

Early OWC Detection Improves Wellbore Positioning to Reduce High Water Cut in Production

IriSphere services enables optimal drilling strategy using ahead-of-the-bit resistivity

An operator in Kuwait needed to space out the well at the optimal distance from current oil/water contact (OWC) because production was 60% water. The IriSphere* look-ahead-while-drilling service was deployed for a well's 8½-in section. It detected the OWC as early as 41 ft from the bit in the well section with a 40° inclination, enabling superior wellbore positioning to optimize production with reduced water content.

Improve wellbore placement to minimize OWC and reduce oil/water ratio

The average water cut of Umm Gudair Field reaches nearly 60% due to its production methodology and regulating drawdown in different parts of the field. Consequently, the undulating layer of OWC causes high uncertainty, impacting field drilling strategy. The typical approach is to develop the field's lower carbonate formation, drill deviated wells to the original OWC to confirm the saturation profile, cement back up to above the high water saturation zone, and then perforate. This method is ineffective, and a high water cut presence remains problematic.

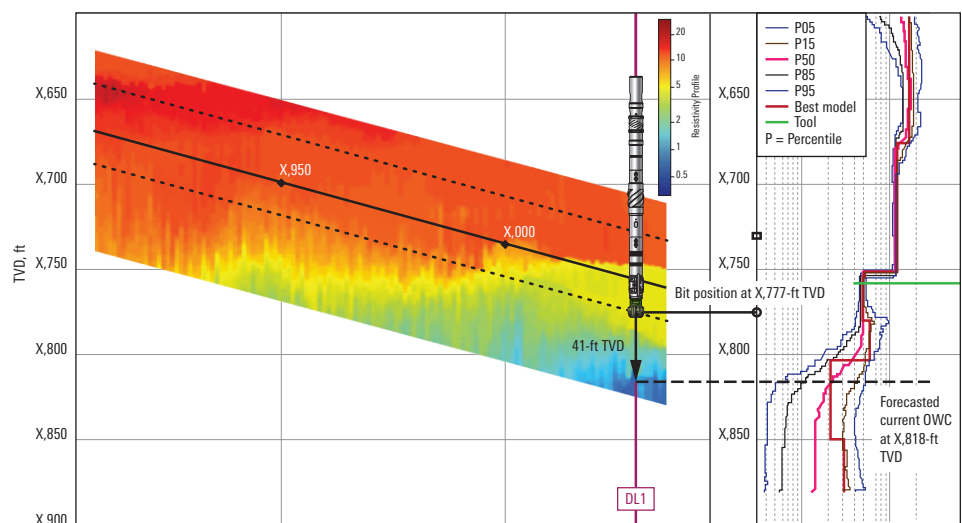
Deploy ahead-of-the-bit resistivity to identify OWC layers while drilling

Schlumberger recommended the IriSphere look-ahead-while-drilling service for the 8½-in section. It combines deep directional measurements with advanced automated inversion to accurately detect formation features ahead of the bit, including OWC layers, while managing drilling risks in real time and optimizing well placement.

The look-ahead capability is delivered using a multifrequency transmitter and multireceiver directional subs. Electromagnetic (EM) signals are sent from the transmitter into the formation and retrieved by the receivers to enable the enhanced look-ahead sensitivity and resistivity profiles. Additionally, it was suggested that the BHA integrate a PowerDrive Xceed* ruggedized RSS for aggressive geosteering combined with the EcoScope* multifunction logging-while-drilling service† that places multiple LWD sensors close to the bit.

Identified OWC ahead of the bit, enabling better wellbore positioning for optimal production

IriSphere service detected the OWC as early as 41 ft from the bit in the well section with a 40° inclination. It enabled production optimization by positioning the wellbore at the ideal distance from an uncertain moving OWC. Additionally, the service eliminated the need for a pilot hole or unnecessary cement-plug operation that would have created potential risks for water channeling.



The IriSphere service detected a low apparent resistivity trend ahead of the bit by 41 ft from last bit position.

*Japan Oil, Gas and Metals National Corporation (JOGMEC), formerly Japan National Oil Corporation (JNOC), and Schlumberger collaborated on a research project to develop LWD technology that reduces the need for traditional chemical sources. Designed around the pulsed neutron generator (PNG), EcoScope service uses technology that resulted from this collaboration. The PNG and the comprehensive suite of measurements in a single collar are key components of the EcoScope service that deliver game-changing LWD technology.

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