DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

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SHEET 1

AVAILABILITY OF WATER FROM UNCONSOLIDATED DEPOSITS IN UPSTATE NEW YORK

INTRODUCTION

Aquifers in upstate New York occur in two rock types—unconsolidated deposits and the bedrock formations. The unconsolidated aquifers are primarily sand and gravel; the more productive bedrock aquifers are limestone, sandstone, and shale.

During the past 40 years, the U.S. Geological Survey, in cooperation with many State and local government agencies, has mapped and appraised many aquifer systems in New York. In the late 1960's, a statewide (excluding Long Island) evaluation of aquifer yields was compiled from data published in more than 30 county reports and from information obtained in several river-basin studies then in progress. Although the Statewide evaluation was never published, the data compilation and mapping were completed. In 1981, in response to the growing need for information on aquifers throughout the State, the information was recompiled for publication in map form to provide a document useful to those concerned with ground-water occurence or with water planning and management.

The data are based on hydraulic methods used in the 1960's; estimates of recharge and aquifer yield were obtained from methods used by Kantrowitz (1970). More recent studies in upstate New York and New England have evaluated recharge rates and indicate that the recharge rates assigned on this map to some types of material in selected areas are probably conservative. Readers who require more detailed information on specific areas are referred to regional reports, which provide greater detail. References that were available and used in preparing these maps in 1969 are listed at the right.

UNCONSOLIDATED AQUIFERS

This map shows (1) aquifer distribution, (2) typical well yields, in gallons per minute (gal/min), (3) aquifer yields, in millions of gallons per day (Mgal/d), and (4) specific capacity, in gallons per minute per foot of drawdown. Yields of fine-grained, less permeable materials are expressed as millions of gallons per day per square mile [(Mgal/d)/mi^2]. Aquifer boundaries, well yields, and aquifer yields were derived from numerous well records and hydrogeologic maps, interpretation of soil maps and topographic maps, and field reconnaissance.

Well yield represents the maximum pumping rate that can be maintained for at least several hours in typical wells in an area.

Specific capacity, a measure of the efficiency of both the aquifer and the well, is determined by dividing the pumping rate by the distance the water level in the well is lowered during pumping. Specific capacity is given only for sand and gravel aquifers.

Aquifer yields are based on estimates of average annual recharge. Recharge is the fraction of precipitation that reaches the water table and replenishes the ground-water supply. About 25 percent of the annual precipitation directly on sand and gravel in upstate New York becomes recharge (Kantrowitz, 1970, p. 67). Additional recharge to valley aquifers from storm runoff is estimated to be 25 percent of the annual precipitation on upland areas tributary to the aquifer (Kantrowitz, 1970, p. 57). Recharge and aquifer-yield estimates for all surficial aquifers were made from these percentages, precipitation records, and the applicable aquifer and (or) upland areas. Direct recharge to aquifers buried beneath less permeable deposits is minimal but, recharge can occur by ground water moving from adjacent water-bearing materials. The quantity of such recharge is assumed to be 0.05 Mgal/d from each square mile contributing direct ground-water flow (Kantrowitz, 1970, p. 68). Recharge and estimates of aquifer yield were made for all buried aquifers from this rate and the applicable area delineations.

The yield of some sand and gravel aquifers may be supplemented by surface water wherever the deposits are in contact with streams, rivers, or lakes. Under normal gradients, ground water moves toward and eventually emerges in surface-water bodies. When normal gradients are altered by heavy pumping from wells, the water table may become lower than the surface-water level, and water from the stream or lake will move into the aquifer by infiltration. Induced infiltration is at a maximum where the water table is lowered below the permeable bed of a stream reach or lake; infiltration rate is the product of the area of that reach and the bed permeability, as long as enough surface water is available. Neither the magnitude nor the range of streambed permeabilities is well documented, but an average of (50 gal/d)/ft^2 has been postulated by Kantrowitz (1970, p. 68) and (20 gal/d)/ft^2 by MacNish and others (1969, p. 14). Areas in which induced infiltration may be possible are indicated on sheet 2.

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EXPLANATION

Predominantly till, clay, silt, or fine sand with small areas of sand and gravel having negligible saturated thickness. Well yields are generally less than 3 gal/min but may be as much as 10 gal/min where the aquifer consists of sand. Aquifer yields range from 0.05 to 0.75 (Mgal/d)/mi^2

1 — Same as above; labeled where enclosed by other areas to avoid confusion

2a to 7b — Sand and gravel. Numbers refer to aquifer yields as tabulated below; letters refer to range in well yield and specific capacity.

Map Units*						Well Yield (gal/min)	Specific capacity (gal/min per ft of drawdown)
2a	3a	4a	5a	6a	7a	10-50	2-5
2b	3b	4b	5b	6b	7b	100-1000	10-50
(<0.4)	(0.4-2)	(2-4)	(4-8)	(8-12)	(12-20)		

* Number in parentheses indicates yield of aquifer (or aquifer segment), in million gallons per day, based on natural recharge rate.

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Base from United States Geological Survey, 1956

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