August 30, 2001

10 CFR Part 50
Section 50.90

U S Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

MONTICELLO NUCLEAR GENERATING PLANT
Docket No. 50-263 License No. DPR-22

License Amendment Request for Monticello Cycle 21
Safety Limit Minimum Critical Power Ratio

Attached is a request for a change in the Technical Specifications (TS), Appendix A of the Operating License for the Monticello Nuclear Generating Plant. This request is submitted in accordance with the provisions of 10 CFR Part 50, Section 50.90.

Changes are proposed to TS Section 2.1.A to revise the Safety Limit Minimum Critical Power Ratio (SLMCPR) value from 1.11 to 1.10 for two recirculation pump operation. Single loop operation remains unchanged at 1.12. Please note that this amendment request does not reflect minor changes submitted June 18, 2001 in a License Amendment Request (LAR) titled: "Revised Reference Point for Reactor Vessel Level Setpoints, Simplification of Safety Limits, and Improvements to the Bases." Since it is unknown which LAR will be approved first, after the first of these two LARs is approved, revised pages will be submitted for the second.

Exhibit A contains a description of the proposed changes, the reasons for requesting the changes, Safety Evaluation, a Determination of No Significant Hazards Consideration, and an Environmental Assessment. Exhibit B contains the current Technical Specification pages marked up with the proposed changes. Exhibit C contains revised Monticello Technical Specification pages. Exhibit D contains several letters with information from Global Nuclear Fuels regarding the cycle specific SLMCPR for Monticello Cycle 21.

Exhibit D-2 is a Global Nuclear Fuel document containing proprietary information and is therefore requested to be withheld from public disclosure in accordance with 10 CFR 2.790(b)(l)(ii).

Startup for Monticello Cycle 21 is scheduled for mid December 2001. Implementation of the new SLMCPR values should be effective upon startup from the refueling outage.

2807 West County Road 75 • Monticello, Minnesota 55362-9637
Telephone: 763.295.5151 • Fax: 763.295.1454

A201

This request is submitted in accordance with the provisions of 10 CFR 50, Section 50.90. This submittal contains no new NRC commitments, nor does it modify any prior commitments.

Please contact Mr. Doug Neve, Licensing Project Manager (interim) at 763-295-1353 if you require additional information related to this request.

by _____
John D. Purkis
Plant Manager
Monticello Nuclear Generating Plant

Subscribed to and sworn before me this 30TH day of August, 2001

_____
Notary

SAMUEL I. SHIREY
NOTARY PUBLIC - MINNESOTA
My Comm. Exp. Jan. 31, 2005

C: Regional Administrator-III, NRC
NRR Project Manager, NRC
Resident Inspector, NRC
Minnesota Department of Commerce

Attachments: Exhibit A – Evaluation of Proposed Changes to the Technical Specifications

Exhibit B – Current Technical Specification Pages Marked Up with Proposed Changes

Exhibit C – Revised Technical Specification Pages

Exhibit D – Letter from Les Conner of Global Nuclear Fuel to Richard J. Rohrer titled, "Additional Information Regarding the Cycle Specific SLMCPR for Monticello Cycle 21." July 10, 2001

Exhibit D-1 – Affidavit for Additional Information Regarding the Cycle Specific SLMCPR for Monticello Cycle 21.

Exhibit D-2 – Proprietary Version of Additional Information Regarding the Cycle Specific SLMCPR for Monticello Cycle 21.

Exhibit D-3 – Non-Proprietary Version of Additional Information Regarding the Cycle Specific SLMCPR for Monticello Cycle 21.

EXHIBIT A

Evaluation of Proposed Changes to the Technical Specifications

License Amendment Request for Monticello Cycle 21
Safety Limit Minimum Critical Power Ratio

Pursuant to 10 CFR Part 50, Section 50.90, Nuclear Management Company hereby proposes the following changes to Appendix A, of facility operating license DPR-22, Technical Specifications and Bases for Monticello Nuclear Generating Plant.

Please note that this amendment request does not reflect changes submitted June 18, 2001 in a License Amendment Request (LAR) titled: "Revised Reference Point for Reactor Vessel Level Setpoints, Simplification of Safety Limits, and Improvements to the Bases." Since it is unknown which LAR will be approved first, after the first of these two LARs is approved, revised pages will be submitted for the second.

Proposed Change
Section 2.1.A on page 6, change value of Minimum Critical Power Ratio (MCPR) from "**1.11**" to "**1.10**" for two recirculation loop operation.

Reason for Change
The current required safety limit MCPR (SLMCPR) for Monticello is 1.11. Calculations performed by Global Nuclear Fuel (GNF) for Monticello resulted in a minimum calculated Cycle 21 two recirculation loop SLMCPR value of 1.10.

Safety Evaluation
The purpose of the SLMCPR is to provide high statistical probability (greater than 99.9%) that fuel rods in the operating core would not experience transition boiling (clad dryout) during the most limiting Abnormal Operational Transient (AOT). The criteria of transition boiling for determination of the SLMCPR is a conservative approach since this phenomena by itself does not signal the onset of fuel cladding failure. The revised SLMCPR for Monticello was determined using plant and cycle-specific fuel and core parameters, and NRC approved methods and uncertainties as discussed in Exhibit D. Analysis of the limiting AOT provides the allowed operating conditions, in terms of MCPR, of the core during the fuel cycle such that if the event were to occur, the transient MCPR would not be less than the SLMCPR. No plant hardware or operational changes are required with this proposed change.

Determination of No Significant Hazards Considerations

Nuclear Management Company, LLC (NMC) proposes a change to the Technical Specifications (TS), Appendix A of the Operating License for the Monticello Nuclear Generating Plant. The change would revise the Safety Limit Minimum Critical Power Ratio (SLMCPR) value from 1.11 to 1.10 for two recirculation pump operation. Single loop operation remains unchanged at 1.12. The proposed Safety Limit MCPR (SLMCPR), and its use to determine the Cycle 21 thermal limits, have been derived using NRC approved methods and uncertainties. The proposed changes to the Operating License have been evaluated to determine whether they constitute a significant hazards consideration as required by 10 CFR Part 50, Section 50.91 using standards provided in Section 50.92. This analysis is provided below:

The proposed amendment will not involve a significant increase in the probability or consequences of an accident previously evaluated.

The proposed Safety Limit MCPR (SLMCPR), and its use to determine the Cycle 21 thermal limits, have been derived using NRC approved methods and uncertainties. These methods do not change operation of the plant, and have no effect on the probability of an accident initiating event or transient. The basis of the SLMCPR is to ensure no mechanistic fuel damage is calculated to occur if the limit is not violated. The new SLMCPR for Cycle 21 preserves the margin to transition boiling and the probability of fuel damage is not increased.

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

The proposed amendment will not create the possibility of a new or different kind of accident from any accident previously evaluated.

The proposed change results only from different inputs, for the Cycle 21 core reload. These methods and uncertainties have been reviewed and approved by the NRC, and do not involve any new or unapproved methods for operating the facility. No new initiating events or transients result from these changes.

The SLMCPR remains high enough to ensure that greater than 99.9% of all fuel rods in the core will avoid transition boiling if the limit is not violated, thereby preserving the fuel cladding integrity. A change in SLMCPR cannot create the possibility of any new type of accident. SLMCPR values for the new fuel cycle are calculated using previously transmitted methodology.

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

The proposed amendment will not involve a significant reduction in the margin of safety.

The margin of safety as defined in the TS bases will remain the same. The new SLMCPR was derived using NRC approved methods and uncertainties which are in accordance with the current fuel design and licensing criteria. The SLMCPR remains high enough to ensure that greater than 99.9% of all fuel rods in the core will avoid transition boiling if the limit is not violated, thereby preserving the fuel cladding integrity.

Fuel licensing acceptance criteria for SLMCPR calculations apply to Monticello Cycle 21 in the same manner as previously applied. SLMCPRs prepared using methodology previously transmitted to the NRC ensure that greater than 99.9% of all fuel rods in the core will avoid transition boiling if the limit is not violated, thereby preserving fuel cladding integrity. The operating MCPR limit is set appropriately above the safety limit value to ensure adequate margin when the cycle specific transients are evaluated.

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

Environmental Assessment
Nuclear Management Company has evaluated the proposed changes and determined that the changes:

1. Do not involve a significant hazards consideration.

2 Do not involve a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, and

3. Do not involve a significant increase in individual or cumulative occupational radiation exposure.

Accordingly, the proposed changes meet the eligibility criterion for categorical exclusion set forth in 10 CFR Part 51, Section 51.22(b), and an environmental assessment of the proposed changes is not required

Exhibit B

MONTICELLO NUCLEAR GENERATING PLANT

License Amendment Request for Monticello Cycle 21
Safety Limit Minimum Critical Power Ratio

Current Technical Specification Pages Marked Up with Proposed Changes

Page

6

2.0 SAFETY LIMITS

2.1 FUEL CLADDING INTEGRITY

Applicability:

Applies to the interrelated variables associated with fuel thermal behavior.

Objective:

To establish limits below which the integrity of the fuel cladding is preserved.

Specification:

A. Core Thermal Power Limit (Reactor Pressure > 800 psia and Core Flow is > 10% of Rated)

When the reactor pressure is > 800 psia and core flow is > 10% of rated, the existence of a minimum critical power ratio (MCPR) less than ~~1.11~~ 1.10, for two recirculation loop operation, or less than 1.12 for single loop operation, shall constitute violation of the fuel cladding integrity safety limit.

LIMITING SAFETY SYSTEM SETTINGS

2.3 FUEL CLADDING INTEGRITY

Applicability:

Applies to trip settings of the instruments and devices which are provided to prevent the reactor system safety limits from being exceeded.

Objective:

To define the level of the process variables at which automatic protective action is initiated to prevent the safety limits from being exceeded.

Specification:

The Limiting safety system settings shall be as specified below:

A. Neutron Flux Scram

1. APRM - The APRM flux scram trip setting shall be:

   a. For two recirculation loop operation (TLO):

   $$S \leq 0.66W + 65.6\%$$

   where

   S = Setting in percent of rated thermal power, rated power being 1775 MWt

   W = Percent of recirculation drive flow required to produce a core flow of 57.6×10^6 lb/hr

   b. For single recirculation loop operation (SLO):

   $$S \leq 0.66(W - 5.4) + 65.6\%$$

   c. No greater than 120%.

Exhibit C

MONTICELLO NUCLEAR GENERATING PLANT

License Amendment Request Dated September 1, 2001
Safety Limit Minimum Critical Power Ratio

Revised Technical Specification Pages

Page

6

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A. Core Thermal Power Limit (Reactor Pressure > 800 psia and Core Flow is > 10% of Rated)

When the reactor pressure is > 800 psia and core flow is > 10% of rated, the existence of a minimum critical power ratio (MCPR) less than 1.10, for two recirculation loop operation, or less than 1.12 for single loop operation, shall constitute violation of the fuel cladding integrity safety limit.

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b. For single recirculation loop operation (SLO):

$$S \leq 0.66(W - 5.4) + 65.6\%$$

c. No greater than 120%.

Exhibit D

MONTICELLO NUCLEAR GENERATING PLANT

License Amendment Request for Monticello Cycle 21
Safety Limit Minimum Critical Power Ratio

Global Nuclear Fuel (GNF) letter dated July 10, 2001
Titled:

"Additional Information Regarding the Cycle Specific SLMCPR for Monticello Cycle 21"

Note: Attached to this letter were three documents: 1) the Affidavit for the proprietary version of the additional information (Attachment D-1 to this LAR). 2) The proprietary version of the additional information (Attachment D-2), and 3) the non-proprietary version of the additional information (Attachment D-3). Each are attached. For clarity and to ensure the proprietary version is not improperly distributed, the attachments are separated under their own cover sheet.

Global Nuclear Fuel

Les Conner
Fuel Project Manager

A Joint Venture of GE, Toshiba, & Hitachi

Global Nuclear Fuel – Americas, LLC
Castle Hayne Road, Wilmington, NC 28401
(910) 675-6194, Fax (910) 675-5684
Les.Conner@gnf.com

LRC01.023
July 10, 2001

cc: C. A. Bonneau
J. E. Fawks
D. L. Orrock
H. H. Paustian
D. G. Wegener

Mr. Richard J. Rohrer
Project Manager, Nuclear Analysis and Design
Nuclear Management Company, LLC
414 Nicollet Mall - Ren Sq 10
Minneapolis, MN 55401-1927

Subject: Additional Information Regarding the Cycle Specific SLMCPR for Monticello Cycle 21

Dear Rick:

GNF is pleased to provide the following additional information for the Cycle Specific SLMCPR for Monticello Cycle 21. This is provided in both the GNF proprietary and non-proprietary versions. Also attached is the signed affidavit provided by Glen Watford.

If you have any questions, please contact me.

Best regards,

L. R. Conner

Exhibit D-1

MONTICELLO NUCLEAR GENERATING PLANT

License Amendment Request for Monticello Cycle 21
Safety Limit Minimum Critical Power Ratio

Affidavit

(Three pages attached)

Affidavit

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

(1) I am Manager, Nuclear Fuel Engineering, Global Nuclear Fuel – Americas, L.L.C. ("GNF-A") 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 the attachment, "Additional Information Regarding the Cycle Specific SLMCPR for Monticello Cycle 21," June 29, 2001.

(3) In making this application for withholding of proprietary information of which it is the owner or licensee, GNF-A 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 GNF-A's competitors without license from GNF-A 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 GNF-A, its customers, or its suppliers;

d. Information which reveals aspects of past, present, or future GNF-A customer–funded development plans and programs, of potential commercial value to GNF-A;

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 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 GNF-A, 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 GNF-A, 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, or subject to the terms under which it was licensed to GNF-A. Access to such documents within GNF-A 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 GNF-A 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 GNF-A's fuel design and licensing methodology.

The development of the methods used in these analyses, along with the testing, development and approval of the supporting methodology was achieved at a significant cost, on the order of several million dollars, to GNF-A or its licensor.

(9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GNF-A's competitive position and foreclose or reduce the availability of profit–making opportunities. The fuel design and licensing methodology is part of GNF-A'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 GNF-A or its licensor.

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.

GNF-A's competitive advantage will be lost if its competitors are able to use the results of the GNF-A 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.

The value of this information to GNF-A 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 GNF-A of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment in developing and obtaining these very valuable analytical tools.

Affidavit

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 2nd day of July, 2001

Glen A. Watford
Global Nuclear Fuel – Americas, LLC

Subscribed and sworn before me this 2nd day of July, 2001

Notary Public, State of North Carolina

My Commission Expires Feb. 6, 2006

Exhibit D-3

MONTICELLO NUCLEAR GENERATING PLANT

License Amendment Request for Monticello Cycle 21
Safety Limit Minimum Critical Power Ratio

Non-Proprietary Version

"Additional Information Regarding the Cycle Specific SLMCPR for Monticello Cycle 21"

(Nine pages attached)

References

[1] Letter, Frank Akstulewicz (NRC) to Glen A. Watford (GE), "Acceptance for Referencing of Licensing Topical Reports NEDC-32601P, *Methodology and Uncertainties for Safety Limit MCPR Evaluations*; NEDC-32694P, *Power Distribution Uncertainties for Safety Limit MCPR Evaluation*; and Amendment 25 to NEDE-24011-P-A on Cycle Specific Safety Limit MCPR," (TAC Nos. M97490, M99069 and M97491), March 11, 1999.

[2] Letter, Thomas H. Essig (NRC) to Glen A. Watford (GE), "Acceptance for Referencing of Licensing Topical Report NEDC-32505P, Revision 1, *R-Factor Calculation Method for GE11, GE12 and GE13 Fuel*," (TAC No. M99070 and M95081), January 11, 1999.

[3] *General Electric BWR Thermal Analysis Basis (GETAB): Data, Correlation and Design Application*, NEDO-10958-A, January 1977.

Comparison of Monticello CYCLE 21 SLMCPR Value

Table 1 summarizes the relevant input parameters and results of the SLMCPR determination for the Monticello Cycle 21 and 20 cores. The SLMCPR evaluations were performed using NRC approved methods and uncertainties[1]. These evaluations yield different calculated SLMCPR values because different inputs were used. The quantities that have been shown to have some impact on the determination of the safety limit MCPR (SLMCPR) are provided.

In comparing the Monticello Cycle 21 and Cycle 20 SLMCPR values it is important to note the impact of the differences in the core and bundle designs. These differences are summarized in Table 1.

[[ ]].

[[ ]].

The uncontrolled bundle pin-by-pin power distributions were compared between the Monticello Cycle 21 bundles and the Cycle 20 bundles. Pin-by-pin power distributions are characterized in terms of R-factors using the NRC approved methodology[2]. [[ ]]

Summary

[[ ]]have been used to compare quantities that impact the calculated SLMCPR value. Based on these comparisons, the conclusion is reached that the Monticello Cycle 21 core/cycle has a flatter core MCPR distribution [[ ]] than what was used to perform the Cycle 20 SLMCPR evaluation; and the Monticello Cycle 20 core/cycle has a flatter in-bundle power distributions [[ ]] than what was used to perform the Cycle 21 SLMCPR evaluation.

The calculated 1.10 Monte Carlo SLMCPR for Monticello Cycle 21 is consistent with what one would expect [[ ]] the 1.10 SLMCPR value is appropriate.

Based on all of the facts, observations and arguments presented above, it is concluded that the calculated SLMCPR value of 1.10 for the Monticello Cycle 21 core is appropriate. It is reasonable that this value is smaller than the 1.11 value calculated for the previous cycle.

For single loop operations (SLO) the calculated safety limit MCPR for the limiting case is 1.12 [[ ]]

Supporting Information

The following information is provided in response to NRC questions on previous submimttals containing GE14 fuel designs:

1. Provide the fuel types and numbers of assemblies used in Monticello Cycle 21 operation and identify if they are fresh or irradiated fuel (once or twice burned, etc.). Also, provide the fuel loading pattern for Cycle 21 and identify its difference from Cycle 20 and the impact on the SLMCPR calculation.

Response:

The requested core loading information is provided as Figures 1 and 2. The impact of the fuel loading pattern differences on the calculated SLMCPR is correlated to the values of [[ ]]

2. The approved methodologies used include NEDC-32694P, NEDC-32601P, Amendment 25 to NEDE-24011P-A, and NEDC-32505P, Revision 1. However, Table 1 indicates that the same power distribution uncertainty in GETAB is used for both Cycle 20 and 21. Please identify which power distribution uncertainties and SLMCPR uncertainties for SLMCPR are used to support this amendment request.

Response:

The GETAB (NEDO-10958-A) power distribution uncertainties are used for both Cycle 20 and 21. GETAB is invoked by reference from NEDE-24011P-A. The GETAB power distribution uncertainties are also reported in column 2 of Table 2.1 of NEDC-32601P. For the GETAB methodology, only the "TIP Reading and Bundle Power" and the "TIP Reading Random Uncertainty" values are classified as power distribution uncertainties. The GETAB values for these two quantities given in column 2 of Table 2.1 of NEDC-32601P are the ones that were used for this submittal. The NRC staff has taken the position in their SER dated March 11, 1999 that the non-power distribution uncertainties reported in NEDC-32601P are "revisions" or "updates" to the GETAB values. GE (GNF) has accepted this position so that the revised non-power distribution uncertainties are used for all SLMCPR calculations performed after June 1999 regardless of which approved methodology is used for the power distribution uncertainties. A line has been added to Table 1 to indicate that the revised non-power distribution uncertainties from NEDC-32601P-A Table 2.1 were used for Monticello, Cycle 21.

3. Provide the details for R-Factor calculation for GE14 fuel and provide the data bases to justify that the approach is conservative with respect to the approved method stated in NEDC-32505P, Revision 1.

Response:

Calculation of GE14 R-factors follows the approved methodology of NEDC-32505P Rev. 1. The R-factor calculations consist of three essential components: the weight scheme for combining rod peaking factors, the additive constants for adjusting individual position performance and the behavior for partially controlled conditions. The weighting scheme of GE14 is identical to that of GE12 because the two bundles are identical in the lattice geometry. The GE14 bundle is similar to the GE12 bundle. It is a 10x10 design with 78 full length rods, 14 part length rods and 2 large central water rods. The location of the part length rods and the water rods are identical. The main difference is that the length of the part length rods and the spacer locations are slightly different. The additive

constants are derived from the test data along with the GEXL coefficients. For partially controlled conditions, the bundle R-factors are calculated based on the prescribed axial power shapes that corresponds to the specific GEXL correlation. [[ ]] The process used for GE14 is the same as the approved methodology in NEDC-32505PA Rev. 1 and the recommendations in the SER.

4. Provide the details for GEXL14 correlation including its development and verification process, and data bases, and justify that the GEXL14 correlation is conservative.

Response:

Section 1.2.7 of NEDE-24011-P-A (GESTAR II) provides the conditions by which a GEXL correlation may be developed and documented. Explicit NRC approval of the "GEXL topical report" is not required under the NRC-approved provisions of Amendment 22 to GESTAR II.

An overview of the evaluations performed for GE14 fuel was provided previously in NEDC-32868P, Revision 0, December 1998 titled "GE14 Compliance with Amendment 22 of NEDE-24011-P-A (GESTAR II)". This document was transmitted by G. A. Watford (GE) letter MFN-045-98 to the attention of M. J. Davis at the NRC Document Control Desk dated December 11, 1998. Section 2.8.3 of this document describes the GEXL14 correlation.

Additional supporting details were provided previously by separate transmittal of "GEXL14 Correlation for GE14 Fuel", NEDC-32851P, Revision 1, September 1999. This document was transmitted by G.A. Watford (GE) letter FLN-2000-12 dated August 8, 2000 to the NRC Document Control Desk and to the attention of Tai L. Huang (NRC). Section 3 of NEDC-32851P, Rev. 1 describes the database used to develop the GEXL14 correlation for GE14 fuel.

GEXL14 correlation is developed based on the full scale ATLAS test data. The full scale test data were used to generate the GEXL coefficients as well as the additive constants for R-factor calculations to accurately predict the data points over the application range. The report "GE14 Compliance with Amendment 22 of NEDE-24011-P-A (GESTAR II)" documents the GEXL14 data and verification base. The database used to develop the GEXL14 correlation consists of [[ ]] different test assemblies. This correlation development database consisted of a total of [[ ]] critical power data points. The database used to verify the GEXL14 correlation consists of [[ ]] different test assemblies. The correlation verification database consisted of a total of [[ ]] data points. [[ ]]

The GEXL14 correlation is valid for GE14 fuel over the following range of state points:

	Database range	Correlation application range
Pressure:	[[	]]
Mass Flux:	[[	]]
Inlet Subcooling:	[[	]]
R-factor:	[[	]]
*exception		[[ ]]

[[ ]]

The GEXL14 correlation like previous GEXL correlations is derived as a best fit to the ATLAS critical power data. The GEXL correlation is not intended to be conservative. The GEXL correlation is derived following the process described in GESTAR II (NEDE-24011-P-A-14) Section 1.1.7.C.iv "Correlation fit to data shall be best fit". The bias and uncertainty in the correlation is determined as

specified in GESTAR Section 1.1.7. The overall GEXL14 uncertainty is [[ ]]. This uncertainty is an explicit input to the approved SLMCPR methodology.

5. Provide justification that the impacts of low R-factor and low subcooling are reflected in developing the overall bias and uncertainty, inaccuracies associated with the GEXL correlation are accounted for in the SLMPCR calculation. Also, identify the analysis and the data bases available in the approved topical report.

Response:

The "GEXL14 Correlation for GE14 Fuel", NEDC-32851P, Revision 1, September 1999 was transmitted by G.A. Watford (GE) letter FLN-2000-12 dated August 8, 2000 to the NRC Document Control Desk and to the attention of Tai L. Huang (NRC). Section 3 of NEDC-32851P, Rev. 1 describes the database used to develop the GEXL14 correlation for GE14 fuel.

[[ ]]

It is difficult to predict and therefore detect the rod location of the boiling transition in a bundle with low R-factor because many rods show the same vulnerability to boiling transition; nevertheless, the critical power value itself is well-predicted. This fact is supported by the lack of any trend in the correlation error as the lower R-factor values are approached. The second point is that the GEXL14 correlation exhibits the typical almost-linear behavior in the critical quality for low R-factor values that one would expect [[ ]]

6. The staff approved those methodologies cited in Question 2 with one condition that the 3D-MONICORE bundle power calculational uncertainty should be verified when applied to fuel and core designs not included in the benchmark comparisons in Tables 3.1 and 3.2 of NEDC-32694P, and three actions should be taken for application of NEDC-32601P for a new fuel. GE14 is considered a new fuel at the time the staff approved those licensing topical reports, therefore, provide the details of the actions taken and verification for Monticello Cycle 21 operation.

Response:

The referenced requirement for 3D-MONICORE and the three actions pertaining to NEDC-32601P correspond to the four items listed as the NRC's Technical Position in Enclosure 2 accompanying their SER dated March 11, 1999 approving NEDC-32601P and NEDC-32694P. The NRC positions are quoted here together with the actions taken to satisfy each item. Item (a) is the specific requirement from NEDC-32694P that pertains to 3D-MONICORE. Items (b), (c) and (d) are the three actions pertaining to NEDC-32601P referred to in the question.

Item (a): Since changes in the fuel and core design can have a significant effect on the calculation accuracy, the 3D-MONICORE bundle power calculational uncertainty should be verified when applied to fuel and core designs not included in the benchmark comparisons of Tables-3.1 and 3.2 of NEDC-32694P.

This item pertains only to the application of the reduced power distribution uncertainties and methodology given in NEDC-32694P. This item or part of the question is not applicable when the original GETAB methodology and uncertainties are used. The original GETAB methodology and

uncertainties have been demonstrated to be sufficiently conservative to be generically applicable to all GE fuel designs. In fact, the GETAB methodology has been shown to be sufficiently conservative to also be applicable to some fuels and monitoring systems not developed by GE. Note that the original GETAB methodology and uncertainties produces SLMCPR values that are on the order of [[ ]] than the SLMCPR values produced using the methodology and reduced uncertainties defined in NEDC-32694P, The original approved GETAB methodology and uncertainties were used since the additional CPR margin that is provided by taking credit for the excessive GETAB conservatism was not required to efficiently operate Monticello, Cycle 21.

Item (b): Since changes in fuel design can have a significant effect on the calculation accuracy, the TGBLA fuel rod power calculational uncertainty should be verified when applied to fuel designs not included in the benchmark comparisons of Table 3.1 of NEDC-32601P.

The fidelity of the TGBLA lattice physics calculations for fuel rod powers depend on the lattice designs. The key considerations are the lattice geometry, the location of the water rods, the location of the gadded rods and for vanished-rod lattices the location of the part-length rods. All these characteristics are identical for GE12 and GE14. See the response to question (3) above. Although the length of the part-length rods is different between GE12 and GE14, this has no impact on the lattice calculations which are performed either for a fully-rodded or partially-rodded lattice. Table 3.1 of NEDC-32601P includes several 10x10 lattices. The values given in Table 3.1 for GE12 are representative of the values being calculated for GE14, thus there is no impact.

Item (c): The effect of the correlation of rod power calculation uncertainties should be reevaluated to insure the accuracy of R-Factor uncertainty when the methodology is applied to a new fuel lattice.

The R-factor uncertainty is dominated by the same factors that influence the rod powers as described above for item (b). The uncertainty is the same for GE12 and GE14. The derivation of the uncertainty value is presented for GE 10x10 lattices (i.e., GE12 and GE14) in Appendix C of NEDC-32601P-A.

Item (d): In view of the importance of MIP criterion and its potential sensitivity to changes in fuel bundle designs, core loading and operating strategies, the MIP criterion should be reviewed periodically as part of the procedural review process to insure that the specific value recommended in NEDC-32601 P is applicable to future designs and operating strategies.

The calculated value of MIP depends only on two things: [[ ]] The GEXL correlation for GE14 was provided in the Amendment 22 submittal for GE14 together with the uncertainty [[ ]] that is needed for the SLMCPR analyses and the calculation of MIP. See also the response to question (4) above. GE (GNF) continues to monitor MIP and periodically assess it as part of their procedural review process. Specific scoping analyses preformed for cores partially and fully-loaded with GE14 fuel have given no indications that suggests that the MIP values from these calculations are statistically distinct from historical data. [[ ]] Thus there is no indication that the MIP criteria should be changed.

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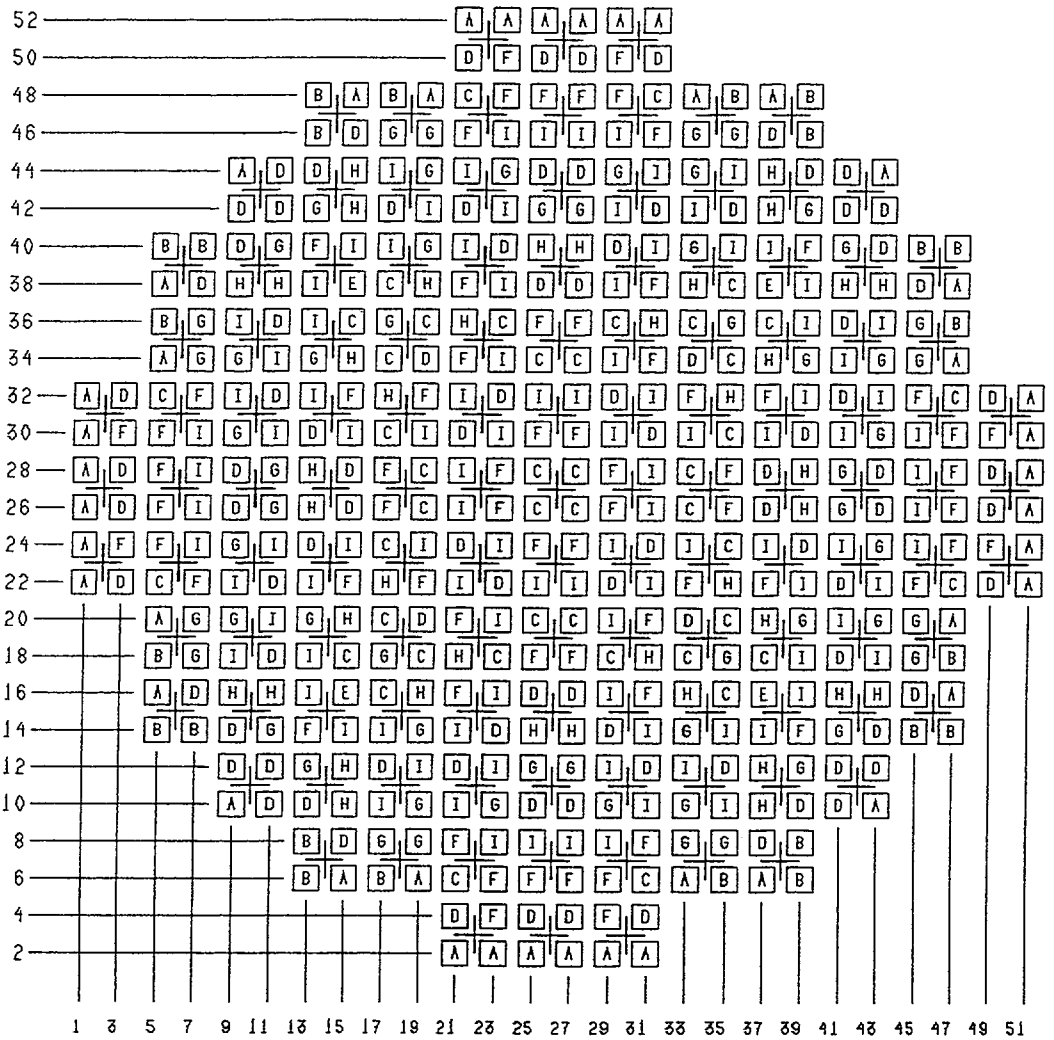
Table 1

Comparison of the Monticello Cycle 21 and Cycle 20 SLMCPR

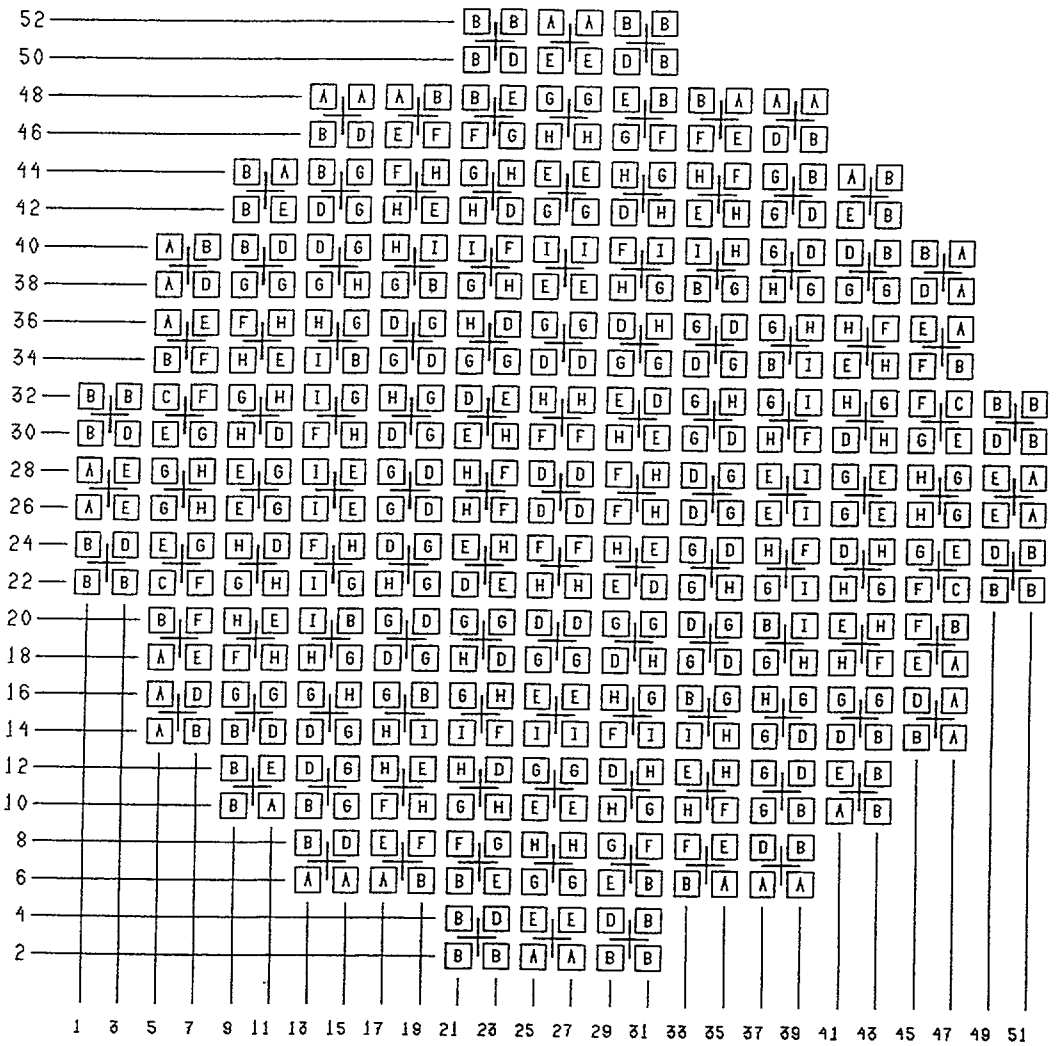
[[ ]]

Figure 1 Reference Core Loading Pattern – Cycle 20



FUEL TYPE	
A = GE10-P8DXB333-10GZ-100M-145-T	F = GE11-P9DUB366-16GZ-100T-141-T
B = GE10-P8DXB324-11GZ-100M-145-T	G = GE11-P9DUB366-17GZ-100T-141-T
C = GE11-P9DUB347-10GZ-100T-141-T	H = GE11-P9DUB380-17GZ-100T-141-T
D = GE11-P9DUB348-10GZ-100T-141-T	I = GE11-P9DUB380-16GZ-100T-141-T
E = GE12-P10DSB330-12GZ-100T-145-T	

Figure 2 Reference Core Loading Pattern – Cycle 21



FUEL TYPE	
A = GE11-P9DUB347-10GZ-100T-141-T	F = GE11-P9DUB380-17GZ-100T-141-T
B = GE11-P9DUB348-10GZ-100T-141-T	G = GE11-P9DUB380-16GZ-100T-141-T
C = GE12-P10DSB330-12GZ-100T-145-T	H = GE14-P10DNAB391-14GZ-100T-145-T-2427
D = GE11-P9DUB366-16GZ-100T-141-T	I = GE14-P10DNAB391-14GZ-100T-145-T-2428
E = GE11-P9DUB366-17GZ-100T-141-T	