

Scouring Additive Improves Cement Bonding in Highly Deviated Well

Wellbore Cleanout Additive Aids Mud Removal in Challenging Section

CHALLENGE

Extended-reach open hole wells are drilled in many parts of the world, with the goal of maximizing contact with the reservoir to increase hydrocarbon recovery. In the Middle East, an operator planned to cement a highly deviated (up to 89 degrees) landing 7-in liner prior to drilling the extended reach open hole reservoir section. During the cementing operation, ensuring zonal isolation would be extremely important to protect wellbore integrity and minimize potential hydrocarbon migration to the surface or other formations, which could have adverse environmental and economic impacts. The biggest challenges would be removing difficult oil-based mud and tubular stand-off.

SOLUTION

The conventional industry approach to removing oil-based mud involves using surfactants to water-wet annular surfaces and improve cement bonding, combined with mud removal techniques and best practices such as:

- Incremental fluid friction and density hierarchy
- Centralization to achieve over 75% tubular stand-off
- Pre-flushes
- Rotation or reciprocation
- Mechanical aids (e.g., scratchers and scrapers)

In this particular well, a novel scouring additive—Impact's POWER SCOUR®—was added to a conventional spacer to improve cement bonding and overall zonal isolation. POWER SCOUR® induces a mechanical action to scour difficult-to-remove mud from the annular surfaces. Mud removal efficiency tests showed a removal rate exceeding 92% with POWER SCOUR® compared to 60% when the scouring additive was not included in the fluid design.



LESSONS LEARNED

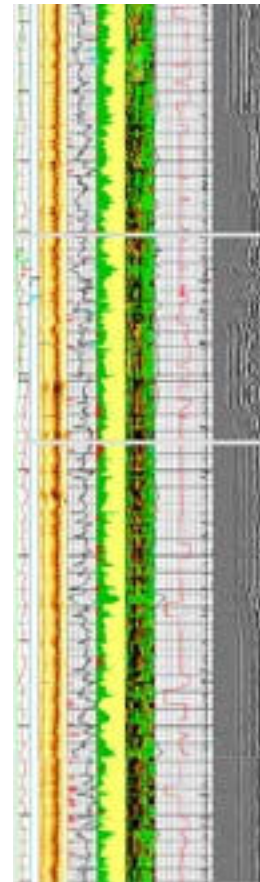
- In similar wells in the same field, it is now a best practice to deploy POWER SCOUR® during the 7-in liner cementing operation.
- POWER SCOUR® has been proven to aid in the mud removal process, improving cement bonding to the casing and formation and allowing the operator to achieve zonal isolation—eliminating the need for remedial cementing operations that increase overall well costs and delay hydrocarbon production.
- POWER SCOUR® can be used with bottom hole temperatures up to 350° F, starting at a concentration of 2 lb/bbl. This unique scouring additive is compatible with cement, conventional spacers, surfactant packages and drilling fluids, including seawater- and brine-based fluids.

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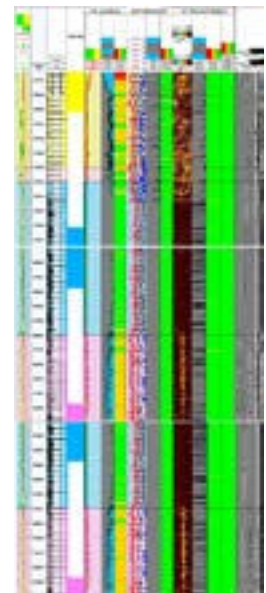


RESULTS

The cementing operation for the 7-in liner started by pumping 200 bbl of low viscosity mud. This was followed by 40 bbl of diesel with surfactant, 60 bbl of 12.5 lb/gal conventional spacer, 40 bbl of chemical wash with surfactant and 60 bbl of 12.5 lb/gal conventional spacer paired with 6 lb/bbl of POWER SCOUR®. The operation then continued by pumping 52 bbl of 15.8 lb/gal lead and 70 bbl of tail expandable cement slurries. The dart was dropped and displacement continued until the plug was bumped according to the theoretical displacement volume. Pressure was increased by 1,000 psi above the final displacement pressure and held for 10 minutes to confirm the float equipment was holding pressure. The liner top packer was then set and reverse circulation began, yielding spacer and good cement returns to the surface. After waiting on cement, hard cement was found in the shoe track. A cement bond log of the cemented interval confirmed strong bonding with both the tubular and the formation, indicating successful zonal isolation.



Conventional spacer



With scouring additive