

**CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES**

1 a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9310	4	71-9310	USA/9310/B(U)-96	1 OF	4

2. PREAMBLE

- a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."
- b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

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| a. ISSUED TO (<i>Name and Address</i>)
Best Theratronics
413 March Road
Ottawa, Ontario
Canada K2K 0E4 | b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION
MDS Nordion application dated May 27, 2003, as supplemented. |
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4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

- (1) Model No. F-431 Transport Package
- (2) Description

The Model No. F-431 Transport Package is designed to transport Cesium-137 in either special form or RAMCO-50 non-special form sealed sources. The F-431 Transport Package consist of: (1) the overpack which provides impact and thermal protection; (2) either the MDS Nordion Gammacell-1000 irradiator (GC-1000), or the MDS Nordion Gammacell-3000 irradiator (GC-3000) which provides shielding protection; and (3) the radioactive contents in either special form or RAMCO-50 non-special form sealed sources which provide containment.

The F-431 Transport Package is a stainless steel cylindrical package with a 1,067-millimeter (mm) (42-inch (in.)) outside diameter and a height of 1,283 mm (50.5 in.) that is placed on a removable mild steel skid. The maximum weight of the package is 2,270 kilograms (kg) (5000 pounds (lb)).

The overpack consists of nested cylindrical shells. The shells are made from stainless steel and the volume between the shells is filled with rigid foam. This foam provides insulation during an accidental fire. Vent holes, plugged with material designed to melt in a fire, are provided between the shells to prevent pressure buildup and allow a pathway for escape of gases from foam during an accidental fire.

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5.(a)(2) continued

The GC-1000 and the GC-3000 are lead-shielding casks each with a source cavity. The package contents may consist of up to eight cesium-137 special form sealed sources or RAMCO-50 non-special form sealed sources (provided Condition 5.(b)(1)(ii) is met) inside a source holder, within the source cavity. The maximum total activity of cesium-137 is 113 tera-Becquerels (TBq)(3,050 Curies (Ci)). The following are the features of the GC-1000 and GC-3000:

Irradiator Model	Rated Capacity	Diameter*	Height*	Lead Thickness*	Steel Shell Thickness*	Weight*
GC-1000	113 TBq (3,050 Ci)	457 mm (18 in.)	610 mm (24 in.)	150 mm (6 in.)	9.5 mm (0.375 in.)	1,054 kg (2,324 lb)
GC-3000	113 TBq (3,050 Ci)	457 mm (18 in.)	610 mm (24 in.)	110 mm (4.35 in.)	9.5 mm (0.375 in.)	1,091 kg (2,404 lb)

* Nominal Values

The approximate dimensions and weights of the package are as follows:

Package outside diameter	1,067 mm (42 inches)
Package height	1,283 mm (50.5 inches)
Cavity diameter	559 mm (22 inches)
Cavity height	813 mm (32 inches)
Removable skid	1,118 mm (44 inches) x 1,003 mm (39.5 inches) x 203 mm (8 inches)
Overpack weight	1044 kg (2300 lbs)
Contents weight (max.)	1225 kg (2700 lbs)
Maximum package weight	2,270 kg (5000 lbs)

(3) Drawings

The packaging is constructed in accordance with the Best Theratronics drawing F643101-001, Sheet 1, Revision J and Sheet 2, Revision E.

(b) Contents

(1) Type and form of material

- (i) Cesium-137 as a sealed source which meets the requirements of special form radioactive material. The sealed sources consist of the following special form sources: C-378, C-1000, C-1001, C-3000, C-3001, or ISO-1000.

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5.(b) continued

(ii) Cesium-137 as the RAMCO-50 non-special form sealed source, provided the following conditions are met:

- Source must conform to the specifications given in Figure 4.8 of the Safety Analysis Report and sealed source registry Certificate No. NR-0880-S-804-S.
- Source must have been shown to not be leaking within six months prior to shipment.
- Source must not have been damaged during its service in the GC-1000.

(2) Maximum quantity of material per package

113 TBq (3,050 Curies).

6. In addition to the requirements of Subpart G of 10 CFR Part 71:

- (a) The package must be prepared for shipment and operated in accordance with the Operating Procedures in Chapter 7 of the application.
- (b) Each packaging must be acceptance tested and maintained in accordance with the Acceptance Tests and Maintenance Program in Chapter 8 of the application.

7. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

8. Transport by air of fissile material is not authorized.

9. Expiration date: June 30, 2014.

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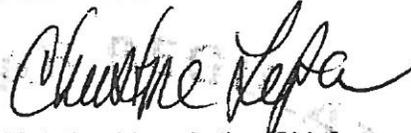
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REFERENCES

MDS Nordion application dated May 27, 2003.

Supplements dated: April 16, July 16, July 21, and July 23, 2004; February 27 (Best Theratronics), March 31 (MDS Nordion), 2009, May 29, 2009 (Best Theratronics), October 21, 2011, February 15, and March 9, 2012.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION



Christine Lipa, Acting Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Date: April 4, 2012



SAFETY EVALUATION REPORT
Docket No. 71-9310
Model No. F-431 Transportation Package
Certificate of Compliance No. 9310
Revision No. 4

SUMMARY

By application dated October 21, 2011, and as supplemented February 15, and March 9, 2012, Best Theratronics requested an amendment to Certificate of Compliance No. 9310, for the Model No. F-431 transportation package. Based on the statements and representations in the application, the staff agrees that these changes do not affect the ability of the package to meet the requirements of 10 CFR Part 71.

GENERAL INFORMATION

Best Theratronics requested the ability to ship both the original design of the package and a modified design which includes additional security features to the content of the package. These minor changes to the payload, the Gammacell-1000 (GC-1000) and Gammacell-3000 (GC-3000) irradiators, led to a modification of the packing braces. The remaining sections (e.g., criticality, materials, and containment) were not affected by this amendment.

STRUCTURAL EVALUATION

The amendment requested design changes to the profile of the shielding heads which required changes to the packing braces. The shielding heads have increased in weight by 20 kg for the GC-1000 and 57 kg for the GC-3000. The increased weight in the shielding heads is bounded by the original analysis of the F-431 Safety Analysis Report (SAR) found in IN/TR 1913 F-431. The analysis is based on a total package weight of 2270 kg and payload weight of 1225 kg while the new maximum payload weight is 1125 kg. The new payload weight includes the weight of the new bracing as well as the irradiators.

The change in bracing is considered to be of low safety significance as during hypothetical accident conditions (HAC) the majority of the support is provided by the polyurethane foam found between the stainless steel shells. The changes in bracing do not affect the package during normal conditions of transport (NCT).

THERMAL EVALUATION

The package consists of a main body and inner lid and outer lid. The main materials of packaging are 304L stainless steel and rigid polyurethane foam. The F-431 package provides thermal protection for the radioactive contents and the containment by the sealed sources.

Except for changes to the payload devices GC-1000 and GC-3000, the thermal design of the F-431 package is unchanged and the heat generated by the payload is unchanged. The thermal properties of materials were presented in SAR IN/TR-1913/1922.

In this analysis, the payload temperature reaches the peak 18 hours after the fire is extinguished because the heat absorbed in the outer layer of the package continues to flow inward toward the payload. The thermal evaluation of this amendment is still bounded by the original analysis of internal heat generation of 50 W.

The thermal analysis of the F-431 under NCT and HAC was presented in SAR IN/TR-1913/1922 and remains valid in SAR IN/TR-6087. The staff accepts the previous thermal analysis of the F-431 package, approved by the NRC with significant safety margin for NCT and HAC, because there are no changes in decay heat limit, packaging components, and packaging material properties. The staff has reviewed the F-431 package description and payload description and has reasonable assurance that the F-431 package satisfies the thermal requirements of 10 CFR Part 71.

SHIELDING EVALUATION

The objective of this review is to verify that the package design meets the external radiation requirements of 10 CFR Part 71 under NCT and HAC. The applicant proposed a modification to the allowable package contents for ensuring the radioactive source in the contents remains secured in its position (and secured from unauthorized access) within the GC-1000 and GC-3000 irradiators. The GC-1000 and GC-3000 irradiators, together with their Cs-137 special form or sealed sources (3050 Ci maximum), constitute the allowable package contents. The package will be used to ship those contents that use the design options for securing the sources, including the proposed modification, as indicated in the proposed licensing drawings (see Drawing No. F643101-001, sheet 2 of 2, Issue E).

Staff reviewed the proposed amendment with respect to impacts on the shielding capabilities. Based on the results of the structural review (see "Structural Evaluation" of this SER), the staff finds that the source will remain secured in its location and thus the shielding capabilities of the package will be maintained. Although the shielding design of the package (the GC-1000 and GC-3000 are relied on for shielding) did not change, the applicant modified the licensing drawings to include additional dimensions to adequately characterize the shielding design of the package and to provide dimension tolerances. The applicant also modified the drawings to correct various inconsistencies. The staff finds that there were no other changes to the package features that impact shielding. The staff finds that the licensing drawings of the application have been appropriately modified to adequately describe the package's shielding design and to account for the change to the contents. Thus, the staff finds there is reasonable assurance that the package will continue to meet the external radiation requirements of 10 CFR Part 71.

CONDITIONS

The following changes have been made to the certificate of compliance:

Condition No. 5(a)(2), "Description," has been updated with increased payload weights and the maximum contents weight has been corrected.

Condition No. 5(a)(3), "Drawings," has been updated to reference the updated drawings which include changes resulting from the additional security features.

Condition No. 5(b)(2), "Contents," and Condition No. 7 have been updated to correct a minor typographical error.

The References section has been updated to include this revision request.

CONCLUSION

Based on the statements and representations contained in the application, the staff concludes that these changes do not affect the ability of the package to meet the requirements of 10 CFR Part 71.

Issued with Certificate of Compliance No. 9310, Revision No. 4 on April 4, 2012.