EVALUATION OF MINERALOGICAL COMPOSITION AND RELIABLE PETROPHYSICAL PARAMETERS BY NEUTRON INDUCED GAMMA RAY SPECTROSCOPY IN MINERALOGICAL COMPLEX RESERVOIR OF LOWER GORU FORMATION, MIDDLE INDUS BASIN A CASE STUDY

Kamran Aziz[1], Aamir Rasheed[1], Arshad Hussain Palekar[2], Rehan Hanif[2]
S. Sohaib Zulfiqar[2], M. Zeeshan Baig[2]

[1]OMV, Gmbh Pakistan, [2]Schlumberger, Pakistan

ABSTRACT

Lower Goru Formation reservoirs sands (Lower Cretaceous) characterization in the Middle Indus Basin is challenging due to complex mineralogy of the rocks. The varying mineralogy characteristically makes the Petrophysical Evaluation difficult, and cannot be resolved by using basic conventional log suites. To resolve this ambiguity in Lower Goru Formation evaluation, proper additional data sets are required.

Reservoir quality is defined by two main factors, porosity and permeability of a rock. The reservoir quality index or rock type is known to be an important input for field static and dynamic models. Core data analysis in Lower Goru Sands across Middle Indus Basin reveals the presence of heavy minerals, calcareous cement, conductive mineral i.e. chlorite, chamosite etc. that effect the conventional wireline logs response i.e. reservoir porosity (storage capacity) and permeability (flow capacity). Hence, the quantification of the mineral contents becomes important in classifying the rock type.

However, estimation of complex mineralogy from conventional logs (density, neutron, and sonic) is also complicated by several factors such as barite mud effects, oil base mud filtrate invasion, sensitivity of the tools' measurements, as well as differences in the tools' vertical resolution and depth of investigation.

Developments in the neutron capture spectroscopy logs make it possible to estimate all matrix parameters which are significant for accurate formation evaluation. The number of parameters is dramatically reduced. Using the measured spectroscopy data as input to multi-mineral solver software, provides more accurate mineralogy output, consequently yielding better porosity and water saturation calculation.

This paper describes the application of neutron capture spectroscopy data to formation evaluation and characterization of Middle Indus Lower Goru Sands. The formation evaluation result in the studied well is found to be validated with core data.