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68854, 2, 1.0, 68917, 2, -0.5, 68918, 2, -0.5
***** 55
*EQUATION
3
61455, 1, 1.0, 61518, 1, -0.5, 61519, 1, -0.5
*EQUATION
3
61455, 2, 1.0, 61518, 2, -0.5, 61519, 2, -0.5
*EQUATION
3
62655, 1, 1.0, 62718, 1, -0.5, 62719, 1, -0.5
*EQUATION
3
62655, 2, 1.0, 62718, 2, -0.5, 62719, 2, -0.5
*EQUATION
3
63855, 1, 1.0, 63918, 1, -0.5, 63919, 1, -0.5
*EQUATION
3
63855, 2, 1.0, 63918, 2, -0.5, 63919, 2, -0.5
*EQUATION
3
64455, 1, 1.0, 64518, 1, -0.5, 64519, 1, -0.5
*EQUATION
3
64455, 2, 1.0, 64518, 2, -0.5, 64519, 2, -0.5
*EQUATION
3
65255, 1, 1.0, 65318, 1, -0.5, 65319, 1, -0.5
*EQUATION
3
65255, 2, 1.0, 65318, 2, -0.5, 65319, 2, -0.5
*EQUATION
3
66055, 1, 1.0, 66118, 1, -0.5, 66119, 1, -0.5
*EQUATION
3
66055, 2, 1.0, 66118, 2, -0.5, 66119, 2, -0.5
*EQUATION
3
66655, 1, 1.0, 66718, 1, -0.5, 66719, 1, -0.5
*EQUATION
3
66655, 2, 1.0, 66718, 2, -0.5, 66719, 2, -0.5
*EQUATION
3
67455, 1, 1.0, 67518, 1, -0.5, 67519, 1, -0.5
*EQUATION
3
67455, 2, 1.0, 67518, 2, -0.5, 67519, 2, -0.5
*EQUATION
3
68055, 1, 1.0, 68118, 1, -0.5, 68119, 1, -0.5
*EQUATION
3
68055, 2, 1.0, 68118, 2, -0.5, 68119, 2, -0.5
*EQUATION
3
68855, 1, 1.0, 68918, 1, -0.5, 68919, 1, -0.5
*EQUATION
3
68855, 2, 1.0, 68918, 2, -0.5, 68919, 2, -0.5
***** 56
*EQUATION
3
61456, 1, 1.0, 61519, 1, -0.5, 61520, 1, -0.5
*EQUATION
3
61456, 2, 1.0, 61519, 2, -0.5, 61520, 2, -0.5

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*EQUATION
3
62656, 1, 1.0, 62719, 1, -0.5, 62720, 1, -0.5
*EQUATION
3
62656, 2, 1.0, 62719, 2, -0.5, 62720, 2, -0.5
*EQUATION
3
63856, 1, 1.0, 63919, 1, -0.5, 63920, 1, -0.5
*EQUATION
3
63856, 2, 1.0, 63919, 2, -0.5, 63920, 2, -0.5
*EQUATION
3
64456, 1, 1.0, 64519, 1, -0.5, 64520, 1, -0.5
*EQUATION
3
64456, 2, 1.0, 64519, 2, -0.5, 64520, 2, -0.5
*EQUATION
3
65256, 1, 1.0, 65319, 1, -0.5, 65320, 1, -0.5
*EQUATION
3
65256, 2, 1.0, 65319, 2, -0.5, 65320, 2, -0.5
*EQUATION
3
66056, 1, 1.0, 66119, 1, -0.5, 66120, 1, -0.5
*EQUATION
3
66056, 2, 1.0, 66119, 2, -0.5, 66120, 2, -0.5
*EQUATION
3
66656, 1, 1.0, 66719, 1, -0.5, 66720, 1, -0.5
*EQUATION
3
66656, 2, 1.0, 66719, 2, -0.5, 66720, 2, -0.5
*EQUATION
3
67456, 1, 1.0, 67519, 1, -0.5, 67520, 1, -0.5
*EQUATION
3
67456, 2, 1.0, 67519, 2, -0.5, 67520, 2, -0.5
*EQUATION
3
68056, 1, 1.0, 68119, 1, -0.5, 68120, 1, -0.5
*EQUATION
3
68056, 2, 1.0, 68119, 2, -0.5, 68120, 2, -0.5
*EQUATION
3
68856, 1, 1.0, 68919, 1, -0.5, 68920, 1, -0.5
*EQUATION
3
68856, 2, 1.0, 68919, 2, -0.5, 68920, 2, -0.5
*****
** FUEL ROD BOTTOM VS BOTTOM TIE PLATE
*****
*NSET, NSET=FAROBTM, GENERATE
61001, 61056, 1
*EQUATION
2
FAROBTM, 3, 1.0, 61132, 3, -1.0
*****
*****
** TOP END SADDLE SUPPORT
*****
*NODE, NSET=SADREF
40400, 24.8750, 0.0000, 166.72

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*ELEMENT, TYPE=R3D4, ELSET=SADDLE
40401, 8381, 8581, 8582, 8382
*ELGEN, ELSET=SADDLE
40401, 13, 1, 1, 4, 200, 20
*RIGID BODY, ELSET=SADDLE, REF NODE=40400
*ELEMENT, TYPE=MASS, ELSET=SADDLEM
42410, 8790
*MASS, ELSET=SADDLEM
3.23
*NODE, NSET=SKIDSD
40042, 40.0000, 19.2286, 166.72
40062, 40.0000, 19.2286, 174.06
*ELEMENT, TYPE=SPRINGA, ELSET=SADDLES
40901, 8790, 40042
*SPRING, ELSET=SADDLES, NONLINEAR

-1.9735E+6, -0.07447
1.9735E+6, 0.07447
**-9.868E+5, -0.07447
**9.868E+5, 0.07447
*****
** BOTTOM END CRADLE SUPPORT
*****
*NODE, NSET=BPIVREF
15000, -2.4382, 24.8750, 5.4400
*NODE, NSET=BPIV1
15001, -2.4382, 24.8750, 5.4400
15011, -2.4382, 24.8750, 3.6900
15012, -3.6756, 24.8750, 4.2026
15013, -4.1882, 24.8750, 5.4400
15014, -3.6756, 24.8750, 6.6774
15015, -2.4382, 24.8750, 7.1490
15016, -1.2008, 24.8750, 6.6774
15017, -0.6882, 24.8750, 5.4400
15018, -1.2008, 24.8750, 4.2026
15021, -2.4382, 24.8750, 1.9400
15022, -4.9131, 24.8750, 2.9651
15023, -5.9382, 24.8750, 5.4400
15024, -4.9131, 24.8750, 7.9149
15025, -2.4382, 24.8750, 8.9400
15026, 0.0367, 24.8750, 7.9149
15027, 1.0618, 24.8750, 5.4400
15028, 0.0367, 24.8750, 2.9651
*NCOPY, SHIFT, CHANGE NU=+50, OLD SET=BPIV1, NEW
SET=BPIV2
0.0, 3.5, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=BPIV
BPIV1, BPIV2
**
*ELEMENT, TYPE=R3D3, ELSET=BPIVB
15001, 15001, 15011, 15012
15002, 15001, 15012, 15013
15003, 15001, 15013, 15014
15004, 15001, 15014, 15015
15005, 15001, 15015, 15016
15006, 15001, 15016, 15017
15007, 15001, 15017, 15018
15008, 15001, 15018, 15011
*ELEMENT, TYPE=R3D4, ELSET=BPIVB
15011, 15011, 15021, 15022, 15012
15018, 15018, 15028, 15021, 15011
*ELGEN, ELSET=BPIVB
15011, 7, 1, 1
**
*ELEMENT, TYPE=R3D4, ELSET=BPIVF
15021, 15021, 15071, 15072, 15022
15028, 15028, 15078, 15071, 15021
*ELGEN, ELSET=BPIVF

15021, 7, 1, 1
**
*ELEMENT, TYPE=R3D3, ELSET=BPIVT
15051, 15051, 15061, 15062
15052, 15051, 15062, 15063
15053, 15051, 15063, 15064
15054, 15051, 15064, 15065
15055, 15051, 15065, 15066
15056, 15051, 15066, 15067
15057, 15051, 15067, 15068
15058, 15051, 15068, 15061
*ELEMENT, TYPE=R3D4, ELSET=BPIVT
15061, 15061, 15071, 15072, 15062
15068, 15068, 15078, 15071, 15061
*ELGEN, ELSET=BPIVT
15061, 7, 1, 1
*ELSET, ELSET=BPIV
BPIVB, BPIVF, BPIVT
*RIGID BODY, ELSET=BPIV, REF NODE=15000
***** BOTTOM CRADLE SUPPORT STIFFNESS
**15051, -2.4382, 28.3750, 5.4400
*NODE, NSET=SKIDCR
40023, 40.0, 28.3750, 5.4400
*ELEMENT, TYPE=MASS, ELSET=CRADLEM
41023, 40023
*MASS, ELSET=CRADLEM
11.0
*ELEMENT, TYPE=SPRINGA, ELSET=CRADLES
40953, 15051, 40023
*SPRING, ELSET=CRADLES, NONLINEAR

-7.310E+5, -0.07448
-5.675E+5, -0.0249
5.675E+5, 0.0249
7.310E+5, 0.07448
*****
** SKID (STIFFNESS LUMPED INTO SUPPORTS)
** SKID WEIGHT = (45,000 - SADDLE -
CRADLE)/FULL
** = 17,000 POUNDS/HALF
*****
*NODE, NSET=SKID
40000, 40.0, 0.0, 90.0
40001, 40.0, 0.0000, -10.0
40002, 40.0, 19.2286, -10.0
40003, 40.0, 28.2550, -10.0
40004, 40.0, 50.0000, -10.0
40021, 40.0, 0.0000, 5.44
40022, 40.0, 19.2286, 5.44
**40023, 40.0, 28.2550, 5.44
40024, 40.0, 50.0000, 5.44
40041, 40.0, 0.0000, 166.72
**40042, 40.0, 19.2286, 166.72
40043, 40.0, 28.2550, 166.72
40044, 40.0, 50.0000, 166.72
40061, 40.0, 0.0000, 174.06
**40062, 40.0, 19.2286, 174.06
40063, 40.0, 28.2550, 174.06
40064, 40.0, 50.0000, 174.06
40081, 40.0, 0.0000, 190.00
40082, 40.0, 19.2286, 190.00
40083, 40.0, 28.2550, 190.00
40084, 40.0, 50.0000, 190.00
*NSET, NSET=SKID
SKID, SKIDCR, SKIDSD
**
*ELEMENT, TYPE=R3D4

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40001,40001,40021,40022,40002
*ELGEN, ELSET=SKID
40001, 3, 1, 1, 4, 20, 20
*RIGID BODY, ELSET=SKID, REF NODE=40000
*ELEMENT, TYPE=MASS, ELSET=SKIDM
40000, 40000
*MASS, ELSET=SKIDM
44.0
*****
** RIGID UNYIELDING TARGET
*****
*NODE, NSET=TARGET0
190000, 0.0, 0.0, -0.0
190001, -100.1, 0.0, -0.0
190002, 100.1, 0.0, -0.0
190003, 100.1, 50.0, -0.0
190004, -100.1, 50.0, -0.0
*NCOPY,SHIFT,CHANGE NU=-100000,OLD
SET=TARGET0,NEW SET=TARGET
40.010, 0., 90.0
40.010, 0., 90.0, 40.010, 1., 90.0, -90.0
*ELEMENT,TYPE=R3D4,ELSET=TARGET
90000,90001,90002,90003,90004
*RIGID BODY, ELSET=TARGET, REF NODE=90000
*****
** TYPE 317 SST MOD
** DYNAMIC S-S CURVE
*MATERIAL, NAME=S317
*DENSITY
21.0775E-4
*ELASTIC
26.5E6, 0.3
*PLASTIC
60000., 0.
71000., 0.008
75000., 0.018
77300., 0.028
79300., 0.038
87000., 0.078
90500., 0.118
93700., 0.158
96000., 0.198
97800., 0.238
98800., 0.268
99500., 0.288
100000., 0.308
** TYPE 304 SST
** USING SANDIA DATA
*MATERIAL, NAME=S304
*DENSITY
7.5052E-4
*ELASTIC
27.0E6, 0.3
*PLASTIC
30000., 0.
35000., 0.002
37300., 0.004
38400., 0.006
39400., 0.008
40000., 0.010
42900., 0.020
45400., 0.030
47900., 0.040
50400., 0.050
52900., 0.060
55400., 0.070
57900., 0.080
60400., 0.090
62900., 0.100

69150., 0.125
75400., 0.150
81650., 0.175
87900., 0.200
94150., 0.250
106650., 0.300
119150., 0.350
** FIN - TYPE 304 SST
*MATERIAL, NAME=FIN
*DENSITY
7.5052E-4
*ELASTIC
27.0E6, 0.3
*PLASTIC
30000., 0.
35000., 0.002
37300., 0.004
38400., 0.006
39400., 0.008
40000., 0.010
42900., 0.020
45400., 0.030
47900., 0.040
50400., 0.050
52900., 0.060
55400., 0.070
57900., 0.080
60400., 0.090
62900., 0.100
69150., 0.125
75400., 0.150
81650., 0.175
87900., 0.200
94150., 0.250
106650., 0.300
119150., 0.350
** TYPE 304 SST, DENSITY NOT ADJUSTED
*MATERIAL, NAME=S304A
*DENSITY
7.5052E-4
*ELASTIC
27.0E6, 0.3
*PLASTIC
30000., 0.
35000., 0.002
37300., 0.004
38400., 0.006
39400., 0.008
40000., 0.010
42900., 0.020
45400., 0.030
47900., 0.040
50400., 0.050
52900., 0.060
55400., 0.070
57900., 0.080
60400., 0.090
62900., 0.100
69150., 0.125
75400., 0.150
81650., 0.175
87900., 0.200
94150., 0.250
106650., 0.300
119150., 0.350
** TYPE 304 SST, DENSITY ADJUSTED TO INCLUDE
FUEL BUNDLE
*MATERIAL, NAME=S304B
*DENSITY

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68.65E-4
*ELASTIC
27.0E6, 0.3
*PLASTIC
30000., 0.
35000., 0.002
37300., 0.004
38400., 0.006
39400., 0.008
40000., 0.010
42900., 0.020
45400., 0.030
47900., 0.040
50400., 0.050
52900., 0.060
55400., 0.070
57900., 0.080
60400., 0.090
62900., 0.100
69150., 0.125
75400., 0.150
81650., 0.175
87900., 0.200
94150., 0.250
106650., 0.300
119150., 0.350
** FOR BASKET SPACER DISKS
** ADJUSTING DENSITY TO INCLUDE POISON RODS
AND OTHER PARTS
*MATERIAL, NAME=S216A
*DENSITY
9.5956E-4
*ELASTIC
26.5E6, 0.3
*PLASTIC
60000., 0.
71000., 0.008
75000., 0.018
77300., 0.028
79300., 0.038
87000., 0.078
90500., 0.118
93700., 0.158
96000., 0.198
97800., 0.238
98800., 0.268
99500., 0.288
100000., 0.308
** TYPE 216 SST IS ASSUMED THE SAME AS 317
SST MOD
** USING 317 SST DYNAMIC S-S CURVE
*MATERIAL, NAME=S216
*DENSITY
7.5052E-4
*ELASTIC
26.5E6, 0.3
*PLASTIC
60000., 0.
71000., 0.008
75000., 0.018
77300., 0.028
79300., 0.038
87000., 0.078
90500., 0.118
93700., 0.158
96000., 0.198
97800., 0.238
98800., 0.268
99500., 0.288

100000., 0.308
** RING = TYPE 216 SST (SAME AS 317 SST MOD)
** USING 317 SST DYNAMIC S-S CURVE
*MATERIAL, NAME=RING
*DENSITY
7.5052E-4
*ELASTIC
26.5E6, 0.3
*PLASTIC
60000., 0.
71000., 0.008
75000., 0.018
77300., 0.028
79300., 0.038
87000., 0.078
90500., 0.118
93700., 0.158
96000., 0.198
97800., 0.238
98800., 0.268
99500., 0.288
100000., 0.308
** DEPLETED URANIUM
** DENSITY = 1175 PCF
*MATERIAL, NAME=DURAN
*DENSITY
1.76E-3
*ELASTIC
26.0E6, 0.3
*PLASTIC
35000., 0.
60000., 0.06
** FUEL BUNDLE TOP/BOTTOM TIE PLATES - TYPE
304 SST
** ELASTIC ONLY, ADJUSTED TO 30 POUNDS/BUNDLE
(TOP AND BOTTOM)
*MATERIAL, NAME=S304F
*DENSITY
1.8145E-4
*ELASTIC
27.0E6, 0.3
***** ZIRCALOY 4 (IRRADIATED 12/2001
data *****
** ZIRCALOY 4 (6.565 g/cc = 0.237 lb/in^3)
**
*MATERIAL, NAME=CLAD
*DENSITY
6.134E-4
*ELASTIC
12.1E6, 0.37
*PLASTIC
104000., 0.
119000., 0.009
** ZIRCALOY 4 CLADDING
** ADJUSTED DENSITY TO HAVE A WEIGHT OF 7.25
POUNDS PER ROD
*MATERIAL, NAME=CLADO
*DENSITY
36.865E-4
*ELASTIC
12.1E6, 0.37
*PLASTIC
104000., 0.
119000., 0.009
** ZIRCALOY 4 CLADDING, ADJUSTED DENSISTY
**
*MATERIAL, NAME=CLADI
*DENSITY
24.922E-4

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*ELASTIC
12.1E6, 0.37
*PLASTIC
104000., 0.
119000., 0.009
** ZIRCALOY 4 for GRID SPACERS, ADJUSTED
DENSITY
**
*MATERIAL, NAME=CLADG
*DENSITY
6.849E-4
*ELASTIC
12.1E6, 0.37
*PLASTIC
104000., 0.
119000., 0.009
** ZIRCALOY 4 for GUIDE AND INST. TUBES,
ADJUSTED DENSITY
**
*MATERIAL, NAME=CLADT
*DENSITY
1.5435E-4
*ELASTIC
12.1E6, 0.37
*PLASTIC
104000., 0.
119000., 0.009
**
** ELEMENT SET DEFINITIONS
**
*ELSET, ELSET=OS
OSB, OSC, OSW
*ELSET, ELSET=DU
DUB, DUC, DUW
*ELSET, ELSET=IS
ISB, ISC, ISW
*ELSET, ELSET=CSKB
ISB, OSB, DUB
*ELSET, ELSET=CSKC
ISC, OSC, DUC
*ELSET, ELSET=CSKW
ISW, OSW, DUW, CFL
*ELSET, ELSET=CSKBD
OS, IS, DU, CFL
*ELSET, ELSET=CSKHD
CHDS, CHDU
*ELSET, ELSET=CASK
CSKBD, CSKHD
*ELSET, ELSET=BASK
SPDSK, TROD, FCH, FCA, FCB, FCC
*ELSET, ELSET=FAROD
FARO, FARI
*ELSET, ELSET=FAG
FAG1, FAG2, FAG3, FAG4, FAG5, FAG6, FAG7, FAG8, FAG9,
FAG10
*ELSET, ELSET=FUELA
FAROD, FAG, FABM, FATP, TUBEA
*ELSET, ELSET=ALLEL
CASK, BASK, FUELA, FATSPR, FABSPR
SKID, SKIDM, SADDLE, SADDLEM, SADDLES
CRADLES, CRADLEM, BPIV
**
** NODE SET DEFINITIONS
**
*NSET, NSET=CSKBD
OSB, OSC, WALL
*NSET, NSET=CSKHD
CHD,
*NSET, NSET=CASK
CSKBD, CSKHD
*NSET, NSET=BASK
SPDSK, TROD, FCH, FCA, FCB, FCC
*NSET, NSET=FAROD
FARO, FARS
*NSET, NSET=FUELA
FAROD, FABM, FATP
*NSET, NSET=ALLND
CASK, BASK, FUELA, FATSPR, FABSPR
SADREF, SKID, BPIV
*NSET, NSET=YSYMM, GENERATE
40000, 40000, 1
90000, 90000, 1
** BOTTOM
1, 5, 1
501, 505, 1
1001, 1005, 1
1501, 1505, 1
2001, 2005, 1
21, 61, 20
521, 561, 20
1021, 1061, 20
1521, 1561, 20
2021, 2061, 20
91, 171, 20
591, 671, 20
1091, 1171, 20
1591, 1671, 20
2091, 2171, 20
29, 69, 20
529, 569, 20
1029, 1069, 20
1529, 1569, 20
2029, 2069, 20
107, 187, 20
607, 687, 20
1107, 1187, 20
1607, 1687, 20
2107, 2187, 20
** BOTTOM CORNER
221, 2221, 500
261, 2261, 500
301, 381, 40
801, 881, 40
421, 461, 40
921, 961, 40
1301, 1341, 40
1381, 1461, 40
1801, 1961, 40
2301, 2381, 40
253, 2253, 500
293, 2293, 500
333, 413, 40
833, 913, 40
453, 493, 40
953, 993, 40
1333, 1373, 40
1413, 1493, 40
1833, 1993, 40
2333, 2413, 40
** WALL
2221, 9021, 200
2261, 9061, 200
2301, 9501, 200
2341, 9541, 200
2381, 9581, 200
2253, 9053, 200
2293, 9093, 200
2333, 9533, 200

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2373, 9573, 200
2413, 9613, 200
** HEAD
10501, 10505, 1
11001, 11005, 1
11501, 11505, 1
12001, 12005, 1
10521, 10561, 20
11021, 11061, 20
11521, 11561, 20
12021, 12061, 20
10591, 10671, 20
11091, 11171, 20
11591, 11671, 20
12091, 12171, 20
10221, 12221, 500
10261, 12261, 500
11301, 12301, 500
11341, 12341, 500
**
10529, 10569, 20
11029, 11069, 20
11529, 11569, 20
12029, 12069, 20
10607, 10687, 20
11107, 11187, 20
11607, 11687, 20
12107, 12187, 20
10253, 12253, 500
10293, 12293, 500
11333, 12333, 500
11373, 12373, 500
** SP1
21002, 21018, 1
21302, 21318, 1
20701, 21601, 300
20719, 21619, 300
20951, 21851, 300
20979, 21879, 300
** SP2
22502, 22518, 1
22802, 22818, 1
22201, 23101, 300
22219, 23119, 300
22451, 23351, 300
22479, 23379, 300
** SP3
24002, 24018, 1
24302, 24318, 1
23701, 24601, 300
23719, 24619, 300
23951, 24851, 300
23979, 24879, 300
** SP4
25502, 25518, 1
25802, 25818, 1
25201, 26101, 300
25219, 26119, 300
25451, 26351, 300
25479, 26379, 300
** SP5
27002, 27018, 1
27302, 27318, 1
26701, 27601, 300
26719, 27619, 300
26951, 27851, 300
26979, 27879, 300
** SP6
28502, 28518, 1

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28802, 28818, 1
28201, 29101, 300
28219, 29119, 300
28451, 29351, 300
28479, 29379, 300
** SP7
30002, 30018, 1
30302, 30318, 1
29701, 30601, 300
29719, 30619, 300
29951, 30851, 300
29979, 30879, 300
** SP8
31502, 31518, 1
31802, 31818, 1
31201, 32101, 300
31219, 32119, 300
31451, 32351, 300
31479, 32379, 300
** SP9
33002, 33018, 1
33302, 33318, 1
32701, 33601, 300
32719, 33619, 300
32951, 33851, 300
32979, 33879, 300
** TOP
33901, 33919, 1
34201, 34219, 1
** CENTRAL FUEL CELL
20408, 34208, 300
20412, 34212, 300
20409, 20411, 1
20709, 20711, 1
*BOUNDARY
12003, 3, 3
40000, 3, 6
90000, 1, 6
YSYMM, YSYMM
*INITIAL CONDITIONS, TYPE=VELOCITY
ALLND, 1, +96.3
*****
** STEP 1
*****
*STEP
*DYNAMIC, EXPLICIT
, 50.0E-3
*RESTART, WRITE, NUMBER INTERVAL=5
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE SKID BOTTOM AND THE TARGET
**
*SURFACE DEFINITION, NAME=TGTOP
TARGET, SPOS
*SURFACE DEFINITION, NAME=SKID
SKID, SNEG
*CONTACT PAIR, PENALTY
SKID, TGTOP
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE CASK INSIDE SURFACE AND THE BASKET
**
*NSET, NSET=TRODNDB
20545, 20555, 20845, 20855
*NSET, NSET=TRODNBT
34645, 34655
*NSET, NSET=TRODND
TRODNDB, TRODNBT
*NSET, NSET=FCCBEB, GENERATE

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20433, 20437, 1
20453, 20457, 1
20473, 20477, 1
20493, 20497, 1
20513, 20517, 1
20533, 20537, 1
*NSET, NSET=FCCBET, GENERATE
20733, 20737, 1
20753, 20757, 1
20773, 20777, 1
20793, 20797, 1
20813, 20817, 1
20833, 20837, 1
*CONTACT NODE SET, NAME=BASKO
SP1RNG, SP2RNG, SP3RNG, SP4RNG, SP5RNG, SP6RNG, SP7
RNG, SP8RNG, SP9RNG
SP1, TOP, TRODND, FCABEB, FCABET, FCBEB, FCBET, FC
CBEB, FCCBET, FCHBEB, FCHBET
*CONTACT NODE SET, NAME=BASKTP
TOP, TRODNDT
*ELSET, ELSET=CASKS2, GENERATE
1501, 1718, 1
*ELSET, ELSET=CASKS6, GENERATE
2221, 2252, 1
2421, 2452, 1
2621, 2652, 1
2821, 2852, 1
3021, 3052, 1
3221, 3252, 1
3421, 3452, 1
3621, 3652, 1
3821, 3852, 1
4021, 4052, 1
4221, 4252, 1
4421, 4452, 1
4621, 4652, 1
4821, 4852, 1
5021, 5052, 1
5221, 5252, 1
5421, 5452, 1
5621, 5652, 1
5821, 5852, 1
6021, 6052, 1
6221, 6252, 1
6421, 6452, 1
6621, 6652, 1
6821, 6852, 1
7021, 7052, 1
7221, 7252, 1
7421, 7452, 1
7621, 7652, 1
7821, 7852, 1
8021, 8052, 1
8221, 8252, 1
8421, 8452, 1
8621, 8652, 1
8821, 8852, 1
*ELSET, ELSET=CASKS6A, GENERATE
10221, 10252, 1
*ELSET, ELSET=CASKS1, GENERATE
10501, 10718, 1
*SURFACE DEFINITION, NAME=CASKI1
CASKS2, S2
CASKS6, S6
*SURFACE DEFINITION, NAME=CASKI2
CASKS1, S1
CASKS6A, S6
*CONTACT PAIR
BASKO, CASKI1

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*CONTACT PAIR
BASKTP, CASKI2
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE FUEL ROD OUTER LAYER WITH BOTTOM TIE
PLATE
**
*CONTACT NODE SET, NAME=FAROB, GENERATE
61001, 61056, 1
*SURFACE DEFINITION, NAME=FABMT
FABM, S2
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE FUEL ROD OUTER LAYER WITH TOP TIE
PLATE
**
*CONTACT NODE SET, NAME=FAROT, GENERATE
69201, 69256, 1
*SURFACE DEFINITION, NAME=FATPB
FATP, S1
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE FUEL CHANNEL A INSIDE SURFACE AND THE
FUEL BUNDLE A
**
*SURFACE DEFINITION, NAME=FCAISH
FCABE, S2
*SURFACE DEFINITION, NAME=FCAISL
FCAR, SPOS
FCAS, SPOS
*CONTACT NODE SET, NAME=FUELA
FUELA,
*CONTACT PAIR
FUELA, FCAISH
FUELA, FCAISL
*****
*CONTACT NODE SET, NAME=FUELATP
FATP,
*CONTACT PAIR
FUELATP, CASKI2
**
** DEFINE THE CONTACT SURFACES BETWEEN
** OUTER FUEL RODS AND INNER FUEL RODS
**
*CONTACT NODE SET, NAME=FARO
FARO,
*SURFACE DEFINITION, NAME=FARI
FARI, SNEG
*CONTACT PAIR
FARO, FARI
*****
** FA FUEL ASSEMBLY INTERNALS (TOP)
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE CASK HEAD FUEL ASSEMBLY SPACER AND
HEAD
**
*SURFACE DEFINITION, NAME=FATSPTHD
FATSPR2, S2
*CONTACT PAIR, ADJUST=0.1, TIED
FATSPTHD, CASKI2
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE CASK HEAD FUEL ASSEMBLY SPACER AND
FUELA TOP
**
*SURFACE DEFINITION, NAME=FATSPTFA
FATSPR1, S1

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*SURFACE DEFINITION,NAME=FATPT
FATP, S2
*CONTACT PAIR, WEIGHT=0.5
FATSPTFA, FATPT
**
**  DEFINE THE CONTACT SURFACES BETWEEN
**  THE FUEL CHANNEL A INSIDE SURFACE AND TOP
SPEACER A
**
*ELSET, ELSET=FCATFASP, GENERATE
33623, 33626, 1
33663, 33666, 1
33643, 33646, 1
33703, 33706, 1
33683, 33684, 1
33923, 33926, 1
33963, 33966, 1
33943, 33946, 1
34003, 34006, 1
33983, 33984, 1
*SURFACE DEFINITION,NAME=FCATFASP
FCATFASP, SPOS
*CONTACT NODE SET,NAME=FATSPR
FATSPR,
*CONTACT PAIR
FATSPR, FCATFASP
**
**  FA FUEL ASSEMBLY INTERNALS (BOTTOM)
**
**  DEFINE THE CONTACT SURFACES BETWEEN
**  THE FUEL ASSEMBLY BOTTOM SPACER AND FCA
BOTTOM PLATE
**
*SURFACE DEFINITION,NAME=FABSPTBE
FABSPTBE, S1
*SURFACE DEFINITION,NAME=FCABET
FCABET, S2
*CONTACT PAIR, WEIGHT=0.5
FABSPTBE, FCABET
**
**  DEFINE THE CONTACT SURFACES BETWEEN
**  THE FUEL ASSEMBLY BOTTOM SPACER AND FUELA
BOTTOM PLATE
**
*SURFACE DEFINITION,NAME=FABSPTBM
FABSPTBM, S2
*SURFACE DEFINITION,NAME=FABMBM
FABMBM, S1
*CONTACT PAIR, WEIGHT=0.5
FABSPTBM, FABMBM
**
**  DEFINE THE CONTACT SURFACES BETWEEN
**  THE FUEL CHANNEL A INSIDE SURFACE AND
BOTTOM SPEACER A
**
*ELSET, ELSET=FCABTBSP, GENERATE
20723, 20726, 1
21023, 21026, 1
21323, 21326, 1
20764, 20766, 1
20783, 20784, 1
21064, 21066, 1
21083, 21084, 1
21364, 21366, 1
21383, 21384, 1
20803, 20806, 1
21103, 21106, 1
21403, 21406, 1
20743, 20746, 1
20763, 20763, 1
21043, 21046, 1
21063, 21063, 1
21343, 21346, 1
21363, 21363, 1
*SURFACE DEFINITION,NAME=FCABTBSP
FCABTBSP, SPOS
*CONTACT NODE SET,NAME=FABSPR
FABSPR,
*CONTACT PAIR
FABSPR, FCABTBSP
*****
**
**  DEFINE THE CONTACT SURFACES BETWEEN
**  THE CASK AND BOTTOM PIVOT
**
*SURFACE DEFINITION,NAME=BPIVB
BPIVB, SNEG
*ELSET, ELSET=CSKPIV1, GENERATE
356, 359, 1
396, 399, 1
1976, 1979, 1
*ELSET, ELSET=CSKPIV4, GENERATE
2356, 2359, 1
2556, 2559, 1
*SURFACE DEFINITION,NAME=CSKPIV
CSKPIV1, S1
CSKPIV4, S4
*CONTACT PAIR, ADJUST=1.0, TIED
CSKPIV, BPIVB
*****
**  OUTPUT DATA
*****
*NSET, NSET=RFORCE
90000,30000
*NSET, NSET=DISP
5781, 5797, 5813
21001,21017,21033
25005,25406,25806,26206,26606,27006,27406
27806,28206,28606,29205
34201,34219,34230
*HISTORY OUTPUT, TIME=1.E-4
*NODE HISTORY,NSET=RFORCE
RF,
*NODE HISTORY,NSET=DISP
A,V,U
*ENERGY HISTORY
ALLKE,
*FILE OUTPUT, NUMBER INTERVAL=100
*NODE FILE,NSET=RFORCE
RF,
*MONITOR,NODE=5797,DOF=1
*END STEP

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E-8.5.2 Hypothetical Accident Conditions Input Files

E-8.5.2.1 IF-300 Cask Impact Analysis 30-ft Bottom-End Drop

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*HEADING
IF-300 CASK IMPACT ANALYSIS
12/20/01
FILE=IFBBE30

2001 model with modified Zircaloy data

*****
** CASK BOTTOM
*****
*NODE, SYSTEM=R
*NODE, NSET=OSB1
1, -3.0000, 0.0000, 0.0000
2, -1.5000, 0.0000, 0.0000
3, 0.0000, 0.0000, 0.0000
4, 1.5000, 0.0000, 0.0000
5, 3.0000, 0.0000, 0.0000
6, -2.7000, 1.2000, 0.0000
7, -1.3500, 1.3500, 0.0000
8, 0.0000, 1.5000, 0.0000
9, 1.3500, 1.3500, 0.0000
10, 2.7000, 1.2000, 0.0000
11, -2.4000, 2.4000, 0.0000
12, -1.2000, 2.7000, 0.0000
13, 0.0000, 3.0000, 0.0000
14, 1.2000, 2.7000, 0.0000
15, 2.4000, 2.4000, 0.0000
21, 4.5625, 0.0000, 0.0000
22, 4.1794, 1.7720, 0.0000
23, 3.3655, 3.3655, 0.0000
24, 1.7720, 4.1794, 0.0000
25, 0.0000, 4.5625, 0.0000
26, -1.7720, 4.1794, 0.0000
27, -3.3655, 3.3655, 0.0000
28, -4.1794, 1.7720, 0.0000
29, -4.5625, 0.0000, 0.0000
*NODE, NSET=OSB2
41, 6.1250, 0.0000, 0.0000
61, 8.0750, 0.0000, 0.0000
*NCOPY,SHIFT,MULTIPLE=8,CHANGE NU=+1,OLD
SET=OSB2,NEW SET=OSB2
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +22.50
*NODE, NSET=OSB3
91, 10.0250, 0.0000, 0.0000
111, 11.9750, 0.0000, 0.0000
131, 13.9250, 0.0000, 0.0000
151, 15.8750, 0.0000, 0.0000
171, 17.2975, 0.0000, 0.0000
*NCOPY,SHIFT,MULTIPLE=16,CHANGE NU=+1,OLD
SET=OSB3,NEW SET=OSB3
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +11.25
*NODE, NSET=OSB4
221, 18.7500, 0.0000, 0.0000
*NCOPY,SHIFT,MULTIPLE=32,CHANGE NU=+1,OLD
SET=OSB4,NEW SET=OSB4
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +5.625
*NSET, NSET=OSBB
OSB1, OSB2, OSB3, OSB4
*NCOPY,SHIFT,CHANGE NU=+500,OLD SET=OSBB,NEW
SET=OSBU1
0.0, 0.0, 1.563
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+500,OLD SET=OSBU1,NEW
SET=OSBU2
0.0, 0.0, 1.9375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+500,OLD SET=OSBU2,NEW
SET=OSBU3
0.0, 0.0, 1.9375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+500,OLD SET=OSBU3,NEW
SET=OSBT
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=OSB
OSBB,OSBU1,OSBU2,OSBU3,OSBT
*****
*ELEMENT, TYPE=C3D8R, ELSET=OSB1
1, 1, 2, 7, 6, 501, 502, 507, 506
*ELGEN, ELSET=OSB1
1, 4, 1, 1, 2, 5, 4
*ELEMENT, TYPE=C3D8R, ELSET=OSB1
9, 5, 21, 22, 10, 505, 521, 522, 510
10, 10, 22, 23, 15, 510, 522, 523, 515
11, 15, 23, 24, 14, 515, 523, 524, 514
12, 14, 24, 25, 13, 514, 524, 525, 513
13, 13, 25, 26, 12, 513, 525, 526, 512
14, 12, 26, 27, 11, 512, 526, 527, 511
15, 11, 27, 28, 6, 511, 527, 528, 506
16, 6, 28, 29, 1, 506, 528, 529, 501
*ELEMENT, TYPE=C3D8R
21, 21, 41, 42, 22, 521, 541, 542, 522
*ELGEN, ELSET=OSB2
21, 8, 1, 1, 2, 20, 20
*ELEMENT, TYPE=C3D6, ELSET=OSB3
61, 61, 91, 92, 561, 591, 592
62, 61, 92, 62, 561, 592, 562
63, 62, 92, 93, 562, 592, 593
64, 62, 93, 94, 562, 593, 594
65, 62, 94, 63, 562, 594, 563
66, 63, 94, 95, 563, 594, 595
67, 63, 95, 96, 563, 595, 596
68, 63, 96, 64, 563, 596, 564
69, 64, 96, 97, 564, 596, 597
70, 64, 97, 98, 564, 597, 598
71, 64, 98, 65, 564, 598, 565
72, 65, 98, 99, 565, 598, 599
73, 65, 99, 100, 565, 599, 600
74, 65, 100, 66, 565, 600, 566
75, 66, 100, 101, 566, 600, 601
76, 66, 101, 102, 566, 601, 602
77, 66, 102, 67, 566, 602, 567
78, 67, 102, 103, 567, 602, 603
79, 67, 103, 104, 567, 603, 604
80, 67, 104, 68, 567, 604, 568
81, 68, 104, 105, 568, 604, 605
82, 68, 105, 106, 568, 605, 606
83, 68, 106, 69, 568, 606, 569
84, 69, 106, 107, 569, 606, 607
*ELEMENT, TYPE=C3D8R
91, 91, 111, 112, 92, 591, 611, 612, 592
*ELGEN, ELSET=OSB3
91, 16, 1, 1, 4, 20, 20
*ELEMENT, TYPE=C3D6, ELSET=OSB4

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171, 171, 221, 222, 671, 721, 722
172, 171, 222, 172, 671, 722, 672
173, 172, 222, 223, 672, 722, 723
174, 172, 223, 224, 672, 723, 724
175, 172, 224, 173, 672, 724, 673
176, 173, 224, 225, 673, 724, 725
177, 173, 225, 226, 673, 725, 726
178, 173, 226, 174, 673, 726, 674
179, 174, 226, 227, 674, 726, 727
180, 174, 227, 228, 674, 727, 728
181, 174, 228, 175, 674, 728, 675
182, 175, 228, 229, 675, 728, 729
183, 175, 229, 230, 675, 729, 730
184, 175, 230, 176, 675, 730, 676
185, 176, 230, 231, 676, 730, 731
186, 176, 231, 232, 676, 731, 732
187, 176, 232, 177, 676, 732, 677
188, 177, 232, 233, 677, 732, 733
189, 177, 233, 234, 677, 733, 734
190, 177, 234, 178, 677, 734, 678
191, 178, 234, 235, 678, 734, 735
192, 178, 235, 236, 678, 735, 736
193, 178, 236, 179, 678, 736, 679
194, 179, 236, 237, 679, 736, 737
195, 179, 237, 238, 679, 737, 738
196, 179, 238, 180, 679, 738, 680
197, 180, 238, 239, 680, 738, 739
198, 180, 239, 240, 680, 739, 740
199, 180, 240, 181, 680, 740, 681
200, 181, 240, 241, 681, 740, 741
201, 181, 241, 242, 681, 741, 742
202, 181, 242, 182, 681, 742, 682
203, 182, 242, 243, 682, 742, 743
204, 182, 243, 244, 682, 743, 744
205, 182, 244, 183, 682, 744, 683
206, 183, 244, 245, 683, 744, 745
207, 183, 245, 246, 683, 745, 746
208, 183, 246, 184, 683, 746, 684
209, 184, 246, 247, 684, 746, 747
210, 184, 247, 248, 684, 747, 748
211, 184, 248, 185, 684, 748, 685
212, 185, 248, 249, 685, 748, 749
213, 185, 249, 250, 685, 749, 750
214, 185, 250, 186, 685, 750, 686
215, 186, 250, 251, 686, 750, 751
216, 186, 251, 252, 686, 751, 752
217, 186, 252, 187, 686, 752, 687
218, 187, 252, 253, 687, 752, 753
*ELSET, ELSET=OSB
OSB1, OSB2, OSB3, OSB4
*ELCOPY, OLD SET=OSB, NEW SET=DUB1, ELEMENT
SH=500, SHIFT NOD=500
*ELCOPY, OLD SET=DUB1, NEW SET=DUB2, ELEMENT
SH=500, SHIFT NOD=500
*ELCOPY, OLD SET=DUB2, NEW SET=ISB, ELEMENT
SH=500, SHIFT NOD=500
*ELSET, ELSET=DUB
DUB1, DUB2
*SOLID SECTION, ELSET=OSB, MATERIAL=S304
*SOLID SECTION, ELSET=ISB, MATERIAL=S304
*SOLID SECTION, ELSET=DUB, MATERIAL=DURAN
*****
** CASK BOTTOM CORNER
*****
*NODE, NSET=OSBC
261, 19.2800, 0.0000, 0.0000
301, 21.5168, 0.0000, 0.4141
341, 23.2817, 0.0000, 1.5933
381, 24.4609, 0.0000, 3.3582
761, 19.2800, 0.0000, 1.5630
801, 20.9198, 0.0000, 1.8553
841, 22.1786, 0.0000, 2.6964
881, 23.0197, 0.0000, 3.9552
421, 19.2800, 0.0000, 2.5323
461, 20.5477, 0.0000, 2.7536
921, 21.5590, 0.0000, 3.3160
961, 22.1214, 0.0000, 4.3273
1261, 19.2800, 0.0000, 3.5005
1301, 20.2880, 0.0000, 3.5016
1341, 21.1098, 0.0000, 3.7653
1381, 19.2800, 0.0000, 4.4698
1421, 20.2880, 0.0000, 4.4708
1461, 21.2960, 0.0000, 4.4708
*NCOPY, SHIFT, MULTIPLE=32, CHANGE NU=+1, OLD
SET=OSBC, NEW SET=OSBC
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +5.625
**
*NODE, NSET=WBS1
1761, 19.2800, 0.0000, 5.4400
1801, 20.2880, 0.0000, 5.4400
1841, 21.2960, 0.0000, 5.4400
1881, 22.3040, 0.0000, 5.4400
1921, 23.3120, 0.0000, 5.4400
1961, 24.8750, 0.0000, 5.4400
*NCOPY, SHIFT, MULTIPLE=32, CHANGE NU=+1, OLD
SET=WBS1, NEW SET=WBS1
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +5.625
*NODE, NSET=WBS2
2261, 19.2800, 0.0000, 6.6900
2301, 21.2960, 0.0000, 6.6900
2341, 23.3120, 0.0000, 6.6900
2381, 24.8750, 0.0000, 6.6900
*NCOPY, SHIFT, MULTIPLE=32, CHANGE NU=+1, OLD
SET=WBS2, NEW SET=WBS2
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +5.625
*NSET, NSET=OSC
OSBC, WBS1, WBS2
*NSET, NSET=WIS1, GENERATE
2221, 2253, 1
*NSET, NSET=WBASE
WIS1, WBS2
*****
*ELEMENT, TYPE=C3D8R
221, 221, 261, 262, 222, 721, 761, 762, 722
381, 381, 1961, 1962, 382, 881, 1921, 1922,
882
1961, 1961, 2381, 2332, 1962, 1921, 2341, 2342,
1922
761, 761, 801, 802, 762, 421, 461, 462, 422
801, 801, 841, 842, 802, 461, 921, 922, 462
841, 841, 881, 882, 842, 921, 961, 962, 922
881, 881, 1921, 1922, 882, 961, 1881, 1882,
962
421, 421, 461, 462, 422, 1261, 1301, 1302,
1262
461, 461, 921, 922, 462, 1301, 1341, 1342,
1302
921, 921, 961, 962, 922, 1341, 1461, 1462,
1342
961, 961, 1881, 1882, 962, 1461, 1841, 1842,
1462
1261, 1261, 1301, 1302, 1262, 1381, 1421,
1422, 1382
1381, 1381, 1421, 1422, 1382, 1761, 1801,
1802, 1762

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1721, 1721, 1761, 1762, 1722, 2221, 2261,
2262, 2222
*ELEMENT, TYPE=C3D6
721, 722, 762, 422, 721, 761, 421
1221, 722, 422, 1222, 721, 421, 1221
2001, 422, 1262, 1222, 421, 1261, 1221
2041, 1222, 1262, 1382, 1221, 1261, 1381
2081, 1222, 1382, 1722, 1221, 1381, 1721
2121, 1382, 1762, 1722, 1381, 1761, 1721
**
2161, 1762, 1802, 2262, 1761, 1801, 2261
1761, 1802, 2302, 2262, 1801, 2301, 2261
1801, 1802, 1842, 2302, 1801, 1841, 2301
1841, 1842, 1882, 2302, 1841, 1881, 2301
1881, 1882, 2342, 2302, 1881, 2341, 2301
1921, 1882, 1922, 2342, 1881, 1921, 2341
*ELGEN, ELSET=OSC
221, 32, 1, 1, 4, 40, 40
381, 32, 1, 1
1961, 32, 1, 1
*ELGEN, ELSET=DUC
761, 32, 1, 1
801, 32, 1, 1
841, 32, 1, 1
881, 32, 1, 1
421, 32, 1, 1
461, 32, 1, 1
921, 32, 1, 1
961, 32, 1, 1
1261, 32, 1, 1, 2, 40, 40
1381, 32, 1, 1, 2, 40, 40
721, 32, 1, 1
1221, 32, 1, 1
2001, 32, 1, 1
2041, 32, 1, 1
2081, 32, 1, 1
2121, 32, 1, 1
2161, 32, 1, 1
1761, 32, 1, 1
1801, 32, 1, 1
1841, 32, 1, 1
1881, 32, 1, 1
1921, 32, 1, 1
*ELGEN, ELSET=ISC
1721, 32, 1, 1
*SOLID SECTION, ELSET=OSC, MATERIAL=S304
*SOLID SECTION, ELSET=ISC, MATERIAL=S304
*SOLID SECTION, ELSET=DUC, MATERIAL=DURAN
*****
** CASK WALL
*****
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=WBASE,NEW
SET=W1
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+400,OLD SET=W1,NEW
SET=W2
0.0, 0.0, 6.935
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=W2A
W1, W2, 2, 200
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=W2,NEW
SET=W3
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+800,OLD SET=W3,NEW
SET=W4
0.0, 0.0, 15.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0

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*NFILL, NSET=W4A
W3, W4, 4, 200
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=W4,NEW
SET=W5
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+4000,OLD SET=W5,NEW
SET=W6
0.0, 0.0, 123.93
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=W6A
W5, W6, 20, 200
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=W6,NEW
SET=W7
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+600,OLD SET=W7,NEW
SET=W8
0.0, 0.0, 12.625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=W8A
W7, W8, 3, 200
*NODE, NSET=W9
9021, 18.7500, 0.0000, 174.0550
9061, 19.6750, 0.0000, 174.0550
9101, 20.6000, 0.0000, 174.0550
9141, 22.7375, 0.0000, 174.0550
9181, 24.8750, 0.0000, 174.0550
*NCOPY,SHIFT,MULTIPLE=32,CHANGE NU=+1,OLD
SET=W9,NEW SET=W9
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +5.625
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=W9,NEW
SET=W10
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=W10,NEW
SET=W11
0.0, 0.0, 0.875
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
***** MODIFY NODES TO ACCEPT STRUCTURAL RINGS
*NODE, NSET=WMOD1
2981, 24.8750, 0.0000, 14.0110
2982, 24.7552, 2.4382, 14.0215
2983, 24.3970, 4.8529, 14.0529
2984, 23.8039, 7.2208, 14.1048
2985, 22.9815, 9.5193, 14.1767
2986, 21.9378, 11.7260, 14.2680
2987, 20.6828, 13.8198, 14.3778
2988, 19.2286, 15.7805, 14.5050
2989, 17.5893, 17.5893, 14.6485
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=WMOD1,NEW
SET=WMOD1A
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NODE, NSET=WMOD2
3981, 24.8750, 0.0000, 32.7390
3982, 24.7552, 2.4382, 32.7285
3983, 24.3970, 4.8529, 32.6971
3984, 23.8039, 7.2208, 32.6452
3985, 22.9815, 9.5193, 32.5733
3986, 21.9378, 11.7260, 32.4820
3987, 20.6828, 13.8198, 32.3722
3988, 19.2286, 15.7805, 32.2450
3989, 17.5893, 17.5893, 32.1015
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=WMOD2,NEW
SET=WMOD2A
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0

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**
*NODE, NSET=WMOD3
8181, 24.8750, 0.0000, 156.1910
8182, 24.7552, 2.4382, 156.2015
8183, 24.3970, 4.8529, 156.2329
8184, 23.8039, 7.2208, 156.2848
8185, 22.9815, 9.5193, 156.3567
8186, 21.9378, 11.7260, 156.4480
8187, 20.6828, 13.8198, 156.5578
8188, 19.2286, 15.7805, 156.6850
8189, 17.5893, 17.5893, 156.8285
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=WMOD3,NEW
SET=WMOD3A
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
**
*NODE, NSET=WMOD4
9181, 24.8750, 0.0000, 174.9190
9182, 24.7552, 2.4382, 174.9085
9183, 24.3970, 4.8529, 174.8771
9184, 23.8039, 7.2208, 174.8252
9185, 22.9815, 9.5193, 174.7533
9186, 21.9378, 11.7260, 174.6620
9187, 20.6828, 13.8198, 174.5522
9188, 19.2286, 15.7805, 174.4250
9189, 17.5893, 17.5893, 174.2815
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=WMOD4,NEW
SET=WMOD4A
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=WMOD
WMOD1A, WMOD2A, WMOD3A, WMOD4A
*NSET, NSET=WALL
W1,W2A,W3,W4A,W5,W6A,W7,W8A,W9,W10,W11,WMOD
*****
*ELEMENT, TYPE=C3D8R
2221, 2221, 2261, 2262, 2222, 2421, 2461,
2462, 2422
*ELGEN, ELSET=ISW
2221, 32, 1, 1, 33, 200, 200
**
*ELEMENT, TYPE=C3D8R
2261, 2261, 2301, 2302, 2262, 2461, 2501,
2502, 2462
*ELGEN, ELSET=DUW
2261, 32, 1, 1, 2, 40, 40, 33, 200, 200
**
*ELEMENT, TYPE=C3D8R
2341, 2341, 2381, 2382, 2342, 2541, 2581,
2582, 2542
*ELGEN, ELSET=OSW
2341, 32, 1, 1, 33, 200, 200
*SOLID SECTION, ELSET=OSW, MATERIAL=S317
*SOLID SECTION, ELSET=DUW, MATERIAL=DURAN
*SOLID SECTION, ELSET=ISW, MATERIAL=S216
*****
** CASK FLANGE
*****
*ELEMENT, TYPE=C3D8R
8821, 8821, 8861, 8862, 8822, 9021, 9061,
9062, 9022
9101, 9101, 9141, 9142, 9102, 9301, 9341,
9342, 9302
*ELGEN, ELSET=CFL
8821, 32, 1, 1, 4, 40, 40
9101, 32, 1, 1, 2, 40, 40, 2, 200, 200
*SOLID SECTION, ELSET=CFL, MATERIAL=S304
*****
** CASK HEAD

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*****
*NCOPY,SHIFT,CHANGE NU=+10000,OLD
SET=OSBB,NEW SET=CHDB0
0.0, 0.0, 174.43
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NODE, NSET=CHDB1
10221, 18.7500, 0.0000, 174.4300
10261, 20.6000, 0.0000, 174.4300
10301, 22.7375, 0.0000, 174.4300
10341, 24.8750, 0.0000, 174.4300
*NCOPY,SHIFT,MULTIPLE=32,CHANGE NU=+1,OLD
SET=CHDB1,NEW SET=CHDB1
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +5.625
*NSET, NSET=CHDB
CHDB0, CHDB1
*NCOPY,SHIFT,CHANGE NU=+500,OLD SET=CHDB,NEW
SET=CHD1
0.0, 0.0, 1.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+500,OLD SET=CHD1,NEW
SET=CHD2
0.0, 0.0, 1.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+500,OLD SET=CHD2,NEW
SET=CHD3
0.0, 0.0, 3.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+500,OLD SET=CHD3,NEW
SET=CHD4
0.0, 0.0, 2.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=CHD
CHDB, CHD1, CHD2, CHD3, CHD4
*****
*ELEMENT, TYPE=C3D8R
10221, 10221, 10261, 10262, 10222, 10721,
9501, 9502, 10722
10721, 10721, 9501, 9502, 10722, 11221,
11261, 11262, 11222
10761, 9501, 9541, 9542, 9502, 11261, 11301,
11302, 11262
11221, 11221, 11261, 11262, 11222, 11721,
11761, 11762, 11722
*ELGEN, ELSET=CHD1
10221, 32, 1, 1
10721, 32, 1, 1
10761, 32, 1, 1, 2, 40, 40
11221, 32, 1, 1, 3, 40, 40, 2, 500, 500
*ELCOPY,OLD SET=OSB,NEW SET=CHDB,ELEMENT
SH=10500,SHIFT NOD=10500
*ELCOPY,OLD SET=CHDB,NEW SET=CHDU,ELEMENT
SH=500,SHIFT NOD=500
*ELCOPY,OLD SET=CHDU,NEW SET=CHDT,ELEMENT
SH=500,SHIFT NOD=500
*ELSET, ELSET=CHDS
CHD1, CHDB, CHDT
*SOLID SECTION, ELSET=CHDS, MATERIAL=S304
*SOLID SECTION, ELSET=CHDU, MATERIAL=DURAN
*****
** CASK HEAD TOP FUEL CHANNEL SPACER (A)
*****
*NODE, NSET=FATSPR1
13001, -14.3000, 1.3500, 171.9300
13002, -10.3000, 1.3500, 171.9300
13003, -6.3000, 1.3500, 171.9300
13004, -6.3000, 5.3500, 171.9300
13005, -6.3000, 9.3500, 171.9300
13006, -10.3000, 9.3500, 171.9300

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13007, -14.3000, 9.3500, 171.9300
13008, -14.3000, 5.3500, 171.9300
13011, -13.3334, 2.3666, 171.9300
13012, -10.3000, 1.9593, 171.9300
13013, -7.3166, 2.3666, 171.9300
13014, -6.9093, 5.3500, 171.9300
13015, -7.3166, 8.3334, 171.9300
13016, -10.3000, 8.7408, 171.9300
13017, -13.3334, 8.3334, 171.9300
13018, -13.6908, 5.3500, 171.9300
13021, -12.2668, 3.3832, 171.9300
13022, -10.3000, 2.5685, 171.9300
13023, -8.3332, 3.3832, 171.9300
13024, -7.5185, 5.3500, 171.9300
13025, -8.3332, 7.3168, 171.9300
13026, -10.3000, 8.1315, 171.9300
13027, -12.2668, 7.3168, 171.9300
13028, -13.0815, 5.3500, 171.9300
13031, -12.0017, 3.6483, 171.9300
13032, -10.3000, 2.9435, 171.9300
13033, -8.5983, 3.6483, 171.9300
13034, -7.8935, 5.3500, 171.9300
13035, -8.5983, 7.0517, 171.9300
13036, -10.3000, 7.7565, 171.9300
13037, -12.0017, 7.0517, 171.9300
13038, -12.7065, 5.3500, 171.9300
13040, -10.3000, 5.3500, 171.9300
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FATSPR1,NEW SET=FATSPR2
0.0, 0.0, 0.375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FATSPR2,NEW SET=FATSPR3
0.0, 0.0, 0.5416
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FATSPR3,NEW SET=FATSPR4
0.0, 0.0, 0.5416
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FATSPR4,NEW SET=FATSPR5
0.0, 0.0, 0.5416
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FATSPR5,NEW SET=FATSPR6
0.0, 0.0, 0.5416
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FATSPR6,NEW SET=FATSPR7
0.0, 0.0, 0.5416
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FATSPR7,NEW SET=FATSPR8
0.0, 0.0, 0.5420
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FATSPR8,NEW SET=FATSPR9
0.0, 0.0, 0.625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FATSPR
FATSPR1, FATSPR2, FATSPR3, FATSPR4, FATSPR5, FATSPR
R6, FATSPR7, FATSPR8, FATSPR9
*****
*ELEMENT, TYPE=C3D8R, ELSET=FATSPR1
13001, 13001, 13002, 13012, 13011, 13051,
13052, 13062, 13061
13008, 13008, 13001, 13011, 13018, 13058,
13051, 13061, 13068
*ELGEN, ELSET=FATSPR1

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13001, 7, 1, 3, 10, 10
13008, 3, 10, 10
*ELEMENT, TYPE=C3D6, ELSET=FATSPR1
13031, 13031, 13032, 13040, 13081, 13082,
13090
13032, 13032, 13033, 13040, 13082, 13083,
13090
13033, 13033, 13034, 13040, 13083, 13084,
13090
13034, 13034, 13035, 13040, 13084, 13085,
13090
13035, 13035, 13036, 13040, 13085, 13086,
13090
13036, 13036, 13037, 13040, 13086, 13087,
13090
13037, 13037, 13038, 13040, 13087, 13088,
13090
13038, 13038, 13031, 13040, 13088, 13081,
13090
*ELEMENT, TYPE=C3D8R, ELSET=FATSPRP
13071, 13071, 13072, 13082, 13081, 13121,
13122, 13132, 13131
13078, 13078, 13071, 13081, 13088, 13128,
13121, 13131, 13138
*ELGEN, ELSET=FATSPRP
13071, 7, 1, 1, 6, 50, 50
13078, 6, 50, 50
*ELCOPY,OLD SET=FATSPR1,NEW
SET=FATSPR2,ELEMENT SH=350,SHIFT NOD=350
*ELSET, ELSET=FATSPR
FATSPR1,FATSPR2,FATSPRP
*SOLID SECTION, ELSET=FATSPR, MATERIAL=S304
*****
** CASK BOTTOM FUEL CHANNEL SPACER (A)
*****
*NCOPY,SHIFT,CHANGE NU=+500,OLD
SET=FATSPR1,NEW SET=FABSPR1
0.0, 0.0, -164.11
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FABSPR1,NEW SET=FABSPR2
0.0, 0.0, 1.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FABSPR2,NEW SET=FABSPR3
0.0, 0.0, 0.375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FABSPR3,NEW SET=FABSPR4
0.0, 0.0, 0.375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FABSPR4,NEW SET=FABSPR5
0.0, 0.0, 0.375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FABSPR5,NEW SET=FABSPR6
0.0, 0.0, 0.375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FABSPR6,NEW SET=FABSPR7
0.0, 0.0, 0.375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FABSPR7,NEW SET=FABSPR8
0.0, 0.0, 0.375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FABSPR8,NEW SET=FABSPR9

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0.0, 0.0, 1.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSSET, NSET=FABSPR
FABSPR1, FABSPR2, FABSPR3, FABSPR4, FABSPR5, FABSP
R6, FABSPR7, FABSPR8, FABSPR9
*****
*ELEMENT, TYPE=C3D8R, ELSET=FABSPR1
13501, 13501, 13502, 13512, 13511, 13551,
13552, 13562, 13561
13508, 13508, 13501, 13511, 13518, 13558,
13551, 13561, 13568
*ELGEN, ELSET=FABSPR1
13501, 7, 1, 1, 3, 10, 10
13508, 3, 10, 10
*ELEMENT, TYPE=C3D6, ELSET=FABSPR1
13531, 13531, 13532, 13540, 13581, 13582,
13590
13532, 13532, 13533, 13540, 13582, 13583,
13590
13533, 13533, 13534, 13540, 13583, 13584,
13590
13534, 13534, 13535, 13540, 13584, 13585,
13590
13535, 13535, 13536, 13540, 13585, 13586,
13590
13536, 13536, 13537, 13540, 13586, 13587,
13590
13537, 13537, 13538, 13540, 13587, 13588,
13590
13538, 13538, 13531, 13540, 13588, 13581,
13590
*ELEMENT, TYPE=C3D8R, ELSET=FABSPRP
13571, 13571, 13572, 13582, 13581, 13621,
13622, 13632, 13631
13578, 13578, 13571, 13581, 13588, 13628,
13621, 13631, 13638
*ELGEN, ELSET=FABSPRP
13571, 7, 1, 1, 6, 50, 50
13578, 6, 50, 50
*ELCOPY, OLD SET=FABSPR1, NEW
SET=FABSPR2, ELEMENT SH=350, SHIFT NOD=350
*ELSET, ELSET=FABSPR
FABSPR1, FABSPR2, FABSPRP
*SOLID SECTION, ELSET=FABSPR, MATERIAL=S304
*****
** BASKET
*****
** SPACER DISK 1
*****
*NODE, NSET=SPDSK1A
21002, -16.2339, 0.0000, 10.0025
21003, -14.8000, 0.0000, 10.0025
21004, -12.5500, 0.0000, 10.0025
21005, -10.3000, 0.0000, 10.0025
21006, -8.0500, 0.0000, 10.0025
21007, -5.8000, 0.0000, 10.0025
21008, -4.5000, 0.0000, 10.0025
21009, -2.2500, 0.0000, 10.0025
21010, 0.0000, 0.0000, 10.0025
21011, 2.2500, 0.0000, 10.0025
21012, 4.5000, 0.0000, 10.0025
21013, 5.8000, 0.0000, 10.0025
21014, 8.0500, 0.0000, 10.0025
21015, 10.3000, 0.0000, 10.0025
21016, 12.5500, 0.0000, 10.0025
21017, 14.8000, 0.0000, 10.0025
21018, 16.2339, 0.0000, 10.0025

*NCOPY, SHIFT, CHANGE NU=+20, OLD
SET=SPDSK1A, NEW SET=SPDSK1B
0.0, 0.85, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY, SHIFT, CHANGE NU=+20, OLD
SET=SPDSK1B, NEW SET=SPDSK1C
0.0, 1.825, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY, SHIFT, CHANGE NU=+20, OLD
SET=SPDSK1C, NEW SET=SPDSK1D
0.0, 1.825, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY, SHIFT, CHANGE NU=+20, OLD
SET=SPDSK1D, NEW SET=SPDSK1E
0.0, 1.906, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY, SHIFT, CHANGE NU=+20, OLD
SET=SPDSK1E, NEW SET=SPDSK1F
0.0, 1.722, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY, SHIFT, CHANGE NU=+20, OLD
SET=SPDSK1F, NEW SET=SPDSK1G
0.0, 1.722, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY, SHIFT, CHANGE NU=+20, OLD
SET=SPDSK1G, NEW SET=SPDSK1H
0.0, 1.65, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY, SHIFT, CHANGE NU=+20, OLD
SET=SPDSK1H, NEW SET=SPDSK1I
0.0, 1.953, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY, SHIFT, CHANGE NU=+20, OLD
SET=SPDSK1I, NEW SET=SPDSK1J
0.0, 1.953, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
** MODIFY NODES
*NODE, NSET=SPDSKMD
21165, -10.3000, 13.3067, 10.0025
21166, -8.0500, 13.3635, 10.0025
21167, -5.8000, 13.4202, 10.0025
21186, -8.0500, 15.1271, 10.0025
21187, -5.8000, 15.3039, 10.0025
**
21173, 5.8000, 13.4202, 10.0025
21174, 8.0500, 13.3635, 10.0025
21175, 10.3000, 13.3067, 10.0025
21193, 5.8000, 15.3039, 10.0025
21194, 8.0500, 15.1271, 10.0025
**
*NODE, NSET=SPRNG1A
21001, -18.1550, 0.0000, 10.0025
21021, -18.1351, 0.8500, 10.0025
21041, -17.9568, 2.6750, 10.0025
21061, -17.5885, 4.5000, 10.0025
21081, -16.9873, 6.4060, 10.0025
21102, -16.2339, 8.1280, 10.0025
21122, -15.2506, 9.8500, 10.0025
21143, -14.0483, 11.5000, 10.0025
21164, -12.5500, 13.1187, 10.0025
21185, -10.3000, 14.9504, 10.0025
21206, -8.0500, 16.2727, 10.0025
21227, -5.8000, 17.2036, 10.0025
21228, -4.5000, 17.5885, 10.0025
21229, -2.2500, 18.0150, 10.0025
**
21019, 18.1550, 0.0000, 10.0025
21039, 18.1351, 0.8500, 10.0025
21059, 17.9568, 2.6750, 10.0025

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21079,	17.5885,	4.5000,	10.0025	0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
21099,	16.9873,	6.4060,	10.0025	*NCOPY,SHIFT,CHANGE NU=+600,OLD
21118,	16.2339,	8.1280,	10.0025	SET=SPRNG1Y,NEW SET=SPRNG1Z
21138,	15.2506,	9.8500,	10.0025	0.0, 0.0, 2.5
21157,	14.0483,	11.5000,	10.0025	0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
21176,	12.5500,	13.1187,	10.0025	*NSET, NSET=SP1DSK
21195,	10.3000,	14.9504,	10.0025	SPDSK1Y,SPDSK1Z
21214,	8.0500,	16.2727,	10.0025	*NSET, NSET=SP1RNG
21230,	0.0000,	18.1550,	10.0025	SPRNG1Y,SPRNG1Z
21231,	2.2500,	18.0150,	10.0025	*NSET, NSET=SP1
21232,	4.5000,	17.5885,	10.0025	SP1DSK,SP1RNG
21233,	5.8000,	17.2036,	10.0025	*****
*NODE, NSET=SPRNG1C				*ELEMENT, TYPE=C3D8R, ELSET=SPDSK1
21207,	-5.8000,	16.4146,	10.0025	21001, 21001, 21002, 21022, 21021, 21301,
21208,	-4.5000,	16.4966,	10.0025	21302, 21322, 21321
21209,	-2.2500,	16.6386,	10.0025	21012, 21012, 21013, 21033, 21032, 21312,
21210,	0.0000,	16.7805,	10.0025	21313, 21333, 21332
21211,	2.2500,	16.6386,	10.0025	21021, 21021, 21022, 21042, 21041, 21321,
21212,	4.5000,	16.4966,	10.0025	21322, 21342, 21341
21213,	5.8000,	16.4146,	10.0025	21027, 21027, 21028, 21048, 21047, 21327,
*NODE, NSET=SPRNG1B				21328, 21348, 21347
21251,	18.6550,	0.0000,	10.0025	21032, 21032, 21033, 21053, 21052, 21332,
21252,	18.6356,	0.8500,	10.0025	21333, 21353, 21352
21253,	18.4622,	2.6750,	10.0025	21068, 21068, 21069, 21089, 21088, 21368,
21254,	18.1041,	4.5000,	10.0025	21369, 21389, 21388
21255,	17.5206,	6.4060,	10.0025	21037, 21037, 21038, 21058, 21057, 21337,
21256,	16.6810,	8.3519,	10.0025	21338, 21358, 21357
21257,	15.6706,	10.1213,	10.0025	21082, 21082, 21083, 21103, 21102, 21382,
21258,	14.4352,	11.8167,	10.0025	21383, 21403, 21402
21259,	12.8956,	13.4800,	10.0025	21097, 21097, 21098, 21118, 21117, 21397,
21260,	10.5837,	15.3621,	10.0025	21398, 21418, 21417
21261,	8.2717,	16.7209,	10.0025	21123, 21123, 21124, 21144, 21143, 21423,
21262,	5.8000,	17.7305,	10.0025	21424, 21444, 21443
21263,	4.5000,	18.1041,	10.0025	21133, 21133, 21134, 21154, 21153, 21433,
21264,	2.2500,	18.5188,	10.0025	21434, 21454, 21453
21265,	0.0000,	18.6550,	10.0025	21144, 21144, 21145, 21165, 21164, 21444,
21266,	-2.2500,	18.5188,	10.0025	21445, 21465, 21464
21267,	-4.5000,	18.1041,	10.0025	21153, 21153, 21154, 21174, 21173, 21453,
21268,	-5.8000,	17.7305,	10.0025	21454, 21474, 21473
21269,	-8.2717,	16.7209,	10.0025	21165, 21165, 21166, 21186, 21185, 21465,
21270,	-10.5837,	15.3621,	10.0025	21466, 21486, 21485
21271,	-12.8956,	13.4800,	10.0025	21173, 21173, 21174, 21194, 21193, 21473,
21272,	-14.4352,	11.8167,	10.0025	21474, 21494, 21493
21273,	-15.6706,	10.1213,	10.0025	21186, 21186, 21187, 21207, 21206, 21486,
21274,	-16.6810,	8.3519,	10.0025	21487, 21507, 21506
21275,	-17.5206,	6.4060,	10.0025	21207, 21207, 21208, 21228, 21227, 21507,
21276,	-18.1041,	4.5000,	10.0025	21508, 21528, 21527
21277,	-18.4622,	2.6750,	10.0025	*ELGEN, ELSET=SPDSK1
21278,	-18.6356,	0.8500,	10.0025	21001, 7, 1, 1
21279,	-18.6550,	0.0000,	10.0025	21012, 7, 1, 1
*NSET, NSET=SPDSK1Y				21021, 2, 1, 1, 3, 20, 20
SPDSK1A,SPDSK1B,SPDSK1C,SPDSK1D,SPDSK1E,SPDSK				21027, 8, 20, 20
1F,SPDSK1G,SPDSK1H				21032, 8, 20, 20
SPDSK1I,SPDSK1J,SPDSK1M,SPRNG1C				21068, 4, 1, 1
*NSET, NSET=SPRNG1Y				21037, 2, 1, 1, 3, 20, 20
SPRNG1A, SPRNG1B				21082, 2, 20, 20
**				21097, 2, 20, 20
*NCOPY,SHIFT,CHANGE NU=+300,OLD				21123, 4, 1, 1
SET=SPDSK1Y,NEW SET=SPDSK1Z				21133, 4, 1, 1
0.0, 0.0, 1.0				21144, 3, 1, 1
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0				21153, 3, 1, 1
**				21165, 2, 1, 1
*NCOPY,SHIFT,CHANGE NU=-300,OLD				21173, 2, 1, 1
SET=SPRNG1Y,NEW SET=SPRNG1Z				21186, 8, 1, 1
0.0, 0.0, -1.5				21207, 6, 1, 1
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0				**
*NCOPY,SHIFT,CHANGE NU=+300,OLD				*ELEMENT, TYPE=C3D6, ELSET=SPDSK1
SET=SPRNG1Y,NEW SET=SPRNG1Z				21081, 21081, 21082, 21102, 21381, 21382,
0.0, 0.0, 1.0				21402

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21122, 21122, 21123, 21143, 21422, 21423,
21443
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21464
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21527
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21418
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21175, 21175, 21176, 21195, 21475, 21476,
21495
21194, 21194, 21195, 21214, 21494, 21495,
21514
21213, 21213, 21214, 21233, 21513, 21514,
21533
**
*ELEMENT, TYPE=C3D8R, ELSET=SPRNG1A
20951, 20719, 20951, 20952, 20739, 21019,
21251, 21252, 21039
20952, 20739, 20952, 20953, 20759, 21039,
21252, 21253, 21059
20953, 20759, 20953, 20954, 20779, 21059,
21253, 21254, 21079
20954, 20779, 20954, 20955, 20799, 21079,
21254, 21255, 21099
20955, 20799, 20955, 20956, 20818, 21099,
21255, 21256, 21118
20956, 20818, 20956, 20957, 20838, 21118,
21256, 21257, 21138
20957, 20838, 20957, 20958, 20857, 21138,
21257, 21258, 21157
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21258, 21259, 21176
20959, 20876, 20959, 20960, 20895, 21176,
21259, 21260, 21195
20960, 20895, 20960, 20961, 20914, 21195,
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21265, 21266, 21229
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20968, 20927, 20968, 20969, 20906, 21227,
21268, 21269, 21206
20969, 20906, 20969, 20970, 20885, 21206,
21269, 21270, 21185
20970, 20885, 20970, 20971, 20864, 21185,
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21271, 21272, 21143
20972, 20843, 20972, 20973, 20822, 21143,
21272, 21273, 21122

20973, 20822, 20973, 20974, 20802, 21122,
21273, 21274, 21102
20974, 20802, 20974, 20975, 20781, 21102,
21274, 21275, 21081
20975, 20781, 20975, 20976, 20761, 21081,
21275, 21276, 21061
20976, 20761, 20976, 20977, 20741, 21061,
21276, 21277, 21041
20977, 20741, 20977, 20978, 20721, 21041,
21277, 21278, 21021
20978, 20721, 20978, 20979, 20701, 21021,
21278, 21279, 21001
*ELCOPY,OLD SET=SPRNG1A,NEW
SET=SPRNG1B,ELEMENT SH=300,SHIFT NOD=300
*ELCOPY,OLD SET=SPRNG1B,NEW
SET=SPRNG1C,ELEMENT SH=300,SHIFT NOD=300
*ELSET, ELSET=SP1
SPDSK1, SPRNG1A, SPRNG1B, SPRNG1C
*SOLID SECTION, ELSET=SP1, MATERIAL=S216A
*****
** SPACER DISK 2
*****
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP1DSK,NEW SET=SP2DSK
0.0, 0.0, 20.875
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP1RNG,NEW SET=SP2RNG
0.0, 0.0, 20.875
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=SP2
SP2DSK,SP2RNG
*ELCOPY,OLD SET=SP1,NEW SET=SP2,ELEMENT
SH=1500,SHIFT NOD=1500
*SOLID SECTION, ELSET=SP2, MATERIAL=S216A
*****
** SPACER DISK 3
*****
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP2DSK,NEW SET=SP3DSK
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP2RNG,NEW SET=SP3RNG
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=SP3
SP3DSK,SP3RNG
*ELCOPY,OLD SET=SP2,NEW SET=SP3,ELEMENT
SH=1500,SHIFT NOD=1500
*SOLID SECTION, ELSET=SP3, MATERIAL=S216A
*****
** SPACER DISK 4
*****
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP3DSK,NEW SET=SP4DSK
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP3RNG,NEW SET=SP4RNG
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=SP4
SP4DSK,SP4RNG
*ELCOPY,OLD SET=SP3,NEW SET=SP4,ELEMENT
SH=1500,SHIFT NOD=1500
*SOLID SECTION, ELSET=SP4, MATERIAL=S216A
*****
** SPACER DISK 5

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*****
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP4DSK,NEW SET=SP5DSK
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP4RNG,NEW SET=SP5RNG
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=SP5
SP5DSK,SP5RNG
*ELCOPY,OLD SET=SP4,NEW SET=SP5,ELEMENT
SH=1500,SHIFT NOD=1500
*SOLID SECTION, ELSET=SP5, MATERIAL=S216A
*****
** SPACER DISK 6
*****
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP5DSK,NEW SET=SP6DSK
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP5RNG,NEW SET=SP6RNG
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=SP6
SP6DSK,SP6RNG
*ELCOPY,OLD SET=SP5,NEW SET=SP6,ELEMENT
SH=1500,SHIFT NOD=1500
*SOLID SECTION, ELSET=SP6, MATERIAL=S216A
*****
** SPACER DISK 7
*****
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP6DSK,NEW SET=SP7DSK
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP6RNG,NEW SET=SP7RNG
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=SP7
SP7DSK,SP7RNG
*ELCOPY,OLD SET=SP6,NEW SET=SP7,ELEMENT
SH=1500,SHIFT NOD=1500
*SOLID SECTION, ELSET=SP7, MATERIAL=S216A
*****
** SPACER DISK 8
*****
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP7DSK,NEW SET=SP8DSK
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP7RNG,NEW SET=SP8RNG
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=SP8
SP8DSK,SP8RNG
*ELCOPY,OLD SET=SP7,NEW SET=SP8,ELEMENT
SH=1500,SHIFT NOD=1500
*SOLID SECTION, ELSET=SP8, MATERIAL=S216A
*****
** SPACER DISK 9
*****
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP8DSK,NEW SET=SP9DSK
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP8RNG,NEW SET=SP9RNG
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=SP9
SP9DSK,SP9RNG
*ELCOPY,OLD SET=SP8,NEW SET=SP9,ELEMENT
SH=1500,SHIFT NOD=1500
*SOLID SECTION, ELSET=SP9, MATERIAL=S216A
*****
** TOP PLATE
*****
*NCOPY,SHIFT,CHANGE NU=+12900,OLD
SET=SPDSK1Y,NEW SET=TOP1
0.0, 0.0, 160.3125
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+12900,OLD
SET=SPRNG1A,NEW SET=TOP1
0.0, 0.0, 160.3125
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+300,OLD SET=TOP1,NEW
SET=TOP2
0.0, 0.0, 0.50
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=TOP
TOP1, TOP2
*ELCOPY,OLD SET=SPDSK1,NEW SET=TOP,ELEMENT
SH=12900,SHIFT NOD=12900
*SOLID SECTION, ELSET=TOP, MATERIAL=S216A
*****
*NSET, NSET=SPDSK
SP1,SP2,SP3,SP4,SP5,SP6,SP7,SP8,SP9,TOP
*ELSET, ELSET=SPDSK
SP1,SP2,SP3,SP4,SP5,SP6,SP7,SP8,SP9,TOP
*****
** FUEL CELL CHANNEL - HALF
*****
*NSET, NSET=FCHBS, GENERATE
21008, 21068, 20
21068, 21072, 1
21012, 21072, 20
** BASE END PLATE (1-IN. THICK)
*NCOPY,SHIFT,CHANGE NU=-300,OLD SET=FCHBS,NEW
SET=FCHBET
0.0, 0.0, -2.1875
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FCHBETL1
20708, 20728, 20748
*NSET, NSET=FCHBETL2
20712, 20732, 20752
*NSET, NSET=FCHBET
FCHBETL1, FCHBETL2, 4, 1
*NCOPY,SHIFT,CHANGE NU=-300,OLD
SET=FCHBET,NEW SET=FCHBEB
0.0, 0.0, -1.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
** SPACER DISK 1-2
*NCOPY,SHIFT,CHANGE NU=600,OLD SET=FCHBS,NEW
SET=FCHSP11
0.0, 0.0, 4.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD
SET=FCHSP11,NEW SET=FCHSP12
0.0, 0.0, 6.9375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD
SET=FCHSP12,NEW SET=FCHSP13
0.0, 0.0, 6.9375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0

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** SPACER DISK 2-3
*NCOPY,SHIFT,CHANGE NU=900,OLD
SET=FCHSP13,NEW SET=FCHSP21
0.0, 0.0, 7.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD
SET=FCHSP21,NEW SET=FCHSP22
0.0, 0.0, 5.7813
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD
SET=FCHSP22,NEW SET=FCHSP23
0.0, 0.0, 5.7812
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FCHSP2M
FCHSP21, FCHSP22, FCHSP23
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCHSP2M,NEW SET=FCHSP3M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCHSP3M,NEW SET=FCHSP4M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCHSP4M,NEW SET=FCHSP5M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCHSP5M,NEW SET=FCHSP6M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCHSP6M,NEW SET=FCHSP7M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCHSP7M,NEW SET=FCHSP8M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
**
** 9.5 IN. TO TOP
*NSET, NSET=FCHTS, GENERATE
33308, 33368, 20
33368, 33372, 1
33312, 33372, 20
*NCOPY,SHIFT,CHANGE NU=300,OLD SET=FCHTS,NEW
SET=FCHT1
0.0, 0.0, 3.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FCH
FCHBET,FCHBEB,FCHSP11,FCHSP12,FCHSP13
FCHSP2M,FCHSP3M,FCHSP4M,FCHSP5M,FCHSP6M,FCHSP
7M,FCHSP8M,FCHT1
*****
*ELEMENT, TYPE=C3D8R, ELSET=FCHBE
20408, 20408, 20409, 20429, 20428, 20708,
20709, 20729, 20728
*ELGEN, ELSET=FCHBE
20408, 4, 1, 1, 3, 20, 20
*SOLID SECTION, ELSET=FCHBE, MATERIAL=S304B
*ELEMENT, TYPE=S4R, ELSET=FCH01
20708, 20708, 20728, 21028, 21008
20728, 20768, 20769, 21069, 21068
20748, 20712, 21012, 21032, 20732
*ELGEN, ELSET=FCH01
20708, 3, 20, 1
20728, 4, 1, 1
20748, 3, 20, 1
** 1-2

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*ELEMENT, TYPE=S4R
21008, 21008, 21028, 21328, 21308
21028, 21068, 21069, 21369, 21368
21048, 21012, 21312, 21332, 21032
*ELGEN, ELSET=FCH12A
21008, 3, 20, 1
21028, 4, 1, 1
21048, 3, 20, 1
*ELCOPY,OLD SET=FCH12A,NEW SET=FCH12B,ELEMENT
SH=300,SHIFT NOD=300
*ELCOPY,OLD SET=FCH12B,NEW SET=FCH12C,ELEMENT
SH=300,SHIFT NOD=300
*ELCOPY,OLD SET=FCH12C,NEW SET=FCH12D,ELEMENT
SH=300,SHIFT NOD=300
*ELCOPY,OLD SET=FCH12D,NEW SET=FCH12E,ELEMENT
SH=300,SHIFT NOD=300
*ELSET, ELSET=FCH12R
FCH12A, FCH12C, FCH12D
*ELSET, ELSET=FCH12S
FCH12B, FCH12E
*ELSET, ELSET=FCH12
FCH12R, FCH12S
** 2-3
*ELCOPY,OLD SET=FCH12R,NEW SET=FCH23R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCH12S,NEW SET=FCH23S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCH23
FCH23R, FCH23S
** 3-4
*ELCOPY,OLD SET=FCH23R,NEW SET=FCH34R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCH23S,NEW SET=FCH34S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCH34
FCH34R, FCH34S
** 4-5
*ELCOPY,OLD SET=FCH34R,NEW SET=FCH45R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCH34S,NEW SET=FCH45S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCH45
FCH45R, FCH45S
** 5-6
*ELCOPY,OLD SET=FCH45R,NEW SET=FCH56R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCH45S,NEW SET=FCH56S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCH56
FCH56R, FCH56S
** 6-7
*ELCOPY,OLD SET=FCH56R,NEW SET=FCH67R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCH56S,NEW SET=FCH67S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCH67
FCH67R, FCH67S
** 7-8
*ELCOPY,OLD SET=FCH67R,NEW SET=FCH78R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCH67S,NEW SET=FCH78S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCH78
FCH78R, FCH78S
** 8-9
*ELCOPY,OLD SET=FCH78R,NEW SET=FCH89R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCH78S,NEW SET=FCH89S,ELEMENT
SH=1500,SHIFT NOD=1500

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*ELSET, ELSET=FCH89
FCH89R, FCH89S
** 9-TOP
*ELEMENT, TYPE=S4R
33008, 33008, 33028, 33328, 33308
33028, 33068, 33069, 33369, 33368
33048, 33012, 33312, 33332, 33032
*ELGEN, ELSET=FCHTOPR1
33008, 3, 20, 1
33028, 4, 1, 1
33048, 3, 20, 1
*ELCOPY, OLD SET=FCHTOPR1, NEW
SET=FCHTOPS, ELEMENT SH=300, SHIFT NOD=300
*ELCOPY, OLD SET=FCHTOPS, NEW
SET=FCHTOPR2, ELEMENT SH=300, SHIFT NOD=300
*ELCOPY, OLD SET=FCHTOPR2, NEW
SET=FCHTOPR3, ELEMENT SH=300, SHIFT NOD=300
*ELSET, ELSET=FCHTOPR
FCHTOPR1, FCHTOPR2, FCHTOPR3
*ELSET, ELSET=FCHTOP
FCHTOPR, FCHTOPS
**
*ELSET, ELSET=FCHR
FCH01, FCH12R, FCH23R, FCH34R, FCH45R, FCH56R, FCH6
7R, FCH78R, FCH89R, FCHTOPR
*ELSET, ELSET=FCHS
FCH12S, FCH23S, FCH34S, FCH45S, FCH56S, FCH67S, FCH
78S, FCH89S, FCHTOPS
*SHELL SECTION, ELSET=FCHR, MATERIAL=S304B
0.0747
*SHELL SECTION, ELSET=FCHS, MATERIAL=S304B
0.1494
*ELSET, ELSET=FCH
FCHBE, FCHR, FCHS
*****
** FUEL CELL CHANNEL - FULL A
*****
*NSET, NSET=FCABS, GENERATE
21023, 21027, 1
21023, 21123, 20
21123, 21127, 1
21027, 21127, 20
** BASE END PLATE (1-IN. THICK)
*NCOPY, SHIFT, CHANGE NU=-300, OLD SET=FCABS, NEW
SET=FCABET
0.0, 0.0, -2.1875
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FCABETL1
20743, 20763, 20783, 20803
*NSET, NSET=FCABETL2
20747, 20767, 20787, 20807
*NFILL, NSET=FCABET
FCABETL1, FCABETL2, 4, 1
*NCOPY, SHIFT, CHANGE NU=-300, OLD
SET=FCABET, NEW SET=FCABEB
0.0, 0.0, -1.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
** SPACER DISK 1-2
*NCOPY, SHIFT, CHANGE NU=600, OLD SET=FCABS, NEW
SET=FCASP11
0.0, 0.0, 4.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY, SHIFT, CHANGE NU=300, OLD
SET=FCASP11, NEW SET=FCASP12
0.0, 0.0, 6.9375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY, SHIFT, CHANGE NU=300, OLD
SET=FCASP12, NEW SET=FCASP13
0.0, 0.0, 6.9375
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0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
** SPACER DISK 2-3
*NCOPY, SHIFT, CHANGE NU=900, OLD
SET=FCASP13, NEW SET=FCASP21
0.0, 0.0, 7.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY, SHIFT, CHANGE NU=300, OLD
SET=FCASP21, NEW SET=FCASP22
0.0, 0.0, 5.7813
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY, SHIFT, CHANGE NU=300, OLD
SET=FCASP22, NEW SET=FCASP23
0.0, 0.0, 5.7812
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FCASP2M
FCASP21, FCASP22, FCASP23
*NCOPY, SHIFT, CHANGE NU=1500, OLD
SET=FCASP2M, NEW SET=FCASP3M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY, SHIFT, CHANGE NU=1500, OLD
SET=FCASP3M, NEW SET=FCASP4M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY, SHIFT, CHANGE NU=1500, OLD
SET=FCASP4M, NEW SET=FCASP5M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY, SHIFT, CHANGE NU=1500, OLD
SET=FCASP5M, NEW SET=FCASP6M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY, SHIFT, CHANGE NU=1500, OLD
SET=FCASP6M, NEW SET=FCASP7M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY, SHIFT, CHANGE NU=1500, OLD
SET=FCASP7M, NEW SET=FCASP8M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
**
** 9.5 IN. TO TOP
*NSET, NSET=FCATS, GENERATE
33323, 33327, 1
33323, 33423, 20
33423, 33427, 1
33327, 33427, 20
*NCOPY, SHIFT, CHANGE NU=300, OLD SET=FCATS, NEW
SET=FCAT1
0.0, 0.0, 3.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FCA
FCABET, FCABEB, FCASP11, FCASP12, FCASP13
FCASP2M, FCASP3M, FCASP4M, FCASP5M, FCASP6M, FCASP
7M, FCASP8M, FCAT1
****
*ELEMENT, TYPE=C3D8R, ELSET=FCABE
20423, 20423, 20424, 20444, 20443, 20723,
20724, 20744, 20743
*ELGEN, ELSET=FCABE
20423, 4, 1, 1, 5, 20, 20
*SOLID SECTION, ELSET=FCABE, MATERIAL=S304A
*ELEMENT, TYPE=S4R, ELSET=FCA01
20723, 20723, 21023, 21024, 20724
20743, 20723, 20743, 21043, 21023
20763, 20803, 20823, 21123, 21103
20764, 20727, 21027, 21047, 20747
20783, 20787, 21087, 21107, 20807
20803, 20823, 20824, 21124, 21123
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*ELGEN, ELSET=FCA01

20723, 4, 1, 1

20743, 4, 20, 1

20764, 3, 20, 1

20783, 2, 20, 1

20803, 4, 1, 1

** 1-2

*ELEMENT, TYPE=S4R, ELSET=FCA12A

21023, 21023, 21323, 21324, 21024

21043, 21023, 21043, 21343, 21323

21063, 21103, 21123, 21423, 21403

21064, 21027, 21327, 21347, 21047

21083, 21087, 21387, 21407, 21107

21103, 21123, 21124, 21424, 21423

*ELGEN, ELSET=FCA12A

21023, 4, 1, 1

21043, 4, 20, 1

21064, 3, 20, 1

21083, 2, 20, 1

21103, 4, 1, 1

*ELCOPY, OLD SET=FCA12A, NEW SET=FCA12B, ELEMENT

SH=300, SHIFT NOD=300

*ELCOPY, OLD SET=FCA12B, NEW SET=FCA12C, ELEMENT

SH=300, SHIFT NOD=300

*ELCOPY, OLD SET=FCA12C, NEW SET=FCA12D, ELEMENT

SH=300, SHIFT NOD=300

*ELCOPY, OLD SET=FCA12D, NEW SET=FCA12E, ELEMENT

SH=300, SHIFT NOD=300

*ELSET, ELSET=FCA12R

FCA12A, FCA12C, FCA12D

*ELSET, ELSET=FCA12S

FCA12B, FCA12E

*ELSET, ELSET=FCA12

FCA12R, FCA12S

** 2-3

*ELCOPY, OLD SET=FCA12R, NEW SET=FCA23R, ELEMENT

SH=1500, SHIFT NOD=1500

*ELCOPY, OLD SET=FCA12S, NEW SET=FCA23S, ELEMENT

SH=1500, SHIFT NOD=1500

*ELSET, ELSET=FCA23

FCA23R, FCA23S

** 3-4

*ELCOPY, OLD SET=FCA23R, NEW SET=FCA34R, ELEMENT

SH=1500, SHIFT NOD=1500

*ELCOPY, OLD SET=FCA23S, NEW SET=FCA34S, ELEMENT

SH=1500, SHIFT NOD=1500

*ELSET, ELSET=FCA34

FCA34R, FCA34S

** 4-5

*ELCOPY, OLD SET=FCA34R, NEW SET=FCA45R, ELEMENT

SH=1500, SHIFT NOD=1500

*ELCOPY, OLD SET=FCA34S, NEW SET=FCA45S, ELEMENT

SH=1500, SHIFT NOD=1500

*ELSET, ELSET=FCA45

FCA45R, FCA45S

** 5-6

*ELCOPY, OLD SET=FCA45R, NEW SET=FCA56R, ELEMENT

SH=1500, SHIFT NOD=1500

*ELCOPY, OLD SET=FCA45S, NEW SET=FCA56S, ELEMENT

SH=1500, SHIFT NOD=1500

*ELSET, ELSET=FCA56

FCA56R, FCA56S

** 6-7

*ELCOPY, OLD SET=FCA56R, NEW SET=FCA67R, ELEMENT

SH=1500, SHIFT NOD=1500

*ELCOPY, OLD SET=FCA56S, NEW SET=FCA67S, ELEMENT

SH=1500, SHIFT NOD=1500

*ELSET, ELSET=FCA67

FCA67R, FCA67S

** 7-8

*ELCOPY, OLD SET=FCA67R, NEW SET=FCA78R, ELEMENT

SH=1500, SHIFT NOD=1500

*ELCOPY, OLD SET=FCA67S, NEW SET=FCA78S, ELEMENT

SH=1500, SHIFT NOD=1500

*ELSET, ELSET=FCA78

FCA78R, FCA78S

** 8-9

*ELCOPY, OLD SET=FCA78R, NEW SET=FCA89R, ELEMENT

SH=1500, SHIFT NOD=1500

*ELCOPY, OLD SET=FCA78S, NEW SET=FCA89S, ELEMENT

SH=1500, SHIFT NOD=1500

*ELSET, ELSET=FCA89

FCA89R, FCA89S

** 9-TOP

*ELEMENT, TYPE=S4R, ELSET=FCATOPR1

33023, 33023, 33323, 33324, 33024

33043, 33023, 33043, 33343, 33323

33063, 33103, 33123, 33423, 33403

33064, 33027, 33327, 33347, 33047

33083, 33087, 33387, 33407, 33107

33103, 33123, 33124, 33424, 33423

*ELGEN, ELSET=FCATOPR1

33023, 4, 1, 1

33043, 4, 20, 1

33064, 3, 20, 1

33083, 2, 20, 1

33103, 4, 1, 1

*ELCOPY, OLD SET=FCATOPR1, NEW

SET=FCATOPS, ELEMENT SH=300, SHIFT NOD=300

*ELCOPY, OLD SET=FCATOPS, NEW

SET=FCATOPR2, ELEMENT SH=300, SHIFT NOD=300

*ELCOPY, OLD SET=FCATOPR2, NEW

SET=FCATOPR3, ELEMENT SH=300, SHIFT NOD=300

*ELSET, ELSET=FCATOPR

FCATOPR1, FCATOPR2, FCATOPR3

*ELSET, ELSET=FCATOP

FCATOPR, FCATOPS

**

*ELSET, ELSET=FCAR

FCA01, FCA12R, FCA23R, FCA34R, FCA45R, FCA56R, FCA6

7R, FCA78R, FCA89R, FCATOPR

*ELSET, ELSET=FCAS

FCA12S, FCA23S, FCA34S, FCA45S, FCA56S, FCA67S, FCA

78S, FCA89S, FCATOPS

*SHELL SECTION, ELSET=FCAR, MATERIAL=S304A

0.0747

*SHELL SECTION, ELSET=FCAS, MATERIAL=S304A

0.1494

*ELSET, ELSET=FCA

FCABE, FCAR, FCAS

** FUEL CELL CHANNEL - FULL B

*NSET, NSET=FCBBS, GENERATE

21088, 21092, 1

21088, 21188, 20

21188, 21192, 1

21092, 21192, 20

** BASE END PLATE (1-IN. THICK)

*NCOPY, SHIFT, CHANGE NU=-300, OLD SET=FCBBS, NEW

SET=FCBBET

0.0, 0.0, -2.1875

0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0

*NSET, NSET=FCBBETL1

20808, 20828, 20848, 20868

*NSET, NSET=FCBBETL2

20812, 20832, 20852, 20872

*NFILL, NSET=FCBBET

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FCBBETL1, FCBBETL2, 4, 1
*NCOPY,SHIFT,CHANGE NU=-300,OLD
SET=FCBBET,NEW SET=FCBBEB
0.0, 0.0, -1.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
** SPACER DISK 1-2
*NCOPY,SHIFT,CHANGE NU=600,OLD SET=FCBBS,NEW
SET=FCBSP11
0.0, 0.0, 4.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD
SET=FCBSP11,NEW SET=FCBSP12
0.0, 0.0, 6.9375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD
SET=FCBSP12,NEW SET=FCBSP13
0.0, 0.0, 6.9375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
** SPACER DISK 2-3
*NCOPY,SHIFT,CHANGE NU=900,OLD
SET=FCBSP13,NEW SET=FCBSP21
0.0, 0.0, 7.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD
SET=FCBSP21,NEW SET=FCBSP22
0.0, 0.0, 5.7813
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD
SET=FCBSP22,NEW SET=FCBSP23
0.0, 0.0, 5.7812
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FCBSP2M
FCBSP21, FCBSP22, FCBSP23
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCBSP2M,NEW SET=FCBSP3M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCBSP3M,NEW SET=FCBSP4M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCBSP4M,NEW SET=FCBSP5M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCBSP5M,NEW SET=FCBSP6M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCBSP6M,NEW SET=FCBSP7M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
**
** 9.5 IN. TO TOP
*NSET, NSET=FCBTS, GENERATE
33388, 33392, 1
33388, 33488, 20
33488, 33492, 1
33392, 33492, 20
*NCOPY,SHIFT,CHANGE NU=300,OLD SET=FCBTS,NEW
SET=FCBT1
0.0, 0.0, 3.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FCB

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FCBBET,FCBBEB,FCBSP11,FCBSP12,FCBSP13
FCBSP2M,FCBSP3M,FCBSP4M,FCBSP5M,FCBSP6M,FCBSP
7M,FCBSP8M,FCBT1
*****
*ELEMENT, TYPE=C3D8R, ELSET=FCBBE
20488, 20488, 20489, 20509, 20508, 20788,
20789, 20809, 20808
*ELGEN, ELSET=FCBBE
20488, 4, 1, 1, 5, 20, 20
*SOLID SECTION, ELSET=FCBBE, MATERIAL=S304B
*ELEMENT, TYPE=S4R, ELSET=FCB01
20788, 20788, 21088, 21089, 20789
20808, 20788, 20808, 21108, 21088
20828, 20868, 20888, 21188, 21168
20829, 20792, 21092, 21112, 20812
20848, 20852, 21152, 21172, 20872
20868, 20888, 20889, 21189, 21188
*ELGEN, ELSET=FCB01
20788, 4, 1, 1
20808, 4, 20, 1
20829, 3, 20, 1
20848, 2, 20, 1
20868, 4, 1, 1
** 1-2
*ELEMENT, TYPE=S4R, ELSET=FCB12A
21088, 21088, 21388, 21389, 21089
21108, 21088, 21108, 21408, 21388
21128, 21168, 21188, 21488, 21468
21129, 21092, 21392, 21412, 21112
21148, 21152, 21452, 21472, 21172
21168, 21188, 21189, 21489, 21488
*ELGEN, ELSET=FCB12A
21088, 4, 1, 1
21108, 4, 20, 1
21129, 3, 20, 1
21148, 2, 20, 1
21168, 4, 1, 1
*ELCOPY,OLD SET=FCB12A,NEW SET=FCB12B,ELEMENT
SH=300,SHIFT NOD=300
*ELCOPY,OLD SET=FCB12B,NEW SET=FCB12C,ELEMENT
SH=300,SHIFT NOD=300
*ELCOPY,OLD SET=FCB12C,NEW SET=FCB12D,ELEMENT
SH=300,SHIFT NOD=300
*ELCOPY,OLD SET=FCB12D,NEW SET=FCB12E,ELEMENT
SH=300,SHIFT NOD=300
*ELSET, ELSET=FCB12R
FCB12A, FCB12C, FCB12D
*ELSET, ELSET=FCB12S
FCB12B, FCB12E
*ELSET, ELSET=FCB12
FCB12R, FCB12S
** 2-3
*ELCOPY,OLD SET=FCB12R,NEW SET=FCB23R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCB12S,NEW SET=FCB23S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCB23
FCB23R, FCB23S
** 3-4
*ELCOPY,OLD SET=FCB23R,NEW SET=FCB34R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCB23S,NEW SET=FCB34S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCB34
FCB34R, FCB34S
** 4-5
*ELCOPY,OLD SET=FCB34R,NEW SET=FCB45R,ELEMENT
SH=1500,SHIFT NOD=1500

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*ELCOPY,OLD SET=FCB34S,NEW SET=FCB45S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCB45
FCB45R, FCB45S
** 5-6
*ELCOPY,OLD SET=FCB45R,NEW SET=FCB56R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCB45S,NEW SET=FCB56S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCB56
FCB56R, FCB56S
** 6-7
*ELCOPY,OLD SET=FCB56R,NEW SET=FCB67R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCB56S,NEW SET=FCB67S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCB67
FCB67R, FCB67S
** 7-8
*ELCOPY,OLD SET=FCB67R,NEW SET=FCB78R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCB67S,NEW SET=FCB78S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCB78
FCB78R, FCB78S
** 8-9
*ELCOPY,OLD SET=FCB78R,NEW SET=FCB89R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCB78S,NEW SET=FCB89S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCB89
FCB89R, FCB89S
** 9-TOP
*ELEMENT, TYPE=S4R, ELSET=FCBTOPR1
33088, 33088, 33388, 33389, 33089
33108, 33088, 33108, 33408, 33388
33128, 33168, 33188, 33488, 33468
33129, 33092, 33392, 33412, 33112
33148, 33152, 33452, 33472, 33172
33168, 33188, 33189, 33489, 33488
*ELGEN, ELSET=FCBTOPR1
33088, 4, 1, 1
33108, 4, 20, 1
33129, 3, 20, 1
33148, 2, 20, 1
33168, 4, 1, 1
*ELCOPY,OLD SET=FCBTOPR1,NEW
SET=FCBTOPS,ELEMENT SH=300,SHIFT NOD=300
*ELCOPY,OLD SET=FCBTOPS,NEW
SET=FCBTOPR2,ELEMENT SH=300,SHIFT NOD=300
*ELCOPY,OLD SET=FCBTOPR2,NEW
SET=FCBTOPR3,ELEMENT SH=300,SHIFT NOD=300
*ELSET, ELSET=FCBTOPR
FCBTOPR1, FCBTOPR2, FCBTOPR3
*ELSET, ELSET=FCBTOP
FCBTOPR, FCBTOPS
**
*ELSET, ELSET=FCBR
FCB01,FCB12R,FCB23R,FCB34R,FCB45R,FCB56R,FCB6
7R,FCB78R,FCB89R,FCBTOPR
*ELSET, ELSET=FCBS
FCB12S,FCB23S,FCB34S,FCB45S,FCB56S,FCB67S,FCB
78S,FCB89S,FCBTOPS
*SHELL SECTION, ELSET=FCBR, MATERIAL=S304B
0.0747
*SHELL SECTION, ELSET=FCBS, MATERIAL=S304B
0.1494
*ELSET, ELSET=FCB
FCBBE,FCBR,FCBS

** FUEL CELL CHANNEL - FULL C

*NCOPY,SHIFT,CHANGE NU=10,OLD SET=FCA,NEW
SET=FCC
20.6, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*ELCOPY,OLD SET=FCABE,NEW SET=FCCBE,ELEMENT
SH=10,SHIFT NOD=10
*ELCOPY,OLD SET=FCAR,NEW SET=FCCR,ELEMENT
SH=10,SHIFT NOD=10
*ELCOPY,OLD SET=FCAS,NEW SET=FCCS,ELEMENT
SH=10,SHIFT NOD=10
*SOLID SECTION, ELSET=FCCBE, MATERIAL=S304B
*SHELL SECTION, ELSET=FCCR, MATERIAL=S304B
0.0747
*SHELL SECTION, ELSET=FCCS, MATERIAL=S304B
0.1494
*ELSET, ELSET=FCC
FCCR,FCCS,FCCBE

** TIE RODS

*NSET, NSET=TRODBS, GENERATE
21145, 21155, 10
** BOTTOM
*NCOPY,SHIFT,CHANGE NU=-600,OLD
SET=TRODBS,NEW SET=TRODBM
0.0, 0.0, -3.3125
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD SET=TRODBM,NEW
SET=TRODO
0.0, 0.0, 1.125
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
** 1-2
*NCOPY,SHIFT,CHANGE NU=600,OLD SET=TRODBS,NEW
SET=TROD11
0.0, 0.0, 4.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD SET=TROD11,NEW
SET=TROD12
0.0, 0.0, 6.9375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD SET=TROD12,NEW
SET=TROD13
0.0, 0.0, 6.9375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
** 2-3
*NCOPY,SHIFT,CHANGE NU=900,OLD SET=TROD13,NEW
SET=TROD21
0.0, 0.0, 7.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD SET=TROD21,NEW
SET=TROD22
0.0, 0.0, 5.7813
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD SET=TROD22,NEW
SET=TROD23
0.0, 0.0, 5.7812
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=TROD2M
TROD21, TROD22, TROD23
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=TROD2M,NEW SET=TROD3M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=TROD3M,NEW SET=TROD4M
0.0, 0.0, 18.5625

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0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=TROD4M,NEW SET=TROD5M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=TROD5M,NEW SET=TROD6M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=TROD6M,NEW SET=TROD7M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=TROD7M,NEW SET=TROD8M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
**
** 4.25 IN. ABOVE TOP PLATE
*NSET, NSET=TRODTS, GENERATE
33445, 33455, 10
*NCOPY,SHIFT,CHANGE NU=300,OLD SET=TRODTS,NEW
SET=TRODT1
0.0, 0.0, 3.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=900,OLD SET=TRODT1,NEW
SET=TRODT2
0.0, 0.0, 11.36
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=TROD
TRODBM, TROD0, TROD11, TROD12, TROD13
TROD2M, TROD3M, TROD4M, TROD5M, TROD6M, TROD7M, TRO
D8M, TRODT1, TRODT2
*****
*ELEMENT, TYPE=B31, ELSET=TROD
20545, 20545, 20845
20555, 20555, 20855
20786, 20845, 21145
20796, 20855, 21155
*ELGEN, ELSET=TROD
20786, 46, 300, 300
20796, 46, 300, 300
*BEAM SECTION, SECTION=CIRC, ELSET=TROD,
MATERIAL=S216
1.125
1.0, 0.0, 0.0
*****
** BOTTOM FINS
*****
***** long fins
*NODE, NSET=BFLB1A
40001, 6.1250, 0.0000, -8.1250
40002, 8.0750, 0.0000, -8.1250
40003, 10.0250, 0.0000, -8.1250
40004, 11.9750, 0.0000, -8.1250
40005, 13.9250, 0.0000, -8.1250
40006, 15.8750, 0.0000, -8.1250
40007, 17.2975, 0.0000, -8.1250
40008, 18.7500, 0.0000, -8.1250
40009, 19.2800, 0.0000, -8.1250
*NCOPY,SHIFT,CHANGE NU=20,OLD SET=BFLB1A,NEW
SET=BFLB1B
0.0, 0., 1.625
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=20,OLD SET=BFLB1B,NEW
SET=BFLB1C
0.0, 0., 1.625
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=20,OLD SET=BFLB1C,NEW
SET=BFLB1D
0.0, 0., 1.625
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=20,OLD SET=BFLB1D,NEW
SET=BFLB1E
0.0, 0., 1.625
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=20,OLD SET=BFLB1E,NEW
SET=BFLB1F
0.0, 0., 1.625
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NSET, NSET=BFLB1
BFLB1A, BFLB1B, BFLB1C, BFLB1D, BFLB1E, BFLB1F
*NODE, NSET=BFLC1
40010, 24.9900, 0.0000, -8.1250
40011, 30.7500, 0.0000, -8.1250
40012, 30.7500, 0.0000, -1.3425
40030, 24.2676, 0.0000, -6.3489
40031, 29.1966, 0.0000, -6.1036
40032, 29.4419, 0.0000, -0.3648
40050, 23.5593, 0.0000, -4.6076
40051, 27.6737, 0.0000, -4.1219
40052, 28.1594, 0.0000, 0.5938
40070, 22.8650, 0.0000, -2.9004
40071, 26.1806, 0.0000, -2.1790
40072, 26.9021, 0.0000, 1.5336
40090, 22.1842, 0.0000, -1.2268
40091, 24.7168, 0.0000, -0.2742
40092, 25.6694, 0.0000, 2.4549
40110, 21.5168, 0.0000, 0.4141
40111, 23.2817, 0.0000, 1.5933
40112, 24.4609, 0.0000, 3.3582
*NODE, NSET=BFLS1A
40013, 30.7500, 0.0000, 5.4400
40014, 30.7500, 0.0000, 7.2200
40015, 30.7500, 0.0000, 9.0000
*NCOPY,SHIFT,CHANGE NU=20,OLD SET=BFLS1A,NEW
SET=BFLS1B
-1.175, 0., 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=20,OLD SET=BFLS1B,NEW
SET=BFLS1C
-1.175, 0., 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=20,OLD SET=BFLS1C,NEW
SET=BFLS1D
-1.175, 0., 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=20,OLD SET=BFLS1D,NEW
SET=BFLS1E
-1.175, 0., 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=20,OLD SET=BFLS1E,NEW
SET=BFLS1F
-1.175, 0., 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NSET, NSET=BFLS1
BFLS1A, BFLS1B, BFLS1C, BFLS1D, BFLS1E, BFLS1F
*NODE, NSET=BFL1
BFLB1, BFLC1, BFLS1
*****
*NCOPY,SHIFT,CHANGE NU=200,OLD SET=BFL1,NEW
SET=BFL2
0.0, -0.5625, 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=400,OLD SET=BFL1,NEW
SET=BFL3
0.0, +0.5625, 0.0

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0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*****
*NCOPY,SHIFT,MULTIPLE=2,CHANGE NU=+3600,OLD
SET=BFL1,NEW SET=BFL4
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +180.0
*NCOPY,SHIFT,MULTIPLE=8,CHANGE NU=+400,OLD
SET=BFL2,NEW SET=BFL2ALL
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +22.50
*NCOPY,SHIFT,MULTIPLE=7,CHANGE NU=+400,OLD
SET=BFL3,NEW SET=BFL3ALL
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +22.50
*NSET, NSET=BFLG
BFL1, BFL2, BFL3, BFL4, BFL2ALL, BFL3ALL
**
*ELEMENT, TYPE=C3D8R
40001, 40001, 40002, 40402, 40401, 40021,
40022, 40422, 40421
40601, 40601, 40602, 40802, 40801, 40621,
40622, 40822, 40821
41001, 41001, 41002, 41202, 41201, 41021,
41022, 41222, 41221
41401, 41401, 41402, 41602, 41601, 41421,
41422, 41622, 41621
41801, 41801, 41802, 42002, 42001, 41821,
41822, 42022, 42021
42201, 42201, 42202, 42402, 42401, 42221,
42222, 42422, 42421
42601, 42601, 42602, 42802, 42801, 42621,
42622, 42822, 42821
43001, 43001, 43002, 43202, 43201, 43021,
43022, 43222, 43221
43401, 43401, 43402, 43602, 43601, 43421,
43422, 43622, 43621
*ELGEN, ELSET=BFLG1
40001, 14, 1, 1, 5, 20, 20
*ELGEN, ELSET=BFLG2
40601, 14, 1, 1, 5, 20, 20
*ELGEN, ELSET=BFLG3
41001, 14, 1, 1, 5, 20, 20
*ELGEN, ELSET=BFLG4
41401, 14, 1, 1, 5, 20, 20
*ELGEN, ELSET=BFLG5
41801, 14, 1, 1, 5, 20, 20
*ELGEN, ELSET=BFLG6
42201, 14, 1, 1, 5, 20, 20
*ELGEN, ELSET=BFLG7
42601, 14, 1, 1, 5, 20, 20
*ELGEN, ELSET=BFLG8
43001, 14, 1, 1, 5, 20, 20
*ELGEN, ELSET=BFLG9
43401, 14, 1, 1, 5, 20, 20
*ELSET, ELSET=BFLG
BFLG1, BFLG2, BFLG3, BFLG4, BFLG5, BFLG6, BFLG7, BFL
G8, BFLG9
*SOLID SECTION, ELSET=BFLG, MATERIAL=FIN
***** short fins
*NODE, NSET=BFSS1A
45001, 15.8750, 0.0000, -6.0000
45002, 17.2975, 0.0000, -6.0000
45003, 18.7500, 0.0000, -6.0000
45004, 19.2800, 0.0000, -6.0000
*NCOPY,SHIFT,CHANGE NU=10,OLD SET=BFSB1A,NEW
SET=BFSB1B
0.0, 0., 1.20
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0

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*NCOPY,SHIFT,CHANGE NU=10,OLD SET=BFSB1B,NEW
SET=BFSB1C
0.0, 0., 1.20
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=10,OLD SET=BFSB1C,NEW
SET=BFSB1D
0.0, 0., 1.20
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=10,OLD SET=BFSB1D,NEW
SET=BFSB1E
0.0, 0., 1.20
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=10,OLD SET=BFSB1E,NEW
SET=BFSB1F
0.0, 0., 1.20
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NSET, NSET=BFSB1
BFSB1A, BFSB1B, BFSB1C, BFSB1D, BFSB1E, BFSB1F
*NODE, NSET=BFSC1
45005, 24.9900, 0.0000, -6.0000
45006, 30.7500, 0.0000, -6.0000
45007, 30.7500, 0.0000, -0.2800
45015, 24.2676, 0.0000, -4.6659
45016, 29.1966, 0.0000, -4.4206
45017, 29.4419, 0.0000, 0.4767
45025, 23.5593, 0.0000, -3.3579
45026, 27.6737, 0.0000, -2.8722
45027, 28.1594, 0.0000, 1.2186
45035, 22.8650, 0.0000, -2.0756
45036, 26.1806, 0.0000, -1.3541
45037, 26.9021, 0.0000, 1.9460
45045, 22.1842, 0.0000, -0.8184
45046, 24.7168, 0.0000, 0.1342
45047, 25.6694, 0.0000, 2.6591
45055, 21.5168, 0.0000, 0.4141
45056, 23.2817, 0.0000, 1.5933
45057, 24.4609, 0.0000, 3.3582
*NODE, NSET=BFSS1A
45008, 30.7500, 0.0000, 5.4400
45009, 30.7500, 0.0000, 7.2200
45010, 30.7500, 0.0000, 9.0000
*NCOPY,SHIFT,CHANGE NU=10,OLD SET=BFSS1A,NEW
SET=BFSS1B
-1.175, 0., 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=10,OLD SET=BFSS1B,NEW
SET=BFSS1C
-1.175, 0., 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=10,OLD SET=BFSS1C,NEW
SET=BFSS1D
-1.175, 0., 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=10,OLD SET=BFSS1D,NEW
SET=BFSS1E
-1.175, 0., 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=10,OLD SET=BFSS1E,NEW
SET=BFSS1F
-1.175, 0., 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NSET, NSET=BFSS1
BFSS1A, BFSS1B, BFSS1C, BFSS1D, BFSS1E, BFSS1F
*NSET, NSET=BFS1
BFSB1, BFSC1, BFSS1
*****
*NCOPY,SHIFT,CHANGE NU=100,OLD SET=BFS1,NEW
SET=BFS2
0.0, -0.75, 0.0

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0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=200,OLD SET=BFS1,NEW
SET=BFS3
0.0, +0.75, 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*****
*NCOPY,SHIFT,MULTIPLE=1,CHANGE NU=+200,OLD
SET=BFS2,NEW SET=BFS2A
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +11.25
*NCOPY,SHIFT,MULTIPLE=1,CHANGE NU=+200,OLD
SET=BFS3,NEW SET=BFS3A
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +11.25
*NCOPY,SHIFT,MULTIPLE=7,CHANGE NU=+200,OLD
SET=BFS2A,NEW SET=BFS2ALL
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +22.50
*NCOPY,SHIFT,MULTIPLE=7,CHANGE NU=+200,OLD
SET=BFS3A,NEW SET=BFS3ALL
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +22.50
*NSET, NSET=BFST
BFS2A, BFS2ALL, BFS3A, BFS3ALL
**
*ELEMENT, TYPE=C3D8R
45301, 45301, 45302, 45402, 45401, 45311,
45312, 45412, 45411
45501, 45501, 45502, 45602, 45601, 45511,
45512, 45612, 45611
45701, 45701, 45702, 45802, 45801, 45711,
45712, 45812, 45811
45901, 45901, 45902, 46002, 46001, 45911,
45912, 46012, 46011
46101, 46101, 46102, 46202, 46201, 46111,
46112, 46212, 46211
46301, 46301, 46302, 46402, 46401, 46311,
46312, 46412, 46411
46501, 46501, 46502, 46602, 46601, 46511,
46512, 46612, 46611
46701, 46701, 46702, 46802, 46801, 46711,
46712, 46812, 46811
*ELGEN, ELSET=BFST1
45301, 9, 1, 1, 5, 10, 10
*ELGEN, ELSET=BFST2
45501, 9, 1, 1, 5, 10, 10
*ELGEN, ELSET=BFST3
45701, 9, 1, 1, 5, 10, 10
*ELGEN, ELSET=BFST4
45901, 9, 1, 1, 5, 10, 10
*ELGEN, ELSET=BFST5
46101, 9, 1, 1, 5, 10, 10
*ELGEN, ELSET=BFST6
46301, 9, 1, 1, 5, 10, 10
*ELGEN, ELSET=BFST7
46501, 9, 1, 1, 5, 10, 10
*ELGEN, ELSET=BFST8
46701, 9, 1, 1, 5, 10, 10
*ELSET, ELSET=BFST
BFST1,BFST2,BFST3,BFST4,BFST5,BFST6,BFST7,BFS
T8
*SOLID SECTION, ELSET=BFST, MATERIAL=FIN
*****
** TOP FINS
*****
***** long fins
*NODE, NSET=TFLB1A
50011, 24.8750, 0.0000, 176.8050
50012, 26.3750, 0.0000, 176.8050
50013, 27.8750, 0.0000, 176.8050
50014, 29.3750, 0.0000, 176.8050
50015, 30.8750, 0.0000, 176.8050
*NCOPY,SHIFT,CHANGE NU=20,OLD SET=TFLB1A,NEW
SET=TFLB1B
0.0, 0., 1.6875
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=20,OLD SET=TFLB1B,NEW
SET=TFLB1C
0.0, 0., 1.6875
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NODE, NSET=TFLB2A
50061, 6.1250, 0.0000, 182.1800
50062, 8.0750, 0.0000, 182.1800
50063, 10.0250, 0.0000, 182.1800
50064, 11.9750, 0.0000, 182.1800
50065, 13.9250, 0.0000, 182.1800
50066, 15.8750, 0.0000, 182.1800
50067, 17.2975, 0.0000, 182.1800
50068, 18.7500, 0.0000, 182.1800
50069, 20.6000, 0.0000, 182.1800
50070, 22.7380, 0.0000, 182.1800
50071, 24.8750, 0.0000, 182.1800
50072, 26.3750, 0.0000, 182.1800
50073, 27.8750, 0.0000, 182.1800
50074, 29.3750, 0.0000, 182.1800
50075, 30.8750, 0.0000, 182.1800
*NCOPY,SHIFT,CHANGE NU=80,OLD SET=TFLB2A,NEW
SET=TFLB2B
0.0, 0., 9.50
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NFILL, NSET=TFLB2C
TFLB2A, TFLB2B, 4, 20
*NSET, NSET=TFL1
TFLB1A,TFLB1B,TFLB1C,TFLB2C
*****
*NCOPY,SHIFT,CHANGE NU=200,OLD SET=TFL1,NEW
SET=TFL2
0.0, -0.5625, 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=400,OLD SET=TFL1,NEW
SET=TFL3
0.0, +0.5625, 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*****
*NCOPY,SHIFT,MULTIPLE=2,CHANGE NU=+3600,OLD
SET=TFL1,NEW SET=TFL4
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +180.0
*NCOPY,SHIFT,MULTIPLE=8,CHANGE NU=+400,OLD
SET=TFL2,NEW SET=TFL2ALL
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +22.50
*NCOPY,SHIFT,MULTIPLE=7,CHANGE NU=+400,OLD
SET=TFL3,NEW SET=TFL3ALL
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +22.50
*NSET, NSET=TFLG
TFL1, TFL2, TFL3, TFL4, TFL2ALL, TFL3ALL
**
*ELEMENT, TYPE=C3D8R
50011, 50011, 50012, 50412, 50411, 50031,
50032, 50432, 50431
50061, 50061, 50062, 50462, 50461, 50081,
50082, 50482, 50481
50611, 50611, 50612, 50812, 50811, 50631,
50632, 50832, 50831
50661, 50661, 50662, 50862, 50861, 50681,
50682, 50882, 50881

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51011, 51011, 51012, 51212, 51211, 51031,
51032, 51232, 51231
51061, 51061, 51062, 51262, 51261, 51081,
51082, 51282, 51281
51411, 51411, 51412, 51612, 51611, 51431,
51432, 51632, 51631
51461, 51461, 51462, 51662, 51661, 51481,
51482, 51682, 51681
51811, 51811, 51812, 52012, 52011, 51831,
51832, 52032, 52031
51861, 51861, 51862, 52062, 52061, 51881,
51882, 52082, 52081
52211, 52211, 52212, 52412, 52411, 52231,
52232, 52432, 52431
52261, 52261, 52262, 52462, 52461, 52281,
52282, 52482, 52481
52611, 52611, 52612, 52812, 52811, 52631,
52632, 52832, 52831
52661, 52661, 52662, 52862, 52861, 52681,
52682, 52882, 52881
53011, 53011, 53012, 53212, 53211, 53031,
53032, 53232, 53231
53061, 53061, 53062, 53262, 53261, 53081,
53082, 53282, 53281
53411, 53411, 53412, 53612, 53611, 53431,
53432, 53632, 53631
53461, 53461, 53462, 53662, 53661, 53481,
53482, 53682, 53681
*ELGEN, ELSET=TFLG1
50011, 4, 1, 1, 7, 20, 20
50061, 10, 1, 1, 4, 20, 20
*ELGEN, ELSET=TFLG2
50611, 4, 1, 1, 7, 20, 20
50661, 10, 1, 1, 4, 20, 20
*ELGEN, ELSET=TFLG3
51011, 4, 1, 1, 7, 20, 20
51061, 10, 1, 1, 4, 20, 20
*ELGEN, ELSET=TFLG4
51411, 4, 1, 1, 7, 20, 20
51461, 10, 1, 1, 4, 20, 20
*ELGEN, ELSET=TFLG5
51811, 4, 1, 1, 7, 20, 20
51861, 10, 1, 1, 4, 20, 20
*ELGEN, ELSET=TFLG6
52211, 4, 1, 1, 7, 20, 20
52261, 10, 1, 1, 4, 20, 20
*ELGEN, ELSET=TFLG7
52611, 4, 1, 1, 7, 20, 20
52661, 10, 1, 1, 4, 20, 20
*ELGEN, ELSET=TFLG8
53011, 4, 1, 1, 7, 20, 20
53061, 10, 1, 1, 4, 20, 20
*ELGEN, ELSET=TFLG9
53411, 4, 1, 1, 7, 20, 20
53461, 10, 1, 1, 4, 20, 20
*ELSET, ELSET=TFLG
TFLG1, TFLG2, TFLG3, TFLG4, TFLG5, TFLG6, TFLG7, TFLG8, TFLG9
*SOLID SECTION, ELSET=TFLG, MATERIAL=FIN
***** short fins
*NODE, NSET=TFSB1A
55006, 24.8750, 0.0000, 176.8050
55007, 26.3750, 0.0000, 176.8050
55008, 27.8750, 0.0000, 176.8050
55009, 29.3750, 0.0000, 176.8050
55010, 30.8750, 0.0000, 176.8050
*NCOPY,SHIFT,CHANGE NU=10,OLD SET=TFSB1A,NEW
SET=TFSB1B
0.0, 0., 1.6875
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=10,OLD SET=TFSB1B,NEW
SET=TFSB1C
0.0, 0., 1.6875
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NODE, NSET=TFSB2A
55031, 15.8750, 0.0000, 182.1800
55032, 17.2975, 0.0000, 182.1800
55033, 18.7500, 0.0000, 182.1800
55034, 20.6000, 0.0000, 182.1800
55035, 22.7380, 0.0000, 182.1800
55036, 24.8750, 0.0000, 182.1800
55037, 26.3750, 0.0000, 182.1800
55038, 27.8750, 0.0000, 182.1800
55039, 29.3750, 0.0000, 182.1800
55040, 30.8750, 0.0000, 182.1800
*NCOPY,SHIFT,CHANGE NU=40,OLD SET=TFSB2A,NEW
SET=TFSB2B
0.0, 0., 6.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NFILL, NSET=TFSB2C
TFSB2A, TFSB2B, 4, 10
*NSET, NSET=TFS1
TFSB1A, TFSB1B, TFSB1C, TFSB2C
*****
*NCOPY,SHIFT,CHANGE NU=100,OLD SET=TFS1,NEW
SET=TFS2
0.0, -0.75, 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=200,OLD SET=TFS1,NEW
SET=TFS3
0.0, +0.75, 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*****
*NCOPY,SHIFT,MULTIPLE=1,CHANGE NU=+200,OLD
SET=TFS2,NEW SET=TFS2A
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +11.25
*NCOPY,SHIFT,MULTIPLE=1,CHANGE NU=+200,OLD
SET=TFS3,NEW SET=TFS3A
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +11.25
*NCOPY,SHIFT,MULTIPLE=7,CHANGE NU=+200,OLD
SET=TFS2A,NEW SET=TFS2ALL
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +22.50
*NCOPY,SHIFT,MULTIPLE=7,CHANGE NU=+200,OLD
SET=TFS3A,NEW SET=TFS3ALL
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +22.50
*NSET, NSET=TFST
TFS2A, TFS2ALL, TFS3A, TFS3ALL
**
*ELEMENT, TYPE=C3D8R
55306, 55306, 55307, 55407, 55406, 55316,
55317, 55417, 55416
55331, 55331, 55332, 55432, 55431, 55341,
55342, 55442, 55441
55506, 55506, 55507, 55607, 55606, 55516,
55517, 55617, 55616
55531, 55531, 55532, 55632, 55631, 55541,
55542, 55642, 55641
55706, 55706, 55707, 55807, 55806, 55716,
55717, 55817, 55816
55731, 55731, 55732, 55832, 55831, 55741,
55742, 55842, 55841
55906, 55906, 55907, 56007, 56006, 55916,
55917, 56017, 56016

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55931, 55931, 55932, 56032, 56031, 55941,
55942, 56042, 56041
56106, 56106, 56107, 56207, 56206, 56116,
56117, 56217, 56216
56131, 56131, 56132, 56232, 56231, 56141,
56142, 56242, 56241
56306, 56306, 56307, 56407, 56406, 56316,
56317, 56417, 56416
56331, 56331, 56332, 56432, 56431, 56341,
56342, 56442, 56441
56506, 56506, 56507, 56607, 56606, 56516,
56517, 56617, 56616
56531, 56531, 56532, 56632, 56631, 56541,
56542, 56642, 56641
56706, 56706, 56707, 56807, 56806, 56716,
56717, 56817, 56816
56731, 56731, 56732, 56832, 56831, 56741,
56742, 56842, 56841
*ELGEN, ELSET=TFST1
55306, 4, 1, 1, 7, 10, 10
55331, 5, 1, 1, 4, 10, 10
*ELGEN, ELSET=TFST2
55506, 4, 1, 1, 7, 10, 10
55531, 5, 1, 1, 4, 10, 10
*ELGEN, ELSET=TFST3
55706, 4, 1, 1, 7, 10, 10
55731, 5, 1, 1, 4, 10, 10
*ELGEN, ELSET=TFST4
55906, 4, 1, 1, 7, 10, 10
55931, 5, 1, 1, 4, 10, 10
*ELGEN, ELSET=TFST5
56106, 4, 1, 1, 7, 10, 10
56131, 5, 1, 1, 4, 10, 10
*ELGEN, ELSET=TFST6
56306, 4, 1, 1, 7, 10, 10
56331, 5, 1, 1, 4, 10, 10
*ELGEN, ELSET=TFST7
56506, 4, 1, 1, 7, 10, 10
56531, 5, 1, 1, 4, 10, 10
*ELGEN, ELSET=TFST8
56706, 4, 1, 1, 7, 10, 10
56731, 5, 1, 1, 4, 10, 10
*ELSET, ELSET=TFST
TFST1, TFST2, TFST3, TFST4, TFST5, TFST6, TFST7, TFS
T8
** SOLID SECTION, ELSET=TFST, MATERIAL=FIN
*****
** STRUCTURAL RING 1
*****
*NODE, NSET=RING1A
15001, 24.8750, 0.0000, 14.8750
*NCOPY, SHIFT, MULTIPLE=32, CHANGE NU=+1, OLD
SET=RING1A, NEW SET=RING1A
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +5.625
***** MODIFY NODES
*NODE, NSET=RING1A
15001, 24.8750, 0.0000, 14.0110
15002, 24.7552, 2.4382, 14.0215
15003, 24.3970, 4.8529, 14.0529
15004, 23.8039, 7.2208, 14.1048
15005, 22.9815, 9.5193, 14.1767
15006, 21.9378, 11.7260, 14.2680
15007, 20.6828, 13.8198, 14.3778
15008, 19.2286, 15.7805, 14.5050
15009, 17.5893, 17.5893, 14.6485
*NODE, NSET=RING1B
15177, 0.0000, 31.8750, 14.8750

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*NCOPY, SHIFT, MULTIPLE=16, CHANGE NU=+1, OLD
SET=RING1B, NEW SET=RING1B
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +5.625
*NODE
15161, 35.5417, 0.0000, 13.0778
15241, 40.8750, 0.0000, 12.6112
15165, 34.9105, 13.7148, 13.1330
15245, 40.8750, 15.8125, 12.6112
15250, 24.8125, 31.8750, 14.0165
15170, 15.0000, 31.8750, 14.8750
*NSET, NSET=LINEA1, GENERATE
15001, 15005, 1
*NGEN, NSET=LINEA2
15161, 15165, 1
*NGEN, NSET=LINEA3
15241, 15245, 1
*NSET, NSET=LINEA4, GENERATE
15005, 15010, 1
*NGEN, NSET=LINEA5
15165, 15170, 1
*NGEN, NSET=LINEA6
15245, 15250, 1
*NSET, NSET=LINEA7, GENERATE
15010, 15017, 1
*NGEN, NSET=LINEA8
15170, 15177, 1
*NSET, NSET=LINEA9, GENERATE
15017, 15033, 1
*NSET, NSET=LINEA10, GENERATE
15177, 15193, 1
**
*NFILL, NSET=RING1C
LINEA1, LINEA2, 4, 40
*NFILL, NSET=RING1D
LINEA2, LINEA3, 2, 40
*NFILL, NSET=RING1E
LINEA4, LINEA5, 4, 40
*NFILL, NSET=RING1F
LINEA5, LINEA6, 2, 40
*NFILL, NSET=RING1G
LINEA7, LINEA8, 4, 40
*NFILL, NSET=RING1H
LINEA9, LINEA10, 4, 40
*NSET, NSET=RING1M
RING1B, RING1C, RING1D, RING1E, RING1F, RING1G, RIN
G1H
*NCOPY, SHIFT, CHANGE NU=+300, OLD
SET=RING1M, NEW SET=RING1N
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=RING1
RING1M, RING1N
*****
*ELEMENT, TYPE=C3D8R
15001, 2981, 15041, 15042, 2982, 3181, 15341,
15342, 3182
15041, 15041, 15081, 15082, 15042, 15341,
15381, 15382, 15342
15161, 15161, 15201, 15202, 15162, 15461,
15501, 15502, 15462
*ELGEN, ELSET=RING1A
15001, 32, 1, 1
*ELGEN, ELSET=RING1B
15041, 32, 1, 1, 3, 40, 40
*ELGEN, ELSET=RING1C
15161, 9, 1, 1, 2, 40, 40
*ELSET, ELSET=RING1
RING1A, RING1B, RING1C

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*SOLID SECTION, ELSET=RING1, MATERIAL=RING
*****
** STRUCTURAL RING 2
*****
*NODE, NSET=RING2A
16001, 24.8750, 0.0000, 31.8750
*NCOPY,SHIFT,MULTIPLE=32,CHANGE NU=+1,OLD
SET=RING2A,NEW SET=RING2A
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +5.625
***** MODIFY NODES
*NODE, NSET=RING2A
16001, 24.8750, 0.0000, 32.7390
16002, 24.7552, 2.4382, 32.7285
16003, 24.3970, 4.8529, 32.6971
16004, 23.8039, 7.2208, 32.6452
16005, 22.9815, 9.5193, 32.5733
16006, 21.9378, 11.7260, 32.4820
16007, 20.6828, 13.8198, 32.3722
16008, 19.2286, 15.7805, 32.2450
16009, 17.5893, 17.5893, 32.1015
*NODE, NSET=RING2B
16177, 0.0000, 31.8750, 31.8750
*NCOPY,SHIFT,MULTIPLE=16,CHANGE NU=+1,OLD
SET=RING2B,NEW SET=RING2B
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +5.625
*NODE
16161, 35.5417, 0.0000, 33.6722
16241, 40.8750, 0.0000, 34.1388
16165, 34.9105, 13.7148, 33.6169
16245, 40.8750, 15.8125, 34.1388
16250, 24.8125, 31.8750, 32.7335
16170, 15.0000, 31.8750, 31.8750
*NSET, NSET=LINEB1, GENERATE
16001, 16005, 1
*NGEN, NSET=LINEB2
16161, 16165, 1
*NGEN, NSET=LINEB3
16241, 16245, 1
*NSET, NSET=LINEB4, GENERATE
16005, 16010, 1
*NGEN, NSET=LINEB5
16165, 16170, 1
*NGEN, NSET=LINEB6
16245, 16250, 1
*NSET, NSET=LINEB7, GENERATE
16010, 16017, 1
*NGEN, NSET=LINEB8
16170, 16177, 1
*NSET, NSET=LINEB9, GENERATE
16017, 16033, 1
*NSET, NSET=LINEB10, GENERATE
16177, 16193, 1
**
*NFILL, NSET=RING2C
LINEB1, LINEB2, 4, 40
*NFILL, NSET=RING2D
LINEB2, LINEB3, 2, 40
*NFILL, NSET=RING2E
LINEB4, LINEB5, 4, 40
*NFILL, NSET=RING2F
LINEB5, LINEB6, 2, 40
*NFILL, NSET=RING2G
LINEB7, LINEB8, 4, 40
*NFILL, NSET=RING2H
LINEB9, LINEB10, 4, 40
*NSET, NSET=RING2M

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RING2B, RING2C, RING2D, RING2E, RING2F, RING2G, RING
G2H
*NCOPY,SHIFT,CHANGE NU=+300,OLD
SET=RING2M,NEW SET=RING2N
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=RING2
RING2M, RING2N
*****
*ELEMENT, TYPE=C3D8R
16001, 3981, 16041, 16042, 3982, 4181, 16341,
16342, 4182
16041, 16041, 16081, 16082, 16042, 16341,
16381, 16382, 16342
16161, 16161, 16201, 16202, 16162, 16461,
16501, 16502, 16462
*ELGEN, ELSET=RING2A
16001, 32, 1, 1
*ELGEN, ELSET=RING2B
16041, 32, 1, 1, 3, 40, 40
*ELGEN, ELSET=RING2C
16161, 9, 1, 1, 2, 40, 40
*ELSET, ELSET=RING2
RING2A, RING2B, RING2C
*SOLID SECTION, ELSET=RING2, MATERIAL=RING
*****
** STRUCTURAL RING 3
*****
*NCOPY,SHIFT,CHANGE NU=+2000,OLD
SET=RING1,NEW SET=RING3
0.0, 0.0, 142.18
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
***** MODIFY NODES
17001, 24.8750, 0.0000, 156.1910
17002, 24.7552, 2.4382, 156.2015
17003, 24.3970, 4.8529, 156.2329
17004, 23.8039, 7.2208, 156.2848
17005, 22.9815, 9.5193, 156.3567
17006, 21.9378, 11.7260, 156.4480
17007, 20.6828, 13.8198, 156.5578
17008, 19.2286, 15.7805, 156.6850
17009, 17.5893, 17.5893, 156.8285
*ELEMENT, TYPE=C3D8R
17001, 8181, 17041, 17042, 8182, 8381, 17341,
17342, 8382
17041, 17041, 17081, 17082, 17042, 17341,
17381, 17382, 17342
17161, 17161, 17201, 17202, 17162, 17461,
17501, 17502, 17462
*ELGEN, ELSET=RING3A
17001, 32, 1, 1
*ELGEN, ELSET=RING3B
17041, 32, 1, 1, 3, 40, 40
*ELGEN, ELSET=RING3C
17161, 9, 1, 1, 2, 40, 40
*ELSET, ELSET=RING3
RING3A, RING3B, RING3C
*SOLID SECTION, ELSET=RING3, MATERIAL=RING
*****
** STRUCTURAL RING 4
*****
*NCOPY,SHIFT,CHANGE NU=+2000,OLD
SET=RING2,NEW SET=RING4
0.0, 0.0, 142.18
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
***** MODIFY NODES
18001, 24.8750, 0.0000, 174.9190
18002, 24.7552, 2.4382, 174.9085
18003, 24.3970, 4.8529, 174.8771

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18004, 23.8039, 7.2208, 174.8252
18005, 22.9815, 9.5193, 174.7533
18006, 21.9378, 11.7260, 174.6620
18007, 20.6828, 13.8198, 174.5522
18008, 19.2286, 15.7805, 174.4250
18009, 17.5893, 17.5893, 174.2815
*ELEMENT, TYPE=C3D8R
18001, 9181, 18041, 18042, 9182, 9381, 18341,
18342, 9382
18041, 18041, 18081, 18082, 18042, 18341,
18381, 18382, 18342
18161, 18161, 18201, 18202, 18162, 18461,
18501, 18502, 18462
*ELGEN, ELSET=RING4A
18001, 32, 1, 1
*ELGEN, ELSET=RING4B
18041, 32, 1, 1, 3, 40, 40
*ELGEN, ELSET=RING4C
18161, 9, 1, 1, 2, 40, 40
*ELSET, ELSET=RING4
RING4A, RING4B, RING4C
*SOLID SECTION, ELSET=RING4, MATERIAL=RING
*****
** FUEL BUNDLE A
*****
** OUTER FUEL RODS
*****
*NODE
61001, -14.2410, 1.4090, 14.6400
61015, -6.3590, 1.4090, 14.6400
61029, -6.3590, 9.2910, 14.6400
61043, -14.2410, 9.2910, 14.6400
61056, -14.2410, 1.9720, 14.6400
*NGEN, NSET=FAR01
61001, 61015
61015, 61029
61029, 61043
61043, 61056
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=FAR01,NEW
SET=FAR02
0.0, 0.0, 2.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+400,OLD SET=FAR02,NEW
SET=FAR03
0.0, 0.0, 2.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FAR03A
FAR02, FAR03, 2, 200
*NCOPY,SHIFT,CHANGE NU=+800,OLD SET=FAR03,NEW
SET=FAR04
0.0, 0.0, 22.215
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FAR04A
FAR03, FAR04, 4, 200
*NCOPY,SHIFT,CHANGE NU=+400,OLD SET=FAR04,NEW
SET=FAR05
0.0, 0.0, 1.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FAR05A
FAR04, FAR05, 2, 200
*NCOPY,SHIFT,CHANGE NU=+800,OLD SET=FAR05,NEW
SET=FAR06
0.0, 0.0, 24.44
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FAR06A
FAR05, FAR06, 4, 200
*NCOPY,SHIFT,CHANGE NU=+400,OLD SET=FAR06,NEW
SET=FAR07

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0.0, 0.0, 1.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FAR07A
FAR06, FAR07, 2, 200
*NCOPY,SHIFT,CHANGE NU=+400,OLD SET=FAR07,NEW
SET=FAR08
0.0, 0.0, 11.82
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FAR08A
FAR07, FAR08, 2, 200
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=FAR08,NEW
SET=FAR09
0.0, 0.0, 0.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+400,OLD SET=FAR09,NEW
SET=FAR10
0.0, 0.0, 11.87
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FAR10A
FAR09, FAR10, 2, 200
*NSET, NSET=FAR01
FAR07A, FAR08A, FAR09, FAR10A
*NCOPY,SHIFT,CHANGE NU=+1400,OLD
SET=FAR01,NEW SET=FAR02
0.0, 0.0, 26.19
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+1400,OLD
SET=FAR02,NEW SET=FAR03
0.0, 0.0, 26.19
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FAR01, GENERATE
67801, 67856, 1
*NCOPY,SHIFT,CHANGE NU=+400,OLD
SET=FAR01,NEW SET=FAR019
0.0, 0.0, 1.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FAR019A
FAR01, FAR019, 2, 200
*NCOPY,SHIFT,CHANGE NU=+400,OLD
SET=FAR019,NEW SET=FAR020
0.0, 0.0, 16.88
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FAR020A
FAR019, FAR020, 2, 200
*NCOPY,SHIFT,CHANGE NU=+400,OLD
SET=FAR020,NEW SET=FAR021
0.0, 0.0, 1.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FAR021A
FAR020, FAR021, 2, 200
*NCOPY,SHIFT,CHANGE NU=+200,OLD
SET=FAR021,NEW SET=FAR022
0.0, 0.0, 0.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FAR0
FAR01, FAR02, FAR03A, FAR04A, FAR05A, FAR06A, FAR0
1, FAR02, FAR03
FAR019A, FAR020A, FAR021A, FAR022
*****
*ELEMENT, TYPE=B31
61001, 61001, 61201
61201, 61201, 61401
69001, 69001, 69201
*ELGEN, ELSET=FAROS
61001, 56, 1, 1
69001, 56, 1, 1
*ELGEN, ELSET=FAROP
61201, 39, 200, 200, 56, 1, 1
*ELSET, ELSET=FARO

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FAROS, FAROP
*BEAM SECTION, SECTION=PIPE, ELSET=FAROP,
MATERIAL=CLADO
0.2092, 0.0272
1.0, 0.0, 0.0
*BEAM SECTION, SECTION=CIRC, ELSET=FAROS,
MATERIAL=CLADO
0.2092
1.0, 0.0, 0.0
3, 4
*****
** SIMULATION OF INNER FUEL RODS AND GRID
SPACERS
*****
**
*NODE, NSET=FARS1
61061, -14.5225, 1.1275, 14.6400
61076, -6.0775, 1.1275, 14.6400
61091, -6.0775, 9.5725, 14.6400
61106, -14.5225, 9.5725, 14.6400
61120, -14.5225, 1.6905, 14.6400
61132, -13.9595, 1.6905, 14.6400
61145, -6.6405, 1.6905, 14.6400
61148, -6.6405, 2.2535, 14.6400
61160, -6.6405, 9.0095, 14.6400
61163, -7.2035, 9.0095, 14.6400
61175, -13.9595, 9.0095, 14.6400
61178, -13.9595, 8.4465, 14.6400
61189, -13.9595, 2.2535, 14.6400
*NGEN, NSET=FARS1
61061, 61076
61076, 61091
61091, 61106
61106, 61120
61132, 61145
61148, 61160
61163, 61175
61178, 61189
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=FARS1,NEW
SET=FARS2
0.0, 0.0, 2.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+400,OLD SET=FARS2,NEW
SET=FARS3
0.0, 0.0, 2.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FARS3A
FARS2, FARS3, 2, 200
*NCOPY,SHIFT,CHANGE NU=+800,OLD SET=FARS3,NEW
SET=FARS4
0.0, 0.0, 22.215
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FARS4A
FARS3, FARS4, 4, 200
*NCOPY,SHIFT,CHANGE NU=+400,OLD SET=FARS4,NEW
SET=FARS5
0.0, 0.0, 1.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FARS5A
FARS4, FARS5, 2, 200
*NCOPY,SHIFT,CHANGE NU=+800,OLD SET=FARS5,NEW
SET=FARS6
0.0, 0.0, 24.44
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FARS6A
FARS5, FARS6, 4, 200
*NCOPY,SHIFT,CHANGE NU=+400,OLD SET=FARS6,NEW
SET=FARS7

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0.0, 0.0, 1.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FARS7A
FARS6, FARS7, 2, 200
*NCOPY,SHIFT,CHANGE NU=+400,OLD SET=FARS7,NEW
SET=FARS8
0.0, 0.0, 11.82
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FARS8A
FARS7, FARS8, 2, 200
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=FARS8,NEW
SET=FARS9
0.0, 0.0, 0.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+400,OLD SET=FARS9,NEW
SET=FARS10
0.0, 0.0, 11.87
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FARS10A
FARS9, FARS10, 2, 200
*NSET, NSET=FARSR1
FARS7A, FARS8A, FARS9, FARS10A
*NCOPY,SHIFT,CHANGE NU=+1400,OLD
SET=FARSR1,NEW SET=FARSR2
0.0, 0.0, 26.19
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+1400,OLD
SET=FARSR2,NEW SET=FARSR3
0.0, 0.0, 26.19
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FARSRT, GENERATE
67861, 67920, 1
67932, 67945, 1
67948, 67960, 1
67963, 67975, 1
67978, 67989, 1
*NCOPY,SHIFT,CHANGE NU=+400,OLD
SET=FARSRT,NEW SET=FARS19
0.0, 0.0, 1.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FARS19A
FARSRT, FARS19, 2, 200
*NCOPY,SHIFT,CHANGE NU=+400,OLD
SET=FARS19,NEW SET=FARS20
0.0, 0.0, 16.88
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FARS20A
FARS19, FARS20, 2, 200
*NCOPY,SHIFT,CHANGE NU=+400,OLD
SET=FARS20,NEW SET=FARS21
0.0, 0.0, 1.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FARS21A
FARS20, FARS21, 2, 200
*NCOPY,SHIFT,CHANGE NU=+200,OLD
SET=FARS21,NEW SET=FARS22
0.0, 0.0, 0.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FARS
FARS1, FARS2, FARS3A, FARS4A, FARS5A, FARS6A, FARSR
1, FARSR2, FARSR3
FARS19A, FARS20A, FARS21A, FARS22
*****
** INNER FUEL RODS ELEMENT
*****
*ELEMENT, TYPE=S4R, ELSET=FARI
61132, 61132, 61332, 61333, 61133
61145, 61145, 61345, 61348, 61148
61148, 61148, 61348, 61349, 61149

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61160, 61160, 61360, 61363, 61163
61163, 61163, 61363, 61364, 61164
61175, 61175, 61375, 61378, 61178
61178, 61178, 61378, 61379, 61179
61189, 61189, 61389, 61332, 61132
*ELGEN, ELSET=FARI
61132, 13, 1, 1, 41, 200, 200
61145, 41, 200, 200
61148, 12, 1, 1, 41, 200, 200
61160, 41, 200, 200
61163, 12, 1, 1, 41, 200, 200
61175, 41, 200, 200
61178, 11, 1, 1, 41, 200, 200
61189, 41, 200, 200
*SHELL SECTION, ELSET=FARI, MATERIAL=CLADI
0.25
*****
**      ROD GRID SPACERS
*****
***** GRID SPACER 1
*ELEMENT, TYPE=S4R, ELSET=FAG1BR
61261, 61261, 61461, 61462, 61262
61320, 61320, 61520, 61461, 61261
*ELGEN, ELSET=FAG1BR
61261, 59, 1, 1
**
*ELEMENT, TYPE=S4R, ELSET=FAG1BS
61061, 61262, 61462, 61532, 61332
61076, 61277, 61477, 61545, 61345
61077, 61278, 61478, 61548, 61348
61091, 61292, 61492, 61560, 61360
61092, 61293, 61493, 61563, 61363
61106, 61307, 61507, 61575, 61375
61107, 61308, 61508, 61578, 61378
61119, 61320, 61520, 61532, 61332
*ELGEN, ELSET=FAG1BS
61061, 14, 1, 1
61077, 13, 1, 1
61092, 13, 1, 1
61107, 12, 1, 1
*ELSET, ELSET=FAG1B
FAG1BR, FAG1BS
*ELCOPY, OLD SET=FAG1BR, NEW SET=FAG1TR, ELEMENT
SH=200, SHIFT NOD=200
*ELCOPY, OLD SET=FAG1BS, NEW SET=FAG1TS, ELEMENT
SH=600, SHIFT NOD=200
*ELSET, ELSET=FAG1R
FAG1BR, FAG1TR
*ELSET, ELSET=FAG1S
FAG1BS, FAG1TS
*ELSET, ELSET=FAG1
FAG1R, FAG1S
*SHELL SECTION, ELSET=FAG1R, MATERIAL=CLADG
0.0747
*SHELL SECTION, ELSET=FAG1S, MATERIAL=CLADG
0.0747
***** GRID SPACER 2 (HTP)
*ELCOPY, OLD SET=FAG1R, NEW SET=FAG2R, ELEMENT
SH=1200, SHIFT NOD=1200
*ELCOPY, OLD SET=FAG1S, NEW SET=FAG2S, ELEMENT
SH=1200, SHIFT NOD=1200
*ELSET, ELSET=FAG2
FAG2R, FAG2S
*SHELL SECTION, ELSET=FAG2R, MATERIAL=CLADG
0.0747
*SHELL SECTION, ELSET=FAG2S, MATERIAL=CLADG
0.0747
***** GRID SPACER 3 (HTP)
*ELCOPY, OLD SET=FAG2R, NEW SET=FAG3R, ELEMENT
SH=1200, SHIFT NOD=1200
*ELCOPY, OLD SET=FAG2S, NEW SET=FAG3S, ELEMENT
SH=1200, SHIFT NOD=1200
*ELSET, ELSET=FAG3
FAG3R, FAG3S
*SHELL SECTION, ELSET=FAG3R, MATERIAL=CLADG
0.0747
*SHELL SECTION, ELSET=FAG3S, MATERIAL=CLADG
0.0747
***** GRID SPACER 4 (IFM)
*ELCOPY, OLD SET=FAG1BR, NEW SET=FAG4R, ELEMENT
SH=3200, SHIFT NOD=3200
*ELCOPY, OLD SET=FAG1BS, NEW SET=FAG4S, ELEMENT
SH=3200, SHIFT NOD=3200
*ELSET, ELSET=FAG4
FAG4R, FAG4S
*SHELL SECTION, ELSET=FAG4R, MATERIAL=CLADG
0.0747
*SHELL SECTION, ELSET=FAG4S, MATERIAL=CLADG
0.0747
***** GRID SPACER 5 (HTP)
*ELCOPY, OLD SET=FAG3R, NEW SET=FAG5R, ELEMENT
SH=1400, SHIFT NOD=1400
*ELCOPY, OLD SET=FAG3S, NEW SET=FAG5S, ELEMENT
SH=1400, SHIFT NOD=1400
*ELSET, ELSET=FAG5
FAG5R, FAG5S
*SHELL SECTION, ELSET=FAG5R, MATERIAL=CLADG
0.0747
*SHELL SECTION, ELSET=FAG5S, MATERIAL=CLADG
0.0747
***** GRID SPACER 6 (IFM)
*ELCOPY, OLD SET=FAG4R, NEW SET=FAG6R, ELEMENT
SH=1400, SHIFT NOD=1400
*ELCOPY, OLD SET=FAG4S, NEW SET=FAG6S, ELEMENT
SH=1400, SHIFT NOD=1400
*ELSET, ELSET=FAG6
FAG6R, FAG6S
*SHELL SECTION, ELSET=FAG6R, MATERIAL=CLADG
0.0747
*SHELL SECTION, ELSET=FAG6S, MATERIAL=CLADG
0.0747
***** GRID SPACER 7 (HTP)
*ELCOPY, OLD SET=FAG5R, NEW SET=FAG7R, ELEMENT
SH=1400, SHIFT NOD=1400
*ELCOPY, OLD SET=FAG5S, NEW SET=FAG7S, ELEMENT
SH=1400, SHIFT NOD=1400
*ELSET, ELSET=FAG7
FAG7R, FAG7S
*SHELL SECTION, ELSET=FAG7R, MATERIAL=CLADG
0.0747
*SHELL SECTION, ELSET=FAG7S, MATERIAL=CLADG
0.0747
***** GRID SPACER 8 (IFM)
*ELCOPY, OLD SET=FAG6R, NEW SET=FAG8R, ELEMENT
SH=1400, SHIFT NOD=1400
*ELCOPY, OLD SET=FAG6S, NEW SET=FAG8S, ELEMENT
SH=1400, SHIFT NOD=1400
*ELSET, ELSET=FAG8
FAG8R, FAG8S
*SHELL SECTION, ELSET=FAG8R, MATERIAL=CLADG
0.0747
*SHELL SECTION, ELSET=FAG8S, MATERIAL=CLADG
0.0747
***** GRID SPACER 9 (HTP)
*ELCOPY, OLD SET=FAG7R, NEW SET=FAG9R, ELEMENT
SH=1400, SHIFT NOD=1400

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*ELCOPY,OLD SET=FAG7S,NEW SET=FAG9S,ELEMENT
SH=1400,SHIFT NOD=1400
*ELSET, ELSET=FAG9
FAG9R, FAG9S
*SHELL SECTION, ELSET=FAG9R, MATERIAL=CLADG
0.0747
*SHELL SECTION, ELSET=FAG9S, MATERIAL=CLADG
0.0747
***** GRID SPACER 10 (HTP)
*ELCOPY,OLD SET=FAG9R,NEW SET=FAG10R,ELEMENT
SH=800,SHIFT NOD=800
*ELCOPY,OLD SET=FAG9S,NEW SET=FAG10S,ELEMENT
SH=800,SHIFT NOD=800
*ELSET, ELSET=FAG10
FAG10R, FAG10S
*SHELL SECTION, ELSET=FAG10R, MATERIAL=CLADG
0.0747
*SHELL SECTION, ELSET=FAG10S, MATERIAL=CLADG
0.0747
*****
**      BOTTOM TIE PLATE
*****
*NCOPY,SHIFT,CHANGE NU=-200,OLD SET=FARS1,NEW
SET=FARB1
0.0, 0.0, -2.52
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NODE, NSET=FARS1
61121, -11.7075, 3.9425, 14.6400
61122, -8.8925, 3.9425, 14.6400
61123, -11.7075, 6.7575, 14.6400
61124, -8.8925, 6.7575, 14.6400
*NCOPY,SHIFT,CHANGE NU=-200,OLD SET=FARS1,NEW
SET=FARB1
0.0, 0.0, -2.52
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FABM
FARS1, FARS1, FARB1
*****
*ELEMENT, TYPE=C3D8R, ELSET=FABM
60861, 60861, 60862, 60932, 60920, 61061,
61062, 61132, 61120
60862, 60862, 60866, 60936, 60932, 61062,
61066, 61136, 61132
60866, 60866, 60871, 60941, 60936, 61066,
61071, 61141, 61136
60871, 60871, 60875, 60945, 60941, 61071,
61075, 61145, 61141
60875, 60875, 60876, 60877, 60945, 61075,
61076, 61077, 61145
60920, 60920, 60932, 60986, 60916, 61120,
61132, 61186, 61116
60932, 60932, 60936, 60921, 60986, 61132,
61136, 61121, 61186
60936, 60936, 60941, 60922, 60921, 61136,
61141, 61122, 61121
60941, 60941, 60945, 60951, 60922, 61141,
61145, 61151, 61122
60945, 60945, 60877, 60881, 60951, 61145,
61077, 61081, 61151
60916, 60916, 60986, 60981, 60911, 61116,
61186, 61181, 61111
60986, 60986, 60921, 60923, 60981, 61186,
61121, 61123, 61181
60921, 60921, 60922, 60924, 60923, 61121,
61122, 61124, 61123
60922, 60922, 60951, 60956, 60924, 61122,
61151, 61156, 61124
60951, 60951, 60881, 60886, 60956, 61151,
61081, 61086, 61156

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60911, 60911, 60981, 60975, 60907, 61111,
61181, 61175, 61107
60981, 60981, 60923, 60971, 60975, 61181,
61123, 61171, 61175
60923, 60923, 60924, 60966, 60971, 61123,
61124, 61166, 61171
60924, 60924, 60956, 60960, 60966, 61124,
61156, 61160, 61166
60956, 60956, 60886, 60890, 60960, 61156,
61086, 61090, 61160
60907, 60907, 60975, 60905, 60906, 61107,
61175, 61105, 61106
60975, 60975, 60971, 60901, 60905, 61175,
61171, 61101, 61105
60971, 60971, 60966, 60896, 60901, 61171,
61166, 61096, 61101
60966, 60966, 60960, 60892, 60896, 61166,
61160, 61092, 61096
60960, 60960, 60890, 60891, 60892, 61160,
61090, 61091, 61092
*SOLID SECTION, ELSET=FABM, MATERIAL=S304F
*****
**      TOP TIE PLATE
*****
*NCOPY,SHIFT,CHANGE NU=8600,OLD SET=FABM,NEW
SET=FATP1
0.0, 0.0, 156.23
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=200,OLD SET=FATP1,NEW
SET=FATP2
0.0, 0.0, 3.48
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FATP
FATP1, FATP2
*ELCOPY,OLD SET=FABM,NEW SET=FATP,ELEMENT
SH=8600,SHIFT NOD=8600
*SOLID SECTION, ELSET=FATP, MATERIAL=S304F
*****
**      GUIDE AND INST. TUBES
*****
*ELEMENT, TYPE=B31, ELSET=TUBEA
61195, 61132, 61332
61196, 61145, 61345
61197, 61160, 61360
61198, 61175, 61375
*ELGEN, ELSET=TUBEA
61195, 42, 200, 200
61196, 42, 200, 200
61197, 42, 200, 200
61198, 42, 200, 200
*BEAM SECTION, SECTION=CIRC, ELSET=TUBEA,
MATERIAL=CLADT
0.4280
1.0, 0.0, 0.0
*****
**      FUEL ROD VS GRID SPACER
*****
***** 01
*EQUATION
3
61401, 1, 1.0, 61461, 1, -0.5, 61462, 1, -0.5
*EQUATION
3
61401, 2, 1.0, 61461, 2, -0.5, 61462, 2, -0.5
*EQUATION
3
62601, 1, 1.0, 62661, 1, -0.5, 62662, 1, -0.5
*EQUATION
3

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62601, 2, 1.0, 62661, 2, -0.5, 62662, 2, -0.5
*EQUATION
3
63801, 1, 1.0, 63861, 1, -0.5, 63862, 1, -0.5
*EQUATION
3
63801, 2, 1.0, 63861, 2, -0.5, 63862, 2, -0.5
*EQUATION
3
64401, 1, 1.0, 64461, 1, -0.5, 64462, 1, -0.5
*EQUATION
3
64401, 2, 1.0, 64461, 2, -0.5, 64462, 2, -0.5
*EQUATION
3
65201, 1, 1.0, 65261, 1, -0.5, 65262, 1, -0.5
*EQUATION
3
65201, 2, 1.0, 65261, 2, -0.5, 65262, 2, -0.5
*EQUATION
3
66001, 1, 1.0, 66061, 1, -0.5, 66062, 1, -0.5
*EQUATION
3
66001, 2, 1.0, 66061, 2, -0.5, 66062, 2, -0.5
*EQUATION
3
66601, 1, 1.0, 66661, 1, -0.5, 66662, 1, -0.5
*EQUATION
3
66601, 2, 1.0, 66661, 2, -0.5, 66662, 2, -0.5
*EQUATION
3
67401, 1, 1.0, 67461, 1, -0.5, 67462, 1, -0.5
*EQUATION
3
67401, 2, 1.0, 67461, 2, -0.5, 67462, 2, -0.5
*EQUATION
3
68001, 1, 1.0, 68061, 1, -0.5, 68062, 1, -0.5
*EQUATION
3
68001, 2, 1.0, 68061, 2, -0.5, 68062, 2, -0.5
*EQUATION
3
68801, 1, 1.0, 68861, 1, -0.5, 68862, 1, -0.5
*EQUATION
3
68801, 2, 1.0, 68861, 2, -0.5, 68862, 2, -0.5
**** 02
*EQUATION
3
61402, 1, 1.0, 61462, 1, -0.5, 61463, 1, -0.5
*EQUATION
3
61402, 2, 1.0, 61462, 2, -0.5, 61463, 2, -0.5
*EQUATION
3
62602, 1, 1.0, 62662, 1, -0.5, 62663, 1, -0.5
*EQUATION
3
62602, 2, 1.0, 62662, 2, -0.5, 62663, 2, -0.5
*EQUATION
3
63802, 1, 1.0, 63862, 1, -0.5, 63863, 1, -0.5
*EQUATION
3
63802, 2, 1.0, 63862, 2, -0.5, 63863, 2, -0.5
*EQUATION

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3
64402, 1, 1.0, 64462, 1, -0.5, 64463, 1, -0.5
*EQUATION
3
64402, 2, 1.0, 64462, 2, -0.5, 64463, 2, -0.5
*EQUATION
3
65202, 1, 1.0, 65262, 1, -0.5, 65263, 1, -0.5
*EQUATION
3
65202, 2, 1.0, 65262, 2, -0.5, 65263, 2, -0.5
*EQUATION
3
66002, 1, 1.0, 66062, 1, -0.5, 66063, 1, -0.5
*EQUATION
3
66002, 2, 1.0, 66062, 2, -0.5, 66063, 2, -0.5
*EQUATION
3
66602, 1, 1.0, 66662, 1, -0.5, 66663, 1, -0.5
*EQUATION
3
66602, 2, 1.0, 66662, 2, -0.5, 66663, 2, -0.5
*EQUATION
3
67402, 1, 1.0, 67462, 1, -0.5, 67463, 1, -0.5
*EQUATION
3
67402, 2, 1.0, 67462, 2, -0.5, 67463, 2, -0.5
*EQUATION
3
68002, 1, 1.0, 68062, 1, -0.5, 68063, 1, -0.5
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62653, 2, 1.0, 62716, 2, -0.5, 62717, 2, -0.5
*EQUATION
3

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3
63853, 1, 1.0, 63916, 1, -0.5, 63917, 1, -0.5
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68853, 2, 1.0, 68916, 2, -0.5, 68917, 2, -0.5
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64454, 1, 1.0, 64517, 1, -0.5, 64518, 1, -0.5

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*EQUATION
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68854, 2, 1.0, 68917, 2, -0.5, 68918, 2, -0.5
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*EQUATION
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*EQUATION
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65255, 1, 1.0, 65318, 1, -0.5, 65319, 1, -0.5
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65255, 2, 1.0, 65318, 2, -0.5, 65319, 2, -0.5
*EQUATION
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66055, 1, 1.0, 66118, 1, -0.5, 66119, 1, -0.5
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*EQUATION
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67455, 1, 1.0, 67518, 1, -0.5, 67519, 1, -0.5
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67455, 2, 1.0, 67518, 2, -0.5, 67519, 2, -0.5
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68855, 1, 1.0, 68918, 1, -0.5, 68919, 1, -0.5
*EQUATION
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68855, 2, 1.0, 68918, 2, -0.5, 68919, 2, -0.5
**** 56
*EQUATION
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61456, 1, 1.0, 61519, 1, -0.5, 61520, 1, -0.5
*EQUATION
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61456, 2, 1.0, 61519, 2, -0.5, 61520, 2, -0.5
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62656, 1, 1.0, 62719, 1, -0.5, 62720, 1, -0.5
*EQUATION
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62656, 2, 1.0, 62719, 2, -0.5, 62720, 2, -0.5
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63856, 1, 1.0, 63919, 1, -0.5, 63920, 1, -0.5
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63856, 2, 1.0, 63919, 2, -0.5, 63920, 2, -0.5
*EQUATION
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64456, 1, 1.0, 64519, 1, -0.5, 64520, 1, -0.5
*EQUATION
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64456, 2, 1.0, 64519, 2, -0.5, 64520, 2, -0.5
*EQUATION
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65256, 1, 1.0, 65319, 1, -0.5, 65320, 1, -0.5
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65256, 2, 1.0, 65319, 2, -0.5, 65320, 2, -0.5
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66056, 1, 1.0, 66119, 1, -0.5, 66120, 1, -0.5
*EQUATION
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66056, 2, 1.0, 66119, 2, -0.5, 66120, 2, -0.5
*EQUATION

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66656, 1, 1.0, 66719, 1, -0.5, 66720, 1, -0.5
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66656, 2, 1.0, 66719, 2, -0.5, 66720, 2, -0.5
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67456, 1, 1.0, 67519, 1, -0.5, 67520, 1, -0.5
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67456, 2, 1.0, 67519, 2, -0.5, 67520, 2, -0.5
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68056, 1, 1.0, 68119, 1, -0.5, 68120, 1, -0.5
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68056, 2, 1.0, 68119, 2, -0.5, 68120, 2, -0.5
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68856, 1, 1.0, 68919, 1, -0.5, 68920, 1, -0.5
*EQUATION
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68856, 2, 1.0, 68919, 2, -0.5, 68920, 2, -0.5
*****
*****
** RIGID UNYIELDING TARGET
*****
*NODE, NSET=TARGET0
190000, 0.0, 0.0, -0.0
190001, -50.0, 0.0, -0.0
190002, 50.0, 0.0, -0.0
190003, 50.0, 50.0, -0.0
190004, -50.0, 50.0, -0.0
*NCOPY,SHIFT,CHANGE NU=-100000,OLD
SET=TARGET0,NEW SET=TARGET
0., 0., -8.13
0., 0., -8.13, 0., 1., -8.13, 0.
*ELEMENT,TYPE=R3D4,ELSET=TARGET
90000,90001,90002,90003,90004
*RIGID BODY, ELSET=TARGET, REF NODE=90000
*****
** TYPE 317 SST MOD
** DYNAMIC S-S CURVE
*MATERIAL, NAME=S317
*DENSITY
16.0461E-4
*ELASTIC
26.5E6, 0.3
*PLASTIC
60000., 0.
71000., 0.008
75000., 0.018
77300., 0.028
79300., 0.038
87000., 0.078
90500., 0.118
93700., 0.158
96000., 0.198
97800., 0.238
98800., 0.268
99500., 0.288
100000., 0.308
** TYPE 304 SST
** USING SANDIA DATA
*MATERIAL, NAME=S304
*DENSITY
7.5052E-4
*ELASTIC

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27.0E6, 0.3
*PLASTIC
30000., 0.
35000., 0.002
37300., 0.004
38400., 0.006
39400., 0.008
40000., 0.010
42900., 0.020
45400., 0.030
47900., 0.040
50400., 0.050
52900., 0.060
55400., 0.070
57900., 0.080
60400., 0.090
62900., 0.100
69150., 0.125
75400., 0.150
81650., 0.175
87900., 0.200
94150., 0.250
106650., 0.300
119150., 0.350
** FIN - TYPE 304 SST
*MATERIAL, NAME=FIN
*DENSITY
7.5052E-4
*ELASTIC
27.0E6, 0.3
*PLASTIC
30000., 0.
35000., 0.002
37300., 0.004
38400., 0.006
39400., 0.008
40000., 0.010
42900., 0.020
45400., 0.030
47900., 0.040
50400., 0.050
52900., 0.060
55400., 0.070
57900., 0.080
60400., 0.090
62900., 0.100
69150., 0.125
75400., 0.150
81650., 0.175
87900., 0.200
94150., 0.250
106650., 0.300
119150., 0.350
** TYPE 304 SST, DENSITY NOT ADJUSTED
*MATERIAL, NAME=S304A
*DENSITY
7.5052E-4
*ELASTIC
27.0E6, 0.3
*PLASTIC
30000., 0.
35000., 0.002
37300., 0.004
38400., 0.006
39400., 0.008
40000., 0.010
42900., 0.020
45400., 0.030
47900., 0.040
50400., 0.050
52900., 0.060
55400., 0.070
57900., 0.080
60400., 0.090
62900., 0.100
69150., 0.125
75400., 0.150
81650., 0.175
87900., 0.200
94150., 0.250
106650., 0.300
119150., 0.350
** TYPE 304 SST, DENSITY ADJUSTED TO INCLUDE
FUEL BUNDLE
*MATERIAL, NAME=S304B
*DENSITY
68.65E-4
*ELASTIC
27.0E6, 0.3
*PLASTIC
30000., 0.
35000., 0.002
37300., 0.004
38400., 0.006
39400., 0.008
40000., 0.010
42900., 0.020
45400., 0.030
47900., 0.040
50400., 0.050
52900., 0.060
55400., 0.070
57900., 0.080
60400., 0.090
62900., 0.100
69150., 0.125
75400., 0.150
81650., 0.175
87900., 0.200
94150., 0.250
106650., 0.300
119150., 0.350
** FOR BASKET SPACER DISKS
** ADJUSTING DENSITY TO INCLUDE POISON RODS
AND OTHER PARTS
*MATERIAL, NAME=S216A
*DENSITY
9.5956E-4
*ELASTIC
26.5E6, 0.3
*PLASTIC
60000., 0.
71000., 0.008
75000., 0.018
77300., 0.028
79300., 0.038
87000., 0.078
90500., 0.118
93700., 0.158
96000., 0.198
97800., 0.238
98800., 0.268
99500., 0.288
100000., 0.308
** TYPE 216 SST IS ASSUMED THE SAME AS 317
SST MOD
** USING 317 SST DYNAMIC S-S CURVE
*MATERIAL, NAME=S216

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*DENSITY
7.5052E-4
*ELASTIC
26.5E6, 0.3
*PLASTIC
60000., 0.
71000., 0.008
75000., 0.018
77300., 0.028
79300., 0.038
87000., 0.078
90500., 0.118
93700., 0.158
96000., 0.198
97800., 0.238
98800., 0.268
99500., 0.288
100000., 0.308
** RING = TYPE 216 SST (SAME AS 317 SST MOD)
** USING 317 SST DYNAMIC S-S CURVE
*MATERIAL, NAME=RING
*DENSITY
7.5052E-4
*ELASTIC
26.5E6, 0.3
*PLASTIC
60000., 0.
71000., 0.008
75000., 0.018
77300., 0.028
79300., 0.038
87000., 0.078
90500., 0.118
93700., 0.158
96000., 0.198
97800., 0.238
98800., 0.268
99500., 0.288
100000., 0.308
** DEPLETED URANIUM
** DENSITY = 1175 PCF
*MATERIAL, NAME=DURAN
*DENSITY
1.76E-3
*ELASTIC
26.0E6, 0.3
*PLASTIC
35000., 0.
60000., 0.06
** FUEL BUNDLE TOP/BOTTOM TIE PLATES - TYPE
304 SST
** ELASTIC ONLY, ADJUSTED TO 30 POUNDS/BUNDLE
(TOP AND BOTTOM)
*MATERIAL, NAME=S304F
*DENSITY
1.8145E-4
*ELASTIC
27.0E6, 0.3
***** ZIRCALOY 4 (IRRADIATED 12/2001
data *****
** ZIRCALOY 4 (6.565 g/cc = 0.237 lb/in^3)
**
*MATERIAL, NAME=CLAD
*DENSITY
6.134E-4
*ELASTIC
12.1E6, 0.37
*PLASTIC
104000., 0.
119000., 0.009
** ZIRCALOY 4 CLADDING
** ADJUSTED DENSITY TO HAVE A WEIGHT OF 7.25
POUNDS PER ROD
*MATERIAL, NAME=CLADO
*DENSITY
36.865E-4
*ELASTIC
12.1E6, 0.37
*PLASTIC
104000., 0.
119000., 0.009
** ZIRCALOY 4 CLADDING, ADJUSTED DENSITY
**
*MATERIAL, NAME=CLADI
*DENSITY
24.922E-4
*ELASTIC
12.1E6, 0.37
*PLASTIC
104000., 0.
119000., 0.009
** ZIRCALOY 4 for GRID SPACERS, ADJUSTED
DENSITY
**
*MATERIAL, NAME=CLADG
*DENSITY
6.849E-4
*ELASTIC
12.1E6, 0.37
*PLASTIC
104000., 0.
119000., 0.009
** ZIRCALOY 4 for GUIDE AND INST. TUBES,
ADJUSTED DENSITY
**
*MATERIAL, NAME=CLADT
*DENSITY
1.5435E-4
*ELASTIC
12.1E6, 0.37
*PLASTIC
104000., 0.
119000., 0.009
**
** ELEMENT SET DEFINITIONS
**
*ELSET, ELSET=OS
OSB, OSC, OSW
*ELSET, ELSET=DU
DUB, DUC, DUW
*ELSET, ELSET=IS
ISB, ISC, ISW
*ELSET, ELSET=CSKB
ISB, OSB, DUB
*ELSET, ELSET=CSKC
ISC, OSC, DUC
*ELSET, ELSET=CSKW
ISW, OSW, DUW, CFL
*ELSET, ELSET=CSKBD
OS, IS, DU, CFL
*ELSET, ELSET=CSKHD
CHDS, CHDU
*ELSET, ELSET=CASK
CSKBD, CSKHD
*ELSET, ELSET=TF
TFLG, TFST
*ELSET, ELSET=BF
BFLG, BFST

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*ELSET, ELSET=RINGB	607, 687, 20
RING1, RING2	1107, 1187, 20
*ELSET, ELSET=RINGT	1607, 1687, 20
RING3, RING4	2107, 2187, 20
*ELSET, ELSET=RING	** BOTTOM CORNER
RING1, RING2, RING3, RING4	221, 2221, 500
*ELSET, ELSET=BASK	261, 2261, 500
SPDSK, TROD, FCH, FCA, FCB, FCC	301, 381, 40
*ELSET, ELSET=FAROD	801, 881, 40
FARO, FARI	421, 461, 40
*ELSET, ELSET=FAG	921, 961, 40
FAG1, FAG2, FAG3, FAG4, FAG5, FAG6, FAG7, FAG8, FAG9,	1301, 1341, 40
FAG10	1381, 1461, 40
*ELSET, ELSET=FUELA	1801, 1961, 40
FAROD, FAG, FABM, FATP, TUBEA	2301, 2381, 40
*ELSET, ELSET=ALLEL	253, 2253, 500
CASK, BASK, TF, BF, RING, FUELA, FATSPPR, FABSPPR	293, 2293, 500
**	333, 413, 40
** NODE SET DEFINITIONS	833, 913, 40
**	453, 493, 40
*NSET, NSET=CSKBD	953, 993, 40
OSB, OSC, WALL	1333, 1373, 40
*NSET, NSET=CSKHD	1413, 1493, 40
CHD,	1833, 1993, 40
*NSET, NSET=CASK	2333, 2413, 40
CSKBD, CSKHD	** WALL
*NSET, NSET=TF	2221, 9021, 200
TFLG, TFST	2261, 9061, 200
*NSET, NSET=BF	2301, 9501, 200
BFLG, BFST	2341, 9541, 200
*NSET, NSET=RINGB	2381, 9581, 200
RING1, RING2	2253, 9053, 200
*NSET, NSET=RINGT	2293, 9093, 200
RING3, RING4	2333, 9533, 200
*NSET, NSET=RING	2373, 9573, 200
RING1, RING2, RING3, RING4	2413, 9613, 200
*NSET, NSET=BASK	** HEAD
SPDSK, TROD, FCH, FCA, FCB, FCC	10501, 10505, 1
*NSET, NSET=FAROD	11001, 11005, 1
FARO, FARS	11501, 11505, 1
*NSET, NSET=FUELA	12001, 12005, 1
FAROD, FABM, FATP	10521, 10561, 20
*NSET, NSET=ALLND	11021, 11061, 20
CASK, BASK, TF, BF, RING, FUELA, FATSPPR, FABSPPR	11521, 11561, 20
*NSET, NSET=YSYMM, GENERATE	12021, 12061, 20
30000, 30000, 1	10591, 10671, 20
90000, 90000, 1	11091, 11171, 20
** BOTTOM	11591, 11671, 20
1, 5, 1	12091, 12171, 20
501, 505, 1	10221, 12221, 500
1001, 1005, 1	10261, 12261, 500
1501, 1505, 1	11301, 12301, 500
2001, 2005, 1	11341, 12341, 500
21, 61, 20	**
521, 561, 20	10529, 10569, 20
1021, 1061, 20	11029, 11069, 20
1521, 1561, 20	11529, 11569, 20
2021, 2061, 20	12029, 12069, 20
91, 171, 20	10607, 10687, 20
591, 671, 20	11107, 11187, 20
1091, 1171, 20	11607, 11687, 20
1591, 1671, 20	12107, 12187, 20
2091, 2171, 20	10253, 12253, 500
29, 69, 20	10293, 12293, 500
529, 569, 20	11333, 12333, 500
1029, 1069, 20	11373, 12373, 500
1529, 1569, 20	** BOTTOM FINIS
2029, 2069, 20	40001, 40115, 1
107, 187, 20	43601, 43715, 1

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** TOP FINS
50011, 50155, 1
53611, 53755, 1
** RINGS
15041, 15241, 40
15073, 15193, 40
15341, 15541, 40
15373, 15493, 40
16041, 16241, 40
16073, 16193, 40
16341, 16541, 40
16373, 16493, 40
17041, 17241, 40
17073, 17193, 40
17341, 17541, 40
17373, 17493, 40
18041, 18241, 40
18073, 18193, 40
18341, 18541, 40
18373, 18493, 40
** SP1
21002, 21018, 1
21302, 21318, 1
20701, 21601, 300
20719, 21619, 300
20951, 21851, 300
20979, 21879, 300
** SP2
22502, 22518, 1
22802, 22818, 1
22201, 23101, 300
22219, 23119, 300
22451, 23351, 300
22479, 23379, 300
** SP3
24002, 24018, 1
24302, 24318, 1
23701, 24601, 300
23719, 24619, 300
23951, 24851, 300
23979, 24879, 300
** SP4
25502, 25518, 1
25802, 25818, 1
25201, 26101, 300
25219, 26119, 300
25451, 26351, 300
25479, 26379, 300
** SP5
27002, 27018, 1
27302, 27318, 1
26701, 27601, 300
26719, 27619, 300
26951, 27851, 300
26979, 27879, 300
** SP6
28502, 28518, 1
28802, 28818, 1
28201, 29101, 300
28219, 29119, 300
28451, 29351, 300
28479, 29379, 300
** SP7
30002, 30018, 1
30302, 30318, 1
29701, 30601, 300
29719, 30619, 300
29951, 30851, 300
29979, 30879, 300

** SP8
31502, 31518, 1
31802, 31818, 1
31201, 32101, 300
31219, 32119, 300
31451, 32351, 300
31479, 32379, 300
** SP9
33002, 33018, 1
33302, 33318, 1
32701, 33601, 300
32719, 33619, 300
32951, 33851, 300
32979, 33879, 300
** TOP
33901, 33919, 1
34201, 34219, 1
** CENTRAL FUEL CELL
20408, 34208, 300
20412, 34212, 300
20409, 20411, 1
20709, 20711, 1
*BOUNDARY
90000, 1, 6
YSYMM, YSYMM
*INITIAL CONDITIONS, TYPE=VELOCITY
ALLND, 3, -528.0
*****
** STEP 1
*****
*STEP
*DYNAMIC, EXPLICIT
, 100.0E-3
*RESTART, WRITE, NUMBER INTERVAL=3
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE CASK/FINS/RINGS AND THE TARGET
**
*SURFACE DEFINITION, NAME=TGTOP
TARGET, SPOS
*CONTACT NODE SET, NAME=BOTTOM
BF,
OSBB,
*CONTACT PAIR
BOTTOM, TGTOP
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE CASK INSIDE SURFACE AND THE BASKET
**
*NSET, NSET=TRODNDB
20545, 20555, 20845, 20855
*NSET, NSET=TRODNBT
34645, 34655
*NSET, NSET=TRODND
TRODNDB, TRODNBT
*NSET, NSET=FCCBEB, GENERATE
20433, 20437, 1
20453, 20457, 1
20473, 20477, 1
20493, 20497, 1
20513, 20517, 1
20533, 20537, 1
*NSET, NSET=FCCBET, GENERATE
20733, 20737, 1
20753, 20757, 1
20773, 20777, 1
20793, 20797, 1
20813, 20817, 1
20833, 20837, 1

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*CONTACT NODE SET,NAME=BASKO
SP1RNG,SP2RNG,SP3RNG,SP4RNG,SP5RNG,SP6RNG,SP7
RNG,SP8RNG,SP9RNG
SP1, TOP, TRODND, FCABEB, FCABET, FCBEBB, FCBEBT, FC
CBEB, FCCBET, FCHBEB, FCHBET
*CONTACT NODE SET,NAME=BASKTP
TOP, TRODNDT
*ELSET, ELSET=CASKS2, GENERATE
1501, 1718, 1
*ELSET, ELSET=CASKS6, GENERATE
2221, 2252, 1
2421, 2452, 1
2621, 2652, 1
2821, 2852, 1
3021, 3052, 1
3221, 3252, 1
3421, 3452, 1
3621, 3652, 1
3821, 3852, 1
4021, 4052, 1
4221, 4252, 1
4421, 4452, 1
4621, 4652, 1
4821, 4852, 1
5021, 5052, 1
5221, 5252, 1
5421, 5452, 1
5621, 5652, 1
5821, 5852, 1
6021, 6052, 1
6221, 6252, 1
6421, 6452, 1
6621, 6652, 1
6821, 6852, 1
7021, 7052, 1
7221, 7252, 1
7421, 7452, 1
7621, 7652, 1
7821, 7852, 1
8021, 8052, 1
8221, 8252, 1
8421, 8452, 1
8621, 8652, 1
8821, 8852, 1
*ELSET, ELSET=CASKS6A, GENERATE
10221, 10252, 1
*ELSET, ELSET=CASKS1, GENERATE
10501, 10718, 1
*SURFACE DEFINITION,NAME=CASKI1
CASKS2, S2
CASKS6, S6
*SURFACE DEFINITION,NAME=CASKI2
CASKS1, S1
CASKS6A, S6
*CONTACT PAIR
BASKO, CASKI1
*CONTACT PAIR
BASKTP, CASKI2
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE FUEL ROD OUTER LAYER WITH BOTTOM TIE
** PLATE
**
*CONTACT NODE SET,NAME=FAROB,GENERATE
61001, 61056, 1
*SURFACE DEFINITION,NAME=FABMT
FABM, S2
*CONTACT PAIR, INTERACTION=FRTPL
FAROB, FABMT
```

```
*SURFACE INTERACTION, NAME=FRTPL
*FRICTION
0.5
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE FUEL ROD OUTER LAYER WITH TOP TIE
** PLATE
**
*CONTACT NODE SET,NAME=FAROT,GENERATE
69201, 69256, 1
*SURFACE DEFINITION,NAME=FATPB
FATP, S1
*CONTACT PAIR, INTERACTION=FRTPL
FAROT, FATPB
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE FUEL CHANNEL A INSIDE SURFACE AND THE
** FUEL BUNDLE A
**
*SURFACE DEFINITION,NAME=FCAISH
FCABE, S2
*SURFACE DEFINITION,NAME=FCAISL
FCAR, SPOS
FCAS, SPOS
*CONTACT NODE SET,NAME=FUELA
FUELA,
*CONTACT PAIR
FUELA, FCAISH
FUELA, FCAISL
*****
*CONTACT NODE SET,NAME=FUELATP
FATP,
*CONTACT PAIR
FUELATP, CASKI2
**
** DEFINE THE CONTACT SURFACES BETWEEN
** OUTER FUEL RODS AND INNER FUEL RODS
**
*CONTACT NODE SET,NAME=FARO
FARO,
*SURFACE DEFINITION,NAME=FARI
FARI, SNEG
*CONTACT PAIR
FARO, FARI
*****
** FA FUEL ASSEMBLY INTERNALS (TOP)
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE CASK HEAD FUEL ASSEMBLY SPACER AND
** HEAD
**
*SURFACE DEFINITION,NAME=FATSPTHD
FATSPR2, S2
*CONTACT PAIR, ADJUST=0.1, TIED
FATSPTHD, CASKI2
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE CASK HEAD FUEL ASSEMBLY SPACER AND
** FUELA TOP
**
*SURFACE DEFINITION,NAME=FATSPTF
FATSPR1, S1
*SURFACE DEFINITION,NAME=FATPT
FATP, S2
*CONTACT PAIR, WEIGHT=0.5
FATSPTF, FATPT
**
** DEFINE THE CONTACT SURFACES BETWEEN
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** THE FUEL CHANNEL A INSIDE SURFACE AND TOP
SPEACER A
**
*ELSET, ELSET=FCATFASP, GENERATE
33623, 33626, 1
33663, 33666, 1
33643, 33646, 1
33703, 33706, 1
33683, 33684, 1
33923, 33926, 1
33963, 33966, 1
33943, 33946, 1
34003, 34006, 1
33983, 33984, 1
*SURFACE DEFINITION, NAME=FCATFASP
FCATFASP, SPOS
*CONTACT NODE SET, NAME=FATSPR
FATSPR,
*CONTACT PAIR
FATSPR, FCATFASP
**
** FA FUEL ASSEMBLY INTERNALS (BOTTOM)
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE FUEL ASSEMBLY BOTTOM SPACER AND FCA
BOTTOM PLATE
**
*SURFACE DEFINITION, NAME=FABSPTBE
FABSPTBE, S1
*SURFACE DEFINITION, NAME=FCABET
FCABET, S2
*CONTACT PAIR, WEIGHT=0.5
FABSPTBE, FCABET
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE FUEL ASSEMBLY BOTTOM SPACER AND FUELA
BOTTOM PLATE
**
*SURFACE DEFINITION, NAME=FABSPTBM
FABSPTBM, S2
*SURFACE DEFINITION, NAME=FABMBM
FABMBM, S1
*CONTACT PAIR, WEIGHT=0.5
FABSPTBM, FABMBM
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE FUEL CHANNEL A INSIDE SURFACE AND
BOTTOM SPEACER A
**
*ELSET, ELSET=FCABTBSP, GENERATE
20723, 20726, 1
21023, 21026, 1
21323, 21326, 1
20764, 20766, 1
20783, 20784, 1
21064, 21066, 1
21083, 21084, 1
21364, 21366, 1
21383, 21384, 1
20803, 20806, 1
21103, 21106, 1
21403, 21406, 1
20743, 20746, 1
20763, 20766, 1
21043, 21046, 1
21063, 21066, 1
21343, 21346, 1
21363, 21366, 1
*SURFACE DEFINITION, NAME=FCABTBSP

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FCABTBSP, SPOS
*CONTACT NODE SET, NAME=FABSPR
FABSPR,
*CONTACT PAIR
FABSPR, FCABTBSP
*****
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE BOTTOM FINS AND THE CASK BOTTOM
**
*ELSET, ELSET=OSWS4, GENERATE
2341, 2372, 1
2541, 2572, 1
*SURFACE DEFINITION, NAME=BOSTBF
OSB, S1
OSC, S1
OSWS4, S4
*NSET, NSET=BFTBOS, GENERATE
40101, 40115, 1
40501, 40515, 1
40701, 40715, 1
40901, 40915, 1
41101, 41115, 1
41301, 41315, 1
41501, 41515, 1
41701, 41715, 1
41901, 41915, 1
42101, 42115, 1
42301, 42315, 1
42501, 42515, 1
42701, 42715, 1
42901, 42915, 1
43101, 43115, 1
43301, 43315, 1
43501, 43515, 1
43701, 43715, 1
**
45351, 45360, 1
45451, 45460, 1
45551, 45560, 1
45651, 45660, 1
45751, 45760, 1
45851, 45860, 1
45951, 45960, 1
46051, 46060, 1
46151, 46160, 1
46251, 46260, 1
46351, 46360, 1
46451, 46460, 1
46551, 46560, 1
46651, 46660, 1
46751, 46760, 1
46851, 46860, 1
*CONTACT NODE SET, NAME=BFTBOS
BFTBOS,
*CONTACT PAIR, ADJUST=0.5, TIED
BFTBOS, BOSTBF
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE TOP FINS AND THE CASK TOP HEAD
**
*ELSET, ELSET=HDS2, GENERATE
11501, 11832, 1
*ELSET, ELSET=HDS4, GENERATE
10801, 10832, 1
11301, 11332, 1
11801, 11832, 1
*SURFACE DEFINITION, NAME=HDTTF

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HDS2,S2
HDS4,S4
*NSET, NSET=TFTHD, GENERATE
50011, 50051, 20
50061, 50071, 1
50411, 50451, 20
50461, 50471, 1
50611, 50651, 20
50661, 50671, 1
50811, 50851, 20
50861, 50871, 1
51011, 51051, 20
51061, 51071, 1
51211, 51251, 20
51261, 51271, 1
51411, 51451, 20
51461, 51471, 1
51611, 51651, 20
51661, 51671, 1
51811, 51851, 20
51861, 51871, 1
52011, 52051, 20
52061, 52071, 1
52211, 52251, 20
52261, 52271, 1
52411, 52451, 20
52461, 52471, 1
52611, 52651, 20
52661, 52671, 1
52811, 52851, 20
52861, 52871, 1
53011, 53051, 20
53061, 53071, 1
53211, 53251, 20
53261, 53271, 1
53411, 53451, 20
53461, 53471, 1
53611, 53651, 20
53661, 53671, 1
**
55306, 55326, 10
55331, 55336, 1
55406, 55426, 10
55431, 55436, 1
55506, 55526, 10
55531, 55536, 1
55606, 55626, 10
55631, 55636, 1
55706, 55726, 10
55731, 55736, 1
55806, 55826, 10
55831, 55836, 1
55906, 55926, 10
55931, 55936, 1
56006, 56026, 10
56031, 56036, 1
56106, 56126, 10
56131, 56136, 1
56206, 56226, 10
56231, 56236, 1
56306, 56326, 10
56331, 56336, 1
56406, 56426, 10
56431, 56436, 1
56506, 56526, 10
56531, 56536, 1
56606, 56626, 10
56631, 56636, 1
56706, 56726, 10

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56731, 56736, 1
56806, 56826, 10
56831, 56836, 1
*CONTACT NODE SET,NAME=TFTHD
TFTHD,
*CONTACT PAIR, ADJUST=0.5, TIED
TFTHD,HDTTF
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE TOP FINS THEMSELVES
**
*SURFACE DEFINITION, NAME=TFLG1
TFLG1,
*SURFACE DEFINITION, NAME=TFLG2
TFLG2,
*SURFACE DEFINITION, NAME=TFLG3
TFLG3,
*SURFACE DEFINITION, NAME=TFLG4
TFLG4,
*SURFACE DEFINITION, NAME=TFLG5
TFLG5,
*SURFACE DEFINITION, NAME=TFLG6
TFLG6,
*SURFACE DEFINITION, NAME=TFLG7
TFLG7,
*SURFACE DEFINITION, NAME=TFLG8
TFLG8,
*SURFACE DEFINITION, NAME=TFLG9
TFLG9,
*SURFACE DEFINITION, NAME=TFST1
TFST1,
*SURFACE DEFINITION, NAME=TFST2
TFST2,
*SURFACE DEFINITION, NAME=TFST3
TFST3,
*SURFACE DEFINITION, NAME=TFST4
TFST4,
*SURFACE DEFINITION, NAME=TFST5
TFST5,
*SURFACE DEFINITION, NAME=TFST6
TFST6,
*SURFACE DEFINITION, NAME=TFST7
TFST7,
*SURFACE DEFINITION, NAME=TFST8
TFST8,
*CONTACT PAIR, WEIGHT=0.5
TFLG1,TFST1
*CONTACT PAIR, WEIGHT=0.5
TFST1,TFLG2
*CONTACT PAIR, WEIGHT=0.5
TFLG2,TFST2
*CONTACT PAIR, WEIGHT=0.5
TFST2,TFLG3
*CONTACT PAIR, WEIGHT=0.5
TFLG3,TFST3
*CONTACT PAIR, WEIGHT=0.5
TFST3,TFLG4
*CONTACT PAIR, WEIGHT=0.5
TFLG4,TFST4
*CONTACT PAIR, WEIGHT=0.5
TFST4,TFLG5
*CONTACT PAIR, WEIGHT=0.5
TFLG5,TFST5
*CONTACT PAIR, WEIGHT=0.5
TFST5,TFLG6
*CONTACT PAIR, WEIGHT=0.5
TFLG6,TFST6
*CONTACT PAIR, WEIGHT=0.5
TFST6,TFLG7

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*CONTACT PAIR, WEIGHT=0.5
TFLG7,TFST7
*CONTACT PAIR, WEIGHT=0.5
TFST7,TFLG8
*CONTACT PAIR, WEIGHT=0.5
TFLG8,TFST8
*CONTACT PAIR, WEIGHT=0.5
TFST8,TFLG9
**
**  DEFINE THE CONTACT SURFACES BETWEEN
**  THE BOTTOM FINS THEMSELVES
**
*SURFACE DEFINITION, NAME=BFLG1
BFLG1,
*SURFACE DEFINITION, NAME=BFLG2
BFLG2,
*SURFACE DEFINITION, NAME=BFLG3
BFLG3,
*SURFACE DEFINITION, NAME=BFLG4
BFLG4,
*SURFACE DEFINITION, NAME=BFLG5
BFLG5,
*SURFACE DEFINITION, NAME=BFLG6
BFLG6,
*SURFACE DEFINITION, NAME=BFLG7
BFLG7,
*SURFACE DEFINITION, NAME=BFLG8
BFLG8,
*SURFACE DEFINITION, NAME=BFLG9
BFLG9,
*SURFACE DEFINITION, NAME=BFST1
BFST1,
*SURFACE DEFINITION, NAME=BFST2
BFST2,
*SURFACE DEFINITION, NAME=BFST3
BFST3,
*SURFACE DEFINITION, NAME=BFST4
BFST4,
*SURFACE DEFINITION, NAME=BFST5
BFST5,
*SURFACE DEFINITION, NAME=BFST6
BFST6,
*SURFACE DEFINITION, NAME=BFST7
BFST7,
*SURFACE DEFINITION, NAME=BFST8
BFST8,
*CONTACT PAIR, WEIGHT=0.5
BFLG1,BFST1
*CONTACT PAIR, WEIGHT=0.5
BFST1,BFLG2
*CONTACT PAIR, WEIGHT=0.5
BFLG2,BFST2
*CONTACT PAIR, WEIGHT=0.5
BFST2,BFLG3
*CONTACT PAIR, WEIGHT=0.5
BFLG3,BFST3
*CONTACT PAIR, WEIGHT=0.5
BFST3,BFLG4
*CONTACT PAIR, WEIGHT=0.5
BFLG4,BFST4
*CONTACT PAIR, WEIGHT=0.5
BFST4,BFLG5
*CONTACT PAIR, WEIGHT=0.5
BFLG5,BFST5
*CONTACT PAIR, WEIGHT=0.5
BFST5,BFLG6
*CONTACT PAIR, WEIGHT=0.5
BFLG6,BFST6
*CONTACT PAIR, WEIGHT=0.5

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BFST6,BFLG7
*CONTACT PAIR, WEIGHT=0.5
BFLG7,BFST7
*CONTACT PAIR, WEIGHT=0.5
BFST7,BFLG8
*CONTACT PAIR, WEIGHT=0.5
BFLG8,BFST8
*CONTACT PAIR, WEIGHT=0.5
BFST8,BFLG9
*****
**      OUTPUT DATA
*****
*NSET, NSET=RFORCE
90000,
*NSET, NSET=DISP
5781, 5797, 5813
21001,21019,21230
34201,34219,34230
62001,63201,62008,63208,62015,63215,62022,632
22
62029,63229,62036,63236,62043,63243,62050,632
50
*HISTORY OUTPUT, TIME=1.E-4
*NODE HISTORY,NSET=RFORCE
RF,
*NODE HISTORY,NSET=DISP
A,V,U
*ENERGY HISTORY
ALLKE,
*FILE OUTPUT, NUMBER INTERVAL=100
*NODE FILE,NSET=RFORCE
RF,
*MONITOR,NODE=5797,DOF=3
*END STEP

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E-8.5.2.2 IF-300 Cask Impact Analysis 30-ft Center-of-Gravity-over-Bottom-Corner Drop

```
*HEADING
IF-300 CASK IMPACT ANALYSIS
12/21/01
FILE=IFBBC30

2001 model with modified Zircaloy data

*****
** CASK BOTTOM
*****
*NODE, SYSTEM=R
*NODE, NSET=OSB1
1, -3.0000, 0.0000, 0.0000
2, -1.5000, 0.0000, 0.0000
3, 0.0000, 0.0000, 0.0000
4, 1.5000, 0.0000, 0.0000
5, 3.0000, 0.0000, 0.0000
6, -2.7000, 1.2000, 0.0000
7, -1.3500, 1.3500, 0.0000
8, 0.0000, 1.5000, 0.0000
9, 1.3500, 1.3500, 0.0000
10, 2.7000, 1.2000, 0.0000
11, -2.4000, 2.4000, 0.0000
12, -1.2000, 2.7000, 0.0000
13, 0.0000, 3.0000, 0.0000
14, 1.2000, 2.7000, 0.0000
15, 2.4000, 2.4000, 0.0000
21, 4.5625, 0.0000, 0.0000
22, 4.1794, 1.7720, 0.0000
23, 3.3655, 3.3655, 0.0000
24, 1.7720, 4.1794, 0.0000
25, 0.0000, 4.5625, 0.0000
26, -1.7720, 4.1794, 0.0000
27, -3.3655, 3.3655, 0.0000
28, -4.1794, 1.7720, 0.0000
29, -4.5625, 0.0000, 0.0000
*NODE, NSET=OSB2
41, 6.1250, 0.0000, 0.0000
61, 8.0750, 0.0000, 0.0000
*NCOPY,SHIFT,MULTIPLE=8,CHANGE NU=+1,OLD
SET=OSB2,NEW SET=OSB2
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +22.50
*NODE, NSET=OSB3
91, 10.0250, 0.0000, 0.0000
111, 11.9750, 0.0000, 0.0000
131, 13.9250, 0.0000, 0.0000
151, 15.8750, 0.0000, 0.0000
171, 17.2975, 0.0000, 0.0000
*NCOPY,SHIFT,MULTIPLE=16,CHANGE NU=+1,OLD
SET=OSB3,NEW SET=OSB3
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +11.25
*NODE, NSET=OSB4
221, 18.7500, 0.0000, 0.0000
*NCOPY,SHIFT,MULTIPLE=32,CHANGE NU=+1,OLD
SET=OSB4,NEW SET=OSB4
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +5.625
*NSET, NSET=OSBB
OSB1, OSB2, OSB3, OSB4
*NCOPY,SHIFT,CHANGE NU=+500,OLD SET=OSBB,NEW
SET=OSBU1
0.0, 0.0, 1.563
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
```

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*NCOPY,SHIFT,CHANGE NU=+500,OLD SET=OSBU1,NEW
SET=OSBU2
0.0, 0.0, 1.9375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+500,OLD SET=OSBU2,NEW
SET=OSBU3
0.0, 0.0, 1.9375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+500,OLD SET=OSBU3,NEW
SET=OSBT
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=OSB
OSBB, OSBU1, OSBU2, OSBU3, OSBT
*****
*ELEMENT, TYPE=C3D8R, ELSET=OSB1
1, 1, 2, 7, 6, 501, 502, 507, 506
*ELGEN, ELSET=OSB1
1, 4, 1, 1, 2, 5, 4
*ELEMENT, TYPE=C3D8R, ELSET=OSB1
9, 5, 21, 22, 10, 505, 521, 522, 510
10, 10, 22, 23, 15, 510, 522, 523, 515
11, 15, 23, 24, 14, 515, 523, 524, 514
12, 14, 24, 25, 13, 514, 524, 525, 513
13, 13, 25, 26, 12, 513, 525, 526, 512
14, 12, 26, 27, 11, 512, 526, 527, 511
15, 11, 27, 28, 6, 511, 527, 528, 506
16, 6, 28, 29, 1, 506, 528, 529, 501
*ELEMENT, TYPE=C3D8R
21, 21, 41, 42, 22, 521, 541, 542, 522
*ELGEN, ELSET=OSB2
21, 8, 1, 1, 2, 20, 20
*ELEMENT, TYPE=C3D6, ELSET=OSB3
61, 61, 91, 92, 561, 591, 592
62, 61, 92, 62, 561, 592, 562
63, 62, 92, 93, 562, 592, 593
64, 62, 93, 94, 562, 593, 594
65, 62, 94, 63, 562, 594, 563
66, 63, 94, 95, 563, 594, 595
67, 63, 95, 96, 563, 595, 596
68, 63, 96, 64, 563, 596, 564
69, 64, 96, 97, 564, 596, 597
70, 64, 97, 98, 564, 597, 598
71, 64, 98, 65, 564, 598, 565
72, 65, 98, 99, 565, 598, 599
73, 65, 99, 100, 565, 599, 600
74, 65, 100, 66, 565, 600, 566
75, 66, 100, 101, 566, 600, 601
76, 66, 101, 102, 566, 601, 602
77, 66, 102, 67, 566, 602, 567
78, 67, 102, 103, 567, 602, 603
79, 67, 103, 104, 567, 603, 604
80, 67, 104, 68, 567, 604, 568
81, 68, 104, 105, 568, 604, 605
82, 68, 105, 106, 568, 605, 606
83, 68, 106, 69, 568, 606, 569
84, 69, 106, 107, 569, 606, 607
*ELEMENT, TYPE=C3D8R
91, 91, 111, 112, 92, 591, 611, 612, 592
*ELGEN, ELSET=OSB3
91, 16, 1, 1, 4, 20, 20
*ELEMENT, TYPE=C3D6, ELSET=OSB4
171, 171, 221, 222, 671, 721, 722
172, 171, 222, 172, 671, 722, 672
173, 172, 222, 223, 672, 722, 723
174, 172, 223, 224, 672, 723, 724
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175, 172, 224, 173, 672, 724, 673
 176, 173, 224, 225, 673, 724, 725
 177, 173, 225, 226, 673, 725, 726
 178, 173, 226, 174, 673, 726, 674
 179, 174, 226, 227, 674, 726, 727
 180, 174, 227, 228, 674, 727, 728
 181, 174, 228, 175, 674, 728, 675
 182, 175, 228, 229, 675, 728, 729
 183, 175, 229, 230, 675, 729, 730
 184, 175, 230, 176, 675, 730, 676
 185, 176, 230, 231, 676, 730, 731
 186, 176, 231, 232, 676, 731, 732
 187, 176, 232, 177, 676, 732, 677
 188, 177, 232, 233, 677, 732, 733
 189, 177, 233, 234, 677, 733, 734
 190, 177, 234, 178, 677, 734, 678
 191, 178, 234, 235, 678, 734, 735
 192, 178, 235, 236, 678, 735, 736
 193, 178, 236, 179, 678, 736, 679
 194, 179, 236, 237, 679, 736, 737
 195, 179, 237, 238, 679, 737, 738
 196, 179, 238, 180, 679, 738, 680
 197, 180, 238, 239, 680, 738, 739
 198, 180, 239, 240, 680, 739, 740
 199, 180, 240, 181, 680, 740, 681
 200, 181, 240, 241, 681, 740, 741
 201, 181, 241, 242, 681, 741, 742
 202, 181, 242, 182, 681, 742, 682
 203, 182, 242, 243, 682, 742, 743
 204, 182, 243, 244, 682, 743, 744
 205, 182, 244, 183, 682, 744, 683
 206, 183, 244, 245, 683, 744, 745
 207, 183, 245, 246, 683, 745, 746
 208, 183, 246, 184, 683, 746, 684
 209, 184, 246, 247, 684, 746, 747
 210, 184, 247, 248, 684, 747, 748
 211, 184, 248, 185, 684, 748, 685
 212, 185, 248, 249, 685, 748, 749
 213, 185, 249, 250, 685, 749, 750
 214, 185, 250, 186, 685, 750, 686
 215, 186, 250, 251, 686, 750, 751
 216, 186, 251, 252, 686, 751, 752
 217, 186, 252, 187, 686, 752, 687
 218, 187, 252, 253, 687, 752, 753
 *ELSET, ELSET=OSB
 OSB1, OSB2, OSB3, OSB4
 *ELCOPY, OLD SET=OSB, NEW SET=DUB1, ELEMENT
 SH=500, SHIFT NOD=500
 *ELCOPY, OLD SET=DUB1, NEW SET=DUB2, ELEMENT
 SH=500, SHIFT NOD=500
 *ELCOPY, OLD SET=DUB2, NEW SET=ISB, ELEMENT
 SH=500, SHIFT NOD=500
 *ELSET, ELSET=DUB
 DUB1, DUB2
 *SOLID SECTION, ELSET=OSB, MATERIAL=S304
 *SOLID SECTION, ELSET=ISB, MATERIAL=S304
 *SOLID SECTION, ELSET=DUB, MATERIAL=DURAN

 ** CASK BOTTOM CORNER

 *NODE, NSET=OSBC
 261, 19.2800, 0.0000, 0.0000
 301, 21.5168, 0.0000, 0.4141
 341, 23.2817, 0.0000, 1.5933
 381, 24.4609, 0.0000, 3.3582
 761, 19.2800, 0.0000, 1.5630
 801, 20.9198, 0.0000, 1.8553
 841, 22.1786, 0.0000, 2.6964
 881, 23.0197, 0.0000, 3.9552

421, 19.2800, 0.0000, 2.5323
 461, 20.5477, 0.0000, 2.7536
 921, 21.5590, 0.0000, 3.3160
 961, 22.1214, 0.0000, 4.3273
 1261, 19.2800, 0.0000, 3.5005
 1301, 20.2880, 0.0000, 3.5016
 1341, 21.1098, 0.0000, 3.7653
 1381, 19.2800, 0.0000, 4.4698
 1421, 20.2880, 0.0000, 4.4708
 1461, 21.2960, 0.0000, 4.4708
 *NCOPY, SHIFT, MULTIPLE=32, CHANGE NU=+1, OLD
 SET=OSBC, NEW SET=OSBC
 0.0, 0.0, 0.0
 0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +5.625
 **
 *NODE, NSET=WBS1
 1761, 19.2800, 0.0000, 5.4400
 1801, 20.2880, 0.0000, 5.4400
 1841, 21.2960, 0.0000, 5.4400
 1881, 22.3040, 0.0000, 5.4400
 1921, 23.3120, 0.0000, 5.4400
 1961, 24.8750, 0.0000, 5.4400
 *NCOPY, SHIFT, MULTIPLE=32, CHANGE NU=+1, OLD
 SET=WBS1, NEW SET=WBS1
 0.0, 0.0, 0.0
 0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +5.625
 *NODE, NSET=WBS2
 2261, 19.2800, 0.0000, 6.6900
 2301, 21.2960, 0.0000, 6.6900
 2341, 23.3120, 0.0000, 6.6900
 2381, 24.8750, 0.0000, 6.6900
 *NCOPY, SHIFT, MULTIPLE=32, CHANGE NU=+1, OLD
 SET=WBS2, NEW SET=WBS2
 0.0, 0.0, 0.0
 0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +5.625
 *NSET, NSET=OSC
 OSBC, WBS1, WBS2
 *NSET, NSET=WIS1, GENERATE
 2221, 2253, 1
 *NSET, NSET=WBASE
 WIS1, WBS2

 *ELEMENT, TYPE=C3D8R
 221, 221, 261, 262, 222, 721, 761, 762, 722
 381, 381, 1961, 1962, 382, 881, 1921, 1922,
 882
 1961, 1961, 2381, 2382, 1962, 1921, 2341, 2342,
 1922
 761, 761, 801, 802, 762, 421, 461, 462, 422
 801, 801, 841, 842, 802, 461, 921, 922, 462
 841, 841, 881, 882, 842, 921, 961, 962, 922
 881, 881, 1921, 1922, 882, 961, 1881, 1882,
 962
 421, 421, 461, 462, 422, 1261, 1301, 1302,
 1262
 461, 461, 921, 922, 462, 1301, 1341, 1342,
 1302
 921, 921, 961, 962, 922, 1341, 1461, 1462,
 1342
 961, 961, 1881, 1882, 962, 1461, 1841, 1842,
 1462
 1261, 1261, 1301, 1302, 1262, 1381, 1421,
 1422, 1382
 1381, 1381, 1421, 1422, 1382, 1761, 1801,
 1802, 1762
 1721, 1721, 1761, 1762, 1722, 2221, 2261,
 2262, 2222
 *ELEMENT, TYPE=C3D6
 721, 722, 762, 422, 721, 761, 421

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1221, 722, 422, 1222, 721, 421, 1221
2001, 422, 1262, 1222, 421, 1261, 1221
2041, 1222, 1262, 1382, 1221, 1261, 1381
2081, 1222, 1382, 1722, 1221, 1381, 1721
2121, 1382, 1762, 1722, 1381, 1761, 1721
**
2161, 1762, 1802, 2262, 1761, 1801, 2261
1761, 1802, 2302, 2262, 1801, 2301, 2261
1801, 1802, 1842, 2302, 1801, 1841, 2301
1841, 1842, 1882, 2302, 1841, 1881, 2301
1881, 1882, 2342, 2302, 1881, 2341, 2301
1921, 1882, 1922, 2342, 1881, 1921, 2341
*ELGEN, ELSET=OSC
221, 32, 1, 1, 4, 40, 40
381, 32, 1, 1
1961, 32, 1, 1
*ELGEN, ELSET=DUC
761, 32, 1, 1
801, 32, 1, 1
841, 32, 1, 1
881, 32, 1, 1
421, 32, 1, 1
461, 32, 1, 1
921, 32, 1, 1
961, 32, 1, 1
1261, 32, 1, 1, 2, 40, 40
1381, 32, 1, 1, 2, 40, 40
721, 32, 1, 1
1221, 32, 1, 1
2001, 32, 1, 1
2041, 32, 1, 1
2081, 32, 1, 1
2121, 32, 1, 1
2161, 32, 1, 1
1761, 32, 1, 1
1801, 32, 1, 1
1841, 32, 1, 1
1881, 32, 1, 1
1921, 32, 1, 1
*ELGEN, ELSET=ISC
1721, 32, 1, 1
*SOLID SECTION, ELSET=OSC, MATERIAL=S304
*SOLID SECTION, ELSET=ISC, MATERIAL=S304
*SOLID SECTION, ELSET=DUC, MATERIAL=DURAN
*****
** CASK WALL
*****
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=WBASE,NEW
SET=W1
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+400,OLD SET=W1,NEW
SET=W2
0.0, 0.0, 6.935
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=W2A
W1, W2, 2, 200
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=W2,NEW
SET=W3
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+800,OLD SET=W3,NEW
SET=W4
0.0, 0.0, 15.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=W4A
W3, W4, 4, 200
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=W4,NEW
SET=W5

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0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+4000,OLD SET=W5,NEW
SET=W6
0.0, 0.0, 123.93
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=W6A
W5, W6, 20, 200
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=W6,NEW
SET=W7
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+600,OLD SET=W7,NEW
SET=W8
0.0, 0.0, 12.625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=W8A
W7, W8, 3, 200
*NODE, NSET=W9
9021, 18.7500, 0.0000, 174.0550
9061, 19.6750, 0.0000, 174.0550
9101, 20.6000, 0.0000, 174.0550
9141, 22.7375, 0.0000, 174.0550
9181, 24.8750, 0.0000, 174.0550
*NCOPY,SHIFT,MULTIPLE=32,CHANGE NU=+1,OLD
SET=W9,NEW SET=W9
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +5.625
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=W9,NEW
SET=W10
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=W10,NEW
SET=W11
0.0, 0.0, 0.875
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
***** MODIFY NODES TO ACCEPT STRUCTURAL RINGS
*NODE, NSET=WMOD1
2981, 24.8750, 0.0000, 14.0110
2982, 24.7552, 2.4382, 14.0215
2983, 24.3970, 4.8529, 14.0529
2984, 23.8039, 7.2208, 14.1048
2985, 22.9815, 9.5193, 14.1767
2986, 21.9378, 11.7260, 14.2680
2987, 20.6828, 13.8198, 14.3778
2988, 19.2286, 15.7805, 14.5050
2989, 17.5893, 17.5893, 14.6485
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=WMOD1,NEW
SET=WMOD1A
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NODE, NSET=WMOD2
3981, 24.8750, 0.0000, 32.7390
3982, 24.7552, 2.4382, 32.7285
3983, 24.3970, 4.8529, 32.6971
3984, 23.8039, 7.2208, 32.6452
3985, 22.9815, 9.5193, 32.5733
3986, 21.9378, 11.7260, 32.4820
3987, 20.6828, 13.8198, 32.3722
3988, 19.2286, 15.7805, 32.2450
3989, 17.5893, 17.5893, 32.1015
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=WMOD2,NEW
SET=WMOD2A
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
**
*NODE, NSET=WMOD3
8181, 24.8750, 0.0000, 156.1910
8182, 24.7552, 2.4382, 156.2015

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8183, 24.3970, 4.8529, 156.2329
8184, 23.8039, 7.2208, 156.2848
8185, 22.9815, 9.5193, 156.3567
8186, 21.9378, 11.7260, 156.4480
8187, 20.6828, 13.8198, 156.5578
8188, 19.2286, 15.7805, 156.6850
8189, 17.5893, 17.5893, 156.8285
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=WMOD3,NEW
SET=WMOD3A
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
**
*NODE, NSET=WMOD4
9181, 24.8750, 0.0000, 174.9190
9182, 24.7552, 2.4382, 174.9085
9183, 24.3970, 4.8529, 174.8771
9184, 23.8039, 7.2208, 174.8252
9185, 22.9815, 9.5193, 174.7533
9186, 21.9378, 11.7260, 174.6620
9187, 20.6828, 13.8198, 174.5522
9188, 19.2286, 15.7805, 174.4250
9189, 17.5893, 17.5893, 174.2815
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=WMOD4,NEW
SET=WMOD4A
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=WMOD
WMOD1A, WMOD2A, WMOD3A, WMOD4A
*NSET, NSET=WALL
W1,W2A,W3,W4A,W5,W6A,W7,W8A,W9,W10,W11,WMOD
*****
*ELEMENT, TYPE=C3D8R
2221, 2221, 2261, 2262, 2222, 2421, 2461,
2462, 2422
*ELGEN, ELSET=ISW
2221, 32, 1, 1, 33, 200, 200
**
*ELEMENT, TYPE=C3D8R
2261, 2261, 2301, 2302, 2262, 2461, 2501,
2502, 2462
*ELGEN, ELSET=DUW
2261, 32, 1, 1, 2, 40, 40, 33, 200, 200
**
*ELEMENT, TYPE=C3D8R
2341, 2341, 2381, 2382, 2342, 2541, 2581,
2582, 2542
*ELGEN, ELSET=OSW
2341, 32, 1, 1, 33, 200, 200
*SOLID SECTION, ELSET=OSW, MATERIAL=S317
*SOLID SECTION, ELSET=DUW, MATERIAL=DURAN
*SOLID SECTION, ELSET=ISW, MATERIAL=S216
*****
** CASK FLANGE
*****
*ELEMENT, TYPE=C3D8R
8821, 8821, 8861, 8862, 8822, 9021, 9061,
9062, 9022
9101, 9101, 9141, 9142, 9102, 9301, 9341,
9342, 9302
*ELGEN, ELSET=CFL
8821, 32, 1, 1, 4, 40, 40
9101, 32, 1, 1, 2, 40, 40, 2, 200, 200
*SOLID SECTION, ELSET=CFL, MATERIAL=S304
*****
** CASK HEAD
*****
*NCOPY,SHIFT,CHANGE NU=+10000,OLD
SET=OSBB,NEW SET=CHDB0
0.0, 0.0, 174.43

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0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NODE, NSET=CHDB1
10221, 18.7500, 0.0000, 174.4300
10261, 20.6000, 0.0000, 174.4300
10301, 22.7375, 0.0000, 174.4300
10341, 24.8750, 0.0000, 174.4300
*NCOPY,SHIFT,MULTIPLE=32,CHANGE NU=+1,OLD
SET=CHDB1,NEW SET=CHDB1
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +5.625
*NSET, NSET=CHDB
CHDB0, CHDB1
*NCOPY,SHIFT,CHANGE NU=+500,OLD SET=CHDB,NEW
SET=CHD1
0.0, 0.0, 1.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+500,OLD SET=CHD1,NEW
SET=CHD2
0.0, 0.0, 1.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+500,OLD SET=CHD2,NEW
SET=CHD3
0.0, 0.0, 3.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+500,OLD SET=CHD3,NEW
SET=CHD4
0.0, 0.0, 2.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=CHD
CHDB, CHD1, CHD2, CHD3, CHD4
*****
*ELEMENT, TYPE=C3D8R
10221, 10221, 10261, 10262, 10222, 10721,
9501, 9502, 10722
10721, 10721, 9501, 9502, 10722, 11221,
11261, 11262, 11222
10761, 9501, 9541, 9542, 9502, 11261, 11301,
11302, 11262
11221, 11221, 11261, 11262, 11222, 11721,
11761, 11762, 11722
*ELGEN, ELSET=CHD1
10221, 32, 1, 1
10721, 32, 1, 1
10761, 32, 1, 1, 2, 40, 40
11221, 32, 1, 1, 3, 40, 40, 2, 500, 500
*ELCOPY,OLD SET=OSB,NEW SET=CHDB,ELEMENT
SH=10500,SHIFT NOD=10500
*ELCOPY,OLD SET=CHDB,NEW SET=CHDU,ELEMENT
SH=500,SHIFT NOD=500
*ELCOPY,OLD SET=CHDU,NEW SET=CHDT,ELEMENT
SH=500,SHIFT NOD=500
*ELSET, ELSET=CHDS
CHD1, CHDB, CHDT
*SOLID SECTION, ELSET=CHDS, MATERIAL=S304
*SOLID SECTION, ELSET=CHDU, MATERIAL=DURAN
*****
** CASK HEAD TOP FUEL CHANNEL SPACER (A)
*****
*NODE, NSET=FATSPR1
13001, -14.3000, 1.3500, 171.9300
13002, -10.3000, 1.3500, 171.9300
13003, -6.3000, 1.3500, 171.9300
13004, -6.3000, 5.3500, 171.9300
13005, -6.3000, 9.3500, 171.9300
13006, -10.3000, 9.3500, 171.9300
13007, -14.3000, 9.3500, 171.9300
13008, -14.3000, 5.3500, 171.9300
13011, -13.3334, 2.3666, 171.9300
13012, -10.3000, 1.9593, 171.9300

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13013, -7.3166, 2.3666, 171.9300
13014, -6.9093, 5.3500, 171.9300
13015, -7.3166, 8.3334, 171.9300
13016, -10.3000, 8.7408, 171.9300
13017, -13.3334, 8.3334, 171.9300
13018, -13.6908, 5.3500, 171.9300
13021, -12.2668, 3.3832, 171.9300
13022, -10.3000, 2.5685, 171.9300
13023, -8.3332, 3.3832, 171.9300
13024, -7.5185, 5.3500, 171.9300
13025, -8.3332, 7.3168, 171.9300
13026, -10.3000, 8.1315, 171.9300
13027, -12.2668, 7.3168, 171.9300
13028, -13.0815, 5.3500, 171.9300
13031, -12.0017, 3.6483, 171.9300
13032, -10.3000, 2.9435, 171.9300
13033, -8.5983, 3.6483, 171.9300
13034, -7.8935, 5.3500, 171.9300
13035, -8.5983, 7.0517, 171.9300
13036, -10.3000, 7.7565, 171.9300
13037, -12.0017, 7.0517, 171.9300
13038, -12.7065, 5.3500, 171.9300
13040, -10.3000, 5.3500, 171.9300
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FATSPR1,NEW SET=FATSPR2
0.0, 0.0, 0.375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FATSPR2,NEW SET=FATSPR3
0.0, 0.0, 0.5416
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FATSPR3,NEW SET=FATSPR4
0.0, 0.0, 0.5416
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FATSPR4,NEW SET=FATSPR5
0.0, 0.0, 0.5416
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FATSPR5,NEW SET=FATSPR6
0.0, 0.0, 0.5416
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FATSPR6,NEW SET=FATSPR7
0.0, 0.0, 0.5416
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FATSPR7,NEW SET=FATSPR8
0.0, 0.0, 0.5420
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FATSPR8,NEW SET=FATSPR9
0.0, 0.0, 0.625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FATSPR
FATSPR1,FATSPR2,FATSPR3,FATSPR4,FATSPR5,FATSP
R6,FATSPR7,FATSPR8,FATSPR9
*****
*ELEMENT, TYPE=C3D8R, ELSET=FATSPR1
13001, 13001, 13002, 13012, 13011, 13051,
13052, 13062, 13061
13008, 13008, 13001, 13011, 13018, 13058,
13051, 13061, 13068
*ELGEN, ELSET=FATSPR1
13001, 7, 1, 1, 3, 10, 10
13008, 3, 10, 10
*ELEMENT, TYPE=C3D6, ELSET=FATSPR1

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13031, 13031, 13032, 13040, 13081, 13082,
13090
13032, 13032, 13033, 13040, 13082, 13083,
13090
13033, 13033, 13034, 13040, 13083, 13084,
13090
13034, 13034, 13035, 13040, 13084, 13085,
13090
13035, 13035, 13036, 13040, 13085, 13086,
13090
13036, 13036, 13037, 13040, 13086, 13087,
13090
13037, 13037, 13038, 13040, 13087, 13088,
13090
13038, 13038, 13031, 13040, 13088, 13081,
13090
*ELEMENT, TYPE=C3D8R, ELSET=FATSPRP
13071, 13071, 13072, 13082, 13081, 13121,
13122, 13132, 13131
13078, 13078, 13071, 13081, 13088, 13128,
13121, 13131, 13138
*ELGEN, ELSET=FATSPRP
13071, 7, 1, 1, 6, 50, 50
13078, 6, 50, 50
*ELCOPY,OLD SET=FATSPR1,NEW
SET=FATSPR2,ELEMENT SH=350,SHIFT NOD=350
*ELSET, ELSET=FATSPR
FATSPR1,FATSPR2,FATSPRP
*SOLID SECTION, ELSET=FATSPR, MATERIAL=S304
*****
** CASK BOTTOM FUEL CHANNEL SPACER (A)
*****
*NCOPY,SHIFT,CHANGE NU=+500,OLD
SET=FATSPR1,NEW SET=FABSPR1
0.0, 0.0, -164.11
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FABSPR1,NEW SET=FABSPR2
0.0, 0.0, 1.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FABSPR2,NEW SET=FABSPR3
0.0, 0.0, 0.375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FABSPR3,NEW SET=FABSPR4
0.0, 0.0, 0.375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FABSPR4,NEW SET=FABSPR5
0.0, 0.0, 0.375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FABSPR5,NEW SET=FABSPR6
0.0, 0.0, 0.375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FABSPR6,NEW SET=FABSPR7
0.0, 0.0, 0.375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FABSPR7,NEW SET=FABSPR8
0.0, 0.0, 0.375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FABSPR8,NEW SET=FABSPR9
0.0, 0.0, 1.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FABSPR

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FABSPR1, FABSPR2, FABSPR3, FABSPR4, FABSPR5, FABSPR6, FABSPR7, FABSPR8, FABSPR9

*ELEMENT, TYPE=C3D8R, ELSET=FABSPR1

13501, 13501, 13502, 13512, 13511, 13551, 13552, 13562, 13561

13508, 13508, 13501, 13511, 13518, 13558, 13551, 13561, 13568

*ELGEN, ELSET=FABSPR1

13501, 7, 1, 1, 3, 10, 10

13508, 3, 10, 10

*ELEMENT, TYPE=C3D6, ELSET=FABSPR1

13531, 13531, 13532, 13540, 13581, 13582, 13590

13532, 13532, 13533, 13540, 13582, 13583, 13590

13533, 13533, 13534, 13540, 13583, 13584, 13590

13534, 13534, 13535, 13540, 13584, 13585, 13590

13535, 13535, 13536, 13540, 13585, 13586, 13590

13536, 13536, 13537, 13540, 13586, 13587, 13590

13537, 13537, 13538, 13540, 13587, 13588, 13590

13538, 13538, 13531, 13540, 13588, 13581, 13590

*ELEMENT, TYPE=C3D8R, ELSET=FABSPRP

13571, 13571, 13572, 13582, 13581, 13621, 13622, 13632, 13631

13578, 13578, 13571, 13581, 13588, 13628, 13621, 13631, 13638

*ELGEN, ELSET=FABSPRP

13571, 7, 1, 1, 6, 50, 50

13578, 6, 50, 50

*ELCOPY, OLD SET=FABSPR1, NEW

SET=FABSPR2, ELEMENT SH=350, SHIFT NOD=350

*ELSET, ELSET=FABSPR

FABSPR1, FABSPR2, FABSPRP

*SOLID SECTION, ELSET=FABSPR, MATERIAL=S304

** BASKET

** SPACER DISK 1

*NODE, NSET=SPDSK1A

21002, -16.2339, 0.0000, 10.0025

21003, -14.8000, 0.0000, 10.0025

21004, -12.5500, 0.0000, 10.0025

21005, -10.3000, 0.0000, 10.0025

21006, -8.0500, 0.0000, 10.0025

21007, -5.8000, 0.0000, 10.0025

21008, -4.5000, 0.0000, 10.0025

21009, -2.2500, 0.0000, 10.0025

21010, 0.0000, 0.0000, 10.0025

21011, 2.2500, 0.0000, 10.0025

21012, 4.5000, 0.0000, 10.0025

21013, 5.8000, 0.0000, 10.0025

21014, 8.0500, 0.0000, 10.0025

21015, 10.3000, 0.0000, 10.0025

21016, 12.5500, 0.0000, 10.0025

21017, 14.8000, 0.0000, 10.0025

21018, 16.2339, 0.0000, 10.0025

*NCOPY, SHIFT, CHANGE NU=+20, OLD

SET=SPDSK1A, NEW SET=SPDSK1B

0.0, 0.85, 0.0

0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0

*NCOPY, SHIFT, CHANGE NU=+20, OLD

SET=SPDSK1B, NEW SET=SPDSK1C

0.0, 1.825, 0.0

0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0

*NCOPY, SHIFT, CHANGE NU=+20, OLD

SET=SPDSK1C, NEW SET=SPDSK1D

0.0, 1.825, 0.0

0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0

*NCOPY, SHIFT, CHANGE NU=+20, OLD

SET=SPDSK1D, NEW SET=SPDSK1E

0.0, 1.906, 0.0

0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0

*NCOPY, SHIFT, CHANGE NU=+20, OLD

SET=SPDSK1E, NEW SET=SPDSK1F

0.0, 1.722, 0.0

0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0

*NCOPY, SHIFT, CHANGE NU=+20, OLD

SET=SPDSK1F, NEW SET=SPDSK1G

0.0, 1.722, 0.0

0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0

*NCOPY, SHIFT, CHANGE NU=+20, OLD

SET=SPDSK1G, NEW SET=SPDSK1H

0.0, 1.65, 0.0

0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0

*NCOPY, SHIFT, CHANGE NU=+20, OLD

SET=SPDSK1H, NEW SET=SPDSK1I

0.0, 1.953, 0.0

0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0

*NCOPY, SHIFT, CHANGE NU=+20, OLD

SET=SPDSK1I, NEW SET=SPDSK1J

0.0, 1.953, 0.0

0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0

** MODIFY NODES

*NODE, NSET=SPDSKMD

21165, -10.3000, 13.3067, 10.0025

21166, -8.0500, 13.3635, 10.0025

21167, -5.8000, 13.4202, 10.0025

21186, -8.0500, 15.1271, 10.0025

21187, -5.8000, 15.3039, 10.0025

**

21173, 5.8000, 13.4202, 10.0025

21174, 8.0500, 13.3635, 10.0025

21175, 10.3000, 13.3067, 10.0025

21193, 5.8000, 15.3039, 10.0025

21194, 8.0500, 15.1271, 10.0025

**

*NODE, NSET=SPRNG1A

21001, -18.1550, 0.0000, 10.0025

21021, -18.1351, 0.8500, 10.0025

21041, -17.9568, 2.6750, 10.0025

21061, -17.5885, 4.5000, 10.0025

21081, -16.9873, 6.4060, 10.0025

21102, -16.2339, 8.1280, 10.0025

21122, -15.2506, 9.8500, 10.0025

21143, -14.0483, 11.5000, 10.0025

21164, -12.5500, 13.1187, 10.0025

21185, -10.3000, 14.9504, 10.0025

21206, -8.0500, 16.2727, 10.0025

21227, -5.8000, 17.2036, 10.0025

21228, -4.5000, 17.5885, 10.0025

21229, -2.2500, 18.0150, 10.0025

**

21019, 18.1550, 0.0000, 10.0025

21039, 18.1351, 0.8500, 10.0025

21059, 17.9568, 2.6750, 10.0025

21079, 17.5885, 4.5000, 10.0025

21099, 16.9873, 6.4060, 10.0025

21118, 16.2339, 8.1280, 10.0025

21138, 15.2506, 9.8500, 10.0025

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21157, 14.0483, 11.5000, 10.0025	0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
21176, 12.5500, 13.1187, 10.0025	*NSET, NSET=SP1DSK
21195, 10.3000, 14.9504, 10.0025	SPDSK1Y, SPDSK1Z
21214, 8.0500, 16.2727, 10.0025	*NSET, NSET=SP1RNG
21230, 0.0000, 18.1550, 10.0025	SPRNG1Y, SPRNG1Z
21231, 2.2500, 18.0150, 10.0025	*NSET, NSET=SP1
21232, 4.5000, 17.5885, 10.0025	SP1DSK, SP1RNG
21233, 5.8000, 17.2036, 10.0025	*****
*NODE, NSET=SPRNG1C	*ELEMENT, TYPE=C3D8R, ELSET=SPDSK1
21207, -5.8000, 16.4146, 10.0025	21001, 21001, 21002, 21022, 21021, 21301,
21208, -4.5000, 16.4966, 10.0025	21302, 21322, 21321
21209, -2.2500, 16.6386, 10.0025	21012, 21012, 21013, 21033, 21032, 21312,
21210, 0.0000, 16.7805, 10.0025	21313, 21333, 21332
21211, 2.2500, 16.6386, 10.0025	21021, 21021, 21022, 21042, 21041, 21321,
21212, 4.5000, 16.4966, 10.0025	21322, 21342, 21341
21213, 5.8000, 16.4146, 10.0025	21027, 21027, 21028, 21048, 21047, 21327,
*NODE, NSET=SPRNG1B	21328, 21348, 21347
21251, 18.6550, 0.0000, 10.0025	21032, 21032, 21033, 21053, 21052, 21332,
21252, 18.6356, 0.8500, 10.0025	21333, 21353, 21352
21253, 18.4622, 2.6750, 10.0025	21068, 21068, 21069, 21089, 21088, 21368,
21254, 18.1041, 4.5000, 10.0025	21369, 21389, 21388
21255, 17.5206, 6.4060, 10.0025	21037, 21037, 21038, 21058, 21057, 21337,
21256, 16.6810, 8.3519, 10.0025	21338, 21358, 21357
21257, 15.6706, 10.1213, 10.0025	21082, 21082, 21083, 21103, 21102, 21382,
21258, 14.4352, 11.8167, 10.0025	21383, 21403, 21402
21259, 12.8956, 13.4800, 10.0025	21097, 21097, 21098, 21118, 21117, 21397,
21260, 10.5837, 15.3621, 10.0025	21398, 21418, 21417
21261, 8.2717, 16.7209, 10.0025	21123, 21123, 21124, 21144, 21143, 21423,
21262, 5.8000, 17.7305, 10.0025	21424, 21444, 21443
21263, 4.5000, 18.1041, 10.0025	21133, 21133, 21134, 21154, 21153, 21433,
21264, 2.2500, 18.5188, 10.0025	21434, 21454, 21453
21265, 0.0000, 18.6550, 10.0025	21144, 21144, 21145, 21165, 21164, 21444,
21266, -2.2500, 18.5188, 10.0025	21445, 21465, 21464
21267, -4.5000, 18.1041, 10.0025	21153, 21153, 21154, 21174, 21173, 21453,
21268, -5.8000, 17.7305, 10.0025	21454, 21474, 21473
21269, -8.2717, 16.7209, 10.0025	21165, 21165, 21166, 21186, 21185, 21465,
21270, -10.5837, 15.3621, 10.0025	21466, 21486, 21485
21271, -12.8956, 13.4800, 10.0025	21173, 21173, 21174, 21194, 21193, 21473,
21272, -14.4352, 11.8167, 10.0025	21474, 21494, 21493
21273, -15.6706, 10.1213, 10.0025	21186, 21186, 21187, 21207, 21206, 21486,
21274, -16.6810, 8.3519, 10.0025	21487, 21507, 21506
21275, -17.5206, 6.4060, 10.0025	21207, 21207, 21208, 21228, 21227, 21507,
21276, -18.1041, 4.5000, 10.0025	21508, 21528, 21527
21277, -18.4622, 2.6750, 10.0025	*ELGEN, ELSET=SPDSK1
21278, -18.6356, 0.8500, 10.0025	21001, 7, 1, 1
21279, -18.6550, 0.0000, 10.0025	21012, 7, 1, 1
*NSET, NSET=SPDSK1Y	21021, 2, 1, 1, 3, 20, 20
SPDSK1A, SPDSK1B, SPDSK1C, SPDSK1D, SPDSK1E, SPDSK1F, SPDSK1G, SPDSK1H	21027, 8, 20, 20
SPDSK1I, SPDSK1J, SPDSK1M, SPRNG1C	21032, 8, 20, 20
*NSET, NSET=SPRNG1Y	21068, 4, 1, 1
SPRNG1A, SPRNG1B	21037, 2, 1, 1, 3, 20, 20
**	21082, 2, 20, 20
*NCOPY, SHIFT, CHANGE NU=+300, OLD	21097, 2, 20, 20
SET=SPDSK1Y, NEW SET=SPDSK1Z	21123, 4, 1, 1
0.0, 0.0, 1.0	21133, 4, 1, 1
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0	21144, 3, 1, 1
**	21153, 3, 1, 1
*NCOPY, SHIFT, CHANGE NU=-300, OLD	21165, 2, 1, 1
SET=SPRNG1Y, NEW SET=SPRNG1Z	21173, 2, 1, 1
0.0, 0.0, -1.5	21186, 8, 1, 1
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0	21207, 6, 1, 1
**	**
*NCOPY, SHIFT, CHANGE NU=+300, OLD	*ELEMENT, TYPE=C3D6, ELSET=SPDSK1
SET=SPRNG1Y, NEW SET=SPRNG1Z	21081, 21081, 21082, 21102, 21381, 21382,
0.0, 0.0, 1.0	21402
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0	21122, 21122, 21123, 21143, 21422, 21423,
*NCOPY, SHIFT, CHANGE NU=+600, OLD	21443
SET=SPRNG1Y, NEW SET=SPRNG1Z	21143, 21143, 21144, 21164, 21443, 21444,
0.0, 0.0, 2.5	21464

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21164, 21164, 21165, 21185, 21464, 21465,
21485
21185, 21185, 21186, 21206, 21485, 21486,
21506
21206, 21206, 21207, 21227, 21506, 21507,
21527
21098, 21098, 21099, 21118, 21398, 21399,
21418
21137, 21137, 21138, 21157, 21437, 21438,
21457
21156, 21156, 21157, 21176, 21456, 21457,
21476
21175, 21175, 21176, 21195, 21475, 21476,
21495
21194, 21194, 21195, 21214, 21494, 21495,
21514
21213, 21213, 21214, 21233, 21513, 21514,
21533
**
*ELEMENT, TYPE=C3D8R, ELSET=SPRNG1A
20951, 20719, 20951, 20952, 20739, 21019,
21251, 21252, 21039
20952, 20739, 20952, 20953, 20759, 21039,
21252, 21253, 21059
20953, 20759, 20953, 20954, 20779, 21059,
21253, 21254, 21079
20954, 20779, 20954, 20955, 20799, 21079,
21254, 21255, 21099
20955, 20799, 20955, 20956, 20818, 21099,
21255, 21256, 21118
20956, 20818, 20956, 20957, 20838, 21118,
21256, 21257, 21138
20957, 20838, 20957, 20958, 20857, 21138,
21257, 21258, 21157
20958, 20857, 20958, 20959, 20876, 21157,
21258, 21259, 21176
20959, 20876, 20959, 20960, 20895, 21176,
21259, 21260, 21195
20960, 20895, 20960, 20961, 20914, 21195,
21260, 21261, 21214
20961, 20914, 20961, 20962, 20933, 21214,
21261, 21262, 21233
20962, 20933, 20962, 20963, 20932, 21233,
21262, 21263, 21232
20963, 20932, 20963, 20964, 20931, 21232,
21263, 21264, 21231
20964, 20931, 20964, 20965, 20930, 21231,
21264, 21265, 21230
20965, 20930, 20965, 20966, 20929, 21230,
21265, 21266, 21229
20966, 20929, 20966, 20967, 20928, 21229,
21266, 21267, 21228
20967, 20928, 20967, 20968, 20927, 21228,
21267, 21268, 21227
20968, 20927, 20968, 20969, 20906, 21227,
21268, 21269, 21206
20969, 20906, 20969, 20970, 20885, 21206,
21269, 21270, 21185
20970, 20885, 20970, 20971, 20864, 21185,
21270, 21271, 21164
20971, 20864, 20971, 20972, 20843, 21164,
21271, 21272, 21143
20972, 20843, 20972, 20973, 20822, 21143,
21272, 21273, 21122
20973, 20822, 20973, 20974, 20802, 21122,
21273, 21274, 21102
20974, 20802, 20974, 20975, 20781, 21102,
21274, 21275, 21081

20975, 20781, 20975, 20976, 20761, 21081,
21275, 21276, 21061
20976, 20761, 20976, 20977, 20741, 21061,
21276, 21277, 21041
20977, 20741, 20977, 20978, 20721, 21041,
21277, 21278, 21021
20978, 20721, 20978, 20979, 20701, 21021,
21278, 21279, 21001
*ELCOPY,OLD SET=SPRNG1A,NEW
SET=SPRNG1B,ELEMENT SH=300,SHIFT NOD=300
*ELCOPY,OLD SET=SPRNG1B,NEW
SET=SPRNG1C,ELEMENT SH=300,SHIFT NOD=300
*ELSET, ELSET=SP1
SPDSK1, SPRNG1A, SPRNG1B, SPRNG1C
*SOLID SECTION, ELSET=SP1, MATERIAL=S216A

** SPACER DISK 2

*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP1DSK,NEW SET=SP2DSK
0.0, 0.0, 20.875
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP1RNG,NEW SET=SP2RNG
0.0, 0.0, 20.875
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=SP2
SP2DSK,SP2RNG
*ELCOPY,OLD SET=SP1,NEW SET=SP2,ELEMENT
SH=1500,SHIFT NOD=1500
*SOLID SECTION, ELSET=SP2, MATERIAL=S216A

** SPACER DISK 3

*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP2DSK,NEW SET=SP3DSK
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP2RNG,NEW SET=SP3RNG
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=SP3
SP3DSK,SP3RNG
*ELCOPY,OLD SET=SP2,NEW SET=SP3,ELEMENT
SH=1500,SHIFT NOD=1500
*SOLID SECTION, ELSET=SP3, MATERIAL=S216A

** SPACER DISK 4

*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP3DSK,NEW SET=SP4DSK
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP3RNG,NEW SET=SP4RNG
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=SP4
SP4DSK,SP4RNG
*ELCOPY,OLD SET=SP3,NEW SET=SP4,ELEMENT
SH=1500,SHIFT NOD=1500
*SOLID SECTION, ELSET=SP4, MATERIAL=S216A

** SPACER DISK 5

*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP4DSK,NEW SET=SP5DSK
0.0, 0.0, 18.5625

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0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP4RNG,NEW SET=SP5RNG
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=SP5
SP5DSK,SP5RNG
*ELCOPY,OLD SET=SP4,NEW SET=SP5,ELEMENT
SH=1500,SHIFT NOD=1500
*SOLID SECTION, ELSET=SP5, MATERIAL=S216A
*****
** SPACER DISK 6
*****
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP5DSK,NEW SET=SP6DSK
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP5RNG,NEW SET=SP6RNG
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=SP6
SP6DSK,SP6RNG
*ELCOPY,OLD SET=SP5,NEW SET=SP6,ELEMENT
SH=1500,SHIFT NOD=1500
*SOLID SECTION, ELSET=SP6, MATERIAL=S216A
*****
** SPACER DISK 7
*****
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP6DSK,NEW SET=SP7DSK
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP6RNG,NEW SET=SP7RNG
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=SP7
SP7DSK,SP7RNG
*ELCOPY,OLD SET=SP6,NEW SET=SP7,ELEMENT
SH=1500,SHIFT NOD=1500
*SOLID SECTION, ELSET=SP7, MATERIAL=S216A
*****
** SPACER DISK 8
*****
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP7DSK,NEW SET=SP8DSK
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP7RNG,NEW SET=SP8RNG
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=SP8
SP8DSK,SP8RNG
*ELCOPY,OLD SET=SP7,NEW SET=SP8,ELEMENT
SH=1500,SHIFT NOD=1500
*SOLID SECTION, ELSET=SP8, MATERIAL=S216A
*****
** SPACER DISK 9
*****
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP8DSK,NEW SET=SP9DSK
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP8RNG,NEW SET=SP9RNG
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=SP9
SP9DSK,SP9RNG
*ELCOPY,OLD SET=SP8,NEW SET=SP9,ELEMENT
SH=1500,SHIFT NOD=1500
*SOLID SECTION, ELSET=SP9, MATERIAL=S216A
*****
** TOP PLATE
*****
*NCOPY,SHIFT,CHANGE NU=+12900,OLD
SET=SPDSK1Y,NEW SET=TOP1
0.0, 0.0, 160.3125
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+12900,OLD
SET=SPRNG1A,NEW SET=TOP1
0.0, 0.0, 160.3125
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+300,OLD SET=TOP1,NEW
SET=TOP2
0.0, 0.0, 0.50
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=TOP
TOP1, TOP2
*ELCOPY,OLD SET=SPDSK1,NEW SET=TOP,ELEMENT
SH=12900,SHIFT NOD=12900
*SOLID SECTION, ELSET=TOP, MATERIAL=S216A
*****
*NSET, NSET=SPDSK
SP1,SP2,SP3,SP4,SP5,SP6,SP7,SP8,SP9,TOP
*ELSET, ELSET=SPDSK
SP1,SP2,SP3,SP4,SP5,SP6,SP7,SP8,SP9,TOP
*****
** FUEL CELL CHANNEL - HALF
*****
*NSET, NSET=FCHBS, GENERATE
21008, 21068, 20
21068, 21072, 1
21012, 21072, 20
** BASE END PLATE (1-IN. THICK)
*NCOPY,SHIFT,CHANGE NU=-300,OLD SET=FCHBS,NEW
SET=FCHBET
0.0, 0.0, -2.1875
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FCHBETL1
20708, 20728, 20748
*NSET, NSET=FCHBETL2
20712, 20732, 20752
*NFILL, NSET=FCHBET
FCHBETL1, FCHBETL2, 4, 1
*NCOPY,SHIFT,CHANGE NU=-300,OLD
SET=FCHBET,NEW SET=FCHBEB
0.0, 0.0, -1.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
** SPACER DISK 1-2
*NCOPY,SHIFT,CHANGE NU=600,OLD SET=FCHBS,NEW
SET=FCHSP11
0.0, 0.0, 4.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD
SET=FCHSP11,NEW SET=FCHSP12
0.0, 0.0, 6.9375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD
SET=FCHSP12,NEW SET=FCHSP13
0.0, 0.0, 6.9375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
** SPACER DISK 2-3
*NCOPY,SHIFT,CHANGE NU=900,OLD
SET=FCHSP13,NEW SET=FCHSP21
0.0, 0.0, 7.0

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0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
 *NCOPY,SHIFT,CHANGE NU=300,OLD
 SET=FCHSP21,NEW SET=FCHSP22
 0.0, 0.0, 5.7813
 0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
 *NCOPY,SHIFT,CHANGE NU=300,OLD
 SET=FCHSP22,NEW SET=FCHSP23
 0.0, 0.0, 5.7812
 0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
 *NSET, NSET=FCHSP2M
 FCHSP21, FCHSP22, FCHSP23
 *NCOPY,SHIFT,CHANGE NU=1500,OLD
 SET=FCHSP2M,NEW SET=FCHSP3M
 0.0, 0.0, 18.5625
 0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
 *NCOPY,SHIFT,CHANGE NU=1500,OLD
 SET=FCHSP3M,NEW SET=FCHSP4M
 0.0, 0.0, 18.5625
 0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
 *NCOPY,SHIFT,CHANGE NU=1500,OLD
 SET=FCHSP4M,NEW SET=FCHSP5M
 0.0, 0.0, 18.5625
 0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
 *NCOPY,SHIFT,CHANGE NU=1500,OLD
 SET=FCHSP5M,NEW SET=FCHSP6M
 0.0, 0.0, 18.5625
 0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
 *NCOPY,SHIFT,CHANGE NU=1500,OLD
 SET=FCHSP6M,NEW SET=FCHSP7M
 0.0, 0.0, 18.5625
 0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
 *NCOPY,SHIFT,CHANGE NU=1500,OLD
 SET=FCHSP7M,NEW SET=FCHSP8M
 0.0, 0.0, 18.5625
 0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
 **
 ** 9.5 IN. TO TOP
 *NSET, NSET=FCHTS, GENERATE
 33308, 33368, 20
 33368, 33372, 1
 33312, 33372, 20
 *NCOPY,SHIFT,CHANGE NU=300,OLD SET=FCHTS,NEW
 SET=FCHT1
 0.0, 0.0, 3.0
 0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
 *NSET, NSET=FCH
 FCHBET,FCHBEB,FCHSP11,FCHSP12,FCHSP13
 FCHSP2M,FCHSP3M,FCHSP4M,FCHSP5M,FCHSP6M,FCHSP
 7M,FCHSP8M,FCHT1

 *ELEMENT, TYPE=C3D8R, ELSET=FCHBE
 20408, 20408, 20409, 20429, 20428, 20708,
 20709, 20729, 20728
 *ELGEN, ELSET=FCHBE
 20408, 4, 1, 1, 3, 20, 20
 *SOLID SECTION, ELSET=FCHBE, MATERIAL=S304B
 *ELEMENT, TYPE=S4R, ELSET=FCH01
 20708, 20708, 20728, 21028, 21008
 20728, 20768, 20769, 21069, 21068
 20748, 20712, 21012, 21032, 20732
 *ELGEN, ELSET=FCH01
 20708, 3, 20, 1
 20728, 4, 1, 1
 20748, 3, 20, 1
 ** 1-2
 *ELEMENT, TYPE=S4R
 21008, 21008, 21028, 21328, 21308
 21028, 21068, 21069, 21369, 21368
 21048, 21012, 21312, 21332, 21032

*ELGEN, ELSET=FCH12A
 21008, 3, 20, 1
 21028, 4, 1, 1
 21048, 3, 20, 1
 *ELCOPY,OLD SET=FCH12A,NEW SET=FCH12B,ELEMENT
 SH=300,SHIFT NOD=300
 *ELCOPY,OLD SET=FCH12B,NEW SET=FCH12C,ELEMENT
 SH=300,SHIFT NOD=300
 *ELCOPY,OLD SET=FCH12C,NEW SET=FCH12D,ELEMENT
 SH=300,SHIFT NOD=300
 *ELCOPY,OLD SET=FCH12D,NEW SET=FCH12E,ELEMENT
 SH=300,SHIFT NOD=300
 *ELSET, ELSET=FCH12R
 FCH12A, FCH12C, FCH12D
 *ELSET, ELSET=FCH12S
 FCH12B, FCH12E
 *ELSET, ELSET=FCH12
 FCH12R, FCH12S
 ** 2-3
 *ELCOPY,OLD SET=FCH12R,NEW SET=FCH23R,ELEMENT
 SH=1500,SHIFT NOD=1500
 *ELCOPY,OLD SET=FCH12S,NEW SET=FCH23S,ELEMENT
 SH=1500,SHIFT NOD=1500
 *ELSET, ELSET=FCH23
 FCH23R, FCH23S
 ** 3-4
 *ELCOPY,OLD SET=FCH23R,NEW SET=FCH34R,ELEMENT
 SH=1500,SHIFT NOD=1500
 *ELCOPY,OLD SET=FCH23S,NEW SET=FCH34S,ELEMENT
 SH=1500,SHIFT NOD=1500
 *ELSET, ELSET=FCH34
 FCH34R, FCH34S
 ** 4-5
 *ELCOPY,OLD SET=FCH34R,NEW SET=FCH45R,ELEMENT
 SH=1500,SHIFT NOD=1500
 *ELCOPY,OLD SET=FCH34S,NEW SET=FCH45S,ELEMENT
 SH=1500,SHIFT NOD=1500
 *ELSET, ELSET=FCH45
 FCH45R, FCH45S
 ** 5-6
 *ELCOPY,OLD SET=FCH45R,NEW SET=FCH56R,ELEMENT
 SH=1500,SHIFT NOD=1500
 *ELCOPY,OLD SET=FCH45S,NEW SET=FCH56S,ELEMENT
 SH=1500,SHIFT NOD=1500
 *ELSET, ELSET=FCH56
 FCH56R, FCH56S
 ** 6-7
 *ELCOPY,OLD SET=FCH56R,NEW SET=FCH67R,ELEMENT
 SH=1500,SHIFT NOD=1500
 *ELCOPY,OLD SET=FCH56S,NEW SET=FCH67S,ELEMENT
 SH=1500,SHIFT NOD=1500
 *ELSET, ELSET=FCH67
 FCH67R, FCH67S
 ** 7-8
 *ELCOPY,OLD SET=FCH67R,NEW SET=FCH78R,ELEMENT
 SH=1500,SHIFT NOD=1500
 *ELCOPY,OLD SET=FCH67S,NEW SET=FCH78S,ELEMENT
 SH=1500,SHIFT NOD=1500
 *ELSET, ELSET=FCH78
 FCH78R, FCH78S
 ** 8-9
 *ELCOPY,OLD SET=FCH78R,NEW SET=FCH89R,ELEMENT
 SH=1500,SHIFT NOD=1500
 *ELCOPY,OLD SET=FCH78S,NEW SET=FCH89S,ELEMENT
 SH=1500,SHIFT NOD=1500
 *ELSET, ELSET=FCH89
 FCH89R, FCH89S
 ** 9-TOP
 *ELEMENT, TYPE=S4R

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33008, 33008, 33028, 33328, 33308
33028, 33068, 33069, 33369, 33368
33048, 33012, 33312, 33332, 33032
*ELGEN, ELSET=FCHTOPR1
33008, 3, 20, 1
33028, 4, 1, 1
33048, 3, 20, 1
*ELCOPY, OLD SET=FCHTOPR1, NEW
SET=FCHTOPS, ELEMENT SH=300, SHIFT NOD=300
*ELCOPY, OLD SET=FCHTOPS, NEW
SET=FCHTOPR2, ELEMENT SH=300, SHIFT NOD=300
*ELCOPY, OLD SET=FCHTOPR2, NEW
SET=FCHTOPR3, ELEMENT SH=300, SHIFT NOD=300
*ELSET, ELSET=FCHTOPR
FCHTOPR1, FCHTOPR2, FCHTOPR3
*ELSET, ELSET=FCHTOP
FCHTOPR, FCHTOPS
**
*ELSET, ELSET=FCHR
FCH01, FCH12R, FCH23R, FCH34R, FCH45R, FCH56R, FCH6
7R, FCH78R, FCH89R, FCHTOPR
*ELSET, ELSET=FCHS
FCH12S, FCH23S, FCH34S, FCH45S, FCH56S, FCH67S, FCH
78S, FCH89S, FCHTOPS
*SHELL SECTION, ELSET=FCHR, MATERIAL=S304B
0.0747
*SHELL SECTION, ELSET=FCHS, MATERIAL=S304B
0.1494
*ELSET, ELSET=FCH
FCHBE, FCHR, FCHS
*****
** FUEL CELL CHANNEL - FULL A
*****
*NSET, NSET=FCABS, GENERATE
21023, 21027, 1
21023, 21123, 20
21123, 21127, 1
21027, 21127, 20
** BASE END PLATE (1-IN. THICK)
*NCOPY, SHIFT, CHANGE NU=-300, OLD SET=FCABS, NEW
SET=FCABET
0.0, 0.0, -2.1875
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FCABETL1
20743, 20763, 20783, 20803
*NSET, NSET=FCABETL2
20747, 20767, 20787, 20807
*NFILL, NSET=FCABET
FCABETL1, FCABETL2, 4, 1
*NCOPY, SHIFT, CHANGE NU=-300, OLD
SET=FCABET, NEW SET=FCABEB
0.0, 0.0, -1.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
** SPACER DISK 1-2
*NCOPY, SHIFT, CHANGE NU=600, OLD SET=FCABS, NEW
SET=FCASP11
0.0, 0.0, 4.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY, SHIFT, CHANGE NU=300, OLD
SET=FCASP11, NEW SET=FCASP12
0.0, 0.0, 6.9375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY, SHIFT, CHANGE NU=300, OLD
SET=FCASP12, NEW SET=FCASP13
0.0, 0.0, 6.9375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
** SPACER DISK 2-3
*NCOPY, SHIFT, CHANGE NU=900, OLD
SET=FCASP13, NEW SET=FCASP21
0.0, 0.0, 7.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY, SHIFT, CHANGE NU=300, OLD
SET=FCASP21, NEW SET=FCASP22
0.0, 0.0, 5.7813
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY, SHIFT, CHANGE NU=300, OLD
SET=FCASP22, NEW SET=FCASP23
0.0, 0.0, 5.7812
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FCASP2M
FCASP21, FCASP22, FCASP23
*NCOPY, SHIFT, CHANGE NU=1500, OLD
SET=FCASP2M, NEW SET=FCASP3M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY, SHIFT, CHANGE NU=1500, OLD
SET=FCASP3M, NEW SET=FCASP4M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY, SHIFT, CHANGE NU=1500, OLD
SET=FCASP4M, NEW SET=FCASP5M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY, SHIFT, CHANGE NU=1500, OLD
SET=FCASP5M, NEW SET=FCASP6M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY, SHIFT, CHANGE NU=1500, OLD
SET=FCASP6M, NEW SET=FCASP7M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY, SHIFT, CHANGE NU=1500, OLD
SET=FCASP7M, NEW SET=FCASP8M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
**
** 9.5 IN. TO TOP
*NSET, NSET=FCATS, GENERATE
33323, 33327, 1
33323, 33423, 20
33423, 33427, 1
33327, 33427, 20
*NCOPY, SHIFT, CHANGE NU=300, OLD SET=FCATS, NEW
SET=FCAT1
0.0, 0.0, 3.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FCA
FCABET, FCABEB, FCASP11, FCASP12, FCASP13
FCASP2M, FCASP3M, FCASP4M, FCASP5M, FCASP6M, FCASP
7M, FCASP8M, FCAT1
*****
*ELEMENT, TYPE=C3D8R, ELSET=FCABE
20423, 20423, 20424, 20444, 20443, 20723,
20724, 20744, 20743
*ELGEN, ELSET=FCABE
20423, 4, 1, 1, 5, 20, 20
*SOLID SECTION, ELSET=FCABE, MATERIAL=S304A
*ELEMENT, TYPE=S4R, ELSET=FCA01
20723, 20723, 21023, 21024, 20724
20743, 20723, 20743, 21043, 21023
20763, 20803, 20823, 21123, 21103
20764, 20727, 21027, 21047, 20747
20783, 20787, 21087, 21107, 20807
20803, 20823, 20824, 21124, 21123
*ELGEN, ELSET=FCA01
20723, 4, 1, 1
20743, 4, 20, 1
20764, 3, 20, 1

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20783, 2, 20, 1
20803, 4, 1, 1
** 1-2
*ELEMENT, TYPE=S4R, ELSET=FCA12A
21023, 21023, 21323, 21324, 21024
21043, 21023, 21043, 21343, 21323
21063, 21103, 21123, 21423, 21403
21064, 21027, 21327, 21347, 21047
21083, 21087, 21387, 21407, 21107
21103, 21123, 21124, 21424, 21423
*ELGEN, ELSET=FCA12A
21023, 4, 1, 1
21043, 4, 20, 1
21064, 3, 20, 1
21083, 2, 20, 1
21103, 4, 1, 1
*ELCOPY, OLD SET=FCA12A, NEW SET=FCA12B, ELEMENT
SH=300, SHIFT NOD=300
*ELCOPY, OLD SET=FCA12B, NEW SET=FCA12C, ELEMENT
SH=300, SHIFT NOD=300
*ELCOPY, OLD SET=FCA12C, NEW SET=FCA12D, ELEMENT
SH=300, SHIFT NOD=300
*ELCOPY, OLD SET=FCA12D, NEW SET=FCA12E, ELEMENT
SH=300, SHIFT NOD=300
*ELSET, ELSET=FCA12R
FCA12A, FCA12C, FCA12D
*ELSET, ELSET=FCA12S
FCA12B, FCA12E
*ELSET, ELSET=FCA12
FCA12R, FCA12S
** 2-3
*ELCOPY, OLD SET=FCA12R, NEW SET=FCA23R, ELEMENT
SH=1500, SHIFT NOD=1500
*ELCOPY, OLD SET=FCA12S, NEW SET=FCA23S, ELEMENT
SH=1500, SHIFT NOD=1500
*ELSET, ELSET=FCA23
FCA23R, FCA23S
** 3-4
*ELCOPY, OLD SET=FCA23R, NEW SET=FCA34R, ELEMENT
SH=1500, SHIFT NOD=1500
*ELCOPY, OLD SET=FCA23S, NEW SET=FCA34S, ELEMENT
SH=1500, SHIFT NOD=1500
*ELSET, ELSET=FCA34
FCA34R, FCA34S
** 4-5
*ELCOPY, OLD SET=FCA34R, NEW SET=FCA45R, ELEMENT
SH=1500, SHIFT NOD=1500
*ELCOPY, OLD SET=FCA34S, NEW SET=FCA45S, ELEMENT
SH=1500, SHIFT NOD=1500
*ELSET, ELSET=FCA45
FCA45R, FCA45S
** 5-6
*ELCOPY, OLD SET=FCA45R, NEW SET=FCA56R, ELEMENT
SH=1500, SHIFT NOD=1500
*ELCOPY, OLD SET=FCA45S, NEW SET=FCA56S, ELEMENT
SH=1500, SHIFT NOD=1500
*ELSET, ELSET=FCA56
FCA56R, FCA56S
** 6-7
*ELCOPY, OLD SET=FCA56R, NEW SET=FCA67R, ELEMENT
SH=1500, SHIFT NOD=1500
*ELCOPY, OLD SET=FCA56S, NEW SET=FCA67S, ELEMENT
SH=1500, SHIFT NOD=1500
*ELSET, ELSET=FCA67
FCA67R, FCA67S
** 7-8
*ELCOPY, OLD SET=FCA67R, NEW SET=FCA78R, ELEMENT
SH=1500, SHIFT NOD=1500
*ELCOPY, OLD SET=FCA67S, NEW SET=FCA78S, ELEMENT
SH=1500, SHIFT NOD=1500
*ELSET, ELSET=FCA78
FCA78R, FCA78S
** 8-9
*ELCOPY, OLD SET=FCA78R, NEW SET=FCA89R, ELEMENT
SH=1500, SHIFT NOD=1500
*ELCOPY, OLD SET=FCA78S, NEW SET=FCA89S, ELEMENT
SH=1500, SHIFT NOD=1500
*ELSET, ELSET=FCA89
FCA89R, FCA89S
** 9-TOP
*ELEMENT, TYPE=S4R, ELSET=FCATOPR1
33023, 33023, 33323, 33324, 33024
33043, 33023, 33043, 33343, 33323
33063, 33103, 33123, 33423, 33403
33064, 33027, 33327, 33347, 33047
33083, 33087, 33387, 33407, 33107
33103, 33123, 33124, 33424, 33423
*ELGEN, ELSET=FCATOPR1
33023, 4, 1, 1
33043, 4, 20, 1
33064, 3, 20, 1
33083, 2, 20, 1
33103, 4, 1, 1
*ELCOPY, OLD SET=FCATOPR1, NEW
SET=FCATOPS, ELEMENT SH=300, SHIFT NOD=300
*ELCOPY, OLD SET=FCATOPS, NEW
SET=FCATOPR2, ELEMENT SH=300, SHIFT NOD=300
*ELCOPY, OLD SET=FCATOPR2, NEW
SET=FCATOPR3, ELEMENT SH=300, SHIFT NOD=300
*ELSET, ELSET=FCATOPR
FCATOPR1, FCATOPR2, FCATOPR3
*ELSET, ELSET=FCATOP
FCATOPR, FCATOPS
**
*ELSET, ELSET=FCAR
FCA01, FCA12R, FCA23R, FCA34R, FCA45R, FCA56R, FCA6
7R, FCA78R, FCA89R, FCATOPR
*ELSET, ELSET=FCAS
FCA12S, FCA23S, FCA34S, FCA45S, FCA56S, FCA67S, FCA
78S, FCA89S, FCATOPS
*SHELL SECTION, ELSET=FCAR, MATERIAL=S304A
0.0747
*SHELL SECTION, ELSET=FCAS, MATERIAL=S304A
0.1494
*ELSET, ELSET=FCA
FCABE, FCAR, FCAS

** FUEL CELL CHANNEL - FULL B

*NSET, NSET=FCBBS, GENERATE
21088, 21092, 1
21088, 21188, 20
21188, 21192, 1
21092, 21192, 20
** BASE END PLATE (1-IN. THICK)
*NCOPY, SHIFT, CHANGE NU=-300, OLD SET=FCBBS, NEW
SET=FCBBET
0.0, 0.0, -2.1875
0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FCBBETL1
20808, 20828, 20848, 20868
*NSET, NSET=FCBBETL2
20812, 20832, 20852, 20872
*NFILL, NSET=FCBBET
FCBBETL1, FCBBETL2, 4, 1
*NCOPY, SHIFT, CHANGE NU=-300, OLD
SET=FCBBET, NEW SET=FCBBEB

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0.0, 0.0, -1.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
** SPACER DISK 1-2
*NCOPY,SHIFT,CHANGE NU=600,OLD SET=FCBBS,NEW
SET=FCBSP11
0.0, 0.0, 4.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD
SET=FCBSP11,NEW SET=FCBSP12
0.0, 0.0, 6.9375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD
SET=FCBSP12,NEW SET=FCBSP13
0.0, 0.0, 6.9375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
** SPACER DISK 2-3
*NCOPY,SHIFT,CHANGE NU=900,OLD
SET=FCBSP13,NEW SET=FCBSP21
0.0, 0.0, 7.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD
SET=FCBSP21,NEW SET=FCBSP22
0.0, 0.0, 5.7813
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD
SET=FCBSP22,NEW SET=FCBSP23
0.0, 0.0, 5.7812
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FCBSP2M
FCBSP21, FCBSP22, FCBSP23
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCBSP2M,NEW SET=FCBSP3M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCBSP3M,NEW SET=FCBSP4M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCBSP4M,NEW SET=FCBSP5M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCBSP5M,NEW SET=FCBSP6M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCBSP6M,NEW SET=FCBSP7M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
**
** 9.5 IN. TO TOP
*NSET, NSET=FCBTS, GENERATE
33388, 33392, 1
33388, 33488, 20
33488, 33492, 1
33392, 33492, 20
*NCOPY,SHIFT,CHANGE NU=300,OLD SET=FCBTS,NEW
SET=FCBT1
0.0, 0.0, 3.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FCB
FCBBET,FCBBEB,FCBSP11,FCBSP12,FCBSP13
FCBSP2M,FCBSP3M,FCBSP4M,FCBSP5M,FCBSP6M,FCBSP
7M,FCBSP8M,FCBT1

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*****
*ELEMENT, TYPE=C3D8R, ELSET=FCBBE
20488, 20488, 20489, 20509, 20508, 20788,
20789, 20809, 20808
*ELGEN, ELSET=FCBBE
20488, 4, 1, 1, 5, 20, 20
*SOLID SECTION, ELSET=FCBBE, MATERIAL=S304B
*ELEMENT, TYPE=S4R, ELSET=FCB01
20788, 20788, 21088, 21089, 20789
20808, 20788, 20808, 21108, 21088
20828, 20868, 20888, 21188, 21168
20829, 20792, 21092, 21112, 20812
20848, 20852, 21152, 21172, 20872
20868, 20888, 20889, 21189, 21188
*ELGEN, ELSET=FCB01
20788, 4, 1, 1
20808, 4, 20, 1
20829, 3, 20, 1
20848, 2, 20, 1
20868, 4, 1, 1
** 1-2
*ELEMENT, TYPE=S4R, ELSET=FCB12A
21088, 21088, 21388, 21389, 21089
21108, 21088, 21108, 21408, 21388
21128, 21168, 21188, 21488, 21468
21129, 21092, 21392, 21412, 21112
21148, 21152, 21452, 21472, 21172
21168, 21188, 21189, 21489, 21488
*ELGEN, ELSET=FCB12A
21088, 4, 1, 1
21108, 4, 20, 1
21129, 3, 20, 1
21148, 2, 20, 1
21168, 4, 1, 1
*ELCOPY,OLD SET=FCB12A,NEW SET=FCB12B,ELEMENT
SH=300,SHIFT NOD=300
*ELCOPY,OLD SET=FCB12B,NEW SET=FCB12C,ELEMENT
SH=300,SHIFT NOD=300
*ELCOPY,OLD SET=FCB12C,NEW SET=FCB12D,ELEMENT
SH=300,SHIFT NOD=300
*ELCOPY,OLD SET=FCB12D,NEW SET=FCB12E,ELEMENT
SH=300,SHIFT NOD=300
*ELSET, ELSET=FCB12R
FCB12A, FCB12C, FCB12D
*ELSET, ELSET=FCB12S
FCB12B, FCB12E
*ELSET, ELSET=FCB12
FCB12R, FCB12S
** 2-3
*ELCOPY,OLD SET=FCB12R,NEW SET=FCB23R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCB12S,NEW SET=FCB23S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCB23
FCB23R, FCB23S
** 3-4
*ELCOPY,OLD SET=FCB23R,NEW SET=FCB34R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCB23S,NEW SET=FCB34S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCB34
FCB34R, FCB34S
** 4-5
*ELCOPY,OLD SET=FCB34R,NEW SET=FCB45R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCB34S,NEW SET=FCB45S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCB45
FCB45R, FCB45S

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** 5-6
*ELCOPY,OLD SET=FCB45R,NEW SET=FCB56R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCB45S,NEW SET=FCB56S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCB56
FCB56R, FCB56S
** 6-7
*ELCOPY,OLD SET=FCB56R,NEW SET=FCB67R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCB56S,NEW SET=FCB67S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCB67
FCB67R, FCB67S
** 7-8
*ELCOPY,OLD SET=FCB67R,NEW SET=FCB78R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCB67S,NEW SET=FCB78S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCB78
FCB78R, FCB78S
** 8-9
*ELCOPY,OLD SET=FCB78R,NEW SET=FCB89R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCB78S,NEW SET=FCB89S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCB89
FCB89R, FCB89S
** 9-TOP
*ELEMENT, TYPE=S4R, ELSET=FCBTOPR1
33088, 33088, 33388, 33389, 33089
33108, 33088, 33108, 33408, 33388
33128, 33168, 33188, 33488, 33468
33129, 33092, 33392, 33412, 33112
33148, 33152, 33452, 33472, 33172
33168, 33188, 33189, 33489, 33488
*ELGEN, ELSET=FCBTOPR1
33088, 4, 1, 1
33108, 4, 20, 1
33129, 3, 20, 1
33148, 2, 20, 1
33168, 4, 1, 1
*ELCOPY,OLD SET=FCBTOPR1,NEW
SET=FCBTOPS,ELEMENT SH=300,SHIFT NOD=300
*ELCOPY,OLD SET=FCBTOPS,NEW
SET=FCBTOPR2,ELEMENT SH=300,SHIFT NOD=300
*ELCOPY,OLD SET=FCBTOPR2,NEW
SET=FCBTOPR3,ELEMENT SH=300,SHIFT NOD=300
*ELSET, ELSET=FCBTOPR
FCBTOPR1, FCBTOPR2, FCBTOPR3
*ELSET, ELSET=FCBTOP
FCBTOPR, FCBTOPS
**
*ELSET, ELSET=FCBR
FCB01,FCB12R,FCB23R,FCB34R,FCB45R,FCB56R,FCB6
7R,FCB78R,FCB89R,FCBTOPR
*ELSET, ELSET=FCBS
FCB12S,FCB23S,FCB34S,FCB45S,FCB56S,FCB67S,FCB
78S,FCB89S,FCBTOPS
*SHELL SECTION, ELSET=FCBR, MATERIAL=S304B
0.0747
*SHELL SECTION, ELSET=FCBS, MATERIAL=S304B
0.1494
*ELSET, ELSET=FCB
FCBBE,FCBR,FCBS
*****
** FUEL CELL CHANNEL - FULL C
*****

*NCOPY,SHIFT,CHANGE NU=10,OLD SET=FCA,NEW
SET=FCC
20.6, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*ELCOPY,OLD SET=FCABE,NEW SET=FCCBE,ELEMENT
SH=10,SHIFT NOD=10
*ELCOPY,OLD SET=FCAR,NEW SET=FCCR,ELEMENT
SH=10,SHIFT NOD=10
*ELCOPY,OLD SET=FCAS,NEW SET=FCCS,ELEMENT
SH=10,SHIFT NOD=10
*SOLID SECTION, ELSET=FCCBE, MATERIAL=S304B
*SHELL SECTION, ELSET=FCCR, MATERIAL=S304B
0.0747
*SHELL SECTION, ELSET=FCCS, MATERIAL=S304B
0.1494
*ELSET, ELSET=FCC
FCCR,FCCS,FCCBE
*****
** TIE RODS
*****
*NSET, NSET=TRODBS, GENERATE
21145, 21155, 10
** BOTTOM
*NCOPY,SHIFT,CHANGE NU=-600,OLD
SET=TRODBS,NEW SET=TRODBM
0.0, 0.0, -3.3125
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD SET=TRODBM,NEW
SET=TRODO
0.0, 0.0, 1.125
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
** 1-2
*NCOPY,SHIFT,CHANGE NU=600,OLD SET=TRODBS,NEW
SET=TROD11
0.0, 0.0, 4.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD SET=TROD11,NEW
SET=TROD12
0.0, 0.0, 6.9375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD SET=TROD12,NEW
SET=TROD13
0.0, 0.0, 6.9375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
** 2-3
*NCOPY,SHIFT,CHANGE NU=900,OLD SET=TROD13,NEW
SET=TROD21
0.0, 0.0, 7.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD SET=TROD21,NEW
SET=TROD22
0.0, 0.0, 5.7813
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD SET=TROD22,NEW
SET=TROD23
0.0, 0.0, 5.7812
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=TROD2M
TROD21, TROD22, TROD23
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=TROD2M,NEW SET=TROD3M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=TROD3M,NEW SET=TROD4M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=TROD4M,NEW SET=TROD5M

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0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=TROD5M,NEW SET=TROD6M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=TROD6M,NEW SET=TROD7M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=TROD7M,NEW SET=TROD8M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
**
** 4.25 IN. ABOVE TOP PLATE
*NSET, NSET=TRODTS, GENERATE
33445, 33455, 10
*NCOPY,SHIFT,CHANGE NU=300,OLD SET=TRODTS,NEW
SET=TRODT1
0.0, 0.0, 3.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=900,OLD SET=TRODT1,NEW
SET=TRODT2
0.0, 0.0, 11.36
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=TROD
TRODBM,TROD0,TROD11,TROD12,TROD13
TROD2M,TROD3M,TROD4M,TROD5M,TROD6M,TROD7M,TRO
D8M,TRODT1,TRODT2
*****
*ELEMENT, TYPE=B31, ELSET=TROD
20545, 20545, 20845
20555, 20555, 20855
20786, 20845, 21145
20796, 20855, 21155
*ELGEN, ELSET=TROD
20786, 46, 300, 300
20796, 46, 300, 300
*BEAM SECTION, SECTION=CIRC, ELSET=TROD,
MATERIAL=S216
1.125
1.0, 0.0, 0.0
*****
** BOTTOM FINS
*****
***** long fins
*NODE, NSET=BFLB1A
40001, 6.1250, 0.0000, -8.1250
40002, 8.0750, 0.0000, -8.1250
40003, 10.0250, 0.0000, -8.1250
40004, 11.9750, 0.0000, -8.1250
40005, 13.9250, 0.0000, -8.1250
40006, 15.8750, 0.0000, -8.1250
40007, 17.2975, 0.0000, -8.1250
40008, 18.7500, 0.0000, -8.1250
40009, 19.2800, 0.0000, -8.1250
*NCOPY,SHIFT,CHANGE NU=20,OLD SET=BFLB1A,NEW
SET=BFLB1B
0.0, 0., 1.625
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=20,OLD SET=BFLB1B,NEW
SET=BFLB1C
0.0, 0., 1.625
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=20,OLD SET=BFLB1C,NEW
SET=BFLB1D
0.0, 0., 1.625
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0

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*NCOPY,SHIFT,CHANGE NU=20,OLD SET=BFLB1D,NEW
SET=BFLB1E
0.0, 0., 1.625
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=20,OLD SET=BFLB1E,NEW
SET=BFLB1F
0.0, 0., 1.625
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NSET, NSET=BFLB1
BFLB1A,BFLB1B,BFLB1C,BFLB1D,BFLB1E,BFLB1F
*NODE, NSET=BFLC1
40010, 24.9900, 0.0000, -8.1250
40011, 30.7500, 0.0000, -8.1250
40012, 30.7500, 0.0000, -1.3425
40030, 24.2676, 0.0000, -6.3489
40031, 29.1966, 0.0000, -6.1036
40032, 29.4419, 0.0000, -0.3648
40050, 23.5593, 0.0000, -4.6076
40051, 27.6737, 0.0000, -4.1219
40052, 28.1594, 0.0000, 0.5938
40070, 22.8650, 0.0000, -2.9004
40071, 26.1806, 0.0000, -2.1790
40072, 26.9021, 0.0000, 1.5336
40090, 22.1842, 0.0000, -1.2268
40091, 24.7168, 0.0000, -0.2742
40092, 25.6694, 0.0000, 2.4549
40110, 21.5168, 0.0000, 0.4141
40111, 23.2817, 0.0000, 1.5933
40112, 24.4609, 0.0000, 3.3582
*NODE, NSET=BFLS1A
40013, 30.7500, 0.0000, 5.4400
40014, 30.7500, 0.0000, 7.2200
40015, 30.7500, 0.0000, 9.0000
*NCOPY,SHIFT,CHANGE NU=20,OLD SET=BFLS1A,NEW
SET=BFLS1B
-1.175, 0., 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=20,OLD SET=BFLS1B,NEW
SET=BFLS1C
-1.175, 0., 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=20,OLD SET=BFLS1C,NEW
SET=BFLS1D
-1.175, 0., 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=20,OLD SET=BFLS1D,NEW
SET=BFLS1E
-1.175, 0., 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=20,OLD SET=BFLS1E,NEW
SET=BFLS1F
-1.175, 0., 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NSET, NSET=BFLS1
BFLS1A,BFLS1B,BFLS1C,BFLS1D,BFLS1E,BFLS1F
*NSET, NSET=BFL1
BFLB1, BFLC1, BFLS1
*****
*NCOPY,SHIFT,CHANGE NU=200,OLD SET=BFL1,NEW
SET=BFL2
0.0, -0.5625, 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=400,OLD SET=BFL1,NEW
SET=BFL3
0.0, +0.5625, 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*****
*NCOPY,SHIFT,MULTIPLE=2,CHANGE NU=+3600,OLD
SET=BFL1,NEW SET=BFL4

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0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +180.0
*NCOPY,SHIFT,MULTIPLE=8,CHANGE NU=+400,OLD
SET=BFL2,NEW SET=BFL2ALL
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +22.50
*NCOPY,SHIFT,MULTIPLE=7,CHANGE NU=+400,OLD
SET=BFL3,NEW SET=BFL3ALL
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +22.50
*NSET, NSET=BFLG
BFL1, BFL2, BFL3, BFL4, BFL2ALL, BFL3ALL
**
*ELEMENT, TYPE=C3D8R
40001, 40001, 40002, 40402, 40401, 40021,
40022, 40422, 40421
40601, 40601, 40602, 40802, 40801, 40621,
40622, 40822, 40821
41001, 41001, 41002, 41202, 41201, 41021,
41022, 41222, 41221
41401, 41401, 41402, 41602, 41601, 41421,
41422, 41622, 41621
41801, 41801, 41802, 42002, 42001, 41821,
41822, 42022, 42021
42201, 42201, 42202, 42402, 42401, 42221,
42222, 42422, 42421
42601, 42601, 42602, 42802, 42801, 42621,
42622, 42822, 42821
43001, 43001, 43002, 43202, 43201, 43021,
43022, 43222, 43221
43401, 43401, 43402, 43602, 43601, 43421,
43422, 43622, 43621
*ELGEN, ELSET=BFLG1
40001, 14, 1, 1, 5, 20, 20
*ELGEN, ELSET=BFLG2
40601, 14, 1, 1, 5, 20, 20
*ELGEN, ELSET=BFLG3
41001, 14, 1, 1, 5, 20, 20
*ELGEN, ELSET=BFLG4
41401, 14, 1, 1, 5, 20, 20
*ELGEN, ELSET=BFLG5
41801, 14, 1, 1, 5, 20, 20
*ELGEN, ELSET=BFLG6
42201, 14, 1, 1, 5, 20, 20
*ELGEN, ELSET=BFLG7
42601, 14, 1, 1, 5, 20, 20
*ELGEN, ELSET=BFLG8
43001, 14, 1, 1, 5, 20, 20
*ELGEN, ELSET=BFLG9
43401, 14, 1, 1, 5, 20, 20
*ELSET, ELSET=BFLG
BFLG1,BFLG2,BFLG3,BFLG4,BFLG5,BFLG6,BFLG7,BFL
G8,BFLG9
*SOLID SECTION, ELSET=BFLG, MATERIAL=FIN
***** short fins
*NODE, NSET=BFSB1A
45001, 15.8750, 0.0000, -6.0000
45002, 17.2975, 0.0000, -6.0000
45003, 18.7500, 0.0000, -6.0000
45004, 19.2800, 0.0000, -6.0000
*NCOPY,SHIFT,CHANGE NU=10,OLD SET=BFSB1A,NEW
SET=BFSB1B
0.0, 0., 1.20
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=10,OLD SET=BFSB1B,NEW
SET=BFSB1C
0.0, 0., 1.20
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0

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*NCOPY,SHIFT,CHANGE NU=10,OLD SET=BFSB1C,NEW
SET=BFSB1D
0.0, 0., 1.20
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=10,OLD SET=BFSB1D,NEW
SET=BFSB1E
0.0, 0., 1.20
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=10,OLD SET=BFSB1E,NEW
SET=BFSB1F
0.0, 0., 1.20
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NSET, NSET=BFSB1
BFSB1A,BFSB1B,BFSB1C,BFSB1D,BFSB1E,BFSB1F
*NODE, NSET=BFSC1
45005, 24.9900, 0.0000, -6.0000
45006, 30.7500, 0.0000, -6.0000
45007, 30.7500, 0.0000, -0.2800
45015, 24.2676, 0.0000, -4.6659
45016, 29.1966, 0.0000, -4.4206
45017, 29.4419, 0.0000, 0.4767
45025, 23.5593, 0.0000, -3.3579
45026, 27.6737, 0.0000, -2.8722
45027, 28.1594, 0.0000, 1.2186
45035, 22.8650, 0.0000, -2.0756
45036, 26.1806, 0.0000, -1.3541
45037, 26.9021, 0.0000, 1.9460
45045, 22.1842, 0.0000, -0.8184
45046, 24.7168, 0.0000, 0.1342
45047, 25.6694, 0.0000, 2.6591
45055, 21.5168, 0.0000, 0.4141
45056, 23.2817, 0.0000, 1.5933
45057, 24.4609, 0.0000, 3.3582
*NODE, NSET=BFSS1A
45008, 30.7500, 0.0000, 5.4400
45009, 30.7500, 0.0000, 7.2200
45010, 30.7500, 0.0000, 9.0000
*NCOPY,SHIFT,CHANGE NU=10,OLD SET=BFSS1A,NEW
SET=BFSS1B
-1.175, 0., 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=10,OLD SET=BFSS1B,NEW
SET=BFSS1C
-1.175, 0., 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=10,OLD SET=BFSS1C,NEW
SET=BFSS1D
-1.175, 0., 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=10,OLD SET=BFSS1D,NEW
SET=BFSS1E
-1.175, 0., 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=10,OLD SET=BFSS1E,NEW
SET=BFSS1F
-1.175, 0., 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NSET, NSET=BFSS1
BFSS1A,BFSS1B,BFSS1C,BFSS1D,BFSS1E,BFSS1F
*NSET, NSET=BFS1
BFSB1, BFSC1, BFSS1
****
*NCOPY,SHIFT,CHANGE NU=100,OLD SET=BFS1,NEW
SET=BFS2
0.0, -0.75, 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=200,OLD SET=BFS1,NEW
SET=BFS3
0.0, +0.75, 0.0

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0.0, 0., 0.0, 0.0, 1., 0.0, 0.0

*NCOPY,SHIFT,MULTIPLE=1,CHANGE NU=+200,OLD
SET=BFS2,NEW SET=BFS2A

0.0, 0.0, 0.0

0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +11.25

*NCOPY,SHIFT,MULTIPLE=1,CHANGE NU=+200,OLD
SET=BFS3,NEW SET=BFS3A

0.0, 0.0, 0.0

0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +11.25

*NCOPY,SHIFT,MULTIPLE=7,CHANGE NU=+200,OLD
SET=BFS2A,NEW SET=BFS2ALL

0.0, 0.0, 0.0

0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +22.50

*NCOPY,SHIFT,MULTIPLE=7,CHANGE NU=+200,OLD
SET=BFS3A,NEW SET=BFS3ALL

0.0, 0.0, 0.0

0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +22.50

*NSET, NSET=BFST

BFS2A, BFS2ALL, BFS3A, BFS3ALL

**

*ELEMENT, TYPE=C3D8R

45301, 45301, 45302, 45402, 45401, 45311,

45312, 45412, 45411

45501, 45501, 45502, 45602, 45601, 45511,

45512, 45612, 45611

45701, 45701, 45702, 45802, 45801, 45711,

45712, 45812, 45811

45901, 45901, 45902, 46002, 46001, 45911,

45912, 46012, 46011

46101, 46101, 46102, 46202, 46201, 46111,

46112, 46212, 46211

46301, 46301, 46302, 46402, 46401, 46311,

46312, 46412, 46411

46501, 46501, 46502, 46602, 46601, 46511,

46512, 46612, 46611

46701, 46701, 46702, 46802, 46801, 46711,

46712, 46812, 46811

*ELGEN, ELSET=BFST1

45301, 9, 1, 1, 5, 10, 10

*ELGEN, ELSET=BFST2

45501, 9, 1, 1, 5, 10, 10

*ELGEN, ELSET=BFST3

45701, 9, 1, 1, 5, 10, 10

*ELGEN, ELSET=BFST4

45901, 9, 1, 1, 5, 10, 10

*ELGEN, ELSET=BFST5

46101, 9, 1, 1, 5, 10, 10

*ELGEN, ELSET=BFST6

46301, 9, 1, 1, 5, 10, 10

*ELGEN, ELSET=BFST7

46501, 9, 1, 1, 5, 10, 10

*ELGEN, ELSET=BFST8

46701, 9, 1, 1, 5, 10, 10

*ELSET, ELSET=BFST

BFST1,BFST2,BFST3,BFST4,BFST5,BFST6,BFST7,BFST8

*SOLID SECTION, ELSET=BFST, MATERIAL=FIN

** TOP FINS

***** long fins

*NODE, NSET=TFLB1A

50011, 24.8750, 0.0000, 176.8050

50012, 26.3750, 0.0000, 176.8050

50013, 27.8750, 0.0000, 176.8050

50014, 29.3750, 0.0000, 176.8050

50015, 30.8750, 0.0000, 176.8050

*NCOPY,SHIFT,CHANGE NU=20,OLD SET=TFLB1A,NEW
SET=TFLB1B

0.0, 0., 1.6875

0.0, 0., 0.0, 0.0, 1., 0.0, 0.0

*NCOPY,SHIFT,CHANGE NU=20,OLD SET=TFLB1B,NEW
SET=TFLB1C

0.0, 0., 1.6875

0.0, 0., 0.0, 0.0, 1., 0.0, 0.0

*NODE, NSET=TFLB2A

50061, 6.1250, 0.0000, 182.1800

50062, 8.0750, 0.0000, 182.1800

50063, 10.0250, 0.0000, 182.1800

50064, 11.9750, 0.0000, 182.1800

50065, 13.9250, 0.0000, 182.1800

50066, 15.8750, 0.0000, 182.1800

50067, 17.2975, 0.0000, 182.1800

50068, 18.7500, 0.0000, 182.1800

50069, 20.6000, 0.0000, 182.1800

50070, 22.7380, 0.0000, 182.1800

50071, 24.8750, 0.0000, 182.1800

50072, 26.3750, 0.0000, 182.1800

50073, 27.8750, 0.0000, 182.1800

50074, 29.3750, 0.0000, 182.1800

50075, 30.8750, 0.0000, 182.1800

*NCOPY,SHIFT,CHANGE NU=80,OLD SET=TFLB2A,NEW
SET=TFLB2B

0.0, 0., 9.50

0.0, 0., 0.0, 0.0, 1., 0.0, 0.0

*NFILL, NSET=TFLB2C

TFLB2A, TFLB2B, 4, 20

*NSET, NSET=TFL1

TFLB1A,TFLB1B,TFLB1C,TFLB2C

*NCOPY,SHIFT,CHANGE NU=200,OLD SET=TFL1,NEW
SET=TFL2

0.0, -0.5625, 0.0

0.0, 0., 0.0, 0.0, 1., 0.0, 0.0

*NCOPY,SHIFT,CHANGE NU=400,OLD SET=TFL1,NEW
SET=TFL3

0.0, +0.5625, 0.0

0.0, 0., 0.0, 0.0, 1., 0.0, 0.0

*NCOPY,SHIFT,MULTIPLE=2,CHANGE NU=+3600,OLD
SET=TFL1,NEW SET=TFL4

0.0, 0.0, 0.0

0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +180.0

*NCOPY,SHIFT,MULTIPLE=8,CHANGE NU=+400,OLD
SET=TFL2,NEW SET=TFL2ALL

0.0, 0.0, 0.0

0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +22.50

*NCOPY,SHIFT,MULTIPLE=7,CHANGE NU=+400,OLD
SET=TFL3,NEW SET=TFL3ALL

0.0, 0.0, 0.0

0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +22.50

*NSET, NSET=TFLG

TFL1, TFL2, TFL3, TFL4, TFL2ALL, TFL3ALL

**

*ELEMENT, TYPE=C3D8R

50011, 50011, 50012, 50412, 50411, 50031,

50032, 50432, 50431

50061, 50061, 50062, 50462, 50461, 50081,

50082, 50482, 50481

50611, 50611, 50612, 50812, 50811, 50631,

50632, 50832, 50831

50661, 50661, 50662, 50862, 50861, 50681,

50682, 50882, 50881

51011, 51011, 51012, 51212, 51211, 51031,

51032, 51232, 51231

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51061, 51061, 51062, 51262, 51261, 51081,
51082, 51282, 51281
51411, 51411, 51412, 51612, 51611, 51431,
51432, 51632, 51631
51461, 51461, 51462, 51662, 51661, 51481,
51482, 51682, 51681
51811, 51811, 51812, 52012, 52011, 51831,
51832, 52032, 52031
51861, 51861, 51862, 52062, 52061, 51881,
51882, 52082, 52081
52211, 52211, 52212, 52412, 52411, 52231,
52232, 52432, 52431
52261, 52261, 52262, 52462, 52461, 52281,
52282, 52482, 52481
52611, 52611, 52612, 52812, 52811, 52631,
52632, 52832, 52831
52661, 52661, 52662, 52862, 52861, 52681,
52682, 52882, 52881
53011, 53011, 53012, 53212, 53211, 53031,
53032, 53232, 53231
53061, 53061, 53062, 53262, 53261, 53081,
53082, 53282, 53281
53411, 53411, 53412, 53612, 53611, 53431,
53432, 53632, 53631
53461, 53461, 53462, 53662, 53661, 53481,
53482, 53682, 53681
*ELGEN, ELSET=TFLG1
50011, 4, 1, 1, 7, 20, 20
50061, 10, 1, 1, 4, 20, 20
*ELGEN, ELSET=TFLG2
50611, 4, 1, 1, 7, 20, 20
50661, 10, 1, 1, 4, 20, 20
*ELGEN, ELSET=TFLG3
51011, 4, 1, 1, 7, 20, 20
51061, 10, 1, 1, 4, 20, 20
*ELGEN, ELSET=TFLG4
51411, 4, 1, 1, 7, 20, 20
51461, 10, 1, 1, 4, 20, 20
*ELGEN, ELSET=TFLG5
51811, 4, 1, 1, 7, 20, 20
51861, 10, 1, 1, 4, 20, 20
*ELGEN, ELSET=TFLG6
52211, 4, 1, 1, 7, 20, 20
52261, 10, 1, 1, 4, 20, 20
*ELGEN, ELSET=TFLG7
52611, 4, 1, 1, 7, 20, 20
52661, 10, 1, 1, 4, 20, 20
*ELGEN, ELSET=TFLG8
53011, 4, 1, 1, 7, 20, 20
53061, 10, 1, 1, 4, 20, 20
*ELGEN, ELSET=TFLG9
53411, 4, 1, 1, 7, 20, 20
53461, 10, 1, 1, 4, 20, 20
*ELSET, ELSET=TFLG
TFLG1, TFLG2, TFLG3, TFLG4, TFLG5, TFLG6, TFLG7, TFL
G8, TFLG9
**SOLID SECTION, ELSET=TFLG, MATERIAL=FIN
***** short fins
*NODE, NSET=TFSB1A
55006, 24.8750, 0.0000, 176.8050
55007, 26.3750, 0.0000, 176.8050
55008, 27.8750, 0.0000, 176.8050
55009, 29.3750, 0.0000, 176.8050
55010, 30.8750, 0.0000, 176.8050
*NCOPY, SHIFT, CHANGE NU=10, OLD SET=TFSB1A, NEW
SET=TFSB1B
0.0, 0., 1.6875
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0

*NCOPY, SHIFT, CHANGE NU=10, OLD SET=TFSB1B, NEW
SET=TFSB1C
0.0, 0., 1.6875
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NODE, NSET=TFSB2A
55031, 15.8750, 0.0000, 182.1800
55032, 17.2975, 0.0000, 182.1800
55033, 18.7500, 0.0000, 182.1800
55034, 20.6000, 0.0000, 182.1800
55035, 22.7380, 0.0000, 182.1800
55036, 24.8750, 0.0000, 182.1800
55037, 26.3750, 0.0000, 182.1800
55038, 27.8750, 0.0000, 182.1800
55039, 29.3750, 0.0000, 182.1800
55040, 30.8750, 0.0000, 182.1800
*NCOPY, SHIFT, CHANGE NU=40, OLD SET=TFSB2A, NEW
SET=TFSB2B
0.0, 0., 6.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NFILL, NSET=TFSB2C
TFSB2A, TFSB2B, 4, 10
*NSSET, NSET=TFS1
TFSB1A, TFSB1B, TFSB1C, TFSB2C
*****
*NCOPY, SHIFT, CHANGE NU=100, OLD SET=TFS1, NEW
SET=TFS2
0.0, -0.75, 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY, SHIFT, CHANGE NU=200, OLD SET=TFS1, NEW
SET=TFS3
0.0, +0.75, 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*****
*NCOPY, SHIFT, MULTIPLE=1, CHANGE NU=+200, OLD
SET=TFS2, NEW SET=TFS2A
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +11.25
*NCOPY, SHIFT, MULTIPLE=1, CHANGE NU=+200, OLD
SET=TFS3, NEW SET=TFS3A
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +11.25
*NCOPY, SHIFT, MULTIPLE=7, CHANGE NU=+200, OLD
SET=TFS2A, NEW SET=TFS2ALL
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +22.50
*NCOPY, SHIFT, MULTIPLE=7, CHANGE NU=+200, OLD
SET=TFS3A, NEW SET=TFS3ALL
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +22.50
*NSSET, NSET=TFST
TFS2A, TFS2ALL, TFS3A, TFS3ALL
**
*ELEMENT, TYPE=C3D8R
55306, 55306, 55307, 55407, 55406, 55316,
55317, 55417, 55416
55331, 55331, 55332, 55432, 55431, 55341,
55342, 55442, 55441
55506, 55506, 55507, 55607, 55606, 55516,
55517, 55617, 55616
55531, 55531, 55532, 55632, 55631, 55541,
55542, 55642, 55641
55706, 55706, 55707, 55807, 55806, 55716,
55717, 55817, 55816
55731, 55731, 55732, 55832, 55831, 55741,
55742, 55842, 55841
55906, 55906, 55907, 56007, 56006, 55916,
55917, 56017, 56016
55931, 55931, 55932, 56032, 56031, 55941,
55942, 56042, 56041

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56106, 56106, 56107, 56207, 56206, 56116,
56117, 56217, 56216
56131, 56131, 56132, 56232, 56231, 56141,
56142, 56242, 56241
56306, 56306, 56307, 56407, 56406, 56316,
56317, 56417, 56416
56331, 56331, 56332, 56432, 56431, 56341,
56342, 56442, 56441
56506, 56506, 56507, 56607, 56606, 56516,
56517, 56617, 56616
56531, 56531, 56532, 56632, 56631, 56541,
56542, 56642, 56641
56706, 56706, 56707, 56807, 56806, 56716,
56717, 56817, 56816
56731, 56731, 56732, 56832, 56831, 56741,
56742, 56842, 56841
*ELGEN, ELSET=TFST1
55306, 4, 1, 1, 7, 10, 10
55331, 5, 1, 1, 4, 10, 10
*ELGEN, ELSET=TFST2
55506, 4, 1, 1, 7, 10, 10
55531, 5, 1, 1, 4, 10, 10
*ELGEN, ELSET=TFST3
55706, 4, 1, 1, 7, 10, 10
55731, 5, 1, 1, 4, 10, 10
*ELGEN, ELSET=TFST4
55906, 4, 1, 1, 7, 10, 10
55931, 5, 1, 1, 4, 10, 10
*ELGEN, ELSET=TFST5
56106, 4, 1, 1, 7, 10, 10
56131, 5, 1, 1, 4, 10, 10
*ELGEN, ELSET=TFST6
56306, 4, 1, 1, 7, 10, 10
56331, 5, 1, 1, 4, 10, 10
*ELGEN, ELSET=TFST7
56506, 4, 1, 1, 7, 10, 10
56531, 5, 1, 1, 4, 10, 10
*ELGEN, ELSET=TFST8
56706, 4, 1, 1, 7, 10, 10
56731, 5, 1, 1, 4, 10, 10
*ELSET, ELSET=TFST
TFST1, TFST2, TFST3, TFST4, TFST5, TFST6, TFST7, TFS
T8
*SOLID SECTION, ELSET=TFST, MATERIAL=FIN
*****
** STRUCTURAL RING 1
*****
*NODE, NSET=RING1A
15001, 24.8750, 0.0000, 14.8750
*NCOPY,SHIFT,MULTIPLE=32,CHANGE NU=+1,OLD
SET=RING1A,NEW SET=RING1A
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +5.625
***** MODIFY NODES
*NODE, NSET=RING1A
15001, 24.8750, 0.0000, 14.0110
15002, 24.7552, 2.4382, 14.0215
15003, 24.3970, 4.8529, 14.0529
15004, 23.8039, 7.2208, 14.1048
15005, 22.9815, 9.5193, 14.1767
15006, 21.9378, 11.7260, 14.2680
15007, 20.6828, 13.8198, 14.3778
15008, 19.2286, 15.7805, 14.5050
15009, 17.5893, 17.5893, 14.6485
*NODE, NSET=RING1B
15177, 0.0000, 31.8750, 14.8750
*NCOPY,SHIFT,MULTIPLE=16,CHANGE NU=+1,OLD
SET=RING1B,NEW SET=RING1B
0.0, 0.0, 0.0

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0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +5.625
*NODE
15161, 35.5417, 0.0000, 13.0778
15241, 40.8750, 0.0000, 12.6112
15165, 34.9105, 13.7148, 13.1330
15245, 40.8750, 15.8125, 12.6112
15250, 24.8125, 31.8750, 14.0165
15170, 15.0000, 31.8750, 14.8750
*NSET, NSET=LINEA1, GENERATE
15001, 15005, 1
*NGEN, NSET=LINEA2
15161, 15165, 1
*NGEN, NSET=LINEA3
15241, 15245, 1
*NSET, NSET=LINEA4, GENERATE
15005, 15010, 1
*NGEN, NSET=LINEA5
15165, 15170, 1
*NGEN, NSET=LINEA6
15245, 15250, 1
*NSET, NSET=LINEA7, GENERATE
15010, 15017, 1
*NGEN, NSET=LINEA8
15170, 15177, 1
*NSET, NSET=LINEA9, GENERATE
15017, 15033, 1
*NSET, NSET=LINEA10, GENERATE
15177, 15193, 1
**
*NFILL, NSET=RING1C
LINEA1, LINEA2, 4, 40
*NFILL, NSET=RING1D
LINEA2, LINEA3, 2, 40
*NFILL, NSET=RING1E
LINEA4, LINEA5, 4, 40
*NFILL, NSET=RING1F
LINEA5, LINEA6, 2, 40
*NFILL, NSET=RING1G
LINEA7, LINEA8, 4, 40
*NFILL, NSET=RING1H
LINEA9, LINEA10, 4, 40
*NSET, NSET=RING1M
RING1B, RING1C, RING1D, RING1E, RING1F, RING1G, RIN
G1H
*NCOPY,SHIFT,CHANGE NU=+300,OLD
SET=RING1M,NEW SET=RING1N
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=RING1
RING1M, RING1N
*****
*ELEMENT, TYPE=C3D8R
15001, 2981, 15041, 15042, 2982, 3181, 15341,
15342, 3182
15041, 15041, 15081, 15082, 15042, 15341,
15381, 15382, 15342
15161, 15161, 15201, 15202, 15162, 15461,
15501, 15502, 15462
*ELGEN, ELSET=RING1A
15001, 32, 1, 1
*ELGEN, ELSET=RING1B
15041, 32, 1, 1, 3, 40, 40
*ELGEN, ELSET=RING1C
15161, 9, 1, 1, 2, 40, 40
*ELSET, ELSET=RING1
RING1A, RING1B, RING1C
*SOLID SECTION, ELSET=RING1, MATERIAL=RING
*****
** STRUCTURAL RING 2

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*NODE, NSET=RING2A

16001, 24.8750, 0.0000, 31.8750

*NCOPY,SHIFT,MULTIPLE=32,CHANGE NU=+1,OLD

SET=RING2A,NEW SET=RING2A

0.0, 0.0, 0.0

0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +5.625

***** MODIFY NODES

*NODE, NSET=RING2A

16001, 24.8750, 0.0000, 32.7390

16002, 24.7552, 2.4382, 32.7285

16003, 24.3970, 4.8529, 32.6971

16004, 23.8039, 7.2208, 32.6452

16005, 22.9815, 9.5193, 32.5733

16006, 21.9378, 11.7260, 32.4820

16007, 20.6828, 13.8198, 32.3722

16008, 19.2286, 15.7805, 32.2450

16009, 17.5893, 17.5893, 32.1015

*NODE, NSET=RING2B

16177, 0.0000, 31.8750, 31.8750

*NCOPY,SHIFT,MULTIPLE=16,CHANGE NU=+1,OLD

SET=RING2B,NEW SET=RING2B

0.0, 0.0, 0.0

0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +5.625

*NODE

16161, 35.5417, 0.0000, 33.6722

16241, 40.8750, 0.0000, 34.1388

16165, 34.9105, 13.7148, 33.6169

16245, 40.8750, 15.8125, 34.1388

16250, 24.8125, 31.8750, 32.7335

16170, 15.0000, 31.8750, 31.8750

*NSET, NSET=LINEB1, GENERATE

16001, 16005, 1

*NGEN, NSET=LINEB2

16161, 16165, 1

*NGEN, NSET=LINEB3

16241, 16245, 1

*NSET, NSET=LINEB4, GENERATE

16005, 16010, 1

*NGEN, NSET=LINEB5

16165, 16170, 1

*NGEN, NSET=LINEB6

16245, 16250, 1

*NSET, NSET=LINEB7, GENERATE

16010, 16017, 1

*NGEN, NSET=LINEB8

16170, 16177, 1

*NSET, NSET=LINEB9, GENERATE

16017, 16033, 1

*NSET, NSET=LINEB10, GENERATE

16177, 16193, 1

**

*NFILL, NSET=RING2C

LINEB1, LINEB2, 4, 40

*NFILL, NSET=RING2D

LINEB2, LINEB3, 2, 40

*NFILL, NSET=RING2E

LINEB4, LINEB5, 4, 40

*NFILL, NSET=RING2F

LINEB5, LINEB6, 2, 40

*NFILL, NSET=RING2G

LINEB7, LINEB8, 4, 40

*NFILL, NSET=RING2H

LINEB9, LINEB10, 4, 40

*NSET, NSET=RING2M

RING2B, RING2C, RING2D, RING2E, RING2F, RING2G, RING2H

*NCOPY,SHIFT,CHANGE NU=+300,OLD

SET=RING2M,NEW SET=RING2N

0.0, 0.0, 1.25

0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0

*NSET, NSET=RING2

RING2M, RING2N

*ELEMENT, TYPE=C3D8R

16001, 3981, 16041, 16042, 3982, 4181, 16341, 16342, 4182

16041, 16041, 16081, 16082, 16042, 16341,

16381, 16382, 16342

16161, 16161, 16201, 16202, 16162, 16461,

16501, 16502, 16462

*ELGEN, ELSET=RING2A

16001, 32, 1, 1

*ELGEN, ELSET=RING2B

16041, 32, 1, 1, 3, 40, 40

*ELGEN, ELSET=RING2C

16161, 9, 1, 1, 2, 40, 40

*ELSET, ELSET=RING2

RING2A, RING2B, RING2C

*SOLID SECTION, ELSET=RING2, MATERIAL=RING

** STRUCTURAL RING 3

*NCOPY,SHIFT,CHANGE NU=+2000,OLD

SET=RING1,NEW SET=RING3

0.0, 0.0, 142.18

0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0

***** MODIFY NODES

17001, 24.8750, 0.0000, 156.1910

17002, 24.7552, 2.4382, 156.2015

17003, 24.3970, 4.8529, 156.2329

17004, 23.8039, 7.2208, 156.2848

17005, 22.9815, 9.5193, 156.3567

17006, 21.9378, 11.7260, 156.4480

17007, 20.6828, 13.8198, 156.5578

17008, 19.2286, 15.7805, 156.6850

17009, 17.5893, 17.5893, 156.8285

*ELEMENT, TYPE=C3D8R

17001, 8181, 17041, 17042, 8182, 8381, 17341, 17342, 8382

17041, 17041, 17081, 17082, 17042, 17341,

17381, 17382, 17342

17161, 17161, 17201, 17202, 17162, 17461,

17501, 17502, 17462

*ELGEN, ELSET=RING3A

17001, 32, 1, 1

*ELGEN, ELSET=RING3B

17041, 32, 1, 1, 3, 40, 40

*ELGEN, ELSET=RING3C

17161, 9, 1, 1, 2, 40, 40

*ELSET, ELSET=RING3

RING3A, RING3B, RING3C

*SOLID SECTION, ELSET=RING3, MATERIAL=RING

** STRUCTURAL RING 4

*NCOPY,SHIFT,CHANGE NU=+2000,OLD

SET=RING2,NEW SET=RING4

0.0, 0.0, 142.18

0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0

***** MODIFY NODES

18001, 24.8750, 0.0000, 174.9190

18002, 24.7552, 2.4382, 174.9085

18003, 24.3970, 4.8529, 174.8771

18004, 23.8039, 7.2208, 174.8252

18005, 22.9815, 9.5193, 174.7533

18006, 21.9378, 11.7260, 174.6620

18007, 20.6828, 13.8198, 174.5522

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18008, 19.2286, 15.7805, 174.4250
18009, 17.5893, 17.5893, 174.2815
*ELEMENT, TYPE=C3D8R
18001, 9181, 18041, 18042, 9182, 9381, 18341,
18342, 9382
18041, 18041, 18081, 18082, 18042, 18341,
18381, 18382, 18342
18161, 18161, 18201, 18202, 18162, 18461,
18501, 18502, 18462
*ELGEN, ELSET=RING4A
18001, 32, 1, 1
*ELGEN, ELSET=RING4B
18041, 32, 1, 1, 3, 40, 40
*ELGEN, ELSET=RING4C
18161, 9, 1, 1, 2, 40, 40
*ELSET, ELSET=RING4
RING4A, RING4B, RING4C
*SOLID SECTION, ELSET=RING4, MATERIAL=RING
*****
** FUEL BUNDLE A
*****
** OUTER FUEL RODS
*****
*NODE
61001, -14.2410, 1.4090, 14.6400
61015, -6.3590, 1.4090, 14.6400
61029, -6.3590, 9.2910, 14.6400
61043, -14.2410, 9.2910, 14.6400
61056, -14.2410, 1.9720, 14.6400
*NGEN, NSET=FAR01
61001, 61015
61015, 61029
61029, 61043
61043, 61056
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=FAR01,NEW
SET=FAR02
0.0, 0.0, 2.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+400,OLD SET=FAR02,NEW
SET=FAR03
0.0, 0.0, 2.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFill, NSET=FAR03A
FAR02, FAR03, 2, 200
*NCOPY,SHIFT,CHANGE NU=+800,OLD SET=FAR03,NEW
SET=FAR04
0.0, 0.0, 22.215
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFill, NSET=FAR04A
FAR03, FAR04, 4, 200
*NCOPY,SHIFT,CHANGE NU=+400,OLD SET=FAR04,NEW
SET=FAR05
0.0, 0.0, 1.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFill, NSET=FAR05A
FAR04, FAR05, 2, 200
*NCOPY,SHIFT,CHANGE NU=+800,OLD SET=FAR05,NEW
SET=FAR06
0.0, 0.0, 24.44
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFill, NSET=FAR06A
FAR05, FAR06, 4, 200
*NCOPY,SHIFT,CHANGE NU=+400,OLD SET=FAR06,NEW
SET=FAR07
0.0, 0.0, 1.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFill, NSET=FAR07A
FAR06, FAR07, 2, 200

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*NCOPY,SHIFT,CHANGE NU=+400,OLD SET=FAR07,NEW
SET=FAR08
0.0, 0.0, 11.82
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFill, NSET=FAR08A
FAR07, FAR08, 2, 200
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=FAR08,NEW
SET=FAR09
0.0, 0.0, 0.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+400,OLD SET=FAR09,NEW
SET=FAR10
0.0, 0.0, 11.87
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFill, NSET=FAR10A
FAR09, FAR10, 2, 200
*NSET, NSET=FAR01
FAR07A, FAR08A, FAR09, FAR10A
*NCOPY,SHIFT,CHANGE NU=+1400,OLD
SET=FAR01,NEW SET=FAR02
0.0, 0.0, 26.19
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+1400,OLD
SET=FAR02,NEW SET=FAR03
0.0, 0.0, 26.19
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FAR01, GENERATE
67801, 67856, 1
*NCOPY,SHIFT,CHANGE NU=+400,OLD
SET=FAR01,NEW SET=FAR02
0.0, 0.0, 1.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFill, NSET=FAR019A
FAR01, FAR019, 2, 200
*NCOPY,SHIFT,CHANGE NU=+400,OLD
SET=FAR019,NEW SET=FAR020
0.0, 0.0, 16.88
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFill, NSET=FAR020A
FAR019, FAR020, 2, 200
*NCOPY,SHIFT,CHANGE NU=+400,OLD
SET=FAR020,NEW SET=FAR021
0.0, 0.0, 1.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFill, NSET=FAR021A
FAR020, FAR021, 2, 200
*NCOPY,SHIFT,CHANGE NU=+200,OLD
SET=FAR021,NEW SET=FAR022
0.0, 0.0, 0.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FAR0
FAR01, FAR02, FAR03A, FAR04A, FAR05A, FAR06A, FAR0
1, FAR02, FAR03
FAR019A, FAR020A, FAR021A, FAR022
*****
*ELEMENT, TYPE=B31
61001, 61001, 61201
61201, 61201, 61401
69001, 69001, 69201
*ELGEN, ELSET=FAROS
61001, 56, 1, 1
69001, 56, 1, 1
*ELGEN, ELSET=FAROP
61201, 39, 200, 200, 56, 1, 1
*ELSET, ELSET=FARO
FAROS, FAROP
*BEAM SECTION, SECTION=PIPE, ELSET=FAROP,
MATERIAL=CLADO
0.2092, 0.0272

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1.0, 0.0, 0.0
*BEAM SECTION, SECTION=CIRC, ELSET=FAROS,
MATERIAL=CLADO
0.2092
1.0, 0.0, 0.0
3, 4
*****
** SIMULATION OF INNER FUEL RODS AND GRID
SPACERS
*****
*NODE, NSET=FARS1
61061, -14.5225, 1.1275, 14.6400
61076, -6.0775, 1.1275, 14.6400
61091, -6.0775, 9.5725, 14.6400
61106, -14.5225, 9.5725, 14.6400
61120, -14.5225, 1.6905, 14.6400
61132, -13.9595, 1.6905, 14.6400
61145, -6.6405, 1.6905, 14.6400
61148, -6.6405, 2.2535, 14.6400
61160, -6.6405, 9.0095, 14.6400
61163, -7.2035, 9.0095, 14.6400
61175, -13.9595, 9.0095, 14.6400
61178, -13.9595, 8.4465, 14.6400
61189, -13.9595, 2.2535, 14.6400
*NGEN, NSET=FARS1
61061, 61076
61076, 61091
61091, 61106
61106, 61120
61132, 61145
61148, 61160
61163, 61175
61178, 61189
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=FARS1,NEW
SET=FARS2
0.0, 0.0, 2.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+400,OLD SET=FARS2,NEW
SET=FARS3
0.0, 0.0, 2.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FARS3A
FARS2, FARS3, 2, 200
*NCOPY,SHIFT,CHANGE NU=+800,OLD SET=FARS3,NEW
SET=FARS4
0.0, 0.0, 22.215
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FARS4A
FARS3, FARS4, 4, 200
*NCOPY,SHIFT,CHANGE NU=+400,OLD SET=FARS4,NEW
SET=FARS5
0.0, 0.0, 1.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FARS5A
FARS4, FARS5, 2, 200
*NCOPY,SHIFT,CHANGE NU=+800,OLD SET=FARS5,NEW
SET=FARS6
0.0, 0.0, 24.44
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FARS6A
FARS5, FARS6, 4, 200
*NCOPY,SHIFT,CHANGE NU=+400,OLD SET=FARS6,NEW
SET=FARS7
0.0, 0.0, 1.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FARS7A
FARS6, FARS7, 2, 200

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*NCOPY,SHIFT,CHANGE NU=+400,OLD SET=FARS7,NEW
SET=FARS8
0.0, 0.0, 11.82
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FARS8A
FARS7, FARS8, 2, 200
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=FARS8,NEW
SET=FARS9
0.0, 0.0, 0.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+400,OLD SET=FARS9,NEW
SET=FARS10
0.0, 0.0, 11.87
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FARS10A
FARS9, FARS10, 2, 200
*NSET, NSET=FARS1
FARS7A, FARS8A, FARS9, FARS10A
*NCOPY,SHIFT,CHANGE NU=+1400,OLD
SET=FARS1,NEW SET=FARS2
0.0, 0.0, 26.19
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+1400,OLD
SET=FARS2,NEW SET=FARS3
0.0, 0.0, 26.19
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FARS1, GENERATE
67861, 67920, 1
67932, 67945, 1
67948, 67960, 1
67963, 67975, 1
67978, 67989, 1
*NCOPY,SHIFT,CHANGE NU=+400,OLD
SET=FARS1,NEW SET=FARS2
0.0, 0.0, 1.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FARS19A
FARS1, FARS19, 2, 200
*NCOPY,SHIFT,CHANGE NU=+400,OLD
SET=FARS19,NEW SET=FARS20
0.0, 0.0, 16.88
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FARS20A
FARS19, FARS20, 2, 200
*NCOPY,SHIFT,CHANGE NU=+400,OLD
SET=FARS20,NEW SET=FARS21
0.0, 0.0, 1.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FARS21A
FARS20, FARS21, 2, 200
*NCOPY,SHIFT,CHANGE NU=+200,OLD
SET=FARS21,NEW SET=FARS22
0.0, 0.0, 0.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FARS
FARS1, FARS2, FARS3A, FARS4A, FARS5A, FARS6A, FARS7
1, FARS8, FARS9
FARS19A, FARS20A, FARS21A, FARS22
*****
** INNER FUEL RODS ELEMENT
*****
*ELEMENT, TYPE=S4R, ELSET=FARS1
61132, 61132, 61332, 61333, 61133
61145, 61145, 61345, 61348, 61148
61148, 61148, 61348, 61349, 61149
61160, 61160, 61360, 61363, 61163
61163, 61163, 61363, 61364, 61164
61175, 61175, 61375, 61378, 61178
61178, 61178, 61378, 61379, 61179

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61189, 61189, 61389, 61332, 61132
*ELGEN, ELSET=FARI
61132, 13, 1, 1, 41, 200, 200
61145, 41, 200, 200
61148, 12, 1, 1, 41, 200, 200
61160, 41, 200, 200
61163, 12, 1, 1, 41, 200, 200
61175, 41, 200, 200
61178, 11, 1, 1, 41, 200, 200
61189, 41, 200, 200
*SHELL SECTION, ELSET=FARI, MATERIAL=CLADI
0.25
*****
**      ROD GRID SPACERS
*****
***** GRID SPACER 1
*ELEMENT, TYPE=S4R, ELSET=FAG1BR
61261, 61261, 61461, 61462, 61262
61320, 61320, 61520, 61461, 61261
*ELGEN, ELSET=FAG1BR
61261, 59, 1, 1
**
*ELEMENT, TYPE=S4R, ELSET=FAG1BS
61061, 61262, 61462, 61532, 61332
61076, 61277, 61477, 61545, 61345
61077, 61278, 61478, 61548, 61348
61091, 61292, 61492, 61560, 61360
61092, 61293, 61493, 61563, 61363
61106, 61307, 61507, 61575, 61375
61107, 61308, 61508, 61578, 61378
61119, 61320, 61520, 61532, 61332
*ELGEN, ELSET=FAG1BS
61061, 14, 1, 1
61077, 13, 1, 1
61092, 13, 1, 1
61107, 12, 1, 1
*ELSET, ELSET=FAG1B
FAG1BR, FAG1BS
*ELCOPY,OLD SET=FAG1BR,NEW SET=FAG1TR,ELEMENT
SH=200,SHIFT NOD=200
*ELCOPY,OLD SET=FAG1BS,NEW SET=FAG1TS,ELEMENT
SH=600,SHIFT NOD=200
*ELSET, ELSET=FAG1R
FAG1BR, FAG1TR
*ELSET, ELSET=FAG1S
FAG1BS, FAG1TS
*ELSET, ELSET=FAG1
FAG1R, FAG1S
*SHELL SECTION, ELSET=FAG1R, MATERIAL=CLADG
0.0747
*SHELL SECTION, ELSET=FAG1S, MATERIAL=CLADG
0.0747
***** GRID SPACER 2 (HTP)
*ELCOPY,OLD SET=FAG1R,NEW SET=FAG2R,ELEMENT
SH=1200,SHIFT NOD=1200
*ELCOPY,OLD SET=FAG1S,NEW SET=FAG2S,ELEMENT
SH=1200,SHIFT NOD=1200
*ELSET, ELSET=FAG2
FAG2R, FAG2S
*SHELL SECTION, ELSET=FAG2R, MATERIAL=CLADG
0.0747
*SHELL SECTION, ELSET=FAG2S, MATERIAL=CLADG
0.0747
***** GRID SPACER 3 (HTP)
*ELCOPY,OLD SET=FAG2R,NEW SET=FAG3R,ELEMENT
SH=1200,SHIFT NOD=1200
*ELCOPY,OLD SET=FAG2S,NEW SET=FAG3S,ELEMENT
SH=1200,SHIFT NOD=1200
*ELSET, ELSET=FAG3

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FAG3R, FAG3S
*SHELL SECTION, ELSET=FAG3R, MATERIAL=CLADG
0.0747
*SHELL SECTION, ELSET=FAG3S, MATERIAL=CLADG
0.0747
***** GRID SPACER 4 (IFM)
*ELCOPY,OLD SET=FAG1BR,NEW SET=FAG4R,ELEMENT
SH=3200,SHIFT NOD=3200
*ELCOPY,OLD SET=FAG1BS,NEW SET=FAG4S,ELEMENT
SH=3200,SHIFT NOD=3200
*ELSET, ELSET=FAG4
FAG4R, FAG4S
*SHELL SECTION, ELSET=FAG4R, MATERIAL=CLADG
0.0747
*SHELL SECTION, ELSET=FAG4S, MATERIAL=CLADG
0.0747
***** GRID SPACER 5 (HTP)
*ELCOPY,OLD SET=FAG3R,NEW SET=FAG5R,ELEMENT
SH=1400,SHIFT NOD=1400
*ELCOPY,OLD SET=FAG3S,NEW SET=FAG5S,ELEMENT
SH=1400,SHIFT NOD=1400
*ELSET, ELSET=FAG5
FAG5R, FAG5S
*SHELL SECTION, ELSET=FAG5R, MATERIAL=CLADG
0.0747
*SHELL SECTION, ELSET=FAG5S, MATERIAL=CLADG
0.0747
***** GRID SPACER 6 (IFM)
*ELCOPY,OLD SET=FAG4R,NEW SET=FAG6R,ELEMENT
SH=1400,SHIFT NOD=1400
*ELCOPY,OLD SET=FAG4S,NEW SET=FAG6S,ELEMENT
SH=1400,SHIFT NOD=1400
*ELSET, ELSET=FAG6
FAG6R, FAG6S
*SHELL SECTION, ELSET=FAG6R, MATERIAL=CLADG
0.0747
*SHELL SECTION, ELSET=FAG6S, MATERIAL=CLADG
0.0747
***** GRID SPACER 7 (HTP)
*ELCOPY,OLD SET=FAG5R,NEW SET=FAG7R,ELEMENT
SH=1400,SHIFT NOD=1400
*ELCOPY,OLD SET=FAG5S,NEW SET=FAG7S,ELEMENT
SH=1400,SHIFT NOD=1400
*ELSET, ELSET=FAG7
FAG7R, FAG7S
*SHELL SECTION, ELSET=FAG7R, MATERIAL=CLADG
0.0747
*SHELL SECTION, ELSET=FAG7S, MATERIAL=CLADG
0.0747
***** GRID SPACER 8 (IFM)
*ELCOPY,OLD SET=FAG6R,NEW SET=FAG8R,ELEMENT
SH=1400,SHIFT NOD=1400
*ELCOPY,OLD SET=FAG6S,NEW SET=FAG8S,ELEMENT
SH=1400,SHIFT NOD=1400
*ELSET, ELSET=FAG8
FAG8R, FAG8S
*SHELL SECTION, ELSET=FAG8R, MATERIAL=CLADG
0.0747
*SHELL SECTION, ELSET=FAG8S, MATERIAL=CLADG
0.0747
***** GRID SPACER 9 (HTP)
*ELCOPY,OLD SET=FAG7R,NEW SET=FAG9R,ELEMENT
SH=1400,SHIFT NOD=1400
*ELCOPY,OLD SET=FAG7S,NEW SET=FAG9S,ELEMENT
SH=1400,SHIFT NOD=1400
*ELSET, ELSET=FAG9
FAG9R, FAG9S
*SHELL SECTION, ELSET=FAG9R, MATERIAL=CLADG
0.0747

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*SHELL SECTION, ELSET=FAG9S, MATERIAL=CLADG
0.0747
***** GRID SPACER 10 (HTP)
*ELCOPY,OLD SET=FAG9R,NEW SET=FAG10R,ELEMENT
SH=800,SHIFT NOD=800
*ELCOPY,OLD SET=FAG9S,NEW SET=FAG10S,ELEMENT
SH=800,SHIFT NOD=800
*ELSET, ELSET=FAG10
FAG10R, FAG10S
*SHELL SECTION, ELSET=FAG10R, MATERIAL=CLADG
0.0747
*SHELL SECTION, ELSET=FAG10S, MATERIAL=CLADG
0.0747
*****
**      BOTTOM TIE PLATE
*****
*NCOPY,SHIFT,CHANGE NU=-200,OLD SET=FARS1,NEW
SET=FARB1
0.0, 0.0, -2.52
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NODE, NSET=FARS1
61121, -11.7075, 3.9425, 14.6400
61122, -8.8925, 3.9425, 14.6400
61123, -11.7075, 6.7575, 14.6400
61124, -8.8925, 6.7575, 14.6400
*NCOPY,SHIFT,CHANGE NU=-200,OLD SET=FARS1,NEW
SET=FARB1
0.0, 0.0, -2.52
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FABM
FARS1, FARS1, FARB1
*****
*ELEMENT, TYPE=C3D8R, ELSET=FABM
60861, 60861, 60862, 60932, 60920, 61061,
61062, 61132, 61120
60862, 60862, 60866, 60936, 60932, 61062,
61066, 61136, 61132
60866, 60866, 60871, 60941, 60936, 61066,
61071, 61141, 61136
60871, 60871, 60875, 60945, 60941, 61071,
61075, 61145, 61141
60875, 60875, 60876, 60877, 60945, 61075,
61076, 61077, 61145
60920, 60920, 60932, 60986, 60916, 61120,
61132, 61186, 61116
60932, 60932, 60936, 60921, 60986, 61132,
61136, 61121, 61186
60936, 60936, 60941, 60922, 60921, 61136,
61141, 61122, 61121
60941, 60941, 60945, 60951, 60922, 61141,
61145, 61151, 61122
60945, 60945, 60877, 60881, 60951, 61145,
61077, 61081, 61151
60916, 60916, 60986, 60981, 60911, 61116,
61186, 61181, 61111
60986, 60986, 60921, 60923, 60981, 61186,
61121, 61123, 61181
60921, 60921, 60922, 60924, 60923, 61121,
61122, 61124, 61123
60922, 60922, 60951, 60956, 60924, 61122,
61151, 61156, 61124
60951, 60951, 60881, 60886, 60956, 61151,
61081, 61086, 61156
60911, 60911, 60981, 60975, 60907, 61111,
61181, 61175, 61107
60981, 60981, 60923, 60971, 60975, 61181,
61123, 61171, 61175
60923, 60923, 60924, 60966, 60971, 61123,
61124, 61166, 61171

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60924, 60924, 60956, 60960, 60966, 61124,
61156, 61160, 61166
60956, 60956, 60886, 60890, 60960, 61156,
61086, 61090, 61160
60907, 60907, 60975, 60905, 60906, 61107,
61175, 61105, 61106
60975, 60975, 60971, 60901, 60905, 61175,
61171, 61101, 61105
60971, 60971, 60966, 60896, 60901, 61171,
61166, 61096, 61101
60966, 60966, 60960, 60892, 60896, 61166,
61160, 61092, 61096
60960, 60960, 60890, 60891, 60892, 61160,
61090, 61091, 61092
*SOLID SECTION, ELSET=FABM, MATERIAL=S304F
*****
**      TOP TIE PLATE
*****
*NCOPY,SHIFT,CHANGE NU=8600,OLD SET=FABM,NEW
SET=FATP1
0.0, 0.0, 156.23
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=200,OLD SET=FATP1,NEW
SET=FATP2
0.0, 0.0, 3.48
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FATP
FATP1, FATP2
*ELCOPY,OLD SET=FABM,NEW SET=FATP,ELEMENT
SH=8600,SHIFT NOD=8600
*SOLID SECTION, ELSET=FATP, MATERIAL=S304F
*****
**      GUIDE AND INST. TUBES
*****
*ELEMENT, TYPE=B31, ELSET=TUBEA
61195, 61132, 61332
61196, 61145, 61345
61197, 61160, 61360
61198, 61175, 61375
*ELGEN, ELSET=TUBEA
61195, 42, 200, 200
61196, 42, 200, 200
61197, 42, 200, 200
61198, 42, 200, 200
*BEAM SECTION, SECTION=CIRC, ELSET=TUBEA,
MATERIAL=CLADT
0.4280
1.0, 0.0, 0.0
*****
**      FUEL ROD VS GRID SPACER
*****
***** 01
*EQUATION
3
61401, 1, 1.0, 61461, 1, -0.5, 61462, 1, -0.5
*EQUATION
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*EQUATION
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*EQUATION
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*EQUATION
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*EQUATION

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*EQUATION

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63810, 2, 1.0, 63870, 2, -0.5, 63871, 2, -0.5
*EQUATION
3

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67450, 1, 1.0, 67513, 1, -0.5, 67514, 1, -0.5
*EQUATION
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67450, 2, 1.0, 67513, 2, -0.5, 67514, 2, -0.5
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68050, 1, 1.0, 68113, 1, -0.5, 68114, 1, -0.5
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*EQUATION
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68850, 2, 1.0, 68913, 2, -0.5, 68914, 2, -0.5
***** 51
*EQUATION
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61451, 1, 1.0, 61514, 1, -0.5, 61515, 1, -0.5

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*EQUATION
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61451, 2, 1.0, 61514, 2, -0.5, 61515, 2, -0.5
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62651, 2, 1.0, 62714, 2, -0.5, 62715, 2, -0.5
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63851, 1, 1.0, 63914, 1, -0.5, 63915, 1, -0.5
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*EQUATION
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*EQUATION
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*EQUATION
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*EQUATION
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66052, 1, 1.0, 66115, 1, -0.5, 66116, 1, -0.5
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*EQUATION
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*EQUATION
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*EQUATION
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*EQUATION
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*EQUATION
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63853, 1, 1.0, 63916, 1, -0.5, 63917, 1, -0.5
*EQUATION
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63853, 2, 1.0, 63916, 2, -0.5, 63917, 2, -0.5
*EQUATION
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3
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64453, 2, 1.0, 64516, 2, -0.5, 64517, 2, -0.5
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66654, 1, 1.0, 66717, 1, -0.5, 66718, 1, -0.5
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66055, 1, 1.0, 66118, 1, -0.5, 66119, 1, -0.5
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66055, 2, 1.0, 66118, 2, -0.5, 66119, 2, -0.5
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*EQUATION
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61456, 1, 1.0, 61519, 1, -0.5, 61520, 1, -0.5
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62656, 2, 1.0, 62719, 2, -0.5, 62720, 2, -0.5
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63856, 1, 1.0, 63919, 1, -0.5, 63920, 1, -0.5
*EQUATION
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65256, 1, 1.0, 65319, 1, -0.5, 65320, 1, -0.5
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66056, 1, 1.0, 66119, 1, -0.5, 66120, 1, -0.5
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66056, 2, 1.0, 66119, 2, -0.5, 66120, 2, -0.5
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66656, 1, 1.0, 66719, 1, -0.5, 66720, 1, -0.5
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67456, 1, 1.0, 67519, 1, -0.5, 67520, 1, -0.5
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68856, 1, 1.0, 68919, 1, -0.5, 68920, 1, -0.5
*EQUATION
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68856, 2, 1.0, 68919, 2, -0.5, 68920, 2, -0.5
*****
*****
** RIGID UNYIELDING TARGET
*****
*NODE, NSET=TARGETO
190000, 0.0, 0.0, -0.0
190001, -80.0, 0.0, -0.0
190002, 80.0, 0.0, -0.0
190003, 80.0, 50.0, -0.0
190004, -80.0, 50.0, -0.0
*NCOPY,SHIFT,CHANGE NU=-100000,OLD
SET=TARGETO,NEW SET=TARGET
-30.7514, 0., -8.13
-30.7514, 0., -8.13, -30.7514, 1., -8.13,
15.73
*ELEMENT,TYPE=R3D4,ELSET=TARGET
90000,90001,90002,90003,90004
*RIGID BODY, ELSET=TARGET, REF NODE=90000
*****
** TYPE 317 SST MOD
** DYNAMIC S-S CURVE
*MATERIAL, NAME=S317
*DENSITY
16.0461E-4
*ELASTIC
26.5E6, 0.3
*PLASTIC
60000., 0.
71000., 0.008
75000., 0.018
77300., 0.028
79300., 0.038
87000., 0.078
90500., 0.118
93700., 0.158
96000., 0.198
97800., 0.238
98800., 0.268
99500., 0.288
100000., 0.308
** TYPE 304 SST
** USING SANDIA DATA
*MATERIAL, NAME=S304
*DENSITY
7.5052E-4
*ELASTIC
27.0E6, 0.3
*PLASTIC
30000., 0.
35000., 0.002
37300., 0.004

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38400., 0.006
39400., 0.008
40000., 0.010
42900., 0.020
45400., 0.030
47900., 0.040
50400., 0.050
52900., 0.060
55400., 0.070
57900., 0.080
60400., 0.090
62900., 0.100
69150., 0.125
75400., 0.150
81650., 0.175
87900., 0.200
94150., 0.250
106650., 0.300
119150., 0.350
** FIN - TYPE 304 SST
*MATERIAL, NAME=FIN
*DENSITY
7.5052E-4
*ELASTIC
27.0E6, 0.3
*PLASTIC
30000., 0.
35000., 0.002
37300., 0.004
38400., 0.006
39400., 0.008
40000., 0.010
42900., 0.020
45400., 0.030
47900., 0.040
50400., 0.050
52900., 0.060
55400., 0.070
57900., 0.080
60400., 0.090
62900., 0.100
69150., 0.125
75400., 0.150
81650., 0.175
87900., 0.200
94150., 0.250
106650., 0.300
119150., 0.350
** TYPE 304 SST, DENSITY NOT ADJUSTED
*MATERIAL, NAME=S304A
*DENSITY
7.5052E-4
*ELASTIC
27.0E6, 0.3
*PLASTIC
30000., 0.
35000., 0.002
37300., 0.004
38400., 0.006
39400., 0.008
40000., 0.010
42900., 0.020
45400., 0.030
47900., 0.040
50400., 0.050
52900., 0.060
55400., 0.070
57900., 0.080
60400., 0.090
62900., 0.100
69150., 0.125
75400., 0.150
81650., 0.175
87900., 0.200
94150., 0.250
106650., 0.300
119150., 0.350
** TYPE 304 SST, DENSITY ADJUSTED TO INCLUDE
FUEL BUNDLE
*MATERIAL, NAME=S304B
*DENSITY
68.65E-4
*ELASTIC
27.0E6, 0.3
*PLASTIC
30000., 0.
35000., 0.002
37300., 0.004
38400., 0.006
39400., 0.008
40000., 0.010
42900., 0.020
45400., 0.030
47900., 0.040
50400., 0.050
52900., 0.060
55400., 0.070
57900., 0.080
60400., 0.090
62900., 0.100
69150., 0.125
75400., 0.150
81650., 0.175
87900., 0.200
94150., 0.250
106650., 0.300
119150., 0.350
** FOR BASKET SPACER DISKS
** ADJUSTING DENSITY TO INCLUDE POISON RODS
AND OTHER PARTS
*MATERIAL, NAME=S216A
*DENSITY
9.5956E-4
*ELASTIC
26.5E6, 0.3
*PLASTIC
60000., 0.
71000., 0.008
75000., 0.018
77300., 0.028
79300., 0.038
87000., 0.078
90500., 0.118
93700., 0.158
96000., 0.198
97800., 0.238
98800., 0.268
99500., 0.288
100000., 0.308
** TYPE 216 SST IS ASSUMED THE SAME AS 317
SST MOD
** USING 317 SST DYNAMIC S-S CURVE
*MATERIAL, NAME=S216
*DENSITY
7.5052E-4
*ELASTIC
26.5E6, 0.3
*PLASTIC

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60000., 0.
71000., 0.008
75000., 0.018
77300., 0.028
79300., 0.038
87000., 0.078
90500., 0.118
93700., 0.158
96000., 0.198
97800., 0.238
98800., 0.268
99500., 0.288
100000., 0.308
** RING = TYPE 216 SST (SAME AS 317 SST MOD)
** USING 317 SST DYNAMIC S-S CURVE
*MATERIAL, NAME=RING
*DENSITY
7.5052E-4
*ELASTIC
26.5E6, 0.3
*PLASTIC
60000., 0.
71000., 0.008
75000., 0.018
77300., 0.028
79300., 0.038
87000., 0.078
90500., 0.118
93700., 0.158
96000., 0.198
97800., 0.238
98800., 0.268
99500., 0.288
100000., 0.308
** DEPLETED URANIUM
** DENSITY = 1175 PCF
*MATERIAL, NAME=DURAN
*DENSITY
1.76E-3
*ELASTIC
26.0E6, 0.3
*PLASTIC
35000., 0.
60000., 0.06
** FUEL BUNDLE TOP/BOTTOM TIE PLATES - TYPE
304 SST
** ELASTIC ONLY, ADJUSTED TO 30 POUNDS/BUNDLE
(TOP AND BOTTOM)
*MATERIAL, NAME=S304F
*DENSITY
1.8145E-4
*ELASTIC
27.0E6, 0.3
***** ZIRCALOY 4 (IRRADIATED 12/2001
data *****
** ZIRCALOY 4 (6.565 g/cc = 0.237 lb/in^3)
**
*MATERIAL, NAME=CLAD
*DENSITY
6.134E-4
*ELASTIC
12.1E6, 0.37
*PLASTIC
104000., 0.
119000., 0.009
** ZIRCALOY 4 CLADDING
** ADJUSTED DENSITY TO HAVE A WEIGHT OF 7.25
POUNDS PER ROD
*MATERIAL, NAME=CLADO

*DENSITY
36.865E-4
*ELASTIC
12.1E6, 0.37
*PLASTIC
104000., 0.
119000., 0.009
** ZIRCALOY 4 CLADDING, ADJUSTED DENSITY
**
*MATERIAL, NAME=CLADI
*DENSITY
24.922E-4
*ELASTIC
12.1E6, 0.37
*PLASTIC
104000., 0.
119000., 0.009
** ZIRCALOY 4 for GRID SPACERS, ADJUSTED
DENSITY
**
*MATERIAL, NAME=CLADG
*DENSITY
6.849E-4
*ELASTIC
12.1E6, 0.37
*PLASTIC
104000., 0.
119000., 0.009
** ZIRCALOY 4 for GUIDE AND INST. TUBES,
ADJUSTED DENSITY
**
*MATERIAL, NAME=CLADT
*DENSITY
1.5435E-4
*ELASTIC
12.1E6, 0.37
*PLASTIC
104000., 0.
119000., 0.009
**
** ELEMENT SET DEFINITIONS
**
*ELSET, ELSET=OS
OSB, OSC, OSW
*ELSET, ELSET=DU
DUB, DUC, DUW
*ELSET, ELSET=IS
ISB, ISC, ISW
*ELSET, ELSET=CSKB
ISB, OSB, DUB
*ELSET, ELSET=CSKC
ISC, OSC, DUC
*ELSET, ELSET=CSKW
ISW, OSW, DUW, CFL
*ELSET, ELSET=CSKBD
OS, IS, DU, CFL
*ELSET, ELSET=CSKHD
CHDS, CHDU
*ELSET, ELSET=CASK
CSKBD, CSKHD
*ELSET, ELSET=TF
TFLG, TFST
*ELSET, ELSET=BF
BFLG, BFST
*ELSET, ELSET=RINGB
RING1, RING2
*ELSET, ELSET=RINGT
RING3, RING4
*ELSET, ELSET=RING

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RING1, RING2, RING3, RING4	221, 2221, 500
*ELSET, ELSET=BASK	261, 2261, 500
SPDSK, TROD, FCH, FCA, FCB, FCC	301, 381, 40
*ELSET, ELSET=FAROD	801, 881, 40
FARO, FARI	421, 461, 40
*ELSET, ELSET=FAG	921, 961, 40
FAG1, FAG2, FAG3, FAG4, FAG5, FAG6, FAG7, FAG8, FAG9,	1301, 1341, 40
FAG10	1381, 1461, 40
*ELSET, ELSET=FUELA	1801, 1961, 40
FAROD, FAG, FABM, FATP, TUBEA	2301, 2381, 40
*ELSET, ELSET=ALLEL	253, 2253, 500
CASK, BASK, TF, BF, RING, FUELA, FATSPPR, FABSPPR	293, 2293, 500
**	333, 413, 40
** NODE SET DEFINITIONS	833, 913, 40
**	453, 493, 40
*NSET, NSET=CSKBD	953, 993, 40
OSB, OSC, WALL	1333, 1373, 40
*NSET, NSET=CSKHD	1413, 1493, 40
CHD,	1833, 1993, 40
*NSET, NSET=CASK	2333, 2413, 40
CSKBD, CSKHD	** WALL
*NSET, NSET=TF	2221, 9021, 200
TFLG, TFST	2261, 9061, 200
*NSET, NSET=BF	2301, 9501, 200
BFLG, BFST	2341, 9541, 200
*NSET, NSET=RINGB	2381, 9581, 200
RING1, RING2	2253, 9053, 200
*NSET, NSET=RINGT	2293, 9093, 200
RING3, RING4	2333, 9533, 200
*NSET, NSET=RING	2373, 9573, 200
RING1, RING2, RING3, RING4	2413, 9613, 200
*NSET, NSET=BASK	** HEAD
SPDSK, TROD, FCH, FCA, FCB, FCC	10501, 10505, 1
*NSET, NSET=FAROD	11001, 11005, 1
FARO, FARS	11501, 11505, 1
*NSET, NSET=FUELA	12001, 12005, 1
FAROD, FABM, FATP	10521, 10561, 20
*NSET, NSET=ALLND	11021, 11061, 20
CASK, BASK, TF, BF, RING, FUELA, FATSPPR, FABSPPR	11521, 11561, 20
*NSET, NSET=YSYMM, GENERATE	12021, 12061, 20
30000, 30000, 1	10591, 10671, 20
90000, 90000, 1	11091, 11171, 20
** BOTTOM	11591, 11671, 20
1, 5, 1	12091, 12171, 20
501, 505, 1	10221, 12221, 500
1001, 1005, 1	10261, 12261, 500
1501, 1505, 1	11301, 12301, 500
2001, 2005, 1	11341, 12341, 500
21, 61, 20	**
521, 561, 20	10529, 10569, 20
1021, 1061, 20	11029, 11069, 20
1521, 1561, 20	11529, 11569, 20
2021, 2061, 20	12029, 12069, 20
91, 171, 20	10607, 10687, 20
591, 671, 20	11107, 11187, 20
1091, 1171, 20	11607, 11687, 20
1591, 1671, 20	12107, 12187, 20
2091, 2171, 20	10253, 12253, 500
29, 69, 20	10293, 12293, 500
529, 569, 20	11333, 12333, 500
1029, 1069, 20	11373, 12373, 500
1529, 1569, 20	** BOTTOM FINS
2029, 2069, 20	40001, 40115, 1
107, 187, 20	43601, 43715, 1
607, 687, 20	** TOP FINS
1107, 1187, 20	50011, 50155, 1
1607, 1687, 20	53611, 53755, 1
2107, 2187, 20	** RINGS
** BOTTOM CORNER	15041, 15241, 40

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15073, 15193, 40
15341, 15541, 40
15373, 15493, 40
16041, 16241, 40
16073, 16193, 40
16341, 16541, 40
16373, 16493, 40
17041, 17241, 40
17073, 17193, 40
17341, 17541, 40
17373, 17493, 40
18041, 18241, 40
18073, 18193, 40
18341, 18541, 40
18373, 18493, 40
** SP1
21002, 21018, 1
21302, 21318, 1
20701, 21601, 300
20719, 21619, 300
20951, 21851, 300
20979, 21879, 300
** SP2
22502, 22518, 1
22802, 22818, 1
22201, 23101, 300
22219, 23119, 300
22451, 23351, 300
22479, 23379, 300
** SP3
24002, 24018, 1
24302, 24318, 1
23701, 24601, 300
23719, 24619, 300
23951, 24851, 300
23979, 24879, 300
** SP4
25502, 25518, 1
25802, 25818, 1
25201, 26101, 300
25219, 26119, 300
25451, 26351, 300
25479, 26379, 300
** SP5
27002, 27018, 1
27302, 27318, 1
26701, 27601, 300
26719, 27619, 300
26951, 27851, 300
26979, 27879, 300
** SP6
28502, 28518, 1
28802, 28818, 1
28201, 29101, 300
28219, 29119, 300
28451, 29351, 300
28479, 29379, 300
** SP7
30002, 30018, 1
30302, 30318, 1
29701, 30601, 300
29719, 30619, 300
29951, 30851, 300
29979, 30879, 300
** SP8
31502, 31518, 1
31802, 31818, 1
31201, 32101, 300
31219, 32119, 300
31451, 32351, 300
31479, 32379, 300
** SP9
33002, 33018, 1
33302, 33318, 1
32701, 33601, 300
32719, 33619, 300
32951, 33851, 300
32979, 33879, 300
** TOP
33901, 33919, 1
34201, 34219, 1
** CENTRAL FUEL CELL
20408, 34208, 300
20412, 34212, 300
20409, 20411, 1
20709, 20711, 1
*BOUNDARY
90000, 1, 6
YSYMM, YSYMM
*INITIAL CONDITIONS, TYPE=VELOCITY
ALLND, 1, -143.14
ALLND, 3, -508.23
*****
** STEP 1
*****
*STEP
*DYNAMIC, EXPLICIT
, 60.0E-3
*RESTART, WRITE, NUMBER INTERVAL=3
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE CASK/FINS/RINGS AND THE TARGET
**
*SURFACE DEFINITION, NAME=TGTOP
TARGET, SPOS
*CONTACT NODE SET, NAME=BOTTOM
BF,
OSBB,
*CONTACT PAIR
BOTTOM, TGTOP
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE CASK INSIDE SURFACE AND THE BASKET
**
*NSET, NSET=TRODNDB
20545, 20555, 20845, 20855
*NSET, NSET=TRODNDDT
34645, 34655
*NSET, NSET=TRODNDD
TRODNDB, TRODNDDT
*NSET, NSET=FCCBEB, GENERATE
20433, 20437, 1
20453, 20457, 1
20473, 20477, 1
20493, 20497, 1
20513, 20517, 1
20533, 20537, 1
*NSET, NSET=FCCBET, GENERATE
20733, 20737, 1
20753, 20757, 1
20773, 20777, 1
20793, 20797, 1
20813, 20817, 1
20833, 20837, 1
*CONTACT NODE SET, NAME=BASKO
SP1RNG, SP2RNG, SP3RNG, SP4RNG, SP5RNG, SP6RNG, SP7
RNG, SP8RNG, SP9RNG

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SP1, TOP, TRODND, FCABEB, FCABET, FCBEB, FCBET, FC
CBEB, FCCBET, FCHBEB, FCHBET
*CONTACT NODE SET, NAME=BASKTP
TOP, TRODNDT
*ELSET, ELSET=CASKS2, GENERATE
1501, 1718, 1
*ELSET, ELSET=CASKS6, GENERATE
2221, 2252, 1
2421, 2452, 1
2621, 2652, 1
2821, 2852, 1
3021, 3052, 1
3221, 3252, 1
3421, 3452, 1
3621, 3652, 1
3821, 3852, 1
4021, 4052, 1
4221, 4252, 1
4421, 4452, 1
4621, 4652, 1
4821, 4852, 1
5021, 5052, 1
5221, 5252, 1
5421, 5452, 1
5621, 5652, 1
5821, 5852, 1
6021, 6052, 1
6221, 6252, 1
6421, 6452, 1
6621, 6652, 1
6821, 6852, 1
7021, 7052, 1
7221, 7252, 1
7421, 7452, 1
7621, 7652, 1
7821, 7852, 1
8021, 8052, 1
8221, 8252, 1
8421, 8452, 1
8621, 8652, 1
8821, 8852, 1
*ELSET, ELSET=CASKS6A, GENERATE
10221, 10252, 1
*ELSET, ELSET=CASKS1, GENERATE
10501, 10718, 1
*SURFACE DEFINITION, NAME=CASKI1
CASKS2, S2
CASKS6, S6
*SURFACE DEFINITION, NAME=CASKI2
CASKS1, S1
CASKS6A, S6
*CONTACT PAIR
BASKO, CASKI1
*CONTACT PAIR
BASKTP, CASKI2
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE FUEL ROD OUTER LAYER WITH BOTTOM TIE
** PLATE
**
*CONTACT NODE SET, NAME=FAROB, GENERATE
61001, 61056, 1
*SURFACE DEFINITION, NAME=FABMT
FABM, S2
*CONTACT PAIR, INTERACTION=FRTPL
FAROB, FABMT
*SURFACE INTERACTION, NAME=FRTPL
*FRICTION
0.5

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**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE FUEL ROD OUTER LAYER WITH TOP TIE
** PLATE
**
*CONTACT NODE SET, NAME=FAROT, GENERATE
69201, 69256, 1
*SURFACE DEFINITION, NAME=FATPB
FATP, S1
*CONTACT PAIR, INTERACTION=FRTPL
FAROT, FATPB
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE FUEL CHANNEL A INSIDE SURFACE AND THE
** FUEL BUNDLE A
**
*SURFACE DEFINITION, NAME=FCAISH
FCABE, S2
*SURFACE DEFINITION, NAME=FCAISL
FCAR, SPOS
FCAS, SPOS
*CONTACT NODE SET, NAME=FUELA
FUELA,
*CONTACT PAIR
FUELA, FCAISH
FUELA, FCAISL
*****
*CONTACT NODE SET, NAME=FUELATP
FATP,
*CONTACT PAIR
FUELATP, CASKI2
**
** DEFINE THE CONTACT SURFACES BETWEEN
** OUTER FUEL RODS AND INNER FUEL RODS
**
*CONTACT NODE SET, NAME=FARO
FARO,
*SURFACE DEFINITION, NAME=FARI
FARI, SNEG
*CONTACT PAIR
FARO, FARI
*****
** FA FUEL ASSEMBLY INTERNALS (TOP)
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE CASK HEAD FUEL ASSEMBLY SPACER AND
** HEAD
**
*SURFACE DEFINITION, NAME=FATSPTH
FATSPTH, S2
*CONTACT PAIR, ADJUST=0.1, TIED
FATSPTH, CASKI2
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE CASK HEAD FUEL ASSEMBLY SPACER AND
** FUELA TOP
**
*SURFACE DEFINITION, NAME=FATSPTFA
FATSPTFA, S1
*SURFACE DEFINITION, NAME=FATPT
FATP, S2
*CONTACT PAIR, WEIGHT=0.5
FATSPTFA, FATPT
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE FUEL CHANNEL A INSIDE SURFACE AND TOP
** SPEACER A
**

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*ELSET, ELSET=FCATFASP, GENERATE
33623, 33626, 1
33663, 33666, 1
33643, 33646, 1
33703, 33706, 1
33683, 33684, 1
33923, 33926, 1
33963, 33966, 1
33943, 33946, 1
34003, 34006, 1
33983, 33984, 1
*SURFACE DEFINITION, NAME=FCATFASP
FCATFASP, SPOS
*CONTACT NODE SET, NAME=FATSPR
FATSPR,
*CONTACT PAIR
FATSPR, FCATFASP
**
** FA FUEL ASSEMBLY INTERNALS (BOTTOM)
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE FUEL ASSEMBLY BOTTOM SPACER AND FCA
BOTTOM PLATE
**
*SURFACE DEFINITION, NAME=FABSPTBE
FABSPT1, S1
*SURFACE DEFINITION, NAME=FCABET
FCABE, S2
*CONTACT PAIR, WEIGHT=0.5
FABSPTBE, FCABET
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE FUEL ASSEMBLY BOTTOM SPACER AND FUELA
BOTTOM PLATE
**
*SURFACE DEFINITION, NAME=FABSPTBM
FABSPT2, S2
*SURFACE DEFINITION, NAME=FABMBM
FABM, S1
*CONTACT PAIR, WEIGHT=0.5
FABSPTBM, FABMBM
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE FUEL CHANNEL A INSIDE SURFACE AND
BOTTOM SPEACER A
**
*ELSET, ELSET=FCABTBSP, GENERATE
20723, 20726, 1
21023, 21026, 1
21323, 21326, 1
20764, 20766, 1
20783, 20784, 1
21064, 21066, 1
21083, 21084, 1
21364, 21366, 1
21383, 21384, 1
20803, 20806, 1
21103, 21106, 1
21403, 21406, 1
20743, 20746, 1
20763, 20766, 1
21043, 21046, 1
21063, 21066, 1
21343, 21346, 1
21363, 21366, 1
*SURFACE DEFINITION, NAME=FCABTBSP
FCABTBSP, SPOS
*CONTACT NODE SET, NAME=FABSPR
FABSPR,

*CONTACT PAIR
FABSPR, FCABTBSP
*****
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE BOTTOM FINS AND THE CASK BOTTOM
**
*ELSET, ELSET=OSWS4, GENERATE
2341, 2372, 1
2541, 2572, 1
*SURFACE DEFINITION, NAME=BOSTBF
OSB, S1
OSC, S1
OSWS4, S4
*NSET, NSET=BFTBOS, GENERATE
40101, 40115, 1
40501, 40515, 1
40701, 40715, 1
40901, 40915, 1
41101, 41115, 1
41301, 41315, 1
41501, 41515, 1
41701, 41715, 1
41901, 41915, 1
42101, 42115, 1
42301, 42315, 1
42501, 42515, 1
42701, 42715, 1
42901, 42915, 1
43101, 43115, 1
43301, 43315, 1
43501, 43515, 1
43701, 43715, 1
**
45351, 45360, 1
45451, 45460, 1
45551, 45560, 1
45651, 45660, 1
45751, 45760, 1
45851, 45860, 1
45951, 45960, 1
46051, 46060, 1
46151, 46160, 1
46251, 46260, 1
46351, 46360, 1
46451, 46460, 1
46551, 46560, 1
46651, 46660, 1
46751, 46760, 1
46851, 46860, 1
*CONTACT NODE SET, NAME=BFTBOS
BFTBOS,
*CONTACT PAIR, ADJUST=0.5, TIED
BFTBOS, BOSTBF
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE TOP FINS AND THE CASK TOP HEAD
**
*ELSET, ELSET=HDS2, GENERATE
11501, 11832, 1
*ELSET, ELSET=HDS4, GENERATE
10801, 10832, 1
11301, 11332, 1
11801, 11832, 1
*SURFACE DEFINITION, NAME=HDTTF
HDS2, S2
HDS4, S4
*NSET, NSET=TFTHD, GENERATE

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50011, 50051, 20	*CONTACT NODE SET, NAME=TFTHD
50061, 50071, 1	TFTHD,
50411, 50451, 20	*CONTACT PAIR, ADJUST=0.5, TIED
50461, 50471, 1	TFTHD, HDTF
50611, 50651, 20	**
50661, 50671, 1	** DEFINE THE CONTACT SURFACES BETWEEN
50811, 50851, 20	** THE TOP FINS THEMSELVES
50861, 50871, 1	**
51011, 51051, 20	*SURFACE DEFINITION, NAME=TFLG1
51061, 51071, 1	TFLG1,
51211, 51251, 20	*SURFACE DEFINITION, NAME=TFLG2
51261, 51271, 1	TFLG2,
51411, 51451, 20	*SURFACE DEFINITION, NAME=TFLG3
51461, 51471, 1	TFLG3,
51611, 51651, 20	*SURFACE DEFINITION, NAME=TFLG4
51661, 51671, 1	TFLG4,
51811, 51851, 20	*SURFACE DEFINITION, NAME=TFLG5
51861, 51871, 1	TFLG5,
52011, 52051, 20	*SURFACE DEFINITION, NAME=TFLG6
52061, 52071, 1	TFLG6,
52211, 52251, 20	*SURFACE DEFINITION, NAME=TFLG7
52261, 52271, 1	TFLG7,
52411, 52451, 20	*SURFACE DEFINITION, NAME=TFLG8
52461, 52471, 1	TFLG8,
52611, 52651, 20	*SURFACE DEFINITION, NAME=TFLG9
52661, 52671, 1	TFLG9,
52811, 52851, 20	*SURFACE DEFINITION, NAME=TFST1
52861, 52871, 1	TFST1,
53011, 53051, 20	*SURFACE DEFINITION, NAME=TFST2
53061, 53071, 1	TFST2,
53211, 53251, 20	*SURFACE DEFINITION, NAME=TFST3
53261, 53271, 1	TFST3,
53411, 53451, 20	*SURFACE DEFINITION, NAME=TFST4
53461, 53471, 1	TFST4,
53611, 53651, 20	*SURFACE DEFINITION, NAME=TFST5
53661, 53671, 1	TFST5,
**	*SURFACE DEFINITION, NAME=TFST6
55306, 55326, 10	TFST6,
55331, 55336, 1	*SURFACE DEFINITION, NAME=TFST7
55406, 55426, 10	TFST7,
55431, 55436, 1	*SURFACE DEFINITION, NAME=TFST8
55506, 55526, 10	TFST8,
55531, 55536, 1	*CONTACT PAIR, WEIGHT=0.5
55606, 55626, 10	TFLG1, TFST1
55631, 55636, 1	*CONTACT PAIR, WEIGHT=0.5
55706, 55726, 10	TFST1, TFLG2
55731, 55736, 1	*CONTACT PAIR, WEIGHT=0.5
55806, 55826, 10	TFLG2, TFST2
55831, 55836, 1	*CONTACT PAIR, WEIGHT=0.5
55906, 55926, 10	TFST2, TFLG3
55931, 55936, 1	*CONTACT PAIR, WEIGHT=0.5
56006, 56026, 10	TFLG3, TFST3
56031, 56036, 1	*CONTACT PAIR, WEIGHT=0.5
56106, 56126, 10	TFST3, TFLG4
56131, 56136, 1	*CONTACT PAIR, WEIGHT=0.5
56206, 56226, 10	TFLG4, TFST4
56231, 56236, 1	*CONTACT PAIR, WEIGHT=0.5
56306, 56326, 10	TFST4, TFLG5
56331, 56336, 1	*CONTACT PAIR, WEIGHT=0.5
56406, 56426, 10	TFLG5, TFST5
56431, 56436, 1	*CONTACT PAIR, WEIGHT=0.5
56506, 56526, 10	TFST5, TFLG6
56531, 56536, 1	*CONTACT PAIR, WEIGHT=0.5
56606, 56626, 10	TFLG6, TFST6
56631, 56636, 1	*CONTACT PAIR, WEIGHT=0.5
56706, 56726, 10	TFST6, TFLG7
56731, 56736, 1	*CONTACT PAIR, WEIGHT=0.5
56806, 56826, 10	TFLG7, TFST7
56831, 56836, 1	*CONTACT PAIR, WEIGHT=0.5

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TFST7,TFLG8
*CONTACT PAIR, WEIGHT=0.5
TFLG8,TFST8
*CONTACT PAIR, WEIGHT=0.5
TFST8,TFLG9
**
**  DEFINE THE CONTACT SURFACES BETWEEN
**  THE BOTTOM FINS THEMSELVES
**
*SURFACE DEFINITION, NAME=BFLG1
BFLG1,
*SURFACE DEFINITION, NAME=BFLG2
BFLG2,
*SURFACE DEFINITION, NAME=BFLG3
BFLG3,
*SURFACE DEFINITION, NAME=BFLG4
BFLG4,
*SURFACE DEFINITION, NAME=BFLG5
BFLG5,
*SURFACE DEFINITION, NAME=BFLG6
BFLG6,
*SURFACE DEFINITION, NAME=BFLG7
BFLG7,
*SURFACE DEFINITION, NAME=BFLG8
BFLG8,
*SURFACE DEFINITION, NAME=BFLG9
BFLG9,
*SURFACE DEFINITION, NAME=BFST1
BFST1,
*SURFACE DEFINITION, NAME=BFST2
BFST2,
*SURFACE DEFINITION, NAME=BFST3
BFST3,
*SURFACE DEFINITION, NAME=BFST4
BFST4,
*SURFACE DEFINITION, NAME=BFST5
BFST5,
*SURFACE DEFINITION, NAME=BFST6
BFST6,
*SURFACE DEFINITION, NAME=BFST7
BFST7,
*SURFACE DEFINITION, NAME=BFST8
BFST8,
*CONTACT PAIR, WEIGHT=0.5
BFLG1,BFST1
*CONTACT PAIR, WEIGHT=0.5
BFST1,BFLG2
*CONTACT PAIR, WEIGHT=0.5
BFLG2,BFST2
*CONTACT PAIR, WEIGHT=0.5
BFST2,BFLG3
*CONTACT PAIR, WEIGHT=0.5
BFLG3,BFST3
*CONTACT PAIR, WEIGHT=0.5
BFST3,BFLG4
*CONTACT PAIR, WEIGHT=0.5
BFLG4,BFST4
*CONTACT PAIR, WEIGHT=0.5
BFST4,BFLG5
*CONTACT PAIR, WEIGHT=0.5
BFLG5,BFST5
*CONTACT PAIR, WEIGHT=0.5
BFST5,BFLG6
*CONTACT PAIR, WEIGHT=0.5
BFLG6,BFST6
*CONTACT PAIR, WEIGHT=0.5
BFST6,BFLG7
*CONTACT PAIR, WEIGHT=0.5
BFLG7,BFST7

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*CONTACT PAIR, WEIGHT=0.5
BFST7,BFLG8
*CONTACT PAIR, WEIGHT=0.5
BFLG8,BFST8
*CONTACT PAIR, WEIGHT=0.5
BFST8,BFLG9
*****
**      OUTPUT DATA
*****
*NSET, NSET=RFORCE
90000,
*NSET, NSET=DISP
5781, 5797, 5813
21001,21019,21230
34201,34219,34230
62001,63201,62008,63208,62015,63215,62022,632
22
62029,63229,62036,63236,62043,63243,62050,632
50
*HISTORY OUTPUT, TIME=1.E-4
*NODE HISTORY,NSET=RFORCE
RF,
*NODE HISTORY,NSET=DISP
A,V,U
*ENERGY HISTORY
ALLKE,
*FILE OUTPUT, NUMBER INTERVAL=100
*NODE FILE,NSET=RFORCE
RF,
*MONITOR,NODE=5797,DOF=3
*END STEP

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E-8.5.2.3 IF-300 Cask Impact Analysis 30-ft Top-End Drop

*HEADING
IF-300 CASK IMPACT ANALYSIS
12/20/01
FILE=IFBTE301 (excluding contact surfaces of
fa bottom spacer)

2001 model with modified Zircaloy data

```
*****
** CASK BOTTOM
*****
*NODE, SYSTEM=R
*NODE, NSET=OSB1
1, -3.0000, 0.0000, 0.0000
2, -1.5000, 0.0000, 0.0000
3, 0.0000, 0.0000, 0.0000
4, 1.5000, 0.0000, 0.0000
5, 3.0000, 0.0000, 0.0000
6, -2.7000, 1.2000, 0.0000
7, -1.3500, 1.3500, 0.0000
8, 0.0000, 1.5000, 0.0000
9, 1.3500, 1.3500, 0.0000
10, 2.7000, 1.2000, 0.0000
11, -2.4000, 2.4000, 0.0000
12, -1.2000, 2.7000, 0.0000
13, 0.0000, 3.0000, 0.0000
14, 1.2000, 2.7000, 0.0000
15, 2.4000, 2.4000, 0.0000
21, 4.5625, 0.0000, 0.0000
22, 4.1794, 1.7720, 0.0000
23, 3.3655, 3.3655, 0.0000
24, 1.7720, 4.1794, 0.0000
25, 0.0000, 4.5625, 0.0000
26, -1.7720, 4.1794, 0.0000
27, -3.3655, 3.3655, 0.0000
28, -4.1794, 1.7720, 0.0000
29, -4.5625, 0.0000, 0.0000
*NODE, NSET=OSB2
41, 6.1250, 0.0000, 0.0000
61, 8.0750, 0.0000, 0.0000
*NCOPY,SHIFT,MULTIPLE=8,CHANGE NU=+1,OLD
SET=OSB2,NEW SET=OSB2
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +22.50
*NODE, NSET=OSB3
91, 10.0250, 0.0000, 0.0000
111, 11.9750, 0.0000, 0.0000
131, 13.9250, 0.0000, 0.0000
151, 15.8750, 0.0000, 0.0000
171, 17.2975, 0.0000, 0.0000
*NCOPY,SHIFT,MULTIPLE=16,CHANGE NU=+1,OLD
SET=OSB3,NEW SET=OSB3
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +11.25
*NODE, NSET=OSB4
221, 18.7500, 0.0000, 0.0000
*NCOPY,SHIFT,MULTIPLE=32,CHANGE NU=+1,OLD
SET=OSB4,NEW SET=OSB4
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +5.625
*NSET, NSET=OSBB
OSB1, OSB2, OSB3, OSB4
*NCOPY,SHIFT,CHANGE NU=+500,OLD SET=OSBB,NEW
SET=OSBU1
0.0, 0.0, 1.563
```

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0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+500,OLD SET=OSBU1,NEW
SET=OSBU2
0.0, 0.0, 1.9375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+500,OLD SET=OSBU2,NEW
SET=OSBU3
0.0, 0.0, 1.9375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+500,OLD SET=OSBU3,NEW
SET=OSBT
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=OSB
OSBB, OSBU1, OSBU2, OSBU3, OSBT
*****
*ELEMENT, TYPE=C3D8R, ELSET=OSB1
1, 1, 2, 7, 6, 501, 502, 507, 506
*ELGEN, ELSET=OSB1
1, 4, 1, 1, 2, 5, 4
*ELEMENT, TYPE=C3D8R, ELSET=OSB1
9, 5, 21, 22, 10, 505, 521, 522, 510
10, 10, 22, 23, 15, 510, 522, 523, 515
11, 15, 23, 24, 14, 515, 523, 524, 514
12, 14, 24, 25, 13, 514, 524, 525, 513
13, 13, 25, 26, 12, 513, 525, 526, 512
14, 12, 26, 27, 11, 512, 526, 527, 511
15, 11, 27, 28, 6, 511, 527, 528, 506
16, 6, 28, 29, 1, 506, 528, 529, 501
*ELEMENT, TYPE=C3D8R
21, 21, 41, 42, 22, 521, 541, 542, 522
*ELGEN, ELSET=OSB2
21, 8, 1, 1, 2, 20, 20
*ELEMENT, TYPE=C3D6, ELSET=OSB3
61, 61, 91, 92, 561, 591, 592
62, 61, 92, 62, 561, 592, 562
63, 62, 92, 93, 562, 592, 593
64, 62, 93, 94, 562, 593, 594
65, 62, 94, 63, 562, 594, 563
66, 63, 94, 95, 563, 594, 595
67, 63, 95, 96, 563, 595, 596
68, 63, 96, 64, 563, 596, 564
69, 64, 96, 97, 564, 596, 597
70, 64, 97, 98, 564, 597, 598
71, 64, 98, 65, 564, 598, 565
72, 65, 98, 99, 565, 598, 599
73, 65, 99, 100, 565, 599, 600
74, 65, 100, 66, 565, 600, 566
75, 66, 100, 101, 566, 600, 601
76, 66, 101, 102, 566, 601, 602
77, 66, 102, 67, 566, 602, 567
78, 67, 102, 103, 567, 602, 603
79, 67, 103, 104, 567, 603, 604
80, 67, 104, 68, 567, 604, 568
81, 68, 104, 105, 568, 604, 605
82, 68, 105, 106, 568, 605, 606
83, 68, 106, 69, 568, 606, 569
84, 69, 106, 107, 569, 606, 607
*ELEMENT, TYPE=C3D8R
91, 91, 111, 112, 92, 591, 611, 612, 592
*ELGEN, ELSET=OSB3
91, 16, 1, 1, 4, 20, 20
*ELEMENT, TYPE=C3D6, ELSET=OSB4
171, 171, 221, 222, 671, 721, 722
172, 171, 222, 172, 671, 722, 672
173, 172, 222, 223, 672, 722, 723
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174, 172, 223, 224, 672, 723, 724
175, 172, 224, 173, 672, 724, 673
176, 173, 224, 225, 673, 724, 725
177, 173, 225, 226, 673, 725, 726
178, 173, 226, 174, 673, 726, 674
179, 174, 226, 227, 674, 726, 727
180, 174, 227, 228, 674, 727, 728
181, 174, 228, 175, 674, 728, 675
182, 175, 228, 229, 675, 728, 729
183, 175, 229, 230, 675, 729, 730
184, 175, 230, 176, 675, 730, 676
185, 176, 230, 231, 676, 730, 731
186, 176, 231, 232, 676, 731, 732
187, 176, 232, 177, 676, 732, 677
188, 177, 232, 233, 677, 732, 733
189, 177, 233, 234, 677, 733, 734
190, 177, 234, 178, 677, 734, 678
191, 178, 234, 235, 678, 734, 735
192, 178, 235, 236, 678, 735, 736
193, 178, 236, 179, 678, 736, 679
194, 179, 236, 237, 679, 736, 737
195, 179, 237, 238, 679, 737, 738
196, 179, 238, 180, 679, 738, 680
197, 180, 238, 239, 680, 738, 739
198, 180, 239, 240, 680, 739, 740
199, 180, 240, 181, 680, 740, 681
200, 181, 240, 241, 681, 740, 741
201, 181, 241, 242, 681, 741, 742
202, 181, 242, 182, 681, 742, 682
203, 182, 242, 243, 682, 742, 743
204, 182, 243, 244, 682, 743, 744
205, 182, 244, 183, 682, 744, 683
206, 183, 244, 245, 683, 744, 745
207, 183, 245, 246, 683, 745, 746
208, 183, 246, 184, 683, 746, 684
209, 184, 246, 247, 684, 746, 747
210, 184, 247, 248, 684, 747, 748
211, 184, 248, 185, 684, 748, 685
212, 185, 248, 249, 685, 748, 749
213, 185, 249, 250, 685, 749, 750
214, 185, 250, 186, 685, 750, 686
215, 186, 250, 251, 686, 750, 751
216, 186, 251, 252, 686, 751, 752
217, 186, 252, 187, 686, 752, 687
218, 187, 252, 253, 687, 752, 753
*ELSET, ELSET=OSB
OSB1, OSB2, OSB3, OSB4
*ELCOPY, OLD SET=OSB, NEW SET=DUB1, ELEMENT
SH=500, SHIFT NOD=500
*ELCOPY, OLD SET=DUB1, NEW SET=DUB2, ELEMENT
SH=500, SHIFT NOD=500
*ELCOPY, OLD SET=DUB2, NEW SET=ISB, ELEMENT
SH=500, SHIFT NOD=500
*ELSET, ELSET=DUB
DUB1, DUB2
*SOLID SECTION, ELSET=OSB, MATERIAL=S304
*SOLID SECTION, ELSET=ISB, MATERIAL=S304
*SOLID SECTION, ELSET=DUB, MATERIAL=DURAN
*****
** CASK BOTTOM CORNER
*****
*NODE, NSET=OSBC
261, 19.2800, 0.0000, 0.0000
301, 21.5168, 0.0000, 0.4141
341, 23.2817, 0.0000, 1.5933
381, 24.4609, 0.0000, 3.3582
761, 19.2800, 0.0000, 1.5630
801, 20.9198, 0.0000, 1.8553
841, 22.1786, 0.0000, 2.6964
881, 23.0197, 0.0000, 3.9552
421, 19.2800, 0.0000, 2.5323
461, 20.5477, 0.0000, 2.7536
921, 21.5590, 0.0000, 3.3160
961, 22.1214, 0.0000, 4.3273
1261, 19.2800, 0.0000, 3.5005
1301, 20.2880, 0.0000, 3.5016
1341, 21.1098, 0.0000, 3.7653
1381, 19.2800, 0.0000, 4.4698
1421, 20.2880, 0.0000, 4.4708
1461, 21.2960, 0.0000, 4.4708
*NCOPY, SHIFT, MULTIPLE=32, CHANGE NU=+1, OLD
SET=OSBC, NEW SET=OSBC
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +5.625
**
*NODE, NSET=WBS1
1761, 19.2800, 0.0000, 5.4400
1801, 20.2880, 0.0000, 5.4400
1841, 21.2960, 0.0000, 5.4400
1881, 22.3040, 0.0000, 5.4400
1921, 23.3120, 0.0000, 5.4400
1961, 24.8750, 0.0000, 5.4400
*NCOPY, SHIFT, MULTIPLE=32, CHANGE NU=+1, OLD
SET=WBS1, NEW SET=WBS1
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +5.625
*NODE, NSET=WBS2
2261, 19.2800, 0.0000, 6.6900
2301, 21.2960, 0.0000, 6.6900
2341, 23.3120, 0.0000, 6.6900
2381, 24.8750, 0.0000, 6.6900
*NCOPY, SHIFT, MULTIPLE=32, CHANGE NU=+1, OLD
SET=WBS2, NEW SET=WBS2
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +5.625
*NSET, NSET=OSC
OSBC, WBS1, WBS2
*NSET, NSET=WIS1, GENERATE
2221, 2253, 1
*NSET, NSET=WBASE
WIS1, WBS2
*****
*ELEMENT, TYPE=C3D8R
221, 221, 261, 262, 222, 721, 761, 762, 722
381, 381, 1961, 1962, 382, 881, 1921, 1922,
882
1961, 1961, 2381, 2382, 1962, 1921, 2341, 2342,
1922
761, 761, 801, 802, 762, 421, 461, 462, 422
801, 801, 841, 842, 802, 461, 921, 922, 462
841, 841, 881, 882, 842, 921, 961, 962, 922
881, 881, 1921, 1922, 882, 961, 1881, 1882,
962
421, 421, 461, 462, 422, 1261, 1301, 1302,
1262
461, 461, 921, 922, 462, 1301, 1341, 1342,
1302
921, 921, 961, 962, 922, 1341, 1461, 1462,
1342
961, 961, 1881, 1882, 962, 1461, 1841, 1842,
1462
1261, 1261, 1301, 1302, 1262, 1381, 1421,
1422, 1382
1381, 1381, 1421, 1422, 1382, 1761, 1801,
1802, 1762
1721, 1721, 1761, 1762, 1722, 2221, 2261,
2262, 2222
*ELEMENT, TYPE=C3D6

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721, 722, 762, 422, 721, 761, 421
1221, 722, 422, 1222, 721, 421, 1221
2001, 422, 1262, 1222, 421, 1261, 1221
2041, 1222, 1262, 1382, 1221, 1261, 1381
2081, 1222, 1382, 1722, 1221, 1381, 1721
2121, 1382, 1762, 1722, 1381, 1761, 1721
**
2161, 1762, 1802, 2262, 1761, 1801, 2261
1761, 1802, 2302, 2262, 1801, 2301, 2261
1801, 1802, 1842, 2302, 1801, 1841, 2301
1841, 1842, 1882, 2302, 1841, 1881, 2301
1881, 1882, 2342, 2302, 1881, 2341, 2301
1921, 1882, 1922, 2342, 1881, 1921, 2341
*ELGEN, ELSET=OSC
221, 32, 1, 1, 4, 40, 40
381, 32, 1, 1
1961, 32, 1, 1
*ELGEN, ELSET=DUC
761, 32, 1, 1
801, 32, 1, 1
841, 32, 1, 1
881, 32, 1, 1
421, 32, 1, 1
461, 32, 1, 1
921, 32, 1, 1
961, 32, 1, 1
1261, 32, 1, 1, 2, 40, 40
1381, 32, 1, 1, 2, 40, 40
721, 32, 1, 1
1221, 32, 1, 1
2001, 32, 1, 1
2041, 32, 1, 1
2081, 32, 1, 1
2121, 32, 1, 1
2161, 32, 1, 1
1761, 32, 1, 1
1801, 32, 1, 1
1841, 32, 1, 1
1881, 32, 1, 1
1921, 32, 1, 1
*ELGEN, ELSET=ISC
1721, 32, 1, 1
*SOLID SECTION, ELSET=OSC, MATERIAL=S304
*SOLID SECTION, ELSET=ISC, MATERIAL=S304
*SOLID SECTION, ELSET=DUC, MATERIAL=DURAN
*****
** CASK WALL
*****
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=WBASE,NEW
SET=W1
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+400,OLD SET=W1,NEW
SET=W2
0.0, 0.0, 6.935
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=W2A
W1, W2, 2, 200
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=W2,NEW
SET=W3
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+800,OLD SET=W3,NEW
SET=W4
0.0, 0.0, 15.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=W4A
W3, W4, 4, 200

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*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=W4,NEW
SET=W5
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+4000,OLD SET=W5,NEW
SET=W6
0.0, 0.0, 123.93
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=W6A
W5, W6, 20, 200
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=W6,NEW
SET=W7
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+600,OLD SET=W7,NEW
SET=W8
0.0, 0.0, 12.625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=W8A
W7, W8, 3, 200
*NODE, NSET=W9
9021, 18.7500, 0.0000, 174.0550
9061, 19.6750, 0.0000, 174.0550
9101, 20.6000, 0.0000, 174.0550
9141, 22.7375, 0.0000, 174.0550
9181, 24.8750, 0.0000, 174.0550
*NCOPY,SHIFT,MULTIPLE=32,CHANGE NU=+1,OLD
SET=W9,NEW SET=W9
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +5.625
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=W9,NEW
SET=W10
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=W10,NEW
SET=W11
0.0, 0.0, 0.875
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
***** MODIFY NODES TO ACCEPT STRUCTURAL RINGS
*NODE, NSET=WMOD1
2981, 24.8750, 0.0000, 14.0110
2982, 24.7552, 2.4382, 14.0215
2983, 24.3970, 4.8529, 14.0529
2984, 23.8039, 7.2208, 14.1048
2985, 22.9815, 9.5193, 14.1767
2986, 21.9378, 11.7260, 14.2680
2987, 20.6828, 13.8198, 14.3778
2988, 19.2286, 15.7805, 14.5050
2989, 17.5893, 17.5893, 14.6485
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=WMOD1,NEW
SET=WMOD1A
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NODE, NSET=WMOD2
3981, 24.8750, 0.0000, 32.7390
3982, 24.7552, 2.4382, 32.7285
3983, 24.3970, 4.8529, 32.6971
3984, 23.8039, 7.2208, 32.6452
3985, 22.9815, 9.5193, 32.5733
3986, 21.9378, 11.7260, 32.4820
3987, 20.6828, 13.8198, 32.3722
3988, 19.2286, 15.7805, 32.2450
3989, 17.5893, 17.5893, 32.1015
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=WMOD2,NEW
SET=WMOD2A
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
**
*NODE, NSET=WMOD3

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8181, 24.8750, 0.0000, 156.1910
8182, 24.7552, 2.4382, 156.2015
8183, 24.3970, 4.8529, 156.2329
8184, 23.8039, 7.2208, 156.2848
8185, 22.9815, 9.5193, 156.3567
8186, 21.9378, 11.7260, 156.4480
8187, 20.6828, 13.8198, 156.5578
8188, 19.2286, 15.7805, 156.6850
8189, 17.5893, 17.5893, 156.8285
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=WMOD3,NEW
SET=WMOD3A
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
**
*NODE, NSET=WMOD4
9181, 24.8750, 0.0000, 174.9190
9182, 24.7552, 2.4382, 174.9085
9183, 24.3970, 4.8529, 174.8771
9184, 23.8039, 7.2208, 174.8252
9185, 22.9815, 9.5193, 174.7533
9186, 21.9378, 11.7260, 174.6620
9187, 20.6828, 13.8198, 174.5522
9188, 19.2286, 15.7805, 174.4250
9189, 17.5893, 17.5893, 174.2815
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=WMOD4,NEW
SET=WMOD4A
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=WMOD
WMOD1A, WMOD2A, WMOD3A, WMOD4A
*NSET, NSET=WALL
W1, W2A, W3, W4A, W5, W6A, W7, W8A, W9, W10, W11, WMOD
*****
*ELEMENT, TYPE=C3D8R
2221, 2221, 2261, 2262, 2222, 2421, 2461,
2462, 2422
*ELGEN, ELSET=ISW
2221, 32, 1, 1, 33, 200, 200
**
*ELEMENT, TYPE=C3D8R
2261, 2261, 2301, 2302, 2262, 2461, 2501,
2502, 2462
*ELGEN, ELSET=DUW
2261, 32, 1, 1, 2, 40, 40, 33, 200, 200
**
*ELEMENT, TYPE=C3D8R
2341, 2341, 2381, 2382, 2342, 2541, 2581,
2582, 2542
*ELGEN, ELSET=OSW
2341, 32, 1, 1, 33, 200, 200
*SOLID SECTION, ELSET=OSW, MATERIAL=S317
*SOLID SECTION, ELSET=DUW, MATERIAL=DURAN
*SOLID SECTION, ELSET=ISW, MATERIAL=S216
*****
** CASK FLANGE
*****
*ELEMENT, TYPE=C3D8R
8821, 8821, 8861, 8862, 8822, 9021, 9061,
9062, 9022
9101, 9101, 9141, 9142, 9102, 9301, 9341,
9342, 9302
*ELGEN, ELSET=CFL
8821, 32, 1, 1, 4, 40, 40
9101, 32, 1, 1, 2, 40, 40, 2, 200, 200
*SOLID SECTION, ELSET=CFL, MATERIAL=S304
*****
** CASK HEAD
*****

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*NCOPY,SHIFT,CHANGE NU=+10000,OLD
SET=OSBB,NEW SET=CHDB0
0.0, 0.0, 174.43
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NODE, NSET=CHDB1
10221, 18.7500, 0.0000, 174.4300
10261, 20.6000, 0.0000, 174.4300
10301, 22.7375, 0.0000, 174.4300
10341, 24.8750, 0.0000, 174.4300
*NCOPY,SHIFT,MULTIPLE=32,CHANGE NU=+1,OLD
SET=CHDB1,NEW SET=CHDB1
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +5.625
*NSET, NSET=CHDB
CHDB0, CHDB1
*NCOPY,SHIFT,CHANGE NU=+500,OLD SET=CHDB,NEW
SET=CHD1
0.0, 0.0, 1.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+500,OLD SET=CHD1,NEW
SET=CHD2
0.0, 0.0, 1.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+500,OLD SET=CHD2,NEW
SET=CHD3
0.0, 0.0, 3.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+500,OLD SET=CHD3,NEW
SET=CHD4
0.0, 0.0, 2.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=CHD
CHDB, CHD1, CHD2, CHD3, CHD4
*****
*ELEMENT, TYPE=C3D8R
10221, 10221, 10261, 10262, 10222, 10721,
9501, 9502, 10722
10721, 10721, 9501, 9502, 10722, 11221,
11261, 11262, 11222
10761, 9501, 9541, 9542, 9502, 11261, 11301,
11302, 11262
11221, 11221, 11261, 11262, 11222, 11721,
11761, 11762, 11722
*ELGEN, ELSET=CHD1
10221, 32, 1, 1
10721, 32, 1, 1
10761, 32, 1, 1, 2, 40, 40
11221, 32, 1, 1, 3, 40, 40, 2, 500, 500
*ELCOPY,OLD SET=OSB,NEW SET=CHDB,ELEMENT
SH=10500,SHIFT NOD=10500
*ELCOPY,OLD SET=CHDB,NEW SET=CHDU,ELEMENT
SH=500,SHIFT NOD=500
*ELCOPY,OLD SET=CHDU,NEW SET=CHDT,ELEMENT
SH=500,SHIFT NOD=500
*ELSET, ELSET=CHDS
CHD1, CHDB, CHDT
*SOLID SECTION, ELSET=CHDS, MATERIAL=S304
*SOLID SECTION, ELSET=CHDU, MATERIAL=DURAN
*****
** CASK HEAD TOP FUEL CHANNEL SPACER (A)
*****
*NODE, NSET=FATSPR1
13001, -14.3000, 1.3500, 171.9300
13002, -10.3000, 1.3500, 171.9300
13003, -6.3000, 1.3500, 171.9300
13004, -6.3000, 5.3500, 171.9300
13005, -6.3000, 9.3500, 171.9300
13006, -10.3000, 9.3500, 171.9300
13007, -14.3000, 9.3500, 171.9300

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13008, -14.3000, 5.3500, 171.9300
13011, -13.3334, 2.3666, 171.9300
13012, -10.3000, 1.9593, 171.9300
13013, -7.3166, 2.3666, 171.9300
13014, -6.9093, 5.3500, 171.9300
13015, -7.3166, 8.3334, 171.9300
13016, -10.3000, 8.7408, 171.9300
13017, -13.3334, 8.3334, 171.9300
13018, -13.6908, 5.3500, 171.9300
13021, -12.2668, 3.3832, 171.9300
13022, -10.3000, 2.5685, 171.9300
13023, -8.3332, 3.3832, 171.9300
13024, -7.5185, 5.3500, 171.9300
13025, -8.3332, 7.3168, 171.9300
13026, -10.3000, 8.1315, 171.9300
13027, -12.2668, 7.3168, 171.9300
13028, -13.0815, 5.3500, 171.9300
13031, -12.0017, 3.6483, 171.9300
13032, -10.3000, 2.9435, 171.9300
13033, -8.5983, 3.6483, 171.9300
13034, -7.8935, 5.3500, 171.9300
13035, -8.5983, 7.0517, 171.9300
13036, -10.3000, 7.7565, 171.9300
13037, -12.0017, 7.0517, 171.9300
13038, -12.7065, 5.3500, 171.9300
13040, -10.3000, 5.3500, 171.9300
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FATSPR1,NEW SET=FATSPR2
0.0, 0.0, 0.375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FATSPR2,NEW SET=FATSPR3
0.0, 0.0, 0.5416
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FATSPR3,NEW SET=FATSPR4
0.0, 0.0, 0.5416
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FATSPR4,NEW SET=FATSPR5
0.0, 0.0, 0.5416
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FATSPR5,NEW SET=FATSPR6
0.0, 0.0, 0.5416
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FATSPR6,NEW SET=FATSPR7
0.0, 0.0, 0.5416
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FATSPR7,NEW SET=FATSPR8
0.0, 0.0, 0.5420
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FATSPR8,NEW SET=FATSPR9
0.0, 0.0, 0.625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FATSPR
FATSPR1,FATSPR2,FATSPR3,FATSPR4,FATSPR5,FATSPR
R6,FATSPR7,FATSPR8,FATSPR9
*****
*ELEMENT, TYPE=C3D8R, ELSET=FATSPR1
13001, 13001, 13002, 13012, 13011, 13051,
13052, 13062, 13061
13008, 13008, 13001, 13011, 13018, 13058,
13051, 13061, 13068
*ELGEN, ELSET=FATSPR1
13001, 7, 1, 1, 3, 10, 10

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13008, 3, 10, 10
*ELEMENT, TYPE=C3D6, ELSET=FATSPR1
13031, 13031, 13032, 13040, 13081, 13082,
13090
13032, 13032, 13033, 13040, 13082, 13083,
13090
13033, 13033, 13034, 13040, 13083, 13084,
13090
13034, 13034, 13035, 13040, 13084, 13085,
13090
13035, 13035, 13036, 13040, 13085, 13086,
13090
13036, 13036, 13037, 13040, 13086, 13087,
13090
13037, 13037, 13038, 13040, 13087, 13088,
13090
13038, 13038, 13031, 13040, 13088, 13081,
13090
*ELEMENT, TYPE=C3D8R, ELSET=FATSPRP
13071, 13071, 13072, 13082, 13081, 13121,
13122, 13132, 13131
13078, 13078, 13071, 13081, 13088, 13128,
13121, 13131, 13138
*ELGEN, ELSET=FATSPRP
13071, 7, 1, 1, 6, 50, 50
13078, 6, 50, 50
*ELCOPY,OLD SET=FATSPR1,NEW
SET=FATSPR2,ELEMENT SH=350,SHIFT NOD=350
*ELSET, ELSET=FATSPR
FATSPR1,FATSPR2,FATSPRP
*SOLID SECTION, ELSET=FATSPR, MATERIAL=S304
*****
** CASK BOTTOM FUEL CHANNEL SPACER (A)
*****
**
**
**
*****
** BASKET
*****
*****
** SPACER DISK 1
*****
*NODE, NSET=SPDSK1A
21002, -16.2339, 0.0000, 10.0025
21003, -14.8000, 0.0000, 10.0025
21004, -12.5500, 0.0000, 10.0025
21005, -10.3000, 0.0000, 10.0025
21006, -8.0500, 0.0000, 10.0025
21007, -5.8000, 0.0000, 10.0025
21008, -4.5000, 0.0000, 10.0025
21009, -2.2500, 0.0000, 10.0025
21010, 0.0000, 0.0000, 10.0025
21011, 2.2500, 0.0000, 10.0025
21012, 4.5000, 0.0000, 10.0025
21013, 5.8000, 0.0000, 10.0025
21014, 8.0500, 0.0000, 10.0025
21015, 10.3000, 0.0000, 10.0025
21016, 12.5500, 0.0000, 10.0025
21017, 14.8000, 0.0000, 10.0025
21018, 16.2339, 0.0000, 10.0025
*NCOPY,SHIFT,CHANGE NU=+20,OLD
SET=SPDSK1A,NEW SET=SPDSK1B
0.0, 0.85, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+20,OLD
SET=SPDSK1B,NEW SET=SPDSK1C
0.0, 1.825, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0

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*NCOPY,SHIFT,CHANGE NU=+20,OLD
SET=SPDSK1C,NEW SET=SPDSK1D
0.0, 1.825, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+20,OLD
SET=SPDSK1D,NEW SET=SPDSK1E
0.0, 1.906, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+20,OLD
SET=SPDSK1E,NEW SET=SPDSK1F
0.0, 1.722, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+20,OLD
SET=SPDSK1F,NEW SET=SPDSK1G
0.0, 1.722, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+20,OLD
SET=SPDSK1G,NEW SET=SPDSK1H
0.0, 1.65, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+20,OLD
SET=SPDSK1H,NEW SET=SPDSK1I
0.0, 1.953, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+20,OLD
SET=SPDSK1I,NEW SET=SPDSK1J
0.0, 1.953, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
** MODIFY NODES
*NODE, NSET=SPDSKMD
21165, -10.3000, 13.3067, 10.0025
21166, -8.0500, 13.3635, 10.0025
21167, -5.8000, 13.4202, 10.0025
21186, -8.0500, 15.1271, 10.0025
21187, -5.8000, 15.3039, 10.0025
**
21173, 5.8000, 13.4202, 10.0025
21174, 8.0500, 13.3635, 10.0025
21175, 10.3000, 13.3067, 10.0025
21193, 5.8000, 15.3039, 10.0025
21194, 8.0500, 15.1271, 10.0025
**
*NODE, NSET=SPRNG1A
21001, -18.1550, 0.0000, 10.0025
21021, -18.1351, 0.8500, 10.0025
21041, -17.9568, 2.6750, 10.0025
21061, -17.5885, 4.5000, 10.0025
21081, -16.9873, 6.4060, 10.0025
21102, -16.2339, 8.1280, 10.0025
21122, -15.2506, 9.8500, 10.0025
21143, -14.0483, 11.5000, 10.0025
21164, -12.5500, 13.1187, 10.0025
21185, -10.3000, 14.9504, 10.0025
21206, -8.0500, 16.2727, 10.0025
21227, -5.8000, 17.2036, 10.0025
21228, -4.5000, 17.5885, 10.0025
21229, -2.2500, 18.0150, 10.0025
**
21019, 18.1550, 0.0000, 10.0025
21039, 18.1351, 0.8500, 10.0025
21059, 17.9568, 2.6750, 10.0025
21079, 17.5885, 4.5000, 10.0025
21099, 16.9873, 6.4060, 10.0025
21118, 16.2339, 8.1280, 10.0025
21138, 15.2506, 9.8500, 10.0025
21157, 14.0483, 11.5000, 10.0025
21176, 12.5500, 13.1187, 10.0025
21195, 10.3000, 14.9504, 10.0025
21214, 8.0500, 16.2727, 10.0025

21230, 0.0000, 18.1550, 10.0025
21231, 2.2500, 18.0150, 10.0025
21232, 4.5000, 17.5885, 10.0025
21233, 5.8000, 17.2036, 10.0025
*NODE, NSET=SPRNG1C
21207, -5.8000, 16.4146, 10.0025
21208, -4.5000, 16.4966, 10.0025
21209, -2.2500, 16.6386, 10.0025
21210, 0.0000, 16.7805, 10.0025
21211, 2.2500, 16.6386, 10.0025
21212, 4.5000, 16.4966, 10.0025
21213, 5.8000, 16.4146, 10.0025
*NODE, NSET=SPRNG1B
21251, 18.6550, 0.0000, 10.0025
21252, 18.6356, 0.8500, 10.0025
21253, 18.4622, 2.6750, 10.0025
21254, 18.1041, 4.5000, 10.0025
21255, 17.5206, 6.4060, 10.0025
21256, 16.6810, 8.3519, 10.0025
21257, 15.6706, 10.1213, 10.0025
21258, 14.4352, 11.8167, 10.0025
21259, 12.8956, 13.4800, 10.0025
21260, 10.5837, 15.3621, 10.0025
21261, 8.2717, 16.7209, 10.0025
21262, 5.8000, 17.7305, 10.0025
21263, 4.5000, 18.1041, 10.0025
21264, 2.2500, 18.5188, 10.0025
21265, 0.0000, 18.6550, 10.0025
21266, -2.2500, 18.5188, 10.0025
21267, -4.5000, 18.1041, 10.0025
21268, -5.8000, 17.7305, 10.0025
21269, -8.2717, 16.7209, 10.0025
21270, -10.5837, 15.3621, 10.0025
21271, -12.8956, 13.4800, 10.0025
21272, -14.4352, 11.8167, 10.0025
21273, -15.6706, 10.1213, 10.0025
21274, -16.6810, 8.3519, 10.0025
21275, -17.5206, 6.4060, 10.0025
21276, -18.1041, 4.5000, 10.0025
21277, -18.4622, 2.6750, 10.0025
21278, -18.6356, 0.8500, 10.0025
21279, -18.6550, 0.0000, 10.0025
*NSET, NSET=SPDSK1Y
SPDSK1A,SPDSK1B,SPDSK1C,SPDSK1D,SPDSK1E,SPDSK
1F,SPDSK1G,SPDSK1H
SPDSK1I,SPDSK1J,SPDSKMD,SPRNG1C
*NODE, NSET=SPRNG1Y
SPRNG1A, SPRNG1B
**
*NCOPY,SHIFT,CHANGE NU=+300,OLD
SET=SPDSK1Y,NEW SET=SPDSK1Z
0.0, 0.0, 1.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
**
*NCOPY,SHIFT,CHANGE NU=-300,OLD
SET=SPRNG1Y,NEW SET=SPRNG1Z
0.0, 0.0, -1.5
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+300,OLD
SET=SPRNG1Y,NEW SET=SPRNG1Z
0.0, 0.0, 1.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+600,OLD
SET=SPRNG1Y,NEW SET=SPRNG1Z
0.0, 0.0, 2.5
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=SP1DSK
SPDSK1Y,SPDSK1Z
*NSET, NSET=SP1RNG

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SPRNG1Y, SPRNG1Z

*NSET, NSET=SP1

SP1DSK, SP1RNG

*ELEMENT, TYPE=C3D8R, ELSET=SPDSK1

21001, 21001, 21002, 21022, 21021, 21301,
 21302, 21322, 21321
 21012, 21012, 21013, 21033, 21032, 21312,
 21313, 21333, 21332
 21021, 21021, 21022, 21042, 21041, 21321,
 21322, 21342, 21341
 21027, 21027, 21028, 21048, 21047, 21327,
 21328, 21348, 21347
 21032, 21032, 21033, 21053, 21052, 21332,
 21333, 21353, 21352
 21068, 21068, 21069, 21089, 21088, 21368,
 21369, 21389, 21388
 21037, 21037, 21038, 21058, 21057, 21337,
 21338, 21358, 21357
 21082, 21082, 21083, 21103, 21102, 21382,
 21383, 21403, 21402
 21097, 21097, 21098, 21118, 21117, 21397,
 21398, 21418, 21417
 21123, 21123, 21124, 21144, 21143, 21423,
 21424, 21444, 21443
 21133, 21133, 21134, 21154, 21153, 21433,
 21434, 21454, 21453
 21144, 21144, 21145, 21165, 21164, 21444,
 21445, 21465, 21464
 21153, 21153, 21154, 21174, 21173, 21453,
 21454, 21474, 21473
 21165, 21165, 21166, 21186, 21185, 21465,
 21466, 21486, 21485
 21173, 21173, 21174, 21194, 21193, 21473,
 21474, 21494, 21493
 21186, 21186, 21187, 21207, 21206, 21486,
 21487, 21507, 21506
 21207, 21207, 21208, 21228, 21227, 21507,
 21508, 21528, 21527

*ELGEN, ELSET=SPDSK1

21001, 7, 1, 1
 21012, 7, 1, 1
 21021, 2, 1, 1, 3, 20, 20
 21027, 8, 20, 20
 21032, 8, 20, 20
 21068, 4, 1, 1
 21037, 2, 1, 1, 3, 20, 20
 21082, 2, 20, 20
 21097, 2, 20, 20
 21123, 4, 1, 1
 21133, 4, 1, 1
 21144, 3, 1, 1
 21153, 3, 1, 1
 21165, 2, 1, 1
 21173, 2, 1, 1
 21186, 8, 1, 1
 21207, 6, 1, 1

**

*ELEMENT, TYPE=C3D6, ELSET=SPDSK1

21081, 21081, 21082, 21102, 21381, 21382,
 21402
 21122, 21122, 21123, 21143, 21422, 21423,
 21443
 21143, 21143, 21144, 21164, 21443, 21444,
 21464
 21164, 21164, 21165, 21185, 21464, 21465,
 21485
 21185, 21185, 21186, 21206, 21485, 21486,
 21506

21206, 21206, 21207, 21227, 21506, 21507,
 21527
 21098, 21098, 21099, 21118, 21398, 21399,
 21418
 21137, 21137, 21138, 21157, 21437, 21438,
 21457
 21156, 21156, 21157, 21176, 21456, 21457,
 21476
 21175, 21175, 21176, 21195, 21475, 21476,
 21495
 21194, 21194, 21195, 21214, 21494, 21495,
 21514
 21213, 21213, 21214, 21233, 21513, 21514,
 21533

**

*ELEMENT, TYPE=C3D8R, ELSET=SPRNG1A

20951, 20719, 20951, 20952, 20739, 21019,
 21251, 21252, 21039
 20952, 20739, 20952, 20953, 20759, 21039,
 21252, 21253, 21059
 20953, 20759, 20953, 20954, 20779, 21059,
 21253, 21254, 21079
 20954, 20779, 20954, 20955, 20799, 21079,
 21254, 21255, 21099
 20955, 20799, 20955, 20956, 20818, 21099,
 21255, 21256, 21118
 20956, 20818, 20956, 20957, 20838, 21118,
 21256, 21257, 21138
 20957, 20838, 20957, 20958, 20857, 21138,
 21257, 21258, 21157
 20958, 20857, 20958, 20959, 20876, 21157,
 21258, 21259, 21176
 20959, 20876, 20959, 20960, 20895, 21176,
 21259, 21260, 21195
 20960, 20895, 20960, 20961, 20914, 21195,
 21260, 21261, 21214
 20961, 20914, 20961, 20962, 20933, 21214,
 21261, 21262, 21233
 20962, 20933, 20962, 20963, 20932, 21233,
 21262, 21263, 21232
 20963, 20932, 20963, 20964, 20931, 21232,
 21263, 21264, 21231
 20964, 20931, 20964, 20965, 20930, 21231,
 21264, 21265, 21230
 20965, 20930, 20965, 20966, 20929, 21230,
 21265, 21266, 21229
 20966, 20929, 20966, 20967, 20928, 21229,
 21266, 21267, 21228
 20967, 20928, 20967, 20968, 20927, 21228,
 21267, 21268, 21227
 20968, 20927, 20968, 20969, 20906, 21227,
 21268, 21269, 21206
 20969, 20906, 20969, 20970, 20885, 21206,
 21269, 21270, 21185
 20970, 20885, 20970, 20971, 20864, 21185,
 21270, 21271, 21164
 20971, 20864, 20971, 20972, 20843, 21164,
 21271, 21272, 21143
 20972, 20843, 20972, 20973, 20822, 21143,
 21272, 21273, 21122
 20973, 20822, 20973, 20974, 20802, 21122,
 21273, 21274, 21102
 20974, 20802, 20974, 20975, 20781, 21102,
 21274, 21275, 21081
 20975, 20781, 20975, 20976, 20761, 21081,
 21275, 21276, 21061
 20976, 20761, 20976, 20977, 20741, 21061,
 21276, 21277, 21041

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20977, 20741, 20977, 20978, 20721, 21041,
21277, 21278, 21021
20978, 20721, 20978, 20979, 20701, 21021,
21278, 21279, 21001
*ELCOPY,OLD SET=SPRNG1A,NEW
SET=SPRNG1B,ELEMENT SH=300,SHIFT NOD=300
*ELCOPY,OLD SET=SPRNG1B,NEW
SET=SPRNG1C,ELEMENT SH=300,SHIFT NOD=300
*ELSET, ELSET=SP1
SPDSK1, SPRNG1A, SPRNG1B, SPRNG1C
*SOLID SECTION, ELSET=SP1, MATERIAL=S216A
*****
** SPACER DISK 2
*****
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP1DSK,NEW SET=SP2DSK
0.0, 0.0, 20.875
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP1RNG,NEW SET=SP2RNG
0.0, 0.0, 20.875
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=SP2
SP2DSK,SP2RNG
*ELCOPY,OLD SET=SP1,NEW SET=SP2,ELEMENT
SH=1500,SHIFT NOD=1500
*SOLID SECTION, ELSET=SP2, MATERIAL=S216A
*****
** SPACER DISK 3
*****
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP2DSK,NEW SET=SP3DSK
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP2RNG,NEW SET=SP3RNG
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=SP3
SP3DSK,SP3RNG
*ELCOPY,OLD SET=SP2,NEW SET=SP3,ELEMENT
SH=1500,SHIFT NOD=1500
*SOLID SECTION, ELSET=SP3, MATERIAL=S216A
*****
** SPACER DISK 4
*****
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP3DSK,NEW SET=SP4DSK
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP3RNG,NEW SET=SP4RNG
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=SP4
SP4DSK,SP4RNG
*ELCOPY,OLD SET=SP3,NEW SET=SP4,ELEMENT
SH=1500,SHIFT NOD=1500
*SOLID SECTION, ELSET=SP4, MATERIAL=S216A
*****
** SPACER DISK 5
*****
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP4DSK,NEW SET=SP5DSK
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP4RNG,NEW SET=SP5RNG
0.0, 0.0, 18.5625

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```

0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=SP5
SP5DSK,SP5RNG
*ELCOPY,OLD SET=SP4,NEW SET=SP5,ELEMENT
SH=1500,SHIFT NOD=1500
*SOLID SECTION, ELSET=SP5, MATERIAL=S216A
*****
** SPACER DISK 6
*****
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP5DSK,NEW SET=SP6DSK
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP5RNG,NEW SET=SP6RNG
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=SP6
SP6DSK,SP6RNG
*ELCOPY,OLD SET=SP5,NEW SET=SP6,ELEMENT
SH=1500,SHIFT NOD=1500
*SOLID SECTION, ELSET=SP6, MATERIAL=S216A
*****
** SPACER DISK 7
*****
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP6DSK,NEW SET=SP7DSK
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP6RNG,NEW SET=SP7RNG
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=SP7
SP7DSK,SP7RNG
*ELCOPY,OLD SET=SP6,NEW SET=SP7,ELEMENT
SH=1500,SHIFT NOD=1500
*SOLID SECTION, ELSET=SP7, MATERIAL=S216A
*****
** SPACER DISK 8
*****
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP7DSK,NEW SET=SP8DSK
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP7RNG,NEW SET=SP8RNG
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=SP8
SP8DSK,SP8RNG
*ELCOPY,OLD SET=SP7,NEW SET=SP8,ELEMENT
SH=1500,SHIFT NOD=1500
*SOLID SECTION, ELSET=SP8, MATERIAL=S216A
*****
** SPACER DISK 9
*****
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP8DSK,NEW SET=SP9DSK
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP8RNG,NEW SET=SP9RNG
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=SP9
SP9DSK,SP9RNG
*ELCOPY,OLD SET=SP8,NEW SET=SP9,ELEMENT
SH=1500,SHIFT NOD=1500

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*SOLID SECTION, ELSET=SP9, MATERIAL=S216A
*****
** TOP PLATE
*****
*NCOPY,SHIFT,CHANGE NU=+12900,OLD
SET=SPDSK1Y,NEW SET=TOP1
0.0, 0.0, 160.3125
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+12900,OLD
SET=SPRNG1A,NEW SET=TOP1
0.0, 0.0, 160.3125
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+300,OLD SET=TOP1,NEW
SET=TOP2
0.0, 0.0, 0.50
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=TOP
TOP1, TOP2
*ELCOPY,OLD SET=SPDSK1,NEW SET=TOP,ELEMENT
SH=12900,SHIFT NOD=12900
*SOLID SECTION, ELSET=TOP, MATERIAL=S216A
*****
*NSET, NSET=SPDSK
SP1,SP2,SP3,SP4,SP5,SP6,SP7,SP8,SP9,TOP
*ELSET, ELSET=SPDSK
SP1,SP2,SP3,SP4,SP5,SP6,SP7,SP8,SP9,TOP
*****
** FUEL CELL CHANNEL - HALF
*****
*NSET, NSET=FCHBS, GENERATE
21008, 21068, 20
21068, 21072, 1
21012, 21072, 20
** BASE END PLATE (1-IN. THICK)
*NCOPY,SHIFT,CHANGE NU=-300,OLD SET=FCHBS,NEW
SET=FCHBET
0.0, 0.0, -2.1875
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FCHBETL1
20708, 20728, 20748
*NSET, NSET=FCHBETL2
20712, 20732, 20752
*NSET, NSET=FCHBET
FCHBETL1, FCHBETL2, 4, 1
*NCOPY,SHIFT,CHANGE NU=-300,OLD
SET=FCHBET,NEW SET=FCHBEB
0.0, 0.0, -1.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
** SPACER DISK 1-2
*NCOPY,SHIFT,CHANGE NU=600,OLD SET=FCHBS,NEW
SET=FCHSP11
0.0, 0.0, 4.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD
SET=FCHSP11,NEW SET=FCHSP12
0.0, 0.0, 6.9375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD
SET=FCHSP12,NEW SET=FCHSP13
0.0, 0.0, 6.9375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
** SPACER DISK 2-3
*NCOPY,SHIFT,CHANGE NU=900,OLD
SET=FCHSP13,NEW SET=FCHSP21
0.0, 0.0, 7.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD
SET=FCHSP21,NEW SET=FCHSP22
0.0, 0.0, 5.7813

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0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD
SET=FCHSP22,NEW SET=FCHSP23
0.0, 0.0, 5.7813
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FCHSP2M
FCHSP21, FCHSP22, FCHSP23
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCHSP2M,NEW SET=FCHSP3M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCHSP3M,NEW SET=FCHSP4M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCHSP4M,NEW SET=FCHSP5M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCHSP5M,NEW SET=FCHSP6M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCHSP6M,NEW SET=FCHSP7M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCHSP7M,NEW SET=FCHSP8M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
**
** 9.5 IN. TO TOP
*NSET, NSET=FCHTS, GENERATE
33308, 33368, 20
33368, 33372, 1
33312, 33372, 20
*NCOPY,SHIFT,CHANGE NU=300,OLD SET=FCHTS,NEW
SET=FCHT1
0.0, 0.0, 3.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FCH
FCHBET, FCHBEB, FCHSP11, FCHSP12, FCHSP13
FCHSP2M, FCHSP3M, FCHSP4M, FCHSP5M, FCHSP6M, FCHSP
7M, FCHSP8M, FCHT1
*****
*ELEMENT, TYPE=C3D8R, ELSET=FCHBE
20408, 20408, 20409, 20429, 20428, 20708,
20709, 20729, 20728
*ELGEN, ELSET=FCHBE
20408, 4, 1, 1, 3, 20, 20
*SOLID SECTION, ELSET=FCHBE, MATERIAL=S304B
*ELEMENT, TYPE=S4R, ELSET=FCH01
20708, 20708, 20728, 21028, 21008
20728, 20768, 20769, 21069, 21068
20748, 20712, 21012, 21032, 20732
*ELGEN, ELSET=FCH01
20708, 3, 20, 1
20728, 4, 1, 1
20748, 3, 20, 1
** 1-2
*ELEMENT, TYPE=S4R
21008, 21008, 21028, 21328, 21308
21028, 21068, 21069, 21369, 21368
21048, 21012, 21312, 21332, 21032
*ELGEN, ELSET=FCH12A
21008, 3, 20, 1
21028, 4, 1, 1
21048, 3, 20, 1

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*ELCOPY,OLD SET=FCH12A,NEW SET=FCH12B,ELEMENT
SH=300,SHIFT NOD=300
*ELCOPY,OLD SET=FCH12B,NEW SET=FCH12C,ELEMENT
SH=300,SHIFT NOD=300
*ELCOPY,OLD SET=FCH12C,NEW SET=FCH12D,ELEMENT
SH=300,SHIFT NOD=300
*ELCOPY,OLD SET=FCH12D,NEW SET=FCH12E,ELEMENT
SH=300,SHIFT NOD=300
*ELSET, ELSET=FCH12R
FCH12A, FCH12C, FCH12D
*ELSET, ELSET=FCH12S
FCH12B, FCH12E
*ELSET, ELSET=FCH12
FCH12R, FCH12S
** 2-3
*ELCOPY,OLD SET=FCH12R,NEW SET=FCH23R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCH12S,NEW SET=FCH23S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCH23
FCH23R, FCH23S
** 3-4
*ELCOPY,OLD SET=FCH23R,NEW SET=FCH34R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCH23S,NEW SET=FCH34S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCH34
FCH34R, FCH34S
** 4-5
*ELCOPY,OLD SET=FCH34R,NEW SET=FCH45R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCH34S,NEW SET=FCH45S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCH45
FCH45R, FCH45S
** 5-6
*ELCOPY,OLD SET=FCH45R,NEW SET=FCH56R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCH45S,NEW SET=FCH56S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCH56
FCH56R, FCH56S
** 6-7
*ELCOPY,OLD SET=FCH56R,NEW SET=FCH67R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCH56S,NEW SET=FCH67S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCH67
FCH67R, FCH67S
** 7-8
*ELCOPY,OLD SET=FCH67R,NEW SET=FCH78R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCH67S,NEW SET=FCH78S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCH78
FCH78R, FCH78S
** 8-9
*ELCOPY,OLD SET=FCH78R,NEW SET=FCH89R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCH78S,NEW SET=FCH89S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCH89
FCH89R, FCH89S
** 9-TOP
*ELEMENT, TYPE=S4R
33008, 33008, 33028, 33328, 33308
33028, 33068, 33069, 33369, 33368
33048, 33012, 33312, 33332, 33032
*ELGEN, ELSET=FCHTOPR1

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33008, 3, 20, 1
33028, 4, 1, 1
33048, 3, 20, 1
*ELCOPY,OLD SET=FCHTOPR1,NEW
SET=FCHTOPS,ELEMENT SH=300,SHIFT NOD=300
*ELCOPY,OLD SET=FCHTOPS,NEW
SET=FCHTOPR2,ELEMENT SH=300,SHIFT NOD=300
*ELCOPY,OLD SET=FCHTOPR2,NEW
SET=FCHTOPR3,ELEMENT SH=300,SHIFT NOD=300
*ELSET, ELSET=FCHTOPR
FCHTOPR1, FCHTOPR2, FCHTOPR3
*ELSET, ELSET=FCHTOP
FCHTOPR, FCHTOPS
**
*ELSET, ELSET=FCHR
FCH01, FCH12R, FCH23R, FCH34R, FCH45R, FCH56R, FCH6
7R, FCH78R, FCH89R, FCHTOPR
*ELSET, ELSET=FCHS
FCH12S, FCH23S, FCH34S, FCH45S, FCH56S, FCH67S, FCH
78S, FCH89S, FCHTOPS
*SHELL SECTION, ELSET=FCHR, MATERIAL=S304B
0.0747
*SHELL SECTION, ELSET=FCHS, MATERIAL=S304B
0.1494
*ELSET, ELSET=FCH
FCHBE, FCHE, FCHE
*****
** FUEL CELL CHANNEL - FULL A
*****
*NSET, NSET=FCABS, GENERATE
21023, 21027, 1
21023, 21123, 20
21123, 21127, 1
21027, 21127, 20
** BASE END PLATE (1-IN. THICK)
*NCOPY,SHIFT,CHANGE NU=-300,OLD SET=FCABS,NEW
SET=FCABET
0.0, 0.0, -2.1875
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FCABETL1
20743, 20763, 20783, 20803
*NSET, NSET=FCABETL2
20747, 20767, 20787, 20807
*NFILL, NSET=FCABET
FCABETL1, FCABETL2, 4, 1
*NCOPY,SHIFT,CHANGE NU=-300,OLD
SET=FCABET,NEW SET=FCABEB
0.0, 0.0, -1.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
** SPACER DISK 1-2
*NCOPY,SHIFT,CHANGE NU=600,OLD SET=FCABS,NEW
SET=FCASP11
0.0, 0.0, 4.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD
SET=FCASP11,NEW SET=FCASP12
0.0, 0.0, 6.9375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD
SET=FCASP12,NEW SET=FCASP13
0.0, 0.0, 6.9375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
** SPACER DISK 2-3
*NCOPY,SHIFT,CHANGE NU=900,OLD
SET=FCASP13,NEW SET=FCASP21
0.0, 0.0, 7.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD
SET=FCASP21,NEW SET=FCASP22

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0.0, 0.0, 5.7813
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD
SET=FCASP22,NEW SET=FCASP23
0.0, 0.0, 5.7812
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FCASP2M
FCASP21, FCASP22, FCASP23
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCASP2M,NEW SET=FCASP3M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCASP3M,NEW SET=FCASP4M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCASP4M,NEW SET=FCASP5M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCASP5M,NEW SET=FCASP6M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCASP6M,NEW SET=FCASP7M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCASP7M,NEW SET=FCASP8M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
**
** 9.5 IN. TO TOP
*NSET, NSET=FCATS, GENERATE
33323, 33327, 1
33323, 33423, 20
33423, 33427, 1
33327, 33427, 20
*NCOPY,SHIFT,CHANGE NU=300,OLD SET=FCATS,NEW
SET=FCAT1
0.0, 0.0, 3.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FCA
FCABET,FCABEB,FCASP11,FCASP12,FCASP13
FCASP2M,FCASP3M,FCASP4M,FCASP5M,FCASP6M,FCASP
7M,FCASP8M,FCAT1
*****
*ELEMENT, TYPE=C3D8R, ELSET=FCABE
20423, 20423, 20424, 20444, 20443, 20723,
20724, 20744, 20743
*ELGEN, ELSET=FCABE
20423, 4, 1, 1, 5, 20, 20
*SOLID SECTION, ELSET=FCABE, MATERIAL=S304A
*ELEMENT, TYPE=S4R, ELSET=FCA01
20723, 20723, 21023, 21024, 20724
20743, 20723, 20743, 21043, 21023
20763, 20803, 20823, 21123, 21103
20764, 20727, 21027, 21047, 20747
20783, 20787, 21087, 21107, 20807
20803, 20823, 20824, 21124, 21123
*ELGEN, ELSET=FCA01
20723, 4, 1, 1
20743, 4, 20, 1
20764, 3, 20, 1
20783, 2, 20, 1
20803, 4, 1, 1
** 1-2
*ELEMENT, TYPE=S4R, ELSET=FCA12A

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21023, 21023, 21323, 21324, 21024
21043, 21023, 21043, 21343, 21323
21063, 21103, 21123, 21423, 21403
21064, 21027, 21327, 21347, 21047
21083, 21087, 21387, 21407, 21107
21103, 21123, 21124, 21424, 21423
*ELGEN, ELSET=FCA12A
21023, 4, 1, 1
21043, 4, 20, 1
21064, 3, 20, 1
21083, 2, 20, 1
21103, 4, 1, 1
*ELCOPY,OLD SET=FCA12A,NEW SET=FCA12B,ELEMENT
SH=300,SHIFT NOD=300
*ELCOPY,OLD SET=FCA12B,NEW SET=FCA12C,ELEMENT
SH=300,SHIFT NOD=300
*ELCOPY,OLD SET=FCA12C,NEW SET=FCA12D,ELEMENT
SH=300,SHIFT NOD=300
*ELCOPY,OLD SET=FCA12D,NEW SET=FCA12E,ELEMENT
SH=300,SHIFT NOD=300
*ELSET, ELSET=FCA12R
FCA12A, FCA12C, FCA12D
*ELSET, ELSET=FCA12S
FCA12B, FCA12E
*ELSET, ELSET=FCA12
FCA12R, FCA12S
** 2-3
*ELCOPY,OLD SET=FCA12R,NEW SET=FCA23R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCA12S,NEW SET=FCA23S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCA23
FCA23R, FCA23S
** 3-4
*ELCOPY,OLD SET=FCA23R,NEW SET=FCA34R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCA23S,NEW SET=FCA34S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCA34
FCA34R, FCA34S
** 4-5
*ELCOPY,OLD SET=FCA34R,NEW SET=FCA45R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCA34S,NEW SET=FCA45S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCA45
FCA45R, FCA45S
** 5-6
*ELCOPY,OLD SET=FCA45R,NEW SET=FCA56R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCA45S,NEW SET=FCA56S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCA56
FCA56R, FCA56S
** 6-7
*ELCOPY,OLD SET=FCA56R,NEW SET=FCA67R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCA56S,NEW SET=FCA67S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCA67
FCA67R, FCA67S
** 7-8
*ELCOPY,OLD SET=FCA67R,NEW SET=FCA78R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCA67S,NEW SET=FCA78S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCA78
FCA78R, FCA78S
** 8-9

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*ELCOPY,OLD SET=FCA78R,NEW SET=FCA89R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCA78S,NEW SET=FCA89S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCA89
FCA89R, FCA89S
** 9-TOP
*ELEMENT, TYPE=S4R, ELSET=FCATOPR1
33023, 33023, 33323, 33324, 33024
33043, 33023, 33043, 33343, 33323
33063, 33103, 33123, 33423, 33403
33064, 33027, 33327, 33347, 33047
33083, 33087, 33387, 33407, 33107
33103, 33123, 33124, 33424, 33423
*ELGEN, ELSET=FCATOPR1
33023, 4, 1, 1
33043, 4, 20, 1
33064, 3, 20, 1
33083, 2, 20, 1
33103, 4, 1, 1
*ELCOPY,OLD SET=FCATOPR1,NEW
SET=FCATOPS,ELEMENT SH=300,SHIFT NOD=300
*ELCOPY,OLD SET=FCATOPS,NEW
SET=FCATOPR2,ELEMENT SH=300,SHIFT NOD=300
*ELCOPY,OLD SET=FCATOPR2,NEW
SET=FCATOPR3,ELEMENT SH=300,SHIFT NOD=300
*ELSET, ELSET=FCATOPR
FCATOPR1, FCATOPR2, FCATOPR3
*ELSET, ELSET=FCATOP
FCATOPR, FCATOPS
**
*ELSET, ELSET=FCAR
FCA01,FCA12R,FCA23R,FCA34R,FCA45R,FCA56R,FCA6
7R,FCA78R,FCA89R,FCATOPR
*ELSET, ELSET=FCAS
FCA12S,FCA23S,FCA34S,FCA45S,FCA56S,FCA67S,FCA
78S,FCA89S,FCATOPS
*SHELL SECTION, ELSET=FCAR, MATERIAL=S304A
0.0747
*SHELL SECTION, ELSET=FCAS, MATERIAL=S304A
0.1494
*ELSET, ELSET=FCA
FCABE,FCAR,FCAS
*****
** FUEL CELL CHANNEL - FULL B
*****
*NSET, NSET=FCBBS, GENERATE
21088, 21092, 1
21088, 21188, 20
21188, 21192, 1
21092, 21192, 20
** BASE END PLATE (1-IN. THICK)
*NCOPY,SHIFT,CHANGE NU=-300,OLD SET=FCBBS,NEW
SET=FCBBET
0.0, 0.0, -2.1875
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FCBBETL1
20808, 20828, 20848, 20868
*NSET, NSET=FCBBETL2
20812, 20832, 20852, 20872
*NFILL, NSET=FCBBET
FCBBETL1, FCBBETL2, 4, 1
*NCOPY,SHIFT,CHANGE NU=-300,OLD
SET=FCBBET,NEW SET=FCBBEB
0.0, 0.0, -1.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
** SPACER DISK 1-2
*NCOPY,SHIFT,CHANGE NU=600,OLD SET=FCBBS,NEW
SET=FCBSP11

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0.0, 0.0, 4.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD
SET=FCBSP11,NEW SET=FCBSP12
0.0, 0.0, 6.9375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD
SET=FCBSP12,NEW SET=FCBSP13
0.0, 0.0, 6.9375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
** SPACER DISK 2-3
*NCOPY,SHIFT,CHANGE NU=900,OLD
SET=FCBSP13,NEW SET=FCBSP21
0.0, 0.0, 7.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD
SET=FCBSP21,NEW SET=FCBSP22
0.0, 0.0, 5.7813
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD
SET=FCBSP22,NEW SET=FCBSP23
0.0, 0.0, 5.7812
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FCBSP2M
FCBSP21, FCBSP22, FCBSP23
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCBSP2M,NEW SET=FCBSP3M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCBSP3M,NEW SET=FCBSP4M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCBSP4M,NEW SET=FCBSP5M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCBSP5M,NEW SET=FCBSP6M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCBSP6M,NEW SET=FCBSP7M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCBSP7M,NEW SET=FCBSP8M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
**
** 9.5 IN. TO TOP
*NSET, NSET=FCBTS, GENERATE
33388, 33392, 1
33388, 33488, 20
33488, 33492, 1
33392, 33492, 20
*NCOPY,SHIFT,CHANGE NU=300,OLD SET=FCBTS,NEW
SET=FCBT1
0.0, 0.0, 3.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FCB
FCBBET,FCBBEB,FCBSP11,FCBSP12,FCBSP13
FCBSP2M,FCBSP3M,FCBSP4M,FCBSP5M,FCBSP6M,FCBSP
7M,FCBSP8M,FCBT1
****
*ELEMENT, TYPE=C3D8R, ELSET=FCBBE
20488, 20488, 20489, 20509, 20508, 20788,
20789, 20809, 20808
*ELGEN, ELSET=FCBBE

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20488, 4, 1, 1, 5, 20, 20
*SOLID SECTION, ELSET=FCBBE, MATERIAL=S304B
*ELEMENT, TYPE=S4R, ELSET=FCB01
20788, 20788, 21088, 21089, 20789
20808, 20788, 20808, 21108, 21088
20828, 20868, 20888, 21188, 21168
20829, 20792, 21092, 21112, 20812
20848, 20852, 21152, 21172, 20872
20868, 20888, 20889, 21189, 21188
*ELGEN, ELSET=FCB01
20788, 4, 1, 1
20808, 4, 20, 1
20829, 3, 20, 1
20848, 2, 20, 1
20868, 4, 1, 1
** 1-2
*ELEMENT, TYPE=S4R, ELSET=FCB12A
21088, 21088, 21388, 21389, 21089
21108, 21088, 21108, 21408, 21388
21128, 21168, 21188, 21488, 21468
21129, 21092, 21392, 21412, 21112
21148, 21152, 21452, 21472, 21172
21168, 21188, 21189, 21489, 21488
*ELGEN, ELSET=FCB12A
21088, 4, 1, 1
21108, 4, 20, 1
21129, 3, 20, 1
21148, 2, 20, 1
21168, 4, 1, 1
*ELCOPY, OLD SET=FCB12A, NEW SET=FCB12B, ELEMENT
SH=300, SHIFT NOD=300
*ELCOPY, OLD SET=FCB12B, NEW SET=FCB12C, ELEMENT
SH=300, SHIFT NOD=300
*ELCOPY, OLD SET=FCB12C, NEW SET=FCB12D, ELEMENT
SH=300, SHIFT NOD=300
*ELCOPY, OLD SET=FCB12D, NEW SET=FCB12E, ELEMENT
SH=300, SHIFT NOD=300
*ELSET, ELSET=FCB12R
FCB12A, FCB12C, FCB12D
*ELSET, ELSET=FCB12S
FCB12B, FCB12E
*ELSET, ELSET=FCB12
FCB12R, FCB12S
** 2-3
*ELCOPY, OLD SET=FCB12R, NEW SET=FCB23R, ELEMENT
SH=1500, SHIFT NOD=1500
*ELCOPY, OLD SET=FCB12S, NEW SET=FCB23S, ELEMENT
SH=1500, SHIFT NOD=1500
*ELSET, ELSET=FCB23
FCB23R, FCB23S
** 3-4
*ELCOPY, OLD SET=FCB23R, NEW SET=FCB34R, ELEMENT
SH=1500, SHIFT NOD=1500
*ELCOPY, OLD SET=FCB23S, NEW SET=FCB34S, ELEMENT
SH=1500, SHIFT NOD=1500
*ELSET, ELSET=FCB34
FCB34R, FCB34S
** 4-5
*ELCOPY, OLD SET=FCB34R, NEW SET=FCB45R, ELEMENT
SH=1500, SHIFT NOD=1500
*ELCOPY, OLD SET=FCB34S, NEW SET=FCB45S, ELEMENT
SH=1500, SHIFT NOD=1500
*ELSET, ELSET=FCB45
FCB45R, FCB45S
** 5-6
*ELCOPY, OLD SET=FCB45R, NEW SET=FCB56R, ELEMENT
SH=1500, SHIFT NOD=1500
*ELCOPY, OLD SET=FCB45S, NEW SET=FCB56S, ELEMENT
SH=1500, SHIFT NOD=1500
*ELSET, ELSET=FCB56
FCB56R, FCB56S
** 6-7
*ELCOPY, OLD SET=FCB56R, NEW SET=FCB67R, ELEMENT
SH=1500, SHIFT NOD=1500
*ELCOPY, OLD SET=FCB56S, NEW SET=FCB67S, ELEMENT
SH=1500, SHIFT NOD=1500
*ELSET, ELSET=FCB67
FCB67R, FCB67S
** 7-8
*ELCOPY, OLD SET=FCB67R, NEW SET=FCB78R, ELEMENT
SH=1500, SHIFT NOD=1500
*ELCOPY, OLD SET=FCB67S, NEW SET=FCB78S, ELEMENT
SH=1500, SHIFT NOD=1500
*ELSET, ELSET=FCB78
FCB78R, FCB78S
** 8-9
*ELCOPY, OLD SET=FCB78R, NEW SET=FCB89R, ELEMENT
SH=1500, SHIFT NOD=1500
*ELCOPY, OLD SET=FCB78S, NEW SET=FCB89S, ELEMENT
SH=1500, SHIFT NOD=1500
*ELSET, ELSET=FCB89
FCB89R, FCB89S
** 9-TOP
*ELEMENT, TYPE=S4R, ELSET=FCBTOPR1
33088, 33088, 33388, 33389, 33089
33108, 33088, 33108, 33408, 33388
33128, 33168, 33188, 33488, 33468
33129, 33092, 33392, 33412, 33112
33148, 33152, 33452, 33472, 33172
33168, 33188, 33189, 33489, 33488
*ELGEN, ELSET=FCBTOPR1
33088, 4, 1, 1
33108, 4, 20, 1
33129, 3, 20, 1
33148, 2, 20, 1
33168, 4, 1, 1
*ELCOPY, OLD SET=FCBTOPR1, NEW
SET=FCBTOPS, ELEMENT SH=300, SHIFT NOD=300
*ELCOPY, OLD SET=FCBTOPS, NEW
SET=FCBTOPR2, ELEMENT SH=300, SHIFT NOD=300
*ELCOPY, OLD SET=FCBTOPR2, NEW
SET=FCBTOPR3, ELEMENT SH=300, SHIFT NOD=300
*ELSET, ELSET=FCBTOPR
FCBTOPR1, FCBTOPR2, FCBTOPR3
*ELSET, ELSET=FCBTOP
FCBTOPR, FCBTOPS
**
*ELSET, ELSET=FCBR
FCB01, FCB12R, FCB23R, FCB34R, FCB45R, FCB56R, FCB6
7R, FCB78R, FCB89R, FCBTOPR
*ELSET, ELSET=FCBS
FCB12S, FCB23S, FCB34S, FCB45S, FCB56S, FCB67S, FCB
78S, FCB89S, FCBTOPS
*SHELL SECTION, ELSET=FCBR, MATERIAL=S304B
0.0747
*SHELL SECTION, ELSET=FCBS, MATERIAL=S304B
0.1494
*ELSET, ELSET=FCB
FCBBE, FCBR, FCBS
*****
** FUEL CELL CHANNEL - FULL C
*****
*NCOPY, SHIFT, CHANGE NU=10, OLD SET=FCA, NEW
SET=FCC
20.6, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*ELCOPY, OLD SET=FCABE, NEW SET=FCCBE, ELEMENT
SH=10, SHIFT NOD=10

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*ELCOPY,OLD SET=FCAR,NEW SET=FCCR,ELEMENT
SH=10,SHIFT NOD=10
*ELCOPY,OLD SET=FCAS,NEW SET=FCCS,ELEMENT
SH=10,SHIFT NOD=10
*SOLID SECTION, ELSET=FCCBE, MATERIAL=S304B
*SHELL SECTION, ELSET=FCCR, MATERIAL=S304B
0.0747
*SHELL SECTION, ELSET=FCCS, MATERIAL=S304B
0.1494
*ELSET, ELSET=FCC
FCCR,FCCS,FCCBE
*****
** TIE RODS
*****
*NSET, NSET=TRODBS, GENERATE
21145, 21155, 10
** BOTTOM
*NCOPY,SHIFT,CHANGE NU=-600,OLD
SET=TRODBS,NEW SET=TRODBM
0.0, 0.0, -3.3125
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD SET=TRODBM,NEW
SET=TROD0
0.0, 0.0, 1.125
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
** 1-2
*NCOPY,SHIFT,CHANGE NU=600,OLD SET=TRODBS,NEW
SET=TROD11
0.0, 0.0, 4.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD SET=TROD11,NEW
SET=TROD12
0.0, 0.0, 6.9375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD SET=TROD12,NEW
SET=TROD13
0.0, 0.0, 6.9375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
** 2-3
*NCOPY,SHIFT,CHANGE NU=900,OLD SET=TROD13,NEW
SET=TROD21
0.0, 0.0, 7.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD SET=TROD21,NEW
SET=TROD22
0.0, 0.0, 5.7813
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD SET=TROD22,NEW
SET=TROD23
0.0, 0.0, 5.7812
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=TROD2M
TROD21, TROD22, TROD23
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=TROD2M,NEW SET=TROD3M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=TROD3M,NEW SET=TROD4M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=TROD4M,NEW SET=TROD5M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=TROD5M,NEW SET=TROD6M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
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*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=TROD6M,NEW SET=TROD7M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=TROD7M,NEW SET=TROD8M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
**
** 4.25 IN. ABOVE TOP PLATE
*NSET, NSET=TRODTS, GENERATE
33445, 33455, 10
*NCOPY,SHIFT,CHANGE NU=300,OLD SET=TRODTS,NEW
SET=TRODT1
0.0, 0.0, 3.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=900,OLD SET=TRODT1,NEW
SET=TRODT2
0.0, 0.0, 11.36
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=TROD
TRODBM, TROD0, TROD11, TROD12, TROD13
TROD2M, TROD3M, TROD4M, TROD5M, TROD6M, TROD7M, TRO
D8M, TRODT1, TRODT2
*****
*ELEMENT, TYPE=B31, ELSET=TROD
20545, 20545, 20845
20555, 20555, 20855
20786, 20845, 21145
20796, 20855, 21155
*ELGEN, ELSET=TROD
20786, 46, 300, 300
20796, 46, 300, 300
*BEAM SECTION, SECTION=CIRC, ELSET=TROD,
MATERIAL=S216
1.125
1.0, 0.0, 0.0
*****
** BOTTOM FINS
*****
***** long fins
*NODE, NSET=BFLB1A
40001, 6.1250, 0.0000, -8.1250
40002, 8.0750, 0.0000, -8.1250
40003, 10.0250, 0.0000, -8.1250
40004, 11.9750, 0.0000, -8.1250
40005, 13.9250, 0.0000, -8.1250
40006, 15.8750, 0.0000, -8.1250
40007, 17.2975, 0.0000, -8.1250
40008, 18.7500, 0.0000, -8.1250
40009, 19.2800, 0.0000, -8.1250
*NCOPY,SHIFT,CHANGE NU=20,OLD SET=BFLB1A,NEW
SET=BFLB1B
0.0, 0., 1.625
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=20,OLD SET=BFLB1B,NEW
SET=BFLB1C
0.0, 0., 1.625
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=20,OLD SET=BFLB1C,NEW
SET=BFLB1D
0.0, 0., 1.625
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=20,OLD SET=BFLB1D,NEW
SET=BFLB1E
0.0, 0., 1.625
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=20,OLD SET=BFLB1E,NEW
SET=BFLB1F
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*NCOPY,SHIFT,CHANGE NU=7,CHANGE NU=+400,OLD
SET=BFL3,NEW SET=BFL3ALL
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +22.50
*NSET, NSET=BFLG
BFL1, BFL2, BFL3, BFL4, BFL2ALL, BFL3ALL
**
*ELEMENT, TYPE=C3D8R
40001, 40001, 40002, 40402, 40401, 40021,
40022, 40422, 40421
40601, 40601, 40602, 40802, 40801, 40621,
40622, 40822, 40821
41001, 41001, 41002, 41202, 41201, 41021,
41022, 41222, 41221
41401, 41401, 41402, 41602, 41601, 41421,
41422, 41622, 41621
41801, 41801, 41802, 42002, 42001, 41821,
41822, 42022, 42021
42201, 42201, 42202, 42402, 42401, 42221,
42222, 42422, 42421
42601, 42601, 42602, 42802, 42801, 42621,
42622, 42822, 42821
43001, 43001, 43002, 43202, 43201, 43021,
43022, 43222, 43221
43401, 43401, 43402, 43602, 43601, 43421,
43422, 43622, 43621
*ELGEN, ELSET=BFLG1
40001, 14, 1, 1, 5, 20, 20
*ELGEN, ELSET=BFLG2
40601, 14, 1, 1, 5, 20, 20
*ELGEN, ELSET=BFLG3
41001, 14, 1, 1, 5, 20, 20
*ELGEN, ELSET=BFLG4
41401, 14, 1, 1, 5, 20, 20
*ELGEN, ELSET=BFLG5
41801, 14, 1, 1, 5, 20, 20
*ELGEN, ELSET=BFLG6
42201, 14, 1, 1, 5, 20, 20
*ELGEN, ELSET=BFLG7
42601, 14, 1, 1, 5, 20, 20
*ELGEN, ELSET=BFLG8
43001, 14, 1, 1, 5, 20, 20
*ELGEN, ELSET=BFLG9
43401, 14, 1, 1, 5, 20, 20
*ELSET, ELSET=BFLG
BFLG1,BFLG2,BFLG3,BFLG4,BFLG5,BFLG6,BFLG7,BFL
G8,BFLG9
**SOLID SECTION, ELSET=BFLG, MATERIAL=FIN
***** short fins
*NODE, NSET=BFSB1A
45001, 15.8750, 0.0000, -6.0000
45002, 17.2975, 0.0000, -6.0000
45003, 18.7500, 0.0000, -6.0000
45004, 19.2800, 0.0000, -6.0000
*NCOPY,SHIFT,CHANGE NU=10,OLD SET=BFSB1A,NEW
SET=BFSB1B
0.0, 0., 1.20
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=10,OLD SET=BFSB1B,NEW
SET=BFSB1C
0.0, 0., 1.20
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=10,OLD SET=BFSB1C,NEW
SET=BFSB1D
0.0, 0., 1.20
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=10,OLD SET=BFSB1D,NEW
SET=BFSB1E
0.0, 0., 1.20

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0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=10,OLD SET=BFSB1E,NEW
SET=BFSB1F
0.0, 0., 1.20
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NSET, NSET=BFSB1
BFSB1A,BFSB1B,BFSB1C,BFSB1D,BFSB1E,BFSB1F
*NODE, NSET=BFSC1
45005, 24.9900, 0.0000, -6.0000
45006, 30.7500, 0.0000, -6.0000
45007, 30.7500, 0.0000, -0.2800
45015, 24.2676, 0.0000, -4.6659
45016, 29.1966, 0.0000, -4.4206
45017, 29.4419, 0.0000, 0.4767
45025, 23.5593, 0.0000, -3.3579
45026, 27.6737, 0.0000, -2.8722
45027, 28.1594, 0.0000, 1.2186
45035, 22.8650, 0.0000, -2.0756
45036, 26.1806, 0.0000, -1.3541
45037, 26.9021, 0.0000, 1.9460
45045, 22.1842, 0.0000, -0.8184
45046, 24.7168, 0.0000, 0.1342
45047, 25.6694, 0.0000, 2.6591
45055, 21.5168, 0.0000, 0.4141
45056, 23.2817, 0.0000, 1.5933
45057, 24.4609, 0.0000, 3.3582
*NODE, NSET=BFSS1A
45008, 30.7500, 0.0000, 5.4400
45009, 30.7500, 0.0000, 7.2200
45010, 30.7500, 0.0000, 9.0000
*NCOPY,SHIFT,CHANGE NU=10,OLD SET=BFSS1A,NEW
SET=BFSS1B
-1.175, 0., 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=10,OLD SET=BFSS1B,NEW
SET=BFSS1C
-1.175, 0., 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=10,OLD SET=BFSS1C,NEW
SET=BFSS1D
-1.175, 0., 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=10,OLD SET=BFSS1D,NEW
SET=BFSS1E
-1.175, 0., 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=10,OLD SET=BFSS1E,NEW
SET=BFSS1F
-1.175, 0., 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NSET, NSET=BFSS1
BFSS1A,BFSS1B,BFSS1C,BFSS1D,BFSS1E,BFSS1F
*NSET, NSET=BFS1
BFSB1, BFSC1, BFSS1
*****
*NCOPY,SHIFT,CHANGE NU=100,OLD SET=BFS1,NEW
SET=BFS2
0.0, -0.75, 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=200,OLD SET=BFS1,NEW
SET=BFS3
0.0, +0.75, 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*****
*NCOPY,SHIFT,MULTIPLE=1,CHANGE NU=+200,OLD
SET=BFS2,NEW SET=BFS2A
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +11.25

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*NCOPY,SHIFT,MULTIPLE=1,CHANGE NU=+200,OLD
SET=BFS3,NEW SET=BFS3A
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +11.25
*NCOPY,SHIFT,MULTIPLE=7,CHANGE NU=+200,OLD
SET=BFS2A,NEW SET=BFS2ALL
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +22.50
*NCOPY,SHIFT,MULTIPLE=7,CHANGE NU=+200,OLD
SET=BFS3A,NEW SET=BFS3ALL
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +22.50
*NSET, NSET=BFST
BFS2A, BFS2ALL, BFS3A, BFS3ALL
**
*ELEMENT, TYPE=C3D8R
45301, 45301, 45302, 45402, 45401, 45311,
45312, 45412, 45411
45501, 45501, 45502, 45602, 45601, 45511,
45512, 45612, 45611
45701, 45701, 45702, 45802, 45801, 45711,
45712, 45812, 45811
45901, 45901, 45902, 46002, 46001, 45911,
45912, 46012, 46011
46101, 46101, 46102, 46202, 46201, 46111,
46112, 46212, 46211
46301, 46301, 46302, 46402, 46401, 46311,
46312, 46412, 46411
46501, 46501, 46502, 46602, 46601, 46511,
46512, 46612, 46611
46701, 46701, 46702, 46802, 46801, 46711,
46712, 46812, 46811
*ELGEN, ELSET=BFST1
45301, 9, 1, 1, 5, 10, 10
*ELGEN, ELSET=BFST2
45501, 9, 1, 1, 5, 10, 10
*ELGEN, ELSET=BFST3
45701, 9, 1, 1, 5, 10, 10
*ELGEN, ELSET=BFST4
45901, 9, 1, 1, 5, 10, 10
*ELGEN, ELSET=BFST5
46101, 9, 1, 1, 5, 10, 10
*ELGEN, ELSET=BFST6
46301, 9, 1, 1, 5, 10, 10
*ELGEN, ELSET=BFST7
46501, 9, 1, 1, 5, 10, 10
*ELGEN, ELSET=BFST8
46701, 9, 1, 1, 5, 10, 10
*ELSET, ELSET=BFST
BFST1,BFST2,BFST3,BFST4,BFST5,BFST6,BFST7,BFS
T8
*SOLID SECTION, ELSET=BFST, MATERIAL=FIN
*****
** TOP FINS
*****
***** long fins
*NODE, NSET=TFLB1A
50011, 24.8750, 0.0000, 176.8050
50012, 26.3750, 0.0000, 176.8050
50013, 27.8750, 0.0000, 176.8050
50014, 29.3750, 0.0000, 176.8050
50015, 30.8750, 0.0000, 176.8050
*NCOPY,SHIFT,CHANGE NU=20,OLD SET=TFLB1A,NEW
SET=TFLB1B
0.0, 0., 1.6875
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=20,OLD SET=TFLB1B,NEW
SET=TFLB1C
0.0, 0., 1.6875

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0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NODE, NSET=TFLB2A
50061, 6.1250, 0.0000, 182.1800
50062, 8.0750, 0.0000, 182.1800
50063, 10.0250, 0.0000, 182.1800
50064, 11.9750, 0.0000, 182.1800
50065, 13.9250, 0.0000, 182.1800
50066, 15.8750, 0.0000, 182.1800
50067, 17.2975, 0.0000, 182.1800
50068, 18.7500, 0.0000, 182.1800
50069, 20.6000, 0.0000, 182.1800
50070, 22.7380, 0.0000, 182.1800
50071, 24.8750, 0.0000, 182.1800
50072, 26.3750, 0.0000, 182.1800
50073, 27.8750, 0.0000, 182.1800
50074, 29.3750, 0.0000, 182.1800
50075, 30.8750, 0.0000, 182.1800
*NCOPY,SHIFT,CHANGE NU=80,OLD SET=TFLB2A,NEW
SET=TFLB2B
0.0, 0., 9.50
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NFILL, NSET=TFLB2C
TFLB2A, TFLB2B, 4, 20
*NSET, NSET=TFL1
TFLB1A,TFLB1B,TFLB1C,TFLB2C
*****
*NCOPY,SHIFT,CHANGE NU=200,OLD SET=TFL1,NEW
SET=TFL2
0.0, -0.5625, 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=400,OLD SET=TFL1,NEW
SET=TFL3
0.0, +0.5625, 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*****
*NCOPY,SHIFT,MULTIPLE=2,CHANGE NU=+3600,OLD
SET=TFL1,NEW SET=TFL4
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +180.0
*NCOPY,SHIFT,MULTIPLE=8,CHANGE NU=+400,OLD
SET=TFL2,NEW SET=TFL2ALL
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +22.50
*NCOPY,SHIFT,MULTIPLE=7,CHANGE NU=+400,OLD
SET=TFL3,NEW SET=TFL3ALL
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +22.50
*NSET, NSET=TFLG
TFL1, TFL2, TFL3, TFL4, TFL2ALL, TFL3ALL
**
*ELEMENT, TYPE=C3D8R
50011, 50011, 50012, 50412, 50411, 50031,
50032, 50432, 50431
50061, 50061, 50062, 50462, 50461, 50081,
50082, 50482, 50481
50611, 50611, 50612, 50812, 50811, 50631,
50632, 50832, 50831
50661, 50661, 50662, 50862, 50861, 50681,
50682, 50882, 50881
51011, 51011, 51012, 51212, 51211, 51031,
51032, 51232, 51231
51061, 51061, 51062, 51262, 51261, 51081,
51082, 51282, 51281
51411, 51411, 51412, 51612, 51611, 51431,
51432, 51632, 51631
51461, 51461, 51462, 51662, 51661, 51481,
51482, 51682, 51681
51811, 51811, 51812, 52012, 52011, 51831,
51832, 52032, 52031

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51861, 51861, 51862, 52062, 52061, 51881,
51882, 52082, 52081
52211, 52211, 52212, 52412, 52411, 52231,
52232, 52432, 52431
52261, 52261, 52262, 52462, 52461, 52281,
52282, 52482, 52481
52611, 52611, 52612, 52812, 52811, 52631,
52632, 52832, 52831
52661, 52661, 52662, 52862, 52861, 52681,
52682, 52882, 52881
53011, 53011, 53012, 53212, 53211, 53031,
53032, 53232, 53231
53061, 53061, 53062, 53262, 53261, 53081,
53082, 53282, 53281
53411, 53411, 53412, 53612, 53611, 53431,
53432, 53632, 53631
53461, 53461, 53462, 53662, 53661, 53481,
53482, 53682, 53681
*ELGEN, ELSET=TFLG1
50011, 4, 1, 1, 7, 20, 20
50061, 10, 1, 1, 4, 20, 20
*ELGEN, ELSET=TFLG2
50611, 4, 1, 1, 7, 20, 20
50661, 10, 1, 1, 4, 20, 20
*ELGEN, ELSET=TFLG3
51011, 4, 1, 1, 7, 20, 20
51061, 10, 1, 1, 4, 20, 20
*ELGEN, ELSET=TFLG4
51411, 4, 1, 1, 7, 20, 20
51461, 10, 1, 1, 4, 20, 20
*ELGEN, ELSET=TFLG5
51811, 4, 1, 1, 7, 20, 20
51861, 10, 1, 1, 4, 20, 20
*ELGEN, ELSET=TFLG6
52211, 4, 1, 1, 7, 20, 20
52261, 10, 1, 1, 4, 20, 20
*ELGEN, ELSET=TFLG7
52611, 4, 1, 1, 7, 20, 20
52661, 10, 1, 1, 4, 20, 20
*ELGEN, ELSET=TFLG8
53011, 4, 1, 1, 7, 20, 20
53061, 10, 1, 1, 4, 20, 20
*ELGEN, ELSET=TFLG9
53411, 4, 1, 1, 7, 20, 20
53461, 10, 1, 1, 4, 20, 20
*ELSET, ELSET=TFLG
TFLG1,TFLG2,TFLG3,TFLG4,TFLG5,TFLG6,TFLG7,TFL
G8,TFLG9
*SOLID SECTION, ELSET=TFLG, MATERIAL=FIN
***** short fins
*NODE, NSET=TFSB1A
55006, 24.8750, 0.0000, 176.8050
55007, 26.3750, 0.0000, 176.8050
55008, 27.8750, 0.0000, 176.8050
55009, 29.3750, 0.0000, 176.8050
55010, 30.8750, 0.0000, 176.8050
*NCOPY,SHIFT,CHANGE NU=10,OLD SET=TFSB1A,NEW
SET=TFSB1B
0.0, 0., 1.6875
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=10,OLD SET=TFSB1B,NEW
SET=TFSB1C
0.0, 0., 1.6875
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NODE, NSET=TFSB2A
55031, 15.8750, 0.0000, 182.1800
55032, 17.2975, 0.0000, 182.1800
55033, 18.7500, 0.0000, 182.1800
55034, 20.6000, 0.0000, 182.1800

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55035, 22.7380, 0.0000, 182.1800
55036, 24.8750, 0.0000, 182.1800
55037, 26.3750, 0.0000, 182.1800
55038, 27.8750, 0.0000, 182.1800
55039, 29.3750, 0.0000, 182.1800
55040, 30.8750, 0.0000, 182.1800
*NCOPY,SHIFT,CHANGE NU=40,OLD SET=TFBSB2A,NEW
SET=TFBSB2B
0.0, 0., 6.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NFill, NSET=TFBSB2C
TFBSB2A, TFBSB2B, 4, 10
*NSET, NSET=TFS1
TFBSB1A,TFBSB1B,TFBSB1C,TFBSB2C
*****
*NCOPY,SHIFT,CHANGE NU=100,OLD SET=TFS1,NEW
SET=TFS2
0.0, -0.75, 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=200,OLD SET=TFS1,NEW
SET=TFS3
0.0, +0.75, 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*****
*NCOPY,SHIFT,MULTIPLE=1,CHANGE NU=+200,OLD
SET=TFS2,NEW SET=TFS2A
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +11.25
*NCOPY,SHIFT,MULTIPLE=1,CHANGE NU=+200,OLD
SET=TFS3,NEW SET=TFS3A
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +11.25
*NCOPY,SHIFT,MULTIPLE=7,CHANGE NU=+200,OLD
SET=TFS2A,NEW SET=TFS2ALL
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +22.50
*NCOPY,SHIFT,MULTIPLE=7,CHANGE NU=+200,OLD
SET=TFS3A,NEW SET=TFS3ALL
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +22.50
*NSET, NSET=TFST
TFS2A, TFS2ALL, TFS3A, TFS3ALL
**
*ELEMENT, TYPE=C3D8R
55306, 55306, 55307, 55407, 55406, 55316,
55317, 55417, 55416
55331, 55331, 55332, 55432, 55431, 55341,
55342, 55442, 55441
55506, 55506, 55507, 55607, 55606, 55516,
55517, 55617, 55616
55531, 55531, 55532, 55632, 55631, 55541,
55542, 55642, 55641
55706, 55706, 55707, 55807, 55806, 55716,
55717, 55817, 55816
55731, 55731, 55732, 55832, 55831, 55741,
55742, 55842, 55841
55906, 55906, 55907, 56007, 56006, 55916,
55917, 56017, 56016
55931, 55931, 55932, 56032, 56031, 55941,
55942, 56042, 56041
56106, 56106, 56107, 56207, 56206, 56116,
56117, 56217, 56216
56131, 56131, 56132, 56232, 56231, 56141,
56142, 56242, 56241
56306, 56306, 56307, 56407, 56406, 56316,
56317, 56417, 56416
56331, 56331, 56332, 56432, 56431, 56341,
56342, 56442, 56441
56506, 56506, 56507, 56607, 56606, 56516,
56517, 56617, 56616
56531, 56531, 56532, 56632, 56631, 56541,
56542, 56642, 56641
56706, 56706, 56707, 56807, 56806, 56716,
56717, 56817, 56816
56731, 56731, 56732, 56832, 56831, 56741,
56742, 56842, 56841
*ELGEN, ELSET=TFST1
55306, 4, 1, 1, 7, 10, 10
55331, 5, 1, 1, 4, 10, 10
*ELGEN, ELSET=TFST2
55506, 4, 1, 1, 7, 10, 10
55531, 5, 1, 1, 4, 10, 10
*ELGEN, ELSET=TFST3
55706, 4, 1, 1, 7, 10, 10
55731, 5, 1, 1, 4, 10, 10
*ELGEN, ELSET=TFST4
55906, 4, 1, 1, 7, 10, 10
55931, 5, 1, 1, 4, 10, 10
*ELGEN, ELSET=TFST5
56106, 4, 1, 1, 7, 10, 10
56131, 5, 1, 1, 4, 10, 10
*ELGEN, ELSET=TFST6
56306, 4, 1, 1, 7, 10, 10
56331, 5, 1, 1, 4, 10, 10
*ELGEN, ELSET=TFST7
56506, 4, 1, 1, 7, 10, 10
56531, 5, 1, 1, 4, 10, 10
*ELGEN, ELSET=TFST8
56706, 4, 1, 1, 7, 10, 10
56731, 5, 1, 1, 4, 10, 10
*ELSET, ELSET=TFST
TFST1,TFST2,TFST3,TFST4,TFST5,TFST6,TFST7,TFS
T8
*SOLID SECTION, ELSET=TFST, MATERIAL=FIN
*****
** STRUCTURAL RING 1
*****
*NODE, NSET=RING1A
15001, 24.8750, 0.0000, 14.8750
*NCOPY,SHIFT,MULTIPLE=32,CHANGE NU=+1,OLD
SET=RING1A,NEW SET=RING1A
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +5.625
***** MODIFY NODES
*NODE, NSET=RING1A
15001, 24.8750, 0.0000, 14.0110
15002, 24.7552, 2.4382, 14.0215
15003, 24.3970, 4.8529, 14.0529
15004, 23.8039, 7.2208, 14.1048
15005, 22.9815, 9.5193, 14.1767
15006, 21.9378, 11.7260, 14.2680
15007, 20.6828, 13.8198, 14.3778
15008, 19.2286, 15.7805, 14.5050
15009, 17.5893, 17.5893, 14.6485
*NODE, NSET=RING1B
15177, 0.0000, 31.8750, 14.8750
*NCOPY,SHIFT,MULTIPLE=16,CHANGE NU=+1,OLD
SET=RING1B,NEW SET=RING1B
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +5.625
*NODE
15161, 35.5417, 0.0000, 13.0778
15241, 40.8750, 0.0000, 12.6112
15165, 34.9105, 13.7148, 13.1330
15245, 40.8750, 15.8125, 12.6112
15250, 24.8125, 31.8750, 14.0165
15170, 15.0000, 31.8750, 14.8750

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*NSET, NSET=LINEA1, GENERATE
15001, 15005, 1
*NGEN, NSET=LINEA2
15161, 15165, 1
*NGEN, NSET=LINEA3
15241, 15245, 1
*NSET, NSET=LINEA4, GENERATE
15005, 15010, 1
*NGEN, NSET=LINEA5
15165, 15170, 1
*NGEN, NSET=LINEA6
15245, 15250, 1
*NSET, NSET=LINEA7, GENERATE
15010, 15017, 1
*NGEN, NSET=LINEA8
15170, 15177, 1
*NSET, NSET=LINEA9, GENERATE
15017, 15033, 1
*NSET, NSET=LINEA10, GENERATE
15177, 15193, 1
**
*NFILL, NSET=RING1C
LINEA1, LINEA2, 4, 40
*NFILL, NSET=RING1D
LINEA2, LINEA3, 2, 40
*NFILL, NSET=RING1E
LINEA4, LINEA5, 4, 40
*NFILL, NSET=RING1F
LINEA5, LINEA6, 2, 40
*NFILL, NSET=RING1G
LINEA7, LINEA8, 4, 40
*NFILL, NSET=RING1H
LINEA9, LINEA10, 4, 40
*NSET, NSET=RING1M
RING1B, RING1C, RING1D, RING1E, RING1F, RING1G, RING1H
*NCOPY, SHIFT, CHANGE NU=+300, OLD
SET=RING1M, NEW SET=RING1N
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=RING1
RING1M, RING1N
*****
*ELEMENT, TYPE=C3D8R
15001, 2981, 15041, 15042, 2982, 3181, 15341,
15342, 3182
15041, 15041, 15081, 15082, 15042, 15341,
15381, 15382, 15342
15161, 15161, 15201, 15202, 15162, 15461,
15501, 15502, 15462
*ELGEN, ELSET=RING1A
15001, 32, 1, 1
*ELGEN, ELSET=RING1B
15041, 32, 1, 1, 3, 40, 40
*ELGEN, ELSET=RING1C
15161, 9, 1, 1, 2, 40, 40
*ELSET, ELSET=RING1
RING1A, RING1B, RING1C
*SOLID SECTION, ELSET=RING1, MATERIAL=RING
*****
** STRUCTURAL RING 2
*****
*NODE, NSET=RING2A
16001, 24.8750, 0.0000, 31.8750
*NCOPY, SHIFT, MULTIPLE=32, CHANGE NU=+1, OLD
SET=RING2A, NEW SET=RING2A
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +5.625
***** MODIFY NODES

*NODE, NSET=RING2A
16001, 24.8750, 0.0000, 32.7390
16002, 24.7552, 2.4382, 32.7285
16003, 24.3970, 4.8529, 32.6971
16004, 23.8039, 7.2208, 32.6452
16005, 22.9815, 9.5193, 32.5733
16006, 21.9378, 11.7260, 32.4820
16007, 20.6828, 13.8198, 32.3722
16008, 19.2286, 15.7805, 32.2450
16009, 17.5893, 17.5893, 32.1015
*NODE, NSET=RING2B
16177, 0.0000, 31.8750, 31.8750
*NCOPY, SHIFT, MULTIPLE=16, CHANGE NU=+1, OLD
SET=RING2B, NEW SET=RING2B
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +5.625
*NODE
16161, 35.5417, 0.0000, 33.6722
16241, 40.8750, 0.0000, 34.1388
16165, 34.9105, 13.7148, 33.6169
16245, 40.8750, 15.8125, 34.1388
16250, 24.8125, 31.8750, 32.7335
16170, 15.0000, 31.8750, 31.8750
*NSET, NSET=LINEB1, GENERATE
16001, 16005, 1
*NGEN, NSET=LINEB2
16161, 16165, 1
*NGEN, NSET=LINEB3
16241, 16245, 1
*NSET, NSET=LINEB4, GENERATE
16005, 16010, 1
*NGEN, NSET=LINEB5
16165, 16170, 1
*NGEN, NSET=LINEB6
16245, 16250, 1
*NSET, NSET=LINEB7, GENERATE
16010, 16017, 1
*NGEN, NSET=LINEB8
16170, 16177, 1
*NSET, NSET=LINEB9, GENERATE
16017, 16033, 1
*NSET, NSET=LINEB10, GENERATE
16177, 16193, 1
**
*NFILL, NSET=RING2C
LINEB1, LINEB2, 4, 40
*NFILL, NSET=RING2D
LINEB2, LINEB3, 2, 40
*NFILL, NSET=RING2E
LINEB4, LINEB5, 4, 40
*NFILL, NSET=RING2F
LINEB5, LINEB6, 2, 40
*NFILL, NSET=RING2G
LINEB7, LINEB8, 4, 40
*NFILL, NSET=RING2H
LINEB9, LINEB10, 4, 40
*NSET, NSET=RING2M
RING2B, RING2C, RING2D, RING2E, RING2F, RING2G, RING2H
*NCOPY, SHIFT, CHANGE NU=+300, OLD
SET=RING2M, NEW SET=RING2N
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=RING2
RING2M, RING2N
*****
*ELEMENT, TYPE=C3D8R
16001, 3981, 16041, 16042, 3982, 4181, 16341,
16342, 4182

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16041, 16041, 16081, 16082, 16042, 16341,
16381, 16382, 16342
16161, 16161, 16201, 16202, 16162, 16461,
16501, 16502, 16462
*ELGEN, ELSET=RING2A
16001, 32, 1, 1
*ELGEN, ELSET=RING2B
16041, 32, 1, 1, 3, 40, 40
*ELGEN, ELSET=RING2C
16161, 9, 1, 1, 2, 40, 40
*ELSET, ELSET=RING2
RING2A, RING2B, RING2C
*SOLID SECTION, ELSET=RING2, MATERIAL=RING
*****
** STRUCTURAL RING 3
*****
*NCOPY,SHIFT,CHANGE NU=+2000,OLD
SET=RING1,NEW SET=RING3
0.0, 0.0, 142.18
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
**** MODIFY NODES
17001, 24.8750, 0.0000, 156.1910
17002, 24.7552, 2.4382, 156.2015
17003, 24.3970, 4.8529, 156.2329
17004, 23.8039, 7.2208, 156.2848
17005, 22.9815, 9.5193, 156.3567
17006, 21.9378, 11.7260, 156.4480
17007, 20.6828, 13.8198, 156.5578
17008, 19.2286, 15.7805, 156.6850
17009, 17.5893, 17.5893, 156.8285
*ELEMENT, TYPE=C3D8R
17001, 8181, 17041, 17042, 8182, 8381, 17341,
17342, 8382
17041, 17041, 17081, 17082, 17042, 17341,
17381, 17382, 17342
17161, 17161, 17201, 17202, 17162, 17461,
17501, 17502, 17462
*ELGEN, ELSET=RING3A
17001, 32, 1, 1
*ELGEN, ELSET=RING3B
17041, 32, 1, 1, 3, 40, 40
*ELGEN, ELSET=RING3C
17161, 9, 1, 1, 2, 40, 40
*ELSET, ELSET=RING3
RING3A, RING3B, RING3C
*SOLID SECTION, ELSET=RING3, MATERIAL=RING
*****
** STRUCTURAL RING 4
*****
*NCOPY,SHIFT,CHANGE NU=+2000,OLD
SET=RING2,NEW SET=RING4
0.0, 0.0, 142.18
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
**** MODIFY NODES
18001, 24.8750, 0.0000, 174.9190
18002, 24.7552, 2.4382, 174.9085
18003, 24.3970, 4.8529, 174.8771
18004, 23.8039, 7.2208, 174.8252
18005, 22.9815, 9.5193, 174.7533
18006, 21.9378, 11.7260, 174.6620
18007, 20.6828, 13.8198, 174.5522
18008, 19.2286, 15.7805, 174.4250
18009, 17.5893, 17.5893, 174.2815
*ELEMENT, TYPE=C3D8R
18001, 9181, 18041, 18042, 9182, 9381, 18341,
18342, 9382
18041, 18041, 18081, 18082, 18042, 18341,
18381, 18382, 18342

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18161, 18161, 18201, 18202, 18162, 18461,
18501, 18502, 18462
*ELGEN, ELSET=RING4A
18001, 32, 1, 1
*ELGEN, ELSET=RING4B
18041, 32, 1, 1, 3, 40, 40
*ELGEN, ELSET=RING4C
18161, 9, 1, 1, 2, 40, 40
*ELSET, ELSET=RING4
RING4A, RING4B, RING4C
*SOLID SECTION, ELSET=RING4, MATERIAL=RING
*****
** FUEL BUNDLE A
*****
** OUTER FUEL RODS
*****
*NODE
61001, -14.2410, 1.4090, 14.6400
61015, -6.3590, 1.4090, 14.6400
61029, -6.3590, 9.2910, 14.6400
61043, -14.2410, 9.2910, 14.6400
61056, -14.2410, 1.9720, 14.6400
*NGEN, NSET=FARO1
61001, 61015
61015, 61029
61029, 61043
61043, 61056
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=FARO1,NEW
SET=FARO2
0.0, 0.0, 2.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+400,OLD SET=FARO2,NEW
SET=FARO3
0.0, 0.0, 2.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FARO3A
FARO2, FARO3, 2, 200
*NCOPY,SHIFT,CHANGE NU=+800,OLD SET=FARO3,NEW
SET=FARO4
0.0, 0.0, 22.215
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FARO4A
FARO3, FARO4, 4, 200
*NCOPY,SHIFT,CHANGE NU=+400,OLD SET=FARO4,NEW
SET=FARO5
0.0, 0.0, 1.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FARO5A
FARO4, FARO5, 2, 200
*NCOPY,SHIFT,CHANGE NU=+800,OLD SET=FARO5,NEW
SET=FARO6
0.0, 0.0, 24.44
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FARO6A
FARO5, FARO6, 4, 200
*NCOPY,SHIFT,CHANGE NU=+400,OLD SET=FARO6,NEW
SET=FARO7
0.0, 0.0, 1.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FARO7A
FARO6, FARO7, 2, 200
*NCOPY,SHIFT,CHANGE NU=+400,OLD SET=FARO7,NEW
SET=FARO8
0.0, 0.0, 11.82
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FARO8A
FARO7, FARO8, 2, 200

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*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=FARO8,NEW
SET=FARO9
0.0, 0.0, 0.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+400,OLD SET=FARO9,NEW
SET=FARO10
0.0, 0.0, 11.87
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFill, NSET=FARO10A
FARO9, FARO10, 2, 200
*NSET, NSET=FAROR1
FARO7A, FARO8A, FARO9, FARO10A
*NCOPY,SHIFT,CHANGE NU=+1400,OLD
SET=FAROR1,NEW SET=FAROR2
0.0, 0.0, 26.19
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+1400,OLD
SET=FAROR2,NEW SET=FAROR3
0.0, 0.0, 26.19
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FARORT, GENERATE
67801, 67856, 1
*NCOPY,SHIFT,CHANGE NU=+400,OLD
SET=FARORT,NEW SET=FARO19
0.0, 0.0, 1.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFill, NSET=FARO19A
FARORT, FARO19, 2, 200
*NCOPY,SHIFT,CHANGE NU=+400,OLD
SET=FARO19,NEW SET=FARO20
0.0, 0.0, 16.88
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFill, NSET=FARO20A
FARO19, FARO20, 2, 200
*NCOPY,SHIFT,CHANGE NU=+400,OLD
SET=FARO20,NEW SET=FARO21
0.0, 0.0, 1.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFill, NSET=FARO21A
FARO20, FARO21, 2, 200
*NCOPY,SHIFT,CHANGE NU=+200,OLD
SET=FARO21,NEW SET=FARO22
0.0, 0.0, 0.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+200,OLD
SET=FARO22,NEW SET=FARO23
0.0, 0.0, 1.355
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NODE
60001, -14.2410, 1.4090, 15.9900
60015, -6.3590, 1.4090, 15.9900
60029, -6.3590, 9.2910, 15.9900
60043, -14.2410, 9.2910, 15.9900
60056, -14.2410, 1.9720, 15.9900
*NGEN, NSET=FARO1M
60001, 60015
60015, 60029
60029, 60043
60043, 60056
*NSET, NSET=FARO
FARO1, FARO2, FARO3A, FARO4A, FARO5A, FARO6A, FAROR
1, FAROR2, FAROR3
FARO19A, FARO20A, FARO21A, FARO22, FARO23, FARO1M
*****
*ELEMENT, TYPE=B31
61001, 60001, 61201
61201, 61201, 61401
69201, 69201, 69401
*ELGEN, ELSET=FAROS
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61001, 56, 1, 1
69201, 56, 1, 1
*ELGEN, ELSET=FAROP
61201, 40, 200, 200, 56, 1, 1
*ELSET, ELSET=FARO
FAROS, FAROP
*BEAM SECTION, SECTION=PIPE, ELSET=FAROP,
MATERIAL=CLADO
0.2092, 0.0272
1.0, 0.0, 0.0
*BEAM SECTION, SECTION=CIRC, ELSET=FAROS,
MATERIAL=CLADO
0.2092
1.0, 0.0, 0.0
3, 4
*****
** SIMULATION OF INNER FUEL RODS AND GRID
SPACERS
*****
*NODE, NSET=FARS1
61061, -14.5225, 1.1275, 14.6400
61076, -6.0775, 1.1275, 14.6400
61091, -6.0775, 9.5725, 14.6400
61106, -14.5225, 9.5725, 14.6400
61120, -14.5225, 1.6905, 14.6400
61132, -13.9595, 1.6905, 14.6400
61145, -6.6405, 1.6905, 14.6400
61148, -6.6405, 2.2535, 14.6400
61160, -6.6405, 9.0095, 14.6400
61163, -7.2035, 9.0095, 14.6400
61175, -13.9595, 9.0095, 14.6400
61178, -13.9595, 8.4465, 14.6400
61189, -13.9595, 2.2535, 14.6400
*NGEN, NSET=FARS1
61061, 61076
61076, 61091
61091, 61106
61106, 61120
61132, 61145
61148, 61160
61163, 61175
61178, 61189
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=FARS1,NEW
SET=FARS2
0.0, 0.0, 2.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+400,OLD SET=FARS2,NEW
SET=FARS3
0.0, 0.0, 2.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFill, NSET=FARS3A
FARS2, FARS3, 2, 200
*NCOPY,SHIFT,CHANGE NU=+800,OLD SET=FARS3,NEW
SET=FARS4
0.0, 0.0, 22.215
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFill, NSET=FARS4A
FARS3, FARS4, 4, 200
*NCOPY,SHIFT,CHANGE NU=+400,OLD SET=FARS4,NEW
SET=FARS5
0.0, 0.0, 1.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFill, NSET=FARS5A
FARS4, FARS5, 2, 200
*NCOPY,SHIFT,CHANGE NU=+800,OLD SET=FARS5,NEW
SET=FARS6
0.0, 0.0, 24.44
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0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FARS6A
FARS5, FARS6, 4, 200
*NCOPY,SHIFT,CHANGE NU=+400,OLD SET=FARS6,NEW
SET=FARS7
0.0, 0.0, 1.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FARS7A
FARS6, FARS7, 2, 200
*NCOPY,SHIFT,CHANGE NU=+400,OLD SET=FARS7,NEW
SET=FARS8
0.0, 0.0, 11.82
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FARS8A
FARS7, FARS8, 2, 200
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=FARS8,NEW
SET=FARS9
0.0, 0.0, 0.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+400,OLD SET=FARS9,NEW
SET=FARS10
0.0, 0.0, 11.87
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FARS10A
FARS9, FARS10, 2, 200
*NSET, NSET=FARSR1
FARS7A, FARS8A, FARS9, FARS10A
*NCOPY,SHIFT,CHANGE NU=+1400,OLD
SET=FARSR1,NEW SET=FARSR2
0.0, 0.0, 26.19
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+1400,OLD
SET=FARSR2,NEW SET=FARSR3
0.0, 0.0, 26.19
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FARSRT, GENERATE
67861, 67920, 1
67932, 67945, 1
67948, 67960, 1
67963, 67975, 1
67978, 67989, 1
*NCOPY,SHIFT,CHANGE NU=+400,OLD
SET=FARSRT,NEW SET=FARS19
0.0, 0.0, 1.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FARS19A
FARSRT, FARS19, 2, 200
*NCOPY,SHIFT,CHANGE NU=+400,OLD
SET=FARS19,NEW SET=FARS20
0.0, 0.0, 16.88
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FARS20A
FARS19, FARS20, 2, 200
*NCOPY,SHIFT,CHANGE NU=+400,OLD
SET=FARS20,NEW SET=FARS21
0.0, 0.0, 1.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FARS21A
FARS20, FARS21, 2, 200
*NCOPY,SHIFT,CHANGE NU=+200,OLD
SET=FARS21,NEW SET=FARS22
0.0, 0.0, 0.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NODE, NSET=FARS1M
60061, -14.5225, 1.1275, 15.9900
60076, -6.0775, 1.1275, 15.9900
60091, -6.0775, 9.5725, 15.9900
60106, -14.5225, 9.5725, 15.9900
60120, -14.5225, 1.6905, 15.9900
60132, -13.9595, 1.6905, 15.9900
60145, -6.6405, 1.6905, 15.9900
60148, -6.6405, 2.2535, 15.9900
60160, -6.6405, 9.0095, 15.9900
60163, -7.2035, 9.0095, 15.9900
60175, -13.9595, 9.0095, 15.9900
60178, -13.9595, 8.4465, 15.9900
60189, -13.9595, 2.2535, 15.9900
*NGEN, NSET=FARS1M
60061, 60076
60076, 60091
60091, 60106
60106, 60120
60132, 60145
60148, 60160
60163, 60175
60178, 60189
*NSET, NSET=FARS
FARS1, FARS2, FARS3A, FARS4A, FARSSA, FARS6A, FARSR
1, FARSR2, FARSR3
FARS19A, FARS20A, FARS21A, FARS22, FARS1M
*****
** INNER FUEL RODS ELEMENT
*****
*ELEMENT, TYPE=S4R, ELSET=FARI
61132, 60132, 61332, 61333, 60133
61145, 60145, 61345, 61348, 60148
61148, 60148, 61348, 61349, 60149
61160, 60160, 61360, 61363, 60163
61163, 60163, 61363, 61364, 60164
61175, 60175, 61375, 61378, 60178
61178, 60178, 61378, 61379, 60179
61189, 60189, 61389, 61332, 60132
**
61332, 61332, 61532, 61533, 61333
61345, 61345, 61545, 61548, 61348
61348, 61348, 61548, 61549, 61349
61360, 61360, 61560, 61563, 61363
61363, 61363, 61563, 61564, 61364
61375, 61375, 61575, 61578, 61378
61378, 61378, 61578, 61579, 61379
61389, 61389, 61589, 61532, 61332
*ELGEN, ELSET=FARI
61132, 13, 1, 1
61148, 12, 1, 1
61163, 12, 1, 1
61178, 11, 1, 1
61332, 13, 1, 1, 41, 200, 200
61345, 41, 200, 200
61348, 12, 1, 1, 41, 200, 200
61360, 41, 200, 200
61363, 12, 1, 1, 41, 200, 200
61375, 41, 200, 200
61378, 11, 1, 1, 41, 200, 200
61389, 41, 200, 200
*SHELL SECTION, ELSET=FARI, MATERIAL=CLADI
0.25
*****
** ROD GRID SPACERS
*****
***** GRID SPACER 1
*ELEMENT, TYPE=S4R, ELSET=FAG1BR
61261, 61261, 61461, 61462, 61262
61320, 61320, 61520, 61461, 61261
*ELGEN, ELSET=FAG1BR
61261, 59, 1, 1
**
*ELEMENT, TYPE=S4R, ELSET=FAG1BS
61061, 61262, 61462, 61532, 61332

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61076, 61277, 61477, 61545, 61345
61077, 61278, 61478, 61548, 61348
61091, 61292, 61492, 61560, 61360
61092, 61293, 61493, 61563, 61363
61106, 61307, 61507, 61575, 61375
61107, 61308, 61508, 61578, 61378
61119, 61320, 61520, 61532, 61332
*ELGEN, ELSET=FAG1BS
61061, 14, 1, 1
61077, 13, 1, 1
61092, 13, 1, 1
61107, 12, 1, 1
*ELSET, ELSET=FAG1B
FAG1BR, FAG1BS
*ELCOPY,OLD SET=FAG1BR,NEW SET=FAG1TR,ELEMENT
SH=200,SHIFT NOD=200
*ELCOPY,OLD SET=FAG1BS,NEW SET=FAG1TS,ELEMENT
SH=600,SHIFT NOD=200
*ELSET, ELSET=FAG1R
FAG1BR, FAG1TR
*ELSET, ELSET=FAG1S
FAG1BS, FAG1TS
*ELSET, ELSET=FAG1
FAG1R, FAG1S
*SHELL SECTION, ELSET=FAG1R, MATERIAL=CLADG
0.0747
*SHELL SECTION, ELSET=FAG1S, MATERIAL=CLADG
0.0747
***** GRID SPACER 2 (HTP)
*ELCOPY,OLD SET=FAG1R,NEW SET=FAG2R,ELEMENT
SH=1200,SHIFT NOD=1200
*ELCOPY,OLD SET=FAG1S,NEW SET=FAG2S,ELEMENT
SH=1200,SHIFT NOD=1200
*ELSET, ELSET=FAG2
FAG2R, FAG2S
*SHELL SECTION, ELSET=FAG2R, MATERIAL=CLADG
0.0747
*SHELL SECTION, ELSET=FAG2S, MATERIAL=CLADG
0.0747
***** GRID SPACER 3 (HTP)
*ELCOPY,OLD SET=FAG2R,NEW SET=FAG3R,ELEMENT
SH=1200,SHIFT NOD=1200
*ELCOPY,OLD SET=FAG2S,NEW SET=FAG3S,ELEMENT
SH=1200,SHIFT NOD=1200
*ELSET, ELSET=FAG3
FAG3R, FAG3S
*SHELL SECTION, ELSET=FAG3R, MATERIAL=CLADG
0.0747
*SHELL SECTION, ELSET=FAG3S, MATERIAL=CLADG
0.0747
***** GRID SPACER 4 (IFM)
*ELCOPY,OLD SET=FAG1BR,NEW SET=FAG4R,ELEMENT
SH=3200,SHIFT NOD=3200
*ELCOPY,OLD SET=FAG1BS,NEW SET=FAG4S,ELEMENT
SH=3200,SHIFT NOD=3200
*ELSET, ELSET=FAG4
FAG4R, FAG4S
*SHELL SECTION, ELSET=FAG4R, MATERIAL=CLADG
0.0747
*SHELL SECTION, ELSET=FAG4S, MATERIAL=CLADG
0.0747
***** GRID SPACER 5 (HTP)
*ELCOPY,OLD SET=FAG3R,NEW SET=FAG5R,ELEMENT
SH=1400,SHIFT NOD=1400
*ELCOPY,OLD SET=FAG3S,NEW SET=FAG5S,ELEMENT
SH=1400,SHIFT NOD=1400
*ELSET, ELSET=FAG5
FAG5R, FAG5S
*SHELL SECTION, ELSET=FAG5R, MATERIAL=CLADG

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0.0747
*SHELL SECTION, ELSET=FAG5S, MATERIAL=CLADG
0.0747
***** GRID SPACER 6 (IFM)
*ELCOPY,OLD SET=FAG4R,NEW SET=FAG6R,ELEMENT
SH=1400,SHIFT NOD=1400
*ELCOPY,OLD SET=FAG4S,NEW SET=FAG6S,ELEMENT
SH=1400,SHIFT NOD=1400
*ELSET, ELSET=FAG6
FAG6R, FAG6S
*SHELL SECTION, ELSET=FAG6R, MATERIAL=CLADG
0.0747
*SHELL SECTION, ELSET=FAG6S, MATERIAL=CLADG
0.0747
***** GRID SPACER 7 (HTP)
*ELCOPY,OLD SET=FAG5R,NEW SET=FAG7R,ELEMENT
SH=1400,SHIFT NOD=1400
*ELCOPY,OLD SET=FAG5S,NEW SET=FAG7S,ELEMENT
SH=1400,SHIFT NOD=1400
*ELSET, ELSET=FAG7
FAG7R, FAG7S
*SHELL SECTION, ELSET=FAG7R, MATERIAL=CLADG
0.0747
*SHELL SECTION, ELSET=FAG7S, MATERIAL=CLADG
0.0747
***** GRID SPACER 8 (IFM)
*ELCOPY,OLD SET=FAG6R,NEW SET=FAG8R,ELEMENT
SH=1400,SHIFT NOD=1400
*ELCOPY,OLD SET=FAG6S,NEW SET=FAG8S,ELEMENT
SH=1400,SHIFT NOD=1400
*ELSET, ELSET=FAG8
FAG8R, FAG8S
*SHELL SECTION, ELSET=FAG8R, MATERIAL=CLADG
0.0747
*SHELL SECTION, ELSET=FAG8S, MATERIAL=CLADG
0.0747
***** GRID SPACER 9 (HTP)
*ELCOPY,OLD SET=FAG7R,NEW SET=FAG9R,ELEMENT
SH=1400,SHIFT NOD=1400
*ELCOPY,OLD SET=FAG7S,NEW SET=FAG9S,ELEMENT
SH=1400,SHIFT NOD=1400
*ELSET, ELSET=FAG9
FAG9R, FAG9S
*SHELL SECTION, ELSET=FAG9R, MATERIAL=CLADG
0.0747
*SHELL SECTION, ELSET=FAG9S, MATERIAL=CLADG
0.0747
***** GRID SPACER 10 (HTP)
*ELCOPY,OLD SET=FAG9R,NEW SET=FAG10R,ELEMENT
SH=800,SHIFT NOD=800
*ELCOPY,OLD SET=FAG9S,NEW SET=FAG10S,ELEMENT
SH=800,SHIFT NOD=800
*ELSET, ELSET=FAG10
FAG10R, FAG10S
*SHELL SECTION, ELSET=FAG10R, MATERIAL=CLADG
0.0747
*SHELL SECTION, ELSET=FAG10S, MATERIAL=CLADG
0.0747
*****
** BOTTOM TIE PLATE
*****
*NCOPY,SHIFT,CHANGE NU=-200,OLD SET=FARS1,NEW
SET=FARB1
0.0, 0.0, -2.52
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NODE, NSET=FARSI
61121, -11.7075, 3.9425, 14.6400
61122, -8.8925, 3.9425, 14.6400
61123, -11.7075, 6.7575, 14.6400

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61124, -8.8925, 6.7575, 14.6400
*NCOPY,SHIFT,CHANGE NU=-200,OLD SET=FARSI,NEW
SET=FARB1
0.0, 0.0, -2.52
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FABM
FARS1, FARSI, FARB1
*****
*ELEMENT, TYPE=C3D8R, ELSET=FABM
60861, 60861, 60862, 60932, 60920, 61061,
61062, 61132, 61120
60862, 60862, 60866, 60936, 60932, 61062,
61066, 61136, 61132
60866, 60866, 60871, 60941, 60936, 61066,
61071, 61141, 61136
60871, 60871, 60875, 60945, 60941, 61071,
61075, 61145, 61141
60875, 60875, 60876, 60877, 60945, 61075,
61076, 61077, 61145
60920, 60920, 60932, 60986, 60916, 61120,
61132, 61186, 61116
60932, 60932, 60936, 60921, 60986, 61132,
61136, 61121, 61186
60936, 60936, 60941, 60922, 60921, 61136,
61141, 61122, 61121
60941, 60941, 60945, 60951, 60922, 61141,
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60922, 60922, 60951, 60956, 60924, 61122,
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61086, 61090, 61160
60907, 60907, 60975, 60905, 60906, 61107,
61175, 61105, 61106
60975, 60975, 60971, 60901, 60905, 61175,
61171, 61101, 61105
60971, 60971, 60966, 60896, 60901, 61171,
61166, 61096, 61101
60966, 60966, 60960, 60892, 60896, 61166,
61160, 61092, 61096
60960, 60960, 60890, 60891, 60892, 61160,
61090, 61091, 61092
*SOLID SECTION, ELSET=FABM, MATERIAL=S304F
*****
** TOP TIE PLATE
*****
*NCOPY,SHIFT,CHANGE NU=8600,OLD SET=FABM,NEW
SET=FATP1
0.0, 0.0, 156.23
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=200,OLD SET=FATP1,NEW
SET=FATP2

```

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0.0, 0.0, 3.48
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FATP
FATP1, FATP2
*ELCOPY,OLD SET=FABM,NEW SET=FATP,ELEMENT
SH=8600,SHIFT NOD=8600
*SOLID SECTION, ELSET=FATP, MATERIAL=S304F
*****
** GUIDE AND INST. TUBES
*****
*ELEMENT, TYPE=B31, ELSET=TUBEA
61195, 61132, 61332
61196, 61145, 61345
61197, 61160, 61360
61198, 61175, 61375
*ELGEN, ELSET=TUBEA
61195, 42, 200, 200
61196, 42, 200, 200
61197, 42, 200, 200
61198, 42, 200, 200
*BEAM SECTION, SECTION=CIRC, ELSET=TUBEA,
MATERIAL=CLADT
0.4280
1.0, 0.0, 0.0
*****
** FUEL ROD VS GRID SPACER
*****
***** 01
*EQUATION
3
61401, 1, 1.0, 61461, 1, -0.5, 61462, 1, -0.5
*EQUATION
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61401, 2, 1.0, 61461, 2, -0.5, 61462, 2, -0.5
*EQUATION
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*EQUATION
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62601, 2, 1.0, 62661, 2, -0.5, 62662, 2, -0.5
*EQUATION
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63801, 1, 1.0, 63861, 1, -0.5, 63862, 1, -0.5
*EQUATION
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63801, 2, 1.0, 63861, 2, -0.5, 63862, 2, -0.5
*EQUATION
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64401, 1, 1.0, 64461, 1, -0.5, 64462, 1, -0.5
*EQUATION
3
64401, 2, 1.0, 64461, 2, -0.5, 64462, 2, -0.5
*EQUATION
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*EQUATION
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65201, 2, 1.0, 65261, 2, -0.5, 65262, 2, -0.5
*EQUATION
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*EQUATION
3
66001, 2, 1.0, 66061, 2, -0.5, 66062, 2, -0.5
*EQUATION
3
66601, 1, 1.0, 66661, 1, -0.5, 66662, 1, -0.5
*EQUATION
3

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66601, 2, 1.0, 66661, 2, -0.5, 66662, 2, -0.5
*EQUATION
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*EQUATION
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*EQUATION
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*EQUATION
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*EQUATION
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***** 02
*EQUATION
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*EQUATION
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*EQUATION

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***** 04

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62606, 1, 1.0, 62666, 1, -0.5, 62667, 1, -0.5

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62650, 2, 1.0, 62713, 2, -0.5, 62714, 2, -0.5
*EQUATION
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63850, 1, 1.0, 63913, 1, -0.5, 63914, 1, -0.5
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*EQUATION

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66050, 1, 1.0, 66113, 1, -0.5, 66114, 1, -0.5
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66050, 2, 1.0, 66113, 2, -0.5, 66114, 2, -0.5
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66650, 1, 1.0, 66713, 1, -0.5, 66714, 1, -0.5
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66650, 2, 1.0, 66713, 2, -0.5, 66714, 2, -0.5
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*EQUATION
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68850, 2, 1.0, 68913, 2, -0.5, 68914, 2, -0.5
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*EQUATION
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61451, 1, 1.0, 61514, 1, -0.5, 61515, 1, -0.5
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62651, 1, 1.0, 62714, 1, -0.5, 62715, 1, -0.5
*EQUATION
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*EQUATION
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63851, 1, 1.0, 63914, 1, -0.5, 63915, 1, -0.5
*EQUATION
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*EQUATION
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*EQUATION
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64451, 2, 1.0, 64514, 2, -0.5, 64515, 2, -0.5
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*EQUATION
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66051, 1, 1.0, 66114, 1, -0.5, 66115, 1, -0.5
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*EQUATION
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*EQUATION
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*EQUATION
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*EQUATION
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*EQUATION
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*EQUATION
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68054, 1, 1.0, 68117, 1, -0.5, 68118, 1, -0.5

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*EQUATION
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*EQUATION
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68855, 2, 1.0, 68918, 2, -0.5, 68919, 2, -0.5
***** 56
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*EQUATION
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68856, 2, 1.0, 68919, 2, -0.5, 68920, 2, -0.5
*****
*****
*****
** RIGID UNYIELDING TARGET
*****
*NODE, NSET=TARGET0
190000, 0.0, 0.0, -0.0

190001, -50.0, 0.0, -0.0
190002, 50.0, 0.0, -0.0
190003, 50.0, 50.0, -0.0
190004, -50.0, 50.0, -0.0
*NCOPY,SHIFT,CHANGE NU=-100000,OLD
SET=TARGET0,NEW SET=TARGET
0., 0., 191.69
0., 0., 191.69, 0., 1., 191.69, -180.0
*ELEMENT,TYPE=R3D4,ELSET=TARGET
90000,90001,90002,90003,90004
*RIGID BODY, ELSET=TARGET, REF NODE=90000
*****
** TYPE 317 SST MOD
** DYNAMIC S-S CURVE
*MATERIAL, NAME=S317
*DENSITY
16.0461E-4
*ELASTIC
26.5E6, 0.3
*PLASTIC
60000., 0.
71000., 0.008
75000., 0.018
77300., 0.028
79300., 0.038
87000., 0.078
90500., 0.118
93700., 0.158
96000., 0.198
97800., 0.238
98800., 0.268
99500., 0.288
100000., 0.308
** TYPE 304 SST
** USING SANDIA DATA
*MATERIAL, NAME=S304
*DENSITY
7.5052E-4
*ELASTIC
27.0E6, 0.3
*PLASTIC
30000., 0.
35000., 0.002
37300., 0.004
38400., 0.006
39400., 0.008
40000., 0.010
42900., 0.020
45400., 0.030
47900., 0.040
50400., 0.050
52900., 0.060
55400., 0.070
57900., 0.080
60400., 0.090
62900., 0.100
69150., 0.125
75400., 0.150
81650., 0.175
87900., 0.200
94150., 0.250
106650., 0.300
119150., 0.350
** FIN - TYPE 304 SST
*MATERIAL, NAME=FIN
*DENSITY
7.5052E-4
*ELASTIC
27.0E6, 0.3

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*PLASTIC
30000., 0.
35000., 0.002
37300., 0.004
38400., 0.006
39400., 0.008
40000., 0.010
42900., 0.020
45400., 0.030
47900., 0.040
50400., 0.050
52900., 0.060
55400., 0.070
57900., 0.080
60400., 0.090
62900., 0.100
69150., 0.125
75400., 0.150
81650., 0.175
87900., 0.200
94150., 0.250
106650., 0.300
119150., 0.350
** TYPE 304 SST, DENSITY NOT ADJUSTED
*MATERIAL, NAME=S304A
*DENSITY
7.5052E-4
*ELASTIC
27.0E6, 0.3
*PLASTIC
30000., 0.
35000., 0.002
37300., 0.004
38400., 0.006
39400., 0.008
40000., 0.010
42900., 0.020
45400., 0.030
47900., 0.040
50400., 0.050
52900., 0.060
55400., 0.070
57900., 0.080
60400., 0.090
62900., 0.100
69150., 0.125
75400., 0.150
81650., 0.175
87900., 0.200
94150., 0.250
106650., 0.300
119150., 0.350
** TYPE 304 SST, DENSITY ADJUSTED TO INCLUDE
FUEL BUNDLE
*MATERIAL, NAME=S304B
*DENSITY
68.65E-4
*ELASTIC
27.0E6, 0.3
*PLASTIC
30000., 0.
35000., 0.002
37300., 0.004
38400., 0.006
39400., 0.008
40000., 0.010
42900., 0.020
45400., 0.030
47900., 0.040
50400., 0.050
52900., 0.060
55400., 0.070
57900., 0.080
60400., 0.090
62900., 0.100
69150., 0.125
75400., 0.150
81650., 0.175
87900., 0.200
94150., 0.250
106650., 0.300
119150., 0.350
** FOR BASKET SPACER DISKS
** ADJUSTING DENSITY TO INCLUDE POISON RODS
AND OTHER PARTS
*MATERIAL, NAME=S216A
*DENSITY
9.5956E-4
*ELASTIC
26.5E6, 0.3
*PLASTIC
60000., 0.
71000., 0.008
75000., 0.018
77300., 0.028
79300., 0.038
87000., 0.078
90500., 0.118
93700., 0.158
96000., 0.198
97800., 0.238
98800., 0.268
99500., 0.288
100000., 0.308
** TYPE 216 SST IS ASSUMED THE SAME AS 317
SST MOD
** USING 317 SST DYNAMIC S-S CURVE
*MATERIAL, NAME=S216
*DENSITY
7.5052E-4
*ELASTIC
26.5E6, 0.3
*PLASTIC
60000., 0.
71000., 0.008
75000., 0.018
77300., 0.028
79300., 0.038
87000., 0.078
90500., 0.118
93700., 0.158
96000., 0.198
97800., 0.238
98800., 0.268
99500., 0.288
100000., 0.308
** RING = TYPE 216 SST (SAME AS 317 SST MOD)
** USING 317 SST DYNAMIC S-S CURVE
*MATERIAL, NAME=RING
*DENSITY
7.5052E-4
*ELASTIC
26.5E6, 0.3
*PLASTIC
60000., 0.
71000., 0.008
75000., 0.018
77300., 0.028

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79300., 0.038
87000., 0.078
90500., 0.118
93700., 0.158
96000., 0.198
97800., 0.238
98800., 0.268
99500., 0.288
100000., 0.308
** DEPLETED URANIUM
** DENSITY = 1175 PCF
*MATERIAL, NAME=DURAN
*DENSITY
1.76E-3
*ELASTIC
26.0E6, 0.3
*PLASTIC
35000., 0.
60000., 0.06
** FUEL BUNDLE TOP/BOTTOM TIE PLATES - TYPE
304 SST
** ELASTIC ONLY, ADJUSTED TO 30 POUNDS/BUNDLE
(TOP AND BOTTOM)
*MATERIAL, NAME=S304F
*DENSITY
1.8145E-4
*ELASTIC
27.0E6, 0.3
***** ZIRCALOY 4 (IRRADIATED 12/2001
data *****
** ZIRCALOY 4 (6.565 g/cc = 0.237 lb/in^3)
**
*MATERIAL, NAME=CLAD
*DENSITY
6.134E-4
*ELASTIC
12.1E6, 0.37
*PLASTIC
104000., 0.
119000., 0.009
** ZIRCALOY 4 CLADDING
** ADJUSTED DENSITY TO HAVE A WEIGHT OF 7.25
POUNDS PER ROD
*MATERIAL, NAME=CLADO
*DENSITY
36.865E-4
*ELASTIC
12.1E6, 0.37
*PLASTIC
104000., 0.
119000., 0.009
** ZIRCALOY 4 CLADDING, ADJUSTED DENSISTY
**
*MATERIAL, NAME=CLADI
*DENSITY
24.922E-4
*ELASTIC
12.1E6, 0.37
*PLASTIC
104000., 0.
119000., 0.009
** ZIRCALOY 4 for GRID SPACERS, ADJUSTED
DENSITY
**
*MATERIAL, NAME=CLADG
*DENSITY
6.849E-4
*ELASTIC
12.1E6, 0.37

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*PLASTIC
104000., 0.
119000., 0.009
** ZIRCALOY 4 for GUIDE AND INST. TUBES,
ADJUSTED DENSITY
**
*MATERIAL, NAME=CLADT
*DENSITY
1.5435E-4
*ELASTIC
12.1E6, 0.37
*PLASTIC
104000., 0.
119000., 0.009
**
** ELEMENT SET DEFINITIONS
**
*ELSET, ELSET=OS
OSB, OSC, OSW
*ELSET, ELSET=DU
DUB, DUC, DUW
*ELSET, ELSET=IS
ISB, ISC, ISW
*ELSET, ELSET=CSKB
ISB, OSB, DUB
*ELSET, ELSET=CSKC
ISC, OSC, DUC
*ELSET, ELSET=CSKW
ISW, OSW, DUW, CFL
*ELSET, ELSET=CSKBD
OS, IS, DU, CFL
*ELSET, ELSET=CSKHD
CHDS, CHDU
*ELSET, ELSET=CASK
CSKBD, CSKHD
*ELSET, ELSET=TF
TFLG, TFST
*ELSET, ELSET=BF
BFLG, BFST
*ELSET, ELSET=RINGB
RING1, RING2
*ELSET, ELSET=RINGT
RING3, RING4
*ELSET, ELSET=RING
RING1, RING2, RING3, RING4
*ELSET, ELSET=BASK
SPDSK, TROD, FCH, FCA, FCB, FCC
*ELSET, ELSET=FAROD
FARO, FARI
*ELSET, ELSET=FAG
FAG1, FAG2, FAG3, FAG4, FAG5, FAG6, FAG7, FAG8, FAG9,
FAG10
*ELSET, ELSET=FUELA
FAROD, FAG, FABM, FATP, TUBEA
*ELSET, ELSET=ALLEL
CASK, BASK, TF, BF, RING, FUELA, FATSPR
**
** NODE SET DEFINITIONS
**
*NSET, NSET=CSKBD
OSB, OSC, WALL
*NSET, NSET=CSKHD
CHD,
*NSET, NSET=CASK
CSKBD, CSKHD
*NSET, NSET=TF
TFLG, TFST
*NSET, NSET=BF
BFLG, BFST

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*NSET, NSET=RINGB	2381, 9581, 200
RING1, RING2	2253, 9053, 200
*NSET, NSET=RINGT	2293, 9093, 200
RING3, RING4	2333, 9533, 200
*NSET, NSET=RING	2373, 9573, 200
RING1, RING2, RING3, RING4	2413, 9613, 200
*NSET, NSET=BASK	** HEAD
SPDSK, TROD, FCH, FCA, FCB, FCC	10501, 10505, 1
*NSET, NSET=FAROD	11001, 11005, 1
FARO, FARS	11501, 11505, 1
*NSET, NSET=FUELA	12001, 12005, 1
FAROD, FABM, FATP	10521, 10561, 20
*NSET, NSET=ALLND	11021, 11061, 20
CASK, BASK, TF, BF, RING, FUELA, FATSPR	11521, 11561, 20
*NSET, NSET=YSYMM, GENERATE	12021, 12061, 20
30000, 30000, 1	10591, 10671, 20
90000, 90000, 1	11091, 11171, 20
** BOTTOM	11591, 11671, 20
1, 5, 1	12091, 12171, 20
501, 505, 1	10221, 12221, 500
1001, 1005, 1	10261, 12261, 500
1501, 1505, 1	11301, 12301, 500
2001, 2005, 1	11341, 12341, 500
21, 61, 20	**
521, 561, 20	10529, 10569, 20
1021, 1061, 20	11029, 11069, 20
1521, 1561, 20	11529, 11569, 20
2021, 2061, 20	12029, 12069, 20
91, 171, 20	10607, 10687, 20
591, 671, 20	11107, 11187, 20
1091, 1171, 20	11607, 11687, 20
1591, 1671, 20	12107, 12187, 20
2091, 2171, 20	10253, 12253, 500
29, 69, 20	10293, 12293, 500
529, 569, 20	11333, 12333, 500
1029, 1069, 20	11373, 12373, 500
1529, 1569, 20	** BOTTOM FINS
2029, 2069, 20	40001, 40115, 1
107, 187, 20	43601, 43715, 1
607, 687, 20	** TOP FINS
1107, 1187, 20	50011, 50155, 1
1607, 1687, 20	53611, 53755, 1
2107, 2187, 20	** RINGS
** BOTTOM CORNER	15041, 15241, 40
221, 2221, 500	15073, 15193, 40
261, 2261, 500	15341, 15541, 40
301, 381, 40	15373, 15493, 40
801, 881, 40	16041, 16241, 40
421, 461, 40	16073, 16193, 40
921, 961, 40	16341, 16541, 40
1301, 1341, 40	16373, 16493, 40
1381, 1461, 40	17041, 17241, 40
1801, 1961, 40	17073, 17193, 40
2301, 2381, 40	17341, 17541, 40
253, 2253, 500	17373, 17493, 40
293, 2293, 500	18041, 18241, 40
333, 413, 40	18073, 18193, 40
833, 913, 40	18341, 18541, 40
453, 493, 40	18373, 18493, 40
953, 993, 40	** SP1
1333, 1373, 40	21002, 21018, 1
1413, 1493, 40	21302, 21318, 1
1833, 1993, 40	20701, 21601, 300
2333, 2413, 40	20719, 21619, 300
** WALL	20951, 21851, 300
2221, 9021, 200	20979, 21879, 300
2261, 9061, 200	** SP2
2301, 9501, 200	22502, 22518, 1
2341, 9541, 200	22802, 22818, 1

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22201, 23101, 300
22219, 23119, 300
22451, 23351, 300
22479, 23379, 300
** SP3
24002, 24018, 1
24302, 24318, 1
23701, 24601, 300
23719, 24619, 300
23951, 24851, 300
23979, 24879, 300
** SP4
25502, 25518, 1
25802, 25818, 1
25201, 26101, 300
25219, 26119, 300
25451, 26351, 300
25479, 26379, 300
** SP5
27002, 27018, 1
27302, 27318, 1
26701, 27601, 300
26719, 27619, 300
26951, 27851, 300
26979, 27879, 300
** SP6
28502, 28518, 1
28802, 28818, 1
28201, 29101, 300
28219, 29119, 300
28451, 29351, 300
28479, 29379, 300
** SP7
30002, 30018, 1
30302, 30318, 1
29701, 30601, 300
29719, 30619, 300
29951, 30851, 300
29979, 30879, 300
** SP8
31502, 31518, 1
31802, 31818, 1
31201, 32101, 300
31219, 32119, 300
31451, 32351, 300
31479, 32379, 300
** SP9
33002, 33018, 1
33302, 33318, 1
32701, 33601, 300
32719, 33619, 300
32951, 33851, 300
32979, 33879, 300
** TOP
33901, 33919, 1
34201, 34219, 1
** CENTRAL FUEL CELL
20408, 34208, 300
20412, 34212, 300
20409, 20411, 1
20709, 20711, 1
*BOUNDARY
90000, 1, 6
YSYMM, YSYMM
*INITIAL CONDITIONS, TYPE=VELOCITY
ALLND, 3, +528.0
*****
** STEP 1
*****

*STEP
*DYNAMIC, EXPLICIT
, 100.0E-3
*RESTART, WRITE, NUMBER INTERVAL=3
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE CASK/FINS/RINGS AND THE TARGET
**
*SURFACE DEFINITION, NAME=TGTOP
TARGET, SPOS
*CONTACT NODE SET, NAME=CKTOP
TF,
CHD4,
*CONTACT PAIR
CKTOP, TGTOP
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE CASK INSIDE SURFACE AND THE BASKET
**
*NSET, NSET=TRODNDB
20545, 20555, 20845, 20855
*NSET, NSET=TRODNDDT
34645, 34655
*NSET, NSET=TRODNDD
TRODNDB,
*NSET, NSET=FCCBEB, GENERATE
20433, 20437, 1
20453, 20457, 1
20473, 20477, 1
20493, 20497, 1
20513, 20517, 1
20533, 20537, 1
*NSET, NSET=FCCBET, GENERATE
20733, 20737, 1
20753, 20757, 1
20773, 20777, 1
20793, 20797, 1
20813, 20817, 1
20833, 20837, 1
*CONTACT NODE SET, NAME=BASKO
SP1RNG, SP2RNG, SP3RNG, SP4RNG, SP5RNG, SP6RNG, SP7
RNG, SP8RNG, SP9RNG
SP1, TOP, TRODNDD, FCABEB, FCABET, FCCBEB, FCCBET, FC
CBEB, FCCBET, FCHBEB, FCHBET
*CONTACT NODE SET, NAME=BASKTP
TOP, TRODNDDT
*ELSET, ELSET=CASKS2, GENERATE
1501, 1718, 1
*ELSET, ELSET=CASKS6, GENERATE
2221, 2252, 1
2421, 2452, 1
2621, 2652, 1
2821, 2852, 1
3021, 3052, 1
3221, 3252, 1
3421, 3452, 1
3621, 3652, 1
3821, 3852, 1
4021, 4052, 1
4221, 4252, 1
4421, 4452, 1
4621, 4652, 1
4821, 4852, 1
5021, 5052, 1
5221, 5252, 1
5421, 5452, 1
5621, 5652, 1
5821, 5852, 1
6021, 6052, 1

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6221, 6252, 1
6421, 6452, 1
6621, 6652, 1
6821, 6852, 1
7021, 7052, 1
7221, 7252, 1
7421, 7452, 1
7621, 7652, 1
7821, 7852, 1
8021, 8052, 1
8221, 8252, 1
8421, 8452, 1
8621, 8652, 1
8821, 8852, 1
*ELSET, ELSET=CASKS6A, GENERATE
10221, 10252, 1
*ELSET, ELSET=CASKS1, GENERATE
10501, 10718, 1
*SURFACE DEFINITION,NAME=CASKI1
CASKS2, S2
CASKS6, S6
*SURFACE DEFINITION,NAME=CASKI2
CASKS1, S1
CASKS6A, S6
*CONTACT PAIR
BASKO, CASKI1
*CONTACT PAIR
BASKTP, CASKI2
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE FUEL ROD OUTER LAYER WITH BOTTOM TIE
PLATE
**
*CONTACT NODE SET,NAME=FAROB,GENERATE
60001, 60056, 1
*SURFACE DEFINITION,NAME=FABMT
FABM, S2
*CONTACT PAIR, INTERACTION=FRTPL
FAROB, FABMT
*SURFACE INTERACTION, NAME=FRTPL
*FRICTION
0.5
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE FUEL ROD OUTER LAYER WITH TOP TIE
PLATE
**
*CONTACT NODE SET,NAME=FAROT,GENERATE
69201, 69256, 1
69401, 69456, 1
*SURFACE DEFINITION,NAME=FATPB
FATP, S1
*CONTACT PAIR, INTERACTION=FRTPL
FAROT, FATPB
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE FUEL CHANNEL A INSIDE SURFACE AND THE
FUEL BUNDLE A
**
*SURFACE DEFINITION,NAME=FCAISH
FCABE, S2
*SURFACE DEFINITION,NAME=FCAISL
FCAR, SPOS
FCAS, SPOS
*CONTACT NODE SET,NAME=FUELA
FUELA,
*CONTACT PAIR
FUELA, FCAISH
FUELA, FCAISL

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*****
*CONTACT NODE SET,NAME=FUELATP
FATP,
*CONTACT PAIR
FUELATP, CASKI2
**
** DEFINE THE CONTACT SURFACES BETWEEN
** OUTER FUEL RODS AND INNER FUEL RODS
**
*CONTACT NODE SET,NAME=FARO
FARO,
*SURFACE DEFINITION,NAME=FARI
FARI, SNEG
*CONTACT PAIR
FARO, FARI
*****
** FA FUEL ASSEMBLY INTERNALS (TOP)
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE CASK HEAD FUEL ASSEMBLY SPACER AND
HEAD
**
*SURFACE DEFINITION,NAME=FATSPTHD
FATSPR2, S2
*CONTACT PAIR, ADJUST=0.1, TIED
FATSPTHD, CASKI2
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE CASK HEAD FUEL ASSEMBLY SPACER AND
FUELA TOP
**
*SURFACE DEFINITION,NAME=FATSPTF A
FATSPR1, S1
*SURFACE DEFINITION,NAME=FATPT
FATP, S2
*CONTACT PAIR, WEIGHT=0.5
FATSPTF A, FATPT
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE FUEL CHANNEL A INSIDE SURFACE AND TOP
SPACER A
**
*ELSET, ELSET=FCATFASP, GENERATE
33623, 33626, 1
33663, 33666, 1
33643, 33646, 1
33703, 33706, 1
33683, 33684, 1
33923, 33926, 1
33963, 33966, 1
33943, 33946, 1
34003, 34006, 1
33983, 33984, 1
*SURFACE DEFINITION,NAME=FCATFASP
FCATFASP, SPOS
*CONTACT NODE SET,NAME=FATSPR
FATSPR,
*CONTACT PAIR
FATSPR, FCATFASP
*****
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE BOTTOM FINS AND THE CASK BOTTOM
**
*ELSET, ELSET=OSWS4, GENERATE
2341, 2372, 1
2541, 2572, 1

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*SURFACE DEFINITION, NAME=BOSTBF

OSB,S1

OSC,S1

OSWS4,S4

*NSET, NSET=BFTBOS, GENERATE

40101, 40115, 1

40501, 40515, 1

40701, 40715, 1

40901, 40915, 1

41101, 41115, 1

41301, 41315, 1

41501, 41515, 1

41701, 41715, 1

41901, 41915, 1

42101, 42115, 1

42301, 42315, 1

42501, 42515, 1

42701, 42715, 1

42901, 42915, 1

43101, 43115, 1

43301, 43315, 1

43501, 43515, 1

43701, 43715, 1

**

45351, 45360, 1

45451, 45460, 1

45551, 45560, 1

45651, 45660, 1

45751, 45760, 1

45851, 45860, 1

45951, 45960, 1

46051, 46060, 1

46151, 46160, 1

46251, 46260, 1

46351, 46360, 1

46451, 46460, 1

46551, 46560, 1

46651, 46660, 1

46751, 46760, 1

46851, 46860, 1

*CONTACT NODE SET, NAME=BFTBOS

BFTBOS,

*CONTACT PAIR, ADJUST=0.5, TIED

BFTBOS, BOSTBF

**

** DEFINE THE CONTACT SURFACES BETWEEN

** THE TOP FINS AND THE CASK TOP HEAD

**

*ELSET, ELSET=HDS2, GENERATE

11501, 11832, 1

*ELSET, ELSET=HDS4, GENERATE

10801, 10832, 1

11301, 11332, 1

11801, 11832, 1

*SURFACE DEFINITION, NAME=HDTTF

HDS2,S2

HDS4,S4

*NSET, NSET=TFTHD, GENERATE

50011, 50051, 20

50061, 50071, 1

50411, 50451, 20

50461, 50471, 1

50611, 50651, 20

50661, 50671, 1

50811, 50851, 20

50861, 50871, 1

51011, 51051, 20

51061, 51071, 1

51211, 51251, 20

51261, 51271, 1

51411, 51451, 20

51461, 51471, 1

51611, 51651, 20

51661, 51671, 1

51811, 51851, 20

51861, 51871, 1

52011, 52051, 20

52061, 52071, 1

52211, 52251, 20

52261, 52271, 1

52411, 52451, 20

52461, 52471, 1

52611, 52651, 20

52661, 52671, 1

52811, 52851, 20

52861, 52871, 1

53011, 53051, 20

53061, 53071, 1

53211, 53251, 20

53261, 53271, 1

53411, 53451, 20

53461, 53471, 1

53611, 53651, 20

53661, 53671, 1

**

55306, 55326, 10

55331, 55336, 1

55406, 55426, 10

55431, 55436, 1

55506, 55526, 10

55531, 55536, 1

55606, 55626, 10

55631, 55636, 1

55706, 55726, 10

55731, 55736, 1

55806, 55826, 10

55831, 55836, 1

55906, 55926, 10

55931, 55936, 1

56006, 56026, 10

56031, 56036, 1

56106, 56126, 10

56131, 56136, 1

56206, 56226, 10

56231, 56236, 1

56306, 56326, 10

56331, 56336, 1

56406, 56426, 10

56431, 56436, 1

56506, 56526, 10

56531, 56536, 1

56606, 56626, 10

56631, 56636, 1

56706, 56726, 10

56731, 56736, 1

56806, 56826, 10

56831, 56836, 1

*CONTACT NODE SET, NAME=TFTHD

TFTHD,

*CONTACT PAIR, ADJUST=0.5, TIED

TFTHD, HDTTF

**

** DEFINE THE CONTACT SURFACES BETWEEN

** THE TOP FINS THEMSELVES

**

*SURFACE DEFINITION, NAME=TFLG1

TFLG1,

*SURFACE DEFINITION, NAME=TFLG2

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```
TFLG2,
*SURFACE DEFINITION, NAME=TFLG3
TFLG3,
*SURFACE DEFINITION, NAME=TFLG4
TFLG4,
*SURFACE DEFINITION, NAME=TFLG5
TFLG5,
*SURFACE DEFINITION, NAME=TFLG6
TFLG6,
*SURFACE DEFINITION, NAME=TFLG7
TFLG7,
*SURFACE DEFINITION, NAME=TFLG8
TFLG8,
*SURFACE DEFINITION, NAME=TFLG9
TFLG9,
*SURFACE DEFINITION, NAME=TFST1
TFST1,
*SURFACE DEFINITION, NAME=TFST2
TFST2,
*SURFACE DEFINITION, NAME=TFST3
TFST3,
*SURFACE DEFINITION, NAME=TFST4
TFST4,
*SURFACE DEFINITION, NAME=TFST5
TFST5,
*SURFACE DEFINITION, NAME=TFST6
TFST6,
*SURFACE DEFINITION, NAME=TFST7
TFST7,
*SURFACE DEFINITION, NAME=TFST8
TFST8,
*CONTACT PAIR, WEIGHT=0.5
TFLG1,TFST1
*CONTACT PAIR, WEIGHT=0.5
TFST1,TFLG2
*CONTACT PAIR, WEIGHT=0.5
TFLG2,TFST2
*CONTACT PAIR, WEIGHT=0.5
TFST2,TFLG3
*CONTACT PAIR, WEIGHT=0.5
TFLG3,TFST3
*CONTACT PAIR, WEIGHT=0.5
TFST3,TFLG4
*CONTACT PAIR, WEIGHT=0.5
TFLG4,TFST4
*CONTACT PAIR, WEIGHT=0.5
TFST4,TFLG5
*CONTACT PAIR, WEIGHT=0.5
TFLG5,TFST5
*CONTACT PAIR, WEIGHT=0.5
TFST5,TFLG6
*CONTACT PAIR, WEIGHT=0.5
TFLG6,TFST6
*CONTACT PAIR, WEIGHT=0.5
TFST6,TFLG7
*CONTACT PAIR, WEIGHT=0.5
TFLG7,TFST7
*CONTACT PAIR, WEIGHT=0.5
TFST7,TFLG8
*CONTACT PAIR, WEIGHT=0.5
TFLG8,TFST8
*CONTACT PAIR, WEIGHT=0.5
TFST8,TFLG9
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE BOTTOM FINS THEMSELVES
**
*SURFACE DEFINITION, NAME=BFLG1
BFLG1,
```

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*SURFACE DEFINITION, NAME=BFLG2
BFLG2,
*SURFACE DEFINITION, NAME=BFLG3
BFLG3,
*SURFACE DEFINITION, NAME=BFLG4
BFLG4,
*SURFACE DEFINITION, NAME=BFLG5
BFLG5,
*SURFACE DEFINITION, NAME=BFLG6
BFLG6,
*SURFACE DEFINITION, NAME=BFLG7
BFLG7,
*SURFACE DEFINITION, NAME=BFLG8
BFLG8,
*SURFACE DEFINITION, NAME=BFLG9
BFLG9,
*SURFACE DEFINITION, NAME=BFST1
BFST1,
*SURFACE DEFINITION, NAME=BFST2
BFST2,
*SURFACE DEFINITION, NAME=BFST3
BFST3,
*SURFACE DEFINITION, NAME=BFST4
BFST4,
*SURFACE DEFINITION, NAME=BFST5
BFST5,
*SURFACE DEFINITION, NAME=BFST6
BFST6,
*SURFACE DEFINITION, NAME=BFST7
BFST7,
*SURFACE DEFINITION, NAME=BFST8
BFST8,
*CONTACT PAIR, WEIGHT=0.5
BFLG1,BFST1
*CONTACT PAIR, WEIGHT=0.5
BFST1,BFLG2
*CONTACT PAIR, WEIGHT=0.5
BFLG2,BFST2
*CONTACT PAIR, WEIGHT=0.5
BFST2,BFLG3
*CONTACT PAIR, WEIGHT=0.5
BFLG3,BFST3
*CONTACT PAIR, WEIGHT=0.5
BFST3,BFLG4
*CONTACT PAIR, WEIGHT=0.5
BFLG4,BFST4
*CONTACT PAIR, WEIGHT=0.5
BFST4,BFLG5
*CONTACT PAIR, WEIGHT=0.5
BFLG5,BFST5
*CONTACT PAIR, WEIGHT=0.5
BFST5,BFLG6
*CONTACT PAIR, WEIGHT=0.5
BFLG6,BFST6
*CONTACT PAIR, WEIGHT=0.5
BFST6,BFLG7
*CONTACT PAIR, WEIGHT=0.5
BFLG7,BFST7
*CONTACT PAIR, WEIGHT=0.5
BFST7,BFLG8
*CONTACT PAIR, WEIGHT=0.5
BFLG8,BFST8
*CONTACT PAIR, WEIGHT=0.5
BFST8,BFLG9
**
** DEFINE THE CONTACT SURFACES BETWEEN
** THE TOP FINS AND RING 4
**
*NSSET, NSSET=TFTRING4, GENERATE
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```
50012, 50015, 1
50412, 50415, 1
50612, 50615, 1
50812, 50815, 1
51012, 51015, 1
51212, 51215, 1
51412, 51415, 1
51612, 51615, 1
51812, 51815, 1
52012, 52015, 1
52212, 52215, 1
52412, 52415, 1
52612, 52615, 1
52812, 52815, 1
53012, 53015, 1
53212, 53215, 1
53412, 53415, 1
53612, 53615, 1
**
55307, 55310, 1
55407, 55410, 1
55507, 55510, 1
55607, 55610, 1
55707, 55710, 1
55807, 55810, 1
55907, 55910, 1
56007, 56010, 1
56107, 56110, 1
56207, 56210, 1
56307, 56310, 1
56407, 56410, 1
56507, 56510, 1
56607, 56610, 1
56707, 56710, 1
56807, 56810, 1
*SURFACE DEFINITION, NAME=RING4TTF
RING4, S2
*CONTACT NODE SET, NAME=TFTRING4
TFTRING4,
*CONTACT PAIR
TFTRING4, RING4TTF
*****
**      OUTPUT DATA
*****
*NSET, NSET=RFORCE
90000,
*NSET, NSET=DISP
5781, 5797, 5813
21001, 21019, 21230
34201, 34219, 34230
62001, 63201, 62008, 63208, 62015, 63215, 62022, 632
22
62029, 63229, 62036, 63236, 62043, 63243, 62050, 632
50
*HISTORY OUTPUT, TIME=1.E-4
*NODE HISTORY, NSET=RFORCE
RF,
*NODE HISTORY, NSET=DISP
A, V, U
*ENERGY HISTORY
ALLKE,
*FILE OUTPUT, NUMBER INTERVAL=100
*NODE FILE, NSET=RFORCE
RF,
*MONITOR, NODE=5797, DOF=3
*END STEP
```

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E-8.5.2.4 IF-300 Cask Impact Analysis 30-ft Center-of-Gravity-over-Top-Corner Drop

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*HEADING
IF-300 CASK IMPACT ANALYSIS
12/22/01
FILE=IFBTC301 (excluding contact surfaces of
fa bottom spacer)

2001 model with modified Zircaloy data

*****
** CASK BOTTOM
*****
*NODE, SYSTEM=R
*NODE, NSET=OSB1
1, -3.0000, 0.0000, 0.0000
2, -1.5000, 0.0000, 0.0000
3, 0.0000, 0.0000, 0.0000
4, 1.5000, 0.0000, 0.0000
5, 3.0000, 0.0000, 0.0000
6, -2.7000, 1.2000, 0.0000
7, -1.3500, 1.3500, 0.0000
8, 0.0000, 1.5000, 0.0000
9, 1.3500, 1.3500, 0.0000
10, 2.7000, 1.2000, 0.0000
11, -2.4000, 2.4000, 0.0000
12, -1.2000, 2.7000, 0.0000
13, 0.0000, 3.0000, 0.0000
14, 1.2000, 2.7000, 0.0000
15, 2.4000, 2.4000, 0.0000
21, 4.5625, 0.0000, 0.0000
22, 4.1794, 1.7720, 0.0000
23, 3.3655, 3.3655, 0.0000
24, 1.7720, 4.1794, 0.0000
25, 0.0000, 4.5625, 0.0000
26, -1.7720, 4.1794, 0.0000
27, -3.3655, 3.3655, 0.0000
28, -4.1794, 1.7720, 0.0000
29, -4.5625, 0.0000, 0.0000
*NODE, NSET=OSB2
41, 6.1250, 0.0000, 0.0000
61, 8.0750, 0.0000, 0.0000
*NCOPY,SHIFT,MULTIPLE=8,CHANGE NU=+1,OLD
SET=OSB2,NEW SET=OSB2
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +22.50
*NODE, NSET=OSB3
91, 10.0250, 0.0000, 0.0000
111, 11.9750, 0.0000, 0.0000
131, 13.9250, 0.0000, 0.0000
151, 15.8750, 0.0000, 0.0000
171, 17.2975, 0.0000, 0.0000
*NCOPY,SHIFT,MULTIPLE=16,CHANGE NU=+1,OLD
SET=OSB3,NEW SET=OSB3
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +11.25
*NODE, NSET=OSB4
221, 18.7500, 0.0000, 0.0000
*NCOPY,SHIFT,MULTIPLE=32,CHANGE NU=+1,OLD
SET=OSB4,NEW SET=OSB4
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +5.625
*NSET, NSET=OSB3
OSB1, OSB2, OSB3, OSB4
*NCOPY,SHIFT,CHANGE NU=+500,OLD SET=OSBB,NEW
SET=OSBU1
0.0, 0.0, 1.563

0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+500,OLD SET=OSBU1,NEW
SET=OSBU2
0.0, 0.0, 1.9375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+500,OLD SET=OSBU2,NEW
SET=OSBU3
0.0, 0.0, 1.9375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+500,OLD SET=OSBU3,NEW
SET=OSBT
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=OSB
OSBB,OSBU1,OSBU2,OSBU3,OSBT
*****
*ELEMENT, TYPE=C3D8R, ELSET=OSB1
1, 1, 2, 7, 6, 501, 502, 507, 506
*ELGEN, ELSET=OSB1
1, 4, 1, 1, 2, 5, 4
*ELEMENT, TYPE=C3D8R, ELSET=OSB1
9, 5, 21, 22, 10, 505, 521, 522, 510
10, 10, 22, 23, 15, 510, 522, 523, 515
11, 15, 23, 24, 14, 515, 523, 524, 514
12, 14, 24, 25, 13, 514, 524, 525, 513
13, 13, 25, 26, 12, 513, 525, 526, 512
14, 12, 26, 27, 11, 512, 526, 527, 511
15, 11, 27, 28, 6, 511, 527, 528, 506
16, 6, 28, 29, 1, 506, 528, 529, 501
*ELEMENT, TYPE=C3D8R
21, 21, 41, 42, 22, 521, 541, 542, 522
*ELGEN, ELSET=OSB2
21, 8, 1, 1, 2, 20, 20
*ELEMENT, TYPE=C3D6, ELSET=OSB3
61, 61, 91, 92, 561, 591, 592
62, 61, 92, 62, 561, 592, 562
63, 62, 92, 93, 562, 592, 593
64, 62, 93, 94, 562, 593, 594
65, 62, 94, 63, 562, 594, 563
66, 63, 94, 95, 563, 594, 595
67, 63, 95, 96, 563, 595, 596
68, 63, 96, 64, 563, 596, 564
69, 64, 96, 97, 564, 596, 597
70, 64, 97, 98, 564, 597, 598
71, 64, 98, 65, 564, 598, 565
72, 65, 98, 99, 565, 598, 599
73, 65, 99, 100, 565, 599, 600
74, 65, 100, 66, 565, 600, 566
75, 66, 100, 101, 566, 600, 601
76, 66, 101, 102, 566, 601, 602
77, 66, 102, 67, 566, 602, 567
78, 67, 102, 103, 567, 602, 603
79, 67, 103, 104, 567, 603, 604
80, 67, 104, 68, 567, 604, 568
81, 68, 104, 105, 568, 604, 605
82, 68, 105, 106, 568, 605, 606
83, 68, 106, 69, 568, 606, 569
84, 69, 106, 107, 569, 606, 607
*ELEMENT, TYPE=C3D8R
91, 91, 111, 112, 92, 591, 611, 612, 592
*ELGEN, ELSET=OSB3
91, 16, 1, 1, 4, 20, 20
*ELEMENT, TYPE=C3D6, ELSET=OSB4
171, 171, 221, 222, 671, 721, 722
172, 171, 222, 172, 671, 722, 672
173, 172, 222, 223, 672, 722, 723

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174, 172, 223, 224, 672, 723, 724
175, 172, 224, 173, 672, 724, 673
176, 173, 224, 225, 673, 724, 725
177, 173, 225, 226, 673, 725, 726
178, 173, 226, 174, 673, 726, 674
179, 174, 226, 227, 674, 726, 727
180, 174, 227, 228, 674, 727, 728
181, 174, 228, 175, 674, 728, 675
182, 175, 228, 229, 675, 728, 729
183, 175, 229, 230, 675, 729, 730
184, 175, 230, 176, 675, 730, 676
185, 176, 230, 231, 676, 730, 731
186, 176, 231, 232, 676, 731, 732
187, 176, 232, 177, 676, 732, 677
188, 177, 232, 233, 677, 732, 733
189, 177, 233, 234, 677, 733, 734
190, 177, 234, 178, 677, 734, 678
191, 178, 234, 235, 678, 734, 735
192, 178, 235, 236, 678, 735, 736
193, 178, 236, 179, 678, 736, 679
194, 179, 236, 237, 679, 736, 737
195, 179, 237, 238, 679, 737, 738
196, 179, 238, 180, 679, 738, 680
197, 180, 238, 239, 680, 738, 739
198, 180, 239, 240, 680, 739, 740
199, 180, 240, 181, 680, 740, 681
200, 181, 240, 241, 681, 740, 741
201, 181, 241, 242, 681, 741, 742
202, 181, 242, 182, 681, 742, 682
203, 182, 242, 243, 682, 742, 743
204, 182, 243, 244, 682, 743, 744
205, 182, 244, 183, 682, 744, 683
206, 183, 244, 245, 683, 744, 745
207, 183, 245, 246, 683, 745, 746
208, 183, 246, 184, 683, 746, 684
209, 184, 246, 247, 684, 746, 747
210, 184, 247, 248, 684, 747, 748
211, 184, 248, 185, 684, 748, 685
212, 185, 248, 249, 685, 748, 749
213, 185, 249, 250, 685, 749, 750
214, 185, 250, 186, 685, 750, 686
215, 186, 250, 251, 686, 750, 751
216, 186, 251, 252, 686, 751, 752
217, 186, 252, 187, 686, 752, 687
218, 187, 252, 253, 687, 752, 753
*ELSET, ELSET=OSB
OSB1, OSB2, OSB3, OSB4
*ELCOPY, OLD SET=OSB, NEW SET=DUB1, ELEMENT
SH=500, SHIFT NOD=500
*ELCOPY, OLD SET=DUB1, NEW SET=DUB2, ELEMENT
SH=500, SHIFT NOD=500
*ELCOPY, OLD SET=DUB2, NEW SET=ISB, ELEMENT
SH=500, SHIFT NOD=500
*ELSET, ELSET=DUB
DUB1, DUB2
*SOLID SECTION, ELSET=OSB, MATERIAL=S304
*SOLID SECTION, ELSET=ISB, MATERIAL=S304
*SOLID SECTION, ELSET=DUB, MATERIAL=DURAN
*****
** CASK BOTTOM CORNER
*****
*NODE, NSET=OSBC
261, 19.2800, 0.0000, 0.0000
301, 21.5168, 0.0000, 0.4141
341, 23.2817, 0.0000, 1.5933
381, 24.4609, 0.0000, 3.3582
761, 19.2800, 0.0000, 1.5630
801, 20.9198, 0.0000, 1.8553
841, 22.1786, 0.0000, 2.6964
881, 23.0197, 0.0000, 3.9552
421, 19.2800, 0.0000, 2.5323
461, 20.5477, 0.0000, 2.7536
921, 21.5590, 0.0000, 3.3160
961, 22.1214, 0.0000, 4.3273
1261, 19.2800, 0.0000, 3.5005
1301, 20.2880, 0.0000, 3.5016
1341, 21.1098, 0.0000, 3.7653
1381, 19.2800, 0.0000, 4.4698
1421, 20.2880, 0.0000, 4.4708
1461, 21.2960, 0.0000, 4.4708
*NCOPY, SHIFT, MULTIPLE=32, CHANGE NU=+1, OLD
SET=OSBC, NEW SET=OSBC
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +5.625
**
*NODE, NSET=WBS1
1761, 19.2800, 0.0000, 5.4400
1801, 20.2880, 0.0000, 5.4400
1841, 21.2960, 0.0000, 5.4400
1881, 22.3040, 0.0000, 5.4400
1921, 23.3120, 0.0000, 5.4400
1961, 24.8750, 0.0000, 5.4400
*NCOPY, SHIFT, MULTIPLE=32, CHANGE NU=+1, OLD
SET=WBS1, NEW SET=WBS1
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +5.625
*NODE, NSET=WBS2
2261, 19.2800, 0.0000, 6.6900
2301, 21.2960, 0.0000, 6.6900
2341, 23.3120, 0.0000, 6.6900
2381, 24.8750, 0.0000, 6.6900
*NCOPY, SHIFT, MULTIPLE=32, CHANGE NU=+1, OLD
SET=WBS2, NEW SET=WBS2
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +5.625
*NSET, NSET=OSBC
OSBC, WBS1, WBS2
*NSET, NSET=WIS1, GENERATE
2221, 2253, 1
*NSET, NSET=WBASE
WIS1, WBS2
*****
*ELEMENT, TYPE=C3D8R
221, 221, 261, 262, 222, 721, 761, 762, 722
381, 381, 1961, 1962, 382, 881, 1921, 1922,
882
1961, 1961, 2381, 2382, 1962, 1921, 2341, 2342,
1922
761, 761, 801, 802, 762, 421, 461, 462, 422
801, 801, 841, 842, 802, 461, 921, 922, 462
841, 841, 881, 882, 842, 921, 961, 962, 922
881, 881, 1921, 1922, 882, 961, 1881, 1882,
962
421, 421, 461, 462, 422, 1261, 1301, 1302,
1262
461, 461, 921, 922, 462, 1301, 1341, 1342,
1302
921, 921, 961, 962, 922, 1341, 1461, 1462,
1342
961, 961, 1881, 1882, 962, 1461, 1841, 1842,
1462
1261, 1261, 1301, 1302, 1262, 1381, 1421,
1422, 1382
1381, 1381, 1421, 1422, 1382, 1761, 1801,
1802, 1762
1721, 1721, 1761, 1762, 1722, 2221, 2261,
2262, 2222
*ELEMENT, TYPE=C3D6

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721, 722, 762, 422, 721, 761, 421
1221, 722, 422, 1222, 721, 421, 1221
2001, 422, 1262, 1222, 421, 1261, 1221
2041, 1222, 1262, 1382, 1221, 1261, 1381
2081, 1222, 1382, 1722, 1221, 1381, 1721
2121, 1382, 1762, 1722, 1381, 1761, 1721
**
2161, 1762, 1802, 2262, 1761, 1801, 2261
1761, 1802, 2302, 2262, 1801, 2301, 2261
1801, 1802, 1842, 2302, 1801, 1841, 2301
1841, 1842, 1882, 2302, 1841, 1881, 2301
1881, 1882, 2342, 2302, 1881, 2341, 2301
1921, 1882, 1922, 2342, 1881, 1921, 2341
*ELGEN, ELSET=OSC
221, 32, 1, 1, 4, 40, 40
381, 32, 1, 1
1961, 32, 1, 1
*ELGEN, ELSET=DUC
761, 32, 1, 1
801, 32, 1, 1
841, 32, 1, 1
881, 32, 1, 1
421, 32, 1, 1
461, 32, 1, 1
921, 32, 1, 1
961, 32, 1, 1
1261, 32, 1, 1, 2, 40, 40
1381, 32, 1, 1, 2, 40, 40
721, 32, 1, 1
1221, 32, 1, 1
2001, 32, 1, 1
2041, 32, 1, 1
2081, 32, 1, 1
2121, 32, 1, 1
2161, 32, 1, 1
1761, 32, 1, 1
1801, 32, 1, 1
1841, 32, 1, 1
1881, 32, 1, 1
1921, 32, 1, 1
*ELGEN, ELSET=ISC
1721, 32, 1, 1
*SOLID SECTION, ELSET=OSC, MATERIAL=S304
*SOLID SECTION, ELSET=ISC, MATERIAL=S304
*SOLID SECTION, ELSET=DUC, MATERIAL=DURAN
*****
** CASK WALL
*****
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=WBASE,NEW
SET=W1
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+400,OLD SET=W1,NEW
SET=W2
0.0, 0.0, 6.935
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFill, NSET=W2A
W1, W2, 2, 200
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=W2,NEW
SET=W3
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+800,OLD SET=W3,NEW
SET=W4
0.0, 0.0, 15.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFill, NSET=W4A
W3, W4, 4, 200

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*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=W4,NEW
SET=W5
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+4000,OLD SET=W5,NEW
SET=W6
0.0, 0.0, 123.93
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFill, NSET=W6A
W5, W6, 20, 200
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=W6,NEW
SET=W7
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+600,OLD SET=W7,NEW
SET=W8
0.0, 0.0, 12.625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFill, NSET=W8A
W7, W8, 3, 200
*NODE, NSET=W9
9021, 18.7500, 0.0000, 174.0550
9061, 19.6750, 0.0000, 174.0550
9101, 20.6000, 0.0000, 174.0550
9141, 22.7375, 0.0000, 174.0550
9181, 24.8750, 0.0000, 174.0550
*NCOPY,SHIFT,MULTIPLE=32,CHANGE NU=+1,OLD
SET=W9,NEW SET=W9
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +5.625
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=W9,NEW
SET=W10
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=W10,NEW
SET=W11
0.0, 0.0, 0.875
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
***** MODIFY NODES TO ACCEPT STRUCTURAL RINGS
*NODE, NSET=WMOD1
2981, 24.8750, 0.0000, 14.0110
2982, 24.7552, 2.4382, 14.0215
2983, 24.3970, 4.8529, 14.0529
2984, 23.8039, 7.2208, 14.1048
2985, 22.9815, 9.5193, 14.1767
2986, 21.9378, 11.7260, 14.2680
2987, 20.6828, 13.8198, 14.3778
2988, 19.2286, 15.7805, 14.5050
2989, 17.5893, 17.5893, 14.6485
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=WMOD1,NEW
SET=WMOD1A
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NODE, NSET=WMOD2
3981, 24.8750, 0.0000, 32.7390
3982, 24.7552, 2.4382, 32.7285
3983, 24.3970, 4.8529, 32.6971
3984, 23.8039, 7.2208, 32.6452
3985, 22.9815, 9.5193, 32.5733
3986, 21.9378, 11.7260, 32.4820
3987, 20.6828, 13.8198, 32.3722
3988, 19.2286, 15.7805, 32.2450
3989, 17.5893, 17.5893, 32.1015
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=WMOD2,NEW
SET=WMOD2A
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
**
*NODE, NSET=WMOD3

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8181, 24.8750, 0.0000, 156.1910
8182, 24.7552, 2.4382, 156.2015
8183, 24.3970, 4.8529, 156.2329
8184, 23.8039, 7.2208, 156.2848
8185, 22.9815, 9.5193, 156.3567
8186, 21.9378, 11.7260, 156.4480
8187, 20.6828, 13.8198, 156.5578
8188, 19.2286, 15.7805, 156.6850
8189, 17.5893, 17.5893, 156.8285
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=WMOD3,NEW
SET=WMOD3A
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
**
*NODE, NSET=WMOD4
9181, 24.8750, 0.0000, 174.9190
9182, 24.7552, 2.4382, 174.9085
9183, 24.3970, 4.8529, 174.8771
9184, 23.8039, 7.2208, 174.8252
9185, 22.9815, 9.5193, 174.7533
9186, 21.9378, 11.7260, 174.6620
9187, 20.6828, 13.8198, 174.5522
9188, 19.2286, 15.7805, 174.4250
9189, 17.5893, 17.5893, 174.2815
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=WMOD4,NEW
SET=WMOD4A
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=WMOD
WMOD1A, WMOD2A, WMOD3A, WMOD4A
*NSET, NSET=WALL
W1,W2A,W3,W4A,W5,W6A,W7,W8A,W9,W10,W11,WMOD
*****
*ELEMENT, TYPE=C3D8R
2221, 2221, 2261, 2262, 2222, 2421, 2461,
2462, 2422
*ELGEN, ELSET=ISW
2221, 32, 1, 1, 33, 200, 200
**
*ELEMENT, TYPE=C3D8R
2261, 2261, 2301, 2302, 2262, 2461, 2501,
2502, 2462
*ELGEN, ELSET=DUW
2261, 32, 1, 1, 2, 40, 40, 33, 200, 200
**
*ELEMENT, TYPE=C3D8R
2341, 2341, 2381, 2382, 2342, 2541, 2581,
2582, 2542
*ELGEN, ELSET=OSW
2341, 32, 1, 1, 33, 200, 200
*SOLID SECTION, ELSET=OSW, MATERIAL=S317
*SOLID SECTION, ELSET=DUW, MATERIAL=DURAN
*SOLID SECTION, ELSET=ISW, MATERIAL=S216
*****
** CASK FLANGE
*****
*ELEMENT, TYPE=C3D8R
8821, 8821, 8861, 8862, 8822, 9021, 9061,
9062, 9022
9101, 9101, 9141, 9142, 9102, 9301, 9341,
9342, 9302
*ELGEN, ELSET=CFL
8821, 32, 1, 1, 4, 40, 40
9101, 32, 1, 1, 2, 40, 40, 2, 200, 200
*SOLID SECTION, ELSET=CFL, MATERIAL=S304
*****
** CASK HEAD
*****

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*NCOPY,SHIFT,CHANGE NU=+10000,OLD
SET=OSBB,NEW SET=CHDB0
0.0, 0.0, 174.43
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NODE, NSET=CHDB1
10221, 18.7500, 0.0000, 174.4300
10261, 20.6000, 0.0000, 174.4300
10301, 22.7375, 0.0000, 174.4300
10341, 24.8750, 0.0000, 174.4300
*NCOPY,SHIFT,MULTIPLE=32,CHANGE NU=+1,OLD
SET=CHDB1,NEW SET=CHDB1
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +5.625
*NSET, NSET=CHDB
CHDB0, CHDB1
*NCOPY,SHIFT,CHANGE NU=+500,OLD SET=CHDB,NEW
SET=CHD1
0.0, 0.0, 1.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+500,OLD SET=CHD1,NEW
SET=CHD2
0.0, 0.0, 1.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+500,OLD SET=CHD2,NEW
SET=CHD3
0.0, 0.0, 3.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+500,OLD SET=CHD3,NEW
SET=CHD4
0.0, 0.0, 2.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=CHD
CHDB, CHD1, CHD2, CHD3, CHD4
*****
*ELEMENT, TYPE=C3D8R
10221, 10221, 10261, 10262, 10222, 10721,
9501, 9502, 10722
10721, 10721, 9501, 9502, 10722, 11221,
11261, 11262, 11222
10761, 9501, 9541, 9542, 9502, 11261, 11301,
11302, 11262
11221, 11221, 11261, 11262, 11222, 11721,
11761, 11762, 11722
*ELGEN, ELSET=CHD1
10221, 32, 1, 1
10721, 32, 1, 1
10761, 32, 1, 1, 2, 40, 40
11221, 32, 1, 1, 3, 40, 40, 2, 500, 500
*ELCOPY,OLD SET=OSB,NEW SET=CHDB,ELEMENT
SH=10500,SHIFT NOD=10500
*ELCOPY,OLD SET=CHDB,NEW SET=CHDU,ELEMENT
SH=500,SHIFT NOD=500
*ELCOPY,OLD SET=CHDU,NEW SET=CHDT,ELEMENT
SH=500,SHIFT NOD=500
*ELSET, ELSET=CHDS
CHD1, CHDB, CHDT
*SOLID SECTION, ELSET=CHDS, MATERIAL=S304
*SOLID SECTION, ELSET=CHDU, MATERIAL=DURAN
*****
** CASK HEAD TOP FUEL CHANNEL SPACER (A)
*****
*NODE, NSET=FATSPR1
13001, -14.3000, 1.3500, 171.9300
13002, -10.3000, 1.3500, 171.9300
13003, -6.3000, 1.3500, 171.9300
13004, -6.3000, 5.3500, 171.9300
13005, -6.3000, 9.3500, 171.9300
13006, -10.3000, 9.3500, 171.9300
13007, -14.3000, 9.3500, 171.9300

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13008, -14.3000, 5.3500, 171.9300
13011, -13.3334, 2.3666, 171.9300
13012, -10.3000, 1.9593, 171.9300
13013, -7.3166, 2.3666, 171.9300
13014, -6.9093, 5.3500, 171.9300
13015, -7.3166, 8.3334, 171.9300
13016, -10.3000, 8.7408, 171.9300
13017, -13.3334, 8.3334, 171.9300
13018, -13.6908, 5.3500, 171.9300
13021, -12.2668, 3.3832, 171.9300
13022, -10.3000, 2.5685, 171.9300
13023, -8.3332, 3.3832, 171.9300
13024, -7.5185, 5.3500, 171.9300
13025, -8.3332, 7.3168, 171.9300
13026, -10.3000, 8.1315, 171.9300
13027, -12.2668, 7.3168, 171.9300
13028, -13.0815, 5.3500, 171.9300
13031, -12.0017, 3.6483, 171.9300
13032, -10.3000, 2.9435, 171.9300
13033, -8.5983, 3.6483, 171.9300
13034, -7.8935, 5.3500, 171.9300
13035, -8.5983, 7.0517, 171.9300
13036, -10.3000, 7.7565, 171.9300
13037, -12.0017, 7.0517, 171.9300
13038, -12.7065, 5.3500, 171.9300
13040, -10.3000, 5.3500, 171.9300
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FATSPR1,NEW SET=FATSPR2
0.0, 0.0, 0.375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FATSPR2,NEW SET=FATSPR3
0.0, 0.0, 0.5416
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FATSPR3,NEW SET=FATSPR4
0.0, 0.0, 0.5416
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FATSPR4,NEW SET=FATSPR5
0.0, 0.0, 0.5416
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FATSPR5,NEW SET=FATSPR6
0.0, 0.0, 0.5416
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FATSPR6,NEW SET=FATSPR7
0.0, 0.0, 0.5416
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FATSPR7,NEW SET=FATSPR8
0.0, 0.0, 0.5420
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+50,OLD
SET=FATSPR8,NEW SET=FATSPR9
0.0, 0.0, 0.625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FATSPR
FATSPR1, FATSPR2, FATSPR3, FATSPR4, FATSPR5, FATSP
R6, FATSPR7, FATSPR8, FATSPR9
*****
*ELEMENT, TYPE=C3D8R, ELSET=FATSPR1
13001, 13001, 13002, 13012, 13011, 13051,
13052, 13062, 13061
13008, 13008, 13001, 13011, 13018, 13058,
13051, 13061, 13068
*ELGEN, ELSET=FATSPR1
13001, 7, 1, 1, 3, 10, 10

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13008, 3, 10, 10
*ELEMENT, TYPE=C3D6, ELSET=FATSPR1
13031, 13031, 13032, 13040, 13081, 13082,
13090
13032, 13032, 13033, 13040, 13082, 13083,
13090
13033, 13033, 13034, 13040, 13083, 13084,
13090
13034, 13034, 13035, 13040, 13084, 13085,
13090
13035, 13035, 13036, 13040, 13085, 13086,
13090
13036, 13036, 13037, 13040, 13086, 13087,
13090
13037, 13037, 13038, 13040, 13087, 13088,
13090
13038, 13038, 13031, 13040, 13088, 13081,
13090
*ELEMENT, TYPE=C3D8R, ELSET=FATSPRP
13071, 13071, 13072, 13082, 13081, 13121,
13122, 13132, 13131
13078, 13078, 13071, 13081, 13088, 13128,
13121, 13131, 13138
*ELGEN, ELSET=FATSPRP
13071, 7, 1, 1, 6, 50, 50
13078, 6, 50, 50
*ELCOPY,OLD SET=FATSPR1,NEW
SET=FATSPR2,ELEMENT SH=350,SHIFT NOD=350
*ELSET, ELSET=FATSPR
FATSPR1,FATSPR2,FATSPRP
*SOLID SECTION, ELSET=FATSPR, MATERIAL=S304
*****
** CASK BOTTOM FUEL CHANNEL SPACER (A)
*****
**
**
*****
** BASKET
*****
*****
** SPACER DISK 1
*****
*NODE, NSET=SPDSK1A
21002, -16.2339, 0.0000, 10.0025
21003, -14.8000, 0.0000, 10.0025
21004, -12.5500, 0.0000, 10.0025
21005, -10.3000, 0.0000, 10.0025
21006, -8.0500, 0.0000, 10.0025
21007, -5.8000, 0.0000, 10.0025
21008, -4.5000, 0.0000, 10.0025
21009, -2.2500, 0.0000, 10.0025
21010, 0.0000, 0.0000, 10.0025
21011, 2.2500, 0.0000, 10.0025
21012, 4.5000, 0.0000, 10.0025
21013, 5.8000, 0.0000, 10.0025
21014, 8.0500, 0.0000, 10.0025
21015, 10.3000, 0.0000, 10.0025
21016, 12.5500, 0.0000, 10.0025
21017, 14.8000, 0.0000, 10.0025
21018, 16.2339, 0.0000, 10.0025
*NCOPY,SHIFT,CHANGE NU=+20,OLD
SET=SPDSK1A,NEW SET=SPDSK1B
0.0, 0.85, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+20,OLD
SET=SPDSK1B,NEW SET=SPDSK1C
0.0, 1.825, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0

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*NCOPY,SHIFT,CHANGE NU=+20,OLD
SET=SPDSK1C,NEW SET=SPDSK1D
0.0, 1.825, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+20,OLD
SET=SPDSK1D,NEW SET=SPDSK1E
0.0, 1.906, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+20,OLD
SET=SPDSK1E,NEW SET=SPDSK1F
0.0, 1.722, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+20,OLD
SET=SPDSK1F,NEW SET=SPDSK1G
0.0, 1.722, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+20,OLD
SET=SPDSK1G,NEW SET=SPDSK1H
0.0, 1.65, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+20,OLD
SET=SPDSK1H,NEW SET=SPDSK1I
0.0, 1.953, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+20,OLD
SET=SPDSK1I,NEW SET=SPDSK1J
0.0, 1.953, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
** MODIFY NODES
*NODE, NSET=SPDSKMD
21165, -10.3000, 13.3067, 10.0025
21166, -8.0500, 13.3635, 10.0025
21167, -5.8000, 13.4202, 10.0025
21186, -8.0500, 15.1271, 10.0025
21187, -5.8000, 15.3039, 10.0025
**
21173, 5.8000, 13.4202, 10.0025
21174, 8.0500, 13.3635, 10.0025
21175, 10.3000, 13.3067, 10.0025
21193, 5.8000, 15.3039, 10.0025
21194, 8.0500, 15.1271, 10.0025
**
*NODE, NSET=SPRNG1A
21001, -18.1550, 0.0000, 10.0025
21021, -18.1351, 0.8500, 10.0025
21041, -17.9568, 2.6750, 10.0025
21061, -17.5885, 4.5000, 10.0025
21081, -16.9873, 6.4060, 10.0025
21102, -16.2339, 8.1280, 10.0025
21122, -15.2506, 9.8500, 10.0025
21143, -14.0483, 11.5000, 10.0025
21164, -12.5500, 13.1187, 10.0025
21185, -10.3000, 14.9504, 10.0025
21206, -8.0500, 16.2727, 10.0025
21227, -5.8000, 17.2036, 10.0025
21228, -4.5000, 17.5885, 10.0025
21229, -2.2500, 18.0150, 10.0025
**
21019, 18.1550, 0.0000, 10.0025
21039, 18.1351, 0.8500, 10.0025
21059, 17.9568, 2.6750, 10.0025
21079, 17.5885, 4.5000, 10.0025
21099, 16.9873, 6.4060, 10.0025
21118, 16.2339, 8.1280, 10.0025
21138, 15.2506, 9.8500, 10.0025
21157, 14.0483, 11.5000, 10.0025
21176, 12.5500, 13.1187, 10.0025
21195, 10.3000, 14.9504, 10.0025
21214, 8.0500, 16.2727, 10.0025
21230, 0.0000, 18.1550, 10.0025
21231, 2.2500, 18.0150, 10.0025
21232, 4.5000, 17.5885, 10.0025
21233, 5.8000, 17.2036, 10.0025
*NODE, NSET=SPRNG1C
21207, -5.8000, 16.4146, 10.0025
21208, -4.5000, 16.4966, 10.0025
21209, -2.2500, 16.6386, 10.0025
21210, 0.0000, 16.7805, 10.0025
21211, 2.2500, 16.6386, 10.0025
21212, 4.5000, 16.4966, 10.0025
21213, 5.8000, 16.4146, 10.0025
*NODE, NSET=SPRNG1B
21251, 18.6550, 0.0000, 10.0025
21252, 18.6356, 0.8500, 10.0025
21253, 18.4622, 2.6750, 10.0025
21254, 18.1041, 4.5000, 10.0025
21255, 17.5206, 6.4060, 10.0025
21256, 16.6810, 8.3519, 10.0025
21257, 15.6706, 10.1213, 10.0025
21258, 14.4352, 11.8167, 10.0025
21259, 12.8956, 13.4800, 10.0025
21260, 10.5837, 15.3621, 10.0025
21261, 8.2717, 16.7209, 10.0025
21262, 5.8000, 17.7305, 10.0025
21263, 4.5000, 18.1041, 10.0025
21264, 2.2500, 18.5188, 10.0025
21265, 0.0000, 18.6550, 10.0025
21266, -2.2500, 18.5188, 10.0025
21267, -4.5000, 18.1041, 10.0025
21268, -5.8000, 17.7305, 10.0025
21269, -8.2717, 16.7209, 10.0025
21270, -10.5837, 15.3621, 10.0025
21271, -12.8956, 13.4800, 10.0025
21272, -14.4352, 11.8167, 10.0025
21273, -15.6706, 10.1213, 10.0025
21274, -16.6810, 8.3519, 10.0025
21275, -17.5206, 6.4060, 10.0025
21276, -18.1041, 4.5000, 10.0025
21277, -18.4622, 2.6750, 10.0025
21278, -18.6356, 0.8500, 10.0025
21279, -18.6550, 0.0000, 10.0025
*NSET, NSET=SPDSK1Y
SPDSK1A, SPDSK1B, SPDSK1C, SPDSK1D, SPDSK1E, SPDSK
1F, SPDSK1G, SPDSK1H
SPDSK1I, SPDSK1J, SPDSKMD, SPRNG1C
*NSET, NSET=SPRNG1Y
SPRNG1A, SPRNG1B
**
*NCOPY,SHIFT,CHANGE NU=+300,OLD
SET=SPDSK1Y,NEW SET=SPDSK1Z
0.0, 0.0, 1.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
**
*NCOPY,SHIFT,CHANGE NU=-300,OLD
SET=SPRNG1Y,NEW SET=SPRNG1Z
0.0, 0.0, -1.5
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+300,OLD
SET=SPRNG1Y,NEW SET=SPRNG1Z
0.0, 0.0, 1.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+600,OLD
SET=SPRNG1Y,NEW SET=SPRNG1Z
0.0, 0.0, 2.5
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=SP1DSK
SPDSK1Y, SPDSK1Z
*NSET, NSET=SP1RNG

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SPRNG1Y, SPRNG1Z

*NSET, NSET=SP1

SPIDSK, SP1RNG

*ELEMENT, TYPE=C3D8R, ELSET=SPDSK1

21001, 21001, 21002, 21022, 21021, 21301,
21302, 21322, 2132121012, 21012, 21013, 21033, 21032, 21312,
21313, 21333, 2133221021, 21021, 21022, 21042, 21041, 21321,
21322, 21342, 2134121027, 21027, 21028, 21048, 21047, 21327,
21328, 21348, 2134721032, 21032, 21033, 21053, 21052, 21332,
21333, 21353, 2135221068, 21068, 21069, 21089, 21088, 21368,
21369, 21389, 2138821037, 21037, 21038, 21058, 21057, 21337,
21338, 21358, 2135721082, 21082, 21083, 21103, 21102, 21382,
21383, 21403, 2140221097, 21097, 21098, 21118, 21117, 21397,
21398, 21418, 2141721123, 21123, 21124, 21144, 21143, 21423,
21424, 21444, 2144321133, 21133, 21134, 21154, 21153, 21433,
21434, 21454, 2145321144, 21144, 21145, 21165, 21164, 21444,
21445, 21465, 2146421153, 21153, 21154, 21174, 21173, 21453,
21454, 21474, 2147321165, 21165, 21166, 21186, 21185, 21465,
21466, 21486, 2148521173, 21173, 21174, 21194, 21193, 21473,
21474, 21494, 2149321186, 21186, 21187, 21207, 21206, 21486,
21487, 21507, 2150621207, 21207, 21208, 21228, 21227, 21507,
21508, 21528, 21527

*ELGEN, ELSET=SPDSK1

21001, 7, 1, 1

21012, 7, 1, 1

21021, 2, 1, 1, 3, 20, 20

21027, 8, 20, 20

21032, 8, 20, 20

21068, 4, 1, 1

21037, 2, 1, 1, 3, 20, 20

21082, 2, 20, 20

21097, 2, 20, 20

21123, 4, 1, 1

21133, 4, 1, 1

21144, 3, 1, 1

21153, 3, 1, 1

21165, 2, 1, 1

21173, 2, 1, 1

21186, 8, 1, 1

21207, 6, 1, 1

**

*ELEMENT, TYPE=C3D6, ELSET=SPDSK1

21081, 21081, 21082, 21102, 21381, 21382,
2140221122, 21122, 21123, 21143, 21422, 21423,
2144321143, 21143, 21144, 21164, 21443, 21444,
2146421164, 21164, 21165, 21185, 21464, 21465,
2148521185, 21185, 21186, 21206, 21485, 21486,
2150621206, 21206, 21207, 21227, 21506, 21507,
2152721098, 21098, 21099, 21118, 21398, 21399,
2141821137, 21137, 21138, 21157, 21437, 21438,
2145721156, 21156, 21157, 21176, 21456, 21457,
2147621175, 21175, 21176, 21195, 21475, 21476,
2149521194, 21194, 21195, 21214, 21494, 21495,
2151421213, 21213, 21214, 21233, 21513, 21514,
21533

**

*ELEMENT, TYPE=C3D8R, ELSET=SPRNG1A

20951, 20719, 20951, 20952, 20739, 21019,
21251, 21252, 2103920952, 20739, 20952, 20953, 20759, 21039,
21252, 21253, 2105920953, 20759, 20953, 20954, 20779, 21059,
21253, 21254, 2107920954, 20779, 20954, 20955, 20799, 21079,
21254, 21255, 2109920955, 20799, 20955, 20956, 20818, 21099,
21255, 21256, 2111820956, 20818, 20956, 20957, 20838, 21118,
21256, 21257, 2113820957, 20838, 20957, 20958, 20857, 21138,
21257, 21258, 2115720958, 20857, 20958, 20959, 20876, 21157,
21258, 21259, 2117620959, 20876, 20959, 20960, 20895, 21176,
21259, 21260, 2119520960, 20895, 20960, 20961, 20914, 21195,
21260, 21261, 2121420961, 20914, 20961, 20962, 20933, 21214,
21261, 21262, 2123320962, 20933, 20962, 20963, 20932, 21233,
21262, 21263, 2123220963, 20932, 20963, 20964, 20931, 21232,
21263, 21264, 2123120964, 20931, 20964, 20965, 20930, 21231,
21264, 21265, 2123020965, 20930, 20965, 20966, 20929, 21230,
21265, 21266, 2122920966, 20929, 20966, 20967, 20928, 21229,
21266, 21267, 2122820967, 20928, 20967, 20968, 20927, 21228,
21267, 21268, 2122720968, 20927, 20968, 20969, 20906, 21227,
21268, 21269, 2120620969, 20906, 20969, 20970, 20885, 21206,
21269, 21270, 2118520970, 20885, 20970, 20971, 20864, 21185,
21270, 21271, 2116420971, 20864, 20971, 20972, 20843, 21164,
21271, 21272, 2114320972, 20843, 20972, 20973, 20822, 21143,
21272, 21273, 2112220973, 20822, 20973, 20974, 20802, 21122,
21273, 21274, 2110220974, 20802, 20974, 20975, 20781, 21102,
21274, 21275, 2108120975, 20781, 20975, 20976, 20761, 21081,
21275, 21276, 2106120976, 20761, 20976, 20977, 20741, 21061,
21276, 21277, 21041

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20977, 20741, 20977, 20978, 20721, 21041,
21277, 21278, 21021
20978, 20721, 20978, 20979, 20701, 21021,
21278, 21279, 21001
*ELCOPY,OLD SET=SPRNG1A,NEW
SET=SPRNG1B,ELEMENT SH=300,SHIFT NOD=300
*ELCOPY,OLD SET=SPRNG1B,NEW
SET=SPRNG1C,ELEMENT SH=300,SHIFT NOD=300
*ELSET, ELSET=SP1
SPDSK1, SPRNG1A, SPRNG1B, SPRNG1C
*SOLID SECTION, ELSET=SP1, MATERIAL=S216A
*****
** SPACER DISK 2
*****
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP1DSK,NEW SET=SP2DSK
0.0, 0.0, 20.875
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP1RNG,NEW SET=SP2RNG
0.0, 0.0, 20.875
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=SP2
SP2DSK,SP2RNG
*ELCOPY,OLD SET=SP1,NEW SET=SP2,ELEMENT
SH=1500,SHIFT NOD=1500
*SOLID SECTION, ELSET=SP2, MATERIAL=S216A
*****
** SPACER DISK 3
*****
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP2DSK,NEW SET=SP3DSK
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP2RNG,NEW SET=SP3RNG
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=SP3
SP3DSK,SP3RNG
*ELCOPY,OLD SET=SP2,NEW SET=SP3,ELEMENT
SH=1500,SHIFT NOD=1500
*SOLID SECTION, ELSET=SP3, MATERIAL=S216A
*****
** SPACER DISK 4
*****
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP3DSK,NEW SET=SP4DSK
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP3RNG,NEW SET=SP4RNG
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=SP4
SP4DSK,SP4RNG
*ELCOPY,OLD SET=SP3,NEW SET=SP4,ELEMENT
SH=1500,SHIFT NOD=1500
*SOLID SECTION, ELSET=SP4, MATERIAL=S216A
*****
** SPACER DISK 5
*****
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP4DSK,NEW SET=SP5DSK
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP4RNG,NEW SET=SP5RNG
0.0, 0.0, 18.5625

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0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=SP5
SP5DSK,SP5RNG
*ELCOPY,OLD SET=SP4,NEW SET=SP5,ELEMENT
SH=1500,SHIFT NOD=1500
*SOLID SECTION, ELSET=SP5, MATERIAL=S216A
*****
** SPACER DISK 6
*****
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP5DSK,NEW SET=SP6DSK
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP5RNG,NEW SET=SP6RNG
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=SP6
SP6DSK,SP6RNG
*ELCOPY,OLD SET=SP5,NEW SET=SP6,ELEMENT
SH=1500,SHIFT NOD=1500
*SOLID SECTION, ELSET=SP6, MATERIAL=S216A
*****
** SPACER DISK 7
*****
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP6DSK,NEW SET=SP7DSK
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP6RNG,NEW SET=SP7RNG
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=SP7
SP7DSK,SP7RNG
*ELCOPY,OLD SET=SP6,NEW SET=SP7,ELEMENT
SH=1500,SHIFT NOD=1500
*SOLID SECTION, ELSET=SP7, MATERIAL=S216A
*****
** SPACER DISK 8
*****
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP7DSK,NEW SET=SP8DSK
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP7RNG,NEW SET=SP8RNG
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=SP8
SP8DSK,SP8RNG
*ELCOPY,OLD SET=SP7,NEW SET=SP8,ELEMENT
SH=1500,SHIFT NOD=1500
*SOLID SECTION, ELSET=SP8, MATERIAL=S216A
*****
** SPACER DISK 9
*****
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP8DSK,NEW SET=SP9DSK
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+1500,OLD
SET=SP8RNG,NEW SET=SP9RNG
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=SP9
SP9DSK,SP9RNG
*ELCOPY,OLD SET=SP8,NEW SET=SP9,ELEMENT
SH=1500,SHIFT NOD=1500

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*SOLID SECTION, ELSET=SP9, MATERIAL=S216A
*****
** TOP PLATE
*****
*NCOPY,SHIFT,CHANGE NU=+12900,OLD
SET=SPDSK1Y,NEW SET=TOP1
0.0, 0.0, 160.3125
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+12900,OLD
SET=SPRNG1A,NEW SET=TOP1
0.0, 0.0, 160.3125
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+300,OLD SET=TOP1,NEW
SET=TOP2
0.0, 0.0, 0.50
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=TOP
TOP1, TOP2
*ELCOPY,OLD SET=SPDSK1,NEW SET=TOP,ELEMENT
SH=12900,SHIFT NOD=12900
*SOLID SECTION, ELSET=TOP, MATERIAL=S216A
*****
*NSET, NSET=SPDSK
SP1,SP2,SP3,SP4,SP5,SP6,SP7,SP8,SP9,TOP
*ELSET, ELSET=SPDSK
SP1,SP2,SP3,SP4,SP5,SP6,SP7,SP8,SP9,TOP
*****
** FUEL CELL CHANNEL - HALF
*****
*NSET, NSET=FCHBS, GENERATE
21008, 21068, 20
21068, 21072, 1
21012, 21072, 20
** BASE END PLATE (1-IN. THICK)
*NCOPY,SHIFT,CHANGE NU=-300,OLD SET=FCHBS,NEW
SET=FCHBET
0.0, 0.0, -2.1875
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FCHBETL1
20708, 20728, 20748
*NSET, NSET=FCHBETL2
20712, 20732, 20752
*NFILL, NSET=FCHBET
FCHBETL1, FCHBETL2, 4, 1
*NCOPY,SHIFT,CHANGE NU=-300,OLD
SET=FCHBET,NEW SET=FCHBEB
0.0, 0.0, -1.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
** SPACER DISK 1-2
*NCOPY,SHIFT,CHANGE NU=600,OLD SET=FCHBS,NEW
SET=FCHSP11
0.0, 0.0, 4.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD
SET=FCHSP11,NEW SET=FCHSP12
0.0, 0.0, 6.9375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD
SET=FCHSP12,NEW SET=FCHSP13
0.0, 0.0, 6.9375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
** SPACER DISK 2-3
*NCOPY,SHIFT,CHANGE NU=900,OLD
SET=FCHSP13,NEW SET=FCHSP21
0.0, 0.0, 7.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD
SET=FCHSP21,NEW SET=FCHSP22
0.0, 0.0, 5.7813

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0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD
SET=FCHSP22,NEW SET=FCHSP23
0.0, 0.0, 5.7812
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FCHSP2M
FCHSP21, FCHSP22, FCHSP23
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCHSP2M,NEW SET=FCHSP3M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCHSP3M,NEW SET=FCHSP4M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCHSP4M,NEW SET=FCHSP5M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCHSP5M,NEW SET=FCHSP6M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCHSP6M,NEW SET=FCHSP7M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCHSP7M,NEW SET=FCHSP8M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
**
** 9.5 IN. TO TOP
*NSET, NSET=FCHTS, GENERATE
33308, 33368, 20
33368, 33372, 1
33312, 33372, 20
*NCOPY,SHIFT,CHANGE NU=300,OLD SET=FCHTS,NEW
SET=FCHT1
0.0, 0.0, 3.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FCH
FCHBET, FCHBEB, FCHSP11, FCHSP12, FCHSP13
FCHSP2M, FCHSP3M, FCHSP4M, FCHSP5M, FCHSP6M, FCHSP
7M, FCHSP8M, FCHT1
*****
*ELEMENT, TYPE=C3D8R, ELSET=FCHBE
20408, 20408, 20409, 20429, 20428, 20708,
20709, 20729, 20728
*ELGEN, ELSET=FCHBE
20408, 4, 1, 1, 3, 20, 20
*SOLID SECTION, ELSET=FCHBE, MATERIAL=S304B
*ELEMENT, TYPE=S4R, ELSET=FCH01
20708, 20708, 20728, 21028, 21008
20728, 20768, 20769, 21069, 21068
20748, 20712, 21012, 21032, 20732
*ELGEN, ELSET=FCH01
20708, 3, 20, 1
20728, 4, 1, 1
20748, 3, 20, 1
** 1-2
*ELEMENT, TYPE=S4R
21008, 21008, 21028, 21328, 21308
21028, 21068, 21069, 21369, 21368
21048, 21012, 21312, 21332, 21032
*ELGEN, ELSET=FCH12A
21008, 3, 20, 1
21028, 4, 1, 1
21048, 3, 20, 1

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*ELCOPY,OLD SET=FCH12A,NEW SET=FCH12B,ELEMENT
SH=300,SHIFT NOD=300
*ELCOPY,OLD SET=FCH12B,NEW SET=FCH12C,ELEMENT
SH=300,SHIFT NOD=300
*ELCOPY,OLD SET=FCH12C,NEW SET=FCH12D,ELEMENT
SH=300,SHIFT NOD=300
*ELCOPY,OLD SET=FCH12D,NEW SET=FCH12E,ELEMENT
SH=300,SHIFT NOD=300
*ELSET, ELSET=FCH12R
FCH12A, FCH12C, FCH12D
*ELSET, ELSET=FCH12S
FCH12B, FCH12E
*ELSET, ELSET=FCH12
FCH12R, FCH12S
** 2-3
*ELCOPY,OLD SET=FCH12R,NEW SET=FCH23R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCH12S,NEW SET=FCH23S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCH23
FCH23R, FCH23S
** 3-4
*ELCOPY,OLD SET=FCH23R,NEW SET=FCH34R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCH23S,NEW SET=FCH34S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCH34
FCH34R, FCH34S
** 4-5
*ELCOPY,OLD SET=FCH34R,NEW SET=FCH45R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCH34S,NEW SET=FCH45S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCH45
FCH45R, FCH45S
** 5-6
*ELCOPY,OLD SET=FCH45R,NEW SET=FCH56R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCH45S,NEW SET=FCH56S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCH56
FCH56R, FCH56S
** 6-7
*ELCOPY,OLD SET=FCH56R,NEW SET=FCH67R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCH56S,NEW SET=FCH67S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCH67
FCH67R, FCH67S
** 7-8
*ELCOPY,OLD SET=FCH67R,NEW SET=FCH78R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCH67S,NEW SET=FCH78S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCH78
FCH78R, FCH78S
** 8-9
*ELCOPY,OLD SET=FCH78R,NEW SET=FCH89R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCH78S,NEW SET=FCH89S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCH89
FCH89R, FCH89S
** 9-TOP
*ELEMENT, TYPE=S4R
33008, 33008, 33028, 33328, 33308
33028, 33068, 33069, 33369, 33368
33048, 33012, 33312, 33332, 33032
*ELGEN, ELSET=FCHTOPR1

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33008, 3, 20, 1
33028, 4, 1, 1
33048, 3, 20, 1
*ELCOPY,OLD SET=FCHTOPR1,NEW
SET=FCHTOPS,ELEMENT SH=300,SHIFT NOD=300
*ELCOPY,OLD SET=FCHTOPS,NEW
SET=FCHTOPR2,ELEMENT SH=300,SHIFT NOD=300
*ELCOPY,OLD SET=FCHTOPR2,NEW
SET=FCHTOPR3,ELEMENT SH=300,SHIFT NOD=300
*ELSET, ELSET=FCHTOPR
FCHTOPR1, FCHTOPR2, FCHTOPR3
*ELSET, ELSET=FCHTOP
FCHTOPR, FCHTOPS
**
*ELSET, ELSET=FCHR
FCH01, FCH12R, FCH23R, FCH34R, FCH45R, FCH56R, FCH6
7R, FCH78R, FCH89R, FCHTOPR
*ELSET, ELSET=FCHS
FCH12S, FCH23S, FCH34S, FCH45S, FCH56S, FCH67S, FCH
78S, FCH89S, FCHTOPS
*SHELL SECTION, ELSET=FCHR, MATERIAL=S304B
0.0747
*SHELL SECTION, ELSET=FCHS, MATERIAL=S304B
0.1494
*ELSET, ELSET=FCH
FCHBE, FCHR, FCHS
*****
** FUEL CELL CHANNEL - FULL A
*****
*NSET, NSET=FCABS, GENERATE
21023, 21027, 1
21023, 21123, 20
21123, 21127, 1
21027, 21127, 20
** BASE END PLATE (1-IN. THICK)
*NCOPY,SHIFT,CHANGE NU=-300,OLD SET=FCABS,NEW
SET=FCABET
0.0, 0.0, -2.1875
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FCABETL1
20743, 20763, 20783, 20803
*NSET, NSET=FCABETL2
20747, 20767, 20787, 20807
*NFILL, NSET=FCABET
FCABETL1, FCABETL2, 4, 1
*NCOPY,SHIFT,CHANGE NU=-300,OLD
SET=FCABET,NEW SET=FCABEB
0.0, 0.0, -1.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
** SPACER DISK 1-2
*NCOPY,SHIFT,CHANGE NU=600,OLD SET=FCABS,NEW
SET=FCASP11
0.0, 0.0, 4.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD
SET=FCASP11,NEW SET=FCASP12
0.0, 0.0, 6.9375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD
SET=FCASP12,NEW SET=FCASP13
0.0, 0.0, 6.9375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
** SPACER DISK 2-3
*NCOPY,SHIFT,CHANGE NU=900,OLD
SET=FCASP13,NEW SET=FCASP21
0.0, 0.0, 7.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD
SET=FCASP21,NEW SET=FCASP22

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0.0, 0.0, 5.7813
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD
SET=FCASP22,NEW SET=FCASP23
0.0, 0.0, 5.7812
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FCASP2M
FCASP21, FCASP22, FCASP23
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCASP2M,NEW SET=FCASP3M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCASP3M,NEW SET=FCASP4M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCASP4M,NEW SET=FCASP5M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCASP5M,NEW SET=FCASP6M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCASP6M,NEW SET=FCASP7M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCASP7M,NEW SET=FCASP8M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
**
** 9.5 IN. TO TOP
*NSET, NSET=FCATS, GENERATE
33323, 33327, 1
33323, 33423, 20
33423, 33427, 1
33327, 33427, 20
*NCOPY,SHIFT,CHANGE NU=300,OLD SET=FCATS,NEW
SET=FCAT1
0.0, 0.0, 3.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FCA
FCABET,FCABEB,FCASP11,FCASP12,FCASP13
FCASP2M,FCASP3M,FCASP4M,FCASP5M,FCASP6M,FCASP
7M,FCASP8M,FCAT1
*****
*ELEMENT, TYPE=C3D8R, ELSET=FCABE
20423, 20423, 20424, 20444, 20443, 20723,
20724, 20744, 20743
*ELGEN, ELSET=FCABE
20423, 4, 1, 1, 5, 20, 20
*SOLID SECTION, ELSET=FCABE, MATERIAL=S304A
*ELEMENT, TYPE=S4R, ELSET=FCA01
20723, 20723, 21023, 21024, 20724
20743, 20723, 20743, 21043, 21023
20763, 20803, 20823, 21123, 21103
20764, 20727, 21027, 21047, 20747
20783, 20787, 21087, 21107, 20807
20803, 20823, 20824, 21124, 21123
*ELGEN, ELSET=FCA01
20723, 4, 1, 1
20743, 4, 20, 1
20764, 3, 20, 1
20783, 2, 20, 1
20803, 4, 1, 1
** 1-2
*ELEMENT, TYPE=S4R, ELSET=FCA12A

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21023, 21023, 21323, 21324, 21024
21043, 21023, 21043, 21343, 21323
21063, 21103, 21123, 21423, 21403
21064, 21027, 21327, 21347, 21047
21083, 21087, 21387, 21407, 21107
21103, 21123, 21124, 21424, 21423
*ELGEN, ELSET=FCA12A
21023, 4, 1, 1
21043, 4, 20, 1
21064, 3, 20, 1
21083, 2, 20, 1
21103, 4, 1, 1
*ELCOPY,OLD SET=FCA12A,NEW SET=FCA12B,ELEMENT
SH=300,SHIFT NOD=300
*ELCOPY,OLD SET=FCA12B,NEW SET=FCA12C,ELEMENT
SH=300,SHIFT NOD=300
*ELCOPY,OLD SET=FCA12C,NEW SET=FCA12D,ELEMENT
SH=300,SHIFT NOD=300
*ELCOPY,OLD SET=FCA12D,NEW SET=FCA12E,ELEMENT
SH=300,SHIFT NOD=300
*ELSET, ELSET=FCA12R
FCA12A, FCA12C, FCA12D
*ELSET, ELSET=FCA12S
FCA12B, FCA12E
*ELSET, ELSET=FCA12
FCA12R, FCA12S
** 2-3
*ELCOPY,OLD SET=FCA12R,NEW SET=FCA23R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCA12S,NEW SET=FCA23S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCA23
FCA23R, FCA23S
** 3-4
*ELCOPY,OLD SET=FCA23R,NEW SET=FCA34R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCA23S,NEW SET=FCA34S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCA34
FCA34R, FCA34S
** 4-5
*ELCOPY,OLD SET=FCA34R,NEW SET=FCA45R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCA34S,NEW SET=FCA45S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCA45
FCA45R, FCA45S
** 5-6
*ELCOPY,OLD SET=FCA45R,NEW SET=FCA56R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCA45S,NEW SET=FCA56S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCA56
FCA56R, FCA56S
** 6-7
*ELCOPY,OLD SET=FCA56R,NEW SET=FCA67R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCA56S,NEW SET=FCA67S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCA67
FCA67R, FCA67S
** 7-8
*ELCOPY,OLD SET=FCA67R,NEW SET=FCA78R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCA67S,NEW SET=FCA78S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCA78
FCA78R, FCA78S
** 8-9

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*ELCOPY,OLD SET=FCA78R,NEW SET=FCA89R,ELEMENT
SH=1500,SHIFT NOD=1500
*ELCOPY,OLD SET=FCA78S,NEW SET=FCA89S,ELEMENT
SH=1500,SHIFT NOD=1500
*ELSET, ELSET=FCA89
FCA89R, FCA89S
** 9-TOP
*ELEMENT, TYPE=S4R, ELSET=FCATOPR1
33023, 33023, 33323, 33324, 33024
33043, 33023, 33043, 33343, 33323
33063, 33103, 33123, 33423, 33403
33064, 33027, 33327, 33347, 33047
33083, 33087, 33387, 33407, 33107
33103, 33123, 33124, 33424, 33423
*ELGEN, ELSET=FCATOPR1
33023, 4, 1, 1
33043, 4, 20, 1
33064, 3, 20, 1
33083, 2, 20, 1
33103, 4, 1, 1
*ELCOPY,OLD SET=FCATOPR1,NEW
SET=FCATOPS,ELEMENT SH=300,SHIFT NOD=300
*ELCOPY,OLD SET=FCATOPS,NEW
SET=FCATOPR2,ELEMENT SH=300,SHIFT NOD=300
*ELCOPY,OLD SET=FCATOPR2,NEW
SET=FCATOPR3,ELEMENT SH=300,SHIFT NOD=300
*ELSET, ELSET=FCATOPR
FCATOPR1, FCATOPR2, FCATOPR3
*ELSET, ELSET=FCATOP
FCATOPR, FCATOPS
**
*ELSET, ELSET=FCAR
FCA01,FCA12R,FCA23R,FCA34R,FCA45R,FCA56R,FCA6
7R,FCA78R,FCA89R,FCATOPR
*ELSET, ELSET=FCAS
FCA12S,FCA23S,FCA34S,FCA45S,FCA56S,FCA67S,FCA
78S,FCA89S,FCATOPS
*SHELL SECTION, ELSET=FCAR, MATERIAL=S304A
0.0747
*SHELL SECTION, ELSET=FCAS, MATERIAL=S304A
0.1494
*ELSET, ELSET=FCAB
FCABE,FCAR,FCAS
*****
** FUEL CELL CHANNEL - FULL B
*****
*NSET, NSET=FCBBS, GENERATE
21088, 21092, 1
21088, 21188, 20
21188, 21192, 1
21092, 21192, 20
** BASE END PLATE (1-IN. THICK)
*NCOPY,SHIFT,CHANGE NU=-300,OLD SET=FCBBS,NEW
SET=FCBBET
0.0, 0.0, -2.1875
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FCBBETL1
20808, 20828, 20848, 20868
*NSET, NSET=FCBBETL2
20812, 20832, 20852, 20872
*NFILL, NSET=FCBBET
FCBBETL1, FCBBETL2, 4, 1
*NCOPY,SHIFT,CHANGE NU=-300,OLD
SET=FCBBET,NEW SET=FCBBEB
0.0, 0.0, -1.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
** SPACER DISK 1-2
*NCOPY,SHIFT,CHANGE NU=600,OLD SET=FCBBS,NEW
SET=FCBSP11
0.0, 0.0, 4.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD
SET=FCBSP11,NEW SET=FCBSP12
0.0, 0.0, 6.9375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD
SET=FCBSP12,NEW SET=FCBSP13
0.0, 0.0, 6.9375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
** SPACER DISK 2-3
*NCOPY,SHIFT,CHANGE NU=900,OLD
SET=FCBSP13,NEW SET=FCBSP21
0.0, 0.0, 7.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD
SET=FCBSP21,NEW SET=FCBSP22
0.0, 0.0, 5.7813
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD
SET=FCBSP22,NEW SET=FCBSP23
0.0, 0.0, 5.7812
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FCBSP2M
FCBSP21, FCBSP22, FCBSP23
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCBSP2M,NEW SET=FCBSP3M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCBSP3M,NEW SET=FCBSP4M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCBSP4M,NEW SET=FCBSP5M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCBSP5M,NEW SET=FCBSP6M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=FCBSP6M,NEW SET=FCBSP7M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
**
** 9.5 IN. TO TOP
*NSET, NSET=FCBTS, GENERATE
33388, 33392, 1
33388, 33488, 20
33488, 33492, 1
33392, 33492, 20
*NCOPY,SHIFT,CHANGE NU=300,OLD SET=FCBTS,NEW
SET=FCBT1
0.0, 0.0, 3.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FCB
FCBBET,FCBBEB,FCBSP11,FCBSP12,FCBSP13
FCBSP2M,FCBSP3M,FCBSP4M,FCBSP5M,FCBSP6M,FCBSP
7M,FCBSP8M,FCBT1
*****
*ELEMENT, TYPE=C3D8R, ELSET=FCBBE
20488, 20488, 20489, 20509, 20508, 20788,
20789, 20809, 20808
*ELGEN, ELSET=FCBBE

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20488, 4, 1, 1, 5, 20, 20
*SOLID SECTION, ELSET=FCBBE, MATERIAL=S304B
*ELEMENT, TYPE=S4R, ELSET=FCB01
20788, 20788, 21088, 21089, 20789
20808, 20788, 20808, 21108, 21088
20828, 20868, 20888, 21188, 21168
20829, 20792, 21092, 21112, 20812
20848, 20852, 21152, 21172, 20872
20868, 20888, 20889, 21189, 21188
*ELGEN, ELSET=FCB01
20788, 4, 1, 1
20808, 4, 20, 1
20829, 3, 20, 1
20848, 2, 20, 1
20868, 4, 1, 1
** 1-2
*ELEMENT, TYPE=S4R, ELSET=FCB12A
21088, 21088, 21388, 21389, 21089
21108, 21088, 21108, 21408, 21388
21128, 21168, 21188, 21488, 21468
21129, 21092, 21392, 21412, 21112
21148, 21152, 21452, 21472, 21172
21168, 21188, 21189, 21489, 21488
*ELGEN, ELSET=FCB12A
21088, 4, 1, 1
21108, 4, 20, 1
21129, 3, 20, 1
21148, 2, 20, 1
21168, 4, 1, 1
*ELCOPY, OLD SET=FCB12A, NEW SET=FCB12B, ELEMENT
SH=300, SHIFT NOD=300
*ELCOPY, OLD SET=FCB12B, NEW SET=FCB12C, ELEMENT
SH=300, SHIFT NOD=300
*ELCOPY, OLD SET=FCB12C, NEW SET=FCB12D, ELEMENT
SH=300, SHIFT NOD=300
*ELCOPY, OLD SET=FCB12D, NEW SET=FCB12E, ELEMENT
SH=300, SHIFT NOD=300
*ELSET, ELSET=FCB12R
FCB12A, FCB12C, FCB12D
*ELSET, ELSET=FCB12S
FCB12B, FCB12E
*ELSET, ELSET=FCB12
FCB12R, FCB12S
** 2-3
*ELCOPY, OLD SET=FCB12R, NEW SET=FCB23R, ELEMENT
SH=1500, SHIFT NOD=1500
*ELCOPY, OLD SET=FCB12S, NEW SET=FCB23S, ELEMENT
SH=1500, SHIFT NOD=1500
*ELSET, ELSET=FCB23
FCB23R, FCB23S
** 3-4
*ELCOPY, OLD SET=FCB23R, NEW SET=FCB34R, ELEMENT
SH=1500, SHIFT NOD=1500
*ELCOPY, OLD SET=FCB23S, NEW SET=FCB34S, ELEMENT
SH=1500, SHIFT NOD=1500
*ELSET, ELSET=FCB34
FCB34R, FCB34S
** 4-5
*ELCOPY, OLD SET=FCB34R, NEW SET=FCB45R, ELEMENT
SH=1500, SHIFT NOD=1500
*ELCOPY, OLD SET=FCB34S, NEW SET=FCB45S, ELEMENT
SH=1500, SHIFT NOD=1500
*ELSET, ELSET=FCB45
FCB45R, FCB45S
** 5-6
*ELCOPY, OLD SET=FCB45R, NEW SET=FCB56R, ELEMENT
SH=1500, SHIFT NOD=1500
*ELCOPY, OLD SET=FCB45S, NEW SET=FCB56S, ELEMENT
SH=1500, SHIFT NOD=1500
*ELSET, ELSET=FCB56
FCB56R, FCB56S
** 6-7
*ELCOPY, OLD SET=FCB56R, NEW SET=FCB67R, ELEMENT
SH=1500, SHIFT NOD=1500
*ELCOPY, OLD SET=FCB56S, NEW SET=FCB67S, ELEMENT
SH=1500, SHIFT NOD=1500
*ELSET, ELSET=FCB67
FCB67R, FCB67S
** 7-8
*ELCOPY, OLD SET=FCB67R, NEW SET=FCB78R, ELEMENT
SH=1500, SHIFT NOD=1500
*ELCOPY, OLD SET=FCB67S, NEW SET=FCB78S, ELEMENT
SH=1500, SHIFT NOD=1500
*ELSET, ELSET=FCB78
FCB78R, FCB78S
** 8-9
*ELCOPY, OLD SET=FCB78R, NEW SET=FCB89R, ELEMENT
SH=1500, SHIFT NOD=1500
*ELCOPY, OLD SET=FCB78S, NEW SET=FCB89S, ELEMENT
SH=1500, SHIFT NOD=1500
*ELSET, ELSET=FCB89
FCB89R, FCB89S
** 9-TOP
*ELEMENT, TYPE=S4R, ELSET=FCBTOPR1
33088, 33088, 33388, 33389, 33089
33108, 33088, 33108, 33408, 33388
33128, 33168, 33188, 33488, 33468
33129, 33092, 33392, 33412, 33112
33148, 33152, 33452, 33472, 33172
33168, 33188, 33189, 33489, 33488
*ELGEN, ELSET=FCBTOPR1
33088, 4, 1, 1
33108, 4, 20, 1
33129, 3, 20, 1
33148, 2, 20, 1
33168, 4, 1, 1
*ELCOPY, OLD SET=FCBTOPR1, NEW
SET=FCBTOPS, ELEMENT SH=300, SHIFT NOD=300
*ELCOPY, OLD SET=FCBTOPS, NEW
SET=FCBTOPR2, ELEMENT SH=300, SHIFT NOD=300
*ELCOPY, OLD SET=FCBTOPR2, NEW
SET=FCBTOPR3, ELEMENT SH=300, SHIFT NOD=300
*ELSET, ELSET=FCBTOPR
FCBTOPR1, FCBTOPR2, FCBTOPR3
*ELSET, ELSET=FCBTOP
FCBTOPR, FCBTOPS
**
*ELSET, ELSET=FCBR
FCB01, FCB12R, FCB23R, FCB34R, FCB45R, FCB56R, FCB6
7R, FCB78R, FCB89R, FCBTOPR
*ELSET, ELSET=FCBS
FCB12S, FCB23S, FCB34S, FCB45S, FCB56S, FCB67S, FCB
78S, FCB89S, FCBTOPS
*SHELL SECTION, ELSET=FCBR, MATERIAL=S304B
0.0747
*SHELL SECTION, ELSET=FCBS, MATERIAL=S304B
0.1494
*ELSET, ELSET=FCB
FCBBE, FCBR, FCBS
*****
** FUEL CELL CHANNEL - FULL C
*****
*NCOPY, SHIFT, CHANGE NU=10, OLD SET=FCA, NEW
SET=FCC
20.6, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*ELCOPY, OLD SET=FCABE, NEW SET=FCCBE, ELEMENT
SH=10, SHIFT NOD=10

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*ELCOPY,OLD SET=FCAR,NEW SET=FCCR,ELEMENT
SH=10,SHIFT NOD=10
*ELCOPY,OLD SET=FCAS,NEW SET=FCCS,ELEMENT
SH=10,SHIFT NOD=10
*SOLID SECTION, ELSET=FCCBE, MATERIAL=S304B
*SHELL SECTION, ELSET=FCCR, MATERIAL=S304B
0.0747
*SHELL SECTION, ELSET=FCCS, MATERIAL=S304B
0.1494
*ELSET, ELSET=FCC
FCCR,FCCS,FCCBE
*****
** TIE RODS
*****
*NSET, NSET=TRODBS, GENERATE
21145, 21155, 10
** BOTTOM
*NCOPY,SHIFT,CHANGE NU=-600,OLD
SET=TRODBS,NEW SET=TRODBM
0.0, 0.0, -3.3125
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD SET=TRODBM,NEW
SET=TROD0
0.0, 0.0, 1.125
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
** 1-2
*NCOPY,SHIFT,CHANGE NU=600,OLD SET=TRODBS,NEW
SET=TROD11
0.0, 0.0, 4.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD SET=TROD11,NEW
SET=TROD12
0.0, 0.0, 6.9375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD SET=TROD12,NEW
SET=TROD13
0.0, 0.0, 6.9375
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
** 2-3
*NCOPY,SHIFT,CHANGE NU=900,OLD SET=TROD13,NEW
SET=TROD21
0.0, 0.0, 7.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD SET=TROD21,NEW
SET=TROD22
0.0, 0.0, 5.7813
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=300,OLD SET=TROD22,NEW
SET=TROD23
0.0, 0.0, 5.7812
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=TROD2M
TROD21, TROD22, TROD23
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=TROD2M,NEW SET=TROD3M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=TROD3M,NEW SET=TROD4M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=TROD4M,NEW SET=TROD5M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=TROD5M,NEW SET=TROD6M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0

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*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=TROD6M,NEW SET=TROD7M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=1500,OLD
SET=TROD7M,NEW SET=TROD8M
0.0, 0.0, 18.5625
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
**
** 4.25 IN. ABOVE TOP PLATE
*NSET, NSET=TRODTS, GENERATE
33445, 33455, 10
*NCOPY,SHIFT,CHANGE NU=300,OLD SET=TRODTS,NEW
SET=TRODT1
0.0, 0.0, 3.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=900,OLD SET=TRODT1,NEW
SET=TRODT2
0.0, 0.0, 11.36
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=TROD
TRODBM, TROD0, TROD11, TROD12, TROD13
TROD2M, TROD3M, TROD4M, TROD5M, TROD6M, TROD7M, TRO
D8M, TRODT1, TRODT2
*****
*ELEMENT, TYPE=B31, ELSET=TROD
20545, 20545, 20845
20555, 20555, 20855
20786, 20845, 21145
20796, 20855, 21155
*ELGEN, ELSET=TROD
20786, 46, 300, 300
20796, 46, 300, 300
*BEAM SECTION, SECTION=CIRC, ELSET=TROD,
MATERIAL=S216
1.125
1.0, 0.0, 0.0
*****
** BOTTOM FINS
*****
***** long fins
*NODE, NSET=BFLB1A
40001, 6.1250, 0.0000, -8.1250
40002, 8.0750, 0.0000, -8.1250
40003, 10.0250, 0.0000, -8.1250
40004, 11.9750, 0.0000, -8.1250
40005, 13.9250, 0.0000, -8.1250
40006, 15.8750, 0.0000, -8.1250
40007, 17.2975, 0.0000, -8.1250
40008, 18.7500, 0.0000, -8.1250
40009, 19.2800, 0.0000, -8.1250
*NCOPY,SHIFT,CHANGE NU=20,OLD SET=BFLB1A,NEW
SET=BFLB1B
0.0, 0., 1.625
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=20,OLD SET=BFLB1B,NEW
SET=BFLB1C
0.0, 0., 1.625
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=20,OLD SET=BFLB1C,NEW
SET=BFLB1D
0.0, 0., 1.625
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=20,OLD SET=BFLB1D,NEW
SET=BFLB1E
0.0, 0., 1.625
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=20,OLD SET=BFLB1E,NEW
SET=BFLB1F

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0.0, 0., 1.625
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NSET, NSET=BFLB1
BFLB1A, BFLB1B, BFLB1C, BFLB1D, BFLB1E, BFLB1F
*NODE, NSET=BFLC1
40010, 24.9900, 0.0000, -8.1250
40011, 30.7500, 0.0000, -8.1250
40012, 30.7500, 0.0000, -1.3425
40030, 24.2676, 0.0000, -6.3489
40031, 29.1966, 0.0000, -6.1036
40032, 29.4419, 0.0000, -0.3648
40050, 23.5593, 0.0000, -4.6076
40051, 27.6737, 0.0000, -4.1219
40052, 28.1594, 0.0000, 0.5938
40070, 22.8650, 0.0000, -2.9004
40071, 26.1806, 0.0000, -2.1790
40072, 26.9021, 0.0000, 1.5336
40090, 22.1842, 0.0000, -1.2268
40091, 24.7168, 0.0000, -0.2742
40092, 25.6694, 0.0000, 2.4549
40110, 21.5168, 0.0000, 0.4141
40111, 23.2817, 0.0000, 1.5933
40112, 24.4609, 0.0000, 3.3582
*NODE, NSET=BFLS1A
40013, 30.7500, 0.0000, 5.4400
40014, 30.7500, 0.0000, 7.2200
40015, 30.7500, 0.0000, 9.0000
*NCOPY, SHIFT, CHANGE NU=20, OLD SET=BFLS1A, NEW
SET=BFLS1B
-1.175, 0., 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY, SHIFT, CHANGE NU=20, OLD SET=BFLS1B, NEW
SET=BFLS1C
-1.175, 0., 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY, SHIFT, CHANGE NU=20, OLD SET=BFLS1C, NEW
SET=BFLS1D
-1.175, 0., 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY, SHIFT, CHANGE NU=20, OLD SET=BFLS1D, NEW
SET=BFLS1E
-1.175, 0., 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY, SHIFT, CHANGE NU=20, OLD SET=BFLS1E, NEW
SET=BFLS1F
-1.175, 0., 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NSET, NSET=BFLS1
BFLS1A, BFLS1B, BFLS1C, BFLS1D, BFLS1E, BFLS1F
*NSET, NSET=BFL1
BFLB1, BFLC1, BFLS1
*****
*NCOPY, SHIFT, CHANGE NU=200, OLD SET=BFL1, NEW
SET=BFL2
0.0, -0.5625, 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY, SHIFT, CHANGE NU=400, OLD SET=BFL1, NEW
SET=BFL3
0.0, +0.5625, 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*****
*NCOPY, SHIFT, MULTIPLE=2, CHANGE NU=+3600, OLD
SET=BFL1, NEW SET=BFL4
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +180.0
*NCOPY, SHIFT, MULTIPLE=8, CHANGE NU=+400, OLD
SET=BFL2, NEW SET=BFL2ALL
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +22.50

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*NCOPY, SHIFT, MULTIPLE=7, CHANGE NU=+400, OLD
SET=BFL3, NEW SET=BFL3ALL
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +22.50
*NSET, NSET=BFLG
BFL1, BFL2, BFL3, BFL4, BFL2ALL, BFL3ALL
**
*ELEMENT, TYPE=C3D8R
40001, 40001, 40002, 40402, 40401, 40021,
40022, 40422, 40421
40601, 40601, 40602, 40802, 40801, 40621,
40622, 40822, 40821
41001, 41001, 41002, 41202, 41201, 41021,
41022, 41222, 41221
41401, 41401, 41402, 41602, 41601, 41421,
41422, 41622, 41621
41801, 41801, 41802, 42002, 42001, 41821,
41822, 42022, 42021
42201, 42201, 42202, 42402, 42401, 42221,
42222, 42422, 42421
42601, 42601, 42602, 42802, 42801, 42621,
42622, 42822, 42821
43001, 43001, 43002, 43202, 43201, 43021,
43022, 43222, 43221
43401, 43401, 43402, 43602, 43601, 43421,
43422, 43622, 43621
*ELGEN, ELSET=BFLG1
40001, 14, 1, 1, 5, 20, 20
*ELGEN, ELSET=BFLG2
40601, 14, 1, 1, 5, 20, 20
*ELGEN, ELSET=BFLG3
41001, 14, 1, 1, 5, 20, 20
*ELGEN, ELSET=BFLG4
41401, 14, 1, 1, 5, 20, 20
*ELGEN, ELSET=BFLG5
41801, 14, 1, 1, 5, 20, 20
*ELGEN, ELSET=BFLG6
42201, 14, 1, 1, 5, 20, 20
*ELGEN, ELSET=BFLG7
42601, 14, 1, 1, 5, 20, 20
*ELGEN, ELSET=BFLG8
43001, 14, 1, 1, 5, 20, 20
*ELGEN, ELSET=BFLG9
43401, 14, 1, 1, 5, 20, 20
*ELSET, ELSET=BFLG
BFLG1, BFLG2, BFLG3, BFLG4, BFLG5, BFLG6, BFLG7, BFL
G8, BFLG9
*SOLID SECTION, ELSET=BFLG, MATERIAL=FIN
***** short fins
*NODE, NSET=BFSB1A
45001, 15.8750, 0.0000, -6.0000
45002, 17.2975, 0.0000, -6.0000
45003, 18.7500, 0.0000, -6.0000
45004, 19.2800, 0.0000, -6.0000
*NCOPY, SHIFT, CHANGE NU=10, OLD SET=BFSB1A, NEW
SET=BFSB1B
0.0, 0., 1.20
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY, SHIFT, CHANGE NU=10, OLD SET=BFSB1B, NEW
SET=BFSB1C
0.0, 0., 1.20
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY, SHIFT, CHANGE NU=10, OLD SET=BFSB1C, NEW
SET=BFSB1D
0.0, 0., 1.20
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY, SHIFT, CHANGE NU=10, OLD SET=BFSB1D, NEW
SET=BFSB1E
0.0, 0., 1.20

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0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=10,OLD SET=BFSB1E,NEW
SET=BFSB1F
0.0, 0., 1.20
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NSET, NSET=BFSB1
BFSB1A,BFSB1B,BFSB1C,BFSB1D,BFSB1E,BFSB1F
*NODE, NSET=BFSC1
45005, 24.9900, 0.0000, -6.0000
45006, 30.7500, 0.0000, -6.0000
45007, 30.7500, 0.0000, -0.2800
45015, 24.2676, 0.0000, -4.6659
45016, 29.1966, 0.0000, -4.4206
45017, 29.4419, 0.0000, 0.4767
45025, 23.5593, 0.0000, -3.3579
45026, 27.6737, 0.0000, -2.8722
45027, 28.1594, 0.0000, 1.2186
45035, 22.8650, 0.0000, -2.0756
45036, 26.1806, 0.0000, -1.3541
45037, 26.9021, 0.0000, 1.9460
45045, 22.1842, 0.0000, -0.8184
45046, 24.7168, 0.0000, 0.1342
45047, 25.6694, 0.0000, 2.6591
45055, 21.5168, 0.0000, 0.4141
45056, 23.2817, 0.0000, 1.5933
45057, 24.4609, 0.0000, 3.3582
*NODE, NSET=BFSS1A
45008, 30.7500, 0.0000, 5.4400
45009, 30.7500, 0.0000, 7.2200
45010, 30.7500, 0.0000, 9.0000
*NCOPY,SHIFT,CHANGE NU=10,OLD SET=BFSS1A,NEW
SET=BFSS1B
-1.175, 0., 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=10,OLD SET=BFSS1B,NEW
SET=BFSS1C
-1.175, 0., 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=10,OLD SET=BFSS1C,NEW
SET=BFSS1D
-1.175, 0., 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=10,OLD SET=BFSS1D,NEW
SET=BFSS1E
-1.175, 0., 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=10,OLD SET=BFSS1E,NEW
SET=BFSS1F
-1.175, 0., 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NSET, NSET=BFSS1
BFSS1A,BFSS1B,BFSS1C,BFSS1D,BFSS1E,BFSS1F
*NSET, NSET=BFSC1
BFSB1, BFSC1, BFSS1
*****
*NCOPY,SHIFT,CHANGE NU=100,OLD SET=BFS1,NEW
SET=BFS2
0.0, -0.75, 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=200,OLD SET=BFS1,NEW
SET=BFS3
0.0, +0.75, 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*****
*NCOPY,SHIFT,MULTIPLE=1,CHANGE NU=+200,OLD
SET=BFS2,NEW SET=BFS2A
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +11.25

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*NCOPY,SHIFT,MULTIPLE=1,CHANGE NU=+200,OLD
SET=BFS3,NEW SET=BFS3A
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +11.25
*NCOPY,SHIFT,MULTIPLE=7,CHANGE NU=+200,OLD
SET=BFS2A,NEW SET=BFS2ALL
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +22.50
*NCOPY,SHIFT,MULTIPLE=7,CHANGE NU=+200,OLD
SET=BFS3A,NEW SET=BFS3ALL
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +22.50
*NSET, NSET=BFST
BFS2A, BFS2ALL, BFS3A, BFS3ALL
**
*ELEMENT, TYPE=C3D8R
45301, 45301, 45302, 45402, 45401, 45311,
45312, 45412, 45411
45501, 45501, 45502, 45602, 45601, 45511,
45512, 45612, 45611
45701, 45701, 45702, 45802, 45801, 45711,
45712, 45812, 45811
45901, 45901, 45902, 46002, 46001, 45911,
45912, 46012, 46011
46101, 46101, 46102, 46202, 46201, 46111,
46112, 46212, 46211
46301, 46301, 46302, 46402, 46401, 46311,
46312, 46412, 46411
46501, 46501, 46502, 46602, 46601, 46511,
46512, 46612, 46611
46701, 46701, 46702, 46802, 46801, 46711,
46712, 46812, 46811
*ELGEN, ELSET=BFST1
45301, 9, 1, 1, 5, 10, 10
*ELGEN, ELSET=BFST2
45501, 9, 1, 1, 5, 10, 10
*ELGEN, ELSET=BFST3
45701, 9, 1, 1, 5, 10, 10
*ELGEN, ELSET=BFST4
45901, 9, 1, 1, 5, 10, 10
*ELGEN, ELSET=BFST5
46101, 9, 1, 1, 5, 10, 10
*ELGEN, ELSET=BFST6
46301, 9, 1, 1, 5, 10, 10
*ELGEN, ELSET=BFST7
46501, 9, 1, 1, 5, 10, 10
*ELGEN, ELSET=BFST8
46701, 9, 1, 1, 5, 10, 10
*ELSET, ELSET=BFST
BFST1,BFST2,BFST3,BFST4,BFST5,BFST6,BFST7,BFS
T8
*SOLID SECTION, ELSET=BFST, MATERIAL=FIN
*****
** TOP FINS
*****
***** long fins
*NODE, NSET=TFLB1A
50011, 24.8750, 0.0000, 176.8050
50012, 26.3750, 0.0000, 176.8050
50013, 27.8750, 0.0000, 176.8050
50014, 29.3750, 0.0000, 176.8050
50015, 30.8750, 0.0000, 176.8050
*NCOPY,SHIFT,CHANGE NU=20,OLD SET=TFLB1A,NEW
SET=TFLB1B
0.0, 0., 1.6875
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=20,OLD SET=TFLB1B,NEW
SET=TFLB1C
0.0, 0., 1.6875

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0.0, 0., 0.0, 0.0, 1., 0.0, 0.0

*NODE, NSET=TFLB2A

50061, 6.1250, 0.0000, 182.1800

50062, 8.0750, 0.0000, 182.1800

50063, 10.0250, 0.0000, 182.1800

50064, 11.9750, 0.0000, 182.1800

50065, 13.9250, 0.0000, 182.1800

50066, 15.8750, 0.0000, 182.1800

50067, 17.2975, 0.0000, 182.1800

50068, 18.7500, 0.0000, 182.1800

50069, 20.6000, 0.0000, 182.1800

50070, 22.7380, 0.0000, 182.1800

50071, 24.8750, 0.0000, 182.1800

50072, 26.3750, 0.0000, 182.1800

50073, 27.8750, 0.0000, 182.1800

50074, 29.3750, 0.0000, 182.1800

50075, 30.8750, 0.0000, 182.1800

*NCOPY,SHIFT,CHANGE NU=80,OLD SET=TFLB2A,NEW

SET=TFLB2B

0.0, 0., 9.50

0.0, 0., 0.0, 0.0, 1., 0.0, 0.0

*NFILL, NSET=TFLB2C

TFLB2A, TFLB2B, 4, 20

*NSET, NSET=TFL1

TFLB1A, TFLB1B, TFLB1C, TFLB2C

*NCOPY,SHIFT,CHANGE NU=200,OLD SET=TFL1,NEW

SET=TFL2

0.0, -0.5625, 0.0

0.0, 0., 0.0, 0.0, 1., 0.0, 0.0

*NCOPY,SHIFT,CHANGE NU=400,OLD SET=TFL1,NEW

SET=TFL3

0.0, +0.5625, 0.0

0.0, 0., 0.0, 0.0, 1., 0.0, 0.0

*NCOPY,SHIFT,MULTIPLE=2,CHANGE NU=+3600,OLD

SET=TFL1,NEW SET=TFL4

0.0, 0.0, 0.0

0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +180.0

*NCOPY,SHIFT,MULTIPLE=8,CHANGE NU=+400,OLD

SET=TFL2,NEW SET=TFL2ALL

0.0, 0.0, 0.0

0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +22.50

*NCOPY,SHIFT,MULTIPLE=7,CHANGE NU=+400,OLD

SET=TFL3,NEW SET=TFL3ALL

0.0, 0.0, 0.0

0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +22.50

*NSET, NSET=TFLG

TFL1, TFL2, TFL3, TFL4, TFL2ALL, TFL3ALL

**

*ELEMENT, TYPE=C3D8R

50011, 50011, 50012, 50412, 50411, 50031,

50032, 50432, 50431

50061, 50061, 50062, 50462, 50461, 50081,

50082, 50482, 50481

50611, 50611, 50612, 50812, 50811, 50631,

50632, 50832, 50831

50661, 50661, 50662, 50862, 50861, 50681,

50682, 50882, 50881

51011, 51011, 51012, 51212, 51211, 51031,

51032, 51232, 51231

51061, 51061, 51062, 51262, 51261, 51081,

51082, 51282, 51281

51411, 51411, 51412, 51612, 51611, 51431,

51432, 51632, 51631

51461, 51461, 51462, 51662, 51661, 51481,

51482, 51682, 51681

51811, 51811, 51812, 52012, 52011, 51831,

51832, 52032, 52031

51861, 51861, 51862, 52062, 52061, 51881,

51882, 52082, 52081

52211, 52211, 52212, 52412, 52411, 52231,

52232, 52432, 52431

52261, 52261, 52262, 52462, 52461, 52281,

52282, 52482, 52481

52611, 52611, 52612, 52812, 52811, 52631,

52632, 52832, 52831

52661, 52661, 52662, 52862, 52861, 52681,

52682, 52882, 52881

53011, 53011, 53012, 53212, 53211, 53031,

53032, 53232, 53231

53061, 53061, 53062, 53262, 53261, 53081,

53082, 53282, 53281

53411, 53411, 53412, 53612, 53611, 53431,

53432, 53632, 53631

53461, 53461, 53462, 53662, 53661, 53481,

53482, 53682, 53681

*ELGEN, ELSET=TFLG1

50011, 4, 1, 1, 7, 20, 20

50061, 10, 1, 1, 4, 20, 20

*ELGEN, ELSET=TFLG2

50611, 4, 1, 1, 7, 20, 20

50661, 10, 1, 1, 4, 20, 20

*ELGEN, ELSET=TFLG3

51011, 4, 1, 1, 7, 20, 20

51061, 10, 1, 1, 4, 20, 20

*ELGEN, ELSET=TFLG4

51411, 4, 1, 1, 7, 20, 20

51461, 10, 1, 1, 4, 20, 20

*ELGEN, ELSET=TFLG5

51811, 4, 1, 1, 7, 20, 20

51861, 10, 1, 1, 4, 20, 20

*ELGEN, ELSET=TFLG6

52211, 4, 1, 1, 7, 20, 20

52261, 10, 1, 1, 4, 20, 20

*ELGEN, ELSET=TFLG7

52611, 4, 1, 1, 7, 20, 20

52661, 10, 1, 1, 4, 20, 20

*ELGEN, ELSET=TFLG8

53011, 4, 1, 1, 7, 20, 20

53061, 10, 1, 1, 4, 20, 20

*ELGEN, ELSET=TFLG9

53411, 4, 1, 1, 7, 20, 20

53461, 10, 1, 1, 4, 20, 20

*ELSET, ELSET=TFLG

TFLG1, TFLG2, TFLG3, TFLG4, TFLG5, TFLG6, TFLG7, TFL

G8, TFLG9

*SOLID SECTION, ELSET=TFLG, MATERIAL=FIN

***** short fins

*NODE, NSET=TFSB1A

55006, 24.8750, 0.0000, 176.8050

55007, 26.3750, 0.0000, 176.8050

55008, 27.8750, 0.0000, 176.8050

55009, 29.3750, 0.0000, 176.8050

55010, 30.8750, 0.0000, 176.8050

*NCOPY,SHIFT,CHANGE NU=10,OLD SET=TFSB1A,NEW

SET=TFSB1B

0.0, 0., 1.6875

0.0, 0., 0.0, 0.0, 1., 0.0, 0.0

*NCOPY,SHIFT,CHANGE NU=10,OLD SET=TFSB1B,NEW

SET=TFSB1C

0.0, 0., 1.6875

0.0, 0., 0.0, 0.0, 1., 0.0, 0.0

*NODE, NSET=TFSB2A

55031, 15.8750, 0.0000, 182.1800

55032, 17.2975, 0.0000, 182.1800

55033, 18.7500, 0.0000, 182.1800

55034, 20.6000, 0.0000, 182.1800

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55035, 22.7380, 0.0000, 182.1800
55036, 24.8750, 0.0000, 182.1800
55037, 26.3750, 0.0000, 182.1800
55038, 27.8750, 0.0000, 182.1800
55039, 29.3750, 0.0000, 182.1800
55040, 30.8750, 0.0000, 182.1800
*NCOPY,SHIFT,CHANGE NU=40,OLD SET=TFBS2A,NEW
SET=TFBS2B
0.0, 0., 6.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NFill, NSET=TFBS2C
TFBS2A, TFBS2B, 4, 10
*NSET, NSET=TFBS1
TFBS1A,TFBS1B,TFBS1C,TFBS2C
*****
*NCOPY,SHIFT,CHANGE NU=100,OLD SET=TFBS1,NEW
SET=TFBS2
0.0, -0.75, 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*NCOPY,SHIFT,CHANGE NU=200,OLD SET=TFBS1,NEW
SET=TFBS3
0.0, +0.75, 0.0
0.0, 0., 0.0, 0.0, 1., 0.0, 0.0
*****
*NCOPY,SHIFT,MULTIPLE=1,CHANGE NU=+200,OLD
SET=TFBS2,NEW SET=TFBS2A
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +11.25
*NCOPY,SHIFT,MULTIPLE=1,CHANGE NU=+200,OLD
SET=TFBS3,NEW SET=TFBS3A
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +11.25
*NCOPY,SHIFT,MULTIPLE=7,CHANGE NU=+200,OLD
SET=TFBS2A,NEW SET=TFBS2ALL
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +22.50
*NCOPY,SHIFT,MULTIPLE=7,CHANGE NU=+200,OLD
SET=TFBS3A,NEW SET=TFBS3ALL
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +22.50
*NSET, NSET=TFST
TFBS2A, TFBS2ALL, TFBS3A, TFBS3ALL
**
*ELEMENT, TYPE=C3D8R
55306, 55306, 55307, 55407, 55406, 55316,
55317, 55417, 55416
55331, 55331, 55332, 55432, 55431, 55341,
55342, 55442, 55441
55506, 55506, 55507, 55607, 55606, 55516,
55517, 55617, 55616
55531, 55531, 55532, 55632, 55631, 55541,
55542, 55642, 55641
55706, 55706, 55707, 55807, 55806, 55716,
55717, 55817, 55816
55731, 55731, 55732, 55832, 55831, 55741,
55742, 55842, 55841
55906, 55906, 55907, 56007, 56006, 55916,
55917, 56017, 56016
55931, 55931, 55932, 56032, 56031, 55941,
55942, 56042, 56041
56106, 56106, 56107, 56207, 56206, 56116,
56117, 56217, 56216
56131, 56131, 56132, 56232, 56231, 56141,
56142, 56242, 56241
56306, 56306, 56307, 56407, 56406, 56316,
56317, 56417, 56416
56331, 56331, 56332, 56432, 56431, 56341,
56342, 56442, 56441
56506, 56506, 56507, 56607, 56606, 56516,
56517, 56617, 56616
56531, 56531, 56532, 56632, 56631, 56541,
56542, 56642, 56641
56706, 56706, 56707, 56807, 56806, 56716,
56717, 56817, 56816
56731, 56731, 56732, 56832, 56831, 56741,
56742, 56842, 56841
*ELGEN, ELSET=TFST1
55306, 4, 1, 1, 7, 10, 10
55331, 5, 1, 1, 4, 10, 10
*ELGEN, ELSET=TFST2
55506, 4, 1, 1, 7, 10, 10
55531, 5, 1, 1, 4, 10, 10
*ELGEN, ELSET=TFST3
55706, 4, 1, 1, 7, 10, 10
55731, 5, 1, 1, 4, 10, 10
*ELGEN, ELSET=TFST4
55906, 4, 1, 1, 7, 10, 10
55931, 5, 1, 1, 4, 10, 10
*ELGEN, ELSET=TFST5
56106, 4, 1, 1, 7, 10, 10
56131, 5, 1, 1, 4, 10, 10
*ELGEN, ELSET=TFST6
56306, 4, 1, 1, 7, 10, 10
56331, 5, 1, 1, 4, 10, 10
*ELGEN, ELSET=TFST7
56506, 4, 1, 1, 7, 10, 10
56531, 5, 1, 1, 4, 10, 10
*ELGEN, ELSET=TFST8
56706, 4, 1, 1, 7, 10, 10
56731, 5, 1, 1, 4, 10, 10
*ELSET, ELSET=TFST
TFST1,TFST2,TFST3,TFST4,TFST5,TFST6,TFST7,TFST8
**
** SOLID SECTION, ELSET=TFST, MATERIAL=FIN
*****
** STRUCTURAL RING 1
*****
*NODE, NSET=RING1A
15001, 24.8750, 0.0000, 14.8750
*NCOPY,SHIFT,MULTIPLE=32,CHANGE NU=+1,OLD
SET=RING1A,NEW SET=RING1A
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +5.625
***** MODIFY NODES
*NODE, NSET=RING1A
15001, 24.8750, 0.0000, 14.0110
15002, 24.7552, 2.4382, 14.0215
15003, 24.3970, 4.8529, 14.0529
15004, 23.8039, 7.2208, 14.1048
15005, 22.9815, 9.5193, 14.1767
15006, 21.9378, 11.7260, 14.2680
15007, 20.6828, 13.8198, 14.3778
15008, 19.2286, 15.7805, 14.5050
15009, 17.5893, 17.5893, 14.6485
*NODE, NSET=RING1B
15177, 0.0000, 31.8750, 14.8750
*NCOPY,SHIFT,MULTIPLE=16,CHANGE NU=+1,OLD
SET=RING1B,NEW SET=RING1B
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +5.625
*NODE
15161, 35.5417, 0.0000, 13.0778
15241, 40.8750, 0.0000, 12.6112
15165, 34.9105, 13.7148, 13.1330
15245, 40.8750, 15.8125, 12.6112
15250, 24.8125, 31.8750, 14.0165
15170, 15.0000, 31.8750, 14.8750

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* NSET, NSET=LINEA1, GENERATE
15001, 15005, 1
* NGEN, NSET=LINEA2
15161, 15165, 1
* NGEN, NSET=LINEA3
15241, 15245, 1
* NSET, NSET=LINEA4, GENERATE
15005, 15010, 1
* NGEN, NSET=LINEA5
15165, 15170, 1
* NGEN, NSET=LINEA6
15245, 15250, 1
* NSET, NSET=LINEA7, GENERATE
15010, 15017, 1
* NGEN, NSET=LINEA8
15170, 15177, 1
* NSET, NSET=LINEA9, GENERATE
15017, 15033, 1
* NSET, NSET=LINEA10, GENERATE
15177, 15193, 1
**
* NFILL, NSET=RING1C
LINEA1, LINEA2, 4, 40
* NFILL, NSET=RING1D
LINEA2, LINEA3, 2, 40
* NFILL, NSET=RING1E
LINEA4, LINEA5, 4, 40
* NFILL, NSET=RING1F
LINEA5, LINEA6, 2, 40
* NFILL, NSET=RING1G
LINEA7, LINEA8, 4, 40
* NFILL, NSET=RING1H
LINEA9, LINEA10, 4, 40
* NSET, NSET=RING1M
RING1B, RING1C, RING1D, RING1E, RING1F, RING1G, RING1H
* NCOPY, SHIFT, CHANGE NU=+300, OLD
SET=RING1M, NEW SET=RING1N
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
* NSET, NSET=RING1
RING1M, RING1N
*****
* ELEMENT, TYPE=C3D8R
15001, 2981, 15041, 15042, 2982, 3181, 15341,
15342, 3182
15041, 15041, 15081, 15082, 15042, 15341,
15381, 15382, 15342
15161, 15161, 15201, 15202, 15162, 15461,
15501, 15502, 15462
* ELGEN, ELSET=RING1A
15001, 32, 1, 1
* ELGEN, ELSET=RING1B
15041, 32, 1, 1, 3, 40, 40
* ELGEN, ELSET=RING1C
15161, 9, 1, 1, 2, 40, 40
* ELSET, ELSET=RING1
RING1A, RING1B, RING1C
* SOLID SECTION, ELSET=RING1, MATERIAL=RING
*****
** STRUCTURAL RING 2
*****
* NODE, NSET=RING2A
16001, 24.8750, 0.0000, 31.8750
* NCOPY, SHIFT, MULTIPLE=32, CHANGE NU=+1, OLD
SET=RING2A, NEW SET=RING2A
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +5.625
***** MODIFY NODES

* NODE, NSET=RING2A
16001, 24.8750, 0.0000, 32.7390
16002, 24.7552, 2.4382, 32.7285
16003, 24.3970, 4.8529, 32.6971
16004, 23.8039, 7.2208, 32.6452
16005, 22.9815, 9.5193, 32.5733
16006, 21.9378, 11.7260, 32.4820
16007, 20.6828, 13.8198, 32.3722
16008, 19.2286, 15.7805, 32.2450
16009, 17.5893, 17.5893, 32.1015
* NODE, NSET=RING2B
16177, 0.0000, 31.8750, 31.8750
* NCOPY, SHIFT, MULTIPLE=16, CHANGE NU=+1, OLD
SET=RING2B, NEW SET=RING2B
0.0, 0.0, 0.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +5.625
* NODE
16161, 35.5417, 0.0000, 33.6722
16241, 40.8750, 0.0000, 34.1388
16165, 34.9105, 13.7148, 33.6169
16245, 40.8750, 15.8125, 34.1388
16250, 24.8125, 31.8750, 32.7335
16170, 15.0000, 31.8750, 31.8750
* NSET, NSET=LINEB1, GENERATE
16001, 16005, 1
* NGEN, NSET=LINEB2
16161, 16165, 1
* NGEN, NSET=LINEB3
16241, 16245, 1
* NSET, NSET=LINEB4, GENERATE
16005, 16010, 1
* NGEN, NSET=LINEB5
16165, 16170, 1
* NGEN, NSET=LINEB6
16245, 16250, 1
* NSET, NSET=LINEB7, GENERATE
16010, 16017, 1
* NGEN, NSET=LINEB8
16170, 16177, 1
* NSET, NSET=LINEB9, GENERATE
16017, 16033, 1
* NSET, NSET=LINEB10, GENERATE
16177, 16193, 1
**
* NFILL, NSET=RING2C
LINEB1, LINEB2, 4, 40
* NFILL, NSET=RING2D
LINEB2, LINEB3, 2, 40
* NFILL, NSET=RING2E
LINEB4, LINEB5, 4, 40
* NFILL, NSET=RING2F
LINEB5, LINEB6, 2, 40
* NFILL, NSET=RING2G
LINEB7, LINEB8, 4, 40
* NFILL, NSET=RING2H
LINEB9, LINEB10, 4, 40
* NSET, NSET=RING2M
RING2B, RING2C, RING2D, RING2E, RING2F, RING2G, RING2H
* NCOPY, SHIFT, CHANGE NU=+300, OLD
SET=RING2M, NEW SET=RING2N
0.0, 0.0, 1.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
* NSET, NSET=RING2
RING2M, RING2N
*****
* ELEMENT, TYPE=C3D8R
16001, 3981, 16041, 16042, 3982, 4181, 16341,
16342, 4182

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16041, 16041, 16081, 16082, 16042, 16341,
16381, 16382, 16342
16161, 16161, 16201, 16202, 16162, 16461,
16501, 16502, 16462
*ELGEN, ELSET=RING2A
16001, 32, 1, 1
*ELGEN, ELSET=RING2B
16041, 32, 1, 1, 3, 40, 40
*ELGEN, ELSET=RING2C
16161, 9, 1, 1, 2, 40, 40
*ELSET, ELSET=RING2
RING2A, RING2B, RING2C
*SOLID SECTION, ELSET=RING2, MATERIAL=RING
*****
** STRUCTURAL RING 3
*****
*NCOPY,SHIFT,CHANGE NU=+2000,OLD
SET=RING1,NEW SET=RING3
0.0, 0.0, 142.18
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
***** MODIFY NODES
17001, 24.8750, 0.0000, 156.1910
17002, 24.7552, 2.4382, 156.2015
17003, 24.3970, 4.8529, 156.2329
17004, 23.8039, 7.2208, 156.2848
17005, 22.9815, 9.5193, 156.3567
17006, 21.9378, 11.7260, 156.4480
17007, 20.6828, 13.8198, 156.5578
17008, 19.2286, 15.7805, 156.6850
17009, 17.5893, 17.5893, 156.8285
*ELEMENT, TYPE=C3D8R
17001, 8181, 17041, 17042, 8182, 8381, 17341,
17342, 8382
17041, 17041, 17081, 17082, 17042, 17341,
17381, 17382, 17342
17161, 17161, 17201, 17202, 17162, 17461,
17501, 17502, 17462
*ELGEN, ELSET=RING3A
17001, 32, 1, 1
*ELGEN, ELSET=RING3B
17041, 32, 1, 1, 3, 40, 40
*ELGEN, ELSET=RING3C
17161, 9, 1, 1, 2, 40, 40
*ELSET, ELSET=RING3
RING3A, RING3B, RING3C
*SOLID SECTION, ELSET=RING3, MATERIAL=RING
*****
** STRUCTURAL RING 4
*****
*NCOPY,SHIFT,CHANGE NU=+2000,OLD
SET=RING2,NEW SET=RING4
0.0, 0.0, 142.18
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
***** MODIFY NODES
18001, 24.8750, 0.0000, 174.9190
18002, 24.7552, 2.4382, 174.9085
18003, 24.3970, 4.8529, 174.8771
18004, 23.8039, 7.2208, 174.8252
18005, 22.9815, 9.5193, 174.7533
18006, 21.9378, 11.7260, 174.6620
18007, 20.6828, 13.8198, 174.5522
18008, 19.2286, 15.7805, 174.4250
18009, 17.5893, 17.5893, 174.2815
*ELEMENT, TYPE=C3D8R
18001, 9181, 18041, 18042, 9182, 9381, 18341,
18342, 9382
18041, 18041, 18081, 18082, 18042, 18341,
18381, 18382, 18342

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18161, 18161, 18201, 18202, 18162, 18461,
18501, 18502, 18462
*ELGEN, ELSET=RING4A
18001, 32, 1, 1
*ELGEN, ELSET=RING4B
18041, 32, 1, 1, 3, 40, 40
*ELGEN, ELSET=RING4C
18161, 9, 1, 1, 2, 40, 40
*ELSET, ELSET=RING4
RING4A, RING4B, RING4C
*SOLID SECTION, ELSET=RING4, MATERIAL=RING
*****
** FUEL BUNDLE A
*****
** OUTER FUEL RODS
*****
*NODE
61001, -14.2410, 1.4090, 14.6400
61015, -6.3590, 1.4090, 14.6400
61029, -6.3590, 9.2910, 14.6400
61043, -14.2410, 9.2910, 14.6400
61056, -14.2410, 1.9720, 14.6400
*NGEN, NSET=FARO1
61001, 61015
61015, 61029
61029, 61043
61043, 61056
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=FARO1,NEW
SET=FARO2
0.0, 0.0, 2.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+400,OLD SET=FARO2,NEW
SET=FARO3
0.0, 0.0, 2.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FARO3A
FARO2, FARO3, 2, 200
*NCOPY,SHIFT,CHANGE NU=+800,OLD SET=FARO3,NEW
SET=FARO4
0.0, 0.0, 22.215
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FARO4A
FARO3, FARO4, 4, 200
*NCOPY,SHIFT,CHANGE NU=+400,OLD SET=FARO4,NEW
SET=FARO5
0.0, 0.0, 1.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FARO5A
FARO4, FARO5, 2, 200
*NCOPY,SHIFT,CHANGE NU=+800,OLD SET=FARO5,NEW
SET=FARO6
0.0, 0.0, 24.44
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FARO6A
FARO5, FARO6, 4, 200
*NCOPY,SHIFT,CHANGE NU=+400,OLD SET=FARO6,NEW
SET=FARO7
0.0, 0.0, 1.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FARO7A
FARO6, FARO7, 2, 200
*NCOPY,SHIFT,CHANGE NU=+400,OLD SET=FARO7,NEW
SET=FARO8
0.0, 0.0, 11.82
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFILL, NSET=FARO8A
FARO7, FARO8, 2, 200

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*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=FARO8,NEW
SET=FARO9
0.0, 0.0, 0.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+400,OLD SET=FARO9,NEW
SET=FARO10
0.0, 0.0, 11.87
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFill, NSET=FARO10A
FARO9, FARO10, 2, 200
*NSET, NSET=FAROR1
FARO7A, FARO8A, FARO9, FARO10A
*NCOPY,SHIFT,CHANGE NU=+1400,OLD
SET=FAROR1,NEW SET=FAROR2
0.0, 0.0, 26.19
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+1400,OLD
SET=FAROR2,NEW SET=FAROR3
0.0, 0.0, 26.19
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NSET, NSET=FARORT, GENERATE
67801, 67856, 1
*NCOPY,SHIFT,CHANGE NU=+400,OLD
SET=FARORT,NEW SET=FARO19
0.0, 0.0, 1.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFill, NSET=FARO19A
FARORT, FARO19, 2, 200
*NCOPY,SHIFT,CHANGE NU=+400,OLD
SET=FARO19,NEW SET=FARO20
0.0, 0.0, 16.88
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFill, NSET=FARO20A
FARO19, FARO20, 2, 200
*NCOPY,SHIFT,CHANGE NU=+400,OLD
SET=FARO20,NEW SET=FARO21
0.0, 0.0, 1.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFill, NSET=FARO21A
FARO20, FARO21, 2, 200
*NCOPY,SHIFT,CHANGE NU=+200,OLD
SET=FARO21,NEW SET=FARO22
0.0, 0.0, 0.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+200,OLD
SET=FARO22,NEW SET=FARO23
0.0, 0.0, 1.355
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NODE
60001, -14.2410, 1.4090, 15.9900
60015, -6.3590, 1.4090, 15.9900
60029, -6.3590, 9.2910, 15.9900
60043, -14.2410, 9.2910, 15.9900
60056, -14.2410, 1.9720, 15.9900
*NGEN, NSET=FARO1M
60001, 60015
60015, 60029
60029, 60043
60043, 60056
*NSET, NSET=FARO
FARO1, FARO2, FARO3A, FARO4A, FARO5A, FARO6A, FAROR
1, FAROR2, FAROR3
FARO19A, FARO20A, FARO21A, FARO22, FARO23, FARO1M
*****
*ELEMENT, TYPE=B31
61001, 60001, 61201
61201, 61201, 61401
69201, 69201, 69401
*ELGEN, ELSET=FAROS

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61001, 56, 1, 1
69201, 56, 1, 1
*ELGEN, ELSET=FAROP
61201, 40, 200, 200, 56, 1, 1
*ELSET, ELSET=FARO
FAROS, FAROP
*BEAM SECTION, SECTION=PIPE, ELSET=FAROP,
MATERIAL=CLADO
0.2092, 0.0272
1.0, 0.0, 0.0
*BEAM SECTION, SECTION=CIRC, ELSET=FAROS,
MATERIAL=CLADO
0.2092
1.0, 0.0, 0.0
3, 4
*****
** SIMULATION OF INNER FUEL RODS AND GRID
SPACERS
*****
*NODE, NSET=FARS1
61061, -14.5225, 1.1275, 14.6400
61076, -6.0775, 1.1275, 14.6400
61091, -6.0775, 9.5725, 14.6400
61106, -14.5225, 9.5725, 14.6400
61120, -14.5225, 1.6905, 14.6400
61132, -13.9595, 1.6905, 14.6400
61145, -6.6405, 1.6905, 14.6400
61148, -6.6405, 2.2535, 14.6400
61160, -6.6405, 9.0095, 14.6400
61163, -7.2035, 9.0095, 14.6400
61175, -13.9595, 9.0095, 14.6400
61178, -13.9595, 8.4465, 14.6400
61189, -13.9595, 2.2535, 14.6400
*NGEN, NSET=FARS1
61061, 61076
61076, 61091
61091, 61106
61106, 61120
61132, 61145
61148, 61160
61163, 61175
61178, 61189
*NCOPY,SHIFT,CHANGE NU=+200,OLD SET=FARS1,NEW
SET=FARS2
0.0, 0.0, 2.0
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NCOPY,SHIFT,CHANGE NU=+400,OLD SET=FARS2,NEW
SET=FARS3
0.0, 0.0, 2.25
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFill, NSET=FARS3A
FARS2, FARS3, 2, 200
*NCOPY,SHIFT,CHANGE NU=+800,OLD SET=FARS3,NEW
SET=FARS4
0.0, 0.0, 22.215
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFill, NSET=FARS4A
FARS3, FARS4, 4, 200
*NCOPY,SHIFT,CHANGE NU=+400,OLD SET=FARS4,NEW
SET=FARS5
0.0, 0.0, 1.75
0.0, 0.0, 0.0, 0.0, 0.0, 1.0, +0.0
*NFill, NSET=FARS5A
FARS4, FARS5, 2, 200
*NCOPY,SHIFT,CHANGE NU=+800,OLD SET=FARS5,NEW
SET=FARS6
0.0, 0.0, 24.44

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