Petrophysical Analysis of the Famous Early Cretaceous Reservoir of the large Oil Field in onshore Abu Dhabi

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Image analysis of thin sections and core-slab samples of the Early Cretaceous age reservoir, can quantify their pore-size distribution and detailed porosity components. The results show the distribution of pore sizes ranges from 4.2 x 10 -5 mm2 to 7.68 mm2 in thin section, and 0.023 mm2 to 630.7 mm2 in core slab. The pore-sizes distribution can be classified into 3 groups such as micropore, mesopore and macropore, based on the minimum resolution of thin-section image analysis (6.5x10 -3 mm), and the average intersection-point value of pore-size distribution curves from thin sections and core slabs (0.858 mm). A linear relationship of a cross plot between mesoporosity plus macroporosity and core-plug permeability on a semi-log plot, shows the influence of large pores on formation's flow behavior. The comparison of pore-size distribution from core slabs to NMR-T2 distribution shows a strong relationship between tails at the high end of T2 distribution and the presence of macropores in the formation. Thus, the NMR log can be used qualitatively as a vug indicator. The detailed distribution of porosity components in the formation is able to provide more precise petrophysics-based flow-unit determination that subdivides certain Reservoir Rock Types into smaller zones with specific characterization of flow capacity and storage capacity. The pitfalls from the 2D techniques used in this study are the derived porosity from image analyses are less than the actual values, due to the exceeded blue-colored shades of epoxy in the thin-section, and the pores that lie at the edges of the core-slab images, were excluded from the pore-size quantification.