

Near Real-Time Fluid Characterization Supports Completion Planning and Basin Modelling



Client

Kuwait Oil Company
Onshore Development, Kuwait
Najmah and Sarjelu Formations (Jurassic)

Challenge

Kuwait Oil Company required a timelier, more cost effective method than wireline sampling and laboratory analysis to determine the fluid type within their limestone oil reservoirs and identify evidence of compartmentalization to aid in development of their completion strategies and basin modelling.

Solution

In addition to GEOLOG's G5 and G8 advanced gas analysis (up to nC8) services, the G9+ service was deployed to accurately define the fluid type using C9 to C27 analyses. This information was acquired from cuttings recovered at surface.

Results

The G9+ service clearly identified the hydrocarbon signature of the drilling mud and identified the key light hydrocarbon compounds in reservoir oils found in cuttings. The light hydrocarbon components in oils and variations in their composition between formations were identified in near real-time.

Value

The data collected identified different types of fluids and was used to optimize the completion strategy for this well. It was used to improve the basin model and identify other zones for potential future production. By utilizing surface logging technologies to obtain this data the client reduced valuable rig time, associated costs and the risk of running extensive downhole logging suites.

Services used



Fluid characterization, from C1 to C27, was provided to determine fluid types and quantities for effective completion planning and basin modelling.

An onshore development well in Kuwait required detailed fluid analysis from two key reservoirs (Najmah and Sarjelu) in order to optimize their completion planning and provide input into their basin model (by identifying compartmentalization or continuity of reservoirs). A suite of advanced surface logging services was made available to provide this information. In addition to advanced gas analyses providing interpretations using data from C1 to nC8, further refinement was provided by integrating interpretations using data from C9-C27.

Thermal extraction of hydrocarbons from cuttings recovered at surface.

The G9+ service utilizes thermal extraction gas chromatography in order to characterize hydrocarbons up to C27 (see Figure 1). This is completed while drilling, in near real-time. The G9+ service is used to analyze the liquid hydrocarbons absorbed on rocks as well as those found in liquids. This is vital to ensure that the signature of any hydrocarbon-based mud or additives can be identified and removed from the final interpretation (see Figure 2). Key zones can be easily identified by the quantities and types of fluids to aid in completion planning (see Figure 3). Further, multiple reservoirs can be assessed and compared as an indication of fluid continuity or compartmentalization. Figure 4 shows a comparison of the fluids in the Najmah and Sarjelu and suggests that the fluids therein are extremely similar, but different nonetheless, and therefore belonging to unconnected compartments.

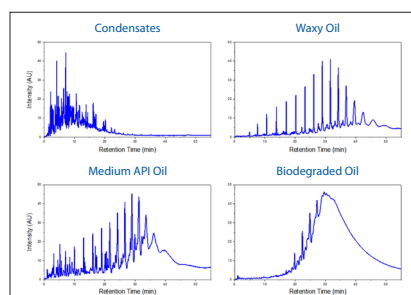


Figure 1.

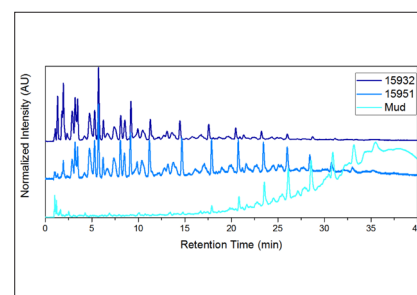


Figure 2.

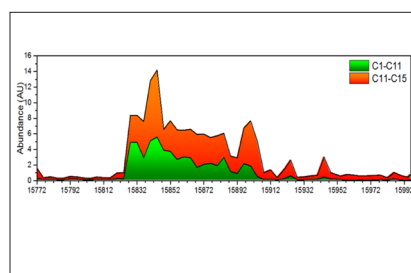


Figure 3.

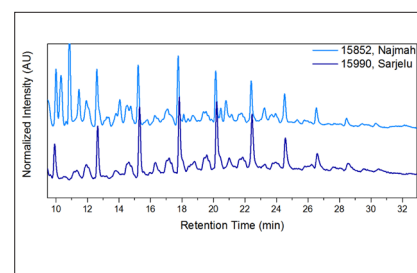


Figure 4.