LAWRENCE
LIVERMORE
NATIONAL
LABORATORY

LLNL-TR-860605

2011.5 Revision of the Evaluated Nuclear Data Library: ENDL2011.5 (legacy and GNDS), and ENDL2011.5-direct

B. R. Beck, M. A. Descalle, G. Gert, C. M. Mattoon, E. Jurgenson, I. J. Thompson

February 16, 2024

Disclaimer

This work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

2011.5 Revision of the Evaluated Nuclear Data Library: ENDL2011.5 (legacy and GNDS), and ENDL2011.5-direct.

B. R. Beck, M.-A. Descalle, G. Gert, C. Mattoon, E. Jurgenson, and I. J. Thompson
Lawrence Livermore National Laboratory, Livermore California 94551
(Dated: February 20, 2024)

LLNL's Nuclear Data and Theory Group has created the 2011.5 revised release of the Evaluated Nuclear Data Library (ENDL2011.5). ENDL2011.5 is designed to support LLNL's current and future nuclear data needs and will be employed in nuclear reactor, nuclear security and stockpile stewardship simulations with ASC codes. This database is currently the most complete nuclear database for Monte Carlo and deterministic transport of neutrons and charged particles. This library was assembled with strong support from the ASC PEM and Attribution programs, leveraged with support from Campaign 4 and the DOE/Office of Science's US Nuclear Data Program. This document lists the revisions made in ENDL2011.5 compared with the data existing in the original ENDL2011.2 and ENDL2011.3 releases. These changes are made in parallel with some similar revisions for ENDL2009.5. We also describe ENDL2011.5-direct that directly uses ENDF sources wherever possible.

Contents

I. INTRODUCTION

LLNL's Nuclear Data and Theory Group has produced the next iteration of LLNL's evaluated nuclear database ENDL2011. ENDL2011 is the third in a series of major ENDL library releases designed to support LLNL's current and future nuclear data needs. This library contains many new evaluations for radiochemical diagnostics (part of a Campaign 4 L2 milestone), structural materials (part of an ASC Attribution L2 milestone), and thermonuclear reactions (to support NIF diagnostics). In addition, we have striven to keep ENDL2011 at the leading edge of nuclear data library development by reviewing and incorporating new evaluations as they are made available to the nuclear data community. This release is our most highly tested release as we have strengthened our already rigorous testing regime by adding tests against LANL Activation Ratio Measurements and many more new critical assemblies. Our testing is now being incorporated into our development process and is serving to guide library improvements.

The new library can be found on LLNL's Open & Secure Computing facilities. In addition, the data will soon be made available in the Nuclear and Atomic Data System (NADS) data viewer on LC at `/usr/gapps/fudge/NADS/nads`.

These libraries are given in 3 forms: legacy, GNDS, and direct:

1. Legacy via Fete ENDL2011.5-rc1. This library uses the `ascii` source files, as with all previous legacy libraries, for processing by mcfgen, ndfgen and tdfgen.
   Location: `/usr/gapps/data/nuclear/development/ENDL2011/endl2011.5-rc1`
2. GNDS via Fete ENDL2011.5-rc1. All the ENDL data in ENDL20211.5-rc1, after translation into the GNDS format, has been processed with Fudge and Merced.
   Location: `/usr/gapps/data/nuclear/development/GNDS_2.0/ENDL2011/ENDL2011.5-rc1`.
3. Direct from ENDF and other sources ENDL2011.5-direct-rc1. ENDF6-formatted sources are used as often as possible to avoid possible translation errors via FETE. This library is only available in GNDS format.
   Location: `/usr/gapps/data/nuclear/development/GNDS_2.0/ENDL2011/ENDL2011.5-direct-rc1`.

All three libraries use the same TDF processed data for Maxwell-averaged cross sections and product distributions, in TDF subdirectories.

II. MODIFICATIONS FOR ENDL2011.5

1. Improved low-energy cross sections for charged particles

Better extrapolation of charged-particle cross sections down to low energies. The details are given in Table I for each exothermic reaction between charged particles. For each reaction, the experimental data are examined to determine for what energy E_g the data are reliable or good above that value. The S-factor is determined by $S(E) = \frac{\sigma(E)}{E} e^{2\pi\eta(E)}$, where $\eta(E)$ is the Sommerfeld parameter. The S-factor value $S(E_g)$ is taken as constant for all lower energies $E < E_g$.

This is a great improvement over previous libraries where cross-sections at say 1 keV were chosen either purely from experiment, or somewhat arbitrarily and without reference to what that implies for the low energy behavior of the S-factor. The changes are the same as made for ENDL2009.5.

2. Heating some source data given at 0 K

The following 20 protares for neutron projectiles were made in ENDL2009 and ENDL2011 at LLNL using the Hauser-Feshbach code STAPRE. The files were thus the cross-sections for stationary targets, or 0 K. Unfortunately they were not heated to 300 K as is standard for ENDL libraries before any processing.

So for ENDL20011.5 we used heat.py (in revision_scripts) to heat to 300 K these protares: za020041 za020045 za021042 za021043 za021044 za021046 za021047 za021048 za021049 za021050 za022044 za022045 za022051 za022052 za023046 za024047 za024055 za024056 za025050 za025053 za025054 za025056 za025057 za028066 za034075 za052127 za053128 za054125 za054127.

3. Energy distributions of γ-rays from fission

For neutrons on ^{235}U, ^{238}U and ^{239}Pu, the energy range of the gammas from fission has been extended from 8 to 20 MeV. This was done in ENDL2009.4, 2009.5, and 2011.5 by copying data from the ENDL99 library to replace ENDL

data above 4 MeV, and renormalizing the distributions (I=4). For ^{235}U and ^{239}Pu the fission gammas are combined into C=55 for incident neutrons above 1.09 MeV, while below 1.09 MeV the yo=7 C=15 I=4 S=0 files are modified. For ^{238}U, all the fission gammas are in the yo=7 C=15 I=4 S=0 file. The revised protare evaluations are used also in ENDL2011.5-direct.

III. MODIFICATIONS FOR ENDL2011.3

The ENDL2011.3 revisions are in the repository branch `/usr/gapps/CNP_data/all/live_repos/svnRepos/endl/branches/endl2011.3` and the latest release candidate is rc7 as tagged at `/usr/gapps/CNP_data/all/live_repos/svnRepos/endl/tags/endl2011.3-rc7`.

The various modifications are listed according to the ND keys used on the JIRA database at `https://lc.llnl.gov/jira/browse/ND/fixforversion/10807`.

1. ND-37: separate ^{241}Am(n,γ) cross section to ground and isomer state in ^{242}Am

In translating n+^{241}Am evaluation from ENDF/B-VII.0, the (n,γ) C=46 cross section was given as the sum of the cross sections to the ground and isomer states in ^{242}Am. The branching to the ground and isomer states was given elsewhere (MT8), and this was not translated by `fete`.

ENDL format has support for cross sections to final isomer states, so a fix was applied by hand to put in two levels in C=46 file, corresponding to ground and isomer final states of ^{242}Am respectively. The sum of these two cross sections is what was in ENDL2009.0 and ENDL2011.0. The branching ratio was obtained from ENDF/B-VII.0. The spectra and multiplicities, also from ENDF/B-VII.0, were assumed the same for both levels.

Repository revision 1078.

2. ND-66 Erroneous cross section for ^{7}Li(t,n)^{9}Be(gs) reaction

For the reaction ^{7}Li(t,n)^{9}Be, the data on ENDL says it comes from the paper Brune et al PRC 43 (1991)875. The cross section should be taken from Fig. 7 in the paper, however, it appears that the cross section in ENDL is from Fig. 9 or similar source, and is too large. Most of the extra cross sections should probably be moved to the ^{7}Li(t,n)[^{9}Be$^{*} \rightarrow$ n, 2α] channel. This error dates back at least to ENDL94.

Data from original publication were examined again. The ENDL evaluations changed to give the correct division of cross sections between C=11 (^{7}Li+t $\rightarrow^{9}$Be+n) and the C=33 (^{7}Li+t$\rightarrow$ 2α+2n) channels.

Repository revision 1069.

3. ND-70: the ^{7}Be evaluation ends at 8.1 MeV

Our evaluation is from ENDF/B-VII (December 2006). Issue of a low energy limit is being addressed at CSEWG by LANL.

The cross sections for total, elastic, (n,p) and (n,a) extended to 20 MeV by rescaling the results of a defaults TALYS 1.6 calculation (without pre-equilibrium) to match the previous curves at 8.1 MeV. This new evaluation has been accepted by CSEWG for the ENDF/B-VIII.0 evaluation.

Repository revision 1071, 1073.

4. ND-71: ^{12}C has incorrect gamma decay data

The gamma decay cross sections from the 2^{+} state are now corrected to agree with the (n, n') cross sections in the C=11 channel. These should be the same since that state at 4.43 MeV was, according to our evaluations, the only inelastic state produced. Some previous ENDEP run had changed this, because of erroneous suspicion of bad energy balance, and this altered evaluations since ENDL2009.1. There is no energy balance issue according to our current ENDEP methods.

Repository revision 1070.

5. ND-79: ^{12}C has inaccurate total cross sections below 100 keV

The total cross section for n+^{12}C below 100 keV has been re-evaluated by Sofia Quaglioni. She found that ENDL evaluations follow closely the data from Uttley (1964), but this is not confirmed by any later measurements (nor does Uttley seem to agree with earlier measurements). In particular, Uttley has some seemingly resonant structures that are odd. The new ENDF/B.VIII evaluation clearly ignores the data from Uttley, and has no resonances below 1 MeV.

A new evaluation is therefore adopted below 1 MeV, using the new (n,tot) fitted cross section obtained with the R-matrix HYRMA. See figures in JIRA (`https://lc.llnl.gov/jira/browse/ND-79`). A new (n,el) cross section is found by subtracting the existing (n,γ) evaluation from the new total cross section, while all other cross sections/distributions remain unchanged. Above 1 MeV, we keep the existing endl2011 evaluation.

Repository endl2011.3work revision 5.

IV. CHANGES IN PREPARING ENDL2011.5 DATA

1. TOSS4 recompilations

All the legacy processing codes `endep, mcfgen, ndfgen` and various `pdb` file utilities have been recompiled with the TOSS4 operating system.

V. CHANGES IN PREPARING ENDL2011.3 DATA

1. Revised `ndfgen` code

The versions of `ndfgen` that were used in ENDL2011.2 and earlier had a severe bug that affected the code's conversion of I=1 and I=3 data to make an I=4 set for processing. Two subroutines used different leading dimensions for the array of Legendre polynomial values. The odd Legendre multipoles resulted in being completely wrong, and even the even Legendre multipoles are doubtful.

An 'experimental' version ENDL2011.2-ex3 was therefore made to improve the ndf files from the ENDL2011.2 ascii base, and all the ENDL2011.3 processing used the new `ndfgen`. The ENDL2011.2-ex3 version was therefore used has the base for displaying the effects of other changes for ENDL2011.3 that are listed in this document.

2. Treatment of thresholds in c55 files

Extraneous zero cross-section points removed from c55 files. This allows `endep` to be rerun without producing energy depositions for neutron energies below threshold (where the cross sections are zero).

Repository revisions 1077, 1094.

3. Improvements in μ interpolation

Adding recalculated yo=1 I=1,3 files for outgoing neutrons, with added μ values at $\mu = 0.95$. This avoids the bump in neutron eigen-energy spectra from neutron-residual sticking configurations being transformed to lab coordinate frames. This affects mainly the distributions from pre-equilibrium processes described in the Kalbach-Mann formalism, where `fete` has translated them from c.m. to lab distributions.

Repository endl2011.3work revision 2.

4. Interpolation of gamma exit distributions

Gamma output angular distributions are now interpolated on incident neutron energy using unit-base methods in `fetePy.py`. This affects the conversion from input ENDF files to ENDL ascii files.

Repository endl2011.3work revision 3.

VI. ENDL2011.5-DIRECT

An ENDL2011.3-direct library is also released at LC location `/usr/gapps/data/nuclear/development/GNDS_-2.0/ENDL2011/ENDL2011.5-direct-rc1`, in which ENDF6-formatted sources are used as often as possible to avoid possible translation errors from FETE. This library is only available in GNDS format.

Reactions and product distributions that were added to ENDL2009 after the initial translation into ENDL format have been also added to the direct translations from ENDF6 to GNDS formats. The reactions and product distributions added are listed in Table II, along with the sources of the original ENDF6-formatted files. The ENDF6 files are included in `/usr/gapps/data/ nuclear/development/GNDS_2.0/ENDL2011/ENDL2011.5/endf`, and the combined GNDS files before processing are at `/usr/gapps/data/ nuclear/development/GNDS_-2.0/ENDL2011/ENDL2011.5-direct/Originals`. The GNDS files include various improvements and patches to bring them as much in line as possible with the legacy ENDL2011.5-rc1 library.

VII. OUTLOOK

This new library can be found on LLNL's Open and Secure Computing facilities. In addition, the data may be viewed in the Nuclear and Atomic Data System data viewer on LC at `/usr/gapps/fudge/NADS/nads`.

Acknowledgements

This work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

Appendix A: Known Issue

1. Legacy MC processing: Missed processing of anisotropic multipoles by MCFGEN

For I = 4 data, the Monte-Carlo processor MCFGEN for mcf data has never processed Legendre multipoles $L > 0$, used for the angular distributions of exit particles. The targets and reactions for which the anisotropic angular data is *not* processed are listed in Table III.

The effect of these missing anisotropic angular distributions can be seen in pulsed-sphere energy distributions, as detailed in the file included in the legacy directory `endl_official/endl2011.3/doc/ENDL2011.3-rc5_TOF_-discrepancies_Cu.pptx`. The cause was verified by making a test GNDS-processed library with only $L = 0$ multipoles.

Appendix B: Detailed Test Results

The comparisons for critical assemblies and LLNL pulsed spheres of ENDL2011.3-rc5 to ENDL2011.2 in MCF or NDF formats are described in document included in the legacy directory `endl2011.3/doc/Results_-ENDL2011.3-rc5.pdf`.

The comparisons for critical assemblies and LLNL pulsed spheres of ENDL2011.5-rc1 to ENDL2011.3-rc7 in MCF or NDF formats are described in document included in the legacy directory `missing`.

Appendix C: `README` files

Here we reproduce the `README` file that accompanies the release.

```
ENDL nuclear data release ENDL2011.5
====================================

1. The following 20 protares for neutron projectiles were made in ENDL2009
   and ENDL2011 at LLNL using the Hauser-Feshbach code STAPRE.
   The files were thus the cross-sections for stationary targets, or 0 K.
```

```
   Unfortunately they were not heated to 300 K as is standard for ENDL libraries.
   Using heat.py in revision_scripts

    za020041 za020045 za021042 za021043 za021044 za021046
    za021047 za021048 za021049 za021050 za022044 za022045
    za022051 za022052 za023046 za024047 za024055 za024056
    za025050 za025053 za025054 za025056 za025057 za028066
    za034075 za052127 za053128 za054125 za054127

2. Changes to low-energy cross-sections of exothermic light-ion reactions
   to use constant S-factors below the last 'good point'.
   For details, see accompanying file  README-2011.5-TDF.txt
   Using fixSfactors-5.py with Lowest-good-point.txt in revision_scripts

3. Extending fission gamma exit spectrum for U235, U238, Pu239
   up to 20 MeV, using ENDL99 data
   Modified files:
     za092235:  yo07c15i004s000  yo07c55i004s000
     za092238:  yo07c15i004s000
     za094239:  yo00c55i000s000  yo00c55i000s003  yo07c15i004s000  yo07c55i004s000

   Ian Thompson
   Aug 2, 2022



ENDL nuclear data release ENDL2011.3
====================================

This release includes the following improved data evaluations and corrections:

1. Data for n+7Be scattering is extended from 8.1 MeV to 20 MeV neutron energy.
The cross sections for total, elastic, (n,p) and (n,a) extended to 20 MeV by rescaling the
results of a default TALYS 1.6 calculation (without pre-equilibrium) to match the
previous curves at 8.1 MeV.

2. Data for t+7Li scattering in the C = 11: t + 7Li -> n + 9Be(gs) channel was reduced
to agree with experiments of Brune et al. See documentation.txt for more details

3. Data for n+12C scattering has fixed gamma production from the C = 11 reaction to the
2+ state at 4.43 MeV. This was 25% too small in the ENDL2011.1 and ENDL2011.2 candidate releases.
Corrected za006012/yo00c55i000s003 file from endl2009.0. So the 12C(n,ng) cross section
is the same for gammas as neutrons

4. Extraneous zero cross-section points removed from c55 files.
This allows ENDEP to be rerun without producing energy depositions for neutron
energies below threshold (where the cross sections are zero).

5. Gamma output angular distributions are now interpolated on incident neutron energy
using unit-base methods in fetePy.py

6. Adding recalculated yo01 I=1,3 files for outgoing neutrons, with added mu values at
mu=0.95. This avoids the bump in neutron eigen-energy spectra from neutron-residual
sticking configurations being transformed to lab coordinate frames.

7. Re-evaluated 12C(n,tot) cross section below 1 MeV, from Sofia Quaglioni.

8. Put back I=4 and 9 files for transitions to 49 keV isomer in 241Am(n,g) reaction

9. Added 3+ resonances to RRR and URR in n+239U evaluation

10. Improved alpha recoil energy distributions in t+h and h+h evaluations
```

TABLE I: Improvements to charged-particle cross-sections at low incident energies.

Incident	**Exit**	**Q-value good above** (MeV)	**S-factor S**(E_g) (MeV)	(MeV.b)	**E**$_g$ (MeV)	$\sigma(E_g)$ (barns)
p + t	a + photon	19.81	0.02	4.547e-06	0.02	2.7e-07
p + Li6	h + a	4.02	0.0	3.5486	0.005	4.12e-16
p + Li7	a + a	17.3473	0.0	0.06671	0.000709	2.674882e-47
d + d	n + h	3.269	0.0	0.05256	0.00062	5.4436e-23
d + t	n + a	17.59	0.0	11.7615	0.000517016	5.7145e-23
d + h	p + a	18.354	0.0	5.9054	0.000517018	4.3223e-50
d + Li6	n + Be7	3.382	0.0073345	33.4435	0.0073345	2.6329e-18
d + Li7	n + 2a	15.124	0.02	31.83890	0.02	2.3659e-10
d + Be7	p + (Be8 → 2a)	16.768	0.75	21.790	0.75	0.057
t + p	a + photon	19.81	0.05985	4.5474e-06	0.05985	2.7e-07
t + d	n + a	17.59	0.0	11.7615	0.0007742	5.71453e-23
t + t	2n + a	11.33	0.0	0.18466	0.0005	3.1052e-31
t + h	n + (Li5 → p + a)	12.097	0.0	0.137471	0.4	0.003
t + Li6	n + (Be8 → 2a)	16.118	0.36	20.67815	0.36	0.016
t + Li7	n + Be9	10.439	0.0101	59.6884	0.0101	4.45093e-19
t + Be7	n + p + 2a	10.511	0.75	22.02743	0.75	0.015
h + d	p + a	18.354	0.0	5.905442	0.00077421	4.32232e-50
h + t	n + (Li5 → p + a)	12.097	0.0	0.06840	1.0	0.0044
h + Li6	H2 + Be7	0.11	0.25	1503.920	0.25	1e-05
h + Li7	n + p + 2a	9.631	5.0	5.27638	5.0	0.015
h + Be7	2p + 2a	11.275	1.0	69923.67	1.0	0.107
a + Be9	n + C12	5.702	0.0	1286.815	1.5	0.003

```
All Sn data is processed with the ndfgen version with corrected conversion of
I=1 and 3 data to make I=4 arrays for processing.

Ian Thompson, Eric Jurgenson, Bret Beck
June 9, 2017

ENDL2011.3 official release:
Ian Thompson,  Feb 1, 2022
```

Table II. Components of the ENDL2011.5-direct-rc1 library.
Reactions and product distributions previously added to ENDL-formatted ENDL2011 after the first translation from ENDF6 format, now patched into the GNDS translations from ENDF6 sources. Additionally, all fissioning nuclides now include the energy-dependent $Q(E)$ distributions from ENDL2011.5 ENDL format files.

Target	**Origin**	**Patching?**	**Added reactions**
n	LANL-2006	ENDL unchanged	
H1	ENDF.B-VII.0	ENDF unchanged	
H2	JENDL-4	ENDF + patched	
H3	LANL-2006	ENDF + patched	
HinH2O	za001801	ENDL unchanged	
HinCH2	za001901	ENDL unchanged	
DinD2O	za001902	ENDL unchanged	
He3	JENDL-4	ENDF + patched	
He4	ENDF.B-VII.1b1	ENDF unchanged	
Li7	ENDF.B-VII.1b1	ENDF + patched	n+H3+He4 2n+Li6
Be7	LLNL-2016	ENDF unchanged	
Be9	ENDF.B-VII.0	ENDF unchanged	
Be11	TENDL-2009	ENDF + patched	4n+2He4
Be-metal	za004809	ENDL unchanged	
BeinBeO	za004909	ENDL unchanged	
B10	ENDF.B-VII.0	ENDF + patched	n+H1+Be9 n+H2+2He4 n+He4+Li6 n+(B10_e5-¿B10) 2n+H1+2He4
B11	ENDF.B-VII.0	ENDF + patched	
C10	TENDL-2009	ENDF + patched	n+C10[c] He3+He4+He4
C11	TENDL-2009	ENDF + patched	n+C11[c] He4+(Be8-¿2He4) He4+(Be8_e1-¿2He4) He4+(Be8_e2-¿2He4) H
C15	TENDL-2009	ENDF + patched	
graphite	za006912	ENDL unchanged	
N13	TENDL-2009	ENDF + patched	n+N13[c]
N15	ROSFOND	ENDF + patched	
N17	TENDL-2009	ENDF + patched	He4+B14[c]
O14	TENDL-2009	ENDF + patched	n+O14[c]
O15	TENDL-2009	ENDF + patched	n+O15[c]
O16	ROSFOND	ENDF + text corrections	
O17	TENDL-2009	ENDF + patched	
O18	ROSFOND	ENDF + patched	
O19	TENDL-2009	ENDF + patched	H1+N19 He4+C16[c]
O20	TENDL-2009	ENDF + patched	
OinBeO	za008916	ENDL unchanged	
F17	TENDL-2009	ENDF + patched	n+F17[c]
F18	TENDL-2009	ENDF + patched	n+F18[c]
F19	ENDF.B-VII.0	ENDF + patched	
F20	TENDL-2009	ENDF + patched	
F21	TENDL-2009	ENDF + patched	H1+O21[c]
Ne18	TENDL-2009	ENDF + patched	n+Ne18[c]
Ne19	TENDL-2009	ENDF + patched	n+Ne19[c]
Ne20	za010020	ENDL unchanged	
Ne23	TENDL-2009	ENDF + patched	
Ne24	TENDL-2009	ENDF + patched	He4+O21[c]
Na21	TENDL-2009	ENDF + patched	n+Na21[c]
Na22	ENDF.A-7.2009	ENDF + patched	
Na23	ROSFOND	ENDF + patched	
Na24	TENDL-2009	ENDF + patched	
Na25	TENDL-2009	ENDF + patched	
Mg0	za012000	ENDL unchanged	
Mg22	TENDL-2009	ENDF + patched	n+Mg22[c]
Mg23	TENDL-2009	ENDF + patched	n+Mg23[c]
Mg24	ENDF.B-VII.0	ENDF + patched	
Mg25	TENDL-2009	ENDF + patched	
Mg26	ENDF.B-VII.0	ENDF + patched	
Mg27	TENDL-2009	ENDF + patched	
Mg28	TENDL-2009	ENDF + patched	He4+Ne25[c]
Al24	TENDL-2009	ENDF + patched	n+Al24[c]
Al25	LLNL-2009	ENDF unchanged	
Al26	LLNL-2009	ENDF unchanged	
Al27	ENDF.B-VII.0	ENDF unchanged	
Al28	TENDL-2009	ENDF + patched	
Al29	TENDL-2009	ENDF + patched	
Si0	za014000	ENDL unchanged	
Si26	TENDL-2009	ENDF + patched	n+Si26[c]
Si27	TENDL-2009	ENDF + patched	n+Si27[c]
Si28	ENDF.B-VII.0	ENDF + patched	
Si29	JENDL-4	ENDF unchanged	

Target	Origin	Patching?	Added reactions
Si30	JENDL-4	ENDF unchanged	
Si31	TENDL-2009	ENDF + patched	H1+Al31[c]
Si32	TENDL-2009	ENDF + patched	He4+Mg29[c]
Si33	TENDL-2009	ENDF + patched	He4+Mg30
Si34	TENDL-2009	ENDF + patched	He4+Mg31
P29	TENDL-2009	ENDF + patched	n+P29[c]
P30	TENDL-2009	ENDF + patched	
P31	JENDL-4	ENDF unchanged	
P32	TENDL-2009	ENDF + patched	
P33	TENDL-2009	ENDF + patched	
S30	TENDL-2009	ENDF + patched	n+S30[c]
S31	TENDL-2009	ENDF + patched	n+S31[c]
S32	ENDF.B-VII.0	ENDF + patched	
S33	ENDF.B-VII.0	ENDF + patched	
S34	TENDL-2009	ENDF + patched	
S35	TENDL-2009	ENDF + patched	
S36	ENDF.B-VII.0	ENDF + patched	
S37	TENDL-2009	ENDF + patched	He4+Si34[c]
S38	TENDL-2009	ENDF + patched	
Cl0	za017000	ENDL unchanged	
Cl33	TENDL-2009	ENDF + patched	n+Cl33[c]
Cl34	TENDL-2009	ENDF + patched	
Cl35	ENDF.A-7.2009	ENDF unchanged	
Cl36	TENDL-2009	ENDF + patched	
Cl37	ENDF.A-7.2009	ENDF unchanged	
Cl38	TENDL-2009	ENDF + patched	He4+P35[c]
Cl39	TENDL-2009	ENDF + patched	He4+P36
Ar0	za018000	ENDL unchanged	
Ar34	LLNL-2009	ENDF unchanged	
Ar35	LLNL-2009	ENDF unchanged	
Ar36	LLNL-2009.BRB	ENDF + patched	n+He4+S32
Ar38	ENDF.B-VII.0	ENDF + patched	
Ar40	ENDF.B-VII.0	ENDF + patched	
Ar41	TENDL-2009	ENDF + patched	He4+S38[c]
K0	za019000	ENDL unchanged	
K37	TENDL-2009	ENDF + patched	
K38	TENDL-2009	ENDF + patched	n+K38[c]
K39	ENDF.A-7.2009	ENDF + patched	
K40	ENDF.B-VII.0	ENDF + patched	
K41	TENDL-2009	ENDF + patched	
K42	TENDL-2009	ENDF + patched	He4+Cl39[c]
K43	TENDL-2009	ENDF + patched	H1+Ar43[c] He4+Cl40
Ca0	za020000	ENDL unchanged	
Ca40	ENDF.B-VII.0	ENDF unchanged	
Ca41	za020041	ENDL unchanged	
Ca42	ENDF.B-VII.0	ENDF unchanged	
Ca43	ENDF.B-VII.0	ENDF unchanged	
Ca44	JENDL-4	ENDF unchanged	
Ca45	za020045	ENDL unchanged	
Ca46	ENDF.B-VII.0	ENDF unchanged	
Ca47	TENDL-2009	ENDF + patched	H1+K47[c] He4+Ar44
Ca48	JENDL-4	ENDF unchanged	
Ca49	TENDL-2009	ENDF + patched	
Ca50	TENDL-2009	ENDF + patched	
Sc41	za021041	ENDL unchanged	
Sc42	za021042	ENDL unchanged	
Sc43	za021043	ENDL unchanged	
Sc44	za021044	ENDL unchanged	
Sc45	JEFF-3.1	ENDF unchanged	
Sc46	za021046	ENDL unchanged	
Sc47	za021047	ENDL unchanged	
Sc48	za021048	ENDL unchanged	
Sc49	za021049	ENDL unchanged	
Sc50	za021050	ENDL unchanged	
Ti0	za022000	ENDL unchanged	
Ti44	za022044	ENDL unchanged	
Ti45	za022045	ENDL unchanged	
Ti46	ENDF.B-VII.1b1	ENDF + patched	
Ti47	ENDF.B-VII.1b1	ENDF + patched	
Ti48	ENDF.B-VII.1b1	ENDF + patched	
Ti49	ENDF.B-VII.1b1	ENDF + patched	
Ti50	ENDF.B-VII.1b1	ENDF + patched	
Ti51	za022051	ENDL unchanged	
Ti52	za022052	ENDL unchanged	

Target	Origin	Patching?	Added reactions
V0	JENDL-3.3	ENDF + patched	
V46	za023046	ENDL unchanged	
V47	TENDL-2009	ENDF + patched	
V48	TENDL-2009	ENDF + patched	
V49	TENDL-2009	ENDF + patched	He4+Sc46[c]
V50	JENDL-4	ENDF + patched	
V51	za023051	ENDL unchanged	
V52	TENDL-2009	ENDF + patched	He4+Sc49[c]
V53	TENDL-2009	ENDF + patched	H1+Ti53
Cr0	za024000	ENDL unchanged	
Cr47	za024047	ENDL unchanged	
Cr48	TENDL-2009	ENDF + patched	n+Cr48[c]
Cr49	TENDL-2009	ENDF + patched	
Cr50	ENDF.B-VII.0	ENDF + patched	
Cr51	TENDL-2009	ENDF + patched	
Cr52	ENDF.B-VII.0	ENDF unchanged	
Cr53	ENDF.B-VII.0	ENDF unchanged	
Cr54	JENDL-4	ENDF + patched	
Cr55	za024055	ENDL unchanged	
Cr56	za024056	ENDL unchanged	
Mn50	za025050	ENDL unchanged	
Mn51	TENDL-2009	ENDF + patched	
Mn52	TENDL-2009	ENDF + patched	
Mn53	za025053	ENDL unchanged	
Mn54	za025054	ENDL unchanged	
Mn56	za025056	ENDL unchanged	
Mn57	TENDL-2009	ENDF + patched	H2+Cr56
Fe0	za026000	ENDL unchanged	
Fe52	TENDL-2009	ENDF + patched	n+Fe52[c]
Fe53	TENDL-2009	ENDF + patched	n+Fe53[c] He4+Cr50[continuum]
Fe54	ENDF.B-VII.0	ENDF + patched	
Fe55	TENDL-2009	ENDF + patched	
Fe56	ENDF.B-VII.0	ENDF + patched	
Fe57	LLNL-2009	ENDF unchanged	
Fe58	ENDF.B-VII.0	ENDF unchanged	
Fe59	za026059	ENDL unchanged	
Fe60	TENDL-2009	ENDF + patched	
Fe61	TENDL-2009	ENDF + patched	
Fe62	TENDL-2009	ENDF + patched	
Co57	LLNL-2009	ENDF unchanged	
Co58	TENDL-2009	ENDF + patched	He4+Mn55[c]
Co59	JENDL-4	ENDF + patched	
Co60	TENDL-2009	ENDF + patched	H1+Fe60[c] He4+Mn57
Co61	TENDL-2009	ENDF + patched	
Ni0	za028000	ENDL unchanged	
Ni56	TENDL-2009	ENDF + patched	n+Ni56[c]
Ni57	TENDL-2009	ENDF + patched	
Ni58	ENDF.B-VII.0	ENDF + patched	
Ni59	ENDF.B-VII.0	ENDF + patched	
Ni60	ENDF.B-VII.0	ENDF + patched	
Ni61	ENDF.B-VII.0	ENDF + patched	
Ni62	ENDF.B-VII.0	ENDF + patched	
Ni63	TENDL-2009	ENDF + patched	H1+Co63[c] He4+Fe60
Ni64	ENDF.B-VII.0	ENDF + patched	
Ni65	TENDL-2009	ENDF + patched	H1+Co65[c] He4+Fe62
Ni66	za028066	ENDL unchanged	
Ni67	TENDL-2009	ENDF + patched	
Ni68	TENDL-2009	ENDF + patched	
Cu0	za029000	ENDL unchanged	
Cu59	TENDL-2009	ENDF + patched	n+Cu59[c]
Cu60	TENDL-2009	ENDF + patched	
Cu61	TENDL-2009	ENDF + patched	
Cu62	TENDL-2009	ENDF + patched	
Cu63	ENDF.B-VII.0	ENDF + patched	
Cu64	TENDL-2009	ENDF + patched	H1+Ni64[c] He4+Co61[continuum]
Cu65	ENDF.B-VII.0	ENDF + patched	
Cu66	TENDL-2009	ENDF + patched	H1+Ni66[c] He4+Co63
Cu67	TENDL-2009	ENDF + patched	He4+Co64
Cu68	TENDL-2009	ENDF + patched	
Cu69	TENDL-2009	ENDF + patched	H1+Ni69[c]
Zn0	za030000	ENDL unchanged	
Zn60	TENDL-2009	ENDF + patched	n+Zn60[c]
Zn61	TENDL-2009	ENDF + patched	n+Zn61[c]

Target	Origin	Patching?	Added reactions
Zn62	TENDL-2009	ENDF + patched	
Zn63	TENDL-2009	ENDF + patched	
Zn64	JENDL-4	ENDF + patched	
Zn65	JENDL-4	ENDF + patched	
Zn66	JENDL-4	ENDF + patched	
Zn67	JENDL-4	ENDF + patched	
Zn68	JENDL-4	ENDF + patched	
Zn69	TENDL-2009	ENDF + patched	H1+Cu69[c] He4+Ni66
Zn71	TENDL-2009	ENDF + patched	He4+Ni68
Zn72	TENDL-2009	ENDF + patched	He4+Ni69
Zn73	TENDL-2009	ENDF + patched	H1+Cu73 He4+Ni70
Ga0	za031000	ENDL unchanged	
Ga67	TENDL-2009	ENDF + patched	
Ga68	TENDL-2009	ENDF + patched	
Ga69	ENDF.B-VII.0	ENDF + patched	
Ga70	TENDL-2009	ENDF + patched	H1+Zn70[c] He4+Cu67[continuum]
Ga71	JENDL-4	ENDF + patched	
Ga72	TENDL-2009	ENDF + patched	H1+Zn72[c] He4+Cu69
Ga73	TENDL-2009	ENDF + patched	
Ge68	TENDL-2009	ENDF + patched	
Ge69	TENDL-2009	ENDF + patched	
Ge70	ENDF.B-VII.0	ENDF + patched	
Ge71	TENDL-2009	ENDF + patched	H1+Ga71[c] He4+Zn68[continuum]
Ge72	TENDL-2009	ENDF + patched	He4+Zn69
Ge73	ENDF.B-VII.0	ENDF + patched	
Ge74	ENDF.B-VII.0	ENDF + patched	
Ge75	TENDL-2009	ENDF + patched	H1+Ga75 He4+Zn72
Ge76	ENDF.B-VII.0	ENDF + patched	
Ge77	TENDL-2009	ENDF + patched	H1+Ga77 He4+Zn74
Ge78	TENDL-2009	ENDF + patched	
Ge79	TENDL-2009	ENDF + patched	H1+Ga79 He4+Zn76
As72	TENDL-2009	ENDF + patched	
As73	LLNL-2009	ENDF + patched	n+He4+Ga69
As74	LLNL-2009	ENDF unchanged	
As75	LLNL-2009	ENDF unchanged	
As76	TENDL-2009	ENDF + patched	H1+Ge76[c] He4+Ga73
As77	TENDL-2009	ENDF + patched	H1+Ge77 He4+Ga74
As79	TENDL-2009	ENDF + patched	H1+Ge79 He4+Ga76
Se72	TENDL-2009	ENDF + patched	
Se73	TENDL-2009	ENDF + patched	
Se74	ENDF.B-VII.0	ENDF + patched	
Se75	za034075	ENDL unchanged	
Se76	JENDL-4	ENDF + patched	
Se77	ENDF.B-VII.0	ENDF + patched	
Se78	TENDL-2009	ENDF + patched	
Se79	TENDL-2009	ENDF + patched	H1+As79 He4+Ge76
Se80	TENDL-2009	ENDF + patched	
Se81	TENDL-2009	ENDF + patched	H1+As81
Se82	JENDL-4	ENDF + patched	
Se83	TENDL-2009	ENDF + patched	H1+As83 He4+Ge80
Se84	TENDL-2009	ENDF + patched	H1+As84 He4+Ge81
Br75	TENDL-2009	ENDF + patched	
Br76	TENDL-2009	ENDF + patched	
Br77	TENDL-2009	ENDF + patched	
Br78	TENDL-2009	ENDF + patched	
Br79	ENDF.B-VII.0	ENDF + patched	
Br80	TENDL-2009	ENDF + patched	H1+Se80[c]
Br81	ENDF.B-VII.0	ENDF + patched	n+H1+Se80 n+He4+As77 n+Br81[c] 2n+Br80 3n+Br79 H1+Se81 H2+Se
Br82	TENDL-2009	ENDF + patched	H1+Se82[c] He4+As79
Br83	TENDL-2009	ENDF + patched	H1+Se83
Kr76	LLNL-2009	ENDF unchanged	
Kr77	LLNL-2009	ENDF unchanged	
Kr78	JENDL-4	ENDF + patched	
Kr79	TENDL-2009	ENDF + patched	
Kr80	TENDL-2009	ENDF + patched	H1+Br80[c] He4+Se77
Kr81	TENDL-2009	ENDF + patched	H1+Br81
Kr82	TENDL-2009	ENDF + patched	H1+Br82
Kr83	ROSFOND	ENDF + patched	
Kr84	ENDF.B-VII.0	ENDF + patched	
Kr85	TENDL-2009	ENDF + patched	H1+Br85[c] He4+Se82
Kr86	ENDF.B-VII.0	ENDF + patched	
Kr87	TENDL-2009	ENDF + patched	
Kr88	TENDL-2009	ENDF + patched	
Rb77	TENDL-2009	ENDF + patched	n+Rb77[c]

Target	Origin	Patching?	Added reactions
Rb78	TENDL-2009	ENDF + patched	
Rb79	TENDL-2009	ENDF + patched	
Rb80	TENDL-2009	ENDF + patched	
Rb81	TENDL-2009	ENDF + patched	
Rb82	TENDL-2009	ENDF + patched	
Rb83	TENDL-2009	ENDF + patched	H1+Kr83[c]
Rb84	TENDL-2009	ENDF + patched	H1+Kr84[c]
Rb85	ENDF.B-VII.0	ENDF + patched	
Rb86	ENDF.B-VII.0	ENDF unchanged	
Rb87	ENDF.A-7.2009	ENDF + patched	
Rb88	TENDL-2009	ENDF + patched	H1+Kr88[c] He4+Br85
Rb89	TENDL-2009	ENDF + patched	H1+Kr89 He4+Br86
Sr82	TENDL-2009	ENDF + patched	
Sr83	TENDL-2009	ENDF + patched	
Sr84	ENDF.B-VII.0	ENDF unchanged	
Sr85	TENDL-2009	ENDF + patched	H1+Rb85[c] He4+Kr82
Sr86	TENDL-2009	ENDF + patched	H1+Rb86[c] He4+Kr83
Sr87	TENDL-2009	ENDF + patched	H1+Rb87[c] He4+Kr84
Sr88	TENDL-2009	ENDF + patched	H1+Rb88 He4+Kr85
Sr89	TENDL-2009	ENDF + patched	H1+Rb89 He4+Kr86
Sr90	TENDL-2009	ENDF + patched	
Sr91	za038091	ENDL unchanged	
Sr92	za038092	ENDL unchanged	
Y84	za039084	ENDL unchanged	
Y85	za039085	ENDL unchanged	
Y86	za039086	ENDL unchanged	
Y87	za039087	ENDL unchanged	
Y88	za039088	ENDL unchanged	
Y89	ENDF.A-7.2009	ENDF + text corrections	
Y90	TENDL-2009	ENDF + patched	H1+Sr90[c] He4+Rb87
Y91	TENDL-2009	ENDF + patched	H1+Sr91 He4+Rb88
Y92	za039092	ENDL unchanged	
Y93	za039093	ENDL unchanged	
Zr0	za040000	ENDL unchanged	
Zr86	za040086	ENDL unchanged	
Zr87	za040087	ENDL unchanged	
Zr88	za040088	ENDL unchanged	
Zr89	TENDL-2009	ENDF + patched	H1+Y89[c] He4+Sr86[continuum]
Zr90	ENDF.A-7.2009	ENDF unchanged	
Zr92	ENDF.B-VII.0	ENDF + patched	
Zr93	JENDL-4	ENDF + patched	
Zr94	JENDL-4	ENDF + patched	
Zr95	ENDF.B-VII.0	ENDF + patched	n+H1+Y94 n+He4+Sr91 n+Zr95[c] 2n+Zr94 3n+Zr93 H1+Y95 H2+Y94
Zr97	TENDL-2009	ENDF + patched	H1+Y97 He4+Sr94
Zr98	TENDL-2009	ENDF + patched	He4+Sr95
Nb87	za041087	ENDL unchanged	
Nb88	za041088	ENDL unchanged	
Nb89	za041089	ENDL unchanged	
Nb90	za041090	ENDL unchanged	
Nb91	TENDL-2009	ENDF + patched	H1+Zr91[c] He4+Y88
Nb92	TENDL-2009	ENDF + patched	H1+Zr92[c]
Nb93	CENDL-3.1	ENDF + patched	
Nb94	TENDL-2009	ENDF + patched	H1+Zr94[c]
Nb95	TENDL-2009	ENDF + patched	H1+Zr95[c] He4+Y92
Nb96	TENDL-2009	ENDF + patched	H1+Zr96[c] He4+Y93
Nb97	TENDL-2009	ENDF + patched	H1+Zr97[c] He4+Y94
Nb98	TENDL-2009	ENDF + patched	H1+Zr98[c] He4+Y95
Nb99	TENDL-2009	ENDF + patched	H1+Zr99 He4+Y96
Nb100	TENDL-2009	ENDF + patched	H1+Zr100 He4+Y97
Mo0	za042000	ENDL unchanged	
Mo90	za042090	ENDL unchanged	
Mo91	za042091	ENDL unchanged	
Mo92	ROSFOND	ENDF + patched	
Mo93	za042093	ENDL unchanged	
Mo94	ENDF.B-VII.0	ENDF + patched	
Mo95	ENDF.B-VII.0	ENDF + patched	
Mo96	JENDL-4	ENDF + patched	
Mo97	ENDF.A-7.2009	ENDF + patched	
Mo98	ENDF.B-VII.0	ENDF + patched	
Mo99	TENDL-2009	ENDF + patched	H1+Nb99 He4+Zr96[c]
Mo100	JENDL-4	ENDF + patched	
Mo101	za042101	ENDL unchanged	
Mo102	TENDL-2009	ENDF + patched	

Target	Origin	Patching?	Added reactions
Tc91	za043091	ENDL unchanged	
Tc92	za043092	ENDL unchanged	
Tc93	za043093	ENDL unchanged	
Tc94	za043094	ENDL unchanged	
Tc95	za043095	ENDL unchanged	
Tc96	TENDL-2009	ENDF + patched	
Tc97	za043097	ENDL unchanged	
Tc98	za043098	ENDL unchanged	
Tc99	JENDL-4	ENDF + patched	
Tc100	za043100	ENDL unchanged	
Tc101	za043101	ENDL unchanged	
Tc102	za043102	ENDL unchanged	
Tc103	za043103	ENDL unchanged	
Tc104	za043104	ENDL unchanged	
Ru94	TENDL-2009	ENDF + patched	
Ru95	TENDL-2009	ENDF + patched	
Ru96	ENDF.B-VII.0	ENDF + patched	
Ru97	TENDL-2009	ENDF + patched	
Ru98	TENDL-2009	ENDF + patched	
Ru99	TENDL-2009	ENDF + patched	H1+Tc99
Ru100	TENDL-2009	ENDF + patched	
Ru101	TENDL-2009	ENDF + patched	H1+Tc101
Ru102	TENDL-2009	ENDF + patched	
Ru103	TENDL-2009	ENDF + patched	He4+Mo100
Ru104	CENDL-3.1	ENDF + patched	
Ru105	TENDL-2009	ENDF + patched	He4+Mo102
Ru106	TENDL-2009	ENDF + patched	
Rh96	TENDL-2009	ENDF + patched	
Rh97	TENDL-2009	ENDF + patched	
Rh98	TENDL-2009	ENDF + patched	n+Rh98[c]
Rh99	TENDL-2009	ENDF + patched	
Rh100	TENDL-2009	ENDF + patched	
Rh101	TENDL-2009	ENDF + patched	
Rh102	TENDL-2009	ENDF + patched	
Rh103	TENDL-2009	ENDF + patched	H1+Ru103
Rh104	TENDL-2009	ENDF + patched	H1+Ru104[c]
Rh105	TENDL-2009	ENDF + patched	
Rh106	TENDL-2009	ENDF + patched	H1+Ru106[c]
Pd100	TENDL-2009	ENDF + patched	
Pd101	TENDL-2009	ENDF + patched	
Pd102	TENDL-2009	ENDF + patched	
Pd103	TENDL-2009	ENDF + patched	H1+Rh103
Pd104	TENDL-2009	ENDF + patched	
Pd105	TENDL-2009	ENDF + patched	H1+Rh105
Pd106	TENDL-2009	ENDF + patched	He4+Ru103
Pd107	TENDL-2009	ENDF + patched	H1+Rh107
Pd108	TENDL-2009	ENDF + patched	
Pd109	TENDL-2009	ENDF + patched	H1+Rh109 He4+Ru106
Pd110	TENDL-2009	ENDF + patched	
Pd111	TENDL-2009	ENDF + patched	He4+Ru108
Pd112	TENDL-2009	ENDF + patched	
Ag105	TENDL-2009	ENDF + patched	
Ag106	TENDL-2009	ENDF + patched	
Ag107	ENDF.B-VII.0	ENDF + patched	
Ag108	TENDL-2009	ENDF + patched	H1+Pd108[c]
Ag109	ENDF.B-VII.0	ENDF unchanged	
Ag110	TENDL-2009	ENDF + patched	H1+Pd110[c]
Ag110_m1	ENDF.B-VII.0	ENDL unchanged	
Ag111	ENDF.B-VII.0	ENDF unchanged	
Cd0	za048000	ENDL unchanged	
Cd104	TENDL-2009	ENDF + patched	
Cd105	TENDL-2009	ENDF + patched	
Cd106	ENDF.B-VII.0	ENDF + patched	
Cd107	TENDL-2009	ENDF + patched	
Cd108	ENDF.B-VII.0	ENDF + patched	
Cd109	TENDL-2009	ENDF + patched	H1+Ag109
Cd110	JENDL-4	ENDF + patched	
Cd111	JENDL-4	ENDF + patched	
Cd112	JENDL-4	ENDF + patched	
Cd113	JENDL-4	ENDF + patched	
Cd114	ENDF.B-VII.0	ENDF + patched	
Cd115	TENDL-2009	ENDF + patched	He4+Pd112
Cd115_m1	ENDF.B-VII.0	ENDL unchanged	
Cd116	ENDF.B-VII.0	ENDF + patched	
Cd117	TENDL-2009	ENDF + patched	n+Cd117[c] He4+Pd114

Target	Origin	Patching?	Added reactions
Cd118	TENDL-2009	ENDF + patched	
In0	za049000	ENDL unchanged	
In111	TENDL-2009	ENDF + patched	
In112	TENDL-2009	ENDF + patched	n+In112[c]
In113	ENDF.B-VII.0	ENDF + patched	
In114	TENDL-2009	ENDF + patched	H1+Cd114[c]
In115	ENDF.B-VII.0	ENDF + patched	
In116	TENDL-2009	ENDF + patched	H1+Cd116[c]
In117	TENDL-2009	ENDF + patched	H1+Cd117
Sn0	za050000	ENDL unchanged	
Sn110	TENDL-2009	ENDF + patched	
Sn111	TENDL-2009	ENDF + patched	
Sn112	JENDL-4	ENDF + patched	
Sn113	ENDF.B-VII.0	ENDF unchanged	
Sn114	JENDL-4	ENDF + patched	
Sn115	JENDL-4	ENDF + patched	
Sn116	JENDL-4	ENDF + patched	
Sn117	JENDL-4	ENDF + patched	
Sn118	JENDL-4	ENDF + patched	
Sn119	JENDL-4	ENDF + patched	
Sn120	JENDL-4	ENDF + patched	
Sn121	TENDL-2009	ENDF + patched	H1+In121 He4+Cd118
Sn122	JENDL-4	ENDF + patched	
Sn123	TENDL-2009	ENDF + patched	H1+In123 He4+Cd120
Sn124	JENDL-4	ENDF + patched	
Sn125	ENDF.B-VII.0	ENDF unchanged	
Sn126	TENDL-2009	ENDF + patched	
Sb0	za051000	ENDL unchanged	
Sb119	TENDL-2009	ENDF + patched	H1+Sn119
Sb120	TENDL-2009	ENDF + patched	H1+Sn120[c]
Sb121	ENDF.B-VII.0	ENDF + patched	
Sb122	TENDL-2009	ENDF + patched	H1+Sn122[c]
Sb123	ENDF.B-VII.0	ENDF + patched	
Sb124	TENDL-2009	ENDF + patched	H1+Sn124[c] He4+In121
Sb125	TENDL-2009	ENDF + patched	H1+Sn125
Sb126	ENDF.B-VII.0	ENDF unchanged	
Te118	TENDL-2009	ENDF + patched	
Te119	TENDL-2009	ENDF + patched	
Te120	ENDF.B-VII.0	ENDF + patched	
Te121	TENDL-2009	ENDF + patched	H1+Sb121
Te122	ENDF.B-VII.0	ENDF + patched	
Te123	ENDF.B-VII.0	ENDF + patched	
Te124	ENDF.B-VII.0	ENDF + patched	
Te125	ENDF.B-VII.0	ENDF + patched	
Te126	ENDF.B-VII.0	ENDF + patched	
Te127	za052127	ENDL unchanged	
Te127_m1	ENDF.B-VII.0	ENDL unchanged	
Te128	ENDF.B-VII.0	ENDF + patched	
Te129	TENDL-2009	ENDF + patched	H1+Sb129 He4+Sn126
Te129_m1	ENDF.B-VII.0	ENDL unchanged	
Te130	ENDF.B-VII.0	ENDF + patched	
Te131	TENDL-2009	ENDF + patched	H1+Sb131 He4+Sn128
Te132	ENDF.B-VII.0	ENDF + text corrections	
Te133	TENDL-2009	ENDF + patched	He4+Sn130
I122	TENDL-2009	ENDF + patched	
I123	TENDL-2009	ENDF + patched	
I124	TENDL-2009	ENDF + patched	
I125	TENDL-2009	ENDF + patched	H1+Te125
I126	TENDL-2009	ENDF + patched	H1+Te126[c]
I127	JENDL-4	ENDF + patched	
I128	za053128	ENDL unchanged	
I129	ENDF.B-VII.0	ENDF + patched	
I130	ENDF.B-VII.0	ENDF unchanged	
I131	ENDF.B-VII.0	ENDF + patched	
I132	TENDL-2009	ENDF + patched	H1+Te132[c] He4+Sb129
I133	TENDL-2009	ENDF + patched	H1+Te133 He4+Sb130
I134	TENDL-2009	ENDF + patched	H1+Te134[c] He4+Sb131
I135	ENDF.B-VII.0	ENDF + patched	
Xe0	za054000	ENDL unchanged	
Xe122	LLNL-2009	ENDF unchanged	
Xe123	LLNL-2009	ENDF unchanged	
Xe124	LLNL-2009	ENDF unchanged	
Xe125	za054125	ENDL unchanged	
Xe126	ENDF.B-VII.0	ENDF + patched	

Target	Origin	Patching?	Added reactions
Xe127	za054127	ENDL unchanged	
Xe128	ENDF.B-VII.0	ENDF + patched	
Xe129	ENDF.B-VII.0	ENDF + patched	
Xe130	JENDL-3.3	ENDF + patched	
Xe131	ENDF.B-VII.0	ENDF unchanged	
Xe132	ROSFOND	ENDF + patched	
Xe133	TENDL-2009	ENDF + patched	H1+I133 He4+Te130
Xe134	TENDL-2009	ENDF + patched	
Xe135	ENDF.B-VII.0	ENDF + patched	
Xe136	TENDL-2009	ENDF + patched	H1+I136[c] He4+Te133
Xe137	TENDL-2009	ENDF + patched	H1+I137 He4+Te134
Xe138	TENDL-2009	ENDF + patched	
Cs131	TENDL-2009	ENDF + patched	H1+Xe131
Cs132	TENDL-2009	ENDF + patched	H1+Xe132[c]
Cs133	ENDF.B-VII.0	ENDF unchanged	
Cs134	ENDF.B-VII.0	ENDF + patched	
Cs135	ENDF.B-VII.0	ENDF + patched	
Cs136	TENDL-2009	ENDF + patched	H1+Xe136[c]
Cs137	TENDL-2009	ENDF + patched	H1+Xe137 He4+I134
Ba128	TENDL-2009	ENDF + patched	
Ba129	TENDL-2009	ENDF + patched	
Ba130	CENDL-3.1	ENDF + patched	
Ba131	TENDL-2009	ENDF + patched	
Ba132	ENDF.B-VII.0	ENDF + patched	
Ba133	TENDL-2009	ENDF + patched	H1+Cs133
Ba134	TENDL-2009	ENDF + patched	
Ba135	TENDL-2009	ENDF + patched	H1+Cs135
Ba136	TENDL-2009	ENDF + patched	He4+Xe133
Ba137	TENDL-2009	ENDF + patched	H1+Cs137
Ba138	ENDF.B-VII.0	ENDF + patched	
Ba139	TENDL-2009	ENDF + patched	H1+Cs139
Ba140	TENDL-2009	ENDF + patched	He4+Xe137
La135	TENDL-2009	ENDF + patched	
La136	TENDL-2009	ENDF + patched	
La137	TENDL-2009	ENDF + patched	H1+Ba137
La138	ENDF.B-VII.0	ENDF + patched	
La139	ENDF.B-VII.0	ENDF + patched	
La140	ENDF.B-VII.0	ENDF unchanged	
La141	TENDL-2009	ENDF + patched	H1+Ba141
Ce134	TENDL-2009	ENDF + patched	
Ce135	TENDL-2009	ENDF + patched	
Ce136	ENDF.B-VII.0	ENDF unchanged	
Ce137	TENDL-2009	ENDF + patched	
Ce138	CENDL-3.1	ENDF unchanged	
Ce139	ENDF.B-VII.0	ENDF unchanged	
Ce140	CENDL-3.1	ENDF unchanged	
Ce141	ENDF.B-VII.0	ENDF + patched	
Ce142	ENDF.B-VII.0	ENDF + patched	
Ce143	ENDF.B-VII.0	ENDF unchanged	
Ce144	TENDL-2009	ENDF + patched	
Pr139	TENDL-2009	ENDF + patched	H1+Ce139[c]
Pr140	TENDL-2009	ENDF + patched	
Pr141	CENDL-3.1	ENDF + patched	
Pr142	ENDF.B-VII.0	ENDF unchanged	
Pr143	JENDL-4	ENDF + patched	
Nd140	TENDL-2009	ENDF + patched	H1+Pr140
Nd141	TENDL-2009	ENDF + patched	H1+Pr141[c]
Nd142	ENDF.B-VII.0	ENDF unchanged	
Nd143	ENDF.B-VII.0	ENDF + patched	
Nd144	ENDF.B-VII.0	ENDF unchanged	
Nd145	ENDF.B-VII.0	ENDF + patched	
Nd146	ENDF.B-VII.0	ENDF unchanged	
Nd147	ENDF.B-VII.0	ENDF unchanged	
Nd148	ENDF.B-VII.0	ENDF unchanged	
Nd149	TENDL-2009	ENDF + patched	H1+Pr149
Nd150	ENDF.B-VII.0	ENDF unchanged	
Nd151	TENDL-2009	ENDF + patched	
Nd152	TENDL-2009	ENDF + patched	
Pm147	ENDF.B-VII.0	ENDF + patched	
Pm148	ENDF.B-VII.0	ENDF + patched	
Pm149	ENDF.B-VII.0	ENDF + patched	
Pm150	TENDL-2009	ENDF + patched	H1+Nd150
Pm151	ENDF.B-VII.0	ENDF unchanged	
Sm142	TENDL-2009	ENDF + patched	
Sm143	TENDL-2009	ENDF + patched	

Target	Origin	Patching?	Added reactions
Sm144	ENDF.B-VII.0	ENDF unchanged	
Sm145	TENDL-2009	ENDF + patched	H1+Pm145
Sm146	TENDL-2009	ENDF + patched	
Sm147	ENDF.B-VII.0	ENDF + patched	
Sm148	ENDF.B-VII.0	ENDF unchanged	
Sm149	ENDF.B-VII.0	ENDF + patched	
Sm150	ENDF.B-VII.0	ENDF unchanged	
Sm151	ENDF.B-VII.0	ENDF unchanged	
Sm152	ENDF.B-VII.0	ENDF unchanged	
Sm153	ENDF.B-VII.0	ENDF unchanged	
Sm154	ENDF.B-VII.0	ENDF unchanged	
Sm155	TENDL-2009	ENDF + patched	
Sm156	TENDL-2009	ENDF + patched	He4+Nd153
Eu0	za063000	ENDL unchanged	
Eu145	TENDL-2009	ENDF + patched	
Eu146	TENDL-2009	ENDF + patched	
Eu147	TENDL-2009	ENDF + patched	
Eu148	TENDL-2009	ENDF + patched	n+Eu148[c]
Eu150	LLNL-2010	ENDF + patched	
Eu151	LLNL-2010	ENDF unchanged	
Eu152	ENDF.B-VII.0	ENDF + patched	
Eu153	ENDF.B-VII.0	ENDF + patched	
Eu154	TENDL-2009	ENDF + patched	H1+Sm154[c]
Eu155	TENDL-2009	ENDF + patched	
Eu156	TENDL-2009	ENDF + patched	H1+Sm156
Eu157	TENDL-2009	ENDF + patched	
Gd0	za064000	ENDL unchanged	
Gd146	za064146	ENDL unchanged	
Gd147	za064147	ENDL unchanged	
Gd148	za064148	ENDL unchanged	
Gd149	za064149	ENDL unchanged	
Gd150	za064150	ENDL unchanged	
Gd151	za064151	ENDL unchanged	
Gd152	JENDL-4	ENDF + patched	
Gd155	ENDF.B-VII.0	ENDF + patched	
Gd156	ENDF.B-VII.0	ENDF unchanged	
Gd157	ENDF.B-VII.0	ENDF + patched	
Gd158	ENDF.B-VII.0	ENDF unchanged	
Gd159	za064159	ENDL unchanged	
Gd160	ENDF.B-VII.0	ENDF unchanged	
Gd161	TENDL-2009	ENDF + patched	He4+Sm158
Gd162	TENDL-2009	ENDF + patched	
Tb156	TENDL-2009	ENDF + patched	
Tb157	TENDL-2009	ENDF + patched	H1+Gd157
Tb158	TENDL-2009	ENDF + patched	H1+Gd158[c]
Tb159	ENDF.B-VII.0	ENDF + patched	
Tb160	ENDF.B-VII.0	ENDF unchanged	
Tb161	TENDL-2009	ENDF + patched	H1+Gd161
Dy154	TENDL-2009	ENDF + patched	
Dy155	TENDL-2009	ENDF + patched	
Dy156	ENDF.B-VII.0	ENDF unchanged	
Dy157	TENDL-2009	ENDF + patched	
Dy158	ENDF.B-VII.0	ENDF unchanged	
Dy159	TENDL-2009	ENDF + patched	H1+Tb159
Dy160	ENDF.B-VII.0	ENDF unchanged	
Dy161	ENDF.B-VII.0	ENDF unchanged	
Dy162	ENDF.B-VII.0	ENDF unchanged	
Dy163	ENDF.B-VII.0	ENDF unchanged	
Dy164	ENDF.B-VII.0	ENDF unchanged	
Dy166	TENDL-2009	ENDF + patched	
Ho163	TENDL-2009	ENDF + patched	H1+Dy163
Ho164	TENDL-2009	ENDF + patched	H1+Dy164
Ho165	ENDF.B-VII.0	ENDF + patched	
Ho166	TENDL-2009	ENDF + patched	H1+Dy166
Ho166_m1	ENDF.B-VII.0	ENDL unchanged	
Ho167	TENDL-2009	ENDF + patched	
Er160	TENDL-2009	ENDF + patched	H1+Ho160
Er161	TENDL-2009	ENDF + patched	
Er162	ENDF.B-VII.0	ENDF + patched	
Er163	TENDL-2009	ENDF + patched	
Er164	ENDF.B-VII.0	ENDF + patched	
Er165	TENDL-2009	ENDF + patched	H1+Ho165
Er166	ENDF.B-VII.0	ENDF + patched	
Er167	ENDF.B-VII.0	ENDF + patched	
Er168	ENDF.B-VII.0	ENDF + patched	

Target	Origin	Patching?	Added reactions
Er169	TENDL-2009	ENDF + patched	H1+Ho169
Er170	ENDF.B-VII.0	ENDF + patched	
Er171	TENDL-2009	ENDF + patched	
Er172	TENDL-2009	ENDF + patched	
Tm167	LLNL-2010	ENDF unchanged	
Tm168	LLNL-2010	ENDF unchanged	
Tm169	LLNL-2010	ENDF unchanged	
Tm170	za069170	ENDL unchanged	
Tm171	TENDL-2009	ENDF + patched	
Yb166	TENDL-2009	ENDF + patched	H1+Tm166
Yb167	TENDL-2009	ENDF + patched	
Yb168	JENDL-4	ENDF + patched	
Yb169	TENDL-2009	ENDF + patched	
Yb170	JENDL-4	ENDF + patched	
Yb171	JENDL-4	ENDF + patched	
Yb172	JENDL-4	ENDF + patched	
Yb173	JENDL-4	ENDF + patched	
Yb174	JENDL-4	ENDF + patched	
Yb175	TENDL-2009	ENDF + patched	
Yb176	JENDL-4	ENDF + patched	
Yb177	TENDL-2009	ENDF + patched	
Yb178	TENDL-2009	ENDF + patched	
Lu173	TENDL-2009	ENDF + patched	H1+Yb173
Lu174	TENDL-2009	ENDF + patched	H1+Yb174[c]
Lu175	TENDL-2009	ENDF + patched	H1+Yb175
Lu176	TENDL-2009	ENDF + patched	H1+Yb176[c]
Lu177	TENDL-2009	ENDF + patched	
Lu178	TENDL-2009	ENDF + patched	H1+Yb178[c]
Hf0	za072000	ENDL unchanged	
Hf172	TENDL-2009	ENDF + patched	H1+Lu172
Hf173	TENDL-2009	ENDF + patched	
Hf174	ENDF.A-9.2009	ENDF unchanged	
Hf175	TENDL-2009	ENDF + patched	H1+Lu175
Hf176	TENDL-2009	ENDF + patched	
Hf177	TENDL-2009	ENDF + patched	H1+Lu177
Hf178	TENDL-2009	ENDF + patched	H1+Lu178
Hf179	TENDL-2009	ENDF + patched	H1+Lu179
Hf180	TENDL-2009	ENDF + patched	
Hf181	TENDL-2009	ENDF + patched	
Hf182	TENDL-2009	ENDF + patched	
Hf183	TENDL-2009	ENDF + patched	
Hf184	TENDL-2009	ENDF + patched	
Ta178	LLNL-2009	ENDF unchanged	
Ta179	LLNL-2009	ENDF unchanged	
Ta180	LLNL-2009	ENDF unchanged	
Ta181	LLNL-2009	ENDF unchanged	
Ta182	LLNL-2009	ENDF unchanged	
Ta183	LLNL-2009	ENDF unchanged	
W0	za074000	ENDL unchanged	
W178	LLNL-2009	ENDF unchanged	
W179	LLNL-2009	ENDF unchanged	
W180	IAEA-W-CRP-2009	ENDF + patched	
W181	LLNL-2009	ENDF unchanged	
W182	IAEA-W-CRP-2009	ENDF + patched	
W183	IAEA-W-CRP-2009	ENDF + patched	
W184	IAEA-W-CRP-2009	ENDF + patched	
W185	LLNL-2009	ENDF unchanged	
W186	IAEA-W-CRP-2009	ENDF + patched	
W187	LLNL-2009	ENDF unchanged	
W188	LLNL-2009	ENDF unchanged	
Re183	LLNL-2009	ENDF unchanged	
Re184	LLNL-2009	ENDF unchanged	
Re185	ENDF.B-VII.0	ENDF + patched	
Re186	LLNL-2009	ENDF unchanged	
Re187	ENDF.B-VII.0	ENDF + patched	
Re188	LLNL-2009	ENDF unchanged	
Re189	LLNL-2009	ENDF unchanged	
Os182	TENDL-2009	ENDF + patched	H1+Re182
Os183	TENDL-2009	ENDF + patched	
Os184	TENDL-2009	ENDF + patched	H1+Re184
Os185	TENDL-2009	ENDF + patched	H1+Re185
Os186	TENDL-2009	ENDF + patched	
Os187	TENDL-2009	ENDF + patched	H1+Re187
Os188	TENDL-2009	ENDF + patched	
Os189	TENDL-2009	ENDF + patched	H1+Re189

Target	Origin	Patching?	Added reactions
Os190	TENDL-2009	ENDF + patched	
Os191	TENDL-2009	ENDF + patched	
Os192	JENDL-4	ENDF + patched	
Os193	TENDL-2009	ENDF + patched	He4+W190
Os194	TENDL-2009	ENDF + patched	
Ir184	TENDL-2009	ENDF + patched	n+Ir184[c]
Ir185	TENDL-2009	ENDF + patched	
Ir186	TENDL-2009	ENDF + patched	n+Ir186[c]
Ir187	TENDL-2009	ENDF + patched	
Ir188	TENDL-2009	ENDF + patched	
Ir189	TENDL-2009	ENDF + patched	H1+Os189
Ir190	TENDL-2009	ENDF + patched	
Ir191	ENDF.B-VII.0	ENDF + text corrections	
Ir192	TENDL-2009	ENDF + patched	H1+Os192
Ir193	ENDF.B-VII.1beta0	ENDF + text corrections	
Ir194	TENDL-2009	ENDF + patched	H1+Os194
Ir195	TENDL-2009	ENDF + patched	
Ir196	TENDL-2009	ENDF + patched	
Ir197	TENDL-2009	ENDF + patched	
Ir198	TENDL-2009	ENDF + patched	
Pt0	JEFF-3.1	ENDF unchanged	
Pt188	TENDL-2009	ENDF + patched	H1+Ir188
Pt189	TENDL-2009	ENDF + patched	
Pt190	TENDL-2009	ENDF + patched	
Pt191	TENDL-2009	ENDF + patched	
Pt192	TENDL-2009	ENDF + patched	
Pt193	TENDL-2009	ENDF + patched	H1+Ir193
Pt194	TENDL-2009	ENDF + patched	
Pt195	TENDL-2009	ENDF + patched	
Pt196	TENDL-2009	ENDF + patched	
Pt197	TENDL-2009	ENDF + patched	
Pt198	TENDL-2009	ENDF + patched	
Pt199	TENDL-2009	ENDF + patched	
Pt200	TENDL-2009	ENDF + patched	
Au193	TENDL-2009	ENDF + patched	
Au194	TENDL-2009	ENDF + patched	n+Au194[c]
Au195	TENDL-2009	ENDF + patched	H1+Pt195
Au196	TENDL-2009	ENDF + patched	H1+Pt196[c]
Au197	ENDF.B-VII.1beta0	ENDF + patched	
Au198	TENDL-2009	ENDF + patched	H1+Pt198
Au199	TENDL-2009	ENDF + patched	He4+Ir196
Hg0	za080000	ENDL unchanged	
Hg194	TENDL-2009	ENDF + patched	H1+Au194
Hg195	TENDL-2009	ENDF + patched	
Hg196	TENDL-2009	ENDF + patched	
Hg197	TENDL-2009	ENDF + patched	H1+Au197
Hg198	TENDL-2009	ENDF + patched	
Hg199	TENDL-2009	ENDF + patched	H1+Au199
Hg200	TENDL-2009	ENDF + patched	
Hg201	TENDL-2009	ENDF + patched	H1+Au201
Hg202	TENDL-2009	ENDF + patched	
Hg203	TENDL-2009	ENDF + patched	H1+Au203 He4+Pt200
Hg204	TENDL-2009	ENDF + patched	
Hg205	TENDL-2009	ENDF + patched	
Hg206	TENDL-2009	ENDF + patched	
Tl201	TENDL-2009	ENDF + patched	H1+Hg201
Tl202	TENDL-2009	ENDF + patched	n+Tl202[c] H1+Hg202[continuum]
Tl203	TENDL-2009	ENDF + patched	H1+Hg203
Tl204	TENDL-2009	ENDF + patched	H1+Hg204[c]
Tl205	TENDL-2009	ENDF + patched	H1+Hg205
Tl206	TENDL-2009	ENDF + patched	He4+Au203
Tl207	TENDL-2009	ENDF + patched	
Pb0	za082000	ENDL unchanged	
Pb200	TENDL-2009	ENDF + patched	H1+Tl200
Pb201	TENDL-2009	ENDF + patched	H1+Tl201
Pb202	TENDL-2009	ENDF + patched	H1+Tl202
Pb203	TENDL-2009	ENDF + patched	H1+Tl203
Pb204	JENDL-4	ENDF + patched	
Pb205	TENDL-2009	ENDF + patched	H1+Tl205
Pb206	TENDL-2009	ENDF unchanged	
Pb207	TENDL-2009	ENDF unchanged	
Pb208	LLNL-2009	ENDF unchanged	
Pb209	TENDL-2009	ENDF + patched	H1+Tl209 He4+Hg206
Pb210	TENDL-2009	ENDF + patched	H1+Tl210
Bi206	TENDL-2009	ENDF + patched	

Target	Origin	Patching?	Added reactions
Bi207	TENDL-2009	ENDF + patched	H1+Pb207[c]
Bi208	TENDL-2009	ENDF + patched	H1+Pb208[c]
Bi209	TENDL-2009	ENDF + patched	H1+Pb209
Bi210	TENDL-2009	ENDF + patched	H1+Pb210[c]
Bi211	TENDL-2009	ENDF + patched	H1+Pb211
Po209	TENDL-2009	ENDF + patched	H1+Bi209[c]
Rn219	TENDL-2009	ENDF + patched	
Rn220	TENDL-2009	ENDF + patched	
Rn221	TENDL-2009	ENDF + patched	
Rn222	TENDL-2009	ENDF + patched	
Rn223	TENDL-2009	ENDF + patched	
Rn224	TENDL-2009	ENDF + patched	
Ra223	TENDL-2009	ENDF + patched	
Ra224	TENDL-2009	ENDF + patched	
Ra225	TENDL-2009	ENDF + patched	
Ra226	TENDL-2009	ENDF + patched	
Ra227	TENDL-2009	ENDF + patched	
Ra228	TENDL-2009	ENDF + patched	
Ac225	JENDL-4	ENDF + patched	
Ac226	JENDL-4	ENDF + patched	
Ac227	JENDL-4	ENDF + patched	
Th227	JENDL-4	ENDF + patched	
Th228	JENDL-4	ENDF + patched	
Th229	JENDL-4	ENDF + patched	
Th230	JENDL-4	ENDF + patched	
Th231	JENDL-4	ENDF + patched	
Th232	ENDF.B-VII.1beta0	ENDF + patched	
Th233	JENDL-4	ENDF + patched	
Th234	JENDL-4	ENDF + patched	
Pa229	JENDL-4	ENDF + patched	
Pa230	JENDL-4	ENDF + patched	
Pa231	ENDF.B-VII.1beta0	ENDF + patched	
Pa232	JENDL-4	ENDF + patched	
Pa233	ENDF.B-VII.1beta0	ENDF + patched	
U230	JENDL-4	ENDF + patched	
U231	JENDL-4	ENDF + patched	
U232	ENDF.B-VII.0	ENDF + patched	
U233	ENDF.B-VII.0	ENDF + patched	
U234	ENDF.B-VII.0	ENDF + patched	
U235	ENDF.B-VII.0	ENDL unchanged	
U236	ENDF.A-9.2009	ENDF + text corrections	
U237	LLNL-2009	ENDF + patched	
U238	ENDF.B-VII.0	ENDL unchanged	
U239	LLNL-2016	ENDF unchanged	
U240	ENDF.B-VII.0	ENDF + patched	
U241	ENDF.B-VII.0	ENDF + patched	
Np234	JENDL-4	ENDF + patched	
Np235	JENDL-4	ENDF + patched	
Np236	JENDL-4	ENDF + patched	
Np237	ENDF.B-VII.1beta0	ENDF + patched	
Np238	JENDL-4	ENDF + patched	
Np239	JENDL-4	ENDF + patched	
Pu236	JENDL-4	ENDF + patched	
Pu237	JENDL-4	ENDF + patched	
Pu238	JENDL-AC-2008	ENDF + patched	
Pu239	ENDF.B-VII.02	ENDL unchanged	
Pu240	ENDF.A-9.2009	ENDF + text corrections	
Pu241	JENDL-4	ENDF + patched	
Pu242	JENDL-4	ENDF + patched	
Pu243	CENDL-3.1	ENDF + patched	
Pu244	JENDL-4	ENDF + patched	
Pu245	CENDL-3.1	ENDF + patched	
Pu246	JENDL-4	ENDF + patched	
Am239	TENDL-2009	ENDF + patched	
Am240	JENDL-4	ENDF + patched	
Am241	ENDF.A-9.2009	ENDF unchanged	
Am242	ENDF.B-VII.0	ENDF + patched	
Am242_m1	ENDF.B-VII.0	ENDL unchanged	
Am243	ENDF.B-VII.0	ENDF + patched	
Am244	ENDF.B-VII.0	ENDF + patched	
Am244_m1	JENDL-4	ENDL unchanged	
Am245	TENDL-2009	ENDF + patched	
Cm240	JENDL-4	ENDF + patched	
Cm241	JENDL-4	ENDF + patched	
Cm242	JENDL-4	ENDF + patched	

Target	Origin	Patching?	Added reactions
Cm243	JENDL-4	ENDF + patched	
Cm244	JENDL-4	ENDF + patched	
Cm245	JENDL-4	ENDF + patched	
Cm246	JENDL-4	ENDF + patched	
Cm247	JENDL-4	ENDF + patched	
Cm248	JENDL-4	ENDF + patched	
Cm249	JENDL-4	ENDF + patched	
Cm250	JENDL-4	ENDF + patched	
Cm251	TENDL-2009	ENDF + patched	
Bk245	JENDL-4	ENDF + patched	
Bk246	JENDL-4	ENDF + patched	
Bk247	JENDL-4	ENDF + patched	
Bk248	JENDL-4	ENDF + patched	
Bk249	JENDL-4	ENDF + patched	
Bk250	JENDL-4	ENDF + patched	
Cf246	JENDL-AC-2008	ENDF + patched	
Cf247	TENDL-2009	ENDF + patched	n+Cf247[c] H1+Bk247
Cf248	JENDL-AC-2008	ENDF + patched	
Cf249	JENDL-4	ENDF + patched	
Cf250	JENDL-4	ENDF + patched	
Cf251	JENDL-AC-2008	ENDF + patched	
Cf252	JENDL-4	ENDF + patched	
Cf253	JENDL-4	ENDF + patched	
Cf254	JENDL-4	ENDF unchanged	
FP99120	za099120	ENDL unchanged	
FP99125	za099125	ENDL unchanged	

TABLE III: Targets and reactions with $L > 0$ Legendre multipoles in ENDL2011 MCF processing for exit distributions. The number shows the maximum multipole L in the source evaluation.

Target ZA	Reactions:L											
za007014	nd:5	t:5	na:5	2a:5								
za009019	2n:3	np:3	na:3									
za011023	np:3	na:3										
za014028	n:3	2n:3	np:3	na:3								
za014029	n:3	2n:3	np:3	na:3								
za014030	n:3	2n:3	3n:3	np:3	na:3							
za020044	n:3	2n:3	3n:3	np:3	na:3							
za020048	n:3	2n:3	3n:3	np:3	na:3							
za022046	n:5	2n:5	np:5	na:5								
za022047	n:5	2n:5	np:5	na:5								
za022048	n:5	2n:5	np:5	na:5								
za022049	n:5	2n:5	np:5	na:5								
za022050	n:5	2n:5	3n:5	np:5	na:5							
za023000	n:5	2n:5	np:5	na:5	p:5							
za023050	n:5	2n:5	np:5	nd:5	na:5	2np:5	np:5	2np:5	nd:5	na:5		
za024052	n:3	2n:3	np:3	na:3								
za024054	n:5	2n:5	3n:5	np:5	na:5	np:5	na:5					
za025055	n:3	2n:3	np:3	na:3								
za026054	n:3	2n:3	np:3	na:3								
za026056	n:5	2n:5	np:5	na:5								
za027059	n:5	2n:5	np:5	na:5								
za028058	n:3	2n:3	np:3	na:3								
za028060	n:3	2n:3	np:3	na:3								
za029063	n:3	2n:3	np:3	na:3								
za029065	n:3	2n:3	np:3	na:3								
za030064	n:5	2n:5	n2p:5	np:5	nd:5	na:5	2na:5	n2p:5	np:5	nd:5	na:5	2na:5
za030065	n:5	2n:5	np:5	nd:5	na:5	2na:5	np:5	nd:5	na:5	2na:5		
za030066	n:5	2n:5	3n:5	np:5	nd:5	na:5	2na:5	np:5	nd:5	na:5	2na:5	
za030067	n:5	2n:5	3n:5	np:5	nd:5	na:5	2na:5	np:5	nd:5	na:5	2na:5	
za030068	n:5	2n:5	3n:5	np:5	nd:5	na:5	np:5	nd:5	na:5			
za032070	n:18	2n:10	np:13	na:17	2na:2	np:2	p:2					
za032073	n:17	2n:16	3n:2	np:10	na:14	2np:2	2na:5	np:2	2np:2	p:2		
za032074	n:17	2n:13	3n:2	np:7	na:14	2na:2	np:2	p:2				
za032076	n:17	2n:13	3n:2	np:3	na:12	2na:2	np:2	p:2				
za037086	n:65	2n:36	3n:2	np:13	na:9	2np:2	2na:2	np:4	2np:2	p:5		
za038084	n:56	2n:9	np:54	na:54	np:4	p:5						
za039089	n:29	2n:9	np:12	na:8	2np:2	np:4	2np:2	p:65				
za040090	n:58	2n:58	np:58	na:58	np:4	p:5						
za040092	n:5	2n:5	3n:5	np:5	nd:5	nt:5	na:5					
za040094	n:5	2n:5	3n:5	np:5	nd:5	na:5						
za041093	n:5	2n:5	np:5	na:5								
za042092	n:5	2n:5	np:5	na:5								
za042094	n:5	2n:5	3n:5	np:5	na:5							
za042095	n:44	2n:23	3n:3	np:12	na:23	2np:4	2na:9	np:4	2np:2	p:5		
za042097	n:5	2n:5	3n:5	np:5	na:5							
za042098	n:5	2n:5	3n:5	np:5	na:5							
za043099	np:4											
za047107	np:5											
za047109	n:44	2n:15	3n:3	np:15	na:15	2np:3	2na:3	np:4	2np:2	p:5		
za047110m	np:5	nd:5	nt:5	na:5								
za047111	n:65	2n:14	3n:3	np:14	na:14	2np:2	2na:2	np:4	2np:2	p:5		
za048115m	n:63	2n:54	3n:3	np:11	na:54	2np:2	2na:3	np:4	2np:2	p:5		
za050112	n:5	2n:5	3n:5	n2p:5	np:5	nd:5	na:5	2na:5	n2p:5	np:5	nd:5	na:5	2na:5
za050113	n:65	2n:15	3n:2	np:14	na:18	2np:2	2na:5	np:4	2np:2	p:5		
za050114	n:5	2n:5	3n:5	np:5	nd:5	na:5	np:5	nd:5	na:5			
za050115	n:5	2n:5	3n:5	np:5	nd:5	na:5	2np:5	2na:5	np:5	2np:5	nd:5	na:5	2na:5
za050116	n:5	2n:5	3n:5	np:5	na:5	np:5	na:5						
za050117	n:5	2n:5	3n:5	np:5	nd:5	na:5	2np:5	2na:5	np:5	2np:5	nd:5	na:5	2na:5
za050118	n:5	2n:5	3n:5	np:5	na:5	np:5	na:5						
za050119	n:5	2n:5	3n:5	np:5	nd:5	na:5	np:5	nd:5	na:5				
za050120	n:5	2n:5	3n:5	np:5	na:5	np:5	na:5						
za050122	n:5	2n:5	3n:5	np:5	na:5	np:5	na:5						
za050124	n:5	2n:5	3n:5	np:5	na:5	np:5	na:5						
za050125	n:59	2n:50	3n:6	np:7	na:10	2na:2	np:4	p:5					
za051126	n:59	2n:28	3n:16	np:17	na:17	2np:16	2na:6	np:4	2np:3	p:5		
za052132	n:65	2n:16	3n:6	np:11	na:15	2na:2	np:4	p:5				
za053130	n:61	2n:16	3n:4	np:16	na:16	2np:6	2na:9	np:4	2np:3	p:5		
za054131	n:46	2n:21	3n:6	np:16	na:21	2np:3	2na:13	np:4	2np:2	p:5		
za055133	n:46	2n:16	3n:3	np:16	na:16	2np:3	2na:3	np:4	2np:2	p:5		
za055134	np:5											
za055135	np:5											
za057140	n:57	2n:33	3n:9	np:16	na:16	2np:9	2na:9	np:4	2np:3	p:5		
za058136	n:65	2n:20	3n:2	np:31	na:34	2np:2	2na:2	np:4	2np:2	p:5		
za058138	n:5	2n:5	np:5	na:5								
za058139	n:65	2n:52	3n:2	np:51	na:51	2np:2	2na:7	np:4	2np:2	p:5		
za058140	n:5	2n:5	np:5	na:5								
za058143	n:65	2n:28	3n:9	np:25	na:28	2np:4	2na:25	np:4	2np:2	p:5		
za059141	np:4											
za059142	n:65	2n:32	3n:6	np:32	na:40	2np:27	2na:27	np:4	2np:3	p:5		
za060142	n:49	2n:16	3n:2	np:16	na:18	2np:2	2na:2	np:4	2np:2	p:5		
za060143	n:44	2n:22	3n:4	np:20	na:34	2np:19	2na:20	np:4	2np:2	p:5		
za060144	n:39	2n:19	3n:19	np:16	na:22	2np:3	2na:19	np:4	2np:2	p:5		

TABLE III: Targets and reactions with $L > 0$ Legendre multipoles in ENDL2011 MCF processing for exit distributions. The number shows the maximum multipole L in the source evaluation.

Target ZA	Reactions:L													
za060145	n:38	2n:20	3n:19	np:19	na:24	2np:14	2na:19	np:4	2np:2	p:5				
za060146	n:27	2n:19	3n:11	np:16	na:19	2np:2	2na:11	np:4	2np:2	p:5				
za060147	n:47	2n:23	3n:11	np:16	na:23	2np:9	2na:15	np:4	2np:3	p:5				
za060148	n:29	2n:19	3n:11	np:13	na:19	2np:2	2na:11	np:4	2np:2	p:5				
za060150	n:47	2n:21	3n:11	np:12	na:23	2np:2	2na:11	np:4	2np:2	p:5				
za061147	np:5													
za061148	np:5													
za061148m	np:5	na:5												
za061149	np:5													
za061151	n:62	2n:26	3n:18	np:25	na:26	2np:6	2na:18	np:4	2np:2	p:5				
za062144	n:46	2n:14	3n:2	np:24	na:24	2np:2	2na:2	np:4	2np:2	p:5				
za062147	n:46	2n:24	3n:8	np:16	na:45	2np:8	2na:14	np:4	2np:2	p:5				
za062148	n:46	2n:24	3n:8	np:16	na:24	2np:2	2na:11	np:4	2np:2	p:5				
za062149	n:46	2n:23	3n:8	np:21	na:45	2np:8	2na:14	np:4	2np:2	p:5				
za062150	n:46	2n:23	3n:11	np:16	na:23	2np:2	2na:12	np:4	2np:2	p:5				
za062151	n:47	2n:16	3n:11	np:16	na:16	2np:8	2na:15	np:4	2np:3	p:5				
za062152	n:47	2n:21	3n:11	np:16	na:21	2np:2	2na:11	np:4	2np:2	p:5				
za062153	n:47	2n:20	3n:9	np:16	na:20	2np:4	2na:13	np:4	2np:2	p:5				
za062154	n:47	2n:17	3n:11	np:16	na:18	2np:2	2na:9	np:4	2np:2	p:5				
za063152	np:5													
za063153	n:13	2n:13	3n:2	np:13	na:13	np:2	na:2							
za064152	n:5	2n:5	3n:5	np:5	nd:5	nt:5	na:5	2np:5	2na:5	np:5	2np:5	nd:5	nt:5	na:5 2na:5
za064155	n:65	2n:20	3n:4	np:20	na:20	2np:3	2na:12	np:4	2np:2	p:5				
za064156	n:65	2n:49	3n:49	np:49	na:49	2np:13	2na:49	np:4	2np:2	p:5				
za064157	n:65	2n:25	3n:37	np:24	na:25	2np:49	2na:25	np:4	2np:2	p:5				
za064158	n:65	2n:12	3n:2	np:11	na:12	2np:2	2na:2	np:3	2np:2	p:5				
za064160	n:65	2n:25	3n:25	np:25	na:25	2np:25	2na:38	np:4	2np:2	p:5				
za065159	np:5													
za065160	n:53	2n:16	3n:8	np:16	na:16	2np:9	2na:9	np:4	2np:3	p:5				
za066156	n:45	2n:16	3n:2	np:17	na:19	2np:2	2na:8	np:4	2np:2	p:5				
za066158	n:45	2n:16	3n:2	np:16	na:18	2np:2	2na:6	np:4	2np:2	p:5				
za066160	n:40	2n:19	3n:2	np:16	na:20	2np:2	2na:6	np:4	2np:2	p:5				
za066161	n:46	2n:18	3n:4	np:16	na:18	2np:2	2na:11	np:4	2np:2	p:5				
za066162	n:46	2n:16	3n:6	np:16	na:16	2np:2	2na:6	np:4	2np:2	p:5				
za066163	n:46	2n:16	3n:4	np:16	na:16	2np:2	2na:8	np:4	2np:2	p:5				
za066164	n:38	2n:16	3n:8	np:14	na:16	2np:2	2na:6	np:4	2np:2	p:5				
za067166m	n:55	2n:25	3n:6	np:23	na:25	2np:6	2na:8	np:4	2np:3	p:5				
za074180	n:20	2n:12	3n:3	np:12	2np:2	np:4	2np:2	p:5						
za074182	n:20	2n:12	3n:3	np:7	2np:2	np:4	2np:2	p:5						
za074183	n:20	2n:13	3n:3	np:5	2np:3	np:4	2np:3	p:5						
za074184	n:20	2n:12	3n:3	np:4	2np:2	np:4	2np:2	p:5						
za074186	n:21	2n:11	3n:3	np:3	2np:2	np:4	2np:2	p:5						
za076192	n:5	2n:5	3n:5	np:5	nd:5	na:5	2na:5	np:5	nd:5	na:5	2na:5			
za077191	n:48	2n:33	3n:16	np:20	na:34	2np:2	2na:36	np:4	2np:2	p:65				
za077193	n:58	2n:20	3n:9	np:20	na:20	2np:2	2na:9	np:4	2np:2	p:65				
za081000	n:5	2n:5	np:5	na:5										
za082204	n:5	2n:5	3n:5	np:5	na:5	np:5	na:5							
za089225	n:5	2n:5	3n:5	4n:5										
za089226	n:5	2n:5	3n:5	4n:5										
za089227	n:5	2n:5	3n:5	4n:5										
za090227	n:5	2n:5	3n:5	4n:5										
za090228	n:5	2n:5	3n:5											
za090229	n:5	2n:5	3n:5	4n:5										
za090230	n:5	2n:5	3n:5	4n:5										
za090231	n:5	2n:5	3n:5	4n:5										
za090232	n:20	2n:17	3n:12	f:4	np:15	na:18	2np:2	2na:11	np:4	2np:2	p:5			
za090233	n:5	2n:5	3n:5	4n:5										
za090234	n:5	2n:5	3n:5	4n:5										
za091229	n:5	2n:5	3n:5											
za091230	n:5	2n:5	3n:5	4n:5										
za091231	n:20	2n:4	3n:3	f:7	np:4	2np:3	np:4	2np:3	p:5					
za091232	n:5	2n:5	3n:5	4n:5										
za091233	n:20	2n:4	3n:3	f:7	np:4	2np:3	np:4	2np:3	p:5					
za092230	n:5	2n:5	3n:5											
za092231	n:5	2n:5	3n:5											
za093234	n:5	2n:5	3n:5											
za093235	n:5	2n:5	3n:5											
za093236	n:5	2n:5	3n:5	4n:5										
za093238	n:5	2n:5	3n:5	4n:5										
za093239	n:5	2n:5	3n:5	4n:5										
za094236	n:5	2n:5	3n:5											
za094237	n:5	2n:5	3n:5											
za094238	n:5	2n:5	3n:5											
za094241	n:5	2n:5	3n:5	4n:5										
za094242	n:5	2n:5	3n:5	4n:5										
za094244	n:5	2n:5	3n:5	4n:5										
za094246	n:5	2n:5	3n:5	4n:5										
za095240	n:5	2n:5	3n:5											
za095244m	n:5	2n:5	3n:5	4n:5										
za096240	n:5	2n:5	3n:5											
za096241	n:5	2n:5	3n:5											
za096242	n:5	2n:5	3n:5											
za096243	n:5	2n:5	3n:5											
za096244	n:5	2n:5	3n:5											
za096245	n:5	2n:5	3n:5	4n:5										
za096246	n:5	2n:5	3n:5											
za096247	n:5	2n:5	3n:5	4n:5										
za096248	n:5	2n:5	3n:5	4n:5										
za096249	n:5	2n:5	3n:5	4n:5										
za096250	n:5	2n:5	3n:5	4n:5										
za097245	n:5	2n:5	3n:5											
za097246	n:5	2n:5	3n:5	4n:5										

TABLE III: Targets and reactions with $L > 0$ Legendre multipoles in ENDL2011 MCF processing for exit distributions. The number shows the maximum multipole L in the source evaluation.

Target ZA	Reactions:L			
za097247	n:5	2n:5	3n:5	4n:5
za097248	n:5	2n:5	3n:5	4n:5
za097249	n:5	2n:5	3n:5	4n:5
za097250	n:5	2n:5	3n:5	4n:5
za098246	n:5	2n:5	3n:5	
za098248	n:5	2n:5	3n:5	
za098249	n:5	2n:5	3n:5	4n:5
za098250	n:5	2n:5	3n:5	4n:5
za098251	n:5	2n:5	3n:5	4n:5
za098252	n:5	2n:5	3n:5	4n:5
za098253	n:5	2n:5	3n:5	4n:5
za098254	n:5	2n:5	3n:5	4n:5