

# Shammar the Challenges of a Sub-Seismic Prolific Play

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## Abstract

The Lower to Middle Paleocene siliciclastics Shammar play is a recently discovered, highly-prolific play in North Oman. The play is characterized by its subtle sub-seismic fairways offset from the underlying major Cretaceous highs. The laterally pinching out basal Shammar Reservoir is stratigraphically trapped between two regional seals; the top Shammar shales above and the Nahr Umr shales below. Excellent production rates from the 1-5 m thin reservoir units in early Shammar wells triggered forensic search for missed pay analysis in well penetrations and from drilling dedicated Shammar wells in “white space” where no/limited Shammar penetrations exist. Exploration locations were selected to step out from well penetrations where Shammar sands are seen on logs while testing an evolving regional Shammar depositional model. Well results were mixed, some finding relatively thick sands proving fairway extension and pressure connectivity over large distances, while others failed to find the fairway in well calibrated segments, proving play complexity. It is now evident that the play fairway has interplaying structural and stratigraphic controls. The geometry and characteristics of this depositional system was controlled by two essential factors: - The paleo-geography at Shammar deposition time, which involved a topography inherited from regional Mesozoic phases of structuration and from a subsequent erosional episode. - The nature of the subcrop (Upper Shuaiba and Natih carbonates, and Nahr Umr shales) immediately before and during the Shammar deposition event. The presence of the basal Shammar siliciclastics in the Greater Lekhwair area seems to have confined distribution of the reservoir in areas where the Nahr Umr subcrop is present. The Nahr Umr shales were considered more prone for erosion and creation of a subtle incised valley, providing accommodation space for the basal Shammar siliciclastics sediments. The geometry (sinuosity) of the incised valleys is influenced by the presence of more resistant Shuaiba and Natih carbonates as a subcrop, probably limiting the erosion processes and by the residual topography post base Tertiary Unconformity defined by the Jurassic faults inverted in compression at the Alpine I stage. Due to its subtle nature, combined with lack of acoustic impedance control in the Shammar explored area northern of the Lekhwair High, the presence of the basal Shammar siliciclastics could not be mapped on the seismic data, and relied on well control. The remaining Shammar prospectivity in North Oman is located further away from control points in a large, underexplored segment on the Lekhwair Southern Flank. Effective exploration of this segment requires multiple wells and operational efficiency, utilizing new seismic data and revised Geology, to minimize financial exposure to the risky, unpredictable play.