Case study: Bohai Bay, China

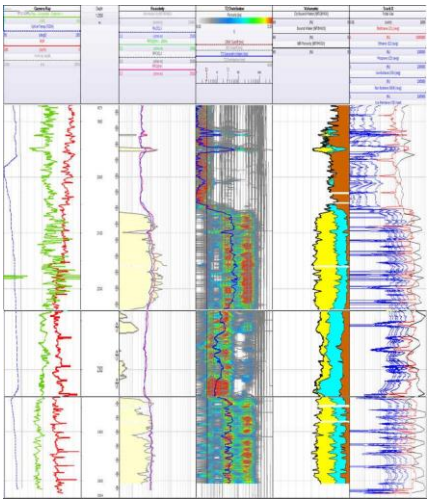
MagTrak supplementary application confirmed pure oil zone, enabled production of 2,000 BOPD sans water

A key operator in China's Bohai Bay was ready to drill a horizontal oil producing well but worried about the gas zone existing on top of the landing zone. Drawing on a history with Baker Hughes, the operator requested the **MagTrak™ logging-while-drilling (LWD) magnetic resonance (NMR) service** provide a real-time measurement to pinpoint the location of the gas. The MagTrak service offers industry-standard, T2-based, real-time magnetic resonance data that locates and identifies producible fluids even under the most difficult drilling conditions, such as high inclination and high-risk wells. With that knowledge, the operator successfully continued drilling.

But during the drilling in the horizontal section, the resistivity dropped. The operator feared puncturing into the water zone. The operator needed accurate porosity measurements without a source porosity tool to confirm the location of the gas cap. Without accurate knowledge of the gas cap's location—or if one even existed—the operator would not be able to land in the oil zone.

Baker Hughes experts took additional measurements, including a real-time T2 distribution. The additional analysis confirmed there was no gas cap. What the MagTrak service revealed was that most of the fluid content was clay-bound water (CBW) and capillary-bound water (BVI). The zone contained almost no free water, and Baker Hughes engineers confirmed this zone should be a tight sand zone instead of a water zone.

When this data was combined with additional reservoir navigation services (RNS) analysis, the operator adjusted the trajectory, continued to drill, and successfully completed the horizontal well. After the completion, this well produced over 2,000 BOPD (318 m^3/d) without any water.



The MagTrak service acquires high-quality pore space measurements while drilling without impacting rates of penetraion (ROP), and includes accurate porosity, fluid type identification, and an estimate of permeability.

Challenges

- Determine if gas cap exists above oil zone
- Reduce any free water
- Pinpoint the oil zone

Results

- Determined, in real time, no gas cap existed in the oil reservoir
- Landed safely in the oil zone
- Concluded the absence of free water in the horizontal well
- Replaced the source (neutron/density) porosity measurement for geoscience formation evaluation which can better protect the environment
- Enabled operator to produce over 2,000 BOPD (318 m^3/d) without any water
- Experienced no health, safety and environmental (HSE) issues or nonproductive time (NPT)