

Aptian Play Attributes in Pelagian Platform Basin, Central-East Tunisia

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Abstract

The detailed play fairway mapping and structural analysis demonstrated clearly the presence of significant hydrocarbon upside linked to the Aptian Serdj play in the Central-east Tunisia (Pelagian Basin). However, the Late Cretaceous wrench tectonics had a great impact on the oil maturity and trapping through the Aptian reservoir sequences. The predominant structural trap types comprise supra-salt faulted four-way dip closures and paleo-horsts. In addition, the structural closures created between the ends of faults became potential sites for hydrocarbon accumulation as determined at several oil-seeps in the Aptian carbonates or channel pinch-outs. Based in oil-source rock correlation, potential plays involve Albian Fahdene rich source rock (TOC Average ~ 4%) sealed by thick Vraconian clays to generate hydrocarbons and charge the Aptian carbonates reservoir by simple pressure differential (downward migration) and/or source reservoir juxtaposition. The Aptian reservoir shows variable porosity but it tends to be better towards the apex of structures with high vertical closure. Permeability is extremely low in tight matrix due to the narrow pore throat size. However, open fractures due to wrench tectonics does provide open fractures large enough for sustainable flow rates as reported in several unstimulated wells (i.e. 3000 Bopd from Mahdia-2 well). Porosity Vs depth and image logs interpretation (OBMI and UBI) suggested a clear deterioration of reservoir quality and the absence of productive fractures in deep areas (> 4 km). Although, the primary pores space has been occluded by calcite cementation or lost by lithostatic compaction. The reservoir facies distributions show that halokinesis has an overwhelming impact on reservoir facies distributions and its utility for exploration purposes. Exploration Fairway maps and seismic data can be used to high-grade areas for further exploration.

Keywords: Aptian, Albian, salt tectonics, diagenetic processes, exploration risk, Pelagian platform.