

Application of advanced geochemical well log to evaluate Cambay Shale in south Cambay Basin, India, for unconventional hydrocarbon resources

DR. SANJUKTA DE¹, PRAKASH K. SINGH² AND
DEBASHISH SENGUPTA³

¹Indian Institute of Technology (Indian School of Mines)

²Banaras Hindu University

³Indian Institute of Technology Kharagpur

Presenting Author: desanjukta00@gmail.com

India is an energy deficient country with huge economic burden on import. With declining conventional energy resources, it is the need of the hour to look for suitable unconventional energy resources like shale gas/oil. There are huge deposits of organic-rich shale formations in several sedimentary basins of India and Cambay Shale of Cambay Basin is considered as one such promising shale resource. The objective of the present work is to characterize and evaluate Cambay Shale in the Jambusar-Broach block, Cambay Basin, for shale hydrocarbon prospect, based on application of an advanced geochemical well log, Litho Scanner, coupled with support of core studies. Litho Scanner log can provide a continuous estimation of elemental concentrations of the formation. Litho Scanner log, recorded in two wells in this block, have been analysed extensively to derive depth-wise continuous estimation of a) mineralogical composition, b) total organic carbon (TOC) content, c) volume fraction of clay (V_{clay}), and d) brittleness index (BI) based on mineralogy. Core studies have been also carried out to correlate and validate the accuracy of the log derived estimation of the parameters.

Knowledge of mineral composition is useful for better characterization of the reservoir, addressing complications during drilling and designing hydro-fracture operation. V_{clay} significantly influences the reservoir quality and completion quality of the hydrocarbon resource. TOC is a key source quality parameter and crucial for evaluation of shale resource. TOC has been derived from log and core studies. BI is an important completion quality parameter and is generally used in the evaluation of frackability. Mineralogical composition derived from log and core measurements has been used for estimation of mineral-based BI. There is a good correlation/ agreement of log derived data and core derived data, supporting the accuracy of log derived estimation of these quality parameters. The log-derived continuous data of TOC, V_{clay} and BI can be used to identify potential target zones. Application of advanced geochemical log like Litho Scanner can provide time efficient and cost-effective useful data for evaluation of shale resource with reasonable accuracy.

Acknowledgement

The authors express thanks to ONGC, India, for providing data and samples.