

Vibrations Damped While Drilling into Abrasive Formations Utilizing Silencer Sub Assembly

Concern Drilling Though Abrasive Formations

Drilling into the Bone Spring formations in the Permian, has caused numerous downhole MWD and tool failures due to vibrations. The WWT Non-Rotating Silencer Sub assembly was utilized to dampen downhole vibrations, reduce stick-slip, lower torque, and provide more efficient transfer of MSE from top drive to bit.

Silencer Sub Specifications

The Silencer Sub provides these benefits by using a non-rotating stabilizer with a low friction fluid bearing design. The stabilizer sleeve is made using a proprietary vibration absorbing polyurethane material on a solid steel fatigue resistant mandrel.

Silencer Sub Operation

The WWT Silencer Sub was installed as part of the BHA assembly for the vertical, curve and lateral. The silencer was placed at the top of a conventional directional BHA, approximately 92ft from the bit.

Wear Results

The Silencer Sub experienced acceptable wear rates and no damage during operation, which is a considerable accomplishment given the extreme abrasive nature of the formations being drilled. The Silencer Sub withstood minimal wear when compared to drill pipe tool joints with casing-friendly hard-banding which showed significant wear.



Location: Permian / Delaware Basin (Bone Spring Formation)

Well Type: Horizontal

Objective: Vibration Dampening

Solution: WWT Silencer Sub

Results: Vibrations and Stick Slip Reduced



Model	OD [in]	ID [in]	Cont. Side Load Rating [lbf]	Intermittent Side Load Rating [lbf]	Tool Length [in]	Maximum Service Temp [°F]
5"	8.38	3.25	6000	12000	56	275

Photo of 5" WWT Silencer Non-Rotating Sub Assembly and Specifications.



WWT Silencer Sub compared to typical tool joint wear after drilling curve section of the well.

WWT Silencer Non-Rotating Sub Assembly
www.wwtinternational.com



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Silenced & Standard BHA

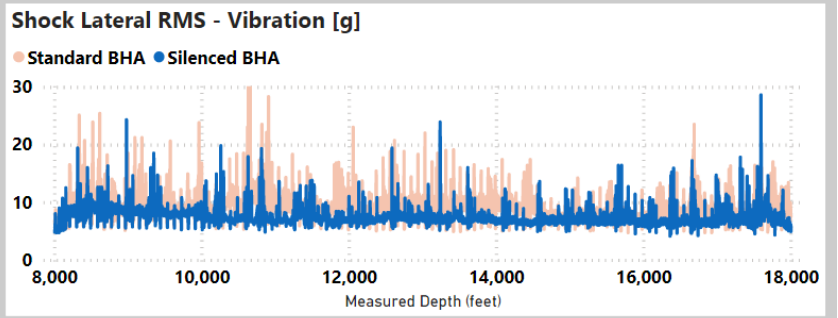
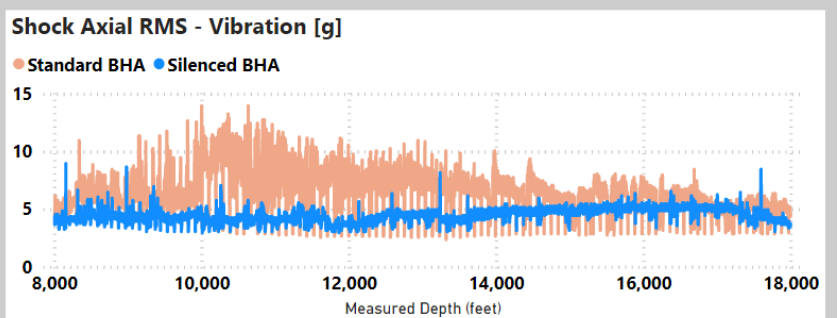
The WWT Silencer trial run results are compared between 2 wells, one well has the WWT Silencer Sub installed as the BHA assembly, while the other well has a standard BHA. They consist of a two well pad with two-mile laterals drilling into the same abrasive Bone Springs formations.

Vibration Results

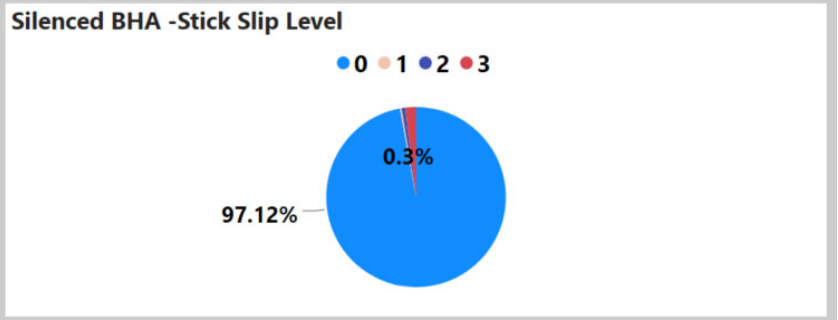
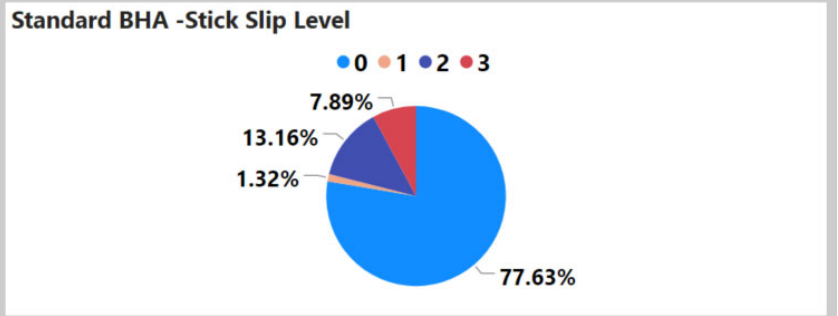
Lateral and Axial Vibrations were compared between the Silenced and Standard BHA. The results demonstrated a substantial reduction in vibration as seen in the root mean square (RMS) acceleration data in both the axial and lateral directions. Vibrations were measured and compared from a depth of 8,000ft to 18,000ft. As a result, Lateral and Axial vibrations were dampened by incorporating the WWT Silencer Sub into the BHA assembly.

Stick Slip Results

Stick Slip Levels were compared between the Silenced and Standard BHA. When Stick Slip is measured it is categorized in levels from 0 to 3. Incorporating the WWT Silencer Sub into the BHA assembly muted Slip Stick Levels to a level of zero, 97.12% of time while drilling into the abrasive Bone Spring formations.



Axial and Lateral Vibration Comparison Between Silenced BHA and Standard BHA.



Stick-Slip Level Comparison Between Silenced BHA and Standard BHA