# Forest City Basin - Structural Control on Production

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## ABSTRACT

The older Paleozoic history of deposition and facies is consistent across the four-state area including the Forest City Basin. However, the recorded history of production from these units is very confined within the Basin. The productive features are small structures within the Basin, all with some degree of structure defining the fields. The dominant structure bounding the Basin is the generally north-south trending Nemaha Uplift and its' eastern boundary the Humboldt Fault Zone. Several fields in Kansas and Nebraska (John Creek, Davis Ranch and Dawson} have dominant north-south trends that seem related to the Nemaha-Humboldt trends. It may be noteworthy that these fields have both Hunton and Viola production. The defining structures on fields distant from the Nemaha Uplift (Falls City and Barada), however, are controlled by faults trending more northwest-southeast or northeast-southwest and produce only from the Hunton. It is suggested that these within-basin faults are related to reactivation over strike-slip faulting within the Precambrian basement. These fault patterns of reactivation in overlying sedimentary units are often termed flower structures. The sparse data on rock type and configuration provides only broad tectonic patterns within the basement. Ground measurements of gravity and magnetics do suggest some potential structural trends. Mapping of shallow marker beds in Permian and Pennsylvanian units indicate the complications of structures related to the Nemaha Uplift. Deeper geophysical data is either not defining or has not been made available. Needing further definition is the timing of structures and its relevance to the source of the oil in these in-basin fields. The oil reserves in the Pennsylvanian of eastern Kansas seem to be related to the regional migration of petroleum northward from the Woodford in Oklahoma. However, studies of the older Paleozoic oils suggest local sourcing from the underlying Ordovician (Simpson) shales. It is noteworthy that the Viola production is overlain (capped) by Sylvan (Maquoketa) Shale and the Hunton production is overlain (capped) by the Chattanooga (Woodford) Shale. This would suggest local vertical migration of oil rather than regional lateral migration as a source. Integrating the available structural data and the history of tectonic and migration history could suggest patterns for additional exploration.