CASE HISTORY

WelPAN™ Reinforced Cement System Improves Annular Bond Integrity in Oklahoma Remedial Cementing Operation

Location: Major County, Oklahoma, USA
Application: Remedial cementing
Product: WelPAN™ Cement Strengthening Additive

Challenge

- Offset wells experienced intermittent or partial cement returns
- Risk of incomplete slurry placement and poor zonal isolation
- Need for improved cement sheath mechanical integrity
- Reliable cement system required to ensure long-term wellbore isolation

Solution

- Implemented two-stage slurry design to improve placement and bonding
- WelPAN cement strengthening additive incorporated into tail slurry
- Technology create distributed reinforcement network within cement matrix
- Slurry pumped through multi-stage cementing tool with stable displacement

Results

- Full and continuous returns maintained during cementing
- No fluid losses or circulation anomalies observed
- CBL/VDL confirmed effective slurry placement at ~4,750 ft MD
- Improved annular sealing performance versus offset wells
- Operator scheduled repeat operation using same slurry design

CHALLENGE

A remedial cementing operation was conducted on a well located west of Orienta in Major County, Oklahoma with the objective of restoring annular cement integrity and verifying the effectiveness of the cement placement.

Offset wells in the area frequently experienced intermittent or partial returns during cementing operations, increasing the risk of incomplete slurry placement and compromised zonal isolation. Achieving stable circulation and uniform cement placement across the targeted interval was therefore critical to ensuring long-term wellbore integrity.

In addition to effective placement, the cement system needed to provide enhanced structural performance capable of resisting the microcracking and stress loading that can compromise cement sheath integrity in downhole environments.

SOLUTION

The cementing program incorporated WelPAN™ cement strengthening additive, a precision-cut polyacrylonitrile (PAN) micro-fiber designed to reinforce cement systems and improve long-term mechanical integrity.

WelPAN fibers create a distributed micro-reinforcement network within the cement matrix, helping mitigate microcrack initiation and propagation while improving tensile strength and resistance to mechanical and thermal stresses. The additive is manufactured from polyacrylonitrile, the same base polymer used in carbon fiber production, providing durable reinforcement within the set cement structure.

A two-stage slurry design was implemented to optimize placement and mechanical performance:

Lead Slurry

- 300 sacks of cement
- 0.5 lb/sk Pol-E-Flake® a resilient flaked lost circulation material
- Designed to provide stable placement characteristics and efficient displacement

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Tail Slurry

- 200 sacks of cement
- 0.5 lb/sk WelPAN™ cement strengthening additive
- Engineered to enhance bonding strength and reinforce the cement sheath across the critical sealing interval

The slurry system was pumped through a multi-stage cementing tool and displaced to surface under stable circulating conditions.

RESULTS

The WelPAN reinforced cement system delivered stable placement and improved annular bonding performance during the remedial cementing operation. Full and continuous returns were maintained throughout the cementing job, indicating effective slurry placement and stable annular flow conditions. No fluid losses or circulation anomalies were observed during displacement.

Post-operation logging using a cement bond log and variable density log (CBL/VDL) identified a clear transition at approximately 4,750 ft measured depth, corresponding to the interface between the lead and tail slurry systems. The change in acoustic amplitude and waveform character reflected the designed change in slurry composition and confirmed effective placement of the fiber-reinforced tail slurry.

Operational observations and logging results indicated improved annular sealing performance relative to offset wells in the area. Based on the successful outcome of the treatment, the operator scheduled a second cementing operation using the same slurry design on the same lease.

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