

Total Organic Carbon Analysis

GeoFlex quantitative cuttings analysis and imaging service component

APPLICATIONS

- Identification of hydrocarbon-bearing formations in unconventional reservoirs
- Quantification of total organic carbon (TOC)

BENEFITS

- Improves identification of organic-rich formations
- Optimizes well placement
- Evaluates reservoir and completion quality

FEATURES

- Isothermal combustion at 1,148 degF [620 degC], which ensures that only organic carbon is measured
- Seven-minute analysis cycle
- Suitability with any drilling fluid
- Measurement corrected for oil-base mud effect
- Quantification of two organic carbon compounds (carbon volatiles and carbon nonvolatiles)

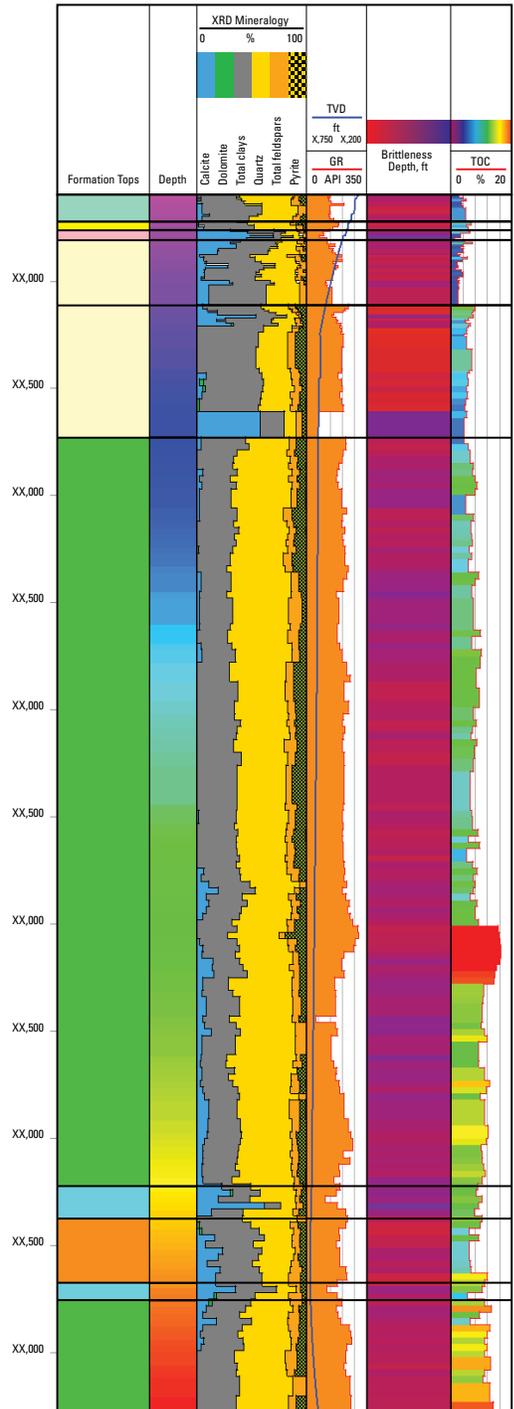
The GeoFlex* quantitative cuttings analysis and imaging service evaluates the TOC quantity of drilled rock. Using a combustion device that analyzes TOC, the GeoFlex service quantifies carbon volatiles related to light hydrocarbons up to C₁₆ and carbon nonvolatiles from C₁₆ to kerogen.

Methodology

Measurements are performed on drilled cuttings that have been washed, dried, and crushed to a grain size of 50 to 100 ug. The powder is then burned in a furnace at a constant temperature of 1,148 degF [620 degC], which preserves inorganic carbonates such as calcite and dolomite. Carbon released through the oxidation process is converted into carbon dioxide, and the resulting emission of carbon dioxide is detected and quantified by an infrared cell.

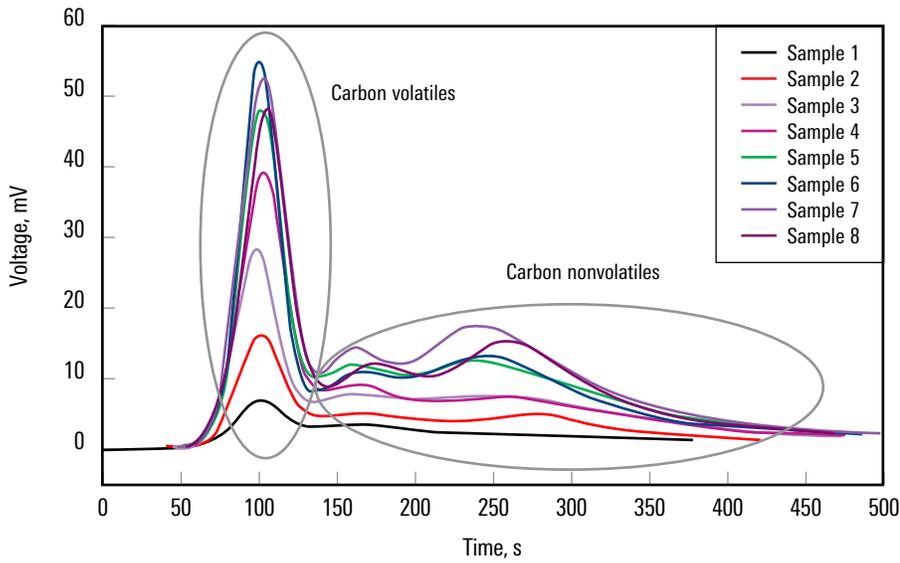
Quantification

The TOC analyzer is calibrated using standard reference samples. Accuracy and limit of quantification have also been quantitatively determined through extensive metrological characterization. In water-base mud, TOC is equal to the sum of contribution of carbon volatiles and carbon nonvolatiles. In oil-base mud, TOC is equal to carbon nonvolatiles; a mathematical cleaning is applied to remove contribution of carbon volatiles caused by contamination from oil in the drilling fluid.



By precisely measuring TOC, the GeoFlex service makes it possible to determine in near-real time when the well is being drilled out of zone.

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TOC quantification from the GeoFlex service shows the presence of carbon volatiles and carbon nonvolatiles, providing accurate identification of pay zones regardless of mud type used.

Specifications

Furnace temperature	1,148 degF [620 degC]
Atmosphere	Air generated by Claind® generator
Power	100–127 V, 220 V, or 240 V [50–60 Hz]
Detector	CO ₂ infrared cell
Sample preparation	Ground powder (50–100 ug)
Measurement time	7 min
Measurement method	Catalytic total oxidation
Accuracy	±0.4%

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