Status of the JEFF-3 File Project

May 2002

Background and organisation

The Joint Evaluated File (JEF) Project was initiated in the early eighties by member countries of the OECD Nuclear Energy Agency Data Bank. The aim of this Project was to produce the best possible evaluated nuclear data files to meet the needs of fission reactor technology applications. The JEF-2.2 library, released in 1992, has been widely distributed and validated.

Work on a new library, called JEFF-3, is currently underway. The objective of this new library is not only to achieve improved performance for existing nuclear reactors and fuel cycles, but also to provide users with a more extensive set of data applicable to a wide range of applications. The European Fusion File (EFF Project) and the associated European Activation File (EAF) contribute to this new initiative, hence the name Joint Evaluated Fission and Fusion (JEFF) File Project.

The JEFF Scientific Co-ordination Group (SCG), whose members are nominated by the Nuclear Science Committee Executive Group, has responsibility for the overall management of the Project.

JEFF technical activities are organised in different Working Groups. Two changes took place in 2001: (i) the Working Group on Fission Product Cross Sections was merged into the Evaluation, Processing and Benchmarking Working Group, and (ii) a new Working Group on Experimental Activities was formerly created, including representatives from the Institute for Reference Materials and Measurements (IRMM) in Geel and from other laboratories. An important mission of this new JEFF Working Group is to collect the needs for new evaluations, to analyse these needs in order to establish if new measurements are required, and to determine in what conditions such measurements can be performed.

Following these changes, there are now five JEFF Working Groups on:

- Experimental Activities,
- Evaluation, Processing and Benchmarking,
- Radioactive Decay and Fission Yield data,
- Intermediate Energy data,
- Fusion data (EFF group).

The Secretariat of the JEFF project is the NEA Data Bank. The NEA Data Bank provides general information about the JEF(F) files, maintains a list of actions, provides support for assembling, QA testing, maintaining, and distributing the libraries and the associated documentation, as well as for collecting user feedback and requests.

Recent developments and future plans

General Purpose File

The first version of the JEFF-3 General Purpose file was officially released on April 26, 2002, as planned. This first version contains 340 nuclides, complemented by seven sets of thermal scattering data. JEFF Report 19 will provide a detailed description of this file.

The main differences with respect to the JEF-2.2 General Purpose file concern the following nuclides:

- H-1, He-4, Li-7, Be-9, B-10, C, N-14, Mg, Al-27, Si-28, V
- Cr-52, Mn-55, Fe-56, Ni-58, Ni-60
- Zr, Mo, Cd, Ba isotopes
- Ru-103, Cs-133, Sm-149, Eu-155
- U-233, U-235, U-236
- Np-237
- Pu-238, Pu-239, Pu-240, Pu-241, Pu-242
Some of these evaluations were adopted, either totally or in part, from the EFF, JENDL3.2 and ENDF/B-VI files.

The JEFF-3.0 evaluations are the results of a careful review and selection process, which started in 1997 and took into account the results of the JEF-2.2 extensive benchmarking, as well as the results of checks and tests on preliminary JEFF-3T test versions of the file.

Before its release, the JEFF-3.0 General Purpose file underwent thorough testing by the NEA Data Bank according to recently-developed QA procedures which included running the BNL checking codes on every evaluated data set. As part of the tests, the file was processed with different versions of NJOY.

The limited benchmarking of the JEFF-3.0 file performed over the past two years confirmed the expected performance improvements. However, it also revealed that the new file leads to a slight systematic underestimation of PWR uranium lattice reactivity. Efforts are currently underway to identify the reasons for this underestimation.

A revision of the JEFF-3.0 General Purpose file is tentatively scheduled for release in late 2003. This revision should contain, in addition to the necessary revisions for improving LWR reactivity calculations, covariance information for the main nuclides as well as more complete gamma-production data.

Special Purpose Files

As the manpower available for producing and benchmarking the various parts of the JEFF-3 library was limited, it was decided to schedule the release of the General Purpose and Special Purpose Files progressively over a two-year period rather than all at once.

The initial JEFF-3 Activation File will be made from EAF-2001, the latest version of the comprehensive activation file EAF produced and continuously improved by the EFF Project. Some format issues have been resolved recently. The official release of JEFF-3.0/A is scheduled for December 2002.

The JEFF-3 Decay Data starter file assembled by the NEA Data Bank in 2001 from the UKPADD-6 and UKHEDD-2.2 evaluations, with complements taken from NUBASE and ENSDF data converted into ENDF-6 format, is currently under test. An updated Fission Yield starter file consistent with this JEFF-3 Decay Data starter file has been recently produced from the UKFY3 evaluations. Considerable work is still needed on these files, both in terms of evaluation and validation, before they can be deemed ready for release (target date: late 2003). This work is a top priority for the JEFF Project in the near future.

Following discussions within the JEFF Project, the release of the JEFF-3.0 Intermediate Energy data is no longer envisaged as a separate Special Purpose file, but instead as an extension of the General Purpose file from 20 to ~ 200 MeV. Current plans are to make this release coincide with the General Purpose file update release scheduled for late 2003.

The next JEFF meeting will take place in Paris on December 4-5-6, 2002.