

**CERTIFICATE OF COMPLIANCE  
FOR RADIOACTIVE MATERIAL PACKAGES**

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2. PREAMBLE

- a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."
- b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

- |                                                                                                                                                                                           |                                                                                                                                                          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>a. ISSUED TO (<i>Name and Address</i>)</p> <p>Westinghouse Electric Company, LLC<br/>Nuclear Fuel<br/>Columbia Fuel Fabrication Facility<br/>5801 Bluff Road<br/>Hopkins, SC 29061</p> | <p>b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION</p> <p>Westinghouse Electric Company, LLC, application<br/>Revision No. 16, dated July 2024.</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, 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

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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)   |

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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)

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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<br>(+0.0127)         | 0.580<br>(1.4732)  | 0.556<br>(1.4122)  | 0.563<br>(1.4300)  | +0.0118<br>(+0.0300)        | 0.563<br>(1.4300)  |
| Minimum Fuel Pellet Outer Diameter (in./cm) | -0.0007<br>(-0.0018)        | 0.3805<br>(0.9665) | 0.3439<br>(0.8735) | 0.3582<br>(0.9097) | -0.0007<br>(-0.0018)        | 0.3580<br>(0.9092) |
| Minimum Cladding Inner Diameter (in./cm)    | -0.002<br>(-0.0051)         | 0.3855<br>(0.9792) | 0.3489<br>(0.8862) | 0.3636<br>(0.9237) | -0.002<br>(-0.0051)         | 0.3627<br>(0.9214) |
| Minimum Cladding Thickness (in./cm)         | -0.002<br>(-0.0051)         | 0.0245<br>(0.0622) | 0.0228<br>(0.0579) | 0.0228<br>(0.0579) | -0.002<br>(-0.0051)         | 0.0265<br>(0.0674) |
| Maximum Active Fuel Length (in./cm)         | +0.500<br>(+1.270)          | 136.70<br>(347.22) | 144.00<br>(365.76) | 144.00<br>(365.76) | +0.500<br>(+1.270)          | 139.76<br>(355.00) |

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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<br>(+0.0127)         | 0.506<br>(1.2852)  | 0.485<br>(1.2319)  | 0.496<br>(1.2598)  | 0.502<br>(1.2751)  |
| Minimum Fuel Pellet OD (in./cm)     | -0.0007<br>(-0.0018)        | 0.3220<br>(0.8179) | 0.3083<br>(0.7831) | 0.3083<br>(0.7831) | 0.3238<br>(0.8225) |
| Minimum Cladding ID (in./cm)        | -0.002<br>(-0.0051)         | 0.3265<br>(0.8293) | 0.3125<br>(0.7938) | 0.3125<br>(0.7938) | 0.3276<br>(0.8321) |
| Minimum Cladding Thickness (in./cm) | -0.002<br>(-0.0051)         | 0.0210<br>(0.0533) | 0.0210<br>(0.0533) | 0.0210<br>(0.0533) | 0.0220<br>(0.0559) |
| Maximum Active Fuel Length (in./cm) | +0.500<br>(+1.270)          | 150.00<br>(381.00) | 144.00<br>(365.76) | 168.00<br>(426.72) | 144.00<br>(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  $\mu\text{m}$  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  $\geq 0.155$  in. and  $\leq 0.183$  in. ( $\geq 0.3937$  cm and  $\leq 0.46482$  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  $0.1325 \text{ g/cm}^3$ .

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## 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  $\text{Cr}_2\text{O}_3$  and up to 200 ppm  $\text{Al}_2\text{O}_3$ .
- (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<br>(+0.0300)        | 0.563<br>(1.430)   | 0.500<br>(1.27)    |
| Minimum Fuel Pellet OD (in./cm)     | -0.0007<br>(-0.0018)        | 0.3581<br>(0.9097) | 0.3165<br>(0.8039) |
| Minimum Cladding ID (in./cm)        | -0.002<br>(-0.0051)         | 0.3665<br>(0.9310) | 0.3236<br>(0.8220) |
| Minimum Cladding Thickness (in./cm) | -0.002<br>(-0.0051)         | 0.0283<br>(0.0720) | 0.0252<br>(0.0640) |
| Maximum Active Fuel Length (in./cm) | +0.500<br>(+1.270)          | 153.54<br>(390.00) | 153.54<br>(390.00) |

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## 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  $\mu\text{m}$  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  $\geq 0.155$  in. and  $\leq 0.183$  in. ( $\geq 0.3937$  cm and  $\leq 0.46482$  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<sup>3</sup>.
- (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<sub>2</sub>O<sub>3</sub> and up to 200 ppm Al<sub>2</sub>O<sub>3</sub>.

## 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:

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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 <sup>a</sup> |
| No. of Fuel Rods per Assembly       | -                           | 312                |
| No. of Non-Fuel Holes               | -                           | 19                 |
| Nominal Pitch (in./cm)              | +0.001<br>(+0.0026)         | 0.502<br>(1.2751)  |
| Minimum Fuel Pellet OD (in./cm)     | -0.0005<br>(-0.0013)        | 0.3083<br>(0.7831) |
| Minimum Cladding ID (in./cm)        | -0.0015<br>(-0.0051)        | 0.3125<br>(0.7938) |
| Minimum Cladding Thickness (in./cm) | -0.0015<br>(-0.0051)        | 0.0210<br>(0.0533) |
| Maximum Active Fuel Length (in./cm) | +0.500<br>(+1.270)          | 143.70<br>(365.00) |

Note: <sup>a</sup> (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  $\mu\text{m}$  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  $\geq 0.155$  in. and  $\leq 0.183$  in. ( $\geq 0.3937$  cm and  $\leq 0.46482$  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<sup>3</sup>.
- (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.



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

Uranium dioxide (UO<sub>2</sub>) 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<sub>2</sub>O<sub>3</sub> and up to 200 ppm Al<sub>2</sub>O<sub>3</sub>. 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<br>5.0 weight percent uranium-235 in 8-inch rod pipe                                                                                                                                |
| Minimum Pellet Diameter (in./cm) <sup>a</sup> | 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                          | <ul style="list-style-type: none"> <li>- Polyethylene packing materials: unlimited quantity in the Rod Pipe.</li> <li>- Materials with hydrogen density less than 0.1325 g/cm<sup>3</sup>.</li> </ul>                                 |

Note: <sup>a</sup> Maximum allowable negative tolerance is -0.0014 in. (-0.0036 cm). No limit on positive tolerance

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**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) <sup>a</sup> | 0.3078 (0.7818)                                                                                                                                                                                      |
| Maximum Pellet Diameter (in./cm) <sup>a</sup> | 0.382 (0.9703)                                                                                                                                                                                       |
| Maximum stack length                          | Up to Rod Pipe length                                                                                                                                                                                |
| Cladding Material                             | Zirconium alloy; Cladding may include a chromium coating of 25 $\mu$ m 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 $\geq 0.155$ in. and $\leq 0.183$ in. ( $\geq 0.3937$ cm and $\leq 0.4648$ cm).                                                                           |
| Maximum number of rods per Rod Pipe           | 60 rods                                                                                                                                                                                              |
| Wrapping or sleeving                          | <ul style="list-style-type: none"> <li>- Polyethylene packing materials unlimited quantity in the Rod Pipe.</li> <li>- Materials with hydrogen density less than 0.1325 g/cm<sup>3</sup>.</li> </ul> |

Note: <sup>a</sup> Maximum allowable tolerance is  $\pm 0.0014$  in. ( $\pm 0.0036$  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 |

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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**

Digitally signed by YOIRA DIAZ-  
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Date: July 22, 2024



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

**SAFETY EVALUATION REPORT  
Docket No. 71-9297  
Model Nos. Traveller STD, Traveller XL and Traveller VVER  
Certificate of Compliance No. 9297  
Revision No. 14**

**SUMMARY**

By application dated April 30, 2024, as supplemented July 1, 2024, Westinghouse Electric Company, LLC (Westinghouse or the applicant) requested an amendment and a renewal of Certificate of Compliance (CoC) No. 9297 for the Model Nos. Traveller STD, XL, and VVER packages.

The amendment request included a consolidated application of all prior revisions of the safety analysis report (SAR) and added a new 8-inch Rod Pipe container to the authorized contents to increase the loose fuel rod shipping capacity in each package. The request also included the combination of accident tolerant fuel cladding features previously approved in the Certificate of Compliance No. 9380, Revision No. 1, For the Model No. Traveller STD & XL Package” (Agencywide Documents Access and Management System [ADAMS] Accession No. ML22080A174) and adding material information and conclusions to the cladding material evaluation in the SAR. Additional changes made to Revision No. 16 of the application consolidate all Competent Authorities previously recommended changes in Chapter 7 “Operations” and additional details of the quality assurance programs in Chapter 8.

The application was supplemented on July 1, 2024, with the testing data and validation for the finite element analysis provided for the amended contents of the new 8-inch Rod Pipe configuration (ML24183A385). The Safety Analysis Report, WCAP-07109297 Revision 16, dated July 2024, is the consolidated application referenced in the CoC.

By letter dated July 18, 2024, the applicant submitted, at U.S. Nuclear Regulatory Commission (NRC) staff's request, a change page 2-248 of the application, Rev 16, to correct a typographical error in the last row of Table 2-58 “Alloy 2 with Chrome Coating”. In addition, to support the resultant data of Table 2-58, the applicant provided the calculation from data for Alloy 2 (ML24200A049).

As requested by the applicant, this application was reviewed using NUREG-1886, “Joint Canada - United States Guide for Approval of Type B(U) and Fissile Material Transportation Packages.” The current Canadian endorsement for the Traveller STD, XL and VVER Package is CDN/E216/-96.

Based on the statements and representation in the application, as supplemented, and the conditions listed below, the staff concludes that the changes proposed for this amendment request do not affect the ability of the package to meet the requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 71. Staff also found that the highlighted areas of emphasis of NUREG-1886 have been appropriately addressed.

Enclosure 2

## 1.0 GENERAL INFORMATION

The packaging design has not been modified by this amendment request. Fuel assemblies are limited to an enrichment of 5 wt. percent (%)  $^{235}\text{U}$  and loose fuel rods are limited to an enrichment of 7 wt.%  $^{235}\text{U}$  in the 6-inch Rod Pipe and 5 wt.%  $^{235}\text{U}$  in the 8-inch Rod Pipe. For uranium silicide ( $\text{U}_3\text{Si}_2$ ) contents, loose fuel rods are limited to an enrichment of 5 wt.%  $^{235}\text{U}$ .

Loose fuel rods or fuel assemblies under PWR Group 1 or Group 2 may be Advanced Doped Pellet Technology (ADOPT™) rods, doped with up to 700 ppm  $\text{Cr}_2\text{O}_3$  and up to 200 ppm  $\text{Al}_2\text{O}_3$ .

The new 8-inch Rod Pipe, introduced in this amendment request, consists of an extruded aluminum pipe with an 8 in. (20.32 cm) nominal inner diameter and an 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. The Rod Pipe is held in place inside the Clamshell with positive restraining devices.

In the Traveller XL package, the axial clamp assembly provides the axial restraint, and the axial clamp arm is bolted into the top shear lip.

For the Traveller STD package, the Clamshell top plate provides the axial restraint, and the contact between the Clamshell top plate and the Rod Pipe is achieved with a spacer.

Lateral and vertical restraints are ensured through the use of removable rubber pads located inside the Clamshell door lip, in conjunction with the latch assemblies on the Clamshell doors. The rubber pads are of varying thickness to accommodate the Rod Pipe in all the Traveller variants.

The 6-inch Rod Pipe design has a maximum loaded weight of 1650 lb. (748 kg) and the 8-inch Rod Pipe has a maximum loaded weight of 1,971 lb. (894 kg).

Fuel rods in the 6 in. and the 8 in. Rod Pipes include designs for both PWR and BWR fuels. The allowance of cladding with chromium coating and Optimized ZIRLO liner (OZL), and the new 8-inch Rod Pipe Licensing Drawing 10078E26, Rev. 1 were added to this amendment request. The theoretical maximum number of fuel rods that can fit inside the 6-inch Rod Pipe is 250 fuel rods and 350 fuel rods for the 8-inch Rod Pipe.

A revision No. 10 to Licensing Drawing 10004E58 was also included in this amendment request to correct a material typographical error that had been previously discussed with the NRC staff during the review of the USA/9380/B(U)F-96 application. It is to be noted that components have always been designed, tested, and fabricated to the corrected material requirements, meeting regulatory requirements as previously reviewed by NRC staff.

The maximum contents weight for the three Traveller variants is 1,650 lb. (748 kg) for the Traveller STD; 1,971 lb (894 kg) for the Traveller XL and 1,850 lb (839 kg) for the Traveller VVER package.

## 2.0 STRUCTURAL AND MATERIALS EVALUATIONS

The applicant submitted an amendment request for the Traveller PWR package to include the design of the 8-in fuel rod pipe for loose fuel rods.

## 2.1 Description of Structural Design

The Traveller package, designed to ship enriched commercial grade uranium fuel assemblies or fuel rods, has three packaging variants: Traveller Standard (STD), Traveller XL (XL), and Traveller VVER (VVER). The Traveller package is designed to carry one (1) fuel assembly or one (1) rod pipe (6-inch or 8-inch design) for loose fuel rods. The Traveller package consists of two main structural components: the Outerpack and the Clamshell. The Outerpack provides impact and thermal protections to the Clamshell and the contents, while the Clamshell, which resides inside the Outerpack cavity, protects the contents of the fuel assembly or the fuel rod pipe during handling and limits rearrangement of the contents in the event of a transportation accident.

The applicant summarized the changes for the Revision 16 of this Traveller SAR: The structural changes include the addition of the 8-inch rod pipe description, 8-inch rod pipe licensing drawings, the evaluations of the two rod pipes (6-inch and 8-inch pipe), the added details for combination of accident tolerant cladding features of chromium coating and Optimized ZIRLO liner, and the analysis of Alloy 2 with chromium coating.

## 2.2 Structural Evaluation under Normal Conditions of Transport (NCT)

The applicant performed structural evaluations for the Traveller package under NCT. Section 2.5 of the SAR presents the parameters (i.e., hot/cold temperatures, internal/external pressures, vibration, water spray, compression and penetration) considered for the evaluations of the Traveller package to demonstrate compliance with the requirements of 10 CFR Part 71.55(d)(2).

The results of the structural evaluations under NCT are presented and discussed in section 2.6 of the SAR. These results, with the methodology used for the structural evaluations under NCT, were previously reviewed and accepted by the staff during the review of previous SAR revisions.

The staff finds that no further structural evaluations are required for because: (i) there are no design changes in the Traveller package, (ii) there are no changes of the structural design criteria, and (iii) the total weight of the package with its new contents specified in section 1.2.1.5.5 for both 6-inch and 8-inch rod pipes is bounded by the total weight of the package specified in Table 2.6 of section 2.12 of the SAR. As stated previously, the structural evaluations for the Traveller package under NCT were previously reviewed and accepted by the staff.

### Rod Pipes Drop Test under NCT

Rod pipes are designed to carry loose fuel rods located inside the Clamshell. The 6-inch rod pipe consists of a 6 in. 304 stainless steel, Schedule 40 pipe with a 0.25 in. 304 stainless steel closures at each end. The 8-inch rod pipe consists of an extruded aluminum pipe with an 8 in. nominal inner diameter and 8.5 in. nominal outer diameter, with a 1.0 in. aluminum plate closures at each end. The rod pipes are held in place inside the Clamshell with positive restraining devices.

The applicant stated that the free drop test under NCT condition per 10 CFR 71.71(c) is bounded by the HAC 30 feet drop for both 6-inch rod pipe and 8-inch rod pipe. Evaluations for all rod pipes under HAC are provided in section 2.3 of this SER.

Therefore, the staff concludes that the structural evaluations for the Traveller package under NCT, in Revision 16 of the application, continue to be valid and the design of the Traveller package meets the requirements of 10 CFR 71.55(d)(2).

## 2.3 Structural Evaluation under Hypothetical Accident Conditions (HAC)

The applicant performed structural evaluations for the Traveller package under HAC to demonstrate compliance with the requirements of 10 CFR 71.55(e). The results of the structural evaluations under HAC are presented and discussed in section 2.7 of the SAR.

These results, with the methodology used for the structural evaluations under HAC, were previously reviewed and accepted by the staff during the review of previous SAR revisions.

The staff finds that the structural evaluations for the Traveller package under HAC are acceptable and no further structural evaluations are required. Therefore, the staff confirms that the structural evaluations for the Traveller package under HAC, in Revision 16 of the application, continue to be valid and meets the requirements of 10 CFR 71.55(e).

### Rod Pipes Drop Test under HAC

The applicant performed a bottom-end HAC 30 feet free drop test for a 6-inch rod pipe to demonstrate the structural integrity of the pipe under HAC. The test is in end-drop orientation that is most damaging to the loose fuel rods. The post drop test inspections included measurements of the rubber spacer and lower impact limiter to quantify their impact response.

The physical testing result of the package shows that there were no measurable changes in the pipe dimensions and no welds were found compromised. Thus, the result indicated that the rod pipe did not experience any buckling, both the end plate and the flange damage were localized, all welds and bolts were intact, and the end flanges remained secure. In addition, the post-test inspection of the rubber spacer and lower impact limiter indicated damage as expected. No credit was taken from the Outerpack and Clamshell for energy absorption. Both components provided adequate protection of the rod pipe.

The applicant demonstrated that, for a 6-inch rod pipe, the design criteria and regulatory requirements were met through physical testing in accordance with 10 CFR 71.73(c).

For the 8-inch aluminum rod pipe, the finite element analysis program LS-DYNA was used to determine the dynamic loads, displacements, accelerations, and strains. A finite element model (FEM) was built for the fuel pipe with only the lower portion of the Outerpack, and Clamshell because only the lower portion of these structural components will experience the rod pipe end-drop impact. No credit was taken from the Outerpack for energy absorption.

This FEM is developed based on Traveller Certification Test Unit as documented in section 2.12.4.5. and modified by replacing the 17XL fuel assembly with the new loose rod pipe and 264 fuel rods.

This FE modeling approach is validated by a comparison of the results of a completed 8-inch 30 feet physical drop test and a FEM analysis.

## 2.4 Fuel Cladding Materials

The applicant added additional fuel cladding materials that included chromium coated zirconium alloys and OZL in section 3.2.1.1. This update is summarized in the applicant's CoC Revision 14 associated with this SAR Revision 16. The staff reviewed the CoC of the application and found that the material updates for the CoC for Revision 14 of this 71-9297 application is the same as the CoC for Revision 2 of the 71-9380 application (Certificate of Compliance No. 9380,

Revision No. 1, For “The Model No. Traveller STD & XL Package”, ML22080A174, dated April 7, 2022) which specifies the same rod cladding design details.

Both CoCs stated that all rod cladding must be composed of a Zirconium Alloy and Cladding may include a chromium coating of 25 µm thick, nominally and/or include an OZL.

The applicant provided data that demonstrated that all of the additional fuel cladding materials have strain energy absorption values that exceed that of the standard zirconium alloy. Since the 71-9380 application has been approved by NRC staff, the material update for this application is considered in compliance with the regulations in 10 CFR Part 71 and International Atomic Energy Agency (IAEA), SSR-6, Revision 1 (2018), requirements.

## 2.5 Fabrication and Examination

### Fabrication

The applicant issued a set of new drawings No. 100078E26, Revision 1, which adequately identifies materials of construction, dimensions and tolerances for the new 8-inch rod pipe design in addition to the existing package fabrication design in section 2.3.1. The staff finds that the drawing clearly identifies the code for weld fabrication of the 8-inch rod pipe.

### Examination

The applicant issued a set of new drawings No. 100078E26, Revision 1, which adequately identifies materials of construction, dimensions and tolerances for the new 8-inch rod pipe design in addition to the existing package examination in section 2.3.2. The staff finds that the drawing clearly identifies the code for examination of welds of the 8-inch rod pipe.

The staff has reviewed the package and concludes that the applicant has met the requirements of 10 CFR 71.31(c), as well as IAEA, SSR-6, Revision 1 (2018), requirement 640. The applicant identified the applicable codes and standards for the design, fabrication, testing, and maintenance of the package and, in the absence of codes and standards, has adequately described controls for material qualification and fabrication.

## 2.6 General Standards

The staff has reviewed the package and concludes that the applicant has met the requirements of 10 CFR 71.43(f), 10 CFR 71.55(d)(2) and 10 CFR 71.55(e), as well as IAEA, SSR-6, Revision 1 (2018), requirements 613, 639 and 679. The applicant has demonstrated that the package will be designed and constructed such that the analyzed geometric form of its contents will not be substantially altered and there will be no loss or dispersal of the contents under the tests for NCT and HAC.

## 2.7 Findings

The staff has reviewed the package structural design description and concludes that the contents of the application satisfy the requirements of 10 CFR 71.31(a)(1) and (a)(2) as well as 10 CFR 71.33(a) and (b).

The staff has reviewed the structural codes and standards used in package design and finds that they are acceptable and therefore satisfy the requirements of 10 CFR 71.31(c).



The staff reviewed the structural performance of the packaging under the NCT required by 10 CFR 71.71 and concludes that there will be no substantial reduction in the effectiveness of the packaging that would prevent it from satisfying the requirements of 10 CFR 71.51(a)(1) for a Type B package and 10 CFR 71.55(d)(2) for a fissile material package.

The staff reviewed the structural performance of the packaging under the HAC required by 10 CFR 71.73 and concludes that the packaging has adequate structural integrity to satisfy the requirements of 10 CFR 71.51(a) and 10 CFR 71.55(e).

The staff reviewed the application to verify the structural performance of the package for NCT and HAC. The staff concludes that the updated the structural design introduced in this revision for 6-inch or 8-inch rod pipe has been adequately described and evaluated in the SAR and that the Traveller transportation packages (STD, XL and VVER) have acceptable structural integrity to meet the structural requirements of 10 CFR Part 71.

The material properties for the addition and combination of accident tolerant cladding features of chromium coating and OZL, as well as the analysis of Alloy 2 with chromium coating, were previously reviewed by the staff for the issuance of certificate of compliance No. 9380 for the Model Nos. Traveller STD & XL packages, dated April 7, 2022 (ML22080A171). The staff concludes that the applicant has met the requirements of 10 CFR 71.43(f) and 10 CFR 71.51(a), as well as IAEA SSR-6, Revision 1 (2018), requirements 507, 614, 639 and 679. The applicant demonstrated effective materials performance of packaging components under NCT and HAC.

Based on a review of the statements and representations in the application (Revision 16 of the SAR), the staff concludes that the structural design has been adequately described and evaluated in the SAR and that the Traveller transportation packages (STD, XL and VVER) have acceptable structural integrity to meet the structural requirements of 10 CFR Part 71. Staff also concludes that the guidance on format and content in NUREG-1886 has been met, and finds that the highlighted areas of emphasis have been appropriately addressed.

### **3.0 THERMAL EVALUATION**

The applicant explained that the thermal evaluation of the fuel assembly bounds the rod pipe configuration (Rod Pipes are not considered in the thermal evaluation since they provide another layer of protection for the loose fuel rods); Thus, the previously approved thermal evaluation is still valid and justified for this amendment request which introduces the 8-inch rod pipe.

The applicant had also previously justified the applicability of the thermal properties to the chromium-coated cladding and cladding with an inner OZL, and provided a technical basis that both the Cr-coating and the inner-diameter OZL are not expected to impact the thermal performance of the cladding; therefore, the staff had agreed that the thermal properties for the un-coating cladding (i.e., Standard Zirconium Alloy) remained valid for the package thermal evaluations.

The applicant updated section 3.2.1 of the application for the combined allowance of cladding with chromium coating and OZL. The addition of the cladding's chromium coating and Optimized ZIRLO™ inner liner does not impact the specifications for the fuel contents. The minimum allowable service temperature of all components, including the stainless-steel rod pipe, is less than or equal to -40°C (-40°F).

Based on a review of the statements and representations in the application, the staff concludes that the Traveller Type AF-96 package thermal design has been adequately described and

evaluated, and that the package meets the thermal requirements of 10 CFR Part 71 and the guidance on format and content in NUREG-1886 for joint approval in the U.S. and Canada.

## **6.0 CRITICALITY EVALUATION**

The applicant requested to modify the CoC for the Model No. Traveller package to include a new 8-inch rod pipe design to carry loose fuel rods at  $\leq 5$  wt.%  $U^{235}$ . Additionally, the applicant requested that the package be reviewed for the Joint United States – Canada process for package approval and validation, in accordance with NUREG-1886, “Joint Canada - United States Guide for Approval of Type B(U) and Fissile Material Transportation Packages.”

In Section 6.1.3 of the SAR, the applicant assigned a Criticality Safety Index (CSI) of 1.0 to the 8-inch rod pipe per 10 CFR 71.59. The applicant’s CSI determination was based on the NCT and HAC package array analyses for the 8” rod pipe configuration, discussed in Sections 6.5 and 6.6 of the SAR, and summarized below. The staff agrees that the package array analyses meet the requirements of 10 CFR 71.59, and that the CSI has been accurately assigned.

In Section 6.3.1.2 of the SAR, the 8-inch Rod Pipe is described as an American Society for Testing and Materials 6061 T-6 extruded aluminum tube with bolted end caps. The 8-inch Rod Pipe has an outer diameter of  $8.50 \pm 0.01$  in. and a thickness of  $0.25 +0.03/-0.01$  in. The pipe modeled by the applicant is a simple, hollow cylindrical shell that extends the entire length of the Clamshell, neglecting the true length of the tube and space taken up by the end caps. The 8-inch rod pipe is further portrayed in licensing drawing 10078E26 (Section 1.3.2 of the SAR).

For the 8-inch Rod Pipe, contents fuel rods are not restricted to a close-packed configuration for NCT. For a single package under HAC, the package is fully flooded including the fuel-clad gap. For a package array under HAC, no flooding is modeled because for the 8-inch Rod Pipe evaluations, all space inside the Rod Pipe and between the rods is filled with polyethylene, which the applicant has demonstrated is more reactive than flooding with water. Under NCT, the model boundary has a 20 cm-thick water reflector. For the Rod Pipe, both polyethylene and water are considered as moderators.

In Section 6.3.2.4 of the SAR, the applicant stated that the base zirconium alloy cladding may include features of chromium-coating and/or have an OZL. The applicant states that the addition of clad coatings and liners were neglected from the criticality analysis. This is because they have a negligible effect on the system reactivity through displacement of moderator and presence of neutron absorbing materials.

For the 8-inch Rod Pipe, the applicant described three preferential flooding configurations. The first configuration replaces the polyethylene moderator with water to verify that water in the pipe is bounded by the polyethylene in the baseline case. The other two regions were kept dry. The second configuration models the space between rods filled with polyethylene, the Clamshell region outside the pipe as flooded, and the regions outside the Clamshell as dry. Finally, the third configuration models the Rod Pipe space between rods filled with polyethylene, the Clamshell region outside the pipe as dry, and the regions outside the Clamshell as flooded. The NRC staff agrees that these configurations represent the most reactive conditions for HAC.

For the Single Package Evaluation, baseline case loose rods are modeled by the applicant in the 8-inch Rod Pipes. One model is used to bound both NCT and HAC, with the pipe filled with varying density polyethylene as moderator and a variable fuel rod pitch. The pitch type is modeled by the applicant as both square and hexagonal as the small variation of geometry varies the water-to-fuel ratio slightly. The Traveller STD and Traveller XL packages are evaluated by the applicant with the Rod Pipe as the only loose rod shipment configuration.

There is one HAC 8-inch Rod Pipe baseline case for  $\text{UO}_2$  fuel rods, which is bounding of all  $\text{UO}_2$  Rod Pipe configurations under NCT and HAC for the Traveller STD and XL variants. The single package is fully flooded to increase moderation and reflection of the single package fissile content.

In section 6.4 of the SAR, the applicant discusses evaluation of maximum reactivity of a Single Package for the 8-inch Rod Pipe with  $\text{UO}_2$  Fuel Rods. Maximum  $k_{\text{eff}}$  was defined as the bounding baseline plus the sum of penalties for each sensitivity study. In Table 6-29 of the SAR, the maximum  $k_{\text{eff}}$  is given as 0.91607. The NRC staff agrees that the maximum  $k_{\text{eff}}$  is below the calculated USL of 0.9420.

In section 6.5 of the SAR, the applicant discusses the evaluation of package arrays under NCT. The applicant evaluated an hexagonal array of 379 packages, fully reflected by 30 cm of water. The maximum  $k_{\text{eff}}$  was defined by the applicant as the bounding baseline plus the sum of penalties for each sensitivity study. The maximum  $k_{\text{eff}}$  is given in the SAR as 0.88074. The NRC staff agrees that that maximum  $k_{\text{eff}}$  is below the calculated USL of 0.9420.

In section 6.6 of the SAR, the applicant discusses the evaluation of package arrays under HAC. The applicant evaluated an hexagonal array of 100 packages, fully reflected by 30 cm of water. For all package array arrangements under HAC, the Clamshell interior and fuel assembly envelope were modeled as flooded with full-density water, including the fuel-clad gap where applicable. For the 8-inch baseline evaluation, the Clamshell is modelled as void. The maximum  $k_{\text{eff}}$  is defined by the applicant as the bounding baseline plus the sum of penalties for each sensitivity study. The maximum  $k_{\text{eff}}$  is given as 0.93576. The NRC staff agrees that the maximum  $k_{\text{eff}}$  is below the calculated USL of 0.9420.

The NRC staff reviewed the configurations modeled by the applicant for the single package and the array analyses. The staff agrees that the applicant has identified the most reactive credible condition of the single package and arrays of packages, consistent with the condition of the package under NCT and HAC, and the chemical and physical form of the fissile and moderating contents.

For all calculations, the applicant used the CSAS6 sequence of the SCALE 6.1.2 computer code, with KENO VI and the continuous energy ENDF/B-VII.0 cross section library. This is the same code and cross section library used for calculations of the previously approved packaging and contents configuration, which is benchmarked as discussed in Section 6.8 of the SAR. No new benchmarking analysis was performed to support this change, since the 8-inch rod pipe configurations evaluated by the applicant are within the range of applicability of the previously approved benchmarking analysis. The NRC staff agrees that previous benchmarking analyses are sufficient to support the proposed changes.

The NRC staff reviewed the application according to the guidance for approval in both the U.S. and Canada in NUREG-1886. This NUREG addresses differences between 10 CFR Part 71 and IAEA SSR-6, "Regulations for the Safe Transport of Radioactive Material," and how they are to be addressed for approval in both the U.S. and Canada. Chapter 6 of NUREG-1886 identifies two differences between 10 CFR Part 71 and IAEA SSR-6 in the area of fissile materials: fissile material exemptions and exceptions to water in-leakage requirements. All other fissile materials regulations are identical between 10 CFR Part 71 and IAEA SSR-6. Since the Model No. Traveller package is for fresh fuel, which is not fissile exempt under either regulation, and since the applicant considers optimum internal moderation by water in its criticality analysis, neither of these two regulatory differences are relevant to this review. Therefore, staff concludes that the applicant has met the criticality analysis guidance in NUREG-1886 for fissile materials package approval per 10 CFR Part 71 and IAEA SSR-6.

The NRC staff reviewed the applicant's requested changes to the CoC, initial assumptions, model configurations, analyses, and results. The staff finds that the applicant has identified the most reactive configuration of the Model No. Traveller package with the requested contents, and that the criticality results are conservative. Therefore, the staff finds with reasonable assurance that the package, with the requested contents, will meet the criticality safety requirements of 10 CFR Part 71 and IAEA SSR-6.

## **7.0 OPERATING PROCEDURES**

Clarifications were made to the operating procedures and the sections on loading and unloading of contents have been revised to include additional details, safety steps, and new subsections for Rod Pipe contents.

Site specific procedures are used in particular to (i) secure the opened Rod Pipe to the horizontal position and load loose rods, (ii) install shipping insert/spacer at the Rod Pipe top end, (iii) lift Rod Pipe out of the Clamshell and transfer it to its desired location. Also, if the upper and lower accelerometers are in a tripped condition, rods will be dispositioned per an applicable Field Specification or instruction from Westinghouse Fuel Engineering.

## **8.0 ACCEPTANCE TESTS AND MAINTENANCE PROGRAM**

The applicant added a description of the quality program to the chapter and updated Sections 8.1.1, 8.1.2, 8.2, and 8.2.6 to add the rod pipe component to the requirements.

The Westinghouse quality assurance program is approved by the NRC staff as it satisfies the provisions of subpart H (Quality Assurance) of 10 CFR Part 71. Details of the quality assurance as related to control, implementation, operation, documentation, and records are implemented by applicable operations procedures. Safety-related packaging components are classified according to their importance to safety, and controlled by licensing and components drawings, technical specifications, and procurement specifications.

Per the requirements of 10 CFR 71.85 and SSR-6 para. 501, the applicant discussed the inspections and acceptance tests to be performed prior to first use of the Traveller package. Regarding the requirements for "Visual Inspections and Measurements", the Traveller STD, Traveller XL, and Traveller VVER packages, as well as the 6-inch and 8-inch Rod Pipe components, have manufacturing drawings that are controlled within a quality assurance program and drawings have quality control characteristics that must be inspected during the manufacturing process.

Source inspection and final release of the package will be performed by Westinghouse to verify the quality characteristics were inspected and that the package is acceptable.

During routine and scheduled maintenance, the external Outerpack and the internal Clamshell structural welds, as well as all applicable external Rod Pipe welds, are inspected visually per American Society of Mechanical Engineers (ASME) Section III, Subsection NF-5221 Class 2 (c), or an approved Engineering equivalent standard including European EN standard.

The lifting eye and forklift leg sub-assembly leg welds, in lieu of visual inspections, may be inspected by nondestructive test methods, such as liquid dye penetrant or magnetic particle, per ASME Section III, Sub-Section NF-5221 Class 2 (a), or an approved Engineering equivalent standard including European EN standard.

## CONDITIONS

The following changes have been made to the certificate:

Condition No. 3(b), "Title and Identification of Report or Application," has been updated to reference the latest application, Rev. No. 16, dated July 2024.

Condition No. 5(a)(2) was updated with the description of the new 8-inch extruded aluminum rod pipe with aluminum plate closures at each end.

Condition No. 5(a)(3) was updated to include the latest revision of the licensing drawings: 6-inch Rod Pipe Drawing 10006E58, 8-inch Rod Pipe Drawing 10078E26."

Condition No. 5(b)(1)(iii) was updated with the addition of cladding with chromium coating and of the Optimized ZIRLO Liner (OZL).

Condition No. 5(b)(1)(x) was added to state that 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.

Condition No. 5(b)(2)(iii) was updated with the addition of cladding with chromium coating and of the Optimized ZIRLO Liner (OZL).

Condition No. 5(b)(3)(iii) was updated with the addition of cladding with chromium coating and of the Optimized ZIRLO Liner (OZL).

Condition No. 5(b)(4) was modified to state that  $\text{UO}_2$  fuel rods with a maximum  $\text{U}^{235}$  enrichment of 7.0 wt.% are allowed in a 6-inch Rod Pipe and 5.0 wt.%  $\text{U}^{235}$  in an 8-inch Rod Pipe. It also adds that any fuel rod may include ADOPT uranium dioxide pellets that are doped with up to 700 ppm  $\text{Cr}_2\text{O}_3$  and up to 200 ppm  $\text{Al}_2\text{O}_3$ . The table also reflects the addition of the cladding with chromium coating and of the optimized ZIRLO liner.

Condition No. 5(b)(5) was updated with the revised drawing for the 6-inch rod pipe and to include also the addition of the cladding with chromium coating and of the optimized ZIRLO liner.

Condition No. 5(c) has been updated with the CSI of 1.0 for the transport of loose rods in the 8-inch Rod Pipe.

Condition No. 9 has been updated to authorize the use of the previous certificate, Rev. 13, until its expiration date of March 31, 2025.

Condition No. 10 has been updated to reflect the new expiration date of March 31, 2030, 5 years from the previous expiration date of the certificate, further to the CoC renewal request as part of this amendment in consideration of the time needed for international revalidations.

The References section has been updated to include the application Revision No. 16 dated July 2024.

## 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, Traveller XL, and Traveller VVER packages meet the

requirements of 10 CFR Part 71 and the guidance on format and content in NUREG-1886 for joint approval in the U.S. and Canada.

Issued with Certificate of Compliance No. 9297, Revision No. 14.