ATR FFSC Docket No. 71-9330, SAR Revision 5

NRC Staff Question Regarding Criticality Analysis and Package External Deformations (phone conversation 8/23/10)

AREVA Federal Services Response:

The ATR FFSC is not designed to be a deformable package. As shown on General Arrangement drawing 60501-10, sheet 3, Section B-B, the package consists of two tubes (an inner, round tube and an outer, square tube) separated and rigidly located by relatively stiff radial members. There are five radial structures in the ATR FFSC: the top plate, shown enlarged in Detail D on that drawing sheet, the bottom plate, shown in Detail E, and three equally spaced radial plates or ribs, shown in Section B-B. The top plate is 1.5 inches thick, the bottom plate is 0.88 inches thick, and the three radial plates are each 1.0 inches thick. These structures substantially strengthen the package to resist deformation in the HAC 30 ft free drop.

This is demonstrated by the testing performed and documented in Appendix 2.12.1 and Appendix 2.12.2. From Appendix 2.12.1 for CTU no. 1, figures 2.12.1-8 through 2.12.1-45 show the progression of the package condition following the free drops and punctures. There were a total of six 30 ft free drops and three punctures on CTU no. 1. As shown from this series of photos, there was no significant deformation of the package outer boundary that would affect the criticality analysis, including the CG-over-corner drop result shown in Figure 2.12.1-33, or the side puncture result shown in Figure 2.12.1-42. As shown in figure 2.12.1-46 and 2.12.1-47, at the completion of the entire series of free drops and punctures, the package cross-section is still essentially that of the as-fabricated package. Figure 2.12.1-48 shows the package partially disassembled by longitudinally cutting away two of the four sides. As shown in this photo, the sides and corners are still straight.

Appendix 2.12.2 documents that CTU no. 2 was subjected to three HAC 30 ft free drops, and its condition following the drops is shown in figures 2.12.2-6 through 2.12.2-12. The results are essentially the same as for CTU no. 1. Figure 2.12.2-18 is a particularly good view of the end plates and the three equally spaced stiffening plates. Given the relative light weight of the package and the relative large stiffness provided by these structures, significant external deformation of the package would not be expected, and as documented, does not occur.

Therefore, utilizing an undeformed package geometry in a square array in the criticality analysis is justified.