

Poster 3 **Implications of Complex Stratigraphy on the Exploration for CBM and Conventional Reservoirs, Hartshorne Formation, Parts of Pittsburg and Hughes Counties, Oklahoma**

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Large volumes of conventionally trapped natural gas and coal bed methane (CBM) are produced from the Hartshorne Formation in the Arkoma Basin. Detailed correlation and mapping in Townships 5 to 7 North, Ranges 11 to 13 East, Pittsburg and Hughes Counties, Oklahoma, indicate that most existing gas production is from conventionally trapped deltaic distributary and incised valley fill sandstone reservoirs. Cross-cutting relationships and reservoir fluid types confirm that this area experienced a complex history of delta progradation and subsequent incision.

Sandstone trend analysis identified an ESE to WNW trending deltaic complex in the lower Hartshorne interval. This delta was incised by a NE to SW trending valley that eroded and filled prior to the deposition of the lower Hartshorne peat. Gas-bearing deltaic sandstones are transected by much thicker, water-bearing incised valley fill sandstones. Trapping in the deltaic distributaries appears to be independent of structure. In contrast, anticlinal folding is necessary to trap gas accumulations in the thick, incised valley fill sandstone reservoirs. Coals tend to be thinner over the thick, valley fill sandstones.

The southeastern quarter of the study area contains the northern Hartshorne coal-split line. Following the trend of the split is an upper Hartshorne incised valley. The upper Hartshorne coal is thin or absent over the valley fill, which suggests peat was eroded from or never deposited over the thickest sand accumulations. This upper Hartshorne valley was eroded through the lower Hartshorne coal and into the underlying deltaic deposits, juxtaposing upper Hartshorne fluvial sands on marginal marine/deltaic mud. High-resolution correlation across the coal split indicates the upper and lower Hartshorne coals merge to form a single, thicker coal. A shale or "bony coal" in the thick coal appears to separate the upper and lower members.

Sandstone trends impact coal thickness. Peat accumulation thins over thicker sandstone, whereas valley erosion removed underlying coals. The inverse relationship between sandstone and coal thickness may be used to predict the location of thicker coals and enhance CBM exploration strategies. On the other hand, understanding the complex nature of the incised valley and deltaic deposits will enhance exploration strategies for conventional sandstone reservoirs.

