

The Petrofacies and Depositional Model of Kalol-VII Reservoir in a Tidal Flat Complex in Kalol Field, Cambay Basin, Gujarat, India

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The Kalol Formation in Cambay basin is informally composed of eleven pay pay sands, namely K-I to K-XI from top to bottom with intervening shale (Mehrotra et al 1980). The K-I to K-V belong to Wavel Member, K-VI and K-VII to Kansari shale and K-VII to K-XI to Sertha Member of Middle to Late Eocene age (Pandey et al., 1993). The K-VI and K-VII are the main hydrocarbon producing reservoirs in Kalol field. The individual units are developed over wide area having thickness ranging from 2m to 15m. The reservoir facies of K-VII has been divided into three depositional cycles by some workers and designated as Units –I, II and III on the basis of their log motif. The geometry of the K-VII sands as brought out in sand isolith maps reveal shifting of channels with time. A detailed sedimentological study of selected conventional cores belonging to K-VII reservoir unit has been carried out. The study includes documentation of the petrofacies (litho and micro-facies), textural attributes, mineralogy and sedimentary structures. The main objective was to map the distribution of litho-subunits and decipher an area based depositional model of K-VII pays. The K-VII sediments are characterized by a mixed facies of shale-sideritic shale, laminated siltstone-shale and fine grained sandstone with thin coal, deposited in a Peritidal environment. It is apparent from the study that the deposition of the K-VII has taken place over a wide spread tidal flat, traversed by a number of tidal channels. There is development of reservoir facies close to tidal channels, whereas, away from the channel there is gradual deterioration. The imprints of tidal environment could be recorded in the core with the help of characteristic sedimentary structures and palynofloral evidences in wells Kalol #A,B,C,D,E,F,G and H from north west to southeastern part of Kalol field. Accordingly, three tidal flat sub-environments were demarcated in the area, which include, subtidal channel complex; intertidal levee / sand flat / mixed flat complex and supratidal mud flat complex after Reineck and Singh, 1980.