

AES DRILLING FLUIDS

CHALLENGES

- Control density below fracture pressure to minimize losses
- Prevent salt washout
- Maximize rate of penetration while effectively cleaning the wellbore

SOLUTION

- EnerLITE direct emulsion system to inhibit salt with a saturated brine phase
- Control density with additions of diesel or saturated brine

RESULTS

- EnerLITE is resilient to adverse well conditions while providing required drilling performance
- Rates of penetration exceeded targets, averaging 400 ft/hr through the salt
- EnerLITE is planned for full deployment in the Delaware Basin

EnerLITE[†] direct emulsion system delivers density control and salt inhibition for the Delaware Basin



The direct emulsion system performed with no phase separation of the oil and brine phases despite numerous drilling challenges. Cuttings through the salt showed no sign of dissolution (left).

Overview

Delaware basin wells traditionally required two intermediate casing strings. The first casing string isolates a salt layer and the second string isolates interbedded sands to reach the Bone Springs formation.

The client requested a saturated salt system to prevent washout in the salt layer. At saturation the brine phase required is approximately 10 lbm/gal, which exceeds fracture pressure. AES designed the EnerLITE system with a dispersed diesel phase to provide the desired mud weight range between 9.2 and 9.6 lbm/gal.

Rates of penetration exceeded expectations. The EnerLITE system provided excellent hole cleaning and density management despite significant saltwater flows, among other drilling challenges. Fluid properties including rheology and fluid loss remained stable with simple maintenance treatments.



EnerLITE filter-cake remained thin and lubricious (left).

Details

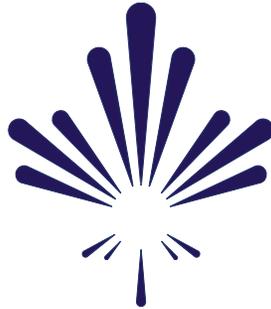
1600 bbl of 9.2 lb/gal EnerLITE was prepared at the rigsite prior to drilling out cement. The system was pre-treated to manage contamination, although the cement was fully set. The salt was drilled without issue.

After drilling through the salt, a saltwater influx was encountered at a rate of 100 bbl/hr, raising the density of the system. Additions of diesel and NORMUL[†] emulsifier were bled in to control the density at 9.6 lbm/gal and the saltwater flow was incorporated into the active drilling fluid system. Throughout the interval, typical oil:water ratios ranged from 20:80 to 30:70. Influx rates reduced below 10 bbl/hr with some seepage losses.

Details (continued)

A trip was required to change the MWD. A heavy mud cap was pumped to control the flowing well. Drilling commenced, balancing density to control the flow while minimizing losses.

At total depth, the hole was circulated clean and casing run to bottom without issue, indicating effective hole cleaning and good well condition. The casing was cemented and the rig skid to an adjacent well to repeat the success of the first EnerLITE section.



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