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	9	71-9297	USA/9297/AF-96	1 OF	10

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 dated May 1, 2015, 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 Nos.: Traveller STD, Traveller XL, Traveller VVER

(2) Description

The Traveller package is designed to transport non-irradiated uranium fuel assemblies or rods with enrichment up to 5.0 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 seal 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 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

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

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 container or rod pipe. The rod pipe consists of a 15.2 cm (6 in.) standard 304 stainless steel, Schedule 40 pipe, and standard 304 stainless steel closures at each end. The closure is a 0.635 cm (0.25 in.) thick cover secured with Type 304 stainless steel hardware to a flange fabricated from 0.635 cm (0.25 in.) 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	68.8 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	894 kg (1,971 lbs)
Outer dimensions	
Length	574 cm (226.1 in.)
Width	68.9 cm (27.1 in.)
Height	99.8 cm (39.3 in.)

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

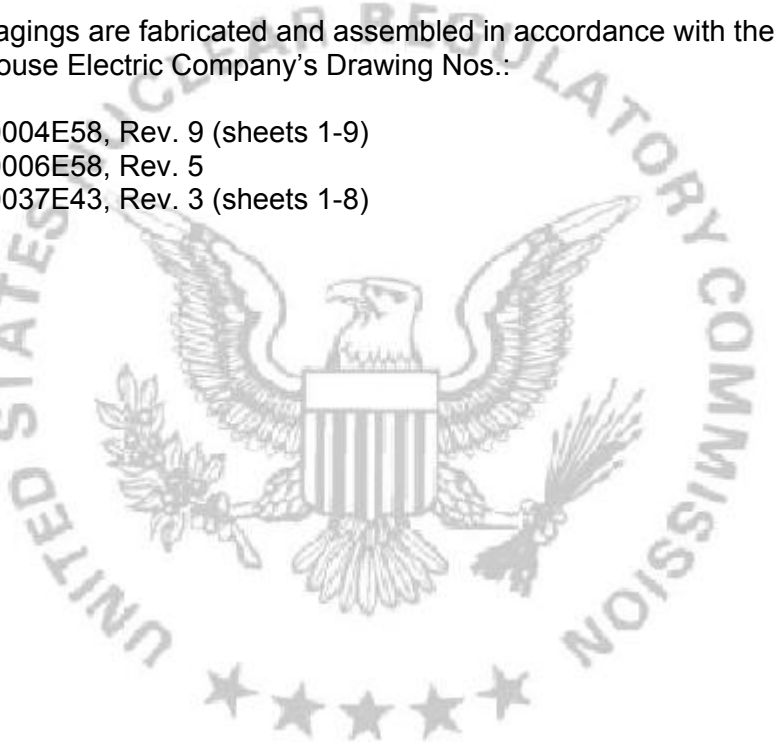
Traveller VVER:

Package gross weight	2,316 kg (5,105 lbs)
Packaging gross weight	1,476 kg (3,255 lbs)
Contents gross weight	839 kg (1,850 lbs)
Outer dimensions	
Length	574 cm (226.1 in.)
Width	68.9 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. 9 (sheets 1-9)
10006E58, Rev. 5
10037E43, Rev. 3 (sheets 1-8)



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

(1) PWR Fuel Assembly

(i) Unirradiated PWR uranium dioxide fuel assemblies with a maximum uranium-235 enrichment of 5.0 weight percent. The parameters of the fuel assemblies that are permitted are as follows:

Parameters for 14 x 14 Fuel Assemblies

Fuel Assembly Description	14 x 14	14 x 14	14 x 14
Fuel Assembly Type	W-STD	W-OFA	CE-1/CE-2
No. of Fuel Rods per Assembly	179	179	176
No. of Non-Fuel Rods	17	17	20
Nominal Guide Tube Wall Thickness	0.043 cm (0.017 in.)	0.043 cm (0.017 in.)	0.097 cm (0.038 in.)
Nominal Guide Tube Outer Diameter	1.369 cm (0.539 in.)	1.336 cm (0.526 in.)	2.822 cm (1.111 in.)
Nominal Pellet Diameter	0.929 cm (0.366 in.)	0.875 cm (0.344 in.)	0.956/0.966 cm (0.376/0.381 in.)
Nominal Clad Outer Diameter	1.072 cm (0.422 in.)	1.016 cm (0.400 in.)	1.118 cm (0.440 in.)
Nominal Clad Thickness	0.062 cm (0.024 in.)	0.062 cm (0.024 in.)	0.071/0.066 cm (0.028/0.026 in.)
Clad Material	Zirconium alloy	Zirconium alloy	Zirconium alloy
Nominal Assembly Envelope	19.70 cm (7.76 in.)	19.70 cm (7.76 in.)	20.60 cm (8.11 in.)
Nominal Lattice Pitch	1.412 cm (0.556 in.)	1.412 cm (0.556 in.)	1.473 cm (0.580 in.)

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

Parameters for 15 x 15 Fuel Assemblies

Fuel Assembly Description	15 x 15	15 x 15
Fuel Assembly Type	STD/OFA	B&W
No. of Fuel Rods per Assembly	204	208
No. of Non-Fuel Rods	21	17
Nominal Guide Tube Wall Thickness	0.043 cm (0.017 in.)	0.043 cm (0.017 in.)
Nominal Guide Tube Outer Diameter	1.387/1.354 cm (0.546/0.533 in.)	1.354 cm (0.533 in.)
Nominal Pellet Diameter	0.929 cm (0.366 in.)	0.929 cm (0.366 in.)
Nominal Clad Outer Diameter	1.072 cm (0.422 in.)	1.072 cm (0.422 in.)
Nominal Clad Thickness	0.062 cm (0.024 in.)	0.062 cm (0.024 in.)
Clad Material	Zirconium alloy	Zirconium alloy
Nominal Assembly Envelope	21.39 cm (8.42 in.)	21.66 cm (8.53 in.)
Nominal Lattice Pitch	1.430 cm (0.563 in.)	1.443 cm (0.568 in.)

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

Parameters for 16 x 16 Fuel Assemblies

Fuel Assembly Description	16 x 16	16 x 16	16 x 16	16 x 16	16 x 16	16 x 16
Fuel Assembly Type	W-STD	NGF	ATOM	CE16NVA	CE16VA	CE16NGF
No. of Fuel Rods per Assembly	235	235	236	236	236	236
No. of Non-Fuel Rods	21	21	20	20	20	20
Nominal Guide Tube Wall Thickness	0.046 cm (0.018 in.)	0.041 cm (0.016 in.)	0.070 cm (0.028 in.)	0.102 cm (0.040 in.)	0.102 cm (0.040 in.)	0.102 cm (0.040 in.)
Nominal Guide Tube Outer Diameter	1.196 cm (0.471 in.)	1.204 cm (0.474 in.)	1.380 cm (0.543 in.)	2.489 cm (0.980 in.)	2.489 cm (0.980 in.)	2.489 cm (0.980 in.)
Nominal Pellet Diameter	0.819 cm (0.323 in.)	0.784 cm (0.309 in.)	0.911 cm (0.359 in.)	0.826 cm (0.325 in.)	0.827 cm (0.326 in.)	0.819 cm (0.323 in.)
Nominal Clad Outer Diameter	0.950 cm (0.374 in.)	0.914 cm (0.360 in.)	1.075 cm (0.423 in.)	0.970 cm (0.382 in.)	0.970 cm (0.382 in.)	0.950 cm (0.374 in.)
Nominal Clad Thickness	0.057 cm (0.023 in.)	0.057 cm (0.023 in.)	0.072 cm (0.029 in.)	0.064 cm (0.025 in.)	0.064 cm (0.025 in.)	0.057 cm (0.023 in.)
Clad Material	Zirconium alloy	Zirconium alloy	Zirconium alloy	Zirconium alloy	Zirconium alloy	Zirconium alloy
Nominal Assembly Envelope	19.72 cm (7.76 in.)	19.72 cm (7.76 in.)	22.95 cm (9.03 in.)	20.63 cm (8.12 in.)	20.63 cm (8.12 in.)	20.63 cm (8.12 in.)
Nominal Lattice Pitch	1.232 cm (0.485 in.)	1.232 cm (0.485 in.)	1.430 cm (0.563 in.)	1.285 cm (0.506 in.)	1.285 cm (0.506 in.)	1.285 cm (0.506 in.)

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

Parameters for 17 x 17 and 18 x 18 Fuel Assemblies

Fuel Assembly Description	17 x 17	17 x 17	18 x 18
Fuel Assembly Type	W-STD/XL	W-OFA	ATOM
No. of Fuel Rods per Assembly	264	264	300
No. of Non-Fuel Rods	25	25	24
Nominal Guide Tube Wall Thickness	0.041/0.051 cm (0.016 /0.020 in.)	0.041 cm (0.016 in.)	0.065 cm (0.026 in.)
Nominal Guide Tube Outer Diameter	1.204/1.224/1.24 cm (0.474/0.482/0.488 in.)	1.204 cm (0.474 in.)	1.240 cm (0.488 in.)
Nominal Pellet Diameter	0.819 cm (0.323 in.)	0.784 cm (0.309 in.)	0.805 cm (0.317 in.)
Nominal Clad Outer Diameter	0.950 cm (0.374 in.)	0.914 cm (0.360 in.)	0.950 cm (0.374 in.)
Nominal Clad Thickness	0.057 cm (0.023 in.)	0.057 cm (0.023 in.)	0.064 cm (0.025 in.)
Clad Material	Zirconium alloy	Zirconium alloy	Zirconium alloy
Nominal Assembly Envelope	21.39 cm (8.42 in.)	21.39 cm (8.42 in.)	22.94 cm (9.03 in.)
Nominal Lattice Pitch	1.260 cm (0.496 in.)	1.260 cm (0.496 in.)	1.270 cm (0.500 in.)

(ii) Non-fissile base-plate mounted core components, and spider-body core components, including secondary source rods and axial spacer assembly, are permitted.

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

(iv) Materials with moderating effectiveness greater than full density water are not permitted, except for polyethylene packing materials, such as sleeves and dunnage, used to protect the fuel assemblies. Such material is limited to a maximum of 2.17 kg per package.

(v) There is no restriction on the length of top and bottom annular blankets.

(vi) Replacement of fuel rods with any number of solid stainless steel rods is permitted.

5.(b) (2) Loose Fuel Rods

Unirradiated uranium dioxide fuel rods with a maximum uranium-235 enrichment of 5.0 weight percent. Fuel rods shall be transported in the Traveller STD and XL package inside a 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
Pellet diameter	0.508 – 1.524 cm (0.20 – 0.60 in.)
Maximum stack length	Up to rod container length
Cladding	Zirconium alloy
Integral absorber	Gadolinia, erbia, and boron
Wrapping or sleeving	Plastic or other material with moderating effectiveness no greater than full density water
Maximum number of rods per container	Up to rod container capacity

Wrapping or sleeving: Materials with moderating effectiveness greater than full density of water are not permitted, except for polyethylene packing materials, such as sleeves and dunnage, used to protect the fuel rods. Such material is limited to a maximum of 8.49 kg per package.

5.(b) (3) VVER Fuel Assembly

(i) Unirradiated VVER uranium dioxide fuel assemblies with a maximum uranium-235 enrichment of 5.0 weight percent. The parameters of the fuel assemblies that are permitted are as follows:

Parameters for VVER Fuel Assemblies

Fuel Assembly Description	VVER
Fuel Assembly Type	VVER
No. of Fuel Rods per Assembly	312
No. of Non-Fuel Rods	19
Nominal Guide Tube Wall Thickness	0.08 cm (0.032 in.)
Nominal Guide Tube Outer Diameter	1.2598 cm (0.496 in.)
Nominal Pellet Diameter	0.7844 cm (0.309 in.)
Nominal Clad Outer Diameter	0.9144 cm (0.360 in.)
Nominal Clad Thickness	0.0572 cm (0.023 in.)
Clad Material	Zirconium alloy
Nominal Assembly Envelope	23.41 cm (9.215 in.)
Nominal Lattice Pitch	1.2751 cm (0.502 in.)

(ii) Non-fissile base-plate mounted core components, and spider-body core components, including secondary source rods and axial spacer assembly, are permitted.

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

(iv) Materials with moderating effectiveness greater than full density water are not permitted, except for polyethylene packing materials, such as sleeves and dunnage, used to protect the fuel assemblies. Such material is limited to a maximum of 3.98 kg per package.

(v) There is no restriction on the length of top and bottom annular blankets.

(vi) Replacement of fuel rods with any number of solid stainless steel rods is permitted.

5.(c) Criticality Safety Index

(1) When transporting fuel assemblies: 0.7

(2) When transporting loose rods in a rod container: 0.0

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. 7 of this certificate may be used until October 31, 2017.

10. Revision No. 8 of this certificate may be used until August 31, 2017.

11. Expiration date: March 31, 2020.

REFERENCES

Westinghouse Electric Company, LLC, application dated May 1, 2015.

As supplemented: May 28, August 19, October 9, and October 26, 2015; and June 27, 2016.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

/RA/

John McKrigan, Chief
Spent Fuel Licensing Branch
Division of Spent Fuel Management
Office of Nuclear Material Safety
and Safeguards

Date: July 29, 2016