

Hydrocarbon reservoir potential of Sakessar Limestone Surghar Range, Trans-Indus Ranges, Northwest Pakistan

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Abstract

The Surghar Range western extension of the Trans-Indus ranges constitutes the southeastern anterior fold-and-thrust belt of the Kohat Plateau. This structural province is comprised of various local to regional scale anticlines right from Serkia-Mitha Khattak to Kutki areas. The existing range front anticlinal trend is well-built along the east-west trending segment of the Surghar Range. These anticlinal features reveal infantile tendency from east to west and unearthing the platform rock sequences ranging from Permian to Eocene which is unconformably overlain by the Mitha Khattak Formation equivalent facies to the Rawalpindi Group. This facies in turn has overlain by the fluvial sediments of Siwalik Group. Overall three major anticlines have been mapped from west to east as the Mitha Khattak, Makarwal and Malla Khel Anticline. Differential stratigraphic levels are exposed in cores of these anticlines which proved excellent prospect to be potential reservoirs horizons. The Eocene Sakessar Limestone has been selected for detailed study of fractures and joints analysis. The same formation exposed along the range front making fraction of the frontal limbs of different anticlines. Various fractures networks and joints pattern has been observed at different localities reveal high secondary porosity and permeability. Most of the secondary tectonically induced and primary diagenetic opening and ruptures planes are interconnected and tenders proficient conduit lattice for munificent circulation of fluids. Origin of fractures and joints growth is associated to force folding in response to the compressional, transpressional and transtensional deformation being observed in the region. The studied anticlines reveal that they are the product of fault-bend and fault-propagation folding. The range frontal flanks reveal that different level of strata thrust against the foredeep showing inconsistency in the subsurface level of basal detachment horizon.