MicroScope Images Identify Geosteering Path Between Complex Faults to Reach TD in One Run

Azimuthally focused resistivity images optimize long horizontal well placement for PetroChina in first carbonate oil development in central China

CHALLENGE
Drill a long horizontal well between two complex major faults in a carbonate oil reservoir.

SOLUTION
Identify structural features of the reservoir using MicroScope* resistivity imaging-while-drilling service to optimize well placement and completion and to enhance production.

RESULTS
Drilled 810 m of horizontal section, 100% in zone with good oil shows throughout the section.

“The MicroScope application has greatly enhanced the ability to geosteer and identify the fractures in this complex carbonate oil reservoir in Sichuan. As a result, we are planning to drill several horizontal oil wells in sequence in the same carbonate reservoir.”

Yang Jing Li
Chief Geologist
PetroChina SWOGC SuiNing

Tight carbonate oil reservoir in China
When PetroChina SWOGC was planning to drill the first commercial oil well in a carbonate oil reservoir in Sichuan, central China, the company faced a variety of challenges. PetroChina planned to drill a long horizontal well between two complex major faults, where it expected to encounter minor faults. There were no control wells to provide information and, to be successful, the company needed to be able to identify the dips, faults, and fractures along the section to be drilled.

Azimuthally focused resistivity images for horizontal well optimization
PetroChina decided to use MicroScope resistivity imaging-while-drilling service to clearly identify and define the dips, faults, and fractures along the horizontal section in this carbonate reservoir. MicroScope service provided the needed information to geosteer the well and enable accurate lateral placement of the well.

Adjusted the trajectory azimuthally to the east
A fault identified adjacent to the left side of the trajectory

The trajectory adjusted azimuthally by turning east based on critical information from MicroScope azimuthally focused resistivity image.
CASE STUDY: Azimuthally focused resistivity images optimize long horizontal well placement in central China

In one instance, the service identified a fault on the left side of the trajectory and adjusted the trajectory azimuthally to the east to avoid the fault. Identification and analysis of fractures along the horizontal section provided valuable information to optimize completion design and, in this case, hydraulic fracture staging design. The images provided by the MicroScope service, combined with teamwork and communication, enabled successful drilling and precise placement of a long horizontal well in this tight carbonate oil reservoir. Accurate identification of the structural features of the reservoir improved understanding of the reservoir characteristics and provided the ability to make decisions in real time to optimize the completion design.

Accurate well placement and completion optimization

With clear structural features identified in real time, a total of 810 m was drilled in the horizontal section with 100% in zone. The well was completed in one run with a total of 265 circulating hours and 155 drilling hours. Accurate identification of geological features improved understanding of the reservoir characteristics, allowing completion design to be optimized, thus enhancing production.

Contact your local Schlumberger representative to learn more.