

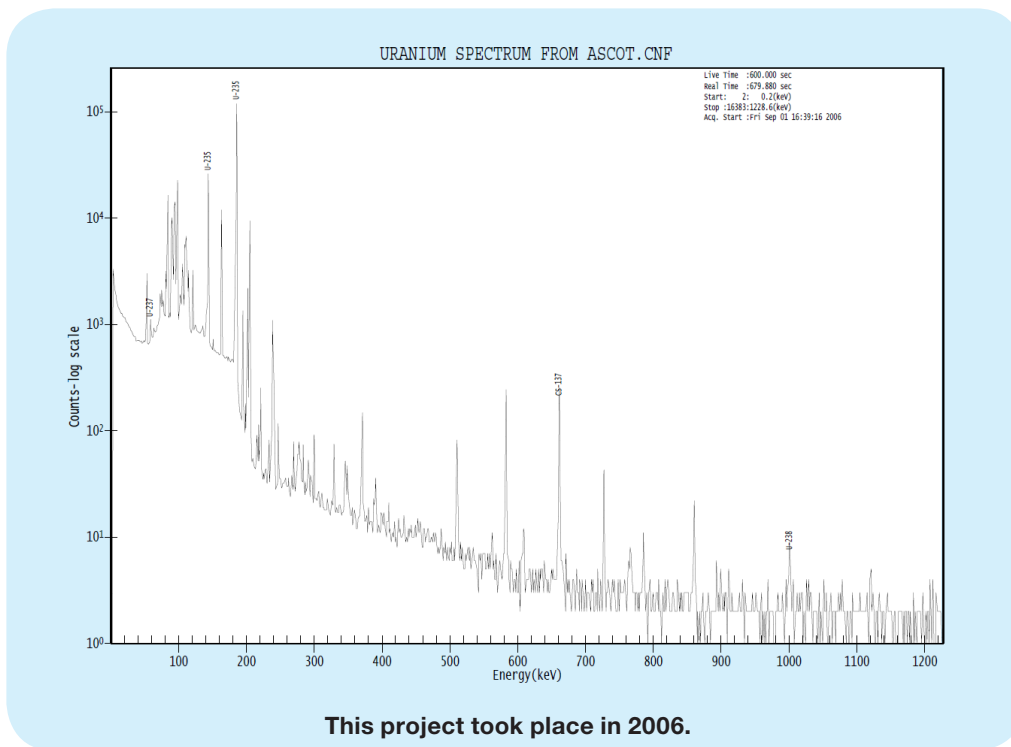
# Measurement of <sup>235</sup>U enrichment for a variety of Uranium items

## Scope:

This project was to provide quantitative <sup>235</sup>U enrichment data for a variety of bulk uranium-bearing items at the Imperial College Reactor Centre, Ascot. A High Resolution Gamma ray Spectrometry (HRGS) system was used. The technique is based on use of the standard Multi-Group Analysis (MGAU) software which measures the low energy gamma rays from Uranium. Measurements were performed at the Imperial College Reactor Centre in Berkshire, UK.

## Key Drivers:

Imperial College's key requirement for this project was to ascertain the <sup>235</sup>U enrichment on a variety of Uranium items. Robust historical inventory data was not available and so measurements were needed to provide essential nuclear material inventory data to determine the options for future storage / treatment of these items.



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# Measurement of $^{235}\text{U}$ enrichment for a variety of Uranium items

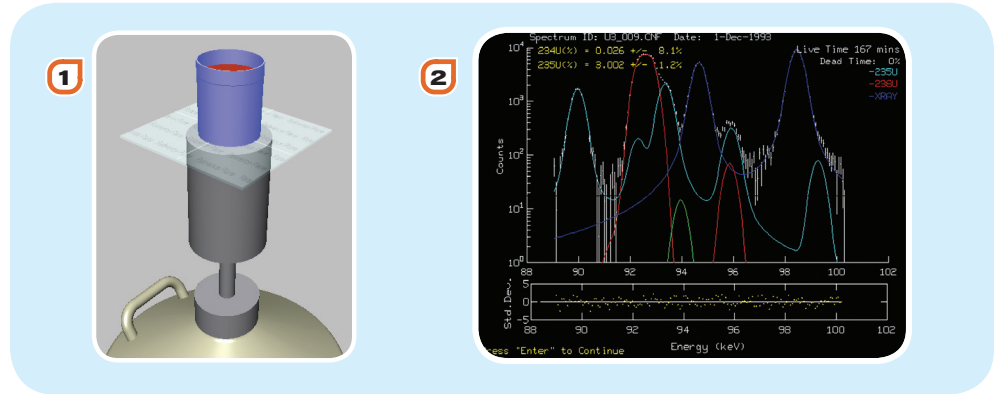
## Instruments & Techniques Used:

### 1 Instruments:

- ISOCS (collimated BEGe detector)

### 2 Software

- Multi-Group Analysis (MGAU) software



## CANBERRA Solution:

In order to perform non destructive assay work on site, CANBERRA's solution to Imperial College's key drivers included:

- Setup and mobilisation of portable HRGS equipment configured with MGAU analysis software.
- Development of complete step by step procedures
- Verifying the system calibrations with actual QC standards
- Performing a non-destructive measurement of the entire item volume to identify the Uranium nuclides responsible for the gamma emissions and determine the  $^{235}\text{U}$  enrichment value.
- Reporting the relative abundances of the uranium isotopes in the items.

A CANBERRA spectroscopy specialist visited the site and carried out the measurements. Data analysis and reporting was conducted, later, using off-line analysis of the measured spectra.

## ACHIEVEMENTS

- The UK measurements team successfully ascertained the  $^{235}\text{U}$  enrichment on 11 items and confirmed that 9 were natural and 2 were enriched Uranium. One of the enriched Uranium items was originally identified as being natural Uranium and this aided the Reactor Centre in the re-classification of the item. The work also provided essential data to allow the Imperial College Reactor Centre to update their inventory records.