6.9 APPENDIX – SAMPLE GEMER INPUT

Table 6.15 – Sample input summary

Figure No.	Case FILE ID	Description
A. Homogeneous UO_2 and H_2O Cases		
6.24a	npcut_25.in	Damaged single package, theoretical UO_2 + H_2O mixture, wtfr H_2O = 0.25, maximum burn
6.24b	npc6um60.in	Infinite undamaged array: 60 kgs theoretical UO_2 + H_2O mixture, wtfr H_2O = 0.28504 (ICCA full)
6.24c	npca2_60.in	Damaged package array: 60 kgs UO_2 + H_2O mixture per canister, CTU-2 observed burn
6.24d	npcat_60.in	Damaged package array: 60 kgs UO_2 + H_2O mixture per canister, maximum burn
B. Heterogeneous 55Kg and 53Kg UO_2 Cylindrical Fuel Element Lattice Cases		
6.25a	ESTP-400.in	Damaged single package, 17X17 pellet type triangular lattice with overlap, 55 kg UO_2, W/F = 4.00
6.25b	CSTN-470.in	Infinite undamaged array, 17X17 pellet type triangular lattice with no overlap, 53 kg UO_2, W/F = 4.70
6.25c	ST55-486.in	Damaged package array, 17X17 pellet type triangular lattice by VFO, 55 kg UO_2, W/F = 4.86
C. Heterogeneous 46 Kg UO_2 Cylindrical Fuel Element Lattice Lattice Cases		
6.26a	MTSL-540.in	Damaged single package, 0.100" cylinder diameter, square lattice by VFO, 46 kg UO_2, W/F = 5.40
6.26b	ABTL-490.in	Infinite undamaged array, 0.100" cylinder diameter, triangular lattice by VFO, 46 kg UO_2, W/F = 4.90
6.26c	BT46-600.in	Damaged package array, , 0.100" cylinder diameter, triangular lattice by VFO, 46 kg UO_2, W/F = 6.00

A. Homogeneous UO_2 and H_2O Cases

Figure 6.24a – Sample input file = npcut_25.in

```
2000.NPC,,,,CYL,,UO2,5.00%,WTFR=VAR.,SS,,,CD,CE
/*ECHO
/*TITLE
  200 2000   10    0    0    1    0    0
    0  293    0    0
\CSXSEC\UO2\GUO2-50.25
\CSXSEC\NOU\GNOU-0.SS
\CSXSEC\NOU\GNOU-0.CAD
\CSXSEC\NOU\GNOU-0.POL 0.98
\CSXSEC\NOU\GNOU-0.F07 0.90
\CSXSEC\NOU\GNOU-0.WAT
\CSXSEC\NOU\GNOU-0.F11 0.90
\CSXSEC\NOU\GNOU-0.F15 0.90
\CSXSEC\NOU\GNOU-0.F40 0.90
\CSXSEC\NOU\GNOU-0.ORC
KENO GEOM
    0  /* # OF REGIONS OR ZERO
    0  /* # OF BOX TYPES OR ZERO
    1  /* # OF BOXES IN X DIRECTION
    1  /* # OF BOXES IN Y DIRECTION
    1  /* # OF BOXES IN Z DIRECTION
    1  /* BOUNDARY CONDITION OPTION
    1  /* STARTING SOURCE OPTION
    1  /* COMPLEX EMBEDDED OPTION
    0  /* # OF PRINT PLOTS
      0.0       0.0       0.0       0.0       0.0       0.0
BOX TYPE     1  /* inner canister: bottom fuel region #1 w/ gap: body assy
CYLINDER     1  10.8141  0.31750  0.00000                              16*.5
CYLINDER     2  10.9233  0.31750  0.00000                              16*.5
CYLINDER     0  12.4092  0.31750  0.00000                              16*.5
CYLINDER     2  12.4092  0.31750 -0.44200                              16*.5
CYLINDER     2  12.4612  0.31750 -0.44200                              16*.5
CYLINDER     0  12.7000  0.31750 -0.44200                              16*.5
```

```
CYLINDER     2  12.7635  0.31750 -0.50550                                16*.5
BOX TYPE     2  /* inner canister: fuel_region #2: body assy
CYLINDER     1  10.8141  25.4635   0.0000                                16*.5
CYLINDER     2  10.9233  25.4635   0.0000                                16*.5
CYLINDER     3  10.9614  25.4635   0.0000                                16*.5
CYLINDER     4  12.4092  25.4635   0.0000                                16*.5
CYLINDER     2  12.4612  25.4635   0.0000                                16*.5
CYLINDER     0  12.7000  25.4635   0.0000                                16*.5
CYLINDER     2  12.7635  25.4635   0.0000                                16*.5
BOX TYPE     3  /* inner canister: fuel_region #3, 0.15" cd gap: body assy
CYLINDER     1  10.8141  0.38100  0.00000                                16*.5
CYLINDER     2  10.9233  0.38100  0.00000                                16*.5
CYLINDER     0  10.9614  0.38100  0.00000                                16*.5
CYLINDER     4  12.4092  0.38100  0.00000                                16*.5
CYLINDER     2  12.4612  0.38100  0.00000                                16*.5
CYLINDER     0  12.7000  0.38100  0.00000                                16*.5
CYLINDER     2  12.7635  0.38100  0.00000                                16*.5
BOX TYPE     4  /* inner canister: fuel_region #4: body assy
CYLINDER     1  10.8141  25.4635   0.0000                                16*.5
CYLINDER     2  10.9233  25.4635   0.0000                                16*.5
CYLINDER     3  10.9614  25.4635   0.0000                                16*.5
CYLINDER     4  12.4092  25.4635   0.0000                                16*.5
CYLINDER     2  12.4612  25.4635   0.0000                                16*.5
CYLINDER     0  12.7000  25.4635   0.0000                                16*.5
CYLINDER     2  12.7635  25.4635   0.0000                                16*.5
BOX TYPE     5  /* inner canister: fuel_region #5, 0.15" cd gap: body assy
CYLINDER     1  10.8141  0.38100  0.00000                                16*.5
CYLINDER     2  10.9233  0.38100  0.00000                                16*.5
CYLINDER     0  10.9614  0.38100  0.00000                                16*.5
CYLINDER     4  12.4092  0.38100  0.00000                                16*.5
CYLINDER     2  12.4612  0.38100  0.00000                                16*.5
CYLINDER     0  12.7000  0.38100  0.00000                                16*.5
CYLINDER     2  12.7635  0.38100  0.00000                                16*.5
BOX TYPE     6  /* inner canister: fuel region #6: body assy
CYLINDER     1  10.8141  21.3385   0.0000                                16*.5
CYLINDER     0  10.8141  21.3385   0.0000                                16*.5
CYLINDER     2  10.9233  21.3385   0.0000                                16*.5
CYLINDER     3  10.9614  21.3385   0.0000                                16*.5
CYLINDER     4  12.4092  21.3385   0.0000                                16*.5
CYLINDER     2  12.4612  21.3385   0.0000                                16*.5
CYLINDER     0  12.7000  21.3385   0.0000                                16*.5
CYLINDER     2  12.7635  21.3385   0.0000                                16*.5
BOX TYPE     7  /* inner canister: fuel region #7: body assy
CYLINDER     1  10.8141   3.4925   0.0000                                16*.5
CYLINDER     0  10.8141   3.4925   0.0000                                16*.5
CYLINDER     2  10.9233   3.4925   0.0000                                16*.5
CYLINDER     3  10.9614   3.4925   0.0000                                16*.5
CYLINDER     4  12.4092   3.4925   0.0000                                16*.5
CYLINDER     2  12.4612   3.4925   0.0000                                16*.5
CYLINDER     0  12.7000   3.4925   0.0000                                16*.5
CYLINDER     2  12.7635   3.4925   0.0000                                16*.5
BOX TYPE     8  /* inner canister - fuel region #8: lid assy
CYLINDER     1  10.8141  0.63250  0.00000                                16*.5
CYLINDER     0  10.8141  0.63250  0.00000                                16*.5
CYLINDER     2  10.9233  0.63250  0.00000                                16*.5
CYLINDER     3  10.9614  0.63250  0.00000                                16*.5
CYLINDER     4  12.4092  0.63250  0.00000                                16*.5
CYLINDER     2  12.4612  0.63250  0.00000                                16*.5
CYLINDER     0  12.7000  0.63250  0.00000                                16*.5
CYLINDER     2  12.7635  0.63250  0.00000                                16*.5
BOX TYPE     9  /* inner canister - fuel region #9 w/ gap: lid assy
CYLINDER     1  10.8141  0.31750  0.00000                                16*.5
CYLINDER     2  10.9233  0.31750  0.00000                                16*.5
CYLINDER     0  12.4092  0.31750  0.00000                                16*.5
CYLINDER     2  12.4612  0.31750  0.00000                                16*.5
BOX TYPE    10  /* inner canister - fuel region #10 w/ ring: lid assy
CYLINDER     1  10.8141  0.44200  0.00000                                16*.5
CYLINDER     2  10.9233  0.44200  0.00000                                16*.5
CYLINDER     2  12.4092  0.44200  0.00000                                16*.5
CYLINDER     2  12.4612  0.44200  0.00000                                16*.5
BOX TYPE    11  /* inner canister - fuel region #11 w/ top: lid assy
CYLINDER     1  10.8141  1.78050  0.00000                                16*.5
CYLINDER     2  10.9233  1.91640  0.00000                                16*.5
CYLINDER     0  12.4092  1.91640  0.00000                                16*.5
BOX TYPE    12  /* inner canister cuboid: body section (7# region)
CUBOID       5  12.7636 -12.7636  12.7636 -12.7636  73.3450  -0.5055  16*.5
BOX TYPE    13  /* inner canister cuboid: body section (40# region)
CUBOID       9  12.7636 -12.7636  12.7636 -12.7636  3.49260  0.00000  16*.5
BOX TYPE    14  /* inner canister upper cylinder: lid section
CYLINDER     0  12.7636  3.30840  0.00000                                16*.5
BOX TYPE    15  /* foam cutout (void) - 40 #/ft3 foam lid section
CYLINDER     0  13.5510  3.30840  0.00000                                16*.5
BOX TYPE    16  /* npc body or lid - 10 ga. 304ss layer
CUBOID       2  54.3687 -54.3687  54.3687 -54.3687  0.31240  0.00000  16*.5
BOX TYPE    17  /* npc body or lid - 1" duraboard (void) layer, 10 ga. 304ss
CUBOID       0  51.5163 -51.5163  51.5163 -51.5163  2.54000  0.00000  16*.5
CUBOID       0  54.0563 -54.0563  54.0563 -54.0563  2.54000  0.00000  16*.5
CUBOID       2  54.3687 -54.3687  54.3687 -54.3687  2.54000  0.00000  16*.5
BOX TYPE    18  /* npc body - 4" bot. foam layer (11 #/ft3)     - face burn
CUBOID       7  42.6086 -42.6086  42.6086 -42.6086  0.00000  0.00000  16*.5
CUBOID       0  54.0563 -54.0563  54.0563 -54.0563  0.00000 -7.62000  16*.5
CUBOID       2  54.3687 -54.3687  54.3687 -54.3687  0.00000 -7.62000  16*.5
BOX TYPE    19  /* npc body - 29.0750" foam layer (7,11 #/ft3) - face burn
CUBOID       5  42.6086 -42.6086  42.6086 -42.6086  73.8505   0.0000  16*.5
CUBOID       7  42.6086 -42.6086  42.6086 -42.6086  73.8505   0.0000  16*.5
CUBOID       0  54.0563 -54.0563  54.0563 -54.0563  73.8505   0.0000  16*.5
CUBOID       2  54.3687 -54.3687  54.3687 -54.3687  73.8505   0.0000  16*.5
BOX TYPE    20  /* npc body - 1.375 " foam layer (40 #/ft3)     - face burn
CUBOID       9  42.6086 -42.6086  42.6086 -42.6086  3.49250  0.00000  16*.5
CUBOID       0  54.0563 -54.0563  54.0563 -54.0563  3.49250  0.00000  16*.5
```

```
CUBOID       2  54.3687 -54.3687  54.3687 -54.3687  3.49250  0.00000  16*.5
BOX TYPE    21  /* npc body - 30.45" two-part body
CUBOID       0  54.3687 -54.3687  54.3687 -54.3687  77.3430   0.0000  16*.5
BOX TYPE    22  /* npc lid - 1.375 " foam layer (40 #/ft3)  - lid burn
CUBOID       0  43.8963 -43.8963  43.8963 -43.8963  3.49250  0.00000  16*.5
CUBOID       0  54.0563 -54.0563  54.0563 -54.0563  3.49250  0.00000  16*.5
CUBOID       2  54.3687 -54.3687  54.3687 -54.3687  3.49250  0.00000  16*.5
BOX TYPE    23  /* npc lid - 3.5" foam layer (15 #/ft3)     - lid burn
CUBOID       0  43.8963 -43.8963  43.8963 -43.8963  2.54000  0.00000  16*.5
CUBOID       0  54.0563 -54.0563  54.0563 -54.0563  8.89000  0.00000  16*.5
CUBOID       2  54.3687 -54.3687  54.3687 -54.3687  8.89000  0.00000  16*.5
BOX TYPE    24  /* complete npc - body assembly
CUBOID       0  54.3688 -54.3688  54.3688 -54.3688  87.8154   0.0000  16*.5
BOX TYPE    25  /* complete npc - lid assembly
CUBOID       0  54.3688 -54.3688  54.3688 -54.3688  15.2349   0.0000  16*.5
BOX TYPE    26  /* global unit: damaged unit, full h2o reflection
CUBOID       0  54.3688 -54.3688  54.3688 -54.3688  103.0503  0.0000  16*.5
CUBOID       6  84.8488 -84.8488  84.8488 -84.8488  133.5303 -30.480  16*.5
 26    1  1  1    1  1  1    1  1  1    1
BEGIN COMPLEX
/* build inner canister - main body section (7 #/ft3 region)
COMPLEX  12  1  0.00000  0.00000  0.00000   1   1   1  0.0   0.0   0.0
COMPLEX  12  2  0.00000  0.00000  0.31750   1   1   1  0.0   0.0   0.0
COMPLEX  12  3  0.00000  0.00000  25.7810   1   1   1  0.0   0.0   0.0
COMPLEX  12  4  0.00000  0.00000  26.1621   1   1   1  0.0   0.0   0.0
COMPLEX  12  5  0.00000  0.00000  51.6256   1   1   1  0.0   0.0   0.0
COMPLEX  12  6  0.00000  0.00000  52.0066   1   1   1  0.0   0.0   0.0
/* build inner canister - upper body section (40 #/ft3 section)
COMPLEX  13  7  0.00000  0.00000  0.00000   1   1   1  0.0   0.0   0.0
/* build inner canister - lid section
COMPLEX  14  8  0.00000  0.00000  0.00000   1   1   1  0.0   0.0   0.0
COMPLEX  14  9  0.00000  0.00000  0.63250   1   1   1  0.0   0.0   0.0
COMPLEX  14 10  0.00000  0.00000  0.95000   1   1   1  0.0   0.0   0.0
COMPLEX  14 11  0.00000  0.00000  1.39200   1   1   1  0.0   0.0   0.0
/* embed 3x3 array of canisters into lid: 11.75"-centers
COMPLEX  15 14 -29.8450 -29.8450  0.00000   3   3   1  29.8450  29.8450  0.0
/* embed 3x3 array of foam cut outs:11.75"-centers
COMPLEX  22 15 -29.8450 -29.8450  0.00000   3   3   1  29.8450  29.8450  0.0
/* embed 3x3 array of canisters into inner body: 11.75"-centers
COMPLEX  19 12 -29.8450 -29.8450  0.50550   3   3   1  29.8450  29.8450  0.0
COMPLEX  20 13 -29.8450 -29.8450  0.00000   3   3   1  29.8450  29.8450  0.0
/* embed two-part body section stackup
COMPLEX  21 19  0.00000  0.00000  0.00000   1   1   1  0.0   0.0   0.0
COMPLEX  21 20  0.00000  0.00000  73.8505   1   1   1  0.0   0.0   0.0
/* build npc - body assembly
COMPLEX  24 16  0.00000  0.00000  0.00000   1   1   1  0.0   0.0   0.0
COMPLEX  24 17  0.00000  0.00000  0.31240   1   1   1  0.0   0.0   0.0
COMPLEX  24 18  0.00000  0.00000  10.4724   1   1   1  0.0   0.0   0.0
COMPLEX  24 21  0.00000  0.00000  10.4724   1   1   1  0.0   0.0   0.0
/* build npc - lid assembly
COMPLEX  25 22  0.00000  0.00000  0.00000   1   1   1  0.0   0.0   0.0
COMPLEX  25 23  0.00000  0.00000  3.49250   1   1   1  0.0   0.0   0.0
COMPLEX  25 17  0.00000  0.00000  12.3825   1   1   1  0.0   0.0   0.0
COMPLEX  25 16  0.00000  0.00000  14.9225   1   1   1  0.0   0.0   0.0
/* complete npc stackup - single unit
COMPLEX  26 24  0.00000  0.00000  0.00000   1   1   1  0.0   0.0   0.0
COMPLEX  26 25  0.00000  0.00000  87.8154   1   1   1  0.0   0.0   0.0
END GEOM
DEFAULTS=YES
END GEMER
```

Figure 6.24b – Sample input file = npc60i28.in

```
2002.NPC,,,,CYL,,UO2,5.00%,WTFR=VAR.,SS,,,CD,CE
/*ECHO
/*TITLE
  200 2000   10    0    0    1    0    0
    0  293    0    0
\CSXSEC\UO2\GUO2-50.285
\CSXSEC\NOU\GNOU-0.SS
\CSXSEC\NOU\GNOU-0.CAD
\CSXSEC\NOU\GNOU-0.POL
\CSXSEC\NOU\GNOU-0.F07 0.90
\CSXSEC\NOU\GNOU-0.WAT
\CSXSEC\NOU\GNOU-0.F11 0.90
\CSXSEC\NOU\GNOU-0.F15 0.90
\CSXSEC\NOU\GNOU-0.F40 0.90
\CSXSEC\NOU\GNOU-0.ORC
KENO GEOM
    0  /* # OF REGIONS OR ZERO
    0  /* # OF BOX TYPES OR ZERO
    1  /* # OF BOXES IN X DIRECTION
    1  /* # OF BOXES IN Y DIRECTION
    1  /* # OF BOXES IN Z DIRECTION
    1  /* BOUNDARY CONDITION OPTION
    1  /* STARTING SOURCE OPTION
    1  /* COMPLEX EMBEDDED OPTION
    0  /* # OF PRINT PLOTS
   -1.0      -1.0      -1.0      -1.0      -1.0      -1.0
BOX TYPE     1  /* inner canister: bottom fuel_region #1 w/ gap: body assy
CYLINDER     1  10.8141  0.31750  0.00000                              16*.5
CYLINDER     2  10.9233  0.31750  0.00000                              16*.5
CYLINDER     0  12.4092  0.31750  0.00000                              16*.5
CYLINDER     2  12.4092  0.31750 -0.44200                              16*.5
CYLINDER     2  12.4612  0.31750 -0.44200                              16*.5
CYLINDER     0  12.7000  0.31750 -0.44200                              16*.5
CYLINDER     2  12.7635  0.31750 -0.50550                              16*.5
BOX TYPE     2  /* inner canister: fuel_region #2: body assy
```

```
CYLINDER     1  10.8141  25.4635   0.0000                              16*.5
CYLINDER     2  10.9233  25.4635   0.0000                              16*.5
CYLINDER     3  10.9614  25.4635   0.0000                              16*.5
CYLINDER     4  12.4092  25.4635   0.0000                              16*.5
CYLINDER     2  12.4612  25.4635   0.0000                              16*.5
CYLINDER     0  12.7000  25.4635   0.0000                              16*.5
CYLINDER     2  12.7635  25.4635   0.0000                              16*.5
BOX TYPE     3  /* inner canister: fuel region #3, 0.15" cd gap: body assy
CYLINDER     1  10.8141  0.38100   0.00000                             16*.5
CYLINDER     2  10.9233  0.38100   0.00000                             16*.5
CYLINDER     0  10.9614  0.38100   0.00000                             16*.5
CYLINDER     4  12.4092  0.38100   0.00000                             16*.5
CYLINDER     2  12.4612  0.38100   0.00000                             16*.5
CYLINDER     0  12.7000  0.38100   0.00000                             16*.5
CYLINDER     2  12.7635  0.38100   0.00000                             16*.5
BOX TYPE     4  /* inner canister: fuel region #4: body assy
CYLINDER     1  10.8141  25.4635   0.0000                              16*.5
CYLINDER     2  10.9233  25.4635   0.0000                              16*.5
CYLINDER     3  10.9614  25.4635   0.0000                              16*.5
CYLINDER     4  12.4092  25.4635   0.0000                              16*.5
CYLINDER     2  12.4612  25.4635   0.0000                              16*.5
CYLINDER     0  12.7000  25.4635   0.0000                              16*.5
CYLINDER     2  12.7635  25.4635   0.0000                              16*.5
BOX TYPE     5  /* inner canister: fuel region #5, 0.15" cd gap: body assy
CYLINDER     1  10.8141  0.38100   0.00000                             16*.5
CYLINDER     2  10.9233  0.38100   0.00000                             16*.5
CYLINDER     0  10.9614  0.38100   0.00000                             16*.5
CYLINDER     4  12.4092  0.38100   0.00000                             16*.5
CYLINDER     2  12.4612  0.38100   0.00000                             16*.5
CYLINDER     0  12.7000  0.38100   0.00000                             16*.5
CYLINDER     2  12.7635  0.38100   0.00000                             16*.5
BOX TYPE     6  /* inner canister: fuel region #6: body assy
CYLINDER     1  10.8141  21.3385   0.0000                              16*.5
CYLINDER     2  10.9233  21.3385   0.0000                              16*.5
CYLINDER     3  10.9614  21.3385   0.0000                              16*.5
CYLINDER     4  12.4092  21.3385   0.0000                              16*.5
CYLINDER     2  12.4612  21.3385   0.0000                              16*.5
CYLINDER     0  12.7000  21.3385   0.0000                              16*.5
CYLINDER     2  12.7635  21.3385   0.0000                              16*.5
BOX TYPE     7  /* inner canister: fuel region #7: body assy
CYLINDER     1  10.8141   3.4925   0.0000                              16*.5
CYLINDER     2  10.9233   3.4925   0.0000                              16*.5
CYLINDER     3  10.9614   3.4925   0.0000                              16*.5
CYLINDER     4  12.4092   3.4925   0.0000                              16*.5
CYLINDER     2  12.4612   3.4925   0.0000                              16*.5
CYLINDER     0  12.7000   3.4925   0.0000                              16*.5
CYLINDER     2  12.7635   3.4925   0.0000                              16*.5
BOX TYPE     8  /* inner canister - fuel region #8: lid assy
CYLINDER     1  10.8141  0.63250   0.00000                             16*.5
CYLINDER     2  10.9233  0.63250   0.00000                             16*.5
CYLINDER     3  10.9614  0.63250   0.00000                             16*.5
CYLINDER     4  12.4092  0.63250   0.00000                             16*.5
CYLINDER     2  12.4612  0.63250   0.00000                             16*.5
CYLINDER     0  12.7000  0.63250   0.00000                             16*.5
CYLINDER     2  12.7635  0.63250   0.00000                             16*.5
BOX TYPE     9  /* inner canister - fuel region #9 w/ gap: lid assy
CYLINDER     1  10.8141  0.31750   0.00000                             16*.5
CYLINDER     2  10.9233  0.31750   0.00000                             16*.5
CYLINDER     0  12.4092  0.31750   0.00000                             16*.5
CYLINDER     2  12.4612  0.31750   0.00000                             16*.5
BOX TYPE    10  /* inner canister - fuel region #10 w/ ring: lid assy
CYLINDER     1  10.8141  0.44200   0.00000                             16*.5
CYLINDER     2  10.9233  0.44200   0.00000                             16*.5
CYLINDER     2  12.4092  0.44200   0.00000                             16*.5
CYLINDER     2  12.4612  0.44200   0.00000                             16*.5
BOX TYPE    11  /* inner canister - fuel region #11 w/ top: lid assy
CYLINDER     1  10.8141  1.78050   0.00000                             16*.5
CYLINDER     2  10.9233  1.91640   0.00000                             16*.5
CYLINDER     0  12.4092  1.91640   0.00000                             16*.5
BOX TYPE    12  /* inner canister cuboid: body section (7# region)
CUBOID       5  12.7636 -12.7636  12.7636 -12.7636  73.3450  -0.5055  16*.5
BOX TYPE    13  /* inner canister cuboid: body section (40# region)
CUBOID       9  12.7636 -12.7636  12.7636 -12.7636  3.49260  0.00000  16*.5
BOX TYPE    14  /* inner canister upper cylinder: lid section
CYLINDER     0  12.7636  3.30840  0.00000                             16*.5
BOX TYPE    15  /* foam cutout (void) - 40 #/ft3 foam lid section
CYLINDER     0  13.5510  3.30840  0.00000                             16*.5
BOX TYPE    16  /* npc body or lid - 10 ga. 304ss layer
CUBOID       2  54.3687 -54.3687  54.3687 -54.3687  0.31240  0.00000  16*.5
BOX TYPE    17  /* npc body or lid - 1" duraboard (void) layer, 10 ga. 304ss
CUBOID       0  51.5163 -51.5163  51.5163 -51.5163  2.54000  0.00000  16*.5
CUBOID       0  54.0563 -54.0563  54.0563 -54.0563  2.54000  0.00000  16*.5
CUBOID       2  54.3687 -54.3687  54.3687 -54.3687  2.54000  0.00000  16*.5
BOX TYPE    18  /* npc body - 3" bot. foam layer (11 #/ft3), 10 ga. 304ss
CUBOID       7  51.5163 -51.5163  51.5163 -51.5163  7.62000  0.00000  16*.5
CUBOID       0  54.0563 -54.0563  54.0563 -54.0563  7.62000  0.00000  16*.5
CUBOID       2  54.3687 -54.3687  54.3687 -54.3687  7.62000  0.00000  16*.5
BOX TYPE    19  /* npc body - 29.0750" foam layer (7,11 #/ft3),10 ga. 304ss
CUBOID       5  43.8963 -43.8963  43.8963 -43.8963  73.8505   0.0000  16*.5
CUBOID       7  51.5163 -51.5163  51.5163 -51.5163  73.8505   0.0000  16*.5
CUBOID       0  54.0563 -54.0563  54.0563 -54.0563  73.8505   0.0000  16*.5
CUBOID       2  54.3687 -54.3687  54.3687 -54.3687  73.8505   0.0000  16*.5
BOX TYPE    20  /* npc body - 1.375 " foam layer (40 #/ft3), 10 ga. 304ss
CUBOID       9  51.5163 -51.5163  51.5163 -51.5163  3.49250  0.00000  16*.5
CUBOID       0  54.0563 -54.0563  54.0563 -54.0563  3.49250  0.00000  16*.5
CUBOID       2  54.3687 -54.3687  54.3687 -54.3687  3.49250  0.00000  16*.5
BOX TYPE    21  /* npc body - 30.45" two-part body
CUBOID       0  54.3687 -54.3687  54.3687 -54.3687  77.3430   0.0000  16*.5
BOX TYPE    22  /* npc lid - 1.375 " foam layer (40 #/ft3), 10 ga. 304ss
CUBOID       9  51.5163 -51.5163  51.5163 -51.5163  3.49250  0.00000  16*.5
```

```
CUBOID       0  54.0563 -54.0563  54.0563 -54.0563  3.49250  0.00000  16*.5
CUBOID       2  54.3687 -54.3687  54.3687 -54.3687  3.49250  0.00000  16*.5
BOX TYPE    23  /* npc lid - 3.5" foam layer (15 #/ft3), 10 ga. 304ss
CUBOID       8  51.5163 -51.5163  51.5163 -51.5163  8.89000  0.00000  16*.5
CUBOID       0  54.0563 -54.0563  54.0563 -54.0563  8.89000  0.00000  16*.5
CUBOID       2  54.3687 -54.3687  54.3687 -54.3687  8.89000  0.00000  16*.5
BOX TYPE    24  /* complete npc - body assembly
CUBOID       0  54.3688 -54.3688  54.3688 -54.3688  87.8154   0.0000  16*.5
BOX TYPE    25  /* complete npc - lid assembly
CUBOID       0  54.3688 -54.3688  54.3688 -54.3688  15.2349   0.0000  16*.5
BOX TYPE    26  /* global unit: npc infinite system
CUBOID       0  54.3700 -54.3700  54.3700 -54.3700  103.051    0.000  16*.5
 26    1  1  1    1  1  1    1  1  1   1
BEGIN COMPLEX
/* build inner canister - main body section (7 #/ft3 region)
COMPLEX  12  1  0.00000  0.00000  0.00000   1   1   1  0.0   0.0   0.0
COMPLEX  12  2  0.00000  0.00000  0.31750   1   1   1  0.0   0.0   0.0
COMPLEX  12  3  0.00000  0.00000  25.7810   1   1   1  0.0   0.0   0.0
COMPLEX  12  4  0.00000  0.00000  26.1621   1   1   1  0.0   0.0   0.0
COMPLEX  12  5  0.00000  0.00000  51.6256   1   1   1  0.0   0.0   0.0
COMPLEX  12  6  0.00000  0.00000  52.0066   1   1   1  0.0   0.0   0.0
/* build inner canister - upper body section (40 #/ft3 section)
COMPLEX  13  7  0.00000  0.00000  0.00000   1   1   1  0.0   0.0   0.0
/* build inner canister - lid section
COMPLEX  14  8  0.00000  0.00000  0.00000   1   1   1  0.0   0.0   0.0
COMPLEX  14  9  0.00000  0.00000  0.63250   1   1   1  0.0   0.0   0.0
COMPLEX  14 10  0.00000  0.00000  0.95000   1   1   1  0.0   0.0   0.0
COMPLEX  14 11  0.00000  0.00000  1.39200   1   1   1  0.0   0.0   0.0
/* embed 3x3 array of canisters into lid: 11.75"-centers
COMPLEX  15 14 -29.8450 -29.8450  0.00000   3   3   1  29.8450  29.8450  0.0
/* embed 3x3 array of foam cut_outs:11.75"-centers
COMPLEX  22 15 -29.8450 -29.8450  0.00000   3   3   1  29.8450  29.8450  0.0
/* embed 3x3 array of canisters into inner body: 11.75"-centers
COMPLEX  19 12 -29.8450 -29.8450  0.50550   3   3   1  29.8450  29.8450  0.0
COMPLEX  20 13 -29.8450 -29.8450  0.00000   3   3   1  29.8450  29.8450  0.0
/* embed two-part body section stackup
COMPLEX  21 19  0.00000  0.00000  0.00000   1   1   1  0.0   0.0   0.0
COMPLEX  21 20  0.00000  0.00000  73.8505   1   1   1  0.0   0.0   0.0
/* build npc - body assembly
COMPLEX  24 16  0.00000  0.00000  0.00000   1   1   1  0.0   0.0   0.0
COMPLEX  24 17  0.00000  0.00000  0.31240   1   1   1  0.0   0.0   0.0
COMPLEX  24 18  0.00000  0.00000  2.85240   1   1   1  0.0   0.0   0.0
COMPLEX  24 21  0.00000  0.00000  10.4724   1   1   1  0.0   0.0   0.0
/* build npc - lid assembly
COMPLEX  25 22  0.00000  0.00000  0.00000   1   1   1  0.0   0.0   0.0
COMPLEX  25 23  0.00000  0.00000  3.49250   1   1   1  0.0   0.0   0.0
COMPLEX  25 17  0.00000  0.00000  12.3825   1   1   1  0.0   0.0   0.0
COMPLEX  25 16  0.00000  0.00000  14.9225   1   1   1  0.0   0.0   0.0
/* complete npc stackup - single unit
COMPLEX  26 24  0.00000  0.00000  0.00000   1   1   1  0.0   0.0   0.0
COMPLEX  26 25  0.00000  0.00000  87.8154   1   1   1  0.0   0.0   0.0
END GEOM
DEFAULTS=YES
END GEMER
```

Figure 6.24c – Sample input file = npca2_60.in

```
2000.NPC,,,,CYL,,UO2,5.00%,WTFR=VAR.,SS,,,CD,CE
/*ECHO
/*TITLE
  200 2000   10    0    0    1    0    0
    0  293    0    0
\CSXSEC\UO2\GUO2-50.285
\CSXSEC\NOU\GNOU-0.SS
\CSXSEC\NOU\GNOU-0.CAD
\CSXSEC\NOU\GNOU-0.POL 0.98
\CSXSEC\NOU\GNOU-0.F07 0.90
\CSXSEC\NOU\GNOU-0.WAT
\CSXSEC\NOU\GNOU-0.F11 0.90
\CSXSEC\NOU\GNOU-0.F15 0.90
\CSXSEC\NOU\GNOU-0.F40 0.90
\CSXSEC\NOU\GNOU-0.ORC
KENO GEOM
    0  /* # OF REGIONS OR ZERO
    0  /* # OF BOX TYPES OR ZERO
    1  /* # OF BOXES IN X DIRECTION
    1  /* # OF BOXES IN Y DIRECTION
    1  /* # OF BOXES IN Z DIRECTION
    1  /* BOUNDARY CONDITION OPTION
    1  /* STARTING SOURCE OPTION
    1  /* COMPLEX EMBEDDED OPTION
    0  /* # OF PRINT PLOTS
      0.0       0.0       0.0       0.0       0.0       0.0
BOX TYPE     1  /* inner canister: bottom fuel region #1 w/ gap: body assy
CYLINDER     1  10.8141  0.31750  0.00000                              16*.5
CYLINDER     2  10.9233  0.31750  0.00000                              16*.5
CYLINDER     0  12.4092  0.31750  0.00000                              16*.5
CYLINDER     2  12.4092  0.31750 -0.44200                              16*.5
CYLINDER     2  12.4612  0.31750 -0.44200                              16*.5
CYLINDER     0  12.7000  0.31750 -0.44200                              16*.5
CYLINDER     2  12.7635  0.31750 -0.50550                              16*.5
BOX TYPE     2  /* inner canister: fuel region #2: body assy
CYLINDER     1  10.8141  25.4635   0.0000                              16*.5
CYLINDER     2  10.9233  25.4635   0.0000                              16*.5
CYLINDER     3  10.9614  25.4635   0.0000                              16*.5
CYLINDER     4  12.4092  25.4635   0.0000                              16*.5
CYLINDER     2  12.4612  25.4635   0.0000                              16*.5
CYLINDER     0  12.7000  25.4635   0.0000                              16*.5
```

```
CYLINDER     2  12.7635  25.4635   0.0000                              16*.5
BOX TYPE     3  /* inner canister: fuel_region #3, 0.15" cd gap: body assy
CYLINDER     1  10.8141  0.38100  0.00000                              16*.5
CYLINDER     2  10.9233  0.38100  0.00000                              16*.5
CYLINDER     0  10.9614  0.38100  0.00000                              16*.5
CYLINDER     4  12.4092  0.38100  0.00000                              16*.5
CYLINDER     2  12.4612  0.38100  0.00000                              16*.5
CYLINDER     0  12.7000  0.38100  0.00000                              16*.5
CYLINDER     2  12.7635  0.38100  0.00000                              16*.5
BOX TYPE     4  /* inner canister: fuel_region #4: body assy
CYLINDER     1  10.8141  25.4635   0.0000                              16*.5
CYLINDER     2  10.9233  25.4635   0.0000                              16*.5
CYLINDER     3  10.9614  25.4635   0.0000                              16*.5
CYLINDER     4  12.4092  25.4635   0.0000                              16*.5
CYLINDER     2  12.4612  25.4635   0.0000                              16*.5
CYLINDER     0  12.7000  25.4635   0.0000                              16*.5
CYLINDER     2  12.7635  25.4635   0.0000                              16*.5
BOX TYPE     5  /* inner canister: fuel_region #5, 0.15" cd gap: body assy
CYLINDER     1  10.8141  0.38100  0.00000                              16*.5
CYLINDER     2  10.9233  0.38100  0.00000                              16*.5
CYLINDER     0  10.9614  0.38100  0.00000                              16*.5
CYLINDER     4  12.4092  0.38100  0.00000                              16*.5
CYLINDER     2  12.4612  0.38100  0.00000                              16*.5
CYLINDER     0  12.7000  0.38100  0.00000                              16*.5
CYLINDER     2  12.7635  0.38100  0.00000                              16*.5
BOX TYPE     6  /* inner canister: fuel region #6: body assy
CYLINDER     1  10.8141  21.3385   0.0000                              16*.5
CYLINDER     0  10.8141  21.3385   0.0000                              16*.5
CYLINDER     2  10.9233  21.3385   0.0000                              16*.5
CYLINDER     3  10.9614  21.3385   0.0000                              16*.5
CYLINDER     4  12.4092  21.3385   0.0000                              16*.5
CYLINDER     2  12.4612  21.3385   0.0000                              16*.5
CYLINDER     0  12.7000  21.3385   0.0000                              16*.5
CYLINDER     2  12.7635  21.3385   0.0000                              16*.5
BOX TYPE     7  /* inner canister: fuel region #7: body assy
CYLINDER     1  10.8141   3.4925   0.0000                              16*.5
CYLINDER     0  10.8141   3.4925   0.0000                              16*.5
CYLINDER     2  10.9233   3.4925   0.0000                              16*.5
CYLINDER     3  10.9614   3.4925   0.0000                              16*.5
CYLINDER     4  12.4092   3.4925   0.0000                              16*.5
CYLINDER     2  12.4612   3.4925   0.0000                              16*.5
CYLINDER     0  12.7000   3.4925   0.0000                              16*.5
CYLINDER     2  12.7635   3.4925   0.0000                              16*.5
BOX TYPE     8  /* inner canister - fuel region #8: lid assy
CYLINDER     1  10.8141  0.63250  0.00000                              16*.5
CYLINDER     0  10.8141  0.63250  0.00000                              16*.5
CYLINDER     2  10.9233  0.63250  0.00000                              16*.5
CYLINDER     3  10.9614  0.63250  0.00000                              16*.5
CYLINDER     4  12.4092  0.63250  0.00000                              16*.5
CYLINDER     2  12.4612  0.63250  0.00000                              16*.5
CYLINDER     0  12.7000  0.63250  0.00000                              16*.5
CYLINDER     2  12.7635  0.63250  0.00000                              16*.5
BOX TYPE     9  /* inner canister - fuel region #9 w/ gap: lid assy
CYLINDER     1  10.8141  0.31750  0.00000                              16*.5
CYLINDER     2  10.9233  0.31750  0.00000                              16*.5
CYLINDER     0  12.4092  0.31750  0.00000                              16*.5
CYLINDER     2  12.4612  0.31750  0.00000                              16*.5
BOX TYPE    10  /* inner canister - fuel region #10 w/ ring: lid assy
CYLINDER     1  10.8141  0.44200  0.00000                              16*.5
CYLINDER     2  10.9233  0.44200  0.00000                              16*.5
CYLINDER     2  12.4092  0.44200  0.00000                              16*.5
CYLINDER     2  12.4612  0.44200  0.00000                              16*.5
BOX TYPE    11  /* inner canister - fuel region #11 w/ top: lid assy
CYLINDER     1  10.8141  1.78050  0.00000                              16*.5
CYLINDER     2  10.9233  1.91640  0.00000                              16*.5
CYLINDER     0  12.4092  1.91640  0.00000                              16*.5
BOX TYPE    12  /* inner canister cuboid: body section (7# region)
CUBOID       5  12.7636 -12.7636  12.7636 -12.7636  73.3450  -0.5055  16*.5
BOX TYPE    13  /* inner canister cuboid: body section (40# region)
CUBOID       9  12.7636 -12.7636  12.7636 -12.7636  3.49260  0.00000  16*.5
BOX TYPE    14  /* inner canister upper cylinder: lid section
CYLINDER     0  12.7636  3.30840  0.00000                              16*.5
BOX TYPE    15  /* foam cutout (void) - 40 #/ft3 foam lid section
CYLINDER     0  13.5510  3.30840  0.00000                              16*.5
BOX TYPE    16  /* npc body or lid - 10 ga. 304ss layer
CUBOID       2  54.3687 -54.3687  54.3687 -54.3687  0.31240  0.00000  16*.5
BOX TYPE    17  /* npc body or lid - 1" duraboard (void) layer, 10 ga. 304ss
CUBOID       0  51.5163 -51.5163  51.5163 -51.5163  2.54000  0.00000  16*.5
CUBOID       0  54.0563 -54.0563  54.0563 -54.0563  2.54000  0.00000  16*.5
CUBOID       2  54.3687 -54.3687  54.3687 -54.3687  2.54000  0.00000  16*.5
BOX TYPE    18  /* npc body - 3" bot. foam layer (11 #/ft3)   *** SN002 burn
CUBOID       7  47.4777 -44.5567  45.3695 -44.4805  0.00000  0.00000  16*.5
CUBOID       0  54.0563 -54.0563  54.0563 -54.0563  0.00000 -7.62000  16*.5
CUBOID       2  54.3687 -54.3687  54.3687 -54.3687  0.00000 -7.62000  16*.5
BOX TYPE    19  /* npc body - 29.0750" foam layer (7,11 #/ft3)***SN002 burn
CUBOID       5  43.8963 -43.8963  43.8963 -43.8963  73.8505   0.0000  16*.5
CUBOID       7  47.4777 -44.5567  45.3695 -44.4805  73.8505   0.0000  16*.5
CUBOID       0  54.0563 -54.0563  54.0563 -54.0563  73.8505   0.0000  16*.5
CUBOID       2  54.3687 -54.3687  54.3687 -54.3687  73.8505   0.0000  16*.5
BOX TYPE    20  /* npc body - 1.375 " foam layer (40 #/ft3)   *** SN002 burn
CUBOID       9  47.4777 -44.5567  45.3695 -44.4805  3.49250  0.00000  16*.5
CUBOID       0  54.0563 -54.0563  54.0563 -54.0563  3.49250  0.00000  16*.5
CUBOID       2  54.3687 -54.3687  54.3687 -54.3687  3.49250  0.00000  16*.5
BOX TYPE    21  /* npc body - 30.45" two-part body
CUBOID       0  54.3687 -54.3687  54.3687 -54.3687  77.3430   0.0000  16*.5
BOX TYPE    22  /* npc lid - 1.375 " foam layer (40 #/ft3)    *** SN002 burn
CUBOID       9  47.4777 -44.5567  45.3695 -44.4805  3.49250  0.00000  16*.5
CUBOID       0  54.0563 -54.0563  54.0563 -54.0563  3.49250  0.00000  16*.5
CUBOID       2  54.3687 -54.3687  54.3687 -54.3687  3.49250  0.00000  16*.5
BOX TYPE    23  /* npc lid - 3.5" foam layer (15 #/ft3)       *** SN002 burn
```

```
CUBOID       8  47.4777 -44.5567  45.3695 -44.4805  7.62000  0.00000  16*.5
CUBOID       0  54.0563 -54.0563  54.0563 -54.0563  8.89000  0.00000  16*.5
CUBOID       2  54.3687 -54.3687  54.3687 -54.3687  8.89000  0.00000  16*.5
BOX TYPE    24  /* complete npc - body assembly
CUBOID       0  54.3688 -54.3688  54.3688 -54.3688  87.8154   0.0000  16*.5
BOX TYPE    25  /* complete npc - lid assembly
CUBOID       0  54.3688 -54.3688  54.3688 -54.3688  15.2349   0.0000  16*.5
BOX TYPE    26  /* npc single-unit cuboid
CUBOID       0  54.3688 -54.3688  54.3688 -54.3688  103.0503  0.0000  16*.5
BOX TYPE    27  /* global unit: 2N=150:5x5x6 cuboid, 30.48-cm h2o refl.
CUBOID       0  271.8440 -271.8440 271.8440 -271.8440 618.3018  0.000  16*.5
CUBOID       6  302.3240 -302.3240 302.3240 -302.3240 648.7818 -30.48  16*.5
 27    1  1  1    1  1  1    1  1  1   1
BEGIN COMPLEX
/* build inner canister - main body section (7 #/ft3 region)
COMPLEX  12  1  0.00000  0.00000  0.00000   1   1   1  0.0   0.0   0.0
COMPLEX  12  2  0.00000  0.00000  0.31750   1   1   1  0.0   0.0   0.0
COMPLEX  12  3  0.00000  0.00000  25.7810   1   1   1  0.0   0.0   0.0
COMPLEX  12  4  0.00000  0.00000  26.1621   1   1   1  0.0   0.0   0.0
COMPLEX  12  5  0.00000  0.00000  51.6256   1   1   1  0.0   0.0   0.0
COMPLEX  12  6  0.00000  0.00000  52.0066   1   1   1  0.0   0.0   0.0
/* build inner canister - upper body section (40 #/ft3 section)
COMPLEX  13  7  0.00000  0.00000  0.00000   1   1   1  0.0   0.0   0.0
/* build inner canister - lid section
COMPLEX  14  8  0.00000  0.00000  0.00000   1   1   1  0.0   0.0   0.0
COMPLEX  14  9  0.00000  0.00000  0.63250   1   1   1  0.0   0.0   0.0
COMPLEX  14 10  0.00000  0.00000  0.95000   1   1   1  0.0   0.0   0.0
COMPLEX  14 11  0.00000  0.00000  1.39200   1   1   1  0.0   0.0   0.0
/* embed 3x3 array of canisters into lid: 11.75"-centers
COMPLEX  15 14 -29.8450 -29.8450  0.00000   3   3   1  29.8450  29.8450  0.0
/* embed 3x3 array of foam cut_outs:11.75"-centers
COMPLEX  22 15 -29.8450 -29.8450  0.00000   3   3   1  29.8450  29.8450  0.0
/* embed 3x3 array of canisters into inner body: 11.75"-centers
COMPLEX  19 12 -29.8450 -29.8450  0.50550   3   3   1  29.8450  29.8450  0.0
COMPLEX  20 13 -29.8450 -29.8450  0.00000   3   3   1  29.8450  29.8450  0.0
/* embed two-part body section stackup
COMPLEX  21 19  0.00000  0.00000  0.00000   1   1   1  0.0   0.0   0.0
COMPLEX  21 20  0.00000  0.00000  73.8505   1   1   1  0.0   0.0   0.0
/* build npc - body assembly
COMPLEX  24 16  0.00000  0.00000  0.00000   1   1   1  0.0   0.0   0.0
COMPLEX  24 17  0.00000  0.00000  0.31240   1   1   1  0.0   0.0   0.0
COMPLEX  24 18  0.00000  0.00000  10.4724   1   1   1  0.0   0.0   0.0
COMPLEX  24 21  0.00000  0.00000  10.4724   1   1   1  0.0   0.0   0.0
/* build npc - lid assembly
COMPLEX  25 22  0.00000  0.00000  0.00000   1   1   1  0.0   0.0   0.0
COMPLEX  25 23  0.00000  0.00000  3.49250   1   1   1  0.0   0.0   0.0
COMPLEX  25 17  0.00000  0.00000  12.3825   1   1   1  0.0   0.0   0.0
COMPLEX  25 16  0.00000  0.00000  14.9225   1   1   1  0.0   0.0   0.0
/* complete npc stackup - single unit
COMPLEX  26 24  0.00000  0.00000  0.00000   1   1   1  0.0   0.0   0.0
COMPLEX  26 25  0.00000  0.00000  87.8154   1   1   1  0.0   0.0   0.0
/* embed 5x5x6 closed packed array
COMPLEX  27 26  -217.4752 -217.4752 0.000  5 5 6 108.7376 108.7376 103.0503
END GEOM
DEFAULTS=YES
END GEMER
```

Figure 6.24d – Sample input file = npcat_60.in

```
2000.NPC,,,,CYL,,UO2,5.00%,WTFR=VAR.,SS,,,CD,CE
/*ECHO
/*TITLE
  200 2000   10    0    0    1    0    0
    0  293    0    0
\CSXSEC\UO2\GUO2-50.285
\CSXSEC\NOU\GNOU-0.SS
\CSXSEC\NOU\GNOU-0.CAD
\CSXSEC\NOU\GNOU-0.POL 0.98
\CSXSEC\NOU\GNOU-0.F07 0.90
\CSXSEC\NOU\GNOU-0.WAT
\CSXSEC\NOU\GNOU-0.F11 0.90
\CSXSEC\NOU\GNOU-0.F15 0.90
\CSXSEC\NOU\GNOU-0.F40 0.90
\CSXSEC\NOU\GNOU-0.ORC
KENO GEOM
    0  /* # OF REGIONS OR ZERO
    0  /* # OF BOX TYPES OR ZERO
    1  /* # OF BOXES IN X DIRECTION
    1  /* # OF BOXES IN Y DIRECTION
    1  /* # OF BOXES IN Z DIRECTION
    1  /* BOUNDARY CONDITION OPTION
    1  /* STARTING SOURCE OPTION
    1  /* COMPLEX EMBEDDED OPTION
    0  /* # OF PRINT PLOTS
      0.0       0.0       0.0       0.0       0.0
BOX TYPE     1  /* inner canister: bottom fuel region #1 w/ gap: body assy
CYLINDER     1  10.8141  0.31750  0.00000                                  16*.5
CYLINDER     2  10.9233  0.31750  0.00000                                  16*.5
CYLINDER     0  12.4092  0.31750  0.00000                                  16*.5
CYLINDER     2  12.4092  0.31750 -0.44200                                  16*.5
CYLINDER     2  12.4612  0.31750 -0.44200                                  16*.5
CYLINDER     0  12.7000  0.31750 -0.44200                                  16*.5
CYLINDER     2  12.7635  0.31750 -0.50550                                  16*.5
BOX TYPE     2  /* inner canister: fuel region #2: body assy
CYLINDER     1  10.8141  25.4635   0.0000                                  16*.5
CYLINDER     2  10.9233  25.4635   0.0000                                  16*.5
CYLINDER     3  10.9614  25.4635   0.0000                                  16*.5
```

```
CYLINDER     4  12.4092  25.4635   0.0000                              16*.5
CYLINDER     2  12.4612  25.4635   0.0000                              16*.5
CYLINDER     0  12.7000  25.4635   0.0000                              16*.5
CYLINDER     2  12.7635  25.4635   0.0000                              16*.5
BOX TYPE     3  /* inner canister: fuel region #3, 0.15" cd gap: body assy
CYLINDER     1  10.8141  0.38100  0.00000                              16*.5
CYLINDER     2  10.9233  0.38100  0.00000                              16*.5
CYLINDER     0  10.9614  0.38100  0.00000                              16*.5
CYLINDER     4  12.4092  0.38100  0.00000                              16*.5
CYLINDER     2  12.4612  0.38100  0.00000                              16*.5
CYLINDER     0  12.7000  0.38100  0.00000                              16*.5
CYLINDER     2  12.7635  0.38100  0.00000                              16*.5
BOX TYPE     4  /* inner canister: fuel region #4: body assy
CYLINDER     1  10.8141  25.4635   0.0000                              16*.5
CYLINDER     2  10.9233  25.4635   0.0000                              16*.5
CYLINDER     3  10.9614  25.4635   0.0000                              16*.5
CYLINDER     4  12.4092  25.4635   0.0000                              16*.5
CYLINDER     2  12.4612  25.4635   0.0000                              16*.5
CYLINDER     0  12.7000  25.4635   0.0000                              16*.5
CYLINDER     2  12.7635  25.4635   0.0000                              16*.5
BOX TYPE     5  /* inner canister: fuel region #5, 0.15" cd gap: body assy
CYLINDER     1  10.8141  0.38100  0.00000                              16*.5
CYLINDER     2  10.9233  0.38100  0.00000                              16*.5
CYLINDER     0  10.9614  0.38100  0.00000                              16*.5
CYLINDER     4  12.4092  0.38100  0.00000                              16*.5
CYLINDER     2  12.4612  0.38100  0.00000                              16*.5
CYLINDER     0  12.7000  0.38100  0.00000                              16*.5
CYLINDER     2  12.7635  0.38100  0.00000                              16*.5
BOX TYPE     6  /* inner canister: fuel region #6: body assy
CYLINDER     1  10.8141  21.3385   0.0000                              16*.5
CYLINDER     0  10.8141  21.3385   0.0000                              16*.5
CYLINDER     2  10.9233  21.3385   0.0000                              16*.5
CYLINDER     3  10.9614  21.3385   0.0000                              16*.5
CYLINDER     4  12.4092  21.3385   0.0000                              16*.5
CYLINDER     2  12.4612  21.3385   0.0000                              16*.5
CYLINDER     0  12.7000  21.3385   0.0000                              16*.5
CYLINDER     2  12.7635  21.3385   0.0000                              16*.5
BOX TYPE     7  /* inner canister: fuel region #7: body assy
CYLINDER     1  10.8141   3.4925   0.0000                              16*.5
CYLINDER     0  10.8141   3.4925   0.0000                              16*.5
CYLINDER     2  10.9233   3.4925   0.0000                              16*.5
CYLINDER     3  10.9614   3.4925   0.0000                              16*.5
CYLINDER     4  12.4092   3.4925   0.0000                              16*.5
CYLINDER     2  12.4612   3.4925   0.0000                              16*.5
CYLINDER     0  12.7000   3.4925   0.0000                              16*.5
CYLINDER     2  12.7635   3.4925   0.0000                              16*.5
BOX TYPE     8  /* inner canister - fuel region #8: lid assy
CYLINDER     1  10.8141  0.63250  0.00000                              16*.5
CYLINDER     0  10.8141  0.63250  0.00000                              16*.5
CYLINDER     2  10.9233  0.63250  0.00000                              16*.5
CYLINDER     3  10.9614  0.63250  0.00000                              16*.5
CYLINDER     4  12.4092  0.63250  0.00000                              16*.5
CYLINDER     2  12.4612  0.63250  0.00000                              16*.5
CYLINDER     0  12.7000  0.63250  0.00000                              16*.5
CYLINDER     2  12.7635  0.63250  0.00000                              16*.5
BOX TYPE     9  /* inner canister - fuel region #9 w/ gap: lid assy
CYLINDER     1  10.8141  0.31750  0.00000                              16*.5
CYLINDER     2  10.9233  0.31750  0.00000                              16*.5
CYLINDER     0  12.4092  0.31750  0.00000                              16*.5
CYLINDER     2  12.4612  0.31750  0.00000                              16*.5
BOX TYPE    10  /* inner canister - fuel region #10 w/ ring: lid assy
CYLINDER     1  10.8141  0.44200  0.00000                              16*.5
CYLINDER     2  10.9233  0.44200  0.00000                              16*.5
CYLINDER     2  12.4092  0.44200  0.00000                              16*.5
CYLINDER     2  12.4612  0.44200  0.00000                              16*.5
BOX TYPE    11  /* inner canister - fuel region #11 w/ top: lid assy
CYLINDER     1  10.8141  1.78050  0.00000                              16*.5
CYLINDER     2  10.9233  1.91640  0.00000                              16*.5
CYLINDER     0  12.4092  1.91640  0.00000                              16*.5
BOX TYPE    12  /* inner canister cuboid: body section (7# region)
CUBOID       5  12.7636 -12.7636  12.7636 -12.7636  73.3450  -0.5055  16*.5
BOX TYPE    13  /* inner canister cuboid: body section (40# region)
CUBOID       9  12.7636 -12.7636  12.7636 -12.7636  3.49260  0.00000  16*.5
BOX TYPE    14  /* inner canister upper cylinder: lid section
CYLINDER     0  12.7636  3.30840  0.00000                              16*.5
BOX TYPE    15  /* foam cutout (void) - 40 #/ft3 foam lid section
CYLINDER     0  13.5510  3.30840  0.00000                              16*.5
BOX TYPE    16  /* npc body or lid - 10 ga. 304ss layer
CUBOID       2  54.3687 -54.3687  54.3687 -54.3687  0.31240  0.00000  16*.5
BOX TYPE    17  /* npc body or lid - 1" duraboard (void) layer, 10 ga. 304ss
CUBOID       0  51.5163 -51.5163  51.5163 -51.5163  2.54000  0.00000  16*.5
CUBOID       0  54.0563 -54.0563  54.0563 -54.0563  2.54000  0.00000  16*.5
CUBOID       2  54.3687 -54.3687  54.3687 -54.3687  2.54000  0.00000  16*.5
BOX TYPE    18  /* npc body - 4" bot. foam layer (11 #/ft3)     - face burn
CUBOID       7  42.6086 -42.6086  42.6086 -42.6086  0.00000  0.00000  16*.5
CUBOID       0  54.0563 -54.0563  54.0563 -54.0563  0.00000 -7.62000  16*.5
CUBOID       2  54.3687 -54.3687  54.3687 -54.3687  0.00000 -7.62000  16*.5
BOX TYPE    19  /* npc body - 29.0750" foam layer (7,11 #/ft3) - face burn
CUBOID       5  42.6086 -42.6086  42.6086 -42.6086  73.8505   0.0000  16*.5
CUBOID       7  42.6086 -42.6086  42.6086 -42.6086  73.8505   0.0000  16*.5
CUBOID       0  54.0563 -54.0563  54.0563 -54.0563  73.8505   0.0000  16*.5
CUBOID       2  54.3687 -54.3687  54.3687 -54.3687  73.8505   0.0000  16*.5
BOX TYPE    20  /* npc body - 1.375 " foam layer (40 #/ft3)     - face burn
CUBOID       9  42.6086 -42.6086  42.6086 -42.6086  3.49250  0.00000  16*.5
CUBOID       0  54.0563 -54.0563  54.0563 -54.0563  3.49250  0.00000  16*.5
CUBOID       2  54.3687 -54.3687  54.3687 -54.3687  3.49250  0.00000  16*.5
BOX TYPE    21  /* npc body - 30.45" two-part body
CUBOID       0  54.3687 -54.3687  54.3687 -54.3687  77.3430   0.0000  16*.5
BOX TYPE    22  /* npc lid - 1.375 " foam layer (40 #/ft3)  - lid burn
CUBOID       0  43.8963 -43.8963  43.8963 -43.8963  3.49250  0.00000  16*.5
```

```
CUBOID       0  54.0563 -54.0563  54.0563 -54.0563  3.49250  0.00000  16*.5
CUBOID       2  54.3687 -54.3687  54.3687 -54.3687  3.49250  0.00000  16*.5
BOX TYPE    23  /* npc lid - 3.5" foam layer (15 #/ft3)      - lid burn
CUBOID       0  43.8963 -43.8963  43.8963 -43.8963  2.54000  0.00000  16*.5
CUBOID       0  54.0563 -54.0563  54.0563 -54.0563  8.89000  0.00000  16*.5
CUBOID       2  54.3687 -54.3687  54.3687 -54.3687  8.89000  0.00000  16*.5
BOX TYPE    24  /* complete npc - body assembly
CUBOID       0  54.3688 -54.3688  54.3688 -54.3688  87.8154   0.0000  16*.5
BOX TYPE    25  /* complete npc - lid assembly
CUBOID       0  54.3688 -54.3688  54.3688 -54.3688  15.2349   0.0000  16*.5
BOX TYPE    26  /* npc single-unit cuboid
CUBOID       0  54.3688 -54.3688  54.3688 -54.3688  103.0503  0.0000  16*.5
BOX TYPE    27  /* global unit: 2N-150:5x5x6 cuboid, 30.48-cm h2o refl.
CUBOID       0  271.8440 -271.8440 271.8440 -271.8440 618.3018  0.000  16*.5
CUBOID       6  302.3240 -302.3240 302.3240 -302.3240 648.7818 -30.48  16*.5
 27    1  1  1     1  1  1     1  1  1   1
BEGIN COMPLEX
/* build inner canister - main body section (7 #/ft3 region)
COMPLEX  12  1  0.00000  0.00000  0.00000   1   1   1  0.0   0.0   0.0
COMPLEX  12  2  0.00000  0.00000  0.31750   1   1   1  0.0   0.0   0.0
COMPLEX  12  3  0.00000  0.00000  25.7810   1   1   1  0.0   0.0   0.0
COMPLEX  12  4  0.00000  0.00000  26.1621   1   1   1  0.0   0.0   0.0
COMPLEX  12  5  0.00000  0.00000  51.6256   1   1   1  0.0   0.0   0.0
COMPLEX  12  6  0.00000  0.00000  52.0066   1   1   1  0.0   0.0   0.0
/* build inner canister - upper body section (40 #/ft3 section)
COMPLEX  13  7  0.00000  0.00000  0.00000   1   1   1  0.0   0.0   0.0
/* build inner canister - lid section
COMPLEX  14  8  0.00000  0.00000  0.00000   1   1   1  0.0   0.0   0.0
COMPLEX  14  9  0.00000  0.00000  0.63250   1   1   1  0.0   0.0   0.0
COMPLEX  14 10  0.00000  0.00000  0.95000   1   1   1  0.0   0.0   0.0
COMPLEX  14 11  0.00000  0.00000  1.39200   1   1   1  0.0   0.0   0.0
/* embed 3x3 array of canisters into lid: 11.75"-centers
COMPLEX  15 14 -29.8450 -29.8450  0.00000   3   3   1  29.8450  29.8450  0.0
/* embed 3x3 array of foam cut outs:11.75"-centers
COMPLEX  22 15 -29.8450 -29.8450  0.00000   3   3   1  29.8450  29.8450  0.0
/* embed 3x3 array of canisters into inner body: 11.75"-centers
COMPLEX  19 12 -29.8450 -29.8450  0.50550   3   3   1  29.8450  29.8450  0.0
COMPLEX  20 13 -29.8450 -29.8450  0.00000   3   3   1  29.8450  29.8450  0.0
/* embed two-part body section stackup
COMPLEX  21 19  0.00000  0.00000  0.00000   1   1   1  0.0   0.0   0.0
COMPLEX  21 20  0.00000  0.00000  73.8505   1   1   1  0.0   0.0   0.0
/* build npc - body assembly
COMPLEX  24 16  0.00000  0.00000  0.00000   1   1   1  0.0   0.0   0.0
COMPLEX  24 17  0.00000  0.00000  0.31240   1   1   1  0.0   0.0   0.0
COMPLEX  24 18  0.00000  0.00000  10.4724   1   1   1  0.0   0.0   0.0
COMPLEX  24 21  0.00000  0.00000  10.4724   1   1   1  0.0   0.0   0.0
/* build npc - lid assembly
COMPLEX  25 22  0.00000  0.00000  0.00000   1   1   1  0.0   0.0   0.0
COMPLEX  25 23  0.00000  0.00000  3.49250   1   1   1  0.0   0.0   0.0
COMPLEX  25 17  0.00000  0.00000  12.3825   1   1   1  0.0   0.0   0.0
COMPLEX  25 16  0.00000  0.00000  14.9225   1   1   1  0.0   0.0   0.0
/* complete npc stackup - single unit
COMPLEX  26 24  0.00000  0.00000  0.00000   1   1   1  0.0   0.0   0.0
COMPLEX  26 25  0.00000  0.00000  87.8154   1   1   1  0.0   0.0   0.0
/* embed 5x5x6 closed packed array
COMPLEX  27 26  -217.4752 -217.4752 0.000  5 5 6 108.7376 108.7376 103.0503
END GEOM
DEFAULTS=YES
END GEMER
```

B. Heterogeneous 55Kg and 53Kg UO_2 Rod Lattice Cases

Figure 6.25a – Sample input file = ESTP-400.in

```
2002 NPC SC, HET Lat,FRad=0.3810,55.0kg U(5.00)O2,WTF=4.00,MixHt=68.432cm
   200  /* # BATCHES
  2000  /* # NEUTRONS PER BATCH
    10  /* # BATCHES TO SKIP
     0  /* # INITIAL 'SEED' (IF NON-ZERO)
     0  /* # 'IDUMP'
     1  /* # 'NRSTRT'
     0  /* # 'NBTED' (NON-ZERO IS PRINT EDITS)
     0  /* # 'KRED' (NUMBER OF COMBINED REGIONS IN EDITS)
  0  293   0   0
\CSXSEC\UO2\GUO2-50.00
\CSXSEC\NOU\GNOU-0.SS
\CSXSEC\NOU\GNOU-0.CAD
\CSXSEC\NOU\GNOU-0.POL 0.98
\CSXSEC\NOU\GNOU-0.F07 0.90
\CSXSEC\NOU\GNOU-0.WAT
\CSXSEC\NOU\GNOU-0.F11 0.90
\CSXSEC\NOU\GNOU-0.F15 0.90
\CSXSEC\NOU\GNOU-0.F40 0.90
\CSXSEC\NOU\GNOU-0.ORC
\CSXSEC\NOU\GNOU-0.WAT 1.00
KENO GEOM
     0  /* 'KREFM'
     0  /* 'NBOX'
     1  /* 'NBXMAX'
     1  /* 'NBYMAX'
     1  /* 'NBZMAX'
     1  /* 'NXX'
     1  /* 'NTYPST'
     1  /* 'NEMBRG'
     0  /* 'NGMCHK'
     0.0     0.0     0.0     0.0     0.0
BOX TYPE      1  /* 17X17 pellet, var. W/F
CYLINDER      1  0.42940   1.04140  0.00000  16*0.5
CUBOID        6  0.90234  -0.90234  0.90234 -0.90234   1.04140  0.00000 16*0.5
BOX TYPE      2  /*  inner canister: bottom fuel_region # 1 w/ gap: body assy
CYLINDER      6  10.8141    0.31750   0.00       16*0.5
CYLINDER      2  10.9233    0.31750   0.00       16*0.5
CYLINDER      0  12.40920   0.31750   0.00000    16*0.5
CYLINDER      2  12.40920   0.31750  -0.44200    16*0.5
CYLINDER      2  12.46120   0.31750  -0.44200    16*0.5
CYLINDER      0  12.70000   0.31750  -0.44200    16*0.5
CYLINDER      2  12.76350   0.31750  -0.50550    16*0.5
BOX TYPE      3  /*  inner canister: fuel_region # 2: body assy
CYLINDER      6  10.8141   25.46350   0.00       16*0.5
CYLINDER      2  10.9233   25.46350   0.00       16*0.5
CYLINDER      3  10.96140  25.46350   0.00000    16*0.5
CYLINDER      4  12.40920  25.46350   0.00000    16*0.5
CYLINDER      2  12.46120  25.46350   0.00000    16*0.5
CYLINDER      0  12.70000  25.46350   0.00000    16*0.5
CYLINDER      2  12.76350  25.46350   0.00000    16*0.5
BOX TYPE      4  /*  inner canister: fuel_region # 3: 0.15 in cd gap: body assy
CYLINDER      6  10.8141    0.38100   0.00       16*0.5
CYLINDER      2  10.9233    0.38100   0.00       16*0.5
CYLINDER      0  10.96140   0.38100   0.00000    16*0.5
CYLINDER      4  12.40920   0.38100   0.00000    16*0.5
CYLINDER      2  12.46120   0.38100   0.00000    16*0.5
CYLINDER      0  12.70000   0.38100   0.00000    16*0.5
CYLINDER      2  12.76350   0.38100   0.00000    16*0.5
BOX TYPE      5  /*  inner canister: fuel_region # 4: body assy
CYLINDER      6  10.8141   25.46350   0.00       16*0.5
CYLINDER      2  10.9233   25.46350   0.00       16*0.5
CYLINDER      3  10.96140  25.46350   0.00000    16*0.5
CYLINDER      4  12.40920  25.46350   0.00000    16*0.5
CYLINDER      2  12.46120  25.46350   0.00000    16*0.5
CYLINDER      0  12.70000  25.46350   0.00000    16*0.5
CYLINDER      2  12.76350  25.46350   0.00000    16*0.5
BOX TYPE      6  /*  inner canister: fuel_region # 5: 0.15 in cd gap: body assy
CYLINDER      6  10.8141    0.38100   0.00       16*0.5
CYLINDER      2  10.9233    0.38100   0.00       16*0.5
CYLINDER      0  10.96140   0.38100   0.00000    16*0.5
CYLINDER      4  12.40920   0.38100   0.00000    16*0.5
CYLINDER      2  12.46120   0.38100   0.00000    16*0.5
CYLINDER      0  12.70000   0.38100   0.00000    16*0.5
CYLINDER      2  12.76350   0.38100   0.00000    16*0.5
BOX TYPE      7  /*  inner canister: fuel_region # 6: body assy
CYLINDER      6  10.8141   16.42593   0.00       16*0.5
CYLINDER      0  10.8141   21.33840   0.00       16*0.5
CYLINDER      2  10.9233   21.33840   0.00       16*0.5
CYLINDER      3  10.96140  21.33840   0.00000    16*0.5
CYLINDER      4  12.40920  21.33840   0.00000    16*0.5
CYLINDER      2  12.46120  21.33840   0.00000    16*0.5
CYLINDER      0  12.70000  21.33840   0.00000    16*0.5
CYLINDER      2  12.76350  21.33840   0.00000    16*0.5
BOX TYPE      8  /*  inner canister: fuel_region # 7: body assy
CYLINDER      0  10.8141    3.49250   0.00       16*0.5
CYLINDER      2  10.9233    3.49250   0.00       16*0.5
CYLINDER      3  10.96140   3.49250   0.00000    16*0.5
CYLINDER      4  12.40920   3.49250   0.00000    16*0.5
CYLINDER      2  12.46120   3.49250   0.00000    16*0.5
CYLINDER      0  12.70000   3.49250   0.00000    16*0.5
CYLINDER      2  12.76350   3.49250   0.00000    16*0.5
```

```
BOX TYPE      9  /*  inner canister: fuel_region # 8: lid assy
CYLINDER      0  10.8141    0.63250   0.00       16*0.5
CYLINDER      2  10.9233    0.63250   0.00       16*0.5
CYLINDER      3  10.96140   0.63250   0.00000    16*0.5
CYLINDER      4  12.40920   0.63250   0.00000    16*0.5
CYLINDER      2  12.46120   0.63250   0.00000    16*0.5
CYLINDER      0  12.70000   0.63250   0.00000    16*0.5
CYLINDER      2  12.76350   0.63250   0.00000    16*0.5
BOX TYPE     10  /*  inner canister: fuel_region # 9 w/ gap: lid assy
CYLINDER      0  10.8141    0.31750   0.00       16*0.5
CYLINDER      2  10.9233    0.31750   0.00       16*0.5
CYLINDER     11  12.40920   0.31750   0.00000    16*0.5
CYLINDER      2  12.46120   0.31750   0.00000    16*0.5
BOX TYPE     11  /*  inner canister: fuel_region #10 w/ ring: lid assy
CYLINDER      0  10.8141    0.44200   0.00       16*0.5
CYLINDER      2  10.9233    0.44200   0.00       16*0.5
CYLINDER      2  12.40920   0.44200   0.00000    16*0.5
CYLINDER      2  12.46120   0.44200   0.00000    16*0.5
BOX TYPE     12  /*  inner canister: fuel_region #11 w/ top: lid assy
CYLINDER      0  10.8141    1.78050   0.00       16*0.5
CYLINDER      2  10.9233    1.91640   0.00       16*0.5
CYLINDER     11  12.40920   1.91640   0.00000    16*0.5
BOX TYPE     13  /*  inner canister cuboid: body section (7# region)
CUBOID        5  12.7636 -12.7636  12.7636 -12.7636  73.3450  -0.5055  16*0.5
BOX TYPE     14  /*  inner canister cuboid: body section (40# region)
CUBOID        9  12.7636 -12.7636  12.7636 -12.7636  3.49260   0.0000  16*0.5
BOX TYPE     15  /*  inner canister upper cylinder: lid section
CYLINDER     11  12.7636  3.30840   0.0000  16*0.5
BOX TYPE     16  /*  foam cutout  (void) - 40 #/ft3 foam lid section
CYLINDER     11  13.5510  3.30840   0.0000  16*0.5
BOX TYPE     17  /*  npc body or lid - 10 ga. 304ss layer
CUBOID        2  54.3687 -54.3687  54.3687 -54.3687  0.31240   0.0000  16*0.5
BOX TYPE     18  /*  npc body or lid - 1 inch duraboard (void) layer, 10 ga. 304ss
CUBOID       11  51.5163 -51.5163  51.5163 -51.5163  2.54000   0.0000  16*0.5
CUBOID       11  54.0563 -54.0563  54.0563 -54.0563  2.54000   0.0000  16*0.5
CUBOID        2  54.3687 -54.3687  54.3687 -54.3687  2.54000   0.0000  16*0.5
BOX TYPE     19  /*  npc body - 4 inch bot. foam layer (11 #/ft3)  - face burn
CUBOID        7  42.6086 -42.6086  42.6086 -42.6086  0.00000   0.0000  16*0.5
CUBOID       11  54.0563 -54.0563  54.0563 -54.0563  0.00000  -7.6200  16*0.5
CUBOID        2  54.3687 -54.3687  54.3687 -54.3687  0.00000  -7.6200  16*0.5
BOX TYPE     20  /*  npc body - 29.0750 inch foam layer (7,11 #/ft3) - face burn
CUBOID        5  42.6086 -42.6086  42.6086 -42.6086 73.85050   0.0000  16*0.5
CUBOID        7  42.6086 -42.6086  42.6086 -42.6086 73.85050   0.0000  16*0.5
CUBOID       11  54.0563 -54.0563  54.0563 -54.0563 73.85050   0.0000  16*0.5
CUBOID        2  54.3687 -54.3687  54.3687 -54.3687 73.85050   0.0000  16*0.5
BOX TYPE     21  /*  npc body - 1.375 inch foam layer (40 #/ft3) - face burn
CUBOID        9  42.6086 -42.6086  42.6086 -42.6086  3.49250   0.0000  16*0.5
CUBOID       11  54.0563 -54.0563  54.0563 -54.0563  3.49250   0.0000  16*0.5
CUBOID        2  54.3687 -54.3687  54.3687 -54.3687  3.49250   0.0000  16*0.5
BOX TYPE     22  /*  npc body - 30.45 inch two-part body
CUBOID       11  54.3687 -54.3687  54.3687 -54.3687 77.34300   0.0000  16*0.5
BOX TYPE     23  /*  npc lid - 1.375 inch foam layer (40 #/ft3) - lid burn
CUBOID       11  43.8963 -43.8963  43.8963 -43.8963  3.49250   0.0000  16*0.5
CUBOID       11  54.0563 -54.0563  54.0563 -54.0563  3.49250   0.0000  16*0.5
CUBOID        2  54.3687 -54.3687  54.3687 -54.3687  3.49250   0.0000  16*0.5
BOX TYPE     24  /*  npc lid - 3.5 inch foam layer (15 #/ft3) - lid burn
CUBOID       11  43.8963 -43.8963  43.8963 -43.8963  2.54000   0.0000  16*0.5
CUBOID       11  54.0563 -54.0563  54.0563 -54.0563  8.89000   0.0000  16*0.5
CUBOID        2  54.3687 -54.3687  54.3687 -54.3687  8.89000   0.0000  16*0.5
BOX TYPE     25  /*  complete npc - body assembly
CUBOID       11  54.3688 -54.3688  54.3688 -54.3688 87.81540   0.0000  16*0.5
BOX TYPE     26  /*  complete npc - lid assembly
CUBOID       11  54.3688 -54.3688  54.3688 -54.3688 15.23490   0.0000  16*0.5
BOX TYPE     27  /*  npc water-reflected single-unit cuboid
CUBOID        0  54.3688 -54.3688  54.3688 -54.3688 103.0503   0.0000  16*0.5
CUBOID        6  84.8488 -84.8488  84.8488 -84.8488 133.5303 -30.4800  16*0.5
BOX TYPE     28  /*  global unit: Damaged Unit, Full H2O Reflection
CUBOID        0  54.3688 -54.3688  54.3688 -54.3688 103.0500   0.0000  16*0.5
CUBOID        6  84.8488 -84.8488  84.8488 -84.8488 133.5303 -30.4800  16*0.5
BOX TYPE     29  /* Region  1 embedded rod
CYLINDER      1  0.38100   0.31750   0.00000    16*0.5
BOX TYPE     30  /* Region  2 embedded rod
CYLINDER      1  0.38100  25.46350   0.00000    16*0.5
BOX TYPE     31  /* Region  3 embedded rod
CYLINDER      1  0.38100   0.38100   0.00000    16*0.5
BOX TYPE     32  /* Region  4 embedded rod
CYLINDER      1  0.38100  25.46350   0.00000    16*0.5
BOX TYPE     33  /* Region  5 embedded rod
CYLINDER      1  0.38100   0.38100   0.00000    16*0.5
BOX TYPE     34  /* Region  6 embedded rod
CYLINDER      1  0.38100  16.42592   0.00000    16*0.5
BOX TYPE     35  /* Region  7 embedded rod
CYLINDER      1  0.38100   3.49250   0.00000    16*0.5
CUBOID        0  0.3810  -0.3810   0.3810  -0.3810   3.4925   0.0000  16*0.5
BOX TYPE     36  /* Region  8 embedded rod
CYLINDER      1  0.38100   0.63250   0.00000    16*0.5
CUBOID        0  0.3810  -0.3810   0.3810  -0.3810   0.6325   0.0000  16*0.5
BOX TYPE     37  /* Region  9 embedded rod
CYLINDER      1  0.38100   0.31750   0.00000    16*0.5
CUBOID        0  0.3810  -0.3810   0.3810  -0.3810   0.3175   0.0000  16*0.5
BOX TYPE     38  /* Region 10 embedded rod
CYLINDER      1  0.38100   0.44200   0.00000    16*0.5
CUBOID        0  0.3810  -0.3810   0.3810  -0.3810   0.4420   0.0000  16*0.5
BOX TYPE     39  /* Region 11 embedded rod
CYLINDER      1  0.38100   1.78050   0.00000    16*0.5
CUBOID        0  0.3810  -0.3810   0.3810  -0.3810   1.7805   0.0000  16*0.5
27  1 1 1  1 1 1  1 1 1  1
BEGIN COMPLEX
COMPLEX   2 29   0.0000   0.0000   0.0000 -16 -10  1   1.6226   2.8105 0.0
COMPLEX   2 29   0.8113   1.4052   0.0000 -16 -10  1   1.6226   2.8105 0.0
```

```
COMPLEX    3 30    0.0000    0.0000    0.0000 -16 -10   1    1.6226    2.8105 0.0
COMPLEX    3 30    0.8113    1.4052    0.0000 -16 -10   1    1.6226    2.8105 0.0
COMPLEX    4 31    0.0000    0.0000    0.0000 -16 -10   1    1.6226    2.8105 0.0
COMPLEX    4 31    0.8113    1.4052    0.0000 -16 -10   1    1.6226    2.8105 0.0
COMPLEX    5 32    0.0000    0.0000    0.0000 -16 -10   1    1.6226    2.8105 0.0
COMPLEX    5 32    0.8113    1.4052    0.0000 -16 -10   1    1.6226    2.8105 0.0
COMPLEX    6 33    0.0000    0.0000    0.0000 -16 -10   1    1.6226    2.8105 0.0
COMPLEX    6 33    0.8113    1.4052    0.0000 -16 -10   1    1.6226    2.8105 0.0
COMPLEX    7 34    0.0000    0.0000    0.0000 -16 -10   1    1.6226    2.8105 0.0
COMPLEX    7 34    0.8113    1.4052    0.0000 -16 -10   1    1.6226    2.8105 0.0
/*  build inner canister - main body sections (7 #/ft3 region)
COMPLEX   13  2  0.00000   0.00000   0.00000    1    1    1  0.0   0.0   0.0
COMPLEX   13  3  0.00000   0.00000   3.31750    1    1    1  0.0   0.0   0.0
COMPLEX   13  4  0.00000   0.00000  25.7810     1    1    1  0.0   0.0   0.0
COMPLEX   13  5  0.00000   0.00000  26.1621     1    1    1  0.0   0.0   0.0
COMPLEX   13  6  0.00000   0.00000  51.6256     1    1    1  0.0   0.0   0.0
COMPLEX   13  7  0.00000   0.00000  52.0066     1    1    1  0.0   0.0   0.0
/*  build inner canister - upper body section (40 #/ft3 section)
COMPLEX   14  8  0.00000   0.00000   0.00000    1    1    1  0.0   0.0   0.0
/*  build inner canister - lid section
COMPLEX   15  9  0.00000   0.00000   0.00000    1    1    1  0.0   0.0   0.0
COMPLEX   15 10  0.00000   0.00000   0.63250    1    1    1  0.0   0.0   0.0
COMPLEX   15 11  0.00000   0.00000   0.95000    1    1    1  0.0   0.0   0.0
COMPLEX   15 12  0.00000   0.00000   1.39200    1    1    1  0.0   0.0   0.0
/*  embed 3x3 array of canisters into lid:  11.75 inch - centers
COMPLEX   16 15 -29.8450 -29.8450   0.00000    3    3    1 29.8450  29.8450  0.0
/*  embed 3x3 array of foam cut_outs: 11.75 inch - centers
COMPLEX   23 16 -29.8450 -29.8450   0.00000    3    3    1 29.8450  29.8450  0.0
/*  embed 3x3 array of canisters into inner body: 11.75 inch - centers
COMPLEX   20 13 -29.8450 -29.8450   0.50550    3    3    1 29.8450  29.8450  0.0
COMPLEX   21 14 -29.8450 -29.8450   0.00000    3    3    1 29.8450  29.8450  0.0
/*  embed two-part body section stackup
COMPLEX   22 20   0.0000   0.0000   0.00000    1    1    1  0.0   0.0   0.0
COMPLEX   22 21   0.0000   0.0000  73.85050    1    1    1  0.0   0.0   0.0
/*  build npc - body assembly
COMPLEX   25 17   0.0000   0.0000   0.00000    1    1    1  0.0   0.0   0.0
COMPLEX   25 18   0.0000   0.0000   0.31240    1    1    1  0.0   0.0   0.0
COMPLEX   25 19   0.0000   0.0000  10.4724     1    1    1  0.0   0.0   0.0
COMPLEX   25 22   0.0000   0.0000  10.4724     1    1    1  0.0   0.0   0.0
/*  build npc - lid assembly
COMPLEX   26 23   0.0000   0.0000   0.00000    1    1    1  0.0   0.0   0.0
COMPLEX   26 24   0.0000   0.0000   3.49250    1    1    1  0.0   0.0   0.0
COMPLEX   26 18   0.0000   0.0000  12.3825     1    1    1  0.0   0.0   0.0
COMPLEX   26 17   0.0000   0.0000  14.9225     1    1    1  0.0   0.0   0.0
/*  complete npc stackup - water reflected single unit
COMPLEX   27 25   0.0000   0.0000   0.00000    1    1    1  0.0   0.0   0.0
COMPLEX   27 26   0.0000   0.0000  87.8154     1    1    1  0.0   0.0   0.0
END GEOM
END GEMER
```

Figure 6.25b – Sample input file = CSTN-470.in

```
2002 NPC IA,HET Lat.,FRad-0.3810, 50.8 kg U(5.00)O2,WTF=4.70,MixHt=80.010cm
   200  /* # BATCHES
  2000  /* # NEUTRONS PER BATCH
    10  /* # BATCHES TO SKIP
     0  /* # INITIAL 'SEED' (IF NON-ZERO)
     0  /* # 'IDUMP'
     1  /* # 'NRSTRT'
     0  /* # 'NBTED' (NON-ZERO IS PRINT EDITS)
     0  /* # 'KRED' (NUMBER OF COMBINED REGIONS IN EDITS)
  0  293   0   0
\CSXSEC\UO2\GUO2-50.00
\CSXSEC\NOU\GNOU-0.SS
\CSXSEC\NOU\GNOU-0.CAD
\CSXSEC\NOU\GNOU-0.POL
\CSXSEC\NOU\GNOU-0.F07 0.90
\CSXSEC\NOU\GNOU-0.WAT
\CSXSEC\NOU\GNOU-0.F11 0.90
\CSXSEC\NOU\GNOU-0.F15 0.90
\CSXSEC\NOU\GNOU-0.F40 0.90
\CSXSEC\NOU\GNOU-0.ORC
\CSXSEC\NOU\GNOU-0.WAT 0.0001
KENO GEOM
     0  /* 'KREFM'
     0  /* 'NBOX'
     1  /* 'NBXMAX'
     1  /* 'NBYMAX'
     1  /* 'NBZMAX'
     1  /* 'NXX'
     1  /* 'NTYPST'
     1  /* 'NEMBRG'
     0  /* 'NGMCHK'
    -1.0    -1.0    -1.0    -1.0    -1.0    -1.0
BOX TYPE       1  /* 17X17 pellet, var. W/F
CYLINDER       1  0.42940    1.04140  0.00000  16*0.5
CUBOID         6  0.90234  -0.90234  0.90234 -0.90234   1.04140  0.00000 16*0.5
BOX TYPE       2  /*  inner canister: bottom fuel_region # 1 w/ gap: body assy
CYLINDER       6  10.8141    0.31750   0.00       16*0.5
CYLINDER       2  10.9233    0.31750   0.00       16*0.5
CYLINDER       0  12.40920   0.31750   0.00000    16*0.5
CYLINDER       2  12.40920   0.31750  -0.44200    16*0.5
CYLINDER       2  12.46120   0.31750  -0.44200    16*0.5
CYLINDER       0  12.70000   0.31750  -0.44200    16*0.5
CYLINDER       2  12.76350   0.31750  -0.50550    16*0.5
BOX TYPE       3  /*  inner canister: fuel_region # 2: body assy
CYLINDER       6  10.8141   25.46350   0.00       16*0.5
```

```
CYLINDER      2  10.9233    25.46350    0.00        16*0.5
CYLINDER      3  10.96140   25.46350    0.00000     16*0.5
CYLINDER      4  12.40920   25.46350    0.00000     16*0.5
CYLINDER      2  12.46120   25.46350    0.00000     16*0.5
CYLINDER      0  12.70000   25.46350    0.00000     16*0.5
CYLINDER      2  12.76350   25.46350    0.00000     16*0.5
BOX TYPE      4  /*  inner canister: fuel_region # 3: 0.15 in cd gap: body assy
CYLINDER      6  10.8141     0.38100    0.00        16*0.5
CYLINDER      2  10.9233     0.38100    0.00        16*0.5
CYLINDER      0  10.96140    0.38100    0.00000     16*0.5
CYLINDER      4  12.40920    0.38100    0.00000     16*0.5
CYLINDER      2  12.46120    0.38100    0.00000     16*0.5
CYLINDER      0  12.70000    0.38100    0.00000     16*0.5
CYLINDER      2  12.76350    0.38100    0.00000     16*0.5
BOX TYPE      5  /*  inner canister: fuel_region # 4: body assy
CYLINDER      6  10.8141    25.46350    0.00        16*0.5
CYLINDER      2  10.9233    25.46350    0.00        16*0.5
CYLINDER      3  10.96140   25.46350    0.00000     16*0.5
CYLINDER      4  12.40920   25.46350    0.00000     16*0.5
CYLINDER      2  12.46120   25.46350    0.00000     16*0.5
CYLINDER      0  12.70000   25.46350    0.00000     16*0.5
CYLINDER      2  12.76350   25.46350    0.00000     16*0.5
BOX TYPE      6  /*  inner canister: fuel_region # 5: 0.15 in cd gap: body assy
CYLINDER      6  10.8141     0.38100    0.00        16*0.5
CYLINDER      2  10.9233     0.38100    0.00        16*0.5
CYLINDER      0  10.96140    0.38100    0.00000     16*0.5
CYLINDER      4  12.40920    0.38100    0.00000     16*0.5
CYLINDER      2  12.46120    0.38100    0.00000     16*0.5
CYLINDER      0  12.70000    0.38100    0.00000     16*0.5
CYLINDER      2  12.76350    0.38100    0.00000     16*0.5
BOX TYPE      7  /*  inner canister: fuel_region # 6: body assy
CYLINDER      6  10.8141    21.33840    0.00        16*0.5
CYLINDER      2  10.9233    21.33840    0.00        16*0.5
CYLINDER      3  10.96140   21.33840    0.00000     16*0.5
CYLINDER      4  12.40920   21.33840    0.00000     16*0.5
CYLINDER      2  12.46120   21.33840    0.00000     16*0.5
CYLINDER      0  12.70000   21.33840    0.00000     16*0.5
CYLINDER      2  12.76350   21.33840    0.00000     16*0.5
BOX TYPE      8  /*  inner canister: fuel_region # 7: body assy
CYLINDER      6  10.8141     3.49250    0.00        16*0.5
CYLINDER      2  10.9233     3.49250    0.00        16*0.5
CYLINDER      3  10.96140    3.49250    0.00000     16*0.5
CYLINDER      4  12.40920    3.49250    0.00000     16*0.5
CYLINDER      2  12.46120    3.49250    0.00000     16*0.5
CYLINDER      0  12.70000    3.49250    0.00000     16*0.5
CYLINDER      2  12.76350    3.49250    0.00000     16*0.5
BOX TYPE      9  /*  inner canister: fuel_region # 8: lid assy
CYLINDER      6  10.8141     0.63250    0.00        16*0.5
CYLINDER      2  10.9233     0.63250    0.00        16*0.5
CYLINDER      3  10.96140    0.63250    0.00000     16*0.5
CYLINDER      4  12.40920    0.63250    0.00000     16*0.5
CYLINDER      2  12.46120    0.63250    0.00000     16*0.5
CYLINDER      0  12.70000    0.63250    0.00000     16*0.5
CYLINDER      2  12.76350    0.63250    0.00000     16*0.5
BOX TYPE     10  /*  inner canister: fuel_region # 9 w/ gap: lid assy
CYLINDER      6  10.8141     0.31750    0.00        16*0.5
CYLINDER      2  10.9233     0.31750    0.00        16*0.5
CYLINDER     11  12.40920    0.31750    0.00000     16*0.5
CYLINDER      2  12.46120    0.31750    0.00000     16*0.5
BOX TYPE     11  /*  inner canister: fuel_region #10 w/ ring: lid assy
CYLINDER      6  10.8141     0.44200    0.00        16*0.5
CYLINDER      2  10.9233     0.44200    0.00        16*0.5
CYLINDER      2  12.40920    0.44200    0.00000     16*0.5
CYLINDER      2  12.46120    0.44200    0.00000     16*0.5
BOX TYPE     12  /*  inner canister: fuel_region #11 w/ top: lid assy
CYLINDER      6  10.8141     1.78050    0.00        16*0.5
CYLINDER      2  10.9233     1.91640    0.00        16*0.5
CYLINDER     11  12.40920    1.91640    0.00000     16*0.5
BOX TYPE     13  /*  inner canister cuboid: body section (7# region)
CUBOID        5  12.7636 -12.7636  12.7636 -12.7636  73.3450  -0.5055  16*0.5
BOX TYPE     14  /*  inner canister cuboid: body section (40# region)
CUBOID        9  12.7636 -12.7636  12.7636 -12.7636  3.49260   0.0000  16*0.5
BOX TYPE     15  /*  inner canister upper cylinder: lid section
CYLINDER     11  12.7636  3.30840   0.0000  16*0.5
BOX TYPE     16  /*  foam cutout  (void) - 40 #/ft3 foam lid section
CYLINDER     11  13.5510  3.30840   0.0000  16*0.5
BOX TYPE     17  /*  npc body or lid - 10 ga. 304ss layer
CUBOID        2  54.3687 -54.3687  54.3687 -54.3687  0.31240   0.0000  16*0.5
BOX TYPE     18  /*  npc body or lid - 1 inch duraboard (void) layer, 10 ga. 304ss
CUBOID       11  51.5163 -51.5163  51.5163 -51.5163  2.54000   0.0000  16*0.5
CUBOID       11  54.0563 -54.0563  54.0563 -54.0563  2.54000   0.0000  16*0.5
CUBOID        2  54.3687 -54.3687  54.3687 -54.3687  2.54000   0.0000  16*0.5
BOX TYPE     19  /*  npc body - 3 inch bot. foam layer (11 #/ft3)  - face burn
CUBOID        7  51.5163 -51.5163  51.5163 -51.5163  7.62000   0.0000  16*0.5
CUBOID       11  54.0563 -54.0563  54.0563 -54.0563  7.62000   0.0000  16*0.5
CUBOID        2  54.3687 -54.3687  54.3687 -54.3687  7.62000   0.0000  16*0.5
BOX TYPE     20  /*  npc body - 29.0750 inch foam layer (7,11 #/ft3) - face burn
CUBOID        5  43.8963 -43.8963  43.8963 -43.8963 73.85050   0.0000  16*0.5
CUBOID        7  51.5163 -51.5163  51.5163 -51.5163 73.85050   0.0000  16*0.5
CUBOID       11  54.0563 -54.0563  54.0563 -54.0563 73.85050   0.0000  16*0.5
CUBOID        2  54.3687 -54.3687  54.3687 -54.3687 73.85050   0.0000  16*0.5
BOX TYPE     21  /*  npc body - 1.375 inch foam layer (40 #/ft3) - face burn
CUBOID        9  51.5163 -51.5163  51.5163 -51.5163  3.49250   0.0000  16*0.5
CUBOID       11  54.0563 -54.0563  54.0563 -54.0563  3.49250   0.0000  16*0.5
CUBOID        2  54.3687 -54.3687  54.3687 -54.3687  3.49250   0.0000  16*0.5
BOX TYPE     22  /*  npc body - 30.45 inch two-part body
CUBOID       11  54.3687 -54.3687  54.3687 -54.3687 77.34300   0.0000  16*0.5
BOX TYPE     23  /*  npc lid - 1.375 inch foam layer (40 #/ft3) - lid burn
CUBOID        9  51.5163 -51.5163  51.5163 -51.5163  3.49250   0.0000  16*0.5
CUBOID       11  54.0563 -54.0563  54.0563 -54.0563  3.49250   0.0000  16*0.5
```

```
CUBOID        2  54.3687 -54.3687  54.3687 -54.3687  3.49250   0.0000  16*0.5
BOX TYPE     24  /*  npc lid - 3.5 inch foam layer (15 #/ft3) - lid burn
CUBOID        8  51.5163 -51.5163  51.5163 -51.5163  8.89000   0.0000  16*0.5
CUBOID       11  54.0563 -54.0563  54.0563 -54.0563  8.89000   0.0000  16*0.5
CUBOID        2  54.3687 -54.3687  54.3687 -54.3687  8.89000   0.0000  16*0.5
BOX TYPE     25  /*  complete npc - body assembly
CUBOID       11  54.3688 -54.3688  54.3688 -54.3688 87.81540   0.0000  16*0.5
BOX TYPE     26  /*  complete npc - lid assembly
CUBOID       11  54.3688 -54.3688  54.3688 -54.3688 15.23490   0.0000  16*0.5
BOX TYPE     27  /*  npc water reflected single-unit
CUBOID        0  54.3688 -54.3688  54.3688 -54.3688 103.0503   0.0000  16*0.5
BOX TYPE     28  /*  global unit: 2N=150:5x5x6 cuboid, 30.48-cm h2o refl.
CUBOID        0  271.844 -271.844  271.844 -271.844 618.3020   0.0000  16*0.5
CUBOID        6  302.324 -302.324  302.324 -302.324 648.7820 -30.4800  16*0.5
BOX TYPE     29  /* Region  1 embedded rod
CYLINDER      1   0.38100   0.31750   0.00000    16*0.5
BOX TYPE     30  /* Region  2 embedded rod
CYLINDER      1   0.38100  25.46350   0.00000    16*0.5
BOX TYPE     31  /* Region  3 embedded rod
CYLINDER      1   0.38100   0.38100   0.00000    16*0.5
BOX TYPE     32  /* Region  4 embedded rod
CYLINDER      1   0.38100  25.46350   0.00000    16*0.5
BOX TYPE     33  /* Region  5 embedded rod
CYLINDER      1   0.38100   0.38100   0.00000    16*0.5
BOX TYPE     34  /* Region  6 embedded rod
CYLINDER      1   0.38100  21.33850   0.00000    16*0.5
BOX TYPE     35  /* Region  7 embedded rod
CYLINDER      1   0.38100   3.49250   0.00000    16*0.5
BOX TYPE     36  /* Region  8 embedded rod
CYLINDER      1   0.38100   0.63250   0.00000    16*0.5
BOX TYPE     37  /* Region  9 embedded rod
CYLINDER      1   0.38100   0.31750   0.00000    16*0.5
BOX TYPE     38  /* Region 10 embedded rod
CYLINDER      1   0.38100   0.44200   0.00000    16*0.5
BOX TYPE     39  /* Region 11 embedded rod
CYLINDER      1   0.38100   1.78050   0.00000    16*0.5
27  1 1 1  1 1 1  1 1 1  1
BEGIN COMPLEX
COMPLEX    2 29 -10.3950   0.0000   0.0000  13   1  1   1.7325   0.0000 0.0
COMPLEX    2 29  -9.5287  -1.5004   0.0000  12   2  1   1.7325   3.0008 0.0
COMPLEX    2 29  -8.6625  -3.0008   0.0000  11   2  1   1.7325   6.0015 0.0
COMPLEX    2 29  -7.7962  -4.5012   0.0000  10   2  1   1.7325   9.0023 0.0
COMPLEX    2 29  -6.9300  -6.0015   0.0000   9   2  1   1.7325  12.0031 0.0
COMPLEX    2 29  -6.0637  -7.5019   0.0000   8   2  1   1.7325  15.0038 0.0
COMPLEX    2 29  -5.1975  -9.0023   0.0000   7   2  1   1.7325  18.0046 0.0
COMPLEX    3 30 -10.3950   0.0000   0.0000  13   1  1   1.7325   0.0000 0.0
COMPLEX    3 30  -9.5287  -1.5004   0.0000  12   2  1   1.7325   3.0008 0.0
COMPLEX    3 30  -8.6625  -3.0008   0.0000  11   2  1   1.7325   6.0015 0.0
COMPLEX    3 30  -7.7962  -4.5012   0.0000  10   2  1   1.7325   9.0023 0.0
COMPLEX    3 30  -6.9300  -6.0015   0.0000   9   2  1   1.7325  12.0031 0.0
COMPLEX    3 30  -6.0637  -7.5019   0.0000   8   2  1   1.7325  15.0038 0.0
COMPLEX    3 30  -5.1975  -9.0023   0.0000   7   2  1   1.7325  18.0046 0.0
COMPLEX    4 31 -10.3950   0.0000   0.0000  13   1  1   1.7325   0.0000 0.0
COMPLEX    4 31  -9.5287  -1.5004   0.0000  12   2  1   1.7325   3.0008 0.0
COMPLEX    4 31  -8.6625  -3.0008   0.0000  11   2  1   1.7325   6.0015 0.0
COMPLEX    4 31  -7.7962  -4.5012   0.0000  10   2  1   1.7325   9.0023 0.0
COMPLEX    4 31  -6.9300  -6.0015   0.0000   9   2  1   1.7325  12.0031 0.0
COMPLEX    4 31  -6.0637  -7.5019   0.0000   8   2  1   1.7325  15.0038 0.0
COMPLEX    4 31  -5.1975  -9.0023   0.0000   7   2  1   1.7325  18.0046 0.0
COMPLEX    5 32 -10.3950   0.0000   0.0000  13   1  1   1.7325   0.0000 0.0
COMPLEX    5 32  -9.5287  -1.5004   0.0000  12   2  1   1.7325   3.0008 0.0
COMPLEX    5 32  -8.6625  -3.0008   0.0000  11   2  1   1.7325   6.0015 0.0
COMPLEX    5 32  -7.7962  -4.5012   0.0000  10   2  1   1.7325   9.0023 0.0
COMPLEX    5 32  -6.9300  -6.0015   0.0000   9   2  1   1.7325  12.0031 0.0
COMPLEX    5 32  -6.0637  -7.5019   0.0000   8   2  1   1.7325  15.0038 0.0
COMPLEX    5 32  -5.1975  -9.0023   0.0000   7   2  1   1.7325  18.0046 0.0
COMPLEX    6 33 -10.3950   0.0000   0.0000  13   1  1   1.7325   0.0000 0.0
COMPLEX    6 33  -9.5287  -1.5004   0.0000  12   2  1   1.7325   3.0008 0.0
COMPLEX    6 33  -8.6625  -3.0008   0.0000  11   2  1   1.7325   6.0015 0.0
COMPLEX    6 33  -7.7962  -4.5012   0.0000  10   2  1   1.7325   9.0023 0.0
COMPLEX    6 33  -6.9300  -6.0015   0.0000   9   2  1   1.7325  12.0031 0.0
COMPLEX    6 33  -6.0637  -7.5019   0.0000   8   2  1   1.7325  15.0038 0.0
COMPLEX    6 33  -5.1975  -9.0023   0.0000   7   2  1   1.7325  18.0046 0.0
COMPLEX    7 34 -10.3950   0.0000   0.0000  13   1  1   1.7325   0.0000 0.0
COMPLEX    7 34  -9.5287  -1.5004   0.0000  12   2  1   1.7325   3.0008 0.0
COMPLEX    7 34  -8.6625  -3.0008   0.0000  11   2  1   1.7325   6.0015 0.0
COMPLEX    7 34  -7.7962  -4.5012   0.0000  10   2  1   1.7325   9.0023 0.0
COMPLEX    7 34  -6.9300  -6.0015   0.0000   9   2  1   1.7325  12.0031 0.0
COMPLEX    7 34  -6.0637  -7.5019   0.0000   8   2  1   1.7325  15.0038 0.0
COMPLEX    7 34  -5.1975  -9.0023   0.0000   7   2  1   1.7325  18.0046 0.0
COMPLEX    8 35 -10.3950   0.0000   0.0000  13   1  1   1.7325   0.0000 0.0
COMPLEX    8 35  -9.5287  -1.5004   0.0000  12   2  1   1.7325   3.0008 0.0
COMPLEX    8 35  -8.6625  -3.0008   0.0000  11   2  1   1.7325   6.0015 0.0
COMPLEX    8 35  -7.7962  -4.5012   0.0000  10   2  1   1.7325   9.0023 0.0
COMPLEX    8 35  -6.9300  -6.0015   0.0000   9   2  1   1.7325  12.0031 0.0
COMPLEX    8 35  -6.0637  -7.5019   0.0000   8   2  1   1.7325  15.0038 0.0
COMPLEX    8 35  -5.1975  -9.0023   0.0000   7   2  1   1.7325  18.0046 0.0
COMPLEX    9 36 -10.3950   0.0000   0.0000  13   1  1   1.7325   0.0000 0.0
COMPLEX    9 36  -9.5287  -1.5004   0.0000  12   2  1   1.7325   3.0008 0.0
COMPLEX    9 36  -8.6625  -3.0008   0.0000  11   2  1   1.7325   6.0015 0.0
COMPLEX    9 36  -7.7962  -4.5012   0.0000  10   2  1   1.7325   9.0023 0.0
COMPLEX    9 36  -6.9300  -6.0015   0.0000   9   2  1   1.7325  12.0031 0.0
COMPLEX    9 36  -6.0637  -7.5019   0.0000   8   2  1   1.7325  15.0038 0.0
COMPLEX    9 36  -5.1975  -9.0023   0.0000   7   2  1   1.7325  18.0046 0.0
COMPLEX   10 37 -10.3950   0.0000   0.0000  13   1  1   1.7325   0.0000 0.0
COMPLEX   10 37  -9.5287  -1.5004   0.0000  12   2  1   1.7325   3.0008 0.0
COMPLEX   10 37  -8.6625  -3.0008   0.0000  11   2  1   1.7325   6.0015 0.0
COMPLEX   10 37  -7.7962  -4.5012   0.0000  10   2  1   1.7325   9.0023 0.0
COMPLEX   10 37  -6.9300  -6.0015   0.0000   9   2  1   1.7325  12.0031 0.0
COMPLEX   10 37  -6.0637  -7.5019   0.0000   8   2  1   1.7325  15.0038 0.0
```

```
COMPLEX  10 37  -5.1975  -9.0023   0.0000   7   2  1   1.7325  18.0046 0.0
COMPLEX  11 38 -10.3950   0.0000   0.0000  13   1  1   1.7325   0.0000 0.0
COMPLEX  11 38  -9.5287  -1.5004   0.0000  12   2  1   1.7325   3.0008 0.0
COMPLEX  11 38  -8.6625  -3.0008   0.0000  11   2  1   1.7325   6.0015 0.0
COMPLEX  11 38  -7.7962  -4.5012   0.0000  10   2  1   1.7325   9.0023 0.0
COMPLEX  11 38  -6.9300  -6.0015   0.0000   9   2  1   1.7325  12.0031 0.0
COMPLEX  11 38  -6.0637  -7.5019   0.0000   8   2  1   1.7325  15.0038 0.0
COMPLEX  11 38  -5.1975  -9.0023   0.0000   7   2  1   1.7325  18.0046 0.0
COMPLEX  12 39 -10.3950   0.0000   0.0000  13   1  1   1.7325   0.0000 0.0
COMPLEX  12 39  -9.5287  -1.5004   0.0000  12   2  1   1.7325   3.0008 0.0
COMPLEX  12 39  -8.6625  -3.0008   0.0000  11   2  1   1.7325   6.0015 0.0
COMPLEX  12 39  -7.7962  -4.5012   0.0000  10   2  1   1.7325   9.0023 0.0
COMPLEX  12 39  -6.9300  -6.0015   0.0000   9   2  1   1.7325  12.0031 0.0
COMPLEX  12 39  -6.0637  -7.5019   0.0000   8   2  1   1.7325  15.0038 0.0
COMPLEX  12 39  -5.1975  -9.0023   0.0000   7   2  1   1.7325  18.0046 0.0
/*  build inner canister - main body sections (7 #/ft3 region)
COMPLEX  13  2  0.00000  0.00000  0.00000   1   1   1  0.0  0.0  0.0
COMPLEX  13  3  0.00000  0.00000  0.31750   1   1   1  0.0  0.0  0.0
COMPLEX  13  4  0.00000  0.00000 25.7810   1   1   1  0.0  0.0  0.0
COMPLEX  13  5  0.00000  0.00000 26.1621   1   1   1  0.0  0.0  0.0
COMPLEX  13  6  0.00000  0.00000 51.6256   1   1   1  0.0  0.0  0.0
COMPLEX  13  7  0.00000  0.00000 52.0066   1   1   1  0.0  0.0  0.0
/*  build inner canister - upper body section (40 #/ft3 section)
COMPLEX  14  8  0.00000  0.00000  0.00000   1   1   1  0.0  0.0  0.0
/*  build inner canister - lid section
COMPLEX  15  9  0.00000  0.00000  0.00000   1   1   1  0.0  0.0  0.0
COMPLEX  15 10  0.00000  0.00000  0.63250   1   1   1  0.0  0.0  0.0
COMPLEX  15 11  0.00000  0.00000  0.95000   1   1   1  0.0  0.0  0.0
COMPLEX  15 12  0.00000  0.00000  1.39200   1   1   1  0.0  0.0  0.0
/*  embed 3x3 array of canisters into lid:  11.75 inch - centers
COMPLEX  16 15 -29.8450 -29.8450  0.00000   3   3   1 29.8450  29.8450  0.0
/*  embed 3x3 array of foam cut_outs: 11.75 inch - centers
COMPLEX  23 16 -29.8450 -29.8450  0.00000   3   3   1 29.8450  29.8450  0.0
/*  embed 3x3 array of canisters into inner body: 11.75 inch - centers
COMPLEX  20 13 -29.8450 -29.8450  0.50550   3   3   1 29.8450  29.8450  0.0
COMPLEX  21 14 -29.8450 -29.8450  0.00000   3   3   1 29.8450  29.8450  0.0
/*  embed two-part body section stackup
COMPLEX  22 20   0.0000   0.0000  0.00000   1   1   1  0.0  0.0  0.0
COMPLEX  22 21   0.0000   0.0000 73.85050   1   1   1  0.0  0.0  0.0
/*  build npc - body assembly
COMPLEX  25 17   0.0000   0.0000  0.00000   1   1   1  0.0  0.0  0.0
COMPLEX  25 18   0.0000   0.0000  0.31240   1   1   1  0.0  0.0  0.0
COMPLEX  25 19   0.0000   0.0000  2.85240   1   1   1  0.0  0.0  0.0
COMPLEX  25 22   0.0000   0.0000 10.4724    1   1   1  0.0  0.0  0.0
/*  build npc - lid assembly
COMPLEX  26 23   0.0000   0.0000  0.00000   1   1   1  0.0  0.0  0.0
COMPLEX  26 24   0.0000   0.0000  3.49250   1   1   1  0.0  0.0  0.0
COMPLEX  26 18   0.0000   0.0000 12.3825    1   1   1  0.0  0.0  0.0
COMPLEX  26 17   0.0000   0.0000 14.9225    1   1   1  0.0  0.0  0.0
/*  complete npc stackup - water reflected single unit
COMPLEX  27 25   0.0000   0.0000  0.00000   1   1   1  0.0  0.0  0.0
COMPLEX  27 26   0.0000   0.0000 87.8154    1   1   1  0.0  0.0  0.0
END GEOM
END GEMER
```

Figure 6.25c – Sample input file = S55-486.in

```
2002 NPC,HET Lat,FRad=0.3810,U(5.00)O2 MASS=55.0kg,WTF=4.86,MixHt=79.645cm
   200  /* # BATCHES
  2000  /* # NEUTRONS PER BATCH
    10  /* # BATCHES TO SKIP
     0  /* # INITIAL 'SEED' (IF NON-ZERO)
     0  /* # 'IDUMP'
     1  /* # 'NRSTRT'
     0  /* # 'NBTED' (NON-ZERO IS PRINT EDITS)
     0  /* # 'KRED' (NUMBER OF COMBINED REGIONS IN EDITS)
  0  293   0   0
\CSXSEC\UO2\GUO2-50.00
\CSXSEC\NOU\GNOU-0.SS
\CSXSEC\NOU\GNOU-0.CAD
\CSXSEC\NOU\GNOU-0.POL 0.98
\CSXSEC\NOU\GNOU-0.F07 0.90
\CSXSEC\NOU\GNOU-0.WAT
\CSXSEC\NOU\GNOU-0.F11 0.90
\CSXSEC\NOU\GNOU-0.F15 0.90
\CSXSEC\NOU\GNOU-0.F40 0.90
\CSXSEC\NOU\GNOU-0.ORC
KENO GEOM
     0  /* 'KREFM'
     0  /* 'NBOX'
     1  /* 'NBXMAX'
     1  /* 'NBYMAX'
     1  /* 'NBZMAX'
     1  /* 'NXX'
     1  /* 'NTYPST'
     1  /* 'NEMBRG'
     0  /* 'NGMCHK'
     0.0     0.0     0.0     0.0     0.0     0.0
BOX TYPE      1  /* 17X17 pellet, var. W/F
INTERS        6  0.439161  0.760649  0.381000 +1.00 30.48 -30.48 16*0.5
CUBOID        1  0.439161 -0.439161  0.760649 -0.760649 30.48 -30.48 16*0.5
BOX TYPE      2  /*  inner canister: bottom fuel_region # 1 w/ gap: body assy
CYLINDER     -1  10.8141    0.31750   0.00       16*0.5
CYLINDER      2  10.9233    0.31750   0.00       16*0.5
CYLINDER      0  12.40920   0.31750   0.00000    16*0.5
CYLINDER      2  12.40920   0.31750  -0.44200    16*0.5
CYLINDER      2  12.46120   0.31750  -0.44200    16*0.5
```

```
CYLINDER      0  12.70000   0.31750  -0.44200    16*0.5
CYLINDER      2  12.76350   0.31750  -0.50550    16*0.5
BOX TYPE      3  /*  inner canister: fuel_region # 2: body assy
CYLINDER     -1  10.8141   25.46350   0.00       16*0.5
CYLINDER      2  10.9233   25.46350   0.00       16*0.5
CYLINDER      3  10.96140  25.46350   0.00000    16*0.5
CYLINDER      4  12.40920  25.46350   0.00000    16*0.5
CYLINDER      2  12.46120  25.46350   0.00000    16*0.5
CYLINDER      0  12.70000  25.46350   0.00000    16*0.5
CYLINDER      2  12.76350  25.46350   0.00000    16*0.5
BOX TYPE      4  /*  inner canister: fuel_region # 3: 0.15 in cd gap: body assy
CYLINDER     -1  10.8141   0.38100    0.00       16*0.5
CYLINDER      2  10.9233   0.38100    0.00       16*0.5
CYLINDER      0  10.96140  0.38100    0.00000    16*0.5
CYLINDER      4  12.40920  0.38100    0.00000    16*0.5
CYLINDER      2  12.46120  0.38100    0.00000    16*0.5
CYLINDER      0  12.70000  0.38100    0.00000    16*0.5
CYLINDER      2  12.76350  0.38100    0.00000    16*0.5
BOX TYPE      5  /*  inner canister: fuel_region # 4: body assy
CYLINDER     -1  10.8141   25.46350   0.00       16*0.5
CYLINDER      2  10.9233   25.46350   0.00       16*0.5
CYLINDER      3  10.96140  25.46350   0.00000    16*0.5
CYLINDER      4  12.40920  25.46350   0.00000    16*0.5
CYLINDER      2  12.46120  25.46350   0.00000    16*0.5
CYLINDER      0  12.70000  25.46350   0.00000    16*0.5
CYLINDER      2  12.76350  25.46350   0.00000    16*0.5
BOX TYPE      6  /*  inner canister: fuel_region # 5: 0.15 in cd gap: body assy
CYLINDER     -1  10.8141   0.38100    0.00       16*0.5
CYLINDER      2  10.9233   0.38100    0.00       16*0.5
CYLINDER      0  10.96140  0.38100    0.00000    16*0.5
CYLINDER      4  12.40920  0.38100    0.00000    16*0.5
CYLINDER      2  12.46120  0.38100    0.00000    16*0.5
CYLINDER      0  12.70000  0.38100    0.00000    16*0.5
CYLINDER      2  12.76350  0.38100    0.00000    16*0.5
BOX TYPE      7  /*  inner canister: fuel_region # 6: body assy
CYLINDER     -1  10.8141   21.33840   0.00       16*0.5
CYLINDER      2  10.9233   21.33840   0.00       16*0.5
CYLINDER      3  10.96140  21.33840   0.00000    16*0.5
CYLINDER      4  12.40920  21.33840   0.00000    16*0.5
CYLINDER      2  12.46120  21.33840   0.00000    16*0.5
CYLINDER      0  12.70000  21.33840   0.00000    16*0.5
CYLINDER      2  12.76350  21.33840   0.00000    16*0.5
BOX TYPE      8  /*  inner canister: fuel_region # 7: body assy
CYLINDER     -1  10.8141   3.49250    0.00       16*0.5
CYLINDER      2  10.9233   3.49250    0.00       16*0.5
CYLINDER      3  10.96140  3.49250    0.00000    16*0.5
CYLINDER      4  12.40920  3.49250    0.00000    16*0.5
CYLINDER      2  12.46120  3.49250    0.00000    16*0.5
CYLINDER      0  12.70000  3.49250    0.00000    16*0.5
CYLINDER      2  12.76350  3.49250    0.00000    16*0.5
BOX TYPE      9  /*  inner canister: fuel_region # 8: lid assy
CYLINDER     -1  10.8141   0.63250    0.00       16*0.5
CYLINDER      2  10.9233   0.63250    0.00       16*0.5
CYLINDER      3  10.96140  0.63250    0.00000    16*0.5
CYLINDER      4  12.40920  0.63250    0.00000    16*0.5
CYLINDER      2  12.46120  0.63250    0.00000    16*0.5
CYLINDER      0  12.70000  0.63250    0.00000    16*0.5
CYLINDER      2  12.76350  0.63250    0.00000    16*0.5
BOX TYPE     10  /*  inner canister: fuel_region # 9 w/ gap: lid assy
CYLINDER     -1  10.8141   0.31750    0.00       16*0.5
CYLINDER      2  10.9233   0.31750    0.00       16*0.5
CYLINDER      0  12.40920  0.31750    0.00000    16*0.5
CYLINDER      2  12.46120  0.31750    0.00000    16*0.5
BOX TYPE     11  /*  inner canister: fuel_region #10 w/ ring: lid assy
CYLINDER     -1  10.8141   0.44200    0.00       16*0.5
CYLINDER      2  10.9233   0.44200    0.00       16*0.5
CYLINDER      2  12.40920  0.44200    0.00000    16*0.5
CYLINDER      2  12.46120  0.44200    0.00000    16*0.5
BOX TYPE     12  /*  inner canister: fuel_region #11 w/ top: lid assy
CYLINDER     -1  10.8141   1.41599    0.00       16*0.5
CYLINDER      0  10.8141   1.78050    0.00       16*0.5
CYLINDER      2  10.9233   1.91640    0.00       16*0.5
CYLINDER      0  12.40920  1.91640    0.00000    16*0.5
BOX TYPE     13  /*  inner canister cuboid: body section (7# region)
CUBOID        5  12.7636 -12.7636  12.7636 -12.7636  73.3450  -0.5055  16*0.5
BOX TYPE     14  /*  inner canister cuboid: body section (40# region)
CUBOID        9  12.7636 -12.7636  12.7636 -12.7636  3.49260   0.0000  16*0.5
BOX TYPE     15  /*  inner canister upper cylinder: lid section
CYLINDER      0  12.7636  3.30840   0.0000  16*0.5
BOX TYPE     16  /*  foam cutout  (void) - 40 #/ft3 foam lid section
CYLINDER      0  13.5510  3.30840   0.0000  16*0.5
BOX TYPE     17  /*  npc body or lid - 10 ga. 304ss layer
CUBOID        2  54.3687 -54.3687  54.3687 -54.3687  0.31240   0.0000  16*0.5
BOX TYPE     18  /*  npc body or lid - 1 inch duraboard (void) layer, 10 ga. 304ss
CUBOID        0  51.5163 -51.5163  51.5163 -51.5163  2.54000   0.0000  16*0.5
CUBOID        0  54.0563 -54.0563  54.0563 -54.0563  2.54000   0.0000  16*0.5
CUBOID        2  54.3687 -54.3687  54.3687 -54.3687  2.54000   0.0000  16*0.5
BOX TYPE     19  /*  npc body - 4 inch bot. foam layer (11 #/ft3)  - face burn
CUBOID        7  42.6086 -42.6086  42.6086 -42.6086  0.00000   0.0000  16*0.5
CUBOID        0  54.0563 -54.0563  54.0563 -54.0563  0.00000  -7.6200  16*0.5
CUBOID        2  54.3687 -54.3687  54.3687 -54.3687  0.00000  -7.6200  16*0.5
BOX TYPE     20  /*  npc body - 29.0750 inch foam layer (7,11 #/ft3) - face burn
CUBOID        5  42.6086 -42.6086  42.6086 -42.6086 73.85050   0.0000  16*0.5
CUBOID        7  42.6086 -42.6086  42.6086 -42.6086 73.85050   0.0000  16*0.5
CUBOID        0  54.0563 -54.0563  54.0563 -54.0563 73.85050   0.0000  16*0.5
CUBOID        2  54.3687 -54.3687  54.3687 -54.3687 73.85050   0.0000  16*0.5
BOX TYPE     21  /*  npc body - 1.375 inch foam layer (40 #/ft3) - face burn
CUBOID        9  42.6086 -42.6086  42.6086 -42.6086  3.49250   0.0000  16*0.5
CUBOID        0  54.0563 -54.0563  54.0563 -54.0563  3.49250   0.0000  16*0.5
CUBOID        2  54.3687 -54.3687  54.3687 -54.3687  3.49250   0.0000  16*0.5
```

```
BOX TYPE      22  /*  npc body - 30.45 inch two-part body
CUBOID         0  54.3687 -54.3687  54.3687 -54.3687 77.34300   0.0000  16*0.5
BOX TYPE      23  /*  npc lid - 1.375 inch foam layer (40 #/ft3) - lid burn
CUBOID         0  43.8963 -43.8963  43.8963 -43.8963  3.49250   0.0000  16*0.5
CUBOID         0  54.0563 -54.0563  54.0563 -54.0563  3.49250   0.0000  16*0.5
CUBOID         2  54.3687 -54.3687  54.3687 -54.3687  3.49250   0.0000  16*0.5
BOX TYPE      24  /*  npc lid - 3.5 inch foam layer (15 #/ft3) - lid burn
CUBOID         0  43.8963 -43.8963  43.8963 -43.8963  2.54000   0.0000  16*0.5
CUBOID         0  54.0563 -54.0563  54.0563 -54.0563  8.89000   0.0000  16*0.5
CUBOID         2  54.3687 -54.3687  54.3687 -54.3687  8.89000   0.0000  16*0.5
BOX TYPE      25  /*  complete npc - body assembly
CUBOID         0  54.3688 -54.3688  54.3688 -54.3688 87.81540   0.0000  16*0.5
BOX TYPE      26  /*  complete npc - lid assembly
CUBOID         0  54.3688 -54.3688  54.3688 -54.3688 15.23490   0.0000  16*0.5
BOX TYPE      27  /*  npc single-unit cuboid
CUBOID         0  54.3688 -54.3688  54.3688 -54.3688 103.0500   0.0000  16*0.5
BOX TYPE      28  /*  global unit: 2N=150:5x5x6 cuboid, 30.48-cm h2o refl.
CUBOID         0  271.844 -271.844  271.844 -271.844 618.3020   0.0000  16*0.5
CUBOID         6  302.324 -302.324  302.324 -302.324 648.7820 -30.4800  16*0.5
28  1 1 1  1 1 1  1 1 1  1
BEGIN COMPLEX
/*  build inner canister - main body sections (7 #/ft3 region)
COMPLEX  13  2  0.00000  0.00000  0.00000   1   1   1  0.0  0.0  0.0
COMPLEX  13  3  0.00000  0.00000  0.31750   1   1   1  0.0  0.0  0.0
COMPLEX  13  4  0.00000  0.00000  25.7810   1   1   1  0.0  0.0  0.0
COMPLEX  13  5  0.00000  0.00000  26.1621   1   1   1  0.0  0.0  0.0
COMPLEX  13  6  0.00000  0.00000  51.6256   1   1   1  0.0  0.0  0.0
COMPLEX  13  7  0.00000  0.00000  52.0066   1   1   1  0.0  0.0  0.0
/*  build inner canister - upper body section (40 #/ft3 section)
COMPLEX  14  8  0.00000  0.00000  0.00000   1   1   1  0.0  0.0  0.0
/*  build inner canister - lid section
COMPLEX  15  9  0.00000  0.00000  0.00000   1   1   1  0.0  0.0  0.0
COMPLEX  15 10  0.00000  0.00000  0.63250   1   1   1  0.0  0.0  0.0
COMPLEX  15 11  0.00000  0.00000  0.95000   1   1   1  0.0  0.0  0.0
COMPLEX  15 12  0.00000  0.00000  1.39200   1   1   1  0.0  0.0  0.0
/*  embed 3x3 array of canisters into lid:  11.75 inch - centers
COMPLEX  16 15 -29.8450 -29.8450  0.00000   3   3   1 29.8450  29.8450  0.0
/*  embed 3x3 array of foam cut_outs: 11.75 inch - centers
COMPLEX  23 16 -29.8450 -29.8450  0.00000   3   3   1 29.8450  29.8450  0.0
/*  embed 3x3 array of canisters into inner body: 11.75 inch - centers
COMPLEX  20 13 -29.8450 -29.8450  0.50550   3   3   1 29.8450  29.8450  0.0
COMPLEX  21 14 -29.8450 -29.8450  0.00000   3   3   1 29.8450  29.8450  0.0
/*  embed two-part body section stackup
COMPLEX  22 20   0.0000   0.0000  0.00000   1   1   1  0.0  0.0  0.0
COMPLEX  22 21   0.0000   0.0000 73.85050   1   1   1  0.0  0.0  0.0
/*  build npc - body assembly
COMPLEX  25 17   0.0000   0.0000  0.00000   1   1   1  0.0  0.0  0.0
COMPLEX  25 18   0.0000   0.0000  0.31240   1   1   1  0.0  0.0  0.0
COMPLEX  25 19   0.0000   0.0000  10.4724   1   1   1  0.0  0.0  0.0
COMPLEX  25 22   0.0000   0.0000  10.4724   1   1   1  0.0  0.0  0.0
/*  build npc - lid assembly
COMPLEX  26 23   0.0000   0.0000  0.00000   1   1   1  0.0  0.0  0.0
COMPLEX  26 24   0.0000   0.0000  3.49250   1   1   1  0.0  0.0  0.0
COMPLEX  26 18   0.0000   0.0000  12.3825   1   1   1  0.0  0.0  0.0
COMPLEX  26 17   0.0000   0.0000  14.9225   1   1   1  0.0  0.0  0.0
/*  complete npc stackup - single unit
COMPLEX  27 25   0.0000   0.0000  0.00000   1   1   1  0.0  0.0  0.0
COMPLEX  27 26   0.0000   0.0000  87.8154   1   1   1  0.0  0.0  0.0
/*  embed 5x5x6 closed packed array
COMPLEX  28 27  -217.475 -217.475 0.00000  5  5  6  108.738 108.738 103.05
END GEOM
END GEMER
```

C. Heterogeneous 46 Kg UO_2 Rod Lattice Cases

Figure 6.26a – Sample input file = MTSL-540.in

```
2002 NPC SC,HET Lat,FRad=0.1270, 46.0kg U(5.00)O2,WTF=5.40,MixHt=72.751cm
   200  /* # BATCHES
  2000  /* # NEUTRONS PER BATCH
    10  /* # BATCHES TO SKIP
     0  /* # INITIAL 'SEED' (IF NON-ZERO)
     0  /* # 'IDUMP'
     1  /* # 'NRSTRT'
     0  /* # 'NBTED' (NON-ZERO IS PRINT EDITS)
     0  /* # 'KRED' (NUMBER OF COMBINED REGIONS IN EDITS)
  0  293   0   0
\CSXSEC\UO2\GUO2-50.00
\CSXSEC\NOU\GNOU-0.SS
\CSXSEC\NOU\GNOU-0.CAD
\CSXSEC\NOU\GNOU-0.POL 0.98
\CSXSEC\NOU\GNOU-0.F07 0.90
\CSXSEC\NOU\GNOU-0.WAT
\CSXSEC\NOU\GNOU-0.F11 0.90
\CSXSEC\NOU\GNOU-0.F15 0.90
\CSXSEC\NOU\GNOU-0.F40 0.90
\CSXSEC\NOU\GNOU-0.ORC
\CSXSEC\NOU\GNOU-0.WAT 1.00
KENO GEOM
     0  /* 'KREFM'
     0  /* 'NBOX'
     1  /* 'NBXMAX'
     1  /* 'NBYMAX'
     1  /* 'NBZMAX'
     1  /* 'NXX'
     1  /* 'NTYPST'
     1  /* 'NEMBRG'
     0  /* 'NGMCHK'
     0.0     0.0     0.0     0.0     0.0     0.0
BOX TYPE      1  /* 0.100 pellet, var. W/F
CYLINDER      1  0.127000  30.48  -30.48  16*0.5
CUBOID        6 0.284734 -.284734 0.284734 -.284734 30.48 -30.48 16*0.5
BOX TYPE      2  /*  inner canister: bottom fuel_region # 1 w/ gap: body assy
CYLINDER     -1  10.8141    0.31750   0.00       16*0.5
CYLINDER      2  10.9233    0.31750   0.00       16*0.5
CYLINDER      0  12.40920   0.31750   0.00000    16*0.5
CYLINDER      2  12.40920   0.31750  -0.44200    16*0.5
CYLINDER      2  12.46120   0.31750  -0.44200    16*0.5
CYLINDER      0  12.70000   0.31750  -0.44200    16*0.5
CYLINDER      2  12.76350   0.31750  -0.50550    16*0.5
BOX TYPE      3  /*  inner canister: fuel_region # 2: body assy
CYLINDER     -1  10.8141   25.46350   0.00       16*0.5
CYLINDER      2  10.9233   25.46350   0.00       16*0.5
CYLINDER      3  10.96140  25.46350   0.00000    16*0.5
CYLINDER      4  12.40920  25.46350   0.00000    16*0.5
CYLINDER      2  12.46120  25.46350   0.00000    16*0.5
CYLINDER      0  12.70000  25.46350   0.00000    16*0.5
CYLINDER      2  12.76350  25.46350   0.00000    16*0.5
BOX TYPE      4  /*  inner canister: fuel_region # 3: 0.15 in cd gap: body assy
CYLINDER     -1  10.8141    0.38100   0.00       16*0.5
CYLINDER      2  10.9233    0.38100   0.00       16*0.5
CYLINDER      0  10.96140   0.38100   0.00000    16*0.5
CYLINDER      4  12.40920   0.38100   0.00000    16*0.5
CYLINDER      2  12.46120   0.38100   0.00000    16*0.5
CYLINDER      0  12.70000   0.38100   0.00000    16*0.5
CYLINDER      2  12.76350   0.38100   0.00000    16*0.5
BOX TYPE      5  /*  inner canister: fuel_region # 4: body assy
CYLINDER     -1  10.8141   25.46350   0.00       16*0.5
CYLINDER      2  10.9233   25.46350   0.00       16*0.5
CYLINDER      3  10.96140  25.46350   0.00000    16*0.5
CYLINDER      4  12.40920  25.46350   0.00000    16*0.5
CYLINDER      2  12.46120  25.46350   0.00000    16*0.5
CYLINDER      0  12.70000  25.46350   0.00000    16*0.5
CYLINDER      2  12.76350  25.46350   0.00000    16*0.5
BOX TYPE      6  /*  inner canister: fuel_region # 5: 0.15 in cd gap: body assy
CYLINDER     -1  10.8141    0.38100   0.00       16*0.5
CYLINDER      2  10.9233    0.38100   0.00       16*0.5
CYLINDER      0  10.96140   0.38100   0.00000    16*0.5
CYLINDER      4  12.40920   0.38100   0.00000    16*0.5
CYLINDER      2  12.46120   0.38100   0.00000    16*0.5
CYLINDER      0  12.70000   0.38100   0.00000    16*0.5
CYLINDER      2  12.76350   0.38100   0.00000    16*0.5
BOX TYPE      7  /*  inner canister: fuel_region # 6: body assy
CYLINDER     -1  10.8141   20.74445   0.00       16*0.5
CYLINDER      0  10.8141   21.33840   0.00       16*0.5
CYLINDER      2  10.9233   21.33840   0.00       16*0.5
CYLINDER      3  10.96140  21.33840   0.00000    16*0.5
CYLINDER      4  12.40920  21.33840   0.00000    16*0.5
CYLINDER      2  12.46120  21.33840   0.00000    16*0.5
CYLINDER      0  12.70000  21.33840   0.00000    16*0.5
CYLINDER      2  12.76350  21.33840   0.00000    16*0.5
BOX TYPE      8  /*  inner canister: fuel_region # 7: body assy
CYLINDER      0  10.8141    3.49250   0.00       16*0.5
CYLINDER      2  10.9233    3.49250   0.00       16*0.5
CYLINDER      3  10.96140   3.49250   0.00000    16*0.5
CYLINDER      4  12.40920   3.49250   0.00000    16*0.5
CYLINDER      2  12.46120   3.49250   0.00000    16*0.5
CYLINDER      0  12.70000   3.49250   0.00000    16*0.5
CYLINDER      2  12.76350   3.49250   0.00000    16*0.5
```

```
BOX TYPE      9  /*  inner canister: fuel_region # 8: lid assy
CYLINDER      0  10.8141    0.63250   0.00       16*0.5
CYLINDER      2  10.9233    0.63250   0.00       16*0.5
CYLINDER      3  10.96140   0.63250   0.00000    16*0.5
CYLINDER      4  12.40920   0.63250   0.00000    16*0.5
CYLINDER      2  12.46120   0.63250   0.00000    16*0.5
CYLINDER      0  12.70000   0.63250   0.00000    16*0.5
CYLINDER      2  12.76350   0.63250   0.00000    16*0.5
BOX TYPE     10  /*  inner canister: fuel_region # 9 w/ gap: lid assy
CYLINDER      0  10.8141    0.31750   0.00       16*0.5
CYLINDER      2  10.9233    0.31750   0.00       16*0.5
CYLINDER     11  12.40920   0.31750   0.00000    16*0.5
CYLINDER      2  12.46120   0.31750   0.00000    16*0.5
BOX TYPE     11  /*  inner canister: fuel_region #10 w/ ring: lid assy
CYLINDER      0  10.8141    0.44200   0.00       16*0.5
CYLINDER      2  10.9233    0.44200   0.00       16*0.5
CYLINDER      2  12.40920   0.44200   0.00000    16*0.5
CYLINDER      2  12.46120   0.44200   0.00000    16*0.5
BOX TYPE     12  /*  inner canister: fuel_region #11 w/ top: lid assy
CYLINDER      0  10.8141    1.78050   0.00       16*0.5
CYLINDER      2  10.9233    1.91640   0.00       16*0.5
CYLINDER     11  12.40920   1.91640   0.00000    16*0.5
BOX TYPE     13  /*  inner canister cuboid: body section (7# region)
CUBOID        5  12.7636 -12.7636  12.7636 -12.7636  73.3450  -0.5055  16*0.5
BOX TYPE     14  /*  inner canister cuboid: body section (40# region)
CUBOID        9  12.7636 -12.7636  12.7636 -12.7636  3.49260   0.0000  16*0.5
BOX TYPE     15  /*  inner canister upper cylinder: lid section
CYLINDER     11  12.7636  3.30840   0.0000  16*0.5
BOX TYPE     16  /*  foam cutout  (void) - 40 #/ft3 foam lid section
CYLINDER     11  13.5510  3.30840   0.0000  16*0.5
BOX TYPE     17  /*  npc body or lid - 10 ga. 304ss layer
CUBOID        2  54.3687 -54.3687  54.3687 -54.3687  0.31240   0.0000  16*0.5
BOX TYPE     18  /*  npc body or lid - 1 inch duraboard (void) layer, 10 ga. 304ss
CUBOID       11  51.5163 -51.5163  51.5163 -51.5163  2.54000   0.0000  16*0.5
CUBOID       11  54.0563 -54.0563  54.0563 -54.0563  2.54000   0.0000  16*0.5
CUBOID        2  54.3687 -54.3687  54.3687 -54.3687  2.54000   0.0000  16*0.5
BOX TYPE     19  /*  npc body - 4 inch bot. foam layer (11 #/ft3)  - face burn
CUBOID        7  42.6086 -42.6086  42.6086 -42.6086  0.00000   0.0000  16*0.5
CUBOID       11  54.0563 -54.0563  54.0563 -54.0563  0.00000  -7.6200  16*0.5
CUBOID        2  54.3687 -54.3687  54.3687 -54.3687  0.00000  -7.6200  16*0.5
BOX TYPE     20  /*  npc body - 29.0750 inch foam layer (7,11 #/ft3) - face burn
CUBOID        5  42.6086 -42.6086  42.6086 -42.6086 73.85050   0.0000  16*0.5
CUBOID        7  42.6086 -42.6086  42.6086 -42.6086 73.85050   0.0000  16*0.5
CUBOID       11  54.0563 -54.0563  54.0563 -54.0563 73.85050   0.0000  16*0.5
CUBOID        2  54.3687 -54.3687  54.3687 -54.3687 73.85050   0.0000  16*0.5
BOX TYPE     21  /*  npc body - 1.375 inch foam layer (40 #/ft3) - face burn
CUBOID        9  42.6086 -42.6086  42.6086 -42.6086  3.49250   0.0000  16*0.5
CUBOID       11  54.0563 -54.0563  54.0563 -54.0563  3.49250   0.0000  16*0.5
CUBOID        2  54.3687 -54.3687  54.3687 -54.3687  3.49250   0.0000  16*0.5
BOX TYPE     22  /*  npc body - 30.45 inch two-part body
CUBOID       11  54.3687 -54.3687  54.3687 -54.3687 77.34300   0.0000  16*0.5
BOX TYPE     23  /*  npc lid - 1.375 inch foam layer (40 #/ft3) - lid burn
CUBOID       11  43.8963 -43.8963  43.8963 -43.8963  3.49250   0.0000  16*0.5
CUBOID       11  54.0563 -54.0563  54.0563 -54.0563  3.49250   0.0000  16*0.5
CUBOID        2  54.3687 -54.3687  54.3687 -54.3687  3.49250   0.0000  16*0.5
BOX TYPE     24  /*  npc lid - 3.5 inch foam layer (15 #/ft3) - lid burn
CUBOID       11  43.8963 -43.8963  43.8963 -43.8963  2.54000   0.0000  16*0.5
CUBOID       11  54.0563 -54.0563  54.0563 -54.0563  8.89000   0.0000  16*0.5
CUBOID        2  54.3687 -54.3687  54.3687 -54.3687  8.89000   0.0000  16*0.5
BOX TYPE     25  /*  complete npc - body assembly
CUBOID       11  54.3688 -54.3688  54.3688 -54.3688 87.81540   0.0000  16*0.5
BOX TYPE     26  /*  complete npc - lid assembly
CUBOID       11  54.3688 -54.3688  54.3688 -54.3688 15.23490   0.0000  16*0.5
BOX TYPE     27  /*  npc water reflected single-unit
CUBOID        0  54.3688 -54.3688  54.3688 -54.3688 103.0503   0.0000  16*0.5
CUBOID        6  84.8488 -84.8488  84.8488 -84.8488 133.5303 -30.4800  16*0.5
BOX TYPE     28  /*  global unit: 2N=150:5x5x6 cuboid, 30.48-cm h2o refl.
CUBOID        0  271.844 -271.844  271.844 -271.844 618.3020   0.0000  16*0.5
CUBOID        6  302.324 -302.324  302.324 -302.324 648.7820 -30.4800  16*0.5
27  1 1 1  1 1 1  1 1 1  1
BEGIN COMPLEX
/*  build inner canister - main body sections (7 #/ft3 region)
COMPLEX  13  2  0.00000  0.00000  0.00000   1   1   1  0.0  0.0  0.0
COMPLEX  13  3  0.00000  0.00000  0.31750   1   1   1  0.0  0.0  0.0
COMPLEX  13  4  0.00000  0.00000  25.7810   1   1   1  0.0  0.0  0.0
COMPLEX  13  5  0.00000  0.00000  26.1621   1   1   1  0.0  0.0  0.0
COMPLEX  13  6  0.00000  0.00000  51.6256   1   1   1  0.0  0.0  0.0
COMPLEX  13  7  0.00000  0.00000  52.0066   1   1   1  0.0  0.0  0.0
/*  build inner canister - upper body section (40 #/ft3 section)
COMPLEX  14  8  0.00000  0.00000  0.00000   1   1   1  0.0  0.0  0.0
/*  build inner canister - lid section
COMPLEX  15  9  0.00000  0.00000  0.00000   1   1   1  0.0  0.0  0.0
COMPLEX  15 10  0.00000  0.00000  0.63250   1   1   1  0.0  0.0  0.0
COMPLEX  15 11  0.00000  0.00000  0.95000   1   1   1  0.0  0.0  0.0
COMPLEX  15 12  0.00000  0.00000  1.39200   1   1   1  0.0  0.0  0.0
/*  embed 3x3 array of canisters into lid:  11.75 inch - centers
COMPLEX  16 15 -29.8450 -29.8450  0.00000   3   3   1 29.8450  29.8450  0.0
/*  embed 3x3 array of foam cut_outs: 11.75 inch - centers
COMPLEX  23 16 -29.8450 -29.8450  0.00000   3   3   1 29.8450  29.8450  0.0
/*  embed 3x3 array of canisters into inner body: 11.75 inch - centers
COMPLEX  20 13 -29.8450 -29.8450  0.50550   3   3   1 29.8450  29.8450  0.0
COMPLEX  21 14 -29.8450 -29.8450  0.00000   3   3   1 29.8450  29.8450  0.0
/*  embed two-part body section stackup
COMPLEX  22 20   0.0000   0.0000  0.00000   1   1   1  0.0  0.0  0.0
COMPLEX  22 21   0.0000   0.0000 73.85050   1   1   1  0.0  0.0  0.0
/*  build npc - body assembly
COMPLEX  25 17   0.0000   0.0000  0.00000   1   1   1  0.0  0.0  0.0
COMPLEX  25 18   0.0000   0.0000  0.31240   1   1   1  0.0  0.0  0.0
COMPLEX  25 19   0.0000   0.0000  10.4724   1   1   1  0.0  0.0  0.0
COMPLEX  25 22   0.0000   0.0000  10.4724   1   1   1  0.0  0.0  0.0
```

```
/*  build npc - lid assembly
COMPLEX   26 23    0.0000    0.0000   0.00000    1    1    1   0.0   0.0   0.0
COMPLEX   26 24    0.0000    0.0000   3.49250    1    1    1   0.0   0.0   0.0
COMPLEX   26 18    0.0000    0.0000  12.3825     1    1    1   0.0   0.0   0.0
COMPLEX   26 17    0.0000    0.0000  14.9225     1    1    1   0.0   0.0   0.0
/*  complete npc stackup - water reflected single unit
COMPLEX   27 25    0.0000    0.0000   0.00000    1    1    1   0.0   0.0   0.0
COMPLEX   27 26    0.0000    0.0000  87.8154     1    1    1   0.0   0.0   0.0
END GEOM
END GEMER
```

Figure 6.26b – Sample input file = ABTL-490.in

```
2002 NPC IA,HET Lat,FRad=0.1270, 46.0kg U(5.00)O2,WTF=4.90,MixHt=67.067cm
   200  /* # BATCHES
  2000  /* # NEUTRONS PER BATCH
    10  /* # BATCHES TO SKIP
     0  /* # INITIAL 'SEED' (IF NON-ZERO)
     0  /* # 'IDUMP'
     1  /* # 'NRSTRT'
     0  /* # 'NBTED' (NON-ZERO IS PRINT EDITS)
     0  /* # 'KRED' (NUMBER OF COMBINED REGIONS IN EDITS)
  0  293   0   0
\CSXSEC\UO2\GUO2-50.00
\CSXSEC\NOU\GNOU-0.SS
\CSXSEC\NOU\GNOU-0.CAD
\CSXSEC\NOU\GNOU-0.POL
\CSXSEC\NOU\GNOU-0.F07 0.90
\CSXSEC\NOU\GNOU-0.WAT
\CSXSEC\NOU\GNOU-0.F11 0.90
\CSXSEC\NOU\GNOU-0.F15 0.90
\CSXSEC\NOU\GNOU-0.F40 0.90
\CSXSEC\NOU\GNOU-0.ORC
\CSXSEC\NOU\GNOU-0.WAT 0.0001
KENO GEOM
     0  /* 'KREFM'
     0  /* 'NBOX'
     1  /* 'NBXMAX'
     1  /* 'NBYMAX'
     1  /* 'NBZMAX'
     1  /* 'NXX'
     1  /* 'NTYPST'
     1  /* 'NEMBRG'
     0  /* 'NGMCHK'
   -1.0   -1.0    -1.0    -1.0    -1.0    -1.0
BOX TYPE      1  /* 0.100 pellet, var. W/F
INTERS        6 0.146886 0.254413 0.127000 +1.00 30.48 -30.48 16*0.5
CUBOID        1 0.146886 -.146886 0.254413 -.254413 30.48 -30.48 16*0.5
BOX TYPE      2  /*  inner canister: bottom fuel_region # 1 w/ gap: body assy
CYLINDER     -1  10.8141    0.31750   0.00        16*0.5
CYLINDER      2  10.9233    0.31750   0.00        16*0.5
CYLINDER      0  12.40920   0.31750   0.00000     16*0.5
CYLINDER      2  12.40920   0.31750  -0.44200     16*0.5
CYLINDER      2  12.46120   0.31750  -0.44200     16*0.5
CYLINDER      0  12.70000   0.31750  -0.44200     16*0.5
CYLINDER      2  12.76350   0.31750  -0.50550     16*0.5
BOX TYPE      3  /*  inner canister: fuel_region # 2: body assy
CYLINDER     -1  10.8141   25.46350   0.00        16*0.5
CYLINDER      2  10.9233   25.46350   0.00        16*0.5
CYLINDER      3  10.96140  25.46350   0.00000     16*0.5
CYLINDER      4  12.40920  25.46350   0.00000     16*0.5
CYLINDER      2  12.46120  25.46350   0.00000     16*0.5
CYLINDER      0  12.70000  25.46350   0.00000     16*0.5
CYLINDER      2  12.76350  25.46350   0.00000     16*0.5
BOX TYPE      4  /*  inner canister: fuel_region # 3: 0.15 in cd gap: body assy
CYLINDER     -1  10.8141    0.38100   0.00        16*0.5
CYLINDER      2  10.9233    0.38100   0.00        16*0.5
CYLINDER      0  10.96140   0.38100   0.00000     16*0.5
CYLINDER      4  12.40920   0.38100   0.00000     16*0.5
CYLINDER      2  12.46120   0.38100   0.00000     16*0.5
CYLINDER      0  12.70000   0.38100   0.00000     16*0.5
CYLINDER      2  12.76350   0.38100   0.00000     16*0.5
BOX TYPE      5  /*  inner canister: fuel_region # 4: body assy
CYLINDER     -1  10.8141   25.46350   0.00        16*0.5
CYLINDER      2  10.9233   25.46350   0.00        16*0.5
CYLINDER      3  10.96140  25.46350   0.00000     16*0.5
CYLINDER      4  12.40920  25.46350   0.00000     16*0.5
CYLINDER      2  12.46120  25.46350   0.00000     16*0.5
CYLINDER      0  12.70000  25.46350   0.00000     16*0.5
CYLINDER      2  12.76350  25.46350   0.00000     16*0.5
BOX TYPE      6  /*  inner canister: fuel_region # 5: 0.15 in cd gap: body assy
CYLINDER     -1  10.8141    0.38100   0.00        16*0.5
CYLINDER      2  10.9233    0.38100   0.00        16*0.5
CYLINDER      0  10.96140   0.38100   0.00000     16*0.5
CYLINDER      4  12.40920   0.38100   0.00000     16*0.5
CYLINDER      2  12.46120   0.38100   0.00000     16*0.5
CYLINDER      0  12.70000   0.38100   0.00000     16*0.5
CYLINDER      2  12.76350   0.38100   0.00000     16*0.5
BOX TYPE      7  /*  inner canister: fuel_region # 6: body assy
CYLINDER     -1  10.8141   15.06078   0.00        16*0.5
CYLINDER      0  10.8141   21.33840   0.00        16*0.5
CYLINDER      2  10.9233   21.33840   0.00        16*0.5
CYLINDER      3  10.96140  21.33840   0.00000     16*0.5
CYLINDER      4  12.40920  21.33840   0.00000     16*0.5
CYLINDER      2  12.46120  21.33840   0.00000     16*0.5
CYLINDER      0  12.70000  21.33840   0.00000     16*0.5
CYLINDER      2  12.76350  21.33840   0.00000     16*0.5
```

```
BOX TYPE      8  /*  inner canister: fuel region # 7: body assy
CYLINDER      0  10.8141    3.49250    0.00        16*0.5
CYLINDER      2  10.9233    3.49250    0.00        16*0.5
CYLINDER      3  10.96140   3.49250    0.00000     16*0.5
CYLINDER      4  12.40920   3.49250    0.00000     16*0.5
CYLINDER      2  12.46120   3.49250    0.00000     16*0.5
CYLINDER      0  12.70000   3.49250    0.00000     16*0.5
CYLINDER      2  12.76350   3.49250    0.00000     16*0.5
BOX TYPE      9  /*  inner canister: fuel region # 8: lid assy
CYLINDER      0  10.8141    0.63250    0.00        16*0.5
CYLINDER      2  10.9233    0.63250    0.00        16*0.5
CYLINDER      3  10.96140   0.63250    0.00000     16*0.5
CYLINDER      4  12.40920   0.63250    0.00000     16*0.5
CYLINDER      2  12.46120   0.63250    0.00000     16*0.5
CYLINDER      0  12.70000   0.63250    0.00000     16*0.5
CYLINDER      2  12.76350   0.63250    0.00000     16*0.5
BOX TYPE     10  /*  inner canister: fuel region # 9 w/ gap: lid assy
CYLINDER      0  10.8141    0.31750    0.00        16*0.5
CYLINDER      2  10.9233    0.31750    0.00        16*0.5
CYLINDER     11  12.40920   0.31750    0.00000     16*0.5
CYLINDER      2  12.46120   0.31750    0.00000     16*0.5
BOX TYPE     11  /*  inner canister: fuel region #10 w/ ring: lid assy
CYLINDER      0  10.8141    0.44200    0.00        16*0.5
CYLINDER      2  10.9233    0.44200    0.00        16*0.5
CYLINDER      2  12.40920   0.44200    0.00000     16*0.5
CYLINDER      2  12.46120   0.44200    0.00000     16*0.5
BOX TYPE     12  /*  inner canister: fuel region #11 w/ top: lid assy
CYLINDER      0  10.8141    1.78050    0.00        16*0.5
CYLINDER      2  10.9233    1.91640    0.00        16*0.5
CYLINDER     11  12.40920   1.91640    0.00000     16*0.5
BOX TYPE     13  /*  inner canister cuboid: body section (7# region)
CUBOID        5  12.7636 -12.7636  12.7636 -12.7636  73.3450  -0.5055  16*0.5
BOX TYPE     14  /*  inner canister cuboid: body section (40# region)
CUBOID        9  12.7636 -12.7636  12.7636 -12.7636  3.49260   0.0000  16*0.5
BOX TYPE     15  /*  inner canister upper cylinder: lid section
CYLINDER     11  12.7636  3.30840   0.0000  16*0.5
BOX TYPE     16  /*  foam cutout  (void) - 40 #/ft3 foam lid section
CYLINDER     11  13.5510  3.30840   0.0000  16*0.5
BOX TYPE     17  /*  npc body or lid - 10 ga. 304ss layer
CUBOID        2  54.3687 -54.3687  54.3687 -54.3687  0.31240   0.0000  16*0.5
BOX TYPE     18  /*  npc body or lid - 1 inch duraboard (void) layer, 10 ga. 304ss
CUBOID       11  51.5163 -51.5163  51.5163 -51.5163  2.54000   0.0000  16*0.5
CUBOID       11  54.0563 -54.0563  54.0563 -54.0563  2.54000   0.0000  16*0.5
CUBOID        2  54.3687 -54.3687  54.3687 -54.3687  2.54000   0.0000  16*0.5
BOX TYPE     19  /*  npc body - 3 inch bot. foam layer (11 #/ft3)  - face burn
CUBOID        7  51.5163 -51.5163  51.5163 -51.5163  7.62000   0.0000  16*0.5
CUBOID       11  54.0563 -54.0563  54.0563 -54.0563  7.62000   0.0000  16*0.5
CUBOID        2  54.3687 -54.3687  54.3687 -54.3687  7.62000   0.0000  16*0.5
BOX TYPE     20  /*  npc body - 29.0750 inch foam layer (7.11 #/ft3) - face burn
CUBOID        5  43.8963 -43.8963  43.8963 -43.8963 73.85050   0.0000  16*0.5
CUBOID        7  51.5163 -51.5163  51.5163 -51.5163 73.85050   0.0000  16*0.5
CUBOID       11  54.0563 -54.0563  54.0563 -54.0563 73.85050   0.0000  16*0.5
CUBOID        2  54.3687 -54.3687  54.3687 -54.3687 73.85050   0.0000  16*0.5
BOX TYPE     21  /*  npc body - 1.375 inch foam layer (40 #/ft3) - face burn
CUBOID        9  51.5163 -51.5163  51.5163 -51.5163  3.49250   0.0000  16*0.5
CUBOID       11  54.0563 -54.0563  54.0563 -54.0563  3.49250   0.0000  16*0.5
CUBOID        2  54.3687 -54.3687  54.3687 -54.3687  3.49250   0.0000  16*0.5
BOX TYPE     22  /*  npc body - 30.45 inch two-part body
CUBOID       11  54.3687 -54.3687  54.3687 -54.3687 77.34300   0.0000  16*0.5
BOX TYPE     23  /*  npc lid - 1.375 inch foam layer (40 #/ft3) - lid burn
CUBOID        9  51.5163 -51.5163  51.5163 -51.5163  3.49250   0.0000  16*0.5
CUBOID       11  54.0563 -54.0563  54.0563 -54.0563  3.49250   0.0000  16*0.5
CUBOID        2  54.3687 -54.3687  54.3687 -54.3687  3.49250   0.0000  16*0.5
BOX TYPE     24  /*  npc lid - 3.5 inch foam layer (15 #/ft3) - lid burn
CUBOID        9  51.5163 -51.5163  51.5163 -51.5163  8.89000   0.0000  16*0.5
CUBOID       11  54.0563 -54.0563  54.0563 -54.0563  8.89000   0.0000  16*0.5
CUBOID        2  54.3687 -54.3687  54.3687 -54.3687  8.89000   0.0000  16*0.5
BOX TYPE     25  /*  complete npc - body assembly
CUBOID       11  54.3688 -54.3688  54.3688 -54.3688 87.81540   0.0000  16*0.5
BOX TYPE     26  /*  complete npc - lid assembly
CUBOID       11  54.3688 -54.3688  54.3688 -54.3688 15.23490   0.0000  16*0.5
BOX TYPE     27  /*  npc single-unit
CUBOID        0  54.3688 -54.3688  54.3688 -54.3688 103.0503   0.0000  16*0.5
BOX TYPE     28  /*  global unit: 2N=150:5x5x6 cuboid, 30.48-cm h2o refl.
CUBOID        0  271.844 -271.844  271.844 -271.844 618.3020   0.0000  16*0.5
CUBOID        6  302.324 -302.324  302.324 -302.324 648.7820 -30.4800  16*0.5
27  1 1 1  1 1 1  1 1 1  1
BEGIN COMPLEX
/*  build inner canister - main body sections (7 #/ft3 region)
COMPLEX  13  2  0.00000  0.00000  0.00000   1   1   1  0.0  0.0  0.0
COMPLEX  13  3  0.00000  0.00000  0.31750   1   1   1  0.0  0.0  0.0
COMPLEX  13  4  0.00000  0.00000  25.7810   1   1   1  0.0  0.0  0.0
COMPLEX  13  5  0.00000  0.00000  26.1621   1   1   1  0.0  0.0  0.0
COMPLEX  13  6  0.00000  0.00000  51.6256   1   1   1  0.0  0.0  0.0
COMPLEX  13  7  0.00000  0.00000  52.0066   1   1   1  0.0  0.0  0.0
/*  build inner canister - upper body section (40 #/ft3 section)
COMPLEX  14  8  0.00000  0.00000  0.00000   1   1   1  0.0  0.0  0.0
/*  build inner canister - lid section
COMPLEX  15  9  0.00000  0.00000  0.00000   1   1   1  0.0  0.0  0.0
COMPLEX  15 10  0.00000  0.00000  0.63250   1   1   1  0.0  0.0  0.0
COMPLEX  15 11  0.00000  0.00000  0.95000   1   1   1  0.0  0.0  0.0
COMPLEX  15 12  0.00000  0.00000  1.39200   1   1   1  0.0  0.0  0.0
/*  embed 3x3 array of canisters into lid:  11.75 inch - centers
COMPLEX  16 15 -29.8450 -29.8450  0.00000   3   3   1 29.8450  29.8450  0.0
/*  embed 3x3 array of foam cut outs: 11.75 inch - centers
COMPLEX  23 16 -29.8450 -29.8450  0.00000   3   3   1 29.8450  29.8450  0.0
/*  embed 3x3 array of canisters into inner body: 11.75 inch - centers
COMPLEX  20 13 -29.8450 -29.8450  0.50550   3   3   1 29.8450  29.8450  0.0
COMPLEX  21 14 -29.8450 -29.8450  0.00000   3   3   1 29.8450  29.8450  0.0
/*  embed two-part body section stackup
```

```
COMPLEX  22 20   0.0000   0.0000  0.00000   1   1   1  0.0  0.0  0.0
COMPLEX  22 21   0.0000   0.0000 73.85050   1   1   1  0.0  0.0  0.0
/*  build npc - body assembly
COMPLEX  25 17   0.0000   0.0000  0.00000   1   1   1  0.0  0.0  0.0
COMPLEX  25 18   0.0000   0.0000  0.31240   1   1   1  0.0  0.0  0.0
COMPLEX  25 19   0.0000   0.0000  2.85240   1   1   1  0.0  0.0  0.0
COMPLEX  25 22   0.0000   0.0000 10.4724    1   1   1  0.0  0.0  0.0
/*  build npc - lid assembly
COMPLEX  26 23   0.0000   0.0000  0.00000   1   1   1  0.0  0.0  0.0
COMPLEX  26 24   0.0000   0.0000  3.49250   1   1   1  0.0  0.0  0.0
COMPLEX  26 18   0.0000   0.0000 12.3825    1   1   1  0.0  0.0  0.0
COMPLEX  26 17   0.0000   0.0000 14.9225    1   1   1  0.0  0.0  0.0
/*  complete npc stackup - water reflected single unit
COMPLEX  27 25   0.0000   0.0000  0.00000   1   1   1  0.0  0.0  0.0
COMPLEX  27 26   0.0000   0.0000 87.8154    1   1   1  0.0  0.0  0.0
END GEOM
END GEMER
```

Figure 6.26c – Sample input file = BT46-600.in

```
2002 NPC,HET Lat,FRad=0.1270,U(5.00)O2 MASS=46.0kg,WTF=6.00,MixHt=79.571cm
   200  /* # BATCHES
  2000  /* # NEUTRONS PER BATCH
    10  /* # BATCHES TO SKIP
     0  /* # INITIAL 'SEED' (IF NON-ZERO)
     0  /* # 'IDUMP'
     1  /* # 'NRSTRT'
     0  /* # 'NBTED' (NON-ZERO IS PRINT EDITS)
     0  /* # 'KRED' (NUMBER OF COMBINED REGIONS IN EDITS)
  0  293   0   0
\CSXSEC\UO2\GUO2-50.00
\CSXSEC\NOU\GNOU-0.SS
\CSXSEC\NOU\GNOU-0.CAD
\CSXSEC\NOU\GNOU-0.POL 0.98
\CSXSEC\NOU\GNOU-0.F07 0.90
\CSXSEC\NOU\GNOU-0.WAT
\CSXSEC\NOU\GNOU-0.F11 0.90
\CSXSEC\NOU\GNOU-0.F15 0.90
\CSXSEC\NOU\GNOU-0.F40 0.90
\CSXSEC\NOU\GNOU-0.ORC
KENO GEOM
     0  /* 'KREFM'
     0  /* 'NBOX'
     1  /* 'NBXMAX'
     1  /* 'NBYMAX'
     1  /* 'NBZMAX'
     1  /* 'NXX'
     1  /* 'NTYPST'
     1  /* 'NEMBRG'
     0  /* 'NGMCHK'
     0.0     0.0     0.0     0.0     0.0     0.0
BOX TYPE      1  /* 0.100 pellet, var. W/F
INTERS        6 0.159994 0.277117 0.127000 +1.00 30.48 -30.48 16*0.5
CUBOID        1 0.159994 -.159994 0.277117 -.277117 30.48 -30.48 16*0.5
BOX TYPE      2  /*  inner canister: bottom fuel_region # 1 w/ gap: body assy
CYLINDER     -1  10.8141    0.31750   0.00       16*0.5
CYLINDER      2  10.9233    0.31750   0.00       16*0.5
CYLINDER      0  12.40920   0.31750   0.00000    16*0.5
CYLINDER      2  12.40920   0.31750  -0.44200    16*0.5
CYLINDER      2  12.46120   0.31750  -0.44200    16*0.5
CYLINDER      0  12.70000   0.31750  -0.44200    16*0.5
CYLINDER      2  12.76350   0.31750  -0.50550    16*0.5
BOX TYPE      3  /*  inner canister: fuel_region # 2: body assy
CYLINDER     -1  10.8141   25.46350   0.00       16*0.5
CYLINDER      2  10.9233   25.46350   0.00       16*0.5
CYLINDER      3  10.96140  25.46350   0.00000    16*0.5
CYLINDER      4  12.40920  25.46350   0.00000    16*0.5
CYLINDER      2  12.46120  25.46350   0.00000    16*0.5
CYLINDER      0  12.70000  25.46350   0.00000    16*0.5
CYLINDER      2  12.76350  25.46350   0.00000    16*0.5
BOX TYPE      4  /*  inner canister: fuel_region # 3: 0.15 in cd gap: body assy
CYLINDER     -1  10.8141    0.38100   0.00       16*0.5
CYLINDER      2  10.9233    0.38100   0.00       16*0.5
CYLINDER      0  10.96140   0.38100   0.00000    16*0.5
CYLINDER      4  12.40920   0.38100   0.00000    16*0.5
CYLINDER      2  12.46120   0.38100   0.00000    16*0.5
CYLINDER      0  12.70000   0.38100   0.00000    16*0.5
CYLINDER      2  12.76350   0.38100   0.00000    16*0.5
BOX TYPE      5  /*  inner canister: fuel_region # 4: body assy
CYLINDER     -1  10.8141   25.46350   0.00       16*0.5
CYLINDER      2  10.9233   25.46350   0.00       16*0.5
CYLINDER      3  10.96140  25.46350   0.00000    16*0.5
CYLINDER      4  12.40920  25.46350   0.00000    16*0.5
CYLINDER      2  12.46120  25.46350   0.00000    16*0.5
CYLINDER      0  12.70000  25.46350   0.00000    16*0.5
CYLINDER      2  12.76350  25.46350   0.00000    16*0.5
BOX TYPE      6  /*  inner canister: fuel_region # 5: 0.15 in cd gap: body assy
CYLINDER     -1  10.8141    0.38100   0.00       16*0.5
CYLINDER      2  10.9233    0.38100   0.00       16*0.5
CYLINDER      0  10.96140   0.38100   0.00000    16*0.5
CYLINDER      4  12.40920   0.38100   0.00000    16*0.5
CYLINDER      2  12.46120   0.38100   0.00000    16*0.5
CYLINDER      0  12.70000   0.38100   0.00000    16*0.5
CYLINDER      2  12.76350   0.38100   0.00000    16*0.5
BOX TYPE      7  /*  inner canister: fuel_region # 6: body assy
CYLINDER     -1  10.8141   21.33840   0.00       16*0.5
CYLINDER      2  10.9233   21.33840   0.00       16*0.5
```

```
CYLINDER      3  10.96140  21.33840   0.00000    16*0.5
CYLINDER      4  12.40920  21.33840   0.00000    16*0.5
CYLINDER      2  12.46120  21.33840   0.00000    16*0.5
CYLINDER      0  12.70000  21.33840   0.00000    16*0.5
CYLINDER      2  12.76350  21.33840   0.00000    16*0.5
BOX TYPE      8  /*  inner canister: fuel region # 7: body assy
CYLINDER     -1  10.8141    3.49250   0.00       16*0.5
CYLINDER      2  10.9233    3.49250   0.00       16*0.5
CYLINDER      3  10.96140   3.49250   0.00000    16*0.5
CYLINDER      4  12.40920   3.49250   0.00000    16*0.5
CYLINDER      2  12.46120   3.49250   0.00000    16*0.5
CYLINDER      0  12.70000   3.49250   0.00000    16*0.5
CYLINDER      2  12.76350   3.49250   0.00000    16*0.5
BOX TYPE      9  /*  inner canister: fuel_region # 8: lid assy
CYLINDER     -1  10.8141    0.63250   0.00       16*0.5
CYLINDER      2  10.9233    0.63250   0.00       16*0.5
CYLINDER      3  10.96140   0.63250   0.00000    16*0.5
CYLINDER      4  12.40920   0.63250   0.00000    16*0.5
CYLINDER      2  12.46120   0.63250   0.00000    16*0.5
CYLINDER      0  12.70000   0.63250   0.00000    16*0.5
CYLINDER      2  12.76350   0.63250   0.00000    16*0.5
BOX TYPE     10  /*  inner canister: fuel_region # 9 w/ gap: lid assy
CYLINDER     -1  10.8141    0.31750   0.00       16*0.5
CYLINDER      2  10.9233    0.31750   0.00       16*0.5
CYLINDER      0  12.40920   0.31750   0.00000    16*0.5
CYLINDER      2  12.46120   0.31750   0.00000    16*0.5
BOX TYPE     11  /*  inner canister: fuel_region #10 w/ ring: lid assy
CYLINDER     -1  10.8141    0.44200   0.00       16*0.5
CYLINDER      2  10.9233    0.44200   0.00       16*0.5
CYLINDER      2  12.40920   0.44200   0.00000    16*0.5
CYLINDER      2  12.46120   0.44200   0.00000    16*0.5
BOX TYPE     12  /*  inner canister: fuel_region #11 w/ top: lid assy
CYLINDER     -1  10.8141    1.34186   0.00       16*0.5
CYLINDER      0  10.8141    1.78050   0.00       16*0.5
CYLINDER      2  10.9233    1.91640   0.00       16*0.5
CYLINDER      0  12.40920   1.91640   0.00000    16*0.5
BOX TYPE     13  /*  inner canister cuboid: body section (7# region)
CUBOID        5  12.7636 -12.7636  12.7636 -12.7636  73.3450  -0.5055  16*0.5
BOX TYPE     14  /*  inner canister cuboid: body section (40# region)
CUBOID        9  12.7636 -12.7636  12.7636 -12.7636  3.49260   0.0000  16*0.5
BOX TYPE     15  /*  inner canister upper cylinder: lid section
CYLINDER      0  12.7636  3.30840   0.0000  16*0.5
BOX TYPE     16  /*  foam cutout  (void) - 40 #/ft3 foam lid section
CYLINDER      0  13.5510  3.30840   0.0000  16*0.5
BOX TYPE     17  /*  npc body or lid - 10 ga. 304ss layer
CUBOID        2  54.3687 -54.3687  54.3687 -54.3687  0.31240   0.0000  16*0.5
BOX TYPE     18  /*  npc body or lid - 1 inch duraboard (void) layer, 10 ga. 304ss
CUBOID        0  51.5163 -51.5163  51.5163 -51.5163  2.54000   0.0000  16*0.5
CUBOID        0  54.0563 -54.0563  54.0563 -54.0563  2.54000   0.0000  16*0.5
CUBOID        2  54.3687 -54.3687  54.3687 -54.3687  2.54000   0.0000  16*0.5
BOX TYPE     19  /*  npc body - 4 inch bot. foam layer (11 #/ft3)  - face burn
CUBOID        7  42.6086 -42.6086  42.6086 -42.6086  0.00000   0.0000  16*0.5
CUBOID        0  54.0563 -54.0563  54.0563 -54.0563  0.00000  -7.6200  16*0.5
CUBOID        2  54.3687 -54.3687  54.3687 -54.3687  0.00000  -7.6200  16*0.5
BOX TYPE     20  /*  npc body - 29.0750 inch foam layer (7,11 #/ft3) - face burn
CUBOID        5  42.6086 -42.6086  42.6086 -42.6086 73.85050   0.0000  16*0.5
CUBOID        7  42.6086 -42.6086  42.6086 -42.6086 73.85050   0.0000  16*0.5
CUBOID        0  54.0563 -54.0563  54.0563 -54.0563 73.85050   0.0000  16*0.5
CUBOID        2  54.3687 -54.3687  54.3687 -54.3687 73.85050   0.0000  16*0.5
BOX TYPE     21  /*  npc body - 1.375 inch foam layer (40 #/ft3) - face burn
CUBOID        9  42.6086 -42.6086  42.6086 -42.6086  3.49250   0.0000  16*0.5
CUBOID        0  54.0563 -54.0563  54.0563 -54.0563  3.49250   0.0000  16*0.5
CUBOID        2  54.3687 -54.3687  54.3687 -54.3687  3.49250   0.0000  16*0.5
BOX TYPE     22  /*  npc body - 30.45 inch two-part body
CUBOID        0  54.3687 -54.3687  54.3687 -54.3687 77.34300   0.0000  16*0.5
BOX TYPE     23  /*  npc lid - 1.375 inch foam layer (40 #/ft3) - lid burn
CUBOID        0  43.8963 -43.8963  43.8963 -43.8963  3.49250   0.0000  16*0.5
CUBOID        0  54.0563 -54.0563  54.0563 -54.0563  3.49250   0.0000  16*0.5
CUBOID        2  54.3687 -54.3687  54.3687 -54.3687  3.49250   0.0000  16*0.5
BOX TYPE     24  /*  npc lid - 3.5 inch foam layer (15 #/ft3) - lid burn
CUBOID        0  43.8963 -43.8963  43.8963 -43.8963  2.54000   0.0000  16*0.5
CUBOID        0  54.0563 -54.0563  54.0563 -54.0563  8.89000   0.0000  16*0.5
CUBOID        2  54.3687 -54.3687  54.3687 -54.3687  8.89000   0.0000  16*0.5
BOX TYPE     25  /*  complete npc - body assembly
CUBOID        0  54.3688 -54.3688  54.3688 -54.3688 87.81540   0.0000  16*0.5
BOX TYPE     26  /*  complete npc - lid assembly
CUBOID        0  54.3688 -54.3688  54.3688 -54.3688 15.23490   0.0000  16*0.5
BOX TYPE     27  /*  npc single-unit cuboid
CUBOID        0  54.3688 -54.3688  54.3688 -54.3688 103.0500   0.0000  16*0.5
BOX TYPE     28  /*  global unit: 2N=150:5x5x6 cuboid, 30.48-cm h2o refl.
CUBOID        0  271.844 -271.844  271.844 -271.844 618.3020   0.0000  16*0.5
CUBOID        6  302.324 -302.324  302.324 -302.324 648.7820 -30.4800  16*0.5
28  1 1 1   1 1 1   1 1 1   1
BEGIN COMPLEX
/*  build inner canister - main body sections (7 #/ft3 region)
COMPLEX  13  2  0.00000  0.00000  0.00000    1   1   1  0.0  0.0  0.0
COMPLEX  13  3  0.00000  0.00000  0.31750    1   1   1  0.0  0.0  0.0
COMPLEX  13  4  0.00000  0.00000  25.7810    1   1   1  0.0  0.0  0.0
COMPLEX  13  5  0.00000  0.00000  26.1621    1   1   1  0.0  0.0  0.0
COMPLEX  13  6  0.00000  0.00000  51.6256    1   1   1  0.0  0.0  0.0
COMPLEX  13  7  0.00000  0.00000  52.0066    1   1   1  0.0  0.0  0.0
/*  build inner canister - upper body section (40 #/ft3 section)
COMPLEX  14  8  0.00000  0.00000  0.00000    1   1   1  0.0  0.0  0.0
/*  build inner canister - lid section
COMPLEX  15  9  0.00000  0.00000  0.00000    1   1   1  0.0  0.0  0.0
COMPLEX  15 10  0.00000  0.00000  0.63250    1   1   1  0.0  0.0  0.0
COMPLEX  15 11  0.00000  0.00000  0.95000    1   1   1  0.0  0.0  0.0
COMPLEX  15 12  0.00000  0.00000  1.39200    1   1   1  0.0  0.0  0.0
/*  embed 3x3 array of canisters into lid:  11.75 inch - centers
COMPLEX  16 15 -29.8450 -29.8450  0.00000    3   3   1 29.8450  29.8450  0.0
```

```
/*  embed 3x3 array of foam cut_outs: 11.75 inch - centers
COMPLEX  23 16 -29.8450 -29.8450  0.00000   3   3   1 29.8450  29.8450  0.0
/*  embed 3x3 array of canisters into inner body: 11.75 inch - centers
COMPLEX  20 13 -29.8450 -29.8450  0.50550   3   3   1 29.8450  29.8450  0.0
COMPLEX  21 14 -29.8450 -29.8450  0.00000   3   3   1 29.8450  29.8450  0.0
/*  embed two-part body section stackup
COMPLEX  22 20   0.0000   0.0000  0.00000   1   1   1  0.0  0.0  0.0
COMPLEX  22 21   0.0000   0.0000 73.85050   1   1   1  0.0  0.0  0.0
/*  build npc - body assembly
COMPLEX  25 17   0.0000   0.0000  0.00000   1   1   1  0.0  0.0  0.0
COMPLEX  25 18   0.0000   0.0000  0.31240   1   1   1  0.0  0.0  0.0
COMPLEX  25 19   0.0000   0.0000 10.4724    1   1   1  0.0  0.0  0.0
COMPLEX  25 22   0.0000   0.0000 10.4724    1   1   1  0.0  0.0  0.0
/*  build npc - lid assembly
COMPLEX  26 23   0.0000   0.0000  0.00000   1   1   1  0.0  0.0  0.0
COMPLEX  26 24   0.0000   0.0000  3.49250   1   1   1  0.0  0.0  0.0
COMPLEX  26 18   0.0000   0.0000 12.3825    1   1   1  0.0  0.0  0.0
COMPLEX  26 17   0.0000   0.0000 14.9225    1   1   1  0.0  0.0  0.0
/*  complete npc stackup - single unit
COMPLEX  27 25   0.0000   0.0000  0.00000   1   1   1  0.0  0.0  0.0
COMPLEX  27 26   0.0000   0.0000 87.8154    1   1   1  0.0  0.0  0.0
/*  embed 5x5x6 closed packed array
COMPLEX  28 27  -217.475 -217.475 0.00000  5  5  6  108.738 108.738 103.05
END GEOM
END GEMER
```

6.10 APPENDIX – TABULATION OF GEMER RESULTS

A. GEMER Results for Homogeneous UO_2 and H_2O Cases

Table 6.16 –Listing of GEMER Calculations for Homogeneouse Cases

FILENAME	K-EFF	SIGMA	K+2S	BIAS	K+2S-B
damaged single unit, CTU-1 observed burn, theoretical uo2+h2o mixture					
npcu1_15	0.80850	0.00140	0.81130	-0.0189	0.83010
npcu1_20	0.83440	0.00130	0.83700	-0.0189	0.85580
npcu1_25	0.84520	0.00130	0.84780	-0.0189	0.86660
npcu1_30	0.84160	0.00130	0.84430	-0.0189	0.86320
npcu1_35	0.83180	0.00140	0.83460	-0.0189	0.85350
npcu1_40	0.81260	0.00120	0.81510	-0.0189	0.83390
npcu1_45	0.78600	0.00120	0.78840	-0.0189	0.80730
damaged single unit, CTU-1 observed burn, theoretical uo2+h2o mixture					
npcu2_15	0.81120	0.00130	0.81390	-0.0189	0.83280
npcu2_20	0.83070	0.00140	0.83360	-0.0189	0.85250
npcu2_25	0.84070	0.00130	0.84330	-0.0189	0.86220
npcu2_30	0.83690	0.00140	0.83970	-0.0189	0.85860
npcu2_35	0.82800	0.00120	0.83050	-0.0189	0.84940
npcu2_40	0.81150	0.00140	0.81420	-0.0189	0.83310
npcu2_45	0.78660	0.00130	0.78930	-0.0189	0.80820
damaged single unit, maximum burn, theoretical uo2+h2o mixture					
npcut_15	0.80780	0.00120	0.81030	-0.0189	0.82920
npcut_20	0.83010	0.00140	0.83280	-0.0189	0.85170
npcut_25	0.84050	0.00140	0.84320	-0.0189	0.86210
npcut_30	0.83860	0.00150	0.84160	-0.0189	0.86050
npcut_35	0.83020	0.00140	0.83290	-0.0189	0.85180
npcut_40	0.81340	0.00140	0.81620	-0.0189	0.83510
npcut_45	0.78720	0.00130	0.78980	-0.0189	0.80870

FILENAME	K-EFF	SIGMA	K+2S	BIAS	K+2S-B
undamaged array, 5N = infinite (60 kgs uo2 + h2o mixture)					
npc60i15	0.81280	0.00120	0.81520	-0.0189	0.83410
npc60i20	0.85990	0.00140	0.86270	-0.0189	0.88160
npc60i25	0.88440	0.00130	0.88710	-0.0189	0.90600
npc60i26	0.88970	0.00140	0.89250	-0.0189	0.91140
npc60i27	0.89560	0.00130	0.89820	-0.0189	0.91710
npc60i28	0.89540	0.00120	0.89780	-0.0189	0.91670
undamaged array, 5N = infinite (60 kgs uo2 + 5% h2o mixture)					
npc1un60	0.34760	0.00080	0.34910	-0.0189	0.36800
npc2un60	0.36990	0.00090	0.37170	-0.0189	0.39060
npc3un60	0.40130	0.00090	0.40320	-0.0189	0.42200
npc4un60	0.43390	0.00100	0.43590	-0.0189	0.45480
npc5un60	0.45880	0.00100	0.46080	-0.0189	0.47970
npc6un60	0.48630	0.00090	0.48820	-0.0189	0.50710
undamaged array, 5N = infinite (60 kgs uo2 compound, 5% h2o added)					
npc1um60	0.36360	0.00080	0.36520	-0.0189	0.38410
npc2um60	0.37780	0.00090	0.37950	-0.0189	0.39840
npc3um60	0.40940	0.00090	0.41110	-0.0189	0.43000
npc4um60	0.43840	0.00090	0.44030	-0.0189	0.45920
npc5um60	0.46830	0.00100	0.47030	-0.0189	0.48920
npc6um60	0.48990	0.00110	0.49200	-0.0189	0.51090

Table 6.16 – Listing of GEMER Calculations for Homogeneouse Cases - Continued

FILENAME	K-EFF	SIGMA	K+2S	BIAS	K+2S-B
damaged single unit, maximum burn, theoretical uo2+h2o mixture, tight h2o					
npcutw15	0.81100	0.00130	0.81360	-0.0189	0.83250
npcutw20	0.83490	0.00150	0.83790	-0.0189	0.85680
npcutw25	0.84760	0.00150	0.85060	-0.0189	0.86940
npcutw30	0.84200	0.00140	0.84480	-0.0189	0.86360
npcutw35	0.83240	0.00130	0.83490	-0.0189	0.85380
npcutw40	0.81270	0.00120	0.81510	-0.0189	0.83400
npcutw45	0.78870	0.00130	0.79120	-0.0189	0.81010
damaged 5x5x6 array (2N = 150), CTU-1 observed burn, uo2 mass/ICCA					
npca1_40	0.87300	0.00130	0.87560	-0.0189	0.89450
npca1_50	0.89700	0.00130	0.89970	-0.0189	0.91850
npca1_55	0.90260	0.00130	0.90520	-0.0189	0.92410
npca1_60	0.90590	0.00130	0.90840	-0.0189	0.92730
npca1_65	0.90810	0.00130	0.91060	-0.0189	0.92950
damaged 5x5x6 array (2N = 150), CTU-2 observed burn, uo2 mass/ICCA					
npca2_40	0.87870	0.00110	0.88090	-0.0189	0.89980
npca2_45	0.89330	0.00120	0.89580	-0.0189	0.91470
npca2_50	0.90390	0.00120	0.90630	-0.0189	0.92520
npca2_55	0.91060	0.00140	0.91330	-0.0189	0.93220
npca2_60	0.91410	0.00130	0.91670	-0.0189	0.93560
npca2_65	0.91620	0.00130	0.91890	-0.0189	0.93770
damaged 5x5x6 array (2N = 150), maximum burn, uo2 mass/ICCA					
npcat_40	0.89200	0.00130	0.89460	-0.0189	0.91350
npcat_45	0.90400	0.00130	0.90650	-0.0189	0.92540
npcat_50	0.91350	0.00140	0.91620	-0.0189	0.93510
npcat_55	0.92370	0.00130	0.92630	-0.0189	0.94520
npcat_60	0.92750	0.00120	0.92990	-0.0189	0.94880
npcat_65	0.93160	0.00130	0.93420	-0.0189	095310

FILENAME	K-EFF	SIGMA	K+2S	BIAS	K+2S-B
damaged 9x9x2 array (2N = 162), max. burn, shape study (60 kgs uo2/ICCA)					
npcatw60	0.91320	0.00120	0.91560	-0.0189	0.93450
damaged 5x5x6 array (2N =150), max. burn, c-c spacing study (60 kgs uo2/ICCA)					
npcat_60	0.92750	0.00120	0.92990	-0.0189	0.94880
npcatb60	0.92740	0.00140	0.93010	-0.0189	0.94900
npcatc60	0.92630	0.00120	0.92870	-0.0189	0.94760
npcatd60	0.92480	0.00140	0.92760	-0.0189	0.94640
npcate60	0.92750	0.00130	0.93010	-0.0189	0.94890
damaged array, 100% foam burn vs. interspersed h2o (60 kgs uo2/ICCA)					
npcfa000	0.94510	0.00130	0.94770	-0.0189	0.96660
npcfa005	0.94480	0.00130	0.94730	-0.0189	0.96620
npcfa010	0.93770	0.00120	0.94010	-0.0189	0.95900
npcfa020	0.92980	0.00130	0.93240	-0.0189	0.95130
npcfa030	0.92370	0.00140	0.92650	-0.0189	0.94540
npcfa050	0.91040	0.00130	0.91300	-0.0189	0.93180
npcfa075	0.89830	0.00140	0.90110	-0.0189	0.92000
npcfa100	0.88830	0.00130	0.89090	-0.0189	0.90980
npcfa125	0.87340	0.00120	0.87590	-0.0189	0.89470

Table 6.16 – Listing of GEMER Calculations for Homogeneouse Cases

FILENAME	K-EFF	SIGMA	K+2S	BIAS	K+2S-B
damaged 5x5x6 array (2N = 150), max.burn, var. h2o content (60 kgs UO2/ICCA)					
npcatx60	0.81020	0.00130	0.81280	-0.0189	0.83170
npcaty60	0.86710	0.00130	0.86970	-0.0189	0.88860
npcatz60	0.90810	0.00140	0.91080	-0.0189	0.92970
damaged 6x5x5 array (2N = 150), max. burn, shape study (60 kgs uo2/ICCA)					
npcatv60	0.92740	0.00120	0.92980	-0.0189	0.94870

FILENAME	K-EFF	SIGMA	K+2S	BIAS	K+2S-B
damaged 5x5x6 array (2N =150), max. burn, structure study (60 kgs uo2/ICCA)					
npcats60	0.92400	0.00120	0.92640	-0.0189	0.94530
damaged 5x5x6 array (2N =150), max. burn, poly gap study (60 kgs uo2/ICCA)					
npcat_60	0.92750	0.00120	0.92990	-0.0189	0.94880
npcatg60	0.92710	0.00120	0.92960	-0.0189	0.94840
npcatf60	0.92730	0.00130	0.92990	-0.0189	0.94880

B. GEMER Results for 55 Kg and 53 Kg UO_2 and H_2O Cases with 17X17, 10X10, 9X9 and 8X8 Pellet Types

Table 6.17 –Listing of GEMER Calculations for Single Container 55Kg and 53 Kg Heterogeneous Cases

Name	KEFF	SIGMA	K+2S	Bias	K+2S - B	Name	KEFF	SIGMA	K+2S	Bias	K+2S - B
55 KGs Single Case with Overlap						53 KGs Single Case without Overlap					
17X17 Square Lattice						8X8 Square Lattice					
ESSP-058	0.52763	0.00113	0.52989	-0.01890	0.54879	ESSN-058	0.52000	0.00116	0.52232	-0.01890	0.54122
ESSP-100	0.64235	0.00121	0.64477	-0.01890	0.66367	ESSN-100	0.63328	0.00115	0.63558	-0.01890	0.65448
ESSP-200	0.78507	0.00135	0.78777	-0.01890	0.80667	ESSN-200	0.77683	0.00142	0.77967	-0.01890	0.79857
ESSP-300	0.83680	0.00147	0.83974	-0.01890	0.85864	ESSN-300	0.83110	0.00148	0.83406	-0.01890	0.85296
ESSP-400	0.84672	0.00143	0.84958	-0.01890	0.86848	ESSN-400	0.84688	0.00135	0.84958	-0.01890	0.86848
ESSP-410	0.84848	0.00144	0.85136	-0.01890	0.87026	ESSN-410	0.84691	0.00131	0.84953	-0.01890	0.86843
ESSP-420	**0.85195**	0.00143	0.85481	-0.01890	**0.87371**	ESSN-420	0.84524	0.00139	0.84802	-0.01890	0.86692
ESSP-430	0.84592	0.00132	0.84856	-0.01890	0.86746	ESSN-430	0.84554	0.00151	0.84856	-0.01890	0.86746
ESSP-437	0.84752	0.00134	0.85020	-0.01890	0.86910	ESSN-437	**0.84788**	0.00138	0.85064	-0.01890	**0.86954**
ESSP-440	0.84628	0.00135	0.84898	-0.01890	0.86788	ESSN-440	0.84652	0.00132	0.84916	-0.01890	0.86806
ESSP-450	0.84985	0.00149	0.85283	-0.01890	0.87173	ESSN-450	0.84683	0.00136	0.84955	-0.01890	0.86845
ESSP-460	0.84916	0.00134	0.85184	-0.01890	0.87074	ESSN-460	0.84536	0.00141	0.84818	-0.01890	0.86708
ESSP-470	0.84950	0.00140	0.85230	-0.01890	0.87120	ESSN-470	0.84482	0.00134	0.84750	-0.01890	0.86640
ESSP-480	0.84960	0.00140	0.85240	-0.01890	0.87130	ESSN-480	0.84770	0.00137	0.85044	-0.01890	0.86934
ESSP-486	0.84746	0.00136	0.85018	-0.01890	0.86908	ESSN-486	0.84195	0.00135	0.84465	-0.01890	0.86355
ESSP-490	0.84454	0.00129	0.84712	-0.01890	0.86602	ESSN-490	0.84212	0.00131	0.84474	-0.01890	0.86364
ESSP-500	0.84543	0.00123	0.84789	-0.01890	0.86679	ESSN-500	0.84504	0.00134	0.84772	-0.01890	0.86662
ESSP-520	0.84268	0.00129	0.84526	-0.01890	0.86416	ESSN-520	0.84026	0.00129	0.84284	-0.01890	0.86174
ESSP-540	0.83709	0.00138	0.83985	-0.01890	0.85875	ESSN-540	0.83416	0.00141	0.83698	-0.01890	0.85588
ESSP-544	0.83545	0.00140	0.83825	-0.01890	0.85715	ESSN-544	0.83694	0.00139	0.83972	-0.01890	0.85862
ESSP-560	0.82760	0.00137	0.83034	-0.01890	0.84924	ESSN-560	0.83201	0.00148	0.83497	-0.01890	0.85387
ESSP-600	0.81883	0.00139	0.82161	-0.01890	0.84051	ESSN-600	0.81876	0.00116	0.82108	-0.01890	0.83998
ESSP-616	0.81436	0.00135	0.81706	-0.01890	0.83596	ESSN-616	0.81752	0.00128	0.82008	-0.01890	0.83898
ESSP-700	0.79511	0.00127	0.79765	-0.01890	0.81655	ESSN-700	0.79481	0.00143	0.79767	-0.01890	0.81657
ESSP-705	0.79466	0.00134	0.79734	-0.01890	0.81624	ESSN-705	0.79703	0.00126	0.79955	-0.01890	0.81845
ESSP-800	0.77394	0.00139	0.77672	-0.01890	0.79562	ESSN-800	0.77155	0.00147	0.77449	-0.01890	0.79339
17X17 Triangular Lattice				Max	0.87371	17X17 Triangular Lattice				Max	0.86954
ESTP-058	0.52325	0.00118	0.52561	-0.01890	0.54451	ESTN-058	0.51991	0.00119	0.52229	-0.01890	0.54119
ESTP-100	0.63807	0.00132	0.64071	-0.01890	0.65961	ESTN-100	0.63377	0.00135	0.63647	-0.01890	0.65537
ESTP-200	0.78504	0.00149	0.78802	-0.01890	0.80692	ESTN-200	0.78191	0.00143	0.78477	-0.01890	0.80367

ESTP-300	0.83849	0.00152	0.84153	-0.01890	0.86043
ESTP-400	**0.85358**	0.00141	0.85640	-0.01890	**0.87530**
ESTP-410	0.84925	0.00149	0.85223	-0.01890	0.87113
ESTP-420	0.84924	0.00141	0.85206	-0.01890	0.87096
ESTP-430	0.85188	0.00145	0.85478	-0.01890	0.87368
ESTP-437	0.84887	0.00149	0.85185	-0.01890	0.87075
ESTP-440	0.84986	0.00144	0.85274	-0.01890	0.87164
ESTP-450	0.84616	0.00149	0.84914	-0.01890	0.86804
ESTP-460	0.85219	0.00136	0.85491	-0.01890	0.87381
ESTP-470	0.84727	0.00144	0.85015	-0.01890	0.86905
ESTP-480	0.84585	0.00140	0.84865	-0.01890	0.86755
ESTP-486	0.84450	0.00142	0.84734	-0.01890	0.86624
ESTP-490	0.84438	0.00130	0.84698	-0.01890	0.86588
ESTP-500	0.84284	0.00149	0.84582	-0.01890	0.86472
ESTP-520	0.83902	0.00125	0.84152	-0.01890	0.86042
ESTP-540	0.83375	0.00150	0.83675	-0.01890	0.85565
ESTP-544	0.83219	0.00145	0.83509	-0.01890	0.85399
ESTP-560	0.82938	0.00131	0.83200	-0.01890	0.85090
ESTP-600	0.82478	0.00135	0.82748	-0.01890	0.84638
ESTP-616	0.82316	0.00133	0.82582	-0.01890	0.84472
ESTP-700	0.79699	0.00141	0.79981	-0.01890	0.81871
ESTP-705	0.79422	0.00145	0.79712	-0.01890	0.81602
ESTP-800	0.77140	0.00127	0.77394	-0.01890	0.79284
	10X10 Square Lattice			Max	0.87530
ETSP-058	0.52919	0.00099	0.53117	-0.01890	0.55007
ETSP-100	0.64509	0.00118	0.64745	-0.01890	0.66635
ETSP-200	0.78549	0.00142	0.78833	-0.01890	0.80723
ETSP-300	0.83535	0.00150	0.83835	-0.01890	0.85725
ETSP-400	0.84431	0.00137	0.84705	-0.01890	0.86595
ETSP-410	**0.84464**	0.00130	0.84724	-0.01890	**0.86614**
ETSP-420	0.84403	0.00134	0.84671	-0.01890	0.86561
ETSP-430	0.84013	0.00134	0.84281	-0.01890	0.86171
ETSP-437	0.84329	0.00124	0.84577	-0.01890	0.86467
ETSP-440	0.84048	0.00151	0.84350	-0.01890	0.86240
ETSP-450	0.84368	0.00149	0.84666	-0.01890	0.86556
ETSP-460	0.84014	0.00130	0.84274	-0.01890	0.86164

ESTN-300	0.83296	0.00141	0.83578	-0.01890	0.85468
ESTN-400	0.84943	0.00147	0.85237	-0.01890	0.87127
ESTN-410	0.84609	0.00136	0.84881	-0.01890	0.86771
ESTN-420	0.84792	0.00138	0.85068	-0.01890	0.86958
ESTN-430	0.84743	0.00136	0.85015	-0.01890	0.86905
ESTN-437	**0.84991**	0.00137	0.85265	-0.01890	**0.87155**
ESTN-440	0.84864	0.00152	0.85168	-0.01890	0.87058
ESTN-450	0.84649	0.00134	0.84917	-0.01890	0.86807
ESTN-460	0.84517	0.00132	0.84781	-0.01890	0.86671
ESTN-470	0.84531	0.00138	0.84807	-0.01890	0.86697
ESTN-480	0.84310	0.00140	0.84590	-0.01890	0.86480
ESTN-486	0.84133	0.00128	0.84389	-0.01890	0.86279
ESTN-490	0.84160	0.00142	0.84444	-0.01890	0.86334
ESTN-500	0.84286	0.00140	0.84566	-0.01890	0.86456
ESTN-520	0.83537	0.00151	0.83839	-0.01890	0.85729
ESTN-540	0.83456	0.00133	0.83722	-0.01890	0.85612
ESTN-544	0.83293	0.00130	0.83553	-0.01890	0.85443
ESTN-560	0.82972	0.00125	0.83222	-0.01890	0.85112
ESTN-600	0.82655	0.00140	0.82935	-0.01890	0.84825
ESTN-616	0.82113	0.00135	0.82383	-0.01890	0.84273
ESTN-700	0.79368	0.00125	0.79618	-0.01890	0.81508
ESTN-705	0.79440	0.00127	0.79694	-0.01890	0.81584
ESTN-800	0.77090	0.00129	0.77348	-0.01890	0.79238
	10X10 Square Lattice			Max	0.87155
ETSN-058	0.51805	0.00107	0.52019	-0.01890	0.53909
ETSN-100	0.63753	0.00134	0.64021	-0.01890	0.65911
ETSN-200	0.78319	0.00146	0.78611	-0.01890	0.80501
ETSN-300	0.82891	0.00146	0.83183	-0.01890	0.85073
ETSN-400	**0.84441**	0.00152	0.84745	-0.01890	**0.86635**
ETSN-410	0.84094	0.00146	0.84386	-0.01890	0.86276
ETSN-420	0.84083	0.00139	0.84361	-0.01890	0.86251
ETSN-430	0.84005	0.00137	0.84279	-0.01890	0.86169
ETSN-437	0.83844	0.00140	0.84124	-0.01890	0.86014
ETSN-440	0.83905	0.00146	0.84197	-0.01890	0.86087
ETSN-450	0.83776	0.00145	0.84066	-0.01890	0.85956
ETSN-460	0.84026	0.00128	0.84282	-0.01890	0.86172

ETSP-470	0.84296	0.00137	0.84570	-0.01890	0.86460
ETSP-480	0.83681	0.00144	0.83969	-0.01890	0.85859
ETSP-486	0.83572	0.00132	0.83836	-0.01890	0.85726
ETSP-490	0.83708	0.00139	0.83986	-0.01890	0.85876
ETSP-500	0.83748	0.00129	0.84006	-0.01890	0.85896
ETSP-520	0.83236	0.00144	0.83524	-0.01890	0.85414
ETSP-540	0.82724	0.00146	0.83016	-0.01890	0.84906
ETSP-544	0.82729	0.00136	0.83001	-0.01890	0.84891
ETSP-560	0.82285	0.00137	0.82559	-0.01890	0.84449
ETSP-600	0.81565	0.00128	0.81821	-0.01890	0.83711
ETSP-616	0.80975	0.00140	0.81255	-0.01890	0.83145
ETSP-700	0.77799	0.00129	0.78057	-0.01890	0.79947
ETSP-705	0.77547	0.00130	0.77807	-0.01890	0.79697
ETSP-800	0.75761	0.00131	0.76023	-0.01890	0.77913
	10X10 Triangular Lattice			Max	0.86614
ETTP-058	0.52642	0.00111	0.52864	-0.01890	0.54754
ETTP-100	0.64258	0.00121	0.64500	-0.01890	0.66390
ETTP-200	0.78809	0.00128	0.79065	-0.01890	0.80955
ETTP-300	0.83701	0.00140	0.83981	-0.01890	0.85871
ETTP-400	0.84313	0.00121	0.84555	-0.01890	0.86445
ETTP-410	0.84350	0.00134	0.84618	-0.01890	0.86508
ETTP-420	0.84380	0.00129	0.84638	-0.01890	0.86528
ETTP-430	0.84806	0.00148	0.85102	-0.01890	**0.86992**
ETTP-437	0.84361	0.00140	0.84641	-0.01890	0.86531
ETTP-440	0.84448	0.00136	0.84720	-0.01890	0.86610
ETTP-450	0.84541	0.00130	0.84801	-0.01890	0.86691
ETTP-460	**0.84836**	0.00130	0.85096	-0.01890	0.86986
ETTP-470	0.83877	0.00127	0.84131	-0.01890	0.86021
ETTP-480	0.83995	0.00126	0.84247	-0.01890	0.86137
ETTP-486	0.83885	0.00132	0.84149	-0.01890	0.86039
ETTP-490	0.83821	0.00144	0.84109	-0.01890	0.85999
ETTP-500	0.83831	0.00137	0.84105	-0.01890	0.85995
ETTP-520	0.83383	0.00126	0.83635	-0.01890	0.85525
ETTP-540	0.82480	0.00142	0.82764	-0.01890	0.84654
ETTP-544	0.82734	0.00143	0.83020	-0.01890	0.84910
ETTP-560	0.81713	0.00147	0.82007	-0.01890	0.83897

ETSN-470	0.83745	0.00141	0.84027	-0.01890	0.85917
ETSN-480	0.83640	0.00138	0.83916	-0.01890	0.85806
ETSN-486	0.83710	0.00133	0.83976	-0.01890	0.85866
ETSN-490	0.83539	0.00140	0.83819	-0.01890	0.85709
ETSN-500	0.83617	0.00138	0.83893	-0.01890	0.85783
ETSN-520	0.83092	0.00130	0.83352	-0.01890	0.85242
ETSN-540	0.82497	0.00135	0.82767	-0.01890	0.84657
ETSN-544	0.82766	0.00138	0.83042	-0.01890	0.84932
ETSN-560	0.82677	0.00127	0.82931	-0.01890	0.84821
ETSN-600	0.81199	0.00140	0.81479	-0.01890	0.83369
ETSN-616	0.81226	0.00133	0.81492	-0.01890	0.83382
ETSN-700	0.77734	0.00126	0.77986	-0.01890	0.79876
ETSN-705	0.77755	0.00148	0.78051	-0.01890	0.79941
ETSN-800	0.75918	0.00135	0.76188	-0.01890	0.78078
	10X10 Triangular Lattice			Max	0.86635
ETTN-058	0.52110	0.00110	0.52330	-0.01890	0.54220
ETTN-100	0.63764	0.00123	0.64010	-0.01890	0.65900
ETTN-200	0.78244	0.00142	0.78528	-0.01890	0.80418
ETTN-300	0.83282	0.00149	0.83580	-0.01890	0.85470
ETTN-400	0.84263	0.00140	0.84543	-0.01890	0.86433
ETTN-410	0.84101	0.00134	0.84369	-0.01890	0.86259
ETTN-420	0.84343	0.00146	0.84635	-0.01890	0.86525
ETTN-430	0.84117	0.00145	0.84407	-0.01890	0.86297
ETTN-437	**0.84546**	0.00133	0.84812	-0.01890	**0.86702**
ETTN-440	0.84327	0.00136	0.84599	-0.01890	0.86489
ETTN-450	0.84138	0.00140	0.84418	-0.01890	0.86308
ETTN-460	0.84102	0.00138	0.84378	-0.01890	0.86268
ETTN-470	0.83886	0.00144	0.84174	-0.01890	0.86064
ETTN-480	0.83793	0.00154	0.84101	-0.01890	0.85991
ETTN-486	0.83650	0.00139	0.83928	-0.01890	0.85818
ETTN-490	0.83383	0.00144	0.83671	-0.01890	0.85561
ETTN-500	0.83468	0.00146	0.83760	-0.01890	0.85650
ETTN-520	0.82686	0.00134	0.82954	-0.01890	0.84844
ETTN-540	0.82432	0.00133	0.82698	-0.01890	0.84588
ETTN-544	0.82320	0.00128	0.82576	-0.01890	0.84466
ETTN-560	0.81805	0.00137	0.82079	-0.01890	0.83969

ETTP-600	0.80825	0.00138	0.81101	-0.01890	0.82991
ETTP-616	0.80755	0.00140	0.81035	-0.01890	0.82925
ETTP-700	0.78947	0.00123	0.79193	-0.01890	0.81083
ETTP-705	0.78910	0.00132	0.79174	-0.01890	0.81064
ETTP-800	0.75263	0.00127	0.75517	-0.01890	0.77407
9X9 Square Lattice				Max	0.86992
ENSP-058	0.52795	0.00109	0.53013	-0.01890	0.54903
ENSP-100	0.64543	0.00126	0.64795	-0.01890	0.66685
ENSP-200	0.78800	0.00134	0.79068	-0.01890	0.80958
ENSP-300	0.83166	0.00143	0.83452	-0.01890	0.85342
ENSP-400	0.84059	0.00151	0.84361	-0.01890	0.86251
ENSP-410	**0.84113**	0.00134	0.84381	-0.01890	**0.86271**
ENSP-420	0.84028	0.00144	0.84316	-0.01890	0.86206
ENSP-430	0.83946	0.00142	0.84230	-0.01890	0.86120
ENSP-437	0.83482	0.00141	0.83764	-0.01890	0.85654
ENSP-440	0.83878	0.00126	0.84130	-0.01890	0.86020
ENSP-450	0.83706	0.00143	0.83992	-0.01890	0.85882
ENSP-460	0.83759	0.00145	0.84049	-0.01890	0.85939
ENSP-470	0.83765	0.00132	0.84029	-0.01890	0.85919
ENSP-480	0.83762	0.00125	0.84012	-0.01890	0.85902
ENSP-486	0.83523	0.00145	0.83813	-0.01890	0.85703
ENSP-490	0.83436	0.00128	0.83692	-0.01890	0.85582
ENSP-500	0.83292	0.00127	0.83546	-0.01890	0.85436
ENSP-520	0.82705	0.00135	0.82975	-0.01890	0.84865
ENSP-540	0.82325	0.00136	0.82597	-0.01890	0.84487
ENSP-544	0.81644	0.00124	0.81892	-0.01890	0.83782
ENSP-560	0.81194	0.00124	0.81442	-0.01890	0.83332
ENSP-600	0.79801	0.00128	0.80057	-0.01890	0.81947
ENSP-616	0.79315	0.00134	0.79583	-0.01890	0.81473
ENSP-700	0.78121	0.00129	0.78379	-0.01890	0.80269
ENSP-705	0.77720	0.00126	0.77972	-0.01890	0.79862
ENSP-800	0.74898	0.00123	0.75144	-0.01890	0.77034
9X9 Triangular Lattice				Max	0.86271
ENTP-058	0.52877	0.00117	0.53111	-0.01890	0.55001
ENTP-100	0.64507	0.00130	0.64767	-0.01890	0.66657
ENTP-200	0.78689	0.00138	0.78965	-0.01890	0.80855

ETTN-600	0.80959	0.00127	0.81213	-0.01890	0.83103
ETTN-616	0.81032	0.00135	0.81302	-0.01890	0.83192
ETTN-700	0.78569	0.00116	0.78801	-0.01890	0.80691
ETTN-705	0.78889	0.00126	0.79141	-0.01890	0.81031
ETTN-800	0.75192	0.00128	0.75448	-0.01890	0.77338
9X9 Square Lattice				Max	0.86702
ENSN-058	0.52039	0.00116	0.52271	-0.01890	0.54161
ENSN-100	0.63720	0.00121	0.63962	-0.01890	0.65852
ENSN-200	0.78125	0.00151	0.78427	-0.01890	0.80317
ENSN-300	0.82725	0.00140	0.83005	-0.01890	0.84895
ENSN-400	0.83697	0.00145	0.83987	-0.01890	0.85877
ENSN-410	0.83636	0.00141	0.83918	-0.01890	0.85808
ENSN-420	0.83554	0.00142	0.83838	-0.01890	0.85728
ENSN-430	0.83393	0.00123	0.83639	-0.01890	0.85529
ENSN-437	**0.83796**	0.00140	0.84076	-0.01890	**0.85966**
ENSN-440	0.83782	0.00137	0.84056	-0.01890	0.85946
ENSN-450	0.83443	0.00148	0.83739	-0.01890	0.85629
ENSN-460	0.83291	0.00135	0.83561	-0.01890	0.85451
ENSN-470	0.83294	0.00133	0.83560	-0.01890	0.85450
ENSN-480	0.83352	0.00136	0.83624	-0.01890	0.85514
ENSN-486	0.83623	0.00138	0.83899	-0.01890	0.85789
ENSN-490	0.83200	0.00127	0.83454	-0.01890	0.85344
ENSN-500	0.82740	0.00127	0.82994	-0.01890	0.84884
ENSN-520	0.82510	0.00137	0.82784	-0.01890	0.84674
ENSN-540	0.81908	0.00137	0.82182	-0.01890	0.84072
ENSN-544	0.81702	0.00138	0.81978	-0.01890	0.83868
ENSN-560	0.81249	0.00130	0.81509	-0.01890	0.83399
ENSN-600	0.79903	0.00139	0.80181	-0.01890	0.82071
ENSN-616	0.79383	0.00125	0.79633	-0.01890	0.81523
ENSN-700	0.78049	0.00140	0.78329	-0.01890	0.80219
ENSN-705	0.77693	0.00135	0.77963	-0.01890	0.79853
ENSN-800	0.74788	0.00127	0.75042	-0.01890	0.76932
9X9 Triangular Lattice				Max	0.85966
ENTN-058	0.52091	0.00113	0.52317	-0.01890	0.54207
ENTN-100	0.63681	0.00129	0.63939	-0.01890	0.65829
ENTN-200	0.78189	0.00132	0.78453	-0.01890	0.80343

ENTP-300	0.83201	0.00138	0.83477	-0.01890	0.85367
ENTP-400	0.84097	0.00122	0.84341	-0.01890	0.86231
ENTP-410	0.84107	0.00146	0.84399	-0.01890	0.86289
ENTP-420	0.83961	0.00145	0.84251	-0.01890	0.86141
ENTP-430	**0.84217**	0.00151	0.84519	-0.01890	**0.86409**
ENTP-437	0.83891	0.00148	0.84187	-0.01890	0.86077
ENTP-440	0.83747	0.00143	0.84033	-0.01890	0.85923
ENTP-450	0.83710	0.00140	0.83990	-0.01890	0.85880
ENTP-460	0.83761	0.00149	0.84059	-0.01890	0.85949
ENTP-470	0.83666	0.00141	0.83948	-0.01890	0.85838
ENTP-480	0.83707	0.00139	0.83985	-0.01890	0.85875
ENTP-486	0.83300	0.00138	0.83576	-0.01890	0.85466
ENTP-490	0.83569	0.00133	0.83835	-0.01890	0.85725
ENTP-500	0.83044	0.00127	0.83298	-0.01890	0.85188
ENTP-520	0.82757	0.00139	0.83035	-0.01890	0.84925
ENTP-540	0.82723	0.00129	0.82981	-0.01890	0.84871
ENTP-544	0.82238	0.00141	0.82520	-0.01890	0.84410
ENTP-560	0.82024	0.00131	0.82286	-0.01890	0.84176
ENTP-600	0.80406	0.00128	0.80662	-0.01890	0.82552
ENTP-616	0.79660	0.00133	0.79926	-0.01890	0.81816
ENTP-700	0.77114	0.00141	0.77396	-0.01890	0.79286
ENTP-705	0.77019	0.00127	0.77273	-0.01890	0.79163
ENTP-800	0.75055	0.00131	0.75317	-0.01890	0.77207
	8X8 Square Lattice			Max	0.86409
EESP-058	0.52867	0.00122	0.53111	-0.01890	0.55001
EESP-100	0.64634	0.00134	0.64902	-0.01890	0.66792
EESP-200	0.78718	0.00134	0.78986	-0.01890	0.80876
EESP-300	0.83115	0.00141	0.83397	-0.01890	0.85287
EESP-400	0.83488	0.00140	0.83768	-0.01890	0.85658
EESP-410	0.83342	0.00146	0.83634	-0.01890	0.85524
EESP-420	**0.83597**	0.00135	0.83867	-0.01890	**0.85757**
EESP-430	0.83230	0.00136	0.83502	-0.01890	0.85392
EESP-437	0.83195	0.00136	0.83467	-0.01890	0.85357
EESP-440	0.83026	0.00133	0.83292	-0.01890	0.85182
EESP-450	0.83381	0.00125	0.83631	-0.01890	0.85521
EESP-460	0.82725	0.00141	0.83007	-0.01890	0.84897

ENTN-300	0.83026	0.00141	0.83308	-0.01890	0.85198
ENTN-400	0.83540	0.00131	0.83802	-0.01890	0.85692
ENTN-410	**0.83982**	0.00135	0.84252	-0.01890	**0.86142**
ENTN-420	0.83527	0.00129	0.83785	-0.01890	0.85675
ENTN-430	0.83279	0.00137	0.83553	-0.01890	0.85443
ENTN-437	0.83543	0.00143	0.83829	-0.01890	0.85719
ENTN-440	0.83322	0.00147	0.83616	-0.01890	0.85506
ENTN-450	0.83314	0.00135	0.83584	-0.01890	0.85474
ENTN-460	0.83340	0.00139	0.83618	-0.01890	0.85508
ENTN-470	0.83370	0.00135	0.83640	-0.01890	0.85530
ENTN-480	0.83362	0.00140	0.83642	-0.01890	0.85532
ENTN-486	0.83191	0.00145	0.83481	-0.01890	0.85371
ENTN-490	0.83294	0.00136	0.83566	-0.01890	0.85456
ENTN-500	0.83171	0.00138	0.83447	-0.01890	0.85337
ENTN-520	0.82694	0.00123	0.82940	-0.01890	0.84830
ENTN-540	0.82441	0.00133	0.82707	-0.01890	0.84597
ENTN-544	0.82395	0.00141	0.82677	-0.01890	0.84567
ENTN-560	0.81948	0.00139	0.82226	-0.01890	0.84116
ENTN-600	0.80746	0.00134	0.81014	-0.01890	0.82904
ENTN-616	0.79990	0.00130	0.80250	-0.01890	0.82140
ENTN-700	0.77107	0.00135	0.77377	-0.01890	0.79267
ENTN-705	0.76972	0.00131	0.77234	-0.01890	0.79124
ENTN-800	0.74875	0.00129	0.75133	-0.01890	0.77023
	8X8 Square Lattice			Max	0.86142
EESN-058	0.52286	0.00115	0.52516	-0.01890	0.54406
EESN-100	0.63879	0.00135	0.64149	-0.01890	0.66039
EESN-200	0.78284	0.00145	0.78574	-0.01890	0.80464
EESN-300	0.82532	0.00134	0.82800	-0.01890	0.84690
EESN-400	**0.83275**	0.00139	0.83553	-0.01890	**0.85443**
EESN-410	0.83247	0.00145	0.83537	-0.01890	0.85427
EESN-420	0.83082	0.00144	0.83370	-0.01890	0.85260
EESN-430	0.82975	0.00141	0.83257	-0.01890	0.85147
EESN-437	0.82972	0.00145	0.83262	-0.01890	0.85152
EESN-440	0.83140	0.00144	0.83428	-0.01890	0.85318
EESN-450	0.82779	0.00137	0.83053	-0.01890	0.84943
EESN-460	0.82817	0.00139	0.83095	-0.01890	0.84985

EESP-470	0.82495	0.00137	0.82769	-0.01890	0.84659
EESP-480	0.82152	0.00144	0.82440	-0.01890	0.84330
EESP-486	0.82403	0.00128	0.82659	-0.01890	0.84549
EESP-490	0.81964	0.00132	0.82228	-0.01890	0.84118
EESP-500	0.81651	0.00148	0.81947	-0.01890	0.83837
EESP-520	0.81448	0.00146	0.81740	-0.01890	0.83630
EESP-540	0.81374	0.00139	0.81652	-0.01890	0.83542
EESP-544	0.81182	0.00144	0.81470	-0.01890	0.83360
EESP-560	0.80986	0.00130	0.81246	-0.01890	0.83136
EESP-600	0.80198	0.00143	0.80484	-0.01890	0.82374
EESP-616	0.79233	0.00129	0.79491	-0.01890	0.81381
EESP-700	0.76305	0.00140	0.76585	-0.01890	0.78475
EESP-705	0.75989	0.00122	0.76233	-0.01890	0.78123
EESP-800	0.72616	0.00131	0.72878	-0.01890	0.74768
	8X8 Triangular Lattice			Max	0.85757
EETP-058	0.52787	0.00108	0.53003	-0.01890	0.54893
EETP-100	0.64733	0.00138	0.65009	-0.01890	0.66899
EETP-200	0.78450	0.00132	0.78714	-0.01890	0.80604
EETP-300	0.83129	0.00145	0.83419	-0.01890	0.85309
EETP-400	0.83465	0.00136	0.83737	-0.01890	0.85627
EETP-410	**0.83736**	0.00129	0.83994	-0.01890	**0.85884**
EETP-420	0.83687	0.00125	0.83937	-0.01890	0.85827
EETP-430	0.83590	0.00132	0.83854	-0.01890	0.85744
EETP-437	0.83531	0.00146	0.83823	-0.01890	0.85713
EETP-440	0.83203	0.00145	0.83493	-0.01890	0.85383
EETP-450	0.83478	0.00135	0.83748	-0.01890	0.85638
EETP-460	0.83330	0.00150	0.83630	-0.01890	0.85520
EETP-470	0.83344	0.00133	0.83610	-0.01890	0.85500
EETP-480	0.82582	0.00135	0.82852	-0.01890	0.84742
EETP-486	0.82713	0.00142	0.82997	-0.01890	0.84887
EETP-490	0.82548	0.00124	0.82796	-0.01890	0.84686
EETP-500	0.82183	0.00130	0.82443	-0.01890	0.84333
EETP-520	0.81697	0.00137	0.81971	-0.01890	0.83861
EETP-540	0.80792	0.00132	0.81056	-0.01890	0.82946
EETP-544	0.80531	0.00124	0.80779	-0.01890	0.82669
EETP-560	0.80047	0.00134	0.80315	-0.01890	0.82205

EESN-470	0.82302	0.00149	0.82600	-0.01890	0.84490
EESN-480	0.82123	0.00129	0.82381	-0.01890	0.84271
EESN-486	0.82040	0.00136	0.82312	-0.01890	0.84202
EESN-490	0.82081	0.00137	0.82355	-0.01890	0.84245
EESN-500	0.81777	0.00127	0.82031	-0.01890	0.83921
EESN-520	0.81568	0.00149	0.81866	-0.01890	0.83756
EESN-540	0.81119	0.00135	0.81389	-0.01890	0.83279
EESN-544	0.81424	0.00143	0.81710	-0.01890	0.83600
EESN-560	0.81001	0.00134	0.81269	-0.01890	0.83159
EESN-600	0.79913	0.00125	0.80163	-0.01890	0.82053
EESN-616	0.79338	0.00135	0.79608	-0.01890	0.81498
EESN-700	0.76337	0.00128	0.76593	-0.01890	0.78483
EESN-705	0.76327	0.00138	0.76603	-0.01890	0.78493
EESN-800	0.72949	0.00132	0.73213	-0.01890	0.75103
	8X8 Triangular Lattice			Max	0.85443
EETN-058	0.52529	0.00108	0.52745	-0.01890	0.54635
EETN-100	0.63944	0.00135	0.64214	-0.01890	0.66104
EETN-200	0.78020	0.00146	0.78312	-0.01890	0.80202
EETN-300	0.82881	0.00137	0.83155	-0.01890	0.85045
EETN-400	0.83382	0.00143	0.83668	-0.01890	0.85558
EETN-410	0.83306	0.00156	0.83618	-0.01890	0.85508
EETN-420	**0.83385**	0.00145	0.83675	-0.01890	**0.85565**
EETN-430	0.83229	0.00132	0.83493	-0.01890	0.85383
EETN-437	0.83367	0.00139	0.83645	-0.01890	0.85535
EETN-440	0.83144	0.00131	0.83406	-0.01890	0.85296
EETN-450	0.82992	0.00152	0.83296	-0.01890	0.85186
EETN-460	0.82918	0.00155	0.83228	-0.01890	0.85118
EETN-470	0.83033	0.00128	0.83289	-0.01890	0.85179
EETN-480	0.82429	0.00132	0.82693	-0.01890	0.84583
EETN-486	0.82494	0.00119	0.82732	-0.01890	0.84622
EETN-490	0.82204	0.00133	0.82470	-0.01890	0.84360
EETN-500	0.82005	0.00141	0.82287	-0.01890	0.84177
EETN-520	0.81552	0.00138	0.81828	-0.01890	0.83718
EETN-540	0.80707	0.00130	0.80967	-0.01890	0.82857
EETN-544	0.80605	0.00128	0.80861	-0.01890	0.82751
EETN-560	0.80121	0.00140	0.80401	-0.01890	0.82291

EETP-600	0.79255	0.00137	0.79529	-0.01890	0.81419
EETP-616	0.79213	0.00130	0.79473	-0.01890	0.81363
EETP-700	0.76687	0.00134	0.76955	-0.01890	0.78845
EETP-705	0.77086	0.00124	0.77334	-0.01890	0.79224
EETP-800	0.73683	0.00130	0.73943	-0.01890	0.75833
55 KGs Single Case without Overlap				Max	0.85884
17X17 Square Lattice				Max OL	0.87530
OSSP-058	0.53515	0.00108	0.53731	-0.01890	0.55621
OSSP-100	0.65011	0.00132	0.65275	-0.01890	0.67165
OSSP-200	0.78878	0.00132	0.79142	-0.01890	0.81032
OSSP-300	0.83274	0.00145	0.83564	-0.01890	0.85454
OSSP-400	0.84496	0.00150	0.84796	-0.01890	0.86686
OSSP-410	0.84281	0.00139	0.84559	-0.01890	0.86449
OSSP-420	0.84371	0.00146	0.84663	-0.01890	0.86553
OSSP-430	0.84609	0.00138	0.84885	-0.01890	0.86775
OSSP-437	0.84465	0.00141	0.84747	-0.01890	0.86637
OSSP-440	0.84495	0.00143	0.84781	-0.01890	0.86671
OSSP-450	0.84567	0.00143	0.84853	-0.01890	0.86743
OSSP-460	0.84576	0.00140	0.84856	-0.01890	0.86746
OSSP-470	0.84653	0.00140	0.84933	-0.01890	0.86823
OSSP-480	**0.84764**	0.00128	0.85020	-0.01890	**0.86910**
OSSP-486	0.83826	0.00151	0.84128	-0.01890	0.86018
OSSP-490	0.83677	0.00129	0.83935	-0.01890	0.85825
OSSP-500	0.82953	0.00145	0.83243	-0.01890	0.85133
OSSP-520	0.82988	0.00134	0.83256	-0.01890	0.85146
OSSP-540	0.83196	0.00136	0.83468	-0.01890	0.85358
OSSP-544	0.83125	0.00144	0.83413	-0.01890	0.85303
OSSP-560	0.82024	0.00128	0.82280	-0.01890	0.84170
OSSP-600	0.81096	0.00136	0.81368	-0.01890	0.83258
OSSP-616	0.80437	0.00144	0.80725	-0.01890	0.82615
OSSP-700	0.79053	0.00134	0.79321	-0.01890	0.81211
OSSP-705	0.79133	0.00127	0.79387	-0.01890	0.81277
OSSP-800	0.77210	0.00132	0.77474	-0.01890	0.79364
17X17 Triangular Lattice				Max	0.86910
OSTP-058	0.53860	0.00128	0.54116	-0.01890	0.56006
OSTP-100	0.64567	0.00143	0.64853	-0.01890	0.66743

EETN-600	0.79279	0.00145	0.79569	-0.01890	0.81459
EETN-616	0.79067	0.00124	0.79315	-0.01890	0.81205
EETN-700	0.76947	0.00135	0.77217	-0.01890	0.79107
EETN-705	0.76714	0.00128	0.76970	-0.01890	0.78860
EETN-800	0.73784	0.00137	0.74058	-0.01890	0.75948
53 KGs Single Case without Overlap				Max	0.85565
17X17 Square Lattice				Max OL	0.87155
OSSN-058	0.52711	0.00107	0.52925	-0.01890	0.54815
OSSN-100	0.64479	0.00131	0.64741	-0.01890	0.66631
OSSN-200	0.77802	0.00144	0.78090	-0.01890	0.79980
OSSN-300	0.82923	0.00127	0.83177	-0.01890	0.85067
OSSN-400	0.84043	0.00157	0.84357	-0.01890	0.86247
OSSN-410	0.84186	0.00142	0.84470	-0.01890	0.86360
OSSN-420	0.84010	0.00136	0.84282	-0.01890	0.86172
OSSN-430	0.84396	0.00135	0.84666	-0.01890	0.86556
OSSN-437	0.84196	0.00141	0.84478	-0.01890	0.86368
OSSN-440	0.84128	0.00145	0.84418	-0.01890	0.86308
OSSN-450	0.84223	0.00144	0.84511	-0.01890	0.86401
OSSN-460	0.84360	0.00155	0.84670	-0.01890	0.86560
OSSN-470	0.84331	0.00137	0.84605	-0.01890	0.86495
OSSN-480	**0.84512**	0.00143	0.84798	-0.01890	**0.86688**
OSSN-486	0.83889	0.00137	0.84163	-0.01890	0.86053
OSSN-490	0.83930	0.00147	0.84224	-0.01890	0.86114
OSSN-500	0.82964	0.00141	0.83246	-0.01890	0.85136
OSSN-520	0.82926	0.00133	0.83192	-0.01890	0.85082
OSSN-540	0.82872	0.00142	0.83156	-0.01890	0.85046
OSSN-544	0.83272	0.00127	0.83526	-0.01890	0.85416
OSSN-560	0.81960	0.00142	0.82244	-0.01890	0.84134
OSSN-600	0.81345	0.00134	0.81613	-0.01890	0.83503
OSSN-616	0.80435	0.00125	0.80685	-0.01890	0.82575
OSSN-700	0.79297	0.00151	0.79599	-0.01890	0.81489
OSSN-705	0.79059	0.00129	0.79317	-0.01890	0.81207
OSSN-800	0.77256	0.00132	0.77520	-0.01890	0.79410
17X17 Triangular Lattice				Max	0.86688
OSTN-058	0.52932	0.00123	0.53178	-0.01890	0.55068
OSTN-100	0.64044	0.00132	0.64308	-0.01890	0.66198

OSTP-200	0.78434	0.00133	0.78700	-0.01890	0.80590	OSTN-200	0.78565	0.00134	0.78833	-0.01890	0.80723
OSTP-300	0.83433	0.00151	0.83735	-0.01890	0.85625	OSTN-300	0.83332	0.00149	0.83630	-0.01890	0.85520
OSTP-400	0.84762	0.00137	0.85036	-0.01890	0.86926	OSTN-400	0.84576	0.00139	0.84854	-0.01890	0.86744
OSTP-410	**0.85091**	0.00139	0.85369	-0.01890	**0.87259**	OSTN-410	0.84693	0.00151	0.84995	-0.01890	0.86885
OSTP-420	0.84919	0.00132	0.85183	-0.01890	0.87073	OSTN-420	0.84833	0.00157	0.85147	-0.01890	**0.87037**
OSTP-430	0.84915	0.00139	0.85193	-0.01890	0.87083	OSTN-430	**0.84845**	0.00139	0.85123	-0.01890	0.87013
OSTP-437	0.84993	0.00119	0.85231	-0.01890	0.87121	OSTN-437	0.84211	0.00139	0.84489	-0.01890	0.86379
OSTP-440	0.84432	0.00137	0.84706	-0.01890	0.86596	OSTN-440	0.84253	0.00140	0.84533	-0.01890	0.86423
OSTP-450	0.84720	0.00135	0.84990	-0.01890	0.86880	OSTN-450	0.84322	0.00156	0.84634	-0.01890	0.86524
OSTP-460	0.84623	0.00145	0.84913	-0.01890	0.86803	OSTN-460	0.84425	0.00134	0.84693	-0.01890	0.86583
OSTP-470	0.83697	0.00139	0.83975	-0.01890	0.85865	OSTN-470	0.83381	0.00140	0.83661	-0.01890	0.85551
OSTP-480	0.82826	0.00139	0.83104	-0.01890	0.84994	OSTN-480	0.82804	0.00145	0.83094	-0.01890	0.84984
OSTP-486	0.83146	0.00154	0.83454	-0.01890	0.85344	OSTN-486	0.82880	0.00130	0.83140	-0.01890	0.85030
OSTP-490	0.83007	0.00153	0.83313	-0.01890	0.85203	OSTN-490	0.82990	0.00144	0.83278	-0.01890	0.85168
OSTP-500	0.83165	0.00132	0.83429	-0.01890	0.85319	OSTN-500	0.82960	0.00136	0.83232	-0.01890	0.85122
OSTP-520	0.82761	0.00130	0.83021	-0.01890	0.84911	OSTN-520	0.83331	0.00149	0.83629	-0.01890	0.85519
OSTP-540	0.83301	0.00132	0.83565	-0.01890	0.85455	OSTN-540	0.82895	0.00125	0.83145	-0.01890	0.85035
OSTP-544	0.82886	0.00130	0.83146	-0.01890	0.85036	OSTN-544	0.83203	0.00143	0.83489	-0.01890	0.85379
OSTP-560	0.83002	0.00136	0.83274	-0.01890	0.85164	OSTN-560	0.83049	0.00146	0.83341	-0.01890	0.85231
OSTP-600	0.81210	0.00131	0.81472	-0.01890	0.83362	OSTN-600	0.81570	0.00135	0.81840	-0.01890	0.83730
OSTP-616	0.81153	0.00135	0.81423	-0.01890	0.83313	OSTN-616	0.81178	0.00131	0.81440	-0.01890	0.83330
OSTP-700	0.78252	0.00139	0.78530	-0.01890	0.80420	OSTN-700	0.78255	0.00132	0.78519	-0.01890	0.80409
OSTP-705	0.78334	0.00133	0.78600	-0.01890	0.80490	OSTN-705	0.78318	0.00128	0.78574	-0.01890	0.80464
OSTP-800	0.76745	0.00137	0.77019	-0.01890	0.78909	OSTN-800	0.77037	0.00134	0.77305	-0.01890	0.79195
	10X10 Square Lattice			Max	0.87259		10X10 Square Lattice			Max	0.87037
OTSP-058	0.54154	0.00127	0.54408	-0.01890	0.56298	OTSN-058	0.53788	0.00106	0.54000	-0.01890	0.55890
OTSP-100	0.64851	0.00126	0.65103	-0.01890	0.66993	OTSN-100	0.64278	0.00132	0.64542	-0.01890	0.66432
OTSP-200	0.78707	0.00150	0.79007	-0.01890	0.80897	OTSN-200	0.78225	0.00148	0.78521	-0.01890	0.80411
OTSP-300	0.83337	0.00146	0.83629	-0.01890	0.85519	OTSN-300	0.82890	0.00141	0.83172	-0.01890	0.85062
OTSP-400	0.84047	0.00138	0.84323	-0.01890	0.86213	OTSN-400	0.83598	0.00148	0.83894	-0.01890	0.85784
OTSP-410	0.83605	0.00139	0.83883	-0.01890	0.85773	OTSN-410	0.83195	0.00132	0.83459	-0.01890	0.85349
OTSP-420	0.83604	0.00134	0.83872	-0.01890	0.85762	OTSN-420	0.83583	0.00138	0.83859	-0.01890	0.85749
OTSP-430	0.83968	0.00133	0.84234	-0.01890	0.86124	OTSN-430	0.83399	0.00146	0.83691	-0.01890	0.85581
OTSP-437	**0.84222**	0.00134	0.84490	-0.01890	**0.86380**	OTSN-437	**0.83676**	0.00140	0.83956	-0.01890	**0.85846**
OTSP-440	0.83062	0.00151	0.83364	-0.01890	0.85254	OTSN-440	0.83069	0.00125	0.83319	-0.01890	0.85209
OTSP-450	0.83386	0.00143	0.83672	-0.01890	0.85562	OTSN-450	0.83339	0.00147	0.83633	-0.01890	0.85523

OTSP-460	0.83026	0.00148	0.83322	-0.01890	0.85212
OTSP-470	0.83518	0.00136	0.83790	-0.01890	0.85680
OTSP-480	0.82839	0.00145	0.83129	-0.01890	0.85019
OTSP-486	0.82907	0.00135	0.83177	-0.01890	0.85067
OTSP-490	0.82894	0.00133	0.83160	-0.01890	0.85050
OTSP-500	0.82901	0.00132	0.83165	-0.01890	0.85055
OTSP-520	0.82854	0.00127	0.83108	-0.01890	0.84998
OTSP-540	0.81462	0.00135	0.81732	-0.01890	0.83622
OTSP-544	0.81505	0.00138	0.81781	-0.01890	0.83671
OTSP-560	0.81416	0.00146	0.81708	-0.01890	0.83598
OTSP-600	0.80999	0.00132	0.81263	-0.01890	0.83153
OTSP-616	0.79433	0.00139	0.79711	-0.01890	0.81601
OTSP-700	0.76982	0.00132	0.77246	-0.01890	0.79136
OTSP-705	0.76972	0.00122	0.77216	-0.01890	0.79106
OTSP-800	0.75841	0.00123	0.76087	-0.01890	0.77977
	10X10 Triangular Lattice			Max	0.86380
OTTP-058	0.53656	0.00123	0.53902	-0.01890	0.55792
OTTP-100	0.64808	0.00137	0.65082	-0.01890	0.66972
OTTP-200	0.78678	0.00135	0.78948	-0.01890	0.80838
OTTP-300	0.83392	0.00157	0.83706	-0.01890	0.85596
OTTP-400	0.84635	0.00136	0.84907	-0.01890	0.86797
OTTP-410	**0.84648**	0.00142	0.84932	-0.01890	**0.86822**
OTTP-420	0.84041	0.00152	0.84345	-0.01890	0.86235
OTTP-430	0.83933	0.00131	0.84195	-0.01890	0.86085
OTTP-437	0.84099	0.00147	0.84393	-0.01890	0.86283
OTTP-440	0.84404	0.00144	0.84692	-0.01890	0.86582
OTTP-450	0.84402	0.00143	0.84688	-0.01890	0.86578
OTTP-460	0.84209	0.00136	0.84481	-0.01890	0.86371
OTTP-470	0.82837	0.00145	0.83127	-0.01890	0.85017
OTTP-480	0.82542	0.00151	0.82844	-0.01890	0.84734
OTTP-486	0.82686	0.00134	0.82954	-0.01890	0.84844
OTTP-490	0.81763	0.00133	0.82029	-0.01890	0.83919
OTTP-500	0.81509	0.00140	0.81789	-0.01890	0.83679
OTTP-520	0.81784	0.00131	0.82046	-0.01890	0.83936
OTTP-540	0.80957	0.00137	0.81231	-0.01890	0.83121
OTTP-544	0.81120	0.00128	0.81376	-0.01890	0.83266

OTSN-460	0.83406	0.00137	0.83680	-0.01890	0.85570
OTSN-470	0.83486	0.00130	0.83746	-0.01890	0.85636
OTSN-480	0.82811	0.00143	0.83097	-0.01890	0.84987
OTSN-486	0.82975	0.00140	0.83255	-0.01890	0.85145
OTSN-490	0.82703	0.00140	0.82983	-0.01890	0.84873
OTSN-500	0.83070	0.00148	0.83366	-0.01890	0.85256
OTSN-520	0.82515	0.00135	0.82785	-0.01890	0.84675
OTSN-540	0.81597	0.00122	0.81841	-0.01890	0.83731
OTSN-544	0.81872	0.00138	0.82148	-0.01890	0.84038
OTSN-560	0.81418	0.00137	0.81692	-0.01890	0.83582
OTSN-600	0.81147	0.00133	0.81413	-0.01890	0.83303
OTSN-616	0.79280	0.00137	0.79554	-0.01890	0.81444
OTSN-700	0.77119	0.00129	0.77377	-0.01890	0.79267
OTSN-705	0.76692	0.00129	0.76950	-0.01890	0.78840
OTSN-800	0.75958	0.00129	0.76216	-0.01890	0.78106
	10X10 Triangular Lattice			Max	0.85846
OTTN-058	0.53183	0.00123	0.53429	-0.01890	0.55319
OTTN-100	0.64333	0.00144	0.64621	-0.01890	0.66511
OTTN-200	0.78362	0.00147	0.78656	-0.01890	0.80546
OTTN-300	0.82879	0.00133	0.83145	-0.01890	0.85035
OTTN-400	0.84044	0.00137	0.84318	-0.01890	0.86208
OTTN-410	**0.84175**	0.00138	0.84451	-0.01890	**0.86341**
OTTN-420	0.84068	0.00136	0.84340	-0.01890	0.86230
OTTN-430	0.83812	0.00157	0.84126	-0.01890	0.86016
OTTN-437	0.83787	0.00138	0.84063	-0.01890	0.85953
OTTN-440	0.83866	0.00131	0.84128	-0.01890	0.86018
OTTN-450	0.83773	0.00129	0.84031	-0.01890	0.85921
OTTN-460	0.83957	0.00129	0.84215	-0.01890	0.86105
OTTN-470	0.82576	0.00150	0.82876	-0.01890	0.84766
OTTN-480	0.82932	0.00139	0.83210	-0.01890	0.85100
OTTN-486	0.82669	0.00139	0.82947	-0.01890	0.84837
OTTN-490	0.81605	0.00145	0.81895	-0.01890	0.83785
OTTN-500	0.81493	0.00129	0.81751	-0.01890	0.83641
OTTN-520	0.81735	0.00136	0.82007	-0.01890	0.83897
OTTN-540	0.80784	0.00145	0.81074	-0.01890	0.82964
OTTN-544	0.80830	0.00137	0.81104	-0.01890	0.82994

OTTP-560	0.80972	0.00134	0.81240	-0.01890	0.83130
OTTP-600	0.80708	0.00128	0.80964	-0.01890	0.82854
OTTP-616	0.80752	0.00129	0.81010	-0.01890	0.82900
OTTP-700	0.77640	0.00127	0.77894	-0.01890	0.79784
OTTP-705	0.77849	0.00133	0.78115	-0.01890	0.80005
OTTP-800	0.74412	0.00122	0.74656	-0.01890	0.76546
9X9 Square Lattice				Max	0.86822
ONSP-058	0.54446	0.00108	0.54662	-0.01890	0.56552
ONSP-100	0.65495	0.00141	0.65777	-0.01890	0.67667
ONSP-200	0.78438	0.00134	0.78706	-0.01890	0.80596
ONSP-300	0.82896	0.00142	0.83180	-0.01890	0.85070
ONSP-400	**0.84056**	0.00142	0.84340	-0.01890	**0.86230**
ONSP-410	0.83671	0.00134	0.83939	-0.01890	0.85829
ONSP-420	0.83587	0.00148	0.83883	-0.01890	0.85773
ONSP-430	0.83161	0.00142	0.83445	-0.01890	0.85335
ONSP-437	0.83239	0.00145	0.83529	-0.01890	0.85419
ONSP-440	0.83258	0.00150	0.83558	-0.01890	0.85448
ONSP-450	0.83575	0.00147	0.83869	-0.01890	0.85759
ONSP-460	0.83326	0.00132	0.83590	-0.01890	0.85480
ONSP-470	0.83469	0.00140	0.83749	-0.01890	0.85639
ONSP-480	0.82939	0.00132	0.83203	-0.01890	0.85093
ONSP-486	0.83287	0.00135	0.83557	-0.01890	0.85447
ONSP-490	0.81823	0.00141	0.82105	-0.01890	0.83995
ONSP-500	0.81756	0.00131	0.82018	-0.01890	0.83908
ONSP-520	0.79440	0.00134	0.79708	-0.01890	0.81598
ONSP-540	0.79535	0.00142	0.79819	-0.01890	0.81709
ONSP-544	0.79540	0.00155	0.79850	-0.01890	0.81740
ONSP-560	0.79513	0.00132	0.79777	-0.01890	0.81667
ONSP-600	0.79101	0.00136	0.79373	-0.01890	0.81263
ONSP-616	0.79665	0.00132	0.79929	-0.01890	0.81819
ONSP-700	0.76429	0.00133	0.76695	-0.01890	0.78585
ONSP-705	0.76545	0.00127	0.76799	-0.01890	0.78689
ONSP-800	0.72250	0.00121	0.72492	-0.01890	0.74382
9X9 Triangular Lattice				Max	0.86230
ONTP-058	0.54377	0.00111	0.54599	-0.01890	0.56489
ONTP-100	0.65148	0.00143	0.65434	-0.01890	0.67324

OTTN-560	0.80824	0.00141	0.81106	-0.01890	0.82996
OTTN-600	0.80814	0.00132	0.81078	-0.01890	0.82968
OTTN-616	0.80894	0.00142	0.81178	-0.01890	0.83068
OTTN-700	0.77613	0.00118	0.77849	-0.01890	0.79739
OTTN-705	0.77715	0.00118	0.77951	-0.01890	0.79841
OTTN-800	0.74239	0.00132	0.74503	-0.01890	0.76393
9X9 Square Lattice				Max	0.86341
ONSN-058	0.53964	0.00127	0.54218	-0.01890	0.56108
ONSN-100	0.64716	0.00118	0.64952	-0.01890	0.66842
ONSN-200	0.78282	0.00137	0.78556	-0.01890	0.80446
ONSN-300	0.82805	0.00144	0.83093	-0.01890	0.84983
ONSN-400	0.83404	0.00140	0.83684	-0.01890	0.85574
ONSN-410	**0.83529**	0.00149	0.83827	-0.01890	**0.85717**
ONSN-420	0.83518	0.00134	0.83786	-0.01890	0.85676
ONSN-430	0.82877	0.00137	0.83151	-0.01890	0.85041
ONSN-437	0.82991	0.00142	0.83275	-0.01890	0.85165
ONSN-440	0.82864	0.00139	0.83142	-0.01890	0.85032
ONSN-450	0.83110	0.00127	0.83364	-0.01890	0.85254
ONSN-460	0.83058	0.00131	0.83320	-0.01890	0.85210
ONSN-470	0.83036	0.00140	0.83316	-0.01890	0.85206
ONSN-480	0.82894	0.00147	0.83188	-0.01890	0.85078
ONSN-486	0.83093	0.00134	0.83361	-0.01890	0.85251
ONSN-490	0.81702	0.00132	0.81966	-0.01890	0.83856
ONSN-500	0.81915	0.00138	0.82191	-0.01890	0.84081
ONSN-520	0.79414	0.00132	0.79678	-0.01890	0.81568
ONSN-540	0.79598	0.00137	0.79872	-0.01890	0.81762
ONSN-544	0.79399	0.00146	0.79691	-0.01890	0.81581
ONSN-560	0.79666	0.00136	0.79938	-0.01890	0.81828
ONSN-600	0.79412	0.00134	0.79680	-0.01890	0.81570
ONSN-616	0.79394	0.00147	0.79688	-0.01890	0.81578
ONSN-700	0.76529	0.00129	0.76787	-0.01890	0.78677
ONSN-705	0.76516	0.00119	0.76754	-0.01890	0.78644
ONSN-800	0.72234	0.00128	0.72490	-0.01890	0.74380
9X9 Triangular Lattice				Max	0.85717
ONTN-058	0.53694	0.00115	0.53924	-0.01890	0.55814
ONTN-100	0.64687	0.00142	0.64971	-0.01890	0.66861

ONTP-200	0.78631	0.00141	0.78913	-0.01890	0.80803
ONTP-300	0.83351	0.00138	0.83627	-0.01890	0.85517
ONTP-400	0.83025	0.00143	0.83311	-0.01890	0.85201
ONTP-410	0.83204	0.00144	0.83492	-0.01890	0.85382
ONTP-420	0.83283	0.00139	0.83561	-0.01890	0.85451
ONTP-430	0.82749	0.00143	0.83035	-0.01890	0.84925
ONTP-437	0.82614	0.00135	0.82884	-0.01890	0.84774
ONTP-440	0.82835	0.00150	0.83135	-0.01890	0.85025
ONTP-450	0.83133	0.00141	0.83415	-0.01890	0.85305
ONTP-460	0.82875	0.00126	0.83127	-0.01890	0.85017
ONTP-470	**0.83397**	0.00136	0.83669	-0.01890	**0.85559**
ONTP-480	0.83189	0.00153	0.83495	-0.01890	0.85385
ONTP-486	0.82989	0.00130	0.83249	-0.01890	0.85139
ONTP-490	0.83001	0.00138	0.83277	-0.01890	0.85167
ONTP-500	0.83177	0.00153	0.83483	-0.01890	0.85373
ONTP-520	0.82703	0.00142	0.82987	-0.01890	0.84877
ONTP-540	0.80202	0.00129	0.80460	-0.01890	0.82350
ONTP-544	0.80245	0.00142	0.80529	-0.01890	0.82419
ONTP-560	0.80282	0.00133	0.80548	-0.01890	0.82438
ONTP-600	0.77571	0.00130	0.77831	-0.01890	0.79721
ONTP-616	0.77411	0.00136	0.77683	-0.01890	0.79573
ONTP-700	0.76585	0.00129	0.76843	-0.01890	0.78733
ONTP-705	0.76715	0.00133	0.76981	-0.01890	0.78871
ONTP-800	0.74149	0.00133	0.74415	-0.01890	0.76305
8X8 Square Lattice				Max	0.85559
OESP-058	0.54631	0.00113	0.54857	-0.01890	0.56747
OESP-100	0.65750	0.00130	0.66010	-0.01890	0.67900
OESP-200	0.78835	0.00145	0.79125	-0.01890	0.81015
OESP-300	0.82644	0.00143	0.82930	-0.01890	0.84820
OESP-400	**0.82941**	0.00140	0.83221	-0.01890	**0.85111**
OESP-410	0.81282	0.00140	0.81562	-0.01890	0.83452
OESP-420	0.81236	0.00147	0.81530	-0.01890	0.83420
OESP-430	0.81426	0.00134	0.81694	-0.01890	0.83584
OESP-437	0.81518	0.00138	0.81794	-0.01890	0.83684
OESP-440	0.81183	0.00144	0.81471	-0.01890	0.83361
OESP-450	0.81511	0.00142	0.81795	-0.01890	0.83685

ONTN-200	0.78202	0.00135	0.78472	-0.01890	0.80362
ONTN-300	0.82806	0.00141	0.83088	-0.01890	0.84978
ONTN-400	0.82584	0.00134	0.82852	-0.01890	0.84742
ONTN-410	0.83120	0.00141	0.83402	-0.01890	0.85292
ONTN-420	0.83061	0.00136	0.83333	-0.01890	0.85223
ONTN-430	0.82506	0.00133	0.82772	-0.01890	0.84662
ONTN-437	0.82748	0.00134	0.83016	-0.01890	0.84906
ONTN-440	0.82799	0.00146	0.83091	-0.01890	0.84981
ONTN-450	0.82909	0.00138	0.83185	-0.01890	0.85075
ONTN-460	**0.83184**	0.00133	0.83450	-0.01890	**0.85340**
ONTN-470	0.83073	0.00147	0.83367	-0.01890	0.85257
ONTN-480	0.83058	0.00141	0.83340	-0.01890	0.85230
ONTN-486	0.82795	0.00131	0.83057	-0.01890	0.84947
ONTN-490	0.83021	0.00143	0.83307	-0.01890	0.85197
ONTN-500	0.82966	0.00134	0.83234	-0.01890	0.85124
ONTN-520	0.82792	0.00128	0.83048	-0.01890	0.84938
ONTN-540	0.80326	0.00127	0.80580	-0.01890	0.82470
ONTN-544	0.80602	0.00144	0.80890	-0.01890	0.82780
ONTN-560	0.80470	0.00132	0.80734	-0.01890	0.82624
ONTN-600	0.77310	0.00140	0.77590	-0.01890	0.79480
ONTN-616	0.77387	0.00138	0.77663	-0.01890	0.79553
ONTN-700	0.76902	0.00144	0.77190	-0.01890	0.79080
ONTN-705	0.76956	0.00126	0.77208	-0.01890	0.79098
ONTN-800	0.74193	0.00123	0.74439	-0.01890	0.76329
8X8 Square Lattice				Max	0.85340
OESN-058	0.54335	0.00113	0.54561	-0.01890	0.56451
OESN-100	0.65199	0.00141	0.65481	-0.01890	0.67371
OESN-200	0.78414	0.00132	0.78678	-0.01890	0.80568
OESN-300	0.82164	0.00148	0.82460	-0.01890	0.84350
OESN-400	**0.82773**	0.00153	0.83079	-0.01890	**0.84969**
OESN-410	0.81042	0.00146	0.81334	-0.01890	0.83224
OESN-420	0.81377	0.00150	0.81677	-0.01890	0.83567
OESN-430	0.81388	0.00139	0.81666	-0.01890	0.83556
OESN-437	0.81509	0.00144	0.81797	-0.01890	0.83687
OESN-440	0.81496	0.00142	0.81780	-0.01890	0.83670
OESN-450	0.81605	0.00152	0.81909	-0.01890	0.83799

OESP-460	0.82112	0.00128	0.82368	-0.01890	0.84258
OESP-470	0.81909	0.00138	0.82185	-0.01890	0.84075
OESP-480	0.81856	0.00127	0.82110	-0.01890	0.84000
OESP-486	0.81948	0.00136	0.82220	-0.01890	0.84110
OESP-490	0.81578	0.00137	0.81852	-0.01890	0.83742
OESP-500	0.81746	0.00135	0.82016	-0.01890	0.83906
OESP-520	0.81736	0.00132	0.82000	-0.01890	0.83890
OESP-540	0.79534	0.00129	0.79792	-0.01890	0.81682
OESP-544	0.79704	0.00140	0.79984	-0.01890	0.81874
OESP-560	0.79554	0.00133	0.79820	-0.01890	0.81710
OESP-600	0.79103	0.00130	0.79363	-0.01890	0.81253
OESP-616	0.77768	0.00127	0.78022	-0.01890	0.79912
OESP-700	0.73721	0.00131	0.73983	-0.01890	0.75873
OESP-705	0.73963	0.00127	0.74217	-0.01890	0.76107
OESP-800	0.72681	0.00122	0.72925	-0.01890	0.74815
	8X8 Triangular Lattice			Max	0.85111
OETP-058	0.54106	0.00112	0.54330	-0.01890	0.56220
OETP-100	0.65342	0.00132	0.65606	-0.01890	0.67496
OETP-200	0.78711	0.00145	0.79001	-0.01890	0.80891
OETP-300	0.82746	0.00140	0.83026	-0.01890	0.84916
OETP-400	0.83788	0.00143	0.84074	-0.01890	0.85964
OETP-410	0.83776	0.00146	0.84068	-0.01890	0.85958
OETP-420	**0.83805**	0.00148	0.84101	-0.01890	**0.85991**
OETP-430	0.82374	0.00153	0.82680	-0.01890	0.84570
OETP-437	0.82580	0.00139	0.82858	-0.01890	0.84748
OETP-440	0.82161	0.00136	0.82433	-0.01890	0.84323
OETP-450	0.82303	0.00132	0.82567	-0.01890	0.84457
OETP-460	0.82364	0.00150	0.82664	-0.01890	0.84554
OETP-470	0.82167	0.00138	0.82443	-0.01890	0.84333
OETP-480	0.79395	0.00139	0.79673	-0.01890	0.81563
OETP-486	0.79467	0.00146	0.79759	-0.01890	0.81649
OETP-490	0.79788	0.00134	0.80056	-0.01890	0.81946
OETP-500	0.79739	0.00147	0.80033	-0.01890	0.81923
OETP-520	0.79475	0.00139	0.79753	-0.01890	0.81643
OETP-540	0.79869	0.00145	0.80159	-0.01890	0.82049
OETP-544	0.79722	0.00143	0.80008	-0.01890	0.81898

OESN-460	0.81443	0.00143	0.81729	-0.01890	0.83619
OESN-470	0.81712	0.00140	0.81992	-0.01890	0.83882
OESN-480	0.81783	0.00129	0.82041	-0.01890	0.83931
OESN-486	0.81711	0.00144	0.81999	-0.01890	0.83889
OESN-490	0.81727	0.00146	0.82019	-0.01890	0.83909
OESN-500	0.81515	0.00141	0.81797	-0.01890	0.83687
OESN-520	0.81692	0.00132	0.81956	-0.01890	0.83846
OESN-540	0.79642	0.00132	0.79906	-0.01890	0.81796
OESN-544	0.79528	0.00140	0.79808	-0.01890	0.81698
OESN-560	0.79580	0.00129	0.79838	-0.01890	0.81728
OESN-600	0.79091	0.00120	0.79331	-0.01890	0.81221
OESN-616	0.77779	0.00126	0.78031	-0.01890	0.79921
OESN-700	0.73684	0.00122	0.73928	-0.01890	0.75818
OESN-705	0.73610	0.00130	0.73870	-0.01890	0.75760
OESN-800	0.72573	0.00134	0.72841	-0.01890	0.74731
	8X8 Triangular Lattice			Max	0.84969
OETN-058	0.53595	0.00116	0.53827	-0.01890	0.55717
OETN-100	0.65067	0.00136	0.65339	-0.01890	0.67229
OETN-200	0.78345	0.00143	0.78631	-0.01890	0.80521
OETN-300	0.82001	0.00156	0.82313	-0.01890	0.84203
OETN-400	0.83129	0.00128	0.83385	-0.01890	0.85275
OETN-410	0.83204	0.00133	0.83470	-0.01890	0.85360
OETN-420	**0.83446**	0.00147	0.83740	-0.01890	**0.85630**
OETN-430	0.82317	0.00139	0.82595	-0.01890	0.84485
OETN-437	0.82214	0.00123	0.82460	-0.01890	0.84350
OETN-440	0.82184	0.00136	0.82456	-0.01890	0.84346
OETN-450	0.82284	0.00136	0.82556	-0.01890	0.84446
OETN-460	0.82198	0.00143	0.82484	-0.01890	0.84374
OETN-470	0.82130	0.00138	0.82406	-0.01890	0.84296
OETN-480	0.79529	0.00145	0.79819	-0.01890	0.81709
OETN-486	0.79638	0.00134	0.79906	-0.01890	0.81796
OETN-490	0.79513	0.00139	0.79791	-0.01890	0.81681
OETN-500	0.79668	0.00131	0.79930	-0.01890	0.81820
OETN-520	0.79555	0.00140	0.79835	-0.01890	0.81725
OETN-540	0.79636	0.00138	0.79912	-0.01890	0.81802
OETN-544	0.80053	0.00133	0.80319	-0.01890	0.82209

OETP-560	0.79583	0.00134	0.79851	-0.01890	0.81741
OETP-600	0.77813	0.00133	0.78079	-0.01890	0.79969
OETP-616	0.77734	0.00140	0.78014	-0.01890	0.79904
OETP-700	0.76551	0.00127	0.76805	-0.01890	0.78695
OETP-705	0.76599	0.00124	0.76847	-0.01890	0.78737
OETP-800	0.71518	0.00136	0.71790	-0.01890	0.73680
55 KGs Single Case with VFO				Max	0.85991
17X17 Square Lattice				Max NO	0.87259
VSSP-058	0.52672	0.00116	0.52904	-0.01890	0.54794
VSSP-100	0.64202	0.00131	0.64464	-0.01890	0.66354
VSSP-200	0.78343	0.00144	0.78631	-0.01890	0.80521
VSSP-300	0.83596	0.00146	0.83888	-0.01890	0.85778
VSSP-400	0.85223	0.00144	0.85511	-0.01890	**0.87401**
VSSP-410	**0.85243**	0.00132	0.85507	-0.01890	0.87397
VSSP-420	0.84854	0.00131	0.85116	-0.01890	0.87006
VSSP-430	0.84985	0.00136	0.85257	-0.01890	0.87147
VSSP-437	0.84658	0.00134	0.84926	-0.01890	0.86816
VSSP-440	0.84599	0.00140	0.84879	-0.01890	0.86769
VSSP-450	0.84958	0.00134	0.85226	-0.01890	0.87116
VSSP-460	0.84732	0.00135	0.85002	-0.01890	0.86892
VSSP-470	0.84780	0.00138	0.85056	-0.01890	0.86946
VSSP-480	0.84688	0.00131	0.84950	-0.01890	0.86840
VSSP-486	0.84700	0.00142	0.84984	-0.01890	0.86874
VSSP-490	0.84380	0.00135	0.84650	-0.01890	0.86540
VSSP-500	0.84494	0.00132	0.84758	-0.01890	0.86648
VSSP-520	0.83942	0.00136	0.84214	-0.01890	0.86104
VSSP-540	0.83877	0.00120	0.84117	-0.01890	0.86007
VSSP-544	0.83499	0.00128	0.83755	-0.01890	0.85645
VSSP-560	0.82968	0.00133	0.83234	-0.01890	0.85124
VSSP-600	0.82174	0.00135	0.82444	-0.01890	0.84334
VSSP-616	0.81714	0.00134	0.81982	-0.01890	0.83872
VSSP-700	0.79610	0.00118	0.79846	-0.01890	0.81736
VSSP-705	0.79612	0.00143	0.79898	-0.01890	0.81788
VSSP-800	0.76746	0.00132	0.77010	-0.01890	0.78900
17X17 Triangular Lattice				Max	0.87401
VSTP-058	0.52423	0.00101	0.52625	-0.01890	0.54515

OETN-560	0.79630	0.00136	0.79902	-0.01890	0.81792
OETN-600	0.77520	0.00130	0.77780	-0.01890	0.79670
OETN-616	0.77838	0.00126	0.78090	-0.01890	0.79980
OETN-700	0.76568	0.00128	0.76824	-0.01890	0.78714
OETN-705	0.76840	0.00126	0.77092	-0.01890	0.78982
OETN-800	0.71715	0.00134	0.71983	-0.01890	0.73873
53 KGs Single Case with VFO				Max	0.85630
17X17 Square Lattice				Max NO	0.87037
VSSN-058	0.51939	0.00114	0.52167	-0.01890	0.54057
VSSN-100	0.63311	0.00130	0.63571	-0.01890	0.65461
VSSN-200	0.77990	0.00145	0.78280	-0.01890	0.80170
VSSN-300	0.83342	0.00148	0.83638	-0.01890	0.85528
VSSN-400	0.84788	0.00151	0.85090	-0.01890	**0.86980**
VSSN-410	**0.84811**	0.00135	0.85081	-0.01890	0.86971
VSSN-420	0.84537	0.00142	0.84821	-0.01890	0.86711
VSSN-430	0.84661	0.00143	0.84947	-0.01890	0.86837
VSSN-437	0.84625	0.00138	0.84901	-0.01890	0.86791
VSSN-440	0.84786	0.00135	0.85056	-0.01890	0.86946
VSSN-450	0.84536	0.00135	0.84806	-0.01890	0.86696
VSSN-460	0.84324	0.00142	0.84608	-0.01890	0.86498
VSSN-470	0.84565	0.00153	0.84871	-0.01890	0.86761
VSSN-480	0.84421	0.00134	0.84689	-0.01890	0.86579
VSSN-486	0.84053	0.00140	0.84333	-0.01890	0.86223
VSSN-490	0.84118	0.00137	0.84392	-0.01890	0.86282
VSSN-500	0.84007	0.00132	0.84271	-0.01890	0.86161
VSSN-520	0.83899	0.00131	0.84161	-0.01890	0.86051
VSSN-540	0.83520	0.00135	0.83790	-0.01890	0.85680
VSSN-544	0.83150	0.00137	0.83424	-0.01890	0.85314
VSSN-560	0.82943	0.00130	0.83203	-0.01890	0.85093
VSSN-600	0.82084	0.00125	0.82334	-0.01890	0.84224
VSSN-616	0.81484	0.00143	0.81770	-0.01890	0.83660
VSSN-700	0.79417	0.00126	0.79669	-0.01890	0.81559
VSSN-705	0.79012	0.00138	0.79288	-0.01890	0.81178
VSSN-800	0.76944	0.00133	0.77210	-0.01890	0.79100
17X17 Triangular Lattice				Max	0.86980
VSTN-058	0.51790	0.00119	0.52028	-0.01890	0.53918

VSTP-100	0.64086	0.00128	0.64342	-0.01890	0.66232
VSTP-200	0.78681	0.00143	0.78967	-0.01890	0.80857
VSTP-300	0.84006	0.00135	0.84276	-0.01890	0.86166
VSTP-400	0.85158	0.00141	0.85440	-0.01890	0.87330
VSTP-410	0.84982	0.00153	0.85288	-0.01890	0.87178
VSTP-420	**0.85253**	0.00136	0.85525	-0.01890	0.87415
VSTP-430	0.85012	0.00163	0.85338	-0.01890	0.87228
VSTP-437	0.84776	0.00151	0.85078	-0.01890	0.86968
VSTP-440	0.84959	0.00146	0.85251	-0.01890	0.87141
VSTP-450	0.84892	0.00129	0.85150	-0.01890	0.87040
VSTP-460	0.85248	0.00154	0.85556	-0.01890	**0.87446**
VSTP-470	0.84876	0.00133	0.85142	-0.01890	0.87032
VSTP-480	0.84850	0.00142	0.85134	-0.01890	0.87024
VSTP-486	0.84611	0.00139	0.84889	-0.01890	0.86779
VSTP-490	0.84977	0.00138	0.85253	-0.01890	0.87143
VSTP-500	0.84474	0.00129	0.84732	-0.01890	0.86622
VSTP-520	0.83850	0.00149	0.84148	-0.01890	0.86038
VSTP-540	0.83591	0.00136	0.83863	-0.01890	0.85753
VSTP-544	0.83675	0.00136	0.83947	-0.01890	0.85837
VSTP-560	0.83030	0.00132	0.83294	-0.01890	0.85184
VSTP-600	0.82435	0.00138	0.82711	-0.01890	0.84601
VSTP-616	0.81860	0.00142	0.82144	-0.01890	0.84034
VSTP-700	0.79919	0.00134	0.80187	-0.01890	0.82077
VSTP-705	0.79798	0.00143	0.80084	-0.01890	0.81974
VSTP-800	0.77030	0.00135	0.77300	-0.01890	0.79190
	10X10 Square Lattice			Max	0.87446
VTSP-058	0.52992	0.00110	0.53212	-0.01890	0.55102
VTSP-100	0.64323	0.00133	0.64589	-0.01890	0.66479
VTSP-200	0.78527	0.00148	0.78823	-0.01890	0.80713
VTSP-300	0.83833	0.00140	0.84113	-0.01890	0.86003
VTSP-400	0.84474	0.00131	0.84736	-0.01890	0.86626
VTSP-410	**0.84517**	0.00143	0.84803	-0.01890	**0.86693**
VTSP-420	0.84179	0.00137	0.84453	-0.01890	0.86343
VTSP-430	0.84313	0.00139	0.84591	-0.01890	0.86481
VTSP-437	0.84299	0.00135	0.84569	-0.01890	0.86459
VTSP-440	0.84374	0.00143	0.84660	-0.01890	0.86550

VSTN-100	0.63521	0.00128	0.63777	-0.01890	0.65667
VSTN-200	0.78282	0.00134	0.78550	-0.01890	0.80440
VSTN-300	0.83343	0.00159	0.83661	-0.01890	0.85551
VSTN-400	**0.84909**	0.00146	0.85201	-0.01890	**0.87091**
VSTN-410	0.84806	0.00141	0.85088	-0.01890	0.86978
VSTN-420	0.84574	0.00142	0.84858	-0.01890	0.86748
VSTN-430	0.84469	0.00143	0.84755	-0.01890	0.86645
VSTN-437	0.84751	0.00126	0.85003	-0.01890	0.86893
VSTN-440	0.84755	0.00137	0.85029	-0.01890	0.86919
VSTN-450	0.84687	0.00138	0.84963	-0.01890	0.86853
VSTN-460	0.84807	0.00140	0.85087	-0.01890	0.86977
VSTN-470	0.84410	0.00127	0.84664	-0.01890	0.86554
VSTN-480	0.84265	0.00133	0.84531	-0.01890	0.86421
VSTN-486	0.84439	0.00144	0.84727	-0.01890	0.86617
VSTN-490	0.84238	0.00136	0.84510	-0.01890	0.86400
VSTN-500	0.84455	0.00147	0.84749	-0.01890	0.86639
VSTN-520	0.83989	0.00140	0.84269	-0.01890	0.86159
VSTN-540	0.83817	0.00138	0.84093	-0.01890	0.85983
VSTN-544	0.83247	0.00144	0.83535	-0.01890	0.85425
VSTN-560	0.83277	0.00136	0.83549	-0.01890	0.85439
VSTN-600	0.82432	0.00135	0.82702	-0.01890	0.84592
VSTN-616	0.81747	0.00136	0.82019	-0.01890	0.83909
VSTN-700	0.79508	0.00133	0.79774	-0.01890	0.81664
VSTN-705	0.79812	0.00137	0.80086	-0.01890	0.81976
VSTN-800	0.77066	0.00125	0.77316	-0.01890	0.79206
	10X10 Square Lattice			Max	0.87091
VTSN-058	0.51917	0.00111	0.52139	-0.01890	0.54029
VTSN-100	0.63652	0.00120	0.63892	-0.01890	0.65782
VTSN-200	0.78009	0.00134	0.78277	-0.01890	0.80167
VTSN-300	0.83220	0.00131	0.83482	-0.01890	0.85372
VTSN-400	0.84173	0.00144	0.84461	-0.01890	0.86351
VTSN-410	0.84188	0.00122	0.84432	-0.01890	0.86322
VTSN-420	**0.84343**	0.00135	0.84613	-0.01890	**0.86503**
VTSN-430	0.84160	0.00147	0.84454	-0.01890	0.86344
VTSN-437	0.83705	0.00132	0.83969	-0.01890	0.85859
VTSN-440	0.83829	0.00136	0.84101	-0.01890	0.85991

VTSP-450	0.84292	0.00132	0.84556	-0.01890	0.86446
VTSP-460	0.84265	0.00141	0.84547	-0.01890	0.86437
VTSP-470	0.83875	0.00148	0.84171	-0.01890	0.86061
VTSP-480	0.83776	0.00127	0.84030	-0.01890	0.85920
VTSP-486	0.83728	0.00131	0.83990	-0.01890	0.85880
VTSP-490	0.84166	0.00134	0.84434	-0.01890	0.86324
VTSP-500	0.83675	0.00125	0.83925	-0.01890	0.85815
VTSP-520	0.83017	0.00126	0.83269	-0.01890	0.85159
VTSP-540	0.82824	0.00146	0.83116	-0.01890	0.85006
VTSP-544	0.82283	0.00124	0.82531	-0.01890	0.84421
VTSP-560	0.81973	0.00121	0.82215	-0.01890	0.84105
VTSP-600	0.80936	0.00132	0.81200	-0.01890	0.83090
VTSP-616	0.80567	0.00132	0.80831	-0.01890	0.82721
VTSP-700	0.78280	0.00134	0.78548	-0.01890	0.80438
VTSP-705	0.78054	0.00132	0.78318	-0.01890	0.80208
VTSP-800	0.75709	0.00126	0.75961	-0.01890	0.77851
	10X10 Triangular Lattice			Max	0.86693
VTTP-058	0.52750	0.00118	0.52986	-0.01890	0.54876
VTTP-100	0.64138	0.00135	0.64408	-0.01890	0.66298
VTTP-200	0.78728	0.00146	0.79020	-0.01890	0.80910
VTTP-300	0.83624	0.00136	0.83896	-0.01890	0.85786
VTTP-400	0.84532	0.00133	0.84798	-0.01890	0.86688
VTTP-410	**0.84900**	0.00136	0.85172	-0.01890	**0.87062**
VTTP-420	0.84257	0.00144	0.84545	-0.01890	0.86435
VTTP-430	0.84550	0.00123	0.84796	-0.01890	0.86686
VTTP-437	0.84473	0.00136	0.84745	-0.01890	0.86635
VTTP-440	0.84498	0.00147	0.84792	-0.01890	0.86682
VTTP-450	0.84019	0.00138	0.84295	-0.01890	0.86185
VTTP-460	0.84244	0.00127	0.84498	-0.01890	0.86388
VTTP-470	0.84168	0.00124	0.84416	-0.01890	0.86306
VTTP-480	0.84193	0.00144	0.84481	-0.01890	0.86371
VTTP-486	0.84165	0.00140	0.84445	-0.01890	0.86335
VTTP-490	0.84450	0.00130	0.84710	-0.01890	0.86600
VTTP-500	0.83550	0.00127	0.83804	-0.01890	0.85694
VTTP-520	0.83325	0.00137	0.83599	-0.01890	0.85489
VTTP-540	0.82776	0.00140	0.83056	-0.01890	0.84946

VTSN-450	0.83729	0.00144	0.84017	-0.01890	0.85907
VTSN-460	0.83685	0.00147	0.83979	-0.01890	0.85869
VTSN-470	0.83819	0.00133	0.84085	-0.01890	0.85975
VTSN-480	0.83767	0.00138	0.84043	-0.01890	0.85933
VTSN-486	0.83723	0.00132	0.83987	-0.01890	0.85877
VTSN-490	0.83355	0.00143	0.83641	-0.01890	0.85531
VTSN-500	0.83666	0.00129	0.83924	-0.01890	0.85814
VTSN-520	0.83088	0.00127	0.83342	-0.01890	0.85232
VTSN-540	0.82630	0.00128	0.82886	-0.01890	0.84776
VTSN-544	0.82464	0.00145	0.82754	-0.01890	0.84644
VTSN-560	0.81965	0.00129	0.82223	-0.01890	0.84113
VTSN-600	0.80861	0.00137	0.81135	-0.01890	0.83025
VTSN-616	0.80402	0.00144	0.80690	-0.01890	0.82580
VTSN-700	0.78260	0.00128	0.78516	-0.01890	0.80406
VTSN-705	0.77932	0.00117	0.78166	-0.01890	0.80056
VTSN-800	0.75668	0.00132	0.75932	-0.01890	0.77822
	10X10 Triangular Lattice			Max	0.86503
VTTN-058	0.51748	0.00115	0.51978	-0.01890	0.53868
VTTN-100	0.63549	0.00117	0.63783	-0.01890	0.65673
VTTN-200	0.78118	0.00141	0.78400	-0.01890	0.80290
VTTN-300	0.83204	0.00146	0.83496	-0.01890	0.85386
VTTN-400	0.84205	0.00152	0.84509	-0.01890	0.86399
VTTN-410	0.84260	0.00139	0.84538	-0.01890	0.86428
VTTN-420	0.84165	0.00143	0.84451	-0.01890	0.86341
VTTN-430	0.84199	0.00151	0.84501	-0.01890	0.86391
VTTN-437	0.84138	0.00138	0.84414	-0.01890	0.86304
VTTN-440	**0.84402**	0.00145	0.84692	-0.01890	**0.86582**
VTTN-450	0.84182	0.00142	0.84466	-0.01890	0.86356
VTTN-460	0.84291	0.00148	0.84587	-0.01890	0.86477
VTTN-470	0.84015	0.00124	0.84263	-0.01890	0.86153
VTTN-480	0.83751	0.00138	0.84027	-0.01890	0.85917
VTTN-486	0.83712	0.00136	0.83984	-0.01890	0.85874
VTTN-490	0.83780	0.00137	0.84054	-0.01890	0.85944
VTTN-500	0.83346	0.00129	0.83604	-0.01890	0.85494
VTTN-520	0.83313	0.00126	0.83565	-0.01890	0.85455
VTTN-540	0.82918	0.00141	0.83200	-0.01890	0.85090

VTTP-544	0.82606	0.00133	0.82872	-0.01890	0.84762
VTTP-560	0.82414	0.00144	0.82702	-0.01890	0.84592
VTTP-600	0.81429	0.00128	0.81685	-0.01890	0.83575
VTTP-616	0.80703	0.00133	0.80969	-0.01890	0.82859
VTTP-700	0.78779	0.00132	0.79043	-0.01890	0.80933
VTTP-705	0.78330	0.00139	0.78608	-0.01890	0.80498
VTTP-800	0.75638	0.00129	0.75896	-0.01890	0.77786
9X9 Square Lattice				Max	0.87062
VNSP-058	0.52821	0.00110	0.53041	-0.01890	0.54931
VNSP-100	0.64457	0.00117	0.64691	-0.01890	0.66581
VNSP-200	0.78882	0.00164	0.79210	-0.01890	0.81100
VNSP-300	0.83421	0.00136	0.83693	-0.01890	0.85583
VNSP-400	**0.84079**	0.00132	0.84343	-0.01890	**0.86233**
VNSP-410	0.83998	0.00143	0.84284	-0.01890	0.86174
VNSP-420	0.83699	0.00137	0.83973	-0.01890	0.85863
VNSP-430	0.83830	0.00142	0.84114	-0.01890	0.86004
VNSP-437	0.83956	0.00132	0.84220	-0.01890	0.86110
VNSP-440	0.83527	0.00144	0.83815	-0.01890	0.85705
VNSP-450	0.83756	0.00126	0.84008	-0.01890	0.85898
VNSP-460	0.83595	0.00136	0.83867	-0.01890	0.85757
VNSP-470	0.83551	0.00148	0.83847	-0.01890	0.85737
VNSP-480	0.83250	0.00134	0.83518	-0.01890	0.85408
VNSP-486	0.83405	0.00125	0.83655	-0.01890	0.85545
VNSP-490	0.83258	0.00135	0.83528	-0.01890	0.85418
VNSP-500	0.83097	0.00133	0.83363	-0.01890	0.85253
VNSP-520	0.82567	0.00136	0.82839	-0.01890	0.84729
VNSP-540	0.81806	0.00137	0.82080	-0.01890	0.83970
VNSP-544	0.81764	0.00143	0.82050	-0.01890	0.83940
VNSP-560	0.81561	0.00122	0.81805	-0.01890	0.83695
VNSP-600	0.79987	0.00130	0.80247	-0.01890	0.82137
VNSP-616	0.79926	0.00127	0.80180	-0.01890	0.82070
VNSP-700	0.77086	0.00121	0.77328	-0.01890	0.79218
VNSP-705	0.77227	0.00137	0.77501	-0.01890	0.79391
VNSP-800	0.74564	0.00132	0.74828	-0.01890	0.76718
9X9 Triangular Lattice				Max	0.86233
VNTP-058	0.52709	0.00111	0.52931	-0.01890	0.54821

VTTN-544	0.82721	0.00145	0.83011	-0.01890	0.84901
VTTN-560	0.82223	0.00133	0.82489	-0.01890	0.84379
VTTN-600	0.80975	0.00128	0.81231	-0.01890	0.83121
VTTN-616	0.81102	0.00123	0.81348	-0.01890	0.83238
VTTN-700	0.78531	0.00130	0.78791	-0.01890	0.80681
VTTN-705	0.78607	0.00135	0.78877	-0.01890	0.80767
VTTN-800	0.75847	0.00122	0.76091	-0.01890	0.77981
9X9 Square Lattice				Max	0.86582
VNSN-058	0.51939	0.00115	0.52169	-0.01890	0.54059
VNSN-100	0.63748	0.00130	0.64008	-0.01890	0.65898
VNSN-200	0.78220	0.00142	0.78504	-0.01890	0.80394
VNSN-300	0.82865	0.00141	0.83147	-0.01890	0.85037
VNSN-400	**0.83652**	0.00143	0.83938	-0.01890	**0.85828**
VNSN-410	0.83445	0.00139	0.83723	-0.01890	0.85613
VNSN-420	0.83424	0.00137	0.83698	-0.01890	0.85588
VNSN-430	0.83501	0.00138	0.83777	-0.01890	0.85667
VNSN-437	0.83485	0.00132	0.83749	-0.01890	0.85639
VNSN-440	0.83236	0.00164	0.83564	-0.01890	0.85454
VNSN-450	0.83427	0.00121	0.83669	-0.01890	0.85559
VNSN-460	0.83555	0.00142	0.83839	-0.01890	0.85729
VNSN-470	0.83134	0.00144	0.83422	-0.01890	0.85312
VNSN-480	0.82961	0.00144	0.83249	-0.01890	0.85139
VNSN-486	0.82831	0.00149	0.83129	-0.01890	0.85019
VNSN-490	0.82936	0.00132	0.83200	-0.01890	0.85090
VNSN-500	0.82629	0.00150	0.82929	-0.01890	0.84819
VNSN-520	0.82284	0.00134	0.82552	-0.01890	0.84442
VNSN-540	0.81970	0.00136	0.82242	-0.01890	0.84132
VNSN-544	0.81655	0.00146	0.81947	-0.01890	0.83837
VNSN-560	0.81272	0.00129	0.81530	-0.01890	0.83420
VNSN-600	0.79967	0.00142	0.80251	-0.01890	0.82141
VNSN-616	0.79810	0.00141	0.80092	-0.01890	0.81982
VNSN-700	0.77336	0.00130	0.77596	-0.01890	0.79486
VNSN-705	0.77064	0.00138	0.77340	-0.01890	0.79230
VNSN-800	0.74559	0.00116	0.74791	-0.01890	0.76681
9X9 Triangular Lattice				Max	0.85828
VNTN-058	0.52185	0.00120	0.52425	-0.01890	0.54315

VNTP-100	0.64436	0.00130	0.64696	-0.01890	0.66586
VNTP-200	0.78680	0.00140	0.78960	-0.01890	0.80850
VNTP-300	0.83482	0.00139	0.83760	-0.01890	0.85650
VNTP-400	**0.84181**	0.00150	0.84481	-0.01890	**0.86371**
VNTP-410	0.83974	0.00143	0.84260	-0.01890	0.86150
VNTP-420	0.84147	0.00135	0.84417	-0.01890	0.86307
VNTP-430	0.83820	0.00134	0.84088	-0.01890	0.85978
VNTP-437	0.83703	0.00125	0.83953	-0.01890	0.85843
VNTP-440	0.84012	0.00132	0.84276	-0.01890	0.86166
VNTP-450	0.83775	0.00137	0.84049	-0.01890	0.85939
VNTP-460	0.83858	0.00137	0.84132	-0.01890	0.86022
VNTP-470	0.83823	0.00147	0.84117	-0.01890	0.86007
VNTP-480	0.83631	0.00136	0.83903	-0.01890	0.85793
VNTP-486	0.83209	0.00132	0.83473	-0.01890	0.85363
VNTP-490	0.83308	0.00142	0.83592	-0.01890	0.85482
VNTP-500	0.82915	0.00131	0.83177	-0.01890	0.85067
VNTP-520	0.83205	0.00136	0.83477	-0.01890	0.85367
VNTP-540	0.82191	0.00144	0.82479	-0.01890	0.84369
VNTP-544	0.82085	0.00140	0.82365	-0.01890	0.84255
VNTP-560	0.81296	0.00136	0.81568	-0.01890	0.83458
VNTP-600	0.80353	0.00140	0.80633	-0.01890	0.82523
VNTP-616	0.80082	0.00124	0.80330	-0.01890	0.82220
VNTP-700	0.77529	0.00122	0.77773	-0.01890	0.79663
VNTP-705	0.77491	0.00131	0.77753	-0.01890	0.79643
VNTP-800	0.74714	0.00110	0.74934	-0.01890	0.76824
8X8 Square Lattice				Max	0.86371
VESP-058	0.52816	0.00110	0.53036	-0.01890	0.54926
VESP-100	0.64697	0.00133	0.64963	-0.01890	0.66853
VESP-200	0.78655	0.00143	0.78941	-0.01890	0.80831
VESP-300	0.83040	0.00138	0.83316	-0.01890	0.85206
VESP-400	**0.83521**	0.00131	0.83783	-0.01890	**0.85673**
VESP-410	0.83473	0.00137	0.83747	-0.01890	0.85637
VESP-420	0.83390	0.00140	0.83670	-0.01890	0.85560
VESP-430	0.83292	0.00149	0.83590	-0.01890	0.85480
VESP-437	0.83105	0.00141	0.83387	-0.01890	0.85277
VESP-440	0.83115	0.00137	0.83389	-0.01890	0.85279

VNTN-100	0.63506	0.00138	0.63782	-0.01890	0.65672
VNTN-200	0.78041	0.00129	0.78299	-0.01890	0.80189
VNTN-300	0.82682	0.00139	0.82960	-0.01890	0.84850
VNTN-400	0.83906	0.00139	0.84184	-0.01890	0.86074
VNTN-410	0.83619	0.00141	0.83901	-0.01890	0.85791
VNTN-420	0.83951	0.00133	0.84217	-0.01890	0.86107
VNTN-430	0.83667	0.00140	0.83947	-0.01890	0.85837
VNTN-437	0.83843	0.00139	0.84121	-0.01890	0.86011
VNTN-440	**0.83967**	0.00144	0.84255	-0.01890	**0.86145**
VNTN-450	0.83661	0.00134	0.83929	-0.01890	0.85819
VNTN-460	0.83367	0.00141	0.83649	-0.01890	0.85539
VNTN-470	0.83170	0.00143	0.83456	-0.01890	0.85346
VNTN-480	0.83273	0.00134	0.83541	-0.01890	0.85431
VNTN-486	0.83340	0.00140	0.83620	-0.01890	0.85510
VNTN-490	0.83108	0.00136	0.83380	-0.01890	0.85270
VNTN-500	0.82663	0.00148	0.82959	-0.01890	0.84849
VNTN-520	0.82765	0.00127	0.83019	-0.01890	0.84909
VNTN-540	0.81984	0.00139	0.82262	-0.01890	0.84152
VNTN-544	0.82153	0.00137	0.82427	-0.01890	0.84317
VNTN-560	0.81836	0.00129	0.82094	-0.01890	0.83984
VNTN-600	0.80406	0.00128	0.80662	-0.01890	0.82552
VNTN-616	0.80111	0.00128	0.80367	-0.01890	0.82257
VNTN-700	0.77449	0.00131	0.77711	-0.01890	0.79601
VNTN-705	0.77510	0.00136	0.77782	-0.01890	0.79672
VNTN-800	0.75276	0.00140	0.75556	-0.01890	0.77446
8X8 Square Lattice				Max	0.86145
VESN-058	0.52199	0.00114	0.52427	-0.01890	0.54317
VESN-100	0.63519	0.00125	0.63769	-0.01890	0.65659
VESN-200	0.78353	0.00146	0.78645	-0.01890	0.80535
VESN-300	0.82996	0.00138	0.83272	-0.01890	0.85162
VESN-400	**0.83352**	0.00135	0.83622	-0.01890	**0.85512**
VESN-410	0.83120	0.00148	0.83416	-0.01890	0.85306
VESN-420	0.83208	0.00136	0.83480	-0.01890	0.85370
VESN-430	0.83144	0.00121	0.83386	-0.01890	0.85276
VESN-437	0.82847	0.00142	0.83131	-0.01890	0.85021
VESN-440	0.82807	0.00123	0.83053	-0.01890	0.84943

VESP-450	0.82958	0.00125	0.83208	-0.01890	0.85098
VESP-460	0.82837	0.00138	0.83113	-0.01890	0.85003
VESP-470	0.82820	0.00136	0.83092	-0.01890	0.84982
VESP-480	0.82265	0.00141	0.82547	-0.01890	0.84437
VESP-486	0.82749	0.00146	0.83041	-0.01890	0.84931
VESP-490	0.82684	0.00136	0.82956	-0.01890	0.84846
VESP-500	0.82588	0.00143	0.82874	-0.01890	0.84764
VESP-520	0.81789	0.00139	0.82067	-0.01890	0.83957
VESP-540	0.80739	0.00133	0.81005	-0.01890	0.82895
VESP-544	0.81006	0.00136	0.81278	-0.01890	0.83168
VESP-560	0.80412	0.00132	0.80676	-0.01890	0.82566
VESP-600	0.79321	0.00124	0.79569	-0.01890	0.81459
VESP-616	0.78699	0.00141	0.78981	-0.01890	0.80871
VESP-700	0.76175	0.00119	0.76413	-0.01890	0.78303
VESP-705	0.76086	0.00132	0.76350	-0.01890	0.78240
VESP-800	0.73397	0.00139	0.73675	-0.01890	0.75565
8X8 Triangular Lattice				Max	0.85673
VETP-058	0.52948	0.00119	0.53186	-0.01890	0.55076
VETP-100	0.64935	0.00138	0.65211	-0.01890	0.67101
VETP-200	0.78855	0.00145	0.79145	-0.01890	0.81035
VETP-300	0.83304	0.00153	0.83610	-0.01890	0.85500
VETP-400	0.83415	0.00129	0.83673	-0.01890	0.85563
VETP-410	0.83637	0.00138	0.83913	-0.01890	0.85803
VETP-420	0.83407	0.00126	0.83659	-0.01890	0.85549
VETP-430	**0.83642**	0.00147	0.83936	-0.01890	**0.85826**
VETP-437	0.83334	0.00141	0.83616	-0.01890	0.85506
VETP-440	0.83385	0.00138	0.83661	-0.01890	0.85551
VETP-450	0.83277	0.00149	0.83575	-0.01890	0.85465
VETP-460	0.82878	0.00138	0.83154	-0.01890	0.85044
VETP-470	0.83032	0.00151	0.83334	-0.01890	0.85224
VETP-480	0.82786	0.00133	0.83052	-0.01890	0.84942
VETP-486	0.82778	0.00148	0.83074	-0.01890	0.84964
VETP-490	0.82564	0.00134	0.82832	-0.01890	0.84722
VETP-500	0.82580	0.00131	0.82842	-0.01890	0.84732
VETP-520	0.81880	0.00141	0.82162	-0.01890	0.84052
VETP-540	0.81211	0.00136	0.81483	-0.01890	0.83373

VESN-450	0.82945	0.00131	0.83207	-0.01890	0.85097
VESN-460	0.82696	0.00136	0.82968	-0.01890	0.84858
VESN-470	0.82439	0.00135	0.82709	-0.01890	0.84599
VESN-480	0.81938	0.00130	0.82198	-0.01890	0.84088
VESN-486	0.82556	0.00137	0.82830	-0.01890	0.84720
VESN-490	0.82339	0.00145	0.82629	-0.01890	0.84519
VESN-500	0.82023	0.00133	0.82289	-0.01890	0.84179
VESN-520	0.81719	0.00134	0.81987	-0.01890	0.83877
VESN-540	0.81040	0.00135	0.81310	-0.01890	0.83200
VESN-544	0.80919	0.00131	0.81181	-0.01890	0.83071
VESN-560	0.80409	0.00144	0.80697	-0.01890	0.82587
VESN-600	0.79410	0.00140	0.79690	-0.01890	0.81580
VESN-616	0.78832	0.00135	0.79102	-0.01890	0.80992
VESN-700	0.76097	0.00128	0.76353	-0.01890	0.78243
VESN-705	0.76342	0.00133	0.76608	-0.01890	0.78498
VESN-800	0.73512	0.00122	0.73756	-0.01890	0.75646
8X8 Triangular Lattice				Max	0.85512
VETN-058	0.52090	0.00126	0.52342	-0.01890	0.54232
VETN-100	0.63770	0.00124	0.64018	-0.01890	0.65908
VETN-200	0.77984	0.00153	0.78290	-0.01890	0.80180
VETN-300	0.82685	0.00132	0.82949	-0.01890	0.84839
VETN-400	**0.83305**	0.00135	0.83575	-0.01890	**0.85465**
VETN-410	0.83109	0.00140	0.83389	-0.01890	0.85279
VETN-420	0.83203	0.00133	0.83469	-0.01890	0.85359
VETN-430	0.83214	0.00142	0.83498	-0.01890	0.85388
VETN-437	0.83017	0.00140	0.83297	-0.01890	0.85187
VETN-440	0.82779	0.00124	0.83027	-0.01890	0.84917
VETN-450	0.83156	0.00134	0.83424	-0.01890	0.85314
VETN-460	0.83045	0.00143	0.83331	-0.01890	0.85221
VETN-470	0.82740	0.00141	0.83022	-0.01890	0.84912
VETN-480	0.82481	0.00143	0.82767	-0.01890	0.84657
VETN-486	0.82440	0.00124	0.82688	-0.01890	0.84578
VETN-490	0.82731	0.00139	0.83009	-0.01890	0.84899
VETN-500	0.82369	0.00133	0.82635	-0.01890	0.84525
VETN-520	0.81608	0.00135	0.81878	-0.01890	0.83768
VETN-540	0.81433	0.00142	0.81717	-0.01890	0.83607

VETP-544	0.81138	0.00130	0.81398	-0.01890	0.83288	VETN-544	0.81134	0.00135	0.81404	-0.01890	0.83294
VETP-560	0.80636	0.00143	0.80922	-0.01890	0.82812	VETN-560	0.80617	0.00126	0.80869	-0.01890	0.82759
VETP-600	0.79228	0.00137	0.79502	-0.01890	0.81392	VETN-600	0.79471	0.00127	0.79725	-0.01890	0.81615
VETP-616	0.79018	0.00136	0.79290	-0.01890	0.81180	VETN-616	0.78766	0.00128	0.79022	-0.01890	0.80912
VETP-700	0.76792	0.00130	0.77052	-0.01890	0.78942	VETN-700	0.76635	0.00132	0.76899	-0.01890	0.78789
VETP-705	0.76295	0.00129	0.76553	-0.01890	0.78443	VETN-705	0.76411	0.00131	0.76673	-0.01890	0.78563
VETP-800	0.73507	0.00131	0.73769	-0.01890	0.75659	VETN-800	0.73467	0.00132	0.73731	-0.01890	0.75621
				Max	0.85826		0.83305			Max	0.85465
				Max VFO	0.87446		0.84909			Max VFO	0.87091