

1994 February 24

Mr. Cass R. Chappell,
Cask Certification Section,
Transportation Branch,
Division of Industrial and Medical
Nuclear Safety,
United States Nuclear Regulatory Commission
Washington D.C.
20555

FILE: C-7
IE1008.4.6

Dear Mr. Chappell

RE: Application to certify the Gammacell 220 Transport Package

This letter is our response to questions asked in the attached letter of June 8, 1993 to Mr. Paul Gray. Each of your questions are addressed in the order in which they appeared. Where appropriate, I have enclosed new pages to be added to Nordion Technical Report No. TR-9236-GC220.

The combination of the TR-9236-GC220 rev. A and these additional pages should be considered to be TR-9236-GC220 rev. B. The attached title page summarizes the changes relative to rev. A. It should replace the old title page.

Drawings

Please find enclosed a copy of engineering drawing C600101-001 rev. B. The drawing should replace page 1.19 of the existing submission. The contents of this drawing are identical to old page 1.19, except for the added title block. Please advise us if any additional information is required.

Structural

QUESTION 1. Question regarding cover plate cap screws.

Please find enclosed the following:

- 1) New pages 2.73a through 2.73e. These pages should be inserted between pages 2.73 and 2.74 of the existing submission.
- 2) A new page 2.80a to be inserted between pages 2.80 and 2.81.
- 3) New pages 2.88a through 2.88d. These pages should be inserted between pages 2.88 and 2.89 of the existing submission.

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The inertial loads used in the calculations are based on the analysis discussed in the response to question 3.

QUESTION 2.

Nordion proposes to modify the design of the unit by switching to a stronger material for the threaded rods and adding a 16 gauge stainless steel cone over the kaowool. A description of the proposed design modification and its structural analysis is provided in pages 2.73f, 2.80a, and 2.88d.

QUESTION 3.

Please find enclosed a copy of Nordion Technical Report No. TR-9403-GC220, "The Impact Analysis of the Impact Limiter for the GC-220: The Use of Rectangular Fin Data to represent the Performance of Curved Fins". This report shows that a more realistic analysis of fin behaviour results in inertial loads smaller than those used in the existing structural analysis. As such, the existing analysis is conservative.

I have enclosed a new page 2.178 for TR-9236-GC220. TR-9403-GC220 should be inserted immediately after page 2.178.

Thermal

The estimates of lost kaowool area after the drop tests should be considered best estimates based on evidence obtained through reasoned argument. It is recognized that these arguments are somewhat qualitative. Therefore, conservative assumptions are used in the thermal analysis.

It is useful to consider the sensitivity of the thermal model to these assumptions. The two most important assumptions are that an equivalent area of 756 in² of kaowool is removed from the unit and that there is no thermal contact resistance between the lead and the outer stainless steel shell.

The enclosed Appendix 3.6-E describes the results of various sensitivity studies completed on the model. It should be inserted after Appendix 3.6-D in the existing submission.

The results show that, even if it is assumed that all of the kaowool is lost, lead temperatures will be less than the melting point of lead. Therefore, additional analysis on the nature and extent of kaowool removal is not warranted.

I trust that this information enables you to complete your review of the Gammacell 220 Package. Please contact me if you have any further questions.

Sincerely,

A handwritten signature in cursive script, appearing to read "M. Krzaniak".

M. Krzaniak, P.Eng.
Package Engineering
Engineering Services

cc: P.Gray, NII



UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555

JUN 08 1993

Postmarked June 17/93
Rec'd. June 24/93 *J*

IMTB:NLO
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Nordion International, Inc.
ATTN: Mr. P. A. Gray
447 March Road
PO Box 13500
Kanata, Ontario, Canada K2K 1X8

Dear Mr. Gray:

This refers to your application dated November 27, 1992, requesting a Certificate of Compliance for the Model No. Gammacell 220 package.

In connection with our review, we need the informa. identified in the enclosure to this letter.

Please advise us within 30 days from the date of this letter when this information will be provided. Additional information requested by this letter should be submitted in the form of revised pages. If you have any questions regarding this matter, we would be pleased to meet with you and your staff. Nancy Osgood is the project manager for our review of your application. Ms. Osgood may be contacted at (301) 504-2459.

Sincerely,

Cass R. Chappell

Cass R. Chappell, Section Leader
Cask Certification Section
Transportation Branch
Division of Industrial and
Medical Nuclear Safety, NMSS

Enclosure: As stated

cc: Mr. George A. Brown
Department of Transportation

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Drawings

Provide engineering drawings showing the safety features and components of the packaging. The drawings should include the following information:

- (a) Drawing title, drawing number, and revisions.
- (b) Package dimensions and total weight.
- (c) Parts list and material specification for each component of the package.
- (d) Type, size, and locations of welds.
- (e) Standards, codes and procedures to be used for fabrication, welding, inspection, and acceptance criteria.
- (f) Torque requirements for the closure bolts and other threaded devices that are part of the package.
- (g) The location and thickness of the kaowool insulation, and how the kaowool is secured in place.
- (h) The attachment of the cover plate to the package.
- (i) The attachment of the crush shield to the package.
- (j) The shipping bracket and its attachment to the package.

Structural

1. Show that the cover plate cap screws would not fail under a 30-foot side drop or top corner drop. Provide a free-body diagram of the cover plate for each orientation. The free-body diagram should show all applied forces and reactions. Explicitly show how the magnitude of each of the applied forces was determined. Specify the allowable stresses that will be used for the cap screws and justify that the allowable values are adequate. Show that the stresses applied to the cap screws are less than the allowable values (consider combined tension, shear and bending of the screws).
2. Show that the crush shield is adequately connected to the package for top corner and side impact orientations; i.e., show that the connection is sufficient to retain the crush shield in place while the fins are crushing.
3. The structural analysis of top corner and side impact orientation is based upon Figures 2.3-F1 and 2.3-F2 for rectangular fins. Justify the use of rectangular fin data to represent the performance of the curved fins on the Model No. GC-220 package. The analysis of the fins is based upon an assumed percentage of deformation (e.g., see pages 2.69 and 2.84). Justify that the assumed percentages are appropriate values.

Thermal

The quantity of kaowool torn from the lead shielding seems arbitrary, particularly since some of the kaowool does not appear to be in close contact with the lead shield. Justify the amount and locations of kaowool removed from the shield.