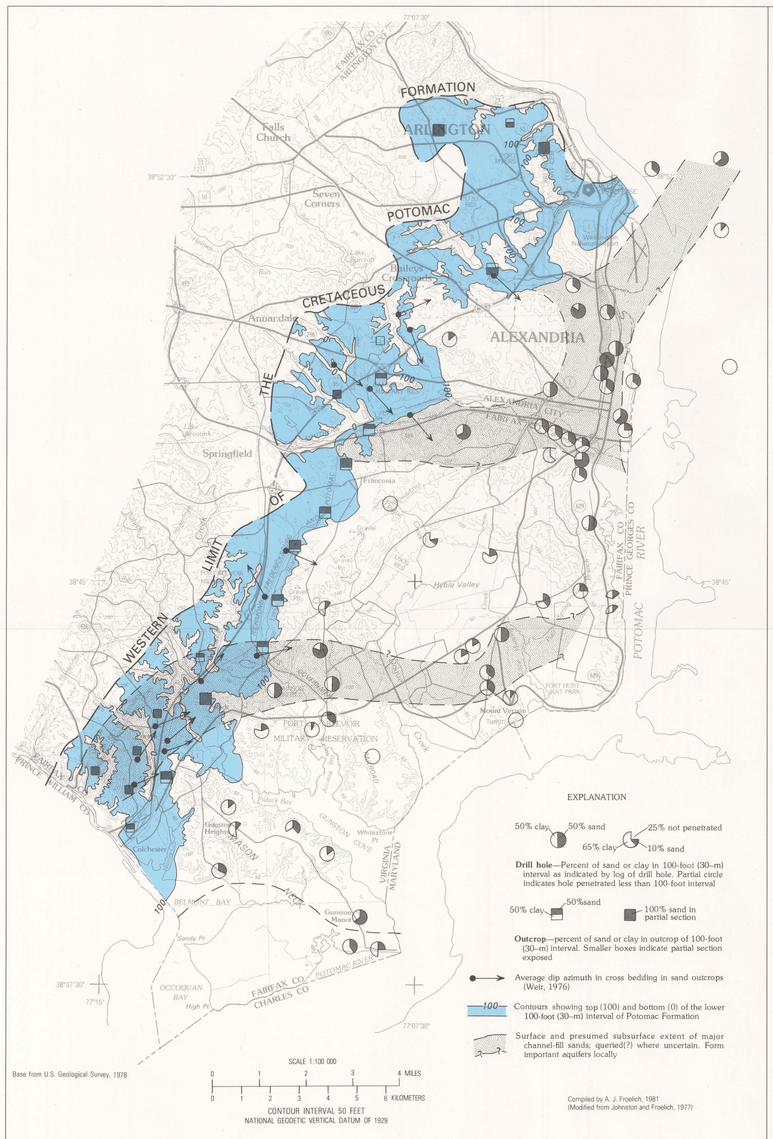
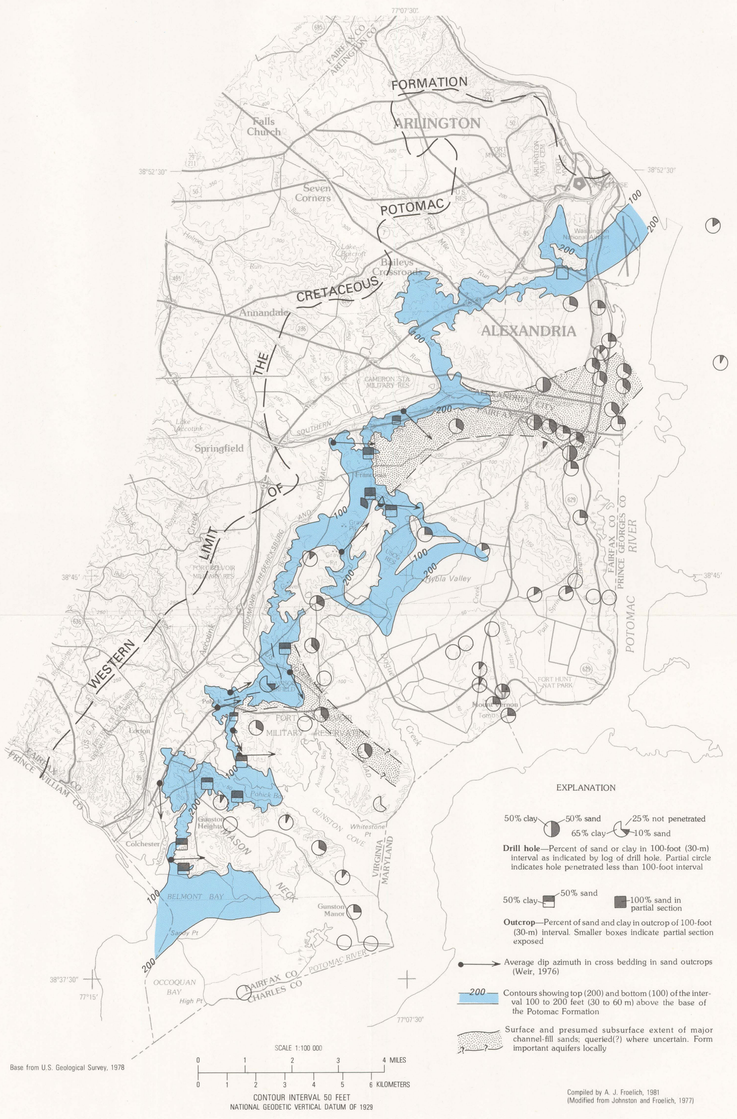
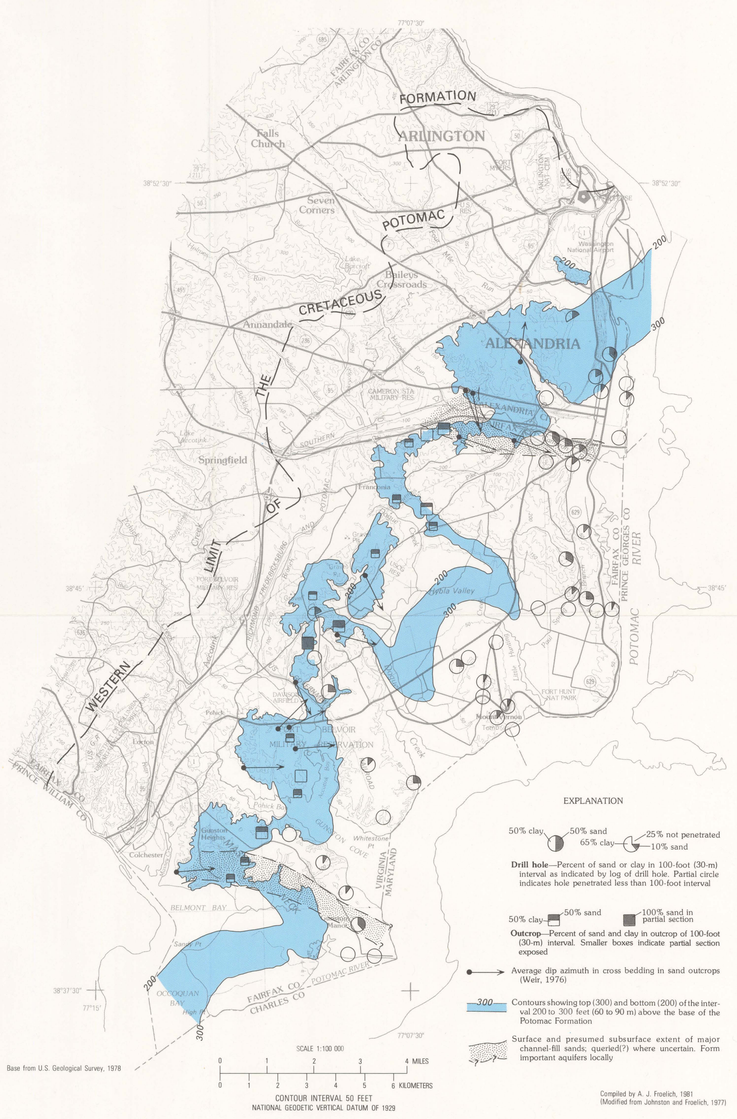


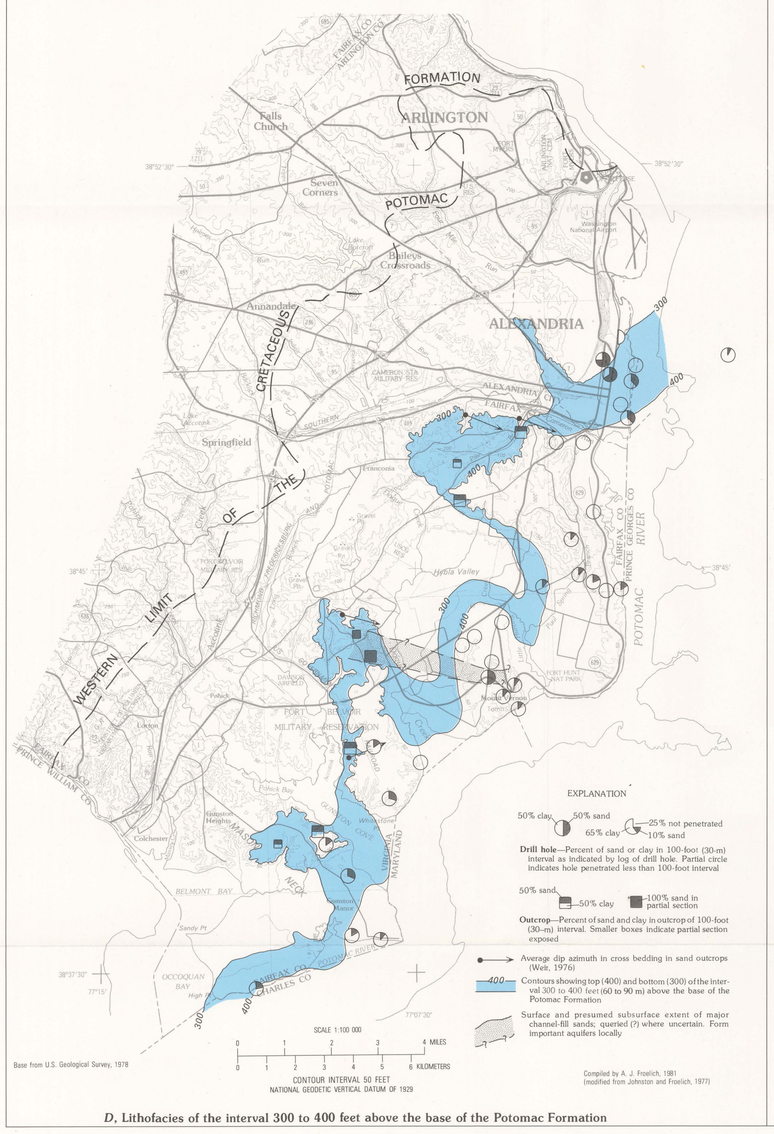
A, Lithofacies of the lower 100 feet of the Potomac Formation



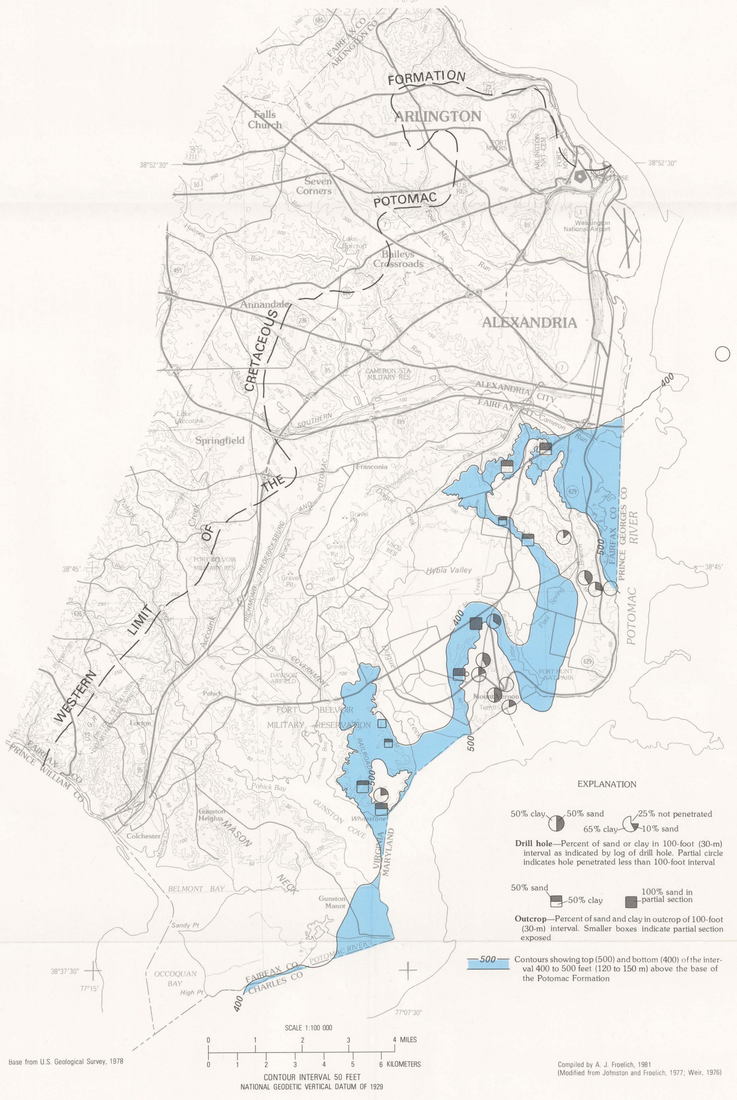
B, Lithofacies of the interval 100 to 200 feet above the base of the Potomac Formation



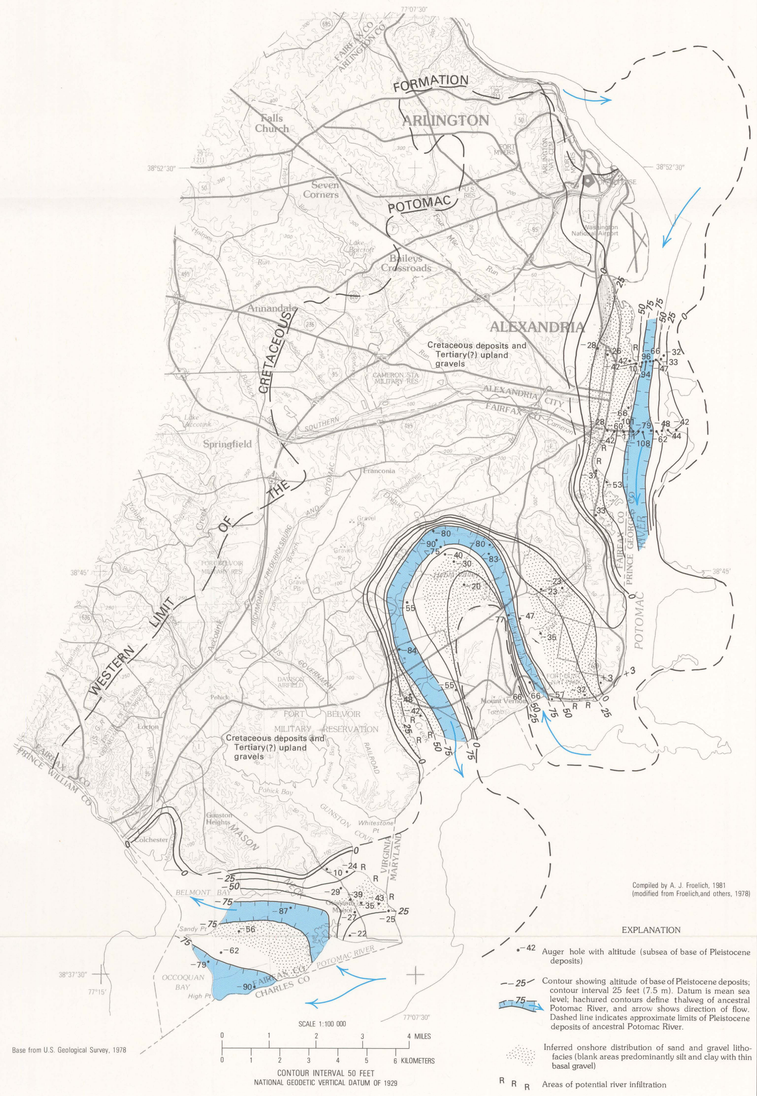
C, Lithofacies of the interval 200 to 300 feet above the base of the Potomac Formation



D, Lithofacies of the interval 300 to 400 feet above the base of the Potomac Formation



E, Lithofacies of the interval 400 to 500 feet above the base of the Potomac Formation



F, Lithofacies and altitude of base of Pleistocene deposits of ancestral Potomac River

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The Potomac Formation was arbitrarily divided into 100-foot (30-m) thick intervals and a generalized lithofacies map was prepared for each interval. Maps ***A*** to ***E*** show the ratio of sand to clay for each 100-foot interval within the Potomac Formation. The reference datum is the base of the Potomac Formation (or top of weathered crystalline bedrock), and it is assumed that locally at least, deposition occurred more or less simultaneously within each interval.

The diagrammatic cross section through the Potomac Formation (fig. 1) shows the method used to prepare the lithofacies maps for each 100-foot interval. Neither the wells nor the outcrops are sufficiently numerous to delineate the subsurface extent of major sand bodies with precision. However, the dip direction of crossbeds (Weir, 1976) is an indication of paleocurrent direction and also the presumed direction of elongation of the sand bodies. Well yields, specific capacity, and aquifer transmissivity data were used to delineate the sand channels. The configuration of the potentiometric surface (see sheet 4) was used to infer the presence of major sand-filled channels in the lowermost 100-foot interval of the Potomac Formation. This delineation of the principal sand bodies is thus based on (1) lithology and crossbed directions in surface exposures of sands, (2) lithologic and geophysical logs of water wells, (3) estimates of aquifer transmissivity mostly from well performance data, and (4) variations in hydraulic gradient as shown by the potentiometric surface map (see sheet 4, maps ***A*** and ***B***). The chief purpose of the lithofacies map is to trace major sand-filled channels from surface exposures into the subsurface.

These maps differ somewhat from map ***F*** of sheet 2, which shows the percent of *total* sand (including clayey or silty sands) in the section, in contrast to the fine- to coarse-grained potential reservoir sands that fill paleochannels shown in maps ***A*** to ***D*** this sheet.

The occurrence of major channel-fill sands in the Cretaceous Potomac Formation can be summarized as follows: (1) A major east-trending sand body is present in the basal 100-foot interval (lower aquifer) beneath the present day course of Cameron Run and beneath southeastern Alexandria (map ***A***). Sand bodies in the overlying 200 feet (60 m) persist in this area (maps ***B*** and ***C***) but are not as well developed as in the basal 100 feet (30 m). (2) Southeast-trending sand bodies occur in the Fort Belvoir-Gunston Hall area (maps ***A***, ***B***, ***C***, and ***D***; however, the paleochannels in which these sands were deposited apparently migrated laterally with time. (3) No major sand bodies have been identified in the areas between major sand channels. Isolated wells have penetrated thin sand bodies in these intervening areas, but in general, the sequence is predominantly silt and clay.

These maps are designed to aid in ground-water exploration, as areas underlain by major channel-fill sand bodies are most likely to provide high-yield wells.

Map ***F*** shows the inferred onshore distribution, altitude of base, and lithofacies of Pleistocene deposits of an ancestral Potomac River in Fairfax County and vicinity. The thalweg, or deepest part of the paleochannel, is overlain by the thickest (as much as 160 feet (50 m)) preserved Pleistocene section; except for a persistent basal sand and gravel unit about 10 feet (3 m) thick, it contains mostly silt, clay, very fine sand, and peat beds. Deposits flanking the main channel contain porous and permeable sections (as much as 50 feet (15 m)) of coarse sand and gravel. Where these sand and gravel deposits extend beneath the present Potomac Estuary, the possibility exists for constructing high-yielding wells supplied by riverbed infiltration, as described in Froelich, Johnston, and Langer (1978).

REFERENCES CITED

Froelich, A. J., Johnston, R. H., and Langer, W. H., 1978, Preliminary report on the ancestral Potomac River deposits in Fairfax County, Virginia, and their potential hydrogeologic significance: U.S. Geological Survey Open-File Report 78-544, 37 p., 1 pl., scale 1:48,000.

Johnston, R. H., and Froelich, A. J., 1977, Maps showing lithofacies and inferred sub-surface distribution of channel-fill sands in the Potomac Group in Fairfax County, Virginia: U.S. Geological Survey Open-File Report 77-287, 8 p., 5 pls, scale 1:48,000.

Weir, G. W., 1976, Crossbedding of the Potomac Formation in Fairfax County, Virginia: U.S. Geological Survey Open-File Report 76-193, 28 p., 1 pl., scale 1:48,000.

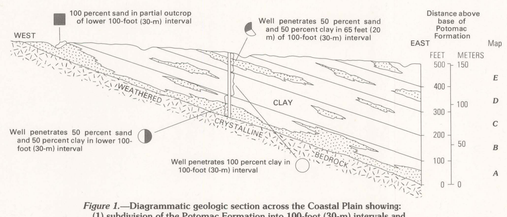

Figure 1.—**Diagrammatic geologic section across the Coastal Plain showing: (1) subdivision of the Potomac Formation into 100-foot (30-m) intervals and (2) method of depicting well and outcrop lithologies on lithofacies maps.**

Sheet 3 of 5: Maps showing lithofacies and hydrogeologic aspects of the Coastal Plain deposits of Fairfax County and vicinity, Virginia

FOLIO OF GEOLOGIC AND HYDROLOGIC MAPS FOR LAND-USE PLANNING IN THE COASTAL PLAIN OF FAIRFAX COUNTY AND VICINITY, VIRGINIA

By
A. J. Froelich

1985