

BaraECD® System Delivers Low ECD and Stable Wellbore in Narrow-Window Shale Lateral

HIGH-PERFORMANCE SYSTEM PROVIDES SUBSTANTIAL SAVINGS

LA CALERA FIELD, ARGENTINA

CHALLENGE

Design a diesel-based fluid that would meet several criteria while drilling in a narrow mud weight window:

- » Provide excellent ECD and pump pressure control at high densities
- » Remain stable during extensive coring and logging operations
- » Deliver a gauge wellbore for optimal data acquisition
- » Improve conditions for setting and cementing casing

SOLUTION

BaraECD® fluid, custom formulated to provide:

- » Optimized ECD values
- » Reliable sag resistance
- » Lower OWR for reduced diesel consumption

RESULTS

- » Drilled, logged, and cased well within planned time frame
- » Cut downhole losses by 71 percent
- » Reduced diesel consumption by 100 m³ (630 bbl)
- » Saved approximately USD 125,000 in drilling fluid costs

OFFSET WELLS INDICATE WELL-CONTROL AND LOST-CIRCULATION ISSUES

An operator in Argentina's La Calera field planned to drill the 6-1/8-inch lateral section in a shale reservoir after setting 7-inch casing at 2,600 meters (8,530 feet) true vertical depth (TVD). The proposed total horizontal displacement was 1,512 meters (4,961 feet) measured depth (MD), reaching total depth (TD) at 4,662 meters (15,295 feet).

Offset well data indicated the necessity for high-density drilling fluid to maintain well control, often exceeding 2.0 SG (16.7 lb/gal). The high densities caused increases in rheological properties, resulting in higher equivalent circulating density (ECD) values and standpipe pressures (SPPs) when drilling the lateral section. Downhole losses had been encountered.

The plan for the subject well included both coring and wireline logging operations. The operation needed to control potentially high pore pressures, recover 100 percent of the core sample, and prevent hole enlargement or irregularities that would impair wireline data acquisition. After logging runs were completed, production casing would be set and cemented in the lateral. Achieving and maintaining optimal wellbore conditions were essential elements for success.

INNOVATIVE DIESEL-BASED SYSTEM OFFERS OPTIMIZED ECD CONTROL

The Baroid technical team proposed running a BaraECD® high-performance non-aqueous fluid (HPNAF) formulated with diesel as the base oil. The BaraECD system has been proven to provide a low controlled ECD in wells with a narrow margin between the pore pressure and fracture gradient, while also providing necessary hole cleaning and resistance to barite sag to drill the intermediate, pilot hole, and lateral sections.

The fluid was designed at the Halliburton lab in Neuquén, with technical support from Bolivia-based personnel. The diesel-based HPNAF exhibits an exceptional low-end rheology achieved by including a customized suspension package built to exacting specifications. The result is a highly stable fluid that can remain static for long periods without risk of settling. On this well, the BaraECD system was used successfully in conjunction with managed pressure drilling (MPD) to increase the operator's flexibility and control over pressure management.

As this was the first time the BaraECD fluid had been used in Argentina by this operator, the well was deemed a "critical first well" candidate. A global technical field advisor (GTFA) was assigned, and the GTFA and local team were also supported by regional and global experts.

The mud density was managed between 1.96–2.06 SG (16.4–17.2 lb/gal), and the fluid exhibited a flat, stable rheology profile compared with conventional oil-based mud (OBM) used on offset wells.

**SAVED
USD 125K**
ON NARROW-MARGIN WELL

CASE STUDY

Downhole fluid losses in the production interval were reduced by 71 percent compared to offset wells (16 m³ vs. 56 m³), saving USD 60,000.

WELL CORED, LOGGED, AND CASED WITH NO ISSUES, SAVING USD 125,000

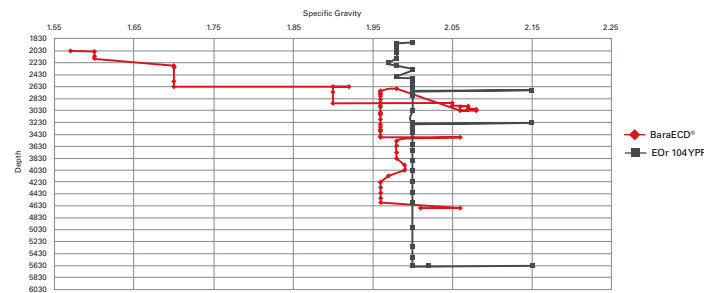
Throughout the drilling operation, the BaraECD system delivered ECD values in a manageable range, reducing overall downhole losses and helping to prevent the onset of wellbore instability in the Vaca Muerta formation. Circulating pressures stayed well below the limits of the rig equipment.

Coring operations were performed from 2,912 meters (9,554 feet) to 3,011 meters (9,879 feet) (recovering 100 percent of the core samples). Eight wireline runs were conducted successfully while drilling the 1,512-meter (4,961-foot) horizontal section to TD at 4,662 meters (15,295 feet). Wiper trips were performed smoothly, and production casing was set and cemented with no issues.

Drilling with the BaraECD system delivered several significant benefits for the operator:

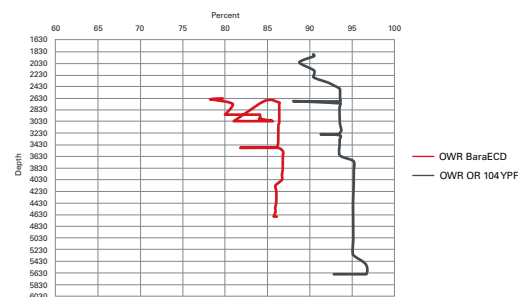
- » Well drilled, logged, and cased within the planned 86-day time frame
- » Consistently stable rheology with reliable barite suspension
- » No increase in SPP or ECD when raising mud weight from 1.96–2.06 SG (16.4–17.2 lb/gal)
- » Gauge hole per caliper log
- » Diesel costs reduced by USD 65,000 due to lower oil/water ratio (86/14 compared to 90/10)
- » Downhole fluid losses in the production interval reduced by 71 percent compared to offset wells (16 m³ vs. 56 m³), saving USD 60,000

MUD WEIGHT (SPECIFIC GRAVITY)



BaraECD® fluid density compared to conventional oil-based system

OIL/WATER RATIO



BaraECD® fluid oil/water ratio (OWR) compared to conventional oil-based system

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