Case History



Cleansorb ORCA® Breakers Utilized to Treat Offshore Romanian Wells Results in Higher-Than-Expected Production and Mitigated Losses

A combination of Reservoir Drilling Fluid (RDF) and Filter Cake Treatment combined with Newpark's extensive offshore experience helped successfully complete a five well project.

CHALLENGE	SOLUTION	RESULT
• Successfully drill and complete 5 Gravel Pack wells • Meet the strict North Sea environmental regulations • Maintain wellbore stability	• ORCA HA® Acid Precursor • LyoZan® –xanthan breaker enzyme • LyoStar® –starch breaker enzyme	• All 5 gas wells were successfully displaced • Higher-than-expected production rate • Mitigated environmental, health and safety issues

OVERVIEW

For an operator in offshore Romania, Newpark was able to provide a Reservoir Drilling Fluid (RDF) and Filter Cake Breaker Treatment, leveraging off our extensive offshore experience to successfully complete the deviated five-well project.

The reservoir section was drilled using the RDF system with no issues and within the planned time. The specially formulated Filter Cake Breaker Treatment removed the filter cake as per design and in full compliance with the local environmental regulations, respecting the strict North Sea Environmental requirements requested by the operator.

The RDF solution provided by Newpark protected the reservoir integrity, ensuring an Open Hole Gravel Pack (OHGP) operation could be performed successfully. The Filter Cake Breaker Treatment - specifically designed around well conditions, the RDF formulation and required soak time - successfully removed the filter cake, resulting in production rates above the estimated levels.

CHALLENGE

The challenge for drilling the reservoir section was to design a WBM RDF fluid system compatible with the reservoir formation properties, ensuring effective bridging to achieve a fluid loss of under 3ml on a disk (500 psi differential) to ensure a high-quality filter cake, facilitating maximum efficiency of the Filter Cake Breaker Treatment.

Another part of the challenge was to use products which met the strictest requirements of the North Sea environmental regulations and having a simplified fluid recipe which was easily mixed (preferably on liquid products) while avoiding the use of strong acid to reduce the HSE risks. Maintaining wellbore stability while pumping the breaker treatment, avoiding losses to the formation while spotting the breaker pill were also critical to the success of the project.

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To mitigate the well control risks, the filter cake breaker formulation was designed to begin production of in-situ organic acids after 6-10 hours at expected bottom hole temperature. The delayed development of milder organic acids was also beneficial in preventing corrosion damage to the sand control screens.

Well	Ana 100	Ana 101	Ana 102	Ana 103	Doina 100
TD (m)	1175	1528	1871.4	1446.2	1273.5
Completion Brine density	1.16	1.16	1.16	1.16	1.16
Reservoir length (m)	40.3	50	62.9	42.2	39.5
Reservoir type	Sand	Sand	Sand	Sand	Sand
BHT (Celsius)	41	49	54	47	45

SOLUTION

To maximize the production rate and net present value (NPV) of the wells, the filter cake needed to be removed as uniformly as possible from the whole of the production interval.

To provide the perfect solution for this project, Cleansorb® Breakers based on in-situ acid production and polymer-specific enzyme treatments were utilized for filter cake cleanup.

Cleansorb developed patented second generation in-situ acidizing fluids for filter cake treatment. These allow polymer breakers to be combined with acid precursors in a single treatment fluid, resulting in a dual attack on the polymers and the carbonate present in the filter cake.

Other products utilized for the WBM filter cake breaker included the following:

- Base brine of NaCl and KCl
- Liquid organic precursor ORCA® HA
- GBC-1 liquid catalyst to accelerate the rate of acid production and buffer initial fluid pH
- LyoZan® – liquid xanthan breaker enzyme
- LyoStar® – liquid starch breaker enzyme
- Incorr – liquid corrosion inhibitor

All of the above products have CEFAS – OCNS Gold band status with no substitution warnings.

Newpark demonstrated its experience using this technology in previous offshore Australia operations. The field results provided a significant increase in production (ranging from 18% to 68%). Extensive laboratory testing showed the Filter Cake Breaker Treatment is efficient and compatible with the reservoir conditions and RDF chosen. Compared to HCl treatments, ORCA provides significant health, safety, and environmental benefits, and can be mixed at the rig site without the need for specialized mixing and pumping equipment

Newpark was able to provide the complete solution required for this project (Drilling-RDF-Completion-Chemical Clean Up-Breakers), leveraging Newpark's offshore experience and providing the Service Advantage consisting of laboratory testing support, an efficient logistics infrastructure and an operational LMP facility.

Case History



RESULTS

After drilling, the wells were displaced to a solids-free blend of NaCl and KCl brine. The standalone screens were set in this brine system. After performing the Gravel Pack, the Filter Cake breakers were spotted across the production zone and allowed to soak.

All five gas wells were successfully displaced to the planned volumes of filter cake breakers with no losses during placement.

The integrated fluid solution based on the synergy between the WBM, RDF, and WBM Filter Cake breaker treatment eliminated the need for any additional cleanup runs (no solids were identified during well testing) or acid treatment jobs.

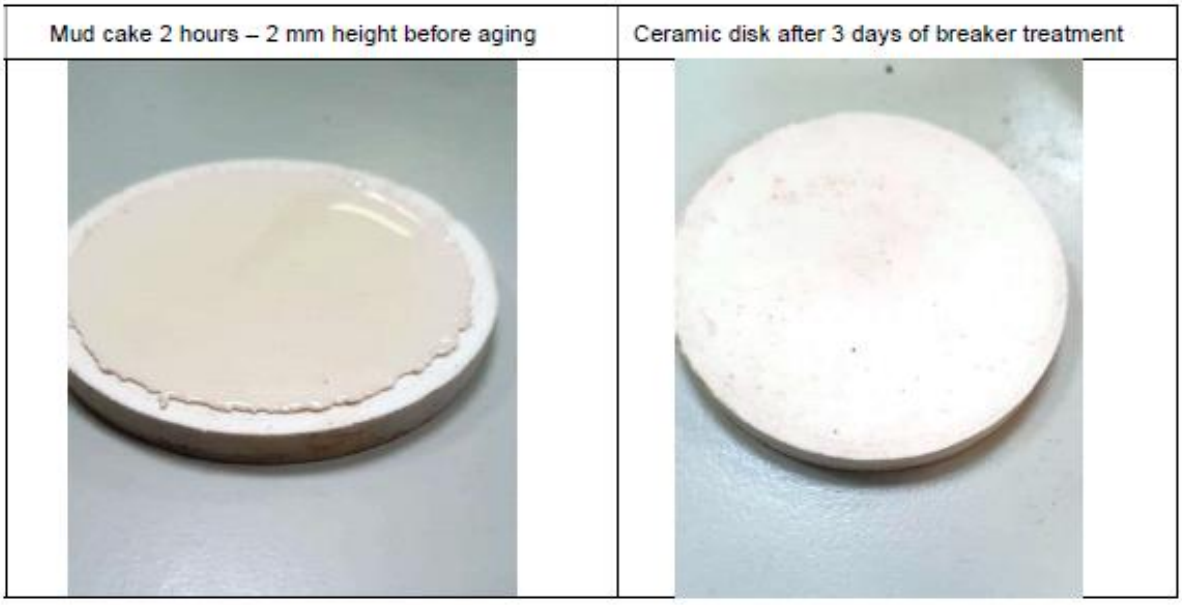
This led to a complete filter cake removal and successful completion, resulting in a higher-than-expected production rate

After the breaker treatment soak time, no solids were identified in later testing stage

In addition, environmental, health and safety issues were mitigated using organic acid precursors instead of HCl acid.

Time was saved due to the ease of mixing and spotting the Filter Cake Breaker Treatment directly after performing the gravel pack, avoiding any additional acid operation.

Well	Ana 100	Ana 101	Ana 102	Ana 103	Doina 100
TD (m)	1175	1528	1871.4	1446.2	1273.5
Time from mixing to pumping(min)	40	40	40	45	40
Reservoir length (m)	40.3	50	62.9	42.2	39.5
Reservoir type	Sandstone-Siltstones	Sandstone-Siltstones	Sandstone-Siltstones	Sandstone-Siltstones	Sandstone-Siltstones
BHT (Celsius)	41	49	54	47	45
Soak time (h)	312	N/A	240	216	in progress
Solid content in produced fluid (%)	0%	0%	0%	0%	0%
% Increase of production	xx%	xx%	xx%	xx%	xx%



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