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By Debra K. Higley

Open-File Report 2011–1242
Sheet 3 of 3

Undiscovered Petroleum Resources for the Woodford Shale and Thirteen Finger Limestone–Atoka Shale Assessment Units, Anadarko Basin—Continued

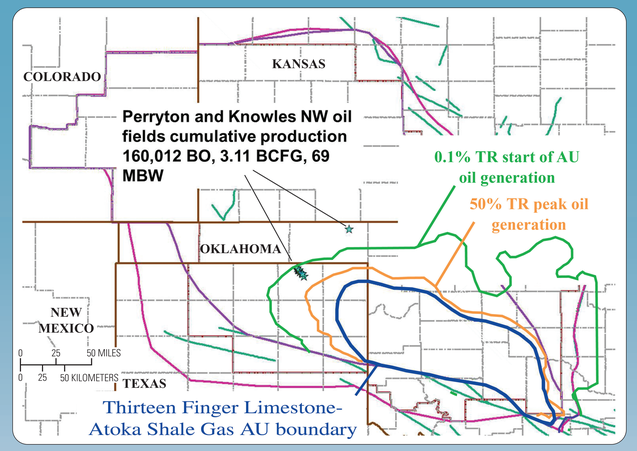


Figure 17. Oil production from the Thirteen Finger limestone is partly within the start of oil generation based on a transformation ratio (TR) of 0.1%. The AU boundary approximates the extent of maturation for gas generation based on the 1.2% R_o and 99% TR contours. Perryton and Knowles NW field information is from IHS Energy (2009a, 2009b).

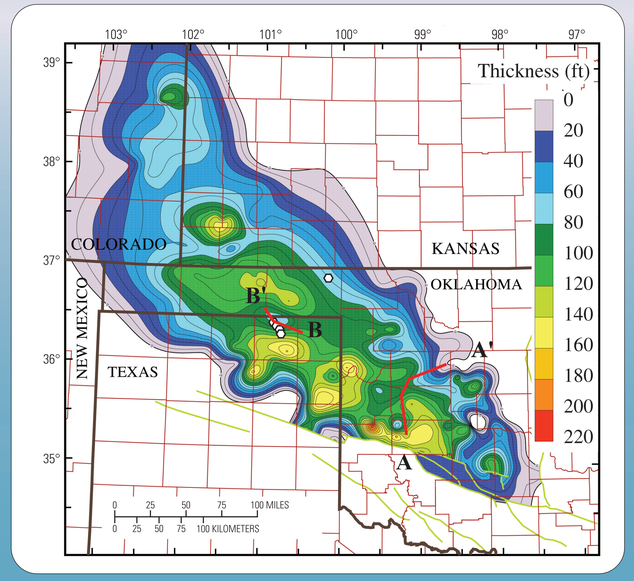
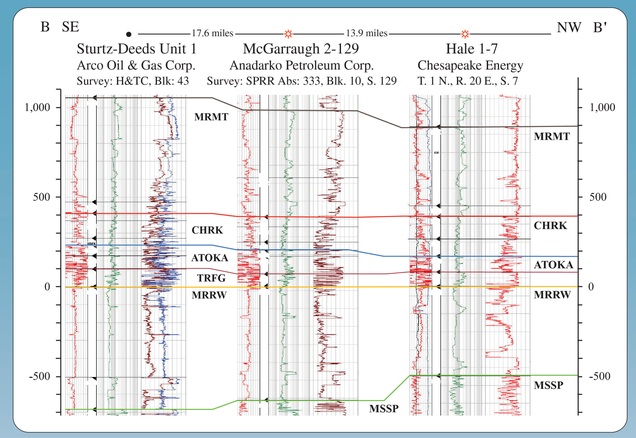


Figure 18. Isopach from the top of the Thirteen Finger limestone to the Morrow Group. Red lines are figure 19 cross section locations. White hexagons are Perryton (Texas) and Knowles (Oklahoma panhandle) oil fields. Morrow and Thirteen Finger limestone tops are based on Andrews (1999), examination of more than 120 well logs, and edited tops from IHS (2009 a, b). Morrow Formation faults (green) are modified from Andrews (1999).



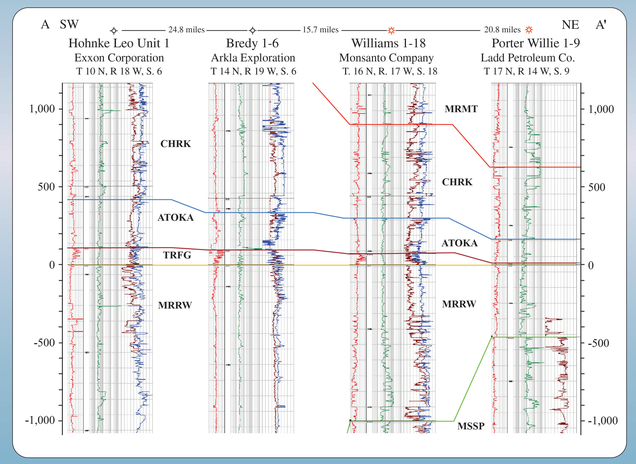


Figure 19. Southwest to northeast (A–A') and southeast to northwest (B–B') cross sections of the Thirteen Finger limestone (TRFG) of the Pennsylvanian Atoka Group (ATOKA). Lines of section are on figure 18. Vertical scale is feet relative to the base of the Thirteen Finger limestone. MRMT is Marmaton Group, CHRK is Cherokee Group, MRRW is Morrow Group, and MSSP is top of the Mississippian.

Conclusions

Paleozoic source rocks are thermally mature for oil and gas generation across most of the Anadarko Basin in Oklahoma and Texas. The deep basin of Oklahoma and Texas is thermally mature for gas from Atokan and older source rocks. Deep basin areas that are overmature for gas generation are within the gas preservation window, as indicated by gas production from Woodford Shale and older formations in this area, and on modeled levels of thermal maturation. Almost all of the Colorado and Kansas portions of the basin are thermally immature for petroleum generation. Source of oil and gas in these areas is long-distance migration radially northward from the deep basin in Oklahoma and proximal Texas, and northward from the panhandle area of Texas.

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Michael Lewan provided the comparison chart of Woodford Shale hydrous pyrolysis transformation ratios and vitrinite reflectance; I also have benefited greatly from his knowledge and research. Chesapeake Energy has been very generous with their time, data, and expertise, which is gratefully acknowledged. The author would like to thank Kathy Winner of IHS Energy and IHS Energy for providing information for our mapping and modeling efforts.

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