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APPLICATIONS OF THE BOREHOLE ELECTRICAL IMAGERY TO THE STUDY OF RESERVOIR ANISOTROPY

MOHAMED TAHA
SCHLUMBERGER (MALAYSIA) SDN. BHD.

Detailed work on hydrocarbon bearing formations show that most of the reservoir rocks are of anisotropic nature regarding their production properties. Such anisotropic nature, in fact, is the result of heterogeneities induced by a complex interplay of processes involving, sedimentological chracteristics, tectonics and diagenesis. Mapping such heterogeneities is found to be of prime importance for a precise geological reservoir modelling of such rocks.

Borehole electrical imagery, due to its high vertical resolution, proves to be of great help in tackling such task where standard well log evaluation tend to miss or give unreliable results.

Faults intersected by boreholes and based on their morphology can increase the water encroachment within the hydrocarbon bearing upthrown blocks or create different hydrocarbon/water contacts along the same field. Stresses related to such faults may produce certain fracture patterns within the reservoir rocks. These fractures may enhance or degrade the productivity of such reservoirs.

Defining the various types of sedimentary structures including size and orientation along a particular stratigraphic sequence are of great value in recognizing the different kinds of depositional environments and delineating the primary reservoir anisotropy. It has been evidenced that the layered nature and direction exert a great control on permeability orientation within reservoir rocks.

Reservoir rocks are often subjected to a various kinds and degrees of diagenesis which occur within depositional environments and during burial. Bioturbation, for example, by causing intermixing of clay and sand is invariably detrimental to the horizontal permeability but, however, may create a certain vertical permeability.

Highly laminated reservoirs and turbidite sediments have become important exploration plays in South-East Asia. In that regard, the borehole electrical imagery is able to reveal thin reservoir layers, attain its gross thickness, leads to more realistic computation for hydrocarbon saturation and help in setting proper testing procedures.

The full borehole electrical imagery with enhanced vertical resolution and better borehole coverage is expected to increase our capacity, even more, in mapping such fine formation heterogeneities and reservoir anisotropies.

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