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MINUTES OF THE FOURTH ANNUAL MEETING OF THE PANEL ON REFERENCE NUCLEAR DATA

BROOKHAVEN NATIONAL LABORATORY
NOVEMBER 1-2, 1979

Edited by
T.W. BURROWS, L. STEWART, AND
J.J. COYNE

June 1980

INFORMATION ANALYSIS CENTER REPORT

NATIONAL NUCLEAR DATA CENTER
✓ BROOKHAVEN NATIONAL LABORATORY
UPTON, NEW YORK 11973

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NOVEMBER 1-2, 1979

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*Subject to Panel approval at the Fifth Annual Meeting, Fall 1980.

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THE FOURTH ANNUAL MEETING OF THE PANEL ON REFERENCE NUCLEAR DATA
WELCOME

1.0 WELCOME

The attendees and observers to the fourth annual meeting of the Panel on Reference Nuclear Data were welcomed to Brookhaven National Laboratory by S. Pearlstein, Director of the National Nuclear Data Center, Brookhaven National Laboratory.

2.0 APPROVAL OF THE AGENDA AND OF THE MINUTES TO THE THIRD ANNUAL MEETING.

The agenda was approved as amended (Appendix A). The minutes of the third meeting were approved with no modifications. The attendance at the meeting and the Panel membership are enclosed as Appendices B and C, respectively.

3.0 REACTOR PHYSICS DATA NEEDS

3.1 Availability Of Decay Data For Spallation Products Of Structural Materials

T.W. Burrows opened the discussion by distributing a September 7, 1979, memo (Appendix D) describing a preliminary survey of the availability of decay data for spallation products. The conclusions of this survey were that, in general, the needs have been satisfied and that the data are of the same quality as for the fission products.

In the general discussion which followed it was pointed out that the production cross sections are required.

3.2 Other Data Needs

The discussion of other reactor physics data needs covered several areas and also touched upon CTR and biomedical needs where these overlapped the reactor physics areas.

L. Stewart noted that data on the (α, n) reactions are needed for the study of shutdown conditions. In particular, these data are required for the oxygen isotopes. F. Mann stated that Johnson and Umbrello of the Hanford Engineering Development Laboratory have completed an article on spontaneous fission and (α, n) reactions in subcritical assemblies (to be published in Nuclear Science and Engineering). The present work contains only thick target yields for the (α, n) reactions, but the work will be extended to provide angular distributions and energy spectra. He also noted that Los Alamos and Oak Ridge are also starting to work on this problem.

L. Stewart continued the discussion by briefly outlining the data available in ENDF (Evaluated Nuclear Data File). These data are primarily neutronic from threshold to 20 MeV but there are also decay and photon interaction data in the file. Members of the Cross Section Evaluation Working Group are committed to extend a few of the neutron evaluations to about 50 MeV to provide data for the FMIT and to develop the formats necessary to include some types of photonuclear

THE FOURTH ANNUAL MEETING OF THE PANEL ON REFERENCE NUCLEAR DATA
REACTOR PHYSICS DATA NEEDS

data. M. Bhat noted that high energy neutron cross section data are also needed for the shielding and collimation designs of neutron therapy facilities.

J.J. Coyne asked how well the neutronic data would be known above 20 MeV. L. Stewart stated that the data would primarily be derived from calculations. F. Mann described the program at Davis where they are measuring for HEDL the total and elastic scattering cross sections at 30, 40, 50 MeV for six materials including iron, calcium, and silicon and where they have completed total measurements for the National Institute of Health on carbon, oxygen, and nitrogen. It was also pointed out that Oak Ridge has also measured the totals on some of these materials. In general, there is good agreement between Davis and Oak Ridge, however for iron they differ by approximately 3 sigma (8 %). T. England, in the discussion of spallation data needs, noted that Los Alamos is calculating cross sections of some of the structural materials for the FMIT program. The calculations go to 50 MeV and have been completed for iron and nickel.

L. Stewart described the difficulties of obtaining good measurements at these energies where there are no monoenergetic neutron sources. Hopefully there will be a few useful $(n,3n)$ reactions and time of flight measurements in this region to tie the calculations of the partial cross sections to.

In response to a question from M. Martin, L. Stewart stated that there would be no error files for these evaluations, but that the File 1 comments would contain estimates of the uncertainties.

F. Mann described the plans of Davis for the near future. These include the measurements of neutrons produced by deuteron-induced reactions, activation from deuteron-induced reactions, activation from white-source neutrons, and an integral measurement of iron for white source reactions. J. MacDonald mentioned that Ohio has started measuring neutron cross sections up to 27 MeV.

R. Roussin and L. Stewart have been given the responsibility by CSEWG to develop ENDF formats for photonuclear data. Presently ENDF contains only the photon interaction data of Hubbell. Since the Berman data are already in CSISRS, these data would probably be evaluated for ENDF. T.W. Burrows noted that the Photonuclear Data Center of Moscow University has begun compiling Soviet photonuclear data in the international exchange format (EXFOR).

H. Makowitz stated that for at least four important fission products (Sr-90, Cs-137, Kr-85, and Zr-95) there are no cross section data in ENDF. N. Morcos added Ru-103 to the list. T. England noted that in addition to fission products which are on the general purpose file, 38 fission products have at least the $(n,2n)$ cross sections given. H. Makowitz felt that the $(n,2n)$ reaction is of lesser importance than the (n,p) and other reactions.

T. England stated that Los Alamos has received the Rudstam data on delayed neutron precursors, including energy spectra and the United Kingdom evaluated actinide and activation files. N. Morcos introduced the German gamma-ray catalog and alpha-energy listing.

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CTR DATA NEEDS

4.0 CTR DATA NEEDS

4.1 Neutronic

4.1.1 Availability Of Transmutation Data - T.W. Burrows began the discussion by distributing an August 26, 1979, memo (Appendix E) surveying the data available. He noted that based on the latest list of materials to be included in the ENDF activation file (Appendix F) only the $^{27}\text{Al}(n,\alpha)$ and $^{118}\text{Sn}(n,\alpha)$ of the important reactions requested by H. Makowitz would not be in ENDF. H. Makowitz noted that his request was based on his work on the maintenance of low activity devices where the impurities are very important and that the data are particularly important when there is a large disparity in the half-lives of the two states. F. Mann hopes that the activation file will be released by Christmas. After the file has been released, additional materials may be added. They appreciate requests for materials to be added and the reasons for such requests. H. Makowitz pointed out the importance of titanium and vanadium alloys in low activity devices.

4.1.2 Clarification Of NJOY - L. Stewart noted that a new version of NJOY is at Brookhaven and if there are any problems, R. Macfarlane should be contacted. T. England felt that the error subroutine does not work correctly in any version of NJOY. H. Makowitz described the problems they have been having with the new version; even the test cases will not run correctly. J.J. Coyne and R. Macfarlane compared their calculations with very good agreement where data are available.

4.2 Charged Particle

4.2.1 Charged-Particle Barn Books - Unfortunately, G. Miley was unable to present a description of his plans for a charged-particle barn book at the meeting. He was asked to provide such a description for the minutes (Appendix G). M. Bhat and L. Stewart felt that Miley's work would be a revision and expansion of the earlier work (COO-2218-17) where the cross sections were represented by analytical functions.

M. Bhat continued the presentation by describing the NNDC plans for a charged-particle barn book. The book would be limited in scope to fusion-related and biomedical data with the data presented in a format similar to BNL-325, Vol. 2 (Appendix H). For the fusion-related data the NNDC plans to compile the experimental data and to present these data along with recent evaluations, e.g. the R-Matrix evaluations of G. Hale (Appendix I). In the area of neutron-source reactions about 80% of the data on the T+D system has been compiled and the NNDC and CAJAD have agreed to give priority to compilation of experimental monoenergetic neutron-source reaction data for the specialists meeting in Hungary next spring. (1) A partial list of radioisotopes that the NNDC hopes to

=====

1. The priorities will be assigned on the basis of the recommendations of the specialists meeting.

THE FOURTH ANNUAL MEETING OF THE PANEL ON REFERENCE NUCLEAR DATA CTR DATA NEEDS

compile and evaluate production data for was presented (Appendix J). The first edition of the NNDC publication should be completed in 1982. A tentative list of the contents of this publication is included as Appendix K.

The Karlsruhe Charged-Particle Data Group also plans a graphical presentation of the data in Charged-Particle EXFOR along with curves based on systematics and global model parameters. Their present plans are to include in the publication all integral data for reactions with target mass greater than or equal to 20.

4.2.2 Other Data Needs - The discussion of other data needs for CTR was almost completely devoted to biomedical data needs. Therefore, this discussion has been included in the discussion of biomedical data needs.

A general discussion of the compilation of experimental data and the interaction of data centers with journal editors and authors followed. S. Pearlstein and T.W. Burrows described a letter that the NNDC had sent to the editors of US journals concerning the preservation of numerical nuclear data. To date, there has been little response to this initiative. S. Pearlstein noted that this was an area where the Panel could be very useful. Most US journals are produced by the professional societies. Therefore, the Panel representatives could influence, via their societies, the policies of the journals regarding the presentation and preservation of data.

5.0 STATUS OF INTERNATIONAL AND NATIONAL COOPERATION

S. Pearlstein reviewed the history and status of international and national cooperation by exhibiting several of the publications which have been produced via these cooperative efforts. In particular, he noted that the cooperative effort which produces CINDA, an index to microscopic neutron data, is now 15 years old.

J.J. Coyne and K. Lathrop asked about the availability of the various publications which were mentioned. Most of the publications are either available from a data center or from NTIS. In a general discussion, the problem of reaching people out of the mainstream was recognized. Even a "compilation of compilations" is of limited use to such people since they may not be aware of its existence and it may be too detailed for their use. The general consensus was that the Panel representatives could aid by preparing for their societies an abbreviated set of useful publications based on the Source List and the Panel minutes.

K. Lathrop was interested in the types of data contained in the various data files and in an explanation of the various acronyms being used for these files. T.W. Burrows distributed a glossary of the quantities contained in the NNDC data files (Appendix L).

M. Martin pointed out the problem of getting new evaluations or publications in a different format accepted.

THE FOURTH ANNUAL MEETING OF THE PANEL ON REFERENCE NUCLEAR DATA
STATUS OF INTERNATIONAL AND NATIONAL COOPERATION

K. Lathrop, after a brief history of the MIRD publications, noted the difficulties in updating these publications. M. Martin noted that the differences in presentation between the MIRD publications and those produced using the MEDLIST program were slight and that the US Nuclear Data Network would be willing to provide MIRD with the necessary information. An action was placed on K. Lathrop to provide the US Nuclear Data Network with a list of data required and the preferred format and an action on the US Nuclear Data Network to reply on the feasibility of providing the data in the preferred format.

6.0 STATUS AND AVAILABILITY OF DATA FILES

C.L. Dunford distributed a description of the products and services available from the NNDC (Appendix M) and a description of the tape formats that the NNDC can distribute (Appendix N). After a brief description of the files, he described the various ways that data may be provided to the users, including listings, tapes, plots, film, and microfiche. He also briefly outlined plans to transfer the responsibility for maintaining the Nuclear Structure Reference File and the Evaluated Nuclear Structure Data File from the Nuclear Data Project (NDP) to the NNDC by the end of calendar year 1980. In response to a question from L. Gevantman, C.L. Dunford stated that he was only discussing the maintenance activities of the NDP, not the evaluation activities.

L. Gevantman asked about the intention of adding photonuclear data to ENDF. L. Stewart noted that only experimental data files are currently available but CSEWG may develop evaluation plans at a later date. She also mentioned the cooperative effort between Berkeley and Los Alamos to compile the data on the number of neutrons per photofission.

7.0 ELECTION OF OFFICERS

After several representatives had been nominated and had declined, W. Morgan moved that the terms the current chairman and vice-chairman be extended for one year. After discussion this motion was passed unanimously with one abstention. In discussions which followed it was decided to keep the terms of officers at one year and it was stressed that the present action of extending the terms should not be construed as a precedent for future elections.

It was noted that the current terms of Panel representatives varied from two years to indefinite with several members not knowing the terms of their appointment. L. Stewart noted that there were several representatives who had never attended a meeting or who had only attended one meeting. The representatives were asked to provide the Panel with the name and address of the chairmen of their divisions so that Panel correspondence could be sent to the chairmen, the Panel could ask for a confirmation of appointments and terms of office, and the appointments could be kept up to date.

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STATUS OF PUBLICATIONS

8.0 STATUS OF PUBLICATIONS

The status of publications discussed at this time and earlier in the meeting is summarized in Appendix O.

8.1 Handbook Of Radionuclides

J.K. Tuli opened the discussion by reviewing the presentation at the last meeting of the Panel. Since that meeting there have been two meetings of the US Nuclear Data Network (NDN). The NDN has decided that responsibility for producing the handbook should rest with the Isotopes Project, LBL. The consensus of the NDN is that the publication should be directed toward the applied user with the basic scientist employing the Nuclear Data Sheets and that the publication should be different from and simpler than the Table of Isotopes. He noted that if everything contained in the Table of Isotopes were to be included in the present format, the handbook would be 2500 pages. There are many choices as to the data which should be included depending upon the size of the handbook users would like to have. If data were to be left out, as they must for a compact handbook, the whole audience could not be satisfied. J.K. Tuli urged the Panel to provide the necessary input in order to determine what data should be included and in what form (tables vs. decay schemes, etc.) to keep the handbook to a reasonable size. There was a general agreement that only one set of numbers should be presented in the publication; that is, only evaluated data should be included.

J. Dairiki continued by handing out an outline of the proposed publication (Appendix P) and briefly describing the contents of the outline. The handbook will contain no reaction data and will be geared to applied users with decay data sufficiently detailed for very specialized groups. She also noted that there are many types of specialized publications which could be produced from the data files and the NDN currently has committed itself to publish only one of these.

L. Gevantman suggested that the radiation tables contain footnotes on the intensity cut-off of 0.1%. M. Martin described the rationale for the current intensity cut-off used. The cut-off is based on the philosophy that ENSDF conversion coefficients are given only if the measured conversion electron intensity is greater than 0.1%. This cut-off makes little practical difference for the gamma tables, but the file would have to be extensively reworked if the limit were to be lowered for the electron tables. W. Bishop suggested that the intensity cut-off should be a fraction relative to the most intense radiation present.

There were three main suggestions as to the physical presentation of the handbook. These were a one volume publication, a multi-volume publication, and a loose-leaf publication. Most of the discussion concerned the advantages and disadvantages of the latter two proposals.

The advantages of a multi-volume publication would be convenience in size and if divided by mass region, convenience in updating. Another advantage would be a reduction in cost per volume. However, those who favored a multi-volume publication appeared to be evenly split between division by mass region and by

THE FOURTH ANNUAL MEETING OF THE PANEL ON REFERENCE NUCLEAR DATA
STATUS OF PUBLICATIONS .

data type, e.g. one volume of tabular data and one volume of detailed level schemes.

The advantage of a loose-leaf format would be the continual updating of the publication as new evaluations appeared with the replacement pages perhaps being published as supplements to the Nuclear Data Sheets. Another advantage cited was the possibility of removing specific sheets from the publication for use by specific users. The disadvantages included the problems of correctly referencing a publication which was constantly being updated, and the problems that libraries and laboratories would have in keeping the publication up to date with the latest sheets.

Several other points were also raised in connection to the physical form of the publication. J.K. Tuli noted that since the publication would be based on the ENSDF file and published every four years, the average age of an evaluation in the file would only be two years old. W. Morgan, J.K. Tuli, and C.L. Dunford noted the possibility of specific retrievals for users requiring more recent data or data not contained in the publication. M. Martin and W. Bishop felt that since the detailed decay schemes appear in the Nuclear Data Sheets, the schemes could be dropped from the handbook saving about 500 pages. C.L. Dunford warned that a loose-leaf format probably could not be published commercially.

M. D'Agostino and H. Makowitz suggested the inclusion of 14-Mev cross sections of interest to neutron activation analysis and fusion. N.E. Holden noted that while some of these data could be obtained from ENDF, additional compilation and evaluation efforts would be necessary. H. Makowitz also suggested the inclusion of (n,2n) thresholds and T. England, the inclusion of resonance integrals.

The discussion concluded with an action on J. Dairiki and J.K. Tuli to provide the Panel with a questionnaire dealing with the specific problems of the priority of data to be included, the optimum size of the publication, and the physical forms of the publication, an action on the Panel to distribute these questionnaires to the respective memberships with NNDC assistance, and an action on the NNDC to include the questionnaire in the next issue of the NNDC Newsletter. The results should be sent to the US NDN by the end of January.

8.2 NNDC PUBLICATIONS

N.E. Holden reviewed the NNDC publications of the past year and future plans. These are summarized in Appendix O. Part 1 of BNL-325, Vol. 1 should go to press by the end of 1979. The next edition of the Source List should go to press in mid-1980. As a result of a review of the Source List which will appear in the Journal of Radioanalytical Chemistry and other comments received, there will be format and content changes. Due to size and cost considerations, the Fourth Edition of The Bibliography of Integral Charged Particle Nuclear Data will probably be an archival edition with supplements issued in future years. The fourth edition will go to press in March, 1980.

THE FOURTH ANNUAL MEETING OF THE PANEL ON REFERENCE NUCLEAR DATA
STATUS OF PUBLICATIONS

8.3 US NDN PUBLICATIONS

N.E. Holden presented the status of mass chain evaluations which will appear in the Nuclear Data Sheets. The mass chains 60, 64, 71, 101, 140, 196, 204, 212, 221, and 225 are in press. Under review are 63, 73, 77, 85, 103, 112, 123, 134, 145, 163, 213, and 217. Evaluations for 91, 92, 108, 125, 127, 152, 158, 208, and 244 are in process.

M. Martin continued the presentation by noting that NCRP-58 has been published. This book contains an Appendix generated by Martin, containing decay data on 226 nuclei from ENSDF. Although not part of the US NDN effort, he also mentioned the work by D.C. Kocher for the DOE Critical Review Series. This work contains decay data on approximately 200 nuclei from ENSDF. There is some overlap between the two publications. The contents of the two publications are contained in Appendices Q and R, respectively.

8.4 NBS PUBLICATIONS

L. Gevantman discussed the following three sets of publications from the NBS or in cooperation with the NBS.

E. Fuller is completing work on an evaluation of photonuclear reaction data for carbon, oxygen, and nitrogen. This evaluation should be published by mid-1980.

J. Hubbell is working on two evaluations. There is one on pair-triplet and total cross sections from 1 MeV to 1 GeV for $A = 1$ to 100 which should be ready by mid-1980. The evaluation of photon cross sections and attenuation coefficients from 1 keV to 1 MeV for $A = 1$ to 100 should be ready by the end of 1980.

In a cooperative effort, the Radiation Dose Data Project, Mallencroft Institute of Radiology, is compiling four and six MeV gamma and electron depth doses for medical accelerators. This should be ready next year. The cooperative effort with AAPM on the dosimetry handbook is continuing.

8.5 OTHER PUBLICATIONS

T.W. Burrows brought the Panel's attention to Physics Data 15-1 and 15-2 which contains the integral charged-particle nuclear data compiled in EXFOR and is produced by the Karlsruhe Charged Particle Data Group and the Fachinformationszentrum. The Karlsruhe Wall Chart should be out by Fall, 1980. Karlsruhe has asked the NNDC to distribute the chart to the United States and Canada and to provide Karlsruhe with the number of copies needed for this distribution. Two action items resulted from this request. The Panel should try to provide estimates from their societies on the number of copies required and the NNDC should obtain the KAPL distribution.

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BIOMEDICAL DATA NEEDS

9.0 BIOMEDICAL DATA NEEDS

9.1 Radiopharmaceutical Council Survey

F.P. Castranovo was unable to attend the meeting, but phoned in his report to T.W. Burrows. He received only two replies to the survey he circulated. Therefore, he has rewritten the survey and it will appear in the next newsletter. He has also been working on the format for the biomedical wall chart. A continuing action was placed on F.P. Castranovo to continue work on the survey and on designing the chart.

9.2 Survey Of Available Data

The survey on the data available which satisfies the needs expressed in Table 2 of last year's minutes was not completed due to the wide range of data requested. In general, T.W. Burrows felt that the nuclear structure and decay data needs are reasonably satisfied by the present evaluations. The Panel was referred to the plans of the NNDC to compile and evaluate charged-particle radioisotope production and to the reviews by the Julich group of Qaim, Stocklin, and Weinrich on radioisotope production. Some of the later reviews of this group are included in Appendix O. The action on NNDC to survey the available data was continued.

9.3 Other Data Needs

J. MacDonald reviewed the high energy charged-particle data needs for medicine. The data are primarily needed for shielding components and body components. The needs include cross sections for 160-MeV protons (Harvard) and 900-MeV alphas and GeV carbon (Berkeley). The reader is referred to the discussion and Table 2 of last year's minutes (BNL-NCS-51023) for a more complete discussion. M. Bhat reminded the Panel of the cascade calculations of Alsmiller. L. Stewart felt that these calculations were limited to outgoing particles up to alphas only; however, R. Roussin noted that there were later versions of the code which could handle heavier outgoing particles. L. Stewart also mentioned the experimental work being done at LAMPF. An action was placed on J. MacDonald to follow through on these data needs and to check on the possible existence and availability of private libraries containing such data.

J.J. Coyne also noted the importance of pion reaction data in medicine. He also asked if there were plans to compile data on the $\text{Be}(d,n)$ reaction. T.W. Burrows stated that the current emphasis would be the compilation of monoenergetic neutron-source reaction data, but that the other neutron-source reaction data would eventually be compiled, including the thesis work of K. Weaver, which is still used as a standard in the field. L. Stewart mentioned the experimental work on the $\text{Be}(d,n)$ reaction at Davis and Argonne.

THE FOURTH ANNUAL MEETING OF THE PANEL ON REFERENCE NUCLEAR DATA
MISCELLANEOUS ACTION ITEMS FROM THE THIRD MEETING

10.0 MISCELLANEOUS ACTION ITEMS FROM THE THIRD MEETING

Only one action from the third meeting was not worked on. The NNDC was to provide the Panel with a generic form of an announcement of the meetings, the minutes, and the Source List. The Panel felt that such a form is not necessary; therefore this action item was dropped.

11.0 SUMMARY OF RECOMMENDATIONS AND ACTION ITEMS

Prior to the summary, L. Gevantman mentioned that there are various groups interested in connecting different data bases. The Panel felt that a discussion of on-line data base systems and, in particular, a discussion of the problems of accessing such systems would be useful. Therefore, the Panel recommended that there be an agenda item on this topic for the next meeting of the Panel and placed an action on the NNDC to organize the presentation.

Recommendations

The Panel recommends that there be an agenda item on on-line data base systems and the accessibility to such systems for the fifth meeting of the panel.

Action Items

J. MacDonald To continue to monitor the biomedical charged-particle data needs and to check on the existence and availability of private libraries containing such data.

K. Lathrop To provide the US NDN with a list of data needed and the preferred formats to update the MIRD decay data publications.

US NDN To reply on the feasibility of providing the data in the preferred format for the MIRD publications.

J. Dairiki and J.K. Tuli To provide the Panel with a questionnaire dealing with the specific problems of the priority of the data to be included in the Handbook of Nuclides, the optimum size of the publication, and the physical form of the publication.

Panel To distribute the questionnaire on the Handbook and return the replies to the US NDN by the end of January, 1980.

NNDC To aid the Panel in the distribution of the questionnaire and to include the questionnaire in the next edition of the NNDC Newsletter.

THE FOURTH ANNUAL MEETING OF THE PANEL ON REFERENCE NUCLEAR DATA
SUMMARY OF RECOMMENDATIONS AND ACTION ITEMS

Panel To provide the NNDC with an estimate of the number of Karlsruhe wall charts needed by their societies.

NNDC To obtain the KAPL distribution of the G.E. Chart of the Nuclides.

F.P. Castranovo To continue his efforts to survey the Radiopharmaceutical Council.

F.P. Castranovo To continue his work on outlining a biomedical wall chart.

NNDC To continue the survey of the availability of data satisfying biomedical needs.

NNDC To organize a presentation for the fifth Panel meeting on on-line data base systems and their accessibility.

12.0 ADJOURNMENT

The Panel was adjourned until the next meeting which will be in October, 1980 and have a length of approximately one day.

13.0 ACKNOWLEDGEMENT

The Panel on Reference Nuclear Data, consisting of professional user groups of nuclear data, was initiated by S. Pearlstein in 1975..

THE FOURTH ANNUAL MEETING OF THE PANEL ON REFERENCE NUCLEAR DATA
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Appendix A

Agenda

AGENDA
Fourth Annual Meeting
Panel on Reference Nuclear Data
Brookhaven National Laboratory
November 1-2, 1979

Thursday, November 1

S. Pearlstein

I. Welcome

II. Approval of Agenda and of Minutes to
Third Meeting

L. Stewart

III. Reactor Physics Data Needs

A. Availability of Decay Data for
spallation products of structural
materials.

T.W. Burrows

B. Other

All

COFFEE BREAK

IV. CTR Data Needs

A. Neutronic

1. Availability of transmutation
data
2. Clarification on NJOY
3. Other

T.W. Burrows
L. Stewart
All

B. Charged-Particle

1. Charged-Particle Barn Books
2. Other

G.H. Miley,
M. Bhat
All

Agenda (cont.)

FRIDAY, November 2

V. Status of International and National Cooperation	S. Pearlstein
VI. Status and Availability of Data Files	C.L. Dunford
VII. Election of Officers	L. Stewart

COFFEE BREAK

VIII. Status of Publications

A. Handbook of Nuclides	J.K. Tuli
B. NNDC	N.E. Holden
C. US NDN	W.B. Ewbank
D. NBS	L. Gevantman
E. Other	All

IX. Biomedical Data Needs

A. Radiopharmaceutical Council Survey	F.P. Castranovo
B. Survey of Available Data	T.W. Burrows
C. Other	J.J. Coyne

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X. Miscellaneous Action Items from Third Meeting	All
XI. Summary of Recommendations and Actions	J.J. Coyne
XII. ADJOURNMENT	J.J. Coyne

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PANEL ON REFERENCE NUCLEAR DATA
Attendees and Observers to the Fourth Annual Meeting

<u>NAME</u>	<u>INSTITUTE*</u>	<u>SOCIETY REPRESENTATION*</u>
Bhat, M.R.	National Nuclear Data Center, BNL	ASTM, E-10 Committee Div. of Nuclear Chemistry and Technology, ACS
Bishop, W.N.	Babcock and Wilcox	
Brenner, D.S.	Clark University	
Burrows, T.W.	National Nuclear Data Center, BNL	Nuclear Science and Plasma Society, IEEE Radiation Research Society Division of Isotopes and Radiation, ANS
Cline, J.E.	Science Applications	
Coyne, J.J.	NBS	
D'Agostino, M.D.	Grumman Aerospace	Div. of Controlled Fusion, ANS
Dairiki, J.	Isotopes Project, LBL	
Dunford, C.L.	National Nuclear Data Center, BNL	
England, T.R.	LASL	Div. of Isotopes and Radiation, ANS Society of Nuclear Medicine
Gevantman, L.H.	Office of Standard Reference Data, NBS	
Kamykowski, E.	Grumman Aerospace	
Lathrop, K.	University of Chicago	American Association of Physics in Medicine Div. of Nuclear Chemistry and Technology, ACS ASTM, E-10 Committee
Makowitz, H.	BNL	
Mann, F.	HEDL	
Martin, M.	Nuclear Data Project, ORNL	
McDonald, J.F.	Sloan-Kettering	
Morcos, N.	Squibb Institute	
Morgan, W.	Battelle Northwest	
Pearlstein, S.	National Nuclear Data Center, BNL	

* INSTITUTES: BNL = Brookhaven National Laboratory
HEDL = Hanford Engineering Development Laboratory
LASL = Los Alamos Scientific Laboratory
LBL = Lawrence Berkeley Laboratory
NBS = National Bureau of Standards

SOCIETIES: ACS = American Chemical Society
ANS = American Nuclear Society
ASTM = American Society for Testing Materials
IEEE = Institute of Electrical and Electronic Engineers

<u>NAME</u>	<u>INSTITUTE*</u>	<u>SOCIETY REPRESENTATION*</u>
Roussin, R.	ORNL	Division of Radiation Protection and Shielding, ANS
Stewart, L.	LASL/ORNL	Division of Radiation Protection and Shielding, ANS
Tuli, J.K.	National Nuclear Data Center, BNL	

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Appendix C
Panel Membership

PANEL ON REFERENCE NUCLEAR DATA

MEMBERSHIP

March 3, 1980

American Chemical Society:

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Worcester, Massachusetts 01610

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Panel on Reference Nuclear Data Membership (cont.)

March 3, 1980

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Society of Nuclear Medicine:

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Gainesville, Florida 32605

American Association of Physics in Medicine:

Dr. Joseph C. McDonald
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Biophysics Laboratory
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New York, New York 10021

ASTM, E-10 Committee

Dr. William Morgan
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Panel on Reference Nuclear Data Membership (cont.)

March 3, 1980

IEEE/Nuclear Science and Plasma Society:

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Science Applications, Inc.
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Rockville, Maryland 20850

Dr. George H. Miley
University of Illinois
214 Nuclear Engineering Laboratory
Urbana, Illinois 61801

The Radiopharmaceutical Science Council Society of Nuclear
Medicine:

Dr. Frank P. Castronovo
The Massachusetts General Hospital
Radiology Department
Boston, Massachusetts 02114

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Appendix D

Decay Data for Spallation Products of Structural Materials

BROOKHAVEN NATIONAL LABORATORY

MEMORANDUM

DATE: September 6, 1979

TO: Panel on Reference Nuclear Data

FROM: T.W. Burrows *TWB*

SUBJECT: Decay data of the principle spallation
product nuclides from structural material

An action was placed on the NNDC at the Third Meeting of the Panel to survey the literature for decay data of the principle spallation product nuclides from structural materials. In general this need appears to be well satisfied by the evaluations contained in the Nuclear Data Sheets and Nuclear Physics (see attachment) and in the Seventh Edition of the Table of Isotopes. Some of the decay data will probably be included in the Special Applications File of ENDF.

Since the action item was so general, a meaningful survey could not be made. Among other data needed would be the incident particles and energy to be considered. Also, the original request in the minutes of the Second Meeting states a need for data "similar to the quality now available for fission-product data." It appears from the literature that the evaluated data are of similar quality. If what was meant was the availability of the data in a computerized file, most of the spallation decay data is available in ENSDF and some is available in ENDF.

Distribution: Panel on Reference Nuclear Data
S. Pearlstein

NUCLEAR DATA SHEETS
Volume 27, No. 1 (1979)
CONSOLIDATED INDEX TO h-CHAINS

h Nucl	Reference	Date	h Nucl	Reference	Date	h Nucl	Reference	Date	h Nucl	Reference	Date
1 H			67 Zn	WDS 16,417	1975	133 Cu	WDS 11,405	1976	199 Rg	WDS 24,57	1978
2 He			68 Zn	WDS 16,155	1975	134 Zn, Ba	WDS 15,203	1976	200 Rg	WDS 24,41	1979
3 He	WDS 25,1	1975*	69 Ga	WDS 17,193	1976	135 Ba	WDS 16,191	1976	201 Rg	WDS 25,193	1978
4 He	WDS 20,6	1973	70 Zn, Ga	WDS 25,1	1976	136 La, Ce	WDS 26,473	1979	202 Rg	WDS 25,675	1978
5	WDS 22,7,5	1976	71 Ga	WDS 10,205	1973	137 Ba	WDS 15,335	1975	203 Yt	WDS 24,117	1978
6 Li	WDS 22,25	1976	72 Ga	WDS 11,121	1976	138 Ba, Ce	WDS 16,167	1976	204 Rg, Pb	WDS 24,401	1979*
7 Li	WDS 22,7,5	1976	73 Ga	WDS 12,305	1976	139 La	WDS 12,139	1976	205 Yt	WDS 23,267	1978
8 Be	WDS 22,7,7	1976	74 Ga, Se	WDS 17,519	1976	140 Ce	WDS 12,303	1976	206 Rg	WDS 26,185	1979
9 Be	WDS 22,7,11	1976	75 As	WDS 16,25	1975	141 Pr	WDS 23,529	1978	207 Pb	WDS 22,407	1977
10 B	WDS 22,7,139	1976	76 Ga, Se	WDS 19,507	1976	142 Ce, Nd	WDS 25,53	1978	208 Pb	WDS 25,243	1979*
11 B	WDS 24,6	1975	77 Se	WDS 9,229	1973	143 Nd	WDS 25,603	1978	209 Bi	WDS 22,545	1977
12 C	WDS 24,9,1	1975	78 Se, Kr	WDS 15,107	1976	144 Nd, Sm	WDS 27,97	1979	210 Po	WDS 25,331	1979*
13 C	WDS 24,9,7	1976	79 Kr	WDS 15,257	1976	145 Sm	WDS 12,203	1976	211 Po	WDS 25,197	1978
14 N	WDS 24,9,27	1976	80 Sm, Kr	WDS 15,289	1975*	146 Sm, Eu	WDS 16,413	1975	212 Po	WDS 25,165	1978*
15 N	WDS 24,9,112	1976	81 Kr	WDS 15,137	1975	147 Sm	WDS 25,113	1978	213 Po	WDS 10,547	1973*
16 O	WDS 24,9,1	1977	82 Se, Kr	WDS 15,315	1975	148 Sm, Eu	WDS 20,373	1977	214 Po	WDS 21,817	1977
17 O	WDS 24,9,49	1977	83 Kr	WDS 16,169	1975	149 Eu	WDS 19,337	1976	215 At	WDS 22,267	1977
18 O	WDS 30,13	1976	84 Kr, Sr	WDS 15,109	1975	150 Nd, Gd	WDS 18,223	1976	216 Po, Rn	WDS 17,127	1976
19 F	WDS 30,13	1976	85 Kr	WDS 15,131	1975	151 Ba	WDS 19,33	1976	217 Rn	WDS 10,611	1973*
20 Ne	WDS 30,125	1978	86 Kr, Sr	WDS 25,553	1978	152 Ba, Gd	WDS 20,373	1977	218 Rn	WDS 21,867	1977
21 Ne	WDS 31,15	1976	87 Sr	WDS 15,157	1975	153 Ba	WDS 10,429	1973	219 Rn	WDS 22,243	1977
22 Ne	WDS 31,38	1976	88 Sr	WDS 16,47	1976	154 Sm, Dy	WDS 26,281	1979	220 Rn	WDS 17,361	1976
23 Na	WDS 31,67	1978	89 Y	WDS 16,405	1975	155 Gd	WDS 15,409	1975	221 Rn	WDS 10,625	1973*
24 Na	WDS 31,96	1978	90 Zr	WDS 16,455	1975	156 Gd, Dy	WDS 18,553	1976	222 Rn	WDS 21,879	1977
25 Mg	WDS 31,127	1978	91 Zr	WDS 16,477	1976	157 Gd	WDS 9,273	1973*	223 Rn	WDS 22,243	1977
26 Mg	WDS 31,156	1978	92 Zr, Mo	WDS 17,209	1972	158 Gd, Dy	WDS 15,245	1976	224 Rn, Th	WDS 17,151	1976
27 Al	WDS 31,183	1978	93 Nb	WDS 16,527	1972	159 Tb	WDS 27,151	1979	225 Ac	WDS 10,643	1973*
28 Si	WDS 31,208	1978	94 Zr, Mo	WDS 10,261	1973	160 Gd, Dy	WDS 12,017	1976	226 Ac, Th	WDS 20,119	1977
29 Si	WDS 31,243	1978	95 Mo	WDS 16,39	1972	161 Dy	WDS 13,493	1976	227 Th	WDS 22,275	1977
30 Si	WDS 31,271	1978	96 Mo, Ru	WDS 16,599	1972	162 Dy, Er	WDS 17,97	1976	228 Th	WDS 17,147	1976
31 P	WDS 31,296	1978	97 Ru	WDS 10,1	1973	163 Dy	WDS 26,295	1972*	229 Th	WDS 24,263	1978
32 S	WDS 31,322	1978	98 Ru, Rh	WDS 11,157	1974	164 Dy, Er	WDS 11,327	1974	230 Th, U	WDS 20,139	1977
33 S	WDS 31,350	1978	99 Rh	WDS 12,031	1976	165 Ru	WDS 11,189	1974	231 Pa	WDS 21,91	1977
34 S	WDS 31,371	1978	100 Rh, Ru	WDS 11,279	1974	166 Er	WDS 14,471	1975	232 Th, U	WDS 20,165	1977
35 Cl	WDS 31,397	1978	101 Ru	WDS 10,47	1973*	167 Er	WDS 17,143	1976	233 U	WDS 24,249	1978
36 S, Ir	WDS 31,420	1978	102 Ru, Pd	WDS 19,1	1976	168 Er, Th	WDS 11,305	1976	234 U	WDS 21,493	1977
37 Cl	WDS 31,450	1978	103 Ru	WDS 13,337	1976*	169 Th	WDS 10,359	1973	235 U	WDS 21,117	1977
38 Ar	WDS 31,476	1978	104 Ru, Pd	WDS 16,125	1976	170 Er, Th	WDS 15,371	1975	236 U, Pu	WDS 20,192	1977
39 K	WDS 31,504	1978	105 Pd	WDS 16,107	1975	171 Th	WDS 11,544	1974	237 Pu	WDS 21,71	1978
40 Ar, Ca	WDS 31,529	1978	106 Pd, Cd	WDS 13,367	1976	172 Th	WDS 15,497	1975	238 Pu	WDS 21,549	1977
41 K	WDS 31,563	1978	107 Ag	WDS 17,1	1972*	173 Th	WDS 14,297	1975	239 Pu	WDS 21,143	1977
42 Ca	WDS 31,599	1978	108 Pd, Cd	WDS 9,733	1972	174 Th	WDS 10,515	1973	240 Pu	WDS 20,216	1977
43 Ca	WDS 31,630	1978	109 Ag	WDS 23,229	1978	175 La	WDS 10,331	1976	241 Am	WDS 23,123	1978
44 Ca	WDS 31,659	1978	110 Pd, Cd	WDS 22,135	1976	176 La	WDS 15,559	1975	242 Am, Ce	WDS 21,415	1977
45 Sc	WDS 22,1	1977	111 Cd	WDS 16,39	1976*	177 Er	WDS 16,135	1975	243 Am	WDS 19,103	1976
46 Ca, Ti	WDS 24,1	1978	112 Cd, Zn	WDS 17,49	1972*	178 Er	WDS 13,549	1976	244 Pu, Ce	WDS 17,402	1976*
47 Ti	WDS 22,59	1977	113 In	WDS 15,181	1975	179 Er	WDS 17,207	1976	245 Ce	WDS 19,143	1976
48 Ca, Ti	WDS 23,1	1978	114 Cd, Sn	WDS 16,107	1975	180 Er, E	WDS 15,559	1975	246 Ce	WDS 17,410	1976*
49 Ti	WDS 24,175	1978	115 Sn	WDS 16,195	1975	181 Th	WDS 9,319	1973	247 Bk	WDS 19,181	1976
50 Ti, Cr	WDS 19,291	1976	116 Cd, Sn	WDS 16,247	1975*	182 U	WDS 16,559	1975	248 Ce, Cf	WDS 17,426	1976*
51 V	WDS 23,163	1978	117 Sn	WDS 25,315	1978	183 U	WDS 16,267	1975	249 Cf	WDS 18,196	1976
52 Cr	WDS 23,235	1978	118 Sn	WDS 17,1	1977	184 U, Os	WDS 21,1	1977	250 Cf	WDS 17,416	1976*
53 Cr	WDS 21,323	1977	119 Sn	WDS 26,207	1979	185 Os	WDS 12,533	1976	251 Cf	WDS 18,416	1976
54 Cr, Fe	WDS 23,455	1978	120 Sn, Te	WDS 17,39	1976	186 U, Os	WDS 12,267	1976	252 Cf, Fe	WDS 17,400	1976*
55 Ba	WDS 10,463	1976	121 Sb	WDS 26,305	1979	187 Os	WDS 16,347	1975	253 Os	WDS 18,428	1976
56 Fe	WDS 26,253	1977	122 Sn, Te	WDS 17,419	1972	188 Os	WDS 10,553	1973	254 Cf, Fe	WDS 17,460	1976*
57 Fe	WDS 20,327	1977	123 Sb	WDS 17,363	1976	189 Os	WDS 12,397	1976	255 Fe	WDS 18,434	1976
58 Fe, Ni	WDS 19,445	1976	124 Sn...Xe	WDS 10,91	1973	190 Os, Pt	WDS 9,401	1973*	256 Fe	WDS 17,468	1976*
59 Co	WDS 17,405	1976	125 Te	WDS 17,405	1972*	191 Ir	WDS 9,479	1973*	257 Fe	WDS 18,446	1976
60 Ni	WDS 16,317	1975*	126 Te, Xe	WDS 9,125	1973	192 Os	WDS 9,195	1973*	258 Fe, Ho	WDS 17,473	1976*
61 Ni	WDS 16,1	1975	127 I	WDS 17,1	1972*	193 Ir	WDS 10,389	1972*	259 Fe	WDS 18,451	1976
62 Ni	WDS 26,5	1978	128 Te, Xe	WDS 9,157	1973	194 Pt	WDS 22,433	1977	260 Fe	WDS 17,476	1976*
63 Cu	WDS 16,119	1975	129 Ie	WDS 18,123	1972*	195 Pt	WDS 23,607	1978	261	WDS 18,485	1976
64 Ni, Zn	WDS 12,305	1976*	130 Te...Ba	WDS 13,133	1976	196 Pt, Rg	WDS 17,395	1972*	262	WDS 17,477	1976*
65 Cu	WDS 16,351	1975	131 Xe	WDS 17,573	1976	197 Au	WDS 20,73	1977	263	WDS 18,486	1976
66 Zn	WDS 16,383	1975	132 Xe, Ba	WDS 17,325	1976	198 Pt, Rg	WDS 21,377	1977			

EXPLANATION

The consolidated index given, for each mass value A, the most recent evaluation of experimental information on levels of nuclei with that A-value.

NUCLID The beta-stable number(s) of this A-chain

REFERENCE WDS = Nuclear Physics
WDS 9,125 = Nuclear Data Sheets, vol.9, p.125
84-269 = Nuclear Data Sheets 84, 269

WDSDF Preliminary summaries of recent results may be obtained as computer printout from the Evaluated Nuclear Structure Data File of the Nuclear Data Project

DATE The year in which the evaluation was published

* Indicates that a revision is in progress

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Appendix E
Transmutation Data

BROOKHAVEN NATIONAL LABORATORY

MEMORANDUM

DATE: August 28, 1979

TO: Distribution

FROM: T.W. Burrows

SUBJECT: Transmutation data needed for CTR work

At the October, 1978, meeting of the Panel on Reference Nuclear Data, an action was placed on the NNDC to survey the data available which would satisfy CTR needs for isomer production ratios. After receiving a list of unresolved isomer ratios from H. Makowitz (Enclosure A), a preliminary survey was made. This preliminary survey was restricted to two major sources of information, CINDA and ENDF/B-V and to $E < 20$ MeV. A summary of the data available by reaction is included as Enclosure B and CINDA retrievals are included as Enclosure C.

This is a preliminary survey and I would appreciate any comments or additions you may have by September 21, 1979, so that I may have a final report ready for the November, 1979, meeting.

Based on Enclosure B some general conclusions on the applicability of ENDF/B-V to isomer ratio needs of CTR may be made.

- 1) The major lack is data for the tin reactions.
- 2) With the exception of $^{60}\text{Ni}(n,t)$, the need for nickel reactions seem well satisfy by ENDF/B-V.
- 3) For ^{27}Al and ^{90}Zr it would be relatively easy to add the additional ones required to the special applications file, since the general purpose materials are isotopic.

It would also be useful for the final report if I could receive additional information on the reasons some of these reactions were included in the request. For example, the $T_{1/2}$'s of ^{26m}Al and ^{24m}Na are so short compared to the ground-state $T_{1/2}$'s that for most applications you could assume 100% feeding to the daughter ground-state. Also, (n,t) cross sections are, in general, relatively small ($< 1\text{mb}$ at 14 MeV) so that for most applications they can be neglected.

kh
Distribution: Panel on Reference Nuclear Data
H. Makowitz

CSEWG: S. Pearlstein
B.A. Magurno
C.L. Dunford
F. Mann
R. Schenter
C.W. Reich

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BROOKHAVEN NATIONAL LABORATORY

MEMORANDUM

DATE: 8-9-79

TO: T. W. Burrows
FROM: H. Makowitz
SUBJECT: Transmutation data needed
for CTR work

Enclosed you will find a list of transmutations with unresolved isomer ratios (assumed to be 0.5 in our current calculations) relevant to our CTR work. The nuclides indicated with an "*" are the important ones quantitatively, for our minimum activity studies.

mk

enclosure

	Assumed Fraction	$t_{1/2}$
*AL 27 1 (n,2n) → AL 26 1	.5	β^+ 6.35 sec
*AL 27 1 (n,2n) → AL 26 2	.5	β^+ .73x10 ⁶ y
AL 27 1 (n, α) → NA 24 1	.5	IT 0.021 sec
AL 27 1 (n, α) → NA 24 2	.5	β^- 15.02 hr
FE 54 1 (n,T) → MN 52 1	.5	β^+ , IT 21.4 min
FE 54 1 (n,T) → MN 52 2	.5	β^+ , EC 5.63 d
ZR 90 2 (n,2n) → ZR 89 1	.5	IT, EC 4.18 min
ZR 90 2 (n,2n) → ZR 89 2	.5	β^+ , EC 3.27 d
ZR 90 2 (n,P) → Y 90 1	.5	β^- , IT 3.19 hr
ZR 90 2 (n,P) → Y 90 2	.5	β^- 2.67 d
ZR 90 2 (n,T) → Y 88 1	.5	IT, 0.138 sec
ZR 90 2 (n,T) → Y 88 2	.5	EC, β^+ 106.6 d
SN 118 1 (n,2n) → SN 117 1	.5	IT 14 d
SN 118 1 (n,2n) → SN 117 2	.5	
SN 118 1 (n,G) → SN 119 1	.5	IT 245 d
SN 118 1 (n,G) → SN 119 2	.5	
*SN 118 1 (n, α) → CD 115 1	.5	β^- 44.6 d
*SN 118 1 (n, α) → CD 115 2	.5	β^- 2.23 d
SN 120 1 (n,2n) → SN 119 1	.5	IT 245 d
SN 120 1 (n,2n) → SN 119 2	.5	
*SN 120 1 (n,G) → SN 121 1	.5	β^- 76.0 y
*SN 120 1 (n,G) → SN 121 2	.5	β^- 1.125 d
NI 58 1 (n,P) → CO 58 1	.5	IT 9.1 hr
NI 58 1 (n,P) → CO 58 2	.5	β^+ , EC 71.3 d
*NI 60 1 (n,P) → CO 60 1	.5	β^- , IT 10.48 min
*NI 60 1 (n,P) → CO 60 2	.5	β^- 5.272 y
NI 60 1 (n,T) → CO 58 1	.5	IT 9.1 hr
NI 60 1 (n,T) → CO 58 2	.5	β^+ , EC 71.3 d

* Most important

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"Enclosure B"

Summary of Data Available Satisfying Transmutation Data Needs for CTR Work

Reaction	Comments
$^{27}\text{Al}(n,2n)^{26g}\text{Al}$ } $^{27}\text{Al}(n,2n)^{26m}\text{Al}$ }	1) Experimental data exists from 14 to 20 MeV. 2) ^{27}Al is an ENDF/B general purpose material, but does not contain isomer production. 3) No plans currently to add these reactions to the ENDF/B special applications file.
$^{27}\text{Al}(n,\alpha)^{24g}\text{Na}$ } $^{27}\text{Al}(n,\alpha)^{24m}\text{Na}$ }	1) A large amount of experimental data exists from ≈ 4 to 20 MeV. Most of this data appears to be for ground-state production or cumulative ground-state production 2) See (2) above. 3) $^{27}\text{Al}(n,\alpha)^{24g}\text{Na}$ will be in the special applications file. The decay data for ^{24g}Na is already in this file.
$^{54}\text{Fe}(n,t)^{52g}\text{Mn}$ } $^{54}\text{Fe}(n,t)^{52m}\text{Mn}$ }	1) Most of the experimental data are in the vicinity of 14 MeV. There is an spectrum-average measurement from 11 to 43 MeV. 2) Natural iron is an ENDF/B general purpose material. 3) No plans currently for the addition of these reactions to the special applications file.
$^{90}\text{Zr}(n,2n)^{89g}\text{Zr}$ } $^{90}\text{Zr}(n,2n)^{89m}\text{Zr}$ }	1) There is quite a bit of experimental data near 14 MeV; some data, from 9.5 to 28 MeV; and some spectrum-average data, from 2 to 20 MeV. 2) ^{90}Zr is an ENDF/B general purpose material, but does not contain isomer production. 3) $^{90}\text{Zr}(n,2n)^{89g}\text{Zr}$ will be in the special applications file. The decay data for both ^{89g}Zr and ^{89m}Zr are already in this file.
$^{90}\text{Zr}(n,p)^{90g}\text{Y}$ } $^{90}\text{Zr}(n,p)^{90m}\text{Y}$ }	1) See comment (1) above. 2) See comment (2) above. 3) No plans currently for addition of these reactions to the special applications file.

Summary of Data Available Satisfying Transmutation Data Needs for CTR Work (cont)

Reaction	Comments
$^{90}\text{Zr}(n,t)^{89}\text{gY}$ $^{90}\text{Zr}(n,t)^{88\text{m}}\text{Y}$	4) Decay data for ^{90}gY and $^{90\text{m}}\text{Y}$ will be in the fission products file. 1) Some experimental data at 15 MeV and spectrum-average data from 11 to 43 MeV. 2) See comment (2) above. 3) See comment (3) above.
$^{118}\text{Sn}(n,2n)^{117\text{g}}\text{Sn}$ $^{118}\text{Sn}(n,2n)^{117\text{m}}\text{Sn}$	1) Some experimental data near 14 MeV and one measurement from 13 to 18 MeV. 2) Tin is not included in ENDF/B. The natural element has been evaluated by Lawrence Livermore. 3) No current plans to include these reactions in the special applications file. 4) Decay data for $^{117\text{m}}\text{Sn}$ will be in the fission products file. $^{117\text{g}}\text{Sn}$ is stable.
$^{118}\text{Sn}(n,\gamma)^{119\text{g}}\text{Sn}$ $^{118}\text{Sn}(n,\gamma)^{119\text{m}}\text{Sn}$	1) Some experimental data from 8.7 keV to 59 keV and some spectrum-average data. 2-3) See comments (2) and (3) above. 4) Decay data for $^{119\text{m}}\text{Sn}$ will be in the fission products file. $^{119\text{g}}\text{Sn}$ is stable.
$^{118}\text{Sn}(n,\alpha)^{115\text{g}}\text{Cd}$ $^{118}\text{Sn}(n,\alpha)^{115\text{m}}\text{Cd}$	1) Some experimental data from 12 to 25 MeV. 2-3) See comments (2) and (3) above. 4) Decay data for both products will be in fission products file.
$^{120}\text{Sn}(n,2n)^{119\text{g}}\text{Sn}$ $^{120}\text{Sn}(n,2n)^{119\text{m}}\text{Sn}$	1) One measurement near 14 MeV. 2-3) See comments (2) and (3) above. 4) See comment (4) of $^{118}\text{Sn}(n,\gamma)$.

Summary of Data Available Satisfying Transmutation Data Needs for CTR Work (cont)

Reaction	Comments
$^{120}\text{Sn}(n,\gamma)^{121\text{g}}\text{Sn}$ $^{120}\text{Sn}(n,\gamma)^{121\text{m}}\text{Sn}$	1) Some experimental data from 9.3 to 55 keV and some spectrum-average data. 2-3) See comments (2) and (3) above. 4) Decay data for both products will be in the fission products file.
$^{58}\text{Ni}(n,p)^{58\text{g}}\text{Co}$ $^{58}\text{Ni}(n,p)^{58\text{m}}\text{Co}$	1) Experimental data from 2.2 to 23 MeV. 2) $^{58}\text{Ni}(n,p)$ is in the ENDF/B dosimetry file, but does not contain isomer production. 3) The reactions will be in the special applications file and includes the production of both isomers. Decay data for ^{58}gCo has already been included in the file.
$^{60}\text{Ni}(n,p)^{60\text{g}}\text{Co}$ $^{60}\text{Ni}(n,p)^{60\text{m}}\text{Co}$	1) Some data from 6 to 20 MeV and quite a bit at 14 MeV. 2) $^{60}\text{Ni}(n,p)$ is in the ENDF/B dosimetry file, but does not contain isomer productions. 3) The reactions will be in the special applications file and includes the production of both isomers. Decay data for $^{60\text{g}}\text{Co}$ has already been included in this file.
$^{60}\text{Ni}(n,t)^{58\text{g}}\text{Co}$ $^{60}\text{Ni}(n,t)^{58\text{m}}\text{Co}$	1) One measurement at 15 MeV and one spectrum-average, from 11 to 43 MeV. 2) The element is included as an ENDF/B general purpose material. 3) It is not planned, currently, to add these reactions to the special applications file. Decay data for $^{58\text{g}}\text{Co}$ is already in the special applications file.

"Enclosure C"

CINDA Retrievals

NUCLIDE AL 27

5-Aug-80

(n,2n)	1.4+7	LAS	Expt	Jour	PR	97	1205	5503	Graves+ 0.00+-0.02B
(n,2n)	1.4+7	LRL	Expt	Prog	WASH-194			5707	Ashby+ NDG
(n,2n)	1.6+7	2.0+7	HAR	Expt	Jour	NP	19	535	6011
	1.6+7	2.1+7		Expt	Data	EXFOR20921.004			7906
(n,2n)	Fiss		CRC	Eval	Rept	CRC-1003			6012
(n,2n)	1.5+7		DEB	Expt	Jour	NP	46	141	6307
	1.5+7			Expt	Jour	AK	4	137	6206
	1.5+7			Expt	Data	EXFOR30118.005			7102
(n,2n)	1.4+7	2.0+7	AE	Eval	Rept	AE- 117			6308
(n,2n)	6.0-4	1.5+6	UK	Eval	Rept	AEW-M-445			6407
(n,2n)	1.4+7	1.8+7	GEO	Expt	Abst	DA	26	3425	6512
	1.4+7	1.8+7		Expt	Data	EXFOR11520.003			7606
(n,2n)	1.4+7	1.5+7	JYV	Eval	Rept	JU-RR-3/1970			7006
(n,2n)	1.4+7		KFI	Comp	Jour	JRC	7	365	7106
(n,2n)	1.4+7		ITJ	Expt	Jour	JRC	14	201	7300
	1.4+7			Expt	Data	EXFOR30322.004			7602
(n,2n)	1.4+7	1.5+7	UK	Eval	Data	UKNDL-DFN	35F		7303
(n,2n)	Pile		CRC	Expt	Prog	INDC(CAN)-13	4		7310
(n,2n)	1.4+7	1.9+7	LRL	Theo	Conf	75WASH		651	7503
(n,2n)	1.4+7	1.5+7	KFK	Eval	Rept	KFK-2233	1		7512
	1.4+7	1.5+7		Eval	Data	KEDAK-3			7510
(n,2n)	1.5+7		NEG	Expt	Rept	INIS-MF-3663			7612
	1.5+7			Expt	Data	EXFOR30447.002			7805
(n,2n)	1.5+7		BOS	Theo	Conf	76AHMEDA	2	12	7612
(n,2n)	1.5+7	1.9+7	NPL	Expt	Jour	JP/G	4111783		7811

Mant+. ACT. TABLE. TO 228KEV LVL.
 9PTS.SIGMA.
 Roy+, ESTIMATED AVG SIG=0.004MB
 Csikai+ ACTIV,RATIOSN,2N/N,GAM, TABLE
 *IN HUNGARN
 RATIO N,2N/N,GAMMA AT 14.6 MEV
 Forsberg.STATMDL EVL OF MANI+. XPTS
 King.(WIN).UKNDL-DFN 35.
 Arnold.SIGMA AT 9 ES.EXPT CFD THEOR
 . 9 PTS, SIG
 Leppanenaki+ TABLE OF EVAL AVG SIG
 Nagy+ SIGMA LIMIT, GAM+BETA ES GIVEN
 Janczyszyn+ TO ISO,ACTIV.CFD OTH,TBL
 1 PNT.
 .2 PTS. E DIST.ANG DIST,LAB.
 Santry+ BRIEF,NO SIGNIFICANT SIGMA
 Gardner.CFD EXPT DATA.GRPH.
 Goel. KEDAK-3 DATA.GRAPHs.
 4 DATA SETS
 Shani. P83.GELI,SIG=.62+-0.05MILLIB.
 1 PNT.
 Nath+ABSOL SIGMA OF CLOSE SHEL NUCLI
 Ryves+ TBL GIVEN

(n,alpha)	9.0+7	BRK	Expt	Jour	PR	75	537	4902	Knox. UPPER LMT SIG REL C12(N,2N)GVN
(n,alpha)	1.4+7	LAS	Expt	Jour	PR	88	1309	5212	Forbes. ACT, NA24 DECAY BETAS
	1.4+7		Expt	Data	EXFOR11474.002			7606	. 1 PT, SIG
(n,alpha)	1.5+7	CRC	Expt	Jour	CJP	31	267	5302	Paul+ ACT, NA24 DECAY BETAS
	1.5+7		Expt	Data	EXFOR11274.009			7606	. 1 PT, SIG
(n,alpha)	1.4+7	LAS	Expt	Jour	PR	97	1205	5503	Graves+ SIGMA (N,P) + (N,A) GIVEN
(n,alpha)	1.5+7	KTO	Expt	Jour	PR	106	155	5704	Kumabe+ PHOTOPLATE 92+15MB ALFA A-E
	1.5+7		Expt	Data	EXFOR20321.			7406	10PTS.A-EMISSION,A-EMISS/DA.
(n,alpha)	1.4+7	KON	Expt	Jour	JPJ	12	443	5705	Yasumi.BY NA24 DECAY BETAS.120+-14MB
	1.4+7		Expt	Data	EXFOR20280.003			7406	1PNT.SIGMA.
(n,alpha)		JAP	Theo	Jour	PTP	17	643	5705	. CCB DIFFWELL CFD XPT D-T NS CURVS
(n,alpha)	+5 +7	KJL	Expt	Conf	S7PARIS	1	48	5709	Samsahl.SAELAN. EXPTL VALUE OF 1954
(n,alpha)	6.7+6 1.4+7	LAS	Expt	Jour	PR	109	425	5801	Grundl+ ACT
	6.7+6 1.4+7		Expt	Data	EXFOR11481.002			7606	. 7 PTS, SIG
(n,alpha)	1.5+7 1.5+7	KTO	Expt	Jour	JPJ	13	325	5804	Kumabe. ALPHA COUNT. NUC EMULSION.
	1.5+7		Expt	Data	EXFOR20283.002			7406	1PNT.SIGMA.
(n,alpha)	Fiss	HAR	Theo	Rept	AERE-R/R-2687			5809	.QUOTE RICHMOND TBP 0.587 -.024MB
(n,alpha)	Fiss	GES	Expt	Jour	NUC	17	1	5901	Rochlin. ACT, 0.6 TO 0.44 MB
(n,alpha)	1.3+7 1.6+7	NRD	Expt	Jour	NP	10	226	5903	Kern+. GAMMA COUNTING.GRAPH.
	1.3+7 1.6+7		Expt	Rept	USNRDL-TR-269			5810	.SUPERSEDED
(n,alpha)	1.4+7		Expt	Data	EXFOR11464.003			7606	. 12 PTS, SIG
	1.4+7	CCP	Expt	Jour	ZET	36	1046	5904	SIG FOR PROD OF NA24M IS .04 B
(n,alpha)	6.1+6 1.0+7	GEA	Eval	Rept	XDC-60-8-81			5906	TRANSLATN."
(n,alpha)	1.5+7	ARK	Expt	Jour	PR	115	989	5908	Roberts. 1.37+2.75MEV GAM,GP AVGD
	1.5+7		Expt	Data	EXFOR11484.002			7606	Poularikas+ C-W, ABS BETA COUNT
(n,alpha)	Fiss	BNL	Eval	Rept	BNL-634			6000	. 1 PT, SIG
(n,alpha)	1.4+7	SAH	Expt	Conf	60WALTAI	289		6002	Sher+.BEST VALUE=0.61+-0.02MB.
(n,alpha)	1.4+7	MUA	Expt	Conf	60WALTAI	297		6002	Mukherjee+.VAL GVN REL AL(N,A),VDG
	1.4+7		Expt	Jour	NP	13	88	5910	Khurana+.VAL GVN REL FE056(N,P),C-W
	1.4+7		Expt	Data	EXFOR30403.002			7707	Khurana+C-W ABS BETA-COUNT 111+-9MB
(n,alpha)	Fiss	HAR	Eval	Rept	AERE-R-3251			6002	REL TO 110MB OF FE-56(N,P).
(n,alpha)	9.4+6 1.4+7	LAS	Expt	Prog	WASH-1028	30		6004	MELLISH CPD REVSD 832(NP)VALUE 60MB
(n,alpha)	Fiss	ALD	Comp	Rept	AWRE-O-2/60			6004	Cochran. 6 ES, NDC
(n,alpha)	1.5+7	LYO	Expt	Jour	JPR	21	377	6005	Hinves+.COMPARES MEASURED VALUES
	1.5+7		Expt	Data	EXFOR21419.004			8003	Depraz+ACTIVATION 116+-9MB
(n,alpha)	8.4+6 1.5+7	LRL	Expt	Rept	UCRL-6028			6006	1PNT. SIGMA.
	8.4+6 1.5+7		Expt	Data	EXFOR11504.003			7606	Tewes.ACT 15ES +-20PC,TO BE COMPLYD
(n,alpha)	Fiss	GEA	Revw	Conf	60SVIENN	383		6006	. 15 PTS, SIG
(n,alpha)	Tr	GDT	Theo	Jour	PR	119	721	6007	Moteff+THRS-SIG-TBLS FOR DOSIMETRY
(n,alpha)	1.2+7 2.1+7	HAR	Expt	Jour	NP	19	535	6011	Bullock. TH CFD EXPT
	1.2+7 2.1+7		Expt	Data	EXFOR20921.003			7906	Mani+. ACTIVATION. TABLE.
(n,alpha)	Fiss	CRC	Eval	Rept	CRC-1003			6012	24PTS.SIGMA.
(n,alpha)	6.1+6 1.5+7	ORL	Expt	Jour	PR	121	827	6102	Roy+.ESTIMATED AVG SIG=0.65MB
	6.1+6 1.5+7		Expt	Rept	ORNL-2610			5809	Schmitt+.ACT,RELATIVE TO U238 NF
	6.1+6 1.5+7		Expt	Data	EXFOR11530.			7606	.SUPERSEDED
(n,alpha)	Fiss	AUA	Theo	Rept	AAEC/E-59			6103	. 39 PTS, SIG
(n,alpha)	1.2+7 2.0+7	HAM	Expt	Jour	JPR	22	602	6110	Nicholson+ FISSN SIG GVN+CPD OTHER'S
	1.3+7 2.0+7		Expt	Data	EXFOR20904.002			7904	Bormann+ACTIVATION 9ES MAX=130MB
(n,alpha)	7.0+6 2.0+7	LAS	Expt	Jour	JIN	23	173	6112	5PTS.SIGMA.
	7.0+6 2.0+7		Expt	Rept	LA- 2493			6012	Bayhurst+.18ES.FROM BETA ACTIVITY
	7.0+6 2.0+7		Expt	Data	EXFOR11462.002			7606	Bayhurst+.ACT EXCITATION CURVE ONLY
(n,alpha)	1.4+7	RBZ	Expt	Jour	NP	30	49	6202	. 15 PTS, SIG
	1.4+7		Expt	Data	EXFOR30008.029			7006	Strohal+ ACTIV,CMPD NUCL THEOR,TABLE
									SIGMA TOTAL

(n,alpha)	1.5+7	MUA	Theo	Conf	62MADRAS	39	6202	Mohindra+.SPECTRA OF ALFAS CPD EXPT
(n,alpha)	Fiss	MOL	Expt	Jour	JNE	16	447	Depuydt+. 0.63+-0.03MB.CPD OTHER DATA
	Fiss		Expt	Data	EXFOR20191.002		7405	1PNT.SIGMA.
(n,alpha)	1.4+7	1.4+7	HAM	Expt	Priv	LANGMANN	6209	Langmann. = 1 DATA INDEX LINES
	1.4+7			Expt	Data	EXFOR20903.002	7904	1PNT.SIGMA.
(n,alpha)	1.2+7	1.8+7	KTY	Expt	Jour	PR	128	Gabbard+ ACT, CPD STAT THEORY
	1.2+7	1.8+7		Expt	Data	EXFOR11494.003	7606	. 23 PTS, SIG
(n,alpha)	3.3+6	1.4+7	ISP	Revw	Conf	62HARMEL	1 325	Dierckx. SIG(E) GRAPH AND FISSN AVG
(n,alpha)	6.0+6	1.2+7	ISP	Revw	Conf	62HARMEL	1 27	Breestit+ SIG(E) GRAPH,THRESHOLD-DET
(n,alpha)	1.4+7		IRK	Expt	Jour	NP	39	Patzak+. E+A DISTRIBUTION. EMULSIONS
	1.4+7			Expt	Jour	QAWA	98	Patzak+
	1.4+7			Expt	Data	EXFOR20055.	7109	13PTS.D/DA,SIG.
(n,alpha)	Fiss		GD	Revw	Conf	62HARMEL	1 153	Romanko+ FISSN AVERAGE VALUE GIVEN
(n,alpha)	Fiss		DGE	Eval	Conf	62HARMEL	2 11	Delattre+ RECOMM EFF+TOT-AVG SIG GVN
(n,alpha)	+6	+7	CRC	Revw	Conf	62HARMEL	1 394	Cross. THRESHOLD DETECTOR REVIEW
(n,alpha)	4.9+6	2.0+7	CRC	Expt	Jour	CJP	41	Butler+ ACT, NA24 DECAY BETAS
	4.9+6	2.0+7		Expt	Data	EXFOR11457.	7606	. 46 PTS, SIG
(n,alpha)	1.5+7		GLS	Expt	Jour	PPS	81	Irfan+ SIG AT 55DEG,ALFA E+ANG DIST
	1.5+7			Expt	Data	EXFOR21076.	7908	56PTS.DIFF.AND DOUBLE DIFF SIGMA.
(n,alpha)	1.4+7		OTC	Expt	Jour	NP	44	Jarvis+ EMULSION. E,ANGDIST-LVL DENS
(n,alpha)	1.5+7		DEB	Expt	Jour	NP	46	Csikai+ ACTIV,RATIOSH,ALFA/N,P,TABLE
	1.5+7			Expt	Jour	AK	4	*IN HUNGARN
	1.5+7			Expt	Data	EXFOR30118.004	7102	RATIOS N,ALFA/N,P AT 14.6 MEV
(n,alpha)	1.2+7	2.1+7	SAC	Expt	Jour	NP	47	Jeronymo+ ACTIVATION OF NA-24
	1.2+7	2.1+7		Expt	Data	EXFOR20922.002	7906	8PTS.SIGMA.
(n,alpha)	6.0+6	2.1+7	AE	Eval	Rept	AE- 117	6308	Forsberg.Q=-3.14 MEV
(n,alpha)	1.4+7		HAM	Expt	Prog	EANDC(E)49L	4	Bormann+ ACTIV. REL LI(N,T).
	1.4+7			Expt	Data	EXFOR20887.014	8004	1PNT.SIGMA.
(n,alpha)	1.5+7		TUR	Expt	Jour	NP	51	Bonazzola+ACT BETA COUNT SIG=112 MB
	1.5+7			Expt	Data	EXFOR20888.002	7904	1PNT.SIGMA.
(n,alpha)	1.4+7		TAT	Expt	Conf	64CHANDG	100	Badrinathan+.GRPH OF ANGLE-DISTRB
(n,alpha)	1.3+7	1.8+7	LOK	Expt	Priv	IMHOFF	6402	Imhoff.
	1.3+7	1.8+7		Expt	Data	EXFOR11526.003	7606	. 4 PTS, SIG
(n,alpha)	1.4+7		CIS	Theo	Jour	NP	51	Facchini+STATMOD SIG XPT/CALC GOOD
	7.0+6	1.9+7		Theo	Jour	NP	51	Saettamenichella+STATMOD CP EXCIT FN
(n,alpha)	1.5+7		CCP	Expt	Jour	AE	16	Aron+CHEM.SEPARAT OF NA24 106+2.3MB
	1.5+7			Expt	Jour	EAF	16	.FRENCH OF AE 16 370
	1.5+7			Expt	Jour	SJA	16	. ENGL OF AE 16 370
(n,alpha)	1.4+7	1.5+7	RBZ	Expt	Jour	PL	10	Kulisic+RES 50KEV ERICSON FLUCTS.OBS
	1.4+7	1.5+7		Expt	Conf	64PARIS	2 678	Kulisic+
(n,alpha)	6.0-4	1.5+6	UK	Eval	Rept	AESW-M-445	6407	King.WIN. UKNDL-DFN 35.SUPERSEDED.
	6.2+6	1.5+7		Eval	Data	UKNDL-DFN	35F	59 PNTS
(n,alpha)	Fiss		AUA	Expt	Jour	JNAB	18	Boldeman.ACT REL S32 NP, CPD OTHERS
	Fiss			Expt	Data	EXFOR30143.004	7112	NEUTRON CONVERTER,U-235 FISS SPEC AV
(n,alpha)	Fiss		ROS	Comp	Rept	ZFK-RN-23	6409	Faehrmann. TBP KERNENERGIE
(n,alpha)	Fiss		JAE	Expt	Jour	NST	1 228	Shikata. ACTIVH REL N158(N,P),=0.5MB
	Fiss			Expt	Data	EXFOR20735.003	7704	1PNT.SIGMA.
(n,alpha)	1.4+7		IIT	Theo	Jour	NP	60	Gardner+PREDICTED BY EMPIRICAL FORM
(n,alpha)	1.0+6		AMS	Expt	Jour	PHY	30	Heertje+PU-BE-SOURCE 25PC BELOW 1MEV
	1.0+6			Expt	Jour	PHY	28	Heertje+ USED RA-BE SOURCE
(n,alpha)	4.0+6	2.4+7	FRK	Expt	Jour	NCS	3	.ABST.NDG.
(n,alpha)	1.5+7		ORL	Expt	Rept	ORNL-3672	6501	Strain. BY NAT ELEMENT IRRAD. 115MB
	1.5+7			Expt	Data	EXFOR11263.011	7606	. 1 PT, SIG
(n,alpha)	6.0+6	2.0+7	SAH	Revw	Conf	65CALCUT	132	Chatterjee. EXPTL+CALC SIG(E) GRAPH
(n,alpha)	Fiss		MOL	Expt	Prog	EANDC(E)57U	6502	Fabry+ 4PI-BETA-G,CALIB SIGMA
	Fiss			Expt	Data	EXFOR20178.003	7405	2PTS.SIGMA.
(n,alpha)	Fiss		IIT	Comp	Conf	65IAEA	251	Barrall+ CALC SIGS,3 SPECS,CFD EXPTS
(n,alpha)	Fiss		LAS	Abst	DA	25	6704	Grundl. U235 SPEC., REL U235
(n,alpha)	1.4+7		HAM	Expt	Jour	NP	68	Seebeck+ ANG+E DIST OF ALPHAS
	1.4+7			Expt	Rept	EANDC-50	110	Bormann+ FULL PAPER OF 65ANTWER,GRPH

	1.4+7		Expt	Data	EXFOR20837.	7903
(n,alpha)	1.4+7		FRK	Expt	Conf 65ANTWER 542	6507
(n,alpha)	1.3+7	2.0+7	GEL	Expt	Jour JHE 19 907	6511
	1.3+7	2.0+7		Expt	Conf 66BERKEL 352	6609
	1.3+7	2.0+7		Expt	Data EXFOR20378.003	7410
(n,alpha)	1.4+7		GRE	Expt	Rept CEA-R-2900	6512
(n,alpha)	Tr	2.0+7	GEL	Comp	Rept EUR-119E VOL.1	6604
(n,alpha)	1.4+7	1.5+7	DUR	Expt	Jour PRSA 292 180	6605
	1.4+7	1.5+7		Expt	Rept AERE-XPR2491/6	6309
	1.4+7	1.5+7		Expt	Data EXFOR21372.002	8002
(n,alpha)	Tr	1.5+7	KAP	Eval	Rept KAPL/CSNL-4 66	6606
(n,alpha)	1.5+7		DEB	Expt	Jour AK 8 79	6606
(n,alpha)	6.0+6	8.3+6	GEL	Expt	Jour NUK 8 315	6608
	6.0+6	8.3+6		Expt	Conf 66BERKEL 352	6609
	6.1+6	8.2+6		Expt	Data EXFOR20387.003	7410
(n,alpha)	Fiss	1.0+6	HAR	Theo	Conf 66BERKEL 331	6609
(n,alpha)	NDG		KAP	Eval	Conf 66PARIS 2 267	6610
(n,alpha)	5.0+6	1.0+7	CRC	Theo	Jour PR 152 1034	6612
(n,alpha)	1.5+7		TUR	Expt	Jour ZP 199 275	6701
	1.5+7			Expt	Data EXFOR21345.002	8002
(n,alpha)	Fiss		MUN	Expt	Jour NUK 9 228	6703
	Fiss			Expt	Data EXFOR20736.002	7704
(n,alpha)	1.2+7	1.5+7	NRD	Expt	Jour NP/A 98 65	6705
	1.2+7	1.5+7		Expt	Rept USNRDL-TR-67	6702
	1.3+7	1.4+7		Expt	Rept USNRDL-TR-846	6505
	1.2+7	1.5+7		Expt	Data EXFOR11512.003	7606
(n,alpha)	5.9+6	1.4+7	LAS	Expt	Jour NSE 30 39	6710
	6.0+6	1.4+7		Expt	Data EXFOR10416.008	7412
(n,alpha)	1.3+7	1.5+7	HAM	Expt	Jour ZP 207 64	6710
	1.3+7	1.5+7		Expt	Data EXFOR21041.	7908
(n,alpha)	6.1+6	1.9+7	LOK	Expt	Jour PR 163 1308	6711
	6.1+6	1.9+7		Expt	Abst DA/B 27 3638	6704
	6.1+6	1.9+7		Expt	Data EXFOR11421.004	7606
(n,alpha)		1.4+7	SOR	Revu	Conf IAEA-107 57	6800
(n,alpha)	5.5+6	2.0+7	GEL	Eval	Conf IAEA-107 258	6800
	5.5+6	2.0+7		Eval	Conf 67BRUSSE	6705
(n,alpha)	1.4+7		TAT	Theo	Jour NP/A 110 317	6803
(n,alpha)	1.4+7	1.5+7	NAP	Expt	Jour NC/B 54 1 53	6803
	1.4+7	1.5+7		Comp	Rept INFN/BE-67-11	6709
	1.4+7	1.5+7		Expt	Data EXFOR2089C.003	7904
(n,alpha)	Fiss		BNW	Theo	Rept BNWL-SA-1794	6804
(n,alpha)	1.4+7	1.7+7	NRD	Expt	Jour HP 14 595	6806
(n,alpha)	Fiss		CCP	Expt	Jour DJK 180 836	6906
	Fiss			Expt	Jour SPD 13 6 559	6812
	Fiss			Expt	Jour AS 25 437	6811
	Fiss			Expt	Jour SJA 25 1251	6811
	Fiss			Expt	Jour EAF 25 125	6811
(n,alpha)	1.4+7		BOR	Expt	Jour APH 4 3 289	6900
	1.4+7			Expt	Rept BNWL-TR-380	7000
(n,alpha)	1.4+7	1.5+7	BIA	Expt	Jour JIN 31 1	6901
	1.4+7	1.5+7		Expt	Data EXFOR20930.005	7906
(n,alpha)	1.4+7	1.5+7	BAS	Expt	Jour HPA 42 252	5904
	1.4+7			Expt	Data EXFOR21250.002	8001
(n,alpha)	Fiss		MTR	Expt	Prog WASH-1136 55	6909
(n,alpha)	Fiss		CRC	Comp	Prog E.NDOC(CAN)-40	6909
(n,alpha)	1.5+7		STF	Expt	Jour NP/A 138 387	6911
	1.5+7			Expt	Data EXFOR10031.002	7106
(n,alpha)	1.3+7	1.5+7	DEB	Comp	Jour RFA 7 4 93	6912
(n,alpha)	6.0+6	1.8+7	SCU	Theo	Rept ICD-7 SUPPL 1	7000
	6.0+6	1.8+7		Theo	Rept INDC(CCP)-18	7112

24PTS.DA/DE, 24PTS.D/DA, 1PNT SIG
Breuer+. SPECTRUM +ANG.DISTR. EMULS.
Paulsen+ CURVE.TBL.ACTIV METHOD.VDG
Liskien+ CURVE.OKS CRC.
23PTS.SIGMA.
Monnand.SIG ISOM.PRODUCT+HALF LIFE
Liskien+PAULSEN.ALL DATA EXCIT FUNCIT
Hemingway+ABSOLUTE DATA BY HE ASSAY
SUPERSEDED+
2PTS.SIGMA.
Lubitz. FISS AVE = .644MB
Csikai.RATIO FORWARD/BACKWARD RECOIL
Liskien+ CURVE TABLE ACTIV METH.VDG
Liskien+ CURVE ONLY.
17PTS.SIGMA.
Carter Cranberg Sp .59+--.04MB, +COMP
Francis+ NDG, XPT FIT TO OPTMDL
Butler+ H-F+OPTMDL CF CJP41 372 DATA
Minetti. = 1 DATA INDEX LINES
1PNT.SIGMA.
Rau. NISB(NP)=95 MB FOR FLUX MEASNT
1PNT.SIGMA.
Ferguson+ STRUCTURE OKS ERICSON THY
.SUPERSEDED
.SUPERSEDED
. 54 PTS, SIG
Grundl+ DET EXCIT MEAS
6PTS,SIGMA
Bormann+,REL MEASUREMENT,CURVE GIVEN
50PTS.REL SIGMA.
Menlove+ ACT,6.1,8.1,13-19MEV, TABLE
.SUPERSEDED
. 10 PTS, SIG
Ben-David.GRPH THRS-SIG(NEUT-E) GVN
Spaepen. "BEST CURVE" AS GRPH+TBL
Spaepen. PPR13. EQU TO IAEA-107
Tiwarl+.SIGMA FROM LVL DENS NA24
Cuzzocrea+ ACT ANAL TH OKS EXPERIMNT
Cuzzocrea+ AVERAGED CHOSEN DATA.
27PTS.SIGMA.
McElroy. SAND 2 CALCULATN.
Rago+ ACT REL S32(NP),NORM AT 14MEV
Nasyrov.(AVG+EFFECTIV)THRESH-SIG-TBL
TRANSLATN.*
Nasyrov.(AVG+EFFECTIV)THRESH-SIG-TBL
Nasyrov.ENGLISH
Nasyrov.FRENCH
Roturier.THESIS
. ENGLISH OF APH 4 289
Crumpton+ ACTIVATION.
2PTS.SIGMA.
Boschung+.ACT.ABS AT14MEV 120MB CFD
1PNT.SIGMA.
Schuman+,ACTIVATION,VALUE GIVEN
Santry+ SIG EFF FOR ASSUMED H-SPECS
Barrall+. D-T NS. GAMMA ACTIVATION.
1PNT.SIGMA.
Csikai+ COMP,SIG+HL,GRPH,ACTIV-ANAL
Sawcliev.STATMOD CALCS,CFD EXPT,GRPH
. ENGL OF ICD-7 SUPPL 1

(n,alpha)	1.5+7	BLN	Expt	Jour	NC/A 65 675	7002	Lebowitz+DET BY ACT METHOD.0
	1.5+7		Expt	Data	EXFOR10116.002	7107	1PT.CS=110+-15 MB.
(n,alpha)	6.0+6	2.0+7	ISP	Eval	NSE 40 331	7005	Bresesti+,EXCITAT CURV,INTERCALIBRAT
(n,alpha)	+6	+7	HAR	Revw	STI/DOC/10-107	7005	Wright. PAGE37,THRESHOLD DETECT DATA
(n,alpha)	4.0+6	2.0+7	BNW	Revw	STI/DOC/10-107	7005	Dahl+PAGE166. SIG(E) GRPH,REVIEW
(n,alpha)	1.0+4	1.8+7	BNW	Eval	BNWL-1312	7005	Simons+.
(n,alpha)	6.0+6	8.5+6	KFK	Revw	70HEL SIN 2 219	7006	Cierjacks.113. REVIEW, SIG(E) GRAPH
(n,alpha)	1.4+7	1.5+7	JYV	Eval	JU-RR-3/1970	7006	Leppaemaeki+ TABLE OF EVAL AVG SIG
(n,alpha)	Maxw	+6	AE	Theo	70HEL SIN 2 861	7006	Eriksson.52. SIGMA TB CALCULATO, NDC
(n,alpha)	1.4+7	1.4+7	MUN	Expt	JP 237 155	7009	Vonach+ 117.0+-0.8MB.ABS MEASUREMENT
	1.4+7	1.4+7		Expt	Data EXFOR20111.002	7109	. ABS SIG AT 14.4 MEV.
(n,alpha)	1.3+7	1.5+7	MUN	Expt	JP 237 155	7009	Vonach+ RENORM. EARIER MEASURENT
	1.3+7	1.5+7		Expt	Conf 68WASH 2 885	6803	Vonach+ DATA SUPERSEDED.
	1.4+7	1.5+7		Expt	Data EXFOR20111.	7109	14PTS.SIG.
(n,alpha)	5.0+6	2.0+7	CCP	Theo	Jour YF 12 704	7010	Savel+Ev+ SIG(E) CFD XPT,HAUSER-F-TH
	5.0+6	2.0+7		Theo	Jour SNP 12 381	7104	TRANSLATN.*
(n,alpha)	7.0+6	2.0+7	BIP	Comp	Jour NIM 92 533	7100	Crumpton+ SLOPE OF EXIT FN AT 14 MEV
(n,alpha)	Pile		ORL	Expt	Abst ANS 14 381	7106	Jenkins+. EFFECTIVE SIG=0.610MB
(n,alpha)	1.4+7		KFI	Comp	Jour JRC 7 365	7106	Nagy+ SIGMA, GAMMA+BETA ES GIVEN
(n,alpha)	1.5+7		SMU	Expt	Jour NP/A 170 193	7107	Salaita+.TO NA24M GE(LI)CYCLIC ACT.M
	1.5+7			Expt	Conf 75WASH 712	7503	Salaita+SHORT-LIVED ISOMER PROD.TBL.
	1.5+7			Expt	Conf 74COLUMB 95	7407	Salaita+ ACT.SIG TO SHORTLIV ISO.TBL
	1.5+7			Expt	Data EXFOR10186.	7201	. 2PTS,SIGMA,GND AND META
(n,alpha)	1.5+7		LND	Expt	Jour PS 4 165	7112	Nyberg+. MEASURED XSECT FOR NONEL GS
	1.5+7			Expt	Rept LU-NP-69G2	6904	Nyberg+ EQUIVALENT TO PS 4 165
	1.5+7	1.6+7		Expt	Data EXFOR20245.018	7405	1PNT.D/DA.
(n,alpha)	7.7+6	9.3+6	RI	Expt	Rept YK- 9 53	7200	Nemilov+ 4PI-DET,SIG(E) TBL+GRAPH
	7.7+6	9.3+6		Expt	Prog YFI-12 89	7200	Nemilov+ ABST,ACTIV,EXCIT FUNCT,NDC
	7.7+6	9.3+6		Expt	Conf 71KIEV	7105	Nemilov+ SIG,TBL,FN OF EXCIT,GRAPH
	7.7+6	9.3+6		Expt	Rept INDC(CCP)-42	7408	.P13.ENGLISH OF YK-9.
	7.7+6	9.3+6		Expt	Prog INDC(CCP)-30	7209	.PAGE 78,ENGLISH OF YFI-12 89
	7.7+6	9.3+6		Expt	Data EXFOR40135.002	7302	.SIGMA AT 4 ES GIVEN
(n,alpha)	Fiss		MOL	Eval	Rept BLC-465	7205	Fabry.0.725+-0.
	Fiss			Conf	70HEL SIN 2 535	7006	Fabry+39. RECOMMENDED DATA,TABLES
(n,alpha)	1.5+7		NPL	Expt	Jour JNE 27 139	7303	Robertson+ B-G COIN COUNT.RES .2MEV
	1.5+7			Expt	Jour JNE 27 531	7308	Robertson+ SIG=115.5MB.REL FE056 NP
(n,alpha)	Fiss		KTO	Expt	Data EXFOR20798.002	7610	1PNT.SIGMA.
	1.5+6			Expt	Jour NST 10 574	7309	Kimura+.ACTIV METHOD.SIG IN TABLE
(n,alpha)	Tr	2.0+7	RCN	Comp	Data EXFOR20593.002	7608	2PTS.SIGMA.
	Fiss			Rept	RCN-196	7310	Zijp+COMPIL.EVAL.CS.FAST N.METROLOGY
(n,alpha)	1.4+7		TUD	Theo	Conf 73PARIS 2 271	7303	Zijp.RECOMM INTEG CFD DIFF CALC,TBLS
(n,alpha)	Fiss		BUK	Theo	Rept ZFK-271 63	7311	Seeliger+ A-EMISSION SPEC, NDC
(n,alpha)	Fiss		IFL	Eval	Rept IFA-R-10	7400	Vasiliiu+(U235).INTEGSIG CFD XPTS,TBL
	4.9+6	1.8+7		Eval	Book LAPENAS	7500	Lapenas. EVAL DATA AVG,VALUE GIVEN
	4.9+6	1.8+7		Eval	Rept YK- 15 63	7308	Lapenas. FULL DOCUM OF EVAL,TABLES
	Fiss			Eval	Rept YK- 15 63	7308	Bondars+ GRPH ONLY.SOME VALS DIFFRNT
	4.9+6	1.8+7		Eval	Data VIEN-V0002.016	7511	Bondars+ SHORT. AVG VALUE GIVEN
	Fiss			Eval	Data VIEN-V0003.016	7511	SIGMA AT 127 ENERGIES
(n,alpha)	2.5+7	2.0+8	BNL	Expt	Jour NIM 129 473	7500	WATT-SPECTRUM, 1 POINT
(n,alpha)	1.5+6		PTB	Expt	Conf 75WASH 273	7503	Katcoff+ SIG IN MEIN FLUX SPEC
	1.5+6			Expt	Rept PTB-FMRB-60	7502	Alberts+252CF SOURCE.SPECTRUM AVG.
	1.5+6			Expt	Jour NSE 55 243	7410	Alberts. CF252-SPC,EVAL DATA AVG,TBL
	1.5+6			Expt	Data EXFOR20619.002	7606	Alberts+ N-SOURCE=CF-252 SPON.FISS.
(n,alpha)	Fiss		HED	Expt	Conf 75WASH 189	7503	1PNT.SIGMA.
(n,alpha)	Fiss		SEO	Eval	Jour KNS 7 119	7506	McElroy.235U THERM FISS SPECT AVG CS
(n,alpha)	7.5+6	2.6+7	LAS	Expt	Jour PR/C 12 451	7508	Seung Gy Ro+ AVG SIG(AVG E),TBL+GRPH
(n,alpha)	5.5+6	2.0+7	BUC	Revw	Rept INDC(RUM)-7	7510	Bayhurst+WAS STANDARD.DET 21-26 MEV.
	5.5+6	2.0+7		Eval	Rept IFA-R-10	7400	Vasiliiu+ CRITIC ANALYS OF EVALS,GRPH
	5.7+6	2.0+7		Eval	Data VIEN-V0001.002	7510	Vasiliiu+ RENORMALIZD,TBL,EVAL CURVES
							SIGMA AT 58 ENERGIES

(n, alpha)	Fiss		MOL	Expt	Prog	INDC(SEC)-51	7512	Fabry.P85.AVG(U35-SPEC),CFD ENDF,TBL
	Fiss			Expt	Conf	7VIENNA	97	Fabry.REL EXPT, U235+PU239 SPECS,TBL
	Fiss			Expt	Jour	NUK	10	Fabry.CFD FISS SPEC CALC,TBL,NAI-DET
	Fiss			Expt	Data	EXFOR20229.002	7405	1PNT.SIGMA.
(n, alpha)	6.0+6	1.5+7	KFK	Eval	Rept	KFK-2233	1	Goel. GRAPH OF KEDAK DATA
	6.2+6	1.5+7		Eval	Data	KEDAK-3	7510	59 DATA SETS
(n, alpha)		7.5+8	IOW	Expt	Jour	PR/C	12	Hill+ ES TO 750 MEV.
(n, alpha)	1.3+7	1.5+7	LRL	Expt	Jbur	NP/A	265	Gardner+87 ENERGIES.1.SPC FLUCTUATNS
	1.3+7	1.5+7		Expt	Rept	UCRL-75463	7402	Gardner+ STRUCTURE AROUND 14 MEV
	1.3+7	1.5+7		Expt	Abst	DA/B	30	Warnock.ACT.DAUGHTER PRDS.EXCIT FNS.
	1.4+7	1.5+7		Expt	Data	EXFOR10327.002	7712	. 94PTS.CS REL NA24.94ES.
(n, alpha)	5.4+6	2.1+7	IAE	Revw	Conf	76LOWELL	1186	Vlasov+PUBL EXPT DATA.EVL PLOTTED.
(n, alpha)	5.2+6	8.5+6	BIR	Expt	Jour	NSPB	9	Mostafa. REL ACT,NORMALIZED.GRPH+TABL
	5.8+6	8.5+6		Expt	Data	EXFOR21049.003	7908	8PTS.SIGMA.
(n, alpha)	1.5+7		LRL	Expt	Jour	NSE	62	Grimes+(N,XA) SPEC CURVS.CS GVN.CFD
	1.5+7			Expt	Conf	77GEEL	312	Haight+ (N,XA) TBL. QUAD SPECTRMR
	1.5+7			Expt	Conf	77BNL	277	Grimes+(N,XA)CS GVN.A SPEC MEAS.NDG
	1.5+7			Expt	Conf	76LOWELL	1347	Grimes+(N,XA)CS,SPEC MEAS.NA CS GVN
	1.5+7			Expt	Data	EXFOR10634.	7704	82PTS.ANG DISTR,INTEG ANG DISTR.
(n, alpha)	Fiss		ANL	Eval	Rept	ANL-NDM-30	7703	Smith+U235 THR FISS SPEC.GRPH,TBL.
(n, alpha)	Fiss		RCN	Revw	Conf	77NBS	128	Zijp.CS AVG OVER CF252 FISS SPEC CFD
(n, alpha)	Fiss		KOS	Expt	Conf	77KIEV	3	Dezso+ (CF252),GELI.AVG SIGMA, TABLE
	Fiss			Expt	Jour	ANE	3	Csikai+ AV SIG FOR CF-252 SPECT.
	Fiss			Expt	Data	EXFOR30400.003	7707	1 PNT, AV SIG FOR CF-252 SPECT.
(n, alpha)	1.5+7		HED	Theo	Conf	77BNL	485	Mann+(N,XA)H-F CS,SPEC.CFD CALC,EXPT
(n, alpha)	Tr	1.8+7	RCN	Comp	Rept	ECN-25	7708	Zijp+ DOSIMETRY SAND-2, TBL.GRPH.
(n, alpha)	Fiss		CCP	Eval	Jour	AE	43	Grigorev+ AVERAGD SIG=0.70MB
	Fiss			Expt	Jour	SJA	43	. ENGL OF AE 43 279
(n, alpha)	Fiss		RCN	Eval	Conf	IAEA-208	2	Zijp+ WATT.CALC FROM LIBRARS CFD.TBL
(n, alpha)	Fiss		NJS	Expt	Conf	IAEA-208	2	Najzer+ (U235).STAND FOR NEW EXPTS
	Fiss			Expt	Conf	70HELISIN	2	Najzer+PPR6. STANDARD FOR 6 REACTNS
(n, alpha)	Fiss		NBS	Revw	Conf	IAEA-208	1	Grundl+ U235,CF252,STAND FIELDS.TABL
(n, alpha)	Fiss		MOL	Revw	Conf	IAEA-208	1	Fabry+ CF252,U235,STAND FIELDS.TABL
(n, alpha)	Fast		KTO	Revw	Conf	IAEA-208	2	Kimura+ AVG SIGS,STAND FIELDS, TABLE
(n, alpha)	Fiss		KTO	Expt	Conf	IAEA-208	2	Kimura+ U-FISSPLATE.AVG SIG CFD,TABL
(n, alpha)	Maxw	Fiss	JAE	Eval	Conf	IAEA-208	2	Asami. EVAL PT-DATA AVGD,CFD OTH.TBL
	5.5+6	2.1+7	JAE	Eval	Conf	IAEA-208	2	Asami. EVAL CFD EXPTS,ENDF/B-4.GRAPH
	5.0+6	2.1+7		Eval	Rept	NEANDC(J)44L	7608	Asami.NORM TO NEW STD AND 14MEV DATA
(n, alpha)	Fast		IST	Eval	Conf	IAEA-208	2	Kanda+.33ENERGY POINTS TABLE+CURVE
(n, alpha)	1.3+7	1.5+7	IRK	Revw	Conf	IAEA-208	1	Hannan+ NISUS-FIELD.CALC AVG SIG GVN
(n, alpha)	8.5+6		UPP	Expt	Jour	NSE	66	Vonach. ABSOL,REL SIG(E) COMPL.GRPH
	8.5+6			Expt	Data	EXFOR20843.009	7903	Nordborg+ACT.CS=55+-6MB.CFD.
(n, alpha)	1.0+5	1.2+7	LAS	Eval	Prog	LA- 7200	5	1PNT.SIGMA.
(n, alpha)	1.5+7		TUD	Expt	Prog	ZFK-350	7	Mult+SPEC AVG CS 15 NUCLIDES.TBL.
(n, alpha)	1.5+7		HED	Theo	Prog	HEDL-TME-77-34	7805	Arli+ A-SPEC CFD,GRPH.LVO DENNS NA-24
(n, alpha)	1.5+7		TOH	Expt	Jour	NST	15	Mann+CALC CS=135B.CFD AI,LRL.VOL2P45
	1.5+7			Expt	Data	EXFOR21304.006	8002	Yamamoto+.7.0+-0.9MB/SR FOR 472KEV G
(n, alpha)	1.4+7	1.9+7	NPL	Expt	Jour	JP/G	4111783	1PNT.D/DA.
	1.4+7	1.9+7		Expt	Prog	NEANDC(E)192	8	Ryves+ TBL GIVEN.
	1.5+7	1.9+7		Expt	Data	EXFOR20867.006	7904	Ryves+ PI07.ABST.ACTIVATION.TBD
(n, alpha)	1.5+7		LND	Expt	Rept	LUNF-D6-3021	7811	6PTS.SIGMA.
	1.4+7			Expt	Prog	KDK-23	15	Andersson+.ABS SIG GIVEN
	1.5+7			Expt	Data	EXFOR20842.003	7903	Lundberg+ ABS MEASUREMENT
(n, alpha)	1.5+7		LOU	Expt	Conf	ZFK-376	51	1PNT.SIGMA.
	1.5+7			Expt	Prog	INR-1773/1/PLA	7809	Dresler+ INR-1773 DATA CHANGED.
	1.5+7			Expt	Data	EXFOR30479.002	7905	Garuska+ P 16.SIG REL FE56(NP) GIVEN
(n, alpha)	Fast		BUC	Expt	Jour	SCF	31	SIG AT 14.6 MEV.
	Fast			Expt	Conf	IAEA-208	2	Garlea+ STANDFIELD DETERM,SIG GIVEN
	Fast			Expt	Jour	SCF	30	Garlea+ (SIGMASIGMA).EXPT,CALC.TABLE
							573	Garlea+ STANDFIELD DESCRIBD,SIG GIVN

		Fast		Expt	Jour	RRP	23	409	7800	Carlea+ STAND-FIELD,ACT.CFD CALC,TBL		
		Fast		Expt	Data	EXFOR30452.006			7806	1 PNT.		
(n,alpha)		Fiss		MUN	Comp	Jour	JRC	52	219	7901	Gryntakis.,45 VALUES GIVEN.	
(n,alpha)		Tr	2.0+7	IRK	Eval	Conf	ZFK-382	163		7901	Tagesen+ SIG(E)+CORREL COEF.TBD,NDG.	
(n,alpha)		1.2+7	1.8+7	AEP	Expt	Jour	PHE	3	1	88	7901	Han-Lin+ ABSOL SIG(E),CFD.TABLE+GRPH
		4.5+6	1.8+7		Expt	Jour	PHF	3	1	88	7901	Han-Lin+ ACTIV,EXC-FCT.14MEV-SIG GVN
		1.5+7			Expt	Data	EXFOR30523.002				7911	1 PNT, ABSOL.
(n,alpha)		1.2+7	1.8+7		Expt	Data	EXFOR30523.003				7911	10 PTS.REL TO AL27(WA) AT 14.61MEV.
		7.5+6	1.4+7	HAR	Expt	Prog	AERE-PR/NP26				7903	Swinhoe+ ACTIV.C.S. TBL.
		4.7+6	1.4+7		Expt	Conf	79KNOX	CA	3		7910	Swinhoe.ACT.GRPH.CFD ENDF.
		7.5+6	1.4+7		Expt	Data	EXFOR20986.003				7907	4PTS.SIGMA.
(n,alpha)		NDG		LAS	Eval	Prog	DDE-NDC-15	131			7904	Stewart+VERSION 4 CARRIED OVER ENDFS
(n,alpha)		6.0+6	1.6+7	KOE	Theo	Jour	NP/A	319	1	157	7904	Sudar+H-F STATMDL COMPARED TO EXP
		6.0+6	1.5+7		Theo	Conf	78HARWEL	755			7809	Sudar+ H-F CALCULATION CFD EXP.GRAPH
(n,alpha)		Fiss		LON	Expt	Conf	INDC(NDS)-103				7905	Burholt+ P157."NISUS",CFD ENDF.TABLE
		Pile			Expt	Prog	NEANDC(E)172	8			7608	Hannan+ FAST REACTOR SPEC N
		Fast			Expt	Data	EXFOR20950.011				7906	1PNT.AVG-SIGMA RATIO TO U-235NP
(n,alpha)		Fiss		IAE	Eval	Conf	INDC(NDS)-103				7905	Ertek+ (P149).WATT.ENDF,SAND CFD.FIG
(n,alpha)		Fiss		PTB	Expt	Prog	NEANDC(E)202	5			7906	Mannhart. P.86, SENSITIVITY COEF
		Fiss			Expt	Jour	NSE	69		333	7902	Mannhart+CF 252 SOURCE.CALC CFD EXPT
		Fiss			Expt	Rept	EUR/5667	2		131	7706	Alberts+ CF252 AVG XSECT.
(n,alpha)		2.3+7		JUL	Expt	Priv	QAIM				7907	Wu+ ACTIV.MASS.SPECTR.
		2.3+7			Expt	Data	EXFOR21009.				7907	1PNT.SIG,1PNT.HL,1PNT.RAO.TO NHE
(n,alpha)		Fiss		RCN	Revw	Rept	ECN-70				7908	Zijp+ DATA GUIDE ACTIV. DETECTORS
		Fiss			Revw	Rept	ECN-56				7903	Zijp. INTEGRAL CHECK DOSIM.XSECT.TBL
		Fiss			Revw	Conf	77NBS			128	7704	Zijp.CS TBL.U235 FISS SPEC MDLS CFD.
		Fiss			Revw	Rept	ECN-2				7609	Zijp+ INTERCOMP. INTEGRAL SIG SAND-2
(n,alpha)		1.5+7		LRL	Revw	Conf	79KNOX	CA	1		7910	Haight+CS FOR FUSION.TBL.
(n,alpha)		1.5+7		ORL	Theo	Conf	79KNOX	GB	2		7910	Fu.H-F,PRE-COMPD CALC.CURVS.CFD EXPT
(n,alpha)		5.8+6	1.5+7	KOS	Revw	Conf	IAEA-223	199			7912	Csikai. ACTIV SIG,CALC CFD XPT.GRPHS

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Evaluation	2.5-2	1.4+7	PCT	Eval	Rept	NP- 8216	5810	Lamarsh+ ALL DATA
Evaluation	5.0+5	1.5+7	LRL	Eval	Rept	UCRL-5351	5811	Howerton. CURVS,TOT,SEL,SIN,NP,NA
Evaluation	5.0+2	1.0+7	ANL	Eval	Book	FRC	6000	Yftah+16E GROUPS.FAST REACTOR DATA
Evaluation	2.5-2	1.5+7	UK	Eval	Rept	AWRE-O-28/60	6103	Buckingham.(ALD).EVAL FOR UKNDL.SPDD
Evaluation	4.1-1	1.0+7	GA	Eval	Rept	GA- 2451	6108	Joanou+.68GRP ABS.TRANSFER-INELASTIC
Evaluation	2.5-2	1.0+7	GEN	Eval	Rept	APEX-704	6111	Cooper+. CONTENT OF C-FINE TAPES
Evaluation	6.3+6	1.8+7	UNC	Eval	Rept	UNC-5002	6201	Tralli+ NDA2111-3VC REVISED
	8.5+5	1.8+7		Eval	Rept	NDA-2111	5911	Troubetskoy. TABLES.
Evaluation	6.0-4	1.5+7	UK	Eval	Rept	AE- 117	6308	.INCORPORATED IN UKNDL.SUPERSEDED.
Evaluation	1.0+3	1.0+8	AE	Eval	Rept	AE- 117	6308	Forsberg.CS,RES PARMS.REFS LOWER ES
Evaluation	2.5-2	1.1+7	FEI	Eval	Book	ABAGJAN	6400	26 GROUP CONST,TOT,CAPT,INEL,EL,ETC
Evaluation	6.0-4	1.5+7	UK	Eval	Rept	AEEW-M-445	6407	King.(WIN).UKNDL-DFN 35.
	6.0-4	1.5+7		Eval	Rept	AEEW-R-351	6402	Barrington+(WIN).SUPERSEDED.
Evaluation	1.5+3	1.5+7	GA	Eval	Rept	GA- 5884	6411	Joanou+ TOT RES SEL DEL SNE SIN ETC.
Evaluation	3.7-2	1.8+7	UNC	Eval	Rept	UNC-5139	6511	Troubetzkoy+ COMPILED AND CALC
Evaluation	1.0+3	1.0+7	AI	Eval	Rept	NAA-SR-11239	6511	Alter.TOT SEL DEL SIN NG NA NP
	1.0-3	1.0+7		Eval	Rept	NAA-SR-M-8904	6308	Alter+ CURVES
	1.0+0	1.0+7		Eval	Rept	NAA-SR-TDR6760	6109	Alter.TOT,SEL,SIN.MONTECARLO FOR DEL
Evaluation	1.0+4	1.4+7	GEN	Eval	Rept	GEMP-620	6801	Zwick. 40-GROUP AVERAGED SIGS.TABLES
Evaluation	Fast		KFK	Eval	Rept	KFK-770	6804	Huschke+ 26.EGROUPS FAST REACT SPEC
Evaluation		2.0+7	TRM	Eval	Conf	69R00RKE 2 106	6912	Garg+INDIAN EVALUATN ACTIVITIES, NDG
Evaluation	NDG		UK	Eval	Prog	NEANDC(UK)160	7407	Story+(WIN).UKNDL-DFN 935
Evaluation	NDG		LAS	Eval	Prog	LA- 6123-PR 3	7511	Foster+CS UNCERT EVAL.NDG
Evaluation	1.0-1	1.0+3	KFK	Eval	Rept	KFK-2386 2 6	7703	Goel+ REVISIONS FOR KEDAK-3
	-3	+7		Eval	Rept	KFK-2233 1	7512	Goel.KEDAK,GRAPHS OF EVALD DATA.
	1.0+4	1.4+7		Eval	Rept	KFK-1340	7102	Hinkelmann+ DESCR KEDAK.ANGDISTR,RES
	6.0-4	1.5+7		Eval	Data	KEDAK-3	7510	DATA FILES FOR 10 REACTIONS
Evaluation	1.0-4	2.0+7	LRL	Eval	Rept	UCRL-50400	7805	Howerton+ VOL.15,PART D. EVAL LIST.
	1.0-4	2.0+7		Eval	Data	ENDL-7818	7807	. SIGS.DA,DE. 9 REACTIONS
Evaluation	1.0-5	2.0+7	LAS	Eval	Rept	LA- 7663	7901	Young.ENDF/B V.GRPHS.
Evaluation	1.0-5	2.0+7	JAE	Eval	Rept	JAERI-1261	7903	Igarasi+.JENDL-1,GRAPHS AND TABLES
	1.0-5	2.0+7		Eval	Data	JENDL-1	7711	TOT.EL.INEL.W2N.NG.NP.NA.SCT ANG

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(n,t)	1.5+7		OTC	Expt	Jour	CJC	39	684	6103	Baerg+ LESS THAN 75 MICROBARNS
	1.5+7			Expt	Data	EXFOR11542.004			7606	. 1 PT.
(n,t)	1.5+7		ARK	Expt	Jour	PR	122	860	6105	Chittenden+ACT.,0.6+-0.1MB TO META
	1.5+7			Expt	Data	EXFOR11718.002			7606	. 1 PT.
(n,t)	1.4+7	1.5+7	JYV	Eval	Rept	JU-RR-3/1970			7006	Leppaemaeki+ TABLE OF EVAL AVG SIG
(n,t)	1.5+7		RBZ	Expt	Jour	JIN	36	477	7400	Diksic+ ACTIV,GE(LI),TABLES
	1.4+7			Expt	Data	EXFOR30169.004			7204	1 DATA LINE
(n,t)	1.5+7		JUL	Expt	Jour	JRC	21	395	7400	Qaim+ CHEM SEPAR,SIG VS 2 SYSTEMATIC
	1.4+7			Expt	Jour	JIN	35	1	7301	Qaim+ACTIVATION ISOM + GRD STE 52MN
	1.5+7			Expt	Conf	72BUD		50	7208	Qaim. ACTIVATION ,GRPH
	1.5+7			Expt	Conf	71CANT		121	7109	Qaim+ PRELIMINARY.SAME AS JIN 35.
	1.5+7			Expt	Data	EXFOR20522.			7604	3PTS.SIGMA.
(n,t)	1.1+7	4.3+7	JUL	Expt	Jour	NP/A	295	150	7801	Qaim+ ACTIVATION,GAMMA ANAL,TBL.
	1.1+7	4.3+7		Expt	Data	EXFOR20840.			7902	3PTS.AVG-SIGMA TO GS,NS,TOTAL.
(n,t)	1.5+7		SMU	ExTh	Conf	79KNOX		GC12	7909	Woo+ACT.G,M ISOMER CS.CFD TH.TBL.
	1.5+7			Expt	Data	EXFOR10806.003			7903	. 1PT.CS=105+-42 MICROBARN.

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Evaluation	3.8+3	1.8+7	KFK	Eval	Rept	KFK-120	1		6602	Schmidt.RES,SIN,DIN(LVLS),NP.+SURVEY
Evaluation	+6	1.5+7	KFK	Eval	Rept	KFK-2386	2	79	7703	Goel+ REVISIONS FOR KEDAK-3
	-3	+7		Eval	Rept	KFK-2233	1		7512	Goel.KEDAK DATA GRAPHS OF NP,NA,N2N
	1.0-3	1.5+7		Eval	Data	KEDAK-3			7510	DATA FILES FOR RES,NA,NP,N2N
Evaluation	1.0-5	1.5+7	JAE	Eval	Rept	JAERI-1261			7903	Igarasi+.JENDL-1,GRAPHS AND TABLES
	1.0-5	2.0+7		Eval	Data	JENDL-1			7711	TOT.EL.INEL.N2N.NNP.NG.NP.NA.
Evaluation	3.0+6	4.0+7	LAS	Eval	Conf	79KNOX		AB 9	7910	Arthur+H-F CALC.DWBA MOLS.GRPHS.CFD.

(n,2n)	Fast	CAR	Expt	Jour	PR 81 184	5101	Cohen. AVR SIG, N SPEC. BETA ACT.
	Fast		Expt	Data	EXFOR11189.039	7606	. 1 PT. SIGMA.
(n,2n)	1.5+7	CRC	Expt	Jour	CJP 31 267	5302	Paul+ BETA ACT. CPD TH. HL=4.5M.
	1.5+7		Expt	Data	EXFOR11274.064	7606	. 1 PT. SIGMA.
(n,2n)	1.4+7	LAS	ExTh	Rept	TID-11929	6002	Reed.THESES.TO ZR89,89M.XPT CPD THEO
	1.4+7		Expt	Data	EXFOR11896.	7606	. 3 PTS. SIGMA TO GND,META,TOTAL.
(n,2n)	9.4+6	LAS	Expt	Prog	WASH-1028 30	6004	Cochran+. NO DATA GIVEN
(n,2n)	Fiss	CRC	Eval	Rept	CRC-1003	6012	Roy+,ESTIMATED AVG SIG=0.03MB
(n,2n)	1.2+7	LAS	Expt	Jour	PR 121 1438	6103	Prestwood+
	1.2+7		Expt	Rept	LA- 2493	6012	Bayhurst+ EXCITATION CURVE.
	1.2+7		Expt	Data	EXFOR11645.014	7606	. 15 PTS. SIGMA.
(n,2n)	1.2+7	BNL	Eval	Rept	BNL-666	6104	Sher. EXCITATN FUNCTN TABLE + CURVE.
(n,2n)	1.4+7	ANL	Expt	Jour	PR 122 168	6104	Rayburn.677 MB FOR BOTH ZR89 AND 89M
	1.4+7		Expt	Data	EXFOR11328.021	7606	. 1 PT. SIGMA.
(n,2n)	Tr	LAS	Theo	Jour	PR 123 859	6108	Barr. THEOR FIT SIG(E,EP) DATA.
(n,2n)	1.4+7	RBZ	Expt	Jour	NP 30 49	6202	Strohal+ ACTIV,CPD NUCL THEOR, TABLE
	1.4+7		Expt	Data	EXFOR30008.013	7006	SIGMA TOTAL
(n,2n)	1.5+7	ARK	Expt	Jour	PR 131 2649	6309	Bramlitt+ SIG=84+-12MB,TO 4.4M ZR89M
	1.5+7		Expt	Rept	TID-16949	6200	.THESES
	1.5+7		Expt	Data	EXFOR11590.039	7606	. 1 PT. SIGMA.
(n,2n)	1.5+7	MUA	Expt	Jour	NP 49 510	6312	Mangal+.SIG=168+-12MB AT14.8MEV ACT.
	1.5+7		Expt	Data	EXFOR30060.	7104	SIG AT 14.8 MEV AND ISOMERIC RATIO
(n,2n)	Fiss	IIT	Comp	Conf	651AEA 251	6503	Barrall+CALC AVG SIGS OF 3FISS-SPECS
(n,2n)	1.4+7	HAM	Comp	Jour	NP 65 257	6503	Bormann. 4EXPT VALS,CPD SHELL EFFECT
(n,2n)	1.2+7	IIT	Eval	Rept	AFWL-TR-65-34	6508	Mcelroy+ DATA IN UK-NDL OFN 238
(n,2n)	Fiss	BNL	Theo	Jour	NSE 23 238	6511	Pearlstein.STATMDL CALC.SPEC AVG.TBL
(n,2n)	1.3+7	BNL	Theo	Jour	NSE 23 238	6511	Pearlstein.3ES.STAT MDL CALC.TBL CS.
(n,2n)	1.4+7	IRK	Expt	Jour	OAWS 175 53	6604	Rieder.INFLUENCE OF MAGIC NUMBER
	1.4+7		Expt	Conf	65ANTWER 547	6507	Rieder. REL TO AL(N,A)
	1.4+7		Expt	Data	EXFOR20033.	7109	4PTS.SIG.
(n,2n)	1.5+7	DEB	Expt	Jour	AHP 23 87	6705	Csikai+ ACTIV,SIG AT THR+3MEV, TABLE
	1.5+7		Expt	Jour	MFF 16 123	6802	SEE ALSO *THEORY+TABLES
	1.4+7		ExTh	Jour	PL 20 52	6601	Csikai+ CPD CURVE VS (N-Z)
	1.5+7		Expt	Data	EXFOR30033.011	7009	SINGLE VALUE
(n,2n)	1.5+7	TUR	ExTh	Jour	NP/A 118 449	6810	Minetti+.ACT.TO GR,METAST.ISOM R.H-L
	1.5+7		Expt	Data	EXFOR20891.	7904	3PTS.SIGMA TO MS,GS AND SUM.
(n,2n)	1.5+7	DEB	Expt	Jour	NP/A 122 234	6812	Karolyi+,ACT,D-I NS,ISOM RAT,CPD TH
	1.5+7		Expt	Data	EXFOR30101.010	7102	ISOMERIC.RATIO
(n,2n)	1.4+7	IRK	Comp	Jour	OAWS 177 469	6900	Hille.
(n,2n)	1.5+7	STF	Expt	Prog	WASH-1127 117	6904	Depangher. ACT.ANAL TBC. NDG.
	1.5+7		Expt	Data	EXFOR10022.018	7211	. 1 PT. SIGMA.
(n,2n)	1.3+7	WWA	Expt	Jour	NP/A 139 42	6912	Abboud+ACTIV,ISOM RATIO,TOT SIG,TBLS
	1.3+7		Expt	Rept	INR-1105	6911	SEE ALSO *ISOMRATIO
	1.3+7		Expt	Conf	JINR-D3893 127	6805	Abboud+ GRAPHS OF G/M,C+M VS NEUT-E
	1.3+7		Expt	Data	EXFOR30028.004	7008	TOTAL (N,2N) SIGMAS AT 13 ES
	1.3+7		Expt	Data	EXFOR30028.005	7008	ISOMERIC RATIOS GND/MS AT 13 ES
(n,2n)	+7	KFI	Comp	Jour	AHP 26 335	6912	Adam+ GRPH+TBL,XPTL SIG CPD SHELL-TH
	+7		Comp	Jour	KFI 16 331	6810	Adam+ IN HUNGARIAN,SEE AHP 26 335
(n,2n)	1.5+7	DEB	Comp	Jour	REA 7 4 93	6912	Csikai+ SIG+HL COMPLITN,N-ACTIV-ANAL
(n,2n)	1.4+7	CCP	Comp	Rept	ICD-6 215	7000	Sluchevskaja.SIGS GND+ISOM,RATIO,TBL
(n,2n)	1.4+7	GIT	Expt	Jour	PR/C 1 350	7001	Fink+ACTIVATION,GRPHS,TBL.CPD OTH.
	1.4+7		Expt	Data	EXFOR10497.	7604	. 2 PTS. M,G STATES.
(n,2n)	1.5+7	ARK	Expt	Jour	PR/C 1 1233	7004	Husain+ACT,2CS-METASTABLE,GND STATE
	1.5+7		Expt	Abst	DA/B 32 5091	7203	Bari.MEAS CS CPD SEMI EMPIRICAL CALC.

	1.5+7		Expt	Data	EXFOR10088.	7107	. 2 PTS. META=143+-15MB,GRND=342+-25
(n,2n)	1.0-4	1.8+7	BNW	Eval	BNWL-1312	7005	Simons+
(n,2n)	1.4+7	1.5+7	JVV	Eval	JU-RR-3/1970	7006	Leppaemaeki+ TABLE OF EVAL AVG SIG
(n,2n)	1.0+7	2.0+7	IRK	Expt	Jour APA 31 354	7010	Bergmann+ ISOM RATIO,SIG TOT.
(n,2n)		+7	KFI	Theo	Rept KFKI-71-8	7102	Jekl. CALCULATED CFD EXPTL SIG VALUE
(n,2n)	1.4+7	1.5+7	IRK	ExTh	Jour AEA 3 285	7107	Winiwarter+ ISOMERIC RATIO
(n,2n)	Fast		JUL	Expt	Conf 71CANT 121	7109	Qaim+EFFECTIVE SIGMA.ACTIV,GAMMA DET
	Fast			Expt	Data EXFOR20554.010	7604	1PNT.SIGMA.
(n,2n)	1.4+7		GIT	Theo	Jour PR/C 4 1173	7110	Fink+.STAT-MODEL CALCULATION,CFD EXP
(n,2n)	1.3+7	1.5+7	KYU	Expt	Jour NP/A 185 177	7204	Kanda. T-D NS. ABSOL MEAS. GND,META
	1.3+7	1.5+7		Expt	Prog EANDC(J)22 32	7108	Kanda. TO METAST, +ISOMER RATIOS.
	1.3+7	1.5+7		Expt	Data EXFOR20338.	7407	31PTS.SIGMA.
(n,2n)	1.4+7	1.5+7	LRL	Expt	Jour NP/A 190 635	7208	Nethaway. D-T NS.TO METST.+SPC ACCU
	1.4+7	1.5+7		Expt	Data EXFOR10312.004	7505	. 12 PTS. SIGMA.
(n,2n)	1.2+7	1.9+7	IBJ	Theo	Rept INR-1475/1/PL	7300	Marcinkowski. SIG(E) CFD STATMOD,FIG
(n,2n)	1.4+7		GER	Revw	Conf 73PARIS 2 193	7303	Krivan.EVALUATED DATA CFD,TABLE
(n,2n)	1.5+7		DEB	Eval	Jour REA 11 1 153	7303	Boedy. COMPILATION+RECOMM.VALUE,TBL
	1.5+7			Eval	Rept IAEA-153 173	7300	Boedy. RECOMM. VALUE ONLY
(n,2n)	1.4+7		LOU	Prog	INR-1464 12	7305	Araminowicz+BRIF,ACTIV,TABLE,GRAPH
	1.4+7			Expt	Data EXFOR30264.027	7311	SIGMA AT 14.6 MEV
(n,2n)	Fiss		KOS	Eval	Jour AK 16 351	7400	Boedy. U238,MAXW-SPC.AVG CFD XPT,TBL
(n,2n)	1.5+7		TAT	Theo	Jour JP/A 7 1457	7408	Kondalah. CALC ON STAT MODEL
(n,2n)	1.5+7		JUL	Expt	Rept EUR-5182E 939	7409	Qaim+ ACT METHOD
	1.5+7			Expt	Conf 77GEEL 327	7712	Qaim+ SIG IN GRAPH + SYSTEMATICS.
	1.4+7			Expt	Jour AK 18 335	7600	Qaim+ SIG IN GRPH. FOR FUSION REACT
	1.5+7			Expt	Conf 71CANT 121	7109	Qaim+D-T,ACTIV.TO GRD+META.CFD OTHER
(n,2n)	1.5+7			Expt	Data EXFOR20513.009	7604	1PNT.SIGMA.
	1.5+7		ARK	Expt	Jour JIN 37 631	7503	Sigg+ TO META,GND.FOR SYSTEMTICS,TBL
	1.5+7			Expt	Abst DA/B 37 2237	7611	Sigg.ACT TECH.CFD OTH EXPT AND PRED
	1.5+7			Expt	Diss SIGG 7600		Sigg.ACT.TBLS,GRPHS.CFD OTH.2META
	1.5+7			Expt	Data EXFOR10477.	7505	. 3 PTS. GND,META,GND+META SIGMAS.
(n,2n)	Fiss		KOS	Eval	Conf 75KARLSR 29	7504	Csikai. CF252,MAXW-SPC.AVG FOR 2TEMP
(n,2n)	1.4+7		TUD	Theo	Conf 75KIEV 4 149	7505	Seidel+ PREEQ-EFF ON CALC SIG-TABLE
(n,2n)	1.2+7	2.2+7	ANL	Eval	Rept ANL-75-34	7506	Davey+ T MDL. LVL DEN MDL FIT.
(n,2n)	1.4+7	2.8+7	LAS	Expt	Jour PR/C 12 451	7508	Bayhurst+ N3N CORRECTION ABOVE 22MEV
(n,2n)	1.4+7	2.8+7		Expt	Data EXFOR10536.	7604	. 11 PTS. SIGMA.
(n,2n)	1.4+7		TEX	Expt	Abst ANS 22 818	7511	Spangler+ TBL.CFD THRES CALC.
(n,2n)	+7		CCP	Expt	Rept YK- 23 4	7600	Brodskaja+ ACTIV,AVG SIG,TBL
(n,2n)	Fiss		KTO	Expt	Jour NST 13 531	7610	Kobayashi+.ACT.SIG=0.229+-0.015 MB
	Fiss			Expt	Data EXFOR20693.010	7903	1PNT.SIGMA.
(n,2n)	1.5+7		BOS	Theo	Conf 76AHMEDA 2 12	7612	Nath+ABSOL SIGMA OF CLOSE SHEL NUCLI
(n,2n)	Fiss		KOS	Expt	Conf 77KIEV 3 32	7704	Dezso+ (CF252),GELI.SIG CFD CALC.TBL
	Fiss			Expt	Data EXFOR30400.029	7806	1 PNT.
(n,2n)	1.5+7		KOS	Expt	Conf 77KIEV 1 246	7704	Seiler+ ACT,GELI.TO META,GRND.TABLE
	1.5+7			Expt	Data EXFOR30438.	7804	.SIG-G,SIG-M.SUPERSDS EXFOR 30441.
(n,2n)	2.0+7	1.0+8	BNL	Theo	Conf 77BNL 491	7705	Divadeenam.EXCIT FN CALC.CFD EXPT
(n,2n)	Tr	1.8+7	RCN	Comp	Rept ECN-25	7708	Zijp+ DOSIMETRY SAND-2, TBL,GRPH.
(n,2n)	1.5+7		KYU	Prog	NEANDC(J)51U60	7709	Fujino+.ACT SIG=805+-58MB.FOR G.S.
	1.5+7			Expt	Data EXFOR20850.	7903	2PTS.SIGMA TO GS AND MS.
(n,2n)	2.0+6	2.0+7	JUL	Expt	Conf 77GEEL 327	7712	Qaim+ 30MEV D BREAKUP NS.SIG IN GRPH
	2.0+6	2.0+7		Expt	Conf 76GARMIS 589	7606	Qaim+ N SOURCE BE(D,N) 30MEV.ACT SIG
	1.1+7			Expt	Data EXFOR20721.040	8001	2PTS.SIGMA.
(n,2n)	Fiss		RCN	Eval	Conf IAEA-208 2 327	7800	Zijp+ WATT.CALC FROM LIBRARS CFD.TBL
(n,2n)	Fiss		MDL	Revw	Conf IAEA-208 1 233	7800	Fabry+ U235-EXPT CFD SAND-II.TABLE
(n,2n)	1.2+7	2.9+7	IAE	Revw	Conf IAEA-208 1 353	7800	Vlasov. EVALS CFD EXPTS,DISCUS.GRAPH
	1.2+7	2.0+7		Revw	Conf 76LOWELL 1186	7607	Vlasov+PUBL EXPT DATA.EVL PLOTTED.
(n,2n)	1.5+7		SMU	Expt	Abst DA/B 38 280	7807	Sothras.ACT.ISOMERIC GND/META RATIO.
	1.5+7			Expt	Jour JIN 40 585	7804	Sothras+ ACT,GELI.SIG GIVEN,CFD.TABL
	1.5+7			Expt	Diss SOTHRAS 7710		Sothras.ACT.N2N SYSTEMATICS STUDY.
	1.5+7			Expt	Data EXFOR10835.010	7907	. 1PT.GND AND META CS GVN.

	1.5+7		Expt	Data	EXFOR10751.002	7903	. IPT.CS=517+-47 MB
(n,2n)	1.2+7	1.6+7	LAS Theo	Prog	LA- 7596	5 7812	Arthur+GNASH CALC CFD COMNUC.TBL.TBC
(n,2n)	1.2+7	2.0+7	IRK Eval	Rept	PHYD-13-1	83 7900	Tagesen+ GRPHS,TBL,GROUP-SIG EVL
	Tr	2.0+7		Eval	Conf	78HARWEL 1066	Tagesen+ STATMDL EVAL+DATA CORRELTNS
	1.2+7	2.0+7		Eval	Data	WIEN-V0014.005	19 PNTS
(n,2n)	1.5+7		PAT Theo	Jour	IPA	17 525	Garg+ HIGH-SPIN ISOM RATIO CALC.TBL
(n,2n)	FISS		RCN Revw	Rept	ECN-70	7908	Zijp+ DATA GUIDE ACTIV. DETECTORS
	FISS			Revw	Rept	ECN-56	Zijp. INTEGRAL CHECK DOSIM.XSECT.TBL
	FISS			Revw	Conf	77NBS 128	Zijp.CS AVG OVER U235 FISS SPEC.CFD.
	FISS			Revw	Rept	ECN-2	Zijp+ INTERCOMP. INTEGRAL SIG SAND-2
(n,2n)	1.4+7		KOS Revw	Conf	IAEA-223 199	7912	Csikai. GRPH RANGE OF ACTIV-XPT DATA

(n,p)	Fast	CAR	Expt	Jour	PR	81	184	5101	Cohen. AVR SIG. N SPEC. BETA ACT.	
(n,p)	Fast		Expt	Data	EXFOR11189.020			7606	. 1 PT. SIGMA.	
(n,p)	1.5+7	CRC	Expt	Jour	CJP	31	267	5302	Paul+ BETA ACT. CFD TH. HL=61H.	
(n,p)	1.5+7		Expt	Data	EXFOR11274.065			7606	. 1 PT. SIGMA.	
(n,p)	1.5+7	GLS	Theo	Jour	PM	2	473	5704	Brown+ COMPNUCL 20MB, DIRECT 20MB	
(n,p)	1.4+7	CCP	Expt	Jour	ZET	33	1520	5712	Act+RDCHEM,REL TO ZR91 1/.74	
(n,p)	1.4+7		Expt	Jour	JET	6	1174	5806	TRANSLATN.*	
(n,p)	1.4+7	LAS	ExTh	Rept	TID-11929			6002	Reed.THESIS. NAI(TL)XTL XPT CFD THEO	
(n,p)	1.4+7		Expt	Data	EXFOR11896.004			7606	. 1 PT. SIGMA.	
(n,p)	Fiss	CRC	Eval	Rept	CRC-1003			6012	Roy+,ESTIMATED AVG SIG=0.9MB	
(n,p)	1.5+7	RED	Expt	Jour	PR	123	1365	6108	Alford+	
(n,p)	1.5+7		Expt	Rept	NP- 11667			6204	Alford. 12+-4 MB REL ZR090 N2N 822MB	
(n,p)	1.5+7		Expt	Data	EXFOR11871.002			7606	. 1 PT. SIGMA.	
(n,p)	8.0+6 2.0+7	LAS	Expt	Jour	JIN	23	173	6112	Bayhurst+.18ES.FROM BETA ACTIVITY	
(n,p)	8.0+6 2.0+7		Expt	Rept	LA- 2493			6012	.SEE ALSO FOR EXCITATION CURVE.	
(n,p)	8.0+6 2.0+7		Expt	Data	EXFOR11462.010			7606	. 17 PTS. SIGMA.	
(n,p)	1.4+7	RBZ	Expt	Jour	NP	30	49	6202	Strohal+ ACTIV,CPMD NUCL THEOR,TABLE	
(n,p)	1.4+7		Expt	Data	EXFOR30008.022			7006	SIGMA TOTAL	
(n,p)	1.4+7	SAH	Expt	Conf	63BOMBAY	244		6302	Mukherjee+.VAL GVN,ACTIVATION METHOD	
(n,p)	1.4+7		Expt	Data	EXFOR31330.002			7209	.SIG GVN	
(n,p)	1.4+7	ICP	Expt	Jour	ZET	45	305	6308	Levkovskij. ACTIVATION METHOD	
(n,p)	1.4+7		Expt	Jour	ZET	31	360	5608	Levkovskij. GEIGER COUNT.REL ZR91-94	
(n,p)	1.4+7		Expt	Jour	JET	18	213	6401	. ENGL OF ZET 45 305	
(n,p)	1.4+7		Expt	Jour	JET	4	291	5703	. ENGL OF ZET 31 360	
(n,p)	5.0+6 1.4+7	KAP	Theo	Conf	CONF-490-1			6310	Dunford+ H-F CALC CFD EXPT CURVE	
(n,p)	1.4+7 1.5+7	SAH	Comp	Jour	NUC	23	8	112	6508	Chatterjee. TABLE WITH REFS.
(n,p)	1.4+7		Comp	Jour	NP	60	273	6411	Chatterjee.MEAN OF EXPT CFD SHELLMOD	
(n,p)	3.6+6 1.5+7	BET	Expt	Jour	NSE	25	285	6607	Carroll+ VDG ACTIVATION.	
(n,p)	3.6+6 1.5+7		Expt	Data	EXFOR11856.			7606	. 11 PTS. SIGMA.	
(n,p)	1.4+7	IIT	Theo	Jour	NP/A	96	121	6704	Gardner+ RELATIVE ISOTOPIC X SECTION	
(n,p)	1.4+7 1.5+7	NAP	Comp	Rept	INFN/BE-67-10			6707	Cuzzocrea+ AVERAGED CHOSEN DATA.	
(n,p)	Fiss	CCP	Expt	Jour	AE	25	437	6811	Nasyrov.(AVG+EFFECTIV)THRESH-SIG-TBL	
(n,p)	Fiss		Expt	Jour	EAF	25	5	125	6811	TRANSLATN.*
(n,p)	Fiss		Expt	Jour	SJA	25	1251	6811	. ENGL OF AE 25 437	
(n,p)	1.4+7 1.5+7	IRK	Comp	Jour	QAWS	177	467	6900	Hille.	
(n,p)	1.5+7	KAZ	Expt	Jour	YF	10	44	6907	Levkovskij+ 2 ABSOL.SIGS+HLS,ACTIVTN	
(n,p)	1.5+7		Expt	Jour	SNP	10	25	7001	. ENGL OF YF 10 44	
(n,p)	1.5+7		Expt	Data	EXFOR40226.			7412	.2SIG GIVEN, GROUND+METASTABLE STATE	
(n,p)	1.5+7	MOS	Theo	Jour	YF	10	431	6908	Karapetyan+	
(n,p)	1.5+7	DEB	Comp	Jour	REA	7	4	93	6912	Csikai+ SIG+HL COMPILTN,N-ACTIV-ANAL
(n,p)	1.4+7	GIT	Expt	Jour	PR/C	1	358	7001	Fink+,ACT,TO 3.1H ISOM,12.9+-1.0MB	
(n,p)	1.4+7		Expt	Data	EXFOR10145.002			7401	. 1 PT. SIGMA.	
(n,p)	1.5+7	ARK	Expt	Jour	PR/C	1	1233	7004	Husain+,ACT,GE(LI),13+-1 MB TO Y90M	
(n,p)	1.5+7		Expt	Abst	DA/B	32	5091	7203	Bari.MEAS CS CFD SEMI EMPIRICAL CALC	
(n,p)	1.5+7		Expt	Data	EXFOR10088.007			7107	. 1 PT. SIGMA.	
(n,p)	1.4+7 1.5+7	JYV	Eval	Rept	JU-RR-3/1970			7006	Leppaemaeki+ TABLE OF EVAL AVG SIG	
(n,p)	1.4+7	OTU	Theo	Jour	NP/A	164	526	7103	Pai+ SHELL/PAIR-INDEP STATMD.FIRST P	
(n,p)	6.1+6	AUB	Expt	Abst	DA/B	32	1138	7108	Ghorai. PROD Y90M	
(n,p)	1.4+7	SAH	Expt	Conf	72CHANOG	2	115	7212	Tikku+GAMMA ACT3.1H HL SIG=37.8+-7MB	
(n,p)	1.5+7		Expt	Data	EXFOR30394.008			7703	PART. SIG TO META STATE.	
(n,p)	7.6+6 9.3+6	RI	Expt	Rept	YK- 12		61	7301	Nemilov+	
(n,p)	7.6+6 9.3+6		Expt	Data	EXFOR40211.002			7406	.SIGMA FOR 4 ES GIVEN	
(n,p)	1.4+7 1.5+7	KAZ	Theo	Jour	YF	18	705	7310	Levkovsky.AVERAGED SIG,CALC,TBL	
(n,p)	1.4+7 1.5+7		Theo	Jour	SNP	18	361	7404	. ENGLISH OF YF 18,705	

(n,p)	5.9+6	6.3+6	AML	Expt	Jour	JPAL	7	32	7402	Hicks+ CYCL, T-GAS. IONIZATION CH.
(n,p)	5.9+6	6.3+6	JUL	Expt	DiSS	HICKS			7400	. EXCIT FCT,ISDB ANALOG STATE FOUND
	1.4+7			Expt	Rept	EUR-5182E	939		7409	Qaim+ ACT METHOD
	1.5+7			Expt	Conf	77GEEL	327		7712	Qaim+ SIG IN GRPH + SYSTEMATICS.
	1.4+7			Expt	Jour	AK	18	335	7600	Qaim+ SIG IN GRPH. FOR FUSION REACT
	1.5+7			Expt	Data	EXFOR20513.			7604	2PTS.SIGMA.
(n,p)	3.5+6	1.8+7	IFL	Eval	Book	LAPENAS			7500	Lapenas. FULL DOCUM OF EVAL, TABLES
Fiss				Eval	Book	LAPENAS			7500	Lapenas. EVAL DATA AVGO, VALUE GIVEN
	3.5+6	1.8+7		Eval	Rept	YK- 15 63			7308	Bondars+ GRPH ONLY. SOME VALS DIFFRNT
Fiss				Eval	Rept	YK- 15 63			7308	Bondars+ SHORT. AVG VALUE GIVEN
	3.5+6	1.8+7		Eval	Data	VIEN-V0003.012			7511	WATT-SPECTRUM, 1 POINT
(n,p)	1.5+7		ARK.	Expt	Jour	JIN	37	631	7503	SIGMA AT 142 ENERGIES
	1.5+7			Expt	Abst	DA/8	37	2237	7611	Sigg+ TO META, FOR SYSTEMATICS, TBL
	1.5+7			Expt	Data	EXFOR10477.002			7505	Sigg.ACT.CFD OTH EXPT AND CALC VALS.
(n,p)	1.4+7		TEX	Expt	Abst	ANS	22	818	7511	. 1 PT. SIGMA.
(n,p)	+7		CCP	Expt	Rept	YK- 23	4		7600	Spangler+ TBL.CFD THRES CALC.
(n,p)	1.5+7		KOS	Expt	Conf	77KIEV	1	246	7704	Brodskaia+ ACTIV, AVG SIG, TBL
	1.5+7			Expt	Data	EXFOR30438.009			7804	Seiler+ ACT, GELI. META. +Zr91(NNP).TBL
(n,p)	Tr	1.8+7	RCN	Comp	Rept	ECN-25			7708	.+Zr91(NNP).SUPERSDS EXFOR30441.009
	Tr	1.8+7		Revu	Rept	ECN-2			7609	Zijp+ DOSIMETRY SAND-2, TBL, GRPH.
(n,p)	1.5+7		KYU	Expt	Prog	NEAND(J)51U60			7709	Zijp+ INTERCOMP. INTEGRAL SIG SAND-2
	1.5+7			Expt	Data	EXFOR20850.002			7903	Fujino+.ACT SIG=9.0+-0.8MB FOR META
(n,p)	2.0+6	2.0+7	JUL	Expt	Conf	77GEEL	327		7712	1PNT.SIGMA.
	2.0+6	2.0+7		Expt	Conf	76GARMIS	589		7606	Qaim+ 30MEV D BREAKUP NS. SIG IN GRPH
	1.1+7			Expt	Data	EXFOR20721.041			8001	Qaim+ N SOURCE BE(D,N) 30MEV. ACT SIG
(n,p)	Fiss		RCN	Eval	Conf	IAEA-208	2	327	7800	2PTS.SIGMA.
(n,p)	6.0+7		DAV	Expt	Abst	BAP	23	943	7809	Zijp+ WATT.CALC FROM LIBRARS CFD.TBL
(n,p)	1.2+7	1.6+7	LAS	Theo	Prog	LA- 7596	5		7812	King+P SPEC 61070 DEG.DWBA ANAL.NDG.
(n,p)	Fiss		KDS	Expt	Conf	ZFK-376	44		7812	Arthur+GNASH CALC CFDCOMNUC.TBL.TBC
	Fiss			Expt	Conf	77KIEV	3	32	7704	Dezso+ (CF252).SAME RESULT AS 77KIEV
	Fiss			Expt	Data	EXFOR30400.030			7806	Dezso+ (CF252).GELI.AVG SIG TO M.TBL
(n,p)	+7		RI	Theo	Rept	YK- 33-2	47		7900	1 PNT.
(n,p)	Tr	2.0+7	FEI	Eval	Rept	YK- 32	55		7900	Trofimov+ E OF SIG-MAX, CFD EXPT.TABL
(n,p)	Fiss		RCN	Revu	Rept	ECN-70			7908	Bychkov+ COMP+ EVAL, FIG.14MEV-SIG, TBL
(n,p)	1.4+7		KDS	Revu	Conf	IAEA-223	199		7912	Zijp+ DATA GUIDE ACTIV. DETECTORS
(n,p)	1.4+7	1.5+7	LRL	Expt	Prog	DOE-NDC-19	87		8005	Csikai. GRPH EXPTL SIGS TO 2 ISOMERS
										Haight+ES, ANGDIST CHG PARTICLES. NDG.

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(n,t)	1.5+7		JUL	Expt	Jour	NP/A	257	233	7602	Qaim+ACT, TBL, GRPH, CFD OTHER ISOTOPE
	1.5+7			Expt	Jour	JRC	21	395	7400	Qaim+ CHEM SEPAR, SIG VS Z SYSTEMATIC
	1.5+7			Data		EXFOR20669.008			7610	1PNT.SIGMA.
(n,t)	1.1+7	4.3+7	JUL	Expt	Jour	NP/A	295	150	7801	Qaim+ ACTIVATION, GAMMA ANAL, TBL.
	1.1+7	4.3+7		Expt	Data	EXFOR20840.046			7902	1PNT.AVG-SIGMA.

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Evaluation	1.0-4	1.5+7	UK	Eval	Rept	AEEW-M-921	6907	Story+(WIN).EVL IN RESOLVD RES RANGE
Evaluation	1.0-3	1.5+7	AUA	Eval	Rept	AAEC/TM-549	7006	Cook.TOT.EL,INEL,NONEI,CAPT SIGS,NDC
	1.0-3	1.5+7		Eval	Rept	AAEC/E-214	7106	Bertram+GROUP SIGMAS SAME QUANTS,NDC
	1.0-3	1.5+7		Eval	Rept	AAEC/TM-587	7103	*DESCRIPTION OF LIBRARY
	1.0-3	1.5+7		Eval	Data	AUSTR-DFN 35.	7111	POINT(232) AND GROUP(127) SIGMAS
Evaluation	1.0-5	2.6+7	SAI	Eval	Rept	EPRI-250	7611	Drake+ENDF/B5.TBLS,GRPHS.CFD.
Evaluation	1.0-5	1.5+7	JAE	Eval	Data	JHDC-PPP-WG	7707	TOT.EL,INEL,CAPTURE,AV SCT ANGLE
Evaluation	1.0+3	2.0+7	LAS	Eval	Rept	LA- 7789	7904	Arthur.COMNUC,GNASH CALC.TBLS,GRPHS.

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(n,2n)	Fiss		CRC	Eval	Rept	CRC-1003	6012	Roy+ ESTIMATED AVG SIG=1.4MB
(n,2n)	Fiss		BNL	Theo	Jour	NSE 23 238	6511	Pearlstein.STATMDL CALC.SPEC AVG.TBL
(n,2n)	1.3+7	1.5+7	BNL	Theo	Jour	NSE 23 238	6511	Pearlstein.3ES.STAT MDL CALC.TBL CS.
(n,2n)	1.5+7		IBJ	ExTh	Jour	NP 74 438	6512	Brzsko+ ACTIVATION,PARTIAL SIGMA
	1.5+7			Expt	Data	EXFOR30105.	7110	PARTIAL SIGMA AT 14.9 MEV
(n,2n)	1.4+7		RBZ	Expt	Jour	NP/A 119 517	6811	Lulic+ G ACT MEAS,TABLE,CFD THEORY
	1.4+7			Expt	Data	EXFOR30202.004	7211	SIGMA (N,2N) TO METASTABLE STATE
(n,2n)	1.5+7		DEB	Comp	Jour	REA 7 4 93	6912	Csikai+ SIG+HL COMPILTN,N-ACTIV-ANAL
(n,2n)	1.4+7		GIT	Expt	Jour	PR/C 1 350	7001	Lu+ ACTIVATION, GRPHS,TBL. CFD OTH.
	1.4+7			Expt	Data	EXFOR10497.023	7604	. 1PT.SN118 N2N+SN117 SIN=957+-100MB
(n,2n)	1.4+7		BRL	Expt	Rept	BRL-1491	7008	Temperly. ACT,INCL SN117 DIN
	1.4+7			Expt	Data	EXFOR10214.015	7310	. 1PT.SIGMA.INCL SN117 DIN
(n,2n)	1.3+7	1.6+7	IBJ	Expt	Prog	INR-1318 8	7104	Decowski+ PARTIAL SIGMA AT 7ES,TABLE
	1.3+7	1.8+7		Expt	Jour	APPB 6 139	7500	Grochulski+ ACTIV,CFD THEO,FINAL PPR
	1.3+7	1.8+7		Expt	Data	EXFOR30287.013	7504	SIG(E) TO ISOMER, 9 POINTS
	1.3+7	1.6+7		Expt	Data	EXFOR30155.	7202	. SUPERSEDED BY EXFOR 30287.013
(n,2n)	1.5+7		DEB	Eval	Jour	REA 11 1 153	7303	Boedy+ RECOMM.VALUE FROM N-2 SYSTEM.
(n,2n)	1.5+7		KFI	Theo	Rept	FKFI-73-68	7312	Jekl.NEW FIT,CALC SIG CFD OTHERS,TBL
(n,2n)	1.5+7		IBJ	Theo	Jour	ASL 27 186	7700	Rurarz+ ISO RATIO,4MODLS,CFD XPT.TBL
	1.4+7			Theo	Rept	INR-1464 19	7305	Rurarz+ ISOMERIC RATIO CFD EXPT,GRAF
(n,2n)	1.4+7		KDS	Revw	Conf	IAEA-223 199	7912	Csikai. GRPH EXPTL SIG TO 14 D ISOM

(n,gamma)	Maxw	CRC	Eval	Rept	AECL-1054	6003	Walker. SAME AS CRRP-913
(n,gamma)	3.0+4	ORL	Expt	Jour	NAT 194 1272	6206	Macklin+AVE.SIG=59+-12MB AT STELL T.
	3.0+4		Expt	Data	EXFOR11958.005	7606	. 1 PT.
(n,gamma)	1.0+4 5.5+4	ORL	Expt	Prog	WASH-1041 30	6210	Macklin+ NO DATA GIVEN
	8.7+3 5.9+4		Expt	Data	EXFOR11981.004	7606	. 19 PTS.
(n,gamma)	5.0+4 9.0+4	ORL	Theo	Jour	RMP 37 166	6501	Macklin+ CALC FOR KT=5TD90KEV. MAXW
(n,gamma)	1.0+3 1.0+5	CCP	Theo	Jour	AE 18 114	6502	Dovbenko+ STATIST MOD CURVE CFD DATA
	1.0+3 1.0+5		Theo	Jour	JNE 20 675	6608	TRANSLATN.*
	1.0+3 1.0+5		Theo	Jour	SJA 18 140	6502	TRANSLATN.*
	1.0+3 1.0+5		Theo	Jour	EAF 18 2 44	6502	TRANSLATN.*
(n,gamma)	2.5-2	BOL	Eval	Rept	RT/FI-4	6701	Palmucci. CALC FROM RES PARAMETERS
(n,gamma)	1.0+3 1.0+5	HAR	Expt	Rept	NP- 17644	6807	Moxon.THESES.MOXON-RAE DET.AVG SIG
(n,gamma)		IEA	Comp	Rept	IEA-INF- 10	6808	Atalla. TABLES OF HL,SIG AND GAMM-E
(n,gamma)	1.0+3 1.0+7	BOL	Eval	Rept	CCDN-NW/10	6912	Benzi+H-F MOD,AXEL G(G)EST,ALL DATA
	1.0+3 1.0+7		Eval	Rept	CEC(70)-2	7004	Benzi+. GRAPH
(n,gamma)	3.0+4	AUA	Theo	Rept	AAEC/E-211	7011	Musgrove. SIGMA GIVEN AND CFD OTHER
(n,gamma)	Maxw	GA	Eval	Rept	GA- 12071	7109	Mathews+ RECOMMENDED VALUES
(n,gamma)	1.0-3 1.5+7	AUA	Eval	Data	AUSTR-DFN 81.	7111	COOK+POINT(223)+GROUP(127)SIG.CF EVL
(n,gamma)	Maxw	CRC	Eval	Rept	AECL-3037 1	7201	Walker.RECOMMEND SIG TO GND+META,TBL
(n,gamma)	1.0+3 1.0+7	FEI	Eval	Rept	YK- 8/2 97	7209	Abagjan+ AVG SIG(ENERGY-GROUPS),TABL
	1.0+3 1.0+7		Eval	Rept	INDC(CCP)-39	7407	.P102. ENGLISH OF YK-8/2 97
(n,gamma)	2.5-2	AUA	Eval	Rept	AAEC/TM-619	7209	Clayton.CALC FROM SIG LIBRARY,TABLE
(n,gamma)	Fiss	WIN	Revw	Conf	IAEA-169 3 137	7400	Dean. POINT DATA AVG OVER STAND -SPC
	Maxw Fiss		Revw	Conf	IAEA-169 3 163	7400	Pope+ MAXW+FIS-SPEC AVG DATA CFD XPT
(n,gamma)	2.5-2	SAC	Revw	Conf	IAEA-169 1 235	7400	Ribon.STATUS SIG CFD REQUESTS,TABLE
(n,gamma)	2.5-2	IJI	Eval	Conf	77KIEV 4 94	7704	Fedorova+ RECOM ACTIV SIG+ERROR GIVN
(n,gamma)	3.0+4	CAL	Eval	Rept	OAP-491	7705	Newman.S PROCESS.63. MB ONE EXP VAL

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(n,alpha)	1.5+7	2.5+7	OSL	Expt	Jour	JIN	10	173	5905	Sharp+ ISOM YIELD RATIO. 43S.	
(n,alpha)	1.5+7	2.5+7		Expt	Data	EXFOR20043.003			7109	3PTS.SIG.	
(n,alpha)	Fiss		CRC	Eval	Rept	CRC-1003			6012	Roy+ ESTIMATED AVG SIG=0.0002MB	
(n,alpha)	7.0+6	2.0+7	LAS	Expt	Jour	JIN	23	173	6112	Bayhurst+ 18ES.FROM BETA ACTIVITY	
	1.2+7	2.0+7		Expt	Rept	LA- 2493			6012	Bayhurst+ ACT EXCITATION CURVE ONLY	
	1.2+7	2.0+7		Expt	Data	EXFOR11462.017			7606	. 14 PTS.	
(n,alpha)	1.4+7		CIS	Theo	Jour	NP	51	460	6402	Facchini+STATMOD SIG XPT/CALC=11	
(n,alpha)	1.5+7		KAZ	Expt	Jour	YF	10	44	6907	Levkovskij+ 2 ABSOL.SIGS+HLS,ACTIVTN	
	1.5+7			Expt	Jour	SNP	10	25	7001	. ENGL OF YF 10 44	
	1.5+7			Expt	Data	EXFOR40226.			7412	.2SIG GIVEN, GROUND+METASTABLE STATE	
(n,alpha)	1.5+7		DEE	Comp	Jour	REA	7	4	93	6912	Csikai+ SIG+HL COMPILTN,N-ACTIV-ANAL
(n,alpha)	1.4+7	1.5+7	JYV	Eval	Rept	JU-RR-3/1970			7006	Leppaemaeki+ TABLE OF EVAL AVG SIG	
(n,alpha)	1.5+7		ARK	Expt	Jour	JIN	34	82405	7208	Rao. ISOMERIC RATIO	
	1.5+7			Expt	Abst	DA/B	34	1934	7311	Rao.CUMULATIVE CD115 ISOMER YLDS	
	1.5+7			Expt	Data	EXFOR10357.003			7406	. 1PT. ISOMER RATIO 115CD MS/GND	
(n,alpha)	Fiss		GHT	Expt	Jour	JRC	16	39	7300	Maenhaut+ACT TO COLL5M.GELI.SIG GIVN	
	1.5+6			Expt	Data	EXFOR20731.006			7704	1PNT.SIGMA.	
(n,alpha)	1.4+7	1.5+7	KAZ	Theo	Jour	YF	18	705	7310	Levkovsky.AVERAGED SIG,CALC,TBL	
	1.4+7	1.5+7		Theo	Jour	SNP	18	361	7404	. ENGLISH OF YF 18,705	
(n,alpha)	1.5+7		FEI	Eval	Rept	YK- 33-2	51		7900	Bychkov+ COMP+RECOM SIGS.TABLE+GRAPH	
(n,alpha)	Fiss		MUN	Comp	Jour	JRC	52	219	7901	Gryntakis., 3 VALUES GIVEN.	
(n,alpha)	1.4+7		KOS	Revw	Conf	IAEA-223	199		7912	Csikai. GRPH EXPTL SIG TO 2 D ISOMER	

NUCLIDE SN118

5-Aug-80

Evaluation	1.0-3	1.5+7	AUA	Eval	Rept	AAEC/TM-549	7006	Cook.TOT,EL,INEL,NONEL,CAPT SIGS,NDG
	1.0-3	1.5+7		Eval	Rept	AAEC/E-214	7106	Bertram+GROUP SIGMAS SAME QUANTS.NDG
	1.0-3	1.5+7		Eval	Rept	AAEC/TM-587	7103	*DESCRIPTION OF LIBRARY
	1.0-3	1.5+7		Eyal	Data	AUSTR-DFN 81.	7111	POINT(223) AND GROUP(127) SIGMAS

NUCLIDE SN120

5-Aug-80

(n,2n)	Fiss		CRC	Eval	Rept	CRC-1003	6012	Roy+,ESTIMATED AVG SIG=1.0MB
(n,2n)	Fiss		BNL	Theo	Jour	NSE 23 238	6511	Pearlstein.STATMDL CALC.SPEC AVG.TBL
(n,2n)	1.3+7	1.5+7	BNL	Theo	Jour	NSE 23 238	6511	Pearlstein.3ES.STAT MDL CALC.TBL CS.
(n,2n)	1.4+7		RBZ	Expt	Jour	NP/A 119 517	6811	Lulic+ G ACT MEAS,TABLE,CFD THEORY
	1.4+7			Expt	Data	EXFOR30202.005	7211	SIGMA (N,2N),ACTIVATION
(n,2n)	1.5+7		DEB	Comp	Jour	REA . 7 4 93	6912	Csikai+ SIG+HL COMPILTN,N-ACTIV-ANAL
(n,2n)	1.4+7	1.5+7	JYV	Eval	Rept	JU-RR-3/1970	7006	Leppaemaeeki+ TABLE OF EVAL AVG SIG
(n,2n)	1.5+7		DEB	Eval	Jour	REA 11 1 153	7303	Boedy+ RECOMM.VALUE FROM N-Z SYSTEM.
(n,2n)	1.5+7		KFI	Theo	Rept	KFKI-73-68	7312	Jeki:NEW FIT,CALC SIG CFD OTHERS,TBL
	+7			Theo	Rept	KFKI-71-8	7102	Jeki. CALCULATED CFD EXPTL SIG VALUE
(n,2n)	1.4+7		TUD	Theo	Conf	75KIEV 4 149	7505	Seidel+ PREEQ-EFF ON CALC SIG.TABLE
(n,2n)	1.5+7		IBJ	Theo	Jour	ASL 27 186	7700	Rurarz+ ISO RATIO,4MODLS,CFD XPT.TBL
	1.4+7			Theo	Rept	INR-1464 19	7305	Rurarz+ ISOMERIC RATIO CFD EXPT,GRAF
(n,2n)	1.4+7		KOS	Revw	Conf	IAEA-223 199	7912	Csikai. GRPH EXPTL SIG TO 2500 ISOM

(n,gamma)	Pile	ORL	Expt	Rept	ORNL-828	5000	Nelson+ NUCL. CHEM. OF TIN
	Pile		Expt	Data	EXFOR11961.	7606	. 1 PT. EACH IN TWO SAN.
(n,gamma)	Fiss	BNL	Expt	Jour	PR 91 1423	5309	Hughes+ ALSO LVL SPACINGS AT EXCIT E
	Fiss		Expt	Data	EXFOR11562.009	7606	. 1 PT.
(n,gamma)	Maxw	CRC	Eval	Rept	AECL-1054	6003	Walker. SAME AS CRRP-913
(n,gamma)	2.5-2	CRC	Eval	Rept	AECL-1054	6003	WALKER (CRRP-913)
(n,gamma)	2.5-2	ANL	Theo	Jour	PR 120 1305	6011	Huizenga+ ISOMER RATIO, TH CFD EXPT
(n,gamma)	3.0+4	ORL	Expt	Jour	NAT 194 1272	6206	Macklin+AVE.SIG=35+-7MB AT STALL T.
	3.0+4		Expt	Data	EXFOR11958.007	7606	. 1 PT.
(n,gamma)	1.0+4	5.5+4	ORL	Expt	WASH-1041 30	6210	Macklin+ NO DATA GIVEN
	9.3+3	5.1+4		Expt	Data	EXFOR11981.006	. 17 PTS.
(n,gamma)	1.0+0	1.3+4	RPI	Expt	Prog	WASH-1048 71	Block+19 RES ES NDG. TOP. RSLN 6NS/M
(n,gamma)	Maxw	ANL	Revw	Jour	NP 60 241	6411	Bishop+EXP AND TH ISOMER RATIOS CFD
(n,gamma)	5.0+4	9.0+4	ORL	Theo	Jour	RMP 37 166	Macklin+ CALC FOR KT=5TO90KEV. MAXW.
(n,gamma)	1.0+3	1.0+5	CCP	Theo	Jour	AE 18 114	Dovbenko+ STATIST MOD CURVE CFD DATA
	1.0+3	1.0+5		Theo	Jour	JNE 20 675	TRANSLATN.*
	1.0+3	1.0+5		Theo	Jour	EAF 18 2 44	TRANSLATN.*
	1.0+3	1.0+5		Theo	Jour	SJA 18 140	TRANSLATN.*
(n,gamma)	2.5-2		BOL	Eval	Rept	RT/FI-4	6701
(n,gamma)	1.0+3	1.0+5	HAR	Expt	Rept	NP- 17644	6807
(n,gamma)			IEA	Comp	Rept	IEA-INF- 10	6808
(n,gamma)	2.4+4		MUA	Expt	Jour	NC/B 58 402	6812
	2.4+4			Expt	Data	EXFOR30077.010	7012
(n,gamma)	1.0+3	1.0+7	BOL	Eval	Rept	CCDN-NW/10	6912
	1.0+3	1.0+7		Eval	Rept	CSC(70)-2	7004
(n,gamma)	3.0+4		AUA	Theo	Rept	AAEC/E-211	7011
(n,gamma)	Maxw		GA	Eval	Rept	GA- 12071	7109
(n,gamma)	1.0-3	1.5+7	AUA	Eval	Data	AUSTR-DFN 83.	7111
(n,gamma)	Maxw		CRC	Eval	Rept	AECL-3037 1	7201
(n,gamma)	2.4+4		MUA	Theo	Jour	IJP 46 114	7203
(n,gamma)	1.0+3	1.0+7	FEI	Eval	Rept	YK- 8/2 97	7209
	1.0+3	1.0+7		Eval	Rept	INDC(CCP)-39	7407
(n,gamma)	2.5-2		AUA	Eval	Rept	AAEC/TM-619	7209
(n,gamma)	Maxw		GHT	Comp	Jour	JRC 16 39	7300
(n,gamma)	Maxw	Fiss	WIN	Revw	Conf	IAEA-169 3 163	7400
				Revw	Conf	IAEA-169 3 137	7400
(n,gamma)	2.5-2		SAC	Revw	Conf	IAEA-169 1 235	7400
(n,gamma)	2.5-2		BRK	Theo	Jour	NP/A 237 3 419	7501
(n,gamma)	2.5-2		IJI	Eval	Conf	77KIEV 4 94	7704
(n,gamma)	3.0+4		CAL	Eval	Rept	OAP-491	7705

Nelson+ NUCL. CHEM. OF TIN
. 1 PT. EACH IN TWO SAN.
Hughes+ ALSO LVL SPACINGS AT EXCIT E
. 1 PT.
Walker. SAME AS CRRP-913
WALKER (CRRP-913)
Huizenga+ ISOMER RATIO, TH CFD EXPT
Macklin+AVE.SIG=35+-7MB AT STALL T.
. 1 PT.
Macklin+ NO DATA GIVEN
. 17 PTS.
Block+19 RES ES NDG. TOP. RSLN 6NS/M
Bishop+EXP AND TH ISOMER RATIOS CFD
Macklin+ CALC FOR KT=5TO90KEV. MAXW.
Dovbenko+ STATIST MOD CURVE CFD DATA
TRANSLATN.*
TRANSLATN.*
TRANSLATN.*
Palmucci. CALC FROM RES PARAMETERS
Moxon.THESES.MOXON-RAE DET.AVG SIG
Atalla. TABLES OF HL,SIG AND GAMM-E
Hasan+,SB-BE,ACT BETA-DET REL I-127.
SIGMA FOR 27. H HALF LIFE GIVEN
Benzi+H-F MOD,AXEL G(G)EST,ALL DATA
Benzi+. GRAPH
Mugrove. SIGMA GIVEN AND CFD OTHER
Mathews+ RECOMMENDED VALUES
COOK+POINT(223)+GROUP(127)SIG.CF EVL
Walker.RECOMMEND SIG TO GND+META,TBL
Chaubey+ P-WAVE STRENGTH FUNC, TABLE
Abagjan+ AVG SIG(ENERGY-GROUPS),TABL
.PI02. ENGLISH OF YK-8/2 97
Clayton.CALC FROM SIG LIBRARY, TABLE
Maenhaut+ACT TO SN121M+GS.GELI.SIGS.
Pope+ MAXW+FIS-SPEC AVG DATA CFD XPT
Dean. POINT DATA AVG OVER STAND -SPC
Ribon.STATUS SIG CFD REQUESTS, TABLE
Nardi+ ISOM RATIO, MTE-CARLO, CFD XPT
Fedorova+ RECOM ACTIV SIG+ERROR GIVN
Newman.S PROCESS.50. NB ONE EXP VAL

Evaluation	1.0-3	1.5+7	AUA	Eval	Rept	AAEC/TM-549	7006	Cook.TOT,EL,INEL,NONEL,CAPT SIGS,NDG
	1.0-3	1.5+7		Eval	Rept	AAEC/E-214	7106	Bertran+GROUP SIGMAS SAME QUANTS,NDG
	1.0-3	1.5+7		Eval	Rept	AAEC/TM-587	7103	*DESCRIPTION OF LIBRARY
	1.0-3	1.5+7		Eval	Data	AUSTR-DFN 83.	7111	POINT(223) AND GROUP(127) SIGMAS

(n,p)	Pile	MTR	Expt	Prog	AECD-3691	9	5510	Passell+,NTR IRRADIATION,SIG=60MB
(n,p)	1.4+7	HAR	Expt	Jour	PPS 70	195	5600	Allan+ CCW,PHOTO-PLATE. P-EMISSION.
(n,p)	Pile	ARK	Expt	Abst	BAP 1	40	5601	Robinson+ 30+-3MB Q=-0.3+-0.4MEV
(n,p)	Fiss	KAP	Expt	Rept	KAPL-1779		5705	Schuman+. SIG=40MB ACTIVATION.
(n,p)	Fiss	HAR	Expt	Rept	AERE-I/R-2630		5807	Mellish+FAST REACTOR,ACTIV
	Fiss		Eval	Rept	AERE-R-3251		6002	Mellish+ CFD REVSD 832(NP)VALUE 60MB
	Fiss		Expt	Conf	57PARIS 1	35	5800	Mellish+ UNESCO CONF.
	Fiss		Expt	Jour	NAT 178	275	5608	Mellish+ SIG=47MB.4TIMES TH.(HUGHES)
(n,p)	Fiss	GES	Expt	Jour	NUC 17 1	54	5901	Rochlin.REL AL27 (W,A).ACT9140.MB
	Fiss		Expt	Data	EXFOR11654.009		7606	. 1 PT.
(n,p)	1.4+7	CBR	Expt	Jour	AUJ 12	103	5903	Purser+0.56+-0.11B AT 14.1MEV
	1.4+7		Expt	Data	EXFOR31038.002		7102	.1 DATA LINE
(n,p)	3.0+6	LAS	Expt	Prog	WASH-1026	36	5910	Smith. ACTIVATION, NDC
(n,p)	Fiss	BNL	Eval	Rept	BNL-634	5	6000	Shar+.BEST VALUE=92+-1MB.
(n,p)	1.5+7	ARK	Expt	Jour	NP 15	316	6002	Kumabe+NP WITH NNP,E+PHI PROTON DIST
	1.5+7		Expt	Data	EXFOR11759.		7606	.3 PTS. SIG NP, COMP, DIR
	1.5+7		Expt	Data	EXFOR11759.		7606	. 48 PTS, DSIG INC.NNP
(n,p)	1.5+7	ARK	Expt	Jour	NP 15	326	6002	Preiss+ ACTIVATION. COSB GS+ISOMER
	1.5+7		Expt	Data	EXFOR11740.		7606	. 2 PTS, SIG FOR GND AND ISOMER
(n,p)	1.3+7	GLS	Expt	Jour	PPS 75	526	6004	Storey+ SIG AT 2ES, P SPEC CFD THEOR
	1.4+7		Expt	Data	EXFOR21443.006		8003	1PNT.SIGMA VIA COMP.NUCL.REACT.
(n,p)	Fiss	ALD	Comp	Rept	AWRE-O-02/60		6004	Hinves+PARKER COMPARES MEASURED VALS
(n,p)	1.8+6	GEA	Revw	Conf	60SVIENN	383	6006	Moteff+THRESH,TH-SIG(E)GRPH,SIG-TBLS
(n,p)	2.2+6	SAN	Expt	Jour	PR 120	1319	6011	Gonzalez+ ACTIVATION,SIG REDUCED 9PC
	2.2+6		Expt	Jour	PR 126	271	6204	Gonzalez+
	2.2+6		Expt	Jour	PR 114	565	5904	Gonzalez+ EXPTL DETAILS
	2.2+6		Expt	Data	EXFOR30220.002		7212	SIGMA AT 10 ENERGIES
(n,p)	Fiss	CRC	Eval	Rept	CRC-1003		6012	Roy+,ESTIMATED AVG SIG=73.0MB
(n,p)	Fiss	BAT	Expt	Rept	BMI-1486		6012	Jung+ ACTIV.EFF SIG ABOV THRESH GIVN
(n,p)	3.3+6	SAN	Expt	Jour	NP 24	340	6104	Van Loeff. ACTIV,7ABLE
	3.3+6		Expt	Data	EXFOR30221.002		7212	SIGMA AT 1 ENERGY ONLY
(n,p)	1.4+7	HAR	Expt	Jour	NP 24	274	6104	ALLAN AT120DEG.PHOTOPL.CFD STATMODEL
	1.4+7		Expt	Data	EXFOR21487.		8004	2PTS.SIGMA.
	1.4+7		Expt	Data	EXFOR20004.		7011	2PTS.CMPD.NUC.
(n,p)	1.5+7	CBR	Expt	Jour	NP 24	431	6105	Glover+ ANGDISP,PROTONS.2-16MEV
	1.5+7		Expt	Data	EXFOR30407.		7708	ANG.DIST.FOR 14 E(P)S. 140 PTS.
(n,p)	Fiss	SRI	Expt	Jour	NSE 10	308	6106	Passell+ 64MB TO 72D,28MB TO 9H ACT
	Fiss		Expt	Conf	62HARWEL 1	501	6212	Passell. INTEG SIG(EN) COMPIATN,TBL
(n,p)	1.4+7	CIS	Expt	Jour	NC 21	966	6109	Colli+E+ANG-DIST.OF P,EVAP+DIR EFPEC
	1.4+7		Expt	Priv	PIGNANELLI		6901	Colli. NUMERICAL DATA
	1.4+7		Expt	Data	EXFOR21102.		8001	46PTS.+(NNP)DA/DE,+(NNP)D/DA.
(n,p)	1.3+7	CBR	Expt	Jour	NP 29	309	6201	Glover+ SIG FALLS FROM 440 T6 3304
	1.3+7		Expt	Data	EXFOR31107.		7209	.SIG AT 10 ES GVN
(n,p)	2.0+6	SAN	Theo	Jour	ZN/A 17	275	6203	Trier.SAXON WOOD POTENTIAL W.K.B
(n,p)	Pile	MTR	Expt	Rept	ID0-16744		6206	Hogg+THERA. CS T 58CO ISONERS.
			Expt	Data	EXFOR11709.		7606	. 2 PTS,SIG, 2 ISOMERS
(n,p)	1.8+6	JAE	Expt	Jour	JPJ 17	1215	6208	Nakai+VDC.SIG ACT CFD EVAPORATN MOD.
	1.8+6		Expt	Data	EXFOR20291.002		7406	13PTS.SIGMA.
(n,p)	1.6+6	ALD	Expt	Jour	JNE 16	467	6210	Barry.TABLE.ACTIVATION REL U235 NF
(n,p)	Fiss	SAL	Expt	Conf	62HARWEL 2	41	6212	Casarelli+ CALC OF EFFECT SIG,GIVEN
(n,p)	2.0+6	SAC	Revw	Conf	62HARWEL 2	157	6212	Lamberieux+ INTEG SIG COMPILED,GRAPH
(n,p)	2.0+6	ISP	Revw	Conf	62HARWEL 1	27	6212	Bresesti+ SIG(E) GRAPH,THRESHOLD-DET
(n,p)	Fiss	DGE	Eval	Conf	62HARWEL 2	11	6212	Delattre+ RECOMM EFF+TOT-AVG SIG GVN
(n,p)	+6 +7	CRC	Revw	Conf	62HARWEL 1	394	6212	Cross. THRESHOLD DETECTOR REVIEW

(n,p)		2.0+7	AMS	Theo	Conf	62HARWEL 1	399	6212	Aten+ SIG(E) GRAPH, MEAN SIGMA EXPT
(n,p)		2.0+6	AE	Eval	Conf	62HARWEL 2	275	6212	Nilsson+ CURV ADOPTD FOR DOSIMETRY
(n,p)		1.5+7	MUN	Expt	Jour	ADP 12	57	6300	Hertlein. ACTIV+REAC-SIG,GND,ISO.TBL
(n,p)		1.6+6	UK	Expt	Rept	NRDC-138L6		6301	657MB AT 8.3MEV 290MB AT 14MEV
(n,p)		1.4+7	CRC	Expt	Prog	EANDC(CAN)-16		6301	Cross+ 335MB TOT,164MB TO META STATE
(n,p)		1.4+7		Expt	Data	EXFOR11696.		7606	. 4 PTS, SIG, 1 PT. ISOMER
(n,p)		2.7+6	CRC	Expt	Abst	BAP 8	368	6301	Cross.RATIO ISOM/GND STATES CO 58.
(n,p)		2.7+6		Expt	Data	EXFOR11755.003		7606	. 6 PTS, ISOMER RATIO
(n,p)		1.0+6	ANL	Expt	Jour	PR 130	2022	6306	Meadows+ SIGS+ISOMRATIOS REL U235 NF
(n,p)		+6		Expt	Conf	62HARWEL 2	275	6212	Rossin+ GROUP SIGS IN FIS-SPEC, TABLE
(n,p)		1.0+6		Expt	Rept	ANL-6580		6206	.SUPERSEDED
(n,p)		1.0+6		Expt	Data	EXFOR11763.		7606	.22 PTS. SIG, ISOMER RATIO
(n,p)		1.3+7	SAC	Expt	Jour	NP 47	157	6308	Jeronymo+ACT SIG(E).CRV.NB TBL WRONG
(n,p)		1.3+7		Expt	Rept	BNL-325		6602	Jeronymo+ DATA GIVEN IS WRONG.
(n,p)		1.3+7		Expt	Jour	JPR 24	816	6311	Jeronymo+ ACTIVATION.
(n,p)		1.3+7		Expt	Jour	NDF 11	3	6300	Jeronymo+ EQU TO NP 47
(n,p)		1.2+7		Expt	Data	EXFOR20922.002		6708	9 8PTS.SIGMA.
(n,p)		1.0+6	KAP	Theo	Conf	CONF-490-1		6310	Dunford+ H-F CALC CFD EXPT CURVE
(n,p)		2.2+6	AE	Expt	Jour	NP 48	191	6310	Konijn+ABSOLUTE. FLUCTUATIONS CFD TH
(n,p)		2.2+6		Expt	Rept	AE- 115		6308	Konijn+ EQUIVALENT TO NP 48
(n,p)		Fiss		Theo	Rept	AE- 102		6305	Konijn.CALCULATED FOR LASL FISS-SPEC
(n,p)		2.4+6		Expt	Rept	RFA-307		6211	Konijn+ REVISED DATA.
(n,p)		2.4+6		Expt	Rept	RFA-66		6110	Konijn. RELATIVE.
(n,p)		2.2+6		Expt	Data	EXFOR20056.003		7109	36PTS.SIG.
(n,p)		Maxw	ORL	Expt	Prog	ORNL-3679	16	6400	Halperin+
(n,p)		Maxw		Expt	Data	EXFOR12595.		7606	. 2 PTS, SIG + RI
(n,p)		Fiss	HAR	Expt	Jour	NSE 18	468	6404	Wright. CITED,107MB REL S32(NP) 65MB
(n,p)		Fiss	CCH	Eval	Jour	NSE 18	468	6404	Martin+ EVAL 32PC TO 9.2H CO58 META
(n,p)		Fiss	SCA	Expt	Prog	EANDC(OR)30L		6406	Balcarczyk+.ASTRA CORE-CENTER,-EDGE.
(n,p)		Fast		Expt	Prog	EANDC(OR)25L		6309	Leonhard+.ACTIV FISS NEUT AVER XSECT
(n,p)		Fiss	AUA	Expt	Jour	JNAB 18	417	6408	Boldeman.ACT 2 CO ISOMERS REL S32 NP
(n,p)		Fiss		Expt	Data	EXFOR30143.011		7112	N-CONVERTER.TOT SIG TO CO-58G+CO-58N
(n,p)		Fiss		Expt	Data	EXFOR30143.012		7112	N-CONVERTER.SIG TO CO-58 META-STABLE
(n,p)		Fast	AMS	Expt	Jour	PHY 30	1762	6409	Heertje+COMPARE WITH OTHER EXPTS
(n,p)		1.4+7	SAH	Comp	Jour	NP 60	273	6411	Chatterjee.MEAN OF EXPT CFD SHELLMOD
(n,p)		1.5+7	ORL	Expt	Rept	ORNL-3672		6501	Strain. BY NAT ELEMENT IRRAD. 281MB
(n,p)		1.5+7		Expt	Data	EXFOR11263.022		7606	. 1 PT.
(n,p)		Fiss	MOL	Expt	Prog	EANDC(E)57U		6502	Fabry+.ACTIV TO CO58 GRND AND METAST
(n,p)		Fiss		Expt	Data	EXFOR20178.		7405	3PTS.SIGMA.
(n,p)		Fiss	IIT	Comp	Conf	65IAEA	251	6503	Barrall+CALC AVG SIGS OF 3FISS-SPECS
(n,p)		5.0+6	FRK	Theo	Jour	NP 63	615	6503	Buttner+STATMOD+2-PART ENIS CORRECTN
(n,p)		Fiss	CAD	Eval	Rept	PNR/SETR65-10		6503	Ravler.OKS NSE 18 468.
(n,p)		1.4+7	RPI	Expt	Abst	DA 26	437	6507	Malanify.PROTON ENERGY+ANG DIST.S.NDG
(n,p)		1.2+7	SAH	Comp	Jour	NOC 23	8 112	6508	Chatterjee. TABLE WITH REFS.
(n,p)		8.4+6	FRK	ExTh	Jour	NP 70	89	6508	Debertin+SPECTRUM IN ENERGY AND ANG.
(n,p)		8.4+6		ExTh	Conf	65ANTWER	544	6507	Debertin+ ABST PPR116.
(n,p)		8.4+6		Expt	Data	EXFOR20971.		7906	305PTS.DA/DE, 75PTS.D/DA. 3PTS.SIG
(n,p)		1.3+7	WWA	Expt	Rept	INR-680/I/PH		6512	Chojnacki+.SIGMA AND ISOMERIC RATIO
(n,p)		1.3+7		Expt	Rept	EANDC-50 P114		6500	.PARTLY SUPERSEDED,=65ANTWERP P114
(n,p)		Tr	KFK	Eval	Rept	KFK-120 1		6602	Schmidt.OTHERS*XPTS+CURVES
(n,p)		Tr		Eval	Conf	61VIENNA		6203	Schmidt. PPREA.SUPERSEDED.
(n,p)		1.4+7	HAM	Expt	Prog	EANDC(E)66U		6602	Bormann+ TABLE.ACTIV.CCW.
(n,p)		1.4+7		Expt	Data	EXFOR20899.		7904	3PNT.SIGMA, TO MS,GS AND TOTAL
(n,p)		Tr	KAP	Eval	Rept	KAPL/CSNL-4	66	6606	Lubitz. FISS AV 105.5 MB
(n,p)		Fiss	HAR	Theo	Conf	66BERKEL	331	6609	Carter+ SP,108+-5MB,+COMPIATION
(n,p)		1.3+7	HAM	Expt	Jour	ZN/A 21	988	6609	Bormann+ TO N158 T,M,GROUNDSTATE
(n,p)		1.3+7		Expt	Data	EXFOR20836.		7903	1PNT.SIGMA, 1PNT MS/TOT RATIO
(n,p)		1.3+7	HAM	Expt	Conf	66PARIS 1	225	6610	Bormann+ PPR81.ACTIV.TBLS,CURVES.
(n,p)		1.3+7		Expt	Data	EXFOR20898.005		7904	10PTS.SIGMA.
(n,p)		1.3+7	KTO	Expt	Jour	NP/A 93	74	6703	OKUMURA ISOMERIC PAIR CROSS SECTIONS

	1.3+7	1.5+7		Expt	Data	EXFOR20303.	7406	12PTS.SIGMA.
(n,p)	Pile		HAR	Eval	Rept	AERE-R-5314	6703	Made+ VALUES FOR FLUX MEASURMNT.TBL
(n,p)	2.2+6	3.6+6	AML	Expt	Priv	ARMITAGE	6703	Sig+ERRORS REL NIS8 BARRY JNE 16,467
	2.1+6	3.7+6		Expt	Data	EXFOR30045.003	7011	TABLE SIGMA AT 6 ES.
(n,p)	1.4+7		IIT	Theo	Jour	NP/A 96 121	6704	Gardner+ RELATIVE ISOTOPIC X SECTION
(n,p)	Tr	2.0+7	GEL	Comp	Rept	EUR-119E VOL.2	6704	Liskien+PAULSEN.ALL DATA EXCIT FUNCT
(n,p)	1.4+7	1.5+7	NAP	Comp	Rept	INFN/BE-67-10	6707	Cuzzocrea+ AVERAGED CHOSEN DATA.
(n,p)	3.1+6		UAR	Expt	Jour	JNE 22 387	6800	Shaaian+
	3.1+6			Expt	Data	EXFOR31084.002	7209	.SIG GVN
(n,p)		1.4+7	SOR	Revw	Conf	IAEA-107 57	6800	Ben-David.GRPH THRS-SIG(NEUT-E) GVN
(n,p)	Fiss		KFK	Expt	Jour	RCA 10 15	6800	Braun+MEAN XSECT REACTOR MEASURD,TBL
	Fiss			Expt	Data	EXFOR20739.007	7704	1PNT.SIGMA.
(n,p)	Fiss		AE	Theo	Prog	EANDC(OR)73L	6801	Eriksson. STAT MOD CALC
(n,p)	2.0+6	1.8+7	WMA	Expt	Jour	NP/A 112 513	6805	Decowski+ SIGMA+ISOM RATIO CFD TH
	2.0+6	1.8+7		Expt	Conf	6770KYD #8.105	6709	.ABSTRACT.(CURVES)
	1.7+6	1.7+7		Expt	Data	EXFOR30082.	7201	SIGMAS+ISOMERIC RATIOS. 36 DATA LINE
(n,p)	2.2+6	1.5+7	NDL	Expt	Jour	NSE 32 195	6805	Temperly. ACT, 12 ES
	2.2+6	1.5+7		Expt	Data	EXFOR11761.002	7606	. 12 PTS.
(n,p)	Fiss		CCP	Expt	Jour	DDK 180 836	6806	Nasyrov.(AVG+EFFECTIV)THRESH-SIG-TBL
	Fiss			Expt	Jour	SPD 13 6 559	6812	TRANSLATN.*
	Fiss			Expt	Jour	AE 25 437	6811	Nasyrov.(AVG+EFFECTIV)THRESH-SIG-TBL
	Fiss			Expt	Jour	EAF 25 5 125	6811	.TRANSLATN.*
(n,p)	1.4+7	1.5+7	IRK	Comp	Jour	SJA 25 1251	6811	. ENGL OF AE 25 437
	1.4+7	1.5+7		Theo	Jour	OAWS 177 467	6900	Hille.
(n,p)	1.5+7		STF	Expt	Rept	APWL-TR-68-134	6903	Hille+.CF XPT/TH INTERPRET SIG N2N
	1.5+7			Expt	Data	EXFOR10022.013	7211	Barrall.
(n,p)	1.5+7		KAZ	Expt	Jour	YF 10 44	6907	. 1PNT. SIGMA.
	1.5+7			Expt	Jour	SNP 10 25	7001	Levkovskij+ 2 ABSOL-SIGS+HLS,ACTIVTN
	1.5+7			Expt	Data	EXFOR40226.	7412	. ENGL OF YF 10 44
(n,p)	Fiss		MTR	Expt	Prog	WASH-1136 55	6909	.2SIG GIVEN, GRCOND+METASTABLE STATE
(n,p)	1.5+7		STF	Expt	Jour	NP/A 138 387	6911	Schuman+.ACTIVATION,VALUE GIVEN
	1.5+7			Expt	Data	EXFOR10031.007	7106	Barrall+. D-T NS. GAMMA ACTIVATION:
(n,p)	1.5+7		DEB	Comp	Jour	REA 7 4 93	6912	. 1PNT. SIGMA.
(n,p)	1.0+6	1.5+7	SCU	Theo	Rept	ICD-7 SUPPL 1	7000	Csikai+ SIG+HL COMPILTN,N-ACTIV-ANAL
	1.0+6	1.5+7		Theo	Rept	INDC(CCP)-18	7112	Saveliev. STATMOD CALCS,CFD EXPT,GRPH
(n,p)	1.5+7		TOK	Theo	Jour	PTP 43 1231	7005	. ENGL OF ICD-7 SUPPL 1
(n,p)	Fiss		ISP	Expt	Jour	NSE 40 331	7005	Obu+ ANGDIST TO ANALOG LVLS OF DWBA
	Fiss			Expt	Jour	NSE 29 7	6707	Bresesti+,EXCITAT CURV,INTERCALIBRAT
	Fiss			Expt	Data	EXFOR20734.	8001	Bresesti+ 91.5MB TO GR,29.5 TO META
(n,p)	1.0+6	1.8+7	BNW	Revw	Rept	STI/DOC/10-107	7005	2PTS.SIGMA.
(n,p)	1.0+4	1.8+7	BNW	Eval	Rept	BNWL-1312	7005	Dahl+PAGE162. SIG(E) GRPH,REVIEW
	1.0+6	1.8+7		Eval	Conf	68WASH 235	6803	Simons+. EVALUATED.
(n,p)	Pile		ANL	Expt	Rept	ANL-7629	7005	Mcelroy+ EVALUATD SIGS FROM FOIL ACT
	Pile			Expt	Prog	ANL-7550 94	6812	Dudey+.EBR-2 SPECTRUM-AVGD SIGS MEAS
(n,p)	1.4+7	1.5+7	JYV	Eval	Rept	JU-RR-3/1970	7006	. EBR-2 FLUX,INTEGRAL MEAST,SIG GVN
(n,p)	3.0+6	3.7+6	AE	Expt	Prog	EANDC(OR)99 16	7008	Leppaemaeki+ TABLE OF EVAL AVG SIG
(n,p)	2.0+6	2.0+7	CCP	Theo	Jour	YF 12 704	7010	Lodin+. TOP.SURFACE BARRIER SI. NDG
	2.0+6	2.0+7		Expt	Jour	SNP 12 381	7104	Savel'Ev+ SIG(E) CFD XPT,HAUSER-F-TH
(n,p)	1.4+7		GIT	Expt	Abst	BAP 15 1372	7011	TRANSLATN.*
	1.4+7			Expt	Data	EXFOR10484.004	7504	Fink+.ACT GE(LI) DET,VALUE GIVEN
(n,p)	1.4+7		OTU	Theo	Jour	NP/A 164 526	7103	. 1PT, SIGMA.
(n,p)	1.5+7	2.2+7	HAR	Theo	Jour	NP/A 165 569	7104	Pal+ SHELL/PAIR-INDEP STATMD.FIRST P
(n,p)	Pile		ORL	Expt	Abst	ANS 14 381	7106	Clement+ DWBA SIG ANALGDPL,EXPT FIT
	1.0+6	1.0+7	IAE	Revw	Jour	REA 9 441	7106	Jenkins+. EFFECTIVE SIG=88.1MB
	Fiss			Revw	Rept	INDC(NDS)-47	7200	Koeler.SIG(E) GRPH,USE FOR FLUX EXPT
	1.0+6	1.0+7		Revw	Rept	IAEA/RL-10	7111	Vlasov+ REVIEW DATA STATUS ,TBL+GRPH
(n,p)	1.0+6	2.0+7	GEL	Conf	71CANT	129	7109	SEE ALSO *FOR DETAILS+TABLES
(n,p)	1.4+7		GIT	Theo	Jour	PR/C 4 1173	7110	Paulsen+ FITTED BEST CURVE+WATT AVG
(n,p)	1.5+7	1.5+7	CCP	Expt	Rept	YK- 9 50	7200	Fink+.STAT-MODEL CALCULATION,CFD EXP
								Maslov+ REL STAND,NA-I,SIG GIVEN

	1.4+7		Expt	Rept	INDC(CCP)-42	7408	.P10. ENGLISH OF YK-9
	1.5+7		Expt	Data	EXFOR40136.008	7302	.1 DATA LINE
(n,p)	7.4+5	1.5+7	UK	Eval	NDCC	7201	.UK-DFN-909, SIGMA AT 453 ES
(n,p)	Tr	Up	CCP	Theo	Jour YF 15 744	7204	Savel'Ev+ H-F CALCS CFD EXPTS,GRAPHS
	Tr	Up		Theo	Jour SNP 15 416	7210	* ENGL OF YF 15 744
(n,p)	1.0+6	1.7+7	GEL	Expt	Prog EANDC(E)150U	7205	Paulsen+, ACTIV MEAS
	1.0+6	1.7+7		Expt	Conf 71CANT 129	7109	Paulsen+ ACTIV MEAS
	1.0+6	2.2+6		Expt	Conf 66PARIS 1 217	6610	Paulsen+ PPR90, CURVE, ACTIV METH VOG
	9.9+5	1.6+7		Expt	Data EXFOR20396.004	7410	39PTS.SIGMA.
(n,p)	2.0+6	1.8+7	WMA	Theo	Jour NPJA 194 380	7210	Decowski+ G-DECAY UNBOUND ST CFD EXP
(n,p)	1.4+7		ERN	Expt	Jour NPJA 195 289	7211	Alvar+ANG DIST.CS CALC FROM P SPEC.
	1.4+7			Expt	Data EXFOR10297.	7604	. 598PTS.NP,NPN COMBINED CS,ANG DIST
(n,p)	1.5+7		KUK	Theo	Prog BARC-695 47	7300	Wadhwa+ THEORETCL CALCS CFD EXP. TBL
(n,p)	1.4+7		DUR	Jour	JNE 27 241	7304	Hemingway.ACT.TO C0058 G.S.
	1.5+7			Expt	Data EXFOR20527.003	7604	1PNT.SIGMA.
(n,p)	1.4+7		LOU	Expt	Prog INR-1464 12	7305	Dresler+ ACTIVATION,BRIEF REPORT,TBL
	1.4+7			Expt	Data EXFOR30263.009	7311	SIGMA AT 14.6 MEV
(n,p)	2.0+6	2.0+7	IRK	Exth	Jour APA 37 3 288	7305	Wagner+TOT.ACT.SEC.STAT.MOD.ISOM.RAT
(n,p)	Tr		KTO	Expt	Jour NST 10 574	7309	Kimura+.ACTIV METHOD.SIG IN TABLE
	1.5+6			Expt	Data EXFOR20593.003	7608	2PTS.SIGMA.
(n,p)	Tr	2.0+7	RCN	Comp	Rept RCN-196	7310	Zijp+COMPIL.EVAL.CS.FAST N.METROLOGY
	Fiss			Conf	73PARIS 2 271	7303	Zijp.RECOMM INTEG CFD DIFF CALC,TBLS
(n,p)	1.4+7	1.5+7	KAZ	Theo	Jour YF 18 705	7310	Levkovsky.AVERAGED SIG,CALC,TBL
	1.4+7	1.5+7		Theo	Jour SNP 18 361	7404	. ENGLISH OF YF 18,705
(n,p)	1.4+7		IRK	Expt	Prog EANDC(OR)126L	7310	Gatterer+ ABST. P SPECT+ANGDIST.
(n,p)	1.4+7		TUD	Theo	Conf ZFK-271 63	7311	Seeliger+ P-EMISSION SPEC, NDC
(n,p)	1.0+5	1.2+6	CCP	Eval	Rept YK- 13 159	7400	Vasiljev+ EFFSG(E),20SPECS.TBL,GRPH
(n,p)	1.0+6	2.2+7	IBJ	Theo	Conf ZFK-271 71	7402	Decowski+ SIG(E),CALC CFD EXPT,GRAPH
	2.0+6	2.0+7		Theo	Rept INR-1475/1/PL	7300	Marcinkowski. SIG(E) CFD STATMOD,FIG
(n,p)	Fiss		IFL	Eval	Book LAPENAS	7500	Lapenas. EVAL DATA AVGQ,VALUE GIVEN
	1.1+6	1.8+7		Eval	Book LAPENAS	7500	Lapenas. FULL DOCUM OF EVAL,TABLES
	Fiss			Eval	Rept YK- 15 63	7308	Bondars+ SHORT. AVG VALUE GIVEN
	1.1+6	1.8+7		Eval	Rept YK- 15 63	7308	Bondars+ GRPH ONLY.SOME VALS DIFFRNT
	1.1+6	1.8+7		Eval	Data VIEN-V0002.009	7511	SIGMA AT 165 ENERGIES
	Fiss			Eval	Data VIEN-V0003.009	7511	WATT-SPECTRUM, 1 POINT
(n,p)	1.4+7	1.5+7	KUK	Theo	Jour NSE 56 96	7501	Wadhwa+ ALSO N2P REACT. 2ES 14+14.8
	1.5+7			Theo	Prog INDC(SEC)-35	7309	Wadhwa+ P123.DIFFUSD EDGE OPTMOD,TBL
	1.4+7	1.5+7		Theo	Conf 72CHANDG 2 139	7212	Wadhwa+ VARIOUS THS+XPTS-RESULTS,TBL
(n,p)	Fiss		HED	Expt	Conf 75WASH 189	7503	Mcelroy.235U THERM PISS SPECT AVG CS
(n,p)	1.5+7		UFT	Theo	Conf 75KIEV 4 180	7505	Dolja+ STATMOD.SIG CFD EXPTL VALUES
(n,p)	4.4+5	9.9+6	ANL	Expt	Jour NSE 58 314	7511	Smith+ GRPHS CFD OTR EXPTS
	4.4+5	1.0+7		Expt	Rept ANL-NDM-13	7506	Smith+ RENORM TO ENDF/B-IV
	4.4+5	9.9+6		Expt	Rept ANL-NDM-10	7501	Smith+TBL.GRPH+EVAL.REL.NF.235U.238U
	4.4+5	5.9+6		Expt	Rept ANL-7989	7308	Smith+. ACT.TBLS+CURVS.CFD OTHERS.
	4.4+5	1.0+7		Expt	Data EXFOR10238.	7509	. 115PTS,SIGMA
(n,p)	Fiss		MOL	Expt	Prog INDC(SEC)-51	7512	Fabry.P85.TO G+m.AVG(U235-SPEC),TBL
	Fiss			Expt	Rept IAEA/RL-27	7412	Fabry+(U235+FASTBREED).INTEG SIG GVN
(n,p)	1.0+6	1.5+7	CRC	Eval	Jour NSE 58 377	7512	Cross+ ANALYTICAL FIT TO DATA
(n,p)	Tr	1.8+7	FEI	Theo	Rept FEI-699	7600	Bychkov+ STATMOD ANAL,LVL DENS EFFCT
	1.0+6	8.0+6		Theo	Conf 75KIEV 1 160	7505	Bychkov+ SIG(E) OPTMOD,CFD XPTS.GRPH
(n,p)	Tr	2.0+7	JAE	Eval	Prog NEANDC(J)44L	7608	Asami.NORM TO NEW STD AND 14MEV DATA
(n,p)	1.5+7		ARK	Expt	Abst DA/B 37 2237	7611	Sigg.ACT.TECH.CFD OTH EXPT AND PRED.
	1.5+7			Expt	Diss SIGG	7600	Sigg.ACT.TBLS,GRPHS.CFD OTH.
	1.5+7			Expt	Data EXFOR10776.004	7904	. 1PT. CS=299+-24 MB. HL GVN
(n,p)	1.0+7	2.0+7	TRM	Theo	Conf 76AHMEDA 2 13	7612	Garg. VERY BRIEF.CALC SIG AT 4ES GVN
(n,p)	1.2+6	1.5+7	FEI	Eval	Rept YK- 25 55	7700	Bychkov+ RECOMMEND VALUES VS E,TABLE
(n,p)	Fiss		MOL	Eval	Conf AERE-R-8636	7701	Fabry.TBL REC AND EXP INTEGRAL DATA
	Fiss			Eval	Rept BLC-465	7205	Fabry.113+-2.5M
	Fiss			Conf	70HEL SIN 2 535	7006	Fabry+39. RECOMMENDED DATA,TABLES.
(n,p)	8.0+5	1.6+7	KFK	Eval	Rept KFK-2386 2 82	7703	Meyer.KEDAK3 RECOMM CURVE+EXPT DATA

	Tr	1.5+7		Eval	Rept	KFK-2233 1	7512	Goel. GRAPH OF KEDAK DATA
	8.0+5	1.5+7		Eval	Data	KEDAK-3	7510	143 DATA SETS
(n,p)	Fiss		ANL	Theo	Rept	ANL-NDM--0	7703	Smith+U235 THR FISS SPEC.GRPH,TBL.
(n,p)	Fiss		RCN	Revw	Conf	77NBS	128	Zijp.CS AVG OVER CF252 FISS SPEC CFD
(n,p)	1.0+6	1.2+7	LAS	Eval	Prog	ERDA-NDC-9	139	Arthur+P,ALF CS+SPEC.STAINLESS STEEL
(n,p)	9.1+6	1.4+7	FEI	Theo	Conf	77KLEV	2 89	Bychkov+ CALC P-SPEC CFD EXPT.GRAPH
	9.0+6	1.4+7		Eval	Rept	YK- 23	20	Bychkov+ CALCULATIONS
(n,p)	9.0+6	2.0+7	LRL	Revw	Conf	77BNL	203	Haight.ACT.10 EXPTS.RVW.GRPH
(n,p)	1.3+7	1.5+7	LAS	Eval	Conf	77BNL	435	Stewart+DISCREPANCY EXAMPLE.GRPH
(n,p)	3.0+6	4.8+6	SHI	Expt	Jour	NSE	63 268	Wu+ ACT,H-STAND.TBL,GRAPH.CFD OTHS.
	2.8+6	4.8+6		Expt	Prog	INER-0218 1	7703	Wu+ P-RECOIL DET.SIG AT 12ES.CFD,TBL
	2.8+6	4.8+6		Expt	Data	EXFOR30363.002	7611	12 POINTS.
(n,p)	Tr	1.8+7	RCN	Comp	Rept	ECN-25	7708	Zijp+ DOSIMETRY SAND-2, TBL,GRPH.
(n,p)	Tr	2.0+7	TIT	Theo	Prog	NEANDC(J)51U74	7709	Isoga+.EVAP+PRECOMP MDL.FIG
(n,p)	5.0+5	2.0+7	TRM	Eval	Prog	INDC(SEC)-61	7710	Garg. P89,ABST. ALSO (N,2P).EVAL,NDG
(n,p)	Fiss		CCP	Jour	Jour	AE	43 279	Grigorev+ AVERAGO SIG=107 MB
	Fiss			Expt	Jour	SJA	43 914	. ENGL OF AE 43 279
(n,p)	Fast		WIN	ExTh	Conf	77GEEL	7712	Murphy+ ZEBRA,INTEG VAL CFD EVAL CLC
(n,p)	1.4+7		KUK	Theo	Conf	77PUNE	2 146	Mohindra+ BRIEF.E,ANG-DIST CALC.FIG
(n,p)	2.0+6	2.0+7	JUL	Expt	Conf	77GEEL	327	Qaim+ 30MEV D BREAKUP NS.SIG IN GRPH
	2.0+6	2.0+7		Expt	Conf	76GARMIS	589	Qaim+ N SOURCE BE(D,H) 30MEV.ACT SIG
	1.1+7			Expt	Data	EXFOR20721.030	8001	2PTS.SIGMA.
(n,p)	7.6+6	9.3+6	RI	Expt	Rept	YFI-26	7800	Nemilov+ ACTIV.SIG AT 4ES,TBL+GRAPH
	7.6+6	9.3+6		Expt	Rept	YFI-25	46	Nemilov+ SIG(NEUT-E),GRAPH,TBL
	7.6+6	9.3+6		Expt	Rept	YK- 27 8	7700	Nemilov+ ACTIV.SIG(NEUT-E),TBL
	7.6+6	9.3+6		Expt	Rept	INDC(CCP)-133	7905	. PAGE 23. ENGL OF YFI-26
(n,p)	Pile		RCN	Eval	Conf	IAEA-208 2 327	7800	Zijp+ 1/E SPEC.CALC FROM LIBRARS.TBL
(n,p)	Fiss		RCN	Eval	Conf	IAEA-208 2 327	7800	Zijp+ WATT.CALC FROM LIBRARS.CFD.TBL
(n,p)	Fiss		NBS	Revw	Conf	IAEA-208 1 53	7800	Grundl+ U235,CF252,STAND FIELDS.TABL
(n,p)	Fiss		MOL	Revw	Conf	IAEA-208 1 233	7800	Fabry+ CF252,U235,STAND FIELDS.TABLS
(n,p)	Fast		KTO	Revw	Conf	IAEA-208 2 265	7800	Kimura+ AVG SIGS,STAND FIELDS.TABLE
(n,p)	Fiss		KTO	Expt	Conf	IAEA-208 2 265	7800	Kimura+ U-FISSPLATE.AVG SIG CFD,TABL
(n,p)	Maxw	Fiss	JAE	Eval	Conf	IAEA-208 2 395	7800	Asami. EVAL PT-DATA AVGD,CFD OTH.TBL
(n,p)	5.0+5	2.1+7	JAE	Eval	Conf	IAEA-208 2 395	7800	Asami. EVAL CFD EXPTS,ENDF/B-4.GRAPH
(n,p)	Fast		IST	Eval	Conf	IAEA-208 2 209	7800	Hannan+ NISUS-FIELD.CALC AVG SIG GVN
(n,p)	2.0+6	2.0+7	BNL	Eval	Conf	IAEA-208 1 407	7800	Divadeenam. ENDF/B5.SIG(E) CFD,GRAPH
(n,p)	Fiss		BNL	Eval	Conf	IAEA-208 1 375	7800	Murgano. MAXW,CRANBERG,WATT.TABLE
	1.0+6	2.0+7	ANL	Revw	Rept	ANL-NDM-41	7802	Smith+EN AVG CS.CFD.GRPH.STATUS GVN
	1.0+6	2.0+7		Revw	Conf	77GEEL	374	.EQUIVALENT TO ANL-NDM-41 2-78.
(n,p)	+6	+7	RI	Theo	Jour	AE	44 259	Trofimov.SIG(N-2,A) CFD EXPT.TBL,FIG
	+7			Theo	Conf	77KIEV	2 140	Trofimov. MAX OF SIG(E),CFD EXPT.TBL
	+6	+7		Jour	Jour	SJA	44 293	.ENGLISH OF AE 44 259
(n,p)	Fiss		PTB	Expt	Prog	NEANDC(E)192 5	7804	Mannhart.P.84 AVG SIG CFD CALC
	Fiss			Expt	Rept	EUR-5667 2 131	7706	Alberts+CF252 FISS NEUT AVER XSECT
	1.5+6			Expt	Conf	75WASH	273	Alberts+ ACTIVATION
	Fiss			Eval	Rept	PTB-FMRB-60	7502	Alberts. CF252-SPC,EVAL DATA AVG,TBL
	1.5+6			Expt	Data	EXFOR20619.008	7606	1PNT.SIGMA.
(n,p)	1.2+6	4.0+6	LTI	Expt	Abst	BAP	23 636	Schier+EXCIT FN & CS.NDG.
(n,p)	Tr	2.0+7	SRI	Theo	Conf	78HARMEL	484	Yamakoshi+ N' AND GAMMA SPECTRA.
(n,p)	1.5+7		KYU	Expt	Prog	NEANDC(J)56U44	7809	Fukuda+ GE(LI),ACT SIG=338+-26 MB
	1.5+7			Expt	Data	EXFOR20841.004	7903	1PNT.SIGMA.
(n,p)	1.3+7	1.5+7	KOS	Expt	Prog	INDC(HUN)-16	7809	Raics+ P44. ABSTR,NDG. ACTIV AT 5 ES
(n,p)	1.5+7		TOH	Expt	Jour	HST	15 797	Yamamoto+.SIG FOR 2 GAMMAS AT 125DEG
	1.5+7			Expt	Data	EXFOR21304.020	8002	2PTS.D/OA.
(n,p)	1.3+7	1.9+7	AUB	Expt	Jour	ANE	5 589	Hudson+ ACT C058 MS GS, REL AL(N,A)
	1.3+7	1.7+7		Expt	Data	EXFOR10836.005	7904	. 5 PTS.META CS,META+GND CS.
(n,p)	Tr	2.0+7	FEI	Eval	Rept	YK- 32 105	7900	Zolotarev+ BOSPOR-78*LIBR.SIG(E),TBL
(n,p)	1.4+7	1.5+7	NDC	Comp	Jour	JRC	49 131	Osterhage. N-E,SIG,METHODS,REFS.TABLE
	Fast		BUC	Expt	Jour	SCF	31 59	Garlea+ STANDFIELD DETERM,SIG GIVEN
(n,p)	Fast			Expt	Jour	RRP	23 409	Garlea+ STAND-FIELD,ACT.CFD CALC,TBL

	Fast		Expt	Jour	SCF	30	573	7800	Garlea+ STANDFIELD DESCRIBD,SIG GIVN	
	Fast		Expt	Conf	IAEA-208	2	309	7800	Garlea+ (SIGMASIGMA).EXPT,CALC.TABLE	
	Fast		Expt	Data	EXFOR30452.005			7806	1 PNT.	
(n,p)	1.4+6	4.0+6	LTI	Theo	Abst	BAP	24	112	7902	Chang+STAT CMPD NUCL CODE CINDY.NDG.
(n,p)	5.0+5	1.8+7	FEI	Theo	Rept	YK- 32	27	7903	Bychkov+ CALC SIG(N-E) CFD EXPT.GRPH	
	Tr	2.0+7		Eval	Rept	YK- 32	55	7900	Bychkov+ COMP+EVAL,FIG.14MEV-SIG,TBL	
(n,p)	1.4+7		HAR	Expt	Prog	AERE-PR/NP26		7903	Swinhoe+ ACTIV.C.S. TBL.	
	1.4+7			Expt	Data	EXFOR20986.006		7907	1PNT.SIGMA.	
(n,p)	1.3+7	1.6+7	KOS	Theo	Jour	NP/A 319	1	157	7904	Sudar+H-F STATMDL COMPARED TO EXP
	1.3+7	1.6+7		Theo	Conf	78HARWEL	755	7809	Sudar+ H-F CALCULATION CFD EXP GRAPH	
(n,p)	6.0+7		DAV	Expt	Abst	BAP	24	631	7904	Ullmann+P SPEC MEAS.CFD MDL.NDG.
(n,p)	Fiss		LON	Expt	Conf	INDC(NDS)-103		7905	Burholt+ P157."NISUS",CFD ENDF.TABLE	
	Fast			Expt	Prog	NEANDC(E)172	8	7608	Hannan+ RATIO TO U235(N,F)	
	Fast			Expt	Data	EXFOR20950.007		7906	1PNT.AVG-SIGMA RATIO TO U-235NF	
(n,p)	Fiss		KOS	Expt	Conf	INDC(NDS)-103		7905	Dezso+ P176.TBL,SAME DATA AS 77KIEV	
	Fiss			Expt	Conf	ZFK-376	44	7812	Dezso+ (CF252),SAME RESULT AS 77KIEV	
	Fiss			Expt	Conf	77KIEV	3	32	7704	Dezso+ (CF252),GELI.SIG CFD OTHS.TBL
	Fiss			Expt	Jour	ANE	3	527	7611	Csikai+ AV SIG FOR CF-252 SPECT.
(n,p)	Fiss		PTE	Expt	Data	EXFOR30400.007		7707	1 PNT, AV SIG FOR CF-252 SPECT	
	Fiss			Expt	Prog	NEANDC(E)202	5	7906	Mannhart. P.86, SENSITIVITY COEF	
(n,p)	Fiss			Expt	Jour	NSE	69	333	7902	Mannhart+CF 252 SOURCE.CALC CFD EXPT
	1.5+7		LRL	Expt	Jour	PRJC	19	2127	7906	Grimes+GRPHS,TBLS.CFD OTH EXPTS,CALC
	1.5+7			Expt	Conf	77GEE	312	7712	Haight+ (N,XP) TBL.QUAD SPECTROMETER	
	1.0+6	1.4+7		Expt	Data	EXFOR10827.		7908	. 27 PTS PAR SIG.1 PT SIG.	
(n,p)	Fiss		RCN	Revw	Rept	ECN-70		7908	Zijp+ DATA GUIDE ACTIV. DETECTORS	
	Fiss			Revw	Rept	ECN-56		7903	Zijp. INTEGRAL CHECK DOSIM.XSECT.TBL	
	Fiss			Revw	Conf	77NBS	128	7704	Zijp.CS TBL.U235 FISS SPEC MDLS CFD.	
	Fiss			Revw	Rept	ECN-2		7609	Zijp+ INTERCOMP. INTEGRAL SIG SAND-2	
(n,p)	Fiss		KTO	Expt	Prog	NEANDC(J)61U81		7909	Kobayashi+.119+-6MB IN CF252 FISS-N	
(n,p)	1.5+7		ORL	Theo	Conf	79KNOX	GB	2	7910	Fu.H-F,PRE-COMPD CALC.NDG.
	1.4+7			Theo	Prog	DOE-NDC-15	174	7904	Fu+(N,XP) H-F CALC.CFD EXPT.NDG.TBP.	
(n,p)	1.0+6	2.0+7	GEL	Revw	Conf	IAEA-223	185	7912	Liskien. EXPTS CFD ENDF/B-IV.GRAPH	
(n,p)	1.4+7		KOS	Revw	Conf	IAEA-223	199	7912	Csikai. GRPH RANGE OF ACTIV-XPT DATA	
(n,p)		1.3+7	HED	Eval	Rept	TC- 1588		7912	Schmittroth+COVARIANCE FOR DOSIMETRY	
(n,p)	8.0+6	1.1+7	OHO	Expt	Prog	DOE-NDC-19	152	8005	Randers-pehrson+3ANGS,2ES.NDG	

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Evaluation	6.0-2	1.0+7	LAS	Eval	Jour	NSE	4	166	5808	Kiehn.TOT,FISS,NG,NU,TRANSF.10GROUPS
Evaluation	1.0-4	1.5+7	CAD	Eval	Rept	PNR/SETR65-10			6503	Ravier.MENTIONED IN NP,N2N OF NAT NI
Evaluation	Tr	1.5+7	KAP	Eval.	Rept	KAPL/CSNL-4	66		6606	Lubitz.EVALUATED NP. FISS AVG105.5MB
Evaluation		2.0+7	TRM	Eval	Conf	69ROORKE	2	106	6912	Garg+INDIAN EVALUATN ACTIVITIES, NDC
Evaluation	-2	6.0+5	HAR	Eval	Rept	AERE-R-7568			7400	Moxon.TH SIGS WN WG
Evaluation	Tr	2.0+7	BNL	Theo	Conf	76LOWELL	1348		7607	Divadeenam+(N,PARTICLE)CS DATA.NDG
Evaluation	+6	1.5+7	KFK	Eval	Rept	KFK-2386	2	79	7703	Goel+ REVISIONS FOR KEDAK-3
	-3	+7		Eval	Rept	KFK-2233	1		7512	Goel.KEDAK DATA GRAPHS OF NP,NA,N2N
	1.0-3	1.5+7		Eval	Data	KEDAK-3			7510	DATA FILES FOR RES,NA,NP,N2N
Evaluation	1.0-4	2.0+7	LRL	Eval	Rept	UCRL-50400			7805	Howerton+ VOL.15,PART D. EVAL LIST.
	1.0-4	2.0+7		Eval	Data	ENDL-7833			7807	. SIGS.OA,DE. SOME DATA.
Evaluation	+0	+7	KAL	Eval	Prog	BARC-990	31		7809	Sharma+ COMPREHENS EVAL CFD OTH.NDG
Evaluation	1.0-5	1.5+7	JAE	Eval	Rept	JAERI-1261			7903	Igarasi+.JENDL-1,GRAPHS AND TABLES
	1.0-5	2.0+7		Eval	Data	JENDL-1			7711	TOT.EL.INEL.N2N.NNP.NG.NP.NA.

(n,p)	1.4+7	HAR	Expt	Jour	PPS	70	195	5608	Allan+ CCW, PHOTO-PLATE. P-EMISSION.		
(n,p)	Pile	ARK	Expt	Abst	BAP	1	40	5601	Robinson+ 0.6+-0.1MB Q=-1.53MEV		
(n,p)	Fiss	KAP	Expt	Rept	KAPL-1779			5705	Schuman+. SIG=0.56MB ACTIVATION.		
(n,p)	1.3+7	GLS	Expt	Jour	PM	3	577	5806	March+TOT.SIG=233MB (N,NP)SIG=68MB		
	1.4+7		Expt	Data	EXFOR21333.			8002	41PTS.D/DA, 3PTS.SIGMA.		
(n,p)	Fiss	HAR	Expt	Rept	AERE-I/R-2630			5807	Mellish+FAST REACTOR,ACTIV		
	1.0+6		Expt	Conf	57PARIS	1	35	5709	Mellish+ UNESCO CONF.		
	Fiss		Expt	Jour	NAT	178	275	5608	Mellish+ SIG=BETWEEN 3 AND 7MB.		
(n,p)	Fiss	GES	Expt	Jour	NUC	17	1	5901	Rochlin.REL AL27 (N,A).ACT9LT 2.MB		
	Fiss		Expt	Data	EXFOR11654.010			7606	. 1 PT.		
(n,p)	1.5+7	ARK	Expt	Jour	NP	15	326	6002	Preiss+ ACTIVATION. CO.60M		
	1.5+7		Expt	Data	EXFOR11740.009			7606	. 1 PT.		
(n,p)	1.4+7	GLS	Expt	Jour	PPS	75	526	6004	Storey+ 158+-32MB, P SPECT T=1.48MEV		
	1.4+7		Expt	Data	EXFOR21443.007			8003	1PNT.SIGMA VIA COMP.NUCL.REACT.		
(n,p)	Fiss	CRC	Eval	Rept	CRC-1003			6012	Roy+,ESTIMATED AVG SIG=2.0MB		
(n,p)	1.4+7	HAR	Expt	Jour	NP	24	274	6104	Allan+AT120DEG.PHOTOP.L.CFD STATMODEL		
	1.4+7		Expt	Data	EXFOR21487.			8004	3PTS.SIGMA.		
	1.4+7		Expt	Data	EXFOR20004.			7011	2PTS.CMPD.NUC.		
(n,p)	1.4+7	CIS	Expt	Jour	NC	21	966	6109	Colli+E+ANG.DIST.OF P, EVAP+DIR EFFEC		
	1.4+7	1.4+7	Expt	Priv	PIGNANELLI			6901	Colli. NUMERICAL DATA		
	1.4+7		Expt	Data	EXFOR21102.			8001	43PTS.+(NNP)DA/DE,+(NNP)D/DA.		
(n,p)	5.0+6	1.6+7	FRK	Theo	Jour	NP	63	615	6503	Buttner+ STATMOD, LVL DENSITY A VARIED	
(n,p)	1.4+7		RPI	Expt	Abst	DA	26	437	6507	Malanify.PROTON ENERGY+ANG DIST.S.NDG	
(n,p)	1.4+7	1.5+7	SAH	Comp	Jour	NUC	23	8	112	6508	Chatterjee. TABLE WITH REFS.
(n,p)	2.0+6	1.6+7	KFK	Eval	Rept	KFK-120	1	6602	Schmidt.OTHERS*XPTS+CURVES		
(n,p)	1.4+7		IIT	Theo	Jour	NP/A	96	121	6704	Gardner+ RELATIVE ISOTOPIC X SECTION	
(n,p)	Tr	2.0+7	GEL	Comp	Rept	EUR-119E VOL.2		6704	Liskien+PAULSEN.ALL DATA EXCIT FUNCT		
(n,p)	6.0+6	2.0+7	GEL	Expt	Jour	NUK	10	91	6706	Paulsen.ACTIV.EXCIT FUNCT +8/12PC	
	6.0+6	2.0+7		Expt	Conf	66BERKEL	352	6609	Liskien+ CURVES ONLY.		
	6.0+6	2.0+7		Expt	Jour	NUK	8	315	6608	Liskien+ CURVE.TBL.VDG.ACTIVATION.	
	6.0+6	2.0+7		Expt	Jour	NP	63	393	6503	Liskien+ ACTIVATION.CFD STAT MOD	
	Fiss		Expt	Data	EXFOR20388.			7410	41PTS.SIGMA.		
(n,p)	1.4+7	1.5+7	NAP	Comp	Rept	INFN/BE-67-10		6707	Cuzzocrea+ AVERAGED CHOSEN DATA.		
(n,p)	8.2+6	1.4+7	GEL	Expt	Jour	ZP	205	226	6709	Paulsen. TO CO-60M. SPIN CUTOFF.	
	8.2+6	1.4+7		Expt	Data	EXFOR20390.		7410	6PTS.SIGMA.		
(n,p)	Fiss		AE	Theo	Prog	EANDC(OR)73L		6801	Eriksson. STAT MOD CALC		
(n,p)	Fiss		CCP	Expt	Jour	AE	25	437	6811	Nasyrov.(AVG+EFFECTIV)THRESH-SIG-TBL	
	Fiss		Expt	Jour	EAF	25	5	125	6811	TRANSLATN.*	
	Fiss		Expt	Jour	SJA	25	1251	6811	. ENGL OF AE 25 437		
(n,p)	1.4+7	1.5+7	IRK	Comp	Jour	OAWS	177	467	6900	Hille.	
(n,p)	1.4+7		IRK	Expt	Prog	EANDC(OR)86L		6901	Palme.P ENERGY SPEC + ANG DISTR		
(n,p)	1.5+7		KAZ	Expt	Jour	YF	10	44	6907	Levkovskij+ ABSOLUTE SIG+HL,ACTIVATN	
	1.5+7			Expt	Jour	SNP	10	25	7001	. ENGL OF YF 10 44	
	1.5+7			Expt	Data	EXFOR40226.013		7412	.SIGMA AT 14.8 MEV GIVEN		
(n,p)	1.5+7		DEB	Comp	Jour	REA	7	4	93	6912	Csikai+ SIG+HL COMPILTN,N-ACTIV-ANAL
(n,p)	1.5+7		CRC	Expt	Prog	EANDC(CAN)-16		7005	Cross+ 160MB TOT+DATA FOR META STATE		
	1.5+7			Expt	Data	EXFOR11696.		7606	. 1 PT.		
(n,p)	1.0+4	1.8+7	BNW	Eval	Rept	BNWL-1312		7005	Simons+.		
(n,p)	Pile		ANL	Expt	Rept	ANL-7629		7005	Dudey+ EBR-2 SPEC AVE SIGS		
	Pile			Expt	Prog	ANL-7550	94	6812	. EBR-2 FLUX.INTEGRAL MEAST.SIG GIVN		
(n,p)	1.4+7	1.5+7	JYV	Eval	Rept	JU-RR-3/1970		7006	Leppaenaeki+ TABLE OF EVAL AVG SIG		
(n,p)	1.4+7		DTU	Theo	Jour	NP/A	164	526	7103	Pai+ SHELL/PAIR-INDEP STATMOD.FIRST P	
(n,p)	1.5+7		MUA	Expt	Jour	NC/A	3	3	467	7106	Prasad+ ACTIVATION CFD STATMOD
	1.5+7			Expt	Conf	69RODRKE	2	112	6912	Prasad+ SIG+VALUE FOR 10.0MNS HALF-	

(n,p)	1.5+7		Expt	Data	EXFOR30336.018	7600	SIG TO ISOM, 1 PNT
	1.4+7		Expt	Rept	YK- 9 50	7200	Maslov+ NA-I,REL STAND.SIG GIVEN
	1.4+7		Expt	Rept	INDC(CCP)-42	7408	.P10. ENGLISH OF YK-9
	1.4+7		Expt	Data	EXFOR40136.010	7302	.1 DATA LINE
(n,p)	Fast		KJL	Expt	Jour RCA 17 46	7202	Hansen+ AVER XSECT TO 60CO M AND G
	Fast			Expt	Data EXFOR20257.	7405	2PTS.SIGMA.
(n,p)	Tr	Up	CCP	Theo	Jour YF 15 744	7204	Savel'Ev+ H-F CALCS CFD EXPTS,GRAPHS
	Tr	Up		Theo	Jour SNP 15 416	7210	* ENCL OF YF 15 744
(n,p)	1.4+7		DUR	Expt	Jour JNE 27 241	7304	Hemingway.ACT.TO C0060 G.S.
	1.5+7			Expt	Data EXFOR20527.005	7604	1PNT.SIGMA.
(n,p)	1.4+7	1.5+7	KAZ	Theo	Jour YF 18 705	7310	Levkovsky.AVERAGED SIG,CALC,TBL
	1.4+7	1.5+7		Theo	Jour SNP 18 361	7404	. ENGLISH OF YF 18,705
(n,p)	1.4+7		MNZ	Expt	Jour RCA 22 11	7500	Weigel+ TOT SIG, ACT METHOD
(n,p)	1.5+7		UFT	Theo	Conf 75KIEV 4 180	7505	Dolja+ STATMOD.SIG CFD EXPTL VALUES
(n,p)	Tr	1.8+7	FEI	Theo	Rept FEI-699	7600	Bychkov+ STATMOD ANAL,LVL DENS EFFECT
	4.0+6	8.0+6		Conf	75KIEV 1 160	7505	Bychkov+ SIG(E) OPTMOD,CFD XPTS.GRPH
(n,p)	Fiss		MUN	Expt	Diss GRYN TAKIS	7603	Gryntakis.,3.32+-0.38MB,REL.N158(NP)
	Fiss			Expt	Jour JRC 46 159	7801	Gryntakis+,EQUIVALENT TO THESES
	Fiss			Expt	Data EXFOR20625.006	7608	1PNT.SIGMA.
(n,p)	1.0+7	2.0+7	TRM	Theo	Conf 76AHMEDA 2 13	7612	Garg. VERY BRIEF.CALC SIG AT 4ES GVN
(n,p)	4.2+6	1.5+7	FEI	Eval	Rept YK- 25 55	7700	Bychkov+ RECOMMEND VALUES VS E,TABLE
(n,p)	4.0+6	1.6+7	KFK	Eval	Rept KFK-2386 2 82	7703	Meyer.KEDAK3 RECOMM CURVE+EXPT DATA
	Tr	1.5+7		Eval	Rept KFK-2233 1	7512	Goel. GRAPH OF KEDAK DATA
	4.0+6	1.5+7		Eval	Data KEDAK-3	7510	73 DATA SETS
(n,p)	Fiss		ANL	Theo	Rept ANL-NDM-30	7703	Smith+U235 THR FISS SPEC.GRPH,TBL.
(n,p)	1.0+6	1.2+7	LAS	Eval	Prog ERDA-NDC-9 139	7704	Arthur+P,ALF CS+SPEC.STAINLESS STEEL
(n,p)	9.1+6	1.4+7	FEI	Theo	Conf 77KIEV 2 89	7704	Bychkov+ CALC P-SPEC CFD EXPT.GRAPH
	9.0+6	1.4+7		Eval	Rept YK- 23 20	7600	Bychkov+ CALCULATIONS
(n,p)	1.5+7		JUL	Expt	Jour NP/A 283 269	7706	Molla+ ACTIV.TBL. TREND VS (N-Z)/A
	1.5+7			Expt	Data EXFOR20721.	8001	3PTS.SIGMA. TO GS,MS.AND RATIO.
(n,p)	Tr	1.8+7	RCN	Comp	Rept ECN-25	7708	Zijp+ DOSIMETRY SAND-2, TBL,GRPH.
(n,p)	5.0+5	2.0+7	TRM	Eval	Prog INDC(SEC)-61	7710	Garg. P89,ABST. ALSO (N,2P).EVAL,GRPH
(n,p)	2.0+6	2.0+7	JUL	Expt	Conf 77GEEL 327	7712	Qaim+ 30MEV D BREAKUP NS.SIG IN GRPH
	2.0+6	2.0+7		Expt	Conf 76GARMIS 589	7606	Qaim+ N SOURCE BE(D,N) 30MEV.ACT SIG
	1.2+7			Expt	Data EXFOR20721.033	8001	2PTS.SIGMA.
(n,p)	1.5+7		JUL	Expt	Conf 77GEEL 327	7712	Qaim+ SIG IN GRPH + SYSTEMATICS
	1.5+7			Expt	Conf 76GARMIS 589	7606	Qaim+TBL.ACTIV(14.7)SIG=100+-9MB
	1.5+7			Expt	Data EXFOR20721.032	8001	. 1PNT.SIGMA.
(n,p)	2.0+6	2.0+7	ANL	Revw	Conf 77GEEL 374	7712	Smith+ GRPH.EXPTS CFD.SEE ANL/NDM11
(n,p)	Fiss		RCN	Eval	Conf IAEA-208 2 327	7800	Zijp+ WATT.CALC FROM LIBRARS CFD.TBL
(n,p)	4.0+6	2.0+7	BNL	Eval	Conf IAEA-208 1 407	7800	Divadeenam. ENDF/B5.SIG(E) CFD,GRAPH
(n,p)	Fiss		BNL	Eval	Conf IAEA-208 1 375	7800	Magurno. MAXW,CRANBERG,WATT.TABLE
(n,p)	2.0+6	2.0+7	ANL	Revw	Rept ANL-NDM-41	7802	Smith+EN AVG CS.CFD.GRPH.STATUS GVN
	1.0+6	2.0+7		Revw	Conf 77GEEL 374	7712	.EQUIVALENT TO ANL-NDM-41 2-78.
(n,p)	1.5+7		KYU	Expt	Prog NEANDC(J)56U44	7809	Fukuda+.GE(LI),ACT SIG=134+-11 MB
	1.5+7			Expt	Data EXFOR20841.005	7903	1PNT.SIGMA.
(n,p)	5.9+7		DAV	Expt	Abst BAP 23 943	7809	Ullmann+ANGDIST.12ANGS.CFD DWBA.NDG
(n,p)	Tr	2.0+7	FEI	Eval	Rept YK- 32 105	7900	Zolotarev+"BOSPOR-78"LIBR.SIG(E),TBL
(n,p)	Tr	2.0+7	FEI	Eval	Rept YK- 32 55	7900	Bychkov+ COMP+EVAL,FIG.14MEV-SIG,TBL
	+7		RI	Theo	Rept YK- 33-2 47	7900	Trofimov+ E OF SIG-MAX,CFD EXPT.TABL
	+6	+7		Theo	Jour AE 44 259	7803	Trofimov. MAX=SIG(N-Z,A).TBL CFD XPT
	+7			Theo	Jour 77KIEV 2 140	7704	Trofimov. MAX OF SIG(E),CFD EXPT.TABL
	+6	+7		Theo	Jour SJA 44 293	7809	.ENGLISH OF AE 44 259
(n,p)	1.4+7	1.5+7	NDC	Comp	Jour JRC 49 131	7900	Osterhage. N-E,SIG,METHODS,REFS.TABLE
(n,p)	1.4+7		ORL	Theo	Prog DOE-NDC-15 174	7904	Fu+(N,XP) H-F CALC.CFD EXPT.NDG.T8P.
(n,p)	1.5+7		LRL	Expt	Jour PR/C 19 2127	7906	Grimes+GRPHS,TBLS.CFD OTH EXPTS,CALC
	1.5+7			Expt	Conf 77GEEL 312	7712	Haight+ (N,XP) TBL.QUAD SPECTROMETER
	1.0+6	1.3+7		Expt	Data EXFOR10827.	7908	. 24 PTS PAR SIG.1 PT SIG.
(n,p)	Fiss		RCN	Revw	Rept ECN-70	7908	Zijp+ DATA GUIDE ACTIV. DETECTORS
	NDG			Revw	Rept ECN-2	7609	Zijp+ INTERCOMP. INTEGRAL SIG SAND-2

(n,p)	4.5+6	2.0+7	GEL	Revw	Conf	IAEA-223	185	7912	Liskien. EXPTS CFD ENDF/B-IV.GRAPH
(n,p)	1.4+7		KOS	Revw	Conf	IAEA-223	199	7912	Csikal. GRPH RANGE OF ACTIV-XPT DATA

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(n,t)	1.5+7		JUL	Expt	Jour	NP/A	257	233	7602	Qaim+ACT,TBL,GRPH,CFD OTHER ISOTOPE
	1.5+7			Expt	Data	EXPOR20669.006			7610	1PNT.SIGMA.
(n,t)	1.1+7	4.3+7	JUL	Expt	Jour	NP/A	295	150	7801	Qaim+ ACTIVATION.GAM ANAL.TBL.
	1.1+7	4.3+7		Expt	Data	EXPOR20840.042			7902	1PNT.AVG-SIGMA.

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Evaluation	1.2+4	1.6+7	KFK	Eval	Rept	KFK-120	1		6602	Schmidt.RES,SIN,DIN(LVLS),NP.+SURVEY
Evaluation		2.0+7	TRM	Eval	Conf	69RDORKE	2	106	6912	Garg+INDIAN EVALUATN ACTIVITIES, NDG
Evaluation	-2	6.0+5	HAR	Eval	Rept	AERE-R-7568			7400	Moxon.TH SIGS WN WG
Evaluation	Tr	2.0+7	BNL	Theo	Conf	76LOWELL	1348		7607	Divadeenam+(N,PARTICLE)CS DATA.NDG
Evaluation	+6	1.5+7	KFK	Eval	Rept	KFK-2386	2	79	7703	Goel+ REVISIONS FOR KEDAK-3
	-3	+7		Eval	Rept	KFK-2233	1		7512	Goel.KEDAK DATA GRAPHS OF NP,NA,N2N
	1.0-3	1.5+7		Eval	Data	KEDAK-3			7510	DATA FILES FOR NA,NP,N2N,RES
Evaluation	+0	+7	KAL	Eval	Prog	BARC-990	31		7809	Sharma+ COMPREHENS EVAL CFD QTH.NDG
Evaluation	1.0-5	1.5+7	JAE	Eval	Rept	JAERI-1261			7903	Igarasi+.JENDL-1,GRAPHS AND TABLES
	1.0-5	2.0+7		Eval	Data	JENDL-1			7711	TOT.EL.INEL.N2N.NNP.NG.NP.NA.

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Appendix F
ENDF/B-V Activation File

REACTIONS OF ENDF/B-V ACTIVATION FILE

(as of Nov. 1, 1979)

<u>Reaction</u>	<u>MAT - Target</u>	<u>MAT - Product</u>
${}^6\text{Li}(n,x)t$	7036	7013
${}^7\text{Li}(n,x)t$	7037	7013
$(n,\gamma){}^8\text{Li}$	7037	7038
${}^{10}\text{B}(n,x)t$	7050	7013
${}^{14}\text{N}(n,p){}^{14}\text{C}$	7074	7064
${}^{16}\text{O}(n,p){}^{16}\text{N}$	7086	7076
${}^{19}\text{F}(n,2n){}^{18}\text{F}$	7099	7098
${}^{23}\text{Na}(n,2n){}^{22}\text{Na}$	7113	7112
$(n,\gamma){}^{24}\text{Na}$	7113	7114
$(n,p){}^{23}\text{Ne}$	7113	7103
${}^{24}\text{Mg}(n,p){}^{24}\text{Na}$	7124	7114
${}^{27}\text{Al}(n,\gamma){}^{28}\text{Al}$	7137	7138
$(n,p){}^{27}\text{Mg}$	7137	7128
$(n,\alpha){}^{24}\text{Na}$	7137	7124
${}^{31}\text{P}(n,p){}^{31}\text{Si}$	7151	7141
${}^{32}\text{S}(n,p){}^{32}\text{P}$	7162	7152
${}^{41}\text{K}(n,d){}^{41}\text{Ar}$	7191	7181
${}^{45}\text{Sc}(n,\gamma){}^{46}\text{Sc}$	7215	7216
${}^{46}\text{Ti}(n,p){}^{46}\text{Sc}$	7226	7216
${}^{47}\text{Ti}(n,p){}^{47}\text{Sc}$	7227	7217
$(n,np){}^{46}\text{Sc}$	7227	7216
${}^{48}\text{Ti}(n,p){}^{48}\text{Sc}$	7228	7218
$(n,np){}^{47}\text{Sc}$	7228	7217
$(n,\alpha){}^{45}\text{Ca}$	7228	7205
${}^{50}\text{Ti}(n,\alpha){}^{47}\text{Ca}$	7220	7207
${}^{55}\text{Mn}(n,2n){}^{54}\text{Mn}$	7255	7254
$(n,\gamma){}^{56}\text{Mn}$	7255	7256
${}^{54}\text{Fe}(n,\gamma){}^{55}\text{Fe}$	7264	7265

REACTIONS OF ENDF/B-V ACTIVATION FILE

(as of Nov. 1, 1979)

<u>Reaction</u>	<u>MAT - Target</u>	<u>MAT - Product</u>
(n,p) ⁵⁴ Mn	7264	7254
(n,α) ⁵¹ Cr	7264	7241
⁵⁶ Fe(n,2n) ⁵⁵ Fe	7266	7265
(n,p) ⁵⁶ Mn	7266	7256
⁵⁸ Fe(n,γ) ⁵⁹ Fe	7268	7269
⁵⁹ Co(n,2n) ⁵⁸ Co	7279	7278
(n,γ) ⁶⁰ Co	7279	7270
⁵⁸ Ni(n,2n) ⁵⁷ Ni	7288	7287
(n,γ) ⁵⁹ Ni	7288	7289
(n,p) ⁵⁸ Co	7288	7278
(n,d) ⁵⁷ Co	7288	7277
(n,α) ⁵⁵ Fe	7288	7265
⁶⁰ Ni(n,2n) ⁵⁹ Ni	7280	7289
(n,p) ⁶⁰ Co	7280	7270
⁶² Ni(n,γ) ⁶³ Ni	7282	7283
(n,α) ⁵⁹ Fe	7282	7269
⁶³ Cu(n,γ) ⁶⁴ Cu	7293	7294
(n,p) ⁶³ Ni	7293	7283
(n,α) ⁶⁰ Co	7293	7270
⁶⁵ Cu(n,2n) ⁶⁴ Cu	7295	7294
⁹⁰ Zr(n,2n) ⁸⁹ Zr	7400	7409
⁹² Zr(n,γ) ⁹³ Zr	7402	7403
⁹⁴ Zr(n,γ) ⁹⁵ Zr	7404	7405
⁹³ Nb(n,n') ⁹³ Nb*	7413	7410
(n,γ) ⁹⁴ Nb	7413	7414
¹¹⁵ In(n,n) ¹¹⁵ In*	7495	7494
(n,γ) ¹¹⁶ In	7495	7496

REACTIONS OF ENDF/B-V ACTIVATION FILE

(as of Nov. 1, 1979)

<u>Reaction</u>	<u>MAT - Target</u>	<u>MAT - Product</u>
$^{127}\text{I}(\text{n}, 2\text{n})^{126}\text{I}$	7537	7536
$^{164}\text{Dy}(\text{n}, \gamma)^{165}\text{Dy}$	7664	7665
$^{181}\text{Ta}(\text{n}, \gamma)^{182}\text{Ta}$	7731	7732
$^{197}\text{Au}(\text{n}, 2\text{n})^{196}\text{Au}$	7797	7796
$(\text{n}, 3\text{n})^{195}\text{Au}$	7797	7795
$(\text{n}, \gamma)^{198}\text{Au}$	7797	7798
$^{232}\text{Th}(\text{n}, 2\text{n})^{231}\text{Th}$	7902	7901
$(\text{n}, \gamma)^{233}\text{Th}$	7902	7903
$^{231}\text{Pa}(\text{n}, \gamma)^{232}\text{Pa}$	7911	7912
$^{233}\text{Pa}(\text{n}, 2\text{n})^{232}\text{Pa}$	7913	7912
$^{233}\text{U}(\text{n}, 2\text{n})^{232}\text{U}$	7923	7922
$^{238}\text{U}(\text{n}, \gamma)^{239}\text{U}$	7928	7929
$^{241}\text{Am}(\text{n}, \gamma)^{242}\text{Am}$	7951	7952
$(\text{n}, \gamma)^{242}\text{Am}^*$	7951	7953
$^{45}\text{Sc}(\text{n}, 2\text{n})^{44}\text{Sc}$	7215	7214
$(\text{n}, 2\text{n})^{44}\text{Sc}^*$	7215	7213
$^{50}\text{Cr}(\text{n}, 2\text{n})^{49}\text{Cr}$	7240	7249
$(\text{n}, \gamma)^{51}\text{Cr}$	7240	7241
$^{52}\text{Cr}(\text{n}, 2\text{n})^{51}\text{Cr}$	7242	7241
$^{90}\text{Zr}(\text{n}, 2\text{n})^{89}\text{Zr}^*$	7400	7408
$^{93}\text{Nb}(\text{n}, 2\text{n})^{92}\text{Nb}$	7413	7412
$(\text{n}, 2\text{n})^{92}\text{Nb}^*$	7413	7411
$^{92}\text{Mo}(\text{n}, \gamma)^{93}\text{Mo}$	7422	7423
$^{98}\text{Mo}(\text{n}, \gamma)^{99}\text{Mo}$	7428	7429
$^{100}\text{Mo}(\text{n}, \gamma)^{101}\text{Mo}$	7420	7421
$^{109}\text{Ag}(\text{n}, \gamma)^{110}\text{Ag}$	7479	7470
$^{120}\text{Sn}(\text{n}, \gamma)^{121}\text{Sn}$	7500	7501

REACTIONS OF ENDF/B-V /CTIVATION FILE

(as of Nov. 1, 1979)

<u>Reaction</u>	<u>MAT - Target</u>	<u>MAT - Product</u>
$(n,\gamma)^{121}\text{Sn}^*$	7500	7506
$^{122}\text{Sn}(n,\gamma)^{123}\text{Sn}$	7502	7503
$(n,\gamma)^{123}\text{Sn}^*$	7502	7507
$^{124}\text{Sn}(n,\gamma)^{125}\text{Sn}$	7504	7505
$(n,\gamma)^{125}\text{Sn}^*$	7504	7508
$^{127}\text{I}(n,\gamma)^{128}\text{I}$	7537	7538
$^{139}\text{La}(n,\gamma)^{140}\text{La}$	7579	7570
$^{164}\text{Dy}(n,\gamma)^{165}\text{Dy}^*$	7664	7666

* * * * *

Reactions No Longer Expected

$^{103}\text{Rh}(n,n')^{103}\text{Rh}^*$
$^{176}\text{Lu}(n,\gamma)^{177}\text{Lu}$
$(n,\gamma)^{177}\text{Lu}^*$

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Appendix G

University of Illinois Charged-Particle Barn Book

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CROSS SECTION EVALUATION AND CONSIDERATIONS

FOR

ADVANCED-FUEL FUSION

BY

J. G. GILLIGAN

G. H. MILEY

J. DEVEAUX

FUSION STUDIES LABORATORY
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UNIVERSITY OF ILLINOIS
URBANA, ILLINOIS 61801

FROM PRESENTATION AT EPRI ADVANCED FUEL CROSS SECTION PANEL MEETING,
25 JULY 1979 HELD AT TRW, LA, CALIFORNIA.

OBJECTIVE:

OBTAIN ADEQUATE CROSS SECTION INFORMATION FOR
EVALUATION OF P-⁶L; ETC.

ENERGY REGIMES OF INTEREST

BEAM ENERGIES

(MeV)

≤ 20

≤ 3

≤ 2

≤ 10

≤ 2

P	} + ${}^6\text{Li}$
D	
${}^3\text{He}$	
α	
${}^6\text{Li}$	

BACKGROUND DISTRIBUTIONS WITH T-1 MeV

REQUIRE

${}^6\text{Li} - {}^6\text{Li}$	} UP TO 10 MeV
P - ${}^6\text{Li}$	

REVISION OF FUSION BARN BOOK

UNIVERSITY OF ILLINOIS PARTICIPATION

PROPOSE:

REVISION OF UI FUSION BARN BOOK, AS PART OF EPRI
ADVANCED FUELS PROJECT.

		○ ORIGINAL BARN BOOK										○ NEEDED (p- ⁶ Li)										-ENDOTHERMIC +EXOTHERMIC	
	H	D	T(R)	³ He	⁴ He	⁵ Li(R)	⁶ Li	⁷ Li	⁸ Li(R)	⁶ Be(R)	⁷ Be(R)	⁸ Be(R)	⁹ Be	¹⁰ Be(R)	⁸ B(R)	⁹ B(R)	¹⁰ B	¹¹ B	¹² B(R)	¹¹ C(R)	¹² C	¹³ C	¹⁴ C(R)
II			○		○		⊕ 2	⊕			○		⊕ 2	○		○	○	⊕		○	○		
I			⊕ 2	⊕	⊕		+	+			+												
T	○		⊕	⊕	⊕		⊕ 2	+			+												
³ He			+	⊕ 3	+	○	⊕ 5	⊕			⊕		○	○		○	○	○		○	○		
⁴ He	○				○		○						○										
⁵ Li	+	⊕ 2	⊕ 5	⊕ 2	⊕ 5	○	+	○			⊕		○	○		○	○	○		○	○		
⁷ Li	⊕		+	+	⊕		○																
¹¹ B	⊕				○		○												+				

MANY POSSIBLE RXNS. THRU
SECOND GENERATION. NEED
TO FOCUS ON IMPORTANT RXNS.

MATRIX OF POSSIBLE FUSION REACTIONS

(R) - RADIOACTIVE ISOTOPE

NUMBER OF CHANNELS SHOWN FOR REACTIONS

REACTIONS FOR WHICH ADDITIONAL
CROSS SECTION DATA ARE NEEDED

● NEUTRON PRODUCTION

Q(MEV)

${}^6\text{Li} + {}^6\text{Li}$	$\rightarrow$	$\text{N} + {}^{11}\text{C}$	9.4
		$\text{N} + \text{P} + {}^{10}\text{B}$	.3
		$\text{N} + \alpha + {}^7\text{Be}$	1.9
		$\text{N} + {}^3\text{He} + 2\alpha$	.3
$\text{D} + {}^6\text{Li}$	$\rightarrow$	$\text{N} + {}^7\text{Be}$	3.3

● RADIOACTIVE ISOTOPES

${}^3\text{He} + {}^6\text{Li}$	$\rightarrow$	${}^7\text{Be} + \text{D}$	.1
${}^6\text{Li} + {}^6\text{Li}$	$\rightarrow$	${}^{11}\text{C} + \text{N}$	9.4
		${}^7\text{Be} + \text{N} + \alpha$	1.9
		${}^{10}\text{Be} + 2\text{P}$	1.0
$\text{D} + {}^6\text{Li}$	$\rightarrow$	${}^7\text{Be} + \text{N}$	3.3

${}^7\text{Be}$	:	$\gamma, 53\text{D}$	] ACTIVITY
${}^{11}\text{C}$	:	$\beta^+, 20 \text{ M.}$	
${}^{10}\text{Be}$	:	$\beta^-, 1.6 \times 10^6 \text{ Y.}$	

● NUCLEAR ELASTIC COLLISIONS

$${}^6\text{Li} (\alpha, \alpha) {}^6\text{Li}$$

$${}^6\text{Li} (p, p) {}^6\text{Li}$$

$$p' (p, p) p'$$

$$\alpha' (\alpha, \alpha) \alpha'$$

CHAIN CENTERS

Q (MeV)

${}^3\text{He} + {}^6\text{Li} \rightarrow \text{D} + {}^7\text{Be}$	.1
$\alpha + {}^6\text{Li} \rightarrow \text{P} + {}^9\text{Be}$	-2.13
${}^6\text{Li} + {}^6\text{Li} \rightarrow \text{P} + {}^{11}\text{B}$	12.2
$\text{P} + \alpha + {}^7\text{Li}$	3.5
$\text{P} + \text{N} + {}^{10}\text{B}$	.8
$2\text{P} + {}^{10}\text{Be}$	1.0
$\text{P} + \text{T} + 2\alpha$	1.1
${}^3\text{He} + {}^3\text{He} \rightarrow 2\text{P} + \alpha$	12.9

HIGH MULTIPLICATION

$\text{D} + {}^6\text{Li} \rightarrow 2\alpha$	22
${}^6\text{Li} + {}^6\text{Li} \rightarrow {}^{12}\text{C} + \gamma$	28.2
3α	20.5
${}^3\text{He} + {}^9\text{Be} \rightarrow 3\alpha$	18.7

Figure 1. Total cross-section results for the ${}^6\text{Li}(p, {}^3\text{He})\alpha$ reaction up to 14 MeV. Apart from the present work, the low-energy measurements (<3 MeV) are from Refs. 4, 12, and 14, and the four points above 8 MeV are from Ref. 3.

FSL-79-159

Figure 2.

$$\langle \sigma v \rangle = \frac{4}{(2\pi m_1)^{1/2}} \left(\frac{n}{m_1 kT} \right)^{3/2} \int_0^\infty dE \, E \, \sigma(E) \exp \left(-\frac{uE}{m_1 kT} \right)$$

where, T = the temperature of both species

m_1 = Mass of the ion with energy E

μ = Reduced mass of the two fusing ions

This form results from assuming that both types of ions in the plasma are Maxwellian and at the same temperature T . The corresponding quantity for the beam-target case is found by assuming that the beam particles are monoenergetic but have an isotropic angular distribution. The background plasma species are assigned a Maxwellian energy distribution at temperature T . The instantaneous reaction rate parameter for a single incident particle with speed v_0 is then given by:

$$\langle \sigma v \rangle_b = \frac{\beta}{\sqrt{\pi}} \frac{1}{v_0} \int_0^\infty \sigma \left(\frac{1}{2} m_1 v^2 \right) v^2 [\exp(-\beta^2 (v_0 - v)^2) - \exp(-\beta^2 (v_0 + v)^2)] dv \quad (3)$$

$$\text{where: } \beta^2 \equiv \frac{m_2}{2kT} \quad (3a)$$

and the various quantities are

v_0 = velocity of injected particle

m_2 = mass of background particle

m_1 = mass of incident particle

The format adopted here has separate sections for each reaction, e.g., Sec. 1 treats d-T and t-D data. For each reaction values and graphs for σ , $\langle \sigma v \rangle$, $\langle \sigma v \rangle / T^2$, and $\langle \sigma v \rangle_b$ are presented, in that order. Then, for comparison purposes, the last section contains composite graphs of σ , $\langle \sigma v \rangle$, and $\langle \sigma v \rangle_b$.

NOMENCLATURE

Figure 3. Cross sections for several prominent fusion reactions.
(Nomenclature found on p. 8.1)

FROM ORIGINAL UI BARN BOOK (UIBB)

Figure 4. Cross section for ${}^3\text{He}(d,p){}^4\text{He}$

FROM UIBB

<σv> For $^3\text{He}(d,p)^4\text{He}$ assuming Maxwellian distributions

TEMP (keV)	<σv> (cm ³ /sec)	TEMP (keV)	<σv> (cm ³ /sec)
1.0000	0.302280-25	1.5000	0.132270-23
2.0000	0.141970-22	2.5000	0.764130-22
3.0000	0.275130-21	3.5000	0.764140-21
4.0000	0.177330-20	4.5000	0.361060-20
5.0000	0.665960-20	5.5000	0.113730-19
6.0000	0.182650-19	6.5000	0.279010-19
7.0000	0.408950-19	7.5000	0.518920-19
8.0000	0.795690-19	8.5000	0.106630-18
9.0000	0.139770-18	9.5000	0.179740-18
10.000	0.227250-18	15.000	0.127430-17
20.000	0.379130-17	25.000	0.817740-17
30.000	0.145200-16	35.000	0.226550-16
40.000	0.322620-16	45.000	0.429700-16
50.000	0.544080-16	55.000	0.662480-16
60.000	0.782160-16	65.000	0.900940-16
70.000	0.101720-15	75.000	0.112960-15
80.000	0.123740-15	85.000	0.134000-15
90.000	0.143710-15	95.000	0.152850-15
100.00	0.161430-15	150.00	0.219610-15
200.00	0.243730-15	250.00	0.250880-15
300.00	0.249970-15	350.00	0.245360-15
400.00	0.239160-15	450.00	0.232470-15
500.00	0.225800-15	550.00	0.219430-15
600.00	0.213460-15	650.00	0.207950-15
700.00	0.202890-15	750.00	0.198250-15
800.00	0.194930-15	850.00	0.190170-15
900.00	0.186660-15	950.00	0.183450-15
1000.0	0.180530-15	1500.0	0.161960-15
2000.0	0.153420-15	2500.0	0.150400-15
3000.0	0.149060-15	3500.0	0.148050-15
4000.0	0.149250-15	4500.0	0.150000-15
5000.0	0.150730-15	5500.0	0.151970-15
6000.0	0.153040-15	6500.0	0.154140-15
7000.0	0.155220-15	7500.0	0.156290-15
8000.0	0.157330-15	8500.0	0.158340-15
9000.0	0.159320-15	9500.0	0.160270-15
10000.	0.161180-15	15000.	0.168690-15
20000.	0.174070-15	25000.	0.178130-15
30000.	0.181320-15	35000.	0.183920-15
40000.	0.186100-15	45000.	0.187940-15
50000.	0.189540-15	55000.	0.190930-15
60000.	0.192170-15	65000.	0.193280-15
70000.	0.194270-15	75000.	0.195180-15
80000.	0.196010-15	85000.	0.196770-15
90000.	0.197480-15	95000.	0.198120-15

SUGGEST:

- CHECK ALL REACTIONS, BUT LIMIT TO FINITE NUMBER.
- CONCLUSIVE DATA ON MANY REACTIONS NOT LIKELY FOR YEARS, THEREFORE, APPROXIMATIONS NEEDED. (STEWART, HALE (LASL))
- MORE SOPHISTICATED SLOWING DOWN MODELS NEEDED TO AVERAGE OVER PROPER DISTRIBUTION FUNCTIONS.
- NUCLEAR ELASTIC COLLISIONS.

FROM UIBB

Figure 5. Values of $\langle \sigma v \rangle_b$ for injection of helium-3 into a deuterium background at various temperatures. (keV)

FROM UIBB

Figure 6. Values of $\langle \sigma v \rangle$ assuming Maxwellian distributions for D-³He fusion reactions

Appendix H

Sample Plot For NNDC Charged-Particle Barn Book

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Appendix I

Los Alamos Scientific Laboratory Charged-Particle Evaluations

LOS ALAMOS SCIENTIFIC LABORATORY CHARGED-PARTICLE EVALUATIONS

CHARGED-PARTICLE REACTIONS FOR WHICH CROSS SECTIONS ARE AVAILABLE FROM CURRENT LASL R-MATRIX ANALYSIS

<u>Reaction</u>	<u>Energy Range(MeV)</u>
T(p,p)T	E = 0-11
T(p,n)Helium-3	E = 1-11
Helium-3(p,p)Helium-3	E = 0-20
Helium-4(p,p)Helium-4	E = 0-30
Lithium-6(p,p)Lithium-6	E = 0-2.5
Lithium-6(p,alpha)Helium-3	E = 0-2.5
D(d,d)D	E = 0-10
D(d,n)Helium-3#	E = 0-10
D(d,p)T#	E = 0-10
T(d,d)T	E = 0-8
T(d,n)Helium-4	E = 0-8
Helium-3(d,d)Helium-3	E = 0-10
Helium-3(d,p)Helium-4	E = 0-10
Helium-4(d,d)Helium-4	E = 0-15
T(t,t)T	E = 0-2
T(t,2n)Helium-4	E = 0-2
Helium-4(t,t)Helium-4	E = 0-14
Helium-4(t,n)Lithium-6@	E = 0-14
Helium-4(helium-3,helium-3)Helium-4	E = 0-11

=====

Preliminary Results

@ Included in the ENDF Lithium-6 evaluation.

Appendix J

Medical Radioisotope Production Data to be Compiled and Evaluated By the NNDC

TYPES OF RADIONUCLIDES FOR IN-VIVO STUDIES

1. "ORGANIC" Short-lived β^+ emitters
(^{11}C , ^{13}N , ^{15}O , ^{18}F , ^{30}P etc.)
2. HALOGENS and RARE GASES
($^{34\text{m}}\text{Cl}$, $^{76,77}\text{Br}$, ^{123}I , ^{79}Kr , $^{81\text{m}}\text{Kr}$, ^{125}Xe etc.)
3. GENERATOR isotopes
(^{68}Ge - ^{68}Ga , ^{81}Rb - $^{81\text{m}}\text{Kr}$, ^{99}Mo - $^{99\text{m}}\text{Tc}$ etc.)
4. ALKALI and alkali like metals
(^{43}K , ^{81}Rb , ^{129}Cs , ^{201}Tl etc.)
5. "INORGANIC" radionuclides
(^{28}Mg , ^{47}Ca , ^{48}Cr , ^{73}Se , ^{97}Ru etc.)

Appendix K

Tentative Contents of the NNDC Charged-Particle Barn Book

TENTATIVE CONTENTS OF THE NNDC CHARGED-PARTICLE BARN BOOK

1. Reactions of Interest to Fusion
 - a. Hydrogen-Isotope Neutron-Source Reactions.
 - b. Other Reactions --- See for example Appendices G and I

2. Reactions of Interest to Medicine --- See Appendix J
 - a. Organic Short-Lived Positron Emitters Production
 - b. Halogens and Rare Gases Production
 - c. Generator Isotope Production
 - d. Alkali and Alkali-like Metals Production
 - e. Inorganic Radionuclide Production

Appendix L

Glossary of Quantities Contained in NNDC Data Files

I. NUCLEAR STRUCTURE AND RADIOACTIVE DECAY

ENSDF	NSR	ENDF	DEFINITION*
LEVEL PROPERTIES			
E	X		Level energy
J	X		Spin
PI	X		Parity
T	T1/2		Half-life
L	X		Angular momentum transfer
S	X		Spectroscopic factor
%EC	X	8,457	Per-cent electron capture decay
%SF	X	8,457	Per-cent spontaneous fission decay
%IT	X	8,457	Per-cent isomeric transition decay
%B-	X	8,457	Per-cent beta- decay
%B+	X	8,457	Per-cent position decay
%A	X	8,457	Per-cent alpha decay
X	X	8,457	Per-cent proton decay
X	X	8,457	Per-cent neutron decay
X	X		g-Factor
X	QUADR		Static electric moments
X	X		Static magnetic moments
X	X		Reduced electric transition probabilities (upward)
GAMMA PROPERTIES			
E	X	8,457	Gamma energy
RI	X	8,457	Relative intensity
M	G-MUL		Multipolarity
X	X		Mixing ratio (delta)
CC	X	8,457	Total conversion coefficient
TI	X	8,457	Total intensity
X	X		Reduced electric transition probabilities (downward)
X	X		Reduced magnetic transition probabilities (downward)
X	ICC	8,457	Conversion electron intensities
X	X	8,457	Theoretical conversion coefficients
X	X	8,457	Measured conversion electron coefficients
X	X		Conversion electron intensity ratios
X	X		Ratios of ce-intensities to total transition intensity
		8,457	Pair-formation coefficient
		8,457	Annihilation radiation intensity
		8,457	Auger electron energies and intensities
		8,457	Conversion electron energies
		8,457	X-ray energies and intensities

X indicates that the file contains information for the quantity,
but the information is not directly retrievable.
* (see appended "NOTES" for heading definitions).

GLOSSARY OF NNDC DATA FILE QUANTITIES
31-Oct-79

ENSDF	NSR	ENDF	DEFINITION*
BETA PROPERTIES			
E	X	8,457	Endpoint energy
IB	X	8,457	Intensity
LOGFT	X		Log ft
UN	X	8,457	Uniqueness classification
X	X	8,457	Average energy
ELECTRON CAPTURE PROPERTIES			
E	X	8,457	Energy
IB	X	8,457	Intensity of beta-branch
IE	X	8,457	Intensity of electron-capture branch
LOGFT	X		Log ft
TI	X	8,457	Total intensity
UN	X	8,457	Uniqueness classification
X	X	8,457	Average energy
X	X		Fraction of electron-capture decay from electron shells
		8,457	Auger electron energies and intensities
		8,457	Annihilation radiation intensity
		8,457	X-ray energies and intensities
ALPHA PROPERTIES			
E	EA	8,457	Energy
IA	X	8,457	Intensity
HF	X		Hindrance factor
PARENT OR TARGET PROPERTIES(see also LEVEL PROPERTIES)			
E	X	Several	Energy
J	X	Several	Spin and Parity
T	X	Several	Half-life
QP	X	8,457	Ground-state Q-value
SN	X		Neutron separation energy
SP	X		Proton separation energy
MISCELLANEOUS ATOMIC/NUCLEAR PROPERTIES			
	X-RAY		X-rays
	MOSSB		Mossbauer effect
	POLAR		Polarization
		AWR	Reduced mass in neutron mass units
		2,151	Abundance
	SUPER		Superheavy nuclei

*"X" indicates that the file contains information for the quantity,
but the information is not directly retrievable.

* (see appended "NOTES" for heading definitions).

II. NUCLEAR REACTIONS

NSR	ENDF	CSISRS	CINDA	CPBIB	DEFINITION*
REACTION PROPERTIES (see also the properties listed above)					
(a,a)	3,1	,TOT),SIG,,	TOT	,TOT),SIG,,	Total. The total cross-section.
	3,2	,EL),SIG,,	SEL	,EL),SIG,,	Elastic. The total elastic scattering cross-section, integrated over all angles.
X	4,2	,EL),DA,,	DEL	,EL),DA,,	Differential elastic. Angular distribution or differential scattering cross section for elastically scattered particles.
X		,POL,,	POL	,POL,,	Polarization. Polarization of particles in the exit channel.
X	2,151	,POL/DA,,		,POL/DA,,	Potential scattering. That part of the scattering cross-section which corresponds to scattering by a hard sphere.
		,EL),POT,,	POT		
(a,a*)	3,4	,INL),SIG,,	SIN	,INL),SIG,,	Total inelastic. The total inelastic scattering cross-section, integrated over all angles and excities levels.
X	3,51-90	,INL),PAR,SIG		,INL),PAR,SIG	Differential inelastic. Angular distributions or energy spectra of inelastically scattered particles, or partial cross-sections for inelastic scattering.
X	5,91	,INL),DA,,		,INL),DA,,	
X	4,51-90	,INL),DE,,		,INL),DE,,	
	7,--	,THS),SIG,,	TSL		Thermal scattering. Elastic or inelastic scattering of slow neutrons depending on structure of target material, e.g. chemical binding, crystal vibrations, etc.
		,SCT),SIG,,	SCT	,SCT),SIG,,	Scattering. The total scattering cross-section.
	3,2	,NON),SIG,,	SNE	,NON),SIG,,	Nonelastic. The sum of all non-elastic cross-sections
	3,27	,ABS),SIG,,	ABS	,ABS),SIG,,	Absorption. The absorption cross-section, i.e. the sum of all non-scattering cross-sections.
		(N,ABS),RI,,	RIA		Resonance integral absorption. The resonance integral for absorption.
(n,g)	3,102	(N,G),SIG,,	NG		(n,gamma). The radiative capture cross-section
		(N,G),RI,,	RIG		Resonance integral capture. The capture resonance integral, for fissioning nuclides only.
X	14,102	(N,G),DA,,	SNG		Spectrum (n,gamma). Spectrum of gamma rays or conversion electrons following neutron capture.
X	15,102	(N,G),DE,,			
X		(N,G),DA,DE,,			
X	12-15,4	,INL),*,G,	DNG		Inelastic gamma. Production cross-section, angular distributions or energy spectra for gamma-rays following inelastic scattering of neutrons.
X	12-15,3	,X)0-G-0,*,,	NEG		Nonelastic gamma. Production cross-section, angular distributions or energy spectra for gamma rays following unseparated neutron induced nonelastic processes.
(n,2n)	3-5,16	(N,2N),*,,	N2N		(n,2n). The (n,2n) or (n,2nc) reaction (c=charged particles). Integral and differential data.
(n,3n)	3-5,17	(N,XN),*,,	NXN		(n,xn) x=3,4... Reactions producing at least 3 neutrons, integral and differential data.
(n,4n)	3-5,37				

X indicates that the file contains information for the quantity, but the information is not directly retrievable.

* (see appended "NOTES" for heading definitions).

GLOSSARY OF NNDC DATA FILE QUANTITIES
31-Oct-79

NSR	ENDF	CSISRS	CINDA	CPBIB	DEFINITION*
		,X)0-NN-1,,*	NEM	,X)0-NN-1,,SIG	Neutron emission. The sum cross-section for all nonelastic processes resulting in neutron emission, weighted for the number of neutrons produced.
(n,p) data.	3,103	(N,P),,,*,	NP		(n,p). The (n,proton) reaction, integral and differential
(n,np)	3,28	(N,N+P),,,*,	NWP		(n,np). Integral and differential data of (n,np).
(n,d)	3,104	(N,D),,,*,	ND		(n,d). The (n,deuteron) reaction, integral and differential data.
(n,nd)	3,32	(N,N+D),,,*,	NND		(n,nd). Integral and differential data of (n,nd).
(n,t)	3,105	(N,T),,,*,	NT		(n,t). The (n,triton) reaction, integral and differential data.
(n,nt)	3,33	(N,N+T),,,*,	NNT		(n,nt). Integral and differential data of (n,nt).
(n,3He)	3,106	(N,HE3),,,*,	NHE		(n,He3). Integral and differential data of the (n,He3) reaction.
(n,a)	3,107	(N,A),,,*,	NA		(n,alpha). Integral and differential data.
(n,na)	3,22	(N,N+A),,,*,	NNA		(n,n+alpha). Integral and differential data.
FISS	3,18	(N,F),,,*,	NF		(n,fission). The cross section for neutron induced fission, or for inelastic scattering to the spontaneously fissioning isomer.
		(N,F),,,RI,,	RIF		Resonance integral fission. The resonance integral for fission.
		(N,ABS),,,ALF,,	ALF		Alpha. The capture to fission cross-section ratio.
		(N,ABS),,,ETA,,	ETA		Eta. For fissionable nuclides: The number of neutrons emitted per absorption.
X	1,452	,F)0-NN-1,,NU	NU	,F)0-NN-1,,NU	Nu. The number of prompt neutrons emitted per fission, also average number of prompt or total neutrons per fission.
X	1,455	F)0-NN-1,DL,NU	NUD	F)0-NN-1,DL,NU	Delayed neutrons. Delayed neutrons from fission.
X	5,18	F),,SPC,,	SPN		Total or group yields, energies.
X	12-15,18	F),PR,SPC,G,	SFG		Spectrum fission neutrons. Energy spectrum or mean energy of prompt fission neutrons.
			FPG		Spectrum fission gamma. Spectrum of prompt gamma rays emitted in fission.
			FPB		Fission product gamma. Spectrum, yields, etc. of the delayed gamma rays from unseparated fission products.
X		,F),,FY,,	NFY	,F),,FY,,	Fission product beta. Spectra, mean energies, etc. of beta-rays from the unseparated fission products.
			FRS		Fission yield. Yields of fission fragments or products.
X	2,151	X	RES		Fragment spectra. The energy or angular distribution of fission products.
	2,151	EL),,STF,,	STF		Resonance parameters. Individual and averaged neutron resonance parameters.
	2,151	(0,0),,LDP,,	LDL		Strength function. The neutron strength function.
(g,n)		(G,N),,,*,	GN		Level density. Density of levels in the continuum, as determined from particles emitted in neutron reactions.
(g,f)		(G,F),,,*,	GF		(gamma,n). The (gamma,n) reaction, integral and differential data.
					Photo-fission. The photon induced fission: cross-sections, yields and spectra of neutrons, fragments, etc.

*X indicates that the file contains information for the quantity,
but the information is not directly retrievable.

* (see appended "NOTES" for heading definitions).

GLOSSARY OF NNDC DATA FILE QUANTITIES
31-Oct-79

NSR (a,b)	ENDF	CSISRS (a,b),*, (a,b),,TTY,,	CINDA	CP8IB (a,b),,SIG,, (a,b),,TTY,,	DEFINITION*
					Partial cross section. The cross section for the specified input and output (b=sum of outgoing particles and processes) channel.
					Partial thick target yield. The thick target yield for the specified input and output (b=sum of outgoing particles and processes) channel. NOTE: A thick target is thick enough to degrade the energy of the incident particle below the reaction threshold.
COULE					Coulomb excitation
ANALO					Analog resonances
HI					Heavy ion-induced reactions

X indicates that the file contains information for the quantity,
but the information is not directly retrievable.
* (see appended "NOTES" for heading definitions).

GLOSSARY OF NNDC DATA FILE QUANTITIES
31-Oct-79

NOTES

1. ENSDF. Evaluated Nuclear Structure Data File. This file is maintained by the Nuclear Data Project, Oak Ridge National Laboratory, on behalf of the IAEA-sponsored Nuclear Structure and Decay Data Network and is distributed by the National Nuclear Data Center. The codes given are those used to define record fields or those used to define free format fields. Additional data may be coded in a free format text.
2. NSR. Nuclear Structure Reference File. The file is maintained by the NDP, ORL on behalf of the IAEA-sponsored NSDD Network and is distributed by the NNDC. The codes given are the common selectors in this file.
3. ENDF. Evaluated Nuclear Data File. The file is maintained and distributed by the NNDC on behalf of the Cross Section Evaluation Working Group. Either the sections of the file are given (e.g. MF=8, MT=457) or the commonly used code of a fixed field is given.
4. CSISRS. Cross Section Indexing Storage and Retrieval System. This file contains the data exchanged by the Nuclear Reaction Data Centers. The main contents of the file are neutron and photonuclear data with some integral charged particle data and a very small amount of differential charged particle data. The data are identified by a defined character string consisting of 8 fields in the format SF1(SF2,SF3)SF4,SF5,SF6,SF7,SF8 with the following definitions for the fields:

SF1	Target
SF2	Incident particle
SF3	Outgoing particles or processes
SF4	Residual nucleus
SF5	Branch
SF6	Parameter
SF7	Particle considered
SF8	Modifier

This format allows for great flexibility and only the grosser level of quantities are given in this glossary.

NOTE: The residual nucleus has, in general, been suppressed in this glossary. Likewise an asterisk (*) stands for the list SIG or DA or DE or DA/DE.

5. CINDA. Computerized Index to Neutron Data. This is a bibliographic file of microscopic data maintained by the 4-Center Network.
6. CPBIB. Integral Charged Particle Nuclear Data Bibliographic File. The file is maintained and distributed by the NNDC on behalf of the Nuclear Reaction Data Centers. It is primarily devoted to integral data with incident particles of protons and higher. Differential charged particle data compiled in CSISRS is also indexed in this file. The same reaction formalism as used for CSISRS is used in this file (see note 4 above).

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Appendix M

NNDC Products and Services

NATIONAL NUCLEAR DATA CENTER

PRODUCTS AND SERVICES

Brookhaven National Laboratory
Upton, New York 11973

I. Background

The National Nuclear Data Center (NNDC), formerly the National Neutron Cross Section Center, at Brookhaven National Laboratory, offers services to customers in the United States and Canada covering the entire field of low energy (usually <40 MeV) nuclear data. In particular, the center can provide information on neutron and charged particle reactions, nuclear structure and decay data in the area of low energy nuclear physics. The resources of cooperating data centers and other interested groups within and without the United States are available to the NNDC to assist in the compilation activities and to make certain that the information is complete.

Extensive bibliographic files for neutron reaction, nuclear structure, and radioactive decay data publications are available at the center. There is a specialized bibliography for integral charged particle reaction data starting with publications after January 1, 1976. Files of experimental neutron reaction data covering all the data produced since the discovery of the neutron and covering most data types are also available. A new file of integral charged particle reaction data has been started with attempts to cover both past and current experiments.

Evaluated nuclear data is important for applications purposes. The center has organized a cooperative national effort to produce neutron reaction data evaluations within an organization known as the Cross Section Evaluation Working Group (CSEWG). The resulting evaluated data file ENDF/B has been made available to users for the past ten years. Evaluated data files originating in other countries are also available from NNDC. Work has begun on a small program to evaluate charged particle reaction data. Some results should be available within one year.

Recently NNDC assumed responsibility for distribution of information on nuclear structure and radioactive decay data. The Recent References bibliographic

file and the ENSDF file of evaluated structure and decay data compiled by the Nuclear Data Project at ORNL are now available to us for answering customer queries.

In response to the increasing need for preprocessed neutron reaction data, the center has begun to collect multigroup libraries which can be used to meet the needs of many users.

The center maintains its own dedicated computer in order to better serve its customers. Queries which cannot be satisfied by a simple answer either by letter or telephone are also fulfilled. Special retrieval requests are answered with documents, computer output listings and/or tapes. The magnetic tapes can be generated to supplement the answer to a request. More general needs are often satisfied by one of the center's many publications.

II. Bibliography

A. Neutron Data

- a data-oriented bibliographic index CINDA to the literature on neutron physics. A data-oriented bibliography is one organized according to data discussed in a paper. Theoretical and experimental references are included. Both published and unpublished literature are scanned. All types of neutron reaction data as well as resonance parameters, level densities, and some photo-nuclear reactions are covered.
- the present computerized file contains about 150,000 entries.

B. Charged Particle Data

- a data-oriented bibliography of integral charged particle data which is complete for 1976 and later.
- this is stored in a computerized file which can be used to meet customer queries. This file contains approximately 13000 entries.

C. Nuclear Structure and Radioactive Decay Data

- a reference-oriented bibliography of the literature (Recent References) pertaining to nuclear structure and decay data. Many papers on nuclear reactions and some papers on atomic physics pertinent to nuclear structure and decay data are included. The file is complete for published data from 1969 on.

- NNDC receives updates periodically from the Nuclear Data Project at Oak Ridge. This file can be used to meet customer queries and contains approximately 41,000 references.

III. Experimental Data

A. Neutron and Charged-Particle Reaction Data

- energy-dependent total and partial cross sections and fission-product yields for incident neutrons and charged particles. Thick target and product yields for incident charged particles. Outgoing-particle energy and angular distributions, resonance parameters, and gamma-ray production for neutron-induced reactions.
- information is stored at NNDC in a computerized experimental data library (CSISRS) containing about 2 million data points plus associated descriptive information.
- worldwide coverage is achieved through exchange agreements with other data centers for the collection and dissemination of neutron and charged-particle data in a mutually agreed on exchange format (EXFOR).

B. Nuclear Structure and Radioactive Decay Data

- spontaneous fission data in EXFOR.
- a file is planned containing experimental nuclear structure data in the ENSDF format as a working file for evaluators (see Evaluated Data B).

IV. Evaluated Data

A. Neutron

- ENDF/B: contains the complete evaluations for approximately 100 elements or isotopes. In addition there are some 900 partial evaluations of fission product cross sections and dosimetry data. Many materials contain information about radioactive decay.
- ENDF/A: contains data sets from other data systems and data sets that may be only partially complete or untested, but which are, nevertheless, useful for scientific studies. There are currently more than 30 evaluation sets in ENDF/A, including the ENDL, KEDAK and UK libraries.

- NNDC is responsible for the coordination of CSEWG, involving a cooperative agreement of many laboratories, within the U.S. and Canada, to produce specific reference data sets which are complete in the information needed for application studies.
- worldwide coverage is achieved through cooperative arrangements with other data centers and with laboratories in the U.S. and Canada.

B. Nuclear Structure Data

- NNDC is responsible for coordinating the U.S. effort and for cooperating in a worldwide effort to evaluate nuclear structure data involving several centers.
- the Nuclear Data Project (ORNL) maintains the evaluated nuclear structure data file (ENSDF) which will contain contributions from the above centers. The file is available from the NNDC and semi-annual updates are provided by DNP.
- ENSDF contains approximately 5100 data sets, covering $A \approx 3$ to $A \approx 263$. Of these data sets 1700 are adopted levels; 1400, decay schemes; 2000, nuclear reactions; etc.

C. Radioactive Decay Data

- as noted above both ENDF and ENSDF contain information on radioactive decay. ENSDF contains 1700 decay schemes from $A \approx 3$ to $A \approx 261$. The present version of ENDF contains Q-value, half-life, and average energies for approximately 800 fission product nuclei; of these, 180 also have spectral information. ENDF also contains decay data for tritium and 16 actinides. The current revision of ENDF will increase the number of fission product nuclei for which spectral data is provided and the number of other radionuclides included.

D. Charged Particle Nuclear Data

- a starter library of proton, deuteron and alpha induced reactions based on nuclear systematics in pseudo-ENDF format is available from the NNDC.
- NNDC is currently defining the areas of data for evaluation. The first evaluations should be available in approximately 1 year.

V. Preprocessed Data

The following preprocessed data is available from NNDC.

- A. The SAND-II library for Dosimetry applications in 620 groups and including 64 materials.
- B. For epithermal reactor applications DLC-2 100 group library from RSIC at ORNL. This library was generated from ENDF/B-III cross sections and contains 69 materials. This library is appropriate for codes such as ANISN and DOT.
- C. The 50 group LIB-IV cross section library from LASL based upon ENDF/B-IV contains 101 materials. This library is issued in the "CCCC" interface format, and is intended for use by the nuclear community for fast reactor design calculations. LIB-IV features cross sections for use in the self-shielding factor method, sometimes called the Bondarenko method. Utility programs are provided with the library.
- D. For thermal reactor applications a 460 thermal group library (in the universal supergroup system) generated by Westinghouse Nuclear Energy Systems from the ENDF/B-IV files is available. Cross sections are available for all materials included in the general files.
- E. Thermal scattering matrices generated by Savannah River Laboratories from ENDF/B-III special files for 13 materials containing S (α, β) information are available. The kernels were generated for various temperatures and are available in 30 and 50 group formats.
- F. An interim 84 group cross section library for actinides in the production chain from ^{242}Pu through ^{253}Es was generated by Savannah River Laboratories and is appropriate for input to the HAMMER code. The epithermal range contains 54 groups in the MUFT structure, and the thermal range contains 30 groups typical of the THERMOS code.

VI. Services

A. Retrievals from Computerized Libraries

CSISRS - Retrievals of specific data sets or retrieval by specific input criteria, such as, target Z and/or $\bar{A}$, Energy Range and Reaction. Output is provided in the form of tapes, listings or graphical displays, with a choice of several output formats available. Data may be retrieved in the orig-

inal format (EXFOR) or in a format more easily useable for machine processing of the data (Computation Format).
ENDF/B - Retrievals for specific materials are available in the form of tapes, listings or plots.

Within the near future, retrievals which interleave data from CSISRS and ENDF/B will be available for the CSISRS computation formats.

ENSDF - Retrievals of specified evaluated data sets or specified types of data (e.g. $T_{1/2}$) are available on tape or listings. Within the near future retrievals will be available in a format more easily useable for machine processing of the data.

MIXED - Plans are underway to provide retrievals interleaving data from ENDF, ENSDF, and BNL-325, Vol. I.

CINDA and the Charged-Particle Bibliography - Retrievals are available for specific input criteria (as for CSISRS) in the form of tape or listings.

Recent References - Retrievals are available using a system of selectors.

VII. Publications

A complete list of recent NNDC publications is available. Examples of NNDC publications are the following:

A. NNCS Newsletter

B. Compilations of microscopic neutron data derived from the centers data files

BNL-325, Neutron Cross Sections. This represents perhaps the earliest and best-known evaluation of neutron resonance data and cross-sections published by the center. Vol. I containing resonance parameters and Vol. II showing experimental data plotted against eye guides/evaluated curves were published in 1973 and 1976, respectively. It is planned to bring out the fourth edition of Vol. I in 1978.

BNL-400, Angular Distributions for Neutron-Induced Reactions

C. Bibliography of Integral Charged-Particle Nuclear (BNL-NCS-50640)

- D. CINDA indexes included in conference proceedings and progress reports
- E. Compilation of Requests for Nuclear Data
- F. Reports on the Evaluated Nuclear Data System (ENDF)
 - BNL-50446, ENDF/B-IV Dosimetry File
 - BNL-50464, ENDF/B-IV Cross Section Measurement Standards
 - BNL-50640, ENDF/B Fission Product Decay Data
- G. NNDC technical reports on data evaluation.

Appendix N

Tape Format Available From the NNDC

AVAILABLE FORMATS FOR MAGNETIC TAPE AT BNL-NNDC

TRACK MODE BPI	7 BCD	9 EBCDIC	9 ASCII (8 BIT)
200			
556			
800			
1600			
6250			

Please indicate format of magnetic tape required.

BLOCKING FACTOR (BF) = logical records/Physical record

A Typical logical record is 80 characters

(Example: an 80 character card image).

A Physical record is a block on a tape separated by interrecord gaps.

A usual user requested format is 80/40 where 80 is logical record length and 40 is the BF.

PLEASE indicate the BF you require

NAME: _____

AFFILIATION: _____

ADDRESS: _____

TELEPHONE: COMMERCIAL: _____

FTS: _____

Appendix O
Summary of Publication Activities*

SUMMARY OF PUBLICATION ACTIVITIES*

0.1 CALIFORNIA INSTITUTE OF TECHNOLOGY

S.E. Woosley, et al. have published semiempirical thermonuclear reaction rate data for the intermediate-mass nuclei in Atomic Data Nuclear Data 22(5), 371(1979).

0.2 CENTER FOR EXPERIMENTAL PHOTONUCLEAR DATA, MOSCOW STATE UNIVERSITY

In addition to compiling photonuclear data in the EXFOR format, the Center produces a bibliographic series, Photonuclear Data.

0.3 CROSS SECTION EVALUATION WORKING GROUP

Most of Version V of the Evaluated Nuclear Data File(ENDF) has been released. Most of the groups have issued summary documentation on their evaluations. An index of these documents is available from the NNDC. In addition, please refer to the NNDC for a list of general summary documentation for ENDF.

0.4 IAEA-SPONSORED NUCLEAR STRUCTURE AND DECAY DATA NETWORK

Please refer to Fachinformationszentrum, Karlsruhe; Nuclear Physics Branch, Idaho Falls National Engineering Laboratory; Isotopes Project, Lawrence Berkeley Laboratory; National Bureau of Standards(Photonuclear Data Group); National Nuclear Data Center, Borrkhaven National Laboratory; Nuclear Data Project, Oak Ridge National Laboratory; Rijkunivresiteit Utrecht; and University of Pennsylvania.

0.5 FACHINFORMATIONSZENTRUM, KARLSRUHE

The Center, formerly Zentralstelle fuer Atomkernenergie Dokumentation, continues to sponsor a series of bibliographies, compilations, and evaluations entitled Physik Daten. The Atomic Energy Documentation Service, Inc., 7 Woodland Ave., Larchmont, NY, distributes this series in the United States.

The Center also contributes to the Nuclear Data Sheets published by the Nuclear Data Project.

0.6 FUSION ENERGY DIVISION, OAK RIDGE NATIONAL LABORATORY

J. Rand McNally, Jr., et al. have published Fusion Reactivity Graphs and Tables for Charged Particle Reactions as ORNL/TM-6914(1979).

* As of April 2, 1980

SUMMARY OF PUBLICATION ACTIVITIES*

0.7 GESELLSCHAFT FUER SCHWEIONFORSCHUNG, DARMSTADT

A cooperative effort between U. Reus and W. Westmeier, University of Marbourg and I. Warnecke, GSI, has resulted in a Gamma-Ray Catalogue, GSI-79-2(1979).

0.8 INSTITUT FUER KERNCHEMIE, LAHNBERGE G.E.B.J.

W. Westmeier and R.E. Esterlund have produced Alpha-Energy Tables.

0.9 ISOTOPES PROJECT, LAWRENCE BERKELEY LABORATORY

The Isotopes Project has published the Nuclear Wallet Cards on behalf of the US Nuclear Data Network. The cards are available from the NNDC at no cost.

The Project has also been chosen by the Network to publish the Handbook of Radionuclides. A tentative outline of this handbook is given in Appendix P. This publication will probably appear in 1982.

The Project also contributes to the Nuclear Data Sheets published by the Nuclear Data Project.

0.10 KERNFORSCHUNGSZENTRUM, JUELICH

Drs. Qaim, Stocklin, and Weinrich have been producing a steady series of review papers on the production of medical radioisotopes. One of the latest of this series appeared in the 1978 Harwell Conference. The reader is referred to the latest edition of BNL-NCS-50640 for a more complete list of this series.

0.11 KERNFORSCHUNGSZENTRUM KARLSRUHE, INSTITUTE FUER RADIOCHEMIE

The fifth edition of the Nuklidkarte will be published in the latter part of 1980.

The index and first two volumes of the Karlsruhe Charged-Particle Reaction Data Compilation, prepared by the Karlsruhe Charged Particle Data Group, have been published by the Fachinformationszentrum as Physik Daten 15-index, 15-1, and 15-2. The publication is based on data compiled and exchanged in the international exchange format (EXFOR) and is restricted to integral charged-particle nuclear data. Additional volumes and updates to the index will be published as more data becomes available in EXFOR. The Physik Daten series is available in the United States from the Atomic Energy Documentation Service, Inc., 7 Woodland Ave., Larchmont, NY 10538.

The Karlsruhe Charged-Particle Data Group also plans a graphical presentation of the data in Charged-Particle EXFOR along with curves based on systematics and global parameters. At present the only limit on this

publication is for targets of Ne-20 and heavier. No publication date has been set.

0.12 LAWRENCE LIVERMORE LABORATORY

R.J. Howerton has published Maxwell-Averaged Reaction Rates for Selected Reactions between Ions with Atomic Mass ≥ 11 as UCRL-50400, Vol. 21, Part A. The evaluations on which these data were based will be published as UCRL-50400, Vol. 15, Part E.

0.13 NATIONAL BUREAU OF STANDARDS

The Photonuclear Data Group, headed by E. Fuller, is completing work on an evaluation of photonuclear reaction data for carbon, oxygen, and nitrogen. This evaluation should be published in mid-1980.

J. Hubbell is working on two evaluations. An evaluation on pair-triplet and total cross sections from 1 MeV to 1 GeV for $A = 1$ to 100 should be ready by mid-1980. The evaluation of photon cross sections and attenuation coefficients from 1 keV to 1 MeV should be ready by the end of 1980.

In a cooperative effort with the Office of Standard Reference Data, the Radiation Dose Data Project, Mallencrot Institute of Radiology is compiling 4- and 6-MeV gamma and electron depth doses for medical accelerators. This should be ready in 1980.

The cooperative effort between the Office of Standard Reference Data and the American Association of Physicists in Medicine on a dosimetry handbook is continuing.

0.14 NATIONAL NUCLEAR DATA CENTER, BROOKHAVEN NATIONAL LABORATORY

With the distribution of most of ENDF/B Version V, the Center will be producing summary documentation of the files on behalf of the Cross Section Evaluation Working Group. Several other major publications are planned in addition to this effort. There will also be summary documentations for those evaluations contributed by the NNDC to ENDF/B.

SUMMARY OF PUBLICATION ACTIVITIES*

0.14.1 ENDF Documentation

ENDF/B Summary Documentation	ENDF-201	December, 1979
Standard Reference and Other Important Nuclear Data	ENDF-300	February, 1980
ENDF/B Cross Sections	ENDF-200	April, 1980
Data Formats and Procedures for ENDF/B Neutron Cross Section Library	ENDF-102	July, 1980
ENDF/B-V Actinide Decay Data		Late 1980
ENDF/B-V Fission Product Decay Data		Mid-1981

0.14.2 Other Documentation

Thermal Cross Sections and Resonance Parameters	BNL-325, Vol.1, Part 1, Z=1-60, Fourth Edition	July, 1980
	BNL-325, Vol.1 Part 2, Z>60, Fourth Edition	September, 1981
The Bibliography of Integral Charged-Particle Nuclear Data	BNL-NCS-50640, Fourth Edition	April, 1980
A Source List of Nuclear Data Bibliographies, Compilations, and Evaluations	BNL-NCS-50702, Third Edition	Mid-1980
Proceedings of the Symposium on Neutron Cross Sections from 10-50 MeV		August, 1980
Charged-Particle Barn Book		Sometime 1982

The Center also participates in the compilation, evaluation, and exchange of nuclear reaction and structure data. It also contributes to the Computerized Index to Neutron Data published by the Nuclear Data Section, IAEA, Vienna and to the Nuclear Data Sheets published by the Nuclear Data Project.

0.15 NUCLEAR DATA CENTER, OBNINSK, USSR

The Center participates in the compilation and exchange of nuclear reaction data and contributes to the Computerized Index to Neutron Data published by The Nuclear Data Section, IAEA, Vienna.

SUMMARY OF PUBLICATION ACTIVITIES*

0.16 NUCLEAR DATA SECTION, INTERNATIONAL ATOMIC ENERGY AGENCY, VIENNA

The Data Section publishes CINDA on behalf of the National Nuclear Data Center, USA, Nuclear Data Center, USSR, Nuclear Energy Agency - Data Bank, Saclay, and itself. An archival version of CINDA was published in 1976 with a 1976-1978 cumulative supplement published in 1979 and a 1979 cumulative published in October, 1979. A 1976-1979 cumulative, CINDA-80, should be published in June, 1980.

The Section also participates in the compilation and exchange of nuclear reaction data.

Several other publications are also issued by the Section. One of these is a bibliographic series on atomic and molecular data.

0.17 NUCLEAR ENERGY AGENCY - DATA BANK, SACLAY

The Data Bank participates in the compilation and exchange of nuclear reaction data. It contributes to the Computerized Index to Neutron Data which is published by the Nuclear Data Section, IAEA, Vienna.

0.18 NUCLEAR DATA PROJECT, OAK RIDGE NATIONAL LABORATORY

The Data Project continues to publish mass chain evaluations in the Nuclear Data Sheets on behalf of the IAEA-sponsored Nuclear Structure and Decay Data Network. As of October, 1979, 10 mass chains were in press, 12, under review, and 9, in progress.

The Data Project also prepares three issues of Recent References for publication in the Nuclear Data Sheets each year.

NCRP-58, containing an appendix of decay data edited by M. Martin, has been published. See Appendix Q for an index of the data contained in this report.

0.19 NUCLEAR ENGINEERING DEPARTMENT, UNIVERSITY OF ILLINOIS

G.H. Miley, et al. are planning to update their charged-particle barn book(COO-2218-17).

0.20 NUCLEAR PHYSICS BRANCH, IDAHO FALLS NATIONAL ENGINEERING LABORATORY

Personnel in this group contribute to the mass-chain evaluations published in the Nuclear Data Sheets as part of their participation in the IAEA-sponsored Nuclear Structure and Decay Data Network.

SUMMARY OF PUBLICATION ACTIVITIES*

The Branch, through its involvement in CSEWG, have the prime responsibility within the United States for the preparation of evaluated sets of decay data for inclusion in the data file ENDF. These evaluations form a portion of the data to be included in the Fission-Product, Actinide, and Activation Files of ENDF-B/V.

Members of the Branch have had a continuing interest in providing compilations of gamma-ray spectral data and measuring precise gamma-ray energies to serve as calibration standards. Some recent publications on the later activity are:

R.G. Helmer, R.J. Gehrke, and R.C. Greenwood. Nucl. Instr. and Meth. 166, 547(1979).

R.C. Greenwood, R.G. Helmer, and R.J. Gehrke. Nucl. Instr. and Meth. 159, 465(1979).

R.G. Helmer, R.C. Greenwood, and R.J. Gehrke. Nucl. Instr. and Meth. 155, 189(1978).

A program, utilizing 4pi beta-gamma coincidence spectroscopy, to measure precisely the absolute gamma-ray intensities of fission products and other important activities. Recent publications from this effort are:

R.J. Gehrke, Int. J. of Appl. Rad. and Isotopes 31, 37(1979).

R.J. Gehrke, R.G. Helmer, and C.W. Reich. Nucl. Sci. and Engr. 70, 298(1979).

0.21 NUCLEAR REACTION DATA NETWORK

Please refer to Center for Experimental Photonuclear Data, Moscow State University, Kernforschungszentrum Karlsruhe(Karlsruhe Charged-Particle Data Group), National Nuclear Data Center, USA, Nuclear Data Center, USSR, Nuclear Energy Agency - Data Bank, Saclay, and the Nuclear Data Section, IAEA, Vienna.

0.22 NUCLEAR SAFETY DIVISION, OAK RIDGE NATIONAL LABORATORY

D.C. Kocher is producing Radiation Decay Data Tables: Handbook of Decay Data for Application to Radiation Dosimetry and Radiological Assessment. This work will be published as part of the DOE Critical Review Series and contains radiation tables derived from ENSDF. The contents are indexed in Appendix R.

SUMMARY OF PUBLICATION ACTIVITIES*

0.23 RADIOPHARMACEUTICAL RESEARCH GROUP, CHEMISTRY DEPARTMENT, BNL

K.I. Karlstrom, et al. are continuing their bibliographic scanning effort for accelerator-produced radionuclides. No date has been given for the next edition of Accelerator Produced Radionuclides for Use in Biology and Medicine(BNL-50448).

0.24 RIJKSUNIVERSITEIT UTRECHT, UTRECHT, NETHERLANDS

P.M. Endt has published the latest revision to Strengths of Gamma-Ray Transitions in A = 6-44 Nuclei in Atomic Data Nuclear Data Tables 23(1), 3(1979). Their last evaluation of A = 21 to 44 was published in Nuclear Physics A310, 15(1978).

0.25 UNIVERSITY OF PENNSYLVANIA, PHILADELPHIA, PA

F. Ajzenberg-Selove continues her evaluation work on nuclei with A = 5 to 20. In 1979 new evaluations for A = 5 to 10 were published in Nuclear Physics. A = 11 and 12 were under revision in September, 1979.

0.26 US NUCLEAR DATA NETWORK

Please refer to the Nuclear Physics Branch, Idaho National Engineering Laboratory; Isotopes Project, Lawrence Berkeley Laboratory; Nuclear Data Project, Oak Ridge National Laboratory; National Nuclear Data Center, Brookhaven National Laboratory; Photoneuclear Data Center, National Bureau of Standards; and the University of Pennsylvania.

Appendix P
Outline of the Handbook of Radionuclides

RADIOACTIVITY HANDBOOK

A *Radioactivity Handbook* for applied users is one of the planned publications of the U.S. Nuclear Data Network. On behalf of the NDN, the Isotopes Project at LBL will produce the *Handbook* with specifications agreeable to members of the international network of nuclear structure and decay data centers. We are requesting comments and suggestions from our colleagues on the contents and format proposed below.

The purpose of the *Handbook* is to provide a compilation of recommended decay data, based on the ENSDF file, that is detailed enough for use in sophisticated applications, but that is organized clearly so as to be usable in routine applications. The *Handbook* is not intended as a nuclear structure reference, but it should be useful to someone studying decay schemes. Its contents are based largely on responses to recent surveys of applied users.¹

The *Handbook* will be produced at four year intervals, beginning in 1982. Data will be taken from the current version of ENSDF, with no further updating. Additional calculations and evaluation will be done to provide recommended data on atomic radiations and conversion electrons, and to provide "best" values for γ -ray properties, independent of the decay parent, in cases where ENSDF does not. Each mass chain will be referenced to the most recent evaluation in the *Nuclear Data Sheets*, as the source for further details and references to the original papers.

The *Handbook* will be ordered by mass number (A) and subordered by atomic number (Z). Each mass chain will consist of:

- a) A "skeleton" mass-chain diagram showing the ground states and long-lived isomers with their half-lives, energies (for isomers), spin-parity assignments, decay modes, Q-values, and the decay relationships between the isotopes. Alpha parents and particle-decay daughters pertinent to the A-chain will also be shown.

- b) Tabulated data for each isotope or isomer:

natural isotopic abundance

mass excess

thermal neutron cross sections (σ_c , σ_f); $\sigma(n,\alpha)$, $\sigma(n,p)$, and σ_{abs} will be given in a few cases.

half-life

decay mode, genetic branching (the fraction of the decay populating each of several isomers in daughter nuclei)

means of production

energies and intensities of all radiations

α particles

β^- and β^+ particles

γ rays

conversion electrons

x-rays

Auger electrons

γ^+

protons

"delayed" p, n, α , fission

average e^- ($\beta^- + ce + \text{Auger}$), e^+ ($\beta^+ + \text{pair}$), photon ($\gamma + x\text{-ray}$)

- c) A decay scheme for each parent isotope, giving the adopted daughter level energies and spin-parity assignments, β and α feeding intensities (and log ft, HF(Q) factors), and γ -ray energies and intensities.

A proposed format is shown in figure 1. Figure 2 shows a fragment of another mass chain to illustrate the format for reporting genetic branching.

The main table will be supplemented by an energy-ordered γ -ray table, with the format illustrated in figure 3, and by appendices containing physical constants, spectroscopy standards, atomic binding energies, K x-ray energies and relative intensities, and radiation absorption curves.

Further characteristics, details, and conventions are described in the following comments:

1. **Size:** The size of the book, as defined here, will be about 1500 pages of size 21.6 by 27.9 cm. Several major components account for most of the bulk. Rough estimates for their contribution to the size of the book, based on 1977 data, are:

skeleton schemes	100 pages
α - and β -group listings	100 pages
photon and electron listings	500 pages
detailed schemes	500 pages
energy-ordered γ -ray table	100 pages*

The addition of adopted levels (E , $J\pi$, $t_{1/2}$ in the form of a ladder diagram) would require an extra 400 pages.

2. **Uncertainties:** Uncertainties will be given in the tables whenever they are available in ENSDF or another source used (see below). Q -values on the skeleton scheme will be given with uncertainty. Other data on the skeleton and detailed schemes will be given without uncertainty, rounded so that the uncertainty in the last place is ≤ 5 units.
3. **Isotopes:** All ground states, as well as isomers with a half-life ≥ 1 s, plus a few "historic" isomers of shorter half-life (e.g., ^{24m}Na) will be included. Unstable nuclides identified in nuclear reactions, for which no decay properties have been measured, will be omitted.
4. **γ -ray intensities:** Absolute photon intensities will be quoted, both in the tabular listings and on the decay schemes. When the uncertainty in the normalization is significant compared to the uncertainties in the relative intensities (the usual case), the stated uncertainties will include only the relative error; the uncertainty in the normalization will be noted separately (see figure 1). When the normalization is unknown, relative intensities will be listed with a comment.

* This number is very approximate; it depends on what kind of intensity cutoff (if any) is applied.

5. Atomic radiations and conversion electrons: Figure 1 illustrates how these will be presented. Conversion-electron intensities will be calculated from the γ -ray intensities and the assigned multipolarities (or multipolarities deducible from the spin assignments), with the use of theoretical internal conversion coefficients. X-ray and Auger intensities will be calculated from the atomic shell vacancies produced by internal conversion and electron capture. Annihilation radiation will be calculated from the β^+ and internal pair conversion intensities.

Some guidelines to limit the inclusion of weak transitions are being formulated, using those developed by M.J. Martin² as a starting point.

6. Other data sources: The following data will be derived from sources other than ENSDF:

mass excesses, Q-values	A.H. Wapstra and K. Bos, Atomic Data and Nucl. Data Tables 19 175(1977), or a more recent update.
abundances, neutron cross sections	Compilations by N.E. Holden
means of production	7th ed. of the <i>Table of Isotopes</i> , or more recent source, if available. (It would be desirable to list $E_{\max}$ and $\sigma(E_{\max})$ for charged particle reactions if a suitable compilation were available.)

References

- 1) BNL-NCS-20573 (1975), BNL-NCS-50717 (1977); minutes of the 2nd annual meeting of the Panel on Reference Nuclear Data, October, 1977, and minutes of the 3rd annual meeting of the Panel on Reference Nuclear Data, October, 1978; C.M. Lederer and J.M. Hollander, in *Nuclear Data in Science and Technology*, Vol. II (Proc. Symposium on the Applications of Nuclear Data in Science and Technology, Paris, March 12-16, 1973), p. 449, IAEA (1973); C.M. Lederer, private communication to Sol Pearlstein, September, 1975; H. Münzel and W. Michaelis, *Survey of the Nuclear Data Needs in Activation Analysis*, KFK 1812, INDC (GER)-12/u+w(1973).
- 2) *Nuclear Decay Data for Selected Radionuclides*, M.J. Martin, ed., ORNL-5114 (1976); *Nuclear Decay Data for Radionuclides Occurring in Routine Releases from Nuclear Fuel Cycle Facilities*, D.C. Kocher, ORNL/NUREG/TM-102(1977).

Figure 1

Figure 1 (continued)

Figure 1 (continued)

 $^{80}_{38}\text{Sr}$ (Continued)

β^+ : Energy ^a	Intensity
(keV)	(%)
189	0.04
225	0.02
542	0.18
603	0.26
778	7.2

a) Based on systematic decay energy.

γ : Energy	Intensity ^a
(keV)	(%)
175.0 5	10.4 10
235.9 8	4.3 4
316.0 15	1.1 1
378.8 5	4.3 4
414.1 5	3.3 3
553.4 5	7.0 7
589.0 5	40

a) Quoted uncertainties refer to relative intensities; 20% additional uncertainty applicable to absolute intensities.

Other radiations:

Radiation	Energy (keV)	Intensity (%)
Rb Auger-L	1.68	100 3
Rb Auger-K	11.4	27 1
Rb LX	1.69	1.0 3
Rb K X	13.33580 2	15.7 6
Rb $\text{K}_{\alpha 1}^{\text{X}}$	13.39530 2	30.4 10
Rb $\text{K}_{\beta}^{\text{X}}$	15	7.9 5
$\gamma^{\pm}$		16

Average energies:

$\langle E_{\gamma^+} \rangle$: 425 94

$\langle E_{e^+} \rangle$: 198

Figure 2

Illustration of proposed handling of genetic decay branchings

$^{133}_{53}\text{I}$
 $t_{1/2}$: 20.9 1 h
 α^- : β^- (97.12% to ^{133}Xe ;
 2.88 2% to $^{133\text{m}}\text{Xe}$)
 Δ : -85.902 31
 Prod: fission

Figure 3

E_{γ} (keV)	I (%)	Isotope	$t_{1/2}$
230.37 5	27	$^{226}_{86}\text{L}$	29 h
	0.12	$^{230}_{90}\text{U}$	20.8 d
609.3 1	0.12	$^{218}_{84}\text{Po}$ ($^{230}_{90}\text{U}$)	20.8 d
616.4 5	7	$^{80}_{38}\text{Sr}$	17.6 m n
	25	$^{80}_{38}\text{Rb}$ ($^{80}_{38}\text{Sr}$)	106 m
661.661 3	85	$^{137}_{55}\text{Ba}$ ($^{137}_{55}\text{Cs}$)	30.17 y fn

Sample format for the energy-ordered gamma-ray table. (The gamma rays illustrated in the sample were chosen only to illustrate features of the layout.) Several listings under the same energy refer to the same transition (i.e., in the same daughter nucleus) excited by different radioactive parents. An isotope in parentheses following another is a longer-lived parent or ancestor with which the listed gamma ray is more commonly observed; the half-life given is that of the parent. A footnote "L" on the isotope indicates that a longer-lived ancestor exists, but is not the more common source of the gamma ray. An "n" following the half-life column denotes a nucleus produced by neutron capture on natural substances; an "f" denotes a fission product.

Appendix Q
Contents of Appendix A, NCRP Report 58,
edited by M. J. Martin

3H B- DECAY (12.35 Y 1)
 11C B- DECAY (20.39 Y 2)
 13B B- DECAY (9.965 H 4)
 14C B- DECAY (5730 Y 40)
 150 B- DECAY (122.74 S 16)
 16H B- DECAY (7.12 S 2)
 18P B- DECAY (109.74 H 4)
 22Na B- DECAY (2.607 Y 2)
 24Al B- DECAY (15.00 H 4)
 26Al B- DECAY (7.1675 Y 32)
 27Mg B- DECAY (9.467 H 11)
 28Mg B- DECAY (20.91 H 3)
 28Al B- DECAY (2.240 H 1)
 32Si B- DECAY (330 Y 40)
 32P B- DECAY (14.29 D 3)
 33P B- DECAY (25.4 D 2)
 35S B- DECAY (87.39 D 10)
 38Cl B- DECAY (37.21 K 4)
 41Ar B- DECAY (1.827 H 7)
 42K B- DECAY (12.36 H 1)
 43K B- DECAY (22.6 H 2)
 44Sc B- DECAY (3.227 S 8)
 44Ti EC DECAY (47.3 Y 12)
 45Ca B- DECAY (163 D 1)
 46Sc B- DECAY (83.83 D 2)
 46Sc IT DECAY (18.67 S 9)
 47Ca B- DECAY (4.536 D 2)
 47Sc B- DECAY (3.351 D 2)
 48V EC DECAY (15.978 D 3)
 51Cr EC DECAY (27.704 D 4)
 52Mn EC DECAY (5.591 D 3)
 52Mn IT DECAY (21.1 H 2)
 52Mn B- DECAY (21.1 H 2)
 52Fe B- DECAY (8.275 H 8)
 54Mn EC DECAY (312.5 D 5)
 55Fe EC DECAY (2.7 Y 1)
 56Mn B- DECAY (2.5785 H 6)
 57Co EC DECAY (270.9 D 6)
 58Co B- DECAY (70.80 D 9)
 59Fe B- DECAY (44.529 D 7)
 60Co B- DECAY (5.271 Y 1)
 63Ni B- DECAY (96 Y 4)
 64Cu B- DECAY (12.701 H 2)
 64Cu B- DECAY (12.701 H 2)
 65Zn EC DECAY (243.9 D 1)
 66Ga B- DECAY (9.40 H 7)
 67Cu B- DECAY (61.86 H 12)
 67Ga EC DECAY (78.26 H 3)
 68Ga B- DECAY (68.0 H 2)
 68Ge EC DECAY (288 D 6)
 69Zn B- DECAY (57 H 1)
 69Zn IT DECAY (13.76 H 3)
 72As B- DECAY (19.1 H 2)
 72As EC DECAY (26.0 H 1)
 73As EC DECAY (80.30 D 6)
 73Se EC DECAY (7.15 H 8)
 74As B- DECAY (17.76 D 2)
 74As B- DECAY (17.78 D 3)
 75Se EC DECAY (119.8 D 1)
 76As B- DECAY (26.32 H 7)
 76Ge B- DECAY (11.30 H 1)
 77As B- DECAY (39.8 H 3)
 77Br EC DECAY (56 H 2)
 79Kr B- DECAY (35.04 H 10)
 81Kr EC DECAY (2.185 Y 2)
 82Br B- DECAY (35.30 H 3)
 84Br B- DECAY (32.77 D 4)
 84Br B- DECAY (33.0 D 2)
 85Kr B- DECAY (10.72 Y 1)
 85Kr B- DECAY (4.48 H 1)
 85Kr IT DECAY (4.48 H 1)
 85Se EC DECAY (64.64 D 3)
 86Br B- DECAY (18.66 D 2)
 86Y B- DECAY (14.74 H 2)
 86Zr EC DECAY (16.5 H 1)
 87Rb B- DECAY (76.3 H 5)

Index to Appendix A

87Sr EC DECAY (2.405 H 3)
 87Sr IT DECAY (2.405 H 3)
 87Y EC DECAY (99.3 H 3)
 87Y B- DECAY (2.84 H 2)
 88Rb B- DECAY (17.8 H 1)
 88Rb EC DECAY (106.64 D 8)
 88Y B- DECAY (15.2 H 1)
 89Sr B- DECAY (50.5 D 1)
 89Sr B- DECAY (29.12 Y 29)
 90Sr B- DECAY (64.0 H 1)
 90Y B- DECAY (2.038 Y 16)
 94Nb B- DECAY (6.26 H 1)
 94Nb IT DECAY (6.26 H 1)
 97Zr B- DECAY (16.20 H 5)
 97Nb B- DECAY (72.1 H 7)
 97Nb IT DECAY (60 S 1)
 97Nb EC DECAY (2.9 D 1)
 99Mo B- DECAY (66.0 H 2)
 99Tc IT DECAY (6.02 H 3)
 103Ru B- DECAY (39.28 D 1)
 103Pd EC DECAY (16.96 D 2)
 103Rh IT DECAY (56.12 H 1)
 100Ag EC DECAY (2.37 H 1)
 108Ag B- DECAY (2.37 H 1)
 108Ag EC DECAY (127 Y 21)
 108Ag IT DECAY (127 Y 1)
 109Pd B- DECAY (13.427 H 14)
 109Cd EC DECAY (464 D 1)
 110Ag EC DECAY (24.6 S 2)
 110Ag B- DECAY (24.6 S 2)
 110Ag IT DECAY (249.9 D 1)
 110Ag B- DECAY (249.9 D 1)
 111Ag B- DECAY (7.45 D 1)
 111In EC DECAY (2.83 D 1)
 113In IT DECAY (1.658 H 1)
 113Sn EC DECAY (115.1 D 2)
 115In IT DECAY (4.3 H 1)
 115In B- DECAY (4.3 H 1)
 116In B- DECAY (54.15 H 6)
 117Sn IT DECAY (13.61 D 4)
 117Sn EC DECAY (2.80 H 1)
 119Sn IT DECAY (293.0 D 13)
 121Te EC DECAY (17 D 1)
 121Te EC DECAY (154 D 7)
 121Te IT DECAY (154 D 7)
 122Sb EC DECAY (2.70 D 1)
 122Sb B- DECAY (2.70 D 1)
 123I EC DECAY (13.2 H 1)
 124Sb B- DECAY (60.20 D 3)
 124I B- DECAY (4.18 D 2)
 125I EC DECAY (60.14 D 11)
 126I EC DECAY (13.02 D 7)
 126I B- DECAY (13.02 D 7)
 127Xe EC DECAY (36.41 D 2)
 129Te B- DECAY (69.6 H 2)
 129Te IT DECAY (33.6 U 1)
 129Te B- DECAY (33.6 D 1)
 129I B- DECAY (1.5787 Y 4)
 129Xe IT DECAY (8.0 D 2)
 129Cs EC DECAY (52.06 H 6)
 130I B- DECAY (12.36 H 1)
 131I B- DECAY (8.04 D 1)
 131Xe IT DECAY (11.9 D 1)
 131Cs EC DECAY (9.69 D 1)
 131Ba EC DECAY (11.8 D 2)
 132Te B- DECAY (78.2 H 8)
 132I B- DECAY (2.30 H 3)
 132Cs B- DECAY (6.475 D 10)
 132Cs B- DECAY (6.475 D 10)
 133I B- DECAY (170.8 H 1)
 133Xe B- DECAY (5.245 D 6)
 133Xe IT DECAY (2.19 D 1)
 133Xe EC DECAY (10.74 Y 5)
 133Ba EC DECAY (38.9 H 1)
 134Te B- DECAY (41.8 Y 0)
 134I B- DECAY (52.6 H 1)
 134Cs B- DECAY (2.062 Y 5)

Edited by M.J. Martin

135I B- DECAY (6.61 H 1)
 135Xe B- DECAY (9.09 H 1)
 135Xe IT DECAY (15.29 H 3)
 135La IT DECAY (23.7 H 2)
 136Cs B- DECAY (13.1 D 1)
 137Ba IT DECAY (2.552 H 2)
 137Cs B- DECAY (30.0 Y 2)
 138Xe B- DECAY (16.17 H 7)
 138Cs B- DECAY (32.2 H 1)
 139Ba B- DECAY (82.7 Y 2)
 139Ce EC DECAY (137.66 D 2)
 140Ba B- DECAY (12.74 D 5)
 140La B- DECAY (40.272 H 7)
 141Ce B- DECAY (32.501 D 5)
 142Pr B- DECAY (19.13 H 8)
 143Ce B- DECAY (33.0 H 2)
 143Pr B- DECAY (13.56 D 2)
 144Pr B- DECAY (17.28 H 3)
 145Pr EC DECAY (17.7 Y 4)
 147Nd B- DECAY (10.98 D 1)
 147Nd EC DECAY (2.6234 Y 2)
 148Pr B- DECAY (5.37 D 1)
 148Pr IT DECAY (41.3 D 1)
 148Pr B- DECAY (41.3 D 1)
 149Nd B- DECAY (1.73 H 1)
 149Pr B- DECAY (53.08 H 5)
 152Eu EC DECAY (13.33 Y 4)
 152Eu B- DECAY (13.33 Y 4)
 152Eu EC DECAY (9.32 H 2)
 152Eu B- DECAY (9.32 H 2)
 153Sm B- DECAY (46.7 H 1)
 153Gd EC DECAY (282 D 1)
 154Eu B- DECAY (8.6 Y 1)
 155Sm B- DECAY (4.96 Y 1)
 157Tb EC DECAY (150 Y 30)
 157Dy EC DECAY (8.1 H 1)
 169Yb EC DECAY (32.01 D 2)
 170Tb B- DECAY (128.6 D 3)
 171Tb B- DECAY (7.52 H 3)
 171Tb B- DECAY (1.92 Y 1)
 175Yb B- DECAY (4.19 D 1)
 177Lu B- DECAY (42.4 D 1)
 181Hf B- DECAY (42.4 D 1)
 181Hf EC DECAY (121.2 D 3)
 181Hf EC DECAY (115.0 D 2)
 182Ta B- DECAY (75.1 D 3)
 185W B- DECAY (23.9 H 1)
 187W B- DECAY (69.4 D 5)
 188W B- DECAY (16.98 H 2)
 188Re B- DECAY (15.6 H 2)
 191Os B- DECAY (15.4 D 2)
 192Ir EC DECAY (170.02 D 18)
 192Ir B- DECAY (170.02 D 18)
 194Pt B- DECAY (19.15 H 3)
 194Pt B- DECAY (4.02 D 1)
 195Pt IT DECAY (183 D 1)
 195Au EC DECAY (180.5 S 2)
 195Au IT DECAY (18.3 H 3)
 197Pt B- DECAY (18.3 H 3)
 197Hg EC DECAY (64.1 H 1)
 198Au B- DECAY (2.696 D 2)
 199Au B- DECAY (3.139 D 7)
 201Tl EC DECAY (3.044 D 9)
 203Pb B- DECAY (46.60 D 2)
 203Tl EC DECAY (52.04 H 10)
 206Pb EC DECAY (6.243 D 3)
 207Pb EC DECAY (38 Y 1)
 226Ra A DECAY (1600 Y 7)
 222Rn A DECAY (3.8235 D 3)
 218Po A DECAY (3.05 H 1)
 214Pb B- DECAY (26.8 H 1)
 214Pb B- DECAY (19.9 H 4)
 214Po A DECAY (154.3 US 20)
 210Pb B- DECAY (22.3 Y 2)
 210Pb B- DECAY (5.012 D 9)
 210Po A DECAY (138.38 D 1)
 239Pu B- DECAY (2.355 D 4)
 242Cm A DECAY (162.8 D 4)

Nuclear Data Project
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Appendix R

Contents of Radiation Decay Data Tables: Handbook of Decay Data for Application to Radiation Dosimetry and Radiological Assessment

D. C. Kocher

DOE Critical Review Series (to be published)

Radiation Decay Data Tables: Handbook at
Decay Data for Application to Radiation
Dosimetry and Radiological Assessment
by D.C. Kocher
DOE Publication - to be published

1708 B- DECAV	776F 9- DECAV (11.30 M)	1030M 17 DECAV (50.119 M)
1709 F- DECAV	776G 9- DECAV	1030N 17 DECAV
1710 F- DECAV	776H 9- DECAV (17.04 M)	1030O 17 DECAV
1711 F- DECAV	776I 9- DECAV (33.00 M)	1030P 17 DECAV (35.30 M)
1712 F- DECAV	776J 9- DECAV (17.04 M)	1030Q 17 DECAV (25.30 M)
1713 F- DECAV	776K 9- DECAV (17.04 M)	1030R 17 DECAV (25.30 M)
1714 F- DECAV	776L 9- DECAV (17.04 M)	1030S 17 DECAV (25.30 M)
1715 F- DECAV	776M 9- DECAV (17.04 M)	1030T 17 DECAV (25.30 M)
1716 F- DECAV	776N 9- DECAV (17.04 M)	1030U 17 DECAV (25.30 M)
1717 F- DECAV	776O 9- DECAV (17.04 M)	1030V 17 DECAV (25.30 M)
1718 F- DECAV	776P 9- DECAV (17.04 M)	1030W 17 DECAV (25.30 M)
1719 F- DECAV	776Q 9- DECAV (17.04 M)	1030X 17 DECAV (25.30 M)
1720 F- DECAV	776R 9- DECAV (17.04 M)	1030Y 17 DECAV (25.30 M)
1721 F- DECAV	776S 9- DECAV (17.04 M)	1030Z 17 DECAV (25.30 M)
1722 F- DECAV	776T 9- DECAV (17.04 M)	1031A 17 DECAV (25.30 M)
1723 F- DECAV	776U 9- DECAV (17.04 M)	1031B 17 DECAV (25.30 M)
1724 F- DECAV	776V 9- DECAV (17.04 M)	1031C 17 DECAV (25.30 M)
1725 F- DECAV	776W 9- DECAV (17.04 M)	1031D 17 DECAV (25.30 M)
1726 F- DECAV	776X 9- DECAV (17.04 M)	1031E 17 DECAV (25.30 M)
1727 F- DECAV	776Y 9- DECAV (17.04 M)	1031F 17 DECAV (25.30 M)
1728 F- DECAV	776Z 9- DECAV (17.04 M)	1031G 17 DECAV (25.30 M)
1729 F- DECAV	777A 9- DECAV (17.04 M)	1031H 17 DECAV (25.30 M)
1730 F- DECAV	777B 9- DECAV (17.04 M)	1031I 17 DECAV (25.30 M)
1731 F- DECAV	777C 9- DECAV (17.04 M)	1031J 17 DECAV (25.30 M)
1732 F- DECAV	777D 9- DECAV (17.04 M)	1031K 17 DECAV (25.30 M)
1733 F- DECAV	777E 9- DECAV (17.04 M)	1031L 17 DECAV (25.30 M)
1734 F- DECAV	777F 9- DECAV (17.04 M)	1031M 17 DECAV (25.30 M)
1735 F- DECAV	777G 9- DECAV (17.04 M)	1031N 17 DECAV (25.30 M)
1736 F- DECAV	777H 9- DECAV (17.04 M)	1031O 17 DECAV (25.30 M)
1737 F- DECAV	777I 9- DECAV (17.04 M)	1031P 17 DECAV (25.30 M)
1738 F- DECAV	777J 9- DECAV (17.04 M)	1031Q 17 DECAV (25.30 M)
1739 F- DECAV	777K 9- DECAV (17.04 M)	1031R 17 DECAV (25.30 M)
1740 F- DECAV	777L 9- DECAV (17.04 M)	1031S 17 DECAV (25.30 M)
1741 F- DECAV	777M 9- DECAV (17.04 M)	1031T 17 DECAV (25.30 M)
1742 F- DECAV	777N 9- DECAV (17.04 M)	1031U 17 DECAV (25.30 M)
1743 F- DECAV	777O 9- DECAV (17.04 M)	1031V 17 DECAV (25.30 M)
1744 F- DECAV	777P 9- DECAV (17.04 M)	1031W 17 DECAV (25.30 M)
1745 F- DECAV	777Q 9- DECAV (17.04 M)	1031X 17 DECAV (25.30 M)
1746 F- DECAV	777R 9- DECAV (17.04 M)	1031Y 17 DECAV (25.30 M)
1747 F- DECAV	777S 9- DECAV (17.04 M)	1031Z 17 DECAV (25.30 M)
1748 F- DECAV	777T 9- DECAV (17.04 M)	1032A 17 DECAV (25.30 M)
1749 F- DECAV	777U 9- DECAV (17.04 M)	1032B 17 DECAV (25.30 M)
1750 F- DECAV	777V 9- DECAV (17.04 M)	1032C 17 DECAV (25.30 M)
1751 F- DECAV	777W 9- DECAV (17.04 M)	1032D 17 DECAV (25.30 M)
1752 F- DECAV	777X 9- DECAV (17.04 M)	1032E 17 DECAV (25.30 M)
1753 F- DECAV	777Y 9- DECAV (17.04 M)	1032F 17 DECAV (25.30 M)
1754 F- DECAV	777Z 9- DECAV (17.04 M)	1032G 17 DECAV (25.30 M)
1755 F- DECAV	778A 9- DECAV (17.04 M)	1032H 17 DECAV (25.30 M)
1756 F- DECAV	778B 9- DECAV (17.04 M)	1032I 17 DECAV (25.30 M)
1757 F- DECAV	778C 9- DECAV (17.04 M)	1032J 17 DECAV (25.30 M)
1758 F- DECAV	778D 9- DECAV (17.04 M)	1032K 17 DECAV (25.30 M)
1759 F- DECAV	778E 9- DECAV (17.04 M)	1032L 17 DECAV (25.30 M)
1760 F- DECAV	778F 9- DECAV (17.04 M)	1032M 17 DECAV (25.30 M)
1761 F- DECAV	778G 9- DECAV (17.04 M)	1032N 17 DECAV (25.30 M)
1762 F- DECAV	778H 9- DECAV (17.04 M)	1032O 17 DECAV (25.30 M)
1763 F- DECAV	778I 9- DECAV (17.04 M)	1032P 17 DECAV (25.30 M)
1764 F- DECAV	778J 9- DECAV (17.04 M)	1032Q 17 DECAV (25.30 M)
1765 F- DECAV	778K 9- DECAV (17.04 M)	1032R 17 DECAV (25.30 M)
1766 F- DECAV	778L 9- DECAV (17.04 M)	1032S 17 DECAV (25.30 M)
1767 F- DECAV	778M 9- DECAV (17.04 M)	1032T 17 DECAV (25.30 M)
1768 F- DECAV	778N 9- DECAV (17.04 M)	1032U 17 DECAV (25.30 M)
1769 F- DECAV	778O 9- DECAV (17.04 M)	1032V 17 DECAV (25.30 M)
1770 F- DECAV	778P 9- DECAV (17.04 M)	1032W 17 DECAV (25.30 M)
1771 F- DECAV	778Q 9- DECAV (17.04 M)	1032X 17 DECAV (25.30 M)
1772 F- DECAV	778R 9- DECAV (17.04 M)	1032Y 17 DECAV (25.30 M)
1773 F- DECAV	778S 9- DECAV (17.04 M)	1032Z 17 DECAV (25.30 M)
1774 F- DECAV	778T 9- DECAV (17.04 M)	1033A 17 DECAV (25.30 M)
1775 F- DECAV	778U 9- DECAV (17.04 M)	1033B 17 DECAV (25.30 M)
1776 F- DECAV	778V 9- DECAV (17.04 M)	1033C 17 DECAV (25.30 M)
1777 F- DECAV	778W 9- DECAV (17.04 M)	1033D 17 DECAV (25.30 M)
1778 F- DECAV	778X 9- DECAV (17.04 M)	1033E 17 DECAV (25.30 M)
1779 F- DECAV	778Y 9- DECAV (17.04 M)	1033F 17 DECAV (25.30 M)
1780 F- DECAV	778Z 9- DECAV (17.04 M)	1033G 17 DECAV (25.30 M)
1781 F- DECAV	779A 9- DECAV (17.04 M)	1033H 17 DECAV (25.30 M)
1782 F- DECAV	779B 9- DECAV (17.04 M)	1033I 17 DECAV (25.30 M)
1783 F- DECAV	779C 9- DECAV (17.04 M)	1033J 17 DECAV (25.30 M)
1784 F- DECAV	779D 9- DECAV (17.04 M)	1033K 17 DECAV (25.30 M)
1785 F- DECAV	779E 9- DECAV (17.04 M)	1033L 17 DECAV (25.30 M)
1786 F- DECAV	779F 9- DECAV (17.04 M)	1033M 17 DECAV (25.30 M)
1787 F- DECAV	779G 9- DECAV (17.04 M)	1033N 17 DECAV (25.30 M)
1788 F- DECAV	779H 9- DECAV (17.04 M)	1033O 17 DECAV (25.30 M)
1789 F- DECAV	779I 9- DECAV (17.04 M)	1033P 17 DECAV (25.30 M)
1790 F- DECAV	779J 9- DECAV (17.04 M)	1033Q 17 DECAV (25.30 M)
1791 F- DECAV	779K 9- DECAV (17.04 M)	1033R 17 DECAV (25.30 M)
1792 F- DECAV	779L 9- DECAV (17.04 M)	1033S 17 DECAV (25.30 M)
1793 F- DECAV	779M 9- DECAV (17.04 M)	1033T 17 DECAV (25.30 M)
1794 F- DECAV	779N 9- DECAV (17.04 M)	1033U 17 DECAV (25.30 M)
1795 F- DECAV	779O 9- DECAV (17.04 M)	1033V 17 DECAV (25.30 M)
1796 F- DECAV	779P 9- DECAV (17.04 M)	1033W 17 DECAV (25.30 M)
1797 F- DECAV	779Q 9- DECAV (17.04 M)	1033X 17 DECAV (25.30 M)
1798 F- DECAV	779R 9- DECAV (17.04 M)	1033Y 17 DECAV (25.30 M)
1799 F- DECAV	779S 9- DECAV (17.04 M)	1033Z 17 DECAV (25.30 M)
1800 F- DECAV	779T 9- DECAV (17.04 M)	1034A 17 DECAV (25.30 M)