



**DESCRIPTION OF MAP UNITS**

- Quaternary**
  - Qal**  
**Alluvium**  
Pebbles, cobbles, and boulders that weather yellow, orange, and orange-brown. Although much of Savage River flows on exposed bedrock, adjacent mapped alluvium deposits include those formed along both modern and ancient streams. The thickness of alluvium varies from a thin veneer to more than 30 feet (10 m). These thicker accumulations tend to be concentrated where colluvium at the edge of valleys overlaps the alluvium.
  - Qk**  
**Swamp**  
Unconsolidated dark gray to black, organic-rich matter to peat. These materials accumulated in low-lying, poorly drained areas that are remnants of late Pleistocene glades and lakes. These sediments are water-logged during parts of the year and are poor agricultural lands. Thickness ranges from less than three feet to nearly 10 feet (1 - 3 m).
  - Qc**  
**Colluvium/Landslide**  
Unconsolidated and unsorted diamict of boulders, cobbles, pebbles, sand, and mud that accumulate on steep slopes or at the base of slopes as the result of mass movement. These accumulations typically have an undulating or wavy upper surface and thin upslope. Thickness ranges from several feet on steep slopes to more than 10 feet (3 to 15 m).
- Pennsylvanian**
  - Pc**  
**Conemaugh Group (in cross-sections only)**  
Interbedded sandstone, shale, siltstone, and light gray nonmarine limestone. The aggregate thickness of the Conemaugh Group is 800 to 900 feet thick (245 to 275 m), approximately 700 feet (215 m) of the group are exposed in the McHenry Quadrangle.
  - Pcc**  
**Casselman Formation**  
Interbedded, tan, medium- to coarse-grained, locally conglomeratic, cross-bedded sandstone, reddish gray mudstone, medium gray, silty shale, siltstone, and light gray, nonmarine limestone. The Barton (b) coal bed is the only coal bed mined in this interval in the Casselman basin. Approximately 200 feet (61 m) of the Casselman Formation are preserved in the McHenry Quadrangle.
  - Pcg**  
**Glenshaw Formation**  
Interbedded, gray, tan - weathering, micaceous, medium - to coarse - grained, cross - bedded sandstone containing abundant coaly plant fragments, reddish and reddish gray, silty shale, siltstone, light gray bioturbated nonmarine limestone, and thin, dark gray, fossiliferous marine shale. The base of the Glenshaw Formation is the top of the Upp Freeport coal bed, and the top of the formation is the top of the Ames marine shale. Several marine intervals are underlain by mined coal beds. These are the Brush Creek (bc), Lower Bakerstown (lb), and Ames (a) coals. The Glenshaw Formation is approximately 350 feet (105 m) thick.
  - Pa**  
**Allegheny Formation**  
Interbedded, medium to dark gray shale and siltstone, and tan to light gray, cross-bedded sandstone, with thin claystone near the base, and several mineable coal beds. The top of the formation is at the top of the Upper Freeport (uf) coal bed and the base of the formation is the top of the Homewood Sandstone member of the underlying Pottsville Formation. The Upper Kittanning (uk) and Lower Kittanning (lk) coal beds are locally mined. The Allegheny Formation is between 200 to 250 feet thick (61 to 76 m).
  - Pp**  
**Pottsville Formation**  
Dominantly tan to light gray, medium - to coarse-grained, cross-bedded sandstone and conglomeratic sandstone with abundant coaly plant fragments and subordinate intervals of dark gray, coaly shale, siltstone, and thin coal beds. The massive, light gray, highly cross-bedded Homewood Sandstone Member constitutes a resistant, mappable sandstone layer at the top of the formation, while the conglomeratic Sharon Member forms a massive unit at the base. Total thickness for the unit is 180 to 200 feet (55 to 61 m).
  - Mmc**  
**Mauch Chunk Formation**  
Interbedded, reddish brown shale, variegated, mudstone and siltstone, and reddish brown to greenish gray, medium - grained, micaceous sandstone. Sandstone intervals are cross-bedded, exhibit sharp bases, and fine upsection. Several thin greenish gray, marine calcareous shale to argillaceous limestone units are present near the base of the formation. The Mauch Chunk Formation is approximately 600 feet thick in Allegheny County, and this westward to 300 feet in thickness in western Garrett County (90 - 180 m).
  - Mg**  
**Greenbrier Formation**  
Light gray, cross-bedded, sandy limestone to calcareous sandstone at the base (Loyalhanna Member). The Loyalhanna Member is overlain by a thin, pure, medium-bedded limestone (Deer Valley Member) and then an interval of interbedded, reddish, fossiliferous mudstone, and tan to reddish brown, fine-grained sandstone, and reddish brown siltstone and variegated shale (Savage Dam Member). The Savage Dam Member is succeeded upward by thin- to medium-bedded, light to medium gray, argillaceous, fossiliferous limestone at the top of the formation (Wynps Gap Member). The Greenbrier Formation is 150 to 200 feet thick (45 - 60 m).
  - Mp**  
**Purslane Formation**  
Light gray, tan, and locally reddish brown, coarse-grained to conglomeratic, thick-bedded to cross-bedded sandstone, thin beds of gray shale, and coaly shale. In the McHenry Quadrangle the base of the Purslane Formation is mapped at the base of a resistant, massive, buff weathering, pebbly, conglomeratic sandstone above the bioturbated marine sandstone and variegated shales of the Riddlesburg Member of the Rockwell Formation. The Purslane Formation is 300 to 400 feet thick in western Garrett County (90 - 120 m).
  - Mdr**  
**Rockwell Formation**  
Interbedded, greenish gray, argillaceous, bioturbated sandstone, and reddish gray to gray, coaly siltstone and shale and tan lenticular sandstone. The greenish gray bioturbated sandstone at the base of the formation (Oswayo Member) sharply overlies the reddish strata of the Hampshire Formation. These basal marine strata are overlain by a light gray to tan, thin- to medium-bedded, cross-bedded, fining upward nonmarine channel sandstone equivalent to the Cussewago Sandstone of Pennsylvania, and then rooted gray mudstone. The top of the formation consists of barrowed, tan sandstone and greenish gray marine shale of the Riddlesburg Member. The Rockwell Formation is between 150 and 200 feet thick in Garrett County (45-65 m).
  - Dh**  
**Hampshire Formation**  
Interbedded, reddish gray, reddish brown, and brownish red, locally greenish gray, shale, and silty mudstone and reddish brown, cross-bedded, fining-upward, micaceous, lenticular sandstone. The reddish brown, siltstone, shale, and mudstone intervals are commonly rooted. Although the sandstone intervals are typically red-brown, the often exhibit greenish gray bases or intervals. The Hampshire ranges from approximately 1,600 to 2,000 feet (500 - 600 m) in Garrett County.
  - Df**  
**Foreknobs Formation**  
Interbedded, olive gray, medium- to coarse-grained, cross-bedded, bioturbated sandstone; greenish gray to dusky red, fossiliferous shale and siltstone. Top of the formation is marked by a thick-bedded, pebbly, cross-bedded, bioturbated light gray to white (<30 feet, 10 m) sandstone herein considered equivalent to the Pound Sandstone Member of the Valley and Ridge Province. This sandstone is exposed along US 219, 2.5 miles south of Accident and along Bear Creek Road, beneath US 219 along Bear Creek. The base of the formation is not exposed in the either the Accident or McHenry quadrangles, but elsewhere the base is marked both by down section gradation from interbedded sandstone and shale to primarily shale of the underlying Shier and Brallier formations, but also by a massive conglomeratic sandstone. The Foreknobs Formation is approximately 1,500 feet (450 m) thick in Garrett County, but thickens to more than 2,000 feet (600 m) in Allegheny County, Maryland.
- Devonian**
  - Dh**
  - Df**

**Explanation of Map Symbols**

**Contacts**  
Geologic contacts, approximately located dotted where concealed

**Planar Features**  
Inclined bedding strike and degree of dip shown  
Horizontal bedding  
Inclined joint strike and degree of dip shown  
Vertical joint strike shown

**Base Map Symbols**  
Primary route, class 1 (divided, lanes separated)  
Primary route, class 1 (undivided)  
Secondary route, class 2  
Light duty road or street, class 3

**Faults**  
Fault, approximately located. D refers to down throw side, U to the up throw side.  
Fault concealed

**Folds**  
Minor anticline bearing and degree of plunge shown

**Coal Beds/Mines**  
Projected outcrop trace of coal bed, dotted where concealed  
Mine or prospect

**Topography**  
Topographic index contour (100-ft interval)  
Topographic intermediate contour (20-ft interval)

**Hydrography**  
Spring  
Stream  
Water body (eg. lakes, ponds, rivers)

**Use Constraint:** The Maryland Geological Survey makes no warranty, express or implied, as to the use or appropriateness of the data and there are no warranties of merchantability or fitness for particular purpose or use. The Maryland Geological Survey makes no representation as 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.

**Acknowledgments:** This map partially funded by the U. S. Geological Survey, National Cooperative Geologic Mapping Program, under USGS award number G18AC00121. Original field mapping was conducted under USGS award G14AC00227 (Accident Quadrangle, 2013) and G15AC00238 (McHenry Quadrangle, Brezinski, 2016). Underlying digital files and metadata created and edited by Christopher Covatta.

The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U. S. Government.

Geologic field mapping conducted in 2014-2017.

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 and mental disability.

**References:**  
Brezinski, D.K., 2015. Geologic map of the Accident quadrangle, Garrett County, Maryland. Maryland Geological Survey Open-File Geologic Map ACCID2015.01, scale 1:24,000.  
Brezinski, D.K., 2016. Geologic map of the McHenry quadrangle, Garrett County, Maryland. Maryland Geological Survey Open-File Geologic Map McHEN2016.01, scale 1:24,000.

Version: ACCID\_McHEN2019.1.0  
Released July 2019

Adjoining 7.5-minute quadrangles (Accident-McHenry quadrangles shaded)

1	2	3	1 Ohioville
4	5	4	2 Confluence
6	7	5	3 Markleton
8	9	6	4 Frittsville
		7	5 Greensville
		8	6 Sang Run
		9	7 Bittinger
		10	8 Oakland
			9 Deer Park
			10 Kitzmiller



DEPARTMENT OF NATURAL RESOURCES  
Jennie Hadaway-Riccio  
Secretary

MARYLAND GEOLOGICAL SURVEY  
Richard Ort  
Director

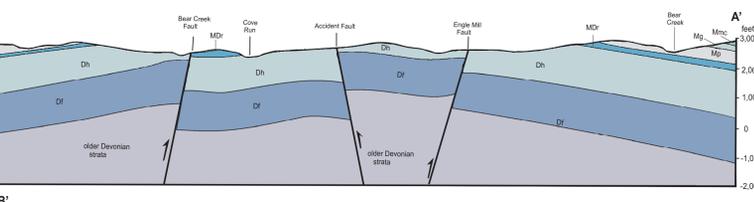
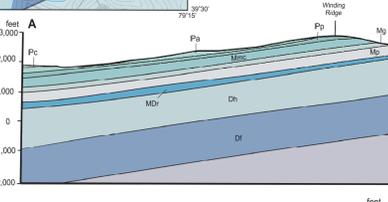
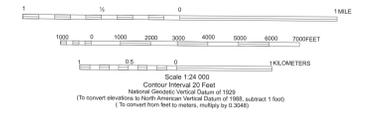
STATE OF MARYLAND  
Lawrence J. Hogan  
Governor

Boyd K. Rutherford  
Lieutenant Governor

U.S. Geological Survey (USGS) US Topo 7.5-minute Series  
Accident, MD/PA quadrangle, 1947. Map revised 1981.  
McHenry, MD/PA quadrangle, May revised 1974.  
Maryland State Plane Coordinate System EPS 1983  
(Projection: Lambert Conformal Conic, 1983 geoidetic reference system)  
(Horizontal Datum: North American Datum 1983)

Geographic coordinates (latitude-longitude) shown near corners  
(State Plane Grid North)

Reported magnetic north declination (center of Accident quadrangle): 9.5° W  
To determine current magnetic declination see: <http://www.ngdc.noaa.gov/gemmag/declination.shtml>



**Geologic Map of the Accident and McHenry Quadrangles, Garrett County, Maryland**  
By David K. Brezinski  
2019