Shallow Marine Reservoir Characterization: Example from the Lower Paleozoic Al-Bashair Formation, Ghaba Salt Basin, Oman

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ABSTRACT

Al Bashair Formation of Haima Supergroup marks the first appearance of marine incursion during the early Cambrian in Central Oman. Recently, Al Bashair Formation has shown commercial hydrocarbon production from the sandstone dominated intervals of the lower part. This study aimed to investigate the reservoir potentiality; petrophysical characteristics and quality distribution of the lower Al Bashair sandstone dominated intervals by the integration of wireline logging and conventional cores analysis data.

A detail description of two conventional cores from two drilled wells in block 3 and 4 led into identification of seven distinct lithofacies namely (i) interbeds of sandstone/ siltstone with claystone, (ii) flaser sandstone bedding, (iii) lenticular mudstone bedding, (iv) claystone, (v) oolitic limestone, (vi) hummocky and wavy rippled sandstone. The presence of oolitic limestones, hummocky cross stratification sandstones and wave rippled sandstones indicate that Al Bashair Formation was deposited in storm dominated shallow marine system.

Conventional wireline logs collected from thirteen wells were used to identify lithology, petrophysical properties, lateral and vertical continuity of different reservoir intervals from the studied fields. Four types of electrofacies were identified, calibrated and compared with the constructed lithofacies from both conventional cores. Moreover, subdivision of these electrofacies into reservoir and non-reservoir intervals by employing concept of flow zone indicators to define Hydraulic zones. Accordingly, a total of four Hydraulics zones have been found with several few meters thick and lateral continuous over the studied fields. However, two of these flow units are found to be of high quality.

Integration of wireline logging and conventional core data helped in increasing our ability for better understanding of lower Al Bashair Formation depositional environment, reservoir quality distribution and continuity.