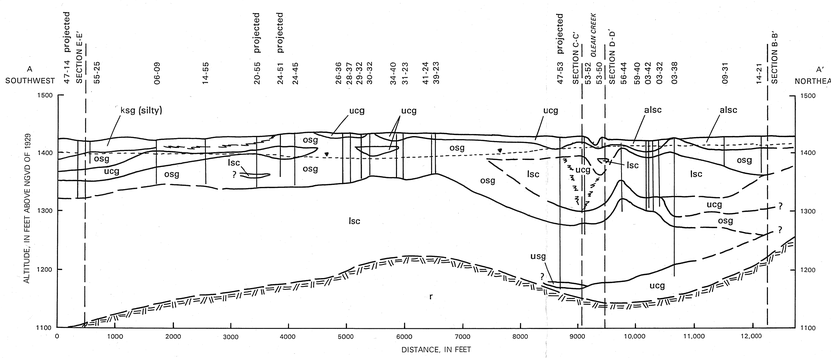
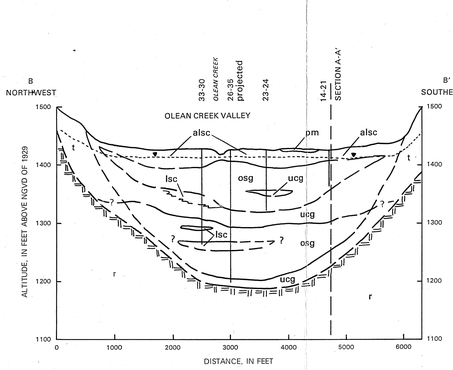
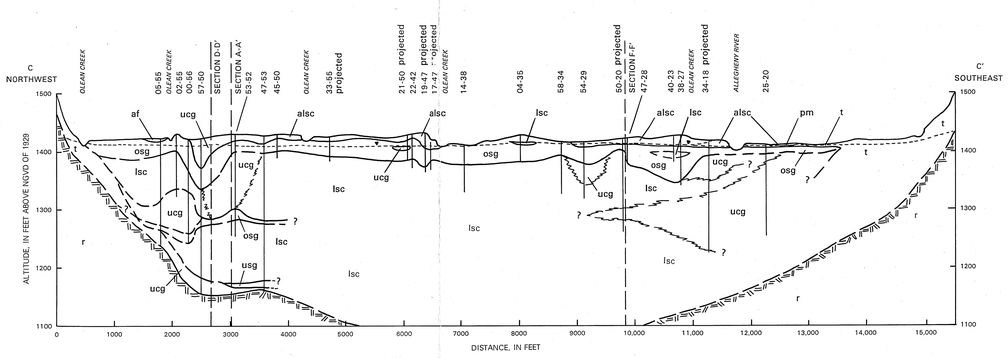






GEOLOGIC SECTIONS

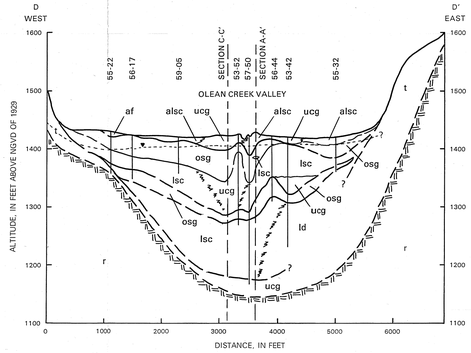
Hydrogeologic data obtained from drillers' logs, logs of test holes, consultants' reports, and published reports of the U.S. Geological Survey were used to construct geologic sections showing the dimensions of the aquifer and the stratigraphic relations among the various types of unconsolidated deposits in the Olean area. Six of the nine sections are within the city of Olean because of the large amount of geologic data available there and because of local public interest in ground-water contamination. (Locations are shown in pl. 1.)

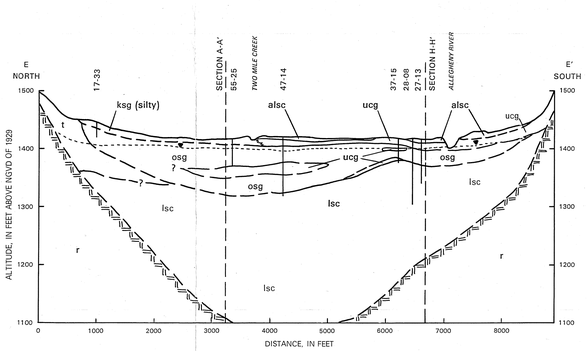
The geologic sections are presented at about twice the horizontal scale of their respective traces shown on plates 1 and 2; the vertical scale is exaggerated 10 times. Some of the sections contain more detailed land-surface information than appears on the surficial geology map (pl. 2). For clarity, the surficial geologic units emt (end moraine till), lmt (lateral moraine till), and t (ablation or lodgment till) have been grouped into a single unit (t).

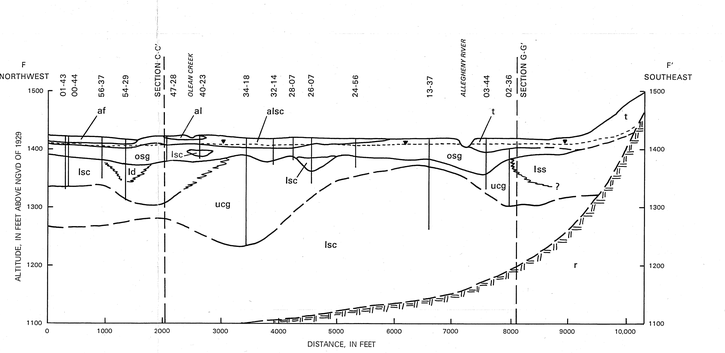
Stratified-Drift Aquifers

A stratified-drift aquifer composed of outwash and kame sand and gravel and Holocene alluvial gravel extends from 40 to 125 feet below the present river level and rests on as much as 200 feet of silt and clay. These deposits form the principal aquifer, which averages 80 feet in thickness and extends from the Salamanca area to the west, upvalley (eastward) through Olean and then south into Pennsylvania. The aquifer is thickest near the valley center and pinches out near the valley walls. In general, it also is thicker downstream (westward) than upstream (eastward) (Frimpter, 1974, p. 35).

The vicinity of Olean Creek at North Olean is underlain by an upper and lower outwash aquifer that are separated by a lacustrine silt and clay unit (section A-A'). Here the upper aquifer ranges from 10 to 50 feet in thickness and is confined locally by a clayey gravel unit; the lower aquifer averages 30 feet in thickness and is confined by the overlying lacustrine silt and clay. To the southwest, where the Olean Creek valley joins the Allegheny River valley, these units locally merge into one aquifer; elsewhere they may be separated by up to 15 feet of clayey gravel (section A-A'). In the area west of Allegany, a single outwash aquifer ranging from 80 to 125 feet in thickness overlies either bedrock or lacustrine silt and clay (section I-I'). This aquifer is overlain by as much as 15 feet of silty alluvium that may act as a confining layer and thus impede recharge. Near East Olean, the outwash aquifer ranges from 20 to 50 feet in thickness and is overlain by 10 to 50 feet of till, which also acts as a confining unit (section G-G'). The geologic section of the Allegheny River valley just west of Olean (section E-E') shows that the outwash aquifer in some areas is separated by a clayey gravel unit about 15 feet thick; in other areas, it is overlain by kame sand and gravel.







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EXPLANATION

alsc — ALLUVIAL SILT AND CLAY--postglacial river and stream flood-plain deposits consisting predominantly of silt and clay with some fine sand. Low to moderate permeability.

alsg — ALLUVIAL SAND AND GRAVEL--postglacial river and stream flood-plain deposits consisting predominantly of sand and gravel, with some interbedded fine sand. Permeability moderate to high except in finer fractions.

al — ALLUVIAL--postglacial river and stream flood-plain deposits consisting predominantly of silt, sand, and gravel, but may also contain varying amounts of clay. Typically these deposits overlie and grade into units of outwash sand and gravel and thus could be interpreted as silty outwash deposits. In general these are moderately permeable deposits; the permeability varies according to grain size and sorting.

af — ARTIFICIAL FILL

pm — PEAT AND MUCK--organic swamp deposits of generally poor permeability, occupies kettlehole depressions in kame sand and gravel.

ksg — KAME SAND AND GRAVEL--ice-contact stratified drift including kames and kame terraces and consisting of interbedded coarse sand and gravel with zones of silt and clay. Generally a poorly sorted deposit ranging from clay to boulder gravel, and of moderatly to high permeability, especially in coarser fractions. Deposited by meltwater streams atop or against stagnant glacial ice, which locally collapsed as the ice melted to form a hummocky "kame and kettle" topography.

osg — OUTWASH SAND AND GRAVEL--well-sorted sand and gravel deposited by meltwater streams from glacial ice. Highly permeable generally but may contain less permeable silty or clayey zones. Deposited as outwash terraces and aprons near the receding ice front and as valley-train outwash by meltwater streams. Outwash aprons subsequently downcut by the Allegheny River appear as prominent terraces. These deposits form the principal stratified-drift aquifer in the area.

lsc — LACUSTRINE SILT AND CLAY--interbedded silt and clay with occasional fine sand, deposited on bottom sediments in proglacial lakes; generally low permeability. May grade into deltaic sand and gravel deposits (outwash deltas) near valley margins.

lss — LACUSTRINE SAND AND SILT--interbedded sand and silt deposited as bottom sediments in proglacial lakes. May grade into deltaic sand and gravel (outwash deltas) near valley margins. Generally low permeability.

ucg — CLAYEY GRAVEL (UNDIFFERENTIATED)--clayey or silty gravel of uncertain origin. Clayey fractions may be correlative with adjacent till; silteier fractions may be silty facies of adjacent outwash or kame deposits. Generally low permeability.

usg — SAND AND GRAVEL (UNDIFFERENTIATED)--clean sand and gravel of uncertain origin, generally overlain by lacustrine deposits. This sand and gravel may have been deposited as channel filling in the preglaciated river channels or as advance outwash at the leading edge of the ice front.

ld — LACUSTRINE-DELTAIC DEPOSITS (INTERBEDDED)--deltaic sand and gravel interbedded with and grading into lacustrine sand, silt, and clay. Permeability generally low but may be higher in coarser, well-sorted fractions. These deposits are found where tributary valleys deposited their sediment loads into the proglacial lake that once occupied the present Allegheny River valley.

ldss — LACUSTRINE-DELTAIC SANDS AND SILTS (INTERBEDDED)--predominantly deltaic sand and silt with some interbedded gravel. Deposited by tributary streams entering the proglacial lake that occupied the present Allegheny valley. Permeability generally low, but higher in coarser fractions.

od — OUTWASH-DELTAIC DEPOSITS (INTERBEDDED)--Outwash sand and gravel interbedded with deltaic sand, silt, clay, and gravel. Found where tributary streams deposited deltas that graded into outwash. Permeability variable, depending on size fraction and sorting.

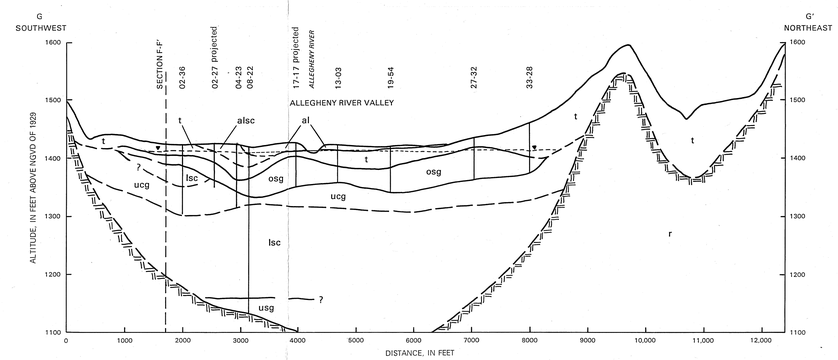
t — TILL--unsorted mixture of clay, silt, sand, gravel, and cobbles deposited beneath, on, or at edge of ice sheet by melting ice during a glacial advance or stillstand. Deposited as ablation or lodgment till, as lateral moraines, end moraines, as till shadows against bedrock hillsides, or ground moraine. Generally low permeability.

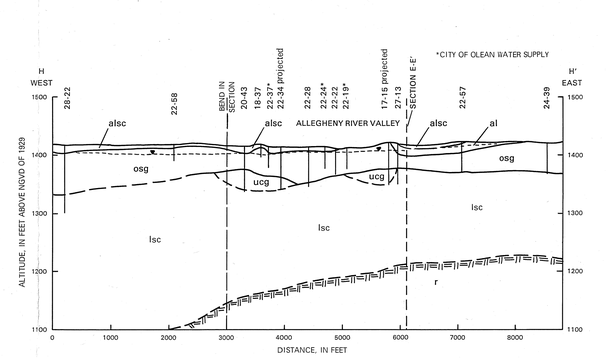
r — BEDROCK--undifferentiated Devonian-age siltstone, sandstone, and shale.

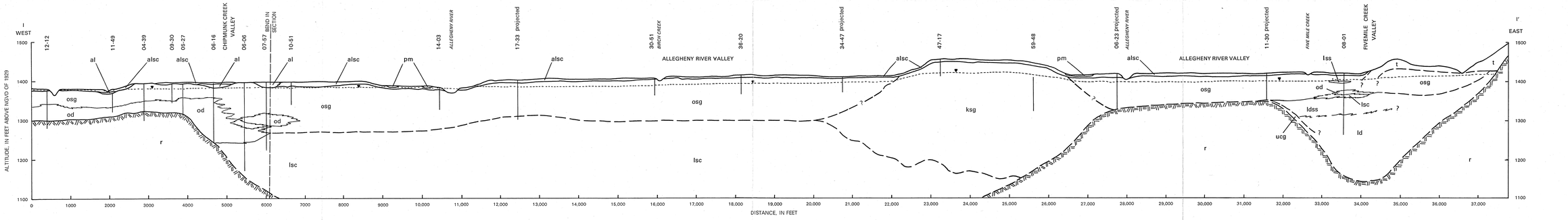
GEOLOGIC CONTACT--denotes contact between morphostratigraphic units; dashed where inferred.

57-50 — WELL OR TEST HOLE--source of information for construction of geologic sections (pl. 3). Hyphenated number indicates seconds of latitude and longitude of well or test hole (see locations of wells on pl. 1, 2, and explanation on plate 1). Location of sections is shown on plates 1 and 2. Well numbers are shown only on plate 1.

POTENTIOMETRIC SURFACE--approximate average altitude of potentiometric surface of confined outwash aquifer. (Pl. 5 is potentiometric surface map.)







VERTICAL EXAGGERATION X10

Hydrogeology by P.J. Zarriello

HYDROGEOLOGY OF THE OLEAN AREA, CATTARAUGUS COUNTY, NEW YORK

by
Phillip J. Zarriello and Richard J. Reynolds

GEOLOGIC SECTIONS