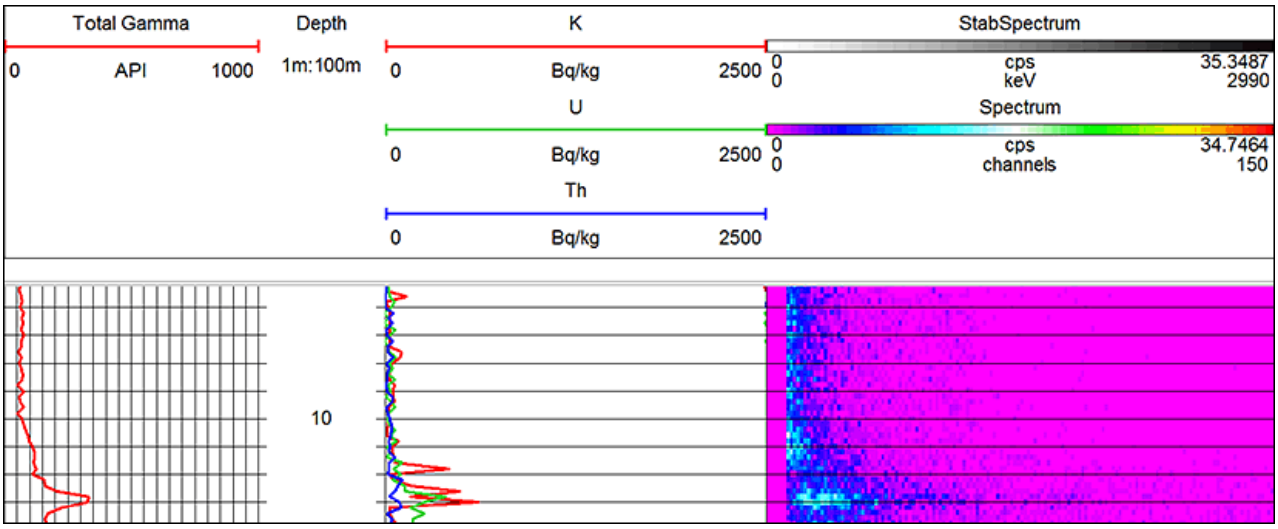
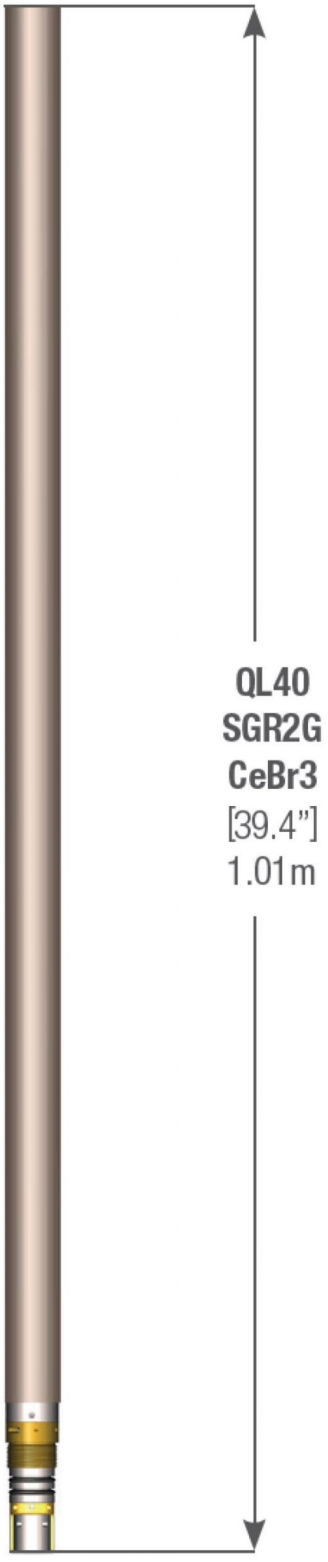
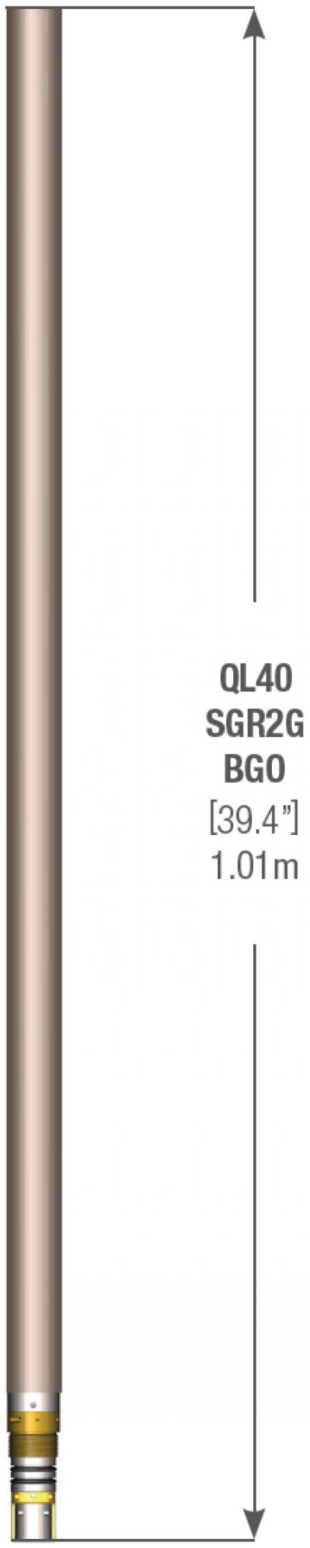
QL40-SGR-2G – Spectral Gamma

mountsopris.com/ql40-sgr-spectral-gamma

October 15, 2020




QL40
SGR2G
CeBr3
[39.4”]
1.01m



Description

The QL40-SGR-2G is a **new generation of borehole logging Spectral Gamma Tool**. This new logging probe consists of a completely redesigned and ruggedized mechanical assembly, electronics and gamma module. It implements also the latest telemetry developments to enhance tool performance on long single and multi-conductor wirelines.

The QL40-SGR-2G probe measures the total gamma counts in API as well as the **full energy spectrum of the gamma radiation emitted naturally** from within the formations crossed by a borehole. A **Full Spectrum Analysis (FSA)** is performed on the recorded energy spectra. The FSA derives in **real time the concentration of the three main radioisotopes 40K, 238U, 212Th**, and thus provides insight into the mineral composition of the formations. The spectral gamma ray log is widely used in the mining and environmental industries for the identification of lithology, correlation between boreholes, and clay content analyses.

The QL40-SGR-2G spectral gamma well logging tool includes a modular platform that can be equipped with a **BGO (Bismuth Germanium Oxide) scintillation crystal** or with a **CeBr3 (Cerium Bromide) scintillation crystal**.

The **BGO crystal** is characterized by a very high scintillation efficiency, good energy resolution, and is mechanically strong. It makes the tool ideal for a wide range of applications.

The QL40-SGR-2G implementing the **CeBr3 crystal** is characterized by a very good spectral resolution and high sensitivity. The short dead time value of the system (less than 1 µs) combined with the latest design of the measurement electronics allows a perfect linearity of the total gamma counts even in a high radiation context. It makes the tool ideal for ore grade analysis when a fine spectral resolution is required to identify radioisotopes with narrow energy bands.

The QL40-SGR-2G spectral gamma probe is supplied as an **inline sub**. It can be combined with other logging tools of the QL product line or can be operated as a standalone tool. It is compatible with all of the current ALT/MSI acquisition systems.

Applications

- Mineral Detection
- Sedimentology- Facies changes and depositional environment
- Lithology Studies
- Identify and Classify Clay Types
- Recognition of Radioactive material
- Contamination Research
- Well to well correlation
- Additional CeBr3 Applications:
    - Mineral composition
    - Uranium exploration
    - Ore grade analysis

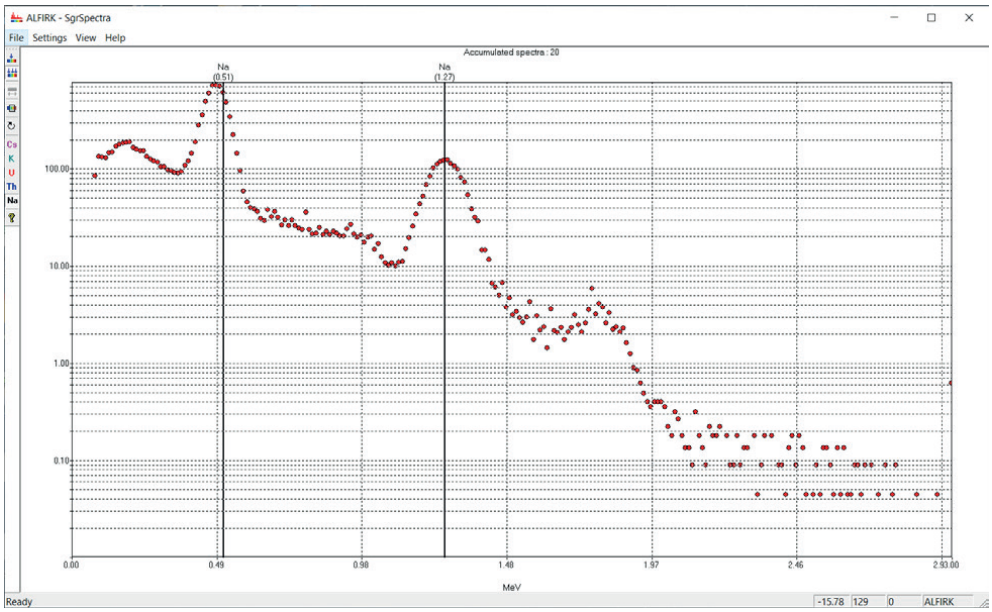
Operating Conditions

Borehole Fluid
[X] Water
[X] Mud

[X] Dry

Casing
[X] Uncased
[X] PVC Borehole
[X] Steel

Centralization
[_] Required
[X] Non-Necessary



LoggerSuite Real Time Spectrum-22Na Isotope

Features & Benefits

- Cutting edge Full Spectrum Analysis (FSA) of data in WellCAD and LoggerSuite
- Versatile, ubiquitous probe which functions with a wide range of applications and borehole conditions.
- WellCAD Spectral processing is fast and easy in real time with Medusa calibration
- Mount Sopris manufactures more natural gamma and spectral tools than any other slim tool manufacturer in the world today.

Specifications – Metric/English

Specification	Metric	Imperial
Diameter	40 mm	1.6 in.
Length	1.01 m	39.4 in.
Weight	6 Kg	13 lbs
Max. Temp.	70ºC	158ºF

Max. Pressure	200 bar	2900 psi

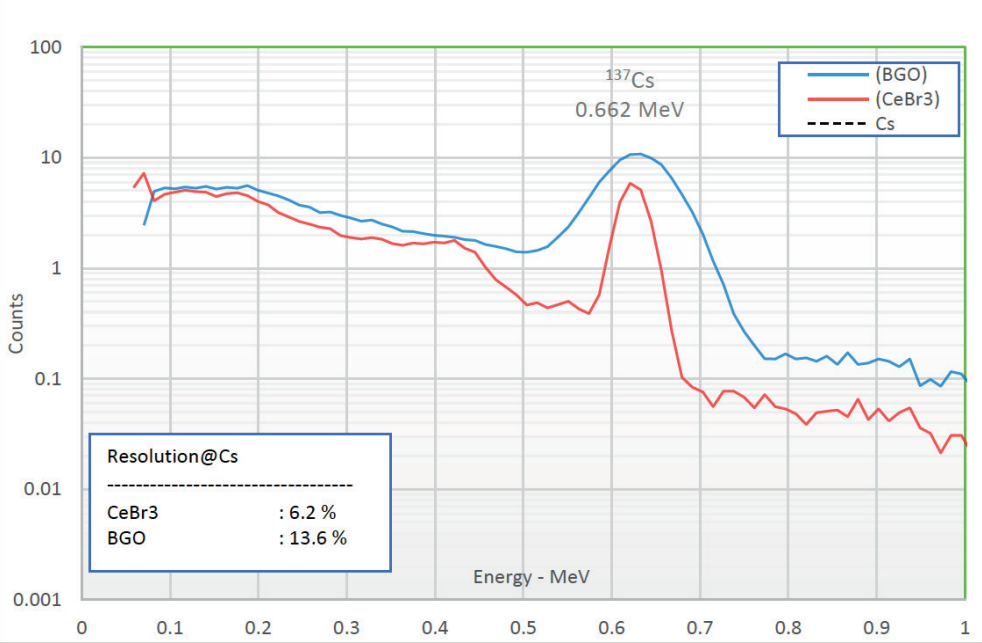
Specifications – Sensor BGO Crystal

- Scintillation crystal : BGO (Bismuth Germanium Oxide)
- Dimensions : 25.4 x 100 mm (1.0 x 4.0 in.)
- Sensitivity (compared to NaI crystal) : x 3
- Spectral Resolution @ Cs (%) : 13.6
- Dead Time (µs) : 4.8

Specifications – Sensor CeBr3 Crystal

- Scintillation crystal : CeBr3 (Cerium Bromide)
- Dimensions : 20 x 96 mm (0.79 x 3.78 in.)
- Sensitivity (compared to NaI crystal) : x 1.9
- Spectral Resolution @ Cs (%) : 6.2
- Dead Time (µs) : 0.8

Measurement Range: Up to 3000 keV



CeBr3 vs BGO crystal – Spectral resolution comparison (137Cs isotope)

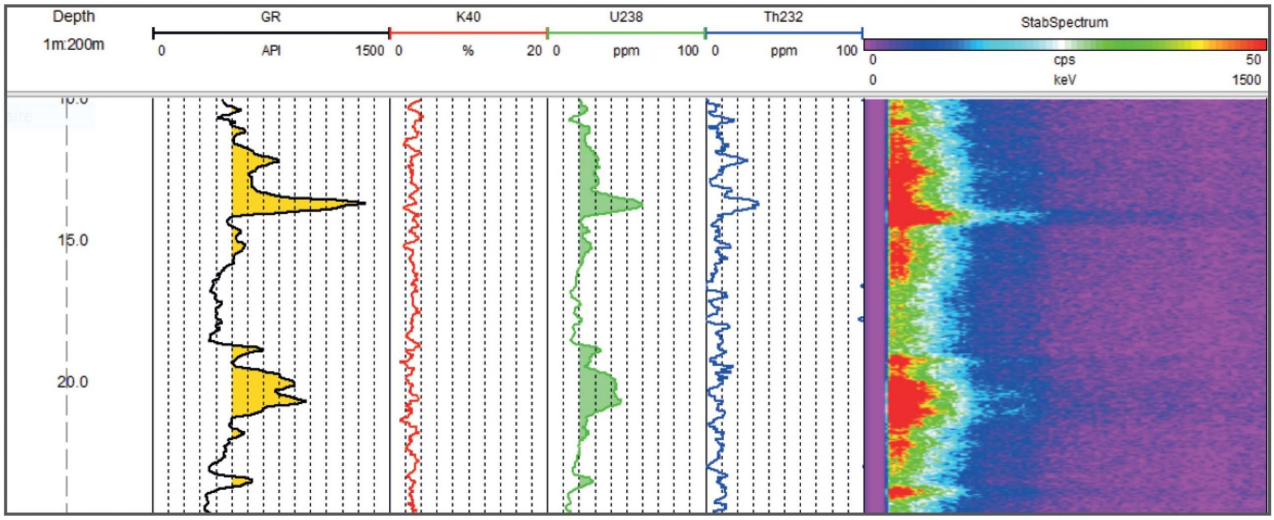
QL Stack Possibilities

- **QL40SGR** + QL40OBI (Optical Televiewer): Exploration, Bedding Planes, and Fractures in Dry holes
- **QL40SGR** + QL40ABI (Acoustic Televiewer): Exploration, Bedding Planes, and Fractures in Fluid-filled holes
- **QL40SGR** + QL40DEV (Deviation): Lithology, Borehole location
- **QL40SGR** + QL40BMR (Borehole Magnetic Resonance): Advanced Coal Mining
- **QL40SGR** + QL40IND (Dual Induction): Clay Analysis through PVC Casing

Full Spectrum Analysis (FSA)

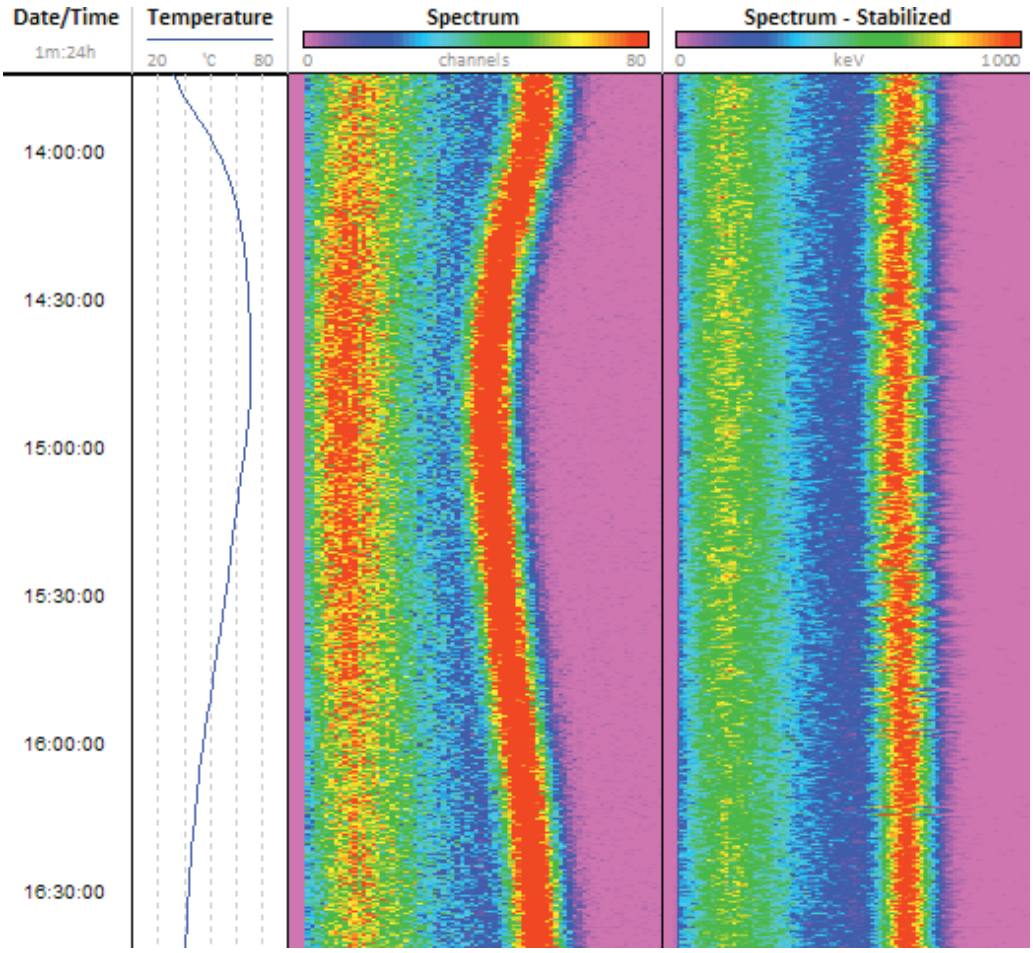
The latest releases of WellCAD and LoggerSuite contain an implementation of the Full Spectrum Analysis (FSA) method developed by Medusa Explorations BV in collaboration with the Nuclear Physics Institute of the University of Groningen (Netherlands). FSA comprises the mathematically most efficient method to derive nuclide concentrations from gamma ray spectra.

Gamma ray analysis is performed in two steps. First spectrum stabilization will be performed: Each multichannel spectrum in the data set will be converted to a spectrum having all count peaks at the corresponding energy position. This process implies a close comparison with reference spectra obtained during the calibration process of the spectral gamma tool at the Medusa calibration facility. In a second step the now stabilized spectrum will be convoluted into concentrations of (naturally occurring) radionuclides (40K, 238U, 232Th, or other man-made nuclides like 137Cs or 60Co). Corrections taking borehole diameter, rock density, casing type and thickness, tool position and borehole fluid conditions into account can be applied.



Field record – Radioisotope concentrations and stabilized spectrum

WellCAD provides an easy to use interface to load the source log containing the raw spectrum data, select the Medusa calibration file and enter the parameters from which the borehole condition corrections will be computed and applied. The process will compute and output in WellCAD the nuclide concentrations and corresponding uncertainties, the stabilized spectra, and the applied stabilization factor. The following image shows the comparison of the raw spectrum showing a considerable spectrum drift due to temperature variations and the resulting stabilized spectrum which will be used as base for the nuclide concentration computation.



Gamma Spectrum with Cs peak drifting and after stabilization

For more information on this new approach to spectral data analysis, please see the research papers and discussions on the Medusa website.

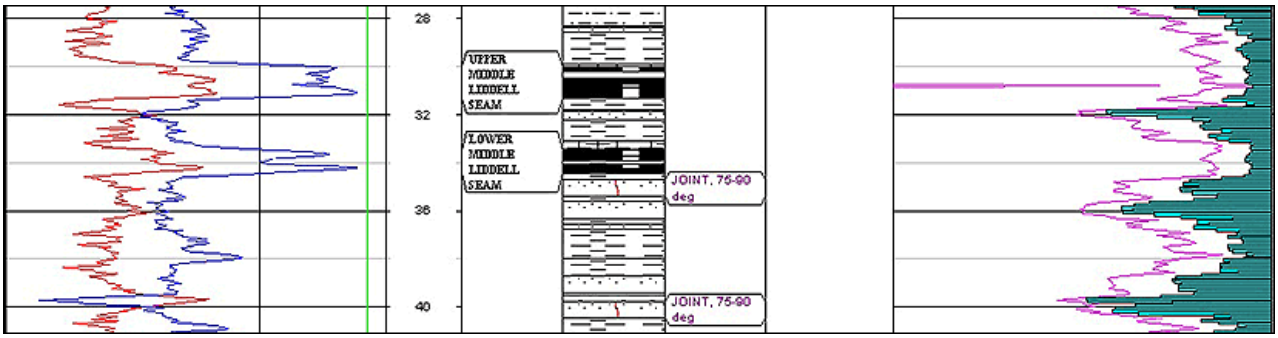
Documentation

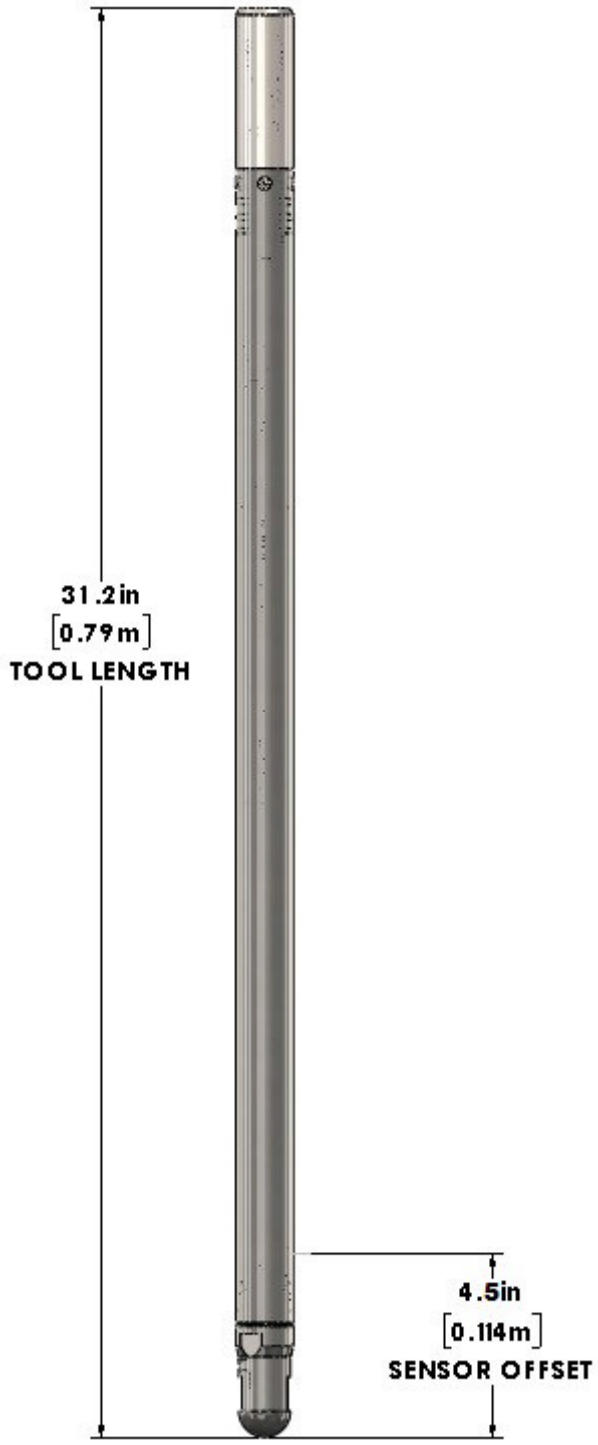
QL40-SGR-2G BGO Spectral Gamma Probe Brochure
QL40-SGR-2G CeBr Spectral Gamma Probe Brochure
Please Contact Us for the User Guide

32GR – Slim Natural Gamma

mountsopris.com/32gr-slim-natural-gamma-probe

August 4, 2014





Description

The 32GR probe is a new generation slim gamma logging tool from Mount Sopris Instruments. It is all digital with newly upgraded electronics, has a slim 32 mm (1.25″) diameter, and measures the amount of gamma radiation occurring naturally within the formations crossed by a borehole.

Gamma rays are produced mainly by isotopes of potassium, thorium, and uranium. This probe can be used for standard gamma logging and uranium exploration logging. The new digital communications mean dialing in the discriminator settings on gamma pulses

is a thing of the past. All this is done downhole within the probe allowing for higher count rates and eliminating the pulse discrimination process.

The tool can be run as a standalone tool or it can be coupled with a source carrier and small radioactive Cs-137 source for 4-Pi Density measurements. The 32GR runs on a standard MSI single conductor or a Gearhart-Owen four conductor cablehead.

Gamma Applications

- Bed boundary analysis
- Facies changes
- Coarsening/ Fining Sequences
- Identify Clay Aquitards
- Aquifer Thickness
- Uranium Concentration

Operating Conditions

Borehole Fluid
[X] Water
[X] Mud
[X] Dry

Casing
[X] Uncased
[X] PVC Borehole
[X] Steel

Centralization
[_] Required
[X] Non-Necessary

Features & Benefits

- Versatile, ubiquitous probe which functions with a wide range of applications and borehole conditions.
- New smaller diameter (32mm, 1.25″) allows for logging through push rods and BQ core holes.
- Matrix .sub files can be modified to output gamma in API units or %wt U3O8 (percent weight Uranium).
- Mount Sopris manufactures more natural gamma and spectral gamma tools than any other borehole logging manufacturer in the world today.
- Digital communications mean dialing in discriminator settings on gamma pulses is a thing of the past. All this is done downhole in the probe allowing for higher count rates in high grade ore bodies.

Specifications – Metric/English

Specification	Metric	Imperial
Diameter	31.75 mm	1.25 inches
Length	79.12 cm	31.15 inches
Weight	1.63 kg	3.6 lbs.
Max. Temp.	70ºC	158ºF
Max. Pressure	200 bar	2900 psi
NaI(Tl) Crystal	1.27 x 3.81 cm	1.5 x 0.5 inches

Documentation

Specifications Brochure: Download Here

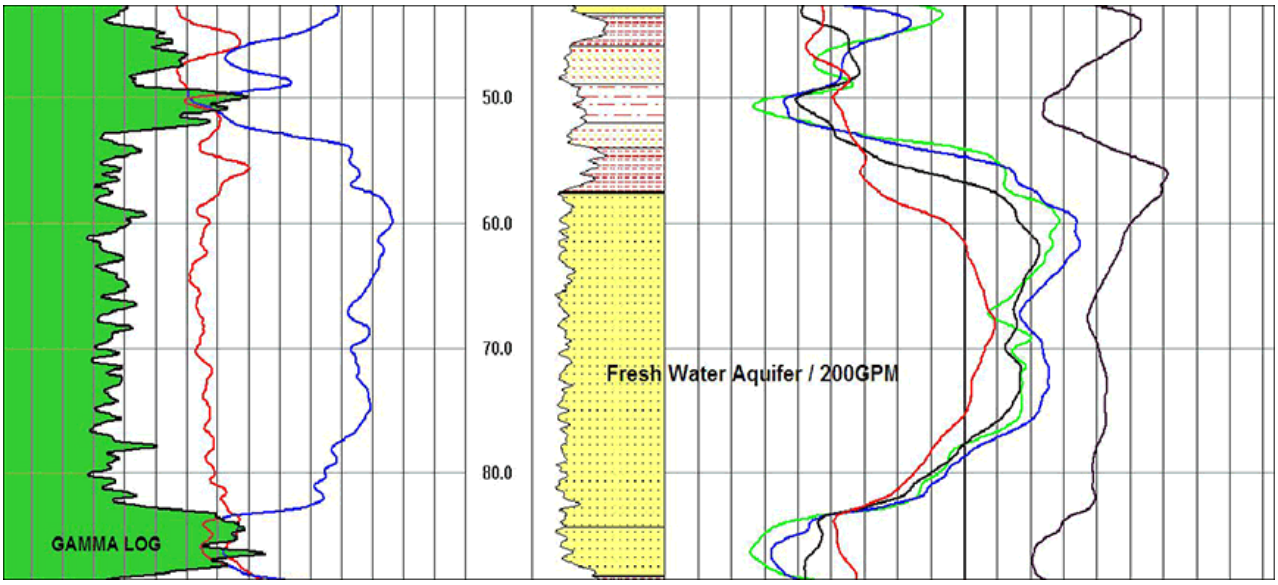
Release Note: Download Here

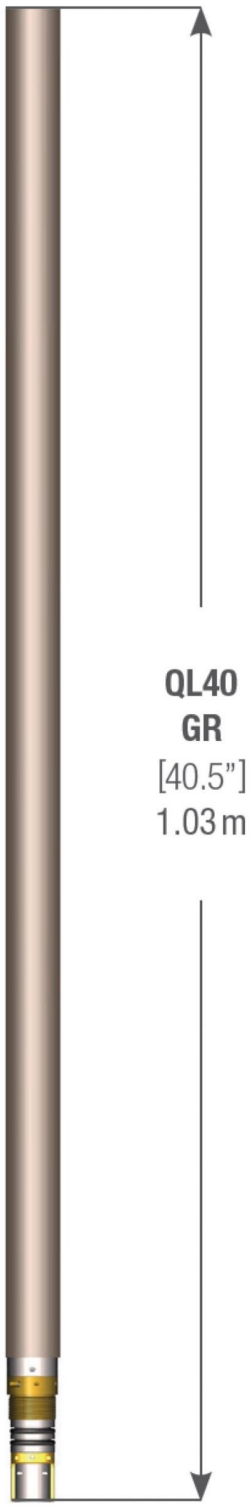
User Guide: Download Here

QL40-GR – Natural Gamma

mountsopris.com/ql40-gr-natural-gamma

October 11, 2020





Description

The QL40-GR probe measures the amount of gamma radiation occurring naturally within the formations crossed by a borehole. Gamma rays are produced mainly by isotopes of potassium, thorium, and uranium. The gamma log is widely used in the groundwater and mining industries to identify lithology and perform clay content analyses.

The tool is supplied as a stackable sub of the Quick Link (QL) product line or it can be run as a standalone tool. The QL40-GR operates on any standard wireline (mono, 4 or 7 conductor, coaxial).

Applications

- Bed boundary analysis
- Facies changes
- Coarsening/ Fining Sequences
- Identify Clay Aquitards
- Aquifer Thickness
- Uranium Concentration

Operating Conditions

Borehole Fluid
[X] Water
[X] Mud
[X] Dry

Casing
[X] Uncased
[X] PVC Borehole
[X] Steel

Centralization
[_] Required
[X] Not Necessary

Features & Benefits

- Versatile, ubiquitous probe which functions with a wide range of applications and borehole conditions.
- Matrix .sub files can be modified to output gamma in API units or %wt U3O8 (percent weight Uranium).
- Mount Sopris manufactures more natural gamma and spectral tools than any other slimline manufacturer in the world today.
- Gamma probes with other scintillation materials and sizes can be custom made for your application.

Specifications – Metric/English

Specification	Metric	Imperial
Diameter	42.3 mm	1.66″
Length	1.03 m	40.5″
Weight	4.67 Kg	10.3 lbs.
Max. Temp.	70ºC	158ºF
Max. Pressure	200 bar	2900 psi

Sensor: NaI(Tl) Crystal 2.22 cm x 7.62 cm (0.875” x 3.0”)

QL Stack Possibilities

- QL40GR (Gamma) + QL40ELOG (Resistivity) + QL40MGS (Magnetic Susceptibility): Mining, Exploration
- QL40GR (Gamma) + QL40ELOG (Resistivity) + QL40OBI (Optical Televiewer): Exploration, Bedding Planes, and Fractures in Dry holes
- QL40GR (Gamma) + QL40ELOG (Resistivity) + QL40ABI (Acoustic Televiewer): Exploration, Bedding Planes, and Fractures in Fluid-filled holes
- QL40GR (Gamma) + QL40ELOG (Resistivity) + QL40FTC (Fluid Res, Temp): Hydrogeologist’s Tool, Groundwater exploration and assessment
- QL40GR (Gamma) + QL40DEV (Deviation): Lithology, Borehole location

Documentation

QL40-GR Natural Gamma Probe Brochure
User Guide