Pay Zone Identification in Oklahoma’s STACK play

*Immediate light hydrocarbon analysis on cuttings taken at regular intervals through <250 ft thick target formation.*

During drilling of a production oil well, TOA was stationed on location to help identify and distinguish between multiple benchmarks of potential pay. Due to the tight rock properties, heavier hydrocarbon shows are minimal through conventional gas detection methods. Samples were measured in regular intervals through a target formation of over 250 ft in thickness. In conjunction to TOA sampling, sealed jars were also collected (track 6) and measured dynamically to determine concentration increase zones. The TOA results (track 3) show the total light hydrocarbons measured. A total of 3 separate pay zone benchmarks were identified using the TOA and show a near perfect correlation to the independent HRGC (high resolution gas chromatography) measurements. For the project, the Operator had consistently drilled multiple wells in the lower benchmark (3). However, the results from the Tight Oil Analyzer showed the upper target (2) contained a thicker and more saturated reservoir of light producible hydrocarbons. The TOA measures 3 distinct phases including gas, condensate & light oil. The pyrograms below represent illustrate the different phases detected by the Tight Oil Analyzer.

**APPLICATIONS & TOOLS**

**Multi-Well Correlation**
TIGHT OIL ANALYZER (TOA)

Exclusive Tight Oil Analysis for petroleum systems dominated by light hydrocarbon composition. Proprietary sampling enables detection of these components during drilling operations.

Tight Oil Formations have different fluid mechanics as well as different petroleum compositions. Using standard mud logging practices, crucial key parameters are missed due to evaporative losses from the cuttings during sample retrieval, storage & processing prior to analysis.

Paladin’s unique development and methodology examines whole sample no more than five (5) minutes after surface collection. Applying a low temperature pyrolysis enables the detection of the S0 peak that is lost during normal source rock pyrolysis. The S0 peak is resolved into three main phases: T0, T1 & T2 nomenclature for Gas, Condensate-Light Oil & Light Oil respectively. With this technique wellsite geologist are able to measure and quantify producible versus non-producible zones during drilling operations in near real time (NRT). Unlike its predecessor (Source Rock Pyrolysis), The TOA has the ability to detect pay zones that are not dependent on organic materials to be present.

The graph on the left shows a standard methodology for the widely used organic geochemistry analysis:
Source Rock Pyrolysis. Typicallly, this process is dependent on organic material and can only be measure using dried & pulverised sample cuttings. This process results in the loss of all the light hydrocarbons which subsequently is the predominate constitute of unconventional tight rock resources. Analysis is suitable for both in-situ & migrated petroleum reservoirs.