Baroid Drilling Fluids

THERMA-FLOW 500® HPHT Thinner Helps Improve Drilling Rate and Reduce Fluid Costs

Location: Nequén Province, Argentina

Overview

The operator was drilling its second horizontal well in the Rincon de la Ceniza field, where the main objective is the Vaca Muerta shale play. A bottomhole temperature of 300°F (150°C) and excessive solids content had an adverse effect on the drilling fluid rheological properties in the horizontal section.

The horizontal 6 ⅛" interval had a target total depth (TD) of 4195 m (13,760 ft). The primary drilling fluid was a conventional water based system formulated with CARBONOX® filtration control additive and AKTAFLO® S surfactant. However, the mud weight range required to keep the well under control was 17.4-18.3 ppg (2.09-2.2 sg), and this contributed to high equivalent circulating density (ECD) values.

There was a significant risk of lost circulation if the rheological properties could not be controlled effectively. The previous well had also encountered similar issues. The customer requested that the Baroid team propose an alternative thinner to stabilize the rheology at the desired specifications.

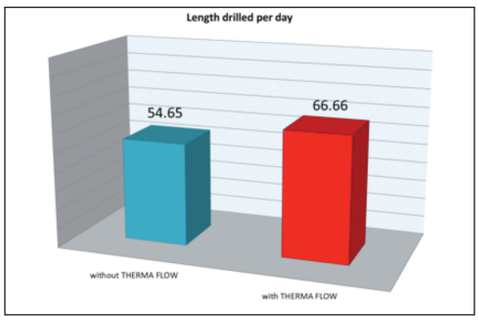

Fig 1. *Footage per day before and after THERMA-FLOW 500® treatment*

CHALLENGE	SOLUTION	RESULT
The operator was drilling its second horizontal well in the Rincon de la Ceniza field. A bottomhole temperature of 300°F (150°C) and excessive solids content had an adverse effect on the drilling fluid rheological properties in the horizontal section. There was a significant risk of lost circulation if the rheological properties could not be controlled effectively.	**The Baroid team recommended** THERMA-FLOW 500® dispersant to help control rheological properties in the high-pressure/high-temperature (HPHT) applications.	**This customized solution increased** length drilled per day by 20% and the fluid cost per drilled meter was reduced by 16% (169.91 vs 203.10 USD/m).

The Baroid team recommended THERMA-FLOW 500® dispersant to help control rheological properties in the high-pressure/high-temperature (HPHT) applications. While the section was being drilled from the casing shoe out to 12,450 ft (3795 m), the active fluid system was diluted with new mud several times, with a total volume of 660 bbl (+/-105 m3) of new fluid added.

The THERMA-FLOW 500 HPHT dispersant treatment was started at 12,450 ft (3795 m), using an initial thinner concentration of ± 3% v/v (5.0 l/m3), progressively increasing up to ± 6% v/v (10 l/m3) at 13,763 ft (4195 m) (TD). The fluid exhibited a stable and flat rheology during the entire interval, including at the maximum density of 18.3 ppg (2.2 sg) This allowed the ECD value to be kept as low as possible and stable during the operation.

Plastic viscosity (PV), yield point (YP) and gel strengths were reduced by 30% by adding THERMA-FLOW 500 dispersant while the section was being drilled.

As a result of the THERMA-FLOW 500 treatment while the horizontal section was being drilled, the pump rate was increased from 211 to 236 gpm (800 to 895 lpm) and, as a consequence of this, pump pressure was reduced from 4000 to 3850 psi (this value was kept until TD). The rate of penetration was kept between 13-23 ft/hr (4-7 m/h), and non-productive time due to mud pump repairs was substantially reduced compared with previous drilled wells. This customized solution increased length drilled per day by 20% and the fluid cost per drilled meter was reduced by 16% (169.91 vs 203.10 USD/m).

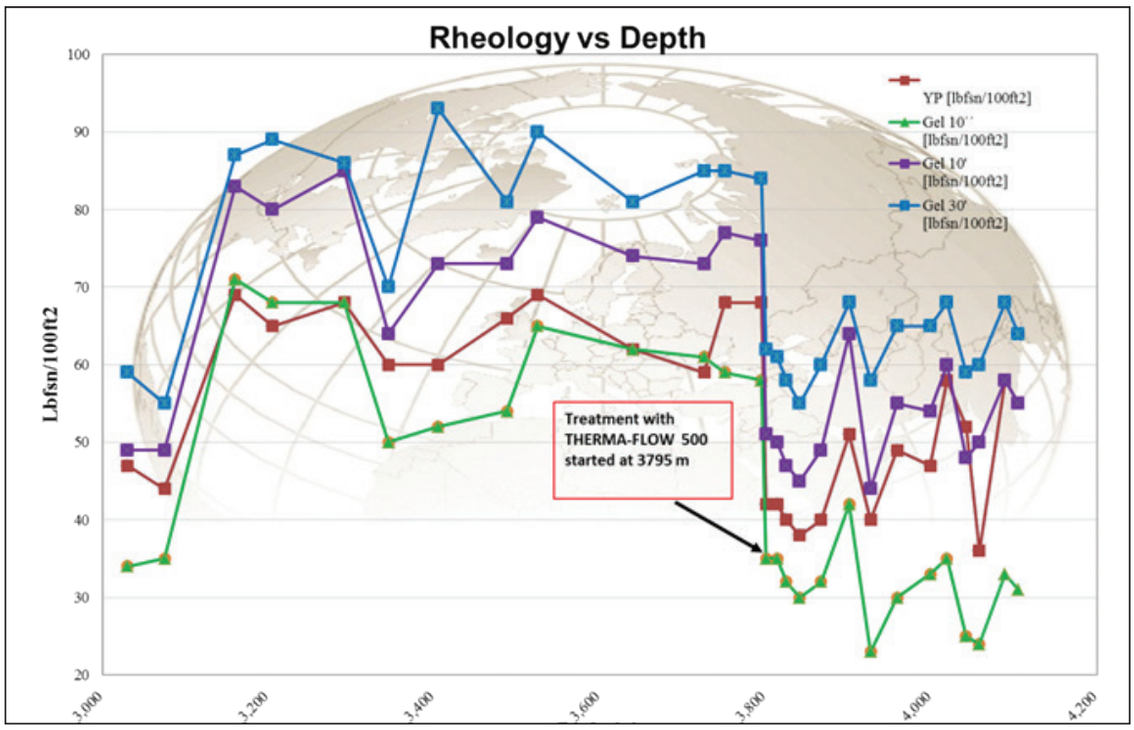

Fig 2. *THERMA-FLOW 500® HPHT dispersant effect on rheological properties*

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