

February 26, 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: REANALYSIS OF LOSS OF FEEDWATER EVENT (TAC
NOS. MB3442 AND MB3443)

Dear Mr. Cruse:

The Commission has issued the enclosed Amendment No. 248 to Renewed Facility Operating License No. DPR-53 and Amendment No. 224 to Renewed Facility Operating License No. DPR-69 for the Calvert Cliffs Nuclear Power Plant (CCNPP), Unit Nos. 1 and 2. The amendments were issued in response to your application transmitted by letter dated November 19, 2001.

The amendments authorize revisions to the CCNPP Updated Final Safety Analysis Report to incorporate revisions to the loss of feedwater flow analysis. These changes require Nuclear Regulatory Commission approval pursuant to 10 CFR 50.59.

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 by PTam for DSkay/

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. 248 to DPR-53
2. Amendment No. 224 to DPR-69
3. Safety Evaluation

cc w/encls: See next page

February 26, 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: REANALYSIS OF LOSS OF FEEDWATER EVENT (TAC
NOS. MB3442 AND MB3443)

Dear Mr. Cruse:

The Commission has issued the enclosed Amendment No. 248 to Renewed Facility Operating License No. DPR-53 and Amendment No. 224 to Renewed Facility Operating License No. DPR-69 for the Calvert Cliffs Nuclear Power Plant (CCNPP), Unit Nos. 1 and 2. The amendments were issued in response to your application transmitted by letter dated November 19, 2001.

The amendments authorize revisions to the CCNPP Updated Final Safety Analysis Report to incorporate revisions to the loss of feedwater flow analysis. These changes require Nuclear Regulatory Commission approval pursuant to 10 CFR 50.59.

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 by PTam for DSkay/

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. 248 to DPR-53
2. Amendment No. 224 to DPR-69
3. Safety Evaluation

cc w/encls: See next page

Accession Number: ML020330002

*input provided by safety evaluation dated 01/25/02
incorporated with no significant changes.

OFFICE	PDI-1/PM	PDI-1/LA	BC:SRXB	PDI-1/ASC	OGC
NAME	DSkay	SLittle	JWermiel*	JMunday	ANicosia for JMoore
DATE	2/7/02	2/7/02	01/25/02	2/25/02	2/15/02

OFFICIAL RECORD COPY

DATED: February 26, 2002

AMENDMENT NO. 248 TO RENEWED FACILITY OPERATING LICENSE NO. DPR-53
CALVERT CLIFFS UNIT 1

AMENDMENT NO. 224 TO RENEWED FACILITY OPERATING LICENSE NO. DPR-69
CALVERT CLIFFS UNIT 2

DISTRIBUTION:

PUBLIC

PDI-1 R/F

EAdensam

JMunday

SLittle

DSkay

OGC

GHill (4)

WBeckner

ACRS

BPlatchek, RI

KDesai

cc: Plant Service list

Calvert Cliffs Nuclear Power Plant
Unit Nos. 1 and 2

cc:

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

James Petro, Esquire
Counsel
Constellation Power Source
111 Market Street
Baltimore, MD 21202

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

Mark Geckle
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

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. 248
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 November 19, 2001, 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 revising paragraph 2.C.3 of Renewed Facility Operating License No. DPR-53 to read as follows:

(3) Additional Conditions

The Additional Conditions contained in Appendix C as revised through Amendment No. 248, are hereby incorporated into this license. The licensee shall operate the facility in accordance with the Additional Conditions

3. The license is also amended by addition of a new condition to Appendix C to read:

This amendment requires the licensee to incorporate in the Updated Final Safety Analysis Report (UFSAR) changes associated with the loss of feedwater flow analysis which was evaluated by the staff in the safety evaluation dated February 26, 2002.

4. This license amendment is effective as of the date of its issuance and shall be implemented in conformance with the scheduling requirements specified in 10 CFR 50.71e.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Joel Munday, Acting Chief, Section 1
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment:
Appendix C

Date of Issuance: February 26, 2002

ATTACHMENT TO LICENSE AMENDMENTS

AMENDMENT NO. 248 TO RENEWED FACILITY OPERATING LICENSE NO. DPR-53

DOCKET NO. 50-317

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

Remove Page

Page 4

Insert Page

Page 4

<u>Amendment No.</u>	<u>Additional Conditions</u>	<u>Implementation Date</u>
246	This amendment requires the licensee to incorporate in the Updated Final Safety Analysis Report (UFSAR) changes associated with the aircraft hazards analysis which was evaluated by the staff in the Safety Evaluation dated August 29, 2001.	Next update of the UFSAR
248	This amendment requires the licensee to incorporate in the Updated Final Safety Analysis Report (UFSAR) changes associated with the loss of feedwater flow analysis which was evaluated by the staff in the safety evaluation dated February 26, 2002.	Next update of the UFSAR

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. 224
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 November 19, 2001, 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 revising paragraph 2.C.3 of Renewed Facility Operating License No. DPR-69 to read as follows:

(3) Additional Conditions

The Additional Conditions contained in Appendix C as revised through Amendment No. 224, are hereby incorporated into this license. The licensee shall operate the facility in accordance with the Additional Conditions

3. The license is also amended by addition of a new condition to Appendix C to read:

This amendment requires the licensee to incorporate in the Updated Final Safety Analysis Report (UFSAR) changes associated with the loss of feedwater flow analysis which was evaluated by the staff in the safety evaluation dated February 26, 2002.

4. This license amendment is effective as of the date of its issuance and shall be implemented in conformance with the scheduling requirements specified in 10 CFR 50.71e.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Joel Munday, Acting Chief, Section 1
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment:
Appendix C

Date of Issuance: February 26, 2002

ATTACHMENT TO LICENSE AMENDMENTS

AMENDMENT NO. 224 TO RENEWED FACILITY OPERATING LICENSE NO. DPR-69

DOCKET NO. 50-318

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

Remove Page

Page 4

Insert Page

Page 4

<u>Amendment No.</u>	<u>Additional Conditions</u>	<u>Implementation Date</u>
221	This amendment requires the licensee to incorporate in the Updated Final Safety Analysis Report (UFSAR) changes associated with the aircraft hazards analysis which was evaluated by the staff in the Safety Evaluation dated August 29, 2001.	Next update of the UFSAR
224	This amendment requires the licensee to incorporate in the Updated Final Safety Analysis Report (UFSAR) changes associated with the loss of feedwater flow analysis which was evaluated by the staff in the safety evaluation dated February 26, 2002.	Next update of the UFSAR

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 248 TO RENEWED

FACILITY OPERATING LICENSE NO. DPR-53

AND AMENDMENT NO. 224 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 November 19, 2001, Calvert Cliffs Nuclear Power Plant, Inc. (the licensee) submitted a request to Renewed Facility Operating License Nos. DPR-53 and DPR-69 for the Calvert Cliffs Nuclear Power Plant (CCNPP), Unit Nos. 1 and 2. These amendments authorize changes to the CCNPP Updated Final Safety Analysis Report (UFSAR) to incorporate revisions to the loss of feedwater (LOFW) analysis. These changes require Nuclear Regulatory Commission (NRC) approval pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50.59.

2.0 BACKGROUND

An LOFW event is defined as a reduction in feedwater flow to the steam generator (SG) without a corresponding reduction in steam flow from the SG. The closure of the feedwater regulating valves, the loss of condensate or feedwater pumps, or a pipe break in the condensate or feedwater systems during steady-state operation would result in an LOFW event. The LOFW analysis is performed to evaluate reactor coolant system (RCS) pressure, secondary system pressure, and the depletion of SG inventory following such an event. For each scenario, the initial conditions, input parameters, and assumptions are selected to maximize the parameter of concern.

During a recent fire protection inspection, some non-conservative assumptions were discovered in the licensee's current LOFW analysis. The assumptions in question are: (1) the use of normal steady-state conditions to calculate inventory versus level during LOFW conditions, (2) treatment of SG blowdown, (3) the single-failure treatment of the auxiliary feedwater system (AFW), and (4) sludge deposition in the SGs.

3.0 EVALUATION

The licensee revised the LOFW analysis and proposed modifications to correct the non-conservative assumptions as follows:

- (1) Calculation of inventory vs. level - the inventory left in the SGs for a given low-level trip setpoint for the revised analysis is less than the amount previously assumed. This also leads to a delay in the time of trip since more inventory must be depleted before the setpoint would be reached. This change impacts both the peak secondary pressure analysis and inventory analysis.
- (2) Treatment of SG blowdown - The licensee will install a modification to isolate SG blowdown upon receipt of an auxiliary feedwater actuation system (AFAS) signal to resolve this non-conservative assumption. This will prevent further SG inventory reduction in the event that an LOFW event were to occur. Prior to isolation of blowdown, the licensee used the computer code CESEC which is approved by the staff (SER dated February 14, 1984) to model SG blowdown flow. This change impacts the inventory analysis only.
- (3) The single-failure treatment of auxiliary feedwater system - The LOFW analysis assumes the worst single active failure within the AFW system. This failure is determined to be failure of the motor-driven AFW pump to deliver flow. An operator action is credited at 10 minutes to increase AFW flow from the steam-driven AFW pump. The operator action is consistent with their licensing basis Emergency Operating Procedures to ensure that the actions would occur in a time frame consistent with the analytical assumptions. Operators would have adequate indications to respond with the correct actions within the allotted time frame. This change impacts the inventory analysis only since the peak pressure analyses do not credit this system.
- (4) Sludge deposition in the SGs - In the current analysis, the sludge deposited in the SGs during normal operation is not accounted for when determining the inventory of water remaining in the SGs. The reanalysis considered sludge deposition in the inventory analysis. This issue has a small effect and although it affects only the current SGs, this will also account for any buildup of sludge in the replacement SGs. The impact in liquid inventory is minimal. It will only impact the inventory analysis.

The licensee performed an LOFW analysis for three distinct, separate scenarios: peak RCS pressure, peak secondary system pressure, and maximum depletion of SG inventory. Below are the results of the staff's review of these analyses:

Peak Pressure Analyses - Reactor Coolant System (RCS)

The initial conditions and inputs used to analyze the LOFW event are listed in Table 1 of the licensee's November 19, 2001, letter. These inputs are designed to maximize peak pressures at 100 percent power with no inoperable main steam safety valves (MSSVs). The licensee included appropriate uncertainties for all values. Parametric cases were run on several parameters to determine the worst set of conditions. Power-operated relief valves, atmospheric dump valves, and turbine bypass valves were assumed to be unavailable, as this would provide primary and secondary pressure relief. For the peak pressure events, SG blowdown was

assumed to be isolated prior to the event in order to delay the low-level trip. The worst case RCS pressure analysis assumed to be loss of AC power. The pressurizer pressure trip was credited in the analysis. The revised assumption regarding single-failure of the AFW system did not impact this scenario since the pressure analyses does not credit this system.

Using these assumptions, the licensee calculated the maximum RCS pressure to be 2620 psia which is below 110 percent of RCS design pressure, 2750 psia. The reactor protective system (RPS) and the pressurizer safety valves prevent the RCS from exceeding 110 percent of RCS design pressure.

Peak Pressure Analyses - Secondary System

The peak secondary pressure scenario assumed 100-percent power with no inoperable MSSVs. This event credits either the high pressurizer pressure trip or the SG low-level trip. The licensee calculated maximum SG pressure to be 1107 psia, including downcomer liquid head, which is below the 110 percent of SG design pressure limit of 1116.5 psia.

Steam Generator Inventory Depletion Analysis

The most limiting initial conditions and inputs for this analysis are presented in Table 4 of the licensee's November 19, 2001, submittal. The licensee included appropriate uncertainties for all values. Parametric cases were run on several parameters to determine the worst set of conditions. The worst case is with no loss of AC power. A change in the acceptance criteria from the current UFSAR analysis has been made for the inventory analysis portion only. The new acceptance criteria will be to demonstrate that the existing SG inventory, in combination with the low-level trip setpoint, auxiliary feedwater actuation signal setpoint, and AFW flow, is sufficient to prevent exceeding the RCS and SG design pressure limits and the specified acceptable fuel design limits (SAFDLs) for the departure from nucleate boiling ratio and linear heat rate. The actions of the RPS, engineered safety feature actuation system, MSSVs, pressurizer safety valves, and the AFW system prevent exceeding design pressures and SAFDLs. The LOFW event is an increasing pressure event and, therefore, the departure from nucleate boiling ratio of 1.21 is not limiting for this event. The LOFW event also results in a small power increase; however, the linear heat rate limit of 22kW/ft is not challenged. This is a heat-up transient and is most limiting at the beginning of the cycle. Therefore, extended fuel burn-up has no adverse impact on the event. The radiological consequences of this event are bounded by the loss of AC power event, which remains within 10 CFR Part 100 limits.

Conclusion

The NRC staff has reviewed the information submitted by the licensee and concludes that the submitted analyses demonstrate that 110 percent of RCS and SG design pressures are not exceeded and SAFDLs are protected. The revised LOFW analysis used conservative assumptions and demonstrated acceptable results which are consistent with Standard Review Plan Section 15.2.7 acceptance criteria. Therefore, the staff finds this LOFW event reanalysis acceptable.

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 (67 FR 925). 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 Contributor: K. Desai

Date: February 26, 2002