Case study: Bualuang Field, Offshore, Thailand

One-Stage sandstone acid system and Roto-Jet tool increased well injectivity by 350%, saved USD 140,000

Production from the Bualuang field was struggling. Injectivity in the field was down 12%—presumably because deposits had built up in the near wellbore of a key disposal well. The operator used the well to dispose of water produced alongside hydrocarbons from nearby wells. If injectivity couldn't be reversed, production from the field would dramatically decline. Though the operator previously had the well treated with a solvent wash, the results were short-lived, and the well's 1,470 ft (448 m) stand-alone screen section was again being choked by deposits.

The sandstone formation would require an acid treatment, but it would be a challenge for the drilling rig to accommodate the volume of hydrochloric acid (HCl) that would typically be used. Alternate acid storage arrangements or multiple shipments would increase costs. After evaluating several alternatives, the operator asked Baker Hughes for a solution that would evenly remove the damage in the long screen section, reduce coiled tubing (CT) runs, and that was compact enough to be stored on the rig.

The Baker Hughes team selected the **One-Stage Sandstone Acid (OSSA)** system. The OSSA system is designed to eliminate the HCl preflush and postflush stages that conventional sandstone acid systems require. The system features a delayed-release mechanism so that the acid maintains its effectiveness deep in the formation, making the cleanout itself more effective. The team would use the **Roto-Jet™ rotary jetting tool** to deliver the acid system. The Roto-Jet tool removes downhole deposits and uses highly efficient and carefully directed jets to help clear a path for acid to travel deep into the formation.

Before the job began, the team used **CIRCA™ modeling software** to determine how to use the Roto-Jet tool most effectively in this well. A drift test was then performed with a blank BHA to ensure that the logging and acidizing BHAs would pass through the inconsistent ID of the sand screens. After the drift test, the well was logged to determine the depth of the near-wellbore obstructions and the Baker Hughes team deployed the Roto-Jet tool.

The One-Stage Sandstone Acid system remediated a struggling disposal well.

Challenges

- Reverse the injectivity decline in offshore field
- Evenly distribute acid in a long treatment area of a highly deviated well
- Accommodate limited deck space to store and mix acid treatment

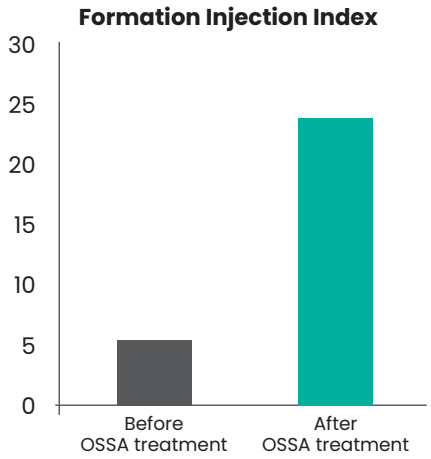
Results

- Saved 14 hours rig time and an estimated USD 140,000
- Increased formation injectivity by 350%
- Removed near-wellbore damage along 1,470 ft drainage section

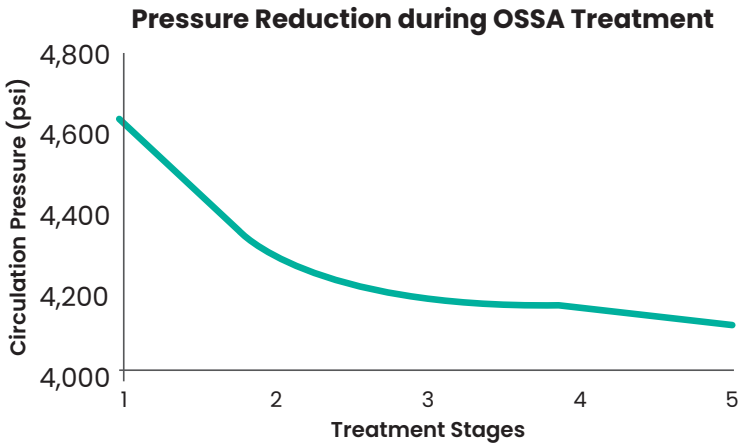
When the tool reached the well's screen section, where the blockages were located, it performed a solvent prewash to clear any residual oil from the surface of the screens and the formation. It then jetted the OSSA treatment evenly into the formation along the drainage zone.

The OSSA system eliminated transportation, pumping time, and mixing of eight stages of HCl preflush. This saved an estimated 14 hours of rig time and reduced the operator's costs by USD 140,000.

Pressure drop declined significantly when the OSSA system made contact with the formation, and continued to drop as the treatment progressed, indicating that obstructions were dissolving. After the OSSA treatment, the logging data indicated the formation's injectivity increased to 24.6 compared to 5.4 before the treatment. And several months later, injection rates were maintaining a level 50% higher than before the OSSA treatment, enabling the operator to produce to its true capacity.



The OSSA system with Roto-Jet tool significantly improved the injection well's effectiveness.



Treatment pressure declined significantly throughout the OSSA treatment, indicating that fluid was traveling to the reservoir much easier.

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