

James A. Spina
Vice President

Calvert Cliffs Nuclear Power Plant, Inc.
1650 Calvert Cliffs Parkway
Lusby, Maryland 20657
410.495.5200
410.495.3500 Fax



February 27, 2007

U. S. Nuclear Regulatory Commission
Washington, DC 20555

ATTENTION: Document Control Desk

SUBJECT: Calvert Cliffs Nuclear Power Plant
Unit No. 1; Docket Nos. 50-317
License Amendment Request: Use of Lead Fuel Assemblies

REFERENCE: (a) Letter from Mr. J. A. Spina (CCNPP) to Document Control Desk (NRC), dated February 23, 2007, Temporary Exemption Request for Use of Lead Fuel Assemblies

Pursuant to 10 CFR 50.90, Calvert Cliffs Nuclear Power Plant requests an amendment to the Renewed Operating License No. DPR-53 to incorporate the change described below into the Technical Specifications for Calvert Cliffs Unit No. 1. In a letter dated February 23, 2007 (Reference a), we submitted a request for a temporary exemption that would allow the insertion of up to four lead fuel assemblies (LFAs) into the Unit 1 core for one cycle of operation. These lead fuel assemblies are currently installed in the Unit 2 core and are scheduled to be discharged during the 2007 refueling outage. We intend to reinstall up to four of these lead fuel assemblies in the Unit 1 Cycle 19 core in the spring 2008 refueling outage. The justification for reinstallation of these lead fuel assemblies into the Unit 1 core is contained in Reference (a).

Currently, Calvert Cliffs Technical Specification 4.2.1, Fuel Assemblies, only allows fuel that is clad with either Zircaloy or ZIRLO™. Therefore, to allow the installation of these lead fuel assemblies into the Unit 1 core a change is needed to Technical Specification 4.2.1 to allow non-Zircaloy based cladding to be placed in the core in accordance with the requested temporary exemption. Pursuant to 10 CFR 50.90, we request an amendment to the Calvert Cliffs Unit 1 Technical Specifications to allow the installation of up to two Westinghouse and two AREVA LFAs into the Unit 1 Cycle 19 core as allowed by the requested temporary exemption (Reference a). The proposed change to Technical Specification 4.2.1 is described in Attachment (1). Attachment (2) contains the marked-up Technical Specification page. The final Technical Specification pages will be renumbered to accommodate the insertion of this change, if necessary.

SAFETY COMMITTEE REVIEW

The Plant Operations Review Committee has reviewed this proposed change and concur that operation with the proposed changes will not result in an undue risk to the health and safety of the public.

A001

Document Control Desk
February 27, 2007
Page 3

cc: D. V. Pickett, NRC
S. J. Collins, NRC

Resident Inspector, NRC
R. I. McLean, DNR

ATTACHMENT (1)

TECHNICAL BASIS AND NO SIGNIFICANT HAZARDS CONSIDERATION

TABLE OF CONTENTS

- 1.0 DESCRIPTION
- 2.0 PROPOSED CHANGE
- 3.0 BACKGROUND
- 4.0 TECHNICAL ANALYSIS
- 5.0 REGULATORY ANALYSIS
- 6.0 ENVIRONMENTAL CONSIDERATION
- 7.0 PRECEDENCE
- 8.0 REFERENCES

ATTACHMENT (1)

TECHNICAL BASIS AND NO SIGNIFICANT HAZARDS CONSIDERATION

1.0 DESCRIPTION

This letter is a request to amend Renewed Operating License DPR-53 for Calvert Cliffs Nuclear Power Plant, Inc., Unit 1. Except for approved exemptions, Calvert Cliffs Technical Specification 4.2.1, Fuel Assemblies, only allows fuel that is clad with either Zircaloy or ZIRLO™. Pursuant to Title 10 Code of Federal Regulations (CFR) 50.90, we request an Amendment to the Calvert Cliffs Unit 1 Technical Specifications to allow the installation of up to two Westinghouse and two AREVA lead fuel assemblies (LFAs) with advanced cladding into the Unit 1 Cycle 19 core.

2.0 PROPOSED CHANGE

This submittal proposes to change Technical Specification 4.2.1, Fuel Assemblies, as shown on the marked-up pages for Calvert Cliffs in Attachment (2). The change allows up to four fuel assemblies with advanced cladding material to be inserted in the Unit 1 Cycle 19 core.

The standard reload analysis process and 50.59 evaluation will ensure that the predicted chemical, mechanical, and material performance of the advanced zirconium-based cladding remain within that approved for Zircaloy or ZIRLO™ under all anticipated operational occurrences and postulated accidents. Additionally, the LFAs will be placed in core locations that will produce peak rod burnups of greater than the currently approved limit for Calvert Cliffs of 60,000 MWD/MTU. Justification for the greater peak rod burnup is provided separately. This amendment request is for the use of an approved exemption in Technical Specification 4.2.1.

3.0 BACKGROUND

The Calvert Cliffs Unit 1 core consists of 217 fuel assemblies. Each standard fresh fuel assembly consists of 176 fuel rods, 5 guide tubes, a bottom Inconel and 8 Zircaloy fuel rod spacer grids, upper and lower end fittings, and a hold-down device. The rods are arranged in a square 14x14 array. The guide tubes, spacer grids, and end fittings form the structural frame of the assembly. The four outer guide tubes are mechanically attached to the end fittings and the spacer grids are welded to all five guide tubes.

In a standard fresh fuel assembly, the fuel rods consist of slightly enriched uranium dioxide cylindrical ceramic pellets and a round wire stainless steel compression spring located at the top of the fuel column, all encapsulated within a seamless ZIRLO™ tube with a Zircaloy-4 cap welded at each end. The uranium dioxide pellets are dished and chamfered on both ends to accommodate thermal expansion and swelling. The LFAs contain advanced cladding material that does not meet the definition of Zircaloy or ZIRLO™.

In April 2003, eight LFAs (four from Westinghouse and four from AREVA) were inserted into the Unit 2 core in accordance with the approval granted for the LFAs in References (4) and (5). References (4) and (5) allowed operation with these eight LFAs for two cycles. References (2) and (3) noted that the LFAs would be removed after two cycles and have inspections performed. Since References (2) and (3) were generated, Calvert Cliffs has re-evaluated our LFA program and desires to irradiate four of the LFAs (up to two from each manufacturer) to a higher burnup level than currently allowed for non-LFAs. We identified in References (2) and (3) that a separate temporary exemption request would be needed for re-insertion of the LFAs into the core for a third cycle. We provided that request in Reference (1).

Our current schedule assumes that four LFAs are discharged to the spent fuel pool for the detailed post-irradiation inspection required for higher burnup assemblies during the 2007 refueling outage for Unit 2. Placement of these assemblies in the core is in accordance with all of the conditions and restrictions contained in Reference (6).

ATTACHMENT (1)

TECHNICAL BASIS AND NO SIGNIFICANT HAZARDS CONSIDERATION

We have requested a temporary exemption to install up to four LFAs into the Unit 1 core during its next operating cycle (Unit 1 Cycle 19). This license amendment request would allow implementation of the temporary exemption.

4.0 TECHNICAL ANALYSIS

The CFR specifies standards and acceptance criteria only for fuel rods clad with Zircaloy or ZIRLO™. Thus, a temporary exemption was requested (Reference 1) to use fuel rods clad with an advanced alloy that is not Zircaloy or ZIRLO™. The original license amendment was only approved for Unit 2 Cycles 15 and 16.

As noted in References (2) and (3), the Calvert Cliffs LFA program is intended to provide data to support the use of new and improved fuel cladding material and fuel evaluation codes and methods. Additionally, References (2) and (3) stated that the LFAs may be reinserted for a third cycle and that an explicit submittal for use during an additional cycle would be provided at that time. Reference (1) constitutes that request and this license amendment request is made to allow implementation of the temporary exemption.

References (2) and (3) were generated with the assumption that the LFAs would see two fuel cycles of duty, and would then be discharged to the spent fuel pool to allow for detailed inspections. However, as noted above, we plan to place up to four LFAs back into the Unit 1 core to gain experience for these assemblies as they will reside at an appropriate location to increase their burnup above the current limit for non-LFAs during their third cycle.

The LFAs placed back in the core will exceed the peak fuel rod burnup limitation of 60,000 MWD/MTU and will meet all other applicable site reload design criteria. Other changes associated with the reload core design are evaluated under 10 CFR 50.59.

A visual inspection was performed on several of the LFAs during the 2005 refueling outage and no anomalies or unexpected cladding behavior was observed. A visual inspection of the LFAs will also be performed during the 2007 refueling outage to confirm expected cladding behavior. Detailed post-irradiation inspections will also be performed on the four discharged assemblies.

5.0 REGULATORY ANALYSIS

5.1 No Significant Hazards Consideration

The proposed change to the Technical Specifications has been evaluated against the standards in 10 CFR 50.92. The proposed change has been determined to not involve a significant hazards consideration, in that operation of the facility in accordance with the proposed amendments:

1. *Would not involve a significant increase in the probability or consequences of an accident previously evaluated.*

Calvert Cliffs Technical Specification 4.2.1, Fuel Assemblies, states that fuel rods are clad with either Zircaloy or ZIRLO™. Calvert Cliffs Nuclear Power Plant, Inc. proposes to re-insert up to four fuel assemblies into Calvert Cliffs Unit 1 that have some fuel rods clad in zirconium alloys that do not meet the definition of Zircaloy or ZIRLO™. A temporary exemption to the regulations has been requested to allow these fuel assemblies to be re-inserted into Unit 1. The proposed change to the Calvert Cliffs Technical Specifications will allow the use of cladding materials that are not Zircaloy or ZIRLO™ for one fuel cycle once the temporary exemption is approved. The proposed change to the Technical Specification is effective only as long as the temporary exemption is effective. The addition of what will be an approved temporary exemption for Unit 1 to Technical

ATTACHMENT (1)

TECHNICAL BASIS AND NO SIGNIFICANT HAZARDS CONSIDERATION

Specification 4.2.1 does not change the probability or consequences of an accident previously evaluated.

Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. *Would not create the possibility of a new or different type of accident from any accident previously evaluated.*

The proposed change does not add any new equipment, modify any interfaces with existing equipment, change the equipment's function, or change the method of operating the equipment. The proposed change does not affect normal plant operations or configuration. Since the proposed change does not change the design, configuration, or operation, it could not become an accident initiator.

Therefore, the proposed change does not create the possibility of a new or different type of accident from any previously evaluated.

3. *Would not involve a significant reduction in the margin of safety.*

The proposed change will add an approved temporary exemption to the Calvert Cliffs Technical Specifications allowing the installation of up to four lead fuel assemblies. The assemblies use advanced cladding materials that are not specifically permitted by existing regulations or Calvert Cliffs' Technical Specifications. A temporary exemption to allow the installation of these assemblies has been requested. The addition of an approved temporary exemption to Technical Specification 4.2.1 is an administrative change to allow the installation of the lead fuel assemblies under the provisions of the temporary exemption. The license amendment is effective only as long as the exemption is effective. This amendment does not change the margin of safety since it only adds a reference to an approved, temporary exemption to the Technical Specifications.

Therefore, the proposed change does not involve a significant reduction in the margin of safety.

5.2 Regulatory Requirements

Title 10 CFR 50.46(a)(1)(i) states, "Each boiling or pressurized light-water nuclear power reactor fueled with uranium oxide pellets within cylindrical zircaloy or ZIRLO cladding must be provided with an emergency core cooling system (ECCS) that must be designed so that its calculated cooling performance following postulated loss-of-coolant accidents conforms to the criteria set forth in paragraph (b) of this section. ECCS cooling performance must be calculated in accordance with an acceptable evaluation model and must be calculated for a number of postulated loss-of-coolant accidents of different sizes, locations, and other properties sufficient to provide assurance that the most severe postulated loss-of-coolant accidents are calculated." Section 10 CFR 50.46 goes on to delineate specifications for peak cladding temperature, maximum cladding oxidation, maximum hydrogen generation, coolable geometry, and long-term cooling.

Additionally, 10 CFR Part 50, Appendix K, paragraph I.A.5, states, "The rate of energy release, hydrogen generation, 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 or ZIRLO™ cladding, the use of fuel with zirconium-based alloys that do not conform to either of these two designations requires an exemption from this section of the Code.

ATTACHMENT (1)

TECHNICAL BASIS AND NO SIGNIFICANT HAZARDS CONSIDERATION

Because 10 CFR 50.46 and 10 CFR Part 50, Appendix K do not explicitly apply to either the AREVA or Westinghouse advanced claddings, we have requested an exemption (Reference 1) from these regulations to allow use of these advanced claddings in the Unit 1 core. In doing so, we provided information to show compliance with the provisions of 10 CFR 50.12.

6.0 ENVIRONMENTAL CONSIDERATION

We have determined that operation with the proposed amendment would not result in any significant change in the types, or significant increases in the amounts, of any effluents that may be released offsite, and no significant increases in individual or cumulative occupational radiation exposure. The addition of four LFAs at a slightly higher burnup to the full core does not significantly change the type or amount of effluents released nor does it significantly affect occupational radiation exposure. We have evaluated the effects of allowing these four fuel assemblies to be irradiated beyond the currently allowed burnup limits on the existing accident analyses. We reviewed the fuel handling accident, waste processing source terms, environmental qualification source terms for equipment and the decay heat load in the spent fuel pool. All of these radiological and heat effects are bounded by the existing analyses. Irradiating these four assemblies beyond the currently allowed burnup limits does not have a significant effect on the types or amounts of effluents that might be released offsite. Therefore, the proposed amendment is eligible for categorical exclusion as set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement, or environmental assessment is needed in connection with the approval of the proposed amendment.

ATTACHMENT (1)

TECHNICAL BASIS AND NO SIGNIFICANT HAZARDS CONSIDERATION

7.0 PRECEDENT

Approval was granted to allow the use of a temporary exemption for insertion of up to four LFAs for a third cycle.

- Letter from Mr. P. D. Milano (NRC) to Mr. J. A. Spina (CCNPP), dated November 16, 2006, Amendments Re: Use of lead Fuel Assemblies (TAC Nos. MD0243 and MD0244)

8.0 REFERENCES

1. Letter from Mr. J. A. Spina (CCNPP) to Document Control Desk (NRC), dated February 23, 2007, Temporary Exemption Request for Use of Lead Fuel Assemblies
2. Letter from Mr. P. E. Katz (CCNPP) to Document Control Desk (NRC), dated July 17, 2002, Westinghouse Lead Fuel Assemblies – Temporary Exemption Request and License Amendment Request
3. Letter from Mr. P. E. Katz (CCNPP) to Document Control Desk (NRC), dated August 6, 2002, Framatome Lead Fuel Assemblies - Temporary Exemption Request and License Amendment Request
4. Letter from Mr. G. S. Vissing (NRC) to Mr. P. E. Katz (CCNPP), dated April 11, 2003, Exemption from the Requirements of 10 CFR 50.44, 10 CFR 50.46, and 10 CFR 50, Appendix K (TAC Nos. MB5648 and MB6065)
5. Letter from Mr. G. S. Vissing (NRC) to Mr. P. E. Katz (CCNPP), dated April 14, 2003, Amendments re: Lead Fuel Assemblies (TAC Nos. MB5646, MB5647 and MB6064)
6. Westinghouse Topical Report, WCAP-15604-NP-A, Revision 2A, Limited Scope High Burnup Lead Test Assemblies, September 2003

ATTACHMENT (2)

MARKED-UP TECHNICAL SPECIFICATION PAGE

4.0-1

4.0 DESIGN FEATURES

4.1 Site Location

The site for the Calvert Cliffs Nuclear Power Plant is located on the western shore of the Chesapeake Bay in Calvert County, Maryland, about 10-1/2 miles Southeast of Prince Frederick, Maryland. The site is approximately 45 miles southeast of Washington, DC, and 60 miles south of Baltimore, Maryland. The exclusion area boundary has a minimum radius of 1,150 meters from the center of the plant.

4.2 Reactor Core

4.2.1 Fuel Assemblies

The reactor shall contain 217 fuel assemblies. Each assembly shall consist of a matrix of Zircalloy or ZIRLO fuel rods with an initial composition of natural or slightly enriched uranium dioxide (UO_2) as fuel material. Limited substitutions of zirconium alloy or stainless steel filler rods for fuel rods, in accordance with approved applications of fuel rod configurations, may be used. Fuel assemblies shall be limited to those fuel designs that have been analyzed with applicable NRC staff approved codes and methods and shown by tests or analyses to comply with all fuel safety design bases. A limited number of lead test assemblies that have not completed representative testing may be placed in nonlimiting core regions. For Unit 2 Cycle 14 only, advanced cladding material may be used in one lead test assembly as described in an approved temporary exemption dated March 6, 2001. For Unit 1 Cycle 19 or Unit 2 Cycle 17 only, advanced cladding material from Framatome-ANP may be used in up to two lead test assemblies as described in approved temporary exemption dated November 9, 2006. For Unit 1 Cycle 19 or Unit 2 Cycle 17 only, advanced cladding material from Westinghouse may be used in up to two lead test assemblies as described in approved temporary exemption dated November 9, 2006.

↑
Insert

Insert

For Unit 1 Cycle 19 only, advanced cladding material from AREVA may be used in up to two lead test assemblies as described in approved temporary exemption dated MM DD, YYYY. For Unit 1 Cycle 19 only, advanced cladding material from Westinghouse may be used in up to two lead test assemblies as described in approved temporary exemption dated MM DD, YYYY.