

Stratigraphy, Depositional Environments, and Coalbed Methane Potential of Pennsylvanian Coals -- Bourbon Arch Region, Eastern Kansas

Troy A. Johnson¹, Jonathan P. Lange², Timothy R. Carr², K. David Newell² (1) University of Kansas, Lawrence, KS (2) Kansas Geological Survey, University of Kansas, Lawrence, KS

The Middle and Upper Pennsylvanian series in eastern Kansas includes thin coal beds (typically less than 0.7 m) within siliciclastic and carbonate successions. Across the study area, coal rank ranges from high-volatile A to B bituminous. Coalbed methane has become an active play due to contributing factors such as sufficient depth and overburden, overlying seals of thick shale, the probability of encountering multiple coal beds in a single well, and excellent pipeline infrastructure. A better understanding of coalbed methane potential requires identification of thick (>0.5 m), gas-rich coal beds in proximity to existing pipelines.

Coal-forming depositional environments were interpreted by integrating core descriptions with well logs to construct cross sections, and structure and isopach maps. Coal samples from cores and cuttings were analyzed for methane content and desorption rates, ash and sulfur contents, and other coal properties. Preliminary analysis of numerous coals shows gas contents ranging from 50 to 175 scf/ton between coals and across the Bourbon Arch region. Coal qualities also vary, on a moisture-free basis, from 6% to 50% ash and 2% to 5% sulfur. Coal-bearing successions were interpreted within a sequence-stratigraphic framework to develop a better understanding of the lateral variability of coal thickness, quality, and gas content. Possible modern analogues of peat-forming settings for Pennsylvanian coals in eastern Kansas may include fluvial or estuarine floodplains, deltaic interdistributaries, coastal strandplains, marshes, and back-barrier marine raised platforms and lowlands. The improved geologic understanding of Pennsylvanian coals should aid in coalbed methane exploration and development in eastern Kansas.