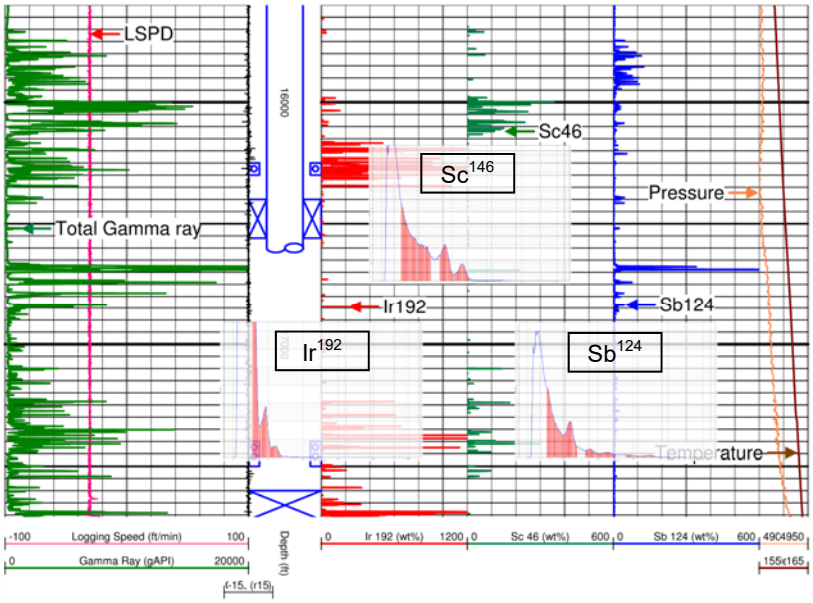
CASED HOLE LOGGING
Spectral Gamma Ray

Spartek Systems specializes in providing the oil and gas industry with high quality data to monitor well performance and diagnose potential problems. Founded in 1994, Spartek Systems leads the industry in providing cost effective solutions for acquiring reliable production data.

Product Overview

The **SS8230 Spectral Gamma Ray (SGR)** is a high resolution, temperature compensated, downhole digital Pulse Height Spectrum Analyzer. This tool has been designed to measure both naturally occurring radioactive isotopes and common radioactive tracers used for fracture monitoring and other application.



Naturally occurring radioactive isotopes such as Potassium, Uranium-Radium series, and Thorium series have characteristic gamma ray energies in the 0.1 MeV to 3.0 MeV range. Analyzing the acquired spectrums provides an improved through casing formation evaluation (shales, sandstones, carbonates, dolomites, etc.) versus using the gross counts from a gamma ray tool.

In a cased hole environment, the **SGR** is commonly used to assess the placement and effectiveness of well stimulation operations and sand control operations, by monitoring tracers that are injected with the proppant. Common radioactive tracers include Iridium 192, Scandium 46, and Antimony 124. These isotopes also have characteristic gamma energies in the 0.1 MeV to 3 MeV range.

The **SGR** is compatible with Spartek's 'Open Architecture Tool Bus', which facilitates both memory and surface-readout conveyance methods.

Processing of the acquired spectral data is provided for in the SparWorks application software. Currently the software provides for peak to Compton ratio's to determine if the measurement is primarily from inside the casing or the formation, spectral stripping, and individual spectrum energy window count rates. The spectral stripping algorithm supports up to three isotopes maximum.

Features and Applications

- Through casing formation evaluation.
- Depth correlation.
- Assess the placement and effectiveness of hydraulic fracturing operations.
- Monitor the placement of gravel during gravel pack operations.
- SRO and Memory operations.
- Combinable with one or more SGR and other "Open Architecture" Spartek Tool Bus tools.
- Industry Leading downhole Pulse Height Analyzer
  - NaI(Tl) Scintillation Crystal
  - Energy Range: 60keV to 3 MeV
  - 16 bit PHA with baseline restore
  - 177°C Max Operating Temperature.
  - Four Acquisition Modes
  - Temperature Compensated Gain Control.
- SparWorks Platform
  - Data Acquisition
  - Spectral Gamma Ray Processing

SPARTEK SYSTEMS

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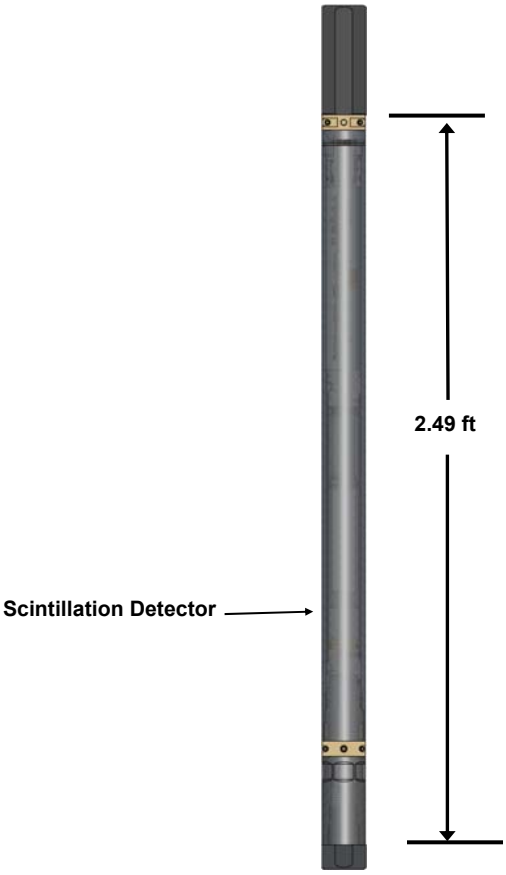
SPARTEK SYSTEMS
GEOPHYSICAL INSTRUMENTATION

Rev: 9/04/2017

Specifications:

Operating	
Pressure rating	15,000 psi [103,425 kPa]
Temperature rating	350°F [177°C]
Material	Inconel 718 (NACE MRO175)
Tool Diameter	1.688 inch [42.9 mm]
Tool Length Shipping Length OAL Make Up	 2.95 ft [0.90 m] 2.70 ft [0.82 m] 2.49 ft [0.76 m]
Tool Weight	13.93 lbs [6.32 kg]
Data Acquisition	
Detector Type Material Length Diameter Packaging Operating Temperature Gradient Resolution	 Scintillation NaI(Tl) 6.0 in [152.4 mm] 1.0 in [25.4 mm] Titanium Housing Sapphire Optical Window 77°F to 350°F [25°C to 177°C] 5.4°F [3°C] per minute max. < 11% at 25°C
Acquisition Modes Channel 0 Channel 1 Channel 2 Channel 3-7	 256 Channel Spectrum mode 512 Channel Spectrum mode Total Gamma Ray Counts Energy Window Counts
Energy Range **Natural GR Energy line** Potassium Uranium-Radium series Thorium Series	60 keV to 3000 keV 1460 keV 1760 keV 2620 keV

SS8230 Spectral Gamma Ray



Common Radioactive Tracer Isotopes	Symbol	Half Life (days)	Decays To	Gamma Energy	Gamma Energy
Iridium-192	^{192}Ir	73.8275		ɣ 468 Kev (80%)	ɣ 317 KeV (49%)
Scandium-46	^{46}Sc	83.785		ɣ 1120 KeV (100%)	ɣ 889 keV (100%)
Antimony 124	^{124}Sb	60.2	^{124}Te	ɣ 603 keV (97%)	ɣ 1692 keV (50%)

Specifications subject to change without notice

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