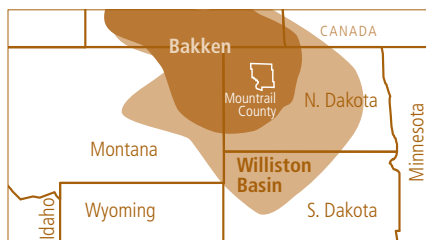


# Packers Plus® Case Study



## Packers Plus RepeaterPORT sleeve technology provides operator with 30-stage system in the Bakken



### The Situation

The Bakken formation, located in the Williston Basin of North Dakota and Montana, has become an increasingly attractive play with the advancement of completions technology. Unconventional characteristics, including low average permeability (0.04 mD) and porosity (5%), have responded well to horizontal drilling with multi-stage fracturing. With high estimated oil and gas in place, operators are dedicated to investing in new technologies to further increase their production and ensure economic wells.

Recent efforts have been focused on increasing lateral length and stage count to maximize recovery; however, this strategy introduces completion challenges. The difficulty lies in matching the longer lateral lengths with increased stage numbers in order to maintain the same stage spacing. Unfortunately, producers are often restricted either by technical or cost limitations.

### The Challenge

An operator working in the Bakken formation wanted to increase their stage number and ultimate production on a well in Mountrail County, ND. Although various multi-stage fracturing technologies are available to producers in the Bakken, this operator focused on open hole, multi-stage fracturing systems utilizing mechanical packers, specifically the Packers Plus StackFRAC® HD™ system. The operator's decision was based on the increased production realized with open hole completions and the efficiency and reliability of the StackFRAC HD system. The trend of increasing stage density in the Bakken had pushed the limits of current StackFRAC HD systems; therefore additional technological advancements were required to meet operator's needs.

### The Solution

Using a customer-driven engineering project strategy, Packers Plus met the challenge of completing open hole wells with higher stage numbers by designing an innovative stage multiplying technology. The new RepeaterPORT® sleeve allows operators to increase stage numbers by using the same size ball for two or more stages. For example, a RepeaterPORT sleeve can be run in conjunction with a FracPORT™ sleeve

with the same ball seat size separated by RockSEAL® II packers to create two isolated stages (Figure 1). This effectively multiplies the number of stages available in the Packers Plus StackFRAC HD system.

### The Results

The operator used the new RepeaterPORT sleeve in conjunction with the field proven StackFRAC HD system to install and fracture 30 stages. The system was run into a wellbore with a lateral length of 9,525 ft (2,905 m) and a measured depth of 19,740 ft (6,018 m). A combination of FracPORT sleeve and RepeaterPORT sleeve stages were used with an average stage length of 310 ft (95 m) to increase communication with the formation. The system was successfully fractured with over 2.6 million pounds (1,182 tonnes) of proppant and a total slurry volume of 37,600 bbl (5,978 m<sup>3</sup>).

With 10 successful RepeaterPORT sleeves run in conjunction with 10 stages using the same size standard FracPORT sleeves, the operator achieved 20 stages. 10 additional FracPORT sleeve stages were run to bring the total to 30. The success of the new RepeaterPORT sleeve in this well has encouraged the operator to use the technology for additional 30-stage wells in the Bakken.

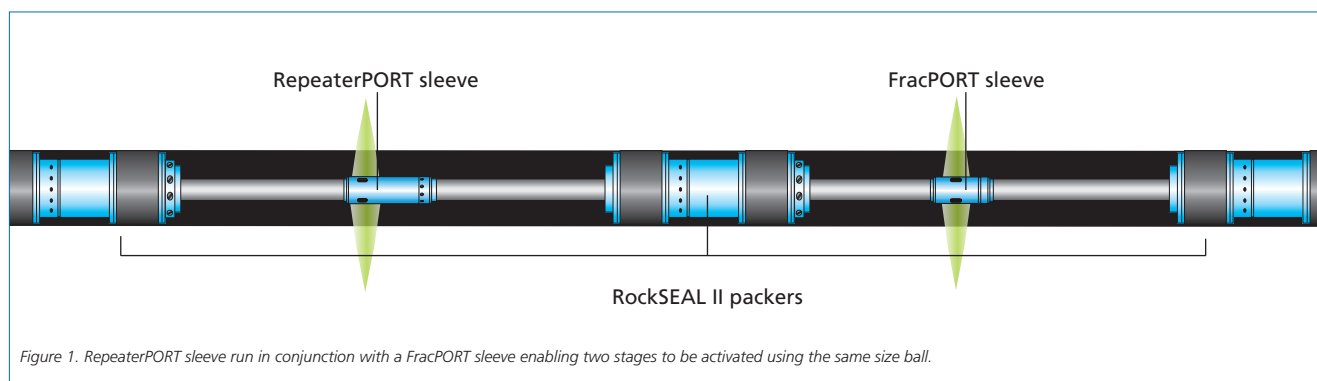


Figure 1. RepeaterPORT sleeve run in conjunction with a FracPORT sleeve enabling two stages to be activated using the same size ball.