

## **Prediction of Fractures Distribution in Carbonate Reservoirs by Using Petrel\* DFN Technique in Potwar Basin of Pakistan –Case History**

**Abid H. Bhatti<sup>1</sup>, Dr. Saeed Jadoon<sup>1</sup>, Munazzah Afzal<sup>2</sup>, Arshad. H. Palekar<sup>2</sup>, Muhammad Ramzan<sup>2</sup>, and Faraz Hasan Siddiqui<sup>2</sup>**

<sup>1</sup>*Oil & Gas Development Company Ltd, Islamabad-Pakistan.*

<sup>2</sup>*Schlumberger Data & Consulting Services, Pakistan.*

Dakhni Gas Condensate Field is located at a distance of about 120 Kms in the south-west of Islamabad in western part of Potwar Basin. The field was discovered in February 1983 and came on regular production in December 1989. Producing reservoirs in Dakhni field are mainly carbonate rocks of Paleogene age. Paleogene carbonates are believed to be producing through fractures because the carbonate matrix has little porosity and permeability. Production alone from matrix porosity in these reservoirs is not reported so far. Since no image log were available upto first seven wells so it was difficult to understand the significance of fracture reservoirs. Dakhni well no. 8 was the first well in which image log was acquired in order to understand the orientation (dip/azimuth), type (open/closed) and distribution of fractures.

Characterization of the Fracture's distribution in a fractured reservoir is extremely important to optimize the well trajectory to encounter open fracture networks/corridors and designing an optimal completion and stimulation strategy, especially in tight carbonates. In such reservoirs it is necessary to understand the fracture network fieldwide by using all the integrated data. High resolution fractures dip data from FMI and UBI images of Dakhni-8, Dakhni-9, Dakhni-10, Dakhni-11, Dakhni-Deep-1 and Dakhni Deep-2 was used to model fractures across the field. The purpose of this paper is to explain the workflow used to define the fractures network distribution across the field by using Discrete fracture Network modeling (DFN) technique of Petrel\* and create simulation properties for fractures to be able to predict reservoir behavior. Petrel has robust workflow that perfectly ties with fracture modeling. DFN is a 3D fracture modeling method to increase the geological controls on predicting fracture intensity in the interwell space. A static model comprising fracture model was built. This model is further upscaled to generate fracture properties such as permeability, porosity and sigma factor. These properties can be further used for an integrated reservoir simulation study for determining hydrocarbon volume and defining depletion strategy of the field.