

## Case Study

# StackFRAC system facilitates pre- and post-stimulation testing of exploration wells

INTERNATIONAL, ALGERIA  
STACKFRAC HD SYSTEM

## Background

An Operator working in the Ain Tsila field of Eastern Algeria wanted to prove gas reserves in an Ordovician-aged reservoir. To do so, the Operator drilled several exploration wells throughout the field to sample all areas. Testing needed to be done prior to stimulating the wells in order to assess the potential for commercial production from the reservoir.



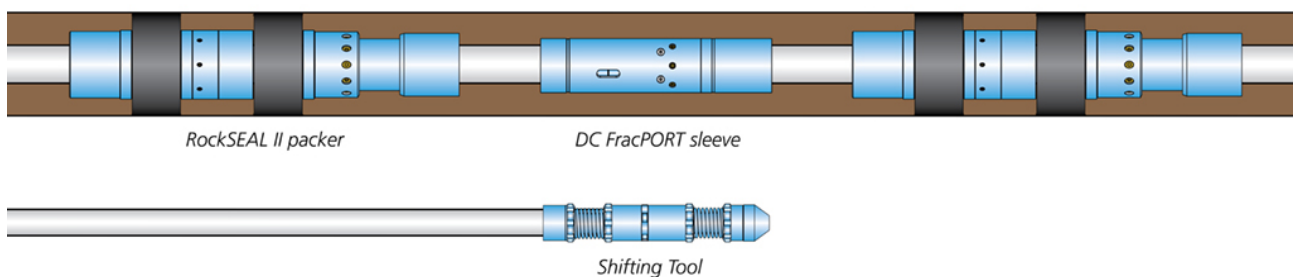
## Challenge

The Operator needed a completion that could be used in both horizontal and vertical wells that would permit the requisite testing and allow for hydraulic fracturing if needed. Because the wells were exploratory, decisions on how many stages the well was to have were finalized after logging the open hole to assess the reservoir. This meant that the completion needed to be flexible, and allow for last minute changes without compromising the timely delivery of equipment, or the successful operation of the completion.

# Solution

The Packers Plus StackFRAC® system is an open hole, multi-stage completion consisting of a series of FracPORT™ sleeves isolated between RockSEAL® packers. After installation, a ball is dropped to close the system off from the wellbore allowing pressure to build up in the liner to set the packers hydraulically. Once the packers are set, stage-by-stage stimulation is performed beginning at the toe of the well moving to the heel. Stage one is opened hydraulically by further increasing pressure within the liner. All remaining stages are opened by pumping a ball onto a ball seat within each FracPORT sleeve to build pressure behind the ball and open the sleeve. Successively larger balls allow for multiple FracPORT sleeves to be run in sequence. This is done in a single continuous pumping operation, a standard practice with Packers Plus completion systems, which are modular and designed based on the well requirements. This makes them flexible and able to adapt to any stimulation and testing program.

In this case, Drillable Closeable (DC) FracPORT sleeves were run in place of the standard FracPORT sleeves. The DC FracPORT sleeve can be shifted either with a shifting tool run on coiled tubing or with a ball as with the standard FracPORT sleeve. Each DC FracPORT sleeve can be opened and closed as desired with or without the ball seat in place. This enables pre- and post-stimulation operations such as production testing of individual zones, or water shut-off. In addition, all testing and stimulation can be done without a rig present to reduce operating costs as compared to the cemented liner method.



# Results

The Operator installed StackFRAC systems into four wells to allow both testing and hydraulic fracturing. The first well was horizontal and used a 4-stage system. The next two wells were drilled vertically and were slated to be completed with a single stage. The fourth well was horizontal and used a 2-stage system.

For the first well, each DC FracPORT sleeve was opened individually using a shifting tool run on coiled tubing and flow tests were conducted for each zone. Once all testing was

complete, the DC FracPORT sleeves were closed to allow for a standard ball-drop fracturing operation on all stages. After cleanup operations were completed, all of the DC FracPORT sleeves were closed and each zone was re-tested by individually opening the sleeves to compare stage-by-stage pre- and post-stimulation flow rates with very good results.

After open hole logging of the second and third wells, the Operator decided to evaluate two more zones with the StackFRAC system. The completion was quickly redesigned and 3-stage open hole systems were installed in both wells. After testing each of the three zones, one stage was hydraulically fractured in each well and the results were better than expected in both cases.

The last well was completed with two stages, tested, and is waiting to be fractured. The four appraisal wells were completed and all testing and stimulation goals were fulfilled without a rig present, within the designed time frame and below budget. The production results from the field were better than expected and a full development plan is now being prepared.