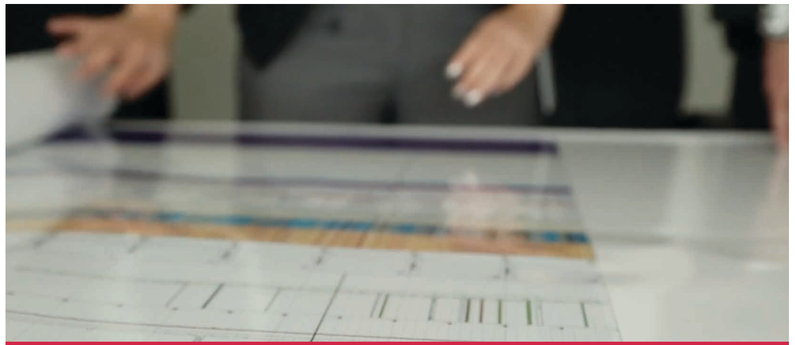
FracAdvisor™ Service

Enhanced completions through advanced technology, data, and expertise



Weatherford wireline technologies, such as the Compact™ spectral gamma ray, Compact cross-dipole sonic, and Compact microresistivity imager, complement our evaluation expertise for optimizing your completion design with the FracAdvisor service.

Today's plays call for advanced wellbore insight and accuracy

With the large increase of unconventional and horizontal drilling projects, maintaining and maximizing production has become increasingly complex and critical for operators. Success in these challenging environments requires clear data and client understanding in key areas including:

- Well completions in geologically complex environments
- Reservoir rock composition and its variability along lateral well sections during drilling
- Swelling clays and their effects on drilling and completions

Reduce uncertainty and improve productivity

Weatherford FracAdvisor service provides near real-time, expert guidance for enhanced completion design in unconventional reservoirs. By combining petrophysical data with a greater understanding of the mechanical properties of a formation, FracAdvisor service identifies the occurrence of natural fractures and calculates their fracability along horizontal or vertical wellbores, fields, or basins. Using evaluations of attributes such as total organic carbon (TOC), maturity, natural fracture patterns, and in-situ stresses, engineered completion designs can be optimized for maximum productivity.

Get custom-fit completion designs for complex subsurface reservoirs

Featuring our highly collaborative approach with clients, FracAdvisor service helps identify ideal completion solutions that complement the unique formation characteristics of a well. With improved understanding of the formation characteristics, each stage and each fracture cluster of a completion can be fine-tuned for greater productivity.

The Compact™ spectral gamma ray is part of our comprehensive portfolio of openhole and cased-hole wireline services. To learn how our services and technologies can work for you, contact us at wireline@weatherford.com, or visit us at www.weatherford.com.

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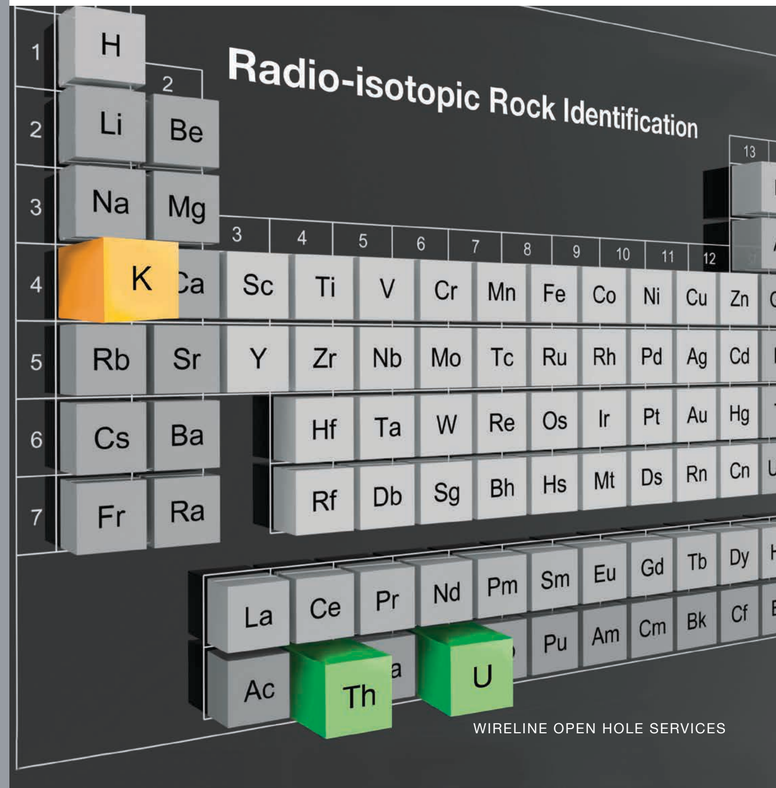
Compact™ Spectral Gamma Ray

A unique, compact spectral gamma ray tool
meets the measurement challenges of horizontal wells



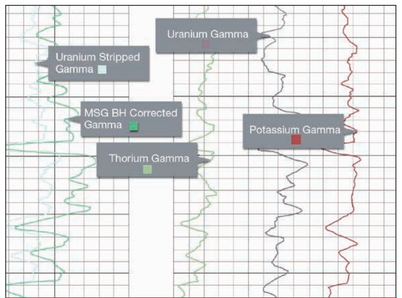
WIRELINE OPEN HOLE SERVICES

Cost-effective, precise spectral gamma data from horizontal wells

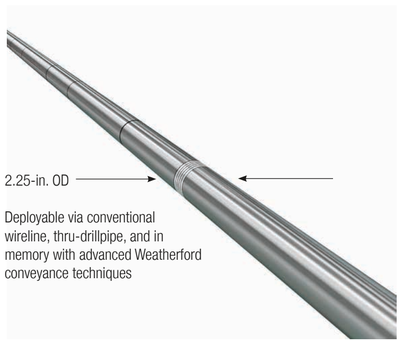
Traditionally, petrophysical data has been limited and costly to obtain in the case of horizontal wells. The Weatherford Compact™ Spectral Gamma Ray (CSG) tool represents a break-through, cost-effective solution to measure total natural gamma radiation and quantities of potassium (K), uranium (U), and thorium (Th).

The small, 2.25-in. OD of the tool allows for advanced conveyance techniques in memory without the need for expensive wireline pipe-conveyed operations. Furthermore, multiple high-resolution scintillation detectors provide high-accuracy measurement for the most demanding petrophysical applications, including unconventional plays and horizontal and high-angle wells, where conventional wireline techniques are ineffective.

These unique features, when coupled with the powerful capabilities of Weatherford FracAdvisor technology (discussed on flap), enable you to fully optimize drilling, completions, and production while significantly reducing costs.



Gamma graph results with Weatherford Compact spectral gamma ray tool



Deployable via conventional wireline, thru-drillpipe, and in memory with advanced Weatherford conveyance techniques

The Compact™ spectral gamma ray advantage

- Facilitates wireline and pipe conveyance in wellbores that large-OD spectral tools cannot log
- Offers high-detection efficiency and formation sensitivity with built-in scintillation detectors
- Provides accurate spectral analysis of natural gamma ray energy, improved pay-zone identification, and detailed well-to-well log correlation
- Maintains statistical accuracy via a multi-detector composite measurement
- Increases logging efficiency and reduces rig time by running multiple CSG tools in a single run
- Provides inputs to FracAdvisor service for optimal engineered completions results
- Reduces the number of frac stages with potential savings of hundreds of thousand dollars per well

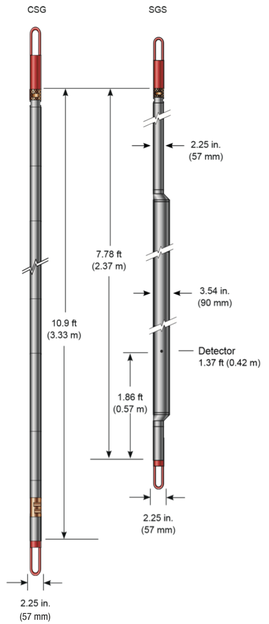
Petrophysical applications

- Identifying clay-mineral composition, including heavy minerals
- Identifying Kerogen and TOC for determining sweet spots in unconventional shale oil and gas wells
- Determining clay volume and type
- Differentiating between radioactive pay zones and shales
- Identifying fractured zones where high uranium concentrations are present
- Determining permeability
- Correlating well-to-well detail
- Delineating the reservoir

Compact Spectral Gamma Ray

Measurement Specifications		
Tool	CSG	SGS
Data	Total gamma, potassium (K), uranium (U), thorium (Th)	
Logging speed	1800 ft/hr (550 m/hr)	
Measurement range	0 to no practical limit	
Vertical resolution	12 in. (305 mm)	
Accuracy	K ±0.4% Th ±3.2 ppm U ±2.3 ppm	
Depth of investigation	9.5 in. (240 mm)	
Borehole fluids	WBM (KCL included), OBM, air	

Mechanical Specifications		
Maximum outside diameter	2.25 in. (57 mm)	3.5 in. (90 mm)
Length	10.9 ft (3.33 m)	7.8 ft (2.37 m)
Total weight (in air)	92 lb (42 kg)	107 lb (48.5 kg)
Maximum temperature	300°F (150°C)	
Maximum pressure	15 kpsi (103 MPa)	
Maximum borehole diameter	No limit	
Minimum borehole diameter	2.8 in. (70 mm)	4 in. (102 mm)



Finally, an optimized technology to help mitigate the high cost of completions

Compact™ spectral gamma ray enhances the quality of petrophysics data collection in shale reservoirs, thus reducing uncertainty and avoiding unnecessary costs.

Features	Advantages	Benefits
Compact 2.25-in. OD	Conveyable in all our Assure™ methods (drop-off, well-shuttle, thru-pipe)	Operational efficiency
High-resolution scintillation detectors	Best available detector technology	Measurement quality suitable for the most demanding petrophysical applications
Multiple detectors per tool	High count rates, redundancy	Measurement precision and reliability
Shock protection	Ruggedized	Reliability
Stackable	Increased statistics	Rig time savings from faster logging speeds than the current industry standard