Isolate Water Zone in Extreme Dogleg Through Window Without Whipstock

Location: North America

CHALLENGE – A customer in North America drilled a horizontal well. The horizontal section exposed the well to a 70 ft water bearing interval in the heel. A zonal isolation method capable of entering a window without a whipstock and navigating high severity doglegs was needed for water shut off.

The chosen long term isolation solution also needed to allow future production from the vertical section below the window.

Challenge Summary
- Run completion through window where there is no whipstock
- Run completion through severe doglegs up to 49° / 100 ft
- Isolate the water zone in the heel
- Allow for easy shut off of horizontal lateral and allow production from the vertical section below the window

SOLUTION – Halliburton proposed using two each, 2 7/8-in. × 5.3-in. × 3-m Swellpacker® systems to provide isolation for the horizontal section. The use of 2 7/8-in. basepipe instead of 3 1/2-in. allowed for a smaller packer OD while maintaining the required differential pressure capability. A whipstock was avoided by using a bent sub with a muleshoe to locate the lateral. A torque and drag simulation was run to observe tubing forces while tripping in the hole. To reduce the buckling effects that were predicted while running through the window, a 3 1/2-in. tubing was used above the 2 7/8-in. bottomhole assembly (BHA). A nipple was run above the bottomhole assembly to be able to plug off and isolate the lateral if desired. The 50 bbl of diesel placed across the packers was used to initiate the swelling process.

Solution Profile
- 2 7/8-in. basepipe was used for the BHA including the 5.3-in. OD packers. The reduced OD of the pipe in the horizontal section allowed for smaller packer OD in the 5 7/8-in. openhole.
- A whipstock was avoided by using a bent sub with a muleshoe to locate the lateral.
- 3 1/2-in. tubing was used above the BHA to avoid buckling effects predicted by the torque and drag simulation.
- A landing nipple profile was placed in the upper end of the completion to allow for future isolation in the lateral section with a plug.
- The Fas Drill® frac plug was used as a reference point to tag at a predetermined location to help locate the lateral. In addition, the frac plug acts as a one-way valve and allows production from the vertical section.

RESULT – The Swellpacker systems entered the window without incident. Tight spots were encountered and worked through at 9,845 ft and 9,892 ft. The completion was successfully run to target depth and spaced out at the desired depth. The well was then turned on, and 17 of the 50 bbl of diesel placed to swell the packers was produced. This is an indication that the packers provided an effective seal against the formation. The well is currently being produced and monitored for reduction in water shutoff.
For more information on Swellpacker® systems, please call your local Halliburton representative or email us at completions@halliburton.com.

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