



U.S. Department  
of Transportation

Pipeline and  
Hazardous Materials  
Safety Administration

East Building, PHH-23  
1200 New Jersey Ave, SE  
Washington, D.C. 20590

**COMPETENT AUTHORITY CERTIFICATION FOR A  
TYPE B(U)F FISSILE  
RADIOACTIVE MATERIALS PACKAGE DESIGN  
CERTIFICATE USA/9374/B(U)F-96, REVISION 0**

The Competent Authority of the United States certifies that the radioactive material package design described in this certificate satisfies the regulatory requirements for a Type B(U)F package for fissile material as prescribed in the regulations of the International Atomic Energy Agency<sup>1</sup> and the United States of America<sup>2</sup>.

1. Package Identification - HI-STAR 80.
2. Package Description and Authorized Radioactive Contents - as described in U.S. Nuclear Regulatory Commission Certificate of Compliance No. 9374, Revision 1 (attached).
3. Criticality - The minimum criticality safety index is 0.0. The maximum number of packages per conveyance is determined in accordance with Table X of the IAEA regulations cited in this certificate.
4. General Conditions -
  - a. Each user of this certificate must have in his possession a copy of this certificate and all documents necessary to properly prepare the package for transportation. The user shall prepare the package for shipment in accordance with the documentation and applicable regulations.
  - b. Each user of this certificate, other than the original petitioner, shall register his identity in writing to the Office of Engineering and Research, (PHH-23), Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, Washington D.C. 20590-0001.

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<sup>1</sup> "Regulations for the Safe Transport of Radioactive Material, 2012 Edition, No. SSR-6" published by the International Atomic Energy Agency (IAEA), Vienna, Austria.

<sup>2</sup> Title 49, Code of Federal Regulations, Parts 100-199, United States of America.

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c. This certificate does not relieve any consignor or carrier from compliance with any requirement of the Government of any country through or into which the package is to be transported.

d. Records of Management System activities required by Paragraph 306 of the IAEA regulations<sup>1</sup> shall be maintained and made available to the authorized officials for at least three years after the last shipment authorized by this certificate. Consignors in the United States exporting shipments under this certificate shall satisfy the applicable requirements of Subpart H of 10 CFR 71.

5. Special Conditions -

a. The package shall be transported exclusive use only, with the personnel barrier installed during transport.

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

6. Marking and Labeling - The package shall bear the marking USA/9374/B(U)F-96 in addition to other required markings and labeling.

7. Expiration Date - This certificate expires on September 30, 2023.

This certificate is issued in accordance with paragraph(s) 810 and 816 of the IAEA Regulations and Section 173.471 and 173.472 of Title 49 of the Code of Federal Regulations, in response to the September 24, 2018 petition by Holtec International, Marlton, NJ, and in consideration of other information on file in this Office.

Certified By:



William Schoonover  
Associate Administrator for Hazardous  
Materials Safety

November 01, 2018  
(DATE)

Revision 0 - Issued to endorse U.S. Nuclear Regulatory Commission Certificate of Compliance No. 9374, Revision 1.

**CERTIFICATE OF COMPLIANCE  
FOR RADIOACTIVE MATERIAL PACKAGES**

1. a. CERTIFICATE NUMBER <b>9374</b>	b. REVISION NUMBER <b>1</b>	c. DOCKET NUMBER <b>71-9374</b>	d. PACKAGE IDENTIFICATION NUMBER <b>USA/9374/B(U)F-96</b>	PAGE <b>1</b>	PAGES <b>OF 4</b>
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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

- a. ISSUED TO (*Name and Address*)  
**Holtec International  
1 Holtec Blvd.  
Camden, NJ 08104**
- b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION  
**Holtec International Report No. HI-2146261 *Safety Analysis Report on the HI-STAR 80 Package*  
Revision 3, dated September 2018**

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.: **HI-STAR 80**
- (2) Description

The HI-STAR 80 packaging consists of the following major components: the packaging body, the fuel baskets, the non-fuel waste basket, the impact limiters, and the personal barrier.

The packaging body is comprised of a nickel steel shell welded to a stainless steel lower forging at the bottom and a stainless steel forging at the top. The closure system consists of two stainless steel closure lids: (i) the inner lid seals against the upper forging flange and a tapered retainer ring connects to the upper forging flange with 36 closure bolts while providing the preload for the inner cask lid, (ii) the outer lid is secured to the upper forging flange with 36 closure bolts. The inner seal of each lid ensures both the containment and moderator exclusion functions of the package.

Radial shielding is provided by lead, steel, copper, and Holtite. Axial shielding is provided by the steel closure lids, and the bottom flange, supplemented by lead and Holtite. The gamma shield consists of lead between the containment shell and an intermediate steel shell supported by four radial ribs welded to both shells. The neutron shield consists of Holtite surrounded by the copper inner and outer shells that are supported by diagonal copper ribs attached to the shells.

The containment system components include: (i) the containment shell, shell cladding, upper and lower forgings; (ii) the inner closure lid including its inner seal, retainer ring, bolts and helical thread inserts, and leak test port plug and seal; (iii) the outer closure lid including its inner seal, bolts, test plug seal and helical thread inserts; (iv) the vent and drain port

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5.(a)(2) Description (continued)

including its bronze plug, bushing and bushing/plug seal, inner port cover plate, and the port outer containment seal, and (v) the spray cooling port including its cap, cap inner seal, cover plate, and cover plate inner seal, bolts and helical thread inserts.

The HI-STAR 80 is designed for maximum heat loads of 50 kW and 54 kW, respectively, depending upon the fuel basket (F-12P for 12 PWR fuel assemblies or F-32B for 32 BWR fuel assemblies) loaded in the package. Fuel baskets are formed by a honeycomb structure of Metamic-HT plates, surrounded by an array of shaped aluminum spacers (basket shims) in the packaging cavity peripheral spaces. The aluminum basket shims are attached to the basket.

The non-fuel waste basket, designated as NFWB-1 and made from stainless steel, is used for core components such as fuel channels, spacer grids, control rods or control blades, burnable absorbers in solid form. Secondary packagings, which provide no safety function, may be also loaded into the non-fuel waste basket.

Two identical impact limiters, referred to as "AL-STAR," comprised of a rigid steel cylindrical core and a steel cylindrical skirt surrounding the crushable shock absorbing material, are attached to the top and bottom of the packaging with 16 bolts.

The personal barrier, placed over the package lying in a horizontal orientation during transport, is a packaging component when in use, providing a physical barrier to prevent access to hot areas of the package.

The packaging body cavity is approximately 180 ¼ inches long, with an inside diameter of 48 7/8 inches, and an outer diameter of approximately 89 ¼ inches. The packaging is 212 inch long (313 inch with the impact limiters installed) and weighs approximately 157,600 lbs (without the lids). The package as configured for transport, i.e., including impact limiters, weighs from 199,500 lbs (NFWB) to 234,800 lbs (F-32B basket).

(3) Drawings

The packaging shall be constructed and assembled in accordance with the following drawings:

- (a) HI-STAR 80 Cask Drawing No. 9800, Sheets 1-11, Rev. 7
- (b) F-12P Fuel Basket Drawing No. 9796, Sheets 1-4, Rev. 4
- (c) F-32B Fuel Basket Drawing No. 9797, Sheets 1-4, Rev. 4
- (d) NFWB-1 Non-Fuel Waste Basket Drawing No. 9798, Sheets 1-2, Rev. 5
- (e) HI-STAR 80 Impact Limiter Drawing No. 9801, Sheets 1-7, Rev. 4
- (f) HI-STAR 80 Transport Package Drawing No. 9795, Sheets 1-7, Rev. 3

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5(b) Contents

(1) Type and form of material

- (a) Intact, moderate to high burnup, up to 70 GWd/MTU, spent PWR or BWR UO<sub>2</sub> fuel, or BWR MOX fuel, or a mixed load of UO<sub>2</sub> and MOX fuel assemblies in the same fuel basket.
- (b) Non-Fuel waste such as fuel channels, transition pieces, spacer grids, core grid and core spray components, control rods or control blades, LPRM neutron monitors using fission chambers, and burnable absorbers.

(2) Maximum quantity of material per package:

- (a) 12 PWR UO<sub>2</sub> fuel assemblies (15x15 and 17x17 arrays) in the F-12P basket with characteristics described in Table 7.D.2 of the application. Control rods are authorized for transport within spent PWR fuel assemblies. Fuel assemblies may contain up to 4 irradiated stainless steel replacement rods. The fuel assemblies are restricted to assembly burnup, enrichment, cooling time and minimum number of 1 year cycle requirements, as specified in Table 7.D.4 of the application.
- (b) 32 BWR fuel assemblies (8x8, 9x9, 10x10 and 11x11 array sizes, and a MOX assembly in a 10x10 array size) in the F-32 B basket with characteristics described in Table 7.D.3 of the application. Non-fuel hardware are not authorized contents with spent BWR fuel assemblies. Fuel assemblies may contain up to 4 irradiated stainless steel replacement rods. The fuel assemblies are restricted to assembly burnup, enrichment, cooling time and minimum number of 1 year irradiation cycle requirements, as specified in Table 7.D.5 of the application. Only four MOX fuel assemblies are authorized to be loaded in the F-32B basket in cells 6, 9, 24, and 27, as identified in Figure 7.D.2 of the application with characteristics described in Table 7.D.6 of the application.
- (c) Non-Fuel Waste, as described in Condition No. 5(b)(1)(b), in the NFWB-1 basket, meeting the specifications and requirements described in Table 7.D.8 of the application.

6. The Criticality Safety Index (CSI) is 0.0.

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

- (a) The package shall be prepared for shipment and operated in accordance with the Operating Procedures in Chapter 7 of the application; and
- (b) The package must meet the Acceptance Tests and Maintenance Program of Chapter 8.0 of the application.

8. Additional operating requirements of the Model No. HI-STAR 80 package include:

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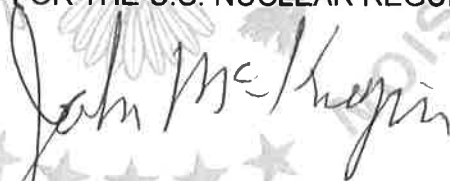
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- (a) Damaged fuel assemblies and fuel debris are not authorized for transportation.
  - (b) MOX fuel composition must meet the plutonium material vector as defined in Table 7.D.1 of the application. Hybrid MOX fuel assemblies, i.e., BWR fuel assemblies that contain both MOX fuel rods and UO<sub>2</sub> fuel rods, are not authorized contents. For BWR MOX assemblies, the total plutonium mass cannot exceed 14 kg per fuel assembly.
  - (c) Maximum allowable times, based on design basis maximum heat load, for the completion of wet transfer operations are defined in Table 3.3.6 of the application.
9. The package shall be transported exclusive use only, with the personnel barrier installed during transport.
10. Transport of fissile material by air is not authorized.
11. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.
12. The package may be used in the U.S. for shipment of UO<sub>2</sub> fuel and Non-Fuel Waste meeting the above conditions.
13. Expiration date: September 30, 2023.

REFERENCES

Holtec International Report No. HI-2146261 *Safety Analysis Report on the HI-STAR 80 Package*, Revision 3, dated September 2018.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION



John McKirgan, Chief  
Spent Fuel Licensing Branch  
Division of Spent Fuel Management  
Office of Nuclear Material Safety  
and Safeguards

Date: October 17, 2018.



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East Building, PHH-23  
1200 New Jersey Ave, SE  
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**CERTIFICATE NUMBER:** USA/9374/B(U)F-96

**ORIGINAL REGISTRANT(S) :**

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Holtec Center  
One Holtec Drive  
Marlton, NJ, 08053  
USA