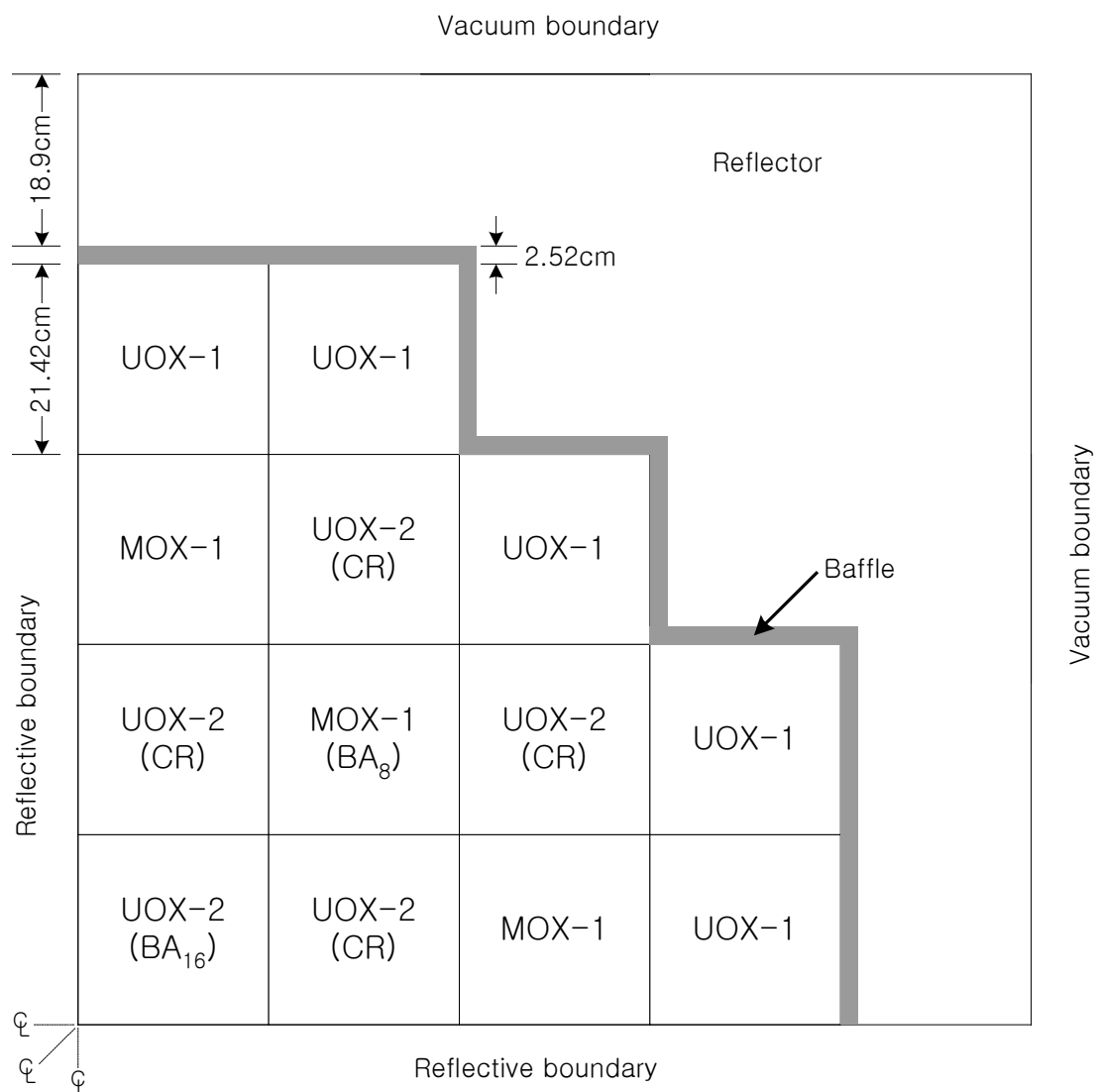


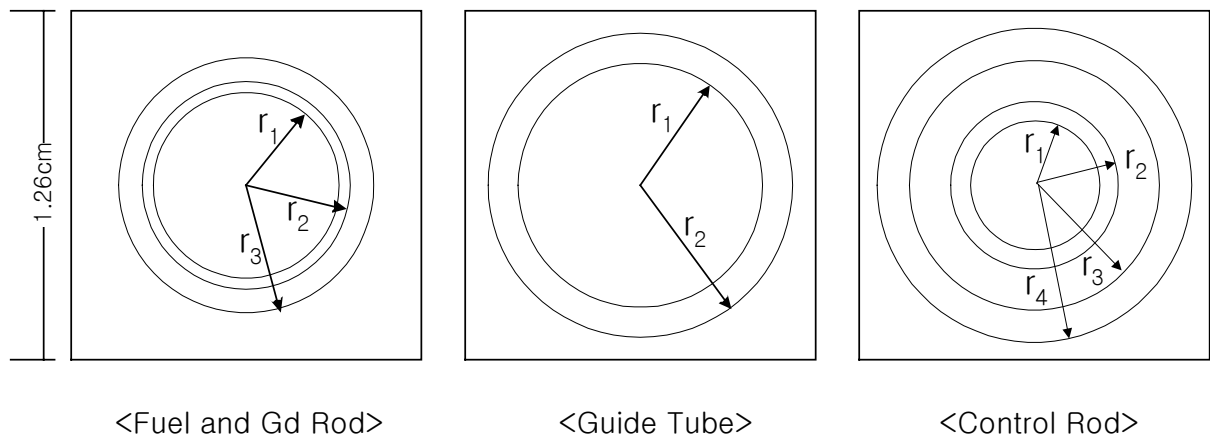
**Benchmark Problem 2A : MOX Fuel-Loaded Small PWR Core**  
**(MOX Fuel with Zoning)**  
**(7 Group Heterogeneous Cells)**

- 1) The problem is to calculate effective multiplication factor ( $k_{eff}$ ) and power distribution.
- 2) Core Configuration (1/4 Core)



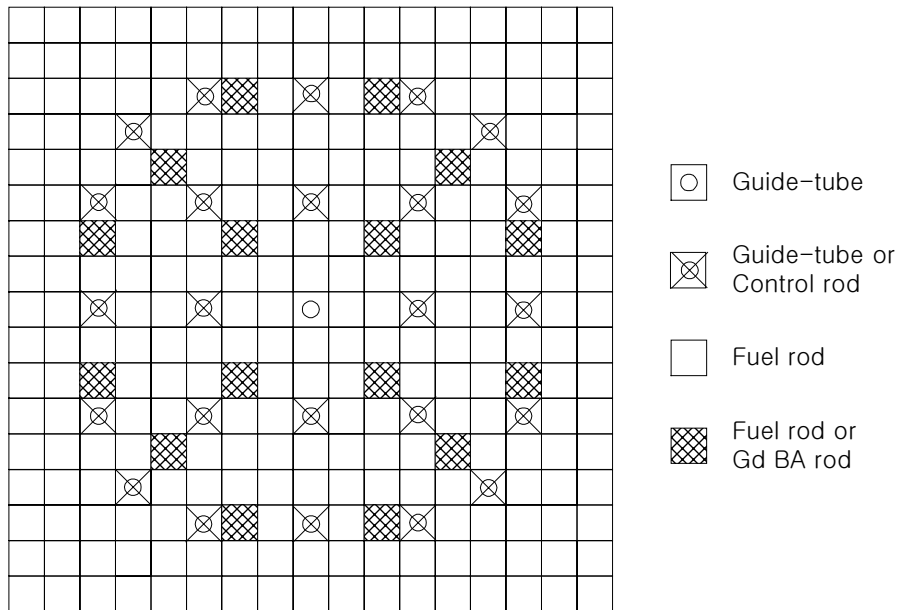
## 3) Fuel Rod Configuration

Cell Type	Region	Radius
Fuel (UOX, MOX, and Gd Rod)	$r_0 - r_1$ : Fuel	$r_1 = 0.4095$ cm
	$r_1 - r_2$ : Gap	$r_2 = 0.4180$ cm
	$r_2 - r_3$ : Clad	$r_3 = 0.4750$ cm
Instrumentation guide tube	$r_0 - r_1$ : Water	$r_1 = 0.5715$ cm
	$r_1 - r_2$ : Clad	$r_2 = 0.6120$ cm
Control rod	$r_0 - r_1$ : Control material	$r_1 = 0.3823$ cm
	$r_1 - r_2$ : Clad	$r_2 = 0.4839$ cm
	$r_2 - r_3$ : Water	$r_3 = 0.5715$ cm
	$r_3 - r_4$ : Clad (guide tube)	$r_4 = 0.6120$ cm

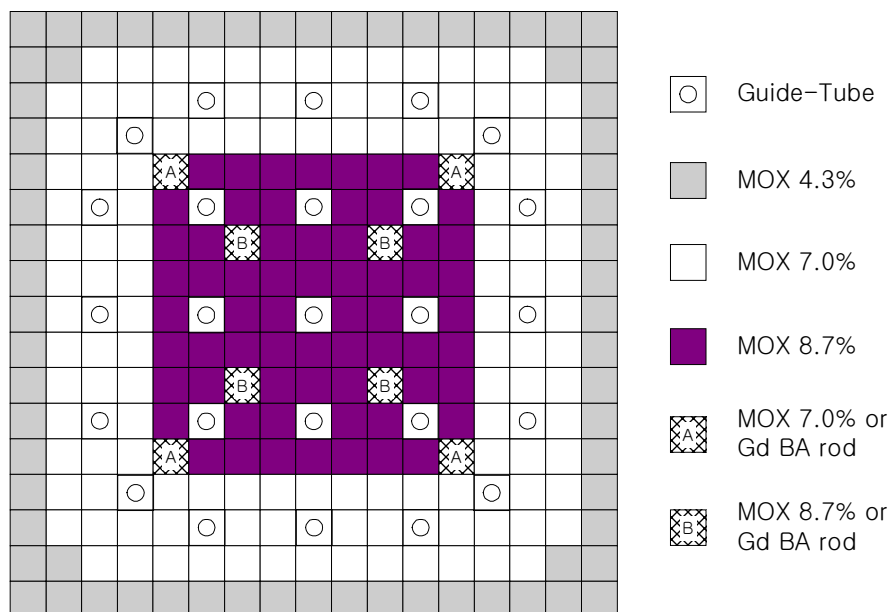


## 4) Fuel Assembly Configuration

- Lattice: 17 X 17	- Assembly pitch: 21.42 cm
- Number of fuel pins: 264	- Pin pitch: 1.26 cm
- Number of control rod guide tubes: 24	- Active fuel length: 365.76 cm
- Number of instrumentation guide tubes: 1	



&lt;UOX Fuel Assembly&gt;



&lt;MOX-1 Fuel Assembly&gt;

5) 7 Group Heterogeneous Cross Sections ( $\text{cm}^{-1}$ )

The 7 group heterogeneous cross sections were generated by condensing the results of HELIOS 34 group runs as follows ;

Fuel Materials	UO2 2.0 w/o, UO2 3.3 w/o, MOX 4.3 w/o, MOX 7.0 w/o, MOX 8.7 w/o	Single-cell calculations
Absorber Materials	Burnable absorber, Control rod	Single-assembly calculations
Other Materials	Clad, Gap, Coolant	UO2 3.3 w/o loaded single-cell calculation
	Baffle, Reflector	Two-assembly calculation (UOX-1 FA + Baffle/Reflector)

- Download : [Bench2A\\_CX.txt](#) (text file format)
- Download : [Bench2A\\_CX.xls](#) (MS Excel file format)

## a) MOX 4.3 w/o fuel (for MOX-1 FA)

	Total	Absorption	NuSigFiss	KappaSigFiss
Group 1	1.6934E-01	1.4207E-02	3.7381E-02	4.4522E-13
Group 2	3.6882E-01	6.2258E-03	4.3742E-03	5.1267E-14
Group 3	5.7921E-01	8.5873E-02	5.1503E-02	6.0902E-13
Group 4	6.4497E-01	2.4481E-01	5.7212E-02	6.7736E-13
Group 5	1.2922E+00	9.0376E-01	1.4885E+00	1.7594E-11
Group 6	1.0066E+00	6.1556E-01	1.0685E+00	1.2603E-11
Group 7	1.2736E+00	8.6783E-01	1.5503E+00	1.8286E-11

Scattering Cross Section [ $\Sigma_g \rightarrow g$ ]

## P0 Scattering Cross Section

	g = 1	g = 2	g = 3	g = 4	g = 5	g = 6	g = 7
g' = 1	1.8385E-01	5.3408E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
g' = 2	0.0000E+00	4.1067E-01	2.3743E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
g' = 3	0.0000E+00	0.0000E+00	4.9953E-01	2.1949E-03	0.0000E+00	0.0000E+00	0.0000E+00
g' = 4	0.0000E+00	0.0000E+00	0.0000E+00	3.9579E-01	1.2995E-02	0.0000E+00	0.0000E+00
g' = 5	0.0000E+00	0.0000E+00	0.0000E+00	7.7071E-03	3.6519E-01	2.3810E-02	5.5843E-04
g' = 6	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	3.9814E-02	3.2481E-01	3.5200E-02
g' = 7	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.4797E-03	7.6133E-02	3.3523E-01

## P1 Scattering Cross Section

	g = 1	g = 2	g = 3	g = 4	g = 5	g = 6	g = 7
g' = 1	8.3704E-02	-1.5793E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
g' = 2	0.0000E+00	5.1178E-02	-7.2616E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
g' = 3	0.0000E+00	0.0000E+00	9.0580E-03	-6.6818E-04	0.0000E+00	0.0000E+00	0.0000E+00
g' = 4	0.0000E+00	0.0000E+00	0.0000E+00	1.1530E-02	-2.9063E-03	0.0000E+00	0.0000E+00
g' = 5	0.0000E+00	0.0000E+00	0.0000E+00	-6.8606E-04	1.3265E-02	-3.4732E-03	-2.9058E-04
g' = 6	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	-6.3276E-03	1.9802E-02	-4.6707E-03
g' = 7	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	-1.3690E-03	-1.0417E-02	1.9900E-02

## Transport-Corrected Scattering Cross Section

	g = 1	g = 2	g = 3	g = 4	g = 5	g = 6	g = 7
g' = 1	1.0173E-01	5.3408E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
g' = 2	0.0000E+00	3.6022E-01	2.3743E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
g' = 3	0.0000E+00	0.0000E+00	4.9114E-01	2.1949E-03	0.0000E+00	0.0000E+00	0.0000E+00
g' = 4	0.0000E+00	0.0000E+00	0.0000E+00	3.8716E-01	1.2995E-02	0.0000E+00	0.0000E+00
g' = 5	0.0000E+00	0.0000E+00	0.0000E+00	7.7071E-03	3.5637E-01	2.3810E-02	5.5843E-04
g' = 6	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	3.9814E-02	3.1601E-01	3.5200E-02
g' = 7	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.4797E-03	7.6133E-02	3.2712E-01

## b) MOX 7.0 w/o fuel (for MOX-1 FA)

	Total	Absorption	NuSigFiss	KappaSigFiss
Group 1	1.7008E-01	1.4998E-02	4.0148E-02	4.7209E-13
Group 2	3.6893E-01	7.0678E-03	6.7757E-03	7.8885E-14
Group 3	5.9613E-01	1.0016E-01	7.6917E-02	9.0716E-13
Group 4	7.3052E-01	3.2292E-01	8.7360E-02	1.0306E-12
Group 5	1.7165E+00	1.3286E+00	2.1907E+00	2.5879E-11
Group 6	1.3600E+00	9.7082E-01	1.7175E+00	2.0225E-11
Group 7	1.7491E+00	1.3454E+00	2.4624E+00	2.8978E-11

## Scattering Cross Section [Sigma\_g'-&gt;g]

## P0 Scattering Cross Section

	g = 1	g = 2	g = 3	g = 4	g = 5	g = 6	g = 7
g' = 1	1.8354E-01	5.2873E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
g' = 2	0.0000E+00	4.0966E-01	2.3686E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
g' = 3	0.0000E+00	0.0000E+00	5.0231E-01	2.0507E-03	0.0000E+00	0.0000E+00	0.0000E+00
g' = 4	0.0000E+00	0.0000E+00	0.0000E+00	4.0442E-01	1.1788E-02	0.0000E+00	0.0000E+00
g' = 5	0.0000E+00	0.0000E+00	0.0000E+00	8.7685E-03	3.6667E-01	2.0863E-02	4.9080E-04
g' = 6	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	4.0120E-02	3.2310E-01	3.4752E-02

$g' = 7$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.5120E-03	7.6912E-02	3.3247E-01
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## P1 Scattering Cross Section

	$g = 1$	$g = 2$	$g = 3$	$g = 4$	$g = 5$	$g = 6$	$g = 7$
$g' = 1$	8.2937E-02	-1.6007E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 2$	0.0000E+00	5.0881E-02	-7.2136E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 3$	0.0000E+00	0.0000E+00	9.0140E-03	-6.2359E-04	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 4$	0.0000E+00	0.0000E+00	0.0000E+00	1.1225E-02	-2.6241E-03	0.0000E+00	0.0000E+00
$g' = 5$	0.0000E+00	0.0000E+00	0.0000E+00	-7.7511E-04	1.2864E-02	-3.0215E-03	-2.5469E-04
$g' = 6$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	-6.3220E-03	1.9737E-02	-4.6261E-03
$g' = 7$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	-1.3852E-03	-1.0391E-02	1.9899E-02

## Transport-Corrected Scattering Cross Section

	$g = 1$	$g = 2$	$g = 3$	$g = 4$	$g = 5$	$g = 6$	$g = 7$
$g' = 1$	1.0221E-01	5.2873E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 2$	0.0000E+00	3.5950E-01	2.3686E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 3$	0.0000E+00	0.0000E+00	4.9391E-01	2.0507E-03	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 4$	0.0000E+00	0.0000E+00	0.0000E+00	3.9581E-01	1.1788E-02	0.0000E+00	0.0000E+00
$g' = 5$	0.0000E+00	0.0000E+00	0.0000E+00	8.7685E-03	3.5785E-01	2.0863E-02	4.9080E-04
$g' = 6$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	4.0120E-02	3.1431E-01	3.4752E-02
$g' = 7$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.5120E-03	7.6912E-02	3.2435E-01

## c) MOX 8.7 w/o fuel (for MOX-1 FA)

	Total	Absorption	NuSigFiss	KappaSigFiss
Group 1	1.7054E-01	1.5496E-02	4.1891E-02	4.8901E-13
Group 2	3.6902E-01	7.5984E-03	8.2883E-03	9.6279E-14
Group 3	6.0584E-01	1.0833E-01	9.1656E-02	1.0800E-12
Group 4	7.7732E-01	3.6532E-01	1.0563E-01	1.2446E-12
Group 5	1.9693E+00	1.5816E+00	2.6070E+00	3.0791E-11
Group 6	1.5826E+00	1.1945E+00	2.1262E+00	2.5025E-11
Group 7	2.0473E+00	1.6447E+00	3.0339E+00	3.5678E-11

Scattering Cross Section [ $\Sigma_{g' \rightarrow g}$ ]

## P0 Scattering Cross Section

	$g = 1$	$g = 2$	$g = 3$	$g = 4$	$g = 5$	$g = 6$	$g = 7$
$g' = 1$	1.8335E-01	5.2537E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 2$	0.0000E+00	4.0902E-01	2.3655E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 3$	0.0000E+00	0.0000E+00	5.0393E-01	1.9694E-03	0.0000E+00	0.0000E+00	0.0000E+00

$g' = 4$	0.0000E+00	0.0000E+00	0.0000E+00	4.0942E-01	1.1164E-02	0.0000E+00	0.0000E+00
$g' = 5$	0.0000E+00	0.0000E+00	0.0000E+00	9.1995E-03	3.6720E-01	1.9693E-02	4.6418E-04
$g' = 6$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	4.0230E-02	3.2203E-01	3.4541E-02
$g' = 7$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.5268E-03	7.7243E-02	3.3096E-01

## P1 Scattering Cross Section

	$g = 1$	$g = 2$	$g = 3$	$g = 4$	$g = 5$	$g = 6$	$g = 7$
$g' = 1$	8.2453E-02	-1.6143E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 2$	0.0000E+00	5.0690E-02	-7.1848E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 3$	0.0000E+00	0.0000E+00	8.9893E-03	-5.9845E-04	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 4$	0.0000E+00	0.0000E+00	0.0000E+00	1.1068E-02	-2.4796E-03	0.0000E+00	0.0000E+00
$g' = 5$	0.0000E+00	0.0000E+00	0.0000E+00	-8.1019E-04	1.2700E-02	-2.8389E-03	-2.4052E-04
$g' = 6$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	-6.3136E-03	1.9696E-02	-4.6022E-03
$g' = 7$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	-1.3926E-03	-1.0369E-02	1.9886E-02

## Transport-Corrected Scattering Cross Section

	$g = 1$	$g = 2$	$g = 3$	$g = 4$	$g = 5$	$g = 6$	$g = 7$
$g' = 1$	1.0251E-01	5.2537E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 2$	0.0000E+00	3.5905E-01	2.3655E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 3$	0.0000E+00	0.0000E+00	4.9554E-01	1.9694E-03	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 4$	0.0000E+00	0.0000E+00	0.0000E+00	4.0083E-01	1.1164E-02	0.0000E+00	0.0000E+00
$g' = 5$	0.0000E+00	0.0000E+00	0.0000E+00	9.1995E-03	3.5839E-01	1.9693E-02	4.6418E-04
$g' = 6$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	4.0230E-02	3.1325E-01	3.4541E-02
$g' = 7$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.5268E-03	7.7243E-02	3.2283E-01

## d) UO2 2.0 w/o fuel (for UOX-1 FA)

	Total	Absorption	NuSigFiss	KappaSigFiss
Group 1	1.6856E-01	1.3209E-02	3.3622E-02	4.1057E-13
Group 2	3.6840E-01	5.5331E-03	2.0510E-03	2.7036E-14
Group 3	5.5958E-01	7.0429E-02	2.3603E-02	3.1445E-13
Group 4	4.1712E-01	3.3334E-02	4.1982E-02	5.5931E-13
Group 5	5.0287E-01	1.1070E-01	1.8488E-01	2.4631E-12
Group 6	5.7710E-01	1.8083E-01	3.0967E-01	4.1256E-12
Group 7	7.6954E-01	3.5839E-01	6.2433E-01	8.3176E-12

Scattering Cross Section [ $\Sigma_{g' \rightarrow g}$ ]

## P0 Scattering Cross Section

$g = 1$	$g = 2$	$g = 3$	$g = 4$	$g = 5$	$g = 6$	$g = 7$
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$g' = 1$	1.8388E-01	5.4476E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 2$	0.0000E+00	4.1150E-01	2.3667E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 3$	0.0000E+00	0.0000E+00	4.9517E-01	2.3867E-03	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 4$	0.0000E+00	0.0000E+00	0.0000E+00	3.7683E-01	1.5642E-02	0.0000E+00	0.0000E+00
$g' = 5$	0.0000E+00	0.0000E+00	0.0000E+00	3.9205E-03	3.6333E-01	3.2969E-02	7.6385E-04
$g' = 6$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	3.9767E-02	3.2961E-01	3.5730E-02
$g' = 7$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.4427E-03	7.5498E-02	3.4133E-01

## P1 Scattering Cross Section

	$g = 1$	$g = 2$	$g = 3$	$g = 4$	$g = 5$	$g = 6$	$g = 7$
$g' = 1$	8.4595E-02	-1.5875E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 2$	0.0000E+00	5.1728E-02	-7.2863E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 3$	0.0000E+00	0.0000E+00	9.1268E-03	-7.2787E-04	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 4$	0.0000E+00	0.0000E+00	0.0000E+00	1.2308E-02	-3.6166E-03	0.0000E+00	0.0000E+00
$g' = 5$	0.0000E+00	0.0000E+00	0.0000E+00	-3.5988E-04	1.4579E-02	-5.0023E-03	-4.0238E-04
$g' = 6$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	-6.3746E-03	1.9958E-02	-4.7461E-03
$g' = 7$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	-1.3504E-03	-1.0504E-02	1.9975E-02

## Transport-Corrected Scattering Cross Section

	$g = 1$	$g = 2$	$g = 3$	$g = 4$	$g = 5$	$g = 6$	$g = 7$
$g' = 1$	1.0087E-01	5.4476E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 2$	0.0000E+00	3.6050E-01	2.3667E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 3$	0.0000E+00	0.0000E+00	4.8677E-01	2.3867E-03	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 4$	0.0000E+00	0.0000E+00	0.0000E+00	3.6814E-01	1.5642E-02	0.0000E+00	0.0000E+00
$g' = 5$	0.0000E+00	0.0000E+00	0.0000E+00	3.9205E-03	3.5452E-01	3.2969E-02	7.6385E-04
$g' = 6$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	3.9767E-02	3.2077E-01	3.5730E-02
$g' = 7$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.4427E-03	7.5498E-02	3.3321E-01

## e) UO2 3.3 w/o fuel (for UOX-2 FA)

	Total	Absorption	NuSigFiss	KappaSigFiss
Group 1	1.6861E-01	1.3431E-02	3.4216E-02	4.1739E-13
Group 2	3.6781E-01	5.9921E-03	3.1451E-03	4.1432E-14
Group 3	5.6845E-01	7.8788E-02	3.7576E-02	5.0060E-13
Group 4	4.3229E-01	4.7232E-02	6.8684E-02	9.1504E-13
Group 5	5.5897E-01	1.6531E-01	2.9824E-01	3.9733E-12
Group 6	6.7360E-01	2.7566E-01	5.0907E-01	6.7821E-12
Group 7	9.6020E-01	5.4767E-01	1.0210E+00	1.3603E-11

Scattering Cross Section [ $\Sigma_{g' \rightarrow g}$ ]



## P0 Scattering Cross Section

	g = 1	g = 2	g = 3	g = 4	g = 5	g = 6	g = 7
g' = 1	1.8375E-01	5.4398E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
g' = 2	0.0000E+00	4.1065E-01	2.3375E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
g' = 3	0.0000E+00	0.0000E+00	4.9577E-01	2.3011E-03	0.0000E+00	0.0000E+00	0.0000E+00
g' = 4	0.0000E+00	0.0000E+00	0.0000E+00	3.7836E-01	1.5395E-02	0.0000E+00	0.0000E+00
g' = 5	0.0000E+00	0.0000E+00	0.0000E+00	4.5072E-03	3.6718E-01	3.0100E-02	6.9294E-04
g' = 6	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	4.0585E-02	3.3105E-01	3.5146E-02
g' = 7	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.4781E-03	7.6661E-02	3.4154E-01

## P1 Scattering Cross Section

	g = 1	g = 2	g = 3	g = 4	g = 5	g = 6	g = 7
g' = 1	8.4564E-02	-1.5995E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
g' = 2	0.0000E+00	5.1890E-02	-7.1958E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
g' = 3	0.0000E+00	0.0000E+00	9.1079E-03	-7.0178E-04	0.0000E+00	0.0000E+00	0.0000E+00
g' = 4	0.0000E+00	0.0000E+00	0.0000E+00	1.2255E-02	-3.5597E-03	0.0000E+00	0.0000E+00
g' = 5	0.0000E+00	0.0000E+00	0.0000E+00	-4.1333E-04	1.4266E-02	-4.6622E-03	-3.6669E-04
g' = 6	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	-6.4334E-03	2.0001E-02	-4.7224E-03
g' = 7	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	-1.3682E-03	-1.0563E-02	2.0082E-02

## Transport-Corrected Scattering Cross Section

	g = 1	g = 2	g = 3	g = 4	g = 5	g = 6	g = 7
g' = 1	1.0078E-01	5.4398E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
g' = 2	0.0000E+00	3.5948E-01	2.3375E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
g' = 3	0.0000E+00	0.0000E+00	4.8736E-01	2.3011E-03	0.0000E+00	0.0000E+00	0.0000E+00
g' = 4	0.0000E+00	0.0000E+00	0.0000E+00	3.6967E-01	1.5395E-02	0.0000E+00	0.0000E+00
g' = 5	0.0000E+00	0.0000E+00	0.0000E+00	4.5072E-03	3.5835E-01	3.0100E-02	6.9294E-04
g' = 6	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	4.0585E-02	3.2220E-01	3.5146E-02
g' = 7	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.4781E-03	7.6661E-02	3.3339E-01

## f) BA + 0.711 w/o UO2 fuel (for UOX-2 FA)

	Total	Absorption	NuSigFiss	KappaSigFiss
Group 1	1.7344E-01	1.1657E-02	2.9089E-02	3.5554E-13
Group 2	3.6787E-01	5.6708E-03	8.4367E-04	1.1142E-14
Group 3	6.1190E-01	1.1578E-01	7.3974E-03	9.8552E-14
Group 4	5.9900E-01	2.2888E-01	1.3197E-02	1.7582E-13
Group 5	2.4158E+00	2.0186E+00	4.8833E-02	6.5057E-13
Group 6	2.7576E+01	2.7007E+01	8.9180E-02	1.1881E-12

Group 7    1.2152E+02    1.2066E+02    1.8121E-01    2.4142E-12

Scattering Cross Section [ $\Sigma_{g' \rightarrow g}$ ]

P0 Scattering Cross Section

	g = 1	g = 2	g = 3	g = 4	g = 5	g = 6	g = 7
g' = 1	1.8200E-01	5.4327E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
g' = 2	0.0000E+00	4.0546E-01	2.4304E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
g' = 3	0.0000E+00	0.0000E+00	5.0185E-01	2.3872E-03	0.0000E+00	0.0000E+00	0.0000E+00
g' = 4	0.0000E+00	0.0000E+00	0.0000E+00	3.6300E-01	1.5545E-02	0.0000E+00	0.0000E+00
g' = 5	0.0000E+00	0.0000E+00	0.0000E+00	7.7391E-03	3.8453E-01	1.3299E-02	2.6068E-04
g' = 6	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	6.6034E-02	4.8111E-01	3.0067E-02
g' = 7	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.7343E-03	1.4176E-01	7.2863E-01

P1 Scattering Cross Section

	g = 1	g = 2	g = 3	g = 4	g = 5	g = 6	g = 7
g' = 1	7.6172E-02	-1.6274E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
g' = 2	0.0000E+00	4.6412E-02	-7.2981E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
g' = 3	0.0000E+00	0.0000E+00	8.8384E-03	-7.2261E-04	0.0000E+00	0.0000E+00	0.0000E+00
g' = 4	0.0000E+00	0.0000E+00	0.0000E+00	1.1968E-02	-3.5452E-03	0.0000E+00	0.0000E+00
g' = 5	0.0000E+00	0.0000E+00	0.0000E+00	-6.5554E-04	1.1757E-02	-2.4166E-03	-1.4826E-04
g' = 6	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	-6.8438E-03	1.9110E-02	-3.7308E-03
g' = 7	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	-1.4913E-03	-1.0033E-02	1.9556E-02

Transport-Corrected Scattering Cross Section

	g = 1	g = 2	g = 3	g = 4	g = 5	g = 6	g = 7
g' = 1	1.0745E-01	5.4327E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
g' = 2	0.0000E+00	3.5977E-01	2.4304E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
g' = 3	0.0000E+00	0.0000E+00	4.9374E-01	2.3872E-03	0.0000E+00	0.0000E+00	0.0000E+00
g' = 4	0.0000E+00	0.0000E+00	0.0000E+00	3.5458E-01	1.5545E-02	0.0000E+00	0.0000E+00
g' = 5	0.0000E+00	0.0000E+00	0.0000E+00	7.7391E-03	3.7599E-01	1.3299E-02	2.6068E-04
g' = 6	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	6.6034E-02	4.7257E-01	3.0067E-02
g' = 7	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.7343E-03	1.4176E-01	7.2060E-01

g) BA + 0.711 w/o UO<sub>2</sub> fuel (for MOX-1 FA)

	Total	Absorption	NuSigFiss	KappaSigFiss
Group 1	1.7310E-01	1.1697E-02	2.9239E-02	3.5661E-13
Group 2	3.6766E-01	5.6615E-03	8.4421E-04	1.1149E-14

Group 3	6.1124E-01	1.1368E-01	7.2589E-03	9.6707E-14
Group 4	6.0930E-01	2.3936E-01	1.2142E-02	1.6176E-13
Group 5	1.9841E+00	1.5914E+00	4.5173E-02	6.0182E-13
Group 6	2.7241E+01	2.6674E+01	8.8873E-02	1.1840E-12
Group 7	1.2194E+02	1.2107E+02	1.8194E-01	2.4239E-12

P0 Scattering Cross Section [ $\Sigma_{g' \rightarrow g}$ ]

	$g = 1$	$g = 2$	$g = 3$	$g = 4$	$g = 5$	$g = 6$	$g = 7$
$g' = 1$	1.8224E-01	5.4009E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 2$	0.0000E+00	4.0532E-01	2.4204E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 3$	0.0000E+00	0.0000E+00	5.0346E-01	2.2125E-03	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 4$	0.0000E+00	0.0000E+00	0.0000E+00	3.6500E-01	1.3343E-02	0.0000E+00	0.0000E+00
$g' = 5$	0.0000E+00	0.0000E+00	0.0000E+00	9.4147E-03	3.8268E-01	9.0212E-03	1.7258E-04
$g' = 6$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	6.7000E-02	4.7920E-01	2.9263E-02
$g' = 7$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.7217E-03	1.4105E-01	7.2950E-01

P1 Scattering Cross Section [ $\Sigma_{g' \rightarrow g}$ ]

	$g = 1$	$g = 2$	$g = 3$	$g = 4$	$g = 5$	$g = 6$	$g = 7$
$g' = 1$	7.6446E-02	-1.5996E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 2$	0.0000E+00	4.6466E-02	-7.2678E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 3$	0.0000E+00	0.0000E+00	8.7860E-03	-6.6973E-04	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 4$	0.0000E+00	0.0000E+00	0.0000E+00	1.1433E-02	-3.0325E-03	0.0000E+00	0.0000E+00
$g' = 5$	0.0000E+00	0.0000E+00	0.0000E+00	-7.9288E-04	1.1210E-02	-1.7699E-03	-9.9758E-05
$g' = 6$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	-6.8755E-03	1.9111E-02	-3.6997E-03
$g' = 7$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	-1.4848E-03	-1.0023E-02	1.9530E-02

Transport-Corrected Scattering Cross Section [ $\Sigma_{g' \rightarrow g}$ ]

	$g = 1$	$g = 2$	$g = 3$	$g = 4$	$g = 5$	$g = 6$	$g = 7$
$g' = 1$	1.0739E-01	5.4009E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 2$	0.0000E+00	3.5958E-01	2.4204E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 3$	0.0000E+00	0.0000E+00	4.9535E-01	2.2125E-03	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 4$	0.0000E+00	0.0000E+00	0.0000E+00	3.5660E-01	1.3343E-02	0.0000E+00	0.0000E+00
$g' = 5$	0.0000E+00	0.0000E+00	0.0000E+00	9.4147E-03	3.7413E-01	9.0212E-03	1.7258E-04
$g' = 6$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	6.7000E-02	4.7067E-01	2.9263E-02
$g' = 7$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.7217E-03	1.4105E-01	7.2148E-01

h) Control rod (B4C)

Total	Absorption	NuSigFiss	KappaSigFiss
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Group 1	1.9540E-01	6.6012E-03	0.0000E+00	0.0000E+00
Group 2	3.7784E-01	2.4867E-02	0.0000E+00	0.0000E+00
Group 3	1.1595E+00	7.2470E-01	0.0000E+00	0.0000E+00
Group 4	7.9551E+00	7.5193E+00	0.0000E+00	0.0000E+00
Group 5	1.8431E+01	1.7993E+01	0.0000E+00	0.0000E+00
Group 6	3.1854E+01	3.1409E+01	0.0000E+00	0.0000E+00
Group 7	5.4530E+01	5.4062E+01	0.0000E+00	0.0000E+00

Scattering Cross Section [ $\Sigma_{g' \rightarrow g}$ ]

P0 Scattering Cross Section

	g = 1	g = 2	g = 3	g = 4	g = 5	g = 6	g = 7
g' = 1	1.5802E-01	3.4331E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
g' = 2	0.0000E+00	3.5178E-01	7.5182E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
g' = 3	0.0000E+00	0.0000E+00	4.3767E-01	2.4430E-03	0.0000E+00	0.0000E+00	0.0000E+00
g' = 4	0.0000E+00	0.0000E+00	0.0000E+00	4.1383E-01	2.7344E-02	0.0000E+00	0.0000E+00
g' = 5	0.0000E+00	0.0000E+00	0.0000E+00	5.1538E-03	3.8821E-01	4.9283E-02	1.4133E-03
g' = 6	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	5.9688E-02	3.2399E-01	6.7329E-02
g' = 7	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	4.0600E-03	1.2823E-01	3.4155E-01

P1 Scattering Cross Section

	g = 1	g = 2	g = 3	g = 4	g = 5	g = 6	g = 7
g' = 1	4.8620E-03	-1.3112E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
g' = 2	0.0000E+00	6.7646E-03	-4.4387E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
g' = 3	0.0000E+00	0.0000E+00	5.4865E-03	-1.4496E-04	0.0000E+00	0.0000E+00	0.0000E+00
g' = 4	0.0000E+00	0.0000E+00	0.0000E+00	6.8217E-03	-1.4191E-03	0.0000E+00	0.0000E+00
g' = 5	0.0000E+00	0.0000E+00	0.0000E+00	3.2670E-05	7.4662E-03	-1.8585E-03	-1.2332E-04
g' = 6	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	-1.1229E-03	8.7547E-03	-2.0733E-03
g' = 7	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	-6.2904E-04	-2.0484E-03	7.9118E-03

Transport-Corrected Scattering Cross Section

	g = 1	g = 2	g = 3	g = 4	g = 5	g = 6	g = 7
g' = 1	1.5447E-01	3.4331E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
g' = 2	0.0000E+00	3.4546E-01	7.5182E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
g' = 3	0.0000E+00	0.0000E+00	4.3233E-01	2.4430E-03	0.0000E+00	0.0000E+00	0.0000E+00
g' = 4	0.0000E+00	0.0000E+00	0.0000E+00	4.0843E-01	2.7344E-02	0.0000E+00	0.0000E+00
g' = 5	0.0000E+00	0.0000E+00	0.0000E+00	5.1538E-03	3.8269E-01	4.9283E-02	1.4133E-03
g' = 6	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	5.9688E-02	3.1843E-01	6.7329E-02
g' = 7	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	4.0600E-03	1.2823E-01	3.3632E-01

## i) Guide tube (for Clad)

	Total	Absorption	NuSigFiss	KappaSigFiss
Group 1	1.3006E-01	2.6479E-04	0.0000E+00	0.0000E+00
Group 2	3.0548E-01	7.3106E-04	0.0000E+00	0.0000E+00
Group 3	3.2991E-01	5.0349E-03	0.0000E+00	0.0000E+00
Group 4	2.6970E-01	1.1884E-03	0.0000E+00	0.0000E+00
Group 5	2.7278E-01	2.7968E-03	0.0000E+00	0.0000E+00
Group 6	2.7794E-01	4.7012E-03	0.0000E+00	0.0000E+00
Group 7	2.9563E-01	8.5762E-03	0.0000E+00	0.0000E+00

Scattering Cross Section [ $\Sigma_{g' \rightarrow g}$ ]

## P0 Scattering Cross Section

	g = 1	g = 2	g = 3	g = 4	g = 5	g = 6	g = 7
g' = 1	1.5467E-01	3.2548E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
g' = 2	0.0000E+00	3.5679E-01	7.7285E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
g' = 3	0.0000E+00	0.0000E+00	3.2666E-01	5.9405E-04	0.0000E+00	0.0000E+00	0.0000E+00
g' = 4	0.0000E+00	0.0000E+00	0.0000E+00	2.6551E-01	5.3135E-03	0.0000E+00	0.0000E+00
g' = 5	0.0000E+00	0.0000E+00	0.0000E+00	2.1268E-03	2.5639E-01	1.3908E-02	0.0000E+00
g' = 6	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	1.4850E-02	2.4423E-01	1.6534E-02
g' = 7	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.9899E-02	2.5954E-01

## P1 Scattering Cross Section

	g = 1	g = 2	g = 3	g = 4	g = 5	g = 6	g = 7
g' = 1	5.7757E-02	-3.3246E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
g' = 2	0.0000E+00	5.3008E-02	-1.9368E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
g' = 3	0.0000E+00	0.0000E+00	2.5633E-03	-1.8962E-04	0.0000E+00	0.0000E+00	0.0000E+00
g' = 4	0.0000E+00	0.0000E+00	0.0000E+00	3.5228E-03	-1.2073E-03	0.0000E+00	0.0000E+00
g' = 5	0.0000E+00	0.0000E+00	0.0000E+00	-2.5996E-04	5.2758E-03	-2.5732E-03	0.0000E+00
g' = 6	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	-2.6623E-03	8.0325E-03	-2.9930E-03
g' = 7	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	-5.2839E-03	7.6619E-03

## Transport-Corrected Scattering Cross Section

	g = 1	g = 2	g = 3	g = 4	g = 5	g = 6	g = 7
g' = 1	9.7249E-02	3.2548E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
g' = 2	0.0000E+00	3.0398E-01	7.7285E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
g' = 3	0.0000E+00	0.0000E+00	3.2428E-01	5.9405E-04	0.0000E+00	0.0000E+00	0.0000E+00
g' = 4	0.0000E+00	0.0000E+00	0.0000E+00	2.6320E-01	5.3135E-03	0.0000E+00	0.0000E+00

$g' = 5$	0.0000E+00	0.0000E+00	0.0000E+00	2.1268E-03	2.5395E-01	1.3908E-02	0.0000E+00
$g' = 6$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	1.4850E-02	2.4185E-01	1.6534E-02
$g' = 7$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.9899E-02	2.5716E-01

j) Gas (for Gap)

	Total	Absorption	NuSigFiss	KappaSigFiss
Group 1	6.1066E-09	6.1066E-09	0.0000E+00	0.0000E+00
Group 2	2.6117E-08	2.6117E-08	0.0000E+00	0.0000E+00
Group 3	1.0268E-06	1.0268E-06	0.0000E+00	0.0000E+00
Group 4	7.9749E-06	7.9749E-06	0.0000E+00	0.0000E+00
Group 5	1.8728E-05	1.8728E-05	0.0000E+00	0.0000E+00
Group 6	3.1520E-05	3.1520E-05	0.0000E+00	0.0000E+00
Group 7	5.7803E-05	5.7803E-05	0.0000E+00	0.0000E+00

Scattering Cross Section [ $\Sigma_{g' \rightarrow g}$ ]

P0 Scattering Cross Section

	$g = 1$	$g = 2$	$g = 3$	$g = 4$	$g = 5$	$g = 6$	$g = 7$
$g' = 1$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 2$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 3$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 4$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 5$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 6$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 7$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

P1 Scattering Cross Section

	$g = 1$	$g = 2$	$g = 3$	$g = 4$	$g = 5$	$g = 6$	$g = 7$
$g' = 1$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 2$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 3$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 4$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 5$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 6$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 7$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

Transport-Corrected Scattering Cross Section

	$g = 1$	$g = 2$	$g = 3$	$g = 4$	$g = 5$	$g = 6$	$g = 7$
$g' = 1$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

$g' = 2$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 3$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 4$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 5$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 6$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 7$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

## k) Coolant

	Total	Absorption	NuSigFiss	KappaSigFiss
Group 1	7.5724E-02	4.6988E-04	0.0000E+00	0.0000E+00
Group 2	2.4474E-01	1.5015E-05	0.0000E+00	0.0000E+00
Group 3	4.2098E-01	7.0644E-04	0.0000E+00	0.0000E+00
Group 4	5.3037E-01	5.4230E-03	0.0000E+00	0.0000E+00
Group 5	8.5390E-01	1.2755E-02	0.0000E+00	0.0000E+00
Group 6	1.3106E+00	2.1456E-02	0.0000E+00	0.0000E+00
Group 7	2.3014E+00	3.9599E-02	0.0000E+00	0.0000E+00

Scattering Cross Section [ $\Sigma_{g' \rightarrow g}$ ]

## P0 Scattering Cross Section

	$g = 1$	$g = 2$	$g = 3$	$g = 4$	$g = 5$	$g = 6$	$g = 7$
$g' = 1$	8.2505E-02	8.2980E-02	5.2268E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 2$	0.0000E+00	4.6679E-01	9.2487E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 3$	0.0000E+00	0.0000E+00	9.8222E-01	8.6242E-02	1.2332E-02	2.2317E-03	1.3779E-03
$g' = 4$	0.0000E+00	0.0000E+00	0.0000E+00	7.1303E-01	3.4849E-01	4.9225E-02	2.2011E-02
$g' = 5$	0.0000E+00	0.0000E+00	0.0000E+00	5.4261E-03	9.3372E-01	3.5236E-01	1.1513E-01
$g' = 6$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.2291E-01	1.1892E+00	4.2193E-01
$g' = 7$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	9.8349E-02	6.4858E-01	2.0064E+00

## P1 Scattering Cross Section

	$g = 1$	$g = 2$	$g = 3$	$g = 4$	$g = 5$	$g = 6$	$g = 7$
$g' = 1$	4.9253E-02	4.1500E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 2$	0.0000E+00	2.7411E-01	4.0452E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 3$	0.0000E+00	0.0000E+00	6.2109E-01	4.0418E-02	2.4147E-03	1.8872E-04	2.0383E-05
$g' = 4$	0.0000E+00	0.0000E+00	0.0000E+00	4.7477E-01	1.2800E-01	4.6011E-03	4.2914E-04
$g' = 5$	0.0000E+00	0.0000E+00	0.0000E+00	4.3846E-03	4.9668E-01	6.5843E-02	-1.4172E-03
$g' = 6$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	5.3067E-02	4.7283E-01	1.8990E-02
$g' = 7$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	4.0398E-03	4.5476E-02	4.4205E-01

## Transport-Corrected Scattering Cross Section

	g = 1	g = 2	g = 3	g = 4	g = 5	g = 6	g = 7
g' = 1	-8.2482E-03	8.2980E-02	5.2268E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
g' = 2	0.0000E+00	1.5223E-01	9.2487E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
g' = 3	0.0000E+00	0.0000E+00	3.1809E-01	8.6242E-02	1.2332E-02	2.2317E-03	1.3779E-03
g' = 4	0.0000E+00	0.0000E+00	0.0000E+00	1.0523E-01	3.4849E-01	4.9225E-02	2.2011E-02
g' = 5	0.0000E+00	0.0000E+00	0.0000E+00	5.4261E-03	3.6823E-01	3.5236E-01	1.1513E-01
g' = 6	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.2291E-01	6.4432E-01	4.2193E-01
g' = 7	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	9.8349E-02	6.4858E-01	1.5148E+00

## l) Baffle

	Total	Absorption	NuSigFiss	KappaSigFiss
Group 1	2.8203E-01	1.6422E-03	0.0000E+00	0.0000E+00
Group 2	4.0167E-01	6.7552E-04	0.0000E+00	0.0000E+00
Group 3	9.9137E-01	7.6252E-03	0.0000E+00	0.0000E+00
Group 4	8.9521E-01	3.4006E-02	0.0000E+00	0.0000E+00
Group 5	9.4509E-01	8.1811E-02	0.0000E+00	0.0000E+00
Group 6	1.0019E+00	1.3499E-01	0.0000E+00	0.0000E+00
Group 7	1.1187E+00	2.3782E-01	0.0000E+00	0.0000E+00

Scattering Cross Section [ $\Sigma_{g' \rightarrow g}$ ]

## P0 Scattering Cross Section

	g = 1	g = 2	g = 3	g = 4	g = 5	g = 6	g = 7
g' = 1	2.2896E-01	5.1421E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
g' = 2	0.0000E+00	3.9802E-01	2.9726E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
g' = 3	0.0000E+00	0.0000E+00	9.8056E-01	3.1882E-03	0.0000E+00	0.0000E+00	0.0000E+00
g' = 4	0.0000E+00	0.0000E+00	0.0000E+00	8.3882E-01	2.2383E-02	0.0000E+00	0.0000E+00
g' = 5	0.0000E+00	0.0000E+00	0.0000E+00	6.0327E-03	7.9668E-01	6.0562E-02	0.0000E+00
g' = 6	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	5.4940E-02	7.4869E-01	6.3251E-02
g' = 7	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	1.1812E-01	7.6275E-01

## P1 Scattering Cross Section

	g = 1	g = 2	g = 3	g = 4	g = 5	g = 6	g = 7
g' = 1	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
g' = 2	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
g' = 3	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
g' = 4	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
g' = 5	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00



$g' = 6$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 7$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

## Transport-Corrected Scattering Cross Section

	$g = 1$	$g = 2$	$g = 3$	$g = 4$	$g = 5$	$g = 6$	$g = 7$
$g' = 1$	2.2896E-01	5.1421E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 2$	0.0000E+00	3.9802E-01	2.9726E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 3$	0.0000E+00	0.0000E+00	9.8056E-01	3.1882E-03	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 4$	0.0000E+00	0.0000E+00	0.0000E+00	8.3882E-01	2.2383E-02	0.0000E+00	0.0000E+00
$g' = 5$	0.0000E+00	0.0000E+00	0.0000E+00	6.0327E-03	7.9668E-01	6.0562E-02	0.0000E+00
$g' = 6$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	5.4940E-02	7.4869E-01	6.3251E-02
$g' = 7$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	1.1812E-01	7.6275E-01

## m) Reflector

	Total	Absorption	NuSigFiss	KappaSigFiss
Group 1	7.5384E-02	4.9929E-04	0.0000E+00	0.0000E+00
Group 2	2.4872E-01	1.5705E-05	0.0000E+00	0.0000E+00
Group 3	4.2163E-01	8.2969E-04	0.0000E+00	0.0000E+00
Group 4	5.3183E-01	5.4649E-03	0.0000E+00	0.0000E+00
Group 5	9.0849E-01	1.3821E-02	0.0000E+00	0.0000E+00
Group 6	1.3205E+00	2.1644E-02	0.0000E+00	0.0000E+00
Group 7	2.3163E+00	3.9881E-02	0.0000E+00	0.0000E+00

Scattering Cross Section [ $\Sigma_{g' \rightarrow g}$ ]

## P0 Scattering Cross Section

	$g = 1$	$g = 2$	$g = 3$	$g = 4$	$g = 5$	$g = 6$	$g = 7$
$g' = 1$	8.2716E-02	8.1963E-02	5.1642E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 2$	0.0000E+00	4.7143E-01	9.9730E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 3$	0.0000E+00	0.0000E+00	9.5552E-01	1.1014E-01	1.5751E-02	2.8683E-03	1.7862E-03
$g' = 4$	0.0000E+00	0.0000E+00	0.0000E+00	7.0714E-01	3.5409E-01	4.9958E-02	2.2326E-02
$g' = 5$	0.0000E+00	0.0000E+00	0.0000E+00	2.3861E-03	8.9203E-01	4.2845E-01	1.3581E-01
$g' = 6$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.1673E-01	1.1939E+00	4.3269E-01
$g' = 7$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	9.8237E-02	6.4545E-01	2.0233E+00

## P1 Scattering Cross Section

	$g = 1$	$g = 2$	$g = 3$	$g = 4$	$g = 5$	$g = 6$	$g = 7$
$g' = 1$	4.9376E-02	4.0935E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 2$	0.0000E+00	2.7854E-01	4.3908E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

$g' = 3$	0.0000E+00	0.0000E+00	6.0837E-01	5.3404E-02	3.2058E-03	2.5700E-04	2.7629E-05
$g' = 4$	0.0000E+00	0.0000E+00	0.0000E+00	4.7130E-01	1.3074E-01	4.6660E-03	4.3373E-04
$g' = 5$	0.0000E+00	0.0000E+00	0.0000E+00	2.0882E-03	4.7579E-01	8.7587E-02	-1.4581E-03
$g' = 6$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	5.0454E-02	4.7343E-01	2.0516E-02
$g' = 7$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	3.9364E-03	4.3914E-02	4.4277E-01

## Transport-Corrected Scattering Cross Section

	$g = 1$	$g = 2$	$g = 3$	$g = 4$	$g = 5$	$g = 6$	$g = 7$
$g' = 1$	-7.5952E-03	8.1963E-02	5.1642E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 2$	0.0000E+00	1.4898E-01	9.9730E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$g' = 3$	0.0000E+00	0.0000E+00	2.9026E-01	1.1014E-01	1.5751E-02	2.8683E-03	1.7862E-03
$g' = 4$	0.0000E+00	0.0000E+00	0.0000E+00	9.9991E-02	3.5409E-01	4.9958E-02	2.2326E-02
$g' = 5$	0.0000E+00	0.0000E+00	0.0000E+00	2.3861E-03	3.2802E-01	4.2845E-01	1.3581E-01
$g' = 6$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.1673E-01	6.4948E-01	4.3269E-01
$g' = 7$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	9.8237E-02	6.4545E-01	1.5327E+00

## 6) 7 Group Structure (eV)

	Upper		Lower
Group 1 :	2.000E+7	-	1.353E+6
Group 2 :	1.353E+6	-	9.119E+3
Group 3 :	9.119E+3	-	3.928E+0
Group 4 :	3.928E+0	-	6.251E-1
Group 5 :	6.251E-1	-	1.457E-1
Group 6 :	1.457E-1	-	5.692E-2
Group 7 :	5.692E-2	-	0.000E+0

## 7) 7 Group Fission Spectrum

Group 1	5.9252E-01
Group 2	4.0714E-01
Group 3	3.3193E-04
Group 4	0.0000E+00
Group 5	0.0000E+00
Group 6	0.0000E+00
Group 7	0.0000E+00

## 8) Reactor Operating Condition

- Total thermal power of the core: 900 MWth

## 9) Problem Cases

- Case 1 : All rods in
- Case 2 : All rods out