January 30, 1989

Docket Nos. 50-317
and 50-318

DISTRIBUTION

Docket file	NRC PDR
PDI-1 Rdg	Local PDR
GLainas	BBoger
CVogan	SMcNeil
RCapra	OGC
DHagan	EJordan
BGrimes	TBarnhart (8)
WJones	EButcher
ACRS (10)	GPA/PA
ARM/LFMB	LTripp, RI

Mr. J. A. Tiernan
Vice President - Nuclear Energy
Calvert Cliffs Nuclear Power Plant
MD Rts. 2 & 4
P. O. Box 1535
Lusby, Maryland 20657

Dear Mr. Tiernan:

SUBJECT: AMENDMENT TO INCREASE ENRICHMENT LIMITS FOR THE NEW FUEL STORAGE RACKS (TACS 68416 AND 68417)

The Commission has issued the enclosed Amendment No. 134 to Facility Operating License No. DPR-53 and Amendment No. 115 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 (TS) in response to your application transmitted by letter dated June 9, 1988 as supplemented on October 25, 1988.

These amendments modified TS 5.6.2, "Criticality - New Fuel," by 1) increasing the U-235 enrichment limit for fuel stored in the new fuel storage racks from 4.1 to 5.0 weight percent and 2) reducing the maximum allowed value for the effective multiplication factor (k_{eff}) for fuel stored in the new fuel storage racks from 0.98 to 0.95 with the addition of the full flood condition to the various densities of unborated water conditions that are assumed in determining k_{eff}.

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

A copy of the Environmental Assessment related to this action was transmitted to you by letter dated January 25, 1989.

Sincerely,

David E. LaBarge for

Scott Alexander McNeil, Project Manager
Project Directorate I-1
Division of Reactor Projects, I/II

Enclosures:
1. Amendment No. 134 to DPR-53
2. Amendment No. 115 to DPR-69
3. Safety Evaluation

cc: w/enclosures
See next page

OFC	:PDI-1	:PDI-1	:PDI-1	:OGC	:	:	:
NAME	:CVogan	:SMcNeil:vr	:RCapra	:APH	:	:	:
DATE	:1/29/89	:1/23/89	:1/30/89	:1/29/89	:	:	:

OFFICIAL RECORD COPY

8902020233 890130
PDR ADOCK 05000317
P PDC

cc:

Mr. John M. Gott, President
Calvert County Board of
Commissioners
Prince Frederick, Maryland 20768

D. A. Brune, Esq.
General Counsel
Baltimore Gas and Electric Company
P. O. Box 1475
Baltimore, Maryland 21203

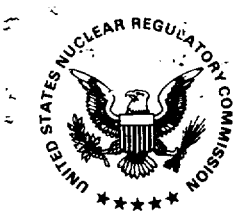
Mr. Jay E. Silberg, Esq.
Shaw, Pittman, Potts and Trowbridge
1800 M Street, NW
Washington, DC 20036

Mr. W. J. Lippold, General Supervisor
Technical Services Engineering
Calvert Cliffs Nuclear Power Plant
MD Rts 2 & 4, P. O. Box 1535
Lusby, Maryland 20657

Resident Inspector
c/o U.S.Nuclear Regulatory Commission
P. O. Box 437
Lusby, Maryland 20657

Department of Natural Resources
Energy Administration, Power Plant
Siting Program
ATTN: Mr. T. Magette
Tawes State Office Building
Annapolis, Maryland 21204

Regional Administrator, Region I
U.S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, Pennsylvania 19406



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

BALTIMORE GAS AND ELECTRIC COMPANY

DOCKET NO. 50-317

CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 134
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 June 9, 1988 as supplemented on October 25, 1988, 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. 134, 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.

FOR THE NUCLEAR REGULATORY COMMISSION

Robert A. Capra

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

Attachment:
Changes to the Technical
Specifications

Date of Issuance: January 30, 1989

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

BALTIMORE GAS AND ELECTRIC COMPANY

DOCKET NO. 50-318

CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 115
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 June 9, 1988 as supplemented on October 25, 1988, 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. 115, 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.

FOR THE NUCLEAR REGULATORY COMMISSION

Robert A. Capra

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

Attachment:
Changes to the Technical Specifications

Date of Issuance: January 30, 1989

ATTACHMENT TO LICENSE AMENDMENTS

AMENDMENT NO. 134 FACILITY OPERATING LICENSE NO. DPR-53

AMENDMENT NO. 115 FACILITY OPERATING LICENSE NO. DPR-69

DOCKET NOS. 50-317 AND 50-318

Revise Appendix A as follows:

Remove Pages	Insert Pages
5-5	5-5
5-6*	5-6*

*Overleaf provided for continuity purposes.

VOLUME

5.4.2 The total water and steam volume of the reactor coolant system is 10,614 ± 460 cubic feet at a nominal T_{avg} of 532°F.

5.5 METEOROLOGICAL TOWER LOCATION

5.5.1 The meteorological tower shall be located as shown on Figure 5.1-1.

5.6 FUEL STORAGE

CRITICALITY - SPENT FUEL

5.6.1 The spent fuel storage racks are designed and shall be maintained with a minimum 10 3/32" x 10 3/32" center-to-center distance between fuel assemblies placed in the storage racks to ensure a k_{eff} equivalent to ≤ 0.95 with the storage pool filled with unborated water. The k_{eff} of ≤ 0.95 includes the conservative allowances for uncertainties described in Section 9.7.2 of the FSAR. The maximum fuel enrichment to be stored in the fuel pool will be 4.1 weight percent.

CRITICALITY - NEW FUEL

5.6.2 The new fuel storage racks are designed and shall be maintained with a nominal 18 inch center-to-center distance between new fuel assemblies such that k_{eff} will not exceed 0.95 when fuel having a maximum enrichment of 5.0 weight percent U-235 is in place and various densities of unborated water are assumed including aqueous foam moderation and full flood conditions. The k_{eff} of ≤ 0.95 includes the conservative allowance for uncertainties described in Section 9.7.2 of the FSAR.

DRAINAGE

5.6.3 The spent fuel storage pool is designed and shall be maintained to prevent inadvertent draining of the pool below elevation 63 feet.

CAPACITY

5.6.4 The fuel storage pool is designed and shall be maintained with a combined storage capacity, for both Units 1 and 2, limited to no more than 1830 fuel assemblies.

5.7 COMPONENT CYCLIC OR TRANSIENT LIMITS

5.7.1 The components identified in Table 5.7-1 are designed and shall be maintained within the cyclic or transient limits of Table 5.7-1.

VOLUME

5.4.2 The total water and steam volume of the reactor coolant system is 10,614 ± 460 cubic feet at a nominal T_{avg} of 532°F.

5.5 METEOROLOGICAL TOWER LOCATION

5.5.1 The meteorological tower shall be located as shown on Figure 5.1-1.

5.6 FUEL STORAGE

CRITICALITY - SPENT FUEL

5.6.1 The spent fuel storage racks are designed and shall be maintained with a minimum 10 3/32" x 10 3/32" center-to-center distance between fuel assemblies placed in the storage racks to ensure a k_{eff} equivalent to ≤ 0.95 with the storage pool filled with unborated water. The k_{eff} of ≤ 0.95 includes the conservative allowances for uncertainties described in Section 9.7.2 of the FSAR. The maximum fuel enrichment to be stored in the fuel pool will be 4.1 weight percent.

CRITICALITY - NEW FUEL

5.6.2 The new fuel storage racks are designed and shall be maintained with a nominal 18 inch center-to-center distance between new fuel assemblies such that k_{eff} will not exceed 0.95 when fuel having a maximum enrichment of 5.0 weight percent U-235 is in place and various densities of unborated water are assumed including aqueous foam moderation and full flood conditions. The k_{eff} of ≤ 0.95 includes the conservative allowance for uncertainties described in Section 9.7.2 of the FSAR.

DRAINAGE

5.6.3 The spent fuel storage pool is designed and shall be maintained to prevent inadvertent draining of the pool below elevation 63 feet.

CAPACITY

5.6.4 The fuel storage pool is designed and shall be maintained with a combined storage capacity, for both Units 1 and 2, limited to no more than 1830 fuel assemblies.

5.7 COMPONENT CYCLIC OR TRANSIENT LIMITS

5.7.1 The components identified in Table 5.7-1 are designed and shall be maintained within the cyclic or transient limits of Table 5.7-1.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 134 TO FACILITY OPERATING LICENSE NO. DPR-53

AND AMENDMENT NO. 115 TO FACILITY OPERATING LICENSE NO. DPR-69

BALTIMORE GAS AND ELECTRIC COMPANY

CALVERT CLIFFS NUCLEAR POWER PLANT, UNITS 1 AND 2

DOCKET NOS. 50-317 AND 50-318

U-235 ENRICHMENT INCREASE FOR NEW FUEL STORAGE

1.0 INTRODUCTION

By letter dated June 9, 1988, as supplemented on October 25, 1988, the Baltimore Gas and Electric Company, (BG&E, the licensee) requested that the Calvert Cliffs Units 1 and 2 Technical Specification (TS) 5.6.2, "Criticality - New Fuel," be modified 1) by increasing the enrichment limit of fuel which may be stored in the new fuel storage racks from 4.1 weight percent U-235 to 5.0 weight percent U-235 and 2) by reducing the maximum permitted effective multiplication factor (k_{eff}) from 0.98 to 0.95 and adding the full flood condition to the various densities of unborated water conditions that are assumed in determining k_{eff}.

2.0 DISCUSSION AND EVALUATION

The Calvert Cliffs new (unirradiated) fuel storage racks consist of 144 storage locations with a nominal 18 inch center-to-center distance between new fuel assemblies. New fuel is normally stored in a dry (air) environment. This normal storage arrangement would result in extremely subcritical configurations. However, for conservatism, the new fuel is assumed to be stored under various amounts of water moderation.

The KENO-IV Monte Carlo code was used to determine k_{eff} for the new fuel storage racks. Neutron cross section data from the ENDF/B-IV library was generated for input to this code using the CEPAK code. This model has been benchmarked against experimental data and has been found to adequately reproduce the critical values.

The new (unirradiated) fuel storage rack was analyzed for varying degrees of moderation, assuming no burnable poison or control rods and 5.0 weight percent U-235 in unirradiated fuel. The maximum k_{eff} was found to occur for full flooding at a water density of 1.0 gm/cc. Therefore, this is also

the optimum moderation condition. The nominal k_{eff} calculated was 0.89, well below the NRC limiting criterion of 0.95 for fully flooded conditions and 0.98 for optimum moderation conditions. An uncertainty analysis, therefore, was not required since typical uncertainties have previously been found to be less than 3.0% for similar storage configurations. Consequently, the NRC staff concludes that the new fuel storage racks at Calvert Cliffs Units 1 and 2 can accommodate fuel having a maximum enrichment of 5.0 weight percent U-235.

The addition of the new limit of 0.95 for k_{eff} for fully flooded conditions was proposed to place the Calvert Cliffs TS limits on new fuel criticality in full compliance with NRC guidance provided in paragraph III.2.a of Section 9.1.1, "New Fuel Storage," of the Standard Review Plan (NUREG-0800). This limit is more restrictive than the current limit of 0.98 for conditions where the fuel is in place and various densities of unborated water are assumed including aqueous foam moderation. Consequently, the NRC staff has determined that the reduction in the maximum limit for the k_{eff} from 0.98 to 0.95 with the addition of the full flood condition for determining k_{eff} is a more restrictive change that increases the assurance that the new fuel while stored in the new fuel storage racks remains in a subcritical condition.

Thus, the NRC staff has determined that the requested changes in TS 5.6.2, 1) to increase the enrichment limit of the new fuel storage racks from the current 4.1 weight percent U-235 to a maximum of 5.0 weight percent U-235 and 2) to reduce the maximum limit on k_{eff} from 0.98 to 0.95 and to add the full flood condition to the various densities of unborated water conditions assumed in determining k_{eff}, are acceptable.

3.0 INTENT

The intent of the proposed changes is 1) to permit the storage of fresh, unirradiated fuel, with enrichment levels up to and including 5.0 weight percent U-235, in the new fuel storage racks and 2) to limit k_{eff} in the new fuel storage racks to 0.95 when fully flooded with pure water in addition to a limit of 0.95 when under optimum moderation conditions (i.e., moderated by extremely low density water or other hydrogenous material such as may occur from fog, mist, and fire fighting foam).

4.0 STATE CONSULTATIONS

A Notice of Consideration of Issuance of Amendment to Facility Operating License and Opportunity for Prior Hearing was published in the Federal Register on August 8, 1988 (53 FR 28791) and modified on December 8, 1988 (53 FR 49618). No hearing requests or intervention petitions were received. The State of Maryland was consulted on this matter and had no comments on the determination.

5.0 ENVIRONMENTAL CONSIDERATION

Pursuant to 10 CFR 51.21, 51.32 and 51.35, and environmental assessment and finding of no significant impact was published in the Federal Register on January 30, 1989 (53 FR 4352).

Accordingly, based upon the environmental assessment, the Commission has determined that issuance of this amendment will not have a significant effect on the quality of the human environment.

6.0 CONCLUSION

We have 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, and (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of these amendments will not be inimical to the common defense and security or to the health and safety of the public.

Dated: January 30, 1989

PRINCIPAL CONTRIBUTORS:

L. Kopp
S. McNeil

January 30, 1989

Docket Nos. 50-317
and 50-318

Mr. J. A. Tiernan
Vice President - Nuclear Energy
Calvert Cliffs Nuclear Power Plant
MD Rts. 2 & 4
P. O. Box 1535
Lusby, Maryland 20657

DISTRIBUTION

Docket file	NRC PDR
PDI-1 Rdg	Local PDR
GLainas	BBoger
CVogan	SMcNeil
RCapra	OGC
DHagan	EJordan
BGrimes	TBarnhart (8)
WJones	EButcher
ACRS (10)	GPA/PA
ARM/LFMB	LTripp, RI

Dear Mr. Tiernan:

SUBJECT: AMENDMENT TO INCREASE ENRICHMENT LIMITS FOR THE NEW FUEL STORAGE RACKS (TACS 68416 AND 68417)

The Commission has issued the enclosed Amendment No. 134 to Facility Operating License No. DPR-53 and Amendment No. 115 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 (TS) in response to your application transmitted by letter dated June 9, 1988 as supplemented on October 25, 1988.

These amendments modified TS 5.6.2, "Criticality - New Fuel," by 1) increasing the U-235 enrichment limit for fuel stored in the new fuel storage racks from 4.1 to 5.0 weight percent and 2) reducing the maximum allowed value for the effective multiplication factor (k_{eff}) for fuel stored in the new fuel storage racks from 0.98 to 0.95 with the addition of the full flood condition to the various densities of unborated water conditions that are assumed in determining k_{eff}.

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

A copy of the Environmental Assessment related to this action was transmitted to you by letter dated January 25, 1989.

Sincerely,

David E. LaBarge for

Scott Alexander McNeil, Project Manager
Project Directorate I-1
Division of Reactor Projects, I/II

Enclosures:
1. Amendment No. 134 to DPR-53
2. Amendment No. 115 to DPR-69
3. Safety Evaluation

cc: w/enclosures
See next page

OFC	:PDI-1	:PDI-1	:PDI-1	:OGC	:	:	:
NAME	:CVogan	:SMcNeil:vr	:RCapra	:APH	:	:	:
DATE	:1/23/89	:1/23/89	:1/30/89	:1/24/89	:	:	:

OFFICIAL RECORD COPY

8902090237 2pp

cc:

Mr. John M. Gott, President
Calvert County Board of
Commissioners
Prince Frederick, Maryland 20768

D. A. Brune, Esq.
General Counsel
Baltimore Gas and Electric Company
P. O. Box 1475
Baltimore, Maryland 21203

Mr. Jay E. Silberg, Esq.
Shaw, Pittman, Potts and Trowbridge
1800 M Street, NW
Washington, DC 20036

Mr. W. J. Lippold, General Supervisor
Technical Services Engineering
Calvert Cliffs Nuclear Power Plant
MD Rts 2 & 4, P. O. Box 1535
Lusby, Maryland 20657

Resident Inspector
c/o U.S.Nuclear Regulatory Commission
P. O. Box 437
Lusby, Maryland 20657

Department of Natural Resources
Energy Administration, Power Plant
Siting Program
ATTN: Mr. T. Magette
Tawes State Office Building
Annapolis, Maryland 21204

Regional Administrator, Region I
U.S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, Pennsylvania 19406

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

BALTIMORE GAS AND ELECTRIC COMPANY

DOCKET NO. 50-317

CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 134
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 June 9, 1988 as supplemented on October 25, 1988, 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. 134, 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.

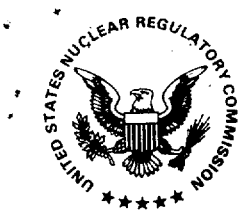
FOR THE NUCLEAR REGULATORY COMMISSION

Robert A. Capra

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

Attachment:
Changes to the Technical
Specifications

Date of Issuance: January 30, 1989



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

BALTIMORE GAS AND ELECTRIC COMPANY

DOCKET NO. 50-318

CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 115
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 June 9, 1988 as supplemented on October 25, 1988, 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. 115, 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.

FOR THE NUCLEAR REGULATORY COMMISSION

Robert A. Capra

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

Attachment:
Changes to the Technical
Specifications

Date of Issuance: January 30, 1989

ATTACHMENT TO LICENSE AMENDMENTS

AMENDMENT NO. 134 FACILITY OPERATING LICENSE NO. DPR-53

AMENDMENT NO. 115 FACILITY OPERATING LICENSE NO. DPR-69

DOCKET NOS. 50-317 AND 50-318

Revise Appendix A as follows:

Remove Pages	Insert Pages
5-5	5-5
5-6*	5-6*

*Overleaf provided for continuity purposes.

VOLUME

5.4.2 The total water and steam volume of the reactor coolant system is 10,614 ± 460 cubic feet at a nominal T_{avg} of 532°F.

5.5 METEOROLOGICAL TOWER LOCATION

5.5.1 The meteorological tower shall be located as shown on Figure 5.1-1.

5.6 FUEL STORAGE

CRITICALITY - SPENT FUEL

5.6.1 The spent fuel storage racks are designed and shall be maintained with a minimum 10 3/32" x 10 3/32" center-to-center distance between fuel assemblies placed in the storage racks to ensure a k_{eff} equivalent to $\leq$ 0.95 with the storage pool filled with unborated water. The k_{eff} of $\leq$ 0.95 includes the conservative allowances for uncertainties described in Section 9.7.2 of the FSAR. The maximum fuel enrichment to be stored in the fuel pool will be 4.1 weight percent.

CRITICALITY - NEW FUEL

5.6.2 The new fuel storage racks are designed and shall be maintained with a nominal 18 inch center-to-center distance between new fuel assemblies such that k_{eff} will not exceed 0.95 when fuel having a maximum enrichment of 5.0 weight percent U-235 is in place and various densities of unborated water are assumed including aqueous foam moderation and full flood conditions. The k_{eff} of $\leq$ 0.95 includes the conservative allowance for uncertainties described in Section 9.7.2 of the FSAR.

DRAINAGE

5.6.3 The spent fuel storage pool is designed and shall be maintained to prevent inadvertent draining of the pool below elevation 63 feet.

CAPACITY

5.6.4 The fuel storage pool is designed and shall be maintained with a combined storage capacity, for both Units 1 and 2, limited to no more than 1830 fuel assemblies.

5.7 COMPONENT CYCLIC OR TRANSIENT LIMITS

5.7.1 The components identified in Table 5.7-1 are designed and shall be maintained within the cyclic or transient limits of Table 5.7-1.

VOLUME

5.4.2 The total water and steam volume of the reactor coolant system is 10,614 ± 460 cubic feet at a nominal T_{avg} of 532°F.

5.5 METEOROLOGICAL TOWER LOCATION

5.5.1 The meteorological tower shall be located as shown on Figure 5.1-1.

5.6 FUEL STORAGE

CRITICALITY - SPENT FUEL

5.6.1 The spent fuel storage racks are designed and shall be maintained with a minimum 10 3/32" x 10 3/32" center-to-center distance between fuel assemblies placed in the storage racks to ensure a k_{eff} equivalent to ≤ 0.95 with the storage pool filled with unborated water. The k_{eff} of ≤ 0.95 includes the conservative allowances for uncertainties described in Section 9.7.2 of the FSAR. The maximum fuel enrichment to be stored in the fuel pool will be 4.1 weight percent.

CRITICALITY - NEW FUEL

5.6.2 The new fuel storage racks are designed and shall be maintained with a nominal 18 inch center-to-center distance between new fuel assemblies such that k_{eff} will not exceed 0.95 when fuel having a maximum enrichment of 5.0 weight percent U-235 is in place and various densities of unborated water are assumed including aqueous foam moderation and full flood conditions. The k_{eff} of ≤ 0.95 includes the conservative allowance for uncertainties described in Section 9.7.2 of the FSAR.

DRAINAGE

5.6.3 The spent fuel storage pool is designed and shall be maintained to prevent inadvertent draining of the pool below elevation 63 feet.

CAPACITY

5.6.4 The fuel storage pool is designed and shall be maintained with a combined storage capacity, for both Units 1 and 2, limited to no more than 1830 fuel assemblies.

5.7 COMPONENT CYCLIC OR TRANSIENT LIMITS

5.7.1 The components identified in Table 5.7-1 are designed and shall be maintained within the cyclic or transient limits of Table 5.7-1.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 134 TO FACILITY OPERATING LICENSE NO. DPR-53

AND AMENDMENT NO. 115 TO FACILITY OPERATING LICENSE NO. DPR-69

BALTIMORE GAS AND ELECTRIC COMPANY

CALVERT CLIFFS NUCLEAR POWER PLANT, UNITS 1 AND 2

DOCKET NOS. 50-317 AND 50-318

U-235 ENRICHMENT INCREASE FOR NEW FUEL STORAGE

1.0 INTRODUCTION

By letter dated June 9, 1988, as supplemented on October 25, 1988, the Baltimore Gas and Electric Company, (BG&E, the licensee) requested that the Calvert Cliffs Units 1 and 2 Technical Specification (TS) 5.6.2, "Criticality - New Fuel," be modified 1) by increasing the enrichment limit of fuel which may be stored in the new fuel storage racks from 4.1 weight percent U-235 to 5.0 weight percent U-235 and 2) by reducing the maximum permitted effective multiplication factor (k_{eff}) from 0.98 to 0.95 and adding the full flood condition to the various densities of unborated water conditions that are assumed in determining k_{eff}.

2.0 DISCUSSION AND EVALUATION

The Calvert Cliffs new (unirradiated) fuel storage racks consist of 144 storage locations with a nominal 18 inch center-to-center distance between new fuel assemblies. New fuel is normally stored in a dry (air) environment. This normal storage arrangement would result in extremely subcritical configurations. However, for conservatism, the new fuel is assumed to be stored under various amounts of water moderation.

The KENO-IV Monte Carlo code was used to determine k_{eff} for the new fuel storage racks. Neutron cross section data from the ENDF/B-IV library was generated for input to this code using the CEPAK code. This model has been benchmarked against experimental data and has been found to adequately reproduce the critical values.

The new (unirradiated) fuel storage rack was analyzed for varying degrees of moderation, assuming no burnable poison or control rods and 5.0 weight percent U-235 in unirradiated fuel. The maximum k_{eff} was found to occur for full flooding at a water density of 1.0 gm/cc. Therefore, this is also

the optimum moderation condition. The nominal k_{eff} calculated was 0.89, well below the NRC limiting criterion of 0.95 for fully flooded conditions and 0.98 for optimum moderation conditions. An uncertainty analysis, therefore, was not required since typical uncertainties have previously been found to be less than 3.0% for similar storage configurations. Consequently, the NRC staff concludes that the new fuel storage racks at Calvert Cliffs Units 1 and 2 can accommodate fuel having a maximum enrichment of 5.0 weight percent U-235.

The addition of the new limit of 0.95 for k_{eff} for fully flooded conditions was proposed to place the Calvert Cliffs TS limits on new fuel criticality in full compliance with NRC guidance provided in paragraph III.2.a of Section 9.1.1, "New Fuel Storage," of the Standard Review Plan (NUREG-0800). This limit is more restrictive than the current limit of 0.98 for conditions where the fuel is in place and various densities of unborated water are assumed including aqueous foam moderation. Consequently, the NRC staff has determined that the reduction in the maximum limit for the k_{eff} from 0.98 to 0.95 with the addition of the full flood condition for determining k_{eff} is a more restrictive change that increases the assurance that the new fuel while stored in the new fuel storage racks remains in a subcritical condition.

Thus, the NRC staff has determined that the requested changes in TS 5.6.2, 1) to increase the enrichment limit of the new fuel storage racks from the current 4.1 weight percent U-235 to a maximum of 5.0 weight percent U-235 and 2) to reduce the maximum limit on k_{eff} from 0.98 to 0.95 and to add the full flood condition to the various densities of unborated water conditions assumed in determining k_{eff}, are acceptable.

3.0 INTENT

The intent of the proposed changes is 1) to permit the storage of fresh, unirradiated fuel, with enrichment levels up to and including 5.0 weight percent U-235, in the new fuel storage racks and 2) to limit k_{eff} in the new fuel storage racks to 0.95 when fully flooded with pure water in addition to a limit of 0.95 when under optimum moderation conditions (i.e., moderated by extremely low density water or other hydrogenous material such as may occur from fog, mist, and fire fighting foam).

4.0 STATE CONSULTATIONS

A Notice of Consideration of Issuance of Amendment to Facility Operating License and Opportunity for Prior Hearing was published in the Federal Register on August 8, 1988 (53 FR 28791) and modified on December 8, 1988 (53 FR 49618). No hearing requests or intervention petitions were received. The State of Maryland was consulted on this matter and had no comments on the determination.

5.0 ENVIRONMENTAL CONSIDERATION

Pursuant to 10 CFR 51.21, 51.32 and 51.35, and environmental assessment and finding of no significant impact was published in the Federal Register on January 30, 1989 (53 FR 4352).

Accordingly, based upon the environmental assessment, the Commission has determined that issuance of this amendment will not have a significant effect on the quality of the human environment.

6.0 CONCLUSION

We have 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, and (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of these amendments will not be inimical to the common defense and security or to the health and safety of the public.

Dated: January 30, 1989

PRINCIPAL CONTRIBUTORS:

L. Kopp
S. McNeil