Managed Pressure Drilling Reaches TD in Record-Setting HPHT Well, Saves $7.5 Million in Rig Time and Costs

Objectives

• Safely drill an 8 1/2-in. section to total depth (TD) within a narrow 0.4-lb/gal (0.05 kg/L) drilling window under the most extreme pressure and temperature conditions ever encountered in a Norwegian well.
• Maintain an overbalanced wellbore and control wellbore breathing events by evaluating pore pressure and detecting kicks in the challenging HPHT well.

Results

• Weatherford and the operator established a project team 4 months before the spud date.
• The team integrated procedures and established guidelines for the use of managed pressure drilling (MPD) and conventional equipment, and then rig and MPD personnel attended several workshops and HPHT training sessions.
• Two rig surveys determined the placement of the MPD equipment and the modifications required to provide the space needed for the rotating control device (RCD) between the annular blowout preventer (BOP) and the diverter.
• Weatherford deployed an MPD equipment package, including a Microflux MPD manifold unit with computer-controlled chokes, Coriolis flow meters, and an intelligent control unit. In addition, the team connected a passive, self-lubricating, large-bore 7875 Marine Series RCD to the annular BOP. Both hard and flexible piping connected the MPD equipment to the RCD.
• Drilling began, and the MPD equipment detected a small influx when the gas level increased by 10 percent at 18,248 ft (5,562 m).

The Microflux® control system accurately detects and effectively manages minute influxes to enhance efficiency and minimize risks.

LOCATION
Norway

WELL TYPE
Offshore, exploratory, HPHT

CASING SIZE
10-3/4 in.

PRODUCTION HOLE SIZE
8-1/2 in. (216 mm)

TOTAL DEPTH
19,465 ft (5,933 m)

PRODUCTS/SERVICES
• Secure Drilling services
• Microflux control system
• Rotating control device
Results (continued)

- Personnel stopped drilling, confirmed an underbalanced state using the MPD choke, increased the mud weight from 17.5 to 18.6 lb/gal, and verified formation integrity. The entire sequence took 40 hours, which is significantly less than the 5 to 6 days it might have taken using conventional equipment.

- After resolving the influx, personnel applied surface backpressure on connection to reduce wellbore breathing and the time to circulate the gas out of the hole.

- Using MPD equipment and techniques, the operator reached TD at 19,463 ft (5,932 m) 8 to 10 days sooner than in offset wells that had required intermediate liners.

Value to Client

- Using the automated MPD system enabled the operator to mitigate hazards and safely drill the entire 8 1/2-in. section to TD within a narrow pressure window.

- The system saved an estimated 10 rig days valued at $7.5 million, while reducing risk and enhancing safety. Controlling gas influxes and precisely weighting up the mud system saved half of those days when compared to a conventional system.

The decision tree above guided engineers to choose between conventional well control or MPD methods in an extreme HPHT offshore well in Norway.