

# Petrophysics Team Uses Isotopic Analysis Technique in Complex Subsalt Formation

GASFACT™ DATA LOGGING SERVICE HELPS OPERATOR CONFIRM PROGNOSSED STRATIGRAPHY USING ISOTOPIC DATA IN REAL TIME

GULF OF MEXICO

## OVERVIEW

An operator requested Halliburton Sperry Drilling provide GasFact™ data logging services for real-time well prognosis in the Gulf of Mexico (GOM) using stable carbon isotope ratio analysis. While exiting the base of salt, displaced cretaceous carbonates with a thermo-genetically mature carbon isotope signature were positioned over younger Miocene sandstones with an immature biogenic carbon isotope signature. These formations were followed by a shaly section with wet stringers and then the thermogenic mature reservoir. The Surface Data Logging (SDL) team recommended an isotopic gas analyzer paired with a flowline constant volume extractor (CVE), in combination with standard total hydrocarbon analysis (THA) and C1-C5 gas chromatography.

## CHALLENGES

Reducing uncertainty in real time is necessary for potential hazard identification during drilling and reservoir characterization. The challenge in this case was to determine fluid origin while drilling through the following complex sections:

- Subsalt nonconforming cretaceous carbonate and pre-miocene marl and clastic
- Transition zone from cretaceous carbonate to in-place sections—a mixture of carbonate and shale at the top to a more shaly section at bottom
- Mid-miocene sand-oil bearing on exploration wells (expected to be wet below OWC)
- Shaly section with sand stringers and possible losses
- Reservoir-oil-bearing sand with possible shaly/sandy intervals

## CHALLENGES

- Confirm presence of subsalt out-of-place formation
- Mitigate potential drilling hazard at salt exit
- Identify nonconforming geological formations
- Identify drill-bit metamorphism occurrence
- Prevent potential losses in shaly section
- Characterize reservoir maturity

## SOLUTION

- Real-time analysis and support using GasFact™ data logging service
- Real-time Isotopic data
- Direct global support to remotely augment equipment operation
- Gas chromatography analysis to identify gases produced by drill-bit metamorphism

## RESULTS

- Delivered operator's petrophysics team feedback in real time
- Indicated transition through nonconforming formations and zones of interest with some level of mature thermogenic hydrocarbon
- Detected potential DBM affecting drill-bit performance and informed the customer of possible effect on isotopic gas data

