

Coalbed Methane: Economic Success in the Arkoma Basin, Oklahoma

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Economically successful coalbed-methane (CBM) wells depend on geology, engineering, and minimizing costs. Important geologic factors include coal thickness, rank, depth, gas content, structure, hydrology, and permeability, controlled by cleat spacing and mineralization.

Middle Pennsylvanian (Desmoinesian) high volatile- to low volatile-bituminous coals in the Arkoma Basin are <10 ft thick with gas content values up to 560 cubic feet per ton. The optimal vertical depth range (based on an initial potential (IP) gas rate ≥ 50 Mcfd) is 598–4,397 ft.

There were 2,179 CBM completions (865 from the Arkoma Basin) in Oklahoma from 1988 through 2002. IP rates were from a trace to 2.3 MMcfd (average 128 Mcfd) from 726 wells in the Arkoma Basin. The greatest CBM potential was from 153 horizontal CBM wells in the Hartshorne coal with IP rates from 15 to 2,300 Mcfd (average 418 Mcfd). Of 222 wells having an IP ≥ 100 Mcfd, 125 are horizontal CBM wells with lateral lengths of 526 to 3,173 ft.

For vertical wells, profitability depends upon production rate, ultimate volume, competitive costs, a reliable, cost effective market for the gas, and low lease operating expenses often accomplished by economies of scale. The lease operating expenses per Mcf of gas produced are relatively high for CBM wells because of high water handling costs, compression fees, normal transportation and marketing fees, and relatively low production rates. CBM operators must expect large up-front expenditures.