LA-UR-13-23395
Approved for public release; distribution is unlimited.

Title:	Summary of DBCN Options in MCNP6
Author(s):	Hughes, H. Grady III
Intended for:	MCNP6 manual and release documentation.
Issued:	2013-05-09

MCNP Coding Notes

LA–UR–13–23395 May 9, 2013

Summary of DBCN Options in MCNP6

H. Grady Hughes

ABSTRACT

The functions of the DBCN card in MCNP6 have expanded considerably beyond their original uses for debugging and other low-level control of the code, and now include a variety of options affecting the general operation and physics of the transport process. In this document, we present a concise table summarizing the functions of this card. This document refers specifically to the first production release of MCNP6.

DBCN Entry	Value	Function	Default
1		Obsolescent: Effect of "RAND seed="	19073486328125
2		One-line debug print interval.	no debug prints.
3		First history number for event log printing.	0
4		Last history number for event log printing.	0
5		Maximum number of events per history in the event log.	600
6		Detector/DXTRAN underflow limit. $50 \le$ DBCN(6) ≤ 200	80.0
7	= 0 ≠ 0	No print from volume and surface area calculations. Generate a detailed print from these calculations.	0
8		Obsolescent: Effect of "RAND hist="	1
9		A tolerance: distance between repeated-structures surfaces to be considered coincident.	10^{-4} cm.
10	—	Not used.	—
11	= 0 ≠ 0	Collision events not printed in event logs for lost particles. Print the collision events in these event logs.	0
12		Expected number of random numbers.	0 (test ignored)
13		Obsolescent: Effect of "RAND stride="	152917

14		Obsolescent: Effect of "RAND gen="	1
15	= 0 ≠ 0	Normal selection of statistical quantities printed. Also print shifted center and VOV for each bin.	0
16		Scale the history score grid for print tables 161 and 162.	1.0
17		Developers only: study electron angular deflection methods	0: current best
18	= 2 = 1 = 0	New detailed logic for Landau electron energy straggling. ITS (“nearest group boundary”) logic. MCNP (“bin centered”) logic.	2
19		Developers only: study quadratic polynomial interpolation.	0: current model
20–22	—	Not used.	—
23	= 0 = 1 = –1	Use PHTVR trees if VR present, otherwise not. Force PHTVR trees whether needed or not. Do not use PHTVR trees.	0
24–26	—	Not used.	—
27	= 0 = 1	Do not promote anti-particles Promote anti-particles on MODE card and certain tallies. (Certain restrictions may apply.)	0
28		Bank size	2048 … or … 128 criticality 16384 hi-energy
29–31	—	Not used.	—
32	= 0 ≠ 0	Normal GENXS behavior. Use internal bremsstrahlung spectrum generation with CEM and LAQGSM models for GENXS.	0
33	≠ 0 = 0	Additional interpolation/smoothing for de/dx for ions. Skip this extra manipulation.	 0

34		Developers only: reproduce a bug in μ^- induced gammas.	0: corrected
35	= 0 ≠ 0	Slight spreading of nuclear excitation during μ^- capture. Turn off this behavior.	0
36	= 0 ≠ 0	Use user-provided data for μ^- induced gammas if available. Use only older data hard-coded in MCNPX.	0
37		Set minimum of internal bremsstrahlung spectrum for CEM and LAQGSM in GENXS when dbcn(32) ≠ 0.	30 MeV
38	= 0 ≠ 0	Use Barashenkov/Polanski data file barpol2001.dat Use older barpol.dat file from 1996.	0
39	= 0 ≠ 0	Use default S(α,β) sampling treatment (from MCNP5). Use MacFarlane/Little treatment (from MCNPX).	0.
40		Developers only: control writing of mcplib and xsdir lines.	0
41		Developers only: for printing photon/electron data.	0
42	= 0 > 0 < 0	Use default integrated method for model cross sections. Use original MCNPX model cross section method. Use earlier MCNP6 method (MARS coding).	0
43		Developers only: controls photon form factor interpolation.	2: best method
44		Developers only: study coherent scattering in isolation.	0: all processes.
45	= 0 ≠ 0	Use MCNP6 elastic scattering method. Use earlier MCNPX elastic scattering method.	0
46	—	Not used.	—
47	= 0 ≠ 0	Use Clem model for cosmic ray spectra. Use Lal model.	0
48	= 0 ≠ 0	Allow MCNP to forbid threading when not suitable. Insist on threading if requested.	0

49	= 0 ≠ 0	Normal input checking. Skip some lattice input checks to save time in initialization.	0
50	= 0 ≠ 0	Normal printing of tally fluctuation charts. More precision in error and variance of the variance.	0
51		Developers only: turn off photon-induced fluorescence.	0: not turned off
52		Developers only: turn off Compton-induced relaxation.	0: not turned off
53	= 0 ≠ 0	Use new ENDF photoelectric relaxation data if available. Use traditional (limited) pre-ENDF/B VI.8 treatment.	0
54	= 0 ≠ 0	Old sampling for ENDF Law 9 for 10^8 tries, then new. New, improved sampling method.	0
55–60	—	Not used.	—
61		Developers only: models of knock-on electron angles.	0
62		Developers only: control single-event electron excitation. .	0
63		Developers only: control single-event elastic scattering.	0
64		Developers only: control knock-on angular deflection.	0
65		Developers only: control deflection of ionizing electron.	0
66		Developers only: control single-event bremsstrahlung angle	0
67		NPS of first calculation of average contributions to point detectors and DXTRAN spheres.	NPS of first tally fluctuation report
68	—	Not used.	—
69		Increase limits on certain arrays (after certain fatal errors).	—
70		Developers only: debug choice of some interaction models.	0
71	= 0 ≠ 0	Allow model photonuclear capability. Prohibit model photonuclear capability.	0
72	= 0 ≠ 0	Explicit log-log interpolation in ELXS_MOD. Random linear interpolation.	0