

TMD-3DCO™ 1 11/16-in. Logging Tool for Oil, Water, and Gas Saturations

PRECISE 169CARBOXSAT™ AND GASSAT™ EVALUATION OF HYDROCARBON SATURATION

OVERVIEW

The Halliburton Thermal Multigate Decay - 3 Detector and Carbon Oxygen (TMD-3DCO™) tool is an advanced new-generation multidetector pulsed-neutron logging instrument employing GYSO crystals and proprietary detector spacing. This tool measures pulse neutron-induced gamma ray counts and spectroscopy through inelastic, capture, and activation radioactive interactions with the formation and borehole. This provides the ability to uniquely solve simple or complex saturation profiles in reservoirs, while eliminating phase-saturation interdependency. Using 3-detector measurements, the technology is primarily used to determine “fluid” saturations in reservoirs using three independent techniques, such as Sigma, CO, and SATG.

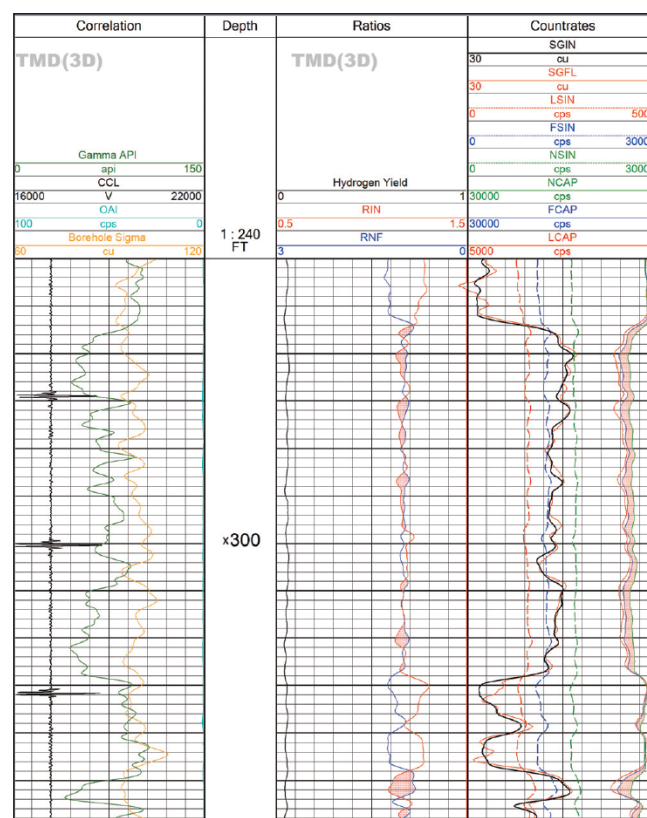
- » Water, oil, and gas saturation evaluation
- » With higher salinities and mid-to-high porosities, the traditional thermal neutron capture cross sections (sigma) is measured to determine water saturation
- » For low porosity and low/unknown salinities, the advanced multidetector measurements are designed for increased dynamic range and accuracy for gas saturation
- » The technology also identifies bypassed gas in complex completions, estimates cased-hole porosity, and provides basic lithology indicators

Additional uses of this technology include reservoir monitoring and well diagnostics:

- » Fluid saturations, including CO₂ (gas) EOR (Enhanced Oil Recovery) and carbon capture and sequestration (CCS) monitoring
- » Oxygen activation to identify water flow inside/outside casings for conformance and silicon activation for gravel pack evaluation

ADVANCED SOLUTIONS AND PRODUCTS

- » Carbon-Oxygen-derived saturations: Oil saturation for fresh, mixed, or unknown formation water salinity
- » SATG-derived saturations: Gas saturation in fresh, mixed, or unknown formation water salinity
- » Sigma-derived saturations: Traditional oil or gas saturation in high formation water salinity
- » Chi Modeling® computation service
- » Water flow: Water flow velocity and direction, inside or outside of casing
- » Elemental yields



Precise gas evaluation in low-porosity unconventional reservoirs.

Dimensions and Ratings		
Maximum OD	1.69 in. (4.29 cm)	
Maximum Temperature and Pressure	300°F (150°C)* / 15,000 psi (103.4 MPa)*	
Minimum and Maximum Casing /Tubing ID	2 in. (5.1 cm) minimum / 16 in. (40.6 cm) maximum	
Length and Weight**	14.25 ft (4.34 m)	35 lb (16 Kg)
Measurement		
Range	5 to 60 cu	
Vertical Resolution (90%)	24 in. (enhanced 18 in.) / 61 cm (enhanced 46 cm)	
Depth of Investigation (90%)	8 to 12 in. (Sigma)	4 to 7 in. (CO)
Precision (1SD), COIR2 (VFP)	2% COSF at 3 fp	
Precision (1SD), Sigma (Capture)	2% SGFF at 15 fpm	
Output	Count rates and ratios, inelastic and capture yields of various elements and their ratios, formation capture cross section (sigma), cased-hole porosity, and advanced multidetector (long) measurements	
Recommended Maximum Logging Speed	600 to 1,800 ft/hr Sigma Mode [formation- and salinity-dependent]	60 to 180 ft/hr advanced inelastic measurements [formation- and porosity-dependent]
Borehole Conditions: Type/Fluids	<input type="checkbox"/> Open <input checked="" type="checkbox"/> Cased <input checked="" type="checkbox"/> Salt <input checked="" type="checkbox"/> Fresh <input checked="" type="checkbox"/> Oil <input checked="" type="checkbox"/> Air	
Combinability	Cement, casing, and production-evaluation tools	
Acquisition	SRO/Memory	

* Flasks for higher temperature and pressures available

** With TTTC-U002 (GR/CCL) and XHU003 (crossover sub), the makeup is 23.55 ft (7.18 m) and 80 lb (36 kg)

Benefits

Flexible applications in formation evaluation and well diagnostics behind casing in new and re-entry wells in slimhole completions.

Provides gas evaluation in tight formations, such as unconventional reservoirs, and gas, oil, and water saturation, in new well completions where openhole logs are not available.

- » Evaluates hydrocarbon saturations in mid-to-high water salinity environments
- » Determines the lithology
- » Enhances oil recovery monitoring for gas, steam, and CO₂ floods
- » Locates water and low-density hydrocarbon zones in waterfloods and mixed-salinities formations
- » Identifies bypassed gas reserves
- » Water conformance identifies water flow inside/outside casing and complex completions
- » Detects leaking plugs and packers
- » Verifies gravel pack integrity via silicon and aluminum activation
- » Verifies bypassed oil and gas saturation

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

Sales of Halliburton products and services will be in accord solely with the terms and conditions contained in the contract between Halliburton and the customer that is applicable to the sale.

H013468 01/20 © 2020 Halliburton. All Rights Reserved.

HALLIBURTON

Features

Best resolution for depth of investigation and dynamic range offered in small-diameter pulsed neutron, enabling greater amounts of information, faster logging speeds, higher accuracy, and reliable operations through:

- » Fast-response, multichannel analyzer electronics for full-spectrum monitoring
- » Rugged, large, dense, and fast-response gadolinium yttrium oxyorthosilicate (GYSO) detectors
- » Optimal arrangement of source-to-detector spacing in a 1¹¹/₁₆-in. (49-mm) diameter running assembly
- » Combinable with cement, casing, and production-evaluation tools

