

# Characterization of Rocky Flats Environmental Technology Site through Paint Sampling and Rapid Gamma Spectroscopy

### Scope:

- The work was performed at Rocky Flats Environmental Technology Site (RFETS) in USA.
- The goal was to distinguish between naturally occurring radionuclides and transuranics/uranium which had originated from the site operations.
- A CANBERRA team developed a technique for characterizing paint chippings, using in-situ gamma spectroscopy as part of an on-site mobile laboratory.

### Key Drivers:

- Meet the criteria for unrestricted release under the Multi-Agency Radiological Site Survey Investigations Manual (MARSSIM).
- Develop a rapid and cost-beneficial approach to perform the paint sampling analysis.
- Unrestricted release criteria are regulated by DOE-O-5400.5, which includes limits of 100 dpm/100 cm<sup>2</sup> for transuranics and 5,000 dpm/100 cm<sup>2</sup> for uranium.
- It is not possible to differentiate transuranics from uranium using hand-held probes which are typically used. The measurement challenge requires a new approach.



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

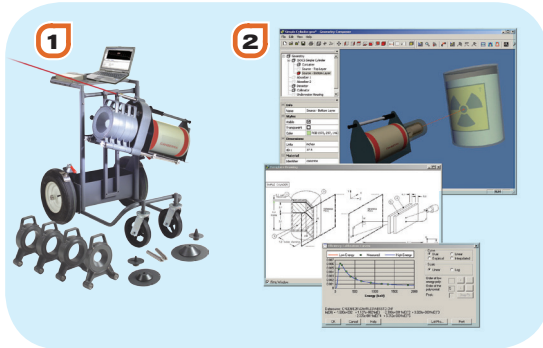


**MIRION**  
TECHNOLOGIES

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## Instruments & Techniques Used:

- 1 ISOCS Spectroscopy System
- 2 Genie 2000 Gamma Spectroscopy SW



	Wet chemistry analysis by offsite laboratory	RISS-Canberra on-site analysis method
Number of Measurements Required to Analyze 110 Samples	110 individual analyses	4 batch analyses
Turnaround Time	14 days*	≤24 hours
<b>Cost per Sample:</b>		
Sample Analysis	\$600/location sampled	\$19/location sampled (\$525 per batch)
Offsite Shipping	\$50/sample	Eliminated
DOT Radscreen	\$250/shipment	Eliminated
Total cost:	\$71,750	\$2,100
<b>Total cost savings for a single sampling evolution</b>	<b>\$69,650</b>	

\* Surcharges of 50% to 100% or more would have been incurred for more rapid turnaround times.

## CANBERRA Solution:

- Collaboration between “RISS (Remediation, Industrial D&D & Site Services) Subject Matter Experts (SMEs) and CANBERRA gamma spectroscopy SMEs.
- Deployment of CANBERRA In Situ Object Counting System (ISOCS) high purity germanium (HPGe) gamma spectroscopy system capabilities in an on-site laboratory.
- Use of MARSSIM gridding methodologies.
- Pre- and post-sampling radiological surveys (i.e., a smear survey and a total surface activity measurement using standard site alpha- and beta-survey instrumentation) were performed at each paint sample location.

## ACHIEVEMENTS

- Post-sampling methodology to verify that the facility surfaces behind the paint were less than the DOE-O-5400.5 unrestricted release criteria.
- The analysis was able to quantitatively and qualitatively differentiate uranium from transuranics with a two- to four-hour analysis time per sample, and meet the minimum detectable activity (MDA) requirements specified in MARSSIM.
- A batching method was developed which resulted in only **four** gamma spectroscopy analysis measurements being required, versus **110** separate sample analysis counts.
- This work at RFETS has brought cost savings (see table), schedule acceleration, helped achieve the site closure goals, and provided legally defensible, quality gamma spectroscopy and activity characterization data.