

High-Definition Dual-Imaging-While-Drilling Optimizes Over 13,000 ft of Geosteering Through Complex Carbonate Reservoir

TerraSphere service improves understanding of permeability distribution and helps drill 8½-in section in one run, Abu Dhabi

TerraSphere* high-definition dual-imaging-while-drilling service provided real-time identification of vugs and faults, improving the operator’s understanding of the permeability distribution in the reservoir and helping drill an 8½-in section in one run.

The operator’s goal

An operator offshore UAE wanted to place a long lateral section through the most permeable layer of the carbonate reservoir and avoid high gas/oil ratio (GOR) zones that could not be identified using conventional logs. The operator also sought to identify and avoid high water saturation zones and map possible faults.

What Schlumberger recommended

TerraSphere service combines with other LWD and surface logging measurements to quantify the permeability distribution and characterize zones with high GOR, ensuring optimal deliverability of the extended reach drain section. The service delivers real-time high-resolution resistivity and acoustic images while drilling in oil-based mud (OBM).

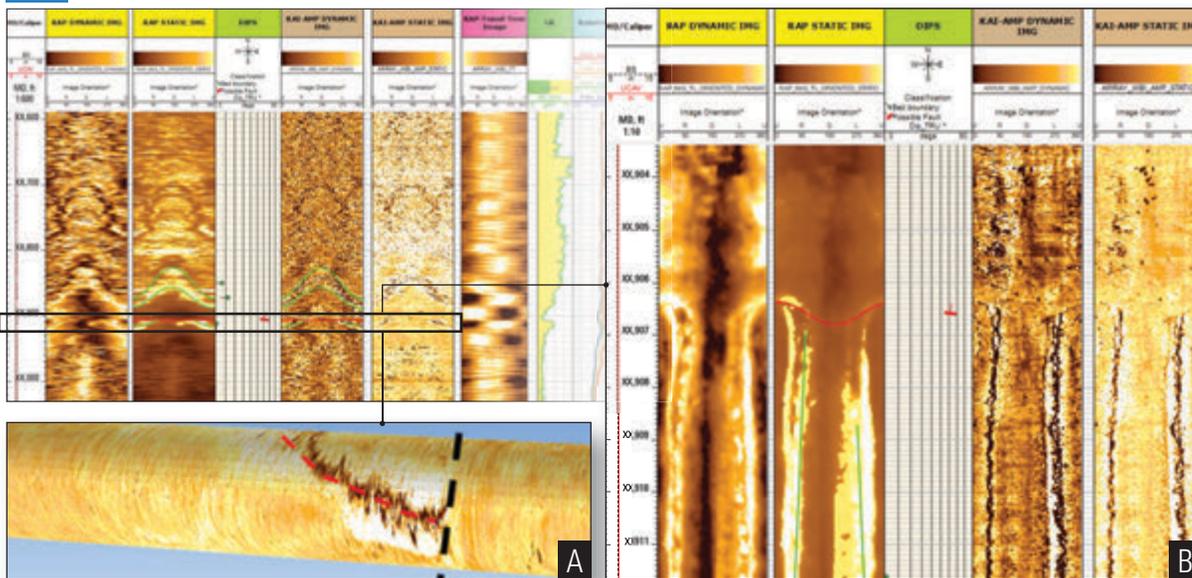
High-quality images provide insight into the reservoir texture, map the vug distribution, and show textural and structural features, enabling understanding of permeability distribution in the reservoir.

What was achieved

The operator used the TerraSphere service in a long horizontal 8½-in section at an MD of more than 27,000 ft. The service helped geosteer a lateral-length interval longer than 13,000 ft without compromising ROP in a TVD of more than 8,250 ft. The novel data compression technique, coupled with the mud pulse telemetry capability, transmitted the high-definition images in real-time for an extended reach drainhole. The service provided real-time identification of large vugs which were linked with high-permeability interval and validated with the mobility estimation from StethoScope* formation pressure-while-drilling service pressure measurements. This service also helped the operator understand and validate the structural and facies control of fault and bioturbation on the real-time fluid log data acquired using FLAIR* real-time fluid logging and analysis service.

The integration of technology within one BHA, guided by high-definition images, enabled real-time decisions during a single run in the 8½-in section.

Fault 1



(A) A 3D image acquired from TerraSphere service shows bed boundary termination.

(B) A composite plot and zoomed section showing presence of fault and fault plane.

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