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Your ref: Docket No. 71-9297  
Our ref: LTR-LCPT-20-06

April 6, 2020

Subject: Amendment Request Application USA/9297/AF-96 for Model No. Traveller STD, XL, and VVER Packages

References: (1) Docket 71-9297  
(2) Certificate of Compliance USA/9297/AF-96, Rev. 11

Dear Director,

An application is hereby submitted to amend the license USA/9297/AF-96 for Model No. Traveller STD, XL, and VVER Packages. This amendment is submitted to amend the license with new contents for accident tolerant fuels (ATF), 7wt.% <sup>235</sup>U fuel rods, amendments to criticality safety case, and additional specifications for maintenance examinations. The changes to the license application are documented in Revision 15 of the Safety Analysis Report (SAR), which is enclosed in this letter. Enclosures of this letter include non-proprietary, redacted documents and proprietary documents. In conformance with the requirements of 10 CFR Section 2.390, as amended, of the Nuclear Regulatory Commission's regulations, we are enclosing with this submittal an Application for Withholding Proprietary Information from Public Disclosure and an Affidavit, AW-20-5027 (Enclosed as non-proprietary Enclosure 1).

#### Background

Based on requests for additional information (RAIs) from competent authorities and clarifications of existing analyses and maintenance process, SAR Revision 15 has been revised as necessary. Additionally, ATF advanced cladding features and UO<sub>2</sub> fuel advancements are evaluated for new contents. There are no changes to the Traveller packaging for this amendment. This application includes revisions to Sections 1, 2, 3, 6, and 8 of the SAR Revision 14. As a result of the Westinghouse docket 71-9380 (Traveller Type B) approval, upgrades to the Rod Pipe drawing (10006E58 Revision 6) have also been applied to this docket. To assist in a timely review, each change for SAR Revision 15 is detailed in Appendix A of this letter.

The ATF advancements of UO<sub>2</sub> fuels and cladding features include: Advanced Doped Pellet Technology (ADOPT™) UO<sub>2</sub> fuel which are doped with Cr<sub>2</sub>O<sub>3</sub> and Al<sub>2</sub>O<sub>3</sub>, 7wt.% <sup>235</sup>U fuel rods, and cladding with chromium-coating or an Optimized ZIRLO™ liner (OZL). These ATF features are designed to enhance in-core performance and are evaluated for the regulatory transport conditions, specifically

*ADOPT and Optimized ZIRLO are a trademark of Westinghouse Electric Company LLC, its affiliates and/or its subsidiaries in the United States of America and may be registered in other countries throughout the world. All rights reserved. Unauthorized use is strictly prohibited. Other names may be trademarks of their respective owners*

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structural/material of Chapter 2, thermal of Chapter 3 and criticality safety case impact of Chapter 6. There is no impact to the package design, operations or maintenance for the new contents.

#### Request

Westinghouse requests an amendment to the 71-9297 license to include the new contents and upgrades of the SAR Revision 15 to be approved by the NRC by end of August 2020 to allow for potential shipments of ATF in the Fall 2020, and subsequent international validations required for ATF Europe shipments in 2021. All changes made to the SAR Revision 15 address previous RAI concerns or support the addition of the new contents; however, the packaging design has been neither changed nor been modified because of this amendment request.

Westinghouse also requests that CoC Revision 11 expiration is extended one-year beyond the date of issuance of the new certificate. CoC Revision 11 was the consolidated 5-year renewal, and is the basis for DOT CAC Revision 10, the competent authority approval for the majority of international validations. With an extended expiration for CoC Revision 11, we will align all international validations to a new single certificate and are providing competent authorities a time for review and approval of new validations.

Finally, it is requested that this application be reviewed for the Joint United States – Canada process for package approval and validation, in accordance with NUREG-1886. The current Canadian endorsement for the Traveller STD, XL and VVER Package is CDN/E216/-96.

#### SAR Revision

All requests are consolidated into the SAR Revision 15. The page changes for the amendment are marked as Revision 15 and the revised portion of the page is marked using change bars, consisting of a vertical line drawn in the right margin. Changes are also noted in the application *Record of Revisions* and *List of Effective Pages*. The revised SAR Revision 15 is provided as proprietary Enclosure 1 and non-proprietary Enclosure 2. A complete detailed list of changes is documented in Appendix A.

Westinghouse has a quality assurance program, approved by the Commission that satisfies the provisions of Subpart H (Quality Assurance) of Part 71. Further, Westinghouse complies with the terms and conditions of the applicable requirements of Subparts A (General Provisions), G (Operating Controls and Procedures), and H (Quality Assurance) of Part 71.

One copy of the amendment application is submitted electronically via NRC Electronic Information Exchange (EIE) system and emailed to the Project Manager, Pierre Saverot. Additional electronic or hard copy submissions are available upon request. Should you have any questions, or require additional information, please contact me either by telephone at (720) 467-5413 or by email at sloma1t@westinghouse.com.

Best regards,

\*

Tanya Sloma-DeLosier  
Package Licensing Program Manager  
Licensing, Compliance and Package Technology  
Nuclear Fuel Transport  
Westinghouse Electric Company LLC

\*Electronically approved records are authenticated in the electronic document management system.

Enclosures:

Non-Proprietary Enclosure:

1. LTR-LCPT-20-07 / Affidavit AW-20-5027, "Submittal of LTR-LCPT-20-06, "Amendment Request Application USA/9297/AF-96 for Model No. Traveller STD, XL, and VVER Packages," dated 6 April 2020.
2. LTR-LCPT-20-06-NP Attachment  
Safety Analysis Report Revision 15 Application for Certificate of Compliance for the Traveller PWR Fuel Shipping Package, NRC Certificate of Compliance USA/9297/AF-96  
(SAR Revision 15, dated March 2020)

Proprietary Enclosure:

1. LTR-LCPT-20-06-P Attachment  
Safety Analysis Report Revision 15 Application for Certificate of Compliance for the Traveller PWR Fuel Shipping Package, NRC Certificate of Compliance USA/9297/AF-96  
(SAR Revision 15, dated March 2020)

cc w/o enclosures:

W. Stilwell, Westinghouse-USA  
T. Grange, Westinghouse-UK  
P. Saverot, NRC

**Appendix A – Detailed List of SAR Revision 15 Changes****CHAPTER 1**

1. Revised text under Sections 1.1, 1.2.2.1, and 1.2.2.2 to clarify the allowable enrichments of 5 wt.% for fuel assemblies and  $U_3Si_2$  loose fuel rods, or 7 wt.% for  $UO_2$  loose fuel rods. Section 1.2.2.1 includes the ADOPT specification allowance for  $UO_2$  contents and updates the restriction on loose rod content quantity in the Rod Pipe.
2. Added text to Section 1.2.2.1.1 to include cladding may be treated with a chromium coating or include an Optimized ZIRLO Liner (OZL) and removed option for steel alloy cladding.
3. Section 1.3.2, updated Rod Pipe Licensing drawing 10006E58 Rev. 6: changes include additional detail of assembly and detailed views, updated of bill of materials, addition of notes, and new sheet 2 added to show Rod Pipe and Clamshell assembly.

**CHAPTER 2**

1. Section 2.12.9 revised to include total strain energy absorption evaluation and materials comparison of existing alloys with advanced variations of chromium coating and Optimized ZIRLO Liner

**CHAPTER 3**

1. Added uranium silicide ( $U_3Si_2$ ) fuel to Table 3-3A, Room Temperature Properties of Key Fuel Assembly Materials.
2. Addition of Section 3.2.1.1 to address thermal comparison of advanced cladding variations including cladding treated with a chromium coating or an Optimized ZIRLO Liner.

**CHAPTER 4**

No changes

**CHAPTER 5**

No changes

**CHAPTER 6**

1. Revised discussion in Section 6.1.2 to redefine “statistical significance” for sensitivity studies, greater than or equal to  $2\sigma$  (i.e. statistically significant) from the baseline case ( $k_{eff} + 2\sigma$ ) analyzed.
2. Table 6-1 Updated for new USL values based on updated USL equation (see Section 6.8 for further discussion).
3. Table 6-2 updated to add 7 wt.% loose rod results and update Maximum  $k_{eff}$  values with updated penalties based on redefined statistical significance criteria. No results of  $U_3Si_2$  loose rod cases have changed.
4. Updated Section 6.2 to discuss 7 wt.% and ADOPT specification allowance for  $UO_2$  rod contents.
5. Section 6.2.1 – typographical errors corrected in Table 6-5. Minimum fuel pellet outer diameter and inner diameter had conversion error from inch to cm. Correction required to CoC table also. (see changes made to Section 6.9.2.1, Table 6-97 described below)
6. Sections 6.2.1 – 6.2.4 all revised to state ADOPT specification allowance for  $UO_2$  contents, advanced claddings, and 7 wt.%  $UO_2$  loose rod contents, as applicable to each content.
7. Section 6.3.2.2 updated to state both enrichments and list ADOPT rod material composition.
8. Section 6.3.2.4 revised to discuss advanced cladding variations and state that how they are insignificant to the criticality analysis.

9. New Section 6.3.2.15 added to address integral absorber and state that how they are insignificant to the criticality analysis.
10. Table 6-12 revised to add 7 wt.% UO<sub>2</sub> material composition.
11. Table 6-13 revised to include ADOPT fuel.
12. Section 6.3.4 text added to address a combined case study in Appendix 6.9.4.
13. Section 6.3.4.3 revised for “statistical significance” discussion (Same as 6.1.2).
14. Table 6-18 revised to update studies performed (added fuel assembly shift study for Groups 1, 2, and 3 Single Package HAC, and added ADOPT study for all contents but Group 3).
15. Updated Section 6.3.4.3.2 to show that the single package evaluation for fuel assembly shift study is also done for HAC.
16. Section 6.3.4.3.7 added the discussion that lead-filled rods may also be used in place of SS rods in the fuel assembly, as evaluated by the SS rod study.
17. New Section 6.3.4.3.14 added for description of ADOPT UO<sub>2</sub> fuel sensitivity study.
18. Single Package studies (Section 6.4).
  - a. No changes to SCALE inputs or results for baseline cases and previous sensitivity studies for fuel assemblies.
  - b. Section 6.4.1.1.2, Table 6-23 UO<sub>2</sub> loose rod results revised for new 7 wt.% cases.
  - c. Section 6.4.1.2, added text to define the maximum  $k_{eff}$  calculation.
  - d. Section 6.4.1.2.1, Table 6-24 revised to add HAC fuel assembly shift study, ADOPT Fuel study, and update bounding configurations based on statistical significance criteria (moderator block density-Group 3 HAC, fuel pellet diameter tolerance-Group 3 HAC; no impact to NCT/HAC Group 1 or 2 or NCT Group 3). Polyethylene packing material HAC penalty is based on the 2kg limit (see Section 6.6.2.2.2 (page 6-95, Table 6-81) for imposed 2kg limit).
  - e. Section 6.4.1.2.2, Table 6-25 revised to add ADOPT Fuel study and UO<sub>2</sub> loose rod results revised for new 7 wt.% cases. Update of statistical significance criteria has no impact to U<sub>3</sub>Si<sub>2</sub> results.
  - f. Section 6.4.2.1, Table 6-26 summary updated penalty,  $\Delta k_{in}$ , based on statistical significance criteria, Max  $k_{eff}$  results, and USL for fuel assemblies. Updated all results of Rod Pipe UO<sub>2</sub> fuel rods based on 7wt.% evaluation. Updated USL results of Rod Pipe U<sub>3</sub>Si<sub>2</sub> fuel rods.
  - g. Penalty summary Section 6.4.2.2.1, Table 6-27 for fuel assemblies revised to add HAC fuel assembly shift study penalties, ADOPT fuel study penalties & update assessed penalties based on statistical significance criteria.
  - h. Section 6.4.2.2.2, Table 6-33A (page 6-51) added to provide results for the Single Package NCT ADOPT fuel study.
  - i. Section 6.4.2.2.3, Table 6-34A (page 6-53) added to provide results for the Single Package HAC fuel assembly position study.
  - j. Section 6.4.2.2.3, Table 6-40A (page 6-59) added to provide results for the Single Package HAC ADOPT fuel study.
  - k. Penalty summary Section 6.4.2.2.4, Table 6-41 for Rod Pipe, fuel rods revised to add ADOPT fuel study penalties and updated 7wt.% UO<sub>2</sub>. No impact to U<sub>3</sub>Si<sub>2</sub> results.
  - l. Rod Pipe, UO<sub>2</sub> fuel rod analyses updated with 7wt.% in Sections 6.4.2.2.4.1 (NCT) and 6.4.2.2.4.2 (HAC).
  - m. Section 6.4.2.2.4.1, Table 6-45A (page 6-63) added to provide results for the Rod Pipe Single Package HAC fuel assembly position study.
  - n. Section 6.4.2.2.4.2, Table 6-50A (page 6-69) added to provide results for the Rod Pipe Single Package HAC ADOPT fuel study.

## 19. NCT Array Studies (Section 6.5)

- a. No changes to SCALE inputs or results for baseline cases and previous sensitivity studies for fuel assemblies.
- b. Section 6.5.1.1.2, Table 6-52 UO<sub>2</sub> loose rod results revised for new 7 wt.% cases.
- c. Section 6.5.1.2.1, Table 6-53 revised to add ADOPT Fuel study and update bounding configurations based on statistical significance criteria (package OD tolerance-Group 2, fuel rod pitch tolerance-Group 1; no impact to Group 3).
- d. Section 6.5.1.2.2, Table 6-54 revised to add ADOPT Fuel study and UO<sub>2</sub> loose rod results revised for new 7 wt.% cases. Update of statistical significance criteria has no impact to U<sub>3</sub>Si<sub>2</sub> results.
- e. Section 6.5.2.1, Table 6-55 summary updated penalty,  $\Delta k_{i,u}$ , based on statistical significance criteria, Max  $k_{eff}$  results, and USL for fuel assemblies. Updated all results of Rod Pipe UO<sub>2</sub> fuel rods based on 7wt.% evaluation. Updated USL results of Rod Pipe U<sub>3</sub>Si<sub>2</sub> fuel rods.
- f. Penalty summary Section 6.5.2.2.1, Table 6-56 for fuel assemblies revised to add ADOPT fuel study penalties & update assessed penalties based on statistical significance criteria.
- g. Section 6.5.2.2.2, Table 6-64A (page 6-81) added to provide results for the Package Array NCT ADOPT fuel study.
- h. Penalty summary Section 6.5.2.2.3, Table 6-65 for Rod Pipe, fuel rods revised to add ADOPT fuel study penalties and updated 7wt.% UO<sub>2</sub>. Update of statistical significance criteria has no impact to U<sub>3</sub>Si<sub>2</sub> results.
- i. Rod Pipe, UO<sub>2</sub> fuel rod analyses updated with 7wt.% in Section 6.5.2.2.4.
- j. Section 6.5.2.2.4, Table 6-70A (page 6-85) added to provide results for the Rod Pipe Package Array NCT ADOPT fuel study.

## 20. HAC Array Studies (Section 6.6)

- a. No changes to SCALE inputs or results for baseline cases and previous sensitivity studies for fuel assemblies.
- b. Section 6.6.1.1.2, Table 6-52 UO<sub>2</sub> loose rod results revised for new 7 wt.% cases.
- c. Section 6.6.1.2.1, Table 6-73 revised to add ADOPT fuel study and update bounding configurations based on statistical significance criteria (moderator density-Group 1 and 2, package OD tolerance-Group 2, fuel pellet diameter tolerance-Group 2, extended active fuel length-Group 3).
- d. Section 6.6.1.2.2, Table 6-74 revised to add ADOPT fuel study and UO<sub>2</sub> loose rod results revised for new 7 wt.% cases. Correction of U<sub>3</sub>Si<sub>2</sub> annular fuel blanket bounding configuration to 'None' as the baseline case with no blanket is most reactive (Table 6-88). Update of statistical significance criteria has no impact to U<sub>3</sub>Si<sub>2</sub> results.
- e. Section 6.6.2.1, Table 6-75 summary updated penalty,  $\Delta k_{i,u}$ , based on statistical significance criteria, Max  $k_{eff}$  results, and USL for fuel assemblies. Updated all results of Rod Pipe UO<sub>2</sub> fuel rods based on 7wt.% evaluation. Updated USL results of Rod Pipe U<sub>3</sub>Si<sub>2</sub> fuel rods.
- f. Penalty summary Section 6.6.2.2.1, Table 6-76 for fuel assemblies revised to add ADOPT fuel study penalties & update assessed penalties based on statistical significance criteria.
- g. Section 6.6.2.2.2, Table 6-86A (page 6-102) added to provide results for the Package Array HAC ADOPT fuel study.

- h. Penalty summary Section 6.6.2.2.3, Table 6-87 for Rod Pipe, fuel rods revised to add ADOPT fuel study penalties and updated 7wt.% UO<sub>2</sub>. Update of statistical significance criteria has no impact to U<sub>3</sub>Si<sub>2</sub> results.
  - i. Rod Pipe, UO<sub>2</sub> fuel rod analyses updated with 7wt.% in Section 6.6.2.2.4.
  - j. Section 6.6.2.2.4, Table 6-94A (page 6-109) added to provide results for the Rod Pipe Package Array HAC ADOPT fuel study.
21. Section 6.8 updated for the addition of two new benchmark series (7.4 wt.% and 6.9 wt.% enrichments) added to supplement the addition of 7 wt.% UO<sub>2</sub> loose rod contents.
  22. Section 6.9.2.1, Table 6-97 metric unit value typographical errors corrected (NOTE: no English units changed. The correct English unit values were used for all analyses. This typographical error had no effect on the criticality analysis beyond the rounded values listed in this table).
    - a. 15 Bin 1 Minimum Pellet OD value in cm updated.
    - b. 14 Bin 2 and 15 Bin 1 Minimum cladding ID values in cm updated.
  23. Appendix 6.9.3.2 Rod Pipe Single Package, 6.9.3.4, Rod Pipe NCT Package Array, 6.9.3.6 Rod Pipe HAC Package Array: all UO<sub>2</sub> loose rod results revised for new 7 wt.% baseline cases.
  24. Addition of new Appendix 6.9.4 for combined case studies, that evaluates for each transport condition and contents a single combined maximum  $k_{\text{eff}}$  case versus the individual penalty method applied for the criticality safety case.

## **CHAPTER 7**

No changes

## **CHAPTER 8**

1. Section 8.1.2 reference to ASME Code revised to allow later edition at time of manufacturing as approved by Engineering.
2. Section 8.2.3.2 heading changed from “Weather Seal” to “Weather Gasket”.
3. Added Section 8.2.6 to address “Periodic Weld Examinations”.
4. Added Section 8.2.7 to address “Periodic Acetate Plug Examinations”.