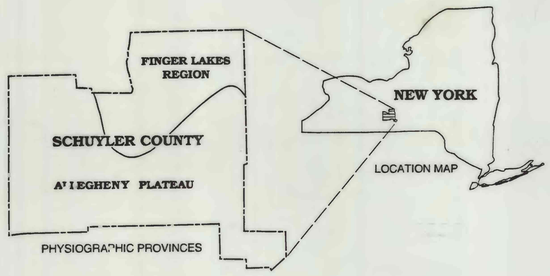
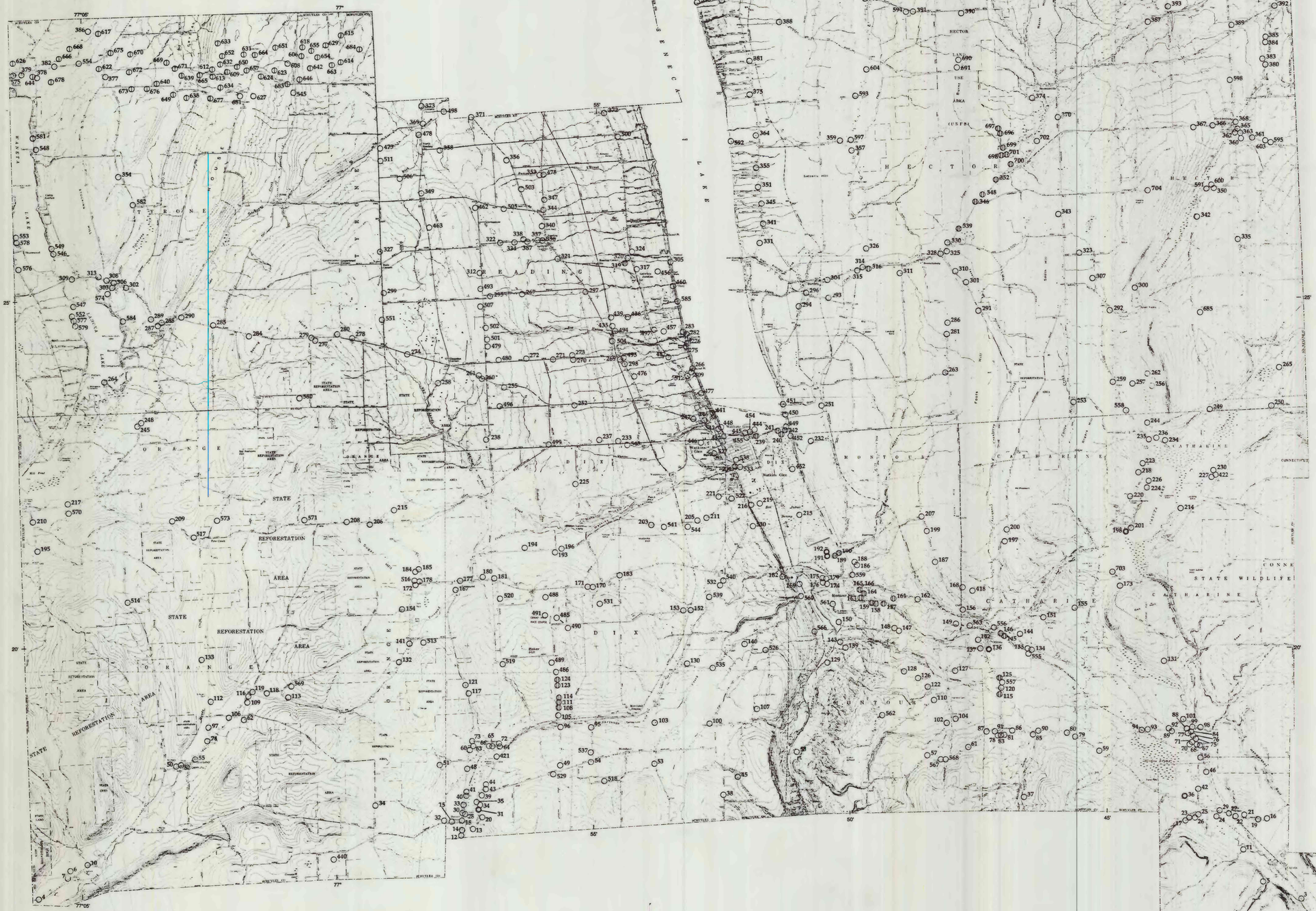
PREPARED IN COOPERATION WITH
SCHUYLER COUNTY, NEW YORK

WATER RESOURCES INVESTIGATIONS REPORT 93-40...
Locations of Wells and Test Borings, Schuyler Co., N.Y.—PLATE 1
McPherson, W.S. and Miller, T.S., 1993, Distribution and Thickness of Unconsolidated Deposits in Schuyler County, New York





Base from New York State Department of Transportation, 1:24,000 scale, 1978

INTRODUCTION

Valley-fill aquifers are the principal source of drinking water for municipalities, farms, and homeowners in Schuyler County. These aquifers, most of which are in southward-draining valleys, consist of coarse sand and gravel that was deposited by meltwater from a retreating glacier. Data on the thickness of these unconsolidated deposits are needed by water-resources managers and land-use planners for proper development and siting of water-supply wells and protection of ground-water resources from potential sources of contamination such as landfills and other waste-disposal systems.

In 1991, the U.S. Geological Survey, in cooperation with Schuyler County, began a 1-year study to compile hydrogeologic data and estimate the thickness of unconsolidated deposits. A map by Miller (1990) depicts the surficial geology, including sand and gravel aquifers. The estimated thickness of these deposits, delineated on plate 2, complements the map by Miller.

The results of the study are summarized on this sheet (pl. 1) and plate 2. Plate 1 shows the locations of wells and test borings that were used to indicate the thickness of unconsolidated deposits; plate 2 indicates the distribution and estimated thickness of these deposits, which are delineated as seven thickness zones. The thickness-zone boundaries are approximate and therefore are not intended for use in site-specific applications.

Acknowledgments

Thanks are extended to local well drillers, the New York State Department of Environmental Conservation at Avon, and the New York State Department of Transportation at Hornell, for supplying well data.

Geologic Setting

Most valley-fill sediments in Schuyler County were deposited during the deglaciation of western New York between 12,000 and 13,500 years ago (Calkin and Muller, 1992). Meltwater from the front of the receding ice transported and deposited sand and gravel as outwash in the major southward-draining stream valleys. Conversely, northward-draining valleys commonly were blocked by the receding ice front, and the impounded water formed proglacial lakes between the ice and topographic highs to the south. Glacial deposits in these valleys consist of fine-grained lacustrine fine sand, silt, and clay underlain by or interbedded with till (compact, poorly sorted, unstratified sediment). Small amounts of sand and gravel are found in these lacustrine deposits, generally as part of a delta or fan from small tributary streams that fed the lakes.

Bedrock in Schuyler County consists of nearly flat-lying shale, siltstone, and fine-grained sandstone of Devonian age. In the uplands, bedrock is overlain in most places by till that was deposited directly by the advancing glacier. The uplands contain hanging deltas and kames composed of sand and gravel, as well as kame and till moraines that overlie the till or bedrock.

Methods of Investigation

The approximate thickness of unconsolidated deposits was estimated, in part, from soil-thickness data (Puglia, 1975), well and test-boring data, and surficial geology. The seven zones of unconsolidated-deposit thickness range from less than 5 feet thick (zone 1) to more than 200 feet thick (zone 7). Zone 1 contains eight types of soils: Angola, Arnot, Aurora, Hornell, Lordstown, Schoharie Variant, and Tuller (Puglia, 1975). These soils typically occupy areas where bedrock is less than 5 feet below land surface. Zones 2 through 7 were delineated on the basis of well data, surficial geologic maps (Miller, 1990), and the results from seismic-refraction surveys.

If a lithologic log was unavailable or inadequate to indicate whether a well was finished in bedrock or unconsolidated deposits, the following assumptions were made about the thickness of deposits:

1. If the depth of the well was greater than the casing depth, the depth of casing was assumed equal to the thickness of unconsolidated deposits, and the well was assumed to terminate in bedrock.
2. If the depth of the well was equal to the depth of the casing, the well was assumed to penetrate only unconsolidated deposits, and the casing depth was taken to be a minimum thickness of unconsolidated deposits.

The thickness of unconsolidated deposits is the difference between the altitude of land surface and bedrock. In areas with little or no data, the thickness of unconsolidated deposits in broad valleys, such as Catherine Creek, was estimated by projecting the slope of the adjacent bedrock valley walls downward, then subtracting the estimated altitude of the bedrock floor from that of the overlying valley floor. This method was also used in narrow, steep-sided upland valleys. Surficial geologic maps by Miller (1990), indicating the type of deposits and a thickness range, were also used in areas where data were minimal.

Seismic refraction is a surface geophysical technique that measures the time it takes for a compressional sound wave generated by a sound source to travel down through the layers of the Earth and back up to detectors (geophones) placed on the land surface. Laws of physics explaining the propogation of sound are applied to the distances between the shotpoints and geophones and the travel-times of the refracted sound waves to interpret the thickness of unconsolidated deposits (Haeni, 1988, p. 3). The computer program used to interpret the data was written by Scott and others (1977). Seismic-refraction surveys were conducted across five valleys (pl. 2 and inset map) to determine the depths to the water table and bedrock surface.

EXPLANATION

- 37 — DOMESTIC WELL--Number shown is County well number
- 192 — MUNICIPAL WATER-SUPPLY WELL--Number shown is County well number
- 157 — TEST BORING--Number shown is County well number
- 617 — GAS EXPLORATORY BORING--Number shown is County well number

Wells and test borings are identified by numbers assigned by the U.S. Geological Survey according to a sequential county-numbering system for New York state. The number refers to the well number as listed in the U.S. Geological Survey's GWSI (Ground-Water Site Inventory) data base. This map includes wells not represented in Miller (1990); well locations were obtained from local well drillers, and from New York State Departments of Environmental Conservation (gas and salt wells) and Transportation (bridge borings).

SCALE

0 1 2 3 4 MILES
0 1 2 3 4 KILOMETERS

CONTOUR INTERVAL 10 FEET
DATUM IS SEA LEVEL

Modified from Miller, 1990

LOCATIONS OF WELLS AND TEST BORINGS IN SCHUYLER COUNTY, NEW YORK

By
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1993