How Much of a Charge do You Get Out of Your Formation? The Game Changer in Petrophysical Evaluation

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A comprehensive petrophysical evaluation is essential to optimize development and production in complex environments. In different high prolific regions, including West Africa, it is not unusual to deal with sandstones interbedded with finer grained deposits with laminated layers and shales, where presence of fresh formation water at varing salinity complicates the analysis and estimation of the reserves.

The dielectric dispersion tool is the latest development in Schumberger's electromagnetic measurements. The revolutionary tool design enables the computation of permittivity and conductivity at several frequencies, scanning the formation radially at multiple spacing. For anisotropy effects, two polarizations are scanned: longitudinal and transverse. A petrophysical model transforms the dielectric results into petrophysical parameters for a direct estimation of the reserves quality and hydrocarbon volumes even in challenging conditions where the conventional measurements has proved to be unable to provide a correct answer.

The extended capabilities of the advanced dielectric technology bring added unique information concerning the rocks and fluids properties, including structural anisotropy characterization, matrix and shale properties and thin beds analysis at high resolution, which are crucial for optimal reservoir management. Data acquisition always receives expert data processing performed using analytical methods developed with the innovative tool in mind for a robust and comprehensive interpretation and fit-to-purpose solutions.

The case studies presented in the paper illustrate the benefits of the application of dielectric dispersion measurement in various formation and boreholes conditions, as part of the field test operations. The new technology has proven to be critical to determine the properties of the fluids (salinity and saturation) independent of water salinity at multiple spacing into the formation and to compute the quantity of hydrocarbons in place in complex shaly sand scenarios. The petrophysical properties of the reserves are measured both in the invaded and virgin zone in a radial profile mode to detect moveable oil and quantify the producibility of the fluid, critical information for perforation design and maximum hydrocarbons production.

In West Africa the use of dielectric dispersion measurement has been pioneered while seeking more accurate reservoir models in fresh water formations and unknown varying salinity environment,