

Sequence Stratigraphy Framework of Hauterivian to Aptian Zubair Formation, Onshore Kuwait

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ABSTRACT

The investigation of biostratigraphy and sedimentology of 450 core chips has been integrated with wire-line logs from 19 wells to establish a depositional sequence stratigraphic framework for Zubair Formation. The Zubair Formation unconformably overlies the Valanginian Ratawi Formation and conformably underlies the Aptian Shuaiba Formation. Zubair Formation is composed dominantly of siliciclastics; very fine to fine sandstone intercalated with shales and minor streaks of carbonates. The channel porous sandstones are the main reservoirs. The Zubair reservoir is productive in the north but non-productive in central and south Kuwait, due to lacking of sealing shale. The Zubair basin configuration was a gently sloping ramp, with exposed shelf at southwest and submerged distal part at northeast. The paleoenvironments ranges from shallow marine, estuarine-deltaic at north and continental fluvial towards the central and southern Kuwait. Zubair Formation has been divided into three 3rd order sequences; K40, K50 and K60. These sequences are interpreted to be composed of highstand systems tracts, with transgressive systems tracts. They are further subdivided into fourteen Higher Order Sequences based on lithofacies, biofacies and wireline log signatures. The K40MFS has been defined at the lower part of Zubair based on common dinoflagellates: *Subtilisphaera perlucida*, *S. pirnaensis*, *S. spp*, *S. senegalensis* Muderongia *pariata*, *Circulodinium brevispinosum*, and common benthic foraminifera. The K50MFS is identified based on common benthonic and planktonic foraminifera and ostracods. The MFS60 has been defined at upper Zubair based on dinoflagellates: *Subtilisphaera perlucida*, *Subtilisphaera spp*, *Cribroperidinium spp.*, *Cribroperidinium edwardsii*, and *Oligosphaeridium complex*. The K60TS is picked based on reappearance of common dinoflagellates above the channel sandstone of K50 HST. Two main stratigraphic plays have been defined. The west flank play which is composed of channel sands intercalated with mouth-bar sands sealed by transgressive shales of K40, K50 and K60. This play is classified as strato-structural entrapment and predicted to exist on the west flanks of north Kuwait anticlines. The incised valley fill play which is composed of incised valley fill reservoir laid on the contact between Ratawi and Zubair formations and sealed by transgressive shales. It is classified as stratigraphic entrapment. It is expected to exist in the central part of Kuwait.