SPECTRE Disintegrating Plugs Eliminated Post-frac Intervention, Boosted Initial Production Rates by 20%
Woodford Shale, OK

An operator in the Woodford Shale in Oklahoma wanted to assess how well disintegrating plugs would perform in their field. They completed three wells with 5.5-in., 20 lb/ft casing, cementing the completion in a single long string ideal for plug-and-perf operations. Two of the wells were drilled with a true vertical depth (TVD) near 9,000 ft (2743 m) and laterals roughly 5,000 ft (1524 m) long. Well design called for using disintegrating plugs to isolate all stages in these two wells. The third well had a similar TVD, but included a 10,500-ft (3200-m) extended-reach lateral. In this multistage well, only the 15 deepest stages would use disintegrating plugs, while the shallower stages would be perforated using standard composite plugs.

When using traditional composite plugs in a standard plug-and-perf completion, the plugs must be milled out before hydrocarbons can flow through the wellbore. Mills are typically run in using coiled tubing, and the debris is circulated out of hole. This process takes time, both in terms of preparation and execution. The recent introduction of new materials and plug designs enables operators to skip milling and eliminate intervention operations altogether in plug-and-perf completions. After reviewing available technologies, the operator chose to run Baker Hughes SPECTRE™ disintegrating frac plugs because they are the only 100% completely disintegrating frac plugs available on the market, meaning they leave behind zero downhole debris.

The operator deployed a total of 47 SPECTRE frac plugs to complete the wells—15 near the toe of the extended-reach well with the deepest being set at 14,012 ft (4270 m)—and 16 being run in each of the other two wells. Each frac plug was run in hole on wireline and set. Then an IN-Tallic™ disintegrating frac ball was dropped and seated on the plug, enabling treatment of each stage. All plugs and balls were deployed flawlessly and showed positive indication of diverting the fracture treatments as planned. Upon completion of the fracturing job on each well, it was shut in briefly while production equipment could be installed. When brought on line, uplift was recorded to be 20% greater than planned, indicating that all plugs disintegrated as expected, leaving a clear wellbore and delivering greater than expected production.

Using SPECTRE disintegrating frac plugs and IN-Tallic frac balls across all three wells saved the operator an estimated 9 days of rig time. Assuming an average daily rig rate of USD 25,000 and other associated costs, this solution saved roughly USD 200,000, and enabled the operator to successfully install an interventionless plug-and-perf completion.

Results
- Eliminated the need for milling runs in two plug-and-perf wells, and enabled treatment of an extended-reach lateral
- Saved 9 days of drillout time and an estimated USD 200,000 across all three wells
- Resulted in 20% higher uplift than experienced in similar offset wells
- Reduced risk of pre-setting composite plugs with impact-resistant SPECTRE plug design

Challenges
- Requirement to eliminate post-frac intervention runs
- 10,778-ft extended-reach lateral in the deepest well
- 9,000-ft TVD in all three wells
- 5.5-in. 20.0 lb/ft casing
- Downhole temperatures ranging from 200°F (93°C) to 230°F (110°C)

Baker Hughes Solution
- Deployed 16 size 438 SPECTRE disintegrating frac plugs to isolate 17 production stages in both shallow wells
- Deployed 15 size 438 SPECTRE disintegrating frac plugs and 31 composite frac plugs to isolate 47 production stages in the extended-reach well
- Used IN-Tallic frac balls to divert the fracturing treatment