A major operator in the Middle East deploys MagniSphere® high-definition NMR logging-while-drilling service to acquire real-time LWD petrophysical data in multiple applications.

**Case study: Drilling Location: Middle East**

**Simultaneous, Real-Time NMR $T_1$ and $T_2$ Distributions Enhance Petrophysical Evaluation, Middle East**

MagniSphere service improves data accuracy and well placement while slimhole drilling

**Use high-definition NMR logging while drilling**

Schlumberger developed MagniSphere high-definition NMR logging-while-drilling service for slimhole applications (wellbores <6 3/4 in). The service incorporates the latest digital and technological enhancements in NMR sensor design and characterization to improve sensitivity, accuracy, and precision of measurements. MagniSphere service simultaneously identifies $T_1$ and $T_2$ distributions while drilling, enabling the optimal characterization of a wide range of fluids, from light oil and gas to heavy oil and tar mats, along with a wide range of pore sizes, from macro- to microporous reservoirs.

Higher tolerance to lateral motion is another key advantage of MagniSphere service that results from an increased volume of investigation and additional motion-prevention methods that incorporate two built-in stabilizers to minimize antenna vibrations. A new NMR signal acquisition sequence and a short echo spacing enable better vertical resolution with enhanced precision in microporosity and heavy oil. Finally, MagniSphere service is also able to operate in high-salinity environments thanks to a newly designed receiver.

**Successful deployment in multiple fields and conditions**

The operator completed a large number of MagniSphere service applications in multiple wells, accumulating high-quality, continuous LWD NMR data. This enabled an accurate evaluation of clastic and carbonate reservoirs by measuring permeability profile, macro- and microporosity volumes, pore size distribution, and identifying the presence of various fluid types, such as light and heavy oil, tar, or water.

Applications comprised multiple drilling environments, including exposure to lateral motion, shock and vibration, water-based and oil-based muds, and multiple BHA configurations.

**Technical details**

Case study: Simultaneous, real-time NMR $T_1$ and $T_2$ distributions enhance petrophysical evaluation, Middle East

MagniSphere service acquired continuous real-time NMR data, enabling accurate petrophysical-based well placement while drilling.