
Systematically Linking Environment of Deposition, Landing Zone, and Productivity in the Springer Shale Tight Oil Play, Oklahoma

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GCAGS Explore & Discover Article #00231*

http://www.gcags.org/exploreanddiscover/2017/00231_roark_et_al.pdf

Posted October 30, 2017.

* Article based on an extended abstract published in the *GCAGS Transactions* (see footnote reference below), which is available as part of the entire 2017 *GCAGS Transactions* volume via the GCAGS Bookstore at the Bureau of Economic Geology (www.beg.utexas.edu) or as an individual document via AAPG Datapages, Inc. (www.datapages.com), and delivered as an oral presentation at the 67th Annual GCAGS Convention and 64th Annual GCSSEPM Meeting in San Antonio, Texas, November 1–3, 2017.

EXTENDED ABSTRACT

In 2015, Chevron's Midcontinent Business Unit Exploration Team evaluated the emerging Springer Shale play in the southern Anadarko Basin. Typical Springer horizontal wells target well-defined, 50 to 150 ft thick horizons (the Lower Springer Target and the Upper Springer Target) within the late Mississippian Springer Shale (locally known as the Goddard Formation; e.g., Westheimer, 1956). These targets show gamma ray perturbations and elevated resistivity values in wireline logs relative to the over- and underlying strata. The Springer Shale targets thin laterally outside of limited fairways and are truncated to the east and north by a regional unconformity, resulting in a relatively small area of interest for the Springer Shale play (Fig. 1). Like other Cambrian through Mississippian mudstone deposits in the southern Anadarko Basin, the shales in the lower Springer Group formed in a relatively distal marine setting with limited coarse-grained clastic input (e.g., Johnson, 1989). Understanding the depositional environment of the target horizons is essential to explaining why only these intervals, and not the rest of the Springer Shale (typically over 1000 ft thick), show prospectivity.

Exclusive access to whole cores through the prospective and non-prospective portions of the Springer Shale permitted detailed analysis of the formation. These Chevron-owned cores covered a portion of the Upper Springer Target (~120 ft) and part of the non-prospective Springer Shale (~55 ft), taken in the Carter-Knox Field, adjacent immediately adjacent to active Springer horizontal development activity. The dominant lithofacies in the Upper Springer Target is silica-rich mudstone, with occasional thin (0.5 in or less) calcareous silt beds.

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Originally published as: Roark, A., B. Horton, K. Lutostanski, and D. Tripathy, 2017, Systematically linking environment of deposition, landing zone, and productivity in the Springer Shale tight oil play, Oklahoma: Gulf Coast Association of Geological Societies Transactions, v. 67, p. 489–495.