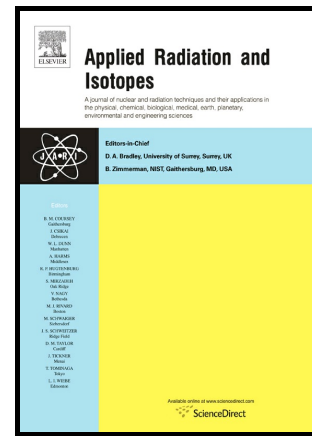


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# New high-throughput measurement systems for radioactive wastes segregation and free release

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**Keywords:** nuclear decommissioning; radioactive waste; free release; clearance level

## Abstract

This paper addresses the measurement facilities for pre-selection of waste materials prior to measurement for repository acceptance or possible free release (segregation measurement system); and free release (free release measurement system), based on a single standardized concept characterized by unique, patented lead-free shielding. The key objective is to improve the throughput, accuracy, reliability, modularity and mobility of segregation and free-release measurement. This will result in a more reliable decision-making with regard to the safe release and disposal of radioactive wastes into the environment and, resulting in positive economic outcomes. The research was carried out within “Metrology for Decommissioning Nuclear Facilities” (MetroDecom) project.

## 1. Introduction

The world faces a major challenge of great urgency: the enormous costs of decommissioning many outdated nuclear facilities. Nuclear decommissioning covers all activities from shutdown to the environmental restoration of the site. More than 200 power reactors are presently being decommissioned or will be in some phase of the decommissioning process by the year 2025. Therefore, it is essential to achieve a significant reduction in the enormous decommissioning costs by means of the development and implementation of decommissioning methodologies and associated new measurement techniques.

Not only that the decommissioning process is very costly, but it is even being carried out in the context of low public confidence in both the comprehensive clearance of nuclear sites and the safe disposal of radioactive waste. Decommissioning needs support by improved metrology that will minimize the environmental burden by providing the means for improved handling and disposition of waste, thus building public trust in nuclear technologies.

Cost reduction requires the adoption of more precise and standardized methods and devices traceable to national standards. This will make it possible to discriminate precisely and rapidly between the various waste categories to reduce conservative approach based on disposal instead of free release or higher repository category selection then appropriate in case of high measurement uncertainty.

Commercially available systems that are currently in use have issues with:

- low throughput,
- standardization of measurement method and design,
- spectrometric capability, while clearance levels are determined for individual radionuclides,
- modularity and transportability,
- expensive lead shielding unsuitable for construction of large facilities,
- insufficient sensitivity and uncertainty,
- fixed and unsuitable measurement geometry,
- versatilely usable measurement and transport containers,
- missing universally applicable certified calibration and testing standards.

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