Case History

Avatensio NS™ Low-Toxicity Hydrocarbon-Free Spotting Fluid and Fast Response by Newpark Fluids Specialists Solves Stuck Pipe Within 2 hours, Adriatic Sea

Newpark specialists quickly formulated the proprietary low-toxicity solution to free the stuck pipe, with the operation completed in less than two hours, 16 hours faster than expected.

CHALLENGE	SOLUTION	RESULT
• Differentially stuck pipe at 5,300 m, resisted several attempts to free it • The pipe-freeing pill solution had to be hydrocarbon-free and low-toxicity	• Rapid response by the Newpark fluids team to test and formulate a solution on location • Avatensio NS™, Newpark's environmentally friendly pipe-freeing agent	• Pipe was successfully freed in 2 hours, allowing drilling to resume a full 16 hours faster than planned

OVERVIEW

A major operator chose Newpark for the offshore appraisal drilling campaign in the Adriatic Sea because of our extensive offshore experience in some of the most challenging drilling environments in the world, and regional experience drilling the offset fields Val d'Agri in Italy and Block 2 & 3 in Albania.

The operator placed strict demands on the use of environmentally friendly products while defining the mud program, which included the stuck pipe procedure. Avatensio NS™ was one of the products selected as a hydrocarbon-free, low-toxicity spotting fluid used to free differentially stuck pipes by effectively soaking the contact and penetrating between the wall cake and the mud.

Avatensio NS is a single package, easy-to-use product which finds application in the preparation of weighted and unweighted spotting fluids. It does not contain any hydrocarbons and it is therefore recommended for environmentally sensitive areas such as offshore drilling.

Spotting Avatensio NS is a quick and effective remedy for differentially stuck pipe, and most effective if applied as soon as the pipe becomes stuck. An Avatensio NS pill is generally used in conjunction with a lubricant and the pill can be partially dispersed in the drilling fluid (by pre-testing compatibility), further improving lubricity and reducing torque.

Avatensio NS is compatible with most water-based muds and their components.

This solution was studied and developed by Newpark for application in the North Sea offshore sector.

CHALLENGE

The following parameters were met while drilling the 10⅝" x 12¼" hole section at 5,386m:

- Flow rate 2000 l/min

- Stand-Pipe Pressure (SPP) 3700-3900 psi
- Revolutions per minute (RPM) 95
- Weight on Bit (WOB) 15-18 ton
- Torque 4-8 klbs*ft
- Mud weight (MW) 2.03 sg
- Equivalent Circulating Density (ECD) 2.07 sg
- Entrained gas (BGG) 0.03-0.5%
- Rate of Penetration (ROP) daily average 1.9 m/h

At 5,386m a kick event was noticed as the well was flowing. Field personnel pulled out of the hole at 5,382m and started circulation with Driller's method with 600 l/min (30 spm), 2.03sg MW. The initial circulating pressure (ICP) held constant at 1,780psi. Meanwhile Mud Weight increased to 2.14sg.

The entire string volume was displaced with kill mud at 2.14sg from the reserve pits and recorded final circulating pressure (FCP) = 720psi and well static.

Once open, the Blow Out Preventer (BOP) pipe was stuck but circulation was still available. Several attempts were made with jar firing, without success.

A first attempt was made with 5m³ of 2.01sg anti-sticking pill (base mud + 18kg/m³ defoamer) and reduced flowrate to 600 l/min when the bit was reached, while working the string up and down, but again without success.

A second attempt included a 5m³ water pill that was pumped downhole and set next to the stuck point to let it soak. Work to free the pipe by applying 60 Ton over-pull (OP) and 95 Ton slack-off (SO), while maintaining 35k lb*ft, was also unsuccessful.

SOLUTION

Newpark fluids specialists suggested pumping the Avatensio NS freeing pipe pill to resolve the situation.

Avatensio NS is a hydrocarbons-free, low-toxicity spotting fluid used to free differentially stuck pipes by effectively soaking the contact and by penetrating between the wall cake and the mud. It can also be weighted up to the desired fluid density.

Due the high density required (the operator required to mix a spotting pill at 2.09sg), several tests were carried out in the field mud laboratory to evaluate the best formulation with the lowest impact on fluid rheology to maintain barite suspension. Analysis indicated that additions of Ecol Lube LG™ were necessary to reduce the fluid rheology.

With the urgency of the event, at the operators request all the tests were quickly performed at room temperature (around 26°C). No barite sag was recorded on the sample of Avatensio NS while mixed at different ratios with Ecol Lube LG lubricant.

The freeing pill formulation was optimized at 90% Avatensio NS with 10% Ecol Lube LG.

The pill was mixed in the slug pit and was pumped in the following order:

- 7.4 m³ of the spotting fluid pill formulation was mixed to fill 145m of annulus volume where the differential sticking occurred
- The pill was pumped to the bit depth @ 2,000 lpm
- The flowrate was then reduced to 600 lpm while displacing out of the bit
- 600l of the pill was left inside the drill string for further displacements inside the BHA annulus.

- Circulation was stopped to allow the fluid to soak.
- After 30 minutes, an additional 300l pill was pumped inside the annulus @ 300 lpm

RESULTS

Attempts to rotate the drill pipe restarted both with and without torque.

The drill string was freed with maximum 90 Tons SO and 30 klb*ft torque.

Field personnel gradually restarted fluid circulation, increasing flow rate up to 2,000 l/min, 4,250psi SPP, 45 RPM, 3-4 klb*ft Torque.

The spotting fluid was displaced out of the hole and diverted into a dedicated pit for final disposal.

No losses were observed while displacing the pill.

The operator set aside 18 hours in the drilling program to free the stuck pipe, but with the rapid response of the Newpark fluids team and the effectiveness of the Avatensio NS pipe-freeing pill, the incident was resolved in less than two hours.