



Evaluation of Total Organic Carbon Content, Thermal Maturity, Clay-Mineralogy and Depositional Environment of Cambay Shale Formation, Cambay Basin, India

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Exploration of shale oil and gas resources in India is at preliminary stage. The domestic shale resources can help India to meet its growing energy demand. Based on the initial analysis and available data, Cambay Shale Formation of Cambay Basin is appeared to be potentially important for shale hydrocarbon resources in India. In the present study, wireline log records have been utilized to determine the total organic carbon (TOC) content, thermal maturity, clay type, and depositional environment of Cambay Shale Formation. Estimation of useful parameters through well logs has the advantage of getting continuous data/information against depth across the entire thickness of the studied shale section. It will be helpful in identifying the potential shale zones for hydrocarbon prospect in the event of having limited core data.

TOC has been estimated with depth over the entire formation using Sonic and Resistivity log following the method developed by Passey et al. (1990). TOC values obtained from well logs for most of the sampling points varies in the range of 2 to 4 wt % and in few sampling points the TOC value exceeds 4 wt%. There is a good agreement between log derived and laboratory determined TOC values. The thermal maturity has been evaluated from the correlation between vitrinite reflectance (VRo) from core samples and sonic log transit time as proposed by Mallick and Raju (1995). The estimated VRo are in the range of 0.57 to 0.9 % and for most of the sampling points VRo is greater than 0.65%. Obtained TOC and VRo values indicate that the Cambay Shale Formation has a very good potential to be the source rock for generating hydrocarbon.

The indicative clay mineralogy has been determined from various cross-plots of Spectral Gamma Ray log and Litho Density log. The presence of clay minerals like chlorite, kaolinite and montmorillonite has been evident from the cross-plots of thorium (Th) – potassium (K) and photoelectric absorption factor (PEF) – K. Studies have shown that there is relationship between depositional environment and ratio of thorium to uranium (Th/U). The Th/U ratio for major part of the formation varied between 2 to 7. In few places the value are less than 2. This indicates a possibility of marginal marine environment at the time of deposition of Cambay Shale.

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References

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