

## Chapter 3 – Thermal Evaluation

### Question

What document, consistent with the fuel composition, specifically address the impact of the transuranic constituents in the fuel on the thermal performance?

### Response

See attachment titled “Fuel Composition” as it is also applicable to this response.

The composition of the fuel is detailed in Table 1-2 “Quantity of Radioactive Material (Type A and Type B)”, Table 1-3 “Type B Quantity of Radioactive Material” and Table 1-4 “Isotopes and A2 Fractions”.

The thermal evaluation of the TN-B1 package considers thermal loads from the environment and the contents of the package to determine the heat input to the fuel. The fuel composition used in the thermal analysis, by the isotope content, is shown in Table 1-3 of the SAR which is reproduced below.

Table 1-3 Type B Quantity of Radioactive Material

Isotope	Maximum content <sup>1</sup>	Maximum mass, g	Specific Activity <sup>2</sup> , TBq/g	Total Activity, TBq	Total Activity, Ci
U-232	2.00E-09 g/gU	9.92E-04	0.83	8.23E-04	2.23E-02
U-234	2.00E-03 g/gU	9.92E+02	2.30E-04	2.28E-01	6.17E+00
U-235	5.00E-02 g/gU	2.48E+04	8.00E-08	1.98E-03	5.36E-02
U-236	2.50E-02 g/gU	1.24E+04	2.40E-06	2.98E-02	8.04E-01
U-238	9.23E-01 g/gU	4.58E+05	1.20E-08	5.49E-03	1.48E-01
NP-237	1.66E-06 g/gU	8.23E-01	2.60E-05	2.14E-05	5.79E-04
PU-238	6.20E-11 g/gU	3.08E-05	6.30E-01	1.94E-05	5.24E-04
PU-239	3.04E-09 g/gU	1.51E-03	2.30E-03	3.47E-06	9.37E-05
PU-240	3.04E-09 g/gU	1.51E-03	8.40E-03	1.27E-05	3.42E-04
Gamma Emitters <sup>3</sup>	5.18E+05 MeV-Bq/kgU	N/A	N/A	2.57E-02	6.94E-01
Total				2.92E-01	7.89E+00

The fuel, as defined by the isotope content in Table 1-3 of the SAR, has insignificant decay heat. So, the thermal loads on the package come solely from the environment. The use of down-blended low enriched fuel and reprocessed uranium, therefore, has an insignificant impact on the thermal evaluation.

Framatome has also reviewed the previously submitted RAI 3-1 and RAI 3-2. The fuel, as defined by the isotope content in Table 1-3 of the SAR, has no impact on those RAI's.