

# Specialist Radiometric support for Land Clearance at Rosyth Naval Base

## Scope:

This project was to provide specialist support and staffing to monitor 1 m<sup>3</sup> builder's bags containing soil and rubble using a High Resolution Gamma Spectrometry (HRGS) system and to monitor land using a Low Resolution Gamma Spectrometry (LRGS) system. Measurements on the builder's bags were performed with a portable HRGS using the ISOCS™ system. Measurements for the land survey were performed with a portable LRGS using the ISOCS system. Measurements were performed at the Rosyth Naval Base site for Babcock Marine in Fife, UK. This project took place between July and September 2009.

## Key Drivers:

Babcock Marine's key requirement was to reclaim an area of potentially contaminated land for re-use allowing other activities to take place on the site. The land area was 2500 square meters. The reference strategy was based on the use of boreholes at various locations across the site, combined with sampling and laboratory analysis of 1 m<sup>3</sup> builders bags filled with excavated material. However there was a risk that the time required for this work would delay the eventual site clearance project.



## CANBERRA™ Solution:

A CANBERRA team discussed Babcock Marine's challenge and sought to implement an alternative approach based on rapid, non-intrusive measurements, which would provide both a robust characterization methodology and possibilities for accelerated land clearance. Our solution included the following key elements:

- Consultancy support to develop a robust validated methodology for in-situ land survey based on low resolution gamma spectroscopy.
- Modeling program studied the effects of unknown activity depth profiles, to ensure adequate confidence margins.
- Development of complete step by step measurement and QC procedures for both in-situ land survey and assay of 1m<sup>3</sup> builders bags containing excavated material.
- Provision and mobilization of all equipment (including Low Resolution Gamma Spectrometry detector with deployment rig and standard ISOCS system).
- Providing specialist support throughout the project.
- Verifying the system calibrations with actual QC standards.
- ISOCS modeling of the 1 m<sup>3</sup> bags assay geometry.
- ISOCS modeling of the in-situ land survey geometry.
- Performing a non-destructive measurement of the entire item volume of the 1 m<sup>3</sup> bags to identify the nuclides responsible for the gamma emissions.
- 240 bags measured in 2 weeks
- Reporting the activity and uncertainty for each identified nuclide.
- Showing that the contents of the bags meet the requirement for having total activity (of anthropogenic gamma-emitting radionuclides) < 0.1 Bq/g based on a volume averaged density and uniform source distribution.
- Showing that the contents of the land meet the requirement for having total activity (of anthropogenic gamma-emitting radionuclides dominated by <sup>60</sup>Co) < 0.1 Bq/g based on a volume averaged density to a depth of 400 mm and uniform source distribution.

A CANBERRA team developed an optimized approach with Babcock Marine, to address the key drivers. The CANBERRA operators carried out the 1 m<sup>3</sup> bag measurements and provided comprehensive analysis reports. For the land survey, our specialist provided training to allow Babcock Marine operators to conduct the measurements while we provided data review support to interpret the assay results.



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## Case Study

### Instruments & Techniques Used:

#### 1 Instruments

- Collimated ISOCS BEGe detector assaying bags on turntable
- 3x3 NaI detector on tripod to survey land area

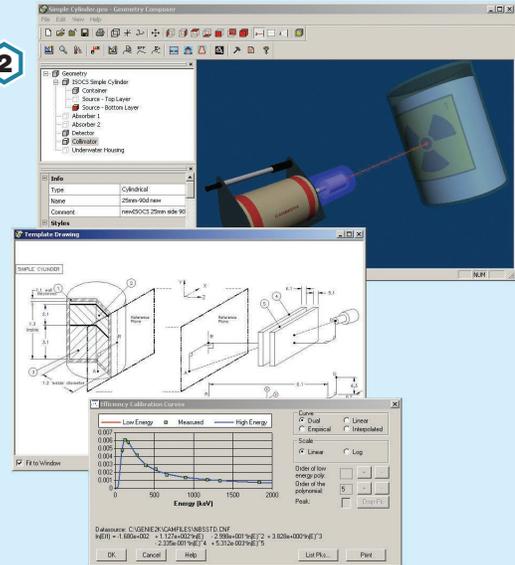
#### 2 Software

- ISOCS modeling

1



2



## ACHIEVEMENTS

The UK measurements team has helped Babcock Marine to reclaim an area of contaminated land for re-use, by measuring builder's bags of rubble and allowing their sentencing through conventional channels. Our methodology also allowed a demonstration that the assayed land is below clearance levels, allowing re-use. The monitored area has now been fully excavated and re-worked, and is now being used as a storage area to support new activities.

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