Geologic Map of Portions of the Hancock, Cherry Run, and Big Pool Quadrangles, Washington County, Maryland

By
John D. Glaser
2003

Scale 1:24,000

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/

GN
(State Plane Grid North)

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

Contour Interval 20 Feet
National Geodetic Vertical Datum of 1929
(To convert elevations to the North American Vertical Datum of 1988, subtract 1 foot)
(To convert from feet to meters, multiply by 0.3048)

Base maps derived from U.S. Geological Survey
7.5-minute Series (Topographic)
Hancock, Cherry Run and Big Pool Quadrangles (1:24000)

Hydrology and hypsography shown are from USGS digital line graphs (DLGs) for these quadrangles
Culture/transportation shown are from USGS stable-base film separates:
Hancock, MD-WV-PA-- 1996
(Topography compiled 1947. Survey control current as of 1951.
Planimetry derived from imagery taken 1996 and other sources.)
1999 magnetic north declination (center of quadrangle): 10 degrees west
Cherry Run, WV-MD-PA -- 1998
(Topography compiled 1947. Survey control current as of 1951.
Photoinspected using imagery dated 1998. No major culture or drainage changes observed.
Boundaries revised 2001.)
2001 magnetic north declination (center of quadrangle): 10 degrees west
Big Pool, MD-WV -- 1998
(Topography compiled 1947. Survey control current as of 1958.
Planimetry derived from imagery taken 1979 and other sources.
Photoinspected using imagery dated 1998; no major culture or drainage changes observed.
Boundaries revised 1999.)

(To determine current magnetic declination see: http://www.ngdc.noaa.gov/cgi-bin/seg/gmag/fldsnth1.pl)

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

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

Adjoining 7.5' Quadrangle Names
Portions of the Hancock, Cherry Run,
and Big Pool Quadrangles, shaded

1	2	3
	6	
7	8	9

1. Needmore (PA)
2. Big Cove Tannery (PA)
3. Mercersburg (PA)
4. Hancock
5. Cherry Run
6. Clear Spring
7. Scalers Crossroads (WV)
8. Big Pool
9. Hedgesville

Quadrangle Location

Explanation of Map Symbols

Topographic and Hydrologic Symbols

- Topographic Contour - Index (100- ft interval)
- Topographic Contour - Intermediate (10- ft interval)
- Stream
- Water body (including lakes, ponds, streams)

Contacts

- Contacts; concealed - dotted line, certain - solid line

Planar Features

- Inclined bedding, strike and dip shown
- Vertical bedding, strike shown
- Horizontal bedding

Faults

- D U Upthrown Side, D Downthrown Side
- Faults; concealed
- Faults; approximate, not dotted where concealed
- Faults; inferred, not dotted where concealed

DESCRIPTION OF UNITS

Quaternary

Qal — Alluvium

Sand, silt, and gravel. Light gray to brown, weathering to tan, yellow, or orange-brown.

Alluvium consists mostly of poorly sorted muddy sand or silt, pebbly in part, containing angular to subrounded clasts of locally derived rocks, chiefly sandstone or siltstone. Bedding is poorly indicated in most sections.

These sediments are Holocene in age, having accumulated during the post-Wisconsinan alluvial cycle, and are now undergoing dissection.

Qt — Terrace deposits

Sand, silt, loam, and gravel. Medium gray to light brown or tan, weathering (oxidizing) to orange-brown or reddish-brown.

Poorly sorted and poorly bedded sandy to loamy sediments, generally bearing pebbles, cobbles, and boulders up to several feet diameter. Nearly all of the clasts consist of resistant sandstone or silstone. Terrace deposits rarely exceed 20 feet in thickness, and most are much thinner, averaging between 5 to 15 feet in thickness. The largest area covered by terrace sediments extends downstream from the mouth of Licking Creek for about 2 miles.

The youngest Potomac River terraces can be found from an elevation of 450 to 550 feet down to the Holocene alluvium overlap. An older series of deposits is widely scattered around the 600- to 700-foot elevations. Several such high terraces, capping hills along Little Tonoloway Creek just west of Hancock, may be associated with an ancient Potomac River channel that cuts north along Long Hollow in the Bellegrove Quadrangle.

The age of these terrace sediments is not known since they contain no fossils. However, their position well above the Holocene alluvium implies a late Tertiary or early Quaternary age. The advanced degree of weathering and erosion of the highest and oldest of the terraces suggests a much greater age, possibly as old as Miocene.

Tertiary

Devonian

Dh — Hampshire Formation

Sandstone, siltstone, and shale. Grayish red to dusky red, mottled with greenish gray in some beds; subordinate greenish gray to medium gray strata in most areas.

The Hampshire consists mostly of reddish brown, fine- to medium-grained, thin- to very thick-bedded, cross-bedded, lenticular sandstone, ranging to massive in some beds. Lumpy irregular bedding is commonplace, as is thin flaggy laminated bedding. The interbedded siltstones are generally micaceous and laminated. Hampshire shale units are mostly fissile, but also range to hackly or massive, and commonly display brighter red hues than the associated coarser clastics. Sedimentary structures typical of fluvial deposition, such as ripple marks, scour channels, and cut-and-fill features, are very common.

The base of the unit is marked by the first thick interval of red beds, above which the section is more than half red. Thus defined, the contact between the Hampshire and the underlying Foreknobs Formation occurs within the thick sequence of interbedded red and non-red strata mapped separately by Stose and Swartz (1912) as a "transition zone." The contact falls in the section from west to east across the map area.

The unit is about 2500 to 3000 feet thick in the map area, thickening eastward.

The Hampshire Formation is Late Devonian in age.

Devonian

●●●●●-Ss Df — Foreknobs Formation

Sandstone, siltstone, pebbly to conglomeratic sandstone, and minor shale.

The Foreknobs is comprised of sandstone, pebbly sandstone, and minor conglomerate, arranged in packages up to 50 feet thick, interbedded with similarly thick beds of siltstone and shale. The sandstone is fine- to coarse-grained, thin and flaggy to very thick-bedded (up to 12 feet), with even planar bedding concentrated in the lower Foreknobs, ranging to lenticular, lumpy, undulatory beds, especially in the upper portion of the unit. Foreknobs strata are locally pebbly or conglomeratic, bearing fine to medium quartz pebbles. The shales are for the most part coarsely fissile, varying to silty, bioturbated, and hackly-weathering, and arranged in thin to very thick massive beds. Foreknobs shales weather to elongate shards, and locally exhibit spheroids. Reddish brown, or less commonly dusky red, shale enters the section in the upper part of the unit, and in places, comprises tens of feet of section. The base of the unit has been positioned at the bottom of the lowermost thick package of medium-thick to thick sandstone strata in the section.

In the Hancock Quadrangle, Foreknobs strata crop out in two widely separated belts, one that barely enters the westernmost part of the map area and provides little exposure, and the second, a broad homoclinal belt straddling Tonoloway Creek with excellent exposure in bluffs along the stream and its lower tributaries. Outcrops are also extensive along Timber Ridge Road, where the interbedding of red and non-red sandstone near the upper contact with the Hampshire is particularly well-shown.

In the Cherry Run Quadrangle, coarse sandstone and conglomerate beds are concentrated at three separate horizons in the Foreknobs, the first near the base (ss1) and the others in the upper portion of the unit (ss2 and ss3). The lowest of the three (ss1) is the most prominent. Each of the sandstone-conglomerate units holds up a ridge, a feature evident in the topography in the core of the Meadow Branch Syncline east of Millstone. The road cuts for I-68 through this structure afford the best exposure of the Foreknobs in the map area. In this map, the three horizons of coarse sandstone and conglomerate are shown by a dense dot pattern.

The Foreknobs has a maximum thickness in the map area of about 3400 feet.

The Foreknobs Formation is early Late Devonian in age.

Db — Brallier Shale

Shale and siltstone, minor sandstone. Olive gray to greenish gray, medium gray in part, locally reddish brown or dusky red.

The Brallier is largely shale, thickly laminated and uniform, with interbeds of planar siltstone or, less commonly, fine-grained sandstones. Shales in the Brallier are typically fissile or platy, weather to small pale-greenish chips and equant chunks. Locally, the beds can be thick and massive, displaying hackly or spheroidal weathering, especially toward the top of the unit. Siltstones in the Brallier are mostly thin to medium-thick bedded. Thicker beds (to 5 feet) occur sporadically but with greater frequency toward the top of the formation. Brallier siltstones tend toward blocky weathering, yielding sharp-edged rectangular fragments, commonly with rusty surfaces. The siltstones show sedimentary structures typically associated with turbidite deposition, including sole markings (flute, groove casts, etc.), load casts, ripple marks, and graded bedding.

The formation as here defined includes the Parkhead Sandstone of Stose and Swartz (1912).

The Brallier is well-exposed in the Meadow Branch Syncline, notably in a series of cliffs overlooking Licking Creek through the central portion of the Cherry Run Quadrangle. The best outcrops are afforded by the road cuts, in the west by Resley Road and in the eastern belt along I-68.

The base of the unit is marked by a thin transition zone of laminated silty shale between typical Brallier interbedded fissile shale and planar siltstones, and massive thick-bedded coarse blocky siltstone of the underlying Mahantango. Due to poor exposure and the prevalence of small-scale folding, thickness estimates are difficult; at least 1500 feet of Brallier strata appear to be present in the area.

The Brallier is Late Devonian in age.

● ▪ ▲ cr/ch/sh Dm — Mahantango Formation

Siltstone, fine sandstone, and fossiliferous shale. Olive gray, weathering brownish gray or deep brown.

The Mahantango in the Hancock and Cherry Run Quadrangles is coarser grained and displays greater heterogeneity than it does west of Town Hill. The formation is dominated by two thick massive siltstone or fine-grained sandstone units with an intervening interval of 350 feet of monotonous uniform hackly and spheroidally weathering shaly siltstone and coarse shale (Frame Shale). The lower siltstone, the **Clearville Siltstone** (cl), consists of 90 to 100 feet of thin-bedded blocky-weathering fossiliferous siltstone, fine-grained sandstone, succeeded by a series of thinner planar bedded siltstone intervals, and capped by about 30 feet of thick-bedded massive blocky siltstone beds. The **Chaneysville Siltstone** (ch) near the top of the formation is about 180 to 200 feet thick, and consists of massive thick-bedded blocky siltstone and fine sandstone with some interbedded fine-granule conglomerate beds. In this map, both the Clearville and the Chaneysville Siltstones are shown as a spaced-dot pattern (dashed where inferred).

The most complete Mahantango section in the map area, exposed in the banks of Licking Creek about one-half mile north of Pecktonville, contains about 1200 feet of strata.

The Mahantango is Middle Devonian in this area.

Dmn — Marcellus - Needmore Shales (undifferentiated)

Shale, and minor calcitic shale and limestone. Because of poor exposure, the Marcellus and Needmore are not differentiated.

The Marcellus Shale is dark grayish black, fissile to papery, homogeneous shale, which weathers to thin white-edged flakes. Near the middle of the unit is a thin zone of calcitic shale containing a few beds or nodule zones of argillaceous limestone.

The best outcrop in the map area is a recently worked quarry opened in intensely folded black shale on Mooresville Road on the northwest flank of Moore Knob.

Due to inadequate exposure, the thickness of the Marcellus can only be estimated at 200 to 400 feet.

The underlying Needmore Shale consists of calcitic and non-calcitic, medium to dark gray, ranging to grayish black, shale weathering light olive gray and chippy. The upper portion has thin- to medium-bedded argillaceous limestone. Shale in the lower part of the unit is non-calcareous. In the area around Elbow Ridge, the base of the Needmore is marked by a thin conglomeratic bed containing quartz pebbles.

The Needmore Shale averages about 125 feet of thickness and contains a sparse fauna of trilobites and brachiopods.

The Marcellus and Needmore Shales are early Middle Devonian in age.

Do — Oriskany Sandstone

Sandstone, pebbly sandstone, and minor conglomerate. Pale bluish gray to medium gray, weathering to pale gray or dirty white.

The Oriskany consists of fine- to coarse-grained, thin- to mostly thick-bedded (to 8 feet) calcareous, locally cross-bedded, fossiliferous sandstone. Many beds in the upper part of the formation grade to sandy limestone and contain up to 40 percent chert layers.

The Oriskany forms Tonoloway Ridge, but the best outcrop of the formation is in an abandoned quarry just south of I-68 at Sandy Mile Road where more than 200 feet of sandstone is exposed. At Cove Mountain this formation is mostly coarser with considerable fine conglomerate in the section. Excellent outcrops occur on the western flank of Moore Knob where the formation crops out in a series of conspicuous cliffs.

The Oriskany is probably as thick as 300 feet in Tonoloway Ridge, but is reduced to as little as 50 feet in Cove Mountain. It becomes notably thinner eastward, reaching a maximum thickness of only about 70 feet in the Cherry Run Quadrangle.

The Oriskany is late Early Devonian in age.

Devonian

DSkh — Keyser-Helderberg Limestones (undifferentiated)

Predominantly gray limestone. Owing to poor exposure the Helderberg and Keyser formations are not differentiated on the map.

The Helderberg Limestone is medium gray to grayish black limestone and shale with minor chert, and sandstone. Weathers pale gray to light gray; sandstone weathering orange to brown.

In the Cherry Run Quadrangle, the Helderberg consists of the basal New Creek Limestone, succeeded by the **Elbow Ridge Sandstone** (er), Corrigamville Limestone, and Licking Creek Limestone. The New Creek is present as 5 feet or less of coarse crinoidal calcarenite. In contrast, the overlying Elbow Ridge is a pale gray calcareous cross-bedded orthoquartzite, 16 to 20 feet thick, and weathers to yellowish or orange rusty porous sandstone blocks that litter the outcrop. The sandstone is characterized by large molds of crinoid columnals and brachiopods. In this map, the Elbow Ridge is shown by a long dash pattern. Succeeding the Elbow Ridge is the Corrigamville Limestone, 20 to 28 feet thick, comprised of fine- to coarse-grained, medium gray bioclastic limestone containing pods and nodules of brown-weathering chert. At the top of the Helderberg is the Licking Creek Limestone, which at about 120 feet thick. The Licking Creek is divided into two members. The lower, the Cherry Run Limestone, consists of up to 85 feet of very cherty dark gray limestone with minor dark calcareous shale and interbeds of massive nodular black chert. The upper member, the Warren Point Limestone is a light gray, medium- to thick-bedded, coarsely crystalline, fossiliferous limestone, with a maximum thickness of 33 feet. A pavement of black chert blocks littering the soil surface is diagnostic of the Cherry Run Limestone.

The Helderberg is Early Devonian in age.

The Keyser Limestone consists of coarsely crystalline, medium gray, massive, nodular, clastic limestone, medium- to thick-bedded (to 6 feet) through most of the unit.

The lower half to three-quarters of the Keyser is mostly thick, massive beds of nodular lumpy limestone containing abundant corals and stromatoporoids. The upper Keyser is predominantly thin-bedded cherty fossiliferous limestone, most of which lacks the nodular character typical of the lower part of the formation. These beds are sharply overlain by the New Creek Limestone of the Helderberg.

The Keyser is not well-exposed in the map area. One of the better exposures is an abandoned quarry on Sandy Mile Road and the south side of I-68. Good outcrops can also be found in the north end of Roundtop Hill, where steep bluffs of massive limestone ring the crest. Smaller and much less complete exposures are present in the road cuts through Cove Mountain around Hancock.

The Keyser, in the map area, has a maximum of about 300 feet and is latest Silurian in age.

Silurian

Tonoloway Limestone — St

Limestone and dolomite, subordinate calcareous shale, and a thin sandstone unit.

Most of the Tonoloway consists of medium to light gray, mudcracked, finely crystalline, mostly thin-bedded, finely laminated limestone, dolomite and dolomitic limestone. In weathered outcrops, laminations are conspicuous. Minor layers of grayish black coarsely fissile, calcareous shale are present in the lower portion of the formation. Approximately 100 feet above the base of the Tonoloway is the **Indian Spring Sandstone** (is). This unit consists of 6 to 9 feet of fine-grained, medium-bedded, lumpy quartzitic sandstone that weathers orange-brown in color. In the Cherry Run Quadrangle, the sandstone is conspicuous at the base of Moore Knob. In this map, the Indian Spring Sandstone is shown as a short dash pattern (dotted where concealed).

The Tonoloway is well-exposed in the map area in the quarry of the Mellott Company 1.5 miles northwest of Hancock. Another good exposure occurs in an abandoned quarry located just south of the I-70/I-68 interchange, as well as in the road cuts of the interchange itself.

About 400 feet of Tonoloway section is present in the map area.

The Tonoloway is Late Silurian in age.

Wills Creek Formation — Swc

Shale, limestone, claystone, and subordinate sandstone. Medium to pale gray, locally reddish, greenish, or tan, weathering yellowish green or pale gray.

The Wills Creek consists mainly of greenish gray (locally red) shale and claystone with gray limestone increasing in abundance and thickness upsection. The shale and claystone intervals weather to yellowish green chips. The upper Wills Creek contains one or more generally thin bedded beds of hard **quartzitic** and/or **argillaceous sandstone** (ss), which hold up a series of linear ridges within the outcrop belt. The sandstone is fine- to medium-grained and thin- to medium-bedded, with lumpy, irregular bedding surfaces. The presence of the sandstone is indicated locally by rubble zones on hill tops. In this map, the quartzitic and/or argillaceous sandstone is shown as a continuous dotted line pattern.

About 400 feet of Wills Creek strata is present in the area.

The Wills Creek-Tonoloway contact is transitional and has been arbitrarily placed at the top of the highest bed of yellowish green weathering calcareous shale, above which dark bluish gray laminated slabby limestone prevails.

The Wills Creek is Late Silurian in age.

Bloomsburg Formation — Sb

Grayish red to purplish red, sandstone and siltstone grading to shale and mudrock with local pale green mottling.

The Bloomsburg in the map area consists mainly of soft mudrock and coarse hackly shale, but most exposures are the sandstone-siltstone lithology. Bedding in these competent lithologies ranges from thin to very thick (to 6 feet or more).

Road cuts along Sandy Mile Road and MD 144 west of Hancock afford excellent exposures of folded Bloomsburg strata.

In the Cherry Run Quadrangle, a series of low cliffs along Rattle Run in red siltstone and coarse shale provide the only good outcrops in that area.

The base of the formation is placed at the lowermost red bed overlying the pale calcareous shale or limestone of the McKenzie, and the upper contact at the top of the highest red bed overlain by non-red Wills Creek Shale. The formation has been ascribed a thickness of 200 feet by some earlier workers, but this probably includes considerable red beds belonging to the Wills Creek Formation, which is mostly red in the Bear Pond Mountains. Perhaps less than 100 feet of strata should be assigned to the Bloomsburg.

The Bloomsburg Formation is Late Silurian in age.

Sm — McKenzie Formation

Shale, calcareous in part, and limestone. Limestone dark gray to bluish gray; shale grayish green to pale green, tan, reddish, or olive green.

The McKenzie Formation is mostly calcareous, fissile to lumpy or hackly shale. The shale, in places, is finely laminated and interbedded with thin dark gray, rippled, fossiliferous limestone. These limestone beds are highly fossiliferous with some beds crowded with brachiopods and ostracodes. As much as one-third of the formation consists of red terrigenous strata resembling the Bloomsburg redbeds.

The McKenzie Formation is 200 feet thick in the Hancock Quadrangle, but reaches 300 feet in the Cherry Run Quadrangle. The contact with the overlying Bloomsburg is sharp and conventionally placed at the top of a greenish gray shale section and the bottom of the first thick sequence of red beds.

The McKenzie Formation is early Late Silurian in age.

Sk — Keefer Sandstone

Sandstone. Light gray to yellowish tan, varying to reddish gray.

The Keefer is fine- to medium-grained sandstone, thin-bedded in the upper and lower portions but thick-bedded (to 30 inches) in the middle part. Bedding planes in the Keefer tend to be lumpy and irregular, some with sinuous trails. The Keefer is moderately fossiliferous with small brachiopods and some crinoid debris. *Scolithus* tubes can be found in some beds.

The Keefer Sandstone is about 30 feet thick in the map area.

The age of the Keefer Sandstone is early Late Silurian in the map area.

■ ■ ■ c Srh — Rose Hill Formation

Shale, siltstone, and minor sandstone. Light olive green, grading to pale reddish gray and light red; light gray, greenish gray, and deep purple-brown sandstone.

The Rose Hill Shale is mostly fissile, papery, fairly homogeneous shale, typically weathering to rusty chips. The shale is interbedded with thin laminated or cross-laminated beds of sandstone that are concentrated in the lower portion of the unit. The unit also contains scattered thin mudrock beds, a few siltstones, and some thin argillaceous limestone beds in the upper portion.

About 150 to 170 feet above the base of the Rose Hill is the **Cresaptown Ironstone** (c), comprised of 20 to 30 feet of fine-grained hematitic sandstone in thin to very thick (to 5 feet) beds, displaying ripple marks, cross-bedding, and shale chips. Minor amounts of green to gray-red coarse shale are interbedded with the sandstone. In this map, the Cresaptown Ironstone is shown by a block pattern.

The contact between the Rose Hill and the succeeding Keefer Sandstone is transitional over several feet of interbedded thin shale and tan sandstone beds. The true thickness of the Rose Hill is difficult to determine because it has been generally subjected to a great deal of minor folding and faulting. Its apparent thickness in Bullskin Mountain is about 300 feet.

The Rose Hill Formation is Early Silurian in age.

St — Tuscarora Sandstone

Sandstone, pebbly sandstone, and very minor shale. Yellowish gray to light gray; shale gray to olive gray. Does not crop out in the Hancock Quadrangle.

The Tuscarora is almost entirely light gray to very light gray, fine- to coarse-grained, thin- to medium-bedded, massive to cross-laminated sandstone. The sandstone is interbedded with minor amounts of shale in thin beds, and is pebbly in places. Bed surfaces commonly show casts of sinuous intersecting trails (*Arthrophycus*).

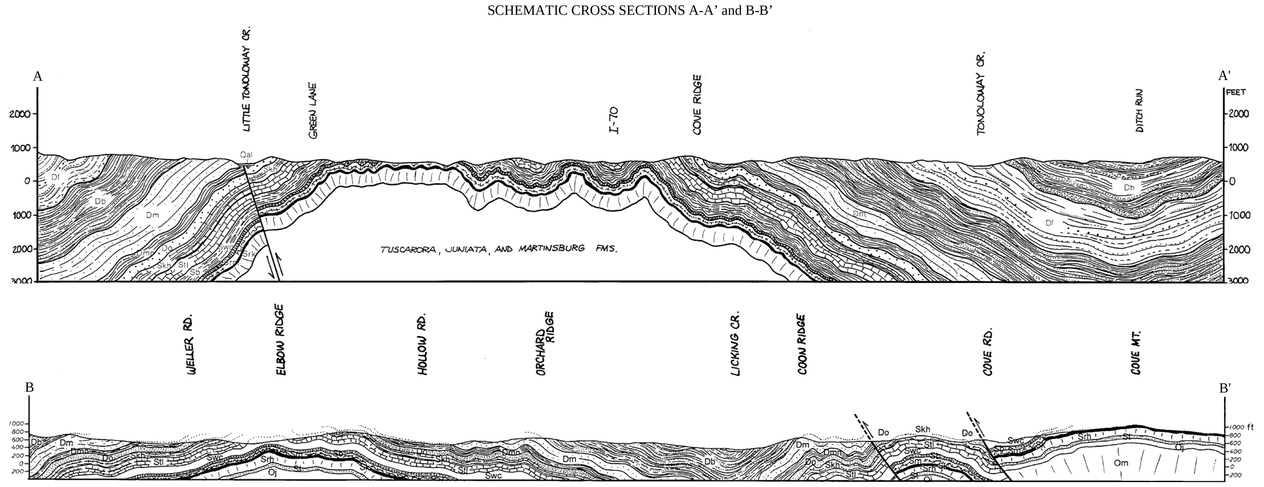
The Tuscarora is a competent ridge-maker, and holds up the crest of Bullskin Mountain along the far eastern edge of the map area. Outcrops are fairly good, especially along the southern edge of the belt. The thickness of the unit in the map area can only be estimated at less than 100 feet, as the top is not present.

The Tuscarora Sandstone is Early Silurian in age.

References cited

Stose, G. W., and Swartz, C. K., 1912, Pawpaw-Hancock Folio. U.S. Geological Survey Atlas No.170

SCHEMATIC CROSS SECTIONS A-A' and B-B'



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

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 geologic 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 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: HCRBP2003.1