71-5797

Department of Energy
Washington, DC 20585

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Robert A. Nelson, Chief
Licensing Branch,
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Mr. Nelson

This letter is in response to your letter of September 28, 2007 requesting additional information to support our Application for Amendment and Renewal of the Nuclear Regulatory Commission Certificate of Compliance USA/5797/B(U)F, Inner and Outer HFIR Unirradiated Fuel Element Shipping Containers (TAC numbers L23118 and L24119). The following is a description of the drawing changes.

Two fuel plate drawings, which are included in the SARP, have been modified since the HFIR unirradiated fuel shipping package certificate was last renewed. These drawings show the individual fuel plate dimensions. The HFIR fuel plates are basically thin aluminum rectangular plates. Within the aluminum plate there is an area that contains the fuel (U_3O_8). That area is surrounded on all sides by aluminum. Once the rectangular plate is fabricated, it is radiographed to ensure the fuel plate meets the dimensional specifications; the plate is curved into an involute shape, and welded into the fuel element's cylindrical side plate. Since the package certificate was renewed, the fuel fabricator has acquired more sensitive radiography instrumentation. Based on the more sensitive measurements, the fuel fabricator determined that the distance between the fueled area and the edge of the plate was slightly greater than what was reflected in the drawings. This was found to be the case for both the inner fuel element and outer fuel element fuel plates. To account for this more accurate knowledge of the HFIR fuel plate fabrication result, changes were made to the dimensions that specify the maximum allowable distances between the edge of the fuel plates and the edge of the fueled area in the plates.

Drawings D42114 (Inner fuel element fuel plate loading details) and D42122 (Outer fuel element fuel plate loading details) were revised to increase the maximum allowable distance between the fuel plate edge and the fueled area by 0.010 inch. Dimensions (B) and (E) in Note 7 of drawing D42114 were changed from 0.234 inches to 0.244 inches and from 0.390 inches to 0.400 inches, respectively. Similarly, dimensions (B) and (E) in Note 7 of drawing D42122 were changed from 0.218 inches to 0.228 inches and from 0.263 inches to 0.273 inches, respectively. No changes in fuel plate loading or fuel plate distribution were implemented by these drawing revisions.

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The fuel plate dimensions are used in the worst case fire analysis described in chapter 3, appendix B, of the SARP. The model developed for that analysis included a representation of the affected dimensions. The dimensional change results in a slight increase in the amount of non-fueled aluminum that must melt during the hypothetical fire before exposing the fueled area of the plate. As a result, the fraction of fuel-bearing material projected to melt during the fire would be slightly reduced. Therefore the conclusion in section 4.3 of the SARP that less than an A_2 amount of material would be released as a result of the hypothetical accident remains valid.

Fuel plate dimensions were also used in developing the model for the criticality analysis. The material definitions described in chapter 6 of the SARP indicate an H/X (hydrogen to U_{235} atom) ratio of ~81 for the inner fuel element, and ~60 for the outer element. The changes in the fuel dimensions will decrease the volume of the fuel regions very slightly, thereby increasing the density of the U_{235} in the fuel region, while the hydrogen density will remain constant. This will result in slightly lower H/X ratios for the inner and outer fuel elements. For the considered H/X range (60 to 81), TID-7028, Figures 8-11 indicate the critical dimensions are essentially independent of minor changes to the H/X ratio over this limited range. However, in this range, a reduction in the fissile dimensions will decrease the neutron multiplication factor, resulting in reduced calculated k_{eff} values. Since the dimensional tolerance changes would result in lower computed k_{eff} values, the existing SARP conclusions for subcriticality of postulated arrays and criticality index assignment are not affected.

The changes have no effect on conclusions presented in the SARP and do not affect the overall safety of the packaging.

If you have any questions, please contact either Dana Willaford at 865-576-5338 or me at 301-903-5513.

Sincerely,

James M. Shuler

James M. Shuler
Manager, Packaging Certification Program
Safety Management and Operations
Office of Environmental Management

cc:
Dana Willaford, Oak Ridge Operations Office
Nancy Osgood, NRC NMSS