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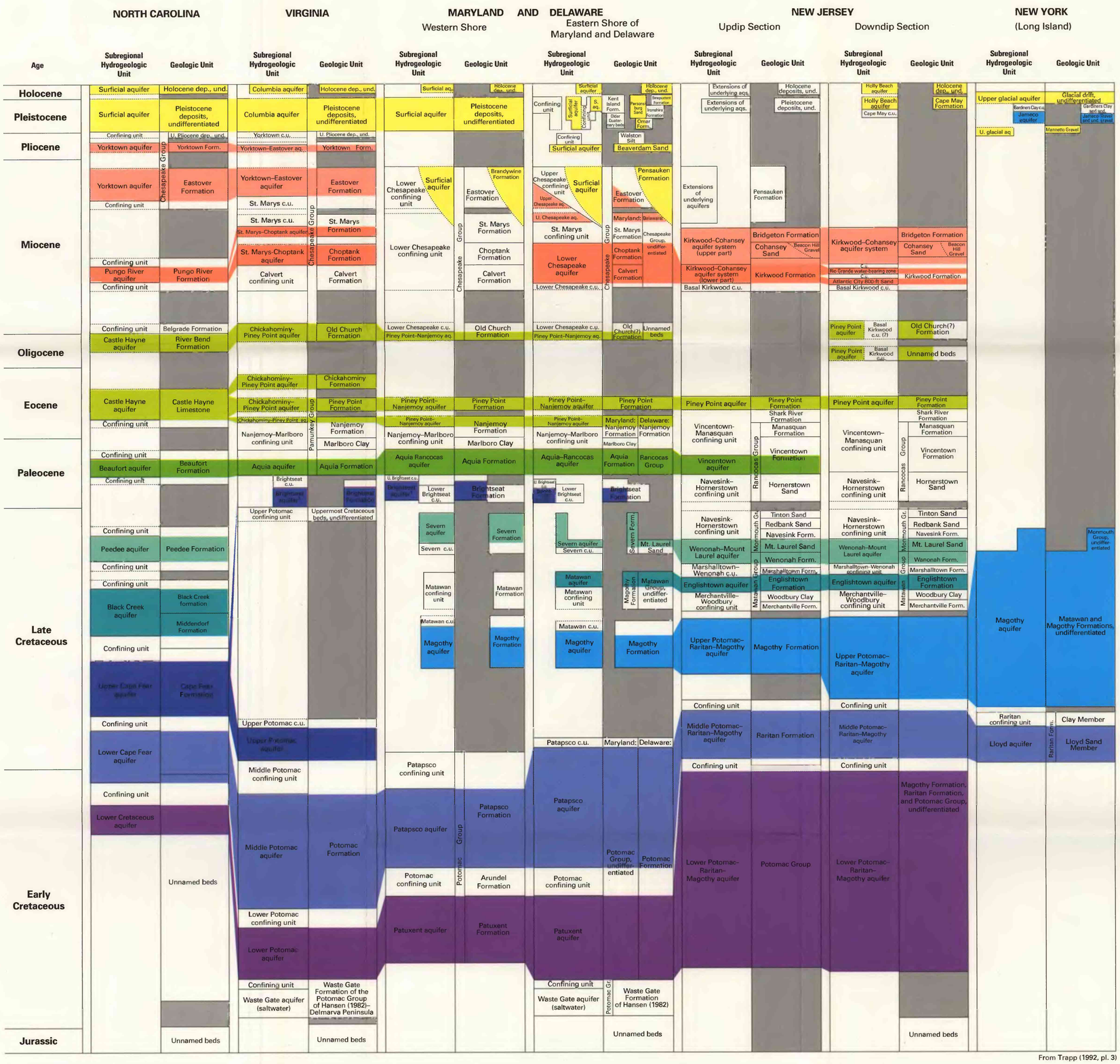
Relations among regional aquifers, local hydrogeologic units, and geologic formations—PLATE 1

Knobel, L.L., and others, 1997, Geochemistry of the northern Atlantic Coastal Plain aquifer system



EXPLANATION

(The chart is not drawn to scale; vertical intervals are not proportionate to either thickness or geologic time.)

Gap in stratigraphic section. (Not all gaps are shown)

Hydrogeologic unit extends beyond this level in stratigraphic section.

Regional-aquifer number[2], name, and description

10 **Surficial aquifer**—The aquifer consists of unconsolidated sand and gravel in valley, terrace, dune, beach, and marine deposits, and glacial deposits on Long Island, N.Y. It is unconfined but contains local confined zones. The average thickness on Long Island is about 250 ft and probably about 50 ft elsewhere but as much as 250 ft in buried channels on the Delmarva Peninsula. Average transmissivity is about 27,000 ft²/day on Long Island and less than 1,000 ft²/day elsewhere (except on the Delmarva Peninsula, where it is commonly 8,000 ft²/day and ranges up to 20,000 ft²/day in buried channels).

9 **Upper Chesapeake aquifer**—The aquifer consists of fine sand of marine origin in North Carolina but grades northward to New Jersey into coarser sands and gravels of fluvial origin. Average total thickness penetrated by wells is about 75 ft in North Carolina, 140 ft in Virginia, 400 ft in Maryland and Delaware, and 190 ft in New Jersey. The thicknesses for Maryland, Delaware, and Virginia include substantial amounts of materials of low permeability between local aquifers. Transmissivity ranges up to about 6,000 ft²/day in North Carolina, 3,000 ft²/day in Virginia, 24,000 ft²/day in Maryland just south of Delaware, and 10,000 ft²/day in New Jersey.

8 **Lower Chesapeake aquifer**—In North Carolina, the aquifer consists of fine to medium phosphatic marine sands, and in Virginia, very fine to fine sand. In Maryland and Delaware, permeable zones of medium to coarse sand with shells are separated by beds of silt and clay. In New Jersey, the aquifer is composed of fine to coarse sand and gravel. The average total thickness penetrated by wells is about 50 ft in North Carolina, 275 ft on the Delmarva Peninsula, and 200 ft in New Jersey. Transmissivity generally ranges up to 8,000 ft²/day in North Carolina, 4,000 ft²/day on the Delmarva Peninsula, and 10,000 ft²/day in New Jersey.

7 **Castle Hayne–Piney Point aquifer**—The aquifer consists of limestone, sandy marl, and fine to coarse lime sand in North Carolina and fine to coarse glauconitic sand with shells from Virginia through New Jersey. The average thickness penetrated by wells is about 185 ft in North Carolina, 60 ft in Virginia, 150 ft in Maryland and Delaware, and 125 ft in New Jersey. Transmissivity generally ranges up to 70,000 ft²/day in North Carolina and 5,000 ft²/day from Virginia to New Jersey.

6 **Beaufort–Aquia aquifer**—The aquifer consists of fine to medium sand with thin shell and limestone beds in North Carolina and Virginia and medium to coarse glauconitic sand in Maryland and Delaware. In New Jersey, the aquifer consists of sparsely glauconitic quartz sand, calcareous in part. The average thickness penetrated by wells is about 90 ft in North Carolina, 45 ft in Virginia, 120 ft in Maryland and Delaware, and 70 ft in New Jersey. Transmissivity is generally less than 2,000 ft²/day but ranges up to about 5,000 ft²/day on the Delmarva Peninsula.

5 **Peedee-Severn aquifer**—The aquifer consists of fine to medium, locally glauconitic sand interbedded with silt and clay in North Carolina, fine-grained glauconitic sand in Maryland and Delaware, and very fine to coarse, slightly glauconitic sand in New Jersey. The average thickness penetrated by wells is about 95 ft in North Carolina, 80 ft in Maryland, 100 ft in Delaware, and 80 ft in New Jersey. Transmissivity of the freshwarter part of the aquifer ranges up to about 10,000 ft²/day in North Carolina but is generally less than 2,000 ft²/day from Maryland to New Jersey.

4 **Black Creek–Matawan aquifer**—The aquifer consists of lignitic, glauconitic, partly clayey sand in North Carolina, fine silty to clayey sand in Maryland and Delaware, and fine to medium quartz sand in New Jersey. The average thickness penetrated by wells is about 180 ft in North Carolina and 55 ft in New Jersey. The aquifer is thin to missing in Maryland and Delaware. Transmissivity of the freshwater part ranges up to 10,000 ft²/day in North Carolina but is generally less than 2,000 ft²/day in other areas.

3N **Magothy aquifer**—The aquifer consists generally of very fine to medium quartz sand with abundant discontinuous layers of carbonaceous clayey silt. It also contains coarse to very coarse sand and gravel, particularly in the thicker parts. On Long Island, it includes some sand and gravel of glacial origin in hydraulic contact. The average thickness penetrated by wells is about 75 ft in Maryland and Delaware, 100 ft in New Jersey, and 460 ft on Long Island. Transmissivity of the freshwater section ranges up to 6,000 ft²/day in Maryland, 3,000 ft²/day in Delaware, 10,000 ft²/day in New Jersey, and 56,000 ft²/day on Long Island.

3S **Upper Potomac aquifer**—In southern Maryland, the regional aquifer is represented by the local Brightseat aquifer, which is made up of fine sand interbedded with silty clay, and extends into northern Virginia. There it is separated from the underlying main body of the aquifer by a confining unit. The main body of the aquifer is made up of very fine to medium quartz sand interbedded with silty clay. The average thickness of the regional aquifer is about 160 ft in North Carolina and 95 ft in Virginia. In southern Maryland, west of the Chesapeake Bay, one well penetrated 245 ft of the aquifer, and a well on the Delmarva Peninsula penetrated 75 ft. Transmissivity of the freshwater section ranges up to about 6,000 ft²/day in North Carolina, 3,000 ft²/day in Virginia, and 1,000 ft²/day in Maryland.

2 **Middle Potomac aquifer**—In North Carolina, the aquifer consists of fine to medium sand, with some coarse sand and gravel, feldspathic sand, and silty clay. In Virginia through New Jersey, it consists of fine to coarse sand, predominantly medium interlensing with much clay and silt. On Long Island, it consists of fine to coarse sand and gravel with interbedded clay and silt and includes some sand and gravel of glacial origin in hydraulic contact. The average thickness, as penetrated by wells, is about 285 ft in North Carolina, 350 ft in Virginia, 770 ft in Maryland and Delaware, 245 ft in New Jersey, and 225 ft on Long Island. Transmissivity of the freshwater section ranges up to about 8,000 ft²/day in North Carolina; 16,000 ft²/day in Virginia, Maryland, Delaware, and New York; and 21,000 ft²/day in New Jersey.

1 **Lower Potomac aquifer**—In North Carolina, the freshwater section of the aquifer, restricted to a small area south of the Virginia border, consists of lenses of fine to medium sand interbedded with clayey and silty material. In Virginia, Maryland, Delaware, and New Jersey, the aquifer consists of lenses of fine to very coarse sand with interstitial clay interbedded with silt and clay. The coarser grained materials are concentrated near its western limit, and the proportion of clayey and silty beds increases toward the coast. The average thickness of the interval between the top of the lower Potomac and the basement, as penetrated by wells, is about 285 ft in North Carolina, 525 ft in Virginia, 935 ft in Maryland and Delaware, and 345 ft in New Jersey. The wells used to derive these averages are concentrated in the updip area, where the aquifer is thinnest. However, the averages include thicknesses of sediment between the base of the aquifer and the basement. Transmissivity of the freshwater section generally ranges up to 8,000 ft²/day in Virginia, 6,000 ft²/day in Maryland, 4,000 ft²/day in Delaware, and 10,000 ft²/day in New Jersey.

Sediments underlying the lower Potomac aquifer—These sediments include clay and silt and at least one brine aquifer, the Waste Gate aquifer of Hansen (1982, 1984).

Abbreviations—aq. ..aquifer; c.u. ..confining unit; dep. ..deposits; Form. ..Formation; ft. ..feet; ft²/day. ..feet squared per day; gr. ..group; L. ..Lower; S. aq. ..Surficial aquifer; U. ..Upper; und. ..undifferentiated.

[1]Recent work on cores from two test holes, one in northern Virginia and the other in southern Maryland, has identified fossil pollen and spores of late Early Cretaceous (Albian) age (D.J. Nichols, U.S. Geological Survey, written commun., 1985; Ronald Litwin, U.S. Geological Survey, written commun., 1987) in deposits designated the Brightseat aquifer in this report. This indicates that the Brightseat aquifer does not correlate with the Brightseat Formation. This plate shows the original interpretation.

[2]The aquifer numbers refer to the modeling layers of Leahy and Martin (1993), except that on Long Island, N.Y., the surficial aquifer is represented by model layers 7 and 6 and the Magothy aquifer by layers 5, 4, and 3. Model layer 3 comprises both the regional upper Potomac (3S) and the Magothy (3N) aquifers.

RELATIONS AMONG REGIONAL AQUIFERS, LOCAL HYDROGEOLOGIC UNITS, AND GEOLOGIC FORMATIONS IN THE NORTHERN ATLANTIC COASTAL PLAIN

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