

Potential Source Rocks in the Western Kansas Petroleum Province

Tyler Hill, Matthew Totten, and Michael Lambert
Department of Geology, Kansas State University, Manhattan, KS

The source of the hydrocarbons in western Kansas has been unknown for many years. The highly organic-rich Anadarko basin directly south of western Kansas is a very prolific producer, and has been the most widely accepted source of the oil in Kansas. The shales within the Anadarko basin are known to have passed through the oil and gas windows and produced hydrocarbons. These hydrocarbons would need to migrate several hundred miles to have sourced western Kansas reservoirs. Several models have been proposed that suggest that thermal maturity is time dependent, and that longer burial times at lower temperatures may initiate catagenesis. This study tested whether the many organic-rich, black shales in Kansas may have sourced the oil that is currently in western Kansas. The shales analyzed in this study are interbedded within producing formations ranging from Permian to Cambrian in age. Pyrolysis of these shale samples resulted in TOC values between 1.26% and 13.33%, rich enough to be excellent source rocks. The organic matter in most of the source rocks was Type II and III suggesting it came from marine and terrestrial environments. S₂/S₃ values showed, however, that only small amounts of hydrocarbons were produced from these rocks. Vitrinite reflectance values ranged between 0.44 and 0.65, also too low to be in the oil window. The results of this study do not support the longer burial at reduced temperature models, and further support the long distance migration from the Anadarko basin source rocks for the hydrocarbons in western Kansas.