



Baroid Drilling Fluids

Over USD 100,000 Saved on Trip Time, Gumbo Issues Using Inhibitive AQUAGEL® Calcium Nitrate System

Location: Orellana, Ecuador

Overview

Drilling operations at Oriente Basin in the Oso field typically proceeded normally with only intermittent drag and torque observed during connections. However, the operator encountered tripping problems caused by the swelling of highly reactive gumbo-type clay. This created tight spots in the wellbore, making it difficult to pull out of the hole and resulting in slow trip speeds.

Another issue in this interval was the potential for shallow water flows in the 16-in. interval. A 12.8 ppg fluid density was required. Facing the combination of the tight hole problems while tripping and the high density requirement, the operator wanted a drilling fluid that would inhibit the gumbo reaction while enhancing ROP.

The Baroid team recommended the addition of calcium nitrate dispersant to keep rheological properties at the desired levels. The calcium concentration was maintained in the 2400-4000 mg/L range to provide good inhibition of the gumbo clay.

Those values were obtained with a calcium nitrate concentration of 5.0 ppb and maintained while drilling the Chalcana formation (Tertiary).

The simple AQUAGEL® viscosifier-calcium nitrate fluid had a track record for minimizing flow line plugging, bit balling and tight hole caused by reactive clays, while the lean rheology was expected to promote good ROPs.

The AQUAGEL calcium nitrate system mitigated the gumbo effects and tripping time improved compared to previous wells drilled with other drilling fluid systems. As a result of the treatments carried out in this well, the primary objectives were achieved. The fluid performance throughout the interval, in conjunction with good drilling practices and drill bit selection, allowed the operator to successfully complete the well as programmed.

CHALLENGE	SOLUTION	RESULT
<p>The operator encountered tripping problems caused by the swelling of highly reactive gumbo-type clay.</p> <p>Another issue in this interval was the potential for shallow water flows in the 16-in. interval. A 12.8 ppg fluid density was required. Facing the combination of the tight hole problems while tripping and the high density requirement, the operator wanted a drilling fluid that would inhibit the gumbo reaction while enhancing ROP.</p>	<p>The Baroid team recommended the addition of calcium nitrate dispersant to keep rheological properties at the desired levels.</p>	<p>The AQUAGEL calcium nitrate system mitigated the gumbo effects and tripping time improved compared to previous wells drilled with other drilling fluid systems. On the well drilled with the calcium nitrate system – a slightly deeper well – the same round trip took only 9 hours, a 72% reduction in non-productive time saving over USD 100,000.</p>

CASE STUDY: AQUAGEL® Calcium Nitrate Fluid System Significantly Reduces NPT.

On the offset well, a total of 32.5 hr were required to pull out of the hole and trip back in prior to running casing. On the well drilled with the calcium nitrate system – a slightly deeper well – the same round trip took only 9 hours, a 72% reduction in non-productive time saving over USD 100,000.

Comparison Tripping / Casing Operations – 16" Interval	
BACK REAMING	Red
POOH WITH PUMP	Yellow
TIGHT HOLE	Green
FREE	Light Green
REAMING	Dark Blue
SAFETY REAMING	Light Blue
NO TRIP	Blue
CASING	Grey

As indicated in the charts, two wells are compared to show the difference in tripping time and issues encountered. The upper chart shows a well drilled with conventional water-based fluid. The lower chart shows the well drilled with the AQUAGEL® calcium nitrate system.

Trip time / issues comparison – the interval drilled with the AQUAGEL Calcium Nitrate system had significantly lower trip time.

