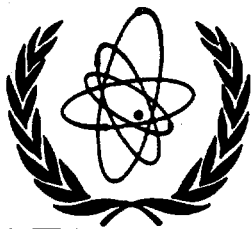


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**INTERNATIONAL NUCLEAR DATA COMMITTEE**

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**IAEA Consultants' Meeting on  
SELECTION OF EVALUATIONS FOR THE FENDL/A-2  
ACTIVATION CROSS SECTION LIBRARY**

**St. Petersburg, Russia  
25 to 27 June 1995**

hosted by the V.G. Khlopin Radium Institute  
St. Petersburg, Russia

**SUMMARY REPORT**

Prepared by

A.B. Pashchenko  
IAEA Nuclear Data Section  
Vienna, Austria

February 1996

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**IAEA NUCLEAR DATA SECTION, WAGRAMERSTRASSE 5, A-1400 VIENNA**

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**ABSTRACT**

FENDL/A is a nuclear data library of neutron activation cross-sections prepared for use in nuclear fusion reactor development. The present report contains recommendations for the creation of a second improved version of FENDL/A, including a list of 400 neutron reactions to be considered with priority.

February 1996

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## 1. Introduction

The Advisory Group Meeting (AGM) on "Improved Evaluations and Integral Data Testing for FENDL" held in Garching, 12-16 September 1994, organized the procedure by which the final FENDL/A-2 library will be selected. This procedure included a schedule for submission of candidate evaluations and associated documentation, nomination of experts to be members of the selection panel, and preparation of the comparison plots for the selection panel members showing the available evaluations and experimental data for important reactions (see report of the Working Group IV on Activation in INDC(NDS)-312, December 1994). It was agreed that the selection panel will review the data and through discussion between its members (via e-mail) reach consensus wherever possible, about the choice of evaluations for two parts of the library: the first for the important reactions, and the second for the remainder of the library (the "base library").

## 2. Membership of Selection Panel

According to the recommendation of the Garching meeting the following scientists were nominated as members of the selection panel:

* H.K. Vonach, IRK, Vienna	<VONACH@PAP.UNIVIE.AC.AT>
* J. Kopecky, ECN, Petten	<KOPECKY@ECN.NL>
* Y. Ikeda, JAERI, Tokai-mura	<IKEDA@FNSHP.TOKAI.JAERI.GO.GP>
* S. Iwasaki, Tohoku Univ., Sendai	<IWA@MINE.NUCL.TOHOKU.AC.JP>
* A. Ignatyuk, IPPE, Obninsk	<IGNATYUK@CJD.OBNINSK.SU>
* V. Manokhin, CJD, Obninsk	<MANOKHIN@CJD.OBNINSK.SU>
* D.L. Smith, ANL, Argonne	<B18245@ANLVM.CTD.ANL.GOV>
* F.M. Mann, WHC, Richland	<V92515@FEP1.RL.GOV>

## 3. Organization of the Meeting and Results

The adhoc Consultants' Meeting (CM) of several selection panel members was organized in conjunction with the IAEA Research Co-ordination Meeting (RCM) on "Activation Cross Sections for the Generation of Long-Lived Radionuclides" held in the same place, St. Petersburg, from 19-23 June 1995. The selection panel members from each region (Europe, Japan, Russia and U.S.A.) participated in the CRP meeting. J. Kopecky, ECN, Petten, representing the European Activation File, EAF-4, was selected to be the chairman of the meeting. The list of participants and the meeting agenda are given below as Attachments 2 and 3, respectively.

The IAEA/NDS provided figures of all important reactions on the Priority 1, 2 and 3 lists showing evaluations and experimental data. The committee members went through the available plots and judged each reaction from the selection list in order to reduce the number of candidates for each file to results which met selection criteria. The progress report prepared at the meeting is given in Attachment 1 below. It was emphasized that the ability to discuss each file and data set, to share knowledge and reasoning behind each decision in brief discussion could only have been accomplished in such a meeting; such an interaction would

not have been possible by electronic media. Recommendations from this CM have been summarized by J. Kopecky after the meeting and distributed in a tabulated form to all panel members by 17 July 1995 (see pp. 11-24). Following the recommendation at the Garching 1994 Meeting, the selection processes will be finalized at the next FENDL AGM scheduled to be held in Del Mar, USA, in December 1995.

#### **4. Acknowledgements**

The participants wish to thank the Agency for focusing much needed attention on the selection of evaluations for FENDL/A-2 activation cross section library discussed here and wish to thank Drs. A.A. Rimski-Korsakov and A.A. Filatenkov of the V.G. Khlopin Radium Institute, St. Petersburg, for the efficient organization of the meeting and for the warm hospitality extended to its participants.

The participants very much hope that the recommendations of this meeting may be acted upon by the Agency in development of improved FENDL-2 data base for the mutual benefit of its Member States.

***IAEA Consultants' Meeting on "Selection of Evaluations for the FENDL/A-2  
Activation Cross Section Library"***

held at the V.G. Khlopin Radium Institute  
St. Petersburg, 25-27 June 1995

M. Blann, A. Ignatyuk, Y. Ikeda, J. Kopecky, V. Manokhin  
A. Pashchenko, D. Smith, H. Vonach

**PROGRESS REPORT**

A subgroup of the FENDL/A-2 selection committee including several advisors met in St. Petersburg, Russia, 25-27 June 1995 in order to make recommendations for selection of evaluations for the FENDL/A-2 file from approximately 400 neutron induced reactions in the 0-20 MeV energy range. The site and time were chosen because several members of the selection committee were present on the occasion of the IAEA CRP on cross sections of long lived isotopes of interest to fusion reactor design. While the overwhelming committee preference was to perform the task with the whole committee present, budget constrictions dictated this compromise. The meeting agenda and the list of participants are given below as Attachments 1 and 2, respectively.

The IAEA/NDS provided figures of all reactions on the Priority 1, 2 and 3 lists showing evaluations and experimental data. Only Priority 1 and 2 were considered at this meeting due to time constraints. An attempt will be made to do Priority 3 plots by e-mail. The tremendous effort of Ms. Baguer Perez in producing the vast number of figures is deeply appreciated by members of this committee.

The panel followed the procedure agreed upon in Garching (see INDC(NDS)-312, December 1994) which was to go through the available plots in order to reduce the number of candidates for each file to results which met selection criteria. The ability to discuss each file and data set, to share knowledge and reasoning behind each decision in brief discussion could only have been accomplished in such a meeting; such an interaction would not have been possible by electronic media.

The committee judged each reaction on the selection list through careful discussion. For those reactions for which experimental data exist, the exclusive versus inclusive nature was considered (e.g. were particle spectra or activation yields measured experimentally). When conflicts were found between different experimental data sets, they were discussed with respect to experimental techniques used and the state of the art existing at the time of experiment. A list discussing each reaction of priority 1 and 2 with suggestions for reasons of choice was prepared just prior to the meeting by Don Smith. These suggestions were one of the very valuable considerations used in the goal of reducing a number of candidates for the FENDL/A-2 file to evaluations which were consistent with selection criteria.

The existing evaluations were considered first with respect to the experimental data base, using evaluations cognizant of nuclear models to guide shapes of excitation functions between and beyond experimental points. On this basis the committee members discussed and then recommended those evaluated files which were judged equally reasonable for each reaction, rejecting results adjudged to be inconsistent with the experimental results.

There were many reactions for which no experimental data points existed. In these cases careful discussions were made on expectations due to systematics and on results of analogous reactions on neighboring isotopes. Additionally, model guided evaluations were used in arriving at final recommendations. For all cases, notes were made on criteria for the recommendations made. For a number of cases high quality evaluations have been identified which will become available in the near future. The committee recommends that these evaluations be considered either in the final selection process or, if not available in time, in later improvements of FENDL/A-2.

For a few cases some evaluations had been omitted from the figure sets used for selection, or minor ambiguities were noted in preparation of the figures. For these cases, action was deferred pending correction and clarification. Recommendations from this meeting have been prepared and summarized by J. Kopecky and distributed in a tabulated form to all panel members by 15 July 1995 (see Appendix in Attachment 1, below). All comments and recommendations on these should be sent to F. Mann for receipt by 1 September 1995 with a copy to A. Pashchenko, who will distribute copies to all panel members. Due to the change of date of the FENDL meeting at Del Mar from 1 October to the beginning of December 1995, the committee suggests deferring actions **d** (due 15 July) and **e** (due 1 August) of the Garching meeting action list (see INDC(NDS)-312, December 1994) until 1 September and 1 October, respectively. A similar change is suggested for the time scale of base library selection, deferring action **b** (due 1 July) and **c** (due 1 September) until 1 August and 1 October, respectively.

The goal of this committee is to produce FENDL/A-2 as a significant improvement of FENDL/A-1. The committee is very confident that this goal has been achieved through the incorporation of many new evaluations originated from ADL-3, JENDL-3.2, EAF-4 and some special evaluations. The ability to meet and share knowledge between panel members was, we emphasize again, an extremely valuable reason for the success we are confident we have achieved in this exercise. It would be extremely valuable to assemble all members of this selection committee at the Del Mar meeting to finalize this work. In addition to the files submitted to improve FENDL/A-1, a number of cases have been identified for which additional improved files should be prepared.











































