

## Exploration in the Mesopotamian Basin: Cretaceous Lowstand Reservoir Potential

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### ABSTRACT

The discovery of gigantic fields in large anticlinal traps is becoming rare. A change is necessary in terms of exploration strategy to search for more subtle stratigraphic traps. This is particularly true in the Mesopotamian Basin where the majority of fields are Cretaceous-aged reservoirs, found in broad anticlinal traps, discovered between 1950-1980. The hydrocarbons in these reservoirs are primarily derived from Jurassic and Cretaceous source rocks, implying an inherently low risk associated with a working petroleum system, no matter what the trapping mechanism. Cretaceous lowstands form potential stratigraphic or combination traps. A sequence stratigraphic approach is used to examine both carbonate and siliciclastic systems, with emphasis on identifying major regional unconformities which might produce lowstand reservoirs (both lowstand shelves and fans) down systems tract. To do this, a detailed analysis of publically available wells and outcrops was performed to generate multiple gross depositional environment maps on major sequence stratigraphic surfaces. These maps enable correlation of areas of sediment erosion with coeval areas of deposits for a given systems tract to highlight new reservoir potential, sediment pathways, and source to sink relationships. Insight is shown for a number of potential reservoirs. The first is within deep marine lowstand fans, developed at the major Valanginian unconformity in southern Iraq, offshore Kuwait and Khuzestan. Secondly, proven shallow marine sandstone reservoirs, which are largely formed by transgressive deposits such as, the Ratawi, Zubair and Nahr Umr formations, may have lowstand extensions down systems tract. Finally, carbonate lowstand shelves are also considered potential plays, such as those associated with the Yamama and Fahliyan formations infilling the Gotnia Basin during the Berriasian. A suite of additional regional datasets is used to consider each reservoir target for distribution, thickness, quality, and the implications of sediment provenance. These assessments are combined with regional depth surfaces to high-grade areas based on predicted reservoir quality. For conventional exploration to continue to be successful in the Mesopotamian Basin, combination and stratigraphic traps formed during lowstand systems tracts must be understood better. This work shows that multiple viable lowstand reservoirs may exist, which represent underexplored exploration targets worthy of further investigation.