

December 19, 2002

Mr. P. E. Katz, Vice President
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: SAFETY INJECTION TANK SURVEILLANCE FREQUENCY
(TAC NOS. MB3974 AND MB3975)

Dear Mr. Katz:

The Commission has issued the enclosed Amendment No. 255 to Renewed Facility Operating License No. DPR-53 and Amendment No. 232 to Renewed Facility Operating License No. DPR-69 for the Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2. These amendments consist of changes to the Technical Specifications in response to your application transmitted by letter dated January 31, 2002, as supplemented on September 18, 2002.

These amendments change the method of verifying the boron concentration of each safety injection tank. Rather than taking a sample from each tank every 31 days, the revised surveillance requirement requires leakage into the tanks to be monitored every 12 hours and a sample to be taken every 6 months.

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 1
Project Directorate 1
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-317 and 50-318

Enclosures: 1. Amendment No. 255 to DPR-53
2. Amendment No. 232 to DPR-69
3. Safety Evaluation

cc w/encls: See next page

Calvert Cliffs Nuclear Power Plant
Unit Nos. 1 and 2

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cc w/encls: See next page

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*Input provided by memo dated 10/22/02 **Input provided by memo dated 10/15/02

OFFICE	PDI-1/PM	PDI-1/LA	SRXB:SC*	SPSB:SC**	PDI-1/SC	OGC
NAME	DSkay	SLittle	FAkstulewicz	FMReinhart	RLauffer	CBray
DATE	12/12/02	12/12/02	10/22/02	10/15/02	12/19/02	12/16/02

OFFICIAL RECORD COPY

DATED: December 19, 2002

AMENDMENT NO. 255 TO RENEWED FACILITY OPERATING LICENSE NO. DPR-53
CALVERT CLIFFS UNIT 1

AMENDMENT NO. 232 TO RENEWED FACILITY OPERATING LICENSE NO. DPR-69
CALVERT CLIFFS UNIT 2

PUBLIC
PDI-1 R/F
RLaufer
SLittle
DSkay
OGC
GHill (2)
WBeckner
ACRS
BPlatchek, RI
NSaltos
LLois

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. 255
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 January 31, 2002, as supplemented on September 18, 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. 255, are hereby incorporated into 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 30 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: December 19, 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. 232
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 January 31, 2002, as supplemented on September 18, 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. 232, 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 30 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:

ATTACHMENT TO LICENSE AMENDMENTS

AMENDMENT NO. 255 TO RENEWED FACILITY OPERATING LICENSE NO. DPR-53

AMENDMENT NO. 232 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

3.5.1-2
3.5.1-3

Insert Pages

3.5.1-2
3.5.1-3

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 255 TO RENEWED
FACILITY OPERATING LICENSE NO. DPR-53
AND AMENDMENT NO. 232 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 January 31, 2002, as supplemented September 18, 2002, the Calvert Cliffs Nuclear Power Plant, Inc. (the licensee) submitted a request for changes to the Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2 (CCNPP), Technical Specifications (TSs). The requested changes would modify Surveillance Requirement (SR) 3.5.1.4 regarding the frequency of the boron concentration measurements in the safety injection tanks (SITs). The current requirement is to take and analyze a tank sample every 31 days. The proposed modification is to increase the sampling period from 31 days to 6 months while requiring SIT level monitoring every 12 hours. The September 18, 2002, letter provided clarifying information that did not change the initial proposed no significant hazards consideration determination.

2.0 REGULATORY EVALUATION

The primary safety function of the four SITs is to inject large quantities of borated water into the reactor vessel during the blowdown phase of a large loss-of-coolant accident (LOCA) and to provide inventory to help accomplish the refill phase that follows the blowdown phase. Boron concentration is controlled in the SITs to prevent either excessive or insufficient boron concentrations. Post-LOCA emergency procedures, directing the operator to establish simultaneous hot and cold leg injection, are based on the worst case minimum boron precipitation time. Maintaining the SIT boron concentration within the upper limit, which is 2700 parts per million (ppm) for Calvert Cliffs, ensures that the borated water sources used for injection during a LOCA would not result in boron precipitation earlier than predicted by the design basis calculation. The minimum boron concentration requirement, which is 2300 ppm for Calvert Cliffs, is based on beginning-of-life reactivity values selected to ensure that the reactor will remain subcritical during the reflood stage of a large-break LOCA. During a large LOCA, all control element assemblies (CEAs) are assumed not to insert into the core, and the initial reactor shutdown is accomplished by void formation during blowdown. Sufficient boron concentration must be maintained in the SITs to prevent a return to criticality during the reflood stage of the LOCA.

The acceptance criteria for the SITs are the criteria listed in the Standard Review Plan Section 6.3 for the emergency core cooling system. The applicable General Design Criteria (GDC) for the proposed change are:

- GDC 17, regarding adequate capacity of the ECCS system to ensure core cooling;
- GDC 27, regarding system design to ensure core cooling with stuck rods; and
- GDCs 35, 36, and 37, regarding ECCS design and its capability to provide adequate cooling water with provisions for appropriate structural and functional system inspections.

The staff also assessed the proposed change against the principles defined in Regulatory Guide (RG) 1.174, "An Approach for using Probabilistic Risk Assessment in Risk-Informed Decisions On Plant-Specific Changes to the Licensing Basis". One of these principles is to show that if the proposed change results in an increase in risk, in terms of core damage frequency (CDF) and large early release frequency (LERF), this increase is small and consistent with the Commission's Safety Goal Policy Statement. Acceptance guidelines for meeting this principle are presented in RG 1.174. In addition, the staff reviewed the proposed change against the guidance provided in RG 1.177, "An Approach for Plant-Specific, Risk-Informed Decision Making: Technical Specifications."

3.0 TECHNICAL EVALUATION

3.1 Deterministic Evaluation

The licensee presented a calculation to demonstrate the amount of leakage required to lower the boron concentration from the administrative limit of 2450 ppm to the TS limit of 2300 ppm. The licensee concluded that in the extreme case of in-leakage of unborated water, 500 gallons would be required to bring the concentration to 2300 ppm, which would raise the level by 12 inches. This difference in the SIT level would require immediate measurement of the concentration by sampling in accordance with the requirements described in the proposed revised TS Bases.

All of the water added to the SITs is sampled and maintained by administrative procedures, which minimizes the possibility of accidental dilution. Boron concentration reduction by precipitation is a physical impossibility because at 32 °F the limiting concentration is 4400 ppm. The simultaneous inflow of unborated water (or reduced boron concentration) and equal outflow seems unlikely. To demonstrate this point, the licensee presented SIT measurement data over a 6-month period. The data indicate very little variation in either water level or boron concentration and no instance of boron concentration lower than the TS limit of 2300 ppm.

3.2 Probabilistic Evaluation

The licensee assessed the risk impact associated with a potential increase in the likelihood of boron concentration falling below the minimum requirement of 2300 ppm because of the proposed reduction in the surveillance testing frequency by sampling. The two mechanisms by which the boron concentration in the SITs can decrease are precipitation and dilution. Precipitation occurs when the solution of borated water becomes so saturated that the boron settles out of the solution. Because the boron concentration in the SITs is well below the solubility limit of boric acid, boron concentration reduction through precipitation is precluded. Dilution occurs through the addition of water containing a lower boron concentration than the

SITs. The proposed requirement to monitor inleakage to the tanks every 12 hours, based on SIT level changes, will limit significantly the likelihood of boron concentration reduction through dilution (verification by sampling is also required if 10 inches of accumulated inleakage is found in any SIT). Two realistic scenarios that would reduce the boron concentration through dilution are: (1) operator failure to monitor inleakage to the tanks; and (2) the possibility of leakage out of the tank which masks the leakage into the tank (i.e., boron dilution can occur without a detectable level change in the SITs).

The licensee did not assess the risk impact associated with a potential increase in the likelihood of not detecting the existence of a high boron concentration in the SITs (above 2700 ppm) because of the proposed reduction in the surveillance testing frequency by sampling. However, the staff finds that this risk impact is insignificant because the boron concentration of the water added to the SITs from the refueling water storage tank, whose boron concentration is controlled by TS, is also sampled at the discharge of the high-pressure safety injection pump. Such sampling ensures that the water being added to the SITs is within the required boron concentration limits prior to being added.

3.2.1 Objectives and Evaluation Criteria

The licensee's analysis follows the approach outlined in RG 1.174. The staff assessed the mean yearly increases in CDF and LERF, due to the proposed change, and compared them to the acceptance guidelines of RG 1.174. The approach used to assess the change in the unavailability of the SITs to provide borated water with concentration above 2300 ppm due to the proposed change in the surveillance testing interval, is consistent with guidance provided in RG 1.177.

In addition, the staff reviewed the quality of the submitted risk assessment to ensure that (1) no risk significant scenarios have been omitted and (2) the assumptions made and data used in the analysis are realistic or conservative.

3.2.2 Risk Impact of Proposed Change

The licensee assessed this risk impact (i.e., the risk associated with SIT boron dilution below the minimum requirement of 2300 ppm due to the proposed change) as the product of three terms: (1) the frequency of a large LOCA; (2) the probability of failure to insert all CEAs given a large LOCA; and (3) the increase in the likelihood of boron concentration falling below the minimum requirement of 2300 ppm (i.e., the increase in the unavailability of the SITs to inject borated water of adequate boron concentration to prevent a return to criticality during the reflood stage of the LOCA given all CEAs failed to insert). In addition to the base case estimate of the risk impact, sensitivity studies were performed to assess the potential impact of uncertainties on the results and ensure that any potential risk increase associated with the proposed TS change is small and within the guidelines provided in RG 1.174.

The following major considerations and assumptions were used in the assessment:

- The mean large-break LOCA frequency at Calvert Cliffs was assessed to be about $2.0E-6$ per year. This frequency was derived from the mean value of $5.0E-6$ per year reported in NUREG/CR-5750, "Rates of Initiating Events at U.S. Nuclear Power Plants: 1987-1995," and adjusting for the smaller range of large-break LOCA sizes at

Calvert Cliffs (the CCNPP large LOCA frequency is based on break sizes between 9.57" and double-ended rupture while the NUREG/CR-5750 large LOCA frequency is based on break sizes between 6" and double-ended rupture).

- Since the probability of failure to insert all CEAs depends on the size of the break, this probability was logarithmically interpolated for the entire break range assuming it is 50 percent for a double-ended rupture and negligible (1E-6) for the smallest large LOCA break. The uncertainty associated with this assumption was addressed by a sensitivity study which assumes that all CEAs will fail to insert during a large LOCA, independently of size.
- The unavailability of the SITs to inject borated water of adequate boron concentration (i.e., 2300 ppm or more) into the reactor coolant system was conservatively assessed to be 2 percent when the surveillance testing frequency by sampling is changed to once every 6 months (an increase of about an order of magnitude, from 0.2 percent to 2 percent, with respect to the case of monthly testing). This unavailability was based on actual data from the current monthly sampling tests which took place since the soft seat SIT discharge check valves were replaced with hard seats in the 1997 refueling outage for Unit 2 and the 1998 refueling outage for Unit 1. This replacement reduced the amount of leakage into the SITs. The information from over 350 actual data points indicates that the boron concentration never fell below 2300 ppm. Actual boron concentration changes, from the monthly sampling data points, were used to predict boron concentration changes that would have occurred if the sampling tests were performed every 6 months, as proposed, and without any boron concentration changes made by the operators (i.e., without any information from the monthly sampling tests). These projected boron concentration changes indicated that if the sampling tests had been performed every 6 months, the boron concentration would still not have fallen below the minimum required by the TS (i.e., 2300 ppm). Even though actual experience indicates that with a 6-month surveillance interval none of the samples would fall below 2300 ppm, the conservative calculation used in the risk analysis predicts a 2 percent probability of boron concentration being below 2300 ppm when the SITs are demanded. It is also important to note that in the calculation of the 2 percent probability, no credit was taken for the operators' ability to monitor the SIT level changes (proposed to take place every 12 hours) and take appropriate action.

The staff finds that the assumptions made and data used in the analysis produced the following results which can safely be used to draw conclusions about the proposed change.

Increase in CDF (base case): 2.0E-9/year

Increase in LERF (base case): Smaller than 2.0E-9/year (was not calculated)

Increase in CDF (all CEAs fail to insert during LOCA): 4.0E-8/year

Increase in LERF (all CEAs fail to insert during LOCA): Smaller than 4.0E-8/year

The results of the licensee's analysis indicate that the mean yearly increases in CDF and LERF due to the proposed change would be well below the RG 1.174 acceptance guidelines which are 1E-6/yr and 1E-7/yr, respectively, even when the sensitivity case assuming no CEA insertion during a large LOCA is considered.

In addition, the licensee committed to track the reliability of the SITs based on boron concentration from SIT samples under the Maintenance Rule, against appropriate goals. This provides extra assurance that the current availability of SITs to provide borated water with boron concentration above the minimum TS limit, as indicated by samples taken since check valve seat replacement, will be maintained even in the unlikely event of future valve leakage out of the tank which masks the leakage into the tank (i.e., boron dilution would occur without a detectable level change in the SITs).

3.3 Summary

The staff reviewed the information submitted by the licensee to support extending the surveillance interval for sampling the SIT boron concentration from 31 days to 6 months. The staff review of the information indicates that the change provides reasonable assurance that the boron concentration will not be below the TS limit of 2300 ppm and that none of the emergency core cooling system acceptance criteria (which apply to SITs) are affected in any way.

The staff reviewed the risk assessment information submitted by CCNPP in support of its request to modify SR 3.5.1.4 to change the method for verifying boron concentration in the SITs. The results of the licensee's risk analysis indicate that the mean yearly increases in CDF and LERF due to the proposed change would be well below the RG 1.174 acceptance guidelines which are 1E-6/yr and 1E-7/yr, respectively. In addition, the licensee committed to track the reliability of the SITs based on boron concentration from SIT samples under the Maintenance Rule, against appropriate goals. Therefore, the staff concludes that the risk information included in the CCNPP application supports the proposed change.

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 and changes the surveillance requirements. 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 (67 FR 18642). 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.

Principal Contributors: L. Lois
N. Saltos

Date: December 19, 2002