CASE STUDY

HALLIBURTON

Offshore Malaysia,
Southeast Asia

Swellpacker® water swelling system provides reliable isolation in ESS completion

CHALLENGE

Competitor's osmosis-based swellable packers failed to seal because of relatively low temperature and high salinity of well

- Without an effective seal, crossflow can occur

SOLUTION

Deploy the Halliburton Swellpacker® WS LT system instead because its compound swelling is not based on osmosis, which allows a reliable hydraulic seal at low temperatures and high salinity

- Tested and qualified low-temperature water-swelling compound at downhole conditions to help ensure effectiveness
- Allowed sufficient time to run middle completion and expand the ESS before creating a seal
- Swellpacker® slip-on system for placement flexibility and expedited logistics

RESULT

Four Swellpacker WS LT slip-on systems run and set successfully in lower completion

- Tools tested and delivered in an eight-week period
- Once installed, packers held approximately 1,000-psi differential pressure between two different injection zones after seven to eight days
- Tool provides more than 3,000-psi differential pressure capacity when fully set
- Operator overcame challenge in short time with Swellpacker WS LT system

Overview

A major operator in Malaysia was used conventional non-Halliburton swellable packers for zonal isolation in its middle completion. However, because of the lack of sealing by the competitor's packers, the operator faced several challenges. To rectify the issue, the operator decided to stop use of the competitor's packer equipment and instead engage Halliburton Swell Technology to help establish a reliable annular isolation seal in the wellbore.

Halliburton Swellpacker® water swelling (WS) low temperature (LT) systems were used for zonal isolation because they allow for full expansion of the expandable sand screen (ESS) before the packer sets which avoids mechanical stresses and movement in the completion system.

Four Swellpacker systems were run and set successfully in the lower completion seal bore. Once installed, permanent downhole gauges (PDGs) confirmed that the Swellpacker systems held apporoximately 1,000 psi of differential pressure between two different injection zones after seven to eight days.

Challenge

During the middle phase of a completion, an ESS is typically deployed and a seal with the lower completion is established to prevent cross flow and segregate the injective zone. That, however, was not the case during this operation.

A competitor's osmosis-based packers were first deployed in the operator's well, but they did not provide sufficient sealing because of the relatively low temperature and high salinity of the fluid (formation fluid). This was later confirmed by a selective injection test and permanent downhole gauges. The operator knew this was a problem that had to be immediately rectified to avoid even greater issues.

The operator decided to forgo use of the competitor's zonal isolation packers and instead engage the Halliburton Swell Technology team for its industry-leading experience, technological advantages, and capability to test, build, and quickly deliver equipment.

Solution

Halliburton proposed the Swellpacker® WS LT system, because its swelling compound is not based on osmosis, which allows a hydraulic seal at low temperatures and in high-salinity wellbore fluid. In addition, Halliburton offered to test and qualify the low-temperature water-swelling compound at downhole fluid and temperature conditions to confirm it would be an effective downhole solution. Tests were performed in a span of two weeks in three different operator-supplied fluids.

Because the packer design needed to provide sufficient time to run the middle completion and expand the ESS before creating a seal, the team entered the test data into Halliburton SwellSim® computer software to help predict packer swell speed. It predicted two days of running time to total depth (TD) with a seal established after four days (including a safety trip for POOH). The test also predicted that the system would hold pressure after six days, in contrast to the five days deemed acceptable by the operator. Test results in two operator fluid systems showed OD expansion as a function of time, which proved adequate swell speed at downhole conditions, approximately 40 to 60°C and up to 25% salinity.

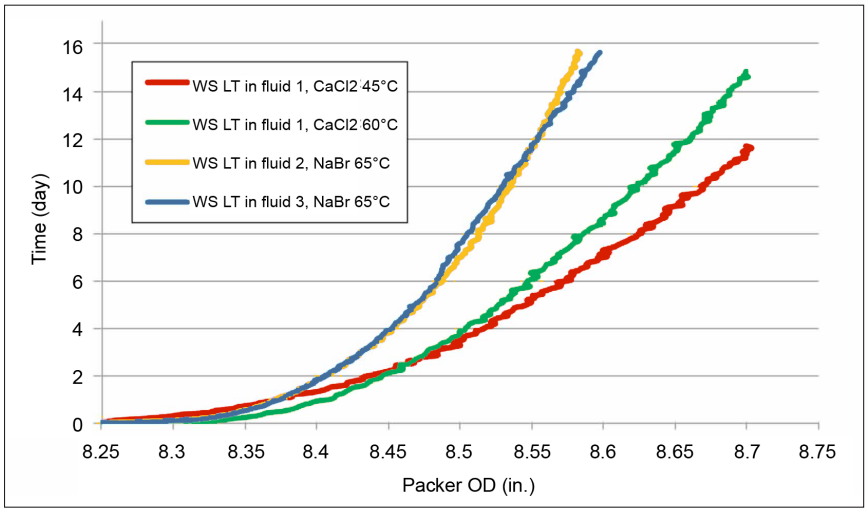
Based on SwellSim software and test results, Halliburton proposed the slip-on system design to simplify and expedite logistics as well as add flexibility to the packer space-out.

Result

Halliburton tools were tested, manufactured and delivered onsite within only eight weeks. Four Swellpacker WS LT slip-on systems were run and set successfully in the lower completion seal bore, and the operator was able to run and expand the ESS during the middle completion and set the packer after the operation. Additionally, PDGs confirmed that the Swellpacker systems held approximately 1,000 psi of differential pressure between two different injection zones seven to eight days post-installation.

Halliburton provided an effective and reliable solution, in a short period, which saved the operator both time and money.

Swell curve for the fluid(s) system at one of the test temperature(s)



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