

Logging while drilling

Gamma logging

FEATURES

- High-quality, real-time measurements of potassium, uranium and thorium concentrations in the formation
- Real-time borehole images, based on both total gamma ray and elemental concentrations
- Clear visualization of results, using a Briggs color-cube presentation
- Fully compatible with all Sperry M/LWD systems and telemetry types
- Rated for operation up to 175°C (347°F) and 25,000 psi (172 MPa)

BENEFITS

- Improve well-placement accuracy and maximize reservoir contact by geosteering based on elemental concentrations, not just total gamma ray signatures
- Reduce uncertainty and optimize well placement by easily distinguishing between formation layers with different combinations of K, U and Th concentrations
- Improve understanding of the depositional environment using the industry's most accurate LWD spectral gamma ray measurements
- Easily identify the optimal target zone, maintain position within it and avoid unplanned sidetracks

Spectral gamma ray service

Natural gamma spectroscopy and borehole imaging while drilling

Overview

The spectral gamma ray service from Halliburton provides the industry's most accurate LWD natural gamma ray spectroscopy measurements. The service provides elemental concentrations of potassium (K), uranium (U) and thorium (Th), based on spectral energy measurements of the natural gamma rays emitted from the formation. These elemental concentrations form the basis for a variety of formation-evaluation techniques, including clay typing, estimation of total organic carbon content, and identification of clay minerals.

Increase reservoir understanding with high-precision measurements

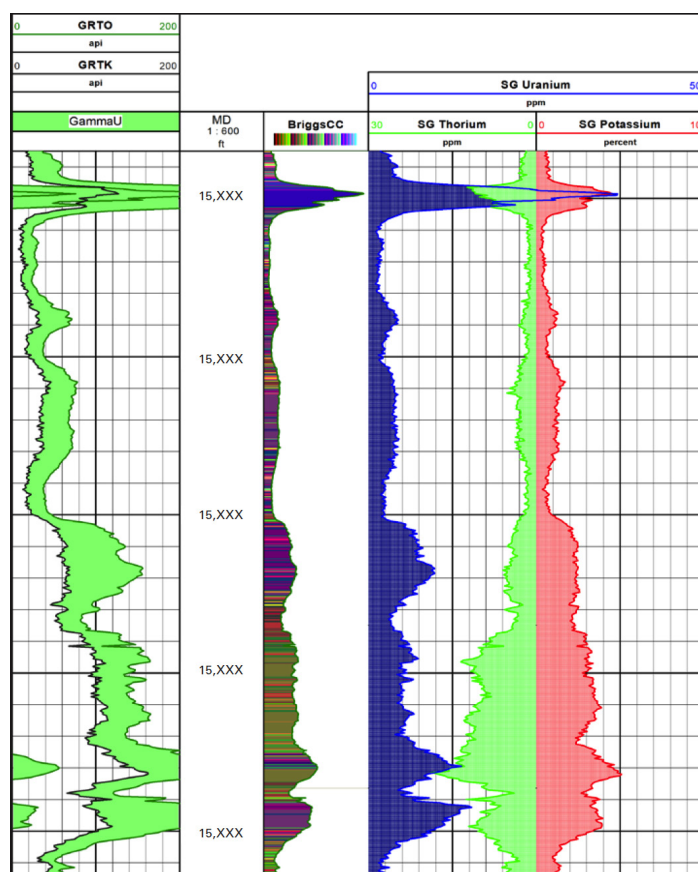
The basis of the service is a highly sensitive gamma ray detector, built around a large, sodium iodide scintillation crystal. Measurement sensitivity is a crucial aspect of a high-quality spectral gamma ray measurement. To maximize sensitivity, the crystal is as large as possible, and as close to the formation as possible, within the confines of the LWD collar. A thin sleeve of titanium covers the detector, protecting it from the drilling environment, while minimizing attenuation of gamma rays from the formation to provide a very high count-rate. The high count-rate gives rise to high-precision measurements.

The use of innovative computer-modeling techniques to characterize the response of the measurements makes them the most accurate in the industry. A patented electronic control system maintains the measurement accuracy across the full range of operating temperature, ensuring reliable results in all conditions.



Easily identify target zones for improved well placement

In addition to the sophisticated tool design, the service also provides a simple method for displaying the results, using a Briggs color-cube presentation, which represents each combination of elemental concentrations with a unique color. This makes visual discrimination between rock types much easier, particularly in geosteering situations, in which the same formation layer may appear repeatedly within a logged interval. The Briggs color-cube presentation is available for not only bulk spectral gamma ray measurements, but also for azimuthal quadrant data, allowing operators to geosteer easily to formation layers with specific elemental characteristics.



Sample log from the Spectral gamma ray service, showing elemental concentrations as traditional curves and using the Briggs color-cube display of both bulk and azimuthal data.

For more information, contact your local Halliburton representative or visit us on the web at www.halliburton.com

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