PDC Bit with Stinger Element Drills More Than 9,600 Feet in One Run in Bakken Shale

Drilling long, single-run laterals sets operator record and improves trajectory control in Williston basin

**CHALLENGE**
Reduce time and costs to drill long horizontal laterals in Bakken shale.

**SOLUTION**
Added Stinger conical diamond element to six-bladed PDC bit.

**RESULTS**
- Drilled first well to 9,544-ft lateral in single runs at average ROP of 97.4 ft/h.
- Drilled second well to 9,631-ft lateral in single runs at average ROP of 83.4 ft/h.
- Set operator record for the fastest lateral ever drilled.
- Improved trajectory control.

The directional driller averaged just one slide every 850 ft compared with conventional PDC bits that averaged a slide every 250 ft.

**Reduce drilling time and costs in Bakken shale**
An operator encountered a number of challenges while drilling horizontal wells targeting the Bakken shale formation in the Williston basin, North Dakota, USA. Conventional PDC drill bits did not allow the directional drillers to achieve the desired ROP and often required course corrections to stay within the target zone, which was less than 5-ft thick in some areas. To reduce drilling time and costs, the operator needed to simultaneously increase ROP and improve directional control.

**Extend PDC bit life with conical diamond element**
The Stinger conical diamond element was chosen to increase PDC bit performance. The Stinger element, which replaces the center cutters of a conventional PDC bit, is manufactured from a synthetic diamond material that provides improved impact strength and resistance to abrasive wear. It is twice as thick as the diamond layer on conventional PDC bits, and coupled with the element’s conical geometry, it also extends bit life.

The Stinger element was mounted at the center of a 6-in, six-bladed bit with 13-mm PDC cutters that were used to drill the long lateral section of the well. On the first day, the bit drilled a total of 2,903 ft in a single trip—the most footage the operator ever drilled in a 24-h period. Drilling continued with the same bit for a total distance of 9,544 ft in 98 h at an average ROP of 97.4 ft/h.

The same type of PDC bit with a Stinger element drilled even farther in the lateral section of another well 20 miles away. The 9,631-ft lateral was drilled in a single run in 115.5 h at an average ROP of 83.4 ft/h with minimal sliding to stay in the sweet spot. Using the new bit, the directional driller averaged just one slide every 850 ft compared with conventional PDC bits that averaged a slide every 250 ft.

**Drill long laterals in one run, setting operator record**
The average ROP of 97.4 ft/h enabled the bit to drill the entire 9,544 ft in 4.25 days, setting a new record for the operator, which was broken again after drilling the 9,631-ft lateral. When the bits used to drill the long laterals were examined, only the regular cutters on the outside shoulder area showed signs of damage. The central Stinger conical element showed no signs of wear after drilling the laterals.

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