

# BaraSolve® Solids Control Strategies Help Offshore Operator Save USD 1.1 Million Per Extended-Reach Well

## CUSTOMIZED BAROID SYSTEM SOLVES DRILLING CHALLENGES AND DELIVERS HIGHER LEVELS OF PERFORMANCE

OFFSHORE BRAZIL

### CHALLENGES

Poor solids control on extended-reach wells impaired drilling efficiency and increased costs. Issues included:

- » Excessive mud consumption
- » High sand/solids content

### SOLUTION

A customized solids control system with four high-G-force shakers, a desander, and a desilter was recommended to replace the old airflow/vacuum type system.

### RESULTS

The new system immediately set new performance records compared to the previous system. Other results included:

- » Reduced mud consumption, which saved the operator up to USD 960,000 per well
- » Increased capacity for higher flow rates and enhanced hole cleaning
- » Sand content remained less than 1 percent by volume during drilling operations
- » Solids content stayed consistently within specified limits
- » Successfully lowered operational costs, equating to savings of approximately USD 1.1 million per well

### EXCESSIVE MUD CONSUMPTION, HIGH SAND/SOLIDS CONTENT IN ERD OPERATIONS

An operator drilling extended-reach wells (ERWs) offshore Brazil wanted to improve drilling efficiency by optimizing the solids control equipment (SCE).

**USD 1.1 M SAVED**  
with optimized SCE SYSTEM

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On past wells, the operator encountered excessive mud consumption due to fluid retained on the drill solids, along with out-of-spec values on mud density, sand content, and low-gravity solids (LGS). On those wells, the SCE system relied on a combination of high air flow and vacuum to separate the drilling fluid from the drilled solids – a departure from the high-G-force shakers typically installed on rigs. A change in SCE strategy was clearly needed.

The fluid selected was an inhibitive water-based mud (WBM). The goals for this operation included reducing fluid consumption and ensuring that the WBM properties remained within specified parameters. Enhanced solids removal would help accomplish these objectives and improve the rate of penetration (ROP).

### BAROID DEVELOPS CUSTOMIZED SCE SOLUTIONS AND KPI GUIDELINES

Using the BaraSolve® engineering process, the Baroid Surface Solutions (BSS) team analyzed several factors that contribute to drilling efficiency. They recommended an SCE configuration that would address the unique conditions arising from the extended-reach drilling (ERD) operations in this field.

The installation of new equipment on the rig meant comparing the performance of the new system to the previously used SCE. The Baroid technical team provided the operator with a set of key performance indicators (KPIs) that would focus on the issues encountered in the past and identify any improvements achieved with the new SCE configuration.

Equipment Type	KPI
Shakers	Mud on cuttings (percent by volume) Total solids removal efficiency (percent) Screen consumption per meter drilled Shaker flow capacity Fluid sand content
Centrifuge	LGS removal efficiency (percent) Total solids removal efficiency (percent)
Desilter	Fluid sand content Total solids removal efficiency (percent)
Other	Sand content Cuttings box consumption in reservoir section

The Baroid team created a solids removal efficiency guideline specifically for this customer's operations, which outlined the KPIs and responsibilities of the participating companies. It was used to optimize system design and implementation.

The Baroid Latin America technical advisor and the local BSS group participated in the engineering phase, including the installation and commissioning of four high-G-force DP-626 shakers, an SE-16 4-inch desilter, and a DE-1000 decanting centrifuge.

The system components were selected to allow for higher flow rates and cuttings handling capacity, and to expand the solids removal range.

The new system proved to be the right choice, as shown in the results table below. The sand content remained less than 1 percent by volume v/v throughout the drilling operations, and the LGS content remained within the specified limit. Drilling efficiency, fluid consumption, and solids control removal efficiency were achieved per the customer's expectations and the KPIs agreed upon for these wells.

Section, in.	Flow Rate, gpm	ROP, ft/h (m/h)	API Screen Mesh
22	1,000 – First time in project	–	140
17.5	1,100 – First time in project	229 (70)	170
12.25		328 (100)	140
8.5	600	–	200
3 x Shakers 1 x Mud Cleaner	–	–	230

The old and new SCE systems were compared in terms of fluid used and fluid discarded, as shown below:

Well	SCE System	Fluid Usage, 17.5-in. (bbl/m)	Fluid Usage, 12.25-in. (bbl/m)
1	High Air Flow/Vacuum	4.93	3.02
2	High Air Flow/Vacuum	4.81	3.09
3	High Air Flow/Vacuum	3.74	3.92
4	High Air Flow/Vacuum	3.61	3.93
5	Baroid SCE System	3.33	2.76

  

Well	SCE System	Fluid Usage, 17.5-in. (bbl/m)	Fluid Usage, 12.25-in. (bbl/m)
1	High Air Flow/Vacuum	NI	2.10
2	High Air Flow/Vacuum	NI	1.96
3	High Air Flow/Vacuum	2.21	3.67
4	High Air Flow/Vacuum	2.39	NI
5	Baroid SCE System	2.10	1.90

### OPTIMIZED SCE SYSTEM LEADS TO COST REDUCTIONS TOTALING USD 1.1 MILLION

The overall savings achieved per well with the new SCE configuration are shown as follows:

Drilling fluid (reduced consumption)	USD 960,000
SCE system cost reduction	USD 150,000
<b>Total savings per extended-reach well</b>	<b>USD 1,110,000</b>

Also, the operator reported saving costs non-related directly to the Baroid work scope, as described below:

Reimbursement MWD/LWD repair (sand always $\leq$ 1% with new shakers)	USD 40,000
Progress impairment (ROP, NPT, waiting invisible NPT)	USD 525,000
<b>Total savings per extended-reach well</b>	<b>USD 565,000</b>

Several additional benefits were realized with the new SCE system:

- » Maintaining sand content at less than 1 percent by volume helped reduce the risk of tool failure and equipment washout.
- » Improved mud properties significantly decreased the dump and dilute rate, and the consumption of mud additives.
- » The ability to produce drier cuttings also resulted in lower mud consumption.
- » The operator was able to drill with considerably higher flow rates, which aided in effective hole cleaning and higher ROPs.
- » The operator expressed appreciation for Baroid's proactive strategies for overcoming drilling challenges and delivering higher levels of performance.

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