Westinghouse Electric Company
Nuclear Fuel
Columbia Fuel Site
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USA

Attn: Document Control Desk
Director, Division of Spent Fuel Storage and Transport
Office of Nuclear Material Safety and Safeguards
U. S. Nuclear Regulatory Commission
Washington, DC 20555-0001

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Your ref: Docket No. 71-9239
Our ref: LCPT-09-26

October 28, 2009

Dear Mr. William Brach:

SUBJECT: Docket 71-9239, Model Nos. MCC-3, 4, 5 Packages, Amendment Request to Revise Conditions for Contents

In accordance with Subpart D-Application for Package Approval, 10 CFR 71.31, Contents of application, Westinghouse Electric Company herein referred to as the Applicant submits a request to revise the authorized contents as specified by reference to the application (Westinghouse Electric Company application dated August 29, 2006) in existing Certificate of Compliance number 9239. This request is for two revisions, the first being a modification to a single fuel assembly type to support planned and anticipated transport to a specific reactor, and the second is a general modification of a condition on the type and form of contents for all fuel assembly types currently authorized by CoC No. 9239.

Background

Modified 15X15 (Type B) OFA

During fuel inspection campaign at Donald C. Cook Unit 1, Westinghouse identified an unusually high frequency of fuel rod cladding failures for assemblies that occupy core locations subject to certain flow conditions. In particular, fuel rods in locations O11, O12, O13 and O14, have developed leaks in several assemblies that have been irradiated at that core location in prior cycles. In order to avoid the development of additional fuel rod leaks during the next operating cycles, Westinghouse modified a 15X15 assembly by replacing seven fuel rods in locations O10 through O15 and N15 with solid stainless steel rods.

CoC No. 9239 had been previously amended by letter on February 5, 2008 to authorize shipment of the modified 15X15 (Type B) OFA assembly. (Enclosure 1) The modified 15X15 fuel assembly was transported from Westinghouse Fuel Fabrication Facility located in Columbia, South Carolina to Donald C. Cook 1 PWR located in Bridgman, Michigan in February 2008. The next scheduled shipment to D. C. Cook is 4 January 2010, and future shipments are planned for August 2011 and January 2013. Considering the need to transport the modified 15X15 (Type B) fuel assembly for an extended time the Applicant hereby requests an amendment by supplement to the CoC instead of amendment by letter as was recently requested. (9/3/2009 P. Vescovi, Ltr. to W. Brach, Re: Docket 71-9239, Model Nos. MCC-3, 4, 5 Packages, Amendment Request to Revise Condition for Contents)

NMSS24

Annular Pellet Blanket

A package evaluation subsequent to the original application considered the effect of the annular pellet zone and moderation in the fuel rod diametric gap (area between fuel pellet and cladding) for Type A, Type B, and Type C fuel assemblies contained in the MCC packaging. These results are summarized in Table 6-3-1 of the application as "Fuel Pin Gap Flooding with Annular Fuel Blankets". This evaluation considered the combined effect of water moderation in the fuel rod diametric gap and replacing solid pellets with annular pellets. These results demonstrated that neutron multiplication increased, thereby the increase was attributed to the combined effect of increased moderation and annular pellet zones. As a result, the application was revised to limit the length of annular pellet zones at top and bottom of any fuel rod.

Annular pellet stack lengths are increasing with new fuel designs to accommodate higher burnable absorber loading and extended exposure. Fuel assembly parameters as specified in condition 5.(b)(1) of the CoC No. 9329 by reference to Appendix 1-5 of the application place limits on the length of annular fuel pellet zones for each fuel design (14X14, 15X15, 16X16, 17X17, and VVER-1000). The 14X14OFA is used to demonstrate the effect of annular pellets because of an immediate need to transport a Type A fuel assembly with a annular pellet zone that exceeds the 6 inch limit specified in the application Appendix 1-5, Table 1-5-1, Note 3. The applicant has a scheduled shipment to Prairie Island PWR on 18 January 2010 to deliver a 14X14 OFA fuel design with 8 inch annular pellet zones..

Conclusions

15X15 (Type B) OFA

The Applicant requests approval of the modified contents based on the statements and representations in a prior application that is included as enclosure 2. The evaluation, analysis and detailed calculations presented in enclosure 2 will be consolidated into the application when the renewal application for the MCC package shipping containers is submitted.

Annular Pellet Blanket

Based on the demonstration of maximum reactivity for the 14X14 OFA fuel design, the Applicant requests that conditions of the CoC be revised to except all fuel designs from the limit on annular pellet zones. The demonstration of maximum reactivity in the current MCC application identifies the 17X17OFA with annular pellets and the diametric gap flooded as the most reactive fuel design. The effect of the annular pellets is small enough and the upper subcritical limit would not be exceeded for any of the authorized fuel designs when the effect of the annular pellet zone is not included. In the event that the demonstration of the annular pellet effect as provided in enclosure 3 is not considered sufficient technical justification for excepting all fuel designs from the limit on annular pellet zone length, then the Applicant requests the CoC be amended to except only the 14X14 Type A fuel assembly from the limit. The evaluation, analysis and detailed calculations presented in enclosure 3 will be consolidated into the application when the renewal application for the MCC package shipping containers is submitted.

Sincerely,

Electronically approved

Peter J. Vescovi
Licensing, Compliance and Package Technology

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enclosures: 3

1. 2/5/2008 R. Nelson, Ltr. to P. Vescovi Re: Authorization for Shipment of Modified Fuel Assembly in the Model Nos. MCC-3, MCC-4, and MCC-5 Packagings (TAC No. L24178) and 1 Enclosure (Safety Evaluation Report). (ML080390252)

2. 1/4/2008 Model Nos. MCC-3,4, 5 Packages, Approval for Shipment of Modified Fuel Assembly Contents. (ML080300519)

3. Evaluation, Analysis and Detailed Calculations - Annular Blanket Pellets

cc:

N. Kent, Westinghouse, Manager, Licensing, Compliance and Packaging Technology
B. Bayley, Westinghouse, Manager, Transport Logistics
E. Bennner, U.S. NRC Chief, NMSS/DSFST/LID/ Licensing Branch
M. Sampson, U.S. NRC Project Manager, NMSS/DSFST/LID/Licensing Branch

By Federal Express
LCPT-09-XX.DOC

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

February 5, 2008

Mr. Peter J. Vescovi
Westinghouse Electric Company, LLC
Columbia Fuel Site
P.O. Drawer R
Columbia, South Carolina 29250

SUBJECT: AUTHORIZATION FOR SHIPMENT OF MODIFIED FUEL ASSEMBLY IN THE MODEL NOS. MCC-3, MCC-4, AND MCC-5 PACKAGINGS (TAC NO. L24178)

Dear Mr. Vescovi:

As requested by your application dated January 4, 2008, pursuant to Title 10 of the Code of Federal Regulations Part 71 Certificate of Compliance (CoC) No. 9239, for Model Nos. MCC-3, MCC-4, and MCC-5 packages is amended to authorize contents as follows:

Contents:

Type and Form of Material – A modified unirradiated 15x15 (Type B) OFA fuel assembly with seven (7) of the fuel rods replaced with solid stainless steel rods.

The following additional conditions apply to the shipment of the contents described above:

- All other conditions of CoC No. 9239 shall remain the same.
- This authorization is for a one-time shipment of a modified unirradiated 15x15 (Type B) OFA fuel assembly with seven (7) of the fuel rods replaced with solid stainless steel rods.
- This authorization shall expire on April 30, 2008.

If you have any questions regarding this authorization, please contact me at (301) 492-3294 or Stewart W. Brown of my staff at (301) 492-3317.

Sincerely,

Robert A. Nelson, Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Docket No. 71-9239

Enclosure: Safety Evaluation Report
cc: R. Boyle, Department of Transportation

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

SUMMARY

By application dated January 4, 2008, the Westinghouse Electric Company, LLC (Westinghouse or the applicant) requested an amendment to Certificate of Compliance (CoC) No. 9239 for the Model Nos. MCC-3, MCC-4, and MCC-5 packagings. Westinghouse requested a one-time authorization to ship a modified unirradiated 15x15 (Type B) OFA fuel assembly with seven (7) of the fuel rods replaced with solid stainless steel rods.

CoC No. 9239 has been amended by letter to authorize shipment of a modified assembly based on the statements and representations in the application, the staff agrees that the change does not affect the ability of the package to meet the requirements of Title 10 of the Code of Federal Regulations (10 CFR) Part 71.

EVALUATION

The applicant requested authorization to make a one-time shipment of a modified unirradiated 15x15 (Type B) OFA fuel assembly with seven (7) of the fuel rods replaced with solid stainless steel rods. NRC staff performed a criticality safety review of the proposed request for the Westinghouse Model Nos. MCC-3, MCC-4, and MCC-5 packages with the modified contents. The replacement stainless steel rods are in a specific configuration for the one time shipment. There were no design changes to the packaging. The staff evaluated the proposed content modification to the certificate based on the information provided in the application.

The licensee's original application demonstrated that the 15x15 (Type B) OFA fuel assembly is the most reactive contents of the package. These calculations were performed using a 227 energy group cross-section and evaluated using the AMPX system of codes. The applicant's current methodology utilizes the SCALE 4.4 code and the 44-group cross-sections. As indicated in Table 1 of the application, the SCALE results agree to a high degree with the original calculations.

With the reduction of fissile mass due to replacing the seven (7) fuel rods with solid stainless steel rods a net reduction of the reactivity of the assembly was experienced. This would indicate that this one time shipment request is bounded by the allowable contents under the current CoC.

NRC staff performed confirmatory calculations on both the original fuel assembly and the one with solid stainless steel rods replacing seven (7) fuel rods using the SCALE 5 system of codes with 238-group cross-sections. The results of these confirmatory calculations were consistent with those performed by the applicant. In all instances the calculated k_{eff} was found to be below

that of the 15x15 (Type B) OFA fuel assembly. The staff's analysis confirms that the package as amended would be bounded by the applicant's original analysis and would remain subcritical under normal and accident conditions of transport.

Based on the NRC staff verification of adequate system modeling by the licensee, the analyses supporting the content modification were considered acceptable. Thus, the proposed content modification does not affect the ability of the package to meet the requirements of 10 CFR Part 71.

CONDITIONS

The authorization is limited to the following contents and additional conditions:

Contents

Type and Form of Material

A modified unirradiated 15x15 (Type B) OFA fuel assembly with seven (7) of the fuel rods replaced with solid stainless steel rods.

The following additional conditions apply to the shipment of the contents described above:

1. All other conditions of CoC No. 9239 shall remain the same.

2. This authorization is for a one-time shipment of a modified unirradiated 15x15 (Type B) OFA fuel assembly with seven (7) of the fuel rods replaced with solid stainless steel rods.

3. This authorization shall expire on April 30, 2008.

CONCLUSION

CoC No. 9239 has been amended by letter to authorize shipment of a modified unirradiated 15x15 (Type B) OFA fuel assembly with seven (7) of the fuel rods replaced with stainless steel rods. This authorization expires April 30, 2008. Based on the statements and representations in the application, and with the conditions listed above, the staff agrees that this change does not affect the ability of the package to meet the requirements of 10 CFR Part 71.

Issued on February 5, 2008.