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Reservoir Zonation, Rock Typing and Compartmentalization of the Tortonian-Serravallian Sequence, Temsah Gas Field, Offshore Nile Delta, Egypt

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Abstract

The present study aims to evaluate the petrophysical properties and to discriminate the Tortonian Wakar and the Serravallian Sidi Salem formations in the offshore Temsah gas field, north Egypt into distinctive rock types. The measured conventional core data includes helium and summation fluids porosities, grain and bulk densities, horizontal and vertical permeabilities as well as the water saturation. Also, the Reservoir Quality Index (RQI), Flow Zone Indicator (FZI) and Reservoir Potentiality Index (RPI) were calculated to establish a successful reservoir zonation. In the Temsah field, The Tortonian- Serravallian sequence has been discriminated into four reservoir rock types (RRTs) which are described based on its lithologic composition as 1) Sandy to argillaceous carbonates (RRT1), 2) Siliceous Pebbly sandstones (RRT2), and 3) Argillaceous to Calcareous sandstones (RRT3), and 4) Calcareous to Dolomitic Sandstones (RRT4). Based on the petrophysical interpretation and ranking for the studied samples, samples of RRT2 have very good rank due to presence of very good porosity, excellent permeability, and good to very good RQI and FZI values which are assigned as the best reservoir rock type in the Tortonian-Serravallian sequence. The petrophysical behavior of RRT4 shows the lowest reservoir potentiality (impervious RQI and poor FZI). The examined sequence has been sliced into reservoir zones; each zone has its hydraulic flow unit range that represents the studied rock types in each zone. Based on the applied pressure tools, including Repeat Formation Tester (RFT) and the Modular Formation Dynamic Tester (MDT), both the Wakar and Sidi Salem reservoirs represent completely isolated compartments. Therefore, ranking both reservoirs and estimating their hydrocarbon potential must be done separately for each reservoir.

Key Words: Routine core analysis, Reservoir Quality Index, Flow Zone Indicator, Reservoir Potentiality Index, Temsah gas field, Nile Delta.

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