

effects on the LOCA analysis. The result showed that the Byron Station ECCS Model Safety Analysis of Record remained bounding for those LTAs. The staff recognizes that the current LTAs will be located at non-limiting core locations, and the ZIRLO (LT-2) is very similar to the approved ZIRLO and the previously exempted ZIRLO (LT-1) in chemical composition and mechanical behavior. Accordingly, the currently approved methodology for analyzing ECCS performance is acceptable to apply for the low tin ZIRLO (LT-2) LTAs, as is further discussed below with respect to the Baker-Just equation. As also discussed below, results of comparative LOCA calculations with the same plant operating parameters will be performed in the reload analysis for Cycle 13 to verify that the current ECCS Model Safety Analysis of Record remains bounding for these four LTAs for Byron Station Unit 1 Cycle 13.

Paragraph I.A.5 of appendix K to 10 CFR part 50 states that the rates of energy, 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 the ZIRLO (LT-2) cladding for determining acceptable fuel performance. The underlying intent of this portion of the Appendix K, however, is to ensure that analysis of fuel response to LOCAs is conservatively calculated. Due to the similarities in the chemical composition of the ZIRLO (LT-2) and zircaloy, the application of the Baker-Just equation in the analysis of the improved ZIRLO (LT-2) clad fuel will conservatively bound all post-LOCA scenarios. Thus, application of appendix K, paragraph I.A.5, is not necessary for the licensee to achieve the underlying purpose of the rule in these circumstances.

According to the submittal, the licensee will perform reload analysis to demonstrate adequate ECCS performance, and show that the LTAs do not have a significant impact upon the analysis for Byron Station Unit 1. In the Cycle 13 reload analyses, the licensee will verify that the predicted peak cladding temperature of the LTAs are significantly lower than that predicted for the resident fuel. The licensee will also verify that the Baker-Just equation conservatively predicts local cladding oxidation of the LTAs of only a few percent. Also, the licensee will verify that maximum hydrogen generation is unchanged with the inclusion of the LTAs, and the coolable geometry is maintained following a

LOCA. As such, application of 10 CFR 50.46 and 10 CFR part 50, appendix K is not necessary to achieve their underlying purposes in these circumstances.

To summarize, based on the previously acceptable performance of the LTAs in Byron Station Units 1 and 2, the staff concludes that the licensee has demonstrated that the LTAs will perform adequately under LOCA conditions, and thus the LTAs are acceptable for operation in Byron Station Unit 1 Cycle 13.

Therefore, application of 10 CFR 50.44, 10 CFR 50.46, and appendix K to 10 CFR part 50 is not necessary to achieve their underlying purposes and that special circumstances are present. Thus, it is acceptable to grant an exemption, pursuant to 10 CFR 50.12(a)(2), from the requirements of 10 CFR 50.44, 10 CFR 50.46, and Appendix K to 10 CFR Part 50 for the irradiation of the lower tin ZIRLO (LT-2) clad fuel rods in Byron Station Unit 1 during Cycle 13.

4.0 Conclusion

Accordingly, the Commission has determined that, pursuant to 10 CFR 50.12(a), 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 Exelon Generation Company, LLC, an exemption from the requirements of 10 CFR 50.44, 10 CFR 50.46, and 10 CFR part 50, appendix K, for irradiation of low tin ZIRLO (LT-2) clad fuel rods in Byron Station Unit 1 during Cycle 13.

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 (68 FR 54246).

This exemption is effective upon issuance.

Dated at Rockville, Maryland, this 22nd day of September, 2003.

For the Nuclear Regulatory Commission.

Eric J. Leeds,

Deputy Director, Division of Licensing Project Management, Office of Nuclear Reactor Regulation.

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NUCLEAR REGULATORY COMMISSION

[Docket Nos. 50-338 and 50-339]

Virginia Electric and Power Company, North Anna Power Station, Units 1 and 2; Exemption

1.0 Background

The Virginia Electric and Power Company (the licensee) is the holder of Renewed Facility Operating License Nos. NPF-4 and NPF-7, which authorize operation of the North Anna Power Station, Units 1 and 2. The licenses provide, among other things, that the facilities are subject to all rules, regulations, and orders of the U.S. Nuclear Regulatory Commission (NRC, the Commission) now or hereafter in effect.

The North Anna units are pressurized-water reactors located in Louisa County in the Commonwealth of Virginia.

2.0 Request/Action

Title 10 of the Code of Federal Regulations (10 CFR), Section 50.44, "Standard for Combustion Gas Control in Light-Water-Cooled Power Reactors," requires, in part, reactors fueled with Zircaloy or ZIRLO cladding to provide means to control any hydrogen gas that may be generated after a postulated loss-of-coolant accident (LOCA). 10 CFR 50.46, "Acceptance Criteria for Emergency Core Cooling Systems for Light Water Nuclear Power Reactors," requires that emergency core cooling systems (ECCSs) for reactors containing fuel with Zircaloy or ZIRLO fuel cladding material be designed such that their performance, as calculated as set forth in that section, meets specified acceptance criteria. Finally, 10 CFR Part 50, Appendix K, "ECCS Evaluation Models," 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 for reactors using Zircaloy fuel cladding.

By letter dated March 28, 2002, as supplemented by letters dated May 13, June 19, and November 15, 2002, and May 6, May 9, May 27, June 11 (2 letters), July 18, August 26, September 4, and September 5, 2003, the licensee requested an exemption from the requirements of 10 CFR 50.44 and 10 CFR 50.46 to use an advanced zirconium-based alloy, designated as M5, for the fuel cladding material instead of the ZIRLO or Zircaloy fuel cladding material specified in these regulations. The licensee's exemption request was submitted in conjunction