

Lithology Density Tool (LDT)



The Lithology Density Tool (LDT) is used to measure the bulk density of the formation, which is then related to formation porosity. The tool also determines the Pe of the formation, allowing for lithology identification, and contains a motorized caliper that is used for borehole diameter information. When the LDT is logged in combination with the Compensated Neutron tool, gas identification is possible.

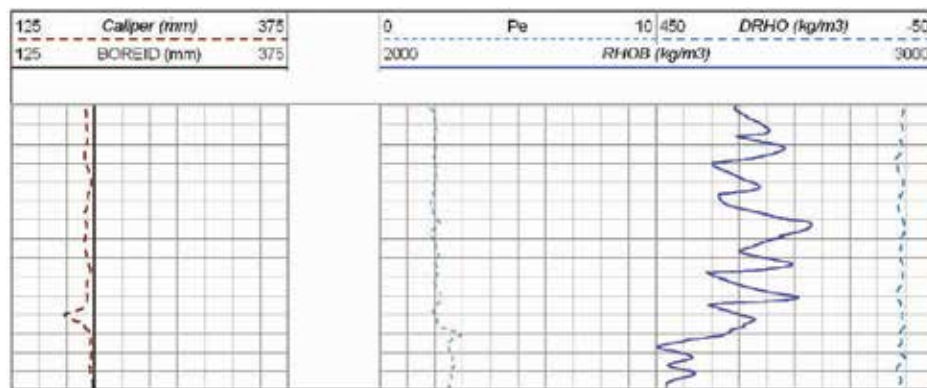
Description

The LDT tool has a pad section that contains a radioactive ^{137}Cs (74 Gbq) Cesium 137 gamma source and two scintillation detectors. The pad is pressed against the formation wall by the caliper while focused high-energy gamma rays are emitted from the source. Some of the gamma rays are absorbed by the formation. The LDT tool monitors the energy levels of the gamma rays that return to the detectors and records this energy spectrum.

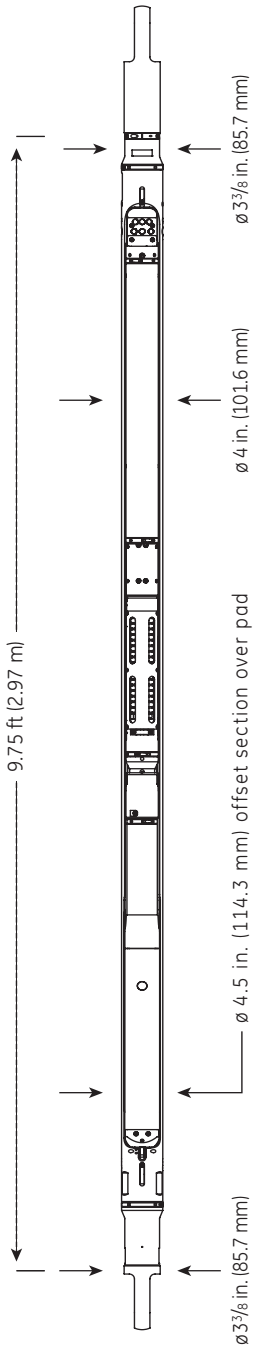
By examining the position of the gamma ray energy in the spectrum, both the bulk density and the formation lithology can be determined. The two-detector arrangement of the LDT compensates for mud cake effects.

Features

- Full energy spectrum displayed at surface for both detectors
- Quick-release source handling to reduce radiation exposure for operators
- Easily removable pad to reduce the weight of loading and unloading tools
- Fully compatible with Sondex Ultrawire* tools
- Easy to transport—can be broken down into sections less than 10 ft



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Specifications	
Maximum OD	4 1/2 in. (114.3 mm)
Makeup length	9.75 ft (2970 mm)
Weight	310 lb (141 kg)
Maximum temperature	302°F (150°C)
Maximum pressure	20 kpsi (137.9 Mpa)
Hole Diameter	6 in. (152 mm) – 22 in. (559 mm)
Tensile strength	50,000 lb (22,700 kg)
Compressive strength	5,500 lb (2,500 kg)
Sensor Offsets	
Sensor offsets	22.1 in (561 mm) from lower tool joint
Borehole Conditions	
Borehole fluids	Salt, fresh, oil, air
Maximum logging speed	30 ft/min (10 m/min)
Tool position	Eccentralized
Measurement	
Measurement range (Pe)	1.4–10 barns/electron
Measurement range (RHOB)	1.3–3.0 g/cc
Accuracy (RHOB)	+/- 0.015 g/cc
Accuracy (Pe)	+/- 0.2 barns/electron for <1/8 in. of mud cake, no barite
Accuracy (Caliper)	+/- 0.075 in. (+/- 2 mm)
Vertical resolution (RHOB)	1.33 ft (405 mm)
Vertical resolution (Pe)	1.33 ft (405 mm)
Primary curves	RHOB, DRHO, Pe, caliper
Secondary curves	Limestone porosity, sandstone porosity, dolomite porosity
Hardware and Power Requirements	
Tool bus	Ultrawire
Power (logging)	Typical 150 mA (18V DC)
Power (opening/closing caliper)	up to 1.2 A (18V DC)