

Downhole Logging and Dynamics Data Resolving Lithology-Related Drilling Behavior

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Abstract : Terms such as “riding a hard streak”, “formation push”, and “fighting formation” are commonly used in the directional drilling world to explain BHA behavior that causes unwanted trajectory change. Theories about downhole directional tendencies are commonly speculated from various personal experiences with little merit due to the lack of hard data to reveal the actual mechanisms behind the phenomenon, leaving interpretation of the root cause up to personal perception. Understanding and identifying in real time the lithological factors that influence the BHA to change or hold direction adds tremendous value in terms reducing sliding time and targeting zones for optimal ROP. Utilizing surface drilling parameters and employing downhole measurements of azimuthal gamma, continuous inclination, and bending moment, a direct measure of the rock related directional phenomenon have been captured and quantified. Furthermore, identifying continuous zones of like lithology with consistent bit to rock interaction has value from a reservoir characterization and completions standpoint. The paper will show specific examples of lithology related directional tendencies from the Spraberry and Wolfcamp in the Delaware Basin.

Keywords : Azimuthal gamma imaging, bending moment, continuous inclination, downhole dynamics measurements, high frequency data

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