INTERNATIONAL NUCLEAR ENERGY RESEARCH INITIATIVE

Nuclear Data Uncertainty Analyses to Support Advanced Fuel Cycle Development

PI (U.S.): Michael E. Dunn, Oak Ridge National Laboratory (ORNL)

PI (ROK): Choong-Sup Gil, Korea Atomic Energy Research Institute (KAERI)

Collaborators: None

Project Number: 2008-003-K

Program Area: AFCI

Project Start Date: November 2007

Project End Date: October 2010

Project Abstract

The main goal of this collaboration is to provide improved neutron cross-section data with uncertainty or covariance data for isotopes important to nuclear safeguards applications. Additional goals include 1) assessing uncertainties of the nuclear integral parameters due to the cross-section data, 2) improving safety validation, and 3) reducing capital cost through system design optimization for advanced fuel cycle (AFC) development.

To achieve the above objectives, the researchers will first identify priority nuclides that need improved nuclear data with uncertainty information for AFC safeguards and design applications. Subsequently, they will produce improved nuclear data files with covariance data for these priority nuclides. The improved, evaluated cross-section data with covariance data will be demonstrated and tested in sensitivity/uncertainty calculations for select benchmark problems. The tests will include uncertainty assessments due to the nuclear cross-section data of the integral parameters for the AFC systems, such as k_{eff}., reaction rates, reactivity worths, and spent fuel isotopic compositions, as well as validation of the cross-section data itself.

Potential benefits of this activity include capital cost reductions through system design optimization, improved technical basis for licensing, improved safety validation, increased design flexibility/optimization, and potentially significant time and cost savings associated with the design and conduct of experimental programs. The final product will be improved and tested nuclear data files with uncertainty information that will be submitted for inclusion in the ENDF/B file system.