



Contribution ID: 109

Type: **Contributor (Panel Session)**

An Example of International Collaboration: the Evolution of Active Neutron Interrogation Collar Methods for Modern Fresh Fuel Assemblies

Global modern nuclear fuel designs are trending to higher enrichment with a larger number of burnable fuel pins to more fully extract the available energy via higher burn up. These design changes challenge current fresh fuel safeguards measures and is one example of how safeguards adaptation is needed to address industry development. We will present a concept of how a collaboration that leverages facilities and expertise in a way that can generate a robust technical safeguards solution using international resources effectively with strong stakeholder involvement. We will present an example of a decades-long collaboration among instrument developers, regional inspectorate, fuel fabricators, and multi-discipline technical experts to address the modern fuel design safeguards challenge. Specifically, we will present a coordinated effort to develop a detailed MCNP model of a reconfigurable fuel bundle and perform measurements on that bundle with an active interrogation collar (UNCL). The UNCL was developed to assay the linear density of fissile mass in fuel assemblies for prevention of nuclear material diversion. Accurate calculation of fissile mass requires an understanding of instrument response in the event of scenarios that include pin diversion, variation of burnable poison, and pin substitution. In the framework of a collaboration project between the Department of Energy and the National Nuclear Energy Commission of Brazil (CNEN), a research activity is ongoing to develop a reconfigurable short fresh fuel assembly of modern design for calibration and research; model the fuel bundle and predict the UNCL detector response. This assembly constructed at Nuclear Industries of Brazil (INB) is supported by detailed destructive assay measurements of the nuclear material and detailed engineering drawings. Comparative measurements have been made at INB between production assembly and certified reference short fuel bundle. The short bundle will also be available at CNEN for training, substitution, and other research studies.

Which "Key Question" does your Abstract address?

NEW2.1

Topics

NEW2

Primary author: FAVALLI, Andrea (Los Alamos National Laboratory)

Co-authors: RENHA, Geraldo (The National Nuclear Energy Commission of Brazil (CNEN), Rio de Janeiro, Brazil); GRUND, Marcos (The National Nuclear Energy Commission of Brazil (CNEN), Rio de Janeiro, Brazil); BROWNE, Michael (Los Alamos National Laboratory); CROFT, Stephen (Oak Ridge National Laboratory, Oak Ridge, TN, US)

Presenter: FAVALLI, Andrea (Los Alamos National Laboratory)

Session Classification: [TEC] Improving Coordination of Safeguards R&D

Track Classification: Leveraging technological advancements for safeguards applications (TEC)

