

Reservoir Characterization of the Niobrara Using High-Tier Wireline Logs

Kaufman, Peter S.^{*1}; Alatrach, Samer¹ (1) Data & Consulting Services, Schlumberger, Greenwood Village, CO.

The keys to success in unconventional horizontal plays can be simplified to five components: acquire and drill the best acreage, identify the best pay in the unconventional target, effectively steer the lateral into that best pay zone, optimize the stimulation of that zone based on local characteristics of the penetrated formation, and develop an efficient, repeatable drilling strategy that minimizes costs. Openhole wireline logging and LWD impact each of these components with critical data that can be used in the decision-making process. The Niobrara, a low-permeability, Late Cretaceous formation comprised of up to four laterally continuous chalk benches with intervening marls, presents a challenging unconventional reservoir that will require careful evaluation to determine its economic viability across the Denver-Julesburg Basin. While typical triple-combo logs will reveal basic information about overall lithology, porosity, and saturation, the application of advanced logging technology will yield more accurate and detailed measurements of these quantities, quantify natural and induced fracture intensity, determine stress orientation, and provide continuous mechanical properties from which completion designs can be optimized. This knowledge can help to estimate resources in place by zone, high grade lateral landing points, predict hydraulic fracture containment, and mitigate potential wellbore instability problems. Examples of high-tier wireline and LWD log suites from the Niobrara will be shown which demonstrate how advanced technology can improve the characterization and exploitation of this re-emerging play.