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U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH THE
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

OPEN FILE REPORT 98-275
PLATE 2- GEOLOGIC SECTIONS

GEOLOGIC SECTIONS

Hydrogeologic data obtained from drillers' logs, logs of test holes, consultants' reports, USGS reports and files, and other published reports were used to construct seven geologic sections showing the thickness of aquifer material and the stratigraphic relations among the various types of valley-fill deposits in the Port Jervis area. The geologic sections are at a horizontal scale of 1:12,000; their traces are shown on sheet 1. For clarity, some small lithologic units are combined and represented as a single geologic unit.

Section A-A' crosses the Neversink River valley near Myers Grove where as much as 150 feet of permeable outwash and ice contact sand and gravel is present beneath alluvial sediment of varying thickness. Outwash encircles an exposed kame deposit at the valley center and ranges in thickness from 0 to 40 feet; kame deposits are as much as 120 feet thick. Kame-terrace deposits are present at the western side of the valley; collapsed components of this deposit extend part way across the valley floor to the southeast. The kame material present at the surface near the valley center probably abuts the kame-terrace deposit near the valley floor. A discontinuous deposit of lacustrine sand and silt, present beneath the outwash and above the kame deposit, encircles the exposed kame deposit at valley center and appears to pinch out toward the eastern side of the valley. Till mantles the bedrock at higher elevations along the upper walls of the valley and may underlie the kame material at depth in places but extensive deposits of till have not been found at the valley center. Saturated thickness of the collapsed kame-terrace deposits at the side of the valley and at depth ranges from 0 to 30 feet whereas the saturated thickness of the kame material exposed at the center of the valley could be as much as 120 feet. Saturated thickness of the outwash deposit ranges from 0 to 35 feet along this section.

Section B-B' crosses the Delaware River valley at Matamoras, Pa. Several striking features are depicted on this cross section. More than 500 feet of unconsolidated material is present in the main valley, as shown by well Pi82. Although this well is 1,600 feet north of the section line, it is included because it depicts a significant erosional feature. The topographic map and the log of well Pi456, close to the western valley wall, show a steeply dipping bedrock valley wall. This suggests the possibility of a fault at this location. The logs of wells Pi82 and Pi456 describe a narrow bedrock erosional channel that is cut to at least 100 feet below sea level in this area. The incised channel was later filled with fine grained sediment (primarily fine sand at well Pi82) that settled in a proglacial lake that occupied the Delaware River valley south of Port Jervis during the late Pleistocene. The location of this channel coincides with the inferred location of an overthrust fault that runs longitudinally along the western side of Shawangunk Mountain beneath the Neversink valley (Soren, 1961, p.18). This fault zone, consisting of broken and shattered rock, provided a preferential zone for erosion by early Pleistocene meltwater from the Delaware and Neversink valleys. Soren (1961, p.18) notes a displacement of possibly more than 1,000 feet along this fault in the vicinity of High Point Park, N.J., southeast of Port Jervis. This fault zone could enhance the secondary permeability of bedrock on either side of the fault and could provide a zone of above average yield to wells completed in bedrock. The stratigraphy depicted at the western edge of the valley along section B-B' appears consistent with Soren's (1961) descriptions.

The primary sediment source of the outwash and lacustrine deposits along section B-B' was the retreating ice tongue within the Neversink River valley. Late glacial meltwater draining through the Delaware River valley provided most of the large volume of water needed to create the deep erosional channel at Pi82. The receding ice paused north of Matamoras during which time the basal kame (ice-contact) unit was deposited. A downvalley blockage caused the formation of a temporary glacial lake, in which a thick sequence of fine sand and silt formed. Later, the downvalley blockage was breached causing the lake to drain and a surficial outwash unit was deposited over the sand and silt. As can be seen on this section, an original lake level is shown by the surface of the lacustrine unit between Pi223 and the present location of the Delaware River. Water flowing through the Delaware River valley at Matamoras, Pa. caused erosion of this lake bed, as shown by the surface of the lacustrine unit between Pi223 and the western valley wall. The bedrock floor rises to the east, and the log of well Pi223 clearly shows a transition zone between the eroded lacustrine surface and the overlying outwash at this location.

Ten feet of coarse gravel is present beneath the lacustrine sand at Pi82 (490 feet below the surface to 500 feet below the surface); bedrock was not encountered. This gravel may represent kame (ice-contact) material.

Further eastward along B-B', a narrow outcrop of limestone separates the Delaware River valley from the Neversink River valley just before their confluence. Thin layers of alluvium, outwash, kame terrace, and till are found east of the Neversink River and in the narrow valley of Mill and Clove Brooks. Colluvium is present just north and south of the section line in the side valley. Saturated thicknesses here are generally less than 40 feet, but those west of the Delaware River approach 500 feet in the deepest part of the section.

Section C-C' is an east-west section that crosses the Delaware River valley 3 miles north of the confluence of the Delaware and Neversink Rivers. Devonian bedrock rises 300 feet above the western bank of the Delaware River; much of it is exposed at the surface. Further westward (not depicted on this section), till up to 150 feet thick caps the bedrock. The gently sloping eastern side of the river valley contains limited deposits of alluvial and outwash material with saturated thicknesses of less than 50 feet. Further up the eastern valley side, a collapsed kame terrace less than 50 feet thick overlies a thin layer of till. As the slope of the valley wall increases the till crops out and is as much as 80 feet thick. The kame terrace deposit and the underlying till at this location are probably only thinly saturated.

Section D-D' extends from the extreme southwestern boundary of the study area east-northeastward to Matamoras along the Pennsylvania side of the Delaware River valley. The same outwash and lacustrine sequence of deposits is present as at B-B'. Thin, discontinuous deposits of alluvial material overlie an outwash deposit 20 to 40 feet thick. Deposits of glaciolacustrine fine sand up to 120 feet in thickness, together with thin deposits of silt and clay, are present beneath the outwash. Well Pi514 is at a depression in the bedrock floor of the valley. At depth within this depression is a layer of clay beneath a deposit of fine sand, further indicating the former presence of a pro-glacial lake. As in section B-B', a basal gravel underlies the lacustrine deposits and is identified here as a kame deposit. The southwestern edge of this section is probably underlain by ice-contact sand and gravel (kame and kame terrace deposits). Davis (1989) shows ice contact deposits that extend adjacent to the valley wall from near this point 3 miles south to Milford.

Section E-E' parallels the Neversink River valley for about 3 miles northeastward from Route I-84 where it intersects section B-B'. Discontinuous, thin deposits of alluvial material deposited by the Neversink River and its tributaries overlie outwash. The level area adjacent to the Delaware River at Port Jervis is a Holocene flood plain. Rising from this flood plain to the northeast is a plateau of outwash sand and gravel that is an erosional remnant of a once thicker deposit. The water table in this outwash plateau is at least partially recharged from the alluvial delta to the northwest; thus the water table is very high despite steep topographic dropoffs on either side of the plateau. Further to the northeast, this outwash plateau has been eroded to a thin layer, now overlain by Holocene alluvium.

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A possible ice-marginal position, showing where the retreating Neversink River valley ice tongue paused, is marked by outcrops of Devonian bedrock at the northeastern end of this section. This location is now the site of a large complex of ice-contact (kame) sand and gravel resting directly atop bedrock. This ice-marginal complex was at one end of a temporary proglacial lake that extended downvalley to at least the southwestern limit of the study area and occupied much of the Delaware River valley. More than 400 feet of fine-grained lacustrine sediments accumulated in this lake at places (section B-B'). After the lake drained, up to 50 feet of outwash from the retreating Neversink Valley ice tongue was deposited over the ice-contact sand and gravel complex. As shown in section E-E', the thickest section of this outwash now stands as an erosional remnant atop the kame deposits that mark the position of the ice margin.

Although at the northeastern end of section E-E' the unconsolidated material thins until bedrock is exposed at the surface, information from other wells on either side of the section line indicates that up to 75 feet of sand, gravel, and silt are present in this area. Saturated thickness of the unconsolidated materials ranges from zero to 150 feet across section E-E' although this includes the moderately permeable lacustrine fine sand and the poorly permeable lacustrine clay that are difficult to differentiate because subsurface data are sparse along this section.

Section F-F' continues northeastward from E-E' to Huguenot. Outwash and kame sand and gravel form the most permeable deposits and are as much as 120 feet thick. The outwash is overlain by discontinuous, thin layers of alluvial material deposited by the Neversink River and its tributaries. Former ice-block depressions were the sites of isolated lakes in the vicinity of Martin Lake, near well 2031 on this section; Martin Lake was one of these. These lakes were subsequently filled by lacustrine sand and silt, as evidenced by the log of well 2028, which also shows a basal kame gravel beneath the lake sediments as in other sections. Northeast of this area along section F-F', available subsurface information does not show any lacustrine material to be present and the outwash is directly underlain by kame material or perhaps extensions of collasped components of the kame terrace deposits present at the surface on the northern side of the valley. The combined saturated thickness of the alluvial, outwash, and kame materials ranges from 10 to 100 feet along this section. The lacustrine sand may not effectively confine the basal gravel below it.

Section G-G' begins just south of section A-A' in the Neversink River valley, extends northeastward across the Neversink River and continues along the west side of the Basher Kill valley, terminating 1 mile north of Cuddebackville. The kame deposit exposed at the southwestern end of the section in the valley center (as also shown in section A-A'), is encircled by outwash. Thin alluvial deposits overlie the outwash across much of the section. Although little subsurface information is available between Graham and Gally Roads, the flat character of the valley suggests that lacustrine sediments form part of the stratigraphic section here. The pattern of outwash overlying lacustrine overlying kame deposits found in sections E-E' and F-F' likely repeats here also. Saturated thickness of the outwash and kame deposits together may be as much as 100 feet.

Section G-G' continues northeastward up the Neversink River valley and, when the Neversink River turns northwestward, the section enters the Basher Kill valley; the depth to bedrock becomes shallower upstream of this point. The section turns slightly here to show the large kame terrace on the western side of the Basher Kill valley, north of Cuddebackville. This deposit ranges up to 140 feet in thickness although much of it is unsaturated. Southeast of the section line, the valley contains Holocene alluvium and outwash that are probably underlain by kame deposits. Smaller kame terraces are present on the opposite side of the valley. Further north, beyond the end of this section and just beyond the Orange and Sullivan county lines, a well log shows 85 feet of outwash and kame sand and gravel overlying 49 feet of lacustrine deposits.

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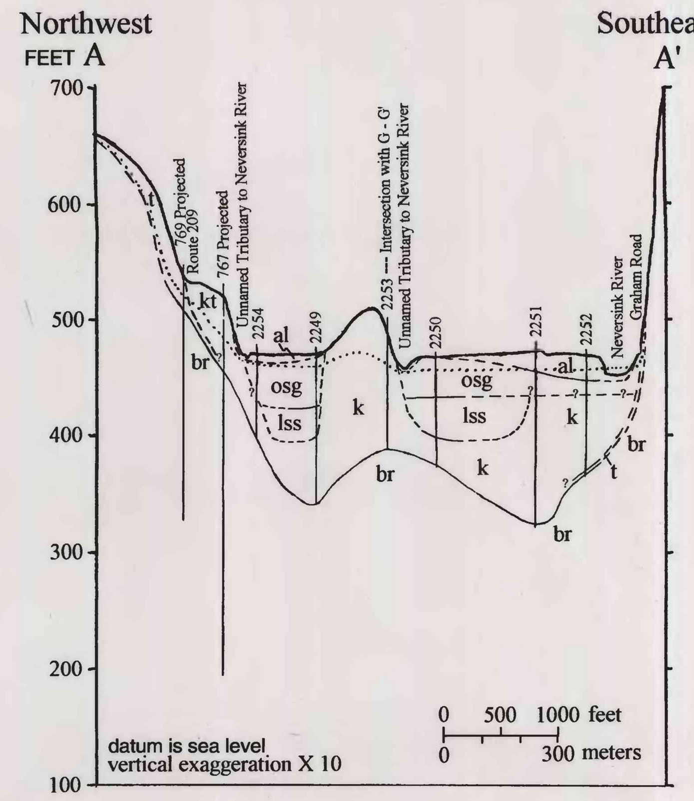

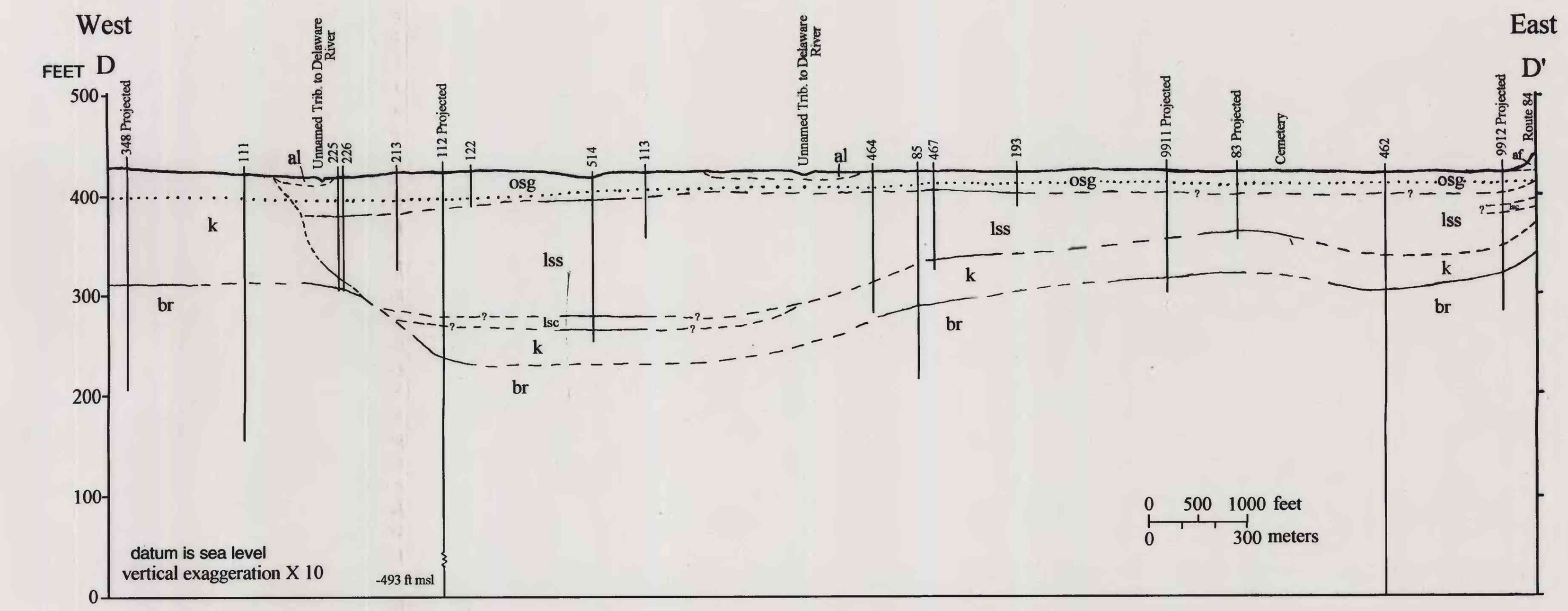

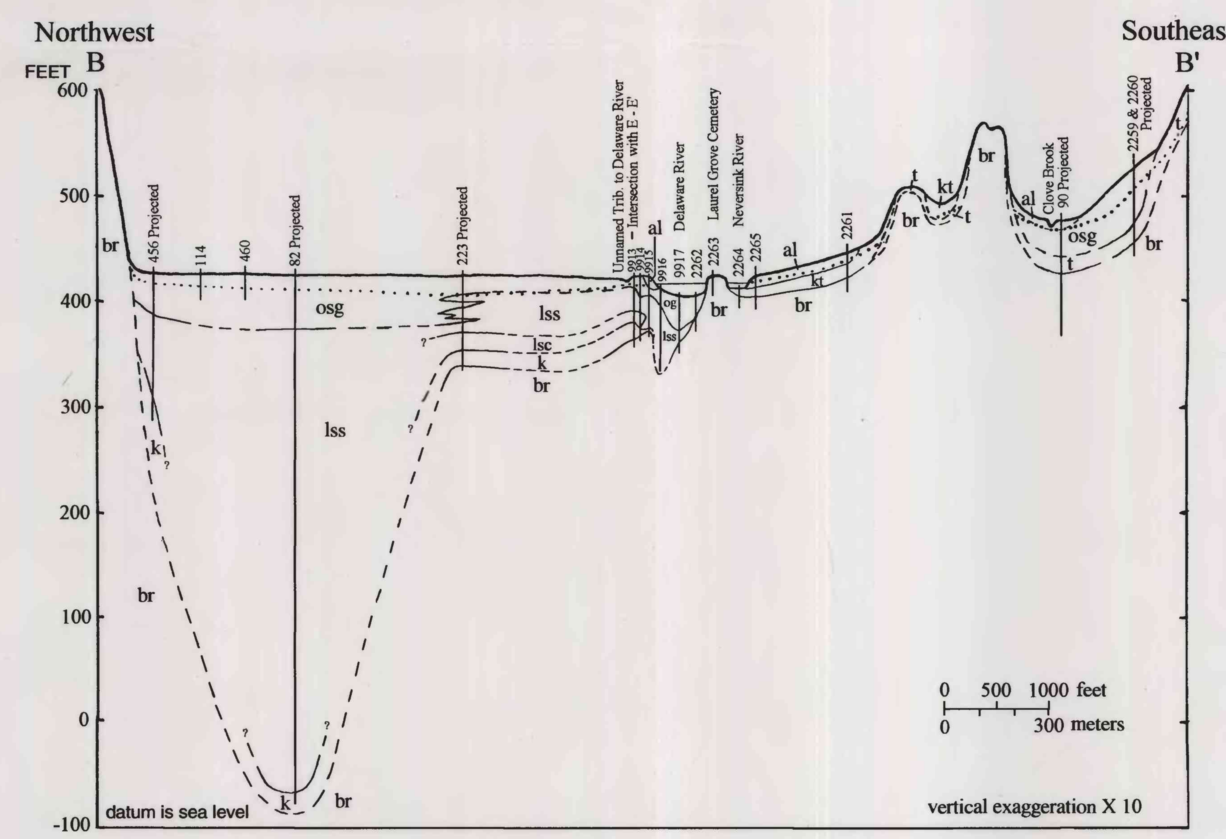

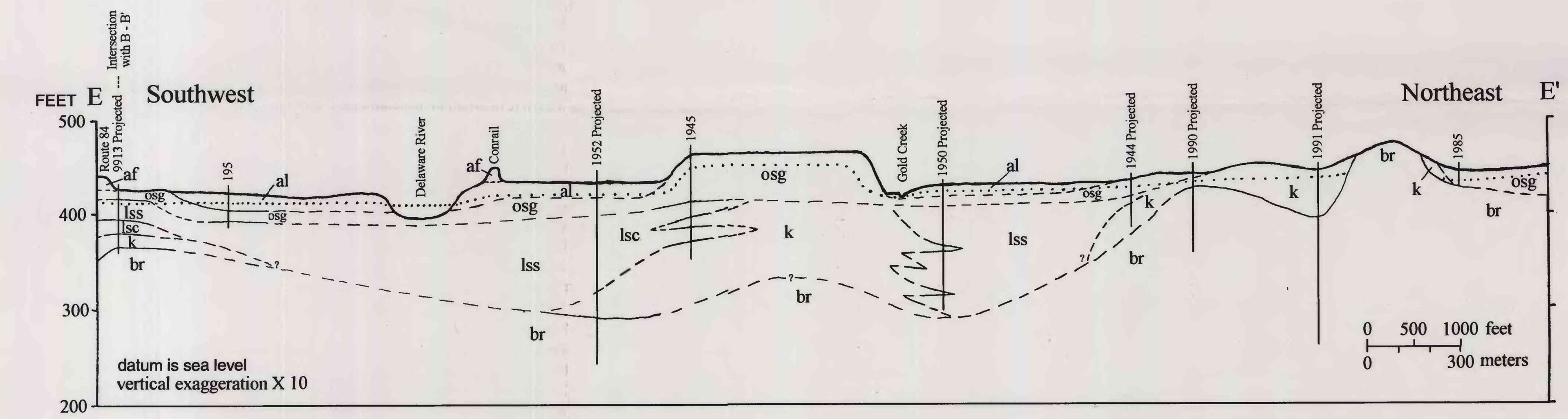

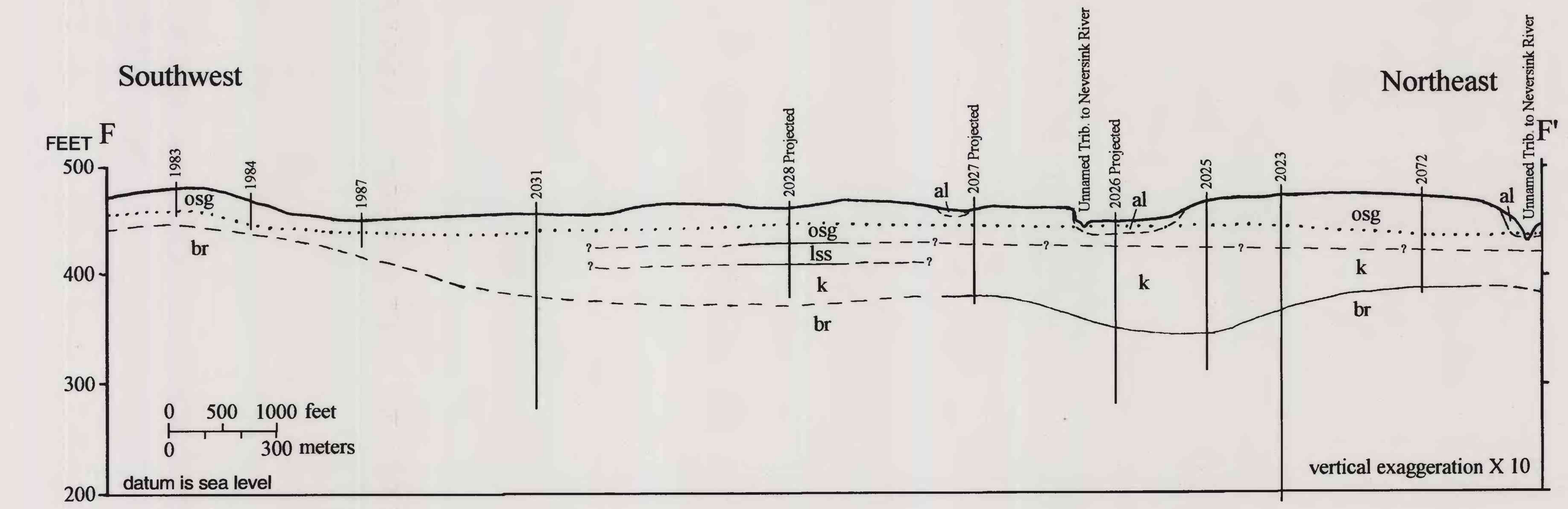

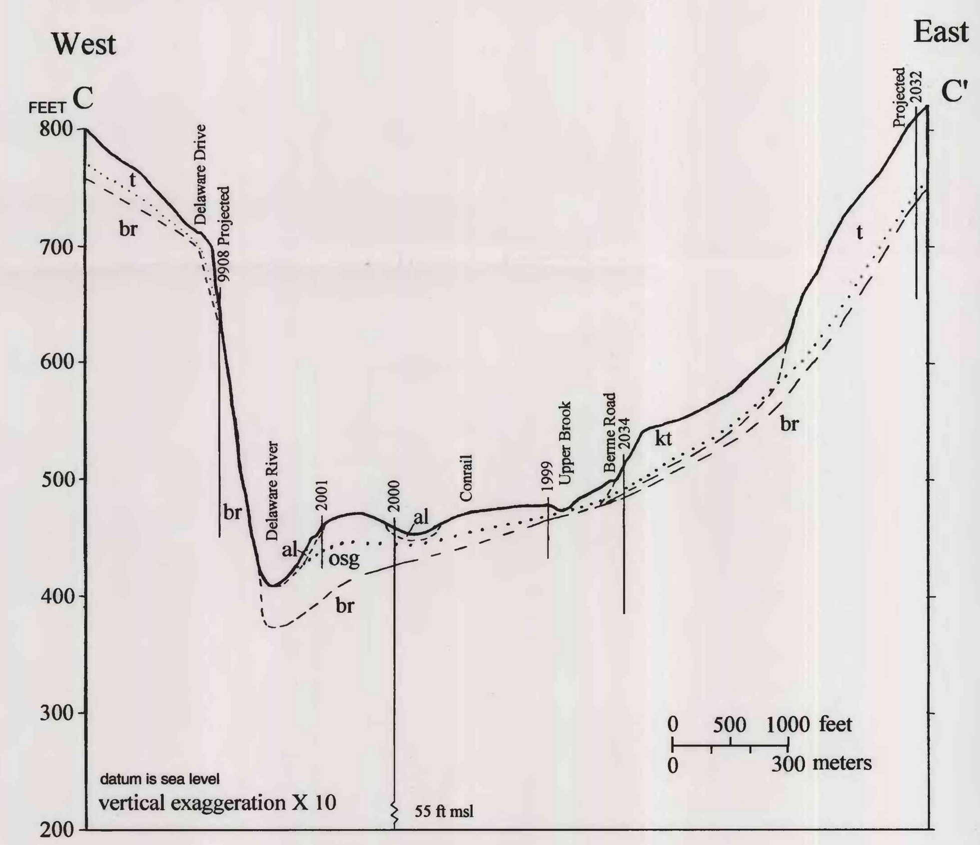

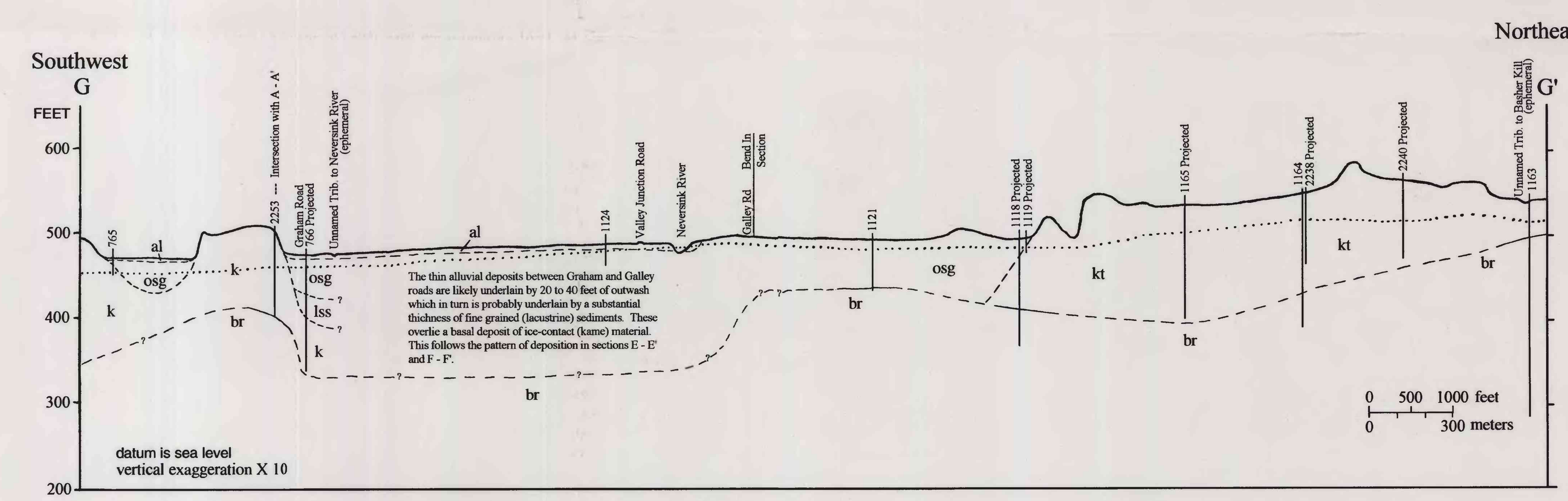

EXPLANATION

HOLOCENE

- s — SWAMP DEPOSITS - Silt, organic muck, peat in poorly drained areas. Low permeability.
- al — ALLUVIUM - Postglacial alluvial deposits of poorly stratified silt, clay, fine sand, and some gravel within river and stream flood plains. Generally thin although larger valleys that are subject to frequent flooding may be overlain by silt of variable thickness. Normally underlain by more permeable outwash deposits throughout the study area. Moderate to poorly permeable.
- alf — ALLUVIAL FAN - Postglacial, fan-shaped alluvial deposits of poorly stratified silt, sand, and gravel at foot of steep slopes. Upland section of fan may overlie till while downslope section typically overlies other alluvial deposits, outwash, or kame. Streams that traverse these fans may be an important source of recharge to the underlying aquifer. Moderately to poorly permeable.
- c — COLLUVIUM - Loose, poorly to well-sorted deposits of mass-wasted (gravity transported) fragments at the foot of slopes, mostly unsaturated. Possibly mixed with alluvial deposits. May overlie alluvial, outwash, or till deposits.
- w — OPEN WATER - Includes major rivers, lakes, and ponds.
- af — ARTIFICIAL FILL - Depicted in geologic sections only.

PLEISTOCENE

- osg — OUTWASH SAND AND GRAVEL - Well sorted, coarse to fine gravel and and deposited by glacial meltwater streams as a long narrow body within the confined course of the valley (valley train) or as outwash plains and terraces. These highly permeable deposits form the most productive aquifer in the study area. Generally become finer grained with increasing distance from ice margin. May contain thin, discontinuous lenses of fine sand and silt.
- os — OUTWASH SAND - Outwash deposit composed primarily of sand.
- og — OUTWASH GRAVEL - Outwash deposit composed primarily of gravel.
- k — KAME DEPOSIT - Ice-contact deposit (deposition adjacent to ice) consisting of sand and gravel deposits fluvially sorted. Extreme variability in sorting, grain size, and thickness of beds. Permeability is variable but generally high in coarse, well-sorted beds.
- kt — KAME TERRACE - Ice-contact deposit, primarily well-sorted, stratified sand and gravel deposited atop or against glacial ice. Predominantly coarse sand and gravel but commonly interbedded with a widely variable mixture of medium to fine sand and silt. Permeability is highly variable but generally moderate to high in coarse fractions. Unsaturated at high elevations but saturated at low elevations and where below stream level.

PLEISTOCENE

- e — ESKER - Ice-contact deposit consisting of sand and gravel. Most fine materials have been washed away. Exposed part of esker is above surrounding land-surface altitude and typically unsaturated; most of the buried part is normally saturated and may be highly permeable.
- lss — LACUSTRINE SAND AND SILT - fine sand and (or) silt deposited as lake-bottom sediments in temporary proglacial lakes. Overlain by outwash and (or) alluvial deposits. Permeability is moderate to low.
- lsc — LACUSTRINE SILT AND CLAY - silt and (or) clay deposited as lake-bottom sediments in temporary proglacial lakes. Overlain by lacustrine sand and silt, outwash, and (or) alluvial deposits. Permeability is low to very low.
- t — TILL - Ice-contact deposits; unstratified, unsorted mixture of clay, silt, sand, gravel, and boulders. Generally borders the study area. Composition varies locally and reflects lithology of the underlying bedrock; thus, permeability also varies locally. Relatively impermeable where clay content is moderate to high, increased permeability where clay content is low. May provide usable amounts of water to domestic wells. Till is thin (zero to a few feet thick) where it overlies bedrock at high elevations and thicker (as much as 150 feet or more) on lower slopes and in upland depressions.

PALEOZOIC

- br — BEDROCK, UNDIFFERENTIATED - Shale, sandstone, conglomerate exposed in many outcrops, locally mantled by discontinuous deposits of till and postglacial colluvium of varying thickness. Yields of wells in bedrock vary and are not assessed in this report.

GEOLOGIC CONTACT - approximately located; dashed where inferred.

WELL or TEST BORING - from which geologic information was obtained.

WATER-TABLE - Approximate.

Hydrogeology by J.D. Garry, 1996

HYDROGEOLOGY OF THE PORT JERVIS AREA, IN ORANGE COUNTY, NEW YORK; PIKE COUNTY, PENNSYLVANIA; AND SUSSEX COUNTY, NEW JERSEY

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1999