Repsol Minimizes Drilling-Related Problems and Improves Efficiency by Applying Automated MPD

@balance services eliminate NPT related to wellbore instability, hole cleaning, differential sticking, and severe mud losses in remote jungle well, Peru

**Challenge**

Overcome challenges associated with drilling a long, deviated reservoir section in a highly mechanically unstable interbedded formation with high probability of differential sticking, mud losses, and intersecting natural fractures.

**Solution**

- Use managed pressure and underbalanced drilling services.
- Engage @balance Control* managed pressure drilling (MPD) system to minimize pressure variations in the open hole and maintain an equivalent circulating density (ECD) high enough to keep the wellbore stable yet low enough to prevent differential sticking and mud losses.

**Results**

- Showed no signs of wellbore instability or differential sticking.
- Rigged up MPD system in remote jungle location in less than 15 hours.
- Achieved excellent wellbore condition for effective running of 7-in liner.

Repsol used @balance services to drill three production sections in two wells in the same location. Additionally, managed pressure cementing (MPC) was used in the intermediate casing and production liner in the last well.

**Mitigated risk of wellbore instability, fluid losses, and differential sticking**

The MPD strategy was based on a geomechanical model and on past experience from offset wells. In the planning phase, comprehensive hydraulic simulations were performed with VIRTUAL HYDRAULICS* drilling fluid simulation software and Drillbench* dynamic drilling simulation software to predict the pressure profile along the wellbore in different operational phases, such as drilling, tripping in and out, and performing mud rollovers. The impact of parameter variations—including mud density, rheology, ROP, pipe rpm, bottomhole temperature, and bottomhole assembly design on the pressure profile—was studied to design the MPD strategy and make recommendations, mitigating risk throughout the job. The MPD strategy evolved from well to well based on lessons to optimize the MPD strategy for drilling the challenging production section in Sagari field.
CASE STUDY: Repsol minimizes drilling-related problems, improves efficiency by applying automated MPD, Peru

Actual MPD Operating Window, Sagari 7D-ST1, 8½-in MPD Hole Section
10,010- to 12,700-ft MD

Equivalent mud weight, lbm/galUS

9¾-in casing window (10,010-ft MD; 7,350-ft TVD)

Mud motor and TeleScope* high-speed telemetry-while-drilling service
to drill casing window (no APWD data)

PowerDrive* RSS, TeleScope high-speed telemetry-while-drilling service,
and NeoScope* sourceless formation evaluation-while-drilling service
to drill well to TD

Last 40 ft drilled with conventional BHA (no APWD data)

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