

Case study: Natrona County, Wyoming

BRIDGEFORM system eliminated lost circulation and well control issues in horizontal well

An operator working in the Salt Creek field in Natrona County, Wyoming, had concerns about the field's many challenges, including carbon dioxide (CO₂) contamination, water flooding, and highly depleted zones. Previous wells drilled in the field encountered lost circulation, well control problems, excessive torque and drag, differential sticking, and wellbore instability. The operator has previously experienced losses in the vertical sections of up to 800 bbl (92.5 m³).

At 2,500 ft (762 m), the shallow depth of the pay zone frequently led to difficulties maintaining hydrostatic pressure, forcing the operator to use high oil-based mud weights of 12.0 to 18.0 ppg (1.44 to 2.16 sg). All these issues combined to create difficulties drilling and running casing to total depth successfully.

Because the operator anticipated crossing a large natural fault during drilling, which often causes lost circulation and well control issues, it preselected the Baker Hughes **BRIDGEFORM™ single-sack wellbore strengthening system**.

The BRIDGEFORM system improves wellbore stability in microfractured shales and minimizes losses in depleted, fractured, and permeable formations.

The BRIDGEFORM system was applied in the lateral section. Although the operator had expected to see a complete loss of circulation or encounter well control incident, neither event occurred. Using the BRIDGEFORM system, the operator was able to drill the well with little or no fluid losses.

The 11-in. hole was drilled vertically and through the curve to 5,521 ft (1,683 m) measured depth (MD) and 2,615 ft (797 m) true vertical depth (TVD). The 8 5/8-in. casing was run and cemented prior to drilling the lateral. A 7 7/8-in. hole was drilled to 5,521 ft MD and 2,615 ft TVD with a maximum mud weight of 13.6 ppg (1.63 sg). The 2,506 ft (764 m) lateral section was drilled in 4 days, and from spud to total depth, the well was finished in 18 days.

Challenging wells like this one are a good fit for the BRIDGEFORM system. There were no instances of differential sticking, mud losses, or wellbore instability. This was the first horizontal well drilled in this field, which could have caused seepage losses due to greater reservoir contact, differential pressure, and natural fractures. The BRIDGEFORM system performed better than expected and losses were eliminated.

Challenges

- Depleted over-pressurized zones
- Severe CO₂ contamination
- High mud weights at shallow depths
- Well control and lost circulation material issues
- Torque and drag, swabbing, and differential sticking problems that affect the ability to slide and run casing
- The need to drill through natural fractures

Results

- Experienced little to no mud losses
- Eliminated issues with torque and drag
- Avoided overbalancing in depleted zones
- Used water-based mud successfully in this horizontal well