Coal Geology and Underground-Mine Degasification Applied to Horizontal Drilling for Coalbed Methane

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In eastern Oklahoma's Arkoma Basin in 1998 at least three energy companies drilled coalbed methane wells 700–2,000 feet deep that eventually penetrated 700–800 feet horizontally into the 4–6-foot-thick Hartshorne coal, but also drilled through shale, mudstone, and interlaminated shale and sandstone. Those well segments in shale and mudstone may collapse, leading to well abandonment. Obviously coal will not be penetrated if the bit drifts into strata overlying or underlying the coalbed. Coal may be missing if the bit intersects a normal fault, a thick noncoal parting, or a channel-fill sandstone.

Coal geology studies, including coal characterization before drilling begins, should help in lease selection and to hold down costs. Also data should be tabulated and maps constructed showing net coalbed thickness, cleat frequency and orientation, coalbed structural contours, faults and secondary coal fractures, cleat-filling minerals, coal-rank isocarbs, inherent moisture, vitrinite reflectance, and lithology of strata overlying or underlying the coalbed. Most of these items, in addition to the laws of gas movement, affect or control the permeability and porosity of the coalbed methane reservoir and the flow of gas to the well.

Twenty-three horizontal, openhole, experimental boreholes, 300–2,200 feet long, were drilled by a coal company into the 4-ft-thick Hartshorne coal in an underground mine in Oklahoma in the middle 1970's, removing great quantities of 97% methane gas without hydraulic fracturing.

Therefore, detailed geological evaluation, combined with information from the history of horizontal drilling to drain gas from coal beds in underground mines, should be applied to maximize success in coalbed methane drilling, production, and profit.

Geoscience for the 21st Century
Edited by D. F. Merriam: Transactions of the Am. Assoc. Petroleum Geologists Midcontinent Section Meeting (Wichita, KS), 1999