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CASE HISTORY BRIEF 2013 • 03S

Newpark's New X-Prima Was Successfully Used to Combat Severe Losses in Deep Water Pre-Salt Exploratory Well in Brazil



Petrobras has drilled in the Florim field (Well 1-RJS-704) in Santos Basin reaching goal overcoming salt formation and lost circulation zones

Challenge

Florim is located at a water depth of 2,009 meters, 206 km off the coast of the Rio de Janeiro state. The main objective is the Microbial Calcium Carbonate reservoir bellow the salts where was predicted lost circulation. The program was to drill the well in five intervals until 6004m, where the salt interval was drilled with 12 1/4" PDC bit enlarging to 14 3/4" touching the top of reservoir before to stop and set casing. The reservoir interval was drilled with 8 1/2" PDC bit. For both Intervals was utilized Paraffin SBM. The biggest challenge is the salt creeping and lost circulation into the reservoir. Both things could occur in the salt interval in case reaching the top of the reservoir with high mud weight.

Recommendation/Plan

Due severe loss be expected in the calcium carbonate reservoir, high amount of LCM material was kept on the rig. Was programmed keep available 200 bbl of Calcium Carbonate (fine and medium) pill in the slug pit. In case of no success, a squeeze operation would be held. Was suggested to use New X-Prima combined with Newbridge as second option to severe losses where an amount for two pills would be available on the rig. The last option was to pump Cement. A bath mix was sent to prepare the pills.

Execution

At 5470m was observed loss of 190 bbl/h when Drilling 8 1/2" interval with 5-12klb, 140rpm / 4-9klb.ft / 250 gpm (bit) + 500 (booster). A Flow check was performed and verified loss of 100 bbl/h in static. Was decided to build a 60 bbl of New X-Prima in bath mix with the formulation bellow:

Material	Concentration, ppb
Spike NaCl Brine	-
New X-Prima	110,3
New Bridge	6

Pill formulation programmed

Procedure:

- Pump 60 bbl of pill with cement unit and displace with SBM through PBL valve

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placing the pill in the annulus.
- Pull two sections (positioning the drill string above the New X-Prima pill theoretical top) and close BOP.
- Squeeze pill through Drill string into formation, monitoring pressures. Hesitations when pressure achieved 400 psi: 8,5 bbl / 0,8 bpm / 450 psi (Dropped to 260 psi in 1,5 h) ; 2,5 bbl / 0,5 bpm / 400 psi (Dropped to 250 psi in 1,5 h) ; 3,3 bbl / 0,5 bpm / 420 psi (Dropped to 390 psi in 2,0 h); kept pressure in last 15 min in 390 psi.

Results

Well	1-RJS-704
OH Diameter	8 1/2"
Water Depth (m)	2040
MD (m)	5470
TVD (m)	5470
Litology	Microbial Calcium Carbonate
Formation Characteristics	Vugs
PP (ppg)	9,86
FLUID	Paraffin SBM
MW (ppg)	10,1
Over Balance PSI	223,176
Pill Volume (bbl)	60
Before bbl/h (static)	50 -100
Before bbl/h (Dynamic)	190
After bbl/h (static)	0
After bbl/h (Dynamic)	0

Summary/Operator Benefits

Calcium carbonate formation bellow the salt has been a big challenge in pre-salt wells. Great vugular pores has been encountered where several losses has experienced. Thousands of barrils has been lost into this formation. A huge volume of fluid has been lost and time to combat has been expended in pre-salt wells, generating a higher time to finish the interval. The success of the New X-Prima pill decreased the volume of SBM lost to formation, reduced the time and material spent to combat losses with LCM and cement plugs.

The New X-Prima had its efficiency proved in the Petrobras pre-salt wells for the loss level presented and nowadays has been adopted as the main LCM product independently of the service company that provide fluids material and services.