Relationship between Sedimentary Facies and Reservoir Rock Types to Construct the Facies Modeling and Reservoir Evaluation of a Mixed Reservoir in Southwest Iran

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Sedimentary facies are important in reservoir characterization because flow properties are commonly assigned using facies-specific correlations. On the other hand, reservoir rock types are defined strongly based on reservoir properties, such as porosity permeability, mercury injection capillary pressure and pore size distribution curves. Facies modeling is not only commonly used to determine spatial arrangement of facies, but also provide information about architecture have “flow-units” and “flow-barriers and baffles”. The evaluation of the formation heterogeneity is important for facies and petrophysical modeling as well as fluid simulation studies.

Facies analysis and reservoir rock type determination were carried out on the upper cretaceous sediments in a giant field in the south west of Iran. Facies modeling of the sequence in the field provided a better understanding of the three-dimensional geometry, facies architecture, and internal heterogeneity in reservoir intervals. Reservoir properties of the sedimentary facies are a product of depositional environment, and control fluid migration and compartmentalization in other deposystems.

In this investigation eleven sedimentary facies related to the wide variety of depositional environments such as distal and proximal open marine, shoal, seaward and leeward shoal, lagoon, and delta identified. On the other hand, integration of petrophysical data with petrographical information deduced to the eight reservoir rock types. These sedimentological characteristics and their related reservoir rock types control fluid migration and compartmentalization in the reservoir, and can be utilized in geostatistical fluid flow models to improve efficiency in the exploration and production of oil in the carbonate basins. Correlation between sedimentary facies and reservoir rock types in this manner shows more than 80 percent coverage.