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10 CFR 50.90

RS-03-023

January 31, 2003

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Dresden Nuclear Power Station, Unit 2
Facility Operating License No. DPR-5
NRC Docket Nos. 50-237

Subject: Request for License Amendment Regarding Minimum Critical Power Ratio Safety Limit

References:

(1) Letter from R. M. Krich (Exelon Generation Company, LLC) to U. S. NRC, "Request for Technical Specifications Change for Minimum Critical Power Ratio Safety Limit," dated June 6, 2001

(2) Letter from U. S. NRC to O. D. Kingsley (Exelon Generation Company, LLC), "Dresden Nuclear Power Station, Unit 2 – Issuance of Amendment," dated November 2, 2001

(3) Letter from U. S. NRC to G. VanMiddlesworth (Nuclear Management Company, LLC), "Duane Arnold Energy Center – Request for Additional Information on the Proposed Extended Power Uprate Program," dated June 4, 2001

(4) Letter from G. VanMiddlesworth (Nuclear Management Company, LLC) to U. S. NRC, "Response to Request for Additional Information (RAI) to Technical Specification Change Request TSCR-042 – Extended Power Uprate," dated July 19, 2001

(5) Letter from U. S. NRC to G. VanMiddlesworth (Nuclear Management Company, LLC), "Duane Arnold Energy Center - Issuance of Amendment Regarding Extended Power Uprate," dated November 6, 2001

(6) Letter from G. A. Watford (Global Nuclear Fuel) to U. S. NRC, "Final Presentation Material For GEXL Presentation – February 11, 2002," dated February 12, 2002

In accordance with 10 CFR 50.90, "Application for amendment of license or construction permit," Exelon Generation Company (EGC), LLC is requesting a change to the Technical Specifications (TS) for Dresden Nuclear Power Station (DNPS), Unit 2. The proposed change increases the value of the Safety Limit for the Minimum Critical Power Ratio (SLMCPR) by 0.03 in TS Section 2.1.1, "Reactor Core SLs," for Unit 2 Cycle 18. This proposed change is to be

APO1

implemented prior to cycle exposure reaching 12,000 megawatt days/metric ton uranium (MWD/MTU).

In Reference 1, EGC requested changes to the TS for the SLMCPR for DNPS, Unit 2 Cycle 18. The NRC approved these changes in Reference 2. In a separate licensing action, in Reference 3, the NRC provided questions to another licensee (Nuclear Management Company (NMC), LLC) regarding the development of the data for the GEXL14 correlation, which is used to predict boiling transition in reactor cores containing GE14 fuel. The questions concerned the adequacy of the boiling transition data for outlet-peaked reactor core power shapes. In response to the NRC questions, Global Nuclear Fuel (GNF) revised the GEXL14 correlation as described in Reference 4. The NRC's safety evaluation for the NMC licensing action (Reference 5), indicated that additional evaluations of the boiling transition data for the GEXL14 correlation were necessary, and that licensees could continue to use the revised GEXL14 correlation in the interim.

In a February 2002 presentation to the NRC (Reference 6), GNF committed to perform testing to provide additional GE14 fuel boiling transition data for outlet-peaked reactor core power distributions. This data would then be used to further revise the GEXL14 correlation. GNF stated that this testing could be completed in approximately seven to fifteen months, depending upon the option chosen. In the interim, GNF proposed to include additional uncertainties in the GEXL14 correlation for outlet-peaked power shapes and to perform plant-specific evaluations to determine the effect of these uncertainties on the current value of the SLMCPR for licensees using GE14 fuel.

GNF evaluated the effect of the additional uncertainties on the SLMCPR for DNPS, Unit 2 Cycle 18 in accordance with Reference 6 and determined that the current value of the SLMCPR should be increased during end-of-cycle conditions when outlet-peaked power shapes were possible. In response, EGC requested that GNF either complete the additional testing described above or perform additional evaluations to determine if the current TS value of the SLMCPR could be maintained throughout Cycle 18. As of December 2002, GNF had not completed the additional testing, and the additional evaluations did not provide any basis for maintaining the current TS value of the SLMCPR during end-of-cycle conditions. Thus, EGC decided to request NRC approval for a revised value of the SLMCPR.

During validation of the calculations for the revised SLMCPR value, GNF discovered an error in the original calculation for the Unit 2 Cycle 18 SLMCPR. This error, combined with the additional uncertainties for outlet-peaked power shapes, affects the value of the SLMCPR during two portions of the cycle; first, with cycle exposure between 3,000 MWD/MTU and 9,000 MWD/MTU and second, with cycle exposure greater than 12,000 MWD/MTU. The error was discovered by GNF on December 30, 2002, when cycle exposure was slightly greater than 9,300 MWD/MTU.

Upon discovery of this error, both GNF and EGC initiated corrective action program reports to evaluate the impact of this error and any necessary compensatory measures. EGC personnel evaluated the DNPS, Unit 2 core parameters during the period of operation from 3,000 MWD/MTU to 9,000 MWD/MTU. No situation occurred in which the re-calculated SLMCPR would have been violated during any plant transient. GNF is also determining the cause of the error and actions needed to prevent recurrence.

In summary, the effects of the additional uncertainties for outlet-peaked power shapes and the error in the original Cycle 18 calculation cause the current TS value of the SLMCPR to be non-conservative for cycle exposures between 3,000 and 9,000 MWD/MTU and for cycle exposures greater than 12,000 MWD/MTU. Thus, in accordance with NRC Administrative Letter 98-10, "Dispositioning Of Technical Specifications That Are Insufficient To Assure Plant Safety," EGC is submitting these proposed changes to the TS.

EGC is requesting that the proposed change to the SLMCPR be approved prior to April 22, 2003, which is the estimated date that DNPS, Unit 2 will reach a Cycle 18 exposure of greater than 12,000 MWD/MTU. Prior to reaching 12,000 MWD/MTU, EGC will ensure that adequate administrative controls are in place to ensure that the DNPS, Unit 2 reactor core MCPR remains above the SLMCPR determined in the corrected GNF calculation during normal operation and anticipated operational occurrences.

The request is subdivided as follows.

1. Attachment A provides a summary and evaluation of the proposed change.
2. Attachment B provides the marked-up TS page.
3. Attachment C provides the revised TS page.
4. Attachment D provides information from GNF describing the specific results of the evaluation for DNPS, Unit 2 Cycle 18.
5. Attachment E provides an affidavit and a non-proprietary version of Attachment D.
6. Attachment F provides responses to questions asked by the NRC regarding previous license amendment requests related to the SLMCPR.
7. Attachment G provides an affidavit and a non-proprietary version of Attachment F.

Portions of the information in Attachments D and F are proprietary to GNF, and we request that Attachments D and F be withheld from public disclosure in accordance with 10 CFR 2.790(a)(4), "Public Inspections, Exemptions, Requests for Withholding." This proprietary information is indicated with double brackets. Attachments E and G provide affidavits supporting the request for withholding and non-proprietary versions of Attachments D and F, respectively.

The proposed changes have been reviewed by the DNPS Plant Operations Review Committee and Nuclear Safety Review Board in accordance with the Quality Assurance Program.

We are notifying the State of Illinois of this amendment request by transmitting a copy of this letter and its attachments to the designated State Official.

Should you have any questions related to this request, please contact Mr. Allan R. Haeger at (630) 657-2807.

Respectfully,

Patrick R. Simpson

Patrick R. Simpson
Manager, Licensing
Mid-West Regional Operating Group

Attachments:

Affidavit

Attachment A:	Evaluation of Proposed Change
Attachment B:	Marked-up TS Page
Attachment C:	Revised TS Page
Attachment D:	Description of GNF Analysis to Support SLMCPR Adjustment
Attachment E:	Affidavit and Non-Proprietary Version of Attachment D
Attachment F:	Responses to NRC Questions Regarding Previous License Amendment Requests Relating to SLMCPR
Attachment G:	Affidavit and Non-Proprietary Version of Attachment F

cc: Regional Administrator – NRC Region III
NRC Senior Resident Inspector – Dresden Nuclear Power Station
Office of Nuclear Facility Safety – Illinois Department of Nuclear Safety

STATE OF ILLINOIS	)	
COUNTY OF DUPAGE	)	
IN THE MATTER OF	)	
EXELON GENERATION COMPANY, LLC	)	Docket Number
DRESDEN NUCLEAR POWER STATION, UNIT 2	)	50-237

SUBJECT: Request for License Amendment Regarding Minimum Critical Power Ratio Safety Limit

AFFIDAVIT

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

Patrick R Simpson

Patrick R. Simpson
Manager, Licensing
Mid-West Regional Operating Group

Subscribed and sworn to before me, a Notary Public in and for the State above named, this 31st day of January, 2003.

Timothy A Byam

Notary Public

"OFFICIAL SEAL"
TIMOTHY A. BYAM
COMMISSION EXPIRES 12/04/06

ATTACHMENT A

Request for License Amendment
Regarding Minimum Critical Power Ratio Safety Limit

EVALUATION OF PROPOSED CHANGES

1.0 INTRODUCTION

In accordance with 10 CFR 50.90, "Application for amendment of license or construction permit," Exelon Generation Company (EGC), LLC is requesting a change to the Technical Specifications (TS) for Dresden Nuclear Power Station (DNPS), Unit 2. The proposed change increases the values of the Safety Limit for the Minimum Critical Power Ratio (SLMCPR) by 0.03 in TS Section 2.1.1, "Reactor Core SLs." The change is to be implemented prior to Unit 2 Cycle 18 reaching cycle exposure greater than 12,000 megawatt days/metric ton uranium (MWD/MTU).

EGC requests approval of this proposed change by April 22, 2003. The circumstances surrounding the need for the proposed change are described in Section 3.0 below.

All EGC submittals related to DNPS currently under review by the NRC were evaluated to determine the impact of the proposed change. No submittals currently under review by the NRC are affected by the information presented in these proposed changes.

2.0 DESCRIPTION OF THE PROPOSED AMENDMENT

TS Section 2.1.1 specifies the value of the SLMCPR. For DNPS, Unit 2, the value specified is as follows.

> For Unit 2 two recirculation loop operation, MCPR shall be ≥ 1.08, or for single recirculation loop operation, MCPR shall be ≥ 1.09.

The proposed change will revise TS Section 2.1.1 to read as follows.

> For Unit 2 two recirculation loop operation, MCPR shall be ≥ 1.11, or for single recirculation loop operation, MCPR shall be ≥ 1.12.

3.0 BACKGROUND

In Reference 1, EGC requested changes to the TS for the SLMCPR for DNPS, Unit 2 Cycle 18. The NRC approved these changes in Reference 2. In a separate licensing action, in Reference 3, the NRC provided questions to another licensee (Nuclear Management Company (NMC), LLC) regarding the development of the data for the GEXL14 correlation, which is used to predict boiling transition in reactor cores containing GE14 fuel. The questions concerned the adequacy of the boiling transition data for outlet-peaked reactor core power shapes. In response to the NRC questions, Global Nuclear Fuel (GNF) revised the GEXL14 correlation as described in Reference 4. The NRC's safety evaluation for the NMC licensing action (Reference 5), indicated that additional evaluations of the boiling transition data for the GEXL14 correlation were necessary, and that licensees could continue to use the revised GEXL14 correlation in the interim.

ATTACHMENT A

Request for License Amendment
Regarding Minimum Critical Power Ratio Safety Limit

In a February 2002 presentation to the NRC (Reference 6), GNF committed to perform testing to provide additional GE14 fuel boiling transition data for outlet-peaked reactor core power distributions. This data would then be used to further revise the GEXL14 correlation. GNF stated that this testing could be completed in approximately seven to fifteen months, depending upon the option chosen. In the interim, GNF proposed to include additional uncertainties in the GEXL14 correlation for outlet-peaked power shapes and to perform plant-specific evaluations to determine the effect of these uncertainties on the current value of the SLMCPR for licensees using GE14 fuel.

GNF evaluated the effect of the additional uncertainties on the SLMCPR for DNPS, Unit 2 Cycle 18 and determined that the current value of the SLMCPR should be increased during end-of-cycle conditions when outlet-peaked power shapes were possible. In response, EGC requested that GNF either complete the additional testing described above or perform additional evaluations to determine if the current TS value of the SLMCPR could be maintained throughout Cycle 18. As of December 2002, GNF had not completed the additional testing, and the additional evaluations did not provide any basis for maintaining the current TS value of the SLMCPR during end-of-cycle conditions. Thus, EGC decided to request NRC approval for a revised value of the SLMCPR.

During validation of the calculations for the revised SLMCPR value, GNF discovered an error in the original calculation for the Unit 2 Cycle 18 SLMCPR. This error, combined with the additional uncertainties for outlet-peaked power shapes, affects the value of the SLMCPR during two portions of the cycle; first, with cycle exposure between 3,000 MWD/MTU and 9,000 MWD/MTU and second, with cycle exposure greater than 12,000 MWD/MTU. The error was discovered by GNF on December 30, 2002, when cycle exposure was slightly greater than 9,300 MWD/MTU.

Upon discovery of this error, both GNF and EGC initiated corrective action program reports to evaluate the impact of this error and any necessary compensatory measures. EGC personnel evaluated the DNPS, Unit 2 core parameters during the period of operation from 3,000 MWD/MTU to 9,000 MWD/MTU. No situation occurred in which the re-calculated SLMCPR would have been violated during any plant transient. GNF is also determining the cause of the error and actions needed to prevent recurrence.

In summary, the effects of the additional uncertainties for outlet-peaked power shapes and the error in the original Cycle 18 calculation cause the current TS value of the SLMCPR to be non-conservative for cycle exposures between 3,000 and 9,000 MWD/MTU and for cycle exposures greater than 12,000 MWD/MTU. Thus, in accordance with NRC Administrative Letter 98-10, "Dispositioning Of Technical Specifications That Are Insufficient To Assure Plant Safety," EGC is submitting these proposed changes to the TS.

4.0 TECHNICAL ANALYSIS

Attachment D contains a safety analysis of the proposed change in a format that GNF has established with the NRC for submitting changes to the SLMCPR. The results of that analysis are summarized in the following paragraphs.

Table 1 of Attachment D summarizes the relevant input parameters and results of the SLMCPR determination for the DNPS, Unit 2, Cycle 17 and 18 cores. The quantities that have been shown to have some impact on the determination of the SLMCPR are provided. The DNPS, Unit 2, Cycle 18 core contains a mixture of Framatome Advanced Nuclear Products (FANP) and GNF fuel. The DNPS, Unit 2, Cycle 17 core was loaded with FANP fuel. The SLMCPR evaluations for Cycle 18 were performed using GNF methods and generic uncertainties, supplemented with DNPS Unit 2 specific uncertainties. These calculations use the GEXL14 correlation for GE14 fuel, and the GEXL96 correlation for FANP fuel, as documented in Attachment D.

Attachment F contains responses to questions asked by the NRC regarding a similar SLMCPR calculation for Quad Cities Nuclear Power Station (QCNPS), Unit 1. The QCNPS submittals and NRC approval are documented in References 7, 8, and 9.

Based on the material presented in Attachments D and F, it is concluded that the calculated SLMCPR value of 1.11 for the DNPS Unit 2 Cycle 18 core is appropriate for two loop operation. The SLMCPR value of 1.12 is appropriate for single loop operation. This proposed change is to be implemented prior to Unit 2, Cycle 18 reaching cycle exposure greater than 12,000 MWD/MTU.

5.0 REGULATORY ANALYSIS

5.1 NO SIGNIFICANT HAZARDS CONSIDERATION

According to 10 CFR 50.92, "Issuance of amendment," paragraph (c), a proposed amendment to an operating license involves a no significant hazards consideration if 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 accident previously evaluated; or

(3) Involve a significant reduction in a margin of safety.

In support of this determination, an evaluation of each of the three criteria set forth in 10 CFR 50.92 is provided below regarding the proposed license amendment.

ATTACHMENT A

Request for License Amendment
Regarding Minimum Critical Power Ratio Safety Limit

Overview

In accordance with 10 CFR 50.90, "Application for amendment of license or construction permit," Exelon Generation Company (EGC), LLC is requesting a change to the Technical Specifications (TS) for Dresden Nuclear Power Station (DNPS), Unit 2. The proposed change increases the values of the Safety Limit for the Minimum Critical Power Ratio (SLMCPR) by 0.03 in TS Section 2.1.1, "Reactor Core SLs."

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

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 proposed change conservatively establishes the safety limit for the minimum critical power ratio (SLMCPR) for Dresden Nuclear Power Station (DNPS), Unit 2, Cycle 18 such that the fuel is protected during normal operation and during any plant transients or anticipated operational occurrences (AOOs).

Changing the SLMCPR does not increase the probability of an evaluated accident. The change does not require any physical plant modifications, physically affect any plant components, or entail changes in plant operation. Therefore, no individual precursors of an accident are affected.

The proposed change revises the SLMCPR to protect the fuel during normal operation as well as during any transients or anticipated operational occurrences. Operational limits will be established based on the proposed SLMCPR to ensure that the SLMCPR is not violated during all modes of operation. This will ensure that the fuel design safety criteria (i.e., that at least 99.9% of the fuel rods do not experience transition boiling during normal operation and anticipated operational occurrences) is met. Since the operability of plant systems designed to mitigate any consequences of accidents has not changed, the consequences of an accident previously evaluated are not expected to increase.

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

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

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 allowable modes of operation. The proposed change does not involve any modifications of the

plant configuration or allowable modes of operation. The proposed change to the SLMCPR assures that safety criteria are maintained for DNPS, Unit 2, Cycle 18. Therefore, the proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

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

The value of the proposed SLMCPR provides a margin of safety by ensuring that no more than 0.1% of the rods are expected to be in boiling transition if the MCPR limit is not violated. The proposed change will ensure the appropriate level of fuel protection. Additionally, operational limits will be established based on the proposed SLMCPR to ensure that the SLMCPR is not violated during all modes of operation. This will ensure that the fuel design safety criteria (i.e., that at least 99.9% of the fuel rods do not experience transition boiling during normal operation as well as AOOs) are met.

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

5.2 APPLICABLE REGULATORY REQUIREMENTS AND CRITERIA

10 CFR 50.36, "Technical specifications," requires that power reactor facilities TS include safety limits for process variables that protect the integrity of certain physical barriers that guard against the uncontrolled release of radioactivity. The fuel cladding integrity SLMCPR is established to assure that at least 99.9% of the fuel rods in the core do not experience boiling transition during an AOO. Thus, the value of the SLMCPR is required to be contained in the TS.

6.0 ENVIRONMENTAL CONSIDERATION

In accordance with 10 CFR 50.90, "Application for amendment of license or construction permit," Exelon Generation Company (EGC), LLC is requesting changes to the Technical Specifications (TS) for the Dresden Nuclear Power Station (DNPS), Unit 2. The proposed change increases the values of the Safety Limit for the Minimum Critical Power Ratio (SLMCPR) by 0.03 in TS Section 2.1.1, "Reactor Core SLs," for Unit 2.

EGC has evaluated this proposed change against the criteria for identification of licensing and regulatory actions requiring environmental assessment in accordance with 10 CFR 51.21, "Criteria for and identification of licensing and regulatory actions requiring environmental assessments." EGC has determined that this proposed change meets the criteria for a categorical exclusion set forth in 10 CFR 51.22, "Criterion for categorical exclusion; identification of licensing and regulatory actions eligible for categorical exclusion or otherwise not requiring environmental review," paragraph (c)(9), and as such, has determined that no irreversible consequences exist in accordance with 10 CFR 50.92, "Issuance of amendment," paragraph (b). This determination is based on the fact that this change is being proposed as an amendment to a license issued pursuant to 10 CFR 50, "Domestic Licensing of Production and Utilization Facilities," which changes a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, "Standards for Protection

Against Radiation," or that changes an inspection or a surveillance requirement, and the amendment meets the following specific criteria:

(i) The amendment involves no significant hazards consideration.

As demonstrated in Section 5.1, this proposed change does not involve any significant hazards consideration.

(ii) There is no significant change in the types or significant increase in the amounts of any effluent that may be released offsite.

The proposed change revises the safety limit for the minimum critical power ratio. It does not allow for an increase in the unit power level, does not increase the production, nor alter the flow path or method of disposal of radioactive waste or byproducts. Therefore, the proposed change does not affect actual unit effluents.

(iii) There is no significant increase in individual or cumulative occupational radiation exposure.

The proposed change will not result in changes in the configuration of the facility. There will be no change in the level of controls or methodology used for processing of radioactive effluents or handling of solid radioactive waste, nor will the proposal result in any change in the normal radiation levels within the plant. Therefore, there will be no increase in individual or cumulative occupational radiation exposure resulting from this change.

7.0 REFERENCES

1. Letter from R. M. Krich (Exelon Generation Company, LLC) to U. S. NRC, "Request for Technical Specifications Change for Minimum Critical Power Ratio Safety Limit," dated June 6, 2001

2. Letter from U. S. NRC to O. D. Kingsley (Exelon Generation Company, LLC), "Dresden Nuclear Power Station, Unit 2 – Issuance of Amendment," dated November 2, 2001

3. Letter from U. S. NRC to G. VanMiddlesworth (Nuclear Management Company, LLC), "Duane Arnold Energy Center – Request for Additional Information on the Proposed Extended Power Uprate Program," dated June 4, 2001

4. Letter from G. VanMiddlesworth (Nuclear Management Company, LLC) to U. S. NRC, "Response to Request for Additional Information (RAI) to Technical Specification Change Request TSCR-042 – Extended Power Uprate," dated July 19, 2001

5. Letter from U. S. NRC to G. VanMiddlesworth (Nuclear Management Company, LLC), "Duane Arnold Energy Center - Issuance of Amendment Regarding Extended

Power Uprate," dated November 6, 2001

6. Letter from G. A. Watford (Global Nuclear Fuel) to U. S. NRC, "Final Presentation Material For GEXL Presentation – February 11, 2002," dated February 12, 2002

7. Letter from P. R. Simpson (Exelon Generation Company, LLC) to U. S. NRC, "Request for Technical Specifications Change for Minimum Critical Power Ratio Safety Limit," dated May 30, 2002

8. Letter from P. R. Simpson (Exelon Generation Company, LLC) to U. S. NRC, "Additional Information Supporting the Request for Technical Specifications Change for Minimum Critical Power Ratio Safety Limit," dated October 18, 2002

9. Letter from U. S. NRC to J. L. Skolds, (Exelon Generation Company, LLC), "Quad Cities Nuclear Power Station, Unit 1 – Issuance of Amendment RE: Change in Minimum Critical Power Ratio Safety Limit," dated November 14, 2002

ATTACHMENT B

Request for License Amendment
Regarding Minimum Critical Power Ratio Safety Limit

Marked-up TS Page

2.0-1

2.0 SAFETY LIMITS (SLs)

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 ≤ 25% RTP.

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

For Unit 2 two recirculation loop operation, MCPR shall be ≥ ~~1.08~~ 1.11 or for single recirculation loop operation, MCPR shall be ≥ ~~1.09~~ 1.12.

For Unit 3 two recirculation loop operation, MCPR shall be ≥ 1.10, or for single recirculation loop operation, MCPR shall be ≥ 1.11.

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 ≤ 1345 psig.

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.

ATTACHMENT C

Request for License Amendment
Regarding Minimum Critical Power Ratio Safety Limit

Revised TS Page

2.0-1

2.0 SAFETY LIMITS (SLs)

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 ≤ 25% RTP.

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

For Unit 2 two recirculation loop operation, MCPR shall be ≥ 1.11, or for single recirculation loop operation, MCPR shall be ≥ 1.12.

For Unit 3 two recirculation loop operation, MCPR shall be ≥ 1.10, or for single recirculation loop operation, MCPR shall be ≥ 1.11.

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 ≤ 1345 psig.

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.

ATTACHMENT E

Request for License Amendment
Regarding Minimum Critical Power Ratio Safety Limit

Affidavit Supporting Withholding From Public Disclosure

and

Non-Proprietary Version of Attachment D

Affidavit

I, Jens G. Andersen, state as follows:

(1) I am Fellow and project manager, TRACG Development, 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 Dresden Unit 2 Cycle 18," January 14, 2003.

(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.

I declare under penalty of perjury that the foregoing affidavit and the matters stated therein are true and correct to the best of my knowledge, information, and belief.

Executed at Wilmington, North Carolina, this 14th day of January, 2003.

Jens G Andersen

Jens G. Andersen
Global Nuclear Fuel – Americas, LLC

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.

[4] Letter, Glen A. Watford (GNF-A) to U. S. Nuclear Regulatory Commission Document Control Desk with attention to R. Pulsifer (NRC), "Confirmation of 10x10 Fuel Design Applicability to Improved SLMCPR, Power Distribution and R-Factor Methodologies", FLN-2001-016, September 24, 2001.

[5] Letter, Glen A. Watford (GNF-A) to U. S. Nuclear Regulatory Commission Document Control Desk with attention to J. Donoghue (NRC), "Confirmation of Applicability of the GEXL14 Correlation and Associated R-Factor Methodology for Calculating SLMCPR Values in Cores Containing GE14 Fuel", FLN-2001-017, October 1, 2001.

[6] GEXL96 Correlation for ATRIUM-9B Fuel, NEDC-32981P, Revision 0, September 2000.

[7] Letter, Glen A. Watford (GNF-A) to U. S. Nuclear Regulatory Commission Document Control Desk with attention to J. Donoghue (NRC), "Final Presentation Material for GEXL Presentation – February 11, 2002", FLN-2002-004, February 12, 2002.

Comparison of Dresden Unit 2 SLMCPR Values for Cycles 18 and 17

Table 1 summarizes the relevant input parameters and results of the SLMCPR determination for the Dresden Unit 2 Cycle 18 and 17 cores. The SLMCPR evaluations were performed using NRC-approved methods and uncertainties[1], supplemented with Dresden Unit 2 specific uncertainties as indicated in Table 3. These calculations use the GEXL14 correlation for GE14 fuel and GEXL96[6] for the SPC fuel. The GEXL14 bias and uncertainty values used in confirming the DLO and SLO SLMCPR values for Cycle 18 of Dresden Unit 2 are the higher values indicated on sheet 35 of the presentation materials attached to Reference [7]. The SLMCPR evaluations for Cycles 17 were performed by SPC. The quantities that have been shown to have some impact on the determination of the safety limit MCPR (SLMCPR) are provided.

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/R-factor distributions. Greater flatness in either parameter yields more rods susceptible to boiling transition and thus a higher calculated SLMCPR.

[[ ]]

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. The calculated 1.11 Monte Carlo SLMCPR for Dresden Unit 2 Cycle 18 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 1.11 for the Dresden Unit 2 Cycle 18 core is appropriate.

For single loop operations (SLO) the calculated safety limit MCPR for the limiting case is 1.12 as determined by specific calculations for Dresden Unit 2 Cycle 18.

Furthermore, for cycle exposures other than EOC, the calculated Monte Carlo SLMCPR results are summarized in Table 2. These results support an exposure dependent SLMCPR for Dresden Unit 2 Cycle 18 as shown in Figure 1.

The SLMCPR results in Table 2 are consistent with what one would expect [[ ]]

Supporting Information

The following information is provided in response to NRC questions on similar submittals regarding changes in Technical Specification values of SLMCPR. NRC questions pertaining to how GE14 applications satisfy the conditions of the NRC SER[1] have been addressed in Reference [4]. Other generically applicable questions related to application of the GEXL14 correlation and the applicable range for the R-factor methodology are addressed in References [5] and [7]. Only those items that require a plant/cycle specific response are presented below since all the others are contained in the references that have already been provided to the NRC.

The core loading information for Dresden Unit 2 Cycles 17 and 18 is provided in Figures 2 and 3, respectively. The impact of the fuel loading pattern differences on the calculated SLMCPR is correlated to the values of [[ ]]

The power and non-power distribution uncertainties that are used in the analyses are indicated in Table 3. The referenced document numbers have previously been reviewed and approved by the NRC. The SER (Reference [1]) specifically provides that higher uncertainty values be used when necessary as was the case for this SLMCPR evaluation for Dresden Unit 2 Cycle 18.

Prepared by:

H. Zhang

H. Zhang
Technical Program Manager

Verified by:

G. I. Maldonado

G. I. Maldonado
Technical Program Manager

Table 1
Comparison of the Dresden Unit 2 Cycle 18 and Cycle 17 SLMCPR

QUANTITY, DESCRIPTION	Dresden Unit 2 Cycle 17	Dresden Unit 2 Cycle 18
Number of Bundles in Core	724	724
Limiting Cycle Exposure Point	N/A	EOC
Cycle Exposure at Limiting Point [MWd/MTU]	N/A	15000
Reload Fuel Type	ATRIUM-9B	GE14
Latest Reload Batch Fraction [%]	34.3%	38.7%
Latest Reload Average Batch Weight % Enrichment	3.71%	4.09%
Batch Fraction for GE14	0%	38.7%
Batch Fraction for ATRIUM-9B	58.6%	57.5%
Batch Fraction for ANF9x9-2B	41.4%	3.9%
Core Average Weight % Enrichment	3.41%	3.77%
Core MCPR (for limiting rod pattern)	N/A	1.48
[[		]]
[[		]]
Power distribution uncertainty	N/A	See Table 3, Column 2
Non-power distribution uncertainty	N/A	See Table 3, Column 2
Calculated Safety Limit MCPR	**1.12**[1]	**1.11**[2]

Table 2
Dresden Unit 2 Cycle 18 SLMCPR Results as a Function of Cycle Exposure

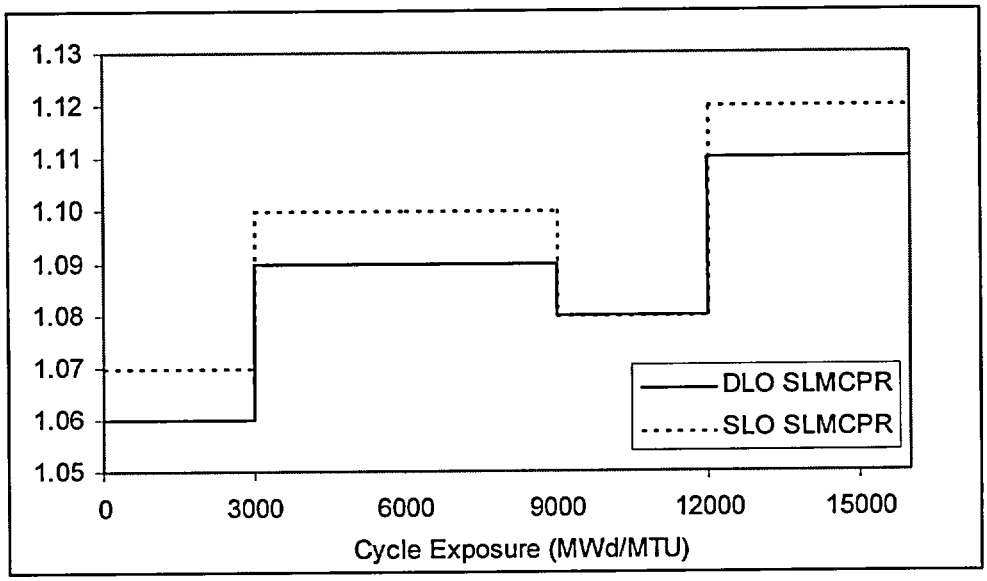
Cycle Exposure (MWd/MTU)	Dual Loop SLMCPR	Single Loop SLMCPR	[[ ]]	[[ ]]
0 (BOC)	1.05	---[3]	[[ ]]	[[ ]]
3000	1.06	1.07	[[ ]]	[[ ]]
6000	1.09	1.10	[[ ]]	[[ ]]
9000	1.06	1.07	[[ ]]	[[ ]]
12000	1.08	1.08	[[ ]]	[[ ]]
15000 (EOC)	1.11	1.12	[[ ]]	[[ ]]

[1] SPC Safety Limit MCPR of 1.12 includes the effects of channel bow per SPC approved method.
[2] GNF Safety Limit MCPR of 1.11 does not include the effects of channel bow per GNF approved method. Such effects are incorporated in the Operating Limit.
[3] Not calculated.

[[ ]]
[[ ]]

Figure 1

Dresden Unit 2 Cycle 18 Exposure Dependent SLMCPR



[[ ]]
[[ ]]

Table 3

Comparison of Dresden Unit 2 Cycle 18 Specific Inputs to NRC-accepted Values

DESCRIPTION	COLUMN 1 Uncertainty Values (%) previously accepted by NRC	COLUMN 2 Dresden Unit 2 Specific Values (%)
Non-power Distribution Uncertainties	From Table 2.1 of NEDC-32601P-A	
Core flow rate (derived from pressure drop)	2.5 TLO 6.0 SLO	2.5 TLO 6.0 SLO
Individual channel flow area	[[ ]]	[[ ]]
Individual channel friction factor	5.0	5.0
Friction factor multiplier	[[ ]]	[[ ]]
Reactor pressure	[[ ]]	[[ ]]
Core inlet temperature	0.2	0.2
Feedwater temperature	[[ ]]	[[ ]]
Feedwater flow rate	[[ ]]	[[ ]]
Power Distribution Uncertainties consistent with the Revised Methodology of NEDC-32601P-A	GETAB uncertainties as used to produce values shown in Table 4.1 of NEDC-32601P-A	Specific Values (%)
GEXL R-factor	[[ ]]	[[ ]]
Random effective TIP reading	1.2 TLO 2.85 SLO	1.2 TLO 2.85 SLO
Systematic effective TIP reading	[[ ]]	[[ ]]
Integrated effective TIP reading	[[ ]]	[[ ]]
Bundle power	[[ ]]	4.156
Effective total bundle power uncertainty	[[ ]]	5.0

[[ ]]
[[ ]]

Figure 2
Reference Core Loading Pattern – Cycle 17

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
1											B	H	H	J	J	J	J	H	H	B											60
2										J	B	A	B	A	B	B	A	B	A	B	J										58
3							J	H	H	A	E	E	E	G	D	D	G	E	E	E	A	H	H	J							56
4						J	B	E	G	G	G	A	G	F	A	A	F	G	A	G	G	G	E	B	J						54
5					J	A	A	G	E	G	B	G	E	G	E	E	G	E	G	B	G	E	G	A	A	J					52
6				J	A	B	G	F	G	B	G	F	G	B	F	F	B	G	F	G	B	G	F	G	B	A	J				50
7			J	B	A	G	B	D	E	F	D	C	D	F	A	A	F	D	C	D	F	E	D	B	G	A	B	J			48
8			H	E	G	F	D	A	F	D	B	A	F	E	A	A	E	F	A	B	D	F	A	D	F	G	E	H			46
9			H	G	E	G	E	F	B	F	E	F	E	F	E	E	F	E	F	E	F	B	F	E	G	E	G	H			44
10		J	A	G	G	B	F	D	F	B	F	E	F	B	F	F	B	F	E	F	B	F	D	F	B	G	G	A	J		42
11	B	B	E	G	B	G	D	B	E	F	A	A	E	F	A	A	F	E	A	A	F	E	B	D	G	B	G	E	B	B	40
12	H	A	E	A	G	F	C	A	F	E	A	B	F	E	A	A	E	F	B	A	E	F	A	C	F	G	A	E	A	H	38
13	H	B	E	G	E	G	D	F	E	F	E	F	A	F	E	E	F	A	F	E	F	E	F	D	G	E	G	E	B	H	36
14	J	A	G	F	G	B	F	E	F	B	F	E	F	A	F	F	A	F	E	F	B	F	E	F	B	G	F	G	A	J	34
15	J	B	D	A	E	F	A	A	E	F	A	A	E	F	B	B	F	E	A	A	F	E	A	A	F	E	A	D	B	J	32
16	J	B	D	A	E	F	A	A	E	F	A	A	E	F	B	B	F	E	A	A	F	E	A	A	F	E	A	D	B	J	30
17	J	A	G	F	G	B	F	E	F	B	F	E	F	A	F	F	A	F	E	F	B	F	E	F	B	G	F	G	A	J	28
18	H	B	E	G	E	G	D	F	E	F	E	F	A	F	E	E	F	A	F	E	F	E	F	D	G	E	G	E	B	H	26
19	H	A	E	A	G	F	C	A	F	E	A	B	F	E	A	A	E	F	B	A	E	F	A	C	F	G	A	E	A	H	24
20	B	B	E	G	B	G	D	B	E	F	A	A	E	F	A	A	F	E	A	A	F	E	B	D	G	B	G	E	B	B	22
21		J	A	G	G	B	F	D	F	B	F	E	F	B	F	F	B	F	E	F	B	F	D	F	B	G	G	A	J		20
22			H	G	E	G	E	F	B	F	E	F	E	F	E	E	F	E	F	E	F	B	F	E	G	E	G	H			18
23			H	E	G	F	D	A	F	D	B	A	F	E	A	A	E	F	A	B	D	F	A	D	F	G	E	H			16
24			J	B	A	G	B	D	E	F	D	C	D	F	A	A	F	D	C	D	F	E	D	B	G	A	B	J			14
25				J	A	B	G	F	G	B	G	F	G	B	F	F	B	G	F	G	B	G	F	G	B	A	J				12
26					J	A	A	G	E	G	B	G	E	G	E	E	G	E	G	B	G	E	G	A	A	J					10
27						J	B	E	G	G	G	A	G	F	A	A	F	G	A	G	G	G	E	B	J						08
28							J	H	H	A	E	E	E	G	D	D	G	E	E	E	A	H	H	J							06
29										J	B	A	B	A	B	B	A	B	A	B	J										04
30											B	H	H	J	J	J	J	H	H	B											02
	01	03	05	07	09	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59	

	Bundle Name	Number In Core	Cycle Loaded
A	ANF9X9-2-P9DANB314-9GZ-SPC80M-145-T6-3909	120	15
B	ANF9X9-2-P9DANB314-8G5 0-SPC80M-145-T6-3910	104	15
C	ATRM9-P9DATB349-9GZ-SPC80M-9WR-145-T6-3911	8	15
D	ATRM9-P9DATB330-11GZ-SPC80M-9WR-144-T6-3915	40	16
E	ATRM9-P9DATB348-11GZ-SPC80M-9WR-144-T6-3913	128	16
F	ATRM9-P9HATB371-13GZ-SPC100T-9WR-144-T6-3914	144	17
G	ATRM9-P9HATB371-13GZ-SPC100T-9WR-144-T6-3912	104	17
H	ANF9X9-2-P9DANB313-7G3 5-SPC80M-145-T6-3907	32	14
J	ANF9X9-2-P9DANB313-8G4 0-SPC80M-145-T6-3908	44	14
	Total	724	

[[ ]]
[[ ]]

Figure 3
Reference Core Loading Pattern – Cycle 18

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
1											A	C	C	C	C	C	C	C	C	A											60
2										A	C	D	E	E	E	E	E	E	D	C	A										58
3							A	C	C	D	D	E	E	D	C	C	D	E	E	D	D	C	C	A							56
4						B	C	E	D	E	F	F	G	F	F	F	F	G	F	F	E	D	E	C	B						54
5					A	B	E	D	F	F	B	F	E	G	D	D	G	E	F	B	F	F	D	E	B	A					52
6				B	B	B	E	F	F	C	F	F	G	E	G	G	E	G	F	F	C	F	F	E	B	B	B				50
7			A	C	E	E	C	F	D	F	C	D	D	G	D	D	G	D	D	C	F	D	F	C	E	E	C	A			48
8			C	E	D	F	F	C	F	F	D	G	G	G	C	C	G	G	G	D	F	F	C	F	F	D	E	C			46
9			C	D	F	F	D	F	B	G	D	G	B	G	D	D	G	B	G	D	G	B	F	D	F	F	D	C			44
10		A	D	E	F	C	F	F	G	C	G	G	G	E	G	G	E	G	G	G	C	G	F	F	C	F	E	D	A		42
11	A	C	D	F	B	F	C	D	D	G	D	C	D	G	D	D	G	D	C	D	G	D	D	C	F	B	F	D	C	A	40
12	C	D	E	F	F	F	D	G	G	G	C	D	G	G	C	C	G	G	D	C	G	G	G	D	F	F	F	E	D	C	38
13	C	E	E	G	E	G	D	G	B	G	D	G	E	G	D	D	G	E	G	D	G	B	G	D	G	E	G	E	E	C	36
14	C	E	D	F	G	E	G	G	G	E	G	G	G	E	G	G	E	G	G	G	E	G	G	G	E	G	F	D	E	C	34
15	C	E	C	F	D	G	D	C	D	G	D	C	D	G	C	C	G	D	C	D	G	D	C	D	G	D	F	C	E	C	32
16	C	E	C	F	D	G	D	C	D	G	D	C	D	G	C	C	G	D	C	D	G	D	C	D	G	D	F	C	E	C	30
17	C	E	D	F	G	E	G	G	G	E	G	G	G	E	G	G	E	G	G	G	E	G	G	G	E	G	F	D	E	C	28
18	C	E	E	G	E	G	D	G	B	G	D	G	E	G	D	D	G	E	G	D	G	B	G	D	G	E	G	E	E	C	26
19	C	D	E	F	F	F	D	G	G	G	C	D	G	G	C	C	G	G	D	C	G	G	G	D	F	F	F	E	D	C	24
20	A	C	D	F	B	F	C	D	D	G	D	C	D	G	D	D	G	D	C	D	G	D	D	C	F	B	F	D	C	A	22
21		A	D	E	F	C	F	F	G	C	G	G	G	E	G	G	E	G	G	G	C	G	F	F	C	F	E	D	A		20
22			C	D	F	F	D	F	B	G	D	G	B	G	D	D	G	B	G	D	G	B	F	D	F	F	D	C			18
23			C	E	D	F	F	C	F	F	D	G	G	G	C	C	G	G	G	D	F	F	C	F	F	D	E	C			16
24			A	C	E	E	C	F	D	F	C	D	D	G	D	D	G	D	D	C	F	D	F	C	E	E	C	A			14
25				B	B	B	E	F	F	C	F	F	G	E	G	G	E	G	F	F	C	F	F	E	B	B	B				12
26					A	B	E	D	F	F	B	F	E	G	D	D	G	E	F	B	F	F	D	E	B	A					10
27						B	C	E	D	E	F	F	G	F	F	F	F	G	F	F	E	D	E	C	B						08
28							A	C	C	D	D	E	E	D	C	C	D	E	E	D	D	C	C	A							06
29										A	C	D	E	E	E	E	E	E	D	C	A										04
30											A	C	C	C	C	C	C	C	C	A											02
	01	03	05	07	09	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59	

	Bundle Name	Number in Core	Cycle Loaded
A	ANF9X9-2-P9DANB314-9GZ-SPC80M-145-T6-3909	28	15
B	ATRM9-P9DATB330-11GZ-SPC80M-9WR-144-T6-3915	40	16
C	ATRM9-P9DATB348-11GZ-SPC80M-9WR-144-T6-3913	128	16
D	ATRM9-P9HATB371-13GZ-SPC100T-9WR-144-T6-3914	144	17
E	ATRM9-P9HATB371-13GZ-SPC100T-9WR-144-T6-3912	104	17
F	GE14-P10HNAB411-4G7 0/9G6 0-100T-145-T6-2484	120	18
G	GE14-P10HNAB408-16GZ-100T-145-T6-2483	160	18
	Total	724	

[[ ]]
[[ ]]

ATTACHMENT G

Request for License Amendment
Regarding Minimum Critical Power Ratio Safety Limit

Affidavit and Non-Proprietary Version of Attachment F

Affidavit

I, Jens G. Andersen, state as follows:

(1) I am Fellow and project manager, TRACG Development, 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, "Response to Request for Additional Information Relating to Amendment Request for Cycle 18 SLMCPR Quad Cities Nuclear Power Station, Unit 1 Docket No. 50-254 Edited for Dresden Unit 2 Cycle 18," January 14, 2003.

(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.

I declare under penalty of perjury that the foregoing affidavit and the matters stated therein are true and correct to the best of my knowledge, information, and belief.

Executed at Wilmington, North Carolina, this 14th day of January, 2003.

Jens G. Andersen

Jens G. Andersen
Global Nuclear Fuel – Americas, LLC

ATTACHMENT 1

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
RELATING TO AMENDMENT REQUEST FOR CYCLE 18 SLMCPR
QUAD CITIES NUCLEAR POWER STATION, UNIT 1
DOCKET NO. 50-254
EDITED FOR DRESDEN UNIT 2 CYCLE 18

Question 1

Provide details of how the derived quantities for effective total bundle power uncertainties are obtained, including assumptions, approved methodology used, and the impact on power distribution uncertainties and contribution to the SLMCPR calculation.

Response

The effective total bundle power model uncertainty (σ_B) is determined from Eq. (3-3) of NEDC-32694P-A (Reference 3) [[ ]] Although the values of the components are different for the GETAB and Revised Safety Limit Minimum Critical Power Ratio (SLMCPR) methodologies, the determination of σ_B is equivalent. The uncertainty component due to local power range monitor (LPRM) updates and instrument failure (σ_U) has [[ ]] components that combine to a value of [[ ]] as indicated by the equation at the bottom of page 3-5 of NEDC-32694P-A. The individual values for these [[ ]] components and their descriptions are summarized in rows three and four of Table 4.2 of NEDC-32694P-A. [[ ]] To illustrate this difference it is beneficial to expand the model uncertainty (σ_M) as indicated in Eq. (3-2) on page 3-1 of NEDC-32694P-A [[ ]] Values for these components are indicated in the first two rows of Table 4.2 of NEDC-32694P-A. [[ ]] See page 3-2 of NEDC-32694P-A for more discussion. For the Revised methodology using the reduced power distribution uncertainties derived for 3D-MONICORE, the value for σ_{PAL} is [[ ]] as shown in row 2 of Table 4.2 of NEDC-32694P-A. For either of the NRC-approved methodologies, Eqs. (1) and (2) can be combined and rearranged to obtain [[ ]] The equivalent terms shown in Eq. (3) are introduced so that the differences in how these components are treated in the GETAB and Revised methodologies can be described. The division of σ_{TIPSYS} by $\sqrt{4}$ occurs because the TIPSYS uncertainty is applied on a quarter axial segment basis. For the GETAB methodology the component associated with σ_{PAL} is conservatively assumed to be correlated for all four bundles around the TIP so that in the model inputs all the values are combined to obtain σ_{TIPSYS}=8.6% [[ ]]. Thus from Eq. (3) above it is evident that for the GETAB methodology and associated uncertainties $\sigma_B = 4.3\%$.

For the reduced uncertainties applied to the Revised methodology the associated input values are [[ ]] as indicated in the fifth row of Table 4.2 of NEDC-32694P-A. These lower values are **not** used to calculate the SLMCPR for Dresden Unit 2, Cycle 18 but have been presented here as an example of how the Revised methodology with reduced uncertainties compares with the GETAB methodology with the original power distribution uncertainties.

Applying the same Revised methodology using the higher bundle power uncertainty of 4.3%

[[ ]]
[[ ]]

associated with GETAB power distribution uncertainties [[ ]] resulting in an effective total bundle power uncertainty of $\sigma_B = 4.3\%$ (as expected). Application of the GETAB uncertainty values in this way is presented in Section 2.10 of NEDC-32601P-A (Reference 4). Some calculated results are presented in Table 4.1 of NEDC-32601P-A. This process has been reviewed and approved by the NRC in accepting the Revised methodology. Since this is the process that has been followed, Table 4.1 of NEDC-32601P-A is cited in Table 3 of Reference 6.

For specific application to Dresden Unit 2, Cycle 18 an effective total bundle power uncertainty of 5.0% has been specified. This value is even more conservative than the 4.3% value used in GETAB. When applied using the NRC-approved Revised SLMCPR methodology the key inputs become[[ ]] resulting in an effective total bundle power uncertainty of $\sigma_B = 5.0\%$ as stipulated.

This discussion has shown how the values presented in the last four rows of Table 3 of Reference 6 are derived. The impact on the calculated SLMCPR of using the Revised methodology instead of the GETAB methodology is indicated in Table 4.1 of NEDC-32601P-A. [[ ]] Typically for a calculated SLMCPR around 1.11 the calculated SLMCPR will be approximately [[ ]] lower if the Revised methodology is used instead of GETAB methodology. The reason for this reduction even when equivalent power distribution uncertainties are used is given on page 4-7 of NEDC-32601P-A.

Question 2

Based on a plant/cycle specific calculation, describe in detail your calculation process, including approved methodology used, to model [[ ]] Justify that the proposed approach and the assumption for this analysis are valid through the entire cycle operation [[ ]].

Response

The approved methodology used is the Revised methodology described in detail in NEDC-32601P-A (Reference 4).

For the current analysis as summarized in Reference 6: [[ ]]. The limiting point in the cycle for purposes of setting the SLMCPR is near end of cycle (EOC) where [[ ]] These are the values agreed to by the NRC.

Since the SLMCPR is most limiting near EOC [[ ]] other exposure points in the cycle will produce lower calculated SLMCPR values [[ ]]

Question 3

The Reference Core Loading Pattern for Cycle 18 is a mixed core consisting of 280 fresh GE14 fuel bundles, 248 once burned ATRIUM-9B fuel bundles, 168 twice burned ATRIUM-9B fuel bundles, and 28 thrice burned 9x9-2 fuel bundles. Identify the most influential factors which may impact the calculation of the proposed SLMCPR in this mixed core condition. Justify that your approach for core bundle-by-bundle MCPR distribution and bundle pin-by-pin power/R-factor distribution is still valid for the mixed core (with other vendor's fuel) SLMCPR calculation.

Response

The calculated SLMCPR in this core as in all cores is most strongly influenced by the fuel

bundles with the highest reactivity. At beginning of cycle (BOC) this usually includes some fuel bundles that were loaded in the previous cycle. For larger batch fractions the relative contribution of bundles from the previous cycle is less important. Notice that for Cycle 18 the latest batch has a 38.7% batch fraction. This implies that throughout the cycle that the SLMCPR will be dominated by bundles loaded for this cycle. It also implies that the BOC SLMCPR will tend to be very low because the core Minimum Critical Power Ratio (MCPR) distribution will be quite peaked in order to accommodate such a high batch fraction. So although the core is a mixed core, the SLMCPR will be dominated by the response of the GE14 fuel. Note, however, that the analyses methodology is applicable to mixed cores [[ ]]

Consequently, it is the critical power response of the GE14 fuel that is most important. The impact on the calculated SLMCPR is dominated by two primary considerations [[ ]]

Question 4

Identify the differences in the analysis for the SLMCPR calculation between GE's and other fuel vendor. Also, identify the errors made in the SLMCPR calculations in Reference 1.

Response

The difference in SLMCPR values between D2C17 and D2C18 is attributed to the following effects.

1. The FANP 9x9-2 and ATRIUM 9B fuel in D2C17 and the FANP 9x9-2 and ATRIUM 9B/GNF GE14 fuel in D2C18 have different applicable CPR correlations and correlation uncertainties.
2. D2C17 and D2C18 have different core radial and axial power distributions.
3. D2C17 FANP SLMCPR calculations include the effects of channel bow in the uncertainties used [[ ]].
4. Different computer code packages are used for the analysis methodology. FANP analysis methodology is used for D2C17 and GNF analysis methodology is used for D2C18. Both methodologies are NRC-approved.

Due to differences in fuel vendors, fuel designs, and vendor methodology between the D2C17 and D2C18 reloads, no specific analyses can be performed to quantitatively determine what portion of the SLMCPR change is separately due to each of the four effects identified above.

The error that was made in calculating the SLMCPR presented in Reference 1 [[ ]] That caused an erroneous value for the Monte-Carlo calculated SLMCPR.

References

1. Letter from R. M. Krich (Exelon Generation Company, LLC) to U.S. NRC, "Request for Technical Specifications Change for Minimum Critical Power Ratio Safety Limit," dated June 6, 2001.

2. Letter from T. W. Simpkin (Exelon Generation Company, LLC) to U.S. NRC, "Additional Information Supporting the Request for Technical Specifications Change for Minimum Critical Power Ratio Safety Limit," dated September 17, 2001.

3. NEDC-32694P-A, "Power Distribution Uncertainties for Safety Limit MCPR Evaluations," dated August 1999.

4. NEDC-32601P-A, "Methodology and Uncertainties for Safety Limit MCPR Evaluations," dated August 1999.

5. Letter from Glen A. Watford (GNF-A) to U.S. Nuclear Regulatory Commission Document Control Desk with Attention to J. Donoghue (NRC), "Final Presentation Material for GEXL Presentation – February 11, 2002," FLN-2002-004, February 12, 2002.

6. GNF Document, "Additional Information Regarding the Cycle Specific SLMCPR for Dresden Unit 2 Cycle 18," dated January 14, 2003.