

## Immediate Torque Reduction of 23% After Installing WWT NRPs in S-Shaped Well.

### High Torque While Drilling Ahead

An operator experienced high torque while drilling. The increasing trend suggested that torque would be above the torsional limit for 5" DP before TD. WWT provided a complimentary well analysis to identify critical areas where frictional torque was occurring.

### NRP Recommendation

WWT Non-Rotating Protectors (NRPs) were recommended to be installed within the casing with a goal of torque reduction and casing protection. NRPs were installed 1ft above the tool joint on the drill pipe. A total of 184 SS-500 NRPs were installed at a frequency of one per joint. The shaded blue area in the projected vertical section plot represents the NRP placement at TD.

### Immediate 23% Torque Reduction

At 13,658ft MD, the average drilling torque was 22kft-lbs without NRPs. After installing NRPs and removing 1,300ft of HWDP, the torque immediately dropped by 23% to 16.5k ft-lbs. The operator successfully drilled to planned TD with this BHA and NRPs.

### 50% Reduction in Friction Factor

Back-modeling suggests overall rotational friction factor of 0.20 average prior to NRP installation. The friction factor decreased to 0.08 after installing NRPs, and remained around 0.10 while drilling to TD. Including the effect of removing the HWDP, the overall friction factor was reduced by 50% using NRPs.



**Location:** Wyoming  
**Well Type:** S - Shaped  
**Objective:** Torque Reduction  
**Solution:** WWT SS-500 NRPs  
**Results:** Immediate 23% Torque Reduction

