geoVISION Imaging While Drilling Increases Liaohe Heavy Oil Production

Improved well placement, optimized cyclic steam stimulation in thin-layered reservoir results in 90% net to gross for PetroChina

CHALLENGE
Improve well placement and cyclic steam flooding techniques to make heavy oil production economic in thin-layered, complex reservoir.

SOLUTION
Integrate geoVISION* imaging-while-drilling service and cyclic steam flooding procedures to optimize parameters for horizontal wells.

RESULTS
- Achieved average net to gross of more than 90%.
- Eliminated NPT.
- Increased production and income.
- Reduced stimulation cost.

The income-to-input ratio at the end of the fourth year of the pilot project averaged 0.93—a significant improvement compared with the 0.03 ratio of the previous project.

Improve heavy oil production in China
Vertical wells drilled in the Liaohe heavy oil reserve in northeastern China had proved uneconomic. So had horizontal wells drilled using traditional technology. Because the reservoir layers were thin—just 3 to 8 m—and the complex structure had many faults and formation dips, the horizontal wells often exited the target layer and had to be sidetracked, resulting in a poor net-to-gross ratio. To make production economic, PetroChina wanted to improve well placement and the cyclic steam flooding procedure used to extract the heavy oil.

Geosteer using imaging while drilling
An integrated solution enabled PetroChina to achieve its objective. Well placement in the complex structure was improved by using the geoVISION imaging-while-drilling service to guide steering decisions. Because the images were acquired near the bit and available in real time, the driller could avoid exiting the pay zone and having to sidetrack. This not only increased net to gross but also reduced cost and aided optimization of the cyclic steam flooding procedure and parameters.

The complex, thin-layered structure resulted in poor net-to-gross ratios for horizontal wells drilled using traditional technology. geoVISION imaging enabled the driller to keep the wellbore in the pay zone to ultimately maximize production.
CASE STUDY: Improved well placement and optimized cyclic steam stimulation results in 90% net to gross

Achieved 90% net to gross while eliminating NPT
Using geoVISION near-bit images to guide well placement resulted in more than 90% net to gross and zero NPT. This improved drilling performance, integrated with cyclic steam flooding optimization, increased production and income and reduced the stimulation cost per ton of oil. The income-to-input ratio at the end of the fourth year of the pilot project averaged 0.93—a significant improvement over the 0.03 ratio of the previous project. That improvement means the new wells will start to make a profit at the beginning of the fifth year. In the future, this proven integrated solution will enable PetroChina to economically develop the thinner heavy oil reserves in other oil fields of northeastern China.

Contact your local Schlumberger representative to learn more.