
Sub-Regional High-Resolution Sequence Stratigraphy and Reservoir Characterization of Upper Thamama (Lower Cretaceous) Reservoirs of Onshore and Offshore Abu Dhabi, United Arab Emirates

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Important hydrocarbon accumulations occur in Upper Thamama platform carbonates of the Kharai (Barremian and Early Aptian) and Shuaiba (Aptian) formations of Abu Dhabi. These formations contain three reservoir units bounded by low porosity/permeability dense zones.

Core descriptions of 25 wells were used to establish a sequence-stratigraphic framework of the Upper Thamama applicable to reservoir units and dense zones alike. Thirteen reservoir and eight non-reservoir (dense) lithofacies are identified from texture, grain type, sedimentary structure, and lithology. Depositional environments of reservoir units range from lower ramp to shoal crest to near-back-shoal. Dense zones (locally with features indicative of very shallow water deposition and exposure) were deposited in a restricted shallow-lagoonal setting.

The Kharai Formation is a second-order, late transgressive sequence set, built by several third-order composite sequences. The Lower Shuaiba is one third-order composite sequence, deposited during a second-order transgression. These third-order composite sequences consist of fourth-order parasequence sets. This framework provides insight into distribution of "higher" and "lower" quality reservoir. In the middle Kharai reservoir, mud-dominated, low to moderate porosity/permeability rocks were deposited during a third-order transgression. Higher porosity/permeability grain-dominated rocks occur in a third-order highstand.

Thickness and facies changes are minor within one field and only become obvious with a regional view. The lower Kharai reservoir unit thins by nearly one-half from west to east, most likely due to lap-out. A facies change follows this trend: orbitolinid-rich skeletal wackestone/packstone (west) becomes bioturbated wackestone/packstone (east).

The stratigraphic framework established in this study gives insight on distribution of reservoir rocks within the ADCO concession. Further, a more "regional" view of these formations reveals facies, stratigraphic geometries, and thickness variations not obvious within one field.
