

Structural Configuration Of The Northern Nemaha Ridge Area In The Forest City Basin, Southwestern Nebraska, Northeast Kansas And Northwest Missouri And Its Implication To Future Petroleum Exploration

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ABSTRACT

The Nemaha Ridge in Eastern Kansas and Nebraska forms the western boundary of the Forest City Basin. There is a general trend of prolific productive structural highs associated with wrench faults that parallel the ridge which produce from the Simpson, Viola and Hunton reservoirs at less than 1,000 meters. These wrench fault systems are associated with the eastern boundary of the ridge called the Humboldt Fault. The average well in the Forest City Basin is 90 MBO per well on 20 acre spacing at less than 1,000 meters. The area is lightly drilled relative to other explored areas in the basin owing to the difficulty of predicting the location of potentially productive horst features based on subsurface well data alone. Aeromagnetic data indicates a series of main northeastern trending basement faults cross-cut by secondary northwest and west trending faults. Well data and seismic confirm many of these faults, which are generally high angle wrench systems with horst and graben features. The apex of any particular productive horizon on a structure commonly do not stack but are slightly offset due to the high angle of faulting. The Livengood Field, Brown County, Kansas lies on the northern end of this trend, was discovered in 1944 and is an example of a complex wrench fault system. The field has been defined in the literature as a single structural high but detail analysis using subsurface geology and seismic data indicate it's a series of structural highs and wrench fault systems with two distinct trends. The Runamuck Field in Atchison County, Missouri is a similar complex structure. The exploration model derived from these fields has and can be applied to this as well as several other areas along the ridge and demonstrates its applicability to finding new reserves.