

March 6, 2001

Mr. Charles H. Cruse
Vice President - Nuclear Energy
Calvert Cliffs Nuclear Power Plant, Inc.
Calvert Cliffs Nuclear Power Plant
1650 Calvert Cliffs Parkway
Lusby, MD 20657-4702

SUBJECT: CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT NO. 2, EXEMPTION
FROM THE REQUIREMENTS OF 10 CFR PART 50, SECTIONS 50.46, 50.44
AND APPENDIX K (TAC NO. MB0008)

Dear Mr. Cruse:

The Commission has approved the enclosed exemption from specific requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Sections 50.44, 50.46, and Appendix K, for Calvert Cliffs Nuclear Plant, Unit 2. This action is in response to your letter of September 14, 2000, as supplemented by letter dated December 21, 2000, that requested a temporary exemption to permit operation of Unit 2 Cycle 14 with a core containing a lead fuel (test) assembly that includes fuel rods with advanced zirconium alloy cladding.

A copy of the exemption is enclosed. The exemption has been forwarded to the Office of the Federal Register for publication.

Sincerely,

/RA/

Donna M. Skay, Project Manager, Section 1
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-318

Enclosure: Exemption

cc w/encl: See next page

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Calvert Cliffs Nuclear Power Plant
Unit Nos. 1 and 2

President
Calvert County Board of
Commissioners
175 Main Street
Prince Frederick, MD 20678

James P. Bennett, Esquire
Counsel
Constellation Energy Group
P.O. Box 1475
Baltimore, MD 21203

Jay E. Silberg, Esquire
Shaw, Pittman, Potts, and Trowbridge
2300 N Street, NW
Washington, DC 20037

Mr. Bruce S. Montgomery, Director
NRM
Calvert Cliffs Nuclear Power Plant
1650 Calvert Cliffs Parkway
Lusby, MD 20657-4702

Resident Inspector
U.S. Nuclear Regulatory Commission
P.O. Box 287
St. Leonard, MD 20685

Mr. Richard I. McLean, Manager
Nuclear Programs
Power Plant Research Program
Maryland Dept. of Natural Resources
Tawes State Office Building, B3
Annapolis, MD 21401

Regional Administrator, Region I
U.S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, PA 19406

Mr. Joseph H. Walter, Chief Engineer
Public Service Commission of
Maryland
Engineering Division
6 St. Paul Centre
Baltimore, MD 21202-6806

Kristen A. Burger, Esquire
Maryland People's Counsel
6 St. Paul Centre
Suite 2102
Baltimore, MD 21202-1631

Patricia T. Birnie, Esquire
Co-Director
Maryland Safe Energy Coalition
P.O. Box 33111
Baltimore, MD 21218

Mr. Loren F. Donatell
NRC Technical Training Center
5700 Brainerd Road
Chattanooga, TN 37411-4017

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
CALVERT CLIFFS NUCLEAR POWER PLANT, INC.
CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT NO. 2
DOCKET NO. 50-318
EXEMPTION

1.0 BACKGROUND

Calvert Cliffs Nuclear Power Plant, Inc. (CCNPPI or the licensee) is the holder of Facility Operating License No. DPR-69, which authorizes operation of Calvert Cliffs Nuclear Power Plant, Unit 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, in part, to the generation of hydrogen gas from a metal-water reaction between the reactor coolant and reactor fuel having 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 enable CCNPP2 to operate in Cycle 14 with a core containing a lead fuel (test) assembly (LFA) including fuel rods with advanced zirconium alloy cladding.

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 a calculation demonstrating adequate ECCS performance for CCNPP2 and has shown that use of the lead fuel assembly does not have a significant impact on that previous calculation. The lead fuel assembly, with the zirconium-based alloy cladding, meets the same design basis as the Zircaloy-4 fuel which is currently in the CCNPP2 reactor core and has similar thermal-hydraulic characteristics. Because the LFA will be placed in a non-limiting location (Technical Specification 4.2.1 limits placement of the LFA to a non-limiting location in the core), the placement scheme and the similarity of the advanced alloys to Zircaloy-4 will assure that the behavior of the fuel rods clad with these alloys are bounded by the fuel performance and safety analyses performed for the

Zircaloy-4 clad rods currently in the Unit 2 core. No safety limits will be changed or setpoints altered as a result of using the lead fuel assembly.

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 LFA and fuel currently in use at CCNPP2 are of like geometry. Therefore, the staff concludes that use of the LFA will not introduce a mixed core penalty into the safety analyses for CCNPP2.

Based on the above, the staff finds that the licensee has achieved the underlying purpose of 10 CFR 50.46 and 10 CFR Part 50, Appendix K with respect to use of the LFA at CCNPP2.

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 small number of fuel rods in the lead fuel assembly containing advanced zirconium-based claddings in conjunction with the chemical similarity of the advanced claddings to zircaloy and ZIRLO ensures that previous calculations of hydrogen production resulting from a metal-water reaction would not be significantly changed. The licensee calculated the metal-water reaction rate for the advanced zirconium-based cladding material and determined that the amount of hydrogen generated will be within the design basis. As such, the licensee has achieved the underlying purpose of 10 CFR 50.44.

The staff examined the licensee's rationale to support the exemption request and concurred that the use of an LFA in the Unit 2 core for Cycle 14 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 would not serve the underlying purpose of the rule.

Therefore, the staff concludes that granting an exemption under the special circumstances of 10 CFR 50.12(a)(2)(ii) is appropriate and that an LFA containing fuel rods with advanced zirconium alloy cladding may be used in CCNPP Unit 2, Cycle 14.

4.0 CONCLUSION

Accordingly, the Commission has determined that, pursuant to 10 CFR 50.12(a), the exemption is authorized by law, will not endanger life or property or common defense and security, and is, otherwise, in the public interest. Also, special circumstances are present. Therefore, the Commission hereby grants CCNPPI an exemption from the requirements of 10 CFR Part 50, Section 50.44, Section 50.46, and 10 CFR Part 50, Appendix K, for CCNPP2.

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 (66 FR 11608).

This exemption is effective upon issuance.

Dated at Rockville, Maryland, this 6th day of March 2001.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

John A. Zwolinski, Director
Division of Licensing Project Management
Office of Nuclear Reactor Regulation