

IntegraGuard™ EZ Spacer Optimizes Isolation Through Advanced Hole Cleaning in the DJ Basin

EXECUTIVE SUMMARY

- An operator approached American Cementing to eliminate Bradenhead Pressure in the DJ Basin.
- The fluid performance needed to be maximized to address hole cleaning, gas migration and displacement efficiency.
- IntegraGuard EZ Spacer was tailored for well conditions in order to address the basin challenges and achieve desired performance results.

OVERVIEW & CHALLENGE

A major and consistent challenge operators face while drilling in the DJ Basin is obtaining uniform isolation across the entire vertical section while mitigating Bradenhead Pressure (pre- and post-completion). The shallowest producing formation in the basin is the Sussex, which is approximately located between 4,000 to 5,000 feet true vertical depth (TVD). Isolating this zone is critical in preventing post-placement annular casing pressure.

An operator approached American Cementing to cement and maximize zonal isolation on a two-well pad in the DJ Basin. The subject wells were both 2-mile laterals cemented to the surface, targeting the Niobrara and Codell Formations with a bottomhole static temperature of 230°F. The production interval was drilled with an 8 1/2-inch. bit and a 5 1/2-inch. production casing was set at ~18,000 feet measured depth (MD) (~8,300 feet TVD).

After enhancing centralizer placement and mud conditioning programs and optimizing the cement slurry design to minimize gas influx, American Cementing and the operator recognized that one of the key success factors for this job was the displacement of the high gel strength 10 ppg oil-based mud. Successful displacement would eliminate cement channeling and ensure proper cement placement and bonding.

SOLUTION

IntegraGuard EZ Spacer was chosen for the operation. This spacer system is a versatile dry-blend formulation that can be optimized for effective mud displacement. This technology was also designed to be mixed and pumped in a variable density train. American Cementing used the IntegraStar™ modeling programs to manage the equivalent circulating densities (ECD) and maximize fluid displacement across the various exposed formations.

The leading edge of the spacer was developed to generate the required shear stress to clean mud with high, long-term static gel strength when displaced at 10 bpm. The leading edge was the thickest fluid pumped during the job, so the tail end of the spacer was mixed lighter to regain rheological hierarchy with the lead cement.

Additional testing was done to optimize the spacer surfactant concentrations to ensure fluid compatibility, maximum wettability and cement bonding were achieved.

RESULTS

The operator was able to mitigate Bradenhead Pressure and achieve adequate isolation by following best cementing practices from start to finish. Ensuring effective hole cleaning on high gel strength drilling fluids, along with running competent slurry designs, was critical in reaching the desired results.

The IntegraGuard EZ Spacer design generated the shear stress required to effectively remove the static oil-based mud and allowed for optimum fluid displacement and cement placement, as shown in Figure 1. The below bond index and log sample shows excellent annular integrity, with over 90% of the logged interval's responses being less than 20 mV. No post-placement annular casing pressure was reported before or after completion operations. A key factor to this project was American Cementing's ability to tailor IntegraGuard EZ Spacer to the operator's wellbore in order to address the challenges faced while cementing in the DJ Basin.

Figure 1: Subject Well #1 Bond Index and Log Sample

