

Significant Drilling Improvement, Cost Savings Witnessed during BLACK FURY Congo Field Trial

“The outstanding performance of BLACK FURY* liquid Gilsonite suspension in this quite unstable claystone formation will no doubt have a substantial positive impact on overall well cost.”

Vincent OKO, M-I SWACO Drilling Fluids Specialist

Well Information

Location Pointe Noire, Congo
 Interval drilled (12¼-in. section) 2405 ft (733 m) to 3028 ft (923 m)
 Inclination 2346 ft (715 m) to 3609 ft (1100 m) total vertical depth (TVD)

The Situation

A field located in the Congo has a history of difficulty with drilling the 12¼-in. well sections, usually from about 2346 ft (715 m) to about 3609 ft (1100 m) TVD. This difficulty is occasioned by the presence of an unstable layer of claystone called the Pointe Indienne claystone formation. The lithology of this formation ranges between 95–100% claystones. The formation is quite unstable and has a strong tendency to swell and “slough.”

This swelling and sloughing generally results in hole instability, tight and sticky wellbore, packoffs and stuck pipe resulting in high costs to the operator. Much of these costs are associated with many hours spent reaming through tight spots prior to running casing; many times the casing string is still unable to reach bottom on the first run. The string is pulled out and the hole is reamed again before casing can be run successfully.

The Solution

As a solution to the intractable problems with drilling the Pointe Indienne formation, M-I SWACO introduced the BLACK FURY product through a test performed on one of the wells in the field. The BLACK FURY liquid Gilsonite[®] suspension is specifically formulated to stabilize water-sensitive, micro-fractured shales when drilling with water-base drilling fluids. It seals micro-fractures, reduces dynamic fluid loss and minimizes the potential for differential sticking. Secondary benefits include improved lubricity and reduced accretion from sticky clays.

The Results

The result of this test was compared with results from two previous wells drilled on the same platform as the test well. The following parameters were compared: rate of penetration, drilling torque, reaming time, casing running time and total fluid costs for the section. The comparison shows that the use of the BLACK FURY product adequately controlled the troublesome Pointe Indienne formation, resulting in huge savings for the operator. The 12¼-in. section of the test well was drilled in record time with one bit run, no sloughing shale, no tight spots, no reaming, and the 9⅝-in. casing was run and cemented in place with no problems.

The Details

Experience from several previous wells in this field has shown that between 2346 ft (715 m) to about 3609 ft (1100 m) TVD, there exists a high risk of stuck pipe due to wellbore instability. On several occasions while tripping, a packoff occurred and the string became stuck. Sometimes it could be jarred free. At other times the jarring was unsuccessful and the string had to be backed off, the hole plugged back and sidetracked.

Generally, this section of the Congo-area wells is drilled with salt-saturated KCl polymer mud with 4.5% glycol added. KCl concentration is maintained at 45.6 lb/bbl (130 kg/m³) while drilling the Pointe Indienne formation. Mud weights range from 1.31 SG (10.9 lb/gal) to 1.51 SG (12.6 lb/gal); API fluid loss is maintained at a maximum of 3 cc/30 min while the yield point is held at above 28 lb/100 ft². High-viscosity weighted sweeps treated with Supersweep[^] are pumped in tandem with low-viscosity, low-weight mud. These fluid properties, working in synergy with optimum flow rates to provide excellent hydraulics, still do not adequately address the problems of drilling the Pointe Indienne formation. Consequently, until the introduction of the BLACK FURY product, there was always the need to re-engineer the drilling fluid system to address the concerns of this interval.

The top of the Pointe Indienne formation was at 2405 ft (733 m) measured depth. This section was drilled to 2638 ft (804 m). A check trip was performed to 2234 ft (681 m). No drag or overpull was observed during the trip. The string went back to bottom freely and drilling continued to 2982 ft (909 m). A leak on the swivel wash pipe necessitated another trip. Again, the string was pulled from 2982 to 1988 ft (909 to 606 m) without any overpull. Once the wash pipe was repaired, the string was tripped back in hole to bottom without any resistance. Drilling continued to 3028 ft (923 m). Another leak on the wash pipe was observed.

This time the string was pulled only 42.6 ft to 2985 ft (13 to 910 m) to allow for the wash pipe to be repaired. Upon resumption of drilling, small amounts of caving were observed at the shakers. The caving stopped once the flow rate was cut back from 3000 to 2800 L/min. Apparently, the increased flow rate coupled with the unscheduled short trip had created enough turbulence in the annulus for some sections of the wellbore to unload cavings.

Drilling continued to TD without any problems. After circulating clean, the string was pulled out to surface without pumping. No drag or overpull was observed. It was not necessary to perform the traditional wiper trip at TD prior to running casing. The casing string was run to bottom without any restrictions in 11 hr.

A comparison was made between two wells drilled without the use of the BLACK FURY product in the same field as the test well in which the BLACK FURY product was used. The table reveals that using the BLACK FURY product in the salt-saturated KCl polymer mud significantly affected all the parameters monitored. No reaming was performed on Well C. The average drilling torque, casing running time, total days per section and total fluid cost on Well C were all significantly lower than Wells A and B.

Table 1

	Well A No BLACK FURY Used	Well B No BLACK FURY Used	Well C BLACK FURY Used
Total reaming time (hr)	14	151.5	0
Average drilling torque (amps)	109	169	69
Average ROP (m/hr)	8.1	8.4	17.9
Number of round trips	2	6	0
Number of sidetracks	0	2	0
Casing running time (hr)	18.5	28.5	11
Total days for section	14	44	6
Total fluid cost for section (USD)	152,000	481,000	146,000

Questions? We'll be glad to answer them.

If you'd like to know more about the BLACK FURY product and how it's performing for our other customers, please call the ALPINE SPECIALTY CHEMICALS or M-I SWACO office nearest you.



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