M-I SWACO
A Schlumberger Company

Reservoir Drill-In and Filtercake Breaker Systems Deliver Trouble-Free Completion, Cornegliano Field

Operator successfully converts reservoir to underground gas storage, Italy

CHALLENGE

Convert the reservoir into underground gas storage (UGS), and use openhole completions to limit sand production.

SOLUTION

Custom design a reservoir drill-in fluid and a filtercake breaker system that removes filtercake uniformly, enabling injection and production through the entire horizontal interval.

RESULTS

- Exceeded customer expectation in gas production.
- Produced lower-than-expected drawdown pressures.
- Incorporated BREAKDOWN* enzyme and chelant filtercake breaker system into gravel pack fluid for intimate contact with filtercake.
- Cored 102.5-m interval with full recovery.

Convert reservoir to underground gas storage

An operator wanted to convert the existing reservoir into an UGS reservoir. To do this, the operator proposed drilling 14 wells in two clusters, with each cluster containing seven wells spaced 8 m apart on the surface.

For each well, the operator needed to drill vertically to 1,450-m TVD across the Strati di Caviaga reservoir section. The 102.5-m-long 8½-in horizontal reservoir section consisted of an intercalation of sands and shales. Because high shear failure was expected in the shale layers, the operator required a drilling fluid that would simplify drilling and enable easier breaking of the deposited filtercake.

Use custom-designed mud to facilitate drilling and coring operations

Three fluids were designed and used to successfully drill the horizontal wells and then complete them with openhole gravel packs. The first fluid, 1.23-relative-density DIPRO LD* low-density divalent reservoir drill-in fluid, was used while drilling the reservoir section; a solids-free version of the DIPRO LD fluid was placed in the openhole screen running pill. A 175-um sand screen was run in the hole, and the well was packed with 20/40 gravel. The BREAKDOWN enzyme and chelant filtercake breaker system was custom designed to remove the filtercake. It was incorporated in the gravel-pack fluid to make the best possible contact with the filtercake. The BREAKDOWN system consisted of D-SOLVER EXTRA* advanced brine-soluble chelating agent and an enzyme to attack the calcium carbonate components in the filtercake and remove the starch.

The production screen test, provided by M-I SWACO, demonstrated that the solids-free DIPRO LD fluid chosen for this well would not clog screens.

Developed well with high gas production rates

The operator successfully drilled and completed the well according to plan using M-I SWACO fluids for openhole completions. Once the well was completed, the gas production rate and drawdown pressure highly exceeded the customer expectation.