CHALLENGE

Construct a petrophysical and geomechanical model that determines horizontal wellbore stability while reducing drilling costs.

SOLUTION

Use the TuffTRAC* cased hole services tractor to convey a triple-combo toolstring, ECS* elemental capture spectroscopy sonde, and Sonic Scanner* acoustic scanning platform to collect the petrophysical and geomechanical data necessary for constructing a mechanical earth model (MEM).

RESULTS

Used the MEM incorporating the high-resolution 3D geomechanical measurements by the Sonic Scanner platform to identify intervals with potential hole instability that enabled the EXL Petroleum to mitigate drilling risk by employing an appropriate mud weight, repositioning the casing shoe point, and installing a short liner string instead of running an intermediate casing, saving approximately USD 200,000.

CASE STUDY

Geomechanics Assessment of Stability Eliminates Second Casing String to Save USD 200,000

TuffTRAC tractor conveyance of triple-combo, spectroscopy, and acoustic logging tools obtains critical data for Wolfcamp lateral

A need for geomechanical insight

EXL Petroleum wanted to better understand wellbore stability and determine the best mud weight to optimize drilling of its next horizontal well in the Wolfcamp Formation in the Delaware basin. Schlumberger petrotechnical experts proposed constructing a MEM using geomechanical and petrophysical data from two previous wells.

Critical data acquisition on TuffTRAC tractor

Measurements made by the Sonic Scanner acoustic scanning platform supply high-resolution compressional, fast and slow shear, and Stoneley wave slownesses. The resulting 3D dataset supports both basic geomechanical interpretation of homogeneous isotropic material and sophisticated geomechanical interpretation of inhomogeneous anisotropic materials.

To convey the Sonic Scanner platform along with a triple-combo Platform Express* integrated wireline logging tool and ECS sonde to measure complementary petrophysical data in the deviated wells, the TuffTRAC cased hole services tractor was used. The TuffTRAC tractor is the shortest and most efficient tractor in the industry, with active traction control and reverse tractoring capability for superior maneuverability in complex deviated and horizontal cased wells.

Wellbore stability analysis to optimize drilling the horizontal

The full 3D acoustic characterization performed with the Sonic Scanner acoustic scanning platform addressed both intrinsic and drilling-induced anisotropy. With this comprehensive mechanical understanding of the drilling environment, the MEM accurately suggested casing shoe points, appropriate mud weights, and drilling practices to maximize wellbore stability. Because potential instability was flagged for the interval from 10,293 to 10,298 ft at 56° deviation in the Wolfcamp Formation, EXL Petroleum was able to mitigate risk by hanging a short liner string across the interval before finishing drilling. A 5 1⁄2-in casing was then run to total depth to successfully avoid having to run an intermediate 7-in string, resulting in a savings of USD 200,000.

The bidirectional TuffTRAC cased hole services tractor incorporates sensors for monitoring the application of active traction control and tracking the progress of downhole operations.
Logging data from the Sonic Scanner acoustic scanning platform and ECS elemental capture spectroscopy sonde were the basis for mechanical earth modeling that identified a potential zone of wellbore instability. EXL Petroleum used this insight to mitigate drilling risk in a new lateral, which saved USD 200,000 per well by eliminating a casing string.

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