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Mr. Steven Baggett, Senior Project Manager  
NMSS/SFPO, M/S-06F18  
**U. S. Nuclear Regulatory Commission**  
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15555 Rockville Pike  
Rockville, MD 20852-2738

**Subject:** Request for Additional Information for the SteriGenics Eagle Transportation Package, Docket Number 71-9287.

**Reference:** Letter, Steven Baggett, U.S. Nuclear Regulatory Commission, to Gary L. Clark, Packaging Technology, Inc., Same Subject, dated June 16, 1999.

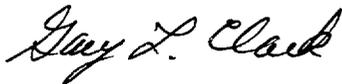
Dear Mr. Baggett:

In response to the referenced letter, Packaging Technology, Inc. (PacTec) submits revised pages of affected SAR Sections 2.0, 3.0, 5.0, 7.0, 8.0, and General Arrangement Drawings for the SteriGenics Eagle Transportation Package. These revisions provide the additional information requested by the NRC staff in its review of the Safety Analysis Report (SAR).

If you should have any questions on this information, please contact Mr. Steve Streutker or me at (253) 922-1450, Ext. 16 or Ext. 17 respectively.

Very Truly Yours,

**Packaging Technology, Inc.**



Gary L. Clark, P.E.  
Vice President, Operations

**Encl:** Responses to Request for Additional Information (RAI), SteriGenics Eagle Transportation Package  
(10) Revised SteriGenics Eagle Transportation Package SAR revised pages and drawing sets.

**cc:** Eric Beers (SteriGenics)



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Mr. Encl.

## Responses to RAI, Dated 6/16/99

## DRAWINGS

1. Provide revised drawings to:
  - A. specify the dimensions and tolerances of the lead plates that may be used as an alternative to the cast lead in the lid and the base,
  - B. clarify whether A-276, Type 304 stainless steel is an optional material for A-240, Type 304 stainless steel,
  - C. include the maximum weight of the package and clarify the correct torque for the closure lid bolts. Drawing SAR 98003, Sheet 1, is inconsistent with the value on page 7.1-2 of the operation procedures.

**Response:** The lead plates will be fitted into the cask and all gaps will be filled as called out in General Note 31 of the *General Arrangement Drawing*. Each layer of lead will be inspected prior to installation of the next layer. Thus, dimensions and tolerances of the lead plate are not necessary. Note 13 has been modified to include A-276, Type 304 as an optional material. Weight of the package has been added in Note 32 and the closure lid torque specified in the SAR has been changed to agree with the drawing specification.

## STRUCTURAL

1. Provide a summary of the maximum stress intensities of the cask body, cask lid and lower closure plate of the finite element analysis, under the accident drop conditions. The summary should include loading conditions, maximum stress location, and stress intensity category. Provide tables which show the combined maximum stress per load combinations specified in Regulatory Guide 7.8. Show that the combined stresses are within acceptable limits.

**Response:** Section 2.7.7, Summary of Damage, has been revised to provide the requested information. Additional maximum stress intensity has been provided in the subsections of Section 2.7.1.2.

2. Provide a summary comparison between impact limiter deformations from the dynamic test and the analytical results based on the finite element method.

**Response:** A summary comparison requested has been added to Section 2.7.1.1. Additionally, a more detailed discussion of the test predictions has also been provided in Appendix 2.10.5.

3. Provide a summary evaluation of damage, including lead slump, to the cask body due to end, side, corner 30-foot drop and the 40-inch puncture tests: and show that the structural integrity of the cask is not impaired.

**Response:** Section 2.7.7, *Summary of Damage*, has been revised to provide the requested information.

4. Justify the use of ASTM specification no. A-774 for the impact limiter. The ASTM specification A-774 considers tubular fittings with nominal thicknesses up to 1/2 -inch, but not 3/4 -inch. Further, the specification does not include Type 304 stainless steel.

**Response:** General Note 11 of the *General Arrangement Drawings* has been revised to accurately specify the elbows used to fabricate the toroids. The elbows are constructed to meet the requirements of A-774 with the exception of the wall thickness and material as noted above.

5. Provide an assessment of the potential for corrosion or sensitization of the stainless steel special form capsules and stainless steel basket under normal conditions of transport. (See NRC Information Notice 96-54, "Vulnerability of Stainless Steel to Corrosion when Sensitized," dated October 17, 1996.) A copy of the Information Notice can be found on NRC's web site ([www.NRC.Gov](http://www.NRC.Gov)) in the reference library.

**Response:** Section 2.4.4 has been expanded to further explain the safety of the design with respect to sensitization of the special form capsules.

## THERMAL

1. Figure 3.4-4, "Temperature Distribution within Cask for NCT," indicates that the model was done in ANSYS Version 5.4, whereas page 3.4-1 states that ANSYS® Version 5.3 was used. Clarify this discrepancy.

**Response:** ANSYS® Version 5.4 was inadvertently used to create this figure, although the analysis was created and run in ANSYS® Version 5.3 per the analysis documentation. Since ANSYS® Version 5.4 is backward compatible, this figure accurately represents the analysis results. To avoid confusion, the 5.4 number was removed from this figure and an explanatory note added.

2. Page 3.4-1, Section 3.4.1.1, states: "However, since the remaining 20% of the decay heat is distributed in significantly fewer capsules". This sentence is not complete. Complete this sentence.

**Response:** The section was revised to read: "However, since the remaining 20% of the decay heat is distributed in significantly fewer capsules, the capsule temperatures will be higher, making the 18 pin configuration controlling for both cask and basket."

3. Table 3.5-2 indicates that the Maximum Transient Temperature for the Cask Lid Seal is 475 °F, whereas on page 3.5-2 it states that "The peak seal temperature is 513 °F." Clarify this discrepancy.

**Response:** The table is correct. The text was revised accordingly.

4. Justify that 20% of the incident solar radiation is intercepted by the personnel barrier as stated in Section 3.4.1.1.2, if the personnel barrier is needed to meet the temperature limits for normal conditions of transport. As an alternative you may choose to omit the personnel barrier affects from the modeling.

**Response:** Given the high heat load from the cask, the personnel barrier will block more radiative heat from the cask than it will block from the sun. Therefore, to model the cask without it would be non-conservative. Per Section 3.1.2.2, the

minimum free flow area is 80%, resulting in a maximum blockage of 20%. Any value less than 20% will lower the temperatures within the package.

## SHIELDING

1. Provide a revised Section 5.3.1 of the application to show the detail of the model used to determine the dose rates due to streaming through the lid drain port, including the detector locations. Show that the dimensions used in the model maximize the gap between the lid drain and the drain tube, (i.e., include the worst-case tolerances).

**Response:** A more detailed MCNP analysis was used to evaluate a modified design of the lid drain port plug. A step was added to minimize streaming dose rate from the plug annulus. A revised Section 5.3.1 has been added to describe the details of the analysis and subsequent results.

2. Provide a revised shielding evaluation for normal conditions of transport to show that there will not be any streaming paths through the lead plates, that may be used as an alternative to the cast lead, in the lid and the base. This should include minimum tolerances on the plates and maximum tolerances on the stainless steel shells of the lid and base. (See item No. 1.A. under Drawings, above.)

**Response:** The lead plates, if used, will be carefully fit into the lid and base cavities. In order to prevent streaming, the plates will be arranged so no stream paths exist and any voids will be filled with lead before the succeeding layer of lead plate is installed. The procedure is detailed in General Note 31 of the *General Arrangement Drawings*.

3. Provide a revised Section 5.4.2 of the application to evaluate the dose rates that will occur as a result of the lead slump under the 30-foot drop test. This increase in radiation levels adjacent to the gap must be shown to meet the 1 Rem/hr limit at 1 meter in 10 CFR §71.51(a)(2).

**Response:** A detailed MCNP analysis of a lead slump condition has been added to Section 5.4.2.

## OPERATING PROCEDURES

1. Provide a revised Section 7.1.1 regarding loading the SteriGenics Eagle Cask in a shielding pool. Specify a visual inspection of the package upon receipt and during removal of the personnel barrier and impact limiters. Provide a revised Section which includes procedures for thread lubrication and methods for inspection of the bolts, torque limits for the personnel barrier bolts, methods to verify package temperature limits, and proper placement of the O-ring seals prior to shipment.

**Response:** Section 7.1.1 has been revised to include the requested information.

2. Provide a revised Section 7.1.1 that expands the procedures regarding drying the cask cavity. The expanded procedures must allow the shipper to make a determination that the cask content is dry.

**Response:** Section 7.1.1 has been revised to include the requested information.

3. Section 7.1.2, item 6 appears to indicate that the vent port plug has a plug seal, yet Section 7.1.1 did not contain an inspection requirement. Clarify this discrepancy. Provide a revised Section which includes procedures for thread lubrication and methods for inspection of the bolts, torque limits for the personnel barrier bolts, methods to verify package temperature limits, and proper placement of the O-ring seals prior to shipment.

**Response:** Section 7.1.2 has been revised to remove the discrepancy noted above. Additional information has been added as requested.

4. Provide a revised Section 7.2 regarding procedures for unloading the package. Specifically include procedure or special actions to be taken if the tamper indicating device is not intact or surface contamination or radiation survey levels are too high. The procedures should also ensure that the contents are completely removed from the package. The procedure should call for a visual inspection of the package upon receipt and during removal of the personnel barrier and impact limiters.

**Response:** Section 7.2 has been revised to include the requested information.

5. Provide a revised Section 7.3 that provide sufficient detail to allow a user to properly prepare for transport of an empty package. This revised Section should specifically include procedures to: 1) ensure that the package meets internal and external contamination limits and levels, 2) discuss properly labeling, and package assembly instruction including bolt torque specifications, 3) verify that the package is empty, and 4) any additional instructions you deem necessary. General references to appropriate requirements of 49 CFR are acceptable.

**Response:** Section 7.3 has been expanded to include the information requested.

## ACCEPTANCE TESTS

Revise the Acceptance Tests (Section 8.1) to include a thermal acceptance test that will be performed on each package before first use. Specify the details of the thermal acceptance test. The test specifications should identify the heat load, the test duration, the test instrumentations, and the specific points for temperature measurement. Specify the numerical criteria for accepting or rejecting a packaging. Show that the acceptance criteria are adequate to verify the thermal performance of the package and show how the criteria correlate to the thermal analysis in the application. Note that the criteria in paragraph 3.2.4 of NUREG/CR-3854 may be helpful.

**Response:** Section 8.1 and General Note 23 of the *General Arrangement Drawings* now require a thermal acceptance test for each SEC. This test will compare the cask thermal performance with analysis based on methods used in Chapter 3.0 of the SAR. The parameters of the analysis will be changed, however, to reflect the differences between the test conditions and the specified NCT conditions. Additional details of the test procedure, apparatus and criteria have also been included.

## MAINTENANCE PROCEDURES

Section 8.2.3 addresses subsystem maintenance. Based on this Section, provide revised Chapter 7 Operating Procedures to include inspection and replacement procedure for fasteners, seals areas and grooves, and impact limiter ball-lock pins.

**Response:** Additional direction has been added to Chapter 7 dealing with inspection and replacement of subsystem parts.