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RS-02-119

10 CFR 50.90

July 31, 2002

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D. C. 20555-0001

SUBJECT: Clinton Power Station, Unit 1
Facility Operating License No. NPF-62
NRC Docket No. 50-461

Request for Amendment to Technical Specification 3.2.2, "Minimum Critical Power Ratio (MCPR)," Addition of a New Surveillance Requirement

Dear Sir or Madam:

Pursuant to 10 CFR 50.90, "Application for amendment of license or construction permit," AmerGen Energy Company (AmerGen), LLC hereby requests a change to Appendix A, Technical Specifications (TS), of Facility Operating License No. NPF-62 for Clinton Power Station (CPS) that adds a surveillance requirement to TS 3.2.2, "Minimum Critical Power Ratio (MCPR)." Specifically, the change adds a surveillance requirement to determine the MCPR limit following the performance of control rod scram time testing. The new SR will require determination of the operating limit MCPR based on the scram time results. The operating limit MCPR can be revised as a result of the use of "Option B" scram times and the cycle specific analysis performed in support of current Cycle 9 operations. Based on the attached evaluation, AmerGen concludes that the proposed amendment presents no significant hazards consideration under the standards set forth in 10 CFR 50.92, "Issuance of amendment," paragraph (c), and, accordingly, a finding of "no significant hazards consideration" is justified.

The information supporting the proposed TS changes is subdivided as follows.

- Attachment 1 is the notarized affidavit.
- Attachment 2 provides our evaluation supporting the proposed changes.
- Attachment 3 contains the copies of the marked up TS pages.
- Attachment 4 provides the typed TS pages and Bases (for information only) pages.

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The proposed TS changes have been reviewed by the CPS Plant Operations Review Committee (PORC) and approved by the Nuclear Safety Review Board (NSRB) in accordance with the Quality Assurance Program.

AmerGen is notifying the State of Illinois of this application for amendment by transmitting a copy of this letter and its attachments to the designated State Official.

AmerGen is requesting approval of this change by February 1, 2003. Approval by this date will allow for application of the MCPR operating limit based on the mean scram speed during the current cycle of operation (i.e., Cycle 9). Once approved, the amendment will be implemented within 30 days.

If you have any questions or require additional information, please contact Mr. Timothy A. Byam at (630) 657-2804.

Sincerely,



for
Keith R. Jury
Director – Licensing
Mid-West Regional Operating Group

Attachments:

1. Affidavit
2. Evaluation of Proposed Changes
3. Markup of Proposed Technical Specification Page Changes
4. Typed Pages for Technical Specification Change and Bases Change (For Information Only)

cc: Regional Administrator – NRC Region III
Clinton Power Station Project Manager – NRR
NRC Senior Resident Inspector – Clinton Power Station
Office of Nuclear Facility Safety - Illinois Department of Nuclear Safety


**ATTACHMENT 1
Affidavit**

STATE OF ILLINOIS)
COUNTY OF DUPAGE)
IN THE MATTER OF)
AMERGEN ENERGY COMPANY, LLC) Docket Number
CLINTON POWER STATION, UNIT 1) 50-461

SUBJECT: Request for Amendment to Technical Specification 3.2.2, "Minimum Critical Power Ratio (MCPR)," Addition of a New Surveillance Requirement

AFFIDAVIT

I affirm that the content of this transmittal is true and correct to the best of my knowledge, information and belief.

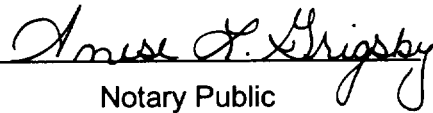


T. W. Simpkin
Manager - Licensing
Mid-West Regional Operating Group

Subscribed and sworn to before me, a Notary Public in and

for the State above named, this 31st day of

July, 2002.



Notary Public



ATTACHMENT 2
Evaluation of Proposed Changes

- 1.0 INTRODUCTION
- 2.0 DESCRIPTION OF PROPOSED AMENDMENT
- 3.0 BACKGROUND
- 4.0 REGULATORY REQUIREMENTS & GUIDANCE
- 5.0 TECHNICAL ANALYSIS
- 6.0 REGULATORY ANALYSIS
- 7.0 NO SIGNIFICANT HAZARDS CONSIDERATION (NSHC)
- 8.0 ENVIRONMENTAL CONSIDERATION
- 9.0 PRECEDENT
- 10.0 REFERENCES

ATTACHMENT 2
Evaluation of Proposed Changes

1.0 INTRODUCTION

This letter proposes to amend Operating License No. NPF-62 for Clinton Power Station (CPS), Unit 1.

The requested change would revise Appendix A, Technical Specifications (TS), of the Operating License to add a Surveillance Requirement (SR) to TS 3.2.2, "Minimum Critical Power Ratio (MCPR)," that requires determination of the MCPR limits following completion of control rod scram time testing. The proposed SR would provide for the required evaluation necessary to apply faster scram times to provide for improved MCPR operating limits.

2.0 DESCRIPTION OF PROPOSED AMENDMENT

The proposed amendment would revise TS 3.2.2 to add SR 3.2.2.2. This SR would read "Determine the MCPR limits." and would have the following frequency.

"Once within 72 hours after each completion of SR 3.1.4.1

AND

Once within 72 hours after each completion of SR 3.1.4.2

AND

Once within 72 hours after each completion of SR 3.1.4.4"

In addition to the above, the TS Bases will be revised to document the basis for this SR and its required frequency.

3.0 BACKGROUND

MCPR is a ratio of the fuel assembly power that would result in the onset of boiling transition to the actual fuel assembly power. The MCPR Safety Limit (SL) is set such that 99.9% of the fuel rods avoid boiling transition when operation within the limit is maintained. The MCPR operating limit is then established to ensure that no fuel damage results during anticipated operational occurrences (AOOs). Although fuel damage does not necessarily occur if a fuel rod actually experiences boiling transition, the critical power at which boiling transition is calculated to occur has been adopted as a fuel design criterion.

The onset of transition boiling is a phenomenon that is readily detected during the testing of various fuel bundle designs. Based on these experimental data, correlations have been developed to predict critical bundle power (i.e., the bundle power level at the onset of transition boiling) for a given set of plant parameters (e.g., reactor vessel pressure, core flow, and reactor coolant inlet temperature). Because plant operating conditions and bundle power levels are monitored and determined relatively easily, monitoring the MCPR is a convenient way of ensuring that fuel failures due to inadequate cooling do not occur.

The analytical methods and assumptions used in evaluating the AOOs to establish the MCPR operating limit are identified in the Bases for TS Section 3.2.2. To ensure the MCPR SL is not exceeded during any transient event that occurs with moderate

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frequency, limiting transients have been analyzed to determine the largest reduction in critical power ratio (CPR). The types of transients evaluated are loss of flow, increase in pressure and power, positive reactivity insertion, and coolant temperature decrease. The limiting transient yields the largest change in CPR (Δ CPR). When the largest Δ CPR is added to the MCPR SL, the required operating limit MCPR is obtained.

The MCPR operating limits derived from the transient analysis are dependent on the operating core flow and power state to ensure adherence to fuel design limits during the worst transient that occurs with moderate frequency. The MCPR operating limits specified in the Core Operating Limits Report (COLR) are the result of the design basis accident and transient analysis. The MCPR operating limits are determined by the larger of the flow and power dependent MCPR limits. TS LCO 3.2.2 requires that all MCPRs be greater than or equal to the MCPR operating limits specified in the COLR when thermal power is $\geq 21.6\%$ rated thermal power.

As stated in Reference 1, BWR/6 type plants have control rod drives that provide scram speeds that are faster than possible in BWR/2 through BWR/5 type plants. For example, the average scram time to position 39 for the LaSalle station, a BWR/5 plant, during Cycle 10 was 0.649 seconds. The average scram time during Cycle 8 for CPS was 0.346 seconds. Faster scram speeds produce lower MCPR operating limits for pressurization events. Prior to the introduction of GE14 fuel, the BWR/6 TS scram speed (i.e., the scram times required by TS LCO 3.1.4, "Control Rod Scram Times") was used to determine the MCPR operating limits (Option A). Use of the Option A methodology limited the severity of the operating limits for pressurization events such that non-pressurization events became limiting. With the introduction of 9x9 and 10x10 fuel types, the pressurization events have become limiting.

BWR/2 through BWR/5 type plants have historically been limited by pressurization events. As a method to improve operating limits, the plants have credited the application of a mean scram speed based operating limit (Option B). The Option B basis does not require any additional scram speed data beyond what is required by the plant TS since the mean scram speed is based on the measured scram speed. The BWR/6 type plant can see a significant benefit in MCPR operating limit by using a similar process.

In the past, CPS has utilized the Option A MCPR operating limits. As a result, the cycle specific MCPR operating limit analysis resulted in one set of limits included in the COLR. However, with two reloads of GE14 fuel in the core following the Spring 2002 refueling outage (i.e., C1R08), an analysis was completed for CPS to derive the Option B scram times that can be used in pressurization event transient analysis to improve the MCPR operating limits. Since the transient analyses may take credit for conservatism in the control rod scram speed performance, it must be demonstrated that the specific scram speed distribution is consistent with that used in the transient analyses. The proposed new SR determines the actual scram speed distribution and compares it with the assumed distribution. The MCPR operating limit is then determined based either on the applicable limit associated with scram times of TS LCO 3.1.4 or the realistic scram times. This determination must be performed and any necessary changes must be implemented within 72 hours after each set of control rod scram time tests required by SR 3.1.4.1, SR 3.1.4.2, and SR 3.1.4.4 because the effective scram speed distribution may change during the cycle or after maintenance that could affect scram times. The 72

ATTACHMENT 2 Evaluation of Proposed Changes

hour Completion Time is acceptable due to the relatively minor changes in the actual control rod scram speed distribution expected during the fuel cycle.

4.0 REGULATORY REQUIREMENTS & GUIDANCE

10 CFR 50.36, "Technical specifications," provides the regulatory requirements for the content required in a licensee's TS. 10 CFR 50.36 requires that the TS will include surveillance requirements to assure that the limiting conditions for operation will be met. The proposed SR will assure the improved MCPR operating limits based on scram times are met.

5.0 TECHNICAL ANALYSIS

5.1 Design Basis

The methodology for use of the Option B and Option A limits is included in the General Electric Standard Application for Reactor Fuel, GESTAR II (Reference 2) which is referenced in the CPS TS Bases. Therefore, use of this methodology is previously approved by the NRC and is properly documented in the CPS TS. This is the same methodology used by the BWR/2 through BWR/5 type plants that have historically been limited by pressurization events. The wording of the proposed SR is consistent with NUREG-1433, "Standard Technical Specifications, General Electric Plants, BWR/4," (Reference 3).

The function of the MCPR operating limit is to ensure that no fuel damage results during anticipated operational occurrences. This function is met whether the operating limit is determined by Option A or B.

As stated above, the Option B basis does not require any additional scram speed data beyond what is already required by plant TS. CPS scram data for Cycles 5 through 8 were collected and used to perform the required analysis at a representative pressure. Therefore, the required analysis is based on CPS specific historical data. The CPS Option B scram time analysis, as documented in Reference 1, was reviewed by Exelon Generation Company (Exelon), LLC and AmerGen Energy Company (AmerGen), LLC. The analysis was found to be acceptable for generation of pressurization transient Δ CPR responses.

Use of the Option B analysis takes credit for faster scram speeds to provide for a lower MCPR operating limit. This lower operating limit ensures that the MCPR safety limit is not exceeded while providing for additional operating margin.

The proposed change will modify the surveillance requirements associated with TS Section 3.2.2. The proposed change will not affect the limiting condition for operation or any actions taken if the requirements of the LCO are not met. The proposed surveillance requirement will ensure the proper MCPR operating limit is used based on the results of the scram time testing.

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Evaluation of Proposed Changes

5.2 Risk Information

This submittal is not based on risk-informed decision making.

6.0 REGULATORY ANALYSIS

10 CFR 50.36, paragraph (c)(3) states that surveillance requirements are requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the limiting conditions for operation will be met.

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

7.0 NO SIGNIFICANT HAZARDS CONSIDERATION

AmerGen has evaluated whether or not a significant hazards consideration is involved with the proposed amendment by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," discussed below:

1. Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No.

The proposed change adds a new surveillance requirement (SR) to the MCPR Technical Specification (TS) which requires determination of the Minimum Critical Power Ratio (MCPR) operating limit following the completion of scram time testing of the control rods. Use of the scram speed in determining the MCPR operating limit (i.e., Option B) is an alternative to the current method for determining the operating limit (i.e., Option A). The probability of an accident previously evaluated is unrelated to the MCPR operating limit that is provided to ensure no fuel damage results during anticipated operational occurrences. This is an operational limit to ensure conditions following an assumed accident do not result in fuel failure and therefore do not contribute to the occurrence of an accident. No active or passive failure mechanisms that could lead to an accident are affected by this proposed change.

The consequences of a previously evaluated accident are not significantly increased. The proposed change ensures that the appropriate operating limit is in place. By implementing the correct operating limit the safety limit will continue to be ensured. Ensuring the safety limit is not exceeded will result in prevention of fuel failure. Therefore, since there is no increase in the potential for fuel failure there is no increase in the consequences of any accidents previously evaluated.

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Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No.

The addition of a new SR to the MCPR TS does not involve the use or installation of new equipment. Installed equipment is not operated in a new or different manner. No new or different system interactions are created, and no new processes are introduced. No new failures have been created by the addition of the proposed SR and the use of the alternate method for determining the MCPR operating limit.

Therefore, the proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

3. Does the proposed change involve a significant reduction in a margin of safety?

Response: No.

Use of Option B for determining the MCPR operating limit will result in a reduced operating limit in comparison to the use of Option A. However, a reduction in the operating limit margin does not result in a reduction in the safety margin. The MCPR safety limit remains the same regardless of the method used for determining the operating limit. All analyzed transient results remain well within the design values for structure, systems and components.

Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above, AmerGen concludes that the proposed amendment presents a no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and accordingly, a finding of "no significant hazards consideration" is justified.

8.0 ENVIRONMENTAL CONSIDERATION

A review has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

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9.0 PRECEDENT

The proposed amendment incorporates into the CPS TS changes that are specific to CPS, and therefore, this proposed amendment does not rely upon the issuance of amendments to other licensees. The wording of the proposed SR is, however, consistent with Reference 3 and a similar SR in the Dresden, LaSalle, Quad Cities and Peach Bottom TS.

10.0 REFERENCES

- (1) GE Nuclear Energy Report GE-NE-0000-0000-7456-01P, "Option B Scram Times For Clinton Power Station," dated February 2002
- (2) NEDE-24011-P-A, "General Electric Standard Application for Reactor Fuel, GESTAR-II," as amended through Amendment 26
- (3) NUREG-1433, "Standard Technical Specifications, General Electric Plants, BWR/4," Revision 2, dated June 2001

ATTACHMENT 3

MARKUP OF PROPOSED TECHNICAL SPECIFICATION PAGE CHANGES

Revised TS Pages

3.2-2

3.2-2a

3.2 POWER DISTRIBUTION LIMITS

3.2.2 MINIMUM CRITICAL POWER RATIO (MCPR)

LCO 3.2.2 All MCPRs shall be greater than or equal to the MCPR operating limits specified in the COLR.

APPLICABILITY: THERMAL POWER \geq 21.6% RTP.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Any MCPR not within limits.	A.1 Restore MCPR(s) to within limits.	2 hours
B. Required Action and associated Completion Time not met.	B.1 Reduce THERMAL POWER to $<$ 21.6% RTP.	4 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.2.2.1 Verify all MCPRs are greater than or equal to the limits specified in the COLR.	Once within 12 hours after \geq 21.6% RTP <u>AND</u> 24 hours thereafter

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
SR 3.2.2.2 Determine the M CPR limits.	Once within 72 hours after each completion of SR 3.1.4.1 <u>AND</u> Once within 72 hours after each completion of SR 3.1.4.2 <u>AND</u> Once within 72 hours after each completion of SR 3.1.4.4

ATTACHMENT 4

**TYPED PAGES
FOR
TECHNICAL SPECIFICATION CHANGE
AND
BASES CHANGE (FOR INFORMATION ONLY)**

Retyped TS Pages

3.2-2
3.2-2a

Retyped Bases Pages

B 3.2-8
B3.2-8a

3.2 POWER DISTRIBUTION LIMITS

3.2.2 MINIMUM CRITICAL POWER RATIO (M CPR)

LCO 3.2.2 All M CPRs shall be greater than or equal to the M CPR operating limits specified in the COLR.

APPLICABILITY: THERMAL POWER \geq 21.6% RTP.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Any M CPR not within limits.	A.1 Restore M CPR(s) to within limits.	2 hours
B. Required Action and associated Completion Time not met.	B.1 Reduce THERMAL POWER to < 21.6% RTP.	4 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.2.2.1 Verify all M CPRs are greater than or equal to the limits specified in the COLR.	Once within 12 hours after \geq 21.6% RTP <u>AND</u> 24 hours thereafter

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
SR 3.2.2.2 Determine the MCPR limits.	Once within 72 hours after each completion of SR 3.1.4.1 <u>AND</u> Once within 72 hours after each completion of SR 3.1.4.2 <u>AND</u> Once within 72 hours after each completion of SR 3.1.4.4

BASES (continued)

SURVEILLANCE
REQUIREMENTS

SR 3.2.2.1

The MCPR is required to be initially calculated within 12 hours after THERMAL POWER is $\geq 21.6\%$ RTP and then every 24 hours thereafter. It is compared to the specified limits in the COLR to ensure that the reactor is operating within the assumptions of the safety analysis. The 24 hour Frequency is based on both engineering judgment and recognition of the slowness of changes in power distribution during normal operation. The 12 hour allowance after THERMAL POWER reaches $\geq 21.6\%$ RTP is acceptable given the large inherent margin to operating limits at low power levels.

With regard to MCPR values obtained pursuant to this SR, as determined from plant indication instrumentation, the specified limit is considered to be a nominal value and therefore does not require compensation for instrument indication uncertainties (Ref. 9).

SR 3.2.2.2

Because the transient analyses may take credit for conservatism in the control rod scram speed performance, it must be demonstrated that the specific scram speed distribution is consistent with that used in the transient analyses. SR 3.2.2.2 determines the actual scram speed distribution and compares it with the assumed distribution. The MCPR operating limit is then determined based either on the applicable limit associated with scram times of LCO 3.1.4, "Control Rod Scram Times," or the realistic scram times. The scram time dependent MCPR limits are contained in the COLR. This determination must be performed and any necessary changes must be implemented within 72 hours after each set of control rod scram time tests required by SR 3.1.4.1, SR 3.1.4.2, and SR 3.1.4.4 because the effective scram speed distribution may change during the cycle or after maintenance that could affect scram times. The 72 hour Completion Time is acceptable due to the relatively minor changes in the actual control rod scram speed distribution expected during the fuel cycle.

(continued)

BASES (continued)

- REFERENCES
1. NUREG-0562, "Fuel Rod Failures As A Consequence of Nucleate Boiling or Dryout," June 1979.
 2. NEDE-24011-P-A, "General Electric Standard Application for Reactor Fuel, GESTAR-II," (latest approved revision).
 3. USAR, Section 15.0.
 4. USAR, Appendix 15B.
 5. USAR, Appendix 15C.
 6. NEDC-31546-P, "Maximum Extended Operating Domain and Feedwater Heater Out-of-Service Analysis for Clinton Power Station," August 1988.
 7. NEDE-30130-P-A, "Steady State Nuclear Methods," April 1985.
 8. NEDO-24154-A, "Qualification of the One-Dimensional Core Transient Model for Boiling Water Reactors," General Electric Company, August 1986.
 9. Calculation IP-0-0002.
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