

Burgan Multilateral Campaign: A Success Story in Development of a Complex Siliciclastic Reservoir in Kuwait

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Abstract

The multilateral well technology was used for the first time in Albian Third Sand reservoir of the super-giant Greater Burgan Field of Kuwait. The reservoir is on production for more than 60 years with conventional development techniques. The multilateral drilling technology was adopted particularly for exploiting the heterogeneous and complex units within Third Sand Upper member of Burgan Formation.

The Third Sand Upper (3SU) unit was chosen because of its low sand thickness, reservoir heterogeneity and inconsistent lateral continuity. All these features rendered it difficult to exploit this reservoir optimally by conventional means. The more prolific Third Sand Middle unit (3SM) was considered not apt for multilateral drilling because of its massive, hydro-dynamically connected sand bodies. Nodal Analysis ruled out comingled production from 3SU and 3SM because of high pressure differential and permeability contrast.

3SU was deposited in a broad transgressive set up. Hence, the sands are thin, heterogeneous and discrete in nature. Paleogeography and sand thickness maps helped in understanding the geometry of the sand bodies for suitable placement of the laterals. A pre-drill model was built based on the logs of the nearby wells aided by seismic to predict the facies in the laterals.

Two stacked bilateral wells were drilled in two different locations. Multilateral TAML-4 level was selected for adequate junction stability and options for possible re-entry. The lateral length varied from 650' to 1663'. Geo-steering aided by real-time distance to boundary logs helped in placing the laterals in thin sands of <10' thickness for which the permeability ranged between 0.5 to 1.5 D. The wells produced 3000 to 5000 BOPD on testing which is about six times compared to vertical wells.

The successful placement of the multi-laterals in such thin, heterogeneous sands opened up fundamentally different development opportunities to maximize recovery.