

Faster Well Delivery With Enhanced High-Torque, High Flow Motors

NITROFORCE® 5" AND 7" MOTORS SET HIGHEST ROP RECORD FOR ONE-RUN LATERALS IN WILLISTON BASIN

NORTH AMERICA

CHALLENGE

- » Improve time to drill well and eliminate failure-related trips
- » Drill through complex, interbedded formation intervals
- » Balance side forces, and minimize vibrations while drilling at high-torque, high horsepower

SOLUTION

- » NitroForce® high-torque and high-flow motor (7-in. and 5-in.) – for increased drilling efficiency and optimized performance in tough conditions
- » Charge® HPE elastomers
- » Experienced Halliburton Sperry Drilling team – to make up for limited onsite personnel

RESULT

- » Successfully drilled 18 laterals, 97,607 ft in the basin with zero TFF using the same configuration
- » Reduced well time (by 40% in the fastest curve with 7-in. NitroForce motor)
- » Improved lateral drilling efficiency by 27%, and enabled the laterals to be drilled in single runs with 5-in. NitroForce motor – a new record for the basin
- » Led to additional wells drilled in the Three Forks and Bakken formations using this proven motor/elastomer pairing

OVERVIEW

Operators in the Williston Basin are in constant pursuit to reduce well time and eliminate trips due to equipment failures. The challenging drilling environment and limited personnel experience are contributing factors to the failure mechanisms observed on equipment. A more resilient mud motor was required to deliver consistent well performance in less time. Halliburton's new NitroForce® high-torque and high-flow motor technology was introduced for drilling the intermediate and horizontal hole sections, with a goal to increase efficiency and attain top tier performance.

CHALLENGE

Challenging well designs in this region necessitate premium motors to last under tough drilling conditions. The intermediate drilling sections have many interbedded formation intervals that experience ratty drilling, leading to extra trips for mud motor failure and bit damage. The lateral sections endure downhole temperatures up to 300°F, while holding high differential pressure that contributes to motor trips for failures beyond the predictable downhole hours.

SOLUTION

A powerful mud motor system was paired with a resilient, hard elastomer with high-flow capability and a lower-end transmission system that could endure the high-torque, high horsepower generated. Halliburton recommended 7-in. and 5-in. NitroForce motors to drill the intermediate and production hole sections. The bottomhole assembly (BHA) was modeled to meet the operator's steering objectives and reduce sliding percentage in the horizontal, while balancing side forces across the BHA and identifying the optimum operating window to minimize vibration.



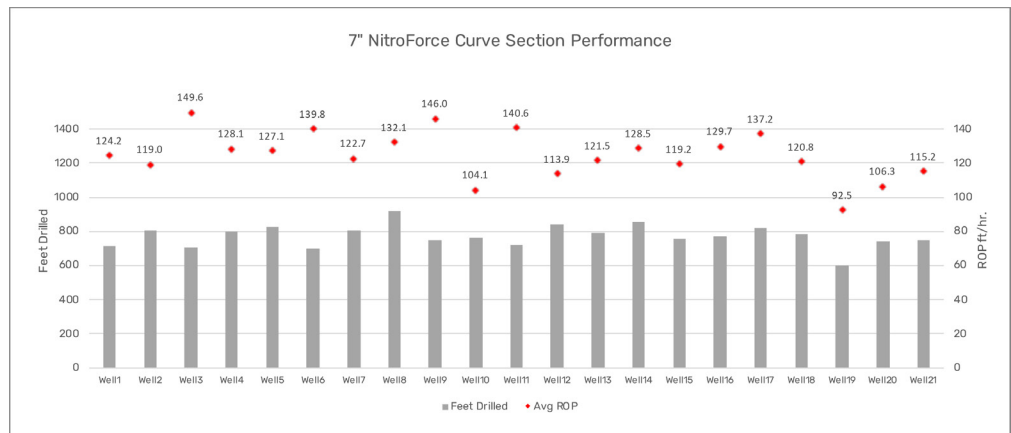
NitroForce high-torque, high-flow motor

RESULT

The new NitroForce bearing assembly used in conjunction with Charge® HPE elastomers provided a custom fit, which delivered exceptional performance. This combined solution continued to repeat the same high performance and outstanding one-run laterals when the operator drilled the ThreeForks and Bakken formations, both located in the Williston Basin.

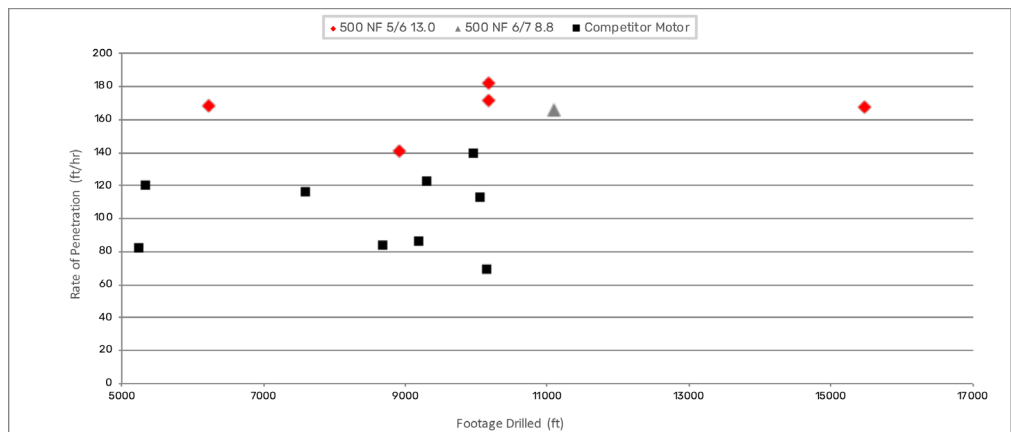
PROJECT HIGHLIGHTS

The 7-in. NitroForce motors drilled 18 lateral runs with zero TFF since April 2021. As a result, the customer was able to deliver wells within AFE time, and less. A total of 97,607 ft has been drilled using this configuration. The fastest curve was drilled in 7 hours, showcasing more than a 40% reduction from planned well time, delivering top quartile performance for the customer in the basin.



Performance data showing high levels of ROP while drilling a curve section with the 7-in. NitroForce motor

The 5-in. NitroForce higher speed motor was ideal for the Middle Bakken with the proprietary 1.0 revs/gal and Charge HPE elastomers delivering up to 1400 psi pressure differential. The slower speed 0.68 revs/gal configuration was ideal in the harder, more abrasive Three Forks delivering up to 1000 psi pressure differential. As lateral lengths extended past three miles, the NitroForce motors kept delivering equally outstanding performance throughout the entire section. This configuration improved lateral drilling efficiency by 27% compared to best competition motors in the lateral.



Performance data showing high levels of ROP while drilling the lateral section with the 5-in. NitroForce motor

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