

Virginia Institute of Marine Science
School of Marine Science

July 10, 2008

U. S. Nuclear Regulatory Commission
Region 1
Commercial and R&D Branch
Division of Nuclear Materials Safety
475 Allendale Road
King of Prussia, PA 19406-1415

Br. 2

Subject: Request for Amendment of NRC License No. 45-07112-01

03006569

The following is a request to amend subject NRC License issued to the College of William and Mary, Virginia Institute of Marine Science/School of Marine Science as follows:

1. Please remove the following as a licensed material user: Hugh Ducklow
2. Please consider the addition of a 10.0 mCi Cesium-137 Sealed Source as an integral part of a GEOTEK, MSCL-S geologic core analyzer which we wish to purchase in support of research. Information in regard to this analytical instrument is enclosed.

Thank You for your attention to these requests.

Sincerely,



Thomas W. Grose
Director, Safety & Environmental Programs
Radiation Safety Officer

2008 JUL 16 AM 10:35

RECEIVED
REGION 1

Enclosures: 4

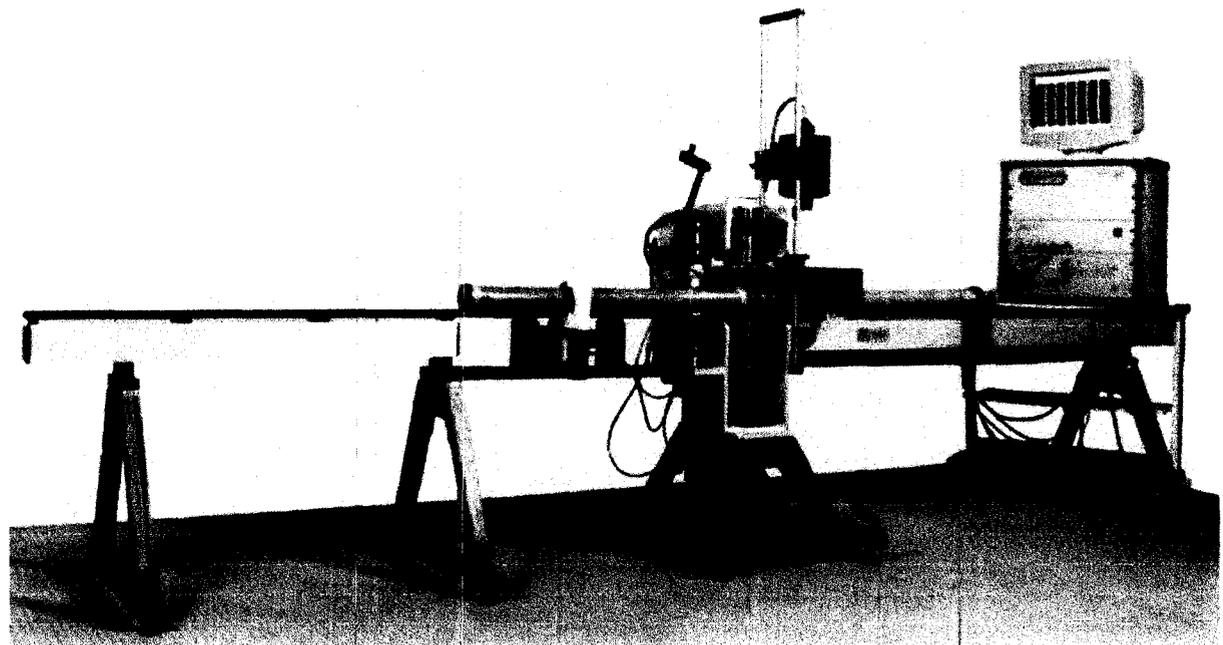


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MSCL-S

Core samples are collected on land or at sea by the hydrocarbon, mining and construction industries, as well as by the military. For academia they are now an essential part of climatic research. The cores come as exposed hard rock samples or as soft sediment encased in plastic sleeves. Correctly analysed, they can yield crucial information about the properties of rock or sedimentary strata. The hydrocarbon industry, for example, needs accurate data on the porosity, grain size, type and chemistry of the geology they are investigating, whereas the construction industry and the military may be interested in geotechnical properties such as p-wave velocities, density and water content.



The Problem of Analysis

The problem facing all these potential users is how to make their core samples yield the widest possible range of information in a consistent, accurate and cost-effective manner.

A Unique Answer

GEOTEK's MSCL is the first commercially available tool for gathering all these data in an automated and quality-controlled way. The range of parameters that can be measured includes p-wave velocity, gamma density, magnetic susceptibility, electrical resistivity, colour imaging and gamma spectroscopy. Typically, the MSCL can log material at a rates of 12 metres per hour and at sampling intervals of down to 1 mm. Its flexibility is such that it can analyse either whole or split (D-section) cores, while clients own sensors can be added to the system as required. Moreover, the MSCL comes in a variety of rugged configurations for work in the field, at sea, or in the laboratory.

Applications

Geological

- rapid, high resolution visual archives-
- sediment accumulation rates and chemistry-
- impedance, permeability and

- water content profiles-
- seismic stratigraphy-
- synthetic seismograms-
- rapid assessment of core quality-
- rapid inter core correlations-
- data rescue from existing core repositories-
- ice core logging-
- Industrial**
- production line monitoring-
- food industry-
- materials testing-

How it works:

A conveyor system pushes each core section past whatever sensors the client requires, which scan the core as it passes. The conveyor is driven by a stepper motor which can position a core to an accuracy of better than 0.5mm. The computer controlling the conveyor also controls the sensors, so that all the data are automatically correlated. The computer also measures the length of each core section and can automatically subtract the thickness of the end caps. This allows the sections to follow sequentially, producing an unbroken stream of data. Such a system not only saves time; by ensuring that the core sections butt up against each other, the data are not corrupted by the air gaps which normally spoil measurements such as those for magnetic susceptibility. So, continuous core logging means exactly what it says: a continuous, automated and uninterrupted process.

The MSCL can handle core sections between 50 and 150mm in diameter and 1.5 m long and can sample at intervals of 1mm or greater.

Alternative conveyors

GEOTEK have also made moving sensor/stationary core systems for specialist applications in the oil industry. Equally, **vertical** tracking systems can be built for samples that must be held upright. XY and XYZ systems can also be produced for certain sensor configurations.

Basic range of sensors available

Core diameter measurements:

Either rectilinear displacement transducers, with a resolution of 0.05mm (sleeved core), or a laser micrometer, with a resolution of 0.02mm (bare rock).

P-wave measurements:

250-500 kHz piezo-electric ceramic transducers, spring-loaded against the sample. Accurate to about 0.2%, depending on core condition.

Gamma Ray Attenuation (bulk density):

137-Cs gamma source in a lead shield with optional 2.5mm or 5mm collimators. Density resolution of better than 1% depending upon count time.

Magnetic susceptibility:

Bartington loop sensor 60-150mm diameter, or point sensor (on split cores) giving 5% calibration accuracy over two ranges; 1×10^{-6} & 10×10^{-6} cgs.

Electrical Resistivity:

Non contact resistivity measurements using a unique double paired coil induction method.

Core imaging:

Geoscan III full colour digital linescan imaging system. Produce RGB images and profile data from your cores.

Spectrophotometer:

Konica Minolta colour spectrophotometer measuring reflectance in the near UV through the visible and into the near IR range (wavelengths 360-740nm).

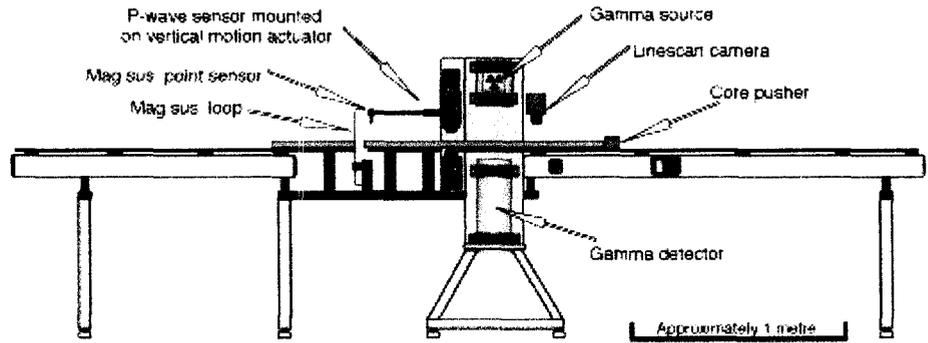
Natural Gamma:

Total natural gamma count or gamma spectra (K, U, Th) from two or more 2"x2" (or 3"x3") NaI(Tl) crystals (BGO crystals are available on request).

Sensors being considered for development

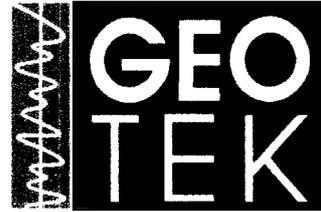
Radar scattering (= water content)
 UV and IR spectroscopy (= core mineralogy)
 Permeability (cf. Pro-permeameter)
 High frequency acoustic imaging (= through-liner porosity/grain-size)
 X-ray imaging (= sediment structure)

A typical MSCL Split/Whole-Core configuration for soft sediments



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Radiation Safety Test Report of Radioactive Material Equipment provided by Geotek

The Geotek Gamma Source

A 10 milli-curie Caesium-137 capsule (active element CsCl) is used as the gamma ray source. ¹³⁷Cs has a half-life of 30.2 years and emits gamma energy principally at 0.662 MeV. The small Caesium capsule is securely housed inside a 150 mm diameter lead filled, 3 mm wall stainless steel shield. The design restricts the radiation at the surface of the shielding to less than 3 μ Sv/h.

The activity level profile is as follows:

At surface of shield -	< 3.0 μ Sv/h
10 cm distance -	< 1.0 μ Sv/h
30 cm distance -	< 0.5 μ Sv/h
100 cm distance -	< 0.3 μ Sv/h

For and on behalf of Geotek Limited.

Dr. John Roberts.
Technical Director.

This is to acknowledge the receipt of your letter/application dated

7/10/09, and to inform you that the initial processing which includes an administrative review has been performed.

Amendment (45-07112-01)
There were no administrative omissions. Your application was assigned to a technical reviewer. Please note that the technical review may identify additional omissions or require additional information.

Please provide to this office within 30 days of your receipt of this card

A copy of your action has been forwarded to our License Fee & Accounts Receivable Branch, who will contact you separately if there is a fee issue involved.

Your action has been assigned **Mail Control Number** 142621.
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You may call us on (610) 337-5398, or 337-5260.