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Status of the JEF project*M. SALVATOIRES (CEA) - C. NORDBORG (OECD/NEA)***1] JEF-2.2 Evaluated files**

The JEF-2.2 general purpose library was released, in the beginning of 1992, to laboratories engaged in the benchmark testing of the file. Following further discussions in the JEF Scientific Coordination Group and the NEA Nuclear Science Committee, it was decided to release these data also to non-OECD countries, in view of the extension of the membership of the International Evaluation Cooperation decided in June 1992.

The JEF-2.2 data have been kept unchanged since the release, to facilitate for scientists involved in the validation of the data to compare their results. Feedback, mainly from the processing of the data, are communicated to the NEA Data Bank where a list of isotopes in need of modifications are being kept and constantly updated. The corrected or newly evaluated files are kept separately from the JEF-2.2 data and these files are only distributed in very special cases for validation purposes. The list does not contain any items of major importance, but rather minor format corrections or indications of available new information.

There are four special purpose libraries in the JEF-2.2: Thermal scattering law data, Radioactive decay data, Fission Yield data and Photon Interaction data. The thermal scattering law data were released in December 1992 and the photon interaction data were adopted from the US evaluation by D.E. Cullen. Both the Radioactive decay and fission yield data were recently updated and validated and would be released in the very near future.

2] The JEF-2.2 Benchmarking

The major effort during the past year has been devoted to the general purpose file and decay data/fission yields files benchmarking.

Several laboratories have been active in this field : AEA-Winfrith, CEA-Cadarache and CEA-Saclay, ECN-Petten, KfK-Karlsruhe, the University of Delft, PSI, IKE-Stuttgart, Studvisk, ENEA.

According to plan set-up by E. FORT, the benchmarking has covered :

- Core applications (both thermal and fast spectrum cores.)
- Shielding applications.
- Criticality-safety.
- Decay heat.

Most contributions are available as JEF-doc presented at the specialists working meetings in December 1992, and June 1993.

A few highlights are as follows :

✱ Structural materials

Common benchmarking work has been made by the JEF and EFF projects, in particular for the iron data.

At present, several points have been made :

- the high sensitivity of neutron propagation experiments (ASPIS, PCA Replica, 14-MeV neutron propagation experiments, leakage experiments, etc...) to iron inelastic scattering data have indicated some trends for revision of Fe-56 data above and below ~ 1 MeV.
- the fluctuation of total cross-section above ~ 1 MeV has to be accounted for. The new Geel experiments are very relevant in this respect, as it is the theoretical analysis performed by F. FROEHNER, which should suggest appropriate ways to represent that structure in the files.
Finally, the data processing and the self-shielding evaluation in the unresolved resonance range are crucial points in the analysis of experiments, to extract from them meaningful indications for the evaluators.

As for Ni data, there is an indication, to be confirmed of a need to revise the capture cross-section data at energies 1 - 100 KeV.

Most of the conclusions of the subgroups 1 and 11 of the WPEC will be relevant for the JEF project too.

✱ Major actinides

The general indication from the present benchmarking in the thermal range for a wide range of lattices (AEA-Winfrith, CEA in particular) is that JEF-2.2 is performing well and no major problems have been detected for the thermal and epithermal data of U-235 and U-238. However, further benchmarking is needed for U-Pu systems. In particular, epithermal data for Pu isotopes need to be carefully analyzed, in view of the few relevant critical experiments available and reliable.

In the fast energy range, indications were obtained for U-238 fission and inelastic cross-sections that are presently verified, enlarging the integral experiment data base.

These indications will be supplied to the relevant subgroup of the WPEC for consideration.

The Pu-239 data benchmarking in the fast range supports the conclusions of subgroup 5 of WPEC. Some indications related to problems on the $(n,2n)$ cross-section of Pu-239, obtained with irradiated sample analysis are being considered.

Also in the fast range, minor Pu isotopes data (in particular capture cross-sections) need further benchmarking, since the present analysis of relevant experiments points out the need for some revisions.

※ Light elements

A significant point was detected in the analysis performed by E. FORT of fast critical systems : apparently the 0-16 data (or its processing, or its representation in the file) should be modified to allow a consistent reduction of (C/E-1) values in an adjustment procedure.

A high sensitivity to 0-16 data was detected for thermal system, in particular to angular distributions. This point will need further investigation.

※ Decay heat

A strong effort was put in the validation of the most recent revision of the relevant JEF files (JEF-2.2.2.).

The results obtained so far, allow to freeze that version and to release it. The problem to define a standard is presently discussed.

3] **New evaluations**

A new evaluation was made available by AEA on Na-23. The impact of this new evaluation will be checked on deep penetration experiments on Na blocks, and on the critical experiments in the fast energy range, where some requirements (for Na-23 σ_{in}) were pointed out by the Cadarache analysis.

U-233 resonance parameters as supplied by H. DERRIEN from JAERI, have been used in a preliminary file, to check some relevant benchmarks. This work is still in progress.

Most of the work on possible evaluation revision is made in the frame of the WPEC subgroups, and will continue in 1993.

4] **Perspectives**

The JEF project will still put much emphasis in the benchmarking activity throughout 1993. The present JEF-2.2 version of the general purpose file is being used in R and D organizations and its use is foreseen by some industry as early as beginning of 1994.

The documentation of the files and of the benchmarking work in a consistent manner is becoming a high priority to meet quality-assurance requirements expressed by the users.

A plan for a new revised version of the JEF files will be set-up in the course of 1993, taking into account the results of the benchmarking activity and the results of the subgroup work performed in the frame of WPEC.

Areas of particular interest for applications are the radioactive waste transmutation studies, optimized use of Pu in LWRs and FRs, criticality-safety studies and advanced fuel cycles.

Priorities will be related to the needs expressed by the JEF user community and will be integrated in the JEF development plan for the next few years.

The support of the NEA Data Bank will continue to play an essential role to keep the JEF project active and up to the needs and expectations of the user community.