ATCE '10: Dielectric Scanner Promises More Accurate Reservoir Evaluation and Management

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Schlumberger released the Dielectric Scanner multifrequency dielectric dispersion service today on the first day of the SPE Annual Technical Conference and Exhibition. The technology promises new petrophysical measurements for better hydrocarbon saturation computation.

"The Dielectric Scanner service is the first in the industry to accurately quantify residual hydrocarbon volume, Archie's exponents, and formation CEC," said Catherine MacGregor, president of Schlumberger Wireline. "With a precise measurement of water volume and rock texture, the service has enabled operators to enhance hydrocarbon production in carbonate, shaly sand, and heavy oil reservoirs in both exploration and development environments."

At an evening event celebrating the launch, Andrew Gould, Schlumberger chief executive officer, said two critical issues the industry faces is increasing output from unconventional resources and raising output from existing reservoirs through better recovery methods. This new tool helps in both areas, he said.

The technology is the newest of the company's wireline tools. The scanner is a multifrequency dielectric dispersion tool offering a new petrophysical measurement. By use of signal dispersion technology, together with state-of-the-art processing, interpreters can estimate porefluid and rock texture information with great accuracy, independent of porefluid salinity. As a result, precise saturation calculations can be made in carbonates, in shaly sands including thin beds, in low contrast pays, and in heavy oil sands containing fresh water. An articulated sensor pad on the tool ensures accurate, repeatable measurements in either waterbased or oilbased mud.
The borehole compensated combinations of transmitter-receiver measurements at four radial spacings, operating at four different frequencies and two axial orientations, thoroughly characterize porewater volume, and pinpoint the Archie's textural parameters. The tool's intrinsic high vertical resolution enables characterizing beds as thin as 1 in.

The company has completed more than 250 jobs in 20 countries around the world providing continuous measurement of dielectric dispersion for precise petrophysical interpretation. In Venezuela, the new tool was employed to evaluate hydrocarbon volumes and the reservoir quality potential of a thinly laminated reservoir, recording high-resolution water-filled porosity in the inches-thick sand beds.

When thinly laminated reservoir layers are intercalated with conductive non-reservoir layers, the apparent formation resistivity is dramatically reduced, the apparent clay volume is increased, and the hydrocarbon volume and the permeability calculated from conventional petrophysics are underestimated, the company said.

The Venezuelan case study describes the challenge commonly encountered in a thinly bedded interval overlaying a clean and thicker sandstone reservoir. The induction accurately measures formation resistivity in the thick sandstone reservoir, but exhibits a pronounced decrease in the section laminated with thin conductive clay beds. The resulting water saturation from a conventional porosity-resistivity analysis is dramatically overestimated.

In a second case study, in Canadian shaly oil sands, water-filled porosity calculated from the scanner was used to accurately determine the weight percent of bitumen in advance of laboratory core analysis, offering critical data to the operator.