

Unlocking the Remaining Potential of Najmah-Sargelu: Play Based Exploration in Kuwait

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ABSTRACT

Middle to Late Jurassic Sargelu and Najmah reservoirs are one of the main Jurassic producers in Kuwait over last few decades. With exploration focus shifting to new frontiers away from the large structural traps, play based exploration is employed to open up new vistas to replicate the exploration successes in less explored western Onland and offshore. The play-based exploration involves integrated interpretation of diverse datasets at the regional scale, documenting the presence or absence of each of the play chance factors (charge, reservoir, trap and seal) for each well that has penetrated the play and preparation of common risk segment maps for each of the play element. The multiplication of the chance factors for play elements gives composite common risk segment map, which provides a synoptic view of the prospective trends. The Najmah-Sargelu section is characterized by a complex lithological suite of interbedded organic rich argillaceous limestone and tight cleaner carbonate reservoirs. The overlying Gotnia Evaporite as top seal and underlying Dharuma tight shaly limestone as base seal define the stratigraphic extent of the Najmah-Sargelu play. Najmah Formation itself is an excellent source rock with average present day organic richness of 7% in onland Kuwait. It is in oil to wet gas maturity window. The primary reservoirs are Najmah Limestone, Najmah Organic Rich Limestone and Sargelu Limestone. The play is present over the entire country and is characterized by very high historical well success ratio, prospect success ratio and play chance. The play carries very low risks on presence and effectiveness of trap, seal and charge and consequently it is heavily dependent on reservoir presence and effectiveness. Gross depositional environment does not change significantly across the play and the presence/absence of natural fractures is the dominant control on reservoir effectiveness. Seismic based curvature and discontinuity maps appears to be good predictor of natural fractures. Six play segments are mapped based on hydrocarbon phase and curvature. Play segments in eastern and western parts of onland Kuwait have proven play chance and best prospect success rates in view of possibility of encountering maximum fractures, which enhance the flow characteristics. Play segments in the southwestern Kuwait and offshore and are envisaged to have relatively moderate chance of success due to moderate deformation resulting in relatively less fracturing.