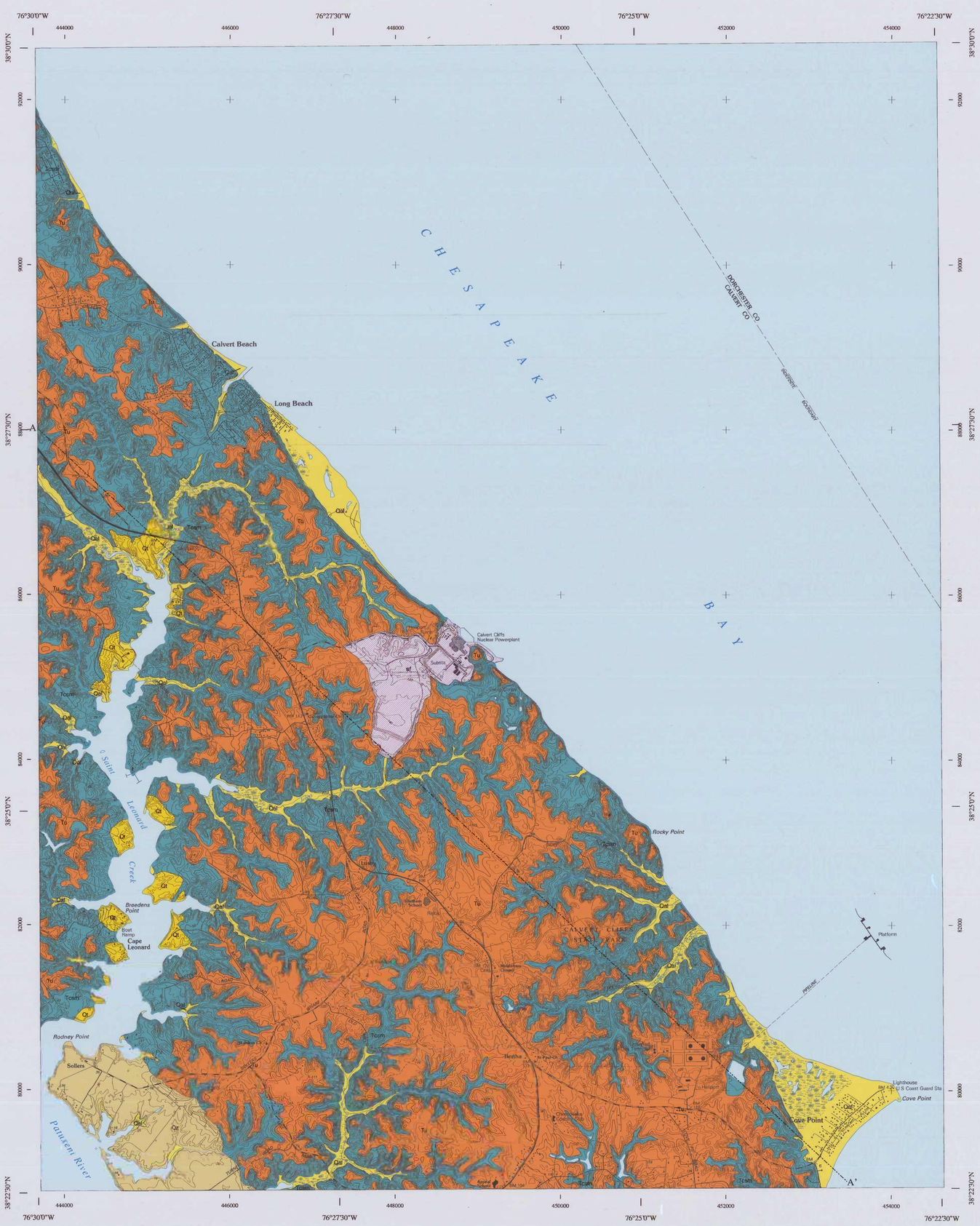


Base map from U.S. Geological Survey
7.5-minute Series (Topographic)
Cove Point, MD, 1987
1987 magnetic north declination (center of sheet): 10 degrees west
(To determine current magnetic declination see: http://www.ngdc.noaa.gov/cgi-bin/seg/gmag/fldsnth1.pl)

Note:
Hydrology layer shown is from USGS digital line graphs (DLGs) for this quadrangle
Topography and cultural/transportation layers from USGS stable-base film separates
Topography by photogrammetric methods from aerial photographs taken 1981.
Field checked 1982. (Base) map edited 1987.

Current map projection:
Maryland State Plane Coordinate System 1987
(Projection: Lambert Conformal Conic, 1980 geodetic reference system)
(Horizontal Datum: North American Datum 1983)

State Plane 2000-meter tics, grid tics and coordinates shown in black
Geographic coordinates (latitude-longitude) shown at 2.5' intervals in black

Geologic Map of the Cove Point Quadrangle, Calvert County, Maryland

By
John D. Glaser
2003

Adjoining 7.5' Quadrangle Names
Cove Point Quadrangle, shaded

1	2	3	1. Prince Frederick 2. North of Cove Point 3. Sharps Island 4. Broomes Island 5. Taylors Island 6. Hollywood 7. Solomons Island 8. Barren Island
4		5	
6	7	8	

GN
(State Plane Grid North)

Scale 1:24,000

1 0.5 0 1 Miles
1,000 0 1,000 2,000 3,000 4,000 5,000 6,000 7,000 Feet
1 0.5 0 1 Kilometers

Contour Interval 10 Feet
National Geodetic Vertical Datum of 1929
Shoreline represents the approximate line of mean high water
The mean range of tide is 1.3 feet
(To convert from feet to meters, multiply by 0.3048)

Quadrangle Location

Explanation of Map Symbols

Topographic and Hydrologic Symbols

- Topographic Contour – Index (50–ft interval)
- Topographic Contour – Intermediate (10–ft interval)
- Stream
- Water body (including lakes, ponds, streams)
- Marsh, wetland, swamp, or bog

STATE OF MARYLAND
Robert L. Ehrlich, Jr.
Governor

Michael S. Steele
Lieutenant Governor

DEPARTMENT OF NATURAL RESOURCES
C. Ronald Franks
Secretary

W. P. Jensen
Deputy Secretary

MARYLAND GEOLOGICAL SURVEY
Emery T. Cleaves
Director

DESCRIPTION OF MAP UNITS

af — **Artificial fill**

Heterogeneous unstratified materials such as sand, gravel, clay, slag, construction debris, and dredge spoil. Only major areas of filled or highly disturbed ground have been mapped.

Quaternary

Holocene

Qal — **Alluvium**

Interbedded sand, gravel, and silt-clay.

Sand, quartzose, fine–to coarse-grained, variably clayey; includes some pebbly sand and fine to coarse quartz gravel. Silt-clay beds thin, lenticular, in places bearing logs, twigs, and leaves, and rarely thin peats. Color tan, gray, or brown.

Alluvium includes heterogeneous, moderately–to poorly-sorted sediments underlying floodplains and channels of streams in the quadrangle. These sediments are generally water-saturated and loosely consolidated in lenticular, internally massive beds. Also mapped under this heading are two large areas of beach sand and associated marsh making up Cove Point and Flag Ponds. Each of these large flats is a complex of successive beach ridges comprised of loose, cross-stratified sand. The ridges are backed by extensive tracts of marsh, particularly in the case of Cove Point.

Although radiocarbon dates are not available to document the age of these deposits, they are generally ascribed to fluvial, estuarine, or wind deposition during the last 10,000 years. In general, alluvium is thin, less than 25 feet (7.6 m).

Pleistocene

Qz — **Quaternary Lowland deposits (undivided)**

Interbedded sand, silt-clay, and minor pebbly sand.

Sand, fine–to coarse-grained, variably clayey, with subordinate pebbly sand and thin gravels near base of unit. Sand mostly poorly-sorted and clayey; fine to medium clean sand much subordinate. Sediment color is tan, gray-green to dark gray; silt-clay is dark with plant fragments in places. Fossiliferous in places; fauna dominated by modern mollusks. Oysters make up most of the fauna in some beds.

Included in this informal map unit are some deposits that were identified as fluvial terrace deposits flanking the Patuxent River on the Calvert County geologic map (Glaser, 1994). Lowland deposits are made up largely of detritus eroded from the adjoining highland areas, redeposited by the ancestral Patuxent River as fluvial or estuarine sediments. Thus, they range from freshwater to brackish in environment of deposition. Sediments presumed to be correlative to the Lowland deposits elsewhere in the Chesapeake Bay area range in age from 24,000 to as old as 180,000 years (e.g., McCartan, 1989).

These sediments collectively lie at 60 feet (18.3 m) or less in elevation. The thickness of these sediments ranges from less than 5 feet (1.5 m) to a maximum of 50 feet (15.2 m).

Qt — **Terrace deposits**

Sand and gravel.

Sand, quartz, fine–to medium-grained, with thin beds of fine to medium quartz gravel. Color white, pale-gray, or brown. Thin flat bedding prevalent, cross-bedded in places or massive.

In this quadrangle, Terrace deposits comprise a discontinuous series of small fluvial terraces flanking St. Leonard Creek, most terrace surfaces at 40 feet (12.2 m) or less in elevation. These mostly sandy sediments show minimal oxidation and are relatively young, probably Quaternary in age. They are the record of valley cutting by St. Leonard Creek and channel deposition. The terraces are underlain by as much as 35 feet (10.7 m) of sediment.

Note: The relationship between the ages of the Terrace deposits and the Lowland deposits is not well defined. These units may represent coeval deposition is some places and not in others.

Tertiary

Upper Miocene – Pliocene

Tu — **Upland deposits (former Brandywine Formation)**

Sand, gravel, and minor silt-clay.

Sand, quartzose, medium–to coarse-grained, poorly-sorted, pebbly in places, interstratified with many thin beds of fine gravel. Pebbles consist of vein quartz, sandstone, and chert. Silt-clay beds rare. Sand is tan, yellow, and reddish-brown; clay is buff, pale gray, and/or red. Bedding lenticular, cross-bedded; rarely massive or flat-bedded.

The unit occupies dissected upland areas of the quadrangle. The base of the unit lies at about 100 feet (30.5 m) elevation across the northern tier of the map area, declining to 80 feet (24.4 m) or less in the south. Exposures are relatively poor in the quadrangle except for a few deep road cuts and stream valley walls. Where intact, the formation sand and gravel capped with as much as 15 feet (4.6 m) of reddish-brown massive sandy loam bearing "floating" pebbles. The base of the unit is erosional on the Choptank-St. Marys part of the Chesapeake Group, but the contact is obscure where similar light-colored sand with gravel comprises the uppermost St. Marys.

The Upland deposits are typically fluvial in origin, generally regarded as a channel-floodplain couplet laid down by a river or rivers, probably the ancestral Potomac during late Miocene or Pliocene time (e.g., Hack, 1955; Schlee, 1957; Glaser, 1971). Unit thickness is as much as 40 feet (12.2 m), but generally less.

Middle Miocene

Tcsm — **Choptank and St. Marys Formations**

Sand, sandy clay, and clay.

Sand, quartzose, fine–to medium-grained, variably clayey, interbedded gradationally with clay and sandy clay. Sand dark-gray to gray-green where unweathered; pale-gray or yellow to whitish where weathered and in uppermost St. Marys Formation. The latter contains beds of coarse quartz sand, granule beds, and thin pebbly layers. Choptank and lower St. Marys strata are variably fossiliferous, peaking in two thick shell-packed sand units – the Drumcliff and Boston Cliffs Members – in the Choptank.

The Choptank-St. Marys contact is a sand-on-sand discontinuity, which is unmappable outside of the type section, and consequently, the two formations are mapped as a single unit. Similarly, the contact between the Choptank and the underlying Calvert is within a sequence of similar muddy sands, also untraceable inland from the type section. Consequently, the lower contact of the Choptank is herein repositioned to the base of the Drumcliff Member, a horizon, which has proved mappable throughout the map area. [This is in agreement with the base of the unit as defined by Kidwell (1984) and the Calvert County geologic map (Glaser, 1994) but differs from some other earlier workers (e.g., Gernant, 1970, 1971; Gibson, 1971).] Moreover, the St. Marys Formation has been expanded to include sandy strata heretofore included in the Upland Deposits. Thus, the repositioned St. Marys-Upland Deposits contact now lies at the base of the generally coarser-grained oxidized sand and gravel section exhibiting fluvial sedimentary structures.

The typical Choptank-St. Marys section in the map area is as follows. The basal Choptank consists of 8 to 30 feet of pale yellowish-brown, fine-grained, well-sorted, sand (Drumcliff Member) containing conspicuous layers of molluscan shells dominated initially by large *Isognomen*. Overlying the Drumcliff is about 20 feet (6.1 m) of fine-grained, dusky-blue muddy sand with few fossils (St.Leonard Member). The St. Leonard is succeeded by the Boston Cliffs Member, which is about 15 feet (4.6 m) thick. The Boston Cliffs Member is similar to the Drumcliff in both lithology and fossil content. The top of the unit is oxidized and limonite–cemented, suggesting subaerial exposure. Overlying the Boston Cliffs Member is a variable sequence of gray to gray-green, fine to medium-grained, muddy to clean sand, interbedded with dark-gray silty to plastic clay (Conoy Member and lowest St. Marys Formation). Bands of fossils, rich in gastropods, are scattered throughout the sand. This sequence grades upward to predominantly dark-gray clay with lenticles of laminated silt laced with well-defined burrows, interbedded with well-sorted non-fossiliferous sand. The sands grade upward into a few tens of feet of pale-gray to yellow or orange sand, fine–to coarse-grained, locally with pebble bands and thin lenticular pale-gray clay lenses. These beds are marked by *Ophiomorpha* burrows, diagnostic of the shoreline environment. The contact with the overlying Brandywine Formation is marked locally by a line of cobbles.

The Choptank-St. Marys section is overall a marine regressive sequence and records environments ranging from shallow marine shelf in the Choptank, to nearshore and marginal marine facies in the upper St. Marys. Within the overall regressive trend, however, several lesser transgressive-regressive cycles are indicated within the Choptank Formation (e.g., Kidwell, 1984; Gernant, 1970). The Choptank and St. Marys Formations are considered middle Miocene in age. The thickness of the combined section is 150 feet (45.7 m) at maximum.

References cited

Gernant, R. E., 1970, Paleoecology of the Choptank Formation (Miocene) of Maryland and Virginia: Maryland Geological Survey Report of Investigations, v. 12, 90 p.

———, 1971, Invertebrate biofacies and paleoenvironments, in R. E. Gernant, T. G. Gibson, and F. C. Whitmore, Jr., eds., Environmental History of Maryland Miocene: Maryland Geological Survey Guidebook, v. 3, p. 19–30.

Gibson, 1971, Miocene of the middle Atlantic Coastal Plain, in R. E. Gernant, T. G. Gibson, and F. C. Whitmore, Jr., eds., Environmental History of Maryland Miocene: Maryland Geological Survey Guidebook, v. 3, p. 1–15.

Glaser, J. D., 1971, Geology and mineral resources of southern Maryland: Maryland Geological Survey Report of Investigations, no 15, 84 p.

———, 1994, Geologic map of Calvert County (blueline only): Maryland Geological Survey, scale 1:62500.

Hack, J. T., 1955, Geology of the Brandywine area and origin of the upland of southern Maryland: U.S. Geological Survey Professional Paper, 267–A, 43 p.

Kidwell, S. M., 1984, Outcrop features and origin of basin margin unconformities in the lower Chesapeake Group (Miocene), Atlantic Coastal Plain: American Association of Petroleum Geologists Memoir 36 p. 37–58.

Schlee, J. S., 1957, Upland gravels of southern Maryland: Geological Society of America Bulletin, v. 68, p. 1371–1409.

Shattuck, G. B., 1902, Map of Calvert County showing geological formations: Maryland Geological Survey, scale 1:62,500.

———, 1906, The Pliocene and Pleistocene deposits of Maryland, in Clark W. B., et al., Pliocene and Pleistocene: Maryland Geological Survey p. 21–138.

Supplemental Information

Use Constraints: These data represent the results of data collection/processing for a specific Department of Natural Resources, Maryland Geological Survey activity and indicate general existing conditions. As such, they are only valid for the intended use, content, time, and accuracy specifications. The user is responsible for the results of any application of the data for other than their intended purpose. Neither the licensor, nor the owner of these data makes any warranty, expressed or implied, as to the use or appropriateness of the licensed data, and there are no warranties of merchantability or fitness for a particular purpose of use. The Maryland Geological Survey makes no representation to the accuracy or completeness of the data and may not be held liable for human error or defect. Data are only valid at 1:24,000 scale. Data may not be used at a scale greater than that.

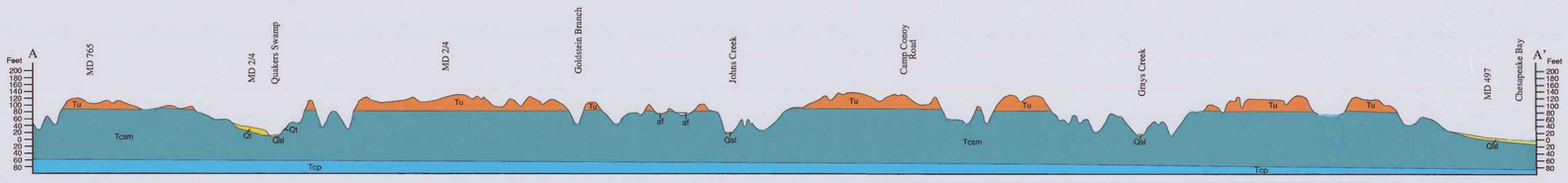
Acknowledgements: This map was funded in part by the USGS National Cooperative Geologic Mapping Program. The views and conclusions contained in this document are those of the author and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Government.

Geologic field mapping was completed in 1999. Geologic map compiled in digital form and edited by Heather Quinn, Maryland Geological Survey. Digital support provided in part by Catherine Garcia of Towson University, Center for Geographic Information Sciences.

The facilities and services of the Maryland Department of Natural Resources are available to all without regard to race, color, religion, sex, sexual orientation, age, national origin or physical or mental disability.

Published September 2003
Version: COVEP2003.1

CROSS SECTION A-A'
Vertical Exaggeration 10x



Copies of this map are available
in hard copy (paper) and digital form from:
MARYLAND GEOLOGICAL SURVEY
2300 Saint Paul Street
Baltimore, MD 21218
Ph: 410–554–5500
Fax: 410–554–5502
http://www.mgs.md.gov/