

MAP KEY AND DISCUSSION

Sediments of the Coastal Plain Province:

The Coastal Plain portion of the Wilmington area is underlain by unconsolidated sediments of Early and Late Cretaceous age (Potomac Formation) unconformably overlain in most places by sediments of Pleistocene (Columbia Formation) and/or Holocene (Recent) age. The map depicts the extent of the Potomac Formation. However, Quaternary age sediments are found in the southern part of the Piedmont, particularly along the Fall Zone.

The Potomac Formation is fluvial in origin and is composed predominantly of clays and silts with some interbedded sands. Generally, in the northern part of the Coastal Plain, these sands are thin and irregular in extent and thickness. Correlation of individual sands is usually difficult unless dense well control exists.

The Potomac thickens to the southeast and sandy units tend to occur in the lower half of the formation (see cross-section A-A'). The average grain size of individual sandy units is usually constant over short lateral distances. However, grain size varies widely among sands of the Potomac Formation as a whole, and development of wells can be difficult and time consuming in the finer-grained sands. Ground-water yields from the Potomac are highly variable ranging from as low as a few gallons per minute to as high as 300 gallons per minute. The results of short-term pumping tests should be interpreted with caution because of the extreme lateral and vertical variations in sediment type and the possibility of leakage through confining beds.

The Columbia Formation is composed primarily of poorly sorted fluvial sands with some interbedded gravels, silts, and clays. Thick sections of the Columbia Formation (paleochannels) may yield up to several hundred gallons per minute to individual wells. The thickness of the Columbia Formation is shown in detail on Delaware Geological Survey Geologic Map, Series No. 4 (Woodruff and Thompson, 1975). A northeast-southwest trending paleochannel occurs in the vicinity of the developments of Castle Hills and Collins Park (see well Cc43-16 on cross-section B-B') and is a major source of ground water. The Delaware River has truncated the Columbia and older formations along the course of the river and has deposited in turn mostly fine-grained material (see cross-section B-B') within the present channel. The Columbia Formation is usually the source of recharge for aquifers within the Potomac Formation. In some cases sands of the Potomac Formation and the Columbia Formation may act as a single hydrologic unit.

Quaternary age sediments of the Coastal Plain greater than 40 feet thick.

Immediately adjacent to the Delaware River and in areas near Cherry Island and Pigeon Point these sediments include the Columbia Formation of Pleistocene age, overlying sediments of Recent age deposited by the Delaware River, and possibly hydraulic fill. In other areas only the Columbia Formation is present.

Crystalline rocks of the Piedmont Province:

Gneisses and schists of the Wissahickon Formation (w) with some interlayered amphibolites underlie the western half of the map area. Ground-water yields are variable but average about 10 gallons per minute (gpm) for wells drilled at least 100 feet. Wells drilled in highly fractured areas may, in rare cases, yield up to about 300 to 400 gpm initially. The overcurrent or weathered rock may be up to several tens of feet thick and often is a source of shallow ground water. This latter water is often of questionable quality and is generally not used if water is available from deeper zones.

Igneous and altered igneous rocks of the Wilmington Complex (wc) predominate in the eastern part of the map area. These rocks generally have less secondary porosity than the Wissahickon Formation and yields are usually low. The yield of the average house well is about 1 gpm and dry holes are fairly common. Some improvement in yield is usually possible by using terrain and linear features as guidelines in exploration. Aquifer tests on new wells in the Piedmont must be interpreted with caution. Initial yields may decline with time by as much as 50 percent due to water being removed from storage within the rocks. Aquifer characteristics derived from short-term tests could be highly directional.

Sediments of the Piedmont Province greater than 10 feet thick (excluding weathered rock):

In scattered areas throughout the Piedmont the crystalline rock is overlain by thin patches of predominantly sandy or gravelly sediments. These sediments include the Bryn Mawr Formation (age uncertain) to the north of Wilmington and Quaternary age sediments within Wilmington along the Fall Zone. The thickness of these deposits does not exceed about 50 feet and, because of their limited extent, they do not yield large amounts of ground water.

Altitude in feet of weathered basement beneath Coastal Plain sediments (see level datum). The top of weathered basement usually defines the maximum depth of drilling for ground-water exploration in the Coastal Plain. Locally, little ground-water has been found in the basement (crystalline) rocks beneath the Coastal Plain sediments.

minor major

Fracture traces or lineaments postulated from study of conventional air photos, topographic maps, and satellite photos. Such traces often indicate zones of fractured rock where ground-water yields may be higher than average.

*D611-28
Well or test hole number

Location of cross-section

Geologic contact, dashed where inferred or concealed

Geologic mapping in the Piedmont is under revision by A. M. Thompson (unpublished manuscript). Geologic contacts within the Piedmont are taken from the revised work and may differ from those shown on previous publications.

SELECTED REFERENCES

- Adams, J.K. and Briggs, D.H., 1964. Water-table, surface-drainage, and engineering soils map of the Wilmington Area, Delaware. U.S. Geological Survey Hydrologic Survey, Atlas HA-79.
- Jordan, R.R. and Cross, J.L., 1962. Some observations on the sediments of the Delaware River, south of Wilmington. Delaware Geological Survey Report of Investigations No. 6, 12 p.
- Martin, M.M. and Dwyer, J.M., 1981. Hydrologic data for the Potomac Formation, New Castle County, Delaware. U.S. Geological Survey unpublished manuscript.
- Matthews, E.D. and Lantz, O.L., 1970. Soil survey of New Castle County, Delaware. U.S. Dept. of Agriculture, 57 p.
- Spillars, N., 1972. Geology of the Fall Zone in Delaware. Delaware Geological Survey Report of Investigations No. 39, 39 p.
- Spillars, N., 1974. Possible new major faults in the Piedmont of Delaware and southeastern Pennsylvania and their importance to recent earthquakes. Southeastern Geology, v. 16, p. 19-29.
- Sanderson, R.W. and Pickett, T.E., 1971. The availability of ground water in the Wilmington area, Delaware. Delaware Water Resource Center, 136 p.
- Woodruff, J.D. and Thompson, A.M., 1975. Geology of the Wilmington Area, Delaware. Delaware Geological Survey Geologic Map Series, No. 4.

INTERPRETIVE CROSS-SECTIONS

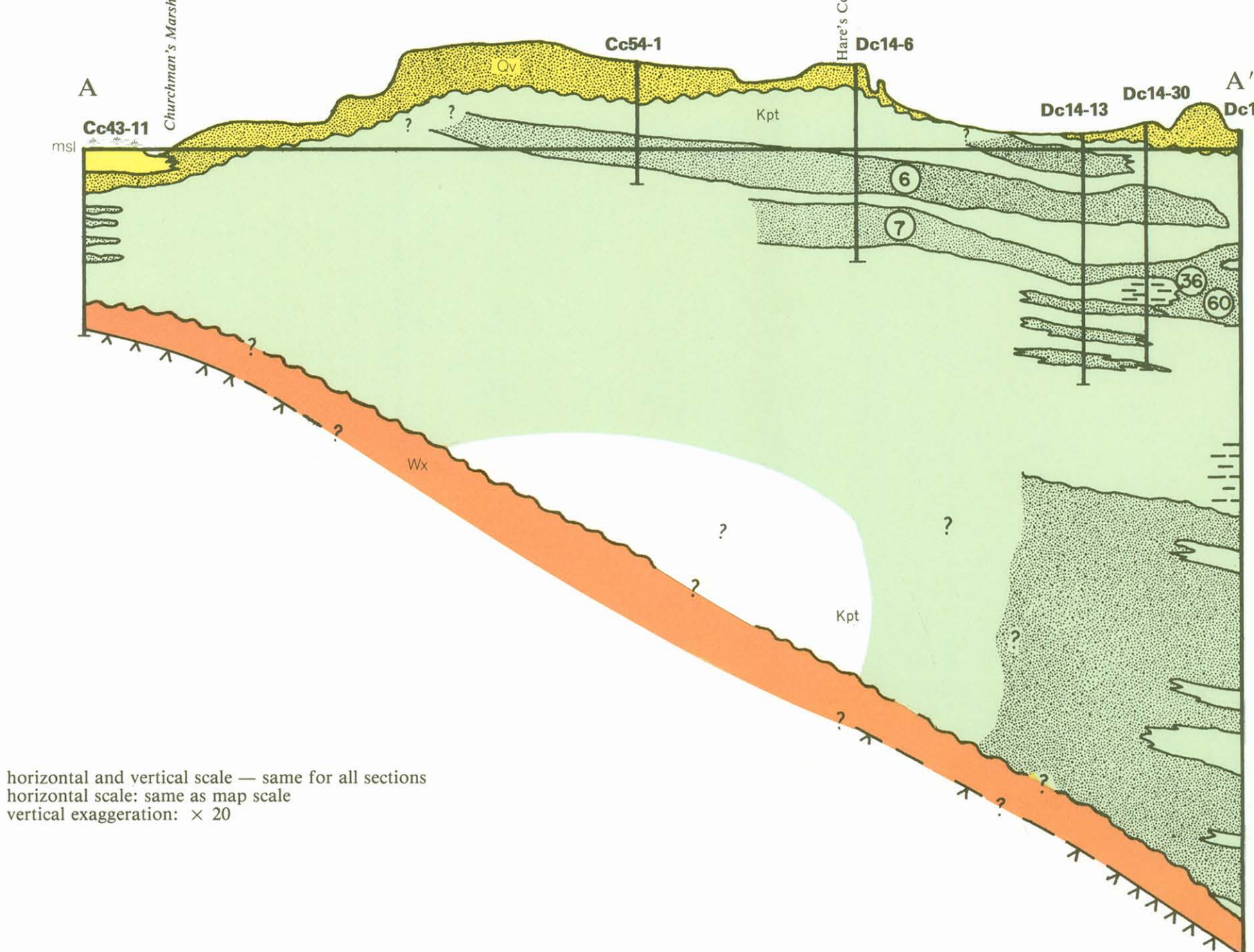
CROSS-SECTION KEY

- Columbia Formation and Holocene Sediments (indicated on cross-section only)
- Potomac Formation
- weathered crystalline basement
- Top of unweathered crystalline basement (dashed where inferred)

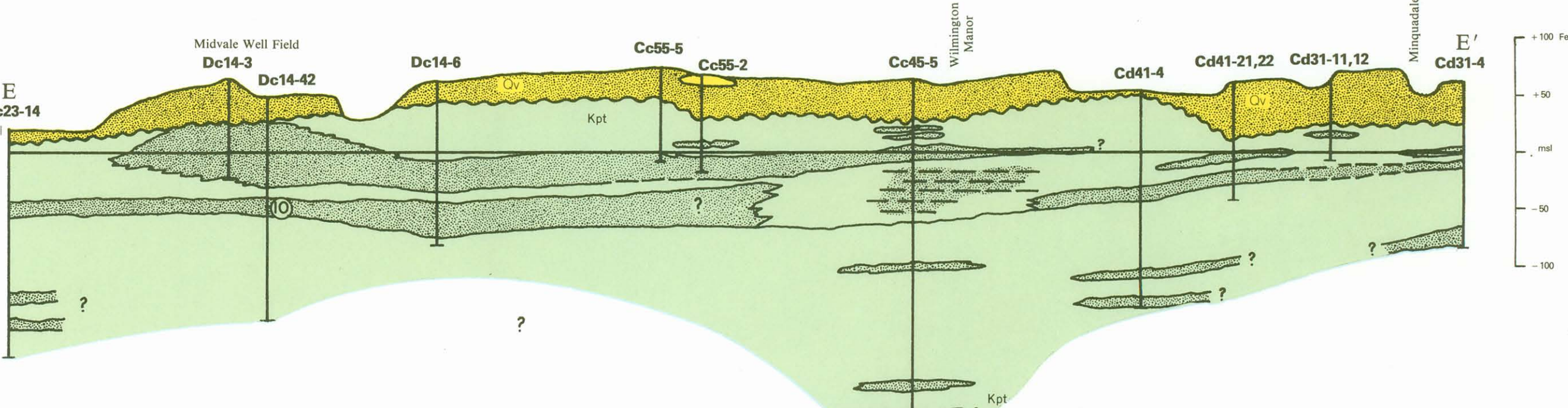
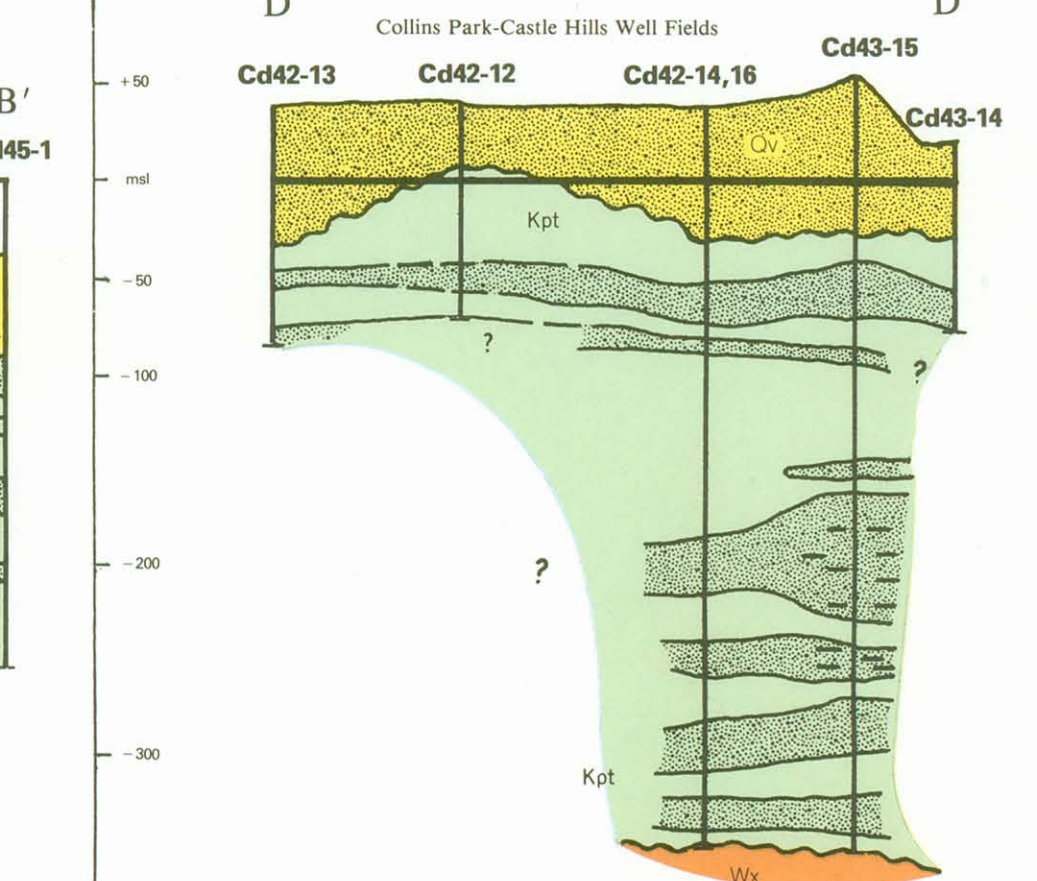
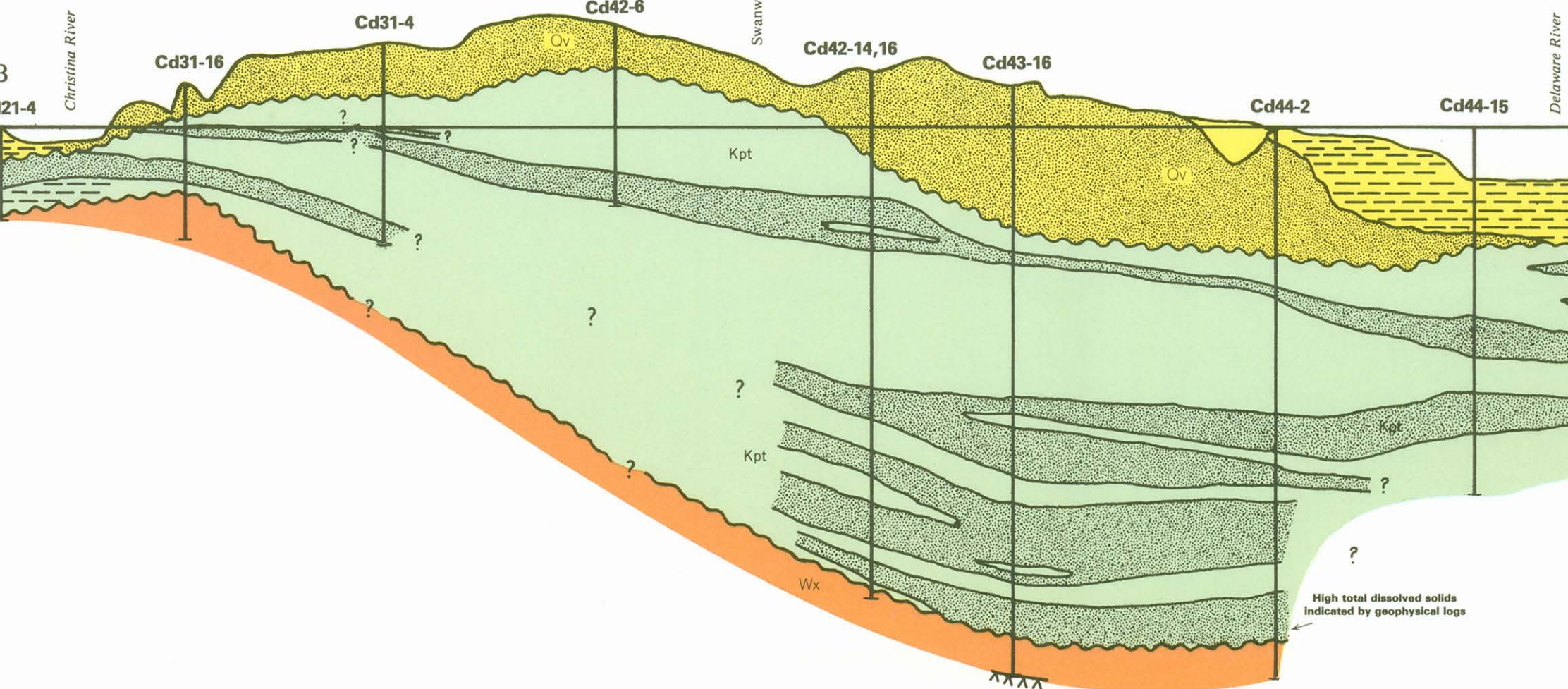
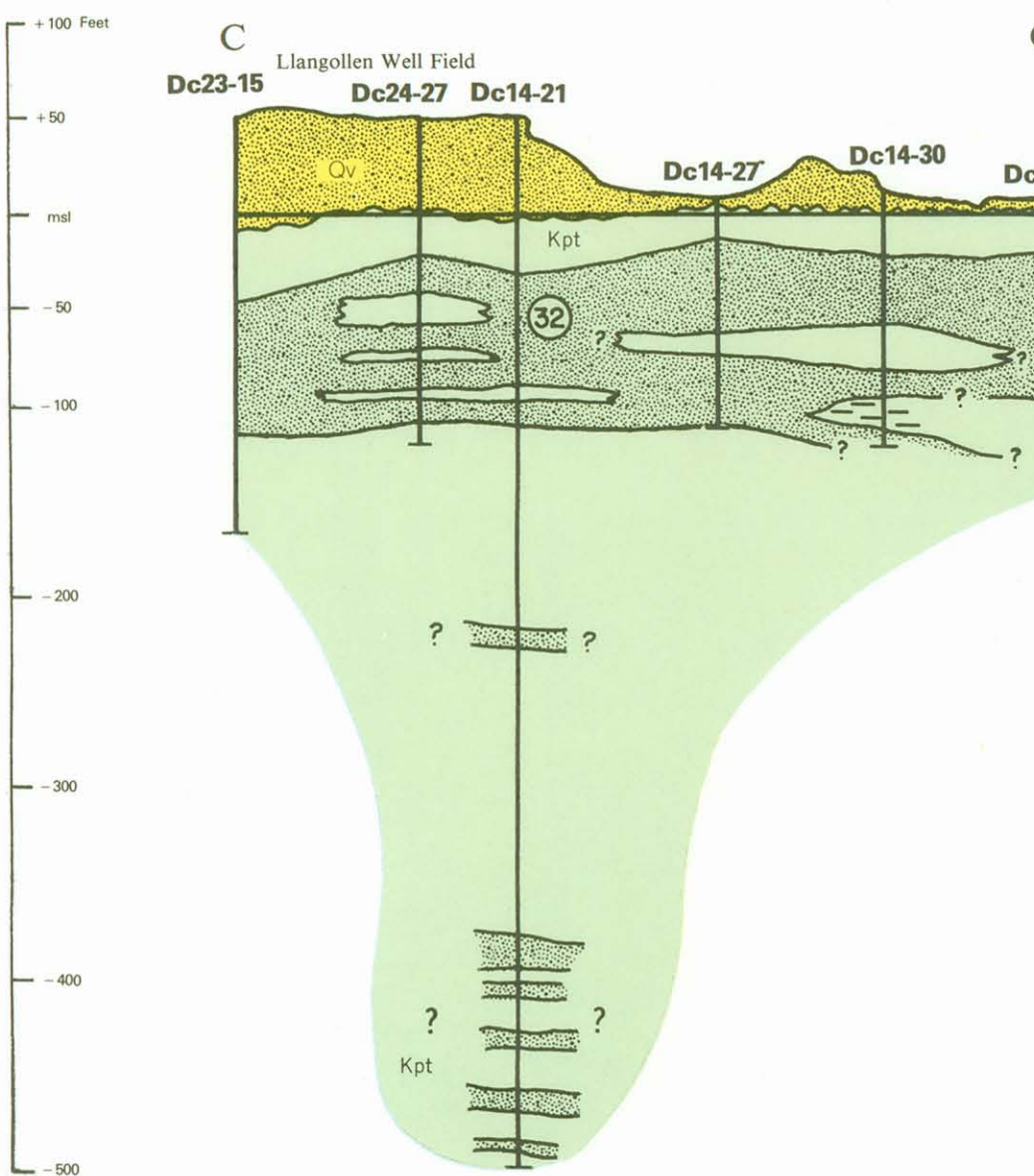
- QUATERNARY
- CRETACEOUS
- PRE-CAMBRIAN?

- marsh
- aquifers or sandy zones
- silt
- clay

- Transmissivity, $k^2 \text{ day} \times 100$
- unconformity
- correlation uncertain



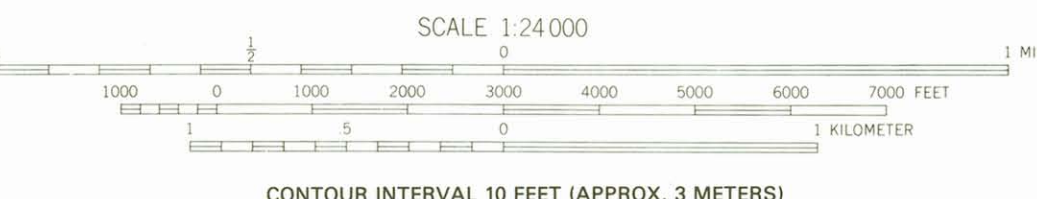
horizontal and vertical scale — same for all sections
horizontal scale: same as map scale
vertical exaggeration: $\times 20$



GEOHYDROLOGY OF THE WILMINGTON AREA, DELAWARE

by
Kenneth D. Woodruff

1981



Base maps — USGS Topographic Division
Wilmington North, Wilmington South, Marcus Hook, Penna. Grove Quadrangles.

UTM GRID AND 1983 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

Williams & Hensel Map Corporation, Capitol Heights, Md. 20743