ORNL/TM--12291

DE93 012516

Engineering Physics and Mathematics Division

COMPILATION OF REQUESTS FOR NUCLEAR DATA

Compiled by the Request List Subcommittee of the
Cross Section Evaluation Working Group (CSEWG)

Edited by Lawrence W. Weston and Duane C. Larson

Date Published - February 1993

Prepared for the
Office of Energy Research
Division of Nuclear Physics

Prepared by the
OAK RIDGE NATIONAL LABORATORY
Oak Ridge, Tennessee 37831
managed by
MARTIN MARIETTA ENERGY SYSTEMS, INC.
for the
U. S. DEPARTMENT OF ENERGY
under contract DE-AC05-84OR21400

1. INTRODUCTION

This compilation represents the current needs for nuclear data measurements and evaluations as expressed by interested fission and fusion reactor designers, medical users of nuclear data, nuclear data evaluators, CSEWG members and other interested parties. The requests and justifications are reviewed by the Data Request and Status Subcommittee of CSEWG as well as most of the general CSEWG membership.

The basic format and computer programs for the Request List were produced by the National Nuclear Data Center(NNDC) at Brookhaven National Laboratory. The NNDC produced the Request List for many years. The Request List is compiled from a computerized data file.

Each request has a unique isotope, reaction type, requestor and identifying number. The first two digits of the identifying number are the year in which the request was initiated. Every effort has been made to restrict the notations to those used in common nuclear physics textbooks. Most requests are for individual isotopes as are most ENDF evaluations, however, there are some requests for elemental measurements.

Each request gives a priority rating which will be discussed in Section 2, the neutron energy range for which the request is made, the accuracy requested in terms of one standard deviation, and the requested energy resolution in terms of one standard deviation. Also given is the requestor with the comments which were furnished with the request. The addresses and telephone numbers of the requestors are given in Appendix 1. ENDF evaluators who may be contacted concerning evaluations are given in Appendix 2. Experimentalists contemplating making one of the requested measurements are encouraged to contact both the requestor and evaluator who may provide valuable information.

This is a working document in that it will change with time. New requests or comments may be submitted to the editors or a regular CSEWG member at any time.

2. PRIORITY ASSIGNMENTS

The exact meaning of priority is very difficult to assess since it tends to be different in each case. The following definitions are those adopted by DOE/CSEWG.

PRIORITY 1. Nuclear data which satisfy the criteria of Priority 2 and which have been selected by DOE/CSEWG for maximum practicable attention taking into account the urgency of program requirements.

PRIORITY 2. Nuclear data that will be required during the next few years in applied programs (for example, data needed to make the best use of reactor fuel and construction materials such as neutron moderators, absorbers, and radiation shields, space and bio-medical applications, data required for better understanding of some significant aspect of reactor behavior).

PRIORITY 3. Nuclear data of more general interest and data required to fill out the body of information needed for nuclear technology.

Isotope	Quantity	Priority	Energy Range	Accuracy	δE	Lab	Requester	No.
^{1}H	$\sigma(n,n)$ (E)	1	10.0 MeV to 0.2 GeV	1 %		NIST	Carlson	92045
				Ratios of measurements at appropriate angles needed (e.g., 180 degrees cm to 60 degrees cm in steps such that can interpolate between measured angles). A large difference is present comparing V5 to V6. To reduce the uncertainty in this standard cross section and extend its useful energy range.				
^{3}He	$\sigma(d,p)$ (E)	2	0.4 MeV	2 %		LLNL	White	92001
				Shape of the cross section has been established, however, the data base is highly discrepant in absolute magnitude. An accurate measurement of the cross section near the peak of the resonance is needed for normalization.				
^{3}He	$\sigma(n,p)$ (E)	2	5.0 keV to 3.0 MeV	1 %		NIST	Carlson	92040
				To reduce the uncertainty in the He-3(n,p) standard cross section.				
^{6}Li	$\sigma(n,Xn)$ $(E,\theta,E_{n'})$	1	6.0 MeV to 12.0 MeV	20%		TSI	Cheng	92114
				Measurements recommended at 6, 8, 10 and 12 MeV. Needed for more accurate determination of neutron spectrum in a fusion blanket. Li-6 is an important fusion breeding material.				
^{6}Li	$\sigma(t,p)$ (E)	2	Thresh to 4.0 MeV	10%		LLNL	White	86054
				Activation product with short half-life. For diagnosing ICF implosions.				
^{7}Li	$\sigma(\alpha,n)$ (E)	1	4.4 MeV to 6.0 MeV	1%		ORNL	Weston	92097
				To determine the B-10(n,alphao) cross section from 20 keV to at least 1 MeV by the inverse reaction. Data base is discrepant.				
^{7}Li	$\sigma(n,Xn)$ $(E,\theta,E_{n'})$	1	6.0 MeV to 12.0 MeV	10%		TSI	Cheng	92115
				Measurements recommended at 6, 8, 10 and 12 MeV. Needed for more accurate determination of neutron spectrum in a fusion blanket. Li-7 is an important fusion breeding material.				
^{7}Li	$\sigma(n,n't)$ (E)	2	Thresh to 8.0 MeV	3 to 5 %		LANL	Young	92122
				Needed to assess tritium production in the tail of the fission neutron energy spectrum.				

Isotope	Quantity	Priority	Energy Range	Accuracy	δE	Lab	Requester	No.	
^{9}Be	$\sigma(p,n)$ (E,Θ,E_n)	2	25.0 MeV to 75.0 MeV	5%	25MeV	LLNL	White	92002	Double-differential cross sections are needed for the optimization of neutron source production for cancer therapy. A minimum of 6 angles from 0 to 50 degrees and one back angle is desired. It is essential that at least one thick-target measurement be made at 0 degrees for each incident proton energy using the same detector arrangement as in the thin target measurements.
^{9}Be	$\sigma(n,Xn)$ $(E,\Theta,E_{n'})$	1	6.0 MeV to 12.0 MeV	10%		TSI	Cheng	92116	Measurements recommended at 6, 8, 10 and 12 MeV. Needed for the determination of neutron spectrum in a fusion blanket. Beryllium is a very important neutron multiplier for fusion applications.
^{9}Be	$\sigma(n,tot)$ (E)	2	1.0 MeV to 10.0 MeV	1%	100keV	ANL	Smith	86046	Resolution should be < 100 keV. For high-temperature and space systems.
^{9}Be	$\sigma(n,n)$ (E,Θ)	2	2.0 MeV to 20.0 MeV	5%	100keV	ANL	Smith	86049	Accuracy sufficient to provide non-elastic cross section to 5%. Resolution <100 keV. For high temperature and space systems.
^{9}Be	$\sigma(n,n')$ $(E,\Theta,E_{n'})$	2	2.0 MeV to 10.0 MeV	5%		ANL	Smith	86047	5% accuracy on discrete inelastic. 10% on break up spectrum. For high-temperature and spac systems.
^{9}Be	$\sigma(n,2n)$ (E)	1	14.0 MeV to 15.0 MeV	3%		TSI	Cheng	86096	Improved precision needed.
^{9}Be	$\sigma(t,\alpha)$ (E)	2	Thresh to 4.0 MeV	10%		LLNL	White	86055	Activation product with short half-life. For diagnosing ICF implosions.
^{10}B	$\sigma(n,\alpha)$ (E)	1	10.0 keV to 5.0 MeV	2 to 5 %		ORNL	Weston	92095	Only ratio (n,alpha0)/(n,alpha1) needed. Data base inadequate and discrepant.
^{10}B	$\sigma(n,tot)$ (E)	1	1.0 keV to 20.0 MeV	0.5 to 1 %		ORNL	Weston	92096	Data base discrepant and inadequate.
^{10}B	$\sigma(n,X\alpha)$ (E)	2	20.0 keV to 20.0 MeV	2 to 5 %		ORNL	Weston	92098	Data base inadequate and discrepant.

Isotope	Quantity	Priority	Energy Range	Accuracy	δE	Lab	Requester	No.
^{10}B	σ(n,Xn) (E,Θ,E_n,)	1	6.0 MeV to 12.0 MeV	20%		TSI	Cheng	92117
				Measurements recommended at 6, 8, 10 and 12 MeV. Needed for better determination of the neutron spectrum in the shield of a fusion reactor. Boron is needed for radiation shielding in a fusion reactor.				
^{10}B	σ(n,α) (E)	1	1.0 keV to 3.0 MeV	1%		NIST	Carlson	86148
				To improve accuracy of standard cross section. Both n,α0 and n,α1 cross sections of interest. Measurements underway at LAMPF/WNR(Haight et al.) and at ORELA.				
^{10}B	σ(t,2n) (E)	2	Thresh to 4.0 MeV	10%		LLNL	White	86056
				Activation product with short half-life. For diagnosing ICF implosions.				
^{10}B	σ(t,p) (E)	2	Thresh to 4.0 MeV	10%		LLNL	White	86057
				Activation product with short half-life. For diagnosing ICF implosions.				
^{10}B	σ(α,n) (E)	1	Thresh to 4.0 MeV	10%		LLNL	White	86052
				Activation product with short half-life. For diagnosing ICF implosions.				
^{11}B	σ(p,n) (E,Θ,E_n)	2	25.0 MeV to 75.0 MeV	5%	25MeV	LLNL	White	92003
				Double-differential cross sections are needed for the optimization of neutron source production for cancer therapy. A minimum of 6 angles from 0 to 50 degrees and one back angle are desired. It is essential that at least one thick-target measurement be made at 0 degrees for each incident proton energy using the same detector arrangement as in the thin target measurements.				
^{11}B	σ(n,Xn) (E,Θ,E_n,)	1	6.0 MeV to 12.0 MeV	10%		TSI	Cheng	92118
				Measurements recommended at 6, 8, 10 and 12 MeV. Needed to determine more accurate neutron spectrum. Boron is an essential shielding material in a fusion reactor.				
^{nat}C	σ(n,n'3α) (E)	2	20.0 MeV to 65.0 MeV	10 to 20%	1MeV	ORNL	Fu	92084
				ENDF/B-VI for carbon has been extended to 32 MeV. Most reaction cross sections were based on estimates in the extension. Since (n,n'3a) appears to be the largest of all cross sections from 20 to 40 MeV, some measurements for this cross section would help constrain the estimates for other cross sections. Some data are available near 20 MeV, but the spread of them is a factor of two. There are medical needs for the kerma.				

Isotope	Quantity	Priority	Energy Range	Accuracy	δE	Lab	Requester	No.
^{12}C	$\sigma(n,\alpha)$ (E,E(α))	2	Thresh to 65.0 MeV	10%	5%	NIST	Caswell	92030
				Improved charged-particle energy spectra are of interest. Measurement at 2-MeV intervals sufficient except 1-MeV intervals below 10 MeV. Needed to improve accuracy of dosimetry for neutron radiation therapy.				
^{12}C	$\sigma(n,n'3\alpha)$ (E,E(α))	2	Thresh to 65.0 MeV	10%	5%	NIST	Caswell	92031
				Improved alpha energy spectra are of interest. Measurement at 2-MeV intervals sufficient except 1-MeV intervals below 20 MeV. Needed to improve accuracy of dosimetry for neutron radiation therapy.				
^{12}C	$\sigma(n,Xn)$ (E,θ,$E_{n'}$)	1	6.0 MeV to 12.0 MeV	10%		TSI	Cheng	92119
				Measurements recommended at 6, 8, 10 and 12 MeV. Needed to determine the neutron spectrum in a low activation (SiC) fusion blanket. SiC is an important low activation structural material for fusion.				
^{13}C	$\sigma(t,p)$ (E)	2	Thresh to 4.0 MeV	10%		LLNL	White	86058
				Activation product with short half-life. For diagnosing ICF implosions.				
^{13}C	$\sigma(t,\alpha)$ (E)	2	Thresh to 4.0 MeV	10%		LLNL	White	86059
				Activation product with short half-life. For diagnosing ICF implosions.				
^{14}N	$\sigma(n,p)$ (E)	1	10.0 MeV to 15.0 MeV	20%		TSI	Cheng	86174
				Long-lived radionuclide, C-14 (5730 yr), produced. Data sparse above 10 MeV.				
^{nat}O	$\sigma(n,n')$ (E)	2	Thresh to 15.0 MeV	10%		NIST	McGarry	92024
				C/E discrepancies in threshold dosimetry in power reactor benchmark experiments with thick water regions in front of iron suggest inelastic scattering cross section is in error.				

Isotope	Quantity	Priority	Energy Range	Accuracy	δE	Lab	Requester	No.
^{nat}O	$\sigma(n,Xn)\ (E,\Theta,E_{n'})$							
		1	0.4 MeV to 3.0 MeV	1 to 5%	5keV	KAPL	Caro	92113
				Measurements recommended at the following energies (MeV): .39, .48, .65, .90, 1.10, 1.20, 1.27, 1.35, 1.5, 1.88, 1.94 and at every .10 MeV from 2.0 to 3.0 at the following angles: from .39 Mev to 1.5: 0, 30, 60, 120, 150, and 180 degrees from 1.88 MeV to 3.0 MeV every 20 degrees starting at 0 degrees plus at 90 degrees. As good energy resolution as possible. Needed for the design of water moderated power reactors and for the calculation of benchmark water moderated critical assemblies.				
		1	6.0 MeV to 15.0 MeV	10%		TSI	Cheng	84002
				Measurements recommended at 6,8,10,12 and 14 MeV. Discrepancy exists at 450 keV and in MeV range.				
^{16}O	$\sigma(n,\alpha)\ (E,E(\alpha))$							
		2	Thresh to 65.0 MeV	10%	5%	NIST	Caswell	92032
				Gamma-ray production and charged-particle spectra are of interest. Measurement at 2-MeV intervals sufficient except 1-MeV intervals below 10 MeV. Needed to improve accuracy of dosimetry for neutron radiation therapy.				
^{16}O	$\sigma(n,n'\alpha)\ (E,E(\alpha))$							
		2	Thresh to 65.0 MeV	10%	5%	NIST	Caswell	92033
				Gamma-ray production and charged-particle spectra are of interest. Measurement at 2-MeV intervals sufficient except 1-MeV intervals below 10 MeV. Needed to improve accuracy of dosimetry for neutron radiation therapy.				
^{16}O	$\sigma(n,n'4\alpha)\ (E)$							
		2	Thresh to 65.0 MeV	10%	5%	NIST	Caswell	92034
				Alpha energy spectra are of interest. Measurement at 5-MeV intervals sufficient except 2-MeV intervals below 30 MeV. Needed to improve accuracy of dosimetry for neutron radiation therapy.				
^{16}O	$\sigma(n,\alpha)\ (E)$							
		1	1.0 MeV to 14.0 MeV	5%		LANL	Young	92123
				Needed for accurate correction of neutron absorption in Mn bath measurements of Be-9 neutron multiplicity.				
^{19}F	$\sigma(n,\gamma)\ (E)$							
		2	Thermal to 15.0 MeV	20%		TSI	Cheng	86099
				Activation data needed for afterheat and safety assessment.				
^{19}F	$\sigma(n,Xn)\ (E,\Theta,E_{n'})$							
		2	6.0 MeV to 12.0 MeV	10%		TSI	Cheng	86094
				Double differential data needed for neutron transport calculations. Measurements recommended at 6, 8, 10 and 12 MeV.				

Isotope	Quantity	Priority	Energy Range	Accuracy	δE	Lab	Requester	No.
^{nat}Si	σ(n,Xn) (E,Θ,$E_{n'}$)	1	6.0 MeV to 12.0 MeV	10%		TSI	Cheng	86151
				Recommend measurements at 6,8,10 and 12 MeV.				
^{nat}Si	σ(n,X) (E)	1	Thresh to 15.0 MeV	20%		TSI	Cheng	92120
				All reaction cross sections leading to the generation of the stable nuclide Al-27. Needed to determine the production of long-lived radionuclide, Al-26 via a 2-step reaction with Si. SiC is an important activation material for fusion.				
^{28}Si	σ(n,p) (E)	1	Thresh to 15.0 MeV	10%		LLNL	White	86050
				Activation product with short half-life. For diagnosing ICF implosions.				
^{nat}S	σ(n,abs) (E)	2	Thermal	1%		NIST	Carlson	92036
				The measurement could be at thermal or for an energy range which includes thermal. To accurately calculate neutron absorption in manganese baths so the thermal constants can be determined more accurately.				
^{32}S	σ(n,p) (E)	2	5.0 MeV to 12.0 MeV	5%		San	Griffin	92008
				Needed for calibration transfer in radiation damage to semiconductor electronics.				
^{40}Ar	σ(n,2n) (E)	2	10.0 MeV to 15.0 MeV	20%		TSI	Cheng	86102
				Long-lived activation product, Ar-39 (269 yr), produced.				
^{39}K	σ(n,p) (E)	2	10.0 MeV to 15.0 MeV	20%		TSI	Cheng	86104
				Long-lived activation product, Ar-39 (269 yr), produced.				
^{39}K	σ(n,α) (E)	2	0.1 MeV to 15.0 MeV	20%		TSI	Cheng	86103
				Long-lived activation product, Cl-36 (3.01+5 yr), produced.				
^{42}Ca	σ(n,2n) (E)	2	12.0 MeV to 15.0 MeV	20%		TSI	Cheng	86107
				Long-lived activation product, Ca-41 (1.03+5 yr), produced.				
^{42}Ca	σ(n,α) (E)	2	0.1 MeV to 15.0 MeV	20%		TSI	Cheng	86108
				Long-lived activation product, Ar-39 (269 yr), produced.				

Isotope	Quantity	Priority	Energy Range	Accuracy	δE	Lab	Requester	No.
^{48}Ti	σ(n,α) (E)	1	3.0 MeV to 14.0 MeV	20%		TSI	Cheng	86175
				Important for analysis of long-lived Ar-42 production: Ti-48(n,α)Ca-45(n,α)Ar-42.				
^{50}V	σ(n,2n) (E)	1	10.0 MeV to 15.0 MeV	20%		TSI	Cheng	86114
				Medium-term activation product, V-49(330 day), produced.				
^{51}V	σ(n,Xn) (E,Θ,$E_{n'}$)	1	6.0 MeV to 12.0 MeV	10%		TSI	Cheng	86152
				Recommend measurements at 6, 8, 10 and 12 MeV.				
^{nat}Cr	σ(n,Xn) (E,$E_{n'}$)	2	Thresh to 20.0 MeV	20%		ORNL	Hetrick	92075
				Model calculation used for ENDF/B-VI based on fitting data at 14.5 MeV. Need data at other energies for confirmation.				
^{nat}Cr	σ(n,Xn) (E,Θ,$E_{n'}$)	1	6.0 MeV to 15.0 MeV	20%		TSI	Cheng	84007
				Measurements recommended at 6,8,10,12 and 14 MeV.				
^{nat}Cr	σ(n,α) (E)	2	Thresh to 14.0 MeV	20%		ORNL	Larson	86080
^{50}Cr	σ(n,p) (E)	3	Thresh to 20.0 MeV	20%		ORNL	Hetrick	92066
				Large cross section, only one point available, evaluations disagree (i.e., BROND, ENDF/B-VI, JENDL-3).				
^{50}Cr	σ(n,α) (E)	3	Thresh to 20.0 MeV	20%		ORNL	Hetrick	92067
				Data available disagree as do the shapes of the evaluations (ENDF/B-IV, BROND, JENDL-3).				
^{50}Cr	σ(n,n'p) (E)	3	Thresh to 20.0 MeV	20%		ORNL	Hetrick	92068
				Large cross section, only 1 data pt available, evaluations disagree(i.e., ENDF/B-VI, BROND, JENDL-3).				
^{50}Cr	σ(n,tot) (E)	3	10.0 eV to 20.0 MeV	3%		ORNL	Larson	92076
				Need high resolution resonance region data, ~0.2% energy resolution over resonance region. Needed for isotopic evaluation of this material. Available data are inadequate.				
^{50}Cr	σ(n,γ) (E)	2	25.3 mV to 0.3 MeV	10%		ORNL	Larson	86081
^{52}Cr	σ(n,p) (E)	2	10.0 MeV to 35.0 MeV	5%		ORNL	Hetrick	92069
				No data available from 10-13 MeV and available data above 13 MeV disagree. To determine activation and hydrogen production.				

Isotope	Quantity	Priority	Energy Range	Accuracy	δE	Lab	Requester	No.	Comment
^{52}Cr	σ(n,α) (E)	2	Thresh to 20.0 MeV	10%		ORNL	Hetrick	92070	Evaluations for ENDF/B-VI, BROND, and JENDL-3 disagree. Only one total alpha emission data point available.
^{52}Cr	σ(n,n'p) (E)	2	Thresh to 20.0 MeV	20%		ORNL	Hetrick	92071	No data available and evaluations from ENDF/B-VI, BROND and JENDL-3 disagree.
^{52}Cr	σ(n,γ) (E)	3	Resonance Region	10%		ORNL	Larson	92077	Resonance region. Need capture area of resonances to 10%. Capture cross sections may be up to 25% in error for structural materials, depending on decay properties of resonance.
^{52}Cr	σ(n,tot) (E)	1	10.0 eV to 20.0 MeV	3%		ORNL	Larson	92083	Need high resolution resonance region data ~0.02% in resonance region. Needed for isotopic evaluation of major isotope of chromium. Available data are inadequate.
^{53}Cr	σ(n,2n) (E)	2	Thresh to 20.0 MeV	10%		ORNL	Hetrick	92072	Large cross section, no data available, evaluations from ENDF/B-IV, BROND, and JENDL-3 disagree.
^{53}Cr	σ(n,α) (E)	3	Thresh to 20.0 MeV	20%		ORNL	Hetrick	92073	No data available and evaluations from ENDF/B-VI, BROND and JENDL-3 disagree
^{53}Cr	σ(n,tot) (E)	2	10.0 eV to 20.0 MeV	3%		ORNL	Larson	92078	Need high resolution data, ~0.02% in resonance region. Needed for isotopic evaluation of second largest chromium isotope. Available data are inadequate.
^{54}Cr	σ(n,2n) (E)	3	Thresh to 20.0 MeV	10%		ORNL	Hetrick	92074	Large cross section, no data available, evaluations from ENDF/B-VI, BROND and JENDL-3 disagree.
^{54}Cr	σ(n,tot) (E)	3	10.0 eV to 20.0 MeV	3%		ORNL	Larson	92079	Need high resolution data, ~0.02% in resonance region. Needed for isotopic evaluation of chromium isotopes. Available data inadequate.
^{55}Mn	σ(n,Xn) (E,Θ,$E_{n'}$)	1	6.0 MeV to 15.0 MeV	20%		TSI	Cheng	84008	Measurements recommended at 6, 8, 10, 12 and 14 MeV. More accurate data needed for fusion power reactor studies.

Isotope	Quantity	Priority	Energy Range	Accuracy	δE	Lab	Requester	No.
^{nat}Fe	$\sigma(n,n')$ (E)	2	Thresh to 3.0 MeV	5%	5%	NIST	McGarry	92025
				C/E discrepancies in power reactor benchmark experiments for low-energy threshold detectors such as Np-237(n,f) suggest revisions in the iron inelastic cross section at energies below 3 MeV.				
^{nat}Fe	$\sigma(n,Xn)$ $(E,\Theta,E_{n'})$	2	5.0 MeV to 15.0 MeV	5 to 10%	0.1MeV	ORNL	Fu	92086
				ENDF/B-VI of requested item was based on model calculation fitting 14-MeV data. Measurements recommended at 5,6,8,10,12 and 14 MeV.				
^{54}Fe	$\sigma(n,n'p)$ (E)	2	Thresh to 20.0 MeV	10%		ORNL	Hetrick	92047
				Sparse data available, when added to (n,p) does not agree with available total proton emission. Evaluations from ENDF/B-VI, BROND AND JENDL-3 disagree.				
^{54}Fe	$\sigma(n,2n)$ (E)	2	Thresh to 20.0 MeV	10%		ORNL	Hetrick	92054
				Data available disagree over the whole energy range.				
^{56}Fe	$\sigma(n,n'p)$ (E)	2	Thresh to 20.0 MeV	10%		ORNL	Hetrick	92048
				Evaluations from ENDF/B-VI, BROND, and JENDL-3 disagree. No data available.				
^{56}Fe	$\sigma(n,\alpha)$ (E)	2	Thresh to 20.0 MeV	10%		ORNL	Hetrick	92049
				Evaluations from BROND, ENDF/B-VI and JENDL-3 disagree. Data available bdlow 10 MeV is discrepant.				
^{56}Fe	$\sigma(n,\gamma)$ (E)	1	Resonance Region	5%		ORNL	Larson	92080
				Especially the 1.15 keV resonance. Resonance region. Capture cross sections may be up to 25% wrong for structural materials, needed for confirmation of an upgraded evaluation.				
^{56}Fe	$\sigma(n,n')$ (E)	1	Thresh to 4.0 MeV	2 to 5%	5keV	ORNL	Fu	92085
				n,n' to the 847-keV level. Important reaction and energy range for reactor pressure vessel surveillance dosimetry. Currently known to about 10%. Needed accuracy is less than 5%.				
^{57}Fe	$\sigma(n,\alpha)$ (E)	2	Thresh to 20.0 MeV	10%		ORNL	Hetrick	92050
				Two points available at 14.5 MeV disagree and also evaluations (ENDF/VI, BROND AND JENDL-3).				

Isotope	Quantity	Priority	Energy Range	Accuracy	δE	Lab	Requester	No.	
^{57}Fe	σ(n,p) (E)	2	Thresh to 20.0 MeV	10%		ORNL	Hetrick	92051	Data available at 14 MeV disagree and the evaluations (ENDF/B/V1, BROND, JENDL-3) have different shapes.
^{57}Fe	σ(n,2n) (E)	2	Thresh to 20.0 MeV	10%		ORNL	Hetrick	92052	Large cross section, no data available and evaluations (ENDF/B-VI, BROND, JENDL-3) disagree.
^{58}Fe	σ(n,2n) (E)	2	Thresh to 20.0 MeV	10%		ORNL	Hetrick	92053	Large cross section and no data available.
^{58}Fe	Resonance Parameters	1	1.0 keV to 0.4 MeV	5 to 10%	1keV	ORNL	Fu	92087	Fe-58(n,gamma) is still being used for reactor dosimetry. However, the existing data base used for ENDF/B-VI is very poor. High-quality data are needed for the lowest 10 s-wave resonances, particularly the radiative widths.
^{58}Fe	σ(n,γ) (E)	1	30.0 keV to 14.0 MeV	20%		TSI	Cheng	86177	Important reaction leading toward production of long-lived radionuclide Fe-60 (1.49+06 yr): Fe-58(n,γ)Fe-59(n,γ)Fe-60.
^{59}Fe	σ(n,γ) (E)	1	RADIOACTIVE 44.5 DAY Thermal to 15.0 MeV	20%		TSI	Cheng	86115	Long-lived activation product, Fe-60 (1.49+6 yr), produced. Fe-58(n,γ) Fe-59(n,γ)Fe-60 multiple reactions are important for the assessment of waste disposal for iron-based blanket materials.
^{60}Co	σ(n,p) (E)	2	RADIOACTIVE 5.27 YR 0.1 MeV to 15.0 MeV	20%		TSI	Cheng	86116	Long-lived activation product, Fe-60 (1.49+6 yr), produced.
^{nat}Ni	σ(n,Xn) (E,$E_{n'}$)	1	5.0 MeV to 20.0 MeV	10%		ORNL	Hetrick	92055	Model calculation used for ENDF/B-VI based on fitting data at En = 14.5 MeV. Need data at other energies for confirmation.
^{nat}Ni	σ(n,α) (E)	2	Thermal to 20.0 MeV	10%		ORNL	Larson	86088	For evaluation and model testing purposes.
^{58}Ni	σ(n,α) (E)	1	6.0 MeV to 10.0 MeV	10%		ORNL	Fu	92056	Difference between data of Qaim and Graham is 80% and spread of ENDF/B-VI, FFF-2, and JENDL-3 is 100% near 8 MeV.

Isotope	Quantity	Priority	Energy Range	Accuracy	δE	Lab	Requester	No.
^{58}Ni	σ(n,n'α) (E)	1	Thresh to 20.0 MeV	5%		ORNL	Hetrick	92057
				Only one data point available and evaluations from ENDF/B-VI, BROND, and JENDL-3 all disagree.				
^{58}Ni	σ(n,γ) (E)	1	Resonance Region	5%		ORNL	Larson	92081
				Resonance region. Need 5% accuracy in capture area of resonances. Capture cross sections may be as much as 25% in error, depending upon decay spectra from resonance.				
^{58}Ni	σ(n,n'p) (E)	2	Thresh to 20.0 MeV	15%		ORNL	Larson	92121
				Large cross section. Data exist around 14 MeV but are discrepant.				
^{58}Ni	σ(n,γ) (E)	2	2.0 MeV to 15.0 MeV	20%		TSI	Cheng	86178
				Production of long-lived radionuclide, NI-59 (7.5+04 yr).				
^{58}Ni	σ(n,p) (E)	2	2.0 MeV to 10.0 MeV	5%	5%	NIST	McGarry	82054
				Required for reactor pressure vessel dosimetry.				
^{60}Ni	σ(n,α) (E)	2	Thresh to 20.0 MeV	10%		ORNL	Hetrick	92058
				Evaluations from ENDF/B-VI, BROND, and JENDL-3 disagree - only total alpha emission available.				
^{60}Ni	σ(n,n'p) (E)	2	Thresh to 20.0 MeV	10%		ORNL	Hetrick	92059
				Only 1 data point available; evaluations from ENDF/B-VI, BROND, and JENDL-3 all disagree.				
^{60}Ni	σ(n,2n) (E)	2	Thresh to 20.0 MeV	10%		ORNL	Hetrick	92060
				Large cross section, no data available; evaluations from ENDF/B-VI, BROND, and JENDL-3 disagree above 1MeV incident energy.				
^{60}Ni	σ(n,γ) (E)	1	Resonance Region	5%		ORNL	Larson	92082
				Resonance region. Capture cross sections may be as much as 25% in error, depending upon shape of decay spectra from resonance.				
^{61}Ni	σ(n,2n) (E)	3	Thresh to 20.0 MeV	10%		ORNL	Hetrick	92061
				Large cross sections and no data available. Evaluations from ENDF/B-VI, BROND, and JENDL-3 disagree.				
^{62}Ni	σ(n,2n) (E)	3	Thresh to 20.0 MeV	10%		ORNL	Hetrick	92062
				Large cross section and no data available.				

Isotope	Quantity	Priority	Energy Range	Accuracy	δE	Lab	Requester	No.
^{62}Ni	σ(n,γ) (E)	1	1.0 keV to 1.0 MeV	20%		TSI	Cheng	86179
				Production of long-lived radionuclide, Ni-63 (100.1 yr).				
^{63}Ni	σ(n,α) (E)		RADIOACTIVE 100 YR					
		1	0.1 MeV to 15.0 MeV	20%		TSI	Cheng	86118
				Long-lived activation product, Fe-60 (1.49+6 yr), produced.				
^{64}Ni	σ(n,2n) (E)	1	10.0 MeV to 15.0 MeV	20%		TSI	Cheng	86119
				Long-lived activation product, Ni-63 (100.1 yr), produced. Needed for the assessement of allowable Ni level in structural alloys to qualify as low activation material.				
^{63}Cu	σ(n,n'p) (E)	2	Thresh to 20.0 MeV	10%		ORNL	Hetrick	92064
				Large cross section, need additional data since only 3 discrepant points available.				
^{63}Cu	σ(n,p) (E)	2	Thresh to 20.0 MeV	10%		ORNL	Hetrick	92065
				Only 1 pt available which disagrees drastically with calculation.				
^{65}Cu	σ(n,n'p) (E)	3	Thresh to 20.0 MeV	20%		ORNL	Hetrick	92063
				Only 1 data point available at 14.5 MeV.				
^{65}Cu	σ(n,t) (E)	1	9.0 MeV to 15.0 MeV	20%		TSI	Cheng	86120
				Long-lived activation product, Ni-63 (100.1 yr), produced. Critical for justification for isotopic tailoring of copper to meet lower residual activation criteria.				
^{64}Zn	σ(n,p) (E)	1	5.0 MeV to 15.0 MeV	5%		TSI	Cheng	84004
				Dosimetry cross section for fusion applications.				
^{67}Zn	σ(n,p) (E)	2	1.0 MeV to 10.0 MeV	10 to 20%		WHC	Schenter	92009
				A measurement at 14 MeV has been made by the Japanese. Cu-67 will have important future application in the treatment of cancer. It is currently involved in clinical trials associated with monoclonal antibodies. Integral data exists for production of Cu-67 in HFBR. Future integral results will be available from the OSU Triga reactor. Zn-67(n,p) data are important for medical isotope production optimization of Cu-67. No evaluation of this reaction exists on ENDF/B.				

Isotope	Quantity	Priority	Energy Range	Accuracy	δE	Lab	Requester	No.
^{nat}Ga	$\sigma(n,Z)$ (E,E_z)	1	0.1 MeV to 1.0 MeV	10%		SAN	Griffin	92004
				Need charged particle production to determine radiation damage in semiconductor electronics.				
^{nat}Ge	$\sigma(n,X\gamma)$ (E)	2	Thresh to 10.0 MeV	10%		ORNL	Roussin	86034
				Photon production needed to properly interpret detector response above the inelastic threshold.				
^{nat}As	$\sigma(n,Z)$ (E,E_z)	1	0.1 MeV to 1.0 MeV	10%		SAN	Griffin	92005
				Need charged particle production to determine radiation damage in semiconductor electronics.				
^{74}Se	$\sigma(n,\gamma)$ (E)	2	1.0 mV to 0.1 MeV	20 to 40%		WHC	Schenter	92010
				Se-75 has been used extensively for medical research (e.g., studies in cancer research at NIH). Integral data exist. Se-74(n,gamma) data are important for medical isotope production optimization of Se-75. No evaluations of this reaction exist on ENDF/B.				
^{78}Kr	$\sigma(n,p)$ (E)	2	10.0 MeV to 15.0 MeV	10%		LLNL	White	86053
				Activation product with short half-life. For diagnosing ICF implosions.				
^{80}Kr	$\sigma(n,2n)$ (E)	1	Thresh to 15.0 MeV	10%		LLNL	White	86051
				Activation product with short half-life. For diagnosing ICF implosions.				
^{82}Kr	$\sigma(n,2n)$ (E)	2	11.0 MeV to 15.0 MeV	20%		TSI	Cheng	86123
				Long-lived activation product, Kr-81 (2.1+5 yr), produced.				
^{82}Kr	$\sigma(n,\alpha)$ (E)	2	0.1 MeV to 15.0 MeV	20%		TSI	Cheng	86124
				Long-lived activation product, Se-79 (<65000 yr), produced.				
^{90}Sr	$\sigma(n,\gamma)$ (E)		RADIOACTIVE 29 years					
		2	10.0 mV to 1.0 MeV			WHC	Mann	92105
				Need 20% accuracy in thermal region and resonance parameters. Average cross sections accurate to 20% over decade energy regions. Important for waste burning, conflicting thermal values; no other data.				
^{89}Y	$\sigma(n,tot)$ (E)	3	14.0 MeV to 20.0 MeV	1%	500keV	ANL	Smith	86024
				Important fission product.				

Isotope	Quantity	Priority	Energy Range	Accuracy	δE	Lab	Requester	No.
^{89}Y	$\sigma(n,\gamma)$ (E)	2	0.1 MeV to 0.5 MeV	10%		ANL	Smith	86028
	Energy-average values to 10%. Needed to check discrepant values.							
^{89}Y	$\sigma(n,Xn)$ $(E,\Theta,E_{n'})$	3	5.0 MeV to 20.0 MeV	10%		ANL	Smith	86025
	Determine angle-energy spectra at 2 MeV incident-energy intervals.							
^{89}Y	$\sigma(n,p)$ (E)	2	Thresh to 20.0 MeV	5%		ANL	Smith	86026
	10% accuracy should be sought to threshold.							
^{89}Y	$\sigma(n,\alpha)$ (E)	3	Thresh to 20.0 MeV	10%		ANL	Smith	86027
	Important fission product.							
^{nat}Zr	$\sigma(n,Xn)$ $(E,\Theta,E_{n'})$	1	Thermal to 1.0 MeV	1 to 5%	0.1MeV	KAPL	Knox	92112
	From 0 to .1MeV, every 40 degrees from 0 to 180 degrees. From .1 to 1 MeV, every 20 degrees from 0 to 180 degrees. The energy resolution should be as good as possible. These data are needed for benchmark testing of nuclear data and for use in accurate nuclear design calculations.							
^{94}Zr	$\sigma(n,2n)$ (E)	2	7.0 MeV to 15.0 MeV	20%		TSI	Cheng	86128
	Long-lived activation product, Zr-93 (1.53+6 yr), produced.							
^{94}Zr	$\sigma(n,n'\alpha)$ (E)	2	4.0 MeV to 15.0 MeV	20%		TSI	Cheng	86129
	Long-lived activation product, Sr-90, (28.6 yr), produced.							
^{93}Nb	$\sigma(n,n)$ (E,Θ)	3	10.0 MeV to 20.0 MeV	5%	5%	ANL	Smith	86032
	Resolution consistent with optical model. Sufficient accuracy to provide non-elastic cross section to 5% (i.e., to angle-integrated values of 5%).							
^{93}Nb	$\sigma(n,n')$ (E)	2	0.5 MeV to 15.0 MeV	10%	10%	NIST	McGarry	82056
	Needed for reactor pressure vessel dosimetry.							
^{93}Nb	$\sigma(n,X\gamma)$ $(E,E(\gamma))$	3	Thermal to 20.0 MeV	10%		ANL	Smith	86030
	Broad resolution gamma spectrum measurements needed. Accuracy sufficient to confirm energy conservation to 10%.							
^{93}Nb	$\sigma(n,Xn)$ $(E,\Theta,E_{n'})$	3	5.0 MeV to 20.0 MeV	10%		ANL	Smith	86029
	Determine angle-energy spectra at 2 MeV incident-energy intervals.							

Isotope	Quantity	Priority	Energy Range	Accuracy	δE	Lab	Requester	No.
^{nat}Mo	σ(n,tot) (E)	2	1.0 keV to 20.0 MeV	1%		ANL	Smith	86042
				Resolution should be consistent with optical model. For high-temperature and space systems.				
^{nat}Mo	σ(n,n) (E,Θ)	2	0.3 MeV to 20.0 MeV	10%		ANL	Smith	86043
				Angle-integrated accuracy <10%. For high-temperature and space systems.				
^{nat}Mo	σ(n,n') (E,Θ,$E_{n'}$)	2	0.3 MeV to 20.0 MeV	10%		ANL	Smith	86044
				Include discrete neutron groups below 3.0 MeV. Include continuum spectra above 3 MeV. For high-temperature and space systems.				
^{nat}Mo	σ(n,γ) (E)	2	1.0 keV to 1.5 MeV	10%		ANL	Smith	86045
				10% accuracy in energy-averaged values. For high-temperature and space systems.				
^{94}Mo	σ(n,p) (E)	1	2.0 MeV to 15.0 MeV	20%		TSI	Cheng	86182
				Production of long-lived radionuclide, Nb-94 (2.03+04 yr).				
^{95}Mo	σ(n,n'p) (E)	2	9.0 MeV to 15.0 MeV	20%		TSI	Cheng	86130
				Long-lived activation product, Nb-94 (2.03+4 yr) produced. This reaction cross section is needed to assess the allowable level of Mo in structural alloys to qualify it as a low activation material.				
^{95}Mo	σ(n,d) (E)	2	7.0 MeV to 15.0 MeV	20%		TSI	Cheng	86181
				Production of long-lived radionuclide, Nb-94 (2.03+04 yr).				
^{nat}Rh	σ(n,n') (E)	2	0.5 MeV to 10.0 MeV	10%	10%	NIST	McGarry	92026
				Needed for reactor pressure vessel dosimetry.				
^{107}Ag	σ(n,γ) (E)	2	1.0 mV to 0.1 MeV	10 to 20%		WHC	Schenter	92011
				Integral data exists for the production of Cd-109 in FFTF and HFIR from Ag-107 targets. Ag-107 (n,gamma) data are important for the medical isotope production optimization of Cd-109.				
^{108}Cd	σ(n,γ) (E)	1	1.0 mV to 0.1 MeV	10 to 20%		WHC	Schenter	92012
				Needs a "keV" capture measurement. Integral data exists for production in FFTF, MURR and HFIR. Cd-109 evaluation used in ENDF/B-VI. Cd-108 is a very minor fission product isotope so that very little time was available in the past for its capture evaluation. Data important for medical isotope production of Cd-109.				

Isotope	Quantity	Priority	Energy Range	Accuracy	δE	Lab	Requester	No.
^{109}Cd	$\sigma(n,\gamma)$ (E)		METASTABLE 462 DAY					
		2	1.0 mV to 0.1 MeV	20 to 40%		WHC	Schenter	92013
				Cd-109(n,gamma) data are important for medical isotope production of Cd-109. Burnout of Cd-109 needs to be determined.				
^{nat}Sb	$\sigma(n,Z)$ (E,E_z)	2	0.1 MeV to 1.0 MeV	10%		SAN	Griffin	92007
				Need charged particle production to determine radiation damage in semiconductor electronics.				
^{nat}Te	$\sigma(n,Z)$ (E,E_z)	2	0.1 MeV to 1.0 MeV	10%		SAN	Griffin	92006
				Need charged particle production to determine radiation damage in semiconductor electronics.				
^{127}I	$\sigma(n,X\gamma)$ (E)	2	Thermal to 10.0 MeV	10%		ORNL	Roussin	86035
				Photon production needed to properly interpret NaI detector response.				
^{129}I	$\sigma(n,\gamma)$ (E)		RADIOACTIVE 15.7+06 y					
		2	1.0 eV to 0.1 keV			WHC	Mann	92106
				Resonance parameters. Important for waste burn, need low-energy RP.				
^{133}Cs	$\sigma(n,X\gamma)$ (E)	2	Thermal to 10.0 MeV	10%		ORNL	Roussin	86033
				Photon production needed to properly interpret CsI detector response.				
^{135}Cs	$\sigma(n,\gamma)$ (E)		RADIOACTIVE 2.3+06 y					
		2	10.0 mV to 1.0 MeV			WHC	Mann	92107
				Need 10% accuracy in thermal region and in capture area from resonance parameters (particularly below 40 eV). Need 20% intervals above resonance region. Important for waste burn; need to find missing resonances and reconfirm thermal measurement.				
^{137}Cs	$\sigma(n,\gamma)$ (E)		RADIOACTIVE 30.2 years					
		2	10.0 mV to 1.0 MeV			WHC	Mann	92108
				Need 10% accuracy in thermal region and in capture area from resonance parameters (particularly below 40 eV). Need 20% accuracy over decade energy intervals above resonance region. Important for waste burn; conflicting thermal values; no other data.				
^{137}Ba	$\sigma(n,p)$ (E)	2	0.4 MeV to 15.0 MeV	20%		TSI	Cheng	86134
				Long-lived activation product Cs-137 (30.17 yr), produced.				
^{138}Ba	$\sigma(n,n'p)$ (E)	2	9.0 MeV to 15.0 MeV	20%		TSI	Cheng	86135
				Long-lived activation product Cs-137 (30.17 yr), produced.				

Isotope	Quantity	Priority	Energy Range	Accuracy	δE	Lab	Requester	No.
^{143}Nd	$\sigma(n,\gamma)$ (E)	2	0.5 eV to 1.0 keV	10%		BET	Dei	86002
				Resonance integral wanted. Improved precision needed. For calculation of fission product poisons.				
^{145}Nd	$\sigma(n,\gamma)$ (E)	2	0.5 eV to 1.0 keV	15%		BET	Dei	86003
				Resonance integral wanted. Improved precision needed. For calculation of fission product poisons.				
^{148}Pm	$\sigma(n,\gamma)$ (E)		METASTABLE	41.3 DAY				
		2	1.0 mV to 1.0 keV	10%		BET	Dei	86004
				Thermal cross section and RI wanted. Improved precision needed. For calculation of fission product poisons.				
^{149}Pm	$\sigma(n,\gamma)$ (E)		RADIOACTIVE	53.1 HR				
		2	1.0 mV to 1.0 keV	10 to 20%		BET	Dei	86005
				Thermal cross section and RI wanted to 10% accuracy. RI wanted to 10% if > 10,000 barns, 20% if 1,000-10,000 barns.				
^{144}Sm	$\sigma(n,\gamma)$ (E)	2	1.0 mV to 0.1 MeV	10 to 20%		WHC	Schenter	92014
				Sm-145 is being used for research studies at BNL on the treatment of brain cancer. Integral data exist for results in MURR and HFIR. Sm-144(n,gamma) data are important for medical isotope production optimization of Sm-145. Only integral data exist for thermal reactor system.				
^{145}Sm	$\sigma(n,\gamma)$ (E)		RADIOACTIVE	340 d				
		2	1.0 mV to 0.1 MeV	20 to 40%		WHC	Schenter	92015
				Sm-145 is being used for research studies at BNL on the treatment of brain cancer. Integral data exist for results in MURR and HFBR.				
^{152}Gd	$\sigma(n,\gamma)$ (E)	2	1.0 mV to 0.1 MeV	10 to 20%		WHC	Schenter	92016
				Integral data exist for results in FFTF, HFIR, and ATR. 152-Gd(n,gamma) data are important for medical isotope production optimization of Gd-153. Gd-153 is used as a dual photon source for the diagnosis and treatment of osteoporosis.				

Isotope	Quantity	Priority	Energy Range	Accuracy	δE	Lab	Requester	No.	
^{153}Gd	$\sigma(n,\gamma)$ (E)	2	1.0 mV to 0.1 MeV	20 to 30%		WHC	Schenter	92017	RADIOACTIVE 241.6 d. Integral data exist for results in FFTF, HFIR, and ATR. Gd-153 has a very large thermal cross section (40,000 b). Gd-153's resonance integral has not been directly measured. High specific activity results can be obtained depending on the epithermal spectrum to thermal spectrum enhancement. 153-Gd(n,gamma) data are important for medical isotope production optimization of Gd-153. Gd-153 is used as a dual photon source for the diagnosis and treatment of osteoporosis.
^{181}Ta	$\sigma(n,tot)$ (E)	2	1.0 keV to 20.0 MeV	1%		ANL	Smith	86039	Resolution should be consistent with optical model. For high-temperature and space systems.
^{181}Ta	$\sigma(n,n)$ (E,Θ)	2	0.1 MeV to 20.0 MeV	10%		ANL	Smith	86040	Angle-integrated accuracy <10%. For high-temperature and space systems.
^{181}Ta	$\sigma(n,n')$ $(E,\Theta,E_{n'})$	2	0.1 MeV to 20.0 MeV	10%		ANL	Smith	86041	Include discrete neutron groups below 3.0 MeV. For high-temperature and space systems.
^{nat}W	$\sigma(n,n')$ (E)	2	Thresh to 15.0 MeV	10%		NIST	McGarry	92027	Transport of neutrons through casing of Hiroshima devices suggest uncertainties in tungsten inelastic scattering cross sections as an explanation for C/E discrepancies in observed Co-60 activation.
^{nat}W	$\sigma(n,Xn)$ $(E,\Theta,E_{n'})$	1	6.0 MeV to 12.0 MeV	10%		TSI	Cheng	86095	Double differential data needed for neutron transport calculations. Measurements recommended at 6, 8, 10 and 12 MeV.
^{182}W	$\sigma(n,n'\alpha)$ (E)	1	0.1 MeV to 15.0 MeV	20%		TSI	Cheng	86139	Activation data leading to production of meta stable nuclide, Hf-178m(31 yr), are needed.
^{186}W	$\sigma(n,\gamma)$ (E)	2	1.0 mV to 0.1 MeV	10 to 20%		WHC	Schenter	92018	W-188 has been produced in HFIR, MURR, OSTR, and FFTF so that integral data are available to test differential measurements. W-188 will be the parent nucleus in a W-188/Re-188 operator which will be used for a monoclonal antibody cancer treatment. W-186 data are important for medical isotope production optimization of W-188.

Isotope	Quantity	Priority	Energy Range	Accuracy	δE	Lab	Requester	No.
^{186}W	σ(n,n'α) (E)							
		1	0.1 MeV to 15.0 MeV	20%		TSI	Cheng	86140
				Long-lived activation product, Hf-182 (9.0+06 yr), produced.				
^{187}W	σ(n,γ) (E)		RADIOACTIVE 23.9 h					
		1	1.0 mV to 0.1 MeV	20 to 50%		WHC	Schenter	92019
				Need a differential measurement. Even though half life is short, the capture reaction is the only path to make W-188. W-188 has been produced in HFIR, ODTR, and FFTF, so that integral data are available to test differential measurements. W-188 will be the parent nucleus in a W-188/Re-188 generator which will be used for monoclonal antibody cancer treatment. W-187 data are important for medical isotope production optimization of W-188. Only one measurement exists (~1959, Igamma). Recent integral results in FFTF and OSU Triga show large (factor of 2-5) discrepancy with 1959 value.				
^{188}W	σ(n,γ) (E)		RADIOACTIVE 69.4 d					
		2	1.0 mV to 0.1 MeV	20 to 50%		WHC	Schenter	92020
				W-188 has been produced in HFIR, MURR, OSTR and FFTF, so that integral data are available to test differential measurement. W-188 will be the parent nucleus in a W-188 / Re-188 generator which will be used for monoclonal antibodies cancer treatment. W-188 data are important for medical isotopes production optimization of W-188.				
^{nat}Re	σ(n,tot) (E)							
		2	1.0 eV to 0.1 keV	1 to 5 %	0.1%	ORNL	Weston	92094
				To determine scattering radius. The scattering radius determined from previous low-energy transmission measurements are inconsistent with previous high-energy transmission measurements.				
		2	1.0 keV to 20.0 MeV	1%		ANL	Smith	86048
				Resolution consistent with optical model. For high-temperature and space systems.				
^{nat}Re	σ(n,n) (E,Θ)							
		2	0.1 MeV to 20.0 MeV	10%		ANL	Smith	86036
				Angle-integrated accuracy < 10%. For high-temperature and space systems.				
^{nat}Re	σ(n,n') (E,Θ,$E_{n'}$)							
		2	0.1 MeV to 20.0 MeV	10%		ANL	Smith	86037
				Include discrete neutron groups below 3.0 MeV. Include continuum spectra above 3 MeV. For high-temperature and space systems.				

Isotope	Quantity	Priority	Energy Range	Accuracy	δE	Lab	Requester	No.
^{185}Re	$\sigma(n,\gamma)$ (E)	2	1.0 mV to 0.1 MeV	10 to 20%		WHC	Schenter	92021
				Re-186 represents an important isotope in the future treatment of cancer using monoclonal anti bodies. Re-186 has been produced in FFTF, HFIR, and MURR and these results can be used as an integral test of the Re-185 and Re-186 capture data. Re-185(n,gamma) data are important for medical isotopes production optimization of Re-186.				
^{190}Os	$\sigma(n,\gamma)$ (E)	2	1.0 mV to 0.1 MeV	10 to 20%		WHC	Schenter	92023
				Os-191 has been produced in FFTF and HFIR, so that integral data are available to test differential measurements. Os-191 is used in medical research to determine the flow patterns of blood through the hearts of premature babies and adults. Use of Os-191 allows the possible elimination of performing open heart surgery on premature babies. Children's Hospital of Boston has extensive research studies involved with Os-191. Os-190 data are important for medical isotope production optimization of Os-191.				
^{191}Os	$\sigma(n,\gamma)$ (E)		RADIOACTIVE 15.4 d					
		2	1.0 mV to 0.1 MeV	20 to 50%		WHC	Schenter	92022
				Os-191 has been produced in FFTF and HFIR, so that integral data are available to test differential measurements. Os-191 is used in medical research to determine the flow patterns of blood through the hearts of premature babies and adults. Use of Os-191 allows the possible elimination of performing open heart surgery on premature babies. Children's Hospital of Boston has extensive research studies involved with Os-191. Os-191 data are important for medical isotope production optimization of Os-191.				
^{nat}Pt	$\sigma(n,n)$ (E)	2	1.0 mV to 10.0 eV	10%		NIST	Carlson	92041
				Extinction effects must be determined. Needed for determining scattering corrections in Pt fission deposit backings.				
^{197}Au	$\sigma(n,\gamma)$ (E)	1	0.2 MeV to 2.5 MeV	2%		NIST	Carlson	92042
				To improve accuracy of standard cross section.				
^{nat}Pb	$\sigma(n,2n)$ (E)	1	14.0 MeV to 15.0 MeV	3%		TSI	Cheng	86097
				Improved accuracy desired.				
^{nat}Pb	$\sigma(n,Xn)$ $(E,\Theta,E_{n'})$	1	6.0 MeV to 12.0 MeV	5%		TSI	Cheng	86161
				Measurements recommended at 6, [illegible]. 10 and 12 MeV. Necessary to calculate neutron multiplication.				

Isotope	Quantity	Priority	Energy Range	Accuracy	δE	Lab	Requester	No.
^{204}Pb	$\sigma(n,p)$ (E)	1	0.1 MeV to 15.0 MeV	20%		TSI	Cheng	86142
				Activation data needed for afterheat and safety assessments for Li-Pb based fusion reactor concepts.				
^{206}Pb	$\sigma(n,Xn)$ (E,$E_{n'}$)	2	10.0 MeV	10 to 20%	0.1MeV	ORNL	Fu	92088
				ENDF/B-VI of requested item was based on model calculation fitting 14-MeV data. Need 10-MeV data for confirmation. Isotopic data are needed because (n,2n) thresholds of the three major isotopes are significantly different.				
^{206}Pb	$\sigma(n,t)$ (E)	1	7.0 MeV to 15.0 MeV	20%		TSI	Cheng	86143
				Activation data needed for afterheat and safety assessments for Li-Pb based fusion reactor concepts.				
^{207}Pb	$\sigma(n,Xn)$ (E,$E_{n'}$)	2	10.0 MeV	10 to 20%	0.1MeV	ORNL	Fu	92089
				ENDF/B-VI of requested item was based on model calculation fitting 14-MeV data. Need 10-MeV data for confirmation. Isotopic data are needed because (n,2n) thresholds of the three major isotopes are significantly different.				
^{208}Pb	$\sigma(n,Xn)$ (E,$E_{n'}$)	2	10.0 MeV	10 to 20%	0.1MeV	ORNL	Fu	92090
				ENDF/B-VI of requested item was based on model calculation fitting 14-MeV data. Need 10-MeV data for confirmation. Isotopic data are needed because (n,2n) thresholds of the three major isotopes are significantly different.				
^{208}Bi	$\sigma(n,2n)$ (E)		RADIOACTIVE 3.68+05 YR					
		2	7.0 MeV to 15.0 MeV	20%		TSI	Cheng	86145
				Long-lived activation product, Bi-207 (32.2 yr), produced.				
^{233}U	$\sigma(n,n)$ (E)		RADIOACTIVE 1.59+05 yr					
		2	1.0 mV to 1.0 eV	5%		NIST	Carlson	92039
				Suitable measurements at thermal may be acceptable Well-characterized samples must be used. Extinction effects must be determined. To more accurately determine the thermal constants.				
^{234}U	$\sigma(n,\gamma)$ (E)		RADIOACTIVE 2.45+05 YR					
		2	1.0 mV to 1.0 MeV	3%		ORNL	Peelle	86092
				2 Need 1.00-3 to 2 eV to 3% 2 Need 2 eV to 10 keV to 6%. 2 Need 10 keV to 1 MeV to 10%.				

Isotope	Quantity	Priority	Energy Range	Accuracy	δE	Lab	Requester	No.
^{235}U	σ(n,n) (E)		RADIOACTIVE 7.04+08 yr					
		2	1.0 mV to 1.0 eV	5%		NIST	Carlson	92037
				Suitable measurements at thermal may be acceptable. Well-characterized samples must be used. Extinction effects must be determined. To more accurately determine the thermal constants.				
^{235}U	σ(n,f) (E)		RADIOACTIVE 7.04+08 yr					
		1	0.2 MeV to 20.0 MeV	0.5%		NIST	Carlson	92043
				To improve accuracy of standard cross section and extend its useful energy range.				
		1	20.0 MeV to 0.2 GeV	1 to 2%		NIST	Carlson	92044
				To improve accuracy of standard cross section and extend its useful energy range.				
^{235}U	Eta (E)		7.04+08 yr					
		1	1.0 mV to 10.0 eV	0.2 to 0.5%		ORNL	Weston	92093
				Determination of the shape of eta at very low neutron energies is of extreme importance for reactor physics.				
^{235}U	Alpha (E)		RADIOACTIVE 7.038+05YR					
		2	1.0 keV to 1.0 MeV	5 to 10%		ANL	Smith	86063
				Discrepancies are too large.				
^{236}U	Resonance Parameters		2.34+07 yr					
		1	1.0 eV to 10.0 keV	5%		NIST	Carlson	92124
				The radiation widths derived by Macklin are appreciably lower than previous measurements. New improved measurements are needed. U-236 is important in calculation of higher actinide build-up.				
^{237}Np	Half-life		RADIOACTIVE 2.14+06 yr					
		2		0.5%		NIST	Gilliam	92028
				For mass determination of fissionable deposits.				
^{237}Np	σ(n,f) (E)		RADIOACTIVE 2.14+06 yr					
		1	50.0 keV to 7.0 MeV	2%		NIST	Gilliam	92029
				Needed for materials dosimetry. It is an important dosimetry standard for measurements in both fast and thermal reactors.				
^{237}Np	σ(n,f) (E)		2.14+06 yr					
		1	3.0 MeV to 15.0 MeV	2 to 3%		LANL	Young	92111
				Precise data at few energies needed for ENDF/B evaluation to settle discrepancy in recent measurements.				
^{239}Pu	σ(n,n) (E)		RADIOACTIVE 2.41+04 yr					
		2	1.0 mV to 1.0 eV	5%		NIST	Carlson	92035
				Suitable measurements at thermal may be acceptable. Well-characterized samples must be used. Extinction effects must be determined. For determination of the thermal constants.				

Isotope	Quantity	Priority	Energy Range	Accuracy	δE	Lab	Requester	No.
^{239}Pu	Eta (E)	1	1.0 mV to 10.0 eV	24119 YR 0.2 to0.5%		ORNL	Weston	92091
				Determination of the shape of eta at very low neutron energies is important for reactor physics.				
^{239}Pu	σ(n,f) (E)	1	10.0 eV to 1.5 MeV	24119 YR 0.5%	0.1%	ORNL	Weston	92092
				Need good resolution in the resonance region to determine background level and want accurate fission cross section in the 1 to 500 keV neutron energy range.				
^{239}Pu	Alpha (E)	2	10.0 mV to 1.0 eV	RADIOACTIVE 24119 YR 2%		ORNL	Weston	86172
^{240}Pu	Resonance Parameters	2	1.0 eV	RADIOACTIVE 6570 YR 0.5%		DOE	Hemmig	82021
				Resonance strongly influences thermal cross section evaluation. There is a discrepancy between differential and integral data.				
^{241}Pu	σ(n,n) (E)	2	1.0 mV to 1.0 eV	RADIOACTIVE 14.35 yr 5%		NIST	Carlson	92038
				Suitable measurements at thermal may be acceptable. Well-characterized samples must be used. Extinction effects must be determined. To more accurately determine the thermal constants.				
^{241}Pu	Alpha (E)	2	10.0 mV to 1.0 keV	RADIOACTIVE 14.4 YR 4. to 8%		ORNL	Weston	86173
				2% accuracy desired from .01 eV to 1.0 eV.				
^{242}Am	σ(n,X) (E)	2	10.0 μV to 20.0 MeV	METASTABLE 152 yr		WHC	Mann	92099
				Evaluation needed to incorporate new measurements since ENDF/B-V. Important for actinide burning, old evaluation (1978) in ENDF/B-VI.				
^{243}Am	σ(n,f) (E)	3	Thermal to 14.0 MeV	RADIOACTIVE 7380 yr 10 to 15%		NIST	Carlson	92046
				Previous measurements are not consistent. For fast reactor design.				
^{242}Cm	σ(n,γ) (E)	2	10.0 keV to 1.0 MeV	RADIOACTIVE 163 DAY 10 to 20%		ANL	Smith	86067
				Needed for fuel cycle calculations.				
^{243}Cm	σ(n,X) (E)	2	10.0 μV to 20.0 MeV	RADIOACTIVE 30 yr		WHC	Mann	92100
				Evaluation needed to incorporate new measurements since ENDF/B-V. Important for actinide burning, old evaluation (1978) for ENDF/B-VI.				
^{244}Cm	σ(n,X) (E)	2	10.0 μV to 20.0 MeV	RADIOACTIVE 18 yr		WHC	Mann	92101
				Evaluation needed to incorporate new measurements since ENDF/B-V. Important for actinide burning, old evaluation (1978) for ENDF/B-VI.				

Isotope	Quantity	Priority	Energy Range	Accuracy	δE	Lab	Requester	No.
^{244}Cm	$\sigma(n,\gamma)$ (E)		RADIOACTIVE 18.1 YR					
		2	10.0 keV to 1.0 MeV					
				10 to 20%		ANL	Smith	86068
				Needed for fuel cycle calculations.				
^{246}Cm	$\sigma(n,X)$ (E)		RADIOACTIVE 5000 yr					
		2	10.0 μV to 20.0 MeV					
						WHC	Mann	92102
				Evaluation needed to incorporate new measurements since ENDF/B-V. Important for actinide burning, old evaluation (1978) for ENDF/B-VI.				
^{247}Cm	$\sigma(n,X)$ (E)		RADIOACTIVE 1.6+07 yr					
		2	10.0 μV to 20.0 MeV					
						WHC	Mann	92103
				Evaluation needed to incorporate new measurements since ENDF/B-V. Important for actinide burning, old evaluation (1978) for ENDF/B-VI.				
^{248}Cm	$\sigma(n,X)$ (E)		RADIOACTIVE 3.7+05 yr					
		2	10.0 μV to 20.0 MeV					
						WHC	Mann	92104
				Evaluation needed to incorporate new measurements since ENDF/B-V. Important for actinide burning, old evaluation (1978) for ENDF/B-VI.				

APPENDIX 1

NAMES AND ADDRESSES OF REQUESTORS

NAME	PHONE	ADDRESS
Dr. Allan D. Carlson	301-975-5570	National Institute of Standards and Technology RADP C311 Gaithersburg, MD 20878
Dr. Ed Caro	518-395-7038	Knolls Atomic Power Laboratory P. O. Box 1072 Schenectady, NY 12301
Dr. Randall S. Caswell	301-975-5525	National Institute of Standards and Technology Bldg. 245, Rm B102 Gaithersburg, MD 20878
Dr. Edward T. Cheng	619-793-3567	TSI Research Corp. Suite 110, 225 Stevens Ave. Solana Beach, CA 92075
Dr. D. E. Dei	412-476-5139	Bettis Atomic Power Laboratory P. O. Box 79, Zap 34-F West Mifflin, PA 15122
Dr. C. Y. Fu	615-574-6116	Oak Ridge National Laboratory Building 6010, MS 6356 P. O. Box 2008 Oak Ridge, TN 37831
Dr. D. M. Gilliam	301-975-6206	National Institute of Standards and Technology Reactor Building 235, A-106 Gaithersburg, MD 20878
Dr. Pat J. Griffin	505-845-9121	Sandia National Laboratory Radiation Effects and Reactor Design, 6452 Albuquerque, NM 87185
Dr. Gerry M. Hale	505-667-7738	Los Alamos National Lab. T-2, MS B243 Los Alamos, NM 87545
Mr. Dave M. Hetrick	615-574-6131	Oak Ridge National Laboratory Building 6010, MS 6356 P. O. Box 2008 Oak Ridge, TN 37831
Mr. Phillip B. Hemmig	301-903-3579	U. S. Department of Energy Advanced Reactor Technology NE-542, GTN Washington, DC 20585
Dr. Harold D. Knox	518-395-7752	Knolls Atomic Power Laboratory P. O. Box 1072 Schenectady, NY 12301
Dr. Duane C. Larson	615-574-6119	Oak Ridge National Laboratory Building 6010, MS 6354 P. O. Box 2008 Oak Ridge, TN 37831
Dr. Fred M. Mann	509-376-5728	Hanford Engineering Development Laboratory, HO-36 P. O. Box 1970 Richland, WA 99352

Dr. E. Dale McGarry	301-975-6205	National Institute of Standards and Technology Reactor Bldg 235, A-106 Gaithersburg, MD 20899
Dr. Robert W. Roussin	615-574-6176	Oak Ridge National Laboratory RSIC, Bldg. 6025, MS 6362 P. O. Box 2008 Oak Ridge, TN 37831
Dr. Robert E. Schenter	509-376-3935	Hanford Engineering Development Laboratory, HO-36 P. O. Box 1970 Richland, WA 99352
Dr. Alan B. Smith	708-252-6084	Argonne National Laboratory APD-316, 9700 S. Cass Ave. Argonne, IL 60439
Dr. Lawrence W. Weston	615-574-6129	Oak Ridge National Laboratory Building 6010, MS6354 P. O. Box 2008 Oak Ridge, TN 37831
Dr. Roger M. White	510-422-9668	Lawrence Livermore National Lab. Dept. of Physics, MS L-298 Livermore, CA 94551
Dr. Phillip G. Young	505-667-7670	Los Alamos National Lab. Group T-2, MS B-243 Los Alamos, NM 87545

APPENDIX 2

ENDF/B-VI EVALUATOR CONTACTS

Material	Evaluator to Contact	Lab	Telephone
^{1}H	G. M. Hale	LANL	505 667 7738
^{2}H	R. E. MacFarlane	LANL	505 667 7742
^{3}He	G. M. Hale	LANL	505 667 7738
^{6}Li	G. M. Hale	LANL	505 667 7738
^{7}Li	P. G. Young	LANL	505 667 7670
^{9}Be	S. T. Perkins	LLNL	510 422 4061
^{10}B	G. M. Hale	LANL	505 667 7738
^{11}B	P. G. Young	LANL	505 667 7670
^{NAT}C	C. Y. Fu	ORNL	615 574 6116
^{14}N	P. G. Young	LANL	505 667 7670
^{15}N	E. D. Arthur	LANL	505 667 1708
^{16}O	G. M. Hale	LANL	505 667 7738
^{19}F	C. Y. Fu	ORNL	615 574 6116
^{NAT}V	A. B. Smith	ANL	708 252 6084
^{50}Cr	D. M. Hetrick	ORNL	615 574 6131
^{52}Cr	D. M. Hetrick	ORNL	615 574 6131
^{53}Cr	D. M. Hetrick	ORNL	615 574 6131
^{54}Cr	D. M. Hetrick	ORNL	615 574 6131
^{55}Mn	K. Shibata	JAERI	
^{54}Fe	C. Y. Fu	ORNL	615 574 6116
^{56}Fe	C. Y. Fu	ORNL	615 574 6116
^{57}Fe	C. Y. Fu	ORNL	615 574 6116
^{58}Fe	C. Y. Fu	ORNL	615 574 6116
^{59}Co	A. B. Smith	ANL	708 252 6084
^{58}Ni	D. C. Larson	ORNL	615 574 6119
^{59}Ni	F. M. Mann	WHC	509 376 5728
^{60}Ni	D. C. Larson	ORNL	615 574 6119
^{61}Ni	D. C. Larson	ORNL	615 574 6119
^{62}Ni	D. C. Larson	ORNL	615 574 6119
^{64}Ni	D. C. Larson	ORNL	615 574 6119
^{63}Cu	D. M. Hetrick	ORNL	615 574 6131
^{65}Cu	D. M. Hetrick	ORNL	615 574 6131
^{89}Y	A. B. Smith	ANL	708 252 6084
^{93}Nb	A. B. Smith	ANL	708 252 6084
^{105}Pd	R. Q. Wright	ORNL	615 574 5279

^{107}Pd	R. Q. Wright	ORNL	615 574 5279
^{NAT}In	A. B. Smith	ANL	708 252 6084
^{115}In	R. E. Schenter	WHC	509 376 3935
^{134}Cs	R. Q. Wright	ORNL	615 574 5279
^{134}Ba	R. Q. Wright	ORNL	615 574 5279
^{135}Ba	R. Q. Wright	ORNL	615 574 5279
^{136}Ba	R. Q. Wright	ORNL	615 574 5279
^{137}Ba	R. Q. Wright	ORNL	615 574 5279
^{147}Nd	R. Q. Wright	ORNL	615 574 5279
^{147}Pm	R. Q. Wright	ORNL	615 574 5279
^{147}Sm	R. Q. Wright	ORNL	615 574 5279
^{151}Sm	R. Q. Wright	ORNL	615 574 5279
^{151}Eu	P. G. Young	LANL	505 667 7670
^{152}Eu	R. Q. Wright	ORNL	615 574 5279
^{153}Eu	P. G. Young	LANL	505 667 7670
^{154}Eu	R. Q. Wright	ORNL	615 574 5279
^{155}Eu	R. Q. Wright	ORNL	615 574 5279
^{165}Ho	P. G. Young	LANL	505 667 7670
^{166}Er	R. Q. Wright	ORNL	615 574 5279
^{167}Er	R. Q. Wright	ORNL	615 574 5279
^{185}Re	L. W. Weston	ORNL	615 574 6129
^{187}Re	L. W. Weston	ORNL	615 574 6129
^{197}Au	P. G. Young	LANL	505 667 7670
^{206}Pb	C. Y. Fu	ORNL	615 574 6116
^{207}Pb	C. Y. Fu	ORNL	615 574 6116
^{208}Pb	C. Y. Fu	ORNL	615 574 6116
^{209}Bi	A. B. Smith	ANL	708 252 6084
^{235}U	L. W. Weston	ORNL	615 574 6129
^{236}U	F. M. Mann	WHC	509 376 5728
^{238}U	L. W. Weston	ORNL	615 574 6129
^{237}Np	P. G. Young	LANL	505 667 7670
^{239}Np	R. Q. Wright	ORNL	615 574 5279
^{239}Pu	P. G. Young	LANL	505 667 7670
^{240}Pu	L. W. Weston	ORNL	615 574 6129
^{241}Pu	L. W. Weston	ORNL	615 574 6129
^{241}Am	Zhou Delin	CHINA	
^{243}Am	L. W. Weston	ORNL	615 574 6129
^{249}Bk	Zhou Delin	CHINA	
^{249}Cf	Zhou Delin	CHINA	

INTERNAL DISTRIBUTION

1. B. R. Appleton
2. J. K. Dickens
3. F. C. Difilippo
4. C. Y. Fu
5. R. Gwin
6. J. A. Harvey
7. D. M. Hetrick
8. N. W. Hill
9. D. T. Ingersoll
10-14. D. C. Larson
15. M. J. Martin
16. R. W. Peelle
17. S. A. Raby
18. S. Raman
19. R. W. Roussin
20. R. R. Spencer
21. R. C. Ward
22. R. M. Westfall
23-32. L. W. Weston
33. John White
34. G. E. Whitesides
35. R. Q. Wright
36. R. W. Brockett(consultant)
37. J. J. Dorning (consultant)
38. J. E. Leiss (consultant)
39. N. Moray (consultant)
40. M. F. Wheeler(consulant)
41-43. Laboratory Records Dept.
44. Laboratory Records, ORNL-RC
45. Documents Reference Section
46. Central Research Library
47. ORNL Patent Section

EXTERNAL DISTRIBUTION

48. Office of the Assistant Manager for Energy Research and Development,U.S. Department of Energy, Oak Ridge Operations,P.O.Box 2008, Oak Ridge, TN 37831.
49. S. L. Whetstone, Division of Nuclear Physics, ER 23/GTN, U. S. Department of Energy, Washington, D.C. 20585.
50. R. A. Meyer, Division of Nuclear Physics, ER 23/GTN, U. S. Department of Energy, Washington, D.C. 20585.
51. S. E. Berk, Office of Energy Research, Reactors and Systems Radiation, U.S. Department of Energy, Washington, D.C. 20585.
52. P. B. Hemmig, Advanced Reactor Technology, NE-542, GTN, U.S. Department of Energy, Washington, DC 20585.
53. L. J. Agee, System Safety and Licensing Analysis, EPRI, 3412 Hillview Ave., P. O. Box 10412, Palo Alto, CA 94303.
54. A. M. Baxter, Reactor Engineering, General Atomics, 3550 General Atomics Court, P.O. Box 85608, San Diego, CA 92138-5608.
55. M. J. Berger, Photon and Charged Particle Data Center, National Institute of Standards and Technology, Gaithersburg, MD 20878.
56. R. C. Block, Dept. of Nuc. Eng.,Rensselaer Polytechnic Inst.,Troy, NY 12180.
57. Robert Breen, Bldg. 3, EPRI, P. O. Box 10412, Palo Alto, CA 94303.
58. A. D. Carlson, RADP C311, NIST, Gaithersburg, MD 20878.
59. Ed Caro, Knolls Atomic Power Lab., P. O. Box 1072, Schenectady, NY 12301.
60. R. S. Caswell, NIST, Bldg. 245, Rm B102, Gaithersburg, MD 20878.
61. E. T. Cheng, Suite 110, TSI Research Corp., 225 Stevens Ave., Solana Beach, CA 92075.
62. P. J. Collins, Argonne National Lab.,P.O. Box 2528,Idaho Falls,ID 83403 2528.
63. F. Corvi, CEC, JRC, CBNM,Steenweg naar Retie, B-2440, Geel, Belgium.

64. Char"es Cowan, MS S15, Advanced Nuclear Technology, General Electric Co.,6835 Visa Del Oro,San Jose,CA 95119.
65. D. E. Cullen, MS L-298, Lawrence Livermore Nat. Lab., Livermore, CA 94551.
66. Ulrich Decher, GC-28, Combustion Engineering, Inc., 1000 Prospect Hill Rd., P.O. Box 500, Windsor, CT 06095.
67. D. E. Dei, Bettis Atomic Power Lab., P.O. Box 79, Zap 34-F, West Mifflin, PA 15122.
68. C. L. Dunford, NNDC, Building 197-D, Brookhaven National Laboratory, Upton, NY 11973.
69. Colin Durston, S. Levy Inc. 3425 S. Boscom Ave., Campbell, CA 95008-7006.
70. T. R. England, T2, MS B-243, Los Alamos Nat. Lab., Los Alamos, NM 87545.
71. R. B. Firestone, Bldg. 50-A, Rm. 6102, Lawrence Berkeley Lab., Berkeley, Ca 94720.
72. E. Fort, C.E.A., C.E.N. de Cadarache, B.P.No. 1, F-13115 St. Paul-lez-Durance, France.
73. F. H. Froehner, Institute fur Neutronenphysik und Reaktortechnik, Kernforschungszentrum, Karlsruhe, Postfach 3640, D-7500, Karlsruhe, Germany.
74. D. G. Gardner, MS L-234, Lawrence Livermore Nat. Lab., Livermore, CA 94551.
75. C. R. Gould, Physics Dept. North Carolina State Univ., Box 8202, Raleigh, NC 27695-8202.
76. S. M. Grimes, Dept. of Physics, Ohio Univ, Athens, OH 45701.
77. H. Gruppelaar, Netherlands Energy Research Foundation (ECN), Postbus 1, NL-1755 Zg Petten, THE NETHERLANDS.
78. M. Gundy, Nuclear Reactor Production Div., Westinghouse Savannah River Comp., P.O. Box 616, Aiken, SC 29802.
79. R. C. Haight, P-3, MS D449, Los Alamos Nat. Lab., Los Alamos, NM 87545.
80. G. M. Hale, T-2, MS B243, Los Alamos Nat. Lab., Los Alamos, NM 87185.
81. J. M. Harris, Livermore Div. 8233, Sandia Nat. Lab., Livermore, CA 94550.
82. J. Helm, Dept. of Applied Physics, 202 Mudd Bldg., Columbia University, 520 W. 120th Street, New York, NY 10027.
83. D. M. Gilliam, NIST, Reactor Bldg. 235, A-106, Gaithersburg, MD 20878.
84. P. J. Griffin, Sandia Nat. Lab., Radiation Effects and Reactor Design, 6452, Albuquerque, NM 87185.
85. U. Jenquin, Bldg. Sigma-3, Battelle Pacific Northwest Lab., P.O. Box 999, Richland, WA 99352.
86. Alf Jonsson, Dept. 5318-02403, Combustion Engineering, 1000 Prospect Hill Rd., P.O. Box 500, Windsor, CT 06095.
87. Albert Kahler, MS ZAP 34-F, Bettis Atomic Power Lab., P. O. Box 79, West Mifflin, PA 15122.
88. H. D. Knox, Knolls Atomic Power Lab., P. O. Box 1072, Schenectady, NY 12301.
89. Glen Knoll, University of Michigan, Ann Arbor, MI 48109.
90. N. P. Kocherov, Nuclear Data Section, IAEA, P. O. Box 100, A-1400 Vienna, Austria.
91. G. P. Lamaze, NIST, Bldg. 235, Gaithersburg, MD 20899.
92. P. W. Lisowski, P-3, MS D449, Los Alamos Nat. Lab., Los Alamos, NM 87545.
93. C. R. Lubitz, Bldg. F-16, KAPL, P.O. Box 1072, Schenectady, NY 12301.
94. R. Mac Farlane, T2, MS B-243, Los Alamos Nat. Lab., Los Alamos, NM 87545.
95. F. M. Mann, L7-29,Hanford Eng. Dev. Lab.,P.O. Box 1970,Richland, WA 99352.

96. E. D. McGarry, NIST, Reactor Bldg 235, A-106, Gaithersburg, MD 20899.
97. F. J. McCrosson, Bldg. 773-41A, Savannah River Lab., Aiken, SC 29808.
98. Victoria McLane, NNDC, Bldg. 197-D,Brookhaven Nat. Lab.,Upton, NY 11973.
99. R. D. McKnight, Bldg. 208, Argonne Nat. Lab., 9700 S Cass Ave., Argonne, IL 60439.
100. M. S. Milgram, Dept. of Reactor Physics, Chalk River Nuclear Lab., Atomic Energy of Canada Ltd., Chalk River, Ontario, KOJ 1JO CANADA.
101. D. W. Muir, Los Alamos National Lab., T2, MS-B243, Los Alamos, NM 87545.
102. M. N. Nikolaev, Centr Po Jadern Dannym (CJD), Fiziko-Energeticheskij Inst., Ploschad Bondarenko, Kaluga Region, SU-249 020 Obninsk, RUSSIA.
103. Claes Nordborg, OEDC/NEA Data Bank, Batiment 445, F-91191 Gif/Yvette, Cedex, France.
104. S. T. Perkins, MS L-298, Lawrence Livermore Nat. Lab., Livermore, CA 94551.
105. S. Pearlstein, Suite 700, Defense Nuclear Facilities Safety Board, 625 Indiana Ave. NW, Washington, DC 20004.
106. W. P. Poenitz, Argonne National Laboratory-West, P.O. Box 2528, Idaho Falls, ID 83403.
107. C. W. Reich, 2837 Snowflake Drive, Boise, ID 83706.
108. D. A. Resler, Dept. of Physics, MS L-298, Lawrence Livermore National Lab., Livermore, CA 94551.
109. G. Rohr, CEC, JRC, CBNM, Steenweg naar Retie, B-2440 Geel, Belgium.
110. J. M. Ryskamp, Engineering Lab., MS 3515, EG&G Idaho, P.O. Box 1625, Idaho Falls, ID 83415.
111. M. Salvatores, Centre d'Etudes Nucleaires de Cadarache, 13108 Saint-Paul-Lez-Durance Cedex, France.
112. Joseph Sapir, MS B-220, Los Alamos National Lab., Los Alamos, NM 87545.
113. R. E. Schenter,L7-29,Hanford Engineering Dev. Lab.,P.O. Box 1970, Richland, WA 99352.
114. R. A. Schrack, RADP B119, NIST, Gaithersburg, MD 20899.
115. R. E. Seamon, X-6,MS B-226, Los Alamos Nat. Lab., Los Alamos, NM 87545.
116. A. B. Smith, APD-316,Argonne Nat. Lab., Argonne, IL 60439.
117. D. L. Smith, Building 314, Argonne National Lab., Argonne, IL 60439.
118. Eugene Specht, MS HB23, Rockwell Int. Corp., 6633 Canoga Park, CA 91303.
119. H. K. Vonach, Institute Fuer Radiumforschung und Kernphysik, Boltzmanngasse 3, A-1090, Wien, Austria.
120. R. L. Walter, Dept. of Physics, Duke University, Durham, NC 27706.
121. O. A. Wasson, RADP B109, NIST, Gaithersburg, MD 20899.
122. C. Wagemans, CBNM, Steenweg naar Retie, B-2550 Geel, Belgium.
123. H. Weigmann, CBNM, Steenweg naar Retie, B-2440 Geel, Belgium.
124. S. A. Wender, P-3, MS D449, Los Alamos Nat. Lab., Los Alamos, NM 87545.
125. R. M. White, Physics Dept., MS L-298, Lawrence Livermore National Laboratory, P.O. Box 808, Livermore, CA 94550.
126. R. R. Winters, Dept. of Physics, Denison Univ., Granville, OH 43023.
127. Mark Williams, Nuclear Science Center, Louisiana State University, Baton Rouge, LA 70803.
128. W. A. Wittkopf, Div. of Fuel Eng., Babcock & Wilcox Co., P.O. Box 10935, 3315 Old Forest Rd., Lynchburg, VA 24506.
129. P. G. Young, T-2, MS-B243, Los Alamos Nat. Lab., Los Alamos, NM 87543.
130. M. Youssef, School of Engineering and Applied Science, 6288 Boelter Hall, University of California, Los Angeles, CA 90024.
131-140. Office of Scientific and Technical Information, P. O. Box 62, Oak Ridge, TN 37831

DATE FILMED

6/21/93