Regaining Production from a Sand-Plugged Reservoir in Deepwater Indonesia

Case study: Chevron successfully cleans wellbore using real-time data

CHALLENGE
Use coiled tubing (CT) cleanout to restore access to and regain production from a water-sensitive, sand-plugged perforation zone in a deepwater well with low bottomhole pressure (BHP) gradients.

SOLUTION
Combine engineered cleanout solution with ACTive* in-well live performance for real-time BHP and fluid flow data during the cleanout process.

RESULTS
Achieved successful cleanout and regained access to high-producing reservoir.

High-producing deepwater well
For a high-producing deepwater well in the West Seno field, Indonesia, Chevron needed to regain access to a perforation zone plugged by sand fill. Initial CT cleanout operations were unsuccessful because of
- large casing—greater than 4.5-in ID
- high deviation angles—greater than 60°
- low BHP gradients—less than 0.3 psi/ft

The company attempted direct circulation using gas lift, reverse cleanout using fluid, and direct foam circulation. Respectively, these techniques resulted in intermittent returns, a stuck pipe incident, and high cost due to offshore logistical limitations.

New cleanout method
Schlumberger supplied a new cleanout method using an engineered cleanout solution, combined with ACTive in-well live performance. The gel is a diesel-base solution with a lower density than water-base gel fluids, resulting in a lower hydrostatic fluid column suitable for low-BHP cleanout applications. Core flow tests on the West Seno field showed the gel to be compatible with the water-sensitive formation. They also showed an increase in retained permeability using the gel. Furthermore, because it works in a single phase, the gel proved less complex than foamed fluids, and its high viscosity limited invasion.

The ACTive CT service provided real-time BHP data that was used with the existing gas lift system to perform the cleanout. Transient effects on the gas lift mandrel could be measured, and operations could be adjusted. The fill-loaded column of fluids was managed with the real-time information, allowing circulation to be maintained at all times. Moreover, the ACTive service’s casing collar locator (CCL) depth measurement enabled cleanout to the desired depth by eliminating the errors of surface device measurements.

Real-time decision making
The combination of the engineered cleanout solution and ACTive services supplied real-time downhole measurements, which eliminated all assumptions surrounding this cleanout job. Chevron personnel were able to make immediate decisions based on accurate real-time data. The cleanout operation proved successful, and the company regained access to its sand-plugged reservoir.

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Used with an engineered cleanout solution, the ACTive CT service provided real-time BHP and depth information that enabled effective cleanout.