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SCIENTIFIC INVESTIGATIONS MAP 2960
Surficial geology (South)—SHEET 4 of 5
Reynolds, R.J., 2007
Hydrogeologic Appraisal of the Valley-Fill Aquifer in the Port Jervis Trough, Sullivan and Ulster Counties, New York

74°34'46" 74°32'30" 74°30' 74°27'30" 74°25' 74°22'30"

41°37'30" 41°35' 41°32'30" 41°30'

Deglaciation south of the Phillipsport Moraine

Prior to the formation of the Phillipsport Moraine, the ice tongue that occupied the Port Jervis Trough was receding northward, backed by an expanding proglacial lake to its south. Unlike the reach north of the Phillipsport Moraine, the 10 mile reach from Summitville south to Westbrookville is devoid of any large glaciolacustrine deltas. Small kame terraces and a few small lake deltas or alluvial fans exist at the mouths of small tributary streams, but there is no indication that an extensive proglacial lake once occupied this part of the valley. However, logs of wells in the valley from Summitville south to Westbrookville reveal a thick sequence of lacustrine clay and silt whose upper surface elevations are as follows: 500 feet at well Sv-1422, 490 feet at well Sv-913, 482 feet at well Sv-537, 484 feet at well Sv-1282, and 445 feet at well Sv-100 at Westbrookville (refer to sheet 2). These elevations of the top of the lacustrine clay and silt indicate that a proglacial lake (or a series of proglacial lakes) at an elevation of at least 500 feet was present in this valley as the ice receded northward to the location of the Phillipsport Moraine. In a study of the aquifer in the Port Jervis area, Garry (1999) shows a very thick deposit of fine-grained lacustrine sediments occupying the bedrock valley just south of Port Jervis in Matamoras, Pa. Here a well log shows more than 400 feet of lacustrine sediments, with the lacustrine surface at about 380 feet (Garry, 1999, Section *B-B'*). Further north at Myers Grove, however, about 4 miles south of Westbrookville, Garry (1990, Section *A-A'*) shows a much thinner section of lacustrine sediments overlying ice-contact sand and gravel, with the top of the lacustrine sediments at about 430 feet. Overlying the lacustrine silts and clays, from the Phillipsport Moraine south to Port Jervis, N.Y. is a layer of outwash sand and gravel that averages about 50 feet in thickness. This outwash, deposited by meltwater issuing from the two drainage channels at the Phillipsport Moraine, forms the main sand and gravel aquifer in the Port Jervis Trough.

SURFICIAL GEOLOGY

The areal distribution of Holocene and Pleistocene-age surficial geologic units in the Port Jervis Trough and adjacent hillsides is shown on sheets 3–North and 4–South. The mapped area includes parts of the Napanoch (1956), Ellenville (1976), Wurtsboro (1976), and Yankee Lake (1976) 7.5-minute quadrangles. The northern part of the study area (sheet 3) was mapped in detail by G. Gordon Connally (1985), while the southern half of the study area was mapped at a reconnaissance level by R.J. Dineen (1989) and D.H. Cadwell (1989) of the New York State Geological Survey. The surficial deposits in the Port Jervis Trough are a direct result of the manner of deglaciation discussed previously and consist primarily of outwash sand and gravel, ice-contact (kame) sand and gravel, and post-glacial alluvium on the valley floor. The hillsides, particularly those on the west (Catskill Front), are mantled with a layer of relatively impermeable till of variable thickness, whereas areas where major west-side tributaries entered Glacial Lake Wawarsing are marked by large glaciolacustrine deltas. The three largest deltas – the Sandburg, Ellenville, and Napanoch deltas – (sheet 3) are emplaced against the western valley wall and, in some areas, abut and overlie previously deposited ice-contact sand and gravel. The narrow valley walls of the west side tributary streams (Sandburg Creek, the Beer Kill, and Rondout Creek) are flanked by kame deltas and terraces, indicating that both stagnant ice and small proglacial lakes once occupied these tributary valleys. The Phillipsport Moraine (denoted km) marks the location at which the receding glacial ice stopped for a considerable period of time. The moraine is composed of a poorly sorted mass of sand, gravel, silt, and clay, along with numerous boulders. Logs of boreholes drilled into the moraine by the New York City Board of Water Supply (Section *A-A'*, sheet 5) for a proposed dam site, reveal alternating, poorly-sorted layers of coarse gravel, fine sand, clay, and boulders. South of the Phillipsport Moraine (sheet 4) an outwash apron emanates from the older and higher (620 feet) Summitville channel and grades to about 540 feet. Southwest of the Phillipsport Moraine and just west of Summitville, a saddle in the bedrock topography at 740 feet denotes a secondary, possibly earlier, drainage channel for Glacial Lake Wawarsing. Logs of four wells drilled near this saddle (Sv-746, 1158, 1402, and 1186) all penetrate from 160 to 190 feet of sand and gravel before encountering till and bedrock. All four of these wells are completed in the bedrock, indicating that the sand and gravel emplaced in this remnant channel is probably thinly saturated, owing to its high elevation in relation to the valley floor. The outwash sand and gravel deposited downvalley from this point is overlain by a thin veneer of post-glacial alluvium and forms the principal unconfined aquifer in the Trough. Minor kame terraces and glaciolacustrine deltas along the western and eastern valley walls from Wurtsboro south to Westbrookville, on both sides of Basher Kill Lake, indicate that this lake may have once been an ice-block depression. Post-glacial alluvial fans, some quite large, such as the one at Wurtsboro, emanate from the mouths of tributary streams. East of the Shawangunk Mountains, deposits of kame sand and gravel occupy the floor of the upper Wallkill Valley near Bloomingburg, and are emplaced against the eastern side of the Shawangunk Mountains as kame terraces. These kame deposits reach as high as 140 feet above nearby stream grades and, as such, are probably largely unsaturated.

EXPLANATION

HOLOCENE

- al — ALLUVIUM – Postglacial river and stream flood-plain deposits consisting predominantly of clean to silty sand and gravel, generally less than 5 feet thick.
- alf — ALLUVIAL FAN – Fan-shaped, fluvially deposited accumulations of stratified gravel, sand, and silt deposited by tributary streams where they enter the Port Jervis Trough. Relatively high permeability. Streams may lose water through alluvial fans to impart additional recharge to the outwash aquifer in the valley.
- pm — PEAT AND MUCK – Postglacial organic deposits of generally low permeability. Occupies kettlehole depressions in outwash or ice-contact deposits.
- af — ARTIFICIAL FILL – Constructed landforms such as railroad and highway grades.
- w — OPEN WATER – Areas of open water such as rivers, lakes, large ponds, and reservoirs.

PLEISTOCENE

- osg — OUTWASH SAND AND GRAVEL – Stratified, well-sorted sand and gravel deposited by glacial meltwater streams as outwash fans, terraces, or deltas near the receding ice front and as valley-train outwash away from the ice front. Forms the primary stratified-drift aquifer in the Port Jervis Trough south of the Phillipsport Moraine. In the Port Jervis Trough, the outwash aquifer is underlain by thick deposits of lacustrine sand, silt, and clay. Very high permeability.
- k — KAME DEPOSITS – Isolated deposits of ice-contact sand and gravel typically emplaced high on hillsides, indicating a former glacial meltwater path. Usually unsaturated unless located on the valley floor. Also used to indicate large areas of ice-contact sand and gravel of uncertain geomorphology. Permeability highly variable.
- km — KAME MORAINE – Largely poorly sorted deposit of sand, silt, clay, gravel, and boulders deposited by stagnant glacial ice during a temporary pause (stillstand) in ice retreat. Kame moraine deposits form the Phillipsport Moraine which impounded Glacial Lake Wawarsing (Heroy, 1974). Permeability highly variable but generally low due to poor sorting.
- ksg — KAME SAND AND GRAVEL – Ice-contact deposits of fluvially sorted sand and gravel that was deposited atop or against stagnant, melting glacial ice. Extreme variability in sorting, grain size, and thickness of individual beds. Moderate to high permeability, especially in coarse, well-sorted fractions.
- kd — KAME DELTA – Ice-contact deposits of fluvially sorted sand and gravel that were deposited as prograding deltas into the proglacial lake that occupied the Port Jervis Trough south of the Phillipsport Moraine and Glacial Lake Wawarsing, north of the moraine. Generally well sorted; moderate permeability.
- kt — KAME TERRACE – Ice-contact deposits of fluvially sorted sand and gravel that was deposited by glacial meltwater streams between the valley wall and stagnant, decaying ice blocks in the Port Jervis Trough. Extreme variability in sorting, grain size, and thickness of individual beds. Moderately to highly permeable, especially in coarse, well-sorted fractions. May be largely unsaturated as a result of their typical high elevations along the valley wall. Collapsed and buried portions may form localized confined aquifers.
- ld — LACUSTRINE DELTA – Glaciolacustrine deltas of sand, gravel, silt, and clay deposited into proglacial lakes both north and south of the Phillipsport Moraine by tributary streams. Coarser fractions of distal bottomset beds of these deltas may form thin confined aquifers in the Port Jervis Trough. Permeability generally moderate except in coarser fractions.
- ls — LACUSTRINE SAND – Deposits of glaciolacustrine sand that were deposited into proglacial lakes both north and south of the Phillipsport Moraine as deltas, fans, or remnant beach deposits. Usually underlain by lacustrine silt and clay.
- lsc — LACUSTRINE SILT AND CLAY – Lacustrine deposits of thinly to massively bedded silt, clay, and very fine sand. Deposited as lake-bottom sediments in Glacial Lake Wawarsing that formed as result of the temporary dam created by the Phillipsport Moraine. Also underlies the outwash aquifer in the Port Jervis Trough south of Summitville. Thickness can be as much as 275 feet.
- t — TILL – Unsorted, unstratified mixture of clay, silt, sand, gravel, and boulders deposited beneath the ice as lodgment till during a glacial advance or at the edge of the ice sheet by melting ice as ablation till during a pause, or retreat, in glacial movement. Very low permeability, but may yield adequate amounts of water for domestic use to large-diameter dug wells where sufficiently saturated.
- t/r — TILL (THIN) OVER ROCK – Unsorted, unstratified mixture of clay, silt, sand, gravel, and boulders deposited beneath advancing ice, underlain by bedrock. Forms a thin veneer, generally less than 5 feet thick, overlying bedrock.

UPPER DEVONIAN AND SILURIAN

- r — BEDROCK – Thin till soils over fine-grained sandstone, siltstone, shale, or conglomerate with numerous bedrock outcrops.
- osg/lsc — STRATIGRAPHIC NOTATION – Indicates the surficial geologic unit and the immediately underlying unit. Surficial-unit symbol is to left of slash mark (/); underlying-unit symbol is to the right. Example denotes outwash sand and gravel (osg) overlying lacustrine silt and clay (lsc). Other units occur at greater depth. Stratigraphic relations are depicted in geologic sections (sheet 5).
- GEOLOGIC CONTACT – Indicates approximate location of contact between map units.
- C — C' TRACE OF GEOLOGIC SECTION – Geologic sections are depicted on sheet 5.
- AQUIFER BOUNDARY – Indicates contact between the stratified drift in the Port Jervis Trough valley and either bedrock or till valley walls, or hills of bedrock and till within the valleys, and therefore indicates the approximate areal extent of the valley-fill aquifer system in the Port Jervis Trough.
- DIRECTION OF MELTWATER FLOW – Indicates the probable direction of glacial meltwater flow responsible for the deposition of a kame deposit or kamic landform. Arrows indicate the direction of glacial meltwater flow.

0 1 2 MILES
0 1 2 KILOMETERS

Base from U.S. Geological Survey Digital Raster Graphics, 1:24,000, Universal Transverse Mercator projections, Zone 18, North American Datum of 1983

Geology modified from R.J. Dineen, 1989 and D.H. Cadwell, 1989

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by
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2007