

BIB-SECTION

* REFERENCE (C,68WASH,2,885,6803) PROCEEDINGS OF CONFERENCE CONTRIBUTION.
 (P,EANDC(E)-89,37,6802) PROGRESS REPORT,SUPERSEDED.
 (J,NP/A,118,9,6805) FINAL PUBLICATION FOR GOLD MEASUREMENTS.
 * AUTHOR (H.K.VONNACH,H.G.VONNACH,H.MUENZER,P.SCHRAMMEL)
 * TITLE -PRECISION MEASUREMENTS OF EXCITATION FUNCTIONS OF (N,P),(N,A) AND (N,2N) REACTIONS INDUCED BY 13.5 - 14.7 MEV NEUTRONS-
 * INSTITUTE (ZGERMIN)
 * N-SOURCE (D-T) BOMBARDMENT OF A THIN TARGET OF DEUTERONS. A RANGE OF INCIDENT ENERGIES WERE USED BY VARYING THE TARGET THICKNESS.
 * FACILITY (VDG) 400KEV VAN DE GRAAFF ACCELERATOR FOR STRAHLENFORSCHUNG.
 * METHOD (ACTIV) GAMMA PULSES EXCEPT FOR TA-180M WHERE BETAS WERE MEASURED.
 * PART-DET (DC) DECAY GAMMAS.
 * SAMPLE .NATURAL MATERIALS. METAL SAMPLES WERE PLACED AT DISTANCES CORRESPONDING TO 30 TO 100 CM ENERGY, AND SUBTENDED AN ANGULAR DISTANCE OF 100MM.
 * CORRECTION .ANGULAR DEPENDENT NEUTRON CROSS SECTION ELASTICALLY SCATTERED NEUTRONS. SCATTERING CONTRIBUTION CORRECTED FOR DECAY CORRECTIONS.
 * ERR-ANALYS .SYSTEMATIC ERRORS, TARGET THICKNESS, ATTENUATION CORRECTIONS (0.05 PC), DECAY CORRECTIONS (0.1 PC). MAXIMUM RELATIVE ERRORS LESS THAN 0.9 PERCENT. STATISTICAL ERRORS INCLUDED IN THE TOTAL ERROR.
 * DETECTOR (NAICR) 5X5INCH WELL CRYSTAL GEIGER COUNTER (PROPC) CH4 FLOW COUNTER FOR DEUTERON TA-180M.
 * STATUS .FROM TABLES IN CONFERENCE CONTRIBUTION.
 * HISTORY (781017C) PDJ. RECOMPILED FROM NEUDADA. (790219E) (800115A) REACTION STRING IN SUBWORKS 019,020,021,022 AND 023 CHANGED. (800115E) (800424A) DATA HEADINGS CORRECTED. (800603E)

NNDEN/28

NEUTRON NUCLEAR DATA EVALUATION NEWSLETTER

NEA DATA BANK
BANQUES DE DONNÉES DE L'AEN

*** END BIB-SECTION ***

BIR-SECTION

* REACTION (23-V-51(N,A)21-SC-48,,STG,,BEL) RATIO TO THE 14.7 MEV CROSS SECTION.
 * STATUS .PUBLISHED TABLE.
 * HISTORY (781018C) PDJ. (790219E) (800424A) DATA HEADINGS CORRECTED. (800603E)

*** END BIR-SECTION ***

*** NO COMMON-SECTION ***

DATA-SECTION

	EN MEV	EN-ERR MEV	DATA ARB-UNITS	DATA-ERR ARB-UNITS
1	13.6	0.075	0.820	0.009
2	13.7	0.075	0.836	0.008
3	13.8	0.075	0.852	0.008
4	13.9	0.075	0.867	0.009
5	14.0	0.075	0.885	0.009
6	14.1	0.075	0.902	0.009

*** END DATA-SECTION ***

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GENERAL RECOMMENDATIONS TO CONTRIBUTORS

Contents and Presentation

These newsletters are meant to be informal : nevertheless, we think it useful to give some recommendations concerning the contents, presentation, distribution, etc.

The Newsletters are concerned with evaluation activities - with evaluation work itself and with computer programs useful for evaluation.

Experimenters should be careful to distinguish between "evaluating" all the good data and the more customary process of simply analysing their own measurements.

When compiling your contribution, the following headings may serve as a guide :

1. Names, address, telephone number, telex code.
2. Work recently completed and publications.
3. Work in progress - please give names of physicists doing each evaluation.
4. Work planned for near future, i e., work expected to start within six months (before publication of the next newsletter).
5. Computer programs for : nuclear data file operations - nuclear data analysis - nuclear model calculations.

Any note or report mentioned should be available on request to another evaluator for his own use but not necessarily for widespread copying and re-distribution. The distribution list of each newsletter will be attached to it.

Contributions should be forwarded typewritten in single spacing, as the newsletters will be produced directly from this typescript.

IMPORTANT NOTE

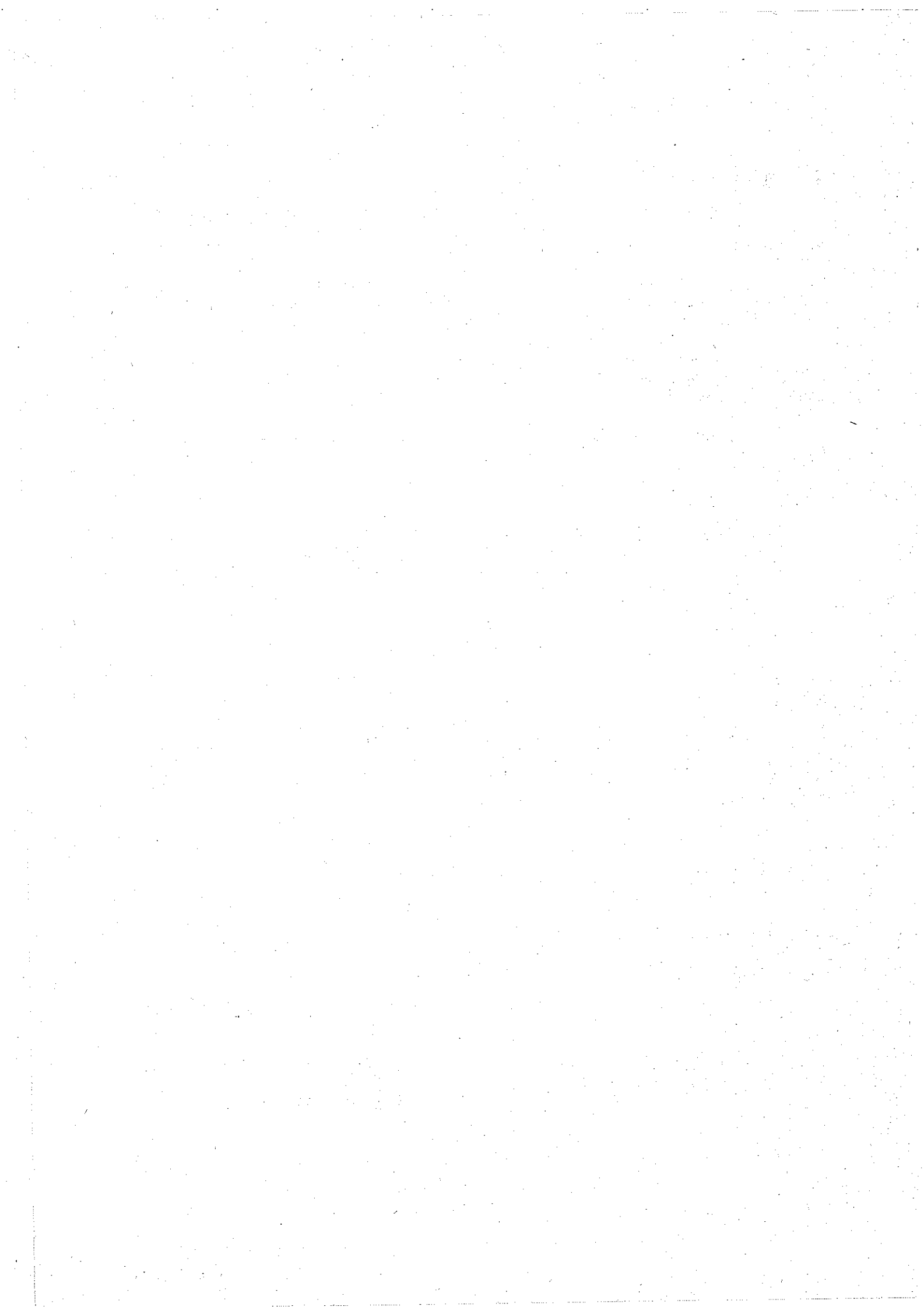
Future Neutron Nuclear Data Evaluation Newsletters will be distributed on 1st June and 1st December each year.

Evaluators are requested to send their contributions by :

15th May and 15th November

to :

NEA DATA BANK
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91190 GIF SUR YVETTE
FRANCE



NEUTRON NUCLEAR DATA EVALUATION NEWSLETTER

NNDEN/28

This Newsletter summarises evaluation activity in the OECD area. It should be noted that work in progress and future plans cited in this document may be changed without notice: consequently, the Newsletter should neither be quoted as a reference in publications nor be listed in an abstract journal.

The information contained in this Newsletter concerns :

1. Evaluation work on particular nuclides;
2. Development of codes for the manipulation of data and for the calculation of cross sections;
3. Publications relevant to the neutron data field.

Contributions on evaluation activities have been received from :

		<u>Page</u>
FRANCE	CEN, Bruyères-le-Châtel	1
	CEN, Cadarache	3
GERMANY	KFK, Karlsruhe	4
ITALY	CNEN, Bologna	5
JAPAN	Japanese Nuclear Data	
	Committee	7
NETHERLANDS	ECN, Petten	8
UNITED KINGDOM	AERE, Harwell/AEE, Winfrith	9
UNITED STATES	National Nuclear Data Center	11

Other information included in this issue :

Contents of the 80-nuclide revised edition of UKNDL	14
NEA Data Bank customer service from the Evaluated Nuclear Structure Data File	15
Proposed NEA Data Bank seminar on Neutron Data Evaluation Techniques	17

July, 1980

1. NEW EVALUATIONS RECENTLY COMPLETED a), IN PROGRESS b), OR

PLANNED IN THE NEAR FUTURE c)

Nuclide	Data Type	Energy Range	Pages			Nuclide	Data Type	Energy Range	Pages		
			a	b	c				a	b	c
Li	scat.	>7MeV		7		Rb-85	many	10 ⁻⁵ eV-20MeV		1	
Li-6	many			13		Rb-87	many	10 ⁻⁵ eV-20MeV		1	
Li-7	many			13		Sn-112	many				8
B	scat.	>7MeV		7		Ce-138	capt.	10 ⁻⁵ eV-20MeV			2
Na-22	many				8	Sm(even A)	many		1		
Na-23	n,xn,g prod.		11			Sm	capt,scat. n2n		1		
Ar-38	many				8	Sm-154	capt.				2
Ar-40	many				8	Gd	many			2	
Ca	n,xn,g prod.			13		Tb-159	capt,scat.	10 ⁻⁵ eV-20MeV			2
Sc-45	capt.				2	Yb	opt.model			2	
Cr-50	many		8			Lu	many			2	
Fe	many	3-40MeV	12			Lu-175	n,p	<20MeV	1		
Fe-54	n,p		11			W	many		12		
Fe-54	many	<40MeV	13			W-182	many		13		
Fe-54	many		8			W-183	many		13		
Fe-56	many	<40MeV	13			W-184	many		13		
Fe-58	capt.		11			W-186	many		13		
Co-58m	many			8		Ir-191	n,2n,capt.	2keV-20MeV	6		
Co-59	many	<50MeV	13			Ir-193	n,2n,capt.	2keV-20MeV	6		
Ni-58	many		8			Pb nat.	many	.025eV-20MeV		7	
Ni-62	many		8			Pb-204	many	.025eV-20MeV		7	
Ni-64	many		8			Pb-206	many	.025eV-20MeV		7	
Se-76	capt.	keV		6		Pb-207	many	.025eV-20MeV		7	
Se-78	capt.	keV		6		Pb-208	many	.025eV-20MeV		7	
Se-79	capt.	keV		6		Bi-209	many		11		
Se-80	capt.	keV		6		Bi-209	many	10 ⁻⁵ eV-20MeV		2	
Br-79	capt.	keV		6		Th-228	many	.025eV-20MeV		7	
Br-81	capt.	keV		6		Th-230	many	.025eV-20MeV		7	
Kr-78	capt.	keV		6		Th-232	res.params		4		
Kr-80	capt.	keV		6		Th-233	many	.025eV-20MeV		7	
Kr-81	capt.	keV		6		Th-234	many	.025eV-20MeV		7	
Kr-82	capt.	keV		6		Pa-231	many	10keV-12MeV		2	
Kr-83	capt.	keV		6		U-233	res.params		4		
Kr-84	capt.	keV		6		U-233	many	10 ⁻⁵ eV-20MeV	7		
Kr-85	capt.	keV		6							

Nuclide	Data Type	Energy Range	Pages			Nuclide	Data Type	Energy Range	Pages		
			a	b	c				a	b	c
U-235	nf		11			F.P.	n,p; n,a		8		
U-235	res.params.		4			F.P.	capt.				8
U-235	n,xn			2		F.P.	capt.		11		
U-235	many	100eV-20MeV		7		F.P.	many		12		
U-236	res.params.		4			F.P.	level spac.		3		
U-237	many	10^{-5} eV-20MeV		2		F.P.	level spac.		4		
U-238	many	100eV-20MeV		7		F.P.	level spac.		5		
U-238	res.params.		4			Actinides	n,f		7		
U-239	many	10^{-5} eV-20MeV		2		Opt.Model	(A=89-130)		1		
Np-237	many	5MeV-15-MeV	3			Opt.Model			4		
Np-239	many				3						
Pu-238	many			3							
Pu-239	n,xn			2							
Pu-239	many	100eV-20MeV		7							
Pu-239	res.params.		4								
Pu-240	res.params.		4								
Pu-240	many	100eV-20MeV		7							
Pu-241	many	10^{-5} eV-20MeV		2							
Pu-241	many	100eV-20MeV		7							
Pu-241	res.params.		4								
Pu-242	res.params.		4								
Am-241	many	< 100keV	4								
Am-241	many	0.1-15MeV		4							
Am-242	many	0.1-15MeV		4							
Am-242m	many	0.1-15MeV		4							
Am-242m	many	10^{-5} eV-20MeV		7							
Am-242m	many	< 100keV	4								
Am-242g	many	10^{-5} eV-20MeV		7							
Am-243	many	< 100keV	4								
Am-243	many			10							
Am-243	many	0.1-15MeV		4							
Cm-243	many	.025eV-15MeV		6							
Cm-244	many	< 100keV	4								
Cm-244	many	0.1-15MeV		4							
Cm-245	many	.025eV-15MeV		6							
Cm-246	many	resonance	5								
Cm-247	many	resonance	5								
Cm-248	many	resonance	5								

Note:

A revised version of UKNDL main tape NDL1 containing cross-sections for 80 materials has been received at NEA Data Bank. See the index on page 14.

Service de Physique Neutronique et Nucléaire
Centre d'Etudes de Bruyères-le-Châtel
France

Names : O. BERSILLON, M. COLLIN, J.P. DELAROCHE, L. FAUGERE, J. JARY,
Ch. LAGRANGE, R. PERRIER, C. PHILIS, J. SALVY, G. SIMON,
N. VERGES.

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Work recently completed and publications

- Ch. LAGRANGE, M. GIROD, B. GRAMMATICOS, K. KUMAR, "Neutron cross section calculations for the even Sm isotopes using deformation dependent wave functions" (Submitted to Int. Conf. on Nuclear Physics, Berkeley, August 24-30, 1980).
- J. JARY, J. FREHAUT, "Level density dependence of (n, γ), (n, n') and (n, 2n) reaction cross sections for some Sm isotopes", in Note CEA-N-2134, NEANDC(E) 212/L (juin 1980).
- Ch. LAGRANGE, "The (p, n) reaction for $89 \leq A \leq 130$ and an anomalous optical model potential for sub-coulomb protons" (to be published as a Comment to Physical Review C)
- Theoretical study of coupled channel calculations for odd mass heavy nuclei (Ch. LAGRANGE, O. BERSILLON, D. MADLAND*).
- Evaluation of ^{175}Lu (n, p) reaction cross section from threshold to 20 MeV (O. BERSILLON).
- Collapsing ECIS penetrabilities for statistical model applications (O. BERSILLON).
- Improvements of the interactive nuclear data evaluation file interface and maintenance system SYNOPSIS (M. COLLIN, D. COTTEN).

Work in progress

- Evaluation of neutron cross sections for ^{85}Rb and ^{87}Rb from 10^{-5} eV to 20 MeV (A. PRINCE**, G. SIMON).
- Evaluation of neutron cross sections and γ -ray production data for W isotopes in the energy range 500 keV-20 MeV (E. ARTHUR*, C. PHILIS, A.B. SMITH***).
- Carrying out of a Fortran code for calculating a convolution of evaporation laws to generate (n, 2n) secondary neutron spectra (G. SIMON).

- Evaluation of neutron cross sections for ^{241}Pu in the energy range 10^{-5} eV - 20 MeV (O. BERSILLON, Ch. LAGRANGE, D. MADLAND*).
- Carrying out of a Fortran code for generating multigroup γ -ray production cross sections (G. SIMON, R. PERRIER, C. PHILIS).
- Rewriting of the statistical model code COMNUC to improve some treatments and to get some flexibility (O. BERSILLON, R. PERRIER).
- Coherent optical and statistical model calculations of neutron cross sections for Gd isotopes (J.P. DELAROCHE, Ch. LAGRANGE).
- Calculations of neutron spectra from actinide (n,xn) reactions. Applications to ^{235}U and ^{239}Pu (J. JARY).
- Evaluation of ^{231}Pa neutron cross sections from 10 keV to 12 MeV (J. JARY).
- Evaluation of $^{237,239}\text{U}$ reaction cross sections from 10^{-5} eV to 20 MeV (C. PHILIS, J. JARY, Ch. LAGRANGE).
- Evaluation of Bi neutron cross sections from 10^{-5} eV to 20 MeV (O. BERSILLON).
- Determination of neutron optical potential from proton scattering data. Application to Yb isotopes (J.P. DELAROCHE).
- Evaluation of neutron cross sections for some unstable Lu isotopes (O. BERSILLON, J.P. DELAROCHE, J. JARY, Ch. LAGRANGE, C. PHILIS, N. VERGES).

Plans for the near future

- Evaluation of ^{45}Sc and ^{154}Sm capture cross sections from 10^{-5} eV to 20 MeV (G. SIMON).
- Evaluation of ^{159}Tb capture and scattering cross sections and ^{138}Ce capture cross section from 10^{-5} eV to 20 MeV (G. SIMON).

* Los Alamos Scientific Laboratory
** Brookhaven National Laboratory
*** Argonne National Laboratory

SECTION DE PHYSIQUE DES NEUTRONS RAPIDES
CENTRE D'ETUDES NUCLEAIRES DE CADARACHE

Names : E. FORT, H. DERRIEN, D. LAFONT, JP. DOAT, F. RIBAUT

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Boîte Postale n° 1
13115 SAINT PAUL LEZ DURANCE

WORK RECENTLY COMPLETED

- Extension of the Evaluation of ^{237}Np from 5 Mev to 15 Mev
Preliminary version in ENDF B IV format (H. DERRIEN, JP. DOAT)
- Improvement of the ESTIMA method to derive average parameters
from resonance sets (E. FORT, JP. DOAT)

WORK IN PROGRESS

- Evaluation of a complete set of neutron cross sections for ^{238}Pu
(H. DERRIEN, E. FORT, JP. DOAT)
- Improvement of statistical code FISINGA (F. RIBAUT, D. LAFOND)

WORK PLANED FOR THE NEAR FUTURE

- Evaluation of a complete set of neutron cross section for ^{239}Np
(E. FORT, H. DERRIEN, JP. DOAT)

WORK RECENTLY PUBLISHED

- Review of the different methods to derive average spacing from
resolved resonance parameter sets. E. FORT, H. DERRIEN, D. LAFOND
(Specialist meeting on F.P. neutron cross sections, Bologne Dec. 1979).

KFK-KARLSRUHE

GERMANY

Names : F.H. Fröhner, B. Goel, H. Jahn, B. Krieg

Address: Institut für Neutronenphysik und Reaktortechnik
Kernforschungszentrum Karlsruhe
Postfach 3640
75 KARLSRUHE , Germany

Work recently completed

- Evaluation of ^{241}Am , $^{242}\text{Am}^m$, ^{243}Am and ^{244}Cm cross sections in the resolved and unresolved resonance region up to 100 keV (F.H.Fröhner, B. Goel)
- Updating of ^{232}Th , ^{233}U , ^{235}U , ^{236}U , ^{238}U , ^{239}Pu , ^{240}Pu , ^{241}Pu , ^{242}Pu evaluations in the same energy range with the help of new resonance parameters and total cross section data, extensive reassessment of level-statistical parameters with the STARA code and optical-model studies with HAUSER-4 (F.H. Fröhner, U. Fischer)
- Reexamination of conventional single-particle descriptions for unresolved resonances in the light of Moldauer's sum rule that permits separate calculation of potential-scattering cross sections and resonance contributions from the optical model. Formulation of a condition which optical-model phase shifts must fulfill in order to yield positive potential-scattering cross sections, viz. $[R_\ell^\infty - 1/(2\ell + 1)]^2 > (\pi s_\ell)^2$

Work in progress

- Evaluation of ^{241}Am , ^{242}Am , $^{242}\text{Am}^m$, ^{243}Am and ^{244}Cm in the range 0.1 - 15 MeV (B. Goel, H. Jahn)

Work recently published

- Efficient Estimation of Strength Functions and Average Level Spacings from Resonance Parameters, Proc. NEANDC Specialists Meeting on Neutron Cross Sections of Fission Product Nuclei, Bologna, Dec . 1979 (F.H.Fröhner, in print)

C.N.E.N. - DIVISIONE FISICA - LABORATORIO DATI NUCLEARI - Via Mazzini, 2
40138 BOLOGNA, ITALY - tel. 307562 - telex 610167 CNEN/BO,I

Names: F. Fabbri, T. Martinelli, E. Menapace, M. Motta, G.C. Panini, G. Reffo,
M. Vaccari, A. Ventura.

Work recently completed and publications

Fission Products Neutron Data

BCS microscopic calculations of average s-wave level spacings \bar{D} at neutron binding energy B_n were performed for a number of nuclei in the mass number range $40 < A < 250$, including collective effects. The temperature corresponding to excitation energy B_n was utilized for radiative width calculations through a thermodynamic approach (black-body model). Theoretical results were found in agreement within 15-20% with experimental data (published as contribution to the Specialists' Meeting on neutron cross sections of fission product nuclei, Bologna, Dec. 12-14, 1979; report NEANDC(E)209"L", p.215; authors: V. Benzi, G. Maino, E. Menapace and A. Ventura).

Actinide Neutron Data

The neutron cross sections of some actinides were evaluated under two international research agreements:

1) IAEA research agreement no. 2114/CF

1a) ^{246}Cm : resonance region (in press as CNEN report RT/FI(80); authors: T. Martinelli, E. Menapace, M. Motta, M. Vaccari and A. Ventura.

1b) ^{247}Cm : resonance region (presented at the 2nd Technical Meeting on the Nuclear Transmutation of Actinides, Ispra, April 21-24, 1980; authors: T. Martinelli, E. Menapace, M. Motta and M. Vaccari).

1c) ^{248}Cm : resonance region (in press as CNEN report RI/FI(80); authors: T. Martinelli, E. Menapace, M. Motta, M. Vaccari and A. Ventura).

- 2) Research agreement with CEA-Cadarache and KFK-Karlsruhe
 - 2a) ^{245}Cm : from thermal energy to 15 MeV (unpublished)
 - 2b) ^{243}Cm : from thermal energy to 15 MeV (work in progress)

Cross Sections Evaluation

Neutron Capture Cross Sections of Kr, Se, Br, isotopes /1/,/2/

A joint project for keV neutron capture measurements (performed at KFK Karlsruhe) and model calculation (performed at CNEN Bologna) is underway.

The following isotopes have been evaluated Kr-78, Kr-80, Kr-81, Kr-82, Kr-83, Kr-84, Kr-85, Se-76, Se-78, Se-79, Se-80, Br-79, Br-81.

/1/ B. Leugers, F. Käppeler, F. Fabbri, G. Reffo, "KeV Neutron Capture Cross Section for s-Process Isotopes of Se, Br, Kr and the Abundance of Kr Isotopes in Solar System", Int. Conf. on Nuclear Cross Sections for Technology, Knoxville, October 22-26, 1979.

/2/ B. Leugers, F. Käppeler, F. Fabbri, G. Reffo, "The "s" Process Branch at Se-79", Second Conference on Nuclear Reaction, Varenna, Italy, June 18-21, 1979.

Measurements and Model Calculations for (n, γ) and (n,2n) Cross Sections of the Isotopes Ir-191, Ir-193 /3/

The cross section for (n,2n) and (n, γ) processes in Ir-191 and Ir-193 have been measured in the energy range (13 18) MeV and (.5 1.3) MeV respectively. Cross Section calculation have been done in the range 2 keV, 20 MeV. Important preequilibrium contributions appear at incident energies above 15 MeV.

/3/ F. Fabbri, G. Reffo, M. Herman, A. Marcinkowski, "Measurements and Model Calculations for (n,) and (n,2n) Cross Sections on Ir Isotopes", Second International Symposium on Neutron Induced Reactions, Smolenice, Czechoslovakia, June 25-29, 1979.

Contribution to Neutron Nuclear Data Evaluation Newsletter-28

Japanese Nuclear Data Committee
(Nuclear Data Center, JAERI)

Work in Progress:

i) Analysis of neutron elastic scattering from lithium and boron isotopes has been performed on the basis of the model which takes account of a loosely-bound cluster structure of a target nucleus. It is found that the angular distributions can be fairly well predicted at forward scattering angles in the energy range above 7 MeV. (from S. Komoda, Osaka Univ.)

ii) Evaluation of neutron cross sections for natural Pb and four stable isotopes was performed in the energy region of thermal to 20 MeV. (from T. Asami, JAERI)

iii) Evaluation of neutron data has been made for ^{228}Th , ^{230}Th , ^{233}Th and ^{234}Th in the energy region of thermal to 20 MeV. The quantities evaluated are total, elastic, inelastic, capture, fission, (n,2n) and (n,3n) cross sections and $\bar{\nu}$. (from T. Ohsawa, Kyushu Univ.)

iv) Analysis of fission cross sections for actinide nuclides has been carried out with the double-humped barrier model, and the barrier parameters were obtained. (from T. Ohsawa, Kyushu Univ.)

v) Evaluation of neutron data for ^{233}U has been completed in the energy range of 10^{-5} eV to 20 MeV. (from N. Asano, SAEI)

vi) Simultaneous evaluation of neutron data for ^{235}U , ^{238}U , ^{239}Pu , ^{240}Pu and ^{241}Pu has been completed in the energy range from 100 eV to 20 MeV by Working Group on Heavy-Nuclide Nuclear Data of JNDC. Reliability of the evaluated data was examined by integral tests with the international benchmark cores of fast reactors. The preliminary results were presented at Knoxville Conference in October, 1979. (from H. Matsunobu, SAEI)

vii) Evaluation of neutron data for $^{242\text{m}}\text{Am}$ and $^{242\text{g}}\text{Am}$ has been performed in the energy range of 10^{-5} eV to 20 MeV. The quantities evaluated are total elastic, inelastic, (n,2n), (n,3n), fission and capture cross sections, angular distributions of elastically scattered neutrons and $\bar{\nu}$. (from T. Nakagawa, JAERI)

S. Igarasi

Nuclear Data Center
Tokai Research Establishment
Japan Atomic Energy Research Institute
Tokai-mura, Naka-gun, Ibaraki-ken, Japan

May 20, 1980

NEUTRON NUCLEAR DATA EVALUATION NEWSLETTER-28

ECN-Petten - The Netherlands

1. Names

H. Gruppelaar, J.M. Akkermans, B.P.J. van den Bos, G. Delfini, R.J. Heijboer, A.J. Janssen and H.A.J. van der Kamp, Netherlands Energy Research Foundation (ECN), P.O. Box 1, 1755 ZG Petten, The Netherlands. Telephone: (02246)-6262, telex: 57211 reacp nl.

2. Recent publications and preprints

- /1/ Heijboer, R.J. and A.J. Janssen, Status of pseudo fission-product cross sections for fast reactors; sensitivity study for sodium void effect, NEANDC Specialists' Meeting on Neutron Cross Sections of Fission Product Nuclei, Bologna, Dec. 12-14, 1979.
- /2/ Gruppelaar, H., P. Hammer and L. Martin-Deidier, Intercomparison of adjusted data sets for capture cross sections of fission products, NEANDC Specialists' Meeting on Neutron Cross Sections of Fission Product Nuclei, Bologna, Dec. 12-14, 1979.
- /3/ Delfini, G. and H. Gruppelaar, Maximum likelihood analysis of resolved resonance parameters for some fission product nuclides, NEANDC Specialists' Meeting on Neutron Cross Sections of Fission Product Nuclei, Bologna, Dec. 12-14, 1979; extended version ECN-82 (1980).
- /4/ Gruppelaar, H. and B.P.J. van den Bos, The contribution of (n,p) and (n, α) reactions to fission-product capture cross sections, NEANDC Specialists' Meeting on Neutron Cross Sections of Fission Product Nuclei, Bologna, Dec. 12-14, 1979; extended version ECN-78 (1979).
- /5/ Akkermans, J.M., H. Gruppelaar and G. Reffo, Angular distributions in a unified model of preequilibrium and equilibrium neutron emission, to be publ. in Phys. Rev. C.
- /6/ Gruppelaar, H. and J.M. Akkermans, Comparison of experimental and calculated neutron emission spectra and angular distributions, Symposium on Neutron Cross Sections from 10-50 MeV, Brookhaven, May 12-14, 1980; extended report in press.

3. Work recently completed

Evaluation of cross sections for some corrosion products of stainless steel: ^{50}Cr , ^{54}Fe , ^{58}Ni , ^{62}Ni , ^{64}Ni (cooperation with KfK, Karlsruhe).

4. Work in progress

Evaluation of neutron cross sections for $^{58\text{m}}\text{Co}$.

5. Work planned for the near future

- . Continuation of efforts in evaluation and adjustment of capture cross sections for about 20 fission-product nuclides.
- . Further evaluation of neutron cross sections for nuclides in the primary cooling circuit of a LMFBR, i.e. for ^{22}Na , $^{38,40}\text{Ar}$, ^{112}Sn .

NUCLEAR DATA EVALUATION NEWSLETTER

NO 28

The United Kingdom

PERSONNEL

The following graduate personnel are currently working on nuclear data evaluation:-

UK Atomic Energy Authority

- i) Winfrith, Nuclear Data Group J S Story - M F James - R W Smith

Address: Building B21, Atomic Energy Establishment, Winfrith, Dorchester, Dorset. Telephone Dorchester 3111; Telex No 41231

Winfrith Technology Branch - A L Nichols

Address: Building A50, Atomic Energy Research Establishment, Winfrith, Dorchester, Dorset. Telephone Dorchester 3111, Telex No 41231

- ii) Harwell, Electron Accelerator Group (Building 418)

J E Lynn - M C Moxon - M G Sowerby - C A Uttley

Address: Atomic Energy Research Establishment, Harwell, Oxfordshire, OX11 0RA. Telephone Abingdon 24141; Telex No 83135

Harwell Chemistry Division (Building 220)

J G Cuninghame - E A C Crouch - Katherine M Glover - M King

Address: Atomic Energy Establishment, Harwell, Oxfordshire, OX11 0RA. Telephone Abingdon 24141; Telex No 83135

- iii) Central Electricity Generating Board

Berkeley Nuclear Laboratory - B S J Davies - A Tobias

Address: Berkeley Nuclear Laboratories, CEGB Berkeley, Gloucestershire, GL13 9PB. Telephone Berkeley 451.

- iv) British Nuclear Fuels Limited

Windscale and Calder Works - V Barnes

Address: Windscale and Calder Works, Sellafield, Seascale, Cumbria. Telephone Seascale 333.

2 WORK COMPLETED

A revised edition of the UKNDL main tape ND11, containing neutron cross sections for 80 materials, has been sent to the NEA Data Bank. This includes the revised Pa-233 file mentioned in the last newsletter.

Tests continue of Crouch's (AERE) revised set of fission-product yields, known as "Crouch-3"; changes are most marked for Pu239. Yields for isomeric states of fission products have been evaluated and are included in this set for Pu-239. For other fissile materials, as an interim measure, isomeric yield ratios have been derived from the US ENDF/B4 compilation. This yield set, like its predecessors, is in ENDF/B4 format.

3 WORK IN PROGRESS

- i) Evaluation of the neutron cross-sections of Am-243 is practically complete at AERE, and a UKNDL file is being compiled as DFN 1010.
- ii) Tobias (CEGB) is continuing with the revision of fission-product decay data for about 150 shorter-lived nuclides.
- iii) Crouch (AERE) has completed evaluation of delayed neutron emission probabilities and half-lives, and work continues on the neutron spectra.
- iv) A new evaluation of fission yields is under way, and will include yields for isomeric states and delayed neutron data.
- v) Nichols (AEEW) is continuing evaluation of decay data for 124 heavy nuclides. The data are being compiled in ENDF/B5 format, and evaluation has been completed for 102 nuclides.

4 COMPUTER PROGRAMMES

The programme MINIGAL, used for calculating Maxwellian average, resonance integral, and fission-spectrum average cross-sections from data in the UKNDL format, has been further revised and has been implemented on the ICL-2976 computer. This programme, together with a version of the resonance cross-section code SIGAR7, were collected from AEEW by G Birgersson for implementation at the NEA Data Bank. Some revisions to SIGAR7, suggested by this exercise, are being implemented and a revised edition will be sent shortly.

Improvements have been made to the computer codes used to handle the UKNDL at AERE, to take advantage of the editing facilities of the IBM TSO system.

J S STORY

Reactor Physics Division
AEE Winfrith

May 1980

U.S.A. Contribution to NNDEN-28

via The National Nuclear Data Center

Recent Publications

- ANL/NDM-45 (1979) "Evaluation of the U-235(n, Fission) Reaction Above 100 keV."
W.P. Poenitz.
- ANL/NDM-51 (April 1980) "Measured and Evaluated Neutron Cross Sections of
Bismuth." A. Smith, P. Guenther, D. Smith and J. Whalen.
- LA-8041-MS, Revised. "TMI-2 Decay Power: LASL Fission-Product and Actinide Decay
Power Calculation for the President's Commission on the
Accident at Three Mile Island." T.R. England and W.B. Wilson.
- LA-8047-T (1979) "A Statistical Model Investigation of Nuclear Fission." Thesis,
R.E. Pepping
- LA-8277-MS (1980) "FITPULS: A Code for Obtaining Analytic Fits to Aggregate
Fission-Product Decay-Energy Spectra." R.J. LaBauve, D.C.
George, and T.R. England
- LA-UR 79-1977 (1979) "Delayed Neutron Calculations Using ENDF/B-V Data."
T.R. England, F. Schmittroth, and R.E. Schenter.
- NUREG/CR-1172 (ORNL/NUREG-66) (1980) "Delayed Beta and Gamma-Ray Production Due
to Thermal-Neutron Fission of ^{239}Pu : Tabular and Graphical
Spectral Distributions for Times After Fission Between 2 and
14000 Sec." J.K. Dickens, T.R. England, T.A. Love, J.W.
McConnell, J.F. Emery, K.J. Northcutt, and R.W. Peelle.
- ORNL-5662 (1980) "An Evaluation of the Neutron and Photon-Production Cross Sections
for Sodium." D.C. Larson.
- ORNL/TM-7042 (1980) "A Consistent Nuclear Model for Compound and Precompound Reac-
tions with Conservation of Angular Momentum," C.Y. Fu.
- Proceedings of the Knoxville Conferences (1979). "Total Neutron Cross Sections of
Heavy Nuclei". W.P. Poenitz, J.F. Whalen and A.B. Smith.
- Proceedings of the Knoxville Conference (1979). "Evaluations of the $^{58}\text{Fe}(n,\gamma)^{59}\text{Fe}$
and $^{54}\text{Fe}(n,p)^{54}\text{Mn}$ Reactions for the ENDF/B-V Dosimetry File."
R.E. Schenter et al.
- Proceedings of the Knoxville Conference (1979). "Evaluations of Fission Product
Capture Cross Sections for ENDF/B-V." R.E. Schenter, et al.
- Proceedings of the Knoxville Conference (1979). "The MATXS-TRANSX System and the
CLAW-IV Nuclear Data Library." R.J. Barrett and R.E. MacFarlane.

U.S.A. Contribution to NNDEN-28 (cont.)
via NNDC

Recent Publications

- Proceedings of the Knoxville Conference (1979). "Calculation of Neutron Cross Sections for Tungsten Isotopes." E.D. Arthur and C.A. Philis.
- Proceedings of the Knoxville Conference (1979). "Calculation of Neutron Cross Sections on Iron Between 3 and 40 MeV." E.D. Arthur and P.G. Young.
- Proceedings of the Knoxville Conference (1979). "Verification of Photon-Production Processing Techniques." R.J. Barrett, W.E. Ford III, Y. Gohar, T.S. Bohn, R.E. MacFarlane and R.M. Boicourt.
- Proceedings of the Knoxville Conference (1979). "Application of Nuclear Models." P.G. Young, E.D. Arthur, and D.G. Madland.
- Proceedings of the Knoxville Conference (1979). "Delayed Neutron Calculations Using ENDF/B-V Data." T.R. England, R.E. Schenter, and F. Schmittroth.
- Proceedings of the Knoxville Conference (1979). "R-Matrix Analyses of Light-Element Reactions for Fusion Applications." G.M. Hale and D.C. Dodder.
- Proceedings of the Knoxville Conference (1979). "ENDF/B-IV and V Cross Section Libraries for Thermal Power Reactor Analysis." R.E. MacFarlane.
- Proceedings of the Knoxville Conference (1979). "Calculations of Prompt Fission Neutron Spectra." D.G. Madland and J.R. Nix.
- NEANDC Specialist Meeting on Neutron Cross Sections of Fission Product Nuclei, Dec. 12-14, 1979, Bologna. "ENDF/B-5 Fission Product Cross Section Evaluations." R.E. Schenter and T.R. England.
- NEANDC Specialist Meeting on Neutron Cross Sections of Fission Product Nuclei, Dec. 12-14, 1979, Bologna. "Implementation of ENDF/B-IV and V Data in LWR Design Codes: EPRI-CELL and EPRI-CPM." O. Ozer, R.E. MacFarlane, and M.L. Williams.
- NEANDC Specialist Meeting on Neutron Cross Sections of Fission Product Nuclei, Dec. 12-14, 1979, Bologna. "Neutron Cross Section Calculations for Fission-Product Nuclei." E.D. Arthur and D.G. Foster, Jr.
- NEANDC Specialist Meeting on Neutron Cross Sections of Fission Product Nuclei, Dec. 12-14, 1979, Bologna. "Fast Neutron Capture Cross Section Measurements, Evaluations and Model Calculations of Fission Product Nuclei." W.P. Poenitz.
- NEANDC Specialist Meeting on Neutron Cross Section of Fission Product Nuclei, Bologna, Italy (1979). "ENDF/B-5 Fission Product Cross Section Evaluations." R.E. Schenter and T.R. England.

U.S.A. Contribution to NN DEN-28 (cont.)
via NNDC

Recent Publications

Proceedings of 3rd ASTM Euratom Symposium, October (1979). "Status of ENDF/B-V Fission Yield File." R.E. Schenter and T.R. England.

Proceedings of Honolulu ACS Meeting, April (1979). "Evaluation of Fission Product Yields for the U.S. National Data Files." B.F. Rider, T.R. England, D.G. Madland, J.R. Liaw and R.E. Schenter.

Symposium on Neutron Cross Sections from 10-50 MeV, May 12-14, 1980, Brookhaven National Laboratory. "Evaluation of Neutron Cross Sections to 40 MeV for $^{54,56}\text{Fe}$." E.D. Arthur and P.G. Young

Symposium on Neutron Cross Sections from 10-50 MeV, May 12-14, 1980, Brookhaven National Laboratory. "Calculation of Neutron Cross Sections to 50 MeV for ^{59}Co ." E.D. Arthur, P.G. Young, and W.K. Matthes

WAPD-TM-1456 (1980). "Review of Thorium- U233 Cycle Thermal Reactor Benchmark Studies." J.J. Ullo, J. Hardy, Jr., N.M. Steen.

Evaluations Recently Completed or In Progress

1. Charged-Particle Fusion Data File (evaluated cross sections and reaction rates from 0.1 keV to 5 MeV for the $\text{T}(d,n)^4\text{He}$, $\text{T}(t,2n)^4\text{He}$, $^3\text{He}(d,p)^4\text{He}$, $^6\text{Li}(p,^3\text{He})^4\text{He}$, and $^{11}\text{B}(p,3\alpha)$ reactions). G.M. Hale (completed).
2. Neutron-Induced Cross Sections for ^{54}Fe , ^{56}Fe , and Elemental Iron from 3 to 40 MeV. E.D. Arthur and P.G. Young (completed).
3. Neutron-Induced Cross Sections for ^6Li . P.G. Young and G.M. Hale (in progress).
4. Neutron-Induced Cross Section for ^7Li . P.G. Young and G.M. Hale (in progress).
5. Neutron-Induced Cross Sections for $^{182-184}$, ^{186}W Isotopes. E.D. Arthur, C. Philis, and A. Smith (in progress).
6. "Evaluation of Ca Neutron and Gamma-Ray Production Cross Sections from 8 to 20 MeV." C.Y. Fu and D.M. Hetrick, (in progress).
7. ENDF/B-V Activation File (124 materials) released as ENDF/B TAPE532.
8. ENDF/B-V Fission Product File (877 materials) sent to NNDC.

Norman E. Holden
National Nuclear Data Center
Brookhaven National Laboratory
Upton, N.Y. 11973

THE 1980 VERSION OF THE UKNDL LIBRARY

An expanded version of the main UKNDL tape, NDL-1, has been received at the Data Bank. It now contains 80 files, and incorporates a number of new evaluations made since the April 1973 edition. The contents of the tape are listed below :

<u>Version</u>	<u>Nuclide Identification</u>	<u>Data Points</u>	<u>Isotope</u>	<u>Version</u>	<u>Nuclide Identification</u>	<u>Points</u>	<u>Isotope</u>
A	923	299	H IN H20	A	70	2203	CD
A	905	789	D IN D20	B	71	1088	CD113
A	252	436	T	*	946	36	SN
*	47	358	HE	F	4	66	XE135
*	44	188	HE3	*	39	2463	SM149
D	221	230	HE4	A	921	3458	EU151
A	914	1080	LI6	A	922	4055	EU153
E	215	496	LI7	B	949	3425	GD
A	967	351	BE9	*	945	1041	GD155
B	90	475	B10	*	948	672	GD157
B	49	725	B11	B	1201	1249	HF174
B	902	1317	C	B	1202	1132	HF176
A	259	3534	N	B	1203	5411	HF177
*	968	2505	N14	B	1204	1211	HF178
A	933	1037	O	B	1205	3602	HF179
*	969	2408	O16	B	1206	2126	HF180
E	23	288	F19	B	328	2069	TA
*	93	1286	NA23	B	213	238	W
*	941	42	MG	B	1208	5998	AU197
A	935	2155	AL27	C	26	545	PB
E	25	296	SI		930	774	TH232
E	141	408	CL	A	59	1008	PA233
B	84	2569	K	B	87	1835	U233
E	138	253	CA	A	953	823	U234
B	190	881	TI	B	159	4354	U235
A	952	804	V	A	954	749	U236
C	446	839	CR	*	167	1107	U237
*	88	987	MN	F	160	6638	U238
A	908	7447	FE	A	276	1119	U239
*	934	3067	CO59	A	277	1060	U240
A	907	3328	NI	*	960	2070	NP237
B	835	2423	CU	A	274	438	PU238
B	681	1935	CU63	A	161	3334	PU239
B	682	1520	CU65	B	402	2669	PU240
B	105	292	GA	B	77	1052	PU240
B	82	1742	ZR	A	60	2155	PU241
C	79	5579	NB93	A	975	1069	PU242
C	81	1309	MO	B	1009	4308	AM241
A	973	1107	AG107	A	957	574	AM243
A	974	1205	AG109	A	976	1649	CM244

Where a data set has been added or modified as compared to the previous version (April 1973 + updates) held at NEA-DB, an asterisk appears in the "version" column.

Proposed NEA Data Bank Seminar on Neutron Data Evaluation Techniques

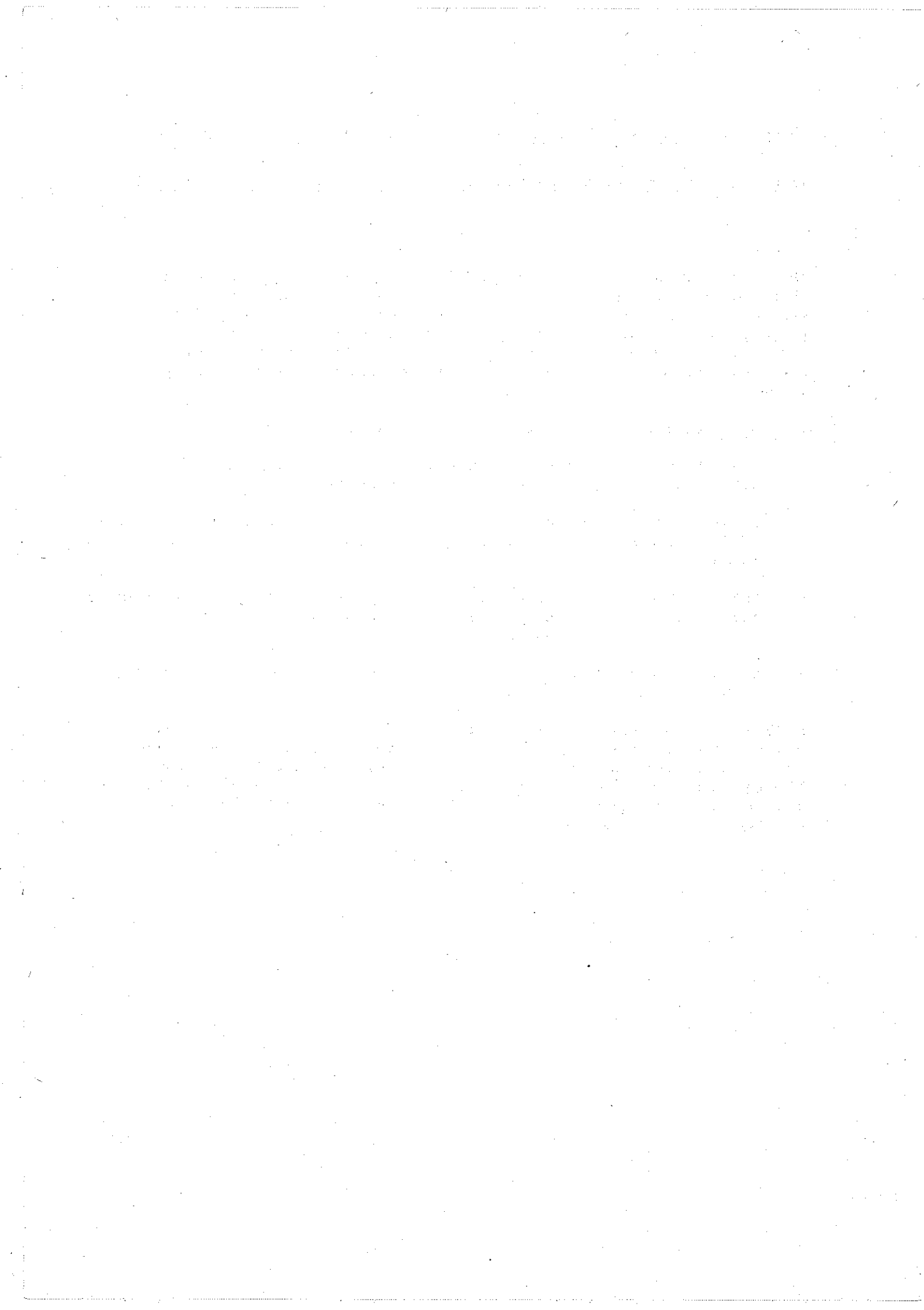
To be held in Paris or at NEA-Data Bank, probably 26th-28th January 1981

In order to improve contacts between the Data Bank and the evaluators to whom NEA-DB sends experimental data, and between the evaluators themselves who in Europe and Japan do not have general and regular meetings, it is proposed to organise a seminar for evaluators in the NEA service area. The immediate aim of the meeting is to identify the needs and scope for an improved service by the Data Bank to neutron data evaluators in Europe and Japan.

Discussion on the following general themes is suggested :

- Evaluation methods in use. Comparison of ENDF/B V methods with those used by European and Japanese groups.
- Physics and format-related problems of neutron data evaluation : selection of data, renormalisation, handling of uncertainty covariance information, formats.
- NEA Data Bank facilities and development plans : data plotting, nuclear model codes and data analysis codes available through NEA-DB, aid in handling very large quantities of data.
- Current work and evaluation plans of different groups of evaluators in Europe and Japan.

Readers of this newsletter are asked to send their ideas on the topics which could be most usefully discussed in a small meeting of evaluators : we would hope to have 15-20 participants at the meeting, plus some Data Bank staff. If support for this idea is sufficient, a formal meeting announcement will be sent out in September/October 1980. Please address your suggestions to Dr. Nigel Tubbs at NEA Data Bank.



DISTRIBUTION LIST

AUSTRALIA	W. Gemmell
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UNITED STATES	R. Benjamin, R.C. Block, C. Bowman, C.L. Cowan, H. Goldstein, J. Hardy, C.R. Head, P. Hemmig, W.B. Henderson, N. Holden, R. Howerton, B.R. Leonard, C.R. Lubitz, D. Mathews, C.W. Maynard, H. Motz, NNCSC Library, E.H. Ottewitte, O. Ozer, N.G. Paik, R.W. Peelle, E.R. Pennington, F.G. Perey, RSIC, G.L. Rogosa, R.E. Schenter, A.B. Smith, N. Steen, W.A. Wittkopf, P. Young.

CROSS SECTION COMPUTATIONAL FORMAT

INDEX							DATA COLUMNS								
ATOMIC No. Z	MASS No. A	REACTION CODE	STANDARD METHOD	FLAGS	LABORATORY DATE	EXFOR No.	NEUTRON ENERGY	ERROR	LEVEL ENERGY	ANGLE	ERROR	CROSS SECTION	ERROR	STANDARD	ERROR
023051NA3LAC					HAMA120904003		1.6000E+07	4.0000E+05				3.1700E-02	6.9740E-03		
023051NA3LAC					HAMA120904003		1.7100E+07	4.0000E+05				3.7000E-02	7.7700E-03		
023051NA3LAC					HAMA120904003		1.8000E+07	4.0000E+05				3.0900E-02	6.4890E-03		
023051NA3LAC					HAMA120904003		1.9400E+07	3.0000E+05				2.4200E-02	4.8400E-03		
023051NA3LAC					HAMA120904003		1.9600E+07	3.0000E+05				2.6000E-02	5.9800E-03		
023051NA3LAC					AEP7930523006		1.7970E+07	2.7000E+05				1.9700E-02	1.3000E-03	1.1750E-01	3.0000E-03
023051NA3LAC					AEP7930523006		1.7180E+07	3.4000E+05				2.0300E-02	1.3000E-03	1.1750E-01	3.0000E-03
023051NA3LAC					AEP7930523006		1.6050E+07	4.3000E+05				1.9300E-02	1.2000E-03	1.1750E-01	3.0000E-03
023051NA3LAC					AEP7930523006		1.4770E+07	2.5000E+05				1.7400E-02	9.0000E-04	1.1750E-01	3.0000E-03
023051NA3LAC					AEP7930523006		1.4610E+07	2.1000E+05				1.6800E-02	9.0000E-04	1.1750E-01	3.0000E-03
023051NA3LAC					AEP7930523006		1.4360E+07	1.5000E+05				1.6000E-02	8.0000E-04	1.1750E-01	3.0000E-03
023051NA3LAC					AEP7930523006		1.3680E+07	3.5000E+05				1.4100E-02	7.0000E-04	1.1750E-01	3.0000E-03
023051NA3LAC					AEP7930523006		1.3410E+07	1.6000E+05				1.3200E-02	7.0000E-04	1.1750E-01	3.0000E-03
023051NA3LAC					AEP7930523006		1.2790E+07	2.9000E+05				1.1500E-02	7.0000E-04	1.1750E-01	3.0000E-03
023051NA3LAC					AEP7930523006		1.2230E+07	1.4000E+05				1.0100E-02	6.0000E-04	1.1750E-01	3.0000E-03
023051NA3LAC					AEP7930523006		1.1400E+07	8.0000E+05				5.3000E-03	7.0000E-04	1.1750E-01	3.0000E-03

NEUTRON DATA SERVICES FROM NEA DATA BANK

This cover illustrates the three formats now in use for answering user requests for experimental neutron data. These data are compiled and exchanged with the three other neutron data centres in "EXFOR" format, and stored at the Data Bank together with the CINDA bibliography in an integrated data base.

NEA Data Bank makes selective searches in this data base for users in its member countries, and supplies either listings structured as in EXFOR of data and associated comments (experiment description and bibliography) or data on tape in one of the computational formats shown on this cover, accompanied by a listing of comment information. NNDC (Brookhaven) supplies data in similar formats to its customers in USA and Canada.

Users are asked to specify their requests in as precise and selective a form as possible: this really wants. Data sent out to users are accompanied by documentation or other explanation of the formats used, and a list will be sent on request of all the other files of neutron and non-neutron nuclear data, experimental or evaluated, available from the Data Bank.

RESONANCE PARAMETERS COMPUTATIONAL FORMAT

INDEX				DATA COLUMNS												
ATOMIC No. Z	MASS No. A	LABORATORY DATE	EXFOR No.	RESONANCE ENERGY	ERROR	PARITY	SPIN	MOMENTUM	TOTAL WIDTH Γ	ERROR $\Delta\Gamma$	NEUTRON WIDTH Γ_n	ERROR $\Delta\Gamma_n$	FISSION WIDTH Γ_f	ERROR $\Delta\Gamma_f$	GAMMA WIDTH Γ_γ	ERROR $\Delta\Gamma_\gamma$
026056KFK700620370008				1.6900E+05	1.0000E+03						8.70E+02	7.00E+01				
026056KFK700620370008				1.4800E+05	1.0000E+03						3.43E+03	2.70E+02				*
026056KFK700620370008				2.2000E+05	1.0000E+03						1.47E+03	8.50E+01				*
026056KFK700620370009				2.2790E+04	7.0000E+01											*
026056KFK700620370009				3.4250E+04	1.0000E+02											*
026056KFK700620370009				3.6690E+04	1.1000E+02											*
026056KFK700620370009				3.8380E+04	1.2000E+02											*
026056KFK700620370009				4.6040E+04	1.4000E+02											*
026056KFK700620370009				5.2200E+04	1.6000E+02											*
026056KFK700620370009				5.3600E+04	1.6000E+02											*
026056KFK700620370009				5.5300E+04	2.0000E+02											*
026056KFK700620370009				5.9250E+04	1.8000E+02											*
026056KFK700620370009				6.3450E+04	1.9000E+02											*
026056KFK700620370009				7.2500E+04	5.0000E+02											*
026056KFK700620370009				7.6900E+04	5.0000E+02											*
026056KFK700620370009				8.0800E+04	3.0000E+02						8.60E+00	6.00E-01G				*
026056KFK700620370009				9.2600E+04	3.0000E+02						1.80E+01	4.00E+00G				*
026056KFK700620370009				9.6100E+04	3.0000E+02						6.00E+00	2.00E+00G				*
026056KFK700620370009				9.6100E+04	3.0000E+02						5.00E+01	8.00E+00G				*
026056KFK700620370009				1.0240E+05	3.0000E+02						7.00E+01	1.20E+01G				*
026056KFK700620370009				1.0580E+05	3.0000E+02											*
026056KFK700620370009				1.1260E+05	3.0000E+02											*
026056KFK700620370009				1.5100E+05	1.0000E+03											*
026056KFK700620370009				1.5300E+05	1.0000E+03											*
026056KFK700620370009				1.6300E+05	1.0000E+03											*
026056KFK700620370009				1.7940E+05	1.2000E+03											*
026056KFK700620370009				1.8070E+05	1.2000E+03											*
026056KFK700620370009				1.9510E+05	1.0000E+03											*
026056KFK700620370009											1.00E+02	2.40E+01G				*