

Safiq Deposition and Impact on Trapping Potential Along Western Flank of Oman Basin

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Abstract

The Upper Ordovician aged sand/shale sequences of the Safiq Group reservoirs represent exploration growth opportunity in OQ operated block-60, SW Oman. Based on evaluated HC pays of existing well data. The reservoirs under focus are the Saih Nihayda and Hasirah as Sahmah is absent in this part of Oman. The sequence has been deposited in a transitional shoreface to progradation marine setup predating a long period of non-deposition and erosion in the form of the Hercynian unconformity. This makes stratigraphic positioning and correlation of the Safiq Group reservoirs quite challenging despite availability of numerous development well data of deeper Lower Haima reservoirs of the Abu Butabul gas field.

Regional data from nearby blocks prove potential of Hasirah and Saih Nihayda reservoirs which has triggered interest for further investigations in block60. Several pay intervals were logged from the existing well data with porosity and HC saturation exceeding 12% and 80% for some locations. Oil to surface was attained via production test from one of the wells. Further geochemical analyses have confirmed Q-source charging either via lateral migration or remigration from deeper reservoirs. The existing NAZ 3D seismic data is quite limited in mapping reservoir zones and identifying sweet spots. This is believed to be related to seismic data quality limitation affected by sand dunes surface geology and overlap in rock properties between sand and shale. Despite the good coverage of well data in most of the block area (average wells separation < 2km), reservoir zones lateral correlation is quite challenging due to lateral variation in the deposition environment. This forms a challenge but also opportunity with potential of stratigraphic trapping.

Ordovician top Ghudun map was isochored upward and tied to Safiq reservoirs. Correlation of hydrocarbon shows and mapped structure indicate two possible trapping mechanisms for Safiq Reservoirs: stratigraphic and structural. Intra-formational reservoir/seal pairs correlation helped to determine trap configuration and extent. Core data from an analogous field were used to define cutoffs and compute petrophysical summaries for volumetrics.

In this presentation, we will discuss the key challenges facing maturation of the Safiq opportunities related to reservoir heterogeneity and fluid type distribution and our plan to mitigate them.