Role of Fractures in Enhancing Quality of Triassic Gas Reservoirs in Western Kuwait

Riyasat Husain[1]*, Haiqing Wu*[2]*, Abdul Aziz Sajer*[1]*, King Hoi Lau*[1]*, Nadia Al-Zabout*[1]*, and Reyad Abu Taleb*[1]*. (1) Exploration Group, Kuwait Oil Company, P.O. Box 9758, Ahmadi, Kuwait, phone: (965) 9170511, fax: (965) 3982052, rhussain@kockw.com, (2) ChevronTexaco, Salmiya, 22058, Kuwait*

Deep Triassic reservoirs have been successfully explored for free gas in the Mutriba and Kra Al-Maru fields in West Kuwait. These structures are NNW-SSE trending doubly plunging elongated anticlines. Western flanks of the structures are steeper in the proximity of NNW/SSE faults. Superimposed upon this dominant grain is a cross trend, roughly at right angles to the trend of the axial trace, which is reflected in offsets of the crest.

The prospective section has been analyzed for lithofacies, reservoir properties and fractures. The reservoir facies are characterized by a complex lithological suite consisting of dolostone, anhydrite and shales. Conventional reservoir rock quality is poor as porosity is commonly occluded by replacive and pore-filling anhydrite. Intercrystalline micropores are present in the dolostones with matrix porosity values ranging from less than 1% to 5.4%. Matrix permeability values typically are less than 0.01 mD.

Core and log data are analyzed for fracture characterization and integrated with seismic interpretation to build a geomechanical model for fracture evaluation. The model is based on fault framework, and provides fracture density, direction, and possible types in observation points around these faults. The fractures are confined to dolomudstones and do not cross cut bedded anhydrites. Fracture-related permeability in these intervals is dominant and much higher than the matrix permeability. Spatially, fracture density value is higher in Kra Al-Maru as compared to Mutriba.

Fracture plays a key role in the distributions of effective porosity and permeability in more brittle dolomudstone intervals. Also, higher flow rates have been observed in areas with higher fracture density.