DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

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PLATE 1

System	Series	Stratigraphic units: District of Columbia (Johnston, 1964)	Stratigraphic units: Maryland[1] (Modified From Jordan and Smith, 1983)	Stratigraphic units: Delaware (Modified From Jordan and Smith, 1983)	Lithology	Local Aquifers: District of Columbia	Local Aquifers: Maryland (Modified From Cushing and others, 1973)	Local Aquifers: Delaware (Modified From Cushing and others, 1973)	Regional hydrogeologic units: Virginia (Meng and Harsh, 1984)	Regional hydrogeologic units: District of Columbia	Regional hydrogeologic units: Maryland	Regional hydrogeologic units: Delaware	Regional hydrogeologic units: New Jersey (M. Martin, U.S. Geological Survey, written commun., 1985)	Hydrologic characteristics of freshwater flow system
Quaternary	Holocene to Pliocene	Sunderland Formation Wicomico Formation Pamlico Formation Terrace Gravel Brandywine Gravel Bryn Mawr Gravel	Columbia Group undivided and upland and lowland deposits (Otton, 1955)	Columbia Formation	Sand, mostly coarse, moderately sorted with gravel and occasional cobbles and thin silt layers.	Not present or present only as isolated occurrences Not important for water supply	Columbia aquifer (Bachman, 1984) Upland and lowland deposits (Otton 1955)	Quaternary aquifer	Columbia aquifer	Not present or present only as isolated occurrences Not important for water supply	Surficial aquifer	Surficial aquifer	Molly Beach aquifer	Unconfined. Used as aquifer over most of its outcrop area east of the Chesapeake Bay. In northern Maryland–Delaware, the saturated thickness is probably less than 20 ft. In southeastern Maryland, the saturated thickness ranges from 40 to about 140 ft. West of the Chesapeake Bay, only limited quantities of water are obtained.
Tertiary	Miocene	Chesapeake Group undivided	Chesapeake Group: Yorktown and Cohansey (?) Formations, undivided (Rasmussen and Slaughter, 1955) and Eastover Formation (Ward and Blackwelder, 1980)	Chesapeake Group undivided	Sand, interbedded gray to whitish gray, fine to coarse grained, and dark gray to blue-gray clays and silts.				Yorktown confining unit		Upper Chesapeake confining unit	Upper Chesapeake confining unit	Cape May confining unit	Confining unit. Thickness ranges from 0 to greater than 150 ft.
							Pocomoke aquifer	Pocomoke aquifer	Eastover aquifer		Upper Chesapeake aquifer	Upper Chesapeake aquifer	Upper Kirkwood–Cohansey aquifer	Multiaquifer system. The internal confining beds are typically leaky. Typical thickness ranges are: Pocomoke, 0–80 ft; Ocean City, 0–85 ft; Manokin, 0–240 ft.
							Ocean City aquifer							
							Manokin aquifer	Manokin aquifer						
			St. Marys Formation		Clay, gray, clayey silt, and very fine sand. Often fossiliferous. Coarsens upward.				St. Marys confining unit		St. Marys confining unit	St. Marys confining unit	Confining unit overlying the Rio Grande water-bearing zone	Confining unit. Thickness ranges from 0 to greater than 200 ft.
			Choptank Formation		Silty sand to sand, medium- to coarse-grained, with some gravel and locally abundant shells. Interbedded with gray or bluish gray, sandy silts and clays. Becomes predominantly silty west of the Chesapeake Bay.		Frederica aquifer	Frederica aquifer	St. Marys–Choptank aquifer		Lower Chesapeake aquifer	Lower Chesapeake aquifer	Lower Kirkwood–Cohansey and confined Kirkwood aquifers	Multilayer system. In most areas east of the Chesapeake Bay, the Cheswold and Frederica are both aquifers, but in St. Marys County, the units become confining beds from which only limited and localized water is obtained. Cheswold is up to 75–100 ft thick north of Frederica, Delaware. The Frederica is up to 50 ft thick near Dover, Delaware.
							Federalsburg aquifer	Federalsburg aquifer						
							Cheswold aquifer	Cheswold aquifer						
			Calvert Formation						Calvert confining unit		Lower Chesapeake confining unit	Lower Chesapeake confining unit	Basal Kirkwood confining unit	Confining unit. Thickness ranges from a 0 to greater than 200 ft.
	Eocene	Pamunkey Group: Nanjemoy Formation	Pamunkey Group: Piney Point Formation, Nanjemoy Formation	Piney Point Formation, Nanjemoy Formation	Sand, grayish-green to grayish-white; medium- to coarse-grained, glauconitic calcite cemented layers. Shell debris. Does not crop out in Maryland and Delaware. Coarsens upward from basal silts.		Piney Point aquifer	Piney Point aquifer	Chickahominy–Piney Point aquifer		Piney Point–Nanjemoy aquifer	Piney Point–Nanjemoy aquifer	Piney Point aquifer	Aquifer in Calvert and St. Marys Counties, Maryland, and in much of the central areas east of the Chesapeake Bay. The thickness ranges from 0 to about 270 ft.
			Marlboro clay		Clay, silty, reddish-brown to pink or gray, micaceous.				Nanjemoy–Marlboro confining unit		Nanjemoy–Marlboro confining unit	Nanjemoy–Marlboro confining unit	Vincentown-Manasquan confining unit	Confining unit. Thickness ranges from 0 to greater than 700 ft.
	Paleocene	Pamunkey Group: Aquia Formation	Pamunkey Group: Aquia Formation	Rancocas Group	Sand, very fine to fine, to coarse-grained, poorly to well sorted, yellow, purple, or green colored, with glauconite, lignite and shell material. Clay layers are greenish gray to black with glauconite.		Aquia aquifer (Hansen, 1972)	Rancocas aquifer (Sundstrom and Pickett, 1971)	Aquia aquifer		Aquia–Rancocas aquifer	Aquia–Rancocas aquifer	Vincentown aquifer	Aquifer in St. Marys and Calvert Counties. A downdip facies change makes the unit function as a confining bed in Worcester County and portions of Somerset and Wicomico Counties. Southeast of Cambridge, thickness ranges from 0 to 250 ft.
			Brightseat Formation (Bennett and Collins, 1952)						Brightseat confining unit		Upper Brightseat confining unit	Beds missing	Beds missing	Beds missing	Confining unit. Thickness ranges from 0 to greater than 60 ft.
							Paleocene aquifer (Hansen, 1967) Mattaponi (?) aquifer (Hansen and Wilson, 1984)	Beds missing	Brightseat[2] aquifer		Brightseat[2] aquifer			Used as an aquifer in Crisfield and Lexington Park, Maryland. Apparently does not exist north of St. Marys and Somerset Counties. The unit is 60 ft thick at Crisfield and about 160 ft thick at Lexington Park.
											Beds missing	Lower Brightseat confining unit	Lower Brightseat confining unit	Navesink–Hornerstown confining unit	Confining unit. Thickness ranges from 0 to greater than 200 ft.
							Monmouth aquifer (Hansen, 1972)	Englishtown–Mount Laurel aquifers (Sundstrom and Pickett, 1971)	Beds missing			Severn aquifer	Severn aquifer	Wanonah–Mount Laurel aquifer	Functions as poor aquifer, primarily in Kent and Queen Annes Counties, Maryland. Functions as confining unit in most other places. The average thickness is less than 90 ft, but is up to 150 ft thick in Kent County, Maryland.
												Severn confining unit	Severn confining unit	Marshalltown–Wenonah confining unit	Confining unit. Thickness ranges from a featheredge to greater than 80 ft.
Cretaceous	Upper Cretaceous	Severn Formation (Minard and other, 1977)	Severn Formation (Minard and others, 1977)	Monmouth Formation	Sand, fine- to coarse-grained, silty or clayey, reddish brown, glauconitic. Localized occurrences of poorly sorted coarse-grained sand.							Matawan aquifer	Matawan aquifer	Englishtown aquifer	Reported to function as an aquifer in Talbot County, Maryland. Probably functions as a confining bed in most other areas. The average thickness is probably less than 50 ft.
		Not present	Matawan Formation	Matawan Group undifferentiated	Sand, fine-grained, silty or clayey, dark gray, micaceous, glauconitic							Matawan confining unit	Matawan confining unit	Merchantville–Woodbury confining unit	Confining unit. Thickness ranges from 0 to greater than 100 ft.
			Magothy Formation	Magothy Formation	Sand, loose, fine to coarse-grained, white, associated with lignite and dark laminated silt-clay sands and gravels, coarser near base. Top grades texturally into clays.		Magothy aquifer	Magothy aquifer				Magothy aquifer	Magothy aquifer	Upper Potomac–Raritan–Magothy aquifer	Aquifer contains leaky or laterally discontinuous confining units in some areas. The aquifer is typically 50–100 ft thick but up to 200 ft thick near Annapolis, Maryland.
									Upper Potomac confining unit		Patapsco confining unit		Patapsco confining unit	Confining unit. Thickness ranges from 0 to greater than 400 ft.
			Patapsco Formation	Potomac Formation	Sand, fine to medium grained, interbedded with variegated (red to gray) silt to clay. Abrupt lateral and vertical changes in lithology. Predominantly sandy in the north, becoming increasingly silty toward the south.	Patapsco aquifer	Patapsco aquifer (Hansen, 1972)	Upper hydrologic zone (Sundstrom and others, 1967)	Upper Potomac aquifer	Patapsco aquifer	Patapsco aquifer	Patapsco aquifer	Middle Potomac–Raritan–Magothy aquifer	Multiaquifer system. The aquifer pinches out at the Fall Line and thickens downdip toward the southeast, reaching at least 2,000 ft, as penetrated by well DO Ce 88 in Dorcester County. Farther southeast, the freshwater part thins, due to a thickening wedge of saline water beneath it.
									Middle Potomac confining unit					
	Lower Cretaceous	Potomac Group: Patapsco Formation							Middle Potomac aquifer					
		Potomac Group: Arundel Formation	Arundel Formation		Clays, thick, variegated, dense with increasing amounts on interbedded sand lenses in a downdip direction from the outcrop zone.				Lower Potomac confining unit	Potomac confining unit	Potomac confining unit	Potomac confining unit	Confining unit	Confining unit. Thickness ranges from 0 to greater than 600 ft.
		Potomac Group: Patuxent Formation	Patuxent Formation		Sand or pebbly sand and gravel, medium- to coarse-grained, with abrupt lateral and vertical changes to variegated (red to gray) silt and clay.	Patuxent aquifer	Patuxent aquifer (Hansen, 1972)	Lower hydrologic zone (Sundstrom and others, 1967)	Lower Potomac aquifer	Patuxent aquifer	Patuxent aquifer	Patuxent aquifer	Lower Potomac–Raritan–Magothy aquifer	Multiaquifer system. The aquifer pinches out at the Fall Line and thickens downdip toward the southeast, reaching at least 358 ft, as penetrated by well QA Eb 110 in Queen Annes County. Farther southeast, the freshwater part thins, due to a thickening wedge of saline water beneath it.
Jurassic (?) to Precambrian		Basement rocks	Basement rocks	Basement rocks	Schists, granites, gneisses and gabbros	Basement rocks	Basement rocks	Basement rocks	Basement rocks	Basement rocks	Basement rocks	Basement rocks	Bedrock confining unit	Confining unit. Thickness unknown.

[1] Since this plate was prepared, the Old Church Formation (a new unit) of latest Oligocene and earliest Miocene age has been assigned to the base of the Chesapeake Group in the subsurface of Maryland and possibly Delaware (Ward, 1986).
[2] Recent work on cores from two drill holes in southern Maryland and northern Virginia has identified fossil pollen and spores of late Early Cretaceous (Albian) age (Ronald Litwin, U.S. Geological Survey, written commun., 1987; D.J. Nichols, U.S. Geological Survey, written commun., 1985) in deposits designated "Brightseat aquifer" in this report.

GENERALIZED STRATIGRAPHIC CORRELATIONS AND DESCRIPTIONS OF GEOLOGIC AND HYDROGEOLOGIC UNITS OF THE COASTAL PLAIN OF MARYLAND, DELAWARE, AND THE DISTRICT OF COLUMBIA