

**CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES**

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9380	2	71-9380	USA/9380/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

- | | |
|---|---|
| <p>a. ISSUED TO (<i>Name and Address</i>)</p> <p>Westinghouse Electric Company, LLC
Nuclear Fuel
Columbia Fuel Fabrication Facility
5801 Bluff Road
Hopkins, SC 29061</p> | <p>b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION</p> <p>Westinghouse Electric Company, LLC, application
for Certificate of Compliance for the Traveller
PWR Fuel Shipping Package, Revision No. 3.</p> |
|---|---|

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
- (2) Description

The Traveller package is designed to transport fresh uranium or slightly contaminated uranium fuel assemblies with enrichment up to 6.0 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 pipe.

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 is used to mitigate rain and debris from entering the package.

**CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES**

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9380	2	71-9380	USA/9380/B(U)F-96	2 OF	19

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

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 pipe 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.

A rectangular Clamshell is used in both the Traveller STD and XL packages, consisting of an aluminum "v" extrusion strong back base and two aluminum panel doors, bottom and top end plates, and similar multi-point cammed latch closure mechanism. The Clamshell uses 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.

For any shipment of contents that are classified as Type B quantity material, a bottom support spacer/plate is required to be used along with the top axial clamping mechanism configuration, to ensure proper structural support for the fuel assembly during a free drop. The fuel assembly is positioned on top of the reusable aluminum bottom support spacer/plate, which rests on top of the Clamshell bottom plate (and fuel axial bottom spacer for shorter assemblies) and fits under the fuel assembly bottom nozzle structure. The bottom support spacer/plate is a stiff structure to ensure the fuel assembly bottom nozzle is supported during all transport conditions.

The Traveller package is designed to carry loose rods using a 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.

**CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES**

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9380	2	71-9380	USA/9380/B(U)F-96	3 OF	19

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

There are two models of the Traveller packaging: the Traveller STD and the Traveller XL.

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 (27.1 in.)
Height	99.8 cm (39.3 in.)

Traveller XL:

Package gross weight	2,372 kg (5,230 lbs)
Packaging gross weight	1,479 kg (3,260 lbs)
Contents gross weight	893 kg (1,970 lbs)
Outer dimensions	
Length	574 cm (226.0 in.)
Width	68.8 cm (27.1 in.)
Height	99.8 cm (39.3 in.)

5.(a)(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)
10071E36, Rev. 5 (sheets 1-9)
10006E58, Rev. 7

**CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES**

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9380	2	71-9380	USA/9380/B(U)F-96	4 OF	19

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

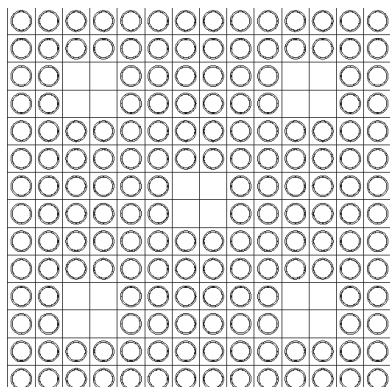
(1) PWR Group 1 Fuel Assembly

- (i) 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:

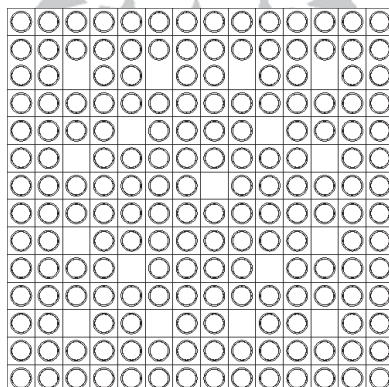
Parameters for Square Lattice Group 1 Fuel Assemblies

Fuel Assembly Description	Fabrication Tolerance Limit	14 Bin 1	14 Bin 2	15 Bin 1
Array Size	-	14 x 14	14 x 14	15 x 15
No. of Fuel Rods per Assembly	-	176	179	204
No. of Non-Fuel Holes	-	20	17	21
Nominal Pitch (in./cm)	+0.005 (+0.0127)	0.580 (1.4732)	0.556 (1.4122)	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 (0.9098)
Minimum Cladding Inner Diameter (in./cm)	-0.002 (-0.0051)	0.3855 (0.9792)	0.3489 (0.8862)	0.3636 (0.9235)
Minimum Cladding Thickness (in./cm)	-0.002 (-0.0051)	0.0245 (0.0622)	0.0228 (0.0579)	0.0228 (0.0579)
Maximum Active Fuel Length (in./cm)	+0.500 (+1.270)	136.70 (347.22)	144.00 (365.76)	144.00 (365.76)

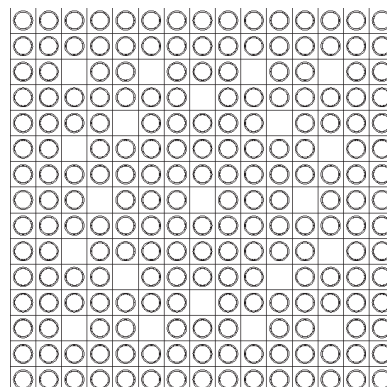
**14 Bin 1
Rod Pattern**



**14 Bin 2
Rod Pattern**



**15 Bin 1
Rod Pattern**



**CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES**

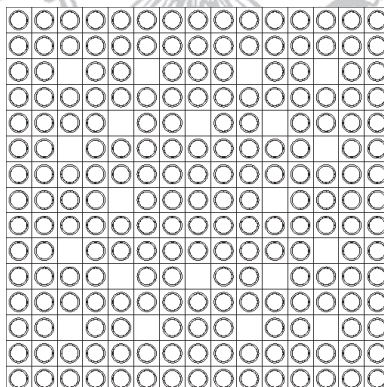
1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9380	2	71-9380	USA/9380/B(U)F-96	5 OF	19

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

Parameters for Group 1 Fuel Assemblies

Fuel Assembly Description	Fabrication Tolerance Limit	15 Bin 2
Array Size	-	15x15
No. of Fuel Rods per Assembly	-	205
No. of Non-Fuel Holes	-	20
Nominal Pitch (in./cm)	+0.0118 (+0.03)	0.563 (1.4300)
Minimum Fuel Pellet OD (in./cm)	-0.0007 (-0.0018)	0.3580 (0.9092)
Minimum Cladding ID (in./cm)	-0.002 (-0.0051)	0.3627 (0.9214)
Minimum Cladding Thickness (in./cm)	-0.002 (-0.0051)	0.0265 (0.0674)
Maximum Active Fuel Length (in./cm)	+0.500 (+1.270)	139.76 (355.00)

**15 Bin 2
Rod Pattern**



**CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES**

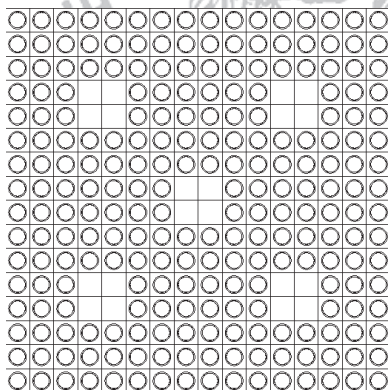
1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9380	2	71-9380	USA/9380/B(U)F-96	6 OF	19

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

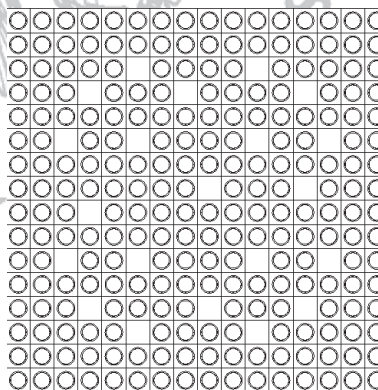
Parameters for Group 1 Fuel Assemblies

Fuel Assembly Description	Fabrication Tolerance Limit	16 Bin 2	16 Bin 3
Array Size	-	16x16	16x16
No. of Fuel Rods per Assembly	-	236	235
No. of Non-Fuel Holes	-	20	21
Nominal Pitch (in./cm)	+0.005 (+0.0127)	0.506 (1.2852)	0.485 (1.2319)
Minimum Fuel Pellet OD (in./cm)	-0.0007 (-0.00178)	0.3220 (0.8179)	0.3083 (0.7831)
Minimum Cladding ID (in./cm)	-0.002 (-0.0051)	0.3265 (0.8293)	0.3125 (0.7938)
Minimum Cladding Thickness (in./cm)	-0.002 (-0.0051)	0.0210 (0.0533)	0.0210 (0.0533)
Maximum Active Fuel Length (in./cm)	+0.500 (+1.270)	150.00 (381.00)	144.00 (365.76)

**16 Bin 2
Rod Pattern**



**16 Bin 3
Rod Pattern**



**CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES**

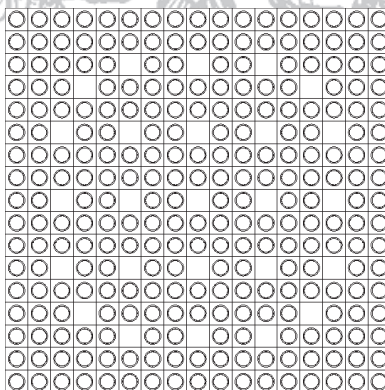
1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9380	2	71-9380	USA/9380/B(U)F-96	7 OF	19

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

Parameters for Group 1 Fuel Assemblies

Fuel Assembly Description	Fabrication Tolerance Limit	17 Bin 1	17 Bin 2
Array Size	-	17x17	17x17
No. of Fuel Rods per Assembly	-	264	264
No. of Non-Fuel Holes	-	25	25
Nominal Pitch (in./cm)	+0.005 (+0.0127)	0.496 (1.2598)	0.502 (1.2751)
Minimum Fuel Pellet OD (in./cm)	-0.0007 (-0.00178)	0.3083 (0.7831)	0.3238 (0.8225)
Minimum Cladding ID (in./cm)	-0.002 (-0.00508)	0.3125 (0.7938)	0.3276 (0.8321)
Minimum Cladding Thickness (in./cm)	-0.002 (-0.00508)	0.0210 (0.0533)	0.0220 (0.0559)
Maximum Active Fuel Length (in./cm)	+0.500 (+1.270)	168.00 (426.72)	144.00 (365.76)

**17 Bin 1 / Bin 2
Rod Pattern**

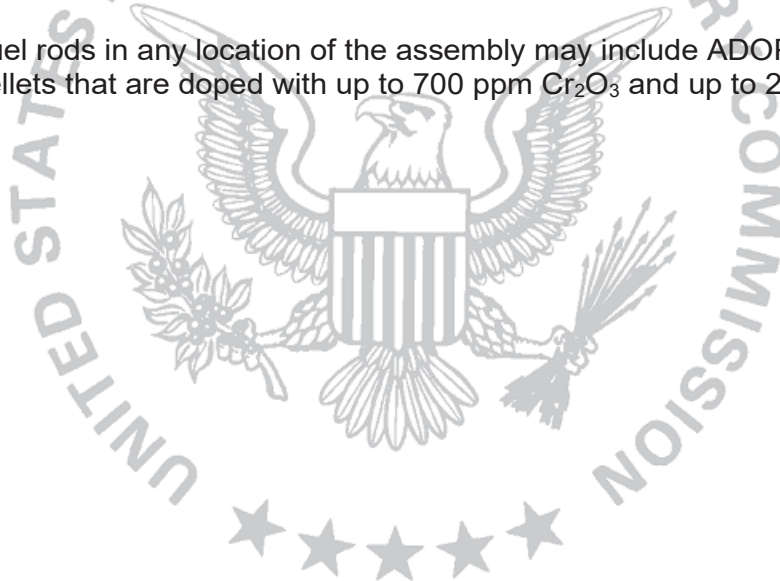


- (ii) For each parameter, the listed fabrication tolerance limit applies to all bins included in the table. For maximum parameters, only the positive tolerance is limited and for minimum parameters, only the negative tolerance is limited.

**CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES**

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9380	2	71-9380	USA/9380/B(U)F-96	8 OF	19

- (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 ≤ 0.4648 cm).
- (v) Any quantity of stainless steel replacement rods is allowed in the assembly.
- (vi) Primary neutron sources or other radioactive material are not permitted.
- (vii) 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 .
- (viii) Non-fissile base-plate mounted core components, and spider-body core components, including burnable absorbers, secondary source rods, and axial spacer assemblies, are 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 .



**CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES**

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9380	2	71-9380	USA/9380/B(U)F-96	9 OF	19

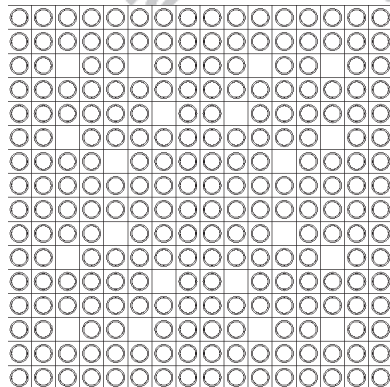
5.(b)(2) PWR Group 2 Fuel Assembly

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

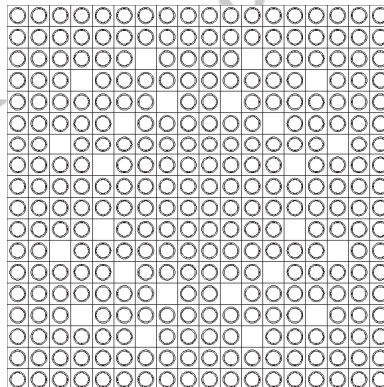
Parameters for Square Lattice Group 2 Fuel Assemblies

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)	+0.01181 (+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)

**16 Bin 1
Rod Pattern**



**18 Bin 1
Rod Pattern**



**CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES**

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9380	2	71-9380	USA/9380/B(U)F-96	10 OF	19

- (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 ≤ 0.4648 cm).
- (v) Any quantity of stainless steel 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 density greater than 0.1325 g/cm³.
- (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 Cr₂O₃ and up to 200 ppm Al₂O₃.

**CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES**

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9380	2	71-9380	USA/9380/B(U)F-96	11 OF	19

5.(b)(3) PWR Group 4 Fuel Assembly

- (i) PWR uranium dioxide fuel assemblies with a maximum uranium-235 enrichment of 6.0 weight percent. The parameters of the fuel assemblies that are permitted are as follows:

Parameters for Square Lattice Group 4 Fuel Assemblies

Fuel Assembly Description	Fabrication Tolerance Limit	14 Bin 1	16 Bin 2
Array Size	-	14 x 14	16x16
No. of Fuel Rods per Assembly	-	176	236
No. of Non-Fuel Holes	-	20	20
Guide Tubes/Instrument Tubes	-	5 ^a	5 ^a
Nominal Pitch (in./cm)	+0.005 (+0.0127)	0.580 (1.4732)	0.506 (1.2852)
Minimum Fuel Pellet Outer Diameter (in./cm)	-	0.3805 (0.9665)	0.3220 (0.8179)
Minimum Cladding Inner Diameter (in./cm)	-	0.3855 (0.9792)	0.3265 (0.8293)
Minimum Cladding Thickness (in./cm)	-	0.0245 (0.0622)	0.0210 (0.0533)
Minimum GT/IT Inner Diameter (in./cm)	-	0.9630 (2.4460)	0.5450 (1.3843)
Minimum GT/IT Thickness (in./cm)	-	0.0360 (0.0914)	0.0360 (0.0914)
Maximum Active Fuel Length (in./cm)	+0.500 (+1.270)	136.70 (347.22)	150.00 (381.00)

Note: ^a Each GT/IT occupies four non-fuel holes that constitute a 2x2 lattice section.

**CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES**

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9380	2	71-9380	USA/9380/B(U)F-96	12 OF	19

5.(b)(3)(i) PWR Group 4 Fuel Assembly (Continued)

Parameters for Square Lattice Group 4 Fuel Assemblies

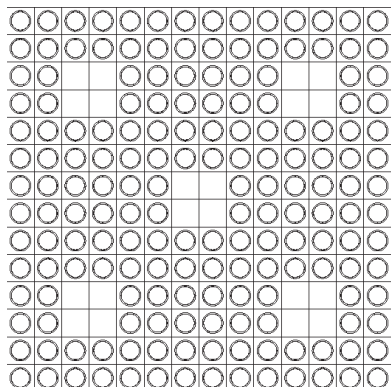
Fuel Assembly Description	Fabrication Tolerance Limit	14 Bin 2	15 Bin 3	16 Bin 3	17 Bin 1
Array Size	-	14x14	15x15	16x16	17x17
No. of Fuel Rods per Assembly	-	179	204	235	264
No. of Non-Fuel Holes	-	17	21	21	25
Guide Tubes/Instrument Tubes	-	17	21	21	25
Nominal Pitch (in./cm)	+0.001 (+0.0025)	0.556 (1.4122)	0.563 (1.4300)	0.485 (1.2319)	0.496 (1.2598)
Minimum Fuel Pellet Outer Diameter (in./cm)	-	0.3439 (0.8735)	0.3654 (0.9281)	0.3083 (0.7831)	0.3083 (0.7831)
Minimum Cladding Inner Diameter (in./cm)	-	0.3489 (0.8862)	0.3709 (0.9421)	0.3125 (0.7938)	0.3125 (0.7938)
Minimum Cladding Thickness (in./cm)	-	0.0228 (0.0579)	0.0228 (0.0579)	0.0210 (0.0533)	0.0210 (0.0533)
Minimum GT/IT Inner Diameter (in./cm)	-	0.3720 (0.9449)	0.4970 (1.2624)	0.3810 (0.9677)	0.3950 (1.0033)
Minimum GT/IT Thickness (in./cm)	-	0.0147 (0.0373)	0.0147 (0.0373)	0.0157 (0.0399)	0.0137 (0.0348)
Maximum Active Fuel Length (in./cm)	+0.50 (+1.27)	144.00 (365.76)	144.00 (365.76)	144.00 (365.76)	168.00 (426.72)

**CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES**

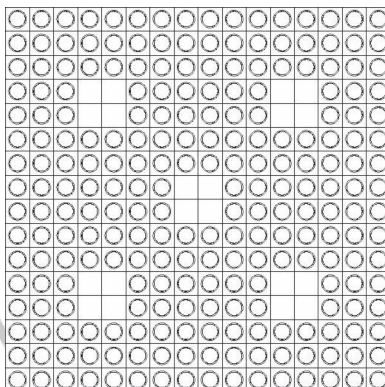
1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9380	2	71-9380	USA/9380/B(U)F-96	13 OF	19

5.(b)(3)(i) PWR Group 4 Fuel Assembly (Continued)

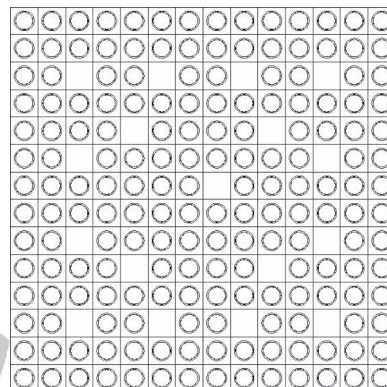
**14 Bin 1
Rod Pattern**



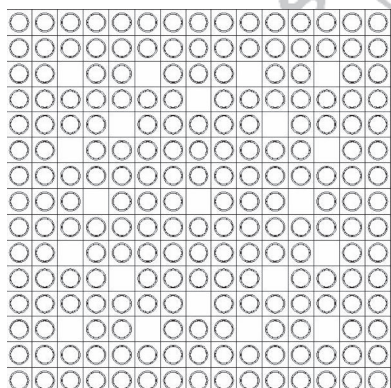
**16 Bin 2
Rod Pattern**



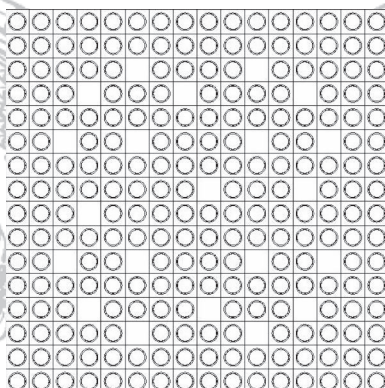
**14 Bin 2
Rod Pattern**



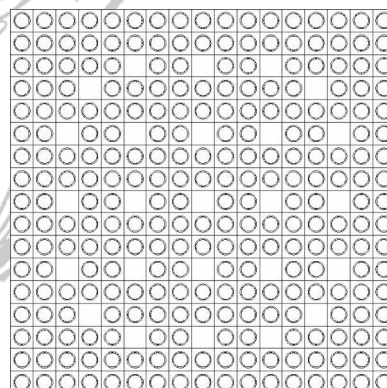
**15 Bin 3
Rod Pattern**



**16 Bin 3
Rod Pattern**



**17 Bin 1
Rod Pattern**



- (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 20 in. (50.8 cm). The annular fuel pellet inner diameter in the blanket region must be ≥ 0.155 in. and ≤ 0.183 in. (≥ 0.3937 cm and ≤ 0.4648 cm).
- (v) Any quantity of stainless-steel replacement rods is allowed in the assembly.

**CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES**

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9380	2	71-9380	USA/9380/B(U)F-96	14 OF	19

- (vi) Polyethylene packing materials are limited to a maximum of 2.0 kg in the Clamshell and may not have a density greater than 0.1325 g/cm³.
- (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 Cr₂O₃ and up to 200 ppm Al₂O₃.



**CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES**

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9380	2	71-9380	USA/9380/B(U)F-96	15 OF	19

5.(b)(3) Loose Uranium Dioxide Fuel Rods

Uranium dioxide (UO₂) fuel rods with a maximum uranium-235 enrichment of 7.0 weight percent, and an 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 Cr₂O₃ and up to 200 ppm Al₂O₃. 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	7.0 weight percent uranium-235
Minimum Pellet Diameter (in./cm) ^a	0.308 (0.7823)
Maximum stack length	Up to rod container length
Cladding Material	Zirconium, aluminum, or stainless steel alloy; Zirconium alloy cladding may include a chromium coating of 25 µm thick, nominally and/or include an Optimized ZIRLO Liner (OZL).
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/cm³.

Note: ^a Maximum allowable negative tolerance is -0.0014 in. No limit on positive tolerance.

**CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES**

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9380	2	71-9380	USA/9380/B(U)F-96	16 OF	19

5.(b) (4) 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 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, aluminum, or stainless steel alloy; Zirconium alloy cladding may include a chromium coating of 25 μ m thick, nominally and/or include an Optimized ZIRLO Liner (OZL).
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 negative tolerance is -0.0014 in. No limit on positive tolerance.

**CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES**

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9380	2	71-9380	USA/9380/B(U)F-96	17 OF	19

5.(c) Maximum quantity of material per package

- (1) PWR fuel assemblies as described in 5.(b)(1), 5.(b)(2) and 5.(b)(3) may only be transported as Type B quantities, if
- (i) The material is enriched commercial grade uranium or slightly contaminated uranium with trace quantities limits as specified below:

Content	Slightly Contaminated U
^{232}U	0.0500 $\mu\text{g/gU}$
^{234}U	2000 $\mu\text{g/gU}$
^{236}U	25,000 $\mu\text{g/gU}$
^{99}Tc	5 $\mu\text{g/gU}$
Alpha Activity from Np and Pu	3300 Bq/kgU
Total Gamma Activity from Fission Products	4.4×10^5 MeV-Bq/kgU

- (ii) The bottom support spacer/plate and top axial clamping mechanism configuration, as defined in Section 1.2.1.5.3 of the application, are utilized.
- (2) PWR fuel assemblies as described in 5.(b)(1), 5.(b)(2) and 5.(b)(3) and Loose rods in the rod pipe as described in 5.(b)(4) and 5.(b)(5) may be transported as Type A quantities, if
- (i) The uranium content meets the “unirradiated uranium” definition of 10 CFR 71.4, or
- (ii) The contents meet the requirements of the Enriched Commercial Grade specification of ASTM C996, specifically the ^{236}U limit (250 $\mu\text{g}^{236}\text{U/gU}$) and the total quantity of material does not exceed a Type A quantity.

Content	Enriched Commercial Grade
^{232}U	0.0001 $\mu\text{g/gU}$
^{234}U	11.0×10^3 $\mu\text{g/g}^{235}\text{U}$
^{236}U	250 $\mu\text{g/gU}$
^{99}Tc	0.01 $\mu\text{g/gU}$
Alpha Activity from Np and Pu	Expected to be below the detection limits of commonly used measurement methodology
Total Gamma Activity from Fission Products	Expected to be below the detection limits of the measurement methodology

**CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES**

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9380	2	71-9380	USA/9380/B(U)F-96	18 OF	19

5.(d) Criticality Safety Index

- | | | |
|-----|---|-----|
| (1) | When transporting Group 1 PWR fuel assemblies as described in 5.(b)(1): | 1.0 |
| (2) | When transporting Group 2 PWR fuel assemblies as described in 5.(b)(2): | 4.2 |
| (3) | When transporting Group 4 PWR fuel assemblies as described in 5.(b)(3): | 2.5 |
| (4) | When transporting loose rods in the rod pipe as described in 5.(b)(4) and 5.(b)(5): | 0.7 |

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 application.
- (b) The package must meet the Acceptance Tests and Maintenance Program in Chapter 8 of the application.
- (c) The maximum backfill pressure of the fuel rod shall not exceed 460 psig in a Type A configuration or 275 psig in a Type B configuration.
- (d) All Zirconium alloy cladding must have at least a total minimum strain energy of 263 psi-in/in when considering tensile yield strength, ultimate strength, and elongation at failure.

7. Transport by air of fissile material is not authorized.

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

9. Expiration date: April 30, 2027

**CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES**

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9380	2	71-9380	USA/9380/B(U)F-96	19 OF	19

REFERENCES

Safety Analysis Report, Revision No. 3 - Application for Certificate of Compliance for the Traveller PWR Fuel Shipping Package, NRC Certificate of Compliance USA/9380/B(U)F-96.

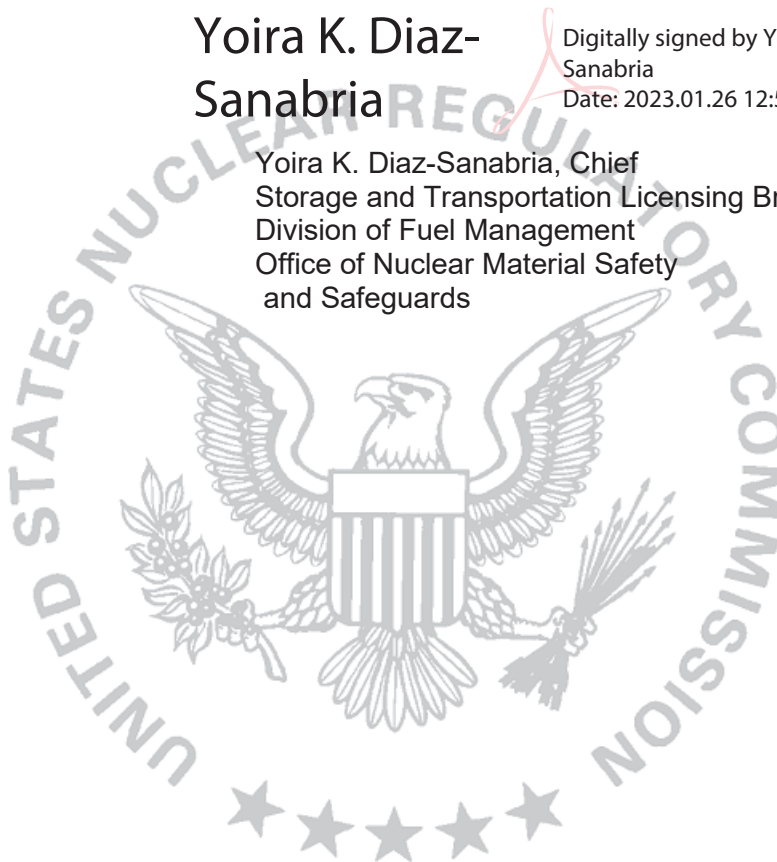
FOR THE U.S. NUCLEAR REGULATORY COMMISSION

**Yaira K. Diaz-
Sanabria**

Digitally signed by Yaira K. Diaz-
Sanabria
Date: 2023.01.26 12:56:41 -05'00'

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

Date: January 26, 2023





**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
WASHINGTON, D.C. 20555-0001

**SAFETY EVALUATION REPORT
Docket No. 71-9380
Model No. Traveller STD and XL Packages
Certificate of Compliance No. 9380
Revision No. 2**

SUMMARY

By letter dated January 20, 2023 (Agencywide Documents Access and Management System [ADAMS] Accession No. ML23020A923), Westinghouse Electric Company (Westinghouse or the applicant) submitted an application to revise Certificate of Compliance (CoC) No. 9380 for the Traveller STD and XL packagings.

The amendment request includes updates and revisions to two licensing drawings:

- Traveller XL and STD Drawing 10004E58 updated to Revision No. 10.
- Traveller XL and STD Type B Drawing 10071E36 updated to Revision 5.

It includes also appropriate revisions to both Table 1-3 of the application "Safety-Related Parts for Traveller Type A Configuration (Drawing 10004E58)" and Table 1-4 "Safety-Related Parts for Traveller Type B Configuration (Drawing 10071E36)".

The applicant submitted Revision No. 3 of its application as part of this amendment request.

NRC staff reviewed the amendment application using the guidance in NUREG-2216, "Standard Review Plan for Transportation Packages for Spent Fuel and Radioactive Material," and NUREG-1886 "Joint Canada – United States Guide for Approval of Type B(U) and Fissile Material Transportation Packages."

Based on the statements and representations in the application, and the conditions listed in the CoC, the U.S. Nuclear Regulatory Commission staff (the staff) concludes that the package meets the requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 71.

EVALUATION

Westinghouse submitted revised licensing drawings to correct a typographical error in the current drawings and safety-related part listings related to the top axial restraint component materials.

Westinghouse clarified that the components were designed and fabricated to the correct material requirements, as tested, and shown to be compliant with the regulatory requirements, as previously reviewed and approved by NRC staff.

The applicant explained that this was a typographical error, and the revised application and that the revised drawings do not introduce any change in the actual design, fabrication, or safety performance of the package.

Specifically, the changes include the following:

- Traveller XL and STD Drawing 10004E58 was updated to Revision 10 due to the fact that the Bill of Material (BOM) required an update to incorporate a material change from “304 STAINLESS STEEL” to “RUBBER”. The rubber pad part is in addition to the stainless-steel part that is previously identified in separate BOM items.
- Traveller XL and STD Type B Drawing 10071E36 was updated to Revision 5 due to the fact that the BOM required an update to incorporate a material change from “ASTM B209/B221 6061-T6 ALUMINUM” to “300 SERIES STAINLESS STEEL”. The top axial restraint component is correctly identified, as designed and tested, in Section 2.7.1.4.1, Type B Full Scale Drop Test Sequence, of the application as being fabricated from “300 SERIES STAINLESS STEEL” but was incorrectly identified on revision 4 of the drawings.

The applicant also revised Table 1-3 of the application “Safety-Related Parts of Traveller Type A Configuration (Drawing 10004E58)”, to correctly identify the material for Item 137 as “RUBBER” instead of “304 STAINLESS STEEL”, consistent with the update to the material listed in the BOM for this item in Drawing 10004E58.

Table 1-4, “Safety-Related Parts of Traveller Type B Configuration (Drawing 10071E36)” was updated to correctly identify the material for Item 133 as “300 SERIES STAINLESS STEEL” instead of “ASTM B209/B221 6061-T6 ALUMINUM”, consistent with the update to the material listed in the BOM for this item in Drawing 10071E36.

The staff reviewed the revised licensing drawings and the revised safety-related parts lists and verified that these revisions adequately describe the package and reflect the applicant’s selected materials for the package, as stated in the SAR.

The staff confirmed that the applicant’s updates to the identification of the materials for these items, as described above, are only to correct typographical errors in the BOM on the drawings and in the safety-related parts lists.

These updates do not change the materials for these items that are described throughout the rest of the SAR for the evaluation of these items.

The staff verified that the use of rubber as the material for the rubber pad is consistent with the description of the rubber pads used in conjunction with metallic components throughout the rest of the application.

The staff also verified that the use of 300 series stainless steel for the top axial restraint is consistent with the description of the top axial restraint in Section 2.7.1.4.1, Type B Full Scale Drop Test Sequence, of the application.

Therefore, the staff determined that the applicant's updates to the identification of the materials for Item 137, RUBBER PAD and Item 133, TOP AXIAL RESTRAINT in the BOM in the licensing drawings and in the safety-related parts lists in Table 1-3 and Table 1-4 of the application are acceptable.

CONDITIONS

The following Conditions have been modified in the certificate:

Item No. 3(b) was updated to reference the Revision No. 3 of the application

Condition No. 5(a)(3) was revised to include the latest revisions of the licensing drawings 10071E36, Rev. 5 and 10006E58, Rev. 10.

Condition No. 9 is deleted, and no previous certificate is authorized for use.

The expiration date of the certificate was not changed but Condition No. 10 has been renumbered Condition No.9.

The references section of the certificate was updated to include the Safety Analysis Report, Revision No. 3

CONCLUSION

Based on the statements and representations contained in the application, and the conditions listed above, the staff concludes that the design has been adequately described and evaluated, and the Model Nos. Traveller STD and Traveller XL packages meet the requirements of 10 CFR Part 71. The changes requested in this amendment also meet the guidance on format and content in NUREG-1886 for joint approval in Canada.

Issued with CoC No. 9380, Revision No. 2.