
Depositional Environment and Reservoir Characteristics of Lower and Upper Dibsiyah Member (Wajid Sandstone), Southwest Saudi Arabia

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The Cambro-Ordovician Dibsiyah member of Wajid Sandstone at Wadi Ad-Dawasir has its subsurface equivalent to the east in the Rub Al-Khali basin, which is a frontier hydrocarbon province in SE Saudi Arabia. This study aims to characterize the Dibsiyah member by integrating facies and architectural analysis, petrographic and petrophysical (porosity, permeability) as well as geostatistical analysis.

The Lower Dibsiyah member consists of medium to very coarse, moderately to poorly sorted sandstone facies. Facies recognized include channel massive to trough cross-bedded micro conglomerate, trough cross-bedded, planar cross-bedded and massive sandstone facies and minor massive to laminated mudstones which occur as thin interbeds or drapes. The facies suggest deposition within channel and bar complexes of a bedload dominated low-sinuosity stream.

The Upper Dibsiyah consists of fine to medium, pebbly moderately to well-sorted massive to cross-bedded conglomerate, trough cross-bedded, planar cross-bedded and horizontally bedded and herring-bone cross-bedded sandstone facies. Massive mudstone and laminated shale are subordinate. Skolithos rich horizons dominate the sandy facies in the upper part. The facies suggest deposition within shallow marine environment.

Both the Lower and Upper Dibsiyah show variations in their texture, composition, sandstone body thicknesses, geometry, stacking patterns and vertical and lateral connectivity. These variations in macro to micro scale characteristics indicate both depositional and post-depositional controls. The results of the outcrop study is expected to be critical and of considerable use in understanding and prediction of reservoir properties of the Dibsiyah subsurface equivalent in the Rub Al-Khali basin.
