

7-in. Wired PBL® Sets World Record Activation and Deactivation Depth with Aker BP, Norway



Challenge

Drilling in the Norwegian North Sea, Aker BP anticipated mud losses while drilling an ERD well in Block 25. To prepare for this, a wired 7-in. PBL® was considered as a contingency option to bypass the BHA and pump LCM if losses occurred. Given the challenging well trajectory and long step-out (potentially reaching 8,000m MD), the operator required total confidence that the activation and deactivation balls would reliably reach the PBL® tool, despite limited flow rates and uncertainty around the fluid system's lifting capacity.

Solution

1.x Activation Ball: DSI engineers calculated that at a flow rate of 150 LPM, the forces acting on the 1 3/4-in. activation ball would be in equilibrium, so any flow rate above that would lift the ball and allow it to travel through the 5 7/8-in. drillpipe using 1.15 SG mud to reach the PBL®.

2.x Deactivation Balls: using the same methodology, DSI engineers calculated that the two 1 3/8-in. balls, with a higher density compared to the activation balls at 64ppg, would require a higher minimum flow rate (256 LPM) to travel within the 5 7/8-in. drillpipe to reach the PBL.

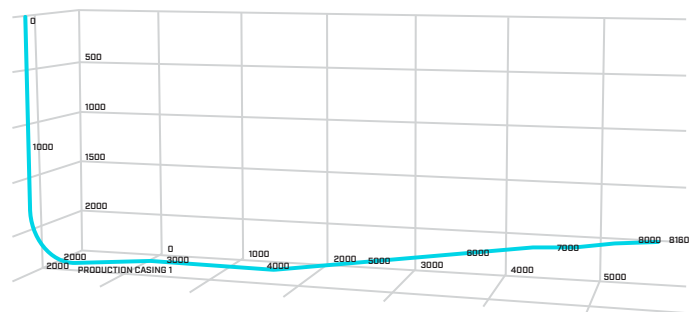
Since the available flow rate exceeded the minimum calculated requirement, the 7-in. wired PBL® tool was included in the BHA. The tool was positioned 176m behind the bit, below the jar and HWDP.

LCM Properties Benchmark: For added assurance, DSI shared operational experience and evidence from recent applications in Brazil, where the same type of LCM was successfully pumped through the PBL® ports, progressively reducing mud losses from 1,000 bbl/hr to zero.

Execution

At a depth of 8,160m, total losses were reported while circulating, prompting the decision to activate the 7-in. wired PBL® and pump an LCM pill to mitigate the issue. The drillpipe connection was broken at surface, and a 1 3/4-in. activation ball was inserted and pumped down at 750 LPM. After being pumped down, the ball successfully seated, confirmed by a drop in standpipe pressure (SPP). A 20 m3 LCM pill was then pumped and displaced through the PBL® ports, fully bypassing the BHA below.

Following the treatment, the connection was broken again, and two 1 3/8-in. deactivation balls were inserted in sequence, with a short time gap between each. Flow rate was then gradually increased to 1,550 LPM, exceeding the minimum required for the balls to reach the tool. As the balls landed and sealed the PBL® ports, pressure built up to 250 bar, causing the activation ball to shear through its seat and close the PBL®, with all flow redirected to the BHA.



Final ERD Well Trajectory: PBL® at 7,964M MD

Conclusion

The DSI team, in close collaboration with our partners at TFS in Norway, used engineering analysis and proven principles to demonstrate that the activation and deactivation balls would successfully reach the tool, even with the challenging ERD trajectory. This gave the operator the confidence to include the 7-in. wired PBL in the BHA and rely on it when needed.

