

INVERTRA[†] INVERT EMULSION LUBRICANT PROVIDES LOWER TORQUE & IMPROVES ROP, SAVING OKLAHOMA OPERATOR ESTIMATED \$85,000

CHALLENGE

- Eliminate drilling dysfunction causing directional control issues
- Improve ROP while Sliding and Rotating

SOLUTION

- Introduce EXPL9090 via sweeps to monitor efficacy
- Treat active system to 3% v/v INVERTRA

RESULTS

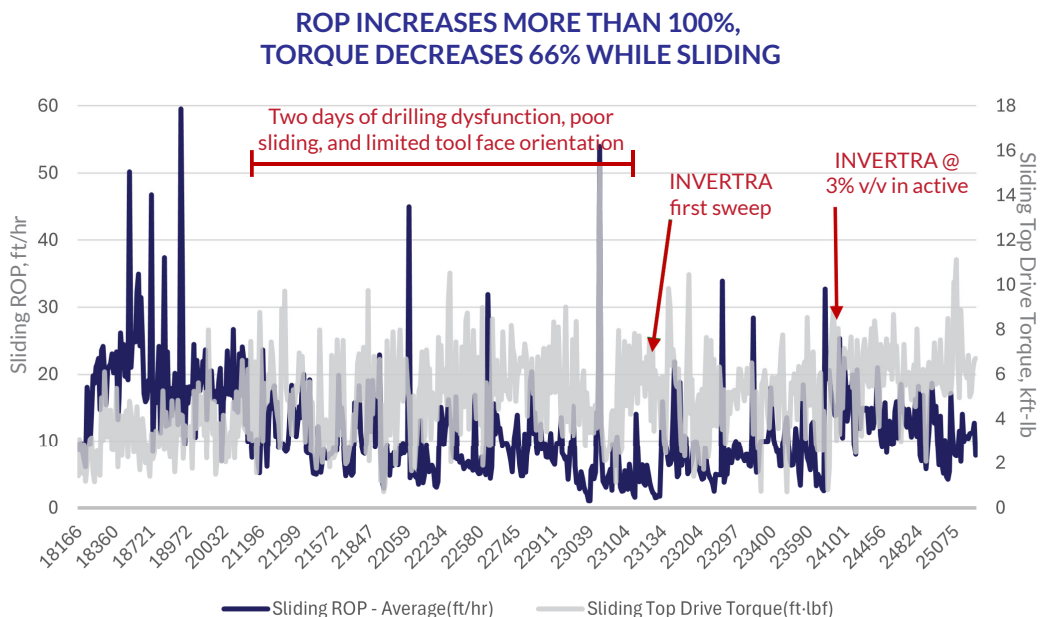
- Torque reduction of 66%.
- Increased ROP while sliding >100%
- Improved directional drilling control
- Improved friction factors during tripping operations

OVERVIEW

An operator in Grady County, Oklahoma was having difficulty with rate of penetration, directional tool face orientation, and sliding with a mud motor while drilling the lateral section of a Woodford target with oil-based mud. This area is notorious for heavy faulting and varying geological stresses – often leading to poor ROP and diminished geo-steering capabilities.

Facing the decision to abandon conventional directional tools for a costly rotary steerable BHA, AES recommended the use of INVERTRA to alleviate the issue. INVERTRA is an invert-emulsion lubricant that contains special additives to increase the film strength of metal-on-metal and metal-on-formation surfaces – providing maximum energy to the bit while minimizing friction.

INVERTRA was first applied in sweeps to test efficacy. Significant improvement in sliding rate of penetration and tool face orientation was apparent via rig sensor output data. The active system was then treated up to 3.0% v/v with INVERTRA. An increase in ROP of 100-150%, torque reduction of 66%, and improved directional drilling control allowed the operator to reach TD as planned. Production liner was run to the bottom without issues and cemented in place.



DETAILS

An operator experienced elevated torque and poor tool face control while drilling the planned 2.75 mile long, 6-3/4" diameter production section with 4-1/2" drill pipe and an 11.2 lb/gal oil-based mud system. At approximately 23,115ft MD / 11,330ft TVD, (10,712 feet into the lateral), a 100 bbl sweep containing 5.0% v/v of INVERTRA lubricant was pumped. Upon exiting the bit during sliding operations, torque reduced from 9000 ft-lb to 3,000 ft-lb. An increase in sliding ROP from 3-4 ft/hr to 8-10 ft/hr was recorded, including an improvement in tool face orientation capability with directional tools. A second sweep consisting of 5% v/v INVERTRA in 100 bbl was pumped with comparable results. The decision was made to increase the concentration of the entire system to 3% v/v. Improved directional control enabled rotational drilling, where increased ROP and reduced torque were realized. At approximately 23,768ft MD / 11,313ft TVD, a decision was made to replace the BHA. A significant reduction in hook load/drag versus a previous trip was confirmed – with friction factors ranging from 0.10-0.18 versus 0.15-0.23 before the lubricant was applied. Overpull instances in excess of 100klbs while tripping dropped by 70%. Once back on bottom, the lateral was drilled to TD of 25,173 ft MD/11,333 ft TVD. The 5-inch liner run was run to bottom on elevators with no delays. No fluid properties were adversely affected by INVERTRA.

Before applying INVERTRA, a change from conventional directional tools to an RSS bottom hole assembly was under consideration, due to continued operational delays from poor drilling performance. Due to improved drilling performance from the application of INVERTRA, the operator avoided this costly change, saving an estimated \$85,000 in associated cost.

