

2016 Nuclear Security Summit: Certified Reference Material Fact Sheet

The detonation of an improvised nuclear device or radiological dispersal device could have devastating consequences with global repercussions. To deter the deployment of these devices and to investigate illicit uses or trafficking of nuclear and other radioactive materials, the United States and its partners have actively pursued the development and maintenance of analytical capabilities to determine the provenance of such materials. These analytical capabilities are collectively referred to as nuclear forensics. To be effective, nuclear forensic analyses must yield accurate and precise results that can withstand scrutiny in a court of law and from the international community. Well-constrained, consistent, and uniform Certified Reference Materials (CRMs) are indispensable for producing high quality analytical results and provide the primary means of demonstrating the accuracy of nuclear forensic measurements.

Nuclear forensics encompasses a very broad spectrum of analytical techniques including radioactivity measurements, isotopic composition measurements, and trace and major elemental content measurements. Many of these analysis methods have been in use for decades, but some key nuclear forensics measurements are relatively new or are non-routine. For these new or modified analytical techniques, the availability of appropriate CRMs is essential for the calibration of analytical instruments, for improved precision of some analytical methods, and for quality control. The United States has spearheaded a multi-agency program for development of new CRMs that meet the emerging needs of the nuclear forensic community. This includes a reference material working group that meets regularly to assess priorities for development and production of new CRMs. Based on these priorities, several new CRMs for nuclear forensic analyses have been produced and are available to both the United States and international community. Many more are in the various stages of production or planning.

The planning, production, characterization, and certification of new reference materials represents a substantial effort but is necessary to assure the quality and confidence of nuclear forensic analyses. Listed below are nuclear forensic CRMs that have been developed by the United States, in some cases as cooperative projects with international partners such as the National Physics Laboratory in the United Kingdom and the Commissariat À L'Énergie Atomique in France. To obtain sample units of these CRMs or for more information about nuclear forensic reference material projects, please contact the U.S. Department of Homeland Security (DHSCRMInfo@hq.dhs.gov). These CRMs will also soon be available for ordering through the National Institute of Standards and Technology website.

Certified reference materials:

- CRM 125-A: U Radiochronometer (low enriched UO₂)
- CRM 125-A: U Radiochronometer (low enriched UO₂)
- CRM U630: U Radiochronometer & Trace U Isotopic Standard (high enriched U₃O₈)
- CRM U045 U-1: Trace U Isotopic Standard (low enriched U nitrate solution)
- NFRM U-1: Trace Actinides in U (high enriched U₃O₈)
- NFRM U-2: Trace Actinides in U (high enriched U₃O₈)

Reference material units prepared – characterization and/or certification in progress:

- CRM 8610: ¹³⁷Cs-¹³⁷Ba Radiochronometer
- CRM 8613: ²²⁹Th Isotopic Tracer
- CRM Am: ²⁴³Am Isotopic Tracer
- CRM 8614: Trace Actinides in Pu
- CRM 8615: Trace Actinides in Pu
- NFRM U-3: Trace Element in U
- CRM 8611: Trace Element in Pu
- CRM 8612: Trace Element in Pu

Reference material units in planning or production:

- CRM 8616: ²³³U Isotopic Tracer
- CRM Ba: ¹³⁴Ba Isotopic Tracer
- SRM 988a: ⁸⁴Sr Isotopic Tracer

