

**Request to Modify Condition and Limitation 2 to WCAP-12610-P-A &
CENPD-404-P-A, Addendum 1-A, “Optimized ZIRLO™”**

February 2019

Westinghouse Electric Company
1000 Westinghouse Drive
Cranberry Township, PA 16066

© 2019 Westinghouse Electric Company LLC
All Rights Reserved

**Request to Modify Condition and Limitation 2 to WCAP-12610-P-A & CENPD-404-P-A,
Addendum 1-A, “Optimized ZIRLO™”****Background**

Westinghouse topical report WCAP-12610-P-A & CENPD-404-P-A, Addendum 1-A (Reference 1) requested review and approval for the use of the **Optimized ZIRLO™** fuel rod cladding material. The topical report was final approved by the Nuclear Regulatory Commission (NRC) in June 2005. Condition and Limitation (C/L) 2 in the Safety Evaluation (SE) includes a restriction on the maximum burnup that is dependent on whether the cladding material is used for Westinghouse or Combustion Engineering (CE) fuel designs. C/L 2 states the following:

“The fuel rod burn up limit for this approval remains at currently established limits: 62 GWd/MTU for Westinghouse fuel designs and 60 GWd/MTU for CE fuel designs.”

WCAP-16500-P-A (Reference 2) requested review and approval for the CE 16x16 Next Generation Fuel (CE16NGF) assembly design and the methods and models used for evaluating its acceptability. The CE16NGF, as described in WCAP-16500-P-A utilizes **Optimized ZIRLO** cladding. The topical report was final approved by the Nuclear Regulatory Commission (NRC) in July 2007. C/L 3 in the NRC Safety Evaluation for WCAP-16500-P-A states the following.

*“The reference fuel assembly design, CE 16x16 NGF, its fuel mechanical design methodology and design criteria, are approved up to a peak rod average burnup of 62 GWd/MTU. A fuel burnup limit may exist, however, either explicitly or implicitly, in other portions of a plant's licensing basis. The NRC staff's approval of this topical report allows the CE 16x16 NGF assembly to reach a rod average burnup of 62 GWd/MTU. However, a license amendment request, specifically addressing each plant's licensing basis including radiological consequences, is required prior to extending burnup beyond current levels. Further, the NRC staff's SE for **Optimized ZIRLO™** (Addendum 1 to TR WCAP-12610-P-A and TR CENPD-404-P-A) specified a 60 MWd/kgU burnup limit and this limitation must be revised prior to extending the peak rod average burnup for the NGF design (SE Section 3.4).”*

Request

Westinghouse is requesting a modification to C/L 2 of Reference 1 that would provide the same burnup limit approved in Reference 2. Westinghouse is requesting that the NRC issue a revised Safety Evaluation applicable to Reference 1 with the following modifications to C/L 2:

*“The fuel rod burn up limit for this approval ~~is remains at currently established limits: 62 GWd/MTU for Westinghouse fuel designs and 60 GWd/MTU for CE~~ **CE16NGF fuel designs and 60GWd/MTU for Standard 14x14 and 16x16 CE fuel designs.**”*

Optimized ZIRLO and CE16NGF are trademarks or registered trademarks 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.

Supporting Information

This request demonstrates, based on subsequent approvals by the NRC (Reference 2), that extending the burnup limit for **Optimized ZIRLO** cladding for CE16NGF fuel designs to 62 GWd/MTU will not pose a risk to the health and safety of the public.

Reference 1 provided sufficient technical information to support the burnup limit of 62 GWd/MTU for **Optimized ZIRLO** cladding material as evidenced by the fact that it has been approved for use with Westinghouse fuel designs to that amount of burnup.

Further, the SE of Reference 2 approves the CE16NGF fuel assembly design, fuel mechanical design methodology, and design criteria to a peak average rod burnup of 62 GWd/MTU. **Optimized ZIRLO** cladding is specified as the cladding used in the CE16NGF fuel design. As noted in C/L 3 from the SE of Reference 2, the C/L related to fuel burnup in the SE for Reference 1 must be revised prior to extending the peak rod average burnup for the CE16NGF design. C/L 3 of Reference 2 also states that in order to achieve burnup levels beyond 60 GWd/MTU, a license amendment request would be needed to address individual plant licensing basis restrictions on burnup including those contained in the radiological consequences analyses. Since the technical basis for the use of 62 GWd/MTU with CE16NGF fuel assemblies which utilize **Optimized ZIRLO** cladding is already approved, the requested change to C/L 2 of Reference 1 is needed for consistency with Reference 2.

It is recognized that each Licensee that seeks to utilize the burnup limit of 62 GWd/MTU for the CE16NGF design must determine the additional licensing basis changes that are necessary and take the appropriate actions to implement those changes into their licensing basis prior to extending the burnup limits associated with their use of the CE16NGF product. For those plants where an NRC-approved burnup-dependent fuel Thermal Conductivity Degradation (TCD) penalty has been applied, this penalty will be validated to 62 GWd/MTU and will be used to determine burnup-dependent power limits for the cycle specific confirmation of future cycles.

It is also noted that revising C/L 2 in the SE for Reference 1 will not alter the burnup limits associated with Standard CE fuel designs. Standard CE 14 x 14 and 16x 16 fuel designs will remain limited to 60 GWd/MTU in accordance with CEN-382(B)-P-A (Reference 3) and CEN-386-P-A (Reference 4). Westinghouse is not requesting an increase in the fuel burnup limits associated with the Standard CE fuel designs.

Conclusion

As discussed herein, Reference 1 demonstrated adequate material performance up to a burnup of 62 GWd/MTU based on the approval for use of the material to that burnup for Westinghouse fuel designs. As documented in Reference 2, the CE16NGF fuel design with **Optimized ZIRLO** cladding and applicable analytical methods have been approved by the NRC for use up to 62 GWd/MTU. As a result, C/L 2 in Reference 1 can be revised for consistency to extend the burnup limit for use with CE fuel design to 62 GWd/MTU without posing additional risk to the public health or safety.

References

1. WCAP-12610-P-A & CENPD-404-P-A, Addendum 1-A, "**Optimized ZIRLO™**," July 2006.
2. WCAP-16500-P-A, "CE 16x16 Next Generation Fuel Core Reference Report," August 2007.
3. CEN-382(B)-P-A, "Verification of the Acceptability of a 1-Pin Burnup Limit of 60 MWD/kgU for Combustion Engineering 14x14 PWR Fuel," August 1993.
4. CEN-386-P-A, "Verification of the Acceptability of a 1-Pin Burnup Limit of 60 MWD/kgU for Combustion Engineering 16x16 PWR Fuel," August 1992.