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

U.S. Department of Transportation

Pipeline and Hazardous Materials Safety Administration

COMPETENT AUTHORITY CERTIFICATION FOR A TYPE FISSILE RADIOACTIVE MATERIALS PACKAGE DESIGN CERTIFICATE USA/9297/AF-96, REVISION 11

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 AF package for fissile material as prescribed in the regulations of the International Atomic Energy Agency[1] and the United States of America[2] The package design is approved for use within the United States for import and export shipments made in accordance with applicable international and domestic transport regulations.

1. Package Identification - Traveller STD, Traveller XL, and Traveller VVER.

2. Package Description and Authorized Radioactive Contents - as described in U.S. Nuclear Regulatory Commission Certificate of Compliance No. 9297, Revision 14 (attached). None.

3. Criticality - The minimum criticality safety index is as assigned in the NRC Certificate of Compliance. The maximum number of packages per conveyance is determined in accordance with Table 11 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

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

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

of Engineering and Research, (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.

d. Records of Management System activities required by Paragraph 306 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. Marking and Labeling - The package shall bear the marking USA/9297/AF-96 in addition to other required markings and labeling.

6. Expiration Date - This certificate expires on March 31, 2030. Previous editions which have not reached their expiration date may continue to be used.

This certificate is issued in accordance with paragraph(s) 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 August 2, 2024 petition by Westinghouse, Columbia, SC, and in consideration of other information on file in this Office.

Certified By:

William Schoonover
Associate Administrator for Hazardous Materials Safety

August 09, 2024
(DATE)

Revision 11 - Issued to endorse NRC Certificate of Compliance No. 9297, Revision 14.

NRC FORM 618
(8-2000)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1 a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9297	14	71-9297	USA/9297/AF-96	1 OF	11

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)*

Westinghouse Electric Company, LLC
Nuclear Fuel
Columbia Fuel Fabrication Facility
5801 Bluff Road
Hopkins, SC 29061

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Westinghouse Electric Company, LLC, application Revision No. 16, dated July 2024.

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.: Traveller STD, Traveller XL, Traveller VVER

(2) Description

The Traveller package is designed to transport fresh uranium fuel assemblies with enrichment up to 5.0 weight percent or rods with enrichment up to 7.0 weight percent. The package is designed to carry one fuel assembly or one container for loose rods. The package consists of three components: 1) an outerpack, 2) a clamshell, and 3) a fuel assembly or rod container.

The outerpack serves as the primary impact and thermal protection for the fuel assembly and also provides for lifting, stacking, and tie down during transportation. Two independent impact limiters consisting of two sections of foam of different densities sandwiched between three layers of sheet metal are integral parts of the outerpack. Polyethylene foam sheeting may be positioned between the clamshell and the lower outerpack to augment shock absorbing characteristics during routine transportation. A weather gasket between the mating surfaces of the upper and lower outerpack provides a barrier to prevent rain from entering the package.

The purpose of the Clamshell is to protect the contents during routine handling and limit rearrangement of the contents in the event of a transport accident. During routine handling, the Clamshell doors open to load the contents and are secured with multi-point cammed

5.(a)(2) Description (Continued)

latches and hinge pins. The Clamshell is a part of the confinement system that protects and restrains the fuel assembly or fuel rod tube contents during all transport conditions. Neutron absorber plates are installed on the inside surface of the clamshell along the full length of each main door and the top door.

There are two general types of clamshells used, a typical rectangular clamshell, and a hexagonal VVER Clamshell. The rectangular clamshell is used in both the Traveller STD and XL packages, with minor differences between the two. The VVER Clamshell is used in the Traveller VVER package. The STD/XL Clamshell consists of an aluminum “v” extrusion strong back. The VVER Clamshell is similar in build to the STD/XL Clamshell, however it has been designed for the transport of hexagonal fuel assemblies. All clamshell designs consist of an aluminum base and two aluminum panel doors, bottom and top end plates, and similar multi-point cammed latch closure mechanism. The clamshells use piano-type hinges (continuous hinges) to connect each main door to the strong back. The strong back and bottom plate are lined with a cork rubber pad to cushion and protect the contents during normal handling and transport conditions. The clamshell is fastened to the lower outerpack using shock absorbing rubber mounts.

The Traveller package is designed to carry loose rods using a rod pipe. The rod pipe consists of either a 15.2 cm (6 in.) stainless steel pipe or a 20.3 cm (8 in.) aluminum pipe. The 6-inch Rod Pipe consists of a 6 in. (15.2 cm) 304 stainless steel, Schedule 40 pipe with 304 stainless steel closures at each end. The end closures are a 0.25 in. (6.35 mm) thick cover secured to a flange fabricated from 0.25 in. (6.35 mm) thick plate. The 8-inch Rod Pipe consists of an extruded aluminum pipe with an 8 in. (20.32 cm) nominal inner diameter and 8.5 in. (21.59 cm) nominal outer diameter, with aluminum plate closures at each end. The end closures are a 1 in. (2.54 cm) thick cover secured to a flange fabricated from 1.5 in. (3.81 cm) thick plate.

There are three models of the Traveller packaging: the Traveller STD, the Traveller XL and the Traveller VVER.

Traveller STD:

Package gross weight	2,041 kilograms (kg) (4,500 pounds (lbs))
Packaging gross weight	1,293 kg (2,850 lbs)
Contents gross weight	748 kg (1,650 lbs)
Outer dimensions	
Length	500.4 cm (197 in.)
Width	68.6 cm (27.0 in.)
Height	99.8 cm (39.3 in.)

Traveller XL:

Package gross weight	2,372 kg (5,230 lbs)
Packaging gross weight	1,476 kg (3,255 lbs)
Contents gross weight	896 kg (1,975 lbs)

5.(a)(2) Description (Continued)

Outer dimensions
- Length 574 cm (226.0 in.)
- Width 68.8 cm (27.1 in.)
- Height 99.8 cm (39.3 in.)

Traveller VVER:
- Package gross weight 2,316 kg (5,105 lbs)
- Packaging gross weight 1,476 kg (3,255 lbs)
- Contents gross weight 840 kg (1,850 lbs)
- Outer dimensions
  - Length 574 cm (226.0 in.)
  - Width 68.8 cm (27.1 in.)
  - Height 99.8 cm (39.3 in.)

(3) Drawings

The packagings are fabricated and assembled in accordance with the following Westinghouse Electric Company's Drawing Nos.:

10004E58, Rev. 10 (sheets 1-9)
10037E43, Rev. 3 (sheets 1-8)
10006E58, Rev. 7 (sheets 1-2)
10078E26, Rev. 1 (sheets 1-8)

5. (b) Contents (Type and Form of Material)

(1) PWR Group 1 Fuel Assembly

(i) Fresh PWR uranium dioxide fuel assemblies with a maximum uranium-235 enrichment of 5.0 weight percent, with an isotopic composition not exceeding a Type A quantity. The parameters of the fuel assemblies that are permitted are as follows:

Parameters for Square Lattice Group 1 Fuel Assemblies

Fuel Assembly Description	Fabrication Tolerance Limit	14 Bin 1	14 Bin 2	15 Bin 1	Fabrication Tolerance Limit	15 Bin 2
Array Size	-	14 x 14	14 x 14	15 x 15	-	15x15
No. of Fuel Rods per Assembly	-	176	179	204	-	205
No. of Non-Fuel Holes	-	20	17	21	-	20
Nominal Pitch (in./cm)	+0.005 (+0.0127)	0.580 (1.4732)	0.556 (1.4122)	0.563 (1.4300)	+0.0118 (+0.0300)	0.563 (1.4300)
Minimum Fuel Pellet Outer Diameter (in./cm)	-0.0007 (-0.0018)	0.3805 (0.9665)	0.3439 (0.8735)	0.3582 (0.9097)	-0.0007 (-0.0018)	0.3580 (0.9092)
Minimum Cladding Inner Diameter (in./cm)	-0.002 (-0.0051)	0.3855 (0.9792)	0.3489 (0.8862)	0.3636 (0.9237)	-0.002 (-0.0051)	0.3627 (0.9214)
Minimum Cladding Thickness (in./cm)	-0.002 (-0.0051)	0.0245 (0.0622)	0.0228 (0.0579)	0.0228 (0.0579)	-0.002 (-0.0051)	0.0265 (0.0674)
Maximum Active Fuel Length (in./cm)	+0.500 (+1.270)	136.70 (347.22)	144.00 (365.76)	144.00 (365.76)	+0.500 (+1.270)	139.76 (355.00)

5.(b)(1)(i) PWR Group 1 Fuel Assembly (Continued)

Parameters for Group 1 Fuel Assemblies

Fuel Assembly Description	Fabrication Tolerance Limit	16 Bin 2	16 Bin 3	17 Bin 1	17 Bin 2
Array Size	-	16x16	16x16	17x17	17x17
No. of Fuel Rods per Assembly	-	236	235	264	264
No. of Non-Fuel Holes	-	20	21	25	25
Nominal Pitch (in./cm)	+0.005 (+0.0127)	0.506 (1.2852)	0.485 (1.2319)	0.496 (1.2598)	0.502 (1.2751)
Minimum Fuel Pellet OD (in./cm)	-0.0007 (-0.0018)	0.3220 (0.8179)	0.3083 (0.7831)	0.3083 (0.7831)	0.3238 (0.8225)
Minimum Cladding ID (in./cm)	-0.002 (-0.0051)	0.3265 (0.8293)	0.3125 (0.7938)	0.3125 (0.7938)	0.3276 (0.8321)
Minimum Cladding Thickness (in./cm)	-0.002 (-0.0051)	0.0210 (0.0533)	0.0210 (0.0533)	0.0210 (0.0533)	0.0220 (0.0559)
Maximum Active Fuel Length (in./cm)	+0.500 (+1.270)	150.00 (381.00)	144.00 (365.76)	168.00 (426.72)	144.00 (365.76)

(ii) For each parameter, the listed fabrication tolerance limit applies to all bins included in the table. For maximum parameters, only the positive tolerance is limited and for minimum parameters, only the negative tolerance is limited.

(iii) All rod cladding must be composed of a Zirconium Alloy. Cladding may include a chromium coating of 25 μm thick, nominally and / or include an Optimized ZIRLO Liner (OZL).

(iv) There is no restriction on the length of top and bottom annular blankets. The annular fuel pellet inner diameter in the blanket region must be ≥0.155 in. and ≤0.183 in. (≥0.3937 cm and ≤0.46482 cm).

(v) Any quantity of stainless steel or lead-filled replacement rods is allowed in the assembly.

(vi) Polyethylene packing materials are limited to a maximum of 2.0 kg in the Clamshell and may not have a hydrogen density greater than 0.1325 g/cm^3.

5.(b)(1)(i) PWR Group 1 Fuel Assembly (Continued)

(vii) Non-fissile base-plate mounted core components, and spider-body core components, including burnable absorbers, secondary source rods, and axial spacer assemblies, are permitted.

(viii) Primary neutron sources or other radioactive material are not permitted.

(ix) Fuel rods in any location of the assembly may include ADOPT uranium dioxide pellets that are doped with up to 700 ppm Cr_2O_3 and up to 200 ppm Al_2O_3.

(x) For Group 1, 17 Bin 1, the center non-fuel position may be filled with a fuel rod, resulting in 265 fuel rods and 24 non-fuel holes.

5.(b)(2) PWR Group 2 Fuel Assembly

(i) PWR uranium dioxide fuel assemblies with a maximum uranium-235 enrichment of 5.0 weight percent, with an isotopic composition not exceeding a Type A quantity. The parameters of the fuel assemblies that are permitted are as follows:

Parameters for Square Lattice Group 2 Fuel Assemblies

Fuel Assembly Description	Fabrication Tolerance Limit	16 Bin 1	18 Bin 1
Array Size	-	16x16	18x18
No. of Fuel Rods per Assembly	-	236	300
No. of Non-Fuel Holes	-	20	24
Nominal Pitch (in./cm)	+0.0118 (+0.0300)	0.563 (1.430)	0.500 (1.27)
Minimum Fuel Pellet OD (in./cm)	-0.0007 (-0.0018)	0.3581 (0.9097)	0.3165 (0.8039)
Minimum Cladding ID (in./cm)	-0.002 (-0.0051)	0.3665 (0.9310)	0.3236 (0.8220)
Minimum Cladding Thickness (in./cm)	-0.002 (-0.0051)	0.0283 (0.0720)	0.0252 (0.0640)
Maximum Active Fuel Length (in./cm)	+0.500 (+1.270)	153.54 (390.00)	153.54 (390.00)

5.(b)(2) PWR Group 2 Fuel Assembly (continued)

(ii) For each parameter, the listed fabrication tolerance limit applies to all bins included in the table. For maximum parameters, only the positive tolerance is limited and for minimum parameters, only the negative tolerance is limited.

(iii) All rod cladding must be composed of a Zirconium Alloy. Cladding may include a chromium coating of 25 μm thick, nominally and / or include an Optimized ZIRLO Liner (OZL).

(iv) The length of top and bottom annular blankets is restricted to 50.8 cm (20 in.). The annular fuel pellet inner diameter in the blanket region must be ≥0.155 in. and ≤0.183 in. (≥0.3937 cm and ≤0.46482 cm).

(v) Any quantity of stainless steel or lead-filled replacement rods is allowed in the assembly.

(vi) Polyethylene packing materials are limited to a maximum of 2.0 kg in the Clamshell and may not have a hydrogen density greater than 0.1325 g/cm^3.

(vii) Non-fissile base-plate mounted core components, and spider-body core components, including burnable absorbers, secondary source rods, and axial spacer assemblies, are permitted.

(viii) Primary neutron sources or other radioactive material are not permitted.

(ix) Fuel rods in any location of the assembly may include ADOPT uranium dioxide pellets that are doped with up to 700 ppm Cr_2O_3 and up to 200 ppm Al_2O_3.

5.(b)(3) PWR Group 3 Fuel Assembly (VVER)

(i) VVER uranium dioxide fuel assemblies with a maximum uranium-235 enrichment of 5.0 weight percent, with an isotopic composition not exceeding a Type A quantity. The parameters of the fuel assemblies that are permitted are as follows:

5.(b)(3) PWR Group 3 Fuel Assembly (VVER) (continued)

Parameters for VVER Fuel Assemblies

Fuel Assembly Description	Fabrication Tolerance Limit	VV Bin 1
Array Size	-	11x21 [a]
No. of Fuel Rods per Assembly	-	312
No. of Non-Fuel Holes	-	19
Nominal Pitch (in./cm)	+0.001 (+0.0026)	0.502 (1.2751)
Minimum Fuel Pellet OD (in./cm)	-0.0005 (-0.0013)	0.3083 (0.7831)
Minimum Cladding ID (in./cm)	-0.0015 (-0.0051)	0.3125 (0.7938)
Minimum Cladding Thickness (in./cm)	-0.0015 (-0.0051)	0.0210 (0.0533)
Maximum Active Fuel Length (in./cm)	+0.500 (+1.270)	143.70 (365.00)

Note: [a] (shortest row) x (longest row).

(ii) For each parameter, the listed fabrication tolerance limit applies to all bins included in the table. For maximum parameters, only the positive tolerance is limited and for minimum parameters, only the negative tolerance is limited.

(iii) All rod cladding must be composed of a Zirconium Alloy. Cladding may include a chromium coating of 25 μm thick, nominally and/or include an Optimized ZIRLO Liner (OZL).

(iv) The length of top and bottom annular blankets is restricted to 50.8 cm (20 in.). The annular fuel pellet inner diameter in the blanket region must be ≥0.155 in. and ≤0.183 in. (≥0.3937 cm and ≤0.46482 cm).

(v) Any quantity of stainless steel is allowed in the assembly.

(vi) Polyethylene packing materials are limited to a maximum of 2.0 kg in the Clamshell and may not have a hydrogen density greater than 0.1325 g/cm^3.

(vii) Non-fissile base-plate mounted core components, and spider-body core components, including burnable absorbers, secondary source rods, and axial spacer assemblies, are permitted.

(viii) Primary neutron sources or other radioactive material are not permitted.

5.(b)(4) Loose Uranium Dioxide Fuel Rods

Uranium dioxide (UO_2) fuel rods with a maximum uranium-235 enrichment of 7.0 weight percent in a 6-inch Rod Pipe and 5.0 weight percent uranium-235 in an 8-inch Rod Pipe and isotopic composition not exceeding a Type A quantity. Any fuel rod may include ADOPT uranium dioxide pellets that are doped with up to 700 ppm Cr_2O_3 and up to 200 ppm Al_2O_3. Fuel rods shall be transported in the Traveller STD and XL package either inside a 6-inch Rod Pipe as specified in Drawing 10006E58 or a 8-inch Rod Pipe as specified in Drawing 10078E26. The fuel rods shall meet the parametric requirements given below:

Parameter	Limit
Maximum Enrichment	7.0 weight percent uranium-235 in 6-inch rod pipe 5.0 weight percent uranium-235 in 8-inch rod pipe
Minimum Pellet Diameter (in./cm) [a]	0.308 (0.7823)
Maximum stack length	Up to rod container length
Cladding Material	Zirconium alloy; Cladding may include a chromium coating of 25 µm thick, nominally and/or include an Optimized ZIRLO Liner
Integral absorber	Including, but not limited to, gadolinia, erbia, boron, and hafnium
Annular Blanket	No limit on length. Inner diameter must be ≥0.155 in. and ≤0.183 in. (≥0.3937 cm and ≤0.4648 cm). For inner diameters >0.183 in. (>0.4648 cm), the inner diameter must be equivalent to no more than 44% of the fuel pellet diameter.
Maximum number of rods per Rod Pipe	Up to Rod Pipe capacity
Wrapping or sleeving	- Polyethylene packing materials: unlimited quantity in the Rod Pipe. - Materials with hydrogen density less than 0.1325 g/cm^3.

Note: [a] Maximum allowable negative tolerance is -0.0014 in. (-0.0036 cm). No limit on positive tolerance

5.(b)(5) Loose Uranium Silicide Fuel Rods

Uranium silicide (U_3Si_2) fuel rods with a maximum uranium-235 enrichment of 5.0 weight percent, with an isotopic composition not exceeding a Type A quantity. Fuel rods shall be transported in the Traveller STD package inside a 6-inch Rod Pipe, as specified in Drawing 10006E58. The fuel rods shall meet the parametric requirements given below:

Parameter	Limit
Maximum Enrichment	5.0 weight percent uranium-235
Minimum Pellet Diameter (in./cm) [a]	0.3078 (0.7818)
Maximum Pellet Diameter (in./cm) [a]	0.382 (0.9703)
Maximum stack length	Up to Rod Pipe length
Cladding Material	Zirconium alloy; Cladding may include a chromium coating of 25 μm thick, nominally and/or include an Optimized ZIRLO Liner
Integral absorber	Including, but not limited to, gadolinia, erbia, boron, and hafnium
Annular Blanket	No limit on length. Inner diameter must be ≥0.155 in. and ≤0.183 in. (≥0.3937 cm and ≤0.4648 cm).
Maximum number of rods per Rod Pipe	60 rods
Wrapping or sleeving	- Polyethylene packing materials unlimited quantity in the Rod Pipe. - Materials with hydrogen density less than 0.1325 g/cm^3.

Note: [a] Maximum allowable tolerance is ±0.0014 in. (±0.0036 cm).

5.(c) Criticality Safety Index

(1) When transporting PWR Group 1 fuel assemblies as described in 5.(b)(1): 1.0

(2) When transporting PWR Group 2 fuel assemblies as described in 5.(b)(2): 4.2

(3) When transporting PWR Group 3 fuel assemblies as described in 5.(b)(3): 1.0

(4) When transporting loose rods in the 6-inch Rod Pipe as described in 5.(b)(4) and 5.(b)(5): 0.7

(5) When transporting loose rods in the 8-inch Rod Pipe as described in 5.(b)(4): 1.0

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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6. 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 7 of the Traveller License Application, as supplemented.

   (b) Each packaging must be acceptance tested and maintained in accordance with the Acceptance Tests and Maintenance Program in Chapter 8 of the Traveller License Application, as supplemented.

7. The package authorized by this certificate is hereby authorized for use under the general license provisions of 10 CFR 71.17.

8. The package is not authorized by this certificate for air transport.

9. Revision No. 13 of this certificate may be used until March 31, 2025.

10. Expiration date: March 31, 2030.

REFERENCES

Safety Analysis Report, WCAP-07109297, Revision No. 16 - Application for Certificate of Compliance for the Traveller PWR Fuel Shipping Package, NRC Certificate of Compliance USA/9297/AF-96. Dated July 2024.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Yoira Diaz-Sanabria, Chief
Storage and Transportation Licensing Branch
Division of Fuel Management
Office of Nuclear Material Safety
and Safeguards

Date: July 22, 2024

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

U.S. Department of
Transportation

**Pipeline and
Hazardous Materials
Safety Administration**

CERTIFICATE NUMBER: USA/9297/AF-96

ORIGINAL REGISTRANT(S):

Westinghouse
Westinghouse Electric Company - Nuclear Fuel
Columbia Fuel Fabrication Facility
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