

## **Integrated Approach for Realistic Evaluation of Shaly Sand Reservoir with Anomalous Log Response - a Case Study.**

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Agartala Dome and Rokhia fields are located in the western part of Tripura which falls within Assam Arkan Basin of India. The anomalous log responses of these fields have been nightmare for log analysts since their discovery and realistic evaluation of reservoir parameters kept evading everyone till now. This paper correlates well log responses with findings from core studies and explains various log anomalies. The different log responses of these fields exhibit complexities against Bhuvan formations of Miocene age.

The Neutron and Sonic logs have poor contrast against sand/shale sequence. The shale resistivity is quite high, even higher than water bearing sandstone formations in many cases. This makes it difficult to differentiate between reservoir and non- - reservoir sections of the formation and their evaluation.

The findings of sedimentology lab. from core studies have been integrated and their effect on different logs have been examined to arrive at logical explanations for the anomalous log response. Core studies indicate the presence of Kaolinite as dominant clay mineral along with Illite in small quantity. The presence of ferromagnesium minerals as Mica and Muscovite has also been reported.

Kaolinite has minimum specific area among all the clay types and lowest CEC resulting in poor conductance and hence high clay resistivity. Kaolinite is non-swelling in nature and Illite has limited swelling tendency. Therefore, interlayer water present in such shales is very less or in other words, "Hydrogen ion" concentration is low. This accounts for lower than normal Neutron porosity against shales. The presence of ferromagnesium minerals and Mica in sand matrix causes apparent Neutron porosity to read higher than the normal, thus, reducing the sand/ shale contrast usually observed in Neutron log. Moreover Kaolinite and Illite are heavier clays, therefore, not much of variation is observed against sand/shale sequence on Sonic log .

None of the logs can be relied upon for the computation of the shale volumes as shales have little effect on Neutron and Sonic log and shale resistivity is quite high. Multimineral model for formation evaluation has been developed which takes into account the effect of clay type, ferromagnesium minerals and Mica. The model has been successfully utilised for formation evaluation and realistic estimation of reservoir parameters in this field. The results obtained are in agreement with testing results, thereby, proving the efficacy of the model.