

ENDF Bugs ("Outstanding Problems")

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Trackers vs. ADVANCE (man vs. machine)

- **Machines are stupid, but can be automated**
 - ADVANCE has found many many bugs, many of which can be fixed automatically
- **People behave stupidly and really don't like to be automated**
 - The ENDF trackers are full of human generated errors, some of which are easy to fix (e.g. MAT number errors)
 - Many however, defy fixing (energy balance)

Deficiencies noted by ADVANCE

(these are candidates for automatic fixing)

- **checkr** There is an error in an interpolation table for this data set: 2x
- **fizcon** All probability distributions should be normalized to 1, this one isn't.: 2x
- **fizcon** Data for a reaction started at a minimum E_{in} that is incorrect, based upon reaction's Q value.: 1x
- **fizcon** Outgoing energy E' not energetically allow: $E' \leq E - Q$.: 7x
- **fizcon** The cross section and an outgoing distribution don't span the same energy region.:7x
- **fudge-4.0** Calculated and tabulated Q values disagree.: all of them
- **fudge-4.0** Calculated and tabulated thresholds don't agree: 28x
- **fudge-4.0** Energy doesn't balance: all of them
- **fudge-4.0** Energy range of data set does not match cross section range: 124x
- **fudge-4.0** Found a negative probability: 61x
- **fudge-4.0** Unnormalized outgoing probability distribution: most of them
- **njoy2012** An angular distribution is negative: 61x
- **njoy2012** Outgoing energy E' not energetically allow: $E' \leq E - Q$.: 42x

In 2013 CSEWG meeting, I got the OK to make these fixes; I started writing the fixer code but it's not done

■ Mass related fixes:

- Sync masses,
- Q values,
- thresholds and
- end-points of E' spectra

■ Probability fixes:

- Normalizations of all probabilities
- Put floor of zero on all probability distributions

■ Synchronize energy ranges between cross sections, distributions

■ Line number removal

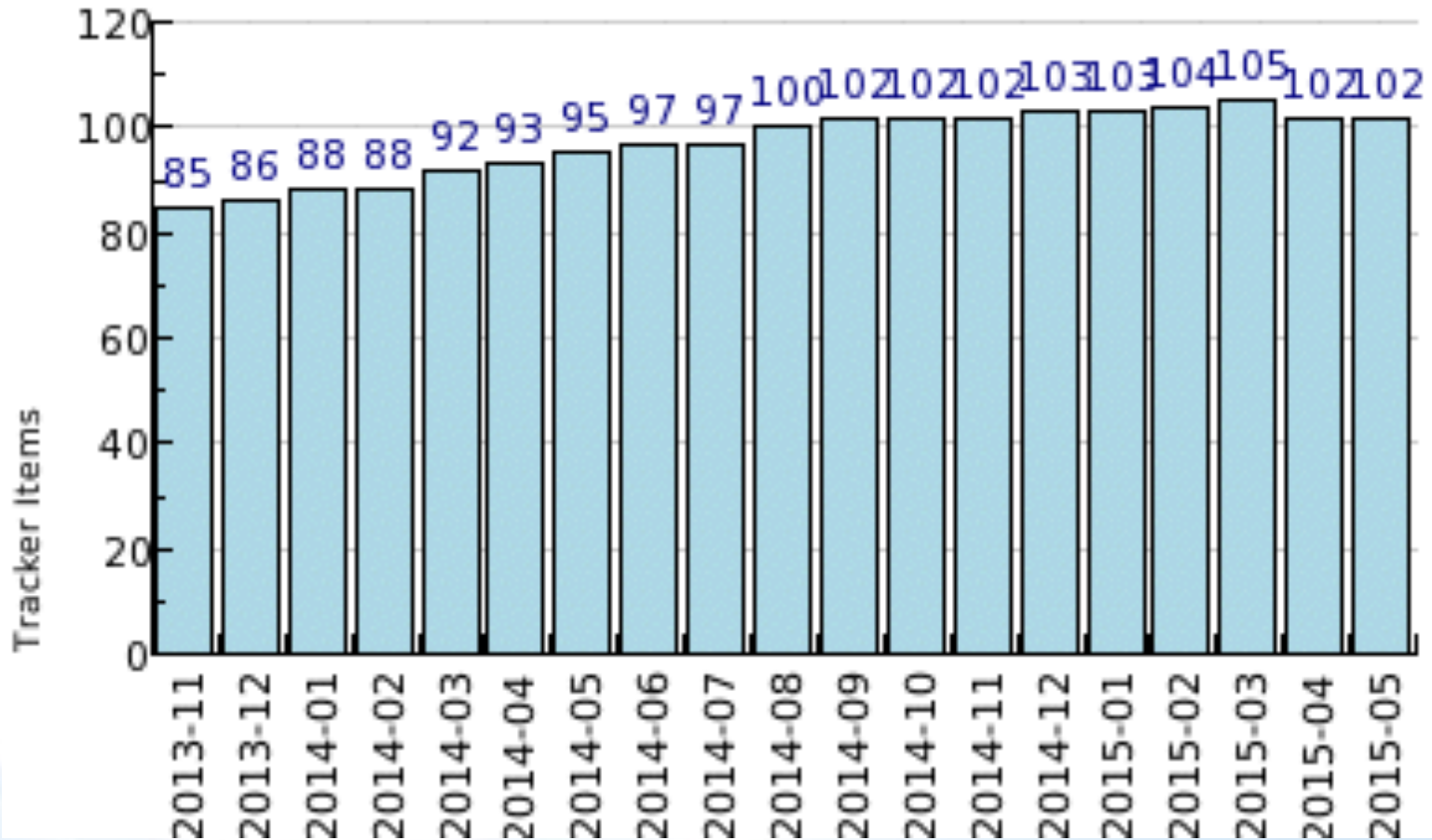
2-3 weeks effort to implement

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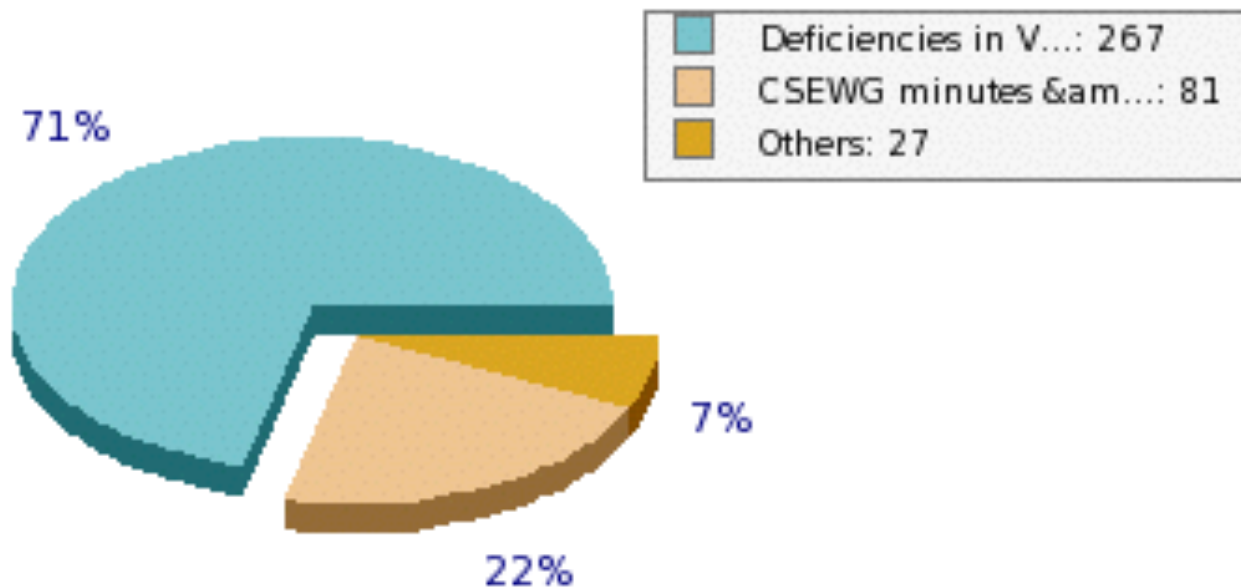
Summary of current deficiencies in GForge

Tracker Items That Remained Open In Each Month



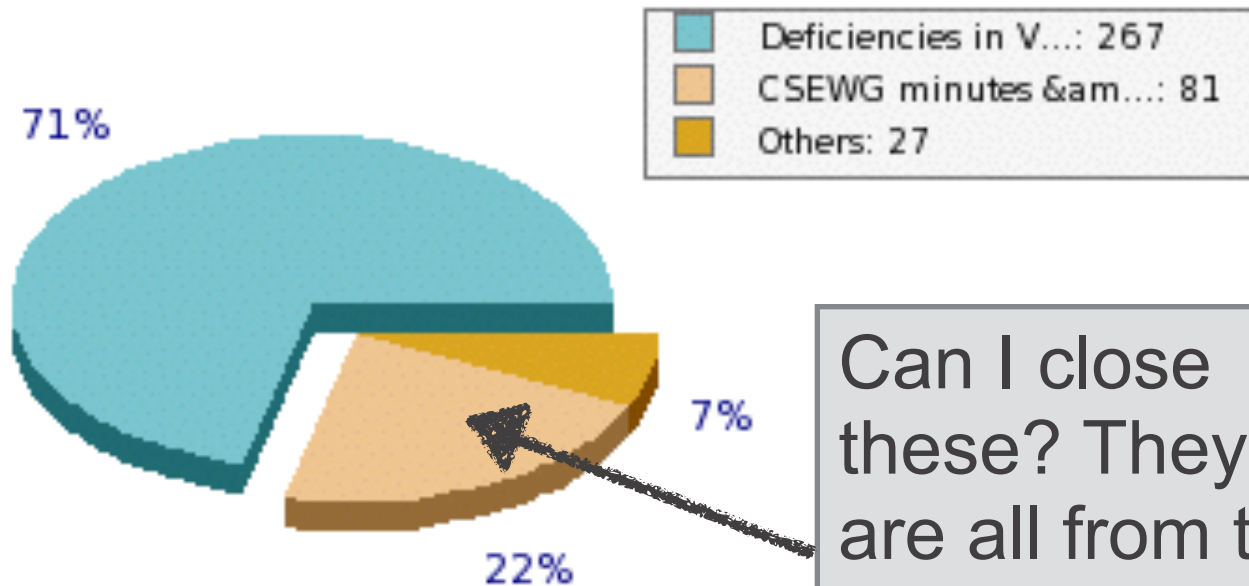
Summary of current deficiencies in GForge

Tracker Items By Tracker



Summary of current deficiencies in GForge

Tracker Items By Tracker



Can I close these? They are all from the 2010 CSEWG meeting

Deficiencies in Decay Sub Library

TrackerIt	Summary	Priority	Status	Open Date	Close Da	Last Modified
218	Unspecified: Inconsistencies in half-lives	4	Closed	2009-12-07	2015-05	2009-12-07
237	Unspecified: Fission beta-spectra 40% lower than in VI.8	4	Closed	2009-12-07	2015-05	2009-12-07
238	Unspecified: Masses (AWR) inconsistent	4	Closed	2009-12-07	2015-05	2009-12-07
239	Sb-129: Inconsistency in beta decay	4	Closed	2009-12-07	2015-05	2009-12-07
240	Rh-102 Rh-102m: Warning statement in MT451	4	Open	2009-12-07		2009-12-07
816	a problem with the Half-life of Rf-261 or Rf 261m in ENDF VII 1	3	Closed	2013-09-25	2015-05	2013-09-25
826	Kr-90	3	Open	2013-10-31		2013-10-31
840	Er-145 listed as stable	4	Open	2014-03-11		2014-03-14
895	Se-80 listed as radioactive with zero half life	3	Open	2014-09-02		2014-09-02

green == fixed
yellow == easy fix

Deficiencies in Thermal Scattering Law Sub Library

TrackerIt	Summary	Priority	Open Date	Follow-ups
232	O in BeO U in UO2: MAT numbers for thermal scat.	4	2009-12-07	TO DO: trivial fix
233	H in H2O: Wrong ZA value	4	2009-12-07	TO DO: trivial fix
692	U(UO2) and O(UO2) reversed	3	2012-06-25	TO DO: trivial fix

green == fixed
yellow == easy fix

Gamma sublibrary

TrackerIt	Summary	Status	Open Date	Follow-ups
858	Mass of deuteron incorrect	Open	2014-05-07	e- mass taken off here, not done in neutron sub library. ENDF manual says to use atomic mass for all targets, so we need to put the electrons back. This will mess up kinematics. Need new evaluation or better rule.
860	Th-232 fissile goofs part 1	Closed	2014-06-05	LFI flag flipped
861	Th-232 fissile goofs part 2	Open	2014-06-05	laudable goal to have prompt and delayed nubar, but often best we can do is the total nubar, such as was done here.

green == fixed

yellow == easy fix

white == isotope fix

red == major fix spanning several isotopes

Deuteron sublibrary

TrackerIt	Summary	Status	Open Date	Follow-ups
236	H-2: Energy range too short in the (d n) reaction	Open	2009-12-07	need new evaluation, evaluation stops at 10 MeV
857	Mass of deuteron incorrect d+d evaluation	Open	2014-05-07	e- mass taken off here, not done in neutron sub library. ENDF manual says to use atomic mass for all targets, so we need to put the electrons back. This will mess up kinematics. Need new evaluation or better rule.

green == fixed

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white == isotope fix

red == major fix spanning several isotopes

Proton sublibrary

TrackerItemID	Summary	Status	Open Date	Follow-ups
234	H-3: Energy range too short in the $3\text{H}(p,n)^3\text{He}$ reaction	Open	2009-12-07	need new evaluation, all cross section stop at 12 MeV
235 a	Ca-40: Inconsistent energy ranges in MF3 and MF6	Open	2009-12-07	
235 b	Cu-63: Inconsistent energy ranges in MF3 and MF6	Open	2009-12-07	
669	Pb207 outgoing energies out of order	Open	2012-02-23	

green == fixed

yellow == easy fix

white == isotope fix

red == major fix spanning several isotopes

nFPY sublibrary

TrackerIt	Summary	Status	Open Date	Follow-ups
702	241Pu in the rare earth region	Open	2012-08-29	need revaluation
703	As-84m doesn't exist but we have a fission yield for it	Open	2012-08-29	need revaluation
812	FPY has non-existent metastable states	Open	2013-09-06	need revaluation
841	IFPY > CFPY for Pu-239	Open	2014-03-14	need revaluation

green == fixed

yellow == easy fix

white == isotope fix

red == major fix spanning several isotopes

.... and neutrons

TrackerIt	Summary	Status	Open Date	Follow-ups
196	Be7: Incomplete evaluation	Open	2009-12-07	--- Posted By atrkov on 2010-06-28 16:31:38: Message
199	U-235 238 Pu-239: Too coarse fission spectra	Open	2009-11-02	--- Posted By dbrown on 2011-10-21 11:08:44: 235U re
204	Eu-153: Negative distributions	Open	2009-12-07	--- Posted By jlconlin on 2012-10-26 13:41:21: Still exist
208	Mg-26 S-34 K-39: Problems with energy balance	Open	2009-12-07	--- Posted By atrkov on 2010-07-09 13:58:11: The inela
209	Mo-100: Unphysical peak in MF5 MT91	Open	2009-12-07	--- Posted By atrkov on 2010-07-02 13:20:20: Mo-100:
213	Np-237: Thermal value to be updated	Open	2009-12-07	
220	Sn-122 Sn-120: Neutron widths of resonances	Open	2009-12-07	
223	Te-132: Problems with energy balance wrong Legendre expansion	Open	2009-12-07	--- Posted By atrkov on 2010-07-09 14:31:30: The phot
285	Cr-52: Discrepancy between MT451 and processed file	Open	2010-03-10	
290	Li-6: Thermal capture uncertainty too small	Open	2010-05-03	--- Posted By atrkov on 2010-07-06 12:04:08: Li-6 is a
292	Cl-35: negative cross sections	Open	2010-06-02	--- Posted By mherman on 2010-06-02 16:00:54: We n
313	AWR values differ from Audi-Wapstra 2003 compilation	Open	2010-07-05	

green == fixed
yellow == easy fix
white == isotope fix
red == major fix spanning several isotopes
grey == automated fix possible
blue == CIELO should fix
purple == energy balance

.... and neutrons (gulp)

314	Na-22: Negative cross sections	Open	2010-07-09	--- Posted By mherman on 2010-07-09 14:22:27: I disa
315	Cl-35 capture above resonance range	Open	2010-07-11	
316	Cl-37 capture above the resonance range	Open	2010-07-11	
317	Delayed neutron spectra missing in library version 93	Open	2010-07-12	
570	Kr-78: Energy balance	Open	2011-04-12	
571	F-19; Energy balance	Open	2011-04-12	
599	Energy balance	Open	2011-06-14	
600	Update H1 H2 H3 He3 He4 Li6 Li7 charges particle emissions	Open	2011-06-21	
603	U235 U238 Pu239 Use Madland 2006 systematics for fission energy release EFR ENP and EGP	Open	2011-09-05	--- Posted By morgan on 2011-09-05 09:35:49: Mark C
624	229Pa level scheme incorrect	Open	2011-10-19	
625	remove redundant MF3 in RRR	Open	2011-10-21	
626	modify parameters for 1st resonance in U-236	Open	2011-10-21	
631	50V 49Ti 65 67 68 70Zn and 93Nb have probability tables with incorrect normalization	Open	2011-10-21	
633	240Pu(n el) thermal cross section is very low	Open	2011-10-21	
636	Neutron outgoing energy too high for MF=5 files in 40Ar	Open	2011-10-28	
637	Neutron outgoing energy too high for MF=5 files in 230Sn	Open	2011-10-28	

.... and more neutrons

638	Neutron outgoing energy too high for MF=5 files in 174Hf	Open	2011-10-28	
639	Neutron outgoing energy too high for MF=5 files in 176Hf	Open	2011-10-28	
640	Neutron outgoing energy too high for MF=5 files in 177Hf	Open	2011-10-28	
641	Neutron outgoing energy too high for MF=5 files in 178Hf	Open	2011-10-28	
642	Neutron outgoing energy too high for MF=5 files in 179Hf	Open	2011-10-28	
643	Neutron outgoing energy too high for MF=5 files in 180Hf	Open	2011-10-28	
645	55Mn(n a) agreement with data very poor	Open	2011-10-28	
658	239Pu MT=3 file should be redundant but it isn't	Open	2011-12-16	
660	2H (deuterium) MT=16 MF=6 data in wrong frame?	Open	2011-12-22	
664	204Pb outgoing gamma tables have bad norms	Open	2012-01-30	
665	Covariances for 55Mn angular distributions have negative variances	Open	2012-01-30	--- Posted By atrkov on 2012-01-30 13:31:57: The first
668	Incorrect covariance values for Li7(n gamma)	Open	2012-02-09	
689	Cf249: MF=3 MT=57 and 58 have exactly the same Q value	Open	2012-06-05	--- Posted By dbrown on 2012-06-05 11:32:11: The EN

... and yet more neutrons

690	Li-6 MT #s 51-80 have wrong QM	Open	2012-06-05	
691	Major problems with elastic scattering Westcott factors	Open	2012-06-08	
694	Am241 and Am243: convert parameterized Madland-Nix data to pointwise?	Open	2012-07-13	
710	Confused ground-state spin for Rh-105	Open	2012-10-15	
711	Negative (n el) in Fe-56	Open	2012-10-16	
712	Negative (n el) in Ni-61	Open	2012-10-16	
738	Discontinuity in Pu242 (n el)	Open	2012-10-31	--- Posted By dbrown on 2012-10-31 13:17:43: This see
765	40-48Ca have incorrect normalization for MT=102 gammas	Open	2013-01-15	
766	123 124Xe have incorrect normalization for MT=102 gammas	Open	2013-01-15	
767	180 181Ta have incorrect normalization for MT=102 gammas	Open	2013-01-15	
768	185 187Re have incorrect normalization for MT=102 gammas	Open	2013-01-15	
769	204 106 107Pb have incorrect normalization for MT=102 gammas	Open	2013-01-15	
770	231Pa 233Pa 232Th PFNS incident energy grid too coarse < 100 keV	Open	2013-01-15	--- Posted By dbrown on 2013-02-06 10:19:34: 232Th v
777	Np-237 fission cross section	Open	2013-02-15	
778	Negative values in distributions for U235 and Pu239	Open	2013-03-12	

... still more neutrons? gimme a break!

788	Incorrect levels in MF8 for W-180 182 and 183	Open	2013-05-02	--- Posted By cmattoon on 2013-05-02 17:55:33: Oops
802	Incorrect QM for Pb208 MTs 649 699 749 and 849	Open	2013-06-03	patch included
807	58Co(n p) partials not equalling total	Open	2013-07-11	--- Posted By dbrown on 2013-07-11 10:52:01: <p> Ke
811	natC: 3.2 MeV line missing from (n n')	Open	2013-08-07	--- Posted By dbrown on 2013-08-07 07:43:08: <p> BT
814	N14 has MT28 (n np) and MT32 (n nd) gammas but no cross section	Open	2013-09-17	
815	Four rarely used isotopes have illegal total angular momenta in the RRR	Open	2013-09-24	no one will notice if we fix them
827	Problem with Sb124 MT91 neutron distribution at threshold	Open	2013-11-01	
828	Negative distribution in Sm151 (n 2np)	Open	2013-11-09	
829	Another problem in Sm151	Open	2013-11-09	
836	Re-185 Re-187 scattering lengths too low	Open	2013-12-18	--- Posted By dbrown on 2013-12-18 08:48:35: <p> Br
837	Mass of H2 in n-001_H_001	Open	2014-01-13	
839	B-10: Covariance of inelastic cross section	Open	2014-01-29	
845	Strong discontinuity in 35Cl(n p) at RRR-Fast transition	Open	2014-03-21	

oh god, is this it?

851	Cu63 & Cu65 angular distributions have duplicate points	Open	2014-04-10	
855	NC-type covariances of O-16 Pb-204 ... refer to other NC-type covariances	Open	2014-04-23	Inconvenient, but allowed in ENDF; patch to fix included
878	natC uses Kalbach-Mann systematics	Open	2014-08-01	
888	237Np: gamma production above 549 keV is too small	Open	2014-08-20	
892	Cross-reaction covariances of Np-237 are typed in wrong order	Open	2014-08-26	
896	W: Fake residual specified for fission	Open	2014-09-19	
925	B11 elastic angular distribution dips below zero	Open	2014-12-17	
929	Th-232 has wrong NLIB value	Closed	2015-02-17	In ENDF/VII.1, but since fixed
934	MAT number for O18	Open	2015-03-25	

Major issues that defy fixing

- energy balance!!!!

Major issues that affect several evaluations

- d mass: with e- or without e-
- Legendre moment data with absurd Lmax
- PFNS grid too coarse
- incomplete evaluation (usu. through 8Be^*)
- total nubar, but no prompt or delayed nubar