Agitator™ System improves sliding ROP by 50%

Performance Summary

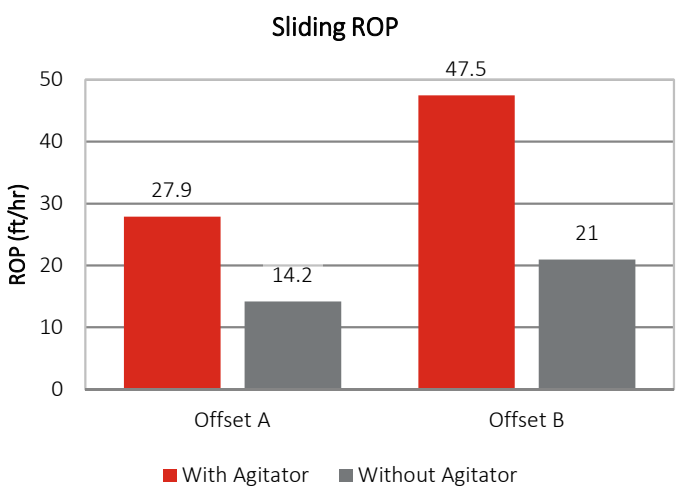
NOV *Agitator*™ System reduces drilling time on two West Texas wells

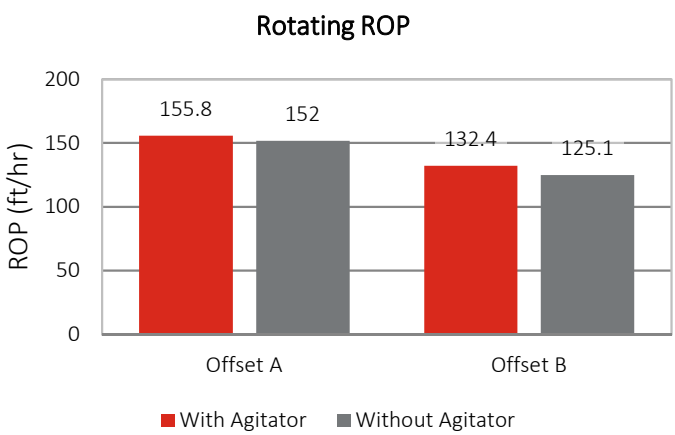
Challenge:
On two wells, an *Agitator*™ System was picked up half way through the lateral by the same rig on the same pad. It was desired to see the benefit of an *Agitator*™ system on drilling performance in a before and after scenario.

Summary:
On offset A, an *Agitator* was added at a depth of 15,591 ft. On Offset- B an *Agitator* was added at 14,619 ft. In both instances performance improved when analyzing parameters 1,000 ft. before and after the *Agitator*™ System went in.

Client	Confidential
Well Name	Confidential
Field/Block	Spraberry
County	Upton
State	Texas
Country	USA
Date	Q2 2015
Lithology	Shale

Results:
- 70% Increase in sliding ROP in both wells
- 50% reduction in drilling time vs. without an agitator.
- **Average savings of $16,000 when only analyzing the *Agitator* in 15% of the lateral, rendering a predicted cost savings of $106,000 if used in the entire lateral.**
- Differential pressure and surface WOB show better correlation, indicating better weight transfer and tool face control.





Well	AGT	Start Depth (ft)	Stop Depth (ft)	Interval (ft)	Drilling Hours	ROP (ft/hr)	Total Cost	Savings
A	N	14,991	15,991	1,000	15.6	64	$48,750	-
A	**Y**	**15,992**	**16,991**	**1,000**	**8.7**	**115**	**$27,188***	**$21,562**
B	N	13,618	14,619	1,000	11.2	89	$35,000	-
B	**Y**	**14,619**	**15,619**	**1,000**	**8.0**	**125**	**$25,000***	**$10,000**

**Total cost including Agitator™ System*

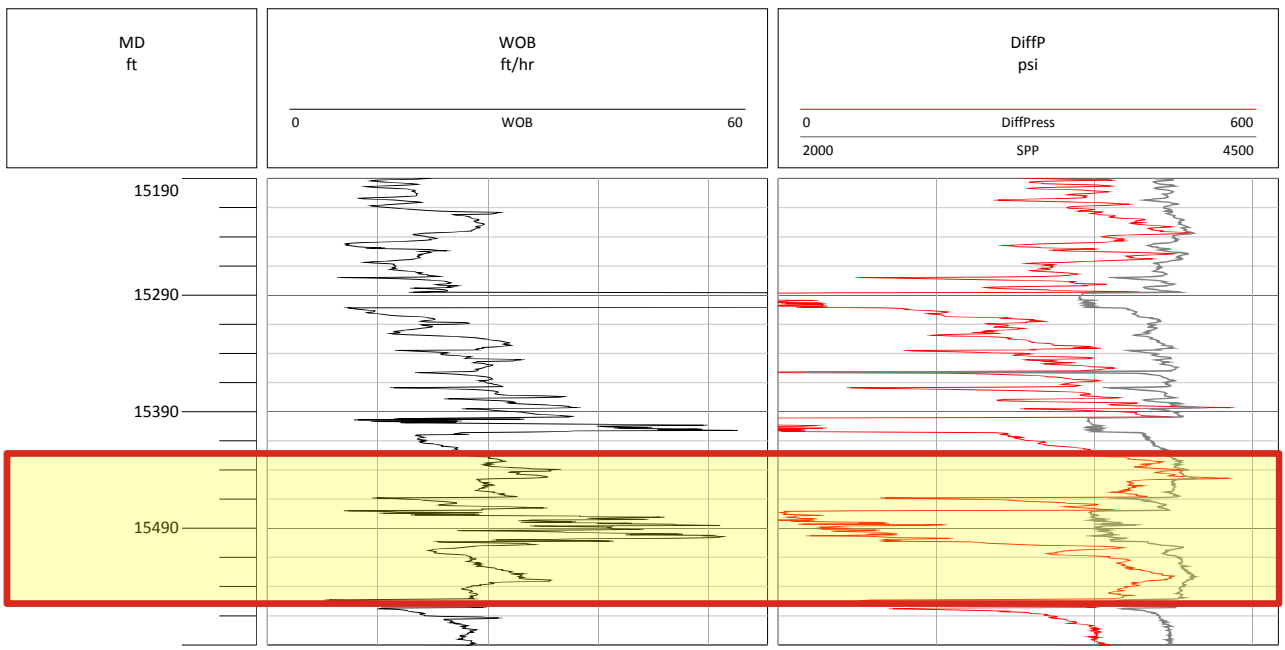
Agitator™ System improves sliding ROP 50%

Performance Summary

NOV *Agitator*™ System reduces drilling time on two west Texas wells continued…

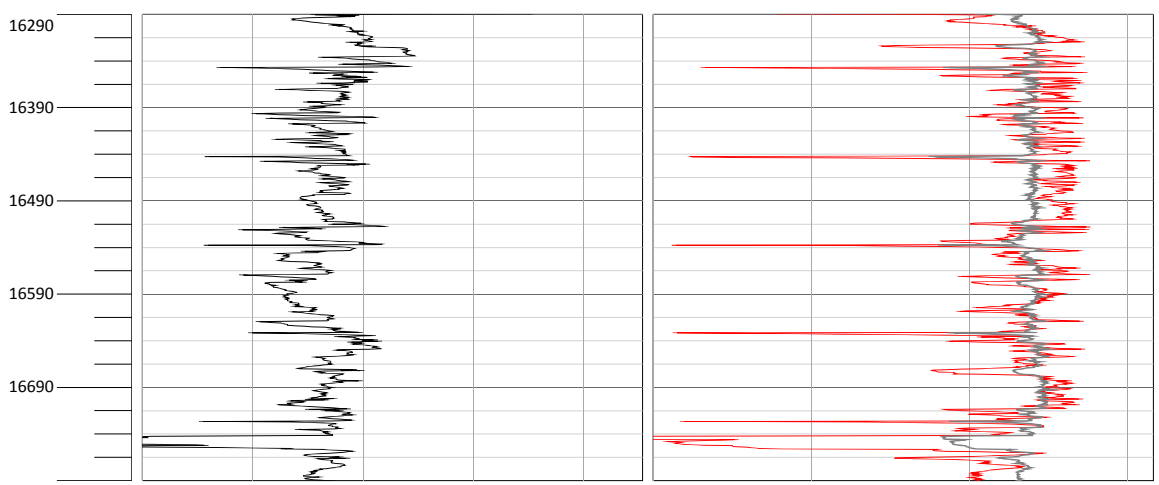
Comparing differential pressure to WOB using the *Agitator*™ System:

Drilling the lateral section can become progressively more difficult due to drag, leading to inefficient weight transfer to the bit and possible weight stacking. The *Agitator* is designed to provide a gentle axial oscillations along the drill string to break static friction leading to enhanced drilling performance.



The plot above shows an instance of weight stacking, where WOB increases, but differential pressure does not increase proportionally. As weight stacking releases to the bit, a resulting reactive torque is experienced. This causes a spike in differential pressure and the stand pipe pressure.

The plot below shows the same well once an agitator was added at 15,991 ft.



In the portion of the lateral in which the *Agitator*™ System was added, fluctuations in WOB and differential pressure are reduced resulting in improved ROP and greater tool face control.