International Atomic Energy Agency

INDC(NDS)-130/G+P

INDC

INTERNATIONAL NUCLEAR DATA COMMITTEE

PROGRESS IN FISSION PRODUCT NUCLEAR DATA

Information about activities
in the field of measurements and compilation/evaluations
of fission product nuclear data (FPND)

collected

by

M. Lammer

Nuclear Data Section
International Atomic Energy Agency
Vienna, Austria

No. 8
July 1982

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PROGRESS

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FOREWORD

This is the eighth issue of a report series on Fission Product Nuclear Data (FPND) which is published by the Nuclear Data Section (NDS) of the International Atomic Energy Agency (IAEA). The purpose of this series is to inform scientists working on FPND, or using such data, about all activities in this field which are planned, ongoing, or have recently been completed.

The main part of this report consists of unaltered original contributions which the authors have sent to IAEA/NDS. Therefore, the IAEA cannot be held responsible for the information contained nor for any consequences resulting from the use of this information. The present issue contains also a section with some recent references relative to fission product nuclear data, which were not covered by the contributions submitted.

The types of activities being included in this report are measurements, compilations and evaluations of:

Fission product yields (neutron induced and spontaneous fission);
Neutron reaction cross sections of fission products;
Data related to the radioactive decay of fission products;
Delayed neutron data of fission products; and
lumped fission product data (decay heat, absorption etc.).

The seventh issue of this series has been published in July 1981 as INDC(NDS)-116. The present issue includes contributions which were received by NDS between 1 August 1981 and 15 June 1982.

The next issue of this report series is envisaged to be published in June 1983.

The still increasing interest in this report series is reflected by the recent development in contributions as illustrated by the table below: the number of pages, contributing countries and institutes have more than doubled since the first issue.

issue no.	number of pages total	exp.	eval.	number of countries total	exp.	eval.	number of institutes total	exp.	eval.
1	71	47	21	12	12	6	32	25	12
2	57	37	17	12	10	7	26	19	9
3	107	81	20	13	12	8	35	28	13
4	99	57	23	13	11	9	35	27	14
5	91	54	26	12	10	7	37	26	15
6	134	82	33	19	16	12	62	48	21
7	166	107	41	20	17	12	78	64	27
8	186	130	38	30	27	12	93	83	25

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*) Page numbers in brackets refer to collaborations, which are not listed under "Laboratory and address"

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*) see page iii

Table of contents (cont'd) Page *)

*) see page iii

Table of contents (cont'd) Page *)

*) see page iii

SUBMITTING CONTRIBUTIONS

The next issue is expected to be published in June 1983. All scientists who are presently working - or have recently completed work - in the field of FPND and who want to contribute to the 9th issue of this series, are kindly asked to send contributions to me between now and 1 May 1983, so that they reach NDS before 15 May 1983.

Those scientists or groups who have already contributed to the present issue and who want to leave their contribution(s) unchanged or who wish to suggest only slight changes, should write an appropriate note to me before the above deadline.

Format:

The size of one contribution should preferably not exceed one page. Of course, the number of contributions per working group or laboratory is not restricted. Similar experiments (or calculations, evaluations, etc.) performed by one person or group should preferably be combined to one contribution, if this is possible without loss of clarity.

The headings suggested for the 3 types of contributions can be found on page viii. For the sake of consistency it is requested that the suggested headings be used as far as appropriate.

Compilation and evaluations: If applicable, the availability of numerical data from computer files could be indicated either under the headings "Computer files ..." or under a separate heading "Availability...".

Editing: Since contributions received are generally used directly for publication, it is important that typed originals are sent and not just carbon- or photocopies. It would be a great help for producing an edited report if a margin of 2 cm (or 1 inch for North American paper format) is left on each side of the text and a 5 cm space is left at the top of each page (or 3 cm, if the name of the country is included).

Comments or suggestions concerning the format, content and layout of this report series are most welcome and should be directed to me in time before the next issue.

I would like to thank the contributors for their cooperation.

M. Lammer

Measurements:	Compilations:	Evaluations:
Laboratory and address:	Laboratory and address:	Laboratory and address:
Names:	Names:	Names:
Facilities:		
Experiment:	Compilation:	Evaluation:
Method:	Purpose:	Purpose:
Accuracy:	Major sources of information:	Method:
Completion date:		Major sources of information:
Descrepancies to other reported data:	Deadline of literature coverage:	Deadline of literature coverage:
Publications:	Cooperation:	
	Other relevant details:	Status:
	Computer file:	Cooperation:
	Completion date:	Other relevant details:
	Publications:	Computer file of compiled data:
		Computer file of evaluated data:
		Discrepancies encountered:
		Completion date:
		Publications:

SUBJECT INDEX a)

1. MEASUREMENTS

1.1. Fission yields

a) with respect to the earlier issues, underlined page numbers refer to new work, page numbers in brackets refer to unchanged contributions, and others refer to revised contributions.

1.1. Fission yields (cont'd)

1.1. Fission yields (cont'd)

1.1. Fission yields (cont'd)

*) several fissioning nuclides which are not yet specified (generally referring to future work)

1.2. Neutron reaction cross sections

1.2 Neutron reaction cross sections (cont'd)

1.2 Neutron reaction cross sections (cont'd)

nuclide	neutron energy	reaction	page
Nb-93	50keV-4.5MeV	total	(103)
	keV-MeV range	elastic, inelastic scat.	(104)
	400 keV	capture γ spectrum	79
Mo	50keV-4.5MeV	total	(103)
	keV-MeV range	elastic scat.	(104)
	400 keV	capture γ spectrum	79
Mo-95	fast	RAPSODIE, mass-spec., absorption	49
	3-200 keV	(n,γ), res. pars.	5
Mo-96	3-200 keV	(n,γ), res. pars.	5
Mo-97	fast	RAPSODIE, mass-spec., absorption	49
	3-200 keV	(n,γ), res. pars.	5
Mo-98	fast	RAPSODIE, mass-spec., absorption	49
	3-200 keV	(n,γ), res. pars.	5
	30 keV	(n,γ)	(102)
Mo-100	30 keV	(n,γ)	(102)
Tc-99	fast	CFRMF, EBR-II, integral (n,γ)	(108)
	4.5-24 eV	res. pars. (transmission)	(34)
	2.6-2000 keV	(n,γ)	(117)
Ru	keV-MeV range	elastic scat.	(104)
Ru-100	fast	RAPSODIE, mass-spec., absorption	49
Ru-101	fast	RAPSODIE, mass-spec., absorption	49
Ru-102	fast	RAPSODIE, mass-spec., absorption	49
Ru-104	fast	RAPSODIE, mass-spec., absorption	49
	fast	CFRMF, EBR-II, integral (n,γ)	(108)
Rh-103	fast	CFRMF, EBR-II, integral (n,γ)	(108)
	10-70 keV	(n,γ), capture γ spectrum	36
	30+500 keV	(n,γ)	(102)
	50keV-4.5MeV	total	(103)
	keV-MeV range	elastic scat.	(104)
	0.4-4.0 MeV	(n,γ)	(102)
Pd	3-80	capture γ spectrum	78
	30 + 500 keV	(n,γ)	(102)
	50keV-4.5MeV	total	(103)
	keV-MeV range	elastic scat.	(104)
	0.4-4.0 MeV	(n,γ)	(102)
Pd-104	3-200 keV	(n,γ), res. pars.	5
	up to 500 keV	(n,γ)	(13)

1.2 Neutron reaction cross sections (cont'd)

1.2 Neutron reaction cross sections (cont'd)

1.2 Neutron reaction cross sections (cont'd)

nuclide	neutron energy	reaction	page
Nd	0.4-4.0 MeV	(n,γ)	(102)
Nd-142	3-200 keV	(n,γ), res. pars.	5
	5-500 keV	(n,γ) rel. Au-197 at 30 keV	(127)
Nd-143	fast	RAPSODIE, mass-spec., absorption	49
	fast	CFRMF, EBR-II, integral (n,γ)	108
Nd-144	fast	RAPSODIE, mass-spec., absorption	49
	fast	CFRMF, EBR-II, integral (n,γ)	108
	5-500 KeV	(n,γ) rel. Au-197 at 30 keV	(127)
Nd-145	fast	CFRMF, EBR-II, integral (n,γ)	108
Nd-146	fast	RAPSODIE, mass-spec., absorption	49
	fast	CFRMF, EBR-II, integral (n,γ)	108
	3-200 keV	(n,γ), res. pars.	5
	5-500 keV	(n,γ) rel. Au-197 at 30 keV	(127)
Nd-148	fast	RAPSODIE, mass-spec., absorption	49
	fast	CFRMF, EBR-II, integral (n,γ)	108
	3-200 keV	(n,γ), res. pars.	5
	5-500 keV	(n,γ) rel. Au-197 at 30 keV	(127)
Nd-150	fast	CFRMF, EBR-II, integral (n,γ)	108
	5-500 keV	(n,γ) rel. Au-197 at 30 keV	(127)
Pm-147	fast	CFRMF, EBR-II, integral (n,γ)	(108)
Sm	0.4-4.0 MeV	(n,γ)	(102)
Sm-147	fast	RAPSODIE, mass-spec., absorption	49
	fast	CFRMF, EBR-II, integral (n,γ)	108
	5-500 keV	(n,γ) rel. Au-197 at 30 keV	127
Sm-148	5-500 keV	(n,γ) rel. Au-197 at 30 keV	(127)
Sm-149	fast	RAPSODIE, mass-spec., absorption	49
	fast	CFRMF, EBR-II, integral (n,γ)	108
	up to 500 keV	(n,γ)	13
	5-500 keV	(n,γ) rel. Au-197 at 30 keV	127
Sm-150	5-500 keV	(n,γ) rel. Au-197 at 30 keV	(127)
Sm-151	5-500 keV	(n,γ) rel. Au-197 at 30 keV	127
Sm-152	5-500 keV	(n,γ) rel. Au-197 at 30 keV	(127)
	30 keV	(n,γ)	35
Sm-154	5-500 keV	(n,γ) rel. Au-197 at 30 keV	(127)
	30 keV	(n,γ)	35

1.2 Neutron reaction cross sections (cont'd)

nuclide	neutron energy	reaction	page
Eu	2 meV-1 eV	total (transmission)	25
Eu-151	fast	CFRMF, EBR-II, integral (n,γ)	108
	2 meV-1 eV	total (transmission)	25
	5-500 keV	(n,γ) rel. Au-197 at 30 keV	127
	48.5 keV	(n,γ) to 9.3 h isomer	35
Eu-152	fast	CFRMF, EBR-II, integral (n,γ)	108
Eu-153	fast	CFRMF, EBR-II, integral (n,γ)	108
	2 meV-1 eV	total (transmission)	25
	5-500 keV	(n,γ) rel. Au-197 at 30 keV	127
Eu-154	fast	CFRMF, EBR-II, integral (n,γ)	108
Eu-155	5-500 keV	(n,γ) rel. Au-197 at 30 keV	127
Gd-152	30 keV	(n,γ)	35
Gd-156	5-500 keV	(n,γ) rel. Au-197 at 30 keV	(127)
Gd-158	5-500 keV	(n,γ) rel. Au-197 at 30 keV	(127)
	30 keV	(n,γ)	35
Gd-160	5-500 keV	(n,γ) rel. Au-197 at 30 keV	(127)
Dy-160	5-500 keV	(n,γ) rel. Au-197 at 30 keV	127
Dy-161	5-500 keV	(n,γ) rel. Au-197 at 30 keV	127
Dy-162	5-500 keV	(n,γ) rel. Au-197 at 30 keV	127
Dy-163	5-500 keV	(n,γ) rel. Au-197 at 30 keV	127
Dy-164	5-500 keV	(n,γ) rel. Au-197 at 30 keV	127
FP *)	unspecified	comparative measurements	(34)
	1 eV-1.5keV	res. pars. (transmission)	(34)
Many +)	thermal	(n,α), systematic study	10
	thermal	(n,γ). some isotopes of Zr,Mo,Cd,In	(102)
	30 + 500 keV	(n,γ), planned	(102)
	MeV range	inelastic scat., some among Z=40-52	(104)
	14 MeV	activation, some rare earth isotopes	18

*) gross FP-mixtures

+) several reactions not specified in detail

1.3. Decay data

1.3. Decay data (cont'd)

1.3. Decay data (cont'd)

1.3. Decay data (cont'd)

1.4. Delayed neutron (del-n) data

1.4. Delayed neutron (del-n) data (cont'd)

1.4. Delayed neutron (del-n) data (cont'd)

nuclide	neutron energy	data type	page
Pu-240	fast	total del-n yield	64
	fast	group spectra	83
Pu-241	thermal	group spectra	83
	fast	total del-n yield	64
Pu-242	fast	group spectra	83
Am-241	fast	total del-n yield	64
Cf-252	spontaneous	group spectra	83
Many		group spec.(time)	(46)

1.5. Decay heat

nuclide	neutron energy	reaction	page
Th-232	fast	β, γ, total	(80)
U-233	fast	β, γ, total	(80)
U-235	thermal	total	23
	fast	β, γ, total	(80)
	fast	gross β	91
	fast	gross γ	92
U-238	fast	β, γ, total	(80)
	fast	γ, 5 sec to 30 min	(80)
Pu-239	fast	β, γ, total	(80)
	fast	gross β	91
	fast	gross γ	92

2. COMPILATIONS AND EVALUATIONS

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	charge distr., U-236, Cf-252 spont. fission	140
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I. MEASUREMENTS

Unchanged contributions are marked as such.

Updates: revisions with respect to the last issue are marked by a vertical bar on the left margin of the text.

New contributions show no marks.

ARGENTINE

Laboratory:	Departamento de Física Comisión Nacional de Energía Atómica Av. del Libertador 8250 1429 Buenos Aires, Argentina
Facilities:	On-line electromagnetic isotope separator coupled with a neutron generator for $^{235}U(n_{+h},f)$ products studies (IALE facility).

1\. Names: H.Huck, M.L.Pérez, J.J.Rossi and H.M.Sofía

Experiment: Decay schemes for ^{131}Sb, ^{131}Sn isotopes has been built on the basis of Ge(Li) gamma-ray spectroscopy and gamma-gamma coincidences.

Method: The ^{235}U thermal fission products were electromagnetically separated and mass 131 collected on a movable tape collector for on line gamma-spectroscopy studies. With different collection-counting times positive assignments were made for the gamma-rays according the half lives present in mass-131 chain. Gamma-ray energies and intensities as well as gamma-gamma coincidences were used to construct the decay schemes.

Accuracy: Varying

Completion date: Completed

Publications: Phys. Rev. C24 (1981) 2227-34.
CNEA NT 5/82 pag. b.47, Progress Report 1980-1981, Department of Physics CNEA, Buenos Aires, Argentina.

ARGENTINE

(cont'd)

2. Names: H.Huck, M.L.Pérez and J.J.Rossi

Experiment: Half lives and partial decay schemes for the ^{129}Sn (2.4 min) and ^{129}Sn (6.9 min) and ^{129}Sb isotopes were established.

Method: The ^{235}U thermal fission products were electromagnetically separated and mass 129 collected on a movable tape collector. Half lives determinations were performed by multiscaling the gamma-spectra. Growing-decay curves were taken in order to assign a new half-life no previously reported. Gamma-ray energies and intensities as well as gamma-gamma coincidences were used to construct the decay schemes.

Accuracy: Varying

Completion date: Completed

Publications: Sended for publication to Phys. Rev. C. CNEA NT 5/82 pag b.49, Progress Report 1980-1981, Department of Physics CNEA, Buenos Aires, Argentina.

AUSTRALIA

Laboratory and address: Australian Atomic Energy Commission, Research Establishment, Lucas Heights Research Laboratories, Lucas Heights, NSW 2234, Australia.

Names: J.W. Boldeman, B.J. Allen, A.R. de L. Musgrove, R.L. Walsh.

Facilities: 3 MeV Van de Graaff accelerator, HIFAR and Moata reactors.

1. Experiment: Collaborative measurements with ORNL of neutron capture cross sections in the fission product mass region.

   Measurements of: $^{86,88}Sr$, ^{89}Y, $^{90-92,94}Zr$, $^{95-98}Mo$, $^{104-106,108,110}Pd$, $^{110,114}Cd$, $^{134,138}Ba$, ^{139}La, ^{140}Ce, ^{141}Pr, $^{142,146,148}Nd$

Method: C_6F_6 detector at 40 m flight path at ORELA; ^6Li monitor

Accuracy: 10-20%

Publications:

"Recent Measurements of Neutron Capture Cross Sections in the Fission Product Region".
A.R. de L. Musgrove, B.J. Allen, J.W. Boldeman, R.L. Macklin[(a)].
Proc. Int. Conf. Neutron Physics and Nuclear Data for Reactors and Other Applied Purposes, Harwell, 1978, OECD-NEA proceedings, p. 449, and references therein.

"Resonance Neutron Capture in ^{138}Ba and ^{140}Ce and the Prompt Neutron Correction to γ-ray Detectors".
A.R. de L. Musgrove, B.J. Allen, R.L. Macklin.[(a)]
Aust.J.Phys. 32 (1979) 213.

"KeV Neutron Capture in ^{141}Pr
R.B. Taylor[(b)], B.J. Allen, A.R. de L. Musgrove, R.L. Macklin[(a)].
Aust.J.Phys. 32 (1979) 551.

"Non Statistical Neutron Capture Mechanisms in ^{139}La and ^{141}Pr".
B.J. Allen and A.R. de L. Musgrove.
"Neutron Capture Gamma Ray Spectroscopy (1979), Ed. R.E. Chrien & W.R. Kane, Plenum, N.Y. p. 538.

"Resonance Neutron Capture in $^{86,87}Sr$".
G.C. Hicks[(b)], B.J. Allen, A.R. de L. Musgrove, R.L. Macklin[(a)].
Aust.J.Phys.(1982) in press.

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2. Experiment: Collaborative Measurements with C.B.N.M. of High Resolution Neutron Capture Cross Sections.

Method: C_6D_6, C_6F_6 detector at 30,60 m flight path at GELINA.

Publications:

"Failure of Valence Neutron Capture in ^{96}Zr".
A. Brusegan[(c)], F. Corvi[(c)], G. Rohr[(c)], B.J. Allen.
Fourth Int.Symp. on Neutron Capture Gamma-Ray Spectroscopy and Related Topics (1981), Grenoble Ed.T. Von Egidy and F. Gonnenwein - Adam Hilger.

AUSTRALIA

(cont'd)

	Publications (cont.):	"Search for Valence Effects in p-Wave Capture in ^{88}Sr". B.J. Allen, R. Shelley[c], T. van der Veen[c], A. Brusegan[c], G. Vanpraet[d] - ibid.
3.	Experiment:	Measurement of fast neutron capture γ-ray spectra.
	Method:	NaF detector and pulsed Van de Graaff accelerator.
	Publications:	"Fast Neutron Capture γ-Ray Spectra in ^{88}Sr. B.J. Allen and F.Z. Company[e]. Fourth Int.Symp. on Neutron Capture Gamma-ray Spectroscopy and Related Topics (1981), Grenoble. Ed. T. von Egidy and F. Gonnenwein - Adam Hilger. "Average Neutron Capture γ-ray Spectra in ^{139}La and ^{141}Pr". B.J. Allen and F.Z. Company[e], ibid.
4.	Experiment:	Relative yields of stable tellurium isotopes in neutron induced fission. Measurements of ^{233}U, ^{235}U.
	Method:	Mass spectrometer; reactor HIFAR.
	Accuracy:	1-5% (relative).
	Completion date:	1982
	Publication:	J.R. de Laeter[f], K.J.R. Rosman[f] and J.W. Boldeman, submitted to Aust.J.Phys., (1982).
5.	Experiment:	Mass yields in neutron fission of ^{230}Th.
	Method:	3 MeV Van de Graaff accelerator; surface barrier detectors.
	Completion date:	December 1982.
	Publication:	J.W. Boldeman and R.L. Walsh, 9th Aust.Inst.Nucl.Science and Eng.Conf., Melbourne, February 1982.

AUSTRALIA

(cont'd)

6. Experiment: Mass yields and kinetic energies for spontaneous fission and thermal neutron fission of plutonium isotopes (in collaboration with J. Trochon et al., Bruyères-le-Châtel). Measurements of: $^{238-244}$Pu.

Method: Surface barrier detectors.

Completion date: March 1983.

Publication: H. Abou Yehia[g], J.W. Boldeman, Y. Pranal[g], and J. Trochon[g]. 4th Aust.Inst.Physics Congress, Melbourne, 1980.

(a) Oak Ridge National Laboratory, Oak Ridge, Tennessee, U.S.A.

(b) James Cook University, Queensland, Australia

(c) Central Bureau for Nuclear Measurements, Geel, Belgium

(d) Rijksuniversitair Centrum, Antwerp, Belgium

(e) University of Wollongong, NSW, Australia

(f) Western Australian Institute of Technology, South Bentley, W.A.

(g) Bruyères-le-Châtel, France.

BELGIUM

Laboratory and address :

Nuclear Physics Laboratory
Proeftuinstraat 42
B-9000 Gent, Belgium

Names : H.Thierens, A.De Clercq, E.Jacobs, D.De Frenne, P.D'hondt, P.De Gelder and A.J.Deruytter.

Facilities : Linear Electron Accelerator, Gent
Reactor BR1, SCK/CEN Mol

Experiment : Kinetic energy and fragment mass distributions for ^{240}Pu s.f., $^{239}Pu(n_{th},f)$ and $^{240}Pu(\gamma,f)$, and for ^{244}Pu s.f., $^{244}Pu(\gamma,f)$ and $^{241}Pu(n_{th},f)$.

Method : Measured : photofission yields, fragment kinetic energies ; deduced : $\sigma(\gamma,f)$, kinetic energy- and provisional mass distributions with changing excitation energy of the compound system.

Completion date : $^{239,240}Pu$: November 1980
$^{241,244}Pu$: probably September 1982

Publications :
- H.Thierens, A.De Clercq, E.Jacobs, D.De Frenne, P.D'hondt, P.De Gelder and A.J.Deruytter, Phys.Rev. C23, 2104 (1981)
- H.Thierens et al, to be published in Phys.Rev.C.

BELGIUM
(cont'd)

Laboratory and adress : - Nuclear Physics Laboratory,
Proeftuinstraat 42
B-9000 Gent, Belgium
- Physikalische Chemie, Philipps-Universität
D-3550 Marburg, W-Germany[a)]

Names : D.De Frenne, H.Thierens, B.Proot, E.Jacobs, P.De Gelder, A.De Clercq and W.Westmeier[a)].

Facilities : Linear Electron Accelerator, Gent.

Experiment : Charge and isotopic distribution, isomeric ratios and initial fragment spins for the photofission of ^{235}U and ^{238}U.

Method : Measured : fission product γ-ray spectra ; deduced : fractional independent and cumulative yields.

Completion date : beginning 1983.

Publications :
- H.Thierens, B.Proot, D.De Frenne and E.Jacobs, Phys.Rev. C25, (1982) 1546
- D.De Frenne, H.Thierens, B.Proot, E.Jacobs, P.De Gelder, A.De Clercq, W.Westmeier, Phys.Rev.C, to be published.

BELGIUM

Laboratory and adress	:	Nuclear Physics Laboratory, Proeftuinstraat 86, B-9000 GENT, Belgium SCK/CEN, B-2400 MOL, Belgium Institut de Physique Nucléaire, 69622 VILLEURBANNE, France Institut Laue-Langevin, BPN..156X, 38042 GRENOBLE, France
Names	:	C. Wagemans, E. Allaert, P. D'Hondt, A. Emsallem, R. Brissot
Facilities	:	High Flux Reactor, Institut Laue-Langevin, GRENOBLE
Experiments	:	Thermal neutron induced (n,α) reactions on fission products.
Method	:	Charged particle detection with surface barrier detectors
Completion date	:	Systematic study in progress
Publications	:	P. D'Hondt et al., Proc. Int. Conf. on Nuclear Data for Science and Technology, Antwerp 1982

BELGIUM

Laboratory and adress :	Nuclear Physics Laboratory, Proeftuinstraat 86, B-9000 GENT, Belgium SCK/CEN, B-2400 MOL, Belgium Institut Laue-Langevin, B.P. N. 156X GRENOBLE, France
Names :	P. D' Hondt, C. Wagemans, A. De Clercq, E. Allaert, R. Brissot
Facilities :	High Flux Reactor, Institut Laue Langevin, GRENOBLE
Experiments :	Absolute yields and energy distributions of the charged light particles emitted during the thermal neutron induced fission of ^{233}U, ^{235}U, ^{237}Np, ^{239}Pu and ^{241}Am
Method :	The charged particles are identified with surface barrier (ΔE-E) telescope detectors
Completion date :	^{235}U completed; other isotopes in progress
Publications :	1) C. Wagemans et al., Report BLG 539 (1980) 2) P. D'Hondt et al., Nucl. Phys. A 346 (1980) 461 3) C. Wagemans et al., Nucl. Phys. A 369 (1981) 1

E.E.C. BELGIUM

Laboratory and adress	:	CEC - JRC, Central Bureau for Nuclear Measurements, B-2440 GEEL, Belgium SCK/CEN, B-2400 MOL, Belgium
Names	:	C. Wagemans, E. Allaert, G. Wegener-Penning, A.J. Deruytter
Facilities	:	Neutron time-of-flight spectrometer at the 150 MeV Linac
Experiments	:	Fission fragments kinetic energy and mass distribution for ^{241}Pu (n_{th},f), ^{242}Pu (s.f.) and ^{244}Pu (s.f.)
Method	:	Coïncident fission fragments detected with surface barrier detectors. Deduced fragment mass and energy distributions
Publications	:	E. Allaert et al., Nucl. Phys. A 380 (1982) 61

E.E.C. Belgium

Laboratory and address	:	JRC, CBNM, Geel, Belgium *Rijksuniversitair Centrum, Antwerpen, Belgium +AAEC, Lucas Heights, Australia
Names	:	B.J. Allen+, C. Bastian, A. Brusegan, E. Cornelis*, F. Corvi, G. Rohr, R. Shelley, T. van der Veen, G. Vanpraet*
Facilities	:	Neutron time-of-flight spectrometer at the 150 MeV Linac (pulse width : 4nsec)
Experiments	:	Neutron capture cross sections for $^{104, 105, 106, 108, 110}Pd$ and ^{149}Sm up to 500 keV Neutron capture : Resonance parameters for ^{88}Sr up to 300 keV
Methods	:	Capture detectors : C_6D_6-, C_6F_6- detectors using Maier-Leibnitz method Neutron flux detectors : ^{6}Li-glass and ^{10}B-slab
Accuracy	:	5 - 10 % in the cross section
Completion date	:	Cross section for Pd isotopes end of 1982
Publication	:	Failure of valence-neutron capture in ^{96}Zr. A. Brusegan, F. Corvi, G. Rohr and B.J. Allen Neutron Capture Gamma-Ray Spectroscopy and Related Topics, Grenoble (1981), p. 406 Search of valence effects in p-wave capture in ^{88}Sr B.J. Allen, R. Shelley, T. van der Veen, A. Brusegan and G. Vanpraet ibid., p. 404 Average capture cross section of the fission product nuclei ^{105}Pd and ^{108}Pd G. Rohr, C. Bastian, E. Cornelis, R. Shelley, T. van der Veen and G. Vanpraet Specialist's Meeting on Fast-Neutron Capture Cross Sections, Argonne, 1982

E.E.C. BELGIUM

Laboratory and address	:	CEC-JRC, Central Bureau for Nuclear Measurements, Geel, Belgium
Names	:	R. Vaninbroukx, G. Grosse, W. Zehner
Facilities	:	X-ray and γ-ray detectors : NaI(Tl), solid state detectors
Experiments	:	Determination of half lives of ^{103}Ru, ^{103m}Rh ...
Methods	:	Remeasurement at regular intervals, over a period of 2 to 3 half lives, of sources prepared from materials of different origin; determination of the radionuclidic purity of the materials used; calculation of the half lives by least-square fittings.
Accuracies	:	Accuracies corresponding to a 1 σ confidence level and taking into account random and systematic uncertainties: ^{103}Ru: $\pm$ 0.05 %; ^{103m}Rh: $\pm$ 0.04 %
Publication	:	R. Vaninbroukx, G. Grosse and W. Zehner, Int. J. Appl. Radiat. Isot. 32, 589 (1981)

E.E.C. BELGIUM

(cont'd)

Laboratory and address	: CEC-JRC, Central Bureau for Nuclear Measurements, Geel, Belgium
Names	: R. Vaninbroukx, W. Zehner
Facilities	: 4 π Liquid scintillation counting device; calibrated Si(Li) photon detectors
Experiments	: Determination of the KX-ray emission probability in the decay of ^{103m}Rh
Methods	: Separation of the ^{103m}Rh from ^{103}Pd samples by anion exchange; determination of the ^{103m}Rh disintegration rates by liquid scintillation counting techniques; determination of the remaining ^{103}Pd in the ^{103m}Rh samples; determination of the KX-ray emission rates using calibrated Si(Li) detectors
Accuracies	: Accuracy corresponding to a 1 σ confidence level and taking into account random and systematic uncertainties: $\pm$ 1.5 %
Publication	: R. Vaninbroukx and W. Zehner, Int. J. Appl. Radiat. Isot. 32, 850 (1981)

BRASIL

Laboratory and address:	Instituto de Engenharia Nuclear Comissão Nacional de Energia Nuclear C.P. 2186 20001 Rio de Janeiro, Brasil.
Names:	A.V. Bellido, I.G. Nícoli
Facilities:	Argonaut Reactor
Experiment:	Measurement of fission product yields for ^{238}U fission induced by fission spectrum neutrons.
Method:	Separation of the irradiated samples in lanthanide and non-lanthanide fractions. Identification and activity measurements of the fission products by γ- ray spectrometry. Calculation of cumulative yields by substraction the ^{235}U fission contribution and relation of the saturation activities for each nuclide, in depleted and natural uranium, with the activities of reference nuclides. (Yields of reference nuclides: $^{142}La = 4.95$ and $^{92}Sr = 4.10$).
Accuracy:	Better than 10%
Completion date:	1983

BULGARIA

Laboratory and address : University of Sofia, Faculty of Physics, Department of Atomic Physics, 1126 Sofia, Bulgaria

1. Names : E. Dobreva, N. Nenoff
M. Iovtshev (Institute for Nuclear Research and Nuclear Energy, Sofia)

Facility : Experimental reactor of the Institute for Nuclear Research and Nuclear Energy

Experiment : Measured yields of ^{131}I, ^{132}I, ^{133}I and ^{134}I for the epicadmium reactor neutron induced fission of ^{238}U. Deduced fractional independent yields for ^{132}I, ^{133}I and ^{134}I; most probable charge for the isobaric chains 132, 133 and 134; yields of precursor nuclides and chain yields for mass 131, 132, 133 and 134 relative to the cumulative yield of ^{135}I.

Method : Radiochemical separation of I, Ge(Li) γ-ray counting. Five independent runs with equal irradiation and different separation time.

Accuracy : Between 5 and 10 % ; 28 % for the lowest yield isotope (^{132}I).

Completion date : November 1979

BULGARIA

(cont'd)

Publications : 1. E. Dobreva, V. Gadjokov, M. Iovtshev, N. Nenoff. Annu. Univ. Sofia 70-71 (1979/80), in press.

2. E. Dobreva, N. Nenoff. Radiochem. Radioanal. Letters (submitted).

2. Names: N. Nenoff et al*)

Experiment: Determination of 14 MeV neutron reaction cross sections for some rare earth isotopes.

Method: Activation technique

Completion date: In progress, only preliminary data obtained.

*) Editor's note: preliminary information extracted from a letter by N. Nenoff. A full contribution on this work will be included in next year's issue.

CANADA

Laboratory and address:	Chalk River Nuclear Laboratories Chalk River, Ontario Canada KOJ 1J0
Names:	Janet S. Merritt, Anne R. Rutledge and Lyall V. Smith
Facilities:	1) Ge(Li) spectrometer 2) $4\pi\beta$ counter
Experiment:	Measurement of the probability for 909-keV γ-ray emission following the decay of ^{89}Sr.
Method:	A Ge(Li) γ-ray spectrometer was used to determine the 909.2 keV emission rate. The spectrometer was efficiency calibrated and a value for the photo-peak efficiency for the 909.2 keV γ-ray deduced. The activity of the ^{89}Sr was determined by $4\pi\beta$ counting. The ratio of γ-ray emission rate to activity for unit sample size gives P_γ directly.
Accuracy:	±0.8%
Completion date:	April, 1981
Discrepancies to other reported data:	Our result is about a factor of ten higher than values given in recent compilations, where unfortunately a value with a misplaced decimal point was adopted.
Publication:	Measurement of the Probability for 909-keV γ-ray Emission Following the decay of ^{89}Sr. Janet S. Merritt, Anne R. Rutledge and Lyall V. Smith, Int. J. Appl. Radiat. Isot. Vol. 33, pp. 77-78, 1982.

CANADA
(cont'd)

Laboratory and address:	Chalk River Nuclear Laboratories Chalk River, Ontario Canada KOJ 1J0
Names:	A.R. Rutledge, L.V. Smith and J.S. Merritt
Facilities:	1) $4\pi\gamma$ ionization chamber 2) 4π gas flow proportional counter 3) $4\pi\beta$-γ coincidence system 4) scintillation spectrometer 5) Ge(Li) detector 6) Radioisotope standardization laboratory
Experiment:	Half-life values for ^{82}Br, ^{95}Nb, $^{99}Tc^m$ ^{109}Pd, $^{115}In^m$, ^{133}Xe, ^{134}Cs, $^{134}Cs^m$, $^{137}Ba^m$, ^{137}Cs, ^{141}Ce and ^{152}Eu. Gamma-ray emission probabilities for ^{85}Kr, $^{99}Tc^m$, $^{115}In^m$, ^{137}Cs and ^{141}Ce.
Method:	$4\pi\gamma$ ionization chamber and 4π gas flow proportional counter used for half-lives; $4\pi\gamma$ ionization chamber, $4\pi\beta$-γ coincidence system, and scintillation spectrometer used for γ-ray emission probabilities.
Accuracy:	$T_{\frac{1}{2}}$; ± 1.4% for ^{137}Cs, <± 0.22% for $^{115}In^m$ and ^{152}Eu, ± 0.02-0.09% for remainder. P_γ; ± 6.5% for ^{85}Kr; 0.2-0.9% for remainder.
Completion date:	Results published March, 1980. Half-life measurements on ^{137}Cs are preliminary and continuing.
Discrepancies to other data:	1) ^{137}Cs half-life 2.6% shorter. 2) ^{85}Kr P_γ 6-7% smaller.
Publication:	Decay Data for Radionuclides used for the Calibration of x- and γ-ray Spectrometers. A.R. Rutledge, L.V. Smith and J.S. Merritt, Atomic Energy of Canada Limited, Report AECL-6692, 1980.

CANADA

Laboratory and address:	Nuclear Research Centre The University of Alberta Edmonton, Alberta Canada T6G 2N5
Names:	S.T. Lam, L.L. Yu, H.W. Fielding, W.K. Dawson G.C. Neilson and J.T. Sample
Facilities:	Subnano-second pulsed beam derived from 7 MV CN van de Graaff accelerator and Mobley magnet. Monoenergetic neutron beam obtained from $^3H(p,n)^3He$ and $^3H(d,n)^4He$ reactions using liquid nitrogen cooled tritium gas cell.
Experiment:	Determination of fission-fragment mass distribution and fission-fragment kinetic energy from fast neutron induced fission of ^{238}U and ^{232}Th. E_n = 2.0 - 5.2 MeV in steps of about 0.5 MeV for ^{238}U fission. E_n = 1.6, 3.1 and 5.2 MeV for ^{232}Th fission. Comparison of fission-fragment mass distribution with statistical model calculation. Fission barriers and shell energies deduced.
Method:	Fission fragment detected by Ortec surface barrier heavy-ion detector. Time-of-flight technique employed to measure fragment flight time. Fission-fragment mass distribution and correlation of fragment kinetic energy versus fragment mass derived from data.
Accuracy:	Fragment mass resolution about 5 u. Fragment energy resolution about 2 MeV. A total of about 5000 fission events collected for each neutron energy.
Completion date:	^{238}U data completed and published. Analysis of ^{232}Th data and Statistical model calculation completed.
Publication:	"Fast Neutron Induced Fission of ^{238}U" S.T. Lam, L.L. Yu, H.W. Fielding, W.K. Dawson G.C. Neilson and J.T. Sample. Phys. Rev. C22, 2485 (1980). Results for ^{232}Th in Bull. Am. Phys. Soc. 26 (1981) 1118.

CANADA

Laboratory and address:	University of Toronto Erindale College 3359 Mississauga Road North Mississauga, Ontario Canada L5L 1C6
Names:	B. Singh†, D. Viggars†, H. W. Taylor († - University of Kuwait)
Facilities:	14 MeV neutron generator producing ∿ 2 × 10^{10} n/s through the d,T reaction.
Experiment:	Study of the decay of 91 m ^{78}As.
Method:	Gamma radiations studied with Ge spectrometers, γ-γ coincidence methods.
Accuracy:	γ-ray energy measurements to ≤0.6 keV energy levels in ^{78}Se to ≤0.22 keV.
Completion date:	January 1982.

Discrepancies to other reported data:

i) energy and intensity determinations have been improved

ii) new transitions with energies of 351.1, 497.0, 637.1, 756.9, 903.6, 988.2, 1018.7, 1169.5 and 2758.8 keV have been observed.

iii) coincidence measurements have produced some revisions of decay scheme.

Publications: B. Singh, D.A. Viggars and H.W. Taylor
Spectroscopy of gamma rays from ^{78}As decay
Phys. Rev. C April 1982

CHILE

Laboratory and address:	Chilean Nuclear Energy Commission La Reina Nuclear Research Reactor Casilla 188-D, Santiago - Chile
Facilities:	Research Reactor, Activation Analysis Systems, Calorimetric Lab.
Experiment:	Precise measurement of the decay heat following irradiation of various uranium samples with slow neutrons. This work is scheduled to begin in September 1982.
Method:	Absolute adiabatic calorimetry. The aim of this work is to check the existing data on uranium decay heat after various irradiation periods. The results will be used to determine the absolute burn-up of the fuel discharged from the research reactors.
Completion date:	experimental part: December 1983

Czechoslovakia

Laboratory and Address:	Institute of Nuclear Physics, Czechoslovak Academy of Sciences, 250 68 Řež Czechoslovakia x) Nuclear Centre, Faculty of Mathematics and Physics, Charles University, Prague, Povltavská 1, 180 00 Praha 8-Pelc-Tyrolka, Czechoslovakia
Names:	R. Bayer, Z. Dlouhý, J. Švanda, x) I.Wilhelm,
Facilities:	1. 6 MW - research reactor 2. Self-fission source of 252 Cf
Experiment:	Light particles emission from heavy nuclei fission
Method:	A semiconductor ΔE-E detector telescope and ΔE- ΔE - E ionisation chamber are used for particle identification
Results:	The yields and their energy spectra of light particles from the self-fission of 252 Cf have been measured. The yields of ^{6}He, ^{8}He, Li, ^{6}Li, 7Li, ^{8}Li, ^{9}Li, Be relative to emission of 100 alpha particles and their most probable energies were determined.
Accuracy:	The accuracy of yield determination was about 5 - 25 %.
Publications:	R. Bayer, Z. Dlouhý, J. Švanda, I.Wilhelm Investigation of light particle yields from ^{252}Cf source. All Union Conf. on Neutron Physics, Kiev 1980, Part 3, 20. R. Bayer, Z. Dlouhý, J. Svanda A Multiparameter System for Heavy Nuclei Fission Study, Czech. J. Phys. B 31 (1981) 1273

Arab Republic of Egypt

Laboratory and address: Reactor and Neutron Physics Dept., Nuclear Research Centre, Atomic Energy Establishment, Cairo, Egypt.

Facilities: a) Two time-of-flight spectrometers installed infront of two of the ET-RR-1 reactor horizontal channels. One of them has a mechanical chopper with its rotor from pertinax 160 mm in diameter, having straight slits 1 x 25 mm^2, while the flight path is 8.1 m. The second spectrometer has a rotor of the same dimensions only with a cigar-shape slit 3 x 25 mm^2, while the flight path is 4.2 m.

b) Neutron diffraction spectrometer with Zn single crystal cut along the (111) plane, installed infront of one of the ET-RR-1 reactor horizontal channels.

(1) Names: M.Adib, R.M.A.Maayouf, A.Abdel-Kawy, A. Ashry and I.Hamouda.

Experiment: Measurement of the total neutron cross-section of Eu^{151}, Eu^{153} and Eu below 1 eV.

Method: Transmission method.

Accuracy: Varying between 0.5% - 5% at energies, 1 - 0.002 eV respectively.

Completion date: October 1980.

Discrepancies to other reported data:

The present set of data is the first complete measurements, carried out for each isotope separately.

Publication: The data are published as IAEA Report-INDC (EGY) -1/L, Dec. 1980.

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Arab Republic of Egypt
(cont'd)

(2) **Names:**	**M.Adib, A.Abdel-Kawy, R.M.A.Maayouf, M.Mostafa, M.Fayek and I.Hamouda.**
Experiment:	Measurements of the total neutron cross-section of Nb, at different temperatures for neutrons with energies below 1 eV.
Method:	Transmission method.
Accuracy:	Varying from 0.5% - 5% respectively for neutron energies 2 eV-0.0023 eV.
Completion date:	March 1981.
Publication:	Published as INDC(EGY)-2 (Sept. 1981)

FRANCE

Laboratory : *Service RADIOCHIMIE ET PHENOMENOLOGIE*
Centre d'Etudes de BRUYERES-LE-CHATEL
B.P. n° 561 - 92542 MONTROUGE CEDEX - FRANCE.

Names : *J. LAUREC - A. ADAM.*

Facilities : *PROSPERO Critical assembly and LANCELOT 14 Mev neutrons generator (S.E.C.R./C.E. VALDUC)*
Radiochimical Laboratory
Calibrated Ge-Li spectrometers.

Experiments : *Determination of cumulative yields of some fission products (^{95}Zr, ^{97}Zr, ^{99}Mo, ^{103}Ru, ^{105}Rh, ^{127}Sb, ^{131}I, ^{132}Te, ^{140}Ba, ^{141}Ce, ^{143}Ce, ^{144}Ce, ^{147}Nd) for ^{233}U, ^{235}U, ^{238}U and ^{239}Pu, with fission spectrum and 14,7 Mev neutrons.*

Method : *The fission number is measured by a fission chamber. The fission products activities of fissile target nuclides are determined by gamma direct spectrometry measurements with calibrated Ge-Li spectrometers. The targets and chamber deposits masses are determined by alpha and mass spectrometries.*

Accuracy : *3 to 5 % ; the branching ratio error is not included ; this last error is variable from one isotope to the other (1 % to 5 %).*

Completion : Work completed

Publication : C.E.A. report R-5147
J. LAUREC, A. ADAM, T. DE BRUYNE

FRANCE

(update of issue 6)

Laboratory and address : Département de Recherche Fondamentale
Laboratoire de Chimie Physique Nucléaire
Centre d'Etudes Nucléaires de Grenoble
85 X - 38041 GRENOBLE CEDEX - France.

Names : J. BLACHOT, J. CRANÇON, Ch. HAMELIN, G. LHOSPICE

Facilities : Melusine reactor (thermal neutron and caramel system for fast neutrons) 3 MeV neutrons generator and high flux reactor of I.L.L.

Experiment : The element yields of Bromine, Krypton, Rubidium, Tellurium, Iodine, Xenon, Caesium, have been measured for :

$^{235}U(n_{th},f)$, $^{235}U(n_f,f)$, $^{235}(n_{3MeV},f)$, $^{232}Th(3MeV,f)$
$^{238}U(n_{3MeV},f)$, $^{*232}U(n_{th},f)$, $^{*229}Th(n_{th},f)$

Values for the odd even effects in Z for all these systems has been deduced.

Method : Direct growth and decay activities are measured with a Ge/Li detector and recorder in a multispectrum mode by a 4K multichannel analyser.

Accuracy : The average relative uncertainty of our measurements is between 5 and 10%.

Completion date: ^{235}U, ^{238}U, ^{232}Th during 1980 and 1981,
^{229}Th and ^{232}U in progress,
^{238}Pu will be started end of 1982.

Publication : International Symposium on Physics and Chemistry of Fission - 14/18 May 1979 - Jülich (**IAEA-SM/241 – F29**)

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*Collaboration with CSTN, Alger

FRANCE

Laboratory and address	:	Laboratoire de Biophysique, U.E.R.D.M., Université de Nice, 28, avenue Valrose - 06034 NICE CEDEX, F.
Name	:	G. MALLET
Facilities	:	This work was performed in the "Laboratoire de Chimie Physique Atomique et Structurale" of the Nice University, Parc Valrose.
Experiment	:	Study of the decay of $^{110}Ag^{m+g}$ by application of the techniques of sum-peak and coincidence, γ-γ coincidence and sum-coincidence.
Methods	:	1. Very great improvements in the determination of the energy levels of radioisotopes by the sum-peak technique plus coincidence counting have been achieved by the utilisation of two Ge(Li) detector arrangements. The spectrometer performances and the validity of the method for the ray-spectrum interpretation and for the shape of the continuum was tested for the decay of $^{110}Ag^{m+g}$ 1,2). 2. Sum-coincidence (Hoogenboom) and γ-γ coincidence spectrometers with Ge(Li) detectors have been used. Their utilisation allowed to show up evidence of the cascade 387.1-997.2 keV and to determine the position of 13 weak transitions in the $^{110}Ag^{m+g}$ decay scheme: 133.4, 365.4, 626.1, 630.6, 997.2, 1085.5, 1117.5, 1251.0, 1300.1, 1334.4, 1421.1, 1593.0 and 1903.4 keV. 3. The γ-ray energy and intensity measurements have been done using 5 semi-conductor detectors of volumes between 100 and 12 cm3.
Accuracy	:	1. The full energy peak efficiency has been determined with an uncertainty of less than 3% by means of our sum-peak and coincidence spectrometer provided with an interpretation method for the sum-peaks, derived from Wapstra's method 5). 2 + 3. γ-ray energy measurements to 0.1 keV. γ-ray intensity measurements to <10%.
Completion date	:	in progress.

FRANCE
(cont'd)

Discrepancies to other reported data :

1. Energy level determination has been improved.

2. Levels at 2078.8, 2250.7, 2287.7, 2433.1, 2539.6, 2659.9, 2706, 2793.4, 2842.5 and 2876.8 keV are definitely confirmed by these techniques. Moreover the existence of a new level at 2356.2 keV is proposed. The known gamma-rays of 120.3, 341.4 and 356.4 keV have been interpreted as well as four new transitions of about 648, 714.9, 1465.6 and 1698.5 keV.

3. Apart from confirming the γ-rays of 264.4, 341.4, 409.6, 572.7, 603.1, 603.6, 774.8, 1630.0 and 2004.6 keV observed by Meyer [6] but refuted by Verma et al. [7], our measurements give evidence for eight new γ-rays at 648.2, 666.1, 714.9, 845.8, 927.6, 1050.1, 1465.6 and 1698.5 keV.

Publications and references :

1) G. MALLET, Thèse, Nice (1979).

2) G. MALLET et M.S. PRAVIKOFF, Nucl. Instr. and Meth., 184 (1981) 469-475.

3) G. MALLET, J. DALMASSO, H. MARIA et G. ARDISSON, J. Phys. G : Nucl. Phys. 7 (1981) 1259-1270.

4) G. MALLET, J. Phys. Soc. Jpn. 50 (1981) 384-392.

5) G. MALLET to be published.

6) R.A. MEYER, private communication to Nucl. Data Sheets, 22 (1977) 135.

7) H.R. VERMA, A.K. SHARMA, R. KAUR, K.K. SURI and P.N. TREHAN, J. Phys. Soc. Jpn. 47 (1979) 16.

FRANCE

Laboratory and address: Laboratoire de Chimie-Physique et Radiochimie
Faculté des Sciences, 28, avenue Valrose
06034 Nice Cédex, France

1 Names: J. Dalmasso, H. Maria, G. Barci-Funel and G. Ardisson

Experiment: (same as INDC(NDS)-116) Search for low energy γ-quanta in ^{125}Sb-$^{125}Te^m$ equilibrium source decay.

Method: Recent works have been performed concerning β decay of ^{125}Sb (ref 1-4) in view to determinate missing low intensity γ-rays in ^{125}Te levels scheme. Walters and Meyer [3] reported a new 19.88 keV transition. In this study, we reinvestigated the low energy spectrum using a high resolution HPGe detector (145 eV at Fe K_α). Pulses were analysed with a 8192 channels ADC. Several runs were performed with one 6 years old ^{125}Sb-$^{125}Te^m$ source, before and after purification and precipitation as Sb_2S_3 [1].

Measurements: Energy and intensity of ^{125}Sb γ-rays and associated Te X-rays were calculated using standards I.A.E.A. sources of ^{137}Cs, ^{241}Am and ^{133}Ba. Careful examination of Te X-rays region was necessary, because a 20.020 keV photon was due to K_β escape of $K_{\beta'1}$ line. However we analysed a contribution of $(0.023 \pm 0.005)\%$ for a 19.888 keV photon, in good agreement with result of Walters and Meyer[3]. Table summarizes results of energy and intensity in ^{125}Sb-$^{125}Te^m$ equilibrium mixture.

Accuracy: The accuracy (1σ) for energy is within 6 to 20 eV. Absolute intensities of γ- and X-rays range between 4 to 8% .

Discrepancies to other reported data: No evidence for reported 110.9 and 146.08 keV γ-rays[3]. Assuming the experimental value $\alpha_K = 151 \pm 11$ of 109.26 keV M4 transition[5] and 12.01 ± 0.36 for $\alpha_K(35.5)$ (ref6), a contribution of 1.55 e_K for all other transition and $\omega_K = 0.859$ (ref6), we found $I(K_\alpha + K_\beta) = 56.7 \pm 8.5$ % decays. This in good agreement with our experimental value i.e. 53.2 ± 6.4 K X-rays % decays.

Publications: See ref. 1, 4 and to be published

References:

(1) C. Marsol, G. Ardisson, Compt. Rend., 272B(1971)61.
(2) J.B. Gupta, N.C. Singhal and J.H. Hamilton, Z. Phys., 261(1973) 137.
(3) W.B. Walters, R.A. Meyer, Phys. Rev., 14C(1976)1925.
(4) G. Ardisson, K. Abdmeziem, Radiochem. Radioanal. Letters, 29, N°1(1977)1.
(5) S.B. Reddy, K. Sudhakar, K.L. Narasimhan, B.V. Thirumala Rao, V. Lakshminarayana, Indian J. Appl. Phys., 15, N°3 (1977)208.
(6) E. Karttunen, H.U. Freund and R.W. Fink, Nucl. Phys., A131(1969)343.

FRANCE
(cont'd)

Table: Absolute intensities of X-and low energy γ-rays in ^{125}Sb-$^{125}Te^{m}$ equilibrium source decay.

present work Energy		I (% decays)			Walters and Meyer[3] Energy		I (% decays)	
19.888	15	0.023	5		19.88	15	0.02	1
27.213	8	14.5	9	Te $K\alpha_2$				
27.484	6	29.1	15	$K\alpha_1$				
30.985	6	7.82	31	$K\beta'_1$				
31.706	6	1.75	9	$K\beta'_2$				
35.505	6	4.46	18		35.504	15		
61.83		0.001						
109.263	12	0.072	6		109.276	15		
					110.89	15	0.0009	1
116.907	12	0.225	18		116.952	11	0.255	4
					146.08	10	0.00062	4
172.702	20	0.181	15		172.615	15	0.182	3
176.342	10	6.74*	26		176.334	11	6.79	2

*Intensity value of ref. 4 normalised to 29.44 photons of 427.9 keV which corresponds to 100 β decays[3].

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2 Names: H. Maria, J. Dalmasso, C. Ardisson and G. Ardisson

Experiment: Accurate measurement of E1 energy transition in the decay of $^{108}Ag^{m}$ ($T_{1/2}$ = 127 y)

Method: Four independant runs were carried out with a 10 years old $^{108}Ag^{m}$. The only one impurity was ^{109}Cd produced by $^{107}Ag(n,\gamma)^{108}Ag \xrightarrow{\beta^-} {}^{108}Cd(n,\gamma)^{109}Cd$. Measurements were performed with 25mm^2 HPGe detector and a 8192 channels ADC. Calibration was accomplished with ^{133}Ba, ^{241}Am and Pb K_α- X rays originated by ^{207}Bi source.

Accuracy: Energy accuracy is 6 eV at 2σ confidence level.

Discrepancy to other data: Other measurements agree well with our accurate value

present work	E_γ =	79.131	(6) keV
ref.1		79.20	(5) keV
ref.2		79.14	(3) keV
ref.3		79.14	(3) keV

Publication: H. Maria, J. Dalmasso, G. Ardissom, Nucl. Instr. Meth. 195 (1982) 621

References:
(1) W.D. Schmidt-Ott, R.W. Fink, Z. Phys., 254(1972)281.
(2) M. Behar, K.S. Krane, R.M. Steffen, and M.E. Bunker, Nucl. Phys., A201(1973)126.
(3) R.A. Meyer, priv. comm., in Lederer and V.S. Shirley Table of Isotopes (J. Wiley, New-York, 1978) app. 5.

FRANCE

(cont'd,new)

Laboratories and Adresses : Laboratoire de Chimie-Physique et Radiochimie(LCPR) Université de Nice, 06034 Nice Cédex, France
Institut de Recherches sur les Energies Nouvelles(IREN) Faculté des Sciences, BP 322, Abidjan, Côte d'Ivoire

Names : J. Dalmasso, G. Barci, H. Maria, C. Ardisson, B. Weiss, H. Forest, G. Ardisson (LCPR)
A. Hachem (IREN)

Facilities : Ge(Li) detectors, planar HPGe detectors, 4K analysers.

Experiments : Measurements of Absolute K-X Transition Probabilities of Fission Products. These quantities are required for quantitative determination of FP activities in environmental samples by the X-Ray spectrometric method (1,2). Accurate determination of I_γ and E_γ in Fission Radionuclides. Decay Schemes.

Method : Very thin sources of radiochemically separated FP nuclides are measured with calibrated coaxial Ge(Li) detectors and planar HPGe detectors (25 and 200 mm^2). The following nuclides are investigated:
^{77}As, ^{95}Zr, $^{108}Ag^{m+g}$, $^{110}Ag^{m+g}$, ^{106}Ru-^{106}Rh, ^{125}Sb, ^{131}I, ^{132}I, ^{137}Cs, ^{140}Ba, ^{140}La, ^{144}Ce-^{144}Pr.

Accuracy : ΔE_γ between 5 to 100 eV, ΔI_γ between 5 to 15%. ΔI_{KX} between 5 to 15% (including error in branching ratios).

Completion date : Expected mid 83

Discrepancies: The new I_γ and E_γ values found for ^{77}As decay are given with better precision than ref(a). For ^{140}La, our $I_\gamma(487)$ =(45.10± 0.9)% (ref 3) disagree with earlier value of ref (b) i.e. $I_\gamma(487)$= (38.1 ± 0.5) %.

Publications : 1/G. Ardisson,G. Barci,J. Dalmasso,H. Maria."Determination of radionuclides in rain water by X-ray spectrometry", European Conference on Analytical Chemistry,Helsinki,(23-28 august 1981).
2/G. Ardisson"Determination of Fission Nuclides in rainwater by X-Ray spectrometry",Trends in Analytical Chemistry,1982, in press.
3/G. Ardisson"Intensités des γ associés à la décroissance de ^{140}La",Nucl. Instr. Methods,151(1978)505.
4/G. Mallet,J. Dalmasso,H. Maria,G. Ardisson,"Contribution à l'étude des états excités de ^{110}Cd peuplés lors de la désintégration de $^{110}Ag^m$",J. Phys.,G,7 (1981) 1259.
5/H. Maria,J. Dalmasso,G. Ardisson,"Sur l'énergie de la transition E1 de $^{108}Ag^m$",Nucl. Instr. Methods,1982,in press

References : a)G. Ardisson, C. Marsol,"Sur la mise en évidence de faibles branches β dans la désintégration de ^{77}As", Can. J. Phys., 49 (1971) 1731.
b)J.T. Harvey,J.L. Meason,J.C. Hogan and H.L. Wright," Gamma-ray intensities for the radioactive decay of Baryum 140 and Lanthanum 140"Nucl. Sci. Eng.,58 (1975) 431.

GERMANY Fed.Rep.

Laboratory and address:

Institut für Reine und Angewandte Kernphysik der Universität Kiel (IKK),
D-2o54 Geesthacht, Reaktorstation

Names: P. Fischer, U. Harz, H.G. Priesmeyer

Facility:
Fast Chopper Neutron Time-of-Flight spectrometer, 42 m flightpath in front of beam hole of 5MW FRG-1 reactor. 15 ns/m nominal resolution, special equipment for transmission investigations of highly radioactive samples, 11 Li-6 glass detectors, max. rotorspeed 12000 rpm, min. burst width 0.64 µsec, min. time channel width 100 nsec, 2560 time-of-flight channels.

Experiments:
Neutron resonance investigations by transmission measurements between 1 eV and 1.5 keV on separated stable or radioactive isotopes of special interest to reactor physics (especially fission products), gross fission products. Possibility of extending energy range to thermal region using crystal spectrometer or neutron guide tubes.

Completed: Final measurements on two of the five gross-fission product samples show time variations useful for isotopic identifications.

Ongoing: Gross-fission product mixtures, comparative measurements

Planned: Transmission experiments on I 129, Krypton isotopes and gross-fission products; installation of 24 keV Fe-filter.

Method:
Sample in beam, sample out-of-beam transmission measurement, black resonance background determination technique.

Accuracy:
For resonance parameters : about 5 % or better, depending on statistical accuracy of transmission points.

Recent publications:

P. Fischer, U. Harz, H.G. Priesmeyer ATKE 38(1), (1981) 63
Neutron Resonance Parameters of ^{99}Tc in the Energy Range 4.5 to 25 eV.

P. Fischer, U. Harz, H.G. Priesmeyer GKSS 81/E/17
Die Energieeichung des IKK Fast-Choppers mit U 238 Standards - Die Resonanzparameter des Iridiums im Energiebereich bis 1.5 eV.

H.G. Priesmeyer, U. Harz, P. Fischer
Neutron Physics Activities at the FRG-I RESEARCH REACTOR
IAEA-SR-77/67 Seminar on Research Reactor Operation and Use, Jülich 1981.

GERMANY, FED. REP.

LABORATORY: Kernforschungszentrum Karlsruhe
Institut für Angewandte Kernphysik

1. NAMES: H. Beer, F. Käppeler

FACILITIES:
1) pulsed 3 MV Van de Graaff, kinematically collimated neutron beam, 25 keV above the $^{7}Li(p,n)$ reaction threshold
2) Ge(Li) detector (rel. efficiency for ^{60}Co: 7 %, energy resolution at 1.33 MeV: 2 keV)

EXPERIMENT. 30 keV capture cross section of ^{124}Xe, ^{132}Xe, ^{134}Xe, $^{152,154}Sm$, $^{152,158}Gd$ and capture cross section of ^{151}Eu to the 9.3 h isomeric state in ^{152}Eu at 48.5 keV

METHOD: activation technique

ACCURACY: 5-10 %

COMPLETION DATE: Data analysis completed

PUBLICATIONS: H. Beer, F. Fabbri, F. Käppeler, R.-D. Penzhorn, G. Reffo, R.A. Ward
Annual Report on Nuclear Physics Activities 1980-1982, KfK 3280 (Febr. 1982)

2. NAMES: F. Käppeler, G. Walter

FACILITIES: pulsed 3 MV Van de Graaff

EXPERIMENT: Capture and Total Cross Section Measurements on ^{80}Kr and ^{86}Kr Between 4 and 300 keV Neutron Energy

GERMANY, FED. REP.
(cont'd)

METHOD: continuous neutron energy spectrum from $^7Li(p,n)$ reaction;
high pressure gas samples (300 bar in stainless steel spheres of 20 mm diameter and 0.5 mm wall thickness);
capture events detected by 2 C_6D_6-detectors of 1 l volume with pulse height weighting;
neutron energy determination by time-of-flight with a resolution of 1.5 ns/m;
^{197}Au-sample used as a standard.

ACCURACY: Statistical uncertainty typically 5-10% for energy intervals corresponding to the experimental resolution.
Systematic uncertainties between 4 and 10 % dependent on the isotopic composition of the samples.

COMPLETION DATE: summer 1982

DISCREPANCIES TO OTHER REPORTED DATA: No such data available

PUBLICATIONS: Preliminary data are summarized in internal reports.

3. NAMES: K. Wisshak, F. Käppeler

FACILITIES:
1.) pulsed 3 MV Van de Graaff, kinematically collimated neutron beam
2.) Moxon Rae detector with graphite converter

EXPERIMENT: Neutron capture cross section of ^{93}Nb, ^{103}Rh and ^{181}Ta in the energy range 10 - 70 keV

METHOD: Relative measurement,gold standard

ACCURACY: 3-5 %

PUBLICATIONS: Fast Neutron Capture Cross Sections and Related Gamma Ray Spectra of ^{93}Nb, ^{103}Rh and ^{181}Ta
G. Reffo, F. Fabbri, K. Wisshak and F. Käppeler
Nucl. Sci. Eng. 80 (1982) 630

Germany,Fed.Rep.

Laboratory and address	Institut für Radiochemie Technische Universität München 8046 Garching
Names	D.C.Aumann*, D.Weismann, H.Zeising
Facility	Swimming-pool type reactor (FRM)
Experiment	Determination of the independent yields of Rh-102m, Rh-102g and Rh-101g for thermal-neutron-induced fission of U-235
Method	Radiochemical separation and γ-counting
Accuracy	25 - 50%
Completion date	completed
Publication	J. Inorg. Nucl. Chem. 43 (1981) 2223

* Present address: Inst. f. Physikalische Chemie, Abt. Nuklearchemie Univ. Bonn

Germany, Fed. Rep.

(cont'd)

Laboratory and address	Institut für Radiochemie Technische Universität München 8046 Garching
Names	D.C.Aumann*, I.Winkelmann
Facility	14.8-MeV neutron generator
Experiment	Determination of fission yields for fission of Pu-242 induced by 14.8-MeV neutrons
Method	Yields determined (1) by γ-counting of irradiated Pu-242 sample and (2) radiochemically with either γ- or ß-counting. Yields of 65 fission products, representing 43 mass chains, have been determined
Accuracy	Yields determined by γ-counting: 5-10% Yields determined radiochemically: 10-20%
Completion date	completed
Publication	I.Winkelmann, Dissertation, Technische Universität München, 1981 **to be published in J. Inorg. Nucl. Chem.**

* **Present address: Inst. f. Physikalische Chemie, Abt. Nuklearchemie Univ. Bonn**

Germany, Fed. Rep.

Laboratory and Address	Institut für Physikalische Chemie Abt. Nuklearchemie Universität Bonn
Names	D.C. Aumann, L. Friedmann
Facility	Swimming-pool type reactor (FRM)
Experiment	Determination of cumulative yield of $1.6 \cdot 10^7$ y I-129 from thermal-neutron induced fission of U-235
Method	Radiochemical separation of I-129 and determination by neutron activation and measurement of the 12.3 h I-130 produced by the neutron capture reaction
Accuracy	10%
Completion date	completed
Publication	Radiochim. Acta 30 (1982) 19

GERMANY, FED. REP.

Laboratory and adress: II. Physikalisches Institut
Universität Giessen
Arndtstr. 2
D-6300 Giessen, Germany

1. Names: C. Geisse, G. Jung, H. Wollnik (II.Physik Giessen)
F. Blönnigen (II.Physik Giessen/ILL Grenoble)
B. Pfeiffer (ILL Grenoble)

Facilities: On-line mass separator OSTIS installed at the high-flux reactor of ILL, Grenoble

Experiment: Q_{β}-values of neuton-rich fission products

Method: Alkaline fission products of ^{235}U are ionized on the 2000 K hot Rhenium surface of the ion source and separated according to mass. The beta-decay products are selected in energy by a magnetic sector device which is used for pile-up and background reduction. The energy determination is made in an $1000 mm^2 \times 15 mm$ Intrinsic Germanium detector. Taking into account the previously measured response function of the detector, the beta-spectra of $^{88-98}Rb$ and $^{138-146}Cs$ are anlysed with an interactive graphics computer program.

Accuracy: 10-20 keV

Completion date: work is in progress

Publications: H. Wollnik et al.: Atomic Masses and Fundamental Constants 6 (1980)
F.Blönnigen et al.:Nucl.Instr. and Meth. 178 (1980) 357-361
Annex to the Annual Report ILL 1979-1981

GERMANY, FED. REP.

(cont'd)

2. Names: K. Becker, G. Jung, E. Koglin, J. Münzel, U. Stöhlker, H. Wollnik (II.Physik Giessen) E. Monnand, B. Pfeiffer (ILL Grenoble)

Experiment: Half-lives and level schemes of neutron-rich fission products

Method: Alkaline and alkaline earth as well as several rare earth fission products of ^{235}U from the thermal ion source (2000 K) and a high temperature ion source (2700 K) are studied in different experiments:
Gamma-multispectra and multiscaling methods for the half-live determination of extremly neutron-rich fission fragments;
single gamma-ray and conversion electron spektra, prompt and delayed gamma-gamma and beta-gamma coincidences and gamma-gamma angular correlation measurements with different Ge(Li)- and Si(Li)-detectors allowed to establish or extend level schemes of numerous isotopes.

Completion date: work is in progress

Publications: E. Koglin et al.: Z. Physik A288 (1978) 319-320
G. Jung et al.: Phys. Rev. C22 (1980) 252-263
J. Münzel et al.: Nucl. Instr. and Meth. 186 (1981) 343-347
B. Pfeiffer et al.: Proc. 4th Int. Conf. on Nuclei far from Stability (1981) CERN 81-09, p. 423 *)

*) Decay of $^{95,97}Rb$, $^{95,97,99}Sr$.

GERMANY, FED. REP.

Laboratory: Institut für Kernchemie
Universität Mainz
D-6500 Mainz, Germany and
Institut Laue-Langevin
38 Grenoble, France

Names: H.O. Denschlag, H. Braun, W. Faubel, H. Faust, W. Pörsch, B. Sohnius

Facilities: LOHENGRIN Mass separator for unslowed fission products at ILL, Grenoble

Experiment: The charge distribution among heavy-mass peak fission products (A=130-147) from $^{235}U(n_{th},f)$ is being measured at various well defined kinetic energies (excitation energies) of the fission fragments

Method: Fission fragments separated according to mass (resolution $\frac{M}{\Delta M}$ = 400) and kinetic energy (resolution 2 MeV) are intercepted on a moving transport tape, transported continuously or discontinuously in front of a Ge(Li) γ-ray detector, and counted via the γ-rays emitted in their β-decay

Accuracy: Varying

Completion: **nearly completed**

Publications: H.O. Denschlag, H. Braun, W. Faubel, G. Fischbach, H. Meixler, G. Paffrath, W. Pörsch, M. Weis, H. Schrader, G. Siegert, J. Blachot, Z.B. Alfassi, H.N. Erten, T. Izak-Biran, T. Tamai, A.C. Wahl, K. Wolfsberg, in Physics and Chemistry of Fission (Proc.Symp. Jülich, 1979), IAEA, Vienna (1980), Vol. II, p. 153-176, and progress reports in Jahresbericht, Institut für Kernchemie, Universität Mainz, and Annex to the Annual Report, Institut Laue-Langevin, Grenoble (1979-1981)

GERMANY, FED. REP.
(cont'd)

Laboratory: Institut für Kernchemie
Universität Mainz
Postfach 3980
D-6500 Mainz, Germany

Facilities: TRIGA Mark II Reactor

1. Names: H. Braun, H.O. Denschlag

Experiment: (same as INDC(NDS)-116)
Yields and decay properties of the fission product chain with mass number A = 133 are being redetermined

Method: Radiochemical and by mass-spectrometry

Completion date: completed

Publications: Jahresbericht 1977 and 1980
Institut für Kernchemie
Universität Mainz

H. Braun, Dissertation, in preparation

2. Names: R. Sehr, H.O. Denschlag

Experiment: (same as INDC(NDS)-116)
Fractional cumulative fission yield of ^{77}Ga shall be redetermined in the fission of ^{235}U by thermal neutrons

Method: Fast radiochemical separation

Accuracy: $\sigma<10\%$

Completion date: partly completed

Publications: R. Sehr, Diplomarbeit Mainz (1980)

R.Sehr, H.O. Denschlag
Jahresbericht 1980, Institut für Kernchemie, Universität Mainz

GERMANY, Fed. Rep.

(cont'd)

3. Names: B. Sohnius, H.O. Denschlag

Experiment: Gamma-ray line intensities of short-lived nuclides in chains 142,143,144,146, and 147 are being redetermined relative to long-lived descendents

Method: Fast radiochemical and mass separations

Accuracy: Generally ±10%

Completion date: 1982/83

Publications: B. Sohnius, W. Pörsch, H.O. Denschlag in Jahresbericht 1980 and B. Sohnius, M. Brügger, H.O. Denschlag in Jahresbericht 1981, Institut für Kernchemie, Universität Mainz

GERMANY, FED. REP.

Laboratory: Institut für Kernchemie
Universität Mainz
Postfach 3980
D-6500 Mainz, Germany

1. Names: H. Ohm, A. Schröder, W. Ziegert, K.-L. Kratz (Kernchemie Mainz), B. Pfeiffer, G. Jung (Universität Giessen/ILL Grenoble), C. Ristori, J. Crancon (CEN Grenoble), G. I. Crawford (Univ. of Glasgow)

Facilities: Alkali isotope separator OSTIS installed at the Grenoble high-flux reactor

Experiment: Using different neutron detectors (^{3}He ionization chambers, liquid and glass scintillators), energy spectra of β-delayed neutrons have been measured in coincidence with γ-rays depopulating excited states in the respective neutron final nucleus.
With these data and the information from neutron singles and γ-ray spectra β^--strength functions (S_β) which extend to near Q_β of ten Rb isotopes have been constructed (A = 89-98). As expected from shell model considerations, the experimental strength below about 9 MeV differs considerably from that predicted by the gross theory of β-decay. The particular importance of these investigations lies in the fact that the shape of S_β is decisive not only in predictions of β-decay half-lives and β-delayed neutron emission probabilities, but also for radioactive decay heat analyses.

Completion date: 1982

GERMANY, FED. REP.
(cont'd)

Publications:	K.-L. Kratz, INDC(NDS)-107, p. 103 (1979) K.-L. Kratz et al., CERN 81-09, p. 317 (1981) K.-L. Kratz et al., Phys. Lett. 86B (1979) 21 and 90B (1980) 57 K.-L. Kratz et al., Z. Physik A306 (1982)
2. Names:	H. Gabelmann, H. Ohm, K.-L. Kratz
Facilities:	TRIGA Mark II Reactor
Experiment:	Time-dependent neutron spectra from $^{235}U(n_{th},f)$ corresponding to Keepin's 6 half-life groups
Method:	Spectroscopy using ^{3}He-ionization chambers and 100 µg ^{235}U samples
Accuracy:	Spectrum range from about 10 keV to 3 MeV with 2 keV channel width; energy resolution about 13-35 keV. Corrections for thermal neutrons, detector response and γ-ray pile-up.
Cooperation:	J.G. Owen, D.R. Weaver (Univ. of Birmingham, U.K.)
Completion date:	Probably end of 1982 for $^{235}U(n_{th},f)$. Further measurements with other fissioning nuclides are planned.

GERMANY, FED. REP.

(cont'd)

3. Names: H. Ohm, A. Schröder, W. Ziegert and K.-L. Kratz

Experiment: From high-resolution delayed neutron energy spectra of ^{85}As, $^{87,89-92}$Br, $^{92-98}$Rb, ^{135}Sb, ^{136}Te, ^{137,138}I, $^{141-147}$Cs measured with ^{3}He-ionization chambers (SEFORAD-Applied Radiation Ltd.) deduced average neutron energies ($\bar{E}_n$)

Accuracy: $\Delta\bar{E}_n \simeq 20$ keV for 'soft' spectra
$\Delta\bar{E}_n \leq 75$ keV for 'hard' spectra

Cooperation: G. Rudstam (Studsvik, Sweden), P.L. Reeder (Batelle, Pacific NW, Richland, USA): a) Comparison of neutron spectra from ^{87}Br, $^{93-95}$Rb and ^{143}Cs taken at 3 different laboratories with ^{3}He-spectrometers of different manufacture
b) Comparison of $\bar{E}_n$ for calibration of the SOLAR neutron counting rate ratio system

Publications: Proc. of the Consultants' Meeting on Delayed Neutron Properties, Vienna, March 1979, INDC (NDS)-107

C.E.C. GERMANY, FED. REP.

Commission of the European Communities
Joint Research Centre
Karlsruhe Establishment
European Institute for Transuranium Elements
Postfach 2266
7500 Karlsruhe
Federal Republic of Germany

Names: L. Koch, Kl. Kammerichs, G. Cottone, R. De Meester, J. Heitz,
R. Molinet, C. Rijkeboer; JRC, Karlsruhe
D. Steinert, KfK Karlsruhe

1. MEASUREMENT

Experiment: (Method) Milligram amounts of ^{233}U, ^{235}U, ^{236}U, ^{238}U, ^{237}Np, ^{239}Pu, ^{240}Pu, ^{241}Pu, ^{242}Pu, ^{241}Am have been separately encapsulated and irradiated to about 10^{23}n/cm^2 in RAPSODIE. Fission product abundancies in each of the capsule were analysed by massspectrometric isotope dilution technique. The analysed nuclides correspond to about 70 % of the amount of fission products with A > 120. The cumulative fission yields were obtained by normalisation. Averages for parallel analysed capsules are given and compared with published data if available.

Publication: Cumulative fast reactor fission yields of ^{233}U, ^{235}U, ^{236}U, ^{238}U, ^{237}Np, ^{239}Pu, ^{240}Pu, ^{241}Pu, ^{241}Am

EUR 6738,en

C.E.C. GERMANY, FED. REP.

(cont'd)

Names: A. Cricchio, R. Ernstberger, L. Koch, R. Wellum

2. MEASUREMENT

Experiment: (Method)

The TACO experiment comprised the irradiation of well-characterized quantities of fissile and fission-product nuclides in the Rapsodie reactor. Each nuclide was prepared as an individual solution in nitric acid from which an aliquot was taken, dried on aluminium foil and sealed into stainless-steel containers under vacuum for irradiation.

The irradiation took place during 1971 and 1972 with the samples being exposed to a total fast neutron flux of 6×10^{22} n/cm^2. After cooling the capsules were dissolved and the contents analysed by massspectrometry. For those cases where neutron absorbtion was followed by β,γ decay and for the determination of fission yields, isotope dilution massspectrometry was employed. The following actinides were irradiated: ^{233}U, ^{235}U, ^{236}U, ^{237}Np, ^{238}U, $^{239-242}Pu$, ^{241}Am and ^{243}Am. After subsequent analysis their integral neutron absorbtion, capture and fission cross-sections were calculated. The method of calculation depended in all cases on specifying the concentration of each nuclide relative to the total nuclide content of the capsule. In this way potential losses of material were compensated for. The fission-product nuclides irradiated included ^{95}Mo, ^{97}Mo, ^{98}Mo, $^{100-102}Ru$, ^{104}Ru, ^{106}Pd, ^{108}Pd, ^{110}Pd, ^{125}Te, ^{126}Te, ^{128}Te, ^{133}Cs, ^{141}Pr, ^{143}Nd, ^{144}Nd, ^{146}Nd, ^{148}Nd, ^{147}Sm, ^{149}Sm and ^{139}La.

Integral neutron absorbtion cross-sections have been calculated for the majority of these isotopes.

Publication: to be presented at: International Conference on Nuclear Data, 6 - 10 September 1982, Antwerp, Belgium

HUNGARY

Laboratory and address: Central Research Institute for Physics, H-1525 Budapest 114, P.O.Box 49, Hungary
[x]Institute for Nuclear Sciences, Proeftuinstraat 86 B-9000 Gent, Belgium

Names: A. Simonits, L. Moens[x], F. De Corte[x], A. De Wispelaere[x], J. Hoste[x]

Facilities: WWRS-M /Budapest/ 5 MW light-water moderated reactor and Ge/Li/ spectrometers
"Thetis" /Gent/ 250 kW graphite moderated reactor and Ge/Li/ spectrometers

<u>Experiment:</u> Absolute intensity measurements for the 140.5 keV gamma-ray of ^{99}Mo

Method: A relative method of irradiating a Mo-target with reactor neutrons and repeatedly measuring its $/n,\gamma/$ induced activity relative to the 181.1 keV and 739.5 keV gamma-lines of ^{99}Mo as internal references was used. The weighted average of different runs yielded:

$$\gamma/^{99}Mo,\ 140.5\ keV/ = /5.07 \pm 0.37/\ \%$$

Accuracy: 7.2 % /1 σ/

Completion data: March 1981

Discrepancy to other reported data: Some compilers give no indication of this line, others report intensity values ranging from 1.4 % to 5.7 % /see original publication/

Publications: J. Radioanal. Chem. Vol.67, No.1 /1981/ 61-74

INDIA

Laboratory & Address : Radiochemistry Division
Bhabha Atomic Research Centre
Trombay, Bombay 400 085.

1. Names (same as INDC(NDS)-116) : S.A. Chitambar, S.N. Acharya
H.C. Jain, C.K. Mathews and
M.V. Ramaniah.

Facilities : CH-5 Mass spectrometer with thermoionic source assembly.

Experiment : Determination of fission yield in thermal neutron induced fission of ^{233}U, ^{235}U, ^{239}Pu and ^{241}Pu.

Method : Fission yields in thermal neutron induced fission of ^{233}U, ^{235}U, ^{239}Pu and ^{241}Pu have been determined for about 20 mass nos. in each of the fissioning system by employing mass spectrometric techniques for the determination of relative yields.

Accuracy : About 2-3 percent for asymmetric masses.

Completion date : March 1980.

2. Names (update) : A. Ramaswami, V. Natarajan, B.K. Srivastava and R.H. Iyer

Facilities : 60 c.c. Ge(Li), 4 K Analyser

Experiment : Absolute yields of the fission products in the neutron induced fission of ^{232}Th and ^{233}U

Method : Track etch cum gamma ray spectrometry.
The total no. of fissions are obtained from the track registered in a mica detector while the fission product activity was measured using a pre-calibrated 60 c.c Ge(Li) coupled to a 4096 channel analyser.

Accuracy : ± 5%

Completion date : Completed

Discrepancies to other reported data : In general yield values are higher than the quoted value by Meek and Rider

Publications : A part of this work has been presented in the "Nuclear Physics and Solid State Physics Symposium" held at Madras, December 1979.
Complete work in: J. Inorg. Nucl. Chem. 43(1981)3067

INDIA

(cont'd, same as INDC(NDS)-116)

Laboratory and address	:	Radiochemistry Division, Bhabha Atomic Research Centre, Trombay, Bombay-400 085
1. Names	:	S.S. Rattan, S.P. Dange, T. Datta, S.B. Manohar, P.P. Burte, Satya Prakash and M.V. Ramaniah
Facilities	:	Ge(Li)Detector, Multichannel analyzer and $4\pi\beta$-γ coincidence counter.
Experiment	:	Intercomparison of gamma ray emission-rate measurements by means of Ge spectrometers and ^{152}Eu sources.
Method	:	Preparation of standard ^{152}Eu sources and development of efficiency calibration curve for Ge(Li) detector for the determination of gamma ray emission rates of ^{152}Eu.
Completion date	:	Already completed.
Publications	:	BARC Report No. 1015 (1979).
2. Names	:	S.S. Rattan, A.V.R. Reddy, R.J. Singh, Satya Prakash and M.V. Ramaniah
Facilities	:	1. Ge(Li) detector with 4 K multichannel analyzer 2. Class A Radiochemical Laboratory
Experiment	:	Charge distribution in the thermal neutron induced fission of ^{229}Th. Fractional cumulative yields of ^{135}I ^{140}Ba.
Method	:	Fractional cumulative yields of ^{135}I and ^{140}Ba have been determined by following the growth and decay of the fission products.
Accuracy	:	1 - 2 %.
Completion date	:	December, 1979.
Publication	:	Proc. Nucl. & Radio Chem. Symposium, Waltair, (India), Feb.25-28, 1980.

INDIA

(cont'd, same as INDC(NDS)-116)

3. Names : R.J. Singh, S.S. Rattan, A.V.R. Reddy, C.R. Venkatasubramani, A. Ramaswamy, Satya Prakash and M.V. Ramaniah

Facilities :
1. Ge(Li) detector coupled with 4 K analyzer.
2. Beta proportional counter, Low background proportional counter.
3. Class A Radiochemical Laboratory

Experiment : Mass yield from thermal neutron fission of ^{229}Th.

Method : Fission yields in thermal neutron induced fission of ^{229}Th were determined using comparison method with respect to thermal neutron fission of ^{235}U and using ^{91}Sr as internal standard.

Accuracy : 5 - 10% in the high yield region.
10 - 15% in the low yield region.

Completion date : Completed.

Discrepancies to other reported data : There are several reported data on mass yields of ^{229}Th in thermal neutron induced fission. Symmetric peak has been reported by some authors while others obtained only two asymmetric peaked mass yield distribution. In the present work, existence of small symmetric peak in addition to two prominent asymmetric peak has been established.

INDIA
(cont'd)

4. Names: A. Ramaswami, B.K. Srivastava, K. Raghuraman and R.H. Iyer.

Facilities: 60 c.c Ge(Li), 4 K Analyser.

Experiment: Absolute Yields of the fission products in the thermal neutron induced fission of ^{245}Cm.

Method: Track etch cum gamma ray spectrometry. The total number of fissions are obtained from the fission tracksregistered in a mica detector while the fission product activity was measured using a pre-calibrated 60 c.c. Ge(Li) coupled to a 4096 channel analyser.

Accuracy: ± 5-6 %

Completion date: Completed

Discrepancies to other reported: In good agreement with the recent literature data

Publication: A part of this work has been presented in the "Seminar-cum-Workshop on Geological records and contemporary fluxes of energetic charged particles" held at Ahmedabad, India. Feb. 1981.

A. Ramaswami et al, Radiochim. Acta 30 (1982) 11.

INDIA
(cont'd, new)

Laboratory and Address	:	Radiochemistry Division Bhabha Atomic Research Centre Trombay, Bombay 400 085.
1. Names	:	A. Ramaswami, B.K. Srivastava, S.B. Manohar, Satya Prakash and M.V. Ramaniah.
Facilities	:	60 c.c. Ge(Li) detector, 4 K channel analyser.
Experiment	:	Charge Distribution in the spontaneous fission of ^{252}Cf: Determination of fractional cumulative yields of ^{138}Xe and ^{139}Cs to arrive at charge distribution parameters.
Method	:	Gamma spectrometrically determined fractional cumulative yields of ^{138}Xe and ^{139}Cs in ^{252}Cf. Used radiochemical separation technique for ^{139}Cs.
Accuracy	:	Within 1-3%.
Completion Date	:	Already completed.
Publication	:	Radiochimica Acta 30 (1982) 15
2. Names	:	T. Datta, S.P. Dange, S.K. Das, Satya Prakash and M.V. Ramaniah.
Facilities	:	60 c.c. Ge(Li), 4 K analyser and Radiochemical separation technique.
Experiment	:	Investigation on fission fragment angular momentum in $^{252}Cf(SF)$ system.
Method	:	Radiochemically determined independent isomeric yield ratios for ^{117}Cd and ^{134}I in $^{252}Cf(SF)$ system. Fragment angular momenta were deduced using statistical model formalism.

INDIA
(cont'd, new)

Accuracy : Within 10-15% for yield ratio with uncertainty of 1 h for fragment angular momentum.

Completion Date : Already completed.

Publication : To be communicated to Phys. Rev. C.

3. Names : S.K. Das, T. Datta, S.P. Dange, A.G.C. Nair, Satya Prakash and M.V. Ramaniah.

Facilities : 60 c.c. Ge(Li) detector, 4 K analyser and Radiochemical separation technique.

Experiment : Investigation on fragment angular momenta in ^{252}Cf(SF) system.

Method : Radiochemically determined independent yield ratio for ^{133}Te and ^{134}I in ^{252}Cf(SF). Deduced fragment angular momenta from statistical model formalism.

Accuracy : Within 10-15% for yield ratio. Uncertainty on angular momentum is 1 h.

Completion Date : Already completed.

Publication : Presented in DAE Silver Jubilee Physics Symposium, BARC, December 28, 1981 - January 1, 1982.

4. Names : A.V.R. Reddy, S.B. Manohar, V.S. Mallapurkar, Satya Prakash and M.V. Ramaniah.

Facilities : 60 c.c. Ge(Li) detector, 4 K analyser and Radiochemical separation technique.

Experiment : Isotopic yield distribution of Iodine in the spontaneous fission of ^{252}Cf: A_p model.

INDIA
(cont'd, new)

	Method	: Radiochemically separated iodine followed by gamma spectrometric and β- counting based estimation of iodine to arrive at the independent yields of the isotopes.
	Accuracy	: 1-5%.
	Completion Date	: Already completed.
	Publication	: Presented in DAE symposium on Nuclear Chemistry and Radiochemistry, BHU, Varanasi, India, Nov. 3-7, 1981.
5.	Names	: T. Datta, S.P. Dange, A.G.C. Nair, Satya Prakash and M.V. Ramaniah.
	Facilities	: i) 60 c.c. Ge(Li) Detector coupled to a 4 K channel analyser ii) Radiochemical separation technique
	Experiment	: To deduce fragment angular momenta from determined isomeric independent yield ratio for ^{95}Nb and ^{132}I in ^{233}U(n,f) to see correlation with fragment deformation.
	Method	: Radiochemically determined independent isomeric yield ratio of ^{95}Nb and ^{132}I in ^{233}U(n,f) system. Fragment angular momenta were deduced using statistical model formalism.
	Accuracy	: About 10% on yield ratio for uncertainty of 1 h on angular momentum.
	Completion Date	: Already completed.
	Publication	: Phys. Rev. C-25, No.1, 358, 1982.

INDIA

(cont'd, new)

6. Names: K. Raghuraman, A. Ramaswami, C.K. Sivaramakrishnan and R.H. Iyer.

Facilities: 60 c.c Ge(Li), 4 K Analyser.

Experiment: Absolute Yields of ^{99}Mo and ^{140}Ba in the spontaneous fission of ^{244}Cm.

Method : Track etch-cum-radiochemistry, beta counting and gamm ray spectrometry.

Accuracy : 5-8%

Date : Completed.

Publication: Due to appear shortly in a forthcoming issue of Radiochemica Acta.

INDIA

Laboratory : Indian Institute of Technology, KANPUR 208016, INDIA.

Names : M.M. Sharma, A.K. Sinha and G.K. Mehta, I.I.T. Kanpur
D.M. Nadkarni, B.A.R.C., Trombay, Bombay.

Facilities : 2 MeV Van de Graaff Accelerator.

Experiment : Angular Distribution of Polar Light Charged Particles in Thermal Neutron Induced Fission of ^{235}U.

Method : A semiconductor ΔE-E detector telescope is used for particle identification and an ionization chamber for fission fragment detection. The ionization chamber separates polar and equatorial light charged particles with the help of a collimator arrangement. Using different collimation for polar LCP region, yields of polar ^{1}H and ^{4}He particles were measured in thermal neutron induced fission of ^{235}U. Using Monte Carlo technique, $\sigma(\theta)$ of the angular distribution for polar proton and α's were determined. Angular distribution of polar protons was found to be very narrow in contrast with a wide distribution of polar α-particles.

Accuracy : Refer to the table.

Completion Date: sept. 1981

Table : Yields of polar ^{1}H and ^{4}He per fission for two different collimator sizes viz 1 mm and 2 mm collimators.

LCP	1 mm Collimator	2 mm Collimator
^{1}H	$(2.0 \pm 0.6)x10^{-8}$	$(1.9 \pm 0.8)x10^{-8}$
^{4}He	$(1.1 \pm 0.4)x10^{-8}$	$(9.3 \pm 1.8)x10^{-8}$

Publications:

1. Polar and equatorial emission of light charged particles in keV neutron induced fission, Journal of Physics G : Nuclear Physics, to be published in June 1982 issue.

2. Angular distribution of polar light charged particles in thermal neutron induced fission of ^{235}U. Silver Jubilee Physics Symposium (DAE, India), Nuclear Physics <u>24B</u> (1981) 97.

INDIA

(cont'd, same as INDC(NDS)-116)

Laboratory : Indian Institute of Technology, KANPUR 208016, INDIA.

Names : A.K. Sinha, M.M. Sharma, N.M. Nadkarni*, S.C.L. Sharma and G.K. Mehta, I.I.T. Kanpur
*BARC, Trombay, Bombay.

Facilities : 2 MeV Van de Graaff Accelerator.

Experiment : Polar and Equatorial Light Charged Particles in Fast Neutron Induced Fission of ^{235}U.

Method : A semi conductor ΔE-E detector telescope is used for particle identification and an ionization chamber for fission fragment detection. Modifications are made in the ionization chamber for proper collimation of the particles so as to identify the polar and the equatorial emission. The yields of ^{1}H, ^{3}H and ^{4}He particles corresponding to the polar and the equatorial emissions have been determined in neutron induced fission of ^{235}U at thermal and 600 ± 100 keV neutron energies.

Accuracy : Refer to the table.

Completion date : December 1980.

Table : Yields of ^{1}H, ^{3}H, ^{4}He at the thermal and 600 keV neutron induced fission normalised so as to give ^{4}He-yield corresponding to the equatorial emission in thermal neutron induced fission as 100.

Particle	Equatorial Emission		Polar Emission	
	Thermal neutron fission	600 keV neutron fission	Thermal neutron fission	600 keV neutron fission
^{1}H	2.7 ± 0.8	15.1 ± 2	5.4 ± 3.5	25 ± 10
^{3}H	9.2 ± 3	9.5 ± 3	-	-
^{4}He	100 ± 9	88 ± 9	100 ± 33	80 ± 40

Publications:

1. Polar Emission in the neutron induced fission of ^{235}U, Nucl. Phys. and Solid State Symposium (India), 1980.

2. Polar Emission in the neutron induced fission of ^{235}U, submitted for publication to Physical Review Letters.

INDIA

(cont'd, same as INDC(NDS)-116)

Laboratory : Indian Institute of Technology, KANPUR 208016, India

Names : S.C.L. Sharma and G.K. Mehta, I.I.T. Kanpur
R.K. Choudhury, D.M. Nadkarni and S.S. Kapoor, BARC Trombay.

Facilities : 2 MeV Van de Graaff Accelerator

Experiment : Light-Charged-Particles in Fast Neutron Induced Fission of ^{235}U.

Method : A semiconductor ΔE-E detector telescope is used for particle identification and an ionization chamber for fragment detection. The yields and energy spectra of ^{1}H, ^{3}H and ^{4}He particles have been determined at thermal, 120±20, 180±20, 230±90 and 550±90 keV neutron energies.

Accuracy : About 5 %

Completion date: July, 1979.

TABLE : Yields of ^{4}He, ^{3}H, and ^{1}H at various incident neutron

E_n (keV)	$Y_{alpha}(\times 10^3)$	$Y_{triton}(\times 10^4)$	$Y_{proton}(\times 10^4)$
Thermal	2.00 ±0.040	1.40 ±0.110	1.84 ±0.121
120±20	2.66 ±0.083	2.07 ±0.230	3.11 ±0.290
180±20	2.26 ±0.044	2.33 ±0.160	3.19 ±0.189
230±90	2.58 ±0.064	3.00 ±0.460	7.20 ±0.701
550±90	1.94 ±0.080	4.82 ± 0.213	17.64 ±0.401

Publications :

1. Study of Emission of Alphas, Tritons and Protons in the Fast Neutron Fission of ^{235}U, Nucl. Phys. Solid State Phys. Symposium (India), 1979.

2. Multiparameter study of ^{1}H, ^{3}H and ^{4}He from fast neutron fission ^{235}U, Nucl. Phys. 355 (1981) 13.

ISRAEL

Laboratory and Address:	Soreq Nuclear Research Centre 70600 Yavne, Israel
Names:	M.S. Rapaport, G. Engler, A. Gayer and I. Yoresh.
Facilities:	-4MW research reactor -SOLIS isotope separator
Experiment:	Experimental Study of ^{145}Cs Decay
Method:	SOLIS isotope separator operating on-line with the 4MW research reactor at Soreq Nuclear Research Centre. Integrated target-ion source system with ^{235}U targets enriched to 93% and exposed to a thermal neutron flux of $5x10^{8}n\text{-}cm^{-2}s^{-1}$. Selective separation of the A=145 mass chain starting with ^{145}Cs and ^{145}Ba with a Ta surface ionization surface used either as one integral piece or as a separate piece from the target container. The measurments consisted of simultaneous detection of γ-rays and conversion electrons.
Accuracy:	10% in intensities, 0.1 to 0.3 keV in energies.
Results:	Established level scheme of ^{145}Ba, γ-intensities, β-branching and log ft values.
Completion date:	Completed
Discrepancies to other reported data:	Reasonable agreement in γ-intensities with other reported data.
Publication:	In press, Z. Phys. A-Atoms and Nucl. 306 (1982).

ISRAEL
(cont'd)

Laboratory and address:	Soreq Nuclear Research Centre 70600 Yavne, Israel
Names:	G. Engler and E. Ne'eman
Facilities:	-4MW research reactor -SOLIS isotope separator
Experiment:	Delayed Neutron Emission Probabilities (P_n) and Half-Lives of Rb, Sr, Y, In, Cs, Ba and La Precursors with A=93-98, A=127-131 and A=142-148.
Method:	SOLIS isotope separator operating on-line with the 4MW research reactor at Soreq Nuclear Research Centre. Integrated target-ion source system with ^{235}U targets enriched to 93% and exposed to a thermal neutron flux of $5x10^8 n\text{-}cm^{-2}s^{-1}$. Selective separation of the isotopes of Rb and Cs by the use of a Ta ionizing surface and of the isotopes of Sr and Rb, or In, Ba and Cs, by the use of Re ionizing surface. Delay half-times achieved in these sources: 0.270±0.027 sec for Rb and Cs, 1.4±0.3 sec for Sr, 1.0±0.4 sec for Ba and 1.5±0.5 sec for In. For the determination of the P_n values a neutron counting system with 12 BF_3 tubes and beta-counter of a 300μm Si surface barrier detector, were used.
Accuracy:	5-40% depending on isotope.
Results:	P_n values of $^{93-98}$Rb, ^{97,98}Sr, ^{97,98}Y, $^{127-131}$In, $^{142-146}$Cs, ^{147,148}Ba and ^{147}La.
Completion date:	Completed
Discrepancies to other reported data:	Reasonable agreement with other reported experimental data except for ^{93}Rb, $^{127-131}$In, ^{144,145}Cs.
Publication:	Nucl. Phys. A367 (1981) 29.

ITALY

Laboratory and Address : Istituto di Ingegneria Nucleare
Politecnico di Milano
Via Ponzio 34/3
20133 MILANO, ITALY

+ ENEL-Centro di Ricerca Termica e Nucleare
Bastioni Porta Volta 10
20121 MILANO, ITALY

Names : A.Cesana, G.Sandrelli+, V.Sangiust, M.Terrani

Facilities: L54 reactor, neutron long counter, high resolution Ge-Li detector.

Experiment : Absolute total yields of delayed neutrons in the fission of ^{233}U, ^{237}Np, $^{238/240/241}Pu$, ^{241}Am.

(work performed under contract CRTN/33-ENEL)

Method : The samples were few milligrams of highly enriched isotopes (oxides) encapsulated in stainless steel or zircaloy vials. Their characteristics were as follows:

Target	mass (mg)	impurities
^{233}U	3.35	===
^{237}Np	30.2	===
^{238}Pu	2.82	^{234}U(5%), ^{237}Np(1.2%), ^{239}Pu(0.7%), ^{240}Pu(1%)
^{240}Pu	4.6	^{239}Pu(1%), ^{241}Pu(0.5%), ^{242}Pu(0.7%), ^{241}Am(0.2%)
^{241}Pu	1.54	^{237}Np(0.2%), ^{239}Pu(0.1%), ^{240}Pu(0.2%), ^{241}Am(21%)
^{241}Am	5.36	^{237}Np(2%), ^{239}Pu(0.8%)

Samples were irradiated in a B_4C filtered flux at the edge of L54 reactor core (1).
After irradiation they were transferred pneumatically to the neutron counter and delayed neutron decay was followed with a 100 channel multiscaler. The neutron efficiency was measured by counting the delayed neutron emission from a ^{235}U target for which the fission rate in the irradiation position had been accurately determined. The fission rates in all the samples were determined by measuring with a high resolution Ge-Li detector the absolute activities of some fission products: ^{103}Ru, ^{131}I and ^{140}La.
Fission yields were derived from ref. (2).
Both delayed neutron intensities and fission product activities were corrected for the presence of impurities.
The samples transfer time was about 0.6 sec, so that half-lives of less than 0.5 sec could not be seen. The delayed neutron decay curves were approximated by five groups (with half lives of about 55,22,6,2,0.5 sec) using a least square unfolding technique. Total delayed neutron yields were obtained as a sum of the yields of the groups listed above and the yield of a sixth group (with half life of about 0.2 sec) obtained by an empirical correlation (3) between the yields and the values of Z and A of each fissioning nuclide; for the determination of the fitting parameters the yields reported in ref. (3) were used. The results are listed below and compared, when possible with the values reported in the literature.

ITALY
(cont'd)

Accuracy: Errors are quoted in the second column of the table below. They are intended as standard errors (± 1 σ) and are obtained combining in the usual way the errors on the neutron intensities with those on the fission rates in the samples.

Completion date: Completed

Publications: G.Benedetti, A.Cesana, V.Sangiust, G.Sandrelli, M.Terrani "Delayed Neutron Yields from Fission of Uranium-233, Neptunium-237, Plutonium-238, -240 -241, and Americium-241." Nucl.Sci. Eng., 80, 379, (1982).

Results:

Nuclide	total delayed neutron yield		
	present work	ref. (3)	ref. (4)
^{233}U	0.00779 ± 0.00026	0.00698 ± 0.00013	0.0074 ± 0.0004
^{237}Np	0.0122 ± 0.0002		
^{238}Pu	0.00406 ± 0.00015	0.00456 ± 0.00051	
^{240}Pu	0.0091 ± 0.0003	0.0096 ± 0.0011	0.0090 ± 0.0009
^{241}Pu	0.0160 ± 0.0007	0.0160 ± 0.0016	0.0157 ± 0.0015
^{241}Am	0.00394 ± 0.00015		

References:

1) P. Barbucci et al., En. Nucleare, 26, 11, (1979), 542.
2) B.F. Rider, NEDO-12154-3(A), (1979).
3) R.J. Tuttle, Nucl. Sci. Eng. 56, (1975), 37.
4) S.A. Cox, ANL/NDM-5, (1974).

ITALY

(cont'd)

Laboratory and Address : Istituto di Ingegneria Nucleare
Politecnico di Milano
Via Ponzio 34/3
20133 MILANO, ITALY

+ ENEL-Centro di ricerca Termica e Nucleare
Via Rubattino 54
20134 MILANO, ITALY

Names: A.Cesana, G.Sandrelli+, V.Sangiust, M.Terrani

Facilities : L54 reactor, high resolution Ge-Li detector.

Experiment : Determination of fission yields in fast neutron fission of Pu-238 and Pu-240.

Method : The total yields of ^{88}Kr, ^{91}Sr, ^{92}Sr, ^{99}Mo, ^{103}Ru, ^{105}Ru, ^{132}Te, ^{131}I, ^{133}I, ^{134}I, ^{135}I, ^{135}Xe, ^{140}Ba, ^{139}Ba, ^{143}Ce are being determined by gamma-ray counting of unseparated samples and by comparison with ^{235}U thermal fission yields.

Completion date: 1983.

JAPAN

Laboratory and Address : Department of Physics, Faculty of Science, Hiroshima University
1-1-89 Higashi-Sendamachi, Nakaku, Hiroshima 730, Japan

Names : Y. Yoshizawa and Y. Iwata

Facility : Ge(Li) spectrometer

Experiment : Precision measurement of gamma-ray intensities for ^{125}Sb

Method : The Ge(Li) detector was calibrated within uncertainties of 1 % with standard sources and cascade gamma rays in the energy range of 90 to 2750 keV. Relative intensities of gamma rays emitted from the ^{125}Sb nuclide were precisely measured. Gamma-ray intensities per decay were obtained from the relative gamma-ray intensities, theoretical internal conversion coefficients and beta branches. The intensity sum of all transitions feeding and crossing the isomer level at 145 keV of the daughter nucleus ^{125}Te.

Accuracy : For strong gamma rays, Accuracies of relative intensities and intensities per decay are within 1 % and 1.5 %, respectively.

Completion date : April 1982

Descrepancies to other reported data: Large descrepancies to other reported data are not recognized.

Table 1. Gamma-ray intensities for ^{125}Sb.

Gamma-ray energy (keV)	Relative intensity (%)	Intensity per decay (%)	Gamma-ray energy (keV)	Relative intensity (%)	Intensity per decay (%)
109.3	(0.241(24))	(0.071(7))	380.4	5.06(4)	1.500(19)
117.0	0.867(25)	0.257(8)	408.0	0.608(21)	0.180(6)
172.6	0.69(4)	0.205(12)	427.9	100.0(7)	29.6(3)
176.3	22.62(21)	6.70(9)	443.5	0.989(23)	0.293(7)
178.8	0.11(4)	0.032(13)	463.4	35.23(14)	10.44(12)
198.6	0.030(11)	0.009(3)	497.4	0.009(8)	0.0025(23)
204.1	1.08(3)	0.320(11)	600.6	59.54(22)	17.64(20)
208.1	0.788(21)	0.233(7)	606.6	16.94(7)	5.02(6)
227.9	0.433(12)	0.128(4)	635.9	37.87(14)	11.22(13)
321.0	1.391(24)	0.412(8)	671.4	6.039(24)	1.790(21)

JAPAN

(cont'd)

Laboratory and Address :	Department of Physics, Faculty of Science, Hiroshima University 1-1-89 Higashi-Sendamachi, Nakaku, Hiroshima 730, Japan
Name :	Y. Iwata
Facility :	Ge(Li) spectrometer
Experiment :	Precision measurement of gamma-ray intensities for ^{156}Eu
Method :	The Ge(Li) detector was calibrated within uncertainties of 0.5 % with standard sources and cascade gamma rays in the region of 280 to 2750 keV. Disintegration rates of the standard sources were determined by means of $4\pi\beta$-γ or $4\pi X$-γ coincidence method. Relative intensites of ^{156}Eu gamma rays higher than 280 keV were precisely measured.
Accuracy :	Relative intensities within accuracies of 1 % were obtained for strong gamma rays.
Completion date :	May 1980
Descrepancies to other reported data :	Large descrepancies to other data are not observed, while uncertainties of them are much larger than present data.
Publication :	Y. Iwata, J. Phys. Soc. Japan 49 (1980) 2114

JAPAN

Laboratory and Address:	Nuclear Engineering School, Tokai Establishment, Japan Atomic Energy Research Institute, Tokai-mura, Ibaraki-ken, Japan
Name:	Eiko Akatsu
Facilities:	Liquid scintillation spectrometer
Experiment:	Measurement of the half-life of ^{87}Rb
Method:	Measuring sample solution of rubidium chloride was dissolved in Insta-gel, and its radioactivity was measured by an efficiency tracing technique of liquid scintillation method. The rubidium content was determined by gravimetry as tetraphenylborate.
Accuracy:	$(5.56 \pm 0.025) \times 10^{10}$ years(0.45%)
Completion date:	May, 1981

Descrepancies to other reported data:

Half-life(year)	Sample	Reference
$(4.70 \pm 0.10) \times 10^{10}$	Rb octoate	1
$(4.77 \pm 0.10) \times 10^{10}$	Rb octoate	2
$(5.21 \pm 0.15) \times 10^{10}$	Rb octoate	3
$(5.56 \pm 0.025) \times 10^{10}$	RbCl	present work

These values were all obtained by liquid scintillation method. Various values were obtained by the other method of measurement[4].

Publication: Eiko Akatsu, Radioisotopes, 30, (12), 647 - 648 (1981).

1) K. F. Flynn and L. E. Glendenin, Phys. Rev., 116, 744 (1959).
2) A. Kovach, Acta Phys. Acad. Sci. Hung., 17, 341 (1964); Nucl. Sci. Abstr., 19, 579 (1965), No. 5135.
3) G. A. Brinkmann, A. H. W. Aten, Jr. and J. Th. Veenboer, Physica, 31, 1305 (1965).
4) W. Neumann and E. Huster, Z. Physik, 270, 121 (1974).

JAPAN

Laboratory and address: Nuclear Physics II Laboratory
Japan Atomic Energy Research Institute
Tokai-mura, Naka-gun, Ibaraki-ken, Japan

Names: Y. Furuta, Y. Kawarasaki, M. Mizumoto, Y. Nakajima
M. Ohkubo, M. Sugimoto, S. Tanaka (JAERI)
Y. Kanda, N. Ohnishi (Kyushu Univ.)

Facilities: Neutron time-of-flight spectrometers at the 120 MeV electron linear accelerator.

1. Experiment: Neutron capture cross section measurements in keV region.

   Detectors: 3500 l liquid scintillator tank for capture yield, ^{6}Li-glass and ^{10}B-NaI detectors for neutron flux and transmission measurements.

   Flight paths: 52 m for capture measurements.
   56 m for flux and transmission measurements.

   Normalization: Saturated resonance method.

(1) Samples: ^{107}Ag, ^{109}Ag (metallic powder enriched to 98.22 and 99.32 %, respectively).

   Energy region: 3.3 to 700 keV

   Accuracy: 5 to 10 % (Experimental uncertainties are represented with a covariance matrix)

   Completion date: Measurements are completed
   Sep, 1982

(2) Sample: La

   Status: Total radiation widths were obtained by the code TACASI for the s-wave resonances below 2.5 keV

   Expected completion date: Aug, 1982

(3) Sample: ^{137}Ba ($Ba(NO_3)_2$ powder enriched to 81.9 %)

   Energy region: 1.5 eV to 100 keV

   Completion date: Measurements are in progress.

2. Experiment: Neutron resonance parameters.

   Detectors: ^{6}Li-glass neutron detectors
   Moxon-Rae detector and 3500 l liquid scintillator tank

   Flight paths: 47 m, 56 m and 190 m for transmission measurements
   47 m and 52 m for capture measurements

   Analysis: The Atta-Harvey area analysis code and the multi-level Breit-Wigner code SIOB
   Monte Carlo code CAFIT and TACASI.

JAPAN
(cont'd)

(1) Samples: ^{79}Br, ^{81}Br
Resonance parameters, S_0, $\bar{D}$, $\bar{\Gamma}_\gamma$
^{79}Br 156 levels $E_n < 10$ keV
^{81}Br 100 levels $E_n < 15$ keV

Publications: M. Ohkubo, Y. Kawarasaki and M. Mizumoto
Resonance parameters of ^{79}Br and ^{81}Br up to 15 keV. Int. Conf. on Nuclear Cross Sections for Technology, p173, NBS special publication 594, 1980
J. Nucl. Sci. Technol. 18 (1981) 745

(2) Samples: ^{85}Rb, ^{87}Rb
Resonance parameters, S_0, $\bar{D}$, $\bar{\Gamma}_\gamma$
Rb 100 levels $E_n < 17$ keV
Rb 42 levels $E_n < 100$ keV

(3) Samples: ^{107}Ag and ^{109}Ag (metallic powder enriched to 98.22 and 99.32 %, respectively)
Energy region: 1.5 to 7000 eV both for ^{107}Ag and ^{109}Ag.
Expected Completion date: Dec. 1982

(4) Sample: ^{123}Sb
Transmission and capture measurements
Expected completion date: Dec. 1982

JAPAN

Laboratory and address : Japan Atomic Energy Research Institute
Tokai-mura, Naka-gun, Ibaraki-ken 319-11, Japan

Names : M. Ohshima, Z. Matumoto and T. Tamura

Facilities : $\pi\sqrt{2}$ iron-free β-ray spectrometer in the Institute for Nuclear Study, University of Tokyo; Japan Research Reactor 2 in JAERI

Experiment : Beta transitions from ^{103}Ru to ^{103}Rh levels

Method : Energies and intensities of β-transitions in the decay of ^{103}Ru were determined from β-ray and conversion electron spectra, and from γ-ray data by Macias et al. (Phys. Rev. C 14 (1976) 639)

Accuracy : I_γ(497.8 keV) : 91.3 ± 0.4 per 100 decays

Completion date: July 1981

Discrepancies to other reported data:
I_γ (497.08 keV) : 89.5 per 100 decays

(Nuclear Data Sheets 28 (1979) 403). The highest β-ray component was confirmed to feed the ground state of ^{103}Rh, and not the first excited state.

Publication : J. Phys. Soc. Japan 51 (1982) 43.

JAPAN

Laboratory and address :	Research Reactor Institute, Kyoto University Kumatori, Sennan-gun, Osaka-fu, 590-04
Names :	Itsuro Kimura, Katsuhei Kobayashi
Facility :	^{252}Cf source of JAERI
Experiments :	Average cross sections to ^{252}Cf fission neutrons, of $^{24}Mg(n,p)^{24}Na$, $^{27}Al(n,p)^{27}Mg$, $^{32}S(n,p)^{32}P$, $^{51}V(n,p)^{51}Ti$, $^{54}Fe(n,p)^{54}Mn$, $^{56}Fe(n,p)^{56}Mn$, $^{58}Ni(n,p)^{58}Co$, $^{59}Co(n,\alpha)^{56}Mn$, $^{64}Zn(n,p)^{64}Cu$, $^{113}In(n,n')^{113m}In$, $^{115}In(n,n')^{115m}In$, $^{197}Au(n,2n)^{196}Au$, $^{46}Ti(n,p)^{46}Sc$, $^{47}Ti(n,p)^{47}Sc$, $^{48}Ti(n,p)^{48}Sc$ and $^{199}Hg(n,n')^{199m}Hg$
Method :	Gamma-rays (except ^{32}P) from the induced activities were measured with a Ge-Li counter. The average cross section for $^{27}Al(n,\alpha)^{24}Na$ was taken to be 1.006 mb as a reference value and the other values were normalized to it. In evaluation of errors, covariance matrix was taken into account.
Accuracy :	3~5 %
Completion date :	March 1982
Publication :	K. Kobayashi et al., J. Nucl. Sci. Technol., in print.

JAPAN

Laboratory and address:	Institute of Atomic Energy, Kyoto University, Uji, Kyoto 611, Japan
Names:	Ichiro Fujiwara and Nobutsugu Imanishi
Facilities:	5 MW research reactor [Research Reactor Institute, Kyoto University]
Experiment:	Cumulative and independent fission-yields of some fission products in the thermal-neutron induced fission of ^{233}U, ^{235}U and ^{239}Pu.
Method:	Radiochemical for fission yields; Instrumental with germanium detectors.
Accuracy:	Errors range from 7 % to 20 % with different combinations of fission products and the fissile isotopes.
[Expected] completion date:	see Table I
Publication:	see Table I

Table I

Nuclide		Completion date	Publication
$^{128,130,132}Sn$, ^{133}Sb	[Cum.]		N. Imanishi, I. Fujiwara and T. Nishi, Nucl. Phys. A263, 141 (1976)
$^{128,130,132}Sb^{m,g}$, ^{131}Sb, $^{131,133}Te^{m,g}$	[Ind.]	Sep. 1975	
^{135}I	[cum.]		T. Nishi, I. Fujiwara and N. Imanishi, Int. Conf. on Nucl. Structure, Tokyo, Sep. 1977
$^{131,133}I$, $^{132,134,136}I^{m,g}$	[Ind.]	Dec. 1976	
$^{133,135}Xe^{m,g}$	[Ind.]	Dec. 1976	I. Fujiwara, N. Imanishi and T. Nishi, J. Phys. Soc. JAPAN (in press)
$^{138}Cs^{m,g}$	[Ind.]	May 1978	
$^{90}Rb^{m,g}$	[Ind.]	End of 1982	

JAPAN

Laboratory : Department of Nuclear Engineering,
Nagoya University.

Address : Furo-cho, Chikusa-ku, Nagoya, Japan

Names : H. Miyahara, T. Gotoh, and T. Watanabe

Facilities : $4\pi\beta$-γ coincidence system, NaI(Tl) scintillators, 400-channel pulse height analyzer, Computer.

1. Experiment : Decay property of ^{86}Rb and ^{103}Ru.

Method : The disintegration rates of all sources were measured with the $4\pi\beta$-γ coincidence system. The γ-ray intensities per decay were determined from the γ-ray spectra of NaI(Tl) scintillators and the halflives were determined from the measurements of the disintegration rates during one or three half-lives.

Accuracy : 1) ^{86}Rb; 1077 keV γ-ray intensity per decay: 8.64 ±0.04%, halflife: 18.631±0.018 day.

2) ^{103}Ru; 497 keV γ-ray intensity per decay: 91.08 ±0.76%, half-life: 39.214±0.013 day.

Completion date: Feburary 22, 1980.

Comparison with other data: The γ-ray intensity per decay was directly determined and the accuracy was improved considerably.

Publication: This work is reported in Int. J. Appl. Radiat. Isotopes Vol.32, p.573 (1981).

JAPAN

Laboratory: 1.Department of Nuclear Engineering, Nagoya University
2.Institute for Atomic Energy. Rikkyo University

Address : 1.Furo-cho, Chikusa, Nagoya, Japan
2.Nagasaka, Yokosuka, Kanagawa, Japan

Names : M.Totsuka[1)],S.Fujita[1)],K.Mio[1)],K.Kawade[1)], H.Yamamoto[1)],T.Katoh[1)] and T.Nagahara[2)]

Facilities: TRIGA-II reactor of Rikkyo University,pneumatic transport system, apparatus for electrophoresis, Ge(Li) detector,4096 pulse height analyzer

1. Experiment : Decay of ^{147}Ce to levels of ^{147}Pr

Method : By using the rapid paper electrophretic method, sources of ^{147}Ce was separated from fission products of ^{235}U irradiated at the TRIGA-II reactor. Energies and intensities of gamma-rays and a half-life of ^{147}Ce were measured and a decay scheme is proposed

Accuracy : Less than 0.7 keV for gamma-ray energies, 57 $\pm$ 5 sec for the half-life

Completion date : September 30, 1981

Discrepancy to other reported data :
Four gamma-rays are newly observed, and two other gamma-rays reported previously are not detected. A new level of ^{147}Pr at 2.7 keV is proposed.

Publication : A paper on this work is submitted for the publication in J.Nuclear Science and Technology.

JAPAN

(cont'd)

Laboratory : 1. Department of Nuclear Engineering, Nagoya University
2. Institute for Atomic Energy, Rikkyo University

Address : 1. Furo-cho, Chikusa-ku, Nagoya, Japan
2. Nagasaka, Yokosuka, Kanagawa, Japan

Names : Hiroshi YAMAMOTO[1)], Yujiro IKEDA[1)], Kiyoshi KAWADE[1)], Toshio KATOH[1)], Teruaki NAGAHARA[2)]

Facilities : TRIGA II reactor of Rikkyo University, Pneumatic transport system, Ge(Li) detector.

2. Experiment : a) Decay Properties of ^{145}Ce and ^{146}Ce
(same as INDC(NDS)-116) b) Decay Studies of ^{143}La and ^{147}Pr

Method : By using the rapid paper electrophoretic method, sources of ^{145}Ce, ^{146}Ce, ^{143}La and ^{147}Pr were separated from fission products of ^{235}U irradiated at the TRIGA-II reactor.
Energies and intensities of γ-rays, Q_β values of β-ray and half-lives were measured and decay schemes were proposed.

Accuracy : Errors of the values of γ-ray energies are less than 0.6 keV. Obtained half-lives are 3.01±0.06 min for ^{145}Ce, 13.52±0.13 min for ^{146}Ce, 14.14±0.16 min for ^{143}La and 13.3±0.4 min for ^{147}Pr. Q_β values were determined with the errors less than 0.1 MeV.

Completion data : a) December, 1979
b) April, 1980

Discrepancies to other reported data :
Fourteen new γ-rays from ^{145}Ce, 6 new ones from ^{146}Ce, 23 new ones from ^{143}La and 9 new ones from ^{147}Pr were observed. Fairly precise decay schemes of these nuclide are proposed.

Publication : a) J. Inorg. Nucl. Chem., Vol. 42 (1980) No. 11, p. 1539
b) J. Inorg. Nucl. Chem., Vol. 43 (1981) No. 5, p. 855

JAPAN

Laboratory: 1. Research Laboratory for Nuclear Reactors, Tokyo Institute of Technolgy
2. Research Reactor Institute, Kyoto University

Address: 1. 2-12-1, O-okayama, Meguro-ku, Tokyo
2. Kumatori-cho, Sennan-gun, Osaka

Names: 1. N. Yamamuro, N. Igashira, H. Shirayanagi, T. Yoshinari.
2. Y. Fujita, K. Kobayashi.

Facilities: 46-MeV Electron Linear Accelerator of Research Reactor Institute, Kyoto University

Experiments: Gamma-ray spectra from $^{133}Cs(n,\gamma)$ and $Pd(n,\gamma)$ reactions.

Method: Gamma-rays from the capture of 3-80keV neutrons were detected with C_6D_6 or BGO scintillation detector. Gamma-ray spectral distribution was obtained by unfolding experimental pulse-height spectrum with the response matrix of the detector.
The gamma-ray strength function for ^{134}Cs was derived.

Completion date: 1982 for ^{133}Cs data. Some additional experiments are planned using the BGO detector.

Publication: N. Yamamuro et al. "Gamma-ray from radiative capture reactions in ^{133}Cs, ^{181}Ta and ^{197}Au", Specialists meetion on fast-neutron capture cross sections, ANL, 20-23 April 1982.

JAPAN
(cont'd)

Laboratory: Research Laboratory for Nuclear Reactors, Tokyo Institute of Technology

Address: 2-12-1, O-okayama, Meguro-ku, Tokyo

Names: M. Igashira, T. Maruyama, K. Hashimoto, H. Kitazawa, N. Yamamuro.

Facilities: 3-MV Pelletron accelerator, Anti-Compton NaI gamma-ray spectrometer.

Experiments: Gamma-ray spectra from capture of 400-keV neutrons in Nb, Mo and Sn.

Method: Gamma-rays following 400-keV neutron capture in Nb, Mo, and Sn have been measured. The neutrons were produced with pulsed proton beam from the pelleton accelerator using the ^{7}Li(p,n) reaction.
Capture gamma-ray spectra were obtained after background subtraction, spectrum unfolding, and correction for the gamma-ray self-absorption and scattering in the sample.

Completion date: The experiment is completed.

JAPAN

(same as INDC(NDS)-116)

Laboratory and adress: Nuclear Engineering Research Laboratory
Faculty of Engineering
University of Tokyo
2-22 Shirane Shirakata, Tokai-mura Naka-gun
Ibaraki, Japan

Names: M. Akiyama and S. An

Facilities: Fast Neutron Source Reactor "YAYOI"

Experiment: Fission Product Decay Heat for Fast-Neutron Fission of ^{235}U, ^{238}U, ^{233}U, ^{239}Pu and ^{232}Th for cooling Time of 20 to 24000 seconds.

Method: Samples have been irradiated for short periods with fast neutrons, and returned pneumatically to a counting area. Gamma-ray energy spectra have been measured using NaI detector and beta-ray energy spectra have been obtained using plastic scintillation detector combined with $\Delta E/\Delta x$ type proportional counter to eliminate gamma-ray effects. Counting times have been chosen to provide good statistics within the time range of interest. Total energy release rates for beta and gamma-rays have been obtained to integrated beta and gamma-energy spectra respectively and summed to obtain the fission product decay heat.

Accuracy: 5% to 10% (1σ)

(Expected) Completion Date: Measurements of gamma-ray energy release rates are finished, and we plan to start writing a report for publication soon. Measurements of beta-ray decay heat have been completed.

Discrepancies to other Reported Date : Data of gamma-ray and beta-ray energy release rates are in reasonable agreement with results of summation calculations.

Publications: M. Akiyama. et al., UTNL-R-103

SWEDEN

Laboratories:	Department of Nuclear Chemistry Chalmers University of Technology S-412 96 Göteborg Sweden Institut für Kernchemie Johannes Gutenberg Universität Postfach 3980 D-6500 Mainz Germany
Names:	The SISAK Collaboration: G. Skarnemark (Göteborg) N. Kaffrell and N. Trautmann (Mainz)
Facilities:	SISAK system for studies of radionuclides with half-lives down to 0.5 s.
Experiments:	$T_{1/2}$-determinations, γ-singles, γ-γ coincidence and γ-γ angular correlation measurements. At present, our fission product measurements are concentrated on very neutron-rich isotopes of technetium, ruthenium, rhodium and palladium.
Method:	Fast chemical on-line separations. The measurements are carried out on flow cells or ion exchange columns. The fission products are transported from the target cell via a gas jet system. Ge(Li)-detectors are used.
Completion data:	The experiments mentioned above will be completed during 1982/83.

SWEDEN

Laboratory and address: Neutron Physics Laboratory
Studsvik Energiteknik AB
Fack
S-611 82 NYKÖPING
Sweden

Names: P-I Johansson

Facilities: 6 MeV VdG accelerator
PDP-15 Computer 24 k memory (on line)
NaI(Tl) and Ge(Li) spectrometers, β-spectrometer
CDC-CYBER 73 Computer (off line)

Experiment: The objective of the experiment is to improve on the accuracy of currently available fission product decay heat data by means of radiometric study of small ^{238}U and ^{239}Pu specimens at cooling times longer than 5 seconds after irradiation with fast and thermal neutrons, respectively.

Method: A facility for fast and thermal neutron irradiation of fissile specimens using a VdG accelerator has been built. Specimens are transported between the neutron source and a spectrometer by means of a pneumatic system.

The absolute number of fissions in the sample is determined by two independent methods: a) by utilizing an absolutely calibrated fission chamber with an active volume of about the same size as the samples, b) by counting the number of gamma quanta emitted from fission products with known yields and decay properties.

The gamma radiation is measured with a NaI(Tl) crystal of diameter and length 12.5 cm. A 4096 channel analyzer is used for recording the spectra. Sample transportation, irradiation and counting times are handled by a PDP-15 computer. Spectra are automatically stored on magnetic tape for off-line data analysis, i.e. the transformation from measured pulse height spectra to energy spectra.

Accuracy: Better accuracy than ± 7 % is expected for the total energy released as γ-radiation from the fission products at any time between a few seconds and 30 minutes after fission.

SWEDEN

Laboratory and address:	The Studsvik Science Research Laboratory, S-611 82 Nyköping, Sweden.
Facility:	The OSIRIS on-line mass separator is used to extract selected nuclei from thermally fissioned ^{235}U. The extraction method has been extended in the sense that Al or CF_4 is added to the ion source to facilitate separation of halogenes or lanthanides, respectively.
1. Names:	K. Aleklett, P. Hoff, E. Lund and G. Rudstam.
Experiment:	Characterization of and P_n values for delayed neutron precursors of yttrium and lanthanides.[1]
Method:	Simultaneous measurement of neutron and beta activities in a multiscaling mode. Neutron counter consisting of 29 ^3He counters imbedded in paraffine beta counter being a 2 mm plastic scintillator. Separation of fluoride ions with CF_4 addition to the ion source.
Completion date:	Indefinite for the P_n studies as such.
2. Names:	G. Rudstam.
Experiment:	Calculation of effective delayed neutron energy spectra for reactor applications.
Method:	Half-lives and branching ratios for delayed neutron precursors were measured as described above (Experiment 1). The shapes of the delayed neutron energy spectra were measured with a ^3He spectrometer. These precursor data combined with the fission yield pattern provide information about the effective delayed neutron spectra for any irradiation condition.
Completion date:	1982.
Publication:	G. Rudstam, Six-Group Representation of the Energy spectra of Delayed Neutrons from Fission. Nucl. Sci. Eng. 80 (1982) 238.[2]

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1) ^{147}La, $^{147,149}Ce$, $^{147,149}Pr$

2) $^{233,235}U$, $^{239,241}Pu$ thermal, ^{232}Th, $^{236,238}U$, ^{237}Np, $^{240,242}Pu$ fast and ^{252}Cf spontaneous fission

SWEDEN

(cont'd)

3. Names: K. Aleklett, P. Hoff, E. Lund and G. Rudstam.

Experiment: Total beta decay energies and atomic masses.

Method: Beta particles were recorded in coincidence with gamma rays depopulating known levels in the daughter nucleus. The end-point energies of the beta-spectra were determined, and by adding the level energy the total beta-decay energies were obtained.
The beta-particles were recorded in a Si(Li) detector system and the gamma rays in two Ge(Li) detectors.

Completion date: Indefinite for the experiment as such.

Publication: K. Aleklett, P. Hoff, E. Lund and G. Rudstam, Total β-decay energies and mass systematics for neutron rich silver and cadmium isotopes 3) (submitted for publication, 1982).

K. Aleklett, P. Hoff, E. Lund and G. Rudstam, Nuclear Q_β-values for fission products. A comparison with mass formula predictions, CERN 81-09 (1981) 124.

P. Hoff, K. Aleklett, E. Lund and G. Rudstam: Decay schemes and total decay energies of ^{89}Br and ^{90}Br, Z. Physik A 300 (1981) 289.

K. Aleklett, P. Hoff, E. Lund and G. Rudstam: Total beta decay energies and masses for ^{80,81}Ga and ^{79,81,82}Ge, Z. Physik A 302 (1981) 241.

4. Names: K. Aleklett, G. Rudstam.

Experiment: Average beta energies of fission products.

Method: The beta spectra have been measured with a spectrometer consisting of a system of Si(Li) detectors. The direct method has been used for important fission products. For other nuclides the average β-ray energy has been determined using experimental data from a study of β-strength functions.

Completion date: 1982.

Publication: K. Aleklett and G. Rudstam, Average Beta-Ray Energies of Short-lived Fission Products. Nucl. Sci. Eng. 80 (1982) 74.4)

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3) $^{115-121}$Ag, $^{119-121}$Cd

4) $^{86-89}$Br, $^{89,91-93}$Kr, $^{89,91-94}$Rb, $^{93-95}$Sr, $^{94-96}$Y, ^{134}Sb, $^{136-139}$I, $^{137-141}$Xe, $^{138-142}$Cs

SWEDEN

(cont'd)

5. Names: B. Fogelberg, P. Hoff and E. Lund.

Experiment: Nuclear spectroscopic studies of the decays of $^{114, 115, 116}Ag$. The studies aim at level scheme determinations to be combined with the Q_β-studies.

6. Names: B. Fogelberg, P. Hoff.

Experiment: Nuclear spectroscopic studies of fission product nuclei. The energy levels and transition probabilities between these are studied. Recent studies include levels populated in the decays of ^{121}Ag, ^{121}Cd, ^{131}In and ^{133}Sn.

Publications: F. Fogelberg, J.A. Harvey, R.L. Macklin, S. Raman and P.H. Stelson, Neutron resonance study of a delayed neutron emitter, ^{87}Kr, CERN 81-09 (1981) 339.

B. Fogelberg and P. Hoff, The decays of $^{121m,g}Cd$ to ^{121}In, Nucl. Phys. A376 (1982) 389.

7. Names: P. Aagaard, E. Lund, G. Rudstam and H-U Zwicky.

Experiment: Fission Yields and Branching Ratios for γ-rays.

Method: The activity of a fission product is determined by means of gamma spectroscopy of neutron counting. After correction for delay, counting efficiency, branching ratio and reactor power the result will be a product of the fission yield and the overall separation efficiency. The latter factor is nearly the same for all isotopes of a given element. Thus relative yields are directly obtainable and have to be normalized against the yield of one of the isotopes determined absolutely by any other technique.
Since the branching ratios for the gamma rays are badly known for many nuclides a special project to determine this quantity has been performed. Well calibrated detectors have been used, a Ge(Li) detector for determination of the intensity of the γ-peaks and a plastic scintillator for counting the β-activity.

Completion date: 1982 for the fission yields of ^{235}U and for branching ratios in the most important fission products. Indefinite for other fissionating elements.

SWEDEN

(cont'd)

Publication: G. Rudstam, Analysis of Results from Delay Studies in ISOL-systems. The Studsvik Science Research Report NFL-20 (1980); Dead Time Corrections in Delay Studies, NFL-20 Complement (1980).

G. Rudstam, P. Aagaard, K. Aleklett, E. Lund, Applications of nuclear data on short-lived fission products. CERN 81-09 (1981) 696.

8. Names: K. Aleklett, P. Hoff and E. Lund

Experiment: Nuclear spectroscopic studies of the decays of $^{75,77}Zn$, $^{89,90}Br$ and $^{139,140}I$. The studies aim at level scheme determinations to be combined with the Q_{β}-studies.

Completion date: 1981.

Publication: P. Hoff, K. Aleklett, E. Lund, Decay schemes and total decay energies for ^{89}Br and ^{90}Br, Z. Physik 300(1981)289.

E. Lund, K. Aleklett, P. Hoff, decay schemes and total decay energies of ^{139}I and ^{140}I (to be published 1982)

SWEDEN

Laboratory and address:

Department of Nuclear Physics, University of Lund,
Sölvegatan 14, 223 62 LUND, Sweden.

Names: G. Magnusson, P. Andersson, R. Zorro and I. Bergqvist.

Experiment: Neutron capture cross-section measurements. Experimental and theoretical determination of corrections due to background low energy neutrons produced in reactions like (n,n') and (n,2n) and in charged-particle reactions.

Concluded: Measurements at the neutron energy 14.7 ± 0.3 MeV for the nuclei ^{23}Na, ^{55}Mn, ^{89}Y, ^{127}I, ^{138}Ba, ^{186}W and ^{197}Au; measurements in the neutron energy range 2 - 4.5 for the nuclei ^{115}In and ^{197}Au.

In progress: Measurements in the neutron energy range 4.5 - 10 MeV for ^{115}In and ^{197}Au.

Method: The activation technique

Accuracy: 10 - 30%

Discrepancies to other reported data: The present results agree well with the results of the spectrum method. Most of previous activation results do not.

Publications: G. Magnusson and I. Bergqvist, 14.7 MeV Neutron Capture Cross-Section Measurements with Improved Activation Technique, Nucl. Techn., 34, 114 (1977).

G. Magnusson, P. Andersson and I. Bergqvist, 14.7 MeV Neutron Capture Cross-Section Measurements with Activation Technique, Physica Scripta, 21, 21 (1980).

SWITZERLAND

Laboratory & address: Eidg. Institut für Reaktorforschung, CH-5303 Würenlingen, Switzerland

Institut für anorganische, analytische und physikalische Chemie, Universität Bern, CH-3012 Bern, Switzerland

Name: H.R. von Gunten, H.N. Erten

Facility: Swimming-pool type reactor (SAPHIR)

Experiments: Determination of independent and cumulative yields in the fission of ^{232}Th, ^{233}U, ^{235}U, ^{239}Pu, and other nuclides

Absolute yields in reactor neutron fission of ^{232}Th

Method: Absolute fission counting
Radiochemical and instrumental (GeLi)

Accuracy: 5 - 10 %

Measurements completed: ^{232}Th: Mass distribution and independent yield measurements completed

Publications:

H.N. Erten, A. Grütter, E. Rössler, H.R. von Gunten
Mass-Distribution in the Reactor-Neutron Induced Fission of ^{232}Th. Nucl. Sci. Eng. 79, 167 (1981)

D.T. Jost and H.R. von Gunten
Independent yields of ^{92m}Nb in the thermal neutron-induced fission of ^{233}U, ^{235}U and ^{239}Pu. J. inorg. nucl. Chem. 43, 2629 (1981)

H.N. Erten, A. Grütter, E. Rössler and H.R. von Gunten
Charge Distribution in the Reactor-Neutron-Induced Fission of ^{232}Th. Phys. Rev. C., 25, 2519 (1982)

CERN, Switzerland

Laboratory: ISOLDE, CERN
and address: CH-1211 Genève 23, Switzerland

Facilities: ISOLDE and Proton Synchrotron. Isotopically pure samples of nuclides are obtained by on-line isotope separation of products formed in proton induced reactions in uranium carbide or irridium targets.

Experiment: Measurement of branching ratios for beta-delayed two-neutron emission from $^{30,31,32}Na$ and ^{100}Rb.

Method: Measurements of neutron time-correlation distributions, beta intensity, gamma intensity from lower mass daughter-products, and for Na also ion counting.

Names 1: C. Detraz, M. Epherre, D. Guillemaud, P.G. Hansen, B. Jonson, R. Klapisch, M. Langevin, S. Mattsson, F. Naulin, G. Nyman, A.M. Poskanzer, H.L. Ravn, M. de Saint-Simon. K. Takahashi. C. Thibault, and F. Touchard

Publication 1: Beta-delayed two-neutron emission from $^{30,31,32}Na$, Phys. Lett. 94B (1980) 307

Names 2: B. Jonson, H.Å. Gustafsson, P.G. Hansen, P. Hoff, P.O. Larsson, S. Mattsson, G. Nyman, H.L. Ravn and D. Schardt

Publication 2: Beta-delayed two-neutron and three-neutron emission. Proc. 4th international conference on nuclei far from stability, Helsingør, Danmark, 1981, CERN- 81-09, p. 265.

CERN, Switzerland

(cont'd)

Laboratory: ISOLDE, CERN
and address: CH-1211, Genève 23, Switzerland

Facility: ISOLDE. Isotopically pure samples of nuclides are obtained by on-line isotope separation of products formed in proton induced reactions in a uranium carbide target.

1. Experiment: Measurement of neutron emission probabilities of ^{9}Li and ^{11}Li.

Method: Neutrons were detected in ^{3}He proportional counters imbedded in paraffin and beta particles in a thin plastic scintillator. The branching ratios were determined from beta-neutron coincidence measurements and for ^{11}Li also from beta-gamma coincidence measurements.

Descrepancies to other reported data: The new measurement of the ^{9}Li Pn-value gives (50±4)% which should be compared to the previously adopted value of (35±5)%. The Pn-values of $^{27-31}Na$, $^{93-98}Rb$, and $^{145,146}Rb$, which have been measured relative to ^{9}Li, all have to be renormalized by the factor 1.43.

Names: T. Björnstad, H.Å. Gustafsson, P.G. Hansen, B. Jonson, U. Lindfors, S. Mattsson, A.M. Poskanzer, and H.L. Ravn

Publication: Delayed neutron emission probabilities of ^{9}Li and ^{11}Li, Nucl. Phys. A359 (1981) 1.

2. Experiment: Spectroscopic investigation of low-lying states in ^{100}Sr fed in the beta-decay of ^{100}Rb.

Method: Gamma-ray spectroscopy of excited states and lifetime determinations by measuring delayed coincidences between beta particles and conversion electrons.

Names: R.E. Azuma, G.L. Borchert, L.C. Carraz, P.G. Hansen, B. Jonson, S. Mattsson, O.B. Nielsen, G. Nyman, I. Ragnarsson and H.L. Ravn

Publication: The strongly deformed nucleus ^{100}Sr. Phys. Lett. 86B (1979) 5.

UNITED KINGDOM

Laboratory and address:	AEE Winfrith	UKAEA Atomic Energy Establishment Winfrith Dorchester, Dorset DT2 8DH

Names: W. H. Taylor, M. F. Murphy, M. F. James

Experiment: Measurements of gross beta decay power from products of Pu239 and U235 fission in a fast reactor. The irradiation was extended over a period of ~ 43 days in order to simulate, as closely as possible, the time distribution of fission events in a typical power reactor irradiation period. The beta power measurements continued up to 2.10^7 seconds after shut down.

Method: Thin deposits of Pu239 and U235, covered with catcher foils, were irradiated near the centre of the Zebra core. The neutron energy spectrum was close to that of a fast power reactor and the fission rates were monitored by absolute (Alpha-calibrated) fission chambers. The beta-power was measured using a scintillation detector which was calibrated using Sr-90/Y-90 and P-32 sources.

Accuracy: The random errors were ± 1% at short cooling times and ± 5% at $\sim 10^7$ sec cooling times. The systematic uncertainty on all the results was ± 2.6%. A comparison between the experimental values of absolute beta power and values calculated using the FISPIN code with the UKFPDD-2 decay data and C3I yield data libraries showed agreement to within the experimental uncertainties.

Completion date: Experiment completed.

Publication: The results have been published in an internal Winfrith report.

UNITED KINGDOM

Laboratory and address: AEE Winfrith — UKAEA
Atomic Energy Establishment
Winfrith
Dorchester, Dorset DT2 8DH

Names: W. H. Taylor, M. F. Murphy, M. R. March, D. B. Gayther*

Experiment: Measurements of gamma decay power from products of Pu239 and U235 fission in a fast reactor. The irradiation was extended over a period of ~43 days in order to simulate, as closely as possible, the time distribution of fission events in a typical power reactor irradiation period.

Method: Thin deposits of Pu239 and U235, covered with catcher foils, were irradiated near the centre of the Zebra core. The neutron energy spectrum was close to that of a fast power reactor and the fission rates were monitored by absolute (Alpha-calibrated) fission chambers. The gross gamma power was measured using a large liquid scintillation tank and the absolute values of the different fission product activities were determined using high resolution γ-ray spectroscopy. The gross measurements extended from 10^4 to 4×10^6 seconds cooling time and the activity measurements from 10^3 to 10^7 seconds.

Accuracy: The uncertainties on the gross gamma power measurements were in the range $\pm$ 2% to $\pm$ 20% and on the activity measurements typically ~$\pm$ 3%.

Completion date: Experiment completed.

Publication: The preliminary results have been published in an internal Winfrith report.

* of AERE Harwell

UNITED KINGDOM

Laboratory and address: AEE Winfrith

UKAEA
Atomic Energy Establishment
Winfrith
Dorchester, Dorset DT2 8DH

Names: W. H. Taylor, C. A. Uttley*, D. B. Gayther*, K Randle+

Experiment: Studies of the Nb93(n,n')Nb93m Reaction

A trial measurement of the differential cross section for this reaction (which at present is only inferred from integral experiments) has been made using the DYNAMITRON machine at Birmingham University as the source of monoenergetic neutrons. This has been made using the joint efforts of AERE, AEE and Birmingham University.

Method: The induced Nb93m activity was determined using a high purity germanium spectrometer and the intensity of the neutron beam from the DYNAMITRON was monitored using the U235(n,f), Ni58(np) Mn54(np) reactions.

Accuracy: The target accuracy is ± 5% and the present problem is to achieve an intense enough neutron beam to enable this target to be achieved.

Completion date: The first measurement should be completed by June 1982.

Publication: The results of the first measurement should be published by the end of 1982.

* of AERE Harwell + Birmingham University

UNITED KINGDOM

Laboratory and Address:	AERE Harwell — UKAEA AERE, Harwell, Oxfordshire OX11 ORA U.K.
Names:	J.G. Cuninghame, H.H. Willis
Facilities:	ZEBRA - BIZET
Experiment:	To measure the effect of change of reactor neutron spectrum on fission yields.
Method:	Four irradiations, each of two ^{235}U, two ^{238}U and two ^{239}Pu metal beads of approx. 100mg. weight have been made; two were in the inner breeder island and two in the outer core. One of the samples of each of the fissile materials was counted directly on a calibrated Ge(Li) detector, while the other was dissolved and used to prepare purified samples of certain fission products of very low yield, viz. As, Ag, Cd, Sn, Sb and Rare Earths. Final results have now been obtained which give complete fission yield curves for fission of ^{235}U in both the inner and outer core positions of a "conventional" fast reactor core arrangement. They show that there is no significant change in fission yields between the two core positions, even though the neutron spectrum in the outer position is much softer than that in the inner. Final calculations of the other 10 fission yield curves are now in progress.
Accuracy:	Expected $\pm$ 10%
Completion date:	Expected 1983

UNITED KINGDOM

Laboratory and Address:	AERE Harwell	UKAEA AERE, Harwell, Oxfordshire, OX11 ORA

Names: I.C. McKean and E.A.C. Crouch

Experiment: ^{3}H yield in thermal and fast fission spectra for U and Pu isotopes

Facilities: GLEEP and 'ZEBRA' Reactors

Method: The tritium produced in fission is converted to tritiated water, separated from other fission products and measured by liquid scintillation counting. A preliminary experiment has been completed in which solutions of ^{235}U were irradiated in a thermal flux. Samples have been irradiated in GLEEP (^{235}U + ^{239}Pu in solution) and in ZEBRA (^{235}U + ^{239}Pu metal) and await analysis. Samples of ^{240}Pu and ^{241}Pu have been obtained for further experiments.

Accuracy: $\pm$ 10%

Completion date: experiment interrupted, continuation pending.

UNITED KINGDOM

Laboratory and Address:	DNPDE	Dounreay Nuclear Power Development Establishment, UKAEA, Northern Division, Thurso, Caithness, Scotland KW14 7TZ
Names:	W. Davies, V.M. Sinclair	
Facilities:	PFR	

Experiment:

The measurement of the absolute yields of ^{90}Sr, ^{137}Cs, ^{144}Ce, $^{143,145,146,148,150}Nd$ and perhaps other fission products, from the fission of ^{235}U, ^{238}U, ^{239}Pu, ^{240}Pu and ^{241}Pu

In progress

Method:

Twelve sealed stainless steel capsules are to be irradiated. Of these,

3 capsules contain ^{235}U as highly enriched uranium dioxide,
3 capsules contain ^{239}Pu as low ^{240}Pu content plutonium dioxide,
2 capsules contain ^{238}U as depleted uranium dioxide with an isotopic analysis of 99.7% ^{238}U,
1 capsule contains ^{240}Pu as a dried aqueous solution of plutonium with an isotopic analysis of 99% ^{240}Pu,
1 capsule contains ^{241}Pu as a dried aqueous solution of plutonium with an isotopic analysis of 93% ^{241}Pu, and
2 capsules contain no added fissile material.

The ^{235}U and ^{239}Pu capsules contain stainless-steel powder mixed with the fissile material dioxide for heat transfer reasons.

It is expected that the ^{235}U and ^{239}Pu capsules will receive irradiation corresponding to about 16% burn-up of the fissile material, the ^{238}U capsule to about 0.7% burn-up, the ^{240}Pu capsule to about 4% burn-up and the ^{241}Pu capsule to about 23% burn-up.

A set of capsules identical to the irradiated set except for irradiation in the reactor will be dissolved and analysed alongside the irradiated set, the objective being to improve the reliability of the analyses.

The aim is to correlate loss of fissile material during irradiation with the amounts of fission products formed, for each capsule, (except ^{238}U) to enable absolute measurements of fission yields to be obtained.

Accuracy:

± 2% for ^{235}U and ^{239}Pu fission yields
± 6% for ^{238}U, ^{240}Pu and ^{241}Pu fission yields

Expected completion date: 1984

UNITED KINGDOM

Laboratory and address:	National Physical Laboratory	Queens Road Teddington Middlesex TW11 OLW, UK

Names: P Christmas, P Cross

Facilities: Iron-free, $\pi\sqrt{2}$ magnetic β-ray spectrometer.

Experiment: Measurement of β-spectra of ^{90}Sr-^{90}Y to determine shape factors and endpoint energies. Similar measurements are being made by three other European Laboratories using sources prepared from NPL solution. This intercomparison has been organized by NPL on behalf of the International Committee for Radionuclide Metrology (ICRM).

Accuracy: Endpoint energies will be determined with an expected uncertainty of ± 1 keV.

Completion date: Target is end 1982.

UNITED KINGDOM

Laboratory and address:	National Physical Laboratory	Queens Road, Teddington Middlesex. TW11 OLW, UK.

Names: M J Woods, J L Makepeace, R A Mercer

Facilities: Mass separator, $4\pi\beta$-γ-coincidence system, high pressure ionisation chambers

Experiment: Production of solution and gamma reference standards of ^{152}Eu, measurement of half-lives of ^{152}Eu and ^{154}Eu.

Method: 99+% enriched ^{151}Eu and ^{153}Eu further enriched by mass separation and irradiated to produce ^{152}Eu and ^{154}Eu. ^{152}Eu solution to be standardised by the $4\pi\beta$-γ-coincidence technique, and then solution and point gamma reference standards to be fabricated. ^{152}Eu and ^{154}Eu half-lives to be determined by current response measurements in high pressure ionisation chambers, type IG11.

Progress: ^{154}Eu has been standardized and a preliminary value of 8.46y obtained for the half-life.

Accuracy: Standards to be accurate within ±1% overall. Estimated that half-lives will be determined to within ± 1% (1σ) by end 1982.

UNITED KINGDOM

Laboratory and address: Birmingham Radiation Centre, University of Birmingham
P.O. Box 363
Birmingham B15 2TT
United Kingdom

Names: J.G. Owen, J. Walker, D.R. Weaver

Facilities: 3MV Dynamitron accelerator (Birmingham) and the Tandem Van de Graaff and IBIS (Harwell)

Experiments: Delayed neutron spectrum measurements following monoenergetic fast neutron induced fission in ^{235}U and ^{239}Pu

Spectrum measurement of Am/Li sources as recommended by the March 1979 Vienna Consultants' Meeting on Delayed Neutron Properties. An Am/F source has also been measured.

Method: ^{3}He spectrometers; for delayed neutron measurements cyclic irradiation and counting to give near-equilibrium contributions from all delayed neutron groups.

Accuracy: A full covariance matrix is calculated.

Publication: A paper describing the Am/Li measurement and the method of obtaining the covariance matrix has been published. A further paper on a 5Ci Am/Li source is in press.

UNITED KINGDOM

(same as INDC(NDS)-116)

Laboratory and Address: Kelvin Laboratory — University of Glasgow, N.E.L., East Kilbride, Glasgow G75 OQU.

Names: G.I. Crawford, J.D. Kellie, S.J. Hall, University of Glasgow: B. Pfeiffer, L. Alquist, I.L.L., Grenoble.

Facilities: Experiment performed on Ostis separator at I.L.L., Grenoble.

Experiment: Delayed neutron energy spectra of ^{93}Rb, ^{94}Rb, ^{95}Rb.

Method: For each named isotope in turn separated precursors were collected on a slowly moving tape (which prevented build-up of long-lived activities) just in front of a thin plastic scintillator which detected the β decay of the Rb nuclei. Neutrons were detected in two detectors (i) a Li glass detector which was at a relatively short flight path and mainly detected low energy (< 250 keV) neutrons and (ii) a NE213 scintillator which was used at a longer flight path to detect the higher energy neutrons. Pulse shape discrimination was used with the NE213 scintillator to reduce γ-ray background. Beta-neutron time of flight spectra were recorded for various flight paths for each of the precursors. Relatively long flight paths for ^{94}Rb and ^{95}Rb gave the best resolution. This was typically < 1 keV below 20 keV, about 6 keV at 250 keV and 16 keV at 500 keV in the high resolution runs. The detector efficiencies were calibrated against the standard ^{252}Cf fission spectrum.

Accuracy: Limited principally by counting statistics and not yet finally established.

Completion date: It is hoped to complete the analysis of the data and comparisons with other results by July 1981.

Comparison with other data: The spectra appear to be in good general agreement with the ^{3}He data of Kratz et al. The presence of the 13.6 keV peak in ^{95}Rb is clearly established. The significance of other structure observed in the spectra is being evaluated.

Publications: Only so far in I.L.L. Annual Reports.

USA

Laboratory and Address:	Argonne National Laboratory 9700 South Cass Avenue Argonne, Illinois 60439
Names:	L. E. Glendenin, J. E. Gindler, J. W. Meadows
Facilities:	Fast-neutron generator facility (FNGF)
Experiment:	Determination of fission yields for monoenergetic neutron-induced fission as a function of incident neutron energy over the range 0.1 to 8 MeV.
Method:	Yields determined (1) radiochemically with either β- or γ-counting (RC) and (2) by γ-counting irradiated foils of fissionable material (γ). Neutrons produced by Li-p or D-d reaction. Flux monitored with fission chamber utilizing as the fission source the same material as that being irradiated. Absolute yields determined from flux measurements and/or 200% normalization of mass-yield distribution.
Accuracy:	Yields > 1% determined by γ-counting: 3-5% Yields < 1% determined by γ-counting: 5-20% Yields determined radiochemically with β-counting: 10-20%
Completion Date:	Measurements completed and published for $^{238}U(n,f)$ $^{232}Th(n,f)$ and $^{235}U(n,f)$. Work in progress for $^{239}Pu(n,f)$.
Publications:	"Mass distributions in monoenergetic-neutron-induced fission of ^{238}U", S. Nagy, K. F. Flynn, J. E. Gindler, J. W. Meadows, and L. E. Glendenin, Phys. Rev. C17, 163 (1978). "Mass distributions in monoenergetic-neutron-induced fission of ^{232}Th", L. E. Glendenin, J. E. Gindler, I. Ahmad, D. J. Henderson and J. W. Meadows, Phys. Rev. C22, 152 (1980). "Mass distributions for monoenergetic-neutron-induced fission of ^{235}U", L. E. Glendenin, J. E. Gindler, D. J. Henderson and J. W. Meadows, Phys. Rev. C24, 2600 (1981).

U.S.A.

(same as INDC(NDS)-116)

Laboratory and address:

Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois, 60439 U.S.A.

1. Measurements of fast-neutron capture cross sections of fission-product nuclei.

Authors:

W. P. Poenitz and J. M. Wyrick

Facilities:

FNG (Fast Neutron Generator Facility), Ge(Li)-detectors, Large Liquid-Scintillation Detector.

Measurements:

Activation cross sections of Indium, Zirconium, Molybdenum and Cadmium were measured at 30 KeV. The forward cone close to the threshold of the ^{7}Li(p,n) reaction was used as a neutron source. The activity was measured with a Li(Ge)-detector. Results will be obtained for ^{115}In(n,γ)^{116m}In, ^{98}Mo(n,γ)^{99}Mo, ^{100}Mo(n,γ)^{101}Mo, ^{94}Zr(n,γ)^{95}Zr, ^{96}Zr(n,γ)^{97}Zr, ^{110}Cd(n,γ)^{111m}Cd, ^{114}Cd(n,γ)^{115g}Cd, ^{116}Cd(n,γ)^{117}Cd, ^{116}Cd(n,γ)^{117g}Cd, and ^{116}Cd(n,γ)^{117m}Cd. Thermal cross sections will also be obtained for some of these reactions. These data should prove useful for the normalization of theoretically calculated capture cross sections.

The energy dependence of capture cross sections of elements in the fission product mass range above 400 KeV were measured with a large liquid scintillator. Data for rhodium, palladium, neodymium, and samarium were analyzed and reported at the NEANDC Specialists' Meeting on Neutron Cross Sections of Fission Product Nuclei held at Bologna, December 12-14, 1979.

Additional activation measurements are planned on rhodium, palladium, niobium and others at 30 KeV and 500 KeV.

U.S.A.

(cont'd, same as INDC(NDS)-116)

Laboratory and address:

Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois, 60439 U.S.A.

2. Measurements of fast-neutron total cross sections of fission-product nuclei.

Authors:

W. P. Poenitz, J. F. Whalen, A. B. Smith and P. T. Guenther

Facilities:

Fast-neutron monoenergetic source capability based upon a tandem accelerator.

Measurements:

Accurate total-neutron-cross-section data are needed in the fission product mass region in order to establish reliable optical model parameter sets to be used in nuclear model calculations of capture cross sections. A perusal of existing data reveals a substantial lack of such data and/or the existence of discrepancies (Ref. 1).

Measurements of the total neutron cross section of Y, Zr, Mo, Cd, Sn, Te, Ag, Nb, Rh, Pd, In and Sb in the energy range from 50 KeV to 4.5 MeV were completed. The measurement procedure followed that used for the heavy nuclei reported earlier (Ref. 2). Data were obtained in the 50 KeV-220 KeV energy range with pseudo-white neutron spectra and from 200 KeV to 4.5 MeV with monoenergetic neutrons. The data were corrected for resonance-self-shielding using correction factors calculated with Monte Carlo techniques. Measurements at some energies and for some samples (Nb, In, Sn, Mo, Y) with different thicknesses were used to verify these corrections. These data will be used together with scattering data for establishing optical model parameters which are needed for the calculation of capture cross sections of fission product nuclei.

Ref. 1. W. P. Poenitz, "Fast Neutron Capture Cross Section Measurements, Evaluations and Model Calculations of Fission Product Nuclei", Proc. Spec. Meeting on Neutron Cross Sections of Fission Product Nuclei, Bologna, (1979), NEANDC(E) 209 "L", p. 85.

Ref. 2. W. P. Poenitz et al., to be published, Nucl. Sci. Eng., (1981).

U.S.A.

(cont'd, same as INDC(NDS)-116)

Laboratory and address:

Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois, 60439 U.S.A.

3. Measurements of fast-neutron scattering cross sections.

Authors:

A. B. Smith, P. T. Guenther and C. Budtz-Jørgensen

Facilities:

FNG (Fast Neutron Generator), 10-Angle Time-of-Flight Facility.

Measurements:

The measurement program has focused upon elastic scattering with comprehensive results obtained from Z=39 to 52 including all elemental targets and selected isotopic targets. The experimental results have been reduced to cross sections and a unified model describing the region is being developed. Some of the measurements (e.g. Y and Nb) include detailed inelastic-neutron scattering results. In other instances additional inelastic-scattering measurements are planned with higher resolutions and in a few cases the isotopic complexity of the element (e.g. Sn) make inelastic-neutron studies unrewarding. In these latter instances isotopic targets are being used to the extent they are available and funded.

U.S.A.

Laboratory and Address: Brookhaven National Laboratory
Upton, New York, 11973

Names: R. E. Chrien, R. L. Gill, M. Shmid, A. Wolf, Y. Y. Chu, R. F. Casten and D. D. Warner

Facilities:
On-Line Mass Separator "TRISTAN"
Surface Ionization Source for Production of Alkaline Metals
High-Temperature Plasma Source
Febiad Source
PDP-11-based Data Acquisition System

Experiments:
β and γ spectroscopy of fission product nuclei
Nuclear masses far from stability
Delayed neutron production and spectra
Time-of-flight, recoil and He 3 spectrometer
Angular correlations and perturbed angular correlations

Accuracy:
State-of-art precision for spectroscopic experiments
±10% in delayed neutron probabilities
±2% in half lives, typical
Q_β ± (10 to 100 keV)

Comments:
TRISTAN is a multi-user facility with participants from the following institutions, in addition to the local group:

Clark University
Cornell University
Idaho National Engineering Laboratory
Iowa State University
Los Alamos National Laboratory
Lawrence Livermore National Laboratory
Louisiana State University
McGill University
Pacific Northwest Laboratory
Swarthmore College
University of Maryland
University of Oklahoma

For detailed publication list and participant list, please refer to individual contributions. A summary of the program is available in the DOE-NDC Progress Reports, available from the National Nuclear Data Center.

Editor's note: a list of measurements in given on the next page.

U. S. A.

(cont'd)

Editor's note: in order to give more details on the data measured, the list below was extracted by the editor from DOE-NDC Progress Report no. 24 (May 1981).

- The O(6) symmetry and the structure of ^{136}Ba (capture measurements at 2 and 2 and 24 keV)

- Nuclear structure of ^{155}Sm

- Tests of odd-mass nuclei for the IBA: ^{103}Ru

- Resonance capture γ-ray studies of the Se isotopes
  (see contribution on next page)

- Beta-delayed two-neutron emission from ^{98}Rb
  (see contribution on page 122)

- Recoil spectrometer measurements of beta-delayed neutron spectra ($^{93-95}Rb$)

- Delayed neutron spectra by time-of-flight (^{95}Rb)

- Precise Q-values for neutron-rich Rb and Cs isotopes

- Angular correlation studies of the transitional nuclides $^{142-146}Ce$ and the low lying 0+ excited states

- Band structure in ^{148}Ce

- Levels of ^{146}Ce from the decay of ^{146}La

- The decay of mass-separated $^{146,148}Ba$ to levels in $^{146,148}La$

- Study of the decay of low-spin ^{148}Pr to levels of ^{148}Nd

- Low-lying levels in the N=85 isotone ^{141}Ba

- Levels in ^{99}Sr resulting from the decay of ^{99}Rb

- Studies of the decay of ^{147}Cs and ^{147}Ba and a reinvestigation of the decay of ^{147}La

U.S.A

Laboratory and Address:	Physics Department, Brookhaven National Laboratory, Upton, New York 11973, USA.
Names:	G. Engler, Robert E. Chrien and H.I. Liou
Facilities:	-40 MW research reactor -Three-crystal-pair spectrometer -Time-of-flight fast chopper facility.
Experiment:	Thermal and Resonance Neutron Capture Studies in Se Targets with A=74, 76, 77, 78, 80.
Method:	A three-crystal-pair spectrometer was used for thermal neutron capture. A time-of-flight chopper facility with stations at 22m and 48m and a Ge(Li) detector, was used for neutron resonance capture experiments.
Accuracy:	20÷30% for γ-intensities, 0.3 keV for energies.
Results:	Energies and intensities of primary and secondary γ-rays for thermal and resonance neutron capture for $^{74,76,77,78,80}Se$. Also neutron separation energies for $^{75,77,78,81}Se$ were deduced. 10 resonances were analyzed. E1 strength functions were calculated for $^{74,76,77}Se$ and for 27.1 eV resonance in ^{74}Se.
Completion date:	Completed
Discrepancies to other reported data:	Overall good agreement with previous experimental γ-ray energies. γ-intensities are systematically higher than published data.
Publication:	Nucl. Phys. A372 (1981) 125

U.S.A

Laboratory and address: Idaho National Engineering Laboratory
EG&G Idaho, Inc.
P. O. Box 1625
Idaho Falls, Idaho 83415 USA

Names: R. A. Anderl, Y. D. Harker

Experiment: Integral cross-section measurements in fast-reactor-type environments.

Method: Enriched isotopes of fission-product-class materials are irradiated in the fast neturon fields of the Coupled Fast Reactivity Measurements Facility(CFRMF) and of the Experimental Breeder Reactor-II (EBR-II). Integral capture cross sections are derived from measurements which utilize gamma spectrometry and/or mass spectrometry. Neutron fields are characterized by means of transport calculations, active neutron dosimetry or passive neutron dosimetry. Integral cross sections are used for testing evaluated cross sections.

Accuracy: 3%-10% (1σ uncertainty)

Measurements Completed: Earlier measurements for ~50 fission-product capture reactions in the CFRMF were re-evaluated and re-analyzed using ENDF/B-V decay data. Final report was prepared on integral capture measurements in EBR-II for isotopes of Nd, Sm and Eu.*)

Measurements Planned: Remeasurements of the integral cross sections of ^{99}Tc, ^{103}Rh, ^{104}Ru, ^{109}Ag, ^{127}I and ^{147}Pm irradiated in the CFRMF are underway.

Publications:

Y. D. Harker, R. A. Anderl, "Integral Cross-Section Measurements on Fission-Products in Fast Neutron Fields," in the Proceedings of Specialists' Meeting on Neutron Cross Sections of Fission-Product Nuclei, Bologna, Italy, December 12-14, 1979, NEANDC(E)209"L" (June 1980).

J. M. Ryskamp, R. A. Anderl et al., "Sensitivity and Uncertainty Analysis of the CFRMF Central Flux Spectrum," Nucl. Tech. 57, 20 (1982).

R. A. Anderl, "Integral Data-Testing Report for ENDF/B-V Fission-Product and Actinide Cross Sections," U. S. DOE Report EGG-PHYS-5406, April, 1981.

R. A. Anderl, F. Schmittroth, Y. D. Harker, "Integral-Capture Measurements and Cross-Section Adjustments for Nd, Sm and Eu," U. S. DOE Report EGG-PHYS-5182, INEL, July, 1981. *)

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*) $^{143-146,148,150}$Nd, ^{147,149}Sm, $^{151-154}$Eu

U.S.A.

Laboratory and address: Idaho National Engineering Laboratory
EG&G Idaho, Inc.
P. O. Box 1625
Idaho Falls, Idaho 83415 USA

1. Names: R. C. Greenwood, R. J. Gehrke, J. D. Baker, V. J. Novick

Experiment: Nuclear decay properties ($T_{1/2}$, γ-branching, β-branching) of short-lived fission products.

Facility: Two 300-μg ^{252}Cf fission-product sources coupled via He-gas jet transport to a chemical separation laboratory.

Method: Fast on-line chemical separations using continuous centrifugal contactors and high pressure liquid chromatography followed by γ- and β-ray measurements.

Measurements Completed: The $T_{1/2}$ and γ-ray energies and intensities for new isotopes 8.5-min ^{168}Dy and 2.11-min ^{165}Tb.

Publications:

J. D. Baker, R. J. Gehrke, R. C. Greenwood and D. H. Meikrantz, "Advanced System for Rapid Separation of Rare Earth Fission Products," Journal of Radioanalytical Chemistry (in press).

R. J. Gehrke, R. C. Greenwood, J. D. Baker and D. H. Meikrantz, "A New Isotope ^{163}Gd; Comments on the Decay of ^{162}Gd," Radiochimica Acta (in press).

R. C. Greenwood, R. J. Gehrke, J. D. Baker and D. H. Meikrantz, "Identification of New Neutron-Rich Rare-Earth Nuclei Produced in ^{252}Cf Spontaneous Fission," in 4th International Conference on Nuclei Far From Stability, CERN 81-09 (1981) pp. 602-607.

R. C. Greenwood, R. J. Gehrke, J. D. Baker and D. H. Meikrantz, "Identification of a New Isotope, ^{155}Pm, Produced in Spontaneous Fission of ^{252}Cf," Radiochimica Acta (in press).

D. H. Meikrantz, R. J. Gehrke, L. D. McIsaac, J. D. Baker and R. C. Greenwood, "An Automated System for Selective Fission Product Separations; Decays of $^{113-115}$Pd", Radiochim. Acta 29 (1981) 93.

U.S.A.

(cont'd)

2. Names: R. J. Gehrke, R. G. Helmer

Facilities:
1) 4π β-γ coincidence counting system
2) Calibrated Ge(Li) spectrometers

Experiment: Determination of absolute γ-ray emission probabilities for important fission-product isotopes.

Method: The decay rates are determined by the 4π β-γ coincidence counting system, which has two separate pulse-processing systems. One system is based on fixed pulse widths. The other is based on variable pulse widths and an overlap coincidence circuit. The dead time of the beta, gamma and coincidence channels is measured by counting the pulses from a 10 MHz clock. The variable pulse width system is useful in measuring the γ-ray emission probabilities of short-lived (<30 m) fission products, where high count rates are needed. The γ-ray emission rates are determined by Ge(Li) spectrometers whose efficiencies have been measured to an accuracy of ±1-1/2% (1σ) between 0.3 and 2 MeV.

Accuracy: ±1% to ±5% (1σ uncertainty).

Measurement Completed: Emission probabilities of the 57- and 293-keV γ rays emitted in the decay of ^{143}Ce measured to an accuracy of ~3% and 1.0%, respectively. (1σ level).

Completion Date:
^{146}Ce measurement in progress.
^{147}Nd measurement in progress.

Publications:

R. J. Gehrke, "γ-Ray Emission Probabilities for the Decays of ^{141}La and ^{142}La," Int. J. Appl. Radiat. and Isotopes 32, 377 (1981).

R. J. Gehrke, "Gamma-Ray Emission Probability for the Decay of ^{143}Ce," Int. J. Appl. Radiat. and Isotopes (in press).

R. J. Gehrke and L. O. Johnson, "A 4π β-γ Coincidence System with Minimally Broadened Pulses for High Count Rates," submitted for publication in Nucl. Instr. and Methods.

U.S.A.

(cont'd)

3. Names: R. G. Helmer, R. C. Greenwood, R. J. Gehrke, A. J. Caffrey

Experiment: (new) Precise γ-ray energy measurements for energy calibration standards.

Facility: γ-ray spectrometers using Ge detectors.

Method: Comparison of γ-ray energies by measurement of spectra including lines of known and unknown energies.

Measurements Completed: γ-ray energies for ^{99}Mo, ^{133}Ba and ^{210}Pb.

Publications: R. G. Helmer, A. J. Caffrey, R. J. Gehrke and R. C. Greenwood, "γ-Ray Energies from the Decay of ^{99}Mo, ^{133}Ba and ^{210}Pb," Nucl. Instr. and Methods 188, 671 (1981).

U. S. A.

Laboratory: Idaho National Engineering Laboratory

Address: Exxon Nuclear Idaho Co., Inc.
P. O. Box 2800
Idaho Falls, Idaho 83401
United States of America

1. Name: T. C. Chapman, W. J. Maeck

Experiment: Fast Reactor Fission Yields and Determination of Burnup for Fast Reactor Fuels

A program at the Idaho Chemical Processing Plant (ICPP) laboratories to accurately measure absolute fast reactor fission yields for ^{233}U, ^{235}U, ^{238}U, ^{237}Np, ^{239}Pu, ^{240}Pu, ^{241}Pu, and ^{242}Pu has been completed. The irradiations were conducted in EBR-II.

Method: The principal measurement technique was isotope dilution mass spectrometry for the isotopes of Kr, Rb, Sr, Zr, Mo, Ru, Xe, Ce, Ba, La, Ce, Nd, and Sm. The number of fissions was established by summing the total number of atoms in the heavy mass peak.

Accuracy: In general, the uncertainties associated with ^{235}U, ^{237}Np, ^{239}Pu, ^{241}Pu, and ^{242}Pu yields range from 1.0-1.5% relative, and for ^{238}U and ^{240}Pu yields, the uncertainties range from 1.5-3.0% relative.

Completion Date: Completed.

Publications: The results of this measurement program have been published in the reports listed below. These reports are available from the National Technical Information Service, U. S. Dept. of Commerce, 5285 Port Royal Road, Springfield, Virginia, 22161, USA.

1. W. J. Maeck, Editor, "Fast Reactor Fission Yields for ^{233}U, ^{235}U, ^{238}U, ^{239}Pu and Recommendations for the Determination of Burnup on FBR Mixed Oxide Fuels: An Interim Project Report," Allied Chemical Corporation, Idaho Chemical Programs Rept., ICP-1050-I (January 1975).

2. W. J. Maeck, Editor, "Fast Reactor Fission Yields for ^{239}Pu and ^{241}Pu," Allied Chemical Corporation, Idaho Chemical Programs Rept., ICP-1050-II (August 1977).

3. W. J. Maeck, W. A. Emel, A. L. Erikson, J. E. Delmore, J. W. Meteer, "Fast Reactor Fission Yields for ^{237}Np," Allied Chemical Corporation, Idaho Chemical Programs Rept., ICPP-1050-III (September 1977).

4. W. J. Maeck, R. L. Eggleston, A. L. Erikson, R. L. Tromp, "Fast Reactor Fission Yields for ^{240}Pu and ^{242}Pu," Allied Chemical Corporation, Idaho Chemical Programs Rept., ICP-1050-IV (February 1979).

U. S. A.

(cont'd)

5. W. J. Maeck, A. L. Erikson, R. L. Tromp, "Fast Reactor Fission Yields for ^{233}U, and ^{235}U Irridated in Row-4 of EBR-II, Exxon Nuclear Idaho Co., Inc., Rept., ENICO-1028 (February 1980).

6. W. J. Maeck A. L. Erikson R. L Tromp, "Fast Reactor Fission Yields for ^{241}Pu and Relative Fission Product Isotopic Data for ^{239}Pu Irradiated in Row-4 of EBR-II," Exxon Nuclear Idaho Co., Inc., Rept., ENICO-1046 (July 1980).

7. A. L. Erikson, R. L. Tromp, W. J. Maeck, W. A. Emel, "Methods for Fission Product Analysis by Isotope Dilution Mass Spectrometry," Exxon Nuclear Idaho Co., Inc., Rept, ENICO-1061 (October 1980).

8. W. J. Maeck, R. L. Tromp, "Revised EBR-II Fast Reactor Fission Yields for ^{233}U, ^{235}U, and ^{238}U," Exxon Nuclear Idaho Co., Inc., Rept, ENICO-1091 (August 1981).

9. R. L. Tromp, J. E, Delmore, R. A. Nielsen, T. C. Chapman, "Mass Spectrometric Systems and Techniques for Fission Product Analysis," Exxon Nuclear Idaho Co., Inc., Rept, ENICO-1094 (October 1981).

2. Name: T. C. Chapman, R. L. Tromp

Experiment: Fast Reactor Fission Yield Measurements in FFTF.

For many years, personnel at the Idaho Chemical Processing Plant (now operated by Exxon Nuclear Idaho Company, Inc.) at the Idaho National Engineering Laboratory, have been involved in the accurate measurement of absolute fission yields for use on the determination of burnup in fast reactor fuels. As a continuing effort of this program, an irradiation of heavy element nuclides (^{233}U, ^{235}U, ^{239}Pu, and ^{241}Pu) was conducted in the eight-day full-power run associated with the FFTF Reactor Characterization Experiment at Hanford, Washington.

The primary purpose is to generate a group of heavy element reference standards for which the number of fissions and burnup are well known. By combining this experiment with others of a similar nature, these samples will serve as reference and comparison standards. A secondary purpose is to verify the fast reactor fission yields measured in EBR-II and to assess the validity of using EBR-II values for irradiations conducted in FFTF.

For this experiment, ten samples each of highly-enriched ^{233}U, ^{235}U, ^{239}Pu, and ^{241}Pu (as oxides), sealed in high-purity nickel capsules were irradiated. Capsules were placed axially in one of the removable pins in Rows 1, 4, 5, and 6. Each pin was located immediately adjacent to an ILLR dosimetry package pin. The amount of material in each sample capsule was adjusted such that each individual sample will give about 10^{19} fissions.

U. S. A.

(cont'd)

Schedule: The irradiation was completed in November, 1981. Analysis is planned to begin in Idaho during late 1982.

Method: The samples in Rows 1 and 6 will be dissolved and analyzed for the following fission product elements using isotope dilution mass spectrometry: Kr, Rb, Sr, Zr, Mo, Ru, Xe, Cs, Ba, La, Ce, Nd, and Sm. The absolute number of fissions will be established by summing the number of fission product atoms in the heavy mass peak. The samples in Rows 4, and 5, will only be partially analyzed. principally for Nd, Cs, Kr, and Xe, to establish relative fission yield values for the intermediate reator positions. Extensive correlation of the isotopic composition and fission yields of several of the fission product elements as a function of neutron energy will be made.

3. Name: William J. Maeck

Experiment: Natural Fission Reactor Studies: ^{238}U Spontaneous Fission Yields

In the process of analyzing approximately 25 rich uranium ore samples for fissiogenic ruthenium, a preliminary estimate of the ^{238}U spontaneous fission yields for ^{99}Ru, ^{101}Ru, ^{102}Ru, ^{104}Ru has been obtained. The measurement technique was mass spectrometry.

After correction for the natural Ru component and the fissiogenic component resulting from ^{235}U induced fission, the best estimate for the isotopic composition of ^{238}U spontaneous fission Ru is:

99	0.236
101	0.285
102	0.314
104	0.165

Using a value of 6.0% for the ^{238}U spontaneous fission yield of ^{99}Mo, the preliminary ^{238}U spontaneous fission yields for the Ru isotopes are:

^{99}Ru	6.0% (relative to ^{99}Mo)
^{101}Ru	7.25
^{102}Ru	8.0
^{104}Ru	4.2

These values have been updated and supersede those reported in INDC (NDS)-86.

Special Comment: Funding for this experiment was discontinued in 1981. Work will be resumed when funding is made available.

U.S.A.
(same as INDC(NDS)-116)

LABORATORY	Lawrence Livermore Laboratory University of California P.O. Box 808 Livermore, CA 94550, U.S.A.	+ McClellan Central Laboratory 1155th Technical Operations Squadron McClellan AFB, CA 95652
NAMES	D. R. Nethaway A. L. Prindle D. H. Sisson	+ M. V. Kantelo[1] + R. A. Sigg[1]

FACILITY — FLATTOP Critical Assembly (Pu), Los Alamos Scientific Laboratory

1. EXPERIMENT — Measure fission yields for fission of Am-241 induced by fission-spectrum neutrons.

METHOD — Measurements were made by doing chemical separations on the irradiated Am-241 samples and by using the recoil catcher-foil technique. Absolute yields are based on a normalization of the mass-yield curve, and on the use of the $^{235}U(n,f)$ and $^{238}U(n,f)$ monitor reactions. The accuracy of the measurements is about ± 5%.

COMPLETION DATE — The experiment is finished.

PUBLICATION — A manuscript has been submitted to The Physical Review C. A preprint is available as UCRL-85195 (Dec. 1980).

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[1] Present address: E. I. duPont de Nemours and Co., Savannah River Laboratory, Aiken, SC 29808.

U.S.A.
(cont'd.)
(new)

LABORATORY: Lawrence Livermore National Laboratory
University of California
P.O. Box 808
Livermore, CA 94550, U.S.A.

NAMES: D. R. Nethaway
F. F. Momyer
C. F. Smith
N. A. Bonner

FACILITY: Livermore RTNS-2 Accelerator (D-T Neutrons)

2. EXPERIMENT: Measure fission yields of rare gases, especially 10.7-y ^{85}Kr, for fission of ^{235}U, ^{238}U, and ^{239}Pu induced by 14-15 MeV neutrons. Several rare-earth yields will also be measured, such as ^{156}Eu and ^{161}Tb.

METHOD: Measurements will be made by separating and counting the gaseous products from the dissolved target. Other products will be measured by direct Ge(Li) counting of an aliquot of the solution, and by chemically separating and counting various rare-earth products. Fission yields will be measured relative to known yields of products such as ^{95}Zr, ^{99}Mo, and ^{147}Nd. We plan to have about 10^{14} fissions in each target of 1 g of uranium or plutonium. The relative fission yields will be measured with an accuracy of about 2-5%.

COMPLETION DATE: We plan to have the first irradiation in June 1982, and to finish the irradiations this year.

U.S.A.

Laboratory	Oak Ridge National Laboratory, P. O. Box X, Oak Ridge, Tennessee USA 37830
Name:	R. L. Macklin
Facility:	Oak Ridge Electron Linear Accelerator (ORELA)
Experiment:	Neutron Capture Cross Sections 2.6-2000 keV; ^{99}Tc, ^{107,109}Ag, ^{127,129}I, ^{136}Xe
Method:	Neutron Time-of-Flight; prompt gamma cascade energy by liquid scintillator pulse height weighting
Accuracy:	Estimated 5% or less
Completion Date:	Experiment 1981-2; Analysis and Report 1982-3
Discrepancies:	Suggested for ^{109}Ag
Publications:	R.L. Macklin and R.R. Winters, "Stable Isotope Capture Cross Sections from Oak Ridge Electron Linear Accelerator," NSE 78, 147 (1981)
	B. Fogelberg et al. "Neutron Resonance Study of ^{86}Kr*", Fourth International Symposium on Neutron-Capture Gamma-Ray Spectroscopy and Related Topics, Grenoble, France, September 7-11, 1981
	R.L. Macklin, "Cesium-133 Neutron Capture Cross Section", NSE (in press) 1982

U.S.A.

Laboratory and Address: Oak Ridge National Laboratory
P. O. Box X, Building 6010
Oak Ridge, Tennessee 37830, USA

1. Names: J. K. Dickens and J. W. McConnell

Facilities: Fast Rabbit Transport Station at Oak Ridge Research Reactor (ORR)

Experiment: (revised) Absolute yields of fifty-one mass chains created by thermal-neutron fission of ^{249}Cf have been determined from data obtained for 107 gamma rays following decay of 97 fission products.

Method: A 0.4 μgram sample of ^{249}Cf was irradiated for three irradiation periods: 5 sec, 120 sec, and 10 min with thermal neutrons. Following an irradiation the sample was moved to a γ-ray counting area. Unseparated fission-product γ-ray spectra were obtained using a large volume Ge(Li) detector. One hundred fifteen counting measurements were made between 45 sec and 0.3 yr after irradiation.

Accuracy: Between 8% and 50% (1σ), made up of 8% uncertainty in determining the number of fissions created in the sample, and the remainder due to uncertainties in peak extractions and in branching ratios and lifetimes given in the literature.

Completion date: January 1981.

Discrepancies: Data agree with most prior measurements, except for A = 113 ± 2, which discrepancies may indicate that incorrect γ-ray branching ratios are currently in the literature for radioisotopes in this mass region.

Publications: J. K. Dickens and J. W. McConnell, "Yields of Fission Products Produced by Thermal-Neutron Fission of ^{249}Cf," Physical Review C 24, 192 (1981).

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2. Names: J. K. Dickens, J. W. McConnell and K. J. Northcutt

Facilities: Fast Rabbit Transport Station of the ORR

Experiment: (revised) Absolute yields of 39 fission products having half-lives between 15 and 4600 sec, representing 30 mass chains created by thermal-neutron fission of ^{229}Th have been determined.

U. S. A.
(cont'd)

Method: A 15 μgram sample of ^{229}Th was irradiated for 15 sec with thermal neutrons. Unseparated fission-product γ-ray spectra were obtained using a large-volume Ge(Li) detector. Counting intervals were initiated between 25 and 1920 sec following the end of the irradiation.

Accuracy: Relative 1σ uncertainties range between 6 and 65%; absolute uncertainties are dominated by a 13% uncertainty in determining the number of fissions created in the sample.

Completion date: March 1981

Discrepancies: Cumulative fission yields are in fair agreement with previous measurements and recommended evaluations.

Publications: J. K. Dickens, J. W. McConnell, and K. J. Northcutt, "Yields of Short-Lived Fission Products Produced by Thermal-Neutron Fission of ^{229}Th," Nucl. Sci. Engg. 80, 455 (1982).

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3. Names: J. K. Dickens and J. W. McConnell

Facilities: Fast Rabbit Transport Station at the ORR.

Experiment: (new) Absolute yields of 37 fission products having half-lives between 7 min and 65 days, representing 25 mass chains created by thermal-neutron fission of ^{229}Th have been determined.

Method: A 15 μgram sample of ^{229}Th was irradiated twice, once for 150 sec and a second time for 1200 sec, with thermal neutrons. Counting intervals were between 15 min and 0.4 yr following the end of the irradiation.

Accuracy: Relative 1σ uncertainties range between 2 and 15%; absolute uncertainties are dominated by an 8% uncertainty in absolute normalization, which is based on good agreement of the total mass yield for A between 76 and 152 with the expected 200% total yield.

Discrepancies: Deduced fission yields are in reasonably good agreement with previous measurements. Deduced mass yields agree with evaluation for $A \le 100$ and $138 \le A \le 141$, and disagree for $129 \le A \le 137$ and $A \ge 141$.

Completion date: January 1982.

Publication: J. K. Dickens and J. W. McConnell, "Yields of Fission Products Produced by Thermal-Neutron Fission of ^{229}Th," preprint available May 1982.

U. S. A.
(cont'd)

4. Names: D. G. Breederland, J. K. Dickens, and J. W. McConnell

Facilities: Fast Rabbit Transport Station of the High Flux Isotope Reactor (HFIR).

Experiment: (new) Absolute yields of 23 fission products having half-lives between 6 hr and 65 day, representing 16 mass chains created by thermal-neutron fission of a sample enriched in the isotope ^{243}Cm have been determined.

Method: A 0.077μgram sample of ^{243}Cm (in the form of curium nitrate) was irradiated for 150 sec by thermal neutrons. Unseparated fission-product γ-ray spectra were obtained between 22 hrs and 79 days after the end of the irradiation.

Accuracy: Relative 1σ uncertainties are between 1 and 25%. Absolute uncertainties have not yet been determined.

Completion date: First part, December 1981. A date has not been set for completion of the total data reduction.

Discrepancies: There are no prior measurements for $^{243}Cm(n,f)$ fission-product yields.

Publication: David G. Breederland, "Fission Product Yields for Thermal-Neutron Fission of Curium-243," ORNL/TM-8168 (1982).

U. S. A.

(same as INDC(NDS)-116)

Laboratory and Address:

Pacific Northwest Laboratory
P. O. Box 999
Richland, WA 99352
USA

Names: P. L. Reeder and R. A. Warner

Facilities: SOLAR - Spectrometer for On-Line Analysis of Radionuclides. This is an on-line mass spectrometer which incorporates a ^{235}U target in a surface ionization source located in the thermal column of a 1 MW TRIGA reactor at Washington State University, Pullman, WA.

Experiment: Isomer yield ratios for $^{235}U + n_{th}$.

Method: Ratios of independent yields of fission product isomers are being measured for thermal neutron fission of ^{235}U by use of an on-line mass spectrometric technique. A short burst of neutrons from the TRIGA reactor is used to produce various isomers of Br, Rb, In, I and Cs fission products within the surface ionization source. Selective ionization performs the rapid chemical separations and magnetic analysis performs the mass separation to give the desired nuclides as a beam of ions. Ions are collected on a moving tape collector system for a short time interval during and after the neutron pulse. The radioactive decay of the two isomers is followed by beta and gamma counting to determine the relative yield of each isomer.

Accuracy: The final accuracy will probably depend more on how well the decay schemes are known for particular cases than on statistical uncertainties.

Completion Date: Work is continuing.

U. S. A.

(cont'd)

Laboratory and Address:

Pacific Northwest Laboratory
P. O. Box 999
Richland, WA 99352

Names: P. L. Reeder and R. A. Warner

Facilities: TRISTAN - This is an on-line isotope separator located at the High Flux Beam Reactor at Brookhaven National Laboratory, Upton, NY

Experiment: Half-lives, P_n values, average energies, and neutron gated gamma spectra are being measured for separated delayed-neutron precursors.

Method: Delayed neutrons from separated precursors are counted in a polyethylene moderated counter containing 3 rings of counter tubes. Delayed neutron growth and decay curves have been measured at masses 97-99 and 146-148 to identify possible precursors among the Sr, Y, Ba, and La isotopes. P_n values are obtained from simultaneous beta decay curves. The ratio of counts in one ring compared to counts in another ring has been calibrated for monoenergetic neutrons from (p,n) reactions. Average energies of unknown spectra are thus obtained from the measured ring ratios. Neutron-gated gamma spectra provide partial neutron emission probabilities to excited states of the (A-1) daughter. The P_n^i are being compared to predictions of a beta-decay model.

Accuracy: The accuracy of the P_n measurements depends primarily on the accuracies of the neutron and beta counter efficiencies. The overall accuracy is expected to be about ±7%. Random errors in the average energy measurements can be as low as ± 10 keV but systematic uncertainties in the ring ratio calibration curve give uncertainties of about 30 keV.

Discrepancies: No evidence for Sr and Ba precursors has been seen at masses 97-99 and 146-148.
The average energies are being measured by the ring ratio technique as a check on delayed neutron spectra measured by various types of neutron spectrometers.

Completion Date: Work is continuing.

Publications:

1. P. L. Reeder and R. A. Warner, "Average Energy of Delayed Neutrons from Individual Precursors and Estimation of Equilibrium Spectra," Nucl. Sci. Eng. 79, 56 (1981).

2. P. L. Reeder, R. A. Warner, T. R. Yeh, R. E. Chrien, R. L. Gill, M. Shmid, H. I. Liou, and M. L. Stelts, "Beta-Delayed Two-Neutron Emission from ^{98}Rb," Phys. Rev. Letters 47, 483 (1981).

U.S.A.

Laboratory and address: University of Illinois
Nuclear Radiation Laboratory
214 Nuclear Engineering Lab.
103 South Goodwin Ave.
Urbana, Illinois 61801
U.S.A.

Names: Bernard W. Wehring

Facilities: Illinois Advanced TRIGA 1.5-MW Nuclear Reactor, HIAWATHA Fission-Fragment Mass Spectrometer.

Experiment: Direct Physical Measurement of the Primary Postneutron-Emission Nuclide Yields in Thermal-neutron Fission of U-235, Pu-239, U-233, and Th-229.

Method: The fission-fragment recoil mass spectrometer HIAWATHA, consisting of a cylindrical focusing electrostatic analyzer and time-of-flight system, is used to determine fragment masses while fragment energy loss is used to identify fragment atomic numbers in multiparameter experiment. All fragment velocities and charge states are measured.

Accuracy: <0.5-amu mass resolution, achieved,
about 1-Z atomic-number resolution, achieved,
1% standard error (relative error) in largest mass yield, achieved,
0.02-0.1% standard error (absolute error) in nuclide yields, achieved.

Completion date:

Publications:

Gino DiIorio, "Direct Physical Measurement of Mass Yields in Thermal Fission of Uranium 235," Ph.D. Thesis, University of Illinois at Urbana-Champaign, 1976.

Gino DiIorio and B. W. Wehring, "HIAWATHA, A Fission-Fragment Recoil Mass Spectrometer," Nucl. Instr. Methods 147, 487 (1977).

R.B. Strittmatter, "Nuclide Yields for Thermal Fission of Uranium 235," Ph.D. Thesis, University of Illinois at Urbana-Champaign, 1978.

R.B. Strittmatter and B.W. Wehring, "Direct Measurement of Nuclide Yields in Thermal-Neutron Fission Using HIAWATHA," Proceedings of the International Conference on Neutron Physics and Nuclear Data for Reactor and other Applied Purposes, Harwell, September 25-29, 1978.

R.B. Strittmatter and B.W. Wehring, "Fragment Atomic-Number Identification Using a Gas Ionization Chamber in Fission Yield Measurements," Nucl. Instr. Methods 166, 473 (1979).

B.W. Wehring, S. Lee, G. Swift, and R.B. Strittmatter, "Light-Fragment Independent Yields for Thermal-Neutron Fission of U-233," UILU-ENG-80-5312 (May 1980); Trans. Am. Nucl. Soc. 35, 551-552 (1980).

U. S. A.

Laboratory and address:	University of Lowell, Lowell, Mass. 01854
Names:	G. Couchell, W. Schier
Facilities:	5.5 - MV Van de Graff, 1 MW swimming pool reactor, helium gas jet and tape transport system
Experiment:	Delayed neutron energy spectra as a function of time following fission; initially for ^{235}U and ^{239}Pu.
Method:	Beta-neutron time-of-flight method using helium jet and tape transport system together with Pilot U plastic and ^{6}Li-glass scintillators. Initially accelerator, later reactor neutrons are used.
Completion date:	In progress; preliminary near equilibrium spectra have been measured.

U. S. A.

Laboratory and address:	University of Missouri Research Reactor Facility Columbia, Missouri 65211, USA
Name:	David E. Troutner
Facility:	10-megawatt research reactor. Fluxes up to 7 x 10^{14} n cm^{-2} S^{-1}. Pneumatic transfer tubes terminating in flux of 10^{14} n cm^{-2} S^{-1}.
Experiment:	Primary yields of products from neutron-induced fission.
Method:	Fission products are separated and purified by radiochemical methods and radioactivity determined by Ge(Li) detectors. Current facilities limit experiments to those which require separation times of about 1 minute or longer. Emphasis is on comparison of primary yields from fission of Cf-249 to those of fission of U-233. Yields from Cf-249 fission appear to be consistent with the charge distribution wider than that found for fission of U-233 and U-235.
Publications:	M.A. Monzyk and D.E. Troutner, "Fractional independent yields of Ba-139 and La-142 from the thermal-neutron-induced fission of Cf-249", Phys. Rev. C20, 212 (1979). D.K. Pal and D.E. Troutner, "Fractional independent yields of La-141 and La-142 from thermal-neutron-induced fission of U-233", J. inorg. nucl. chem. 43(1981)885. D. K. Pal, "Nuclear charge distribution in fission: independent yields of La-141, La-142, Y-92, and Y-93 from thermal-neutron fission of U-233 and Y-92 and Y-93 from thermal-neutron fission of Cf-249", Ph.D. thesis, University of Missouri, Columbia, 1981.

U.S.A.

(same as INDC(NDS)-116)

Laboratory and address	Washington University, Dept. of Chemistry, St. Louis, MO, USA
Names	A. C. Wahl, T. Semkow, L. Robinson
Facilities	Cyclotron and 14-MeV neutron generator
Experiment	Fractinal yields from thermal and 14 MeV fission of ^{235}U.
Method	Fractional independent or cumulative yields of indium, cadmium, silver, and palladium fission products will be determined to learn about nuclear-charge-distribution systematics for near symmetric modes of fission. Rapid (∿1 sec), continuous solvent-extraction separations of short-lived, low-yield fission products from their beta-decaying precursors will be carried out using a SISAK-2 system containing H-10 centrifuges. Relatively long-lived descendants in each phase will be purified and measured radiochemically for yield determinations.
Publications	E.N. Vine and A.C. Wahl, "Fractional Independent Yields of ^{104}Tc and ^{105}Tc from Thermal-neutron-induced Fission of ^{235}U and ^{239}Pu," J. inorg. nucl. Chem. 43, 877 (1981).
	M.M. Fowler and A.C. Wahl, "Yields and Genetic Histories of ^{128}Sb, ^{129}Sb, and ^{130}Sb from Thermal-Neutron-Induced Fission of ^{235}U," J. inorg. nucl. Chem. 36, 1201 (1974).
	B.R. Erdal, A.C. Wahl, and R.L. Ferguson, "Modes of Formation of Tin Fission Products," J. inorg. nucl. Chem. 33, 2763 (1971).

U.S.S.R.

Laboratory and address : Fiziko-Energeticheskij Institut, (Institute of Physics and Power Engineering), Obninsk, Kaluga Region

Names : V.N. Kononov, E.D. Poletaev, B.D. Yurlov

Facility : Fast and resonance neutron time-of-flight spectrometer on pulsed Van-de-Graaff accelerator EG-1. Continuous neutron spectrum from $^{7}Li(p,n)^{7}Be$ reaction, thick metallic Lithium target.

Experiment : Neutron capture cross section measurements for 5-500 keV neutrons, enriched samples.

Method : Prompt capture γ-ray detection with liquid scintillator detector. Determination of total γ-ray energy by weighting method

Absolutisation: a) relative standard capture cross section in ^{197}Au at $E_n = 30$ keV;

b) by using a method of saturated (black) resonances in the eV region. Measurement of neutron flux by 0,8 mm thick ^{6}Li-glass detector and ^{10}B plate - NaI(Tl) neutron detector.

Accuracy : Method a) - 7 + 9 %
Method b) - 3 + 5 %

Results : Neutron capture cross sections were measured for 28 isotopes (^{115}In, $^{142,144,146,148,150}Nd$, $^{144,147,148,149,150,152,154}Sm$, $^{151,153}Eu$, $^{156,158,160}Gd$, $^{160,161,162,163,164}Dy$, $^{166,168,170}Er$, ^{181}Ta, ^{197}Au).

Average fast neutron capture cross sections were analyzed in terms of statistical theory and s-, p-, d- wave neutron and radiative strength functions were obtained. Measurements are completed for Yb, Hf, Sn isotopes. Fast neutron capture cross sections evaluation for $^{147,\ 149,\ 151}Sm$, $^{151,\ 153,155}Eu$ is in progress.

Publications:

1. "Fast Neutron Radiative Capture Cross Sections for In, Ta, Au, Sm und Eu".
   V.N. Kononov, B.D. Yurlov, E.D. Poletaev, V.M. Timokhov
   Yadernaja Fizika, v. 26, No. 5 (1977)947, (English: Sov. J. Nucl. Phys., v. 26, (1977)500)

2. "Fast Neutron Radiative Capture Cross Sections for Even-Even Isotopes of Nd, Sm, Gd and Er".
   V.N. Kononov, B.D. Yurlov, E.D. Poletaev, V.M. Timokhov.
   Yadernaja Fizika, v. 27, No. 1, (1978)10, (English: Sov. J. Nucl. Phys., v. 27(1978)5)

3. "Some Results of Experimental Research of s-, p- and d-Neutrons Interaction with Nuclei".
   V.N. Kononov. The III International School on Neutron Physics (Alushta, April 19-30 1978). D3-11787, Dubna 1978, p. 415.

4. "Fast Neutron Radiative Capture Cross Sections and d-Wave Strength Functions". V.N. Kononov, E.D. Poletaev, B.D. Yurlov, M.V. Bokhovko, L.E. Kazakov, V.M. Timokhov.
   4th International Symposium on Neutron Capture Gamma-Ray Spectroscopy and Related Topics, 7-11 September 1981, Grenoble.

U.S.S.R.

Laboratory and address: Lensovjet Institute of Technology Leningrad 198013, USSR

Names: M.Ya.Kondrat'ko, A.V.Mosesov, K.A.Petrzhak, O.A.Teodorovich

Facilities: Ge(Li) γ-ray spectrometer, 4πβ-counters

Experiments: Measurements of product yields for the fission of Pu-239 induced by 28MeV bremsstrahlung

Method: Targets containing thin layers of Pu-239 and Al-catchers were irradiated with linac bremsstrahlung. Radioactive nuclides were determined by means of direct γ-ray spectrometry of unseparated products in catcherfoils, radiochemical separation with subsequent γ-ray spectrometry and 4πβ-counting.

Absolute cumulative yields were determined by normalization of mass distribution to a total yield of 200%.

Fractional independent yields were determined by γ-ray spectrometry, unmeasured chain yield of Nb-96 was estimated by interpolation.

Accuracy: The accuracy achieved for absolute cumulative yields is within 3-8%, mean 4.5%(1σ) for peak products and within 5-15%, mean 9%(1σ) for low yield products.

The accuracy of fractional independent yields is within 6-20%.

Results:

Fission product	Cumulative yield,%	Fission product	Cumulative yield,%
Kr-85m	.851±.068	Zr-95	4.39 ±.13
Kr-88	1.62 ±.21	Zr-97	4.63 ±.17
Sr-91	2.89 ±.23	Mo-99	5.76 ±.22
Y -92	3.20 ±.16	Ru-103	5.55 ±.28
Y -93	4.02 ±.20	Rh-105	3.96 ±.20

U.S.S.R.

(cont'd)

Results: (continued)

Fission product	Cumulative yield,%	Fission product	Cumulative yield,%
Ru-106	3.70 ±.26	Ba-139	5.18 ±.26
Ag-111	1.242±.075	La-140	4.55 ±.18
Ag-112	.955±.057	Ce-141	4.23 ±.14
Ag-113	.710±.069	Ce-143	3.26 ±.13
Cd-115g	.394±.027	Ce-144	2.83 ±.11
Cd-117m	.165±.017	Pr-145	2.33 ±.15
Cd-117g	.227±.016	Nd-147	1.642±.064
Sb-127	1.43 ±.15	Pm-149	1.138±.064
I -131	4.67 ±.15	Pm-151	.745±.074
I -132	4.96 ±.16	Sm-153	.385±.027
I -133	5.43 ±.21	Sm-156	.161±.018
Xe-135	6.32 ±.26	Eu-157	.098±.015

Fission product	Fractional independent yield
Nb-96	.011±.002
I -132	.217±.044
Xe-135	.412±.025
Cs-136	.123±.009
La-140	.032±.006

Publications: Neutron Physics. Proceedings of 5th Conference on Neutron Physics, Kiev, 15-19 September 1980. Part 3, pp. 148-152.

Atomnaja Energija (USSR), 50, 34-36 (1981).

II. COMPILATIONS AND EVALUATIONS

Unchanged contributions are marked as such.

Updates: revisions with respect to the last issue are marked by a vertical bar on the left margin of the text.

New contributions show no marks.

BELGIUM

Laboratory and address : Nuclear Physics Laboratory
Proeftuinstraat 42
B-9000 Gent, Belgium

Names : P.De Gelder, D.De Frenne, E.Jacobs

Evaluation : Nuclear Data Sheets for A = 102 and 110

Purpose : to give a critical survey of all available information concerning A = 102 and 110 nuclei, and derivation of consistent best or preferred values with their uncertainties.

Method : cfr. Nuclear Data Project

Major sources of information : Recent References of NDP

Deadline of literature coverage : 102 : March 1982
110 : April 1982

Status : about 75 % of the data sets is reevaluated

Computer file of evaluated data : ENSDF

Completion date : 102 : March 1982
110 : May 1982

Publications : to be published as a Nuclear Data Sheets issue.

FRANCE

(update of issue 6)

Laboratory and address : Département de Recherche Fondamentale
Laboratoire de Chimie Physique Nucléaire
Centre d'Etudes Nucléaires de Grenoble
85 X - 38041 GRENOBLE CEDEX - France.

Name : J. BLACHOT

Cooperation : C. FICHE** for developping the file and J.C. NIMAL*; B. DUCHEMIN* for the applications in summation calculation.

Compilation and Evaluation : Radionuclide decay data :
- to provide a comprehensive data bank of radioactive decay data with : half lives, Q-values, branching ratios, nuclear and spectra α, β, γ, energies and intensities with associated uncertainties.

Purpose :
- Decay data file for summation calculation of decay heat (Pepin code).
- Data bank for all people using decay data parameters.

Sources : ENSDF file mostly and new recent works on short lived F.P. not yet evaluated in ENSDF.

Computer file and programs :
- EDIBIB, TRIGAL, ISOTAB Programs
- Magnetic tape available on line for those using the French CISI Network.
- Off line from the NEA Data bank (Saclay).

Publication :
- AT. Data and Nucl. Dat. Tab. Vol. 20 (1977) p.241.
- Annales de Physique Vol 6S (1981)
- Nucl. Data for Science ANTWERP Sept. 82

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** CEN/SACLAY-
C.E.A - BP.2 - 91190 GIF SUR YVETTE -

FRANCE

Laboratory and address:	Laboratoire de Métrologie des Rayonnements Ionisants C.E.N. de Saclay B.P. No. 2, F-91190 Gif sur Yvette
Names:	F. Lagoutine, N. Coursol, J. Legrand
Evaluation:	Radionuclide decay data
Purpose:	Preparation of a document providing recommended values of the principle decay scheme parameters: half-life, energies and intensities of various radiations emitted (e.g. β, γ, c.e., X-rays)
Method:	- critical analysis of published results - determination of mean values and associated uncertainties
Source of information:	Nuclear Data Sheets, INIS-Atomindex, other recent publications
Publications:	Table de radionucléides, edition CEA-LMRI, containing among other radionuclides, the following fission products:

- Vol.1: Kr-85, Mo-99, Tc-99, Ru-103 + Rh-103m, Sb-125 + Te-125m, Xe-133, Xe-133m, Ce-144 + Pr-144 (revised publication 1982)

- Vol.2: Rb-86, Rb-88, Sr-89, Sr-90 + Y-90, Y-91, Ru-106 + Rh-106, Te-127m + Te-127, I-129, Te-131m + Te-131, Xe-131m, Ba-140 + La-140, Pr-143.
  Zr-95 + Nb-95, 95m, I-131, Cs-137 + Ba-137m, Ce-141 (revised publication 1982)

- Vol.3: Sr-92, Y-92, Pm-147, Ra-226 and its descendants, Pu-239 (publication 1982)

- in preparation: Kr-88, Te-129m, Nd-147, Sm-151.

GERMANY, DEM. REP.
(same as INDC(NDS)-116)

Laboratory and address: Zentralinstitut für Kernforschung
Rossendorf
DDR 8051 Dresden
Postfach 19

Names: H.-C. Mehner, E. Franke

Evaluation: Effective resonance integral of ^{133}Cs in reactor fuel elements

Purpose: To clear differences between experimental and calculated fission product concentrations of ^{134}Cs observed in investigations of burnt fuel elements

1. Method: Calculation of effective resonance integral of ^{133}Cs taking into account shielding by ^{238}U resonances and self-shielding using Breit-Wigner formalism with Doppler broadening

Major sources of information: BNL-325, 3rd. ed. 1973

Status: Completed

Publication: Radiochem. Radioanal. Letters 43 (1980) 77

2. Method: Calculation of the effective resonance integral of ^{133}Cs with the cell-code PEACO-II

Major sources of information:
- Y. Ishiguro, PEACO-II, JAERI-M 5527 (1974)
- BNL-325, 3rd. ed., 1973 for ^{133}Cs data
- JAERI-1255 (1978) for ^{238}U data

Status: under work

Publication: in plan

GERMANY, FED. REP.

Laboratory and address: Inst. for Nuclear Chemistry, Philipps-University Marburg, Lahnberge, D-3550 Marburg/Lahn

*Physikalisch-Technische Bundesanstalt, Abteilung SE, Bundesallee 100, D-3300 Braunschweig

Names: U. Reus, W. Westmeier and *I. Warnecke

Compilation: Gamma-Ray Catalog§

Type of data: Compilation of energies and intensities of gamma-rays originating from the radioactive decay of nuclides, as well as other important decay properties of these nuclides.

Arrangement: Part I is a listing of ca. 22,000 gamma-rays ordered by increasing energy with the corresponding nuclei and other information needed for identification purposes. Part II is ordered by nuclides (A,Z) and contains the complete data sets for ca. 2400 nuclides and isomers (i.e. ca. 40,000 gamma-energies), decay data, references, comments etc.

Purpose: Identification of gamma-rays, data for cross-section calculations, activation analysis etc.

Major sources of information: Nuclear Data Sheets and almost all important journals in nuclear physics and chemistry.

Deadline of literature coverage: All information received before December 31, 1981, has been included.

Other details: The updated version includes information on X-rays. K-X-ray intensities have been calculated where no experimental data were available.

Completion date: Revision of data has been completed, appearance of the revised version is planned for the end of 1982.

Publication: It is anticipated that the revised version of the catalog will be published in Atomic Data and Nuclear Data Tables in order to be commonly available.

§Work performed with the support of GSI (Gesellschaft für Schwerionenforschung mbH, D-6100 Darmstadt).

C.E.C. GERMANY, FED. REP.

Commission of the European Communities
Joint Research Centre
Karlsruhe Establishment
European Institute for Transuranium Elements
Postfach 2266
Federal Republic of Germany

Names: L. Koch

1. EVALUATION

Evaluation: (purpose & method) Systematics of fast cumulative fission yields of ten actinide isotopes were observed for isotopic and isodiapheric nuclides and could be explained by relation to the magic numbers 50 and 82.

Key or source of information: EUR 6738,en

Publication: Systematics of fast cumulative fission yields
Radiochimica Acta 29, 61 - 63 (1981)

C.E.C. GERMANY, FED. REP.

(cont'd)

Commission of the European Communities
Joint Research Centre
Karlsruhe Establishment
European Institute for Transuranium Elements
Postfach 2266
7500 Karlsruhe
Federal Republic of Germany

Names: I. Broeders, KfK Karlsruhe, FRG
L. Koch,
M. Robin, CEA Cadarache, France
R. Wellum

2. EVALUATION

Evaluation: (purpose and method) In the TACO experiment described previously, integral neutron cross-sections of selected actinides and fission product nuclides were determined. The total neutron flux was measured and the neutron spectrum as a function of axial position in the irradiation pins was known. Differential cross-sections for the isotopes concerned were taken from the KEDAK library. From the flux and differential cross-sections the integral (n,γ), fission, and in some cases (n, 2n), cross-sections have been calculated. The experimentally determined and the calculated values are compared.

Publication: to be presented at: International Conference on Nuclear Data, 6 - 10 September 1982, Antwerp, Belgium

INDIA

Laboratory and address	:	Department of Physics, Panjab University, Chandigarh-160014(INDIA)
Names	:	D.R.Saroha, R.Aroumougame, R.K.Gupta
Evaluation	:	Charge distribution yields in the spontaneous fission of ^{236}U and ^{252}Cf nuclei.
Purpose	:	To predict the charge distribution of fission fragments of the naturally fissioning nuclei in terms of an analytically solvable model based on the results of Fragmentation theory and two-centre shell model.
Method	:	An analytical solution of the time-dependent Schrodinger equation leads to an explicit expression for charge distribution yields as a Gaussian function which gives the most probable charge and the width of distribution. The hypothesis of unchanged charge distribution and minimum potential energy are included as limiting cases.
Major sources of information	:	Journals and reports.
Deadline of literature coverage	:	1980.
Status	:	Comparison of theoretical results with the experimental data for the charge distribution yields in ^{236}U and ^{252}Cf nuclei is shown to be good and the most probable charge is comparable with that of potential energy hypothesis.
Publication	:	Results for ^{236}U are submitted for publication.

ITALY

Laboratory and address:	ENEA, Centro Studi e Ricerche "E.Clementel" Via Mazzini 2 - 40138 Bologna, Italy.
Names:	V. Benzi, F. Fabbri, G. Maino, T. Martinelli, E. Menapace, M. Motta, G.C. Panini, G. Reffo, M. Vaccari, A. Ventura.
Work in Progress and Methods:	i) A critical intercomparison was performed on the recent evaluations of the 21 most important FP nuclei for fast reactor calculations. As reference Files ENDF/B-V, CNEN-CEA, JENDL-1, RCN-3 were considered. From these files group constants in CARNAVAL scheme and average capture cross sections, for a number of fast reference spectra, were also examined and compared. The work has been made in cooperation with ECN-Petten, with the aim of recommending a FP library for fast reactor applications. ii) New evaluations of Pd-105 and -107, as maximum priority nuclei for fast reactors, were undertaken referring to the indications from recent differential and integral experiments. iii) BCS microscopic approach to level density calculations, extended to odd nuclei with a new blocking procedure, was applied systematically to the nuclides in 40-160 mass region. A systematics of "gap parameters" to be utilized in the model was obtained and explained according to the basic theory. A paper on the matter was published on "Il Nuovo Cimento" 66,1,1 (authors: V. Benzi, G. Maino, E. Menapace).
Purpose:	Evaluation of reliable FP data, mainly capture cross sections, for estimate of long term reactivity effects in fast reactors.
Major sources of information:	NEUDADA, CINDA up to 81 supplement, Nuclear Data Sheets.
Deadline of literature coverage:	December 1981.
Status:	see above text.
Cooperation:	CEA-Cadarache, ECN-Petten.

JAPAN

Laboratory and address :	Japanese Nuclear Data Committee/FPND W.G., Japan Atomic Energy Research Institute, Tokai-mura, Naka-gun, Ibaraki, Japan
Name :	S. Iijima, M. Kawai (group leader) (i), S. Igarashi Y. Kikuchi, Y.Nakajima, H. Nishimura (ii) H. Matsunobu(iii), T. Aoki(iv), A. Zukeran(v), T. Watanabe(vi), M. Sasaki (vii).
Evaluation :	(1) Neutron cross sections of about 80 FP nuclides (Z=35 to 64), for JENDL-2 FP Library. (2) Integtal test of JENDL FP Iibrary.
Purpose :	Fast breder reactor and thermal reactor calculation.
Method :	(1) Calculation with spherical optical model and statistical theory. Single and muti-level BW formula in thermal and resonance regions. Optical model paremeters are determined by SPRT method. Level density parameters are re-evaluated, deriving systematics of parameters. (2) Calculation using JAERI-FAST type 70-group cross sections with resonance self-shielding factors, and the neutron spectrum data from STEK and CFRMF data.
Major sources of information :	EXFOR Library, CINDA, BNL-325 and recent literature. Integral data from STEK, CFRMF and EBR-II.
Status :	(1) Re-evaluation for about 80 FP nuclides. Optical model parameters were re-determined in element-wise way for Rb-Gd. Level density parameters were determined for about 90 nuclides based on level spacing data and level scheme data. Compilation and evaluation of resonance parameters are in progress. (2) Analysis of STEK reactivity data for weak absorbers was completed. Revised calculation of CFRMF activation rates is planned using ENDF/B-5 spectrum field. (3) FP data library for thermal reaction application was prepared, and the fission product model was investigated for LWR calculation.
Other relvant details :	The evaluation of 68 nuclides was completed in Aug., 1977, and the file is available from NEA Data Bank. New preliminary calculation for JENDL-2 was completed. File preparation was started in May 1982. Cross-section adjustment based on integral data is planned.

(i) Nippon Atomic Industry Group Co., Ltd. (ii) JAERI (iii) Sumitomo Atomic Energy Industries, Ltd. (iv) Fuji Electric Co. (v) Hitachi Ltd. (vi) Kawasaki Heavy Industries (vii) Mitsubishi Atomic Power Industries, Ltd.

JAPAN

(cont'd)

Computer file of evaluated data : JENDL (ENDF/B-IV Format).

Discrepancy encountered : The STEK reactivities for scatterers such as O,C, Al were systematically underpredicted by about 20%. After correcting for the scattering reactivity based on the above observation, capture reactivity of Zr-93 was found as considerably overstimated whenJENDL-1 data was used. Probably,ENDF/B-4 and CNEN-2 will give a better result for this nuclide.

Expected completion data : End of 1982

Publications :

(1) Y. Kikuchi, T. Nakagawa, H. Matsunobu, M. Kawai, S. Igarashi and S. Iijima, Neutron cross sections of 28 Fission Product Nuclides adopted in JENDL-1, JAERI 1268 (NEAND C (J)-68/U) (February 1981)

(2) S. Iijima, T. Yoshida and T. Yamamoto, Fission product model for BWR lattice calculation code, J. Nucl. Sci. Technol. 19 (1982) 96.

JAPAN

Japanese Nuclear Data Committee, Decay Heat Evaluation Working Group

Secretariat address:
Japan Atomic Energy Research Institute
Tokai-mura, Naka-gun, Ibaraki-ken 319-11, Japan

Names:
R. Nakasima (Hosei University) M. Yamada (Waseda University)
T. Tamai (Kyoto University) M. Akiyama (University of Tokyo)
I. Otake (Fuji Electric Co.,Ltd.) A. Zukeran (Hitachi Ltd.)
S. Iijima, T. Murata, T. Yoshida (Nippon Atomic Industry Group Co.)
T. Hojuyama (FBR Engineering Co.)
K. Umezawa, K. Tasaka, Z. Matumoto, T. Tamura, H. Ihara, J. Katakura (JAERI)

1. Compilation: Decay data and delayed neutron data
Purpose: Revision of a FP decay data library completed in 1981 for summation calculation of decay heat
Major Sources of Information: Journals, Nuclear Data Sheets, and ENSDF
Expected Completion Date: Continuous compilation

2. Evaluation: (1) Evaluation of raw decay data by comparing calculated decay heat curves with measurements
(2) Study of beta strength functions to improve the reliability of released beta- and gamma-energy data for short-lived FP nuclides

Purpose: Revision of a FP decay data library completed in 1981 for summation calculation of decay heat
Sensitivity study for decay heat

Method: Gross theory of beta decay and systematics

Major Sources of Information: Own compiled data

Status: Quite satisfactory agreement was obtained between calculated decay heat curves and measurements, especially those from Univ. of Tokyo (fast fission) and those from ORNL (thermal fission), at short cooling-times. This improvement was achieved by an introduction of theoretical values of beta- and gamma-energies released from short-lived FPs. Some discrepancy remains, however, at cooling-times around 3000 seconds after a fission event.

Computer File of Evaluated Data: FP DECAY DATA FILE contains half-life, decay constant, Q-beta, Q-EC, mean energies of beta, gamma and conversion electron, branching ratios, neutron capture cross section, and yields for 10 fission types

Avaliability of Numerical Data: Contact Dr. Z. Matumoto, Nuclear Data Center, Japan Atomic Energy Research Institute, Tokai-mura, Ibaraki-ken 319-11, Japan

Publications:
T. Yoshida, Nucl. Sci. Engn., 63, 376 (1977)
T. Yamamoto, M. Akiyama, Z. Matumoto, and R. Nakasima, JAERI-M 9357 (1981)
T. Yoshida and R. Nakasima, J. Nucl. Sci. Technol., 18, 393 (1981)
H. Ihara, Z. Matumoto, K. Tasaka, R. Nakasima, M. Akiyama, and T. Yoshida, JAERI-M 9714 (1981) (in Japanese)
H. Ihara, Z. Matumoto, K. Tasaka, M. Akiyama, T. Yoshida, and R. Nakashima, JAERI-M 9715 (1981)
K. Tasaka, et al., JAERI report (in preparation)

NETHERLANDS

Laboratory : Netherlands Energy Research Foundation ECN,
Postbus 1,
1755 ZG Petten,
The Netherlands.

Names : Willem L. Zijp and J.H. Baard.

Compilation : **Selected fission yields and fission product decay data for reactor neutron metrology application.**

purpose : Creation of a common data set for all laboratories working in the field of reactor neutron metrology. The guide was prepared on behalf of the Euratom Working Group on Reactor Dosimetry.

Major sources of information :
- Cuninghame, J.G., Technical Report IAEA-213 (IAEA, Vienna, 1978);
- Gilliam, D.M., et al., Report NUREG/CP-004 (NRC, Washington D.C., 1978);
- Data supplied by the computer program MEDLIST from the Evaluated Nuclear Structure Data File (ENSDF);
- Data supplied by the Physikalisch Technische Bundesanstalt, Braunschweig.

Deadline of literature coverage: Spring 1979.

Cooperation : Members of Euratom Working Group on Reactor Dosimetry.

Other relevant details : Fission yields and decay data and decay schemes are given for the following fission products: ^{95}Zr, ^{97}Zr, ^{103}Ru, ^{131}I, ^{132}Te, ^{137}Cs and ^{140}Ba. The fissionable isotopes considered are: ^{235}U, ^{238}U, ^{239}Pu, ^{237}Np.

Computer file : Not present.

Completion date : August 1979.

Publications : Report ECN-71, also as EUR 7164, part II.

NETHERLANDS

Laboratory and address	Netherlands Energy Research Foundation (ECN) P.O. Box 1, 1755 ZG Petten, The Netherlands. Telephone: (02246)-6262, telex: 57211 reacp nl.
Names	H. Gruppelaar, H.A.J. van der Kamp, R.J. Heijboer.
Evaluation	(1) RCN-2 and RCN-3 evaluations of neutron cross sections for fission-product nuclides and natural elements in the fission-product mass range |1-3|. The RCN-3 evaluation is a revised version of the published RCN-2 evaluation (see previous newsletters). The capture cross section has been adjusted to fit integral STEK and CFRMF data. The format of the library is that of KEDAK. (2) Pseudo fission-product group cross sections in 26-group ABBN format |4|.
Purpose	Fast breeder power-reactor data needs.
Method	Calculation with multilevel Breit-Wigner formula, optical model and statistical model, taking into account all available experimental information. Adjustment of point-wise given capture cross sections to integral data (STEK+CFRMF); see Refs. |1-3|.
Major sources of information	BNL-325, EXFOR, CINDA, Nuclear Data Sheets, recent literature, integral data from STEK and CFRMF.
Status	(1) RCN-3 evaluation completed for : Nb-93, natural Mo, Tc-99, Rh-103, Pd-102, Pd-104, Pd-105, Pd-106, Pd-107, Pd-108, Pd-110, Ag-107, Ag-109, natural Ag, I-127, I-129, Cs-133, La-139, Pr-141, Nd-142, Nd-143, Nd-144, Nd-145, Nd-146, Nd-147, Nd-148, Nd-150, natural Nd, Pm-147, Sm-148, Sm-149, Sm-150, Sm-151, Sm-152, Sm-154, natural Sm. In progress: Reevaluation of Ru-isotopes. (2) Completed: Pseudo fission-product cross sections |4|, based upon adjusted RCN-2A data, supplemented with ENDF/B-IV data and charged-particle emission cross sections |5|; comparison with ENDF/B-V data |3|.
Computer file	RCN-2 and RCN-3 libraries in KEDAK-format, available from NEA Data Bank.
Completion date	1983
Recent publications	|1| Plakman, J.C. (comp.), Fast reactor programme. Annual progress report 1980, ECN-115 (1982), other progress reports in press. |2| Gruppelaar, H. and J.B. Dragt, Cross section adjustments using integral data, Conf. on Nuclear Data Evaluation Methods and Procedures, Brookhaven, Sept. 22-25, 1980, BNL-NCS-51363, vol. 1, p. 133 (1981).

NETHERLANDS

(cont'd)

|3| H. Gruppelaar, Status of recent fast capture cross section evaluations for important fission product nuclides, NEANDC/NEACRP Specialists' Mtg. on Fast-neutron capture cross sections, Argonne, 20-23 April, 1982.

|4| Heijboer, R.J. and A.J. Janssen, Status of pseudo fission-product cross sections for fast reactors; sensitivity study for sodium void effect, Proc. of the NEANDC Specialists' Meeting on Neutron Cross Sections of Fission Product Nuclei, Bologna, Dec. 12-14, 1979, NEANDC(E)209"L" (1980), p. 375.

|5| Gruppelaar, H. and B.P.J. van den Bos, The contribution of (n,p) and (n,α) reactions to fission-product capture cross sections, ibid, p. 285; extended report: ECN-78 (1979).

TURKEY

Laboratory and address:	Ege University Nuclear Research and Training Institute Bornova, Izmir
Name:	Güngör Yener
Evaluation:	Number of prompt neutrons and gamma-ray energies in thermal neutron fission of Pu-239 and Pu-241
Purpose:	To compare different models for division of energy between the complementary fragments
Method:	Considering the neutron and gamma-ray emission as statistical pocesseses, Monte-Carlo technique is used in calculations.
Major sources of information:	FPND(1974,1978), Dostrovsky et.al. Phys.Rev. 116(1959)683, Gordon and Aras,Proc. IAEA Symp. Phys. Chem.Fission Vol.II(1965)73, Kıldır,Thesis(1978) and recently published papers
Deadline of literature coverage:	1980
Status:	Completed in September 1980, further development continuing.
Other relevant details:	Yield-mass and charge distribution for secondary fragments, charge dependence of avarage number of neutrons and gamma-rays energies are also investigated. All the results are compared with experimental values which are available.
Computer file:	None
Publications:	Assoc. Prof.Thesis, Ege Univ.1980, Some relevant details are in progress for publication.

UNITED KINGDOM

(same as INDC(NDS)-116)

Laboratory and Address:	AERE Harwell	UKAEA AERE, Harwell, Oxfordshire, Ox11 ORA

Name: E.A.C. Crouch

Compilation: Chain, Cumulative and Independent fission product yields for all neutron induced fission reactions with neutrons of energy up to 14 MeV, including spontaneous fission. Ongoing compilation.

Purpose: Basic data for fission yield evaluation.

Sources: Journals, Proceedings of Learned Societies, or other open literature, Project reports if the work is complete but unlikely to be published.

Deadline: No results prior to 1950 are collected.

Cooperation: We are prepared to exchange files with other groups.

Computer File: Information held in standard forms on Computer Files.

Completion Date: Continuous compilation.

Publications: AERE R6642 'A library of neutron induced fission product yields maintained and interrogated by computer methods'.
'Part I: The establishment of the library'.
E.A.C. Crouch, December 1970.

AERE R7207 'A library of neutron induced fission product yields maintained and interrogated by computer methods'.
'Part II: The interrogation of the library'.
E.A.C. Crouch, August 1972.

Fission Product Yields from Neutron-Induced Fission - E.A.C. Crouch.
Atomic Data and Nuclear Data Tables, Vol. 19, 5, May, 1977.
Contains experimental values and adjusted values after fitting to conservation laws .

UNITED KINGDOM

(same as INDC(NDS)-116)

Laboratory and Address: AERE Harwell

UKAEA
AERE Harwell
Oxfordshire OX11 ORA

Name: E.A.C. Crouch

1. Evaluation

(1) Neutron induced fission product yields for all fissile nuclides at neutron energies up to 15 MeV; chain yields and independent yields.

(2) Adjustments of the chain yields and the calculated independent yields to force agreement with the conservation laws i.e. to form a 'consistent set'.

Purpose: UKND File to be used in Reactor design and operation.

Method:

(1) The individual yields for a given reaction (both chain and independent), are examined, weighted and the means calculated together with the errors.

(2) The evaluated yields are augmented by interpolation to fill missing values or in the case of independent yields by calculation based on parameters estimated from known values. The results are fitted by least squares to the conservation conditions to give adjustments for chain yields and independent yields.

Complete - the fitting of conservation laws and the equality of yields of complementary elements. The set will be tested for its ability to produce an estimate of after heat from ^{239}Pu Fission nearer to experimental values than previous sets.

Sources: Compilation mentioned above.

Deadline: No results prior to 1950 are collected. Compilations believed to be complete up to end 1975, some 1976 results included.

Status: Evaluation and Consistent set complete at January 1977. Further development continuing.

Cooperation: We are prepared to exchange files with other groups.

UNITED KINGDOM

(cont'd, same as INDC(NDS)-116)

Computer Files of Compiled Data:	Compilation as above.
Computer File of Evaluated data:	Magnetic tape or punched cards of the consistent set in ENDF/BIV format.
Discrepancies found:	Files are compared with those of B.F. Rider and discrepancies found are resolved.
Publication:	Fission Product Yields from Neutron-Induced Fission. E.A.C. Crouch. Atomic Data and Nuclear Data Tables, vol. 19, 5, May 1977.

2. Evaluation:	Compilation and evaluation of the half lives of delayed neutron emitter precursors and emission probabilities of the delayed neutron emitters. Hence, using the fission product consistent sets, calculation of the delayed neutron yields ... Proceeding.
Purpose:	UK Nuclear Data File for use in Reactor design and operation calculations.
Sources:	The open literature
Deadline:	Continuous compilation.
Status:	Compilation of delayed neutron data proceeding.
Cooperation:	We are prepared to exchange information with other groups.
Computer files:	Not yet implemented.

UNITED KINGDOM

Laboratory and Address:	CEGB Berkeley Nuclear Laboratories	Berkeley Nuclear Laboratories Berkeley, Gloucestershire, GL13 9PB U.K.

Working Group:

V. Barnes	BNFL, Windscale
B.S.J. Davies	CEGB, BNL
A. Tobias	CEGB, BNL
K.M. Glover	AERE, Harwell
M. F. James	AEE, Winfrith
A. L. Nichols	AEE, Winfrith
D. G. Vallis	AWRE, Aldermaston

Compilation and Evaluation: Radionuclide decay data

purpose: To provide a comprehensive, updated data file of radioactive decay data including half-lives, Q-values, branching ratios, α , β and γ energies and intensities and associated uncertainties.

progress: A revised file of fission product decay data, known as UKFPDD-2 has been completed. This contains data on 855 nuclides of which 736 are radioactive and 390 have spectral data.

Data, particularly on short-lived nuclides is being collected from the literature for use in future revisions. The UKFPDD-2 data has been used to calculate decay heat values for fission in ^{235}U, ^{238}U and ^{239}Pu and sums of exponential functions have been fitted to these values to enable rapid estimates to be made.

Publication: Tobias A. 'Accurate Analytical Fits to UKFPDD-2 Decay Heat Estimates for ^{235}U, ^{238}U and ^{239}Pu', CEGB report RD/B/5079N81

UNITED KINGDOM

Laboratory and address:	Birmingham Radiation Centre	University of Birmingham P.O. Box 363 Birmingham B15 2TT United Kingdom
Name:	D.R. Weaver	
Evaluation:	Equilibrium and near-equilibrium delayed neutron spectra	
Purpose:	For reactor physics calculations and analysis of delayed neutron yield measurements. The evaluation was recommended by the March 1979 Vienna Consultants' Meeting on Delayed Neutron Properties	
Method:	Calculation of a full covariance matrix for the spectra	
Deadline of literature coverage:	None. Raw experimental data from laboratories who used either ^{3}He or proton recoil counters has been obtained. Further data would be welcomed	
Status:	A method of obtaining a full covariance matrix has been derived based upon the sensitivity of the spectra obtained from unfolding to changes in the calibration parameters of the detector and counting statistics. A paper describing the technique and measurement of an Am/Li spectrum using a ^{3}He counter has been published.	

U.S.A.

Laboratory and addresses:

National Nuclear Data Center
Brookhaven National Laboratory
Upton, N.Y. 11973, U.S.A.

Names:

S. F. Mughabghab, and M. Divadeenam

1. Evaluation:

BNL-325 Neutron Cross Sections Vol. I. Resonance Parameters and Thermal Cross Sections

Purpose

Update resonance parameter and thermal cross section evaluations

Major Sources of Information:

CSISRS data file, CINDA, Private communications and personal files.

Status:

Vol. 1, Part A: Z = 1-60 is completed and published by Academic Press, Inc.

Other Relevant Details:

Any other details may be obtained from S. F. Mughabghab

Completion Date:

Projected Publication Dates:

Part A (Z = 1-60) is available from the Academic Press, Inc.
Part B (Z = 61-100) goes to press early 1983

Publications:

The new edition of BNL-325, Neutron Cross Sections. Vol. I. Part B Neutron Resonance Parameters and thermal cross section will be published by the Academic Press.

U.S.A.
(cont'd)

Laboratory and addresses:

J. K. Tuli
National Nuclear Data Center
Brookhaven National Laboratory
Upton, N.Y. 11973, U.S.A.

2. Evaluation:

Evaluated Nuclear Structure Data File (ENSDF)

Purpose:

Evaluate nuclear structure information

Method:

By mass chain as published in the Nuclear Data Sheets

Major Sources of Information:

Published literature

Deadline of Literature Coverage:

Varies by mass number, but generally within the last five years.

Status:

Continuously updated

Cooperation:

IAEA - sponsored Nuclear Structure and Decay Data Network

Computer File of Evaluated Data:

ENSDF maintained and distributed by the National Nuclear Data Center.

Publications:

Nuclear Data Sheets

U.S.A.

Laboratory and address:

Hanford Engineering Development Laboratory
P.O.Box 1970
Richland, WA 99352

Names:

RE Schenter, FM Mann, DL Johnson, and F Schmittroth

Evaluation:

ENDF/B-V, Mods to ENDF/B-V, and ENDF/B-VI Fission Product Data File and Fission Yield Files

A. Coordinate generation and testing of complete ENDF/B-FP files which will contain cross sections, decay data and fission yields for approximately 900 fission product nuclei and 20 fissionable nuclei. Coordination is part of the responsibility as Chairman of CSEWG (Cross Section Evaluation Working Group) Fission Product and Actinide Data Subcommittee. Two subcommittees related and contributing to this subcommittee are chaired by TR England (LASL) and CW Reich (INEL) and cover the areas of fission yields and experimental decay data, respectively. Evaluations to these files will be contributed by essentially all CSEWG member laboratories.

B. Evaluate important FP cross sections for fast and thermal reactor application. These will mainly involve updating about 180 cross section evaluations from ENDF/B-V with emphasis on capture. Use will be made of combining recent integral and differential data results from CFRMF, STEK, RPI and ORNL.

C. Evaluate delayed neutron spectra using summation method from individual precursors in cooperation with TR England (LASL) and CW Reich (INEL). Precursors without experimental spectra will be predicted using the computer code BETA.

D. Evaluate decay data parameters $\overline{E}_\beta$, $\overline{E}_\gamma$ for "theoretical" ("no line data") FP nuclides using BETA code, extrapolated "fits" to known data, and integral results of recent decay heat measurements.

E. Analyze fission yield experimental results from FFTF.

Purpose:

Update ENDF/B Fission Product Data Files

Completion dates:

ENDF/B-V file was issued May 1980. ENDF/B-V Fission Yield Files issued April/May 1979. Mods to ENDF/B-V expected to be released Sep. 1982 and May 1983.

U.S.A.

(cont'd)

References:

Results for delayed neutron spectra will be reported at the Internat. Conf. on Nuclear Data for Science and Technol., Antwerp, 6-10 Sep. 1982.

Other references related to this work may be obtained from R.E. Schenter.

U.S.A.

Laboratory and address:	Idaho National Engineering Laboratory EG&G Idaho, Inc. P.O. Box 1625 Idaho Falls, Idaho 83415 USA
Names:	C. W. Reich, R. L. Bunting
Compilation:	Decay data for fission products. Quantities treated include: $T_{1/2}$; Q_β; branching fractions for the various decay modes; energies and intensities of all emitted radiations (e.g., β, γ, c.e., x-ray); K-, L- and total ICC; delayed-neutron energy spectra for individual precursors; uncertainties in all measured values.
Purpose:	Decay data file for ENDF/B.
Major sources of information:	Nuclear Data Sheets, Table of Isotopes (7th Ed.), recently published papers, preprints of recent work.
Deadline of literature coverage:	Ongoing. For Version V of ENDF/B, cut-off date is approximately September, 1978.
Computer File:	Decay data are included in ENDF/B Fission Product File. Tapes available through normal ENDF/B procedures. Evaluated decay data sets for 318 fission-product nuclides (and isomeric states) have been prepared for inclusion in the ENDF/B-V Fission-Product File.
Publications:	R. L. Bunting and C. W. Reich, "Evaluation Procedures for Experimental Decay Data," in Proceedings of the Conference on Nuclear Data Evaluation Methods and Procedures, BNL-NCS-51363, Vol. I, pp. 163-183 (March, 1981). C. W. Reich and R. L. Bunting, "The Use of Data from Beta-Strength-Function Experiments to Obtain Average Decay-Energy Values for Short-Lived Fission-Product Nuclides," Nuclear Science and Engineering (in press).

U. S. A.

Laboratory: Idaho National Engineering Laboratory

Address: Exxon Nuclear Idaho Co., Inc.
P. O. Box 2800
Idaho Falls, Idaho 83401
United States of America

1. Names: William J. Maeck, T. C. Chapman (same as INDC(NDS)-116)

Evaluation: The Correlation of ^{235}U Fission Yields with Neutron Energy

Purpose: A study was conducted to evaluate the correlation of ^{235}U fission yields with neutron energy over the energy region encompassed by thermal and fast reactors.

Method: In this study, to correlate yields with neutron energy, the criteria for entry into the data base were: 1) mass spectrometrically determined values, and 2) a measurement of the relative isotopic abundance of fission product neodymium. Although these criteria eliminated the bulk of the reported fast yield measurements, especially radiochemical measurements, sufficient data were retained to conduct this study.

Through the use of mass spectrometric isotopic measurements of the stable and long-lived fission products, both the change in the relative isotopic abundance and the fission yields of the major fission product nuclides correlate well with neutron energy. In many cases, changes of only a few percent in the relative isotopic abundance of the fission yields over the energy range from thermal to 1MeV are easily discernable and significant.

The neutron energy index used in this study is the isotope ratio, $^{150}Nd/^{143}Nd$. A unique feature of this index is that the resulting correlations are linear for the energy range studied. In some respects, this energy index is superior to others because neodymium, which is a direct result of the fission process, is formed in the sample undergoing fission and, as such, provides superior data to that afforded by the use of monitors external to the target.

Major Sources of Information: The ^{235}U yield data used in this study inclued measurements from samples irradiated in the Experimental Breeder Reactor-II (EBR-II), the Dounreay Fast Reactor, French fast reactors, and EBR-I. The primary data sources, details relative to various experiments, neutron spectrum, and specific comments on the data are discussed.

For all the major fission products, mass spectrometrically measured fast yield data representative of at least three different neutron energies, in addition to the thermal data, are available. In many cases, the only data available are those produced in our laboratory.

U. S. A.

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Deadline of Literature Coverage: Mid-1980.

Status: Specific conclusions relative to this study are:

1. The isotope ratio $^{150}Nd/^{143}Nd$ is an effective energy index for correlating changes in fission product relative isotopic abundance data and fission yields with neutron energy.

2. The relative isotopic abundances of the individual nuclides of the major fission product elements determined in several different experiments and neutron environments are highly correlated with neutron energy.

3. Absolute fast reactor fission yield data reported by several different experimentors can be correlated with neutron energy.

4. Existing and future fast reactor fission yield compilations must consider the energy dependency factor if the listed values are to be meaningful.

5. Certain ENDF fast yield values should be reevaluated in light of the results of this evalution.

6. Fast reactor fission yields for ^{235}U can now be assigned for any neutron spectrum.

Publications:

1. W. J. Maeck, "The Correlation of ^{235}U Thermal and Fast Reactor Fission Yields with Neutron Energy," Exxon Nuclear Idaho Co., Inc., Rept., ENICO-1065 (December 1980).

Available from:

National Technical Information Service, U. S. Dept,,, of Commerce, 5285 Port Royal Road, Springfield, Virginia 22161, USA.

2. Names: W. J. Maeck, T. C. Chapman **(new)**

Evaluation: The correlation of ^{239}Pu Fission Yields with Neutron Energy.

Purpose: The relative isotopic abundances and the fission yields for over 40 stable and long-lived fission products from ^{239}Pu fast fission were evaluated to determine if the data could be correlated with neutron energy.

Method: Through the use of precise mass spectrometric isotopic abundance and isotope dilution measurements of many stable and long-lived fission product nuclides, both the change in the relative isotopic abundance, and the fast reactor fission yields for some nuclides are shown to correlate well with neutron energy. For others, the data are too sparse and scattered to obtain definitive correlations.

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The energy index used for the correlation study is the isotope ratio $^{150}Nd/^{143}Nd$. This ratio can be measured with high precision, approximately 0.25%, and for ^{239}Pu fission changes approximately 20% over the energy range of thermal to approximately 12 MeV. The correlation of the isotopic abundances and the fission yields of the major fissions product nuclides is linear relative to the $^{150}Nd/^{143}Nd$ ratio for a wide energy range.

Major Sources of Information: The data used in this study were obtained from samples irradiated in several different fast reactors and were analyzed in different laboratories.

As part of this study, the current ENDF yields, especially the fast yields, were compared to the results obtained from this work. Several discrepancies between the ENDF values and those obtained from this work are identified.

Deadline of Literature Coverage: End of 1980.

Status: Specific conclusions relative to this study are:

1. Fast fission yield values for some of the major ^{239}Pu fission products can now be assigned for any neutron spectrum.

2. In many cases the data are too sparse and scattered to obtain definitive correlation.

3. There are several discrepancies between the correlations developed in this study and the current ENDF data.

4. There is a serious need for additional ^{239}Pu fast yield measurements, especially in the 800-1000 keV range.

Publications:

1. W. J. Maeck, "The Correlation of ^{239}Pu Thermal and Fast Reactor Fission Yields with Neutron Energy", Exxon Nuclear Idaho Co., Inc., Rept., ENICO-1099 (October 1981)

Available from:

National Technical Information Service, U. S. Dept. of Commerce, 5285 Port Royal Road, Springfield, Virginia 22161, USA.

U. S. A.

(same as INDC(NDS)-116)

Laboratory and Address:

University of California
Los Alamos Scientific Laboratory
P. O. Box 1663
Los Alamos, New Mexico 87545 (U.S.A.)

1. Names:

T. R. England (LASL)
R. E. Schenter (HEDL)
B. F. Rider (G.E.)
J. Liaw (ANL)

Compilation:

Library of evaluated fission product yields for Version V of the Evaluated Nuclear Data Files (ENDF/B-V).

Deadline of Literature Coverage:

Mid-1978, including recent unpublished data.

Cooperation:

Subcommittee consisting of members from major U.S.A. commercial and government laboratories.

Other Relevant Details:

Twenty yield sets for 11 fissionable nuclides ($^{233,235,236,238}U$, $^{239,240,241,242}Pu$, ^{237}Np, ^{232}Th, and ^{252}Cf). Each set contains $\sim$1100 yields and uncertainties; independent yields before delayed neutron emission and cumulative yields (by A and Z) after delayed neutron emission are given. Yield distributions account for isobaric states, Z and N pairing effects, ternary fission and delayed neutron branching.

Completion Date:

August 1978 for compilation.
Phase I testing completed.
Phase II testing completed.

Publications:

Report on Phase I testing, and other relevant details in progress.

Computer File:

Distributed by the National Nuclear Data Center at the Brookhaven National Laboratory.

U.S.A.

(cont'd; same as INDC(NDS)-116)

LABORATORY AND ADDRESS:

University of California
Los Alamos Scientific Laboratory
P O Box 1663
Los Alamos, New Mexico 87545 (USA)

2. NAMES:

T. R. England
R. J. LaBauve
W. B. Wilson

COMPILATION:

Library of processed 154-group ENDF/B-IV fission_product reaction cross sections.

PURPOSE:

Data file of multigroup values (10^{-5} eV-20 MeV) for use in collapsing to few-group values.

MAIN SOURCE OF INFORMATION:

ENDF/B-IV Fission-Product Data File

OTHER RELEVANT DETAILS:

Cross sections were processed into the Power Reactor Studies (PRS) 154-group structure described in Ref. 1 and 2, using the PRS Neutron Flux Weighting Function described in Ref. 1. Cross sections were processed at 900 or 1000 K at infinite dilution. A total of 181 nuclides are described with total, elastic, total inelastic, and radiative capture multigroup values. Additional neutron absorption reaction cross-section tabulations are given for 36 of the nuclides. A total of 960 multigroup cross-section tabulations are included in the data file, which is issued with a companion collapsing code TOAFEW.

COMPUTER FILE:

The data file and collapsing code are available from the Radiation Shielding Information Center, Oak Ridge National LAboratory, P O Box X, Oak Ridge, Tennessee 37830 (USA).

REFERENCES:

1. W. B. Wilson, T. R. England, and R. J. Labauve, "Multigroup and Few-Group Cross Sections for ENDF/B-IV Fission Products; the TOAFEW Collapsing Code and Data File of 154-Group Fission-Product Cross Sections," Los Alamos Scientific LAboratory report LA-7174-MS (March 1978).

2. R. J. LaBauve and W. B. Wilson, "Proposal to Extend CSEWG Neutron and Photon Multigroup Structures for Wider Applications," Los Alamos Scientific Laboratory report LA-6240-P (February 1976).

U. S. A.

(cont'd)

3. Names:

T. R. England
R. J. LaBauve
D. G. Madland
W. B. Wilson
D. C. George

Cooperation:

R. E. Schenter, chairman of the ENDF/B actinide and fission product subcommittee, and F. Schmittroth of the Hanford Engineering Development Laboratory, P. O. Box 1970, Richland, Washington 93352.

Compilations:

A) Nuclide Parameter Evaluated Compilations

1) β and γ decay energies, branching fractions [decay and (n,γ)], half-lives, Q-values and cross sections for 824 fission products are tabulated in Ref. 1. This is a basic data set that includes the major types of parameters, with corrections, from ENDF/B-IV, except for yields and the energy dependence of cross sections.

2) Multigroup β and γ spectra are tabulated in Ref. 2 for 180 fission product nuclides. The β spectra are given in 75 groups and the γ spectra in 150 groups. These data are based on ENDF/B-IV; ENDF/B-V spectra are now available.

3) Multigroup cross sections are compiled in Ref. 11, processed from ENDF/B-IV. (see contribution 4. below).

4) Few group fitted spectral functions available in Ref. 9; a report based on ENDF/B-V is available in draft form.

5) Comparisons with experiment and a new decay heat standard are presented in Ref. 14. Reference 15 is a code incorporating the pulse function data of the new ANS Decay Heat Standard.

B) Evaluations

1) Yield distribution (pairing effects) and branching to isomeric states are evaluated and modeled in Refs. 3 and 4. Estimated values from the modeling are also included in these references.

2) Ternary fission is evaluated and compiled in Ref. 5.

3) β and γ spectra, decay heating and absorption buildup are evaluated by comparison with experiment in Refs. 6-13. based on ENDF/B-IV and a draft report using ENDF/B-V is available.

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Purpose:

Research by the Los Alamos nuclear data group (T-2) is directed at improvement in the national data file ENDF/B and at the use of these data in, e.g., determining a new decay heat standard, absorption buildup, etc.

References

1. T. R. England and R. E. Schenter, "ENDF/B-IV Fission Product Files: Summary of Major Nuclide Parameters," Los Alamos Scientific Laboratory report LA-6116-MS [ENDF-223] (October 1975).

2. T. R. England and M. G. Stamatelatos, "Multigroup Beta and Gamma Spectra of Individual ENDF/B-IV Fission-Product Nuclides," Los Alamos Scientific Laboratory report LA-NUREG-6622-MS (Decamber 1976).

3. D. G. Madland and T. R. England, "The Influence of Pairing on the Distribution of Independent Yield Strengths in Neutron-Induced Fission," Los Alamos Scientific Laboratory report LA-6430-MS [ENDF-240] (July 1976).

4. D. G. Madland and T. R. England, "Distribution of Independent Fission-Product Yields to Isomeric States," Los Alamos Scientific Laboratory report LA-6596-MS [ENDF-241] (November 1976).

5. D. G. Madland and Leona Stewart, "Light Ternary Fission Products: Probabilities and Charge Distributions," Los Alamos Scientific Laboratory report LA-6783-MS [ENDF-247] (April 1977).

6. D. G. Foster, Jr. and T. R. England, "Time-Dependent Spectra of Photons and Spontaneous-Fission Neutrons for Applied Problems," Invited Paper, Trans. Am. Nucl. Soc. 23, 551 (1976).

7. T. R. England and M. G. Stamatelatos, "Beta and Gamma Spectra and Total Decay Energies from Fission Products," Trans. Am. Nucl. Soc. 23, 493 (1976).

8. M. G. Stamatelatos and T. R. England, "Fission-Product Gamma-Ray and Photoneutron Spectra and Energy-Integrated Sources," NUREG-0155 [LA-NUREG-6345-MS] (Issued December 1976) (See also Addendum 1, March 1977).

9. R. J. LaBauve, et al., "The Application of a Library of Processed ENDF/B-IV Fission-Product Aggregate Decay Data in the Calculation of Decay-Spectra," LA-7483-MS (September 1978).

10. M. G. Stamatelatos and T. R. England, "Short Irradiation Fission-Product Beta Spectra and Total Energy: Calculations Versus Experiment," (ANS Summary accepted for ANS Annual Meeting June 12-17, 1977).

11. T. R. England, W. B. Wilson, and M. G. Stamatelatos, "Fission-Product Data for Thermal Reactors
Part 1
A Data Set for EPRI-CINDER Using ENDF/B-IV
Part 2
Users Manual for EPRI-CINDER Code and Data," Los Alamos Scientific Laboratory reports LA-6745-MS and LA-6746-MS (December 1975) [To be issued by EPRI ~ March 1977].

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12. W. B. Wilson and T. R. England, "Status of Fission-Product Data for Absorption Calculations," LA-UR-78-1452, (May 1978).

13. E. T. Jurney, P. J. Bendt, and T. R. England, "Fission Product Gamma Spectra," LA-7620-MS (January 1979).

14. T. R. England, R. E. Schenter, and F. Schmittroth," Integral Decay-Heat Measurements and Comparisons to ENDF/B-IV and V," NUREG/CR-0305 [LA-7422-MS] (August 1978).

15. W. B. Wilson, T. R. England, and R. J. LaBauve," DKPOWR: A Code for Calculating Fission-Product Decay Power (report in preparation).

16. T. R. England, W. B. Wilson, "TMI-2 decay power: LASL fission-product and Actinide decay power calculations for the president's commission on the accident at Three Miles Island " LA-8041-MS, Revised (March 1980).

17. "Generation of Pulse Functions for Beta and Gamma Decay Spectra " LA-8277-MS.

18. "Comparisons of Calculated and Measured Pu-239 Beta and Gamma Spectra " NUREG/CR-1172 (ORNL/NURGE-66).

19. "Status of ENDF/B-5 Yields " Third ASTM Euratom Symposium, Ispra, Italy, Oct. 1979.

20. "Summary of major decay parameters and cross sections based on ENDF/B-V", (report in preparation)

21. T. R. England, W. B. Wilson, R. E. Schenter, and F. M. Mann, "Aggregate Delayed Neutrons and Spectral Calculations Using Preliminary Precursor Data Evaluated for Inclusion in ENDF/B-VI," Los Alamos National Laboratory report LA-UR-82-841 (March 1982).

22. R. J. LaBauve, T. R. England, and D. C. George, "Integral Data Testing of ENDF/B Fission Product Data and Comparisons of ENDF/B with Other Fission Product Data Files," Los Alamos National Laboratory report LA-9090-MS (ENDF-320), (November 1981).

23. R. J. LaBauve, T. R. England, D. C. George, and C. W. Maynard, "Fission Product Analytic Impulse Source Functions", Nucl. Technol. 56 (1982) 322.

U.S.A.
(cont'd)

LABORATORY AND ADDRESS:

University of California
Los Alamos National Laboratory
PO Box 1663
Los Alamos, New Mexico 87545 (USA)

4. NAMES:

W. B. Wilson
T. R. England
R. J. LaBauve
R. M. Boicourt

COMPILATION:

Library of processed 154-group ENDF/B-V actinide and fission-product reaction cross sections.

PURPOSE:

Direct application or input file to companion TOAFEW-V cross-section collapsing code.

MAIN SOURCE OF INFORMATION:

ENDF/B-V actinide and fission-product data files.

OTHER RELEVANT DETAILS:

This processed 154-group ENDF/B-V actinide and fission-product cross-section file replaces our earlier ENDF/B-IV fission-product file described in Ref. 1. All total, elastic, total inelastic, (n,2n), (n,3n), fission, (n,n'α), (n,n'p), n,4n), (n,γ), (n,p), (n,d), (n,t), (n,^{3}He), and (n,α) cross sections given in ENDF/B-V for 41 actinide and 196 fission-product nuclides were processed at 300, 900, and 1200 K at infinite dilution. Actinide cross sections were processed at additonal dilutions using the Bondarenko scheme. The library is furnished with the companion TOAFEW-V collapsing code, which collapses desired multigroup values to any few-group structure using any of a variety of flexible user flux-dependent schemes. The code and library are described in Ref. 2.

COMPUTER FILE:

The data file and collapsing code will soon be available from the Radiation Shielding Information Center, Oak Ridge National Laboratory.

REFERENCES:

1. TOAFEW report, LA-7174-MS.

2. TOAFEW-V report, EPRI NP-2345 (April 1982).

U. S. A.

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LABORATORY AND ADDRESS:

University of California
Los Alamos National Laboratory
PO Box 1663
Los Alamos, New Mexico 87545 (USA)

5. NAMES:

T. R. England (LANL)
B. F. Rider (Retired)
R. E. Schenter (HEDL)

COMPILATION

Library of evaluated fission product yields for ENDF/B-VI files (preliminary).

DEADLINE OF LITERATURE COVERAGE

Mid-1981

COOPERATION

Subcommittee consisting of members from major USA commercial and government laboratories.

RELEVANT DETAILS

See comment for ENDF/B-V. The new files are updated and extended to include 50 yield sets for 34 fissioning nuclides at one or more fission energies. Data are not yet in ENDF/B-V format and there has been no Phase I Testing.

PUBLICATIONS

1. B. F. Rider, et al, "Evaluation of Fission Product Yields for the U. S. National Nuclear Data Files," Proc. of the Conf. on Nuclear Data Evaluation Methods and Procedures, held at BNL Sept. 22-25, 1980. Report BNL-NCS-51363 [DOE-NDC-23, NEANCD(US)-209, INDC(USA)-85] March 1981.

2. B. F. Rider, "Compilation of Fission Product Yields," General Electric Vallecitos Nuclear Center report (microfiche only) NEDO-12154-3(C) [ENDF-322] October 31, 1981.

U.S.A.

Laboratory and Address: Oak Ridge National Laboratory
P. O. Box X, Building 6010
Oak Ridge, Tennessee 37830, USA

1. Name: J. K. Dickens

Compilation and Evaluation: Data file of fission-product radioactive β-decay information including energies, E_β, and absolute branching ratios, A_β, and degree of forbiddenness for 353 fission products, augmented by average β-ray energies for 183 additional fission products.

Purpose: To compute gross fission-product β-ray spectra obtained, e.g. following fission of ^{235}U so as to determine the associated "reactor antineutrino" spectrum to be used in experimental measurements of antineutrino-induced reactions.

Major sources of information: Nuclear Data Sheets, Table of Isotopes (7th Edition), and recent published literature.

Deadline: January 1982 for the current compilation.

Status: Data file will be available from the ORNL Radiation Shielding Information Center in July 1982.

Publications: J. K. Dickens, "Electron Spectra from Decay of Fission Products," ORNL/TM-8285 (in preparation); J. K. Dickens, "Electron Antineutrino Spectrum for $^{235}U(n,f)$," Phys. Rev. Lett. 46, 1061 (1981); J. K. Dickens, "Calculated Beta-Ray Spectra from Decay of Fission Products Produced by Thermal-Neutron Fission of ^{235}U," Phys. Lett. B (accepted).

2. Name: J. K. Dickens and P. T. Perdue

Compilation: Data file of radioactive γ-decay information including energies and absolute intensities when available, or relative intensities when absolute values are not available.

Purpose: Identification of responsible radionuclides for data reduction of high-resolution Ge(Li) spectroscopy.

Major Sources: Nuclear Data Sheets and Table of Isotopes (7th Edition).

Deadline: Continuing.

Status: Three data files contain data for 748 radionuclides between 7-Be and 254-Es. About 50% of the 3100 entries are up to date (December 1981). The remainder are being upgraded on a continuous basis. The primary file is ordered by increasing Z and A; the file contains information useful for neutron

U. S. A.
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activation analysis (NAA). There is a secondary file consisting of 3136 γ rays ordered by increasing γ-ray energy; for each entry a second γ ray is included if available. There is an additional secondary file of the 748 radionuclides ordered by increasing half life; no γ-decay information is in this file. These data files will be available from the ORNL Radiation Shielding Information Center in May 1982.

Publication: Radiation Shielding Information Center Document No. DLC088/TPASGAM, "Informal Notes," J. K. Dickens and P. T. Perdue (April 1982).

U.S.A.

(same as INDC(NDS)-116)

Laboratory and address	Washington University, Dept. of Chemistry, St. Louis, MO., USA
Name	A. C. Wahl
Compilation and evaluation	Independent yields and other data related to nuclear-charge distribution in fission are compiled and evaluated for low-energy fission reactions (excitation energies up to ∿20 MeV). The current compilation includes data for thermal-nuetron-induced fission of ^{233}U, ^{235}U, and ^{239}Pu and for spontaneous fission of ^{252}Cf. Data for other fission reactions are to be added.
Purpose	Systematic trends in independent yields (IN) are derived from the data by use of models, which allow reasonable estimates to be made of independent yields for all fission products and increase knowledge of fission-reaction mechanisms.
Sources of information	Journals, reports, preprints, other compilations, and personal communications
Method	Original values of experimental data and uncertainties are maintained in a file, and average values are calculated and normalized for each A, when sufficient data exist, so that the sum of fractional independent yields (FI) is unity. The set of FI values for each fission reaction, or IN values derived from them, are treated by the method of least squares to derive systematic trends in the yields described by the Z_P and A'_P models. Experimental yield data are evaluated by comparison with other data, with average yield values, and with yields calculated from the models.
Cooperation	We are prepared to exchange files with other groups.
Computer file	Information is held in standard forms on computer files.
Completions	Compilation is continuous.
Publications	A.C. Wahl, "Systematics of Nuclear Charge Distribution in Fission - The Z_P Model," J. Radioanal. Chem. 55, 111 (1980). A.C. Wahl, "Nuclear-Charge distribution in Fission - Investigation of Systematics and Methods of Estimation of Independent Yields," Contribution to IAEA Petten Panel on Fission Product Nuclear Data - Sept., 1977. Published in: INDC(NDS)-87 (1978), 215. A.C. Wahl, A.E. Norris, R.A. Rouse, and J.C. Williams, "Products from Thermal-neutron-induced fission of ^{235}U: A correlation of Radiochemical Charge and Mass Distribution Data," in Proceedings of the Second International Atomic Energy Symposium on Physics and Chemistry of Fission, Vienna, Austria, 1969 (I.A.E.A.), p. 813.

III. RECENT PUBLICATIONS RELATED TO FPND

The publications listed below refer to activities related to FPND which are not covered by the contributions contained in this issue. They are sorted according to

1. Fission yields and charge distribution
2. Neutron reaction cross sections
3. Decay data
4. Delayed neutron data
5. FP decay heat
6. Reviews and summaries

Completeness of this section has not been attempted. For papers presented at meetings see section IV.

III.1. Fission yields and charge distribution

(For fission yields of delayed neutron precursors see also "delayed neutrons")

Determination of the isoboric elemental yields in velocity selected fission products

H. Faust, P. Geltenbort, F. Gönnenwein, A. Oed
Nucl. Instr. Meth. 193 (1982) 577

A continuous on-line method for fission yield measurements with the combined GJRT-SISAK technique

T. Björnstad
Nucl. Instr. Meth. 188 (1981) 375

Measurement of yields of fission products with half lives of 1 to 30 sec by continuous chemistry techniques

K. Rengan, J. Lin, R.A. Meyer
Radiochem. Radioanal. Lett. 51 (1982) 339

(fissioning nuclide not mentioned in paper)

Charge distribution in the fission of ^{232}Th by 14 MeV neutrons

Li W., Sun T., Sun X., Zhang T., Zheng M., Dong T., Fu M.
Physica En. Fortis et Physica Nucl. 6 (1982) 365
(in Chinese with English abstract; independent yields of ^{82}Br, ^{96}Nb, $^{130,132,134}I$, $^{134m,135m,136}Cs$, ^{140}La)

Mass number and prompt neutron emission of individual fission fragments as functions of nuclear charge, both involving parameters determinable from radiochemical data

M. Talât-Erben, R.K. Tokay
Phys. Rev C 24 (1981) 1055

(expressions derived for fragment mass, charge density and neutron yields versus charge for fission of ^{232}Th, ^{233}U, ^{235}U., ^{238}U. ^{239}Pu. ^{252}Cf)

Thin film scintillation detector response to fragments from light charged particle accompanied fission of ^{236}U

N.N. Ajitanand, K.M. Iyengar, S.R.S. Murthy
Nucl. Instr. Meth. 193 (1982) 587

(^{235}U thermal fission)

Energy, angular, and mass correlations in fission of ^{235}U by thermal neutrons with emission of ^{4}He, Li, and Be nuclei

V.T. Grachev, Yu.I. Gusev, D.M. Seliverstov, N.N. Smirnov
Yad. Fiz. 32 (1980) 1186 (Engl.: Sov. J. Nucl. Phys. 32 (1980) 612)

Fine structure in the mass yields from fission of ^{237}Np by neutrons

V.F. Teplykh, E.V. Platygina, K.A. Petrzhak, B.M. Markov, V.I. Kozinets
Yad. Fiz. 29 (1979) 293 (Engl.: Sov. J. Nucl. Phys. 32 (1979) 144)

Absolute measurement of velocities, masses and energies of fission fragments from Californium-252 (SF)

H. Henschel, A. Kohnle, H. Hipp, G. Gönnenwein
Nucl. Instr. Meth. 190 (1981) 125

Fission-fragment kinetic energy and mass distribution measurement for ^{252}Cf spontaneous fission

Bao Z., Han H., Meng J. Huang S.
Chinese J. Nucl. Phys. 4 (1982) 41

(in Chinese with English abstract)

III.2. Neutron reaction cross sections

Mesure de la section efficace de capture radiative de neutrons pour les noyaux de rubidium, yttrium, niobium, gadolinium, tungstene, platine et thallium entre 0,5 et 3 MeV

J. Voignier, S. Joly, G. Grenier
report CEA-R-5089 (August 1981)

Evaluation complete des données nucléaires neutroniques de ^{85}Rb et ^{87}Rb de 10^{-5} eV à 20 MeV

G. Simon, A. Prince, E. Lalie
report CEA-N-2201 (April 1981)

Experimental and theoretical neutron cross sections at 14 MeV

R.C. Harper, W.L. Alford
J. Phys. G 8 (1982) 153

(including ^{93}Nb(n,2n)^{92m}Nb and ^{93}Nb(n,α)^{90m}Y)

Evaluation of the cross sections for the reactions ^{19}F(n,2n)^{18}F, ^{31}P(n,p)^{31}Si, ^{93}Nb(n,n')^{93m}Nb and ^{103}Rh(n,n')^{103m}Rh

B. Strohmaier, S. Targesen, H. Vonach
Physics Data No. 13-2 (1980)

Measurement of the total neutron cross-section of molybdenum in the energy range from 2.2 eV to 3 meV

M. Salama, M. Mazhar
Atomkernenergie 39 (1981) 207

New measurements for the total neutron cross section of molybdenum in the energy range from 2.2 eV to 0.04 eV

M.A. Salama, M.S. Mazher
Atomkernenergie 40 (1982) 290

III.3. Decay data

(for delayed neutron precursor decay data see also "delayed neutrons")

Properties of strongly neutron-rich isotopes of germanium and arsenic

P. Hoff, B. Fogelberg
Nucl. Phys. A 368 (1981) 210

(cf. contributions on pages 84-86)

Ground-state decay branchings for ^{85,86,87,88}Se isotopes with a gas-phase rapid chemistry system

J. Lin, K. Rengan, R.A. Meyer
Radiochem. Radioanal. Lett. 50 (1982) 399

Use of organo-metallic reactions for the isolation and study of short-lived selenium fission products and simultaneous supression of daughter bromine activity

K. Rengan, J. Lin, T.N. Massey, M. Zendel, R.A. Meyer
Radiochem. Radioanal. Lett. 50 (1982) 385

(decay studies assigned to ^{89}Se)

Continuous gas-phase separation of bromine fission products with half-lives of 600 ms to 56 s

K. Rengan, J. Lin, R.A. Meyer
Radiochem. Radioanal. Lett. 50 (1982) 393

(decay studies of $^{88-90}$Br)

A hyperpure germanium detector for precise beta endpoint energy determinations

R. Decker, K.-D. Wünsch, H. Wollnik, G. Jung, E. Koglin, G. Siegert
Nucl. Instr. Meth. 192 (1982) 261

(including ^{88}Rb; see also contribution on page 40)

Energy levels of ^{99}Mo populated in the decay of ^{99m}Nb

S. Ohya, M. Kanazawa, N. Mutsuro, T. Tamura, Z. Matumoto
J. Phys. Soc. Japan 50 (1981) 1057

Chemical effects of β^--decay in $^{99}Mo(CO)_6$

T. Muto, H. Ebihara
J. inorg. nucl. Chem. 43 (1981) 2617

Chemical effect of Tc K X-ray intensity in the decay $^{99}Mo \xrightarrow{\beta^-} {}^{99m}Tc \rightarrow {}^{99}Tc$

K. Yoshihara, A. Hibino, I. Yamoto, H. Kaji
Radiochem. Radioanal. Lett. 48 (1981) 303

Measurement of the number of radioactive atoms and half-life (I)

Feng X., Zhao Z., Lo S., Zhang J., Guo Y., Xu Y., Yang R., Huang Z., Zhang Y., Su Z., Li Z., Ma G.
Physica Energiae Fortis et Physica Nucl. 5 (1981) 754

(half life of ^{99m}Tc; in Chinese with English abstract)

Measurement of the number of radioactive atoms and half-life (II)

Feng X., Zhao Z., Xu Y., Guo Y., Lo S., Huang Z., Yang R., Jiang Y.
Physica Energiae Fortis et Physica Nucl. 6 (1982) 112

(half life of ^{99m}Tc; in Chinese with English abstract)

Decay scheme of 50 sec ^{103}Tc

H. Niizeki, S. Kageyama, T. Tamura, Z. Matumoto
J. Phys. Soc. Japan 47 (1979) 26

The decay of ^{106g}Rh

R. Kaur, A.K. Sharma, S.S. Sooch, N. Singh, P.N. Trehan
J. Phys. Soc. Japan 51 (1982) 23

Study of the radioactive decay of Ag^{110m}

H.R. Verma, A.K. Sharma, R. Kaur, K.K. Suri, P.N. Trehan
J. Phys. Soc. Japan 47 (1979) 16

Decay properties of neutron-rich silver isotopes

W. Brüchle, G. Herrmann
Radiochim. Acta 30 (1982) 1

(β^-, γ^-, x-ray spectroscopy of $^{113-118}Ag$)

Experimental beta-decay energies of very neutron-rich Cs isotopes

U. Keyser, F. Münnich, B. Pahlmann, B. Pfeiffer
Z. Phys. A 300 (1981) 249

($^{142-146}Cs$)

Precise Q_β-values with an intrinsic germanium detector for heavy, neutron-rich fission products

R. Decker, K.D. Wünsch, H. Wollnik, G. Jung, J. Münzel,
G. Siegert, E. Koglin
Z. Phys. A 301 (1981) 165

($^{138-146}Cs$, $^{139,141,143,146}Ba$, ^{146}La; in German
see also contribution on page 40)

Level scheme of ^{140}Cs

D. Otero, A.N. Proto, E. Duering, M.L. Pérez
Phys. Rev. C 23 (1981) 2691

Study of the radioactive decay of isotopes with mass number A=140

I. Adam et al
Dubna report no. P6-81-523

(Ba, La decay; in Russian)

Levels and transitions in $^{142,144}Ce$ populated following the decay of $^{142,144}La$

E. Michelakakis, W.D. Hamilton, P. Hungerford, G. Jung,
P. Pfeiffer, S.M. Scott
J. Phys. G 8 (1982) 111

The decay of ^{144}Ce

Yu B., Liu F., Lu X., Li S., Yang C.
Chinese J. Nucl. Phys. 3 (1981) 312

(γ-ray spectroscopy; in Chinese with English abstract)

Gamma ray emission probabilities in the decay of ^{144}Ce and ^{144}Pr

J.B. Olomo, T.D. MacMahon
Nucl. En. 20 (1981) 237

Level scheme of ^{149}Pm

T. Seo, S. Yamada, Y. Miyatake, T. Hayashi
Annu. Rep. Res. Reactor Inst. Kyoto Univ. 12 (1979) 152

Internal ionisation probability in the beta decay of ^{151}Sm

I.J. Unus, P.A. Indira, P. Venugopala Rao
J. Phys. G. 7 (1981) 1683

III.4. Delayed neutrons

Observation of beta-delayed neutron decay to excited 0^+ states in the residual nucleus: the case $^{97}Rb(\beta n\gamma)^{96}Sr$

K.-L. Kratz, A. Schröder, H. Ohm, G. Jung, B. Pfeiffer, F. Schussler
Phys. Lett. 103B (1981) 305

Delayed neutrons and symmetric fission

B.P. Maksyutenko, A.A. Shimanskii
Yad. Fiz. 29 (1979) 3
(Engl.: Sov. J. Nucl. Phys. 29 (1979) 1)

(calculated contribution of symmetric fission fragment precursors to delayed neutron yields in 15 MeV neutron fission of ^{235}U and ^{238}U)

III.5. Decay heat

Absolute measurement of the beta spectrum from ^{235}U fission as a basis for reactor antineutrino experiments

K. Schreckenbach, H.R. Faust, F. von Feilitzsch, A.A. Hahn
K. Hawerkamp, J.L. Vuilleumier
Phys. Lett. 99B (1981) 251

III.6. Reviews and summaries

Nuclei far from stability

B. Jonson
Nucl. Phys. A 354 (1981) 77c

IV. MEETINGS

4th international conference on nuclei far from stability

Helsingoer, Denmark, 7-13 June 1981

The proceedings were published as CERN 81-09 (20 July 1981)

page: selected papers:

116 Critical survey of beta decay energies and nuclear masses for the neutron-rich Rb and Cs isotopes.

U. Keyser, F. Münnich, B. Pahlmann, B. Pfeiffer

124 Nuclear Q_β-values for fission products. A comparison with mass formula predictions.

K. Aleklett, P. Hoff, E. Lund, G. Rudstam

(see also contribution on page 84)

129 Precision Q-value determinations for neutron-rich Rubidium isotopes at TRISTAN

D.S. Brenner, M.K. Martel, A. Aprahamian, R.E. Chrien, R.L. Gill, G.M. Gowdy, H.I. Liou, M. Shmid, M.L. Stelts, F.K. Wohn, C. Chung, D.M. Rehfield

(see also contribution on page 105)

265 Beta-delayed two-neutron and three-neutron emission

B. Jonson, H.A. Gustafsson, P.G. Hansen, P. Hoff, P.O. Larsson, S. Mattsson, G. Nyman, H.L. Ravn, D. Schardt

(see also contribution on page 89)

276 Beta-delayed two-neutron decay studies for $^{96-99}Rb$

P.L. Reeder, R.A. Warner, T.R. Yeh, R.E. Chrien, R.L. Gill, H. Liou, M. Shmid, M.L. Stelts

(see also contribution on page 122)

317 The beta minus strength function of nuclei far from stability in the A = 90 mass region

K.-L. Kratz, H. Ohm. A. Schröder, H. Gabelmann, W. Ziegert, H.V. Klapdor, H. Metzinger, T. Oda, B. Pfeiffer, G. Jung, L. Alquist, G.I. Crawford

(see also contribution on page 45)

334 Investigation of the beta strength function at high energy: gamma-ray spectroscopy of the decay of 5.3 s ^{84}As to ^{84}Se

E.A. Henry, O.G. Lien III, R.A. Meyer

339 Neutron resonance study of a delayed neutron emitter, ^{87}Kr

B. Fogelberg, J.A. Harvey, R.L. Macklin, S. Raman, P.H. Stelson

(see also contribution on page 85)

413 Decay properties of ^{81}Ga and ^{81}Ge and observation of abnormal energy shift in the $p_{1/2}$ state

P. Hoff, K. Aleklett, B. Fogelberg, E. Lund, G. Rudstam

(see also contribution on pages 84,85)

423 The level schemes of Sr and Y isotopes in the mass chains A = 95, 97 and 99

B. Pfeiffer, E. Monnand, J.A. Pinston, F. Schussler, G. Jung, J. Münzel, H. Wollnik

(see also contribution on page 41)

430 The strongly deformed nucleus ^{100}Sr

S. Mattsson, R.E. Azuma, H.A. Gustafsson, P.G. Hansen, B. Jonson, V. Lindfors, G. Nyman, I. Ragnarsson, H.L. Ravn, D. Schardt

(see also contribution on page 90)

436 Phase transition in nuclear shape in the A = 100 region?

J. Stachel, N. Kaffrell, N. Trautmann, H. Emling, H. Folger, E. Grosse, R. Kulessa, D. Schwalm, K. Brodén. G. Skarnemark, D. Eriksen

(see also contribution on page 81)

443 Extension of systematics for even-even Zr isotopes to A = 102

John C. Hill, K. Shizuma, H. Lawin, M. Shaanan, H.A. Selic, K. Sistemich

532 Level scheme of ^{131}Sb

F. Schussler, J. Blachot, E. Monnand, J.A. Pinston, H. Lawin, K. Sistemich, K. Kawade, K. Heyde, J. Sau, B. Pfeiffer

557 Angular correlation and coincidence studies of excited 0^+ and other levels in the transitional Ce nuclides ^{142}Ce, ^{144}Ce, ^{146}Ce and ^{148}Ce

W.B. Walters, C. Chung, D.S. Brenner, R. Gill, M. Shmid, R. Chrien, H.I., Liou, G. Gowdy, M. Stelts, Y.Y. Chu, F.K. Wohn, K. Sistemich, H. Yamamoto, R. Petry

(see also contribution on page 105)

562 Levels in ^{146}Ce and the N=88 isotones

G.M. Gowdy, R.E. Chrien, Y.Y. Chu, R.L. Gill, H.I. Liou, M. Shmid, M.L. Stelts, K. Sistemich, F.K. Wohn, H. Yamamoto D.S. Brenner, T.R. Yeh, R.A. Meyer, C. Chung, W.B. Walters, R.F. Petry

(see also contribution on page 105)

569 Band Structure in ^{148}Ce from the decay of mass separated ^{148}La

R.L. Gill, R.E. Chrien, M. Shmid, G.M. Gowdy, H.I. Liou, D.S. Brenner, F.K. Wohn, K. Sistemich, H. Yamamoto, C. Chung, W.B. Walters

(see also contribution on page 105)

576 Nuclear spectroscopy of neutron rich A=147 nuclides: decay of ^{147}Cs, ^{147}Ba and ^{147}La

M. Shmid, Y.Y. Chu, G.M. Gowdy, R.L. Gill, H.I. Liou, M.L. Stelts, R.E. Chrien, R.F. Petry, H. Dejbakhsh, C. Chung, D.S. Brenner

(see also contribution on page 105)

581 The transitional Cerium isotopes $^{142,144}Ce$

E. Michelakakis, W.D. Hamilton, P. Hungerford, S. Scott, G. Jung, B. Pfeiffer

589 Nuclear spectroscopy of neutron rich A = 147 nuclei

F. Schussler, B. Pfeiffer, H. Lawin, E. Monnand, J. Münzel, J.A. Pinston, K. Sistemich

602 Identification of new neutron-rich rare-earth nuclei produced in ^{252}Cf spontaneous fission

R.C. Greenwood, R.J. Gehrke, J.D. Baker, D.H. Meikrantz

(see also contribution on page 109)

696 Applications of nuclear data on short-lived fission products

G. Rudstam, P. Aagaard, K. Aleklett, E. Lund

723 Development of a gas-jet coupled ISOL facility with a ^{252}Cf spontaneous fission source

R.C. Greenwood, R.A. Anderl, V.J. Novick

727 Rapid continuous chemical methods for studies of nuclei far from stability

N. Trautmann, N. Greulich, U. Hickmann, N. Kaffrell, E. Stender, M. Zendel, H. Gäggeler, K. Brodén, G. Skarnemark, D. Eriksen

(see also contribution on page 81)

Internat. Conf. on nuclear data for science and technology

Antwerp, Belgium, 6-10 Sept. 1982

Among the abstracts received at the Nuclear Data Section, the following selected papers contain some information on FPND:

paper no: title:

13A Study of excitation functions around 14 MeV neutron energy

J. Csikai

(cross section between 13.5 and 14.7 MeV including: (n,2n) for ^{90}Zr, ^{93}Nb, ^{113}In, (n,α) for $^{94,96}Zr$, (n,n') for $^{113,115}In$, and ^{92}Zr(n,d))

13B Measurement of some average cross sections for ^{252}Cf neutrons

H. Benabdallah, G. Paic, J. Csikai

(including: (n,γ) for ^{86}Sr, ^{115}In, $^{134,138}Ba$, (n,n') for ^{87}Sr, ^{111}Cd, $^{113,115}In$, ^{135}Ba)

13C Measurement of average cross section for ^{252} Cf neutrons

Z. Dezsö, J. Csikai

(including: ^{93}Nb(n,α), ^{113}In(n,n'))

13D Measurement and evaluation of (n,t) cross sections

Z.T. Bödy, F. Cserpak, J. Csikai, S. Sudar, K. Mihaly

(including: ^{93}Nb)

28A Nuclear fission: from saddle to scission

J.P. Theobald

(light fragment mass distribution in ^{233}U thermal fission)

29A Present status and benchmark tests of JENDL-2

Yasuyuki Kikuchi and members of JNDC

(see also contribution page 142)

35C Radiation widths of iodine, cesium and iridium neutron resonances

A.B. Popov, K. Trzeciak, Zo In Ok

36A Precise measurement of cross sections for the reactions $^{90}Zr(n,2n)^{89}Zr$ and $^{58}Ni(n,2n)^{57}Ni$ from threshold to 20 MeV

G. Winkler, A. Pavlik, H. Vonach, A. Paulsen, H. Liskien

42A On neutron capture cross section measurements with the activation technique in the MeV region

P. Andersson, I. Bergqvist, R. Zorro

($^{115}In(n,\gamma)^{116m}In$, see also contribution page 87)

45A The UK Chemical nuclear data library: evaluated nuclear decay data for reactor applications

B.S.J. Davies

(see also contribution page 152)

54A Energy and mass distributions for $^{241}Pu(n_{th},f)$, $^{242}Pu(s.f.)$ and $^{244}Pu(s.f.)$-fragments

E. Allaert, C. Wagemans, C. Wegener-Penning, A.J. Deruytter, R. Barthélémy

(see also contribution page 12)

63E Measurement of cross sections for the (n,2n) reaction of ^{55}Mn, ^{58}Ni, ^{59}Co, ^{93}Nb, ^{181}Ta and ^{197}Au

Lu Hanlin, Huang Jianzhou, Fan Peiguo, Cui Yunfeng, Zhao Wenrong

79A Measurements of fission-product decay heat for fast reactors

Masatsugu Akiyama and Shigehiro An

(see also contribution page 80)

80A IBA Description of collective states in neodymium isotopes

G. Maino, E. Menapace, A. Ventura

94A Gamma-rays from capture of 400-keV neutrons

N. Yamamuro, H. Kitazawa, M. Igashira, T. Maruyama, K. Hashimoto

(see also contribution page 79)

102A Neutron radiative capture and transmission measurements of ^{107}Ag and ^{109}Ag

M. Mizumoto, M. Sugimoto, Y. Nakajima, M. Ohkubo, Y. Furuta Y. Kawarasaki

(see also contribution on pages 70,71)

111A Isotopic distributions for Kr, Sr, I and Xe in the photofission of $^{235,238}U$

D. De Frenne, H. Thierens, B. Proot, E. Jacobs, P. De Gelder, A. De Clercq

(see also contribution on page 9)

120A A measurement of the cross sections for the reactions $^{93}Nb(n,2n)^{92m}Nb$, $^{90}Zr(n,2n)^{89m+g}Zr$, $^{63}Cu(n,2n)^{62}Cu$, $^{27}Al(n,p)^{27}Mg$ and $^{27}Al(n,\alpha)^{24}Na$ for the purpose of neutron spectrometry around E_n = 14 MeV

A. Chiadli, G. Paic

141B A predicted directional bias of the mass asymmetry in $^{230}Th(n,f)$

D.W. Lang

145A Effets dynamiques dans la fission de ^{232}Th et ^{230}Th induite par neutrons

J. Trochon, J. Fréhaut, J.W. Boldeman, G. Simon, Y. Pranal

145B Comparaison des caracteristiques des fragments de la fission spontanée et de la fission induite par neutrons thermiques des noyaux $^{240,239}Pu$, $^{242,241}Pu$ et $^{244,241}Pu$

J. Trochon, J.W. Boldeman, F. Brisard, Y. Pranal

(see also contribution page 7)

150A Mesure de la section efficace de capture radiative du lanthane, du bismuth, du cuivre naturel et de ses isotopes pour des neutrons d'energie comprise entre 0,5 et 3 MeV

J. Voignier, S. Joly, G. Grenier

175A Decay heat calculations using the CEA radioactivitiy data bank and the PEPIN Code

B. Duchemin, J. Blachot, B. Nimal, J.C. Nimal, J.P. Veillaut

(see also contribution page 134)

177A Reactor Irradiations of ^{242}Pu and comparisons of measured and calculated yields of ^{244}Pu, ^{243}Am, ^{244}Cm and fission products

C. De Raedt, P. De Regge, T. Babeliowsky, E. Wattecamps

193A Fission fragment angular distribution data for neutron induced fission of ^{235}U

S.S. Kapoor, K.N. Iyengar, D.M. Nadkarni, V.S. Ramamurthy

197B Fission fragment angular distributions and total kinetic energies for $^{235}U(n,f)$ from 0.18 to 8.83 MeV

J.W. Meadows, C. Budtz-Jorgensen

201A Delayed neutron spectral measurements and covariance error analysis for fast fission in ^{235}U and ^{239}Pu

J. Walker, D.R. Weaver, J.G. Owen

(see also contribution page 99)

205A Measurements of decay scheme data

S.P. Holloway, J.B. Olomo, T.D. Mac Mahon, B.W. Hooton

(including: γ-ray spectroscopy of ^{140}Ba - ^{140}La, half life of ^{154}Eu)

211A A comparison of measured and calculated integral neutron cross-sections

I. Broeders, L. Koch, M. Robin, R. Wellum

(see also contribution page 139)

211B The TACO experiment for the determination of integral neutron cross-sections in a fast reactor

A. Cricchio, R. Ernstberger, L. Koch, R. Wellum

(see also contribution page 49)

214A The measurement of short-lived radionuclides using a cyclic activation system

Charles A. Adesanmi, Nicholas M. Spyrou

(including: ^{92}Y, ^{99}Zr, ^{101}Zr, ...)

218A High resolution measurements of delayed neutron emission spectra from fission products

T.R. Yeh, D. CLark, G. Scharff-Goldhaber, R.E. Chrien, L.-J. Yuan, M. Shmid, R.L. Gill, A. Evans, H. Dautel, J. Lee

(see also contribution page 105)

224B Mesures par activation d'isotopes separes de produits de fission dans des spectres de reacteurs a neutrons rapides

L. Martin Deidier, M. Darrouzet

(including: $^{98,100}Mo$, $^{102,104}Ru$, ^{108}Pd, ^{139}La, ^{141}Pr, ^{142}Ce, $^{146,148,150}Nd$, ^{152}Sm)

235A Radiative capture cross-sections of ^{160}Gd and ^{115}In in MeV energy region

M. Afzal Ansari, I.M. Govil, M.L. Sehgal

226A Average capture cross section of the fission product nuclei $^{104,105,106,108,110}Pd$

E. Cornelis, C. Bastian, G. Rohr, R. Shelley, T. van der Veen, G. Vanpraet

(see also contribution page 13)