Wanting to reduce the footprint, necessary horsepower, and amount of water needed for fracturing, an operator in the Montana Bakken chose to use the Baker Hughes OptiPort™ multistage fracturing system. The relatively shallow well on the southwestern edge of the Bakken formation was drilled to a total vertical depth (TVD) of 7,870 ft (2399 m) and a measured depth (MD) of 11,959 ft (3645 m).

The OptiPort system allows a nearly unlimited number of fracture stimulations, while providing exceptional speed, reliability, and flexibility. The integrated system is comprised of multiple pressure-balanced OptiPort sleeves that are hydraulically opened using a specially designed coiled tubing bottomhole assembly (BHA). The BHA consists of a mechanical casing collar locator used to position the BHA across the sleeve, and a packer that is used for opening the sleeves and providing isolation from the previous fractured zone. After stimulation of a single zone is complete, the BHA progresses to the next sleeve, marking the next fracture stage, and the process continues.

For this job, the OptiPort system was used to fracture 19 stages, one every 200 ft (61 m), with the first stage set at 11,833 ft (3,607 m). On recommendation from Baker Hughes, the BHA was equipped with memory gauges to measure bottomhole pressure (BHP) and temperature (BHT) during hydraulic fracturing operations. Expecting to see some screen-outs during fracturing, the Baker Hughes team proactively established a screen-out recovery plan. Because the OptiPort system is deployed using coiled tubing, fluid can quickly be pumped down the tubing to circulate solids out of the wellbore.

**Results**
- Saved operator USD 140,000
- Reduced screen-out rate
- Reduced footprint, necessary horsepower, and water needed to complete fracturing

**Background and Challenges**
- Shaley dolomite, Bakken formation
- Horizontal well measuring 7,870 ft TVD and 11,959 ft MD
- 4.5-in. 11.6 lb/ft casing with cemented liner
- Reservoir required multistage fracturing
- Risks included potential for screen-outs and weather interruptions in a remote location

**Baker Hughes solution**
- Deployed 19-stage OptiPort multistage fracturing system
- Processed memory gauge data from first four stages
- Modified fracturing fluid to match measured bottomhole conditions, reducing screen-outs and NPT
- Fractured 15 stages in a single trip in 30 hours after modifying fluid
The Baker Hughes team was ready when stage two and stage four—50% of the first four fracturing stages—resulted in screen-outs. The team executed the recovery plan and was able to quickly clean out the wellbore in both instances.

After recovery from the stage four screen-out was complete, weather conditions forced the operator to trip out the BHA and temporarily suspend operations. Baker Hughes took advantage of work stoppage and downloaded data recorded by the memory gauges onboard the BHA during the first four fracturing stages. Working together, Baker Hughes completions and fracturing engineers quickly identified an unexpectedly low BHT and recommended changes to the fracturing fluid composition. The reconfigured fluid decreased the likelihood of screen-outs caused by the low BHT and made post-fracturing fluid recovery easier.

Upon resuming operations, the remaining 15 stages were completed in a single trip in 30 hours. Whereas two of the initial four stages resulted in screen-outs, the last 15 stages produced only three screen-outs, reducing the screen-out rate to only 20% in phase two.

In traditional plug-and-perf-style completions, screen-outs cause delays between 18 and 72 hours while the wellbore is cleaned (a conservative estimate that assumes a coiled tubing crew is nearby and available). Because the OptiPort system is deployed with coiled tubing, recovery efforts were started immediately after screen-outs and required no additional trips or equipment.

The OptiPort system reduced required recovery time to only a few hours per incident. Based on an average of USD 3,500 per hour for screen-out NPT, and a modest average of eight hours per incident, the OptiPort system saved this operator USD 28,000 per screen-out in NPT for a total savings of USD 140,000.