Case History

Customized CleanDrill™ Reservoir Drill-In Fluid (RDF) System Meets Operator's Significant Challenges in Successful Completion of Onshore Wells, Germany

An engineered solution was thoroughly tested and employed to successfully meet the stringent requirements of this German operator

CHALLENGE	SOLUTION	RESULT
• Temperature stability at 150°C for minimum 4 days • Resist solids contamination • Ensure formation is not damaged • Provide API fluid loss control	• CleanDrill® formulation comprised of unique, proprietary Newpark fluids	• No contamination and no reservoir water influx • Fluid loss remained stable while drilling • Fluid remained stable, even at high temperatures

OVERVIEW

Newpark was chosen as the preferred supplier for this operator in Germany following fluids systems tests on a previously drilled well which achieved excellent production results after using a customized Newpark formulation to drill the reservoir.

The major difference between the performance of Newpark's CleanDrill™ Reservoir Drill-In Fluid (RDF) and the competitor RDF were test results which showed excellent reservoir flow properties immediately. These results were reproduced in a non-producing well, where CleanDrill™ was used to drill a side-track where the well began producing oil immediately after displacing to brine.

CHALLENGE

Newpark was challenged to develop a low-density, monovalent brine based, reservoir-friendly drill-in fluid for the 4th & 5th intervals of the well, capable of achieving the following requirements:

- Excellent temperature stability at 150 °C (302 °F) for at least four days
- Improved resistance against solids contamination
- Remain stable for four days at high Bottomhole Static Temperatures (BHST) up to 165 °C (329 °F)
- Providing the required API fluid loss control and rheological profile
- Composed of non-damaging formation products
- Superior reservoir protection characteristics (Regain Permeability of 96.7%)

NEWPARK FLUIDS SYSTEMS

Case History

SOLUTION

Newpark specialists developed a customized CleanDrill™ RDF formulation for the high BHST expected of 165 °C. The formulation was designed and tested extensively at Newpark Fluids Systems Rome laboratory, as well as at the customer's facilities, and at Freiberg University in Germany. The customized RDF exhibited the following parameters:

- Excellent temperature stability at 165 °C for at least four days
- Improved resistance against solids contamination while still providing the required API fluid loss control and rheological regime
- Superior reservoir protection characteristics with a return permeability of 96.7 %

The tests in the Newpark laboratory were able to maintain stable properties for 10 days at 160 °C (320 °F) before the filtrate and rheology degraded.

RESULTS

Due to an ongoing exchange of reservoir water and drill in fluid the pH dropped constantly.

Liquid Caustic Soda (25 % in IBC) was added to the mud to keep the pH continuously in range.

While circulating at bottom, samples were taken to measure the influence of incoming reservoir water. Except for the decreased pH, no influx was observed.

The CleanDrill RDF again showed excellent temperature and property stability while drilling the well to TD.

As the temperature did not exceed 152 °C (305.6 °F) the system performed exactly as planned, the rheology and fluid loss remained stable while drilling the section.

The technology met the expectations for the section, performing as planned.

Results AHR @ 150 °C for 48 h

Rheology @ 120 °F	F1	F1 Evomod
pH	9.7	9.7
600 rpm	73	60
300 rpm	56	45
200 rpm	47	38
100 rpm	34	26
6 rpm	7	4
3 rpm	5	3
Gels 10"/10' (lbs/100 ft^2)	4/5	4/4
PV (cPs)	17	15
YP (lbs/100 ft^2)	39	30
API (ml)	2.5	2.5
PPT* T=250°F, ΔP=500psi Spurt loss(ml) V tot (ml)	2.5 20.5	4.0 17.0

Results ASA @ 150 °C for 48 h

Rheology @ 120 °F	F1	F1 Evomod
pH	9.8	9.7
600 rpm	31	47
300 rpm	20	33
200 rpm	15	26
100 rpm	9	16
6 rpm	1	2
3 rpm	0	2
Gels 10"/10' (lbs/100 ft^2)	1/1	2/3
PV (cPs)	11	14
YP (lbs/100 ft^2)	9	19
API (ml)	4.5	3.5
PPT* T=250°F, ΔP=500psi Spurt loss(ml) V tot (ml)	-/-	3.0 24

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