September 20, 1993

Docket Nos. 50-317
and 50-318

Mr. Robert E. Denton
Vice President - Nuclear Energy
Baltimore Gas and Electric Company
Calvert Cliffs Nuclear Power Plant
1650 Calvert Cliffs Parkway
Lusby, Maryland 20657-4702

Dear Mr. Denton:

SUBJECT: ISSUANCE OF AMENDMENTS FOR CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT NO. 1 (TAC NO. M86142) AND UNIT NO. 2 (TAC NO. M86143)

The Commission has issued the enclosed Amendment No. 182 to Facility Operating License No. DPR-53 and Amendment No. 159 to Facility Operating License No. DPR-69 for the Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2, respectively. The amendments consist of changes to the Technical Specifications in response to your application transmitted by letter dated April 1, 1993.

The amendments provide changes and clarifications which separate the requirements for borated water sources and flow paths needed in Mode 1 above 80 percent of rated thermal power to mitigate a small break loss-of-coolant accident from the requirements for borated water and flow paths needed in Modes 1 through 4 to provide emergency boration.

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,

Original signed by:

Daniel G. McDonald, Senior Project Manager
Project Directorate I-1
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment No. 182 to DPR-53
2. Amendment No. 159 to DPR-69
3. Safety Evaluation

cc w/enclosures:
See next page

Distribution: See attached sheet

*See previous concurrence

LA:PDI-1	PM:PDI-1	*SRXB	*OGC	D:PDI-1	
CVogan	DMcDonald:smm	RJones	APH	RACapra	
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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

September 20, 1993

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Vice President - Nuclear Energy
Baltimore Gas and Electric Company
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1. Amendment No. 182 to DPR-53
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cc w/enclosures:
See next page

Mr. Robert E. Denton
Baltimore Gas & Electric Company

Calvert Cliffs Nuclear Power Plant
Unit Nos. 1 and 2

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DATED: September 20, 1993

AMENDMENT NO. 182 TO FACILITY OPERATING LICENSE NO. DPR-53-CALVERT CLIFFS UNIT 1
AMENDMENT NO. 159 TO FACILITY OPERATING LICENSE NO. DPR-69-CALVERT CLIFFS UNIT 2

Docket File
NRC & Local PDRs
PDI-1 Reading
S. Varga, 14/E/4
J. Calvo, 14/A/4
R. Capra
C. Vogan
D. McDonald
OGC
D. Hagan, 3302 MNBB
C. Liang, 8/E/23
G. Hill (4), P1-22
Wanda Jones, P-370
C. Grimes, 11/F/23
ACRS (10)
OPA
OC/LFDCB
PD plant-specific file
C. Cowgill, Region I
R. Jones, 8/E/23

cc: Plant Service list

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

BALTIMORE GAS AND ELECTRIC COMPANY

DOCKET NO. 50-317

CALVERT CLIFFS NUCLEAR POWER PLANT UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 182
License No. DPR-53

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

   A. The application for amendment by Baltimore Gas and Electric Company (the licensee) dated April 1, 1993, 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 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. 182 , 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

Robert A. Capra

Robert A. Capra, Director
Project Directorate I-1
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: September 20, 1993

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

BALTIMORE GAS AND ELECTRIC COMPANY

DOCKET NO. 50-318

CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 159
License No. DPR-69

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

   A. The application for amendment by Baltimore Gas and Electric Company (the licensee) dated April 1, 1993, 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 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. 159, 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

Robert A. Capra

Robert A. Capra, Director
Project Directorate I-1
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical Specifications

Date of Issuance: September 20, 1993

ATTACHMENT TO LICENSE AMENDMENTS

AMENDMENT NO. 182 FACILITY OPERATING LICENSE NO. DPR-53

AMENDMENT NO. 159 FACILITY OPERATING LICENSE NO. DPR-69

DOCKET NOS. 50-317 AND 50-318

Revise Appendix A as follows:

Remove Pages	Insert Pages
Table of Contents III	Table of Contents III
Table of Contents IV*	Table of Contents IV*
3/4 1-17	3/4 1-17
3/4 1-20	3/4 1-20
3/4 1-21	3/4 1-21
3/4 1-22	3/4 1-22
B 3/4 1-2	B 3/4 1-2
B 3/4 1-3	B 3/4 1-3
B 3/4 1-4**	B 3/4 1-4
B 3/4 1-5**	B 3/4 1-5

* Table of Contents changes inadvertently left out from previous Amendment No. 158 for Unit 2 only.

** Rollover pages with no changes to the text. These pages are for Unit 1 only.

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LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

3/4.1 **REACTIVITY CONTROL SYSTEMS**

3/4.1.2 BORATION SYSTEMS

Boric Acid Pumps - Operating

LIMITING CONDITION FOR OPERATION

3.1.2.6

a. The boric acid pump(s) in the boron injection flow path(s) required to be **OPERABLE** pursuant to Specification 3.1.2.2.a shall be **OPERABLE** and capable of being powered from an **OPERABLE** emergency bus.

AND,

When in **MODE** 1 > 80% of **RATED THERMAL POWER**

b. The boric acid pump(s) in the boron injection flow path(s) required to be **OPERABLE** pursuant to Specification 3.1.2.8.a shall be **OPERABLE** and capable of being powered from an **OPERABLE** emergency bus.

APPLICABILITY: **MODES** 1, 2, 3 and 4.

ACTION: With one boric acid pump required for the boron injection flow path(s) pursuant to either Specification 3.1.2.2.a or 3.1.2.8.a inoperable, restore the boric acid pump to **OPERABLE** status within 72 hours or be in at least **HOT STANDBY** within the next 6 hours and borated to a **SHUTDOWN MARGIN** equivalent to at least 3% $\Delta k/k$ at 200°F; restore the above required boric acid pump(s) to **OPERABLE** status within the next 7 days or be in **COLD SHUTDOWN** within the next 30 hours.

SURVEILLANCE REQUIREMENTS

4.1.2.6 No additional Surveillance Requirements other than those required by Specifications 4.0.5 and 4.1.2.2.

3/4.1 **REACTIVITY CONTROL SYSTEMS**

3/4.1.2 BORATION SYSTEMS

Charging Pump ECCS Subsystem

LIMITING CONDITION FOR OPERATION

3.1.2.8 As a minimum, the following equipment shall be **OPERABLE**:

a. Boric Acid Storage Tank 12 and its associated heat tracing circuit shall be **OPERABLE** per Specification 3.1.2.9.a and the boron injection flow path via Boric Acid Pump 12 from Boric Acid Storage Tank 12 shall be **OPERABLE** per Specification 3.1.2.2.a and Specification 3.1.2.6.

AND,

One of the following:

b. The boron injection flow path from Boric Acid Storage Tank 12 via a gravity feed connection shall be **OPERABLE** per Specification 3.1.2.2.a, or,

Boric Acid Storage Tank 11 and its associated heat tracing circuit shall be **OPERABLE** per Specification 3.1.2.9.a and the boron injection flow path from Boric Acid Storage Tank 11 via a gravity feed connection shall be **OPERABLE** per Specification 3.1.2.2.a.

APPLICABILITY: **MODE** 1 > 80% of **RATED THERMAL POWER.**

ACTION: With only one of the required combinations of borated water sources and flow paths **OPERABLE**, restore two required combinations of borated water sources and flow paths to **OPERABLE** status within 72 hours or reduce power to less than 80% of **RATED THERMAL POWER** within the next 6 hours and comply with Specifications 3.1.2.2, 3.1.2.6, and 3.1.2.9 as applicable.

SURVEILLANCE REQUIREMENTS

4.1.2.8 No additional Surveillance Requirements other than those required by Specifications 4.0.5, 4.1.2.2, and 4.1.2.9

3/4.1 **REACTIVITY CONTROL SYSTEMS**

3/4.1.2 BORATION SYSTEMS

Borated Water Sources - Operating

LIMITING CONDITION FOR OPERATION

3.1.2.9 At least two of the following three borated water sources shall be **OPERABLE**:

a. Two boric acid storage tank(s) and one associated heat tracing circuit per tank with the contents of the tanks in accordance with Figure 3.1.2-1 and the boron concentration limited to ≤ 8%, and

b. The refueling water tank with:

1. A minimum contained borated water volume of 400,000 gallons,

2. A boron concentration of between 2300 and 2700 ppm,

3. A minimum solution temperature of 40°F, and

4. A maximum solution temperature of 100°F in **MODE** 1.

APPLICABILITY: **MODES** 1, 2, 3 and 4.

ACTION: With only one borated water source **OPERABLE**, restore at least two borated water sources to **OPERABLE** status within 72 hours or be in at least **HOT STANDBY** within the next 6 hours and borated to a **SHUTDOWN MARGIN** equivalent to at least 3% $\Delta k/k$ at 200°F; restore at least two borated water sources to **OPERABLE** status within the next 7 days or be in **COLD SHUTDOWN** within the next 30 hours.

flow rate of at least 3000 GPM will circulate an equivalent Reactor Coolant System volume of 9,601 cubic feet in approximately 24 minutes. The reactivity change rate associated with boron concentration reductions will therefore be within the capability of operator recognition and control.

3/4.1.1.4 Moderator Temperature Coefficient (MTC)

The limitations on MTC are provided to ensure that the assumptions used in the accident and transient analyses remain valid through each fuel cycle. The surveillance requirements for measurement of the MTC during each fuel cycle are adequate to confirm the MTC value since this coefficient changes slowly due principally to the reduction in RCS boron concentration associated with fuel burnup. The confirmation that the measured MTC value is within its limit provides assurances that the coefficient will be maintained within acceptable values throughout each fuel cycle.

3/4.1.1.5 Minimum Temperature For Criticality

This specification ensures that the reactor will not be made critical with the Reactor Coolant System average temperature less than 515°F. This limitation is required to ensure 1) the moderator temperature coefficient is within its analyzed temperature range, 2) the protective instrumentation is within its normal operating range, 3) the pressurizer is capable of being in an **OPERABLE** status with a steam bubble, and 4) the reactor pressure vessel is above its minimum RT_{NDT} temperature.

3/4.1.2 BORATION SYSTEMS

The Boration System is a subset of the Chemical Volume and Control System. The Boration System ensures that negative reactivity control is available during each **MODE** of facility operation. The system also provides coolant flow following a SIAS (e.g., during a Small Break LOCA) to supplement flow from the Safety Injection System. Above 80% of **RATED THERMAL POWER**, the Small Break LOCA analyses assume flow from a single charging pump, accounting for measurement uncertainties and flow mal-distribution effects in calculating a conservative value of charging flow actually delivered to the RCS. Credit is only taken for the water inventory, no credit is taken for the injected boron. Above 80% of **RATED THERMAL POWER**, two independent, redundant, and automatic boration systems are provided to ensure functional capability in the event an assumed failure renders one of the systems inoperable.

The components required to perform this function include: 1) borated water sources, 2) charging pumps, 3) separate flow paths, 4) boric acid pumps, 5) associated heat tracing systems, and 6) an emergency power supply from **OPERABLE** diesel generators. At or below 80% of **RATED THERMAL POWER**, there is a corresponding decrease in decay heat which compensates for the loss of injection from one charging pump assumed in the Small Break LOCA analyses.

With the RCS average temperature above 200°F, a minimum of two independent and redundant boration systems are provided to ensure single functional capability in the event an assumed failure renders one of the systems inoperable. Allowable out-of-service periods ensure that minor component repair or corrective action may be completed without undue risk to overall facility safety from injection system failures during the repair period.

The boration capability of either system is sufficient to provide a **SHUTDOWN MARGIN** from all operating conditions of 3.0% Δk/k after xenon decay and cooldown to 200°F. The maximum boration capability requirement occurs at EOL from full power equilibrium xenon conditions and requires boric acid solution from the boric acid tanks, the concentration and volume of which are met by the range of values given in Specifications 3.1.2.8 and 3.1.2.9, or 55,627 gallons of 2300 ppm borated water from the refueling water tank. However, to be consistent with the ECCS requirements, the RWT is required to have a minimum contained volume of 400,000 gallons during **MODES** 1, 2, 3 and 4. The maximum boron concentration of the refueling water tank shall be limited to 2700 ppm and the maximum boron concentration of the boric acid storage tanks shall be limited to 8% to preclude the possibility of boron precipitation in the core during long term ECCS cooling.

With the RCS temperature below 200°F, one boration system is acceptable without single failure consideration on the basis of the stable reactivity condition of the reactor and the additional restrictions prohibiting **CORE ALTERATIONS** and positive reactivity change in the event the single injection system becomes inoperable.

The boron capability required below 200°F is based upon providing a 3% Δk/k **SHUTDOWN MARGIN** after xenon decay and cooldown from 200°F to 140°F. This condition requires either boric acid solution from the boric acid tanks, the requirements of which are met by Specification 3.1.2.7, or 9,844 gallons of 2300 ppm borated water from the refueling water tank.

The **OPERABILITY** of one boration system during **REFUELING** ensures that this system is available for reactivity control while in **MODE** 6.

3/4.1.3 MOVABLE CONTROL ASSEMBLIES

The specifications of this section ensure that (1) acceptable power distribution limits are maintained, (2) the minimum **SHUTDOWN MARGIN** is maintained, and (3) the potential effects of a CEA ejection accident are limited to acceptable levels.

The **ACTION** statements which permit limited variations from the basic requirements are accompanied by additional restrictions which ensure that the original criteria are met. A regulating or shutdown CEA is considered to be misaligned if it is more than 7.5 inches from any other CEA in its group, however, a shutdown CEA is also considered to be misaligned if it is withdrawn to less than 129 inches even if it is within 7.5 inches of all other CEAs in its group. For the purposes of the Technical Specifications, a dual assembly, connected to a single CEA drive mechanism, is considered to be a single CEA (e.g., dual shutdown CEAs connected to a single drive mechanism).

The **ACTION** statements applicable to an untrippable CEA and to a large misalignment ($\geq$ 15 inches) of two or more CEAs, require a prompt shutdown of the reactor since either of these conditions may be indicative of a possible loss of mechanical functional capability of the CEAs and in the event of an untrippable CEA, the loss of **SHUTDOWN MARGIN**. A CEA is considered untrippable when it is known that the CEA would not be insertable in response to a Reactor Protection System signal or is known to be immovable due to excessive friction or mechanical interference.

For small misalignments (< 15 inches) of the CEAs, there is 1) a small degradation in the peaking factors relative to those assumed in generating LCOs and LSSS setpoints for DNBR and linear heat rate, 2) a small effect on the time dependent long term power distributions relative to those used in generating LCOs and LSSS setpoints for DNBR and linear heat rate, 3) a small effect on the available **SHUTDOWN MARGIN**, and 4) a small effect on the ejected CEA worth used in the safety analysis. Therefore, the **ACTION** statement associated with the small misalignment of a CEA permits a one hour time interval during which attempts may be made to restore the CEA(s) to within their alignment requirements prior to initiating a reduction in **THERMAL POWER**. The one hour time limit is sufficient to (1) identify causes of a misaligned CEA, (2) take appropriate corrective action to realign the CEAs and (3) minimize the effects of xenon redistribution.

Overpower margin is provided to protect the core in the event of a large misalignment ($\geq$ 15 inches) of a single regulating or shutdown CEA. However, this misalignment would cause distortion of the core power distribution. The Reactor Protective System would not detect the degradation in radial peaking factors and since variations in other system parameters (e.g., pressure and coolant temperature) may not be sufficient to cause trips, it is possible that the reactor could be operating with process variables less conservative than those assumed in generating LCO and LSSS setpoints. The **ACTION** statement associated with a large CEA misalignment requires prompt action to realign the CEA to avoid excessive margin degradation. If the CEA is not realigned within the given time constraints, **ACTION** is specified which will preserve margin, including reductions in **THERMAL POWER**.

For a single CEA misalignment, the time allowance to realign the CEA (Figure 3.1.3-1 or as determined by BASSS) is permitted for the following reasons:

1. The margin calculations which support the power distribution LCOs for DNBR are based on a steady-state F_r^T as specified in Technical Specification 3.2.3.

2. When the actual F_r^T is less than the Technical Specification value, additional margin exists.

3. This additional margin can be credited to offset the increase in F_r^T with time that will occur following a CEA misalignment due to xenon redistribution.

4. If an F_r^T measurement has not been taken recently (within 5 days), a pre-misaligned value of 1.70 is assumed and no time for realignment is permitted.

The requirement to reduce power level after the time limit of Figure 3.1.3-1 or after the time limit determined by BASSS is reached offsets the continuing increase in F_r^T that can occur due to xenon redistribution. A power reduction is not required below 50% power. Below 50% power there is sufficient conservatism in the DNB power distribution LCOs to completely offset any, or any additional, xenon redistribution effects.

The **ACTION** statements applicable to misaligned or inoperable CEAs include requirements to align the **OPERABLE** CEAs in a given group with the inoperable CEA. Conformance with these alignment requirements brings the core, within a short period of time, to a configuration consistent with that assumed in generating LCO and LSSS setpoints. However, extended operation with CEAs significantly inserted in the core may lead to perturbations in 1) local burnup, 2) peaking factors, and 3) available **SHUTDOWN MARGIN** which are more adverse than the conditions assumed to exist in the safety analyses and LCO and LSSS setpoints determination. Therefore, time limits have been imposed on operation with inoperable CEAs to preclude such adverse conditions from developing.

There are five different operating modes for control of CEAs; Off, Manual Individual, Manual Group, Manual Sequential and Automatic. The Manual Sequential mode is applicable to only the regulating CEAs and the Automatic mode is disabled and not used for both regulating and shutdown CEAs.

OPERABILITY of the CEA position indicators is required to determine CEA positions and thereby ensure compliance with the CEA alignment and insertion limits and ensures proper operation of the rod block circuit. The CEA "Full In" and "Full Out" limits provide an additional independent means for determining the CEA positions when the CEAs are at either their fully inserted or fully withdrawn positions. Therefore, the **OPERABILITY** and the **ACTION** statements applicable to inoperable CEA position indicators permit continued operations when positions of CEAs with inoperable indicators can be verified by the "Full In" or "Full Out" limits.

CEA positions and **OPERABILITY** of the CEA position indicators are required to be verified on a nominal basis of once per 12 hours with more frequent verifications required if an automatic monitoring channel is inoperable. These verification frequencies are adequate for assuring that the applicable LCOs are satisfied.

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LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

3/4.1 REACTIVITY CONTROL SYSTEMS

3/4.1.2 BORATION SYSTEMS

Boric Acid Pumps - Operating

LIMITING CONDITION FOR OPERATION

3.1.2.6

a. The boric acid pump(s) in the boron injection flow path(s) required to be **OPERABLE** pursuant to Specification 3.1.2.2.a shall be **OPERABLE** and capable of being powered from an **OPERABLE** emergency bus.

AND,

When in **MODE** 1 > 80% of **RATED THERMAL POWER**

b. The boric acid pump(s) in the boron injection flow path(s) required to be **OPERABLE** pursuant to Specification 3.1.2.8.a shall be **OPERABLE** and capable of being powered from an **OPERABLE** emergency bus.

APPLICABILITY: **MODES** 1, 2, 3 and 4.

ACTION: With one boric acid pump required for the boron injection flow path(s) pursuant to either Specification 3.1.2.2.a or 3.1.2.8.a inoperable, restore the boric acid pump to **OPERABLE** status within 72 hours or be in at least **HOT STANDBY** within the next 6 hours and borated to a **SHUTDOWN MARGIN** equivalent to at least 3% $\Delta k/k$ at 200°F; restore the above required boric acid pump(s) to **OPERABLE** status within the next 7 days or be in **COLD SHUTDOWN** within the next 30 hours.

SURVEILLANCE REQUIREMENTS

4.1.2.6 No additional Surveillance Requirements other than those required by Specifications 4.0.5 and 4.1.2.2.

3/4.1.2 BORATION SYSTEMS

Charging Pump ECCS Subsystem

LIMITING CONDITION FOR OPERATION

3.1.2.8 As a minimum, the following equipment shall be **OPERABLE**:

a. Boric Acid Storage Tank 22 and its associated heat tracing circuit shall be **OPERABLE** per Specification 3.1.2.9.a and the boron injection flow path via Boric Acid Pump 22 from Boric Acid Storage Tank 22 shall be **OPERABLE** per Specification 3.1.2.2.a and Specification 3.1.2.6.

AND,

One of the following:

b. The boron injection flow path from Boric Acid Storage Tank 22 via a gravity feed connection shall be **OPERABLE** per Specification 3.1.2.2.a, or,

Boric Acid Storage Tank 21 and its associated heat tracing circuit shall be **OPERABLE** per Specification 3.1.2.9.a and the boron injection flow path from Boric Acid Storage Tank 21 via a gravity feed connection shall be **OPERABLE** per Specification 3.1.2.2.a.

APPLICABILITY: **MODE** 1 > 80% of **RATED THERMAL POWER.**

ACTION: With only one of the required combinations of borated water sources and flow paths **OPERABLE,** restore two required combinations of borated water sources and flow paths to **OPERABLE** status within 72 hours or reduce power to less than 80% of **RATED THERMAL POWER** within the next 6 hours and comply with Specifications 3.1.2.2, 3.1.2.6, and 3.1.2.9 as applicable.

SURVEILLANCE REQUIREMENTS

4.1.2.8 No additional Surveillance Requirements other than those required by Specifications 4.0.5, 4.1.2.2, and 4.1.2.9.

3/4.1 **REACTIVITY CONTROL SYSTEMS**

3/4.1.2 BORATION SYSTEMS

Borated Water Sources - Operating

LIMITING CONDITION FOR OPERATION

3.1.2.9 At least two of the following three borated water sources shall be **OPERABLE**:

a. Two boric acid storage tank(s) and one associated heat tracing circuit per tank with the contents of the tanks in accordance with Figure 3.1.2-1 and the boron concentration limited to $\leq$ 8%, and

b. The refueling water tank with:

1. A minimum contained borated water volume of 400,000 gallons,

2. A boron concentration of between 2300 and 2700 ppm,

3. A minimum solution temperature of 40°F, and

4. A maximum solution temperature of 100°F in **MODE** 1.

APPLICABILITY: **MODES** 1, 2, 3 and 4.

ACTION: With only one borated water source **OPERABLE**, restore at least two borated water sources to **OPERABLE** status within 72 hours or be in at least **HOT STANDBY** within the next 6 hours and borated to a **SHUTDOWN MARGIN** equivalent to at least 3% $\Delta k/k$ at 200°F; restore at least two borated water sources to **OPERABLE** status within the next 7 days or be in **COLD SHUTDOWN** within the next 30 hours.

3/4.1.1.3 Boron Dilution

A minimum flow rate of at least 3000 GPM provides adequate mixing, prevents stratification and ensures that reactivity changes will be gradual during boron concentration reductions in the Reactor Coolant System. A flow rate of at least 3000 GPM will circulate an equivalent Reactor Coolant System volume of 9,601 cubic feet in approximately 24 minutes. The reactivity change rate associated with boron concentration reductions will therefore be within the capability of operator recognition and control.

3/4.1.1.4 Moderator Temperature Coefficient (MTC)

The limitation on MTC are provided to ensure that the assumptions used in the accident and transient analyses remain valid through each fuel cycle. The surveillance requirements for measurement of the MTC during each fuel cycle are adequate to confirm the MTC value since this coefficient changes slowly due principally to the reduction in RCS boron concentration associated with fuel burnup. The confirmation that the measured MTC value is within its limit provides assurances that the coefficient will be maintained within acceptable values throughout each fuel cycle.

3/4.1.1.5 Minimum Temperature for Criticality

This specification ensures that the reactor will not be made critical with the Reactor Coolant System average temperature less than 515°F. This limitation is required to ensure 1) the moderator temperature coefficient is within its analyzed temperature range, 2) the protective instrumentation is within its normal operating range, 3) the pressurizer is capable of being in an **OPERABLE** status with a steam bubble, and 4) the reactor pressure vessel is above its minimum RT_{NDT} temperature.

3/4.1.2 BORATION SYSTEMS

The Boration System is a subset of the Chemical Volume and Control System. The Boration System ensures that negative reactivity control is available during each **MODE** of facility operation. The system also provides coolant flow following a SIAS (e.g., during a Small Break LOCA) to supplement flow from the Safety Injection System. Above 80% of **RATED THERMAL POWER**, the Small Break LOCA analyses assume flow from a single charging pump, accounting for measurement uncertainties and flow mal-distribution effects in calculating a conservative value of charging flow actually delivered to the RCS. Credit is only taken for the water inventory, no credit is taken for the injected boron. Above 80% of **RATED THERMAL POWER**, two independent, redundant, and automatic boration systems are provided to ensure functional capability in the event an assumed failure renders one of the systems inoperable.

The components required to perform this function include: 1) borated water sources, 2) charging pumps, 3) separate flow paths, 4) boric acid pumps, 5) associated heat tracing systems, and 6) an emergency power supply from **OPERABLE** diesel generators. At or below 80% of **RATED THERMAL POWER**, there is a corresponding decrease in decay heat which compensates for the loss of injection from one charging pump assumed in the Small Break LOCA Analyses.

With the RCS average temperature above 200°F, a minimum of two independent and redundant boration systems are provided to ensure single functional capability in the event an assumed failure renders one of the systems inoperable. Allowable out-of-service periods ensure that minor component repair or corrective action may be completed without undue risk to overall facility safety from injection system failures during the repair period.

The boration capability of either system is sufficient to provide a **SHUTDOWN MARGIN** from all operating conditions of 3.0% $\Delta k/k$ after xenon decay and cooldown to 200°F. The maximum boration capability requirement occurs at EOL from full power equilibrium xenon conditions and requires boric acid solution from the boric acid tanks, the concentration and volume of which are met by the range of values given in Specifications 3.1.2.8 and 3.1.2.9, or 55,627 gallons of 2300 ppm borated water from the refueling water tank. However, to be consistent with the ECCS requirements, the RWT is required to have a minimum contained volume of 400,000 gallons during **MODES** 1, 2, 3 and 4. The maximum boron concentration of the refueling water tank shall be limited to 2700 ppm and the maximum boron concentration of the boric acid storage tanks shall be limited to 8% to preclude the possibility of boron precipitation in the core during long term ECCS cooling.

With the RCS temperature below 200°F, one boration system is acceptable without single failure consideration on the basis of the stable reactivity condition of the reactor and the additional restrictions prohibiting **CORE ALTERATIONS** and positive reactivity change in the event the single injection system becomes inoperable.

The boron capability required below 200°F is based upon providing a 3% $\Delta k/k$ **SHUTDOWN MARGIN** after xenon decay and cooldown from 200°F to 140°F. This condition requires either boric acid solution from the boric acid tanks, the requirements of which are met by Specification 3.1.2.7, or 9,844 gallons of 2300 ppm borated water from the refueling water tank.

The **OPERABILITY** of one boration system during **REFUELING** ensures that this system is available for reactivity control while in **MODE** 6.

3/4.1.3 MOVABLE CONTROL ASSEMBLIES

The specifications of this section ensure that (1) acceptable power distribution limits are maintained, (2) the minimum **SHUTDOWN MARGIN** is maintained, and (3) the potential effects of a CEA ejection accident are limited to acceptable levels.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 182 TO FACILITY OPERATING LICENSE NO. DPR-53

AND AMENDMENT NO. 159 TO FACILITY OPERATING LICENSE NO. DPR-69

BALTIMORE GAS AND ELECTRIC COMPANY

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

DOCKET NOS. 50-317 AND 50-318

1.0 INTRODUCTION

By letter dated April 1, 1993, the Baltimore Gas and Electric Company (the licensee) submitted a request for changes to the Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2, Technical Specifications (TSs). The requested changes would revise TS 3/4.1.2, "Boration Systems." The proposed changes and clarifications will separate the requirements for mitigating small break loss-of-coolant accidents (SBLOCA) from the requirements for providing emergency boration. The changes provide needed clarification to ensure that the appropriate boration lineups are operable during applicable modes of operation. Potential combinations of water sources and flow paths which do not meet the single failure criterion and the potential need for operator action during the first 10 minutes of a SBLOCA will be eliminated. The TS Bases Section 3/4.1, "Reactivity Control Systems," will also be revised to support the proposed changes. The proposed changes do not add, revise, or delete any of the existing TS requirements.

The specific changes and clarifications proposed to separate the requirements for mitigating a SBLOCA from the requirements for providing emergency boration are:

TS 3.1.2.6, Boric Acid Pumps - Operating, Limiting Condition for Operation (LCO), will be changed to include a reference to TS 3.1.2.8.a, Charging Pump Emergency Core Cooling (ECCS) Subsystems, LCO.

TS 3.1.2.8, Boration Systems Borated Water Sources - Operating, will be changed to Boration Systems Charging Pump ECCS Subsystem, LCO, and will only contain the requirements which need to be met to mitigate a SBLOCA. This LCO will continue to be applicable to Mode 1 when greater than 80 percent of rated thermal power. The previous requirements for providing emergency boration capability are moved to TS 3.1.2.9, Borated Water Sources - Operating, LCO.

The footnote on TS 3.1.2.9, Borated Water Sources - Operating, LCO, which makes the LCO applicable to Mode 1 when less than or equal to 80 percent of rated thermal power, is removed. The LCO, as changed, will be applicable in

Modes 1 through 4 to assure the requirements needed for emergency boration are available. The LCO requirements necessary to mitigate an SBLOCA for Mode 1 when greater than 80 percent of rated thermal power will be contained in TS 3.1.2.8, as previously noted.

2.0 BACKGROUND

As noted in the licensees submittal, the chemical volume and control system (CVCS) is designed to control the reactor coolant volume, regulate reactor coolant chemistry, and maintain reactor coolant radioactivity at the desired levels. The boron concentration of the reactor coolant is controlled by the CVCS to optimize the position of the control element assemblies; compensate for reactivity changes caused by variations in the temperature of the reactor coolant and by core burnup; and to provide shutdown margin for maintenance, refueling or emergencies. The portion of the CVCS known as the boration system consists of a batching tank for preparing boric acid solution, two tanks for storing the solution, and two pumps and two gravity feed lines for supplying boric acid solution to the makeup system. The refueling water tank (RWT) also provides a source of borated water. For emergency boration purposes, the boration system is required to maintain a minimum 3.0 percent delta k/k Shutdown Margin from all operating conditions during xenon decay and cooldown to 200 °F. The requirement for providing emergency boration capability in Modes 1 through 4 can be accomplished by having any two of the three borated water sources operable.

A reanalysis was previously performed by the licensee for a SBLOCA and the TSs were revised for both units to support the reanalysis. The reanalysis assumed a reduction in high pressure safety injection (HPSI) flow capacity which was compensated for by crediting flow from one charging pump. Charging pump flow was required when operating in Mode 1 above 80 percent of rated thermal power.

The current TSs for borated water sources and flowpaths (which are applicable above 80 percent of rated thermal power) combine the requirements for providing emergency boration and the requirements for mitigating a SBLOCA. These TSs allow potential combinations of sources and flowpaths which may not meet the single failure criterion and the time response requirement of the ECCS to provide the charging pump flow necessary to mitigate the consequences of a SBLOCA.

3.0 EVALUATION

As detailed above, the current TS allow potential combinations of borated water sources and flowpaths which may not meet the single failure criterion (due to their associated power sources) for mitigating a SBLOCA. In addition, the current TS could also be interpreted to allow the RWT to be credited as a source of borated water to mitigate a SBLOCA. The design of the RWT requires operator action to open the valve from the RWT to the charging pump header. The SBLOCA analysis does not credit operator action during the first 10 minutes of the event; thus, no credit was taken for the RWT as a source of borated water. Although the RWT can not be given credit as a source of borated water for the SBLOCA, it is an acceptable source for emergency boration when operating in Modes 1 through 4.

The proposed TS changes would eliminate the possibility of misinterpretation of the existing TSs in relation to the requirements to mitigate a SBLOCA.

Proposed TS 3.1.2.8 will only contain the LCO requirements for the charging pump ECCS subsystem necessary to mitigate a SBLOCA. The LCO would require that boric acid storage tank (BAST) 12 (BAST 22 for Unit 2) and its associated heat tracing and flow paths via the boric acid pump be operable. The LCO also requires either a flow path via BAST 12 (BAST 22 Unit 2) gravity feed connection or BAST 11 (BAST 21 for Unit 2) gravity feed connection and their associated heat tracing be operable. These borated water sources and flow paths, including their associated heat tracing and power sources, meet the single failure criterion and do not require operator intervention during the first 10 minutes of an SBLOCA as assumed in the SBLOCA analysis.

The staff has determined, based on the above, that the proposed changes are acceptable.

Proposed TS 3.1.2.9 will contain the LCO requirements for emergency boration during Modes 1, 2, 3 and 4. The deletion of the footnote which indicates that it is applicable in Mode 1 when at or below 80 percent of rated thermal power will be deleted. This footnote is no longer required because of the changes to TS 3.1.2.8 detailed above and is, therefore, acceptable.

The proposed changes to TS 3.1.2.6 contains the LCO requirements for the boric acid pumps which are necessary to assure that the operability requirements for the emergency ECCS subsystem in TS 3.1.2.8 and operability requirements for the emergency boration system in TS 3.1.2.9 can be met. Therefore, the staff has determined that the proposed changes are acceptable.

The action statements for TSs 3.1.2.6, 3.1.2.8, and 3.1.2.9 have been adjusted to support the changes described above which separate the requirements for mitigating an SBLOCA from the requirements for providing emergency boration. The action statements will assure that appropriate steps are taken within the times specified, which are consistent with the times specified in the current TSs, when the respective LCOs can not be met. The associated surveillance requirements in the proposed TSs will not result in any changes in the current TS surveillance requirements for the ECCS subsystem or the emergency boration system. Therefore, the staff has determined that the proposed changes are acceptable.

The TS Bases Section 3/4.1.2 is updated to reflect the proposed changes in TSs 3.1.2.6, 3.1.2.8, and 3.1.2.9 and is, therefore, 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 and change 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 (58 FR 25852). 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.

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