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Dated in Rockville, Maryland, this 10th day of April, 2003.

For the Nuclear Regulatory Commission.

Brenda Jo. Shelton,

NRC Clearance Officer, Office of the Chief Information Officer.

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NUCLEAR REGULATORY COMMISSION

[Docket No. 50-318]

Calvert Cliffs Nuclear Power Plant, Inc., Calvert Cliffs Nuclear Power Plant, Unit No. 2; Exemption

1.0 Background

Calvert Cliffs Nuclear Power Plant, Inc. (CCNPP1 or the licensee) is the holder of Renewed Facility Operating License No. DPR-69, which authorizes operation of Calvert Cliffs Nuclear Power Plant, Unit No. 2 (CCNPP2). 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 Calvert County in Maryland.

2.0 Purpose

Title 10 of the Code of Federal Regulations (10 CFR), part 50, section 50.46 and Appendix K identify requirements for calculating emergency core cooling system (ECCS) performance for reactors containing fuel with zircaloy or ZIRLO cladding, and 10 CFR 50.44 relates to the control of hydrogen gas generated in part from a metal-water reaction between the reactor coolant and reactor fuel having zircaloy or ZIRLO cladding.

Since 10 CFR 50.44, 10 CFR 50.46, and Appendix K specifically relate to the use of zircaloy or ZIRLO cladding, the licensee has requested a temporary exemption to 10 CFR 50.44, 10 CFR 50.46, and Appendix K that would allow CCNPP2 to operate in Cycles 15 and 16 with a core containing up to eight lead fuel assemblies (LFAs) clad with an advanced zirconium-based alloy (up to four LFAs containing fuel rods

clad with Framatome proprietary zirconium-based M5 alloy, and up to four LFAs containing fuel rods clad with Westinghouse proprietary advanced zirconium-based alloys).

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 section 50.12(a)(2), special circumstances include, among other things, when application of the regulation in the particular circumstance would not serve, or is not necessary to achieve, the underlying purpose of the rule.

The underlying purpose of 10 CFR 50.46 and 10 CFR part 50, Appendix K, is to establish requirements for the calculation of ECCS performance and acceptance criteria for that performance in order to assure that the ECCS functions to transfer heat from the reactor core following a loss-of-coolant-accident (LOCA) such that (1) fuel and clad damage that could interfere with continued effective core cooling is prevented, and (2) clad metal-water reaction is limited to negligible amounts. The licensee has performed assessments of plant transients and accidents, including LOCAs, using methodologies approved for application to the Calvert Cliffs plants. Though the methodologies may not have been approved for licensing-basis analyses for some of the LFAs, the licensee provided information that confirmed that the methodologies were adequate for assessing them.

The licensee's analyses indicate that the LFAs will not affect the present design basis analyses for CCNPP2 during Cycles 15 and 16. The licensee attributed this finding in part to positioning of the LFAs in non-limiting locations. The licensee has clarified that it will place the LFAs in locations that represent the normal CCNPP2 operational fuel duty, including in "hot," though non-limiting, locations. The licensee believes this will provide data representative of the fuel operation and burnup for two cycles.

Because the LFAs will be placed in non-limiting locations (Technical Specification 4.2.1 limits placement of LFAs to non-limiting locations in the core), the placement scheme and the similarity of the advanced zirconium-

based alloy cladding used in the LFAs to the Zircaloy-4 clad rods, which are currently in the reactor core, will assure that the behavior of the LFAs will be bounded by the fuel performance and safety analyses performed for the Zircaloy-4 clad rods. No safety limits will be changed or setpoints altered as a result of using the LFAs.

In similar reviews of applications to use advanced fuel, the staff found that fuels with advanced cladding do not introduce a mixed core penalty in licensing safety analyses, provided that the resident fuel and the LFA were of like geometry. The licensee has indicated that the LFAs and fuel currently in use at CCNPP2 are of like geometry. Therefore, the staff concludes that use of the LFAs will not introduce a mixed core penalty into the safety analyses for CCNPP2.

Based on the above, the staff finds that, with the LFAs in use, the ECCS performance calculations assure that the ECCS will function to achieve the goals stated in 10 CFR 50.46 and 10 CFR part 50, Appendix K. Accordingly, the staff finds that application of section 50.46 and Appendix K with respect to use of the LFAs with advanced zirconium-based alloy cladding at CCNPP2 is not necessary to achieve the underlying purpose of these regulations.

The underlying purpose of 10 CFR 50.44 is to ensure that means are provided for the control of hydrogen gas that may be generated following a postulated LOCA. The licensee submitted supporting documentation that shows that the use of the Baker-Just equation to determine the metal-water reaction rate is conservative for the Framatome M5™ cladding and the Westinghouse advanced zirconium alloy cladding. Therefore, the amount of hydrogen generated by metal-water reaction in these materials will be within the design basis. As such, the licensee has achieved the underlying purpose of 10 CFR 50.44, and application of that rule with respect to use of the LFAs with advanced zirconium-based alloy cladding at CCNPP2 is not necessary to achieve that purpose.

The staff examined the licensee's rationale to support the exemption request and, as set forth above, has determined that the use of LFAs with advanced zirconium-based alloy cladding in the Unit 2 core for Cycles 15 and 16 would meet the underlying purpose of 10 CFR 50.44, 10 CFR 50.46, and 10 CFR part 50, Appendix K. Application of these regulations in these circumstances is not necessary to achieve the underlying purpose of the rule.