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

December 15, 2010

Mr. David A. Heacock
President and Chief Nuclear Officer
Virginia Electric and Power Company
Innsbrook Technical Center
5000 Dominion Boulevard
Glen Allen, VA 23060-6711

SUBJECT: SURRY POWER STATION UNITS 1 AND 2, VIRGINIA ELECTRIC AND POWER COMPANY, LLC, EXEMPTION FROM THE REQUIREMENTS OF 10 CFR PART 50, SECTION 50.46 (TAC NOS. ME3343 AND ME3344)

Dear Mr. Heacock:

The Commission has approved the enclosed exemption from specific requirements of Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.46, "Acceptance criteria for emergency core cooling systems [ECCS] for light-water nuclear power reactors," and Appendix K to 10 CFR Part 50, "ECCS Evaluation Models," for the Surry Power Station, Units 1 and 2. This action is in response to your application dated, February 10, 2010, that requested to allow the use of Optimized ZIRLO™ for fuel rod cladding.

A copy of the exemption is enclosed. The previous exemption sent to you required some corrections regarding the proprietary documents referenced. The corrected exemption has been forwarded to the Office of the Federal Register for publication.

Sincerely,

Karen Cotton

Karen Cotton, Project Manager
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-280 and 50-281

Enclosure:
Exemption

cc w/encl: Distribution via Listserv

[7590-01-P]

NUCLEAR REGULATORY COMMISSION

VIRGINIA ELECTRIC AND POWER COMPANY

SURRY POWER STATION UNIT NOS. 1 AND 2

DOCKET NOS. 50-280 AND 50-281

EXEMPTION

[NRC-2010-0283]

1.0 BACKGROUND

Virginia Electric and Power Company (the licensee) is the holder of Facility Operating License Nos. DPR-32 and DPR-37 which authorizes operation of the Surry Power Station (SURRY) Unit Nos. 1 and 2. The license provides, among other things, that the facility is subject to all rules, regulations, and Orders of the U.S. Nuclear Regulatory Commission (NRC, the Commission) now or hereafter in effect.

The facility consists of a pressurized-water reactor located in Surry County, Virginia.

2.0 REQUEST/ACTION

Pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.12, "Specific exemptions," the Virginia Electric and Power Company (VEPCO), by letter dated February 10, 2010[1], 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 to 10 CFR Part 50, "ECCS Evaluation Models," (Appendix K). The regulations in 10 CFR 50.46 contain acceptance criteria for the ECCS for reactors fueled with zircaloy or ZIRLO™ cladding. In addition, Appendix K to 10 CFR Part 50 requires that the Baker-Just equation be used to predict the rates of energy release, hydrogen concentration, and

[1] VEPCO letter to NRC, Agencywide Documents Access and Management System (ADAMS) Accession No. ML100470738

cladding oxidation from the metal/water reaction. The Baker-Just equation assumed the use of a zirconium alloy different than Optimized ZIRLO™. The exemption request relates solely to the specific types of cladding material specified in these regulations. As written, the regulations presume the use of zircaloy or ZIRLO™ fuel rod cladding. Thus, an exemption from the requirements of 10 CFR 50.46 and Appendix K is needed to support the use of different fuel rod cladding material. Therefore, the licensee requested an exemption that would allow the use of Optimized ZIRLO™ fuel rod cladding at SURRY. The NRC staff will prepare a separate safety evaluation, fully addressing VEPCO's application for a related license amendment.

3.0 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.

Authorized by Law

This exemption would allow the use of Optimized ZIRLO™ fuel rod cladding material at SURRY. As stated above, 10 CFR 50.12 allows the NRC to grant exemptions from the requirements of 10 CFR Part 50. The NRC staff has determined that granting of the licensee's proposed exemption will not result in a violation of the Atomic Energy Act of 1954, as amended, or the Commission's regulations. Therefore, the exemption is authorized by law.

No Undue Risk to Public Health and Safety

The underlying purpose of 10 CFR 50.46 is to establish acceptance criteria for adequate ECCS performance. By letter dated June 10, 2005, the NRC staff issued a safety evaluation (SE)[2] approving Addendum 1 to Westinghouse Topical Report WCAP-12610-P-A and CENPD-404-P-A, "Optimized ZIRLO™ (these topical reports are non-publicly available because they contain proprietary information)," wherein the NRC staff approved the use of Optimized ZIRLO™ as a fuel cladding material. The NRC staff approved the use of Optimized ZIRLO™ as a fuel cladding material based on: (1) similarities with standard ZIRLO™, (2) demonstrated material performance, and (3) a commitment to provide irradiated data and validate fuel performance models ahead of burnups achieved in batch application. The NRC staff's safety evaluation for Optimized ZIRLO™ includes 10 conditions and limitations for its use. As previously documented in the NRC staff's review of topical reports submitted by Westinghouse Electric Company, LLC (Westinghouse), and subject to compliance with the specific conditions of approval established therein, the NRC staff finds that the applicability of these ECCS acceptance criteria to Optimized ZIRLO™ has been demonstrated by Westinghouse. Ring compression tests performed by Westinghouse on Optimized ZIRLO™ (NRC-reviewed, approved, and documented in Appendix B of WCAP-12610-P-A and CENPD-404-P-A, Addendum 1-A, "Optimized ZIRLO™") demonstrate an acceptable retention of post-quench ductility up to 10 CFR 50.46 limits of 2200 degrees Fahrenheit and 17 percent equivalent clad reacted. Furthermore, the NRC staff has concluded that oxidation measurements provided by the licensee illustrate that oxide thickness (and associated hydrogen pickup) for Optimized ZIRLO™ at any given burnup would be less than both zircaloy-4 and ZIRLO™. Hence, the NRC staff concludes that Optimized ZIRLO™ would be expected to maintain better post-quench

[2] ADAMS Accession No. ML051670408

ductility than ZIRLO™. This finding is further supported by an ongoing loss-of-coolant accident (LOCA) research program at Argonne National Laboratory, which has identified a strong correlation between cladding hydrogen content (due to in-service corrosion) and post-quench ductility.

The underlying purpose of 10 CFR Part 50, Appendix K, Section I.A.5, "Metal-Water Reaction Rate," is to ensure that cladding oxidation and hydrogen generation are appropriately limited during a LOCA and conservatively accounted for in the ECCS evaluation model. Appendix K states that the rates of energy release, hydrogen concentration, and cladding oxidation from the metal-water reaction shall be calculated using the Baker-Just equation. Since the Baker-Just equation presumes the use of zircaloy clad fuel, strict application of the rule would not permit use of the equation for Optimized ZIRLO™ cladding for determining acceptable fuel performance. However, the NRC staff has found that metal-water reaction tests performed by Westinghouse on Optimized ZIRLO™ demonstrate conservative reaction rates relative to the Baker-Just equation and are bounding for those approved for ZIRLO™ under anticipated operational occurrences and postulated accidents.

Based on the above, no new accident precursors are created by using Optimized ZIRLO™; thus, the probability of postulated accidents is not increased. Also, based on the above, the consequences of postulated accidents are not increased. Therefore, there is no undue risk to public health and safety due to using Optimized ZIRLO™.

Consistent with Common Defense and Security

The proposed exemption would allow the use of Optimized ZIRLO™ fuel rod cladding material at SURRY. This change to the plant configuration has no relation to security issues. Therefore, the common defense and security is not impacted by this exemption.

Special Circumstances

Special circumstances, in accordance with 10 CFR 50.12(a)(2)(ii), are present whenever application of the regulation in the particular circumstances is not necessary to achieve the underlying purpose of the rule. The underlying purpose of 10 CFR 50.46 and Appendix K to 10 CFR Part 50 is to establish acceptance criteria for ECCS performance. The wording of the regulations in 10 CFR 50.46 and Appendix K is not directly applicable to Optimized ZIRLO™, even though the evaluations above show that the intent of the regulation is met. Therefore, since the underlying purposes of 10 CFR 50.46 and Appendix K are achieved through the use of Optimized ZIRLO™ fuel rod cladding material, the special circumstances required by 10 CFR 50.12(a)(2)(ii) for the granting of an exemption from certain requirements of 10 CFR 50.46 and Appendix K exist.

4.0 CONCLUSION

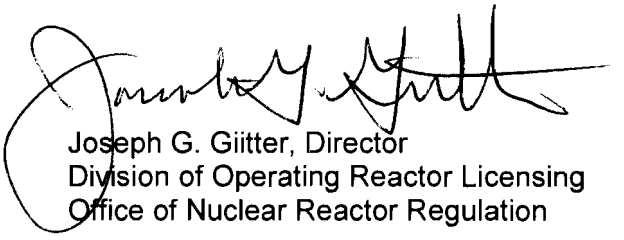
Accordingly, the Commission has determined that, pursuant to 10 CFR 50.12, the exemption is authorized by law, will not present an undue risk to the public health and safety, and is consistent with the common defense and security. Also, special circumstances are present. Therefore, the Commission hereby grants VEPCO an exemption from certain 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, for SURRY, Unit Nos. 1 and 2.

Pursuant to 10 CFR 51.32, the Commission has determined that the granting of this exemption will not have a significant effect on the quality of the human environment as published in the *Federal Register* on October 5, 2010 (75 FR 61528).

This exemption is effective upon issuance.

Dated at Rockville, Maryland, this 15th day of December 2010.

FOR THE NUCLEAR REGULATORY COMMISSION



Joseph G. Giitter, Director
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

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/RA/

Karen Cotton, Project Manager
Plant Licensing Branch II-1
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Docket Nos. 50-280 and 50-281

Enclosure:
Exemption

cc w/encl: Distribution via Listserv

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