



Offshore Romania: POLY-PLUS® Improves Drilling Efficiency

“This program marked the first time the local operator used the POLY-PLUS system. The high efficiency of the mud system was reflected in the significant cost reduction, increased drilling rates in highly reactive shales, near full-gauge holes and fewer overall drilling problems.”

Catalin Ivan — Technical Representative

Well information

Location:	Offshore Romania
Spud/completion:	Well #1: February/April 1997 Well #2: July/August 1997
Intervals drilled:	Well #1: 12¼-in. hole for a total of 4,231 ft — from 2,175 to 6,406 ft 8½-in. for a total of 2,522 ft — from 6,406 to 8,928 ft Well #2: 12¼-in. hole for a total of 3,253 ft — from 3,116 to 6,393 ft
Required mud weight:	Well #1: 15.4 lb/gal Well #2: 10.5 lb/gal

The situation

After setting the 13¾-in. casing at approximately 2,175 ft (Well #1) and 3,116 ft (Well #2), the operator wanted to continue drilling through highly reactive claystones. All of the offset wells experienced bit and

Bottom-Hole Assembly (BHA) balling, wellbore instability and packoff. Furthermore, repeated fishing problems had been recorded on the wells drilled on the same structure.

The solution

KCl/ POLY-PLUS drilling fluid systems (5 and 7%, respectively) were determined to be the optimum choices for both wells. For controlling clay

hydration, the ideal type of polymer is a long-chain, Partially Hydrolyzed Poly Acrylamide (PHPA).

The results

- Lower product consumption. When compared to the offset wells, POLY-PLUS and the high inhibitive environment it provides resulted in a lower consumption rate for all products.
- Stable wellbore. Unlike the instability recorded in all the offsets, no overpulls or tight spots were recorded.
- Good hole cleaning. The XCD polymer successfully controlled both the yield point and gels with no cutting beds recorded.
- Near-gauge hole. As reflected in caliper logs.
- Drilling time reduction. In Well #2, the targeted interval was drilled in 26 days, translating to a 44.7% reduction in drilling time when compared to the average of the offset wells.
- Cost reduction. The reduced drilling time on Well #2 saved the operator 40% in total drilling costs.

POLY-PLUS benefits:

- Eliminates bit and BHA balling
- Improved filter-cake quality
- Minimizes differential sticking
- Good hole cleaning



The details

Well #1. A new seawater KCl/POLY-PLUS system was designed to drill the 12¼-in. section, using prehydrated bentonite remaining from the previous interval. The cement was drilled with seawater and swept from the casing with mud from the previous section. Afterwards, the POLY-PLUS system was displaced with the unsheared mud and circulated at a low rate to shear and heat the new system and prevent losses over the shaker screens. Wellbore stabilization required continual increases in mud weight from 9.2 to 10.5 lb/gal. While running in the hole after a wiping trip at the 6,406-ft casing point, the operator successfully reamed a tight spot from 6,314 to 6,327 ft. During drilling of the 8½-in. interval (6,406 to 8,928 ft), potassium iodide was incorporated into the system as a tracer at the calculated concentration of 200 mg/l.

Well #2. During the run, a KCl concentration of 5 to 6% was required in all new dilution volumes to maintain

the desired potassium ion level of 20,000 to 22,000 mg/l. The use of POLYPAC® UL maintained fluid loss in the 4 cm³ range.

After displacing the POLY-PLUS system, the operator circulated the unsheared mud at a low rate to shear and heat the new system and prevent losses over the shaker screens. The mud weight was continually increased from 14.6 to 15.4 lb/gal, while the potassium ion was maintained at 20,000 to 22,000 mg/l. Maintaining the potassium at this level required a KCl concentration of 5 to 6% in all new dilution volumes. The operator used CMC LV to maintain fluid loss in the 6 to 7 cm³ range. Meanwhile, owing to a wellbore angle of 36.5°, the operator used 2 kg/m³ LUBE-167™ to reduce torque and drag. XCD was utilized for hole cleaning, resulting in reduced M-I GEL® concentration of less than 15 kg/m³ and 18 to 22 lb/100 ft² yield point values at low plastic viscosity values.

Properties of the mud system at the beginning and end of targeted intervals.

Properties	Well #1		Well #2	
	2,175 ft	8,928 ft	3,116 ft	6,370 ft
Hole size, in.	12¼	8½	12¼	12¼
Density, lb/gal	15.1	15.4	9.0	10.5
Plastic viscosity, cP	16	25	26	27
Yield point, lb/100 ft ²	15	14	24	19
Chlorides, mg/l	34,000	35,500	36,000	40,000
Gel strengths, lb/100 ft ²	3/6	3/7	8/16	9/21
API fluid loss, cm ³ /30 min	5.4	3.9	6.4	6.7
pH	9.7	9.6	9.7	9.6

Questions? We'll be glad to answer them.

If you would like to know more about the POLY-PLUS system and how it's performing for our other customers, please call the M-I office nearest you.

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