# Where to Find the Reservoir? Late Valanginian Unconformity Associated Play in Kuwait

Saifullah K. Tanoli, Mohammed D. Al-Ajmi, Heyam Al-Ammar, and Nikhil Banik
Prospect Evaluation, Kuwait Oil Company, Ahmadi, Kuwait.

The Late Valanginian unconformity, with a hiatus of about four million years in southern Kuwait, separates the Zubair Formation from the underlying Ratawi Shale Formation. Both of these formations are dominantly siliciclastic and overlie a thick (1975-2300 feet in thickness) Early Cretaceous carbonate succession. This shift in sedimentation is attributed to the uplift and erosion in the hinterland westward in the Arabian Shield. The Zubair Formation consists of 1150-1450 feet thick sequence of interbedded sandstone, siltstone, and mudstone. A sandbody of variable thickness (0-60 feet), which is locally hydrocarbon bearing, is encountered at its base in a few geographically scattered wells. Log signatures, by comparing to the cores over similar zones, indicate them as channelized bodies which are associated with the Late Valanginian sequence boundary. Regional analyses suggest the development of northeasterly drainage during this time which eroded and incised into the exposed surface developing into incised valleys. Reservoir sandstone facies were deposited during the early phases of the channel development. These sandstone facies are overlain variably by the fine grained facies made up of interbedded sandstone, siltstone and mudstone which could act vertical seal for fluid migration. These fine grained faices either relate to channel abandonment and/or were deposited in estuarine and marginal marine environments as a result of the following transgression. No entrapment is expected where (1) this upper seal is not effective barrier to fluid flow and (2) where there is no trap development. In addition to the presence of four way closure and sealing faults, one of the effective trapping mechanisms is where sealing facies impinge against a paleohigh to provide lateral as well as top seal.

With this understanding, the play is based on finding the (1) possible paleoflow pathways and once found (2) mapping of the channels by using seismic inversion and attribute analysis. By assuming the flow to follow paleolow areas, the paleodrainage pathways could be figured out from the paleotopography which existed at the time of the earliest Zubair deposition. Consequently, potentially prospective exploration areas can be determined by using these along with other favorable play elements.