Case Study: Improved Hydrocarbon Analysis

GEOLOG SURFACE LOGGING

Use of PDC bits and Oil Based Muds created contaminated surface gas measurements which hindered cost effective evaluation of an appraisal drilling program.

Klene

Client

An E&P operator in Africa drilling a series of appraisal wells in an oil field utilizing PDC bits and an oil-based mud system.

Challenge

The operator was using surface gas measurements to help determine downhole fluid types, but recognized that in some wells gas readings were showing values that conflicted with previous wells in known formations. It was suspected that alkene contamination may be the cause of the variations.

Solution

Two independent gas acquisition and analysis systems were deployed at the wellsite. The control system comprised a constant volume gas trap, gas distribution panel and G5 service, while the second system comprised similar components with the addition of our Klene service performing alkene removal prior to the chromatographic analysis.

Results

Gas readings obtained by the two systems show significant variation, which in turn resulted in different interpretations of results. The high degree of contamination from alkene gases, generated by friction from PDC bits causing thermal cracking of the Oil Based mud components was clearly visible. Interpretation performed using the uncontaminated gas data complemented the other petrophysical analyses performed and was in agreement with previous wells.

Value

The surface gas readings obtained using the Klene, alkene removal service complemented the client's other petrophysical analyses and provided a comprehensive characterization of the hydrocarbon content of the well from spud to TD.

Services used

G5 DualFid™ Klene

Drilling an appraisal program, the operator was tasked with reducing formation evaluation costs and utilizing the most cost-effective solutions available.

Knowing that the combined use of Oil Based drilling muds and PDC bits was likely to introduce alkene gas contamination, it was suspected that surface gas analysis was being compromised by the generation of these gases. The effects of bit wear were anticipated to be more prevalent in the deeper, harder formations.

By implementing two similar acquisition and analysis systems, with one incorporating the Klene, alkene removal service, the effects of alkene gas contamination were clearly identified and unaffected readings used to perform detailed reservoir analysis and interpretation.

Removing the effects of alkene contamination.

Drill-Bit metamorphism generates alkene gases through the cracking of hydrocarbon components of the mud system at high temperatures. These high temperatures are generated when drill bits lose cutting action and friction becomes a dominant force. By incorporating removal of the alkenes into the gas acquisition system, clean, uncontaminated gases may be analyzed.

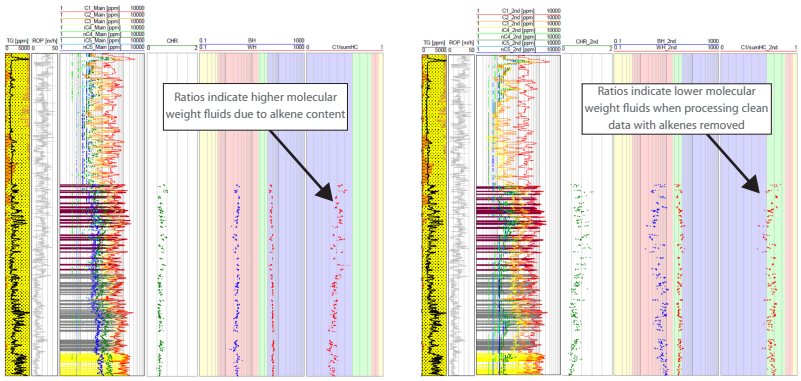

Figure 1. The left plot displays alkene contaminated G5 service gas data, with ratio analyses performed. The right plot, shows the identical gas stream measured with the alkenes removed, providing G5 Klene data.

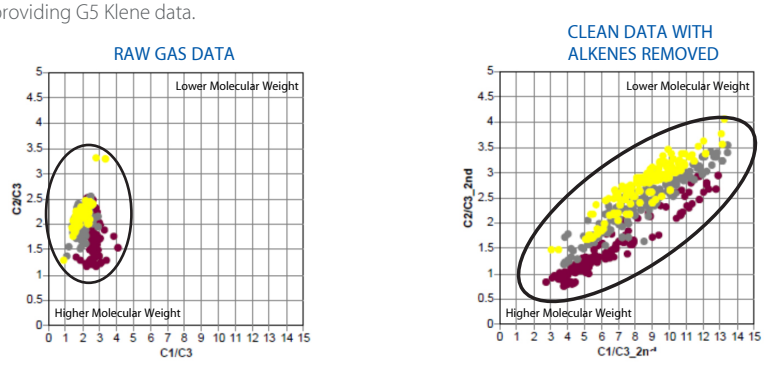

Figure 2. Displays cross plots of the data clearly demonstrating the incorrect interpretation based on the alkene contaminated unfiltered data when compared to uncontaminated data

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