

## **Regional Depositional Trends within the Northern Appalachian Basin: The Possible Importance of Low Gamma Ray Troughs within the Givetian Geneseo/Burket and the Eifelian Marcellus Black Shales**

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The Northern Appalachian Basin is populated with several distinct black shales of Middle Devonian through Lower Mississippian age along which the Eifelian Marcellus (Hamilton Group) is the richest. Of all the overlying black shales, the log-based internal stratigraphy of the Givetian Geneseo/Burket (Genesee Group) comes closest to that of the Marcellus. In the region of northern PA and southwestern NY, the Geneseo/Burket is capped with a limy shale, the Lodi. Above the Lodi is the Penn Yan, the base of which commonly presents a gamma ray signal > 180 API units. In many regards, the package of Geneseo/Burket-Lodi-Penn Yan resembles the three members of the Marcellus, the package Union Springs-Purcell-Oatka Creek. Both formations thin to the west where the remaining black shale of each package presents a higher gamma ray API signature and less dense beds. The internal stratigraphy of the Geneseo includes more than one package of coarsening upward shale with the uppermost package reaching furthest to the west. Both units, but particularly the Geneseo/Burket, are punctuated by lower gamma ray troughs indicative of layers a few cm to a half meter thick. These individual sheets can be traced through areas the size of a couple of counties by virtue of both layer thickness and thickness of the intervening black shale. One of the important questions to industry is whether these low gamma ray troughs, either carbonates or siltstones, provide an opportunity for stable open holes within the black shale units. Core samples taken by Penn State's Appalachian Basin Black Shales Group shows that these low gamma troughs are siltstone layers 15-40 cm thick. Can industry land horizontal wells in these layers and then stay within them to create more stable well bores which might have a number of advantages?