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The Sequence Stratigraphic Framework of the Maestrichtian Reservoir: Key to the Geostatistical Modeling and Reservoir Development, Wafra Field, Partitioned Neutral Zone, Kuwait and Saudi Arabia

The Maestrichtian reservoir is one of five prolific oil reservoirs in the giant Wafra oil field. The oil production is from subtidal dolomites at an average depth of 2500 feet. The reservoir is in an early stage of development even though production was first established in 1959. The development has been delayed because of the low oil gravity, high sulfur content, and high water-cut. The purpose of the modeling was to address these concerns and evaluate the potential of the Maestrichtian. The key to modeling the Maestrichtian was to construct the sequence stratigraphic framework. The sequence stratigraphic modeling consisted of five cored wells and 128 wells with synthetic lithofacies curves.

The methodology involved first developing the depositional model from the core description. The core description and the correlation of the Maestrichtian well log data has revealed ten high frequency sequences (HFS) which can act as barriers and baffles to vertical fluid migration. The next step in the model development was to construct the 3-D sequence stratigraphic framework. This stratigraphic framework involved constructing 22 cross sections that correlated the ten HFS to all the wells. The correlation of the sequences was verified with isochore and structure maps for each HFS.

The geostatistical modeling of the Maestrichtian reservoir has revealed a highly layered and compartmentalized reservoir. The ten HFS act as barriers and baffles to flow. As determined by the modeling effort, the location of the reservoir facies within the Maestrichtian is controlled by the original depositional fabric and subsequent dolomitization, both of which have had been influenced by the paleotopography. The geostatistical modeling of the Maestrichtian has been used to quantify a significant, multi-billion barrel oil resource. Furthermore, the reservoir model is being used to evaluate and maximize the oil production potential of the Maestrichtian reservoir.