

Hydrocarbon Prospects of Karak Siwalik Anticline, NW Pakistan: Myths & Facts

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The Karak Siwalik Anticline (KSA) is a prominent structural high of the southern Kohat Basin in northwest Pakistan. In recent past the Kohat Basin has emerged as a prolific hydrocarbon bearing province of the country. In 1977-78, Texas Gulf drilled an exploratory well Karak-1 on KSA to test Eocene carbonate reservoir. The well was abandoned within Siwaliks at the depth of 4459 meters. Since then the exploration chapter remained close on the assumption that Siwaliks are enormously thick and the reservoir is too deep. This paper discusses issues related to hydrocarbon prospectivity of the KSA incorporating redefinition and reinterpretation of the data. Current field investigations reveal that the KSA is about eighteen kilometers long, running ENE-WSW, is a well-defined, slightly asymmetrical fold with a relatively broad crest. The closure to the NW, west and along the southern flank are well marked. The fold is cut on the north eastern boundary by the Mitha Khel Fault, which is steeply north dipping. The attitude data on the limbs of KSA suggest the presence of a subcrop, south facing thrust fault. The seismic definition of the fold is in harmony with the surface data and depicts two prospective highs at the level of Eocene related to subcrop fault: one in the hanging wall with Eocene top at 3300m depth from ground level and the second one in footwall with Eocene top at 4700m depth from ground level. Geo-seismic transect constructed across the KSA depicts that Karak- 1 well was placed around 800 m south of the hanging wall prospect and penetrated the steeply dipping forelimb, the subcrop fault and repeated sequence of Siwaliks and was abandoned approximately 200m above the footwall high. Reported oil and gas seepages, kerogen shales (oil shales) associated with gypsum, faint film of oil (about I mile NW of Karak), and discoveries in the adjoining areas indicate that KSA is lying within the hydrocarbon province and, since the anticline is bounded by well-marked structural lows, it would be expected that any petroleum generated in the structural lows would have migrated updip, into the likely reservoirs in the anticline. The Bannu Plain is the hydrocarbon kitchen for KSA. The reservoir rocks beneath the KSA include Eocene Sakesar Limestone and Paleocene Lockhart/Hangu formations which are the main producing horizons of the oil fields in adjoining areas.