PROPRIETARY INFORMATION – WITHHOLD UNDER 10 CFR 2.390

10 CFR 50.90
10 CFR 2.390

April 30, 2015

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

Peach Bottom Atomic Power Station, Unit 3
Renewed Facility Operating License No. DPR-56
NRC Docket No. 50-278

Subject: License Amendment Request - Safety Limit Minimum Critical Power Ratio Change

Reference:
1. Exelon letter to the NRC, "License Amendment Request – Maximum Extended Load Line Limit Analysis Plus," dated September 4, 2014 (ADAMS Accession No. ML14247A503)
2. GE Hitachi Nuclear Energy, "General Electric Boiling Water Reactor Maximum Extended Load Line Limit Analysis Plus," NEDC-33006P-A, Revision 3, June 2009

In accordance with 10 CFR 50.90, Exelon Generation Company, LLC (Exelon) requests a change to the Technical Specifications (TS) Section 2.1.1 ("Reactor Core SLs") for Peach Bottom Atomic Power Station (PBAPS) Unit 3. Specifically, this change incorporates revised Safety Limit Minimum Critical Power Ratios (SLMCPRs) due to the cycle specific analysis performed by Global Nuclear Fuel for Peach Bottom Atomic Power Station (PBAPS) Unit 3 Cycle 21. The re-analysis was performed to accommodate operation in the Maximum Extended Load Line Limit Analysis Plus (MELLLA+) operating domain as discussed in Reference 1.

The proposed changes have been reviewed by the PBAPS Station Plant Operations Review Committee, and approved by the Nuclear Safety Review Board in accordance with the requirements of the Exelon Quality Assurance Program.

Exelon requests approval of this proposed License Amendment Request (LAR) by September 9, 2015, with an implementation period to coincide with the PBAPS Unit 3 implementation of the MELLLA+ LAR (Reference 1).

There are no commitments contained within this letter.

Attachment 1 contains the evaluation of the proposed changes. Attachments 2 and 3 provide the marked up TS page and the retyped TS page, respectively.

Attachment 4 contains Proprietary Information.
When separated from Attachment 4, this document is decontrolled.

Attachment 4 (letter from C. F. Lamb (Global Nuclear Fuel) to J. Tusar (Exelon), 002N5030 R1-P, dated March 16, 2015, specifies the new SLMCPRs for PBAPS Unit 3 Cycle 21 for MELLLA+ conditions. Attachment 4 contains information proprietary to Global Nuclear Fuel. Global Nuclear Fuel requests that the document be withheld from public disclosure in accordance with 10 CFR 2.390. Attachment 5 contains a non-proprietary version of the Global Nuclear Fuel document, 002N5030 R1-NP. An affidavit supporting this request is also contained in Attachment 6. Attachment 7 contains the power/flow map for PBAPS Unit 3 Cycle 21 that shows both the current MELLLA and the proposed MELLLA+ operating domains.

In accordance with 10 CFR 50.91, Exelon is notifying the Commonwealth of Pennsylvania of this application for license amendment by transmitting a copy of this letter and its attachments to the designated State Official.

Should you have any questions concerning this letter, please contact David Neff at (610) 765-5631.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 30th day of April 2015.

Respectfully,

James Barstow
Director, Licensing and Regulatory Affairs
Exelon Generation Company, LLC

Attachments:
1. Evaluation of Proposed Changes
2. Markup of Technical Specifications Page
3. Retyped Technical Specifications Page
4. Proprietary Version of Global Nuclear Fuel Report 002N5030 R1-P
5. Non-Proprietary Version of Global Nuclear Fuel Report 002N5030 R1-NP
6. GNF Affidavit in Support of Request to Withhold Information
7. Power/Flow Map for Cycle 21 with MELLLA+ Operating Domain

cc:	USNRC Region I, Regional Administrator	w/attachments
	USNRC Senior Resident Inspector, PBAPS	w/attachments
	USNRC Project Manager, PBAPS	w/attachments
	R. R. Janati, Commonwealth of Pennsylvania	w/o proprietary attachment
	S. T. Gray, State of Maryland	w/o proprietary attachment

ATTACHMENT 1

Evaluation of Proposed Changes

Peach Bottom Atomic Power Station, Unit 3
Renewed Facility Operating License No. DPR-56

ATTACHMENT 1

CONTENTS

SUBJECT: Safety Limit Minimum Critical Power Ratio Change

1.0 SUMMARY DESCRIPTION

This evaluation supports a request to amend Renewed Facility Operating License No. DPR-56 for Peach Bottom Atomic Power Station (PBAPS) Unit 3.

The proposed change modifies Technical Specification (TS) 2.1.1 ("Reactor Core SLs"). Specifically, a change to the Safety Limit Minimum Critical Power Ratio (SLMCPR) is requested to allow operation in the expanded Maximum Extended Load Line Limit Analysis Plus (MELLLA+) operating domain. This change in being proposed to coincide with the PBAPS Unit 3 implementation of the MELLLA+ LAR (Reference 1) requested for September 2015.

2.0 DETAILED DESCRIPTION

The proposed change involves revising the SLMCPRs contained in TS 2.1.1 for two recirculation loop operation and single recirculation loop operation. The SLMCPR value for two recirculation loop operation is being changed from ≥ 1.09 to ≥ 1.15. The SLMCPR value for single recirculation loop operation is being changed from ≥ 1.12 to ≥ 1.15. This change is being proposed to coincide with the PBAPS Unit 3 implementation of the MELLLA+ LAR (Reference 1). A License Amendment Request (LAR) for implementation of the MELLLA+ operating strategy was submitted in Reference 1.

Implementation of operation in the MELLLA+ operating domain for PBAPS Unit 3 is planned for the fourth quarter of 2015 in operating Cycle 21. Reload analysis with the MELLLA+ operating domain was performed for Cycle 21 assuming implementation would occur during Cycle 21 following NRC approval of the MELLLA+ LAR (Reference 1). As stated in Reference 1, Attachment 4, Section 2.2.1, based on the potential for MELLLA+ implementation affecting the SLMCPR, the NRC approved Licensing Topical Report (LTR) for MELLLA+ (Reference 2) allows that the SLMCPR be calculated based on the actual core loading pattern for each reload core. During the reload analysis it was determined that the cycle specific SLMCPR for PBAPS Unit 3 Cycle 21 in the MELLLA+ operating domain is not bounded by the current PBAPS Unit 3 TS values. Since the Cycle 21 core design and re-analysis were not completed at the time of the MELLLA+ LAR submittal, a separate LAR is necessary.

Marked up TS page 2.0-1 showing the requested changes is provided in Attachment 2. No changes are necessary to the TS Bases for this LAR. The retyped TS page 2.0-1 is provided in Attachment 3.

3.0 TECHNICAL EVALUATION

The proposed TS change will revise the SLMCPRs contained in TS 2.1.1 for two recirculation loop operation and single recirculation loop operation to reflect the changes in the cycle specific analysis performed by Global Nuclear Fuel for PBAPS Unit 3 Cycle 21 with implementation of the MELLLA+ operating strategy.

The new SLMCPRs are calculated using NRC-approved methodology described in NEDE-24011-P-A, "General Electric Standard Application for Reactor Fuel," Revision 20 (Reference 3). A listing of the associated NRC-approved methodologies for calculating the SLMCPRs is provided in Section 1.0 ("Methodology") of Attachment 4.

The SLMCPR analysis establishes SLMCPR values that reasonably assure that, during normal operation and during anticipated operational transients, at least 99.9% of all fuel rods in the core do not experience boiling transition if the limits are not violated. The SLMCPRs are calculated to include cycle specific parameters and, in general, are dominated by two key parameters: 1) flatness of the core bundle-by-bundle MCPR distribution, and 2) flatness of the bundle pin-by-pin power/R-Factor distribution. Information to support the cycle specific SLMCPRs is included in Attachment 4. That attachment summarizes the methodology, inputs, and results for the change in the SLMCPRs. The PBAPS Unit 3 Cycle 21 core consists of GNF2 fuel type only.

Attachment 7 contains the PBAPS Unit 3 Power / Flow Map for Cycle 21 that shows both the current MELLLA and the proposed MELLLA+ operating domains referred to in Section 2.9 of Attachment 4.

The proposed changes do not involve any new modes of operation, any changes to setpoints, or any plant modifications beyond those associated with the MELLLA+ LAR (Reference 1).

4.0 REGULATORY EVALUATION

4.1 Applicable Regulatory Requirements/Criteria

10 CFR 50.36, "Technical Specifications," paragraph (c)(1), requires that power reactor facility TS include safety limits for process variables that protect the integrity of certain physical barriers that guard against the uncontrolled release of radioactivity. The SLMCPR analysis establishes SLMCPR values that reasonably assure that, during normal operation and during anticipated operational transients, at least 99.9% of all fuel rods in the core do not experience boiling transition if the limits are not violated. Thus, the SLMCPR is required to be contained in TS.

4.2 Precedents

The NRC has approved a similar SLMCPR change at the following plant:

1. Letter from P. Tam (U.S. Nuclear Regulatory Commission) to T. J. O’Connor (Northern States Power Company - Minnesota), "Monticello Nuclear Generating Plant, Issuance of Amendment RE: Minimum Critical Power Ratio Safety Limit (TAC No. ME4790)," dated May 4, 2011 (ADAMS Accession No. ML11101A111)

4.3 No Significant Hazards Consideration

Exelon Generation Company, LLC (Exelon) has evaluated whether or not a significant hazards consideration is involved with the proposed amendment by focusing on the three standards set forth in 10 CFR 50.92, “Issuance of amendment,” as discussed below:

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

Response: No.

The derivation of the cycle specific Safety Limit Minimum Critical Power Ratios (SLMCPRs) for incorporation into the Technical Specifications (TS), and their use to determine cycle specific thermal limits, has been performed using the methodology discussed in NEDE-24011-P-A, "General Electric Standard Application for Reactor Fuel," Revision 20 (Reference 3).

The basis of the SLMCPR calculation is to reasonably assure that, during normal operation and during anticipated operational transients, at least 99.9% of all fuel rods in the core do not experience boiling transition if the limit is not violated. The new SLMCPRs preserve the existing margin to boiling transition.

The MCPR safety limit is reevaluated for each reload using NRC-approved methodologies. The analyses for Peach Bottom Atomic Power Station (PBAPS) Unit 3 Cycle 21, with the addition of operation in the MELLLA+ operating domain, have concluded that a two recirculation loop MCPR safety limit of ≥ 1.15, based on the application of Global Nuclear Fuel's NRC-approved MCPR safety limit methodology, will reasonably assure that this acceptance criterion is met. For single recirculation loop operation, a MCPR safety limit of ≥ 1.15 also reasonably assures that this acceptance criterion is met. The MCPR operating limits are presented and controlled in accordance with the PBAPS Unit 3 Core Operating Limits Report (COLR).

The requested TS changes do not involve any additional plant modifications or operational changes that could affect system reliability or performance or that could affect the probability of operator error beyond those associated with the MELLLA+ LAR (Reference 1). The requested changes do not affect any postulated accident precursors, do not affect any accident mitigating systems, and do not introduce any new accident initiation mechanisms. Therefore, the proposed TS changes do not involve a significant increase in the probability or consequences of an accident previously evaluated.

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

Response: No.

The SLMCPR is a TS numerical value, calculated to reasonably assure that, during normal operation and during anticipated operational transients, at least 99.9% of all fuel rods in the core do not experience boiling transition if the limit is not violated. The new SLMCPRs are calculated using NRC-approved methodology discussed in NEDE-24011-P-A, "General Electric Standard Application for Reactor Fuel," Revision 20 (Reference 3). The proposed changes do not involve any new modes of operation, any changes to setpoints, or any plant modifications beyond those associated with the MELLLA+ LAR (Reference 1). The proposed revised MCPR safety limits have been shown to be acceptable for Cycle 21 operation with the MELLLA+ operating domain. The core operating limits will continue to be developed using NRC-approved methods. The proposed MCPR safety limits or methods for establishing the core operating limits do not

result in the creation of any new precursors to an accident. Therefore, this proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

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

Response: No.

There is no significant reduction in the margin of safety previously approved by the NRC as a result of the proposed change to the SLMCPRs. The new SLMCPRs are calculated using methodology discussed in NEDE-24011-P-A, "General Electric Standard Application for Reactor Fuel," Revision 20 (Reference 3). The SLMCPRs reasonably assure that, during normal operation and during anticipated operational transients, at least 99.9% of all fuel rods in the core do not experience boiling transition if the limits are not violated, thereby preserving the fuel cladding integrity. Therefore, the proposed TS changes do not involve a significant reduction in the margin of safety previously approved by the NRC.

Based on the above, Exelon concludes that the proposed amendment does not involve a significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of no significant hazards consideration is justified.

4.4 Conclusions

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

5.0 ENVIRONMENTAL CONSIDERATION

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

6.0 REFERENCES

1. Exelon letter to the NRC, "License Amendment Request – Maximum Extended Load Line Limit Analysis Plus," dated September 4, 2014. (ADAMS Accession No. ML14247A503).
2. GE Hitachi Nuclear Energy, "General Electric Boiling Water Reactor Maximum Extended Load Line Limit Analysis Plus," NEDC-33006P-A, Revision 3, June 2009.
3. NEDE-24011-P-A, "General Electric Standard Application for Reactor Fuel," Revision 20.

ATTACHMENT 2

Markup of Technical Specifications Page

Revised TS Page

2.0-1 (Unit 3)

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:

MCPR shall be ≥ ~~1.09~~ 1.15 for two recirculation loop operation or ≥ ~~1.12~~ 1.15 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 ≤ 1325 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.

(continued)

ATTACHMENT 3

Retyped Technical Specifications Page

Revised TS Page

2.0-1 (Unit 3)

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:

MCPR shall be ≥ 1.15 for two recirculation loop operation or ≥ 1.15 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 ≤ 1325 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.

(continued)

ATTACHMENT 5

Non-Proprietary Version of Global Nuclear Fuel Report 002N5030 R1-NP

16 March 2015

002N5030 R1-NP

Revision 0

GNF Additional Information Regarding the Requested Changes to the Technical Specification SLMCPR

Peach Bottom Unit 3 Cycle 21

Proprietary Information Notice

This is a non-proprietary version of the document 002N5030 R1-P, Revision 0, which has the proprietary information removed. Portions of the document that have been removed are indicated by an open and closed bracket as shown here [[ ]].

Important Notice Regarding Contents of this Report
Please Read Carefully

The design, engineering, and other information contained in this document is furnished for the purpose of providing information regarding the requested changes to the Technical Specification SLMCPR for Exelon Peach Bottom Unit 3. The only undertakings of GNF-A with respect to information in this document are contained in contracts between GNF-A and Exelon, and nothing contained in this document shall be construed as changing that contract. The use of this information by anyone other than Exelon, or for any purposes other than those for which it is intended is not authorized; and with respect to any unauthorized use, GNF-A makes no representation or warranty, and assumes no liability as to the completeness, accuracy, or usefulness of the information contained in this document.

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1.0 Methodology

Global Nuclear Fuel (GNF) performs Safety Limit Minimum Critical Power Ratio (SLMCPR) calculations in accordance with NEDE-24011-P-A "General Electric Standard Application for Reactor Fuel" (Revision 20) using the following Nuclear Regulatory Commission (NRC)-approved methodologies and uncertainties:

- NEDC-32601P-A "Methodology and Uncertainties for Safety Limit MCPR Evaluations," August 1999.
- NEDC-32694P-A "Power Distribution Uncertainties for Safety Limit MCPR Evaluations," August 1999.
- NEDC-32505P-A "R-Factor Calculation Method for GE11, GE12 and GE13 Fuel," Revision 1, July 1999.

The latter reference is applicable to GNF's current fuel offerings of GE14 and GNF2. Both are 10x10 lattice designs with two water rods, as for GE12.

Table 2 identifies the methodologies used for the Peach Bottom Unit 3 Cycle 20 and the Cycle 21 SLMCPR calculations.

2.0 Discussion

In this discussion, the TLO nomenclature is used for two recirculation loops in operation, and the SLO nomenclature is used for one recirculation loop in operation.

2.1. Major Contributors to SLMCPR Change

The calculated Monte Carlo SLMCPR values for the prior cycle and the current cycle are presented in Table 3.

In general, the calculated safety limit is dominated by two key parameters: (1) flatness of the core bundle-by-bundle Minimum Critical Power Ratio (MCPR) distribution; and (2) flatness of the bundle pin-by-pin power/R-Factor distribution. Greater flatness in either parameter yields more rods susceptible to boiling transition and thus a higher calculated SLMCPR. MCPR Importance Parameter (MIP) measures the core bundle-by-bundle MCPR distribution and R-Factor Importance Parameter (RIP) measures the bundle pin-by-pin power/R-Factor distribution. The effect of the fuel loading pattern on the calculated TLO SLMCPR has been correlated to the parameter MIPRIP, which combines the MIP and RIP values.

Another factor besides core MCPR distribution or bundle R-factor distribution that significantly affects the SLMCPR is the expansion of the analysis domain that comes with the initial application of Maximum Extended Load Line Limit Analysis Plus (MELLLA+). The rated power/minimum core flow point is analyzed at a lower core flow (than without MELLLA+)

using increased uncertainties (see Section 2.2.2) that tend to increase the SLMCPR. Also, a new point at off-rated power/off-rated flow is analyzed using the increased uncertainties. It is expected that in most cases this off-rated power/off-rated flow point will set the overall limit.

Table 3 presents the MIP and RIP parameters for the previous cycle and the current cycle along with the TLO SLMCPR estimates using MIPRIP correlations. The MIPRIP prediction is correlated to Monte Carlo results for rated power/rated flow. Predictions for the MELLLA+ domains (at rated power/minimum core flow and off-rated power/off-rated core flow) must be adjusted by an amount estimated to account for the effect of the larger (SLO) uncertainties. In addition, Table 3 presents estimated effects on the TLO SLMCPR due to methodology deviations, penalties, and/or uncertainty deviations from approved values. Based on the MIPRIP correlation and any effects due to deviations from approved values, a final estimated TLO SLMCPR is determined. Table 3 also provides the actual calculated Monte Carlo SLMCPR. Given the bias and uncertainty in the MIPRIP correlation [[ ]] and the inherent variation in the Monte Carlo results [[ ]], the change in the Peach Bottom Unit 3 Cycle 21 calculated Monte Carlo TLO SLMCPR is consistent with the corresponding estimated TLO SLMCPR value.

The intent of the final estimated TLO SLMCPR is to provide an estimate to check the reasonableness of the Monte Carlo result. It is not used for any other purpose. The methodology and final SLMCPR is based on the rigorous Monte Carlo analysis.

The items in Table 3 that result in the increase of the estimated SLMCPR are discussed in Section 2.2.

2.2. Deviations in NRC-Approved Uncertainties

Tables 4 and 5 provide a list of NRC-approved uncertainties along with values actually used. A discussion of deviations from these NRC-approved values follows, all of which are conservative relative to NRC-approved values. Also, the estimated effect on the SLMCPR is provided in Table 3 for each deviation.

2.2.1. R-Factor

At this time, GNF has generically increased the GEXL R-Factor uncertainty from [[ ]] to account for an increase in channel bow due to the emerging unforeseen phenomena called control blade shadow corrosion-induced channel bow, which is not accounted for in the channel bow uncertainty component of the approved R-Factor uncertainty. The step "σ RPEAK" in Figure 4.1 from NEDC-32601P-A, which has been provided for convenience in Figure 3, is affected by this deviation. Reference 4 technically justifies that a GEXL R-Factor uncertainty of [[ ]] accounts for a channel bow uncertainty of up to [[ ]].

Peach Bottom Unit 3 has experienced control blade shadow corrosion-induced channel bow to the extent that an increase in the NRC-approved R-Factor uncertainty [[ ]] is deemed prudent to address its effect. Accounting for the control blade shadow corrosion-induced

channel bow, the Peach Bottom Unit 3 Cycle 21 analysis shows an expected channel bow uncertainty of [[ ]], which is bounded by a GEXL R-Factor uncertainty of [[ ]]. Thus the use of a GEXL R-Factor uncertainty of [[ ]] adequately accounts for the expected control blade shadow corrosion-induced channel bow for Peach Bottom Unit 3 Cycle 21.

2.2.2. Core Flow Rate and Random Effective TIP Reading

In Reference 5, GNF committed to the expansion of the state points used in the determination of the SLMCPR. Consistent with the Reference 5 commitments, GNF performs analyses at the rated core power and minimum licensed core flow point in addition to analyses at the rated core power and rated core flow point. The approved SLMCPR methodology is applied at each state point that is analyzed.

For the TLO calculations performed in the MELLLA+ domain at rated power/minimum core flow and off-rated power/off-rated core flow, the approved uncertainty values for the core flow rate (2.5%) and the random effective Traversing In-Core Probe (TIP) reading (1.2%) are conservatively adjusted by using the SLO uncertainty values of 6.0% and 2.85% for the core flow rate and random effective TIP reading respectively. The steps "σ CORE FLOW" and "σ TIP (INSTRUMENT)" in Figure 4.1 from NEDC-32601P-A, which has been provided for convenience in Figure 3, are affected by this deviation, respectively.

The treatment of the core flow and random effective TIP reading uncertainties is based on the assumption that the signal to noise ratio deteriorates as core flow is reduced. GNF believes this is conservative.

2.2.3. LPRM Update Interval and Calculated Bundle Power

To address the Local Power Range Monitor (LPRM) update/calibration interval in the Peach Bottom Unit 3 Technical Specifications, GNF has increased the LPRM update uncertainty in the SLMCPR analysis for Peach Bottom Unit 3 Cycle 21. The approved uncertainty values for the contribution to bundle power uncertainty due to LPRM update [[ ]], and the resulting total uncertainty in calculated bundle power [[ ]] are conservatively increased, as shown in Table 5. The steps "σ TIP (INSTRUMENT)" and "σ BUNDLE (MODEL)" in Figure 4.1 from NEDC-32601P-A, which has been provided for convenience in Figure 3, are affected by this difference.

[[

]] The total bundle power

uncertainty is a function of the LPRM update uncertainty as detailed in Section 3.3 of NEDC-32694P-A.

2.3. Departure from NRC-Approved Methodology

No departures from NRC-approved methodologies were used in the Peach Bottom Unit 3 Cycle 21 SLMCPR calculations.

2.4. Fuel Axial Power Shape Penalty

At this time, GNF has determined that higher uncertainties and non-conservative biases in the GEXL correlations for the various types of axial power shapes (i.e., inlet, cosine, outlet, and double hump) could potentially exist relative to the NRC-approved methodology values (References 3, 6, 7, and 8). The following table identifies, by marking with an "X", this potential for each GNF product line currently in use:

[[

]]

Axial bundle power shapes corresponding to the limiting SLMCPR control blade patterns are determined using the PANACEA three-dimensional (3D) core simulator. These axial power shapes are classified in accordance to the following table:

[[

]]

If the limiting bundles in the SLMCPR calculation exhibit an axial power shape identified by this table, GNF penalizes the GEXL critical power uncertainties to conservatively account for the effect of the axial power shape. Table 6 provides a list of the GEXL critical power uncertainties determined in accordance to the NRC-approved methodology contained in NEDE-24011-P-A along with the values actually used.

For the limiting bundles, the fuel axial power shapes in the SLMCPR analysis were examined to determine the presence of axial power shapes identified in the above table. These power shapes were not found; therefore, no power shape penalties were applied to the calculated Peach Bottom Unit 3 Cycle 21 SLMCPR values.

2.5. Methodology Restrictions

The four restrictions identified on Page 3 of NRC's Safety Evaluation (SE) relating to the General Electric (GE) Licensing Topical Reports (LTRs) NEDC-32601P, NEDC-32694P, and Amendment 25 to NEDE-24011-P-A (March 11, 1999) are addressed in References 1, 2, 3, and 9.

The four restrictions for GNF2 were determined acceptable by the NRC review of "GNF2 Advantage Generic Compliance with NEDE-24011-P-A (GESTAR II)," NEDC-33270P, Revision 0, FLN-2007-011, March 14, 2007. Specifically, in the NRC audit report ML081630579 for the said document, Section 3.4.1 (page 59) states:

> "The NRC staff's SE of NEDC-32694P-A (Reference 19 of NEDC-33270P) provides four actions to follow whenever a new fuel design is introduced. These four conditions are listed in Section 3.0 of the SE. The analysis and evaluation of the GNF2 fuel design was evaluated in accordance with the limitations and conditions stated in the NRC staff's SE, and is acceptable."

GNF's position is that GNF2 is an evolutionary fuel product based on GE14. It is not considered a new fuel design as it maintains the previously established 10x10 array and two water rod makeup, as stated by the NRC audit report ML081630579, Section 3.4.2.2.1 (page 59):

> "The NRC staff finds that the calculational methods, evaluations and applicability of the OLMCPR and SLMCPR are in accordance with existing NRC-approved methods and thus valid for use with GNF2 fuel."

As such, no new GNF fuel designs are being introduced in Peach Bottom Unit 3 Cycle 21; therefore, the NEDC-32505P-A statement "…if new fuel is introduced, GENE must confirm that the revised R-Factor method is still valid based on new test data" is not applicable.

2.6. Minimum Core Flow Condition

For Peach Bottom Unit 3 Cycle 21, the most limiting SLMCPR calculation occurred at the 78.8% rated power/55.0% rated flow point. At low core flows, the search spaces for the limiting rod pattern and the nominal rod pattern are essentially the same. Additionally, the condition that MIP [[ ]] establishes a reasonably bounding limiting rod pattern. Hence, the rod pattern used to calculate the SLMCPR at 78.8% rated power/55.0% rated flow reasonably assures that at least 99.9% of the fuel rods in the core would not be expected to

experience boiling transition during normal operation or anticipated operational occurrences (AOOs) during the operation of Peach Bottom Unit 3 Cycle 21. Consequently, the SLMCPR value calculated from the 78.8% rated power/55.0% rated core flow condition limiting MCPR distribution reasonably bounds this mode of operation for Peach Bottom Unit 3 Cycle 21.

2.7. Limiting Control Rod Patterns

The limiting control rod patterns used to calculate the SLMCPR reasonably assure that at least 99.9% of the fuel rods in the core would not be expected to experience boiling transition during normal operation or AOOs during the operation of Peach Bottom Unit 3 Cycle 21.

2.8. Core Monitoring System

For Peach Bottom Unit 3 Cycle 21, the 3DMONICORE system will be used as the core monitoring system.

2.9. Power/Flow Map

The utility has provided the current and previous cycle power/flow map in a separate document.

2.10. Core Loading Diagram

Figures 1 and 2 provide the core-loading diagram for the current and previous cycle respectively, which are the Reference Loading Pattern, as defined by NEDE-24011-P-A. Table 1 provides a description of the core.

2.11. Figure References

Figure 3 is Figure 4.1 from NEDC-32601P-A. Figure 4 is Figure III.5-1 from NEDC-32601P-A. Figure 5 is based on Figure III.5-2 from NEDC-32601P-A, and has been updated with GE14 and GNF2 data.

2.12. Additional SLMCPR Licensing Conditions

For Peach Bottom Unit 3 Cycle 21, the additional SLMCPR licensing condition that the SLMCPR shall be established by adding 0.02 (Reference 10) to the cycle-specific SLMCPR value calculated using the NRC-approved methodologies documented in NEDE-24011-P-A has been applied (see Table 3).

2.13. 10 CFR 21 Evaluation

There are no known 10 CFR 21 factors that affect the Peach Bottom Unit 3 Cycle 21 SLMCPR calculations.

2.14. Summary

The requested changes to the Technical Specification SLMCPR values are 1.15 for TLO and 1.15 for SLO for Peach Bottom Unit 3 Cycle 21. These values bound the calculated results for Peach Bottom Unit 3 Cycle 21.

3.0 References

1. Letter, Glen A. Watford (GNF-A) to NRC 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.

2. Letter, Glen A. Watford (GNF-A) to NRC Document Control Desk with attention to Joseph E. Donoghue (NRC), "Confirmation of the 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.

3. Letter, Glen A. Watford (GNF-A) to NRC Document Control Desk with attention to Joseph E. Donoghue (NRC), "Final Presentation Material for GEXL Presentation – February 11, 2002," FLN-2002-004, February 12, 2002.

4. Letter, John F. Schardt (GNF-A) to NRC Document Control Desk with attention to Mel B. Fields (NRC), "Shadow Corrosion Effects on SLMCPR Channel Bow Uncertainty," FLN-2004-030, November 10, 2004.

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60									16	22	22	22	23	23	11	23	23	16	16	16	22	16								
58								21	24	11	26	29	29	3	24	23	3	29	29	26	23	24	21							
56						22	22	11	22	36	25	36	25	36	26	26	36	25	36	25	36	22	23	22	22					
54						22	23	3	36	32	32	35	32	35	33	33	35	32	35	32	32	36	3	22	22					
52					16	23	26	32	33	34	25	31	25	31	4	4	31	25	31	25	34	33	32	26	11	22				
50			22	16	22	25	32	32	34	28	35	29	31	29	31	31	29	31	29	35	28	34	32	32	25	23	16	22		
48			22	23	26	32	3	34	3	35	34	34	3	31	26	26	31	3	34	34	35	3	34	3	32	26	23	22		
46		21	16	3	32	32	34	3	35	3	34	4	35	25	38	38	25	35	4	34	3	35	3	34	32	32	3	22	21	
44	22	24	22	36	33	34	3	35	29	39	29	35	34	34	3	3	34	34	35	29	39	29	35	3	34	33	36	22	23	16
42	23	23	36	32	34	28	35	3	39	26	35	4	39	26	31	31	26	39	4	35	26	39	3	35	28	34	32	36	23	22
40	16	29	25	32	25	35	34	34	29	35	25	38	30	31	25	25	31	30	38	25	35	29	34	34	35	25	32	25	26	22
38	16	29	36	35	31	29	34	4	35	4	38	25	35	27	37	37	27	35	25	38	4	35	4	34	29	31	35	36	29	22
36	23	26	25	32	25	31	3	35	34	39	30	35	29	37	3	3	37	29	35	30	39	34	35	3	31	25	32	25	29	16
34	22	3	36	35	31	29	31	25	34	26	31	27	37	26	35	35	26	37	27	31	26	34	25	31	29	31	35	36	3	24
32	16	24	26	33	4	31	26	38	3	31	25	37	3	35	25	25	35	3	37	25	31	3	38	26	31	4	33	26	24	24
30	23	24	26	33	4	31	26	38	3	31	25	37	3	35	25	25	35	3	37	25	31	3	38	26	31	4	33	26	23	23
28	23	3	36	35	31	29	31	25	34	26	31	27	37	26	35	35	26	37	27	31	26	34	25	31	29	31	35	36	3	24
26	23	29	25	32	25	31	3	35	34	39	30	35	29	37	3	3	37	29	35	30	39	34	35	3	31	25	32	25	29	16
24	22	29	36	35	31	29	34	4	35	4	38	25	35	27	37	37	27	35	25	38	4	35	4	34	29	31	35	36	29	22
22	16	26	25	32	25	35	34	34	29	35	25	38	30	31	25	25	31	30	38	25	35	29	34	34	35	25	32	25	26	16
20	22	11	36	32	34	28	35	3	39	26	35	4	39	26	31	31	26	39	4	35	26	39	3	35	28	34	32	36	23	22
18	16	24	22	36	33	34	3	35	29	39	29	35	34	34	3	3	34	34	35	29	39	29	35	3	34	33	36	22	24	16
16		21	23	3	32	32	34	3	35	3	34	4	35	25	38	38	25	35	4	34	3	35	3	34	32	32	3	22	21	
14			22	16	26	32	3	34	3	35	34	34	3	31	26	26	31	3	34	34	35	3	34	3	32	26	23	22		
12			22	16	23	25	32	32	34	28	35	29	31	29	31	31	29	31	29	35	28	34	32	32	25	16	22	22		
10					22	11	26	32	33	34	25	31	25	31	4	4	31	25	31	25	34	33	32	26	11	22				
8						22	23	3	36	32	32	35	32	35	33	33	35	32	35	32	32	36	3	22	16					
6						22	16	22	22	36	25	36	25	36	26	26	36	25	36	25	36	22	23	16	22					
4								21	24	23	26	29	29	3	24	23	3	29	29	26	23	24	21							
2									16	22	22	22	22	23	16	23	24	11	22	22	23	16								
	1	3	5	7	9	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

Fuel Type			
3=GNF2-P10DG2B403-8G7.0/4G6.0-100T2-150-T6-4236	(Cycle 20)	29=GNF2-P10DG2B393-15GZ-100T2-150-T6-4235	(Cycle 20)
4=GNF2-P10DG2B393-15GZ-100T2-150-T6-4235	(Cycle 20)	30=GNF2-P10DG2B403-8G7.0/4G6.0-100T2-150-T6-4236	(Cycle 20)
11=GNF2-P10DG2B395-14GZ-100T2-150-T6-3991	(Cycle 19)	31=GNF2-P10DG2B409-14GZ-100T2-150-T6-4365	(Cycle 21)
16=GNF2-P10DG2B390-4G8.0/8G7.0/2G6.0-100T2-150-T6-3992	(Cycle 19)	32=GNF2-P10DG2B417-12G7.0-100T2-150-T6-4366	(Cycle 21)
21=GNF2-P10DG2B399-13GZ-100T2-150-T6-3993	(Cycle 19)	33=GNF2-P10DG2B417-12G7.0-100T2-150-T6-4366	(Cycle 21)
22=GNF2-P10DG2B404-13GZ-100T2-150-T6-3994	(Cycle 19)	34=GNF2-P10DG2B402-15GZ-100T2-150-T6-4367	(Cycle 21)
23=GNF2-P10DG2B390-4G8.0/8G7.0/2G6.0-100T2-150-T6-3992	(Cycle 19)	35=GNF2-P10DG2B402-15GZ-100T2-150-T6-4367	(Cycle 21)
24=GNF2-P10DG2B404-13GZ-100T2-150-T6-3994	(Cycle 19)	36=GNF2-P10DG2B424-12G7.0-100T2-150-T6-4368	(Cycle 21)
25=GNF2-P10DG2B400-13GZ-100T2-150-T6-4232	(Cycle 20)	37=GNF2-P10DG2B408-14GZ-100T2-150-T6-4369	(Cycle 21)
26=GNF2-P10DG2B393-4G8.0/8G7.0/2G6.0-100T2-150-T6-4233	(Cycle 20)	38=GNF2-P10DG2B403-14GZ-100T2-150-T6-4370	(Cycle 21)
27=GNF2-P10DG2B400-13GZ-100T2-150-T6-4232	(Cycle 20)	39=GNF2-P10DG2B409-14GZ-100T2-150-T6-4365	(Cycle 21)
28=GNF2-P10DG2B393-4G8.0/8G7.0/2G6.0-100T2-150-T6-4233	(Cycle 20)		

Figure 1. Current Cycle Core Loading Diagram

60									9	7	1	18	7	10	2	10	2	6	7	1	10	6								
58								8	10	10	2	10	6	10	7	7	10	6	10	2	2	10	2							
56						1	10	8	8	6	10	10	23	16	11	11	16	23	8	10	6	8	2	2	1					
54						8	2	10	22	23	23	22	3	3	30	30	3	3	22	23	23	22	10	8	2					
52					2	2	2	24	24	3	21	3	3	3	16	16	3	3	3	21	3	24	24	10	8	2				
50			1	2	6	8	23	3	3	25	25	4	25	22	26	26	22	25	4	25	25	3	3	23	8	6	2	1		
48			2	8	9	23	22	27	21	25	16	25	22	25	16	16	25	22	25	16	25	21	27	22	23	9	8	9		
46		8	7	10	24	3	27	23	25	16	26	16	26	23	29	29	23	26	16	26	16	25	23	27	3	24	10	7	8	
44	9	6	8	22	24	3	21	25	22	28	22	25	16	29	16	16	29	16	25	22	28	22	25	21	3	24	22	8	6	2
42	7	10	8	23	3	25	25	16	28	16	26	22	29	16	4	4	16	29	22	26	16	28	16	25	25	3	23	2	10	7
40	1	8	8	23	21	25	16	26	22	26	22	29	11	26	16	16	26	11	29	22	26	22	26	16	25	21	23	8	8	1
38	7	8	2	22	3	4	25	16	25	22	29	16	26	23	29	29	23	26	16	29	22	25	16	25	4	3	22	8	8	7
36	2	8	23	3	3	25	22	26	16	29	11	26	22	29	23	23	29	22	26	11	29	16	26	22	25	3	3	23	8	10
34	2	10	16	3	3	22	25	23	29	16	26	23	29	16	4	4	16	29	23	26	16	29	23	25	22	3	3	16	10	7
32	2	6	11	30	16	26	16	29	16	4	16	29	23	4	16	16	4	23	29	16	4	16	29	16	26	16	30	11	6	2
30	2	6	11	30	16	26	16	29	16	4	16	29	23	4	16	16	4	23	29	16	4	16	29	16	26	16	30	11	6	2
28	2	10	16	3	3	22	25	23	29	16	26	23	29	16	4	4	16	29	23	26	16	29	23	25	22	3	3	16	10	2
26	1	8	23	3	3	25	22	26	16	29	11	26	22	29	23	23	29	22	26	11	29	16	26	22	25	3	3	23	8	1
24	18	10	8	22	3	4	25	16	25	22	29	16	26	23	29	29	23	26	16	29	22	25	16	25	4	3	22	8	8	7
22	10	2	10	23	21	25	16	26	22	26	22	29	11	26	16	16	26	11	29	22	26	22	26	16	25	21	23	8	8	10
20	7	8	2	23	3	25	25	16	28	16	26	22	29	16	4	4	16	29	22	26	16	28	16	25	25	3	23	2	10	2
18	9	6	8	22	24	3	21	25	22	28	22	25	16	29	16	16	29	16	25	22	28	22	25	21	3	24	22	8	2	2
16		8	7	10	24	3	27	23	25	16	26	16	26	23	29	29	23	26	16	26	16	25	23	27	3	24	10	7	8	
14			2	8	2	23	22	27	21	25	16	25	22	25	16	16	25	22	25	16	25	21	27	22	23	2	8	2		
12			1	2	6	8	23	3	3	25	25	4	25	22	26	26	22	25	4	25	25	3	3	23	2	2	6	1		
10					10	2	10	24	24	3	21	3	3	3	16	16	3	3	3	21	3	24	24	2	2	2				
8						2	2	10	22	23	23	22	3	3	30	30	3	3	22	23	23	22	10	10	2					
6						1	2	8	8	6	10	9	23	16	11	11	16	23	10	8	6	8	8	2	1					
4								8	10	10	2	10	6	10	7	7	10	6	10	6	2	10	8							
2									9	7	1	7	6	2	2	2	10	6	7	1	7	2								
	1	3	5	7	9	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

Fuel Type			
1=GE14-P10DNAB416-15GZ-100T-150-T6-2908	(Cycle 18)	18=GE14-P10DNAB403-15GZ-100T-150-T6-3003	(Cycle 18)
2=GE14-P10DNAB408-15GZ-100T-150-T6-3213	(Cycle 18)	21=GNF2-P10DG2B399-13GZ-100T2-150-T6-3993	(Cycle 19)
3=GNF2-P10DG2B403-8G7.0/4G6.0-100T2-150-T6-4236	(Cycle 20)	22=GNF2-P10DG2B404-13GZ-100T2-150-T6-3994	(Cycle 19)
4=GNF2-P10DG2B393-15GZ-100T2-150-T6-4235	(Cycle 20)	23=GNF2-P10DG2B390-4G8.0/8G7.0/2G6.0-100T2-150-T6-3992	(Cycle 19)
6=GE14-P10DNAB414-14GZ-100T-150-T6-3200	(Cycle 18)	24=GNF2-P10DG2B404-13GZ-100T2-150-T6-3994	(Cycle 19)
7=GE14-P10DNAB403-15GZ-100T-150-T6-3003	(Cycle 18)	25=GNF2-P10DG2B400-13GZ-100T2-150-T6-4232	(Cycle 20)
8=GE14-P10DNAB417-15GZ-100T-150-T6-3199	(Cycle 18)	26=GNF2-P10DG2B393-4G8.0/8G7.0/2G6.0-100T2-150-T6-4233	(Cycle 20)
9=GE14-P10DNAB408-15GZ-100T-150-T6-3213	(Cycle 18)	27=GNF2-P10DG2B400-13GZ-100T2-150-T6-4232	(Cycle 20)
10=GE14-P10DNAB420-13GZ-100T-150-T6-3198	(Cycle 18)	28=GNF2-P10DG2B393-4G8.0/8G7.0/2G6.0-100T2-150-T6-4233	Cycle 20)
11=GNF2-P10DG2B395-14GZ-100T2-150-T6-3991	(Cycle 19)	29=GNF2-P10DG2B393-15GZ-100T2-150-T6-4235	(Cycle 20)
16=GNF2-P10DG2B390-4G8.0/8G7.0/2G6.0-100T2-150-T6-3992	(Cycle 19)	30=GNF2-P10DG2B403-8G7.0/4G6.0-100T2-150-T6-4236	(Cycle 20)

Figure 2. Previous Cycle Core Loading Diagram

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Figure 3. Figure 4.1 from NEDC-32601P-A

[[

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Figure 4. Figure III.5-1 from NEDC-32601P-A

[[

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Figure 5. Relationship Between MIP and CPR Margin

Table 1. Description of Core

Description	Previous Cycle Rated Power Minimum Core Flow Limiting Case	Previous Cycle Rated Power Rated Core Flow Limiting Case	Current Cycle Off-Rated Power Off-Rated Core Flow Limiting Case	Current Cycle Rated Power Minimum Core Flow Limiting Case	Current Cycle Rated Power Rated Core Flow Limiting Case	Current Cycle Rated Power Increased Core Flow Limiting Case
Number of Bundles in the Core	764		764			
Limiting Point (i.e., Beginning of Cycle (BOC)/Middle of Cycle (MOC)/End of Cycle (EOC))	EOC	EOC	MOC	EOC	EOC	EOC
Cycle Exposure at Limiting Point (MWd/STU)	12,400	12,400	8,100	14,550	14,550	14,550
% Rated Core Power	100.0	100.0	78.8	100.0	100.0	100.0
% Rated Core Flow	82.8	100.0	55.0	83.0	100.0	110.0
Reload Fuel Type	GNF2		GNF2			
Latest Reload Batch Fraction, %	35.6		45.0			
Latest Reload Average Batch, Wt% Enrichment	3.97		4.09			
Core Fuel, % GNF2 GE14	 70.7 29.3		 100.0 ---			
Core Average Wt% Enrichment	4.01		4.02			

Table 2. SLMCPR Calculation Methodologies

Description	Previous Cycle	Current Cycle
Non-Power Distribution Uncertainty	NEDC-32601P-A	NEDC-32601P-A
Power Distribution Methodology	NEDC-32601P-A	NEDC-32601P-A
Power Distribution Uncertainty	NEDC-32694P-A	NEDC-32694P-A
Core Monitoring System	3DMONICORE	3DMONICORE
R-Factor Calculation Methodology	NEDC-32505P-A	NEDC-32505P-A

Table 3. Monte Carlo Calculated SLMCPR vs. Estimate

Description	Previous Cycle Rated Power Minimum Core Flow Limiting Case	Previous Cycle Rated Power Rated Core Flow Limiting Case	Current Cycle Off-Rated Power Off-rated Core Flow Limiting Case	Current Cycle Rated Power Minimum Core Flow Limiting Case	Current Cycle Rated Power Rated Core Flow Limiting Case	Current Cycle Rated Power Increased Core Flow Limiting Case
[[						
						]]

Table 3. Monte Carlo Calculated SLMCPR vs. Estimate

Description	Previous Cycle Rated Power Minimum Core Flow Limiting Case	Previous Cycle Rated Power Rated Core Flow Limiting Case	Current Cycle Off-Rated Power Off-rated Core Flow Limiting Case	Current Cycle Rated Power Minimum Core Flow Limiting Case	Current Cycle Rated Power Rated Core Flow Limiting Case	Current Cycle Rated Power Increased Core Flow Limiting Case
Calculated Monte Carlo TLO SLMCPR	[[	]]	1.119	1.093	1.074	1.074
[[						]]
Additional SLMCPR Licensing Conditions	[[	]]	0.02 [1]	0.02 [1]	0.02 [1]	0.02 [1]
Requested Change to the Technical Specification SLMCPR	N/A		1.15 (TLO) / 1.15 (SLO)			
[[						
						]]

Note: MELLLA+

Table 4. Non-Power Distribution Uncertainties

Description	Nominal (NRC-Approved) Value ± σ (%)	Previous Cycle Rated Power Minimum Core Flow Limiting Case	Previous Cycle Rated Power Rated Core Flow Limiting Case	Current Cycle Off-Rated Power Off-Rated Core Flow Limiting Case	Current Cycle Rated Power Minimum Core Flow Limiting Case	Current Cycle Rated Power Rated Core Flow Limiting Case	Current Cycle Rated Power Increased Core Flow Limiting Case
GETAB							
Feedwater Flow Measurement	1.76	N/A	N/A	N/A	N/A	N/A	N/A
Feedwater Temperature Measurement	0.76	N/A	N/A	N/A	N/A	N/A	N/A
Reactor Pressure Measurement	0.50	N/A	N/A	N/A	N/A	N/A	N/A
Core Inlet Temperature Measurement	0.20	N/A	N/A	N/A	N/A	N/A	N/A
Total Core Flow Measurement	2.5 TLO 6.0 SLO	N/A	N/A	N/A	N/A	N/A	N/A
Channel Flow Area Variation	3.0	N/A	N/A	N/A	N/A	N/A	N/A
Friction Factor Multiplier	10.0	N/A	N/A	N/A	N/A	N/A	N/A

Table 4. Non-Power Distribution Uncertainties

Description	Nominal (NRC-Approved) Value ± σ (%)	Previous Cycle Rated Power Minimum Core Flow Limiting Case	Previous Cycle Rated Power Rated Core Flow Limiting Case	Current Cycle Off-Rated Power Off-Rated Core Flow Limiting Case	Current Cycle Rated Power Minimum Core Flow Limiting Case	Current Cycle Rated Power Rated Core Flow Limiting Case	Current Cycle Rated Power Increased Core Flow Limiting Case
Channel Friction Factor Multiplier	5.0	N/A	N/A	N/A	N/A	N/A	N/A
NEDC-32601P-A							
Feedwater Flow Measurement	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]
Feedwater Temperature Measurement	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]
Reactor Pressure Measurement	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]
Core Inlet Temperature Measurement	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Total Core Flow Measurement	2.5 TLO 6.0 SLO	3.02 TLO 6.0 SLO	2.5 TLO 6.0 SLO	6.0 TLO	6.0 TLO	2.5 TLO 6.0 SLO	2.5 TLO 6.0 SLO
Channel Flow Area Variation	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]

Table 4. Non-Power Distribution Uncertainties

Description	Nominal (NRC-Approved) Value ± σ (%)	Previous Cycle Rated Power Minimum Core Flow Limiting Case	Previous Cycle Rated Power Rated Core Flow Limiting Case	Current Cycle Off-Rated Power Off-Rated Core Flow Limiting Case	Current Cycle Rated Power Minimum Core Flow Limiting Case	Current Cycle Rated Power Rated Core Flow Limiting Case	Current Cycle Rated Power Increased Core Flow Limiting Case
Friction Factor Multiplier	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]
Channel Friction Factor Multiplier	5.0	5.0	5.0	5.0	5.0	5.0	5.0

Table 5. Power Distribution Uncertainties

Description	**Nominal (NRC-Approved) Value ± σ (%)**	**Previous Cycle Rated Power Minimum Core Flow Limiting Case**	**Previous Cycle Rated Power Rated Core Flow Limiting Case**	**Current Cycle Off-Rated Power Off-Rated Core Flow Limiting Case**	**Current Cycle Rated Power Minimum Core Flow Limiting Case**	**Current Cycle Rated Power Rated Core Flow Limiting Case**	**Current Cycle Rated Power Increased Core Flow Limiting Case**
GETAB/NEDC-32601P-A							
GEXL R-Factor	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]
Random Effective TIP Reading	1.2 TLO 2.85 SLO	N/A	N/A	N/A	N/A	N/A	N/A
Systematic Effective TIP Reading	8.6	N/A	N/A	N/A	N/A	N/A	N/A
NEDC-32694P-A, 3DMONICORE							
GEXL R-Factor	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]
Random Effective TIP Reading	1.2 TLO 2.85 SLO	1.45 TLO 2.85 SLO	1.2 TLO 2.85 SLO	2.85 TLO	2.85 TLO	1.2 TLO 2.85 SLO	1.2 TLO 2.85 SLO
TIP Integral	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]

Table 5. Power Distribution Uncertainties

Description	Nominal (NRC-Approved) Value ± σ (%)	Previous Cycle Rated Power Minimum Core Flow Limiting Case	Previous Cycle Rated Power Rated Core Flow Limiting Case	Current Cycle Off-Rated Power Off-Rated Core Flow Limiting Case	Current Cycle Rated Power Minimum Core Flow Limiting Case	Current Cycle Rated Power Rated Core Flow Limiting Case	Current Cycle Rated Power Increased Core Flow Limiting Case
Four Bundle Power Distribution Surrounding TIP Location	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]
Contribution to Bundle Power Uncertainty Due to LPRM Update	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]
Contribution to Bundle Power Due to Failed TIP	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]
Contribution to Bundle Power Due to Failed LPRM	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]
Total Uncertainty in Calculated Bundle Power	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]

Table 5. Power Distribution Uncertainties

Description	Nominal (NRC-Approved) Value ± σ (%)	Previous Cycle Rated Power Minimum Core Flow Limiting Case	Previous Cycle Rated Power Rated Core Flow Limiting Case	Current Cycle Off-Rated Power Off-Rated Core Flow Limiting Case	Current Cycle Rated Power Minimum Core Flow Limiting Case	Current Cycle Rated Power Rated Core Flow Limiting Case	Current Cycle Rated Power Increased Core Flow Limiting Case
Uncertainty of TIP Signal Nodal Uncertainty	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]	[[ ]]

Table 6. Critical Power Uncertainties

Description	Nominal Value ± σ (%)	Previous Cycle Rated Power Minimum Core Flow Limiting Case	Previous Cycle Rated Power Rated Core Flow Limiting Case	Current Cycle Off-Rated Power Off-Rated Core Flow Limiting Case	Current Cycle Rated Power Minimum Core Flow Limiting Case	Current Cycle Rated Power Rated Core Flow Limiting Case	Current Cycle Rated Power Increased Core Flow Limiting Case
GETAB							
GE11	[[						
GE14							
GNF2							]]
NEDC-32694P-A, 3DMONICORE							
GE11	[[						
GE14							
GNF2							]]

ATTACHMENT 6

GNF Affidavit in Support of Withholding Information

Global Nuclear Fuel – Americas
AFFIDAVIT

I, Lukas Trosman, state as follows:

(1) I am Engineering Manager, Reload Design and Analysis, Global Nuclear Fuel – Americas, LLC (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 GNF-A proprietary report 002N5030 R1-P, *GNF Additional Information Regarding the Requested Changes to the Technical Specification SLMCPR, Peach Bottom Unit 3 Cycle 21*, Revision 0, March 16, 2015. GNF-A proprietary information in 002N5030 R1-P, *GNF Additional Information Regarding the Requested Changes to the Technical Specification SLMCPR, Peach Bottom Unit 3 Cycle 21*, Revision 0, March 16, 2015, is identified by a dotted underline placed within double square brackets. [[This sentence is an example.{3}]] GNF-A proprietary information in figures and some tables is identified with double square brackets before and after the object. In each case, the superscript notation {3} refers to Paragraph (3) of this affidavit, which provides the basis for the proprietary determination.

(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 2.390(a)(4) for "trade secrets" (Exemption 4). The material for which exemption from disclosure is here sought 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, 975 F2d 871 (DC Cir. 1992), and Public Citizen Health Research Group v. FDA, 704 F2d 1280 (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 aspects of past, present, or future GNF-A customer-funded development plans and programs, resulting in potential products to GNF-A;

d. 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) To address 10 CFR 2.390 (b) (4), 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. 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. Its initial designation as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in paragraphs (6) and (7) following.

(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.

(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 this methodology, along with the testing, development and approval was achieved at a significant cost to GNF-A.

The development of the fuel design and licensing methodology along with the interpretation and application of the analytical results is derived from an extensive experience database that constitutes a major GNF-A asset.

(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 information 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.

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 is true and correct.

Executed on this 12th day of March 2015.

Lukas Trosman
Engineering Manager, Reload Design and Analysis
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ATTACHMENT 7

Power/Flow Map for Cycle 21 with MELLLA+ Operating Domain

PBAPS Unit 3 Power to Flow Map with MELLLA+ Conditions

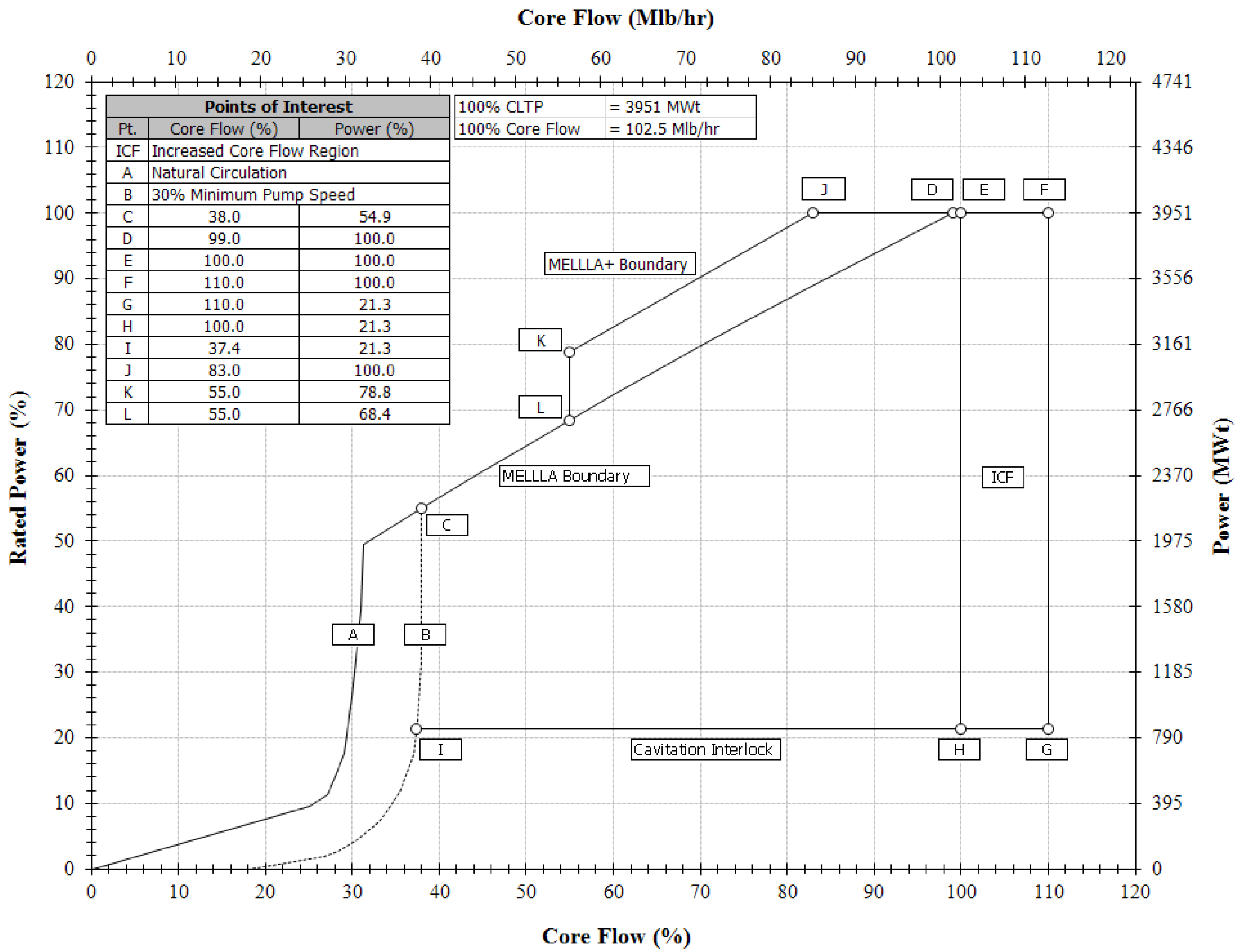

Figure 1-1 Power/Flow Operating Map for MELLLA+