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BroadBand Precision Service Saves 10 Days on 20-Zone Completion for Gazpromneft-Yamal

Integrated service reduces well construction costs, improves reservoir contact, and enables future water and gas shutoff, Russia

CHALLENGE

Improve oil recovery and completion time in an oil-rim reservoir.

SOLUTION

Complete the well with a 20-stage BroadBand Precision* integrated completion service.

RESULTS

- Reduced completion time by 44% per stage—10 days overall—in comparison with standard ball-drop technology.
- Reduced water cut to 39% as compared with 60% on average in neighboring wells.
- Reduced gas-to-oil ratio to 472 m³/t [2,223 scf/bbl] as compared with 800 to 1,000 m³/t [3,773 to 4,716 scf/bbl] in neighboring wells.
- Increased reservoir contact with 20 stages per well compared with 8 stages per well and large unstimulated "dead zones" in neighboring well ball-drop completions.
- Simplified future water- and gas-shutoff operations by leaving fullbore, reclosable sleeves in each zone.

"The detailed targeting in the BroadBand Precision service allowed us to contact more of the productive reservoir while managing the risk of early gas or water breakthrough."

Alexander Belov
Head of WI Supervisory Department
Gazpromneft-Yamal

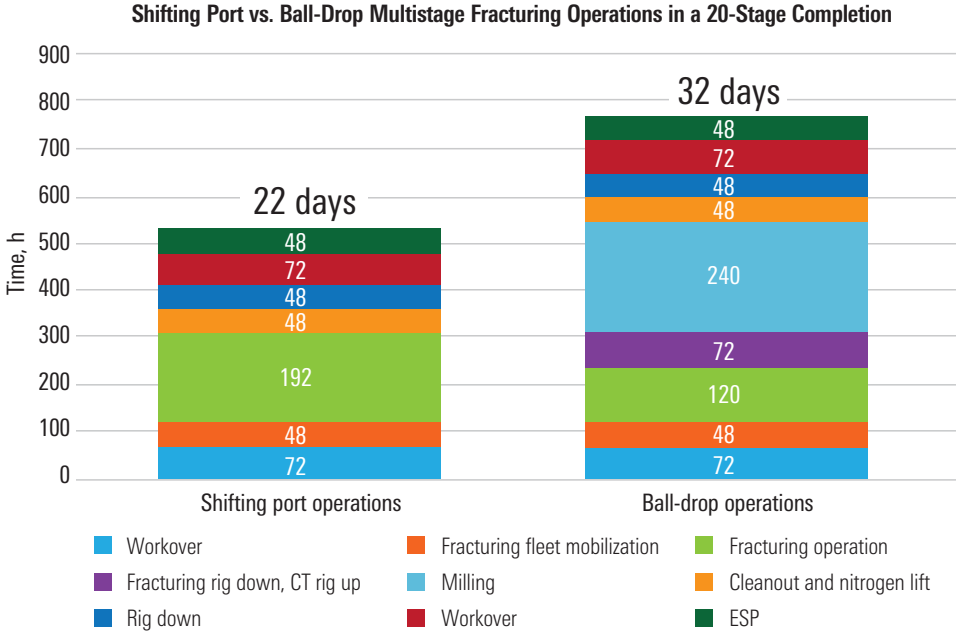
Ball-drop completions limit recovery in oil rim field

Unlike traditional oil fields, oil rim deposits have water at the bottom and gas at the top. This complicates oil recovery and well design because early breakthrough of either gas or water can make further production of oil impossible.

The Novoportovskoe field is an example of this type of challenge. In one section, the thickness of the oil-saturated interval between gas-oil and water-oil contact can reach 45 m [148 ft], making it a good production target. However, all of the reserves are connected, which creates risks that affect the development strategy. The main concern in this field is early gas breakthrough, but water can be a concern as well.

Conventional completions in the field used ball-drop completions, typically limited to 8 stages per well. Each stage could include multiple perforation clusters, but fracture stimulation operations for each stage also had to be limited to avoid breaching water or gas zones. As a result, the conventional completions left long, unstimulated "dead zones" of unproduced oil. In addition, milling out the ball seats delayed oil production by several days to weeks.

For two new wells in the field, Gazpromneft-Yamal asked for help in more efficiently recovering more of the oil reserves.



Completing 20 stages with coiled tubing and the sliding sleeve technology eliminated about 10 days of operations as compared with a ball-drop completion. Most of the savings is from eliminating milling operations.

Integrated service increases reservoir contact and flexibility

Schlumberger recommended the BroadBand Precision service, which integrates a number of products and services to target all of the promising hydrocarbon-bearing zones along the lateral and ensure each receives a stimulation treatment optimized for its particular characteristics.

By coordinating multiple services into one offering, the BroadBand Precision service improves operational efficiency. Integrated reservoir modeling and measurement data are considered alongside water, proppant, and equipment constraints to optimize completion and simulation designs and operations for maximum return on investment.

Cemented sliding sleeves eliminate ball-size constraints that limit the number of stages per well in conventional ball-drop completions. In addition, the fullbore sleeves improve operational efficiency by maintaining the well's diameter without costly and time-consuming poststimulation milling. As the well matures, the sleeves also enable an operator to seal off specific zones and stop unwanted water or gas production.

Gazpromneft-Yamal decided to use the BroadBand Precision service for two wells. Modeling with the Kinetix* stimulation software suite led to a recommendation for 20 fracturing stages per well in a 1,000-m [3,280-ft] horizontal section, which reduced the distance between stages from 130 to 50 m [427 to 164 ft].

Oil production meets expectations—with less water and gas

To isolate each stage, sliding sleeves were run in with the well casing. For stimulation, coiled tubing (CT) was run into the well to open and close the sleeves and clean out excess proppant between stages, including any screenouts. CT remained in the well for the entire process with each fracturing stage pumped through the casing-to-CT annulus, improving operational efficiency.

Initial production from the first well was 188 t/d [1,343 bbl/d] of oil. After both wells were on production, the water cut was calculated at 39%, as compared with the average of 60% in neighboring wells. The gas-to-oil ratio was 472 m^3/t, as compared with the average of 800 to 1,000 m^3/t in neighboring wells, an improvement of 41% to 52%. Stimulation time was also reduced by 44%, mostly by eliminating milling requirements.

For more details, see SPE-187680 and SPE-187715.

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