

Case Study

CANBERRA

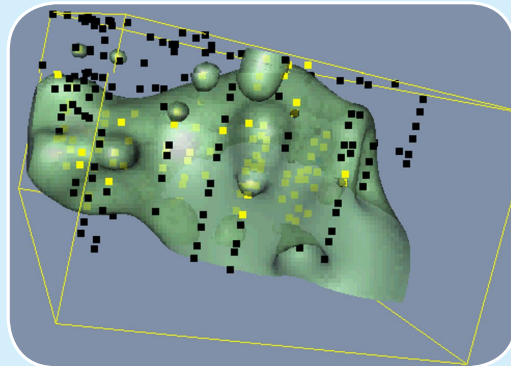
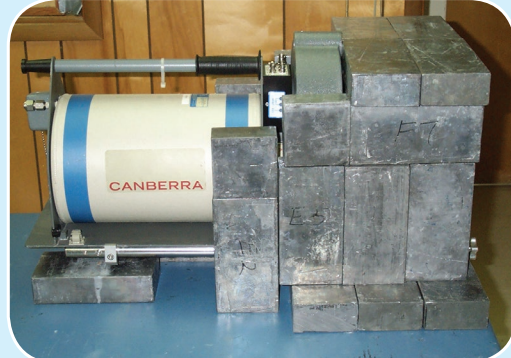
Real-time Radiological Analyses of Transuranic Soil Cores

Scope:

- Tank W-1A at Oak Ridge National Laboratory (ORNL) collected wastes from three high-radiation-level analytical facilities between 1951 and 1986. A groundwater contamination plume containing Cs-137, transuranics, uranium, and other isotopes emanated from contaminated soil surrounding the tank. URS|CH2M Hill Oak Ridge (UCOR) was the DOE environmental management contractor.
- Sampling and radiological analysis of subsurface soils to determine the extent and depth of the contamination and to estimate the volume of transuranic soil to be excavated.

Key Drivers:

- Quantify transuranic components in the presence of high Cs-137.
- Maintain Am-241 Minimum Detectable Activity (MDA) < 10 nCi/g for all soil samples.
- Report all nuclides that contribute to 99% of the total activity.
- Real-time analysis required to guide the evolving sampling plan.
- Keep radiation doses to all personnel ALARA.
- Maintain sample integrity with no spread of radiological contamination.



Map of Subsurface Cs-137 Contamination



Visit our *Measurement and Expertise (M&E)* page.



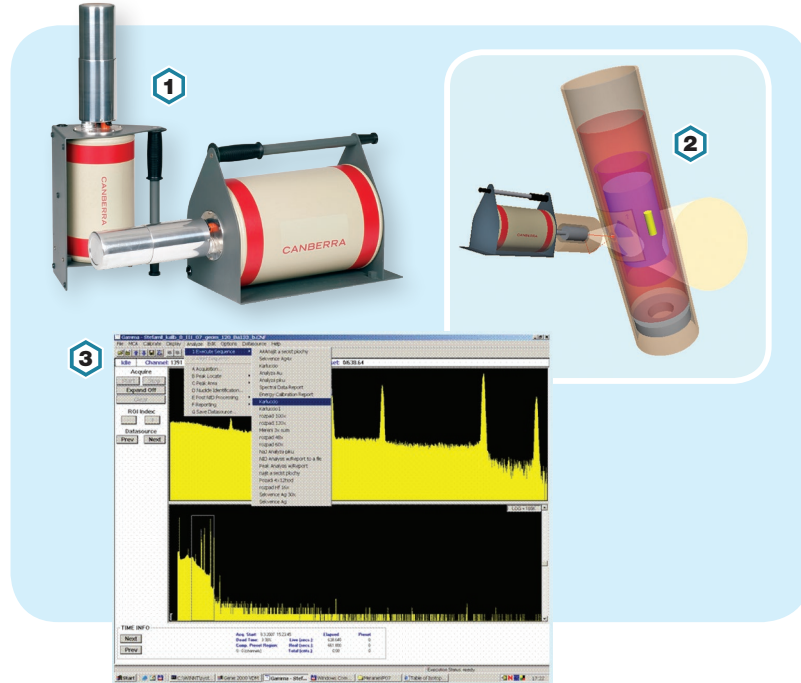
MIRION
TECHNOLOGIES

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Instruments & Techniques Used:

- 1 Broad Energy Germanium (BEGe) detectors
- 2 ISOCS™ Mathematical Efficiency Calibration
- 3 Genie™ 2000 Gamma Analysis



CANBERRA™ Solution:

- Divide the 36-inch soil core samples into 12-inch segments.
- Lead shielding to isolate the gamma flux from each segment.
- Scan each segment with NaI detector to check for hotspots.
- Perform ISOCS high-resolution gamma spectroscopy measurement on each segment.
- Variable detector-segment standoff distance to allow for high dose rate samples.
- Create custom ISOCS efficiency model for each measurement geometry.
- Analyze gamma spectrum, generate Radioassay Data Sheet for, and deliver to onsite Project Manager within 30 minutes.

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ACHIEVEMENTS

- ➔ More than 300 soil segments collected from 45 bore holes analyzed.
- ➔ Transuranic constituents quantified in every sample.
- ➔ Am-241 MDA's maintained < 10nCi/g for all ISOCS measurements.
- ➔ Analytical results delivered within 30 minutes.
- ➔ Customer's sampling plan evolved based on ISOCS results.
- ➔ Customer generated 3D subsurface maps of transuranic and other radiological contaminants.
- ➔ 3D maps were used to guide next-phase soil excavation.