

**ANALYSIS OF HYDRAULIC FRACTURE GROWTH AND
SEGMENTATION: IMPLICATIONS OF THE HFTS1 SLANT CORE,
WOLFCAMP FM., MIDLAND BASIN, WEST TEXAS**

Bethany G Rysak

ABSTRACT

The 6TW slant core is part of the multidisciplinary Hydraulic Fracture Test Site (HFTS1) project in the Midland Basin. The slant core made a close pass by two horizontal wells on an 11-well pad and has yielded new insight into fracture networks created by the hydraulic fracturing process. Approximately ~600 ft of core was recovered through the Wolfcamp A and B, with fracture characterization identifying 375 hydraulic fractures (trending E-W), and 309 calcite-sealed natural fractures (Set 1 trending NE-SW; Set 2 trending WNW-ESE).

Initial observations showed that the number of hydraulic fractures found in core was higher than the number estimated to have been created via the completion processes. This abundance may be closely tied to the examples of twist-hackle segmentation, diversion, and bifurcation seen in core. These features can be used to determine propagation direction and help build a clearer picture of fracture network growth and geometry. To further investigate the impact of these features on our current understanding of hydraulic fracture propagation, this research was divided into four parts, those being: 1) Analysis of hydraulic fractures in the slant core, 2) Observation of lab-generated hydraulic fracture morphology, 3) Observation of natural hydraulic fracture morphology in the field, and 4) Building of a 3D reservoir model for the HFTS1 pad to run fracture forward modeling.

The key implications of this work provide a greater understanding of hydraulic fracture network propagation in the subsurface, and could have wider applications for evaluation, completion, production, and fracture modeling techniques in unconventional reservoirs.

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