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W. Scott Meddaugh<sup>1</sup>, Dennis Dull<sup>1</sup>, Paul Montgomery<sup>1</sup>, Gerry McNaboe<sup>2</sup> (1) ChevronTexaco Exploration and Production Technology Company, Bellaire, TX (2) Joint Operations, Wafra Field, PNZ, N/A,

**Stochastic Reservoir Model for the First Eocene Reservoir, Wafra Field, Partitioned Neutral Zone**

The Wafra field is located in the Partitioned Neutral Zone (PNZ) between Saudi Arabia and Kuwait. The field produces from five intervals of which the Tertiary First Eocene dolostone reservoir is the youngest. The reservoir produces from extensively dolomitized peloidal packstones and grainstones that were deposited on a very gently dipping, restricted ramp environment with interbedded evaporites. Discovered in 1954, the First Eocene reservoir has produced more than 260 MMbbls of 17-19° API, high S oil.

The stochastic reservoir model utilizes a new sequence stratigraphic framework and is based on data from over 285 wells. The 22 million cell geostatistical model (182 x 227 x 535 layers) covers an area of 372 km<sup>2</sup> (17.3 x 21.5 km). Porosity was distributed using sequential Gaussian simulation (SGS) constrained by stratigraphic layer. Porosity semivariogram range parameters average 1500 m (compared to an average well spacing of about 500 m) and show a moderate N120E trend. Efforts to incorporate a lithofacies or rock-type constraint on porosity distribution were unsuccessful as neither could not be reliably predicted using from the available FE data.

Permeability was added using a cloud transform algorithm that was constrained by core data for specific stratigraphic layers. Sw was distributed by collocated cokriging with SGS using Sw well log curves as primary data and the prior stochastic porosity distribution as secondary data.

Model quality was assessed by comparing predicted property values at model locations corresponding to several wells that were inadvertently missed while the initial project database was constructed.