Petroleum System Assessment of Anadarko Basin Continuous and Conventional Resources

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The U. S. Geological Survey is conducting a petroleum systems-based assessment of conventional and continuous (unconventional) oil and gas resources for the Anadarko Basin province. This area includes most of southwestern Kansas, western Oklahoma, northeastern Texas, and the Las Animas uplift of southeastern Colorado. Exploration status of the province is mature, with more than 200,000 wells; reservoirs include Cambrian through Permian formations.

Assessment includes Permian production from the Hugoton gas field, which is defined as continuous primarily because it is underpressured, with updip and downdip water contacts, and limited water production. Lateral facies changes and hydrodynamics provide updip and downdip seals. Continuous oil and gas is also produced from scattered wells in the Devonian-Mississippian Woodford and Pennsylvanian Atokan shales.

The most thermally mature source rocks are in the deep basin of Oklahoma and Texas. Modeled 2-D petroleum migration flow paths are primarily radial, extending northward from the faulted southern boundary of the basin in Oklahoma and north-northeastward from Texas. Corrected borehole temperature and measured vitrinite reflectance (Ro) data were used to calibrate wells used in 1-D models of wells in the basin. Onset of oil generation from the Woodford Shale calculated from the Bertha Rogers 1 well (Sec. 27, T. 10 N., R. 19 W.) in the deep Anadarko Basin was about 310 Ma and overmaturity was reached about 295 Ma using Woodford hydrous pyrolysis kinetics. Maturity history based on Ro values resulted in onset of oil generation at 310 Ma (Ro 0.55%) and overmaturity (Ro 4.0%) at 260 Ma.