

# Accepted Manuscript

Title: Recent contributions to the rapid screening of radionuclides in emergency responses and nuclear forensics

Author: Ian W. Croudace, Phillip E. Warwick, David G. Reading, Benjamin C. Russell

PII: S0165-9936(16)30030-9

DOI: <http://dx.doi.org/doi: 10.1016/j.trac.2016.05.007>

Reference: TRAC 14750

To appear in: *Trends in Analytical Chemistry*



Please cite this article as: Ian W. Croudace, Phillip E. Warwick, David G. Reading, Benjamin C. Russell, Recent contributions to the rapid screening of radionuclides in emergency responses and nuclear forensics, *Trends in Analytical Chemistry* (2016), <http://dx.doi.org/doi: 10.1016/j.trac.2016.05.007>.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

# Recent contributions to the rapid screening of radionuclides in emergency responses and nuclear forensics

Ian W. Croudace\*, Phillip E. Warwick, David G. Reading, Benjamin C. Russell #  
GAU-Radioanalytical Laboratories, OES, University of Southampton, National Oceanography Centre, European Way, Southampton, SO14 3ZH, United Kingdom  
# now National Physical Laboratory, Teddington, TW11 0LW, UK United Kingdom

## Highlights:

- A general overview of current Investigative methods used in nuclear forensics and emergency responses is presented along with a range of new rapid methods.
- Borate fusion is presented as a valuable tool for rapidly dissolving complex samples with one key application being the elimination of matrix absorption effects that can compromise gamma ray spectrometry data.
- A novel, rapid liquid scintillation method is presented that uses multiple quench corrections to allow rapid screening and identification of alpha and beta contaminated water and other samples in emergency situations
- A review of mass spectrometric methods shows their impact on rapid and precise isotopic analysis in the context of nuclear forensics and emergency situations

## Abstract

The ability to efficiently identify potential radiological threats or actual radioactive assaults on society and the environment demands a sophisticated and dedicated infrastructure comprising specialised personnel, mobile and fixed laboratories and advanced analytical instrumentation. Most developed countries have such systems but ensuring a long-term and resilient capability is recognised as a perennial challenge. National government laboratories specialising in nuclear forensics play a key role in maintaining capability but these organisations continue to benefit significantly from interdisciplinary and innovative contributions derived from universities and other research institutions. This review provides an insight into the range of technologies used and also provides a broad overview of applied techniques and instrumentation that contribute to rapid screening and analysis in the context of nuclear forensics and radiological emergencies.

**Keywords:** Homeland security, nuclear forensics, radiological emergencies, rapid radioanalytical methods, radioanalytical skills gaps, universities as innovators

Download English Version:

<https://daneshyari.com/en/article/5141793>

Download Persian Version:

<https://daneshyari.com/article/5141793>

[Daneshyari.com](https://daneshyari.com)