Integrated reservoir rock-typing, hydraulic flow units and electrofacies determination in sequence stratigraphic framework of the Permian–Triassic reservoirs in the central Persian Gulf

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Abstract

This study presents reservoir rock-types, hydraulic flow units and electrofacies of the upper Dalan and Kangan formations in a well from the South Pars Field. To achieve these goals, drilled core data and thin section petrography are integrated with petrophysical logs and porosity–permeability data. The main target of this study was to elaborate on the relationships between the reservoir rock-types, flow units and electrofacies with depositional sequences and systems tracts. Petrographic analysis of facies characteristics (depositional textures), diagenetic alterations and dominant pore types are integrated to define the petrographic rock-types. Eight hydraulic flow units are recognized using the values of flow zone indicator. Neutron, sonic, density and resistivity logs are clustered to define the electrofacies. Finally, all rock-types, flow units and electrofacies are correlated in a sequence stratigraphic framework. Consequently, grain-dominated facies of shoal setting with dominant interparticle pores as well as dissolution molds and vugs provide the best reservoir units in the K4, and middle parts of K2 and K1 sequences. On the other hand, anhydritic facies of supratidal and mud-dominated facies of intertidal, lagoon and open marine settings along with compacted and cemented grain-supported facies form the non-reservoir intervals in the transgressive systems tracts of K2, K3, early TST and RST of K1 sequences.

Keywords*: reservoir rock type, hydraulic flow unit, electrofacies, depositional sequence, upper Dalan and Kangan formations*