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## Detroit Edison



10CFR50.92

December 17, 1999  
NRC-99-0100

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

Reference: Fermi 2  
NRC Docket No. 50-341  
NRC License No. NPF-43

Subject: Proposed Technical Specification Change (License Amendment)  
Safety Limit-Minimum Critical Power Ratio (MCPR)

Pursuant to 10CFR50.90, Detroit Edison hereby proposes to amend the Fermi 2 Plant Operating License NPF-43, Appendix A, Technical Specifications (TS), by modifying Technical Specification Section 2.1.1.2. This application proposes to change the Safety Limit Minimum Critical Power Ratios (SLMCPRs) in Technical Specification (TS) 2.1.1.2 to reflect results of a cycle-specific calculation performed for Fermi 2 operating Cycle 8 by General Electric Nuclear Energy (GENE) using the revised power distribution uncertainties recently approved by the NRC.

Enclosure 1 provides a description and evaluation of the proposed TS change. Enclosure 2 provides an analysis of the issue of significant hazards consideration using the standards of 10CFR50.92. Enclosure 3 provides the marked up pages of the existing TS to show the proposed change and a typed version of the affected TS pages with the proposed changes incorporated. The General Electric Nuclear Energy (GENE) document provided as Attachment 1 contains additional information regarding the Cycle 8 SLMCPR analysis, including a comparison of the Fermi 2 Cycle 8 SLMCPR calculated using the revised power distribution uncertainties to the Cycle 8 and Cycle 7 SLMCPR values calculated using the standard GETAB power distribution uncertainties. Some of the information contained in the document is considered GE proprietary information and should be withheld from public disclosure in accordance with 10CFR9.17(a)(4) and 10CFR2.790(a)(4).

*Change: Pol without Prop*

*APol  
11*

*PDN ADOCR 05000341*

An affidavit attesting to this fact is provided as Attachment 2. A non-proprietary version of the GE document is provided as Attachment 3.

Detroit Edison has reviewed the proposed TS changes against the criteria of 10CFR51.22 for environmental considerations. The proposed changes do not involve a significant hazards consideration, nor significantly change the types or significantly increase the amounts of effluents that may be released offsite, nor significantly increase individual or cumulative occupational radiation exposures. Based on the foregoing, Detroit Edison concludes that the proposed TS changes meet the criteria provided in 10CFR51.22(c) (9) for a categorical exclusion from the requirements for an Environmental Impact Statement or an Environmental Assessment.

Based on the refueling outage schedule, Detroit Edison requests issuance of the proposed license amendment by March 31, 2000. In order to allow time for procedure revision and orderly incorporation into copies of the Technical Specifications, Detroit Edison requests that the proposed license amendment, once approved by the NRC, be issued with a requirement for implementation prior to startup of Fermi 2 following Refueling Outage 7.

Should you have any questions or require additional information, please contact Mr. Norman K. Peterson of my staff at (734) 586-4258.

Sincerely,

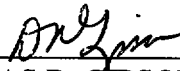


Enclosures

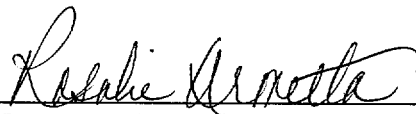
Attachments

cc: A. J. Kugler  
A. Vogel  
NRC Resident Office  
Regional Administrator, Region III  
Supervisor, Electric Operators,  
Michigan Public Service Commission

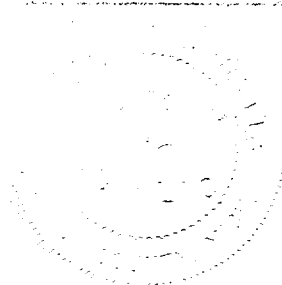
I, DOUGLAS R. GIPSON, do hereby affirm that the foregoing statements are based on facts and circumstances which are true and accurate to the best of my knowledge and belief.

  
\_\_\_\_\_  
DOUGLAS R. GIPSON  
Senior Vice President, Nuclear Generation

On this 17<sup>th</sup> day of December 1999 before me personally appeared Douglas R. Gipson, being first duly sworn and says that he executed the foregoing as his free act and deed.

  
\_\_\_\_\_  
Notary Public

**ROSALIE A. ARMETTA**  
Notary Public, Monroe County, MI  
My Commission Expires Oct 11, 2003



**ENCLOSURE 1 TO  
NRC-99-0100**

**FERMI 2 NRC DOCKET NO. 50-341  
OPERATING LICENSE NO. NPF-43**

**REQUEST TO REVISE TECHNICAL SPECIFICATIONS:**

**SAFETY LIMITS (SLs), Reactor Core SLs**

**DESCRIPTION AND EVALUATION OF THE PROPOSED CHANGES**

**DESCRIPTION AND EVALUATION OF  
THE PROPOSED CHANGE(S)**

**DESCRIPTION:**

The proposed change involves revising the SLMCPR values specified in Detroit Edison Fermi 2 TS Section 2.1.1.2 for two recirculation loop operation from 1.11 to 1.07 and for single loop operation from 1.13 to 1.09.

On November 5, 1996, the NRC approved Amendment Number 109 to the Facility Operating License for the Fermi 2 facility. This amendment revised the SLMCPR values specified in Technical Specification Section 2.1.2 from 1.07 to 1.09 for two recirculation loop operation and from 1.08 to 1.11 for single loop operation based upon a plant/cycle specific analysis performed by General Electric assuming a mixed core of GE11, GE9B, and GE6 fuel which was loaded for Fermi 2 Cycle 6. Because these SLMCPR values were based upon a cycle specific analysis for Fermi 2 Cycle 6, the approval of these SLMCPR values was limited to Cycle 6 operation by inclusion of a footnote to the SLMCPR value. On September 21, 1998, the NRC approved Amendment Number 129 to the Facility Operating License for the Fermi 2 facility. This amendment revised the SLMCPR values specified in Technical Specification Section 2.1.2 from 1.09 to 1.11 for two recirculation loop operation and from 1.11 to 1.13 for single loop operation based upon a plant/cycle specific analysis performed by General Electric assuming a full core of GE11 fuel which was loaded for Fermi 2 Cycle 7. The approval of these SLMCPR values was once again limited by inclusion of a footnote denoting their applicability only to Cycle 7 operation. On September 30, 1999, the NRC approved Amendment 134 to the Facility Operating License for the Fermi 2 facility. This amendment converted the Fermi 2 Technical Specifications to the Improved Standard Technical Specification (ITS) format. As part of this conversion, the SLMCPR Technical Specification Section number was changed from 2.1.2 to 2.1.1.2, and the footnote limiting the applicability of the SLMCPR values to a specific cycle was removed.

Prior to 1996, General Electric Report NEDE-24011-P-A-11, "General Electric Standard Application for Reactor Fuel (GESTAR II)" stipulated that the SLMCPR for a new fuel design be performed for a large, high power density plant assuming a bounding equilibrium reactor core. A generic SLMCPR for the GE11 fuel type was determined, according to this specification, and found to be 1.07. In March 1996 it was discovered that the SLMCPR calculated on a generic basis with the GE methodology may be non-conservative when applied to some actual core and fuel designs. This was the subject of a 10 CFR Part 21 notification for General Electric dated May 24, 1996. Since that time, plant/cycle specific SLMCPR analyses have been performed to confirm the calculated SLMCPR value on a plant/cycle-specific basis using NRC approved methods (General Electric Standard Application for Reactor Fuel, NEDE-24011-P-A-13 and U. S. Supplement NEDE-24011-P-A-13-US, August 1996), the uncertainties defined in NEDE-31152-P, Revision 6, "General Electric Fuel Bundle Designs," and interim implementing procedures which were discussed between General Electric Nuclear Energy (GENE) and the

NRC during their meetings with the NRC staff on April 17, 1996 and May 6 through 10, 1996. The implementing procedures were identical to those described in GENE's proposed Amendment Number 25 to GESTAR II (R. J. Reda (GE) to T. E. Collins (NRC), Proposed Amendment Number 25 to GE Licensing Topical Report NEDE-24011-P-A (GESTAR II) on Cycle-Specific MCPR, December 13, 1996) and Licensing Topical Reports NEDC-32601P, "Methodology and Uncertainties for Safety Limit MCPR Evaluations" and NEDC-32694P, "Power Distribution Uncertainties for Safety Limit MCPR Evaluation."

On March 11, 1999, the NRC issued a Safety Evaluation Report approving Amendment Number 25 to GESTAR II and Licensing Topical Reports NEDC-32601P and NEDC-32694P. General Electric's calculation of the plant-specific SLMCPR values for Fermi 2 Cycle 8 was performed using the procedures and uncertainties that are described in these NRC approved documents. This calculation resulted in a calculated Cycle 8 SLMCPR value of 1.07 for two recirculation loop operation and 1.09 for single loop operation. The General Electric document provided as Attachment 1 contains additional information regarding the Cycle 8 SLMCPR analysis, including a comparison of the Fermi 2 Cycle 8 SLMCPR calculated using the revised power distribution uncertainties that were recently approved by the NRC to the Cycle 8 and Cycle 7 SLMCPR values calculated using the standard GETAB power distribution uncertainties. Some of the information contained in the document is considered GE proprietary information and should be withheld from public disclosure in accordance with 10 CFR 9.17(a)(4) and 10 CFR 2.790(a)(4). An affidavit attesting to this fact is provided as Attachment 2. A non-proprietary version of the GE document is provided as Attachment 3.

Therefore, Detroit Edison proposes that the Fermi 2 Plant Technical Specification Section 2.1.1.2 be revised to reflect the change in the SLMCPRs.

### **EVALUATION OF THE PROPOSED CHANGE(S):**

The proposed Technical Specification change will revise the Technical Specifications to reflect the change in the SLMCPRs due to the plant specific evaluation performed by GENE for Fermi 2, Cycle 8 (see Table 1 below for comparison of Cycle 7 and 8 core compositions). The new SLMCPRs were calculated using NRC approved methods and uncertainties described in Amendment Number 25 to NEDE-24011-P-A (GESTAR II) and Licensing Topical Reports NEDC-32601P-A, "Methodology and Uncertainties for Safety Limit MCPR Evaluations" and NEDC-32694P-A, "Power Distribution Uncertainties for Safety Limit MCPR Evaluation."

The Fuel Cladding Integrity Safety Limit is set such that no mechanistic fuel damage is calculated to occur if the limit is not violated. Since the parameters which result in fuel damage are not directly observable during reactor operation, the thermal and hydraulic conditions resulting in a departure from nucleate boiling have been used to mark the beginning of the region where fuel damage could occur. Although it is recognized that a departure from nucleate boiling would not necessarily result in damage to BWR fuel rods, the critical power at which boiling transition is calculated to occur had been adopted as a convenient limit. However, the

uncertainties in monitoring the core operating state and in the procedures used to calculate the critical power result in an uncertainty in the value of the critical power. Therefore, the Fuel Cladding Integrity Safety Limit is defined as the CPR 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 all uncertainties. The new SLMCPRs for Fermi 2 Cycle 8 were calculated to be 1.07 and 1.09 (single loop operation).

**TABLE 1**

Cycle No.	Number of Bundles	Bundle Name
7	141	GE11-P9CUB331-11GZ-100M-146-T
	227	GE11-P9CUB353-10GZ-100M-146-T
	176	GE11-P9CUB366-15GZ-100T-146-T
	220	GE11-P9CUB380-12GZ-100T-146-T
8	160	GE11-P9CUB353-10GZ-100M-146-T
	176	GE11-P9CUB366-15GZ-100T-146-T
	220	GE11-P9CUB380-12GZ-100T-146-T
	144	GE11-P9CUB378-4G6.0/8G5.0-100T-146-T
	64	GE11-P9CUB396-13GZ-100T-146-T

**ENCLOSURE 2 TO  
NRC-99-0100**

**FERMI 2 NRC DOCKET NO. 50-341  
OPERATING LICENSE NO. NPF-43**

**REQUEST TO REVISE TECHNICAL SPECIFICATIONS:**

**10CFR50.92 SIGNIFICANT HAZARDS CONSIDERATION**



## **10CFR50.92 SIGNIFICANT HAZARDS CONSIDERATION**

### **BASIS FOR SIGNIFICANT HAZARDS DETERMINATION**

In accordance with 10CFR50.92, Detroit Edison has made a determination that the proposed amendment involves no significant hazards consideration. The proposed Technical Specification changes described above do not involve a significant hazards consideration for the following reasons:

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

The proposed license amendment establishes a revised SLMCPR value of 1.07 for two recirculation loop operation and 1.09 for single recirculation loop operation. The derivation of the cycle-specific SLMCPRs was performed using NRC approved methods and uncertainties described in Amendment Number 25 to NEDE-24011-P-A (GESTAR II) and Licensing Topical Reports NEDC-32601P-A, "Methodology and Uncertainties for Safety Limit MCPR Evaluations" and NEDC-32694P-A, "Power Distribution Uncertainties for Safety Limit MCPR Evaluation."

The probability of an evaluated accident is derived from the probabilities of the individual precursors to that accident. The consequences of an evaluated accident are determined by the operability of plant systems designed to mitigate those consequences. Limits have been established, consistent with NRC approved methods, to ensure that fuel performance during normal, transient, and accident conditions is acceptable.

The probability of an evaluated accident is not increased by revising the SLMCPR values. The change does not require any physical plant modifications or physically affect any plant components. Therefore, no individual precursors of an accident are affected.

The proposed license amendment establishes a revised SLMCPR that ensures that the fuel is protected during normal operation and during any plant transients or anticipated operational occurrences. Specifically, the reload analysis demonstrates that a SLMCPR value of 1.07 (1.09 for single loop operation) ensures that less than 0.1 percent of the fuel rods will experience boiling transition during any plant operation if the limit is not violated.

Based on (1) the determination of the new SLMCPR values using NRC approved methods and uncertainties, and (2) the operability of plant systems designed to mitigate the consequences of accidents not having been changed; the consequences of an accident previously evaluated have not been increased.

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

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

The proposed license amendment involves a revision of the SLMCPR from 1.11 to 1.07 for two recirculation loop operation and from 1.13 to 1.09 for single loop operation based on the results of analysis of the Cycle 8 core which will once again be fully loaded with GE11 fuel. Creation of the possibility of a new or different kind of accident would require the creation of one or more new precursors of that accident. New accident precursors may be created by modifications of the plant configuration, including changes in the allowable methods of operating the facility. This proposed license amendment does not involve any modifications of the plant configuration or changes in the allowable methods of operation. Therefore, the proposed Technical Specification change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

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

The proposed license amendment establishes a revised SLMCPR value of 1.07 for two recirculation loop operation and 1.09 for single recirculation loop operation. The derivation of these revised SLMCPRs was performed using NRC approved methods and uncertainties described in Amendment Number 25 to NEDE-24011-P-A (GESTAR II) and Licensing Topical Reports NEDC-32601P-A, "Methodology and Uncertainties for Safety Limit MCPR Evaluations" and NEDC-32694P-A, "Power Distribution Uncertainties for Safety Limit MCPR Evaluation." Use of these methods ensures that the resulting SLMCPR satisfies the fuel design safety criteria that less than 0.1 percent of the fuel rods experience boiling transition if the safety limit is not violated. Based on the assurance that the fuel design safety criteria will be met, the proposed license amendment does not involve a significant reduction in a margin of safety.

**ENCLOSURE 3 TO  
NRC-99-0100**

**FERMI 2 NRC DOCKET NO. 50-341  
OPERATING LICENSE NO. NPF-43**

**REQUEST TO REVISE TECHNICAL SPECIFICATIONS:**

**SAFETY LIMITS (SLs), Reactor Core SLs**

Attached is a mark-up of the existing Technical Specifications (TSs), indicating the proposed changes (Part 1) and a typed version of the TSs incorporating the proposed changes with a list of included pages (part 2).

**ENCLOSURE 3 - PART 1 TO  
NRC-99-0100**

**PROPOSED TECHNICAL SPECIFICATION MARKED UP PAGES**

**INCLUDED PAGE(S):**

**2.0-1**

## 2.0 SAFETY LIMITS (SLs)

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### 2.1 SLs

#### 2.1.1 Reactor Core SLs

2.1.1.1 With the reactor steam dome pressure < 785 psig or core flow < 10% rated core flow:

THERMAL POWER shall be  $\leq$  25% RTP.

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

MCPR shall be  $\geq$  ~~1.11~~<sup>1.07</sup> for two recirculation loop operation  
or  $\geq$  ~~1.13~~<sup>1.09</sup> for single recirculation loop operation.

2.1.1.3 Reactor vessel water level shall be greater than the top of active irradiated fuel.

#### 2.1.2 Reactor Coolant System Pressure SL

Reactor steam dome pressure shall be  $\leq$  1325 psig.

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### 2.2 SL Violations

With any SL violation, the following actions shall be completed within 2 hours:

2.2.1 Restore compliance with all SLs; and

2.2.2 Insert all insertable control rods.

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**ENCLOSURE 3 - PART 2 TO  
NRC-99-0100**

**PROPOSED TECHNICAL SPECIFICATION REVISED PAGES**

**INCLUDED PAGE(S):**

**2.0-1**

## 2.0 SAFETY LIMITS (SLs)

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### 2.1 SLs

#### 2.1.1 Reactor Core SLs

2.1.1.1 With the reactor steam dome pressure < 785 psig or core flow < 10% rated core flow:

THERMAL POWER shall be  $\leq$  25% RTP.

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

MCPR shall be  $\geq$  1.07 for two recirculation loop operation or  $\geq$  1.09 for single recirculation loop operation.

2.1.1.3 Reactor vessel water level shall be greater than the top of active irradiated fuel.

#### 2.1.2 Reactor Coolant System Pressure SL

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With any SL violation, the following actions shall be completed within 2 hours:

2.2.1 Restore compliance with all SLs; and

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**ATTACHMENT 2 TO  
NRC-99-0100**

**GENERAL ELECTRIC NUCLEAR ENERGY AFFIDAVIT  
REGARDING WITHHOLDING FROM PUBLIC DISCLOSURE**





**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 the attachment, *Additional Information Regarding the Cycle Specific SLMCPR for Fermi-2 Cycle 8, dated October 21, 1999*.
- (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 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 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 and licensing methodology 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.

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.

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 28<sup>th</sup> day of October, 1999



Glen A. Watford  
General Electric Company

Subscribed and sworn before me this 28<sup>th</sup> day of October, 1999



Notary Public, State of North Carolina

My Commission Expires 10/08/01

**ATTACHMENT 3 TO  
NRC-99-0100**

**GENERAL ELECTRIC NUCLEAR ENERGY DOCUMENT ENTITLED**

**“ADDITIONAL INFORMATION REGARDING THE  
CYCLE SPECIFIC SLMCPR FOR FERMI-2 CYCLE 8”**

**(NON-PROPRIETARY VERSION)**

## 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 Fermi-2 Cycle 8 and 7 SLMCPR Values

Table 1 summarizes the relevant input parameters and results of the SLMCPR determination for the Fermi-2 Cycle 8 and 7 cores. The SLMCPR evaluations were performed using NRC approved methods and uncertainties<sup>[1]</sup>. 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 Fermi-2 Cycle 8 and Cycle 7 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 Fermi-2 Cycle 8 bundles and the Cycle 7 bundles. Pin-by-pin power distributions are characterized in terms of R-factors using the NRC approved methodology<sup>[2]</sup>.

As indicated in Table 1, the NRC approved<sup>[1]</sup> revised power distribution uncertainties have been assumed for the Fermi-2 Cycle 8 analyses. Standard GETAB power distribution uncertainties were also used in Cycle 8 for purposes of comparison. For the Cycle 7 case, the standard GETAB power distribution uncertainties were used.

## Summary

Parameters have been used to compare quantities that impact the calculated SLMCPR value. Based on these comparisons, the conclusion is reached that the Fermi-2 Cycle 8 core/cycle has a more peaked core MCPR distribution and flatter in-bundle power distributions than what was used to perform the Cycle 7 SLMCPR evaluation.

The calculated 1.07 Monte Carlo SLMCPR for Fermi-2 Cycle 8 is consistent with what one would expect. Based on all of the facts, observations and arguments presented above, it is concluded that the calculated SLMCPR value of 1.07 for the Fermi-2 Cycle 8 core is appropriate. It is reasonable that this value is 0.04 lower 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 1.09.

Table 1

Comparison of the Fermi-2 Cycle 8 and Cycle 7 SLMCPR

Prepared by:



R. H. Szilard  
Technical Project Manager  
Fermi-2 Project

Verified by:



K.M. Fawcett  
Nuclear & Safety Analysis