Rhino XS2 Reamer Enlarges Seven Horizontal Sections in Horizontal Deepwater Wells

BHA that included Rhino XS2 and roller reamer expands an average of 1,100 m per section with 18-m/h ROP, offshore Brazil

**CHALLENGE**
- Underream while drilling an 8½-in × 9½-in horizontal section to facilitate running gravel-pack sand screens, tripping in and out, and equivalent-circulating-density (ECD) management.
- Provide underreamer deactivation at final enlargement section depth.

**SOLUTION**
Run a Rhino XS2* full-cycle expandable reamer and a roller reamer to increase wellbore quality while enlarging the hole.

**RESULTS**
- Successfully underreamed seven horizontal sections in seven runs.
- Enlarged an average of 1,100 m with no failures.
- Circulated four bottom-up cycles with successful tool deactivation in all runs.
- Achieved average ROP of 18 m/h.

**Enlarge horizontal sections in wellbore with complex stability issues**
While drilling in deep water offshore Brazil, an operator had encountered wellbore stability issues in its horizontal wells. In one instance, the BHA became stuck in a tight hole and had to be cemented in. The operator wanted to overcome these problems by enlarging the horizontal section from 8½ in to 9½ in to allow more clearance when tripping the BHA in and out of hole. Enlarging the section would also allow tripping and running gravel-pack sand screens in the 8½-in parent hole open lengths from 1,000 m to 1,400 m. Additionally, increasing annular clearances would improve ECD management.

**Deploy Rhino XS2 reamer in customized BHA**
The operator requested a tool that allows deactivation to prevent formation damage, to deter the creation of ledges and washouts, and to improve hole cleaning. Schlumberger recommended running a BHA that included the Rhino XS2 reamer, a hydraulically expandable reamer that permits one activation and one deactivation through a ball-drop method. This was the first time that the Rhino XS2 reamer was used in South America.

The Schlumberger team used the i-DRILL* engineered drilling system design to evaluate different drilling mechanics issues and design a customized BHA, which included a roller reamer placed below the Rhino XS2 reamer. This configuration would avoid stick/slip and reduce surface speed as well as shock and vibration. i-DRILL system simulations showed that adding a roller reamer instead of an 8½-in stabilizer below the Rhino XS2 reamer would help reduce stick/slip levels by 24%.

**Enlarged an average of 1,100 m with no failures**
While deactivated after enlarging all the horizontal sections an average of 1,100 m per run, the three bottom-up cycles were achieved in open hole, and one bottom-up cycle was achieved inside the 9½-in casing. The average ROP of the seven total runs was 18 m/h. In all, seven hole enlargements were completed in seven runs with a 100% success rate, and the cutter blocks arrived at surface with little wear.

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