Case Study

RS Straddle system provides cost-effective solution for open hole acidization

Canada, Midale
RS Straddle System

Background

While light oil reservoirs in the Midale Beds have been waterflooded since the 1960s, this carbonate zone in southeast Saskatchewan has primarily served as a key research site for a CO2 monitoring and storage project. By the time the 12-year project concluded in 2012, nearly half of the 5,600 bbl per day of production from the formation was attributed to the enhanced oil recovery method of CO2 injection. The federal government estimates 10 Mt of CO2 were permanently stored in the Midale oilfield over the lifespan of the project.

Challenge

The Midale oilfield is shallower than the region’s Bakken formation and has considerably less activity. A privately owned operator was looking for a cost-effective solution to produce light oil from the relatively untapped reservoir. The operator wanted to utilize an open hole completion system to take advantage of the natural fractures in the carbonate zone, while stimulating the reservoir with an acid treatment to maximize production.

Solution

A 25-stage completion job was designed for a barefoot well with no liner using the Packers Plus RockSEAL® (RS) Straddle system. This retrievable service tool is used in open hole wellbores to create an isolated zone for injection, stimulation or testing operations. The RS Straddle system is mechanically set without the need for pumping. This enables the packer to be easily set and returned to the run-in position making it ideal for repeated operations.

The RS Straddle system is run downhole to the desired depth. With the last motion up on the tubing, right hand rotation followed by slacking off into compression engages the slips and allows the elements to extrude. Once the packers have isolated the desired zone, stimulation can begin. When the zone is completed, right hand rotation is maintained while pulling up on the tubing. This opens the unloader valves equalizing the tubing and annulus pressure. Continued pull allows the slips to disengage and elements to relax. The RS Straddle system can then be moved to the next zone.

The RS Straddle system can be customized to allow for flexibility in job design and execution. The RS Straddle system can be equipped with various accessories such as an emergency ball release, fluid control valve, inline gauges, or an upper cup assembly, which provides additional
pack-off in shallow wells.

Results

The operator’s open hole horizontal well in the Midale oilfield had a measured depth of 2,775 m and the RS Straddle system was run-in using a service rig. After being unable to set the tool at the determined depth of the first stage, the system was successfully set and unset at stages 2 to 8, delivering the desired acid treatment. The tool string was removed from the wellbore and although it was in good condition, the operator decided to run a new RS Straddle system downhole. The second tool string was successfully set and unset at stages 9 to 25, again delivering the desired acid treatment at each stage. Acid was pumped at a rate of 300 l/min and pressure ranges of 4 to 14 MPa. The second tool string used to complete the reservoir stimulation was also in good condition when removed from the wellbore.

By completing the well with the retrievable RS Straddle system, the operator was able to leave the wellbore barefoot, saving the cost of a full system installed on production liner. As well, the operator was able to utilize a less expensive service rig to run the RS Straddle system, instead of the more expensive drilling rig typically used to install an open hole, multi-stage completion system.

The RS Straddle system has also been successfully deployed by the operator to complete a dual lateral well in southeast Saskatchewan. Operator’s seeking to increase efficiencies in unconventional oilfields rely on new and innovative technologies. Advancements in the design of Packers Plus systems provide operators with efficient and cost-effective systems to complete their multi-stage horizontal wells.