

## The Emerging Rogersville Shale Play: Hurry Up and Wait...

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### ABSTRACT

The Cambrian Rogersville Shale was identified as a mature hydrocarbon source rock in 2002. Hydrocarbon extracts from the Rogersville were geochemically matched to oils produced from Cambrian reservoirs in eastern Kentucky, thus defining a new petroleum system in the Appalachian Basin. The Rogersville Shale is one of six formations in the Conasauga Group, and occurs in parts of eastern Kentucky, West Virginia, and eastern Tennessee. Regional distribution and thickness of the Rogersville is controlled by extensional faults that were active during Conasauga deposition. Interest in the potential of the Rogersville Shale as an unconventional reservoir was sparked by an exploration well targeting the Rogersville completed in early 2014 in Lawrence County, Kentucky.

The Rogersville unconventional play concept was based on a single core cut in the 1977 Exxon No. 1 Smith well in Wayne County, West Virginia. Total organic carbon for the Rogersville Shale in this core ranges from 1.2 to 4.75 percent, with  $T_{max}$  values of 446 to 469°C. Low hydrogen indices and  $T_{max}$  data indicate thermal maturity in the wet gas to condensate window. The Rogersville Shale ranges in thickness from 200 to more than 1,200 feet in eastern Kentucky and West Virginia. Drilling depth ranges from approximately 6,000 to 13,000 feet below sea level.

Seven Rogersville test locations have been permitted in the last 2 years, and five have been drilled to date. The apparent discovery well is the Bruin Exploration No. 1 Young well in Lawrence County, Kentucky, drilled vertically to 11,967 feet into the Rome Formation. Bruin hydraulically fractured along a 576 feet interval in the Rogersville, and reported initial production of 115 MCFGD and 19 BOPD. A surface shut-in pressure of 2,599 psi was reported. Although these volumes are modest, a vertical well may not reflect the full potential of the zone. This well is currently shut-in. A second well, the Cabot No. 50 Amherst Industries, was permitted in mid-2014 to 14,000 feet, targeting the Rogersville Shale in Putnam County, West Virginia. Records have not been released, but the well was producing gas in late 2015. Speculation about the Bruin well resulted in extensive leasing and sales of deep mineral rights in eastern Kentucky in 2014-2015.

Three additional wells were drilled in Kentucky in 2014 and 2015: one horizontal well by Horizontal Technology Energy and two vertical wells by Chesapeake Energy. These wells are still being evaluated, or pending completion. More recently, permits were issued for a horizontal lateral from the Bruin Young discovery well, a second Bruin horizontal well, and a horizontal lateral from one of the Chesapeake vertical wells (all in Lawrence County, Kentucky). Data from the wells drilled to date are very limited because the Kentucky wells were permitted as stratigraphic tests, allowing 5 years of confidentiality. Since the initial exploratory wells were drilled and the resulting leasing boom, activity has slowed because of low oil and gas prices. The Rogersville play concept has been proven, but economic viability will depend on the production rates established and higher commodity prices.