

Revealing the Exploration Potential of Subtle Natih Truncation Traps in North Oman, Resulting in the Recent Discovery

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Abstract

The Cretaceous Natih play of the Wasia Group is one of the core-producing plays in North Oman, constituting approximately 17% of the total hydrocarbon oil volumes discovered so far in the PDO Block 6 concession area. Deposited during the Late Albian to Turonian ages, the Natih Formation formed on a shallow carbonate platform across the Arabian Gulf. In the Lekhwair High region northwest of Oman, an uplift during the Late Cretaceous led to the progressive erosion of the Natih Formation by the Base Tertiary's unconformity and overlain by the Shammar. This truncation pattern of multiple sub-units of Natih carbonate, combined with a competent top seal, creates laterally repeating truncation trapping geometries in the vicinity of the Lekhwair High area. Despite the PDO concession area's success with the Natih truncation play, identifying subtle traps in the Lekhwair High has been challenging due to seismic quality issues, generation of multiples, Natih facies variations, and inconsistencies in formation tops.

PDO recently executed a Wide Azimuth (WAZ) seismic acquisition in North Oman, leveraging advancements in processing and seismic imaging technology. This prompted an integrated data-driven reassessment in the Greater Lekhwair area to refine our understanding of the Natih truncation play and evaluate its remaining exploration potential. This integrated data-driven evaluation utilises results of high-resolution stratigraphy, sedimentology, integrated petroleum systems analysis, petrophysics, forensic identification of potential missed pay, and detailed seismic and quantitative interpretation (QI). Special attention was given to identifying subtle intra-Natih truncation traps, which had been challenging to identify previously due to limitations in seismic imaging.

This integrated data-driven approach and using technologies defined high-resolution truncation lines in Natih sub-units. Also, it has identified reservoir sweet spots, improved our understanding of seal distribution, and highlighted hydrocarbon charge-focused areas, including timing. As a result, known play segment sweet spots expanded into new areas. This integration also generated a portfolio of exploration growth opportunities. Testing a subtle Natih truncation trap in Q4 2023 led to the first Natih F Truncation discovery in the Greater Lekhwair area.