

In-field Exploration: Identify an Overlooked Potential Reservoir (diyab Fm.) in the Sarb Field, Abu Dhabi Offshore, using Regional Geologic and Newly Processed Reflection Seismic Data

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Abstract

Satah al-Razboot (SARB) is an offshore oil field located about 200 km northwest of Abu Dhabi city. The field is operated by ADNOC Offshore; Cepsa and OMV are the other two Concession Holders. The field produces from the Upper Jurassic *Arab* A, B, C and D which is a very prolific reservoir in the Arabian Platform. The overall Arab sequence consists of a series of thinly bedded limestones and dolomites intercalated with anhydrites. The top seal is provided by the evaporitic (mainly anhydrite) of U. Jurassic *Hith* Fm. The source rock is represented by the underlying U. Jurassic *Diyab* Fm. Despite the recognized primary source rock properties, the Diyab Fm. contains some intra-formational reservoir layers. In some of the offshore fields located nearby SARB, along the *Shoal Belt Margin* running NNW-SSE, the *Hanifa* and the *Tuwaiq Mt.* formations (lower part of the Diyab complex) show some hydrocarbon bearing levels, from where oil has been tested with good production rates. These elements have induced OMV to believe that the full reservoir potential of the lower part of the Diyab complex in SARB area might not have been fully exploited yet. Our regional work, based on detailed well correlation, highlighted the following key elements: a) a westwards progradation of *Tuwaiq Mountain* and *Hanifa Shoal Belt Margin* not far from SARB area and b) a parallel westwards facies variation from cleaner platform carbonates to basinal argillaceous mudstones. Not many wells have penetrated the lower part of the Diyab in the SARB area. In some of them an increase of gas shows, with all components from C1 to C5, were detected by the mud logging. In parallel, a petrophysical re-evaluation of the same wells, indicates an increase of the average and maximum porosity in some levels of the *Upper* and *Lower Hanifa*. On the other hand, two DSTs performed in two SARB wells were not able to produce from some of the Diyab intervals.

The newly reprocessed seismic data allowed OMV to run a deterministic post-stack seismic inversion to investigate if different seismic facies could be identified in the interval of interest. At log-scale resolution, the cross plot of Total Porosity (PhiT) *versus* Acoustic Impedance (AI) for the whole Lower Diyab interval shows a good correlation. Moreover, the upper part of the Lower Diyab is characterized by higher PhiT and lower AI than the lower part, suggesting a facies differentiation between an argillaceous limestone and a cleaner one with potential reservoir properties. At seismic-scale resolution, the continuity, and the contrast between the two Lower Diyab facies can be also confirmed. In conclusion, the analysis of the well data and the newly reprocessed seismic data seems to indicate a possible westwards migration of the *Shoal Belt Margin* in the Lower Diyab formation towards the SARB field and, therefore, the possible presence of reservoir layers. Further studies are deemed necessary to confirm these elements.