Highlights: Precambrian Midcontinent Rift Play (Palacas, 1995)

Geology: Volcanic horsts flanked by sedimentary basins up to 30,000 feet thick, sedimentary basins up to 6,500 feet thick atop the horsts

Reservoirs: Sandstones, conglomerates, fractured shales; porosities up to 18%; probable shale and fault gouge seals

Source rocks: Nonesuch Formation shale, up to 700 feet thick, up to 3% total organic carbon (TOC), type I & I kerogens, mature to overmature, known oil seeps in Michigan

Traps: Fault-related structures, large anticlinal features, drag folds, stratigraphic traps likely

Exploration status: Five wells drilled from Kansas to Michigan; seismic refraction data available for parts of the rift; increasing awareness of source rock potential and oil seeps, improved knowledge of large reserves in other rifts and Precambrian terranes

Resource potential: A high-risk play with few wells drilled and mature to overmature source rocks; source rocks may have favorable thermal maturity along basin flanks

Sponsored by: Minnesota Minerals Coordinating Committee

Produced by: Minnesota Geological Survey

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have re-migrated into structures formed during compression. Hydrocarbons that might have accumulated during initial rifting may have occurred following deposition of Paleozoic sediments. In addition, of flanking basins, a second phase of oil and gas generation probably occurred prior to compressional tectonism. In the shallower portions of flanking basins, especially in the deeper portions of the basins, prior to compressional tectonism. Drag folds against reverse faulting offer multiple reservoir possibilities. It is likely that stratigraphic traps also occur. 

Seals: Probable seals include shales of the Nonesuch Formation, as well as tight horizons in the overlying Freda Sandstone and Bayfield Group. Fault gouge may also account for some seals.

Exploration status: Very few wells have penetrated the lower Nonesuch Formation. Source rocks that have the highest potential for hydrocarbon reserves, drilling at sites from Kansas to Michigan was stimulated by increasing awareness of source rock potential and oil seeps, and also improved knowledge of large reserves in other rift basins such as the North Sea, Gulf of Suez, and Pripyat Basin, as well as other Precambrian terranes such as the Lena-Tunguska Petroleum Province of eastern Siberia, the Sichuan Basin of southern China, and the Huqf Group of Oman.

Resource potential: The rift is regarded as a high-risk play by the U.S. Geological Survey because very few wells have been drilled. Potential source rocks may be overmature, and reservoir porosities in some regions may be unfavorable. However, it is reasonable to speculate that source rocks may have more favorable levels of thermal maturity if present at shallower depths of burial along the basin flanks. Drilling depths would vary from 3,000 feet to as much as 25,000 feet.

References

