AP16

The Faridah Unit of Central and Northeast Saudi Arabia: Stratigraphy and Depositional Setting

G. Al Eid* (Saudi Aramco), P. Breuer (Saudi Aramco) & A. Aburas (Saudi Aramco)

SUMMARY

This core- and log-based analysis provides a depositional and stratigraphic synthesis of the Faridah compartment in the area. It brings together data from a number of cored wells, totaling 1950 feet in length. These wells are located in the onshore and adjacent coastal waters.

The Middle Jurassic Dhurma Formation is stratigraphically positioned between the Tuwaiq Mountain and Marrat formations, respectively, and consists predominantly of carbonates and a minor amount of shale. The formation has been subdivided into six members; D1-D6, with D-4 containing the Farida layers. The type section of the Faridah in the study area is the FRDH-A well, where the upper part of the section comprises four stacked and distinct layers, termed the Faridah-D, -C, -B and -A, in ascending stratigraphic order. The grainy-rich layers are considered to represent the upper part of the Middle Dhurma D4 Member. The sedimentologic analysis and lithologic breakdown of the Faridah sediments resulted in the identification of twelve primary lithofacies. These are designated LF1 to LF12 in broadly shallowing upward order. The lateral lithofacies distribution suggests that environments of deposition are in line with platform interior to shelf margin to basin.

The stratigraphic architecture and facies stacking patterns suggest that the Faridah spans parts of at least two long-term depositional sequences, together forming a large-scale northward-prograding and thinning shelf-margin succession. This thinning trend is accompanied by a gross change in depositional facies, from (a) thick platform-top peloid-oncoid packstone and grainstone, to (b) shelf-edge micro-gravels, coral boundstones and slumped foreslope facies, to (c) thin bituminous basin-floor laminites in the northern parts. The Dhurma D4 stacking patterns comprise four correlatable high-frequency depositional cycles (Faridah D-A layers), representing a mid- to late-highstand systems tract that is genetically-linked to the underlying Dhurma D3 TST and early HST. These four cycles progressively thin basin-ward, and their correlatability becomes insecure and less distinguishable.

The best quality rocks recorded in the area are associated with the Faridah shelf-margin grainstone facies at Faridah, Ash Shihyah and southern Juraybi'at areas, with excellent porosities and fair to good permeabilities. The northward transition from clean porous shelf-edge facies to tight basin-floor laminites occurs over a distance of just a few tens of kilometers, and provides opportunities for stratigraphic trapping in the area.