

Case study: Kuwait

# Enhanced perforating system restored production to ESP well

A client in Kuwait was having issues maintaining production due to poor inflow performance from the reservoir. The ESP (electric submersible pump) was repeatedly stalling, causing a loss of production and frequent shut-ins.

Baker Hughes personnel proposed re-perforating the well with the new **DeepConnect™ shaped charge** and to add the enhanced **TerraPERM™ propellant-assisted perforating system**.

DeepConnect is the field-proven series of shaped charges from Baker Hughes specifically designed to perforate reservoir rock. The perforation tunnel geometry and entry hole size are tuned for maximum productivity.

TerraPERM is a propellant based system designed to add additional energy to the perforating event. This additional energy will break through the crushed and compacted rock created by the detonation, improving near wellbore skin and overall conductivity.

Baker Hughes designed a gun system specifically for the DeepConnect and TerraPERM combination and deployed it to Kuwait.

The pump assembly and tubing were removed from the well and Baker Hughes wireline rigged up and deployed the DeepConnect gun system. High-speed data recorders were run with the gun string to record the pressures generated during the perforating event. Figure 1 shows actual pressure data from the well. Pressure data from a conventional gun detonation is shown for comparison (orange curve).

The client performed an injectivity test immediately after perforating, the results exceeded the client's expectations, clearly illustrating that the wellbore was effectively connected to the reservoir through the perforations.

The well was put back on production with no further stalling issues, the client was extremely happy with the overall result.

## Challenges

- ESP repeatedly stalling due to poor fluid inflow from the reservoir
- Low oil production
- Client wanted to ensure a clean connection to the reservoir

## Results

- Injectivity test performed on the well after perforating exceeded customers' expectations, indicating good reservoir connection and low formation skin

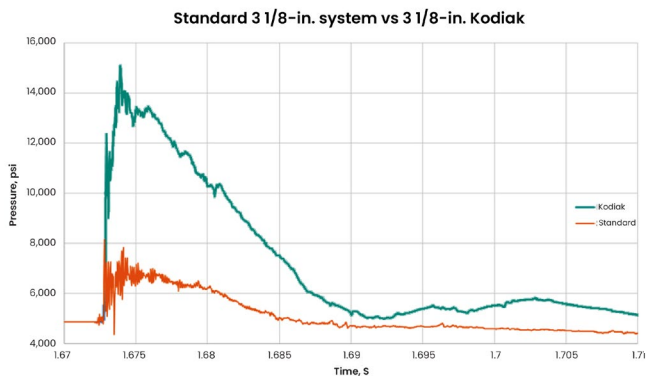


Fig. 1 - The green curve shows the additional energy generated by the propellant system as compared to a conventional gun system.



DeepConnect reservoir-driven perforating charges deliver increased formation connectivity compared to traditional charges.