FracAdvisor Service
Enhanced completions through advanced technology, data, and expertise

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.

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.

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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
- Identifies fractured zones where high uranium concentrations are present
- Accurately correlates well-to-well data
- Manages statistical accuracy via a multi-detector composite measurement

Petrophysical applications

- Identifying clay-mineral composition, including heavy minerals
- Identifying Kargon 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
- Determining permeability
- Correlating well-to-well detail
- Depleting the reservoir

Mineral Identification

- 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 breakthrough, 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 measurements for the most demanding petrophysical applications, including unconventional plays and horizontal and high-angle wells, where conventional wireline techniques are ineffectual.

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.

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.

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

**Measurement Specifications**

- **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** 8 in. (203 mm)
- **Accuracy** K ±0.4%, Th ±3.2 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)
- **Length** 10.9 ft (3.33 m)
- **Total weight (in air)** 92 lb (42 kg)
- **Maximum temperature** 300°F (150°C)
- **Maximum pressure** 15 kpsi (103 MPa)
- **Minimum borehole diameter** 2.8 in. (70 mm)

**Mineral Identification**

- **K** ±0.4%
- **U** ±2.3 ppm
- **Th** ±3.2 ppm

Mineral identification using the Weatherford Compact™ Spectral Gamma Ray tool.