

AVABIOLUBE - CLAYBLOCK

Product Combination Improves Bore Hole Stability



“The effectiveness of the AVACLAYBLOCK and AVABIOLUBE system at the recommended concentrations is well demonstrated by the caliper logs”

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INTRODUCTION

This case study reports the performance of our new generation products AVACLAYBLOCK and AVABIOLUBE with water based mud. The experience refers to the drilling of a 12¼” interval on a Libyan offshore well in November 1998. Based on experience gained in this field a drilling fluid program designed.

The following problems were expected during the 12¼” section:

- ◆ Reactive clay (Cherahil) formation drilling, expected hole instability (tight hole, caving, etc) and lost returns.
- ◆ Fractured (Ketatna) formation drilling, with increase risk of gas kicks and/or total losses.

The correct drilling fluid design allowed drilling the interval under cost and with minimal hole problems.

OBJECTIVES

The operator’s objective was to minimize drilling costs while staying in compliance with environmental regulations, thus reducing the impact of offshore drilling activities on the environment.

The formations to be drilled were very problematic for borehole stability because of the highly reactive clay presence. The most suitable drilling fluid was an Oil Based Mud (OBM) because of its known inhibition, but due to the expensive haul off and disposal costs an alternative was needed. A second alternative was a low toxicity OBM which would have reduced disposal costs, but would have resulted in a higher mud cost per m3 due to the price of the low toxicity

base oil.

The third option, and the one that was implemented, was a water base mud (WBM) using new generation Ava products designed to inhibit reactive clay. Their performances have proven to produce results similar to oil base mud, at a lower cost and minimal environmental impact.

ACTIONS

To reach the goals, AVA used their AVACLAYBLOCK and AVABIOLUBE mud system, specifically designed to reduce bore-hole instability problems caused by reactive clays.

The first product AVACLAYBLOCK is a mix of polyvinyl polymers and silicates in aqueous solution that produces a strong inhibiting action on clays, creating a barrier on the clay surface. This barrier reduces seepage, prevents clay hydration and dispersion in the mud, and eliminates well instability problems. This product has a short chain (i.e. low molecular weight), it does not increase mud rheological properties, and is stable up to 150°C. AVACLAYBLOCK is an environmentally safe product.

The second product, AVABIOLUBE, is a natural polysorbitol based product. It modifies clay hydration mechanism, making it more difficult for the clays to absorb fluid. AVABIOLUBE displays a synergetic action if used with AVACLAYBLOCK and Potassium (K+) ions, moreover it shows a strong lubricating action thus reducing frictions and drag.

	Low Toxicity OBM	WBM - Avaclayblock - Biolube (Programmed)	WBM - Avaclayblock - Biolube (Actual)
Cost/m ³	\$1,192	\$297	\$247

Fig. 1: Cost Comparisons

CASE STUDY



AVABIOLUBE - CLAYBLOCK - (page 2)

Programmed concentrations were as follows:

AVACLAYBLOCK 10-15 kg/m³

AVABIOLUBE 15-25 kg/m³

RESULTS

The initial drilling of the interval proved to be difficult with significant losses experienced at the shoe in the KETATNA formation. To minimize costs, product concentrations were minimized and LCM was added to the system. A cement plug was eventually necessary to stop the losses after 500m.

Once the losses were controlled, product concentrations were brought back up to programmed and drilling continued from 1800m through to the proposed casing depth of 2555m. The rest of the interval was drilled with only occasional seepage losses detected.

The effectiveness of the AVACLAYBLOCK and AVABIOLUBE system at the recommended concentrations is well demonstrated by the caliper logs. The upper section experienced large washout, with calipers showing an average of less than 13" hole size (12 1/4" bit) from 1800m to casing point at 2555m once the concentrations were restored, demonstrating the improved bore hole stability and inhibition.

CASE STUDY