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Geologic Map of the Coastal Plain part of the Joplin quadrangle, Stafford and Prince William Counties, Virginia

by
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(Plate 1 accompanies text)

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DESCRIPTION OF MAP UNITS

af Artificial fill--Sandy and gravelly materials in areas filled for construction of roads, highways, bridges, and dams

dg Disturbed ground--Areas leveled for construction of firing ranges

Sedimentary Rocks

Qal Alluvium (Holocene)--Fine to coarse gravelly sand and sandy gravel, silt, and clay, light- to medium-gray and yellowish-gray. Clasts are mainly vein quartz, quartzite, and other metamorphic rocks. Deposited in channels and narrow flood plains of Chopawamsic and Quantico Creeks and Beaverdam Run

Tpsg Pliocene sand and gravel--Fine to medium quartz sand, grades upward to sandy loam, thin gravel at base, laps over Potomac Formation onto saprolite of Piedmont crystalline rocks. Unit is as much as 6 ft (2 m) thick, basal contact is exposed in low cuts along Russell Road. Occurs as small, isolated outlier of extensively dissected sand and gravel sheet that once covered much of inner Coastal Plain along and east of Thornburg scarp (Mixon, 1978; Mixon and others, 1989). Correlates, in part, with unit QTs in adjacent Quantico quadrangle (Mixon and others, 1972) and unit QTl in Occoquan quadrangle (Seiders and Mixon, 1981)

Tmsg Miocene sand and gravel--Fine to coarse sandy gravel and gravelly, quartzose sand, contains abundant large pebbles and cobbles of vein quartz and quartzite, thick to massively bedded, weathers reddish brown, appears to be of fluvial origin. Locally, lower 5-10 ft (2-3 m) of unit consists of pale-yellow to yellowish-gray, very fine to fine, well sorted quartz sand and sandy and clayey silt believed to be of marine origin, appears to correlate with Choptank Formation as mapped in adjacent Stafford and Quantico quadrangle areas. Occurs as highly dissected erosional remnants capping drainage divides west of Thornburg scarp. Thickness as much as 35 ft (10 m)

Ta Aquia Formation (upper Paleocene)--Fine to very fine, moderately sorted, glauconitic quartz sand, light-olive-gray or yellowish-gray, upper part weathers reddish brown, thin pebble bed at base. Irregular burrows filled with glauconite-rich sand common. Clay fraction is predominantly montmorillonite-illite. Black heavy minerals, chiefly ilmenite, are abundant. Abundant molds and casts of pelecypods and gastropods in unit in adjacent Quantico quadrangle area indicate a marine origin. Late Paleocene age is based on foraminifers, nannofossils, dynocysts, and mollusks from nearby Widewater quadrangle area. Unit unconformably overlies the Potomac Formation; occurs as small outliers on upthrown and

downthrown sides of Dumfries fault zone in southeast corner of map area. Thickness as much as 15 ft (5 m) on upthrown side of fault zone, thickens abruptly to southeast across fault zone

Kp Potomac Formation (Lower Cretaceous)--Fine to coarse, poorly sorted, pebbly, quartzo-feldspathic sand, light-gray to pinkish- and yellowish-gray, weathers yellow, orange, and brown, commonly thick-bedded and trough-crossbedded, represents fluvial channel-lag and channel-bar deposits. Grades laterally and upward to finer grained silty sands of probable point-bar origin and to greenish gray clayey silt and silty clay, commonly mottled reddish brown, representing clay-silt plugs of abandoned channels and extensive flood-plain deposits. Coalified and silicified stems of plants are present but rare. Pollen and well-preserved leaf and stem impressions of ferns, cycads, and gymnosperms from equivalent beds in adjacent quadrangles indicate an early Cretaceous (Aptian to Barremian) age (J.A. Doyle, oral commun., 1971; Brenner, 1963). Thickness ranges from a feather edge along northwest margin of outcrop to about 120 ft (37 m) on relatively upthrown west side of Dumfries fault zone. Unit thickens across fault zone to about 260 ft (79 m) on downthrown east side

OZu Undifferentiated metasedimentary and metaigneous rocks of the Piedmont terrane

MAP SYMBOLS

———— Contact--Dotted where concealed

—200— Structure contour--Drawn on base of Potomac Formation. Contour interval is 50 feet (15 m), datum is mean sea level

U
D Dumfries fault zone--U, upthrown side; D, downthrown side

GEOLOGIC SETTING

The Joplin quadrangle includes parts of two very different geologic terranes--the Appalachian Piedmont to the west and north and the Atlantic Coastal Plain to the south and east. In the map area, the Piedmont terrane consists of highly deformed metamorphosed sedimentary, volcanic, and plutonic rocks of Ordovician, Cambrian, and Late Proterozoic(?) ages. The fresh unweathered rock exposed in deeper stream valleys and on steeper slopes is hard and resistant to erosion. The more gentle slopes and ridge tops are covered by a mantle of soft decomposed rock (saprolite) derived by weathering of the underlying crystalline rock. The erosional surface at the top of the Piedmont crystalline rock is quite irregular but dips generally eastward at low angles beneath the Coastal Plain deposits (see structure contours on base of Potomac Formation). For a detailed description of the Piedmont rocks see adjacent published geologic quadrangle maps (Mixon and others, 1972; Seiders and Mixon, 1981) and summary report (Pavlides, 1981).

The Coastal Plain terrane consists of much younger and generally unconsolidated sedimentary rocks, chiefly sand and gravel with lesser amounts of silt and clay. These strata dip gently to the southeast and constitute an eastward-thickening clastic wedge overlying the crystalline rocks of the Piedmont terrane. The thin, highly truncated updip remnants of Coastal Plain formations present within the map area, including the Potomac and Aquia Formations, are commonly deeply weathered and leached of calcareous material.

COASTAL PLAIN STRUCTURE

The Dumfries fault zone, which crosses the southeast corner of the map area, is a main element of the Stafford fault system, a series of en echelon, northeast-trending, high-angle reverse faults paralleling the Fall Line in Prince William, Stafford, and Spotsylvania Counties, Va. (Mixon and Newell, 1977, 1978, 1982). The Dumfries fault zone was recognized, initially, as a linear zone of much steeper-than-average dips shown by structure contours drawn on the top of the Piedmont crystalline rocks (base of the Lower Cretaceous Potomac Formation). For example, in the map area, contours drawn on the base of the Potomac beds indicate a regional dip of 80-100 ft (24-30 m) per mile, whereas the steep gradient or "downstep" across the Dumfries contour lineament in the Joplin quadrangle and in the adjacent Quantico and Stafford quadrangles is 100-150 ft (30-45 m) within about 0.25 mi (0.4 km) (see Mixon and others, 1972; Mixon and Newell, 1982, fig. 3).

Trenches excavated by the U.S. Geological Survey and by Potomac Electric Power Company across the Dumfries structure-contour lineament northwest of the town of Stafford showed that the main structure is a northwest-dipping high-angle reverse fault along which Piedmont metamorphic rocks are thrust over Coastal Plain strata (Newell and others, 1976; Potomac Electric Power Company, 1976). A stereo net analysis of subsidiary reverse and normal faults exposed in the trench indicates a right-lateral strike-slip component of movement along the Dumfries fault (Newell and others, 1976). Vertical separation on the unconformable contact between the Potomac Formation and the underlying Piedmont rocks at the U.S. Geological Survey trench site is about 115 ft (35 m), as indicated by detailed mapping and borehole data. Abruptness of truncation of the upper Paleocene Aquia Formation along and immediately west of the Dumfries fault zone suggests that appreciable fault movement occurred in post-Aquia time.

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