An operator in the Horn River Basin of northern British Columbia wanted to significantly improve overall wellsite efficiency and reduce time on location during plug-and-perf hydraulic fracturing operations. Baker Hughes recommended a new-generation frac plug that completely eliminates the post-frac intervention phase of plug-and-perf-style completions.

The new SHADOW™ series frac plug is deployed downhole to help isolate zones for fracture treatments—like composite bridge-plug technology—but the SHADOW frac plug is designed to be left in the well. It has a large inside diameter (ID) and a unique profile that enables production to start as soon as fracturing operations are complete. The plugs use IN-Tallic™ frac balls that disintegrate in the well when exposed to fluid, eliminating the need for milling and providing a full ID for production.

The operator in the Horn River Basin had a seven-well pad and agreed to complete two of the wells with SHADOW frac plugs. The other five wells were completed with conventional composite plugs.

Baker Hughes successfully set 27 SHADOW plugs in the first well and 25 SHADOW plugs in the second well using our E-4™ setting tool. During fracturing, the plugs provided reliable zonal isolation and ball-seat signatures were clearly visible on the SHADOW pump charts. Because of the SHADOW plugs’ large ID, the wells were ready to be put on production as soon as fracturing operations were complete.

The IN-Tallic frac balls used with the SHADOW plugs completely disintegrated within a few days after the pumping operation. When composite plugs are used, the startup of production can be delayed as long as three or more days while the plugs and drop balls are drilled out using coiled-tubing-conveyed milling tools, and debris is circulated to the surface. With SHADOW plugs, no sand flush is required, and there is no plug debris that could affect flowback.

Results
- Provided an interventionless solution that matched the production performance of composite plugs
- Saved operator USD 300,000
- Eliminated costs and risks associated with post-frac intervention
- Allowed production to begin immediately after fracturing operations
- Reduced time on location

Background and challenges
- Seven-well pad
- 5.5-in. 20lb/ft casing
- Operator needed a solution to increase efficiency and reduce cost
- Operator agreed to complete two entire wells with SHADOW plugs
- Ran composite plugs in other five wells

Baker Hughes solution
- Deployed a total of 52 SHADOW frac plugs with IN-Tallic disintegrating frac balls across two wells
- Eliminated coiled-tubing drillout on two wells of seven-well pad
- Ball seat signatures were clearly visible on pump charts
- Wells with SHADOW produced at the same volume as the five wells completed with composite plugs
After completing all seven wells, the customer began flowback; results showed that the wells with the SHADOW frac plugs produced at the same volume as wells completed from the same pad using the conventional composite plugs.

Use of our interventionless SHADOW plugs in two of the seven wells clearly demonstrated its value in comparison to standard composite plugs. Because the drillout phase was eliminated, no coiled tubing unit needed to be deployed, and the operator realized a cost saving of USD 150,000 or more per well, in addition to reducing HSE risk, cutting time on site, and increasing overall efficiency.

The operator was so pleased with the results they decided to change their entire operational scheme around using SHADOW frac plugs.

Production Data Chart

The two wells with SHADOW plugs showed no signs of production drop off.

SHADOW ball-seat signatures were easily observed throughout the pumping operation.