HALLIBURTON

FORMATION EVALUATION | NUCLEAR MAGNETIC RESONANCE

MRIL®-2D fluid characterization

Oil and gas volumes and saturations from NMR two-dimensional fluid characterization

BENEFITS

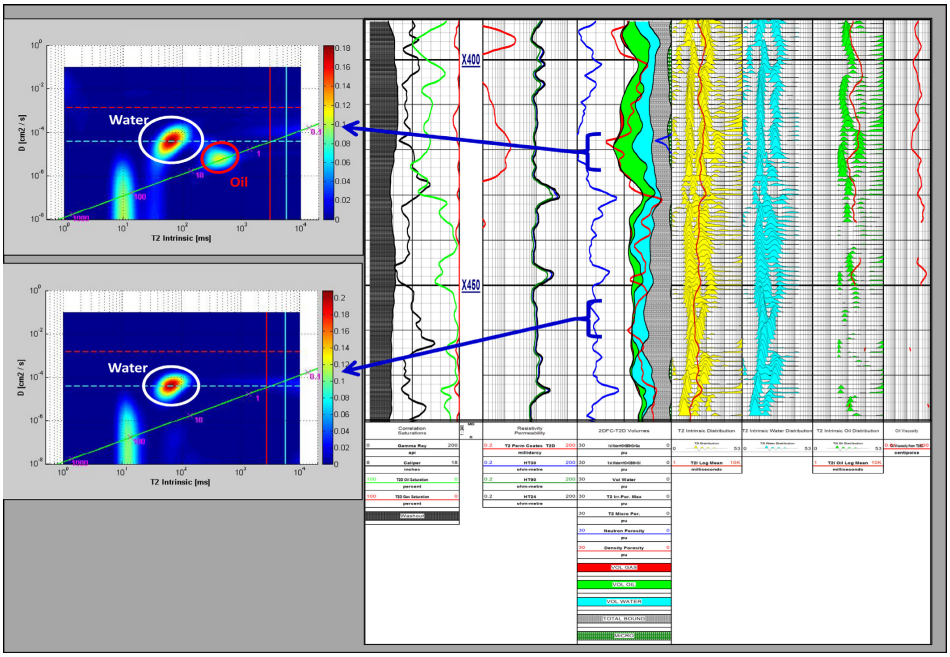
- Proven very successful both offshore and onshore in a wide range of oil and gas reservoirs
- Provides analysis of T_2-diffusion from a single log pass with simultaneous multi-echo spacing acquisition
- Computes oil, gas, and water saturations, as well as microporosity, capillary bound water, moveable fluid volume, effective porosity, total NMR porosity, and a permeability estimation
- Provides an Rw-independent method for evaluating potential reserves in water- and oil-based mud systems

2-Dimensional fluid characterization - T_2-Diffusion

Oil and gas identification and quantification from two-dimensional nuclear magnetic resonance (NMR) imaging is now available with both the MRIL®-XL and MRIL®-Prime services from Halliburton Wireline and Perforating.

Direct near-wellbore NMR measurements of oil and gas saturations are accomplished with simultaneous T_2 and diffusion acquisition. Oil, gas, and moveable water occupy unique locations within a two-dimensional T_2-D map, allowing direct identification in either water- or oil-based mud systems.

Computation of NMR oil, gas, and water volumes and saturations from the 2D maps is incorporated into an NMR fluids log.



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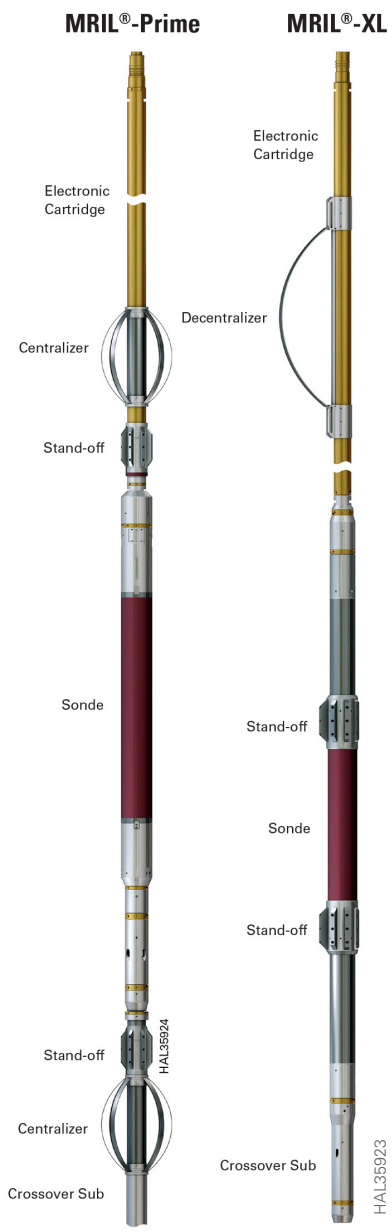
Two-Dimensional Fluid Characterization T_2-Diffusion 2DFC-T_2D

Wireline NMR sensor dimensions and ratings

	MRIL®-PRIME		MRIL®-XL	DEEPSUITE™ MRIL®-XL
Maximum Working Temperature	350°F (175°C)			
Maximum Working Pressure	20,000 psi (138 MPa)			30,000 psi (207 MPa)
Maximum Torque Limit	1,000 ft-lb (138 kg-m)			
Maximum Compression Limit	37,000 lb (16 783 kg)		50,000 lb (22 680 kg)	
Maximum Tension Limit	32,000 lb (14 515 kg)		100,000 lb (45 360 kg)	
Sonde OD (without standoffs)	4.875 in. (12.4 cm)	6 in. (15.3 cm)	6 in. (15.3 cm)	
Length	50.38 ft (15.35 m)	52.88 ft (16.12 m)	44.75 ft (13.64 m)	44.67 ft (13.62 m)
Weight	1,275 lb (578 kg)	1,475 lb (669 kg)	1,600 lb (726 kg)	1,976 lb (896 kg)
Tool Positioning	Centralized		Eccentralized	
BOREHOLE CONDITIONS				
Borehole Fluids	All (0.02Ω•m minimum)			
Minimum Borehole Size	5.875 in. (14.9 cm)	7 in. (17.8 cm)	7.875 in. (20 cm)	
Maximum Borehole Size	8.5 in. (21.6 cm)	12.25 in. (31.1 cm)	16 in. (40.6 cm)	
Open/Cased Hole	Open			
Rugosity Effect	No effect if not in sensitive volume			
Mudcake Effect	None, if not in sensitive volume			
MEASUREMENT				
Frequencies of Operation	9			
MRIL Measurement Geometry	9 concentric right cylinders		9 concentric arcs	
MRIL Measurement Accuracy	±1 pu or 5% (whichever is greater)			
MRIL Measurement Repeatability	1 pu standard deviation on porosity measurement			
Static Vertical Resolution	24 in. (61 cm)			



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