

**CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES**

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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*)
U.S. Department of Energy
Washington, DC 20585
- b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION
Nuclear Packaging, Inc. application
dated April 22, 1985, as supplemented

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.: T-3
- (2) Description

A stainless steel and lead shielded irradiated fuel shipping package (cask). The cask is a right circular cylinder with upper and lower steel encased rigid polyurethane foam (20 lb/ft³) impact limiters. The overall dimensions are 213.2 inches in length and 2 inches in diameter. The cask without the impact limiters measures 177.2 inches in length and 26.44 inches in diameter.

The outer cask shell is comprised of a 1-inch thick stainless steel shell overlaid with a 10 gauge stainless steel cover. Between these two materials is a 0.08-inch diameter wire wrap, providing an air gap for additional thermal protection.

The inner shell (containment vessel) is a standard seamless stainless steel Schedule 40 pipe having an outside diameter of 8.625 inches with a nominal wall thickness of 0.322 inch. The annular space between the inner and outer shells is filled with lead having a thickness of approximately 8 inches.

Both the inner and outer shells are welded at each end to heavy steel closure plates with conical surfaces to assist in positioning and sealing. The containment vessel measures 147 inches in length by 7.981 inches in diameter.

The containment vessel is sealed at the bottom end with a 11.83-inch thick stainless steel plug with two Viton O-ring seals. The top end of the containment vessel is sealed with a 11.625-inch thick stainless steel plug with two Viton O-ring seals. The bottom plug is retained by a closure plate secured by eight, ½"-13UNC x 2-1/4-inch ASTM A320, Grade L7 socket head cap screws. The top plug is secured in place utilizing 16, ½"-13UNC x 1-3/4-inch ASTM A320, Grade L7 hex flange screws.

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5.(a) (2)(continued)

No drain or vents penetrate directly into the containment vessel. A drain/vent line opens directly into the area between the two O-ring seals at each end of the cask (end plugs). During shipment, the lines are sealed with Viton O-ring sealed threaded fasteners.

The cask is provided with six trunions, four spaced 90 degrees apart at the top end and two spaced at 180 degrees apart at the bottom end of the cask. The cask is tied down at the forward and aft ends by means of a cradle and yoke assembly. The gross weight of the cask and contents is 38,200 pounds.

(3) Drawings

The packaging is constructed in accordance with Energy Research and Development Administration (ERDA) Drawing No. H-4-66230, Sheets 1, 3, 5, and 6, Revision No. 0, and Sheets 2 and 4, Revision No. 1. For payloads in spent fuel containers, the applicable drawings are DOE Drawing Nos. H-3-47474, Sheets 1 and 2, Revision No. 0, and H-4-66535, Revision No. 0, and Los Alamos Drawing No. 54Y-110854, Sheets 1 and 2, Revision No. B.

5.(b) Contents

Type, form, and maximum quantity of material per package

Irradiated, (a) mixed oxide (MOX) fuel pins and assemblies; (b) reactor fuel comprised of U-235 and/or Pu-239 oxides, carbides, nitrides, or metallic alloys; and (c) structural components. The minimum cooling time of each assembly and rod must be 90 days, and the cask may contain 1,400 thermal watts. Prior to irradiation, the fuel and structural components must have the following specifications:

	Type	Fuel Description*	Array Description	Maximum Fissile Package Loading	Pin Dimensions
(1)	217-Pin DFA assembly	31% PuO ₂ - 69% UO ₂ (natural U)	Hexagonal array w/pins at 0.26" center-to-center	11.2 kg	0.23" dia 36" active fuel length
(2)	217-Pin MOX fuel pins	50% max PuO ₆ + ²³⁵ UO ₂ - remainder natural UO ₂	Circular array groups of pins in seven compartments in 5" Schedule 5 Pipe	27.5 kg	0.23"-0.29" dia. 36" active fuel length

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	Type	Fuel Description*	Array Description	Maximum Fissile Package Loading	Pin Dimensions
(3)	109-Pin MOX fuel pins	35% PuO ₂ -65% UO ₂ (86% U-235)	Circular array individual pins contained in 0.44" dia. tubes	26.2 kg	0.23"-0.29" dia. 36" active fuel length
(4)	55-Pin MOX fuel pins	35% PuO ₂ -65% UO ₂ (86% U-235)	Circular array individual pins contained in 0.625" dia. tubes	13.2 kg	0.23"-0.29" dia. 36" active fuel length
(5)	37-Pin MOX fuel pins	35% PuO ₂ -65% UO ₂ (86% U-235)	Circular array individual pins contained in 0.75" dia. tubes	8.9 kg	0.23"-0.29" dia. 36" active fuel length
(6)	42-Pin MOX	35% PuO ₂ -65% UO ₂ (86% U-235)	Circular array individual pins contained in 0.625" dia. tubes	10.1 kg	0.23"-0.29" dia. 36" active fuel length
(7)	40-Pin MOX fuel pins	35% PuO ₂ -65% UO ₂ (86% U-235)	Circular array individual pins contained in 0.625" dia. tubes	9.6 kg	0.23"-0.29" dia. 36" active fuel length
(8)	19-Pin MOX fuel pins	35% PuO ₂ -65% UO ₂ (86% U-235)	Circular array individual pins contained in 0.88" dia. tubes	4.6 kg	0.23"-0.29" dia. 36" active fuel length
(9)	PU compounds fuel pins (spent fuel containers)	50% PUX max-UX X=C,N, or O (94% U-235)	Unrestricted array individual pins contained in SS 5-inch Schedule 40 pipe	8.0 kg	Container cavity 5.047" dia. by 38.9" length
(10)	LAMPRE fuel pins (spent fuel container)	97.5% Pu max-X alloy X=Fe, Co or Cs	Circular array individual pins contained in 0.625" or 0.75" dia. steel tubes	8.0 kg	0.425" dia. 38" active fuel length

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	Type	Fuel Description*	Array Description	Maximum Fissile Package Loading	Pin Dimensions
(11)	Structural components (incl. control assemblies)	Dosimetry foils	--	1.0 kg	--
(12)	24 max. Pins. U-Pu carbide fuel pins	85-94%(Pu-U)C ₋₆ to 15% (Pu-U ₂)C ₃ . Max 23% Pu, uranium is not enriched	Circular array; individual pins contained in 0.625-in. dia. tubes within 5-in. Schedule 40 pipe	3.0 kg	0.37" outer dia. 36" active fuel length
(13)	18 max. Pins. Sodium bonded (fuel-to-clad)	10% Zr-20% Pu max. Remainder U (U enriched to 40% max. (U-235))	Circular array; individual pins contained in 0.625-in. diam. tubes within 5-in. Schedule 40 pipe	1.9 kg	0.30" outer dia. 36" active fuel length

*All plutonium in the fuel types (1) thru (8) contains at least 10% Pu-240; fuel type (9) has no limit for PU-240; type (10) contains at least 6% PU-240.

5.(c) Criticality Safety Index: 100

6. Content 5.(b)(1) shown in AEC Drawing No. H-4-21500, Rev. 9, and ERDA Drawing No. H-4-66230, Sheet 5, Rev. 0.

Contents 5.(b)(2), (3), (4), and (5) must be contained within inner container Ident 69 described by ERDA Drawing Nos. H-4-66160, Sheet 1, Rev. 0, and H-4-66230, Sheets 5 and 6, Rev. 0.

Contents 5.(b)(6), (7), (8), (12) and (13) must be contained within inner container Ident 1578 described by ERDA Drawing Nos. H-4-66160, Sheet 2, Rev. 0, and H-4-66230, Sheets 5 and 6, Rev. 0.

Contents 5.(b)(9) and (10) shown in DOE Drawing No. H-3-47474, Sheets 1 and 2, Revision No. 0, and Los Alamos Drawing No. 54Y-110854, Sheets 1 and 2, Revision No. B must be contained within the Ident 69 Liner shown in ERDA Drawing No. H-4-66230, Sheets 5 and 6, Revision No. 0, and DOE Drawing No. H-4-66535, Revision No. 0.

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7. The cask must be shipped dry (no water coolant in cask cavity). Shipment of sodium wetted fuel rods (external) is authorized for up to 200 g of sodium provided the additional requirements of Section 7.4 of the application are adhered to.
8. In addition to the requirements of Subpart G of 10 CFR Part 71:
- (a) Each package must meet the Acceptance Tests and Maintenance Program of Chapter 8 of the application, as supplemented. The leak test to satisfy ANSI N 14.5 and Regulatory Guide 7.4 in Section 8.1.3 of the application must be a test having sufficient sensitivity to detect a leak rate (air at standard temperature and pressure leaking to 10^{-2} atm) of 10^{-7} atm cc/sec. The results of these tests must be documented and retained for the life of the cask.
 - (b) Each package shall be operated and prepared for shipment in accordance with the Operating Procedures of Chapter 7 of the application, as supplemented.
9. Any repair to the trunnions because of out-of-roundness or weld failure must be authorized by NRC prior to returning the package to service.
10. The containment closure bolts (as specified by Note 9, Drawing No. H-4-66230, Sheet 1, Revision No. 0) must be torqued to 70 ± 10 ft-lb.
11. The cask authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.17.
12. Revision No. 14 of this certificate may be used until April 30, 2007.
13. Expiration Date: April 30, 2011.

REFERENCES

Nuclear Packaging, Inc., application dated April 22, 1985.

Supplements dated: October 8 and 31, 1985; February 4, 1986; March 21, 1986; May 24, 1988; September 11, 1990; March 22, 1991; February 21, 1996; February 22, 2001; and February 16, 2006.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

/RA/

Robert A. Nelson, Chief
Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Date: March 17, 2006