

Towards Unlocking the Potential of the Upper Gharif Sands in Block-60, Oman

Sulaiman Z. Al Farqani¹, Kamel Djaouti¹, Nabil Mrabti¹, Mohammed Al Mughairy¹

¹OQ E&P

Abstract

The Permian stacked Upper Gharif channel sands are one of the most prolific reservoirs in block-60, operated by OQEP. Despite more than dedicated 17 exploration and development wells drilled in the past, they continue to be challenging at all aspects of the maturation process from prospects identification and reservoir characterization up to drilling and production behavior.

In this presentation, demonstrated with case studies, we will share in detail the key challenges associated with Upper Gharif reservoir focusing on and following aspects:

Geological uncertainties including lateral facies distribution with limited contribution from the existing seismic dataset. This has a dramatic impact on resources estimation and well placement.

Reservoir petrophysical characterization given the laminated pay and the clays-rich nature of the sandstone reservoirs that had impacted the porosity and saturation estimation.

OWC identification in such a complex channel belts depositional system is likely expected especially given the limitation on the resistivity logs. Downhole fluid sampling together with mud gas analysis helped in confining this uncertainty.

Complex lateral and vertical connectivity as indicated by the collected fluid samples which highlighted different fluid types and pressure regime suggesting reservoir compartmentalization.

Drilling challenges in terms of optimizing mud recipe and weight for well control without creating formation damage. In addition, geo-steering horizontal wells through a complex channelized thin sand with limited pay/non-pay resistivity contrast. Azimuthal Gamma Ray and density logs were used for look-around geo-steering.

With reservoir tightness, hydraulic fracturing is required to produce economical rates, yet this technology is being hampered by the absence of geomechanical contrast to contain the frack within the hydrocarbon zone, leading to early water breakthrough.

Production related challenges including production impairment caused by fine migration, wellbore bottom water hold-up and artificial lift selection in high GOR environment.

This complex context imposes challenges to select the best development concept and to generate a robust production forecast. Nevertheless, building on the experience, an optimized exploration and appraisal program has been set for the coming 5 years to further reduce the uncertainties and unlock the potential of the Upper Gharif reservoirs of Block-60.