

Case Study

SlicFrac

SlicFrac Diverts Multistage Sleeve System for Successful Re-Frac Operations

Case Study No. 6202

DETAILS:

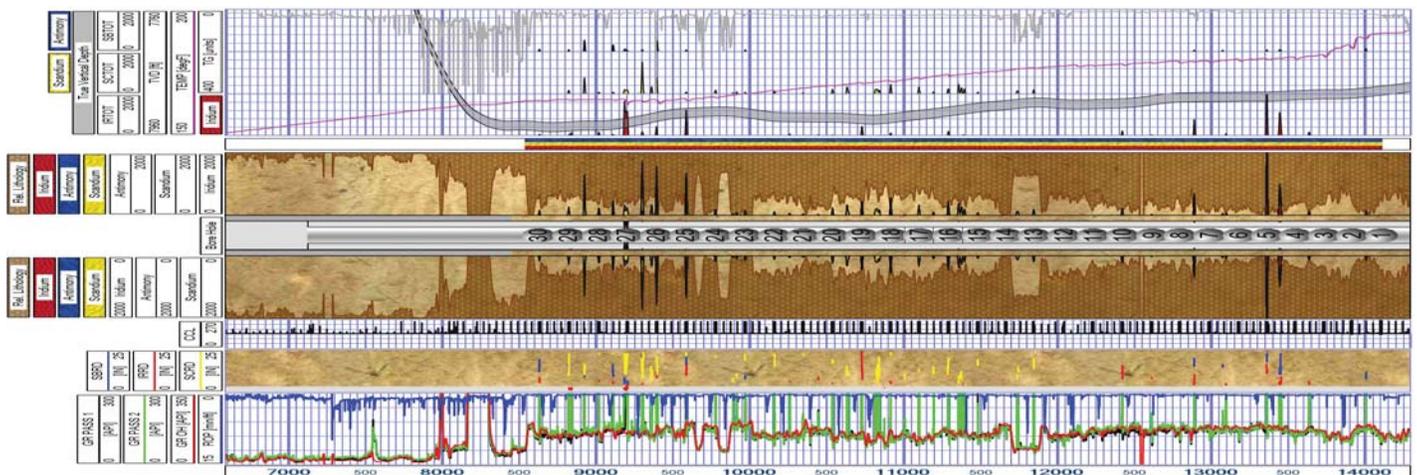
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|---------------------------|--------------------------------|
| Location: | Divide County, ND |
| Formation: | Bakken |
| Operation Depth: | 13,710' - 14,400' |
| Well Orientation: | Horizontal |
| POD Type: | PCL-Large Millable PODs |
| Type of Operation: | Horizontal Re-Frac |

An alternative to conventional plug 'n perf completions is a multistage sleeve system. Sleeves are installed directly into the casing string, placed throughout the lateral section at points of interest, and cemented in hole. They can be opened hydraulically by pumping a ball on seat to shift or mechanically by utilizing Coiled Tubing (CT) with a shifting tool. The ports or slots are typically larger in flow area than a standard perforation, which can allow for higher flow rates and larger frac volumes; however, to successfully execute a re-frac, the large ports/slots can be difficult to seal and divert.

A customer in the Bakken was planning a re-frac program on a wellbore which was originally completed through

multistage sleeves. To optimize spacing and increase reservoir stimulation, Thru Tubing Solutions' abrasive perforating assembly was used to add 6 shots (60 degree phasing) between the existing sleeves. Thru Tubing Solutions' SlicFrac technology was incorporated into the re-frac schedule to divert the proppant to virgin formation and efficiently stimulate the existing sleeves as well as breakdown all new perforation clusters. SlicFrac Perf PODs are designed to effectively plug irregular shaped holes as well as circular perforations; the same diverter was used throughout the job to plug and seal inside the slots of the existing sleeves as well as the new perforations.

To monitor proppant placement and diversion effectiveness, seismic monitoring and radioactive tracer were used. The seismic activity showed diversion across a natural fault, which extended through the middle of the lateral section, thus allowing proppant to effectively reach the toe stages. Radioactive tracer showed evidence of diversion throughout the entire lateral with stimulation to the sleeves as well as the new perforations. After completion of the first re-frac and seeing evidence of diversion, the customer utilized SlicFrac in their re-frac program for an additional 2 wellbores following the same design.



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