Schlumberger

Application-Specific BHA Lands Longest ERD Well and Multilateral Well, Mainland Russia

Integrated drilling system delivers extended-reach wells to maximize production and recovery offshore northwestern Siberia

CHALLENGE

Drill and complete four extended-reachdrilling (ERD) wells in a geologically uncertain offshore area with a tight mud environment.

SOLUTION

Engineer a drilling system that incorporates Schlumberger technologies and technologies from Smith Bits and M-I SWACO, both Schlumberger companies.

RESULTS

- Drilled three offshore ERD wells from onshore locations.
- Modified drilling plans to enable drilling a fourth ERD well in the same area.
- Achieved stable field production levels.
- Drilled the longest extended-reach well and the first multilateral well onshore Russia.



Maintain stable gas production in mature fields

Novatek — Russia's largest independent natural gas producer — planned to drill three ERD wells as part of an offshore development plan from an onshore location on the Tazov peninsula of northwestern Siberia. The operator was developing the natural gas and gas condensate field to increase the flat gas production level and to prolong field development. Development involved drilling from onshore locations and overcoming wellbore instability, high geological uncertainty, and unknown pore pressure. These issues often lead to a narrow mud-weight window and the inability to drill several sections of the wells.

In addition, Valangin deposits on target formations lay at depth intervals of approximately 2,900-m [9,514-ft] TVD. Horizontal displacement for the wells was planned between 5,800-m [19,029-ft] and 7,100-m [23,294-ft] MD. The operation required highly sophisticated and integrated technologies.

Engineer an application-specific drilling system

To help ensure the success of the operation, Schlumberger designed an applicationspecific drilling system that incorporated key Schlumberger technologies with services from Smith Bits and M-I SWACO. A colocated group of technical specialists at the Schlumberger PetroTechnical Engineering Center (PTEC) selected and developed the technical solutions required for the operation.

A geomechanical model was developed to address issues related to borehole stability. It was updated in real time during drilling using SonicScope* multipole sonicwhile-drilling service; adnVISION* azimuthal density neutron service; StethoScope* formation pressure-while-drilling service; and annular pressure-while-drilling, resistivity, and logging tools combined with high-speed telemetry delivered through the DigiScope* slimhole measurements-while-drilling service. The operation marked the first time that the SonicScope, StethoScope, and DigiScope services were used in Russia land operations.

The PTEC team modeled downhole conditions using the IDEAS* integrated drillbit design platform to determine surface operating parameters for reducing shock and vibration. MEGADRIL[†] oil-base drilling fluid from M-I SWACO provided optimal rheological parameters for hole stability, shale inhibition, and lubricity and helped maintain the required equivalent circulating density (ECD) range. A special additive achieved low drag in the borehole, helping Novatek drill to the planned TD.

Geomechanical experts provided support to maintain operating parameters for drilling, tripping, and running casing. A unique wellbore geometry was used for the well types with 178-mm [7-in] and 127-mm [5-in] tie-back and liner strings and a tapered drillstring composed of several drillpipe sizes with connections rated for high torque.



Integrating advanced technologies from Schlumberger, Smith Bits, and M-I SWACO into an application-specific drilling system enabled Novatek to drill four ERD wells and achieve stable field production rates in a complex-geology formation.

Achieve successful multiwell ERD campaign, change plans for future field development

Using the integrated drilling system, Novatek drilled and cased each section of the three ERD wells including the longest well and the first multilateral well onshore Russia — according to plan and AFE. These results led the customer to alter its drilling plans and drill a fourth ERD well in the Valangin formations. The new approach makes future development of the field feasible, especially when drilling ERD wells in complex shallow formations.

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