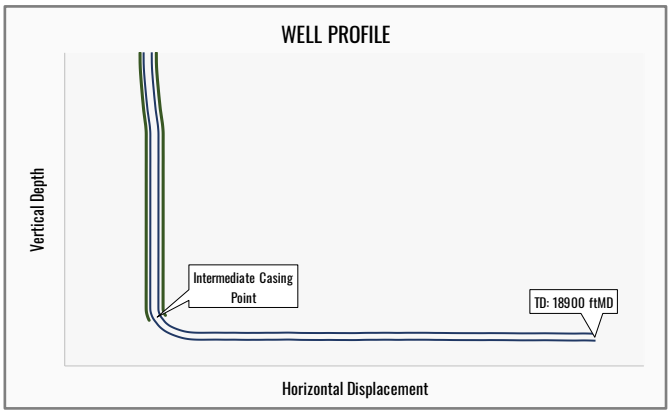
CASE STUDY – MANAGED PRESSURE DRILLING

MPD and Wellbore Strengthening Turns a Negative Drilling Window in a Depleted Field, Extended Reach Infill Lateral into a Success

Challenge

As unconventional plays become more heavily developed with more intensive fracture stimulations, operators face more risk of heterogenous formation properties when new infill wells are drilled.

A pair of new infill laterals were planned for formation with a normally narrow window that mandated the use of managed pressure drilling techniques. While drilling these development wells, a fracture network with an unusually low fracture gradient was encountered outside the heel, however, as the well approached the target TD, virgin reservoir pressure was encountered.



Due to the of the difference in pore pressure at the toe and the fracture gradient at the heel, the well had a negative window of approximately 4400 kPa (630 psi) that resulted in the continuous loss of mud at the heel while taking reservoir gas influxes at the toe.

Solution

Over days, the controlled bleed down of pore pressure through the application of surface applied back pressure and pump rate changes in combination with the addition of fracture size targeted LCM increased the drilling window to 1200 kPa (175 psi).

The calculated use of a full diversion sub to displace an upper portion of the vertical to partially kill the well along with the associated fluid drop from the pipe displacement of a wet trip allowed the operator to kill the well with a 600 kPa (90 psi) trip margin.

Results

Once out of the hole, the operator was able to run a multistage liner assembly to TD and isolate the formation for hand over to completions for hydraulic fracture stimulation.

In total 510 mscf of near wellbore gas was brought to surface without a well control incident or the use of BOPs.