

# **Precambrian Sourced Magmatic Fluids as the Cause of Thermal Maturation of Ordovician Source Rocks along the Mid-Continent Rif System and Forest City Basin Central USA**

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## **ABSTRACT**

The Nemaha Ridge is the eastern boundary of the failed North American Mid-Continent Precambrian rift system and the western boundary of the Forest City Basin located in the central part of the USA. The rift has over 4,000 meters of Precambrian sediment and trends north-northeast. The Nemaha Ridge has been active since Precambrian times and was finally drowned in Desmoinesian time. Along the ridge there are numerous sympathetic and secondary wrench fault systems some of which contain oil productive closures. Overall the source rocks of Ordovician (Maquoketa and Simpson mudstones) and Late Devonian-Early Mississippian (Chattanooga mudstones) age, in the area of the ridge, are thermally immature (Carlson, 1989). Locally there are several isolated structures where the Ordovician age source rocks have been altered and expelled oil. To the east of the Nemaha Ridge in the Forest City Basin localized Precambrian intrusions also have numerous oil fields with Ordovician oil in Pennsylvanian sandstones. Locally upwelling of low temperature hydrothermal fluids derived from Precambrian rocks migrated along faults within these minor wrench systems and intrusions in the Late Pennsylvanian and Permian time thermally altering the carbonaceous mudstones and dolomitizing certain limestones (Coveney, 1992; Coveney and Sangster, 1995). Presented here are three areas with 3D and 2D seismic that discuss the complex nature and history of these wrench fault and intrusive systems that provide a potential exploration model for other areas.