

OpenPath Reach Service Saves USD 180,000 on Offshore Acid Stimulation for Middle East Operator

Single-phase retarded acid system reduces fluid volume and equipment footprint, eliminating the need for a stimulation vessel, Arabian Gulf

CHALLENGE

Economically stimulate oil production from an offshore horizontal well through a hot carbonate formation.

SOLUTION

Deliver OpenPath Reach* extended-contact stimulation service with single-phase retarded acid system through CT.

RESULTS

- Exceeded the operator's oil production expectation by more than 1,000 bbl/d [159 m³/d].
- Saved more than USD 180,000 by reducing operating time and eliminating the need for a stimulation vessel.

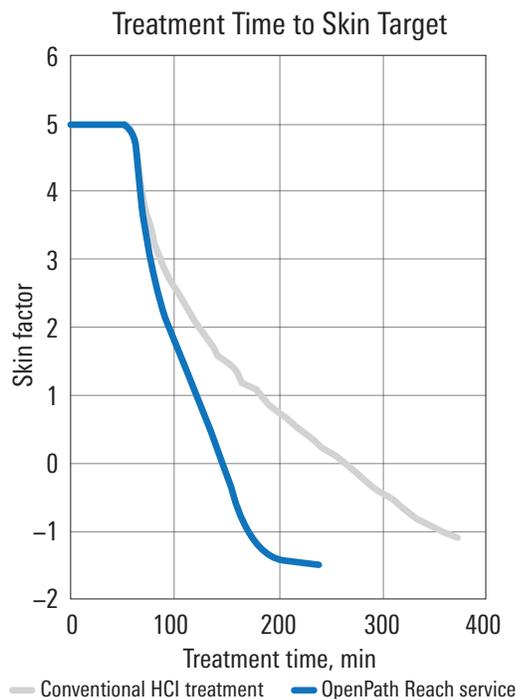


Hot, horizontal open hole limits offshore stimulation options

An operator in the Middle East operates a number of offshore wells. Historically, the operator has drilled vertical and deviated wells, but recently the company began a horizontal drilling campaign to boost oil production from the field.

Because of their high H₂S and CO₂ content, the wells are drilled overbalanced, which normally causes filtercake damage to the producing formation. To bypass the damage and stimulate production from the carbonate formation, the operator typically uses conventional matrix acid treatments, bullheading 15% HCl at 10 to 15 galUS/ft [124 to 186 L/m] from the offshore rig. Although the bottomhole temperature reaches 230 degF [110 degC], the cooldown effect of the stimulation fluid volume in the relatively short vertical interval minimizes the risk of rapid acid spending.

For the next horizontal well, a new stimulation approach was required for several reasons related to the 1,400-ft [427-m] openhole section. First, bullheading was unlikely to distribute the fluid across such a long lateral. Second, the volume of HCl to treat the section would require a dedicated stimulation vessel to support the operation because of the limited footprint on the offshore rig. In addition, the time to pump such a volume would be expensive in terms of rig operating time. Finally, the longer openhole section would limit the cooldown effect, likely leading to rapid HCl spending and face dissolution rather than deep wormhole penetration.



Stimulation modeling determined that delivering an OpenPath Reach service with single-phase retarded acid through CT would reduce the acid volume requirement, improve the final skin factor, and save more than 3 hours of offshore rig time compared with a conventional HCl job.

Single-phase acid system simplifies design and delivery

To optimize the stimulation design and delivery program for the well, the Schlumberger engineers compared options using the WellBook* software application for treatment design, execution, and evaluation, and Kinetix Matrix* matrix stimulation design. Simulations led the engineers to recommend an OpenPath Reach extended-contact stimulation service with single-phase retarded acid system delivered through coiled tubing.

Compared with HCl, the single-phase retarded acid system is much more efficient at high temperature, delivering stimulation performance similar to that of conventional retarded acid systems, such as emulsified acid. In addition, compared with other retarded acid systems, the single-phase fluid simplifies mixing and pumping operations, limits the equipment footprint requirements, and minimizes the risk of emulsions during production.

CASE STUDY: OpenPath Reach service saves USD 180,000 by reducing acid stimulation footprint for Arabian Gulf well

For the Arabian Gulf well, the acid system's efficiency enabled skin reduction with a dosage of only 5 galUS/ft through CT. The reduced acid volume and limited equipment footprint eliminated the need for a stimulation vessel. In addition, simulations indicated that pumping the smaller volume would save 3 hours of rig time compared with pumping the larger HCl volume.

To model CT reach and deliverability, engineers used CoilCADE* coiled tubing design and evaluation software. Also, upon final fluid selection, formation fluid samples were tested with the engineered acid system and additives to verify compatibility.

Treatment saves money and stimulates oil production

The OpenPath Reach service operation was conducted as approved by the operator, with 1¾-in CT reaching total depth to distribute the single-phase acid system throughout the open hole. In all, the treatment squeezed approximately 3,960 galUS [15,000 L] into the formation from toe to heel.

The resulting oil production exceeded the operator's expectation by more than 1,000 bbl/d [159 m³/d]. In addition, reducing the job time and eliminating the need for a stimulation vessel saved the operator more than USD 180,000.

The operator has decided to replace 15% HCl with the single-phase acid system in upcoming stimulation operations.

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