



Contribution ID: 285

Type: oral

Advanced Mathematical Methods for Gamma Ray Based Nuclear Safeguards Measurements

Thursday, 23 October 2014 09:10 (20 minutes)

Working in close collaboration with the IAEA, Canberra Industries has developed an analysis tool that yields self-consistent radionuclide activities or masses contained in items commonly encountered in nuclear safeguards measurements. The tool, known as Advanced-ISOCS, is based on Canberra's In Situ Calibration Software (ISOCS) and automatically adjusts source geometry parameters to yield an efficiency calibration that is a best match for the given measurement. Canberra worked with the IAEA at every stage of the project. The final deliverables were tested thoroughly by Canberra as well as the IAEA. The advanced-ISOCS project was funded by the US Support Program. (USSP Task USA A 1607 "Development of ISOCS Self Modelling Capabilities" A.267).

Advanced-ISOCS reduces the total measurement uncertainty (TMU) and improves the accuracy of radionuclide quantification in safeguards measurement. The capability of the ISOCS Uncertainty Estimator (IUE), a tool already present in ISOCS, has now been extended to adjust the efficiency calibration by benchmarking the efficiency shape and magnitude to the data available in the analysed gamma ray spectra. The benchmarks include isotopic results from MGA, MGAU, FRAM analysis, or declared information, the consistency of line activities from a given multiple-line nuclide, the consistency between measured and modelled uranium or plutonium mass, and the consistency of activities from multiple measurements of the same item.

Since IAEA inspectors face many measurement and time challenges in the field, an additional achievement of the development was a utility that enables measurement setup and analysis parameters to be pre-defined in advance of field measurements. The utility, called "Field ISOCS", greatly facilitates the inspectors' quantitative analysis of measured items in the field and the comparison of results with declarations.

An overview of the methodology and functionality of the Advanced-ISOCS software and recent performance results are presented.

Country or International Organization

Canberra Industries (AREVA BU Nuclear Measurements)

EPR Number (required for all IAEA-SG staff)

759

Primary author: VENKATARAMAN, Ramkumar (Canberra Industries (AREVA BUNM))

Co-authors: LEBRUN, Alain (IAEA); BOSKO, Andrey (Canberra Industries (AREVA BUNM)); BERLIZOV, Andriy (IAEA); BRONSON, Frazier (Canberra Industries (AREVA BUNM)); ILIE, Gabriela (Canberra Industries (AREVA BUNM)); BOURVA, Ludovic (Canberra United Kingdom (AREVA BUNM)); YOON, Seokryung (IAEA); NIZHNIK, Vladimir (IAEA); RUSS, William (Canberra Industries (AREVA BUNM))

Presenter: VENKATARAMAN, Ramkumar (Canberra Industries (AREVA BUNM))

Session Classification: NDA Measurements I: Gamma Spectrometry