



CASE STUDY: Customized Fluid and Right-Size Shaker Screen Solution Saves Rig 17 Hours

Drilling Fluids/Solids Control Equipment

Saturated-Salt Fluid and Right-Size Screens Safely Deliver Gauge Hole, Saving Time on Exploration Well

Location: Mukhaizna Field, Oman

Overview

On a previous exploration well, the decision was made to run 10-mesh shaker screens while drilling the 12-1/4-in. hole through the Ara salt formation. This allowed the drilled salt cuttings to be recirculated and helped maintain the salt saturation of the water-based mud (WBM). Drilling with a saturated-salt WBM was necessary to achieve a gauge wellbore and prevent washouts that would cause a poor cement job.

However, retaining drill solids in the WBM system created several significant issues: the kill line became plugged with cuttings, the pump liners had to be replaced three times during the interval, and it took much longer than normal to clean the pits.

The operator's drilling program in the next section showed possible mud weight ranges from 13 ppg to 17 ppg, indicating a chance of taking a kick. Preventing any plugging in the kill line would be advantageous if a well control situation should develop.

Halliburton's Solution

The Baroid team recommended formulating the 11-ppg saturated-salt WBM with the salt saturation maintained at 189,000 mg/l, using sodium chloride (NaCl) salt. BARACARB® 5 sized calcium carbonate, used as a bridging material, maintained the system density at 11 ppg as required for the section.

Dry-sieve analysis confirmed that, when adding 20 ppb of excess NaCl, 1.5 ppb of salt passed through 100-mesh screens. This allowed the operator to continuously maintain 1.5–2.0 ppb of excess NaCl in the event that the chloride level dropped in the mud due to natural or unexpected means (as might occur in an exploration well).

The drilling fluids procedure emphasized the strict testing required to ensure that proper salinity levels were maintained. The finer-mesh shaker screens were able to remove the drill cuttings while retaining the salt saturation with continuous additions of NaCl.

Removing drill solids from the active system and mud pits would eliminate the risk of plugging lines, decrease equipment wear, and reduce the amount of time required to clean the pits, thus improving the overall efficiency of the operation.

CHALLENGE	SOLUTIONS	RESULTS
<ul style="list-style-type: none"> Drill a gauge hole through a salt formation on an exploration well without solids plugging issues 	<ul style="list-style-type: none"> Use 100-mesh screens that will remove drill solids but retain salt added for high-salinity WBM Maintain excess salt in WBM at 1.5–2.0 ppb 	<ul style="list-style-type: none"> Saved 17 hours of rig time by preventing solids buildup in kill line and pits, along with excessive wear on pump liners Saturated-salt WBM salinity maintained at correct level to deliver gauge hole

Economic Value Created

The saturated-salt WBM performed as planned and prevented washouts from occurring in the Ara salt formation. The 100-mesh shaker screens effectively removed the cuttings at the surface.

No cuttings in the active system and mud pits meant that no extra time was needed to clean the pits and lines, and equipment wear was normal. The proposed solution had achieved the operator's goal for the interval (a gauge hole), while also improving operational efficiency and saving rig time.

With the rig day rate of US\$32,000, and the additional costs of other services bringing the total to US\$55,000 per day, the savings achieved by implementing the customized WBM and shaker screen solution equaled US\$38,958.

This approach brought the added benefit of helping to ensure that the kill line was not plugged and that the rig pumps would not be out of service due to liner damage if a well control event occurred. In the next section drilled (8-1/2-in.), a kick was encountered that required a density increase from 13.5 ppg to 16.7 ppg, highlighting the importance of equipment functionality on this exploration well.

