[7590-01-P]

NUCLEAR REGULATORY COMMISSION

[Docket Nos. 50-390 and 50-391; NRC-2019-0138]

Tennessee Valley Authority; Watts Bar Nuclear Plant, Units 1 and 2

AGENCY: Nuclear Regulatory Commission.

ACTION: Exemption; issuance.

SUMMARY: The U.S. Nuclear Regulatory Commission (NRC or the Commission) has issued an exemption in response to a July 23, 2018, request from Tennessee Valley Authority (TVA or the licensee) to implement Optimized ZIRLO™ fuel rod cladding at the Watts Bar Nuclear Plant (Watts Bar), Units 1 and 2.

DATES: The exemption was issued on July 25, 2019.

ADDRESSES: Please refer to Docket ID **NRC-2019-0138** when contacting the NRC about the availability of information regarding this document. You may obtain publicly-available information related to this document using any of the following methods:

- **Federal Rulemaking Web Site:** Go to https://www.regulations.gov/ and search for Docket ID **NRC-2019-0138**. Address questions about NRC docket IDs to Jennifer Borges; telephone: 301-287-9127; e-mail: Jennifer.Borges@nrc.gov. For technical questions, contact the individual listed in the **FOR FURTHER INFORMATION CONTACT** section of this document.

- **NRC's Agencywide Documents Access and Management System (ADAMS):** You may obtain publicly-available documents online in the ADAMS Public Documents collection at https://www.nrc.gov/reading-rm/adams.html. To begin the

search, select "ADAMS Public Documents" and then select "Begin Web-based ADAMS Search." For problems with ADAMS, please contact the NRC's Public Document Room (PDR) reference staff at 1-800-397-4209, 301-415-4737, or by e-mail to pdr.resource@nrc.gov. The ADAMS accession number for each document referenced (if it is available in ADAMS) is provided the first time that it is mentioned in this document. In addition, for the convenience of the reader, the ADAMS accession numbers are provided in a table in the "Availability of Documents" section of this document.

- **NRC's PDR:** You may examine and purchase copies of public documents at the NRC's PDR, Room O1-F21, One White Flint North, 11555 Rockville Pike, Rockville, Maryland 20852.

FOR FURTHER INFORMATION CONTACT: Robert Schaaf, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; telephone: 301-415-6020, e-mail: Robert.Schaaf@nrc.gov.

SUPPLEMENTARY INFORMATION:

I. Background

TVA is the holder of Facility Operating License Nos. NPF-90 and NPF-96, which authorize operation of Watts Bar, Units 1 and 2, respectively. The licenses provide, among other things, that the facilities are subject to all rules, regulations, and orders of the NRC now or hereafter in effect. The facilities consist of pressurized-water reactors located in Spring City, Tennessee.

II. Request/Action

By application dated July 23, 2018 (ADAMS Accession No. ML18205A492), TVA, pursuant to section 50.12 of title 10 of the *Code of Federal Regulations* (10 CFR), "Specific exemptions," requested an exemption from certain requirements of

10 CFR 50.46, "Acceptance criteria for emergency core cooling systems [ECCS] for light-water nuclear power reactors," and appendix K, "ECCS Evaluation Models," to 10 CFR part 50 to allow the use of fuel rod cladding with Optimized ZIRLO™ alloy for future reload applications. The regulations in 10 CFR 50.46 contain acceptance criteria for the ECCS for reactors fueled with zircaloy or ZIRLO™ fuel rod cladding material. In addition, 10 CFR part 50, appendix K, requires that the Baker-Just equation be used to predict the rates of energy release, hydrogen concentration, and cladding oxidation from the metal/water reaction. The Baker-Just equation assumes the use of a zirconium alloy, which is a material different from Optimized ZIRLO™. The licensee requested the exemption because these regulations do not have provisions for the use of fuel rod cladding material other than zircaloy or ZIRLO™. Because the material specifications of Optimized ZIRLO™ differ from the specifications for zircaloy or ZIRLO™, a plant-specific exemption is required to support the reload applications for Watts Bar, Units 1 and 2.

This exemption request relates solely to the specific type of cladding material specified in these regulations for use in light-water reactors. As written, the regulations presume use of either Zircaloy or ZIRLO™[1] fuel rod cladding. The exemption is required because Optimized ZIRLO™ has a slightly different composition than Zircaloy or ZIRLO™. Therefore, TVA has requested an exemption to consider Optimized ZIRLO™ as an approved fuel rod cladding material. TVA is not seeking an exemption from the acceptance and analytical criteria of 10 CFR 50.46 and appendix K to 10 CFR part 50. The requirements regarding the acceptance and analytical criteria will be maintained.

Along with the exemption request, the submittal from TVA described above also contains a license amendment request to modify Technical Specifications 4.2.1, "Fuel

[1] "Optimized ZIRLO" and "ZIRLO" are trademarks or registered trademarks of Westinghouse Electric Company, LLC.

Assemblies," and 5.9.5, "Core Operating Limits Report (COLR)," to allow the use of Optimized ZIRLO™ as an approved fuel rod cladding material. This exemption and the proposed Technical Specification changes are subject to a concurrent review that is being documented in the safety evaluation with the license amendments (ADAMS Accession No. ML19112A004).

The NRC has previously approved exemption requests that were similar in nature to that requested by TVA. Precedent exemptions have been approved for other pressurized-water reactor plants, including Beaver Valley Power Station, Units 1 and 2 (ADAMS Accession Nos. ML18022B116 and ML17313A550); Palo Verde Nuclear Generating Station, Units 1, 2, and 3 (ADAMS Accession Nos. ML17319A107 and ML17319A214); and Wolf Creek Generating Station, Unit 1 (ADAMS Accession Nos. ML16179A293 and ML16179A440).

III. Discussion

Pursuant to 10 CFR 50.12, the Commission may, upon application by any interested person or upon its own initiative, grant exemptions from the requirements of 10 CFR part 50 when: (1) the exemptions are authorized by law, will not present an undue risk to public health or safety, and are consistent with the common defense and security; and (2) when special circumstances are present. Under 10 CFR 50.12(a)(2), special circumstances include, among other things, when application of the specific regulation in the particular circumstance would not serve, or is not necessary to achieve, the underlying purpose of the rule. The requested exemption to apply the acceptance criteria to Optimized ZIRLO™ fuel rod cladding rather than Zircaloy or ZIRLO™ at Watts Bar, Units 1 and 2, satisfies the criteria as described below.

A. Special Circumstances

The special circumstance that necessitates the request for exemption to

10 CFR 50.46 and appendix K to 10 CFR part 50 is that neither of these regulations explicitly allows the use of Optimized ZIRLO™ fuel rod cladding material. The ultimate objective of 10 CFR 50.46 is to ensure that nuclear power reactors fueled with uranium oxide pellets within Zircaloy or ZIRLO™ cladding must be provided with ECCS that must be designed to provide core cooling following postulated loss-of-coolant accidents. It has been demonstrated in the NRC-approved Westinghouse Topical Report WCAP-14342-A & CENPD-404-NP-A, Addendum 1-A (ADAMS Accession No. ML062080569) that the effectiveness of the ECCS will not be affected by a change from Zircaloy or ZIRLO™ clad fuel to Optimized ZIRLO™ clad fuel. Normal reload safety analyses will confirm that there is no adverse impact on ECCS performance.

The objective of 10 CFR 50.46(b)(2) and (b)(3) and paragraph I.A.5 of appendix K to 10 CFR part 50 is to ensure that cladding oxidation and hydrogen generation are appropriately limited during a loss-of-coolant accident and conservatively accounted for in the ECCS evaluation model. Appendix K of 10 CFR 50 requires that the Baker-Just equation be used in the ECCS evaluation model to determine the rate of energy release, cladding oxidation, and hydrogen generation. Westinghouse has shown in Addendum 1-A to WCAP-12610-P-A that the Baker-Just model is conservative in all post-loss-of-coolant accident scenarios with respect to the use of the Optimized ZIRLO™ advanced alloy as a fuel cladding material.

B. <u>The Exemption is Authorized by Law</u>

The NRC has the authority under 10 CFR 50.12 to grant exemptions from the requirements of 10 CFR part 50 upon showing proper justification. The fuel that will be irradiated at Watts Bar, Units 1 and 2, contains cladding material that does not conform to the cladding material that is explicitly defined in 10 CFR 50.46 and implicitly defined in appendix K to 10 CFR part 50. However, the criteria of these sections will continue to be

satisfied for the operation of the Watts Bar, Units 1 and 2, core containing Optimized ZIRLO™ fuel cladding.

C. The Exemption Presents No Undue Risk to Public Health and Safety

The standards for exemption are also satisfied since the exemption will not present an undue risk to public health and safety. The NRC-approved Westinghouse topical report discussed above has demonstrated that predicted chemical, thermal, and mechanical characteristics of the Optimized ZIRLO™ alloy cladding are bounded by those approved for ZIRLO™ under anticipated operational occurrences and postulated accidents. Reload cores are required to be operated in accordance with the operating limits specified in the Technical Specifications and COLR. Thus, the granting of this exemption request will not pose an undue risk to public health and safety.

D. The Exemption is Consistent with the Common Defense and Security

The exemption request is to allow the licensee to use an improved fuel rod cladding material. The licensee has documented compliance with the conditions and limitations of the NRC safety evaluation regarding the use of Optimized ZIRLO™ fuel rod cladding at Beaver Valley Power Station, Units 1 and 2, and has committed to ensuring compliance for future reloads in the current application for Watts Bar, Units 1 and 2. Use of Optimized ZIRLO™ fuel rod cladding in the Watts Bar, Units 1 and 2, cores will not affect plant operations and is consistent with common defense and security.

E. Environmental Considerations

A review has determined that the proposed amendments would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR part 20, or would change an inspection or surveillance requirement. However, the proposed amendments do not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant

increase in the amounts of any effluents that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendments meet the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendments.

IV. Conclusion

Accordingly, the Commission has determined that, pursuant to 10 CFR 50.12, the exemption is authorized by law, will not present an undue risk to the public health and safety, and is consistent with the common defense and security. Therefore, the Commission hereby grants TVA an exemption from the requirements of 10 CFR 50.46 and appendix K to 10 CFR part 50 to allow the use of Optimized ZIRLO™ fuel rod cladding material at Watts Bar, Units 1 and 2. As stated in this notice, this exemption relates solely to the cladding material specified in these regulations.

Dated at Rockville, Maryland, this 25th day of July, 2019.

For the Nuclear Regulatory Commission.

Blake D. Welling,
Deputy Director,
Division of Operating Reactor Licensing,
Office of Nuclear Reactor Regulation.

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