August 27, 2008

Mr. James A. Spina, Vice President
Calvert Cliffs Nuclear Plant, Inc.
Calvert Cliffs Nuclear Power Plant
1650 Calvert Cliffs Parkway
Lusby, MD 20657-4702

SUBJECT: CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT NO. 1 - AMENDMENT RE: LONG-TERM COUPON SURVEILLANCE PROGRAM (TAC NO. MD5509)

Dear Mr. Spina:

The Commission has issued the enclosed Amendment No. 288 to Renewed Facility Operating License No. DPR-53 for the Calvert Cliffs Nuclear Power Plant, Unit No. 1. This amendment, which is in response to your application transmitted by letter dated May 10, 2007, and supplemented by letters dated January 10 and July 18, 2008, fulfills the requirements identified in Appendix C, Additional Conditions, to Renewed Facility Operating License No. DPR-53 and further described in Amendment No. 267 issued on June 3, 2004.

The amendment describes the long-term coupon surveillance program for the carborundum samples found in the Unit No. 1 spent fuel pool (SFP). The program verifies that the carborundum degradation rates assumed in the licensee's analyses to prove subcriticality, as required by Title 10 of the *Code of Federal Regulations,* Section 50.68, remain valid over the 70-year life span of the Unit No. 1 SFP.

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/

Douglas V. Pickett, Senior Project Manager
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-317

Enclosures:
1. Amendment No. 288 to DPR-53
2. Safety Evaluation

cc w/encls: See next page

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Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

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2. Safety Evaluation
cc w/encls: See next page
Package No.: ML082180502
Amendment No.: ML082180478
Tech Spec No.: ML082180496

OFFICE	LPLI-1/PM	LPLI-1/LA	CSGB/BC	SRXB/BC	OGC	LPLI-1/BC
NAME	DPickett	SLittle	AHiser as signed on	GCranston	BSubin	MKowal
DATE	08/12/ 08	08 /11/ 08	7 / 24 / 08	08 / 20/ 08	08 / 27/08	08 / 27/ 08

OFFICIAL RECORD COPY

DATED: August 27, 2008

AMENDMENT NO. 288 TO RENEWED FACILITY OPERATING LICENSE NO. DPR-53
CALVERT CLIFFS UNIT 1

PUBLIC
LPLI-1 R/F
RidsNrrDorlLpi-1
RidsNrrLASLittle
RidsNrrPmDPickett
RidsOgcMailCenter
GHill (2)
RidsAcrsAcnew&mMailCenter
RidsNrrDciCsgb
LMiller, NRR
GDentel, RI

Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2

cc:

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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. 288
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 May 10, 2007, as supplemented by letters dated January 10 and July 18, 2008, 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 fulfilling the requirements identified in Appendix C, Additional Conditions, to Renewed Facility Operating License No. DPR-53 and further described in Amendment No. 267 issued on June 3, 2004.

3. This license amendment is effective as of the date of its issuance and shall be implemented within 30 days.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Mark G. Kowal, Chief
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the License

Date of Issuance: August 27, 2008

ATTACHMENT TO LICENSE AMENDMENTS

AMENDMENT NO. 288 TO RENEWED FACILITY OPERATING LICENSE NO. DPR-53

DOCKET NO. 50-317

Replace the following page of the Facility Operating License with the attached revised page. The revised page is identified by amendment number and contains marginal lines indicating the areas of change.

Remove Page	Insert Page
3	3

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 288 TO RENEWED

FACILITY OPERATING LICENSE NO. DPR-53

CALVERT CLIFFS NUCLEAR POWER PLANT, INC.

CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT NO. 1

DOCKET NO. 50-317

1.0 INTRODUCTION

By letter dated May 10, 2007 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML071440224), Calvert Cliffs Nuclear Power Plant, Inc. (the licensee), submitted their long-term Carborundum coupon surveillance program for the Calvert Cliffs Nuclear Power Plant (CCNPP) Unit No. 1 spent fuel pool (SFP) racks. Amendment No. 267 to CCNPP Unit No. 1, issued on June 3, 2004 (ADAMS Accession No. ML041040160), included a license condition that required the submission of a long-term coupon surveillance program as a license amendment for Nuclear Regulatory Commission (NRC) review and approval. This surveillance program must verify that the carborundum degradation rates assumed in the licensee's analysis to maintain criticality control, as required by Title 10 of the *Code of Federal Regulations*, Section 50.68, remain valid over the 70-year design life span of the CCNPP Unit No. 1 SFP. The licensee provided additional information in letters dated January 10 (ADAMS Accession No. ML080140341), and July 18, 2008 (ADAMS Accession No. ML082040579).

The letters dated January 10 and July 18, 2008, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the NRC staff's original proposed no significant hazards consideration determination as published in the *Federal Register*.

2.0 BACKGROUND

The licensee committed in their license renewal application to perform an analysis to demonstrate that the carborundum sheets can perform its criticality control function for over a 70-year service life. The NRC acknowledged this commitment in NUREG-1705, Section 3.10.2.4. This commitment created a need to account for the boron (B_{10}) loss during the additional 30 year exposure. The licensee calculated this loss performing a linear extrapolation of the loss rate to 70 years. This extrapolation was based on four data points measured from the coupons removed from the accelerated exposure program (five points were measured, but only four were used due to an anomalous data point). From the measured data, a 0.414-percent loss per year was calculated. This corresponded to a 26.2-percent of B_{10} loss at the end of the 70-year period. This predicted value of B_{10} loss was lower than the value determined by the

conservative reactivity calculations to be required for the reactivity control during plant life. Although the calculated value of B_{10} loss was acceptable, because it was based on a limited number of data, this prediction required future verification. Therefore, by letter dated February 25, 2004 (ADAMS Accession No. ML040610679) the licensee added a license condition which was in effect for 3 years to provide a surveillance program for verification. This was found to be acceptable because the licensee calculated that during those 3 years the loss of B_{10} from the carborundum sheets would be lower than 26.2-percent. The license condition reads as follows:

> This amendment requires the licensee develop a long-term coupon surveillance program for the Carborundum samples. This program must verify that the Carborundum degradation rates assumed in the licensee's analyses to prove subcriticality, as required by 10 CFR 50.68, remain valid over the seventy-year life span of the Unit 1 spent fuel pool. The licensee must submit this modified coupon surveillance program to the NRC under the 10 CFR 50.90 requirements for its review and approval.

This new surveillance program will allow the licensee to substantiate the assumptions made in the B_{10} degradation program. The licensee's neutron absorption material consists of borated sheets inserted between the walls of the fuel rack cells. The sheets used in the SFP are made of a composite material consisting of a boron carbide (B_4C) powder in a fiberglass matrix (carborundum sheet). The licensee will predict the degradation in the borated sheets using a long-term coupon surveillance program to ensure the borated sheets maintain sufficient B_4C to maintain a subcriticality minimum of 5 percent in the SFP. The degradation of the neutron absorption material can be monitored by periodic testing of the coupons that are representative of the materials in the SFP storage racks.

Since the installation of the coupon surveillance program, a total of 6 coupons from the accelerated exposure program have been removed. The first five coupons tested demonstrated less than 6-percent weight loss over a 14-year period. The most recent accelerated exposure coupon surveillance was performed in 2005 which demonstrated 9.5-percent loss in B_{10} which was reported to correspond with the extrapolation performed in response to NUREG-1705, Section 3.10.2.4. Only three coupons have been removed from the long-term exposure program and demonstrated less than 5-percent loss over a 17-year period.

3.0 EVALUATION

The licensee's long-term coupon surveillance program is designed to provide both accelerated and long-term exposure to gamma radiation and borated SFP water and it also allows for carborundum coupons to be removed from the SFP for examination. The coupon surveillance program provides for periodic monitoring of the condition of the neutron absorption material in the SFP. Accelerated exposure (Accelerated Surveillance Assembly, ASA) is achieved by placing a coupon by freshly discharged fuel and every outage moving it to a new location having freshly discharged fuel. The long-term exposure (Long-Term Surveillance Assembly, LTSA) consists of initially surrounding a coupon by freshly discharged fuel but throughout the duration of the coupon surveillance program keeping it in the same location in the SFP, surrounded by the same fuel. The new coupon trees for the long-term surveillance program will be placed in the space between racks in the SFP to allow the coupons to receive dose from the fuel that is in the rack locations on both sides. This configuration is stated to be an improvement over the

coupon tree that was used under the short-term coupon surveillance program that was approved for 3 years (Unit 1 License Amendment Number 267) given that coupon tree only allowed the coupons to receive dose primarily from the fuel in the storage rack location adjacent to that side.

The licensee stated that when a coupon is removed in accordance with the coupon surveillance program, the following measurements will be performed:

1. Visual Examination (physical observations).

2. Dimensional Measurements: Length and Width.

3. Weight.

4. Areal density measurements will be performed in 2009, 2017, 2025, 2037, and 2053 to confirm the B_{10} concentration. The licensee's complete coupon surveillance schedule is as follows:

Test Number	Coupon Surveillance Date	Coupon Type
10	2009	ASA
11	2013	ASA
12	2017	ASA
13	2021	ASA
14	2025	LTSA
15	2029	LTSA
16	2033	LTSA
17	2037	LTSA
18	2041	LTSA
19	2045	LTSA
20	2049	LTSA
21	2053	LTSA

Prior to installing the coupons in the SFP, each coupon was pre-characterized and the baseline was documented for each coupon. The licensee's acceptance criteria for visual examinations and dimensional, weight, and areal density measurements are as follows:

- Any evidence of gross changes or deterioration.
- Any change in the length and width of ± 0.5 inches compared to baseline.
- Any change in weight of ± 26-percent compared to baseline.

- Decrease in B_{10} content of ≥ 0.0177 g/cm^2 of plate compared to baseline.

The licensee's corrective actions are as follows:

- Coupon does not meet established acceptance criteria for visual examinations or dimensional and weight measurements.
    - Licensee will perform an areal density measurement on coupon regardless if it was scheduled and if the areal density measurement meets the established acceptance criteria, then expansion of the surveillance program will be determined by evaluations done as part of the corrective action program.
    - Licensee will expand the surveillance program to remove additional coupons for visual examinations, dimensional, weight, and areal density measurements.

- Established acceptance criteria for expanded surveillance program not met.
    - Licensee will perform an investigation evaluating the neutron absorbing capabilities meaning the impact on criticality control would be evaluated.

After visual examinations and dimensional and weight measurements are finished, the coupons will be returned to the coupon tree to support long-term testing. However, coupons will not be returned to the coupon tree after areal density measurements given that these measurements cannot be performed on site and may result in the integrity of the coupon being compromised.

The licensee has committed to provide the results of all future surveillances to the NRC within 6 months of completion of the surveillance. This report will include historical results and the most recent inspection results. In the event that the coupons do not meet the established acceptance criteria, the NRC staff may engage the licensee in further discussions regarding the justifications for their inspection results and corrective actions.

4.0 SUMMARY

The NRC staff has reviewed the information provided by the licensee related to its long-term carborundum coupon surveillance program that will be used to ensure the performance of the carborundum as a neutron absorption material to maintain criticality control. On the basis of this review, the staff concludes that the licensee's long-term carborundum coupon surveillance program is adequate to monitor the performance of the carborundum and to ensure that it does not undergo unacceptable degradation.

5.0 STATE CONSULTATION

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

6.0 ENVIRONMENTAL CONSIDERATION

The amendment changes 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 amendment involves 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 amendment involves no significant hazards consideration, and there has been no public comment on such finding (72 FR 33780). Accordingly, the amendment meets 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 amendment.

7.0 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 amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: Leslie Miller, NRR

Date: August 27, 2008