

Description of Map Units

Unit	Description
Qal	<b>Alluvium</b> Reddish brown, poorly sorted mixture of rounded pebbles to boulder-sized clasts with sand, silt, and clay, as interbeds and interstitial matrix. Locally, layers of moderately well sorted, rounded cobbles or sandstone pebbles are present. Thickness estimated at 1.0 foot to more than 15 feet especially along the Monocacy River.
Qc	<b>Colluvium</b> Coarse cobbles, boulders, and blocks of quartzite that were transported by gravity and debris flow, and modified by freeze-thaw processes, concentrated in hillside depressions and hollows on Sugarfoot Mountain; thickness ranges from a thin veneer to greater than 10 feet. Includes subangular to subrounded pebbles and cobbles of quartzite and vein quartz derived from rocks of the Blue Ridge-South Mountain anticlinorium in fan-like aprons covering the strata along the western margin of the Culpeper basin. Thickness ranges from a thin veneer to 3 feet.
Qr	<b>Weathering residuum</b> Mixture of moderate reddish brown soil and pebbles to blocks of grayish pink to white angular, locally euhedral, quartz. Thickness ranges from a thin veneer to 10 feet.
Qt	<b>Terrace deposits</b> Reddish brown to brown, sandy and clayey mixture of rounded pebbles to cobbles of sandstone, vein quartz and quartzite. Present along elevated low relief areas above the current floodplains of the Potomac River and Catoctin Creek. Several separate levels of terrace deposits can be observed along the Potomac River, but are not separately mapped here. Thickness ranges from a thin veneer to more than 10 feet.
Tl	<b>Leesburg Formation</b> Light gray to light reddish gray, very thickly bedded to massive, cobble to boulder conglomerate. Clasts are dominantly subangular to subrounded limestone and dolostone of Cambrian and Ordovician age, but locally Triassic age siltstone and sandstone are prevalent. Thickness ranges from 100 to 3000 feet (Lee, 1979).
Tb	<b>Balls Bluff Siltstone</b> Brownish red to reddish brown, argillaceous, massive siltstone with thin fine-grained sandstone interbeds. Thickness is estimated at 200 to 4500 feet (Lee, 1979).
Tmp	<b>Manassas Formation</b> <b>Poolsville Member</b> Reddish brown to reddish gray, locally greenish gray, medium-grained sandstone and reddish variegated claystone. Sandstone beds (fmp) exhibit sharp convex-down bases, shale pebble lag conglomerates, and fining-up-section character. Claystone intervals are thoroughly root mottled and contain light gray calcareous carbonate nodules. The thickness of this member is estimated at 500 to 3000 feet (Lee, 1979).
Tr	<b>Tomstown Formation</b> Medium light gray to medium gray, sugary dolomite with thin (< 0.1 cm) layers of mica. The formation is poorly exposed in the Point of Rocks Quadrangle and cannot be differentiated into members as it is on the western Blue Ridge (Brezinski, 1992). Thickness is estimated at 150 to 300 feet.
Ca	<b>Antietam Formation</b> Interbedded, light olive gray to olive gray, medium- to coarse-grained, medium-bedded, locally ferruginous, micaceous, silty sandstone and very fine grained, silty sandstone to sandy siltstone. Thickness is estimated at 200 to 300 feet. Interbedded Antietam phyllite (Cap) - Light gray to medium light gray, highly foliated, micaceous, siliceous phyllite. Individual foliation planes have a lustrous sheen and papery parting. Thickness estimated a 200 feet.
Ch	<b>Harpers Formation</b> Brownish gray to dark greenish gray, silty phyllitic shale to highly sheared phyllitic siltstone with intervals of brownish gray, medium-grained, silty sandstone. Thickness is estimated at greater than 900 to 1000 feet.
CaB	<b>Weynton Formation</b> <b>Buzzard Knob Member</b> The Buzzard Knob Member is light gray to medium gray, medium-bedded quartzite with dark gray, argillaceous layers up to 4 cm thick, separating the quartzite beds. Crossbedding within individual quartzite strata is pervasive. Although truncated along the eastern side of its outcrop belt the Buzzard Knob Member has an estimated thickness of 50 to 150 feet.
CZ	<b>Loudoun Formation</b> Medium to dark gray, medium-bedded conglomerate, and black, tuffaceous phyllite. Lithology is very variable, ranging from a crossbedded quartz-pebble conglomerate to a highly cleaved polymictic conglomerate with a matrix of flattened phyllite pebbles. The localized distribution of this formation may be the result of the original deposition or omission by faulting; however, owing to the colluvial apron of the Weynton this relationship remains obscure. The Loudoun Formation ranges in thickness from 30 to 200 feet in the Point of Rocks Quadrangle.
Zm	<b>Catoctin Formation</b> <b>Metabasalt</b> Medium to dark greenish gray, chloritic, locally amygdaloidal, epidote-rich metabasalt. Some areas are composed of highly sheared chlorite schist. Epidote occurs as light green veins and nodules. Thickness estimated at greater than 1000 feet by Fauth (1977).
Zp	<b>Phyllite</b> Light to medium gray phyllite containing highly elongated light gray feldspar and biotite. Thickness of this unit appears to be less than 100 feet.
Zb	<b>Basaltic dike</b> Dark greenish gray, locally phyllitic, chloritic, basalt. Commonly has strongly developed cleavage. These bodies are present in the basement gneiss complex and appear to represent dikes that once contacted the main Catoctin outcrop belt.
Zr	<b>Swift Run Formation</b> Dark greenish-brown, silty, sandstone with intervals of very light gray, foliated, micaceous marble. Marble locally quarried for agricultural purposes. Thickness estimated at 0 to 200 feet.
Yg	<b>Basement gneiss complex</b> <b>Leucocratic gneiss</b> Medium light gray to medium gray, coarse-grained, locally porphyritic, feldspar, quartzose, granite gneiss. Potassium feldspar augen, up to 3 cm in diameter, are commonly present.
Yb	<b>Biotite gneiss</b> Medium gray to medium greenish gray, biotite, feldspar, granite gneiss. Typically more fine grained, and more strongly foliated than the leucocratic granite gneiss. Biotite rarely makes up more than 20 percent of the rock.
Yh	<b>Hornblende gneiss</b> Medium greenish gray, medium- to coarse-grained, foliated, hornblende, plagioclase gneiss. Hornblende blades up to 0.5 cm long commonly make up 10 to 20 percent of the rock that commonly has a salt-and-pepper appearance on fresh surfaces.
Yhb	<b>Hornblende biotite gneiss</b> Medium to light greenish gray, medium- to coarse-grained, hornblende biotite gneiss. Hornblende blades make up approximately 10 percent of the rock, and biotite locally makes up more than 10 percent. The gneiss has a salt-and-pepper appearance on fresh surfaces.

References

\_\_\_\_\_. 1992. Lithostratigraphy of the western Blue Ridge cover rocks in Maryland. Maryland Geological Survey Report of Investigations 55, 69 p.

\_\_\_\_\_. 2004. Stratigraphy of Frederick Valley and its relationship to karst development. Maryland Geological Survey Report of Investigations 75, 101 p.

Brezinski, D.K., 2004. Geologic Map of part of the Point of Rocks Quadrangle, Frederick County, Maryland: Maryland Geological Survey Geologic Map, scale 1:24,000 (Verstosn FREDGE0204.I).

Burton, W.C., Froelich, A.J., Pomeroy, J. S., and Lee, K.Y., 1995. Geology of the Waterford Quadrangle, Virginia and Maryland, and the Virginia Part of the Point of Rocks Quadrangle. U.S. Geological Survey Bulletin 2095, 30 p.

Fauth, J.L., 1977. Geologic map of the Catoctin Furnace and Blue Ridge Summit quadrangles, Maryland. Maryland Geological Survey Geologic Map, scale 1:24,000.

Lee, K.Y., 1979. Triassic-Jurassic geology of the northern part of the Culpeper Basin, Virginia and Maryland. U.S. Geological Survey Open File Report 79-1557, 8 p.

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 not intended 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. The Maryland Geological Survey makes no warranty, expressed or implied, as to the use or appropriateness of the 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 should not be used at a scale greater than that.

**Acknowledgements:** This map was funded in part by the Maryland State Highway Administration.

Field mapping of karst features was conducted in 2000 and 2001 and updated in 2002 by David K. Brezinski. Geologic field mapping was conducted in 2000 and 2001. This karst map was compiled in digital form by Liana Dume and Heather Quam of the Maryland Geological Survey and Catherine Luskshans 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.

Version: PTOFRK2004.1  
Released June 2004

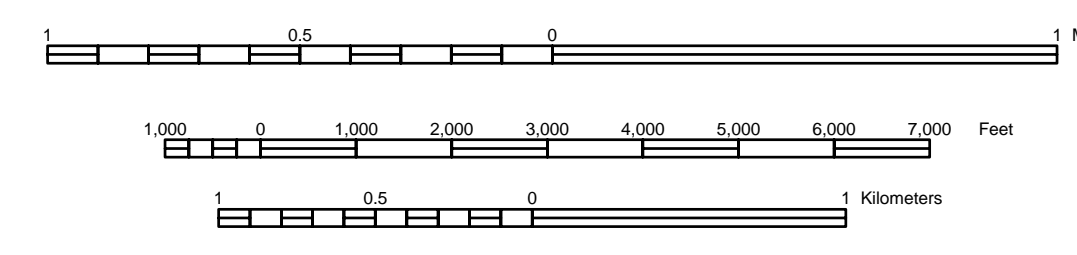
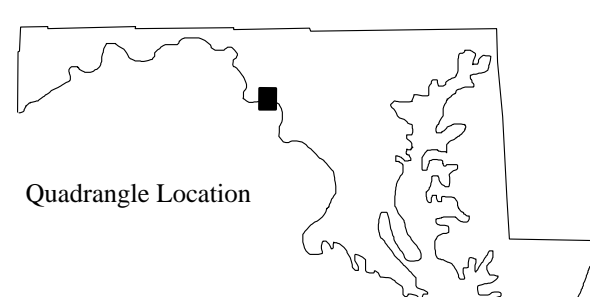
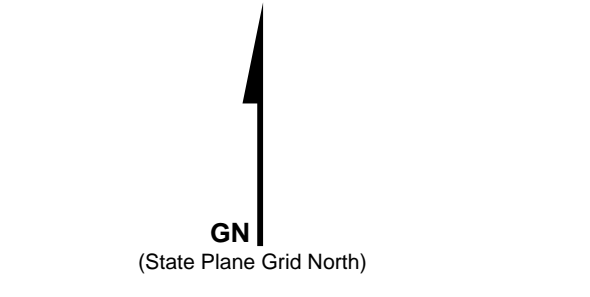
Base layers derived from U.S. Geological Survey (USGS) 7.5 minute Series (Topographic)  
Point of Rocks Quadrangle 1970 (photomapped 1961)  
Digital line graphs (DLG) for hydrography, topography, transportation and boundaries (1:24,000)  
Cultural features shown from USGS Geographic Names Information System database  
(To determine current magnetic declination see: <http://www.ngs.noaa.gov/cgi-bin/og/gmag/TabMag.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 ticks and coordinates shown in black  
Geographic coordinates (latitude-longitude) shown near corners and 2.5' intervals (in black)

**Karst Features of Part of the Point of Rocks Quadrangle, Frederick County, Maryland**

By  
**David K. Brezinski**  
2004

Scale 1:24,000



Contour Interval 20 Feet  
Dotted Lines Represent 10 Foot Contours  
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)

Adjacent 7.5' Quadrangle Names  
Point of Rocks Quadrangle, shaded

1	2	3	1. Keedysville
4	5	6	2. Middleton
7	8	9	3. Frederick
			4. Harpers Ferry
			5. Buckeystown
			6. Panterville
			7. Waterford
			8. Poolesville

Explanation of Map Symbols

Geologic Symbols

- |   |                                     |
|---|-------------------------------------|
| <b>Contacts</b>   | <b>Faults</b>                       |
| Geologic contact, approximately located<br>dotted where concealed | U Upright side<br>D Downthrown side |
| <b>Karst Features</b>   | --- Fault, concealed                |
| Active Sinkhole   |                                     |
| Depression  |                                     |
| Spring  |                                     |

Base Map Symbols

- |   |   |
|---|---|
| <b>Transportation</b>                             | <b>Topography</b>                                 |
| Primary route, class 1 (divided, lanes separated) | Topographic index contour (100-ft interval)       |
| Primary route, class 1 (undivided)                | Topographic intermediate contour (20-ft interval) |
| Secondary route, class 2                          | Topographic supplemental contour (10-ft interval) |
| Light duty road or street, class 3                | <b>Hydrography</b>                                |
| Unimproved road or street, class 4                | Stream  |
| Trail   | Ditch or canal                                    |
| Railroad, railroad siding or spur                 | Marsh, wetland, swamp, or bog                     |
| Power transmission line                           | Water body (eg. lakes, ponds, rivers)             |
| Substation  | <b>Culture</b>                                    |
|   | Boundary, incorporated city, village, or town     |
|   | Cemetery  |
|   | Church  |
|   | School  |
|   | Hospital  |

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. Cheaves  
Director

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.ngs.md.gov/>