

R. T. Ryder, U. S. Geological Survey, D. C. Harris, Kentucky Geological Survey, P. Gerome, Equitable Production Company, T. J. Hainsworth, GCSI, R. C. Burruss, P. G. Lillis, U. S. Geological Survey, and D. M. Jarvie, Humble Geochemical Services

Cambrian Petroleum Source Rocks in the Rome Trough of West Virginia and Kentucky

A 130-ft-thick Cambrian marine black shale from a core between 11,150-11,195 ft in the Exxon No. 1 Smith well in Wayne County, West Virginia, is a good petroleum source rock that, combined with favorable oil-source rock correlations, defines a petroleum system in the Rome trough. This black shale occurs in the Middle Cambrian Rogersville Shale of the Conasauga Group. Total organic carbon (TOC) values of 4 samples that range from 1.2 to 4.4%, average 2.6%, are the highest reported to date in the pre-Knox section of the Rome trough. Although the samples are in the zone of gas generation based on low HI values (55 to 63) and Tmax values of about 465, S1 values of 0.81 to 2.71 indicate that they contain free extractable hydrocarbons. The gas chromatogram (GC) of a bitumen extract is characterized by *n*-alkanes from C₁₁ through C₃₀, strong odd-carbon predominance in the C₁₅ to C₁₉ range, and small amounts of pristane and phytane. The strong odd-predominance is diagnostic of the alga *G. prisca* whose age is usually restricted to the Ordovician. This study may be among the first to document *G. prisca* characteristics in Cambrian-age source rocks. Thin black shale in the Lower to Middle Cambrian Rome Formation in the Texaco No. 1 Kirby well in Garrard County, Kentucky, having TOC values as high as 3.2%, HI values as high as 417, and similar extract GC characteristics, may be a secondary source rock in the petroleum system. The GC fingerprint of the bitumen extract from the Rogersville Shale correlates closely with oils from Cambrian reservoirs in eastern Kentucky. These oils are from the Homer field in Elliott County; Inland No. 529 White well in Boyd County; and Miller No. 1 Bailey well in Wolfe County. The new petroleum system probably extends along the Rome trough from eastern Kentucky to at least central West Virginia.