Precise Geosteering Results in Oil Production Exceeding Estimate by 240% Offshore Norway

PeriScope bed boundary mapper enables access to attic oil without penetrating overlying shale

Avoid penetrating overlying shale
An operator was drilling a production well from an existing borehole on the Norwegian Continental Shelf. The 12¼-in hole section was drilled as planned, within AFE, but a pressure drop and fluid losses were encountered after drilling 200 m MD of the 8½-in hole section. When attempts to stop the unexpected fluid losses did not succeed, a second sidetrack was drilled and fluid losses were again encountered. A third sidetrack was then drilled, with the same result.

At that point, the 8½-in hole section was 40 days behind schedule and the asset team decided to drill two more stands to enter the reservoir, call TD, and run a 7-in liner before drilling the reservoir with a 6-in BHA. That deepened the planned well profile by 16 m TVD and made drilling the 6-in reservoir section even more challenging. The team wanted to place the well as high as possible in the structure to avoid bypassing attic oil, but that placement presented a very high risk of penetrating the overlying shale, due to seismic uncertainty in the reservoir model.

Using the PeriScope bed boundary mapper to geosteer the well to the best place resulted in significantly higher net to gross and production volumes than predicted offshore Norway.

Well flowed 1,700 m³ of oil per day when tested—an increase of more than 240% over the midcase estimated production of 700 m³/d.
CASE STUDY: PeriScope bed boundary mapper enables access to attic oil without penetrating overlying shale

Using the PeriScope bed boundary mapper for geosteering, the team placed 533 m MD of the well in the reservoir's sweet spot without penetrating the overlying shale.

Place well in reservoir’s sweet spot
Detailed prejob planning and modeling, conducted by Schlumberger, and use of the PeriScope bed boundary mapper to geosteer the well mitigated the risk of drilling into the overlying shale while placing the well as high as possible in the structure. To ensure smooth operation while geosteering, a meeting was held between the geological and geophysical asset team and well placement engineers to finalize the decision tree and communication procedures.

The objective for the 6-in reservoir section was to drill 300 m MD in the oil-filled formation while maintaining a standoff distance of 2 m from the overlying shale. That objective was exceeded. Geosteering using the PeriScope mapper placed 533 m MD of the well in the reservoir’s sweet spot—over 70% more sand exposure than expected—without penetrating the shale. Good directional control achieved on-target dogleg severity and both the liner and completion string were run successfully.

Increase production
Use of the PeriScope mapper enabled the well’s reservoir section to be drilled in one run and deliver net to gross and production volumes that were significantly higher than predicted. When tested, the well flowed at 1,700 m$^3$/d of oil per day—an increase of more than 240% over the midcase estimated production of 700 m$^3$/d. In addition to achieving higher production, the asset team avoided sidetracking, mitigated lost circulation risk, and saved rig time. This success demonstrated once again that combining the right technology with the right team adds significant value to drilling operations.

Contact your local Schlumberger representative to learn more.