KDP Delivers Reliable Degradation in Wells with High Tortuosity and Casing Deformation

Background

An operator in the Powder River area reached out to Kureha Energy Solutions (KES) requiring a reliable 10k dissolvable frac plug that can degrade in their low temperature wellbore conditions for their plug-and-perf frac operations. With countless problems occurring during drilling, the operator was worried that coil was limited and could only clean out a few stages due to their well trajectory with high tortuosity and casing deformation. Composite plugs could not be run in case coil could not reach TD. The operator needed a non-chloride dependent reliable degrading frac plug with consistent degradation, and can degrade in a multitude of wellbore environments and fluids. The operator requested to run the Kureha Degradable Frac Plug (KDP) in a full wellbore application at 210°F with confidence that the KDP would fully degrade regardless of the well environment.

KDP Features

- PGA based plug
- Traditional Frac Plug Design
  - Dual Slips
  - Large Sealing Element
  - Bottom Set Plug
- Max differential pressure of 10,000 psi
- Optimized pumpdown speeds
- BHT range of 150F – 450F
- Ball-in-place and pumpdown ball options

CASE STUDY DATA

PLUG LOCATION
Full Wellbore

WATER TYPE
Fresh Water

REGION
Powder River

CASING SIZE
4.5'' 13.5#

BOTTOM HOLE TEMPERATURE
210 F

SOAK TIME
6 days

CLEANOUT REPORT
No tags, no debris in the returns

KDP Design

The KDP is designed to eliminate the risk of costly plug mill-out operations. It is manufactured from the industry's original degrading material that is field tested and highly suitable for frac plug material. The KDP hybrid design includes the degradable polymer (Polyglycolic acid, PGA) and dissolvable sealing element that predictably degrade to provide a clear wellbore for production without intervention and assist in reaching longer laterals that coil tubing cannot reach.

The degradation behavior of PGA and the degradable sealing element is much simpler than 100% Mg alloy frac plugs. PGA is temperature dependent only, whereas Mg alloy degradation depends on temperature, chloride level, and can be affected by other well conditions, such as buried in sand or covered by other fluids. The KDP can degrade in all water types, oil, water moisture, and sand.

Operators are also consistently impressed with the plug's frac performance. The KDP's dual slip design and traditional full-length sealing element provides exceptional sealing performance in wells with harsh environments, such as casing deformation, large temperature ranges, and high differential pressures.

Results

The 3.62" KDP was run full wellbore in 4.5" 13.5# casing. No problems were reported or seen during the frac operations, and the operator was very pleased with the KDP performance. After frac, the operator soaked the KDP's for 6 days. The operator was able to reach TD with coil, but had a contingency with a reliable degradable plug in case cleanout operations were not successful. The results of this trial are a good example of the great frac performance and stable degradation of the KDP. PGA based degradable plugs perform and degrade stably under a variety of conditions. PGA degradation does not stop, even in the conditions that have less liquid water or have a lot of sand. Please contact KES to learn more about our frac plug solutions.

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