A Triumvirate of Targeting - A Three-Pronged Approach to Keeping a Horizontal Well in the Desired Eagle Ford Reservoir Interval

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Geosteering with LWD gamma ray has long been a common approach to targeting a horizontal well. Unfortunately, it suffers from serious drawbacks: the need for analog wells with near-identical log character, a scale that applies only at the most local of levels, and periods of often panicked confusion after crossing suspected faults.

Recent work in the Eagle Ford Shale of South Texas has shown that detailed cuttings sample description and chemostratigraphy, when integrated with LWD geosteering, provide a method to work around these LWD limitations and bolster the robustness of the targeting solution. Careful targeting is essential for completions, as results demonstrate that fracture initiation within the carbonate-rich target is easier and more effective than in clay-rich intervals. Each of the three components - sample description, chemostratigraphy, and LWD - is independent of the others and works at a different scale. The critical requirement of this multi-faceted targeting approach is a solid regional understanding and network of correlations.

Dozens of wells across the Eagle Ford trend were drilled in the last few years, targeting the underlying Edwards Formation. Description of drill cuttings from these wells was supervised by a field-based mudlogging coordinator who ensured consistency between wells and across vendors. This hands-on approach built an institutional memory for the regional “look” of the Eagle Ford and provides a framework, in a gross sense, in which to correlate samples from actively-drilling wells.

Chemostratigraphy’s value was maximized through the careful construction of a regional net of correlations using drill cuttings and densely sampled cores from existing vertical wells. A chemostratigraphic zonation system was developed that is largely unrelated to lithologic or petrophysical character, and is on a vertical scale somewhat finer than that provided by the cuttings descriptions. Samples from drilling wells are analyzed in real-time and are immediately tied into this framework, providing an independent interpretation of wellbore position.

LWD gamma ray correlation is the finest-scale leg of the system, providing specific targeting down to the nearest foot, assuming a good correlation. Sample description and chemostratigraphy narrow the window for likely LWD correlations and, when crossing faults, provide a quick rough correlation. This allows new LWD data to be interpreted more quickly and reliably than with LWD alone.