OVERVIEW
A major operator in deepwater Gulf of Mexico (GOM) installed a gravel pack/screen completion in the log horizontal reservoir at 17,259 feet (5260 meters) measured depth. A filter cake breaker treatment was planned to remove filter cake and mud residue from the wellbore and to regain permeability.

However, obtaining uniform placement and breaker performance by using a conventional live acid would be difficult in the long lateral section. Premature breakthrough before all acid was pumped would result in partial filter cake removal and loss of acid through pinholes. Further, the conventional breaker could fail to diffuse through the gravel pack and screen assembly, and never make reservoir contact.

CHALLENGE
The situation clearly called for a delayed-reaction filter cake breaker that could be placed uniformly throughout the reservoir before acidizing can take place.

SOLUTION
N-FLOW™ 325 filter cake breaker, in order to:
- Achieve up to 16 hours of delay before the breaker begins to dissolve the filter cake and remove mud damage
- Decrease fluid and time requirements, compared with traditional breaker systems

RESULTS
- Optimized conditions for production, with the breaker effectively penetrating the gravel pack and screen assembly, and dissolving filter cake after the specified delay period
- Required half the volume of breaker and half the pumping time usually needed for a conventional breaker, thus saving treatment costs and high-rate deepwater rig time

N-FLOW™ 325 Delayed-Reaction Filter Cake Breaker Optimizes Conditions in GOM Deepwater Reservoir

N-FLOW 325 APPLICATION CUTS TRADITIONAL FLUID AND TIME REQUIREMENTS IN HALF, SAVING SIGNIFICANT TREATMENT COST

GULF OF MEXICO

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However, obtaining uniform placement and breaker performance by using a conventional live acid would be difficult in the long lateral section. Premature breakthrough before all acid was pumped would result in partial filter cake removal and loss of acid through pinholes. Further, the conventional breaker could fail to diffuse through the gravel pack and screen assembly, and never make reservoir contact.

CHALLENGE
The situation clearly called for a delayed-reaction filter cake breaker that could be placed uniformly throughout the reservoir before the acidizing effect was activated. The breaker fluid chemistry had to account for reservoir temperature (which would control reaction time), and the breaker fluid density would affect its ability to diffuse evenly through the gravel pack and screen assembly.

SOLUTION
Baroid personnel recommended the N-FLOW™ 325 filter cake breaker to achieve up to 16 hours of delay before the breaker begins to dissolve the filter cake and remove mud damage.

The N-FLOW 325 breaker also provides a safety advantage for surface handling, since the acid forms only after the breaker is placed in the reservoir at the expected bottomhole temperature. Special containers and pumps are not required, and there is minimal risk of corrosion to tubulars and equipment.

The operator approved the use of N-FLOW 325 breaker to dissolve all filter cake components at 150°F (65°C) reservoir temperature. The treatment was spotted at 4 bbl/min across the entire zone evenly, with no increase in losses observed during placement.
The total treatment volume was 110 bbl, 50 percent less than the volume of conventional live acid that would be needed for the same application. Time required to pump the complete N-FLOW 325 breaker was 7.5 hours, as compared to over 14 hours of estimated pumping time for a live acid.

RESULTS

After placement, the well was monitored and loss rates began to increase, indicating that the breaker had effectively penetrated the gravel pack and screen assembly, and had begun dissolving filter cake after the specified delay period. This helped the operator produce the entire reservoir contact area, rather than just the partial “pinhole” production that is characteristic of conventional acidizing.

In addition to optimizing conditions for production, the N-FLOW 325 application required half the volume of breaker and half the pumping time usually needed for a conventional breaker. This helped save treatment costs and high-rate deepwater rig time.

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Lab testing demonstrates the effectiveness of N-FLOW™ 325 delayed-reaction filter cake breaker over time.