

SHALE CONCRETIONS

Collecting location: Take RT 250 west for 30 miles to the small town of McDowell, VA.

Two to three miles east of McDowell the road cuts through a 100 foot plus shale bed. Adjacent to a large creek there is an area with little parking but just enough room to fit in several cars. Shale is referred to Devonian, Millboro and other names but it is part of the Marcellus shale deposit of western Virginia.

Division of Mineral Resources publication [“Geology of the Devonian Marcellus Shale— Valley and Ridge Province, Virginia and West Virginia— A Field Trip Guidebook for the American Association of Petroleum Geologists Eastern Section Meeting, September 28–29, 2011”, Figure 37, Page 35]: Photomontage of western portion of U.S. 250 roadcut. This view extends from the Lower Devonian Oriskany Sandstone (exposed in the woods at the left of the image) through the Middle Devonian Needmore Shale to a covered interval beneath which lies the upper Needmore Shale, Tioga(?) Ash Bed, and lower Millboro (lower Marcellus) Shale (Middle Devonian). Downhill, to the right of the montage, the upper Marcellus Shale and lower Mahantango Formation (upper Millboro Shale) are well exposed.

Numerous calcareous concretions weather out of the face of this exposure, and some of these have an internal septarian structure. Many of them also contain appreciable barite and quartz.

Calcium carbonate rich concretion They are commonly composed of a [carbonate](#) mineral such as [calcite](#) and/or a microcrystalline form of [silica](#) such as [chert](#), [flint](#), or [jasper](#), or an iron oxide or hydroxide such as [goethite](#) and [hematite](#).

Carbonate concretions, which form in response to the reduction of [sulfates](#) by [bacteria](#), often contain minor percentages of pyrite. Other concretions, which formed as a result of microbial sulfate reduction, consist of a mixture of calcite, barite, and pyrite.

A **concretion** is a hard, compact mass of [sedimentary rock](#) formed by the precipitation of [mineral](#) cement within the spaces between the sediment grains. Concretions form within layers of sedimentary [strata](#) that have already been deposited. They usually form early in the burial history of the sediment, before the rest of the sediment is hardened into rock.

Shale is a fine-grained, [clastic sedimentary rock](#) composed of [mud](#) that is a mix of flakes of [clay minerals](#) and tiny fragments of other minerals, especially [quartz](#) and [calcite](#). Shale is characterized by breaks along thin parallel layering or bedding less than one centimeter in thickness, called [fissility](#).

Variable amounts of minor constituents alter the color of the rock. Black shale results from the presence of greater than one percent carbonaceous material and indicates a [reducing](#) environment.^[1] Red, brown and green colors are indicative of ferric oxide ([hematite](#) – reds), iron hydroxide ([goethite](#) – browns and [limonite](#) – yellow), or micaceous minerals ([chlorite](#), [biotite](#) and [illite](#) – greens).^[1]

Shales and mud rocks contain roughly 95 percent of the organic matter in all sedimentary rocks.

Shales are typically deposited in very slow moving water and are often found in lakes and [lagoonal](#) deposits, in [river deltas](#), on [floodplains](#) and offshore from beach sands. They can also be deposited on the [continental shelf](#), in relatively deep, quiet water.