

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

Nuclear Measurements Division of AREVA

## » 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.





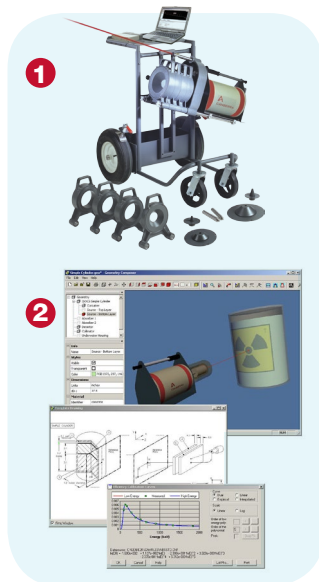
# Characterization of Rocky Flats Environmental Technology Site through Paint Sampling and Rapid Gamma Spectroscopy

## » CANBERRA Solution:

- > Collaboration between “RISS (Remediation, Industrial D&D & Site Services) Characterization” 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.

## » Instruments & Techniques Used:

- > ❶ ISOCS Spectroscopy System
- > ❷ Genie 2000 Gamma Spectroscopy SW



## 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.

	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.

