

Midrikah Field: An Example of a Combined Structural & Stratigraphic Trap in Saudi Arabia

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The Midrikah field, located in the Eastern Province of Saudi Arabia, was discovered in 2004 by the drilling of the MDRK-1 well. Located in a down-faulted structural position, the well encountered a thick gas bearing reservoir comprising a series of stacked aeolian dune sands interbedded with fluvial and playa lake deposits assigned to the upper part of the Permo-Carboniferous aged Unayzah Formation (Unayzah A Member). This interval represents the desiccation event which followed on from the Gondwana deglaciation characterised by the Lower Unayzah (B/C Member).

The Midrikah structure forms part of the southern nose of the greater Ghawar anticline which initially developed due to compressional tectonics associated with the Hercynian Orogeny. This stress regime formed the gently dipping eastern flank of the Midrikah structure together with the more steeply dipping and high angle reverse faulted western flank. In addition to the structural control, trapping integrity is provided by lateral facies changes within the reservoir unit.

The Midrikah prospect was mapped using 3-D seismic data that were both pre-stack time migrated and pre-stack depth migrated to improve image quality and to increase the accuracy of the structural interpretation. In addition, the confidence in the structural interpretation was increased by the use of coherency and curvature seismic volumes. The prediction of reservoir distribution was aided by the use of seismic inversion, waveform classification and frequency attenuation in addition to other seismic attributes including amplitude extraction.