M-I SWACO
A Schlumberger Company

MUDSOLV NG Service Dissolves Filtercake to Avoid Coiled Tubing Acid Intervention, UAE

FLOPRO NT fluid comprising internal D-STROYER breaker and external BREAKDOWN HD system enables record-breaking well depths and increased production

CHALLENGE

Drill long horizontal section and completely clean up filtercake components with internal and external breakers during completion when CT acid stimulation is not possible or desired.

SOLUTION

Deploy MUDSOLV NG* integrated filtercake removal service to clean up the filtercake, which incorporates the D-STROYER* polymer-coated oxidizing breaker and the external BREAKDOWN HD* high-density filtercake breaker system into the FLOPRO NT* water-base reservoir drill-in fluid.

RESULTS

- Successfully achieved record-breaking well depths without major issues.
- Deployed downhole completion assemblies without any problems.
- Efficiently and effectively cleaned up the filtercake.
- Achieved production exceeding expectations.

Drill long horizontal section and clean up filtercake without intervention

An operator in the UAE initiated a drilling program offshore Abu Dhabi. The first two wells were to be drilled to approximately 20,000-ft [6,096-m] MD with roughly 10,000-ft [3,048-m] maximum reservoir contact in the horizontal sections. The 8.5-in openhole sections would be drilled using the FLOPRO NT fluid and completed with a 6⅝-in preperforated liner with swellable packers. A third well was to be completed with inflow control devices (ICDs). The openhole sections would be acid stimulated over the entire 10,000-ft interval using 2⅜-in CT. The plan for the fourth well, which had a shorter horizontal pay zone of approximately 5,641 ft [1,719 m], called for using a similar casing program to that used in the first three wells.

Based on a maximum reservoir contact program, an alternative completion fluid program was proposed for this well. The reason for this alternative program is to simulate the completion and filtercake removal for the wells with extreme horizontal displacement. For drilling these extended-reach wells, CT acidization was not expected to be successful because TD was beyond the length limits of CT units; therefore, an intervention-free in situ filtercake removal breakdown solution that would be instead driven by time and temperature was required.

Completely break down filtercake polymer and starch components

To achieve complete filtercake dissolution, M-I SWACO performed extensive laboratory testing to optimize breaker design and lubricant compatibility in addition to evaluating the internal breaker and postspot breaker performance when dissolving the FLOPRO NT fluid filtercake. M-I SWACO recommended that the operator include the D-STROYER breaker in the FLOPRO NT fluid when drilling the openhole sections, which would deposit inert breaker particles in the filtercake while drilling. During completion operations, a filtercake breaker treatment with low pH would be spotted in the open hole to dissolve the coating of the D-STROYER breaker and release the internal oxidizer, enabling it to attack and break down the polymer and starch components of the filtercake.

A low-pH chelant-base breaker treatment, the BREAKDOWN HD system, was also recommended to be postspotted to clean up the calcium carbonate component of the FLOPRO NT fluid filtercake. The D-SOLVER HD* high-density chelating agent included in the system dissolves the SAFE-CARB* ground marble bridging agent in the filtercake while the low pH achieved by adding the D-STRUCTOR* organic-acid precursor breaker activates the coated internal oxidizer.

Reached record-breaking depths and produced above expectation

As part of the MUDSOLV NG service deployment, the D-STROYER breaker was incorporated into the FLOPRO NT fluid to help the operator reach the target TD in the four wells without any major issues. Afterward, the downhole completion assemblies were deployed successfully. All of the wells drilled using this technique produced significantly above expectation even when acid or a filtercake breaker treatment was not pumped.

Acid stimulation was cancelled in the second well and only a slightly acidic completion brine (pH 5) was pumped to activate the D-STROYER breaker. In the third well, acid stimulation was planned; however, acid completion brine was instead pumped to activate the D-STROYER breaker. Production from both of these wells exceeded expectations without the need for acid stimulation via CT. In the fourth well, the BREAKDOWN HD system was used for a more comprehensive filtercake cleanup. This well met production expectations while also avoiding the need for acid stimulation.

Following the proven success of this technology, the operator adopted the FLOPRO NT fluid with D-STROYER breaker and BREAKDOWN HD system combination as its standard reservoir drill-in fluid and filtercake breaker treatment for its extended-reach wells. To date, 26 extended-reach wells with horizontal sections have been drilled using the combination. The operator has set and reset multiple times, on subsequent wells, the record for the longest drilled and completed horizontal section in the UAE, which is now more than 10,000 ft.

Operational Information	
Location	Offshore, Abu Dhabi, UAE
Reservoir type	Carbonate
Well type	Extended-reach with horizontal sections
Rig type	Jackups and artificial islands
Openhole size, in	8.5
Horizontal openhole section, ft [m]	11,048 [3,367]
TD, ft [m]	24,488 [7,464]
Liner size, in	9⅝
Liner depth, ft [m]	13,440 [4,097]
Completion type	Preperforated liner with swellable packers and inflow control devices