

Geological Characterization of the Upper Mississippian Fayetteville Shale in Northern and Eastern Arkoma Basin, and Mississippian Embayment Regions, Arkansas

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The Upper Mississippian (Chesterian) Fayetteville Shale is the main source of natural gas production in the Arkoma Basin, Arkansas. The most productive area is located in central and northern Arkansas, in a region with a general east-west orientation, limited to the south by the Frontal Ouachita Thrust Belt, and to the east by the Mississippi Embayment. As of February 2010, the cumulative production of the Fayetteville Shale totaled approximately 900 Bcf. However, there is little to no commercial gas production from the Fayetteville Shale in the west-central portion of the Arkoma Basin (Li et al., 2010). The purpose of this study is to establish a correlation between surface data obtained in outcrops of Upper and Lower Fayetteville Formation in Searcy and Stone counties in northern Arkansas, with subsurface data obtained from wells located in the Embayment, and to differentiate the geological and geochemical settings that cause unequal gas production in this region.

To achieve this goal I have rock samples for thin sections and geochemical analysis from both locations, well log data, and outcrop data including hand samples, gamma ray scintillometer profiles and outcrop descriptions. Nine lithological facies have been described in the field which show vertical variations related with gamma ray response and physical features in outcrops. High contents in TOC have been obtained from samples of Upper and Lower Fayetteville. According to XRD analysis results the most common clay is Illite. From thin sections analysis, several features have been identified which will be useful for environmental and lithological interpretations.