

## **Evaluation of Source Rock Potential of Talhara Shale by Integrating Wireline Logs and Geochemical Data and its Application for Characterization of Shale Gas Potential in Lower Indus Basin, Pakistan**

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### **Abstract**

Potential of source rock in Lower Indus Basin remains largely unknown due to limited data in shales because wells are usually drilled at the structural highs targeting conventional reservoirs. However an attempt has been made in this paper to utilize wireline logs and wells data for evaluating the hydrocarbon potential of source rock, which exhibits various properties on wireline logs. There are three main indicators to estimate the unconventional hydrocarbon potential of a formation; organic matter of a rock, organic matter quality and organic matter maturity grade.

The goal of this paper is to determine Total Organic Carbon (TOC) and its distribution in Cretaceous Goru Talhar shale member in Lower Indus Basin by utilizing the well data and e-logs. Since shale gas reservoirs are essentially source rocks that have not expelled their entire hydrocarbon, understanding the distribution of major source rocks can provide aid in locating these potential untapped reserves. While measurement and understanding of the TOC is critical to evaluate the potential shale gas plays.

Previous studies show that organic rich shales have low velocity in sonic logs and high resistance in resistivity logs. Based on the past analysis of source rocks all around the world, a general formula has been derived for separating the source rock from non-source rock using sonic resistivity combination (Mayer and Nederlof, 1984). This method is applied to identify potential source rock, while estimation of Total Organic Carbon is done by using resistivity, sonic and density logs and based on  $\Delta\text{LogR}$  method (Passey et al. 1990) and Source Potential Index (SPI) is determined by Dembicki and Pirkle (1985) method.