

Packers Plus® Case Study



Packers Plus and Schlumberger combine technologies for successful offshore Brasil screen completion



Background

The Campos Basin, found 80 km off the coast of Macaé, Rio de Janeiro, Brasil, has been explored for hydrocarbons since 1971. Advancements in directional drilling and multi-stage completions have enabled the development of previously uneconomical subsea reserves in this area. With these advancements, the Cretaceous section of the Waimea accumulation of the South Campos Basin has begun to see development. Oil in this carbonate formation was discovered through the drilling of an exploration well in December of 2009.

The Challenge

The operator wanted to section the well into stages in order to effectively distribute acid stimulation over the entire lateral, and so required a multi-stage completion with proven isolation. In addition, water production at the toe of the well was a concern, so the operator was looking for a completion that could mitigate post-stimulation water production. The presence of hydrogen sulfide (H₂S) and carbon dioxide (CO₂) create further challenges to completion design in this formation, as in their aqueous forms H₂S and CO₂ are acidic and will corrode standard steels. For their expertise in open hole, multi-stage

completions, Packers Plus was called upon to help overcome the challenges that this operation presented.

The Solution

The operator considered several packer styles to section the well into eight stages. They decided to use hydraulically set mechanical packers for their ability to hold higher pressures allowing for elevated stimulation pressure. The final design implemented field-proven Packers Plus RockSEAL® II dual-element packers run in conjunction with Schlumberger premium screens.

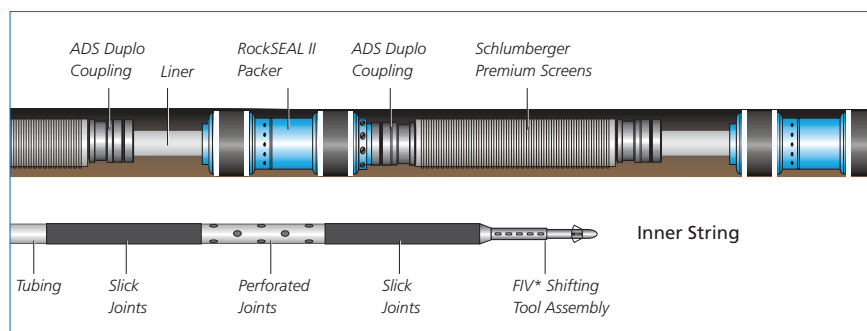
The system was manufactured from corrosion resistant alloy (CRA) to ensure its integrity after installation. RockSEAL II packers are set by pressuring up the liner. However, because the operator opted to use screens, an alternative was necessary. To set the packers, an inner string was run into the well simultaneously with the liner to the landing depth. This inner string included a polished joint on either side of a perforated wash pipe. While pulling the inner string out, the polished joints were aligned with the acid diversion system (ADS) Duplo couplings located above and below each packer to form a seal, and fluid was pumped through the wash pipe in order to pressure up and set the packers.

Once the packers were individually set, the operator was able to acidize the well using a similar inner string to seal the ADS Duplo coupling above each stage with a polished joint and sequentially stimulate the eight stages along the 1,000 m horizontal wellbore. The acid stimulation was conducted at 1,500 psi, and was done in order to increase the effective permeability by cleaning the formation to ensure optimal oil recovery.

The Results

A drill stem test showed a potential production rate of 40,000 BOPD of 20° API oil with an expected flow rate of 20,000 BOPD. "This is one of the best production tests I have ever seen in my life," said the operator's General Director. Reservoir rock and fluid samples were collected and will be analyzed to assist the operator in preparing a development plan moving forward.

A second well will be completed using the same system design and the operator plans to drill more wells in the area. They are also reviewing the Packers Plus StageFRAC* system which will allow them to increase stimulation pressure should the formation require fracturing. The StageFRAC system also provides the option to close water-producing zones through the use of Drillable Closeable FracPORT™ sleeves.



RockSEAL® II packers run in conjunction with Schlumberger premium screens.

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