Wireline logs

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Log	Name	Measures	Units	Range	Typical plot range	Precision	Vertical resolution at normal logging speed, ~1000 m/hr	Depth of investigation	Env correction	Composition	Texture	Stratigraphy	Faults & fractures	Shale & source rx	Fluid	Pressure	Seismic analysis	Quality reducers	Tool names and mnemonics	Mud	Casing
CAL	caliper	hole diameter	mm or in	50–600 mm or 2–24 in	250 mm or 10 in	±1 mm	sample interval	0 m	●		○		○			○		High logging speed	CALI; Four-arm dual caliper, 4CAL [BHI]; CL, or Four Arm Caliper Tool, FACT [HAL]; Borehole Geometry Tool, BGT [SLB]; X and/or Y are opposite and perpendicular to DEN tool	Any	Open or cased
TEMP	temperature	tool temperature	˚C or ˚F	5–300˚C	10–150˚C	±1°C but accuracy perhaps ±10 °C	low	—	●									Operational conditions, time for equilibration	Integral part of most tools	Any	Open or cased
GR	gamma ray	natural radioactivity	API units	0–250	0–150	±4 API units	0.5 m	50%: 0.1 m 90%: 0.3 m		◐	○	●	○	◑				Large hole, high mud weight, centered tool decrease count; KCl in mud causes baseline shift	Computed Gamma Ray, CGR; Uranium-free gamma-ray, GRS, SGR, or KTH	WBM or OBM	Open or cased
SGR POTA, K THOR, Th URAN, U	spectral gamma ray	natural radioactivity	K permil (‰) or percent (%), Th ppm, U ppm	K 0–100 ‰, Th 0–40 ppm, U 0–30 ppm	K 0–100 ‰, Th 0–40 ppm, U 0–30 ppm	±5 API units	0.5 m	50%: 0.1 m 90%: 0.3 m		●	○	◐	○	●				Large caves, KCl in mud (baseline shift on K), spurious tool temperature correction	Natural Gamma Tool, NGT, or Natural Gamma Spectrometry, NGS [SLB]; Spectralog, SL [BHI]; Natural Gamma Ray Tool, NGRT, or Compensated Spectral Natural Gamma Ray, CSNG [HAL]	WBM or OBM	Open or cased
ECS	elemental capture spectroscopy	induced radioactivity spectrum	converted to volume percent Fe, Ca, S, Ti, Gd, Cl, Ba, Si, and H	0–100%	0–100% cumulative	±2% for the major elements; proportional to abundance	0.5 m	0.15–0.23 m		●	○			◑				Hole rugosity, mud salinity	ECS [SLB], GEM [HAL], SpectraLog [BHI]	Any	Open; cased with specialist tool
PE	photoelectric	photoelectric absorption index	barns/electron	1.5–18 b/e	0–10 (half track) or 0–20 (full track), often displayed with neutron-density	±0.02 b/e	0.3–0.5 m	<0.5 m		●		○	○					Caved hole, rugose hole, barite in mud system	On density tool	Any, except barite-bearing	Open or cased
RHOB	bulk density	bulk density	kg/m^3 or g/cm^3	1500–3500 kg/m^3	2000–3000 kg/m^3 in most basins	±20 kg/m^3	0.1 m for deflection but 0.5–1.0 m for true value	0.10–0.15 m (shallower for higher density)		◐	●	○	○	◑	◐	○	●	Caved hole, rugose hole	RHOZ, DEN; ZDEN [BHI]; high-res RHO8 [SLB]; DPHI, PHID, DPOR converted to porosity	Any	Open; cased under some circumstances
NPHI	compensated neutron	hydrogen index converted to neutron porosity	dimensionless	–15 to +45 pu	0–30 pu	±1 pu	0.6–1.0 m	Varies with φ: 30% φ means 16.5 cm depth, 20% 23 cm, 10% 34 cm, 0% 60 cm		◐	◐	◐	○	○	●			Hole rugosity increases Nphi, mud salinity (corrected), T & P (corrected)	CNL [SLB], Ultra CN [BHI]	Any	Open or cased
NMR	nuclear magnetic resonance	T2 relaxation time distribution (often converted to free-fluid porosity)	ms (porosity in pu)	0.1–10 000 ms	0.3–3000 ms	±1 pu for total porosity, ±0.5 pu for free-fluid porosity	0.15 m (high-res), or 0.7 m (standard)	50%: 28 mm, 95%: 38 mm		○	◐				●			Hole rugosity	CMR [SLB], MRIL [HAL], MREX [BHI]	Any	Open
SP	spontaneous (self) potential	electric potential	mV	relative	relative, 100 mV wide, curve deflection to left opposite sandstones	±1 mV	Poor; do not use for bed boundaries	Shallow, <0.3 m		●	○	○	○	○	◐			Caved hole, rugose hole	Static Spontaneous Potential, SSP	WBM (must be conductive)	Open
IL	induction log	whole rock conductivity, converted to resistivity	mS/m but converted to Ωm	0.2–2000 Ωm	0.2–20 Ωm	±0.25 mS/m (accuracy reduced above 500 Ωm)	0.7 m (deep), 0.5 m (shallow)	50%: 0.5 m (shallow) 3.0 m (deep)			○			○	●		○	Hole rugosity, high resistivity formations or low low resistivity mud	ILD, ILM, AHT (10 to 90) or AHO (10 to 90) [SLB]; HDIL (M2R1 to M2R9) [BHI]; High-Resolution Induction, HRI [HAL]	Any	Open
usually considered identical																					
RT	resistivity	whole rock resistitivity	Ωm	0.2–2000 Ωm	0.2–20 Ωm	±1%	0.7 m	50%: 1.5–2.0 m (deep) 0.7–1.0 m (med)			○			○	●		○	Hole rugosity	Laterolog (LL), micro-log (ML), HALS, HRLD, HRLS [SLB]; Dual laterolog, DLL [HAL]	WBM (must be conductive)	Open
MI	micro-image resistivity	hi-resolution 2D conducitvity, but converted to res	mS/m but converted to Ωm	0.2–2000 Ωm	normalized to relative values	±0.1 Ωm	25 mm	50%: 40 mm		○	●	●	●	◑			○	Hole rugosity	FMI [SLB], EMI [HAL]	WBM; specialist tools for OBM	Open
DT Δt	sonic	P-wave travel-time at ca. 18 kHz	µs/m or µs/ft	120–750 µs/m or 40–250 µs/ft	150–450 µs/m or 50–150 µs/ft	±6 µs/m or 2 µs/ft	0.3–0.5 m, depending on receiver spacing	0.12–1.0 m (shallower for high velocity)		○	○	○	○	◑	○	●	●	Caved hole, high logging speed results in cycle skipping (high Δt), uncentered tool	Δt; Acoustic, AC or ACL [BHI]; Borehole Compensated Sonic, BHC [SLB] or BCS [HAL];	Any	Open; cased hole for cement bond log
DTS	shear sonic	S-wave travel-time	µs/m or µs/ft	200–1400 µs/m or 60–425 µs/ft	150–450 µs/m or 50–150 µs/ft (plotted with DT)	±3 µs/m or 1 µs/ft	0.3–0.5 m, depending on receiver spacing	0.12–1.0 m (shallower for high velocity)		○	○	○	○	◑	○	◐	●	Caved hole, high logging speed results in cycle skipping (high Δt), uncentered tool	Dipole Shear Sonic Imager, DSI [SLB]; Full Wave Sonic, FWS [HAL]	Any	Open

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SOURCES

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