Reservoir characteristics of Lumshiwal and Kawagarh Formations along Abbottabad Nathiagali Road, District Abbottabad, Pakistan

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Abstract

The basic intent of this study is to decode fracture density, secondary porosity and permeability of the Lumshiwal and Kawagarh formations. Lumshiwal and Kawagarh Formations are well known reservoir rocks of Pakistan. A significant portion of these formations is exposed along Nathiagali-Abbottabad road. The present study was carried out to understand the reservoir characteristics (fractures development, fracture density, secondary porosity and permeability) of these formations. Data for the fracture analysis was collected from 45 station points with an average 10 meter interval using the circle inventory method. Two types of data were collected during the course of field. Fracture orientation data and fracture description data. In fracture orientation data, 664 fracture orientation were measured in total while for fracture description data, in-situ length and width of each fracture was measured. Fracture orientation data was plotted and represented stereographically through computer aided software Geo-Orient while fracture density, porosity and permeability was calculated using Monte Carlo Technique.

Interpretation of fracture orientation data revealed two dominant fractures sets one having average NW strike and the other striking at NE. Our results indicate an average fracture density of 6.03cm^{-1} with an average porosity of 4.79% and permeability values of $6.03x10^{7}$ Darcy. We interpret the variation in average fracture density, porosity and permeability to be because of close association of the fractures with a major anticline in the area. The crest of the anticline was found to be the site of maximum fracture density, porosity and permeability while limbs of anticline had comparatively low fracture density, porosity and permeability. These surficial characteristics of the Kawagarh and Lumshiwal formations make them an excellent candidate for a hydrocarbon reservoir.

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