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October 27, 1998  
PY-CEI/NRR-2325L

United States Nuclear Regulatory Commission  
Document Control Desk  
Washington, D.C. 20555

Perry Nuclear Power Plant  
Docket No. 50-440  
Proposed Revision of Minimum Critical Power Ratio Safety Limit

Ladies and Gentlemen:

Pursuant to 10 CFR 50.90, Nuclear Regulatory Commission review and approval of a license amendment for the Perry Nuclear Power Plant is requested. The proposed amendment would modify the existing Minimum Critical Power Ratio (MCPR) Safety Limit contained in TS 2.1.1.2. Specifically, the change would apply additional conservatism by modifying the MCPR Safety Limit values, as calculated by General Electric (GE), by maintaining the limit of 1.09 for two recirculation loop operation and by increasing the limit from 1.10 to 1.11 for single recirculation loop operation.

In addition to the proposed changes to the MCPR Safety Limit, the proposed amendment removes a note to TS 2.1.1.2 and a footnote to TS 5.6.5.b that references MCPR Safety Limit values as cycle specific. The removal of these notes will avert the review and approval of subsequent license amendments when the MCPR Safety Limit does not require modification.

Attachment 1 provides a Summary of the proposed TS change, a Description of the Proposed TS Change, a Safety Analysis, and an Environmental Consideration. Attachment 2 provides the Significant Hazards Consideration. Attachment 3 provides the annotated TS pages reflecting the proposed change

Attachment 4 provides additional information regarding how the plant cycle specific MCPR Safety Limit was evaluated for Perry. This attachment contains material that General Electric considers proprietary information as described in 10 CFR 2.790(a)(4), for which an affidavit is provided as Attachment 5. It is requested that this information be withheld from disclosure. The proprietary text contained in the attachments is enclosed in double brackets.

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APP 1

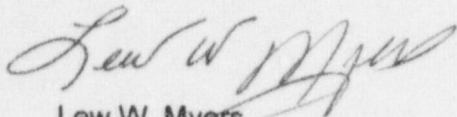
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If you have questions or require additional information, please contact  
Mr. Henry L. Hegrat, Manager - Regulatory Affairs, at (440) 280-5606.

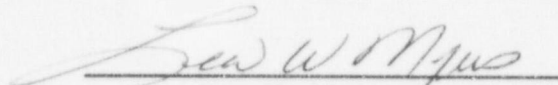
Very truly yours,

A handwritten signature in cursive script, appearing to read "Lew W. Myers".

Lew W. Myers

cc: NRC Project Manager  
NRC Resident Inspector  
NRC Region III  
State of Ohio

I, Lew W. Myers, being duly sworn state that (1) I am Vice President - Nuclear, of the Centerior Service Company, (2) I am duly authorized to execute and file this certification on behalf of The Cleveland Electric Illuminating Company and Toledo Edison Company, and as the duly authorized agent for Duquesne Light Company, Ohio Edison Company, and Pennsylvania Power Company, and (3) the statements set forth herein are true and correct to the best of my knowledge, information and belief.

  
Lew W. Myers

Sworn to and subscribed before me, the 27<sup>th</sup> day of October, 1998

  
Jane E. Mott

JANE E. MOTT  
Notary Public, State of Ohio  
My Commission Expires Feb. 20, 2000  
(Recorded in Lake County)



GENERAL ELECTRIC COMPANY

AFFIDAVIT



## Affidavit

I, **Glen A. Watford**, being duly sworn, depose and state as follows:

- (1) I am Manager, Nuclear Fuel Engineering, General Electric Company ("GE") and have been delegated the function of reviewing the information described in paragraph (2) which is sought to be withheld, and have been authorized to apply for its withholding.
- (2) The information sought to be withheld is contained in Attachment 4 to the letter from Lew W. Myers (PNPD) to USNRC Document Control Desk, *Proposed Revision of Minimum Critical Power Ratio Safety Limit*, letter number PY-CEI/NRR-2325L. The proprietary text has been enclosed by double brackets.
- (3) In making this application for withholding of proprietary information of which it is the owner, GE relies upon the exemption from disclosure set forth in the Freedom of Information Act ("FOIA"), 5 USC Sec. 552(b)(4), and the Trade Secrets Act, 18 USC Sec. 1905, and NRC regulations 10 CFR 9.17(a)(4) and 2.790(a)(4) for "trade secrets and commercial or financial information obtained from a person and privileged or confidential" (Exemption 4). The material for which exemption from disclosure is here sought is all "confidential commercial information," and some portions also qualify under the narrower definition of "trade secret," within the meanings assigned to those terms for purposes of FOIA Exemption 4 in, respectively, Critical Mass Energy Project v. Nuclear Regulatory Commission, 975F2d871 (DC Cir. 1992), and Public Citizen Health Research Group v. FDA, 704F2d1280 (DC Cir. 1983).
- (4) Some examples of categories of information which fit into the definition of proprietary information are:
  - a. Information that discloses a process, method, or apparatus, including supporting data and analyses, where prevention of its use by General Electric's competitors without license from General Electric constitutes a competitive economic advantage over other companies;
  - b. Information which, if used by a competitor, would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product;
  - c. Information which reveals cost or price information, production capacities, budget levels, or commercial strategies of General Electric, its customers, or its suppliers;
  - d. Information which reveals aspects of past, present, or future General Electric customer-funded development plans and programs, of potential commercial value to General Electric;
  - e. Information which discloses patentable subject matter for which it may be desirable to obtain patent protection.

- The information sought to be withheld is considered to be proprietary for the reasons set forth in both paragraphs (4)a. and (4)b., above.
- (5) The information sought to be withheld is being submitted to NRC in confidence. The information is of a sort customarily held in confidence by GE, and is in fact so held. Its initial designation as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in (6) and (7) following. The information sought to be withheld has, to the best of my knowledge and belief, consistently been held in confidence by GE, no public disclosure has been made, and it is not available in public sources. All disclosures to third parties including any required transmittals to NRC, have been made, or must be made, pursuant to regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence.
  - (6) Initial approval of proprietary treatment of a document is made by the manager of the originating component, the person most likely to be acquainted with the value and sensitivity of the information in relation to industry knowledge. Access to such documents within GE is limited on a "need to know" basis.
  - (7) The procedure for approval of external release of such a document typically requires review by the staff manager, project manager, principal scientist or other equivalent authority, by the manager of the cognizant marketing function (or his delegate), and by the Legal Operation, for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside GE are limited to regulatory bodies, customers, and potential customers, and their agents, suppliers, and licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or proprietary agreements.
  - (8) The information identified in paragraph (2) is classified as proprietary because it contains details of GE's Safety Limit MCPR analysis and the corresponding results which GE has applied to Perry's actual core design with GE's fuel.

The development of the methods used in these analysis, along with the testing, development and approval of the supporting critical power correlation was achieved at a significant cost, on the order of several million dollars, to GE.

- (9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GE's competitive position and foreclose or reduce the availability of profit-making opportunities. The fuel design is part of GE's comprehensive BWR safety and technology base, and its commercial value extends beyond the original development cost. The value of the technology base goes beyond the extensive physical database and analytical methodology and includes development of the expertise to determine and apply the appropriate evaluation process. In addition, the technology base includes the value derived from providing analyses done with NRC-approved methods.

The research, development, engineering, analytical, and NRC review costs comprise a substantial investment of time and money by GE.

The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

GE's competitive advantage will be lost if its competitors are able to use the results of the GE experience to normalize or verify their own process or if they are able to claim an equivalent understanding by demonstrating that they can arrive at the same or similar conclusions.



Affidavit

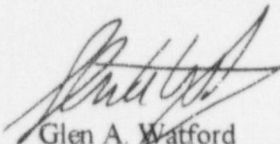
The value of this information to GE would be lost if the information were disclosed to the public. Making such information available to competitors without their having been required to undertake a similar expenditure of resources would unfairly provide competitors with a windfall, and deprive GE of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment in developing these very valuable analytical tools.

State of North Carolina    )  
County of New Hanover    ) SS:

Glen A. Watford, being duly sworn, deposes and says:

That he has read the foregoing affidavit and the matters stated therein are true and correct to the best of his knowledge, information, and belief.

Executed at Wilmington, North Carolina, this 21<sup>st</sup> day of September, 1998



Glen A. Watford  
General Electric Company

Subscribed and sworn before me this 21<sup>st</sup> day of September, 1998

Jason M. Anderson  
Notary Public, State of North Carolina

My Commission Expires 10/08/2001

## SUMMARY

This License Amendment Request proposes an amendment of the Facility Operating License NPF-58 Appendix A Technical Specifications for the Perry Nuclear Power Plant (PNPP), Unit Number 1. The proposed amendment would modify the existing Minimum Critical Power Ratio (MCPR) Reactor Core Safety Limit contained in Technical Specification (TS) 2.1.1.2. In addition, the proposed amendment removes a footnote to TS 5.6.5.b that references MCPR Safety Limit values as Cycle specific. The removal of this footnote will avert the need for review and approval of subsequent license amendments when the MCPR Safety Limit does not require modification.

## DESCRIPTION OF THE PROPOSED CHANGE

In accordance with 10 CFR 50.90, an amendment to Operating License NPF-58 is proposed to reflect the results of the plant/cycle specific MCPR Safety Limit analyses which maintains the MCPR Safety Limit value at 1.09 for two recirculation loop operation, and increases the single recirculation loop operation value from 1.10 to 1.11.

The following changes to the PNPP TS are proposed:

Change TS 2.1.1.2 to read:

"With the reactor steam dome pressure  $\geq$  785 psig and core flow  $\geq$  10% rated flow:

MCPR shall be  $\geq$  1.09 for two recirculation loop operation or  $\geq$  1.11 for single recirculation loop operation."

Change TS 5.6.5.b by:

Eliminating the asterisk at the end of the sentence and removing the foot note at the bottom of the same page, Page 5.0-18, which reads: "For Cycle 7, as approved in the NRC Safety Evaluation Report dated November 7, 1997."

The proposed TS change is annotated on the affected pages from the PNPP TS in Attachment 3.



## SAFETY ANALYSIS

### BACKGROUND

The MCPR Safety Limit is established to ensure fuel cladding integrity is not compromised as a result of overheating. The Safety Limit is defined as the critical power ratio in the limiting fuel assembly for which more than 99.9% of the fuel rods in the core are expected to avoid boiling transition, considering the power distribution within the core and uncertainties. The MCPR Safety Limit provides a 95% probability at the 95% confidence level that following any abnormal operating occurrence, greater than 99.9% of the fuel rods avoid boiling transition.

Prior to 1996, the MCPR Safety Limit was generically determined for each fuel product line during the bundle qualification process. General Electric Standard Application for Reactor Fuel (GESTAR II) stipulated that the MCPR Safety Limit analysis for a new fuel design be performed for a large high power density plant assuming a bounding equilibrium core. The GE12 product line (the predominant fuel type currently in use at Perry) generic Safety Limit Minimum Critical Power Ratio (SLMCPR) value of 1.09 was determined according to this specification.

In May 1996, the fuel vendor initiated a 10CFR Part 21, Reportable Condition to document that the MCPR Safety Limit calculated on a generic basis was not always conservative when applied to some actual core loading patterns and fuel bundle designs. Pending NRC approval of the proposed Amendment 25 to GESTAR II, the NRC staff has been reviewing the plant cycle specific MCPR Safety Limit individually for each plant.

### CALCULATING THE MCPR SAFETY LIMIT

The MCPR Safety Limit is determined using a statistical model that combines uncertainties of the operating parameters and the procedures used to calculate critical power. The probability of the occurrence of boiling transition is determined using the NRC-approved GE critical power correlation.

In general, the calculated Safety Limit is dominated by two key parameters: (1) flatness of the core bundle-by-bundle MCPR distributions and (2) flatness of the bundle pin-by-pin power distributions. Greater flatness in either parameter yields more rods susceptible to boiling transition. The MCPR Safety Limit analysis maximizes the number of fuel rods that are close to the transition boiling limits. With more bundles with little variation in characteristics, there are more bundles available to be at the transition boiling limits. In addition, the uniform power distribution within the bundle causes more fuel rods to be at the same margin to the limit.

Therefore, the MCPR Safety Limit is established to satisfy the probability requirements providing a 95% probability at the 95% confidence level that following any abnormal operating occurrence, 99.9% of the fuel rods avoid boiling transition, considering the power distribution within the core and uncertainties.

GE's calculation of the plant specific MCPR Safety Limit for the PNPP Unit 1 are based upon NRC approved methods (GESTAR II, NEDE-24011-P-A-13, and US Supplement, NEDE-24011-P-A-13-US, August 20, 1996) along with NRC approved interim implementing procedures as discussed in "Proposed Amendment 25 to GE Licensing Topical Report NEDE-24011-P-A (GESTAR II) on Cycle-Specific Safety Limit MCPR", December 13, 1996. The methodology is identical to the generic calculations except the following plant cycle-specific parameters were used to offset the non-conservatism of the generic MCPR:

1. Actual core loading
2. Conservative variations of projected control blade patterns
3. Actual bundle parameters for R-factor distributions
4. Calculations made for several points in the cycle

Attachment 4 provides additional proprietary information to support review of how plant/cycle specific MCPR Safety Limit analyses were calculated for PNPP. Attachment 5 provides an affidavit requesting the withholding of disclosure of the proprietary information provided in this attachment.

#### IMPACT ON OTHER REACTOR PARAMETERS

The MCPR Safety Limit has no influence on peak pressure due to MSIV closure; thus there is no influence on the reactor pressure vessel integrity.

The bases for the Maximum Average Planar Linear Heat Generation Rate (MAPLHGR) and Linear Heat Generation Rate (LHGR) are to limit the peak clad temperature during a Loss of Coolant Accident and to prevent 1% plastic strain of the clad. The MCPR Safety Limit has no influence on MAPLHGR and LHGR.

The MCPR Safety Limit has no influence on the nuclear characteristics of the fuel bundle during cold shutdown. Therefore, there is no influence on shutdown margin.

#### CYCLE SPECIFIC FOOTNOTE

In addition to the proposed changes to the MCPR Safety Limit, the proposed amendment removes a note to TS 2.1.1.2 and a footnote to 5.6.5.b that references MCPR Safety Limit values as cycle specific. The removal of these notes will avert the review and approval of subsequent license amendments when the MCPR Safety Limit does not require modification.

## CONCLUSION

This change maintains the MCPR Safety Limit to the same margin of safety as described in the PNPP USAR and GESTAR II.

## ENVIRONMENTAL CONSIDERATIONS

The proposed Technical Specifications change request was evaluated against the criteria of 10 CFR 51.22 for environmental considerations. The proposed change does not significantly increase individual or cumulative occupational radiation exposures, does not significantly change the types or significantly increase the amounts of effluents that may be released offsite, and as discussed in Attachment 2, does not involve a significant hazards consideration. Based on the foregoing, it has been concluded that the proposed Technical Specification change meets the criteria given in 10 CFR 51.22 (c) (9) for a categorical exclusion from the requirement for an Environmental Impact Statement.



## SIGNIFICANT HAZARDS CONSIDERATIONS

The standards used to arrive at a determination that a request for amendment involves no significant hazards considerations are included in the Commission's Regulations, 10 CFR 50.92, which state that the operation of the facility in accordance with the proposed amendment would not: (1) involve a significant increase in the probability or consequences of an accident previously evaluated; or (2) create the possibility of a new or different kind of accident from any previously evaluated; or (3) involve a significant reduction in the margin of safety.

The proposed amendment has been reviewed with respect to these three factors and it has been determined that the proposed change does not involve a significant hazard because:

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

There is no change to any plant equipment. Per USAR Section 4.2.1, the fuel system design bases are provided in General Electric Standard Application for Reactor Fuel (GESTAR II). The Minimum Critical Power Ratio (MCPR) Safety Limit protects the fuel in accordance with the design basis. The MCPR Safety Limit calculations limit the bundle power to ensure the critical power ratio remains unchanged. Therefore, there is not an increase in the probability of transition boiling. The basis of the MCPR Safety Limit calculation remains the same, ensuring that greater than 99.9% of all fuel rods in the core avoid transition boiling if the limit is not violated. Therefore, there is no increase in the probability of the occurrence of a previously analyzed accident.

The fundamental sequences of accidents and transients have not been altered. The MCPR Operating Limits are selected such that potentially limiting plant transients and accidents prevent the MCPR from decreasing below the MCPR Safety Limit anytime during the transient. Therefore, there is no impact on any of the limiting USAR Appendix 15E transients. The radiological consequences are the same as previously stated in the USAR, and as approved in the NRC Safety Evaluation for GESTAR II. Therefore, the consequences of an accident do not increase over previous evaluations in the USAR.

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

The MCPR Safety Limit values are designed to ensure that fuel damage from transition boiling does not occur in at least 99.99% of the fuel rods in the core as a result of the limiting postulated accident. The values are calculated in accordance with GESTAR II and the fuel vendor's interim implementing procedures, which incorporate cycle-specific parameters.

The GESTAR II analysis has been accepted by the NRC as comprehensive for ensuring that fuel designs will perform within acceptable bounds. The MCPR Safety Limit ensures that the fuel is protected in accordance with the design basis. The function, location, operation, and handling of the fuel remain unchanged. In addition, the initiating sequence of events has not changed. Therefore, no new or different kind of accident is created.

3. The proposed change does not involve a significant reduction in a margin of safety.

The MCPR Safety Limit values do not alter the design or function of any plant system, including the fuel. The new MCPR Safety Limit values were calculated using NRC-approved methods described in GESTAR II and the fuel vendor's interim implementing procedures, which incorporate cycle-specific parameters. The MCPR Safety Limit values are consistent with GESTAR II, the NRC Safety Evaluation of GESTAR II, the NRC Safety Evaluation Report for the Perry Nuclear Power Plant and its Supplements for USAR Sections 4.4.1 and 15.0.3.3.1, and the Technical Specification Bases (Section 2.1.1.2) for the MCPR Safety Limit. This change incorporates a cycle-specific MCPR Safety Limit, as opposed relying on the generic limit. Therefore, the implementation of the proposed change to the MCPR Safety Limit does not involve a reduction in the margin of safety.