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Pressure Measurements and Fluid Sampling Find Low-Permeability Laminated Pay, Offshore Australia

Saturn 3D radial probe circumferentially extracts fluid from deepwater reservoir where conventional probes were ineffective

CHALLENGE

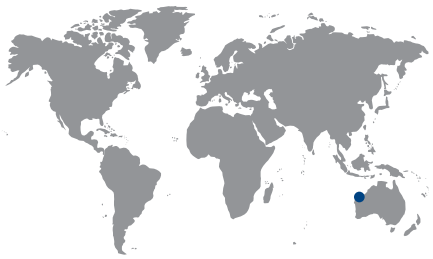
Measure pore pressure to quantify permeability and extract reservoir fluid for identification from marginal, thinly laminated sands where conventional probe-type tools have been unsuccessful.

SOLUTION

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

RESULTS

Obtained valid pressure measurements in submillidarcy formations and collected samples for fluid identification from zones down to 0.36-mD permeability to add to the well's net pay.



Offshore exploration well with thinly laminated sands

An operator's practice was to identify areas for investigation from borehole images obtained with the OBMI* oil-based microimager. However, conventional probe tools were unsuccessful at evaluating a number of thinly laminated sands of interest in a deepwater exploration well drilled offshore Northwest Australia. Pressure measurements were ineffective, indicating very low permeabilities, and flow could not be established through a single probe for fluid sampling.

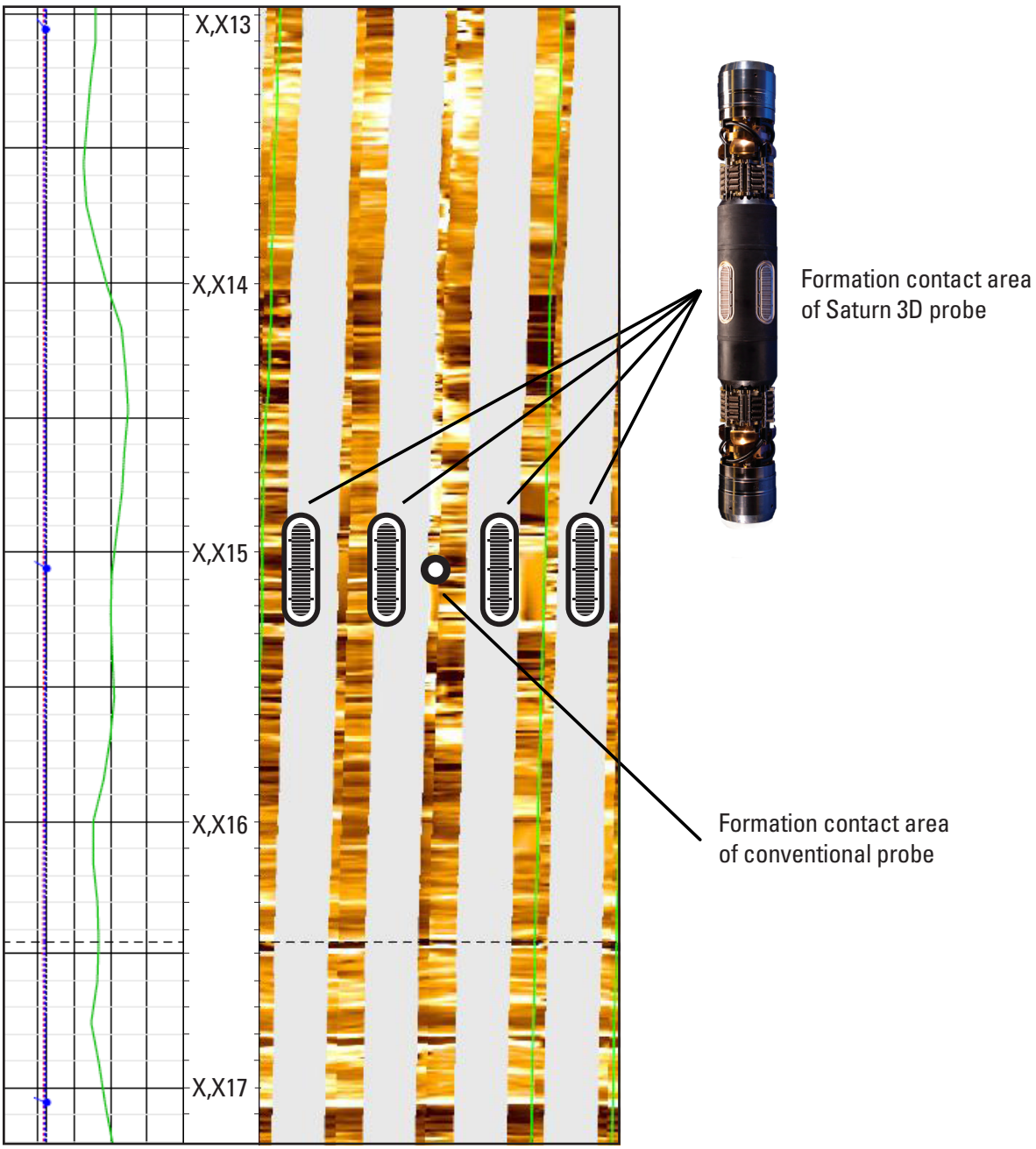
Fluid extraction even in low permeability

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, which quickly establishes and maintains flow from the entire circumference of the wellbore instead of funneling fluid from the reservoir to a single access point. The design of the Saturn probe 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.

More net pay identified from pressure and fluid results

With its large surface flow area totaling more than 79 in^2, the Saturn 3D radial probe performed well in the low-permeability laminated sands. Valid pressure measurements were obtained in submillidarcy formations for pressure transient analysis to accurately determine permeability. Fluid samples were collected for identification, with a gas sample captured from a zone with 0.36-mD permeability, where conventional probe tools could not extract reservoir content. Reservoir evaluation was greatly improved by the test results to significantly increase the net pay for the well.

The mechanical retract mechanism of the Saturn 3D radial probe employs heavy-duty springs to secure the ports when not deployed.



High-quality borehole images obtained with the OBMI oil-based microimager were used to identify areas for investigation, first with conventional probes and then with the Saturn 3D radial probe. It was not possible to perform pressure measurements with the small contact area of the conventional probe. Pressure measurements and fluid samples were obtained with the Saturn radial probe and its large 79-in^2 contact area.

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