IntegraGuard™ Star Plus 3K Combats Severe Lost Circulation Issues in the Rockies

Technology: IntegraGuard™ Star Plus 3K | **Basin:** Williston | **Application:** Cementing

EXECUTIVE SUMMARY

1. Lost circulation was confirmed during a post-job pressure-matching analysis.
2. BJ recommended a spacer system using IntegraGuard Star Plus 3K, an advanced technology specific for lost circulation scenarios with fluid losses into fractures.
3. Results indicated there was no lost circulation with this spacer system and lead cement returns to surface.

OVERVIEW & CHALLENGE

On a two-well pad development in the Williston Basin, fluid returns and a post-job pressure-matching analysis indicated an operator was experiencing severe lost circulation while cementing a 7-in. intermediate casing set at 11,000 ft. A detailed pressure analysis showed that the lost circulation zones were potentially in the Mission Canyon Formation at ~10,000 ft, with estimated losses between 40 to 60%.

In this area, state requirements mandate that the Dakota formation must be isolated with cement at ~5,000 ft to fracture stimulate the wells down the casing. Without adequate isolation, a smaller diameter frac string would have to be used, resulting in pump rate limitations during stimulation, increased treatment pressures and horsepower pump charges, and a higher risk of compromising the fracture stimulation efficiency and well production potential.

SOLUTION

BJ Services was consulted to help mitigate these losses to ensure cement coverage across the Dakota formation. An IntegraGuard Star spacer system using the IntegraGuard Star Plus 3K lost circulation technology was recommended. This advanced fluid was specifically developed for lost circulation scenarios that involve fluid losses into fractures. Additionally, the job design was slightly modified by reducing the pump rates to lower the cementing equivalent circulating densities (ECD) without compromising mud displacement efficiencies.

RESULTS

On the third and fourth wells, 50 bbls of IntegraGuard Star spacer with IntegraGuard Star Plus 3K was pumped ahead of the cement. This resulted in spacer and lead cement returns to surface on both wells and no lost circulation indicated from a pressure-matching analysis. Figure 1 shows the pre-job gauge-hole cement fluid return estimates and compares it to the actual fluid returns observed. A bond log analysis is planned to confirm initial findings. Due to this sytem's performance, the operator continues to use it on similar pad wells.

Figure 1: Pre-Job Gauge-Hole Cement Fluid Returns (Estimates vs. Actuals)

	Estimate Spacer to Surface (bbl)	Estimate Cement to Surface (bbl)	Actual Spacer to Surface (bbl)	Actual Cement to Surface (bbl)	Losses	IntegraGuard Star Plus 3K
Pad Well #1	50	~30	0	0	Yes	No
Pad Well #2	50	~80	0	0	Yes	No
Pad Well #3	50	~100	50	~100	No	Yes
Pad Well #4	50	~100	50	~30	No	Yes