

Variety of Mississippian (Kinderhookian to Osagean) Subsurface Reservoir Systems in the Midcontinent; Their Lithostratigraphic Architecture Related to Eustasy and Syndepositional Tectonics

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Mississippian (Kinderhookian to Osagean) in exposures in the central midcontinent, and in the petroliferous subsurface of Kansas and northern Oklahoma, preserve evidence of eustasy and the imprint of considerable syndepositional tectonism, related to Ouachita collisional tectonics, in their facies types and lithostratigraphic architecture. Such eustatic and tectonic overprint are clearly reflected in the variety of petroleum reservoir rocks and traps, hence, they are significant attribute of any exploration model. The main eustatic event in the section was global lowstand at the end of Reeds Spring time (approx. middle Osagean) when extensive tripolite formation occurred. Such rocks are major gas reservoirs in the midcontinent. Most other reservoirs have strong tectonic signatures, and they include: (i) low-angle, E-W oriented folds and associated intraformational unconformities of marine and meteoric origin, the latter associated with dissolution-related porosity. Such features formed on multiple arches that are separated laterally and temporally, that reflect the repeated passage of foreland bulges during deposition. They are associated with structural and subunconformity-truncation traps within mappable areas in the subsurface; (ii) facies-trap reservoirs are likely in areas in central Kansas in areas where there is significant thickening of the Kinderhookian to Osagean section related to anomalous subsidence within areally vacillating fore-bulge basins; and (iii) “reefs” in the section, which include both allochthonous (related to syndepositional uplift and down-slope detachment) and autochthonous occurrences. “Reef” types are bryozoan-crinoid bafflestones and physically-deposited buildups, and locally, stromatactis-type Waulsortian mounds. Such rocks locally are porous and oil-stained in outcrops, hence, they may be a new reservoir play in the subsurface.