

**CERTIFICATE OF COMPLIANCE  
FOR RADIOACTIVE MATERIAL PACKAGES**

a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9239	17	71-9239	USA/9239/AF	1	OF 5

2. PREAMBLE

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

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

- |   |   |
|---|---|
| a. ISSUED TO ( <i>Name and Address</i> )<br>Westinghouse Electric Company, LLC<br>Columbia Fuel Site<br>P.O. Drawer R<br>Columbia, SC 29250 | b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION<br>Westinghouse Electric Company, LLC, application<br>Revision No. 13, dated October 2011. |
|---|---|

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.: MCC-3, MCC-4, and MCC-5
- (2) Description

The MCC packages are shipping containers for unirradiated uranium oxide fuel assemblies. The packagings consist of a steel fuel element cradle assembly equipped with a strongback and an adjustable fuel element clamping assembly. The cradle assembly is shock mounted to a 13-gauge carbon steel outer container by shear mounts. The MCC-3 container is closed with thirty ½-inch T-bolts. The MCC-4 and MCC-5 containers are closed with fifty ½-inch T-bolts.

The MCC-3 and MCC-4 containers are permanently equipped with vertical Gd<sub>2</sub>O<sub>3</sub> neutron absorber plates that are mounted on the center wall of the strongback. Additional horizontal Gd<sub>2</sub>O<sub>3</sub> neutron absorber plates, mounted on the underside of the strongback, are required for the contents as specified.

The MCC-5 container is permanently equipped with both the vertical and horizontal Gd<sub>2</sub>O<sub>3</sub> neutron absorber plates. Additional vee-shaped, guided Gd<sub>2</sub>O<sub>3</sub> neutron absorber plates are required for the contents as specified.

Approximate dimensions of the MCC-3 packaging are 44½ inches O.D. by 194½ inches long. The gross weight of the packaging and contents is 7,544 pounds. The maximum weight of the contents is 3,300 pounds.

**CERTIFICATE OF COMPLIANCE  
FOR RADIOACTIVE MATERIAL PACKAGES**

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9239	17	71-9239	USA/9239/AF	2	OF 5

5. (a) (2) Packaging (continued)

Approximate dimensions of the MCC-4 packaging are 44½ inches O.D. by 226 inches long. The gross weight of the packaging and contents is 10,533 pounds. The maximum weight of the contents is 3,870 pounds.

Approximate dimensions of the MCC-5 packaging are 44½ inches O.D. by 226 inches long. The gross weight of the packaging and contents is 10,533 pounds. The maximum weight of the contents is 3,700 pounds.

(3) Drawings

The MCC-3 packaging is constructed in accordance with Westinghouse Electric Corporation Drawing No. MCCL301, Sheets 1, 2, 3, and 4, Rev. 6.

The MCC-4 packaging is constructed in accordance with Westinghouse Electric Corporation Drawing No. MCCL401, Sheets 1, 2, 3, 4, and 5, Rev. 9.

The MCC-5 packaging is constructed in accordance with Westinghouse Electric Corporation Drawing No. MCCL501, Sheets 1 through 10, Rev. 6.

(b) Contents

(1) Type and form of material

Unirradiated PWR uranium dioxide fuel assemblies with a maximum uranium-235 enrichment of 5.0 weight percent with the following exceptions: 15x15 BW fuel assemblies have a maximum enrichment of 4.65 wt%, and VVER-1000 fuel assemblies have a maximum enrichment of 4.80 wt%.

**CERTIFICATE OF COMPLIANCE  
FOR RADIOACTIVE MATERIAL PACKAGES**

1.	a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
	9239	17	71-9239	USA/9239/AF	3 OF	5

5. (b) (1) Contents (continued)

The fuel assemblies shall meet the specifications given in Westinghouse Drawing No. 6481E15, Rev. 6, and in the following tables of Appendix 1-5 of the application:

Table 1-5.1, Rev. 13	Fuel Assembly Parameters 14x14 Type Fuel Assemblies <sup>†</sup>
Table 1-5.2, Rev. 13	Fuel Assembly Parameters 15x15 Type Fuel Assemblies <sup>‡</sup>
Table 1-5.3, Rev. 13	Fuel Assembly Parameters 16x16 Type Fuel Assemblies <sup>**</sup>
Table 1-5.4, Rev. 13	Fuel Assembly Parameters 17x17 Type Fuel Assemblies <sup>**</sup>
Table 1-5.5, Rev. 13	Fuel Assembly Parameters VVER-1000 Type Fuel Assembly <sup>***</sup>

\*\* 16x16 CE fuel assemblies and the 17x17 W-STD/XL fuel assemblies shall be shipped only in the Model No. MCC-4 package.

\*\*\* VVER-1000 fuel assemblies shall be shipped only in the Model No. MCC-5 package.

<sup>†</sup> 14x14 Type fuel assemblies' annular pellet zone length is not restricted and may exceed 6-inches.

<sup>‡</sup> 15x15 (Type B) OFA fuel assemblies may be modified by replacing seven fuel rods in locations O10 through O15 and N15 with solid stainless steel.

(2) Maximum quantity of material per package

Two (2) fuel assemblies

(c) Criticality Safety Index 0.4

6. (a) For shipments of 14x14, 15x15, 16x16, and 17x17 OFA fuel assemblies with U-235 enrichments of over 4.65 wt% and up to 5.0 wt%, horizontal Gd<sub>2</sub>O<sub>3</sub> neutron absorber plates shall be positioned underneath each assembly. The horizontal absorber plates shall be placed horizontally on the underside of the strongback, as specified in the respective drawings in Condition 5(a)(3) for the MCC-3 and MCC-4 models.

**CERTIFICATE OF COMPLIANCE  
FOR RADIOACTIVE MATERIAL PACKAGES**

1.	a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
	9239	17	71-9239	USA/9239/AF	4	OF 5

6. (b) For shipments of 17x17 STANDARD lattice fuel assemblies (17x17 STD and 17x17 XL) with U-235 enrichments of over 4.85 wt% and up to 5.0 wt%, horizontal Gd<sub>2</sub>O<sub>3</sub> neutron absorber plates shall be positioned underneath each assembly. The horizontal absorber plates shall be placed horizontally on the underside of the strongback, as specified in the respective drawings in Condition 5(a)(3) for the MCC-3 and MCC-4 models.
7. Shipments of VVER-1000 fuel assemblies are authorized with U-235 enrichments up to 4.80 wt%.
8. Each fuel assembly must be unsheathed or must be enclosed in an unsealed plastic sheath which may not extend beyond the ends of the fuel assembly. The ends of the sheath may not be folded or taped in any manner that would prevent flow of liquids into or out of the sheathed fuel assembly.
9. The dimensions, minimum Gd<sub>2</sub>O<sub>3</sub> loading and coating specifications, and acceptance testing of the neutron absorber plates shall be in accordance with the "Gd<sub>2</sub>O<sub>3</sub> Neutron Absorber Plates Specifications," Appendix 1-7, Rev. 12, of the application, as supplemented. The minimum Gd<sub>2</sub>O<sub>3</sub> coating areal density on the vertical and horizontal neutron absorber plates shall be 0.054 g-Gd<sub>2</sub>O<sub>3</sub>/cm<sup>2</sup>. The minimum Gd<sub>2</sub>O<sub>3</sub> coating areal density on guided neutron absorber plates shall be 0.027 g-Gd<sub>2</sub>O<sub>3</sub>/cm<sup>2</sup>.
10. In addition to the requirements of Subpart G of 10 CFR Part 71:
  - (a) Each package shall be prepared for shipment and operated in accordance with the "Routine Shipping Container Utilization Summary Operating Procedures," in Chapter 7 of the application; and
  - (b) Each package shall be tested and maintained in accordance with the "Acceptance Tests, Maintenance Program, and Recertification Program," in Chapter 8 of the application, and as specified in the respective drawings in Condition 5(a)(3) for the MCC-3, MCC-4, and MCC-5 models.
11. Transport by air of fissile material is not authorized.
12. Fabrication of new packagings is not authorized.
13. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.17.
14. Revision No. 15 of this certificate may be used until March 31, 2013.
15. Expiration date: March 31, 2017.

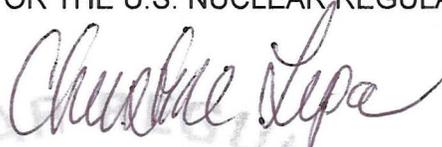
**CERTIFICATE OF COMPLIANCE  
FOR RADIOACTIVE MATERIAL PACKAGES**

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9239	17	71-9239	USA/9239/AF	5	OF 5

REFERENCES

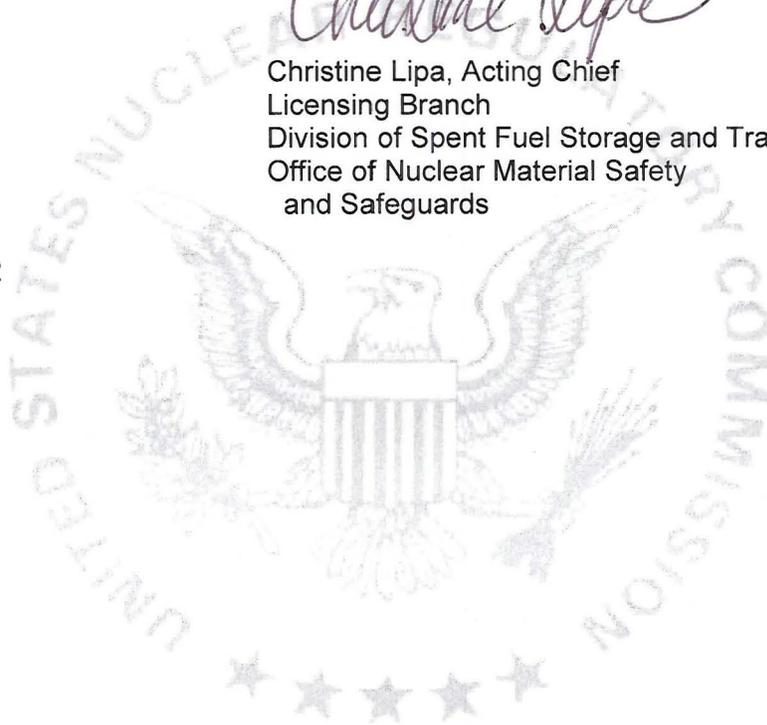
Westinghouse Electric Company, LLC, "Application For Approval of Packaging Of Fissile Radioactive Material (MCC Shipping Containers)", Revision No. 13, dated October 2011.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION



Christine Lipa, Acting Chief  
Licensing Branch  
Division of Spent Fuel Storage and Transportation  
Office of Nuclear Material Safety  
and Safeguards

Date: February 15, 2012





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

SAFETY EVALUATION REPORT  
Docket No. 71-9239  
Model Nos. MCC-3, MCC-4, and MCC-5  
Certificate of Compliance No. 9239  
Revision No. 17

## SUMMARY

By application dated October 28, 2011, Westinghouse Electric Company LLC (Westinghouse or the applicant) requested renewal of Certificate of Compliance (CoC) No. 9239 for the Model Nos. MCC-3, MCC-4, and MCC-5 packages and provided a consolidated application as specified in 10 CFR 71.38(c). Westinghouse requested the evaluation of deviations from design values for the VVER-1000 fuel assembly type and a change to a mid-grid design in the VVER-1000 fuel assembly for a particular customer plant.

NRC staff reviewed the application using the guidance in NUREG-1609, "Standard Review Plan for Transportation Packages for Radioactive Material." Based on the statements and representation in the application, and the conditions listed below, the staff concludes that these changes do not affect the ability of the package to meet the requirements of 10 CFR Part 71. The certificate has been renewed for a five year term.

## EVALUATION

By letter dated October 28, 2011, Westinghouse submitted a consolidated application to support the renewal of CoC No. 9239 for the Model Nos. MCC-3, MCC-4, and MCC-5 packages. The consolidated application incorporates all changes previously incorporated by reference in the existing certificate from previous supplements to the original application, i.e., supplements dated September 25 and November 29, 2006; January 24, 2007; October 28, December 10, and December 30, 2009.

### 1.0 Structural Evaluation

Staff reviewed changes in the nominal values of VVER fuel parameters, and changes to the VVER 1000 fuel assembly mid-grid design dimensions. Cited dimensional corrections to fuel assembly subcomponents are of minimal consequence to the structural evaluation of these packages. As there were no changes indicated for the structural evaluation, nor were any revision pages offered for that section, staff finds that the previous safety evaluations for these packages are still valid.

### 2.0 Thermal Evaluation

#### 2.1 Review Objectives

The objective of the review is to verify that the thermal performance of the package has been adequately evaluated for the tests specified under normal conditions of transport (NCT) and hypothetical accident conditions (HAC) and that the package design satisfies the thermal requirements of 10 CFR Part 71. This case was also reviewed to determine whether the

package fulfills the acceptance criteria listed in Section 3 of NUREG-1609, "Standard Review Plan for Transportation Packages for Radioactive Material," as well as associated Interim Staff Guidance (ISG) documents.

## 2.2 Evaluation

Changes not previously reviewed include deviations from design values for the VVER-1000 fuel assembly type. These changes include four deviations: diameter and thickness of the guide thimble tube ("GT Diameter" and "GT Thickness") and diameter and thickness of the instrument tube ("IT Diameter" and "IT Thickness"). In addition, a change to a mid-grid design in the VVER-1000 fuel assembly for a particular customer plant resulted in a change to two dimensions noted in Figure 1 of the application. The applicant noted that the MCC container is limited to use for transporting unirradiated, low enriched uranium, nuclear reactor core assemblies. Therefore, thermal engineering design of the packaging is not necessary. The fuel rods, that contain the radioactive material, are designed to withstand temperatures of 1204°C (2200°F) without substantial damage, i.e., well in excess of 10 CFR 71.73 HAC conditions resulting in thermal conditions of at least 800°C (1475°F) for a period of 30 minutes.

The staff reviewed the applicant's approach to address the thermal evaluation and finds it acceptable because the MCC package is used to transport unirradiated fuel during normal conditions of transportation and fuel rods that can withstand fire temperatures much higher than required by the regulations. Also, the staff agrees that the deviations from the VVER-1000 fuel assembly nominal design values have no impact on the package thermal performance.

## 2.3 Evaluation Findings

Based on review of the statements and representations in the application, the staff concludes that the thermal design has been adequately described and evaluated, and that the thermal performance of the package meets the thermal requirements of 10 CFR Part 71.

## 3.0 Criticality Evaluation

The applicant revised the criticality safety analysis for the Model Nos. MCC-3, MCC-4, and MCC-5 packages to reflect changes in the VVER-1000 type fuel assembly dimensions. The VVER-1000 assembly guide thimble tube and instrument tube dimensions, listed in Table 1-5-5 of Appendix 1-5 of the application, were found to deviate from design dimensions of the assembly. The guide thimble and instrument tube diameters were revised from 0.4740 inches to 0.4960 inches, and the tube thicknesses were revised from 0.0160 inches to 0.0315 inches. Additionally, the applicant modified Westinghouse Drawing No. 6481E15 to indicate variation in some of the nominal external dimensions of the VVER-1000 fuel assembly mid-grid design.

The applicant evaluated these changes for their potential effect on the criticality analysis in Chapter 6 of the application, and determined that there was a negligible effect on the conclusions for the VVER-1000 contents. Staff agrees with the applicant that these changes would tend to either decrease system reactivity, or otherwise result in negligible changes in  $k_{eff}$ .

Therefore, the applicant has shown and the staff agrees that the Model Nos. MCC-3, MCC-4, and MCC-5 packages, with the changes identified above, will continue to meet the criticality safety requirements of 10 CFR Part 71.

## **CONDITIONS**

The CoC includes the following condition(s) of approval:

Item No. 3(b) has been revised to incorporate the consolidated application dated October 2011.

Condition No. 5(b)(1) was revised to incorporate the new Westinghouse Drawing No. 6481E15, Rev. 6, and the current revision of Table 1-5.1, i.e., Rev. 13.

Condition No. 14 was revised to authorize use of Revision No. 15 of the CoC until March 31, 2013. The current US DOT Certificate still references the NRC CoC No. 15.

Condition No. 15 was revised to indicate the new expiration date of the certificate.

The October 2011 consolidated application supersedes all previous revisions of the application and was included in the References section.

## **CONCLUSION**

The certificate has been renewed for a five year term which expires on March 31, 2017. Based on the statements and representations contained in the application, as supplemented, and the conditions listed above, the staff concludes that the design of the Model Nos. MCC-3, MCC-4, and MCC-5 packages has been adequately described and evaluated. The staff concludes that the changes indicated do not affect the ability of the package to meet the requirements of 10 CFR Part 71.

Issued with Certificate of Compliance No. 9239, Revision No. 17,  
on February 15, 2012.