CASE STUDY

The FloThru Reservoir Drill-In System Shows Excellent Results When Drilling Sidetracks in West Siberia, Russia

"The next generation reservoir drill-in fluids demonstrate their benefits to the market by reducing time necessary to put the well on stable production, reducing water cut, and generating excellent actual oil production rates after drilling sidetracks."

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Well Information

Location	West Siberia, Russia
Number of wells	6 sidetracks
Interval drilled	Group A formations 1,400 – 1,500 m (4592 – 4920 ft), TVD
	Group B formations 2,100 – 2,200 m (6888 – 7216 ft), TVD
Hole Size section	124 mm (4.0 in)
Length of horizontal section	300–350 m (984 – 1148 ft)
Completion type	perforated liner, 102 mm (4.9 in)
Fluid density	1.16 – 1.18 SG (9.6- 9.8 lb/gal)
Bottomhole temperature	60-70 °C (140-160 °F)

The Situation

For a few years M-I SWACO successfully provided drilling fluids technologies and engineering support services for sidetrack drilling and reservoir drill-in fluids for a leading Russian operator. During sidetracking operations which included about 60 wells a month on average a third-party company's classical biopolymer systems were used, as well as M-I SWACO FloPro* NT reservoir drill-in fluids.

In developing and supporting the FloPro NT system, M-I SWACO used a complete package of know-how and technological solutions aimed at providing maximum quality and non-damaging reservoir drill-in, including geotechnical data analyses, actual core sample tests, the use of the OptiBridge* program to determine the precise bridging particle-size distribution based on reservoir characteristics. Bridging agent content and its particle-size distribution was optimized while drilling using high-pressure ceramic disk filter presses and a calcimeter. Fluid rheological properties were controlled and optimized using the Virtual Hydraulics* program. A comprehensive engineering approach to drilling mud program development and support helped achieve excellent technical and economic results of sidetrack drilling at the customer's fields.

Following the internal program of performance improvement and optimization of well construction cost-performance ratio, the customer put special emphasis on new technologies in the field of exploratory and production drilling, and particularly for sidetracking. The customer turned to M-I SWACO for its new solutions in reservoir drill-in fluids.

The Solution

M-I SWACO had implemented the new-generation polymer /carbonate drilling fluids, the FloThru* system, so it was suggested that the customer run a pilot test of the FloThru system at its fields for the purpose of comparing its performance to previously applied drill-in fluid technologies. M-I SWACO, together with the customer, carried out the analysis of well-completion technology. The optimal formulation of FloThru system for group A and B formation drilling was developed and suggested, in accordance with the results of the preparatory work performed.

The Details

The technical solution was unique in the way that the water-based fluid was used to make an oleophilic filter cake, permeable for formation hydrocarbons, but at the same time built an effective barrier against filtrate invasion to the formation. Due to this ability, the new drilling fluid was less damaging to the formation and it ensured lower flow initiation pressure and shorter time for the well to attain stable production

The tests were carried out while drilling six sidetracks in the customer's three fields. In order to make a quality comparison of the drill-in fluid performance, similar well construction/casing programs were selected (124-mm openhole, 300- to 350-m long, completed with the 102-mm perforated liner).

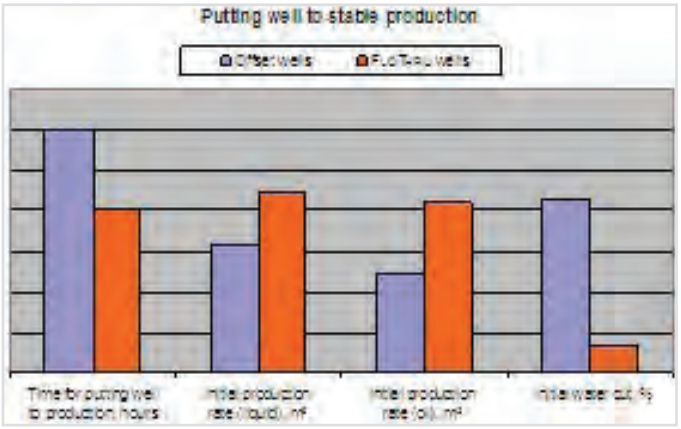
The FloThru parameters were maintained in accordance with the developed fluid programs and current project solutions. In all the cases the density of drilling fluid was 1.16-1.18 g/cm^3 (9.7 -9.8 lb/gal) and the average abnormal formation pressure gradient was about 1.0 gm/cm^3 (8.33 lb/gal).

Sidetracks were drilled without any problems.

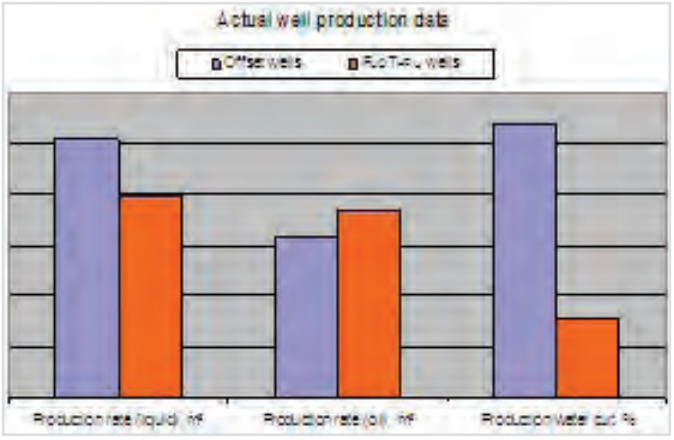
The Results

The tests proved to have some additional advantages of using FloThru fluid over using FloPro NT fluid:

- An 80% reduction in water cut over the offset well production data
- A 30% reduction of time necessary for the well to reach stable production over the offset production data
- Planned or higher than planned oil production rates



Picture 1 – Putting well to stable production



Picture 2 – Actual well production data

Questions? We'll be glad to answer them.

If you'd like to know more about the FloThru product and how it's performing for our other customers, please call the M-I SWACO office nearest you.

M-I SWACO
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