CASE STUDY

HALLIBURTON

Williston Basin, North Dakota

Operator deploys integrated cemented liner solution for refracturing operations

MatchSet® liner hanger system integrated with wet shoe sub contributes to successful completion of four wells

CHALLENGES

- Operator required a liner solution for a cemented refrac liner run on tubing

SOLUTIONS

MatchSet® conventional liner hanger system

- Set and release cemented hanger system deployed on tubing string
- Modular design not dependent on left-hand rotation to operate
- Pressure test annulus after liner top packer is set
- Polished bore and seal assembly to isolate intermediate casing during fracture stimulation

Wet shoe sub

- Allow controlled over- displacement for interventionless access to first stage

RESULTS

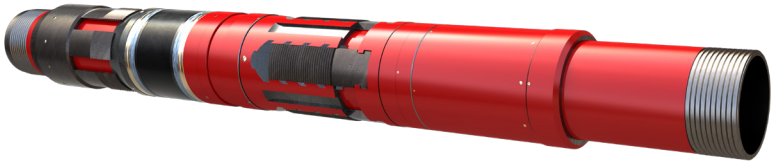
- Successful first installation of the 3.5-in. refrac MatchSet® liner hanger and WSS system for refracturing purposes for the operator

Overview

An operator in North Dakota required 3.5-in. liner installed and cemented inside existing 4.5-in. production liner to prepare for a four-well refracturing and stimulation project. The intermediate casing needed to be isolated from pressure up to 9,500 psi for stimulation. Halliburton recommended the modular MatchSet® liner hanger system for its configurability and conventional liner hanger capabilities.

Challenges

The liner installations, deployed on a service rig with tubing, posed limitations compared to running liner with drillpipe on a drilling rig. Maximizing the ID of the liner results in small annular clearance and potentially higher equivalent circulating densities (ECDs) during cement operations. A short shoe track was necessary to reduce the distance from the current plug back depth to the first stage of the fracture, which increased pay length. All wells exhibited low pressure and were unable to support a full column of fresh water. With unknown fluid levels, activating pressure-operated tools was identified as a challenge.

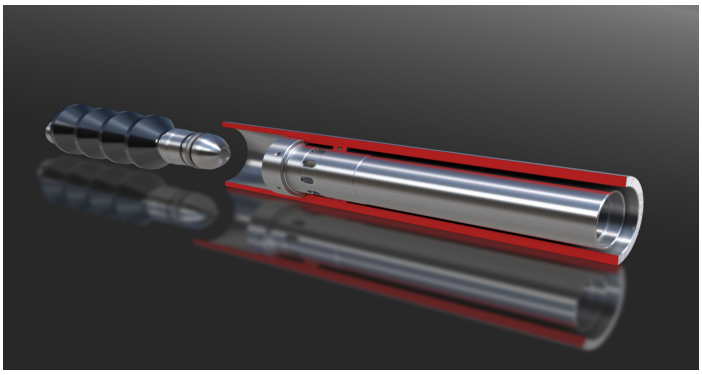


MatchSet® conventional liner hanger system

Solutions

Halliburton developed a new 3.5-in. wet shoe sub (WSS) to create a flow path from inside the newly installed liner, through the bottommost sleeve or perforations in the existing completion, to the formation. The 3.5-in. WSS is a compact 3-in-1 tool with a shearable ball seat used for liner hanger operations, a landing collar for a wiper dart, and a wet shoe feature. All liner hanger equipment operates on differential pressure and maintains a designed sequence of shear events during liner hanger setting operations, even with unknown fluid levels. The compact design enabled maximized pay length through a reduced shoe track length.

The conventional liner hanger system completed all pressure events to set the liner hanger and release the running tool before cement was pumped, which allows elevated pump pressure during cement operations, if necessary. The deployment on a tubing workstring was accommodated using a custom running tool configuration and also provided the capability to isolate the annulus above the liner top from the liner below and pressure test post-circulation of excess cement.



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Wet shoe sub (WSS)

Results

Equipment selection from the compact WSS to the MatchSet liner hanger system enabled installation of a liner system with requested capabilities and verified integrity. Halliburton and the operator worked closely to successfully complete all four wells and equip the operator with liner ready for future stimulation operations.

For more information, contact your local Halliburton representative or visit us on the web at www.halliburton.com

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