CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATION 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.

c. ISSUED TO (Name and Address)

TN Americas LLC
7160 Riverwood Drive, Suite 200
Columbia, MD 21046

d. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

TN-40HT Transportation Package Safety Analysis Report, Revision No. 0, dated December 2023.

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-40HT

(2) Description

The Model No. TN-40HT package, designed to transport up to 40 pressurized water reactor spent fuel assemblies, consists of a basket assembly, a containment vessel, a package body which also functions as the gamma shield and neutron shield, and impact limiters. A transport frame, which is not part of the packaging, is used for tie-down purposes.

The basket structure consists of an assembly of stainless steel cells joined by a fusion welding process and separated by aluminum and poison plates which form a sandwich panel. The panel consists of two aluminum plates separated by a poison plate. The aluminum plates provide the heat conduction paths from the fuel assemblies to the cask inner plate. The poison material provides the necessary criticality control. The opening of the cells is 8.05 in. x 8.05 in. which provides a minimum of 1/8 in. clearance around the fuel assemblies. The overall basket length (160.0 in.) is less than the cask cavity length to allow for thermal expansion and fuel assembly handling.

The containment vessel components consist of the inner shell and bottom inner plate, shell flange, lid outer plate, lid bolts, penetration cover plates and bolts (vent and drain), and the inner metallic seals of the lid seal and the vent and drain seals. The containment vessel prevents leakage of radioactive material from the cask cavity and also maintains an inert atmosphere (helium) in the cask cavity. The

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

overall containment vessel length is approximately 175.0 in. with a wall thickness of 1.5 in. The cylindrical cask cavity has a nominal diameter of 72.0 in. and a length of 163 in.

The carbon steel packaging body, which also functions as the gamma shielding, is around the inner shell and the bottom inner plate of the containment vessel. The 7.25 in. gamma shield completely surrounds the containment vessel shell and bottom plate, respectively. A 5.50 in. thick shield plate is also welded to the inside of the 4.50 in. thick lid outer plate.

Double metallic seals are used for the lid closure. To preclude air in-leakage, the cask cavity is pressurized with helium above atmospheric pressure. The cask cavity is accessed via draining and venting ports. Double metallic seals are utilized to seal these two lid penetrations. The over-pressure (OP) port provides access to the volumes between the double seals in the lid and cover plates for leak testing purposes. The OP port cover is not part of the containment boundary.

Radial neutron shielding is provided by a borated polyester resin compound surrounding the gamma shield shell. The total radial thickness of the resin and aluminum is 5.25 in. The array of resin-filled containers is enclosed within a 0.50 in. thick outer steel shell. The aluminum container walls also provide a path for heat transfer from the gamma shield shell to the outer shell. A pressure relief valve is mounted on top of the resin enclosure to limit the possible internal pressure increase under hypothetical accident conditions.

The impact limiters consist of balsa wood and redwood blocks encased in stainless steel plates. The impact limiters have an outside diameter of 144 in., and an inside diameter of 92 in. to accommodate the cask ends. The bottom limiter is notched to fit over the lower trunnions. The impact limiters are attached to each other using tie rods and attached to the outer shell of the cask with bolts. Each impact limiter is provided with fusible plugs that are designed to melt during a fire accident, thereby relieving excessive internal pressure. Each impact limiter has lifting lugs for handling, and support angles for holding the impact limiter in a vertical position during storage. An axial aluminum spacer is placed on the cask lid prior to mounting the top impact limiter to provide a smooth contact surface between the lid and the top impact limiter, and a radial aluminum spacer is placed on the inside of the top impact limiter recess to limit the radial gap between the axial aluminum spacer, the top of the cask OD, and the inner diameter of the impact limiter.

The nominal external dimensions of the package, with impact limiters, are 261 in. long by 144 in. wide. The total weight of the package is 275,000 lb.

5.(a)(3) Drawings

The package shall be constructed and assembled in accordance with the following TN Americas LLC, Drawing numbers:

TN40HT-71-1, Rev. 0, TN-40HT High Burnup Transport Cask Parts List and Notes

5.(a)(3) Drawings (continued)

TN40HT-71-2, Rev. 0, TN-40HT High Burnup Transport Cask Transport Configuration

TN40HT-71-3, Rev. 0, TN-40HT High Burnup Transport Cask Shell Assembly

TN40HT-71-4, Rev. 0, TN-40HT High Burnup Transport Cask Lid Assembly and Details

TN40HT-71-5, Rev. 0, TN-40HT High Burnup Transport Cask Lid Details

TN40HT-71-6, Rev. 0, TN-40HT High Burnup Transport Cask Shell Assembly Details

TN40HT-71-7, Rev. 0, TN-40HT High Burnup Transport Cask Basket Assembly and Details

TN40HT-71-8, Rev. 0, TN-40HT High Burnup Transport Cask Basket Rails

TN40HT-71-9, Rev. 0, TN-40HT High Burnup Transport Cask Impact Limiter Radial Spacer

10421-71-7, Rev. 3, TN-40 and TN-40HT Transport Packaging Impact Limiter Spacer Details

10421-71-40, Rev. 2, TN-40 and TN-40HT Transport Packaging Impact Limiters General Arrangement

10421-71-41, Rev. 2, TN-40 and TN-40HT Transport Packaging Impact Limiters Parts List and Notes

10421-71-42, Rev. 1, TN-40 and TN-40HT Transport Packaging Impact Limiters Assembly

10421-71-43, Rev. 1, TN-40 and TN-40HT Transport Packaging Impact Limiters Details

10421-71-44, Rev. 1, TN-40 and TN-40HT Transport Packaging Impact Limiters Parts

5.(b) Contents of Packaging

(1) Type and Form of Material

(a) Unconsolidated Westinghouse 14X14 Standard, Westinghouse 14X14 OFA, Exxon 14X14 Standard (including high burn up standard), Exxon 14X14 TOPROD, with specifications in Table 1.2 of the application.

(b) The fuel assembly average burnup shall be ≤ 60,000 MWd/MTU.

(c) Fuel may include burnable poison rod assemblies (BPRAs) provided that the BPRAs have cooled for ≥ 18 years, and the average cumulative exposure of the fuel assembly(ies) where the BPRAs resided during reactor operation shall be ≤ 30,000 MWd/MTU.

(d) Fuel may include thimble plug assemblies (TPAs) provided that the TPAs have cooled for a minimum of 16 years, and the average cumulative exposure of the fuel assembly(ies) where the TPAs resided during reactor operation shall be ≤ 125,000 MWd/MTU, and that only TPAs that do not have water displacement rods extending into the active fuel may be loaded into the package.

(e) The combined weight of a fuel assembly and any BPRA or TPA shall not exceed 1330 lb.

(f) The fuel shall not be damaged or oxidized, i.e., (i) a partial fuel assembly from which fuel pins are missing unless dummy fuel pins are used to displace an amount of water equal to or greater than that displaced by the original pins; (ii) with known or is suspected to have gross cladding failures (other than pinhole leaks) or have structural defects sufficiently severe to adversely affect fuel handling and transfer capability; or (iii) has been exposed to air oxidation during storage, as indicated by maintenance or operating records.

(g) The minimum cooling time for various combinations of minimum assembly average enrichment and maximum assembly average burnup prior to transport shall be in accordance with Table 8-1 of the application.

(h) The maximum decay heat shall not be more than 0.80 kW per fuel assembly and 32.00 kW per package, including the BPRAs and TPAs.

(i) The boron-10 (B^{10}) in the neutron poison plates in the basket must be uniformly distributed in the plates with a minimum required B^{10} poison loading of 37.5 mg/cm^2 for enriched B-Al alloy or Metal Matrix Composite, or 45.0 mg/cm^2 for Boral.

(j) Integral Fuel Burnable Absorber is not an authorized content.

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(k) The nominal length of the assembly axial blankets shall not exceed 6.2 in. The maximum cooling time of the spent fuel shall not exceed 200 years.

5(b)(2) Maximum quantity of material per package:

(a) The combined weight of all fuel assemblies, BPRAs, and TPAs in a single package shall not exceed 52,000 lb.

(b) The number of assemblies in the package shall not exceed 40.

5.(c) Criticality Safety Index: "0"

6. In addition to the requirements of Subpart G of 10 CFR Part 71, the TN-40HTpackage shall:

(a) Be prepared for shipment and operated in accordance with the Operating Procedures in Chapter 8.0 of the application, and

(b) Meet the Acceptance Tests and Maintenance Program of Chapter 9.0 of the application.

7. The personnel barrier shall be always installed during shipment of a loaded package.

8. Transport by air is not authorized.

9. The TN-40HT package authorized by this certificate are hereby approved for use under the general license provisions of 10 CFR 71.17.

10. Expiration Date: December 31, 2028.

REFERENCES

TN-40HT Transportation Package Safety Analysis Report, Revision No. 0, dated December 2023.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Yen-Ju Chen

Digitally signed by Yen-Ju Chen
Date: 2023.12.27 13:10:04 -05'00'

Yen-Ju Chen, Acting Chief
Storage and Transportation Licensing Branch
Division of Fuel Management
Office of Nuclear Material Safety
and Safeguards

Date: December 27, 2023