Pressure Measurement, Downhole Fluid Analysis, and Sampling in Extremely Tight Deepwater Reservoir

Saturn 3D radial probe completes formation testing program in mobilities much less than 0.1 mD/cP, offshore West Africa

**CHALLENGE**

Complete program of pressure measurement, downhole fluid analysis (DFA), and sample collection that a conventional single-probe formation tester was unable to perform in permeabilities at the limit of an unconventional reservoir facies (0.1–0.01 mD).

**SOLUTION**

Deploy the Saturn* 3D radial probe with its large surface flow area of multiple elliptical ports that makes it possible to induce and sustain flow in low-mobility formations for pressure testing and fluid acquisition.

**RESULTS**

Achieved formation pressure measurements in mobilities as low as 0.01 mD/cP and flowed formation fluid to conduct DFA and capture samples in mobilities as low as 2 mD/cP.

**Extremely tight reservoir conditions**

An operator needed pressure measurements and fluid analysis and sampling for a deepwater West Africa well, but the very low mobilities of the reservoir sections were below the operating envelope for single-probe formation testers to flow fluid. In addition, using a straddle packer to isolate intervals would have been time consuming and could have delivered misleading data, owing to the large intrapacker sump volume.

**Circumferential fluid flow**

The Saturn 3D radial probe creates true 3D circumferential flow around the borehole even in very low-permeability formations. The four self-sealing elliptical ports have the industry’s largest surface flow area, totaling more than 79 in², to quickly establish and maintain flow from the entire circumference of the wellbore instead of funneling fluid from the reservoir to a single access point. The Saturn design also minimizes storage volume effects. The result is quicker cleanup times and the efficient performance of pressure measurements, especially in low-mobility formations where conventional probes cannot function.

**Reservoir pressure measurement at mobility below 0.1 mD/cP**

In two successive intervals, the Saturn 3D radial probe measured formation pressure and flowed fluid for DFA using the InSitu Fluid Analyzer* system and for sample collection. Stabilized pressure measurements were achieved down to mobilities of 0.01 mD/cP, and formation fluid was flowed for DFA and sampling at mobilities less than 2 mD/cP.

The operator plans to include the Saturn 3D radial probe in upcoming wireline logging programs.

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