April 8, 2002

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 NOS. 1 AND 2 - AMENDMENT RE: IMPLEMENTATION OF ZIRLO CLAD FUEL RODS (TAC NOS. MB2540 AND MB2541)

Dear Mr. Cruse:

The Commission has issued the enclosed Amendment No. 251 to Renewed Facility Operating License No. DPR-53 and Amendment No. 228 to Renewed Facility Operating License No. DPR-69 for the Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2. This amendment consists of changes to the Technical Specifications (TSs) in response to your application transmitted by letter dated July 27, 2001, as supplemented on January 16, and February 26, 2002.

The amendments add additional references to Technical Specification 5.6.5.b to allow the use of ZIRLO™ clad fuel rods in the Calvert Cliffs reactor cores.

A copy of the related Safety Evaluation is enclosed. A Notice of Issuance will be included in the Commission's next regular biweekly *Federal Register* notice.

Sincerely,

***/RA/***

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

Docket Nos. 50-317 and 50-318

Enclosures: 1. Amendment No. 251 to DPR-53
2. Amendment No. 228 to DPR-69
3. Safety Evaluation

cc w/encls: See next page

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3. Safety Evaluation

cc w/encls: See next page
Package: ML021000169 TSs: ML020990433
Accession Number: ML020790273 **See previous concurrence
*input provided by safety evaluation dated 03/14/02 incorporated with no significant changes

| OFFICE | PDI-1/PM | PDI-1/LA | SRXB/SC | PDI-1/SC | OGC |
|---|---|---|---|---|---|
| NAME | DSkay | SLittle | RCaruso* | RLaufer | AHodgdon** |
| DATE | 4/8/02 | 04/01/02 | 03/14/02 | 4/8/02 | 04/03/02 |

**OFFICIAL RECORD COPY**

DATED: April 8, 2002

AMENDMENT NO. 251 TO RENEWED FACILITY OPERATING LICENSE NO. DPR-53
CALVERT CLIFFS UNIT 1

AMENDMENT NO. 228 TO RENEWED FACILITY OPERATING LICENSE NO. DPR-69
CALVERT CLIFFS UNIT 2

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PDI-1 R/F
R. Laufer
S. Little
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OGC
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B. Platchek, RI

cc: Plant Service list

CALVERT CLIFFS NUCLEAR POWER PLANT, INC.

DOCKET NO. 50-317

CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT NO. 1

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 251
Renewed License No. DPR-53

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Calvert Cliffs Nuclear Power Plant, Inc. (the licensee) dated July 27, 2001, as supplemented on January 16 and February 26, 2002, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.2. of Renewed Facility Operating License No. DPR-53 is hereby amended to read as follows:

2. Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 251, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance and shall be implemented within 60 days.

FOR THE NUCLEAR REGULATORY COMMISSION

***/RA/***

Richard J. Laufer, Chief, Section 1
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: April 8, 2002

CALVERT CLIFFS NUCLEAR POWER PLANT, INC.

DOCKET NO. 50-318

CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT NO. 2

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 228
Renewed License No. DPR-69

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Calvert Cliffs Nuclear Power Plant, Inc. (the licensee) dated July 27, 2001, as supplemented on January 16 and February 26, 2002, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.2. of Renewed Facility Operating License No. DPR-69 is hereby amended to read as follows:

2. Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 228, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance and shall be implemented within 60 days.

FOR THE NUCLEAR REGULATORY COMMISSION

***/RA/***

Richard J. Laufer, Chief, Section 1
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: April 8, 2002

ATTACHMENT TO LICENSE AMENDMENTS

AMENDMENT NO. 251 TO RENEWED FACILITY OPERATING LICENSE NO. DPR-53

AMENDMENT NO. 228 TO RENEWED FACILITY OPERATING LICENSE NO. DPR-69

DOCKET NOS. 50-317 AND 50-318

Replace the following pages of the Appendix A Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

| Remove Pages | Insert Pages |
|---|---|
| 5.0-39 | 5.0-39 |
| 5.0-40 | 5.0-40 |
| 5.0-41 | 5.0-41 |

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 251 TO RENEWED

FACILITY OPERATING LICENSE NO. DPR-53

AND AMENDMENT NO. 228 TO RENEWED FACILITY OPERATING LICENSE NO. DPR-69

CALVERT CLIFFS NUCLEAR POWER PLANT, INC.

CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT NOS. 1 AND 2

DOCKET NOS. 50-317 AND 50-318

## 1.0 INTRODUCTION

By letter dated July 27, 2001, as supplemented by letters dated January 16 and February 26, 2002, Calvert Cliffs Nuclear Power Plant, Inc. (CCNPPI), requested an amendment to Technical Specification (TS) Section 5.0 for Calvert Cliffs Nuclear Power Plant (CCNPP) Unit Nos. 1 and 2. The requested changes would add three Topical Reports to the list of allowed analytical methods used to determine core operating limits in TS 5.6.5.b: CENPD-404-P-A, "Implementation of ZIRLO Cladding Material in CE [Combustion Engineering] Nuclear Power Fuel Assembly Designs;" CENPD-132, Supplement 4-P-A, "Calculative Methods for the CE Nuclear Power Large Break LOCA [loss-of-coolant accident] Evaluation Model;" and CENPD-137, Supplement 2-P-A, "Calculative Methods for the ABB CE Small Break LOCA Evaluation Model." The January 16 and February 26, 2002, letters provided clarifying information that did not change the initial proposed no significant hazards consideration determination.

## 2.0 BACKGROUND

The inclusion of these analytical methods to the list of allowed analytical methods will allow CCNPPI to implement the use of ZIRLO clad fuel for the CCNNP units. CCNPPI believes that the use of ZIRLO cladding material will reduce exterior corrosion and spallation currently experienced with the Zircaloy-4 clad fuel rods.

The NRC staff previously reviewed and approved the use of ZIRLO cladding material for use in CE Nuclear Power (CENP) plants subject to plant-specific conditions. These conditions are as follows:

1. The corrosion limit, as predicted by the best-estimate model will remain below 100 microns for all locations of the fuel.

2. All of the conditions listed in the safety evaluations (SEs) for all CENP methodologies used for ZIRLO fuel analysis will continue to be met, except that the use of ZIRLO cladding in addition to Zircaloy-4 cladding is now approved.

3. All CENP methodologies will be used only within the range for which ZIRLO data was acceptable and for which the verification discussed in CENPD-404-P and related responses to requests for additional information were performed.

4. Until data is available demonstrating the performance of ZIRLO cladding in CENP plants, the fuel duty will be limited for each CENP plant with some provision for adequate margin to account for variations in core design (e.g., cycle length, plant operating conditions, etc.). Details of this condition will be addressed on a plant-specific basis during the approval to use ZIRLO in a specific plant.

5. The burnup limit for this approval is 60 MWD/MTU.

In addition, the topical report which approves the use of ZIRLO clad fuel pins for use in CENP plants requires the use of specific versions of the Westinghouse Emergency Core Cooling System (ECCS) performance evaluation models for CE designed pressurized-water reactors.

## 3.0 EVALUATION

### 3.1 Conditions for use of CENPD-404-P-A

Condition 1

CCNPPI stated that it will use the best-estimate models and methods for calculating the corrosion thickness as described and approved by the staff in CENPD-404-P-A. In addition, CCNPPI will take waterside corrosion measurements of the high duty ZIRLO fuel to verify that the corrosion thickness correlates to the fuel duty as expected. This approach is acceptable to the staff because it provides the licensee with an approved method for calculating the corrosion thickness and verifies that the fuel will perform as predicted by the modeling correlations.

Condition 2

The licensee stated in its letter dated January 16, 2002, that it will abide by all the conditions of the SEs needed for the implementation of ZIRLO cladding.

Condition 3

CCNPP commited to verify that the CENP methodologies are used with the accepted data ranges during the design and safety analysis for each fuel cycle. CENPD-404-P-A was approved by the NRC staff with a burnup limit of 60,000 MWD/MTU. CCNPP commits to maintaining this limit. These measures will ensure that CCNPP continues to meet the conditions of the SE and are acceptable means of ensuring compliance with the conditions in the SE.

Condition 4

The modified fuel duty index (mFDI) is dependent upon the time averaged oxide layer surface temperature, the total irradiation time, and the boiling rate. Although the fuel duty index model has not been reviewed by the staff, the correlation between MFDI versus the oxide thickness appears to be in better agreement than burnup versus oxide thickness. MFDI is also a useful tool to compare how aggressively the fuel is being burned. CCNPPI committed to restrict the MFDI of each ZIRLO clad fuel pin to 110% of the maximum fuel pin value previously experienced at CCNPP units (523). A fraction of the fuel pins in a limited number of assemblies (no more than 8) will be allowed to attain up to 120% of the maximum fuel pin value previously experienced (570). After the baseline value (maximum fuel pin value) is confirmed in a qualified analysis, it will be the baseline value which will not change during the process of collecting additional data to support increasing the mFDI. This restriction on the mFDI will be lifted after consultation with the NRC, if the mFDI and measured oxide thickness are found to be conservative or correlate as expected to the model predictions. The results of the measurements used to demonstrate that the oxide thickness is in good agreement with the predictions will be shared with the NRC. This proposal is acceptable because the mFDI will be restricted to a range where the model predictions for oxide buildup should be close to actual buildup based on the limited ZIRLO data used to support CENPD-404-P-A. Additionally, the actual results of measurements will be shared and discussed with the NRC prior to CCNPP lifting the mFDI limit.

Condition 5

CCNPPI stated that it will maintain the maximum integrated rod burnup below 60 GWD/MTU.

3.2 Use of CENPD-132, Supplement 4-P and CENPD-137, Supplement 2-P

CENPD-404-P-A requires the use of specific Westinghouse ECCS performance evaluation models. These include CENPD-132, Supplement 4-P, “Calculative Methods for the CE Large Break LOCA Evaluation Model”, and CENPD-137, Supplement 2-P, “Calculative Methods for the CE Small Break LOCA Evaluation Model.” These specific versions of the methodologies are required. Both of these methodologies are applicable to CCNPP; therefore, the staff finds it acceptable for CCNPPI to use them for plant analysis.

As indicated in the SE approving the use of ZIRLO clad fuel for CE designed nuclear power plants (Reference 3), “changes to the LOCA methodologies and models could affect the relative PCT [peak clad temperature] impact between the substituted properties and the ZIRLO specific properties. If the CENP LOCA methodologies and/or constituted models are changed in the future, documentation supporting the change(s) should include justification of the continued applicability of the methodology or model to ZIRLO.” Therefore, although the CCNPP TS is written to allow CCNPPI to use the latest approved revision of these methodologies, if the latest approved revision of these methodologies does not properly account for the applicability to ZIRLO, then use of the latest revision will invalidate the approval to use ZIRLO clad fuel.

3.3 Conclusion

Based on the above evaluation, the NRC staff finds it acceptable for CCNPP Unit Nos. 1 and 2 to amend TS Section 5.0, to include the use of Topical Reports CENPD-404-P-A,

"Implementation of ZIRLO Cladding Material in CE Nuclear Power Fuel Assembly Designs"; CENPD-132, Supplement 4-P-A, "Calculative Methods for the CE Nuclear Power Large Break LOCA Evaluation Model"; and CENPD-137, Supplement 2-P-A, "Calculative Methods for the ABB CE Small Break LOCA Evaluation Model" to the list of analytical methods used to determine core operating limits.

## 4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Maryland State official was notified of the proposed issuance of the amendments. The State official had no comments.

## 5.0 ENVIRONMENTAL CONSIDERATION

The amendments change a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such finding (66 FR 46476). Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

## 6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above that (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

## 7.0 REFERENCES

1. Letter from Charles Cruse, Constellation Nuclear Service Company, to the U.S. Nuclear Regulatory Commission, submitting a request for amendment to Technical Specification 5.6.5.b, July 27, 2001.

2. CE Nuclear Power LLC Methodology for "Implementation of ZIRLO Cladding Material in CE Nuclear Power Fuel Designs," CENPD-404-P-A, November 2001.

3. Safety Evaluation of Topical Report CENPD-404-P, Revision 0, "Implementation of ZIRLO Cladding Material in CE Nuclear Power Fuel Designs," dated September 12, 2001, and Correction to Safety Evaluation on Topical Report CENPD-404-P, Revision 0, "Implementation of ZIRLO Cladding Material in CE Nuclear Power Fuel Designs," dated October 12, 2001.

4. Letter from Charles Cruse, Constellation Nuclear Service Company, to the U.S. Nuclear Regulatory Commission, Response to Request for Additional Information, January 16, 2001.

5. Letter from Charles Cruse, Constellation Nuclear Service Company, to the U.S. Nuclear Regulatory Commission, Response to Request for Additional Information, February 26, 2001.

Principal Contributor: U. Shoop

Date: April 8, 2002

Calvert Cliffs Nuclear Power Plant
Unit Nos. 1 and 2

cc:

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