Great White Field: A Near Perfect Petroleum System in the Perdido Fold-belt, Gulf of Mexico

Presented by:

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ABSTRACT

Great White Field in the Perdido Fold Belt is the preeminent Lower Tertiary field in the Deep Water Gulf of Mexico in terms of cumulative production. The field has produced over 124 MMBO and 249 BCF from a single zone, the WM12 Sand, since production started in 2010.

The WM12 reservoir differs from many of the other Wilcox reservoirs found to the east in Keathley Canyon and Walker Ridge in that its reservoir fluids are high GOR (~2000) and that oil bearing sands are seismically characterized as Direct Hydrocarbon Indicators.

The Wilcox reservoirs at Great White (GW) are composed of turbidite sands that were sourced from the NW and deposited in a near flat abyssal setting. Specifically, the WM12 is Lower Eocene in age (~50Ma). The trapping structures were formed by compressional tectonism that initiated near Frio time (28Ma) creating NNE-SSW trending anticlines. These structures were later subjected to significant extensional faulting.

For a sand with a gross thickness less than 150', the WM12 Sand uniquely forms one hydraulically connected reservoir across the structure and across numerous fault blocks. The proven oil column or Lowest Known Oil (LKO) extends past the structural spill point of the GW structure indicating that the field has a stratigraphic element to its trap.

Basin Modelling was conducted to determine the timing of the critical elements that created the WM12 oil reservoir. Tithonian age shales (141Ma) are assumed to be the hydrocarbon source rocks for the field. Thermal Modelling and Structural Reconstruction indicate that an area to the east of the GW structure would have been in the peak oil expulsion window during the Upper Oligocene shortly after the formation of the GW structure and before the extensional faulting. This allowed oil charge across the whole structure prior to segmentation by later normal faulting with magnitudes greater than the sand thickness.

The WM12 interval thickens towards the SW onto the adjacent Lamprey structure. The LKO at GW extends across the saddle connecting these structures such that if the WM12 sand were to be contiguous across the saddle then the Lamprey WM12 could be considered to be proven oil bearing. Geophysical modelling and processing were used to determine if the acoustic characteristics at Lamprey are consistent with a thick, oil-bearing WM12 sand. The Lamprey structure is currently unleased.

BIOGRAPHY

Toby Roesler is a geophysicist who has been employed by a number of oil and gas companies in New Orleans for nearly 30 years. He has primarily worked exploration projects in the DW GOM but has also worked projects in the onshore Gulf basin, DW Brazil, offshore West Africa, and in north and south Alaska. He also mentors students at the University of New Orleans and the University of Western Kentucky for the AAPG Imperial Barrel Award competition. He is currently Chief Geoscientist at Stone Energy.