Logging-while-drilling technology continues to reduce drilling risk

When logging-while-drilling (LWD) made its debut in the late 1980s, several advantages were touted. Chief among these was the potential elimination of wireline logs. In addition, it was postulated that LWD tools arrived at target formations only a few minutes after they had been penetrated by the bit, thus avoiding, for the most part, invasion of mud filtrate that might flush hydrocarbons away from the sandface.

But early LWD log quality, resolution and depth accuracy were not up to the same level of that offered by popular wireline logs that were in use at the time. LWD telemetry bandwidth limited real-time transmission of log data. That was then.

Today, modern LWD logs rival their wireline counterparts in most categories. New tools measure nearly every formation parameter with comparable precision. Telemetry bandwidth has been boosted, and downhole processing has reduced the amount of data so decision-critical information is available to the logging engineer in real time.

As the perceived value of LWD/MWD data escalated, operators who once were not satisfied by the cost have come increasingly to accept that the cost is more than offset by the value of timely drilling and reservoir information. As more extended-reach wellsbores are constructed, operators are not comfortable extrapolating formation information from vertical pilot holes that could be thousands of feet away. They demand accurate data in these wellsbores. This has leveled the playing field for LWD versus wireline.

The ability to reduce risk and steer wellsbores precisely into formation sweet spots transcends the cost in many cases.

Delivering quantitative solutions

Akshay Sagar, Global Business Development Manager for Schlumberger Drilling & Measurements, explained his company’s position. “Schlumberger is committed to delivering quantitative solutions through high quality measurements using a complete portfolio of formation evaluation services supported by geographically dispersed centers strategically located worldwide with highly skilled technical experts to support these services.” He continued: “Two new measurements have been launched to kick off an aggressive campaign—the NeoScope sourceless formation evaluation-while-drilling service and the MicroScope resistivity- and imaging-while-drilling service,” he said.

Both new members of the Scope family of LWD services provide formation evaluation for various targeted applications. The NeoScope tool is the first system able to provide a comprehensive multi-function formation evaluation without a chemical radioactive source. Using a unique application of nuclear physics, the high-energy electronic neutron generator provides 2.5 times deeper reading formation density, neutron porosity, sigma, and elemental spectroscopy with repeatable accuracy. Interpretation of the resulting logs benefits from a new algorithm that translates data into actionable information in real time.

The MicroScope service helps in accurate formation evaluation and well placement in reservoir sweet spots. Operating equally well in clastics and carbonates, it maps natural fracture networks to support the completion design. Recently, in China, the tool maintained 91% coverage in a 3-ft to 7-ft (1 m to 2 m) thin dolomite bed over a 3,600-ft (1,095 m) lateral despite numerous faults and dip variations.

“The new services work well in combination with other members of the Scope family of LWD services in the respective hole sizes,” said Sagar. “NeoScope service is especially useful in countries with strict rules that limit transportation of traditional radioactive sources,” he explained. “Also, in high risk areas, such as deepwater, customers no longer risk losing a radioactive source in the hole and all the mandatory and costly procedures that accompany such incidents.” The added reliability is paying off.