TECH REPORT

OFFSHORE NORWAY
NORTH SEA

Well type	Oil producer
Borehole size	9.5 in [24.1 cm]
Pressure	5,500 to 6,500 psi [37.9 to 44.8 MPa]
Length drilled	4,791 ft [1,460 m]
Bottomhole temperature	270 degF [132 degC]
Mud-weight density requirement	12 to 12.5 lbm/galUS [1,438 to 1,498 kg/m^3]

Background

Because of the estimated density requisite, filtercake cleanup was a major concern for an operator planning to drill and complete a horizontal well in the Norwegian sector of the North Sea. M-I SWACO recommended the PRIMO-FAZE* low-oil/water-ratio reversible nonaqueous reservoir drill-in fluid (RDF) system and the PRIMO-MUL* low-oil/water-ratio RDF emulsifier. The drilling fluid system performance exceeded overall KPI expectations set by the operator.

Technologies

- PRIMO-FAZE low-oil/water-ratio reversible nonaqueous RDF system
- PRIMO-MUL low-oil/water-ratio RDF emulsifier

M-I SWACO
A Schlumberger Company

PRIMO-FAZE Nonaqueous RDF System Solves Filtercake Cleanup Concerns, Offshore Norway

Reversible reservoir drill-in fluid system functions as oil-base drilling fluid with cleanup capabilities of a water-base fluid in horizontal well

Properties†	Initial (After Mixing)	While Drilling (Average Values)	At TD
Mud weight, lbm/galUS	12.0	12.0	12.0
Viscometer reading, cP			
600 rpm	111	147	139
300 rpm	66	92	86
200 rpm	49	71	67
100 rpm	31	46	44
6 rpm	8	13	13
3 rpm	6.5	11	11
Plastic viscosity, cP	45	56	53
Gel strength, lbf/100 ft^2			
10 s	7	11	11
10 min	7	11	12
Yield point, lbf/100 ft^2	21	38	33
3-h HPHT fluid loss, mL	2.4	1.8	1.8
Electrical stability, V	663	792	1,150
Reversibility, mL	5	10	10
Oil/water ratio	50:50	50:50	50:50
Filtercake, mm	1	1	1

† Properties measured at 120 degF [49 degC].

The PRIMO-FAZE system was designed and modeled for drilling the well with a mud weight range between 11.5 and 12.5 lbm/galUS [1,378 and 1,498 kg/m^3] depending on formation pressures. M-I SWACO performed extensive tests simulating drilling conditions, including filtercake cleanup tests, and confirmed the ease of cleanup with the system while ensuring minimal reservoir damage.

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