

Invizion Evaluation Service Improves Zonal Isolation 70% in Eagle Ford Shale

Evaluation of near-wellbore communication and isolation of cemented BroadBand Precision service sleeves enhance well stimulation

CHALLENGE

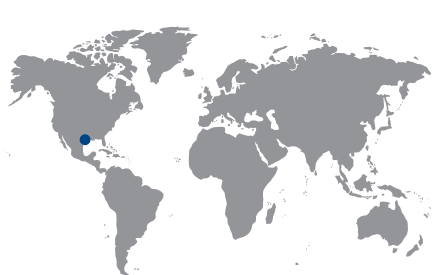
- Design, execute, and assess cementing operation in horizontal section of critical well in the Eagle Ford Shale.
- Evaluate the isolation of BroadBand Precision* integrated completion service sleeves to enable an optimized completion.

SOLUTION

- Use Invizion Evaluation* well integrity evaluation service to demonstrate the effect of the selected cementing solutions on the expected zonal isolation and to estimate isolation of cemented sleeves.
- Deploy tractored USI* ultrasonic imager to measure acoustic impedance of the cement, indicate cement azimuthal coverage, and evaluate near-wellbore communication.

RESULTS

Validated improved zonal isolation with approximately 88% of the sleeves having more than 20 ft [6.1 m] of isolation between the sleeves and 91% of the sleeves having no indication of near-wellbore communication, an improvement of 70% when compared with conventional cement placement.



Precise fracture stimulation requires zonal isolation confirmation

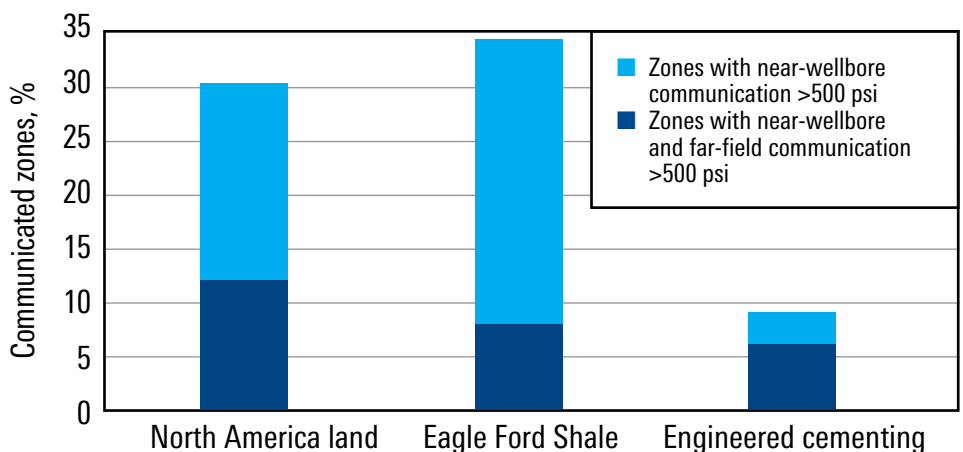
Drilling horizontal sections maximizes access to the production layer of the reservoir. Traditional plug-and-perf hydraulic fracturing techniques are typically executed with several sets of perforations or clusters and hundreds to thousands of feet between perforations. The BroadBand Precision integrated completion service individually and precisely fractures every cluster along the lateral for optimized stimulation and production of a reservoir. However, this technique requires good annular isolation to precisely pinpoint and stimulate each perforation cluster.

Zonal isolation in horizontal sections also presents challenges in achieving sufficient centralization, running and movement of casings, and cementing fluid placement. Before a BroadBand Precision service operation could be performed, an operator needed to optimize cement placement to maximize zonal isolation and increase cement job success.

Well integrity service determines quality of zonal isolation

Based on the robust multisegment analysis, Invizion Evaluation service was deployed to determine the quality of isolation and to demonstrate the effect of recommended cementing practices on the zonal isolation outcome. In the horizontal section of the well, 67 3-ft- by 7-in-OD BroadBand Precision service sleeves were placed, each 60 ft [18.3 m] apart. During this operation, CEMENTICS* zonal isolation software simulations were run to determine the optimal number of centralizers in the most critical horizontal production interval, enabling better cement placement.

For effective mud removal, the rheologies were optimized based on the CEMENTICS software simulations and the WELLCLEAN III* pipe and annular mud displacement simulator. The ScavengerPlus* scavenger slurry stabilizer was used to enhance the rheological hierarchy. Effective mud removal using a mix-on-the-fly spacer was enabled by the MUDPUSH Express* stable, continuously mixed mud removal system. Spacer volume and surfactant concentration were also optimized for improved mud removal and water wetting.



After successfully cementing the horizontal section of the production interval in the Eagle Ford Shale, near-wellbore communication improved by 70% when compared to the average evaluated wells in North America.

CASE STUDY: Invizion Evaluation service improves zonal isolation by 70%, Eagle Ford Shale

Each sleeve was initially closed. A coiled tubing unit opened each sleeve for the portion to be stimulated. A packer set below each sleeve isolated the previously stimulated sleeves. The previously stimulated sleeves would remain open after a stage had been stimulated. After the stimulation treatment was completed, the pressures and temperatures were analyzed to identify near-wellbore communication. The Eagle Ford Shale well provided the least amount of near-wellbore communication when compared with other BroadBand Precision service wells.

Invizion Evaluation service improved near-wellbore communication by 70% and isolated 88% of sleeves

The subsequent successful stimulation treatment using BroadBand Precision service validated the isolation. Based on the evaluation logs, the relative isolation of the 67 sleeves in the production section was categorized into four isolation groups: indication of isolation of the entire length (or 100%), 50–100%, 31–50%, and 0–31% or 0–20 ft between sleeves.

The data acquired by the USI ultrasonic imager and a near-wellbore communication evaluation indicated that approximately 88% of sleeves were isolated, which yielded a more-than 70% improvement in near-wellbore communication when compared with the average evaluated wells in North America.

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