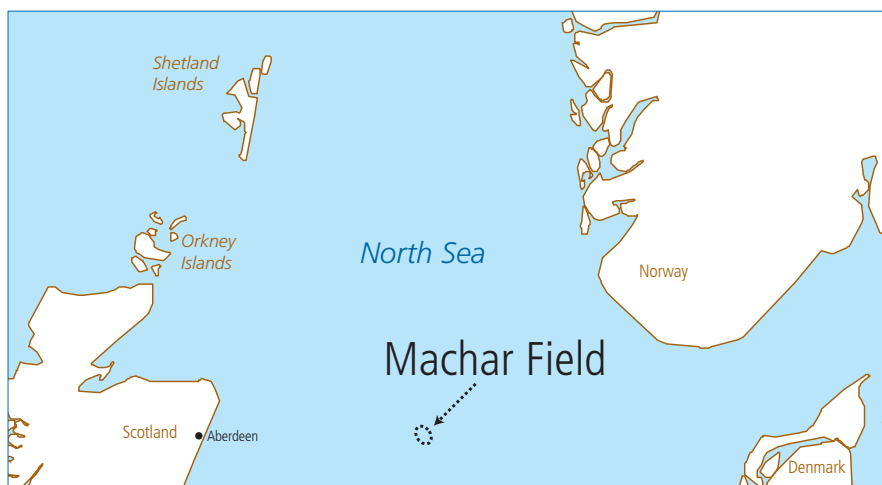




Packers Plus and Schlumberger successfully complete the world's first subsea StageFRAC multi-stage stimulation in the North Sea



Background

The Eastern Area Trough Project (ETAP) is a network of nine oil and gas fields in the central North Sea that has been in development since the late 1990s. The Machar oil accumulation was one of seven fields in the initial development of this area situated 240 km east of Aberdeen, Scotland. The target formation is at a depth of 1,250 to 2,800 m with a water depth of 85 m and is produced through a subsea manifold tied back to the Central Processing Facility.

The Machar is a naturally fractured chalk reservoir with low matrix permeability requiring stimulation for economic production. Historically, wells were cased and cemented with limited entry perforation clusters at each natural fracture location and then stimulated with large acid treatments using ball sealer diversion.

The Challenge

A sidetrack of a Machar well presented a number of unique challenges for the Operator. Because the density of natural fractures could not be determined prior to drilling, the Operator wanted to segment the lateral into isolated sections to allow for sequential, high-rate acid stimulations. They were also concerned about potential water encroachment near the heel of the well, so they were looking for future shut-off capabilities.

The Solution

A 7-stage open hole StageFRAC* multi-stage fracturing system was chosen because it provided focused fracturing, allowed production contribution from the matrix and eliminated the cost and risk of cementing and perforating.

The system design included 14 RockSEAL® II packers separating each stage with two packers to target acid treatment to a limited interval by creating blanked sections in between the stimulation stages. Drillable

Closeable FracPORT™ sleeves (DCFP) were run to allow for future water shut-off capability. The DCFP can be closed and reopened with or without the ball seat in place.

Schlumberger provided stimulation products including mud and silt remover (MSR*) to create connections in the four zones with strong natural fracture networks and viscoelastic diverting acid (VDA*) to create additional fractures in the three zones with low amounts of natural fractures.

The Results

The StageFRAC installation and subsequent stimulation treatment were performed for the first time from a semi-submersible rig, the latter via Schlumberger's BIGORANGE* XVIII stimulation vessel.

Due to the expertise provided by the Packers Plus and Schlumberger personnel, the operation went very smoothly and was completed 11 days ahead of schedule compared to the previous "plug and perf" operations. The service quality prior to and during the job was reflected in the written positive feedback received from the Operator.

The application of StageFRAC allowed the Operator to eliminate coiled tubing, perforating and cementing in the reservoir section which saved the Operator time and reduced risk to personnel.

Not only were time and cost savings realized through the completion and stimulation operations, but the well came in significantly higher than expected, prompting the Operator to consider more open hole StageFRAC completions in the Machar and other offshore fields.

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