

STAR SHIELD® Enables Higher Mud Weights in the Resthaven Field in Canada Allowing the Operator to Extend the Intermediate Casing Point

North America

CHALLENGE:

- ▶ Mechanically weak coal seam and shale formations
- ▶ Offset wells verified extensive induced mud losses
- ▶ Low fracture gradients across multiple formation

SOLUTION:

- ▶ STAR SHIELD pre-treated and maintained in an invert fluid at 25kg/m³ (8 lb/bbl)
- ▶ Deepening the intermediate casing point, allowing operator to drill horizontal section with brine fluid
- ▶ FIT successfully performed, allowing for increased mud weight without causing induced mud losses

RESULT:

- ▶ Enabled higher mud weights
- ▶ Prevented whole mud losses in Belly River and Edmonton formations
- ▶ Minimized wellbore instability issues through Notikewin and Falher Coals
- ▶ Reduced drilling time by allowing the operator to drill horizontal section with brine-based mud
- ▶ Cemented casing on the bottom with full returns



OVERVIEW

The Belly River and Edmonton formations in the Resthaven Field are plagued with mechanical wellbore instability, that can result in lost circulation events. In offset well data, the fracture gradient of the Belly River and Edmonton formations was low, and thus a challenge to drill because higher mud weights were needed to prevent gas influx and hole instability. In this case, the challenge for the operator was drilling through the Notikewin and Falher coal and shale formations. Previously, operators implemented shallow intermediate casing strings to protect these formations from the higher mud weights needed to maintain wellbore stability. In addition to deepening the intermediate casing point, the operator wanted to displace from an invert-based mud system in the horizontal sections, which have led to lower penetration rates and multiple bit trips in the past.

SOLUTION

Impact Fluid Solutions recommended pre-treating an invert-based mud system with 25 kg/m³ (8 lb/bbl) of STAR SHIELD before displacing the sodium silicate mud at 2,107 m (6912-ft.). Solids control equipment was equipped with API 70 mesh screens before displacing the mud to prevent discarding of the additive. Maintenance additions of STAR SHIELD were added to the circulating system while drilling ahead to the top of the Doe Creek formation (2,554 m, 8,380-ft.). An open-hole formation integrity test (FIT) was performed at 2,201 m to an equivalent mud weight (EMW) of 1,600 kg/m³ (13.4 lb/gal) across the Belly River Formation to determine if the wellbore shielding additive provided sufficient stability to drill the Notikewin and Fahler formations while preventing catastrophic mud losses in the upper hole section. In this field, the operator typically drills with 1200-1250 kg/m³ (10-10.5 lb.gal) EMW. However, upon completing a successful FIT, the 251 mm (9 7/8-in.) hole was drilled through the Notikewin and Falher formations to landing point with a 1,555 kg/m³ (13 lb/gal) mud weight without inducing mud losses or hole instability issues.

RESULT

The operator was able to deepen the intermediate casing point through the Notikewin and Fahler formations without experiencing induced mud losses -- with an EMW of 300 kg/m³ (2.5 lb/gal) over the typical mud weight. The operator successfully cemented the casing on bottom with full returns and was able to displace to a brine-based fluid system. The horizontal section of these wells was drilled successfully, increasing the rate of penetration (ROP) and reducing the overall bit trips in this interval. Finally, hole instability issues in these formations were minimized.