

MAP KEY AND DISCUSSION

Thickness of Quaternary age sediments in the Delaware River (feet)

Contour lines in the Delaware River indicate the combined thickness of Pleistocene and post-Pleistocene age deposits occurring in or adjacent to the present course of the River. In every case, over 90 percent of the total thickness is composed of post-Pleistocene silts with occasional interbeds of mostly fine sands. The silts apparently form an effective aquiclude downward vertical leakage of brackish river water due to their thinness and relatively low vertical hydraulic conductivity. A thin layer of large gravel often marks the base of the Quaternary age sediments.

Sediments of the Columbia Formation greater than 40 feet thick

The Columbia Formation (Pleistocene age) unconformably overlies older units in nearly all parts of the map area. Thicknesses greater than 40 feet generally indicate where higher than average ground-water yields may be possible. An unusually thick paleochannel extends approximately north-south through the refinery area just northwest of Delaware City. Pleistocene coxons in this channel has removed both overlying marine Cretaceous sediments and a small section of Potomac Formation to a depth of up to 140 feet below present sea level. The Columbia Formation forms the water-table aquifer and, because of its higher permeability, also acts as a source of recharge to deeper aquifers. In present day stream valleys recent erosion has removed most of the Columbia sediments.

HORNERSTOWN FORMATION

The Hornerstown Formation of the Rancocas Group is a silty, glauconitic sand generally capable of providing small yields for domestic wells. The unit is not thick enough in the map area to be considered a major aquifer. Gamma logs in the Rancocas Group often indicate a fairly high silt or clay content because of the high glauconitic content.

MOUNT LAUREL FORMATION

The Mount Laurel Formation is predominantly a fine to medium silty sand that in the subsurface is part of the water-table aquifer. South of the subsurface area yields are usually sufficient for domestic wells.

MATAWAN GROUP

Kent MARSHALLTOWN FORMATION
Kent ENGLISHTOWN FORMATION
Kent MERCHANTSVILLE FORMATION

The Matawan Group in the vicinity of the Chesapeake and Delaware Canal comprises the Merchantville, Englishtown, and Marshalltown formations (oldest to youngest). The Englishtown sand is coarse enough to yield small amounts of water to domestic wells. The other two units are generally fine-grained, glauconitic, and probably are not likely to yield water. South of the map area, three separate formations cannot be distinguished and the interval is designated the Matawan Formation.

MAGOTHY FORMATION

The Magothy Formation is comprised of clean sands with some interbedded, black, lignitic silts and is remarkably persistent laterally throughout the Delaware Coastal Plain. Magothy sands are often a distinctive marker on both electric and gamma logs and may yield tens of gallons per minute to wells.

POTOMAC FORMATION

The Potomac is the basal formation of the Coastal Plain sequence in the map area, comprising over 75 percent of the total sediment volume. Potomac fluvial sands deposited in shifting stream channels are the major ground-water reservoirs in northern New Castle County. Individual wells in thick, sandy sections may yield up to several hundred gallons per minute. However, the bulk of the Potomac is fine-grained and was deposited in overbank and interfluvial environments. Thus individual sands are difficult to correlate laterally although sandy zones can usually be traced over much of the map area. The distinction between the upper and lower hydrologic zone (Simmons and others, 1967) is less certain in this map area than in areas to the north. The Potomac thicken to the southeast (downwind) with more sands being added to the section. A fairly thick sandy section generally occurs just above weathered basement.

Altitude in feet of weathered basement beneath Coastal Plain sediments (sea 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.

Gamma Log

Geologic contact, dashed where inferred

Fault in crystalline basement
C: upthrown, D: downthrown

Faulting in both weathered and crystalline basement has been determined from well control and from seismic reflection profiles (enhanced). Fairly detailed data are available in the industrial area northwest of Delaware City. Interpretation of basement structure as seen on this map is in basic agreement with that of other studies although some details may differ. A zone of complex faulting appears to underlie the northeast corner of the map area and extends southwesterly to at least the Chesapeake and Delaware Canal. Vertical offsets as interpreted from the seismic data are on the order of feet and thus usually extend upward through the weathered zone and in some cases into the Potomac Formation. No faulting can be seen in the overlying marine Cretaceous formations or the surficial sediments. Spjallric (1979) postulated a major lineament (not identified on map) from satellite imagery that passes through this zone of basement faulting and trends in the same direction.

Major lineament zone postulated from study of conventional air photos, topographic maps, and satellite photos. In addition to the zone shown, another, much wider, lineament trends northeast-southwest through the map area but can be seen only on high altitude satellite photography (Spjallric, 1979). The transcription of the boundaries of this latter zone to the map scale is uncertain. Abrupt changes in depth to crystalline basement and/or thickness of the weathered basement might be expected in areas of smaller scale lineaments in particular.

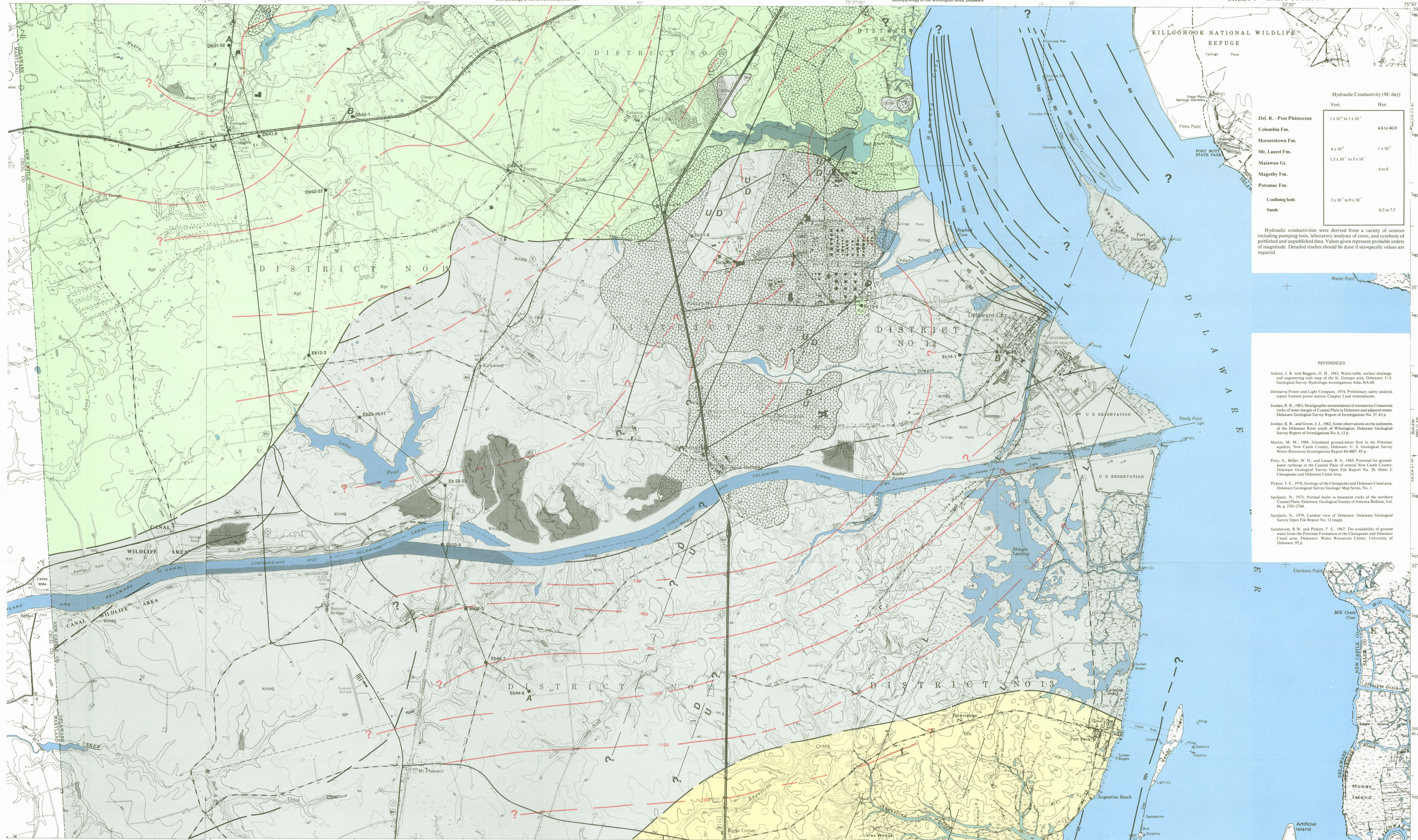
Well or test hole number

Location of cross-section

Photorevised area on base map

Wetlands (Hobocene marsh)

Gamma log sections shows are segments chosen from a number of logs, generally redrafted for clarity. In some cases the segments are direct reductions from original logs. All segments are from logs where the log signatures appear to be distinctive or best developed.



Hydraulic Conductivity (M/dy)

Unit	Vert.	Hor.
Del. R. - Post Pleistocene	1×10^{-10} to 1×10^{-11}	4.6 to 46.0
Columbia Fm.		
Hornerstown Fm.		
Mt. Laurel Fm.	6×10^{-8}	1×10^{-7}
Matawan Gr.	1.5×10^{-10} to 5×10^{-11}	
Potomac Fm.		4 to 8
Confined beds	3×10^{-10} to 9×10^{-11}	
Sands		0.1 to 7.5

Hydraulic conductivities were derived from a variety of sources including pumping tests, laboratory analyses of cores, and synthesis of published and unpublished data. Values given represent probable orders of magnitude. Detailed studies should be done if site-specific values are required.

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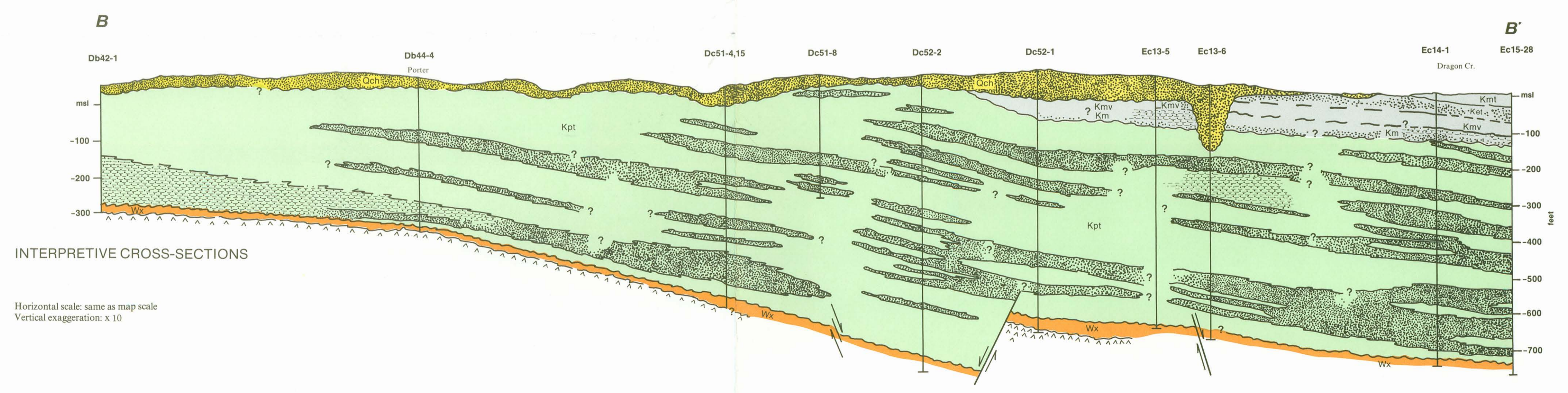
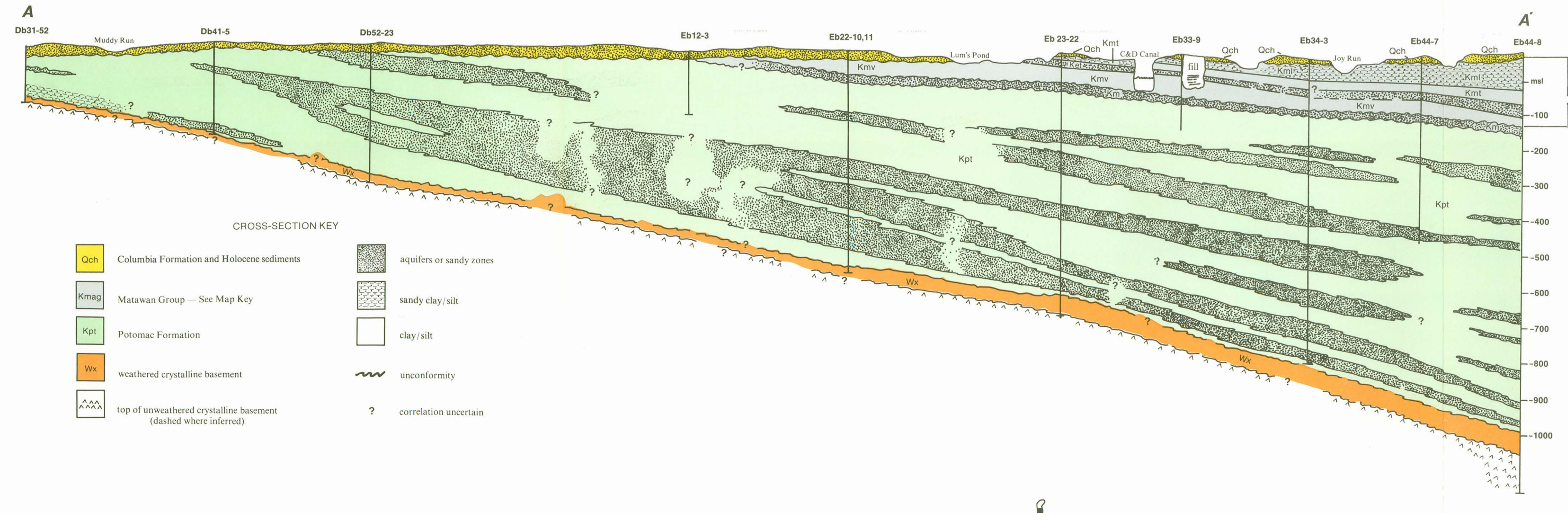
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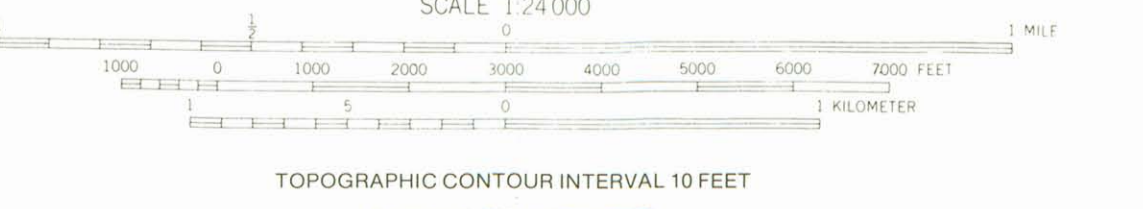
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GEOHYDROLOGY OF THE CHESAPEAKE AND DELAWARE CANAL AREA, DELAWARE

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Base Maps — USGS Topographic Division, Delaware City, Elton, Saint Georges Quadrangles

