

# **Paleotectonic Controls and their Relationship to Wyodak Coal Deposition and Production in the Powder River Basin, Wyoming**

**Robert E. Zilinski Jr. <sup>1</sup>, Donna M. Goldstein <sup>1</sup>  
(1) Western Gas Resources Inc., Denver, CO**

Recent mapping of the Wyodak coal in the eastern portion of the Powder River Basin suggests a relationship exists between present-day structure, paleostructure, and depositional controls of the Wyodak coal. Mapped structural lineaments define depositional limits and net coal thickness, which are two key factors controlling gas production.

Slack (1981) mapped several northeast-southwest trending lineaments. These lineaments have been active and controlling facies deposition from at least the Paleozoic Era through the Cretaceous Period. Slack's work showed that stratigraphically trapped hydrocarbons in the Permian Minnelusa Formation and the Cretaceous Dakota, Muddy, Turner, Shannon and Sussex Formations were governed by the relative up-down position of these lineaments.

New work suggests that paleostructure also controlled the depositional environment within the Paleocene Wyodak coal member of the Fort Union Formation. Structural mapping of the Wyodak coal member, along with dip-angle algorithms, show that the eastern part of the Powder River Basin is segmented into several structural blocks. These blocks are controlled by northeast-southwest trending faults. Faults identified in this study have a similar location and orientation to those described by Slack. These structural trends correlate well with abrupt changes in coal thickness shown by the Wyodak Coal isopach map, areas where the coal splits and possibly the location of fluvial channels (no coal zones). Gas production from the Wyodak coal is controlled by the segmentation and coal thickness variability of the Wyodak coal swamp relative to these paleo-lineaments.