DELAWARE GEOLOGICAL SURVEY
University of Delaware, Newark
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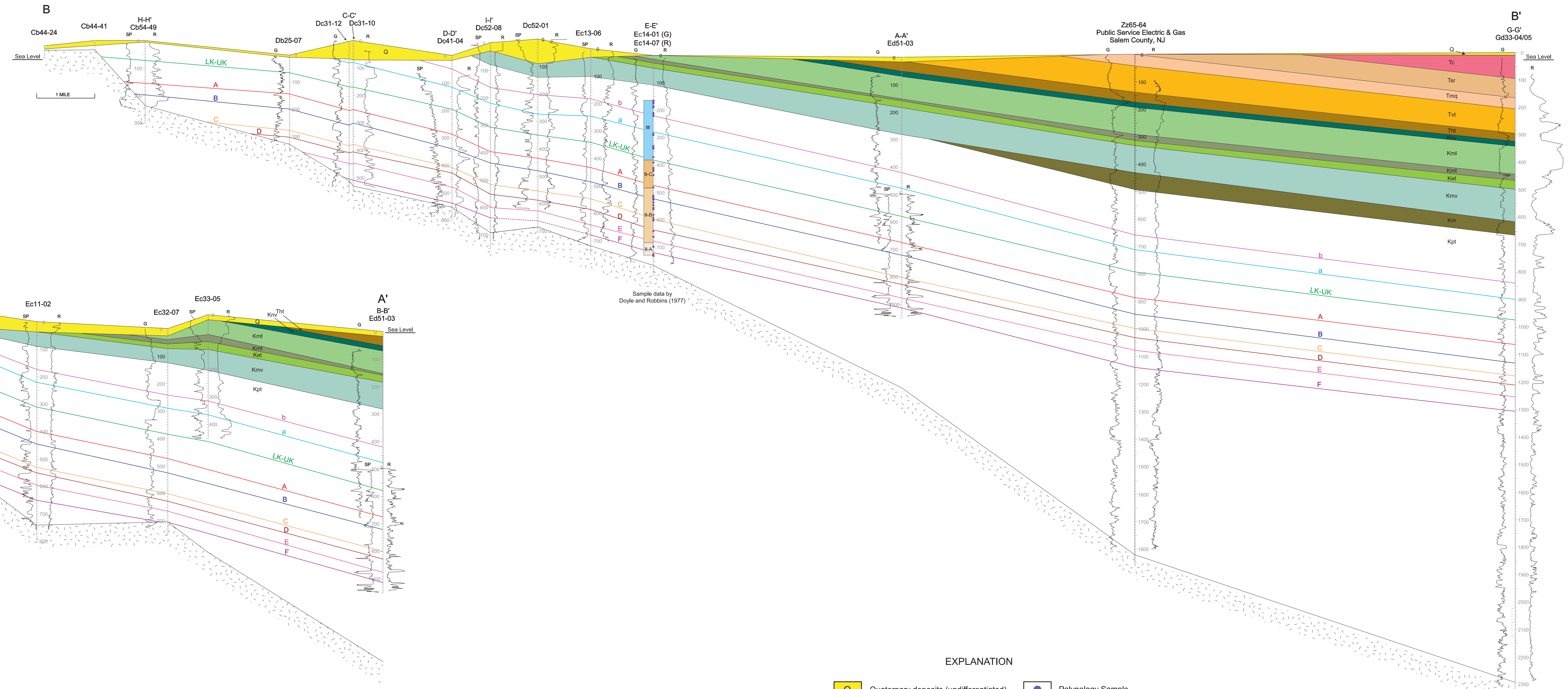
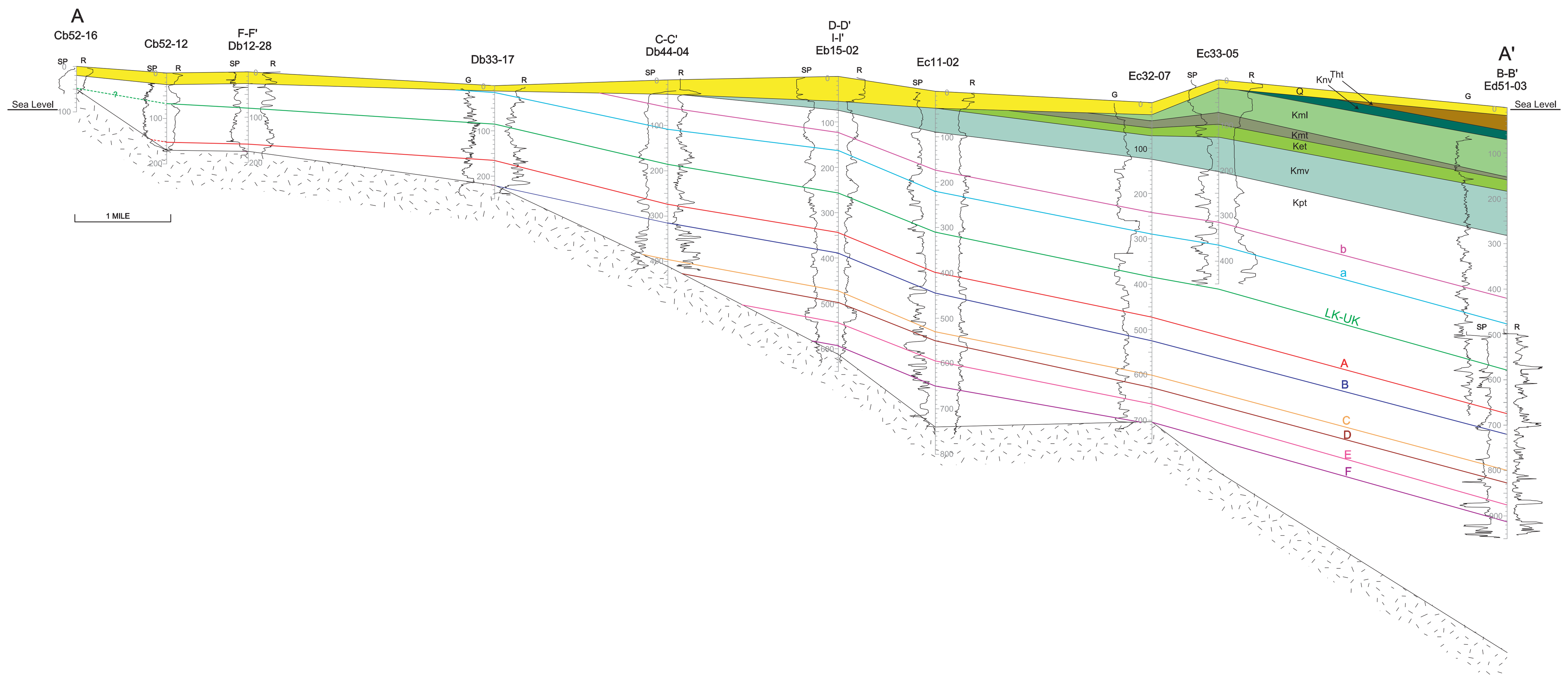
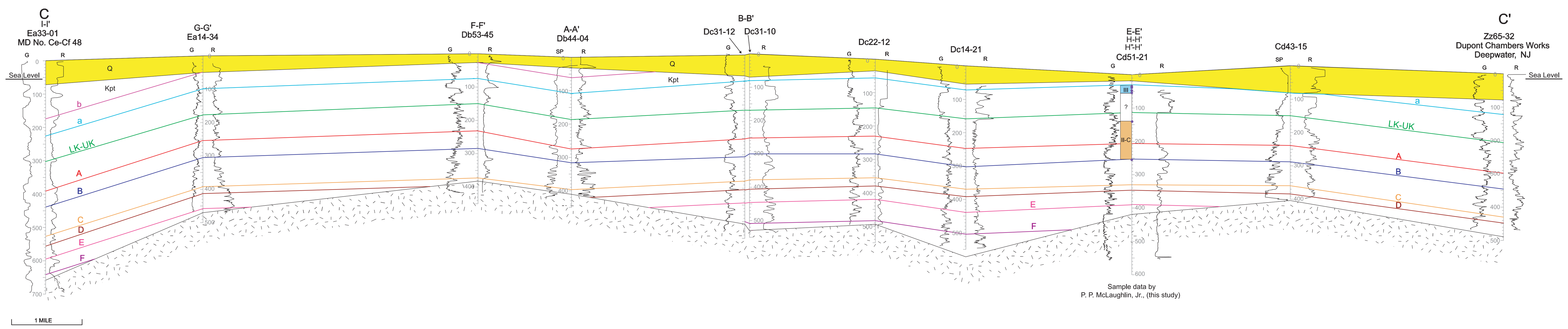
DELAWARE GEOLOGICAL SURVEY
Report of Investigations No. 71

Cross Sections A-A' through C-C'

Plate 1







EXPLANATION

- Q — Quaternary deposits (undifferentiated)
- Tc — Calvert Formation
- Tsr — Shark River Formation
- Tmq — Manasquan Formation
- Tvt — Vincentown Formation
- Tht — Hornerstown Formation
- Knv — Navesink Formation
- Kml — Mt. Laurel Formation
- Kmt — Marshalltown Formation
- Ket — Englishtown Formation
- Kmv — Merchantville Formation
- Km — Magothy Formation
- Kpt — Potomac Formation
- Basement
- ● Palynology Sample
- I-III — Palynological Zone Designation
- LK-UK — Lower Cretaceous-Upper Cretaceous Datum
- A — Time Line Correlation
- - - - Correlation Inferred
- G — Gamma Log
- R — Resistivity Log
- SP — Spontaneous Potential Log

Discussion of Cross Sections

The first step in generating the cross sections presented here was to select a time-line datum recognizable on geophysical logs of boreholes that penetrated basement (plus a few that did not). The datum chosen approximates the palynologically defined Albian-Cenomanian or Lower Cretaceous (LK)-Upper Cretaceous (UK) contact. Next, silt-clay (shale) markers were identified on the geophysical logs above and below the datum that were considered correlatable on the basis of the consistency of their stratigraphic positions from log to log. As the shale "kicks" are assumed to represent flood-plain surfaces, many if not most of which are marked with paleosols, they approximate additional time lines above and below the datum. The time lines are labeled A through F below and *a* and *b* above the LK-UK datum, and their time-stratigraphic significance is verified by additional palynological data. The lines are solid if they connect boreholes with geophysical log control; where control is lacking they are dashed and projected parallel to the solid correlation line immediately above. The overall effect on a regional basis is a distinct parallelism of time lines which is apparent on the cross sections. This is not surprising as the Potomac Formation comprises the deposits of a vast alluvial plain of low relief in an anastomosing river environment consisting of subordinate channel sands enclosed by overbank sands, silts, and clays—a three-dimensional labyrinthine network of channel sands in a matrix of flood-plain muds. Individual sand bodies vary in thickness and character from borehole to borehole and are generally no thicker than 20 feet; therefore, relief between channel and adjacent flood plain was low.

The time-stratigraphic units shown on the dip-oriented cross sections on Plates 1 to 3 onlap the basement in an updip direction. The top of the Potomac Formation on all cross sections is truncated by an erosional unconformity. In updip areas, Quaternary deposits (undifferentiated) overlie the Potomac. Downdip, the Magothy Formation overlies the Potomac Formation in most places; locally, where the Magothy Formation is absent, the Potomac Formation is overlain by the Merchantville Formation. Correlation of post-Potomac stratigraphic units on the cross sections follows that of Benson and Spoljaric (1996). The elevation of basement not identified by boreholes is estimated from a preliminary structure contour map of the basement surface (U.S. Army Corps of Engineers, 2004).

One feature of the stratigraphy supported by palynological constraints is increasing truncation of the top of the Potomac Formation in an updip (northwestward) direction. Near-surface construction-boring samples from two sites near the Fall Line, Cc52-a and Cc41-b (section H"-H', Plate 3), are assigned to Zone II-B, indicating a considerable amount of Potomac strata was eroded from the top of the formation at those sites. This observation supports correlations from holes downdip in New Castle (Cd51-23, Cd51-21; section H"-H', Plate 3) that indicate the erosional contact at the top of the Potomac Formation updip from those boreholes cuts down into strata below the LK-UK contact.

Another feature of the local stratigraphy made evident by palynological analysis is an apparent structural offset of Potomac strata near the Fall Line. On section H-H', there appears to be an abrupt change in the elevation of Potomac strata between boreholes Cb54-49 and Cb55-60. This location is near a high point of the basement near Christiana, Delaware, that was uncovered beneath a thin Quaternary layer during construction of a shopping center. The boreholes west of that area are interpreted to include the highest levels of the Potomac Formation based on cross correlation with sections A-A' and B-B' and the identification of Subzone II-C or lower Zone III in borehole Db12-49. On the east side of that area, split-spoon core samples from a depth of 50 ft in borehole Cb55-60 yielded pollen that identified Subzone II-B; therefore, the overlying section equivalent to Subzone II-C and Zone III is considered to be missing, consistent with correlations east of that location (section H-H', Plate 3). A fault is shown on H-H' to explain the offset with the western block downthrown and the eastern block upthrown.

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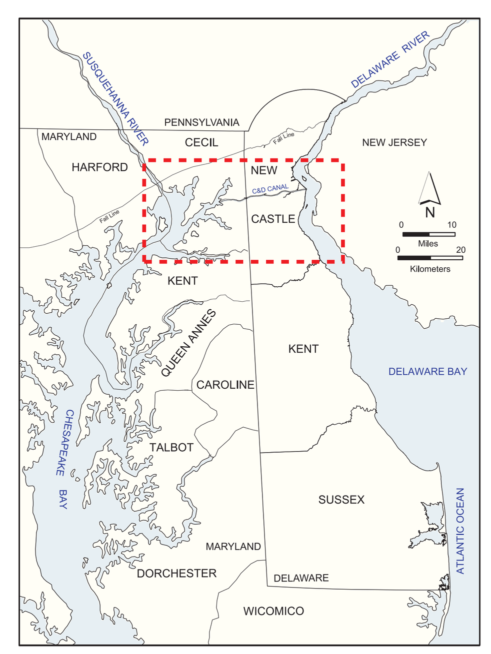

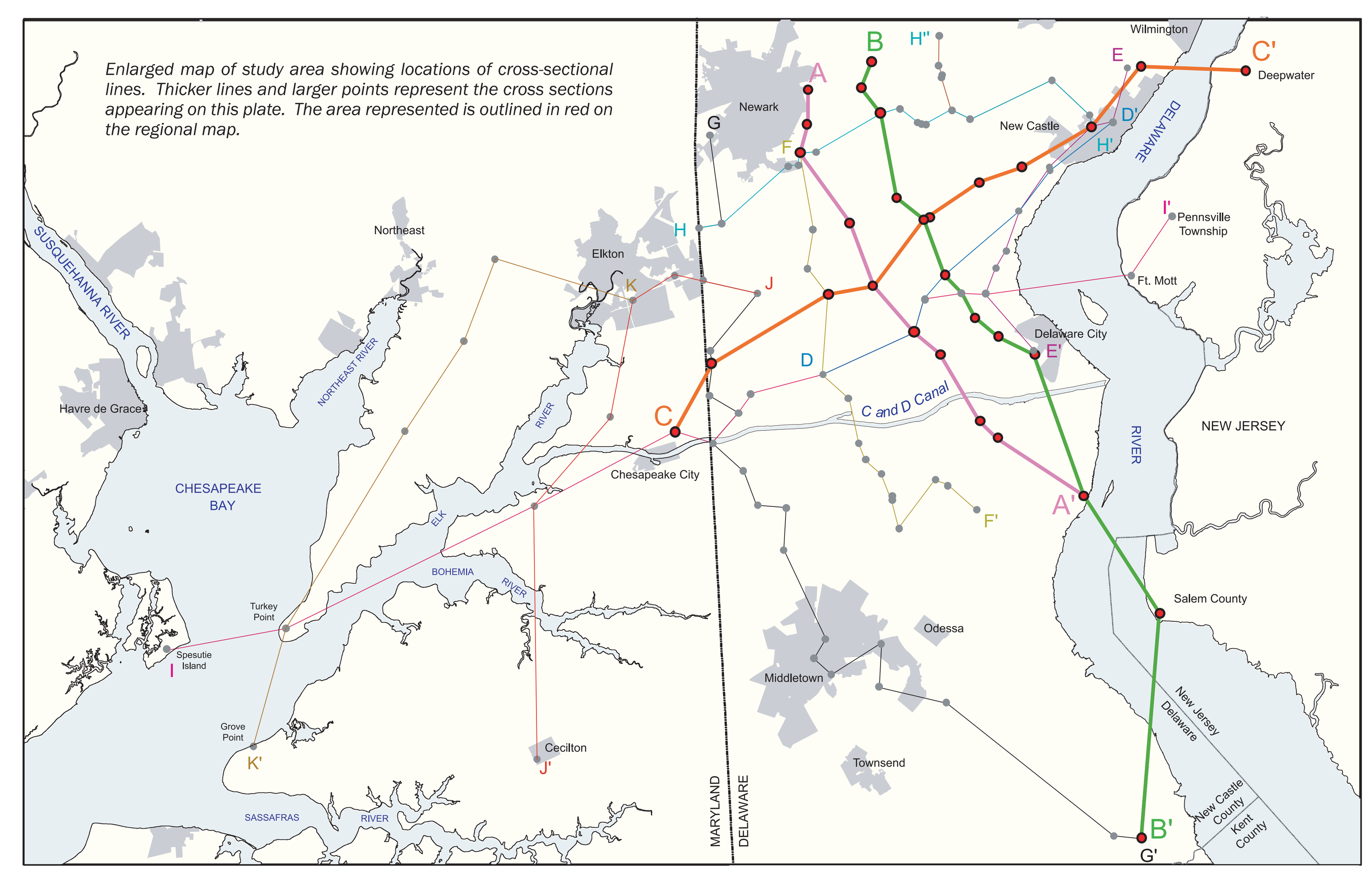

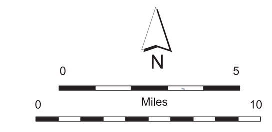

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