Triple Combination Tool String

Description

The Schlumberger Triple Combination Tool String ("Triple Combo") consists of a series of Schlumberger logging tools combined to provide a broad suite of *in situ* physical property measurements in an uncased borehole. The term "Triple Combo" is derived from the three principle measurements collected by the tool string: density, porosity and resistivity. Specifically, the Triple Combo is designed to measure formation density, porosity, deep/intermediate/shallow resistivity, natural gamma radiation, hole size, and fluid temperature, all in a single logging pass.

Applications

Hostile Environment Natural Gamma Sonde

- Clay typing
- Mineralogy identification
- Ash layer detection

Accelerator Porosity Sonde

- Formation porosity
- Lithologic determination

Hostile Environment Litho-Density Tool

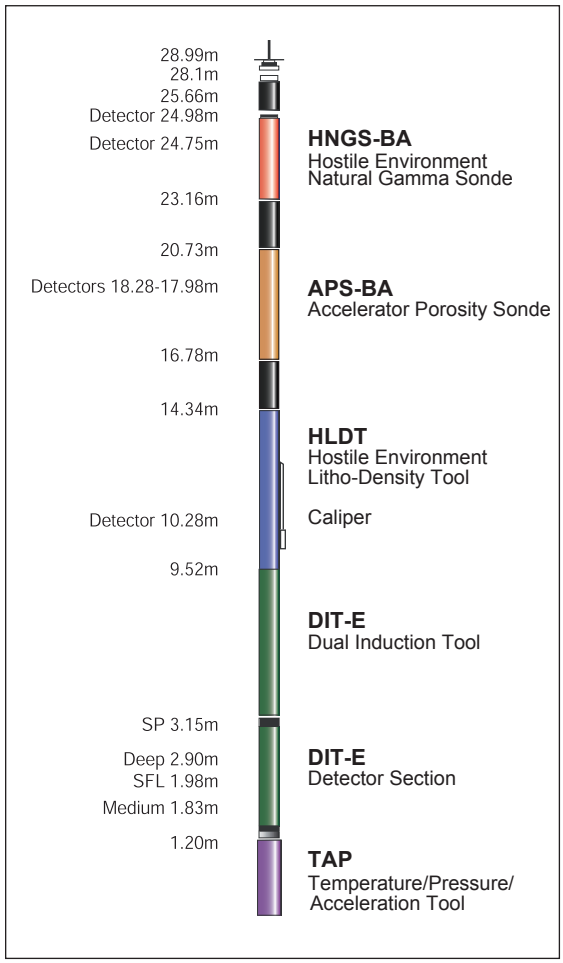
- Porosity estimation
- Seismic impedence calculation
- Lithology and rock chemistry definition

Dual Induction Tool

- Porosity estimation
- Density and velocity reconstruction
- Lithologic boundary definition and textural changes

Temperature / Pressure / Acceleration Tool

- Geothermics
- Hydrogeology



Schematic illustration of the Triple Combo tool string and its primary components.

Deployment Notes

In ODP, the Triple Combo is always the first tool string run into the open borehole to ascertain the condition of the hole. The modular nature of the Triple Combo affords great flexibility with regard to tool substitutions and additions/deletions. For example, third party tools such as the Lamont-Doherty Earth Observatory's High Resolution Gamma and TAP tools have been run in-line with the Triple Combo.

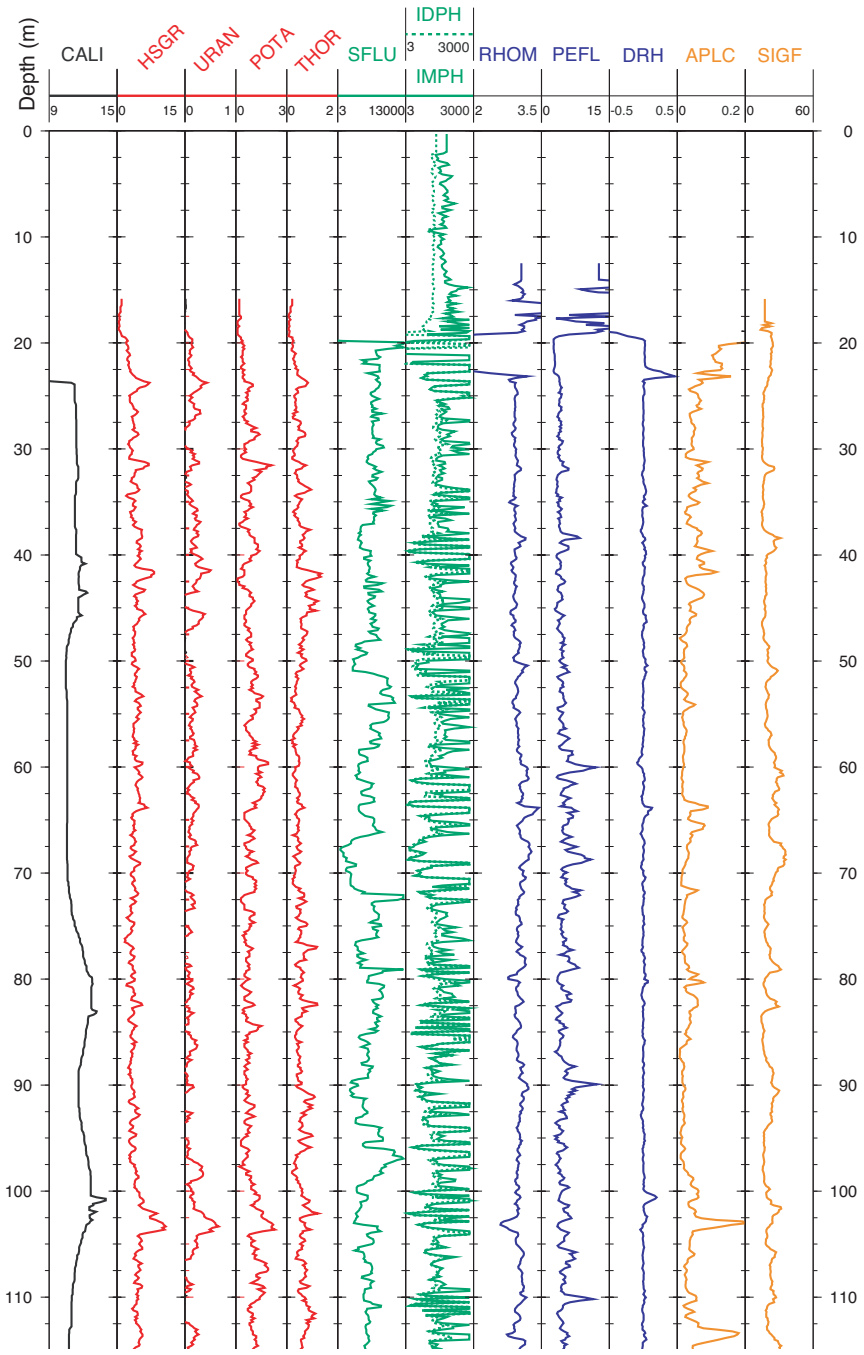
Tool String Specifications

Length:	28.99 meters
Diameter:	3.75 inches
Primary Measurements:	Spectral gamma (Uranium, Potassium and Thorium), Formation density, Formation porosity, Resistivity (Shallow, Medium and Deep depths of investigation), Fluid temperature

OCEAN DRILLING PROGRAM

ODP Logging Services, Lamont-Doherty Earth Observatory, Rt. 9W, Palisades, NY 10964

Triple Combo Logs



Triple Combo Tool Specifications

Tool	Measurement	Maximum Temperature	Maximum Pressure	Sample Interval	Vertical Resolution	Logging Speed
HNGS	Spectral Gamma	260° C	25,000 psi	6 in.	1.66 ft	1600 ft/hr
APS	Porosity	176° C	20,000 psi	6 in.	12 - 14 in.	1600 ft/hr
HLDT	Density	260° C	25,000 psi	6 in.	1.25 ft	1600 ft/hr
DIT	Resistivity	175° C	20,000 psi	6 in.	2.5 - 8 ft	10,000 ft/hr
TAP	Temperature/Acceleration/Pressure	105° C	10,000 psi	1 sec.	Conditional	Conditional