

Combining Cement and Swell Technology Results in Effective Well Control and Reliable Zonal Isolation Behind Casing

FIRST 13 5/8-IN. SWELLPACKER® SYSTEM INSTALLATION IN ASIA PACIFIC

VIETNAM, SOUTHEAST ASIA

CHALLENGE

Reliable secondary barrier zonal isolation in the event of severe losses during the cement job to avoid expensive remedial operations

- » Severe fluid losses anticipated
- » Well control due to huge volume of mud losses to formation and annulus pressure buildup
- » Packer OD of less than 14.65-in. after four days
- » Logistical obstacles to delivering the solution on time

SOLUTION

Swellpacker systems with delay fusion layer to provide highly reliable secondary barrier to primary cement for zonal isolation

RESULT

Swellpacker systems provided effective zonal isolation control along with good shoe to drill ahead provided by cement, saving the operator money and optimizing logistics.

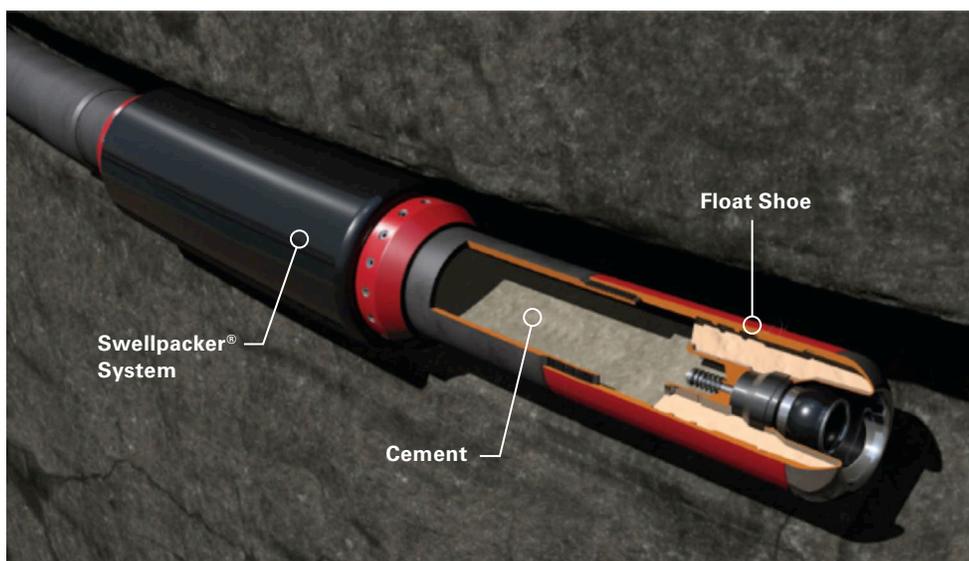
- » 13 5/8-in. Swellpacker system was installed trouble-free
- » 10 days after the cement job and 14 days after the Swellpacker system passed the rotary table, the pressure in the C-annulus was at zero and no more pressure had built up

OVERVIEW

A major operator in Vietnam decided to run and cement a 13 5/8-in casing inside 16-in. liner for the first time in its high pressure/ high temperature (HP/HT) field. Halliburton determined severe fluid losses could be expected due to the very tight annular tolerance between the 13 5/8-in. casing and 16-in. liner. The primary objective was to provide a good shoe to drill ahead and a secondary barrier for added zonal isolation should the cement column be impacted by the high equivalent circulating density (ECD) and the low pressure zone below the casing shoe.

Halliburton proposed using its Swellpacker® isolation systems to help ensure well integrity. Since drilling operations were ongoing, the operator needed to have the equipment delivered to the wellsite in only six weeks. Adding to the challenge, a lab test was required to prove that the Swellpacker system design would meet operator internal approval before running it in the well.

The 13 5/8-in. Swellpacker system was delivered on time, and the required lab test report confirming that the packer could be safely run was provided several days before the operation was to begin. The Swellpacker system was then deployed and sealed successfully, exceeding operator expectations.



Swell Technology Systems for Well Construction

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CHALLENGE

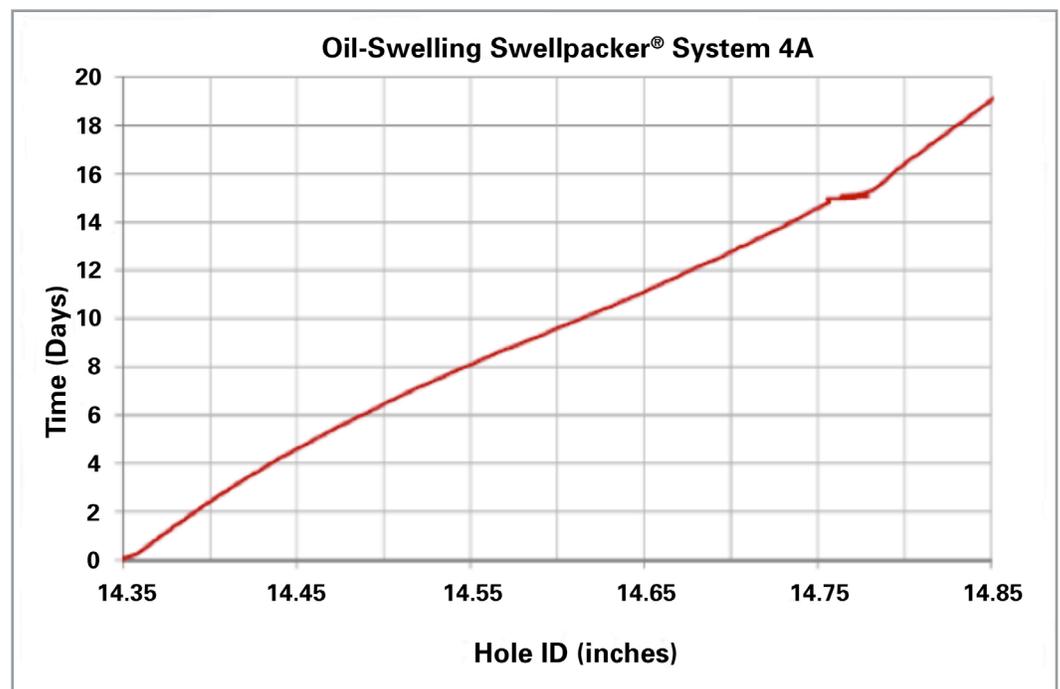
For the operator, this particular well was the most extreme of HP/HT wells in the field, and it would be the first run using 16-in. casing as a parent casing rather than the 18-in. parent casing typically used for a 13 5/8-in. casing. Potential for severe losses were anticipated during the cement job due to the very tight annular tolerance between the 13 5/8-in. casing and 16-in. liner hanger, which could lead to high equivalent circulating density.

Possible fluid loss would minimize the chance achieving the planned top of cement inside the 16-in. casing. This raised concern about well control, since ballooning effects can be caused by huge volumes of mud loss to the formation and annulus pressure build up due to no cement barrier inside 13 5/8" x 16" annulus as expected. The operator needed a secondary solution along with good cement at the shoe to drill ahead to help ensure total zonal isolation control.

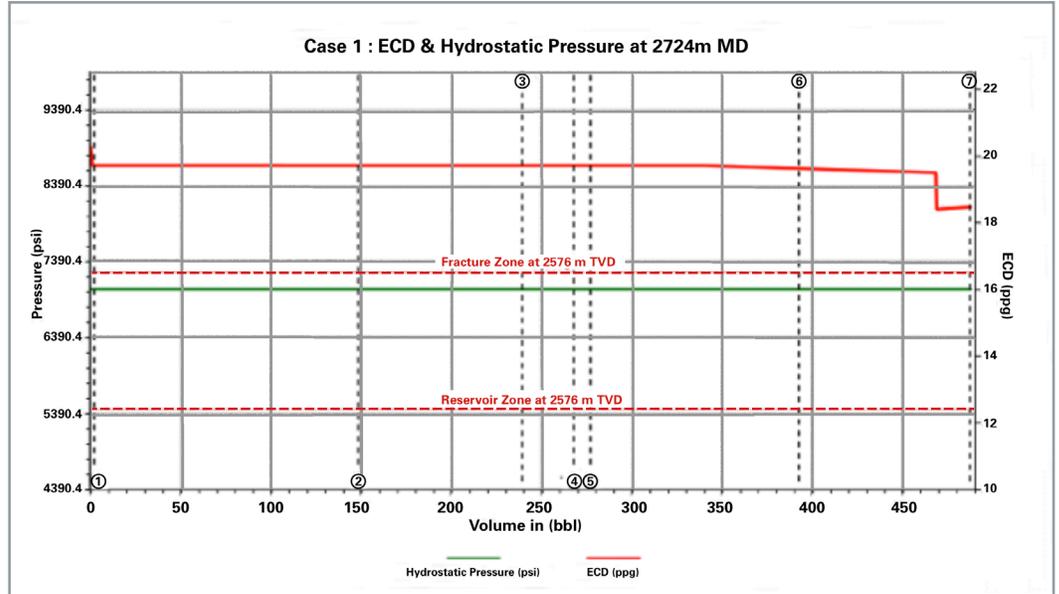
SOLUTION

Halliburton proposed the use of its highly reliable Swellpacker isolation systems for the secondary barrier. The Swellpacker system would swell in oil-based mud (OBM) to isolate the formation below from the well. In conjunction with the operator, it was determined that the packer OD needed to be less than 14.65-in. after four days' time. The Swellpacker system with its delay fusion layer fit these requirements, which helped ensure that the packer would enter the polish bore receptacle of 16-in. top of liner and keep the risk of losses to a minimum during the cement job.

This operation marked the first use of a 13 5/8-in. Swellpacker system in Vietnam. Ongoing drilling operations required Halliburton to deliver the system to the operator's base in Vietnam within six weeks, including commercial logistics and other relevant processes. The operator also required that a donut test report be submitted for their internal approval before running the system. The operator would provide the basepipe, making close collaboration on the logistics process especially critical.



Swell curve on the lab test done to verify swelling OD < 14.65 in. after four days



The ECD exceeded the provided FG of formation at 16-in. liner shoe - indicating strong possibility of severe losses during the cement job.

RESULT

Pressure in the C-annulus built up to 200-300 psi for four days after the cement job was finished, then bled off to zero psi several times over the next five days. Ten days after the cement job and 14 days after the Swellpacker system passed the rotary table, the pressure in the C-annulus was at zero and no additional pressure had built up. This timeline was close to the swelling profile of the Swellpacker system and donut test, indicating that the packer fully sealed the C-annulus.

Without the Swellpacker system, effective well control would not have been possible after completing the cement job, since the cement was unable to bring top of cement inside the 16-in. liner due to very tight annular 13 5/8-in. x 16-in. Formation pressure below the hanger indicated the pressure kept rising to the surface, reaffirming the importance of the reliable secondary barrier.

Halliburton took on the challenge to mate these Swellpacker systems with the operator’s basepipe, even in a tight lead time. This helped the operator save money, and optimize logistics and manufacturing lead time. The operator was impressed with the Halliburton team’s ability to provide a viable solution on such short notice, to exceed their expectations of service quality, and to resolve their challenges for this cement job.

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