



MATURE FIELDS



UNCONVENTIONALS

BaraShale™ Lite Fluid Enables Sustained Success of Unconventionals in Low-Cost Oil Environment

NEW WATER-BASED FLUID SYSTEM HELPS OPERATORS SAVE TIME AND REDUCE COSTS

EDDY COUNTY, NEW MEXICO

CHALLENGES

To sustain operations in the Permian Basin against the low-cost oil environment, operators needed to achieve superior borehole integrity and annular isolation, and to reduce drilling time and waste disposal costs.

SOLUTION

BaraShale™ Lite fluid – a new, innovative direct emulsion drilling fluid system delivering greatly improved hole integrity, higher ROPs, and vastly reduced dilution rates

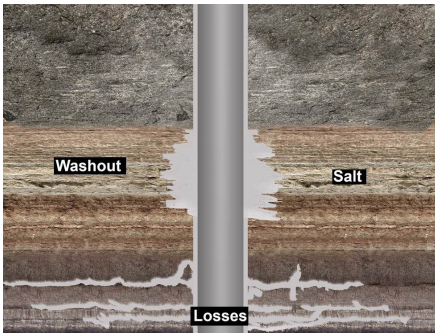
RESULTS

- » Reduced total drilling time by 4 to 8 hours
- » Enhanced hole integrity, allowing removal of a casing string while reducing cement volumes and improving zonal isolation
- » Reduced waste disposal costs by 70 percent

PERMIAN BASIN OPERATORS SEEK IMPROVEMENTS FOR CHALLENGES AND COSTS

With its unconventional field developments, the outstanding success of the Permian Basin as a global oil and gas swing producer has been sustained by operators and service companies using innovative technologies and cost-efficient operational practices.

Overlying much of the hydrocarbon-rich Delaware Basin – the western province of the Permian Basin – is a thick evaporite sequence posing a significant challenge for wellbore integrity. Commonly used water-based drilling fluids suffer substantially from wellbore washout and from high dump and dilution rates due to salt leaching when drilling through



the evaporites. A further drilling hazard has been the frequent occurrence of lost circulation below the evaporite formation because of a reduced formation fracture gradient. Poor hole quality has impacted cementing operations where drilling permits have demanded cement to surface as proof of satisfactory zonal isolation. Moreover, environmental regulations have required waste haul-offs to designated disposal sites where long-distance transportation costs become aggravated by the high dilution volumes.

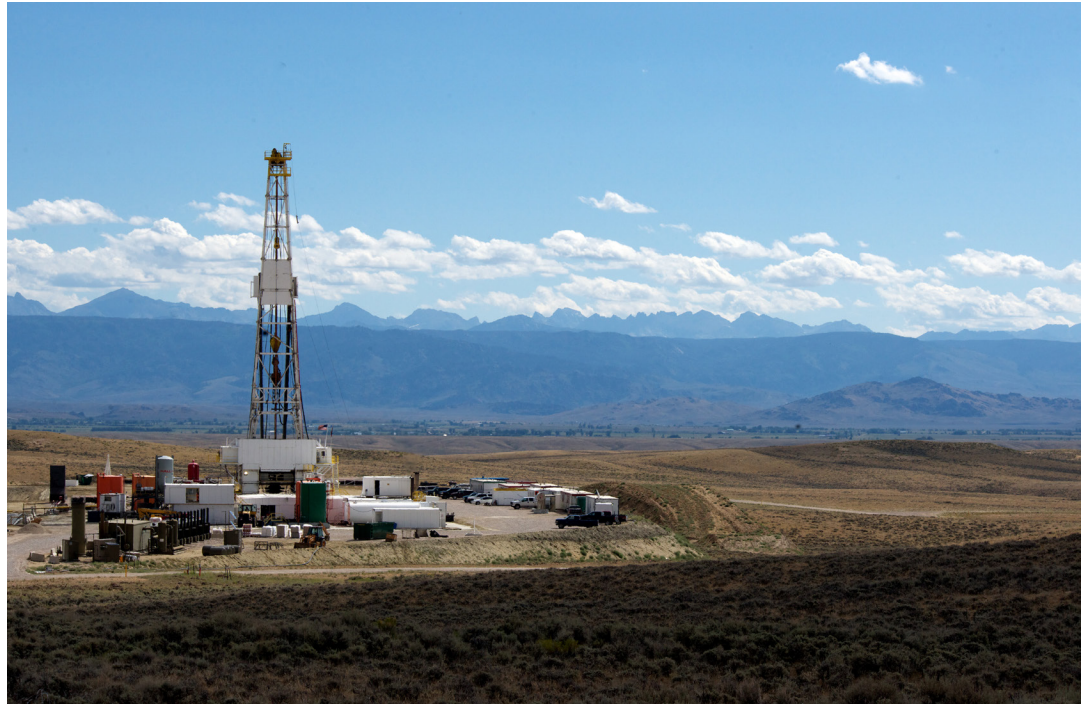
**70%
REDUCTION**
IN WASTE DISPOSAL COSTS

NEW FLUID SYSTEM IMPROVES EFFICIENCIES AND CEMENTING OPERATIONS

In the pervading low-cost oil environment, Baroid and its customers identified an opportunity to mitigate challenging operating conditions and costs. In introducing the new BaraShale™ Lite water-based fluid system, Baroid was able to actively demonstrate significant improvements in hole quality, along with a dramatic reduction in lost circulation events and fluid waste volumes. The new direct emulsion drilling fluid system prevented leaching of the evaporitic salt layers, thus maintaining near-gauged hole conditions and removing the need for continuous fluid dilution and dumping. Furthermore, the direct emulsion system facilitated easy management of low fluid densities, enabling successful drilling of formations with very low fracture gradients.

With BaraShale Lite fluid in the hole, Baroid's customers were able to realize substantial improvements in the efficiency and integrity of cementing operations. Improved hole conditions were demonstrated by caliper logs and by reduced cement volumes and pumping

In the Permian Basin, BaraShale™ Lite system enables operators to reduce total drilling times by 4 to 8 hours.



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schedules in multiple wells where BaraShale Lite fluid was used. Improved wellbore integrity and the prevention of lost circulation from lower fluid densities allowed the customers to set casing points deeper, thus enabling them to remove a casing string and to substantially improve costs and operational efficiency. Greater rates of penetration (ROPs) with the new direct emulsion system relative to offset wells were also experienced, significantly reducing time to total depth. Further operational gains at the rigsite were realized from a greater efficiency of solids control equipment, as well as from improved cuttings integrity. Salt cuttings were observed for the first time relative to offset operations using conventional water-based drilling fluid systems. The BaraShale Lite fluid provided substantially lower haul-off volumes by preventing salt dissolution.

BARASHALE™ LITE SYSTEM HELPS OPERATORS REDUCE DRILLING AND WASTE-DISPOSAL COSTS

Baroid's BaraShale Lite solution allowed its customers to achieve significant cost savings on a well-by-well basis. Total drilling times were reduced by 4 to 8 hours, or 7 percent, compared to offset wells that were drilled in 120 hours, through greater drilling efficiencies gained from simpler drilling fluid maintenance, vastly reduced dilution rates, and higher ROPs. Enhanced hole integrity allowed the removal of a casing string while also reducing cement volumes and greatly improving zonal isolation. Waste disposal costs were reduced by 70 percent due to the significantly lower haul-off volumes with the added benefit of fewer road trips and reduced road safety risks.

The technical and operational success of the BaraShale Lite introduction has been rewarded by increased operator confidence and further work awards for multiple rigs in the Permian Basin.

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