Widmer (1963) discussed lot sizes as related to wells in considerable detail. Using the figure of 500,000 gpd per square mile as an average safe sustained yield for the Brunswick Shale during periods of normal precipitation, and an average of 500 gpd per family, a minimum lot size of two-thirds of an acre was calculated (1,000 households × 500 gpd = 500,000 gpd and 640 acres (1 sq. mile) = approximately 1,000 households (⅔ acre). He also noted that most of the ground water is returned to the ground via the septic system. A certain amount of dilution must occur to prevent pollution of the ground water. During periods of drought the water table is lowered and there would be less dilution, but there would be somewhat more oxidation since the septic tank effluent would have to travel further to the lowered water table. Also there is more danger of pollution when the cone of depression intercepts the septic leaching field and if the casing has not been properly sealed as described in paragraph 4.6, page 21, Chapter 199, P.L. 1934 And Standards For The Construction Of Water Supply Systems For Realty Improvements (Revised—1966).

Recent work by the Bureau of Geology indicates that 500,000 gpd per square mile safe sustained yield for the Brunswick Shale in Mercer County is the maximum figure and that in certain areas underlain by the shale less than 300,000 gpd can be withdrawn without exceeding recharge during periods of drought. On account of the above recommended minimum lot sizes were increased. Kasabach (1966) recommended a minimum lot size of 1 to 1½ acres for the Brunswick Shale.

On the basis of a comparison of the yields of 528 domestic Brunswick Shale wells in Hunterdon County and 121 domestic Stratified Drift wells (Table 5) the average and median yields are almost identical as are the specific capacities (Table 7). Areas underlain by Stratified Drift would need the same recharge area as the Brunswick Shale to obtain the same amount of water.

Because of the necessity of adequate zoning in rural areas of Sussex County and Northern Warren County where homes and industries must depend on individual wells and septic systems, estimates of water availability and pollution probability of the various formations must be made now with the available data. Experience in other, now densely populated areas of New Jersey, indicates that by the time the geologists and hydrologists have the quantative data they desire it is frequently too late to do much with it. The following lot size recommendations may not be the final answer, but they are certainly better than completely ignoring the water bearing properties of the various formations. There is only a certain amount of water that can be recovered from the ground. The standards as set forth by: Chapter 199, P.L. 1954 and Standards For The Construction Of Sewerage Facilities For Realty Improvements (Revised 1963)—Chapter 199, P.L. 1954 and Standards For The Construction Of Water Supply Systems For Realty Improvements (Revised 1966) should be strictly enforced.

On the basis of average, median yields, specific capacities and practical experience, the following minimum lot sizes for the major formations of Sussex and northern Warren Counties are recommended by the N.J. Bureau of Geology for areas where there is no detailed hydrologic information and where homes and industry must rely on wells and septic systems. These minimum lot sizes would not apply where a public water supply and/or a central sewerage system is installed.

These lot size recommendations are somewhat higher than the yield and specific capacity data might indicate. For example, the data for the Brunswick Formation indicated that ⅔ acre lots should have been adequate. However, this figure considers only the ground water availability in an undeveloped area. It does not take into account either the polluting effects of septic systems or the amount of recharge area lost because of buildings and pavement. These recommended minimum lot sizes were computed by estimating the average water availability, the probable percolation rate for each formation, the overlying soils, and the cumulative effect of development in any area in Sussex County and the northern portion of Warren County, and not by inserting known quantities into an equation.

RECOMMENDED MINIMUM LOT SIZE (acres)

Stratified Drift	1–1½
Poxono Is. Shale Through the Oriskany Formation	3–4½
High Falls Formation	1½–2
** Shawangunk Formation	3–4
Martinsburg Formation	3–4½
* Kittatinny Formation	1½–3
* Franklin Limestone	1½–3
** Precambrian Crystallines	3–4

* In areas where the limestone is fractured or cavernous larger lot sizes may be needed.
** Even these may not be large enough in some dense crystalline rock.

These minimum lot size recommendations are not the final answer to the water resource problem, but they should be followed until more detailed hydrologic information is available. As more work is done on the various formations better estimates will be possible. Ideally, each area to be rezoned should be studied on the basis of data obtained from pumping tests and observation wells. The Bureau of Geology and Topography believes that if the above lot size recommendations are followed as a guide, the possibilities of ground water depletion and septic tank pollution will be minimized.

SUMMARY AND CONCLUSIONS

The specific capacity of a well (gallons per minute per foot of drawdown) when used in conjunction with yield and drawdown not only provide data for the selection of pumping equipment, but also provide data from which the ability of the aquifer to transmit water to a well can be calculated. In general, high specific capacities indicated an aquifer through which ground water moves freely and low specific capacities indicate a less permeable aquifer. Using this basic assumption, Table 7 shows the average specific capacity of wells drilled in nine of the fourteen mapped units. The other three had too few wells to summarize. It also shows graphically the relative ability of the formation to provide ground water to wells.

Several formations do not have the potential of supplying large populations with ground water. Table 7 shows the average specific capacities of domestic wells by formation and depth. Figure 4 shows the average specific capacities of domestic and industrial wells in graphic form. A glance at Table 7 shows that areas underlain by stratified glacial drift have the greatest potential for ground water, followed by areas underlain by the Kittatinny Formation. Areas underlain by the Franklin and the High Falls Formation and the Precambrian crystallines by and large have very poor yielding wells.

The largest yielding industrial and public supply wells are pumping from Stratified Glacial Drift. They have approximately four times the capacity of wells located in the Kittatinny Formation. The wells drilled in the Precambrian crystallines have about one-half the capacity of the wells drilled in the Kittatinny Formation. The wells drilled in the Martinsburg Formation have only 65% the capacity of those drilled in the Precambrian crystallines and the wells drilled in the Stratified Drift have 18 times the capacity of the Martinsburg wells.

As a rule, the most efficient wells drilled in the study area are less than 300 feet deep. The chances of encountering large volumes of water from depths in excess of 300 feet are greatly diminished, although there are exceptional cases where wells draw from occasional deep water bearing joints, faults, fractured zones or solution cavities. If sufficient quantities of water for domestic purposes are not found within 300 feet, a new well should be considered. Most domestic wells are between 50 and 199 feet deep. Most of the industrial and public supply wells are less than 250 feet deep.

Large water users in the study area should avoid consolidated rock with the exception of cavernous members of the Kittatinny Formation. The greatest source of ground water is in the Stratified Drift (Table 7 and Map Plate 2). If wells seeking high yields have to be located in consolidated rock, they should be located in structually favorable areas. If substantial quantities of water have not been obtained in industrial and public supply wells by 500 feet, further deepening will probably be to no avail and a new well location should be chosen and tested.

Table 7 shows the average specific capacity (gpm per foot of drawdown) by depth by formation for 1,790 domestic wells and 82 industrial and public supply wells.

A summary of yield and depth by formation of domestic wells is given in Table 5 and a summary of industrial and public supply wells is given in Table 6. These summaries should be used with caution as a guide for budget purposes in areas where there are no nearby wells from which detailed information can be obtained. Each area has local differences within the same formation so that several neighboring wells will usually be a better guide than an average or a median figure for the whole study area.

The yields and depths of wells in each township are summarized by formation. Each well is tabulated and shown on Well Location Geologic Map, Plate 1. Where there are a considerable number of wells pumping from one formation, the township summary is probably more useful than the overall summary. If only a few wells in a township are pumping from a formation, the overall summary would have to be used for predicting general yields and depths. Most of the yields of domestic wells were estimated by the drillers and are approximations rather than actual yields.

The ground water quality throughout Sussex County and the northern portion of Warren County is generally good for most users. Excessive hardness, iron, and low pH are present locally. These conditions are easily corrected with modern water conditioning equipment. Well contamination from septic systems and cesspools is a hazard in the more densely populated areas which have both a well and a septic system on a lot which is usually too small to support both.

No estimates of safe sustained yield for the various formations can be made at this time because of lack of geologic and hydrologic data. Base flow of rivers during periods of drought has been used in lieu of the above data in approximating a safe sustained yield.

Except for a small amount of recharge induced from surface water bodies, all ground water within the study area is derived from local precipitation. During periods of drought, very little recharge occurs, and nearly all ground water is derived from storage. In years of normal precipitation, water which has been removed from storage during dry years is replaced. During periods of extended drought water levels will drop, pumps may have to be lowered and the shallower wells may have to be deepened. To the author's knowledge, there are no areas where a permanent lowering of the water table has occurred.

There is at present no water shortage in Sussex County and the Tocks Island portion of Warren County. However, the whole area will be subjected to a population explosion within the next decade because of the Tocks Island Park and new Interstate Highways. Sussex and Warren Counties can be prepared to meet the increased demand on ground and surface waters only by continued research and continuous data gathering.

RECOMMENDATIONS

It is recommended that:

1) A network of observation wells be established so that the long term water level fluctuations may be recorded. These are necessary for accurate determination of recharge, storage and other hydrological properties of the aquifers. These test wells should be located in the buried river channels and in areas underlain by cavernous or sheared members of the Kittatinny Formation. See Map, Plates 1 and 2. Detailed mapping is being done in Sussex County by geologists of this Bureau, and should be available soon.

2) Detailed hydrologic studies can be made on major aquifers only when the geologic formations have been mapped in detail. The first formation to be mapped should be the Stratified Drift, which occurs in buried river valleys. The second formation should be the Kittatinny Formation; this is being done.

3) Areas underlain by the Precambrian crystallines, the Martinsburg Formation, and the Silurian-Devonian Formations forming Kittatinny Mountain and its western slope to the Delaware River should be zoned against any moderate or large use of ground water. If some structural feature such as a major fault with its accompanying shear zone, which is capable of supplying an abundant amount of ground water is found in one of these formations, exceptions can be made providing that test wells indicate an ample supply. Developments on these formations should be supplied with a public water supply system and with central sewerage.

4) Minimum lot sizes should be established for homes in accordance with the availability of ground water and pollution potential. Summer homes have been clustered around lakes and built on lots that are too small with the result that the lakes become polluted.

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ANDOVER TOWNSHIP (Including ANDOVER and NEWTON)

DOMESTIC WELLS [1]

Formation	*No. of Wells*	*Maximum*	*Minimum*	*Average*	*Median*
		YIELD IN GALLONS PER MINUTE			
Stratified Drift (Qsd)	7	60	10	26	23
Martinsburg Formation (Omb)	16	60	½	12	5
Kittatinny Formation (C0k)	41	120	½	19	10
Precambrian crystallines (pC)	18	45	½	12	8

Formation	*No. of Wells*	*Maximum*	*Minimum*	*Average*	*Median*
		DEPTH IN FEET BELOW SURFACE			
Stratified Drift (Qsd)	7	170	54	121	118
Martinsburg Formation (Omb)	16	298	27	138	122
Kittatinny Formation (C0k)	41	485	36	137	115
Precambrian crystallines (pC)	18	300	37	146	142

INDUSTRIAL WELLS [1, 2]

Formation	*No. of Wells*	*Maximum*	*Minimum*	*Average*	*Median*
		YIELD IN GALLONS PER MINUTE			
Kittatinny Formation (C0k)	9	815	35	191	70

Formation	*No. of Wells*	*Maximum*	*Minimum*	*Average*	*Median*
		DEPTH IN FEET BELOW SURFACE			
Kittatinny Formation (C0k)	9	430	60	231	214

1 Wells and formations with insufficient data are not used in this summary.

2 There are 8 small industrial wells; 2 from the Stratified Drift, 4 from the Martinsburg Formation and 2 from the Precambrian crystallines.

Well No.	*Owner*	*Year Drilled*	*Csg. dia. (in)*	*Yield (gpm)*	*Depth (ft.)*	*FORMATION*	*Screen Setting or depth csd. (ft.)*	*Static Water Level (ft.)*	*Pumping Level/hrs. Pumped*	*Depth to Bedrock*	*USE*
1	J. Anderson	1949	6	15	166	Omb	20	10	45/6	8	
2	St. Paul's Abbey	1926	6	25	68	C0k		20	29/		
3	J. Pryblyski	1951	6	25	110	Qsd	110	8	30/3		
4	L. Northrup	1948	6	10	127	"	126	2	8/6		
5	Lake Lenape Corp.	1946	8	180	74	"		4½			I
6	Boro of Andover	1936	18/12	218	50	"	150	2	6/8		I
7	Darlington Fabrics Corp. Inc.	1947	8/6	220	227	Omb		flows	120/36	17	I
8	M. K. Pickett & Son (Water Street)	1932	8	40	434	"		8	150/	2	I
9	St. Cloud Amusement Co. (Newton Theater)	1946	8/6	47	430	C0k	82	85	220/		I
10	Sussex Dye & Print Works	1946	10/8	815	225	"		37	61/	80	I
11	Anken Company	1943	8	90	60	"	56	9½	50/24	45	I
12	Anken Company	1944	8	270	147	"	76	8	80/	74	I
13	Campbell & Co.	1940	8	140	110	"		30	35/	7	I
14	H. C. DeGroat	1951	6	2½	87	"	15	23		15	
15	C. Kemmer	1951	6	2	44	Omb	15	15	22/	7	
16	M. Santore	1947	6	30	77	C0k					
17	G. McCollan	1949	6	25	82	"	20				
18	K. Slack	1951	6	2	27	Omb	16	15	22/	8	
19	St. Pauls Abbey Camp St. Benedict	1949	6	60	54	Qsd	49-54	6	7/		
20	St. Pauls Abbey Camp St. Benedict	1949	6	12	116	Omb	27	12	68/		
21	H. Vanderbilt	1948	6	1½	184	C0k	20	50	175/3		
22	Camp Clearwater	1949	6	20	52	"	52	18	19/	52	
23	" "	1948	6	2	485	"	18	38			
24	J. Early	1949	6	4	125	pC	51	37	100/3		
25	E. Morrow	1951	6	1	260	"	23	20	250/1		
26	" "	1951	6	1	265	"	30	12	130/3		
27	O'Dowds Creamery	1932	10	50	202	C0k		11	23/	53	I
28	Perona Farms	1932	6	7	180	pC		7			

Well No.	Owner	Year Drilled	Csg. dia. (in)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
29	Perona Farms	1935	6	45	45	pC		7	19/	13	
30	C. Catalanos	1964	6	120	90	C0k	78	10	30/2		
31	St. Pauls Abbey	1965	6	22	120	"	21	13	13/2		
32	St. Pauls Abbey	1961	12/8	50	400	"	70	14	250/8		I
33	A. Westra	1955	6	10	41	"	27	10	18/4	27	
34	A. Westra	1964	6	25	165	Qsd	165	9	140/2		
35	G. Jaeger	1955	6	20	132	"	132	8	20/4		
36	A. Westra	1958	6	30	170	"	170	8	30/4		
37	" " #2	1965	6	50	160	Qsd & C0k	158	8	20/2	158	
38	" " #3	1965	6	100	180	" "	173	7	20/2	173	
39	" " #4	1965	6	100	173	" "	172	7	20/2	172	
40	A. Westra	1964	6		165	Qsd	165				
41	G. Tsitsiragos	1966	6	60	182	C0k	20	6	60/2		
42	W. Sherred	1957	6	15	52	"	28	12	25/1		
43	L. Ratti	1965	6		546	"	42				
44	Robert Hall Clothes	1965	6	20	258	Omb	21	Flowing	160/1	5	
45	Millie & Pauls Corp.	1957	6	5	125	"	18	45	125/6		I
46	Don Bosco College	1955	8	50	200	"	20	3	180/1		I
47	" " "	1957	8	75	370	"	21	Flowing	230/8	3	I
48	Grand Union Store	1956	10	25	191	Ojb?	65		15	60	I
49	" " "	1956	10/6	35	351	C0k Fault?	67		110	58	I
50	Anken Company	1960	10/8	224	152	C0k	106/152	17	127/27	81	I
51	G. Dierial	1964	6	75	141	C0k	19	58	80/2		
52	R. Derrick	1966	6	6	98	"	31				
53	C. E. Meyer Post #86	1966	6	30	97	Omb	20	15	70/2		
54	E. Zenes	1956	6	10	90	Ojb?	36	29	75/2	36	
55	L. Hoeger	1961	6	10	78	Omb	22	12		20	
56	Faith Baptist Church	1960	6	4	126	"	28	17	120/		
57	R. Radcliffe	1964	6	60	123	"	21	15	60/2		
58	Jehovah's Witnesses	1964	6	4	238	"	16	23	200/2		
59	L. Stamato	1966	6	2	298	"	20	100	210/2		
60	R. Siegfried	1966	6	5	122	Omb	20	31	100/2		
61	O. DeGroat #2	1964	6	½	207	"	11	25			
62	P. Bothof	1959	6	20	80	"	54	18	48/	50	
63	H. Billingsby	1966	6	8	160	pC	16	12	155/2		
64	C. Shotmiger	1960	6	30	37	"	28	6	28/4	28	
65	C. H. Biram, Inc.	1966	6	6	98	Omb	15	11	75/2		
66	G. Burd	1965	6	20	122	C0k	86	32	70/2		
67	R. Sayer	1966	6	1	228	"	21	19	210/2		
68	E. McPeer	1957	6	15	36	"	11	15	28/4	10	
69	R. Pruser	1964	6	25	72	"	15	10	40/2		
70	Andover Nursing Home	1966	8	100	172	Qsd & C0k	130	54	80/2		I
71	W. Wiederkehr	1966	6	1	122	C0k	23	14	100/1		
72	D. Lance	1960	6	10	82	"	43	20	35/4		
73	St. Pauls Abbey	1966	6	24	340	"	23	39	54/1		
74	J. Piisli	1962	5	½	222	"	25	30	170/1		
75	C. Harris	1961	5	4½	184	"	17	59	90/1		
76	L. Dallos	1962	6	24+	185	"	35	33	33/1		
77	Sussex County Board of Freeholders	1966	6	20+	236	"	50	50	90/4	8	
78	W. Hambor	1962	6	8	47	pC	18	6	25/3		
79	H. Johnston	1962	6	1	190	C0k	22	40	150/1		
80	G. Hnot	1965	6	60	154	C0k	15	25	80/2		
81	C. Kent	1961	6	15	235	"	35	45		6	
82	Wedge Constr. Co.	1964	6	6½	72	pC	28	29	70/½	8	
83	A. Bootsma	1963	6	11	60	"	22	19	50		
84	R. White	1954	6	5	77	C0k	8	20	45/4	15	
85	W. Doty	1964	6	6	115	"	41	20	100/2		
86	R. Basse	1964	6	8	50	"	23	20	40/2		
87	V. McMickle	1961	6	5	100	"	60	16	80/4	60	
88	F. Devaney	1964	6	5	72	"	35	20	60/1		

ANDOVER TOWNSHIP (Including ANDOVER and NEWTON)

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
89	W. Doty	1962	6	¾	198	C0k	21	15	185/1		
90	Lake Iliff Water Co.	1964	6	20	120	pC	28	19	100/2		I
91	J. Sammarco	1964	6	8	300	"	19	60	150/2		
92	J. Klem	1962	6	30	73	"	21	8	40/2		
93	Doty Constr. Co.	1964	6	½	262	"	19	25	258/2		
94	" " "	1964	6	6	115	C0k	41	20	100/2		
95	M. Graf	1966	6	¾	297	pC	30	44	250/1		
96	D. Wilgus	1964	6	15	60	"	20	14	55/4	10	
97	W. Percy	1964	6	15	123	"	44	47	110/1	25	
98	T. Minifie	1966	6	30	60	C0k	22	10	14/4	10	
99	I. Bloom	1959	6	6	140	"	18				
100	J. Echeandia	1967	6	2	97	pC	21	10	80/2		
101	C. Strait	1963	6	30	90	C0k	50	22	60/4	8	
102	Boro of Andover	1964	6	10	197	"	100	8	180/1	15	
103	A. Miller	1961	6	10	90	Qsd	90	20	40/4		
104	R. Compton	1963	6	4	79	C0k	19	26	70/4		
105	Andover Industries	1965	6	75	64	pC	64	15	50/2		I
106	R. Maichins	1961	6	15	177	"	35	19			
107	P. Sabella	1964	6	12	147	C0k	34	16	90/2		

Drillers' Logs of Wells, Andover Township
(Depths below land surface are given in feet)

Well #	Depth	Log	Formation
3	0-10	Gravel	
	-50	Sand	Qsd
	-110	Sand and Clay	
	-110	Water bearing gravel	
4	0-18	Gravel	
	-63	Blue clay	
	-78	Brown sand	Qsd
	-118	Blue clay	
	-127	Gravel	
5	0-4	Soil	
	-15	Sand	Qsd
	-23	Light gray, indurated limey clay sand	
	-71	Clean fresh, glacial gravel	
6	0-45	Sand	Qsd
	-50	Coarse gravel—clay	
			C0k
9	0-14	Earth and clay	
	-82	Rotten limestone	
	-430	Limestone	
10	0-15	Yellow clay	
	-35	Sand, fine, yellow	
	-60	Gray clay and gravel	C0k
	-75	Fine grained sand	
	-80	Clay and gravel	
	-255	Hard light-colored limestone	
11	0-15	Brown clay, sand and gravel	C0k
	-60	Gray limestone	
	-60	Limestone sand and clay (from crevice)	
12	0-6	Earth	
	-35	Gravel, yellow sand	
	-42	Gravel, gray sand	C0k
	-55	Sand and gravel	
	-74	Sand, clay and gravel	
	-124	Limestone	
	-148	Seamy limestone	
27	0-6	Earth	
	-53	Quick sand	C0k
	-70	Rotten slate	
	-144	Gray limestone	
	-166	Black slate	
	-202	Limestone	
32	0-33	Sand and gravel	C0k
	-48	Fine gray sand	
	-400	Limestone	
33	0-27	Sand	C0k
	-41	Limestone	
34	0-25	Overburden	Qsd
	-150	Gray clay	
	-165	Gravel	
35	0-6	Gravel	
	-126	Clay	Qsd
	-132	Gravel	
40	0-25	Overburden	
	-150	Gray clay	Qsd
	-165	Gravel	
50	0-5	Dirt	
	-46	Fine sand	
	-55	Sand and gravel	
	-75	Clay	C0k
	-81	Broken limestone	
	-130	Limestone rock with rotten layers of rock	
		Fill in very bad	
	-152	Hard limestone rock	
52	0-12	Sand and gravel	
	-81	Black limestone	C0k
	-82	Soft brown limestone, clay, water	
	-92	Black limestone	
	-98	Black, white limestone	
54	1-25	Clay	
	-36	Boulders and sand	Ojb?
	-50	Limestone	
	-90	Black shale rock	

BYRAM TOWNSHIP (Including BOROUGH OF STANHOPE)

DOMESTIC WELLS [1]

Formation	*No. of Wells*	*YIELD IN GALLONS PER MINUTE* *Maximum*	*Minimum*	*Average*	*Median*
Stratified Drift (Qsd)	5	30	15	22	18
Franklin Limestone (fl)	6	21	2	11	6
Precambrian crystallines (pC)	85	65	1	12	10

Formation	*No. of Wells*	*DEPTH IN FEET BELOW SURFACE* *Maximum*	*Minimum*	*Average*	*Median*
Stratified Drift (Qsd)	5	107	43	69	57
Franklin Limestone (fl)	6	295	54	132	96
Precambrian crystallines (pC)	85	421	44	125	87

INDUSTRIAL WELLS [1, 2]

Formation	*No. of Wells*	*YIELD IN GALLONS PER MINUTE* *Maximum*	*Minimum*	*Average*	*Median*
Precambrian crystallines (pC)	11	150	10	52	35

Formation	*No. of Wells*	*DEPTH IN FEET BELOW SURFACE* *Maximum*	*Minimum*	*Average*	*Median*
Precambrian crystallines (pC)	11	305	37	124	97

[1] Wells and formations with insufficient data are not used in this summary.

[2] There are 4 additional industrial wells; 3 from the Stratified Drift and one from the Kittatinny Formation. See regional summary of industrial wells.

Well No.	*Owner*	*Year Drilled*	*Csg. dia. (in)*	*Yield (gpm)*	*Depth (ft.)*	*FORMATION*	*Screen Setting or depth csd. (ft.)*	*Static Water Level (ft.)*	*Pumping Level/hrs. Pumped*	*Depth to Bedrock*	*USE*
1	Lake Mohawk Sparta Water Co.	1967	8/6	60	412	COk	78	68	237/24	54	I
2	C. F. Doriot	1964	6	3½	198	pC	22	12	180/2		
3	V. Houtari	1960	5	7	148	"	58	18	125/1		
4	I. Flemming	1952	6	15	44	Qsd	44	26	36/3		
5	J. Longerke	1952	6	15	82	"	82	32			
6	Kinney Electric Co.	1964	6	5	105	pC	21	15	95/2		
7	Von Lengerke Buick Co.	1964	8	30	147	"	19	8	85/1½		I
8	Von Lengerke Buick Co.	1964	8	12	37	"	15	7	30/1½		I
9	K. Burke	1966	6	20	73	fl	50	34	50/2		
10	E. Biron	1965	6	6	103	"	24	44	90/2		
11	B. Hughes	1964	6	25	125	Limestone?	74	20	80/2		
12	K. Harnish	1961	6	8	118	pC	22	42			
13	I. Francisco	1963	6	2	180	"	22	15			
14	Frenches Grove Water Co.	1939		10	125	"	50				I
15	Frenches Grove Water Co.	1962	6	25	305	"	50	35		3	I
16	D. Osborne	1956	6	12	78	"	46	3		44	
17	W. Castimore	1963	6	10	120	"	20	30			
18	J. Menken	1962	6	1½	210	"	28	33	170/1		
19	L. Castrovinci	1962	6	6	110	"	24	4		10	
20	R. Ivey	1961	5	6	63	"	21	20	50/1		
21	M. Bradley	1964		3	149	"	22	34	140/1	0	
22	C. Johnson	1963	6	15	65	"	30	20	40/2		
23	J. Wasson	1962	6	4	265	"	30	22		5	
24	R. Cirvus	1967	6	3	121	"	27	8	110/1		
25	A. Rockwood	1959	6	10	150	"	22	40	128/6	7	
26	Bilney Bros., Inc.	1965	6	24	95	"	93	3	20/1	93	
27	D. Bright	1956	6	27	105	"	33	6	40/6	26	
28	F. Cook	1963	6	4	173	fl	38	10	30/		
29	K. Hoag	1963	6	10	87	pC	20	19	47/2		
30	A. Rossillo	1962	6	18	86	"	18	7	25/1		
31	Frenches Grove Water Co.	1950	6	13	150	"	50	6	120/10	10	I

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
32	G. Eide	1961	6	10	120	pC	36	21		33	
33	V. Retunno	1966	6	20+	72	"	34			20	
34	R. Appe	1960	6	3	235	"	34	30		32	
35	E. Brown	1965	6	12	155	"	32	14	140/1	17	
36	T. Clayton	1961	6	3	95	"	24	30	90/1		
37	M. Sullivan	1953	6	2	60	"	11	5	10/1	1	
38	J. Stillwell	1948	6	6	195	"	50	16		3	
39	J. Konesky	1966	6	1	421	"	20	9	250/1	7	
40	R. Hind	1965		5	126	"	33	6	120/1½	18	
41	W. Schmidt	1967	6	3	334	"	21	38	250/1	2	
42	R. Price	1962	6	1	184	"	35	12	172/		
43	Bilney Bros., Inc.	1966	6	2	328	"	32			18	
44	Cardia Co.	1960	5	18	148	"	19	13	100/1		
45	J. Alper	1959	6	4	180	"	30	30		28	
46	Bilney Bros., Inc.	1965	6	50+	50	"	45			35	
47	" " "	1966	6	15	54	fl	51	10	40/3		
48	" " "	1966	6	2	295	"	21			0	
49	H. Patterson	1956	6	12	97	pC	54	18			
50	E. Case	1963	6	21	96	fl	54	25	25/1		
51	S. Schuman	1966	6	16	372	pC	41	44	250/1	21	
52	Bilney Bros., Inc.	1965	6	3½	145	"	86			77	
53	P. Bahn	1961	6	10	80	"	24	40	60/2		
54	D. Falconer	1961	6	5	113	"	22	15	100/		
55	G. Ward	1964	6	2	72	"		9	72/	0	
56	Freeway Constr. Co.	1963	6	9	94	"	22	9	80/1		
57	Freeway Constr. Co.	1963	6	25	47	"	38	5	10/1		
58	C. Russell	1951	6	5	70	"	16	20	30/	7	
59	L. H. Monetti & Sons	1961	5	12	91	"	32	4	60/1		
60	P. Thieme	1963	6	1¾	229	"	50	9	200/1		
61	W. Padgett	1954	6	10	47	"	31	8	32/3	20	
62	Bd. of Education of Byram Twp.	1936	4	12	50	"		30	35/		
63	Bilney Bros., Inc.	1967	6	5	198	"	40			15	
64	" " "	1966	6	20	122	"	21			8	
65	" " "	1965	6	30	121	"	40			18	
66	J. Holly	1966	6	4	97	"	62			61	
67	Bilney Bros., Inc.	1965	6	4	121	"	23			13	
68	" " "	1965			120	"	36			10	
69	" " "	1966	6	20+	58	"	36			30	
70	R. Ralph	1965		20	118	"	37	6	100/1	24	
71	A. Grablum	1961	6	10	95	"	42	20		40	
72	L. Blanchard	1963	6	5	110	"	21	2	12/1		
73	S. Allison	1949	6	3	100	"	20	22	80/3		
74	A. Charles	1948	6	15	198	"	20	34	81/5		
75	Bilney Bros., Inc.	1963	6	10	86	"	60				
76	C. Bilby	1963		20	151	"	22		70/1		
77	Bilney Bros., Inc.	1963	6	10	62	"	58				
78	" " "	1963	6	9	90	"	87	9	75/1		
79	R. Smith	1963	6	5	114	"	64	9	105/1½		
80	Lords Valley Homes, Inc.	1965		24+	43	Qsd	41	7	9/1		
81	Lake Waterloo Estates #1	1930	6		94	"					(abd.)
82	" " " #2	1930	6		54	"					"
83	" " " #3	1930	6	100	53	"		5			I
84	" " " #4	1930	6		100	"					(abd.)
85	" " " #5	1930	6	0	166	pC				135	"
86	" " " #6	1930	6	106	162	"		2	85/	68	I
87	Briar & Della Heights Property Owners Assn.	1950	6	5	175	"	62	3	120/1	18	
88	A. Foote	1964		4	123	"	24	12	110/1		
89	Shell Gasoline Station	1930		15	44	"					
90	Lake Waterloo Corp.	1953	8	45	97	"	31	21	95/14	26	I
91	F. Minton	1954	6	20	104	"	64	34		60	

Well No.	Owner	Year Drilled	Csg. dia. (in)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
92	East Brookwood Estates	1966	6	65	200	pC	83	10	100/8		
93	Brookwood Estates	1953	8	40	97	"		21	71/		I
94	Brookwood Musconetcong River Property Owner Assn.	1955	8	70	66	"	48	6	60/5	47	I
95	S. Lewandowsky	1963	6	14	65	"	36	13	35/1		
96	Aunt Kates, Inc.	1964		18	99	"	50	15	90/1		
97	Borough of Stanhope	1958	8	70	77	Qsd	54-59	15+		61	I
98	" " "	1958	8		124	"	100-120			118	I
99	" " "	1964	12	225	103	"	78-103	7	74/8	102	I
100	" " "	1910		100	64	"					I
101	" " "	1915	10	75	90½	pC		3	89/		I
102	" " "	1924	12	150	85	"					I
103	" " "	1935	8	15	150	"				41	I (abd.)
104	W. Schmuki	1963	6	5	73	"	23	9	60/1		
105	D. Romane	1965		24	130	"	22	19	75/½	7	
106	P. Otiz	1954	6	10	58	"	21	16		20	
107	K. Vraun	1962	6	20	71	"	28	11	31/2		
108	H. Landenberger	1965	6	5½	98	"	79	10	90/1	20	
109	E. Smith	1963	6	23	46	"	23	16	19/1		
110	Bilney Bros., Inc.	1963	6	12	95	"	92	9	80/1½		
111	Freeway Constr. Co.	1963	6	23	48	"	32	2	9/1		
112	Freeway Constr. Co.	1962	6	5	88	"	42	23	83/1		
113	Bilney Bros., Inc.	1964		30	67	"	48	6	12/3/4		
114	" " "	1966	6	1	210	"	20			0	
115	" " "	1964		15	98	"	90	6	90/½		
116	P. Loubet	1962	5	15	47	"	30	6	20/1		
117	K. Hoffman	1966	6	20	61	"	40	8	8/3	0	
118	C. Young	1955	6		90	Qsd	90	8			
119	W. MacKenzie	1964		30+	70	"	88	2	5/1		
120	Bilney Bros., Inc.	1965	6	30	120	pC	20			3	
121	" " "	1964		25	107	Qsd	105	2	70/1		
122	Morris-Sussex Area Boy Scouts of America	1948	8	18	143	pC	26	13	75/8	10	

Drillers' Logs of Wells, Byram Township
(Depths below land surface are given in feet)

Well #	Depth	Log	Formation
24	0-25	Overburden, brown, white granite	pC
	-52	Brown-white granite	
	-75	Brown granite	
	-80	Gray granite	
	-90	Gray granite, soft seams	
	-100	Gray granite, water	
	-110	Soft seam-water	
	-121	Gray granite	
25	0-7	Clay Boulders	
	-150	Hard seamy granite	pC
26	0-93	Sand, gravel	Qsd
	-95	Granite	pC
27	0-26	Clay and boulders	
	-105	Granite	pC
33	0-20	Sandy clay	
	-34	Rotten granite	pC
	-42	Rotten seam	
	-62	Seamy granite	
34	0-32	Clay and hardpan	
	-203	Granite	pC
35	0-17	Sand, gravel and boulders	
	-155	Granite	pC
39	0-7	Overburden	
	-38	Soft granite	pC
	-49	Hard granite	
	-90	Soft granite	
	-91	Soft seam	
	-150	Hard granite	
	-151	Soft seam	
	-318	Hard granite	
	-320	Seam	
	-350	Hard granite	
	-396	Pink granite	
	-421	Pink hard granite	
40	0-18	Sand, gravel and boulders	
	-23	Rotten rock	
	-126	Granite	pC
41	0-2	Overburden	
	-20	Granite	pC
	-122	Gray granite	
	-334	Pink and white granite	
43	0-18	Overburden	
	-55	Hard granite	pC
	-100	Soft granite	

Drillers' Logs of Wells, Byram Township
(Depths below land surface are given in feet)

Well #	Depth	Log	Formation
43	-148	Hard granite	
	-150	Soft granite	
	-230	Hard granite	
	-231	Soft seam	
	-290	Hard granite	
	-328	Soft red granite	
45	0-28	Clay and hardpan	
	-152	Blue and gray granite	pC
46	0-35	Overburden	
	-47	Green white granite	pC
	-47	Clay	
	-50	Brown granite	
47	0-14	Layer of white limestone (boulders?)	
	-30	Gravel bed	Qsd
	-51	Brown clay	
	-53	White limestone	fl
	-54	Bad seam, water	
48	0-289	White limestone	fl
	-290	Seam	
	-295	White limestone	
51	0-21	Overburden	
	-63	White granite	pC
	-75	Black white granite	
	-112	White granite	
	-137	Black, white, green granite	
	-199	White granite	
	-204	Black, white, green granite	
	-271	White granite	
	-284	Black granite	
	-308	Black, white, green granite	
	-325	Green, white granite	
	-340	Black, white, green granite	
	-363	Green, white granite	
	-364	Black granite, water	
	-372	Black, white, green granite	
52	0-38	Yellow clay	
	-70	Brown clay	
	-73	Gravel	Qsd
	-77	Brown clay	
	-110	White granite	pC
55	0-45	Soft brown granite	pC
	-61	Gray granite	
	-72	Hard gray granite	
63	0-15	Overburden with boulders	
	-35	White, brown granite	pC
	-60	White granite	
	-63	Soft white granite	
	-148	Hard white granite	
	-167	Green, white, black granite	
	-168	Soft white, brown granite, water	
	-198	White granite	
64	0-8	Overburden	
	-46	White, green granite	pC
	-48	White, brown granite	
	-60	White, green granite	
	-63	White granite, soft	
	-72	White, green granite	
	-74	Brown, green granite, water	
	-87	Green and gray granite	
	-90	Rotten granite	
	-108	Green and gray granite	
	-110	Rotten granite, more water	
	-122	Green and gray granite	
65	0-6	Overburden	
	-11	Boulders	
	-18	Sand	
	-49	White granite	pC
	-50	Brown, white granite, water	
	-102	White granite	
	-104	Brown granite, water	
	-112	White granite	
	-114	Brown, white granite, water	
	-121	White granite	
66	0-12	Sand and gravel	Qsd
	-40	Sand	
	-61	White clay, gravel	
	-97	White granite	pC
67	0-13	Overburden with boulders	
	-43	White granite	pC
	-44	Brown, white granite	
	-115	White granite	
	-116	Brown, white granite, water	
	-121	White granite	
68	0-10	Overburden	
	-15	Brown, white granite	pC
	-120	Green, white granite	
69	0-30	Sand, gravel	Qsd
	-35	Green, white granite	pC
	-39	Brown granite, water	
	-43	Green, white granite	
	-45	Brown, black granite, water	
	-58	Black, white, green granite	
81	0-12	Clay	
	-94	Gravel	Qsd
82	0-30	Clay	
	-54	Gravel	Qsd
83	0-30	Clay and sand	
	-53	Gravel	Qsd
84	0-22	Sand, clay and gravel	Qsd
	-100	Gravel	
85	0-10	Clay, sand and stones	
	-30	Hardpan	
	-80	Sandy clay	
	-85	Gravel	Qsd
	-135	Hardpan	
	-166	Rotten granite	pC
94	0-12	Hardpan, boulders and gravel	
	-20	Fine sand	Qsd
	-40	Coarse sand	
	-47	Hardpan	
	-66	Light gray and blue granite	pC
96	0-9	Overburden	
	-40	Gray granite	pC
	-55	Green granite	
	-57	Soft brown granite, water	
	-60	Gray, black, white granite	
	-65	Pink, white granite	
	-73	Gray granite	
	-78	Soft brown granite	
	-99	Black, white granite	
97	0-5	Fill	
	-8	Topsoil	
	-17	Sandy clay, gravel and boulders	
	-41	Sand, gravel, streaks of clay boulders	Qsd
	-53	Gray clay, large gravel	

Drillers' Logs of Wells, Byram Township
(Depths below land surface are given in feet)

Well #	Depth	Log	Formation
97	-55	Sand and gravel, streaks of clay	
	-59	Sand and gravel	
	-60	Brown clay	
	-77	Granite	pC
98	0-6	Fill	
	-35	Clay and boulders	
	-70	Sand and gravel with some boulders	Qsd
	-88	Coarse sand and gravel	
	-96	Sand and gravel	
	-99	Fine sand	
	-102	Clay	
	-110	Coarse sand	
	-117	Rotten rock with some sand	
	-118	Coarse sand	
	-124	Greenish granite	pC
99	0-10	Clay and boulders	
	-18	Sand and boulders	Qsd
	-30	Sand, clay and boulders	
	-57	Sand, boulders and clay	
	-73	Sand and gravel	
	-75	Gray clay	
	-91	Fine sand and boulders	
	-95	Gray clay	
	-102	Sand and gravel	
	-102	Rock	pC
108	0-3	Overburden	
	-20	Sand and gravel	Qsd
	-98	Green, white, brown granite	pC
117	0-40	Sand	Qsd
	-45	White granite	pC
	-46	White granite, water	
	-61	White, black granite	
119	0-8	Overburden	
	-22	Sand	Qsd
	-65	Sand and clay	
	-70	Sand and gravel	
120	0-30	Overburden	
	-24	Green, white granite	pC
	-25	Brown, white granite, water	
	-91	Green, white granite	
	-93	Brown, white granite, water	
	-110	Green, white granite	
	-111	Brown, white granite, water	
	-120	Green, white granite	
121	0-4	Overburden	
	-75	Fine sand	Qsd
	-79	Fine sand with gravel	
	-104	Coarse sand with small gravel	
	-107	Gravel	

FRANKFORD TOWNSHIP

DOMESTIC WELLS [1 & 2]

Formation	No. of Wells	YIELD IN GALLONS PER MINUTE Maximum	Minimum	Average	Median
Stratified Drift (Qsd)	16	60	¾	12	5
Martinsburg Formation (Omb)	161	120	½	14	7
Kittatinny Formation (C0k)	8	60	4	16	11

Formation	No. of Wells	DEPTH IN FEET BELOW SURFACE Maximum	Minimum	Average	Median
Stratified Drift (Qsd)	16	218	56	110	115
Martinsburg Formation (Omb)	161	568	42	196	174
Kittatinny Formation (C0k)	8	217	55	124	104

[1] Wells and formations with insufficient data are not used in this summary.

[2] There are 6 industrial wells from the Stratified Drift and 2 from the Kittatinny Formation. See regional summary of industrial wells.

Well No.	Owner	Year Drilled	Csg. dia. (in)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
1	Gus Wilhelm	1951	6	20	115	Omb	61	1	39/3	59	
2	Joe Miller	1950	6	25	89	"					
3	P. Putera	1951	6	20	183	"	123	0	120/3		
4	Frankford Twp. Fire House	19—	6	5	115	Qsd	115	37	100/1		
5	G. Hollenbeck	1951	6	5	25	Omb	7	3	19/1		
6	Charles Longcor	1952	6	7	82	"	20	6			
7	Borden's (very hd.)	1940	10	250	43	C0k		14	14/½		I
8	G. R. Lantz	1948	6	4	113	Omb	91	12	65/1	91	
9	W. S. Heindel	1952	6	6	55	C0k	38	17	45/1		
10	Frankford Twp. Elementary School	1950	6	60	104	"	61	16	26/9	60	
11	P. Derrick	1948	6	10	115	Qsd	115	20	63/10		

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMA-TION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USB
12	G. Parr	1951	6	5	99	Omb	22	26	26/1		
13	Henry Becker Dairy	1926	10	150	62	Qsd	50	6	30/		I
14	Sussex Farm Service	1950	6	1½	231	Omb	133	30			
15	Ideal Dairy	1935	8	100	120	Qsd	110	25	70/		I
16	Henry Becker	1926	10	2	567	Omb	26	50		7	I
17	" "	1932	10	350	62	Qsd	62	14	50/		I
18	Ideal Farms Dairy	1939	6	12	167	C0k?	21	15	120/		
19	A. Adler	19—	6	5	217	Omb	23	10	100/2		
20	A. F. Young	1961	6	3	146	"	30	flowing			
21	G. J. Krumeich	1957	6	5	178	"	17	3			
22	John H. White	1960	6	12	220	"	125	27	130/3	125	
23	E. Ananson	1965	6	3	146	"	80	20		80	
24	W. A. Varley	1965	6	2	206	"	21	18			
25	Edgar Tavernier	1964	6	7	104	"	76	23			
26	Raulph Edsall	1953	6	20	130	"	100	8	50/3	100	
27	G. Barklow	1965	6	15	252	"	214	83	150/2		
28	J. Veil	1966	6	30	248	"	187	10	120/2		
29	L. Holland	1962	6	45	174	"	130	2		130	
30	M. Angleson	1958	6	10	300	"	193	65		193	
31	KTM Const. Inc.	1963	6	3	400	"	30	63	380/3	12	
32	J. F. Monico	1961	6	22	195	"	120	14	120/3	115	
33	L. R. Freeman	1957	6	15	155	"	86	8	60/4		
34	J. Chase	1966	6	15	180	"	176	10	85/2	103	
35	E. Schneider	1958	6	5	258	"	196	40	130/4	196	
36	M. LaForge	1964	6	15	173	"	11	20	160/2		
37	J. Falls	19—	6	4	185	"	107	33	110/2		
38	G. Lenze	1966	6	10	203	"	125	57			
39	F. Gutowski	1956	6	12	185	"	116	30	120/3	116	
40	W. C. Earl	1965	6	5	127	Qsd	121	55			
41	L. Fletcher	1964	6	5	253	Omb	123	50	200/2		
42	E. Kogener	1965	6	30	245	"	125	63	119/3	112	
43	A. Morris	1955	6	4	160	"	142	40	110/4	149	
44	N. J. State Highway Dept.	1958	6	13	120	"	85	surface	70/2		
45	L. Henderson	1966	6	1	422	"	61	148	300/2		
46	H. Snook	1965	6	60	192	"	188	12	100/2		
47	R & R Honey	1963	6	1	600	"	40	59	590/2	25	
48	D. Morris	1966	6	3	230	"	50	21	220/3	35	
49	Sussex City Bd. of Freeholders	1965	6	15	97	C0k	36	18	80/2		
50	KTM Constr. Co.	1964	6	1½	335	Omb	35	31	325/3	25	
51	T. Kemy	1962	6	15	200	"	182	76	145/3	175	
52	T. DeRose	1963	6	4	268	"	30	32	232/3	0	
53	N. A. Ericson	1954	6	8	104	"	66	15		40	
54	G. Bell	1965	6	20	75	"	14	12			
55	Rutgers University	1965	6	40	125	"	10	10		10	
56	H. McNeel	19—	6	10	148	"	24	46	100/2		
57	R. Van Alstine	1966	6	1	372	"	20	120	300/2		
58	D. W. Owens	1964	6	8	103	"	23	35			
59	J. Heater	1965	6	15	170	"	41	17	80/2		
60	C. Compton	1965	6	20	145	"	31	31	80/2		
61	S. Sikarski	1964	6	2	217	"	67	20	200/2		
62	L. E. Metcalf	1965	6	8	172	"	13	8	105/2		
63	R. Kubiak	1965	6	12	147	"	41	35	100/2		
64	Metcalf Farms	1965	6	30	123	"	22	46	80/2		
65	P. Tag	1966	6	1	98	"	64	10	80/2		
66	L. E. Metcalf	1966	6	1½	222	"	17	2	150/2		
67	Lyndhurst Girl Scout Camp	1964	6	10	203	"	40	18	120/3	32	
68	J. J. Cavanaugh	1965	6	5	220	"	13	26	85/2		
69	W. Payack	1964	6	20	143	"	40	12	60/2		
70	M. Roof	1963	6	5	157	"	116	41			

Well No.	Owner	Year Drilled	Csg. dia. (in)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
71	H. E. Stark	1962	6	1	288	Omb	36	40			
72	Altyatt B. Phillips	1964	6	6	155	"	26	13	100/2		
73	G. Hamm	1965	6	5	147	"	43	6½	80/2		
74	E. DeVries	1958	6	1	416	"	15½	34			
75	H. Douma	1964	6	7	124	"	32	19			
76	R. B. Paul	1966	6	30	97	"	20	15	70/2		
77	E. Hough	1961	6	3½	145	"	28	30			
78	B. Dalrymple	1964	6	7	84	"	45	17			
79	W. Little	1964	6	2	104	"	17	12			
80	W. Search	1964	6	20	100	"	13	20	80/2		
81	A. MacGregor	1964	6	10	70	"	19	27			
82	H. Dalrymple	1963	6	7	124	"	24	16			
83	F. Strecker	1964	6	4	125	"	17	4			
84	J. Meyer	1964	6	60	394	"	22	18	90/2		
85	F. Hough	1965	6	25	110	"	20	10	50/2		
86	W. De Groat	1961	6	10	257	"	122	69			
87	D. Heater	1966	6	3	222	"	134	44	200/2		
88	Methodist Home for Aged	1960	6	6	500	"	50	35			
89	L. Metcalf	19—	6	25	160	"	80	5	80/2		
90	S. Willis	1962	6	12	56	Qsd	44-54	14	50/8	56	
91	Metcalf Farms	1965	6	20	174	Omb	51	10	20/2		
92	L. Metcalf	1966	6	5	348	"	10	10	300/2		
93	D. Lundy	1962	6	25	130	Qsd	130	6	65/3		
94	Blue Ridge Rescue Squad	1965	6	20	175	Omb	135	12	46/3	125	
95	H. Mills	1965	6	5	78	"	33	19	60/2		
96	W. W. Wolf	1962	6	1½	505	"	44	37	350/3	25	
97	W. Steckley	1962	6	6	300	"	162	73	280/3		
98	R. Lawson	19—	6	25	292	"	125	50	160/2		
99	H. C. Gordon	1965	6	5	125	"	85	27	75/2		
100	Boro of Branchville	1958	6	350	170	C0k	54	2	38/24	52	I
101	J. G. Roe, II	1966	6	4	217	"	23	50	150/1	16	
102	E. Gray	1957	6	8	107	"	66	53	98/3	63	
103	E. Hyatt	1965	6	2	568	Omb	14	65	200/2	35	
104	Happy Time Barn (Christian Davis)	1964	6	20	119	"	40	5	60/2		
105	F. E. Ehlers	1962	6	10	94	"	57	8	80/3	57	
106	R. C. Richards	1962	6	5	115	"		6	80/2		
107	N. Nesmith	1966	6	14	172	C0k	96	7	42/1½	28	
108	L. Cassidy, Jr.	1965	6	20	73	Omb	22	25	60/2	28	
109	" "	1960	6	1½	121	"	22	15			
110	G. D. Hill	1965	6	2	348	"	50	8	300/2		
111	A. Hopper	19—	6	1	397	"	21½	120	380/2		
112	J. Spindler	1965	6	3	272	"	149	72	200/2		
113	C. Hautau	1966	6	5	180	"	70	25	160/2		
114	E. J. Molnar	1964	6	50	102	"	102	46	75/2		
115	O. J. Fields	1963	6	6	268	"	57	27			
116	H. Lee	1963	6	4	187	"	104	30			
117	O. A. Smith	1963	6	7	186	"	67	29			
118	F. Kushnerchuk	19—	6	30	248	"	20	60	100/2		
119	H. Hautau	1966	6	30	95	"	62	17	70/2		
120	Fetzer Trucking Co.	1965	6	60	60	Qsd	60	32	40/2		
121	J. Fields	1962	6	1½	85	Omb	23	35			
122	Estate of S. Peller	1966	6	1	348	"	61	34	300/2		
123	M. Devita	1958	6	14	248	"	21	0			
124	Anna M. Sisco	1966	6	10	73	C0k	19	8	60/2		
125	L. W. Truesdell	1965	6	5	183	Omb	109	18			
126	M. R. Bain	1959	6	2½	303	"	29	12	290		
127	E. Spangenberg & Son	1966	6	6	115	"	21	5	100/½		
128	T. J. Bain	1965	6	1	308	"	48	31			
129	Frankford Twp.	1963	10	2½	42	"	17	13			
130	Ideal Realty Co.	1956	10	400	118	Qsd	108-118	20	40/8		I
131	Humble Oil & Ref.	1965	6	40	178	Omb	85	11	80/2		
132	L. Holland	1962	6	45	174	"	130	2	68/2		

CULVERS LAKE (133-169)

Well No.	Owner	Year Drilled	Csg. dia. (in)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
133	Stanley A. Miller	1952	6	16	90	Omb	54	14	50/2		
134	Alice M. Jewell	1951	6	68	69	"	57	10	25/3		
135	E. E. Buchner	1951	6	6	78	"	58				
136	Irving Smith	1950	8	¾	147	Qsd	131	52	100/2		
137	Dr. G. A. Braun	1951	8	9	248	Omb	157	flows	125/6	157	
138	Dr. E. B. Gibbins	1952	6	10	66	Qsd	66	10			
139	Kenneth W. Hornel	1951	6	20	78	Omb	56	18	23/2		
140	William J. Lamb	1952	6	20	66	"	56	14			
141	J. M. Boleter	1948	6	3	110	"	43	1	108/1	43	
142	Halterc Hotel	1948	8	20	181	"	72	6	50/6		
143	T. Amore	1964	6	7	141	"	82	3			
144	P. Nord	1965	6	5	173	"	20	20	100/2		
145	C. Borchard	1964	6	45	150	"	50	30	75/2		
146	Odd Olsen	1958	6	25	220	"	163	63	125/3	163	
147	A. Stave & S. Tyseaer	1959	6	22	235	"	145	66	122/3	145	
148	R. G. McDowell	1961	6	4	107	"	56	15			
149	L. Nelson	1965	6	7	147	"	52	93	120/2		
150	D. Dube	1966	6	28	146	"	72	21	63/3	58	
151	L. W. Thacher	1965	6	10	129	"	77	33	100/2		
152	J. J. McLarens	1961	6	48	174	"	78	32	58/2	72	
153	L. Bock	1965	6	1	258	"	77	37	200/2		
154	J. Brown & M. Mues	1963	6	4	96	"	30	20	85/1		
155	G. Thor Kilsen	1954	6	10	151	Qsd	151	flows	70/1		
156	Gutterm Sollie	1954	6	15	182	Omb	143	23	90/2	140	
157	E. K. Kissam	1964	6	7	155	"	88	15			
158	W. Behnke	1966	6	21	225	"	60	4		45	
159	T. Chambers	1964	6	18	200	"	80	21	65/3	70	
160	K. W. Horne	1960	6	12	125	"	82	9			
161	C. Nussbaum	1961	6	21	240	"	160	19	100/3	150	
162	R. J. Ford	1965	6	20	142	"	91	3	60/2		
163	G. Schopfer	1964	6	7	303	"	303	17	80/2		
164	F. Kristensen	1964	6	20	135	"	102	25	90/2		
165	W. Schroder	1965	6	2	91	Qsd	68	2	75/2		
166	A. Cherick	1964	6	30	135	Omb	63	11	36/3	50	
167	V. C. Thaller	1964	6	120	154	"	85	22	80/2		
168	J. Comerci & A. Mosca	1964	6	10	148	"	138	3	60/2		
169	T. Wood	1962	6	5	125	Qsd	124	15			
170	Joe Miller Esso Gas Station	1946	6	5	135	Omb		16			
171	Joe Miller	1947	6	2	98	"					
172	J. Nemith	1951	6	3	80	Qsd	72	10	80/8		
173	Dr. Schneider	1938	6	3	96	"	96	20			
174	A. Wilson	1962	6	15	105	"	106	12			
175	R. L. Green	1962	6	20	218	"	218	5			
176	J. Marchetti	1966	6	32	412	Omb	326	18		325	
177	J. McGuire	1967	6	3	275	"	150	25	258/3	140	
178	G. Schroder	1963	6	18	205	"	199	5	45/1½		
179	E. Monte	1966	6	½	446	"	173			166	
180	E. Dubis	1963	6	5	305	"	212	21	185/3	180	
181	H. Bennett	1965	6	5	197	"	134	22	90/2		
182	J. Mastek	1964	6	10	235	"	186	20	100/4	186	
183	E. O. Kirko	1964	6	12	315	"	238	36	75/6		
184	Normanoch Assn.	1965	6	30	255	"	220	17	100/2	220	
185	I. Smith, Jr.	1957	6	25	325	"	250	3	167/2	225	
186	Culver Lake Golf Co.	1962	6	15	123	"	112	48	75/		
187	J. McNamara	1961	6	10	378	"	133	141	336/5		
188	S. Porter	1956	6	12	216	"	150	21	180/3	150	
189	R. Pflaum	1963	6	21	178	"	134	18	80/3	125	
190	E. Dallero	1958	6	10	162	"		35	125/3	162	
191	D. Coates	1953	6	5	70	Qsd	70	21	65/4		
192	H. Voelker	1964	4	30	127	Omb	11	27	60/		
193	McKeown's	1936	6	"enough"	82	Qsd	screen				

Drillers' Logs of Wells, Frankford Township
(Depths below land surface are given in feet)

Well #	Depth	Log	Formation
1	0-59	Boulders and hardpan	
	-115	Black slate	Omb
4	0-115	Hardpan, gravel and boulders	Qsd
5	0-7	Soil and hardpan	
	-25	Hard slate rock	Omb
8	0-91	Hardpan and boulders	
	-113	Gray rock	Omb
9	0-38	Sand and gravel	Qsd
	-55	Blue limestone	COk
10	0-20	Sand and gravel	Qsd
	-42	Fine sand	
	-55	Gray mucky sand	
	-59	Gray mucky sand and gravel	
	-61	Gravel, no water	
	-104	Limestone rock	COk
11	0-115	Earth, hardrock, many boulders	Qsd
13	0-66	Stratified glacial drift	Qsd
14	0-133	Glacial drift	Qsd
	-231	Slate	Omb
15	0-22	Muddy brown sand	
	-89	Gray lacustrine clay	
	-100	Gray clay with a little fine grained sand	
	-103	Gray clayey sand (largely slate) and a little gravel	
	-115	Sand with a little gravel	
	-118	Gravel up to 1½"	
	-120	Sand	Qsd
19	0-9	Dirt and boulders	
	-167	Limestone	COk?
21	0-15	Clay	
	-178	Slate	Omb
22	0-25	Hardpan, boulders and gravel	
	-50	Hardpan and sandy loam	
	-75	Blue clay and gravel	
	-100	Blue clay and gravel with water	
	-125	Sand and gravel (set casing)	
	-220	Blue shale rock	Omb
23	0-80	Clay	
	-146	Slate	Omb
28	0-25	Hardpan and boulders	
	-50	Boulders, gravel and water	
	-75	Blue clay and gravel	
	-100	Blue clay	
	-125	Blue clay, sand and water	
	-130	Blue clay and shale rock	
	-174	Blue shale	Omb
30	0-193	Boulders and conglomerate	
	-300	Slate	Omb
31	0-12	Hardpan	
	-100	Shale rock	Omb
	-150	Hard gray rock	
	-179	Very hard gray rock	
	-300	Black shale rock	
	-338	Hard gray rock	
	-342	Brown honeycomb rock	
	-368	Hard gray rock	
	-400	Black shale rock	
32	0-50	Hardpan and boulders	
	-75	Hardpan, gravel, sand and water	
	-115	Blue clay	
	-120	Broken up shale rock	Omb
	-195	Blue shale rock	
33	0-86	Boulders and hardpan	
	-155	Slate	Omb
35	0-20	Clay and hardpan	
	-50	Clay and gravel	
	-186	Sand and gravel	Qsd
	-196	Clay	
	-258	Slate	Omb
38	0-25	Hardpan and boulders	Qsd
	-50	Large boulders and cobbles	
	-75	Boulders, gravel and sand	
	-103	Gravel, sand and water	
	-203	Blue shale rock	Omb
39	0-75	Hardpan and boulders	
	-116	Blue clay and gravel	
	-185	Shale rock	Omb
42	0-50	Hardpan and boulders	
	-75	Blue clay and boulders	
	-100	Large boulders	
	-112	Blue clay	
	-225	Blue shale rock	Omb
	-245	Brown honeycomb rock	
43	0-105	Clay and gravel	
	-141	Sand	
	-160	Slate	Omb
47	0-25	Hardpan	
	-150	Black shale rock	Omb
	-225	Hard gray rock	
	-282	Black shale rock	
	-297	Soft shale rock	
	-450	Black shale rock	
	-550	Hard gray rock	
	-600	Black shale rock	
48	0-25	Hardpan and boulders	
	-35	Clay and broken up rock	
	-86	Hard gray rock	Omb
	-187	Blue shale rock	
	-212	Hard gray rock	
	-230	Blue shale rock	
50	0-25	Broken lime rock	
	-100	Black lime rock	Omb
	-150	Hard black lime rock	
	-175	Soft blue shale	
	-200	Blue shale rock	
	-214	Soft brown sandstone	
	-300	Hard gray rock	
	-325	Soft brown sandstone	
	-335	Blue shale rock	
51	0-50	Hardpan and boulders	
	-75	Boulders and gravel	
	-100	Gravel and clay with water	
	-125	Clay	
	-150	Gravel and boulders	
	-175	Boulders or slabs of rock	
	-200	Blue shale rock	Omb

Drillers' Logs of Wells, Frankford Township
(Depths below land surface are given in feet)

Well #	*Depth*	*Log*	*Formation*
52	0-50	Black shale rock	Omb
	-100	Hard gray rock	
	-175	Black shale rock	
	-238	Hard gray rock	
	-268	Soft brown honeycomb rock	
53	0-30	Earth and clay	
	-104	Grayish black shale	Omb
67	0-25	Sand, gravel, clay and cobbles	
	-32	Blue clay	
	-125	Blue shale rock	Omb
	-188	Hard gray rock	
	-203	Blue shale rock	
90	0-11	Clay and soft rock	Qsd
	-28	Clay and some gravel	
	-34	Dirty gravel	
	-53	Hard gravel, water	
	-56	Rock	Omb
93	0-50	Hardpan and boulders	Qsd
	-75	Cobbles and large boulders	
	-115	Boulders and cobbles	
	-120	Red clay	
	-130	Gravel and clay with water	
94	0-25	Hardpan and large boulders	Qsd
	-50	Hardpan, gravel and boulders	
	-75	Large boulders, sand and water	
	-100	Sand, gravel and some small boulders	
	-120	Some clay, gravel and sand	
	-125	Broken up rock and water	
	-175	Blue shale rock	
96	0-25	Hardpan and broken up rock	
	-100	Shale rock	Omb
	-183	Hard gray rock	
	-208	Soft blue slate	
	-267	Hard gray rock	
	-417	Blue shale rock	
	-431	Hard gray rock	
	-469	Blue shale rock	
	-495	Blue lime rock	
	-505	Yellow lime rock	
97	0-125	Hardpan and boulders	
	-140	Blue clay	
	-150	Blue clay, sand and water	
	-155	Blue clay	
	-200	Blue shale rock	Omb
	-237	Hard gray rock	
	-248	Brown sandstone and water	
	-279	Blue shale rock	
	-300	Brown sandstone and water	
100	0-14	Boulders and stones	
	-52	Clay and stones	
	-170	Hard gray rock	COk
101	0-16	Overburden	
	-217	Limestones	COk
102	0-63	Hardpan	
	-85	Blue lime rock	COk
	-100	White lime rock	
107	0-28	Clay and gravel	
	-41	Rock	
	-62	Gray white limestone	COk
107	-64	Soft clay seam	
	-89	Gray white limestone, clay and water	
	-172	Gray white limestone	
130	0-25	Sandy clay	
	-30	Gravel	Qsd
	-78	Gray clay	
	-118	Very coarse gravel	
134	0-54	Glacial drift	
	-67	Slate	Omb
135	0-58	Hardpan	
	-78	Slate	Omb
136	0-147	Boulders	Qsd
137	0-157	Stones, sand, gravel, gray and yellow clay	
	-248	Gray slate rock	Omb
139	0-55	Glacial drift	
	-78	Slate	Omb
141	0-43	Hardpan and gravel	
	-110	Slate	Omb
142	0-67	Glacial drift	
	-100	Dark reddish very fine sandstone	Omb
146	0-50	Clay and boulders	
	-75	Boulders	
	-100	Clay, boulders and gravel	
	-163	Gravel and sand	
	-220	Slate	Omb
147	0-25	Clay and boulders	
	-75	Clay, boulders and gravel	
	-100	Clay and boulders	
	-145	Clay	
	-235	Slate	Omb
150	0-44	Hardpan and boulders	
	-58	Clay, gravel, sand and water	
	-146	Blue shale rock	Omb
152	0-25	Hardpan and boulders	
	-58	Clay, gravel, sand and water	
	-63	Quicksand	
	-72	Blue clay and shale rock	
	-174	Blue shale rock	Omb
156	0-30	Clay	
	-40	Clay and coarse sand	
	-50	Silty medium-coarse sand	
	-110	Silty very coarse sand	
	-180	Clay	
	-182	Slate	Omb
158	0-25	Hardpan	
	-41	Hardpan and boulders	
	-100	Blue shale	
	-142	Hard gray rock	
	-178	Black lime rock	
	-212	Yellow lime rock	
	-225	Soft brown sandstone	Omb
159	0-25	Hardpan and boulders	
	-50	Blue clay and gravel	
	-70	Gravel, sand and water	
	-150	Blue shale rock	
	-168	Grass green shale	
	-200	Blue shale rock	Omb

Drillers' Logs of Wells, Frankford Township
(Depths below land surface are given in feet)

Well #	Depth	Log	Formation
161	0-25	Hardpan and boulders	
	-50	Blue clay and boulders	
	-75	Boulders, gravel and sand	
	-100	Gravel, sand and water	
	-125	Boulders and clay	
	-150	Blue clay and broken up rock	
	-240	Blue shale rock	Omb
165	0-91	Gravel and boulders	Qsd
166	0-25	Hardpan and boulders	
	-50	Gravel, sand and water	
	-100	Black shale rock	Omb
	-112	Hard gray rock	
	-135	Soft brown sandstone	
170	0-70	Glacial drift	
	-135	Slate	Omb
171	0-20	Yellow clay and small boulders	
	-62	Blue clay and boulders	
	-66	Large boulders	Qsd
	-80	Red gravel	
176	0-50	Hardpan and boulders	
	-75	Gravel, sand and cobbles	
	-100	Boulders	
	-125	Large boulders and clay	
	-150	Sand, gravel and boulders	
	-175	Gravel, sand and water	
	-200	Sand and water	
	-225	Sand and clay	
	-300	Quicksand	
	-326	Quicksand, red clay and blue shale	
	-400	Blue shale rock	Omb
	-412	Soft shale rock with water	
177	0-25	Sand, gravel	
	-50	Sand, gravel and clay	
	-75	Sand, gravel and clay	
	-100	Sand, gravel	
	-140	Clay seams	
	-175	Brown shale	Omb
	-200	Black shale	
	-220	Blue shale, water	
	-250	Soft seam, water	
	-275	Black shale	
179	0-166	Boulders and gravel	
	-466	Gray shale	Omb
180	0-25	Hardpan and boulders	
	-50	Hardpan, boulders and gravel	
	-75	Gravel and cobbles	
	-125	Gravel, sand and water	
	-175	Blue clay and gravel	
	-200	Blue clay, broken up rock	
	-275	Blue shale rock	Omb
	-305	Brown sandstone	
182	0-75	Clay and gravel	
	-176	Clay and sand	
	-186	Clay	
	-235	Slate	Omb
185	0-100	Boulders and hardpan	
	-150	Boulders and broken up rock	
	-200	Hardpan and clay	
	-225	Yellow clay and water	
	-245	Blue shale	Omb
	-250	Yellow clay and white sand	
	-290	Hard blue limestone	
	-305	Green shale with water 10 gpm	
	-315	Green and yellow shale with lots of water	
	-325	Hard blue shale	
187	0-75	Hardpan and boulders	
	-100	Hardpan, boulders and gravel	
	-125	Gravel, sand and water	
	-133	Blue clay	
	-175	Hard gray rock	Omb
	-225	Hard blue shale rock	
	-286	Blue shale rock	
	-325	Very hard gray rock	
	-367	Soft blue shale rock	
	-378	Very soft brown sandstone	
189	0-25	Hardpan and boulders	
	-50	Sand, gravel and clay	
	-75	Sand, gravel, clay and water	
	-100	Blue clay and gravel	
	-125	Blue clay and broken up rock	
	-168	Black shale rock	Omb
	-178	Brown sandstone	
190	0-50	Hardpan and boulders	
	-100	Hard packed gravel and sand	
	-150	Blue clay, sand and water	
	-162	Yellow clay and water	
	-180	Blue shale	Omb

FREDON TOWNSHIP

DOMESTIC WELLS [1 & 2]

YIELD IN GALLONS PER MINUTE

Formation	*No. of Wells*	*Maximum*	*Minimum*	*Average*	*Median*
Martinsburg Formation (Omb)	49	55	1	11	5
Kittatinny Formation (C0k)	5	101	5	43	24

DEPTH IN FEET BELOW SURFACE

Formation	*No. of Wells*	*Maximum*	*Minimum*	*Average*	*Median*
Martinsburg Formation (Omb)	49	500	35	172	143
Kittatinny Formation (C0k)	5	483	66	247	122

[1] Wells and formations with insufficient data are not used in this summary.
[2] There are no industrial wells. See regional summary of industrial wells.

Well No.	Owner	Year Drilled	Csg. dia. (in)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
1	F. Lockburner	1952	6	15	118	Omb	24	30	65/2	0	
2	E. Charles	1949	6	3	150	"	24	11	100/3		
3	W. Behrman	1954	6	5	115	Qsd	115	31	60/4		
4	J. Vandercrake	1950	6	3½	166	Omb	11	18	70/2		
5	C. Molencamp	1952	6	15	64	"	21	12	42/		
6	A. Wurm	1948	6	6	194	"	25	68	150/		
7	A. Wodlin	1948	6	6	140	"	27½	35	70/4	27½	
8	W. Goddard	1949	6	1½	260	"	20	14	200/		
9	R. Hendershot	1951	6	8	55	"	31	15	50/3		
10	T. Galanto	1965	6	2	186	"	16	38			
11	G. Bitzer	1964	6	5	135	"	16	26	130/		
12	H. Kent	1961	6	35	300	"	20	5	200/4	8	
13	R. Snook	1966	6	3½	430	"	50	63	300/4	10	
14	D. Roy	1963	6	4	105	"	27½	16	100/4	27½	
15	M. Douma	1964	6	5	245	"	21	4	200/4	10	
16	C. Spangenberg	1965	6	1½	222	"	22	10	200/2		
17	Dr. L. Fletcher, Jr.	1961	6	10	130	"	20	21	120/4		
18	H. Bauer	1964	6	3	237	"	19	18	200/2		
19	T. Inslee	1965	6	7	101	"	22	10		22	
20	B. Umberger	1964	6	3	215	"	32	16	160/4	32	
21	O. Marquard	1966	6	1½	372	"	20			0	
22	" "	1965	6	4½	350	"	21	39		7	
23	S. Walker, Jr.	1966	6	60	71	COk	20	14	50/2		
24	Newton Tool & Mould Co.	1965	6	20	66	"	58				
25	A. Micaglietta	1962	6	101	173	"	62	18	150/8	56	
26	H. Stubbs	1966	6	1	372	Omb	12	47	210/2		
27	A. Ray	1962	6	20	125	"	50	8	40/4	14	
28	H. Nurge	1965	5	18	105	"	30	26	66/3	10	
29	C. Jung	1962	6	50	197	"	21	22	80/2		
30	P. Kaletzko	1960	6	55	300	"	20	3	100/4	2	
31	C. Ward	1965	6	5	147	"	23	14	105/2		
32	O. Evensen	1961	6	3	320	"	28	60		4	
33	W. Hopper	1966	6	14	80	"	31	20	65/4	18	
34	" "	1962	6	10	90	"	21	21	85/4	4	
35	T. Barrett	1964	6	4½	135	"	20	8	130/4	18	
36	Southerland Constr. Co.	1964	6	4	206	"	18	78			
37	C. Smith	1965	6	5	97	"	22	26	75/2		
38	W. Klenn	1963	6	30	50	"	20	7	30/4	10	
39	W. Nally	1961	6	20	35	"	20	11	15/3	0	
40	" "	1962	6	3	72	"	20	20		20	
41	" "	1962	6	5	70	"	24	8		20	
42	" "	1964	6	8	115	"	20	20	80/2		
43	Pleasant Heights, Inc.	1957	6	12	98	"	10	2	75/4		
44	E. Roy	1963	6	20	60	"	20	10	50/4	20	
45	C. Hardin	1964	6	35	60	"	20½	12	40/4	10	
46	A. Miragliotta	1966	6	4½	500	"	35	32	480/3	6	
47	P. Hardin	1962	6	10	81	"	54	30	75/4	54	
48	E. Lofoam	1964	6	3	250	"	50	6	240/4	2	
49	L. Gouger	1962	6	15	178	"	30	46		7	
50	F. Pehrson	1960	6	7	175	"	26	28			
51	Fredon Vol. Fire Co.	1960	6	20	117	"	26	20	60/4		
52	W. Bitzer	1964	6	5	135	"	16	26	130/2		
53	C. Roy	1949	6	4	104	"	20	15	76/1		
54	T. Inslee	1966	8	5	443	COk	39	200	—/½		
55	" "	1966	8	28	483	"	41	65	—/1		

Drillers' Logs of Wells, Fredon Township
(Depths below land surface are given in feet)

Well #	Depth	Description	Formation
3	0-114½	Yellow clay	
	-115½	Gravel	Qsd
12	0-8	Clay	
	-300	Slate	Omb
13	0-10	Clay	
	-430	Slate	Omb
14	0-27½	Clay	
	-105	Slate	Omb
15	0-10	Clay	
	-245	Slate	Omb
19	0-22	Clay	
	-101	Slate	Omb
20	0-32	Clay	
	-215	Slate	Omb
21	0-170	Gray shale	Omb
	-197	1½ gpm.	
	-223	Soft, no water	
	-372	Gray shale	
22	0-7	Overburden	
	-25	Dark gray shale	Omb
	-50	Light brown shale	
	-100	Black shale	
	-125	Gray shale	
	-150	Water	
	-250	Black shale	
	-275	Dark shale	
	-325	Gray shale	
	-350	Black shale	
25	0-25	Hardpan and gravel	
	-39	Blue clay	
	-46	Gravel and water	
	-49	Gravel, water and sand	
	-52	Yellow clay	
	-56	Broken up limestone	C0k
	-90	Hard blue limestone	
	-110	Soft yellow limerock with water	
	-140	Hard blue limerock	
	-148	Soft yellow limerock with water	
	-162	Hard blue limerock	
	-173	Brown limerock with quartz	
26	0-10	Hardpan	
	-75	Shale	
	-90	Hard gray shale	
	-105	Shale with water	Omb
46	0-6	Hardpan	
	-150	Shale	Omb
	-178	Gray rock	
	-199	Hard gray rock	
	-450	Blue shale rock	
	-480	Brown sandstone	
	-485	Yellow "soapstone"	
	-500	Green shale	
47	0-30	Hardpan and clay	
	-54	Clay	
	-81	Slate	Omb

GREEN TOWNSHIP

DOMESTIC WELLS [1 & 2]

Formation	*No. of Wells*	*YIELD IN GALLONS PER MINUTE* *Maximum*	*Minimum*	*Average*	*Median*
Martinsburg Formation (Omb)	8	40	3½	10	5
Kittatinny Formation (C0k)	32	40	¼	16	13
Precambrian crystallines (pC)	20	30	1	7	5

Formation	*No. of Wells*	*DEPTH IN FEET BELOW SURFACE* *Maximum*	*Minimum*	*Average*	*Median*
Martinsburg Formation (Omb)	8	423	85	177	148
Kittatinny Formation (C0k)	32	300	44	131	110
Precambrian crystallines (pC)	20	199	45	104	98

[1] Wells and formations with insufficient data are not used in this summary.
[2] There are no industrial wells. See regional summary of industrial wells.

Well No.	*Owner*	*Year Drilled*	*Csg. dia. (in)*	*Yield (gpm)*	*Depth (ft.)*	*FORMA-TION*	*Screen Setting or depth csd. (ft.)*	*Static Water Level (ft.)*	*Pumping Level/hrs. Pumped*	*Depth to Bedrock*	*USE*
1	R. Shotwell	1966	6	40	50	C0k	25	10	40/2		
2	C. Sommer	1966	6	3½	423	Omb	35			18	
3	World Wide Constr. Co.	1967	6	5½	123	"	28			10	
4	C. Chrittchet	1964	6	18	170	C0k	45	28	122/3	30	
5	J. Dobson	1965	6	10	121	Qsd-Ojb	108	20		108	
6	J. C. Havel	1962	5	12	215	Omb	84	60	135/5½		
7	J. Hamilton	1951	6	4½	117	"	23	49	84/		
8	C. Swinson	1927	6	7	172	Omb (fault)	90	30	50/	94	

Well No.	Owner	Year Drilled	Csg. dia. (in)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
9	LaBarre	1934	6	5	135	Omb (fault)	130	40	77/	12	
10	Sheffield Farms Company	1927	6	40	178	" "				32	
11	(House)	1927	6	5	85	" "			22/	0	
12	Thompson	1930	6		100	COk		flows		0	
13	E. Tynan	1966	6	20+	97	"	40	10	25/1	3	
14	Green Twp. School	1953	6	12	245	"	21	50	120/12		
15	C. Buckingham	1966	6	20	48	"	26	10	30/2		
16	C. Clauer	1965			122	Qsd	54				
17	A. Welden	1961	6	14	110	COk	28	30		26	
18	P. DeJager	1960	6	12	130	"	25	30		7	
19	H. Gibbs	1964		30	213	"	50			2	
20	A. Paul	1964	6	18	70	"	20	40	50/2		
21	T. Masitti	1963		1/4	203	"	36	55	190/1		
22	Tranquility Bldrs.	1961	5	20+	44	"	21	20	20/1		
23	M. Grimm	1963	6	3/4	172	"	22	54	160/1		
24	E. Roome	1949	6	17	143	"	22	20	60/		
25	L. VanAuken	1949	6	2	250	"	22	45	200/	4	
26	M. Smith	1961	5	16	98	"	21	25	80/1		
27	Tranquility Bldrs.	1961	5	1	99	pC	22	40	90/1		
28	H. Kehoe	1964		30	70	"	68	26	26/1		
29	M. Douma	1961	6	7	300	COk	38	24		37	
30	Creamery	1950	6	40	100	"				50	
31	R. Wieck	1962	5	6 1/2	97	"	27	27	70/1		
32	J. Salvadore	1966	6	3	170	"	100			75	
33	Tranquility Bldrs.	1961	5	2	224	"	28	37	102/1		
34	Tranquility Bldrs.	1961	5	3	69	"	22	16	60/2 1/2		
35	W. Witlington	1951	6	30	125	Ch	35	24	34/3	35	
36	T. Murphy	1960	6	40	90	COk	28	16		14	
37	A. Stang	1948	6	5	125	"	20	47	75/2	4	
38	B. Dahn	1952	6	11	75	"	24	28	60/7	24	
39	C. Nelson	1961	6	15	68	Qsd	68	25			
40	T. Duffee	1965	6	3	125	COk	21				
41	F. Kabrehel	1966	6	20	45	"	29	14	35/4	13	
42	E. Taylor	1961	5	13	172	"	69	17	42/1		
43	D. Papa	1964		1 1/2	74	pC	22	29	74/2	0	
44	Tranquility Bldrs.	1960	5	8	55	"	21	10	45/1		
45	G. Auche	1966	6	30	50	COk	37	10	35/2		
46	G. Basticlas	1967	6	10	50	"	23	10	35/2		
47	W. Joost	1967	6		85	Qsd	81				
48	O. Loeffley	1967	6	6	140	pC	20	38	105/2		
49	Montgomery	1966	6	20+	76	Qsd	76				
50	W. Meyrick	1964	6	4	123	pC	20	20	90/2		
51	M. Augustyn	1966	6	4 1/2	122	Ojb	44	20	105/2		
52	K. Baranauskas	1965	6	5	147	pC	19	25	105/2		
53	A. Baldassare	1962	5	12	45	"	25	7	20/1		
54	Realty Associates	1954	6	30	260	COk	23	16	80/6		
55	V. Araso	1964	6	5	90	pC	21	20	80/2		
56	H. Doeschir	1962	6	9	65	"	43	18	25/3 1/2		
57	Tranquility Bldrs., Inc.	1961	5	2 1/2	199	"	21	34	120/1		
58	Tranquility Bldrs., Inc.	1961	5	5	123	"	21	40	100/1		
59	Tranquility Bldrs., Inc.	1962	5	6	69	"	26	15	40/1		
60	L. Beaudoin	1962	5	8	73	"	33	33	68/1		
61	Tranquility Bldrs., Inc.	1961	5	6	60	"	22	18	50/1 1/2		
62	J. Cooper	1961	5	2	122	"	22	40	100/1		
63	Tranquility Bldrs., Inc.	1961	5	2 1/2	97	"	23	16	75/1		
64	Tranquility Bldrs., Inc.	1962	5	2	148	"	56	37	140/1		
65	Tranquility Bldrs., Inc.	1962	5	5	123	"	30	37	90/1		
66	J. Blades	1967	6	20+	117	COk	71			6	
67	H. Feldman	1964			248	"	85			70	
68	R. Frey	1966	6	20+	71	"	40			15	

Drillers' Logs of Wells, Green Township
(Depths below land surface are given in feet)

Well #	Depth	Log	Formation
2	0-18	Overburden	
	-395	Blue shale	Omb
	-423	Seam, blue shale, water	
4	0-25	Hardpan, boulders and gravel	
	-30	Blue clay	
	-125	Blue limestone	C0k
	-141	Yellow limestone	
	-160	White limestone	
	-170	"Brown honeycomb" rock with water	
5	0-24	Overburden	
	-36	Brown clay	
	-80	Black mud, clay	
	-108	Gravel, sand	Qsd
	-121	Limestone	Ojb
8	0-4	Overburden	
	-44	Shale	Omb
	-89	Black muck (Fault)	
	-94	Gravel	
	-172	Slate	
9	0-12	Overburden	
	-35	Slate	Omb
	-130	Black muck (Fault)	
	-135	Slate	
10	0-32	Soil and gravel	
	-52	Slate	Omb
	-84	Black muck (Fault)	
	-178	Slate	
11	0-40	Slate	Omb
	-85	Muck (Fault)	
	-85	Slate	
13	0-16	Limestone, clay, gravel	
	-53	Clay, sand, gravel	Qsd
	-122	Clay	
32	0-25	Overburden	
	-50	Sand and boulders	Qsd
	-62	Rotten rock	
	-65	Mud seam	
	-75	Silt	
	-100	Limestone	C0k
	-125	Blue limestone	
32	-130	Soft seam—water	
	-140	Gray limestone	
	-150	Soft seam—water	
	-170	Blue limestone	
43	0-33	Brown granite	pC
	-54	Gray granite	
	-74	Black granite	
47	0-5	Overburden	
	-20	Gravel	Qsd
	-45	Fine sand	
	-49	Gravel	
	-79	Fine sand, clay	
	-85	Sand and gravel	
49	0-76	Gravel	Qsd
66	0-6	Overburden	
	-48	Limestone boulders	
	-54	Big gravel	Qsd
	-103	Blue limestone	C0k
	-105	Brown limestone with brown clay	
	-117	Blue white limestone	
67	0-25	Overburden	
	-31	Sand and gravel	Qsd
	-34	Boulders	
	-70	Sand and gravel	
	-86	Soft limestone	C0k
	-130	Blue limestone	
	-140	Gray white limestone	
	-195	Blue white limestone	
	-199	Brown limestone	
	-230	Blue limestone	
	-231	Brown limestone	
	-238	Blue limestone	
	-239	Brown white limestone	
	-248	Black limestone	
68	0-15	Sand	
	-23	Hard limestone	C0k
	-40	Rotten limestone	
	-44	Rotten limestone—water	
	-71	Soft rotten limestone	

HAMPTON TOWNSHIP

DOMESTIC WELLS [1 & 2]

Formation	*No. of Wells*	*YIELD IN GALLONS PER MINUTE* *Maximum*	*Minimum*	*Average*	*Median*
Stratified Drift (Qsd)	5	30	5	15	10
Martinsburg Formation (Omb)	154	65	1	8	7
Kittatinny Formation (C0k)	38	75	1	12	5

Formation	*No. of Wells*	*DEPTH IN FEET BELOW SURFACE* *Maximum*	*Minimum*	*Average*	*Median*
Stratified Drift (Qsd)	5	71	44	53	50
Martinsburg Formation (Omb)	154	392	53	142	130
Kittatinny Formation (C0k)	38	236	57	133	125

[1] Wells and formations with insufficient data are not used in the summary.
[2] There are no industrial wells. See regional summary of industrial wells.

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
1	R. A. Foley	1952	6	2	108	COk	24	39	84/		
2	F. Cassedy	1953	6	1½	110	"	20	25	90/		
3	A. Mawson	1954	6	8	95	"	8	19	31/4	5	
4	J. Ciuselsli	1951	6	10	81	"	20½	20	45/	25	
5	E. F. Victoria	1953	6	10	82	"	14	27	48/4	14	
6	S. Sicheri	1952	6	3	70	"	26	25	35/3	29	
7	Park Tavern	1940	6	7	149	"					
8	J. Rupakus	1956	6	5	131	"	8	38	84/4	10	
9	Louis' Lake House	1964	6	4	236	"	85	12	200/2		
10	J. Moore	1961	6	10	101	"	18	30	90/4	10	
11	C. Beyer	1954	6	3	154	"	11	40	85/4	8	
12	R. Simon	1965	6	30	64	"	26	26			
13	W. Jackman	1960	6	3	85	Omb	53	28	80/4	10	
14	Blair Haven	1964	6	6	176	COk?	42	20	80/2		
15	E. Castagna	1965	6	30	100	"	70	14	50/2		
16	B. Nutter	1962	6	30	134	Omb	97	20	80/4	27	
17	Chas. Reise	1949	6	2	175	"	21	10	170/4		
18	James Ocella	1949	6	3	125	"	29	12	100/3		
19	I. Kline & H. Wheeler	1948	6	16	108	"	40	13	40/8		
20	Berchten Breites	1950	6	1½	156	"	21	18	50/		
21	M. Walton & L. DeWitta	1949	6	10	110	"	21	21	60/		
22	J. A. Leach	1948	6	3	145	"	21	42	100/		
23	J. J. Robinson	1948	6	3	122	"	20	30	90/2		
24	Frank G. Miller	1949	6	10	125	"	19	14	90/3		
25	R. Tulloch	1952	6	5	105	"	32	20	80/		
26	Wm. Stoecker	1949	6	8	175	"	32	55	84/1		
27	A. V. Schweser	1953	6	10	108	"	90	3	63/		
28	C. Van Horn	1951	6	15	169	"	20	15	86/2		
29	R. Millana	1953	6	4½	109	"	19	34	94/		
30	C. Delade	1965	6	4	147	"	83	38	100/2		
31	H. Lindstromi	19—	6	60	110	"	86	10	60/		
32	J. T. Kenny	1966	6	2	130	COk	85	20	80/2		
33	E. DeFrancis	1956	6	6	116	Omb	106	31			
34	T. Menig	1964	6	15	121	"	78	54	100/2		
35	P. Peluso	1966	6	1½	317	"	49	59	210/2		
36	F. H. Ray	1964	6	6	120	"	98	12			
37	Martin DeMarco	1963	6	65	100	"	52	22	31/	45	
38	R. Lecher	1964	6	2½	156	"	74	5	140/2		
39	Carl K. Morse	1955	6	6	210	"	8	25	50/4		
40	N. Obree	1961	6	15	160	"	102	43	118/3	82	
41	G. C. Humphrey	1965	6	10	95	COk	43	20		43	
42	Silesian Sisters	1958	6	35	382	Omb	23	50	270/		
43	Elmer A. Tag	1964	6	5	273	COk breccia?	20	68	250/3/4		
44	H. Wolcott	1965	6	5	81	COk	52	31			
45	R. App	1957	6	25	100	COk fault	25	49	70/3	25	
46	E. Huff	1961	6	3	196	Omb	20	25	190/4	3	
47	T. Whitworth	1966	6	20	83	"	59	41			
48	R. Decker	1965	6	7	96	"	40	28	80/4	20	
49	J. Snover	1966	6	50	87	"	37	10	25/2		
50	R. Haight	1966	6	6	196	"	20	50	140/2		
51	W. Yetter	1965	6	5	86	"	34	16			
52	C. Wyker	1965	6	..	122	"	20			0	
53	H. Bone	1961	6	7	78	"	20	15	60/1	18	
54	W. Trexler	1962	6	3	183	"	28	30			
55	Newton Drive-In Theater	1958	6	15	130	"	20	6			
56	C. Sprague	1964	6	20	100	"	50	14	70/4	18	
57	C. Molencamp	1957	6	10	165	"	25	24	160/2	0	
58	K. Koninis	1964	6	15	98	"	12	33	80/2		
59	P. Koninis	1966	6	1	297	"	20	50	210/2		
60	J. Sullivan	1961	6	12	392	"	27	18			

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMA-TION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
61	F. Kiely	1961	6	5	147	Omb	20	20	130/4		
62	J. Bellush	1965	6		293	Omb & Obj?	75			64	
63	W. Gray	1961	6	7	150	Omb	32	6	140/4	5	
64	J. Sabo	1966	6	7	100	"	14	12	80/2		
65	V. Galate	1949	6	6	255	"	141	64	200		
66	R. Spartarella	1964	6	2	222	"	92	11	190/2		
	CLEARVIEW LAKE (67-84)										
67	A. Markefka	1964	6	5	137	COk	20	9	120/2		
68	H. Panasick	1959	6	10	188	"	25	71	171/2	25	
						fault					
69	K.T.M. Constr. #6	1963	6	32	143	COk	40	52	100/2	25	
70	F. Bosillo	1963	6	20	183	"	53	78	118/2	43	
						fault					
71	W. Hamilton	1958	6	20	60	COk	42	8			
72	Frank Buchner	1963	6	35	172	"	85	28	56/3	70	
73	R. Krajewski	1962	6	3	84	"	28	20			
74	W. Labe	1965	6	5	115	"	93	78			
75	P. Nagy	1965	6	5	85	"	19	26			
76	Clear View Lake, Inc.	1963	6	10	49	Qsd	49	27			
77	W. Katowski	1962	6	5	161	COk	106	60			
78	S. Ruski	1964	6	10	123	"	18	23	80/2		
79	G. Meisenkothen	1963	6	5	52	Qsd	52	35			
80	E. Tyson	1962	6	75	125	COk	25	48			
81	M. Stasiak	1963	6	4	125	"	22	58			
82	M. Szuba	1963	6	30	71	Qsd	71	38			
83	H. E. Schmidt	1963	6	3	165	COk	40	46			
84	Clear View Lakes, Inc.	1960	6	5	124	"	54	39			
85	K. Nehrkorn	1962	6	1	200	"	24	30			
86	J. Ferrara	1960	6	1	215	"	215	49			
87	P. Nagy	1962	6	10	57	"	40	21			
88	W. Borgos	1962	6	12	147	"	108	45			
89	C. Quinn	1962	6	20	51	Qsd	51	19			
90	Clear View Lake, Inc.	1961	6	10	44	"	44	22			
91	W. Gould	1965	6	6	203	Omb	40	53			
	CRANDON LAKES (92-199)										
92	J. Gansarski	1965	6	10	118	Omb	45	8			
93	E. Olsen	1965	6	10	117	"	46	12			
94	F. Bartok	1964	6	10	190	"	42	58	138/3		
95	A. Monti	1964	6	4	104	"	35	10			
96	A. P. Tirinato	1962	6	10	138	"	66	70			
97	J. Mulligan	1963	6	7	121	"	23	2			
98	G. Cardinal	1962	6	10	116	"	36	2			
99	E. Linihan	1963	6	5	158	"	115	73			
100	J. Grod	1964	6	3	124	"	21	2			
101	P. L. Jumet	1963	6	5	153	"	100	43			
102	V. J. Loos	1963	6	7	53	"	47	34			
103	Crandon Lakes Dev. Co.	1962	6	10	119	"	52	10			
104	S. Oktabinski	1962	6	5	160	"	16	59			
105	C. J. Goble	1962	6	4	146	"	37	5			
106	H. Hiller	1961	6	1	145	"	26	13			
107	J. T. Meckier	1961	6	20	146	"	26	32			
108	M & J Griffin	1965	6	8	125	"	86	31			
109	F. Smith	1965	6	7	106	"	43	5			
110	O. E. Spino	1965	6	10	105	"	49	9			
111	W. Perkins	1965	6	4	125	"	42	5			
112	C. H. Fiorillo	1965	6	4	145	"	53	2			
113	C. Rider	1964	6	20	87	"	42	flows			
114	H. E. Hochter	1964	6	8	145	"	62	30			
115	R. Sollecito	1964	6	20	233	"	47	13			

CRANDON LAKES (92-199)

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
116	P. Weindorf	1964	6	6	136	Omb	42	20			
117	J. Viano	1964	6	10	122	"	23	11			
118	W. Henning	1964	6	5	104	"	46	6			
119	G. E. Helander	1964	6	7	130	"	53	2			
120	G. Combos	1964	6	10	105	"	34	9			
121	M. Tunick	1963	6	4	125	"	21	14			
122	J. Juodis	1963	6	7	125	"	23	16			
123	J. Lulay	1963	6	3	125	"	20	14			
124	M. Fronzuto	1963	6	5	55	"	49	3			
125	M. Nolan	1963	6	3	180	"	58	51			
126	H. Joerger	1963	6	7	155	"	104	44			
127	S. Adamski	1962	6	7	57	"	52	flows 1 gpm			
128	Shulkowski & Kovach	1962	6	10	118	"	59	15			
129	G. H. Cooney	1962	6	8	90	"	49	1			
130	C. Bock	1962	6	10	102	"	42	3			
131	G & M Genduso	1962	6	7	146	"	28	14			
132	J. Suirken	1961	6	2	145	"	26	12			
133	M. Pollack	1963	6	10	131	"	21	4			
134	F. Marcigliano	1960	6	1	165	"	49	4			
135	E. Olson	1965	6	10	117	"	46	12			
136	J. Maricq	1965	6	2	185	"	20	6			
137	E. Brozostowski	1965	6	11	247	"	18	1			
138	T & S Parks	1962	6	3	180	"	146	75			
139	T. Stange	1956	6	10	230	"	215	120	220/3	215	
140	W. Hamer	1963	6	10	135	"	54	11			
141	J. R. Keller	1961	6	7	118	"	78	43			
142	A. C. Long	1963	6	7	123	"	56	10			
143	G. Maurer	1963	6	2	145	"	36	14			
144	E. C. Becon	1963	6	6	163	"	21	16			
145	M. Pihokker	1964	6	5	130	"	59	6			
146	W. Grigonis	1964	6	7	140	"	36	5			
147	D. Wasylyk	1965	6	4	145	"	36	8			
148	C. Bishop	1965	6	8	150	"	114	52			
149	J. M. Hyland	1965	6	3	197	"	50	10	150/2		
150	L. M. Mongiello	1963	6	2	120	"	68	flows 1 gpm			
151	J. S. Parks	1959	6	5	105	"	71	4			
152	J. Koerber	1965	6	9	92	"	73	35			
153	A. Ficarota	1964	6	6	125	"	56	6			
154	Jannello & Russo	1962	6	7	130	"	34	6			
155	S. Sanphillopo	1966	6	6	90	"	18	11			
156	A. Fitzgibbons	1965	6	10	125	"	48	12			
157	J. Fontana	1964	6	6	135	"	60	18			
158	J. T. Foy	1962	6	5	124	"	24	13			
159	G. Rosien	1966	6	10	101	"	79	1			
160	A. Pedona	1965	6	20	85	"	25	10			
161	W. Wragg, Jr.	1965	6	14	116	"	38	12			
162	R. Spehalski	1965	6	5	107	"	45	6			
163	J. Spehalski	1966	6	5	130	"	44	21			
164	G. E. Smith	1964	6	5	117	"	52	13			
165	P. Slahor	1964	6	3	156	"	61	8			
166	A. M. O'Reilley	1963	6	7	126	"	24	16			
167	M. Lawrence	1963	6	8	133	"	48	15			
168	D. Mattiace	1962	6	4	130	"	60	19			
169	T. Sutowski	1962	6	3	115	"	58	10			
170	C. Wasdyke	1962	6	3	114	"	63	4			
171	S. I. Weinberg	1961	6	2	112	"	41	8			
172	E. Cembor	1961	6	2½	88	"	64	4			
173	W. Johnson	1961	6	6	161	"	44	12			

HAMPTON TOWNSHIP

CRANDON LAKES (92-199)

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
174	A. Garforth	1961	6	7	160	Omb	30	11			
175	R. Pittenger	1966	6	15	124	"	22	flows			
176	E. Zielinski	1966	6	15	84	"	25	1			
177	R. O'Donnell	1963	6	5	130	"	51	15			
178	H. Burkhardt	1962	6	2	186	"	21	13			
179	S. B. Matranga	1963	6	1	206	"	21	15			
180	W. Lordo	1961	6	5	104	"	57	11			
181	J. Hicswa	1962	6	2	166	"	33	15			
182	P. Donanski	1962	6	10	63	"	26	6			
183	H. J. Beltram, Jr.	1961	6	15	104	"	26	9			
184	L. Palazzo	1961	6	6	153	"	40	13			
185	E. Goirin	1961	6	3	146	"	29	29			
186	S. D. Ambrosio	1965	6	7	270	"	191	113	170/2		
187	M. Souza	1964	6	10	332	"	32	28	158/3	32	
188	J. Pagnotta	1960	6	12	145	"	45	flows			
189	E. Bollinger	1966	6	8	186	"	21	26			
190	J. Sandano	1963	6	10	135	"	20	25			
191	A. Yannuzzi	1960	6	1	247	"	20	8			
192	W. Rella	1966	6	2	90	"	52	4			
193	D. R. Cuches	1964	6	2½	103	"	39	9			
194	J. Schultz	1965	6	12	175	"	50	4	80/2		
195	J. Albohn	1964	6	12	70	"	70	6	60/2		
196	C. Rosien	1964	6	5	172	"	50	10	90/2		
197	W. Marquardt	1963	6	1½	165	"	24	3			
198	D. Kelly	1959	6	3	114	"	42	12	bottom/1		
199	A. Passalacqua	1959	6	15	98	"	37	15	65/1		

Drillers' Logs of Wells, Hampton Township
(Depths below land surface are given in feet)

Well #	Depth	Log	Formation
2	0-5	Clay	
	-95	Limestone	C0k
5	0-14	Clay	
	-82	Limestone	C0k
6	0-3	Clay	
	-28	Hardpan	
	-70	Slate	Omb
33	0-20	Clay and gravel	
	-93	Sand and gravel	
	-101	Gravel	
	-106	Clay	
	-116	Slate	Omb
91	0-25	Hardpan and broken up rock	
	-100	Black shale rock	Omb
	-158	Hard gray rock	
	-175	Black shale rock	
91	-186	Very hard gray rock	
	-203	Black shale rock	
139	0-100	Hardpan and gravel	
	-150	Hardpan and red clay	
	-200	Red clay and red sand	
	-215	Very fine sand	
	-230	Blue shale rock	Omb
187	0-12	Boulders and hardpan	
	-16	Broken up rock	
	-100	Blue shale rock	Omb
	-172	Hard gray rock	
	-229	Brown sandstone	
	-275	Hard red rock	
	-298	Soft red shale rock	
	-315	Hard red rock	
	-332	Red shale rock	

HARDYSTON TOWNSHIP (Including FRANKLIN and HAMBURG BOROUGHS)

DOMESTIC WELLS [1]

Formation	No. of Wells	Maximum	Minimum	Average	Median
		YIELD IN GALLONS PER MINUTE			
Stratified Drift (Qsd)	13	27	3½	13	13
Martinsburg Formation (Omb)	5	60	1	18	6
Kittatinny Formation (C0k)	77	120	1	15	8
Franklin Limestone (fl)	19	70	1½	19	18
Precambrian crystallines (pC)	86	50	¼	9	7

Formation	No. of Wells	*DEPTH IN FEET BELOW SURFACE* Maximum	Minimum	Average	Median
Stratified Drift (Qsd)	13	218	51	109	87
Martinsburg Formation (Omb)	5	207	83	125	99
Kittatinny Formation (C0k)	77	428	40	145	128
Franklin Limestone (fl)	19	205	52	109	98
Precambrian crystallines (pC)	86	350	50	126	122

INDUSTRIAL WELLS [1, 2]

Formation	No. of Wells	*YIELD IN GALLONS PER MINUTE* Maximum	Minimum	Average	Median
Stratified Drift (Qsd)	5	942	50	319	177

Formation	No. of Wells	*DEPTH IN FEET BELOW SURFACE* Maximum	Minimum	Average	Median
Stratified Drift (Qsd)	5	113	72	87	72

1 Wells and formations with insufficient data are not used in this summary.

2 There are 4 additional industrial wells, 2 from the Kittatinny Formation, and 2 from the Precambrian Crystallines. See regional summary of industrial wells.

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
1	J. Quimet	1966	6	20	80	pC	22	30	60/2		
2	A. Poulos	1965	6	12	122	"	14	15	80/2		
3	H. Peterman	1961	6	10	65	"	16	25	bottom/2		
4	L. Cofrancesco	1953	6	12	236	"	12	16	60/2	0	
5	A. Dennis	1964	6	10	197	C0k	11	28	70/2		
6	C. Clayton	1961	6	5	250	"	90	87	230/3	82	
7	Manich & Ross	1962	6	3	207	Omb	27	7			
8	E. Opatick	1966	6	6	200	C0k	55	62	187/3	30	
9	G. W. Dowd	1951	6	1	99	Omb	14	3			
10	C. E. Ross	1952	6	10	83	"	28	16			
11	E. Opatick	1965	6	28	428	C0k	25	132	276/3	5	
12	Shotmeyer Bros. #1	1965	6	8	147	"	21	15	105/2		
13	T. Forgesen	1963	6	1½	125	"	16	22			
14	T. Butte	1963	6	35	208	"	115	6	92/3		
15	Shotmeyer Bros. #2	1966	6	20	73	"	52	43	60/2		
16	E. Opatick	1963	6	27	212	Qsd	212	95	120/3		
17	F. Kirk	1963	6	22	158	C0k	132	92	120/3	122	
18	E. Opatick	1962	6	30	192	"	136	82	110/3	125	
19	" "	1963	6	7	225	"	70	96	200/3	60	
20	" "	1962	6	30	225	"	120	62	123/3	110	
21	M. Day	1954	6	5½	116	"	34				
22	C. Hunt	1964	6	6	272	"	14	62	250/2		
23	S. Bower & Son	1965	6	18	245	"	75	68	148/3	60	
24	Pacific Gas & Oil	1965	6	5½	325	"	42			15	
25	W. Munkacsy	1961	6	50	151	"	136	75	110/3	136	
26	G. Harms	1964	6	5	125	"	24	45	115/3		
27	Alhar Realty Co.	1950	6	30	165	"	55	80	80/4		
28	R. Crane	1964	6	3	84	"	19	47	75/2		
29	Carlton Village	1967	6	3	350	"	50			2	
30	F. Edsall	1967	6	9	112	"	30				
31	W. Munkacsy	1962	6	20	250	"	115	68	114/3	102	
32	A. Grumm	1961	6	15	146	"	26	31			
33	Sussex Quarries, Inc.	1965	6	50	109	pC	15	26	90/2		
34	E. Prisco	1966	6	12	74	C0k	21	12	50/2		
35	A. J. Smith	1952	6	12	98	"	13	45	65/2		
36	H. Lewis, Sr.	1963	6	5	182	"	15	77			
37	A. Terhune	1965	6	3	157	"	18	53			
38	C. Banta	1952	6	8	135	"	25	52	70/1		

HARDYSTON TOWNSHIP (Including Franklin & Hamburg Boroughs)

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
39	S. Rosen	1963	6	10	131	COk	24	70			
40	R. Garrity	1965	6	2	225	"	19	59			
41	R. Stefft	1962	6	6	120	"	16	57	90/2		
42	R. Maticko	1964	6	3	166	"	37	5	150/2		
43	C. Premock	1956	6	15	73	Qsd	73	14	18/2		
44	Sheffield Farms (Prior) Dairy	1920	6	30	160	COk				60	
45	Boro. of Hamburg #1 (Prior)	1929	38/26	125	72	Qsd					I
46	Boro. of Hamburg #2 (Prior)	1929	12/8	230	72	"	53/73	0	30/		I
47	Boro. of Hamburg #3 (Prior)	1929	12/8	50	103	"					I
48	Boro. of Hamburg #4 (Prior)	1927	36/24	250	73	"	55/75				I
49	J. Lentz	1959	6	25	97	COk	25	37	48/1		
50	H. Labar	1961	6	12	210	"	26	36	142/3	20	
51	R. Rachok	1964	6	1½	173	"	21	70	160/2		
52	G. House	1966	6	18	51	Qsd	51	19	40/2		
53	T. Eginton	1966	6	6	148	COk	14	14	80/2		
54	P. Yurchalk	1964	6	16	172	Ch	40	66	122/3	20	
55	T. Case	1962	6	6	125	fl	24	12			
56	A. Stockbower	1966	6	21	191	COk	62	86	124/3	50	
57	W. Munkacsy	1963	6	27	98	Ch	27	36	84/3	15	
58	R. Edwards	1965	6	7	73	fl	42	24	60/2		
59	C. Conner	1964	6	20	68	"	45	27	50/2		
60	J. Rude	1964	6	15	71	"	20	24	60/2		
61	C. Rude	1964	6	8	65	"	35	25	60/2		
62	R. Storms	1962	6	3	130	"	120	43	114/1		
63	G. Geary, Sr.	1964	6	14	133	Omb	21	7	90/2		
64	T. Buchkewich	1951	6	30	40	COk	23	12	12/2		
65	K. Henderson, Jr.	1964	6	60	98	Omb	20	20	60/2		
66	R. Bachholz	1965	6	5	126	COk	18	26			
67	D. LaForge	1965	6	50	50	"	37	14	30/2		
68	D. Koch	1968	6	2½	273	"	51	59	210/2		
69	Freeway Constr. Co.	1965	6	1½	297	pC	20	41	290/	4	
70	R. Simmons	1954	6	10	218	Qsd	208/218	50	60/6		
71	W. Rousset	1964	6	120	65	COk	10	20	50/2		
72	J. Brohm	1961	6	4	90	"	19	20			
73	Q. Gauter	1964	6	11	172	"	40	30	150/3	30	
74	R. Bergman	1962	6	10	116	"	92	71			
75	L. Day	1950	6	10	114	"	87	69	73/2		
76	Hardyston Township	1952	6	5	175	"	96	37	60/4	95	
77	North Hardyston Cemetery	1955	6	5	202	"	154	115	200/3	145	
78	J. Quinn	1965	6	4½	97	"	22	21	80/2		
79	F. Van Horn	1965	6	15	55	"	22	18			
80	B. Edsall	1964	6	5	250	"	24	23	200/2		
81	D. Veltri	1964	6	4	147	"	34	23	90/2		
82	T. Allbright	1965	6	5	73	"	21	10	60/2		
83	T. Veltri	1964	6	10	66	"	22	20	55/2		
84	J. Laner	1965	6	2½	108	pC	20	80	108/2	28	
85	W. Munkacsy	1962	6	30	205	COk	167	36	69/3	167	
86	E. W. Duck	1954	6	7	82	"	21	10	75/2	12	
87	E. Demchak	1966	6	30	110	"	48	5	90/2		
88	H. Atwood	1967	6	12	87	Qsd	87	31	75/2		
89	T. Jones	1964	6	4½	98	COk	22	20	80/2		
90	E. Crane	1960	6	8	76	Qsd	76	23	bottom/3		
91	E. Scott, Sr.	1965	6	25	50	COk	43	12	35/2		
92	" " "	1964	6	20	50	"	42	25	35/2		
93	" " "	1964	6	20	50	"	43	26	35/2		
94	J. McGee	1955	6	10	71	"	57	21			
95	Wm. Munkacsy	1964	6	10	85	fl	25	21	66/3	25	

HARDYSTON TOWNSHIP (Including Franklin & Hamburg Boroughs)

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
96	L. Snook	1964	6	10	98	fl	50	27	72/3	42	
97	Borough of Franklin	1966	6	100	105	C0k	62	30	100/8		I
98	W. Drew	1965	6	2½	112	"	30	35			
99	E. Carrol	1963	6	7	63	"	23	35			
100	N. Lorenzo	1962	6	1	85	"	35	12			
101	G. A. Yanvary	1951	6	8	48	"	15	18			
102	Boro. of Franklin #1			Test	63	Qsd				58	I
103	" " " #2			"	95	C0k				88	I
104	" " " #3			"	60	Qsd				54	I
105	" " " #4			"	45	"				31	I
106	" " " #5			"	10	C0k				5	I
107	" " " #6			"	105	"				48	I
108	L. Weslowski	1952	6	3	67	"	18	16			
109	R. Carrol	1964	6	1	145	"	19	59			
110	St. Cloud Bldg. Corp.	1957	8	50	379	C0k-Ch-pC	12	112	220/8	10	I
111	L. J. Osborne	1966	6	20	104	C0k	21	40			
112	J. Pongracz	1965	6	3	122	"	13	28	80/2		
113	Cellate, Inc.	1959	6	19	166	Ch-fl	38	19	bottom/6		
114	W. Grazevich	1967	6	35	72	C0k	41	6	50/2		
115	Franklin Armory N.J. N.G.	1956	6	40	117	"	28	22	22/8	15	
116	Immaculate Conception Church	1960	6	7	157	"	28	40			
117	M. Franek	1961	6	45	105	fl	35	11	79/5	25	
118	C. Norman	1964	6	2½	155	C0k	25	50	145/2		
119	Hardyston Twp. Bd. of Education	1958	6	20	262	"	20	37			
120	J. VanAcker	1955	6	10	110	Qsd	65	20	100/2	65	
121	W. Day	1965	6	7	170	fl	50	28	138/3	30	
122	S. Wein	1964	6	30	52	"	13	5	40/2		
123	J. Smith	1949	6	17	165	"	85	77	96/3		
124	J. Ribel	1951	6	3½	130	Qsd	126	1½			
125	R. Landay	1964	6	20	114	fl	109	26	50/2		
126	G. Graf	1963	6	8	121	pC	50	21	110/7		
127	J. Martin	1967	6	70	148	fl	50	30	60/2		
128	R. Hillis, Jr.	1966	6	25	132	"	92	45	100/3	90	
129	E. Day	1959	6	20	105	Brn., & Yellow Shale	41	15	51/3		
130	H. Moine	1966	6	15	51	Qsd	51	10	40/2		
131	J. Shauger	1964	6	3	222	pC	217	19	200/2		
132	C. Englert	1965	6	10	290	fl-pC	275	18	70/2	75	
133	W. Martin	1964	6	5	147	pC	73	24	90/2		
134	A. Sova	1957	6	1½	205	fl	48	20			
135	D. Jantusch	1964	6	6	60	pC	55	24	50/2		
136	J. Vance	1962	6	18	188	"	65	56	152/3	52	
137	F. Jennings	1966	6	25	64	fl	64	1	30/2		
138	" "	1966	6	30	70	"	58	1	50/2		
139	R. Marshall	1955	6	8	87	Qsd	30	21	40/14	21	
140	M. Krizovsky	1950	6	10	140	fl	122	45	100/4		
141	E. Honig	1966	6	10	197	pC	20	2	160/2		
142	" "	1965	6	4	173	"	21	7	160/2		
143	A. Yurchak	1966	6	20	94	"	94	10	60/2		
144	N. Weir	1961	6	6	102	"	19	20	80/2	8	
145	W. Marchall	1958	6	15	110	"	20	21	110/4		
146	R. Grimshaw	1962	6	8	165	"	44	20	120/2		
147	Silver Lake YMCA #1	1967	6	2	350	"				4	
148	" " " #2	1967	6	0	198	"				17	
149	" " " #3	1967	6	20	298	"				20	
150	" " " #4	1967	6	½	200	"	86	2	160/½	59	
151	E. Cole	1964	6	6	148	"	25	20	80/2		
152	J. Henderson	1964	6	2	85	"	9	27	80/2		
153	B. Deckmar	1962	6	7	73	"	10	23	60/2	37	

HARDYSTON TOWNSHIP (Including Franklin & Hamburg Boroughs)

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
154	Lake Gerard Co.	1955	8	40	76	pC	28	0	20/8	14	
155	A. P. Van de Veld	1966	6	5	51	Qsd	51	7			
156	D. Bennett	1964	6	6	122	pC	20	15	90/2		
157	L. VanArden	1964	6	6	71	"	19	23	60/2		
158	E. Kay	1964	6	4	122	"	51	27	100/2		
159	M. Schneller	1965	6	20	80	"	11	18	60/2		
160	Holbar Constr. Co.	1965	6	4½	123	"	24	17	80/2		
161	Deertrail Lake	1954	6	7	78	"	35	15	78/½	34	
162	" "	1954	6	10	76	"	26	53	76/½	25	
163	P. Simpson	1965	6	2	172	"	31	14	160/2		
164	J. Prebula	1965	6	3	55	"	17	9	55/3		
165	C. Leoner	1965	6	5½	172	"	47	2	100/2		
166	Aeon Realty Co.	1953	6	7½	133	"	22	6	47/5	12	
167	J. Hamilton	1967	6	8/10	197	"	17			0	
168	F. Hoffman	1966	6	2	186	"	18	31			
169	M. Kasperczak	1964	6	3	122	"	11	20	100/2		
170	A. Ackerman	1965	6	4	64	"	35	22			
171	Lake Tamarack Water Co.	1963	6	140	58	"	22	2	45/8	21	I
172	C. Dandrew	1964	6	1	207	"	16	40	200/2		
173	F. Tentschert	1964	6	4	171	"	12	20	160/2		
174	E. Mesmer	1965	6	3½	145	"	11	40	105/2	0	
175	R. Babcock	1964	6	2	146	"	11	38			
176	E. Weber	1966	6	5	174	"	52	32	162/3	27	

LAKE STOCKHOLM (177 to 215)

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
177	H. Promnitz	1965	6	20	114	"	22	+1	25/2	13	
178	C. Happe	1963	6	9	127	"	21	11	110/2		
179	F. Seeger	1966	6	3	147	"	50			46	
180	L. VanNess	1965	6	6	70	"	24	34	60/1		
181	H. Kinnard	1964	6	4	147	"	20	27	140/¾	6	
182	St. John's Church	1962	6	20	85	"	42	19	75/2		
183	J. Decker	1962	6	16	70	"	34	13	95/1		
184	W. Norman	1956	6	10	82	"	48	40	70/3	47	
185	A. Birtone	1966	6	21	125	"	75	6	64/1	85	
186	K. D. & H. Realty Co.	1965	6	18	173	"	42	8	150/1	15	
187	Rock Lodge Club	1966	6	14	98	"	20	5	90/1	2	
188	" " "	1964	6	15	121	"	21	41	111/1¼	4½	
189	R. Colson	1955	6	15	84	"	52	19	70/3	52	
190	J. Foy	1964	6	8½	98	"	42	23	90/1		
191	E. West, Jr.	1954	6	5	110	"	13	7	100/3	8	
192	H. Kinnard	1964	6	¼	222	"	29	18	175/¾	9	
193	A. Lewis	1965	6	2½	139	"	38	30	120/2	22	
194	S. Boles	1963	6	1½	123	"	39	37	115/1		
195	J. Ruggiero	1963	6	8	65	"	41	12	55/1		
196	G. Paulison	1963	6	15	86	"	64	8	86/2	64	
197	H. Kinnard	1962	6	2	148	"	30	17	135/1		
198	J. Foy	1961	6	5	95	"	39	20	30/1		
199	B. Kazzera	1961	6	10	73	"	36	10	40/1		
200	E. Ulbright	1961	6	7	81	"	38	36	60/1		
201	" "	1963	6	20	67	"	50	8	20/1		
202	H. Kinnard	1966	6	6	122	"	21			2	
203	R. Colson	1965	6	4	120	"	48	18	100/2		
204	E. Ulbright	1962	6	17	72	"	52	10	35/1		
205	S. Boles	1965	6	10	90	"	31	26	60/2		
206	H. Bradshaw	1966	6	20	92	"	26	20	35/1		
207	L. VanNess	1965	6	2	172	"	23	23	160/2		
208	G. Grace	1952	6	15	60	"	20	18	25/3	19	
209	P. A. Nigri	1953	6	25	50	"	21	10	25/2	12	
210	T. Aiello	1967	6	12	77	"	10	12	50/2		
211	J. Dassatti	1965	6	15	70	"	21	39	60/2		
212	J. Azzarello	1962	6	1½	162	"	40	12	100/1		

HARDYSTON TOWNSHIP (Including Franklin & Hamburg Boroughs)

LAKE STOCKHOLM (177 to 215)

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
213	J. Mulhern	1962	6	2½	150	pC	33	17	130/1		
214	E. Ulbright	1962	6	3½	75	"	41	17	60/1		
215	M. Lacatena	1962	6	1½	122	"	43	14	114/1		
216	Sparta Mt. Water Co.	1950	8	60	88	"		2½	44/		I
217	Lake Tamarack Realty Developers	1946	6	5	295	"				35	
218	Lake Tamarack Realty Developers	1946	6	3	90	"				35	
219	H. A. Hogan	1949	6	15	103	"	77	15	25/1		
220	E. Ulbright	1951	6	2½	99	"			bottom/		
221	J. Ocet, Jr.	1964	6	18	147	Qsd	147	8	100/6		
222	American Urethane Co.	1956	10	200	200	C0k	26	16	60/10		I
223	J. Popek	1965	6	20	122	Qsd	109	8	50/1	109	
224	M. Vetri (Phillips Gas Station)	1967	6	70	78	C0k	61	15	55/2		
225	Boro. of Hamburg	1961	20/12	942	113	Qsd	78/96	26	33/24	113	I

Drillers' Logs of Wells, Hardyston Township including Franklin and Hamburg Boroughs
(Depths below land surface are given in feet)

Well #	Depth	Log	Formation
6	0-25	Hardpan	
	-50	Hardpan and boulders	
	-75	Boulders and gravel	
	-82	Blue clay and broken up rock	
	-225	White limestone	C0k
	-250	Yellow limestone, very soft water	
8	0-25	Hardpan and boulders	
	-30	Sand and gravel	
	-40	Broken up rock	C0k
	-96	Hard blue limestone	
	-131	Soft yellow limestone—water	
	-178	Hard blue limestone	
	-200	Soft brown sandstone	
11	0-5	Hardpan	
	-10	Broken up rock	
	-100	Hard blue limestone	C0k
	-150	White limestone	
	-168	Soft yellow limestone—water	
	-336	Hard gray limestone	
	-399	"Blue shale" facies	
	-428	"Green shale" facies—water	
16	0-25	Hardpan	
	-50	Hardpan and sandy loam	
	-100	"Blue" clay	
	-125	"Blue" clay and sand	
	-150	Sand, gravel and clay	Qsd
	-175	Clay and large boulders	
	-191	Large boulders, "blue" clay and sand	
	-199	"Blue" clay, sand	
	-212	Gravel	
17	0-50	Hardpan and gravel	
	-75	Clay, gravel—water	
	-100	Fine sand, gravel—water	
	-122	Gravel and blue clay	
	-150	"Blue" limestone	C0k
	-158	A brown "honeycomb" limestone	
18	0-25	Hardpan	
	-50	Hardpan and boulders	
	-75	Hardpan, boulders, gravel and water	
	-100	Clay and sand	
	-125	Clay and broken up rock	
	-175	Hard "blue" limestone	C0k
	-192	Soft "yellow" limestone	
19	0-25	Hardpan	
	-40	Sand and gravel	
	-50	Sand, gravel and "blue" clay	
	-60	"Blue" clay	
	-125	"Blue" limestone	C0k
	-175	"White" limestone	
	-200	"Yellow" limestone	
	-225	Soft "yellow" limestone—water	
20	0-25	Hardpan, boulders	
	-50	Hardpan, boulders and gravel	
	-75	Gravel and sand	Qsd
	-90	Gravel, sand and "blue" clay	
	-100	Gravel and "blue" clay	
	-110	"Blue" clay and broken up rock	
	-150	Hard "blue" limestone	C0k
	-200	"White" limestone	
	-225	"Yellow" limestone	
23	0-25	Hardpan and gravel	
	-50	Sand, gravel and some boulders	
	-60	"Blue" clay	
	-175	Hard "blue" limestone	C0k
	-245	Soft "yellow" limestone	
24	0-15	Sand and gravel	
	-42	White limestone	C0k
	-55	Gray limestone	
	-60	Black limestone	
	-88	Light gray limestone—water	
	-92	Brown limestone	
	-100	Light gray limestone	
	-175	Black limestone—water	

Well #	Depth	Log	Formation
24	-200	Black limestone	
	-250	Light gray limestone	
	-275	Black limestone—water	
	-300	Black limestone	
	-325	Light gray limestone	
25	0-25	Hardpan	
	-75	Hardpan and boulders	
	-100	Boulders, gravel and sand	Qsd
	-125	Gravel and sand	
	-136	"Blue" clay	
	-151	White limestone	COk
29	0-2	Overburden	
	-96	Limestone	COk
	-98	Soft seam	
	-259	Limestone	
	-270	Gray shale	
	-300	Limestone	
	-350	Gray shale and limestone	
30	0-13	Overburden	
	-95	Blue limestone—water	COk
	-110	Blue limestone	
	-112	Clay seam—(This is probably a solution cavity)	
31	0-25	Hardpan	
	-50	Hardpan and cobble stones	
	-75	Sand and gravel	
	-95	Quicksand—water	
	-102	Broken up rock, sand—water	
	-150	Hard "blue" limestone	COk
	-233	"White" limestone	
	-242	Brown sandstone—water	
	-250	Soft "yellow" limestone—water	
50	0-10	Hardpan and broken up rock	
	-75	Hard "blue" limestone	COk
	-138	Soft "black" shale	
	-156	Soft "brown" limestone—water	
	-172	Soft "yellow" limestone	
	-193	Very hard gray "granite"?	
	-210	Very soft brown "granite"?	
54	0-10	Hardpan	
	-20	Broken up limestone	COk
	-75	"White" limestone	
	-129	Hard "blue" limestone	
	-146	Soft "yellow" limestone	
	-153	Soft "brown honeycomb" limestone—water	
	-161	Very hard gray limestone	
	-172	Brown sandstone—water	
56	0-25	Hardpan	
	-40	Hardpan and large boulders	
	-50	Broken up rock	
	-96	Hard "black" limestone	COk
	-118	Soft "yellow" limestone—water	
	-175	Hard "black" limestone	
	-182	Very hard "gray" limestone	
	-191	Soft "brown" sandstone—water	
57	0-15	Boulders and hardpan	
	-27	Soft "granite"? rock	Ch
	-75	Soft "brown" "granite"?	
	-87	Hard "gray" "granite"?	
	-98	Soft "brown" "granite"?	

Well #	Depth	Log	Formation
73	0-20	Hardpan	
	-30	Gravel, sand and cobble stones	
	-100	Hard "blue" limestone	COk
	-132	Soft "yellow" limestone—water	
	-150	"White" limestone	
	-172	Soft "brown honeycomb" limestone—water	
85	0-25	Hardpan	
	-50	Hardpan and cobble stones	
	-75	Hardpan and clay	
	-100	Clay, gravel and water	Qsd
	-125	Gravel and sand	
	-150	Clay	
	-167	"Blue" clay and rock	
	-205	"Blue" shale rock	COk
86	0-25	Hardpan and boulders	
	-42	Gravel, sand and water	
	-88	White limestone	fl
	-98	Yellow limestone, very soft	
102	0-5	Cinders and gravel fill	
	-48	Blue clay	Qsd
	-50	Coarse gravel	
	-57	Gravelly hardpan	
	-58	Sand	
	-63	Blue limestone	COk
103	0-88	Blue clay	
	-95	Blue limestone	COk
104	0-5	Gravelly hardpan	
	-45	Blue clay	
	-50	Clay and gravel	
	-54	Sand and gravel	
	-60	Blue limestone	COk
105	0-31	Blue clay and fine sand	
	-45	Blue limestone	COk
106	0-5	Blue clay	
	-10	Blue limestone	COk
107	0-5	Gravel	
	-48	Blue clay, gravel and fine sand	
	-105	Blue limestone and soft rotten limestone	COk
110	0-10	Open pit	
	-29	Hard blue rock	COk
	-36	Hard brown rock	Ch
	-93	Hard gray rock	
	-379	Hard granite rock	pC
115	5-15	Light gray limey clay with pebbles of medium gray dolomitic limestone	
	-45	Medium gray dolomitic limestone	COk
	-65	Same as above with yellowish gray sandy lenses	
	-95	Same, with a little pyrite and chert	
	-105	Dark gray cherty dolomitic limestone	
117	0-25	Hardpan and boulders	
	-35	Broken up rock and water	
	-82	White limestone	fl
	-95	Yellow limestone	
	-105	Blue shale rock with water	

Well #	*Depth*	*Log*	*Formation*
120	0-58	Silt and sand	
	-71	Coarse brown sand	Qsd
	-78	Limestone (boulder?)	
	-84	Clay, silt and sand	
	-98	Brown clay and sand	
	-135	Sandstone and clay	
	-140	Soft clay	
	-147	Clay, silt, granite and limestone	
121	0-20	Hardpan	
	-30	Boulders and hardpan	
	-40	Broken up rock	
	-125	Hard gray rock	pC
	-170	Brown "sandstone"	
122	0-52	Sand	Qsd
	-109	Gravel	
	-122	Soft brown granite	pC
132	0-25	Hardpan and boulders	
	-75	Yellow clay and sand	
	-100	Very soft yellow rock (limestone)	fl
	-250	Very soft brown granite	pC
	-290	Brown granite	
136	0-25	Hardpan and boulders	
	-35	Sand, gravel and water	Qsd
	-48	Gravel and water	
	-52	Clay	
	-65	Broken up rock	
	-125	Soft brown granite	pC
	-168	Hard blue granite	
	-188	Soft brown granite	
147	0-4	Overburden with boulders	
	-105	Hard white granite	pC
	-106	Brown granite—water	
	-120	Green, white and black granite	
	-203	White granite	
	-211	Black, white and green granite	
	-230	White granite	
	-350	White and black granite	
148	0-17	Overburden	
	-26	Brown granite	pC
	-92	White granite	
	-198	White, green and black granite	
149	0-20	Overburden with boulders	
	-61	White granite	pC
	-138	White and green granite	
	-139	Soft white granite	
	-210	White, green and black granite	
	-298	Green and white granite	
150	0-35	Muck and sand	
	-57	White granite	pC
	-59	Brown sand	
	-73	White and green granite	
	-74	Soft white granite	
	-81	White and green granite	
	-82	Brown and white granite	
	-98	Green and white granite	
	-99	Brown and white granite	
	-200	Green and white granite	
167	0-37	White granite, very hard	pC
	-71	Seam, water	
	-195	White, pink and green granite	
	-199	Large seam—water	

Well #	*Depth*	*Log*	*Formation*
171	0-21	Earth and boulders	
	-24	Granite	pC
	-37	Soft granite	
	-41	Very hard granite	
	-58	Granite	
176	0-20	Hardpan and boulders	
	-27	Sand and gravel	Qsd
	-34	Broken up rock	
	-128	Hard gray granite	pC
	-147	Soft brown granite—water	
	-161	Hard gray granite	
	-174	Soft brown granite—water	
179	0-46	Sand and boulders	
	-53	Rotten granite	pC
	1-47	Dark gray granite	
181	0-6	Overburden	
	-27	Gray granite	pC
	-30	Brown, soft granite	
	-60	Gray granite	
	-75	White and black granite	
	-89	Black and green granite	
	-96	Black and white granite	
	-100	Soft white granite—water	
	-120	Gray and white granite	
	-147	Gray granite	
185	0-10	Dirt	
	-25	Clay	
	-55	Sand	
	-70	Rotten granite	pC
	-125	Granite	
186	0-15	Sand, clay and gravel	
	-42	Rotten granite	pC
	-173	Hard granite	
187	0-2	Overburden	
	-7	Hard granite	pC
	-28	Dirt seam	
	-31	Soft granite	
	-60	Hard granite	
	-61	Soft seam, water	
	-98	Hard granite	
188	0-5	Overburden	
	-38	Black and white granite	pC
	-49	Brown and white granite	
	-71	Black and white granite	
	-74	Black and brown granite	
	-80	Brown and white granite	
	-91	Black, white and green granite	
	-99	Black and white granite	
	-100	Brown and white granite—water	
	-121	Black and white granite	
192	0-9	Overburden	
	-38	Black and white granite	pC
	-40	Green and white granite	
	-41	Soft brown granite	
	-60	Green and white granite	
	-104	Green and white with red mica granite	
	-126	Green and white granite	
	-166	Green and black granite	
	-177	Green, black and white granite	
	-182	Black granite	
	-199	Black, green and white granite	
	-222	Black and white granite	

HARDYSTON TOWNSHIP (Including Franklin & Hamburg Boroughs)

Well #	Depth	Log	Formation	Well #	Depth	Log	Formation
202	0-2	Overburden		225	0-3	Topsoil	
	-3	Black and white granite	pC		-12	Yellow clay	
	-25	Granite			-37	Fine yellow sand	Qsd
	-50	Light gray granite, water			-55	Sand with some clay	
	-100	Dark gray granite			-78	Sand with some traces of clay	
	-116	Black granite			-80	Clear fine sand	
	-118	Gray granite, water			-95	Clear gravel	
	-122	Soft seam			-105	Clear coarse gravel	
					-113	Gravel with traces of bedrock	

HOPATCONG BOROUGH

DOMESTIC WELLS [1]

Formation	*No. of Wells*	*YIELD IN GALLONS PER MINUTE* Maximum	Minimum	Average	Median
Precambrian crystallines (pC)	221	70	1/8	9	7

Formation	*No. of Wells*	*DEPTH IN FEET BELOW SURFACE* Maximum	Minimum	Average	Median
Precambrian crystallines (pC)	221	440	35	153	135

INDUSTRIAL WELLS

Formation	*No. of Wells*	*YIELD IN GALLONS PER MINUTE* Maximum	Minimum	Average	Median
Precambrian crystallines (pC)	5	154	25	95	94

Formation	*No. of Wells*	*DEPTH IN FEET BELOW SURFACE* Maximum	Minimum	Average	Median
Precambrian crystallines (pC)	5	198	74	130	106

[1] Wells and formations with insufficient data are not used in this summary.

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
1	A. Meury	1961	5	3	99	pC	50	27	70/1		
2	A. Ressa	1966	6	15	90	"	50			7	
3	A. Fruginele	1951	6	5	62	"	10	28	57/2		
4	S. Novak	1951	6	12	56	"	14	28	50/2		
5	L. Weber	1961	6	8	172	"	50	20			
6	H. Steer	1962	5	6	80	"	51	10	75/1		
7	R. D'Anseglio	1959	8	4	95	"	50	66			
8	L. Munni	1964		10	107	"	70	34	100/1	0	
9	D. DiMarco	1962	5	4½	121	"	51	flows	85/1		
10	B. Saverse	1962	5	5	123	"	50	7	100/1		
11	W. Brehm	1967	6	15	96	"	50			0	
12	R. Corradi	1967	6	2	197	"	50				
13	J. Rosbeck	1964	6	20	97	"	50	57	90/1		
14	S. Dion	1961	6	1	223	"	50	35	170/		
15	E. Hammaren	1966	6	3	140	"	50			8	
16	J. Hardy	1962	6	1½	166	"	50	51	145/1		
17	J. Verletto	1951	6	70	70	"	12	20	40/	12	
18	J. Lucas	1962	5	1/8	170	"	50	20	155/1		
19	S. Zaborski	1961	6	4	193	"	50	17	150/1		
20	C. Triola	1962	5	4½	123	"	50	28	105/1		
21	J. Baker	1956	6	4	112	"	50			7	
22	J. Mullaney	1961	6	10	85	"	50	12	40/1	3	
23	M. Flagan	1962	6	10	70	"	50	30			
24	J. Heule	1961	5	16	135	"	50	25	105/1		
25	Charles Turner Realty Company	1963	6	22	102	"	50	12	75/1		

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
26	E. Schoenleber	1963	6	3	215	pC	50	22	155/1		
27	R. Marshall	1961	5	4	98	"	50	50	80/1		
28	J. McDonough	1963	6	8	138	"	50	35	130/1		
29	A. Conte	1959	5	16	245	"	50	32	50/1½	8	
30	J. Ives	1960	8	12	125	"	50	55	100/½		
31	J. Novak	1964	6	10	147	"	74	12	100/2		
32	Hudson Guild Farm	1958	6	25	200	"	30	28	125/6	16	
33	S. Rice	1962	5	3	98	"	50	55	95/1		
34	E. VanVliet	1965	6	18	83	"	50	25	80/1		
35	W. Lyons	1962	5	12	74	"	50	30	65/1		
36	J. Cavanagh	1963	6	20	148	"	21	8	25/1		
37	L. Pakoczy	1962	5	18	48	"	21	3	30/1		
38	W. Eisenbach	1965	6	12	72	"	50				
39	H. Gefers	1962	5	6	100	"	50	37	90/1		
40	J. Wykoff	1962	5	6	147	"	51	48	130/1		
41	J. Crosson	1963	6	14	89	"	55	28	75/1		
42	B. Leach	1961	5	4½	145	"	50	25	130/1		
43	N. Maas	1963	6	2½	210	"	39	53	89/1		
44	T. Cahill	1964	6	5	198	"	50	35	150/1	6	
45	C. Bassard	1961	6	30+	115	"	21	27	80/2	6	
46	G. Knehr	1966	6	10	80	"	50	17	70/1	0	
47	R. Holder	1964	6	5	99	"	50	32	90/1	0	
48	R. Klein	1966	6	20	122	"	100	21	115/1	6	
49	C. Dyer	1961	6	5	156	"	50	30	140/1	0	
50	Christiansen	1962	6	3	174	"	50	38	155/1		
51	D. Crist	1967	6	5	197	"	30			8	
52	C. Hamilton	1962	6	5½	87	"	50	45	80/2		
53	I. Rebarber	1964	6	18	252	"	29	15	100/1		
54	J. O'Shaughnessy	1963	5	20	98	"	50	24	45/1		
55	J. Gruber	1965	6	6	147	"	50	4	147/1	20	
56	Detz, Inc.	1962	6	15	110	"	50	30	75/1		
57	R. Petrick	1967	6	20+	301	"	30			0	
58	Suwydaterm & Whse., Inc.	1962	6	¼	420	"	50	18	130/1		
59	P. Esposito	1965	6	6	138	"	50	10	80/2		
60	C. Dyer	1965	6	15	98	"	50	26	80/1	0	
61	R. Wolgast	1961	5	3	121	"	30	44	90/1		
62	A. Pannone	1967	6	6	222	"	54	14	200/1	8	
63	E. Brucker	1966	6	12	195	"	50	30	180/1	3	
64	A. McCarthy	1966	6	3¼	123	"	50	48	110/1	10	
65	M. Friedman	1966	6	12	146	"	50			0	
66	J. Begg	1962	5	3	149	"	50	38	130/1		
67	P. Borsilli	1964	6	5	121	"	50	23	110/1	0	
68	A. Perillo	1966	6	4	123	"	50	53	110/1	0	
69	E. Hoar	1964	6	1¼	272	"	50	11	245/1		
70	H. Wallenfels	1962	5	3	115	"	50	37	105/1		
71	F. Herlox	1965	6	8	161	"	50			4	
72	W. Shepard	1967	6	4	200	"	50			6	
73	I. Bilitz	1965	6	8	72	"	50				
74	S. Criscione	1964	6	7	170	"	50	78	160/1	0	
75	R. Baer	1962	6	20	102	"	50	62	67/1		
76	F. Palladino	1966	6	5	148	"	50			10	
77	H. Johansson	1967	6	12	363	"	50	44	150/1	8	
78	A. Granata	1966	6	15	223	"	50			31	
79	D. Ruotolo	1966	6	20+	85	"	50	48	60/1	0	
80	Z. Takats	1967	6	20	90	"	51			4	
81	C. Askeland	1965	6	20	90	"	50			9	
82	J. Lisanti	1966	6	4	122	"	50			4	
83	G. Unger	1965	6	24	236	"	50	43	78/1	0	
84	M. Fisichella	1959	5	15	302	"	50	63	130/1½		
85	K. Sutton	1964			122	"	50			11	
86	R. Bauer	1966	6	3	172	"	50	11	160/1	12	
87	H. Schwabelmeir	1962	5	25	110	"	50	4	12/1½		

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
88	P. Bramsen	1967	6	3½	145	pC	50			7	
89	R. Killian	1962	6	5	73	"	50	22	65/1		
90	M. Trumpore	1965		7	172	"	50	58	160/1	0	
91	G. Allen	1965			165	"	50			10	
92	Pete DeJager, Inc.	1967	6	1½	197	"	50			15	
93	" " "	1967	6	3½	159	"	50			0	
94	A. Antola	1963	6	23	65	"	50	10	10/1¼		
95	F. Boland	1961	5	5	80	"	31	28	70/1		
96	J. Rosey	1961	5	7	69	"	29	31	60/1		
97	Keelcraft Corp.	1961	6	12	96	"	50	30	75/1		
98	M. Hart	1963	6	3	142	"	50	4	135/1		
99	A. Basile	1961	5	12	175	"	30	15	75/1		
100	Olschesky	1965			118	"				2	
101	T. Smothergill	1965	6	20	130	"	50	6	50/2		
102	J. Gutman	1957	5	10	158	"	23	29	145/	5	
103	H. Genzale	1965	6	5½	122	"	50	5	100/2		
104	H. Swensen	1965			95	"	50			0	
105	E. Ricker	1966	6	2	185	"	50			5	
106	W. Kugel	1964			500	"	50			19	
107	G. Hoyt	1949	6	8	150	"	40	15	90/3		
108	H. Kaplin	1963	6	5	152	"	50				
109	J. Reil	1965	6	25	233	"	50	10	60/2		
110	D. Doty	1961	5	6½	120	"	50	22	105/1		
111	St. Joseph Roman Catholic Church	1958	5	15	198	"	28	30	145/2½	17	
112	F. Antonelli	1964		15	90	"	55	6	80/1	44	
113	L. Aguanno	1966	6	3	247	"	50	34	130/1	2	
114	R. Drummond	1967	6	20+	176	"	50	54	80/1	16	
115	S. J. Pollio, Inc.	1966	6	20+	110	"	50			11	
116	J. Hinlicky	1966	6	1½	270	"	50	7	250/1	17	
117	M. Wiafore	1963	6	3	110	"	50	12	150/1		
118	E. Leary	1962	6	4	115	"	50	10	105/1		
119	Bilney Bros., Inc.	1967	6	10+	80	"	50			35	
120	J. Poilter	1967	6	10½	263	"	50	70	200/1	2	
121	C. Borst	1964		8	97	"	50	9	90/1	0	
122	G. Caplan	1967	6	1½	197	"	53	19	180/1	12	
123	Morris Hills Investment Corp.	1964		7	98	"	50	12	85/1	14	
124	E. Cory	1966		20+	105	"					
125	J. Yarussi	1963	6	3	197	"	50	21	185/1		
126	J. Eccleston	1966	6	5	97	"	74			23	
127	G. Horvath	1965	6	3	150	"	50			15	
128	A. Tove	1966	6	7	122	"	50	10	110/1	25	
129	J. Post	1966	6	1¾	297	"	297	50	110/1	227	
130	J. Korobko	1966	6	½	290	"	50	41	270/1	4	
131	A. Kuffner	1954	6	5	92	"	26	10	88/¼	11	
132	A. Smith	1952	6	18	56	"	33	19	35/5		
133	W. Hulings, Jr.	1967	6	¾	272	"	50			10	
134	W. Cronk	1967	6	7	97	"	50	16	90/1	13	
135	G. Cleary	1965			145	"	50			0	
136	S. J. Pollio, Inc.	1966	6	3	121	"	50			11	
137	G. Prickett	1966	6	1½	160	"	50	11	140/1	8	
138	S. Verdetto	1965		12	97	"	75	2	85/1	15	
139	Bd. of Education, Boro. of Hopatcong, River Styx School	1957	5	6	190	"	25	45	175/4	7	
140	R. Albinson	1965	6	25	98	"	60			45	
141	Nariticong Estates, Inc.	1963	6		484	"	50				
142	R. Broune	1962	5	2½	173	"	50	53	150/1		
143	F. Martin	1963	6	½	345	"	50	40	200/1		
144	Highlands of Sussex County	1962	6	24	250	"	50	65	65/1		

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
145	Highlands of Sussex County	1962	6	1½	220	pC	50				
146	J. Kearney	1961	5	8	85	"	50	11	65/1		
147	F. Albinson	1965			118	"	50				
148	Highlands of Sussex County	1961	6	22	148	"	50	26	50/1		
149	J. Dean	1963	6	5	148	"	50	8	135/1		
150	P. Plante	1962	5	1½	173	"	50	4	145/1		
151	Highlands of Sussex County	1961	6	20	148	"	50	28	75/1		
152	F. Bolt	1966	6	7	97	"	50	42	90/1	13	
153	Highlands of Sussex County	1962	6	15	196	"	50	14	180/1		
154	Liberty Estates	1961	5	1½	300	"	32	56	230/2		
155	S. Levy	1962	6	18	70	"	30	16	35/1		
156	Highlands of Sussex County	1961	6	6	200	"	50	50	180/1		
157	C. Heuslein	1964	6	8	245	"		35	235/1	0	
158	Nariticong Estates	1963	6		300	"	50				
159	Nariticong Estates, Inc.	1963	6	1	389	"	50	20	210/1		
160	Nariticong Estates, Inc.	1963	6	5	248	"	50	33	235/1		
161	P. DeJager, Inc.	1962	6	10	248	"	50	20	240/1		
162	" " "	1962	6	7½	148	"	30	39	135/1		
163	Highlands of Sussex County, Inc.	1962	6	1½	246	"	50	14	200/1		
164	Highlands of Sussex County, Inc.	1961	5	12	440	"	30	84	130/2		
165	Highlands of Sussex County, Inc.	1962	6	25	96	"	50	12	17/1		
166	P. DeJager, Inc.	1961	6	5	350	"	50	44	250/1		
167	" " "	1961	6	2	249	"	30	37	210/1		
168	" " "	1961	6	3	300	"	30	27	185/1		
169	M. Kaletkowski	1961	6	3	170	"	20	15	150/	3	
170	P. DeJager, Inc.	1962	6	14	180	"	50	37	160/1		
171	Nariticong Estates, Inc.	1963	6		400	"	50				
172	P. DeJager, Inc.	1962	6	15	307	"	50	51	260/1		
173	Lake Hopatcong Water Co. #3	1949	8	106	74	"	39	4	55/24	28	I
174	Lake Hopatcong Water Co. #4	1954	6	90	120	"	20	6	116/36	6	I
175	Lake Hopatcong Water Co. #5	1957	8/6	25	198	"	50	0	150/8		I
176	Lake Hopatcong Water Co. #7	1958	6	154	93	"	32	3	70/24		I
176A	Lake Hopatcong Water Co. #8	1961	6	98	165	"	66	3	68/8		I
177	N. Casciotta	1965	6	4	195	"	50				
178	Giordano	1962	5	18	98	"	50	3	40/1		
179	A. Gargolione	1961	6	11	130	"	50	8		15	
180	S. Olenick	1961	6	12	95	"	50	6		12	
181	J. Ebert	1961	6	9	130	"	50	35	100/1	3	
182	F. Todisco	1961	6	4	130	"	50	21		10	
183	J. Pace	1963	6	7	98	"	50	17	85/1		
184	J. Coston	1961	6	4	138	"	50	16		12	
185	G. Wenz	1967	6	1½	272	"	50	75	250/1	6	
186	K. Byrne	1965	6	4½	221	"	50	19	200/1		
187	J. Nocera	1961	6	20	95	"	50	12		12	
188	S. Colabella	1962	6	1	210	"	50	8	180/1		
189	A. Black	1964		25	139	"	78	8	35/1		
190	E. Eisman	1962	6	8	90	"	50	21		12	
191	H. Hillenbrand	1961	5	8	98	"	50	25	80/1		
192	KaJon Realty Co.	1965	6	10	90	"	61				

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
193	L. Perrone	1951	6	8	68	pC	20	22	60/4	16	
194	G. Fletcher	1951	6	9	72	"	18	26	60/4	14	
195	KaJon Realty Co.	1965	6	1½	150	"	50				
196	J. Abbondola	1951	6	12	82	"	18	28	60/4	18	
197	MacReid Co.	1964	6	30	78	"	70	6	14/¾	20	
198	Lake Hopatcong Heights, Inc.	1954	6	11	92	"	28	18		27	
199	MacReid Company	1966	6	3	122	"	50			8	
200	MacReid Company	1966	6	20+	72	"	50			6	
201	MacReid Company	1964		16	71	"	50	28	70/1	14	
202	MacReid Company	1964		½	171	"		32	160/1	12	
203	Lake Hopatcong Heights, Inc.	1958	5	6	225	"	28	35	135/1½	12	
204	F. Salimando	1961	6	8	110	"	50	20		15	
205	Lake Hopatcong Civic Association	1954	6	8	85	"	24	18		9	
206	KaJon Realty Co.	1965	6	1½	150	"	50			20	
207	KaJon Realty Co.	1965	6		150	"	50				
208	J. Babick	1966	6	5	389	"	50	25	250/	7	
209	KaJon Realty Co.	1965	6		175	"	65			65	
210	E. Marotta	1964		120	120	Qsd	115	10	110/1	120+	
211	P. Gagliardo	1962	6	6	73	pC	50	9	60/1		
212	M. Jacobs	1951	6	10	35	"	20	6	12/	20	
213	Vogel & Serrano	1964	6	8	148	"	50	3	140/1		
214	KaJon Realty Co.	1965	6		198	"	50			10	
215	Cay Const. Co.	1966	6	12	96	"	50			5	
216	KaJon Realty Co.	1965			300	"	50			0	
217	Rt. 10 Realty Co.	1965			123	"	106			90	
218	E. Nadolny	1964		10	398	"	50	24			
219	S. J. Pollio, Inc.	1966	6	10	75	"	50			14	
220	S. J. Pollio, Inc.	1966	6	¾	346	"	50			12	
221	R. Henderson	1965		9	155	Qsd	155	20	80/1	155+	
222	Lake Hopatcong Heights, Inc.	1958	6	18	95	pC	52	3		50	
223	L. Ferali	1961	6	4	120	"	50	26		11	
224	W. Kinney	1961	6	15	138	"	50	28		6	
225	S. Scalzo	1964	6	15	122	"	50	70	115/½	5	
226	H. Gottschlinger	1963	6	7	97	"	50	10	90/1		
227	D. Marim	1967	6	5	165	"	50			9	
228	Westshore Agency, Inc.	1957	4¾	15	98	"	45	11	20/1½		
229	P. Capalbo	1961	6	8	112	"	50	30		6	
230	A. Fetcho	1965	6	5	148	"	50			15	
231	R. Martin	1962	6	6	115	"	50	18		10	
232	H. Nast	1965			195	"	60			0	
233	W. Kane	1961	5	7	74	"	30	1	20/1		
234	D. Colabella	1966	6	8	97	"	50			8	
235	G. Thompson	1964		3	137	"	50	27	130/½	5	
236	A. Magnone	1961	6	3	120	"	50	5			
237	E. Staniseski	1964		10½	122	"	50	29	100/1		
238	F. Iervoline	1961	5	11	74	"	50	2	15/1½		
239	M. Patro	1965	6	¼	322	"	50	104	300/1	9	
240	F. DeRosa	1966	6	20	100	Qsd	100	44	65/1	100+	
241	L. Shennis	1960	5	4	225	pC	50	10	215/3	25	
242	Rhone Estates	1967	6	14	72	"	40	11		34	
243	F. DeRosa	1966	6	10	98	"	34	3	80/1½	30	
244	Point Pleasant Club	1954	6	10	187	"	22	14	152/11	8	

Drillers' Logs of Wells, Hopatcong Borough
(Depths below land surface are given in feet)

Well #	Depth	Log	Formation
2	0-7	Sand and boulders	
	-34	Medium granite	pC
	-53	Gray granite	
	-90	Light gray granite	
8	0-44	Hard, gray, brown granite	pC
	-73	Hard, gray, white granite	
	-76	Rotten, seamy granite	
	-92	Gray, brown, medium to hard, seamy granite	
	-107	Hard, gray granite	
11	0-70	Gray granite	pC
	88-89	Water seam—15 gpm	
	-96	Gray granite	
12	0-2	Overburden	
	-34	Granite	pC
	-35	Soft, brown and white granite	
	-90	Gray, white, black granite	
	-127	Hard, gray granite	
	-132	Black, granite—water	
	-197	Hard, gray granite	
15	0-8	Overburden	
	-42	Gray granite	pC
	-62	Large fractured area—water	
	-70	Water	
	-140	Gray granite	
21	0-7	Overburden	
	-63	Gray granite, rotten seam	pC
	-97	Light gray granite—water	
	-112	Granite	
44	0-6	Boulder and sand fill	
	-42	Medium, hard, brown, gray and orange	pC
	-192	Gray, brown with seamy layers	
	-198	Brown, rotten granite	
47	0-64	Very hard, gray, white granite	pC
	-94	Hard, gray, pink, white granite	
	-99	Medium to soft, rotten granite	
48	0-6	Dirt	
	-57	Gray granite	pC
	-62	Brown, orange granite—water	
	-104	Light gray granite	
	-107	Green, seamy—water, bad seam	
	-122	Dark gray granite	
51	0-8	Overburden	
	-25	Brown granite—soft spot	pC
	-50	Brown granite	
	-75	Soft seam—water	
	-80	Brown granite—water	
	-100	Gray granite	
	-150	Hard, gray granite	
	-165	Soft seams	
	-170	Brown and white granite—soft seams	
	-185	Water	
55	0-20	Overburden	
	-35	Brown granite—water	pC
	-50	Brown and white granite	
	-55	Water	
	-75	Soft seams—water	
	-100	Gray granite	
	-120	Black, white granite—water	
	-147	Gray granite	

Well #	Depth	Log	Formation
57	0-50	Blue, gray granite	pC
	-76	Dark gray granite	
	-83	Soft seam	
	-123	Soft seam	
	-300	Water	
60	0-50	Rock, black, white	pC
	-55	Granite, water	
	-67	Brown, white granite	
	-70	Granite—water	
	-85	Soft seam	
	-88	Little water	
	-90	Black, white granite	
	-98	Granite	
62	0-8	Overburden	
	-25	Soft granite	pC
	-91	Hard granite	
	-98	Soft granite	
	-162	Hard granite	
	-164	Soft granite	
	-205	Hard granite	
	-210	Soft granite	
	-222	Hard granite	
63	0-3	Dirt	
	-142	Dark gray granite	pC
	-144	Seamy area—water	
	-170	Dark gray granite	
	-195	Dark gray granite—water	
64	0-10	Overburden	
	-58	Gray granite	pC
	-59	Soft seam, brown granite	
	-69	Gray granite	
	-70	Brown granite, soft seam—water	
	-123	Gray granite	
65	0-27	Granite	pC
	-29	Soft seam	
	-50	Granite	
	-135	Gray granite	
	-137	Soft seam—water	
	-146	Gray granite	
67	0-34	Hard, brown granite, sandstone	pC
	-38	Hard, gray granite	
	-88	Orange, brown granite	
	-113	Green and white granite	
	-121	Gray, green and black, hard granite	
68	0-58	Granite	pC
	-60	Soft seam—water	
	-98	Granite	
	-99	Soft seam—water	
	-109	Granite	
	-111	Soft seam—water	
	-123	Granite	
71	0-4	Overburden	
	-35	Brown, white granite	pC
	-50	Black, white granite	
	-75	Soft, no water	
	-100	Dark gray granite	
	-103	Brown, white granite—soft seam	
	-110	Brown granite—water	
	-120	Light gray granite	
	-125	Brown seam—water	
	-143	Brown, white seam—water	

Drillers' Logs of Wells, Hopatcong Borough
(Depths below land surface are given in feet)

Well #	Depth	Log	Formation
	-150	Very soft seam—water	
	-155	Brown, white and gray granite	
	-161	Gray granite	
72	0-6	Overburden	
	-50	Brown granite	pC
	-60	Light gray granite—water	
	-75	Dark granite	
	-125	Soft, brown granite	
	-130	Granite	
	-135	Brown granite	
	-200	Gray granite	
74	0-6	Granite	
	-140	Black and white granite (some water at 60')	pC
	-170	Granite (Water at 150')	
76	0-10	Overburden	
	-59	Granite	pC
	-60	Brown granite	
	-61	Seam—water	
	-108	Gray granite—water	
	-137	Gray granite	
	-138	Seam—water	
	-148	Gray granite	
77	0-8	Overburden	
	-50	Granite	pC
	-100	Gray granite	
	-148	Granite	
	-187	Black granite—water	
	-363	Gray granite—water	
78	0-17	Hard, packed sand and gravel	Qsd
	-31	Boulders and gravel	
	-43	Soft brown granite	pC
	-205	Large seamy area	
	-218	Water	
	-223	Hard, gray granite	
79	0-74	Light gray granite	pC
	-77	Brown granite, fractured seam	
	-85	Hard, gray, brown granite	
81	0-9	Sand overburden	
	-53	Gray, brown granite—water	pC
	-60	Gray granite—water	
	-65	Fractured seam with clay—water	
	-69	Fractured seam with clay—water	
	-90	Total depth	
82	0-4	Dirt	
	-32	Light gray, brown granite	pC
	-82	Light gray granite	
	-83	Brown granite—seam-water	
	-122	Light gray, pink granite	
83	0-3	Brown granite	pC
	-185	Green, white granite	
	-195	Pink granite	
	-236	Black, white granite .	
85	0-11	Hardpan	
	-18	Sandstone (weathered granite?)	pC
	-50	Hard, gray granite	
	-122	Gray white granite—water	
86	0-12	Overburden	
	-42	Brown granite	pC
	-140	Gray granite—water	
	-148	Water	
	-172	White granite	
88	0-7	Overburden	
	-75	Brown, white granite	pC
	-80	Soft seam—water	
	-90	Brown granite	
	-125	Gray granite	
	-140	Soft seam—water	
	-145	Gray granite	pC
91	0-10	Sandy overburden and stones	
	-165	Hard, gray, white granite	pC
92	0-15	Overburden	
	-22	Soft, gray granite	
	-29	Rotten seam—water	
	-45	Gray granite	
	-50	Gray granite—soft spots	
	-97	Gray granite	
	-107	Soft, brown granite, clay seams —water	
	-162	Gray granite	
	-197	White, orange, gray granite	
93	0-50	Gray granite	pC
	-56	Soft, brown, green, black granite	
	-140	Gray, white granite	
	-142	Black, green, white granite	
	-147	Water	
	-159	Gray granite	
100	0-2	Overburden	
	-118	Brown, rotten granite	pC
104	0-2	Rock	
	-50	Gray and black granite	pC
	-65	White granite	
	-95	Black granite	
105	0-5	Overburden	
	-50	Granite	pC
	-74	Soft, brown granite	
	-120	Gray granite	
	-125	Soft, brown granite—water	
	-185	Gray granite	
106	0-19	Hard packed sand, sharp stones	
	-302	Black granite	pC
	-500	White granite slightly gray green	
112	0-44	Soft boulders, clay, sand—water	
	-59	Rotten granite	pC
	-90	Soft granite	
113	0-2	Fill	
	-16	Brown granite	pC
	-30	Gray granite	
	-40	Brown granite	
	-55	Gray granite—water	
	-98	Seamy	
	-147	Hard, light gray granite	
	-204	Hard, dark gray granite	
	-207	Brown, seamy granite—water	
	-247	Gray granite	
114	0-16	Sand, gravel	Qsd
	-52	Gray, brown granite	pC
	-85	Brown granite	
	-175	Gray granite—water	
	-176	Rotten, fractured seam—water	
115	0-11	Boulders, clay and gravel	
	-20	Brown granite	pC
	-37	Seam	
	-52	Gray granite	

HOPATCONG BOROUGH

Well #	Depth	Log	Formation
115	-62	Brown granite	
	-85	Gray granite	
	-100	Water	
116	0-17	Sand, boulders—water	
	-88	Extremely hard, light gray granite	pC
	-246	Water	
119	0-33	Clay, gravel, boulders	
	-58	Granite	pC
	-62	Soft seam	
	-68	Granite	
	-71	Soft seam—water	
	-80	Granite	
120	0-2	Overburden	
	-25	Gray granite	pC
	-50	Gray, white granite	
	-75	Black, white granite—water	
	-85	Black, white granite—soft spot	
	-125	Gray granite	
	-140	Black, white, hard granite	
	-150	Soft spot	
	-175	Black, white, hard granite	
	-200	Gray granite	
	-220	Water	
	-250	Dark, gray granite	
	-260	Soft seam—water	
	-263	Gray granite—water	
121	0-18	Rotten granite	pC
	-81	Hard, gray, green granite	
	-97	Hard granite—very seamy	
122	0-12	Clay, gravel	
	-35	Brown, white granite	pC
	-178	Gray granite	
	-197	Water—small brown seam	
123	0-14	Sand and boulders	
	-36	Black granite	pC
	-46	Gray, brown granite	
	-54	Gray, black granite	
	-98	Brown, green, mostly black granite	
124	0-69	Granite	pC
	-80	Green, white granite	
	-81	Brown granite	
	-102	Pink, white granite	
	-105	Brown granite—water	
127	0-15	Overburden	
	-40	Brown, white granite	pC
	-50	Gray granite	
	-60, 70	Water	
	-114-118	Soft seam—water	
	-150	Black granite—water	
128	0-25	Fine sand, clay	
	-50	Brown, white granite	pC
	-75	Black granite	
	-80	Water	
	-110	Soft seams—water	
	-122	Gray granite—water	
129	0-227	Hard packed sand, gravel and chunks of granite	Qsd
	-269	Coarse granite, gray, pink and white	pC
	-293	Light gray granite—water	

Well #	Depth	Log	Formation
130	0-4	Overburden	
	-26	Brown granite	pC
	-39	Gray, brown granite	
	-42	Water—10 gpm	
	-62	Brown granite	
	-71	Gray granite	
	-290	Light gray granite—water	
133	0-10	Overburden	
	-50	Brown granite	pC
	-75	Light gray granite	
	-100	Dark gray granite, soft seam at 100′	
	-113	Water	
	-120	Soft seams, no water	
	-150	Gray granite	
	-175	Soft spot	
	-225	Light gray granite—water	
	-272	Dark gray granite	
134	0-13	Sand, gravel, boulders	
	-50	Gray granite	pC
	-70	Hard, gray granite	
	-71	Rotten granite seam—water	
	-85	Hard, gray granite	
	-87	Rotten seam—water	
	-97	Hard granite	
135	0-10	Rock	
	-50	Sandstone (probably weathered granite)	pC
	-145	Gray and white granite	
136	0-5	Fill	
	-11	Boulders, sand and gravel	
	-102	Gray granite	pC
137	0-8	Clay and gravel	
	-12	Brown granite	pC
	-25	Gray granite	
	-48	Brown granite	
	-68	Gray granite—water	
	-160	Total depth	
138	0-15	Overburden	
	-31	Brown, white granite	pC
	-72	Green, white granite	
	-86	White granite	
	-97	Green, white granite	
140	0-45	Overburden	
	-60	Granite	pC
	-70	Water	
	-87	Brown granite—water	
	-98	Light gray granite	
152	0-13	Sand, gravel, boulders	
	-41	Brown, fractured granite	pC
	-55	Gray granite	
	-60	Fractured, brown granite—water	
	-87	Dark gray granite	
	-89	Brown granite—water	
	-97	Gray granite	
157	0-78	Black and white granite	pC
	-88	Gray granite	
	-200	Pink granite	
	-245	Black and white granite	

Well #	Depth	Log	Formation
185	0-6	Overburden	
	-50	Hard granite	pC
	-52	Soft seam	
	-170	Hard granite	
	-171	Soft seam	
	-238	Hard granite	
	-245	Soft granite—water	
	-272	Hard granite	
197	0-20	Overburden	
	-78	Gray granite	pC
199	0-8	Overburden	
	-15	Brown granite	pC
	-25	Light gray granite	
	-50	Dark gray granite	
	-60	Soft seam—water	
	-75	Brown, white granite—water	
	-90	Soft seams—water	
	-105	Brown granite, soft seam	
	-110	Water	
	-118	Soft seam	
	-122	Gray granite	
200	0-6	Overburden	
	-40	Brown granite	pC
	-50	Gray granite	
	-55	Dark gray granite, soft—water	
	-60	Soft seam	
	-63	Soft seam	
	-70	Water	
	-72	Brown granite	
201	0-14	Overburden	
	-20	Brown granite	pC
	-62	Black, white granite	
	-64	Brown, black granite	
	-69	Black, white granite	
	-70	Brown, white granite	
	-71	Black, white granite	
202	0-12	Dirt and stones	
	-70	Hard, gray granite	pC
	-99	Gray and brown granite	
	-171	Hard, gray granite	
206	0-20	Overburden	
	-40	Brown, white granite	pC
	-50	Gray granite	
	-75	Gray, white granite	
	-100	Water	
	-125	Water	
	-140	Water	
	-150	Brown, white granite, bad seam	
208	0-7	Overburden	
	-19	Brown granite	pC
	-386	Gray granite—water	
209	0-65	Sand, gravel	
	-75	Dark gray granite	pC
	-90	Soft seam, brown, white granite, little water	
	-125	Gray granite	
	-140	Soft seam, water	
	-150	Soft seam, water	
	-160	Soft seam, water	
	-175	Black, white, granite	
210	0-30	Sand, gravel	Qsd
	-110	Sand, gravel, clay	
	-120	Sand, gravel	
214	0-10	Sand, boulders	
	-198	Black, white granite	pC
215	0-5	Overburden	
	-25	Brown, white granite	pC
	-65	Brown granite—water	
	-75	Soft seam—water	
	-96	Black granite	
216	0-10	Rock	
	-50	Black, white granite	pC
	-300	Black and white granite	
217	0-30	Dirty sand and gravel	
	-90	Fine sand, some gravel	Qsd
	-123	Brown granite	pC
219	0-5	Fine sand	
	-14	Boulders, sand, gravel	Qsd
	-42	Brown granite	pC
	-60	Gray granite	
	-70	Clay seam and water	
220	0-6	Fine sand and fill	
	-12	Boulders and gravel	
	-40	Brown granite	pC
	-135	Gray granite	
	-225	Rotten, brown granite	
	-270	Gray granite	
	-346	White granite	
221	0-50	Sand, gravel	Qsd
	-75	Sand	
	-155	Sand and gravel	
225	0-5	Sandy overburden	
	-102	Hard, gray granite	pC
	-114	Hard, black, gray granite	
	-122	Hard, gray, white granite	
227	0-9	Overburden	
	-65	Gray granite	pC
	-70	Brown granite	
	-159	Gray granite	
	-160	Waterseam	
	-165	Gray granite	
230	0-15	Overburden	
	-50	Black, white granite	pC
	-75	White granite	
	-100	Gray granite	
	-110	Soft seam—water under gray granite	
	-125	Black, white granite	
	-140	Soft seam—water	
	-148	Black granite	
232	0-60	Gray, white granite	pC
	-195	Gray granite	
234	0-8	Overburden	
	-50	Brown, white granite	pC
	-60	Soft seam—water	
	-65	Soft seam	
	-70	Black granite	
	-75	White granite—water	
	-85	Brown, white granite—water	
	-97	Dark gray granite	
235	0-5	Stones and sandy overburden	
	-53	Hard, gray, white granite	pC
	-58	Hard, gray granite	
	-104	Hard, gray granite, medium brown	
	-127	Very hard gray, white, green, and some pink granite	
	-137	Seamy, brown and gray granite	

HOPATCONG BOROUGH

Well #	Depth	Log	Formation
239	0-9	Fill dirt	
	-14	Pink, white granite, very hard	pC
	-17	Rotten granite, sandstone (weathered granite?)	
	-77	Gray, white granite	
	-160	White granite	
	-308	Light gray, pink granite	
	-315	Brown, pink, green granite, water	
	-322	Light gray, pink granite	
240	0-100	Clay and gravel	Qsd
241	0-25	Hardpan and broken up rock	
241	-150	Hard granite—water	pC
	-225	Hard granite—water	
242	0-34	Overburden, boulders and mud	
	-59	Granite	pC
	-60	Very rotten	
	-68	Soft, brown granite	
	-70	Granite	
	-72	Very soft granite—water	
243	0-30	Sand, gravel, boulders	
	-54	Soft, brown granite	
	-93	Soft seam—water	

LAFAYETTE TOWNSHIP

DOMESTIC WELLS [1 & 2]

		YIELD IN GALLONS PER MINUTE [3]			
Formation	*No. of Wells*	*Maximum*	*Minimum*	*Average*	*Median*
Martinsburg Formation (Omb)	16	60	1	13	5
Kittatinny Formation (C0k)	34	50	1	14	6

		DEPTH IN FEET BELOW SURFACE			
Formation	*No. of Wells*	*Maximum*	*Minimum*	*Average*	*Median*
Martinsburg Formation (Omb)	16	447	75	175	144
Kittatinny Formation (C0k)	34	297	27	132	119

[1] Wells and formations with insufficient data are not used in this summary.

[2] There are 5 industrial wells; 1 from the Martinsburg Formation, 3 from the Kittatinny Formation and 1 from an unknown unit. See regional summary of industrial wells.

Well No.	*Owner*	*Year Drilled*	*Csg. dia. (in.)*	*Yield (gpm)*	*Depth (ft.)*	*FORMATION*	*Screen Setting or depth csd. (ft.)*	*Static Water Level (ft.)*	*Pumping Level/hrs. Pumped*	*Depth to Bedrock*	*USE*
1	L. T. Northrup	1951	6	5	130	C0k	18	83	120		
2	E. E. Hikins	1947	6	7	111	Qsd	109	56	84/1		
3	H. Goble	1953	6	20	45	C0k	24	12	25/2		
4	L. Northrup	1953	6	2	109	"	18	58	106/2		
5	G. M. Gass	1952	6	20	70	"	23	13	30/2		
6	P. O. Zimmerman	1951	6	25	90	"	38	28	35/5	5	
7	J. Snook	1949	6	1	144	Omb	11	29	144	11	
8	J. Hughes	1957	6	8	87	"	20	18	52/4	20	
9	O. W. Casperson	1952	6	10	140	"	30	15	100/6	30	
10	L. C. Price	1952	6	4	123	C0k	120	38	38		
11	St. Anthony's Guild #5	1951	8	50	278	Limestone?	49	16	80/7	49	I
12	" " " "	1942	8	64	207	Omb		44	80		I
13	H. L. Swanson	1949	6	3½	120	"	14	20			
14	E. Spalding	1961	6	5	80	"	38	18	60/4	38	
15	J. Hendricks	1965	6	20	139	"	43				
16	E. Henderson	1965	6	1½	196	C0k		12	140/2		
17	Lansdell Const. Co.	1954	6	15	135	Omb	24	18		22	
18	J. Pumleye	1965	6	8	137	C0k	42	22	60/2		
19	J. O'Krepsky	1966	6	1	447	Omb	13	16	300/2		
20	R. Duvoisin	1966	6	7	103	C0k		10	80/2		
21	R. J. Hikins	1965	6	3	272	"	23	25	200/2	0	
22	H. Henderson, Jr.	1965	6	45	72	"	47	29	46/2		
23	L. J. DeYoung	1963	6	5	190	"	22	20	170/1		
24	W. Yucius	1963	6	5	248	Omb	73	34	210/1½		
25	L. A. Price	1964	6	1	112	C0k	26	26	112/2	16	
26	John C. Hikens	1963	6	2	200	C0k & pC?	35	72	190/3	10	
27	Lafayette Assoc.	19..	6	10	200	C0k		50	150/2		
28	L. Lance	1962	6	2½	297	"	22	27	245/1		
29	R. G. Aurren	1965	6	30	90	"	15	50	80/2		
30	E. O'Neill	1965	6	2½	148	"	20	33	130/1	5	
31	R. Swayze	1955	6	10	71	"	11	30	40/4	5	
32	F. J. Tozzi	1965	6	6	155	"	108	35	100/2		
33	W. M. DuFresne	1958	6	1	27	"		43			
34	R. E. Ayers	1965	6	25	228	Omb	18	310			

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
35	D. Pritchard	1964	6	4	257	Omb	30	20	200/2		
36	R. E. Ayers	1958	6	1½	309	"	21	34			
37	R. Post	1966	6	4	205	C0k	51	15	150/2		
38	E. Beck	1965	6	25	105	"	32	43			
39	W. B. Baigrie	1962	6	45	86	"	74	7	45/4	74	
40	D. R. Baigrie	1962	6	30	70	"	59	8	40/4	59	
41	C. Robinson	1964	6	4½	123	"	10	44	115/2		
42	C. Pansegrace	1964	6	2½	170	Omb	21	10	160/2		
43	S. Prichards	1963	6	14	128	C0k	69	41	111/3	50	
44	K. Klausner	1964	6	60	75	Omb-(fault)	75	15	50/2		
45	F. Bell	1964	6	6	84	C0k	18	5	75/2		
46	Suburban Prop.	1963	6	24	70	"	65	35	40/1		
47	L. Northup	1957	6	4	250	"	25	33	245/1	10	
48	W. Spanger, Jr.	1957	6	25	50	"	25	19	32/3	20	
49	R. Scott	19..	6	6	205	"	103	38	100/2		
50	Schering Corp. #1	1960	10	37	521	"	80	39	198/9	76	I
51	Schering Corp. #2	1960	10	25	453	"	44	0	208/9	40	I
52	L. C. Price	1957	6	4½	217	"	19	33			
53	P. Vaughn	1964	6	16	119	"		46	119/2	12	
54	Home Oil Co.	1958	6	50	124	"	17	12		10	
55	Capuchin Fathers	1965	6	27	123	Omb	50	33	100/24		
56	Deerfield Bldrs. Assc.	1964	6	15	98	"	40	16			
57	St. Anthony's Guild	1956	8	60	303	"		30	50±/8	20	I

Drillers' Logs of Wells, Lafayette Township
(Depths below land surface are given in feet)

Well #	Depth	Log	Formation
2	0-30	Hardpan	
	-69	Blue clay	
	-98	Brown sand	Qsd
	-111	Gravel	
6	0-5	Clay	
	-90	Limestone	C0k
		Solution cavity	
7	0-11	Hardpan	
	-144	Slate	Omb
9	0-30	Hardpan and clay	
	-140	Slate	Omb
11	0-49	Sand, gravel and boulders	
	-278	Limestone	C0k
12	0-28	Earth and clay	
	-49	Soft slate	Omb
	-207	Soft slate	
13	0-10	Earth and clay	
	-110	Slate	Omb
16	0-46	Clay and boulders	
	-365	Hard limestone	C0k
17	0-22	Clay and hardpan	
	-135	Slate	Omb
25	0-16	Overburden	
	-112	Limestone	C0k
26	0-10	Hardpan and broken up rock	
	-75	White lime rock	C0k?
	-125	Hard blue lime rock	
	-200	Soft, black shale rock	pC Mylonite?
30	0-5	Clay	
	-10	Blue shale	
	-74	Brown rock	C0k
	-148	Rotten yellow rock	
31	0-5	Clay	
	-71	Limestone	C0k
43	0-25	Hardpan and boulders	
	-50	Hardpan and rock	
43	-69	Lime rock and water	C0k
	-100	Hard, blue lime rock	
	-115	Soft, yellow lime rock	
	-128	Soft, dark brown rock with water	
47	0-10	Hardpan	
	-25	Limestone—broken up	C0k
	-250	White limestone	
48	0-20	Hardpan and gravel	
	-25	Limestone—broken up	C0k
	-50	Limestone	
50	0-12	Stones and dirt	
	-16	Boulders	
	-54	Sand, gravel and clay	
	-76	Hardpan	
	-79	Broken rock	C0k
	-521	Hard limestone rock	
51	0-8	Soil	
	-30	Sand, gravel and clay	
	-40	Hardpan and broken rock	
	-453	Hard limestone rock	C0k
53	0-11	Overburden	
	-119	Limestone	C0k
54	0-70	Overburden	
	-124	Limestone (8" seam producing 50 gpm)	C0k
56	0-23	Overburden and boulders	
	-60	Blue shale	Omb
	-62	Blue shale with white specks—water	
	-98	Blue shale	
57	0-8	Earth	
	-20	Loose rock and boulders	
	-66	Broken rock and clay	
	-303	Limestone rock	C0k
58	0-20	Clay	
	-87	Slate	Omb

MONTAGUE TOWNSHIP

DOMESTIC WELLS [1 & 2]

Formation	*No. of Wells*	*YIELD IN GALLONS PER MINUTE* *Maximum*	*Minimum*	*Average*	*Median*
Stratified Drift (Qsd)	8	30	10	18	15
Onondaga Limestone (Don)	55	100	1	19	17
Esopus Siltstone (Des)	7	20	1	6	3½
Poxono Island Shale through Oriskany Formation (Spi-Do)	30	60	3½	19	15
High Falls Formation (Shf)	16	30	2	18	15

Formation	*No. of Wells*	*DEPTH IN FEET BELOW SURFACE* *Maximum*	*Minimum*	*Average*	*Median*
Stratified Drift (Qsd)	8	147	40	95	78
Onondaga Limestone (Don)	55	293	35	144	134
Esopus Siltstone (Des)	7	339	98	190	148
Poxono Island Shale through Oriskany Formation (Spi-Do)	30	278	51	132	109
High Falls Formation (Shf)	16	316	37	116	117

[1] Wells and formations with insufficient data are not used in this summary.

[2] There are 2 industrial wells from the Spi-Do.

Well No.	*Owner*	*Year Drilled*	*Csg. dia. (in.)*	*Yield (gpm)*	*Depth (ft.)*	*FORMATION*	*Screen Setting or depth csd. (ft.)*	*Static Water Level (ft.)*	*Pumping Level/hrs. Pumped*	*Depth to Bedrock*	*USE*
1	E. Peterman	1953	6	20	140	Don	36	31	96/1½		
2	James Waldron	1952	6	5	115	Des & Spi-Do	24	6		20	
3	R. J. Hewitt	1946	6	4	247	Don				31	
4	Lippe	1933	6	6	185	"				88	
5	Monds	1932	6	3	135	Des				57	
6	Montague Twp. School #3	1939	6	30	88	Don				44	
7	E. Meyers	1932	6	6	41	"				23	
8	Wm. Hartrin	1934	6	5	120	"				18	
9	T. Hilton	1934	6	10	60	"				36	
10	Bradley	1945	6	14	183	"				50	
11	Methodist Ref. Church	1947	6	10	120	"				23	
12	Bauman	1938	6	40	110	"				36	
13	S. B. Roberts	1953	6	20	98	Des	25	16	44/1	25	
14	Costello	1950	6	20	60	Spi-Do		26		20	
15	Staudt	1945	6	20	179	Don				21	
16	Montague Twp. School #4	1939	6	2	118	"				17	
17	A. Jerger	1951	6	10	138	"	135	60	75/		
18	Alder	1945	6	20	112	"				57	
19	J. A. Rutan	1939	6	2½	185	"				75	
20	Henn Bros.	1935	6	20	147	Qsd					
21	Sheulin	1946	6	30	78	"					
22	Sullivan #1	1938	6	20	178	Don				82	
23	Sullivan #2	1938	6	20	180	"				78	
24	Richards	1940	6	30	120	Qsd					
25	Owens	1942	6	25	134	Don				127	
26	Carlow	1946	6	15	197	"				92	
27	H. Knight—prior to	1937	6	12	35	"	20	15			
28	1.4 mi. NE of Millville prior to	1937	6	100+	50	Don (cavern)		1	Small drop		
29	1.4 mi. NE of Millville prior to	1937	6	100+	108	"		1	small drop		
30	W. H. Swartwout	1948	6	20	121	Don	4	30	110/		
31	H. Miller	1930	6	10	128	"				14	
32	Westbrook	1946	6	30	122	"				73	
33	J. Pantis	1943	6	30	59	"				22	
34	O'Neil	1941	6	20	162	"				31	
35	Miller	1947	6	25	135	"				27	

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
36	Klein	1933	6	4	90	Don				14	
37	Naegeli	1945	6	20	116	"				63	
38	St. James The Great Catholic Church	1946	6	20	137	"				107	
39	Blasberg	1942	6	30	106	"				18½	
40	Montague Twp. School #1	1939	6	16	98	Spi-Do				19	
41	Mortimere	1947	6	40	79	"				43	
42	Montague Twp. School #2	1939	6	30	101	"				90	
43	Liptak	1947	6	35	125	Don				33½	
44	Lorgan	1942	6	1	231	"				89	
45	Next house North of Catholic Church	1947	6	15	218	"				115	
46	A. Cooper	1930	6	10	58	Qsd					
47	Buczek	1940	6	4	101	Don				53	
48	Rubinstein	1946	6	8	207	"				at surface	
49	J. F. Reinhardt	1939	6	5	195	"				7	
50	Schubiger	1939	6	1	162	Des				27	
51	Priggie	1937	6	20	152	Don					
52	J. G. Scharf	1962	6	22	135	"	42	28	93/3	42	
53	J. Klinmans	1963	6	27	146	"	25	72	85/3	12	
54	J. B. Ford	1958	6	20	290	"	132	60	150/5	25	
55	R. Keller	1964	6	11	210	"	72	48	120/3	61	
56	S. B. Roberts	1962	6	15	138	"	42	32	78/3	30	
57	M. Conklin	1962	6	6½	120	"	40	16	108/3	30	
58	P. Neudeck	1964	6	22	170	Spi-Do	30	46	72/3	20	
59	R. Westbrook	1964	6	30	110	"	72	23	54/3	44	
60	E. T. Newton	1963	6	4	293	Don	25	93	283/3		
61	R. Carroll	1964	6	7	123	"	85	10	90/2		
62	J. Whitesell	1961	6	8	180	Des	21	34			
63	Holiday Lk., Inc.	1965	8	100	250	Spi-Do	60	20	200/8		I
64	Holiday Lk., Inc.	1965	8	100	250	"	60	20	200/5		I
65	C. Browning, Sr.	1965	6	10	180	Don	64	50	180/4	59	
66	L. B. Rogers	1961	6	20	97	"	85	17			
67	W. Birler	1963	6	3	289	Des	75	28	245/3	62	
68	G. Sauer	1961	6	35	278	Spi-Do	128	78	180/3	118	
69	A. Mesiti	1965	6	11	73	"	72	17			
70	A. Fabian	1965	6	4	122	Don	61	26	100/2		
71	M. K. Barker	1964	6	15	175	Spi-Do		80			
72	F. Cucinello	1965	6	5	115	"		20			
73	Lillian Meyer	1966	6	9	216	"	18	155			
74	F. Kovarik	1961	6	10	261	"	10	160			
75	W. Rosanelli	1963	6	16	225	Spi-Do & Shf?	40	82	205/3		
76	R. Turner	1964	6	15	225	Spi-Do	16	120			
77	M. J. Cafone	1961	6	6	233	"					
78	F. Malindwski	1963	6	7	175	"	22	135			
79	J. Demalderis	1964	6	10	110	Qsd	110	21			
80	Life Camps, Inc.	1939	6	30	316	Shf		109	129/1		
81	H. Phillips	1948	6	10	132	Spi-Do				104	
82	S. DePinto	1950	6	3½	171	"	112	88		110	
83	J. Halbach	1952	6	8	65	"	9	15			
84	J. M. Feick	1961	6	30	109	"	82	27	61/3	82	
85	Jerger Bros. Co.	1964	6	4	339	Des	95	77	150/2		
86	C. Richter	1962	6	25	102	Don	25	1			
87	Meloi Supply Co.	1959	6	15	220	Spi-Do	160	43	200/3	50	
88	P. Meloi	1966	6	70	135	Qsd & Des	125	35	60/2		
89	H. Keller	1964	6	15	37	Shf?	37	8	25/2		
90	H. Meyers	1959	6	30	110	Spi-Do	48	31	63/5	48	
91	I. Messenger	1965	6	12	97	"	55	15	60/2		
92	Biccum Bros.	1965	6	30	80	"	65	10	50/2		
93	D. Fausto	1965	6	30	47	Shf?	21	15	30/2		
94	P. Szucs	1964	6	25	135	"	88	10	60/2		
95	A. Tooley	1965	6	15	75	Spi-Do	32	10	50/2		

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
96	S. Riccio (Lk. Montague)	1965	6	12	73	Spi-Do	42	10	50/2		
97	D. Biccum	1965	6	12	39	Shf?	39	30	35/2		
98	A. Riccio (Lk. Montague)	1966	6	12	73	Spi-Do	42	10	50/2		
99	E. Schaffert	1966	6	2	122	Shf?	60	20	100/2		
100	A. Gatti	1965	6	5	172	Shf	52	14	150/2		
101	R. Raya	1961	6	12	80	"	53	7			
102	I. Heubner	1965	6	15	134	Don	20	50			
103	G. J. Kerr	1965	6	45	212	"	82	11	63/3	60/66	
104	J. R. Gilman	1966	6	5	127	Des?	21	95			
105	J. Carpenter	1965	6	60	54	Spi-Do	54	10			
106	J. Zitone	1962	6	15	145	Shf	120	42	112/3	100	
107	A. Riccio (Lk. Montague)	19..	6	12	51	Spi-Do	51	30	40/2		
108	E. Williams	1964	6	20	117	Shf	25	40			
109	F. LeTexier	1965	6	6	122	"	57	10	80/2		
110	N. J. Honor Test Camp	1958	6		35	Omb				20	
111	N. J. Reformatory	1957	6	2	305	"	21	5			
112	J. Zitone	1966	6	22	112	Shf	50	2		40	
113	A. Toombs	1963	6	30	125	"	52	27	86/3	43	
114	Girl Scout Camp	1964	6	2½	147	Ssg	96	35	300/2		
115	Stokes State Forest	1960	6	18	136	Qsd	131	3			
116	Annandale Work Camp	1963	6	18	120	Shf	21			83	
117	W. Deans	1964	6	20	132	Don	30				
118	C. P. Huther	1964	6	25	150	"	46	22			
119	C. Lombaerde	1963	6	25	85	Spi-Do	43	32			
120	J. C. Pehle	1963	6	20	188	"	10	62			
121	F. Hindermith	1952	6	30	87	Shf	61	14			
122	High Point Park, State of N. J.	1933	6	20	102	Ssg					
123	High Point Park, State of N. J.	1950	6	15	75	Shf	44	5	17/7	50	
124	High Point Park, State of N. J.	1950	6	10	70	Qsd		15		71	
125	High Point Park, State of N. J.	1950	6		20	"		0			
126	High Point Park, State of N. J.	1950	6		20	"		5			
127	High Point Park, State of N. J.	1950	6	15	40	"		16			

Well #	Depth	Log	Formation
1	0-20	Hardpan	
	-30	Hardpan and boulders	Don
	-33	Sand and water	
	-36	Limestone	Don
	-75	Hard limestone	
	-100	White limestone	
	-125	Hard, blue limestone	
	-140	Rotten limestone and lots of water	
2	0-10	Brown, fine sand	
	-30	Dark, gray silty shale	Des
	-60	Dark, gray fine-grained limestone	
	-70	Light, gray fine-grained limestone	
	-80	Gray limestone	
	-100	Dark gray limestone	
	-130	Light, gray crystalline limestone	
	-140	Gray limestone	
	-150	Gray, crystalline limestone	Spi-Do
3	0-31	Glacial drift	
	-247	Limestone	Don
4	0-88	Glacial drift	
	-185	Limestone	Don

Well #	Depth	Log	Formation
5	0-57	Glacial drift	
	-137	Shale	Des
6	0-44	Glacial drift	
	-88	Limestone	Don
7	0-23	Glacial drift	
	-41	Limestone	Don
8	0-18	Glacial drift	
	-120	Limestone	Don
9	0-36	Glacial drift	
	-60	Limestone	Don
10	0-50	Glacial drift	
	-183	Limestone	
11	0-23	Glacial drift	
	-120	Limestone	Don
12	0-36	Glacial drift	
	-110	Limestone	Don
13	0-20	Hardpan and boulders	
	-25	Gravel and sand	
	-50	Black shale	Des
	-70	Gray rock	
	-98	Shale	

MONTAGUE TOWNSHIP

Well #	Depth	Log	Formation
14	0-20	Glacial drift	
	-35	Shale	Spi-Do
	-60	Dark gray, shaly limestone	
15	0-21	Glacial drift	
	-179	Limestone	Don
16	0-17	Glacial drift	
	-118	Limestone	Don
17	0-135	Glacial drift and river terrace	
	-138	Limestone	Don
18	0-57	Glacial drift	
	-112	Limestone	Don
19	0-75	Glacial drift or river gravel	
	-185	Limestone	Don
20	0-147	Glacial drift	Qsd
21	0-78	Glacial drift	Qsd
22	0-82	Glacial drift	
	-178	Limestone	Don
23	0-78	Glacial drift	
	-180	Limestone	Don
24	0-120	Glacial drift	Qsd
25	0-127	Glacial drift	
	-134	Limestone	Don
26	0-92	Glacial drift	
	-197	Limestone	Don
27	0-20	Glacial drift	
	-35	Limestone	Don
28	0-50	Limestone (cavern at bottom)	Don
29	0-108	Limestone (cavern at bottom)	Don
30	0-2	Earth	
	-121	Limestone	Don
31	0-14	Glacial drift	
	-128	Limestone	Don
32	0-73	Glacial drift	
	-122	Limestone	Don
33	0-22	Glacial drift	
	-59	Limestone	Don
34	0-31	Glacial drift	
	-162	Limestone	Don
35	0-27	Glacial drift	
	-135	Limestone	Don
36	0-14	Glacial drift	
	-90	Limestone	Don
37	0-107	Glacial drift	
	-237	Limestone	Don
38	0-63	Glacial drift	
	-116	Limestone	Don
39	0-18½	Glacial drift	
	-106	Limestone	Don
40	0-19	Glacial drift	
	-98	Soft, rotten limestone	Spi-Do
41	0-43	Glacial drift	
	-79	Greenish, rotten limestone	Spi-Do
42	0-90	Glacial drift	
	-101	Yellowish, rotten limestone	Spi-Do
43	0-33½	Glacial drift	
	-125	Limestone	Don
44	0-89	Glacial drift	
	-231	Limestone	Don
45	0-115	Glacial drift	
		Limestone	Don
46	0-58	Glacial drift	Qsd
47	0-53	Glacial drift	
	-101	Limestone	Don
48	0-207	Limestone	Don

Well #	Depth	Log	Formation
49	0-7	Overburden	
	-195	Limestone	Don
50	0-27	Glacial drift	
	-162	Blackish, flinty rock	Des
51	0-152	Limestone	Don
53	0-12	Hardpan and boulders	
	-18	Broken up rock	
	-100	Hard, blue lime rock	Don
	-136	Soft, white lime rock	
	-146	Yellow lime rock	
54	0-25	Hardpan	
	-50	Hard limestone	Don
	-100	White limestone	
	-132	Yellow limestone, sand and water	
	-225	Blue limestone	
	-275	White limestone	
	-290	Yellow limestone and green shale	
55	0-40	Hardpan and boulders	
	-50	Gravel, sand and water	
	-60	Sand and broken up rock	
	-72	Blue limestone	Don
	-121	Hard, blue lime rock	
	-136	Soft, yellow lime rock	
	-175	White lime rock	
	-210	Soft, brown sandstone	
56	0-25	Hardpan	
	-30	Hardpan and broken up rock	
	-138	Blue shale rock	Des
57	0-20	Hardpan and boulders	
	-30	Blue clay and gravel	
	-120	Blue shale rock	Des
58	0-10	Hardpan and boulders	
	-20	Gravel and broken up rock	
	-30	Rock	Don
	-70	Hard, gray rock	
	-100	Hard, shale rock	
	-125	Soft limestone	
	-150	White limestone	
	-170	Yellow limestone	
59	0-36	Hardpan and boulders	
	-44	Gravel and water	
	-50	Soft sandstone	Spi-Do
	-68	Very soft sandstone and water	
	-110	Sandstone	
65	0-59	Sand, gravel and boulders	
	-130	Medium limestone	Don
	-150	Hard limestone	
	-170	Medium limestone	
	-180	Medium-soft shale	
67	0-25	Hardpan and boulders	
	-50	Clay, gravel and water	
	-62	Blue clay	
	-131	Blue shale rock	Des
	-200	Hard, gray rock	
	-289	Blue shale rock	
68	0-50	Hardpan and boulders	
	-75	Gravel and blue clay	
	-100	Sand, gravel and water	
	-118	Blue clay	
	-175	Black, lime rock	Des
	-228	Very hard lime rock	
	-241	Soft, white limestone	
	-258	Hard, blue lime rock	
	-278	Yellow limestone	Spi-Do

MONTAGUE TOWNSHIP

Well #	Depth	Log	Formation
75	0-25	Gray lime rock, broken up	
	-75	Gray lime rock	Shf? & Spi-Do
	-200	Red shale rock	
	-225	Brown sandstone	
77	0-25	Hardpan and boulders	
	-50	Hardpan and gravel	
	-90	Gravel, sand and water	
	-95	Blue clay and rock	
	-175	Lime rock	Des
	-184	Brown sandstone	
	-225	Hard, blue limestone	
	-233	Yellow limestone and water	Spi-Do
79	0-50	Hardpan and boulders	
	-100	Yellow clay and gravel	Qsd
	-110	Gravel	
80	0-25	Sand and gravel	
	-316	Alternately hard and soft beds of reddish-brown sandstone	Shf
82	0-130	Sand, gravel and clay	
	-150	Gray, fine grained shaly limestone	Spi-Do
	-160	Gray, fine grained limestone	
	-170	Dark gray to black fine grained shale	
84	0-25	Hardpan and gravel	
	-33	Gravel and sand	
	-70	Sand	
	-82	Blue clay and rock	
	-100	Rock and limestone	Spi-Do
	-109	Lime rock	
87	0-20	Hardpan and boulders	
	-30	Boulders	
	-40	Boulders, gravel and water	
	-50	Yellow clay	
	-90	Light gray limestone	
	-110	Same, medium to coarse sand and gravel	
	-160	Blue limestone, coarse sand to medium gravel	
	-220	Shale rock	Spi-Do
90	0-10	Hardpan	
	-20	Hardpan and boulders	
	-30	Boulders, cobbles and sand	
	-40	Sandy loam, gravel and water	
90	-48	Sandy loam, gravel and water	
	-70	Bluish-gray fine grained, shaly limestone	Spi-Do
	-100	Gray limestone	
	-110	Gray limestone with yellow clay, sand and pebbles	
103	0-25	Hardpan and boulders	
	-50	Hardpan, boulders and gravel	
	-60	Gravel and water	
	-66	Broken-up lime rock	Don
	-100	Lime rock	
	-146	Blue lime rock	
	-178	Soft, yellow lime rock, with water	
	-200	White lime rock	
	-212	Green shale rock with water	
106	0-25	Hardpan and boulders	
	-50	Blue clay and boulders	
	-75	Gravel, sand and water	
	-136	Red slate rock	Shf
	-145	Hard, blue limestone	
110	0-30	Silt, pebbles	
	-35	Fine-grained sandstone and siltstone	Omb
112	0-20	Hardpan and boulders	
	-30	Hardpan, boulders and gravel	
	-40	Gravel and broken up rock	
	-86	Red sandstone	Shf
	-112	Red slate rock	
113	0-25	Hardpan and boulders	
	-100	Hard, red quartzite	Ssg
	-125	Red shale rock	
123	0-40	Sand and gravel	
	-70	Red fine-grained sandstone	Shf
124	0-71	Sand and gravel	Qsd
125	0-10	Buff clay and gravel	
	-20	Sand	Qsd
126	0-20	Sand	Qsd
127	0-10	Buff clay with some sand	
	-20	Gray clay with some sand	
	-30	Gray, fine-grained sand	
	-40	Gray, coarse-grained sand	Qsd

SANDYSTON TOWNSHIP

DOMESTIC WELLS [1 & 2]

Formation	*No. of Wells*	*YIELD IN GALLONS PER MINUTE* *Maximum*	*Minimum*	*Average*	*Median*
Stratified Drift (Qsd)	6	42	10	25	20
Onondaga Limestone (Don)	10	42	3	18	15
Poxono Island Shale through Oriskany Formation (Spi-Do)	23	80	3	19	11
High Falls Formation (Shf)	55	60	1.5	19	17

Formation	*No. of Wells*	*DEPTH IN FEET BELOW SURFACE* *Maximum*	*Minimum*	*Average*	*Median*
Stratified Drift (Qsd)	6	195	57	108	73
Onondaga Limestone (Don)	10	315	63	165	131
Poxono Island Shale through Oriskany Formation (Spi-Do)	23	238	59	105	90
High Falls Formation (Shf)	55	265	36	135	130

[1] Wells and formations with insufficient data are not used in this summary.

[2] There are no industrial wells.

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
1	Camp Wapalanne	1934	6	30	101	Shf	70	Flows 7 gpm	60/6	67	
2	A. Weyer	1951	6	20	131	Don	80	Flows 1½ gpm			
3	W. Rodda	1952	6	20	60	Qsd	60	10			
4	J. M. Fair	1951	6	20	149	Don	130	35			
5	J. Cedzideo	1952	6	30	105	"	10	1			
6	Jack Dempsey's Bar	1947	6	7	72	Shf					
7	G. Neal	1948	6	20	105	"	65	15		65	
8	J. F. Baker	1940	6	30	77	"				43	
9	A. Cancro	1949	6	15	154	"	20	75	125/1	23	
10	Bevan's Store	1946	6	20	160	Spi-Do				102	
11	No owner given	1932	6	17	107	Des	21			27	
12	J. Canfield	1952	6	4	130	Don	7	20			
13	J. Cron	1946	6	6	70	Spi-Do				28	
14	Stubble	1948	6	4	116	"				66	
15	Mortimer	1937	6	25	111	"				34	
16	Spangenberg	1942	6	30	57	Shf Qsd					
17	J. H. Sanderson	1951	6	25+	248	Shf		48			
18	A. Lertora	1949	6	25	170	"	25	46	60/½		
19	Geo. Keupker	1950	6	9	155	Spi-Do	46	15			
20	S. Shay	1936	6	25	76	"				62	
21	N. J. Convict Camp #1B	1915	6/4	10	59	"		57	55/10		
22	Bevan's Store	1948	6	30+	82	"		15		63	
23	Ellett #3	1946	6	10+	97	"				74	
24	" #2	1946	6	7	95	"				23	
25	" #1	1945	6	10	80	"				63	
26	Layton School	1940	6	30	92	Shf				60	
27	Clark	1942	6	5	80	"				12	
28	D. Guevieve	1952	6	30	152	"	23	6			
29	A. E. Waldt	1946	6	1½	150	"				103	
30	O. Raser	1941	6	16	110	"				25	
31	Hotalen	1941	6	30	105	"	1			12	
32	J. Guerriere	1952	6	5	65	Spi-Do	64	21			
33	Stevens Inst. Camp	1929	6	42	132	Shf	23	32	55/½		
34	Middlesex Cty. B.S.A.	1949	6	18	228	"	28	40	156/3		
35	J. C. Snook, Jr.	1949	6	10	132	"	125	35			
36	Stokes HQ.	1929	6	12½	102	"		Flows 4 gpm		52	
37	G. Diliberto	1949	6	10	195	Qsd	195	18	70/1		
38	G. Roselli--Gyp's	1949	6	15	73	"	73				
39	R. E. Hoffman	1952	6	3	65	Shf	56	15	20/3	56	
40	State of N. J.	1938	6	25	100	"	54	22	50/8	35	
41	H.C.C. Snook Est.	1944	6	15	118	"	117	30		117	
42	Mrs. Paul	1948	6	30	85	Spi-Do		22			
43	K. Treibel—prior to	1948	6	15	122	"					
44	L. Depew	1936	6	20	88	Don					
45	Methodist Church	1963	6	20	105	Spi-Do	60	37			
46	C. Tanzola	1959	6	15	315	Don	25	38	246/3		
47	F. C. Selber	1963	6	4	151	Des	15	Surface			
48	Girls Scouts of U.S.A.	1959	6	15	285	Don	241	110	200/3	241	
49	Brace Block Co.	1961	8	15	160	"	23	51	160/4		
50	W. Knapp	1963	6	10	62	Spi-Do	40	18			
51	J. B. Delea	1965	6	5	272	Des	140	50			
52	J. McWilliams	1966	6	3	133	Spi-Do	20	60	105/2		
53	A. Spoolstra	1966	6	60	105	"	45	23	60/2		
54	S. Sockolof	1966	6	30	172	Qsd	172	35			
55	C. Ibsen	1966	6	80	173	Spi-Do	34	62	115/2		
56	G. Hill	1961	6	42	225	Don	56	26	65/3	45	
57	H. Haskins	1965	6	12	238	Spi-Do	132	190	225/4	132	
58	H. Van Wold	1965	6	..	97	Shf	63			5	
59	G. A. Lord	19—	6	20	94	"	60	22	68/3		

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
60	B. D. Hunt	1963	6	10	84	Spi-Do	77	28			
61	F. N. Reiher	1962	6	25	118	Shf	67	27			
62	J. Walsh	1962	6	12	82	Spi-Do	54	22			
63	Brookwood Rod and Gun	1956	6	45	125	Shf	35	½	21/3	35	
64	E. P. Mayer	1963	6	30	50	"	4	15			
65	Sussex County Garage	1956	6	25	244	"	36	37	55/4		
66	Newark YM-YWCA Linwood Camp	1959	6	35	89	"	59	6½	25/3	50	
67	Stokes Dev. Corp.	1960	6	25	146	"	27	2			
68	R. L. Oliver	1961	6	16	120	"	63	28	82/3	63	
69	Paul Nigri #3	1954	6	25	100	"	48	10	50/4	46	
70	Middlesex County B.S.A.	1962	6	60	250	"	72	5	60/4	72	
71	E. Freudenheim	1963	6	3	63	Don	22	4			
72	Stokes State Forest—Shotwell Camp	1966	6	4	158	Shf	83		/3	43	
73	P. A. Nigri	1954	6	10	115	"	12	50	105/3	10	
74	M. Chiariello	1957	6	7	78	"	58	6	70/3	45	
75	J. Esposito	1963	6	8	192	"	154	28			
76	F. Territo	1963	6	8	145	"	60	24			
77	J. Francaviglia	1962	6	25	200	"	178	37			
78	G. Champignon	1965	6	35	160	"	137	70	85/2		
79	A. E. Wing	1963	6	19	112	"	35	23	74/3	30	
80	G. Welsh	1962	6	5	134	"	75	32	130/3	62	
81	A. Van Sickle	1956	6	15	36	"	17½	12	20/4	17½	
82	Consumer's Water Service	1959	6	30	100	"	30				
83	M. Welgos	1962	6	16	173	"	23	42	127/3	10	
84	W. Jurgensen	1964	6	15	232	"	40	32	180/3	30	
85	J. Passarotti	1966	6	20	75	Spi-Do	41	31			
86	C. Merghahaghn	1965	6	5	101	"	40	7			
87	E. L. Fox	1965	6	6	190	Shf	118	85			
88	R. J. Huebner	1961	6	5	56	"	17	20			
89	D. Mozgai, Sr.	1965	6	7	136	"	53	24			
90	Harry F. Krfie	1965	6	10	265	"	157	210			
91	Henry Cohn	1963	6	42	90	Qsd	90	38			
92	Mrs. Edith Mitchell	1957	6	25	115	Shf	32	29		25	
93	Otto L. Pehle	1966	6	20	130	"	34	35			
94	Pascack Valley Girl Scout Camp	1958	6	8	156	"	126	Flows			
95	Sunrise Field & Stream Club	1958	6	20	130	"	52	34		52	
96	B. Karou	1965	6	17	150	"	105	50			
97	State of N. J. Dept. of Cons.	1961	6	3	130	"	91	18		60	
98	Ed Johnson	1954	6	15	155	"	94	65			
99	Newark YMCA & YWCA Camp	1964	6	20	146	"	47	21	80/2		

Drillers' Logs of Wells, Sandyston Township
(Depths below land surface are given in feet)

Well #	Depth	Log	Formation
1	0-35	Sand, clay and boulders	
	-54	Gravel and clay	
	-67	Red sand and clay	
	-101	Red sandstone	Shf
3	0-60	Stratified sand and gravel	Qsd
7	0-35	Red sandy shale	Shf
	-40	Soft, red shale	
	-50	Red, sandy shale, buff and green limey shale	
	-55	Hard, dark red shale	
	-60	Hard, dark red, sandy shale	
	-65	Hard, dark red, shale	
	-70	Hard, dark red, sandy shale	
	-85	Hard, dark red shale	
	-90	Hard, dark red, limey shale	
	-95	Hard, dark red shale	
	-105	Hard, dark red, limey shale	
8	0-43	Glacial drift	
	-77	Red rock	Shf
9	0-23	Hardpan	
	-154	Hard, red sandstone and shale	Shf
12	0-27	Hardpan	
	-107	Slate	Des
13	0-28	Glacial drift	
	-70	Limestone	Spi-Do
14	0-60	Glacial drift	
	-116	Limestone	Spi-Do
15	0-34	Glacial drift	
	-111	Limestone	Spi-Do
		Red sandstone and shale	Shf

Drillers' Logs of Wells, Sandyston Township
(Depths below land surface are given in feet)

Well #	*Depth*	*Log*	*Formation*
16	0-57	Sand and gravel	Qsd
19	0-45	Glacial drift	
	-70	Dark gray, fine-grained, crystalline limestone	Spi-Do
	-80	Dark gray, limey shale	
	-155	Dark gray, fine-grained limestone and limey shale	
20	0-62	Glacial drift	
	-76	Greenish, rotten limestone	Spi-Do
21	0-54	Hardpan and clay	
	-58	Water bearing sand	
	-59	Limestone	Spi-Do
22	0-63	Glacial drift	
	-70	Buff, gray and greenish limey shale	Spi-Do
	-80	Buff and greenish limey shale and gray limestone	
23	0-73	Glacial drift	
	-97	Limestone	Spi-Do
24	0-23	Glacial drift	
	-95	Limestone	Spi-Do
25	0-63	Glacial drift	
	-80	Rotten limestone	Spi-Do
26	0-60	Glacial drift	
	-92	Red sandstone	Shf
27	0-12	Glacial drift	
	-80	Red sandstone	Shf
29	0-103	Glacial drift	
	-150	Some limestone, mostly red sandstone	Shf
30	0-12	Glacial drift	
	-105	Red sandstone	Shf
36	0-52	Glacial drift	
	-102	Red rock	Shf
37	0-195	Hardpan, gravel and boulders —finished in gravel	Qsd
39	0-30	Clay and hardpan	
	-56	Hardpan	
	-65	Red rock	Shf
40	0-35	Sand, gravel and boulders	
	-100	Hard, red shale, sandy towards bottom	Shf
41	0-117	Sand, clay and boulders	Qsd
42	0-74	Glacial drift	
	-85	Red-brown limey, sandy shale and buff to greenish shaley limestone	Spi-Do
44	0-44	Glacial drift	
	-88	Flinty, hard limestone	Don
46	0-25	Hardpan and broken up rock	
	-100	Soft, white limestone	Don
	-200	Hard, blue limestone	
	-250	Very hard, blue limestone	
	-300	Soft, white limestone	
	-315	Yellow limestone	
48	0-241	Sand and silt	
	-285	Blue limestone	Don
49	0-20	Sand and gravel	
	-160	Blue and black limestone	Don
56	0-25	Hardpan and boulders	
	-32	Gravel, sand and water	
	-45	Blue clay	
	-100	Hard, blue lime-rock	Don
56	-150	Black lime-rock	
	-195	Blue shale, rock	
	-213	Hard, gray rock	
	-225	Very soft, brown sandstone	
57	0-123	Clay and sand	
	-132	Clay	
	-238	Slate	Spi-Do
58	0-5	Gravel, clay and boulders	
	-97	Red sandstone	Shf
59	0-25	Hardpan and boulders	
	-50	Sand, gravel and boulders	
	-60	Quick sand	
	-94	Red sandstone	Shf
63	0-35	Hardpan, boulders and gravel	
	-100	Red sandstone	Shf
	-114	Hard, blue rock	
	-120	Very hard, blue rock	
	-125	Red sandstone	
66	0-50	Hardpan and boulders	
	-89	Red sandstone	Shf
68	0-25	Boulders and hardpan	
	-50	Boulders, hardpan and gravel	
	-63	Gravel, sand and water	
	-120	Red-shale rock	Shf
69	0-46	Boulders and gravel	
	-100	Red sandstone and shale	Shf
70	0-72½	Clay	
	-251	Red sandstone and shale	Shf
72	0-20	Hardpan and boulders	
	-30	Boulders, clay and gravel	
	-43	Hardpan, clay, boulders and gravel	
	-75	Red rock—broken up	Shf
	-125	Red rock (sandstone) hard	
	-132	Hard, gray flint rock	
	-158	Red rock (sandstone) hard	
73	0-10	Boulders	
	-115	Red rock (sandstone and shale)	Shf
74	0-45	Sand, gravel and silt	
	-78	Conglomerate and red sandstone	Shf
79	0-25	Hardpan and boulders	
	-30	Sand, gravel and water	
	-51	Hard, red sandstone	Shf
	-87	Hard, gray sandstone	
	-98	Hard, red sandstone	
	-105	Hard, gray sandstone	
	-112	Soft, brown sandstone	
80	0-25	Hardpan and boulders	
	-35	Large boulders and cobbles	
	-50	Large gravel	
	-62	Gravel and water	
	-100	Red sandstone	Shf
	-122	Hard, blue sandstone	
	-134	Red shale-rock	
81	0-17½	Clay and gravel	
	-36	Sandstone	Shf
83	0-10	Hardpan and broken-up rock	
	-23	Red sandstone	Shf
	-75	Hard, red sandstone	
	-115	Hard, gray sandstone	
	-127	Green shale with water	
	-173	Red sandstone	

SPARTA TOWNSHIP (Including OGDENSBURG)

DOMESTIC WELLS [1]

Formation	No. of Wells	*YIELD IN GALLONS PER MINUTE* Maximum	Minimum	Average	Median
Stratified Drift (Qsd)	6	75	4	26	10
Kittatinny Formation (C0k)	20	52	½	17½	15
Precambrian crystallines (pC)	110	75	½	11	7

Formation	No. of Wells	*DEPTH IN FEET BELOW SURFACE* Maximum	Minimum	Average	Median
Stratified Drift (Qsd)	6	123	63	90	76
Kittatinny Formation (C0k)	20	400	65	157	125
Precambrian crystallines (pC)	110	375	48	132	118

INDUSTRIAL WELLS [1, 2]

Formation	No. of Wells	*YIELD IN GALLONS PER MINUTE* Maximum	Minimum	Average	Median
Stratified Drift (Qsd)	8	733	6	265	80
Kittatinny Formation (C0k)	11	250	18	151	162
Precambrian crystallines (pC)	12	157	5	60	61

Formation	No. of Wells	*DEPTH IN FEET BELOW SURFACE* Maximum	Minimum	Average	Median
Stratified Drift (Qsd)	8	253	35	101	65
Kittatinny Formation (C0k)	11	354	90	222	203
Precambrian crystallines (pC)	12	300	164	214	201

[1] Wells and formations with insufficient data are not summarized.

[2] See regional summary of industrial wells.

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
1	Lake Mohawk Water Co. (A. D. Crane Co.)	1935	6	260	151	Qsd				150	I
2	Lake Mohawk Water Co. (A. D. Crane Co.)	1935	10	400	42	"	20/41	5	30/4½		I
3	Lake Mohawk Water Co. (A. D. Crane Co.)	1933	12	550	35	"	30/35	Flows	16/168	35	I
4	Lake Mohawk Water Co. (A. D. Crane Co.)	1929	8	38	250	pC		10	210/	128	I
5	Lake Mohawk Water Co. (A. D. Crane Co.)	1932	18	55	77	Qsd	46/68	6	49/		I
6	Lake Mohawk Water Co. (A. D. Crane Co.)	1931	6	Small	200	C0k					I
7	Lake Mohawk Water Co. (A. D. Crane Co.)	1931	18	80	55	Qsd	25/36 50/55	6	38/	55½	I
8	Lake Mohawk Water Co. (A. D. Crane Co.)	1931	12	Test	90	"					I
9	Lake Mohawk Water Co. (A. D. Crane Co.)	1931	8	17	62	"			40/		I
10	Lake Mohawk Water Co. (A. D. Crane Co.)	1931	18	70	69	"	45/61	Flows	44/	61	I
11	Lake Mohawk-Sparta Water Co.	1954	8	187	215	Ch & C0k	107	0	120/8	90	I
12	Lake Mohawk-Sparta Water Co.	1939	10/8	Very little	282	fl	132	2+		80	I
13	Lake Mohawk-Sparta Water Co.	1952	8	15	202	pC	105	18	140/8	65	I
14	Lake Mohawk-Sparta Water Co.	1936	12	250	200	C0k	158	10	104/	58	I

SPARTA TOWNSHIP (Including Ogdensburg)

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
15	Lake Mohawk-Sparta Water Co.	1929	10	6	253	Qsd				70	I
16	Lake Mohawk-Sparta Water Co.	1943	8	62	203	pC	33	9	160/8	29	I
17	Lake Mohawk-Sparta Water Co.	1957	8	54	200	"	89	34	160/24	37	I
18	Lake Mohawk-Sparta Water Co.	1963	8	190	241	COk	108	10	175/24	68	I
19	Lake Mohawk-Sparta Water Co.	1966	10/6	75	176	pC	16/25	36	175/1	14	I
20	Lake Mohawk-Sparta Water Co.	1966	6	5	276	"	42	0	275/½	42	I
21	Sparta Coal & Oil	1942	6	3½	125	COk	40	8	100/	39	
22	C. Force	1937	6	3	331	pC		185			
23	W. Janke	1953	6	25	108	"	34½	18	60/2	8½	
24	J. Fasolo	1951	6	10	70	COk	17	58	58/4	108	
25	M. Risse	1953	6	25	120	pC	78	90	110/6	36	
26	Boro. of Ogdensburg	1949	8	Test	78	Qsd				65	I
27	" " "	1949	12	200	157	COk		24		24	I
28	" " "	1949	8	200	125	"	70/120	12	64/8	24	I
29	St. Cloud Bldg. Corp.	1950	8/6	75	304	"	274½	113	125/8	270	I
30	Sparta Mountain Water Co.	1953	8	10	164	pC	36	12½	145/	10	I
31	E. Bull	1942	6	17	147	COk	147			130	
32	Texaco Service Station	1953	6	3½	133	pC		56		38	
33	D. Goble	1942	6	36	144	COk	71½	22	60/	71	
34	L. Garrabrant	1950	6	15	103	"	63	Flows ½ gpm	80/6	63	
35	A. Jacobs	1936	6	15	91	"		20	50/	84	
36	C. W. Hubbard Co.	1950	8	21	300	"	19½	7	180/8	7	
37	A. Hopper	1943	6	12	220	"		Flows ½ gpm	100/	185	
38	Crane Co. (Lake Saginaw)	1945	8	5	300	pC	45	5	117/	40	
39	A. Grazevich	1952	6	4	65	COk	14	30	65/2	11	
40	E. Laidlaw	1952	6	6½	85	pC	11	7			
41	" "	1933	6	1½	103	"					
42	" "	1933	6	1½	80	"					
43	" "	1933	6	½	60	"					
44	A. Sortz & D. Houtsma	1952	6	8	110	"	10	40	90/2		
45	B. Boscarino	1954	6	2½	240	"	16	53	240/3		
46	Lake Mohawk Water Co. (Closs Crane, Inc.)	1948	8	157	207	"	127	7	150/	124	I
47	H. Hollinshead	1942	6	15	221	"	30	11	120/	10±	
48	E. Branham	1944	6	10±	94	fl		11	20/		
49	Limestone Prod. of America	1945	12	800	35	"	20		10/		I
50	" " " "	1965	6	12	173	"	61	53	120/2		
51	" " " "	1961	10	228	172	COk	59	15	45/53		I
52	J. Fasolo	1965	6	12	97	"	20	8	60/2		
53	C. W. Smith	1964	6	52	145	"	42	63	75/3	15	
54	J. P. Smith	1964	6	5	325	"	42	32	305/3	20	
55	J. M. Smith	1956	6	15	95	"	28	52	70/2		
56	G. E. Stone	1965	6	5	63	Qsd	63	21			
57	A. M. Roberston	1964	6	30	115	COk	72	39	50/3	50	
58	E. G. Anderson	1966	6	10	95	pC	18½	12	80/4	3	
59	W. Scheuer	1965	6	4	76	Qsd	76	20			
60	Camp Clipawage	1962	6	14	115	pC	22	22	100/1		
61	A. E. Lohr	1966	6	10	90	"	33	30	80/4	33	
62	E. G. Anderson	1964	6	20	60	"	22	10	50/4	10	
63	S. Olsen	1962	6	5½	71	"	26	24	60/1		
64	G. H. Anderson	1966	6	40	115	"	30	12	80/2		
65	Donfred Const. Co.	1964	6	30	169	"	19	17	100/2		
66	R. Mitchell	1964	6	6	106	"	33	37	90/2		
67	G. Williams	1964	6	25	97	"	47	0	50/1		

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
68	J. L. Bennett	1961	6	6½	107	pC	76	22	60/1		
69	Sparta Township	1956	8/6	135	206	COk	134	Flows	150/48+	78	I
70	" " (Prod. #1)	1965	20/10	733	140	Qsd	120/140	23½	100±/72	140	I
71	M. Kozdeba	1966	6	7	98	pC	71	33	70/2		
72	J. E. Norman	1965	6	11	97	"	47	27	80/1	47	
73	L. Sargent	1963	6	20	103	Qsd	103	32	40/1		
74	St. Anthony's Guild	1964	6	30	130	COk	78	10½	40/2		
75	A. Heustin	1955	6	7	55	pC	18	12	45/4	15	
76	Willis & Paul	1961	6	40	72	Qsd	62/72	10	11½/4		
77	P. Michelotti & Sons, Inc.	1964	6	100	300	pC	93	11	160/2		I
78	P. J. Coerts	1965	6	7	147	fl?	15	30	130/2		
79	F. Demarest	1964	6	5	300	pC	37	22	280/2		
80	R. Layton	1966	6	60	130	"	22	10	50/2		
81	F. Bennett	1959	6	15	130	"	90	78	99/3	70	
82	H. Swingle	1963	6	6	83	"	25	18	70/1		
83	Boro. of Ogdensburg	1964	12	200	350	COk	31½	2	95/24	9	I
84	" " "	1957	6	4	82	pC	22	7	60/1		
85	J. Hunt	1964	6	8	96	"	47	2½	60/2		
86	R. A. Howe	1966	6	36	113	"	25	27	68/3	10	
87	G. Novak	1966	6	15	60	"	25	10	40/2		
88	O. J. Thuestad	1963	6	15	143	"	25	35	118/3	5	
89	H. B. Skinner	1965	6	4	165	"	68	26			
90	Donfred Const. Co.	1964	6	40	177	COk	27	20	170/2		
91	Sparta High School	1958	8	100	243	"	40½	12	43/24	23	I
92	E. DeGraw	1965	6	4	73	pC	20½	12	60/2		
93	G. Ziegler	1963	6	15	149	"	22	77	130/1		
94	J. Crane	1965	6	6	172	"	20	4	100/2		
95	R. L. Straway	1965	6	15	135	"	43	19	100/1	16	
96	W. Rome	1960	5	7	130	"	61	22	115/1	60	
97	" "	1961	5	5	98	"	54	23	85/1		
98	J. Antablian	1962	6	1½	183	"	25	9			
99	Mohawk Ind.	1962	6	65	90	COk	81	41	41/6		I
100	" "	1965	6	½	162	"	50	39	100/¾	43	
101	R. E. Bennett	1965	6	20	80	Qsd & pC	80	20	60/2	80	
102	H. J. Dericks	1964	6	5	73	"	70	8	60/2		
103	R. Cisternina	1966	6	½	400	COk	40	30	250/1	10	
104	J. Dobbins	1954	6	3	135	pC	76	80	125/2	76	
105	E. Predmore	1966	6	30	96	COk	73	51	60/2		
106	J. Foley	1964	6	7½	85	pC	53	6	75/2		
107	M. F. Gorham	1965	6	23	127	"	64	34	65/6	14	
108	N. Beck	1966	6	16	123	"	94	35	65/6	76	
109	C. Pierson	1964	6	18	98	"	26	18	80/2		
110	R. Rurade	1964	6	5	72	"	23	5	60/2		
111	F. W. Russell	1961	6	9	90	"	35	20		33	
112	C. McConchie	19—	6	8	97	"	43	19	80/2		
113	M. Kamke	1965	6	8	78	"	20	28	60/2	14	
114	K. Scheuer	1961	6	22	147	"	22	27	43/6	14	
115	A. Stebbins, Jr.	1962	5	2	70	"	26	6	60/1		
116	R. Budney	1965	6	20	100	"	52	30	60/2		
117	R. Wauters	1965	6	4	146	"		17	100/2		
118	Sparta Church of The Nazarene	1966	6	4	146	"		17	100/2	15	
119	T. Carter	1964	6	4½	110	"	21	18	80/2		
120	G. Myers	1963	6	8	71	"	47	16	60/1		
121	F. Gillespie	1966	6	12	73	"	14	26	60/2		
122	W. R. Harris	1964	6	10	111	"	18	18	80/2		
123	R. Pugh	1962	5	15	123	"	23	31	70/1		
124	J. E. Johnston	1965	6	9	109	"	21	10	65/	5	
125	R. C. Diocese of Paterson	1957	8	75	212	"	102	15	70/8	85	I
126	Russcarl Devel. Corp.	1966	8/6	64	174	"	103	12	85/24		I
127	D. Volpe	1966	6	9	121	"	23	37	100/1	11	
128	Raabe & Schmidt	1962	5	6	48	"	27	15	46/1		

SPARTA TOWNSHIP (Including Ogdensburg)

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
129	A. Marks, Jr.	1964	6	6	95	pC	35	20	80/2		
130	C. V. Searing	1964	6	10	132	"	12	20	120/2		
131	E. L. Rox	1965	6	9	172	"	108	116	160/1		
132	D. Richter	1964	6	5	50	"	17	13	40/2		
133	Timbercraft, Inc.	1964	6	6	194	"	12	23	150/2		
134	E. Steubel	1966	6	10	101	Qsd	101	41	80/2		
135	H. Bayles	1965	6	75	202	pC	20	10	60/2		
136	J. Puleo	1964	6	10	103	"		14	93/	44	
137	H. Stockhaus	1962	6	5	100	"	32	22	80/1		
SUNSET LAKE (138-148)											
138	Regal Estates L. 15; Blk. 6-3	1965	6	6	175	"	23½	26	160/1	8	
139	Regal Estates L. 16; Blk. 6-3	1965	6	3	175	"	23½	29	160/1	7	
140	Tram. Assoc., Inc.	1964	6	9	152	"	29	25	140/1	6	
141	E. Anderson	1964	6	15	72	"	20	5	60/2		
142	W. DeHaan	1962	6	8	148	"	38	20	130/2		
143	Rev. R. J. Clark	1962	6	3	280	"	35	58	265/3	20	
144	H. L. Smith	1962	6	28	265	"	25	72	178/3	10	
145	Lk. Arapaho	1966	8	20	125	"	15	6	105/2		
146	R. A. Curtis	1962	6	3	275	"	33	54	365/3		
147	R. Lindquist	1962	6	22	375	"	25	81	196/3	10	
148	E. K. Wilcox	1963	6	3	300	"	22	72	262/3	22	
149	M. Rider	1965	6	30	205	"	110	20	175/2		
150	F. Birtwistle	1965	6	3/4	236	"	33	51	225/1	10	
151	S. Sachs	1962	5	5	122	"	21	Flows	100/1		
152	S. Mackey	1962	6	5	113	"	46	22	105/3	35	
153	H. Youngman	1966	6	3	120	"	16	20	90/2		
154	B. VanVliet	1964	6	4	223	"	68	83	200/1	53	
155	No. N. J. Bldrs., Inc.	1961	6	2	80	"	24	24	70/2		
156	" " " " "	1961	6	7	118	"	17	20	80/2		
157	" " " " "	1965	6	8	60	"	15	20	50/2		
158	" " " " "	1961	6	2	121	"	25	25	115/2		
159	" " " " "	1963	6	6	98	"	52	32	82/3	32	
160	" " " " "	1961	6	2½	162	"	23	46	150/2		
161	" " " " "	1961	6	3	123	"	20	5	90/		
162	" " " " "	1961	6	3	123	"	53	5	90/		
163	" " " " "	1961	6	2½	80	"	15½	5	70/2		
164	" " " " "	1960	6	20	51	Qsd & pC	45	10	40/8		
165	" " " " "	1962	6	5	110	pC	55	32	95/3		
166	" " " " "	1961	6	8	64	"	42	20	60/8	42	
167	" " " " "	1961	6	5	115	"	42	60	110/8		
168	" " " " "	1965	6	48	240	"	30	34	214/3	10	
169	J. Sickles	1966	6	10½	96	"	66	3	85/1	50	
170	Mrs. J. DeJesus	1964	6	10	125	"	20	37	90/½	2	
171	J. Bogaert	1965	6	7	122	"	16	73	105/2		
172	D. Allen	1954	6	5	85	"	12	20	65/3	12	
173	Sparta Lk. Club	1958	6	20	105	"	9½	69	85/4		
174	L. White	1964	6	30	73	"	41	27	60/2		
175	Morris Area Girl Scouts	1963	6	3	248	"	50	37	240/1		
176	M. Kubiak	1962	6	30	127	"	91	18	60/2		
177	R. Mayer	1961	6	60	199	"	108	27	68/8	108	I
178	Umbrian Farms	1943	8	60	202	Ojb, Omb & COk		30	100/	25	I
179	Ideal Farms	1939	8	18	354	COk	21	30	250/	9	I
180	P. Franek	1957	6	2	125	"	19	28	100/4	18	
181	Camp Sacajawea	1964	6	75	123	Qsd	113/123	35	45/5		
182•	J. Smith	1964	6	2	115	COk	21	23	100/2		
183•	Sparta Twp. (test #1)	1965	6	307	141	Qsd	136/141	22	88/72		I

• Not included in tabulations.

Drillers' Logs of Wells, Sparta Township including Ogdensburg
(Depths below land surface are given in feet)

Well #	Depth	Log	Formation
1	0-30	Old well	
	-34	Sand and clean gravel	Qsd
	-35½	Small boulders, dirty	
	-37	Gravel with water	C0k
	-38	Gravel grits	
	-39	Gravel, dirty	
	-43½	Small boulders, gravel	
	-50	Clay	
	-75	Yellow clay	
	-114	Hardpan, rotten rock	
	-128	Yellow sand and silt and water	
	-134	Fine, dead, yellow sand	
	-150	Yellow sand, clay and water	
	-150	Rock, granite gneiss	
3	0-5	Humus and clay	
	-35	Sand and gravel	Qsd
4	0-128	Hardpan, clay and boulders	
	-145	Pegmatite	
	-160	Byram gneiss	pC
5	0-15	Yellow clay and sand	
	-25	Fine, muddy sand	
	-35	Gray clay and sand	
	-50	Gray clay	
	-58	Coarse sand and gravel	
	-72	Hard-packed sand, gravel and boulders	Qsd
7	0-10½	Sand	
	-34	Sand, gravel and boulders	
	-47	Fine-grained, white muddy sand	
	-49	Clay	
	-54½	Sand, gravel and boulders	
	-55½	Clay	
	-55½	Limestone	C0k
8	0-60	Light gray sand and gravel	
	-65	Light gray clay and fine sand	
	-75	Light gray sand	
	-90	Yellow clay	
	-90	Coarse sand	Qsd
9	40-49	Gravel	Qsd
	-62	Quicksand	
	-62	Clay	
10	0-3	Black muck	
	-10	Sand and gravel	
	-15	Gravel and mud	
	-25	Gravel and boulders	
	-30	Boulders	
	-38	Fine sand	
	-40	Clay	
	-45	Fine sand	
	-55	Gray sand	
	-60	Hard, white sand	
	-61	Clay	
	-69	Rock	C0k

Well Drilled for the Lake Mohawk-Sparta
Water Company by the Wm. Stothoff Co.,
and completed Jan. 1954

#11

Depth	Description by Meredith E. Johnson	Correlation
15	Fine-grained, yellow, slightly clayey sand with discernible grains of quartz (most), feldspar, muscovite and magnetite.	Glacial
32	Soft, yellow clay with gray-brown layers.	
40	Soft, yellow clay with thin gray-brown layers.	
50	Soft, yellow clay with thin gray-brown layers.	
60	Brown, sandy clay and fragments of fine-grained gneiss.	Slope wash
70	Dark brown gneiss that has weathered in place.	Granite gneiss
80	Same.	" "
90	Yellow, fine to coarse sand with well-rounded grains, but including also some rock fragments of shale and chert.	Weathered and partly decomposed Hardyston Quartzite
100	Similar but greater percentage of shale and chert, fragments of sandstone also noted.	
110	Similar with larger fragments of sandstone and shale.	
120	Same as 100.	
130	Hard, sericitic shale.	Hardyston
140.	Same.	
150	Gray limestone.	Kittatinny
160	Same.	
170	Same with some hard, interbedded shale.	
180	Interbedded sandstone and hard interbedded shale.	
190	Dark gray limestone with several small stalactite fragments showing that well penetrated open cavity between 180′ and 190′.	
200	Same as last.	
210	Dark gray limestone.	

SPARTA TOWNSHIP (Including Ogdensburg)

Well #	Depth	Log	Formation
12	0-3	Swamp	
	-25	Light olive drab clayey silt	
	-58	Yellow sandy clay	
	-64	Yellow sandy clay and small stone fragments	
	-80	Yellow sandy clay	
12	-82	Franklin limestone and some granite gneiss	fl
	-85	Mixture of various kinds of rock	
	-90	Mostly Franklin limestone	
	-282	White Franklin limestone	

Log of Well Drilled for the
Sparta Water Company at Lake Mohawk by
Wm. Stothoff Co. & completed December, 1952

#13 Depth	Description by R. A. R.	Correlation
2-18	Brown-yellow, fine clay with a few grains of medium to coarse sand.	Glacial drift
18-30	Gray, calcareous, silty clay.	
40	Light brown, fine, sandy, silty clay with some chert pebbles.	
50	Light brown, fine, sandy, silty clay with many semi-angular granite, red shale and chert pebbles up to 10 mm.	
60	Same, with semi-angular to sub-rounded pebbles up to 40 or 50 mm. Calcite and graphite noted along with quartz—monazite, granite and chert.	
65	Poorly sorted sand and semi-angular gravel with many dark minerals. Some clay or silt and limestone noted.	
104	Boulders (?) of dolomitic limestone and granite. Grains of orthoclase feldspar, quartz, pyroxene or hornblende noted. (Driller's log states "rotten granite".)	
120	Gray limestone.	Kittatinny Ls.
160	" "	
170	Granite or similar high silica rock. Quartz, feldspar, calcite with accessory of pyrite.	Granite Byram gneiss?
185	Granite.	
195	Same.	

Well #	Depth	Log	Formation
14	0-10	Yellow clayey sand	
	-15	Silty, clayey, medium to coarse sand, coarse arkosic sand or decomposed boulder	
	-20	Granite gneiss	
	-25	Sand and small pebbles	
	-40	Same but a little finer	
	-48	Same but a little coarser	
	-49	Very fine-grained yellow silt	
	-51	Fine to medium-grained yellow sand	
	-53	Sand and pieces of broken gray limestone	
	-54	Same, with a little clay	
	-58	Sand and broken limestone	
	-250	Gray Kittatinny limestone	COk
15	0-20	Stony soil	
	-48	Fine sand and gravel	
	-52	Clay and gravel	
	-70	Fine sand and clay	
	-74	Very coarse gravel and clay	
	-253	Limestone	COk
16	0-29	Glacial till	
	-203	Granite	pC
17	0-3	Soil	
	-21	Sand, gravel and boulders	
	-30	Coarse sand and gravel	
	-58	Fine sand	
	-67	Fine sand, clay and stones	
	-73	Fine sand	
	-77	Fine sand and gravel	
	-82	Sand and gravel	
	-90	Sandy clay	
	-95	Yellow clay	
	-97	Yellow clay and rock	
	-101	Limestone	COk
19	0-14	Sand, gravel and clay	
	-176	Granite	pC
21	0-39	Glacial drift	
	-125	Limestone	COk
24	0-10	Overburden	
	-40	Gray limestone	COk
	-50	Dark gray limestone	
	-60	Gray limestone	
	-70	Dark gray limestone with traces of chert and dolomite	
25	0-36	Earth, clay and stones	
	-120	Gneiss	pC

Log of Test Well #2 Drilled for the Borough of Ogdensburg by the Layne-New York Company and Completed in April, 1949

Log compiled from samples by M.E.J.

#26

Depth	Description	Correlation
1-14	Typical, vari-colored, coarse sand and broken rock fragments.	Stratified glacial drift of Wisconsin age.
14-29	Coarse gravel and a little sand.	
29-35	Brown medium-grained sand.	
35-38	Coarse gravel.	
38-39	Gravel and a little medium-grained brown sand.	
39-43	Coarse gravel and a little medium-grained brown sand.	
43-46	Coarse gravel and a little medium to coarse grained brown sand.	
46-48	Medium-grained brown sand.	
48-57	Coarse gravel and medium to coarse brown sand.	
57-58	Dark red clay, and some red sand and small sub-angular pebbles.	
58-59	Medium to coarse gray-brown sand.	
59-60	Brown sand and gravel.	
60-61	Light brown sand loosely cemented with $CaCO_3$.	
61-62	Brown clay with a little sand.	
62-63	Sub-angular gravel and a little sand.	
63-65	Coarse gravel and just a little sand.	
65-75	Light gray dolomitic limestone.	Kittatinny Ls.
75-78	Medium-grained brown sand.	Stratified drift

Log of Test Well #3 Drilled for the Borough of Ogdensburg by the Layne-New York Company and Completed in April, 1949

Log compiled from samples by M.E.J.

#27

Depth	Description	Correlation
1-12	Fine to medium-grained brown sand and angular fragments of granite gneiss, quartzite, etc.	Wisconsin glacial drift
12-24	Gray clay with a slight olive tint.	
24-39	Mixture of slightly rounded pebbles and limestone.	Kittatinny Ls. & Wisconsin drift
39-42	Brownish-gray weathered limestone.	Kittatinny Ls.
42-55	Slightly weathered gray limestone.	
55-105	Slightly weathered gray and brown limestone.	
105-125	Slightly weathered gray limestone.	
125-157	Dolomitic limestone with grains of garnet, quartz.	

#28

Formation	Thickness of Formation (Feet)	Depth of Formation (Feet)	
Top Soil	1	1	
Sand and Gravel	11	12	Glacial drift
Sandy Clay	12	24	
Broken Rock	16	40	
Hard Rock	7	47	
Soft Rock	45	92	
Lime Rock	7	99	

#28

Formation	Thickness of Formation (Feet)	Depth of Formation (Feet)	
Soft Rock	4	103	Kittatinny Ls.
Lime Rock	8	111	
Rotten Rock	7	118	
Hard Rock	12	130	
Rotten Rock	15	145	
Hard Rock	12	157	

Log of well drilled for St. Cloud Bldg. Corp. at Sparta
by Wm. Stothoff Co. (1950)

Surface elev. 850 | Log by W.H.C.

#29

Depth	*Description*	*Correlation*
10	Variegated sand and gravel. Pebbles are ¼″ and under, consisting chiefly of limestone. Gravel makes up about ⅓ of washed sample.	Stratified glacial drift
19	Buff-colored silt, slightly clayey.	" " "
90	Buff-colored silt, slightly clayey.	" " "
116	Buff-colored silt w/ some very fine-grained sand.	" " "
125	Buff-colored silt w/ some very fine-grained sand.	" " "
134	Variegated sand and gravel, pebbles are ⅝″ and under, consisting of shale, quartz and limestone.	" " "
148	Principally variegated sand with some gravel. Pebbles of limestone, quartz, and shale are under ¼″.	" " "
167	Variegated sand and gravel, pebbles are under ⅝″ and constitute ¾ of the sample.	" " "
200	Similar to 167, but pebbles are smaller in size and constitute approximately 40% of sample.	" " "
210	Buff-colored clayey, fine-grained to very coarse-grained sand. Some small-sized gravel.	" " "
225	Variegated, fine-grained sand.	" " "
238	Variegated sand and gravel, pebbles are ¾″ and less. Granite gneiss pebbles are conspicuous.	" " "
245	Buff-colored silt, slightly clayey.	" " "
270	Weathered limestone.	Kittatinny Ls.
284	Weathered limestone.	" "
300	Weathered limestone.	" "

Well #	*Depth*	*Log*	*Formation*	*Well #*	*Depth*	*Log*	*Formation*
30	0-10	Clay and boulders		37	0-25	Sand, gravel and boulders	
	-164	Very hard granite	pC		-35	Clay	
31	0-45	Hardpan and boulders			-55	Sand and gravel	
	-65	Clay			-90	Sand, gravel and clay	
	-75	Sand and clay			-185	Decayed limestone	
	-120	Hardpan and boulders			-220	Weathered limestone	COk
	-130	Yellow sand and clay		38	0-8	Soil and clay	
	-147	Limestone	COk		-44	Hardpan and boulders	
33	0-51	Hardpan and boulders			-300	Hard granite	pC
	-71	Broken limestone					
	-144	Limestone	COk		-124	Clay	
34	0-35	Sand and gravel			-207	Granite	pC
	-63	Sand and clay		45	0-2	Dirt	
	-103	Limestone	COk		-240	Very hard granite	pC
36	0-7	Boulders		46	0-68	Sand and gravel	
	-300	Hard limestone	COk				

Log of Well Drilled for Sen. H. H. Hollinshead
on Sparta Mtn.
by the
Wm. Stothoff Company (1942)

#47

Sample *Depth*	*Description*	*Correlation*
10	Medium-grained buff-greenish-gray granite-gneiss.	Losee, pC
25	Fine to medium-grained buff colored granite gneiss.	
50	Fine to medium-grained pinkish-yellow colored granite gneiss.	
75	Fine to medium-grained gray and yellow colored granite gneiss.	
100	Fine grained, almost white (some pink grains) sil., gr. gn.	
115	Fine grained speckled greenish-gray and white gr. gn.	
140	Fine grained light greenish-gray.	
150-160	Fine grained greenish-gray (just a little darker than previous sample). Down 176′ now	

Well #	Depth	Log	Formation
51	0-59	Fine sand	
	-172	Limestone	fl?
53	0-15	Hardpan	
	-25	White limestone (broken up)	
	-45	White limestone	
	-75	Hard blue limestone	
	-125	Soft yellow limestone	
	-145	Brown "Honey Comb" limestone	C0k
54	0-20	Hardpan and broken up rock	
	-100	White limestone	
	-175	Hard blue limestone	C0k
	-225	Soft yellow limestone	
	-250	Brown soft "Honey Comb" limestone	
	-275	Soft yellow limestone	
	-300	Soft white limestone	
	-325	Very soft white limestone	
57	0-25	Hardpan and cobblestones	
	-50	Gravel	
	-65	Broken up limestone	
	-72	Limestone	C0k
	-85	White limestone	
	-95	Hard blue limestone	
	-115	Soft yellow limestone	
59	0-76	Overburden to coarse gravel	Qsd
61	0-33	Clay and gravel	
	-90	Granite	pC
62	0-10	Clay and gravel	
	-60	Granite	pC
69	0-60	Clay	
	-78	Clay and sand	
	-134	Blue limestone, hard with streaks of rotten rock	C0k
	-201	Limestone	
		Production Well	
70	0-45	Fine sand and boulders	Qsd
	-120	Fine sand	
	-140	Coarse sand and gravel	
	-140	Rock	
		Test Well #1	
71	0-10	Sand and boulders	Qsd
	-36	Sand and gravel	
	-108	Fine dirty sand and clay	
	-120	Coarse water-bearing sand	
	-142	Sand and gravel	

Well #	Depth	Log	Formation
72	0-24	Clay, sand and gravel	
	-47	Sandstone	
	-97	Granite	pC
75	0-10	Light yellowish brown, overburden of granitic origin	
	-20	Light gray granite gneiss cuttings-quartz, feldspar, Byram gneiss, mica, few pyroxenes, no magnetics.	pC
	-30	Same	
	-40	Same	
	-50	Same, high percentage of mica	
76	0-35	Clay	Qsd
	-52	Coarse gravel	
	-58	Gravel with little water	
	-62	Gravel and sand	
	-72	Coarse gravel, water	
83	0-9	Overburden	
	-350	Limestone	C0k
84	0-82	Granite	pC
86	0-10	Hardpan and boulders	
	-15	Broken up limestone	
	-25	Limestone	
	-78	White limestone	
	-113	Soft brown granite	pC
88	0-5	Hardpan and broken up rock	
	-50	Gray granite	pC
	-75	Soft brown granite	
	-125	Hard gray granite	
	-143	Soft brown "Honey Comb" rock	
91	0-23	Clay	
	-243	Limestone	C0k
100	0-15	Clay, sand, gravel and boulders	
	-40	Clay	
	-43	Gravel and sand	
	-48	Limestone	C0k
	-62	Rotten seam	
	-70	Limestone	
	-82	Rotten seam	
	-148	Limestone	
	-162	Blue-white limestone	
103	0-10	Overburden	
	-25	Soft limestone	C0k
	-40	Hard limestone	
	-400	Limestone	

Log of Well Drilled for James Dobbins
by George R. Burgess & Son, Inc. (1954)

#104

Depth	Description	Correlation
30	Light yellowish gray heterogenous mixture of fine sand to angular ⅜" pebbles. Material of granitic origin and sedimentary.	Pleistocene
40	Same as 30', somewhat coarser.	
50	Same as 40'.	
60	Same as 50', slightly finer.	
70	Same.	
80	Light olive gray angular cuttings rich in dark mineral. Probable top of weathered bedrock. Pochuck gneiss.	Pochuck, pC
90	Same as 80', with some sub-angular fragments.	
100	Same as 90', rich in dark minerals, hornblende, biotite, magnetite, probable Ca feldspars	
110	Same as 100'.	

Depth	*Description*	*Correlation*
120	Light tan fresh, fine angular grains of quartz, feldspar, minor hornblende, magnetite and mica.	
130	Same as 120′.	

No radioactivity noted in any samples.

Well #	*Depth*	*Log*	*Formation*
107	0-6	Clay, gravel and sand	
	-14	Clay and broken limestone or granite	
	-33	Broken limestone or granite	
	-59	Rotten granite	pC
	-127	Solid granite	
108	0-76	Sand, gravel and granite boulders	
	-90	Broken granite	pC
	-123	Solid granite	
111	0-33	Clay and hardpan	
	-90	Granite	pC
114	0-14	Clay and boulders	
	-80	Rotten granite	
	-147	Gray granite	pC
118	0-16	Overburden	
	-59	Granite, gray	pC
	-60	Soft seam-granite-brown (2 gpm)	
	-110	Granite-gray	
	-110	Soft seam (4 gpm)	
	-121	Granite-gray	
124	0-5	Overburden	
	-21, 22, 23	Seam 10½ gpm	
	-71	Gray granite	pC
	-75	Light gray granite	
	-100	Dark gray granite	
	-125	White, gray granite	
	-150	Gray granite	
	-180	Dark gray granite	
125	0-24	Clay and boulders	
	-33	Gravel and boulders	
	-50	Gravel, sand and boulders	
	-59	Yellow clay	
	-65	Small gravel stones	
	-78	Yellow clay	
	-85	Fine sand	
	-100	Soft sandstone (weathered granite)	pC
	-212	Yellow sandstone (weathered granite)	
127	0-11	Overburden	
	-49	Green, white granite	pC
	-51	Brown, white granite	
	-63	Black, white granite	
	-86	Green, white granite	
	-87	Brown granite (water)	
	-102	Gray-white granite	
	-121	Black, white granite	
131	0-108	Gravel and sand	
	-172	Gray granite	pC
136	0-8	Overburden	
	-75	Granite	pC
137	0-7	Overburden	
	-175	Granite	pC
138	0-21	Fine sand and clay	
	-44	Med. brown gravel	
	-74	Seamy hard gray, green, some pink granite	pC
138	-97	Rotten granite, green, brown, black, pink	
	-103	Hard gray granite	
140	0-6	Overburden-sand and boulders	
	-36	Granite	pC
	-38	Rotten seam	
	-40	Soft granite	
	-152	Hard white granite	
141	0-10	Hardpan and broken up rock	
	-125	Hard granite	pC
	-165	Soft, brown granite	
	-300	Hard, blue granite	
	-320	Black granite	
	-344	Brown granite	
	-361	Hard, gray granite	
	-382	Green "shale" rock	
143	0-20	Hardpan and broken up rock	
	-35	Hard granite	pC
	-150	Hard, gray granite	
	-225	Hard, blue granite	
	-268	Very soft, brown granite	
	-280	Hard, gray granite	
144	0-10	Hardpan and broken up rock	
	-25	Hard granite	pC
	-100	Hard, gray granite	
	-125	Hard, blue granite	
	-150	Soft, brown granite	
	-175	Soft, green granite	
	-250	Hard, blue granite	
	-265	Very soft, brown granite	
146	0-75	Hard granite	pC
	-150	Hard, gray granite	
	-250	Hard, red granite	
	-262	Soft, brown granite	
	-335	Hard, blue granite	
	-358	Soft, brown granite	
	-375	Hard, blue granite	
148	0-3	Hardpan	
	-75	Hard, gray granite	pC
	-150	Hard, blue granite	
	-228	Hard, red granite	
	-283	Black granite	
	-300	Soft, brown granite	
150	0-8	Overburden	
	-10	Boulders	
	-40	Green-white granite	pC
	-71	Brown-white granite	
	-104	White granite	
	-113	Brown-green granite	
	-236	White granite	
152	0-25	Hardpan and boulders	
	-35	Sand and gravel	
	-46	Granite	pC
	-75	Brown granite	
	-100	Gray granite	
	-113	Soft, brown granite	

Drillers' Logs of Wells, Sparta Township
(Depths below land surface are given in feet)

Well #	Depth	Log	Formation
154	0-7	Dirt	
	-10	Granite boulders	
	-53	Gravel	
	-74	Brown granite	pC
	-80	Much harder gray granite	
	-82	Brown granite	
	-150	Very hard gray granite	
	-172	Brown granite	
	-198	Black to gray granite	
	-223	Very hard gray granite	
165	0-25	Hardpan and boulders	
	-42	Hardpan, gravel and sand	
	-50	Broken-up rock	
	-88	Hard granite	pC
	-94	Soft, brown granite	
	-99	Very hard, gray granite	
	-110	Soft, brown granite	
166	0-42	Sand	
	-64	Gray granite	pC
168	0-10	Boulders and hardpan	
	-20	Broken-up rock	
168	-75	Gray granite	pC
	-100	Hard, gray granite	
	-150	Soft, brown granite	
	-193	Hard, gray granite	
	-225	Soft, brown granite	
	-240	Brown "Honey Comb" rock	
169	0-50	Quicksand, gravel and boulders	
	-96	Granite	pC
177	0-108	Sand and gravel	
	-199	Granite	pC
178	0-25	Gravel	
	-30	Broken granite	
		Basal Martinsburg	Omb
	-39	Granite	
	-202	Hard limestone	
		Jacksonburg	Obj
		Kittatinny	C0k
179	0-9	Sand and gravel	
	-35	Hard, blue limestone	C0k
	-59	Hard, black limestone	
	-354	Gray and blue limestone	

STILLWATER TOWNSHIP

DOMESTIC WELLS 1 & 2

Formation	*No. of Wells*	*YIELD IN GALLONS PER MINUTE* Maximum	Minimum	Average	Median
Stratified Drift (Qsd)	16	30	2	10	8
Martinsburg Formation (Omb)	181	100	1	10	6
Kittatinny Formation (C0k)	50	100	1½	11	8

Formation	*No. of Wells*	*DEPTH IN FEET BELOW SURFACE* Maximum	Minimum	Average	Median
Stratified Drift (Qsd)	16	205	39	106	88
Martinsburg Formation (Omb)	181	365	48	155	146
Kittatinny Formation (C0k)	50	495	50	122	100

1 Wells and formations with insufficient data are not used in this summary.
2 There are two industrial wells from the Kittatinny Formation. See regional summary of industrial wells.

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
1	Camp Kiamesa Newark YMCA #1	1930	6	16	267	Omb		60			
2	" " #2	1947	6	15	152	"		50			
3	W. M. McCarthey	1952	6	10	195	"	175	100	143/3	175	
4	L. Benedetto	1950	6	3	132	C0k	21	61	117/4	21	
5	R. Channin	1952	6	5	45	Qsd	45	15	18/4		
6	A. Gilmore & C. Swartz	1954	6	15	73	Omb	46	12	24/4	46	
7	H. A. Kiep, Jr.	1952	6	4	60	Qsd	59	15	19/4		
8	W. Philo	1952	6	5	98	Omb	79	35	40/3	80	
9	E. Kloza	1954	6	2	270	"	30	125	210/2	30	
10	B. Giammarinaro	1950	6	5	110	"	20	18	82/		
11	P. Falotico	1953	6	7	186	"	136	35	110/5½	136	
12	M. B. Roessel	1951	6	10	139	"	22	25	80/		
13	A. Ciulla	1948	6	5	110	"	23	11	100/2		
14	F. Montiglio	1951	6	2	208	"	20	10	190/		

STILLWATER TOWNSHIP

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
15	J. Murchini	1949	6	4	167	Omb	21	14	165/		
16	A. Fiori	1954	6	12	119	"	81	22	60/4	81	
17	J. Ferlise	1953	6	6	103	"	26	14	80/4	24	
18	V. Aiosa	1948	6	2	200	Omb & C0k	70	42	85/	60	
19	I. Cardinales & L. Monchiero	1949	6	10	93	C0k	35	39	83/	35	
20	F. Amico	1948	6	5	215	Omb	117	83	147/	117	
21	J. Mandola	1951	6	15	122	C0k	27	47	80/	25	
22	A. F. Cafiero	19—	6	5	90	"	25	25	25/3		
23	Albert J. Genatt	1952	6	10	100	"	12	17	47/4	12	
24	C. Counterman	1954	6	6	70	"	47	10	37/4	46	
25	Leon Wilbur	1952	6	15	79	"	22	36	60/1		
26	Dept. of Conservation	1943	6	100	211	"	30	29	100/7		
27	E. Maska	1951	6	10	130	Omb	83	41	84/		
28	A. Sorce	1953	6	15	48	"	25	20	60/6	25	
29	J. Colasibetia	1952	6	15	104	"	48	27	42/		
30	Oscar T. Muller	1951	6	15	210	"	20	23			
31	N. Kappelson	1951	6	15	110	"	36	9	40/		
32	P. O. Kane	1950	6	3	136	"	22	22	105/3		
33	D. Curotolo	1951	6	15	173	C0k	18	26	100/		
34	L. Sederholt	1952	6	10	93	"	10	40	60/4		
35	T. Margold	1952	6	12	39	Qsd	39	23	33/		
36	A. Klein	1951	6	10	45	"	45	29	31/4		
37	C. Hall	1951	6	15	160	"	160	6	20/10		
38	Geo. Hafmiester	1951	6	11	50	C0k	21	32			
39	T. Kithcart	1953	6	5	86	"	12	31	39/4	18	
40	H. L. Jones	1949	6	6	140	Omb	22	53	77/2		
41	" " "	1953	8	48	303	"	41	32	150/6	40	
42	C. C. Bell	1952	6	4	86	Qsd	86	30	50/4		
43	R. E. Hendershot	1953	6	4	163	C0k	12	64	95/4		
44	F. C. Roy	1951	6	9	135	"	21		80/		
45	H. VanStone	1953	6	8	80	"	18	20	30/6		
46	Amos T. Dixon	1948	6	7	113	"	17	34	45/4	41	
47	A. Fontana	1952	6	14	88	Qsd	88	6	70/3		
48	W. Landis	1956	6	8	70	C0k	20	30	64/	8	
49	E. Weimann	1960	6	5	155	Omb	126	35	120/4	126	
50	K. Oldmixon	1963	6	6	162	Qsd	162	100			

PLYMOUTH LAKES (51-68)

51	J. Gluszak (E. Shore)	1965	6	12	135	Omb	107	20	100/4	107
52	W. Litchkowski (E. Shore)	1966	6	100	185	"	19	21	80/2	
53	W. S. Woods (E. Shore)	1963	6	10	97	"	35	8	85/1	
54	H. Swanson (W. Shore)	1961	6	18	48	"	30	11	11/1	
55	M. Watcher	1966	6	4	146	"	30	15	100/2	
56	J. & N. Cernero (E. Shore)	1965	6	2	247	"	124	53	210/2	
57	Pittenger Bros. (E. Shore)	1963	6	25	101	"	43	6	60/4	
58	A. DeSerio (E. Shore)	1963	6	17	74	"	38	1	58/1	
59	H. Hart (E. Shore)	1961	6	15	124	"	73	27	35/1	
60	H. Kulessa (E. Shore)	1965	6	20	60	"	21	18	50/4	15
61	J. Hilb (W. Shore)	1958	6	9	103	"	14	10	60/4	14
62	R. Basile (E. Shore)	1963	6	12	111	"	29	11	100/1	
63	F. Carlon (W. Shore)	1961	6	8	123	"	30	8	85/2½	
64	C. Granoro	1962	6	7½	140	"	83	18	50/4	83
65	A. Fischer	1962	6	5	110	"	58	22	70/4	58½
66	E. Clemente (E. Shore)	1962	6	12	91	"	61	22	60/4	61
67	S. Young (W. Shore)	1964	6	10	65	"	26	6	60/1	15
68	W. Terry (W. Shore)	1965	6	20	98	"	30	8	80/1	
69	A. Geletta	1966	6	17	197	"	40	37	180/1	
70	R. Miller	1964	6	9	160	"	116	90	150/4	116
71	J. J. Walsh	1961	6	20	123	"	31	27	59/1	
72	M. Della Fave	1965	6	20	70	"	32	20	60/2	
73	A. Knutsui	1958	6	5	191	"	183	90	180/4	183

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
74	F. Cole	1958	6	5	267	Omb	208	100	250/4	208	
75	A. Prinz	1966	6	5	258	"	76	59	150/2		
76	S. Chambers	1955	6	10	72	"	15	20	40/4	15	
77	W. Nietzel	1962	6	10	70	"	20	12	60/4	20	
78	D. McGuirl	1964	6	20	132	"	132	38	100/2		
79	R. Eschmann	1965	6	3	247	"	56	10	100/2		
80	J. Hornyak	1965	6	9	120	"	20	12	100/4	10	
81	L. Praino	1962	6	5	130	"	29	25	80/4	28	
82	J. Fertig	1961	6	5	80	"	21	25		21	
83	N. R. Spicer	1964	6	6	98	"	55	28	90/1		
84	R. Nearpass	1966	6	12	73	"	25	15	60/2		
85	J. E. Mazoreskos	1962	6	5	320	"	50	8	270/4	5	
86	M. L. Hancock	1963	6	4	155	"	20	10	150/4	2	
87	E. J. McGuene	1962	6	6	93	"	20	15		2	
88	C. Russo	1966	6	12	162	"	128	50	150/4	128	
89	M. Walendzinski	1963	6	7	170	"	126	55	150/4	126	
90	E. Kulisz	1962	6	12	165	"	126	30	50/4	126	
91	G. Pfaff	1955	6	8	77	Qsd	77	25	50/4		
92	H. Smith	1954	6	7	98	Omb	63	18	65/4	65	
93	M. Threnig	1964	6	20	50	"	32	12	40/4	32	
94	J. Ferina	1961	6	15	130	COk	105	22	90/4	105	
95	N. Noble	1964	6	5	245	Omb	121	18	230/4	121	
96	Blairstown Plmbg. & Htg.	1966	6	9	122	"	49			47	
97	S. Vioniti, Jr.	1962	6	15	150	"	46	20	100/4	46	
98	F. Atria	1964	6	3	200	"	35	20	180/4	35	
99	L. Clowater	1965	6	1½	285	"	17	16	260/4	6	
100	P. Burdi	1965	6	60	212	"	67	53	60/2		
101	A. Ferrara	1955	6	20	125	"	34	35	60/4	34	
102	P. DiGrandi	1964	6	6	135	"	85	35	90/2		
103	C. Marino	1962	6	8	196	"	78	25	170/4	78	
104	R. Cassidy	1965	6	3	100	"	21	18	80/4	8	
105	C. Counterman	1966	6	8½	100	"	52	4	80/2		
106	M. Palumbo	1966	6	6	70	COk	41	10	40/2		
107	D. Meany	1963	6	22	192	Omb	39	38	90/2	26	
108	A. Diecidue	19—	6	1	273	"	21	12	260/2		
109	G. Giovanna	1963	6	1½	165	COk	19	36			
110	W. Horne	1954	6	3	141	"	13	60	80/4	10	
111	H. Eckloff	1965	6	5	95	"	17	12	80/2		
112	J. Caponoso	1960	6	20	52	"	27	8	40/4	8	
113	M. Newhouse	1955	6	15	50	"	16	12	25/4	4	
114	E. Pfaff	1964	6	3	147	"	23	65	140/1		
115	J. Grosset, Jr.	1954	6	10	123	Qsd	123	24	70/4		
116	M. Valea	1965	6	5	157	Omb	57	43			
117	C. Counterman	1962	6	10	100	COk	70	18	52/1	70	
118	G. Struble	1955	6	2	112	Qsd	112	20	40/4		
119	M. Munio	1963	6	7	165	COk	83	28	80/4	43	
120	D. Tosti	1962	6	12	112	"	83	28	80/4	80	
121	Swartswood Vol. Fire Dept.	1954	6	20	45	Qsd	45	3	13/4		
122	T. Eitzenhofer	1962	6	5	148	"	148	20	70/4		
123	L. Ross	1964	6	15	55	COk	20	14	40/4	3	
124	J. Anderson	1966	6	10	90	"	30	35	80/4	30½	
125	C. Kraus	1965	6	7	160	"	20	75	150/4	8	
126	C. Fricke	1961	6	20	58	"	40	18	50/4	16	
127	L. Burd	1965	6	6	70	"	20	18	60/4	2	
128	J. Mergott	1963	6	6	150	Omb	20	16	125/4	10	
129	E. Chammings	1962	6	15	90	"	20	21	64/1	3	
130	G. Swenson	1954	6	15	62	Ojb?	45	7	20/4	45	
131	H. Helland	1956	6	5	163	COk	13	88	156/4	3	
132	P. Little	1966	6	15	205	Omb & Ojb	28	80	150/4	25±	
133	M. Rosenkraus	1963	6	4½	110	COk	20	43	105/4	3	
134	" "	1965	6	5	120	"	40	30	100/4	3	
135	" "	1962	6	7	124	"	23	20	60/4	5	

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
136	Orange YMCA-Camp Minisink	1933	6	15	150	Omb		10½	60/	70	
137	Orange YMCA-Camp Minisink	1961	6	30	78	"	50	8	35/8		
138	E. Callahan	1965	6	10	90	"	23	25	80/4		
139	V. Scott	1962	6	10	74	Ojb? & C0k	46	28	70/4		
140	G. Scudder	1966	6	4½	87	C0k	35	10	65/2		
141	R. Hendershot	1964	6	30	172	Qsd	172	16	60/4		
142	Stillwater Consolidated School	1959	8	30	200	C0k	20	30	130/4	14	I
143	O. Roof	1963	6	30	80	"	42	18	60/4	42	
144	Twp. of Stillwater	1965	6	20	90	Omb	41	26	70/4	41	
145	H. Huff	1965	6	75	312	"	20	46	150/2		
146	W. Meyer	1962	6	15	80	C0k	21	20	60/4	21	
147	F. Ernst	1966	6	10	85	"	43	32	75/4	43	
148	W. Meyer	1963	6	11	90	"	54	14			
149	A. Klose	1961	6	5	247	"	56	111			
150	J. Roy	1966	6	8	75	"	40	12	60/4	10	
151	R. Brookhart	1964	6	21	113	"	30	62	82/3	9	
152	F. Dufford	1966	6	2½	172	"	38	57	160/1	16	
153	Paulins Kill Lake Corp.	1966	8	30	454	"	19				I
154	J. Reilly	1966	6	4	172	"	10	42	150/2		
155	Wm. Gee, Jr.	1966	6	10	495	"	20			3	
156	J. Erickson	1966	6	25	73	"	73	20	50/2		
157	C. Roof	1965	6	6	278	"	41	55	200/4	10	
158	D. Foster	1966	6	8	205	Qsd	12				
159	A. Zegarski	1965	6	6	175	Omb	139				
160	R. Fox	1965	6	3	246	"	210	136			
161	V. Ponzio	1964	6	1	264	"	255	139			
CRANDON LAKES (162-250)											
162	A. Meluso	1966	6	1½	159	"	35	12			
163	R. Loesch	1964	6	4	125	"	28	16			
164	G. Finnegan	1963	6	7	122	"	103	47			
165	V. Passalaqua	1966	6	5	113	"	64	21			
166	A. Binninger	1965	6	2	145	"	32	19			
167	F. Rose	1963	6	5	82	"	61	15			
168	H. Lambert	1955	6	6	172	"	160	84			
169	R. Duffy	1965	6	5	135	Qsd	135	94			
170	W. Kimball	1963	6	10	145	Omb	56	21			
171	G. L. Stevens	1962	6	8	93	"	35	10			
172	F. Masciallo	1962	6	4	131	"	59	flowing			
173	E. D. Gorman	1962	6	2	183	"	105	67			
174	N. S. Marino	1961	6	10	152	"	70	51			
175	M. Zulich	1961	6	4	150	"	82	35			
176	F. Esposito	1961	6	5	212	"	191	73			
177	E. W. Johnson	1962	6	5	135	"	37	6			
178	Anthony J. Mileo	1962	6	10	161	"	128	78			
179	A. Platt	1963	6	5	133	"	73	15			
180	L. C. Wilke	1961	6	1	166	"	27	13			
181	G. Esposito	1962	6	3	145	"	74	63			
182	W. Maurer	1963	6	6	146	"	111	62			
183	T. Gram	1961	6	40	124	"	37	8			
184	J. Lind	1961	6	2	133	"	110	24			
185	J. Clune	1961	6	2½	146	"	63	29			
186	P. McEvoy	1964	6	4	197	"	193	94			
187	W. A. Cioffero	1964	6	2	195	"	179	104			
188	M. Freizinger	1963	6	4	192	"	181	94			
189	J. W. Ellis, Jr.	1963	6	3	195	"	181	105			
190	G. Gregory	1963	6	10	208	"	175	107			
191	L. Passman	1963	6	3	240	"	228	115			
192	H. DeMarino	1961	6	3	262	"	241	141			

CRANDON LAKES (162-250)

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMA-TION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
193	Geo. D'Aromando	1964	6	3	179	Omb	167	97			
194	J. S. Deutsch	1963	6	9	202	"	196	112			
195	D. Anderson	1962	6	6	235	"	184	104			
196	E. Battersby	1961	6	2	260	"	230	137			
197	L. Wilson	1963	6	10	177	"	163	98			
198	L. Woudhuysen	1961	6	3	171	"	113	51			
199	J. M. Keane	1963	6	10	150	"	23	7			
200	J. Lynch	1962	6	4	122	"	95	28			
201	M. J. Miles	1963	6	7	227	"	200	127			
202	C. Ogar	1963	6	9	189	"	180	125			
203	W. C. Tuohy	1963	6	9	235	"	200	128			
204	J. Morale	1963	6	6	103	"	43	9			
205	J. Whelan	1961	6	3	269	"	229	150			
206	J. J. Mallon	1962	6	1	206	"	92	31			
207	J. Oehlkers	1962	6	10	172	"	152	59			
208	M. Knierim	1963	6	10	154	"	113	36			
209	J. Butindari	1963	6	4	135	"	83	19			
210	F. J. Ward	1961	6	1½	230	"	181	123			
211	D. Tedeschi	1961	6	10	114	"	92	24			
212	D. Morel	1962	6	5	165	"	141	61			
213	A. Della Rocca	1962	6	10	172	"	149	49			
214	J. Picciotto	1962	6	4	201	"	178	93			
215	L. Pedicini	1962	6	10	171	"	154	58			
216	J. Sullivan	1963	6	5	150	"	118	23			
217	Crandon Lakes Dev. Co., Inc.	1963	6	4	130	"	99	1			
218	C. Perotta	1961	6	4	137	"	104	15			
219	S. Powers, Jr.	1962	6	2	120	"	24	13			
220	M. & R. Maginnis	1964	6	3	157	"	20	8			
221	T. Sollheim	1964	6	8	104	"	19	9			
222	J. Greenwald	1963	6	15	120	"	70	2			
223	W. Kerney	1962	6	12	167	"	27	2			
224	S. Dombrowski	1962	6	8	84	"	34	2			
225	A. Alcuri	1961	6	2	165	"	27	3			
226	A. McDonald	1962	6	7	95	"	35	6			
227	Crandon Lakes Dev. Co., Inc.	1961	6	7	130	"	34	8			
228	J. Sanita	1964	6	5	141	"	114	14			
229	M. Johnston & E. Geraght	1962	6	7	147	"	62	13			
230	C. A. Eastby	1963	6	4	158	"	34	5			
231	R. Greco	1963	6	7	150	"	23	12			
232	R. J. Schumann	1962	6	1½	187	"	23	22			
233	H. Connaghan	1966	6	1	190	"	103	17			
234	L. F. Enzenbach	1962	6	1	207	"	27	18			
235	G. Weidig	1962	6	1	207	"	86	11			
236	N. Romano	1962	6	1	145	"	108	27			
237	P. Forgione	1964	6	6	145	"	21	28		0	
238	A. Curialli	1964	6	5	111	"	94	25			
239	G. Carlin	1965	6	6	84	"	40	10			
240	J. Millard	1964	6	2	145	"	22	17		0	
241	C. Meluso	1963	6	10	83	"	41	7			
242	T. W. Duane	1962	6	10	155	"	58	17			
243	J. Tracy	1962	6	7	159	"	50	8			
244	L. J. Rosenthal	1963	6	5	166	"	32	12		0	
245	A. Lehmberg	1963	6	10	125	"	20	12		0	
246	P. Rufano	1963	6	2½	145	"	17	18		0	
247	G. Tobin	1964	6	2	145	"	36	10			
248	J. H. Connolly	1963	6	3	152	"	21	8			
249	W. Tangin	1965	6	28	332	"	30	8	56/3	5	
250	E. F. Kennedy	1963	6	15	63	"	20	4			
251	E. Powell	1954	6	15	70	"	21	7	32/4	3	
252	N. Francrose	1951	6	9	140	"	70	46	100/		
253	J. Emmons	1966	6	4	365	"	76	110	300/4	76	

Drillers' Logs of Wells, Stillwater Township
(Depths below land surface are given in feet)

Well #	Depth	Log	Formation
3	0-175	Hardpan	
	-195	Slate rock	Omb
4	0-12	Sandy clay	
	-45	Hardpan	
	-46	Gravel	Qsd
6	0-3	Clay	
	-44	Hardpan	
	-73	Slate	Omb
7	0-5	Yellow clay	
	-55	Blue clay	
	-60	Sand and gravel	Qsd
8	0-18	Yellow clay	
	-33	Clay and boulders	
	-69	Hardpan	
	-80	Soft clay	
	-98	Slate	Omb
9	0-30	Clay and hardpan	
	-270	Slate	Omb
11	0-20	Clay	
	-38	Gravel	Qsd
	-129	Sand and gravel	
	-186	Slate	Omb
16	0-5	Clay	
	-81	Hardpan	
	-119	Slate	Omb
17	0-24	Clay	
	-103	Slate	Omb
18	0-60	Overburden	
	-130	Slate	Omb
	-200	Limestone	COk
19	0-34	Clay and boulders	
	-93	Limestone	COk
20	0-78	Clay and gravel	
	-117	Blue clay	
	-215	Slate	Omb
23	0-12	Clay	
	-100	Limestone	COk
24	0-10	Gravel and clay	
	-46½	Hardpan	
	-70	Limestone	COk
26	0-6	Overburden	
	-25	Light gray dolomitic limestone	COk
	-50	Light and dark gray dolomitic limestone with scattered round, frosted quartz grains and limonitic "crusts"	
	-75	Identical with preceding sample	
	-100	Light gray dolomitic limestone	
	-118-120	Yellow clay	
	-160	Mud seams	
	-206	" "	
	-211	Dolomitic light gray limestone with some fine grained quartz	
28	0-15	Clay and hardpan	
	-25½	Hardpan	
	-148	Slate	Omb
36	0-21	Gravel	
	-23	Sand	
	-45	Gravel	Qsd
37	0-10	Gravel and hardpan	Qsd
	-90	Gray, fine sand	
	-155	Sticky gray clay	
	-160	Coarse gravel	
39	0-11	Gravel	
	-86	Limestone	COk
41	0-40	Clay and boulders	
	-185	Slate rock	Omb
	-303	Limestone	COk
46	0-4	Clay	
	-113	Limestone	COk
47	0-87	Hardpan	
	-88	Gravel	Qsd
48	30-3	Clay	
	-70	Limestone	COk
51	0-60	Clay and hardpan	
	-107	Clay	
	-135	Slate	Omb
57	0-25	Clay and gravel	
	-43	Clay	
	-101	Slate	Omb
60	0-15	Clay and slate	
	-60	Slate	Omb
61	0-14	Clay	
	-103	Slate	Omb
67	0-15	Overburden with boulders	
	-26	Blue shale	Omb
	-30	Blue shale, soft, with water	
	-50	Blue shale, hard	
	-53	Blue shale with water	
	-65	Blue shale, hard	
68	0-16	Overburden with boulders	
	-98	Blue shale	Omb
69	0-18	Sand and boulders	
	-60	Gray shale	Omb
	-65	Brown shale	
	-197	Gray shale and water	
70	0-50	Clay and gravel	
	-90	Clay and hardpan	
	-116	Clay	
	-160	Slate	Omb
73	0-125	Clay and gravel	
	-183	Clay	
	-191	Slate	Omb
74	0-100	Clay and gravel	
	-208	Clay	
	-262	Slate	Omb
88	0-40	Clay and gravel	Qsd
	-75	Gravel	
	-105	Sand and gravel	
	-128	Clay	
	-162	Slate	Omb
89	0-113	Clay and gravel	Qsd
	-126	Clay	
	-170	Slate	Omb
90	0-101	Clay and gravel	
	-126	Clay	
	-165	Slate	Omb

Drillers' Logs of Wells, Stillwater Township
(Depths below land surface are given in feet)

Well #	Depth	Log	Formation
91	0-20	Clay and hardpan	
	-40	Hardpan	
	-67	Clay	
	-77	Gravel	Qsd
92	0-16	Clay and hardpan	
	-63	Gravel	
	-98	Slate	Omb
93	0-32	Clay and gravel	
	-50	Slate	Omb
94	0-105	Clay and gravel	
	-130	Limestone	COk
95	0-35	Clay and hardpan	
	-101	Gravel and clay	
	-121	Clay	
	-245	Slate	Omb
97	0-30	Clay and gravel	
	-46	Clay	
	-150	Slate	Omb
98	0-35	Clay	
	-200	Slate	Omb
99	0-6	Clay	
	-285	Slate	Omb
101	0-34	Clay	
	-125	Slate	Omb
104	0-8	Clay and gravel	
	-100	Slate	Omb
107	0-20	Hardpan and boulders	
	-26	Blue clay	
	-75	Blue shale	Omb
	-122	Hard gray rock	
	-150	Blue shale	
	-169	Hard gray rock	
	-192	Blue shale	
110	0-10	Clay	
	-141	Limestone	COk
112	0-8	Clay	
	-52	Limestone	COk
113	0-4	Clay	
	-50	Limestone	COk
115	0-20	Clay	
	-50	Sand and clay	
	-120	Clay	
	-123	Gravel	Qsd
117	0-52	Clay and gravel	
	-70	Clay	
	-100	Limestone	COk
118	0-40	Sand	
	-112	Sand and gravel	Qsd
119	0-43	Clay and gravel	
	-165	Limestone	COk
120	0-75	Clay and gravel	
	-80	Clay	
	-112	Limestone	COk
121	0-10	Gravel	Qsd
	-30	Sand	
	-45	Gravel	
122	0-80	Clay and sand	
	-148	Gravel	Qsd
123	0-3	Clay and hardpan	
	-55	Limestone	COk
124	0-30	Clay	
	-90	Limestone	COk
125	0-8	Clay	
	-160	Limestone	COk
126	0-16	Clay	
	-58	Limestone	COk
127	0-2	Clay	
	-70	Limestone	COk
128	0-10	Clay	
	-150	Slate	Omb
129	0-3	Clay	
	-90	Slate	Omb
130	0-45	Clay	
	-62	Slate	Ojb?
131	0-3	Clay	
	-163	Limestone	COk
132	0-28	Clay and shale	
	-48	Slate	Omb
	-205	Limestone	COk
133	0-3	Clay	
	-110	Limestone	COk
134	0-3	Clay	
	-120	Limestone	COk
135	0-5	Clay	
	-124	Limestone	COk
136	0-70	Boulders and clay	
	-150	Slate	Omb
138	0-3	Clay	
	-90	Slate	Omb
139	0-20	Gravel	
	-74	Limestone	COk
141	0-10	Gravel	Qsd
	-120	Sand and clay	
	-172½	Gravel	
142	0-14	Gravel	
	-200	Limestone	COk
143	0-42	Gravel and clay	
	-80	Limestone	COk
144	0-41	Gravel	
	-90	Slate	Omb
146	0-21	Clay	
	-80	Limestone	COk
147	0-43	Clay	
	-85	Limestone	COk
150	0-10	Clay	
	-75	Limestone	COk
151	0-9	Hardpan and boulders	
	-18	Lime rock (broken-up)	COk
	-30	Lime rock	
	-75	White lime rock	
	-88	Hard, blue lime rock	
	-113	Soft, brown "honey comb" rock	
152	0-16	Clay and boulders	
	-22	Rotten limestone	COk
	-145	Limestone	

STILLWATER TOWNSHIP

Well #	Depth	Log	Formation	Well #	Depth	Log	Formation
153	0-290	Gray limestone	C0k	157	0-10	Clay	
	-300	Soft area, 30 gpm			-278	Limestone	C0k
	-454	Limestone		192	0-30	Clay and gravel	
155	0-120	Limestone	C0k		-76	Clay	
	-222	Limestone, soft area, no water			-365	Limestone	C0k
	-300	Limestone		251	0-3	Clay	
	-495	Limestone, softer rock			-26	Hardpan	
					-70	Slate	Omb

VERNON TOWNSHIP

DOMESTIC WELLS [1]		*YIELD IN GALLONS PER MINUTE*			
Formation	*No. of Wells*	*Maximum*	*Minimum*	*Average*	*Median*
Stratified Drift (Qsd)	7	45	5	24	24
Kittatinny Formation (C0k)	54	52	2	11	9
Hardyston Quartzite (Ch)	5	60	3½	24	25
Franklin Limestone (fl)	134	100	¼	13	8
Precambrian crystallines (pC)	478	100	⅙	9	6

		DEPTH IN FEET BELOW SURFACE			
Formation	*No. of Wells*	*Maximum*	*Minimum*	*Average*	*Median*
Stratified Drift (Qsd)	7	136	59	97	83
Kittatinny Formation (C0k)	54	530	40	138	120
Hardyston Quartzite (Ch)	5	268	47	149	107
Franklin Limestone (fl)	134	520	45	156	132
Precambrian crystallines (pC)	478	344	40	127	110

[1] There are 6 industrial wells; 1 from the Stratified Drift, 1 from the Kittatinny Formation, 1 from the Franklin Limestone, and 3 from the Precambrian crystallines. See regional summary of industrial wells.

Well No.	*Owner*	*Year Drilled*	*Csg. dia. (in.)*	*Yield (gpm)*	*Depth (ft.)*	*FORMATION*	*Screen Setting or depth csd. (ft.)*	*Static Water Level (ft.)*	*Pumping Level/hrs. Pumped*	*Depth to Bedrock*	*USE*
1	O. Rapp	1950	6	2	170	pC	52	35	170/3		
2	Camp Louemma	1954	6	30	134	fl	21	30	58/4	18	
3	P. Forshee	1950	6	25	120	"	70	30	40/3		
4	H. V. Coes	1951	6	5	49	pC	15	8	43/1	15	
5	Van Althuis	1954	6	35	325	" (rotten 300-325′)	70	35	50/3	70	
6	A. A. Walker	1951	6	8	115	C0k	68	70	115/2		
7	C. V. Ellis	1953	6	10	100	pC	17	14	60/4	14	
8	J. Fox	1948	6	25	155	C0k (fault?)	81	5±	35/3	89	
9	W. Ricken	1950	6	25	115	"	81	24	35/3		
10	K. C. Decker	1952	6	15	77	fl	74	28	50/2	74	
11	L. Guardino	1951	6	40	224	Qsd & C0k	166	35	80/16	166	
12	A. Frederickson	1948	6	15	175	pC	90	95	120/3		
13	W. Fette	1948	6	15	165	"	134	65	80/4		
14	C. Conway	1951	6	15	110	"	60	30	80/3	60	
15	G. Ohberg	1951	6	10	78	"	12	30	bottom/13	8	
16	H. J. McGuire	1953	6	1/6	76	"	28	18	62/1½	21	
17	W. Keogh-Dwyer	1952	6	3½	300	"	15	30	300/4	12	
18	O. Amschler	1949	6	6	118	"	20	25	118/3	10	
19	L. Congleton	1948	6	5	105	"	10	20	85/4		
20	A. Barra	1951	6	5	59	"	15	20	bottom/13	13	
21	W. Keogh-Dwyer	1954	6	30	115	"	50	14	60/4	48	
22	D. E. Katz	1951	6	30	63	"	23	4	10/2	19	
23	E. B. Shutt	1951	6	7	106	"	35	25	106/3	35	
24	J. Novack	1951	6	3½	222	"	53	19	222/4	52	
25	Highland Lakes, Inc.	1954	6	7	109	"	30	10	105/	3	

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
26	J. Andoling	1961	6	2	70	pC	21	14			
27	T. Holleran	1967	6	4	100	"	10	15	80/2		
28	R. Schmeal	1961	6	6	240	COk	74	18	220/3	60	
29	Sussex Hills, Inc.	1966	6	2	123	pC	74	10	115/2		
30	S. J. Paling	1965	6	4	218	"	16	20			
31	Bugsby Corp.	1964	6	5	138	"	10	4	80/2		
32	B. Natoli	1964	6	2½	147	"	20	16	135/2		
33	N. Brunacki	1964	6	1½	136	"	10	37	130/2		
34	J. Catenzaro	1966	6	12	122	fl	61	10	80/2		
35	J. Lintner	1966	6	12	73	pC	30	10	60/2		
36	L. J. Waters	1966	6	3	157	"	40	49	105/2		
37	J. Leary	1967	6	3½	98	"	31	12	80/2		
38	H. Grofesendt	1965	6	2	247	"	21	40	210/2		
39	A. B. Nelson	1965	6	5	95	"	22	20	80/2		
40	G. Prinssen	1964	6	1½	172	"	22	70	160/2		
41	V. Gunser	1966	6	2	202	rotten pC	20	38	189/2		
42	R. Treiber	1965	6	5	90	"	21	30	80/2		
43	J. Cash	1966	6	10	97	"	54	33	80/2		
44	H. Bechtloff	1962	6	4	123	slate?	38	15	90/2		
45	R. Toomy	1955	6	6½	105	pC	56	49½			
46	J. Loeschhorn	1965	6	3	75	"	45	7			
47	Cooperative Loan & Saving Society	1965	6	10	112	"	25	21	80/3	15	
48	F. Bauberaer	1958	6	½	344	"	20	106		0	
49	C. H. Reinhardt	1966	6	4½	228	"	32	21	126/3	12	
50	R. Winans	1960	6	1	160	"	20	34	bottom/11		
51	W. Wood	1965	6	2	122	"	11	25	110/2		
52	R. Villar	1965	6	7½	123	"	11	32	80/2		
53	M. Naneuse	1965	6	6	73	"	11	16	50/2		
54	H. Boecherer	1965	6	9	55	"	15	12	40/2		
55	L. B. Steele	1959	6	2½	156	"	56	25		56	
56	G. Smith	1965	6	7	80	"	31	27	60/2		
57	B. Weisman	1965	6	3	172	"	11	35	160/2		
58	J. Porcelli	1962	6	3½	173	"	30	42	160/3	10	
59	J. Correia	1965	6	3	197	"	15	79	170/2		
60	M. Dionisaluo	1965	6	9	185	"	20	38	148/3	10	
61	H. Kling	1962	6	8	168	"	25	69	150/3	15	
62	J. Lepore	1966	6	15	52	"	22	17	38/3	12	
63	Lakeview Builders	1962	6	7	122	"	25	85	120/3	15	
64	C. Pauli	1960	6	4½	112	"	10	15	100/2	2	
65	L. Sartell	1961	6	10	76	"	16	18	50/2	6	
66	J. Walsh	1965	6	1½	170	"	11	27	160/2		
67	J. Dimicola	1967	6	1	223	"	10	39	210/2		
68	G. Brink	1967	6	3	152	"	10	28	140/2		
69	M. P. Suares	1966	6	4	305	"	30	86	280/3	20	
70	J. Brady	1966	6	7	50	"	11	10	40/2		
71	W. Lentkowski	1966	6	10	110	"	17	25	100/2		
72	F. Sherwood	1966	6	1½	247	"	10	102	210/2		
73	G. Parsons	1965	6	20	97	"	11	21	50/2		
74	R. Rummals	1965	6	½	343	"	71	25	300/2		
75	M. Gallucci	1965	6	3	100	"	23	15	100/2		
76	T. Orenchuk	1967	6	2	123	"	35	3	105/2		
77	J. Cunningham	1967	6	2	170	"	10	20	160/2		
78	L. Hermon	1965	6	2½	228	"					
79	R. Cates	1965	6	1½	271	"	12	50	210/2		
80	M. Solomon	1965	6	1	296	"	11	100	280/2		
81	J. Ebeling	1967	6	2	97	"	33	17	80/2		
82	C. Pauli	1964	6	2	121	"	32	22	105/2		
83	M. Sanderson	1962	6	15	110	"	56	45	85/3	40	
84	N. Facciola	1964	6	15	170	"	12	62	90/2		
85	R. Bartone	1965	6	10	50	"	11	2	25/2		
86	J. Dara	1965	6	6	50	"	16	22	40/2		

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
87	R. Meekins	1964	6	12	132	pC	9	6	90/2		
88	E. Van Dyke	1964	6	1½	197	"	15	38	180/2		
89	R. Van Wettering	1967	6	1½	200	"	17	7			
90	J. Ganzalus	1964	6	7	64	"	9	12	50/2		
91	M. Millrath	1964	6	2	298	"	11	30	270/2		
92	M. Richardson	1967	6	7	76	"	20	16	60/2		
93	S. Goldstein	1967	6	3	140	"	20	22	120/2		
94	R. Cinquemani	1966	6	2	178	"	40	27	150/2		
95	M. Kobielsky	1966	6	1	272	"	15	18	200/2		
96	L. Vincent	1964	6	10	109	"	22	40	80/2		
97	J. Bernardia	1962	6	5	145	"	38	32	140/3	25	
98	T. McGuckin	1964	6	10	123	"	30	20	90/2		
99	J. Haas	1965	6	25	65	"	10	15	50/2		
100	S. Tegmander	1966	6	50	174	"	15	87	150/2		
101	D. Deckert	1964	6	1	223	"	12	24	200/2		
102	R. Stalberger	1961	6	1½	169	"	17	31			
103	H. Townsley	1961	6	1	186	"	20	25			
104	E. S. Dison	1961	6	1½	162	"	25	64			
105	R. Spivey	1963	6	5	160	"	22	15			
106	J. L. Guerazzi	1962	6	½	171	"	12	18			
107	A. Fafara	1964	6	5	80	"	18	25			
108	DeMasu	1964	6	1½	226	"	27	46			
109	M. McLaughlin	1964	6	10	72	fl	27	10	25/3	10	
110	E. Warhurst	1966	6	3	123	pC	34	52	105/2		
111	" "	1966	6	3	123	"	34	52	105/2		
112	F. Decker	1962	6	1	115	fl	23	10			
113	P. Adelberg	1966	6	5	127	"	55	18	100/2		
114	S. F. Monzo	1966	6	10	140	"	102	40	100/2	102	
115	W. A. Hunter	1965	6	10	235	"	210	30	200/2		
116	J. Sudek	1966	6	10	81	"	17	15	25/3	7	
117	Glenwood Cemetery Assoc.	1963	6	10	130	pC	95	40	90/2		
118	J. D. Hussey	1967	6	1	248	"	31	30	210/2		
119	R. Boesch	1966	6	3½	123	"	13	20	105/2		
120	W. Randolph	1967	6	35	148	"	25	6	55/3	10	
121	F. Jacobs	1963	6	1	97	"	30	10			
SUSSEX HILLS (122 to 163)											
122	H. Ill	1967	6	8	128	"	20	20	105/2		
123	Sussex Hills, Inc.	1966	6	2	197	"	61	40	180/2		
124	A. Ladanyi	1965	6	22	160	"	16	29			
125	Sussex Hills, Inc. Lot 21	1964	6	5	140	"	113	36	120/2		
126	" " " Lot 23	1964	6	15	79	"	79	28	60/2		
127	Deuchler	1965	6	2½	130	"	61	30	120/2		
128	W. Munkacsy	1964	6	12	138	fl	58	32	92/3	50	
129	Sussex Hills, Inc. Lot 1	1959	6	15	145	pC	130	27	60/1		
130	" " " Lot 20	1964	6	7	105	"	59	5	80/2		
131	" " " Lot 2	1959	6	15	108	"	97	flowing			
132	" " " Lot 19	1964	6	4	114	"	59	13	90/2		
133	R. Scull	1964	6	4	123	"	74	20	90/2		
134	H. Strait	1954	6	15	140	"	118	12	60/6	90	
135	N. Weir	1964	6	9	73	"	118	12	60/2		
136	Timmer	1965	6	1	298	fl	112	20	280/2		
137	Marklatt	1966	6		248	pC	72				
138	P. Hockenberry	1964	6	3½	86	"	50	20	80/2		
139	Sussex Hills, Inc.	1966	6	2½	140	"	65	36	120/2		
140	Dunn & Dunn, Inc.	1966	8	25	192	"	106	25	100/2		I
141	Sussex Hills, Inc., Block 7 Lot 2-3	1965	6	2	172	"	60	10	150/2		
142	Howard Strait, Inc. Lot #4	1964	6	8	150	"	131	45	120/2		
143	Sussex Hill, Inc.	1964	6	8	104	"	88	35	80/2		
144	Howard Strait, Inc. Lot #5	1964	6	15	140	"	120	40	120/2		

VERNON TOWNSHIP

SUSSEX HILLS (122 to 163)

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
145	Howard Strait, Inc.	1964	6	12	113	pC	85	19	80/2		
146	B. Lott, Panorama Lake	1966	6	12	97	"	38	28	80/1	22	
147	Country Lodge Assoc., Inc.	1965	6	3	190	fl	49	25			
148	J. LaPorta	1964	6	20	136	pC	87	10	90/2		
149	A. Landrud	1964	6	35	94	fl	67	5	50/2		
150	R. Vandurhan	1966	6	4	147	"	80	49	105/2		
151	A. Fatica	1965	6	3	123	pC	71	18	105/2		
152	G. Van Althuis	1964	6	5	230	"	96	50	180/2		
153	W. Van Althuis	1964	6	4	137	"	76	20	120/2		
154	F. Dramer	1964	6	4	122	"	74	20	100/2		
155	V. Biunno	1964	6	20	72	fl	19	20	60/2		
156	L. H. South	1965	6	4	90	pC	46	40	80/2		
157	A. Landruc	1964	6	20	123	fl	74	45	80/2		
158	R. South	1964	6	4	142	pC	64	20	80/2		
159	A. Rizzo	1964	6	3	100	"	63	35	80/2		
160	Drew & Zemuda	1965	6	3½	253	"	56	2	210/2		
161	L. Drew	1962	6	20	190	"	62	48	90/3		
162	K. Walther	1964	6	8	98	"	42	5	80/2		
163	Sussex Hills, Inc.	1966	6	5	140	"	113	36	120/2		
164	R. Harden	1964	6	12	173	"	153	45	90/2		
165	R. Comrad	1965	6	30	71	"	8	9	40/2		
166	H. Hinricks	1965	6	15	50	"	12	10	35/2		
167	J. W. Bedell	1963	6	24	100	"	42	28	62/3	25	
168	D. Browkek	1964	6	6	123	"	33	10	80/2		
169	H. J. Hall	1966	6	4	227	"	17	94			
170	Lake Glenwood Realty Co.	1966	6	17	123	"	10	27	100/2		
171	D. McCann	1965	6	15	68	"	46	26	58/3	36	
172	R. Clarke	1964	6	10	176	"	161	31	90/2	59	
173	M. Hartmen	1965	6	10	190	fl	150	20	150/3	150	
174	Dunn & Dunn, Inc., Cliffwood Lake	1966	8	35	195	pC	40	15	180/4		I
175	S. H. Sandei	1964	6	20	53	fl	31	10	40/2		
176	E. McBride	1966	6	20	310	"	306	80	200/2		
177	H. Drew	1951	6	6	60	pC	38	30	50/10	36	
178	P. J. Larsen	1965	6	8	284	"	200	9	200/2		
179	Vernon Twp. School	1965	6	4	300	fl	32	40	250/2		
180	J. DePinto	1965	6	6	375	"	352	70	200/2		
181	Sabol & Becker	1965	6	9	112	"	52	32	100/3	40	
182	F. Decker	1964	6	2	140	"	15	15	120/2	8	
183	H. J. Kenely	1965	6	2	228	"	16	20	215/2	4	
184	A. Holczer	1964	6	5	140	"	88	26	85/2		
185	T. F. Muller	1966	6	4	150	"	46	30	120/2	30	
186	C. Vance, Jr.	1967	6	15	110	"	51	10	40/3	51	
187	T. Kuhner	1965	6	20	171	pC	126	10	80/2		
188	G. Rogers	1962	5	10	179	"	171	25	149/3		
189	R. VanBlarcom	1965	6	2½	99	"	30	28	90/2	20	
190	J. Cox	1961	6	10	73	"	22	10	39/2	20	
191	G. J. Holler	1966	6	6	228	"	206	20	200/2	206	
192	D. Drew	1966	6	6	151	fl	125	60	140/6	125	
193	L. Edsall	1964	6	15	73	pC	44	10		44	
194	J. VanKuilenberg	1966	6	3	136	"	31	30	120/2	18	
195	L. Edsall	1966	6	15	82	fl	27	45	55/2	15	
196	R. Ranges	1961	6	10	168	"	122	20	100/2	122	
197	S. Zsenai	1966	6	20	45	"	20	10	15/3	10	
198	M. Bernstein	1967	6	60	58	"	22	28	35/2		
199	A. Bredder	1964	6	15	50	"	25	12	25/2	10	
200	A. Gilpatrick	1962	6	3	80	"	26	20	70/2	15	
201	D. Scott	1961	6	3½	100	"	30	20	90/1	10	
202	F. Sparta, Jr.; Vernon Valley Electric	1967	6	15	255	fl & pC	136	50	150/2	136	

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
203	S. Zipco	1964	6		159	fl	58	30	130/2	58	
204	A. Gilpatrick	1965	6	15	71	"	37	20	40/4	20	
205	A. Storms	1966	6	20	109	"	43	30	80/2	6	
206	J. Sparta	1964	6	4	132	"	15	25	100/	6	
207	F. Predmore	1962	6	10	135	"	40	20	110/4	35	
208	E. Hall	1967	6	10	130	COk	49	10	80/6	48	
209	E. Drew	1955	6	15	135	"	17	35	100/3	15	
210	H. Hillman	1964	6	12	91	fl	23	42			

VERNON VALLEY LAKES AND WALNUT HILLS ESTATES (211-247)

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
211	T. F. Muller	1965	6	6	118	"	100	25	110/2	100	
212	R. Mazzuca	1965	6	1	247	fl & pC	45	35			
213	W. Kalker	1965	6	5	105	"	80	60	80/8		
214	S. Klecha	1967	6	10	170	fl	39	35	110/2	39	
215	J. W. Wilson	1967	6	50	97	"	13	60	80/2		
216	H. Storms	1966	6	5	145	"	32	40	130/2	20	
217	P. Nabile	1967	6	100	172	"	12	16	50/2		
218	J. J. Greisch	1967	6	7½	71	"	15	32	60/2		
219	C. Jorgensen	1965	6	2	185	COk	17	23			
220	E. Belniak	1965	6	5	105	fl	28	26			
221	A. Brannigan	1965	6	2	185	"	23	58			
222	C. O'Boyle	1965	6	5	105	"	44	44			
221A	C. Keuntje	1965	6	10	105	"	20	46			
222A	R. Haberski	1967	6	70	115	"	40	30	60/2		
223	R. Gaughran	1966	6	75	120	"	12	42	60/2		
224	M. Palerno	1966	6	2	146	"	19	53			
225	S. Hurtuk	1966	6	15	105	"	19	63			
226	J. J. Peacock	1965	6	15	60	"	22	3			
227	T. Prendergast	1964	6	7	67	"	15	25	50/3	4	
228	W. V. Waal	1964	6	10	82	"	26	30	60/2	12	
229	J. J. Daly	1964	6	10	154	"	28	40	120/2	15	
230	J. Vuono	1964	6	5	112	"	25	10	90/2	8	
231	J. Hill	1967	6	8½	90	"	10	32	60/2		
232	M. G. Wheelock	1965	6	9	100	COk	22	22	85/2	10	
233	Walnut Hills Estates, Inc. #1	1962	6	6	55	"	28	15	41/2	26	
234	K. Courtright	1963	6	4	69	"	44	15	55/2	44	
235	T. W. Banker	1965	6	15	160	"	17	41			
236	Walnut Hills Estates, Inc.	1963	6	10	197	"	36	20	150/	12	
237	Walnut Hills Estates, Inc. #4	1962	6	15	90	"	21	18	80/2	10	
238	Walnut Hills Estates, Inc.	1962	6	2	150	fl	21	14	130/2	8	
239	Walnut Hills Estates, Inc.	1962	6	15	80	COk	24	12	65/2	12	
240	Walnut Hills Estates, Inc.	1966	6	20	97	"	55	10	80/4	25	
241	G. Dollar	1966	6	10	54	fl	20	22	40/2	10	
242	S. D. Ackerson	1962	6	5	40	COk	30	15	35/2	25	
243	T. Rago, Jr.	1965	6	5	93	fl	42	18	80/2		
244	M. Herzenberg	1965	6	10	62	"	41	20	45/2	18	
245	T. Sicurilla	1963	6	2½	72	COk	18	22	60/2	6	
246	Walnut Hills Estates, Inc., #2	1962	6	4	103	"	24	8	90/2	20	
247	Martin Charles	1967	6	15	203	fl	106	25	120/2	120	
248	S. Storms	1961	6	4½	75	COk	16	18	65/2	6	
249	E. Brush	1965	6	3	125	"	20	8			
250	W. Baldwin	1965	6	6½	147	"	22	21	105/2		
251	F. Decker	1963	6	10	82	"	26	12	60/3	26	

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
252	J. G. Auberger	1963	6	6	138	COk	112	105	115/	72	
253	W. E. Koch	1964	6	3	170	"	26	30	160/2	6	
254	W. Masker	1961	6	8	80	"	18	15	40/6	18	
255	H. Eisner	1963	6	2½	120	"	26	30	110/	6	
256	C. Deitz, Highland Lakes	1963	6	4	102	"	26	50	90/	12	
256A	R. A. Gross	1966	6	10	112	"	20	20	95/3		
257	F. Decker	1963	6	5	92	"	55	28	89/3	55	
258	E. O'Dell	1962	6	10	85	"	19	40	60/2	8	
259	E. Paddock	1954	6	15	179	"	110	40	80/30	110	
260	R. Chupak	1967	6	10	123	"	41	10	60/4	41	
261	F. Paddock	1965	6	15	133	"	80	30	90/3	80	
262	S. D. Ackerson	1965	6	10	240	"	247	55	90/8	247	
263	" " "	1964	6	20	358	"	355	120	210/6	353	
264	F. Henderson	1962	6	7	216	"	187	124	170/2		
265	W. Vaughn	1964	6	5	89	"	89	20	75/2		
266	D. Ragalski	1965	6	10	530	"	226	9	152/3	206	
267	C. J. Knacht	1965	6	10	130	"	110	30	90/	110	
268	R. Kadish	1957	6	5	112	"	12	15	100/2	2	
269	H. C. Coster	1956	6	10	135	"	15	60	110/4	12	
270	T. Unglaub	1967	6	5	123	"	40	22	105/2		
271	W. Rickey	1966	6	10	165	"	146	50	90/8		
272	A. Lye	1965	6	8	76	pC	18	12	50/2	10	
273	Barry Lakes Const. Co.	1967	6	1	237	"	20	25	210/2		
274	" " " "	1967	6	4½	90	"	20	12	80/2		
275	" " " "	1967	6	20	70	"	20	4	60/2		
276	" " " "	1967	6	1½	183	"	20	16	175/2		
277	" " " "	1967	6	15	97	"	31	10	80/2		
278	" " " "	1967	6	2	173	"	36	37	160/2		
279	W. Kilarsky	1967	6	5	177	"	20	28	105/		
280	Barry Lakes Const. Co.	1967	6	4½	123	"	20	20	100/2		
281	Sussex Woodland, Inc.	1963	6	6½	97	"	21	20	85/1		
282	F. Chokile	1964	6	10	60	"	28	10		20	
283	G. VanAlthuis	1964	6	5	101	"	101	20	80/2		
284	E. VanAlthuis	1966	6	4	221	"	133	65	200/2		
285	H. C. Scheffer	1959	6	21	151	"	58	42	100/2		
286	J. Pettit	1954	6	11½	92	"	11	5			
287	Little Homestead Farm	1966	6	17	175	"	158	30	130/2		
288	C. Terhune	1961	6	20	112	fl	17	14	14/2		
289	W. Lewis	1964	6	4½	98	pC	11	12	80/2		

SUN VALLEY ESTATES (290-297)

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
290	K. Kline	1966	6	1½	191	pC	22	72	180/2		
291	" "	1966	6	1½	267	"	26	20	80/2		
292	" "	1966	6	15	72	fl	36	20	60/7		
293	" "	1966	6	6	220	"	21	30	200/2		
294	" "	1966	6	20	86	"	86	4	70/2		
295	" "	1966	6	1½	275	"	38	15	200/2		
296	" "	1966	6	1½	265	"	94	47	200/2		
297	" "	1966	6	3	272	"	22	49	200/2		
298	R. Montross	1964	6	10	146	"	141	1			
299	Cedar Ridge Estates	1965	6	18	175	pC	26	17		15	

SCENIC LAKES (300-385)

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
300	A. Pfluger	1962	6	6	91	pC	29	6			
301	L. Mracek	1967	6	1½	212	"	16	39	200/2		
302	T. Bouko	1961	6	6	120	"	39	39			
303	J. Keegan	1965	6	6	132	"	43	10	100/2		
304	J. Knapp	1961	6	3	80	"	46	12			
305	J. Kasenzahl	1961	6	8	126	"	59	39			

SCENIC LAKES (300-385)

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
306	V. Brown	1965	6	5	147	fl	32	16	100/2		
307	F. Morans	1967	6	3	110	pC	19	10	90/2	7	
308	J. McLaughlin	1964	6	4	194	fl	118	100	150/2		
309	Sussex Hills, Inc.	1964	6	12	142	pC	133	35	120/2		
310	L. McIntosh	1964	6	12	198	"	18	23	120/2		
311	G. W. Ettinger, Jr.	1964	6	2	266	fl	19	65	250/2		
312	H. Fehling	1966	6	30	198	"	51	20	105/2		
313	E. Miskuff	1965	6	11	205	"	25	84	176/3	10	
314	A. A. Olsen	1964	6	2	186	"	21	52	175/2		
315	W. F. Anderson	1963	6	5	120	fl & pC	36	38	110/3	10	
316	C. Hall	1965	6	40	141	fl	22	30	100/2		
317	J. Servillo	1959	6	10	194	"	150	30	100/1	150	
318	J. Flanagan	1965	6	6	172	C0k	21	70	105/2		
319	A. Angerome	1965	6	6	85	fl	11	40	75/2		
320	P. Kerner	1964	6	5	110	pC	22	32	90/2		
321	B. Walsh	1964	6	8	223	C0k	158	30	150/2		
322	A. Badame	1966	6	50	70	fl	27	15	50/2		
323	F. R. Tollmer	1967	6	4	197	"	31	50	150/2		
324	J. DeJesus	1965	6	2	272	"	30	88	210/2		
325	R. Gaff	1965	6	4	441	"	42	57	200/2		
326	B. Eberts	1965	6	10	138	"	22	67	100/2		
327	M. Weber	1964	6	6	97	pC	20	10	90/2		
328	E. Ross	1966	6	2	197	"	45	36	185/2		
329	E. Miskuff	1965	6	3	175	"	70	27	165/3	40	
330	J. E. Stella	1964	6	5	170	"	42	140	160/2	42	
331	G. Hombach	1963	6	10	95	fl	25	40	80/2	10	
332	L. Keidel	1963	6	4	140	"	72	25	125/2		
333	A. Sulzbach	1964	6	5	170	"	40	102	150/2		
334	Cantanzaro & Christiansen	1964	6	2	318	"	24	42	300/2		
335	D. Rapisardi	1964	6	6	221	"	146	20	120/2		
336	H. Laffertz	1964	6	2½	173	"	11	17	100/2		
337	A. Calabrese	1964	6	20	95	"	6	67	80/2		
338	J. L. Dow	1963	6	5	115	"	26	60	105/2	12	
339	V. Kolakowski	1962	6	10	160	"	29	137	150/2	29	
340	O. Strodthoff	1962	6	10	92	"	23	47	80/2	12	
341	J. A. Vandigriff	1961	6	1½	202	"	16	21	bottom		
342	J. Onufer	1961	6	4	82	pC	54	28	75/2	53	
343	P. Bifulco	1963	6	5	140	fl & pC	38	70	135/3	26	
344	Merendine	1958	6	10	198	fl	121	140	145/2	121	
345	A. W. Valls	1964	6	7	105	"	30	47	90/2		
346	D. Borstad	1965	6	30	73	"	23	20	65/2		
347	Janel Bldrs., Inc.	1965	6	42	72	"	23	16	40/1		
348	C. Zaleckis	1964	6	7	116	"	19	63	90/2		
349	J. Schoeller	1964	6	2	307	"	21	64	280/2		
350	Bethlehem Steel Co.	1960	6	40	155	"	43	10	25/4	43	
351	Ken Kline, Inc. #1	1964	6	80	73	"	21	5	40/2		I
352	K. South	1959	6	1½	268	"	30	35		19	
353	Ken Kline, Inc. #2	1964	6	1½	189	"	22	30	180/2		
354	A. Calabrese	1964	6	12	94	"	29	19	75/2		
355	C. Cowdrick	1964	6	5	268	"	60	53	220/2		
356	E. Avosso	1963	6	8	100	"	26	30	85/2	11	
357	F. Derooy	1962	6	3	120	"	18	50	110/2	8	
358	L. Conklin	1961	6	30	59	Qsd	59	16	20/4		
359	C. Marchesani	1961	6	5	165	fl	23	46			
360	F. Fasulino	1958	6	5	107	"	41	50	90/	34	
361	E. Marsh	1965	6	6	430	fl	20	35	210/2		
362	Tidewater Oil Co.	1964	6	2	440	"	22	5	200/2		
363	P. Pattakas	1965	6	12	260	pC	10	8	105/2		
364	P. Kraemer	1964	6	50	50	C0k	32	11	25/2		
365	J. VanBennekum	1965	6	10	112	"	23	100	105/2		

VERNON TOWNSHIP

SCENIC LAKES (300-385)

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
366	G. Belecher	1964	6	10	72	fl	51	10	60/2		
367	H. Sanders	1965	6	2½	174	"	113	33	160/2		
368	J. Fitzgerald	1965	6	5	96	"	32	20	60/2		
369	E. Bizzari	1964	6	30	115	"	22	39	90/2		
370	F. M. Reason	1962	6	10	90	"	33	35	75/2	13	
371	T. Pappas	1965	6	5	128	COk	22	45	100/2	12	
372	P. Tonini	1964	6	2	219	"	20	23	200/2		
373	J. Ferrara	1966	6	¼	520	fl	20	30	250/1½		
374	H. Drew	1964	6	5	115	Qsd	107-115	10	80/6		
375	F. M. Card	1961	6	30	130	fl	105	25	48/3	105	
376	County of Sussex	1964	6	75	115	Ojb	115	6	90/2		
377	S. Graziano	1964	6	11	116	fl	33	45	100/2		
378	J. Sparta	1964	6	20	128	"	109	10	80/2		
379	M. Adams	1964	6	75	123	"	23	25	80/2		
380	J. Haas	1962	6	25	132	Qsd	132	20	25/3		
381	A. Grant	1966	6	2½	214	fl	18	60	200/2	4	
382	P. Askeland	1966	6	20	74	Qsd	68				
383	W. J. Collins	1963	6	23	72	"	22	20	23/1		
384	H. Gardner	1962	6	45	136	"	136	4	22/4		
385	R. Montross	1966	6	60	47	Ch	47	7	25/2		
386	H. Hopkins	1967	6	5	165	fl	22	80	140/2	10	
387	S. Smith	1966	6	1	247	fl & COk	31	40	210/2		
388	A. Mabee	1966	6	2	345	fl	341	75	200/2		
389	Kenal Developing Co., Inc.	1966	6	30	222	"	115	10	80/2		
390	F. Sparta	1962	6	25	90	pC	30	10	40/2	50	
391	M. Mabee	1963	6	7	220	Qsd & fl	211-220	10	150/20		
392	C. M. Stickle	1963	6	5	96	pC	80	25	90/3	70	
393	W. L. Clouse	1965	6	21	132	fl	30	27	62/3	15	
394	M. White	1965	6	2½	273	"	52	60	220/2		
395	Allen Mac Peek & Sons	1963	6	15	180	"	162	35	80/6	162	
396	J. Keating	1964	6	10	118	COk	27	75	100/2	15	
397	W. T. Stewart	1962	6	3½	222	Ch	40	42	210/2		
398	A. Petzold	1965	6	7	97	pC	31	29	80/2		
399	D. Benson	1964	6	20	107	Ch	107	12	50/2		
400	King Brush Co.	1964	6	200	198	"	198	11	60/2		
401	R. Cole	1964	6	52	112	COk	32	12	37/3	25	
402	W. Benn	1964	6	10	112	pC	47	32	90/2		
403	C. J. McGeoghegan	1965	6	100	66	"	66	10	50/2		
404	A. Kolb	1966	6	1	272	"	41	25	210/2		
405	Great Gorge Ski, Inc.	1967	6	400	118	COk	118	25	100/2		I
406	" " " "	1967	8	400	117	Qsd	117	38	90/2		I
407	" " " "	1966	6	6	87	pC	8	32	65/2		
408	" " " "	1966	6	7	148	"	21	32	100/2		
409	K. Heyman	1967	6	15	98	"	11	15	75/2		
410	R. Jordan	1967	6	8	98	"	21	6	75/2		
411	Milkyway, Inc.	1966	6	30	268	Ch	12	37	125/2		
412	H. R. Sisco	1965	6	5	83	pC	32	30	70/2	20	
413	H. W. Lang	1965	6	5	123	"	20	17	80/2		
414	R. Baldwin	1965	6	5	296	"	40	34	250/2		
415	H. Boniface	1964	6	10	108	"	16	40	70/2	6	
416	S. Zlanze	1961	6	15	180	COk	91	26	90/2	91	
417	O. S. Lozaw	1954	6	10	100	Ch	52	6	40/3	52	
418	E. Miller	1965	6	10	120	COk	20	2	80/2	10	
419	R. E. Baldwin #3	1965	6	25	115	pC	46	8	40/4	26	
420	" " "	1965	6	10	170	"	24	30	100/3	10	
421	Vernon Twp. Municipal Bldg.	1964	6	5	70	"		20	60/2		
422	V. Garlinghouse	1963	6	2½	110	"	25	10	90/2	10	
423	Vernon Twp. Fire Dept. #1	1964	6	15	100	"	23	6	70/2	10	
424	M. Kriest	1963	6	10	86	"	34	4	70/3	34	

VERNON TOWNSHIP

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
425	S. Phillips	1961	6	6	95	pC	42	45	85/2	40	
426	H. McGlew	1963	6	5	113	C0k & pC	43	40	105/2	40	
427	W. B. Alverson	1963	6	4½	98	pC	21	7	90/1		
428	C. K. Mutze	1963	6	8	61	"	21	8	50/		
429	Northern N. J. Builders	1967	6	6½	87	"	33	20	75/2		
430	H. Schildt	1964	6	10	74	"	54	12	60/2	40	
431	J. P. Linehan	1963	6	10	93	"	23	15	60/2	12	
432	L. Bergman	1965	6	20	70	"	32	20	50/2	20	
433	P. J. Curry	1966	6	20	110	"	32	30	60/4	20	
434	K. Leisinger	1963	6	7	125	"	21	20	100/3	10	
435	S. Parker	1963	6	10	145	"	123	35	110/3	123	
436	R. Forcier	1962	6	10	112	"	31	15	85/2	20	
437	J. Schmick	1966	6	8	138	"	126	50	120/3	126	
438	E. Howse	1965	6	10	127	"	98	20	75/2	98	
439	C. M. Hartman	1962	6	8	83	"	36	20	70/2	26	
440	J. Slavinsky	1962	6	10	135	"	115	60	100/3	100	
441	J. E. Leck	1963	6	8	138	"	117	30	70/3	117	
HIGHLAND LAKES (442-651)											
442	O. Schoeller	1967	6	65	73	pC	11	22	60/2		
443	Wm. Miklowic	1967	6	20	95	"	20	27	80/2		
444	E. Toyler	1966	6	10	52	"	11	18	40/2		
445	J. W. Foster	1966	6	8	75	"	45	20	60/2	40	
446	H. Holste	1965	6	60	153	"	22	37	65/2		
447	S. T. Tarvin	1965	6	5	121	"	11	32	100/2		
448	F. Peterson	1966	6	1	320	"	20	39	280/2		
449	A. Egger	1965	6	2	190	"	17	40	180/2		
450	R. Smith	1965	6	10	270	"	21	55	100/2		
451	C. Furce	1966	6	9	78	"	10	54	65/2		
452	F. Devries	1965	6	5	210	"	12	21	150/2		
453	H. M. Ewe	1965	6	5	131	"	11	15	100/2		
454	J. H. McCall	1964	6	4	106	"	28	20	80/2	10	
455	H. Humphrey	1965	6	25	98	"	22	5	40/2		
456	A. Schwarz	1965	6	2½	147	"	50	29	105/2		
457	M. Melzer	1965	6	5	126	"	26	60	115/2	12	
458	W. Chenoweth	1963	6	20	70	"	22	27	60/1		
459	H. Kane	1963	6	10	70	"	15	4	50/3	6	
460	K. Schaal	1966	6	4	142	"	10	54	105/2		
461	C. Agustin	1966	6	10	80	"	41	3	50/2	30	
462	J. Santos	1967	6	6	72	"	27			12	
463	F. Edsall	1967	6	6	112	"	50			39	
464	R. J. Cowan	1965	6	20	73	"	14	10	50/2		
465	M. Card	1963	6	5	70	C0k	26	12	60/2	16	
466	J. Reilly	1963	6	8	122	pC	16	75	110/2	6	
467	A. Ferlanti	1963	6	5	328	"	59	20	50/2	12	
468	W. Dunmeyer	1963	6	5	93	"	26	25	80/3	6	
469	G. Betty	1964	6	22	238	"	30	47	145/2	4	
470	K. Kandler	1967	6	10	141	"	16	25	105/2		
471	A. Mueller	1966	6	25	73	"	10	12	60/2		
472	McKeown	1965	6	3	148	"	11	11	105/2		
473	A. Mancini	1965	6	10	81	"	26	20	60/2	12	
474	O'Connor	1966	6	15	73	fl	34	28	60/2		
475	G. E. Baul	1967	6	16	142	pC	10	21	100/2		
476	C. T. Mason	1966	6	9	50	"	10	10	35/2		
477	J. Braet	1961	6	6	140	"	60	33	110/6	10	
478	J. Slavinsky	1954	6	5	85	"	16	14	75/3	14	
479	Highland Lakes Constr.	1967	6	3	122	"	27			11	
480	R. Gross	1966	6	10	112	"	20	20	95/3		
481	J. A. Vellekamp	1966	6	7	90	"	30	3	60/2		
482	W. E. Pfaehlen	1966	6	10	86	"	37	30	60/3	20	

HIGHLAND LAKES (442-651)

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMA-TION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
483	E. Bryant	1964	6	3	217	pC	34	4	200/2		
484	T. McGovern	1964	6	2	194	"	14	4	180/2		
485	F. Kurgan	1963	6	10	80	"	21	10	30/2	10	
486	H. Connors	1962	6	7	118	"	26	8	100/3	12	
487	B. Nelson	1967	6	30	50	"	29	11	25/2		
488	R. Lopresti	1967	6	5	93	"	40	15	60/2		
489	Spearin, Preston & Burrows, Inc.	1967	6	6	122	"	20	15	105/2		
490	L. Pittner	1963	6	2½	120	"	63	25	110/2	63	
491	W. Linscott	1966	6	6	102	"	11	10	80/2		
492	A. Murphy	1962	6	5	108	"	26	15	80/2	18	
493	C. A. Schafer	1966	6	10	68	"	25	22	50/2		
494	F. Hespos	1966	6	1½	247	"	12	18	210/2		
495	P. Gogots	1965	6	3	172	"	40	30	150/2		
496	J. Faber	1964	6	3	120	"	16	30	110/2	5	
497	E. S. Burke	1965	6	3	172	"	14	66	160/2		
498	J. W. Dowd	1961	6	12	85	"	26	25½		18	
499	J. Shenlin, Sr.	1967	6	12	50	"	20	22	35/2		
500	J. Henderson	1963	6	5	85	"	18	20	70/2	8	
501	C. F. Williams	1963	6	6	92	"	24	20	70/2	12	
502	K. Cleveland	1966	6	2	172	"	32	28	150/2		
503	D. J. O'Neil	1966	6	1½	147	"	25	23	140/2		
504	M. Kocenski	1966	6	12	110	"	20	12	80/2		
505	F. Carroll	1965	6	4	108	"	41	19	100/2		
506	W. M. Sanders	1966	6	5	96	"	18	24	65/2		
507	V. Muratore	1962	6	10	102	"	41	18	80/2	30	
508	H. Tarpey	1966	6	25	78	"	21	10	60/2		
509	E. Reidy	1965	6	7	225	"	22	34	100/2		
510	A. Meinzinaer	1962	6	5	74	"	41	14	60/2	31	
511	Our Lady of Fatima, R. C. Church	1955	6	4	90	"	26	9	bottom/3	22	
512	J. S. Denon	1961	6	10	69	"	38	10	60/2	38	
513	Highland Lakes Constr. Co., Inc.	1964	6		58	"	17			2	
514	Schwedler	1964	6	5	80	"	16	40	65/	6	
515	M. R. Janssens	1962	6	6	82	"	34	15	65/2	10	
516	J. Whaley	1965	6	4	97	"	21	17	100/2		
517	S. Sadlon	1962	6	10	80	"	18	12	65/2	8	
518	J. McNamarra	1966	6	15	105	"	20	20	65/2		
519	M. Campbell	1964	6	60	88	"	21	5	60/2		
520	K. Schott	1962	6	8	75	"	17	24	60/2	6	
521	J. Giordano	1967	6	20	82	"	32	1	70/2		
522	W. McManus	1967	6	2	250	"	21	8	210/2		
523	McGrath	1965	6	4	262	"	10	109	210/2		
524	Roy L. Smith & Son, Inc.	1965	6	7	55	"	20	15	50/2		
525	K. Gokey	1965	6	4	125	"	24	50	100/2	12	
526	E. Schiff	1964	6	15	117	"	20	23			
527	S. J. Peat	1964	6	10	80	"	36	20	50/2	21	
528	A. Fendlander	1966	6	60	83	"	10	23	60/2	37	
529	W. Kubie	1964	6	40	110	"	22	10	80/2		
530	P. W. Rammel	1954	6	5	84	"	62	10	75/2	62	
531	O. Weiss	1967	6	3½	147	"	30	7	105/2		
532	J. Pablik	1967	6	5	172	"	23				
533	C. Moore	1966	6	6	73	"	10	20	60/2		
534	D. Curtis	1965	6	12	50	"	19	12	15/2		
535	" "	1966	6	15	47	"	14	10	22/2		
536	T. Rebele	1967	6	9	68	"	10	9	60/2		
537	W. Lichte	1964	6	3½	147	"	22	20	80/2		
538	McGrath	1965	6	7	120	"	28	30	110/2	14	
539	C. Lacherza	1965	6	1½	248	"	30	17	235/½	14	

HIGHLAND LAKES (442-651)

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
540	F. Wilson	1966	6	7½	190	pC	20	20	100/2		
541	W. Brooks	1966	6	5	95	"	14	8	80/2		
542	E. Spiegel	1966	6	4	173	"	22	34	160/1	3	
543	W. Frost	1965	6	7	73	"	10	12	60/2		
544	J. Muchka	1966	6	8	70	"	20	6	50/2		
545	A. Larese	1966	6	8	50	"	10	10	45/2		
546	C. Miller	1962	6	6	75	"	24	21	60/2	12	
547	F. Ferber	1964	6	20	92	Qsd	41	52	85/1	92+	
548	Highland Lakes Improvement Co.	1964	6	¼	120	pC	26	1	115/4	13	
549	R. Parker	1965	6	5	72	"	19	12	65/2		
550	F. Decker	1962	6	5	70	"	26	12	60/2	15	
551	Manalio	1961	6	4	85	"	26	22	75/	18	
552	R. Watts	1961	6	5	83	"	27	28	70/4	22	
553	D. Fischer	1966	6	8	102	"	19	30	60/2	8	
554	A. Morgan	1964	6	7	147	"	25	52	140/½		
555	" "	1964	6	6½	98	"	21	14	95/1	3	
556	B. Edsall	1964	6	6	90	"	33	20	80/2		
557	Seckler & Shepperd, Inc.	1963	6	12	90	"	33	1	70/1		
558	" " " "	1964	6		50	"	21			0	
559	A. Morgan	1964	6		110	"	35			10	
560	Roy L. Smith & Sons	1963	6	10	41	"	22	12	25/2	30	
561	Allen Nagel	1962	6	6	60	"	21	20	45/2	2	
562	P. Gunsheimer	1961	6	12	160	"	20	55	100/4		
563	N. Paspatis	1965	6	60	105	"	20	7	60/2		
564	J. Madonna	1961	6	5	84	"	22	18	80/2	3	
565	H. Landram	1965	6	30	110	"	7	25	60/2		
566	F. Current	1964	6	7	73	"	12	13	50/2		
567	S. Novack	1964	6	10	73	"	47	3	60/2		
568	R. Wadle	1962	6	1	176	"	23	30	165/1		
569	F. Smith	1961	6	4	49	"	34	20		28	
570	H. Allen	1961	6	5	96	"		22	90/2	6	
571	H. Wittschief	1965	6	6	81	"	23	15	65/2	10	
572	A. Morgan	1964	6	5	148	"	20	46	140/1		
573	E. Hucovsky	1966	6	10	73	"	10	10	60/2		
574	J. Cox	1966	6	20	72	"	30	10	60/2		
575	D. Simon	1966	6	4½	98	"	28	15	80/2		
576	J. Beaver	1966	6	5	75	"	17	42	60/2		
577	W. Simms	1965	6	6	122	"	10	8	90/2		
578	T. Koziol	1965	6	6	242	"	9	60	210/2		
579	H. Bleschmidt	1965	6	1	190	"	23	37	180/2		
580	H. Haring	1965	6	5	123	"	14	10	100/2		
581	Levale Redner	1964	6	5	50	"	14	14	40/2		
582	F. Baumgartner	1967	6	10	83	"	14	28	60/2	6	
583	N. Schillaci	1963	6	6	75	"	15	35	60/2		
584	R. Morgan	1962	6	5	112	"	38	8	80/2	28	
585	S. Cokinos	1965	6	5	122	"	15	13	100/2		
586	L. Apadavecchia	1965	6	1½	197	"	12	20	180/2		
587	G. Decker	1965	6	2½	88	"	18	25	70/2	8	
588	H. Cram	1964	6	5	40	"	22	15		10	
589	A. Ellis	1964	6	6	52	"	17	30	45/2	3	
590	F. Till	1961	6	5	130	"	18	70	90/2	3	
591	J. Busera	1964	6	2	172	"	11		150/2		
592	A. Kopec	1966	6	3½	85	"	11	17	80/2		
593	Highland Lakes Rescue Squad	1965	6	30	73	"	33	26	60/2		
594	J. Haas	1967	6	60	84	"	15	32	70/2		
595	H. Williamson	1967	6	45	70	"	13	18	60/2		
596	M. Baker	1962	6	5	61	"	28	10	50/2	18	
597	E. Tikko	1964	6	1½	123	"	20	7	110/1	0	

HIGHLAND LAKES (442-651)

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
598	A. Morgan	1965	6		150	pC	22			0	
599	K. Anderson	1965	6	5	157	"	22	40	140/2	12	
600	A. Morgan	1964	6	1	247	"	20	12	190/1¾	7	
601	W. Snyder	1962	6	8	104	"	29	17			
602	A. Grafton	1967	6	10	85	"	19	15	65/2	7	
603	Highland Lakes Improvement Co.	1967	8	10	200	"	50			28	
604	E. Schwader	1965	6	10	81	"	12	6	60/2	4	
605	F. Medar	1964	6	7	98	"	23	2	80/2		
606	R. Walker	1967	6		75	"	20			2	
607	S. Meeker	1966	6	7	71	"	26	15	60/2		
608	J. Pierce	1967	6	25	98	"	24	13	80/2		
609	P. McDevitt	1967	6	7	105	"	20	10	80/2		
610	A. Schloz	1966	6	3	145	"	31	8	100/2		
611	A. Kilian	1967	6	20	123	"	11	11	100/2		
612	C. Small	1966	6	2	170	"	13	25	150/2		
613	R. Simone	1967	6	15	100	"	31	10	75/2		
614	J. Maxwell	1965	6	18	170	"	49	31	120/1	39	
615	Meister	1964	6	2	96	"	26				
616	F. Altemure	1962	6	4	200	"	25	40	190/4		
617	G. Welter	1962	6	20	55	"	22	12	40/2	18	
618	R. Ackley	1966	6	12	72	"	11	15	60/2		
619	J. Tarpey	1964	6	3	90	"	20	35	80/2		
620	G. Whiting	1965	6	3½	80	"	20	20	60/2		
621	S. Kay	1964	6	20	117	"	24	10	80/2		
622	E. Wilburn	1962	6	3½	72	"	23	7			
623	A. Klein	1967	6	14	247	"	21	25	210/2		
624	K. Saaret	1967	6	2½	173	"	10	45	165/2		
625	J. Jun	1965	6	10	72	"	31	17	60/2		
626	M. Stolarz	1961	6	3½	110	"	16	26	90/2	3	
627	J. Ryan	1955	6	6	102	"	37	50	95/3	37	
628	E. Sharp	1966	6	2	148	"	35	50	105/2		
629	G. Decker	1963	6	5	60	"	18	15		6	
630	S. Miller	1962	6	10	58	"	41	20	40/2	30	
631	F. LaBarbera	1962	6	6	66	"	20	31	50/2	5	
632	J. Kryschuk	1966	6	4	98	"	20	16	80/2		
633	R. Small	1965	6	2½	120	"	34	25	100/2		
634	S. Boehan	1962	6	1½	290	"		32	260/2		
635	E. Budahazy	1962	6	8	82	"	20	18	60/	6	
636	A. Foresto	1965	6	4	247	"	8	100	210/2		
637	J. Meister	1965	6	2	161	"	27	2	150/1	2	
638	J. Brady	1964	6	6	76	"	22	30	60/2	10	
639	W. Lyness	1966	6	4	114	"	56	55	100/2	56	
640	J. Cleveland	1964	6	2	148	"	29	23	100/2		
641	W. Walker	1961	6	10	72	"	39	19	60/2	30	
642	D. Massaker	1965	6	4½	97	"	20	21	80/2		
643	A. Steinman	1965	6	3	101	"	23			7	
644	Brunning	1966	6	30	90	"	10	10	60/2		
645	Seckler & Shepperd	1964	6		97	"	20			6	
646	J. Fitzsimmons	1965	6	½	200	"	47			30	
647	Nelson & Dayharsh	1964	6	20	80	"	11	30	60/2		
648	E. Ulbricht	1967	6	4	97	"	20	20	90/2		
649	P. Vacante	1966	6	1½	297	"	14	120	310/2		
650	C. Smith	1964	6	3	67	"	14	20		6	
651	F. Paretta	1962	6	3	75	"	21	8	65/	8	
652	V. Horhan	1965	6	2	128	"	11	38	105/2		
653	Barry Lakes Constr. Co. (Muller)	1966	6	5	172	"	20	70	105/2		
654	G. Keller	1965	6	4	144	"	10	20	100/2		
655	H. Ludwig	1965	6	6	160	"	10	20	105/2		

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
656	Barry Lakes Constr. Co. (Fortunato)	1965	6	60	72	pC	20	6	60/2		
657	Barry Lakes Constr. Co.	1967	6	10	78	"	20	13	60/2		
658	" " " "	1966	6	30	98	"	20	8	80/2		
659	Denue	1966	6	10	50	"	25	6	30/2		
660	J. Jennino	1966	6	2½	195	"	20	46	170/1	3	
661	Barry Lakes Constr. Co. (Cardo)	1967	6	6	126	"	20	20	65/2		
662	Barry Lakes Constr. Co. (Cardo)	1966	6	10	63	"	20	4	55/2		
663	Barry Lakes Constr. Co. (Cardo)	1966	6	5	99	"	20	54	80/2		
664	Barry Lakes Constr. Co. (Cardo)	1967	6	4	122	"	20	28	105/2		
665	Barry Lakes Constr. Co. (Cardo)	1966	6	15	98	"	20	8	80/2		
666	Barry Lakes Constr. Co. (Cardo)	1967	6	5	123	"	30	24	100/2		
667	Barry Lakes Constr. Co. (Coles)	1966	6	15	110	"	20	40	80/2		
668	J. Potter	1967	6	2½	135	"	92	30	120/3	92	
669	R. Conway	1963	6	10	110	"	88	40	100/2	88	
670	J. Klebieko	1955	6	8	120	"	74	35	110/2	74	
671	C. Currier	1965	6	20	82	"	46	28	45/4	34	
672	C. Thompson	1964	6	20	97	"	38	26	80/2		
673	T. W. Hood	1966	6	10	150	"	134	60	110/4	134	
674	R. Jensen	1966	6	8	138	"	31	15	60/2		
675	A. Jauss	1962	6	15	105	"	90	24	65/2	90	
676	R. Jensen	1966	6	1	170	"	55	24	155/2		
677	" "	1966	6	8	195	"	36	23	120/2		
678	Trades, Inc.	1966	6	6	95	"	65	36	60/2		
679	" "	1966	6	6½	98	"	80	39	60/2		
680	O. Driemel	1965	6	20	47	"	21	17	40/2		
681	J. Hinchman	1964	6	11	97	"	36	6	90/½	21	
682	R. Jensen	1966	6	2	120	"	26	15	100/2		
683	" "	1966	6	3	173	"	51	19	120/2		
684	" "	1966	6	1½	178	"	33	15	170/2		
685	" "	1966	6	4	160	"	52	18	100/2		
686	" "	1966	6	6	68	"	24	24	55/2		
687	" "	1965	6	1	172	"	30	16	160/2		
688	Dunn & Dunn, Inc.	1966	10	50	140	"	72	20	100/4		I
689	R. Jensen	1966	6	1½	128	"	32	31	120/2		
690	" "	1966	6	1	147	"	60	23	135/2		
691	" "	1965	6	1½	122	"	41	28	100/2		
692	F. Ferber	1964	6	3	123	"	51	43	110/1	30	
693	F. Sweitzer	1964	6	10	90	"	52	35	70/2	52	
694	R. Aldrich	1965	6	3½	135	"	78	14	90/2		
695	H. Lewandowski	1966	6	4	145	"	80			50	
696	Gold Seal Builders	1964	6	3	173	"	30	9	150/2		
697	A. Endler	1964	6	4	115	"	87	28	100/2		
698	Gold Seal Builders	1963	6	4½	97	"	66	17	80/1		
699	E. Ulbright	1967	6	15	98	"	52			52	
700	J. Caroselli	1967	6	13	122	"	60			35	
701	E. Ulbright	1966	6	12	85	"	40			25	

Drillers' Logs of Wells, Vernon Township
(Depths below land surface are given in feet)

Well #	Depth	Log	Formation
16	0-15	Hardpan	
	-21	Broken rock	
	-28	Hard rock	pC
	-50	Hard granite	
	-60	Rotten granite	
	-74	Hard granite	
	-76	Bluestone	
18	0-60	Weathered gneiss	pC
	-118	Gray gneiss	
28	0-25	Hardpan and boulders	
	-35	Gravel, boulders and clay	
	-50	Gravel, sand and clay	
	-60	Sand and gravel	
	-138	White limestone	C0k
	-162	Hard blue limestone	
	-178	Soft brown sandstone	
	-225	Hard blue limestone	
	-240	Yellow limestone	
47	0-15	Hardpan and broken-up rock	
	-75	Hard, gray granite	pC
	-92	Soft, brown granite	
	-105	Very hard, gray granite	
	-112	Soft, yellow granite	
49	0-12	Hardpan and broken-up rock	
	-75	Hard granite	pC
	-150	Very hard, gray granite	
	-210	Soft, brown granite	
	-220	Very hard, blue granite	
	-228	Soft, dark brown granite	
58	0-10	Hardpan and broken-up rock	
	-75	Hard, gray granite	pC
	-92	Soft, brown granite	
	-150	Hard, gray granite	
	-173	Soft, brown granite	
60	0-10	Hardpan and broken-up rock	
	-93	Hard, gray granite	pC
	-118	Soft, brown granite	
	-168	Hard, blue granite	
	-185	Soft, brown granite	
63	0-11	Hardpan and boulders	
	-15	Broken-up rock	
	-100	Hard, gray granite	
	-132	Soft, brown granite	
69	0-10	Hardpan and boulders	
	-20	Broken-up granite	pC
	-75	Hard granite	
	-150	Hard, gray granite	
	-175	Soft, brown granite	
	-225	Hard, black granite	
	-275	Hard, white granite	
	-305	Soft, brown granite	
97	0-25	Hardpan and broken-up rock	
	-70	Hard granite	pC
	-100	Soft, brown granite	
	-145	Red granite	
120	0-10	Hardpan and boulders	
	-16	Broken-up rock	pC
	-112	Hard, blue granite	
	-148	Soft, brown granite	
128	0-20	Hardpan and large boulders	
	-30	Large boulders	
	-40	Yellow clay and gravel	
	-50	Sand and gravel	
	-96	White limestone	fl?
	-125	Hard, gray limestone	
	-138	Brown "honey comb" limestone	
146	0-22	Overburden, boulders and clay	
	-23	Gray granite	pC
	-66	Soft seams	
	-69	Gray granite	
	-89	Soft seam	
	-91	Gray granite	
	-97	Gray granite	
161	0-25	Hardpan and boulders	
	-35	Boulders	
	-50	Gravel and sand	
	-54	Blue clay	
	-62	Granite ..	pC
	-125	Hard granite	
	-132	Soft, brown granite	
	-182	Hard granite	
	-190	Very soft, brown granite	
167	0-25	Hardpan and boulders	
	-30	Broken-up granite	pC
	-75	Hard, white granite	
	-100	Soft, brown granite	
266	0-65	Hardpan and boulders	
	-183	Yellow clay	
	-200	Broken-up rock	
	-206	Black sand	
	-218	Brown sandstone (very soft)	C0k
	-275	Brown sandstone	
	-300	Red sandstone	
	-350	Green shale	
	-375	Red shale	
	-450	Gray rock (hard)	
	-500	Red shale	
	-530	Green shale	
313	0-5	Hardpan and broken-up rock	
	-100	White limestone	fl
	-163	Hard, blue limestone	
	-179	Soft, yellow limestone	
	-187	Soft, brown sandstone	
	-205	Soft, brown "honey comb" limestone	
315	0-10	Hardpan	
	-60	White limestone	fl
	-120	Gneiss	pC
329	0-20	Hardpan and boulders	
	-175	Soft, brown granite	pC
373	0-1½	Overburden	
	-7	Brown limestone	fl
	-123	White limestone	
	-125	Green, white and black limestone	
	-199	White limestone	
	-260	Black limestone	
	-262	Brown limestone	
	-290	Green and white limestone	
	-400	White limestone	

Drillers' Logs of Wells, Vernon Township
(Depths below land surface are given in feet)

Well #	Depth	Log	Formation
373	-420	Gray limestone	
	-520	White limestone	
374	0-100	Fine sand and silt	
	-115	Coarse sand	Qsd
380	0-25	Hardpan	
	-50	Sandy loam	
	-75	Quicksand	
	-100	Clay and sand	
	-120	Blue clay with gravel	
	-132	Gravel	Qsd
382	0-9	Overburden	
	-53	Clay	
	-74	Sand and gravel	Qsd
384	0-70	Blue clay	
	-110	Silt and sand	
	-136	Gravel	Qsd
390	0-50	Hardpan and sandstone	
	-90	Gneiss	pC
391	0-200	Clay and decomposed limestone	fl
	-220	Gritty gravel and sand	(fault?)
392	0-70	Boulders, clay and gravel	
	-80	Broken rock	pC
	-96	Gneiss	
393	0-15	Hardpan and broken-up rock	
	-75	White limestone	fl
	-85	Yellow limestone	
	-109	Very hard, blue limestone	
	-132	Brown "honey comb" limestone	
401	0-25	Hardpan and boulders	
	-75	Hard, blue limestone	COk
	-85	Soft, white limestone	
	-112	Soft, brown sandstone	
462	0-12	Sand, chunks of granite	pC
	-52	Gray granite—seamy	
	-56	Soft, brown granite	
	-62	Light gray granite	
	-63	Brown, black granite	
	-72	Light gray granite	
469	0-4	Hardpan and broken-up rock	
	-100	Hard, gray granite	pC
	-150	Soft, brown granite	
	-171	Very hard, blue granite	
	-188	Hard, gray granite	
	-212	Soft, green soapstone	fl?
	-226	Brown "honey comb" rock	
	-238	Soft, whitish rock	
513	0-2	Overburden	
	-23	Hard, pink, gray, white granite	pC
	-58	Brown seam spots	
532	0-5	Overburden	
	-56	Green, white, black granite	pC
	-71	White granite	
	-98	Green, white granite	
	-158	Green, white granite with red mica	
	-159	Brown granite	
	-170	Black, white granite	
539	0-14	Overburden	
	-60	Granite	pC
	-248	Gray granite	

Well #	Depth	Log	Formation
542	0-3	Overburden	
	-22	White granite	pC
	-163	Brown granite—seamy	
547	0-92	Clay and boulders	Qsd
548	0-13	Sand, clay and boulders	
	-80	Medium hard, gray black granite	pC
	-97	Medium to soft shaley rock	
	-120	Gray, white granite, some pink quartz	
555	0-3	Sandy overburden	
	-62	Hard, white granite	pC
	-76	Medium to hard granite	
	-94	Hard, white granite with pink in it	
	-98	Hard, seamy, black, green and white	
559	0-10	Dirt and boulders	
	-19	Soft, rotten granite	pC
	-35	Hard granite	
	-110	Granite	
600	0-7	Fill	
	-38	Hard, gray, white granite	pC
	-47	Medium, white, brown, seamy granite	
	-95	Gray, white, hard granite	
	-145	White and black, medium to hard, seamy granite	
	-247	Hard white granite, some black	
603	0-28	Sand and gravel	
	-50	Gray granite	pC
	-89	Black, green granite, seamy	
	-139	Gray granite	
	-141	Pink, brown granite, seamy	
	-155	Black, gray granite (152-155-seams)	
	-164	Brown, gray, black granite	
	-200	Hard, gray granite	
606	0-2	Overburden	
	-20	Granite	pC
	-25	Hard, white granite	
	-50	Gray granite	
	-53	Soft seam	
	-65	White granite	
	-68	Soft, brown granite	
	-75	White granite	
614	0-39	Overburden	
	-170	Green, white granite	pC
637	0-2	Overburden	
	-8	Brown granite	pC
	-23	Green, white granite	
	-98	Black, white granite	
	-103	White granite	
	-149	Green, white granite	
	-161	Green, white, black granite	
645	0-6	Boulders and sand	
	-45	Hard, white granite	pC
	-55	White, brown, black and speckled granite	
	-97	White, pink, green, black and brown granite (mixed)	
646	0-30	Clay and boulders	
	-46	Rotten granite	pC
	-98	Gray granite	
	-103	Seam	

Well #	Depth	Log	Formation
646	-106	Gray granite	
	-200	White granite	
660	0-3	Overburden	
	-20	Gray granite	pC
	-25	Soft spot	
	-50	Soft seams	
	-62	Light gray granite	
	-65	Brown, white granite	
	-75	Brown granite	
	-80	Soft seam	
	-110	Black, white granite	
	-130	Light gray granite	
	-135	Black, white granite	
	-145	Gray granite	
	-158	Soft seams	
	-168	Very soft	
	-175	Water	
	-180	Brown, white granite	
	-195	Dark, gray granite	
681	0-21	Gray clay, sand, gravel and boulders (black granite)	
	-55	Medium to soft, black, gray, green and shaley granite	pC
	-65	White, brown, black, gray granite (medium to hard)	
	-71	Hard, white and gray granite	
	-97	Rotten granite, brown, seamy, (medium hard)	
692	0-30	Clay and boulders	
	-51	Rotten granite	pC
	-123	Granite	
695	0-25	Overburden	
	-50	Brown clay	
	-60	Brown granite	pC
	-75	Gray granite	
	-110	White granite	
	-125	White, black granite	
	-145	Black granite	
699	0-8	Overburden	
	-52	Gray clay, boulders and gravel	
	-60	White, green granite	pC
	-61	Brown granite	
	-92	White, green granite	
	-94	Brown, white granite, brown clay	
	-98	White, green granite	
700	0-35	Gravel and sand	
	-60	Granite	pC
	-62	Water seam	
	-72	Gray granite	
	-73	Water seam	
	-95	Gray granite	
	-98	Mica-seam	
701	0-15	Sand	
	-25	Sand and gravel	
	-50	Granite	pC
	-62	Brown, white granite	
	-78	Soft seams	
	-80	Water	
	-85	Gray granite	

WALLPACK TOWNSHIP

DOMESTIC WELLS [1 & 2]

Formation	No. of Wells	YIELD IN GALLONS PER MINUTE Maximum	Minimum	Average	Median
Poxono Island Shale through Oriskany Formation (Spi-Do)	9	40	2	13	7
High Falls Formation (Shf)	22	25	½	8	6
Shawangunk Formation (Ssg)	13	13	½	5	3

Formation	No. of Wells	DEPTH IN FEET BELOW SURFACE Maximum	Minimum	Average	Median
Poxono Island Shale through Oriskany Formation (Spi-Do)	9	212	67	131	116
High Falls Formation (Shf)	22	320	75	156	140
Shawangunk Formation (Ssg)	13	306	97	185	173

[1] Wells and formations with insufficient data are not used in this summary.

[2] There is 1 industrial well from the Shawangunk Formation. See regional summary of industrial wells.

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
1	R. Wolf	1951	6	8	143	Don	9	30			
2	P. McLennan	1952	6	30	105	Des	12	4			
3	J. R. Frame	1950	6	4	237	"	132	75		125	
4	G. F. Seltenreich	1949	6	2	116	Spi-Do	20	25	bottom		
5	Boy Scouts of America	1936	8	50	114	Ssg		10	85/8	12	I
6	Walpack Center School	1942	6	16	116	Spi-Do				47	

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
7	T. J. Lackner #1	1947	6	30	105	Qsd	5	14	40/		
8	" " " #2	1947	6	40	123	Spi-Do	116	23	40/1	117	
9	R. Layton	1934	6	5	308	Shf		flows ½ gpm			
10	Donnelly	1946	6	4	143	Spi-Do					
11	H. J. Donavan	1961	6	10	150	Don	20	60	93/4	8	
12	W. Doot	1961	6	10	213	Des	20	41	100/4		
13	H. G. Burger	1964	6	20	67	Qsd	67	26			
14	J. H. Burger	1964	6	30	116	Spi-Do	105	8			
15	J. G. Young	1954	6	10	212	"	6	58		6	
16	F. Wilson	1961	6	20	120	Don	30	55	110/4	4	
17	W. Treibel	1940	6	2	67	Spi-Do	5			5	
18	Flatbrookville School	1947	6	5	103	"	9	9	80/		
19	L. Szilogzi	1966	6	6	140	Ssg	12	20	120/½		
20	F. J. Fitzpatrick	1963	6	3	215	"	20	80	160/1		
21	Blairstown Plmbg. & Htg.	1965	6	?	221	"	21				
22	R. Meinzer	1962	6	9	110	"	21	54	90/1		
23	R. Bodien	1966	6	0	300	"	20				
24	P. Bentley	1961	6	4	223	"	23	141	175/1½		
25	A. Jaeger	1959	6	4	197	Shf	16	145			
26	R. Gutsche	1966	6	6	207	"	14	18	180/½		
27	Blairstown Plmbg. & Htg.	1965	6	13	97	Ssg	31				
28	A. D. Franzo	1962	6	3	145	Shf	14	40	100/1		
29	Freeman	1962	6	7	147	"	19	12	80/½		
30	Mrs. R. Porter	1964	6	8	185	Spi-Do	165	85	110/½		
31	J. Sandmeier	1966	6	5	300	Don	30	8	295/3	20	
32	J. Anderson	1966	6	½	306	Ssg	21			5	
33	J. Mincieli	1965	6	7	147	"	23	73	140/1	3	

BLUE MOUNTAIN LAKES (34-62)

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
34	T. Stensgaard	1966	6	1	345	Ssg	16	30	300/1		
35	J. Beehm	1961	6	12	95	Shf	22	15			
36	Geo. Hobbs	1961	6	4	238	Ssg?	15	190	220/2		
37	A. Ippolitto	1962	6	12	100	Shf	15	20	40/1	2	
38	M. L. Douglas	1961	6	12	285	Shf & Ssg	32	245	267/3	8	
39	D. Falcone	1961	6	8	125	Shf	44	56	110/1	34	
40	A. Amaranti	1961	6	4	110	"	18	60		3	
41	A. Scarpato	1963	6	4	114	"	40	8	50/1		
42	F. Zraly	1962	6	2	210	Ssg	15	103	200/1		
43	A. Ventrudo	1966	6	3	195	Shf	150	95	180/1	150	
44	A. Tavares	1965	6	25	170	Shf?	104			104	
45	Pollett	1965	6	?	398	Shf & Ssg	20			20	
46	J. Schinder #1	1965	6	?	147	Ssg?	21			21	
47	J. Russo	1965	6	½	320	Shf	21			20	
48	S. Babick	1966	6	5	160	Ssg	21			5	
49	Blairstown Plmbg. & Htg.	1966	6	2	245	"	21				
50	S. Suczak	1965	6	9	140	Shf	22			7	
51	R. Krieger	1965	6	?	190	Shf & Ssg	23			2	
52	J. Schinder #2	1965	6	?	298	" " "	20			5	
53	E. Scherman	1962	6	8	156	Shf	19	79			
54	P. Gaul	1966	6	10	75	"	16	8	50/1		
55	M. Domb	1966	6	8	125	"	120	30	60/1		
56	C. A. Hanson	1961	6	3	196	Ssg	14	110			
57	N. Pirro	1963	6	3	115	"	15	20	40/1		
58	R. F. Ehrenbach	1966	6	15	110	Shf	30	46	90/3	20	
59	R. Tate	1961	6	5	135	"	14	64	100/1		
60	R. Tate	1963	6	20	143	"	20	70	120/4	10	
61	R. S. Chapman	1966	6	6	175	"	20	60	160/1		
62	A. E. Ford	1961	6	5	135	"	15	50	80/½		

Drillers' Logs of Wells, Walpack Township
(Depths below land surface are given in feet)

Well #	Depth	Log	Formation
5	15-52	Gray quartzite	Ssg
	-58	Same	
	-76	Hard, gray quartzite and interbedded red shale	
	-83	Fine-grained, sea green and dull red quartzite	
	-90	Very fine-grained, dull red quartzite	
	-99	Fine-grained light green quartzite	
	-101	Rusty brown quartzite, nearly all grains coated with limonite	
	-114	Fine-grained, light brown quartzite	
6	0-47	Glacial drift	
	-116	Soft limestone	Spi-Do
7	0-105	Sand and gravel	Qsd
8	0-105	Red clay	
	-117	Gravel and sand	
	-123	Lime rock	Spi-Do
11	0-8	Dirt	
	-150	Limestone	Don
16	0-4	Overburden	
	-108	Hard limestone	Don
	-120	Soft, brown sandstone	
21	0-221	Conglomerate of white quartz, pebbles in red to bluish matrix	Ssg
23	0-25	Shale	
	-300	Conglomerate of white quartz, pebbles in red to bluish matrix	Ssg
25	0-20	Red shale and sandstone	Shf
	-60	Pinkish shale and sandstone	
	-80	Red sandstone	
	-100	Pinkish sandstone	
	-120	Fine-grained yellow-brown sandstone	
	-150	Blue shale	
	-180	Brown-gray shale	
	-197	Light gray, fine-grained shale	
38	0-8	Hardpan and cobbles	
	-58	Red sandstone	Shf
	-82	Gray sandstone	
	-103	Red sandstone	
	-127	Gray sandstone	
	-152	Red sandstone	
38	-171	Brown sandstone	
	-187	Red sandstone	
	-263	Gray sandstone, very hard	
	-277	Brown sandstone, very soft	
	-285	Gray sandstone, very hard	Ssg
39	0-34	Glacial drift with boulders	
	-125	Brown sandstone	Shf
40	0-3	Overburden	
	-110	Red sandstone	Shf
43	0-150	Clay, gravel and boulders	
	-195	Red rock	Shf?
44	0-104	Sand, gravel and boulders	
	-170	Gray sandstone	Shf?
45	0-3	Overburden	
	-20	Red shale	Shf
	-398	Gray rock	Ssg?
46	0-21	Overburden	
	-147	Gray rock	Ssg?
47	0-21	Overburden	
	-320	Red rock (sandstone?)	Shf
48	0-5	Overburden	
	-160	Alternating bands of quartzite and shale	Shf
49	0-5	Overburden	
	-245	Alternating bands of quartzite and shale	Shf
50	0-7	Overburden	
	-8	Black-white sandstone	Shf
	-25	Black-gray sandstone	
	-82	Shale	
	-85	Brown sandstone	
	-100	Gray sandstone	
	-130	Brown-white sandstone	
	-140	Shale	
51	0-2	Overburden	
	-25	Red sandstone	Shf
	-190	Hard sandstone	
52	0-5	Overburden	
	-68	Red shale	Shf
	-91	Hard sandstone	
	-100	Red shale	
	-298	Hard sandstone	

WANTAGE TOWNSHIP (Including SUSSEX)

DOMESTIC WELLS[1]

		YIELD IN GALLONS PER MINUTE			
Formation	*No. of Wells*	*Maximum*	*Minimum*	*Average*	*Median*
Martinsburg Hornfels (Ombh)	12	18	1	5½	3
Martinsburg Formation (Omb)	257	100	½	10	5
Kittatinny Formation (C0k)	15	50	2	18	15

		DEPTH IN FEET BELOW SURFACE			
Formation	*No. of Wells*	*Maximum*	*Minimum*	*Average*	*Median*
Martinsburg Hornfels (Ombh)	12	273	104	179	173
Martinsburg Formation (Omb)	257	698	35	182	152
Kittatinny Formation (C0k)	15	359	63	158	137

[1] Wells and formations with insufficient data are not summarized.

WANTAGE TOWNSHIP (Including SUSSEX)

INDUSTRIAL WELLS [2]

Formation	No. of Wells	*YIELD IN GALLONS PER MINUTE* Maximum	Minimum	Average	Median
Martinsburg Formation (Omb)	9	50	2	31	33

Formation	No. of Wells	*DEPTH IN FEET BELOW SURFACE* Maximum	Minimum	Average	Median
Martinsburg Formation (Omb)	9	833	206	394	311

[2] There is 1 additional industrial well from the Kittatinny Formation. See regional summary of industrial wells.

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
1	R. Nichling	1952	6	36	84	Omb	24	3	9/2	0	
2	W. Ayers	1952	6	7	99	"	32	12			
3	F. Hughes	1948	6	10	104	Ombh	49	17	90/1	49	
4	K. Leonhardt	1949	6	9	122	"	58	29	50/1	58	
5	S. Kessler	1948	6	18	112	"	76	63	95/1	76	
6	L. Howell	1951	6	10	35	Omb	20	12	25/1	20	
7	M. Haggerty	1948	6	4	181	"	106	5	105/1	106	
8	L. Banghart	1951	6	5	47	"	17	7	41/1	17	
9	L. Carr	1949	6	20	140	"	18	5	40/8		
10	A. Maroldi	1952	6	15	66	"	23	7	20/2		
11	R. Edsell	1951	6	1	218	"	8	54	200/1		
12	C. Gilliken	1953	6	1	250	"	20	15	240/8		
13	B. Wilson	1953	6	6	82	"	20				
14	C. D. Becker	1949	6	1	290	"	19	37	bottom	18	
15	J. Tierney	1948	6	½	132	"	30	14	bottom	30	
16	W. G. Friend	1951	6	1½	346	"	3	2	100/1	3	
17	S. Retz	1953	6	12	94	"	Deepened	24			
18	Simmons Realty Co. #3	1950	6	17	150	"	58	26	80/2	55	
19	B. Repsher #2	1952	6	10	110	"	13	52	80/2	10	
20	E. Bishop	1953	8	21½	223	"	12	28	85/6		
21	S. Mikrut	1953	6	20	84	"	30	24	25/2	27	
22	C. W. Brownell Co. #2	1951	6	30	36	Qsd	36	5	5/2		
23	J. Todd, Jr.	1948	6	2	272	Omb	52	47	65/1	52	
24	E. Johnson	1948	6	2	120	"	54	23	40/1	54	
25	A. Rizzo	1953	6	35	75	COk	24	8	8/2		
26	American Tel. & Tel. Co.	1959	6	45	500	Omb	28	31			I
27	" " " " "	1959	6	15	500	"	21	13½			I
28	E. Denman, Sr.	1964	6	1½	413	"	30	13	350/2		
29	K. Boyd	1954	6	10	95	"	12	flows 3 gpm		0	
30	W. Hill	1965	6	8	80	"	31	10	60/2		
31	M. Cicerale	1964	6	10	90	"	20	5	60/2		
32	L. Wojcik	1965	6	10	135	"	30	4	80/2		
33	R. Sanders	1966	6	6	73	"	14	2	60/2		
34	V. Rome	1964	6	12	94	"	21	40	90/2		
35	G. Titus	1961	6	1	104	"	26	23			
36	J. Thompson	1961	6	20	165	"	29	1			
37	L. Green	1962	6	2	84	"	22	17			
38	J. Vernie	1961	6	1	186	"	20	42			
39	Ridge Runners Gun Club, Inc.	1959	6	1	108	Ssg	15	10			
40	Dairy Research Center	1964	6	1	297	Omb	30	23	200/2		
41	H. Prins	1962	6	1	125	"	35	23			
42	R. Abrazinskas	1965	6	5	83	"	17	19			
43	R. Ayers	1965	6	3	173	Ombh	24	14	160/2		
44	R. Frey	1966	6	18	95	Omb	23	20	28/2		
45	J. Sailer	1965	6	10	122	Ombh	67	14	60/2		
46	H. Phillips, Jr.	1964	6	1½	221	"	23	20	160/2		
47	D. Keasler	1966	6	1½	247	"	30	12	210/2		
47A	Cooperative Loan & Savings Society	1967	6	6	203	"	42	19	180/3		

WANTAGE TOWNSHIP (Including SUSSEX)

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USB
48	J. Lordy	1964	6	3	130	Ombh	19	17			
49	H. Zabrowski	1966	6	1½	273	"	30	26	210/2		
50	I. Vreeland	1961	6	2	146	COk	20	62			
51	W. Card	1966	6	2	195	Ombh	121	50			
52	W. Pfitzenmayer	1966	6	1	249	"	18	19			
53	H. Haggerty	1965	6	15	210	Omb	25	15	120/2		
54	G. Christy	1957	6	2	225	"	27	19			
55	W. Haggerty	1966	6	10	66	"	42	24			
56	G. Fräuenpries	1962	6	2	258	"	146	22	200/2		
57	Rutgers Univ. Research Farm	1964	6	50	152	"	45	6	100/2		
58	Rutgers Univ. Research Farm	1961	6	5	101	"	37	7			
59	R. Burse	1964	6	2	338	"	47	50	300/2		
60	R. Ayers	1956	6	6	83	Omb & dike	19	17	70/2		
61	O. Venden Heuvel	1964	6	2	283	Omb	21	15			
62	Beemerville Fire Co.	1956	6	25	60	"	27	5	20/1	50	
63	Space Farms	1966	6	4	97	"	32	14	60/2		
64	" "	1966	6	35	147	"	26	20	100/2		
65	First Presbyt. Church	1958	6	1½	166	"	19½	15			
66	R. Beamer, Jr.	1964	6	5	95	"	28	12			
67	M. Crowell	1956	6	2½	254	"	154	33			
68	W. Systema	1963	6	2½	309	"	100	25			
69	N. Skellenger	1963	6	5	165	"	23	4			
70	C. Longcar	1964	6	12	50	"	23½	11	20/2		
71	C. Petrolevitch	1964	6	12	58	"	20	5	40/2		
72	H. Chapin	1964	6	15	105	"	23	13			
73	G. Schineller	1964	6	4	123	"	52	9	80/2		
74	R. Slate	1964	6	3	198	"	20	6	180/2		
75	J. Kaweska	1966	6	4	172	"	162	2	105/2		
76	W. Aboto	1951	6	1	146	"	35	10			
77	L. Coykendall	1964	6	8	98	"	21	5	60/2		
78	W. Viet	1963	6	7	195	"	73	25			
79	J. Berry	1965	6	2	185	"	101	2	160/2		
80	A. Chase	1965	6	12	197	"	23	10	100/2		
81	H. VanHorn	1965	6	2	124	"	21	32			
82	M. Coyhendal	1965	6	24	72	"	25	18	44/3	12	
83	R. Harde	1965	6	15	72	"	39	5	60/2		
84	C. Rome	1963	6	3	265	"	17	44			
85	C. Albright	1964	6	150	90	Qsd & Omb	90	4	20/2		
86	Jim-B-Farms	1965	6	3	317	Omb	20	8	300/2		
87	R. Fuller	1965	6	4	78	"	13	15			
88	H. Brink	1965	6	12	156	"	17	24	100/2		
89	C. Albright #2	1964	6	60	70	Qsd & Omb	70	24	20/2		
90	F. Huback, Jr.	1964	6	8	108	Omb	24	15			
91	C. Westdyke	1964	6	5	66	"	21	20	50/2		
92	C. Raye	1965	6	6	397	"	35	67	300/2		
93	R. Tuma	1962	6	30	145	"	25	15			
94	D. Bruker	1965	6	½	273	"	21	10	200/2		
95	E. McGraw, Jr.	1964	6	2	298	"	10	13	280/2		
96	T. Ryan, Jr.	1962	6	1	167	"	28	25			
97	E. Christensen	1965	6	20	92	"	17	5			
98	F. Dailey	1963	6	2	325	"	21	16			
99	E. Link	1965	6	6	97	"	19	10	80/2		
100	L. Bedell	1964	6	2	130	"	25	20	120/2		
101	D. Richelshagen	1965	6	1	197	"	12	20	190/2		
102	P. Compton	1966	6	8	260	"	20	40	150/2		
103	A. Seideman	1966	6	15	210	"	6	20	80/2		
104	M. Jones #2	1955	6	8	250	"	81	30	110/		
105	G. Schwarz	1965	6	14	142	" Fault?	82	32	122/2	58	

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
106	L. Klaus	1965	6	40	172	Omb Fault?	106	6	80/2		
107	J. Aglialoro	1966	6	1	222	Omb	150	35	210/2		
108	John Turpin	1967	6	1	479	"	21	56	300/2		
109	C. Feenstra	1965	6	14	155	Qsd	155	57			
110	J. Desmarais	1965	6	1½	246	Omb	30	32	210/2		
111	M. Faul	1965	6	2	247	"	44	9	200/2		
112	S. Heinlein	1961	6	2	698	"	24	32	620/5	12	
113	L. Struble #2	1958	6	11	360	"	28	9½	130/		
114	Simmons Realty Company	1965	6	2	297	"	21	16	280/2		
115	" " "	1965	6	2	297	"	21	22	280/2		
116	H. France	1964	6	4	257	"	40	20	150/2		
117	A. Moraldi, Sr.	1959	6	3	309	"	22	10	bottom		
118	L. Carr	1966	6	5	146	"	32	17	100/2		
119	A. Hutting	1965	6	5	155	"	23	27			
120	Klip & Kurl Beauty Salon	1965	6	1½	297	"	21	15	210/2		
121	B. Paugh	1965	6	12	67	"	67	11	55/2		
122	E. Johnson	1964	6	3	475	"	21	30	460/2		
123	A. Klim	1966	6	2½	683	"	19	3	300/2		
124	J. Noonan	1966	6	6½	122	"	51	18	100/2		
125	C. Lott	1964	6	2½	80	"	17	3			
126	M. Willson	1965	6	1	310	"	27	16			
127	R. Struble	1964	6	7	289	"	22	34	120/2		
128	A. Baker	1964	6	3	247	"	21	25	200/2		
129	L. Willson, Jr.	1964	6	½	295	"	27	50			
130	G. Zimba	1966	6	3	222	"	22	18	200/2		
131	J. Rush	1965	6	4	216	"	57	60	216/2	57	
132	H. Carr	1965	6	15	215	"	28	25	90/2		
133	E. Turner	1965	6	1½	342	"	17	16	300/2		
134	O. Peckham	1965	6	2	144	"	46	51			
135	B. Brink	1965	6	7	72	"	21	10	50/2		
136	M. Smith	1966	6	4½	173	"	18	48	105/2		
137	D. Simmons	1960	6	30	206	"	23	11			
138	J. Illaria	1962	6	2½	145	"	29	22			
139	J. Sipley	1962	6	8	157	"	21	5	50/2		
140	R. Pluymers	1966	6	1½	235	"	30	16	210/2		
141	J. Rannon	1966	6	7	98	"	13	30	80/2		
142	W. Gutowski	1962	6	3	145	"	41	27			
143	M. Bombara	1963	6	5	224	"	99	21			
144	N. Van Horn	1963	6	2	100	"	28	20			
145	S. Nemeth	1964	6	5	278	"	182	62	266/	170	
146	A. Kaczkowski	1965	6	8½	136	"	60	14	100/2		
147	B. VandenBerg	1966	6	1½	271	"	10	26	210/2		
148	F. Rite	1964	6	3	50	"	23	6	15/2		
149	Cre-Art Corp.	1966	6	20	122	"	81	21	85/2		
150	R. E. Baldwin	1966	6	6	335	"	90	20	220/2	90	
151	H. Rome	1962	6	6	120	"	70	29			
152	C. Rome	1962	6	6	135	"	83	37			
153	R. Van Arden	1964	6	9	130	"	90	46	120/2		
154	H. Rome	1963	6	4	137	"	71	37			
155	W. Smith	1964	6	10	170	"	50	65	135/2		
156	L. Cash	1966	6	10	73	"	63	16	50/2		
157	J. Perovich	1966	6	2	297	"	50	42	210/2		
158	V. Cartabona	1964	6	1½	257	"	50	53	200/2		
159	R. Howell	1958	6	6	289	"	62	12			
160	J. Clouse	1965	6	10	145	"	70	29			
161	W. Chasmar	1962	6	10	104	"	25	20			
162	G. Rome, Sr.	1964	6	30	50	"	45	24	30/2		
163	Sussex Co. Bd. of Freeholders-Wantage Twp. Garage	1965	6	60	147	"	42	10	80/2		
164	G. Ferretti	1964	6	6	61	"	18	15			
165	W. Chasmar	1964	6	2½	85	"	43	8			

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
166	J. Healey	1964	6	30	115	Omb	58	4	50/2		
167	Delgrosso Bros., Inc.	1964	6	½	246	"	20	86			
168	J. Cillarto	1965	6	75	297	"	20	28	200/2		
169	St. Cloud Bldg. Corp.	1958	8	35	833	"	42	50	300/6		I
170	S. Hymes	1964	6	50	130	"	50	74	90/2		
171	Estey Corp.	1963	6	5	371	"	20	13			
172	Simmons Realty Co. #1	1960	8	2	294	"	25	49			I
173	" " " #2	19..	8	30	206	"	23	11			I
174	C. Sartell	1964	6	35	58	"	35	7	35/2		
175	M. Drake	1964	6	30	94	"	21	6	40/2		
176	E. Decker	1964	6	3	164	"	20	14			
177	Udemac, Inc.	1966	6	4	249	"	32				
178	Ideal Farms, Inc.	1954	6	50	313	"	40	10	95/1		I
179	W. Decker	1962	6	20	176	"	29	21	30/2		
180	G. Moore	1962	6	2	268	"	104	110			
181	J. Jaeger	1964	6	4	135	"	42	9	90/2		
182	M & B Havens	1966	6	1½	323	"	25	18	300/2		
183	B. Havens	1966	6	1½	273	"	20	18	210/2		
184	J. Cosh	1964	6	4	95	"	18	10			
185	E. Katterman	1965	6	30	103	"	22	10	50/2		
186	E. Brislin	1964	6	5	172	"	11	14	150/2		
187	P. O'Biso	1965	6	8	104	"	29	13			
188	High Point Regional High School	1965	8	50	308	"	50	33	250/24		I
189	E. Oliva	1962	6	5	115	"	59	12	90/2		
190	M. Edsall	1965	6	4	97	"	45	32	80/2		
191	Roy Farms, Inc.	1964	6	5	135	"	61	29	90/2		
192	G. Williams	1963	6	20	75	"	19	10			
193	Northern N. J. Bldrs.	1966	6	3	248	"	50	4	180/2		
194	" " " "	1962	6	6	84	"	25	21			
195	" " " "	1966	6	5	270	"	51	45	180/2		
196	J. Moore	1965	6	100	65	"	52	14	40/2		
197	D. Elston	1964	6	100	68	"	57	16	40/2		
198	F. Shields	1964	6	4	82	"	35	21			
199	H. Grohman	1966	6	25	152	"	25	12	85/2		
200	H. Elliott	1966	6	1	396	"	31	26	380/2		
201	W. Scholl	1964	6	2½	172	"	39	11	150/2		
202	W. Stires	1962	6	3½	135	"	23	15			
203	O. Krueger	1954	6	2	200	"	32	13			
204	R. Textor	1956	6	10	90	"	27	13	70/2		
205	P. Grau	1965	6	10	56	"	39	20	45/2		
206	D. Burger	1966	6	20	85	"	17	11	60/2		
207	Dunn & Dunn, Inc.	1966	8	37	326	"	65	8	150/2		I
208	R. Ross	1966	6	1	305	"	38	10	210/2		
209	N. Kemble	1965	6	10	273	C0k	32	74	210/2		
210	D. DeKorte	1963	6	10	125	Ojb	28	43			
211	F. Ackerman	1964	6	5	147	C0k	20	30	135/2		
212	R. Pillar	1965	6	50	115	"	11	46	55/2		
213	W. Boynton	1963	6	12	158	"	43	61	111/3	25	
214	Sussex Redi-Mix Co.	1966	6	5	480	Omb	44	24	300/2		
215	W. Todd	1962	6	18	128	C0k	46	36	65/3	25	
216	A. Weemstra	1966	6	2½	255	Omb	22	20	225/2		
217	A. Ferris	1963	6	4½	145	"	20	9			
218	E. Todd	1964	6	5	106	C0k	20	49	120/2		
219	Holland Amer. Bakery	1964	6	22	90	"	22	4½	40/2		
220	M. L. Willson	1955	6	24	359	"	40	30			
221	Mar-Men Corp.	1955	6	20	116	"	33	3	3½/2		
222	" " "	1966	6	4	173	"	43	17	160/2		
223	T. Rome	1962	6	20	63	"	20	23			
224	F. Henderson	1964	6	2	196	"	20	45	180/2		
225	P. Bisak	1965	6	40	228	"	51	10	70/2		
226	Sussex Motel, Inc.	1964	6	250	148	"	22	15	120/2		I
227	Wantage Corp.	1959	8	15	262	Omb	31	20	180/6	11	I

WANTAGE TOWNSHIP (Including SUSSEX)

LAKE NEEPAULIN (228-300)

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
228	P. Kunz	1962	6	5	338	Omb	50	44			
229	F. Vitale	1958	6	1	289	"	50	162			
230	R. Spooner	1959	6	10	308	"	50	173			
231	H. Klemm	1959	6	1	289	"	50	123	280/		
232	F. Castagna	1958	6	3	209	"	50	90			
233	E. Gordon	1962	6	20	84	"	50	28			
234	W. Wesserling	1962	6	1	310	"	50	46			
235	L. Guelpa	1959	6	1	289	"	50	104			
236	J. Zapolski	1959	6	8	84	"	50	23			
237	P. Manzi	1955	6	5	81	"	13	12			
238	T. Nolan	1960	6	1½	269	"	50	103	bottom		
239	H. Murray	1965	6	25	270	"	50	68	200/2		
240	G. Cain	1963	6	3	104	"	50	28			
241	C. Williams	1963	6	6	92	"	24	20	70/2	12	
242	I. Pepper	1962	6	1½	185	"	50	37			
243	Lake Neepaulin Land Corp.	1961	6	1	156	"	50	18			
244	R. Trapani	1965	6	2	145	"	50	23			
245	Lake Neepaulin Realty Co.	1959	6	50	125	"	50	14			
246	P. Ryan	1964	6	3	105	"	50	25			
247	J. Barton	1962	6	2	160	"	50	60			
248	L. VanIngen	1964	6	3	247	"	50	120			
249	A. Lange	1964	6	10	176	"	50	25	90/2		
250	L. Grossman	1964	6	3	196	"	50	73	160/2		
251	F. Galardi	1961	6	3	227	"	50	98			
252	R. Tepedino	1959	6	15	146	"	50	65	70/		
253	M. Stebner	1958	6	2½	248	"	50	114			
254	C. Smith	1959	6	30	125	"	50	10	20/		
255	J. Dzamba	1966	6	1	272	"	50	56	210/2		
256	J. Tribuzio	1966	6	2	248	"	50	63	210/2		
257	Lake Neepaulin Land Corp.	1962	6	4	114	"	50	52			
258	W. Degethoff	1961	6	1	339	"	50	115			
259	A. Giagnacoyo	1961	6	5	117	"	54	flows			
260	A. Anastasi	1961	6	5	146	"	50	30			
261	W. Oprisko	1959	6	5	105	"	50	flows ½ gpm			
262	R. Sylvester	1959	6	1½	332	"	50	124			
263	P. Nigri	1955	6	15	68	"	28	5			
264	N. Costa	1959	6	1	250	"	50	115			
265	Lake Neepaulin Develop. & Bldr.	1955	6	20	75	"	27	8			
266	J. France	1956	6	5	82	"	14	18			
267	J. Stock	1960	6	20	131	"	50	34			
268	F. Johansen	1964	6	2	206	"	50	57			
269	E. Abatisr	1965	6	100	150	"	50	60	80/2		
270	L. LeBlanc	1964	6	7	134	"	50	60	100/2		
271	F. Cordasco	1964	6	4	268	"	50	100	200/2		
272	T. Caponigro	1964	6	4	157	"	50	25	100/2		
273	W. Heidepren	1959	6	4	166	"	50	43	120/		
274	M. Walsh	1966	6	3	173	"	50	10	150/2		
275	T. Trehy	1966	6	4	197	"	50	50	150/2		
276	O. Jacobsen	1966	6	5	95	"	50	15	80/2		
277	J. Sudol	1966	6	5	349	"	50	20	80/2		
278	B. Sadowski	1958	6	1½	207	"	50	112			
279	H. Payan	1962	6	7	143	"	50	18			
280	P. Litrenta	1966	6	25	123	"	50	18	80/2		
281	V. Tita	1964	6	6	197	"	50	80	150/2		
282	M. Mohr	1962	6	4	115	"	52	5	90/2		
283	H. Bley	1964	6		258	"	50	5	220/2		
284	W. Hintz	1964	6	12	176	"	50	96	160/2		

LAKE NEEPAULIN (228-300)

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
285	S. Paulter	1965	6	50	73	Omb	50	10	60/2		
286	R. Woodhull	1964	6	7	166	"	50	78			
287	E. Porto	1963	6	5	104	"	50	45			
288	L. VanHouten	1963	6	20	104	"	50	18			
289	W. Herlihy	1962	6	15	84	"	50	18			
290	S. Barbieri	1958	6	4	207	"	50	142			
291	R. Breen	1964	6	1	448	"	32	58	350/2		
292	G. McManus	1960	6	20	105	"	50	9	80/		
293	S. Parcase	1962	6	2	165	"	50	10			
294	P. Ablequest	1964	6	7	105	"	50	20	90/2		
295	G. Panico	1963	6	15	125	"	50	8			
296	J. Kramer & R. Sihksnel	1962	6	5	145	"	50	38			
297	B. Lamberechts	1960	6	1½	167	"	50	47			
298	H. Rome	1964	6	8	100	"	88	32			
299	N. Cerrito	1964	6	15	238	"	15	15	105/2		
300	Lake Neepaulin Constr. Co.	1966	6	9	73	"	50	27	60/2		

Drillers' Logs of Wells, Wantage Township
(Depths below land surface are given in feet)

Well #	Depth	Log	Formation
3	0-49	Hardpan	
	-104	Gray rock	Omb
4	0-58	Hardpan and boulders	
	-122	Gray rock	Omb
5	0-76	Hardpan and boulders	
	-112	Gray rock	Omb
6	0-20	Hardpan	
	-35	Slate rock	Omb
7	0-106	Blue clay	
	-181	Slate	Omb
8	0-17	Hardpan	
	-47	Hard slate	Omb
11	0-8	Soil, hardpan and gravel	
	-210	Slate	Omb
15	0-30	Clay	
	-102	Shale	Omb
16	0-3	Soil	
	-346	Slate	Omb
22	0-36	Sand and gravel	Qsd
23	0-52	Clay and gravel	
	-220	Slate	Omb
24	0-54	Clay and gravel	
	-120	Slate	Omb
47A	0-20	Hardpan and boulders	
	-30	Boulders, gravel and water	
	-34	Gravel, sand and water	
	-100	Blue shale rock	Omb
	-152	Hard, gray rock	
	-186	Blue shale	
	-203	A soft, brown sandstone	
62	0-40	Sandy clay	
	-60	Shale	Omb
82	0-12	Hardpan and broken-up rock	
	-25	Hard, black rock	Omb
	-72	Black shale rock	
105	0-25	Hardpan and large boulders	
	-35	Boulders, gravel and water	
	-58	Blue clay	
	-65	Broken-up rock	
	-100	Blue shale rock	Omb
	-125	Hard, gray rock	
	-142	Soft, brown, "honey comb" rock	
112	0-12	Hardpan	
	-125	Blue shale rock	Omb
	-200	Gray rock, hard	
	-300	Blue shale rock	
	-443	Gray rock, hard	
	-580	Blue shale rock	
	-650	Gray rock, hard	
	-698	Blue shale rock	
119	0-17	Sandy overburden	
	-155	Shale rock	Omb
131	0-12	Hardpan	
	-48	Clay	
	-216	Blue limestone	COk
144	0-12	Hardpan and clay	
	-100	Slate and blue stone	Omb
145	0-50	Hardpan and boulders	
	-75	Blue clay, boulders and gravel	
	-125	Blue clay, gravel and water	
	-150	Blue clay and boulders	
	-162	Boulders	
	-170	Blue clay and broken-up rock	
	-200	Blue shale rock	Omb
	-222	Hard, gray rock	
	-278	Blue shale rock	
150	0-9	Overburden	
	-335	Blue stone and slate	Omb
169	0-5	Earth and clay	
	-833	Gray slate rock	Omb

WANTAGE TOWNSHIP (Including SUSSEX)

Well #	Depth	Log	Formation	Well #	Depth	Log	Formation
213	0-25	Hardpan		215	0-25	Hardpan and broken-up rock	
	-30	Broken-up lime rock			-35	Broken-up rock and water	
	-40	Lime rock with water	C0k		-100	White limestone	C0k
	-75	White lime rock			-110	Yellow lime rock with water	
	-121	Hard, blue lime rock			-122	Hard, blue lime rock	
	-129	Soft, yellow lime rock with water			-128	Soft, yellow limestone with water	
	-148	White lime rock		227	0-11	Earth and clay	
	-158	Brown sandstone with water			-262	Hard, gray rock	Omb

BLAIRSTOWN TOWNSHIP

DOMESTIC WELLS [1 & 2]		*YIELD IN GALLONS PER MINUTE*			
Formation	*No. of Wells*	*Maximum*	*Minimum*	*Average*	*Median*
Stratified Drift (Qsd)	7	30	4	18	20
Martinsburg Formation (Omb)	23	20	¾	10	9
Kittatinny Formation (C0k)	17	35	3	13	10

		DEPTH IN FEET BELOW SURFACE			
Formation	*No. of Wells*	*Maximum*	*Minimum*	*Average*	*Median*
Stratified Drift (Qsd)	7	177	35	79	57
Martinsburg Formation (Omb)	23	345	50	145	130
Kittatinny Formation (C0k)	17	290	40	121	104

[1] Wells and formations with insufficient data are not used in this summary.

[2] There are 4 industrial wells, all from the Martinsburg Formation. See regional summary of industrial wells.

Well No.	*Owner*	*Year Drilled*	*Csg. dia. (in.)*	*Yield (gpm)*	*Depth (ft.)*	*FORMA-TION*	*Screen Setting or depth csd. (ft.)*	*Static Water Level (ft.)*	*Pumping Level/hrs. Pumped*	*Depth to Bedrock*	*USE*
1	P. Bauman	1951	6	12	140	Omb	21	12	41/		
2	F. Hochstuhl, Jr.	1952	6	12	265	"	183	90	160/	180	
3	D. R. Merritt	1948	6	6	141	"	21	29	100/7		
4	F. Pallaute	1949	6	10	96	"	22	30	84/3		
5	Col. I. J. Lovell	1939	6	4	145	C0k					
6	W. Bakst	1951	6	15	65	Omb	17	flows 1½ gpm	40/		
7	A. Guisler	1951	6	10	94	C0k	20	55			
8	M. Zerelli	1948	6	10	190	"	31	78	62/	31	
9	Methodist Episcopal Church	1935	6		140	"				122	
10	Vail	1930	6		100	Qsd					
11	"	1930	6		100	Omb				50	
12	T. H. McKittvick	1951	6	15	117	"		2	46/		
13	E. H. Jones	1952	6	10	64	Qsd	64	33	52/		
14	A. S. Haney, Jr.	1948	6	4	177	"	42	42	140/3		
15	J. M. Wintermute	1949	6	4½	120	Qsd & C0k	120	28	90/2		
16	E. M. Wullster	1949	6	3	113	C0k	20	28	100/		
17	H. Blanke	1950	6	15	160	"	24	36	75/3		
18	C. Garretson	1951	6	12½	136	"	22	20	56/		
19	A. Noe	1950	6	3/4	200	Omb	22	15	195/		
20	C. J. Semonson	1953	6	5½	180	"	20	14	140/		
21	C. W. Huff	1948	6	2	175	"	19	42	151/1	5	
22	C. Lauer	1951	6	6	85	"	20	21	84/		
23	H. C. Scheer	1950	6	9	277	"		50	160/		
24	M. E. Storey	1949	6	3	201	"	18	46	110/		
25	Order of the Golden Chain	1949	8	27	270	"	21	30	150/2		I
26	Blair Academy #1	1896	8	100	300	"		Top of well	8/24		I
27	" " #2	1917	6	80	318	"		5	0/24		I
28	" " #3	1921	8	80	270	"			0/24		I

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
29	O'Dowd Creamery	1947	6	35	290	C0k	100	13		100	
30	A. Fusi	1963	6	20	50	Omb	20	3	25/4	15	
31	E. A. Gasparin	1961	6	20	51	"	26	3	30/3	27	
32	E. Friedricks	1963	6	20	80	"	29	14	50/6	29	
33	O. Schultheiss	1963	6	20	110	"	40	35	75/4	40	
34	T. H. Benton	1965	6	10	342	Obj?	30	4	240/1	160?	
35	Blairstown Plmbg. & Htg.	1965	6	24	196	C0k	42	30	50/1	29	
36	W. Houck, Jr.	1962	6	5½	74	"	73	30	65/2		
37	T. A. St. Mirl	1966	6	30	40	"	27	15	30/4	27	
38	L. H. Matlock	1961	6	10	90	"	31	11	50/4	31	
39	E. Oyer	1965	6	20	43	Qsd	43	15	25/6		
40	J. J. Hannon	1962	6	20	35	"	35	flows	10/3½		
41	G. Gaisler	1962	6	30	98	"	98	6			
42	A. Ramm	1963	6	5	100	Qmb	20	10	10/		
43	A. D. Sipley	1963	6	15	98	Qsd & C0k	97	30			
44	J. McConachy	1965	6	7	150	Omb	22	14	24/2		
45	C. W. Huff	1961	6	10	50	C0k	20	21		5	
46	J. Ramm	1966	6		166	Qsd	156				
47	Jersey Central Power & Light Co.	1965	6		100	Omb	30				
48	J. Bielecki	1966	6	20	86	Qsd	86	7	70/1½		
49	G. Winders	1966	6	20	30	C0k?	20	10	20/4	20	
50	G. B. Grupe	1965	6	5	148	C0k	22	31		2	
51	F. A. Gebhart	1966	6	12	100	"		30	80/2		
52	Blairstown Plmbg. & Htg.	1964	6	7½	97	"	63	50	90/1½		
53	J. Nodzak	1964	6	20	50	Qsd	46	34	35/1		
54	W. Rosemeier	1962	6	5	108	C0k	25	20	95/1		
55	Blairstown Plmbg. & Htg.	1966	6	9	172	Omb	20			0	
56	G. E. Christian	1966	6	2	100	"	20	3		20	
57	L. L. B. Corp.	1966	6	15	120	"	20	36	110/1		
58	B. E. Christian	1965	6	20	115	"	20	30		20	
59	C. Dieltenbach	1962	6	4	345	"	30	40		8	

Drillers' Logs of Wells, Blairstown Township
(Depths below land surface are given in feet)

Well #	Depth	Log	Formation
9	0-12	Sand and gravel	
	-35	Quicksand	
	-113	Gray clay	
	-122	Quicksand	
	-137	Limestone	C0k
11	0-50	Qsd	
	-100	Gray slate	Omb
14	0-177	Clay and boulders	Qsd
15	0-120	Clay, boulders and sand	Qsd
29	0-9	Sand, clay and gravel	
	-100	Quicksand	
	-290	Limestone	C0k
30	0-15	Clay and gravel	
	-20	Clay	
	-56	Slate	Omb
31	0-26	Clay and gravel	
	-51	Slate	Omb
32	0-29	Clay and gravel	
	-80	Slate	Omb
33	0-40	Clay and gravel	
	-110	Slate	Omb
34	0-161	Overburden	
	-163	Shale, limestone, water	Ojb?
	-174	Gray, black shale, limestone	
	-181	Small limestone, crystal seam	
	-304	Water seam	
	-337	Black shaley limestone	
35	0-29	Sand and gravel	
	-196	Gray limestone	C0k
37	0-27	Sand and clay	
	-41	Limestone	C0k
38	0-31	Sand and gravel	
	-91	Limestone	C0k
39	0-43	Clay and gravel	Qsd
41	0-83	Hardpan, clay and fine sand	
	-95	Gravel	Qsd
42	0-10	Clay and slate	
	-110	Slate	Omb
45	0-5	Clay	
	-50	Limestone	C0k
46	0-63	Boulders, clay and gravel	
	-115	Gravel, brown clay with mica	Qsd
	-176	Gravel	

BLAIRSTOWN TOWNSHIP

Well #	Depth	Log	Formation
47	0-5	Limestone shale overburden	
	-100	Gray shale	Omb
48	0-20	Clay and gravel	
	-75	Coarse sand and water	Qsd
	-80	Gray clay	
	-86	Large gravel	
49	0-3	Clay	
	-18	Limestone	C0k
	-30	Rotten seam	
	-60	Limestone	
50	0-2	Overburden	
	-22	Limestone	C0k
	-148	Gray limestone	
52	0-63	Gray limestone	C0k
	-97	Gray limestone with some brown	
53	0-28	Overburden with boulders	
	-50	Sand and gravel	Qsd
55	0-3	Shale	Omb
	-172	Shale	
56	0-20	Dirt and slate	
	-100	Slate	Omb
57	0-30	Shale	Omb
	-42	Brown seam	
	-70	Brown seam	
	-92	Blue shale	
	-115	Blue shale	
58	0-20	Clay and slate	
	-115	Slate	Omb
59	0-8	Clay and hardpan	
	-345	Slate rock	Omb

FRELINGHUYSEN TOWNSHIP

DOMESTIC WELLS [1] & [2]

Formation	No. of Wells	*YIELD IN GALLONS PER MINUTE* Maximum	Minimum	Average	Median
Martinsburg Formation (Omb)	11	30	½	10	8
Kittatinny Formation (C0k)	8	20	3	11	10

Formation	No. of Wells	*DEPTH IN FEET BELOW SURFACE* Maximum	Minimum	Average	Median
Martinsburg Formation (Omb)	11	423	65	182	154
Kittatinny Formation (C0k)	8	160	47	106	112

[1] Wells and formations with insufficient data are not used in this summary.

[2] There are 3 industrial wells; 2 from the Martinsburg Formation and 1 from the Kittatinny Formation. See regional summary of industrial wells.

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
1	F. Mettler	1949	6	6	149	Omb	23	60	125/		
2	M. Prever	1952	6	15	65	"	39	17	27/		
3	A. Zablocki	1952	6	10	105	"	20	25	50/6		
4	H. Vass	1952	6	10	47	C0k	17	10	34/		
5	E. Huff	1950	6	15	200	Omb	29	10	79/		
6	Sheffield Farms Co.	1911	8	43	1000	C0k		323		9	I
7	B. Natyzak #1	1949	6	3	160	"		38	155/	140	
8	" " #2	1949	6	12	112	"	109	25	85/4	96	
9	W. Erd	1952	6	15	119	"	54	18	28/5		
10	R. Guiler	1951	6	15	60	"	20	30	30/2	4	
11	A. Shilling	1941	6	5	125	"		25	80/8	4½	
12	M. Koban	1950	6	4	153	"	21	43	100/		
13	E. Jaeger	1962	6	10	125	Omb	36	20	90/4	36	
14	Board of Education Frelinghuysen #4	1965	6	3½	173	"	41	13	170/1	5	
15	Board of Education Frelinghuysen #5	1965	6	4½	174	"	42	16	170/1	3	
16	Gordos Corp.	1966	8	25	340	"	20	10	24/24		I
17	W. Sebecki	1966	6	½	423	"	43	10	250/1	6	
18	West Brook Creamery, Inc.	1966	8	100	178	"	68	26	82/8	68	I
19	G. Hanson	1965	6	8	122	"	12	10	105/2		
20	R. Pittenger	1966	6	20	70	C0k	65	22	55/4		
21	S. Zwarych, Jr.	1965	6	30	159	Omb	30	10	50/2		
22	W. Mulholland	1958	6	8	330	"	30	60			

Drillers' Logs of Wells, Frelinghuysen Township
(Depths below land surface are given in feet)

Well #	Depth	Log	Formation	Well #	Depth	Log	Formation
7	0-140	Clay and clayey gravel		14	-173	Blue slate	
	-160	Limestone	C0k	15	0-3	Overburden	
8	0-48	Clay			-13	Brown slate	Omb
	-50	Limestone (boulder?)			-63	Blue slate	
	-60	Gray clay with a little sand			-69	Brown slate	
	-96	Brown clay			-94	Blue slate	
	-112	Limestone	C0k		-95	Brown slate	
10	0-4	Overburden			-174	Black slate	
	-60	Limestone	C0k	17	0-6	Clay	
11	0-4½	Overburden			-25	Soft, seamy shale	Omb
	-125	Blue limestone	C0k		-43	Blue shale	
13	0-36½	Clay and hardpan			-423	Shale	
	-125	Slate	Omb	18	0-18	Overburden	
14	0-5	Overburden			-178	Limestone	C0k
	-51	Blue slate	Omb	20	0-55	Gravel	
	-53	Brown slate			-65	Gravel and clay	
	-71	Blue slate			-70	Limestone	C0k
	-72	Brown slate					

KNOWLTON TOWNSHP

DOMESTIC WELLS [1 & 2]

Formation	*No. of Wells*	*YIELD IN GALLONS PER MINUTE* *Maximum*	*Minimum*	*Average*	*Median*
Stratified Drift (Qsd)	14	20	10	14	15
Martinsburg Formation (Omb)	26	30	2	13	10
Kittatinny Formation (C0k)	16	20	½	8	8

Formation	*No. of Wells*	*DEPTH IN FEET BELOW SURFACE* *Maximum*	*Minimum*	*Average*	*Median*
Stratified Drift (Qsd)	14	95	35	69	71
Martinsburg Formation (Omb)	26	300	45	117	100
Kittatinny Formation (C0k)	16	300	67	141	109

1 Wells and formations with insufficient data are not used in this summary.
2 There are no industrial wells. See regional summary of industrial wells.

Well No.	*Owner*	*Year Drilled*	*Csg. dia. (in.)*	*Yield (gpm)*	*Depth (ft.)*	*FORMA-TION*	*Screen Setting or depth csd. (ft.)*	*Static Water Level (ft.)*	*Pumping Level/hrs. Pumped*	*Depth to Bedrock*	*USE*
1	H. J. O'Keefe	1952	6	10	109	C0k	71	25	80/		
2	H. A. Boorman	1949	6	10	119	Omb	54	35	80/		
3	J. Nelson	1948	6	6	129	C0k	31	39	90/6		
4	Blairstown Plmbg. & Htg.	1965	6	½	300	"	20				
5	G. Snyder	1952	6	10	40	Qsd & C0k	39	18	25/		
6	J. Stark	1948	6	2	135	C0k	20	30	80/1		
7	L. Litz	1948	6	3	82	"	54	43	74/1		
8	W. D. Burns	1949	6	8	102	"	50	3	60/	59	
9	C. E. Stoll	1949	6	7	109	"	56	35	71/2		
10	R. George	1948	6	15	98	"	73	37	43/4	70	
11	A. & M. Shearer	1952	6	12	137	"	87	60	80/6		
12	J. F. Stanpone	1949	6	6	150	Omb	22	17	84/1		
13	M. P. Coigne	1947	6	9	162	"	52	flows	79/24	52	
14	E. Rossi	1951	6	18	95	"	55		60/4	55	
15	F. Litz	1953	6	10	88	"	40	14	34/6	40	
16	G. Stone	1951	6	2	300	"	15	15			
17	Camp Mohican B.S.A.	1941	6	?	277	"	143			138	
18	D. A. Gladd	1964	6	4	175	"	34	40		40	
19	E. Litz	1964	6	5	100	"	34	37	85/5	34	
20	J. J. Taylor	1965	6	10	82	Qsd	82	31	70/6		

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
21	C. Stanowski	1965	6	20	50	Omb	20	8	25/6		
22	R. G. Babcock	1964	6	10	200	C0k	20	105	184/4	0	
23	R. W. Kitchen	1962	6	3	240	"	86	121		83	
24	W. C. Read	1966	6	20	42	Qsd	42	5	25/2		
25	" " "	1962	6	4	265	C0k	30	30		8	
26	E. H. Bair, Jr.	1964	6	15	85	Omb	63	25	70/8	33	
27	L. Gulick	1963	6	5	81	"	62	3			
28	L. Maharwick	1964	6	30	75	"	20	5	40/6	21±	
29	H. E. Read	1964	6	20	100	"	34	10	70/6	34	
30	F. W. Snyder	1965	6	20	67	C0k	58	40	60/4	58	
31	H. Rymon	1955	6	16	80	"	46	50	70/4	46	
32	J. Morris	1965	6	15	84	Qsd	84	20	50/3		
33	J. Jones, Jr.	1964	6	15	77	"	77	20	50/3		
34	B. Hallett	1963	6	7	95	C0k	65	22	60/5	70	
35	A. Witzel	1962	6	10	78	Qsd	78	25	50/8		
36	E. Moore	1962	6	20	90	"	90	20	35/5		
37	W. Kitchen	1954	6	10	71	"	71	41	49/4		
38	L. Kitchen	1964	6	8	115	C0k	82	62	100/6	80	
39	C. VanHorn	1964	6	20	63	Qsd	63	32	55/1		
40	G. Koehler	1966	6	3	147	Omb	60			40	
41	R. Gladd	1966	6	10	120	"	42	60	60/3		
42	C. Decker	1963	6	15	85	"	61	25	75/6	61	
43	J. Travis	1965	6	20	115	"	20	30	70/3	20	
44	E. Stanpone	1964	6	20	120	"	20	9	30/4	20	
45	N. Cocucei	1966	6	20	48	Qsd	48	24	44/4		
46	F. & R. Osman	1963	6	20	45	Omb	20	3	25/4	2±	
47	E. Range	1961	6	30	165	"	30	40		8	
48	J. Jones	1961	6	20	60	"	51	5	30/4	45	
49	R. Kitchen	1966	6	9	200	"	30	40	125/5	10	
50	F. & R. Osman	1966	6	20	67	"	20	20	40/4	5±	
51	E. Stout	1966	6	15	95	Qsd	95	20	30/3		
52	H. Hartzell	1965	6	15	35	"	35	12	25/4		
53	W. Gray	1966	6	10	53	"	53	20	30/4		
54	F. McLain	1966	6	10	79	"	79	25	57/5		
55	C. Van Horn	1966	6	10	64	"	64	23	33/3		
56	W. Waters	1963	6	2	200	Omb	20	25		5±	
57	A. Cressman	1964	6	7	60	"	40	25	50/4	40	
58	J. Scharer	1954	6	6	100	"	16	3	50/3	0	

Drillers' Logs of Wells, Knowlton Township
(Depths below land surface are given in feet)

Well #	Depth	Log	Formation
6	0-20	Clay and boulders	
	-135	Limestone	C0k
7	0-43	Clay and boulders	
	-82	Limestone	C0k
8	0-59	Sand and clay	
	-102	Limestone	C0k
10	0-72	Sand and boulders, very little gravel	
	-98	Limestone	C0k
12	0-2½	Dirt	
	-150	Slate	Omb
13	0-52	Sand, gravel and clay	
	-162	Slate	Omb
14	0-55	Gravel	
	-95	Slate	Omb
17	0-138	Sand	
	-277	Shale	Omb
18	0-20	Gravel	
	-40	Clay and slate	Omb
18	-175	Slate	
19	0-34	Gravel and clay	
	-100	Slate	Omb
20	0-33	Clay	
	-80	Clay and gravel	
	-82	Gravel	Qsd
22	0-200	Limestone	C0k
23	0-20	Clay, gravel and boulders	
	-240	Limestone	C0k
24	0-42	Sand and gravel	Qsd
25	0-8	Clay and hardpan	
	-265	Limestone—no seams	C0k
26	0-63	Clay and gravel	
	-85	Slate	Omb
27	0-22	Clay and gravel	
	-62	Clay	
	-81	Slate	Omb
28	0-25	Clay and slate	Omb
	-75	Slate	

Drillers' Logs of Wells, Knowlton Township
(Depths below land surface are given in feet)

Well #	Depth	Log	Formation
29	0-34	Clay	
	-100	Slate	Omb
30	0-32	Dirt and gravel	
	-62	Clay and limestone	C0k
	-67	Limestone	
31	0-20	Clay and gravel	
	-46	Gravel and sand	
	-80	Limestone	C0k
32	0-64	Sand	
	-84	Gravel	Qsd
33	0-50	Dirt and sand	
	-77	Sand and gravel	Qsd
34	0-20	Clay	
	-50	Sand	
	-70	Sand and limestone	C0k
	-95	Limestone	
35	0-14	Clay and gravel	
	-69	Clay	
	-78	Gravel	Qsd
36	0-25	Clay and gravel	
	-83	Clay	
	-90	Gravel	Qsd
37	0-10	Sandy clay	
	-45	Gravel	Qsd
	-51	Sand	
	-71	Gravel	
38	0-50	Sand	
	-80	Gravel	
	-115	Limestone	C0k
39	0-63	Gravel	Qsd
40	0-24	Sandy clay and gravel	
	-30	Boulders	
	-40	Gray clay, gravel	
	-147	Slate	Omb
42	0-61	Sand and gravel	
	-85	Slate	Omb
43	0-20	Clay and slate	
	-115	Slate	Omb
44	0-25	Clay and slate	
	-120	Slate	Omb
45	0-24	Sand	
	-48	Sand and gravel	Qsd
46	0-10	Clay and slate	
	-45	Slate	Omb
47	0-8	Clay and hardpan	
	-165	Slate	Omb
48	0-40	Clay and gravel	
	-55	Clay and slate	Omb
	-60	Slate	
49	0-20	Dirt and slate	
	-200	Slate	Omb
50	0-20	Clay and slate	
	-67	Slate	Omb
51	0-70	Sand and clay	
	-95	Clay and gravel	Qsd
52	0-35	Sand and gravel	Qsd
53	0-45	Sand and gravel	
	-53	Gravel	Qsd
54	0-77	Sand and gravel	
	-79	Gravel	Qsd
55	0-26	Gravel and clay	Qsd
	-51	Gray silt	
	-58	Gravel and brown sand	
	-64	Gravel and sand	
56	0-10	Clay and slate	Omb
	-200	Slate	
57	0-40	Dirt and clay	Omb
	-60	Slate	

HARDWICK TOWNSHIP

DOMESTIC WELLS [1] & [2]

Formation	*No. of Wells*	*YIELD IN GALLONS PER MINUTE* *Maximum*	*Minimum*	*Average*	*Median*
Martinsburg Formation (Omb)	13	30	1	13	11
Kittatinny Formation (C0k)	6	100	¾	34	20

Formation	*No. of Wells*	*DEPTH IN FEET BELOW SURFACE* *Maximum*	*Minimum*	*Average*	*Median*
Martinsburg Formation (Omb)	13	300	51	200	200
Kittatinny Formation (C0k)	6	205	40	88	72

[1] Wells and formations with insufficient data are not used in this summary.
[2] There are no industrial wells. See regional summary of industrial wells.

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
1	Mrs. R. H. Glander	1951	6	12	200	Omb	152	70	126/		
2	Richard H. Glander	1948	6	12	229	"	147	70	120/4	82	
3	Mrs. R. H. Glander	1950	6	20	235	"	23	10	42/5		
4	E. Allen	1951	6	15	80	"	80	9	34/		
5	H. Holub	1948	6	3½	150	"	73	53	103/1	73	
6	H. F. Butler	1950	6	4	300	"	33½	40	150/	30	
7	Mrs. Wm. Shannon	1950	6	4	150	Qsd	128/150	90	125/4		

HARDWICK TOWNSHIP

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
8	J. Cecconi	1953	6	11	60	COk	10	27	33/4	10	
9	R. Treat Counc. Boy Scouts	1959	6	10	120	Omb	12	24	90/4	3	
10	B. Giaviano	1965	6	3	222	Limestone	48	22	190/2		
11	R. C. Lee	1960	6	20	256	Omb	21	34	210/10		
12	T. O. Hofman	1965	6	8	200	"	22	5			
13	W. Roddy	1964	6	30	190	"	20	20	175/4	24	
14	J. & E. VanAuken	1966	6	20+	72	COk	49				
15	T. Delaney	1961	6	10	283	Omb	45	50	180/4	45	
16	A. Crisman #1	1964	6	1	300	"	23	24	250/1		
17	" " #2	1964	6	22	51	"	24	10	10/1		
18	L. A. Mott	1965	6		361	"	63				
19	L. Mott	1964	6	3/4	80	COk	51	30	70/1½		
20	J. A. Sullivan	1966	6	100	205	"	36	20	80/6		
21	Blairstown Plmbg. & Htg.	1965	6	50	40	"	39				
22	R. Belcher	1966	6	20	72	"	30			3	

Drillers' Logs of Wells, Hardwick Township
(Depths below land surface are given in feet)

Well #	Depth	Log	Formation
2	0-147	Hardpan and boulders	
	-229	Slate	Omb
5	0-73	Clay and boulders	
	-150	Slate	Omb
7	0-150	Boulders, sand, gravel and clay	Qsd
8	0-10	Clay	
	-60	Limestone	COk
9	0-3	Clay	
	-120	Slate rock	Omb
13	0-10	Clay	
	-190	Slate	Omb
15	0-55	Clay and gravel	
	-283	Slate	Omb
19	0-51	Overburden	
	-80	Limestone	COk

PAHAQUARRY TOWNSHIP

There is an insufficient number of wells in Pahaquarry Township for a summary. See regional summary of domestic wells.

There are no industrial wells. See regional summary of industrial wells.

Well No.	Owner	Year Drilled	Csg. dia. (in.)	Yield (gpm)	Depth (ft.)	FORMATION	Screen Setting or depth csd. (ft.)	Static Water Level (ft.)	Pumping Level/hrs. Pumped	Depth to Bedrock	USE
1	Kacamac Camp #1	1937	8/6	1±	319	Ssg & Shf		200		0	
2	" " #2	1938	8/6	30	190	" " "		6	158/3	0	
3	N. J. Dept. of Cons.	1964	6	20	100	Shf	61	9	66/8	50	
4	" " " " "	1964	6	20	165	"	112	6	100/8	105	
5	J. Hadrenberry	1965	6	20	67	Qsd	67	10	30/4		
6	Buckwood Park Inn	1937	8	50	108	Shf	40				
7	D. Anderson	1966	6	20	103	Qsd	103	20	35/8		

DRILLER'S LOGS OF WELLS, PAHAQUARRY TOWNSHIP
(Depths below land surface are given in feet)

Well #	Depth	Log	Formation
1	0-20	Red rock (shale)	Shf
	-319	Hard, green and gray rock	Ssg
2	0-30	Soft, red shale, a little green rock, red shale	Shf
	-126	Green rock	Ssg
	-190	Green rock	
3	0-20	Sand and clay	
	-50	Boulders, sand and clay	
	-58	Broken shale	Shf
	-68	Shale with gray specks	
	-70	Hard argillite (probably siltstone)	
	-80	Shale with gray specks	
	-90	Shale with white specks	
	-100	Shale with gray specks	
4	0-25	Boulders, sand and clay	
4	-50	Clay	
	-55	Boulders	
	-60	Clay and boulders	
	-71	Clay	
	-105	Rock and sand	
	-109	Boulders and red rock	Shf
	-118	Shale and broken rock	
	-125	Shale with gray specks	
	-135	Dark red shale	
	-160	Shale	
	-165	Argillite (probable siltstone)	
5	0-30	Sand	
	-60	Sand and gravel	
	-67	Gravel	Qsd

NEW JERSEY GEOLOGICAL SURVEY 1967

GEOLOGIC AND WELL LOCATION MAP OF SUSSEX COUNTY AND PORTIONS OF WARREN COUNTY

LEGEND

QUATERNARY

Qrm RECESSIONAL MORAINE
Qd UNSTRATIFIED GLACIAL DRIFT
Qsd STRATIFIED GLACIAL DRIFT

SILURIAN-DEVONIAN

Dmo MARCELLUS SHALE AND ONONDAGA LIMESTONE
Des ESOPUS GRIT
Sp-Do POXONO ISLAND THROUGH ORISKANY FORMATION
INCLUDES:
ORISKANY FORMATION
PORT EWEN FORMATION
BECRAFT FORMATION
NEW SCOTLAND FORMATION
STORMVILLE FORMATION
COEYMANS FORMATION
MANLIUS FORMATION
RONDOUT FORMATION
DECKER FORMATION
BOSSARDVILLE LIMESTONE
POXONO ISLAND SHALE

Shf HIGH FALLS FORMATION
Ssg SHAWANGUNK FORMATION

ORDOVICIAN

bb VOLCANIC BRECCIA
ns NEPHELITE SYENITE
Ombh MARTINSBURG HORNFELS
Omb MARTINSBURG FORMATION
Ojb JACKSONBURG LIMESTONE

CAMBRO-ORDOVICIAN

€OK KITTATINNY FORMATION

CAMBRIAN

€h HARDYSTON QUARTZITE

PRECAMBRIAN

fl FRANKLIN LIMESTONE
P€ PRECAMBRIAN (UNDIFFERENTIATED)

●120 DOMESTIC WELLS
▲155 INDUSTRIAL & PUBLIC SUPPLY WELLS
NOTE: WELLS ARE ARRANGED NUMERICALLY BY TOWNSHIP

CONTACT
FAULT
(Dashed where inferred)

PROPOSED TOCKS ISLAND RESERVOIR
N.J. STATE OWNED LANDS
COMMUNITIES
ROADS
MUNICIPALITIES
PROPOSED ACQUISITION LINE FOR RECREATION DEVELOPMENT

SECHLER

NEW JERSEY GEOLOGICAL SURVEY

OVERLAY FOR DEPTH TO BEDROCK MAP OF SUSSEX COUNTY AND PORTIONS OF WARREN COUNTY

SCALE

1 ½ 0 1 2 3 Miles

(1 MILE TO THE INCH)

LEGEND

---50--- DEPTH TO BEDROCK

REFERENCES

GEOLOGY AND GROUND WATER RESOURCES OF SUSSEX COUNTY AND THE WARREN COUNTY PORTION OF THE TOCKS ISLAND IMPACT AREA
BULLETIN #73

BASE MAP- NEW JERSEY ATLAS SHEETS 21, 22, 24, 25