

## **The Evolution of Dual Extended Laterals to Optimize Production and Economics in Heterogeneous Carbonate Reservoirs of Oman**

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### **Abstract**

Occidental of Oman has been drilling conventional carbonate reservoirs in Oman for decades. As drilling progresses in Block 9, the reservoir becomes more heterogeneous. The increasing heterogeneity of the flow units in the carbonate reservoirs have increased the demand for innovation and enabled Occidental of Oman to progress its development practice to optimize the current reservoir. Within the major field of Block9, Occidental of Oman drilled the more connected and homogeneous flow units first; this allowed for short single well (less than 3,000 feet lateral length) development to adequately produce the main flow units. As development continued, Occidental of Oman evolved the field development strategy to dual short lateral wells in the more homogeneous flow units; this too proved optimal for the flow units they targeted. As development progressed southwestward, the flow units became increasingly heterogeneous and the demand to evolve the development strategy arose again. Extended lateral wells increased the likelihood of finding higher reservoir quality within the lateral and improved economics and production. Occidental of Oman successfully drilled over 20 extended-reach wells with the longest reaching over 11,000 feet for a single lateral.

The extended dual laterals increased the likelihood of encountering reservoir with relatively higher porosity, permeability, and oil saturation. This significantly increased the initial production, leading to gentler production decline and improved estimated ultimate recovery. Extended dual laterals provided better economics compared to conventional dual laterals.

The extended dual lateral well development plan has not been without challenges. Geologically, these areas contain multiple thin and heterogeneous flow units which make staying in the target window more difficult due to the increase in the cone of uncertainty the longer the lateral gets. The increased cone of uncertainty also increases our anticollision risk. Another significant challenge in long laterals is string stick-slip, where the rotary steerable system and bit rotation are erratic and reaching the total planned depth is a struggle. The deployment of the drill-n-ream tool significantly reduced torque and enhanced the efficiency of these trips. Furthermore, the advancements in utilizing state-of-the-art drilling, 24/7 geosteering, and resistivity tool advancements have allowed for the dual extended laterals to be drilled in areas with multiple flow units and target windows as thin as 4 feet.