Hostile Density Neutron (HDNT™) Tool

HELPS PROVIDE ACCURATE DATA IN HP/HT CONDITIONS

OVERVIEW

The Halliburton Hostile Density Neutron (HDNT™) tool is a section of the Hostile Environment Applications Tools system (HEAT™ Suite). It is available with the source-detector pad either as a bottom-only, in-line configuration (2.75-in. tool OD) or as a powered, extendable configuration (3.5-in. tool OD). It is fully combinable with all other HEAT Suite tools.

The HDNT log measures:

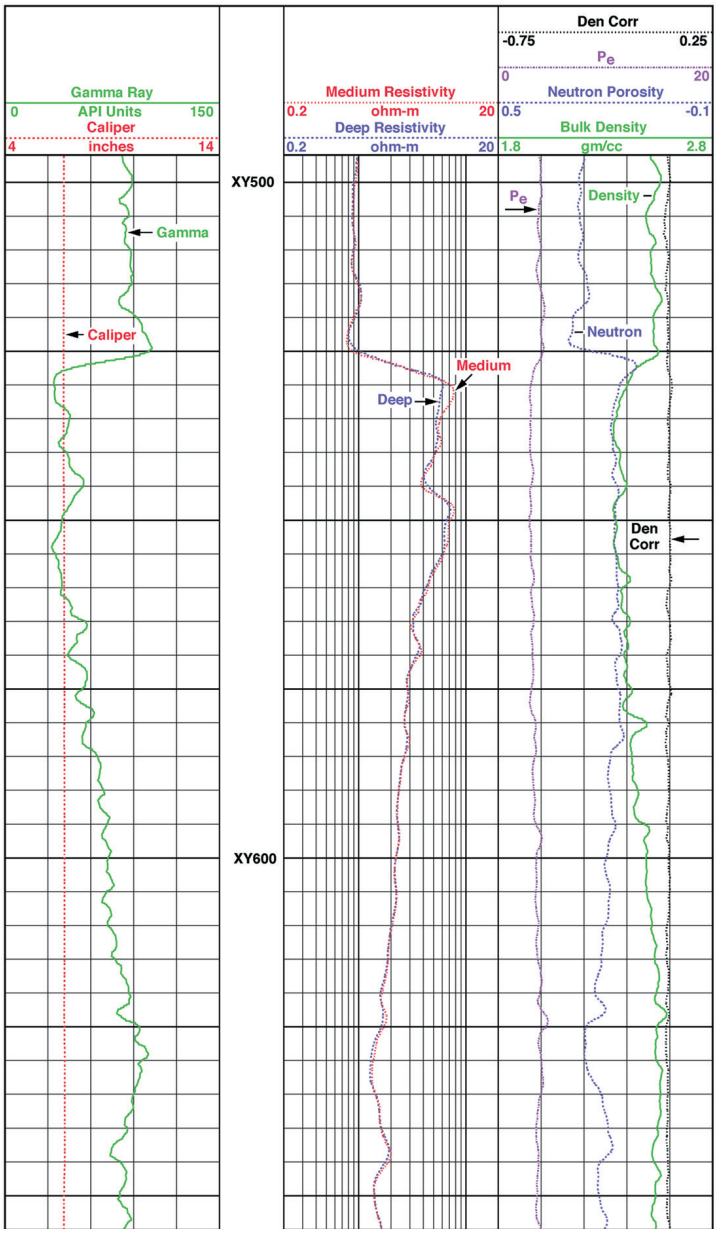
- Formation density, photoelectric factor (a lithology indicator), borehole diameter, and neutron porosity
- Formation density by emitting gamma rays into the formation and recording the energy of gamma rays reflected by the formation to the two detectors in the tool
- Borehole diameter with a spring-loaded caliper arm that opens and closes as the tool is pulled through changes in hole diameter
- Neutron porosity of the formation as indicated by the detection of neutron radiation induced in the formation by the tool

Additionally, as for all the Halliburton HEAT Suite services, the HDNT log provides reliable data in temperatures up to 500°F (260°C) and pressures as high as 25,000 psi (172.4 MPa) that are encountered in hot hydrocarbon-bearing formations.

FEATURES

The HDNT log contains the following features:

- More precise delineation of thinly bedded formations using the unfiltered Pe curve
- Curves indicating data quality are displayed on a computer screen in real time and recorded on the log
- Advanced correction algorithm is applied to density and neutron-porosity data in real time
- Rugged construction and advanced gain stabilization help maintain measurement integrity under varying temperature conditions
- Specially designed He3 detectors minimize the effects of elevated temperature on observed count rates and computed neutron porosity



Typical field output of the HDNT log.

- Combinable with a complete family of tools that operates under the Digital Interface Telemetry System (DITS™) technology
- Extensively characterized in test pits with a full set of correction charts available
- 2.75-in. OD for use in slimholes makes it possible to design a through-formation evaluation program for holes as small as 3.5 in.
- Combinable in almost any configuration to suit borehole geometry and provide appropriate formation evaluation information
- Uses a new 4D technique to account for the density and photoelectric absorption of the formation and mudcake without assuming any correlation between these variables. Besides yielding a superior density, these calculations provide information for compensating the Pe measurement and computing useful quality indicators such as the two-component density correction

BENEFITS

The HDNT log offers the following benefits:

- Complete formation evaluation in slimholes
- More reliable performance, even under hostile conditions
- More consistent, high-quality measurement
- Aids real-time assessment of the validity of NPHI, ρb, and Pe measurements
- Valid log response in weighted borehole fluids
- More accurate ρb with minimal statistical variation
- Single-pass, comprehensive formation evaluation
- Extendable pad design is preferred in most conditions, and especially in rugose boreholes, because it provides the more positive pad contact needed to obtain good log data. (in-line pad option can be used when bit size is less than 4.5 in.)
- Facilitates drilling in hostile formations
- Permits use of smaller tubing and bits
- Makes drillouts in smaller holes possible

ASSOCIATED ANSWER PRODUCTS

The following answer products are associated with the HDNT log.

- The wellsite answer product is formation density, neutron porosity, and Pe
- Density and neutron-porosity data is also used with openhole sensors as input to the Halliburton mineralogy, openhole, and cased-hole saturation analysis to provide a complete formation evaluation product. These include:
  - ULTRA™ (Multimineral Evaluation Program) log
  - CORAL™ (Complex Lithology Analysis) log
  - LARA™ (Laminated Reservoir Analysis) log
  - SASHA™ (Shaly Sand Analysis) log

Hostile Density Neutron Tool (HDNT™)

	Length (ft) (m)	Diameter (minimum) (in.) (mm)	Max Pressure (psi) (MPa)	Max Temperature °F °C	Weight (lb) (kg)
In-Line Pad	29.1* (8.8)	2.75 (69.9)	25,000 (172.4)	500 (6 hr) 260 (6 hr)	355 (160.8)
Extendable Pad	39.1 (11.9)	3.5 (89.9)	25,000 (172.4)	500 (6 hr) 260 (6 hr)	635 (287.8)
High Pressure High Temperature	26.18 (7.98)	4.0 (101.6)	30,000 (206.84)	500 (6 hr) 260 (6 hr)	604 (274)

* Usually run with the HPDC-A - If so, add 3.8 ft (1.2 m)

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