

# Progress Report on Nuclear Data Development Activities of the IAEA Nuclear Data Section

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## Summary

Report covers 1-year period (June 1995 - May 1996) after the last meeting of the NEA WPIEC. Summarized is progress on FENDL and given is a brief account of CRPs.

### FENDL

The activity focused on integral data testing and benchmark analysis of the first version of the library, FENDL-1. It was found that high level of confidence of data was reached. With few exceptions this holds for the materials of highest importance for fusion reactor applications. The FENDL-1 was officially released and distributed to major nuclear data centers (February 1996).

Some existing deficiencies and discrepancies have been identified in FENDL-1 that should be removed in the improved version, FENDL-2. Altogether, 26 materials were identified as candidates for replacement in the basic file FENDL/E-2. Out of them, 4 materials ( $^9\text{Be}$ ,  $^{51}\text{V}$ ,  $^{56}\text{Fe}$  and  $^{nat}\text{W}$ ) are of priority 1, 8 materials ( $^{12}\text{C}$ ,  $^{16}\text{O}$ ,  $^{27}\text{Al}$ ,  $^{28,29,30,nat}\text{Si}$  and  $^{nat}\text{Zr}$ ) of priority 2 and 14 of the lowest priority 3. The major part of identified candidates for replacement are from the JENDL-FF and from the EFF libraries. The final selection should be performed at the forthcoming Consultants' Meeting on Selection of FENDL/E-2 to be held in Karlsruhe, 24-28 June 1996.

The selection process of cross sections for the activation file FENDL/A-2 was completed. The file of pointwise data, FENDL/A-2.0, was already assembled (March 1996). It is a merge of 400 'important reactions' identified by the activation selection panel with the basic library EAF-4.1 that is largely based on the ADL-3. The derived working activation libraries (multigroup and Monte Carlo) are near completion.

Under preparation is the improved decay data file, FENDL/D-2. Improved d+t evaluation should be included into the charged particle fusion reaction file, FENDL/C-2.

The following meetings on FENDL were held in the reported period:

- Activation Selection Panel, St. Petersburg, 25-27 June 1995
- Benchmark Validation of FENDL-1, Karlsruhe, 17-19 October 1995
- Completion of FENDL-1 and Start of FENDL-2, Del Mar, 5-9 December 1995

The improved library, FENDL-2, should be subject to extensive data testing and benchmark validation during the rest of this year. The closeout meeting on FENDL-2, scheduled originally for Vienna, November 1996, should be held in 1997. Official release of FENDL-2 should follow shortly after this meeting.

## Coordinated Research Programmes

In the reported period, there were 7 CRPs active and 1 new CRP was approved for initiation. Out of the active CRPs, one was completed, another one is under completion and one was initiated.

1. Activation Cross Sections for Generation of Long-Lived Radionuclides of Importance in Fusion Reactor Technology: CRP aimed to evaluate 16 selected reactions important for low-activation material development and radioactive waste disposal (half-lives from 13 to 700 000 years). Out of them, evaluation of 12 reactions with particle emission was successfully completed, open remained 4 capture reactions. Final meeting was held in June 1995, final report is under preparation.
2. Compilation and Evaluation of Fission Yield Nuclear Data: CRP is near completion, final meeting will be held in October 1996. A follow-up CRP is under preparation on fission product yields required for transmutation of minor actinide nuclear waste.
3. Improvement of Measurement, Theoretical Computations and Evaluations of Neutron Induced Helium Production Cross Sections: CRP is under completion, final meeting was held in September 1995. Completed was evaluation of helium production on Fe, under completion is Ni, open remained Cr.
4. Establishment of International Reference Data Library of Nuclear Activation Cross Sections: CRP is well underway, second meeting was held in May 1996.
5. Development of Reference Input Parameter Library of Nuclear Model Calculations of Nuclear Data (Phase I: Starter File): CRP is well underway, complete Starter file is assumed to be ready in the first half of 1997 together with its full description. The library is meant for low energy nuclear reactions (below 100 MeV). Completed was the file with atomic masses, shell corrections and deformations, near completion is the file with staircase plots of cumulative numbers of discrete levels. This activity is complementary to the NEA WPIEC Subgroup 12 on Nuclear Model Validation.
6. Measurement, Calculation and Evaluation of Photon Production Data: CRP is well underway, second meeting was held in May 1996. Completed was a draft of Atlas of neutron capture cross sections.
7. Development of Reference Charged-Particle Cross Section Database for Production of Medical Radioisotopes: CRP was initiated in 1995, current work concentrates on evaluation of beam monitor reactions and on evaluation of production reactions for gamma emitters.
8. Compilation and Evaluation of Photonuclear Data: CRP was approved for initiation in 1996. Its objective is to develop a file of photonuclear reaction cross sections for photon energies up to 50 MeV with a possible extension up to about 140 MeV, 1-st meeting is tentatively planned for December 1996.