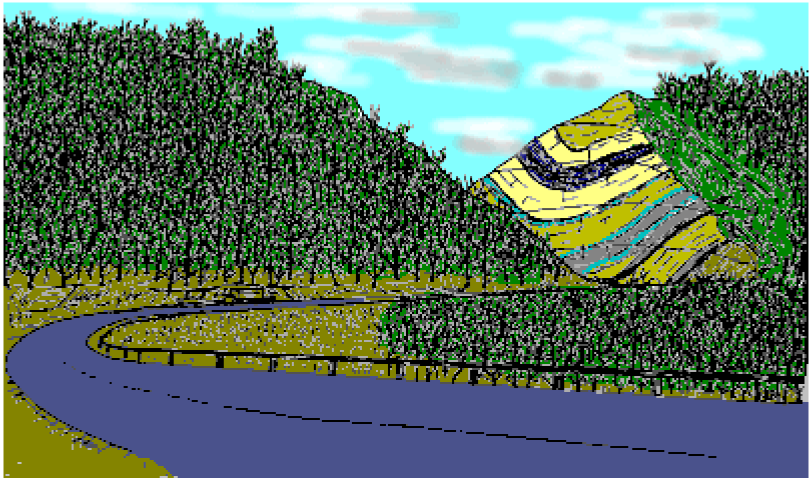
Maryland Geological Survey	Pamphlet Series

GEOLOGY OF THE SIDELING HILL ROAD CUT

http://www.mgs.md.gov/esic/brochures/sideling.html



by David K. Brezinski
1989 (revised 1994)

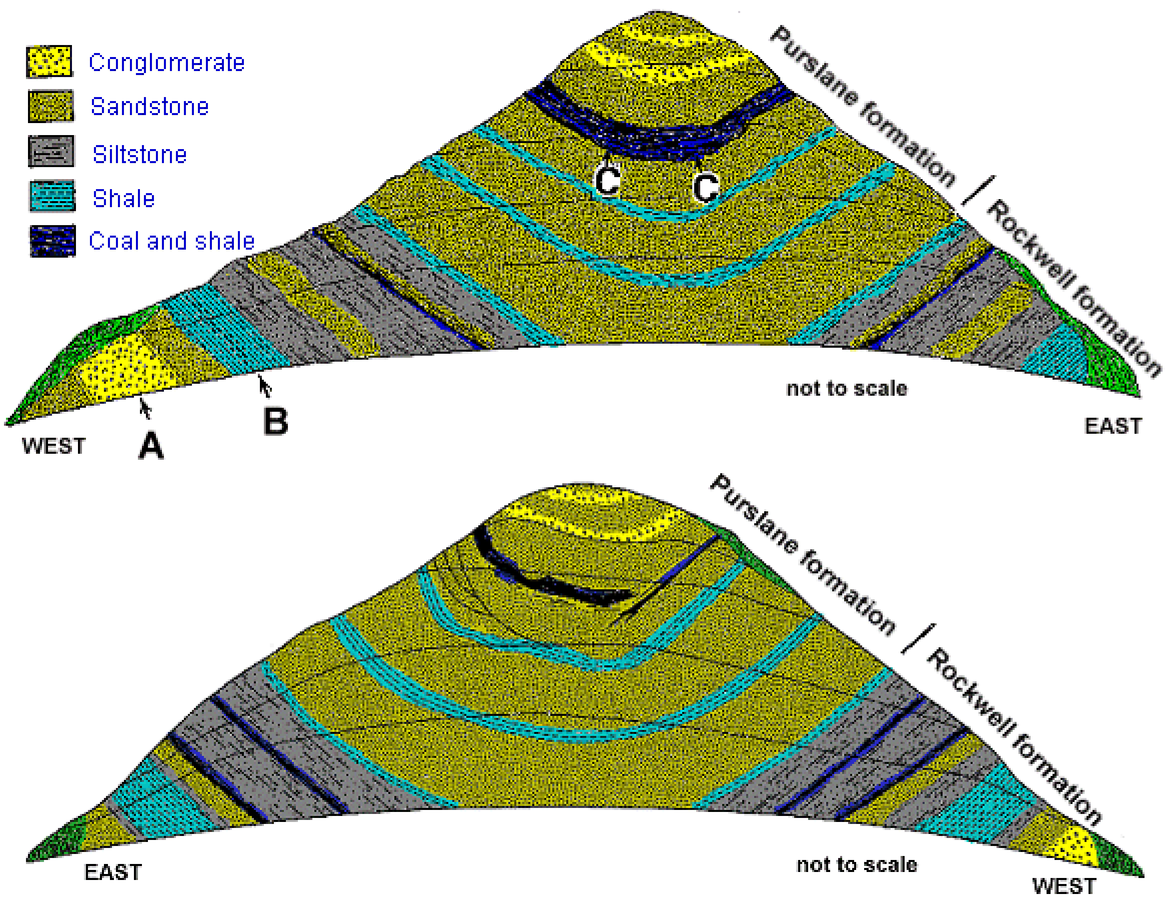
FIGURE 1. Location map of the road cut through Sideling Hill.

One of the best rock exposures in Maryland and indeed in the entire northeastern United States is located approximately 6 miles west of Hancock in Washington County, where Interstate 68 cuts through Sideling Hill (Figure 1). Almost 810 feet of strata in a tightly folded syncline are exposed in this road cut. Although other exposures may surpass Sideling Hill in either thickness of exposed strata or in quality of geologic structure, few can equal its combination of both. This exposure is an excellent outdoor classroom where students of geology can observe and examine various sedimentary rock types, structural features, and geomorphic relationships.

Sideling Hill lies in the Valley and Ridge Physiographic Province of eastern North America, a region characterized by tightly folded strata. Erosion of these folds has produced a series of subparallel ridges and valleys, in which the ridges are capped by erosion-resistant sandstones, and the intervening valleys are underlain by soluble limestones and easily eroded shales. At first, Sideling Hill may appear to be a somewhat unusual feature, inasmuch as the downfold, or syncline, exposed in the road cut would seem to be more likely to form a valley, rather than a ridge. However, the youngest rocks, or those highest in the stratigraphic section, are the resistant sandstones and conglomerates of the Purslane Formation, which occur in the center of the fold and cap the ridge.

The valleys on either side are underlain by more easily eroded rocks of the Rockwell and Hampshire Formations. This topographic inversion, in which the structural low becomes a topographic high, is also seen at Town Hill, the next major ridge to the west and a structural twin to Sideling Hill. Between these two ridges the intervening lower area is composed predominantly of Devonian age shales and siltstones.

FIGURE 2. Geologic cross-sections of the north (top) and south (bottom) sides of the I-68 road cut through Sideling Hill.



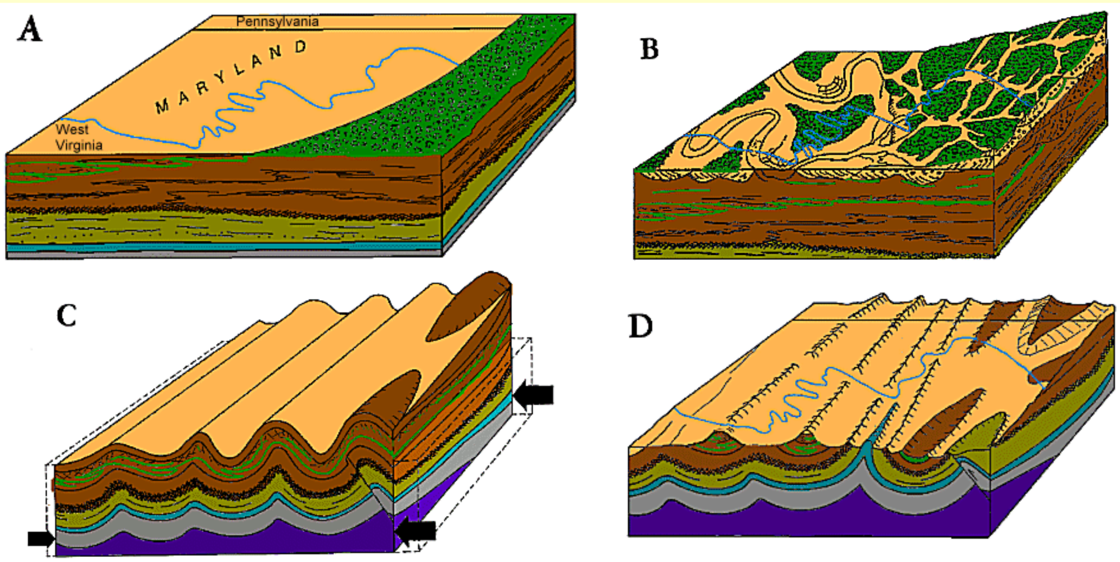
The Rockwell and Purslane Formations were deposited during the early Mississippian, about 330 to 345 million years ago. At the road cut, approximately 450 feet of the Rockwell Formation are exposed and consist of interbedded, tan and gray-green, clay rich sandstones, gray-green to dark-gray, silty shales, and gray to dark-gray, sandy siltstones with several intervals of red-brown claystone near the top. In places, thin shaly coals and coaly shales are interbedded with shales and siltstones. These coals are interesting in that coal is typically not common in Lower Mississippian strata. An even rarer and indeed unusual lithology, termed diamictite, is present approximately 70 feet above the base of the section (A of Figure 2). A diamictite is a very poorly sorted to unsorted rock composed of clay, silt, sand, and pebbles or cobbles. The larger pebbles and cobbles consist of a multitude of lithologies including granite, graywacke, chert, and quartzite. The origin of such diamictites is highly debatable and no generally accepted theory has yet been proposed.

Fossils are moderately common in the Rockwell Formation, but almost all are plant fragments and imprints. Marine fossils are present within the black silty shale 165 to 178 feet above the lowest exposed strata (B in Figure 2).

The fossils are generally rare within these intervals and consist of brachiopods and bivalves. A similar marine unit has been recognized in correlative rocks in central Pennsylvania, where it has been termed the Riddlesburg Shale. The Sideling Hill exposure is the first recognition of this zone in Maryland.

The Rockwell Formation in the area of Sideling Hill was probably deposited in an alluvial plain environment near sea-level. The Riddlesburg Shale records a major shift of the shoreline which submerged an area from eastern Ohio to western Maryland (Figure 3A).

FIGURE 3. Sequence of development of the rocks exposed at Sideling Hill.
A, Shallow marine waters and adjacent shoreline swamps of the Riddlesburg sea.
B, River systems of the Purslane.
C, Folding during the Alleghenian mountain-building episode.
D, Post mountain-building erosion to the ridges and valleys seen today.



Overlying the Rockwell Formation is the Purslane Formation, typified by gray-green, tan, and white, cross-bedded sandstones and quartz-pebble conglomerates with interbedded gray siltstones, shales, and coaly shales. Only about 350 feet of the formation occur on Sideling Hill, the remainder, an unknown thickness, having been removed by erosion. Individual sandstone units range in thickness from 25 to 75 feet.

Near the top of the exposure are 45 feet of dark-gray siltstones and shales in which numerous thin shaly coal beds are present. Analysis of one of these coals shows it to be semianthracite in rank. This same shaly sequence may be observed more closely at the sharp turn in old U.S. 40 (now Scenic 40) as it crosses the crest of Sideling Hill, 1.5 miles south of this road cut. The only fossils found in the Purslane Formation are plant remains common in the lower part of many of the thick sandstone units, and in the upper coaly sequence.

The prominence of thick sandstone units with quartz-pebble conglomerates plus the lack of marine fossils also suggest an alluvial plain environment of deposition for the Purslane Formation in the area of Sideling Hill. The sandstones and conglomerates represent channel deposits of sand and gravel laid down by rivers. The coal beds may have formed in swamps on flood plains adjacent to the fluvial channels (Figure 3B).

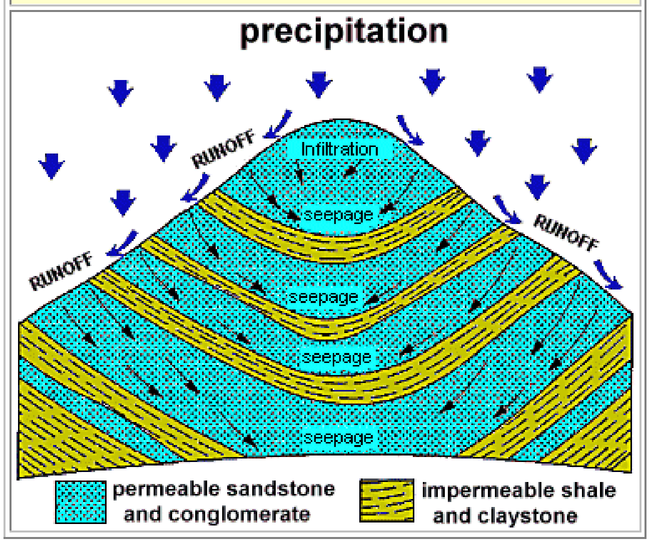


FIGURE 4. Movement of water producing the seepage within the Purslane sandstones.

The Sideling Hill road cut exposes a section through the axis of a tightly folded syncline. A syncline is a fold in which the strata on either side dip inward toward the axis. Such folding resulted from the enormous compressional stresses developed in the Earth's crust by the collision of the North American and African continents. This episode of mountain-building is termed the Alleghenian Orogeny and reached its maximum during the late Permian or early Triassic, approximately 230 to 240 million years ago (Figure 3C).

Moreover, these same stresses produced differential slippage between the strong or highly competent sandstones and the weak or less competent carbonaceous siltstones and shales. Such slippage resulted in the development of two types of fractures -- faults and cleavage. Cleavage can form where two competent units (e.g., sandstone) surround a relatively thin incompetent shale. The result is an abundance of small subparallel fractures within the shale. Numerous small faults can be observed in the shaly sequence near the top of the Purslane Formation. Here compressional stresses near the axis of the syncline have caused offsets along fractures in several of the siltstone beds (C of Figure 2).

During the spring, summer, and fall, water can be observed seeping out from along fractures in the rock along the axis of the syncline. This water has its origin as rain which infiltrates the permeable and porous sandstone and conglomerate, and runs down through the rock until it reaches a barrier such an impermeable layer of clay. When it reaches this barrier it runs down the dip of the beds to the axis of the fold and then is emitted at the exposed rock face (Figure 4). During the winter such places of outflow of water serve as points from which layers of ice originate and grow to cover much of the exposed face.

For more information on Maryland geology and geography check out
http://www.mgs.md.gov/esic/publications/books.html

Suggested Readings:

Bjerstedt, T.W., 1986. Regional stratigraphy and sedimentology of the Lower Mississippian Rockwell Formation and Purslane Sandstone based on the new Sideling Hill road cut, Maryland: Southeastern Geology, v. 27, p. 69-94.

Brezinski, D.K., 1989. The Mississippian System in Maryland: Maryland Geol. Survey Report of Investigation 52, 75 p.

Pelletier, B.R., 1958. Pocono paleocurrents in Pennsylvania and Maryland: Geological Society of America Bulletin, v. 69, p. 1033-1064.

Read,C.B., 1955. Floras of the Pocono Formation and Price Sandstone in parts of Pennsylvania, Maryland, West Virginia, and Virginia: U.S. Geological Survey Professional Paper 263, 32 p.

Reger, D.B., 1927. Pocono stratigraphy in the Broadtop Basin of Pennsylvania: Geological Society of America Bulletin, v. 56, p. 397-410.

Stose, G.W. and Swartz, C.K., 1912. Paw Paw-Hancock Folio. Maryland-West Virginia-Pennsylvania: U.S. Geological Survey Folio 179, 24 p.

Girty, G.H., 1927. The Pocono fauna of the Broad Top coal field, Pennsylvania: United States Geological Survey Professional Paper 150 E, p. 111-123.

This version of "The Geology of Sideling Hill" was prepared by R.D. Conkwright, Division of Coastal and Estuarine Geology, Maryland Geological Survey.

Department of Natural Resources
Maryland Geological Survey
2300 St Paul St.
Baltimore, MD 21218
(410) 554-5505
www.mgs.md.gov