

# Kuwait Oil Company Decreases Wellhead Injection Pressure by 1,000 psi with ACTive Q Service

Real-time flow measurement enables successful stimulation and saves three days of operational time

### CHALLENGE

Determine the optimal pump schedule and diversion strategy to maximize the zonal coverage achieved from stimulating the horizontal openhole section of a water injector well.

### SOLUTION

- Use ACTive Q\* real-time flow measurement service to obtain an accurate prestimulation injection profile.
- Adjust the stimulation strategy to optimize the coverage and effectiveness of the treatment fluid.
- Acquire a postinjection flow profile with the ACTive DFLO\* CT real-time flow measurement tool at the end of the stimulation run to confirm treatment effectiveness.

### RESULTS

- Reduced the wellhead injection pressure from 1,000 psi prestimulation to zero psi poststimulation, with a constant injection rate of 8 bbl/min [1.27 m<sup>3</sup>/min].
- Improved injectivity after acid stimulation and achieved a more uniform injection over the 2,400 ft [731.5 m] of the horizontal openhole section.
- Performed preprofiling, stimulation, and postprofiling in a single run, which minimized costs, enabled fast decision making, and improved operational turnaround time.



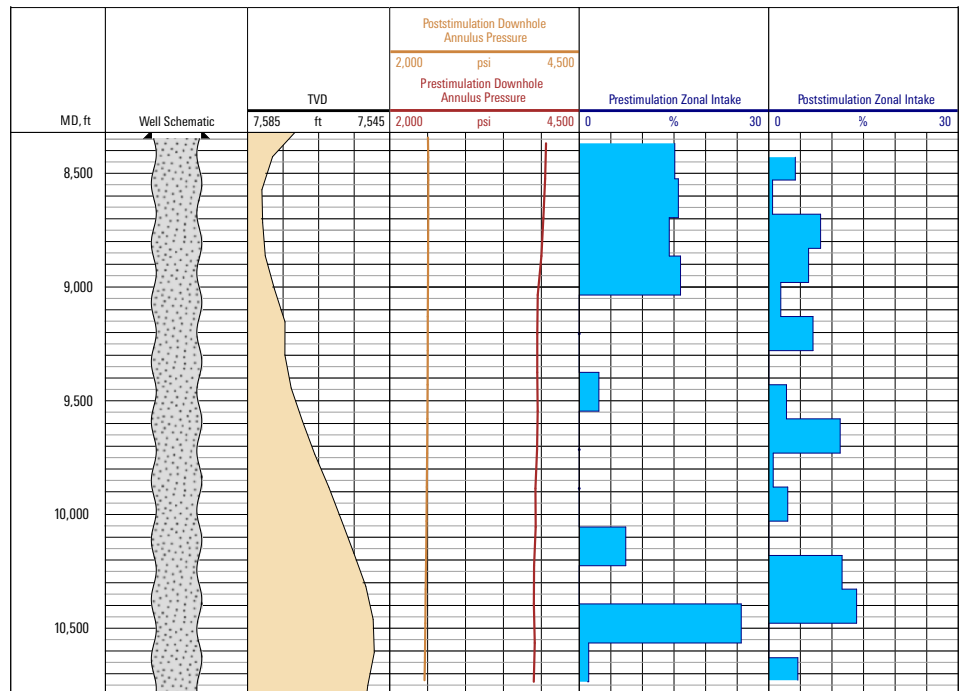
### Improve declining injectivity of water injector well

A water injector well in the Sabriya field in Kuwait exhibited falling injection rates over time. This was accompanied by an increase in injection wellhead pressure, which was negatively affecting the pressure support for other producer wells. Because blindly bullheading treatment fluid from the surface had only minimally improved injection rates in the past, Kuwait Oil Company (KOC) wanted to identify and target sections of the interval that needed stimulation or diversion. KOC had previously used traditional logging solutions, but it was interested in using newer technology that would save time and eliminate additional runs to obtain the needed information.

### Identify and target intervals with real-time flow measurement services

Schlumberger suggested using the ACTive Q service and the ACTive DFLO tool to identify intake and tight zones, enabling the operator to adjust the pumping program to accurately target sections along the interval.

The ACTive Q service identified two primary thief zones, located at the heel and toe of the well. It also indicated that the middle section was not taking any fluid. Having this information allowed KOC to focus the treatment, using coiled tubing to spot acid along the middle section while leaving the toe and heel untouched. Because the ACTive DFLO tool is resistant to acid, engineers were able to monitor and adjust pumping of the treatment fluid while the stimulation was in progress.



Comparison of pre- and poststimulation injection profiling along the openhole horizontal section. The acid stimulation targeted the middle section and resulted in a more uniform water injection distribution along the open hole. Surface injection pressure was reduced from 1,000 to zero psi.

**Enhanced injectivity while reducing expenses and intervention time**

Using accurate real-time flow data to target the stimulation treatment substantially improved the wellhead injection pressure from 1,000 psi to zero psi, with a constant injection rate of 8 bbl/min [1.27 m<sup>3</sup>/min]. In addition, the ability to combine real-time flow monitoring, injection profiling, and acid stimulation in a single run significantly reduced costs by eliminating three days of operations that would have been required to acquire information with spectral noise logging. Compared to traditional bullheading, the customized strategy saved fluid resources and also prevented the overstimulation of the major intake zones.

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