

November 5, 2009

Mr. Richard Boyle, Chief
Radioactive Materials Branch
Office of Hazardous Materials
Technology
U.S. Department of Transportation
400 Seventh Street, S.W.
Washington, DC 20590

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR REVIEW OF
THE MODEL NO. JRF-90Y-950K PACKAGE

Dear Mr. Boyle:

This refers to your request dated July 20, 2009, for a recommendation concerning the revalidation of the Model No. JRF-90Y-950K package, Japanese Certificate of Approval No. J/119/B(U)F-96, Revision 11. Enclosed is a request for additional information needed to continue the review for revalidation of the JRF-90Y-950K package. Our established schedule provides a recommendation date of February 28, 2010, for the JRF-90Y-950K package. We request that you provide this additional information by December 4, 2009, or earlier if possible. Inform us at your earliest convenience, but no later than November 30, 2009, if you are not able to provide the information by that date. To assist us in re-scheduling your review, you should include a new proposed submittal date and the reasons for the delay.

Please reference Docket No. 71-3036 in future correspondence related to this request. The staff is available to meet to discuss your proposed responses. If you have any questions regarding this matter, I may be contacted at (301) 492-3339.

Sincerely,

/RA/

Kimberly J. Hardin, Senior Project Manager
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Docket No. 71-3036
TAC No. L24357

Enclosure: Request for Additional Information

November 5, 2009

Mr. Richard Boyle, Chief
Radioactive Materials Branch
Office of Hazardous Materials
Technology
U.S. Department of Transportation
400 Seventh Street, S.W.
Washington, DC 20590

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR REVIEW OF
THE MODEL NO. JRF-90Y-950K PACKAGE

Dear Mr. Boyle:

This refers to your request dated July 20, 2009, for a recommendation concerning the revalidation of the Model No. JRF-90Y-950K package, Japanese Certificate of Approval No. J/119/B(U)F-96, Revision 11. Enclosed is a request for additional information needed to continue the review for revalidation of the JRF-90Y-950K package. Our established schedule provides a recommendation date of February 28, 2010, for the JRF-90Y-950K package. We request that you provide this additional information by December 4, 2009, or earlier if possible. Inform us at your earliest convenience, but no later than November 30, 2009, if you are not able to provide the information by that date. To assist us in re-scheduling your review, you should include a new proposed submittal date and the reasons for the delay.

Please reference Docket No. 71-3036 in future correspondence related to this request. The staff is available to meet to discuss your proposed responses. If you have any questions regarding this matter, I may be contacted at (301) 492-3339.

Sincerely,

/RA/

Kimberly J. Hardin, Senior Project Manager
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Docket No. 71-3036
TAC No. L24357

Enclosure: Request for Additional Information

DISTRIBUTION: SFST r/f NMSS r/f CRegan DNaujock BWhite
G:\SFST\Hardin\Revalidations\JRF-90Y-950K RAls.doc **ML093210566**

OFC:	SFST	E	SFST		SFST		SFST		SFST		SFST	
NAME:	KHardin		MDeBose		MCall		MRahimi		SBaggett			
DATE:	11/3/09		11/4/09		11/4/09		11/5/09		11/5/09			

C = COVER

E = COVER & ENCLOSURE

N = NO COPY

OFFICIAL RECORD COPY

Department of Transportation
Docket No. 71-3036
Request for Additional Information
Model No. JRF-90Y-950K Package

By letter dated July 20, 2009, the Department of Transportation submitted a request to the U.S. Nuclear Regulatory Commission to provide a recommendation concerning the revalidation of the Model No. JRF-90Y-950K package, Japanese Certificate of Approval No. J/119/B(U)F-96, Revision 11. This Request for Additional Information (RAI) identifies information needed by the U.S. Nuclear Regulatory Commission (NRC) staff in connection with its review of the application. Each individual RAI describes information needed by the staff for it to complete its review of the application to determine whether the applicant has demonstrated compliance with regulatory requirements.

General Information

- 1-1 Provide the licensing drawings for the package.

Package drawings are needed to understand the package design, including dimensions, tolerances, locations and amounts of various materials to ensure that all design aspects affecting the criticality and structural analyses are properly considered. These licensing drawings are more detailed than the figures submitted in the application and include weld specifications, tolerances, material specifications, etc. These drawings should include the drawing for the metal spacer for the KUR fuel, which should also specify the metal used for the spacer. The drawings are also needed to ensure that no changes have been made to the packaging that may affect the criticality design.

This information is needed to confirm compliance with TS-R-1 Paragraphs 671 and 682.

Criticality Review

- 6-1 Describe the mechanism for maintaining the fuel element's vertical position in the basket under normal conditions of transport (NCT) and hypothetical accident conditions (HAC).

It is not clear how the fuel elements' vertical position is maintained in the basket or how secondary impacts are prevented from causing damage to the fuel during HAC. It appears from some sketches in the application that a spacer of some kind may be placed above the fuel element. The applicant should clarify whether a spacer is used, the spacer materials, how it is secured so that it performs its function, and how the criticality analysis considers this material (e.g., if rubber, whether it can melt and deform around the fuel to provide moderation and lead to conditions conducive to preferential flooding). Provide clarifying sketches, as appropriate. If a spacer is not used, clarify how the fuel is maintained under HAC such that it doesn't experience secondary impacts that may result in damage to the fuel beyond what the already approved contents may experience.

This information is needed to confirm compliance with TS-R-1 Paragraphs 671 and 682.

- 6-2 Provide the tolerances on the KUR fuel element parameters.

The tolerances on the KUR assembly dimensions, particularly those related to the coolant channel width, the fuel plate thickness, and the width of the fuel meat can have a significant affect on the package reactivity.

This information is needed to confirm compliance with TS-R-1 Paragraphs 671 and 682.

- 6-3 Provide a benchmark analysis from which a bias is determined and used in the criticality analysis.

For the KUR contents, the applicant has used a different code and cross section library from that used for the previously approved contents. Thus, the benchmark analysis currently in the application does not apply to the new analysis. The benchmark analysis must use the same code and cross section library as is used for the package and KUR contents analysis. A number of critical experiments sufficient to provide a statistically sound base should be analyzed as part of the benchmark analysis. From this analysis, a bias that is used in the package analysis should be calculated using an appropriate technique that also accounts for trends in the bias with respect to parameters such as fuel pitch, hydrogen-to-fissile material atom ratio, the energy of the average lethargy of neutrons causing fission (EALF), etc. The experiments selected for the benchmark analysis should be as similar as possible to the package model and cover the range of values in the foregoing parameters and the other package features in the package criticality analysis. The bias (and the uncertainty in the bias) is used to ensure that the package design will in fact remain subcritical under the conditions described in Section VII in TS-R-1.

This information is needed to confirm compliance with TS-R-1 Paragraphs 671, 677, 681, and 682.

- 6-4 Modify the analysis to account for preferential flooding of the package.

The current package analysis floods the package array uniformly with moderator in the package and between packages. The applicant varies the moderator density uniformly throughout the package and between packages. However, staff notes that the fuel elements may be placed in poly bags. Thus, a condition exists for which moderator densities may not uniformly vary throughout the package. The applicant's analysis should address non-uniform variation of moderator density in the package and between packages. Staff performed calculations for these conditions, including full density moderator within the fuel element coolant channels and no moderator in the remainder of the package and void between packages. These calculations indicate that non-uniform variation of moderator density can result in significantly higher k-effective values than those predicted by the applicant, even values that significantly exceed 1.0 for the KUR fuel. This trend is expected to be true for the other package fissile contents and is of concern since these other contents were shown by the applicant to be more reactive than the KUR fuel contents. Therefore, the package analysis should be modified to account for non-uniform variation of moderator density (for all package contents). The package array size should be modified as necessary to meet the requirement for sub-criticality. Optionally, the use of the poly bags can be removed or the bags (and the foam) around the fuel elements (including the KUR fuel and the other approved package

contents) can be modified to allow for free flow of moderator. In other words, the bags (and foam) do not cover the top and the bottom of the fuel elements so that moderator can move freely between the elements and the package cavity. The package operations would then need to be modified to ensure this condition of the foam-wrapped and bagged fuel elements.

This information is needed to confirm compliance with TS-R-1 Paragraphs 671, 677, 681, and 682.

- 6-5 Clarify the assumptions relied upon in the criticality analysis and the bases for those assumptions.

The application is not clear regarding several assumptions of the criticality analysis. It appears the analysis assumes the fuel assemblies are all oriented the same direction and remain centered in the basket cells. It also appears that nominal dimensions of the package and the fuel contents are used. The bases for these assumptions are not clear. These assumptions should be adequately justified. The analysis should address the tolerances on the fuel elements, eccentric positioning of the elements in the basket (e.g., such as shifting all elements toward the basket center) and non-uniformity of fuel element orientation in the basket. Staff calculations indicate that these factors can increase the k-effective by a few percent. This is a significant effect. It is not clear how the analysis addresses the polyurethane foam around the elements.

This information is needed to confirm compliance with TS-R-1 Paragraphs 671, 677, 681, and 682.

- 6-6 Modify (IV)-Table A.1 criterion 2.1) for the fuel elements inspection to account for the KUR fuel contents having lower allowable uranium (U) and U-235 mass limits than are currently listed in this table.

The pre-shipment inspections for the contents should describe the appropriate limits for the allowable contents. The current mass limits in criterion 2.1) of the stated table show U and U-235 mass limits that are much larger than those for the proposed KUR limits. The KUR fuel mass limits should be added as a separate criterion. Or, the criteria could be modified to state that the enrichment and uranium mass of the contents are less than the limit stated in the certificate for the contents to be shipped.

This information is needed to confirm compliance with TS-R-1 Paragraph 502.