Integrated P&A BHA Expands Window Length and Milling Speed Capabilities, North Sea

ProMILL trip-saving milling and underreaming system helps save operator 7.5 rig days and USD 1 million as part of an ongoing abandonment operation

CHALLENGE

- Efficiently section mill two windows longer than 100 ft [31 m] and then underream the open hole to enable placing an abandonment cement plug.

SOLUTION

- Deploy the ProMILL* trip-saving milling and underreaming system with the WavEdge* ridged milling element; efficiently manage cuttings removal using the WELL COMMANDER* ball-activated drilling circulating valve from M-I SWACO, a Schlumberger company.

RESULTS

- Displaced and conditioned well.
- Milled and underreamed 100-ft and 109-ft sections, completing each window in a single run.
- Achieved an ROP of 4.2 ft/h [1.3 m/h], a 40% increase compared with the field average of 3 ft/h [0.9 m/h].
- Contributed to P&A operation savings of 7.5 rig days and USD 1 million.

Efficiently mill and underream multiple sections in offshore well

An operator was planning a P&A operation in the UK sector of the North Sea. Its objective was section milling two windows of approximately 100 ft in the 13¾-in casing—the first across the Frigg Formation and the second across the Utsira Formation. Each openhole section would then need to be underreamed—in a single trip—to enable placing a rock-to-rock abandonment cement plug against the original formation.

Use integrated, single-run solution to achieve objectives

Schlumberger collaborated with the operator on an integrated solution that would meet the P&A objectives while helping to decrease the cost and regulatory concerns inherent to well decommissioning. The solution included a hybrid ProMILL system cutting structure the WavEdge element inserts used in combination with conventional inserts to enhance cutter durability and improve swarf quality. Additionally, the WELL COMMANDER valve was run to boost circulation by removing cuttings at high flow rates, which eliminated a dedicated trip for conditioning the wellbore fluids for the milling program.

The ProMILL system would eradicate all potential leak paths from the abandonment barrier which is not possible to ensure when using perf-and-squeeze methods.

Saved 7.5 days and USD 1 million across P&A operation

The integrated P&A solution effectively displaced and conditioned the well as required. In the first window, across the Frigg Formation, the operator milled and underreamed a record-breaking 109 ft of 13¾-in casing in one trip using performance inserts. In the second window, across the Utsira Formation, conventional inserts milled and underreamed 100 ft of 13¾-in casing in 27.25 h, achieving the operator’s fastest milling time in the formation.

During milling, the operator achieved an ROP of 4.2 ft/h, representing a 40% increase compared with 3 ft/h, the average ROP of the operator’s jobs completed in the field. In this well, the operator recorded an overall cost reduction of 7.5 days and USD 1 million—the ProMILL system’s efficacy played an integral role in this achievement. Using the ProMILL system in this well continued the operator’s string of zero HSE events during abandonment in three previous wells.

The ProMILL system saved an operator multiple trips in a North Sea decommissioning project.

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