Evaluation of Thinly Laminated Zones from the Granite Wash Using an Integrated Workflow Including Logs, Core Data, and Digital Rock Analysis

Tiffany Rider[1], Robert Aylsworth[1], Joel Walls[1], and Anyela Morcote[1]

[1]Ingrain

ABSTRACT

The Granite Wash is a stacked liquids rich tight sand play in the Anadarko Basin covering 2.5 million acres from the Texas Panhandle into Western Oklahoma. A four inch diameter core of 290 feet was obtained from a well in the Texas Panhandle and a comprehensive suite of petrophysical properties were measured at various scales to characterize multiple formations. The analysis included high resolution dual-energy CT (DE-CT) scanning, spectral gamma logging (SGR), plug sample selection, digital rock analysis (DRA) and traditional core analysis. Digital rock data from plugs was upscaled to the whole core. Continuous vertical curves were computed for mineralogy, total organic content (TOC), brittleness index (BI), total porosity (PhiT), effective porosity (PhiE), porosity associated with organic matter (PAOM), and permeability. The results from DRA were compared to other lab measurements including XRD, LECO TOC, and porosity.

Lithologies were quantified from SGR, bulk density (RHOB), and photoelectric factor (PEF) computed from the DE-CT scans. Plug samples were taken from 84 depths that were representative of key lithologies. Samples were analyzed for XRD, LECO TOC and DRA. For each DRA sample, XRF analysis and micro-CT X-ray imaging were used to select locations for SEM imaging. Ion-milled SEM data and 3D FIB-SEM data was used to compute effective PhiE, solid organic matter (OM), PAOM, and permeability.