U.S. Department
of Transportation
Pipeline and
Hazardous Materials
Safety Administration

East Building, PHH-23
1200 New Jersey Avenue Southeast
Washington, D.C. 20590

COMPETENT AUTHORITY CERTIFICATION FOR A TYPE B(U)F FISSILE RADIOACTIVE MATERIALS PACKAGE DESIGN CERTIFICATE USA/9302/B(U)F-96, REVISION 3

This certifies that the radioactive material package design described has been certified by the Competent Authority of the United States as meeting the regulatory requirements for a Type B(U)F packaging for fissile radioactive material as prescribed in the regulations of the International Atomic Energy Agency[1] and the United States of America[2].

1. Package Identification - NUHOMS®-MP197, NUHOMS®-MP197HB.

2. Package Description and Authorized Radioactive Contents - as described in U.S. Nuclear Regulatory Commission Certificate of Compliance No. 9302, Revision 8 (attached).

3. Criticality - The minimum criticality safety index is 0. There is no restriction on the number of packages per conveyance.

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 Hazardous Materials Technology, (PHH-23), Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, Washington D.C. 20590-0001.

   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.

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[1] "Regulations for the Safe Transport of Radioactive Material, 1996 Edition (Revised), No. TS-R-1 (ST-1, Revised)," published by the International Atomic Energy Agency(IAEA), Vienna, Austria.

[2] Title 49, Code of Federal Regulations, Parts 100-199, United States of America.

d. Records of Quality Assurance activities required by Paragraph 310 of the IAEA regulations[1] 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.

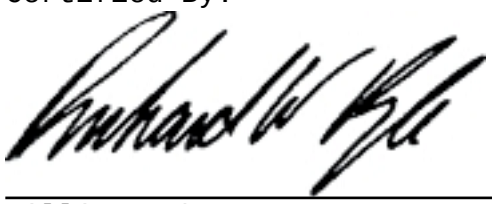
5. Special Condition - The package must be shipped by exclusive use and carrier personnel shall be equipped with dosimetry to monitor occupational exposure under a radiation protection program.

6. Marking and Labeling - The package shall bear the marking USA/9302/B(U)F-96 in addition to other required markings and labeling.

7. Expiration Date - This certificate expires on August 31, 2022. On May 31, 2018, this certificate supersedes all previous revisions of USA/9302/B(U)F-96.

This certificate is issued in accordance with paragraph 814 of the IAEA Regulations and Section 173.471 and 173.472 of Title 49 of the Code of Federal Regulations, in response to the June 01, 2017 petition by TN Americas LLC, Columbia, MD, and in consideration of other information on file in this Office.

Certified By:



William Schoonover
Acting Associate Administrator for Hazardous Materials Safety

Jun 05 2017
(DATE)

Revision 3 - Issued to endorse U.S. Nuclear Regulatory Commission Certificate of Compliance No. 9302, Revision 8.

NRC FORM 618 (8-2000) 10 CFR 71			U.S. NUCLEAR REGULATORY COMMISSION	
CERTIFICATE OF COMPLIANCE FOR RADIOACTIVE MATERIAL PACKAGES				
1. a. CERTIFICATION NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE PAGES
9302	8	71-9302	USA/9302/B(U)F-96	1 OF 19

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.
7135 Minstrel Way, Suite 300
Columbia, MD 21045

d. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

NUHOMS®-MP197 Transportation Package Safety Analysis Report, Revision No. 18, dated April 2017.

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 Nos: NUHOMS®-MP197, NUHOMS®-MP197HB

(2) Description: NUHOMS®-MP197

The NUHOMS®-MP197 package consists of an outer packaging, used for the transport of the NUHOMS®-61BT dry shielded canister (DSC). Weights and dimension noted below are approximate values.

Packaging

The NUHOMS®-MP197 packaging is fabricated primarily of stainless steel. Non-stainless steel items include the lead shielding between the containment boundary inner shell and the structural shell, the O-ring seals, the neutron shield, and carbon steel closure bolts. The body of the packaging consists of a 1.25 inch thick, 68 inch inside diameter, stainless steel inner (containment) shell and a 2.5 inch thick, 82 inch outside diameter stainless steel structural shell, without impact limiters, which sandwich the 3.25 inch thick cast lead shielding. The packaging is 208 inches long and has an outer diameter of 91.5 inches. The weight of the packaging body is 148,840 pounds including about 10,000 pounds of neutron shield and 60,000 pounds of cast lead.

5.(a)(2) Description, NUHOMS®-MP197 (continued)

The containment system of the NUHOMS®-MP197 packaging consists of the inner shell, a 6.50 inch thick bottom plate, a 2.5 inch thick radioactive material (RAM) access closure with a 24 inch diameter, a top closure flange, a 4.5 inch thick top closure lid with closure bolts, drain port closures and bolts, and double O-ring seals for each penetration. The packaging cavity is pressurized to above atmospheric pressure with an inert gas, helium. Shielding is provided by 4 inches of stainless steel, 3.25 inches of lead, and 4.5 inches of neutron shielding. Four removable trunnions are provided for handling and lifting of the package.

Dry Shielded Canister (DSC)

The DSC allows the transfer of spent fuel assemblies, into or out of a storage module, a dry transfer facility, or a pool as a unit. The DSC also provides additional axial biological shielding during handling and transport. The DSC consists of a stainless steel shell, with an outside diameter of 67 inches and an external length of 200 inches, and of a basket assembly designed to accommodate 61 intact BWR fuel assemblies, with or without fuel channels.

The basket structure consists of a welded assembly of stainless steel tubes (fuel compartments) separated by poison plates and surrounded by larger stainless steel boxes and support rails. The poison plates, constructed from borated aluminum, provide criticality control and a heat conduction path from the fuel assemblies to the canister wall. No credit is given to the DSC as a containment boundary.

Impact Limiters

The two impact limiters, consisting of a laminate of balsa wood and redwood encased in stainless steel shells, are attached to the top (front) and bottom (rear) of the packaging by 12 bolts. The impact limiters are provided with seven fusible plugs that are designed to melt during a fire accident, thereby relieving excessive internal pressure. Each impact limiter has two hoist rings for handling. The hoist rings are threaded into the impact limiter shell. During transportation, the impact limiter hoist rings are removed. An aluminum thermal shield is added to the bottom impact limiter to reduce the impact limiter wood temperature. The weight of the impact limiters, the thermal shield, and attachment bolts, is approximately 28,000 lbs. Additionally, a personnel barrier is mounted to the transportation frame to prevent access to the body of the package during transport.

5.(a)(3) Description, NUHOMS®-MP197HB

The NUHOMS®-MP197HB package consists of an outer packaging, which is used for the off-site transport of any one of the nine NUHOMS® DSCs (24PT4, 24PTH, 32PT, 32PTH, 32PTH1, 37PTH, 61BT, 61BTH, and 69BTH). It is also used to transport a secondary container (Radioactive Waste Container (RWC)) with dry irradiated and/or contaminated non-fuel bearing solid materials. Weights and dimensions are approximate values, unless otherwise noted.

Packaging

The MP197HB packaging is a modified version of the MP197 packaging described in 5(a)(2).

The packaging is fabricated primarily of nickel-alloy steel (NAS). Other materials include the cast lead shielding between the containment boundary inner shell and the structural shell, the O-ring seals, the resin neutron shield, and the carbon steel closure bolts. Socket headed cap screws (bolts) are used to secure the lid to the package body and the RAM access closure plate to the bottom of the package. The body of the packaging consists of a NAS inner shell, 1.25 inch thick with a 70.5 inch inside diameter, and a NAS outer shell, 2.75 inch thick with a 84.5 inch outside diameter, which sandwich the 3 inch thick cast lead shielding material.

The packaging is 271.25 inch long with a diameter of 126 inches, when both impact limiters are installed. The packaging diameter, including the radial neutron shield, is 97.75 inches without the fins or 104.25 inches with the fins. The fins are an optional feature for heat loads less than or equal to 26 kW. The packaging cavity is 199.25 inches long and 70.5 inches in diameter without the internal sleeve (discussed below) or 68 inches in diameter with the sleeve.

The MP197HB uses an internal aluminum sleeve for smaller diameter DSCs and secondary containers. The inner sleeve is designed with slots to accommodate the existing rails inside the packaging and to provide rails inside the sleeve on which the smaller diameter DSCs or secondary containers slide during horizontal loading or unloading of the package.

The gross weight of the loaded package is 152 tons including a maximum payload of 56 tons. Four removable trunnions, attached to the package body, are provided for lifting and handling operations, including rotation of the packaging between the horizontal and vertical orientations.

The package containment boundary consists of the inner shell, a 6.5 inch thick bottom plate with a 28.88 inch diameter, a 2.5 inch thick RAM access closure plate with seal and bolts, a package body flange, a 4.5 inch thick lid with seal and bolts, vent and drain ports with closures bolts and seals, and all containment welds.

5.(a)(3) Description, NUHOMS®-MP197HB (continued)

An inert atmosphere (helium) is maintained in the package cavity. Helium assists in heat removal and provides a non-reactive environment to protect the fuel assemblies against fuel cladding degradation. Shielding is provided by approximately 4 inches of steel, 3 inches of lead and 6.25 inches of neutron shielding assembly.

To accommodate the NUHOMS®-69BTH DSC with heat loads greater than 26 kW, removable external fins are provided for the packaging.

Dry Shielded Canister (DSC)

The function of the DSC, which is placed within the transport package, is identical to that described for the MP197 cask in 5(a)(2) above. The DSC consists of a stainless steel shell and a basket assembly. The DSC basket assembly provides criticality control and contains a storage position for each fuel assembly. No credit is taken for the DSC as a containment boundary.

There are nine DSC designs and a radioactive waste canister authorized for transport in the NUHOMS®-MP197HB packaging. The packaging cavity is designed to accommodate the larger 69.8 inch diameter DSCs (32PTH, 32PTH1, 37PTH, and 69BTH DSC). To accommodate the smaller 67.3 inch diameter DSCs (24PT4, 24PTH, 32PT, 61BT, and 61BTH DSC) or secondary container (RWC), an aluminum inner sleeve is provided. To accommodate the varying lengths of the DSCs and secondary containers, stainless steel or aluminum spacers are provided to limit axial movement of the payload. Spacers are to be installed in the MP197HB overpack or DSC cavity, if necessary, to limit the axial gaps between the components, as specified n Chapter A.7, Table A.7-1 of the application.

The maximum weight of the payload (DSC including the fuel) is limited to 56 tons.

The DSC basket poison plates are constructed from Boral®, borated aluminum or aluminum/B_4C metal matrix composite (MMC) and provide a heat conduction path from the fuel assemblies to the canister wall, as well as the necessary criticality control.

Radioactive Waste Container (RWC)

The RWC consists of a payload of dry irradiated and/or contaminated non-fuel bearing solid materials. No credit is taken for the containment provided by the RWC.

The RWC assembly together with any appropriate cask cavity spacers shall provide an equivalent of 1.75 inches minimum steel shielding in the radial direction. A minimum of 5.75 inches equivalent steel shielding shall be provided at the bottom of the canister and a minimum of 7.00 inches equivalent steel shielding at the top of the canister. The maximum weight of the payload (RWC, including waste) is limited to 56 tons.

5.(a)(3) Description, NUHOMS®-MP197HB (continued)

Impact Limiters

Impact limiters consisting of balsa wood and redwood encased in stainless steel shells are attached at the front and rear end of the package during shipment by twelve (12) attachment bolts. The impact limiters are provided with seven fusible plugs that are designed to melt during a fire accident, thereby relieving internal pressure. Each impact limiter has three hoist rings for handling, and two support angles for supporting the impact limiter in a vertical position during storage. The hoist rings are threaded into the impact limiter shell, while the support angles are welded to the shell. Prior to transport, the impact limiter hoist rings are removed and replaced with bolts. An aluminum thermal shield is added to each impact limiter to reduce the impact limiter wood temperature. The weight of the impact limiters, the thermal shield, and attachment bolts, is 25,000 lbs. A personnel barrier is mounted to the transportation frame to prevent access to the body of the package.

5.(a)(4) Drawings, NUHOMS®-MP197

The package shall be constructed and assembled in accordance with the following Transnuclear, Inc., Drawing numbers:

1093-71-1, Revision 0,
NUHOMS®-197 Packaging
Transport Configuration

1093-71-2, Revision 1,
NUHOMS®-197 Packaging
General Arrangement

1093-71-3, Revision 1,
NUHOMS®-MP197 Packaging
Parts List

1093-71-4, Revision 1,
NUHOMS®-MP197 Packaging
Cask Body Assembly

1093-71-5, Revision 0,
NUHOMS®-MP197 Packaging
Cask Body Details

1093-71-6, Revision 0,
NUHOMS®-MP197 Packaging
Cask Body Details

1093-71-7, Revision 0,
NUHOMS®-MP197 Packaging
Lid Assembly & Details

1093-71-8, Revision 0,
NUHOMS®-MP197 Packaging
Impact Limiter Assembly

1093-71-9, Revision 0,
NUHOMS®-MP197 Packaging
Impact Limiter Details

1093-71-10, Revision 0,
NUHOMS®-61BT Transportable
Canister for BWR Fuel Basket
Assembly

1093-71-11, Revision 1,
NUHOMS®-61BT Transportable
Canister for BWR Fuel Basket
Details

1093-71-12, Revision 0,
NUHOMS®-61BT Transportable
Canister for BWR Fuel Basket
Details

1093-71-13, Revision 1,
NUHOMS®-61BT Transportable
Canister for BWR Fuel General
Assembly

5.(a)(4) Drawings, NUHOMS®-MP197 (continued)

1093-71-14, Revision 1, NUHOMS®-61BT Transportable Canister for BWR Fuel General Assembly

1093-71-15, Revision 2, NUHOMS®-61BT Transportable Canister for BWR Fuel Shell Assembly

1093-71-16, Revision 0, NUHOMS®-61BT Transportable Canister for BWR Fuel Shell Assembly

1093-71-17, Revision 2, NUHOMS®-61BT Transportable Canister for BWR Fuel Canister Details

1093-71-18, Revision 1, NUHOMS®-61BT Transportable Canister for BWR Fuel Canister Details

1093-71-20, Revision 0, NUHOMS®-MP197 Packaging Regulatory Plate

1093-71-21, Revision 0, NUHOMS®-MP197 Packaging on Transport Skids

5.(a)(5) Drawings, NUHOMS®-MP197HB

The NUHOMS®-MP197HB package shall be constructed and assembled in accordance with the following Transnuclear, Inc. drawings:

MP197HB-71-1001 Rev 3	NUHOMS®-MP197HB Packaging Transport Configuration (2 sheets)
MP197HB-71-1002 Rev 6	NUHOMS®-MP197HB Packaging Parts List (2 sheets)
MP197HB-71-1003 Rev 2	NUHOMS®-MP197HB Packaging General Arrangement (1 sheet)
MP197HB-71-1004 Rev 4	NUHOMS®-MP197HB Packaging Cask Body Assembly (1 sheet)
MP197HB-71-1005 Rev 5	NUHOMS®-MP197HB Packaging Cask Body Details (3 sheets)
MP197HB-71-1006 Rev 2	NUHOMS®-MP197HB Packaging Lid Assembly And Details (1 sheet)
MP197HB-71-1007 Rev 0	NUHOMS®-MP197HB Packaging Regulatory Plate (1 sheet)
MP197HB-71-1008 Rev 1	NUHOMS®-MP197HB Packaging Impact Limiter Assembly (1 sheet)
MP197HB-71-1009 Rev 1	NUHOMS®-MP197HB Packaging Impact Limiter Details (1 sheet)

MP197HB-71-1011 Rev 0	NUHOMS®-MP197HB Packaging Transport Configuration Outer Sleeve With Fins Option (1 sheet)
MP197HB-71-1014 Rev 1	NUHOMS®-MP197HB Packaging Internal Sleeve Design (2 sheets)
NUH24PT4-71-1001 Rev 0	NUHOMS® 24PT4 Transportable Canister For PWR Fuel Basket Assembly (5 sheets)
NUH24PT4-71-1002 Rev 0	NUHOMS® 24PT4 Transportable Canister For PWR Fuel Main Assembly (8 sheets)
NUH24PT4-71-1003 Rev 0	NUHOMS® 24PT4 Transportable Canister For PWR Fuel Failed Fuel Can (4 sheets)
NUH32PT-71-1000 Rev 0	NUHOMS® 32PT Transportable Canister For PWR Fuel Summary Dimensions (1 sheet)
NUH32PT-71-1001 Rev 1	NUHOMS® 32PT Transportable Canister For PWR Fuel Main Assembly (5 sheets)
NUH32PT-71-1002 Rev 1	NUHOMS® 32PT Transportable Canister For PWR Fuel Shell Assembly (3 sheets)
NUH32PT-71-1003 Rev 1	NUHOMS® 32PT Transportable Canister For PWR Fuel "A" Basket Assembly (16 Poison/16 Compartment Plates)(8 sheets)
NUH32PT-71-1004 Rev 1	NUHOMS® 32PT Transportable Canister For PWR Fuel Aluminum Transition Rail – R90 (2 sheets)
NUH32PT-71-1005 Rev 1	NUHOMS® 32PT Transportable Canister For PWR Fuel Aluminum Transition Rail –R45 (1 sheet)
NUH32PT-71-1006 Rev 1	NUHOMS® 32PT Transportable Canister For PWR Fuel "A/B/C/D" Basket Assembly (20 Poison/12 Compartment Plates)(6 sheets)
NUH32PT-71-1007 Rev 1	NUHOMS® 32PT Transportable Canister For PWR Fuel "A/B/C/D" Basket Assembly (24 Poison/8 Compartment Plates)(8 sheets)
NUH24PTH-71-1000 Rev 1	NUHOMS® 24PTH Transportable Canister For PWR Fuel Main Assembly (5 sheets)
NUH24PTH-71-1001 Rev 1	NUHOMS® 24PTH Transportable Canister For PWR Fuel Basket Shell Assembly (4 sheets)
NUH24PTH-71-1002 Rev 1	NUHOMS® 24PTH Transportable Canister For PWR Fuel Shell Assembly (4 sheets)
NUH24PTH-71-1003 Rev 2	NUHOMS® 24PTH Transportable Canister For PWR Fuel Basket Assembly (8 sheets)

NUH24PTH-71-1004 Rev 1	NUHOMS® 24PTH Transportable Canister For PWR Fuel Transition Rails (4 sheets)
NUH24PTH-71-1008 Rev 1	NUHOMS® 24PTHF Transportable Canister For PWR Fuel Failed Fuel Can (2 sheets)
NUH24PTH-71-1009 Rev 1	NUHOMS® 24PTHF Transportable Canister For PWR Fuel Basket Assembly (8 sheets)
NUH32PTH-71-1001 Rev 2	NUHOMS® 32PTH Transportable Canister For PWR Fuel Parts List (1 sheet)
NUH32PTH-71-1002 Rev 1	NUHOMS® 32PTH Transportable Canister For PWR Fuel Main Assembly (1 sheet)
NUH32PTH-71-1003 Rev 0	NUHOMS® 32PTH Transportable Canister For PWR Fuel Siphon Pipe Details (1 sheet)
NUH32PTH-71-1004 Rev 0	NUHOMS® 32PTH Transportable Canister For PWR Fuel Inner Top Cover Details (2 sheets)
NUH32PTH-71-1005 Rev 0	NUHOMS® 32PTH Transportable Canister For PWR Fuel Outer Top Cover Details (1 sheet)
NUH32PTH-71-1006 Rev 0	NUHOMS® 32PTH Transport able Canister For PWR Fuel Shell Assembly (1 sheet)
NUH32PTH-71-1007 Rev 0	NUHOMS® 32PTH Transportable Canister For PWR Fuel Shell Bottom Details (1 sheet)
NUH32PTH-71-1008 Rev 0	NUHOMS® 32PTH Transportable Canister For PWR Fuel Grapple Ring Details (1 sheet)
NUH32PTH-71-1009 Rev 0	NUHOMS® 32PTH Transportable Canister For PWR Fuel Basket Assembly (1 sheet)
NUH32PTH-71-1010 Rev 0	NUHOMS® 32PTH Transportable Canister For PWR Fuel Basket Assembly Details (1 sheet)
NUH32PTH-71-1011 Rev 0	NUHOMS® 32PTH Transportable Canister For PWR Fuel Basket Assembly details (1 sheet)
NUH32PTH-71-1012 Rev 0	NUHOMS® 32PTH Transportable Canister For PWR Fuel Basket Assembly – Details (1 sheet)
NUH32PTH-71-1013 Rev 0	NUHOMS® 32PTH Transportable Canister For PWR Fuel Basket Rail A180 (1 sheet)
NUH32PTH-71-1014 Rev 0	NUHOMS® 32PTH Transportable Canister For PWR Fuel Basket Rail A90 (1 sheet)

NUH32PTH-71-1015 Rev 0	NUHOMS® 32PTH Transportable Canister For PWR Fuel Damaged Fuel End Caps (1 sheet)
NUH32PTH Type 1-71-1000 Rev 1	NUHOMS® 32PTH Type 1 Transportable Canister For PWR Fuel Main Assembly (4 sheets)
NUH32PTH Type 1-71-1001 Rev 2	NUHOMS® 32PTH Type 1 Transportable Canister For PWR Fuel Basket Shell Assembly (4 sheets)
NUH32PTH Type 1-71-1002 Rev 1	NUHOMS® 32PTH Type 1 Transportable Canister For PWR Fuel Shell Assembly (4 sheets)
NUH32PTH Type 1-71-1003 Rev 2	NUHOMS® 32PTH Type 1 Transportable Canister For PWR Fuel Basket Assembly (7 sheets)
NUH32PTH Type 1-71-1004 Rev 2	NUHOMS® 32PTH Type 1 Transportable Canister For PWR Fuel Transition Rails (4 sheets)
NUH32PTH Type 1-71-1010 Rev 1	NUHOMS® 32PTH Type 1 Transportable Canister For PWR Fuel Alternate Top Closure (6 sheets)
NUH32PTH1-71-1000 Rev 1	NUHOMS® 32PTH1 Transportable Canister For PWR Fuel Main Assembly (4 sheets)
NUH32PTH1-71-1001 Rev 1	NUHOMS® 32PTH1 Transportable Canister For PWR Fuel Basket Shell Assembly (5 sheets)
NUH32PTH1-71-1002 Rev 1	NUHOMS® 32PTH1 Transportable Canister For PWR Fuel Shell Assembly (4 sheets)
NUH32PTH1-71-1003 Rev 2	NUHOMS® 32PTH1 Transportable Canister For PWR Fuel Basket Assembly (8 sheets)
NUH32PTH1-71-1004 Rev 1	NUHOMS® 32PTH1 Transportable Canister For PWR Fuel Transition Rails (7 sheets)
NUH32PTH1-71-1010 Rev 1	NUHOMS® 32PTH1 Transportable Canister For PWR Fuel Alternate Top Closure (6 sheets)
NUH37PTH-71-1001 Rev 2	NUHOMS® 37PTH Transportable Canister For PWR Fuel Main Assembly (4 sheets)
NUH37PTH-71-1002 Rev 3	NUHOMS® 37PTH Transportable Canister For PWR Fuel Basket Shell Assembly (5 sheets)
NUH37PTH-71-1003 Rev 3	NUHOMS® 37PTH Transportable Canister For PWR Fuel Shell Assembly (4 sheets)
NUH37PTH-71-1004 Rev 3	NUHOMS® 37PTH Transportable Canister For PWR Fuel Alternate Top Closure (6 sheets)

NUH37PTH-71-1011 Rev 2	NUHOMS® 37PTH Transportable Canister For PWR Fuel Basket Assembly (7 sheets)
NUH37PTH-71-1012 Rev 1	NUHOMS® 37PTH Transportable Canister For PWR Fuel Transition Rails (7 sheets)
NUH37PTH-71-1015 Rev 0	NUHOMS® 37PTH Transportable Canister For PWR Fuel Damaged Fuel End Caps (1 sheet)
NUH61BT-71-1000 Rev 1	NUHOMS® 61BT Transportable Canister For BWR Fuel Parts List (1 sheet)
NUH61BT-71-1001 Rev 1	NUHOMS® 61BT Transportable Canister For BWR Fuel Basket Assembly (1 sheet)
NUH61BT-71-1002 Rev 0	NUHOMS® 61BT Transportable Canister For BWR Fuel Basket Details (1 sheet)
NUH61BT-71-1003 Rev 0	NUHOMS® 61BT Transportable Canister For BWR Fuel General Assembly (1 sheet)
NUH61BT-71-1004 Rev 0	NUHOMS® 61BT Transportable Canister For BWR Fuel General Assembly (1 sheet)
NUH61BT-71-1005 Rev 0	NUHOMS® 61BT Transportable Canister For BWR Fuel Shell Assembly (1 sheet)
NUH61BT-71-1006 Rev 0	NUHOMS® 61BT Transportable Canister For BWR Fuel Shell Assembly (1 sheet)
NUH61BT-71-1007 Rev 0	NUHOMS® 61BT Transportable Canister For BWR Fuel Canister Details (1 sheet)
NUH61BT-71-1008 Rev 0	NUHOMS® 61BT Transportable Canister For BWR Fuel Canister Details (1 sheet)
NUH61BT-71-1009 Rev 0	NUHOMS® 61BT Transportable Canister For BWR Fuel Basket Details (1 sheet)
NUH61BT-71-1010 Rev 1	NUHOMS® 61BT Transportable Canister For BWR Fuel Additional Basket Details – Damaged Fuel (4 sheets)
NUH61BTH-71-1000 Rev 1	NUHOMS® 61BTH Type 1 Transportable Canister For BWR Fuel Main Assembly (5 sheets)
NUH61BTH-71-1100 Rev 2	NUHOMS® 61BTH Type 2 Transportable Canister For BWR Fuel Main Assembly (7 sheets)
NUH61BTH-71-1101 Rev 1	NUHOMS® 61BTH Type 2 Transportable Canister For BWR Fuel Shell Assembly (2 sheets)
NUH61BTH-71-1102 Rev 2	NUHOMS® 61BTH Type 2 Transportable Canister For BWR Fuel Basket Assembly (8 sheets)

NUH61BTH-71-1103 Rev 1	NUHOMS® 61BTH Type 2 Transportable Canister For BWR Fuel Transition Rails (2 sheets)
NUH61BTH-71-1104 Rev 1	NUHOMS® 61BTH Type 2 Transportable Canister For BWR Fuel Damaged Fuel End Caps (1 sheet)
NUH61BTH-71-1105 Rev 1	NUHOMS® 61BTHF Type 2 Transportable Canister For BWR Fuel Failed Fuel Can (2 sheets)
NUH61BTH-71-1106 Rev 2	NUHOMS® 61BTH Type 2 Transportable Canister For BWR Fuel Top Grid Assembly Alternate 3 (2 sheets)
NUH69BTH-71-1001 Rev 3	NUHOMS® 69BTH Transportable Canister For BWR Fuel Main Assembly (4 sheets)
NUH69BTH-71-1002 Rev 3	NUHOMS® 69BTH Transportable Canister For BWR Fuel Basket – Shell Assembly (4 sheets)
NUH69BTH-71-1003 Rev 3	NUHOMS® 69BTH Transportable Canister For BWR Fuel Shell Assembly (4 sheets)
NUH69BTH-71-1004 Rev 6	NUHOMS® 69BTH Transportable Canister For BWR Fuel Alternate Top Closure (7 sheets)
NUH69BTH-71-1011 Rev 3	NUHOMS® 69BTH Transportable Canister For BWR Fuel Basket Assembly (5 sheets)
NUH69BTH-71-1012 Rev 4	NUHOMS® 69BTH Transportable Canister For BWR Fuel Transition Rail Assembly And Details (6 sheets)
NUH69BTH-71-1013 Rev 4	NUHOMS® 69BTH Transportable Canister For BWR Fuel Holddown Ring Assembly (2 sheets)
NUH69BTH-71-1014 Rev 2	NUHOMS® 69BTH Transportable Canister For BWR Fuel Damaged Fuel Modification (1 sheet)
NUH69BTH-71-1015 Rev 2	NUHOMS® 69BTH Transportable Canister For BWR Fuel Damaged Fuel End Caps (1 sheet)
NUHRWC-71-1001 Rev 1	NUHOMS® System RWC Canister - Welded Top Shield Plug Design Main Assembly (5 sheets)
NUHRWC-71-1002 Rev 1	NUHOMS® System RWC Canister - Welded Top Shield Plug Design Inner Liner (3 sheets)
NUHRWC-71-1003 Rev 0	NUHOMS® System RWC Canister - Bolted Top Shield Plug Design Main Assembly (4 sheets)

5.(b) Contents of Packaging, NUHOMS®-MP197

(1) Type and Form of Material

(a) Intact irradiated BWR fuel assemblies with or without fuel channels, with uranium oxide pellets and zircaloy cladding. Channel thickness is limited to 0.065 to 0.120 inches. Prior to irradiation, the fuel assemblies must meet the dimensions and specifications of Table 1. Assemblies containing fuel rods with no known or suspected cladding defects greater than hairline cracks or pinhole leaks are authorized when contained in the NUHOMS®-61BT DSC.

(b) The maximum burn-up and minimum cooling times for the individual assemblies shall meet the requirements of Table 2.

In addition, the fuel shall have been decayed for a time sufficient to meet the thermal criteria of condition 5(b)(1)(c). The maximum total allowable cask heat load is 15.86 kW.

(c) The maximum assembly decay heat of an individual assembly is 260 watts

(d) BWR fuel assembly poison material shall meet the design requirements of Table 3.

TABLE 1[1]

Assembly Type	7x7 49/0	8x8 63/1	8x8 62/2	8x8 60/4	8x8 60/1	9x9 74/2	10x10 92/2
Maximum Initial Enrichment (wt% ^{235}U)	See Table 3	See Table 3	See Table 3	See Table 3	See Table 3	See Table 3	See Table 3
Rod Pitch (in)	0.738	0.640	0.640	0.640	0.640	0.566	0.510
Number of Fuel Rods per Assembly	49	63	62	60	60	66-full 8-partial	78-full 14-partial
Fuel Rod OD (in)	0.563	0.493	0.483	0.483	0.483	0.440	0.404
Minimum Cladding Thickness (in)	0.032	0.034	0.032	0.032	0.032	0.028	0.026
Pellet Diameter	0.487	0.416	0.410	0.410	0.411	0.376	0.345
Maximum Active Fuel Length (in)	144	146	150	150	150	146-full 90-partial	150-full 93-partial

[1)] Maximum Co-59 content in the Top End Fitting region is 4.5 g per assembly
Maximum Co-59 content in the Plenum region is 0.9 g per assembly
Maximum Co-59 content in the In-Core region (including the whole fuel channel) is 4.5 g per assembly
Maximum Co-59 content in the Bottom region is 4.1 g per assembly

TABLE 2

Intact BWR Fuel Assembly Characteristics	
Physical Parameters:	
Fuel Design	7x7, 8x8, 9x9, or 10x10 BWR fuel assemblies manufactured by General Electric or equivalent reload fuel
Cladding Material	Zircaloy
Fuel Damage	Cladding damage in excess of pinhole leaks or hairline cracks is not authorized to be stored as "Intact BWR fuel"
Channels	Fuel may be stored with or without fuel channels
Maximum assembly weight	705 lbs
Radiological Parameters:	
Group 1:	
Maximum Burnup:	27,000 MWd/MTU
Minimum Cooling Time:	6-Years
Maximum Initial Enrichment:	See Table 3
Minimum Initial Bundle Average Enrichment:	2.0 wt.% ^{235}U
Maximum Initial Uranium Content:	198 kg/assembly
Maximum Decay Heat:	260 W/assembly
Group 2:	
Maximum Burnup:	35,000 MWd/MTU
Minimum Cooling Time:	12-Years
Maximum Initial Enrichment:	See Table 3
Minimum Initial Bundle Average Enrichment:	2.65 wt.% ^{235}U
Maximum Initial Uranium Content:	198 kg/assembly
Maximum Decay Heat:	260 W/assembly

Intact BWR Fuel Assembly Characteristics	
Radiological Parameters:	
Group 3:	
Maximum Burnup:	37,200 MWd/MTU
Minimum Cooling Time:	12-Years
Maximum Initial Enrichment:	See Table 3
Minimum Initial Bundle Average Enrichment:	3.38 wt.% ^{235}U
Maximum Initial Uranium Content:	198 kg/assembly
Maximum Decay Heat:	260 W/assembly
Group 4:	
Maximum Burnup:	40,000 MWd/MTU
Minimum Cooling Time:	15-Years
Maximum Initial Enrichment:	See Table 3
Minimum Initial Bundle Average Enrichment:	3.4 wt.% ^{235}U
Maximum Initial Uranium Content:	198 kg/assembly
Maximum Decay Heat:	260 W/assembly

TABLE 3
Minimum Boron-10 Areal Density as a Function of Maximum Fuel Assembly Lattice Average Enrichment

NUHOMS®-61BT DSC Basket Type	Maximum Fuel Assembly Lattice Average Enrichment (wt.% ^{235}U)	Minimum Boron-10 Areal Density for Boral® (g/cm^2)	Minimum Boron-10 Areal Density for Borated Aluminum, Metamic®, and Boralyn® (g/cm^2)	Areal Density Used in the Criticality Evaluation [75% Credit for Boral®] (g/cm^2)
	Intact Fuel Assemblies			
A	3.7	0.025	0.021	0.019
B	4.1	0.038	0.032	0.029
C	4.4	0.048	0.040	0.036

5.(b) Contents of Packaging, NUHOMS®-MP197 (continued)

(2) Maximum quantity of material per package

(a) The quantity of material authorized for transport is 61 intact standard BWR fuel assemblies with or without fuel channels. Where a DSC is to be loaded with fewer fuel assemblies than the DSC capacity, dummy fuel assemblies with the same nominal weight as a standard fuel assembly shall be installed in the unoccupied spaces.

(b) For material described in 5(b)(1) the approximate maximum payload is 43,505 lbs.

5.(c) Contents of Packaging, NUHOMS®-MP197HB

(1) Type and Form of Material

(a) Fuel assemblies stored inside any of the nine DSCs, as described in Chapter A.7, Section A.7.1 of the application.

(b) Dry irradiated and/or contaminated nonfuel bearing solid materials in an RWC as described in Chapter A.7, Section A.7.1 of the application.

(2) Maximum quantity of material per package: as specified in Chapter A.7, Section A.7.1 of the application.

(3) The maximum peaking factor of the fuel assembly average burnup in all fuel contents shall not exceed 1.212 and 1.152 for BWR and PWR fuel, respectively, for burnups greater than 45 GWd/MTU.

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

6. For the NUHOMS®-MP197 and the NUHOMS®-MP197HB packages, fuel assemblies with missing fuel rods shall not be shipped as intact fuel unless the missing fuel rods are replaced with dummy rods that displace an equal or greater amount of water.

7. In addition to the requirements of Subpart G of 10 CFR Part 71, the NUHOMS®-MP197 and NUHOMS®-MP197HB packages shall:

   (a) Be prepared for shipment and operated in accordance with the Operating Procedures in Chapters 7.0 and A.7 of the application, respectively; and

   (b) Meet the Acceptance Tests and Maintenance Program of Chapters 8.0 and A.8 of the application, respectively.

8. Additional operating requirements of the NUHOMS®-MP197 package include:

   (a) Verification of the basket type A, B, or C, by inspection of the last digit of the serial number on the grapple ring at the bottom of the DSC.

   (b) Verification that the fuel assemblies to be placed in the DSC meet the maximum burnup, maximum initial enrichment, minimum cooling time, and maximum decay heat limits for fuel assemblies as specified in Tables 2 and 3. The enrichment limit must correspond to the basket type determined in 8(a) above.

   (c) Replacement of the package lid bolts after 85, or fewer, roundtrip shipments to ensure that the allowable fatigue damage factor will not be exceeded during normal conditions of transport.

9. Additional operating requirements of the NUHOMS®-MP197HB package include:

   (a) Transportation is limited to facilities that have the capability to handle uncanned damaged fuel assemblies.

   (b) Detailed site-specific procedures shall be developed to address site specific conditions and requirements that may require the use of different equipment and ordering of steps to accomplish the same objectives or acceptance criteria which must be met to ensure the integrity of the package.

   (c) Prior to transportation, the condition of the canister must be evaluated to verify that (i) the containment function of the canister is maintained and (ii) the degradation of neutron absorbers and basket materials has not occurred to the extent they would no longer comply with applicable materials and dimensions, as specified in condition 5(a)(5). The verification of the containment function shall follow the instructions outlined in Chapter A.7, Section A.7.1.3, Step 5 of the application. The effectiveness of the inspection and verification techniques, outlined in Chapter A.7, Section A.7.1.3, Step 5, shall be demonstrated on mockups or working systems, prior to transportation.

(d) The aging management plan and evaluation for each canister, or set of canisters, shall be submitted to the NRC prior to shipment.

(e) Replacement of the package lid bolts after 250, or fewer, round trip shipments to ensure that the allowable fatigue damage factor will not be exceeded during normal conditions of transport.

10. The NUHOMS®-MP197 and NUHOMS®-MP197HB packages are approved for exclusive use by rail, truck, or marine transport. Transport by air is not authorized.

11. The NUHOMS®-MP197 and NUHOMS®-MP197HB packages authorized by this certificate are hereby approved for use under the general license provisions of 10 CFR 71.17.

12. Revision No. 7 of this certificate may be used until May 31, 2018.

13. Expiration Date: August 31, 2022.

NRC FORM 618 (8-2000) 10 CFR 71			U.S. NUCLEAR REGULATORY COMMISSION	
CERTIFICATE OF COMPLIANCE FOR RADIOACTIVE MATERIAL PACKAGES				
1. a. CERTIFICATION NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE PAGES
9302	8	71-9302	USA/9302/B(U)F-96	19 OF 19

REFERENCES

NUHOMS®-MP197 Transportation Package Safety Analysis Report, Revision No. 18, dated April 2017.

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: May 23, 2017

U.S. Department
of Transportation

**Pipeline and
Hazardous Materials
Safety Administration**

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

CERTIFICATE NUMBER: USA/9302/B(U)F-96, Revision 3

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