

Reservoir Effectiveness Prediction in Palaeozoic Reservoirs of the northern Murzuq Basin, Southwest Libya: An Integrated Approach

Cubitt, Chris¹, Tim Conroy¹, Andrew Buffin¹, Mark Partington¹, Georgia Boyd¹, Stuart King², Adel Obeidi² (1) Woodside Energy Ltd, Perth, Australia (2) Woodside Energy North Africa Ltd, Tripoli, Libya

Reservoir quality prediction and characterisation, is a key risk in the exploration and development of NC210 and NC151 concessions in the northern Murzuq Basin, south west Libya. Outcrop, wireline, core and cuttings analyses have been integrated to gain an understanding of the geology, petrophysical properties, and ultimately reservoir effectiveness of the Palaeozoic Memouniat, Tahara, Acacus and M'rar formations.

Six hundred metres of core were described and sampled with respect to ichnofabrics, depositional environments and reservoir rock properties. The core based results together with field outcrop observations were then integrated into a sequence stratigraphic framework based on parasequence stacking patterns and stratal surfaces derived from wireline logs. Subsequently geological models were constructed for each productive unit allowing the reservoir effectiveness of each facies to be modelled and predicted in a “geologically realistic” manner.

Cuttings analysis or “Rock Typing” was then performed on approximately 850m of cuttings over key intervals identified from core analysis. The Rock Typing technique, first described by Sneider et. al. (1983) and Esther et. al. (1984), is a semi-quantitative technique which discriminates rocks into distinct groupings, or “Rock Types” according to key visual attributes.

Having benchmarked the rock typing results against known DST and core based petrology analyses potential flow rate estimates were then calculated using locally derived permeability height/reservoir pressure/flow rate cross plots. From these estimates it was then possible to risk reservoir effectiveness and potential formation deliverability at both a prospect and field scale over the entire NC210 and NC151 concessions.