
Woodbine Formation Sandstone Reservoir Prediction and Variability, Polk and Tyler Counties, Texas

Robert J. Bunge

10111 Richmond Ave., Ste. 500, Texas 77042

ABSTRACT

The Woodbine Formation in East Texas has been drawing attention with recent high gas prices and fast payout of wells. Since production to date has largely been limited to deltaic sandstones deposited on the shelf, speculation of downdip play potential, akin to the Tuscaloosa (the age equivalent formation in Louisiana), has been high. An integrated geological and geophysical study of the Woodbine led to the recognition of a younger deltaic sequence, positioned basinward of previous production. A deep well test confirmed the geologic model, finding thick deltaic sandstones. Although the sandstones were tight, they suggest there is a deeper play fairway for the Woodbine.

Abundant geophysical work, including elastic inversion and an amplitude versus offset (AVO) study, was conducted to detect reservoir sands, to no avail. Reservoir prediction, then, relied on the strong integration of data in a sequence stratigraphic framework. Sequences were mapped based on traditional surfaces, and paleo-geographic maps were created from top, base, and internal reflection geometries, along with well and core data. Deeper Upper Woodbine exploration potential would not have been realized without changing stratigraphic models away from the Tuscaloosa analogue.

While thick sandstones were discovered, they did not flow despite having wireline log responses characteristic of good reservoir quality, analogous to nearby fields. This prompted an in depth study of Double A Wells Field, which exhibits Woodbine sandstones of highly variable stratigraphic character, and similar production variability from one well to the next, despite having similar log responses.

The geologically successful test of the Woodbine in Tyler County relied on integrating geology and geophysics in a sequence stratigraphic framework. Despite non-commerciality, reservoir variability displayed at Double A Wells suggests that more than a single well test may be required to prove up commerciality.