

Successful Section Milling Achieves Rock-to-Rock Barriers in Challenging Qatar Offshore Wells

Delivered multiple rock-to-rock windows in 13⁵/₈ inch casing across two wells as part of a plug and abandon (P&A) operation.

Regulatory requirements created a challenging offshore operation.

As part of the regulatory requirements for holistic well abandonment, the customer in Qatar needed to isolate the cap rocks along the 13⁵/₈ inch casing on two offshore wells.

Challenges included the presence of two centralizers per joint of the casing and a very poor cement bond across the cap rock depth. In one well, the customer perforated the 13⁵/₈ inch casing and squeezed cement but was unable to achieve zonal isolation, necessitating the section milling of a 45 ft perforated interval. Additionally, the second window in the same well required milling part of the 13⁵/₈ inch casing inside an 18⁵/₈ inch casing, with the objective of maintaining the integrity of the 18⁵/₈ inch outer casing while milling the 13⁵/₈ inch casing.

Wellbore Integrity Solutions (WIS) proposed using the 11700 K-Mill, assembled with high-performance WavEdge* inserts, to mill across the perforated casing and centralizers, providing rock-to-rock zonal isolation of the cap rocks.

Planning and execution of the operation.

Detailed planning of the section milling operations included the design and opening sweep of the section mill knives, Bottom Hole Assembly (BHA) configuration, and hydraulic analysis optimization. During the execution phase, WIS' experienced personnel focused on implementing the planned downhole milling parameters.

The perforated casing section was successfully milled in one trip. The flush knife design effectively milled the 13⁵/₈ inch casing inside the 18⁵/₈ inch outer casing, maintaining its integrity to be used as a barrier.

Constant monitoring of hole cleaning trends, swarf recovery percentages, and effective communication ensured efficient section milling of multiple cap rock windows across the 13⁵/₈ inch casing in both wells. The successful section milling operation allowed the client to establish rock-to-rock barriers at the desired depth, meeting regulatory requirements for plug and abandonment.



CHALLENGE

- Section mill 13.625 inch, 88.2 ppf, L-80 casing with poor cement
- Casing joints with two centralizers
- Section mill across perforations
- Casing inside casing configuration
- Place rock-to-rock permanent abandonment barriers across the cap rocks

SOLUTION

- To use 11700 K-Mill assembled with WavEdge insert technology
- Customized section mill knife design to mill casing inside casing interval

RESULTS

- WavEdge inserts dressed on the 11700 K-Mill knives delivered excellent results while section milling the 13⁵/₈ inch casing.
- Multiple centralizers and couplings milled.
- 45 ft section of section milled across perforations in a single trip
- 110 ft rock-to-rock barriers delivered across two wells
- Excellent swarf recovery at surface
- Swarf recovery operations executed in a safe manner



*Mark of Wellbore Integrity Solutions. Other company, product, and service names are the properties of their respective owners. Copyright © 2024 Wellbore Integrity Solutions. All rights reserved. WIS-PB-MKT-249_rev1