Benchmark Input/Output Format Specification

This document describes the format to be used for input/output comparison of benchmark data. The format is designed to be as user-friendly as possible to both human reader and computer codes.

When sending data files for benchmark input/output comparison, participants should also provide the following information,

```
# Date: …
# Lab: …
#
# Benchmark step: 1 or 2 or 3 (with or without integral correlation)
# Status: input or output
```

The scientific format (e.g. E12.4) should generally be used except for correlation, which values (*1000) should be given as integer. Integral C/E values for reactivity data should be given with 5 digits (e.g. E13.5). Energies are sorted by increasing lethargy. See the <u>sample files</u> and following description for details.

Nuclear data

The following quantities can be adjusted:

MF3/MT2	Elastic scattering infinite-dilution cross section,
MF3/MT4	Total inelastic scattering infinite-dilution cross section,
MF3/MT101	Neutron-disappearance infinite-dilution cross section (mainly radiative capture, but also specific cases such as ^{10}B(n,α) and ^{23}Na(n,p) reactions),
MF3/MT251	Average cosine of elastically scattered neutrons (Mu-bar),
MF3/MT18	Fission infinite-dilution cross section,
MF1/MT456	Average prompt fission neutron multiplicity (Nu-p),
MF5/MT18	Normalized prompt fission neutron spectrum (Chi-p), averaged over incident groups,
MF1/MT455	Average delayed fission neutron multiplicity (Nu-d).

Note 1: For the sake of simplicity, we may assume MT101=MT102 (n,γ) for all isotopes except boron, for which we may assume that MT101=MT107 (n,α). Another specific case is sodium, for which we will assume that MT101=MT102 (n, γ)+MT103 (n,p).

Note 2: The adjustment of delayed nu-bar is optional. If provided, these data should be given in the last column of the file.

The following quantities are not adjusted, but should be provided for consistency check of adjusted cross sections:

MF3/MT1	Total cross section
MF3/MTS	Sum of adjusted cross sections (MT2+MT4+MT101+MT18)

Nuclear Data (cont'd)

Sample 1: nuclear_data.txt

33 groups data and relative uncertainty (1 sigma) for all nuclear data (cross sections, mu-bar, nu-p, Chi-p, nu-d) and all isotopes. If needed, a similar format can be used to provide the ^{238}U(n,n') scattered neutron spectrum for selected incident group i (MF6/MT4/Gi) at various scattering angles (or P0, P1 contributions).

Sample 2: nuclear_correl.txt

33x33 groups self- and cross-correlation(*1000) matrices for all nuclear data and all isotopes. In addition to correlations, nuclear data as well as absolute and relative uncertainties are given again to facilitate computer use of this file (e.g. for calculation of the covariance or for uncertainty propagation).

Integral data

Sample 3: integral_data.txt

Initial and final C/E value and associated relative uncertainty (1 sigma) on the calculated (C) and experimental (E) values for all integral quantities of all experiments.

In addition, this file may contain isotope/reaction contributions to the integral data uncertainty (see "Calculation of isotope/reaction contributions to integral data uncertainty" for more information).

Sample 4: integral_correl.txt

20x20 correlation(*1000) matrix of integral quantities numbered as in the *"integral_data"* file.

Sensitivity coefficients

Sample 5: sensitivity_JEZEBEL.txt

33 groups sensitivity coefficients of all integral quantities (for one experiment) to all nuclear data. Summation of sensitivity coefficients over energy and nuclear data of one specific isotope are also given for every integral quantity.

Additional information

Sample 6: info.txt

Additional quantitative information provided by the participants: e.g. global chi-square, computing time …