

OpenPath Reach Service Boosts Production 20% While Reducing Acid Volume 30%, Iraq

Production from low-permeability target zone increased 67% because of coiled tubing-enabled isolation and selective stimulation

CHALLENGE

- Restimulate oil production improvement in a deep, hot carbonate well without the risky diesel transport required for a conventional emulsified acid system.
- Accurately place acid in target intervals with high permeability contrast.

SOLUTION

- Model the reservoir and stimulation options using WellBook* software application for treatment design, execution, and evaluation.
- Design and deliver an OpenPath Reach* extended-contact stimulation service with water-based single-phase retarded acid system.
- Stimulate intervals selectively by deploying CoilFLATE* coiled tubing through-tubing inflatable packer and ACTive* real-time downhole coiled tubing services.

RESULTS

- Eliminated risky diesel transport and related delays.
- Reduced treatment fluid volumes by 30%, which also eliminated two truck trips to deliver fresh water and accelerated flowback to gain an oil increment valued at more than USD 500,000.
- Improved production by 20% overall and 67% in the target intervals, with the incremental oil paying off the stimulation operation in less than 3 weeks.
- Accelerated operational time, reducing security costs at the wellsite.

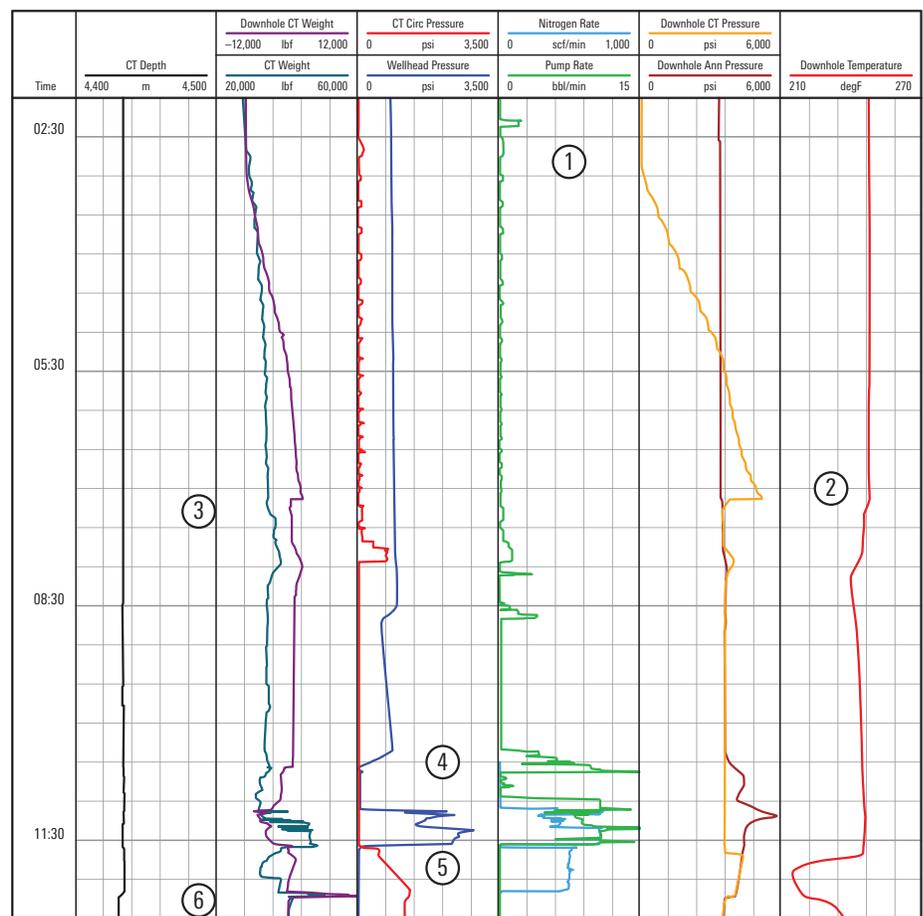


Increase and sustain oil production

A vertical well through a carbonate formation in Iraq experienced a rapid oil production decline after initial acid matrix stimulation by another service company. A conventionally bullheaded 15% hydrochloric acid (HCl) treatment reduced formation skin and delivered oil production that met the operator's expectations. However, 7 months later, the production had declined enough that the operator needed to restimulate the well to maintain economic production.

Penetrate more deeply into the reservoir

Schlumberger engineers simulated several treatment designs and fluid options using the WellBook application. The simulations determined that 15% HCl reacts too rapidly with the reservoir rock at the high bottomhole temperatures (>248 degF [>120 degC]), leading to face dissolution without deep reservoir penetration, and therefore rapid declines.



Real-time data, enabled by the ACTive services, reduced treatment time by giving immediate feedback about the CoilFLATE packer inflation (1-2), anchoring test (3), fluid delivery (4), nitrogen lifting (5), and packer release (6).



A CoilFLATE packer (right) isolated the high-permeability zones, enabling the OpenPath Reach service to precisely stimulate lower-permeability zones using less fluid and equipment compared with conventional emulsified acid stimulation.

To improve penetration and long-term results, the engineers first considered emulsified acid with a diesel base, which had been used with positive results in this field. However logistics and security constraints for transporting diesel in Iraq, additional equipment setup for mixing this fluid, and higher friction pressures related to the emulsified systems led the operator and Schlumberger to consider a new option.

The engineers recommended an OpenPath Reach service with water-based single-phase retarded acid. The system is easy to mix in real time on location with no special equipment or processes. In addition, the system imparts very low fluid friction, enabling higher pump rates and more efficient stimulation with less fluid. Core flow and compatibility testing also verified that the single-phase acid system was compatible with the formation and reservoir fluids.

For accurate and uniform acid placement into target zones of widely differing permeabilities, Schlumberger proposed a selective stimulation using a CoilFLATE packer to isolate specific segments for treatment with ACTive services to enable precise depth correlation and control of the packer inflation, anchoring, and monitoring of the stimulation treatment.

Reduce fluid volumes for faster flowback and production

The engineered operation was delivered as approved by the operator, in a treatment that used 30% less fluid as compared with the conventional 15% HCl because of the improved efficiency of the single-phase retarded acid. The design simplified logistics to wellsite, reduced treatment time, and accelerated flowback to generate initial production 2 to 3 days faster as compared with the conventional HCl treatments.

The operation improved production by 20% overall and 67% in the target zone, with the incremental oil paying off the stimulation operation in less than 3 weeks. In addition, the reduced treatment time minimized site security costs, and the improved flowback resulted in an early oil increment valued at more than USD 500,000.

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