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INTERNATIONAL NUCLEAR DATA COMMITTEE

COORDINATION OF THE
INTERNATIONAL NETWORK OF NUCLEAR STRUCTURE
AND DECAY DATA EVALUATORS

Summary Report of a Consultants' Meeting
organized by the International Atomic Energy Agency
and held at the Fachinformationszentrum in Karlsruhe, FRG,
3-6 April 1984

Edited by A. Lorenz
Nuclear Data Section
International Atomic Energy Agency

September 1984

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

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ABSTRACT

The IAEA Nuclear Data Section convened the sixth meeting of the international nuclear structure and decay data network at the Fachinformationszentrum Karlsruhe in the Federal Republic of Germany, 3 - 6 April 1984. The meeting was attended by 22 scientists from 10 Member States and one international organization, concerned with the compilation, evaluation, and dissemination of nuclear structure and decay data.

FOREWORD

The international nuclear structure and decay data (NSDD) network, consisting of numerous evaluation groups and data service centres, aims at a complete and continuous nuclear structure data evaluation of all isobaric mass-chains on a six-year cycle, the continuous publication of these evaluations and their dissemination to the scientific community. The evaluated mass-chain data resulting from this concerted international effort are published in Nuclear Physics A and the Nuclear Data Sheets, and comprise the currently recommended "best values" of all nuclear structure and decay data. The international NSDD network has evolved from the pioneering work in the late forties and early fifties by physicists from the California Institute of Technology (Pasadena), the Rijksuniversiteit at Utrecht (Netherlands) and the Nuclear Data Group (Washington and Oak Ridge). The United State effort is presently coordinated by the US Nuclear Data Center at the Brookhaven National Laboratory.

Periodic meetings of this network have the objectives to maintain the coordination of all centres and groups participating in the compilation, evaluation and dissemination of NSDD, to maintain and improve the standards and rules governing NSDD evaluation, and to review the development and common use of the computerized systems and data bases maintained specifically for this activity.

DEFINITION OF TERMS

Nuclear Structure Data: numerical values of nuclear level structure and decay parameters and associated atomic parameters of pertinence to nuclear physics techniques and methods.

Tabulation: systematic collection and transcription of numerical information without critical selection or manipulation.

Compilation: systematic collection and transcription of information on a given subject with collation and re-organization for optimal presentation to the users.

Evaluation: critical appraisal of all available information compiled on a given subject and derivation of consistent best or preferred values with their uncertainties.

Mass-chain (vertical): pertaining to properties of nuclides with a given mass number.

Selected (horizontal): pertaining to a particular nuclear property or properties for a range of nuclides.

List of Abbreviations

CAJaD	Centre for Data on the Structure of the Atomic Nucleus and Nuclear Reactions of the USSR State Committee on the Utilization of Atomic Energy, located at the Kurchatov Institute in Moscow.
CBNM	Central Bureau for Nuclear Measurements, located at Geel, Belgium.
CODEN	International code for the abbreviation of periodical titles used by ASTM, INIS and Chemical Abstracts.
CPND	Charged Particle Nuclear Data.
EBCDIC	Extended binary-coded decimal interchange code.
ENSDF	Computer-based <u>E</u> valuated <u>N</u> uclear <u>S</u> tructure <u>D</u> ata <u>F</u> ile developed by US/NDP.
EXFOR	<u>E</u> xchange <u>F</u> ormat, internationally used format for the exchange of experimental nuclear reaction data.
FIZ	Fachinformationszentrum Energie, Physik, Mathematik GmbH, Eggenstein-Leopoldshafen, FRG.
IAEA/NDS	Nuclear Data Section of the International Atomic Energy Agency.
INDC	International Nuclear Data Committee.
INIS	International Nuclear Information System, operated by the IAEA, to replace Nuclear Science Abstracts.
KACHAPAG	Karlsruhe Charged Particle Group.
LIYaF	Leningrad Institut Yadernoy Fiziki: Data Centre of the Leningrad Nuclear Physics Institute of the USSR Academy of Sciences.
NSR	Nuclear Structure Reference (file).
NDS	Nuclear Data Sheets.
NSDD	NSD data = Nuclear Structure and Decay Data.
US/NNDC	US National Nuclear Data Centre, located at the Brookhaven National Laboratory.
US/NDP	Nuclear Data Project located at the Oak Ridge National Laboratory.

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I. MEETING SUMMARY

A. Introduction

The sixth Advisory Group Meeting on Nuclear Structure and Decay Data (NSDD) was convened by the IAEA Nuclear Data Section at the Fachinformationszentrum Karlsruhe in the Federal Republic of Germany, 3 - 6 April 1984. The meeting was attended by 22 scientists from ten Member States and one international organization, representing centres and groups concerned with the compilation, evaluation and dissemination of nuclear structure and decay (NSD) data. The list of participants is given in Appendix 1.

The meeting was conducted in two separate sessions: the morning sessions, devoted to the coordination of the NSDD network of centres and groups, were chaired by A. Lorenz; the afternoon sessions, devoted to physics questions related to the evaluation of NSDD, were chaired by M. Martin. The Adopted Agenda is given in Appendix 2, and the list of papers submitted to the meeting by the participants is given in Appendix 3. None of the papers submitted to the meeting are included in this report; they can be obtained on request from the Nuclear Data Section. The actions which resulted from this meeting are listed in Appendix 4.

B. Objectives

The international NSDD Network, consisting presently of 17 evaluation groups in 11 Member States and 2 international data service centres, aims at a complete and continuous nuclear structure data evaluation of all isobaric mass-chains on a six-year cycle, the continuous publication of these evaluated data in the Nuclear Data Sheets and Nuclear Physics A journals, and their dissemination to the scientific community. This international cooperative effort is coordinated by the Nuclear Data Section of the IAEA.

The periodic meetings of the international NSDD network have the objectives to maintain the coordination of all centres and groups participating in the compilation, evaluation and dissemination of NSDD, to maintain and improve the standards and rules governing NSDD evaluation, and to review the development and common use of the computerized systems and data bases maintained specifically for this activity.

All members of the international NSDD network are referred to in the text of this report by their identification code agreed at the May 1976 NSDD meeting. A current list of these centres, together with their codes and addresses, is given in Appendix 5.

II. MEETING PROCEEDINGS

A. Meeting organization

The meeting was conducted in two separate sessions: the morning sessions, devoted to the co-ordination of the NSDD network of centres and groups, were chaired by A. Lorenz; the afternoon sessions, devoted to physics questions related to the evaluation of NSDD, were chaired by M. Martin. The Adopted Agenda is given in Appendix 2, and the list of papers submitted to the meeting by the participants is given in Appendix 3. Part of the afternoon of Wednesday, 4 April, was used to visit experimental facilities of the laboratory.

B. Review of Actions from last meeting

The May 1982 Meeting Actions were reviewed. For the full text of these actions, the reader is referred to Appendix 4 of the 1982 NSDD Meeting Report (INDC(NDS)-133/NE). Some of the actions from previous meetings were adopted as continuing actions and are included in this meeting's List of Actions, Appendix 4.

C. Short Reports from NSDD Network Members

Status reports made by the members of the NSDD Network can be obtained from the Nuclear Data Section on request. The following reports were presented:

1. Status Report from Utrecht. Netherlands. P.M. Endt and C. Van der Leun.
2. Status Report from Belgium. D. De Frenne, E. Jacobs.
3. Status Report from France. J. Blachot.
4. Status Report. Nuclear Structure Evaluation in Canada. M. Johns.
5. Status Report. United Kingdom. N.J. Ward, P.D. Forsyth and P.J. Twin.
6. Status Report: Kuwait Nuclear Data Group. D. Viggars and B. Singh.
7. Progress Report from Sweden. P. Eckström.
8. Statement on CBNM Activity in Evaluation and Compilation of Decay Data. W. Bambynek.
9. Status Report. Fachinformationszentrum Energie, Physik, Mathematik GmbH, Karlsruhe. H. Behrens, H.-W. Müller, T.W. Tepel.
10. U.S. Contributions to International Co-operation in the Evaluation of Nuclear Structure Data. J. Tuli and M. Bhat.
11. Status Report on Japanese Activities in Nuclear Structure and Decay Data. T. Tamura.
12. Report from the USSR Groups. F.E. Chukreev.

D. Status of the NSDD Evaluation Effort

In the A-Chain evaluation projections for 1983 (NS/1A-46 of Feb. 1, 1983) the NSDD network evaluators planned to complete 44 mass-chains. The number of evaluations finished in 1983 was only 18. This low rate of evaluations was of serious concern to the NSDD network.

In the mass region A=45-263, the 1983 production rate of 18 evaluations/year implies about a 12 year cycle time. This is too long and is unacceptable to the Nuclear Data Sheets journal and the ENSDF users. A cycle time of 6 years or less with a production rate of at least 36 mass-chains/year is desirable.

If the present low rate of production of mass-chain evaluations continues, there may be serious and detrimental consequences to the entire evaluation effort. Some of these are:

- a) Loss of support to the evaluation effort from the basic and applied user community.
- b) Possible demise of the Nuclear Data Sheets journal (NDS).
- c) Loss of good quality evaluators in the NSDD Network due to (a) or (b) above.

D.1. Mass-chain evaluation status

The mass-chain evaluation status, as of 15 March 1984, is given in Tables I and II. Table I shows an overview of those mass-chains which have been published, submitted for publication and/or reported to be in progress, during 1980-1983. Table II gives the number of mass-chains which have been completed, are in progress, or not being evaluated in the last five-year period.

D.2. Mass-chain evaluation procedure

M. Bhat from the US/NNDC reported on the time it takes currently to process A-chains. The various steps for processing A-chains and the average time taken is shown in Table III. It was agreed by everyone that an improvement in the efficiency of these procedures was necessary in order to maintain an acceptable publication schedule.

A proposal to omit step 2 in the procedures (see Table III), was accepted. This would in effect mean that

"Each A-chain evaluation manuscript will be sent to the reviewer at the same time as it is sent to the evaluator, unless the evaluator wants to see it before it goes to the reviewer".

This would save at least one month in the processing time and two weeks "in transit" (mail) time.

TABLE III

Steps for Processing A-Chains

	<u>Elapsed Time (months)</u>	
1. Prepare pre-review copy (NNDC)	2	
2. Evaluator corrections	1	
3. Prepare review copy (NNDC)	1	
4. Review	2	
5. Post-review corrections by evaluator	1	
6. Prepare galley (NNDC)	1	
7. Editor-in-Chief Review	0.5	
8. Prepare Final Copy (NNDC)	0.5	
9. Time Spent in Transit (8x1 week/transit)	<u>2</u> (USA)	<u>3</u> (Foreign)
	11	12
	==	==

D.3. Processing of A-chain Evaluations

In order to facilitate the processing of mass-chain evaluations and expedite their publication, the NNDC has made available to the NSDD network a number of codes to check for format and physics errors, to obtain plot and tabular representation of data and do the physics analysis related to evaluations. If the evaluators cooperate and use these codes, and the evaluations submitted are with a minimum of format and physics errors they can be processed quickly. Prompt review of the evaluations would also reduce the time needed for their publication. It would also be helpful if more of the experienced evaluators volunteer to review the mass chains.

The following evaluator manuals have been completed and distributed to the network:

- Minimum Standards
- Guidelines for Evaluators
- The ENSDF Coding Manual
- The NDS Style Manual

The following checking programs are now available from US/NNDC to the evaluators, which should help reduce the time it takes to prepare the review copy (see Table III):

- FMTCHK - Format check code
- PANDORA - Physics check code
- PREND - Code to plot ENSDF data sets
- TREND - Code to produce tables from ENSDF data sets

The documentation of programs FMTCHK and PANDORA (BNL-33479 report) was distributed by US/NNDC in August 1983 as part of Memorandum NS-1A/-54.

All evaluators were reminded to identify their mass-chain evaluations, and to include the "Transmittal Form", when sending their evaluations to US/NNDC. In addition, an "Evaluator Check List", designed to speed up the processing of individual evaluations, was distributed to the meeting participants.

In order to improve the efficiency of the evaluation process it was strongly recommended that

"All new evaluators should be sent to an established centre for an extensive training session".

D.4. Publication of mass-chain evaluations

- A = 1 - 4 Presently not published, but partial evaluations included in ENSDF.
- A = 5 - 10 Published in Nuclear Physics A413(1984)1-214, January 1984. F. Ajzenberg-Selove evaluator.
- A = 11 - 12 Published in Nuclear Physics A336(1980)1-154, February 1980. F. Ajzenberg-Selove and C.L. Busch evaluators.
- A = 13 - 15 Published in Nuclear Physics A360(1981)1-185, May 1981. F. Ajzenberg-Selove evaluator.
- A = 16 - 17 Published in Nuclear Physics A375(1982)1-168, February 1982. F. Ajzenberg-Selove evaluator.
- A = 18 - 20 Published in Nuclear Physics A392(1983)1-126, January 1983. F. Ajzenberg-Selove evaluator.
- A = 21 - 44 Published in Nuclear Physics A310(1978)1-752. P.M. Endt and C. Van der Leun evaluators. A new evaluation of this A-range is in preparation and is planned to be published in 1985.
- A = 45 - 263 Published in the Nuclear Data Sheets journal. Evaluations performed by members of the International Network of NSDD Evaluators. Current status shown in introductory section of each issue of Nuclear Data Journal.

A retrospective summary of mass-chains published since the beginning of 1978 is given in Table IV below.

D.5. Mass-Chain Evaluation Assignments

The current mass-chain evaluation assignment is shown in Table V. The mass-chain evaluation projections of $A \geq 45$, is shown in Table VI.

D.6. Evaluation Priorities

It was agreed that evaluation priorities (i.e., which mass-chains are to receive priority in recycling) will be determined by the individual centres on the basis of the number of primary and secondary references added to the NSR File since last evaluation. This information is sent twice a year by NNDC to all network members (last such distribution was sent in February 1984, J.K. Tuli Memo NS/1A-66).

E. Status of the Nuclear Structure Reference (NSR) File

- E.1. The NSR Coding Manual draft, dated February 1984, was distributed to the meeting participants.
- E.2. The clean-up of the NSR file is not done systematically because of lack of manpower. Duplications are removed as they are noticed. It was requested that all evaluators identify those references, encountered in the evaluation process, which are superseded and report them to US/NNDC. This instruction is to be included in the "Guidelines for Evaluators".
- E.3. In order to improve the information content of "Private Communications" it was requested that the originator's laboratory/institute affiliation be added to "Private Communications" when sent in to US/NNDC.
- E.4. It was announced that an updated issue of the "Integral Charged Particle Bibliography" will be published as a BNL report in Recent Reference format.

F. Status of the Evaluated Nuclear Structure Data File (ENSDF)

F.1. ENSDF Coding Manual

A manual for the preparation of data sets for input to ENSDF was distributed as report BNL-NCS-51655 (March 1983) in the course of 1983.

F.2. ENSDF Formats and Procedures

The Ad Hoc Subcommittee of USNDN on ENSDF Formats and Procedures (Members: M.J. Martin, NDP; J.K. Tuli, NNDC; R. Firestone, LBL; C.W. Reich, INEL; R.R. Kinsey, NNDC) made a number of recommendations relating to mass chain evaluations at its meeting at Berkeley, CA (May 17-19, 1983) and at Oak Ridge, TN (Nov. 15-16, 1983). The excerpts from the minutes of the Berkeley meeting were distributed to NDN members

(see M.J. Martin, J.K. Tuli memo NS/1A-55 dated September 20, 1983). The minutes of the Oak Ridge meeting were distributed to the network members in March 1984. Paper 84/20 summarizes some of the recommendations of the USNDN formats and procedures subcommittee. Various items in this document were discussed one by one and their disposition is given in Table VII.

The Format and Procedures (F&P) subcommittee of USNDN at its Oak Ridge meeting suggested some changes in the presentation of tabular data in NDS (see p. 5 of Oak Ridge meeting minutes). NNDC has been requested to produce some sample pages in this regard. A recommendation, if any, will be made only after perusal of the sample pages.

Please note that the next meeting of the F&P subcommittee of USNDN will take place at BNL on Sept. 18-19, 1984 and non-US members of NSDD are invited to attend the meeting as observers (see M. Bhat Memo NS/1A-58).

F.3. Content status of ENSDF

At the 1982 NSDD meeting an action was initiated to merge the A = 5-44 evaluations into ENSDF (see INDC(NDS)-133, p.18). The status of this project is as follows:

- A = 5-10 US/NNDC. Expected completion in September 1984.
- A = 11-12 US/NNDC.
- A = 13-24 US/NDP. Expected completion in summer 1984.
- A = 25-26 Has been done by B. Ewbank.*
- A = 27-28 Responsibility of UK/Liverpool, but will be done by FR/Grenoble.
- A = 29-32 Has been done by FR/Grenoble.
- A = 33-44 Is to be done by FRG/FIZ, but not during the next two years.

* The mass-chain data converted to ENSDF format by B. Ewbank included data for A = 21-26. P.M. Endt and C. van der Leun have agreed to check the converted data.

See Action # 16

F.4. ENSDF and the user community

In response to some comments received from the user community, the network underlined that ENSDF is a source file which is used primarily for the production of the Nuclear Data Sheets journal publications.

In addition to its primary function, ENSDF can be used by individual centres to produce other compilations (e.g., through the code MEDLIST) for specific user applications. The principal concern of the international NSDD network is to produce a source file (i.e. ENSDF) that is as complete and up-to-date as possible so as to serve as the basic reference for nuclear structure and decay data.

F.5. ENSDF Clean-up

The proposal for the ENSDF cleanup, described in J.K. Tuli's memo NS/1A-63, was discussed and approved. It was decided that members of network with permanent assignment of A-chains will check parts of ENSDF covering A-chains of their responsibility. The marked up listing, or corrected files, will be sent to NNDC for inclusion of changes in the master file.

See Action # 13

G. Status of NSDD Processing Computer Programs

G.1. The ENSDF Computer Program Status, as of March 1984, is shown in Table VIII.

G.2. The computer programme RULER, under development at US/NNDC, is designed to calculate reduced transition probabilities from data contained in files conforming to legal ENSDF formats; it is primarily designed for use with ADOPTED LEVELS and GAMMA data sets, but will process any data set whose DSID indicates that gammas are present in the data set. A brief description of RULER is given in Paper 84/24.

G.3. The new version of the MEDLIST program is called MEDNEW which transforms ENSDF data into ENDF format in addition to the usual MEDLIST output.

G.4. In response to a recommendation by the US National Academy Panel on Basic Nuclear Data Compilations, the LBL Isotopes Project (US/LBL) has started to implement a procedure by which users at remote sites may access the LBL-Nuclear Structure Numerical Database. Currently this Database contains information from ENSDF for isotopes with masses $A = 200-263$. A description of this procedure was distributed at the meeting and is available on request from US/LBL.

H. NSDD Data Centre Services

H.1. Distribution of the ENSDF file

It was agreed that in the distribution of ENSDF updates, only the changed DATASETS will be transmitted, rather than the whole A-chain. Those who receive the complete file at every update will continue to do so. The version of the distributed ENSDF file is identified by the month and year of its distribution.

H.2. Referencing the ENSDF file as a reference

In order to allow for a universally accepted manner in which ENSDF users should reference the ENSDF file, or selected information contained in ENSDF, the network adopted at their April 1980 Meeting (INDC(NDS)-115) "Reference Guidelines for ENSDF", and suggested that these guidelines be sent together with ENSDF retrievals or transmissions to all ENSDF requestors.

The network re-emphasized these procedures in the form of the following suggestions:

"Referencing procedures should be sent to everyone who receives the ENSDF file, or an output from ENSDF".

"Recipients who quote the ENSDF file or selected output from the file, in publications, should reference it properly using the established guidelines."

The network suggested to the US/NNDC centre that ENSDF be included as an author in the Science Citation Index.

I. NSDD Publications

I.1. Nuclear Data Sheets

- The network expressed great concern about the significant drop in subscriptions to the Nuclear Data Sheets Journal. In an effort to give this journal more publicity, the network recommended that a pamphlet, advertising the availability of nuclear structure data, be produced by the network. US/NNDC agreed to produce a draft of a pamphlet and circulate it to the network.

Action # 14

- US/NNDC was asked to distribute the latest statistical information on the publication of the NDS journal to the Network.

Action # 15

- It was suggested that the NDS journal be advertised in the Zeitschrift für Physik journal.
- It was also concluded that the NDS journal should not be diluted by horizontal compilations.

I.2. Radioactivity Handbook

The status of the Radioactivity Handbook, as described in paper 84/29 "Report on Radioactivity Handbook Progress" November 1983, by R.B. Firestone and E. Browne, was reported on by J. Dairiki (US/LBL). The Handbook is expected to be published in the Spring of 1985. It will contain information with a cut-off date of August 1984, and will have approximately 1000 pages. Although some members expressed a preference to include decay schemes in the Handbook, the consensus among members of the Network was that no decay schemes be included in the Handbook if it was going to delay its publication.

I.3. Wallchart

The latest "Chart of the Nuclides" has been published by the General Electric Company in the Spring of 1984. The sales price of the GE 1984 Wallchart is US \$ 7.00, the book version costs US \$ 8.00. Although only a very limited number of copies have been given by GE to US/NNDC for free distribution, it was suggested that larger numbers of copies could perhaps be obtained on the basis of distribution for educational purposes.

The COMPUTOPE wallchart generated by computer at US/NNDC from their data files is available on microfiche from US/NNDC on request. An enlarged print of each box with additional data is also available.

I.4. Wallet Cards

A revised issue of Nuclear Wallet Cards is expected to be produced by US/NNDC, and will be available for free distribution.

I.5. Bibliography of Evaluation

FRG/FIZ is preparing an up-to-date revision of their report "Data Compilations in Physics".

I.6. Horizontal Compilations

In addition to the discussions on horizontal compilations described under Section I below, the following two specific horizontal compilations were announced .

- "Thermal Neutron Capture Gamma-Rays", J.K. Tuli, January 1983, BNL-NCS-51647 report.
- A compilation of delayed neutron properties in the proceedings of the Specialists' meeting on Fission Product Yields and Decay Data, October 24-27, 1983, at the Brookhaven National Laboratory (to be published).

I.7. Use of Keywords in Nuclear Physics Journals

In view of a recently adopted policy by the Physical Review C journal to eliminate "keywords abstracts", the meeting decided to send a letter signed by P.M. Endt to the Nuclear Physics Division of APS to reconsider its decision regarding the keywords abstracts and reinstate their inclusion in Physical Review C articles. The replies received subsequently from H.H. Barschall, Physical Review C, Editor, and E. Hayward, Vice-Chairman of the American Physical Society, imply a negative response.

However, in their reply, Prof. Endt was informed that the Physical Review C has adopted the following policy: at the time a paper is accepted, a keyword form is sent to the author with a request that he fill it out and return it to the Brookhaven Data Centre (US/NNDC). These forms are being prepared by the Brookhaven Data Center. The package consists of three sheets and a return envelope. The first sheet is a letter urging the author to co-operate, the second is the form itself, and the third is an example illustrating how to fill it out.

In addition, the network asked IAEA/NDS to write to editors of nuclear physics journals to include keyword abstracts in published nuclear physics papers.

See Action # 3

J. Physics of NSDD Evaluation

Discussions were held on the following topics:

J.1. Consideration of horizontal compilations

Conversion Coefficients

Paper 84/1, submitted by H. Behrens, points out that all presently existing tables of Hager and Seltzer, Band and Trzhashovskaya and of Rösler et al. based on calculations using different approximations are of comparable quality from the theoretical point of view. A considerable improvement would only be achieved by including exact Hartree-Fock calculations.

The following conclusions were drawn:

Although the Rösler tables cover a larger scope (larger Z-range, more shells) than the Hager and Seltzer tables, it was decided to keep the whole package (Hager/Seltzer + Dragoun + Band tables of $Z \leq 30$) presently used for the NDS evaluation, until newer tables based on exact Hartree-Fock calculations will be available.

It was recommended to contact appropriate persons (Rösel or others) who would be able to perform such calculations.

See Action 12

EO Transitions

The method for handling EO transition probabilities in ENSDF, as proposed by R.B. Firestone (US/LBL) in Paper 84/26, was adopted.

Atomic Masses

The latest mass adjustment by Wapstra is to be published, probably in Nuclear Physics. Tuli will send each center a tape copy of the adjustment when he receives it from Wapstra. The new adjustment should be used when it becomes available. It was also recommended that the mass tables be used to obtain extrapolated Q values for those nuclides in the mass chains for which no systematic value is given in the mass adjustment.

See Action 11

Ratio of reduced matrix elements

The horizontal compilations of Krane were discussed. It was recommended that these compilations should be incorporated, where possible, into the mass chain evaluations. At the very least, they are a good summary of data available at the time of publication.

Effective fluorescence yields ω_K , ω_L

Bambynek (CBNM) reported that a new review of ω_K values will soon be available. There are no plans to report on ω_L values.

J.2. ENSDF and Evaluation Procedures

Discussion of P. Ekström Memorandum (Paper 84/27)

Several of the points raised in this memo were addressed in the morning session. The suggestions that data sets should be run through MEDLIST to check the energy balance will be added to the manual, Guidelines for Evaluators. The new ENSDF manual defines the default options on the normalization records. BNL can provide a complete list of the valid parameter values for the SELECTRS field. The tables for J_π assignments produced in A=59,61 by the Lund group met with favorable comment.

It was recommended that other centers experiment with such a table.

Guidelines for Evaluators

The revised version of the Guidelines for Evaluators was presented by Martin (US/ORNL). After some discussion the document was accepted. There will be some minor revisions and corrections made, and a final version will be issued in summer 1984.

J.3. Considerations regarding the NDS journal

RUL: It was agreed that the abbreviation, RUL, will be used for Recommended Upper Limit on gamma-ray reduced transition probabilities and so defined in the abbreviation section of the Nuclear Data Sheets.

A revised version of symbols and abbreviations was submitted by US/NNDC for comment. Several changes and additions were suggested, and the final version will appear in subsequent issues of the Nuclear Data Sheets.

$J\pi$ Assignments: It was recommended that the section on Arguments for $J\pi$ assignments in the introduction to the Nuclear Data Sheets should be prefaced by a statement that the section does not exclude the use of other rules.

ENSDF Cleanup: It was agreed that memo NS/1A-63 on this topic is adequate and would be adopted.

J.4. Referencing

Unassigned keynumbers

When an evaluator wishes to use a reference for which a keynumber has not yet been assigned, the evaluator can assign a temporary keynumber in the standard notation but with the last two characters chosen to be AA, AB, etc. (see J.K. Tuli, Memo NS/1A-36). Copies of the documents, with this dummy keynumber assigned, should be sent to BNL. When a regular keynumber is assigned, the replacement (84MEAA, 84MEZX or 84ME21, for example) will be made automatically.

Private Communication References

BNL was requested to look into the possibility of including the following two additional pieces of information in the citation:

- a. Author's affiliation
- b. Person to whom private communication was sent

K. Next NSDD Meeting

The next meeting of the NSDD network was suggested to be held in close time proximity to the 1986 International Nuclear Physics Conference, at the end of June or first week of July. Grenoble was suggested as the place of the meeting. It was also recommended that the meeting be extended to five days, and include an "evaluator's workshop".

TABLE I

STATUS OF MASS-CHAIN EVALUATIONS

April 1, 1984

A Mass-Chain Published
 (A) Mass-Chain Submitted for Publication
 [A] Mass-Chain Evaluation in Progress

Nuclear Data Sheet issue date
 * Temporary assignment

Center	Assignment	1980#	1981#	1982#	1983#
BNL	136-145, 45*, 48*, 50*, 53*, 57*, 58*, 146*, 148*, 150*	145	139	138	137, (45), (50), (55), (58), (146), (148), [48], [53], [57], [150]
INEL	153-162	158		153	157, (161), [160], [162]
LBL	167-194	152, 163, 191, 185, 188, 189, 193		169, 187, 190	(171), (174), (181), (192)
ORNL	195-237, 239, 241, 243, 245-263	106, 115	107, 197, 210, 243 245-263	108, 232, 236	(198), (230), (231), (234), (235), (239), [207], [208], [241]
U of Penn	5-20	11, 12,	13-15	16-17	18, 19, 20, 5, 6, 7, 8, 9, 10, [11], [12]
UK	65-73, 165*	72, 73	68, 75	69	66, 67, [65], [165]
Kuwait	74-80	77	78	79, 80	(76), [74]
FRG	81-100	85, 91, 92		96	95, 98, [82], [93], [94], [97]
FR-BLG	101-117	106, 112, 115	107, 116	102, 114	110, (104), (109), [103], [105], [111], [117]
Japan	118-129	123	125	126, 127	128, 129, (124), [118], [120], [122]
USSR	1-4, 130-135, 164, 166, 238, 240, 242, 244		1, 3, 4, 134, 244		238, (240), (242), [164], [166]
Sweden	113*, 59-64		113		59, 61, [60]
Canada	149, 151				[149]
The Nether- lands	21-44				Done 1978, scheduled for publication 1984
China	51*, 54-56*				[51], [54], (55), [56]

TABLE II
STATUS OF MASS-CHAIN EVALUATION
(April 1, 1984)

<u>Center</u>	<u>Assigned</u>	<u>Number of Mass-Chains</u>						<u>In Progress or Reviewed in 1983</u>	<u>Older Than 1978 from Present Assignment</u>
		<u>1978</u>	<u>1979</u>	<u>Published</u>		<u>1982</u>	<u>1983</u>		
				<u>1980</u>	<u>1981</u>				
BNL	10+9*	3	3	2	1	1	1	9	0
INEL	10	0	2	1	0	1	1	3	2
LBL	28	0	0	3	4	3		4	16
ORNL	65	20	18	2	23	3		9	13
UP	16	3	6	2	3	2	9	2	0
<u>Non-US Centres</u>									
UK	9+1*	1	1	2	2	1	2	2*	0
Kuwait	7	0	0	1	1	2	0	2	0
FRG	20	1	2	3	0	1	2	4	7
France/Belgium	17	-	3	2	2	2	1	6	0
Japan	12	0	2	1	1	2	2	4	0
USSR	16	0	0	0	2	0	1	4	5
Sweden	6	-	-	0	1	0	2	1	0
Canada	2	-	-	-	-	0		1	1
Utrecht	24	24	-	-	-			-	0
China	4*	-	-	-	-	0		4	0
								Total	44
									=====

Mass-Chains unassigned and not being worked on: 46, 47, 49, 52, 152, 163

* Temporary assignment

TABLE IV

Retrospective Summary of Mass-Chains published since 1978
 (Statistics as of March 15, 1984)

Year of Publication	Year of Intitiation							Total number of A-chains published
	1978	1979	1980	1981	1982	1983	1984*	
1978	12							12(e)
1979	15	12						27
1980		14	1					15
1981	1	2	9(a)	8(b)				20
1982		1	3	8	2(c)			15
1983				4	6	2		12(f)
unpublished					2	16(d)	4	-
Total number of A-chains published								101
Total number of A-chains initiated	29	29	13	20	10	18	4	123

(a) 1 ME (243, 245)

(b) 1 ME (246-262 even) + 1 ME (249-263) odd

(c) 1 ME (232, 236)

(d) 1 ME (231, 235, 239)

(e) Actual number published is 25 (including 13 received prior to 1978)

(f) Actual number to be published is 16 (including 45, 198, 230 and 231-239)

* First three months only

Table V

Mass-Chain Assignment as of April 1984

<u>A-Range</u>	<u>Number of mass-chains</u>	<u>Responsible NSDD Evaluation Groups</u>
1 -4	4	USSR
5 -20	16	US/UP
21 -44	24	NED/UTRECHT
45 -58	14	US/NNDC
59 -64	6	SWD/Lund
65 -73	9	US/NNDC
74 -80	7	KUW/ISR
81 -100	20	FRG/FIZ
101-117	17	FR-BLG
118-129	12	JAP/JAERI
130-135	6	USSR
136-145	10	US/NNDC
146-148, 150, 152	5	Unassigned
149, 151	2	CAN/TAL
153-162	10	US/INEL
164, 166	2	USSR
163, 165	2	Unassigned
167-194	28	US/LBL
195-237	43	US/NDP
238, 240, 242, 244	4	USSR
239, 241, 243, 245	4	US/NDP
246-263	18	US/NDP

TABLE VI

Mass-Chain Evaluation Projections of $A \geq 45$
July 1, 1983

<u>Lab</u>	<u>Mass-chains projected for Completion</u>	<u>Total for 1983</u>	<u>Mass-chains received to date</u>
BNL	50, 58, 150(4, 83), 53, 57(8/83), 47, 51, 48, 142(84)	5	50, 58, 148
INEL (USA)	160(8/83), 161(9/83), 162(6/84), 155(7/84)	2	
LBL (USA)	192(1/83), 181(1/83), 174(6/83), 168, 171, 183(12/83), 178 or 186(84)	6	192
NDP (USA)	208, 198(3/83), 230(4/83), 231, 235, 239(6/83), 218, 214, 228, 224, 220, 216(9/83), 241, 226(1/84), 227, 223, 219, 215, 207, 205, 203(2/84)	9(FLE)*	230, 231, 235, 239, 198, 234
Liverpool (UK)	65(7/83), 67(83), 165(12/83 or 84)	3	67
Kuwait University	76(7/83), 74(3/84)	1	76
FIZ (FRG)	82, 93, 94, 97, 99	5	
CEA (France) + Gent (Belgium)	109(1/83), 111, 117(12/83), 101, 112, 115(84), 105(6/83), 106(84), 103 or 104 or 108(84)	4	109
JAERI (Japan)	124(1/83), 118, 120, 122(8/83), 177(83/84), 119, 121, 123(84/85)	4	124
CAJaD & LIYaF (USSR)	133(6/83), 135(12/83), 130, 131(84)	2	240
McMaster U. (Canada)	149(10/83), 151(84)	1	
Lund (Sweden)	59(5/83)	1	
CNDC (PRC)	55(1/83)	1	
		<u>44</u>	<u>13 (FLE)*</u>
		=====	=====

* FLE stands for a full-length equivalent mass-chain which
is considered to be about 80-90 pages of The Nuclear Data Sheets

TABLE VII

Changes in ENSDF Formats and Procedures

A. The following items were approved as proposed. See reference given for details of format or procedure change.

<u>Item # in 84/20</u>	<u>Format/Procedure</u>	<u>Reference</u>
1	Final level designator	NS/1A-55 (J. Tuli) F&P Berkeley meeting format proposal #83.3
3	Coincidence Information	F&P Oak Ridge meeting minutes p.1
4,5,7	Documentation/Table Record: Extension to Comment Record	NS/1A-68 (J. Tuli) Rev. Manual p. 7-8, 8a
6	Indicate multiply placed γ 's with unresolved intensity by '&' in col. 77 of G-card	F&P Oak Ridge meeting minutes p.2
8	Use of SN and SP in level energy field	NS/1A-68 (J. Tuli) Rev. Manual p.26
12	Suppress contents of 2B,2E cards routinely	NS/1A-52 (J. Tuli), F&P Oak Ridge meeting minutes p.1
15	Headings in NDS drawings to explain I_{α} , I_{γ} in α -decay	F&P Oak Ridge meeting minutes p.6

B. The following formats/procedures were adopted with comments as indicated below:

<u>Item # in 84/20</u>		
2	Cross referencing data sets	NS/1A-55 (J. Tuli) F&P Berkeley meeting. Format # 83.1. Comment: Consider producing a table showing adopted level energies compared with level energies measured in various reactions.

- 9 Use of min and yr min was accepted as the abbreviation for minute. Suggestions of using 'yr' or 'a' for year was discussed but no consensus was reached.
- 10 Lower case and special characters in EBSDF It was agreed to allow evaluators to use lower case Roman characters in their evaluations. The use of alternate character set will be taken up later.
- 11 Delayed particle emitters NS/1A-55 (J. Tuli) F&P Berkeley meeting - Attachment II.
Comment: Although no consensus on the proposed format could be reached, J. Tuli is to provide to the Network the format in its final form, and the Network is to report on their experience with it at the next meeting.
- 13 Relabel formatted field NS/1A-68 (J. Tuli) Rev. Manual p. 8a.
Comment: Only "S" field on L-card be allowed to be relabelled

TABLE VIII

ENSDF Program Status - March, 1984

<u>PROGRAM</u>	<u>FORTRAN-66</u> <u>VERSION*</u>	<u>FORTRAN-77</u> <u>VERSION*</u>	Proposed Format Changes							<u>COMMENT</u>
			<u>D, T, H</u> <u>RECORDSt</u>	<u>XREF</u> <u>RECORDSt</u>	<u>FINAL</u> <u>LEVEL+</u>	<u>FOOTNOTE</u> <u>RECORDSt</u>	<u>DELAYED-</u> <u>PARTICLE</u> <u>FORMATSt</u>	<u>Sp + X</u> <u>Sn + X</u> <u>FORMALISM+</u>		
DELTA	I	D								
FMTCHK		I	M	M	M	M	M	M	M	
GTOL	I	D	X	X	M	X	X	M	M	(1)
HSICC	I		X	X	X	X	X	M	X	
LOGFT	I		X	X	X	X	X	X	X	
MEDLST	I	D	X	X	X	X	X	M	X	
PANDORA		I	X	X	M	X	X	M	M	
RULER		(I)	X	X	X	X	X	M	X	(2)
SPENS	(I)		X	X	M	X	X	M	M	(3)
TREND		(I)	M	M	M	M	M	M	M	(4)
ADINF		(D)	X	X	M	X	X	M	M	

* I - Machine-independent version
 D - Machine-dependent version
 (D) - Machine-dependent version under development
 (I) - Machine-independent version under development

+ M - Major effect on program
 X - Minor effect on program

(1) This program needs major revision to improve its efficiency. It would also be useful to add an option to output a "corrected" ENSDF data set containing the level energies and particle feedings as calculated by the program.

(2) New program to calculate Γ_γ/Γ_w and compare the results to the NDS recommended upper limits or to calculate BELW and BMLW.

(3) New program to produce rudimentary level schemes from ENSDF data sets.

(4) New program to produce tables of level and radiation properties similar to those contained in NDS but without translation into the full character set contained in NDS.

IAEA Meeting on the Coordination of the
International Network of Nuclear Structure
and Decay Data Evaluators

3 - 6 April 1984, Fachinformationszentrum Karlsruhe, FRG

LIST OF PARTICIPANTS

- | | |
|---------------------|---------------------------------|
| 1. W. Bambynek | CEC/CBNM, Geel, Belgium |
| 2. H. Behrens | FIZ, Karlsruhe, FRG |
| 3. M.R. Bhat | NNDC, Brookhaven, USA |
| 4. J. Blachot | CEN, Grenoble, France |
| 5. D. Chmielewska | IBJ, Swierck, Poland |
| 6. J. Dairiki | LBL, Berkeley, USA |
| 7. D. De Frenne | Gent University, Belgium |
| 8. P. Ekström | Lund University, Sweden |
| 9. P.M. Endt | Fys. Lab., Utrecht, Netherlands |
| 10. P.D. Forsyth | Liverpool University, UK |
| 11. M.W. Johns | McMaster University, Canada |
| 12. M.A. Lee | INEL, Idaho Falls, USA |
| 13. A. Lorenz | IAEA, NDS, Vienna, Austria |
| 14. P. Lüksch | FIZ, Karlsruhe, FRG |
| 15. M. Martín | ORNL/NDP, Oak Ridge, USA |
| 16. H.W. Müller | FIZ, Karlsruhe, FRG |
| 17. B. Singh | Kuwait University, Kuwait |
| 18. J.W. Tepel | FIZ, Karlsruhe, FRG |
| 19. J. Tuli | NNDC, Brookhaven, USA |
| 20. C. van der Leun | Fys. Lab., Utrecht, Netherlands |
| 21. D.A. Viggars | Kuwait University, Kuwait |
| 22. N.J. Ward | Liverpool University, UK |

IAEA Meeting on the Coordination of the
International Network of Nuclear Structure and Decay
Data Evaluators

3 - 6 April, Fachinformationszentrum Karlsruhe, FRG

Adopted Agenda

(Morning session 09:00 - 12:00, Afternoon session 01:30 - 05:00)

- A. Introductory Items (Tuesday, 3 April, forenoon)
 - 1. Opening statements
 - 2. Election of chairmen
 - 3. Adoption of Agenda
 - 4. Announcements
 - 5. Review of Actions and Recommendations from last meeting

- B. NSDD Network (Tuesday, 3 April, forenoon)
 - 1. Short reports from network members
 - 2. Report from the US NSDD Network

- C. Status of the NSDD Evaluation Effort (Wednesday, 4 April, forenoon)
 - 1. Current mass-chain evaluation status
 - 2. Procedures for mass-chain evaluation
 - 3. Status of Nuclear Data Sheets publications
 - 4. Mass-chain evaluation assignment
 - 5. Recycling of evaluations on a priority basis

- D. Status of the Nuclear Structure Reference (NSR) File (Friday, 6 April, forenoon)
 - 1. NSR coding manual
 - 2. File documentation and format
 - 3. Schedule and content of NSR publication in NDS
 - 4. Clean-up of NSR file

- E. Status of the Evaluated Nuclear Structure Data File (ENSDF) (Thursday, 5 April, forenoon)
1. ENSDF coding manual (distribution, updates)
 2. ENSDF content status
 3. ENSDF update procedures
 4. Improvement in ENSDF output format and its documentation
 5. Discussion of the recommendations of the Formats and Procedures Subcommittee of the US Nuclear Data Network
 6. Completeness of ENSDF for computerized retrievals
- F. Status of NSDD Processing Computer Programs (Thursday, 5 April, forenoon)
1. ENSDF physics computer programs
 2. ENSDF data output processing computer programs (e.g., MEDLIST)
 3. ENSDF on-line systems
- G. NSDD Data Centre Services (Thursday, 5 April, forenoon)
1. Distribution of ENSDF Data File
 2. How effective is the dissemination of NSDD
- H. NSDD Publications (Friday, 6 April, forenoon)
1. Nuclear Physics publications (A = 5-44)
 2. Nuclear Data Sheets publications
 3. Other publications
 - Radioactivity Handbook
 - Wall Charts
 - Wallet Cards
 - Bibliography of Evaluations
 - Horizontal compilations and evaluations
- I. Review of Evaluation Rules and Nuclear Structure Physics Topics (Tuesday, Wednesday, Thursday afternoons)
- (Topics for discussion to be proposed by the participants)
- J. Summary of Conclusions and Recommendations (Friday, 6 April, afternoon)
- K. Next Meeting

List of Papers Submitted to the Meeting

- 84/ 1. Conversion coefficient tables, which of them should be used in ENSDF? By H. Behrens.
- 84/ 2. Status Report: Utrecht. By P.M. Endt and C. van der Leun.
- 84/ 3. Status Report: Belgium. By D. De Frenne and E. Jacobs.
- 84/ 4. Status Report: France. By J. Blachot.
- 84/ 5. Status Report Nuclear Structure Evaluation in Canada. By M. Johns.
- 84/ 6. Status Report: United Kingdom. By N.J. Ward, P.D. Forsyth, and P.J. Twin.
- 84/ 7. Status Report: Kuwait Nuclear Data Group.
- 84/ 8. Status Report: Sweden. By Per Andersson, Peter Ekström and Jacquette Lyttkens.
- 84/ 9. Statement on CBNM Activity in Evaluation and Compilation of Decay Data. By W. Bambynek.
- 84/10. Status Report: Fachinformationszentrum Energie, Physik, Mathematik GmbH. By H. Behrens, H.-W. Müller and J.W. Tepel.
- 84/11. U.S. Contributions to International Cooperation in the Evaluation of Nuclear Structure Data.
- 84/12. Status Report on Japanese Activities in Nuclear Structure and Decay Data. by Tsutomu Tamura.
- 84/13. Report from the USSR Groups. By F.E. Chukreev.
- 84/14. Status of Mass-Chain Evaluations (incorporated in the report).
- 84/15. Steps for Processing A-Chains (incorporated in the report).
- 84/16. NDS Evaluation Transmittal Form.
- 84/17. Evaluator Check List.
- 84/18. Table of NDS Publications April 1982 - June 1984.
- 84/19. NDS Publication (Statistics) (incorporated in the report).

- 84/20. Status of Some Format/Procedure Changes.
- 84/21. Mass-Chain Assignment as of April 1984 (incorporated in the report).
- 84/22. Status of NNDC Efforts to Translate A=5 to 12 Nuclear Physics Evaluations into ENSDF. By T.W. Burrows.
- 84/23. ENSDF Program Status, March, 1984. (Incorporated in the report).
- 84/24. Program Ruler. By T.W. Burrows.
- 84/25. On-line access to remote users of LBL Nuclear Structure Numerical Database. By E. Browne.
- 84/26. The handling of EO transitions in ENSDF. By R.B. Firestone.
- 84/27. Memorandum for the NSDD Meeting in Karlsruhe, April 1984. By P. Ekström.
- 84/28. Nuclear Structure Reference Coding Manual (draft) for NSR File.
- 84/29. Report on Radioactivity Handbook, November 1983. R.B. Firestone and E. Browne.

ACTIONS

1. Network Send in to US/NNDC suggestions for symbols, abbreviations and conventions used in the publication of the Nuclear Data Sheets. (Standing action).
2. Network Send in to US/NNDC comments and suggestions on the ENSDF Style Manual and on the NSR Manual. (Standing action).
3. IAEA/NDS Write editors of physics journals (except Phys. Rev. and Nuclear Physics) to include keywords in published nuclear physics papers. (Repeat of Action 82/12).
4. Network Distribute those computer codes which could be useful to other members of the network. (Standing action).
5. US/NNDC Communicate to the network all errors discovered in the ENSDF file and all changes made to the ENSDF file. (Standing action).
6. Network Investigate if there are any appropriate groups interested to participate in the mass-chain evaluation effort. (Standing action).
7. Network Communicate to US/NNDC identified errors in the keywords in "Recent References". (Standing action).
8. Network Help clean up NSR file in the process of evaluation by informing US/NNDC of the identified errors or omissions. (Standing action).
9. Network Send to M. Martin suggestions for additional "minimum requirements" to be used as guidelines for evaluators. (Standing action).
10. Network Communicate identified mistakes in the ENSDF file pertinent to the mass-chain for which they are responsible to US/NNDC for all mass-chains, and in addition to NED/Utrecht for mass-chains 21-44, and to US/UP for mass-chains 5-20. (Standing action).
11. Tuli Obtain the new (1984) Wapstra mass tape and distribute it to the network.
12. Behrens Find someone willing to perform Hartree Fock calculations in order to investigate the effect of using different values of conversion coefficients.

13. Network Clean up the part of the ENSDF file for which they are responsible (see Tuli memo NS/1A-63) using the latest (15 June 84) version of the ENSDF file, and send the corrections to US/NNDC for incorporation into the ENSDF master file.

14. US/NNDC Prepare a draft of a pamphlet advertising the Nuclear Data Sheets publication, and send it to all centres for comments and approval.

15. US/NNDC Distribute to the Network the latest statistical information on the publication of the Nuclear Data Sheets journal.

16. Tuli/Martin Send to P. Endt and C. van der Leun tape with A = 21-26 mass data converted by Ewbank to ENSDF format - for checking.

Addresses of Members of the NSDD Network

(Active mass-chain evaluation centres are indicated by an asterisk,
NSDD distribution centres are indicated by an +)

<u>Code</u>	<u>Centre/Group</u>	<u>Address</u>	<u>Head of Project or Centre</u>
1A	US/NNDC	*+ National Nuclear Data Centre Brookhaven National Laboratory Upton, New York 11973, USA	S. Pearlstein
1B	US/NDP	* Nuclear Data Project Oak Ridge National Laboratory Oak Ridge, Tennessee 37830 U.S.A.	M. Martin
1C	US/LBL	* Lawrence Berkeley Laboratory University of California Berkeley, Cal. 94720, USA	J. Dairiki
1D	US/INEL	* EG and G Idaho, Inc. P.O. Box 1625 Idaho Falls, Idaho 83401, USA	C.W. Reich
1E	US/UP	* University of Pennsylvania Philadelphia, Penn. 19174, USA	F. Ajzenberg-Selove
2A	USSR/CAJaD	*+ Institut Atomnoi Energii I.V. Kurchatova 46 Ulitsa Kurchatova Moscow, D-182, USSR	F.E. Chukreev
2B	USSR/LIYaF	* Data Centre Leningrad Nuclear Physics Inst. Gatchina, Leningrad Region 188350, USSR	I.A. Kondurov
3A	NED/Utrecht	* Fysisch Laboratorium P.O. Box 80 000 Princetonplein 5 3508 TA Utrecht, The Netherlands	C. van der Leun
4A	UK/Liverpool	* Oliver Lodge Laboratory University of Liverpool Liverpool L69 3BX, U.K.	P.J. Twin

<u>Code</u>	<u>Centre/Group</u>	<u>Address</u>	<u>Head of Project or Centre</u>
5A	FRG/FIZ	*+ Fachinformationszentrum Energie, Physik, Mathematik GmbH Kernforschungszentrum D-7514 Eggenstein-Leopoldshafen 2 FRG	H. Behrens
6B	FR/CEA-Grenoble	* Centre d'Etudes Nucleaires de Grenoble Cedex No. 85 F-38041 Grenoble-Gare	J. Blachot
7A	IAEA/NDS	+ Nuclear Data Section International Atomic Energy Agency P.O. Box 100 A-1400 Vienna, Austria	A. Lorenz
8A	NEA/DB	+ NEA Data Bank B.P. No. 9 F-91190 Gif-sur-Yvette	N. Tubbs
9A	CBNM/Geel	Bureau Central de Mesures Nucleaires C.E.C. Steenweg naar Retie B-2440 Geel, Belgium	W. Bambynek
10A	JAP/JAERI	* Japan Atomic Energy Research Institute Division of Physics Tokai-Mura, Naka-Gun Ibaraki-Ken 319-11, Japan	T. Tamura
11A	SWD/Lund	* University of Lund Institute of Physics Solvegatan 14 S-223 62 Lund, Sweden	J. Lyttkens
12A	KUW/ISR	* Kuwait Institute for Scientific Research Shuwaik, Kuwait	D.A. Viggars
19A	BLG/Gent	* Laboratorium voor Kernfysika Proeftuinstraat 86 B-9000 Gent, Belgium	D. De Frenne
20A	CAN/TAL	* Tandem Accelerator Laboratory McMaster University Hamilton, Ontario L8S 4K1	M. Johns