Cross Section Evaluation Working Group

Status of the ENDF Project

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1. Introduction

The Cross Section Evaluation Working Group (CSEWG) has been established in 1966, the first release of the Evaluated Nuclear Data File, ENDF/B-I followed in 1968. The current ENDF/B-VI was initially released in 1990 and had numerous updates, the last being ENDF/B-VI.8 released in October 2001.

Table 1. Releases of the ENDF/B library

ENDF/B	I	II	III	IV	V	VI	VII
Year	1968	1970	1972	1974	1978	1990	(2006)

Since 2002, the CSEWG has been working on a new release of the library, ENDF/B-VII. So far, three preliminary versions were distributed for validation.

Table 2. Preliminary versions of the ENDF/B-VII library

Version	**NSUB=10 materials**	**Release**	**Review**	**Comment**
Beta0	340	March 2005	July 2005, ORNL	
Beta1	387	October 2005	Nov 2005, BNL	219 FPs from SG23
Beta2	393	April 25, 2006	June 27, 2006, BNL	120 modified files

Considering good performance of the library achieved so far, the chance is high that ENDF/B-VII.0 will be officially released later in 2006.

2. ENDF/B-VII beta2 release

2.1 Library

Release. The library has been released for testing and validation on April 25, 2006, see www.nndc.bnl.gov.

Format. ENDF-6 format, the same as for ENDF/B-VI library, was adopted.

Contents. ENDF/B-VII beta2 contains 14 sublibraries summarized in Table 3. Since ENDF/B-VII is no more stored on tapes, the tape containing standards had to be replaced by newly created Standards Sublibrary (NSUB=19).

Two sublibraries (photonuclear, standards) can be considered as new. In 7 other sublibraries often considerable updates and extensions were made, while 5 remaining sublibraries were taken without any change from the current ENDF/B-VI.8.

Table 3. Contents of the ENDF/B-VII beta2 library

No.	NSUB	Sublibrary	Short name	Materials in b2	Materials in VI.8	Comment
1	0	Photonuclear reactions	g	**163**	-	**New sublibrary**
2	3	Photo-atomic	photo	**100**	100	Taken from VI.8
3	4	Radioactive decay	decay	**3830**	979	**New evaluations**
4	5	Spont. fission yields	s/fpy	**9**	9	Taken from VI.8
5	6	Atomic relaxation	ard	**100**	100	Taken from VI.8
6	10	Neutron reactions	n	**393**	328	**Many new evaluations**
7	11	Neutron fission yields	n/fpy	**31**	31	Taken from VI.8
8	12	Thermal scattering	tsl	**20**	15	**Some new evaluations**
9	19	Standards	std	**8**	8	**New evaluations**
10	113	Electro-atomic	e	**100**	100	Taken from VI.8
11	10010	Proton reactions	p	**48**	35	**Some new evaluations**
12	10020	Deuteron reactions	d	**5**	2	**Some new evaluations**
13	10030	Triton reactions	t	**3**	1	**Some new evaluations**
14	20030	He-3 reactions	he3	**2**	1	**Some new evaluations**
Full	**library**			**4812**	1709	

2.2 Neutron sublibrary

Materials. The sublibrary contains 393 materials, majority of which was updated or newly evaluated, for full list see **Appendix**. There are 390 isotopic evaluations, and 3 elemental evaluations (C, V and Zn). As many as 120 materials were modified compared to b1 release

Completeness. All evaluations except for ^{253}Es are complete, meaning that they cover all reaction channels needed for neutronics calculations.

Actinides. Actinide evaluations, representing the backbone of the new library, were evaluated by LANL. In several key instances, MF2 was evaluated by ORNL. In particular, LANL evaluated and made a number of adjustments for $^{232\text{-}241}$U, ^{237}Np, ^{239}Pu and $^{241\text{-}243}$Am.

Light nuclei. Important update for 1-H by LANL was already included in b1 release. This file, taken over in b2, can be now processed using NJOY 99.125. Important adjustments were made in 16-O evaluation in b2 by LANL, in particular in 16O(n,α0) cross sections.

Fission products. A full set of 219 materials in the fission products range (Z = 31 – 68) was taken from the WPEC SG23 library, representing a massive update of ENDF/B-VI.8. As many as 71 materials were evaluated for ENDF/B-VII, using RRR and URR data derived from Atlas of Neutron Resonances (2006) and fast neutrons based on EMPIRE-2.19.

Covariances. A limited amount of new covariances were included in ENDF/B-VII beta2. These are complete covariance evaluations for 9 materials, with file MF=32 always using Reich-Moore representation:

- ^{152,153,154,155,156,157,158,160}Gd with MF = 32, 33
- ^{232}Th with MF = 31, 32, 33.

In ENDF/B-VI.8 there are covariances, in general fairly old and incomplete, for 47 materials. In the course of ENDF/B-VII development the evaluators dropped covariances for some of these materials, reducing the list to 38 materials in beta1, and this list was further reduced in beta2, see Table 4.

Table 4. Number of materials with covariance data

Library	VI.8	b1	b2	Comment
Materials	47	38	13 old + 9 new	252-Cf MF35 not found

Don Smith, ANL analyzed ENDF/B-VII beta1 covariances and recommended that only small amount of covariance MT files migrate to ENDF/B-VII beta2, see Table 5. This recommendation was followed by the NNDC when assembling beta2 up to minor modifications (for instance, the NNDC was unable to locate file MF35 for 252Cf).

Table 5. Summary of covariance files in ENDF/B-VII beta1, only small part of which migrated to ENDF/B-VII beta2 library following the recommendation by D. Smith.

MF	Quantity	Materials in ENDF/B-VII b1	Number of MT Covariance Files that migrated to ENDF/B-VII b2
31	Nu-bar	4	2 out of 7 total
32	Resonance Parameters	4	1 out of 4 total
33	Cross Sections	36	21 out of 358 total [a]
35	Neutron Emission Spectra	1	1 out 1 total
40	Activation Cross Sections	1	1 out 1 total
Totals		39 [b]	26 out of 371 total

[a] The numbers of specific MT covariance files available for materials where covariance information has been provided range from 1 to 17, with 10 individual MT covariance files per material being typical. Thus, the number of specific covariance files recommended for migration (only 21) is indeed a small fraction of the total number of available files.

[b] A few materials are represented in more than one MF category.

2.3 Other sublibraries

Photonuclear. This is entirely new sublibrary containing 163 materials, mostly up to 150 MeV. The sublibrary was supplied by LANL and largely based on the IAEA CRP photonuclear project completed in 2000 that in turn was largely based on evaluations using the LANL methodology and code GNASH.

Decay. The radioactive decay sublibrary contains entirely new evaluations for 3830 materials, to be compared with 979 materials in ENDF/B-VI.8. New evaluations were performed by BNL using the latest information from the ENSDF database and Nuclear Wallet Cards. Some additional adjustments were made, such as considering TAGS data.

Thermal. The thermal neutron scattering sublibrary contains evaluations for 20 materials. Notable improvements for b2 are H in H_2O and D in D_2O by LANL.

Standards. Neutron cross-section standards are given in the new Standards Sublibrary (NSUB=19). These are 9 standards reactions organized in 8 files that, with the exception of C(n,n), represent new evaluations, see Table 6. Full files for these 8 materials can be found in the neutron sublibrary, all of them were already adjusted to the new standards.

Table 6. Neutron cross section standards (9 reactions in 8 files)

No.	Reaction	Energy range	Comment
1	H(n,n)	1 keV to 200 MeV	New
2	3-He(n,p)	Thermal to 50 keV	New
3	6-Li(n,t)	Thermal to 1 MeV	New
4	10-B(n,α)	Thermal to 1 MeV	New
5	10-B(n,$\alpha_1\gamma$)	Thermal to 1 MeV	New
6	C(n,n)	Thermal to 1.8 MeV	ENDF/B-VI.8
7	197-Au(n,γ	Thermal, 0.2 to 2.5 MeV	New
8	235-U(n,f)	Thermal, 0.15 to 200 MeV	New
9	238-U(n,f)	2 to 200 MeV	New

2.4 Data verification

ENDF/B-VII beta2 data verification procedure is summarized in Table 7. Full verification consisted of checking (done for a full list of 14 sublibraries), followed by processing (7 sublibraries) and subsequent use of ACE files in basic neutronics application calculation (4 sublibraries). The following codes were used:

- ENDF checking codes: CHECKR-7.03, FIZCON-7.04 and PSYCHE-7.02
- Processing code: **NJOY-99.125** that includes the latest patch provided by R. MacFarlane, LANL to the NNDC on April 21, 2006
- Monte Carlo codes: MCNP5 and MCNPX

- Processing code for new covariances: ERRORJ, unspecified version provided by L. Leal, ORNL to the NNDC in February 2006, to be used to process MF32 in Reich-Moore representation

Table 7. Data verification of ENDF/B-VII b2 library

No.	Sublibrary	Checking	NJOY	MCNP	Comment
1	Photonuclear	Yes	Yes	Yes	CHECKR problems, NJOY+MCNP ok
2	Photo-atomic	Yes			
3	Radioactive decay	Yes			
4	Spont. fission yields	Yes			
5	Atomic relaxation	Yes			
6	Neutron	Yes	Yes	Yes	253Es incomplete. New covariances (MF32) for 8 isotopes of Gd and 232Th went ok through ERRORJ.
7	Neutron fission yields	Yes			
8	Thermal scattering	Yes	Yes	Yes	No problems observed
9	Standards	Yes			
10	Electro-atomic	Yes			
11	Proton	Yes	Yes	Yes	13C crashes with NJOY
12	Deuteron	Yes	Yes		
13	Triton	Yes	Yes		
14	He-3	Yes	Yes		

3. Validation of preliminary ENDF/B-VII

Beta0 and beta1. These earlier versions have already been tested. For illustration, we reproduce some of the conclusions reported by the data testers at the last CSEWG meeting, November 2005:

- A.C. (Skip) Kahler and R.E. MacFarlane (LANL): ENDF/B-VII beta1 cross-section eigenvalues for homogeneous solution systems **remain very good**".

- A.C. (Skip) Kahler and R.E. MacFarlane (LANL): "Water moderated and reflected LEU-COMP-THERM eigenvalues are **significantly improved** with ENDF/B-VII beta1 cross sections."

- C. Lubitz (KAPL): "For the ECSBEP benchmarks we examined, ENDF/B-VII beta0 performs **better than any previous** data set we are aware of."

- R. Mosteller and R. Little (LANL): "Overall, initial ENDF/B-VII produces **major improvements** relative to ENDF/B-VI and JENDL-3.3."

Beta2. Only partial and very preliminary results of ENDF/B-VII beta2 validation are available at the moment. As an example, we show k_eff values for a number of criticals performed by R. MacFarlane, LANL (January 26, 2006):

Assembly	**Experiment**	**beta1**	**beta2**	**Comment**
	<---------- C/E values ----------->			
PMF001 (Jezebel)	1.0000(20)	1.00010(15)	0.99979(10)	Pu/bare
PMF006 (Flattop-Pu)	1.0000(30)	1.00196(22)	0.99980(15)	Pu/uranium
PMF008c (Thor)	1.0000(6)	0.99989(22)	0.99940(14)	Pu/thorium
PMF011	1.0000(10)	0.99907(19)	0.99945(15)	Pu/water
PMF020	0.9993(17)	0.99955(21)	0.99866(12)	Pu/uranium
PMF022s	1.0000(21)	0.99894(22)	0.99850(12)	Pu/bare
PMF023	1.0000(16)	1.00037(16)	1.00018(12)	Pu/graphite
PMF024	1.0000(20)	1.00180(23)	1.00190(15)	Pu/poly
HMF001 (Godiva)	1.0000(10)	0.99989(15)	1.00007(11)	HEU/bare
HMF004	0.9985	1.00045(19)	1.00043(15)	HEU/water
HMF011	0.9989(15)	1.00013(26)	1.00012(15)	HEU/poly
HMF028 (Flattop-25)	1.0000(30)	1.00358(20)	1.00343(13)	HEU/uranium
UMF001 (Jezebel-23)	1.0000(10)	0.99977(14)	0.99977(10)	U233/bare
UMF006 (Flattop-23)	1.0000(14)	0.99989(17)	0.99930(14)	U233/uranium
IMF007s (Bigten)	1.0045(7)	1.00068(16)	1.00009(11)	10%U235/uranium
MCF001 (ZPR67)	0.9866(23)	1.00102(17)	1.00046(10)	Pu/U LMFBR
ICF001 (ZPR66A)	0.9939(23)	0.99828(15)	0.99833(10)	U/U LMFBR

Effects of changing 16-O(n,α):

PMF011	1.0000(10)	.99941(15)
HMF004	.9985	1.00052(16)
MCF001 (ZPR67)	.9866(23)	1.00122(10)
ICF001 (ZPR66A)	.9939(23)	.99929(10)

Appendix

ENDF/B-VII beta2: List of materials in the neutron sublibrary

There are 393 materials, including 390 isotopic and 3 elemental evaluations (C, V and Zn). Altogether 122 materials (29 light nuclei, 60 fission products, 33 heavy nuclei) have no direct recent contribution from the US evaluators.

#	Material	Lab.	Date	Authors	MAT
1)	1-H - 1	LANL	EVAL-OCT05	G.M.HALE	125
2)	1-H - 2	LANL	EVAL-FEB97	P.G.YOUNG,G.M.HALE,M.B.CHADWICK	128
3)	1-H - 3	LANL	EVAL-NOV01	G. M. HALE	131
4)	2-He- 3	LANL	EVAL-MAY90	G.HALE, D.DODDER, P.YOUNG	225
5)	2-He- 4	LANL	EVAL-OCT73	NISLEY, HALE, YOUNG	228
6)	3-Li- 6	LANL	EVAL-APR06	G.M.HALE, P.G.YOUNG	325
7)	3-Li- 7	LANL	EVAL-AUG88	P.G.YOUNG	328
8)	4-Be- 7	LANL	EVAL-JUN04	P.R.PAGE	419
9)	4-Be- 9	LLNL,LANL	EVAL-JAN86	PERKINS,PLECHATY,HOWERTON,FRANKLE	425
10)	5-B - 10	LANL	EVAL-APR06	G.M.HALE, P.G.YOUNG	525
11)	5-B - 11	LANL	EVAL-MAY89	P.G.YOUNG	528
12)	6-C - 0	LANL,ORNL	EVAL-JUN96	M.B.CHADWICK, P.G.YOUNG, C.Y. FU	600
13)	7-N - 14	LANL	EVAL-JUN97	M.B.CHADWICK & P.G.YOUNG	725
14)	7-N - 15	LANL	EVAL-SEP83	E.ARTHUR,P.YOUNG,G.HALE	728
15)	8-O - 16	LANL	EVAL-DEC05	HALE,YOUNG,CHADWICK,CARO,LUBITZ,P	825
16)	8-O - 17	BNL	EVAL-JAN78	B.A.MAGURNO	828
17)	9-F - 19	CNDC,ORNL	EVAL-OCT03	Z.X.ZHAO,C.Y.FU,D.C.LARSON, LEAL+	925
18)	11-Na- 22	NEA	RCOM-JUN83	SCIENTIFIC CO-ORDINATION GROUP	1122
19)	11-Na- 23	ORNL	EVAL-DEC77	D. C. LARSON	1125
20)	12-Mg- 24	DEC,NEDAC	EVAL-MAR87	M.HATCHYA(DEC), T.ASAMI(NEDAC)	1225
21)	12-Mg- 25	DEC,NEDAC	EVAL-MAR87	M.HATCHYA(DEC),T.ASAMI(NEDAC)	1228
22)	12-Mg- 26	DEC,NEDAC	EVAL-MAR87	M.HATCHYA(DEC),T.ASAMI(NEDAC)	1231
23)	13-Al- 27	LANL,ORNL	EVAL-FEB01	M.B.CHADWICK+, Derrien+	1325
24)	14-Si- 28	LANL,ORNL	EVAL-DEC02	M.B.CHADWICK,P.G.YOUNG,D.HETRICK	1425
25)	14-Si- 29	LANL,ORNL	EVAL-JUN97	M.B.CHADWICK,P.G.YOUNG,D.HETRICK	1428
26)	14-Si- 30	LANL,ORNL	EVAL-JUN97	M.B.CHADWICK,P.G.YOUNG,D.HETRICK	1431
27)	15-P - 31	LANL,LLNL	EVAL-DEC97	M.CHADWICK,P.YOUNG,R.HOWERTON	1525
28)	16-S - 32	FUJI E.C.	EVAL-MAY87	H.NAKAMURA	1625
29)	16-S - 33	FUJI E.C.	EVAL-MAY87	H.NAKAMURA	1628
30)	16-S - 34	FUJI E.C.	EVAL-MAY87	H.NAKAMURA	1631
31)	16-S - 36	FUJI E.C.	EVAL-MAY87	H.NAKAMURA	1637
32)	17-Cl- 35	ORNL,LANL	EVAL-OCT03	SAYER,GUBER,LEAL,LARSON,YOUNG+	1725
33)	17-Cl- 37	ORNL,LANL	EVAL-OCT03	SAYER,GUBER,LEAL,LARSON,YOUNG+	1731
34)	18-Ar- 36	NEA	EVAL-JUN83	SCIENTIFIC CO-ORDINATION GROUP	1825
35)	18-Ar- 38	NEA	EVAL-JUN83	SCIENTIFIC CO-ORDINATION GROUP	1831
36)	18-Ar- 40	KHI	EVAL-MAR94	T.WATANABE	1837
37)	19-K - 39	FUJI E.C.	EVAL-MAY87	H.NAKAMURA	1925
38)	19-K - 40	FUJI E.C.	EVAL-MAY87	H.NAKAMURA	1928
39)	19-K - 41	FUJI E.C.	EVAL-MAY87	H.NAKAMURA	1931
40)	20-Ca- 40	NRG	EVAL-OCT04	A.J. Koning	2025
41)	20-Ca- 42	NRG	EVAL-OCT04	A.J. Koning	2031
42)	20-Ca- 43	NRG	EVAL-OCT04	A.J. Koning	2034
43)	20-Ca- 44	NRG	EVAL-OCT04	A.J. Koning	2037
44)	20-Ca- 46	NRG	EVAL-OCT04	A.J. Koning	2043
45)	20-Ca- 48	NRG	EVAL-OCT04	A.J. Koning	2049
46)	21-Sc- 45	ANL,LLNL	EVAL-JUL92	A.B.SMITH, R.J.HOWERTON	2125
47)	22-Ti- 46	KUR	EVAL-SEP88	K.KOBAYASHI(KUR),H.HASHIKURA(TOK)	2225
48)	22-Ti- 47	KUR	EVAL-SEP88	K.KOBAYASHI(KUR),H.HASHIKURA(TOK)	2228
49)	22-Ti- 48	KUR	EVAL-SEP88	K.KOBAYASHI(KUR),H.HASHIKURA(TOK)	2231
50)	22-Ti- 49	KUR	EVAL-SEP88	K.KOBAYASHI(KUR),H.HASHIKURA(TOK)	2234
51)	22-Ti- 50	KUR	EVAL-SEP88	K.KOBAYASHI(KUR),HASHIKURA(TOK)	2237
52)	23-V - 0	ANL,LLNL,+	EVAL-JUN88	A.SMITH,D.SMITH+	2300
53)	24-Cr- 50	LANL,ORNL	EVAL-OCT97	S.CHIBA,M.CHADWICK,D.HETRICK	2425
54)	24-Cr- 52	LANL,ORNL	EVAL-OCT97	S.CHIBA,M.CHADWICK,D.HETRICK	2431
55)	24-Cr- 53	LANL,ORNL	EVAL-OCT97	S.CHIBA,M.CHADWICK,K.SHIBATA	2434
56)	24-Cr- 54	LANL,ORNL	EVAL-OCT97	S.CHIBA,M.CHADWICK,D.HETRICK	2437

57)	25-Mn- 55	JAERI,ORNL	EVAL-MAR88	K.SHIBATA	2525
58)	26-Fe- 54	LANL,ORNL	EVAL-SEP96	M.B.CHADWICK,P.G.YOUNG,D.HETRICK	2625
59)	26-Fe- 56	LANL,ORNL	EVAL-SEP96	M.B.CHADWICK,P.G.YOUNG,C.Y.FU	2631
60)	26-Fe- 57	LANL,ORNL	EVAL-SEP96	M.B.CHADWICK,P.G.YOUNG,D.HETRICK	2634
61)	26-Fe- 58	ORNL	EVAL-NOV89	HETRICK,FU,N.M.LARSON	2637
62)	27-Co- 58	NEA	RCOM-JUN83	SCIENTIFIC CO-ORDINATING GROUP	2722
63)	27-Co- 58M	NEA	RCOM-JUN82	SCIENTIFIC CO-ORDINATION GROUP	2723
64)	27-Co- 59	ANL,ORNL	EVAL-JUL89	A.SMITH+,G.DESAUSSURE+	2725
65)	28-Ni- 58	LANL,ORNL	EVAL-SEP97	S.CHIBA,M.B.CHADWICK,LARSON	2825
66)	28-Ni- 59	NEA,ECN	EVAL-NOV87	GRUPPELAAR,VD.KAMP,KOPECKY,NIEROP	2828
67)	28-Ni- 60	LANL,ORNL	EVAL-SEP97	S.CHIBA,M.B.CHADWICK,LARSON	2831
68)	28-Ni- 61	LANL,ORNL	EVAL-SEP97	S.CHIBA,M.B.CHADWICK,HETRICK	2834
69)	28-Ni- 62	LANL,ORNL	EVAL-SEP97	S.CHIBA,M.B.CHADWICK,HETRICK	2837
70)	28-Ni- 64	LANL,ORNL	EVAL-SEP97	S.CHIBA,M.B.CHADWICK,HETRICK	2843
71)	29-Cu- 63	LANL,ORNL	EVAL-FEB98	A.KONING,M.CHADWICK,HETRICK	2925
72)	29-Cu- 65	LANL,ORNL	EVAL-FEB98	A.KONING,M.CHADWICK,HETRICK	2931
73)	30-Zn- 0	FEI	EVAL-DEC89	NIKOLAEV M.N.AND ZABRODSKAJA S.V	3000
74)	31-Ga- 69	KHI,BNL	EVAL-JAN05	T.WATANABE, Mughabghab	3125
75)	31-Ga- 71	CNDC	EVAL-OCT98	SONG-BAI ZHANG,B.S.YU,Z.J.ZHANG	3131
76)	32-Ge- 70	BNL,JAERI	EVAL-AUG04	Iwamoto,Herman,Mughabghab+	3225
77)	32-Ge- 72	BNL,JAERI	EVAL-AUG04	Iwamoto,Herman,Mughabghab+	3231
78)	32-Ge- 73	BNL,JAERI	EVAL-AUG04	Iwamoto,Herman,Mughabghab+	3234
79)	32-Ge- 74	BNL,JAERI	EVAL-AUG04	Iwamoto,Herman,Mughabghab+	3237
80)	32-Ge- 76	BNL,JAERI	EVAL-AUG04	Iwamoto,Herman,Mughabghab+	3243
81)	33-As- 74	LLNL	EVAL-FEB06	D.A.Brown, H.I.Kim, S.Mughabghab	3322
82)	33-As- 75	LLNL	EVAL-FEB06	D.A.Brown, Pruet, H.I.Kim	3325
83)	34-Se- 74	JNDC	EVAL-MAR90	JNDC FP NUCLEAR DATA W.G.	3425
84)	34-Se- 76	JNDC	EVAL-MAR90	JNDC FP NUCLEAR DATA W.G.	3431
85)	34-Se- 77	JNDC	EVAL-MAR90	JNDC FP NUCLEAR DATA W.G.	3434
86)	34-Se- 78	JNDC	EVAL-MAR90	JNDC FP NUCLEAR DATA W.G.	3437
87)	34-Se- 79	JNDC	EVAL-MAR90	JNDC FP NUCLEAR DATA W.G.	3440
88)	34-Se- 80	JNDC	EVAL-MAR90	JNDC FP NUCLEAR DATA W.G.	3443
89)	34-Se- 82	JNDC,BNL	EVAL-JAN05	JNDC FPND W.G., Mughabghab	3449
90)	35-Br- 79	JNDC	EVAL-MAR90	JNDC FP NUCLEAR DATA W.G.	3525
91)	35-Br- 81	JNDC,BNL	EVAL-JAN05	JNDC FPND W.G., Mughabghab	3531
92)	36-Kr- 78	JNDC,BNL	EVAL-FEB05	JNDC FPND W.G., Mughabghab	3625
93)	36-Kr- 80	JNDC	EVAL-MAR90	JNDC FP NUCLEAR DATA W.G.	3631
94)	36-Kr- 82	JNDC,BNL	EVAL-FEB05	JNDC FPND W.G., Mughabghab	3637
95)	36-Kr- 83	CNDC	EVAL-JUN99	YOU-XIANG ZHUANG, CHONG-HAI CAI	3640
96)	36-Kr- 84	JNDC,BNL	EVAL-JAN05	JNDC FPND W.G., Mughabghab	3643
97)	36-Kr- 85	BNL	EVAL-MAR06	Herman,Oblozinsky,Mughabghab	3646
98)	36-Kr- 86	JNDC,BNL	EVAL-JAN05	JNDC FPND W.G., Mughabghab	3649
99)	37-Rb- 85	JNDC	EVAL-MAR90	JNDC FPND WG + S.F. Mughabghab	3725
100)	37-Rb- 86	BNL	EVAL-MAR06	Herman,Oblozinsky,Mughabghab	3728
101)	37-Rb- 87	JNDC	EVAL-MAR90	JNDC FP NUCLEAR DATA W.G.	3731
102)	38-Sr- 84	BNL	EVAL-MAR06	Herman,Oblozinsky,Mughabghab	3825
103)	38-Sr- 86	JNDC,BNL	EVAL-FEB05	JNDC FPND W.G., Mughabghab	3831
104)	38-Sr- 87	JNDC	EVAL-MAR90	JNDC FP NUCLEAR DATA W.G.	3834
105)	38-Sr- 88	CNDC,BNL	EVAL-FEB05	ZHUANG,CAI, Mughabghab	3837
106)	38-Sr- 89	CNDC	EVAL-SEP01	YIN-LU HAN,C.H.CAI,Y.X.ZHUANG	3840
107)	38-Sr- 90	JNDC	EVAL-MAR90	JNDC FP NUCLEAR DATA W.G.	3843
108)	39-Y - 89	JNDC	EVAL-MAR90	JNDC FP NUCLEAR DATA W.G.	3925
109)	39-Y - 90	BNL	EVAL-MAR06	Herman,Oblozinsky,Mughabghab	3928
110)	39-Y - 91	JNDC	EVAL-MAR90	JNDC FP NUCLEAR DATA W.G.	3931
111)	40-Zr- 90	CJD,IATE	EVAL-DEC88	GRUDZEVICH O.T. ET. AL.	4025
112)	40-Zr- 91	JNDC,BNL	EVAL-FEB05	JNDC FPND W.G., Mughabghab	4028
113)	40-Zr- 92	JNDC	EVAL-AUG89	JNDC FP NUCLEAR DATA W.G.	4031
114)	40-Zr- 93	JNDC,BNL	EVAL-MAR05	JNDC FPND W.G., Mughabghab	4034
115)	40-Zr- 94	JNDC,BNL	EVAL-Mar05	JNDC FPND W.G., Mughabghab	4037
116)	40-Zr- 95	JNDC	EVAL-MAR90	JNDC FP NUCLEAR DATA W.G.	4040
117)	40-Zr- 96	JNDC,BNL	EVAL-FEB05	JNDC FPND W.G., Mughabghab	4043
118)	41-Nb- 93	LANL,ANL	EVAL-DEC97	M.CHADWICK,P.YOUNG,D.L.SMITH	4125
119)	41-Nb- 94	JNDC	EVAL-MAR90	JNDC FP NUCLEAR DATA W.G.	4128
120)	41-Nb- 95	JNDC	EVAL-MAR90	JNDC FP NUCLEAR DATA W.G.	4131
121)	42-Mo- 92	JNDC	EVAL-AUG89	JNDC FP NUCLEAR DATA W.G.	4225
122)	42-Mo- 94	JNDC,BNL	EVAL-FEB05	JNDC FPND W.G., Mughabghab	4231
123)	42-Mo- 95	BNL,KAERI	EVAL-FEB06	Kim,Herman,Oh,Mughabghab+	4234
124)	42-Mo- 96	JNDC	EVAL-AUG89	JNDC FP NUCLEAR DATA W.G.	4237
125)	42-Mo- 97	JNDC,BNL	EVAL-FEB05	JNDC FPND W.G., Mughabghab	4240
126)	42-Mo- 98	JNDC	EVAL-AUG89	JNDC FP NUCLEAR DATA W.G.	4243
127)	42-Mo- 99	JNDC	EVAL-MAR90	JNDC FP NUCLEAR DATA W.G.	4246

128)	42-Mo-100	CNDC	EVAL-AUG00	CHONG-HAI CAI AND QI-CHANG LIANG	4249
129)	43-Tc- 99	BNL	EVAL-SEP05	Oblozinsky,Rochman,Herman,Mughab+	4325
130)	44-Ru- 96	JNDC	EVAL-MAR90	JNDC FP NUCLEAR DATA W.G.	4425
131)	44-Ru- 98	JNDC	EVAL-MAR90	JNDC FP NUCLEAR DATA W.G.	4431
132)	44-Ru- 99	JNDC	EVAL-MAR90	JNDC FP NUCLEAR DATA W.G.	4434
133)	44-Ru-100	JNDC,BNL	EVAL-MAR05	JNDC FPND W.G., Mughabghab	4437
134)	44-Ru-101	BNL,KAERI	EVAL-FEB06	Kim,Herman,Oh,Mughabghab+	4440
135)	44-Ru-102	CNDC,BNL	EVAL-FEB05	QI-CHANG LIANG+, Mughabghab	4443
136)	44-Ru-103	CNDC,BNL	EVAL-FEB05	Z.G.GE+, Mughabghab	4446
137)	44-Ru-104	CNDC	EVAL-JUN99	Z.J.ZHANG,Q.C.LIANG,Q.SHEN,X.SUN	4449
138)	44-Ru-105	CNDC	EVAL-JUN00	QI-CHANG LIANG,Z.J.ZHANG,X.Q.SUN	4452
139)	44-Ru-106	JNDC	EVAL-MAR90	JNDC FP NUCLEAR DATA W.G.	4455
140)	45-Rh-103	BNL,KAERI	EVAL-FEB06	Kim,Herman,Chang,Mughabghab+	4525
141)	45-Rh-105	CNDC	EVAL-DEC99	X.SUN,Z.ZHANG,Q.SHEN,J.ZHAO,W.SU	4531
142)	46-Pd-102	LANL,BNL	EVAL-Mar05	P. G. YOUNG, Mughabghab	4625
143)	46-Pd-104	LANL,BNL	EVAL-MAR05	P. G. YOUNG, Mughabghab	4631
144)	46-Pd-105	BNL,KAERI	EVAL-FEB06	Kim,Herman,Oh,Mughabghab+	4634
145)	46-Pd-106	LANL,BNL	EVAL-MAR05	P. G. YOUNG, Mughabghab	4637
146)	46-Pd-107	JNDC	EVAL-MAR90	JNDC FP NUCLEAR DATA W.G.	4640
147)	46-Pd-108	LANL,BNL	EVAL-MAR05	P. G. YOUNG, Mughabghab	4643
148)	46-Pd-110	LANL,BNL	EVAL-MAR05	P. G. YOUNG, Mughabghab	4649
149)	47-Ag-107	JAERI,BNL	EVAL-MAR05	LIU+, Mughabghab	4725
150)	47-Ag-109	BNL,KAERI	EVAL-FEB06	Kim,Herman,Oh,Mughabghab+	4731
151)	47-Ag-110M	JNDC,BNL	EVAL-MAR05	JNDC FPND W.G., Mughabghab	4735
152)	47-Ag-111	BNL	EVAL-MAR06	Herman,Oblozinsky,Mughabghab	4737
153)	48-Cd-106	JNDC,BNL	EVAL-MAR05	JNDC FPND W.G., Mughabghab	4825
154)	48-Cd-108	UA,ANL,BNL	EVAL-MAR05	J.McCabe, A.B. Smith, Mughabghab	4831
155)	48-Cd-110	UA,ANL,BNL	EVAL-MAR05	J.McCabe, A.B. Smith, Mughabghab	4837
156)	48-Cd-111	JNDC,BNL	EVAL-MAR05	JNDC FPND W.G., Mughabghab	4840
157)	48-Cd-112	UA,ANL,BNL	EVAL-Mar05	J.McCabe, A.B. Smith, Mughabghab	4843
158)	48-Cd-113	CNDC,BNL	EVAL-MAR05	J.W.ZHAO +, Mughabghab	4846
159)	48-Cd-114	UA,ANL, +	EVAL-AUG94	J.MCCABE, A.B. SMITH, +	4849
160)	48-Cd-115M	BNL	EVAL-MAR06	Herman,Oblozinsky,Mughabghab	4853
161)	48-Cd-116	UA,ANL,BNL	EVAL-MAR05	J.McCabe, A.B. Smith, Mughabghab	4855
162)	49-In-113	JNDC,BNL	EVAL-MAR05	JNDC FPND W.G., Mughabghab	4925
163)	49-In-115	JNDC,BNL	EVAL-MAR05	JNDC FPND W.G., Mughabghab	4931
164)	50-Sn-112	JNDC,BNL	EVAL-DEC04	JNDC FPND W.G., Mughabghab	5025
165)	50-Sn-113	BNL	EVAL-MAR06	Herman,Oblozinsky,Mughabghab	5028
166)	50-Sn-114	JNDC,BNL	EVAL-DEC04	JNDC FPND W.G., Mughabghab	5031
167)	50-Sn-115	JNDC,BNL	EVAL-DEC04	JNDC FPND W.G., Mughabghab	5034
168)	50-Sn-116	JNDC,BNL	EVAL-DEC04	JNDC FPND W.G., Mughabghab	5037
169)	50-Sn-117	JNDC,BNL	EVAL-DEC04	JNDC FPND W.G., Mughabghab	5040
170)	50-Sn-118	JNDC,BNL	EVAL-DEC04	JNDC FPND W.G., Mughabghab	5043
171)	50-Sn-119	JNDC,BNL	EVAL-DEC04	JNDC FPND W.G., Mughabghab	5046
172)	50-Sn-120	JNDC,BNL	EVAL-DEC04	JNDC FPND W.G., Mughabghab	5049
173)	50-Sn-122	JNDC,BNL	EVAL-DEC04	JNDC FPND W.G., Mughabghab	5055
174)	50-Sn-123	JNDC	EVAL-MAR90	JNDC FP NUCLEAR DATA W.G.	5058
175)	50-Sn-124	JNDC,BNL	EVAL-DEC04	JNDC FPND W.G., Mughabghab	5061
176)	50-Sn-125	BNL	EVAL-MAR06	Herman,Oblozinsky,Mughabghab	5064
177)	50-Sn-126	JNDC	EVAL-MAR90	JNDC FP NUCLEAR DATA W.G.	5067
178)	51-Sb-121	CNDC,BNL	EVAL-DEC04	ZHAO+, Mughabghab	5125
179)	51-Sb-123	CNDC,BNL	EVAL-DEC04	ZHANG+, Mughabghab	5131
180)	51-Sb-124	JNDC	EVAL-MAR90	JNDC FP NUCLEAR DATA W.G.	5134
181)	51-Sb-125	JNDC	EVAL-MAR90	JNDC FP NUCLEAR DATA W.G.	5137
182)	51-Sb-126	BNL	EVAL-MAR06	Herman,Oblozinsky,Mughabghab	5140
183)	52-Te-120	JNDC	EVAL-MAR90	JNDC FP NUCLEAR DATA W.G.	5225
184)	52-Te-122	JNDC,BNL	EVAL-MAR90	JNDC FPND W.G., Mughabghab	5231
185)	52-Te-123	JNDC,BNL	EVAL-DEC04	JNDC FPND W.G., Mughabghab	5234
186)	52-Te-124	JNDC,BNL	EVAL-DEC04	JNFP W.G., Mughabhab	5237
187)	52-Te-125	JNDC,BNL	EVAL-Dec04	JNDC FPND W.G., Mughabghab	5240
188)	52-Te-126	JNDC,BNL	EVAL-DEC04	JNDC FPND W.G., Mughabghab	5243
189)	52-Te-127M	JNDC	EVAL-MAR90	JNDC FP NUCLEAR DATA W.G.	5247
190)	52-Te-128	JNDC,BNL	EVAL-DEC04	JNDC FPND W.G., Mughabghab	5249
191)	52-Te-129M	JNDC	EVAL-MAR90	JNDC FP NUCLEAR DATA W.G.	5253
192)	52-Te-130	CNDC	EVAL-DEC04	W.N.SU+, Mughabghab	5255
193)	52-Te-132	BNL	EVAL-MAR06	Herman,Oblozinsky,Mughabghab	5261
194)	53-I -127	LANL,BNL	EVAL-JAN05	YOUNG, MACFARLANE, MUGHABGHAB	5325
195)	53-I -129	JNDC,BNL	EVAL-JAN05	JNDC FPND W.G., Mughabghab	5331
196)	53-I -130	BNL	EVAL-MAR06	Herman,Oblozinsky,Mughabghab	5334
197)	53-I -131	JNDC	EVAL-MAR90	JNDC FP NUCLEAR DATA W.G.	5337
198)	53-I -135	CNDC,BNL	EVAL-JAN05	Q.SHEN,X.SUN,Z.ZHANG,W.SU,J.ZHAO	5349

199)	54-Xe-123	CNDC	EVAL-OCT00	QING-BIAO SHEN	5422
200)	54-Xe-124	CNDC,BNL	EVAL-JAN05	YU, SHEN, Mughabghab	5425
201)	54-Xe-126	JNDC,BNL	EVAL-JAN05	JNDC FPND W.G., Mughabghab	5431
202)	54-Xe-128	JNDC,BNL	EVAL-JAN05	JNDC FPND W.G., Mughabghab	5437
203)	54-Xe-129	JNDC,BNL	EVAL-JAN05	JNDC FPND W.G., Mughabghab	5440
204)	54-Xe-130	BNL	EVAL-JAN05	M.R.BHAT+, Mughabghab	5443
205)	54-Xe-131	BNL,KAERI	EVAL-FEB06	Kim,Herman,Oh,Mughabghab+	5446
206)	54-Xe-132	CNDC,BNL	EVAL-JAN05	B.S.YU+, Mughabghab	5449
207)	54-Xe-133	JNDC	EVAL-MAR90	JNDC FP NUCLEAR DATA W.G.	5452
208)	54-Xe-134	CNDC,BNL	EVAL-JAN05	B.S.YU+, Mughabghab	5455
209)	54-Xe-135	JNDC	EVAL-MAR90	JNDC FP NUCLEAR DATA W.G.	5458
210)	54-Xe-136	CNDC,BNL	EVAL-JAN05	Q.B.SHEN+, Mughabghab	5461
211)	55-Cs-133	BNL,KAERI	EVAL-FEB06	Kim,Herman,Oh,Mughabghab+	5525
212)	55-Cs-134	JNDC,BNL	EVAL-JAN05	JNDC FPND W.G., Mughabghab	5528
213)	55-Cs-135	JNDC,BNL	EVAL-JAN05	JNDC FPND W.G., Mughabghab	5531
214)	55-Cs-136	JNDC	EVAL-MAR90	JNDC FP NUCLEAR DATA W.G.	5534
215)	55-Cs-137	JNDC	EVAL-MAR90	JNDC FP NUCLEAR DATA W.G.	5537
216)	56-Ba-130	JNDC,BNL	EVAL-JAN05	JNDC FPND W.G., Mughabghab	5625
217)	56-Ba-132	JNDC,BNL	EVAL-JAN05	JNDC FPND W.G., Mughabghab	5631
218)	56-Ba-133	BNL	EVAL-MAR06	Herman,Oblozinsky,Mughabghab	5634
219)	56-Ba-134	JNDC,BNL	EVAL-JAN05	JNDC FPND W.G., Mughabghab	5637
220)	56-Ba-135	JNDC,BNL	EVAL-JAN05	JNDC FPND W.G., Mughabghab	5640
221)	56-Ba-136	JNDC,BNL	EVAL-JAN05	JNDC FPND W.G., Mughabghab	5643
222)	56-Ba-137	JNDC,BNL	EVAL-JAN05	JNDC FPND W.G., Mughabghab	5646
223)	56-Ba-138	CNDC,BNL	EVAL-JAN05	W.N.SU+, Mughabghab	5649
224)	56-Ba-140	NEA	EVAL-JUL82	H.GRUPPELAAR,E.MENAPACE	5655
225)	57-La-138	JNDC	EVAL-MAR90	JNDC FP NUCLEAR DATA W.G.	5725
226)	57-La-139	CNDC,BNL	EVAL-JAN05	J.W.ZHAO+, Mughabghab	5728
227)	57-La-140	BNL	EVAL-MAR06	Herman,Oblozinsky,Mughabghab	5731
228)	58-Ce-136	BNL	EVAL-MAR06	Herman,Oblozinsky,Mughabghab	5825
229)	58-Ce-138	BNL	EVAL-MAR06	Herman,Oblozinsky,Mughabghab	5831
230)	58-Ce-139	BNL	EVAL-MAR06	Herman,Oblozinsky,Mughabghab	5834
231)	58-Ce-140	JNDC,BNL	EVAL-JAN05	JNDC FPND W.G., Mughabghab	5837
232)	58-Ce-141	CNDC,BNL	EVAL-JAN05	ZHANG+, Mughabghab	5840
233)	58-Ce-142	JNDC,BNL	EVAL-JAN05	JNDC FPND W.G., Mughabghab	5843
234)	58-Ce-143	BNL	EVAL-MAR06	Herman,Oblozinsky,Mughabghab	5846
235)	58-Ce-144	JNDC	EVAL-MAR90	JNDC FP NUCLEAR DATA W.G.	5849
236)	59-Pr-141	BNL,KAERI	EVAL-FEB06	Kim,Mughabghab,Herman,Oblozinsky	5925
237)	59-Pr-142	BNL	EVAL-MAR06	Herman,Oblozinsky,Mughabghab	5928
238)	59-Pr-143	JNDC,BNL	EVAL-JAN05	JNDC FPND W.G., Mughabghab	5931
239)	60-Nd-142	BNL,KAERI	EVAL-FEB06	Kim,Mughabghab,Herman,Oblozinsky	6025
240)	60-Nd-143	BNL,KAERI	EVAL-FEB06	Kim,Herman,Chang,Mughabghab+	6028
241)	60-Nd-144	BNL,KAERI	EVAL-FEB06	Kim,Mughabghab,Herman,Oblozinsky	6031
242)	60-Nd-145	BNL,KAERI	EVAL-FEB06	Kim,Herman,Chang,Mughabghab+	6034
243)	60-Nd-146	BNL,KAERI	EVAL-FEB06	Kim,Mughabghab,Herman,Oblozinsky	6037
244)	60-Nd-147	BNL,KAERI	EVAL-FEB06	Kim,Mughabghab,Herman,Oblozinsky	6040
245)	60-Nd-148	BNL,KAERI	EVAL-FEB06	Kim,Mughabghab,Herman,Oblozinsky	6043
246)	60-Nd-150	BNL,KAERI	EVAL-FEB06	Kim,Mughabghab,Herman,Oblozinsky	6049
247)	61-Pm-147	JNDC	EVAL-MAR90	JNDC FP NUCLEAR DATA W.G.	6149
248)	61-Pm-148	JNDC	EVAL-MAR90	JNDC FP NUCLEAR DATA W.G.	6152
249)	61-Pm-148M	CNDC	EVAL-SEP01	YOU-XIANG ZHUANG, QING-BIAO SHEN	6153
250)	61-Pm-149	JNDC	EVAL-MAR90	JNDC FP NUCLEAR DATA W.G.	6155
251)	61-Pm-151	BNL	EVAL-MAR06	Herman,Oblozinsky,Mughabghab	6161
252)	62-Sm-144	BNL,KAERI	EVAL-FEB06	Kim,Mughabghab,Herman,Oblozinsky	6225
253)	62-Sm-147	BNL,KAERI	EVAL-FEB06	Kim,Mughabghab,Herman,Oblozinsky	6234
254)	62-Sm-148	BNL,KAERI	EVAL-FEB06	Kim,Mughabghab,Herman,Oblozinsky	6237
255)	62-Sm-149	BNL,KAERI	EVAL-FEB06	Kim,Mughabghab,Herman,Oblozinsky	6240
256)	62-Sm-150	BNL,KAERI	EVAL-FEB06	Kim,Mughabghab,Herman,Oblozinsky	6243
257)	62-Sm-151	BNL,KAERI	EVAL-FEB06	Kim,Mughabghab,Herman,Oblozinsky	6246
258)	62-Sm-152	BNL,KAERI	EVAL-FEB06	Kim,Mughabghab,Herman,Oblozinsky	6249
259)	62-Sm-153	BNL,KAERI	EVAL-FEB06	Kim,Mughabghab,Herman,Oblozinsky	6252
260)	62-Sm-154	BNL,KAERI	EVAL-FEB06	Kim,Mughabghab,Herman,Oblozinsky	6255
261)	63-Eu-151	CNDC,BNL	EVAL-JAN05	GE+, Mughabghab	6325
262)	63-Eu-152	JNDC,ORNL	EVAL-MAR05	JNDC FPND W.G., R.Q.Wright	6328
263)	63-Eu-153	BNL,KAERI	EVAL-SEP02	Oblozinsky,Herman,Rochman,Chang,+	6331
264)	63-Eu-154	CNDC,BNL	EVAL-JAN05	GE+, Mughabghab	6334
265)	63-Eu-155	CNDC	EVAL-FEB99	YOU-XIANG ZHUANG AND ZHI-GANG GE	6337
266)	63-Eu-156	JNDC	EVAL-MAR90	JNDC FP NUCLEAR DATA W.G.	6340
267)	63-Eu-157	BNL	EVAL-MAR06	Herman,Oblozinsky,Mughabghab	6343
268)	64-Gd-152	BNL,ORNL+	EVAL-APR06	Rochman,Mughabghab,Leal,Kawano+	6425
269)	64-Gd-153	BNL,ORNL+	EVAL-APR06	Rochman,Mughabghab,Leal,Kawano+	6428

270)	64-Gd-154	BNL,ORNL+	EVAL-APR06	Rochman,Mughabghab,Leal,Kawano+	6431
271)	64-Gd-155	BNL,ORNL+	EVAL-APR06	Rochman,Mughabghab,Leal,Kawano+	6434
272)	64-Gd-156	BNL,ORNL+	EVAL-APR06	Rochman,Mughabghab,Leal,Kawano+	6437
273)	64-Gd-157	BNL,ORNL+	EVAL-APR06	Rochman,Mughabghab,Leal,Kawano+	6440
274)	64-Gd-158	BNL,ORNL+	EVAL-APR06	Rochman,Mughabghab,Leal,Kawano+	6443
275)	64-Gd-160	BNL,ORNL+	EVAL-APR06	Rochman,Mughabghab,Leal,Kawano+	6449
276)	65-Tb-159	JNDC,BNL	EVAL-JAN05	JNDC FPND W.G., Mughabghab	6525
277)	65-Tb-160	BNL	EVAL-MAR06	Herman,Oblozinsky,Mughabghab	6528
278)	66-Dy-156	BNL,KAERI	EVAL-FEB06	Kim,Mughabghab,Herman,Oblozinsky	6625
279)	66-Dy-158	BNL,KAERI	EVAL-FEB06	Kim,Mughabghab,Herman,Oblozinsky	6631
280)	66-Dy-160	BNL,KAERI	EVAL-FEB06	Kim,Herman,Oh,Oblozinsky	6637
281)	66-Dy-161	BNL,KAERI	EVAL-FEB06	Kim,Herman,Oh,Oblozinsky	6640
282)	66-Dy-162	BNL,KAERI	EVAL-FEB06	Kim,Herman,Oh,Oblozinsky	6643
283)	66-Dy-163	BNL,KAERI	EVAL-FEB06	Kim,Herman,Oh,Oblozinsky	6646
284)	66-Dy-164	BNL,KAERI	EVAL-FEB06	Kim,Herman,Oh,Oblozinsky	6649
285)	67-Ho-165	LANL,BNL	EVAL-JAN05	P.G.YOUNG+, Mughabghab	6725
286)	67-Ho-166M	BNL	EVAL-MAR06	Herman,Oblozinsky,Mughabghab	6729
287)	68-Er-162	TIT	EVAL-SEP00	A.K.M. HARUN-AR-RASHID+	6825
288)	68-Er-164	TIT	EVAL-SEP00	A.K.M. HARUN-AR-RASHID+	6831
289)	68-Er-166	TIT,BNL	EVAL-JAN05	HARUN-AR-RASHID+, Mughabghab	6837
290)	68-Er-167	TIT,BNL	EVAL-JAN05	HARUN-AR-RASHID+, Mughabghab	6840
291)	68-Er-168	TIT,BNL	EVAL-JAN05	HARUN-AR-RASHID+, Mughabghab	6843
292)	68-Er-170	TIT,BNL	EVAL-JAN05	HARUN-AR-RASHID+, Mughabghab	6849
293)	71-Lu-175	ORNL,BNW	EVAL-MAR98	R.Q. WRIGHT, LEONARD-STEWART	7125
294)	71-Lu-176	ORNL,BNW	EVAL-MAR98	R.Q. WRIGHT, LEONARD-STEWART	7128
295)	72-Hf-174	ORNL,SAI,+	EVAL-APR76	R.Q.WRIGHT, M.K.DRAKE+	7225
296)	72-Hf-176	ORNL,SAI,+	EVAL-APR76	R.Q.WRIGHT, M.K.DRAKE+	7231
297)	72-Hf-177	ORNL,SAI,+	EVAL-APR76	R.Q.WRIGHT, M.K.DRAKE+	7234
298)	72-Hf-178	ORNL,SAI,+	EVAL-AUG76	R.Q.WRIGHT, M.K.DRAKE+	7237
299)	72-Hf-179	ORNL,SAI,+	EVAL-APR76	R.Q.WRIGHT, M.K.DRAKE+	7240
300)	72-Hf-180	ORNL,SAI,+	EVAL-APR76	R.Q.WRIGHT, M.K.DRAKE+	7243
301)	73-Ta-181	LLNL	EVAL-JAN72	HOWERTON, PERKINS, MACGREGOR	7328
302)	73-Ta-182	AI	EVAL-APR71	J.OTTER,C.DUNFORD,AND E.OTTEWITTE	7331
303)	74-W -182	LANL,ANL	EVAL-OCT96	M.B.CHADWICK,P.G.YOUNG,E.ARTHUR	7431
304)	74-W -183	LANL,ANL	EVAL-OCT96	M.B.CHADWICK,P.G.YOUNG,ARTHUR	7434
305)	74-W -184	LANL,ANL	EVAL-OCT96	M.B.CHADWICK,P.G.YOUNG,ARTHUR	7437
306)	74-W -186	LANL,ANL	EVAL-OCT96	M.B.CHADWICK,P.G.YOUNG,ARTHUR	7443
307)	75-Re-185	ORNL,LANL	EVAL-MAR90	L.W.WESTON AND P.G.YOUNG	7525
308)	75-Re-187	ORNL,LANL	EVAL-MAR90	L.W.WESTON AND P.G.YOUNG	7531
309)	77-Ir-191	ORNL	EVAL-MAR95	R.Q.WRIGHT, R.R.SPENCER	7725
310)	77-Ir-193	ORNL	EVAL-MAR95	R.Q.WRIGHT, R.R.SPENCER	7731
311)	79-Au-197	LANL	EVAL-JAN84	P.G.YOUNG	7925
312)	80-Hg-196	LANL	EVAL-FEB98	S.CHIBA, M.CHADWICK,P.YOUNG	8025
313)	80-Hg-198	LANL	EVAL-OCT04	M.CHADWICK,S.CHIBA,P.YOUNG	8031
314)	80-Hg-199	LANL	EVAL-OCT04	S.CHIBA, M.CHADWICK,P.YOUNG	8034
315)	80-Hg-200	LANL	EVAL-OCT04	M.CHADWICK,S.CHIBA,P.YOUNG	8037
316)	80-Hg-201	LANL	EVAL-OCT04	S.CHIBA,M.CHADWICK,P.YOUNG	8040
317)	80-Hg-202	LANL	EVAL-OCT04	M.CHADWICK,S.CHIBA,P.YOUNG	8043
318)	80-Hg-204	LANL	EVAL-OCT05	S.CHIBA,M.CHADWICK,P.YOUNG	8049
319)	82-Pb-204	NRG	EVAL-DEC04	A.J. Koning	8225
320)	82-Pb-206	NRG	EVAL-DEC04	A.J. Koning	8231
321)	82-Pb-207	NRG	EVAL-DEC04	A.J. Koning	8234
322)	82-Pb-208	LANL,ORNL	EVAL-MAR06	M.B.CHADWICK,P.G.YOUNG,C.Y.FU	8237
323)	83-Bi-209	LANL,ANL	EVAL-JUL98	M.CHADWICK,P.YOUNG,A.SMITH	8325
324)	88-Ra-223	TIT	EVAL-AUG88	N.TAKAGI	8825
325)	88-Ra-224	TIT	EVAL-AUG88	N.TAKAGI	8828
326)	88-Ra-225	TIT	EVAL-AUG88	N.TAKAGI	8831
327)	88-Ra-226	TIT	EVAL-AUG88	N.TAKAGI	8834
328)	89-Ac-225	TIT	EVAL-AUG88	N.TAKAGI	8925
329)	89-Ac-226	TIT	EVAL-AUG88	N.TAKAGI	8928
330)	89-Ac-227	TIT	EVAL-AUG88	N.TAKAGI	8931
331)	90-Th-227	TIT	EVAL-AUG88	N.TAKAGI	9025
332)	90-Th-228	KINKI U.	EVAL-JUN87	T.OHSAWA	9028
333)	90-Th-229	TIT	EVAL-AUG88	N.TAKAGI	9031
334)	90-Th-230	HEDL	EVAL-NOV77	MANN	9034
335)	90-Th-232	IAEA	Eval-Feb06	CRP/Th-U Coordinator A. Trkov	9040
336)	90-Th-233	KINKI U.	EVAL-JUL87	T.OHSAWA	9043
337)	90-Th-234	KINKI U.	EVAL-JUL87	T.OHSAWA	9046
338)	91-Pa-231	IAEA	Eval-Feb06	CRP/Th-U Coordinator A. Trkov	9131
339)	91-Pa-232	ORNL,TIT	EVAL-	R. Q. WRIGHT, N. TAKAGI	9134
340)	91-Pa-233	IAEA	Eval-Mar06	CRP/Th-U Coordinator A. Trkov	9137

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341)  92-U -232 ORNL,LANL+ EVAL-APR05 M.B.CHADWICK, P.G.YOUNG          9219
342)  92-U -233 LANL,ORNL  EVAL-FEB05 YOUNG,CHADWICK,TALOU,LEAL,DERRIEN9222
343)  92-U -234 ORNL,LANL+ EVAL-MAR06 YOUNG,KAWANO,CHADWICK,MACFARLANE 9225
344)  92-U -235 ORNL,LANL,+EVAL-DEC05 YOUNG, CHADWICK, TALOU, LEAL     9228
345)  92-U -236 LANL       EVAL-FEB05 YOUNG,CHADWICK,MACFARLANE,ET AL. 9231
346)  92-U -237 LANL       EVAL-FEB06 P.G.Young, M.B.Chadwick          9234
347)  92-U -238 ORNL,LANL+ EVAL-DEC05 YOUNG,CHADWICK,DERRIEN,COURCELLE 9237
348)  92-U -239 LANL       EVAL-FEB06 P.G.Young, M.B.Chadwick          9240
349)  92-U -240 LANL       EVAL-FEB05 YOUNG,CHADWICK,MACFARLANE,ET AL. 9243
350)  92-U -241 LANL       EVAL-FEB05 P.G.Young, M.B.Chadwick          9246
351)  93-Np-235 JAERI      EVAL-MAR95 T.Nakagawa                       9340
352)  93-Np-236 ORNL-JAERI EVAL-DEC99 R. Q. WRIGHT, T. NAKAGAWA        9343
353)  93-Np-237 LANL       EVAL-MAR06 P.YOUNG,E.ARTHUR,F.MANN,T.KAWANO 9346
354)  93-Np-238 JAERI      EVAL-MAR93 T.NAKAGAWA                       9349
355)  93-Np-239 ORNL       EVAL-DEC88 R. Q. WRIGHT                     9352
356)  94-Pu-236 JAERI      EVAL-FEB02 O.Iwamoto                        9428
357)  94-Pu-237 HEDL       EVAL-APR78 MANN AND SCHENTER                9431
358)  94-Pu-238 HEDL,AI,+  EVAL-APR78 MANN,SCHENTER,ALTER,DUNFORD,+    9434
359)  94-Pu-239 LANL       EVAL-JAN06 TALOU, CHADWICK, MADLAND, YOUNG  9437
360)  94-Pu-240 ORNL       EVAL-AUG86 L.W. WESTON AND E. D. ARTHUR     9440
361)  94-Pu-241 ORNL       EVAL-OCT03 L.WESTON,R.WRIGHT,H.DERRIEN +    9443
362)  94-Pu-242 HEDL,SRL,+ EVAL-OCT78 MANN,BENJAMIN,MADLAND,HOWERTON,+ 9446
363)  94-Pu-243 BNL,SRL,+  EVAL-JUL76 KINSEY-ASSEMBLER(SEE COMMENTS)   9449
364)  94-Pu-244 HEDL,SRL   EVAL-APR78 MANN,SCHENTER,BENJAMIN,MCCROSSON 9452
365)  94-Pu-246 JAERI      EVAL-MAR95 T.Nakagawa                       9458
366)  95-Am-241 LANL       EVAL-MAR06 KAWANO,CHADWICK                  9543
367)  95-Am-242 LANL       EVAL-DEC04 TALOU, YOUNG, KAWANO             9546
368)  95-Am-242M LANL      EVAL-SEP05 TALOU, YOUNG, KAWANO             9547
369)  95-Am-243 LANL,ORNL  EVAL-SEP96 P.G.YOUNG, L.W.WESTON, P.TALOU   9549
370)  95-Am-244 JAERI      EVAL-MAR88 T.NAKAGAWA                       9552
371)  95-Am-244MJAERI      EVAL-MAR88 T.NAKAGAWA                       9553
372)  96-Cm-241 HEDL       EVAL-APR78 MANN AND SCHENTER                9628
373)  96-Cm-242 HEDL,SRL,+ EVAL-APR78 MANN,BENJAMIN,HOWERTON,ET AL.    9631
374)  96-Cm-243 MINSK      EVAL-JUL95 V.MASLOV,ET AL.                  9634
375)  96-Cm-244 JAERI      EVAL-OCT95 T.NAKAGAWA AND T.LIU             9637
376)  96-Cm-245 MINSK,BYEL EVAL-NOV95 V.M. Maslov et al.               9640
377)  96-Cm-246 MINSK      EVAL-NOV95 V.MASLOV ET AL.                  9643
378)  96-Cm-247 JAERI-ORNL EVAL-OCT05 R.Q. WRIGHT, T.NAKAGAWA, T.LIU   9646
379)  96-Cm-248 HEDL,SRL,+ EVAL-APR78 MANN,BENJAMIN,HOWERTON,ET AL.    9649
380)  96-Cm-249 JAERI      EVAL-OCT95 T.NAKAGAWA AND T.LIU             9652
381)  96-Cm-250 JAERI      EVAL-OCT95 T.NAKAGAWA AND T.LIU             9655
382)  97-Bk-249 CNDC       EVAL-JUN86 ZHOU DELIN ET. AL.               9752
383)  97-Bk-250 JAERI      EVAL-MAR87 T.NAKAGAWA                       9755
384)  98-Cf-249 CNDC       EVAL-APR89 ZHOU DELIN, SU ZHONGDI ET AL.    9852
385)  98-Cf-250 BNL,SRL,+  EVAL-JUL76 KINSEY-ASSEMBLER(SEE COMMENTS)   9855
386)  98-Cf-251 BNL,SRL,+  EVAL-JUL76 KINSEY-ASSEMBLER(SEE COMMENTS)   9858
387)  98-Cf-252 BNL,SRL,+  EVAL-JUL76 KINSEY-ASSEMBLER(SEE COMMENTS)   9861
388)  98-Cf-253 SRL        EVAL-DEC75 BENJAMIN AND MCCROSSON           9864
389)  98-Cf-254 TIT        EVAL-AUG87 N.TAKAGI                         9867
390)  99-Es-253 BNL,SRL    EVAL-JUL76 KINSEY,BENJAMIN, AND MCCROSSON   9913
391)  99-Es-254 TIT        EVAL-AUG87 N.TAKAGI                         9914
392)  99-Es-255 TIT        EVAL-AUG87 N.TAKAGI                         9915
393) 100-Fm-255 TIT        EVAL-AUG87 N.TAKAGI                         9936
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