



# Hydros™ High-Performance Water-Based Drilling Fluid Cuts 17 Days Off Scheduled Well Completion Schedule, Incurring Zero NPT, Despite Highly Challenging Formations, Onshore Bahrain

“Throughout the entire well, the Newpark team have demonstrated the highest standards of competence and professionalism and their performance has been exemplary”

*Operator’s Fluids Superintendent*

CHALLENGE	SOLUTION	RESULT
<ul style="list-style-type: none"> <li>• Presence of anhydrite</li> <li>• Abnormal pressures</li> <li>• Water influx</li> <li>• Differential sticking</li> <li>• Reactive Shales</li> </ul>	<ul style="list-style-type: none"> <li>• Hydros™ high-performance water-based drilling fluid system</li> <li>• Superior inhibition package designed with KCl, Newperm™ NF and HydroFilm™</li> <li>• Pro-active Engineering capabilities to manage operations</li> </ul>	<ul style="list-style-type: none"> <li>• Well completed 17 days ahead of schedule</li> <li>• Significant costs savings realized</li> <li>• Zero non-productive time</li> </ul>

## OVERVIEW

Similar previous wells drilled in the area for an onshore operator in Bahrain encountered numerous problems, including:

- Well control issues, ultimately requiring plug and abandonment
- Unpredictable and abnormal well pressures
- Water influx
- Significant formation losses downhole

These issues resulted in significant Non-Productive Time (NPT) while drilling offset wells, and the duration of additional wells were then scheduled for 62 days from spud to completion.

Objectives included achieving a faster Rate of Penetration (ROP) which would reduce the exposure of the formation to fluids. A 12" interval would be drilled to set a 9 5/8" casing, and an inhibited drilling fluid system was needed to preserve wellbore stability while drilling the problematic shale formations.

## CHALLENGE

There were many different challenges for this particular project, including those listed below:

Formations included anhydrite which can result in the extremely difficult to control both the API Fluid Loss and the HPHT Fluid Loss.

The abnormal pressures encountered in offset wells would require careful mud weight management, potentially requiring mud density as high as 18 ppg.



The drilling fluid system required an effective inhibition package, especially for drilling through the abundant highly reactive shale section, mostly brick red.

Water influx from the formation was of concern, as it could create well control and borehole stability issues. To check for any signs of water influx, Newpark fluid specialists onsite routinely monitored chloride content along with potential increases in calcium and magnesium levels.

There were concerns over the potential for differential sticking while drilling in the problematic shale sections, which increased the importance of choosing an effective inhibition package.

### SOLUTION

Newpark fluids experts selected the innovative Hydros™ high-performance water-based drilling fluid system (HPWBM) for this challenging project, with the addition of a custom-formulated inhibition package developed after extensive laboratory testing.

The Hydros fluid system was further customized for this project following these main criteria:

- Low solids content, in order to reduce plastic viscosity and ECD, to avoid undesirable and detrimental effects on borehole instability. This was achieved using a brine-based fluid composed of 7% w/v Potassium Chloride as the main Potassium ions source and primary inhibitor, and 20 % w/v of Sodium Chloride as the primary weighting agent replacing barite.
- To include an organic multivalent clay inhibitor, in this case Newperm™ NF. Newperm NF is effective in blocking shale hydration through multiple absorption sites.
- To incorporate a fluid loss reducer and shale encapsulator. HydroFilm™ is a high performance, multipurpose modified branched polysaccharide, and was selected to prevent both shale disintegration and to form a thin filter cake over shale formation thus controlling fluid loss.

These fluid specifications were optimized to ensure drilling would proceed in the fastest way possible, thereby minimizing exposure of the formation to the drilling fluid.



*Figure 1: Cuttings from the well illustrating superior inhibition achieved from careful design of the customized HPWBM*



### RESULTS

Working closely with the customer team, the proactive leadership and support shown by the Newpark fluids specialists and project engineering team was critical to the success of the project. This demonstration of the 'Newpark Service Advantage' received recognition and praise from the customer.

The Hydros drilling fluid system formulation was continually tuned to ensure optimum performance was achieved throughout each well interval.

No issues were detected while drilling and completing the well; zero NPT was recorded, despite the challenging formations in the area and the problems that had been encountered by the operator on similar offset wells.

The 12" interval was drilled within 38 hours with an average ROP of 34.8 ft/h and completed in a total of 4 days, including run-in-hole and cement of the 9 5/8" casing.

The operator's planned duration for drilling and casing the 12" interval was 6 days, consequently 2 days were saved just on this interval alone. Fluids related costs were also lower than planned.

The whole well was drilled and completed in a total of 45 days instead of the 62 days scheduled, a saving of 17 days.

The Newpark solution delivered a stable wellbore allowing the 9 5/8" casing to be run to bottom without issues.