

## WWT Non-Rotating Protectors Reduce Torque in Directional Well

### Torque Concerns

Operator experienced high erratic torque while drilling off-set wells. WWT NRPs were planned into the well to keep torque below rig limits for the more challenging higher step out wells.

### WWT NRPs Run While Drilling

117 NRPs (2540 ft) were added when the bit reached approximately 6000 ft. 2 NRPs per joint were required at the top of the well due to side loads in excess of 3000 lbs/joint.

### Torque Reduced and Stabilized

As NRP's entered into the high side force areas of the well, the actual torque was much less then modeling (No Protectors) predicted using back modeled friction factors (FF).

An additional benefit was less erratic torque as more NRPs entered the high side force areas. This may also be an indicated of reduced stick-slip.

At the end of the section, the NRPs began moving out of the optimal coverage zone, slightly reducing overall benefit. This can be seen between 8600 and 9000 ft, as torque increases and become more erratic.

Overall torque reduction is estimated to have been 20-24%, staying below the torque limit and close to WWT's modeling (With Protectors).



**Location:** Asia-Pacific  
**Well Type:** Directional  
**Objective:** Torque Reduction  
**Solution:** WWT NRPs  
**Results:** Immediate torque reduction upon installation of WWT NRPs

Input Parameters:  
 FF = 0.35CH, 0.4 OH  
 NRP Rotating FF = 0.07  
 10000 lb WOB, 4000 ft-lbs bit torque

