IAEA Benchmark Analysis Expected Outputs

All participants in the benchmark analysis are kindly requested to:

1. Provide the following data in both tables and figures in the format specified below
2. Conduct analysis with fuel particles homogenized in specified regions as shown in the separate documents for unit-cell specifications
3. Evaluate the double heterogeneity effects of fuel particles if possible

Expected Outputs

1. Brief description of analysis codes and nuclear data libraries used in the analysis; methodology of solution of neutron transport equation, resonance absorption treatment, etc.

2. Neutron energy dependent parameters
   - Unit-cell averaged neutron flux per lethargy at BOC and EOC for more than 40 neutron energy groups
   - Unit-cell averaged effective multi-group macroscopic cross sections: nu*fission, fission, capture
   - Two group constants: diffusion coefficient, nu*fission, fission, capture, scattering matrix

   Note: If Monte-Carlo method is used, participants should determine the number of energy groups to be tallied considering computation time and reliability of outputs, but it is expected to use as many energy groups as possible.

□ Format

■ Figures:

1. Flux/lethargy[arbitrary] vs. Neutron energy [eV] — Fig 1.
2. Effective Macroscopic Cross section [/cm] vs. Neutron energy [eV] — Fig 2.

■ Tables:

1. Energy structure and Flux/lethargy — Table 1
2. Energy structure and Cross section — Table 2
3. Two group constants — Table 3
4. Scattering matrix — Table 4

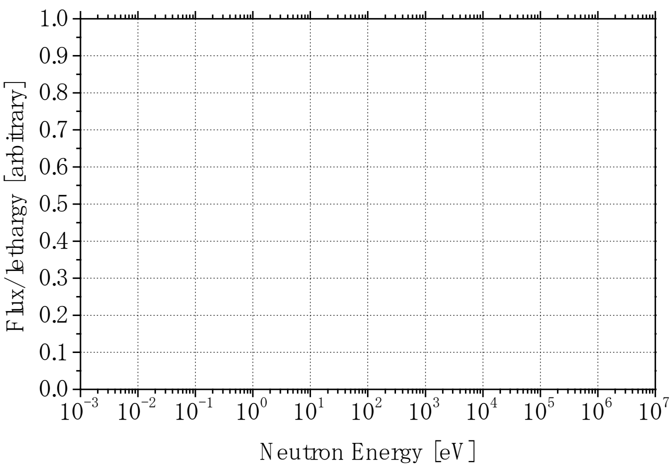

Fig 1: Flux/lethargy vs. Neutron energy

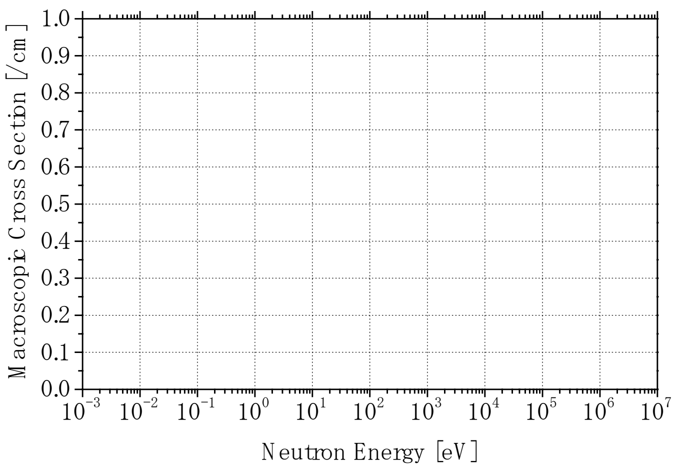

Fig 2 : Cross section vs. Neutron energy

Table 1: Flux/lethargy and energy structure

I	E_{i-1} [eV]	E_i [eV]	Flux/lethargy
G			
g-1			
….	….	….	….
1			

Table 2: Multi-group cross sections and energy structure

I	E_{i-1} [eV]	E_i [eV]	Nu*fission	Fission	Capture
g					
g-1					
….	….	….	….	….	….
1					

Table 3: two group constants

G	D	Nu*fission	Fission	capture	Capture
1					
2					

Table 4: scattering matrix G=>g

G=>g	g = 1	g = 2
G=1		
G=2		

3. Burn-up dependent characteristics
- Spectrum index
- Infinite multiplication factor
- Instantaneous conversion ratio
- Format
  - Figure:
    1. Spectrum index vs. burnup [MWd/t] Fig. 3
    2. Infinite multiplication factor vs. burnup [MWd/t] Fig. 4
    3. Instantaneous conversion ratio vs. burnup [MWd/t] Fig. 5
  - Table:
    1. Burnup steps and spectrum index Table. 5
    2. Burnup steps and infinite multiplication factor Table. 5
    3. Burnup steps and Instantaneous conversion ratio Table. 5

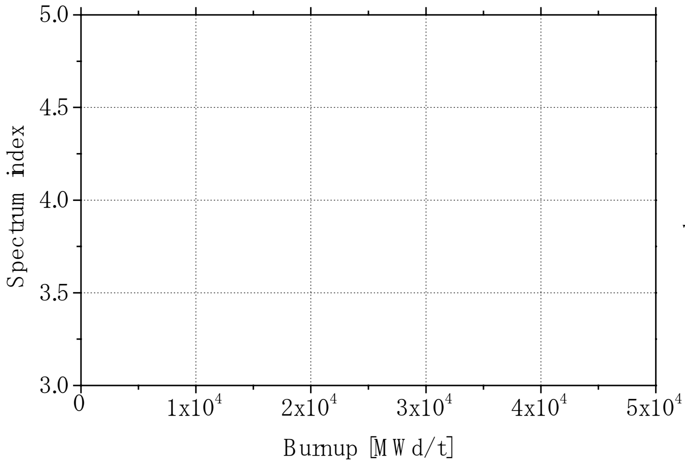

Fig 3: Spectrum Index vs. Burnup

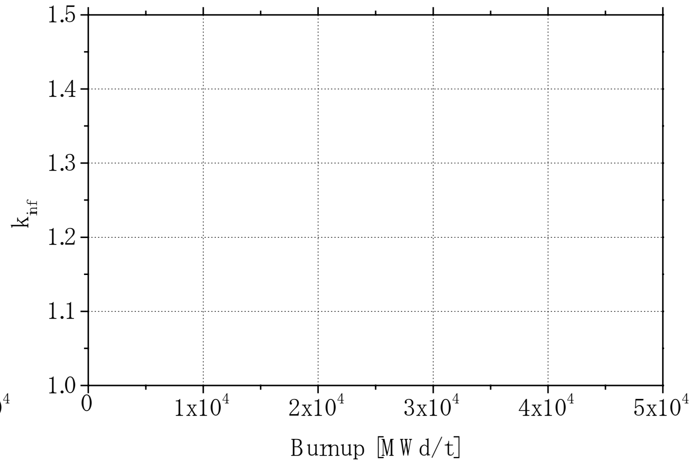

Fig 4: Infinite multiplication factor, kinf

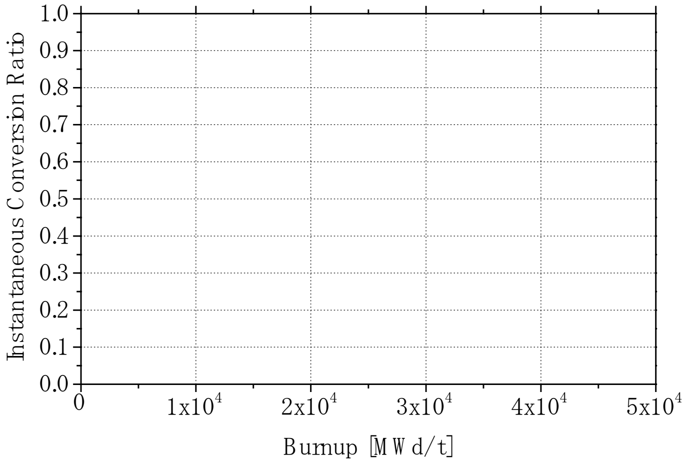

Fig 5: Instantaneous Conversion Ratio

Table 5. Burnup dependent parameters

Step	Burnup [MWd/t]	Spectrum index	Kinf	Inst. Conv. Ratio
1	0.000E+00			
2	Bu_2			
….	….			
N	Bu_N			

4. Fuel composition

- Number densities of the elements listed in table 7 at BOC and EOC. Here, EOC is defined as the burnup step when infinite multiplication factor reaches unity. It is requested to provide the burnup in MWd/t at EOC.

Table 6. Number density of elements [/cm^3] at BOC and EOC

Elements	BOC	EOC
^{235}U		
^{236}U		
^{238}U		
^{237}Np		
^{238}Pu		
^{239}Pu		
^{240}Pu		
^{241}Pu		
^{242}Pu		
^{241}Am		
^{242m}Am		
^{243}Am		
^{242}Cm		
^{243}Cm		
^{244}Cm		
^{233}U		
^{234}U		
^{230}Th		
^{232}Th		
^{231}Pa		
^{233}Pa		