

Evaluating the Fluid Distribution in Mauddud Reservoir after 80 Years of Gas Injection and Production

Nadia Nemmawi¹

¹Tatweer Petroleum, Manama, Bahrain.

ABSTRACT

ABSTRACT BODY: Mauddud reservoir is one of the most prolific reservoirs in the Awali field. The Mauddud limestone is subdivided into two connected units, Mauddud A and B. The Mauddud is a shallow-to-open marine carbonate on what is commonly referred to as the Arabian shelf. The Awali anticline has undergone post-charge structural adjustments with possible associated seal failures that has permitted hydrocarbon migration to shallower horizons and subsequent aquifer water ingress. The water replaced moveable oil, leaving a significant residual oil column. When discovered in 1932 the existence of a residual paleo oil column was not identified, which subsequently led to confusion on selecting oil water contacts. Gas injection commenced early in the field's life in 1938 in order to maintain reservoir pressure and a large gas cap soon developed. A detailed geological and Petrophysical study was recently undertaken which accurately mapped the extent of the gas cap throughout both Mauddud A and B and highlighted the impact of the structure, faults and permeability heterogeneity in controlling the gas cap distribution, the displaced oil rim development as well as the water ingress pattern. Leading to a surprising discovery that oil migration had taken place both vertically and laterally. The study re-examined the application of a full suite of logs, core and pressure data in assessing the complex fluid migration history. This detailed geological and Petrophysical study resulted in the development of a new conceptual geo-model based on a logical application of all available data that led to an improved geological model and an improved future drilling target plan.