

December 1, 2008

Dr. James Shuler, Manager
Packaging Certification Program
Safety Management and Operations
Office of Environmental Management
U.S. Department of Energy
Washington, DC 20585

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR REVIEW OF THE
MODEL NO. ATR FFSC PACKAGE

Dear Dr. Shuler:

By letter dated September 8, 2008, the Department of Energy submitted an application for approval of the Model No. ATR FFSC package for transportation of four payload types: ATR fuel elements, MIT fuel elements, MURR fuel elements, and unassembled ATR, MIT, and MURR fuel elements plates.

On October 16, 2008, you were notified that the NRC staff had completed its acceptance review of your application and that your application contained sufficient information for the staff to perform a detailed technical review. The schedule allowed for staff to issue a possible Request for Additional Information (RAI) in December 2008.

The staff has determined that further information is needed to complete its technical review. The information requested is listed in the enclosure to this letter. We request that you provide this information by January 28, 2009. If you are unable to meet this deadline, you must notify us in writing no later than December 31, 2008, of your new submittal date and the reasons for the delay. The staff will then assess the impact of the new submittal date and notify you of a revised schedule.

Please reference Docket No. 71-9330 and TAC No. L24248 in future correspondence related to this licensing action. If you have any questions regarding this matter, I may be contacted at (301) 492-3408.

Sincerely,

/RA/

Pierre Saverot, Project Manager
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Docket No. 71-9330
TAC No. L24248

Enclosure: Request for Additional Information

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Request for Additional Information
U.S. Department of Energy
Docket No. 71-9330
Certificate of Compliance No. 9330
Model No. ATR FFSC Package

By application dated September 8, 2008, the Department of Energy submitted an application for approval of the Model No. ATR FFSC package for transportation of four payload types: Advanced Test Reactor (ATR) fuel elements, Massachusetts Institute of Technology research reactor (MIT) fuel elements, Missouri University Research Reactor (MURR) fuel elements, and unassembled ATR, MIT, and MURR fuel elements plates.

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 Safety Analysis Report "Advanced Test Reactor Fresh Fuel Shipping Container (ATR FFSC)," Revision 3, dated August 2008. The requested information is listed by chapter number and title in the applicant's Safety Analysis Report (SAR).

Each individual RAI section describes information needed by the staff to complete its review of the application and to determine whether the applicant has demonstrated compliance with the regulatory requirements.

Chapter 2: Structural Evaluation

- 2-1 Demonstrate that the MIT and MURR fuel elements' structural performance is bounded by the structural performance of the previously tested and approved ATR simulated fuel element.

The principal justification provided by the applicant for bounding structural behavior is that all fuel elements are constructed with similar materials and the previously tested ATR simulated fuel element has the most associated mass (11.35 kg, 25 lbs) when compared to the MIT and MURR fuel [4.54 kg (10 lbs) and 6.81 kg (15 lbs) respectively]. The staff does not agree that this justification is sufficient given that the geometry near the ends of the respective fuel elements is significantly different and would result in potentially more damage to the fuel plates due to the lack of incidental impact energy absorption.

Furthermore, the applicant states in Sections 1.2.1.1.3, 1.2.1.1.4, and 1.2.1.1.5, that the Fuel Handling Enclosures (FHE) "[do] not add strength to the package, or satisfy any safety requirement." Given that the spacers for the MIT and MURR FHEs are necessary to maintain their position within the external packaging, there is a structural function being performed by the spacers and the spacers must be evaluated. If the spacers are not evaluated, then an evaluation must be performed to determine the damage associated with the gap that would exist between the fuel assemblies centered within the outer package and the inner surface of the package end fitting.

This information is required by staff to assess compliance with the requirements of 10 CFR 71.71 and 10 CFR 71.73.

Chapter 3: Thermal Evaluation

- 3-1 Revise the application to clarify or justify the apparent discrepancy between the thermal conductivity and specific heat values for Aluminum 6061-T651/T6511 in Table 3.6-3 "Thermal Properties of Package Metallic Materials," in Section 3.6.6.2 of the SAR and the values used for "A96061 Aluminum" in the MIT and MURR Thermal Desktop models.

The thermal conductivity and specific heat values provided in Table 3.6-3 of the SAR are different from those used for "A96061 Aluminum" in the MIT and MURR Thermal Desktop models.

This information is necessary to determine compliance with 10 CFR 71.35.

Chapter 6: Criticality Evaluation

- 6-1. Justify not performing analyses for the MIT and MURR loose plate contents.

The applicant states (in Section 6.10, 2nd paragraph) that due to the similarity with ATR fuel and the same mass limit for the loose plate basket the reactivity of the MURR and MIT loose plates contents would be similar to the reactivity of the ATR loose plate contents.

The application does not include any quantitative support for this statement nor does it include any discussion of the similarities relied upon to arrive at the given conclusion. Additionally, it is not clear, based upon the comparison of the maximum reactivities of the MURR and ATR fuel elements, for example, that the reactivities of the loose plate contents of the different fuel types will be similar. The MURR fuel element has less fissile mass but is noticeably more reactive than the ATR fuel element.

The application should include quantitative support for the statement referred to above, or it should describe the similarities upon which the statement relies, properly justifying how those similarities result in the reactivities of the proposed loose plate contents and the approved ATR loose plate contents being similar.

The justification should include consideration of features important to reactivity, such as the hydrogen-to-fissile material ratio and whether a fissile mass less than the maximum would result in a noticeably higher maximum reactivity.

This information is needed to confirm compliance with 10 CFR 71.55(b) and 71.59(a).

- 6-2. Justify the applicability of the tolerance used on the MURR fuel meat arc length.

The application states that a tolerance of 0.1 inch was used to be consistent with the ATR analysis. However, it is not clear from the application that this tolerance is applicable to the MURR fuel. The 0.1-inch tolerance on the ATR fuel can be derived from the dimensions provided on Figure 6.2-1 (based upon the technical drawing for the ATR fuel). The figure for the MURR fuel (Figure 6.10-1) does not provide sufficient information to derive the tolerance value that is appropriate for the fuel meat arc length. The tolerance that is applicable to (or conservative for) the MURR fuel meat arc length should be used in the analysis for the MURR fuel. The application should also describe

the basis for the MURR and the MIT fuel element figures (Figures 6.10-1 and 2); the figures should be based upon the applicable technical drawing for the respective fuel type.

This information is needed to confirm compliance with 10 CFR 71.33(b), 71.55(b), and 71.59(a).

- 6-3. Clarify if and how motion of the loose MURR and MIT plates along the length of the LFPB cavity is prevented, while providing the necessary information in the Package Operations and/or modifying the criticality evaluation as appropriate.

The application indicates that the same LFPB used for loose MURR and MIT fuel plates is also used for loose ATR fuel plates. Based upon the licensing drawing for the LFPB and the application descriptions of the MURR and MIT fuel plates (see text and figures of Section 6.10.2), there is significant room for the MURR and MIT fuel plates to move around in the LFPB. For example, the LFPB cavity length is 50.5 inches and the length of the MIT plates is 23 inches. Thus, the MIT fuel plates may sustain damage and/or rearrange (under hypothetical accident conditions) in a manner that does not appear to have been considered in the criticality evaluation. The application should describe any means relied upon to protect the loose plates contents and consider those means (or lack thereof) in the technical evaluations.

This information is needed to confirm compliance with 10 CFR 71.33(b), 71.35(c), 71.55(b), 71.59(a), and 71.87(f).

- 6-4. Modify the criticality evaluations for the MURR and MIT fuel elements to address damage to the fuel elements resulting from hypothetical accident conditions (HAC).

The applicant's HAC criticality analysis for the MURR and MIT fuel elements is similar to that done for the ATR fuel element; no damaged fuel element models were developed. The justification for this analysis assumption for the ATR is given on page 6-12 of the application and is based upon actual HAC tests performed with a simulated ATR fuel element, which showed only minor damage that will have a negligible effect on reactivity.

Due to package configuration differences versus the ATR fuel element, it is not clear that this analysis assumption is valid for the MURR and MIT fuel elements (see question 2-1).

The condition of the MURR and MIT fuel elements used in the HAC analysis should be well justified and be consistent with or conservative versus the fuel element condition resulting from HAC conditions (as determined in the structural evaluation).

This information is needed to confirm compliance with 10 CFR 71.55(e) and 71.59(a).

Chapter 7: Package Operations

- 7-1. Modify the last bullet in Section 7.1.1, "Preparation for Loading," on page 7-1 of the application to read similar to: "Damage to the spring plunger, *or ball lock pins and end spacers, as applicable*, or body of the fuel handling enclosure."

The italics indicate the text that should be added. Not all fuel handling enclosures use a spring plunger to lock closed. The enclosures for the MURR and MIT fuel use ball lock

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pins and end spacers that should be inspected for damage in preparation for loading MURR and MIT contents, as is done for the ATR enclosure spring plunger. The text of the referenced bullet should be modified so as to be clear regarding the required inspections.

This information is needed to confirm compliance with 10 CFR 71.87(b).