

A proposal to WPEC towards formalizing the definition of nuclear data needs for GEN-IV Systems

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Basics

ENDF, JENDL, JEFF files are intended for multiple applications, and Gen-IV is only one particular application

Gen-IV is long term, most Gen-IV systems are still at a very preliminary design stage today

In ND-related work, not everything is driven by specific needs (e.g., general theoretical developments)

There is limited support/manpower available

The systematic inclusion of covariance data in evaluated ND files represents a major effort and a long term objective

Background

- **This week's workshop has been successful at clarifying a number of key issues. The bad news first:**
 - So far, the approach to defining nuclear data needs has not been systematic
 - *Based on large XS uncertainties, that do not necessarily have a significant influence*
 - *Based on extreme exotic designs that have little probability of realization*
 - *Based on capabilities rather than needs*
 - *“Wrong” approaches keep being repeated*

Background (2)

- The respective roles of differential and integral data are poorly defined
- Current covariance files are not trustworthy
- Poor communications between producers and users
- Poor communications with funding agencies

Background(3)

- **The good news (finally):**
 - The community realizes that there is a need for formalization
 - A consistent methodology is emerging
 - Good work on covariances. This is critical.
 - Preliminary results of methodology are very credible. They are consistent with educated expectations; they also seem to eliminate frivolous claims
 - Recognition of the importance of reexamining the major principal reactions

The systematic Approach

- **Define target parameter uncertainties via tradeoff studies**
- **Produce sensitivities**
- **Define Nuclear Data needs**

- **Difficulties that need to be lifted:**
 - validity of covariance files
 - Acceptability of ad hoc covariance files
 - Partially completed designs
 - Weak tradeoff studies

Thoughts

- **New R, D & D approach for ND production, shorter cycles, but no “quick and dirty” work.**
- **→ Consider, whenever possible, combining differential and integral information *during* the evaluation process rather than after**
- **Reliable estimates of “user-oriented” covariance data have to be included in future releases of ENDF, JEFF, JENDL files, in a reasonably short time, to motivate priority ND improvements for Gen-IV studies.**
- **→ Consider combining the nuclear physicist’s “rigorous” approach with the reactor physicist’s “educated guesses” approach**

Thoughts (2)

- **All Gen-IV reactor concepts will benefit from improved major actinide capture and fission cross sections (in level).**
- **Tighter precision constraints on future differential and integral measurements**
- **Well-prepared analytic integral experiments (e.g., MASURCA, BFS) will be necessary to assess ND and code performance + identify further improvements.**
- **Will have to be documented and archived properly → IRPhE**
- **Few players left in the ND measurement + evaluation field today internationally ⇒ it is essential to combine our resources (WPEC)**

Proposal

- **The Gen-IV train is leaving the station but it is not too late**
- **Propose putting together a group within WPEC that would have the following charter/phases:**
 - Phase 1: definition of needs
 - *Consensus on methodology*
 - *Integration of existing data*
 - *Definition of needs*
 - Phase 2: how to best meet these needs
 - *Role of differential and integral data*
 - *Need for refined experimental approaches*