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SOME APPLICATIONS OF THE COMBINED USE OF CORE ANALYSIS AND ELECTRIC LOG DATA

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Even though accurate assessments of water saturation, and therefore hydrocarbon-in-place, may be derived from electric log data, it does not necessarily follow that a reliable assessment of pay zones can be made on the basis of logs. For example, zones showing an apparent water saturation of greater than 50 percent traditionally often receive no further consideration for testing or production. However water-free oil production has been recorded in sands where the apparent water saturation is as much as 70 percent.

One way to assess whether or not hydrocarbon-bearing zones are potentially productive is to determine values for critical water saturation – which can be defined as the formation water saturation that must not be exceeded if hydrocarbons are to be produced water-free or at a specified water-cut.

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Critical water saturation may be derived from core analysis data. By intergrating these values with laboratory-derived electrical properties of the formation rock it is possible to produce a curve for critical resistivity or minimum productive resistivity, Rmp. The true formation resistivity (Rt) must not fall below the Rmp if one is to produce hydrocarbons water-free or at a specified water-cut.

Using transparent film, one can overlay the deep resistivity log with the calculated Rmp curve and quickly identify potential pay zones.