JEFF Expectations from CIELO

1. JEFF Background

2. JEFF-3.2 and beyond

3. JEFF expectations from CIELO

R. Jacqmin

CEA

1. JEFF Background

- **Background:** A collaborative international "project" (like CIELO) from the beginning

    - Early 80's: Joint Evaluated File (JEF) project started by the OECD/NEA Data Bank member countries. Focus is on fission reactor technology applications

    - Mid 90's: Joint Evaluated Fission and Fusion (JEFF) File Project started. Combined effort of EFF, EAF fusion + JEF fission file Projects.

        *The objective of the Joint Evaluated Fusion and Fission (JEFF) file Project is to develop and promote the use of high quality evaluated nuclear data sets in standard formats for a wide range of scientific and technical applications. The Project assesses the **needs** for nuclear data improvements and addresses those needs by initiating the necessary measurements, evaluation and benchmarking efforts.*

    - 2012   Release of JEFF-3.1.2

    - 2013   Planned release of JEFF-3.2

Rationale for JEFF file updates

Guiding principles
  - ➤ Meet the users' needs
  - ➤ Use the best physics
  - ➤ Continuously improve

1. **Improve** first, by adopting new evaluations from *within* the JEFF community, either because they yield **better or comparable performance**, as measured by consistent validation studies, or because they integrate better physics when validation data is lacking

2. **Further improve** by importing data from *outside* the JEFF community.
When updates of earlier versions are available, adopt these newer evaluations, unless there are reasons *not* to do so.
Choose source evaluations other than those of JEFF-3.1 if there are reasons to do so (same criteria as in 1)

3. **Further improve** by *completing*, using other data.
Adopt data from other libraries that are still "missing"
Adopt recent evaluations to fill gaps and replace very old evaluations

■ **JEFF-3.2**

─ **Preparation and general motivation**
- ➢ Preserve the performance of JEFF-3.1 (for **LWRs**) and take into account validation feedback $\rightarrow$ improve MOX-fuelled systems
- ➢ Address the needs of **fast reactors and transmutation applications**
- ➢ Planned several years ago already, target release date is late **2013**

─ **Improvements**
- ➢ Improve FR systems predictions $\rightarrow$ improved major actinides in the fast range, in particular Pu-239, Pu-240, U-238
- ➢ Improve some structural materials, metallic coolant, absorbers
- ➢ Add more gamma-production data
- ➢ Integrate evaluations based on new high-quality measurements: Am-241
- ➢ Integrate progress in model developments and evaluation methods: TALYS, CONRAD, GEF, cov. production,…
- ➢ Increase internal consistency, in anticipation of future updates $\rightarrow$ U files
- ➢ Add covariance information
- ➢ Update the decay data and fission yields libraries
- ➢ Update the activation file (using EAF-2010)

- **Beyond JEFF-3.2**

  - Aim for

    - A "**qualitative step forward**": built upon the investments made in
      (i) nuclear models and codes (TALYS, CONRAD, GEF…)
      (ii) many new high-quality differential measurements
      (iii) expertise

    - **Complete covariances**

    - **Improved file consistency**

    - **Better integration** so as to ease subsequent updates

  - Needs-driven $\Rightarrow$ applications + lessons learned

  - ~ 2020, with intermediate step in 2017

  - Same "business model"?

3. JEFF Expectations from CIELO

■ **CIELO goals**

1. *Bring together experts from across the international nuclear reaction data community to **identify discrepancies (and document reasons for the discrepancies)** among existing evaluated data libraries, measured data, and model calculation interpretations (described herein), and to **make progress in reconciling these discrepancies** to create more accurate ENDF-formatted files.*

2. *Create demonstrably **more accurate evaluations***

3. Also, *help identify **future experiments** that are needed, from cross section measurements (e.g., as collated in the NEA's High Priority Request List) to more integral experiments*

3. JEFF Expectations from CIELO

- **Some lessons learned, difficulties**

    - Diversity of users, applications, requests for improvements → ≠ priorities

    - Evaluation:
        - ➢ "Experts of good will can disagree"
        - ➢ Fragile (resonances, preservation of some information)

    - "Some data is better than no data at all, unless it is misused" (covariance)

    - Validation
        - ➢ Testing vs benchmarking
        - ➢ Statistical adjustment, trends

    - Error compensations

3. JEFF Expectations from CIELO

Expectations

→ CIELO Goals #1 and #3 are most important to JEFF

- Find the reasons for the remaining significant discrepancies between files
- Take or suggest actions to reconcile the differences
- Document the decision process (why)

- Agree on best practices (how) to be adopted
- Introduce a feedback mechanism to EXFOR
- Improve the integration of the data/models/decisions (at the NEA level?) so as to ease future updates

- Recommend specific actions (measurements) for further improving the data in future updates

→ CIELO Goal #2

- Evaluators should adopt best practices in producing the evaluations
- Estimate uncertainties (covariances) and include them in the files