MATURE FIELDS

CASE STUDY

Customized NAF, Optimized Solids Control, and STOPPIT® LCM Help Save over USD 1 Million in One Year

MIDDLE EAST

CHALLENGES

- Minimize NPT related to gumbo attacks in surface hole
- Provide effective cure for severe losses in large fractures
- Optimize NAF formulation and decrease maintenance costs

SOLUTIONS

- Establish ROP control and pump sweeps in surface hole
- Spot STOPPIT® LCM pills in highly fractured or vugular zones
- Lower oil/water ratio to 70/30
- Optimize solids control equipment for maximum fluid recovery

RESULTS

- Saved more than USD 1 million over one year in a 140-well program
- Reduced base oil consumption by approximately 5,500 bbl
- Recovered over 4,000 bbl of NAF for reuse in the active system

OPERATOR NEEDS TO ECONOMIZE ON DRILLING COSTS DUE TO LOWER OIL PRICES

NAF RECOVERY STRATEGIES YIELD **USD 1.2 MILLION** IN SAVINGS

An operator in north the Middle East wanted to lower drilling costs and prevent severe lost circulation. A non-aqueous fluid (NAF) system was used on these wells, with an average of 140 wells drilled per year.

The Baroid technical team was asked to identify ways to decrease NAF costs, optimize solids control efficiency for improved base oil and whole mud recovery, and implement a rapid cure for downhole losses.

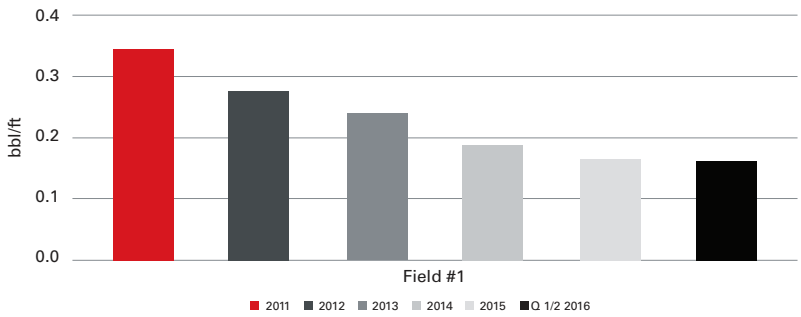
SOLUTIONS TARGET BASE OIL CONSUMPTION, WHOLE MUD RECOVERY, AND LCM

Baroid personnel recommended changing the NAF oil/water ratio (OWR) to 70/30. The reduction in base oil content would provide immediate cost benefits with low- to medium-density fluid. Next, optimizing shaker and centrifuge processing rates would result in lower dilution requirements and less base oil consumption.

Additional whole mud could be recovered in two ways: 1) treat NAF spacers contaminated during cementing jobs, and return them to the treated volume to the active system; and 2) capture and reuse mud remaining in surface tanks and the rig cellar by using a BaraStream™ SV60 portable cuttings and fluid transfer unit.

The Baroid team also proposed controlling the rate of penetration (ROP) and pumping sweeps while drilling the surface hole to help eliminate gumbo attacks that had been causing significant nonproductive time (NPT).

Annual Trend_NAF Losses



Non-aqueous fluid (NAF) losses were cut by over 50 percent in a six-year comparison, down to less than 0.2 bbl per foot drilled.

The use of STOPPIT® LCM pills, combined with careful mud density management, reduced downhole losses by 45 percent compared to the previous year.

To cure downhole losses in large and/or vugular fractures, the Baroid team recommended spotting 100-bbl pills containing 80 lb/bbl STOPPIT® lost circulation material (LCM). The STOPPIT LCM pills could be pumped through the bottomhole assembly (BHA) with no issues, eliminating the need to trip out of the hole.

ESTIMATED SAVINGS IN ONE YEAR EXCEED USD 1 MILLION

These efforts to reduce costs and optimize drilling performance helped the operator save an estimated USD 1,213,000 over the course of 140 wells drilled in one year.

The use of STOPPIT LCM pills, combined with careful mud density management, reduced downhole losses by 45 percent compared to the previous year. The pills were effective in curing losses in 90 percent of loss zones encountered.

The breakout in savings is shown below:

Drilling Program: 140 Wells Per Year	Volumes	Savings, USD
Reduce OWR to 70/30	Saved 25 bbl of base oil per well, for total of 3,500 bbl per year	415,000
Improve solids control efficiencies	Reduced base oil dilution requirements by 2,000 bbl	240,000
Recover and treat contaminated spacers	Recovered 20 bbl per cement job, to save 2,400 bbl per year	336,000
Capture residual NAF in tanks and rig cellar	Recovered 11–13 bbl per well	222,000

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