Fulcrum Technology Delivers 100% Isolation for 102 Fracturing Stages in Oklahoma

Memory gauges in prior wells recorded 22% to 43% stage-to-stage communication, indicating fluid communication behind the casing.

**CHALLENGE**

Improve hydraulic fracturing by ensuring that each stage is treated as designed, as compared with previous wells where 22% to 43% of treatments communicated with previously treated zones.

**SOLUTION**

Isolate each stage from the others by constructing the well using Fulcrum* cement-conveyed frac performance technology.

**RESULTS**

Isolated 100% of the 102 stages of hydraulic fracturing, as recorded by a memory gauge below the packer.

**Memory gauge detects out-of-stage fracture communication**

An operator in Oklahoma drills horizontal wells to accommodate multistage sliding sleeve completions stimulated with hydraulic fracturing. Each well is designed for about 100 stages to optimally stimulate the reservoir. However, the frac design assumes that the fracturing fluids and proppants will uniformly reach the intended zones and not communicate behind the casing with previously treated zones.

To minimize the risk of communication, the operator uses industry best practices for cementing, including using centralizers and spacers to encourage mud removal and maximum zonal isolation.

The sliding sleeve completion uses coiled tubing to convey a retrievable packer to isolate prior stages inside the casing. Below the packer, the operator uses a pressure memory gauge to record pressure that builds below the packer—indicating fracturing fluid and pressure communication behind the casing during the treatment.

For three wells cemented conventionally by a third-party service company, the memory gauge recorded communication with prior zones during 22% to 43% of stages. As a result, the operator wanted a better solution that would enable more uniform fracture delivery.

**Technology improves isolation for optimum stimulation**

Schlumberger recommended Fulcrum technology, which is delivered during a conventional cementing operation to react with any leftover nonaqueous drilling fluid and reduce the risk that fracturing fluid or pressure will communicate through channels behind the casing.

**Memory gauge indicates 100% isolation for all 102 stages**

Schlumberger cemented the operator’s next well using the Fulcrum technology. As with the previous wells, it was completed with sliding sleeves using a CT-conveyed packer with a memory gauge below it. During the 102 fracturing stages, the memory gauge recorded zero incidents of fracture communication behind the casing. As a result, each stage received exactly the treatment it was designed to receive, with no stage being over- or understimulated.

**Stage-to-Stage isolation from Memory Gauge**

![Bar chart showing stage-to-stage isolation]

A memory gauge indicated conventional cementing in Wells 1–3 resulted in incomplete zonal isolation that enabled fracture communication behind the casing—leaving some stages undertreated and others overtreated. After Well 4 was cemented using Fulcrum technology, the memory gauge saw no communication, so all 102 stages were fractured as designed.