

Australia's first cemented liner long-lateral application of the QuickPORT IV and Toe-AP sleeves

Australia



Increasing the horizontal lateral length of a shale gas well is a method to improve productivity and overall project economics. Historically, the drive for longer lateral lengths was offset by the limited number of completion options available to stimulate the toe section of an extended reach well. More specifically, long horizontal wells limit the use of plug-and-perf stimulation techniques since access to the toe section of the well is constrained by the maximum reach of coiled tubing length.

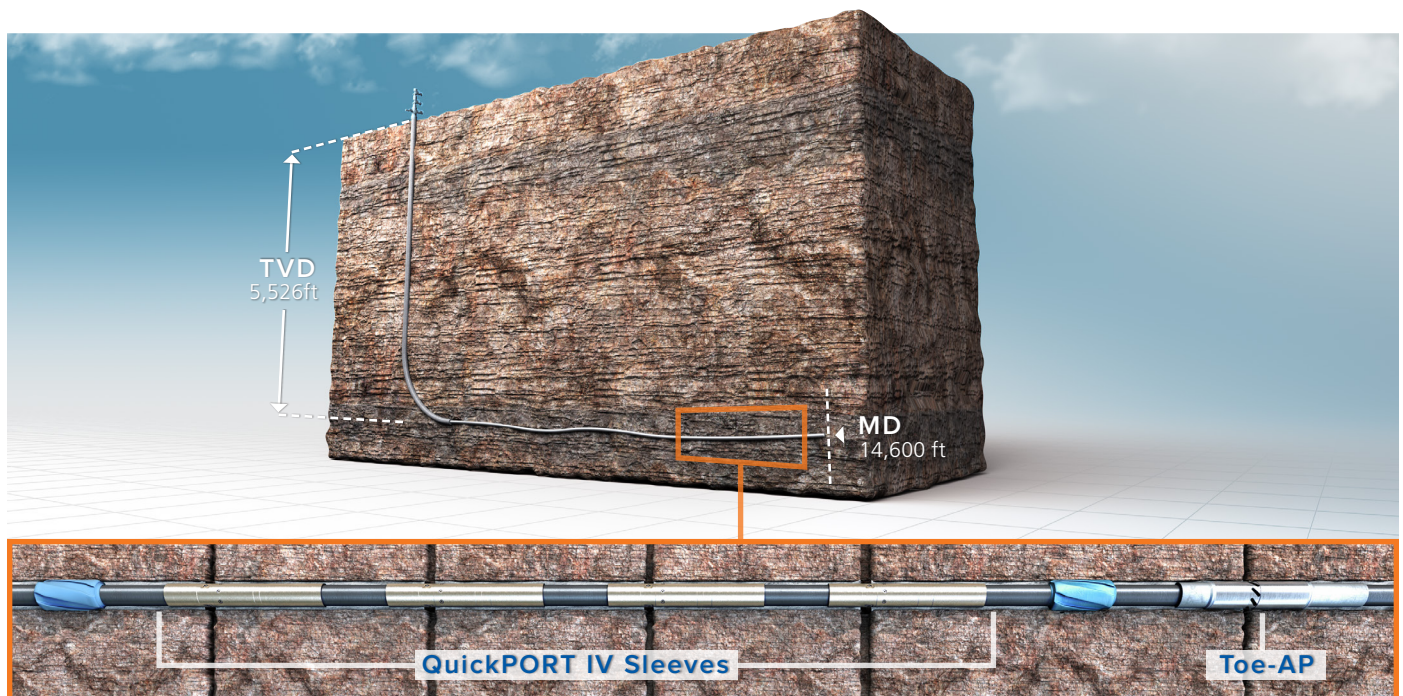
An operator in Australia planned the well completion of a 5,526 ft. TVD horizontal well in the Beetaloo Basin and needed a completion solution

that would establish communication with the formation to stimulate the toe stages. The completion liner was designed to be floated to the designed target depth of 14,600 ft. MD in the Velkerri Shale. The planned well step-out ratio (MD/TVD) of 2.64 dictated that a coiled tubing intervention to reach the toe would not be possible. Cemented, ball-actuated Packers Plus QuickFRAC system, coupled with the hydraulically-actuated Toe-AP sleeve, provided the means to access and to stimulate the remote reservoir section successfully.

CHALLENGE

The planned 4½ in. completion liner was designed to position the toe section of the reservoir at 8,600 ft. lateral length. Considering the plug-and-perf methodology, the intervention options were very limited for the shallower, heel section of the wellbore and non-existent for the toe section. The reservoir section at the toe was comprised of thin gas-bearing layers that were critical for overall production and thus the ROI for the project. As an additional requirement, the production liner was designed to be cemented and pressure tested prior to the commencement of stimulation operations. Considering the drive to reduce the overall cost of the well, the downhole completion equipment selection criteria was very demanding.

continued on reverse



Some or all of the systems, methods or products discussed herein may be covered by one or more patents, or patents pending.
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SOLUTION *(CONTINUED)*

To overcome the limitations of plug-and-perf technology in a long horizontal well, a first-in-the-region completion technique was implemented using the QuickFRAC system, consisting of multiple QuickPORT IV sleeves designed specifically for cemented liner completions. This multi-point-entry, ball-actuated system had already been proven globally to be an effective completion solution to stimulate reservoirs in long lateral applications where coiled tubing could not reach to the toe. This Packers Plus completion solution permitted a well integrity pressure test after cementing the liner in place by utilizing a pressure test sub and an SF9.4D degradable ball.

The hydraulically actuated Toe-AP assembly was deployed to initiate access to the reservoir section at 14,383 ft. MD where coiled tubing cannot reach. The Toe-AP is designed to withstand liner cementing operations after which it is armed at a specific, pre-determined pressure to shift open. Following the cementing operations, the Toe-AP was hydraulically opened, and an injection test confirmed good communication with the reservoir. After stimulating the deepest section of the wellbore through the Toe-AP, a single actuation ball was used to open four QuickFRAC sleeves to stimulate the second zone in a single pumping treatment. The same ball pumped through the QuickFRAC completion also provided isolation from the initial toe stage. QuickFRAC system features erosion-resistant nozzles, which provide limited-entry diversion to equalize treatment fluid distribution across the entire zone and thus maximize the returns from the reservoir.

RESULTS

The success of the QuickFRAC completion solution and respective effectiveness of the stimulation treatment through the sleeves was confirmed using gas and water chemical tracers. The QuickFRAC completion equipment functioned as designed, without the need for intervention. Using the Packers Plus Debris Sub as a pressure test sub, the cemented liner successfully passed the required pressure test and then facilitated communication from the wellbore to the reservoir as designed. This allowed for these specific reservoir zones at the toe to be hydraulically fractured, ultimately contributing to the largest stimulation treatment performed to date in Australia. It also demonstrated the ability of the limited-entry QuickFRAC system to breakdown the formation of a complex stress regime, without perforating through the zone of near-wellbore stress concentration.

The project resolved multiple challenges: reaching the distant toe of the well without intervention, enabling the equal distribution of the stimulation fluid across four cemented sleeves using erosion-protected nozzles sized specifically for the planned pumping treatment. The QuickFRAC system and Toe-AP technologies deliver value for any operation by providing a multi-point-entry, multi-stage completion solution for long, horizontal cemented wellbores, reducing the total project cost by eliminating intervention and unlocking previously inaccessible production with increased access to the reservoir.

Packers Plus is a leading supplier of multi-stage fracturing systems, providing field-proven stimulation technology for completing horizontal wells with superior production results in numerous formations around the world. For more information about Retina and other completion solutions, visit packersplus.com.