

Symposium on International Safeguards: Linking Strategy, Implementation and People - IAEA CN-220



Contribution ID: 238

Type: oral

Experimental and Analytical Plans for the Non-destructive Assay System of the Swedish Encapsulation and Repository Facilities

Wednesday, 22 October 2014 11:20 (20 minutes)

The Swedish Nuclear Fuel and Waste Management Company (SKB), European Atomic Energy Community (Euratom), two universities and several U.S. Department of Energy Laboratories have joined in a collaborative research effort to determine the capability of non-destructive assay (NDA) techniques to meet the combined needs of the safeguards community and the Swedish encapsulation and repository facilities operator SKB. These needs include partial defect detection, heat quantification, assembly identification (initial enrichment, burnup and cooling time), and Pu mass and reactivity determination. The experimental component of this research effort involves the measurement of 50 assemblies at the Central Storage of Spent Nuclear Fuel (Clab) facility in Sweden, 25 of which were irradiated in Pressurized Water Reactors and 25 in Boiling Water Reactors. The experimental signatures being measured for all assemblies include spectral resolved gammas (HPGe and LaBr₃), time correlated neutrons (Differential Die-away Self Interrogation), time-varying and continuous active neutron interrogation (Differential Die-away and an approximation of Californium Interrogation Prompt Neutron), total neutron and total gamma fluxes (Fork Detector), total heat (assembly length calorimeter) and possibly the Cerenkov light emission (Digital Cerenkov Viewing Device). This paper fits into the IAEA's Department of Safeguards Long-Term R&D Plan in the context of developing "more sensitive and less intrusive alternatives to existing NDA instruments to perform partial defect test on spent fuel assembly prior to transfer to difficult to access storage," as well as potentially supporting pyrochemical processing. The work describes the specific measured signatures, the uniqueness of the information contained in these signatures and why a data mining approach is being used to combine the various signatures to optimally satisfy the various needs of the collaboration. This paper will address efficient and effective verification strategies particularly in the context of encapsulation and repository facilities.

Country or International Organization

United States of America

Primary author: TOBIN, Stephen (LANL, UU, SKB)

Co-authors: KAPLAN, Alexis (U. Michigan and LANL); SJÖLAND, Anders (SKB); FAVALLI, Andrea (LANL); WORRALL, Andrew (ORNL); BELIAN, Anthony (LANL); GROGAN, Brandon (ORNL); RAEL, Carlos (LANL); MEYERS, Dennis (NNSA); BLAIR, Dianna (SNL); VO, Duc (LANL); BALDWIN, George (SNL); ILAS, Germina (ORNL); LILJENFELDT, Henrik (SKB); TRELLE TR, Holly (LANL); MENLOVE, Howard (LANL); GAULD, Ian (ORNL); GALLOWAY, Jack (LANL); HU, Jianwei (ORNL); HENDRICKS, John (LANL); IANAKIEV, Kiril (LANL); SWINHOE, Martyn (LANL); NEWELL, Mathew (LANL); FENSIN, Michael (LANL); DE-BAERE, Paul (Euratom); POLK, Paul (LANL); JANSSON, Peter (Uppsala U.); SANTI, Peter (LANL); SCHWALBACH, Peter (Euratom); POZZI, Sara (U. Michigan); GRAPE, Sophie (Uppsala U.); JACOBSSON SVÄRD, Staffan (Uppsala U.); VACCARO, Stefano

(Euratom); ULRICH, TJ (LANL); BURR, Thomas (LANL); MARTINIK, Tomas (Uppsala U. and LANL); HENZL, Vladimir (LANL); MOZIN, Vladimir (LLNL); HAM, Young (LLNL)

Presenter: TOBIN, Stephen (LANL, UU, SKB)

Session Classification: Safeguards Needs at Geological Repositories and Encapsulation Facilities