A fluid pressure-based assessment of vertical and lateral hydraulic connectivity of the Wilcox Formation in the St. Malo structure and surrounding area of central Walker Ridge, northern Gulf of Mexico

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ABSTRACT

In Walker Ridge the Wilcox formation is an approximately 2,000 ft. thick turbidite sand sequence of interbedded sands, silts, and shales with proven hydrocarbon resources. The vertical and lateral hydraulic connectivity of sandstones within the Wilcox Formation for St. Malo (WR 677 and 678) was assessed using fluid pressure measurements obtained from the Modular Formation Dynamic Tester. Fluid pressure gradients indicate the Wilcox is divided vertically into two hydraulic intervals, corresponding to the Upper and Lower Wilcox. Except where fault separated, the Upper Wilcox demonstrates excellent vertical and lateral hydraulic continuity. The upper portions of the Lower Wilcox also demonstrate excellent vertical and lateral hydraulic continuity. However, deeper in the interval some variability in hydraulic connectivity is observed, possibly due to internal shale seals and/or penetration of small, sealing faults on the crest of the anticline

Nearby Wilcox penetrations at Stones (WR 507 and 508), Tucker (WR 544), Das Bump (WR 724, and Jack (WR 758) show excellent vertical hydraulic connectivity in the Upper Wilcox and similar variable continuity in the Lower Wilcox. However, neither Upper nor Lower Wilcox is in lateral hydraulic communication with these five adjacent structures. We hypothesize that somewhat higher temperatures as well as higher vertical effecting stress in the connecting synclines between structures has lowered porosity and permeability and is limiting regional lateral hydraulic connectivity of the Wilcox.

BIOGRAPHIES

Will Morrison is a graduate student at The University of New Orleans. He is from New Roads, Louisiana. He acquired his bachelor's degree in geology from Tulane University. Before starting graduate school, he was employed as a field geologist in Tampa, Florida and an HSE technician for Shell in the Gulf of Mexico. His thesis research involves using geophysics to assess fluid distribution in deep-water Wilcox fields. Will was on the UNO IBA team that won the Gulf South in 2016.

Ryan Jones received his Bachelors in Earth and Environmental Science from the University of New Orleans in 2013. After working for a mobile app developer, he returned to UNO for a master's degree where he has been a teaching assistant for several courses and is the past UNO-AAPG Student Chapter president. His thesis research investigates paleo-climate of the Neogene Siwalik group, Nepalese Himalaya, using a multi-proxy isotopic study. Ryan was on the UNO IBA team that won the Gulf South in 2016.