

# **Improved Ultimate Recovery through a Successful Azimuthal Geosteering: A Case Study from South Sultanate of Oman**

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## **Abstract**

Drilling horizontal flank wells in field A in the south of the Sultanate of Oman has been a real challenge. Drilling out of the target reservoir and into a non-reservoir formation is a real possibility with the absence of robust seismic data and well control. Drilling the well inside the reservoir and close to the roof is crucial for keeping the well above the development limit depth, resulting in better initial water cut and improved ultimate recovery by maximizing the reservoir exposure and delaying the water break through.

Field A is a dome structure brown field with a strong bottom aquifer and highly viscous oil. It has been under development since 1980. The field is made up of several stacked connected reservoirs characterized by complex structural events and sedimentology. Historically, the understanding of the reservoir sand distribution mainly depended on vertical well data due to the poor seismic quality. Therefore, the development and drilling focused on the crestal part of the structure where the hydrocarbon column is the highest. This provided more depth flexibility for well placement within such complex reservoirs, and it helped in delaying water breakthrough due to the far relative position of the wells from the oil-water contact. To extend the field life, and increase the overall recovery, the flank development started using geosteering to overcome the challenge of being proximal to the OWC and complex distribution of reservoir sand.

Utilizing the azimuthal resistivity tool technology within the geosteering service in a flank well called well A has been significantly helpful in navigating the reservoir and maximizing its exposure. The most important azimuthal tool is the resistivity, because of its high Depth of Investigation.

In this case, the well was successfully placed as close as possible to the roof of the structure and away from the oil-water contact. It has been observed in the well test that well A is capable of producing twice as much as the promised initial production rate. This proves the optimized well placement using geosteering drastically enhanced the well performance in terms of oil production, reducing the initial water cut leading to increased ultimate recovery, especially for long horizontal wells where high initial water cut is often observed due to very high mobility contrast for the fluids and variance on the properties along the horizontal section of the well.

Geosteering and well-placement technology have made it possible to access bypassed reserves that weren't previously considered to be feasible targets. It has also been observed that well-to-well pressure interference is reduced significantly due to this placement closer to the roof, Thus, enabling previously defined marginally economic targets to be placed back on the development sequence, increasing the field reserves, and safeguarding the production plateau.