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Integration of well test analysis in reservoir characterization and field development – A case study

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An application of integration of well test analysis in reservoir characterization and field development is presented in this paper. The real data of Jin Gas Field of L-Basin of Pakistan is used. The basic concept behind this work is to enlighten the importance of well test analysis in a broader way (i.e. reservoir characterization and field development) unlike to just determine the permeability and skin parameters. Normally in the case of reservoir characterization we rely on well test analysis to some extent but for field development plan, the well test analysis has become a forgotten tool specifically for locations of new development wells. This paper describes the successful implementation of well test analysis in Jin Gas Field where the main uncertainties identified during initial stage of field development when location of new development well was marked only on the basis of G&G (Geologic and Geophysical) data. The seismic interpretation could not encounter the boundary (fault, sub-seismic fault, heterogeneity) near the main and only producing well of Jin Gas Field whereas the results of the model from the well test analysis played a very crucial rule in order to propose the location of second well of the newly discovered field. The results from different methods of well test analysis of Jin Gas Field are also verified and supported by other tools of reservoir engineering i.e. material balance method and volumetric method.

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Reservoir characterization using comparative petrophysical testing approach acquired with facies architecture properties analysis

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Studies were conducted to map the reservoir properties based on facies architecture which determines the distribution of the petrophysical properties and calculate hydrocarbon reserves in study interval. Facies Architecture analysis begins with stratigraphic correlation that indicates the area is divided into different system tracts. The analysis of distribution patterns and compiling core analysis with facies architecture model show that there are three estuarine facies appear. Formation evaluation begins with shale volume calculation using Asquith-Krygowski and Volan Triangle Method. Proceed to the calculation of the total and effective porosity using the Bateman - Konen and Volan Triangle Method. After getting the value of the porosity calculation was continued to determine the effective water saturation and non-effective by including parameters of water resistivity and resistivity clay. The results on the research show that the Facies Architecture on the field is divided into three main facies which are Estuarine Channel, Estuarine Sand Bar and Tidal Flat. The petrophysics analysis done by comparing different methods also shows that the Volan Triangle Method does not give a better result of the Volume Shale than the Gamma Ray Method, but on the other hand, the Volan Triangle Method is better on calculating porosity compared to the Bateman-Konen Method. The effective porosity distribution is effected by the distribution of the facies. Estuarine Sand Bar has a low porosity number and Estuarine Channel has a higher number of the porosity. The effective water saturation is controlled by structure where on the closure zone the water saturation is lower than the area beneath it. It caused by the hydrocarbon accumulation on the closure zone.

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