

## Offshore Bahrain: Exploring for Stratigraphic Traps in the Mishrif Fm.

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### Abstract

The Mesozoic stratigraphy of the Middle East is characterized by multiple world-class, economically significant petroleum systems. Since the first discovery of the giant Awali field of Bahrain in 1932, Exploration in the Middle East has been mostly focused on large structural traps. However, the remaining undrilled structural traps are becoming scarce and smaller. Therefore, in this mature petroleum province focusing on subtle stratigraphic traps might open new opportunities, especially within the hydrocarbon-rich Mesozoic stratigraphy. Through the sequence- and seismic-stratigraphy tools it is possible to assess potential intervals of the Mesozoic stratigraphy in Offshore Bahrain. Following a first regional screening, focus was on the middle Cretaceous series, in which regional sequence stratigraphic-based correlations have identified potential stratigraphic traps in the Mishrif Fm. The Mishrif Formation is Upper Cenomanian-Lower Turonian in age and comprises a very low angle ramp carbonate depositional system. In the northern part of Offshore Bahrain facies reflect middle to outer ramp settings. The regional mid-Turonian unconformity is particularly evident towards Qatar in Offshore Bahrain and shows potential stratigraphic traps beneath. In-depth seismic and well data analysis showed low-dip prograding carbonate ramp and stratigraphic pinch-out geometries associated with possible onlap onto basin margins. To de-risk the Mishrif stratigraphic traps, CPI well analysis was used to test the seal thickness and the seal lateral continuity. In addition, reservoir quality was predicted through facies analysis and quantitative seismic analysis through lithological characterization. A similar approach for hunting stratigraphic traps can be applied also to other carbonates or clastic reservoirs in Bahrain. For instance, the siliciclastic Lower Cretaceous Nahr Umr Fm. shows tidal channels encased in a shaly tidal flat/mud flats that could represent a potential stratigraphic trap.