

**CERTIFICATE OF COMPLIANCE  
FOR RADIOACTIVE MATERIAL PACKAGES**

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
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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*)

Transnuclear, Inc.  
7135 Minstrel Way  
Columbia, MD 21045

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Transnuclear, Inc., application dated March 25, 1991, 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.: TN-9

(2) Description

The TN-9 is a lead, steel and resin shielded irradiated fuel shipping cask. The cask approximates a right circular cylinder 1,718 mm in diameter and 5,756 mm long. The cavity consists of three rectangular, stainless steel pressure vessels welded to end plates and a circular stepped top flange, separated by thin copper plates. The bays are divided into a total of seven square compartments, 150 x 150 mm and 4,520 mm long. The main shielding consists of 128 mm of lead, 26 mm of steel, and 150 mm of resin. A wet cement layer is located between the lead and the outer shell. Radial copper fins are welded to the outer shell and cover the surface of the cask between each end drum.

The lid is a welded stainless steel shell containing lead and resin shields. The pressure vessel are closed and sealed by sixteen, 1-1/4-inch diameter bolts and two silicone rubber or Viton O-rings located within recessed grooves on the top flange. Each extremity of the cask is surrounded by circular stainless steel drums reinforced by radial gusset plates and filled with balsa wood. A disk shaped impact limiter, constructed of carbon steel and balsa wood, is fastened to each drum with four, 1-1/4-inch bolts. The vent and drain lines which penetrate the inner cavity are equipped with positive closures. In addition, all access ports are protected by the impact limiters. Trunnions are used for lifting and tie-down of the package. The weight of the package is approximately 36,000 kg.

(3) Drawings

The package is constructed in accordance with Transnuclear Drawing No. 9317.03, Rev. J. The materials of construction and welds must be in accordance with Annex A, B, and C to Chapter II of the application.

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## 5.(b) Contents

## (1) Type and form of material

## (i) Irradiated BWR uranium oxide fuel assemblies of the following specifications:

Fuel form	Clad UO <sub>2</sub> Pellets
Cladding material	Zr or SS
Initial fuel pin pressure at 100°F, psig	200
Maximum initial U content/ assembly, kg	201
Maximum average initial U-235 enrichment, w/o	2.65
Maximum bundle cross section, in	5.52
Maximum active fuel length, in	144
Average burnup, MWD/MTU	36,500
Minimum cooling time, day	150
Maximum weight/fuel assembly, kg	300

## (ii) Solid non-fissile irradiated hardware. As needed, appropriate component spacers must be used when loading irradiated hardware into the cask cavity to limit movement of the contents during accident conditions of transport.

## (2) Maximum quantity of material per package

## (i) Seven BWR assemblies. The maximum decay heat load per package is not to exceed 24.4 kilowatts and 3.5 kilowatts per assembly. As needed, appropriate component spacers may be used in the cask cavity to properly position the fuel assemblies.

## (ii) The maximum weight of the contents (fuel assemblies, component spacers, inserts, irradiated hardware, etc.) must not exceed 2,110 kg.

## (c) Criticality Safety Index: 100

## 6. The cask cavity must be dry (no free water) when delivered to a carrier for transport. Residual moisture must be promptly removed from the cask cavity by the methods described in Annex I to Chapter VIII of the application. For contents 5.(b)(1)(i), the cavity must be promptly backfilled with 1.0 atm of helium, nitrogen, or argon gas.

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7. 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 VIII of the application.
  - (b) Each package must be tested and maintained in accordance with the Acceptance Test and Maintenance Procedures in Chapter VIII of the application.
8. Known or suspected failed fuel assemblies (rods) and fuel with cladding defects greater than pin holes and hairline cracks are not authorized.
9. For contents 5.(b)(1)(ii), the dryness verification test is required but leakage tests for assembly verification are not required.
10. The package contents must be so limited that under normal conditions of transport, the total dose rates must not exceed 14 mrem/hr at one meter from the surface of the package.
11. Any system used for cooling down the package must be provided with a pressure relief device set so that the maximum pressure in the containment vessel cannot exceed 7 atmospheres during the cool-down process.
12. The systems and components of each packaging must meet the periodic tests and criteria specified in Chapter VIII of the application. Each packaging that fails to meet these criteria must be withdrawn from service until corrective action has been completed.
13. All valves, fittings, seals, and relief devices must be of the type, size, model, and manufacture as indicated on the design drawings. The resin material must be of the specifications stated in Annex A to Chapter II of the application.
14. In accordance with Annex L to Chapter VIII, at periodic intervals not to exceed two years, the thermal performance of the cask must be analyzed to verify that the cask operation has not degraded below that which is licensed\*. Following the initial acceptance tests, the heat source may be that provided by the decay heat from the loading of the package, provided that the heat source is equal to at least 25% of the design heat load for the package. Each cask that fails to meet the thermal acceptance criteria given in Annex L of the application must be withdrawn from service until corrective action can be completed or the license amended to limit the package to lower heat load.

\* The thermal performance test is not required at periodic intervals when the maximum decay heat load per package does not exceed 25% of the design heat load.

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15. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.17.
16. Revision No. 13 of this certificate may be used until May 31, 2007.
17. Expiration date: October 1, 2008.

## REFERENCES

Transnuclear, Inc., application dated March 25, 1991, and supplements dated April 22, 1991; April 22, 1996; March 22, 2001, and April 26, 2006.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

**/RA/ For James R. Hall**

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

Date: May 9, 2006