Chapter 4 – Containment

Question

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

Response

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

For Type B packages, 10 CFR 71.51 requires that no escape of other radioactive material exceeding a total amount A2 in 1 week, and no external radiation dose rate exceeding 10 mSv/h (1 rem/h) at 1 m (40 in) from the external surface of the package.

As stated in Section 4.1 of the SAR, Table 1-4 shows the Isotopes and the associated A2 fractions for the fuel. That table is reproduced below:

Table 1-4 Isotopes and A2 Fractions

Isotope	Maximum Radioactivity content (Ci)	10CFR71 A_2 per isotope (Ci)	Activity Fraction	A_2 Fraction
U-232	2.23E-02	0.0270	2.75E-03	1.02E-01
U-234	6.17E+00	0.1600	7.63E-01	4.77E+00
U-235	5.36E-02	Unlimited		
U-236	8.04E-01	0.1600	9.94E-02	6.22E-01
U-238	1.48E-01	Unlimited		
Np-237	5.79E-04	0.0540	7.18E-05	1.33E-03
Pu-238	5.24E-04	0.0270	6.50E-05	2.41E-03
Pu-239	9.37E-05	0.0270	1.16E-05	4.29E-04
Pu-240	3.42E-04	0.0270	4.23E-05	1.57E-03
Gamma Emitters	6.94E-01	0.5400	8.59E-02	1.59E-01
Total	**7.89E+00**		**Sum of A_2 fractions**	**5.65E+00**
Mixture A_2				**0.18 Ci**

Chapter 4 "Containment" was updated as a part of this submission to include ATRIUM 11. Included within this revision was an update to the A_2 value based upon the revision to Table 1-4. Section 4.4 was updated as well, using the revised A_2 value. This section also increased the leak rate to 4.1 cm^3/wk based upon the higher number of fuel rods in the ATRIUM 11 assembly.

Section 4.4 then provides the demonstration that the containment requirements of 10 CFR 71.51 are met.

In the SER (ML18173A034), section 4.3, the last paragraph of that section reads as follows: "As discussed above, however, the staff finds that a leak rate of 5.5x10-6 atm-cm3/sec adjusted for an ATRIUM 11 x11

content, with 112 fuel rods as opposed to 91 fuel rods with a 10x10 content, would continue to meet the containment requirements of 10 CFR 71.51”

In summary then the SAR clearly identifies the allowable content of the package, both Type A and Type B, including ATRIUM 11. Additionally Framatome believes that that SAR provides adequate justification for Type B shipments of ATRIUM 11 fuel assemblies, not just shipments with enriched natural uranium (Type A). As noted in the SAR and the SER, shipments with a composition of fuel as 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” will meet the containment requirements of 10 CFR 71.51.